WARNING

Servicing a vehicle can be dangerous. If you have not received service-related training, the risks of injury and property damage increase. The recommended servicing procedures for the vehicle in this workshop manual were developed with Mazda-trained technicians in mind. This manual may be useful to non-Mazda trained technicians, but a technician with our service-related training and experience will be at less risk when performing servicing operations. However, all users of this manual are expected to know general safety procedures.

This manual contains "Warnings" and "Cautions" applicable to risks not normally encountered in a general technician's experience. They should be followed to reduce the risk of injury and the risk that improper service or repair may damage the vehicle or render it unsafe. It is also important to understand that the "Warnings" and "Cautions" are not exhaustive. It is impossible to warn of all the hazardous consequences that might result from failure to follow the procedures.

The procedures recommended and described in this manual are effective methods of performing service and repair. Some require tools specifically designed for a specific purpose. Nonrecommended procedures and tools should include consideration for safety of the technician and continued safe operation of the vehicle.

Parts should be replaced with genuine Mazda replacement parts, not parts of lesser quality. Use of a nonrecommended replacement part should include consideration for safety of the technician and continued safe operation of the vehicle.

VEHICLE IDENTIFICATION NUMBERS (VIN)

626

1YV GE22C*T5 500001—
1YV GE22D*T5 500001—

MX-6

1YV GE31C*T5 500001—
1YV GE31D*T5 500001—

1996 Mazda 626/MX-6 Workshop Manual

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*** Refer to the 1996 626/MX-6 Body Electrical Troubleshooting Manual (Form No.1493–10–95F, Part No.9999–95–084F–96) for servicing of the body electrical components.**

FOREWORD

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.

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.

Mazda Motor Corporation
HIROSHIMA, JAPAN

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

PRINTED IN THE U.S.A. JUNE, '95
Form No.1492–10–95F
Part No.9999–95–019B–96

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SAFETY INFORMATION

LUBRICANTS

Avoid prolonged and repeated contact with petroleum-based oils. Used oil may irritate the skin, and can cause skin cancer and other skin disorders.
Wash thoroughly after working with oil. We recommend water soluble hand cleaners. Do not use kerosene, gasoline, or any other solvent, to remove oil from your skin.
If repeated or prolonged contact with oil is necessary, wear protective clothing. Soiled clothing, particularly those soiled with used oils and greases containing lead, should be cleaned at regular intervals.

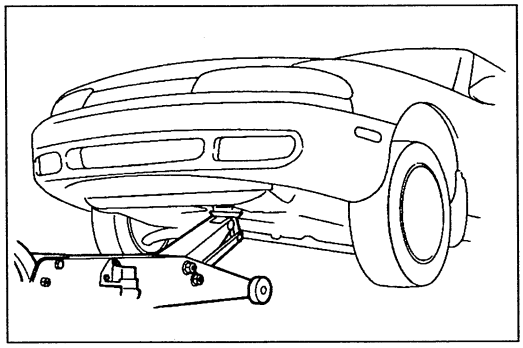
JACKING POSITIONS

Warning

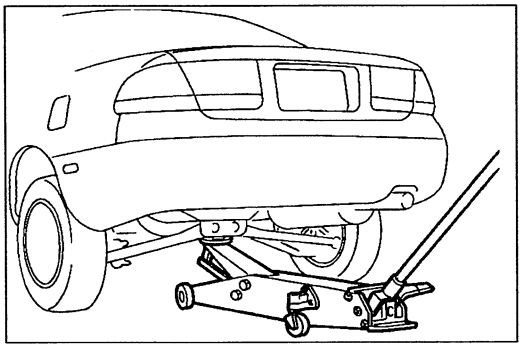
- **Improperly jacking a vehicle is dangerous. The vehicle can slip off the jack and cause serious injury. Use only the correct front and rear jacking positions and block the wheels.**

Use safety stands to support the vehicle after it has been lifted.

Front
At the center of the crossmember

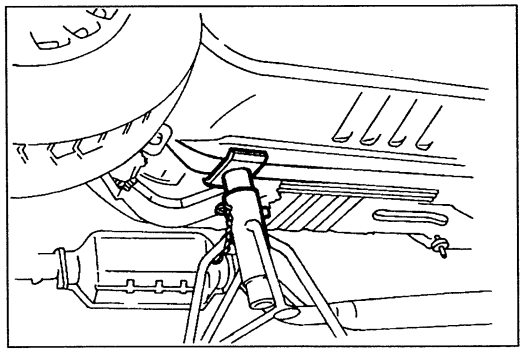


Rear
At the center of the crossmember

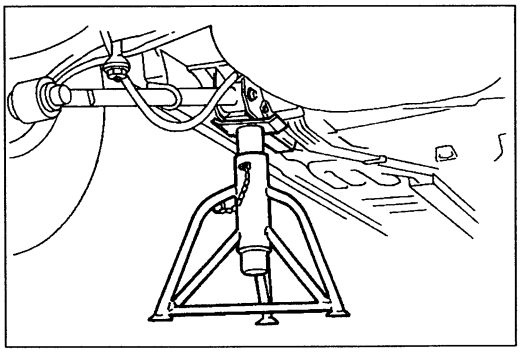


SAFETY STAND POSITIONS

Front
Both sides of the vehicle

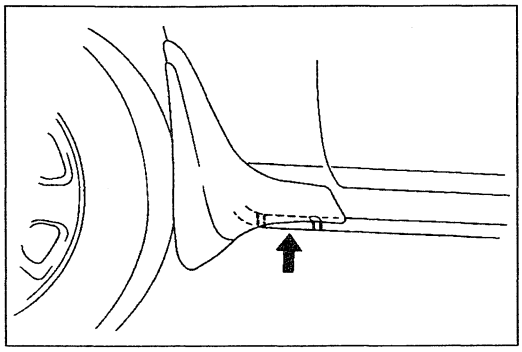


Rear
Both sides of the vehicle

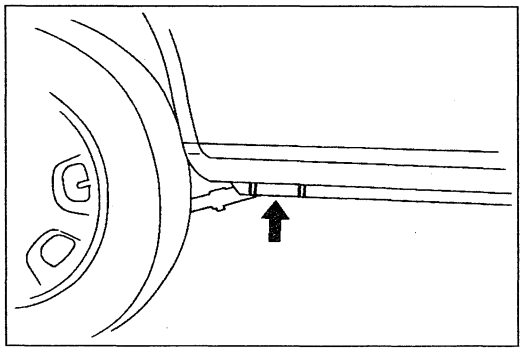


VEHICLE LIFT POSITIONS

Front
Both sides of the side sill



Rear
Both sides of the side sill



DYNAMOMETER

When test-running a vehicle on a dynamometer:

- Place a fan, preferably a vehicle-speed proportional type, in front of the vehicle.
- Connect an exhaust gas ventilation unit.
- Cool the exhaust pipes with a fan.
- Keep the area around the vehicle uncluttered.
- Watch the water temperature gauge.

COMPRESSED AIR

When using compressed air to clean or remove parts:

- Wear protective eye wear.
- Hold a rag over the opening to prevent parts from shooting out.
- Take precautions so that people around you are not struck by flying debris.

HOW TO USE THIS MANUAL

ADVISORY MESSAGES

You'll find several **Warnings**, **Cautions**, and **Notes** in this manual.

Warning

- **A Warning indicates a situation in which serious injury or death could result if the warning is ignored.**

Caution

- **A Caution indicates a situation in which damage to the vehicle could result if the caution is ignored.**

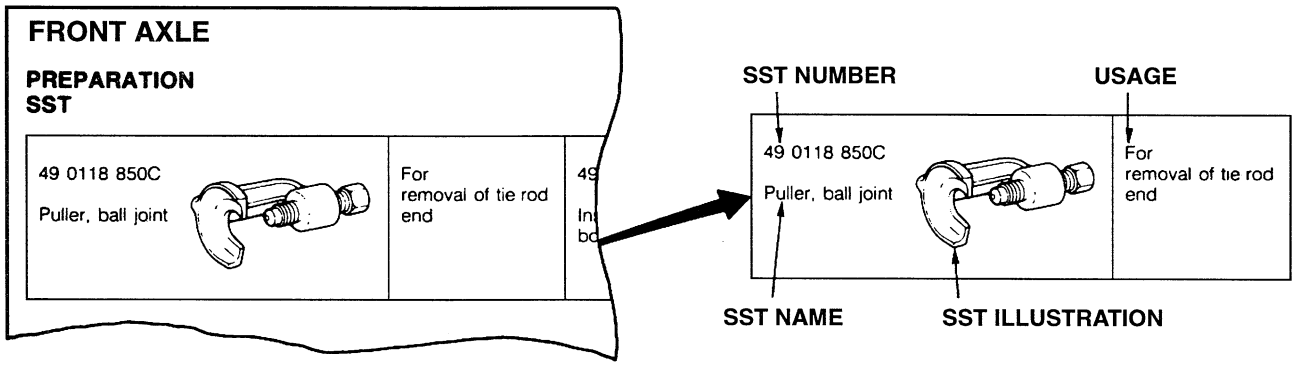
Note

- A **Note** provides added information that will help you to complete a particular procedure.

PREPARATION

This points out the needed **SSTs** for the service operation. It is best to gather all necessary **SSTs** before beginning work.

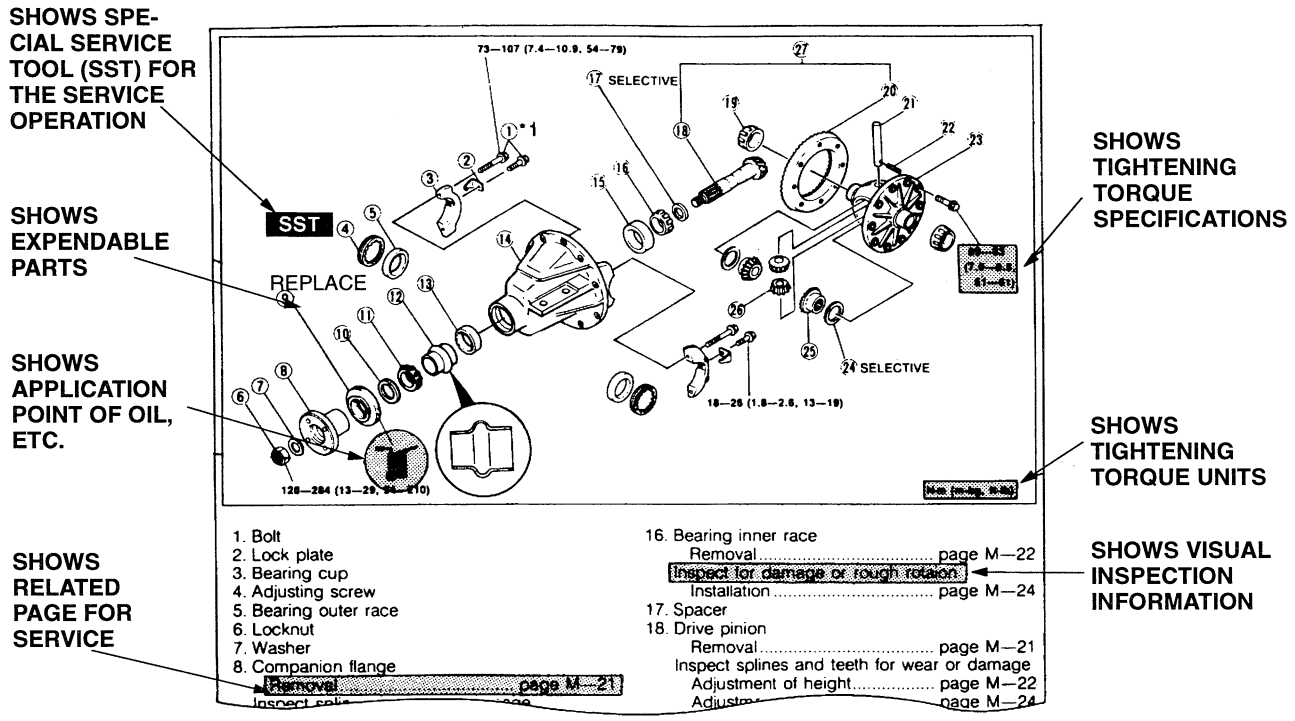
Example:



REPAIR PROCEDURE

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

Example:



*1: The numbers (①, etc.) refer to part identification and servicing procedures.

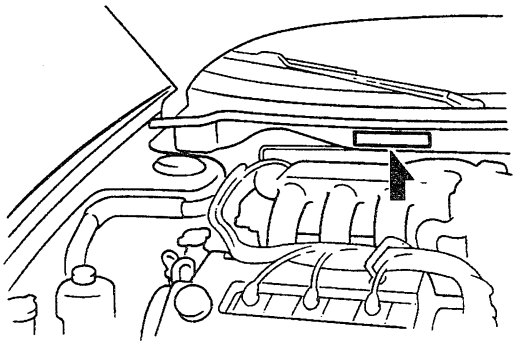
SYMBOLS

There are six symbols indicating oil, grease, and sealant. These symbols show the points of applying such materials during service.

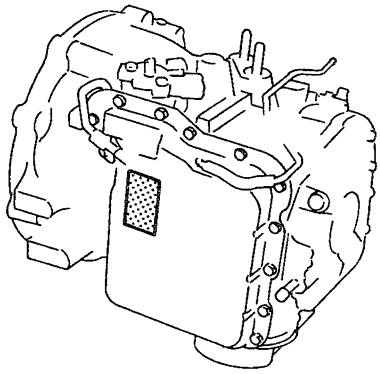
Symbol	Meaning	Kind
OIL	Apply oil	New engine oil or gear oil as appropriate
BRAKE FLUID	Apply brake fluid	FMVSS116: DOT–3
ATF	Apply automatic transaxle fluid	M–III or Dexron®II
GREASE	Apply grease	Appropriate grease
SEALANT	Apply sealant	Appropriate sealant
P	Apply petroleum jelly	Appropriate petroleum jelly

IDENTIFICATION NUMBER LOCATIONS

VEHICLE IDENTIFICATION NUMBER (VIN)

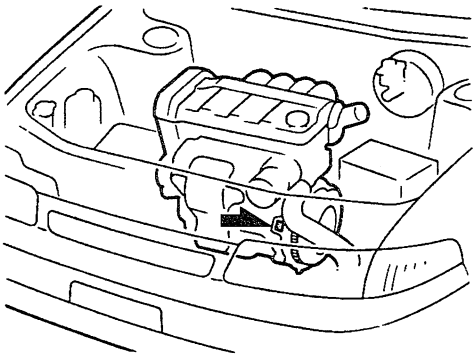


AUTOMATIC TRANSAXLE MODEL AND NUMBER

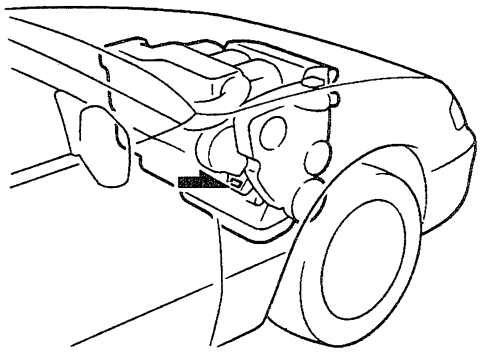


ENGINE MODEL AND NUMBER

FS ENGINE



KL ENGINE



UNITS

Electrical current	A (ampere)
Electric potential	V (volt)
Electric power	W (watt)
Length	mm (millimeter) in (inch)
Negative pressure	kPa (kilo Pascal) mmHg (millimeters of mercury) inHg (inches of mercury)
Positive pressure	kPa (kilo Pascal) kgf/cm^2 (kilogram force per square centimeter) psi (pounds per square inch)
Resistance	Ω (ohm)
Torque	N·m (Newton meter) kgf·m (kilogram force per meter) kgf·cm (kilogram force per centimeter) ft·lbf (foot pound) in·lbf (inch pound)
Volume	L (liter) US qt (U.S. quart) Imp qt (Imperial quart) ml (milliliter) cc (cubic centimeter) cu in (cubic inch) fl oz (fluid ounce)
Weight	g (gram) oz(ounce)

Conversion to SI Units (Système International d'Unités)

All numerical values in this manual are based on SI units. Numbers shown in conventional units are converted from these values.

Rounding off

Converted values are rounded off to the same number of places are the SI unit value. For example, if the SI unit value is 17.2 and the value after conversion is 37.84, the converted value will be rounded off to 37.8.

Upper and lower limits

When the data indicates upper and lower limits, the converted values are rounded down if the SI unit value is an upper limit and rounded up if the SI unit value is a lower limit. Therefore, converted values for the same SI unit value may differ after conversion. For example, consider 2.7 kgf/cm^2 in the following specifications:

- 210—260 kPa {2.1—2.7 kgf/cm^2, 30—38 psi}
- 270—310 kPa {2.7—3.2 kgf/cm^2, 39—45 psi}

The actual converted values for 2.7 kgf/cm^2 are 264 kPa and 38.4 psi. In the top specification, 2.7 is used as an upper limit, so its converted values are rounded down to 260 and 38. In the bottom specification, 2.7 is used as a lower limit, so its converted values are rounded up to 270 and 39.

ABBREVIATIONS

ABDC	After bottom dead center
ABS	Antilock brake system
ACC	Accessory
A/CP SW	A/C pressure switch
ATDC	After top dead center
ATF	Automatic transaxle fluid
ATFT	Transaxle fluid temperature
ATFT V	Transaxle fluid temperature signal voltage
ATX	Automatic transaxle
BAC	Bypass air control
BARO V	Barometric pressure signal voltage
BBDC	Before bottom dead center
BDC	Bottom dead center
BLR SW	Fan switch
BRK SW	Brake switch
BTDC	Before top dead center
CM	Control module
CTP SW	Closed throttle position switch
D range	Drive range
DEF SW	Rear window defroster switch
DRL	Daytime running light
D SW	Transaxle range switch (D range)
ECT V	Engine coolant temperature signal voltage
EGRBV	EGR boost sensor solenoid valve
EGRP V	EGR valve position signal voltage
EGRVAC	EGR solenoid valve (vacuum) duty value
EGRVENT	EGR solenoid valve (vent) duty value
ESPS	Engine speed sensing power steering
EX	Exhaust
FANC	Coolant fan control
FANCH	Coolant fan control (hi)
FANCN	Coolant fan, condenser fan control
FANNH	Condenser fan control (hi)
FHO2S	Heated oxygen sensor (front)
FHO2S L	Heated oxygen sensor (front LH)
FHO2S R	Heated oxygen sensor (front RH)
FHO2SH	Heated oxygen sensor heater (front)
FHO2SHL	Heated oxygen sensor heater (front LH)
FHO2SHR	Heated oxygen sensor heater (front RH)
FMEM	Failure mode effects management
HDL SW	Headlight switch
HLA	Hydraulic lash adjuster
HU	ABS hydraulic unit
IACV	Idle air control valve
IAT V	Intake air temperature signal voltage
IC	Integrated circuit
IDM	Ignition diagnostic monitor
IG	Ignition
IG SW	Ignition switch
IGT	Ignition timing
IN	Intake
INJ	Fuel injection duration
INJ L	Fuel injection duration (left bank)
INJ R	Fuel injection duration (right bank)
INJ#1	Fuel injector (cylinder No.1)
KAM	Keep alive memory
KOEO	Key on engine off
KOER	Key on engine running
KR	Knocking retard
LH	Left hand
LINE	LINE pressure solenoid valve duty value
L SW	Transaxle range switch (L or 1 range)
M	Motor
MAF RTN	Mass airflow return
MAF V	Mass air flow signal voltage
MTX	Manual transaxle
N position	Neutral position
NL SW	Neutral/clutch switch
O/D	Overdrive
O/DF LP	O/D OFF indicator light
O/DF SW	O/D OFF switch
P position	Park position
PCV	Positive crankcase ventilation
PRC	Pressure regulator control
PRCV	PRC solenoid valve
PRGV	Purge solenoid valve
P/S	Power steering
PWR GND	Power ground
R	Reverse
RH	Right hand
RHO2S	Heated oxygen sensor (rear)
RHO2S L	Heated oxygen sensor (rear LH)
RHO2S R	Heated oxygen sensor (rear RH)
RLY	Relay
RPM	Engine speed
R SW	Transaxle range switch (R position)
SAS	Sophisticated air bag sensor
SHIFT A	Shift solenoid A
SHIFT B	Shift solenoid B
SHIFT C	Shift solenoid C
SIG RTN	Signal return
SS1	Shift solenoid No.1
SS2	Shift solenoid No.2
SST	Special service tool
S SW	Transaxle range switch (S or 2 range)
SW	Switch
TCC CON	Torque converter clutch control solenoid valve
TEN	TEN terminal (Data link connector)
TFT	Transaxle fluid temperature
TNS	Tail number side lights
TP V	Throttle position sensor signal voltage
TSS	Turbine shaft speed
TURBINE	Input/turbine speed sensor
VAF V	Volume air flow signal voltage
VPWR	Vehicle power
VRIS	Variable inertia charging system
VRISV1	VRIS solenoid valve No.1
VRISV2	VRIS solenoid valve No.2
VS	Vehicle speed
1GR	First gear
2GR	Second gear
3–2T/CCS	3–2 timing/coasting clutch solenoid
3–2TIME	3–2 Timing solenoid valve

SAE STANDARDS

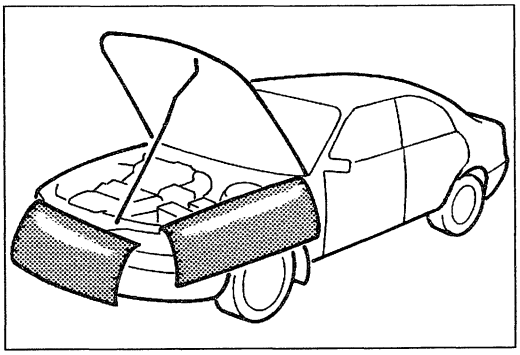
In accordance with new regulations, SAE (Society of Automotive Engineers) standard names and abbreviations are now used in this manual. The table below lists the names and abbreviations that have been used in Mazda manuals up to now and their SAE equivalents.

Previous Standard		SAE Standard		
Abbreviation	**Name**	**Abbreviation**	**Name**	**Remark**
—	Accelerator Pedal	AP	Accelerator Pedal	
—	Air Cleaner	ACL	Air Cleaner	
—	Air Conditioning	A/C	Air Conditioning	
—	Airflow Meter	VAF	Volume Air Flow Sensor	
—	Airflow Sensor	MAF	Mass Air Flow Sensor	
—	Alternator	GEN	Generator	
—	ATF Thermosensor	—	Transmission (Transaxle) Fluid Temperature Sensor	
—	Atmospheric Pressure	BARO	Barometric Pressure	
V_B	Battery Voltage	B+	Battery Positive Voltage	
—	Catalytic Converter	OC	Oxidation Catalytic Converter	
		TWC	Three-way Catalytic Converter	
		WU-TWC	Warm Up Three-way Catalytic Converter	#1
—	Circuit Opening Relay	FPR	Fuel Pump Relay	#2
—	Clutch Position	CPP	Clutch Pedal Position	
—	Crank Angle Sensor	CMP	Camshaft Position Sensor	
—	Crank Angle Sensor 2	CKP	Crankshaft Position Sensor	
—	Diagnosis Connector	DLC	Data Link Connector	
—	Diagnosis/Self-Diagnosis	OBD	On-Board Diagnostic	
—	Direct Ignition	DLI	Distributorless Ignition	
—	EC-AT Control Unit	TCM	Transmission (Transaxle) Control Module	
EGI	Electronic Gasoline Injection System	CIS	Continuous Fuel Injection System	
—	Electronic Spark Ignition	EI	Electronic Ignition	#3
ECU	Engine Control Unit	PCM	Powertrain Control Module	#4
		ECM	Engine Control Module	
—	Engine Modification	EM	Engine Modification	
—	Engine RPM Signal	—	Engine Speed Input Signal	
—	Evaporative Emission	EVAP	Evaporative Emission	
—	Exhaust Gas Recirculation	EGR	Exhaust Gas Recirculation	
—	Fan Control	FC	Fan Control	
—	Feedback System	CLS	Closed Loop System	
—	Flexible Fuel	FF	Flexible Fuel	
—	Fuel Pump	FP	Fuel Pump	
—	Fully Closed	CTP	Closed Throttle Position	
—	Fully Open	WOT	Wide Open Throttle	
—	Ground/Earth	GND	Ground	

#1: Directly connected to exhaust manifold
#2: In some models, there is a fuel pump relay that controls pump speed. That relay is now called the fuel pump relay (speed).
#3: Controlled by the ECM (PCM)
#4: Device that controls engine and powertrain

Previous Standard		SAE Standard		
Abbreviation	Name	Abbreviation	Name	Remark
—	IC Regulator	VR	Voltage Regulator	
—	Idle Speed Control	IAC	Idle Air Control	
—	Idle Switch	—	Closed Throttle Position Switch	
—	Igniter	ICM	Ignition Control Module	
—	Inhibitor Position	TR	Transmission (Transaxle) Range	
—	Intake Air Pressure	MAP	Manifold Absolute Pressure	
—	Intake Air Thermo	IAT	Intake Air Temperature	
—	Intercooler	CAC	Charge Air Cooler	
—	Knock Sensor	KS	Knock Sensor	
—	Line Pressure Solenoid Valve	—	Pressure Control Solenoid	
—	Lock-up Position	TCC	Torque Converter Clutch	
—	Malfunction Indicator Light	MIL	Malfunction Indicator Lamp	
—	Multiport Fuel Injection	MFI	Multiport Fuel Injection	
—	Open Loop	OL	Open Loop	
—	Overdrive	4GR	Fourth Gear	
—	Oxygen Sensor	HO2S	Heated Oxygen Sensor	With heater
		O2S	Oxygen Sensor	
—	Park/Neutral Range	PNP	Park/Neutral Position	
—	Power Steering Pressure	PSP	Power Steering Pressure	
—	Pulse Generator	—	Input/Turbine Speed Sensor	
—	Reed Valve	SAPV	Secondary Air Pulse Valve	
—	Secondary Air Injection System	PAIR	Pulsed Secondary Air Injection	Pulsed injection
		AIR	Secondary Air Injection	Inject with compressor
—	Sequential Fuel Injection	SFI	Sequential Multipoint Fuel Injection	
—	Service Code(s)	DTC	Diagnostic Trouble Code(s)	
—	Spark Ignition	DI	Distributor Ignition	
—	Stoplight Switch	—	Brake Switch	
—	Test Mode	DTM	Diagnostic Test Mode	#5
—	Throttle Body	TB	Throttle Body	
—	Throttle Sensor	TP	Throttle Position Sensor	
—	Turbocharger	TC	Turbocharger	
—	Vehicle Speed Sensor	VSS	Vehicle Speed Sensor	
—	Vehicle Speed Sensor 1	—	Output Speed Sensor	
—	Water Thermo	ECT	Engine Coolant Temperature	
—	1–2 Shift Solenoid Valve	—	Shift Solenoid A	
	Shift A Solenoid Valve			
—	2–3 Shift Solenoid Valve	—	Shift Solenoid B	
	Shift B Solenoid Valve			
—	3–4 Shift Solenoid Valve	—	Shift Solenoid C	
—	3rd Gear	3GR	Third Gear	
—	—	—	Incorrect Gear Ratio	

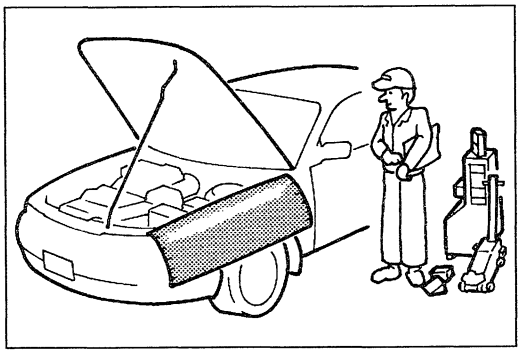
#5: Diagnostic trouble codes depend on the diagnostic test mode



FUNDAMENTAL PROCEDURES

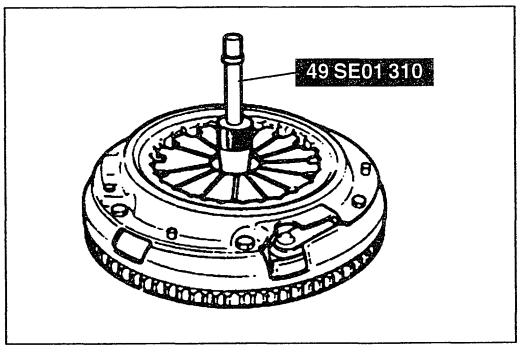
PROTECTION OF THE VEHICLE

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



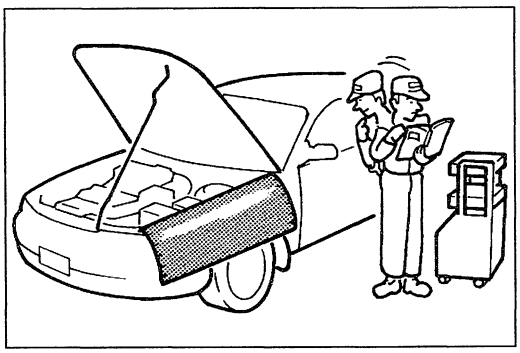
PREPARATION OF TOOLS AND MEASURING EQUIPMENT

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



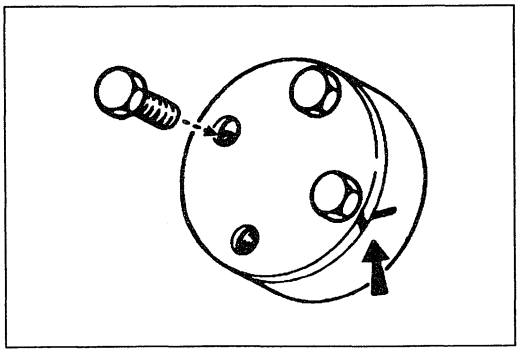
SPECIAL TOOLS

Use special tools when they are required.



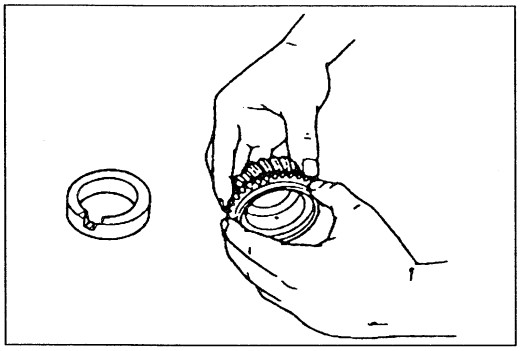
REMOVAL OF PARTS

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. After removing the part, plug all holes and ports to prevent foreign material from entering.

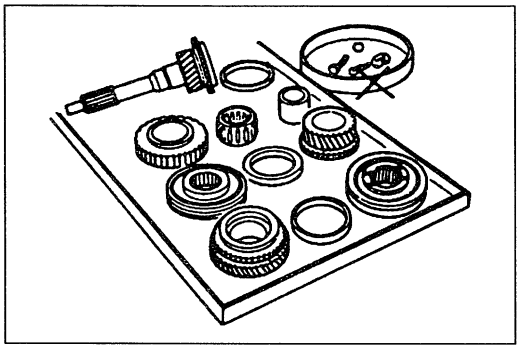


DISASSEMBLY

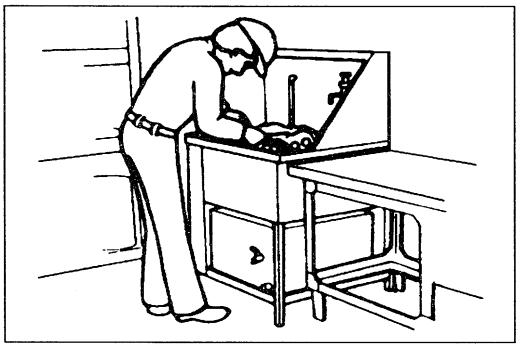
If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be disassembled in a way that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



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

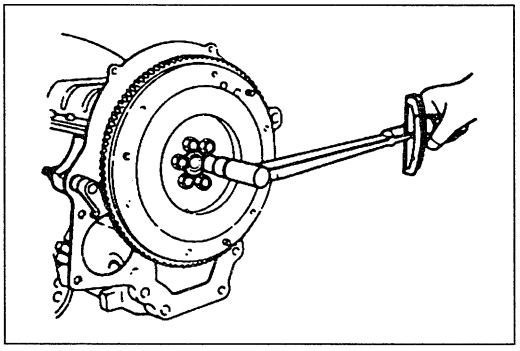


2. Arrangement of parts
All disassembled parts should be carefully arranged for reassembly.
Be sure to separate or otherwise identify the parts to be replaced from those that will be reused.



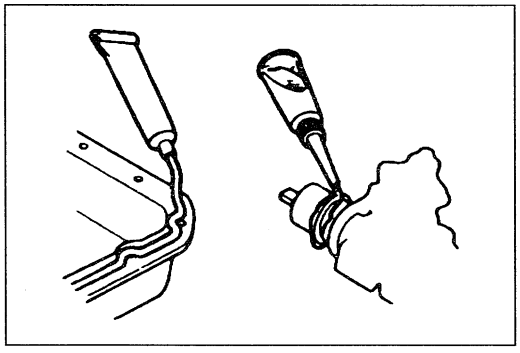
3. Cleaning parts for reuse
All parts to be reused should be carefully and thoroughly cleaned in the appropriate method.

Warning
- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eye wear whenever using compressed air.**

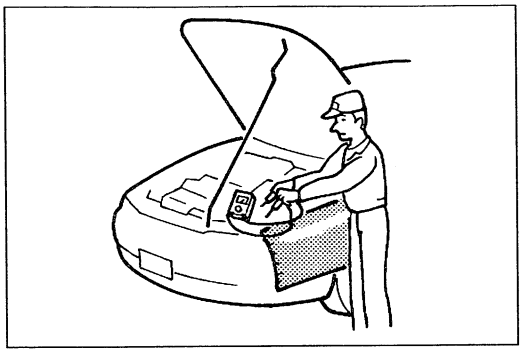


REASSEMBLY
Standard values, such as torques and certain adjustments, must be strictly observed in the reassembly of all parts.

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

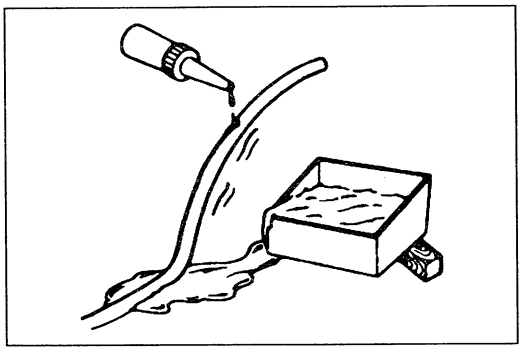


Depending on location:
1. Sealant should be applied to gaskets.
2. Oil should be applied to the moving components of parts.
3. Specified oil or grease should be applied at the prescribed locations (such as oil seals) before reassembly.



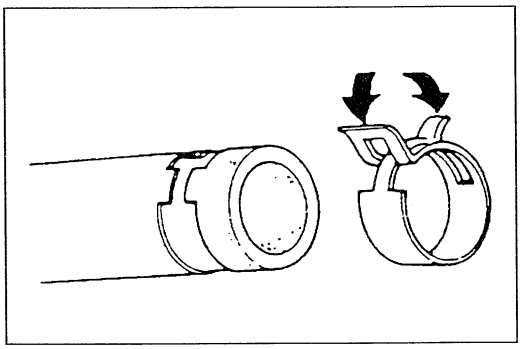
ADJUSTMENTS

Use suitable gauges and testers when making adjustments.



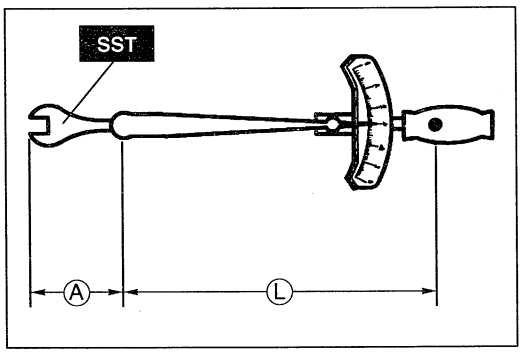
RUBBER PARTS AND TUBING

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



HOSE CLAMPS

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

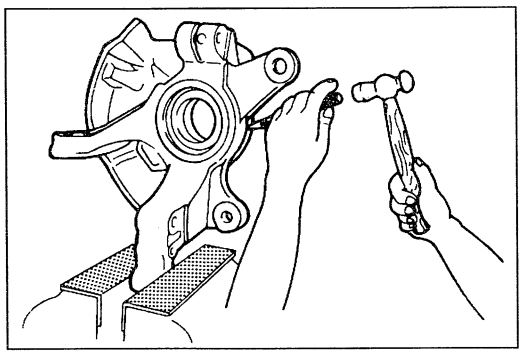


TORQUE FORMULAS

When using a torque wrench-**SST** combination, the written torque must be recalculated due to the extra length that the **SST** adds to the torque wrench. Recalculate the torque by using the following formulas. Choose the formula that applies to you.

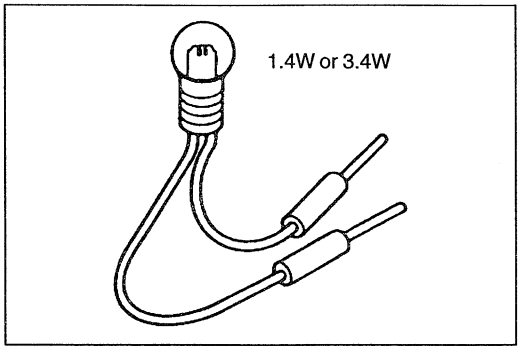
Torque Unit	Formula
N·m	N·m × [L/(L+A)]
kgf·m	kgf·m × [L/(L+A)]
kgf·cm	kgf·cm × [L/(L+A)]
ft·lbf	ft·lbf × [L/(L+A)]
in·lbf	in·lbf × [L/(L+A)]

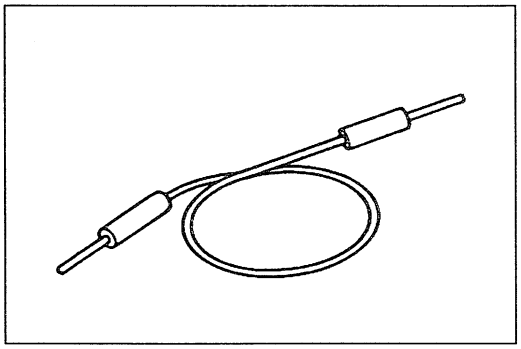
A = The length of the **SST** past the torque wrench drive.
L = The length of the torque wrench.

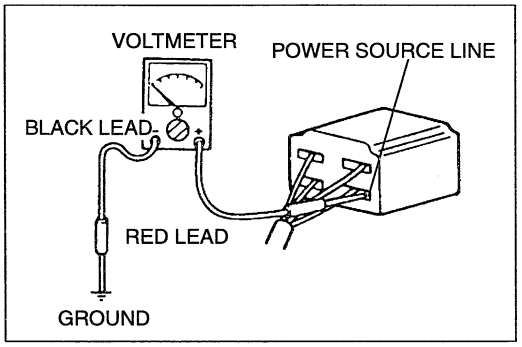


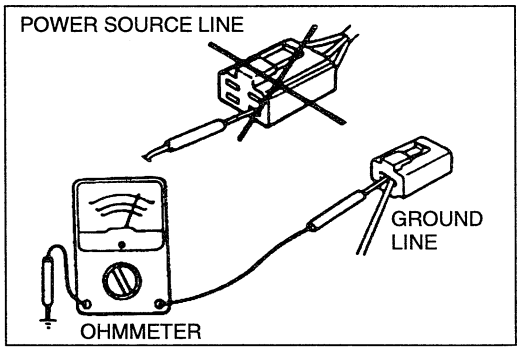
VISE

When using a vise, put protective plates in the jaws of the vise to prevent damage to parts.









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

- **Using a bulb over 3.4W when checking the control unit may damage the control unit.**

JUMPER WIRE

A jumper wire is used to create a temporary circuit. Connect the jumper wire between the terminals of a circuit to bypass a switch.

Caution

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

VOLTMETER

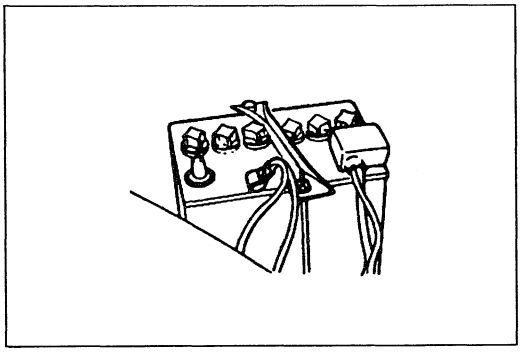
The DC voltmeter is used to measure circuit voltage. A voltmeter with a range of 15V or more is used by connecting the positive (+) probe (red lead wire) to the point where voltage is to be measured and the negative (–) probe (black lead wire) to a body ground.

OHMMETER

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

Caution

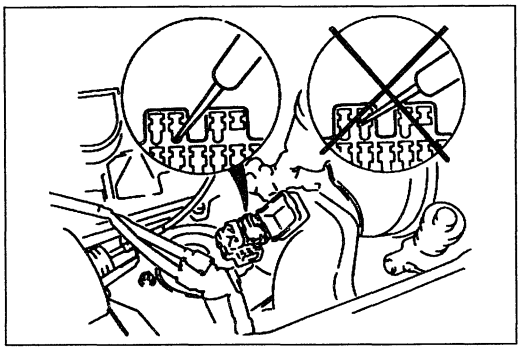
- **Do not connect the ohmmeter to any circuit to which voltage is applied; this will damage the ohmmeter.**



ELECTRICAL PARTS

BATTERY CABLE

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



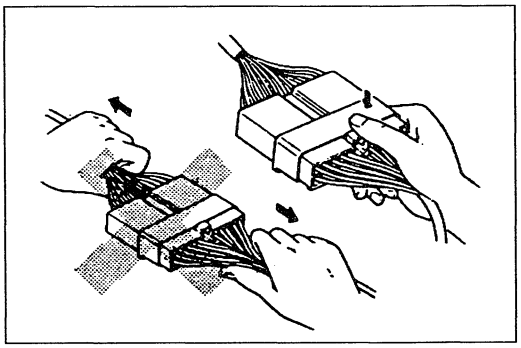
CONNECTORS

Data Link Connector

Insert the probe into the service hole when connecting a jumper wire to the data link connector.

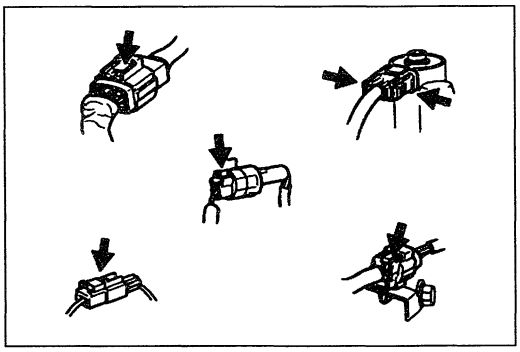
Caution

- **Inserting a jumper wire probe into the data link connector terminal may damage the terminal.**

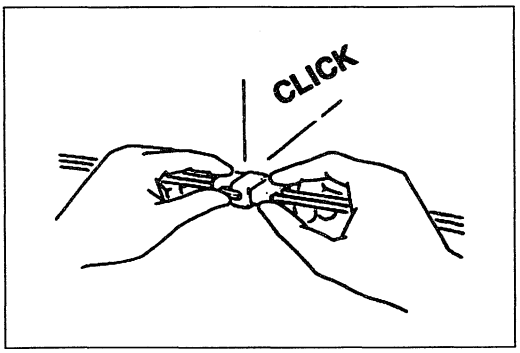


Disconnecting Connectors

When disconnecting two connectors, grasp the connectors, not the wires.

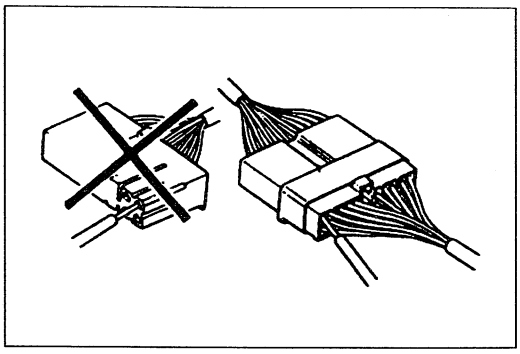


Connectors can be disconnected by pressing or pulling the lock lever as shown.



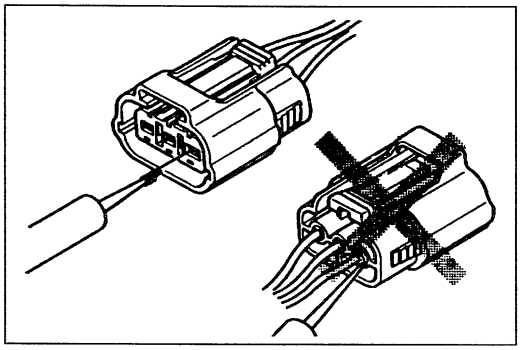
Locking connector

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



Inspection

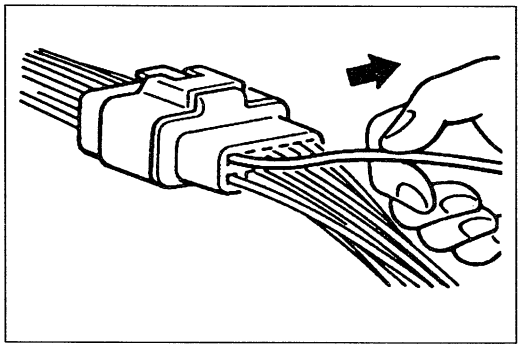
1. When a tester is used to check for continuity or to measure voltage, insert the tester probe from the wiring harness side.



2. Check the terminals of waterproof connectors from the connector side, as they cannot be accessed from the wiring harness side.

Caution

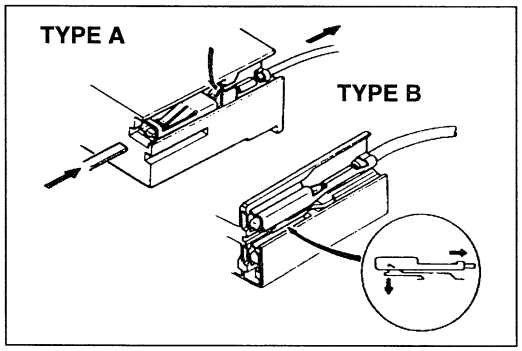
- **To prevent damage to the terminal, wrap a thin wire around the lead before inserting it into the terminal.**



TERMINALS

Inspection

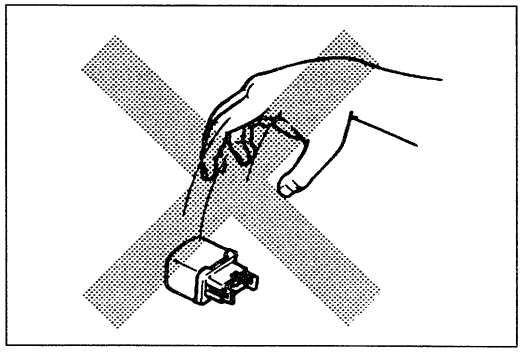
Pull lightly on individual wires to check that they are secured in the terminal.



Replacement

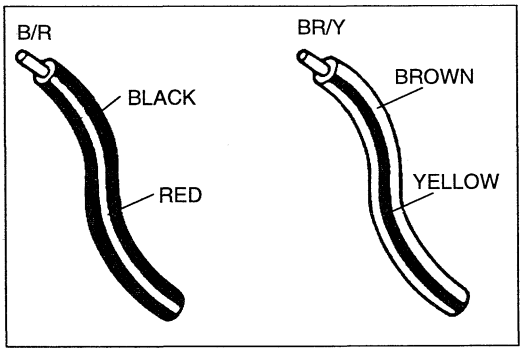
Use the appropriate tools to remove a terminal as shown. When installing a terminal, be sure to insert it until it locks securely.

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.



SENSORS, SWITCHES, AND RELAYS

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



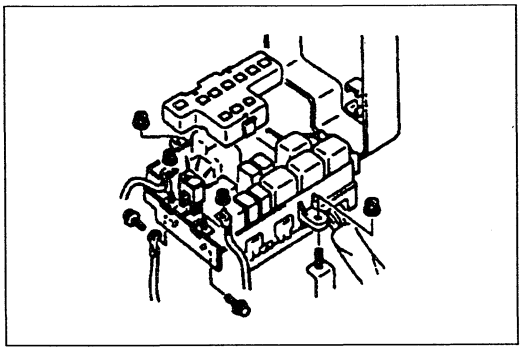
WIRING HARNESS

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		—	—

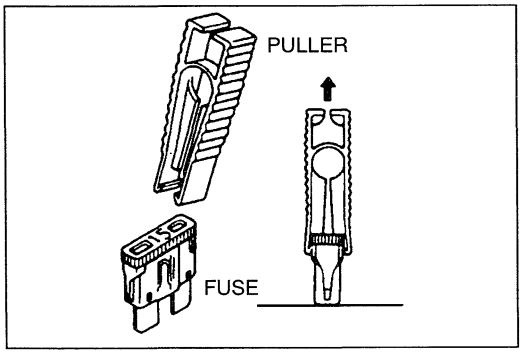


MAIN FUSE BLOCK

Cartridge Fuse (100A)

Removal / Installation

1. Disconnect the negative battery cable.
2. Open the main fuse block lid.
3. Remove the bolts.
4. Remove **MAIN 100A** fuse.
5. Install in the reverse order of removal.



FUSE BLOCK

Removal / Installation

1. Remove the fuse block cover.
2. Use the puller found on the fuse block cover to remove the fuses. It one or more of the fuses are burnt, check for a short in the harness.

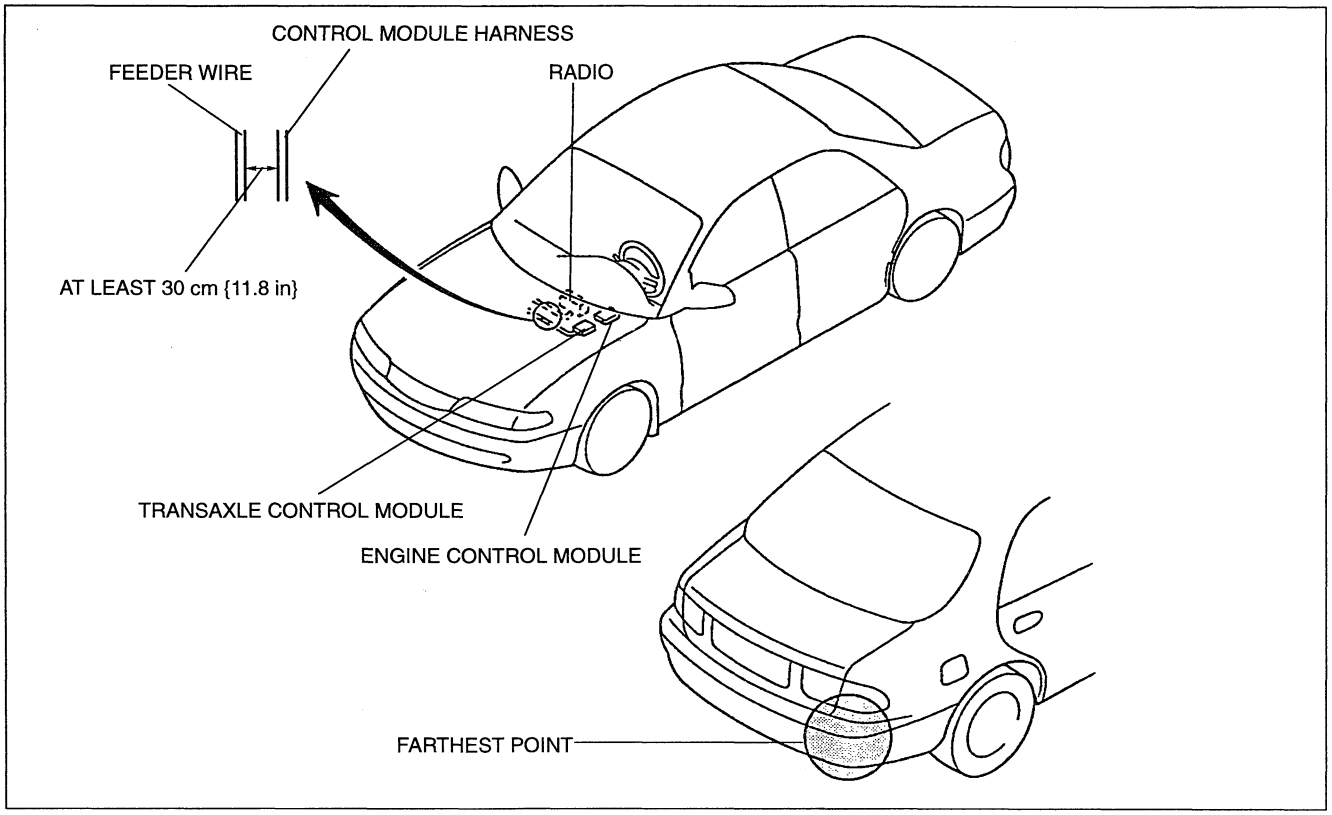
   Caution

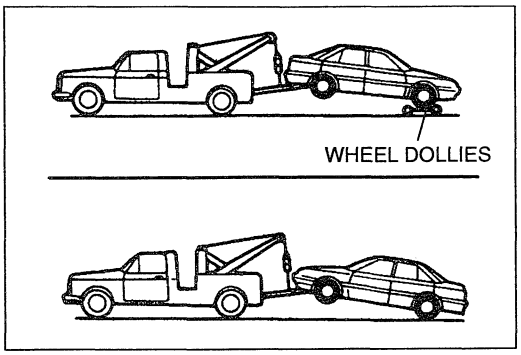
   - **Determine and correct the cause of the burnt fuse before replacing it. If the fuse is replaced before doing this, it may burn again.**

3. Install in the reverse order of removal.

INSTALLATION OF RADIO SYSTEM

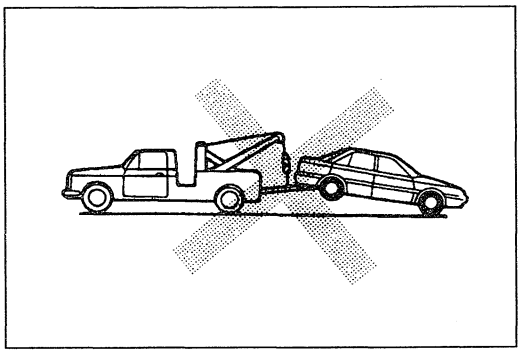
If a radio system is installed improperly or if a high-powered type is used, the CIS and other systems may be affected.
When the vehicle is to be equipped with a radio, observe the following precautions:
1. Install the antenna at the farthest point from control modules.
2. Install the antenna feeder as far as possible from the control module harnesses **(at least 30 cm {11.8 in})**.
3. Ensure that the antenna and feeder are properly adjusted.
4. Do not install a high-powered radio system.





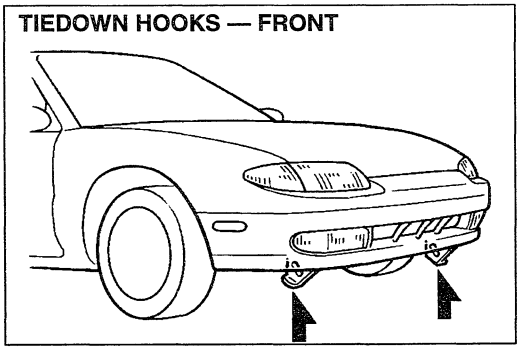
TOWING

Proper towing equipment is necessary to prevent damage to the vehicle.
Laws and regulations applicable to vehicles in tow must always be observed.
As a general rule, towed vehicles should be pulled with the driving wheels off the ground. If excessive damage or other conditions prevent towing the vehicle with the driving wheels off the ground, use wheel dollies.

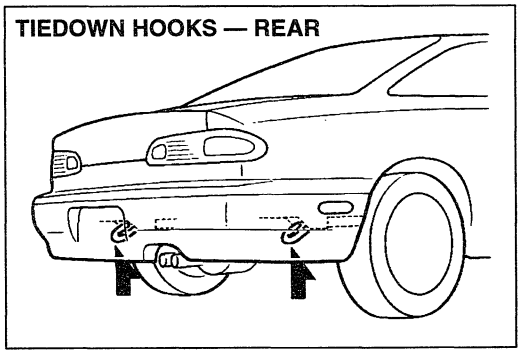


With either automatic or manual transaxle:
1. Set the ignition switch in the ACC position;
2. Place the selector lever or shift lever in N (Neutral);
3. Release the parking brake.

Caution
- **Do not tow the vehicle backward with driving wheels on the ground. This may cause internal damage to the transaxle.**



Caution
- **Don't use the hook loops under the front and rear for towing. They are designed ONLY for tying down the vehicle when it's being transported. Using them for towing will damage the bumper.**



PRE-DELIVERY INSPECTION

PRE-DELIVERY INSPECTION TABLE

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

EXTERIOR

INSPECT and **ADJUST**, if necessary, the following items to specification:
- ☐ Glass, exterior bright metal and paint for damage
- ☐ Wheel lug nuts and locks (if equipped)
  89—117 N·m {9—12 kgf·m, 66—86 ft·lbf}
- ☐ All weatherstrips for damage or detachment
- ☐ Operation of hood release and lock
- ☐ Operation of trunk lid and fuel lid opener
- ☐ Door operation and alignment
- ☐ Headlight aim

INSTALL the following parts:
- ☐ Wheel caps

UNDER HOOD—ENGINE OFF

INSPECT and **ADJUST**, if necessary, the following items to specification:
- ☐ Fuel, engine coolant, and hydraulic lines, fittings, connections, and components for leaks
- ☐ Engine oil level
- ☐ Power steering fluid level
- ☐ Brake (clutch) fluid level
- ☐ Windshield washer reservoir fluid level
- ☐ Radiator coolant level
- ☐ Tightness of battery terminals
- ☐ Manual transaxle oil level

INTERIOR

CHECK the operations of the following items:
- ☐ Seat controls (slide and recline) and headrests
- ☐ Folding rear seat
- ☐ Door locks, including childproof door locks (if equipped)
- ☐ Seat belts and warning system
- ☐ Ignition switch and steering lock
- ☐ Air bag system by using warning light
- ☐ Cruise set
- ☐ Shift-lock system and transaxle range switch (ATX only)
- ☐ Starter interlock switch (clutch pedal, MTX only)
- ☐ All lights including warning, and indicator lights
- ☐ Sound warning system
- ☐ Horn, wipers, and washers
- ☐ Audio system (if equipped)
- ☐ Cigarette lighter and clock
- ☐ Sunroof (if equipped)
- ☐ Power outside mirrors (if equipped)
- ☐ Power windows (if equipped)
- ☐ Heater, defroster, and air conditioner at various mode selections (if equipped)

CHECK the following items:
- ☐ Presence of spare fuse
- ☐ Upholstery and interior finish

CHECK and **ADJUST**, if necessary, the following items:
- ☐ Pedal height and free play of brake and clutch pedal

	Pedal height mm {in}	Free play mm {in}
Clutch pedal	186—211 {7.32—8.31} (with carpet)	5—14 {0.20—0.55}
Brake pedal	191.5—196.5 {7.54—7.74} (with carpet)	4—12 {0.16—0.47}

- ☐ Parking brake
  5—7 notches/98 N {10 kgf, 22 lbf}

UNDER HOOD—ENGINE RUNNING AT OPERATING TEMPERATURE

CHECK the following items:
- ☐ Automatic transaxle fluid level
- ☐ Operation of idle-up system for electrical load, air conditioner or power steering (if equipped)
- ☐ Ignition timing (except FS ATX model)
- ☐ Idle speed

ON HOIST

CHECK the following items:
- ☐ 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

ROAD TEST

CHECK the following items:
- ☐ Brake operation
- ☐ Clutch operation
- ☐ Steering control
- ☐ Operation of gauges
- ☐ Squeaks, rattles, and unusual noises
- ☐ Emergency locking retractors
- ☐ Cruise control system (if equipped)

AFTER ROAD TEST

CHECK for necessary owner information materials, tools, and spare tire in vehicle

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

- ☐ Load test battery and charge if necessary — ☐ Volts (Load test result)
- ☐ Adjust tire pressure to specification (Refer to door label)
- ☐ Clean outside of vehicle
- ☐ Install fuses for accessories
- ☐ Remove seat and cabin carpet protective covers
- ☐ Vacuum inside of vehicle

SCHEDULED MAINTENANCE

MAINTENANCE TABLE (EXCEPT CANADA)

Schedule 1 (Normal driving conditions)

The vehicle is mainly operated where none of the "unique driving conditions" apply.

Chart symbols:

I : Inspect and repair, clean, or replace if necessary.
R : Replace
L : Lubricate

Remarks:

- After 48 months or 60,000 miles {96,000 km}, continue to follow the described maintenance at the recommended intervals.
  - *1 This maintenance is required for all states except California. However, we recommend that it also be performed on California vehicles.
  - *2 This maintenance is recommended by Mazda. However, it is not necessary for emission warranty coverage or manufacturer recall liability.

Schedule 2 (Unique driving conditions)

- Repeated short-distance driving.
- Driving in dusty conditions.
- Driving with extended use of brakes.
- Driving in areas where road salt or other corrosive materials are used.
- Driving on rough or muddy roads.
- Extended periods of idling or low-speed operation.
- Driving for long prolonged periods in cold temperatures or extremely humid climates.

Chart symbols:

I : Inspect and repair, clean, or replace if necessary. (Inspect, and if necessary replace .... Air cleaner element only)
R : Replace
L : Lubricate

Remarks:

- After 48 months or 60,000 miles {96,000 km}, continue to follow the described maintenance at the recommended intervals.
  - *1 This maintenance is required for all states except California. However, we recommend that it also be performed on California vehicles.
  - *2 This maintenance is recommended by Mazda. However, it is not necessary for emission warranty coverage or manufacturer recall liability.

Schedule 1 (Normal driving conditions)

Maintenance Interval / Maintenance Item	Number of months or miles {kilometers}, whichever comes first								
	Months		6	12	18	24	30	36	42	48
	×1000	Kilometers	12	24	36	48	60	72	84	96
		Miles	7.5	15	22.5	30	37.5	45	52.5	60
Engine										
Engine oil			R	R	R	R	R	R	R	R
Oil filter			R	R	R	R	R	R	R	R
Tension of all drive belts						I				I
Engine timing belt			Replace every 60,000 miles {96,000 km}							
Engine timing belt (California)			*2Inspect at 60,000 miles {96,000 km}, and again at 90,000 miles {144,000 km}							
			Replace every 105,000 miles {168,000 km}							
Hose and tube for emission										I*2
Air cleander										
Air cleaner element						R				R
Ignition system										
Spark plugs						R				R
Fuel system										
Idle speed*2						I*2				I*1
Fuel filter										R*1
Fuel lines and hoses						I*2				I*1
Fuel hose (California)			Inspect every 105,000 miles {168,000 km}							
Cooling system										
Cooling system						I				I
Engine coolant			Replace at first 45,000 miles {72,000 km} or 36 months; after that, every 30,000 miles {48,000 km} or 24 months							
Chassis and body										
Brake lines, hoses and connections						I				I
Disc brakes						I				I
Drum brakes						I				I
Steering operation and linkages						I				I
Front suspension ball joints						I				I
Drive shaft dust boots						I				I
Bolts and nuts on chassis and body						I				I
Exhaust system heat shield						I				I
All locks and hinges			L	L	L	L	L	L	L	L
Air conditioner system (if equipped)										
Refrigerant				I		I		I		I
Compressor				I		I		I		I

Schedule 2 (Unique driving conditions)

Maintenance Interval / Maintenance Item	Number of months or miles {kilometers}, whichever comes first												
	Months		4	8	12	16	20	24	28	32	36	40	44	48
	×1000	Kilometers	8	16	24	32	40	48	56	64	72	80	88	96
		Miles	5	10	15	20	25	30	35	40	45	50	55	60
Engine														
Engine oil			R	R	R	R	R	R	R	R	R	R	R	R
Engine oil	(Puerto Rico)		Replace every 3,000 miles {4,800 km} or 3 months											
Oil filter			R	R	R	R	R	R	R	R	R	R	R	R
Tension of all drive belts								I						I
Engine timing belt			Replace every 60,000 miles {96,000 km}											
Engine timing belt (California)			*2Inspect at 60,000 miles {96,000 km}, and again at 90,000 miles {144,000 km}											
			Replace every 105,000 miles {168,000 km}											
Hose and tube for emission														I*2
Air cleander														
Air cleaner element					I*2			R			I*2			R
Ignition system														
Spark plugs								R						R
Cooling system														
Cooling system								I						I
Engine coolant			Replace at first 45,000 miles {72,000 km} or 36 months; after that, every 30,000 miles {48,000 km} or 24 months											
Fuel system														
Fuel filter														R*1
Fuel lines and hoses								I*2						I*1
Idle speed								I*2						I*1
Fuel hose (California)			Inspect every 105,000 miles {168,000 km}											
Chassis and body														
Brake lines, hoses and connections								I						I
Drum brakes								I						I
Disc brakes					I			I			I			I
Steering operation and linkages								I						I
Front suspension ball joints								I						I
Drive shaft dust boots								I						I
Bolts and nuts on chassis and body					I			I			I			I
Exhaust system heat shield								I						I
All locks and hinges			L	L	L	L	L	L	L	L	L	L	L	L
Air conditioner system (if equipped)														
Refrigerant					I			I			I			I
Compressor					I			I			I			I

MAINTENANCE TABLE (CANADA)
Chart symbols:
I : Inspect and repair, clean, or replace if necessary. (Inspect, and if necessary replace ... Air cleaner element only)
R : Replace
L : Lubricate
Rt : Rotation (tires)

Remarks:
- After 60 months or 60,000 miles {96,000 km}, continue to follow the described maintenance at the recommended intervals.
  *1: Replacement of the timing belt is required every 60,000 miles {96,000 km}. Failure to replace this belt may result in damage to the engine.
  *2: This maintenance is recommended by Mazda. However, it is not necessary for emission warranty coverage or manufacturer recall liability.
  *3: This maintenance operation is recommended by Mazda.

Maintenance Interval / Maintenance Item	Number of months or miles {kilometers}, whichever comes first												
	Months		5	10	15	20	25	30	35	40	45	50	55	60
	×1000	Kilometers	8	16	24	32	40	48	56	64	72	80	88	96
		Miles	5	10	15	20	25	30	35	40	45	50	55	60
Engine														
Engine oil			R	R	R	R	R	R	R	R	R	R	R	R
Oil filter			R	R	R	R	R	R	R	R	R	R	R	R
Tension of all drive belts			I	I	I	I	I	I	I	I	I	I	I	I
Engine timing belt*1														R
Air cleander														
Air cleaner element					I			R			I			R
Ignition system														
Spark plugs								R						R
Cooling system														
Engine coolant level and strength			I	I	I	I	I	I	I	I	I	I	I	I
Cooling system for leaks					I			I			I			I
Engine coolant			Replace at first 72,000 km {45,000 miles} or 45 months; after that, every 48,000 km {30,000 miles} or 30 months											
Fuel system														
Idle speed					I			I			I			I
Fuel lines and hoses								I*2						I
Fuel filter								R						R
PCV valve*2														I
Emission hoses and tubes														I
Chassis and body														
Automatic transaxle fluid level			I	I	I	I	I	I	I	I	I	I	I	I
Transaxle oil (MTX and ATX)								R						R
Drive shaft dust boots								I						I
Brake lines and hoses								I						I
Brake and clutch fluid level			I	I	I	I	I	I	I	I	I	I	I	I
Brake fluid*3								R						R
Disc brakes (front and rear)					I			I			I			I
Rear drum brakes								I						I
Tire inflation pressure and tire wear			I	I	I	I	I	I	I	I	I	I	I	I
Tires					Rt			Rt			Rt			Rt
Power steering fluid level			I	I	I	I	I	I	I	I	I	I	I	I
Steering operation and linkages (Includes four wheel alignment)								I						I
Suspension components (front and rear)								I						I
All chassis and body nuts and bolts					I			I			I			I
Exhaust system heat shields								I						I
All locks and hinges			L	L	L	L	L	L	L	L	L	L	L	L
Washer fluid level			I	I	I	I	I	I	I	I	I	I	I	I
Function of all lights			I	I	I	I	I	I	I	I	I	I	I	I
Air conditioner system (if equipped)														
Refrigerant				I		I		I		I		I		I
Compressor				I		I		I		I		I		I

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

ENGINE
(FS)

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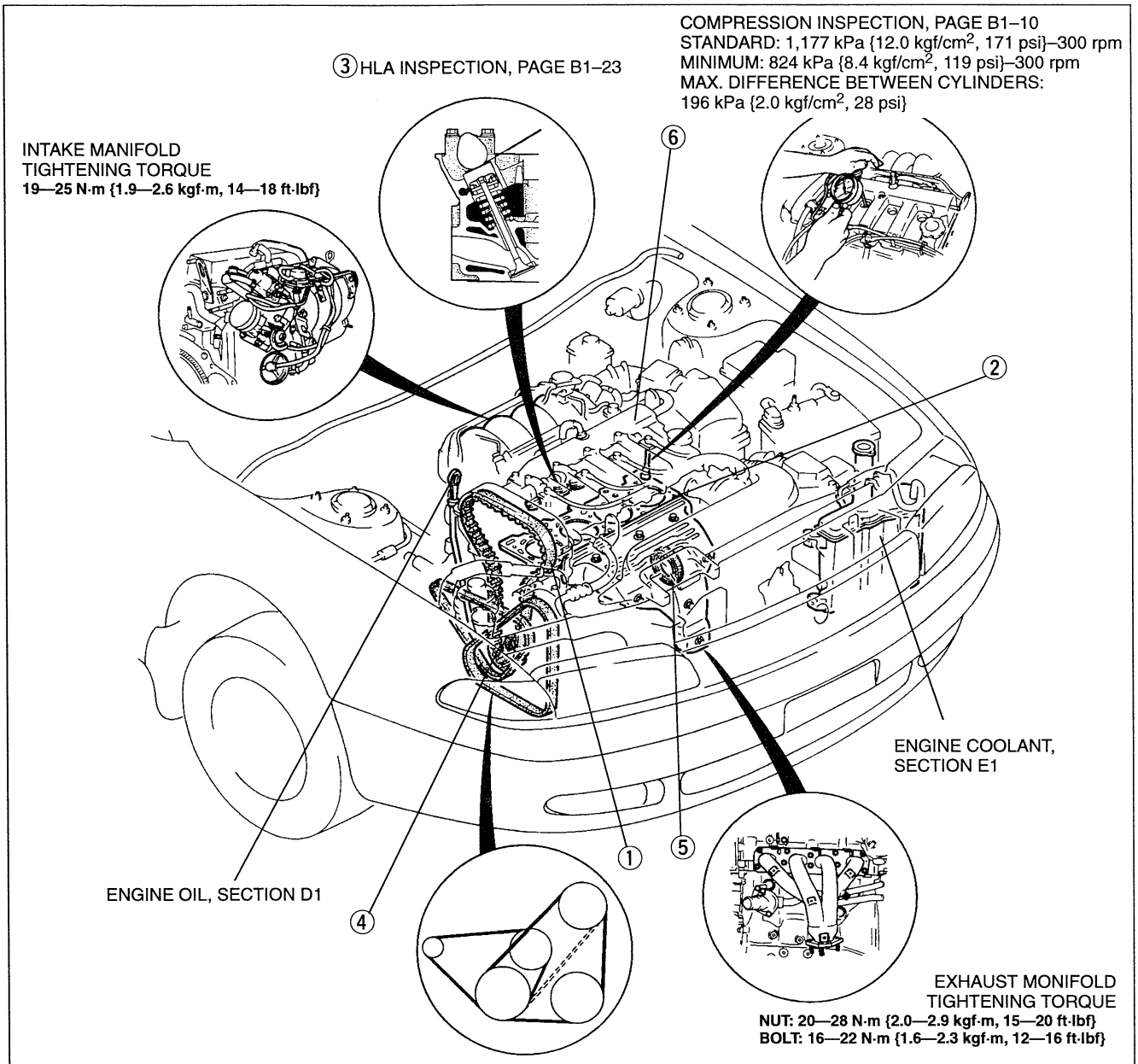

DRIVE BELT DEFLECTION AT 98 N {10 kgf, 22 lbf} mm {in}

DRIVE BELT	NEW	USED	LIMIT
GENERATOR	6.5—7.0 {0.26—0.27}	7.0—9.0 {0.28—0.35}	10 {0.39}
P/S, P/S + A/C	7.5—9.0 {0.30—0.35}	8.0—9.5 {0.32—0.37}	11 {0.43}

1. Timing belt
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2. Cylinder head gasket
   Replacement ..... page B1–16
3. HLA
   Removal / Installation ..... page B1–22
4. Front oil seal
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5. Rear oil seal
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   Engine stand dismounting ... page B1– 98
   Installation ..... page B1–101

OUTLINE

SPECIFICATIONS

Item \ Engine				FS
Type				Gasoline, 4-cycle
Cylinder arrangement and number				In-line, 4-cylinders
Combustion chamber				Pentroof
Valve system				DOHC, belt-driven, 16 valves
Displacement			ml {cc, cu in}	1,991 {1,991, 121.5}
Bore × stroke			mm {in}	83.0×92.0 {3.27×3.62}
Compression ratio				9.0
Compression pressure			kPa {kgf/cm^2, psi}–rpm	1,177 {12.0, 171}–300
Valve timing	IN	Open	BTDC	8°
		Close	ABDC	50°
	EX	Open	BBDC	54°
		Close	ATDC	8°
Valve clearance		IN	mm {in}	0 {0}: Maintenance-free
		EX	mm {in}	0 {0}: Maintenance-free

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Action	Page
Difficult starting	**Malfunction of engine-related components**		
	Burnt valve	Replace	B1–58
	Worn piston, piston ring, or cylinder	Replace or repair	B1–64, 66
	Damaged cylinder head gasket	Replace	B1–16
	Malfunction of fuel system	Refer to sections F1, F3	
	Malfunction of ignition system	Refer to section G	
Poor idling	**Malfunction of engine-related components**		
	Malfunction of HLA*	Replace	B1–22
	Poor valve-to-valve seat contact	Replace or repair	B1–60
	Damaged cylinder head gasket	Replace	B1–16
	Malfunction of fuel system	Refer to sections F1, F3	
	Malfunction of ignition system	Refer to section G	
Excessive oil consumption	**Oil working up**		
	Worn piston ring groove or stuck piston ring	Replace	B1–66
	Worn piston or cylinder	Replace or repair	B1–64, 66
	Oil working down		
	Worn valve seal	Replace	B1–48, 84
	Worn valve stem or guide	Replace	B1–58
	Oil leakage	Refer to section D1	

* Tappet noise may occur if the engine has set idle for an extended period. The noise should stop after the engine has reached normal operating temperature. (HLA troubleshooting: Refer to page B1–7.)

Problem	Possible Cause	Action	Page
Insufficient power	**Insufficient compression**		
	Malfunction of HLA*	Replace	B1–22
	Compression leakage from valve seat	Repair	B1–60
	Seized valve stem	Replace	B1–58
	Weak or broken valve spring	Replace	B1–61
	Damaged cylinder head gasket	Replace	B1–16
	Cracked or distorted cylinder head	Replace	B1–57
	Stuck, damaged, or worn piston ring	Replace	B1–66
	Cracked or worn piston	Replace	B1–66
	Malfunction of fuel system	Refer to sections F1, F3	
	Malfunction of ignition system	Refer to section G	
	Others		
	Slipping clutch	Refer to section H	
	Dragging brakes	Refer to section P	
	Incorrect tire size	Refer to section Q	
Abnormal combustion	**Malfunction of engine-related components**		
	Malfunction of HLA*	Replace	B1–22
	Stuck or burnt valve	Replace	B1–58
	Weak or broken valve spring	Replace	B1–61
	Carbon accumulation in combustion chamber	Eliminate carbon	—
	Malfunction of fuel system	Refer to sections F1, F3	
	Malfunction of ignition system	Refer to section G	
Engine noise	**Crankshaft- or bearing-related parts**		
	Excessive main bearing oil clearance	Replace or repair	B1–74
	Main bearing seized or heat-damaged	Replace	B1–69
	Excessive crankshaft end play	Replace of repair	B1–75
	Excessive connecting rod bearing oil clearance	Replace or repair	B1–78
	Connecting rod bearing seized or heat-damaged	Replace	B1–69
	Piston-related parts		
	Worn cylinder	Replace or repair	B1–64
	Worn piston or piston pin	Replace	B1–66
	Seized piston	Replace	B1–66
	Damaged piston ring	Replace	B1–66
	Bent connecting rod	Replace	B1–67
	Valve train-related parts		
	Malfunction of HLA*	Replace	B1–22
	Broken valve spring	Replace	B1–61
	Excessive valve guide clearance	Replace	B1–59
	Malfunction of cooling system	Refer to section E1	
	Malfunction of fuel system	Refer to sections F1, F3	
	Others		
	Malfunction of water pump bearing	Refer to section E1	
	Improper drive belt tension	Adjust	B1– 6
	Malfunction of generator bearing	Refer to section G	
	Exhaust gas leakage	Refer to sections F1, F3	
	Malfunction of timing belt tensioner	Replace	B1–10

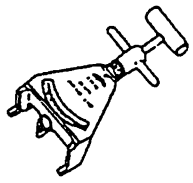
* Tappet noise may occur if the engine has set idle for an extended period. The noise should stop after the engine has reached normal operating temperature. (HLA troubleshooting: Refer to page B1–7.)

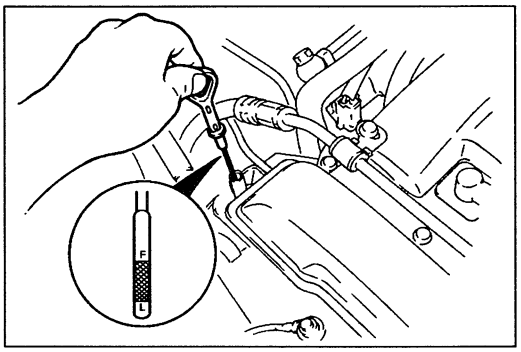
Warning

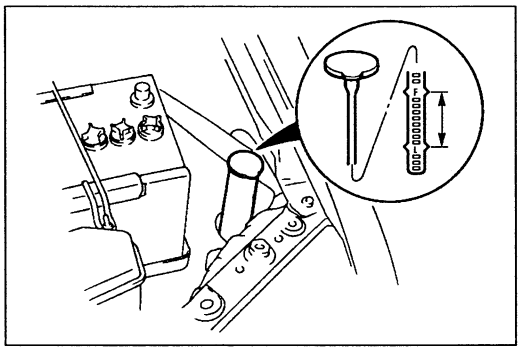
- **Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.**

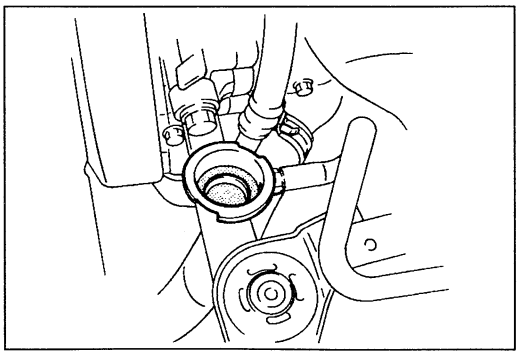
ENGINE TUNE-UP

PREPARATION
SST

49 9200 020A V-ribbed belt tension gauge		For inspection of drive belt tension







ENGINE OIL
Inspection

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 dipstick 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 dipstick represents 1.0 L {1.1 US qt, 0.9 Imp qt}.

ENGINE COOLANT
Inspection
Coolant level (Engine cold)

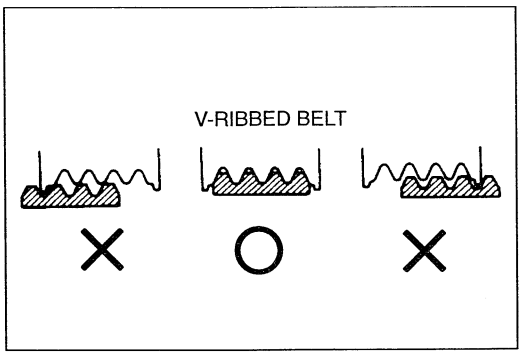
Warning
- **Removing the radiator cap or the coolant drain plug while the engine is running, or when the engine and radiator are hot is dangerous. Scalding coolant and steam can shoot out and cause serious injury. It can also damage the engine and cooling system.Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
  When you're sure all the pressure is gone, press down on the cap — still using a cloth — turn it, and remove it.

1. Verify that the coolant level is at the filler neck.
2. Verify that the coolant level on the coolant dipstick is between the F and L marks.
3. Add coolant if necessary.

Note
- The distance between the L and F marks on the dipstick represents 0.55 L {0.55 US qt, 0.44 Imp qt}.

Coolant quality

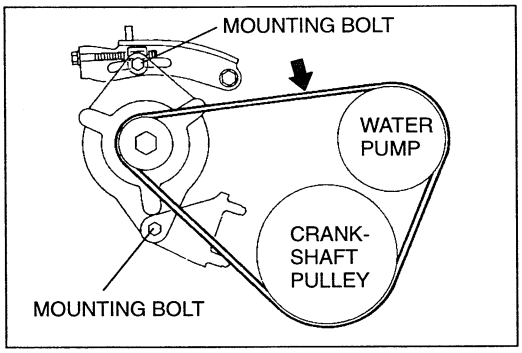
1. Verify that there is no buildup of rust or scale around the radiator cap and radiator filler neck.
2. Verify that the coolant is free of oil. Replace the coolant if necessary.



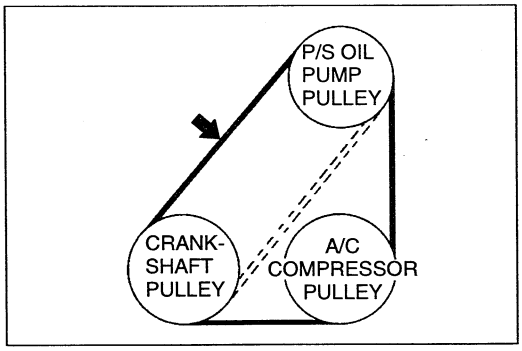
DRIVE BELT

Inspection

1. Check the drive belts for wear, cracks, and fraying. Replace if necessary.
2. Verify that the drive belts are correctly mounted on the pulleys.



3. Check the drive belt deflection when the engine is cold, or at least 30 minutes after the engine has stopped. Apply moderate pressure **98 N {10 kgf, 22 lbf}** midway between the specified pulleys.



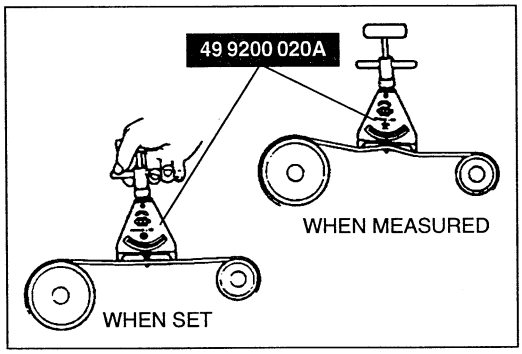
Deflection

mm {in}

Drive belt	*New	Used	Limit
Generator	6.5—7.0 {0.26—0.27}	7.0—9.0 {0.28—0.35}	10 {0.39}
P/S, P/S+A/C	7.5—9.0 {0.30—0.35}	8.0—9.5 {0.32—0.37}	11 {0.43}

* A belt that has been on a running engine for less than five minutes.

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



Drive belt tension check

Belt tension can be checked in place of belt deflection.

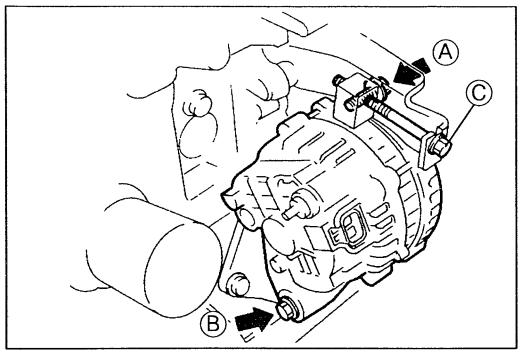
1. Check the drive belt tension when the engine is cold, or at least 30 minutes after the engine has stopped. Using the **SST**, check the belt tension between any two pulleys.

N {kgf, lbf}

Drive belt	*New	Used	Limit
Generator	740—830 {75—85, 170—180}	500—680 {50—70, 110—150}	390 {40, 88}
P/S, P/S+A/C	590—780 {60—80, 140—170}	500—680 {50—70, 110—150}	390 {40, 88}

* A belt that has been on a running engine for less than five minutes.

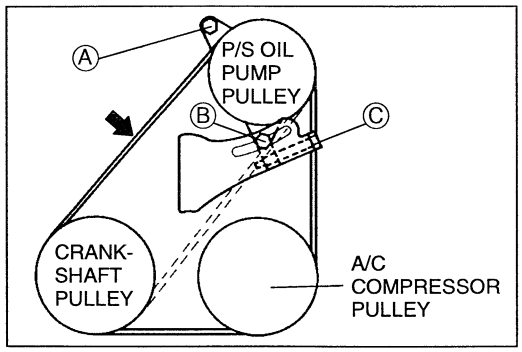
2. If the tension is not within the specification, adjust it.



Adjustment
Generator belt

1. Loosen generator mounting bolts Ⓐ and Ⓑ and adjust the belt deflection/tension by turning adjusting bolt Ⓒ.
2. Tighten mounting bolts Ⓐ and Ⓑ and recheck the deflection/tension.

Tightening torque
Ⓐ: 16—22 N·m {1.6—2.3 kgf·m, 12—16 ft·lbf}
Ⓑ: 32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}

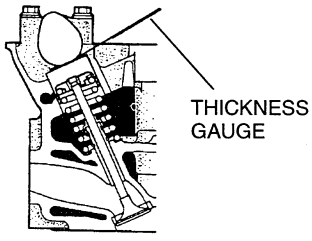


P/S belt, P/S+A/C belt

1. Loosen bolts Ⓐ and Ⓑ and adjust the belt deflection/tension by turning adjusting bolt Ⓒ.
2. Tighten mounting bolts Ⓐ and Ⓑ and recheck the deflection/tension.

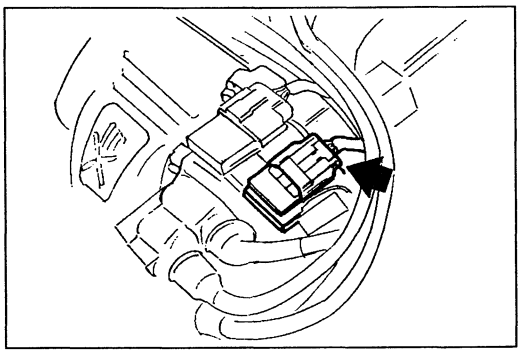
Tightening torque
Ⓐ: 44—60 N·m {4.4—6.2 kgf·m, 32—44 ft·lbf}
Ⓑ: 32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}

HLA TROUBLESHOOTING GUIDE

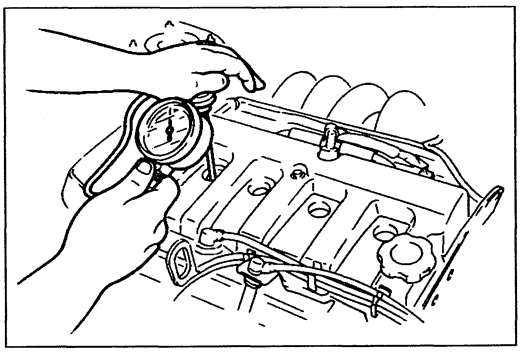
Problem	Possible Cause	Action
1. Noise when engine is started immediately after oil is changed.	Oil leakage in oil passage or in HLA	Run engine at 2,000—3,000 rpm. If noise stops within 20 minutes*, HLA is normal. If not, replace HLA. *Time required for engine oil to circulate within HLA includes tolerance for engine oil condition and ambient temperature.
2. Noise when engine is started after setting one day or more.		
3. Noise when engine is started after new HLA is installed.	Oil leakage in HLA	
4. Noise during idle after warm up.	Insufficient oil pressure	Check oil pressure. If lower than specification, check for cause. (Refer to section D1.)
	Faulty HLA	Measure valve clearance. If more than 0.15 mm {0.0059 in}, replace HLA. 
5. Noise 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.

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 (Refer to below.)
3. Fuel system (Refer to sections F1, F3.)



INSPECTION
1. Verify that the battery is fully charged. Recharge it if necessary. (Refer to section G.)
2. Warm up the engine to the normal operating temperature.
3. Stop the engine and allow it to cool for about 10 minutes.
4. Remove the all spark plugs.
5. Disconnect the primary wire connector from the ignition coil as shown.



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

Compression

kPa {kgf/cm^2, psi}-rpm

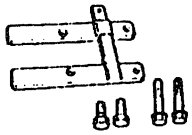
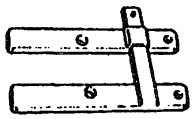
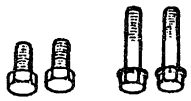
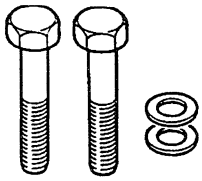
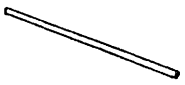
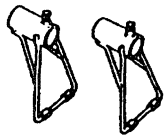
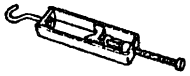
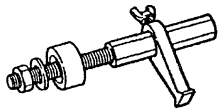
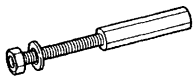
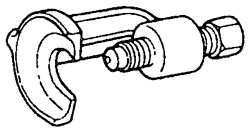
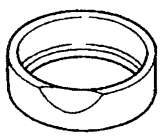
Standard	1,177 {12.0, 171}-300
Minimum	824 {8.4, 119}-300
max. difference between cylinders	196 {2.0, 28}

10. If the compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder and recheck the compression.
    (1) If the compression increases, the piston, piston rings, or cylinder wall may be worn.
    (2) If the compression stays low, the valve may be stuck or improperly seated.
    (3) If the compression in adjacent cylinders stays low, the cylinder head gasket may be damaged or the cylinder head distorted.
11. Connect the ignition coil connector.
12. Install the all spark plugs.

Tightening torque:
15—22 N·m {1.5—2.3 kgf·m, 11—16 ft·lbf}

ON-VEHICLE MAINTENANCE

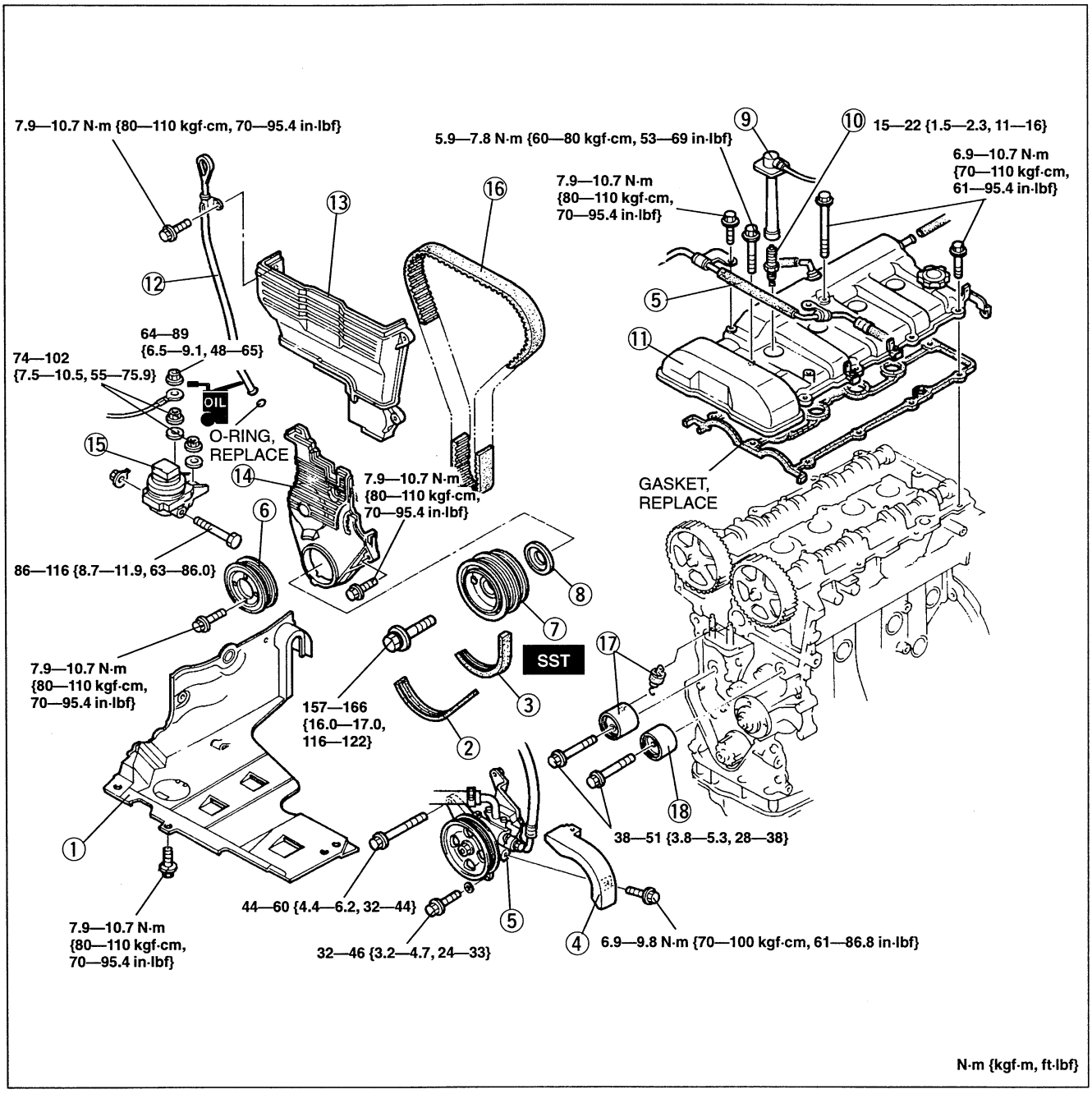
PREPARATION
SST

49 S120 710 Holder, coupling flange 	For prevention of crankshaft rotation	49 E011 1A1 Set, holder 	For prevention of crankshaft rotation
49 E011 101 Holder (Part of 49 E011 1A1) 	For prevention of crankshaft rotation	49 E011 102 Bolts (Part of 49 E011 1A1) 	For prevention of crankshaft rotation
49 G011 103 Bolts 	For prevention of crankshaft rotation	49 G017 5A0 Support, engine 	For support of engine
49 G017 501 Bar (Part of 49 G017 5A0) 	For support of engine	49 G017 502 Support (Part of 49 G017 5A0) 	For support of engine
49 G017 503 Hook (Part of 49 G017 5A0) 	For support of engine	49 E011 1A0 Brake set, ring gear 	For prevention of crankshaft rotation
49 E011 103 Shaft (Part of 49 E011 1A0) 	For prevention of crankshaft rotation	49 E011 104 Collar (Part of 49 E011 1A0) 	For prevention of crankshaft rotation
49 E011 105 Stopper (Part of 49 E011 1A0) 	For prevention of crankshaft rotation	49 0118 850C Puller, ball joint 	For removal of tie-rod end
49 G033 107A Installer, dust cover 	For installation of rear oil seal	—	—

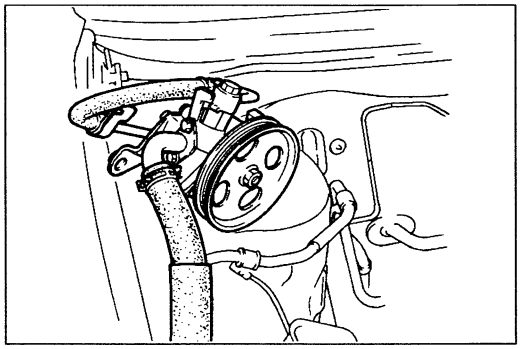
TIMING BELT
Removal / Installation

Warning
- **Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.**

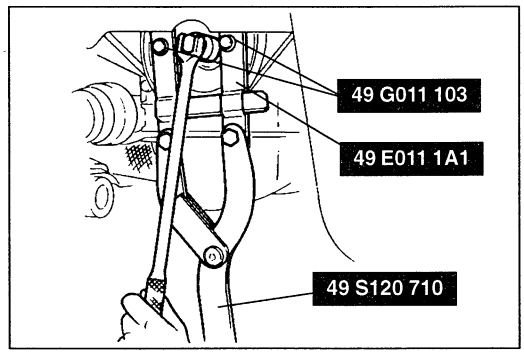
1. Disconnect the negative battery cable.
2. Remove the right front wheel.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal, referring to **Installation Note**.



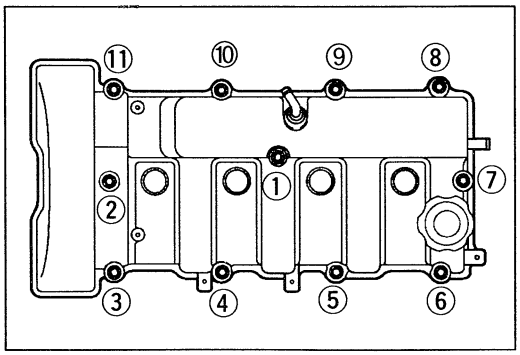
1. Splash shield
2. P/S and/or A/C drive belt
   Adjustment ..... page B1– 7
3. Generator drive belt
   Adjustment ..... page B1– 7
4. Pulley shield
5. P/S oil pump and hose
   Removal Note ..... below
6. Water pump pulley
7. Crankshaft pulley
   Removal Note ..... below
   Installation Note ..... page B1–15
8. Guide plate
9. High-tension lead
10. Spark plug
11. Cylinder head cover
    Removal Note ..... below
    Installation Note ..... page B1–15
12. Dipstick and pipe
13. Timing belt cover, upper
14. Timing belt cover, lower
15. No.3 engine mount rubber
    Removal Note ..... page B1–12
    Installation Note ..... page B1–14
16. Timing belt
    Removal Note ..... page B1–12
    Installation Note ..... page B1–13
17. Tensioner and tensioner spring
18. Idler



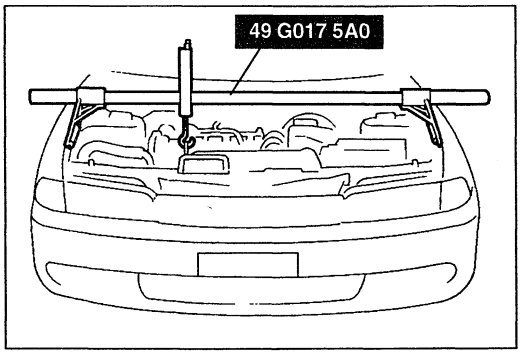
Removal Note
P/S oil pump and hose
1. Remove the P/S oil pump with the hoses still connected.
2. Position the pump away from the engine and affix it with wire.



Crankshaft pulley
1. Hold the crankshaft pulley by using the **SST**.
2. Loosen the crankshaft pulley bolt.
3. Remove the crankshaft pulley bolt and the crankshaft pulley.

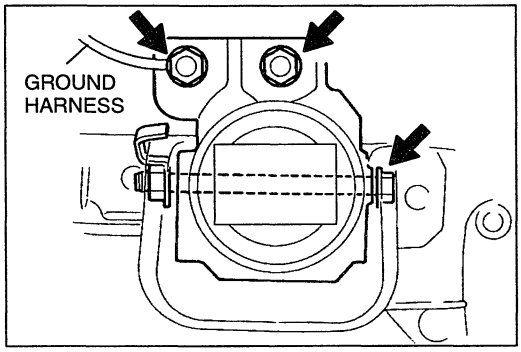


Cylinder head cover
1. Loosen the cylinder head cover bolts in five or six steps in the order shown.
2. Remove the cylinder head cover bolts.
3. Remove the cylinder head cover.

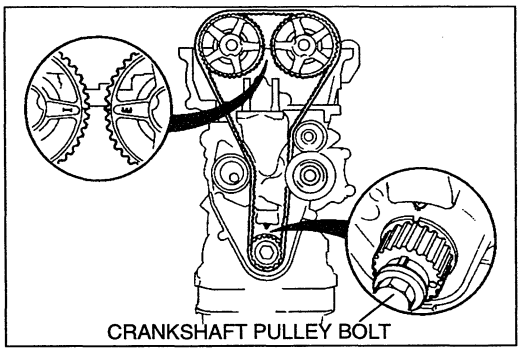


No.3 engine mount rubber

1. Suspend the engine by using the **SST**.

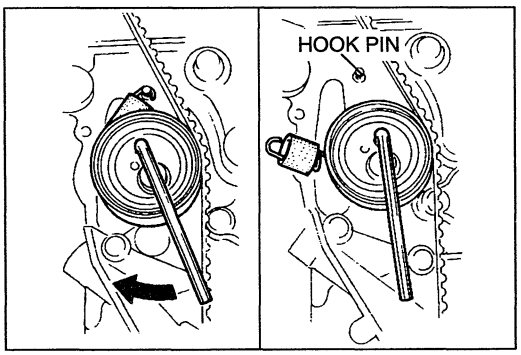


2. Remove the ground harness.
3. Remove the No.3 engine mount rubber.

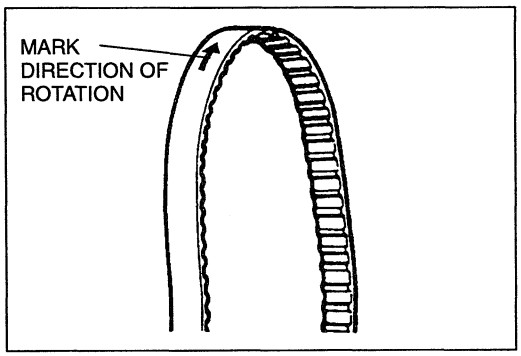


Timing belt

1. Install the crankshaft pulley bolt.
2. Turn the crankshaft to align the matching marks of the pulleys as shown.



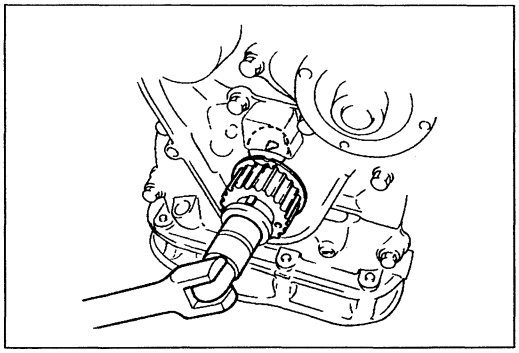
3. Turn the tensioner clockwise by using an Allen wrench.
4. Disconnect the tensioner spring from the hook pin.



Caution

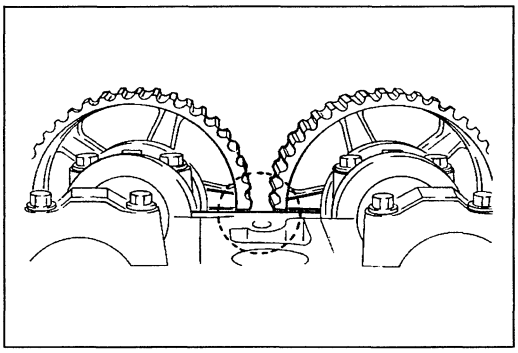
- **The following will damage the belt and shorten its life; Forcefully twisting it, turning it inside out, bending it, or allowing oil or grease on it.**

5. When the belt will be reused, mark its rotation for proper reinstallation.
6. Remove the timing belt.
7. Check the timing belt for damage, wear, peeling, cracks and hardening. Replace the timing belt if necessary.



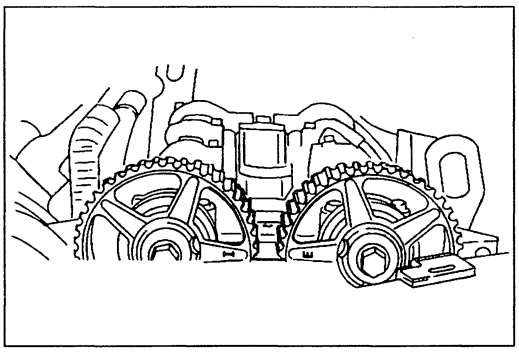
Installation Note
Timing belt

1. Turn the crankshaft clockwise and align the timing marks as shown.

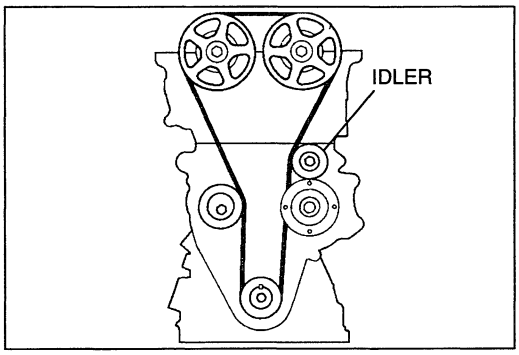


Note

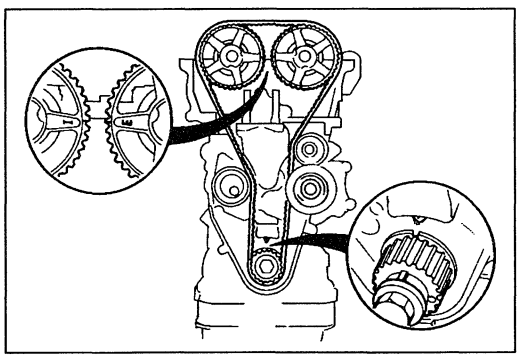
- The timing marks (grooves) can also be used to align the pulleys.



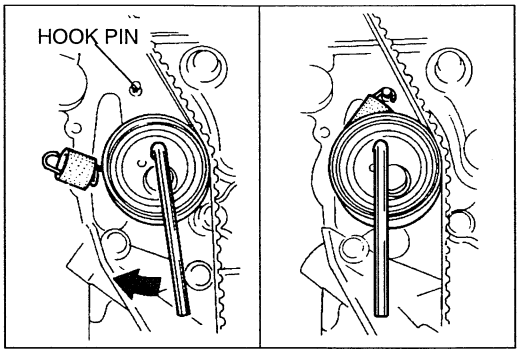
2. Verify that the camshaft pulley I and E marks are aligned with the cylinder head upper line.



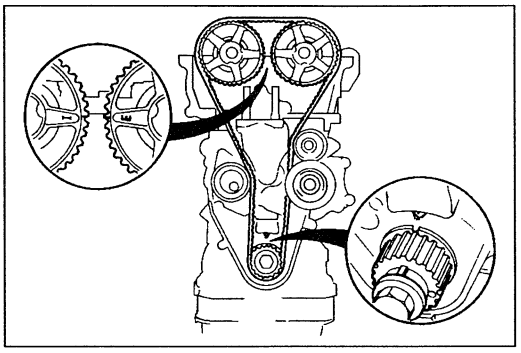
3. Install the timing belt so that there is no looseness at the idler side or between the two camshaft pulleys.



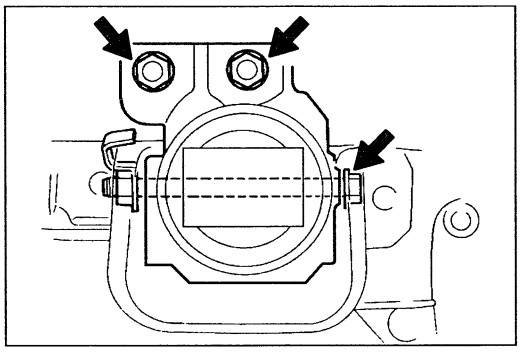
4. Turn the crankshaft clockwise two turns, and align the timing marks.
5. Verify that all timing marks are correctly aligned. If not aligned, remove the timing belt and repeat from step 1.



6. Turn the tensioner clockwise by using an Allen wrench and connect the tensioner spring to the hook pin. Verify that tension is applied to the timing belt.



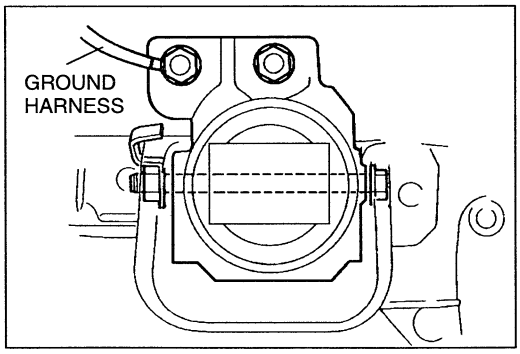
7. Turn the crankshaft clockwise two turns, and verify that all timing marks are aligned. If not aligned, repeat from step 1.



No.3 engine mount rubber

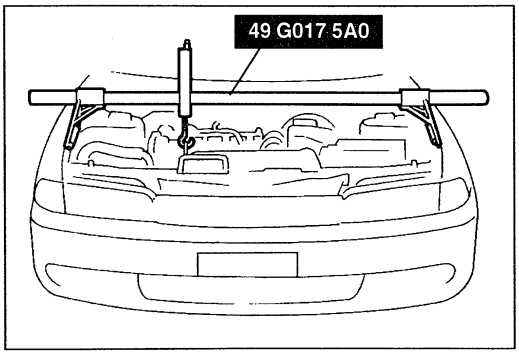
1. Install the No.3 engine mount rubber.

Tightening torque
Bolt: 86—116 N·m {8.7—11.9 kgf·m, 63—86.0 ft·lbf}
Nut: 74—102 N·m {7.5—10.5 kgf·m, 55—75.9 ft·lbf}

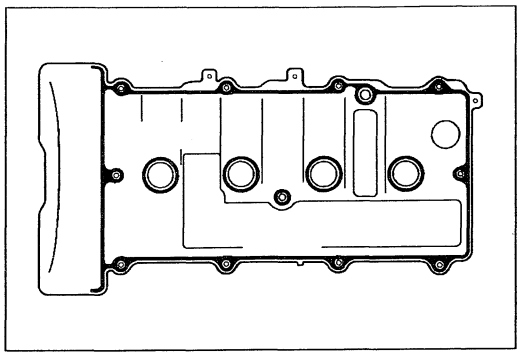


2. Install the ground harness.

Tightening torque:
64—89 N·m {6.5—9.1 kgf·m, 48—65 ft·lbf}

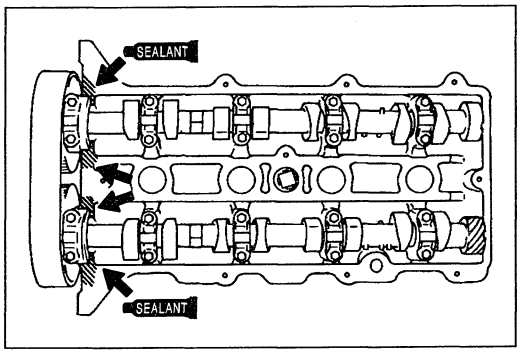


3. Remove the **SST** from the engine.

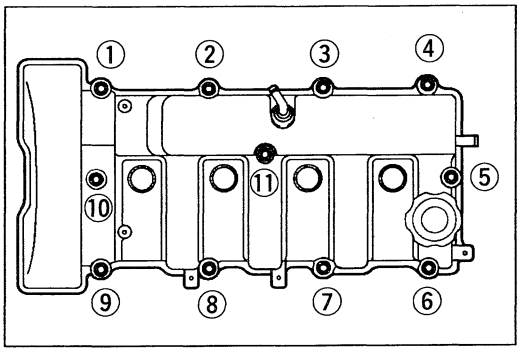


Cylinder head cover

1. Install a new cylinder head cover gasket.

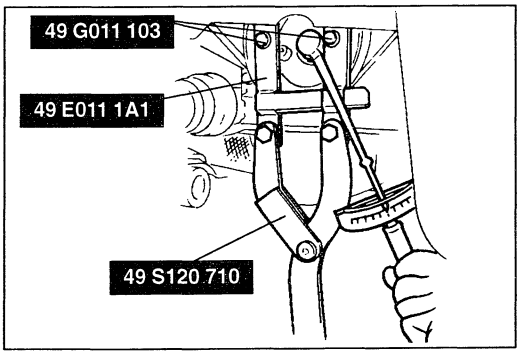


2. Apply silicone sealant to the shaded areas of the cylinder head as shown.



3. Set the cylinder head cover on the cylinder head.
4. Tighten the cylinder head cover bolts in five or six steps in the order shown.

Tightening torque:
6.9—10.7 N·m {70—110 kgf·cm, 61—95.4 in·lbf}



Crankshaft pulley

1. Remove the crankshaft pulley bolt.
2. Install the crankshaft pulley and hand tighten the crankshaft pulley bolt.
3. Install the **SST** to the crankshaft pulley.
4. Tighten the crankshaft pulley bolt.

Tightening torque:
157—166 N·m {16.0—17.0 kgf·m, 116—122 ft·lbf}

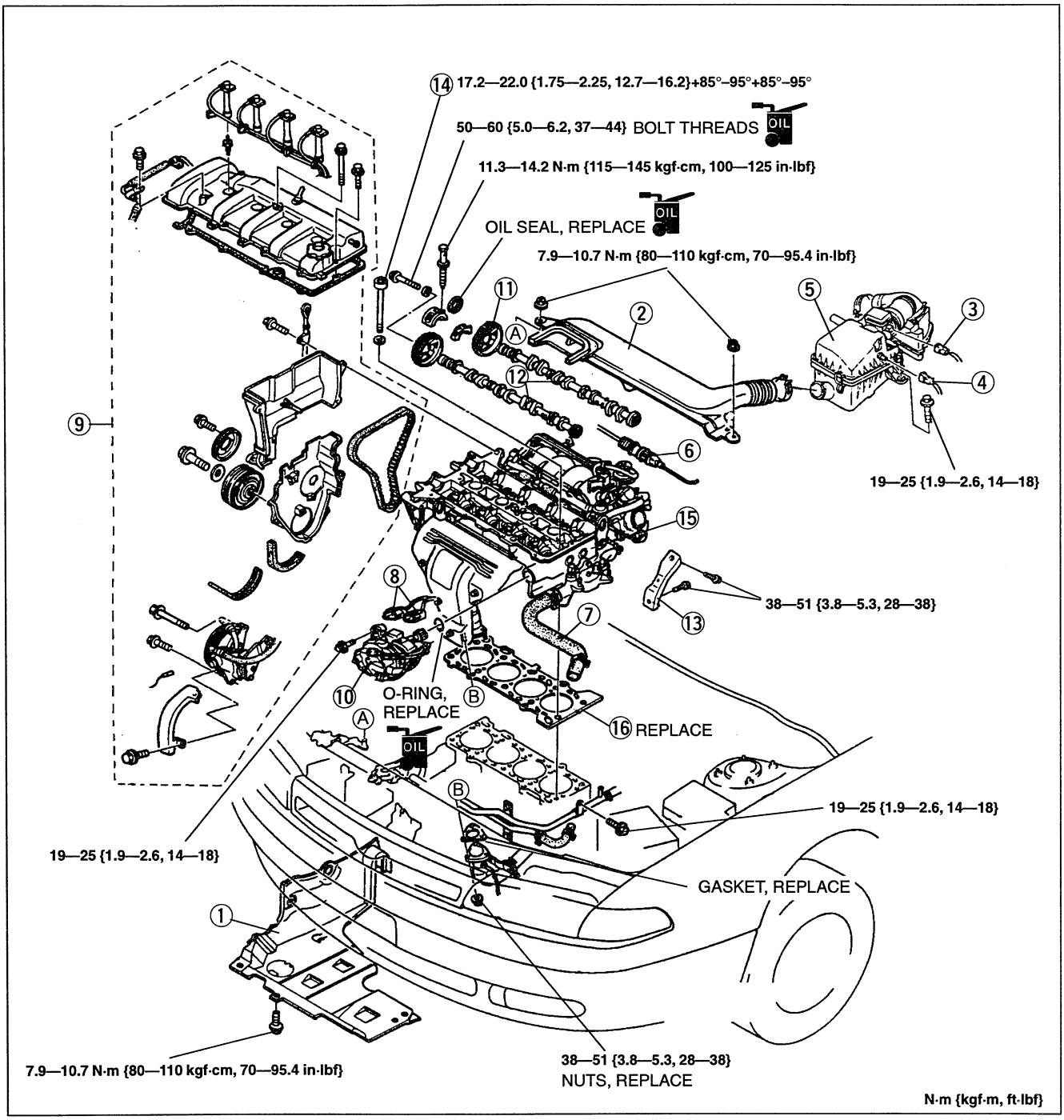
Steps After Installation

1. Install the right front wheel.
2. Connect the negative battery cable.
3. Perform the necessary engine adjustments. (Refer to sections F1, F3.)

CYLINDER HEAD GASKET
Replacement

Warning
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure" on sections F1, F3.**

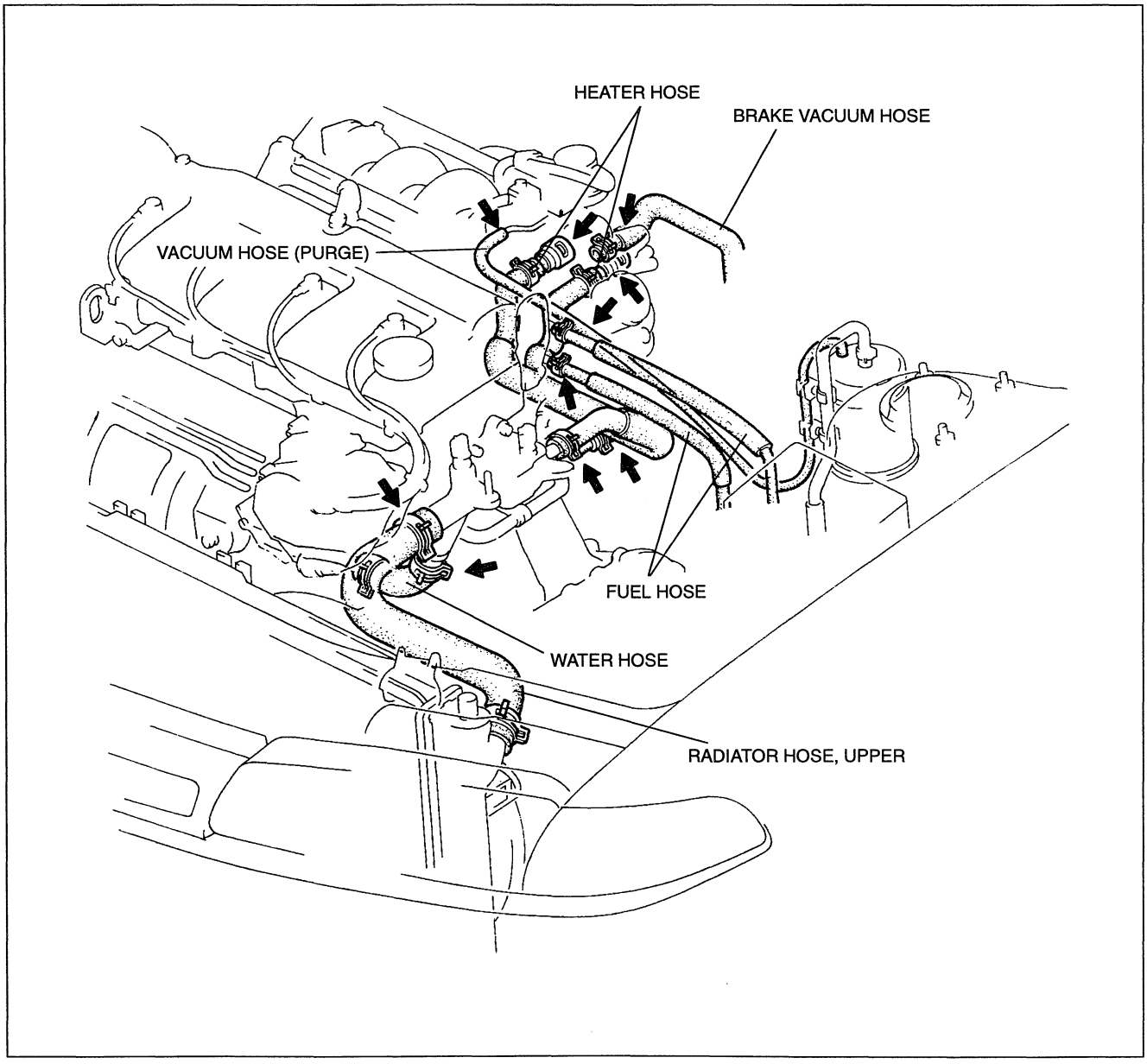
1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to section E1.)
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal, referring to **Installation Note**.

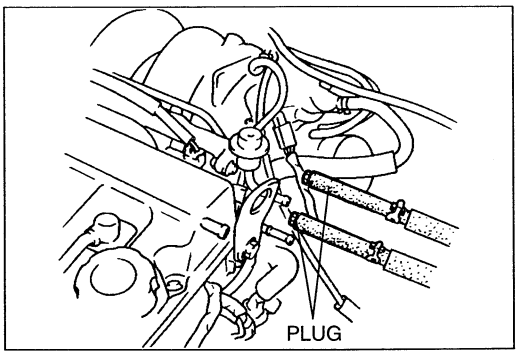


1. Splash shield
2. Fresh-air duct
3. Mass air flow sensor connector
4. Intake air temperature sensor connector
5. Air cleaner and resonance chamber No.2
6. Accelerator cable
   Installation Note ..... page B1–21
7. Hose
   Removal Note ..... below
   Installation Note ..... page B1–21
8. Harness connectors
9. Timing belt
   Removal / Installation ..... page B1–10
10. Distributor
    Installation Note ..... page B1–20
11. Camshaft pulley
    Removal Note ..... page B1–18
    Installation Note ..... page B1–20
12. Camshaft
    Removal Note ..... page B1–18
    Installation Note ..... page B1–19
13. Intake manifold bracket
14. Cylinder head bolt
    Removal Note ..... page B1–18
    Installation Note ..... page B1–18
15. Cylinder head
16. Cylinder head gasket

Removal Note
Hose

Disconnect the hoses shown in the figure.



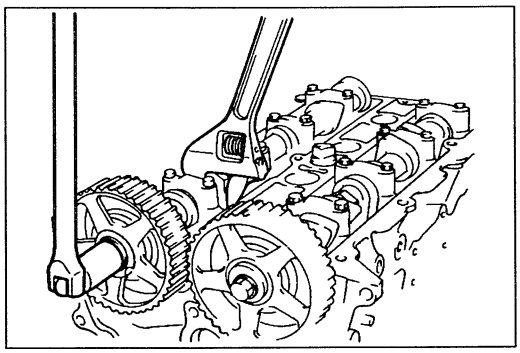


Fuel hose

Warning

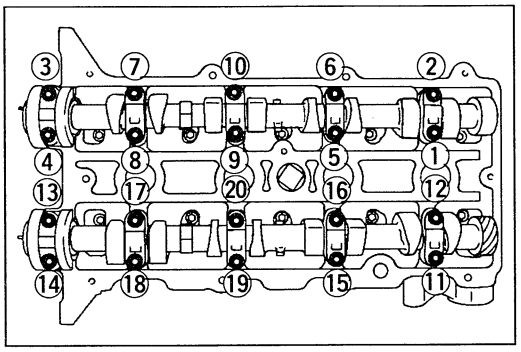
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, aways complete the "Fuel Line Safety Procedure" on section F1, F3.**

Plug the disconnected hoses to prevent fuel leakage.



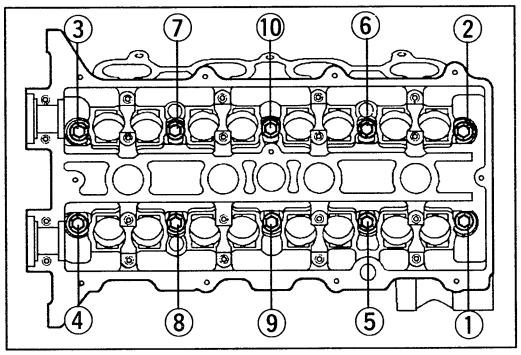
Camshaft pulley

1. Hold the camshaft by using a wrench on the cast hexagon as shown, and loosen the camshaft pulley bolt.
2. Remove the camshaft pulley.



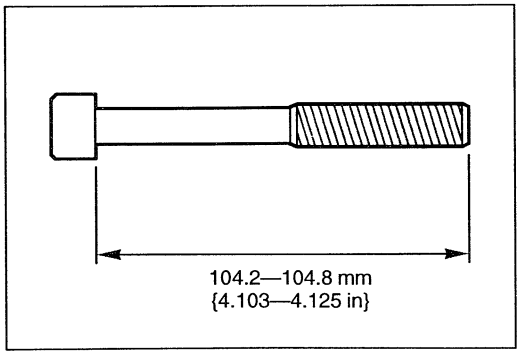
Camshaft

1. Loosen the camshaft cap bolts in five or six steps in the order shown.
2. Remove the camshaft caps.
3. Remove the camshafts.
4. Remove the camshaft oil seals from the camshafts.



Cylinder head bolt

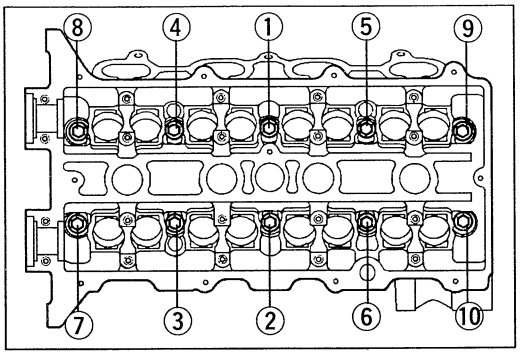
1. Loosen the cylinder head bolts in two or three steps in the order shown.
2. Remove the cylinder head bolts.



Installation Note
Cylinder head bolt

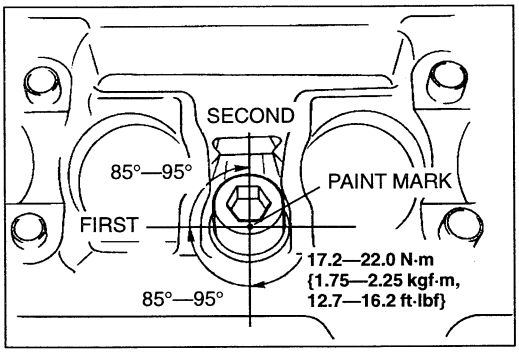
1. Measure the length of each cylinder head bolt below its head.

Length
Standard: 104.2—104.8 mm {4.103—4.125 in}
Maximum: 105.5 mm {4.154 in}

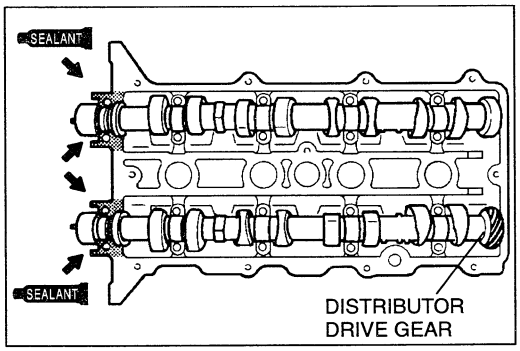


2. If the length exceeds the maximum, replace the bolt.
3. Apply clean engine oil to the bolt threads and head seat.
4. Install and tighten the cylinder head bolts.
   (1) Tighten the bolts to the specified torque in the order shown.

Tightening torque: 17.2—22.0 N·m {1.75—2.25 kgf·m, 12.7—16.2 ft·lbf}



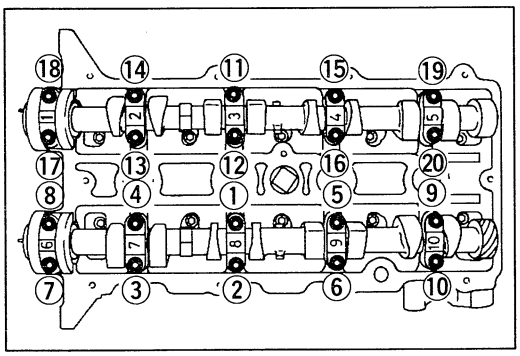
   (2) Put a paint mark on each bolt head.
   (3) Use this mark as a reference, tighten the bolts **85°—95°** in the order shown.
   (4) Further tighten each bolt by turning **another 85°—95°**.



Camshaft

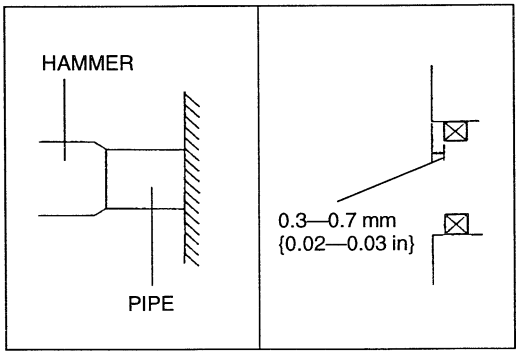
Note
- The exhaust camshaft is machined with the distributor drive gear.

1. Apply clean engine oil to the camshaft journals and bearings and install the camshaft in position.
2. Apply silicone sealant to the shaded areas as shown.



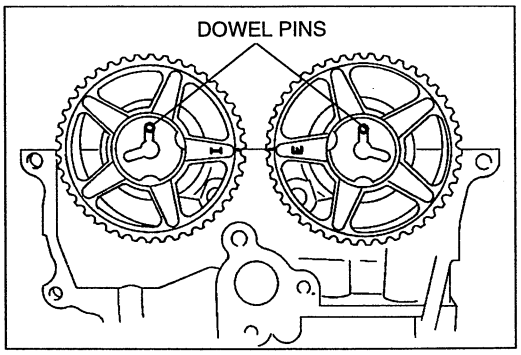
3. Install the camshaft caps according to the cap number as shown.
4. Install the camshaft cap bolts and tighten them in five or six steps in the order shown.

Tightening torque: 11.3—14.2 N·m {115—145 kgf·cm, 100—125 in·lbf}



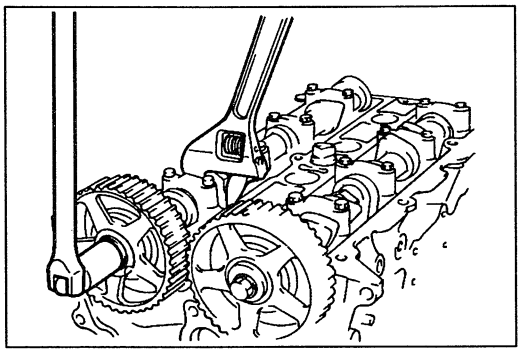
5. Apply clean engine oil to the lip of each new camshaft oil seal.
6. Push the oil seal slightly in by hand.
7. Using a pipe and hammer, tap the oil seal in evenly until it is flush with the edge the camshaft cap.

Note
- Oil seal outer diameter: 48.0 mm {1.89 in}
- Oil seal inner diameter: 34.0 mm {1.34 in}



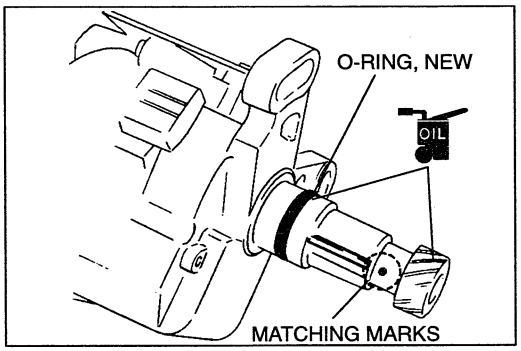
Camshaft pulley

1. Install the camshaft pulleys, positioning the dowel pins as shown.



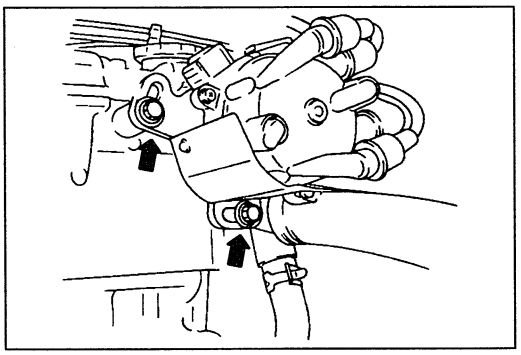
2. Apply clean engine oil to the bolt threads and hand tighten the lock bolts.
3. Hold the camshaft by using a wrench on the cast hexagon as shown, and tighten each bolt.

Tightening torque:
50—60 N·m {5.0—6.2 kgf·m, 37—44 ft·lbf}



Distributor

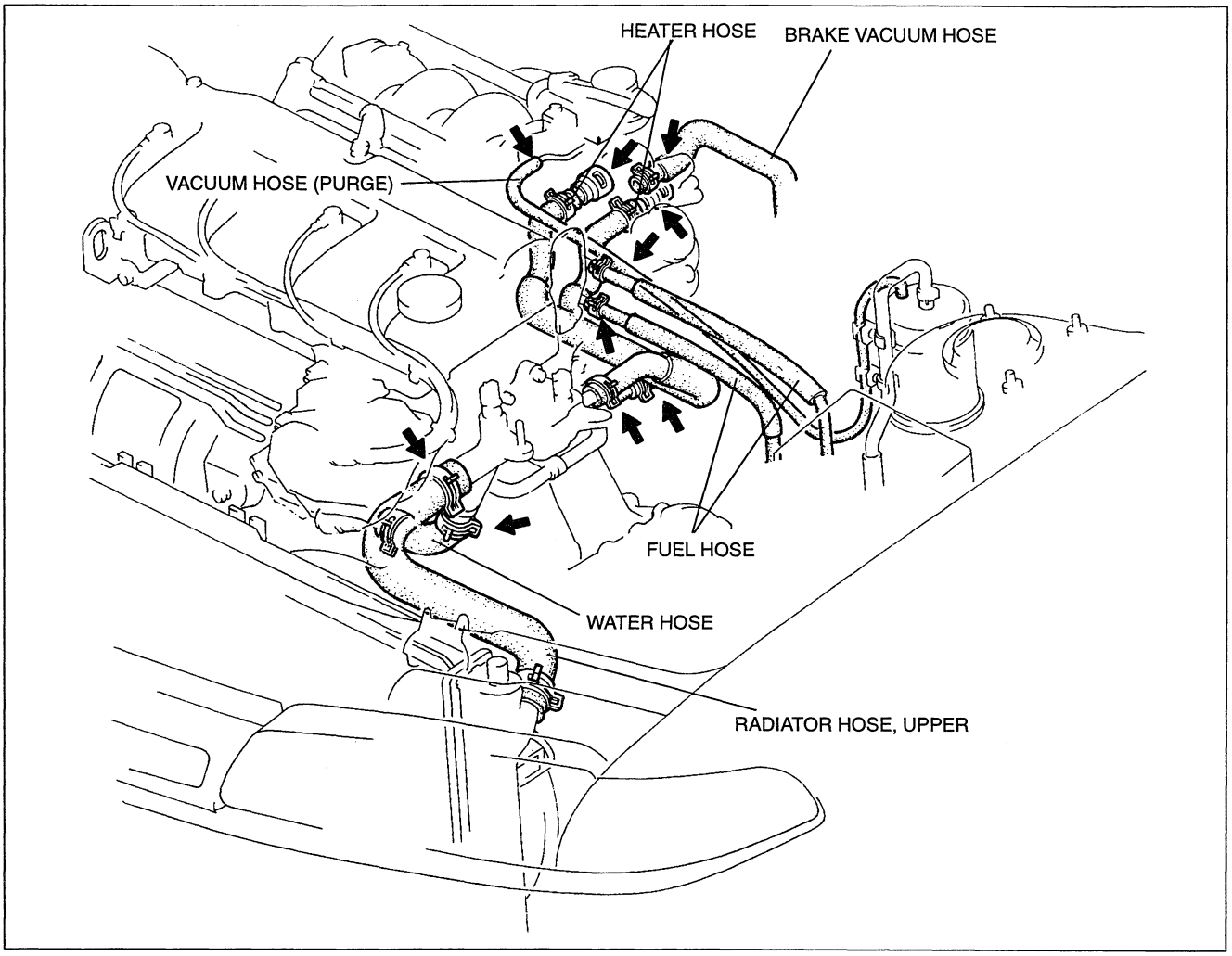
1. Apply clean engine oil to a new O-ring and position it on the distributor.
2. Apply clean engine oil to the drive gear.
3. Align the matching marks as shown.

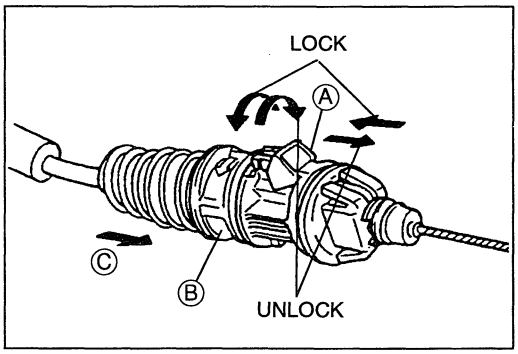


4. Install the distributor and hand tighten the mounting bolts.

Hose

Connect the hoses shown in the figure.





Accelerator cable

1. Verify that the throttle valve is fully closed.
2. Measure the free play of the accelerator cable.

   Free play: 1.5—4.0 mm {0.06—0.15 in}

3. If not as specified, turn stopper Ⓑ while pressing lock button Ⓐ to release the lock.
4. Push the spring in direction Ⓒ and adjust the cable free play.
5. Lock stopper Ⓐ after locking stopper Ⓑ.

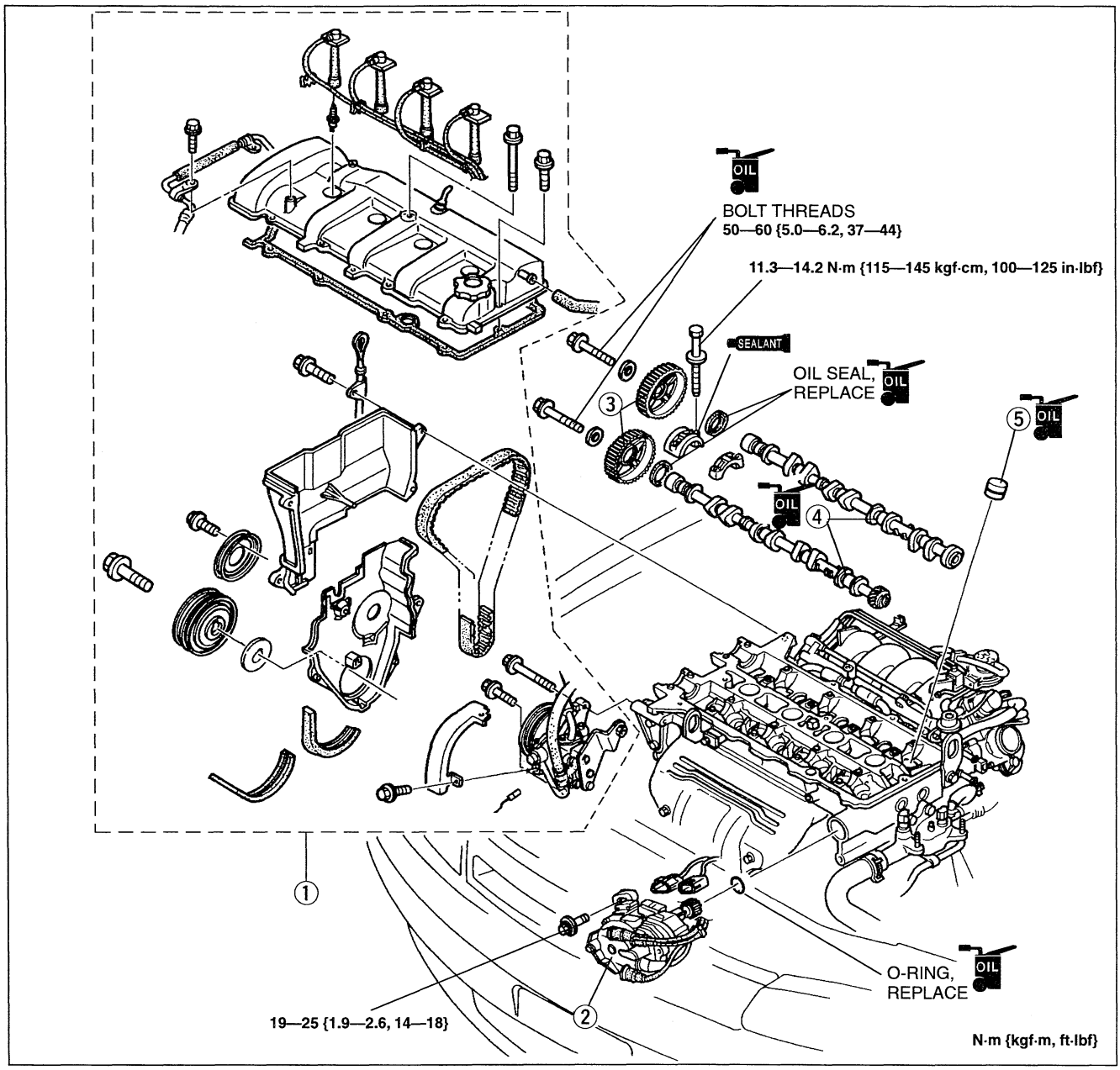
Steps After Installation

1. Connect the negative battery cable.
2. Fill the radiator with the specified amount and type of engine coolant. (Refer to section E1.)
3. Start the engine and
   (1) check the engine oil and engine coolant leakage.
   (2) check the ignition timing and idle speed. (Refer to sections F1, F3.)
   (3) check the operation of the emission control system.
4. Recheck the engine oil and engine coolant levels.

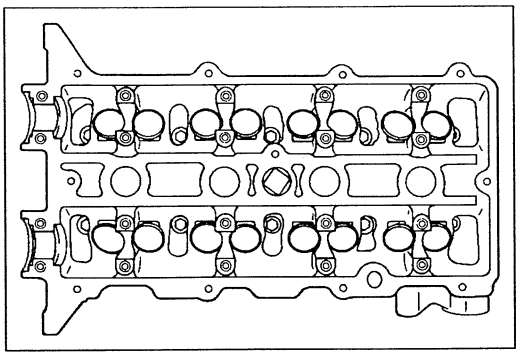
HLA
Removal / Installation

Caution
- **Removal and installation of the HLA must be carried out only when the problem cannot be solved by the HLA troubleshooting (Refer to page B1–7.)**

1. Disconnect the negative battery cable.
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**.



1. Timing belt
   Removal / Installation ..... page B1–10
2. Distributor
   Installation Note ..... page B1–20
3. Camshaft pulley
   Removal Note ..... page B1–18
   Installation Note ..... page B1–20
4. Camshaft
   Removal Note ..... page B1–18
   Installation Note ..... page B1–19
5. HLA
   Removal Note ..... page B1–23
   Installation Note ..... page B1–23

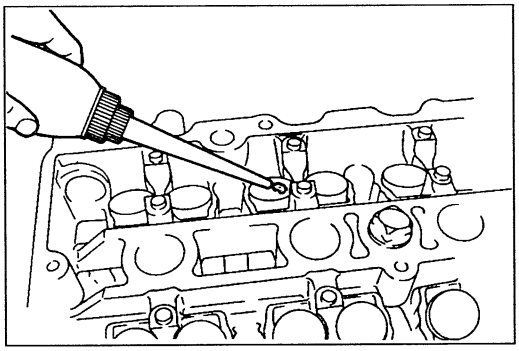


Removal Note
HLA

Caution
- **The HLA must be reinstalled in the same positions from which they were removed. If they are not, it can cause premature and uneven wear.**

Note
- Mark the HLA to show their original positions.

1. Remove the HLA from the cylinder head.
2. Store the HLA upside down in an oil-filled container.



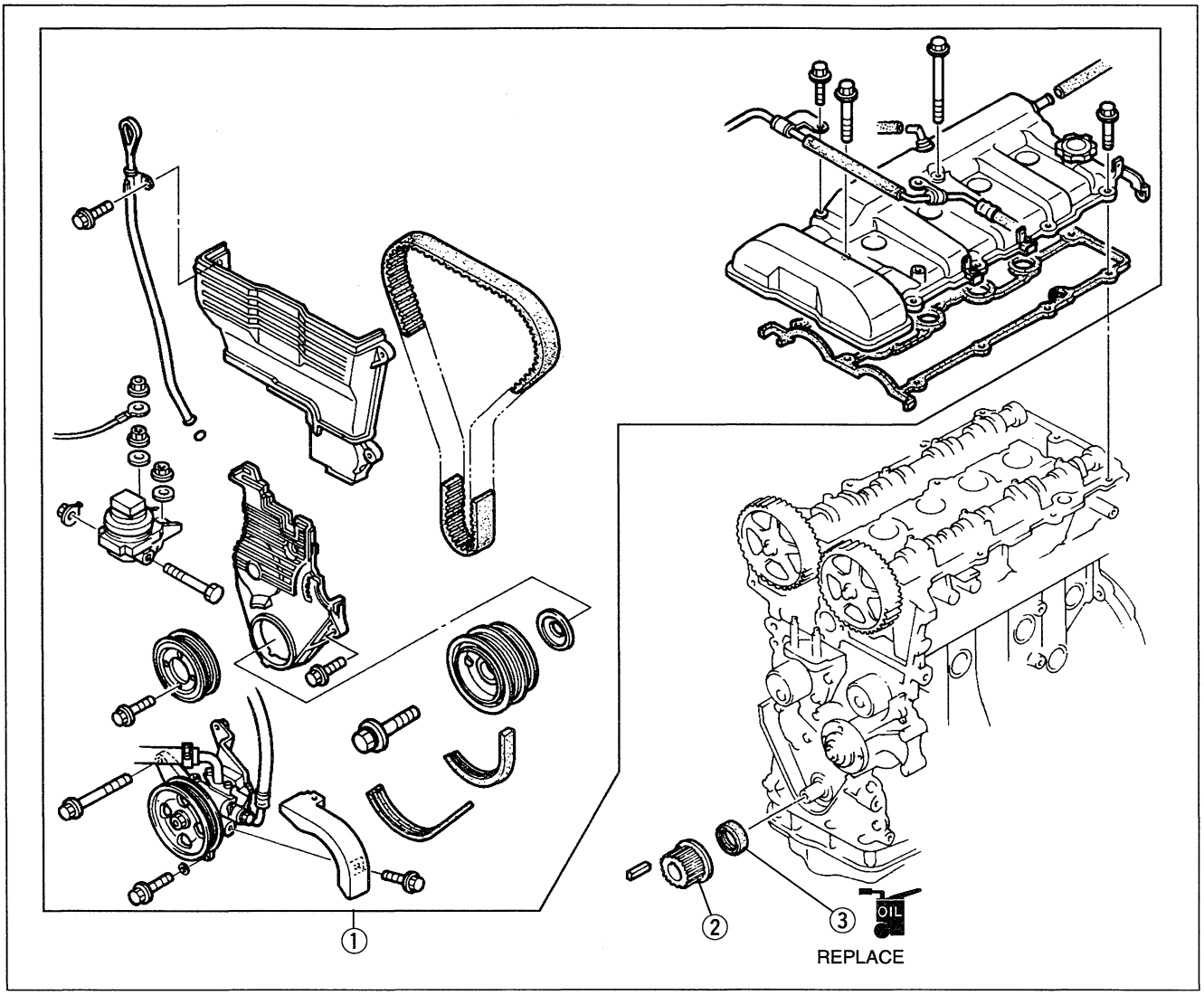
Installation Note
HLA
1. Apply clean engine oil to the friction surfaces.
2. If the HLA are being reused, install them in the positions from which they were removed.
3. Verify that the HLA move smoothly in their bores.

Step After Installation
1. Connect the negative battery cable.
2. Start the engine and
   (1) check the engine oil leakage.
   (2) check the ignition timing and idle speed. (Refer to sections F1, F3.)
   (3) check the operation of the emission control system. (Refer to section F1.)
   (4) check the HLA tappet noise. (Refer to page B1–7.)
3. Recheck the engine oil and engine coolant levels.

FRONT OIL SEAL

Replacement

1. Disconnect the negative battery cable.
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**.

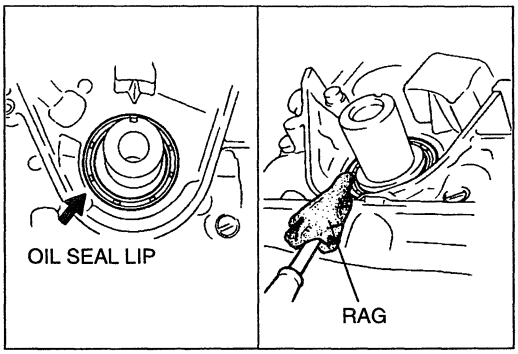


1. Timing belt
   Removal / Installation ..... page B1–10
2. Timing belt pulley
   Removal Note ..... below
   Installation ..... page B1–25
3. Oil seal
   Removal Note ..... page B1–25
   Installation Note ..... page B1–25

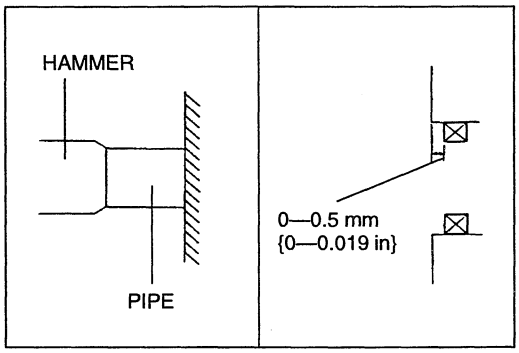
Removal Note

Timing belt pulley

1. Remove the timing belt pulley.
2. Remove the timing belt pulley key.

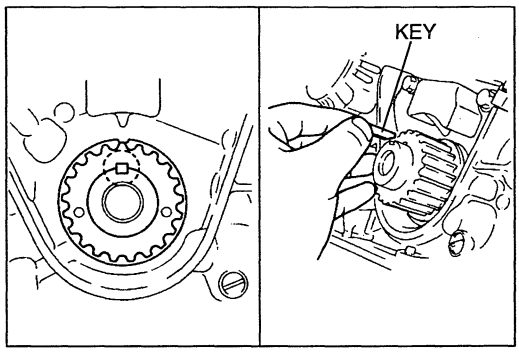


Oil seal
1. Cut the oil seal lip by using a razor knife.
2. Remove the oil seal by using a screwdriver protected with a rag.



Installation Note
Oil seal
1. Apply clean engine oil to the lip of the new oil seal.
2. Push the oil seal slightly in by hand.
3. Using a pipe and a hammer, tap the oil seal in evenly until it is flush with the edge of the oil pump body.

Note
- Oil seal outer diameter: 54.5 mm {2.15 in}
- Oil seal inner diameter: 42.5 mm {1.67 in}



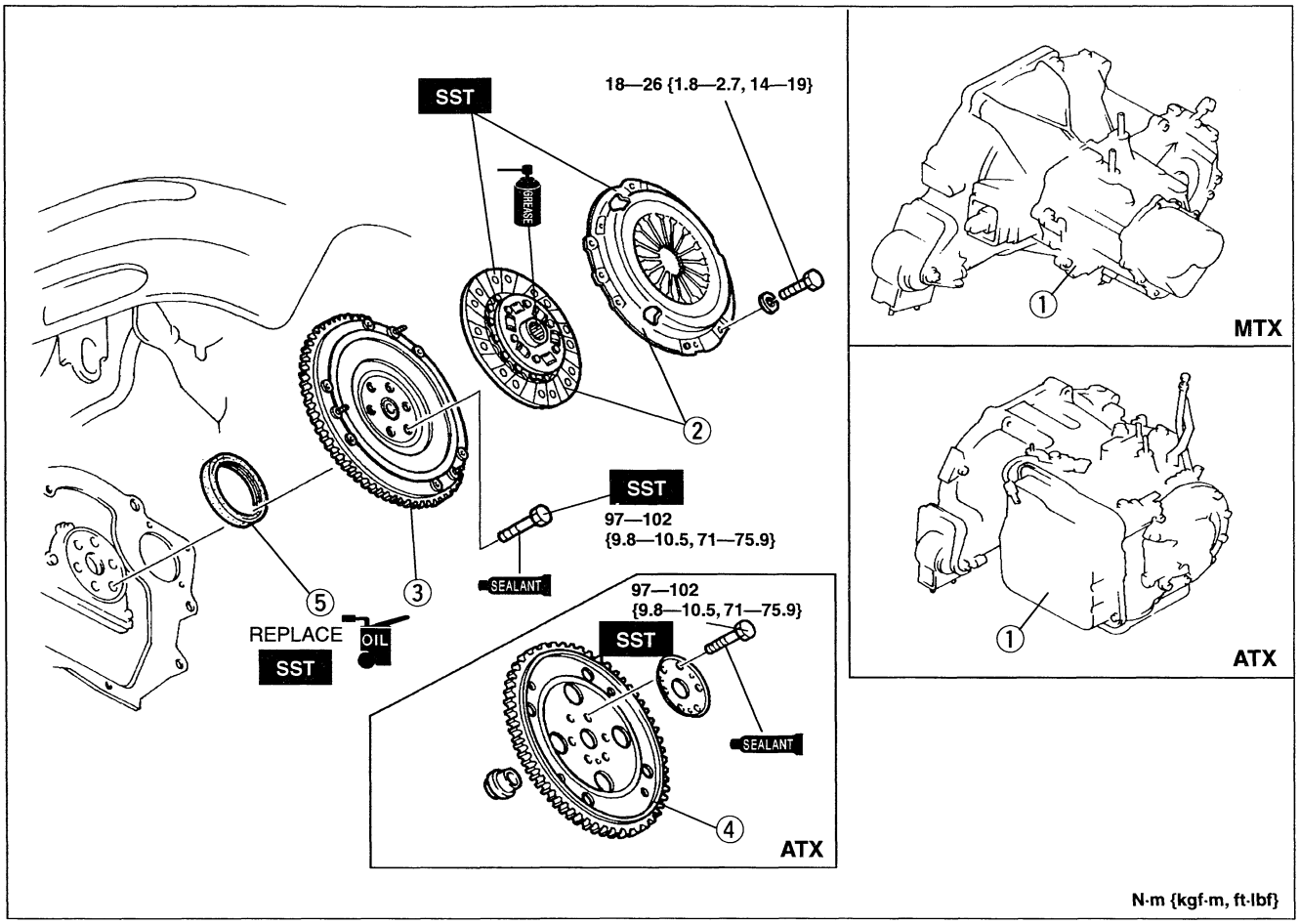
Timing belt pulley
1. Install the timing belt pulley.
2. Install the timing belt pulley key.

Steps After Installation
1. Connect the negative battery cable.
2. Start the engine and check follows:
   - Ignition timing. (Refer to sections F1, F3.)

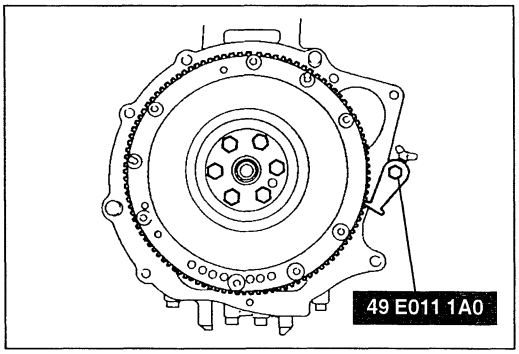
REAR OIL SEAL

Replacement

1. Disconnect the negative battery cable.
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**.

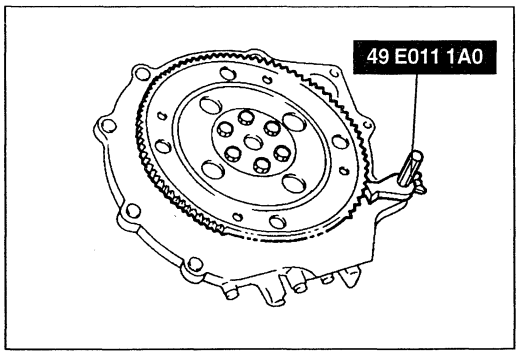


1. Transaxle
   MTX
   Removal / Installation ..... section J
   ATX
   Removal / Installation ..... section K2
2. Clutch cover, clutch disc (MTX)
   Removal / Installation ..... section H
3. Flywheel (MTX)
   Removal Note ..... below
   Installation Note ..... page B1–27
4. Drive plate (ATX)
   Removal Note ..... page B1–27
   Installation Note ..... page B1–28
5. Oil seal
   Removal Note ..... page B1–27
   Installation Note ..... page B1–27

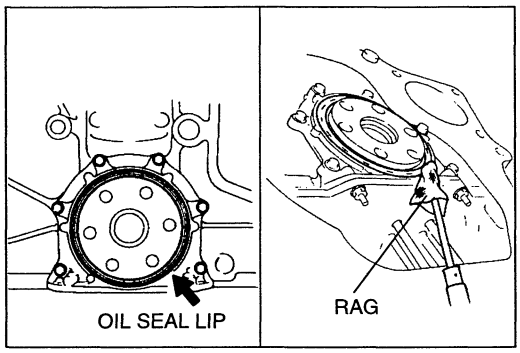


Removal Note
Flywheel (MTX)

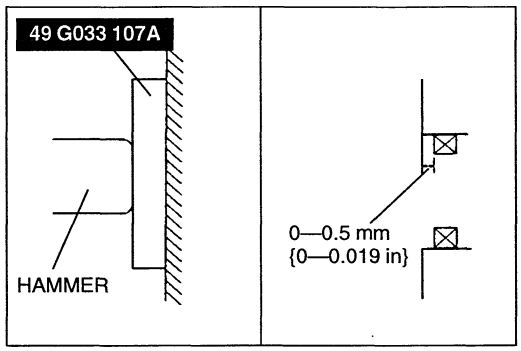
1. Hold the flywheel by using the **SST**.
2. Remove the flywheel bolts.
3. Remove the flywheel.



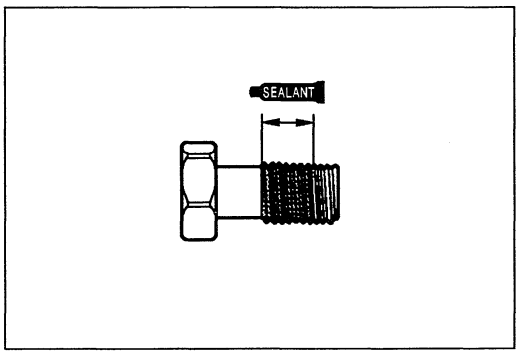
Drive plate (ATX)
1. Hold the drive plate by using the **SST**.
2. Remove the drive plate bolts.
3. Remove the backing plate, drive plate, and adapter.



Oil seal
1. Cut the oil seal lip by using a razor knife.
2. Remove the oil seal by using a screwdriver protected with a rag.



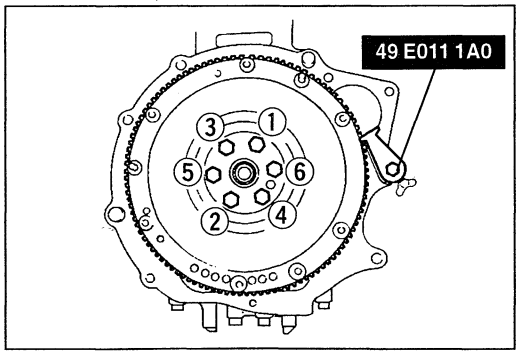
Installation Note
Oil seal
1. Apply clean engine oil to the lip of the new oil seal.
2. Push the oil seal slightly in by hand.
3. Using the **SST** and a hammer, tap the oil seal in evenly until it is flush with the edge of the rear cover.



Flywheel (MTX)
1. Remove the sealant from the flywheel bolt holes in the crankshaft and from the flywheel bolts.

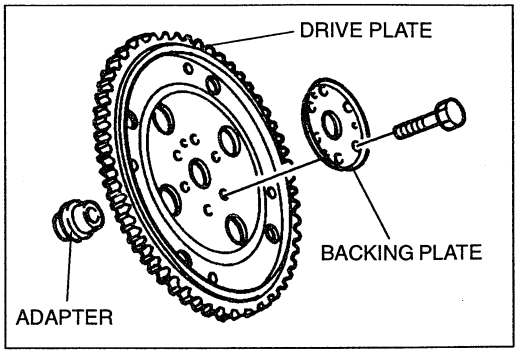
Caution
- **If all of the old thread sealant cannot be removed from the bolt, it will not torque properly. Replace the bolt.**

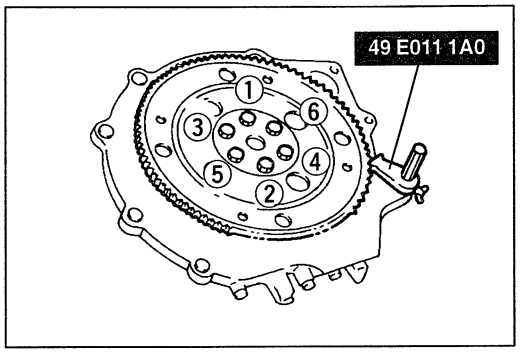
Note
- If a new bolt is used, do not apply thread locking sealant. New Mazda bolts have sealant on them.



2. Set the flywheel onto the crankshaft.
3. Apply sealant to the flywheel bolts and install them.
4. Hold the flywheel by using the **SST**.
5. Tighten the bolts in two or three steps in the order shown.

Tightening torque:
97—102 N·m {9.8—10.5 kgf·m, 71—75.9 ft·lbf}





Drive plate (ATX)

1. Remove the sealant from the drive plate bolt holes in the crankshaft and from the drive plate bolts.

Caution

- **If all of the old thread sealant cannot be removed from the bolt, it will not torque properly. Replace the bolt.**

Note

- If a new bolt is used, do not apply thread locking sealant. New Mazda bolts have sealant on them.

2. Install the adapter, drive plate, and backing plate onto the crankshaft.
3. Apply sealant to the drive plate bolts and install them.
4. Hold the drive plate by using the **SST**.
5. Tighten the bolts in two or three steps in the order shown.

Tightening torque:
97—102 N·m {9.8—10.5 kgf·m, 71—75.9 ft·lbf}

Steps After Installation

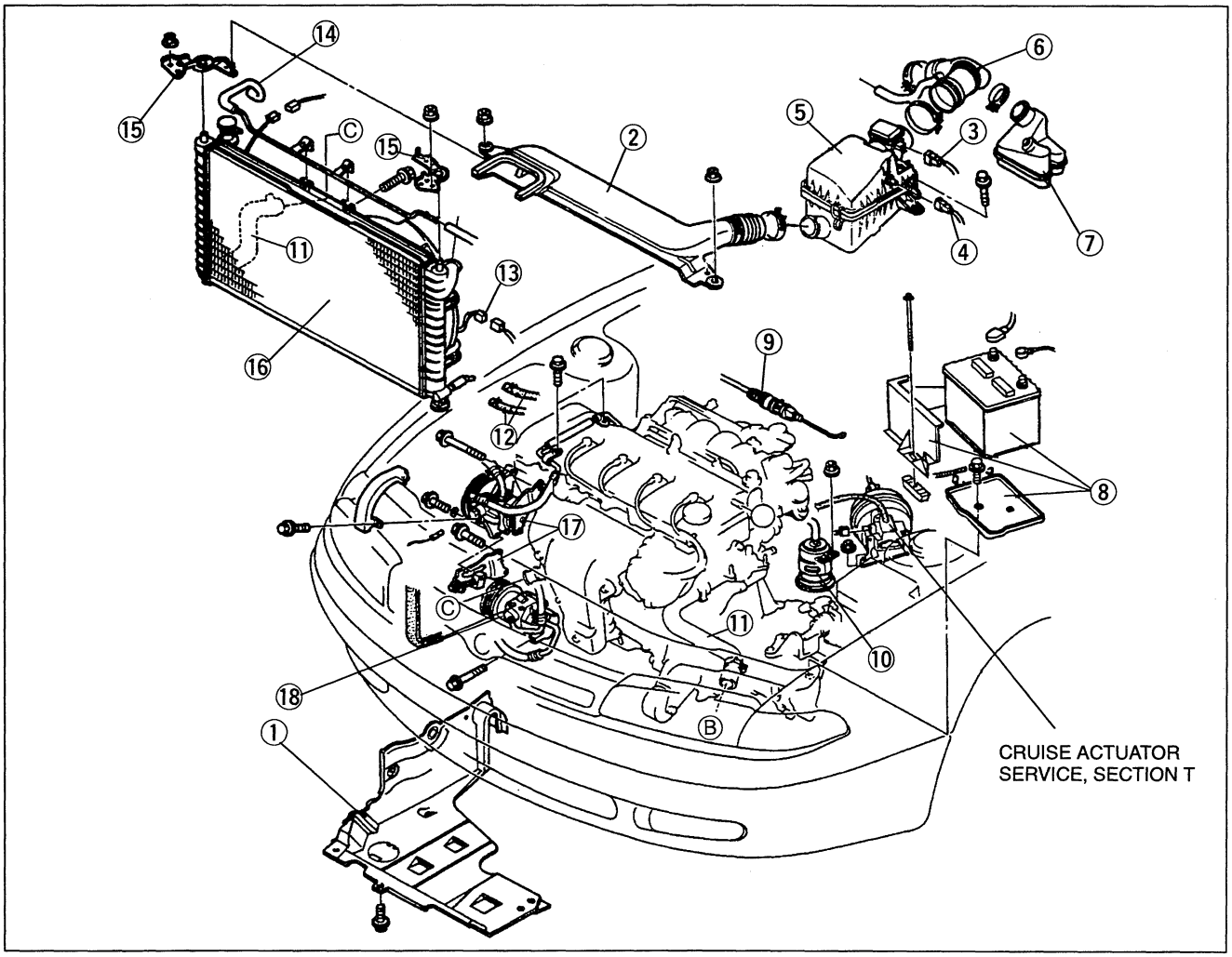
1. Connect the negative battery cable.
2. Start the engine and perform engine adjustments as necessary.
3. Check the oil level.

REMOVAL

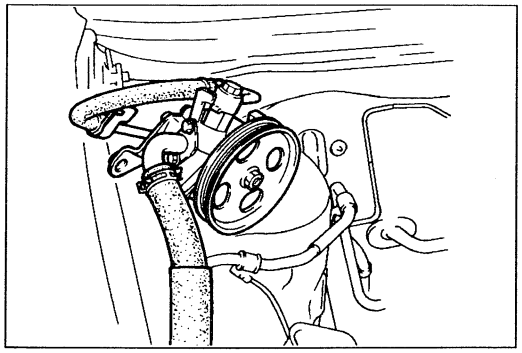
Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure" on sections F1, F3.**

PROCEDURE
1. Disconnect the negative battery cable.
2. Drain the engine coolant and transaxle oil. (Refer to section E1 and section J, K2.)
3. Remove the hood and front wheels.
4. Remove in the order shown in the figure, referring to **Removal Note**.

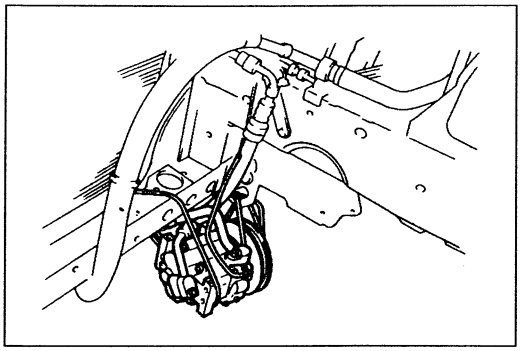
Step 1



1. Splash shield
2. Fresh-air duct
3. Mass air flow sensor connector
4. Intake air temperature sensor connector
5. Air cleaner assembly
6. Air hose
7. Resonance chamber No.2
8. Battery and carrier
9. Accelerator cable
10. Fuel filter
11. Radiator hose
12. Oil cooler hose (ATX)
13. Cooling fan motor connector
14. Coolant reservoir pipe
15. Radiator bracket
16. Radiator and cooling fan assembly
17. P/S oil pump and adjuster
    Removal Note ..... page B1–30
18. A/C compressor (if equipped)
    Removal Note ..... page B1–30



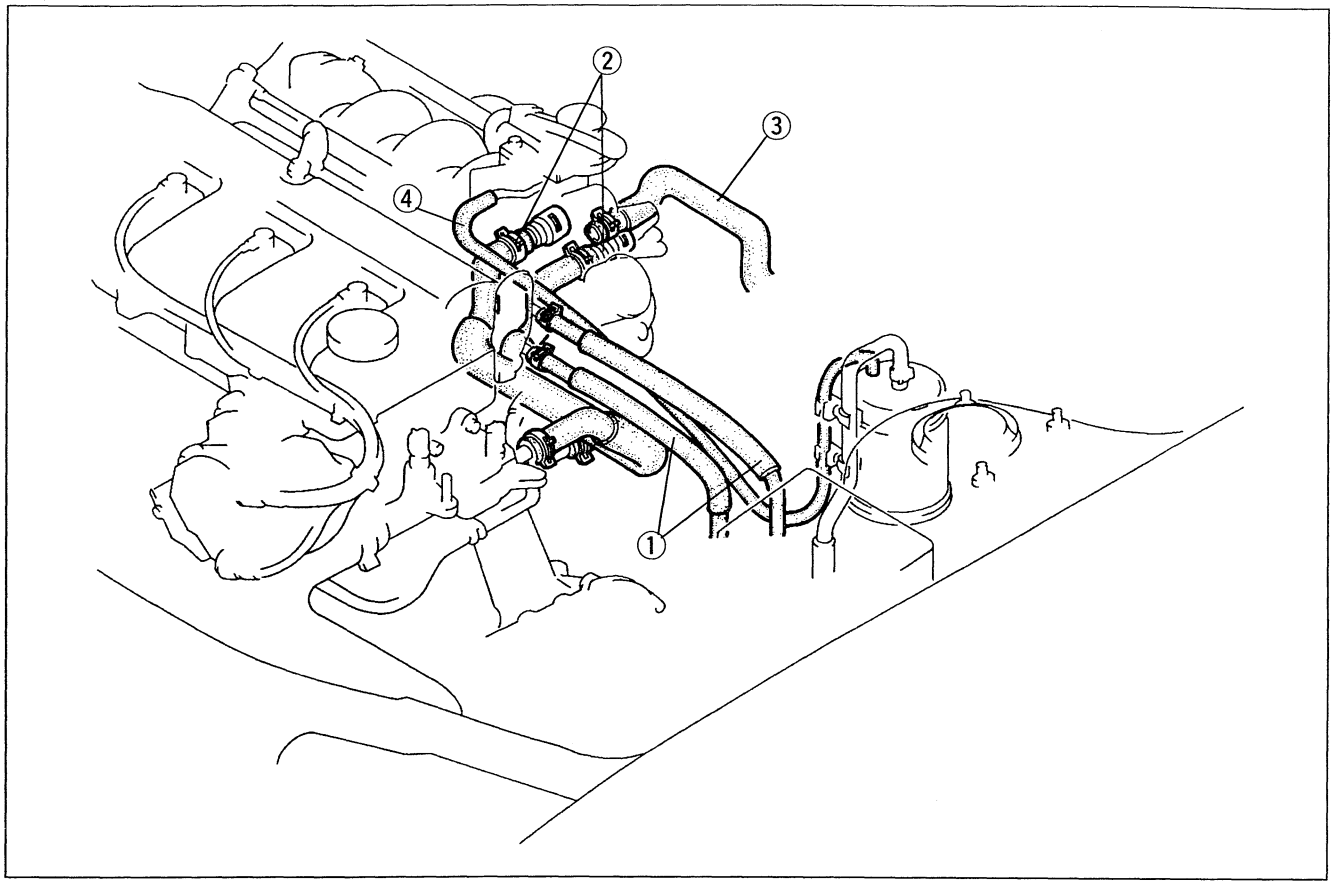
Removal Note
P/S oil pump
1. Remove the P/S oil pump with the hoses still connected.
2. Position the pump away from the engine and affix it with wire.



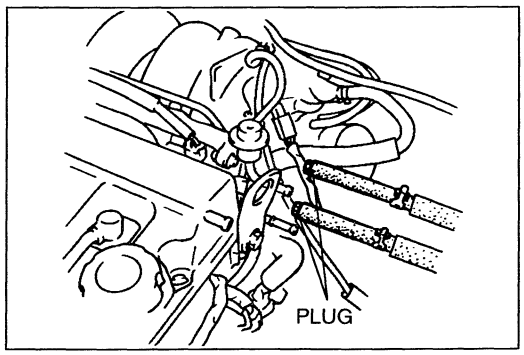
A/C compressor (if equipped)
1. Remove the A/C compressor with the hoses still connected.
2. Position the compressor away from the engine and affix it with wire.

Step 2
Disconnect the harness connectors.

Step 3
Disconnect the hoses shown in the figure.



1. Fuel hose
   Removal Note ..... below
2. Heater hose
3. Brake vacuum hose
4. Vacuum hose (Purge)

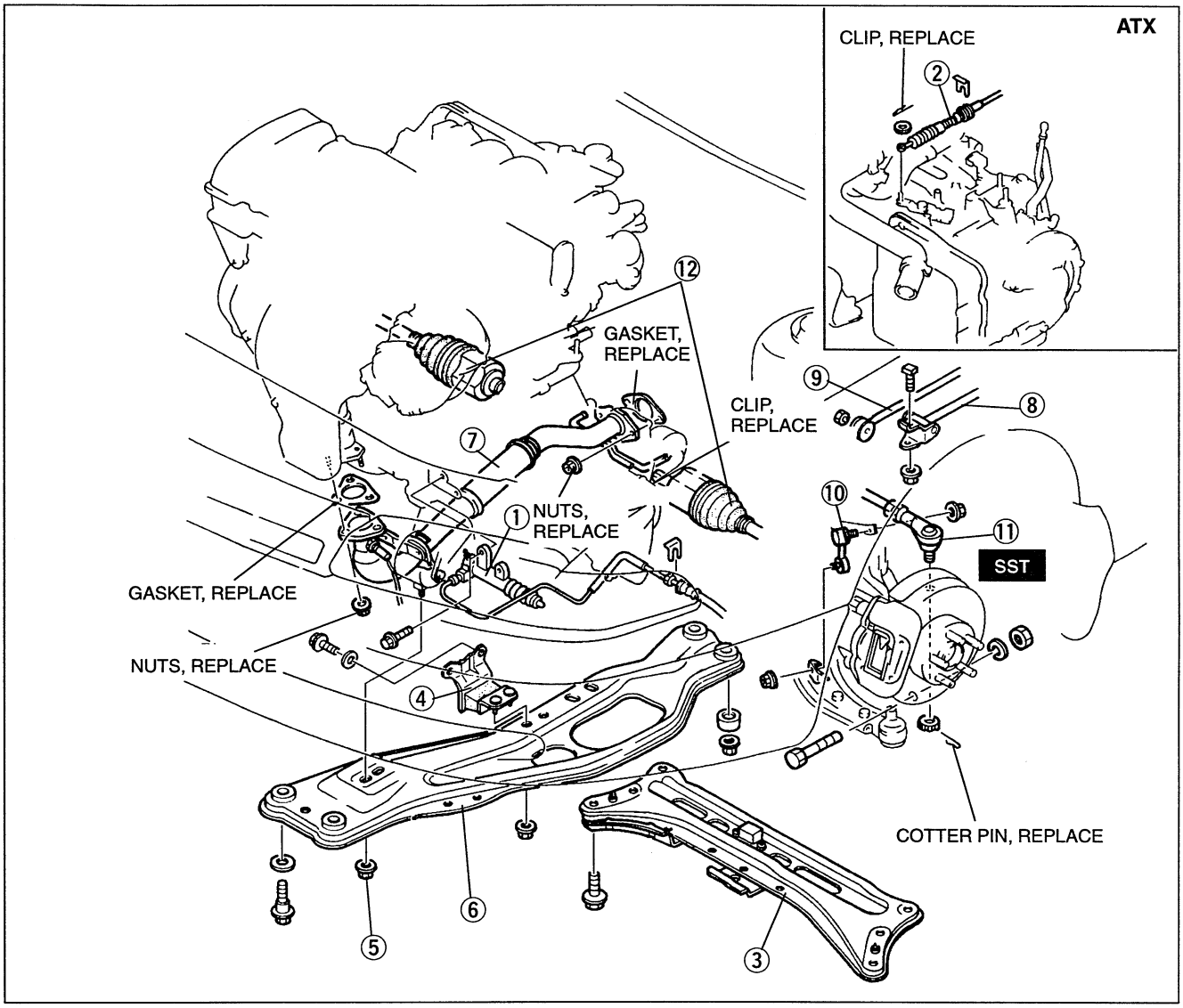


Removal Note
Fuel hose

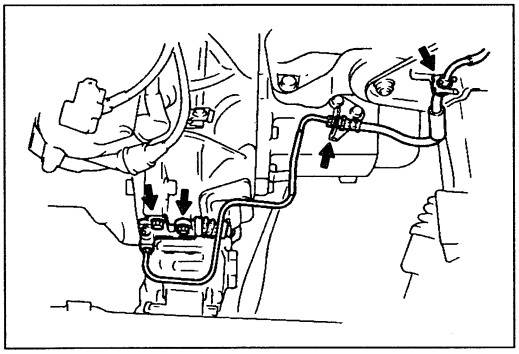
Warning
- **Fuel vapor is hazardous. If can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

Plug the disconnected hoses to avoid fuel leakage.

Step 4



1. Clutch release cylinder (MTX)
   Removal Note ..... below
2. Shift control cable (ATX)
3. Transverse member
4. No.5 engine mount rubber
5. No.2 engine mount nuts
6. Engine mount member
   Removal Note ..... page B1–33
7. Exhaust pipe
8. Shift control rod (MTX)
9. Extension bar (MTX)
10. Stabilizer control link
11. Tie-rod end ball joint
    Removal Note ..... page B1–33
12. Drive shaft
    Removal Note ..... page B1–33

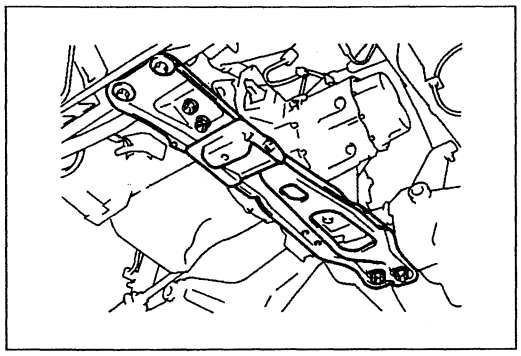


Removal Note
Clutch release cylinder (MTX)

1. Remove the bolts and clips as shown.

Caution
- **Bending the pipe can cause kinks or cracks.**

2. Remove the release cylinder with the hose still connected and position it away from the transaxle.

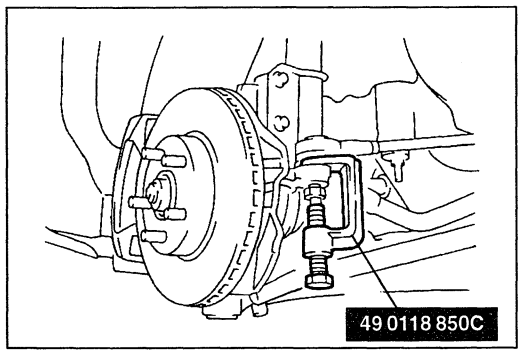


Engine mount member

Warning

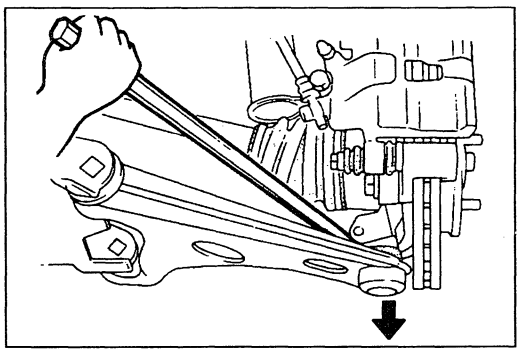
- **Removing the member without first suspending the engine can cause the engine to tilt or fall and cause injury. Suspend the engine properly before removing the member.**

1. Suspend the engine by using a chain block.
2. Remove the No.2 engine mount nuts.
3. Remove the engine mount member bolts and nuts and remove the engine mount member.



Tie-rod end ball joint

1. Remove the cotter pin and loosen the nut so that it is flush with the end of the ball joint stud.
2. Separate the knuckle arm and ball joint by using the **SST**.



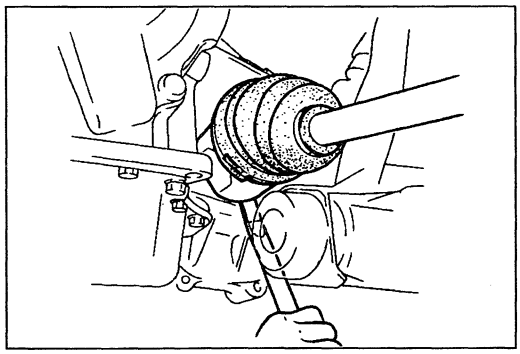
Drive shaft

1. Remove the bolts and nuts from the lower arm ball joints.

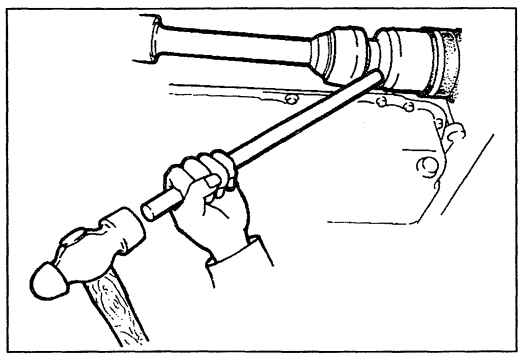
Caution

- **The ball joint dust boots and oil seals are damaged easily if this procedure is not done correctly.**

2. Pry the lower arm downward to separate it from the knuckles.

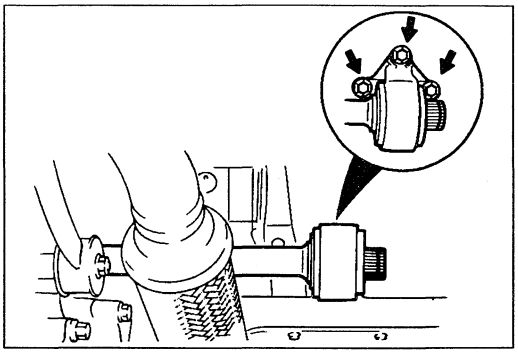


3. Separate the drive shafts from the transaxle by prying with a bar inserted between the shaft and the case. (Left side)



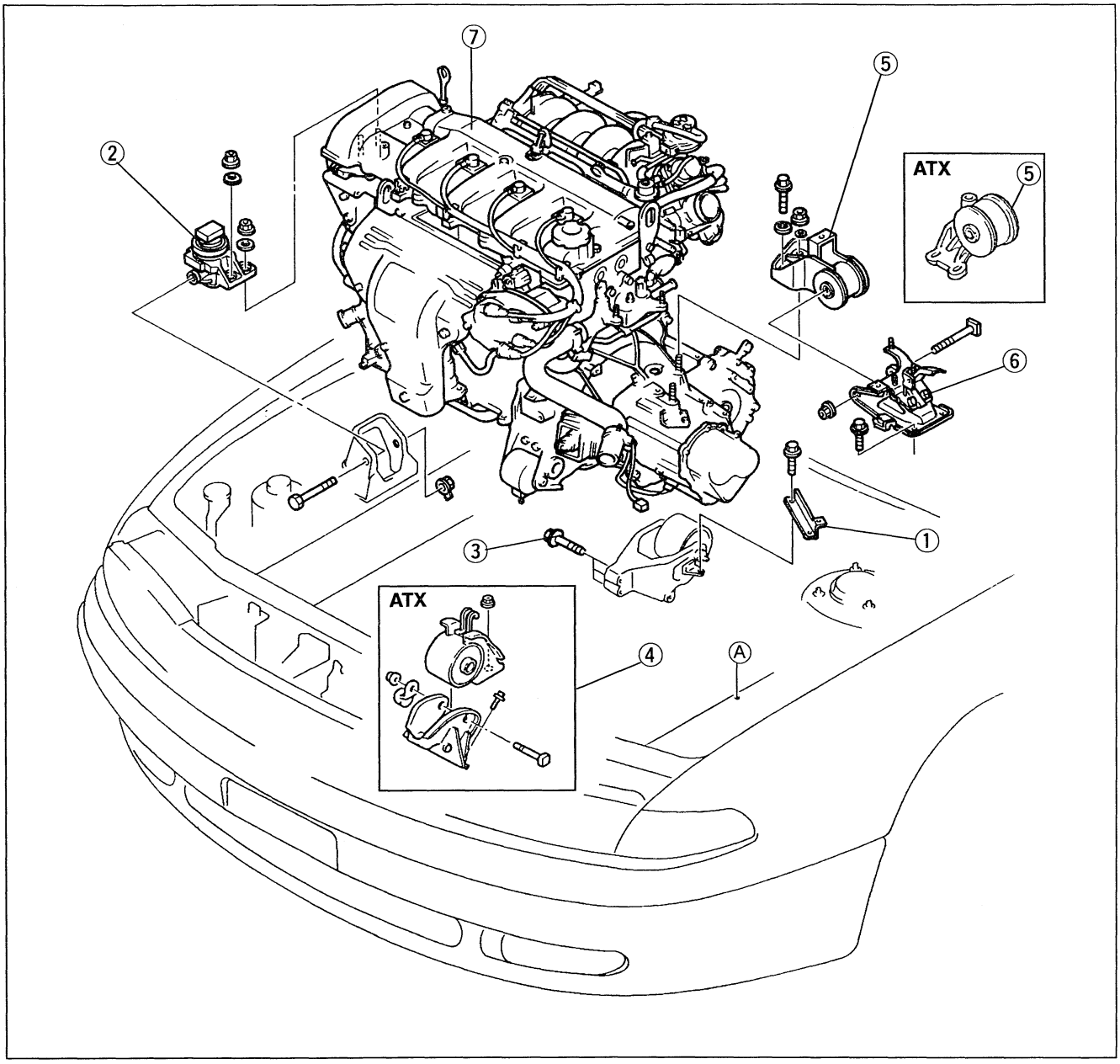
4. As shown in the figure, insert a pry bar between the drive shaft and the joint shaft and tap on the bar to uncouple them. (Right side)

REMOVAL

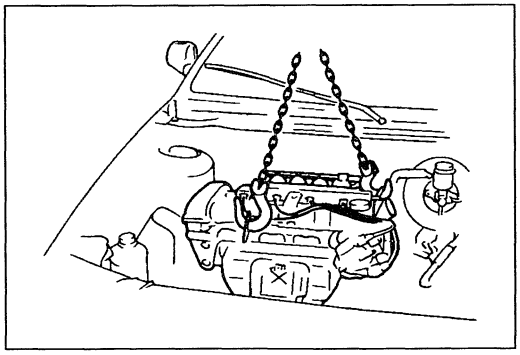


5. Remove the joint mounting bolts.
6. Remove the joint shaft.

Step 5



1. No.1 engine mount stay bracket
2. No.3 engine mount rubber
3. No.1 engine mount bolts (MTX)
4. No.1 engine mount (ATX)
5. No.4 engine mount rubber
6. No.4 engine mount bracket
7. Engine and transaxle assembly
   Removal Note ..... below

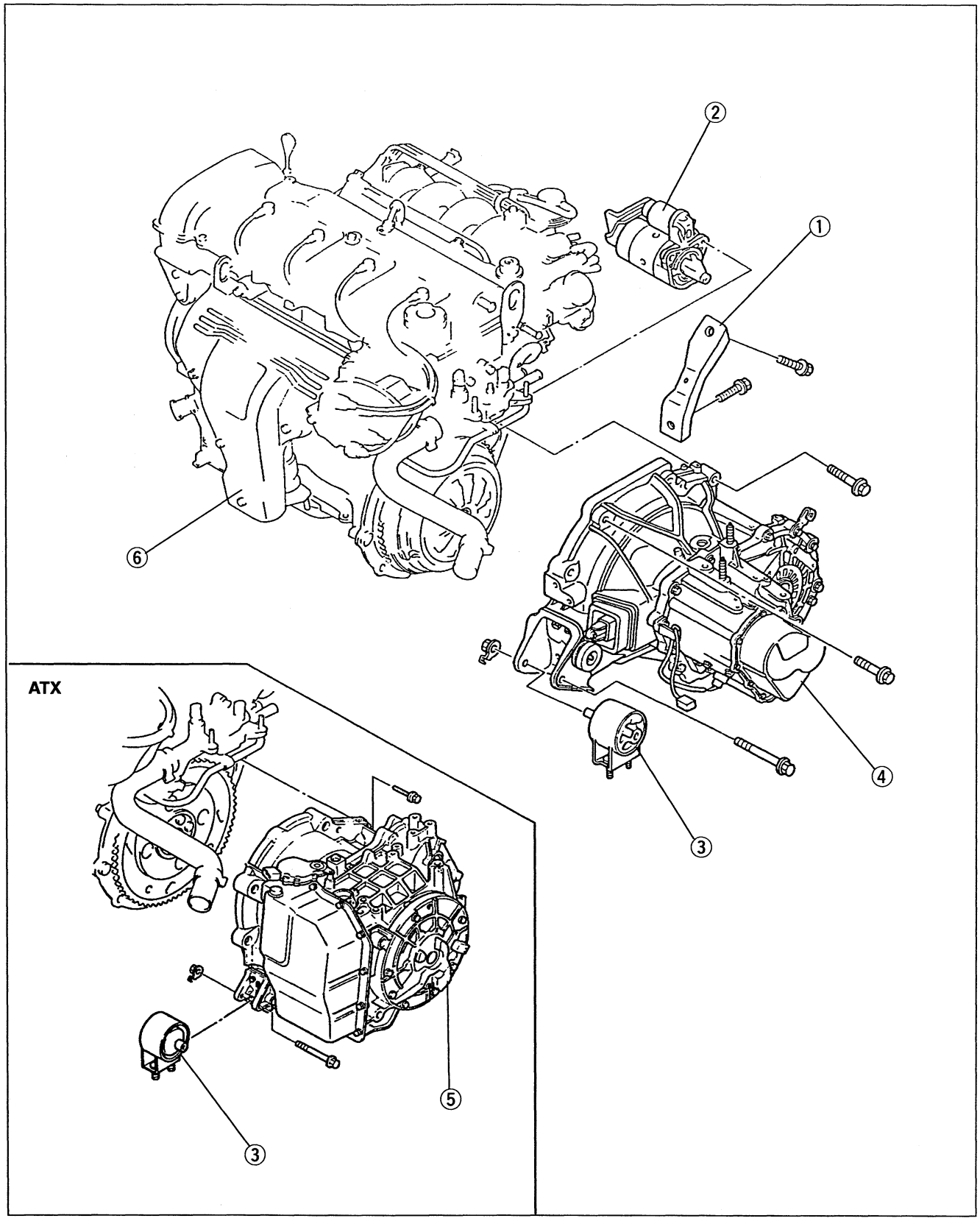


Removal Note

Engine and transaxle assembly

Slowly lift the engine and transaxle assembly as a unit. Keep the engine from swinging or bumping into components in the engine compartment.

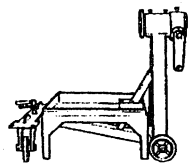
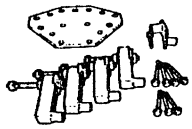
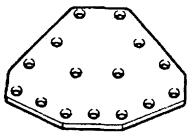
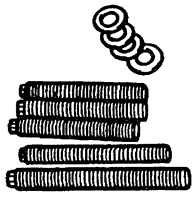
Step 6



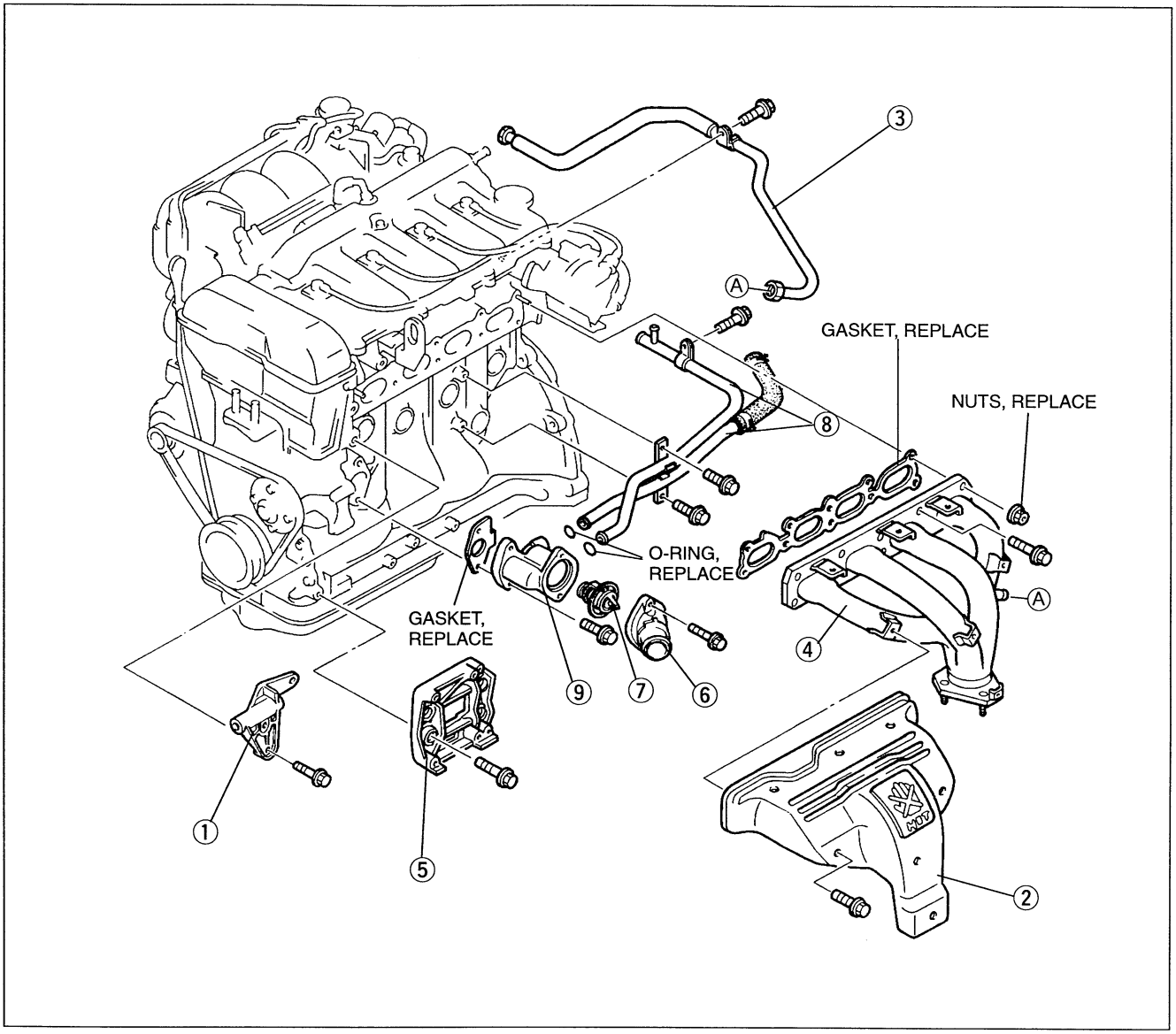
1. Intake manifold bracket
2. Starter
3. No.2 engine mount rubber
4. Manual transaxle
5. Automatic transaxle
6. Engine assembly

ENGINE STAND MOUNTING

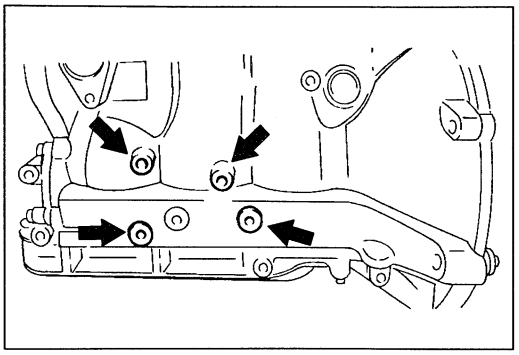
PREPARATION
SST

49 0107 680A Engine stand 	For disassembly / assembly of engine	49 L010 1A0 Hanger set, engine stand 	For disassembly / assembly of engine
49 L010 101 Plate (Part of 49 L010 1A0) 	For disassembly / assembly of engine	49 L010 102 Arms (Part of 49 L010 1A0) 	For disassembly / assembly of engine
49 L010 103 Hooks (Part of 49 L010 1A0) 	For disassembly / assembly of engine	49 L010 104 Nuts (Part of 49 L010 1A0) 	For disassembly / assembly of engine
49 L010 105 Bolts (Part of 49 L010 1A0) 	For disassembly / assembly of engine	49 L010 106 Bolts (Part of 49 L010 1A0) 	For disassembly / assembly of engine

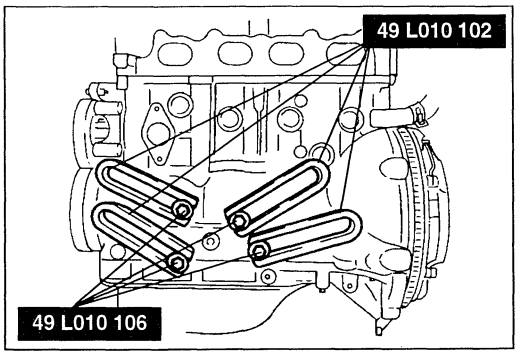
PROCEDURE
Step 1
Remove in the order shown in the figure.



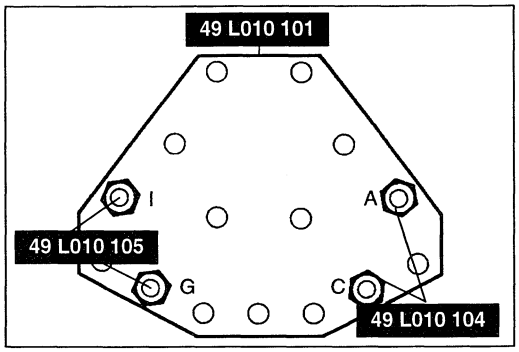
1. P/S oil pump bracket
2. Exhaust manifold insulator
3. EGR pipe
4. Exhaust manifold
5. A/C compressor bracket (if equipped)
6. Thermostat cover
7. Thermostat
8. Water bypass pipe
9. Thermostat housing



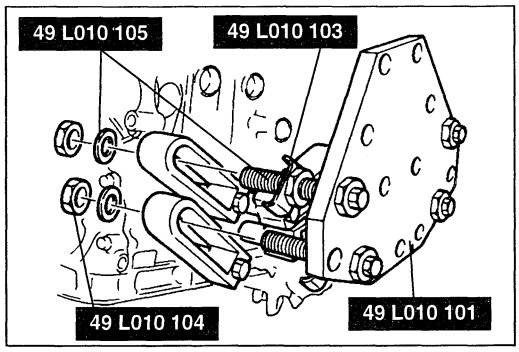
Step 2
Engine stand mounting procedure
1. Use the holes shown in the figure.



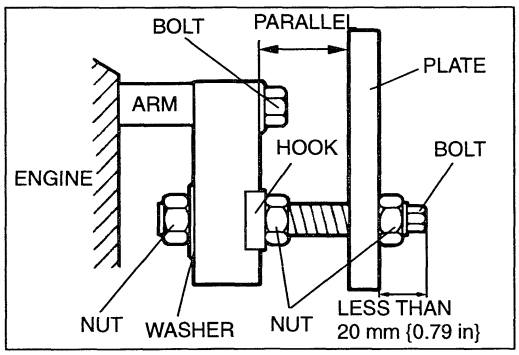
2. Install the **SST** (arms) to the holes as shown in the figure, and hand tighten the **SST** (bolts).



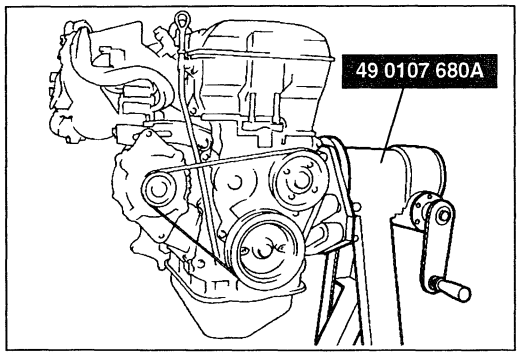
3. Assemble the **SST** (bolts and plate) in the specified position.



4. Assemble the **SST** (nuts, hooks, and bolts).
5. Install the **SST** to the respective arms.



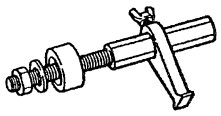
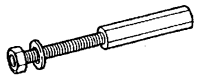
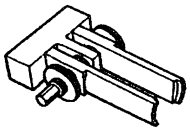
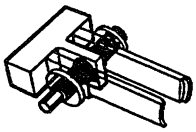
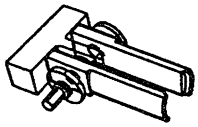
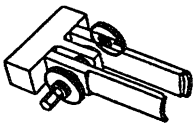
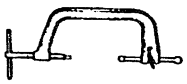
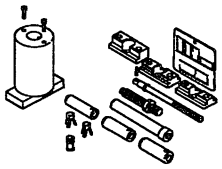
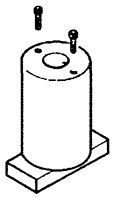
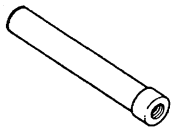
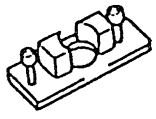
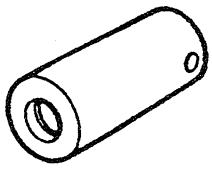
6. Adjust the **SST** (bolts) so that less than **20 mm {0.79 in}** of thread is exposed.
7. Make the **SST** (plate and arms) parallel by adjusting the **SST** (bolts and nuts).
8. Tighten the **SST** (bolts and nuts) to affix the **SST** firmly.

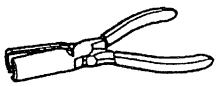


9. Mount the engine on the **SST** (engine stand).

DISASSEMBLY

PREPARATION
SST

49 E011 1A0 Brake, ring gear 	For prevention of crankshaft rotation	49 E011 103 Shaft (Part of 49 E011 1A0) 	For prevention of crankshaft rotation
49 E011 104 Collar (Part of 49 E011 1A0) 	For prevention of crankshaft rotation	49 E011 105 Stopper (Part of 49 E011 1A0) 	For prevention of crankshaft rotation
49 B012 0A2 Pivot 	For removal / installation of valves	49 B012 012 Body (Part of 49 B012 0A2) 	For removal / installation of valves
49 B012 013 Foot (Part of 49 B012 0A2) 	For removal / installation of valves	49 B012 014 Locknut (Part of 49 B012 0A2) 	For removal / installation of valves
49 0636 100B Arm, valve spring lifter 	For removal / installation of valves	49 L011 0A0B Tool set, piston pin setting 	For removal / installation of piston pins
49 L011 001 Body, support block (Part of 49 L011 0A0B) 	For removal / installation of piston pins	49 L011 006 Installer, piston pin (Part of 49 L011 0A0B) 	For removal / installation of piston pins
49 E011 002 Screw 	For removal / installation of piston pins	49 D011 002B Head, support block (Part of 49 L011 0A0B) 	For removal / installation of piston pins
49 E011 001 Guide 	For removal / installation of piston pins	49 G014 001 Wrench, oil filter 	For removal / installation of oil filter

49 S120 170 Remover, valve seal 	For removal of valve seals	—	—

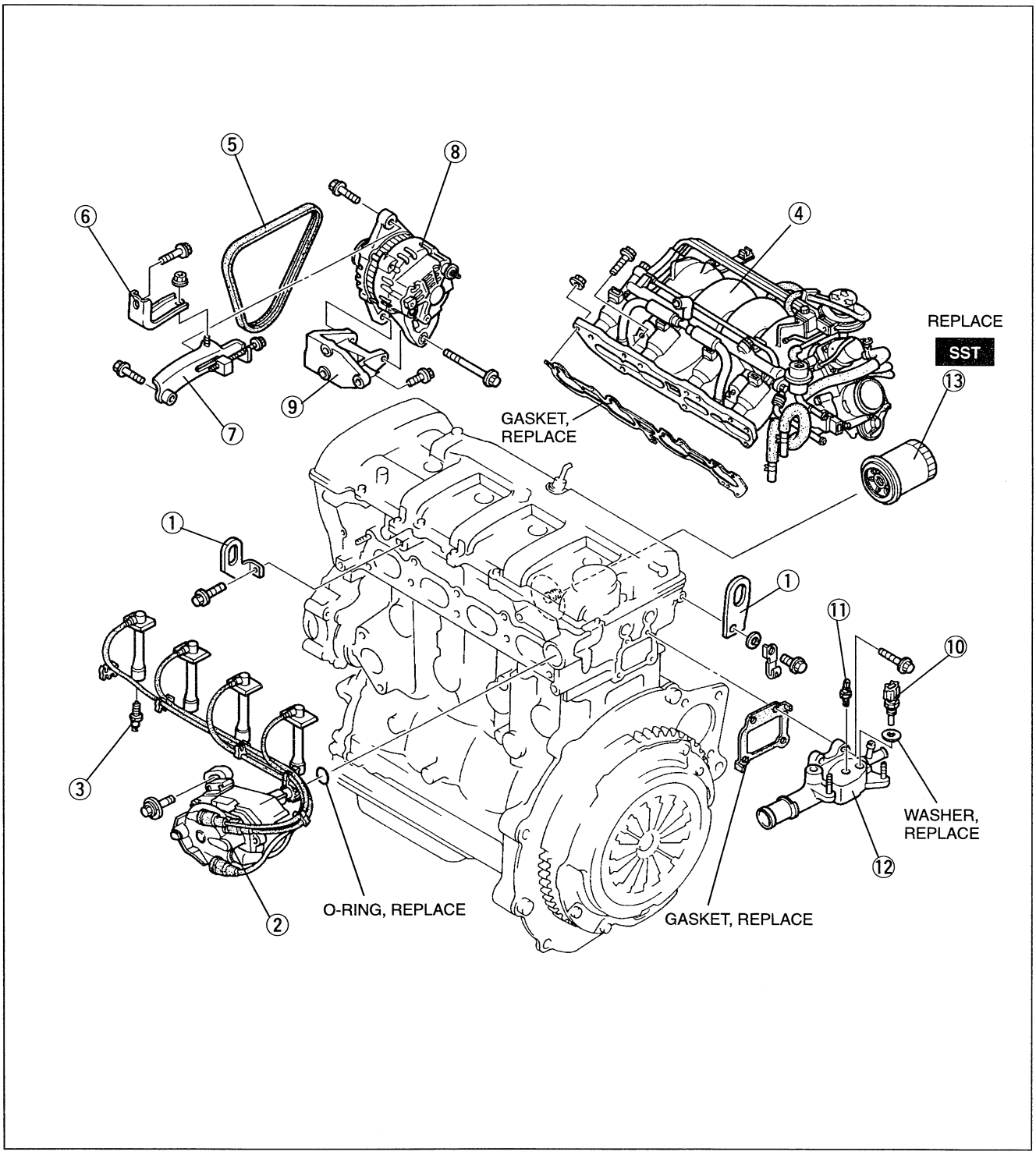
1. Code or arrange all identical parts (such as HLA, pistons, piston rings, connecting rods, and valve springs) so that they can be reinstalled in the cylinder from which they were removed.
2. Clean the parts by using a steam cleaner. Blow dry with compressed air.

Warning

- **Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.**

AUXILIARY PARTS

1. Drain the engine oil.
2. Disassemble in the order shown in the figure.

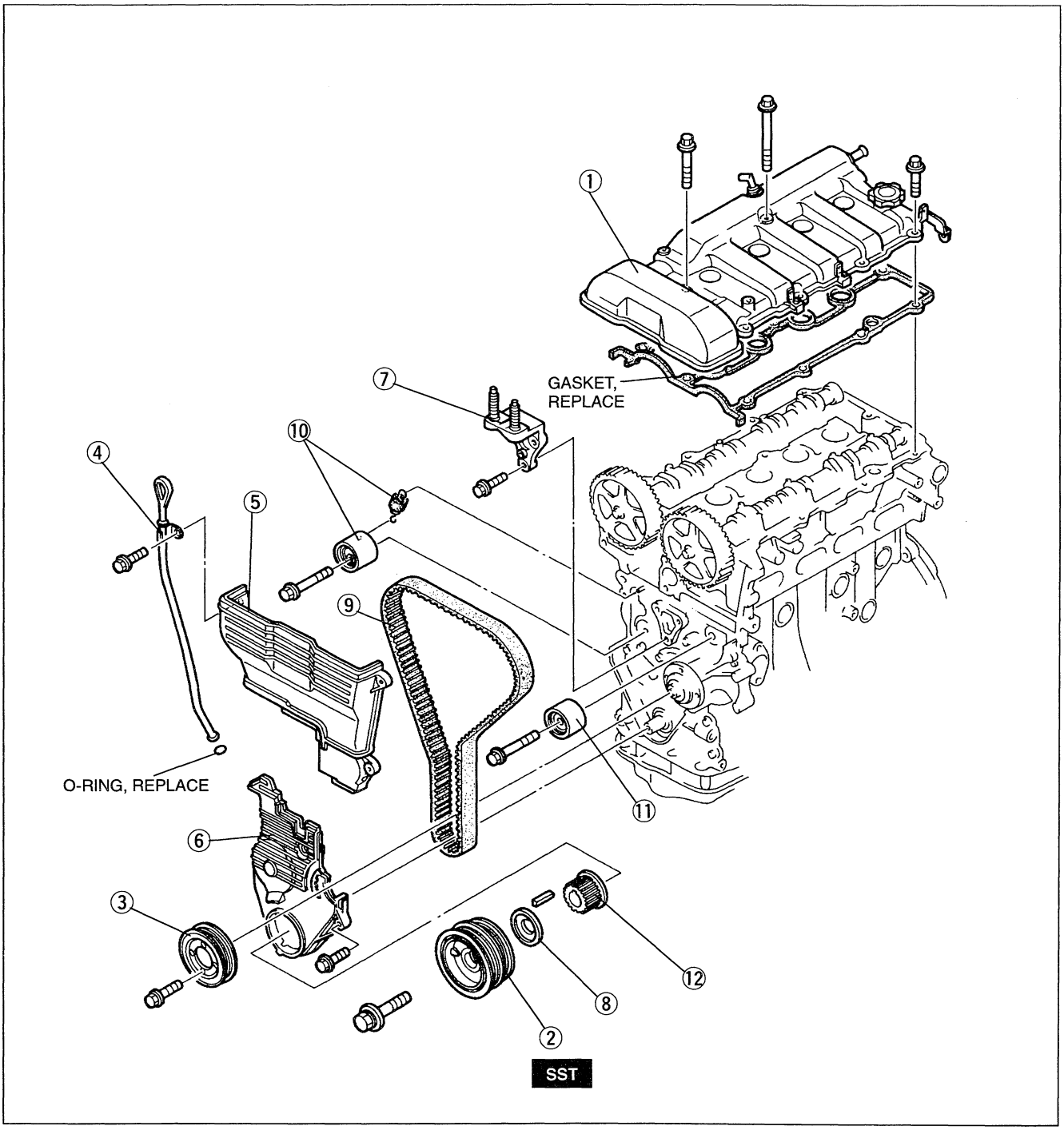


1. Engine hanger
2. Distributor and high-tension lead
3. Spark plug
4. Intake manifold assembly
5. Drive belt
6. Generator stay (MTX)
7. Generator strap
8. Generator
9. Generator bracket
10. Engine coolant temperature sensor
11. Heat gauge sender unit
12. Water outlet
13. Oil filter

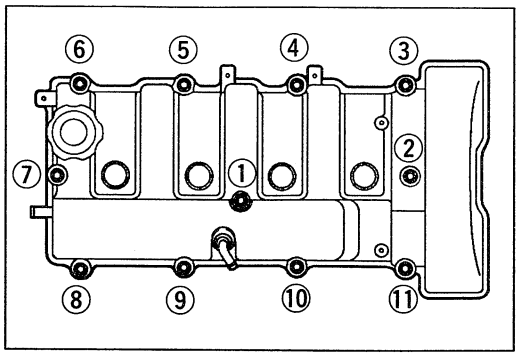
    Removal ..... section D1

TIMING BELT

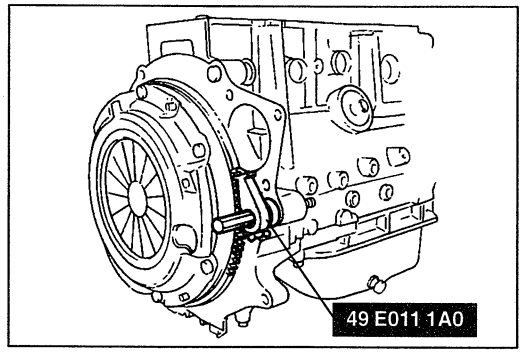
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



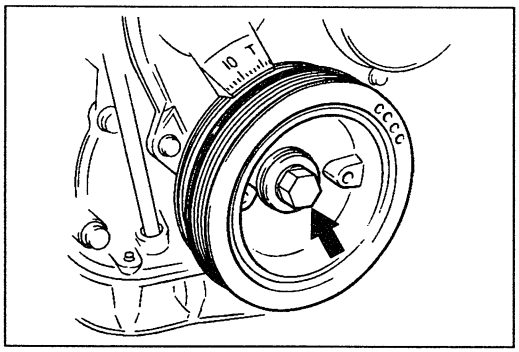
1. Cylinder head cover
   Disassembly Note ..... page B1–44
2. Crankshaft pulley
   Disassembly Note ..... page B1–44
3. Water pump pulley
4. Dipstick and pipe
5. Timing belt cover, upper
6. Timing belt cover, lower
7. No.3 engine mount bracket
8. Timing belt guide plate
9. Timing belt
   Disassembly Note ..... page B1–44
   Inspection ..... page B1–69
10. Tensioner, tensioner spring
    Inspection ..... pages B1–69, 70
11. Idler
    Inspection ..... page B1–70
12. Timing belt pulley
    Disassembly Note ..... page B1–45



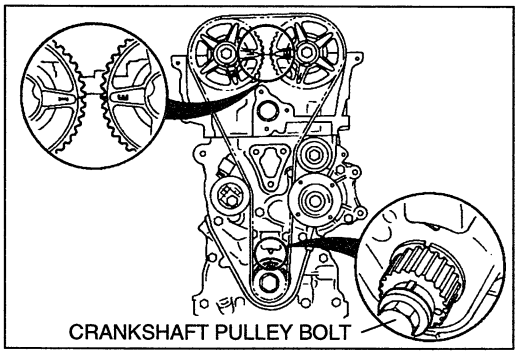
Disassembly Note
Cylinder head cover
1. Loosen the cylinder head cover bolts in five or six steps in the order shown.
2. Remove the cylinder head cover bolts.
3. Remove the cylinder head cover.



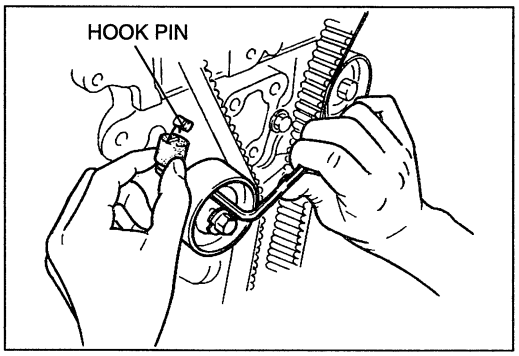
Crankshaft pulley
1. Hold the flywheel (MTX) or the drive plate (ATX) by using the **SST**.



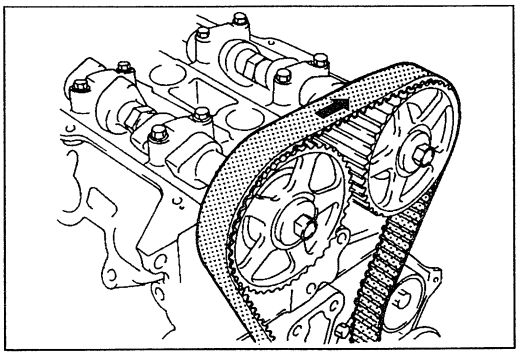
2. Remove the crankshaft pulley bolt.
3. Remove the crankshaft pulley.



Timing belt
1. Install the crankshaft pulley bolt.
2. Turn the crankshaft to align the matching marks as shown.



3. Turn the tensioner clockwise by using an Allen wrench.
4. Disconnect the tensioner spring from the hook pin.



Note
- Mark the timing belt rotation for proper reinstallation.

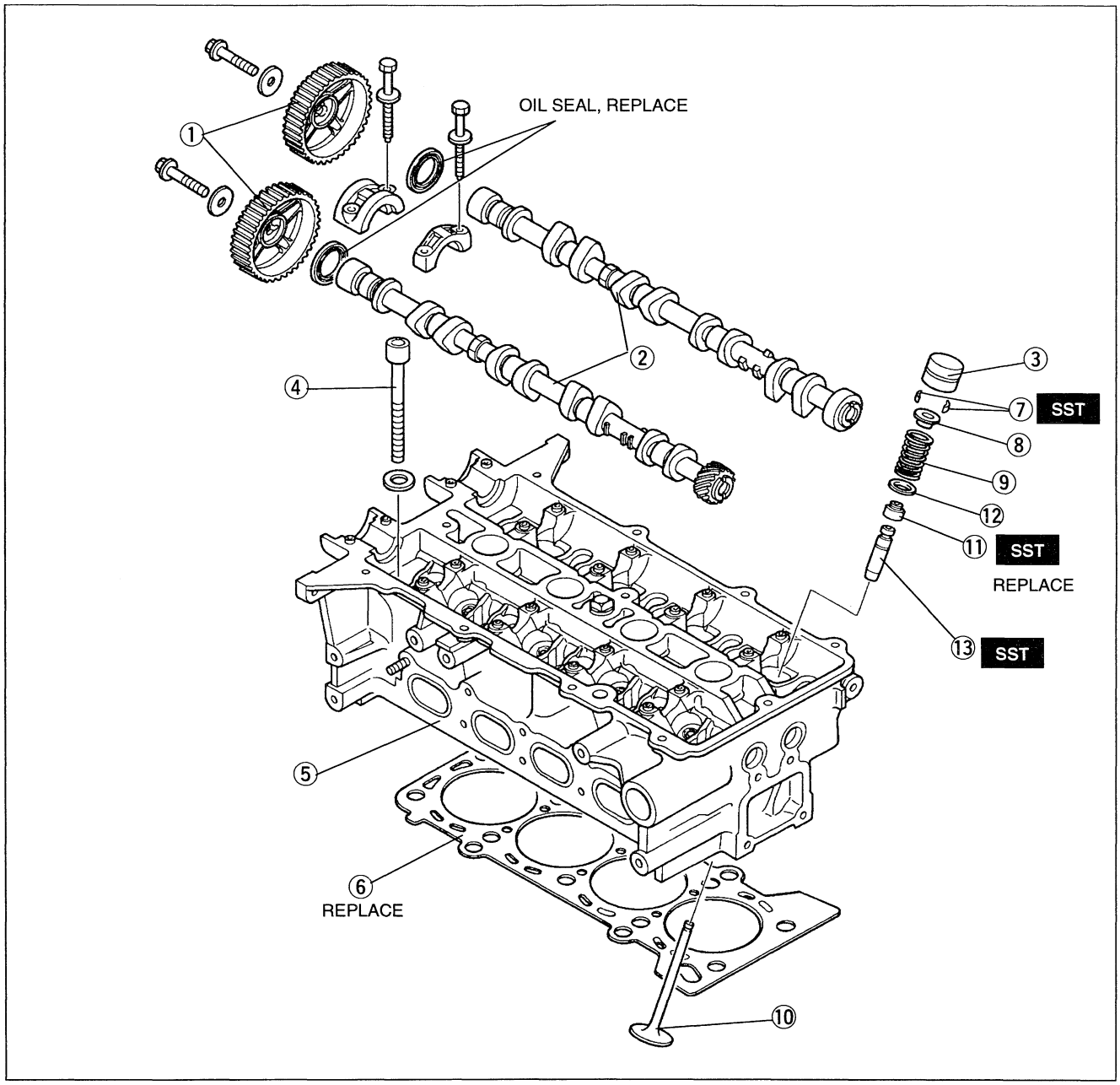
5. Remove the timing belt.

Caution
- **The following will damage the belt and shorten its life; Forcefully twisting it, turning it inside out, bending it, or allowing oil or grease on it.**

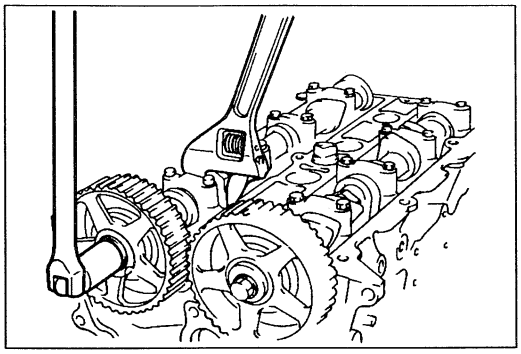
Timing belt pulley
1. Remove the timing belt pulley.
2. Remove the timing belt pulley key.

CYLINDER HEAD

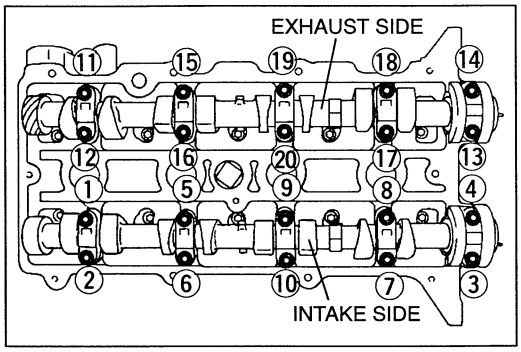
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



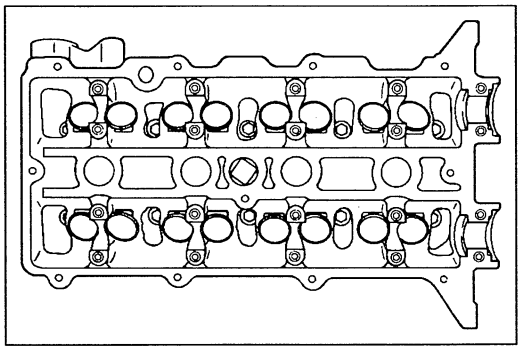
1. Camshaft pulley
   - Disassembly Note ..... page B1–47
   - Inspection ..... page B1–70
2. Camshaft
   - Disassembly Note ..... page B1–47
   - Inspection ..... page B1–61
3. HLA
   - Disassembly Note ..... page B1–47
   - Inspection ..... page B1–64
4. Cylinder head bolt
   - Disassembly Note ..... page B1–47
   - Inspection ..... page B1–58
5. Cylinder head
   - Inspection ..... page B1–57
6. Cylinder head gasket
7. Valve keeper
   - Disassembly Note ..... page B1–47
8. Valve spring seat, upper
9. Valve spring
   - Inspection ..... page B1–61
10. Valve
    - Inspection ..... page B1–58
11. Valve seal
    - Disassembly Note ..... page B1–48
12. Valve spring seat, lower
13. Valve guide
    - Inspection ..... page B1–59
    - Replacement ..... page B1–59



Disassembly Note
Camshaft pulley
1. Hold the camshaft by using a wrench on the cast hexagon as shown, and loosen the camshaft pulley bolt.
2. Remove the camshaft pulley.



Camshaft
1. Loosen the camshaft cap bolts in five or six steps in the order shown.
2. Remove the camshaft caps.
3. Remove the camshafts.
4. Remove the camshaft oil seals from the camshafts.

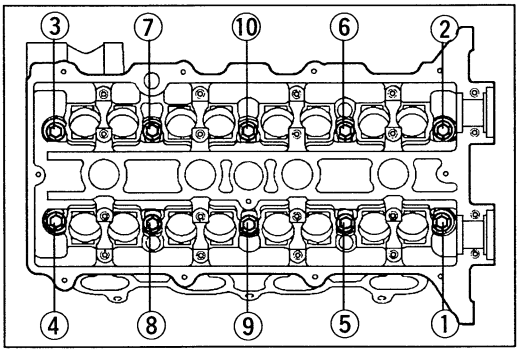


HLA

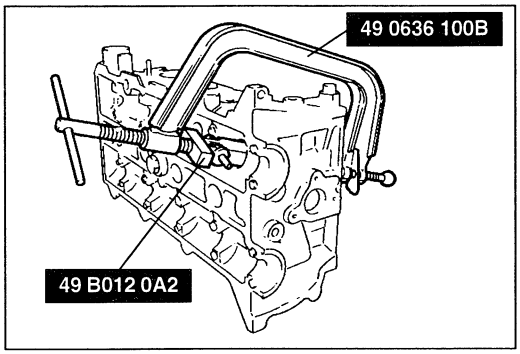
Caution
- **The HLA must be reinstalled in the same positions from which they were removed. If they are not, it can cause premature and uneven wear.**

Note
- Mark the HLA to show their original positions.

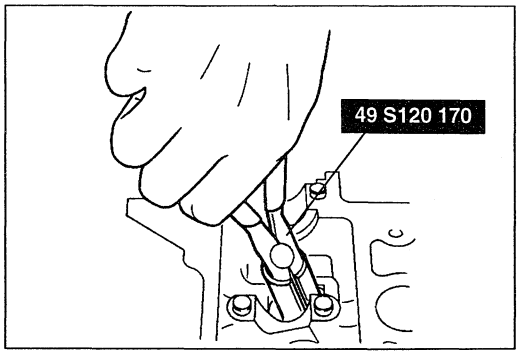
1. Remove the HLA from the cylinder head.
2. Store the HLA upside down in an oil-filled container.



Cylinder head bolt
1. Loosen the cylinder head bolts in two or three steps in the order shown.
2. Remove the cylinder head bolts.



Valve keeper
1. Set the **SST** against the upper valve spring seat as shown.
2. Compress the spring and remove the valve keepers.

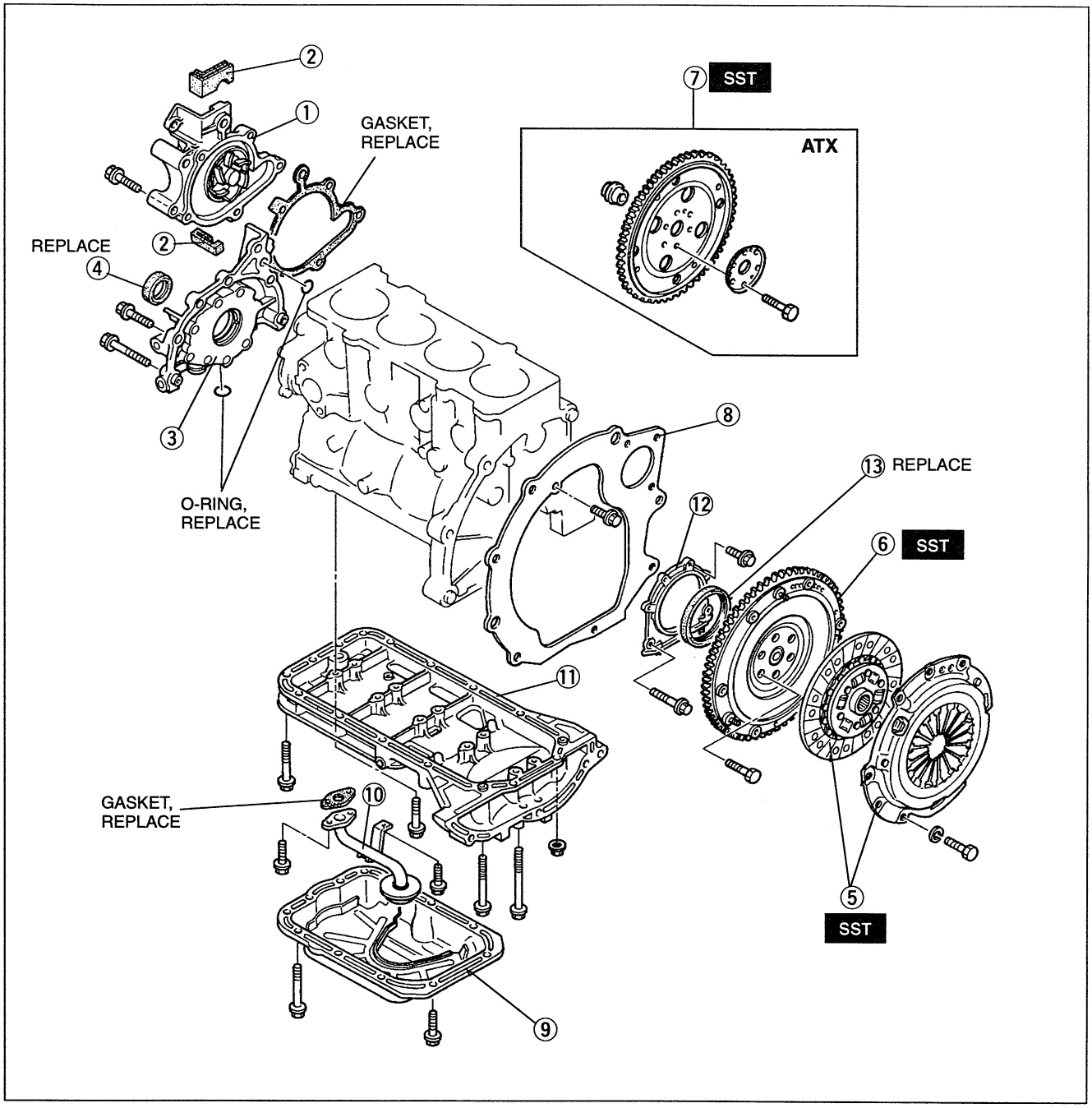


Valve seal

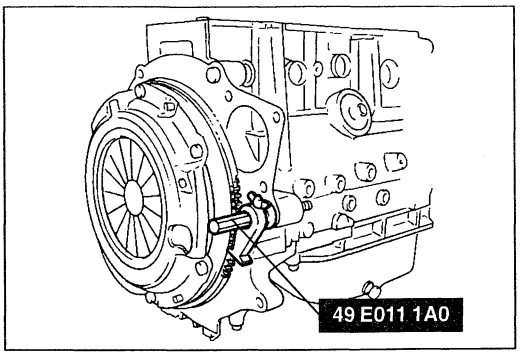
Remove the valve seal by using the **SST.**

CYLINDER BLOCK (EXTERNAL PARTS)

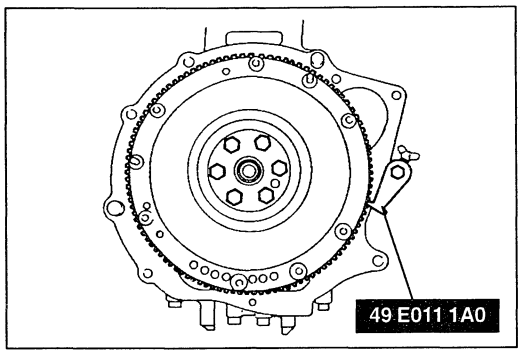
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



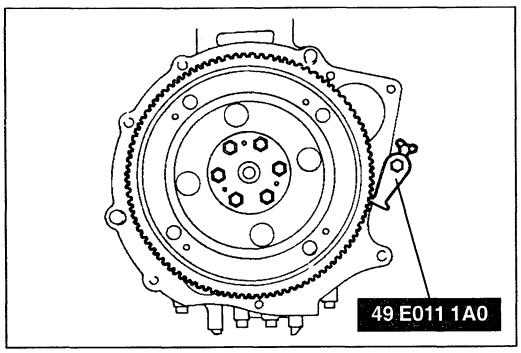
1. Water pump
2. Rubber seal
3. Oil pump
   Disassembly / Assembly ..... section D1
4. Front oil seal
   Disassembly Note ..... page B1–51
5. Clutch cover and clutch disc (MTX)
   Disassembly Note ..... page B1–50
6. Flywheel (MTX)
   Disassembly Note ..... page B1–50
7. Backing plate, drive plate, and adapter (ATX)
   Disassembly Note ..... page B1–50
8. End plate
9. Oil pan
   Disassembly Note ..... page B1–50
   Inspect for damage
10. Oil strainer
    Disassembly Note ..... page B1–51
    Inspect for damage
11. Oil pan upper block
    Disassembly Note ..... page B1–51
12. Rear cover
13. Rear oil seal
    Disassembly Note ..... page B1–51



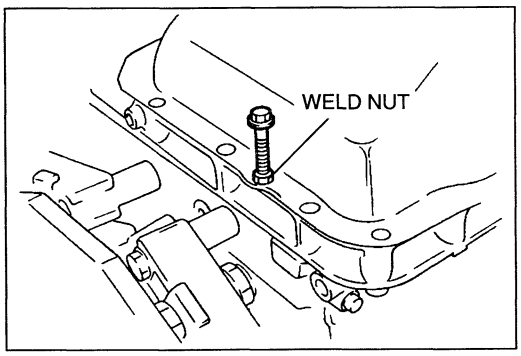
Disassembly Note
Clutch cover and clutch disc (MTX)
1. Hold the flywheel by using the **SST**.
2. Loosen the clutch cover bolts in two or three steps and remove them.
3. Remove the clutch cover.
4. Remove the clutch cover and clutch disc.



Flywheel (MTX)
1. Hold the flywheel by using the **SST**.
2. Loosen the flywheel bolts in two or three steps and remove them.
3. Remove the flywheel.
4. Remove the **SST**.



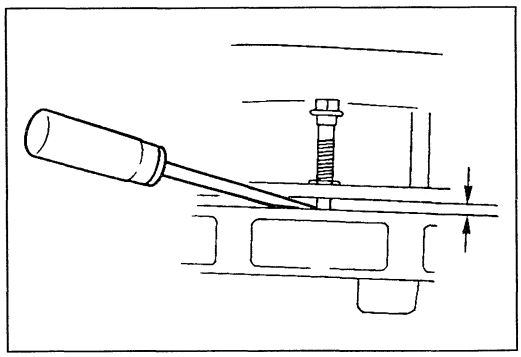
Backing plate, drive plate, and adapter (ATX)
1. Hold the drive plate by using the **SST**.
2. Loosen the drive plate bolts in two or three steps and remove them.
3. Remove the backing plate, drive plate, and adapter.
4. Remove the **SST**.

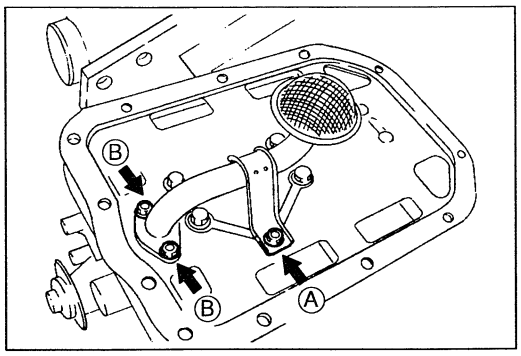


Oil pan
1. Remove the oil pan mounting bolts.

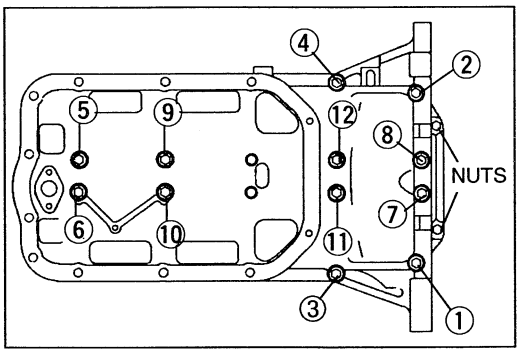
Caution
- **Pry tools can easily scratch the oil pan stiffener and oil pan contact surfaces. Prying off the oil pan can also easily bend the oil pan flange. Refer to the following instructions before removing the oil pan.**

2. Remove the sealant from the bolt threads.
3. Screw an oil pan bolt into the weld nut to make a small gap between the oil pan upper block and the oil pan.
4. Using a screwdriver, pry apart the oil pan and oil pan upper block.
5. Remove the oil pan.

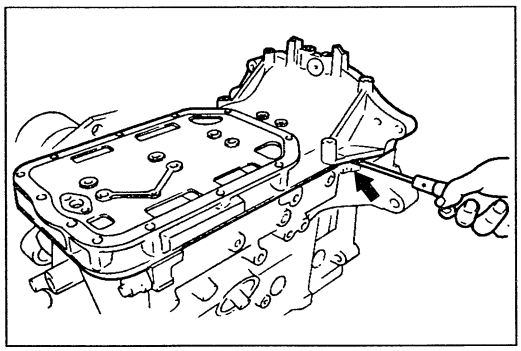




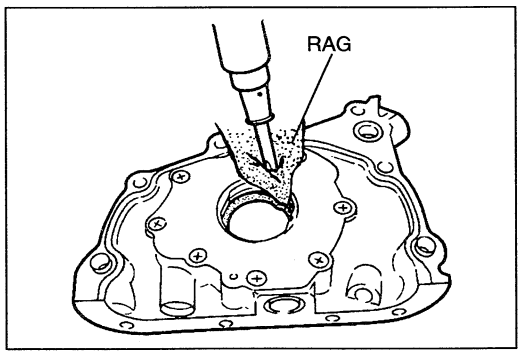
Oil strainer
1. Remove bolt Ⓐ.
2. Remove bolts Ⓑ.
3. Remove the oil strainer.



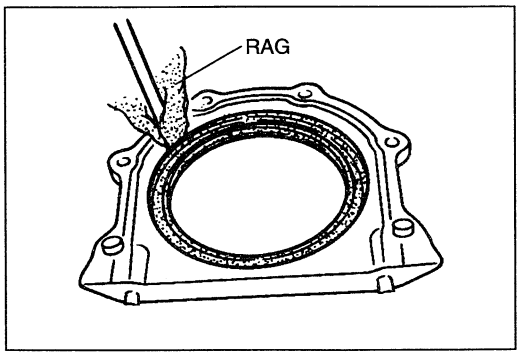
Oil pan upper block
1. Remove the two nuts at the rear of the cylinder block.
2. Loosen the oil pan upper block bolts in two or three steps in the order shown.
3. Remove the bolts.



4. Insert a screwdriver as shown in the figure and pry loose the oil pan upper block.



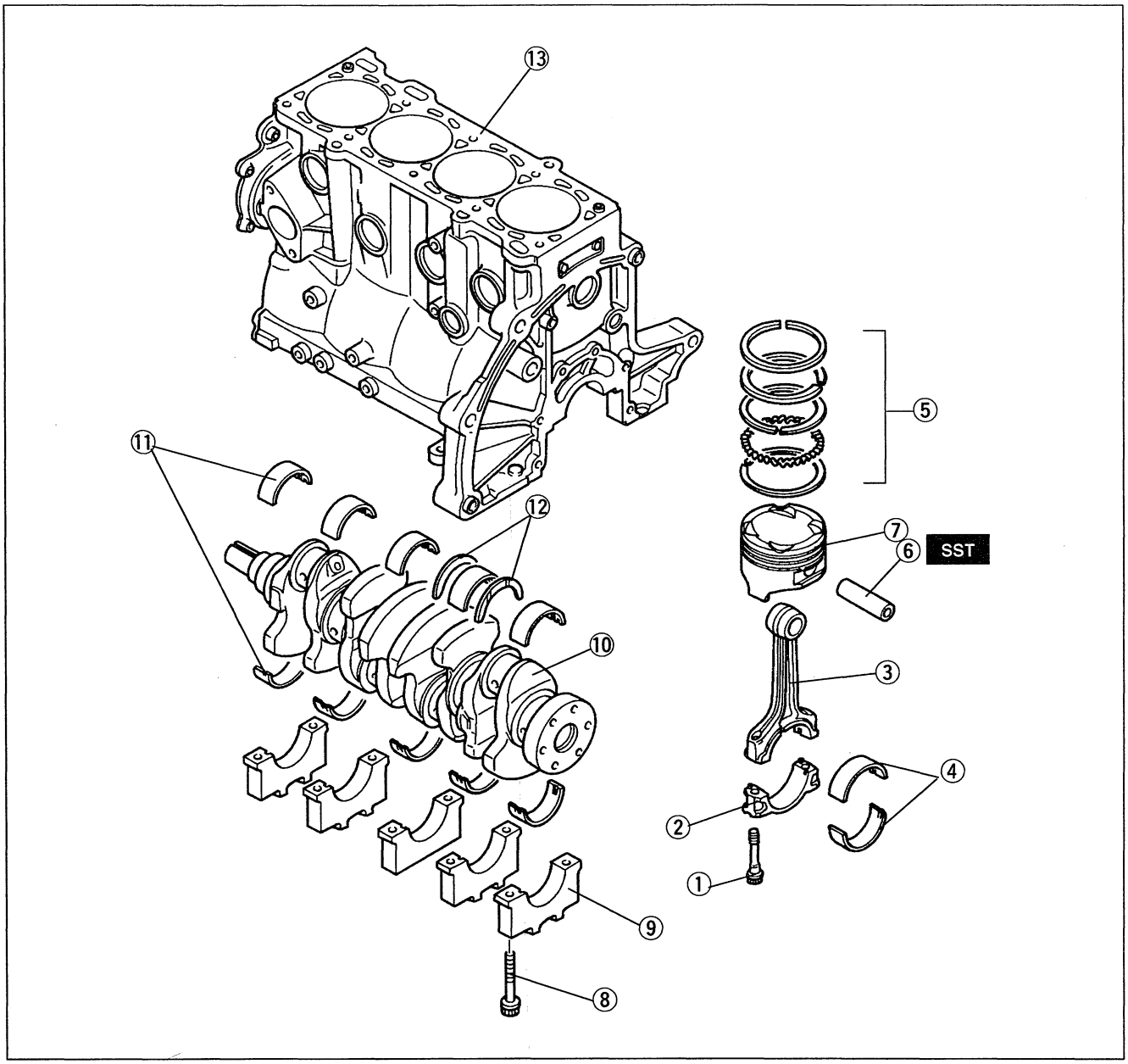
Front oil seal
Remove the front oil seal by using a screwdriver protected with a rag.



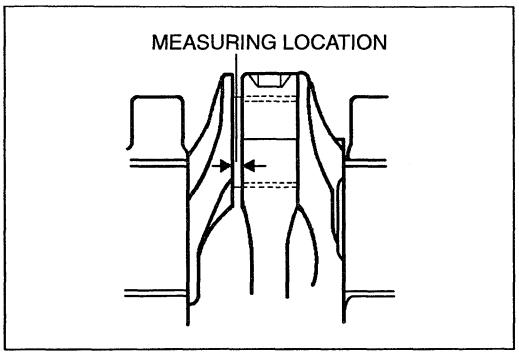
Rear oil seal
Remove the rear oil seal by using a screwdriver protected with a rag.

CYLINDER BLOCK (INTERNAL PARTS)

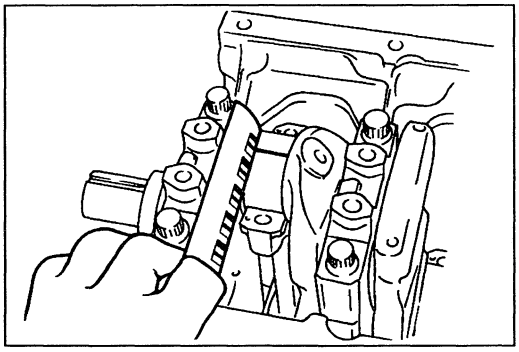
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



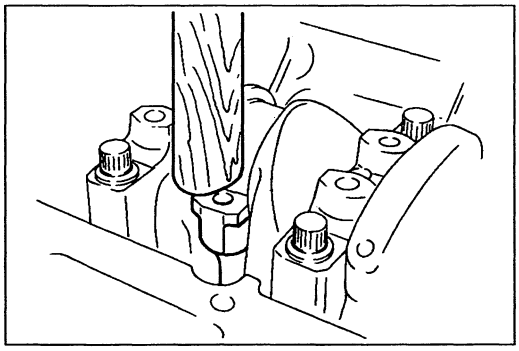
1. Connecting rod bolt
   - Inspection ..... page B1–68
2. Connecting rod cap
   - Disassembly Note ..... page B1–53
3. Connecting rod
   - Disassembly Note ..... page B1–53
   - Inspection ..... page B1–67
4. Connecting rod bearing
   - Inspection ..... page B1–69
5. Piston ring
   - Disassembly Note ..... page B1–53
   - Inspection ..... page B1–66
6. Piston pin
   - Disassembly Note ..... page B1–53
   - Inspection ..... page B1–67
7. Piston
   - Inspection ..... page B1–66
8. Main bearing cap bolt
   - Inspection ..... page B1–68
9. Main bearing cap
   - Disassembly Note ..... page B1–54
10. Crankshaft
    - Disassembly Note ..... page B1–55
    - Inspection ..... page B1–68
11. Main bearing
    - Inspection ..... page B1–69
12. Thrust bearing
13. Cylinder block
    - Inspection ..... page B1–64
    - Oil jet ..... page B1–55



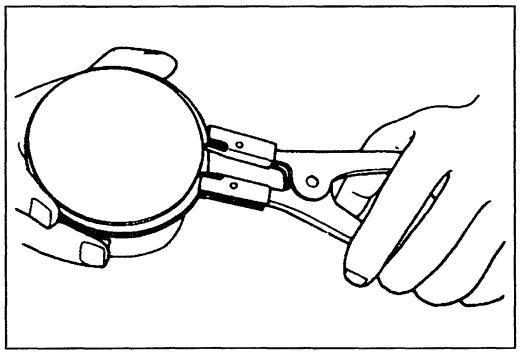
Disassembly Note
Connecting rod cap
Before removing the connecting rod caps, measure the connecting rod side clearance. (Refer to page B1–78.)



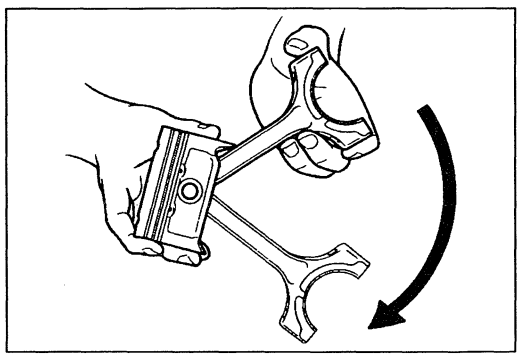
Connecting rod
1. Before removing the connecting rods, measure the connecting rod bearing oil clearance. (Refer to page B1–78.)



2. Remove the Plastigage from the crankpin journals.
3. Use the handle of a hammer to remove the piston and connecting rod assembly through the top of the cylinder block.



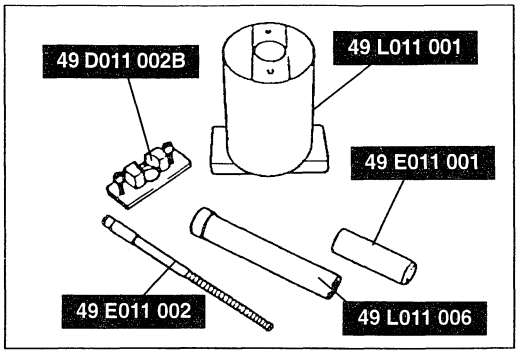
Piston ring
Remove the piston rings by using a piston ring expander.



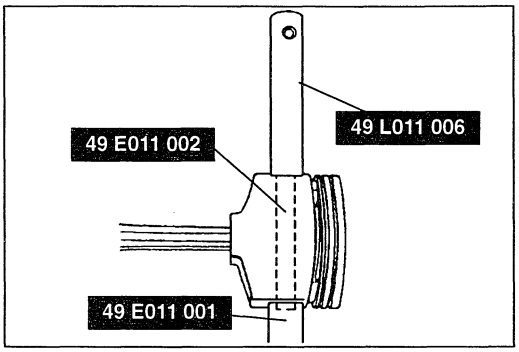
Piston pin

Caution
- **The connecting rods must be reinstalled in the same positions from which they were removed. If they are not, it can cause premature and uneven wear.**

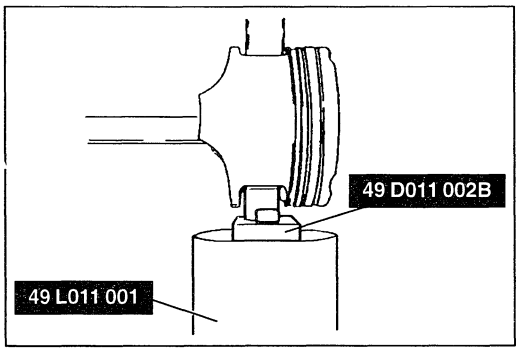
1. Before disassembling the piston and connecting rod, check the oscillation torque as shown. If the large end does not drop by its own weight, replace the piston and/or the piston pin.



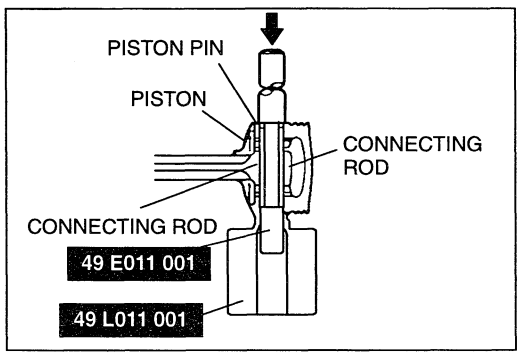
2. Use the **SSTs** shown in the figure and a press.



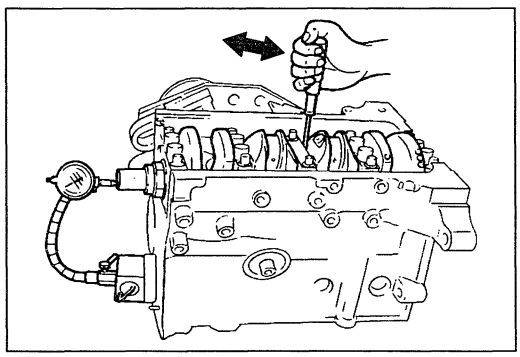
3. Assemble the **SST** into the piston pin as shown.



4. Verify that the **SST** fits squarely into the piston before pressing.

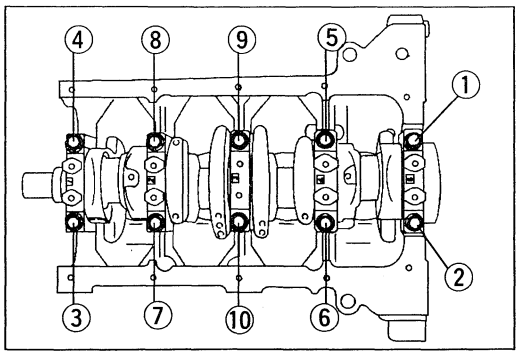


5. Set the piston and connecting rod on the **SST** as shown.
6. Press out the piston pin.While removing the piston pin, check the pressure. If it is lower than **4,903 N {500 kgf, 1,100 lbf}**, replace the piston pin and/or connecting rod.

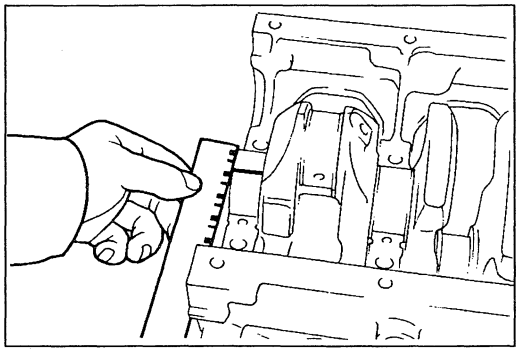


Main bearing cap

1. Before removing the main bearing caps, measure the crankshaft end play. (Refer to page B1–75.)

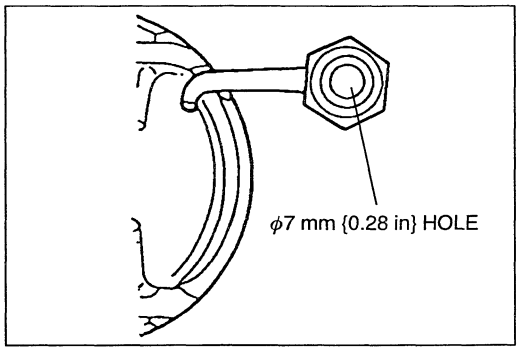


2. Loosen the main bearing cap bolts in two or three steps in the order shown.
3. Remove the main bearing caps.



Crankshaft

Before removing the crankshaft, measure the main bearing oil clearances. (Refer to page B1–73.)

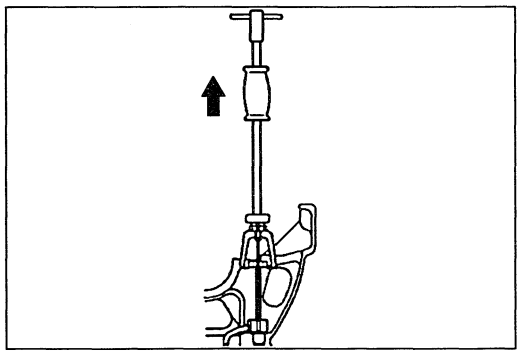


Oil jet
Removal / Installation
Removal

1. Drill a hole into the center of the oil jet head with a 7 mm {0.28 in} drill bit.
2. Remove the spring and ball through the hole.
3. Tap the hole with a M8 × 1.25 tap to 8 mm {0.31 in} deep.
4. Screw a M8 × 1.25 bolt into the tapped hole.
5. Attach the sliding hammer to the bolt.

Caution

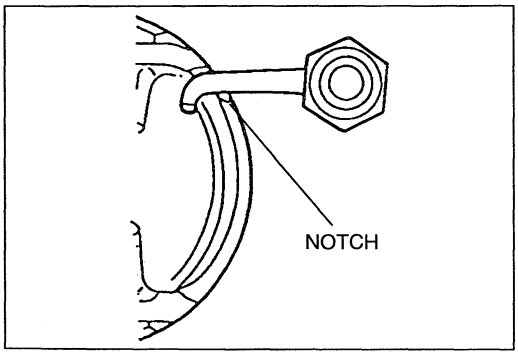
- **Twisting or turning the sliding hammer while removing the oil jet can damage the cylinder block.**



6. Pull the sliding hammer straight upward and discard the oil jet.

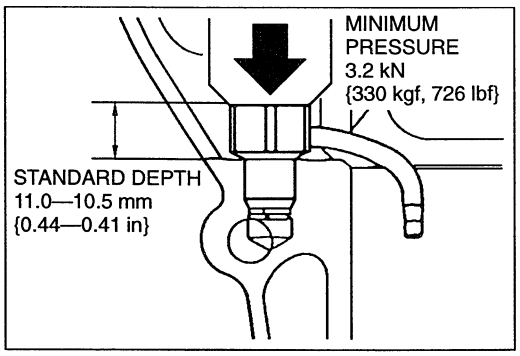
Installation

1. Temporarily install the crankshaft, connecting rod, and piston to the cylinder block.
2. Coat the oil jet installation hole with a small amount of clean engine oil.
3. Fit the oil jet into the hole and align the nozzle with the piston's notch.
4. Remove the crankshaft, connecting rod and piston.
5. Remove the cylinder block from the **SST** (engine stand).
6. Put the cylinder block on the press stand.
7. Verify that the oil jet nozzle is properly aligned.



Caution

- **If the oil jet nozzle is not properly aligned after being pressed in, it can damage the oil jet, cylinder block, and the piston.**



8. Press-fit the oil jet into the cylinder block.

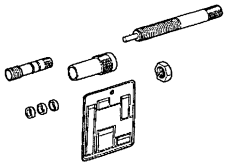
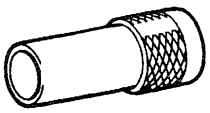
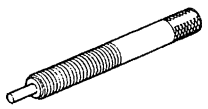
   Depth: 11.0—10.5 mm {0.44—0.41 in}
   Pressure: 3.2 kN {330 kgf, 726 lbf} min.

   Caution
   - **Depth over specification can damage the oil jet nozzle.**
   - **Pressure below specification indicates loose fit. Replace the cylinder block and oil jet.**

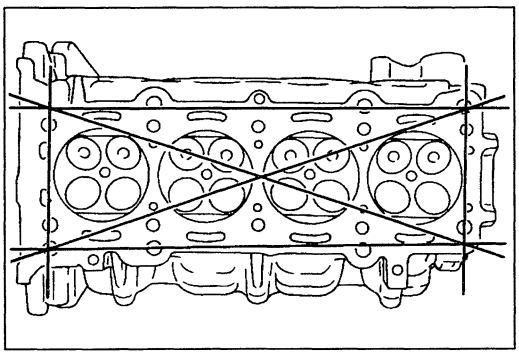
9. Mount the cylinder block on the **SST** (engine stand).
10. Install the crankshaft, connecting rod, and piston to the cylinder block.
11. Turn the crankshaft clockwise and check that the crankshaft and piston do not contact the oil jet.

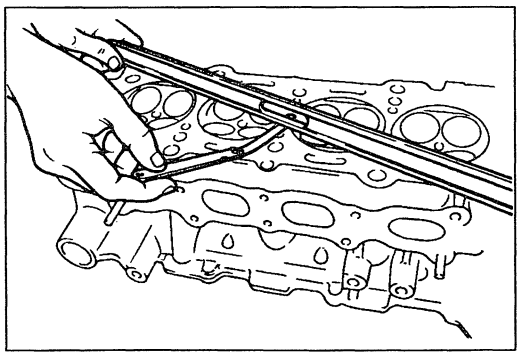
INSPECTION / REPAIR

PREPARATION
SST

49 B012 005 Remover & installer, valve guide 	For removal / installation of valve guide	49 L012 0A0 Installer set, valve seal & valve guide 	For installation of valve guide
49 L012 002 Body (Part of 49 L012 0A0) 	For installation of valve guide	49 L012 003 Installer (Part of 49 L012 0A0) 	For installation of valve guide
49 L012 004 Nut (Part of 49 L012 0A0) 	For installation of valve guide	—	—

1. Clean all parts, being sure to remove all foreign materials.
2. Inspection and repairs must be performed in the order specified.





CYLINDER HEAD

1. Inspect the cylinder head for damage, cracks, and leakage of water and oil. Replace if necessary.
2. Using a straightedge, measure the cylinder head for distortion in the six directions as shown.

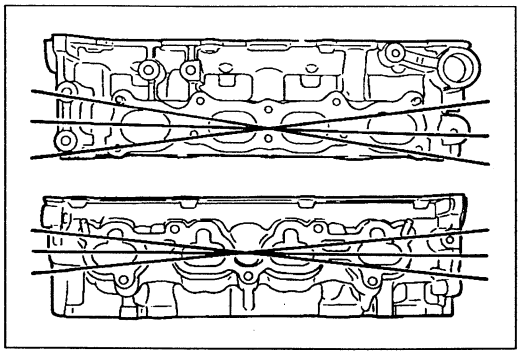
   Distortion: 0.10 mm {0.004 in} max.

3. Inspect for the following and repair or replace.
   (1) Sunken valve seats
   (2) Damaged intake and exhaust manifold contact surfaces
   (3) Excessive camshaft oil clearances and end play
4. If the cylinder head distortion exceeds the specification, grind the cylinder head surface.

   Grinding: 0.15 mm {0.006 in} max.

5. If the cylinder head height is not within the specification, replace it.

   Height: 124.45—124.55 mm {4.8996—4.9035 in}

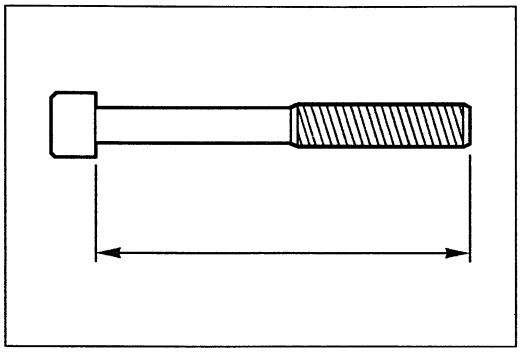


6. Using a straightedge, measure the manifold contact surfaces for distortion in the six directions shown.

   Distortion: 0.10 mm {0.004 in} max.

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

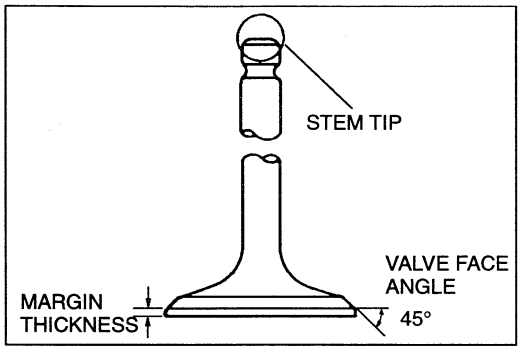
   Grinding: 0.15 mm {0.006 in} max.



Cylinder Head Bolt

Measure the length of each bolt. Replace if necessary.

Length : 104.2—104.8 mm {4.103—4.125 in}
Maximum : 105.5 mm {4.154 in}

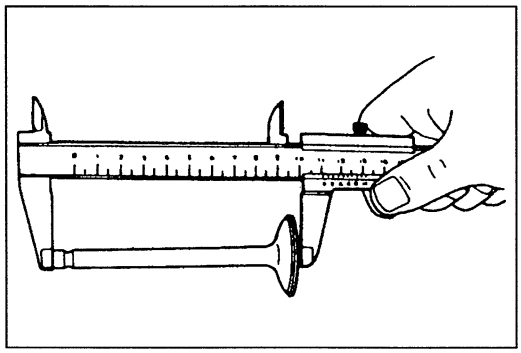


VALVE MECHANISM

Valve and Valve Guide

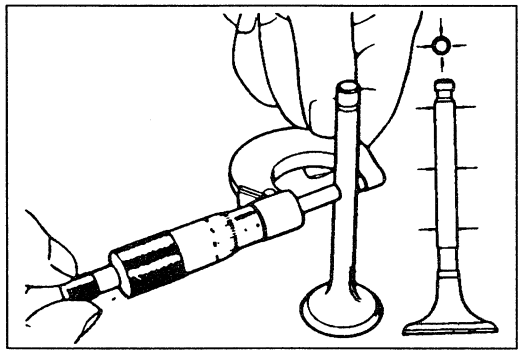
1. Inspect each valve for the following. Replace or resurface the valves as necessary.
   (1) Damaged or bent stem
   (2) Rough or damaged face
   (3) Damaged or unevenly worn stem tip
2. Measure the head margin thickness of each valve. Replace the valves if necessary.

   Margin thickness
   IN : 1.10 mm {0.0433 in}
   EX : 1.20 mm {0.0472 in}



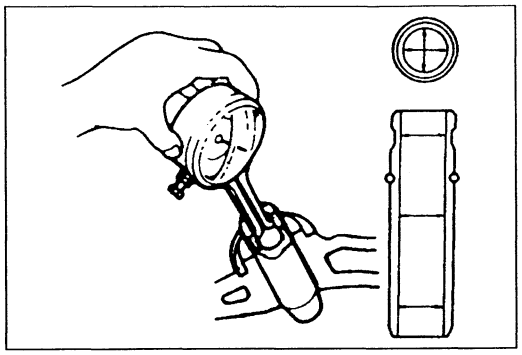
3. Measure the length of each valve and replace the valves if necessary.

   Length
   Standard IN : 89.68 mm {3.5307 in}
   EX : 89.78 mm {3.5346 in}
   Minimum IN : 89.28 mm {3.5150 in}
   EX : 89.38 mm {3.5189 in}



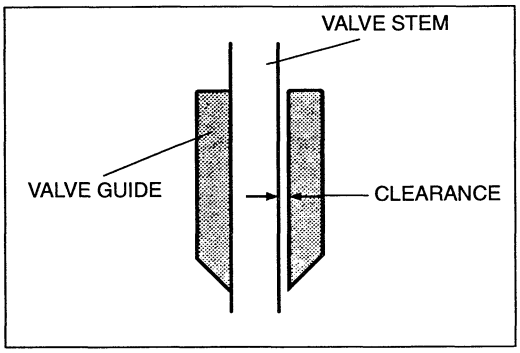
4. Measure the diameter of each valve stem and replace the valves if necessary.

   Diameter
   Standard
   IN : 5.970—5.985 mm {0.2351—0.2356 in}
   EX : 5.965—5.980 mm {0.2349—0.2354 in}
   Minimum IN : 5.940 mm {0.2339 in}
   EX : 5.935 mm {0.2337 in}



5. Measure the inner diameter of each valve guide at the points shown.

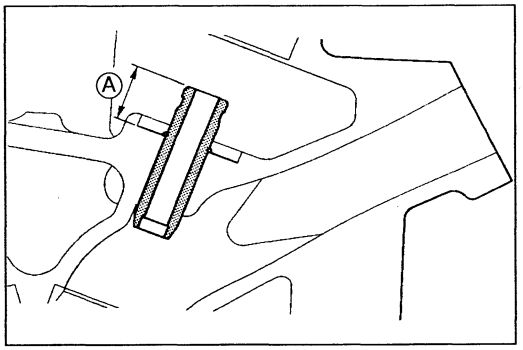
Inner diameter
IN : 6.01—6.03 mm {0.2367—0.2374 in}
EX : 6.01—6.03 mm {0.2367—0.2374 in}



6. Calculate the valve stem-to-guide clearance by subtracting the outer diameter of the valve stem from the inner diameter of the corresponding valve guide.

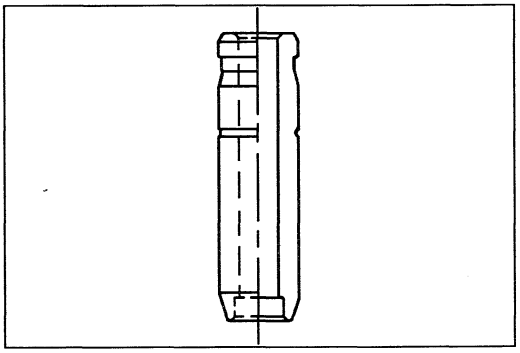
Clearance
IN : 0.025—0.060 mm {0.0010—0.0023 in}
EX : 0.030—0.065 mm {0.0012—0.0025 in}
Maximum: 0.10 mm {0.004 in}

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



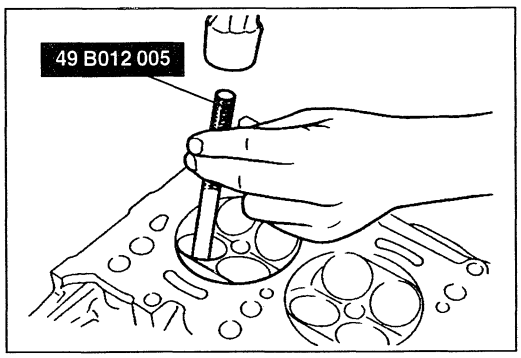
8. Measure each valve guide projection height Ⓐ. Replace the guides if necessary.

Height Ⓐ
IN : 13.5—14.1 mm {0.532—0.555 in}
EX : 13.5—14.1 mm {0.532—0.555 in}

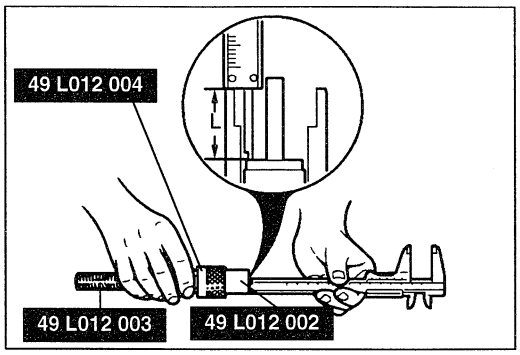


Replacement of valve guide

Note
- The intake and exhaust valve guides are the same.



Removal
Remove the valve guide from the combustion chamber side by using the **SST**.

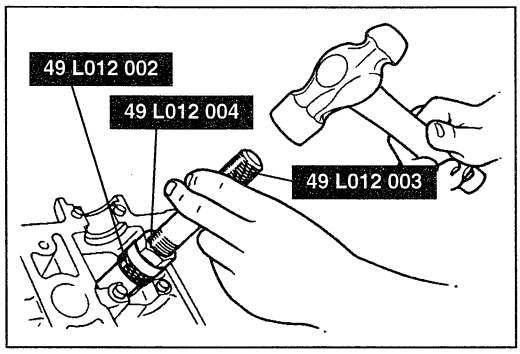


Installation

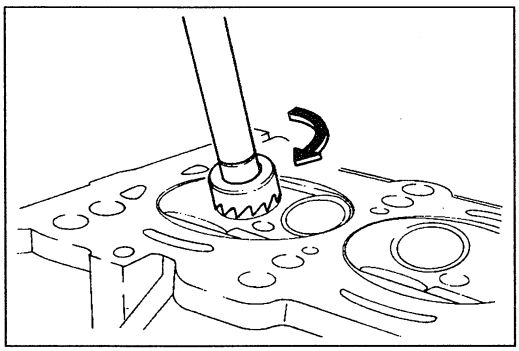
1. Assemble the **SST** so that depth **L** is as specified.

   Depth L: 13.5—14.1 mm {0.532—0.555 in}

2. Tighten the locknut.

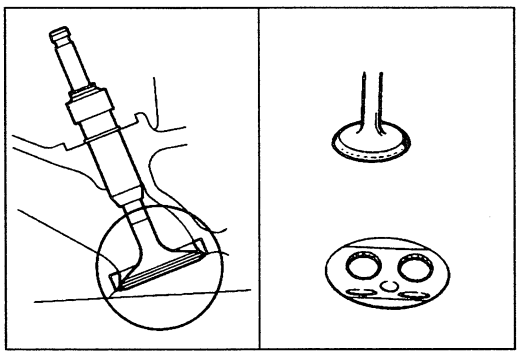


3. Tap the valve guide in from the side opposite the combustion chamber until the **SST** contacts the cylinder head.
4. Verify that the valve guide height is within the specification. (Refer to page B1–59.)
5. If not within the specification, repeat steps 1—4.

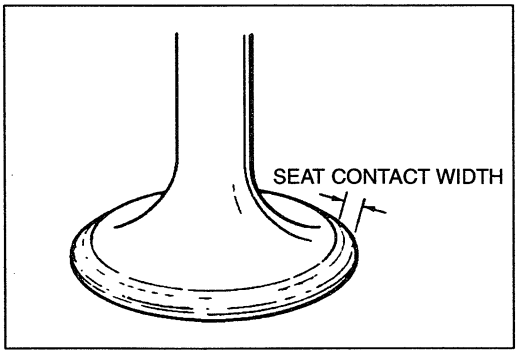


Valve Seat

1. Inspect the contact surface of each 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.

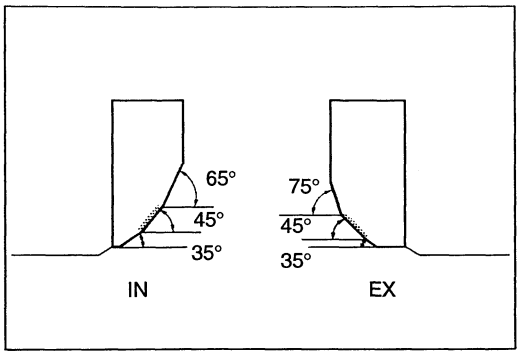


3. Apply a thin coat of Prussian blue to the valve face.
4. Check the valve seating by pressing the valve against the seat.
   (1) If blue does not appear **360°** around the valve face, replace the valve.
   (2) If blue does not appear **360°** around the valve seat, resurface the seat.

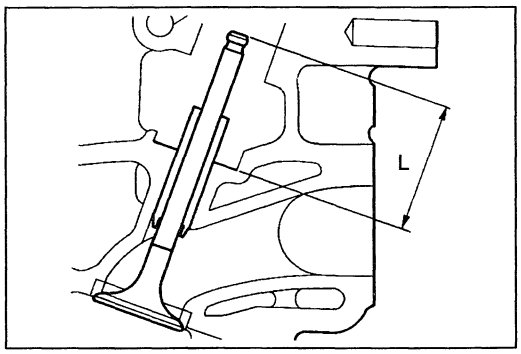


5. Measure the seat contact width.

   Width: 0.9—1.3 mm {0.036—0.051 in}

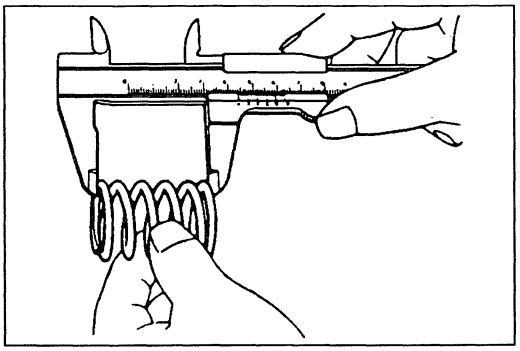


6. Verify that the valve seating position is at the center of the valve face.
   (1) If the seating position is too high, correct the valve seat using **65° (IN)** or **75° (EX)** cutter, and a **45°** cutter.
   (2) If the seating position is too low, correct the valve seat using a **35°** cutter and a **45°** cutter.
7. Seat the valve to the valve seat by using a lapping compound.
8. Check the sinking of the valve seat.
   Measure the protruding length (dimension **L**) of the valve stem.



Dimension L: 39.0 mm {1.535 in}

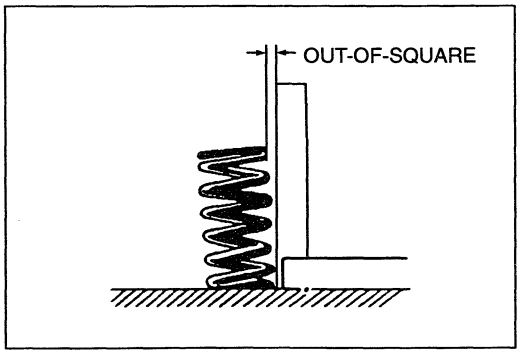
(1) If L is 39.0—39.5 mm {1.536—1.555 in}, no correction needed.
(2) If L is 40.6 mm {1.598 in} or more, replace cylinder head.



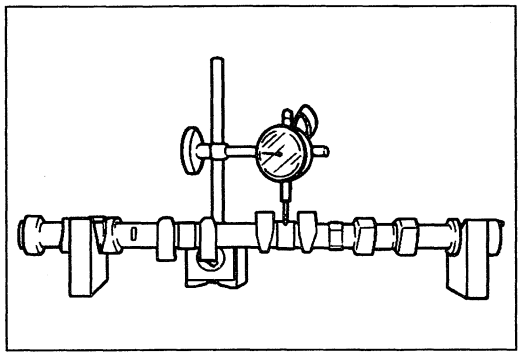
Valve Spring

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

Free length
Standard: 44.0 mm {1.732 in}
Minimum: 36.5 mm {1.437 in}/177.1—200.2 N {18.05—20.42 kgf, 39.71—44.92 lbf}



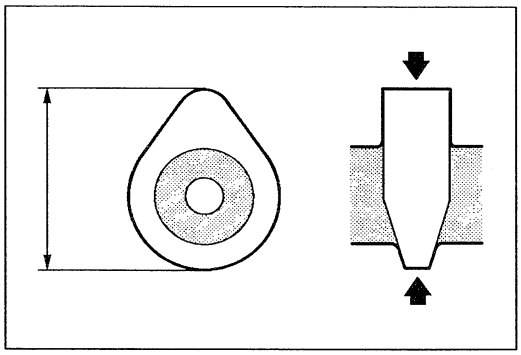
Out-of-square: 1.54 mm {0.061 in} max.



CAMSHAFT

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

Runout: 0.03 mm {0.0012 in} max.

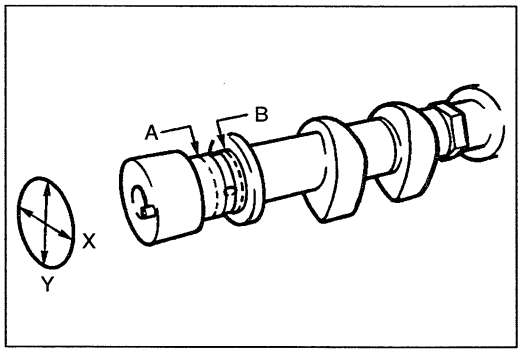


3. Inspect the camshaft for wear and damage. Replace the camshaft if necessary.
4. Measure the camshaft lobe height at the point shown.

Height

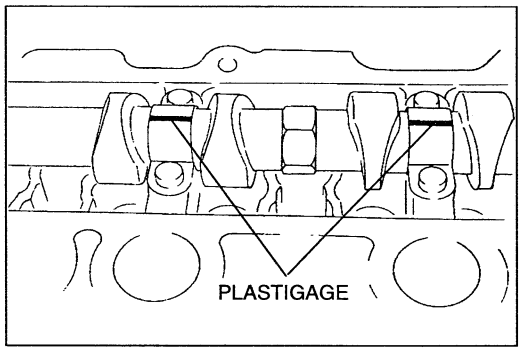
mm {in}

IN	Standard	42.973 {1.6918}
	Minimum	42.823 {1.6859}
EX	Standard	43.338 {1.7062}
	Minimum	43.188 {1.7003}

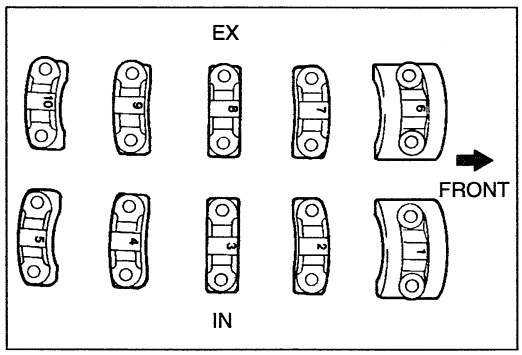


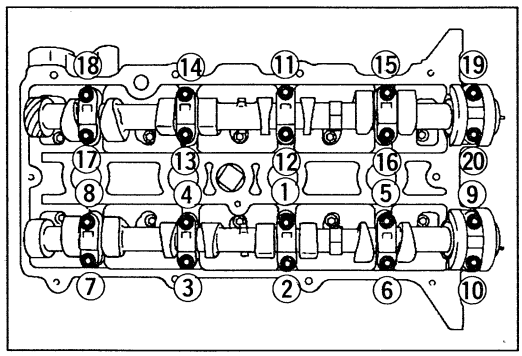
5. Measure the journal diameters in X and Y directions at two points (A and B) shown.

Diameter: 25.940—25.965 mm {1.0213—1.0222 in}
Minimum: 25.910 mm {1.0201 in}
Out-of-round: 0.03 mm {0.001 in} max.



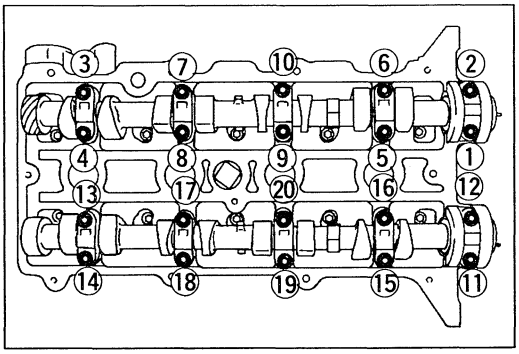
6. Measure the camshaft journal oil clearances with the HLA removed.
   (1) Remove all foreign material and oil from the journals and bearing surfaces.
   (2) Set the camshaft onto the cylinder head.
   (3) Position Plastigage atop the journals in the axial direction.
   (4) Do not rotate the camshaft when measuring the oil clearances.
   (5) Install the camshaft caps according to the cap numbers as shown.



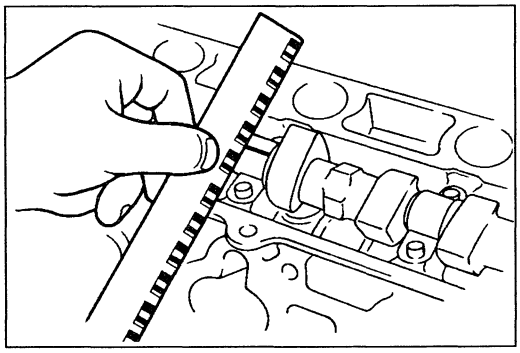


(6) Install the camshaft cap bolts and tighten them in five or six steps in the order shown.

Tightening torque:
11.3—14.2 N·m {115—145 kgf·cm, 100—125 in·lbf}



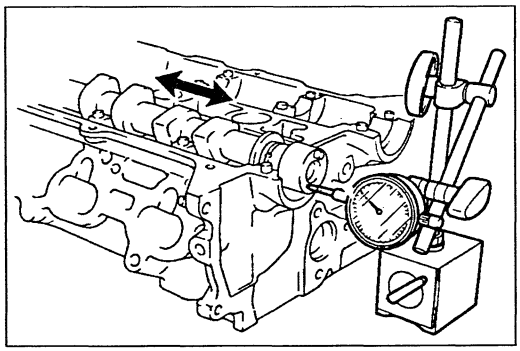
(7) Loosen the camshaft cap bolts in five or six steps in the order shown.
(8) Remove the camshaft caps.



(9) Measure the oil clearances.

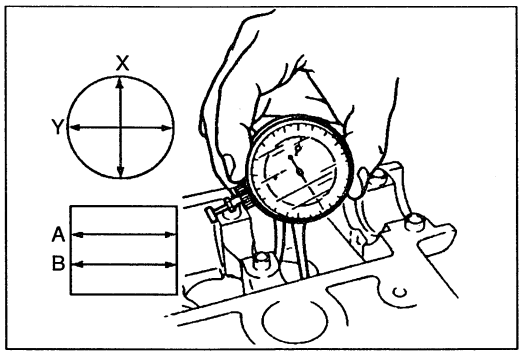
Oil clearance: 0.035—0.081 mm {0.0014—0.0031 in}
Maximum: 0.15 mm {0.006 in}

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



7. Measure the camshaft end play. If it exceeds the maximum, replace the camshaft and/or the cylinder head.

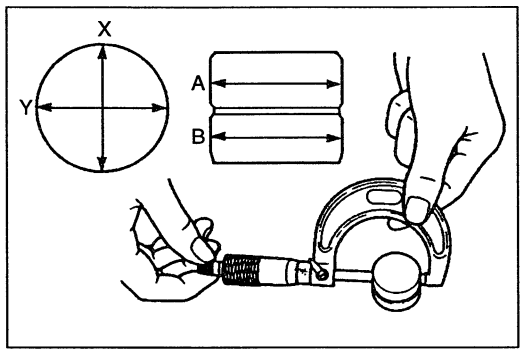
End play: 0.08—0.20 mm {0.0032—0.0078 in}
Maximum: 0.21 mm {0.008 in}



HLA

1. Measure the HLA bores in X and Y directions at two points (A and B) as shown.

   Diameter: 30.000—30.025 mm {1.1811—1.1820 in}



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

   Diameter: 29.959—29.975 mm {1.1795—1.1801 in}

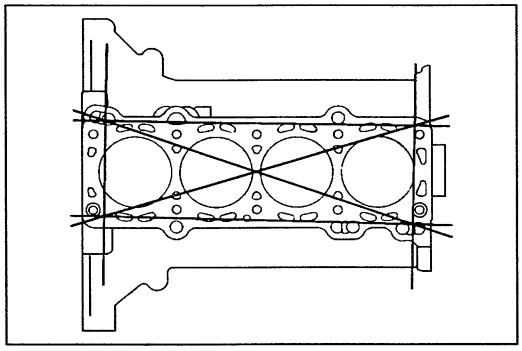
3. Calculate the clearance between the HLA and the related HLA bore.

   Clearance: 0.025—0.066 mm {0.00099—0.00259 in}
   Maximum: 0.180 mm {0.0071 in}

4. If the clearance exceeds the maximum, replace the HLA and/or to cylinder head.

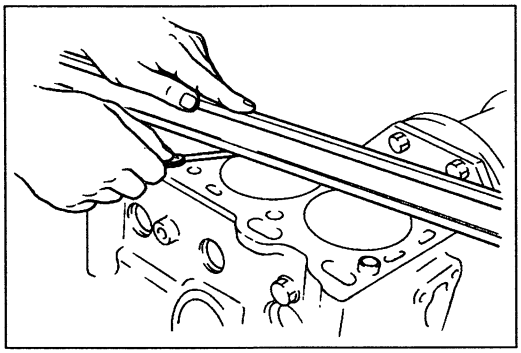
CYLINDER BLOCK

1. Inspect the cylinder block for the following. Repair or replace the cylinder block if necessary.
   (1) Leakage damage
   (2) Cracks
   (3) Scoring of wall



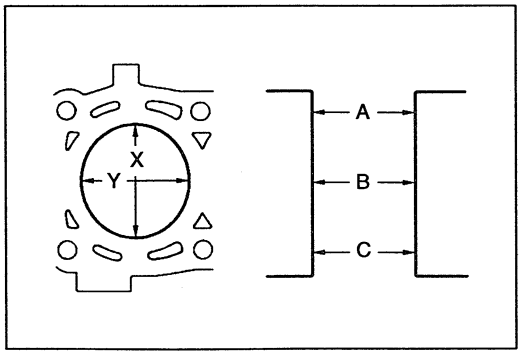
2. Using a straightedge, measure the top deck of the cylinder block for distortion in the six directions as shown.

   Distortion: 0.05 mm {0.002 in} max.



3. If the distortion exceeds the specification, replace it.

   Height: 271.0 mm {10.67 in}



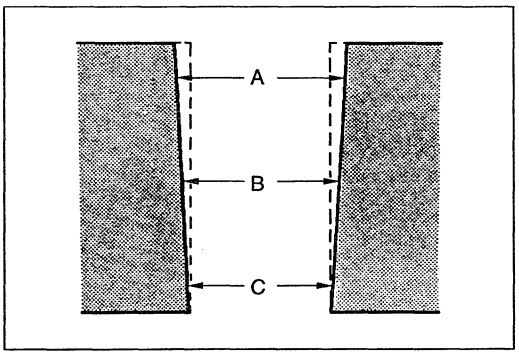
4. Measure the cylinder bore in X and Y directions at three levels (A, B, and C) in each cylinder as shown.

Cylinder bore

Base the boring diameter on the diameter of an oversize piston. All cylinders must be the same diameter.

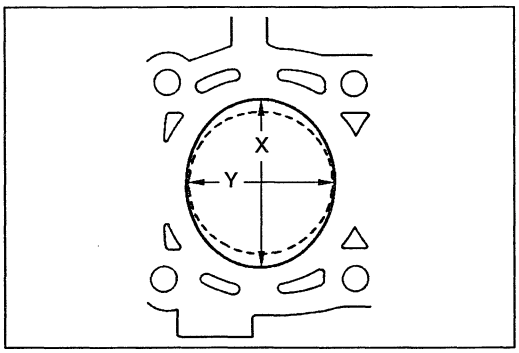
mm {in}

Bore size	Diameter
Standard	83.000—83.019 {3.2678—3.2684}
0.25 {0.01} oversize	83.250—83.269 {3.2776—3.2783}
0.50 {0.02} oversize	83.500—83.519 {3.2874—3.2881}



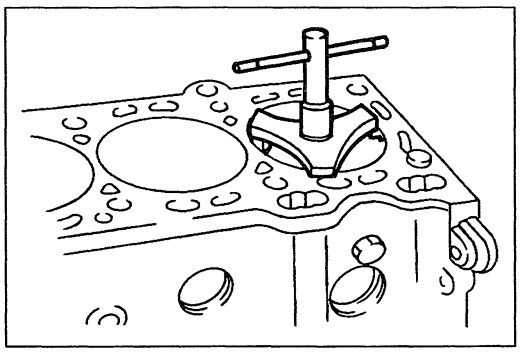
(1) If the cylinder bore exceeds the maximum, rebore it to oversize.
(2) If the difference between measurements A and C exceeds the maximum taper, rebore the cylinder to oversize.

Taper: 0.019 mm {0.0007 in} max.

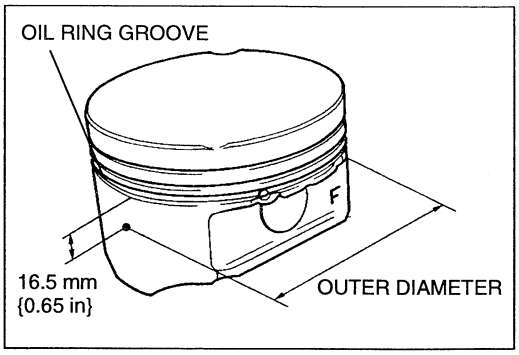


(3) If the difference between measurements X and Y exceeds the maximum out-of-round, rebore the cylinder to oversize.

Out-of-round: 0.020 mm {0.0008 in} max.



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



PISTON, PISTON RING, AND PISTON PIN

Piston

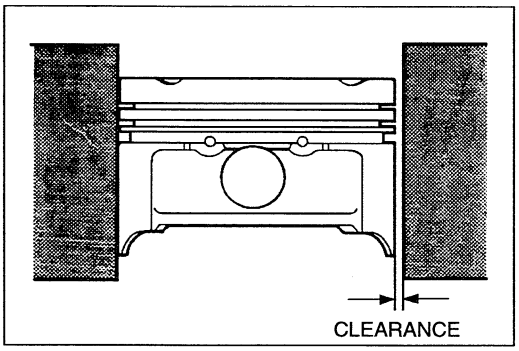
If the piston is replaced, the piston rings must also be replaced.

1. Inspect the outer circumferences of all pistons for seizing and scoring. Replace if necessary.
2. Measure the outer diameter of each piston at a right angle **(90°)** to the piston pin, **16.5 mm {0.65 in}** below the oil ring groove lower edge.

Piston diameter

mm {in}

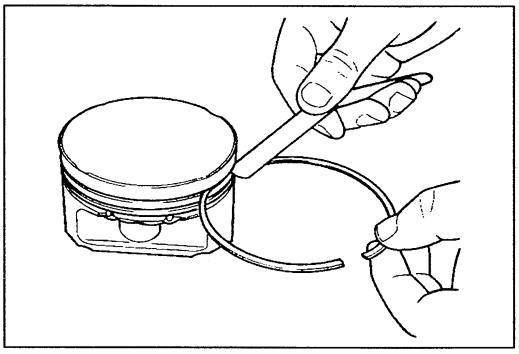
Piston size	Diameter
Standard	82.954—82.974 {3.2659—3.2666}
0.25 {0.01} oversize	83.204—83.224 {3.2758—3.2765}
0.50 {0.02} oversize	83.454—83.474 {3.2856—3.2863}



3. Measure the piston-to-cylinder clearance.

   Clearance: 0.039—0.052 mm {0.0016—0.0020 in}
   Maximum: 0.15 mm {0.006 in}

4. If the clearance exceeds the maximum, replace the piston or rebore the cylinders to accept oversize pistons. If the piston is replaced, the piston rings must also be replaced.

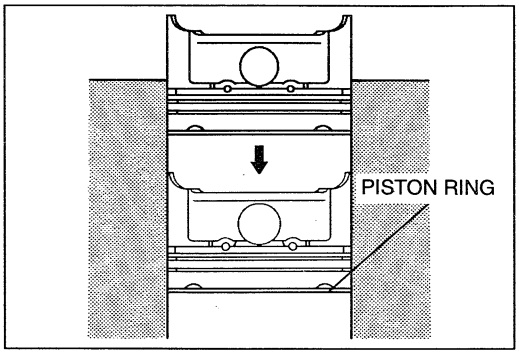


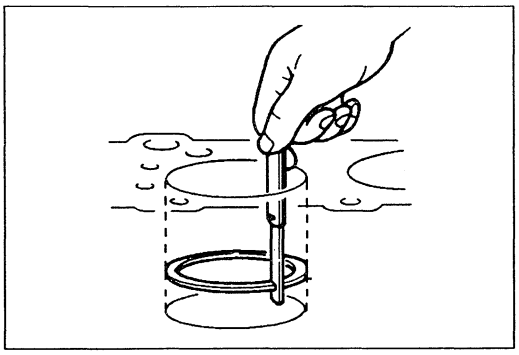
Piston and Piston Rings

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

   Clearance
   Top: 0.035—0.065 mm {0.0014—0.0025 in}
   Second: 0.030—0.065 mm {0.0012—0.0025 in}
   Maximum: 0.085 mm {0.0033 in}

2. If the clearance exceeds the maximum, replace the piston.
3. Inspect the piston rings for damage and abnormal wear. Replace the piston rings 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.

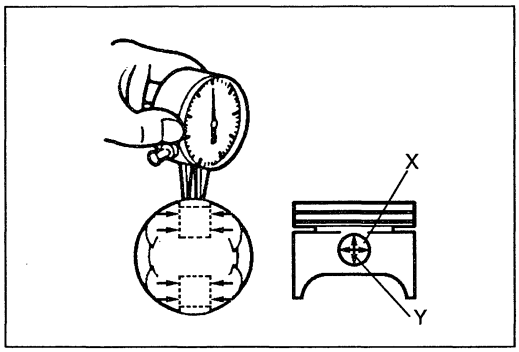




5. Measure the end gap of each piston ring by using a feeler gauge. Replace the piston rings if necessary.

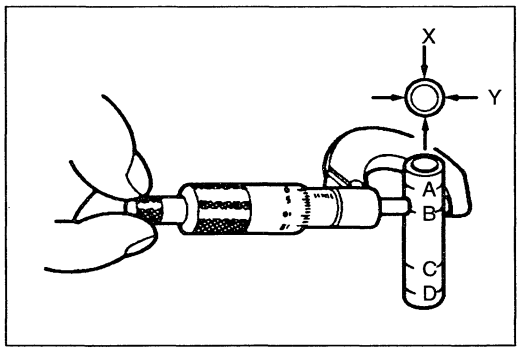
End gap
Top: 0.15—0.30 mm {0.006—0.011 in}
Second: 0.15—0.30 mm {0.006—0.011 in}
Oil rail: 0.20—0.70 mm {0.008—0.027 in}

Maximum
Top, Second: 0.50 mm {0.020 in}
Oil rail: 0.90 mm {0.035 in}



Piston and Piston Pin
1. Measure each piston pin bore diameter in X and Y directions at four points.

Diameter: 18.988—19.000 mm {0.7476—0.7480 in}



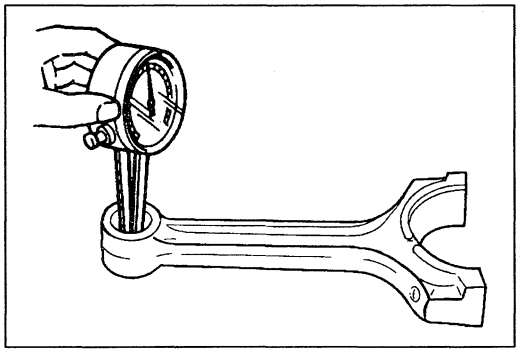
2. Measure each piston pin diameter in X and Y directions at four points.

Diameter: 18.974—18.980 mm {0.7471—0.7472 in}

3. Calculate the related piston pin-to-piston clearance.

Clearance: 0.008—0.026 mm {0.0003—0.0010 in}

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



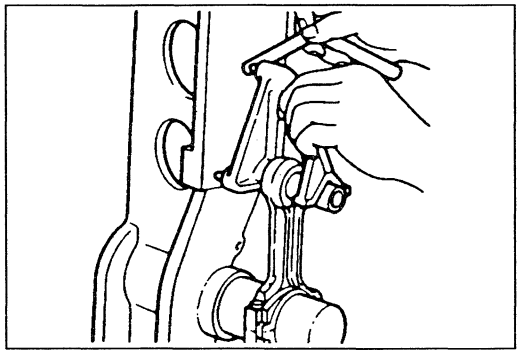
CONNECTING ROD
1. Measure the small end inner diameter of each connecting rod.

Diameter: 18.943—18.961 mm {0.7458—0.7464 in}

2. Calculate the interference between the connecting rod small end bore and the related piston pin.

Interference: 0.013—0.037 mm {0.0006—0.0014 in}

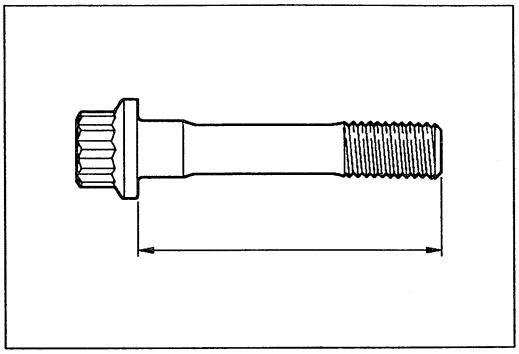
If the connecting rod is replaced, the connecting rod cap, bolts, and nuts must also be replaced because they are a matched set.



3. Measure each connecting rod for bending. Replace the connecting rod if necessary.

Bending: 0.05 mm {0.002 in} max./50 mm {1.97 in}

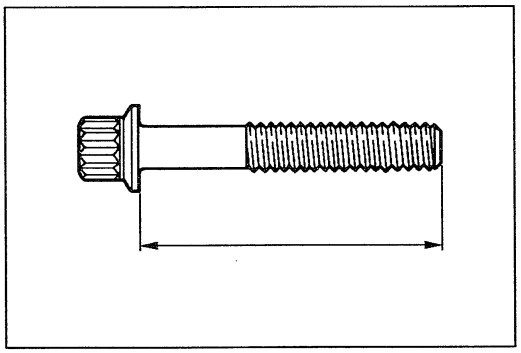
Length (Center to Center):
135.15—135.25 mm {5.3209—5.3247 in}



CONNECTING ROD BOLT

Measure the length of each connecting rod bolt. Replace if necessary.

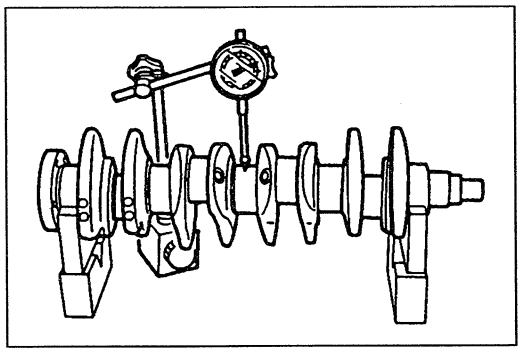
Length: 46.7—47.3 mm {1.839—1.862 in}
Maximum: 48.0 mm {1.890 in}



MAIN BEARING CAP BOLT

Measure the length of each main bearing cap bolt. Replace if necessary.

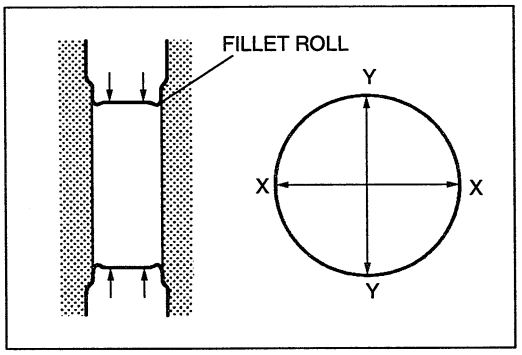
Length: 67.7—68.3 mm {2.666—2.688 in}
Maximum: 69.0 mm {2.717 in}



CRANKSHAFT

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

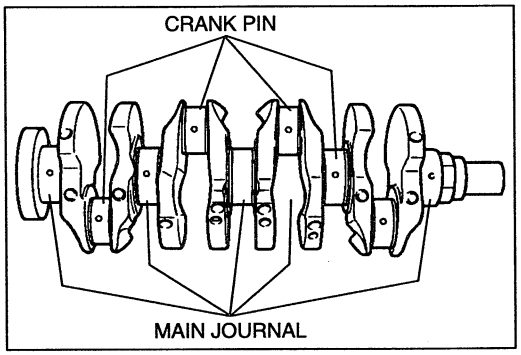
Runout: 0.03 mm {0.0012 in} max.



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

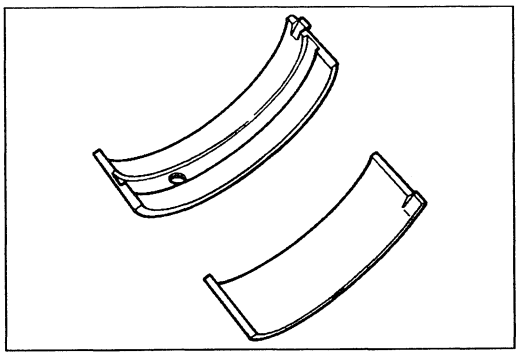
Main journal
Diameter: 55.937—55.955 mm {2.2023—2.2029 in}
Out-of-round: 0.003 mm {0.0001 in} max.

Crankpin journal
Diameter: 47.940—47.955 mm {1.8874—1.8879 in}
Out-of-round: 0.003 mm {0.0001 in} max.



5. If the diameter is less than the minimum, grind the journals to accept undersize bearings.

Undersize bearing:
0.25 mm {0.01 in} (main journal and crankpin),
0.50 mm {0.02 in} (crankpin)



Main journal diameter undersize

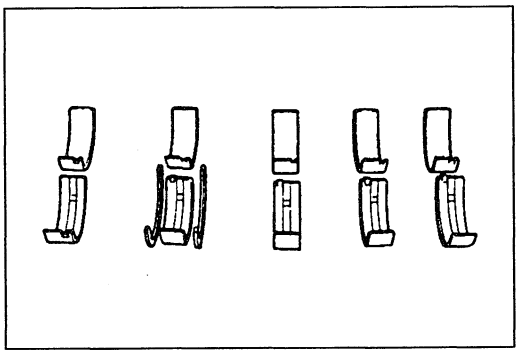
mm {in}

Bearing size	Journal diameter
0.25 {0.01} undersize	55.687—55.705 {2.1924—2.1931}

Crankpin journal diameter undersize

mm {in}

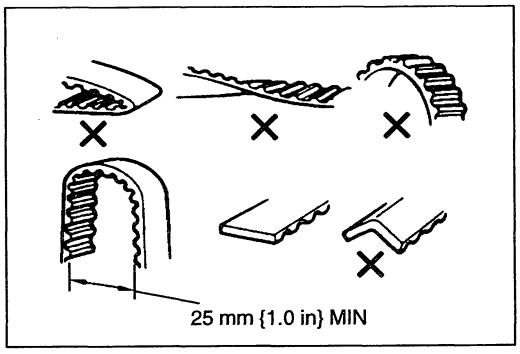
Bearing size	Journal diameter
0.25 {0.01} undersize	47.690—47.705 {1.8776—1.8781}
0.50 {0.02} undersize	47.440—47.455 {1.8678—1.8683}



BEARING

Main Bearing and Connecting Rod Bearing

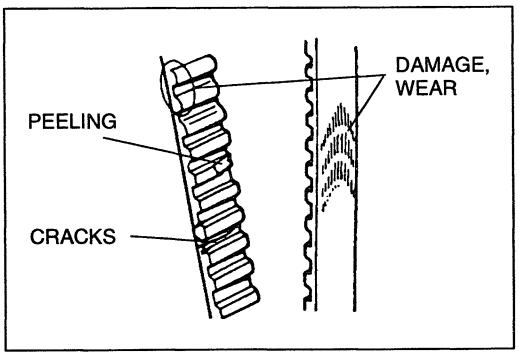
Check the main bearings and the connecting rod bearings for peeling, scoring, and other damage.



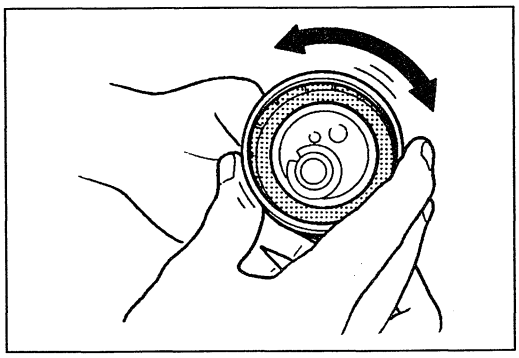
TIMING BELT

Caution

- **The following will damage the belt and shorten its life; Forcefully twisting it, turning it inside out, bending it, or allowing oil or grease on it.**



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

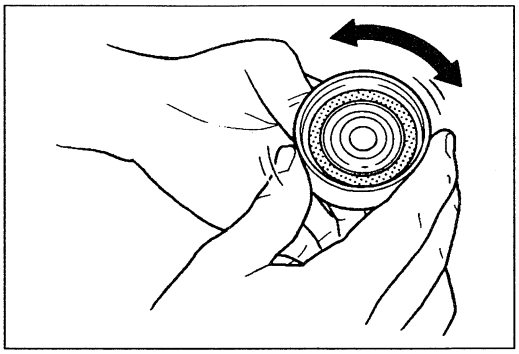


TENSIONER

Caution

- **Using cleaning fluids or a steam cleaner to clean the tensioner can dissolve the grease in its sealed bearing.**

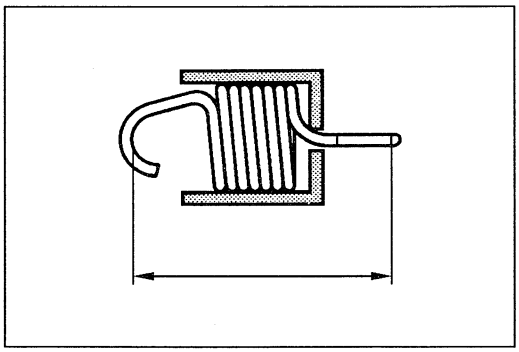
1. Use a clean, soft rag to wipe the tensioner contact surface.
2. If the tensioner does not rotate smoothly, replace it.
3. If there are silicone oil leaks, scratches or abnormal noise when turning the tensioner, replace it.
4. If the spring bracket and grommet are loose or damaged, replace the tensioner.



IDLER

Caution
- **Using cleaning fluids or a steam cleaner to clean the idler can dissolve the grease in its sealed bearing.**

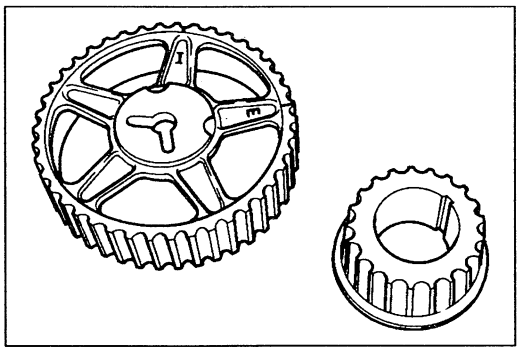
1. Use a clean, soft rag to wipe the idler contact surface.
2. If the idler does not rotate smoothly, replace it.
3. If there are silicone oil leaks, scratches or abnormal noise when turning the idler, replace it.



TENSIONER SPRING

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

Free length: 36.6 mm {1.441 in}



PULLEY

Timing Belt Pulley, Camshaft Pulley

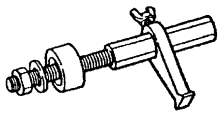
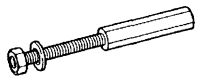
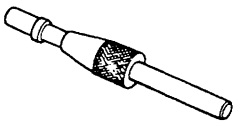
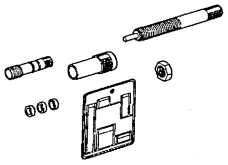
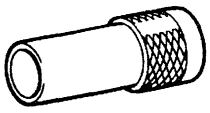
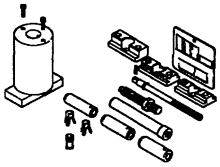
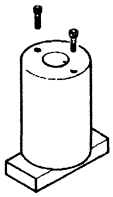
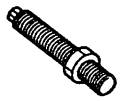
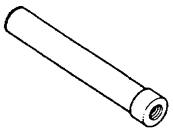
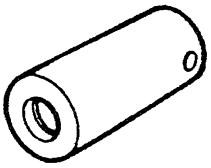
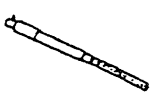
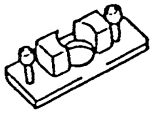
Inspect the pulley teeth for wear, deformation, and other damage. Replace the pulley if necessary.

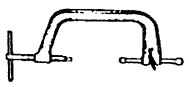
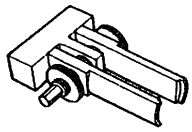
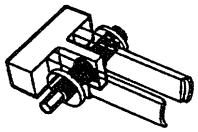
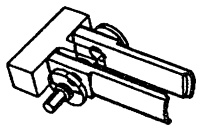
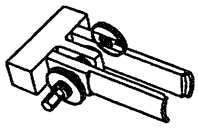
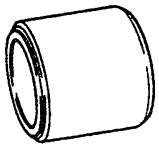
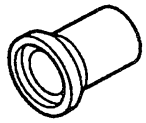
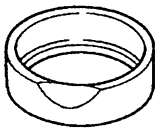
TIMING BELT COVER

Inspect the timing belt covers for damage and cracks. Replace as necessary.

ASSEMBLY

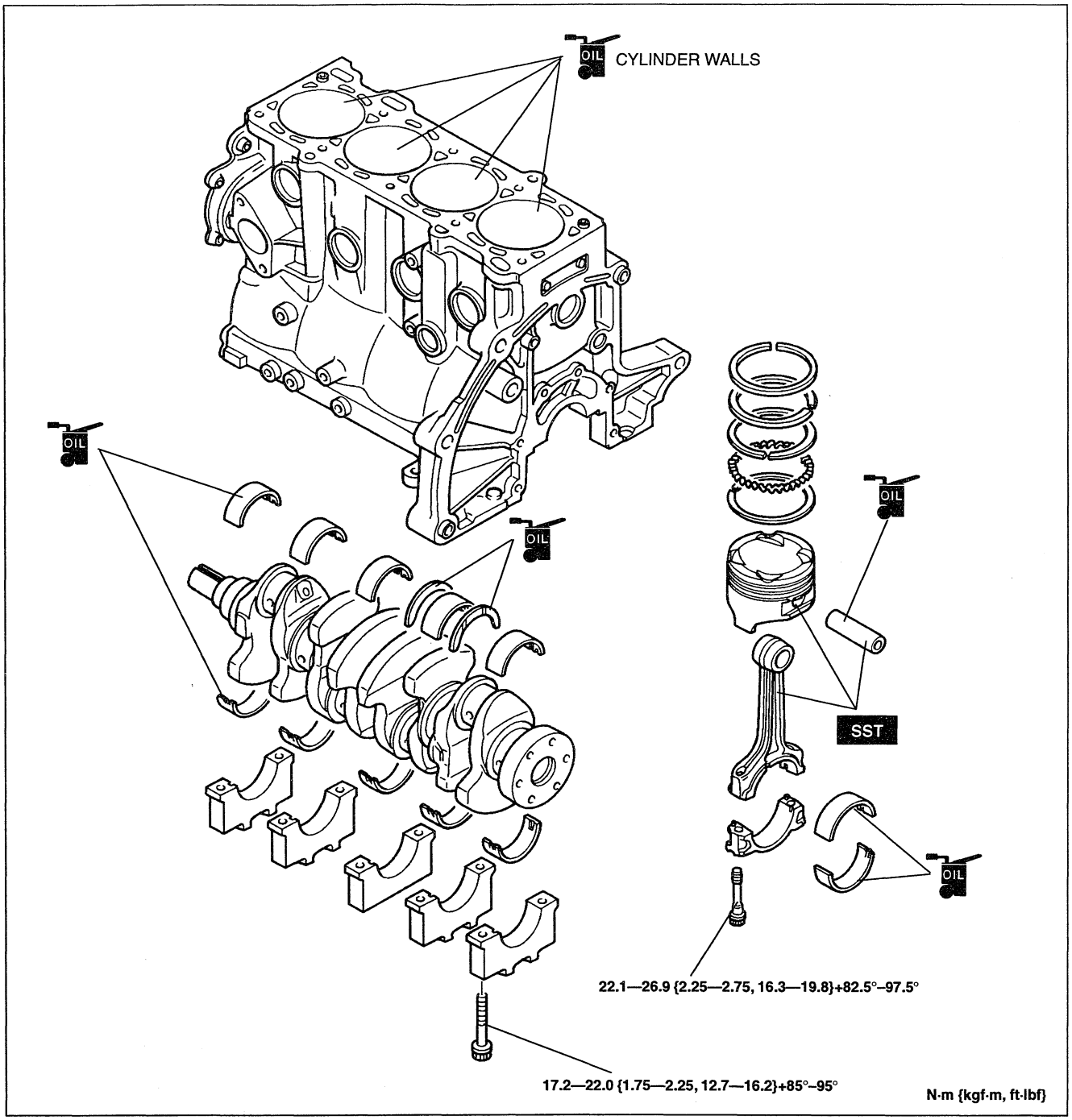
PREPARATION
SST

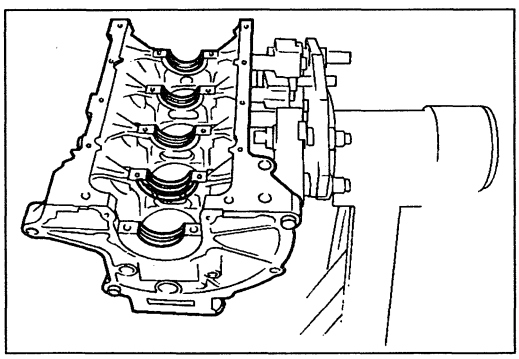
49 E011 1A0 Brake, ring gear 	For prevention of engine rotation	49 E011 103 Shaft (Part of 49 E011 1A0) 	For prevention of engine rotation
49 E011 104 Collar (Part of 49 E011 1A0) 	For prevention of engine rotation	49 E011 105 Stopper (Part of 49 E011 1A0) 	For prevention of engine rotation
49 SE01 310A Centering tool, clutch disc 	For installation of clutch disc	49 L012 0A0 Installer set, valve seal & valve guide 	For installation of valve seal
49 L012 005 Spacer (Part of 49 L012 0A0) 	For installation of valve seals	49 L012 001 Installer (Part of 49 L012 0A0) 	For installation of valve seal
49 L012 002 Body (Part of 49 L012 0A0) 	For installation of valve seal	49 L011 0A0B Tool set, piston pin setting 	For removal / installation of piston pin
49 L011 001 Body, support block (Part of 49 L011 0A0B) 	For removal / installation of piston pin	49 L011 005 Bolt, stopper (Part of 49 L011 0A0B) 	For removal / installation of piston pin
49 L011 006 Installer, piston pin (Part of 49 L011 0A0B) 	For removal / installation of piston pin	49 E011 001 Guide 	For removal / installation of piston pin
49 E011 002 Screw 	For removal / installation of piston pin	49 D011 002B Head, support block (Part of 49 L011 0A0B) 	For removal / installation of piston pin

49 0636 100B Arm, valve spring lifter 	For removal / installation of valve	49 B012 0A2 Pivot 	For removal / installation of valve
49 B012 012 Body (Part of 49 B012 0A2) 	For removal / installation of valve	49 B012 013 Foot (Part of 49 B012 0A2) 	For removal / installation of valve
49 B012 014 Locknut (Part of 49 B012 0A2) 	For removal / installation of valve	49 G014 001 Wrench, oil filter 	For removal / installation of oil filter
49 B014 001 Installer, oil seal 	For installation of camshaft oil seal	49 H010 401 Installer, oil seal 	For installation of front oil seal
49 G033 107A Installer, dust cover 	For installation of rear oil seal	—	—

1. Do not reuse gaskets or oil seals.
2. Clean all parts before reinstallation.
3. Apply clean engine oil to all sliding and rotating parts.
4. Replace plain bearings if they are peeled, burned, or otherwise damaged.
5. Tighten all bolts and nuts to the specified torque.

CYLINDER BLOCK (INTERNAL PARTS)
Torque Specifications



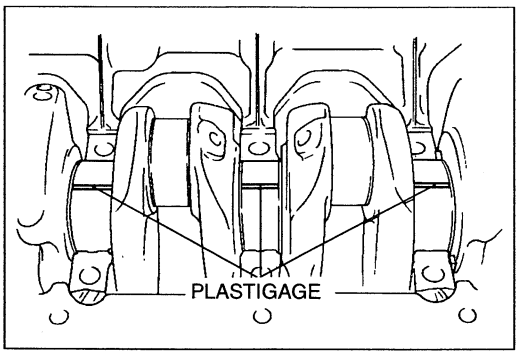


Crankshaft

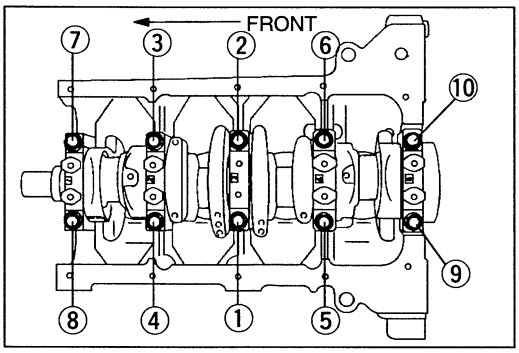
1. Before installing the crankshaft, inspect the main bearing oil clearances as follows.

Oil clearance inspection

(1) Remove all foreign material and oil from the journals and bearings.

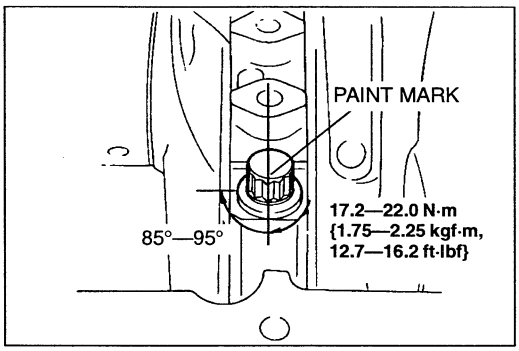


(2) Install the grooved upper main bearings in the cylinder block.
(3) Install the thrust bearings with the oil groove facing the crankshaft.
(4) Set the crankshaft in the cylinder block.
(5) Position Plastigage atop the journals in the axial direction.
(6) Do not rotate the crankshaft when measuring the oil clearances.

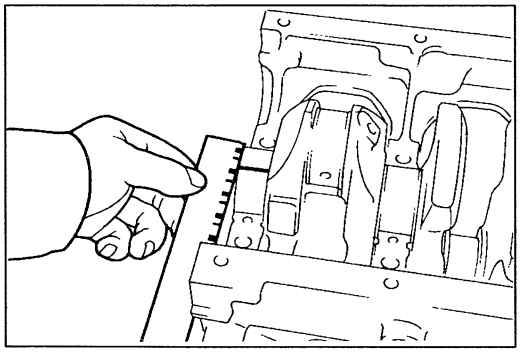


(7) Install the lower main bearings and the main bearing caps according to the cap number, facing the ▭ mark toward the front.
(8) Tighten the main bearing cap bolts in two or three steps in the order shown.

Tightening torque:
17.2—22.0 N·m {1.75—2.25 kgf·m, 12.7—16.2 ft·lbf}



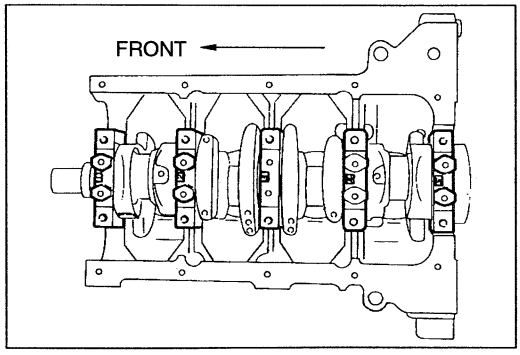
(9) Put a paint mark on each bolt head.
(10) Using the mark as a reference, tighten the bolts by turning each **85°—95°** in the sequence shown.



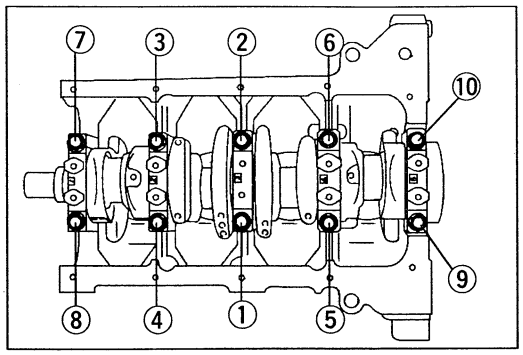
(11) Remove the main bearing caps, and measure the Plastigage at each journal at the widest point for the smallest clearance, and at the narrowest point for the largest clearance.
(12) If the oil clearance exceeds the specification, grind the crankshaft and install undersize main bearings. (Refer to page B1–68.)

mm {in}

	No.1, 2, 4, 5	No.3
Oil clearance	0.024—0.050 {0.0010—0.0019}	0.030—0.056 {0.0012—0.0022}
Maximum	0.067 {0.0026}	

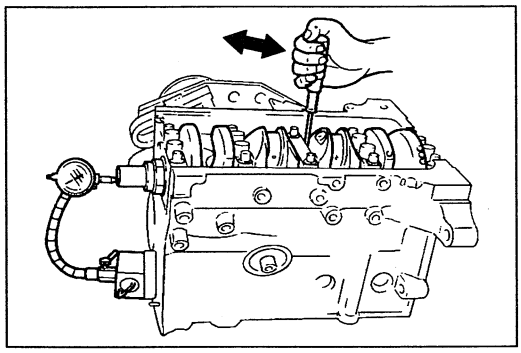


2. Apply clean engine oil to the main bearings, thrust bearings and main journals.
3. Install the main bearing caps according to the cap number, facing the ▭ mark toward the front.



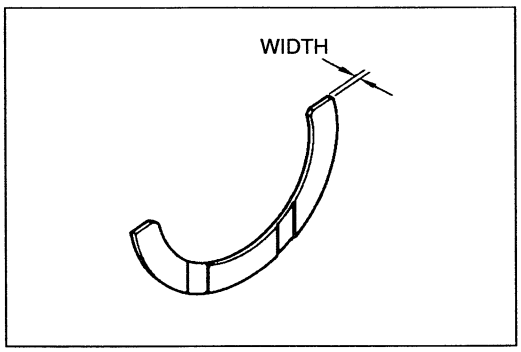
4. Tighten the main bearing cap bolts in two or three steps in the order shown.

Tightening torque: 17.2—22.0 N·m {1.75—2.25 kgf·m, 12.7—16.2 ft·lbf} +85°—95°



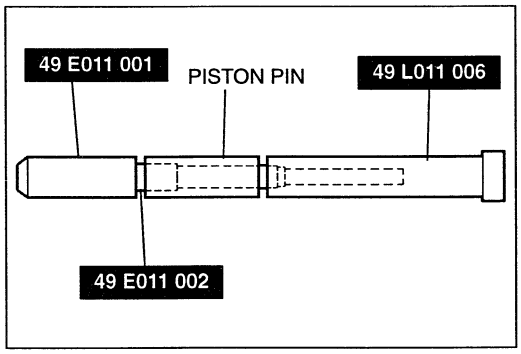
5. Measure the crankshaft end play.

End play: 0.080—0.282 mm {0.0032—0.0111 in}
Maximum: 0.30 mm {0.0118 in}

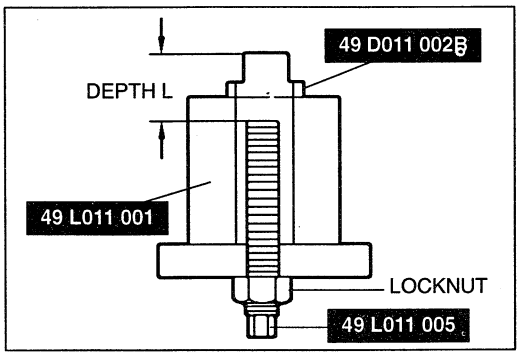


6. If the end play exceeds the maximum, grind the crankshaft and install oversize thrust bearings, or replace the crankshaft and thrust bearings.

Thrust bearing width
Standard:
2.500—2.550 mm {0.0985—0.1003 in}
0.25 mm {0.01 in} oversize:
2.625—2.675 mm {0.1034—0.1053 in}
0.50 mm {0.02 in} oversize:
2.750—2.800 mm {0.1083—0.1102 in}
0.75 mm {0.03 in} oversize:
2.875—2.925 mm {0.1132—0.1151 in}



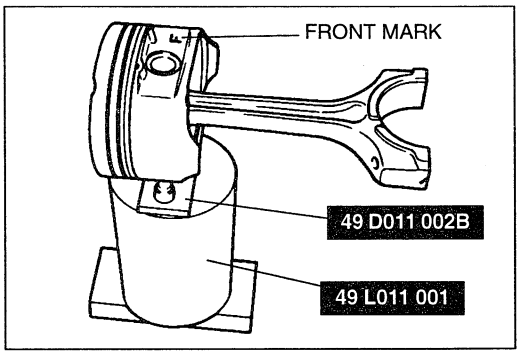
Connecting Rod
1. Assemble the **SST** and the piston pin as shown.
2. Apply clean engine oil to the piston pin.



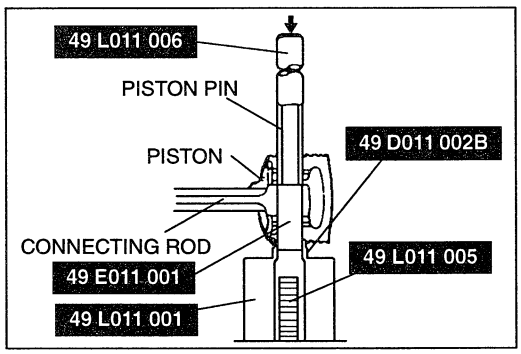
3. Adjust the **SST** (stopper bolt) so that depth L is as specified.

Depth L: 59.1 mm {2.33 in}

4. Tighten the locknut.

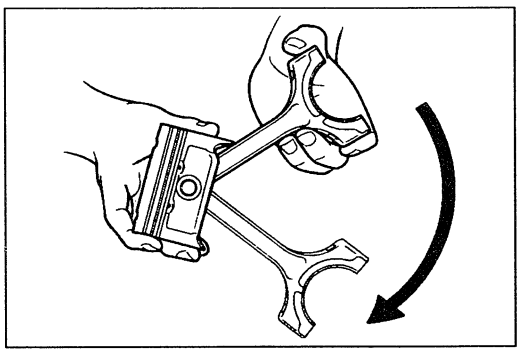


5. Set the piston on the **SST** with the **F** mark facing upward.
6. Assemble the piston and the connecting rod in the direction from which they were disassembled.
7. Verify that the **SST** is set squarely into the piston.

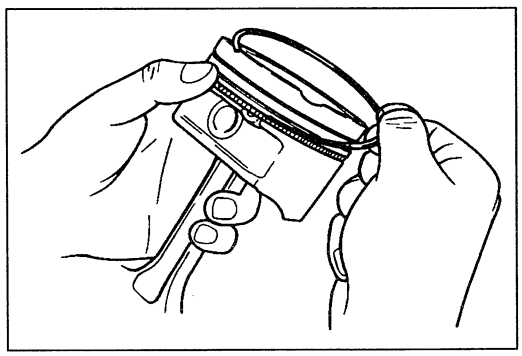


8. Set the piston and connecting rod on the **SST** as shown and press the piston pin through the piston and connecting rod until the **SST** contacts the stopper bolt.
9. While inserting the piston pin, check the pressing force. If it is less than specified, replace the piston pin and/or the connecting rod.

Pressing force:
4,904—14,709 N {500—1,500 kgf, 1,100—3,300 lbf}



10. Check the oscillation torque of the connecting rod. If the large end does not drop by its own weight, replace the piston and/or piston pin.

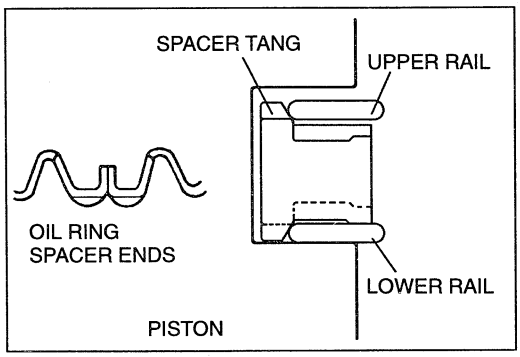


Piston Ring

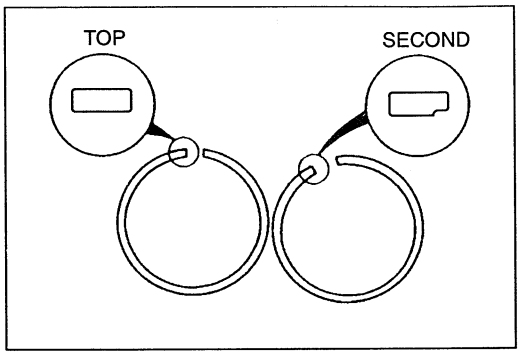
1. Install the three-piece oil rings on the pistons.
   (1) Apply clean engine oil to the oil ring spacer and rails.
   (2) Install the oil ring spacer with the ends upward.

Note
- The upper and lower rails are the same. They can be installed with either face upward.

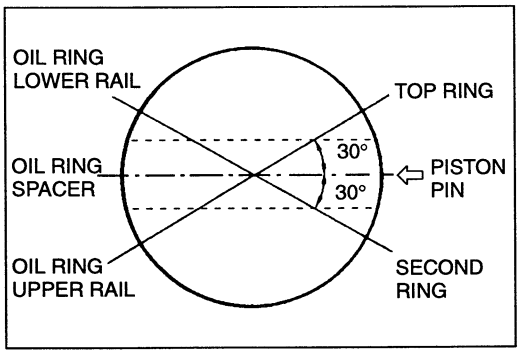
   (3) Install the upper and lower rails.



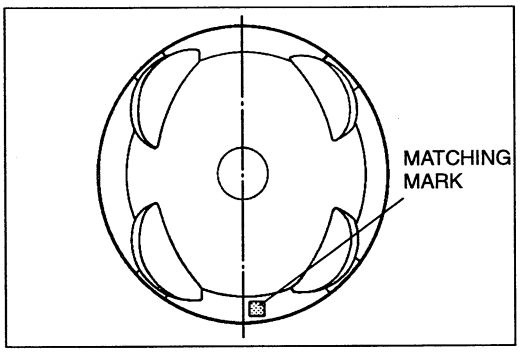
2. Verify that the spacer tang separates the rails, and that the rails turn smoothly in both directions.



3. Install the second ring with the scraper face downward.
4. Apply clean engine oil to the top and second piston rings.
5. Install the second ring to the piston; then install the top ring. Use a piston ring expander.

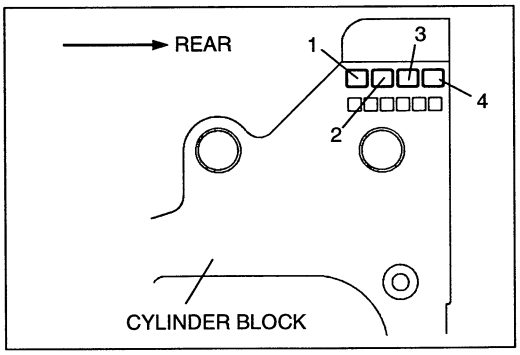


6. Position the end gaps of the rings as shown.



Piston and connecting rod assembly

The piston and the cylinder block have matching marks on them to ensure correct installation. Note these marks when installing the pistons.

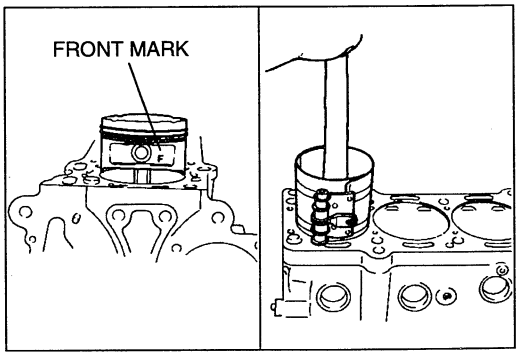


Mark
Standard

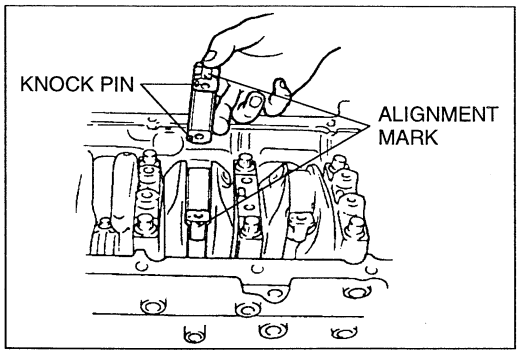
Piston	Cylinder block
a	A
b	B
c	C

Oversize (piston)

25	0.25 O.S.
50	0.50 O.S.



1. Apply clean engine oil to the cylinder walls, pistons, and piston rings.
2. Check the piston rings for correct end gap alignment.
3. Using a piston ring compressor, insert each piston assembly into the cylinder block with the **F** mark facing the front of the engine.

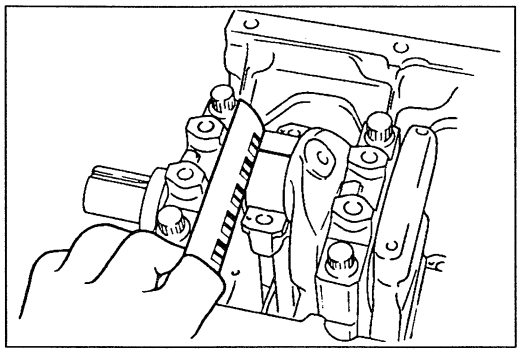


Connecting Rod Cap

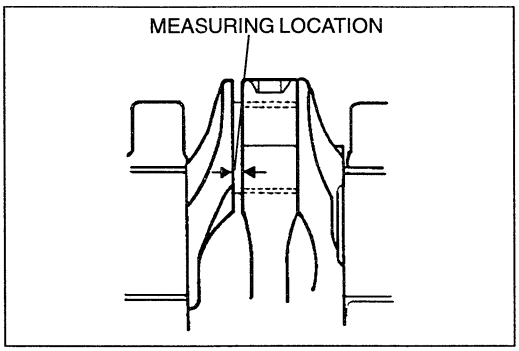
1. Measure the connecting rod bearing oil clearances using the same procedure as for the main bearing oil clearance.

   Tightening torque: 22.1—26.9 N·m {2.25—2.75 kgf·m, 16.3—19.8 ft·lbf}+ 82.5°—97.5°

   Oil clearance: 0.024—0.061 mm {0.0010—0.0024 in}
   Maximum: 0.067 mm {0.0026 in}



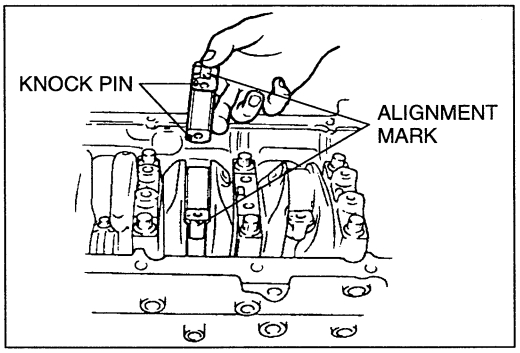
2. If the oil clearance exceeds the maximum, grind the crankshaft to accept undersize bearings.
   (Refer to page B1–68.)



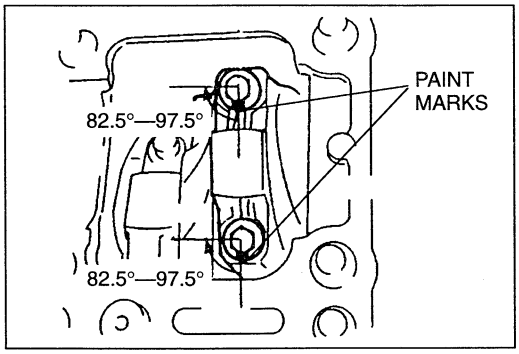
3. Measure the connecting rod side clearances.

   Side clearance:
   0.110—0.262 mm {0.0044—0.0103 in}
   Maximum: 0.30 mm {0.012 in}

4. If the clearance exceeds the maximum, replace the connecting rod and the cap.



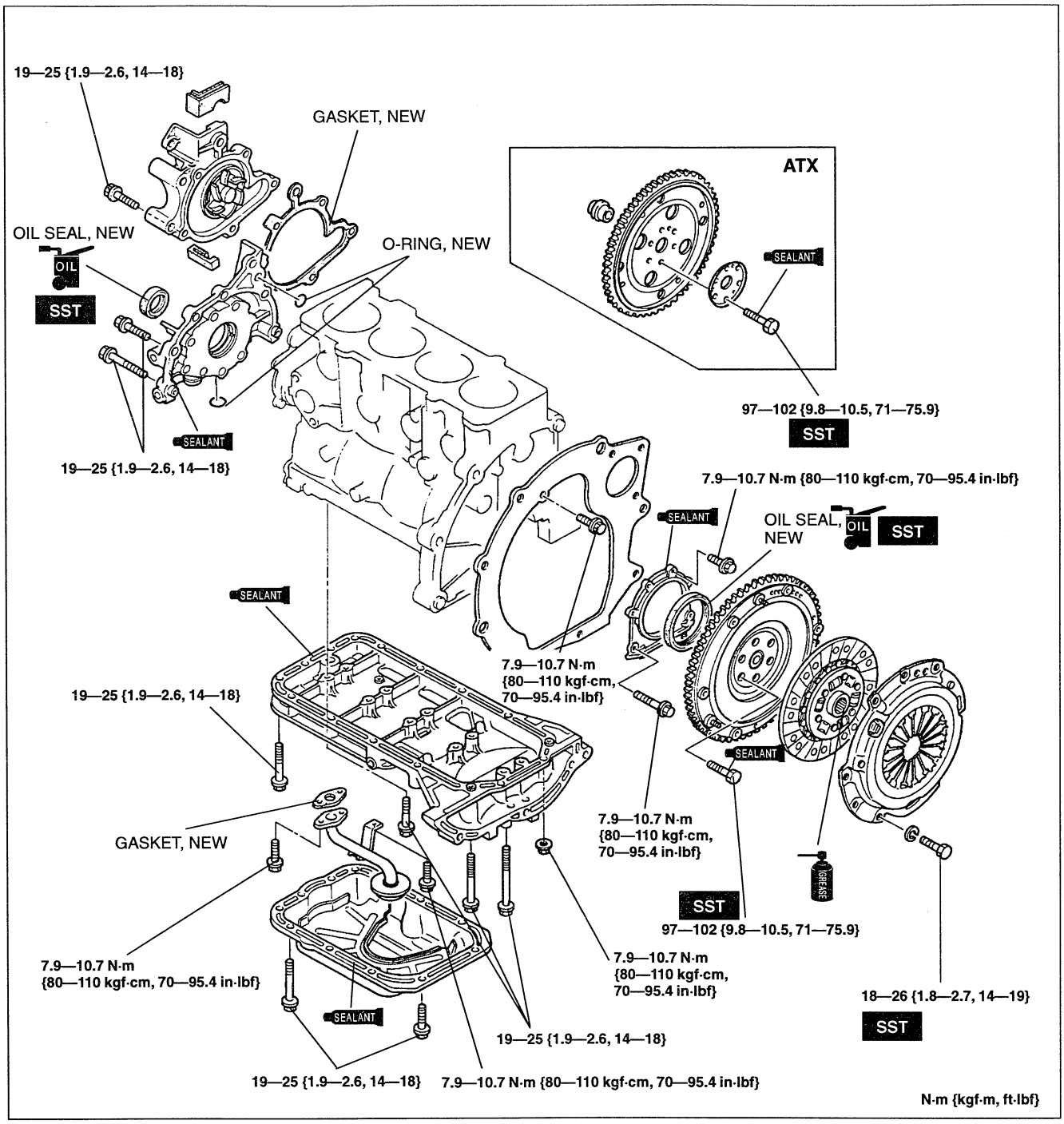
5. Apply clean engine oil to the crankpin journals and the connecting rod bearings.
6. Install the connecting rod caps with the knock pins and the alignment marks aligned.

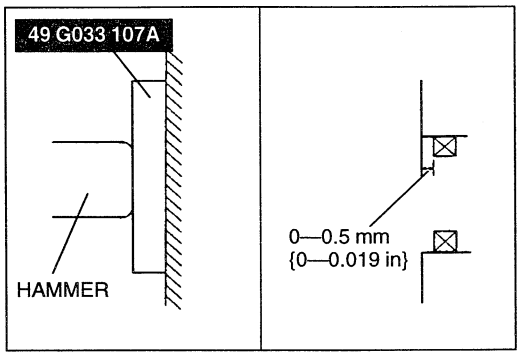


7. Tighten the connecting rod cap bolts.

   Tightening torque: 22.1—26.9 N·m {2.25—2.75 kgf·m, 16.3—19.8 ft·lbf} + 82.5°—97.5°

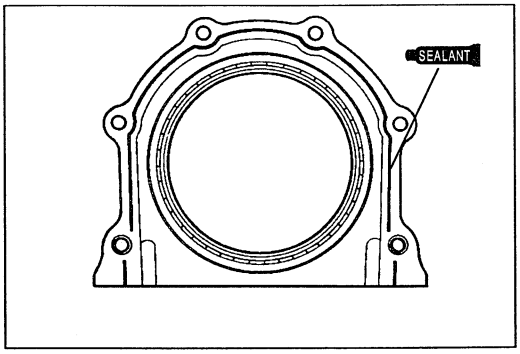
CYLINDER BLOCK (EXTERNAL PARTS)
Torque Specifications



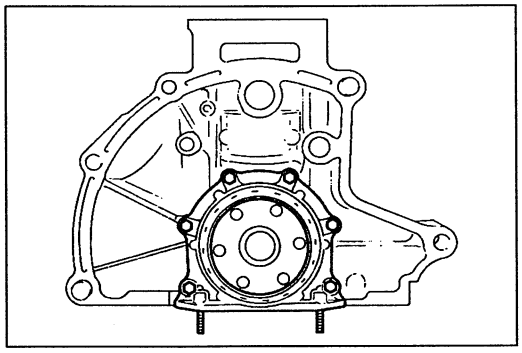


Rear Cover

1. Apply clean engine oil to the lip of a new oil seal.
2. Push the oil seal slightly in by hand.
3. Using the **SST** and a hammer, tap the oil seal in evenly until it is flush with the edge of the rear cover.

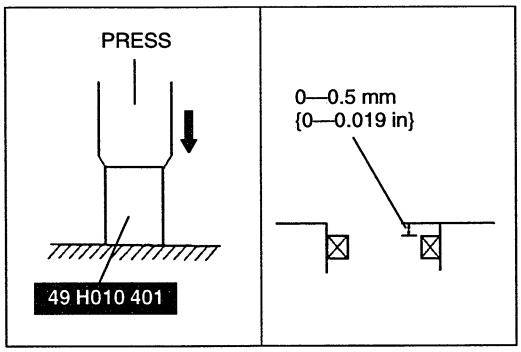


4. Apply silicone sealant to the rear cover as shown.

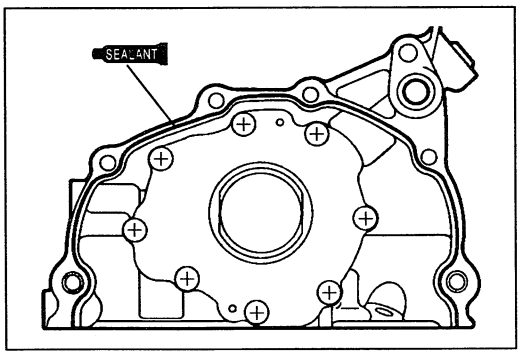


5. Install the rear cover within five munutes of applying the sealant.

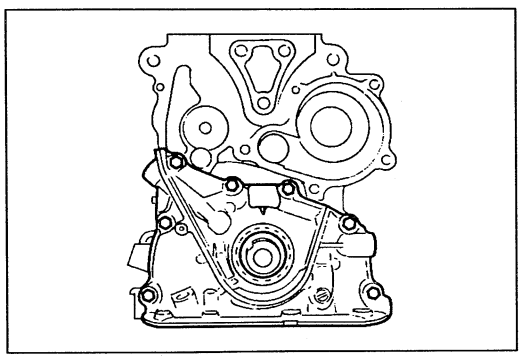
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



Oil Pump
1. Apply clean engine oil to the lip of a new oil seal.
2. Push the oil seal slightly in by hand.
3. Press the oil seal into the oil pump body by using the **SST**.

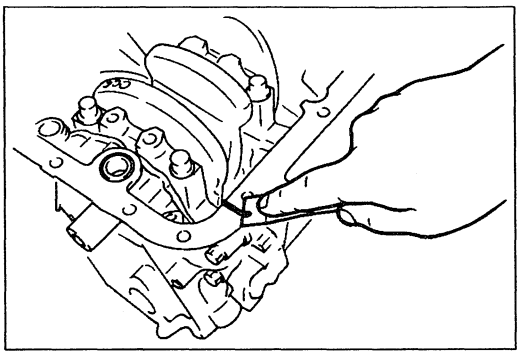


4. Apply silicone sealant to the oil pump housing as shown.

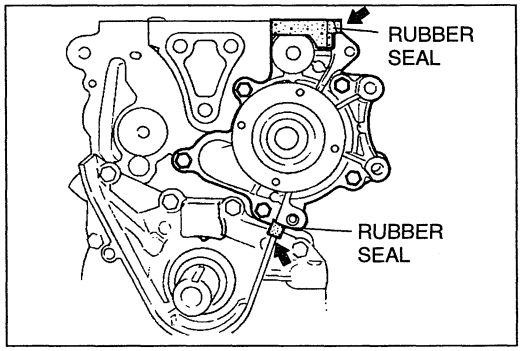


5. Install the oil pump within five minutes of applying the sealant.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



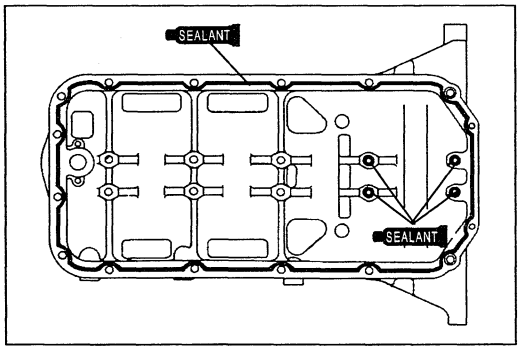
6. Remove any sealant that is pushed out at the oil pan side.



Water Pump

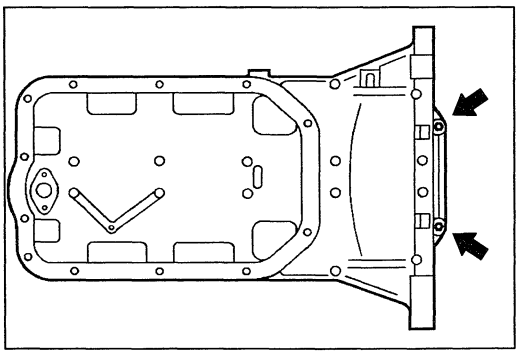
Install the water pump along with a new gasket and new rubber seals. Verify that the rubber seals stay in place when installing the pump.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



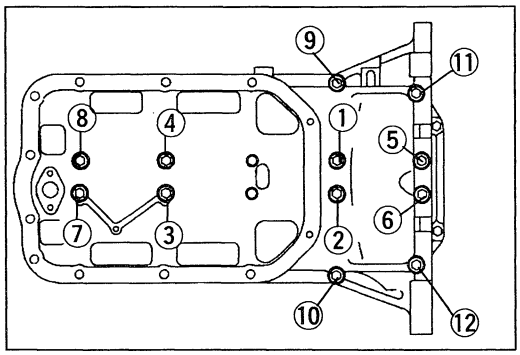
Oil Pan Upper Block

1. Remove all foreign material from the contact surfaces.
2. Apply silicone sealant to the oil pan upper block as shown.



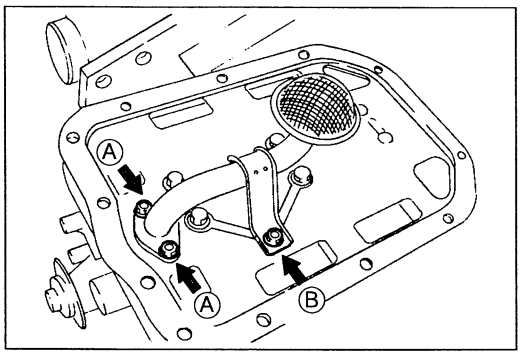
3. Install the oil pan upper block within five minutes of applying the sealant.
4. Tighten the two nuts.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



5. Tighten the oil pan upper block bolts in two or three steps in the order shown.

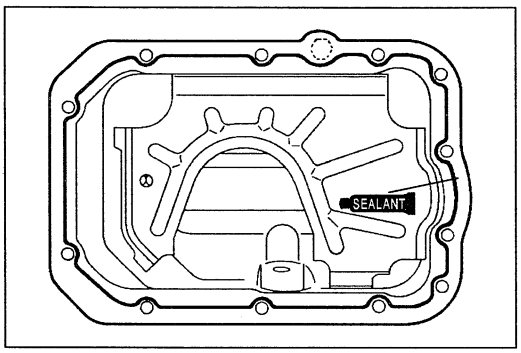
Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



Oil Strainer

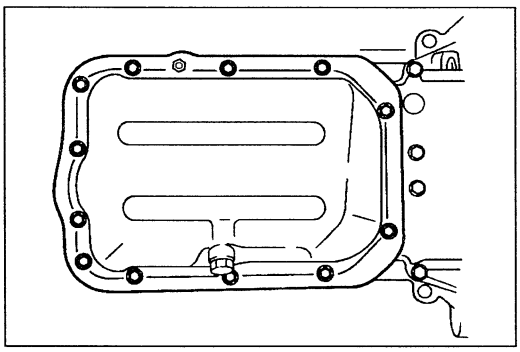
1. Install the oil strainer along with a new gasket.
2. Tighten the bolts marked Ⓐ first.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



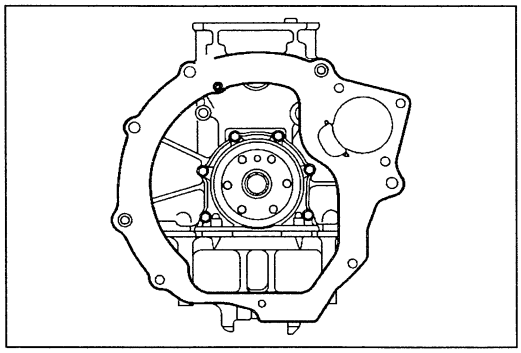
Oil Pan

1. Remove all foreign material from the contact surfaces.
2. Apply silicone sealant to the oil pan as shown.



3. Install the oil pan within five minutes of applying the sealant.
4. Tighten the oil pan bolts.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



End Plate

Install the end plate.

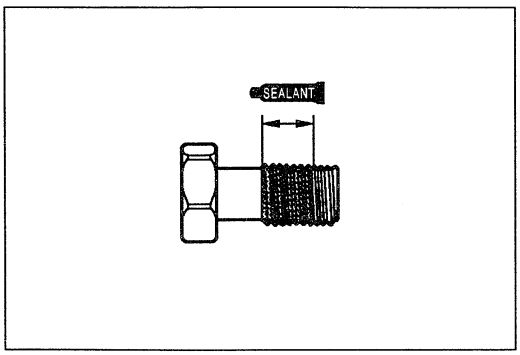
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

Flywheel (MTX)

1. Remove the sealant from the flywheel bolt holes in the crankshaft and from the flywheel bolts.

Caution

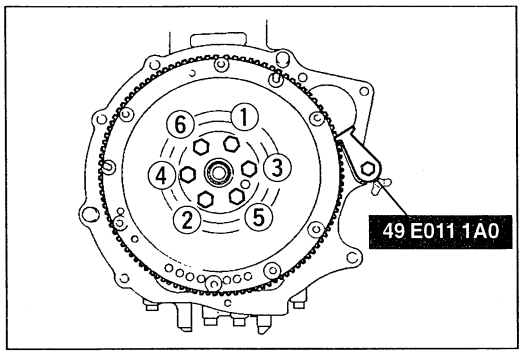
- **If all of the old thread locking sealant cannot be removed from the bolt, it will not torque properly. Replace the bolt.**



Note

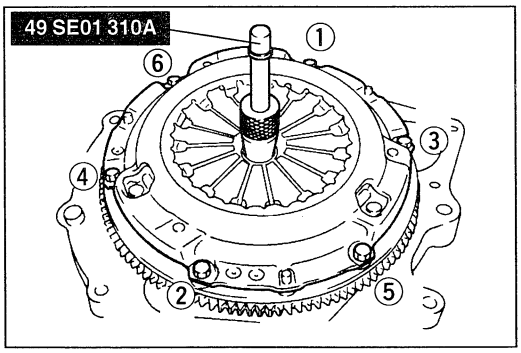
- If a new bolt is used, do not apply thread locking sealant. New Mazda bolts have sealant on them.

2. Set the flywheel onto the crankshaft.
3. Apply sealant to the flywheel bolts and install them.



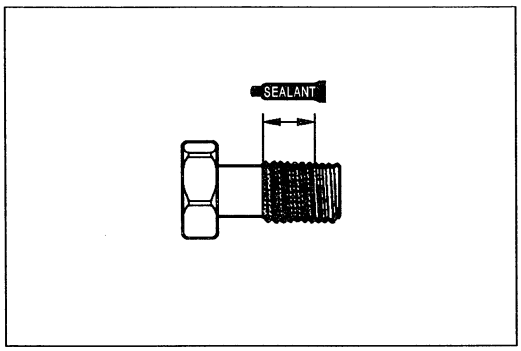
4. Hold the flywheel by using the **SST**.
5. Tighten the bolts in two or three steps in the order shown.

Tightening torque:
97—102 N·m {9.8—10.5 kgf·m, 71—75.9 ft·lbf}



Clutch Disc and Clutch Cover (MTX)
1. Install the clutch disc and the clutch cover by using the **SST**.
2. Tighten the clutch cover bolts in two or three steps in the order shown.

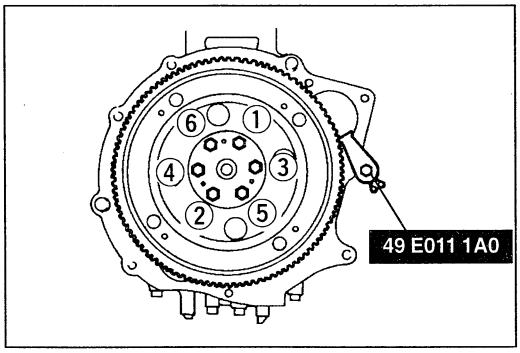
Tightening torque:
18—26 N·m {1.8—2.7 kgf·m, 14—19 ft·lbf}



Drive Plate (ATX)
1. Remove the sealant from the drive plate bolt holes in the crankshaft and from the drive plate bolts.

Caution
- **If all of the old thread locking sealant cannot be removed from the bolt, it will not torque properly. Replace the bolt.**

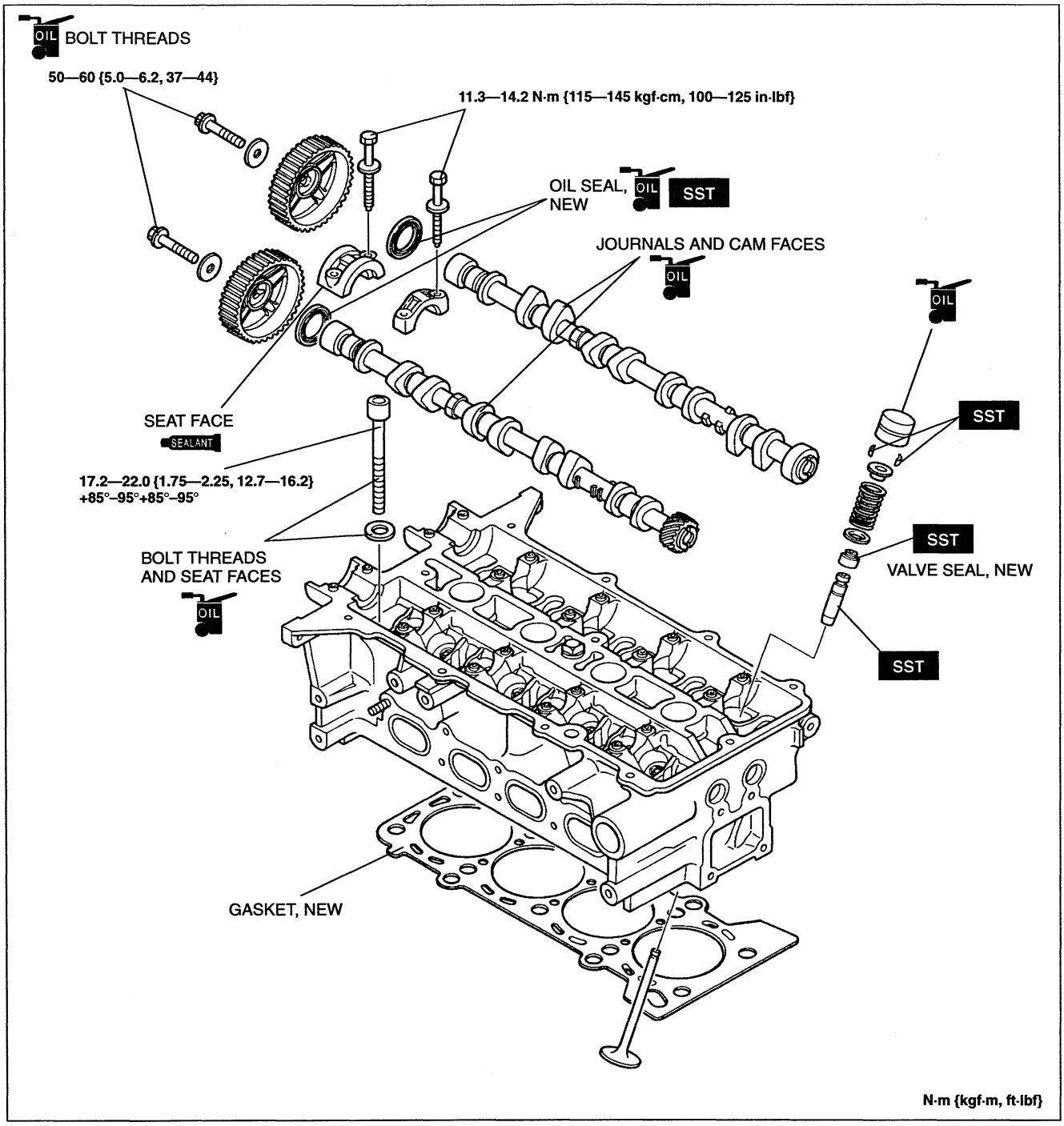
Note
- If a new bolt is used, do not apply thread locking sealant. New Mazda bolts have sealant on them.

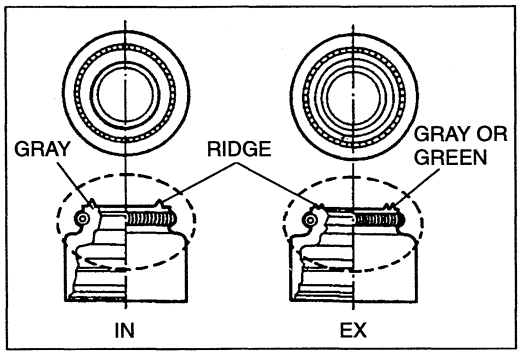


2. Set the adapter, drive plate, and backing plate onto the crankshaft.
3. Apply sealant to the drive plate bolts and install them.
4. Hold the drive plate by using the **SST**.
5. Tighten the bolts in two or three steps in the order shown.

Tightening torque:
97—102 N·m {9.8—10.5 kgf·m, 71—75.9 ft·lbf}

CYLINDER HEAD
Torque Specifications

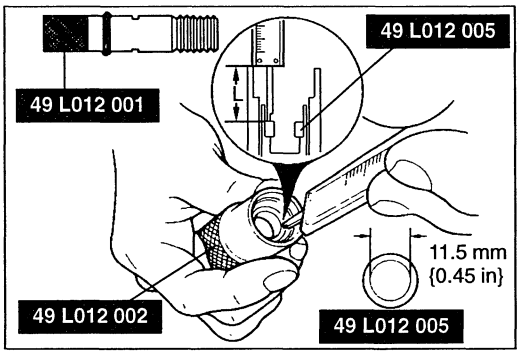




Valve Seal

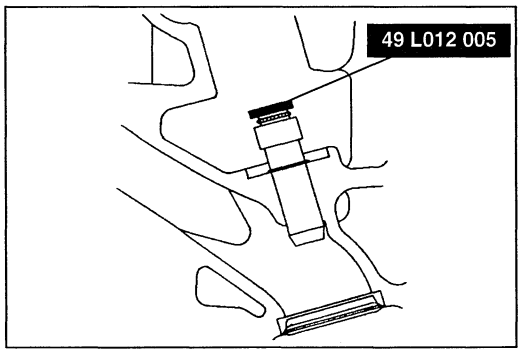
The intake and exhaust valve seals are different as shown.

	Ridge	Color
Intake	No or One	Gray
Exhaust	Two	Gray or Green

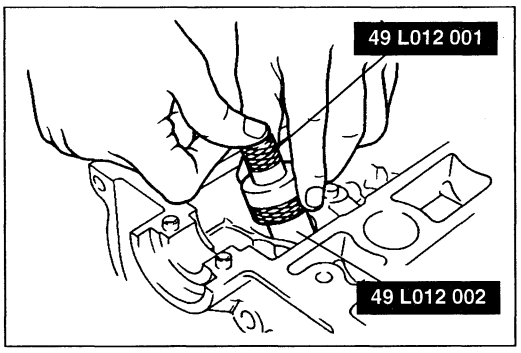


1. Assemble the **SST** so that depth **L** is as specified.

   Depth L: 17.7—18.3 mm {0.697—0.720 in}

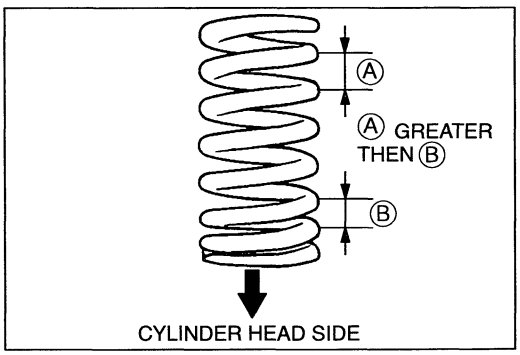


2. Slide the valve seal onto the valve guide.
3. Set the **SST** against the valve seal.

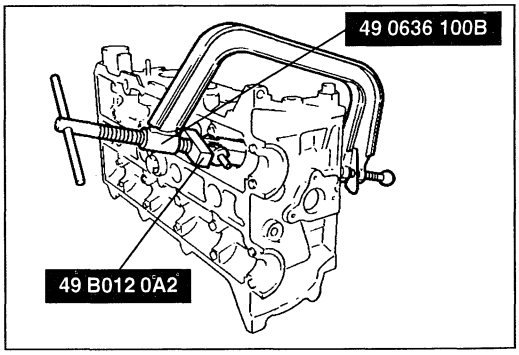


Caution
- **Using a hammer will damage the valve seal.**

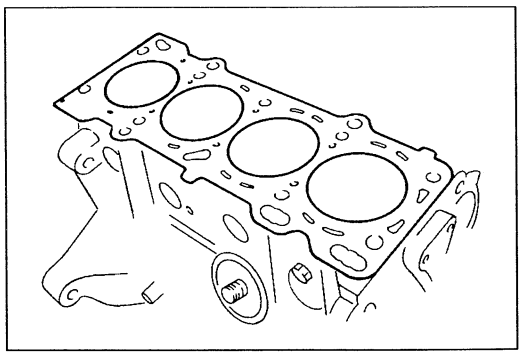
4. Using the **SST**, press the valve seal on by hand until the **SST** touches the cylinder head.



Valve and Valve Spring
1. Install the lower spring seat.
2. Install the valve.
3. Install the valve spring with the closer pitch toward the cylinder head.
4. Install the upper spring seat.

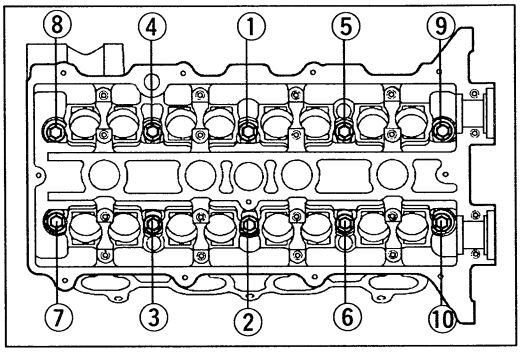


5. Compress the valve spring by using the **SST**, and install the valve keepers.
6. Remove the **SST**.
7. Tap the end of the valve stem lightly two or three times with a plastic hammer to verify that the keepers are fully seated.



Cylinder Head Gasket

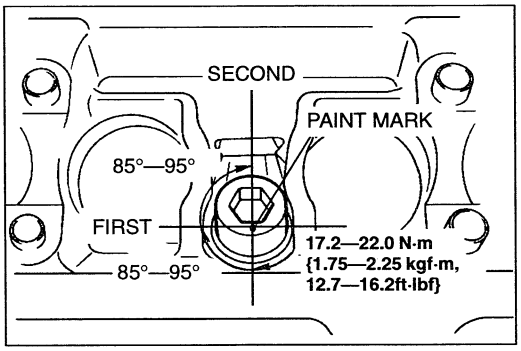
1. Remove all foreign material from the top of the cylinder block.
2. Place the new cylinder head gasket in position.



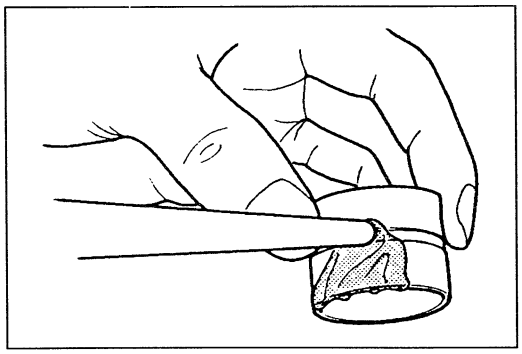
Cylinder Head

1. Install the cylinder head.
2. Tighten the cylinder head bolts.
   (1) Apply clean engine oil to the bolt threads and seat faces.
   (2) Tighten the cylinder head bolts in two or three steps in the order shown.

Tightening torque:
17.2—22.0 N·m {1.75—2.25 kgf·m, 12.7—16.2 ft·lbf}

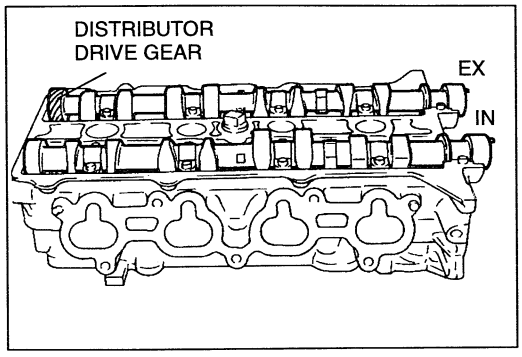


   (3) Put a paint mark on each bolt head.
   (4) Use this mark as a reference, tighten the bolts **85°—95°** in the order shown.
   (5) Further tighten each bolt **another 85°—95°**.



HLA

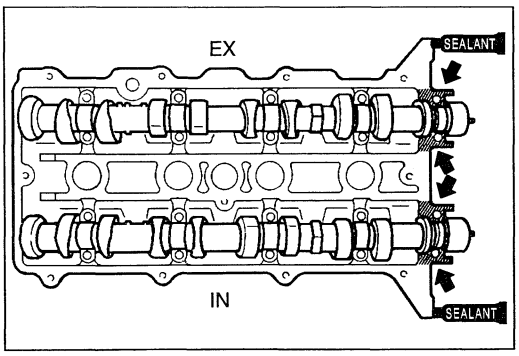
1. Apply clean engine oil to the friction surfaces of the HLA.
2. If the HLA are being reused, install them in the position from which they were removed.
3. Verify that the HLA move smoothly in their bores.



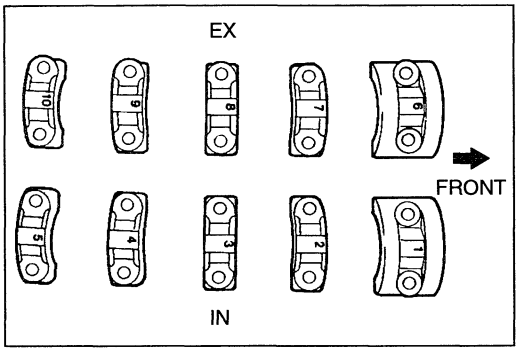
Camshaft

Note
- The exhaust camshaft is machined with the distributor drive gear.

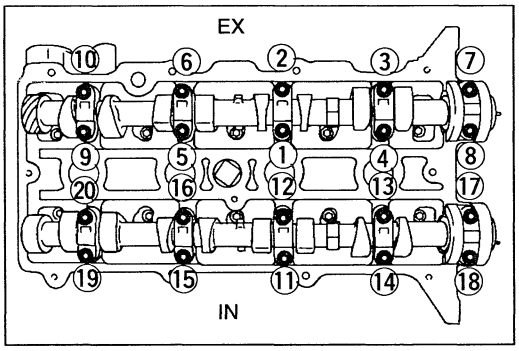
1. Apply clean engine oil to the camshaft journals and bearings.
2. Install the camshaft in position, facing the dowel pin upward.



3. Apply silicone sealant to the shaded areas shown.

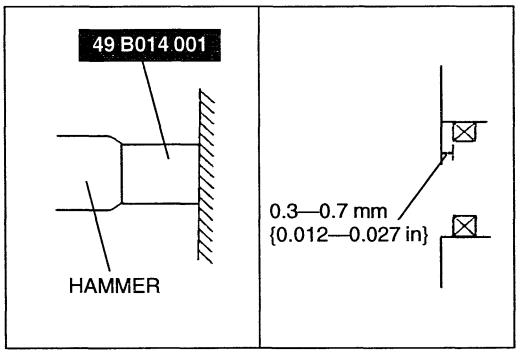


4. Install the camshaft caps according to the cap number as shown.

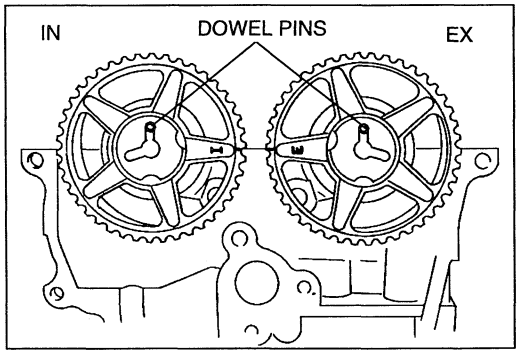


5. Install the camshaft cap bolts and tighten them in five or six steps in the order shown.

Tightening torque:
11.3—14.2 N·m {115—145 kgf·cm, 100—125 in·lbf}

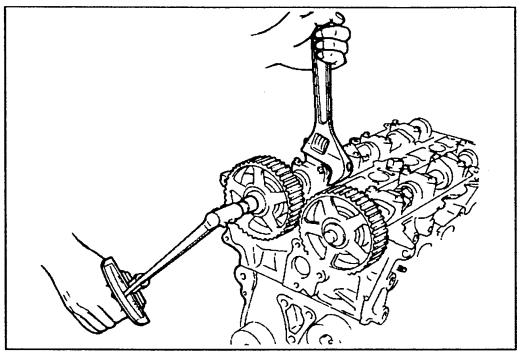


6. Apply clean engine oil to the lip of each new camshaft oil seal.
7. Push the oil seals slightly in by hand.
8. Using the **SST** and a hammer, tap the oil seal in evenly until it is flush with the edge of the camshaft cap.



Camshaft Pulley

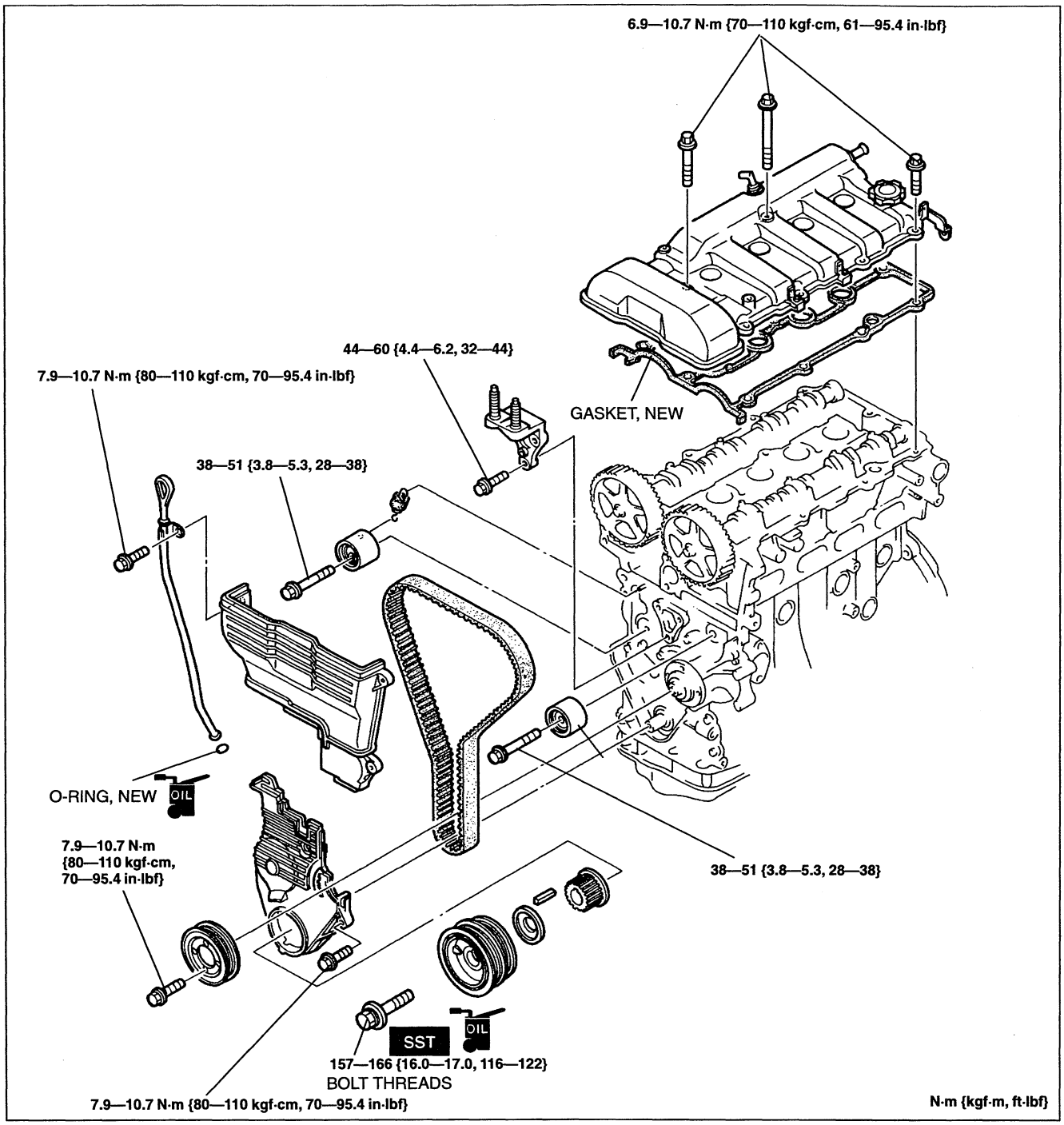
1. Install the camshaft pulleys, positioning the dowel pins as shown.

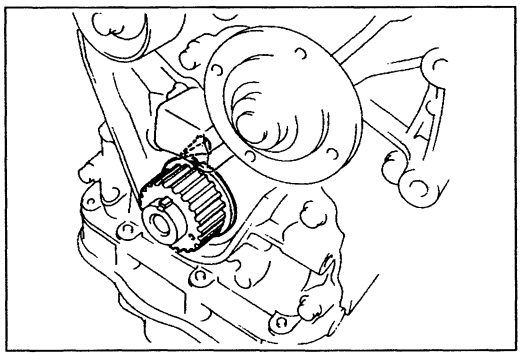


2. Apply clean engine oil to the camshaft bolt threads and hand tighten the bolts.
3. Hold the camshafts by using a wrench on the cast hexagon as shown, and tighten the bolts.

Tightening toque:
50—60 N·m {5.0—6.2 kgf·m, 37—44 ft·lbf}

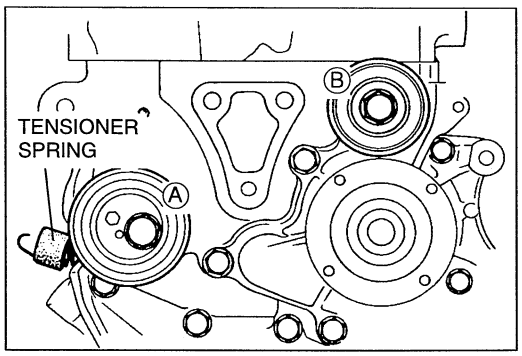
TIMING BELT
Torque Specifications





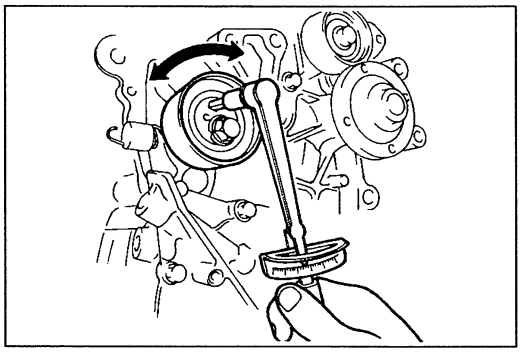
Timing Belt

1. Install the timing belt pulley and key.



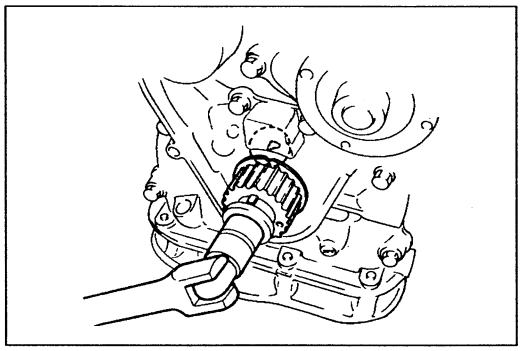
2. Install the tensioner spring to the tensioner.
3. Install the tensioner and the idler.

Tightening torque
Ⓐ: 38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}
Ⓑ: 38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

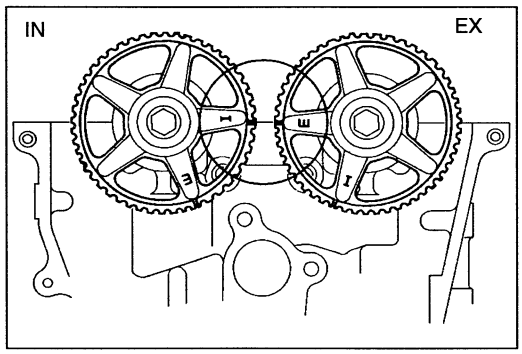


4. Using a torque wrench, rotate the tensioner right and left to measure the resistance. Replace the tensioner if the torque (resistance) is not as specified.

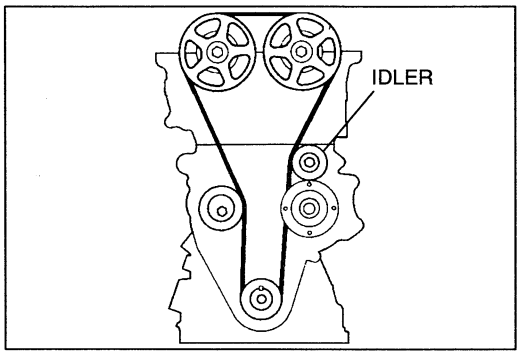
Resistance:
0.50—2.25 N·m {5.0—23.0 kgf·cm, 4.4—19.9 in·lbf}
[10—30°C {50—86°F}]



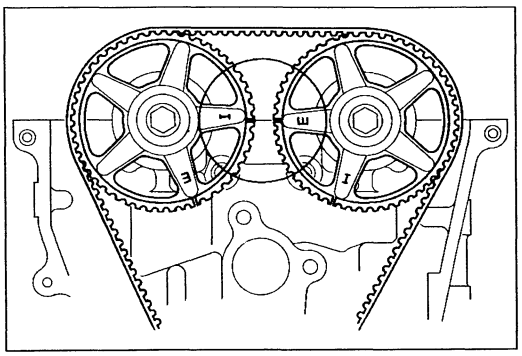
5. Temporarily install the crankshaft pulley bolt.
6. Turn the crankshaft clockwise and align the timing marks.



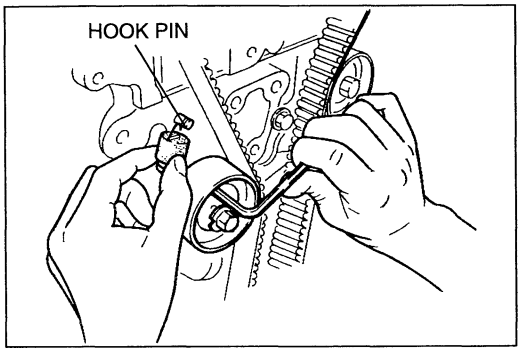
7. Verify that the camshaft pulley marks are aligned with the cylinder head parting line.



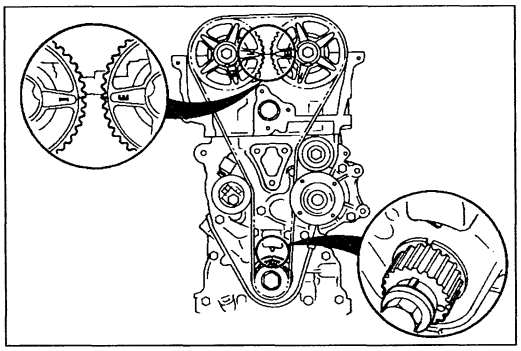
8. Install the timing belt so that there is no looseness at the idler side or between the two camshaft pulleys.



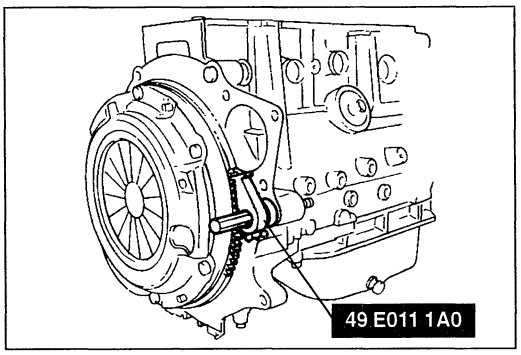
9. Turn the crankshaft two turns clockwise, and align the timing belt pulley marks.
10. Verify that all timing marks are correctly aligned.
    If not aligned, remove the timing belt and repeat from tensioner installation.



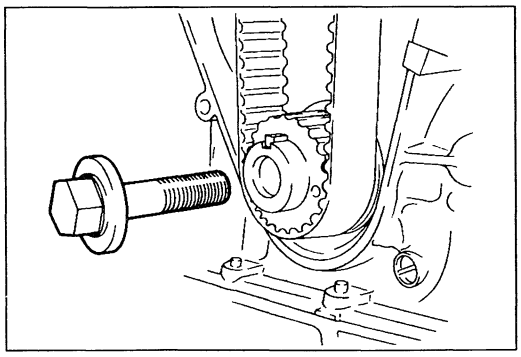
11. Turn the tensioner clockwise by using an Allen wrench.
12. Connect the tensioner to the hook pin.



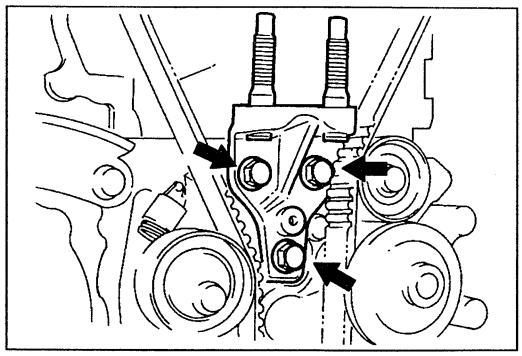
13. Turn the crankshaft two turns clockwise and again verify that the timing marks are correctly aligned.



14. Hold the flywheel (MTX) or the drive plate (ATX) by using the **SST**.

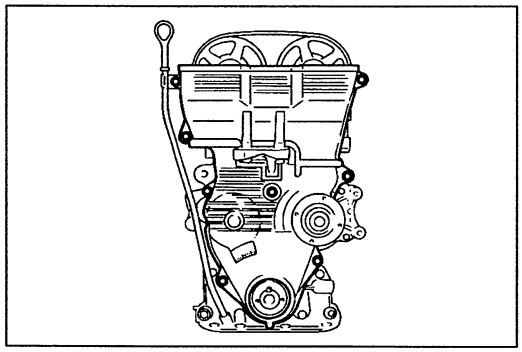


15. Remove the crankshaft pulley bolt.



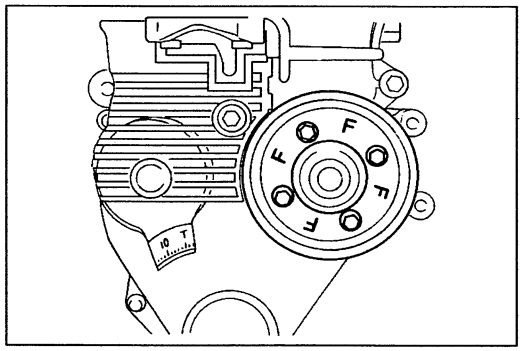
No.3 engine mount bracket
Install the No.3 engine mount bracket.

Tightening torque:
44—60 N·m {4.4—6.2 kgf·m, 32—44 ft·lbf}



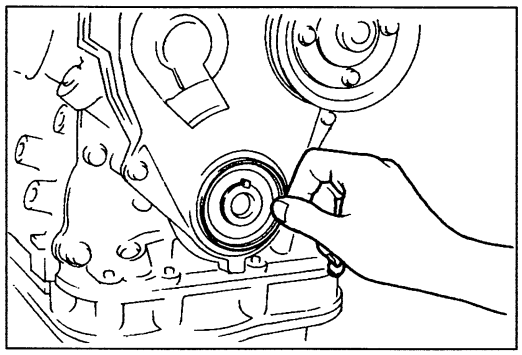
Timing Belt Cover
1. Install the lower, then upper covers.
2. Install the dipstick and pipe.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

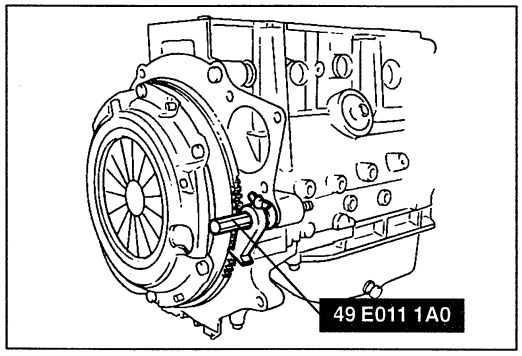


Water Pump Pulley
Install the water pump pulley, facing the "F" marks outward.

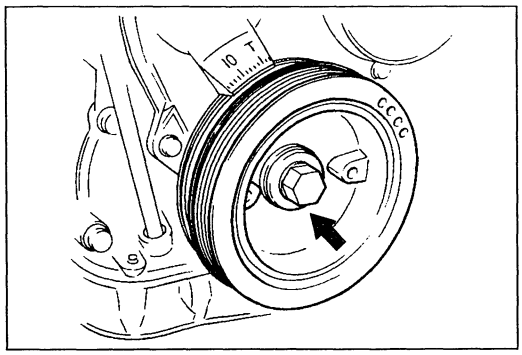
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



Crankshaft Pulley
1. Install the timing belt guide plate, facing the flat side toward the timing belt.

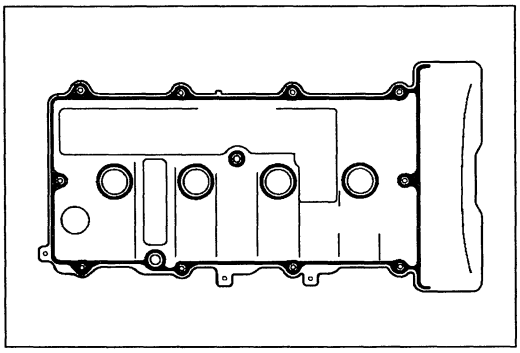


2. Hold the flywheel (MTX) or the drive plate (ATX) by using the **SST**.



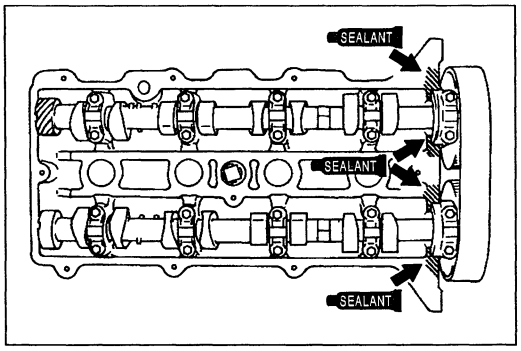
3. Install the crankshaft pulley.
4. Tighten the crankshaft pulley bolt.

Tightening torque:
157—166 N·m {16.0—17.0 kgf·m, 116—122 ft·lbf}

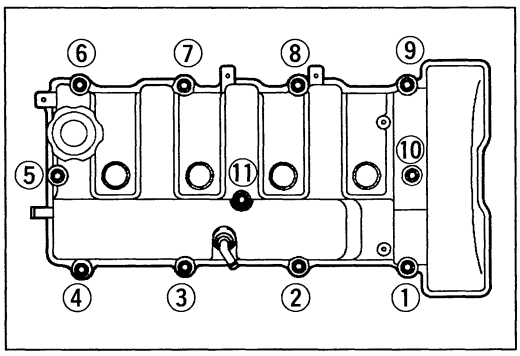


Cylinder Head Cover

1. Install a new cylinder head cover gasket.



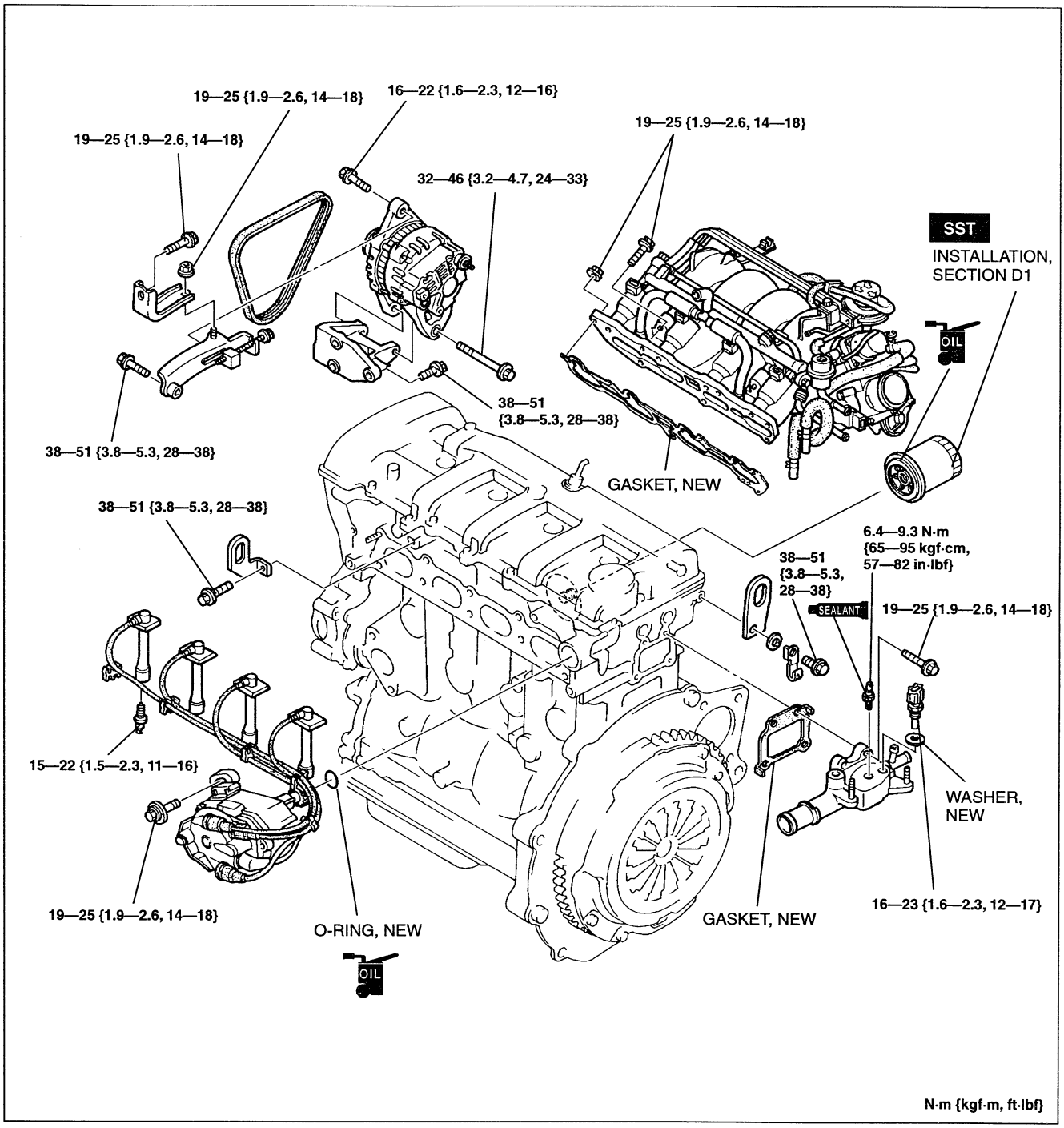
2. Apply silicone sealant to the shaded areas of the cylinder head as shown.

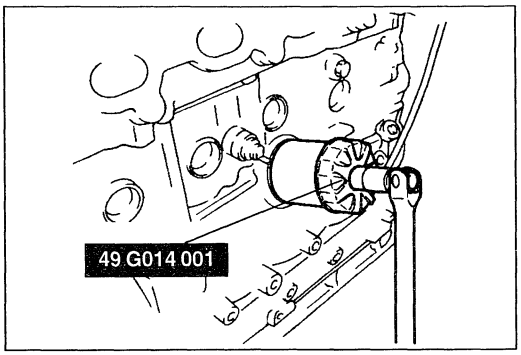


3. Install the cylinder head cover.
4. Install the cylinder head cover bolts and tighten them in five or six steps in the order shown.

Tightening torque:
6.9—10.7 N·m {70—110 kgf·cm, 61—95.4 in·lbf}

AUXILIARY PARTS
Torque Specifications

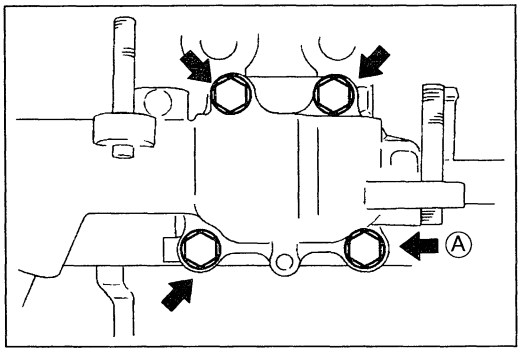




Oil Filter

1. Remove all foreign material from the oil filter mounting surface.
2. Apply a small amount of clean engine oil to the rubber seal of the oil filter.
3. Install the oil filter and tighten it by hand until the rubber seal contacts the mounting surface.
4. Tighten the filter 1-1/6 turns by using the **SST**.

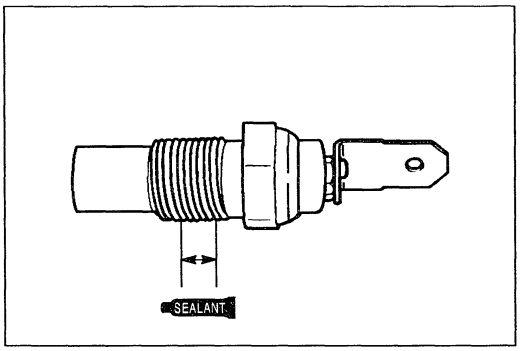
Tightening torque:
14—17 N·m {1.4—1.8 kgf·m, 11—13 ft·lbf}



Water Outlet

1. Place the water outlet in position.
2. Hand tighten bolt Ⓐ.
3. Install the water outlet.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



Heat Gauge Sender Unit and Engine Coolant Temperature Sensor

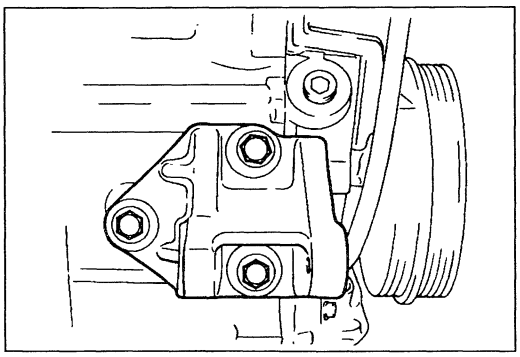
1. Apply silicone sealant to the top two-thirds of the threads.

2. Install the heat gauge sender unit.

Tightening torque:
6.4—9.3 N·m {65—95 kgf·cm, 57—82 in·lbf}

3. Install the engine coolant temperature sensor.

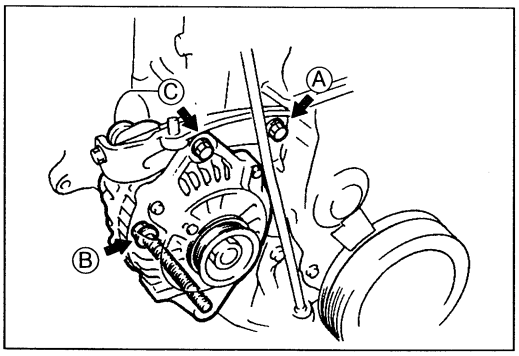
Tightening torque:
16—23 N·m {1.6—2.4 kgf·m, 12—17 ft·lbf}



Generator

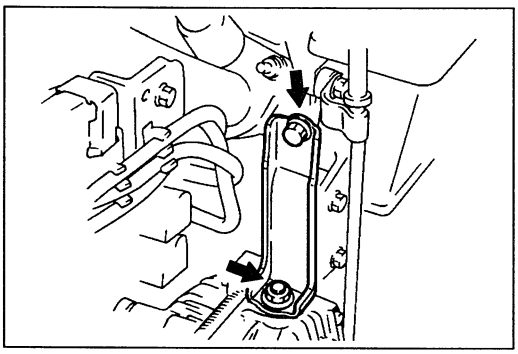
1. Install the generator bracket.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



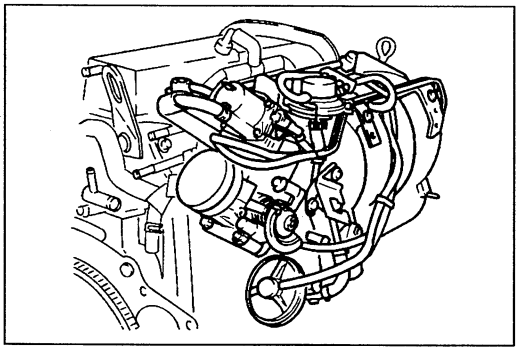
2. Install the generator and the strap.

Tightening torque
Ⓐ: 38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}
Ⓑ: 38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}
Ⓒ: 19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



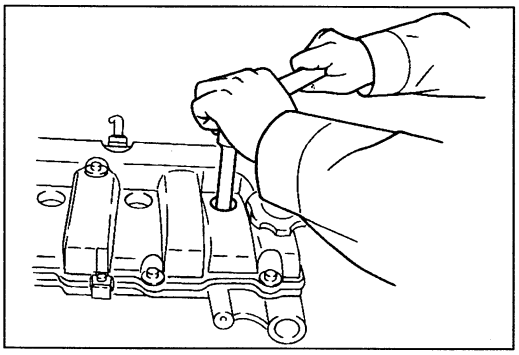
3. Install the generator stay. (MTX)

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



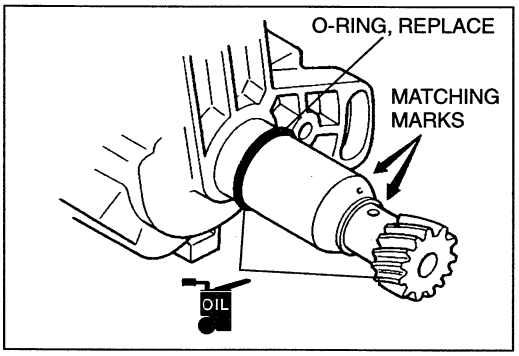
Intake Manifold Assembly
1. Remove all foreign material from the intake manifold contact surface.
2. Install a new gasket and the intake manifold assembly.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

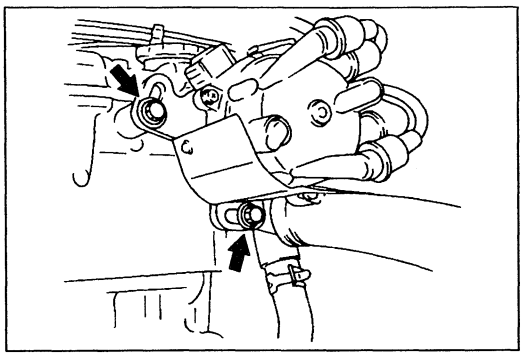


Spark Plug
Install the spark plugs.

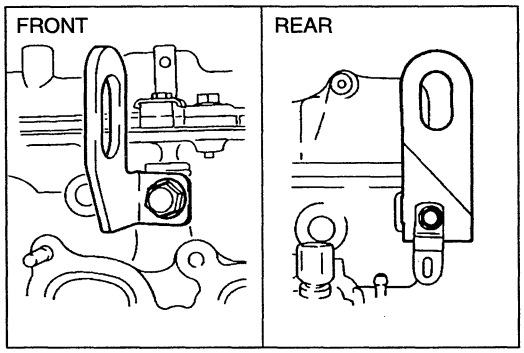
Tightening torque:
15—22 N·m {1.5—2.3 kgf·m, 11—16 ft·lbf}



Distributor and High-tension Lead
1. Apply clean engine oil to a new O-ring and position it on the distributor.
2. Apply clean engine oil to the drive gear.
3. Verify that the No.1 cylinder is at the top dead center and the distributor matching marks are aligned.



4. Install the distributor and hand tighten the installation bolts.
5. Connect the high-tension leads.



Engine Hanger

Install the front and rear engine hangers.

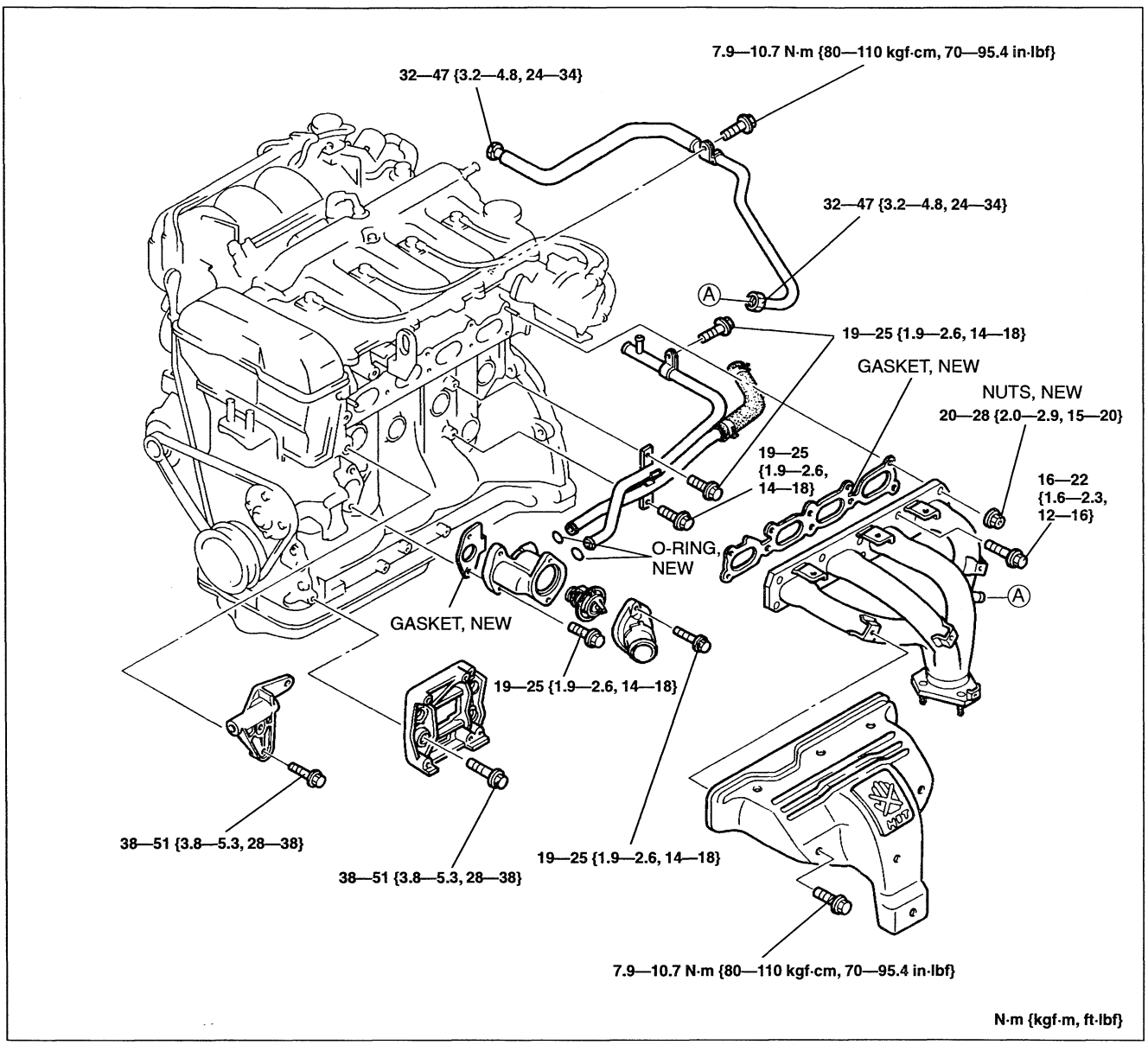
Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

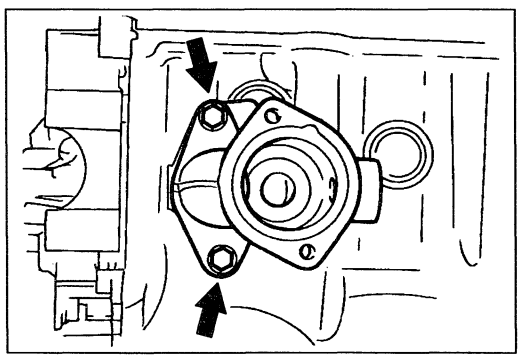
ENGINE STAND DISMOUNTING

PROCEDURE

1. Remove the engine from the **SST** (engine stand).
2. Remove the **SST** (engine hanger) from the engine.
3. Install the parts shown in the figure.

Torque Specifications

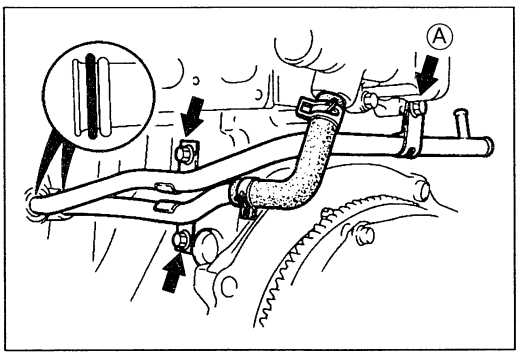




Thermostat Housing

Install a new gasket and the thermostat housing.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



Water Bypass Pipe

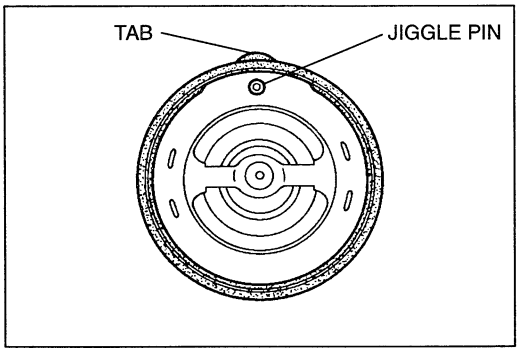
1. Apply a small amount of clean engine coolant to new O-rings.
2. Install the water bypass pipes.

Note

- Bolt Ⓐ is at the water outlet. (Refer to page B1–95.)

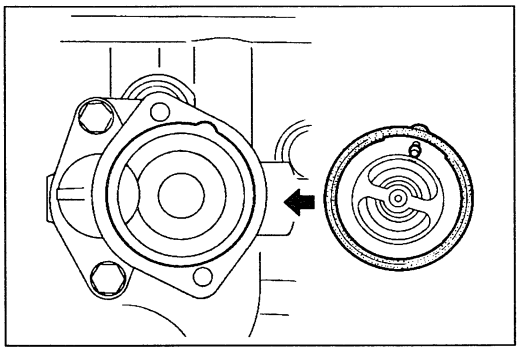
Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

3. Connect the water hose.

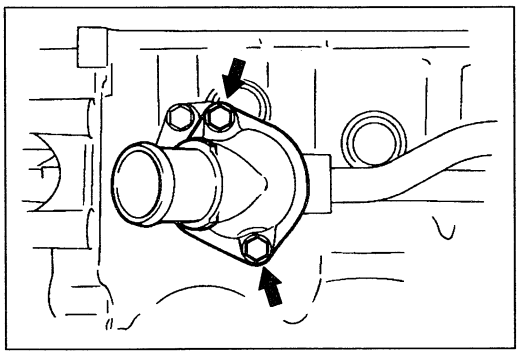


Thermostat, Thermostat Cover

1. Remove all foreign material from the thermostat cover mounting surface.
2. Verify that the left jiggle pin is aligned with the tab of the thermostat gasket as shown.

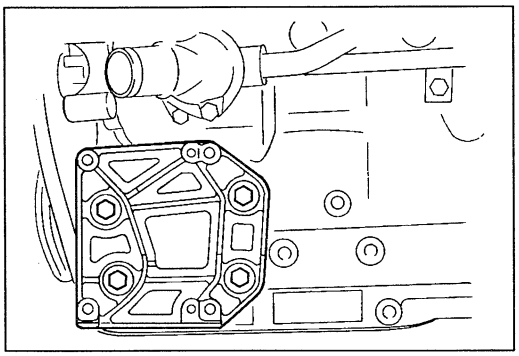


3. Install the thermostat and gasket into the thermostat housing, aligning the tab to the housing as shown.



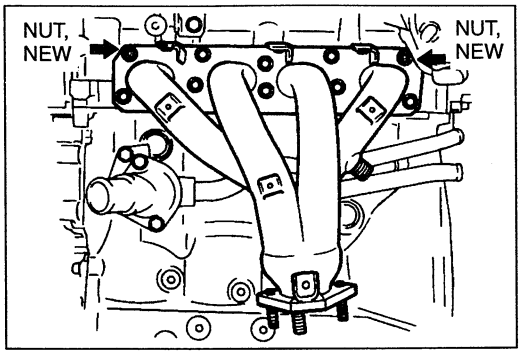
4. Install the thermostat cover.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



A/C Compressor Bracket (if equipped)
Install the A/C compressor bracket.

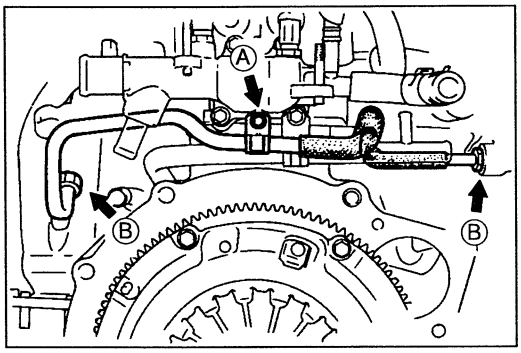
Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



Exhaust Manifold

1. Remove all foreign material from the exhaust manifold contact surface.
2. Install the new gasket and the exhaust manifold.

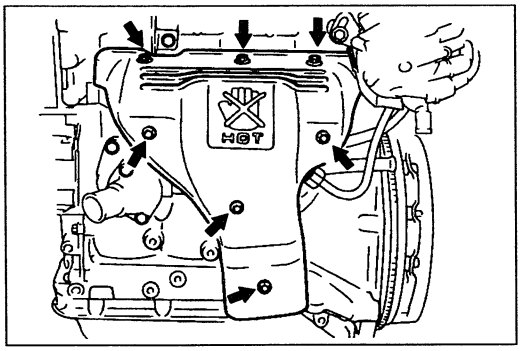
Tightening torque
Nut: 20—28 N·m {2.0—2.9 kgf·m, 15—20 ft·lbf}
Bolt: 16—22 N·m {1.6—2.3 kgf·m, 12—16 ft·lbf}



EGR Pipe

Install the EGR pipe.

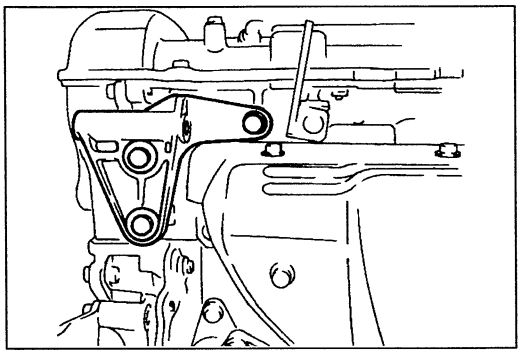
Tightening torque
Ⓐ: 7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}
Ⓑ: 32—47 N·m {3.2—4.8 kgf·m, 24—34 ft·lbf}



Exhaust Manifold Insulator

Install the exhaust manifold insulator.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



P/S Oil Pump Bracket

Install the P/S oil pump bracket.

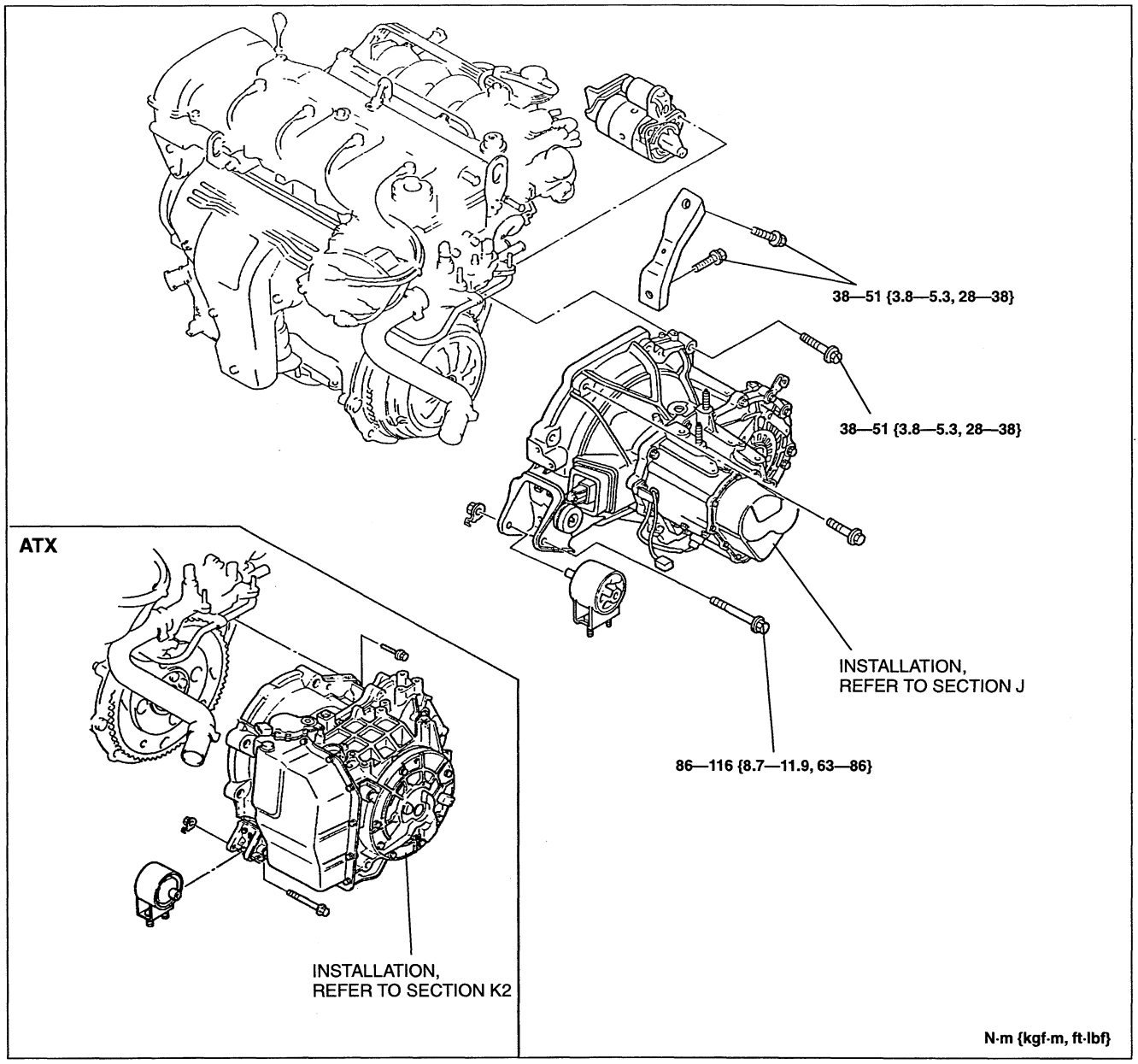
Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

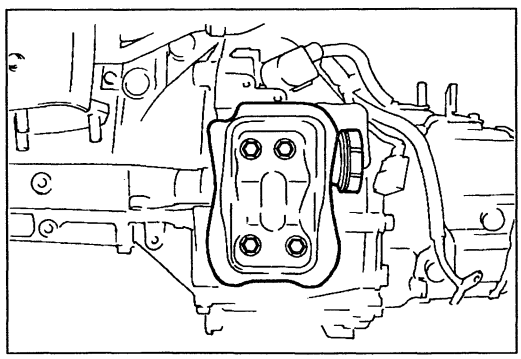
INSTALLATION

PROCEDURE

Tighten all bolts and nuts to the specified torques.

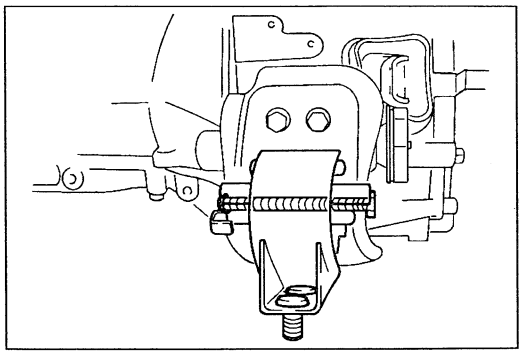
Step 1
Torque Specifications





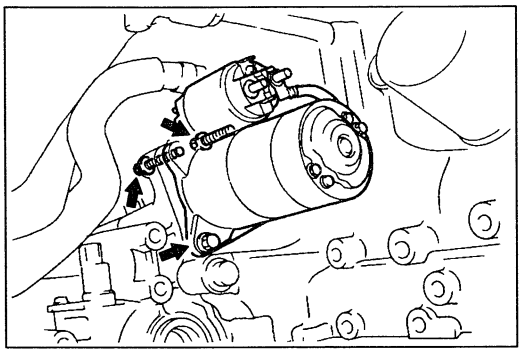
No.2 engine mount bracket
Install the No.2 engine mount bracket.

Tightening torque:
44—60 N·m {4.4—6.2 kgf·m, 32—44 ft·lbf}



No.2 engine mount rubber

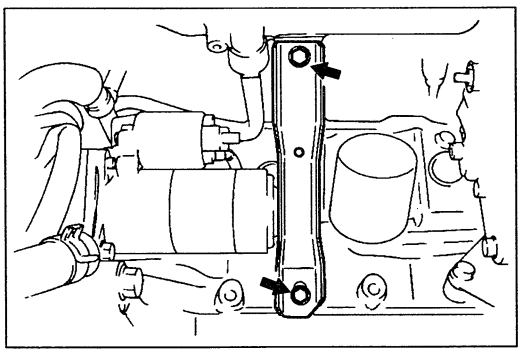
Install the No.2 engine mount rubber and hand tighten the through bolt.



Starter

Install the starter to the transaxle housing.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



Intake manifold bracket

Install the intake manifold bracket.

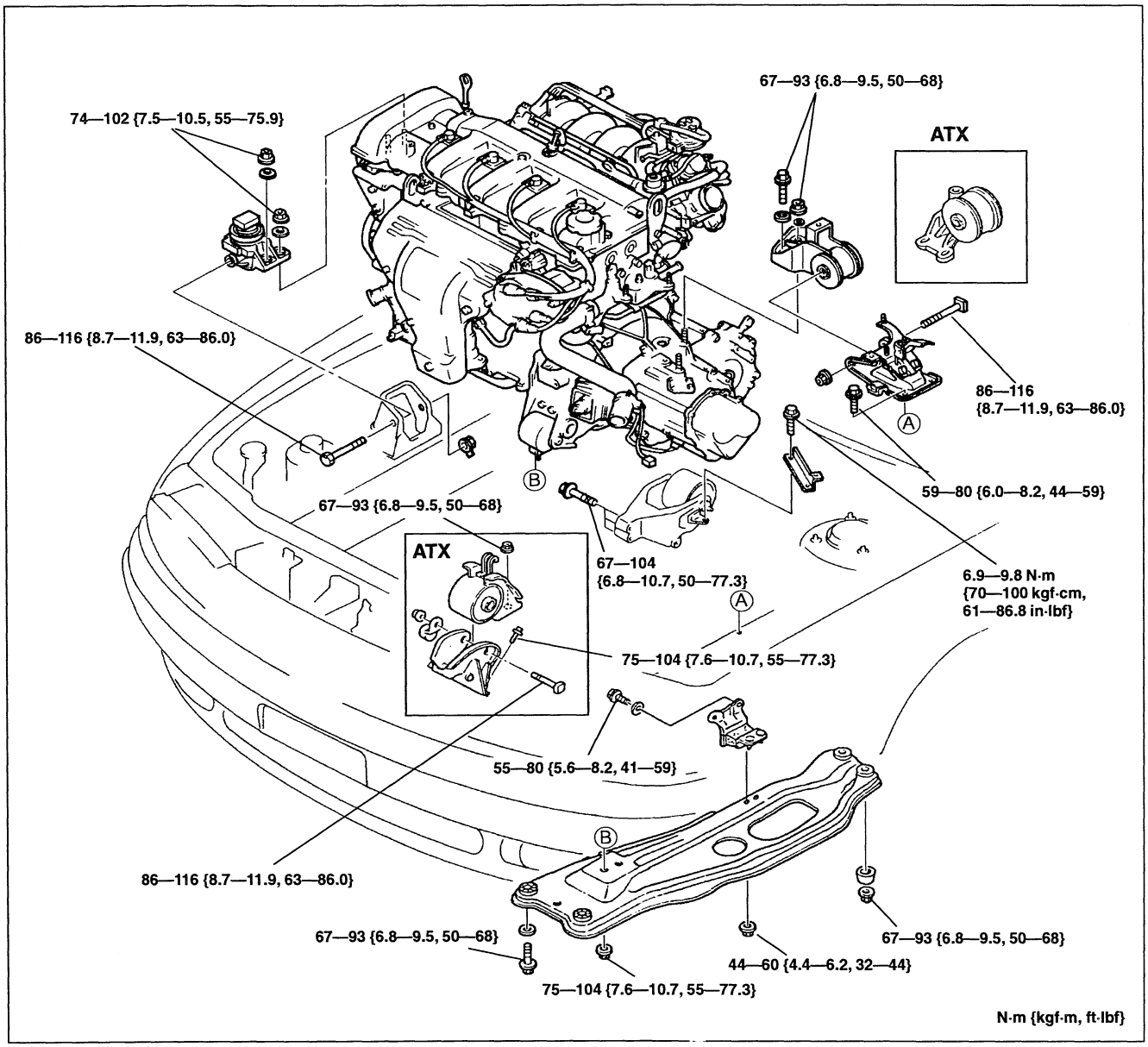
Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

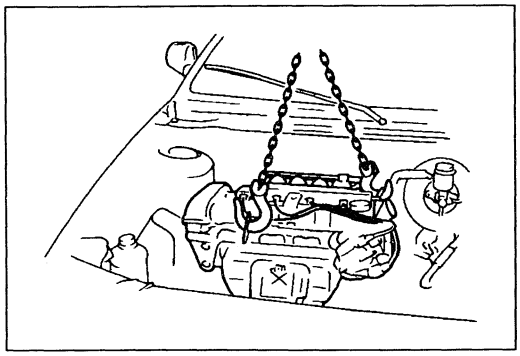
Step 2

Warning

- **A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.**

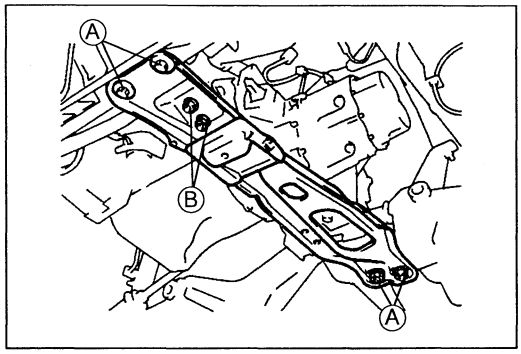
Torque Specifications





Engine and transaxle assembly

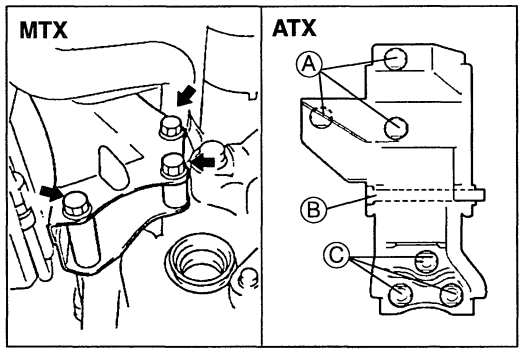
1. Suspend the engine and transaxle assembly.
   Slowly lower the engine and transaxle assembly as a unit.
   Keep the engine from swinging or bumping into components in the engine compartment.
2. Position the engine and transaxle assembly in the engine compartment.
3. Align the engine mounts with the engine mount member mounting holes.



Engine mount

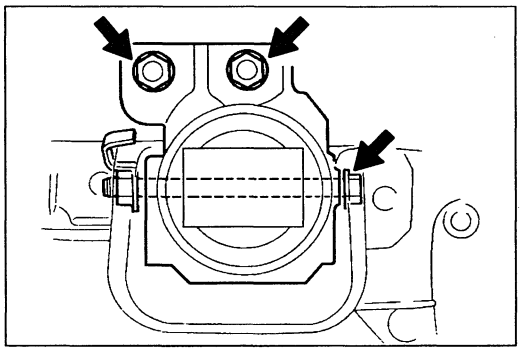
1. Hand tighten the nuts marked Ⓑ. (No.2 engine mount)
2. Install the bolts and nuts shown.

Tightening torque
Ⓐ: 67—93 N·m {6.8—9.5 kgf·m, 50—68 ft·lbf}



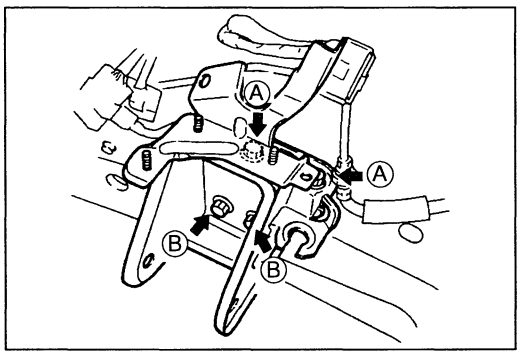
3. Install the No.1 engine mount mounting bolts.

Tightening torque
MTX: 67—93 N·m {6.8—9.5 kgf·m, 50—68 ft·lbf}
ATX
Ⓐ: 67—104 N·m {6.8—10.7 kgf·m, 50—77.3 ft·lbf}
Ⓑ: 86—116 N·m {8.7—11.9 kgf·m, 63—86.0 ft·lbf}
Ⓒ: 67—93 N·m {6.8—9.5 kgf·m, 50—68 ft·lbf}



4. Install the No.3 engine mount rubber.

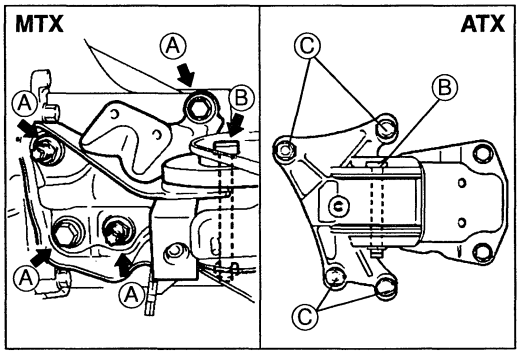
Tightening torque
Nut: 74—102 N·m {7.5—10.5 kgf·m, 55—75.9 ft·lbf}
Bolt: 86—116 N·m {8.7—11.9 kgf·m, 63—86.0 ft·lbf}



5. Install the No.4 engine mount bracket.
6. Hand tighten bolts Ⓑ.
7. Tighten bolts Ⓐ.

Tightening torque
Ⓐ: 59—80 N·m {6.0—8.2 kgf·m, 44—59 ft·lbf}
Ⓑ: 59—80 N·m {6.0—8.2 kgf·m, 44—59 ft·lbf}

8. Tighten bolts Ⓐ.

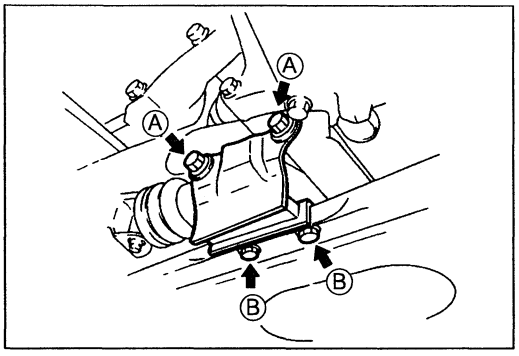


9. Install the No.4 engine mount rubber.

Tightening torque
MTX
Ⓐ: 67—93 N·m {6.8—9.5 kgf·m, 50—68 ft·lbf}
Ⓑ: 86—116 N·m {8.7—11.9 kgf·m, 63—86.0 ft·lbf}
ATX
Ⓒ: 38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

10. Remove the chain from the engine hangers.
11. Tighten the No.2 engine mount nuts. (Refer to step 1.)

Tightening torque:
75—104 N·m {7.6—10.7 kgf·m, 55—77.3 ft·lbf}

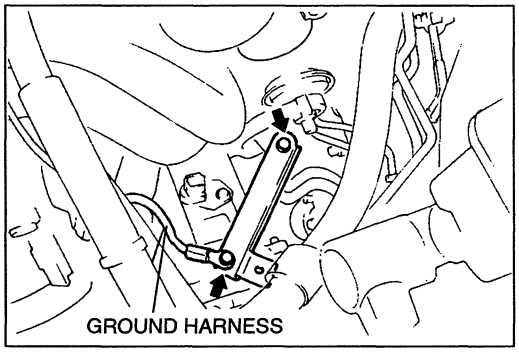


12. Tighten the No.2 engine mount rubber through bolt. (Refer to page B1–102.)

Tightening torque:
86—116 N·m {8.7—11.9 kgf·m, 63—86.0 ft·lbf}

13. Install the No.5 engine mount rubber as shown.

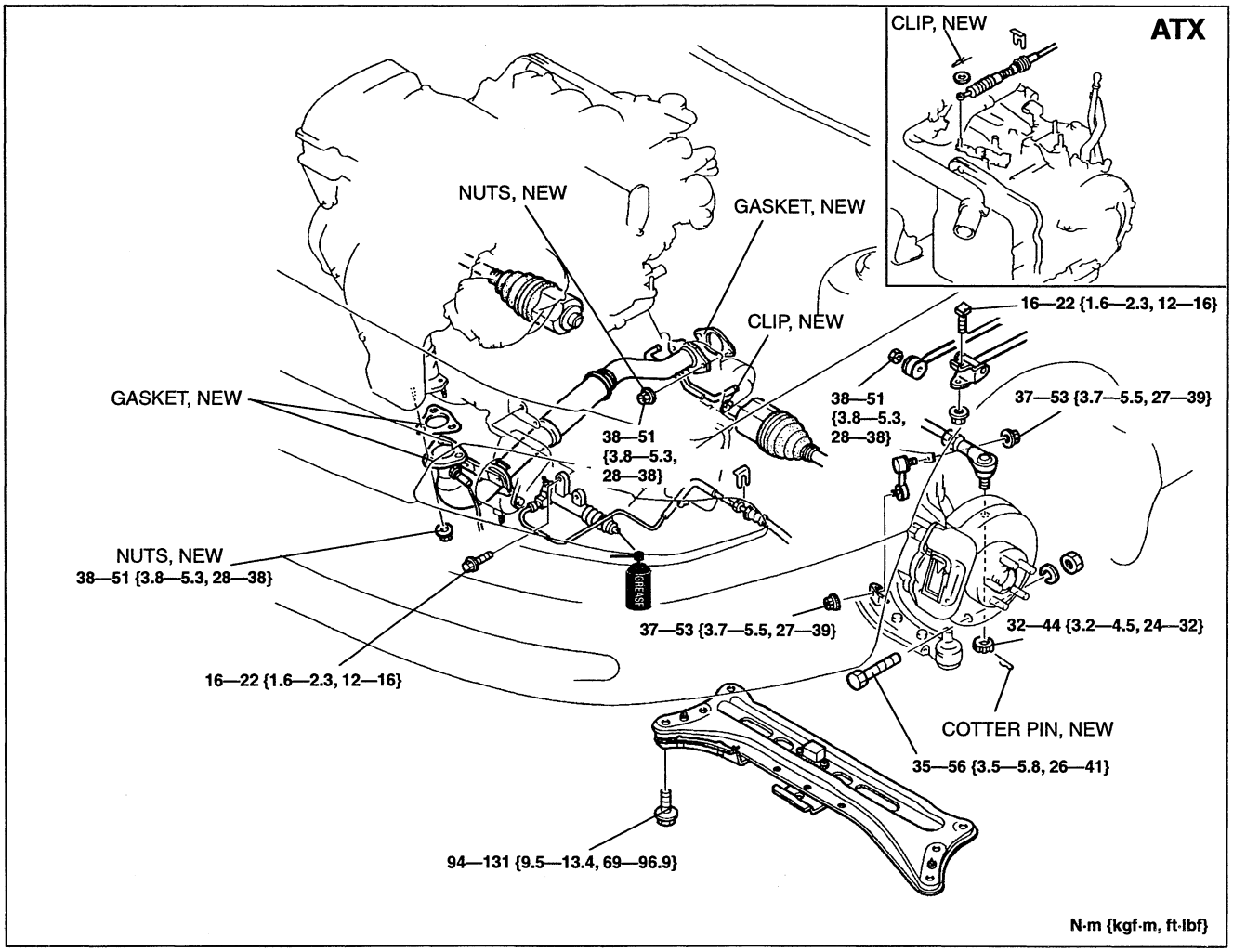
Tightening torque
Ⓐ: 55—80 N·m {5.6—8.2 kgf·m, 41—59 ft·lbf}
Ⓑ: 44—60 N·m {4.4—6.2 kgf·m, 32—44 ft·lbf}

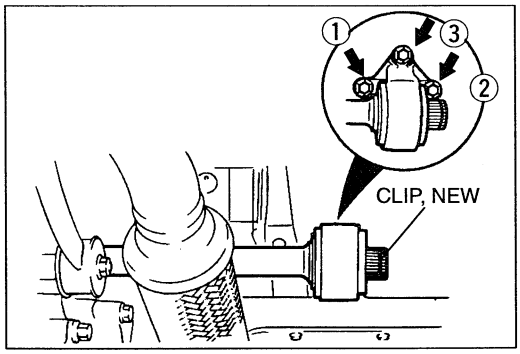


14. Install the No.1 engine mount stay bracket and ground harness (MTX).

Tightening torque:
6.9—9.8 N·m {70—100 kgf·cm, 61—86.8 in·lbf}

Step 3
Torque Specifications



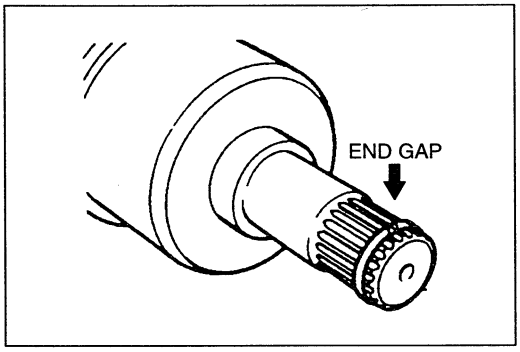


Joint shaft

1. Install the new clip.
2. Install the joint shaft.
3. Tighten the bolts in the order shown.

Tightening torque:
43—61 N·m {4.3—6.3 kgf·m, 32—45 ft·lbf}

4. Apply grease to the end of joint shaft.



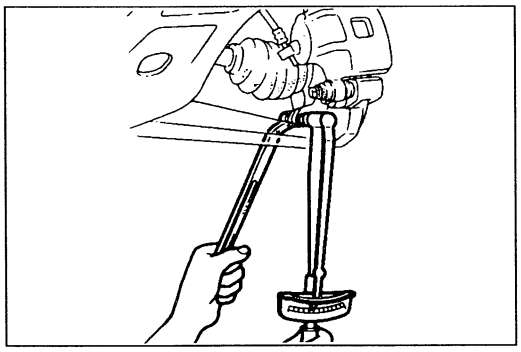
Drive shaft

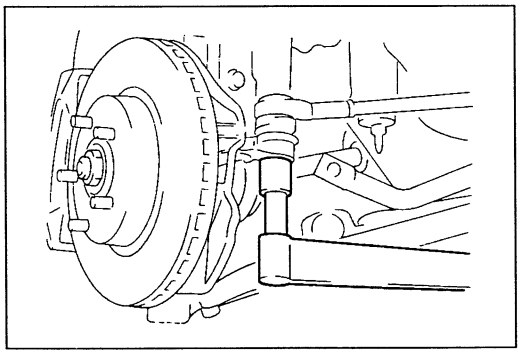
1. Apply grease to the end of the drive shafts.

Caution
- **The oil seals are damaged easily if this procedure is not done correctly.**

2. Install the drive shaft.
3. Install the new clip with the end gap facing upward.
4. Push the drive shaft into the joint shaft.
5. After installation, pull the front hub outward to confirm that the drive shaft is securely held by the clip.
6. Install the lower arm ball joint to the knuckle and tighten the through bolt.

Tightening torque:
35—56 N·m {3.5—5.8 kgf·m, 26—41 ft·lbf}



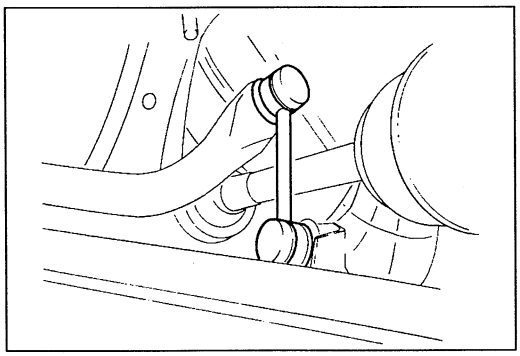


Tie-rod end

1. Install the tie-rod end to the knuckle.

Tightening torque:
32—44 N·m {3.2—4.5 kgf·m, 24—32 ft·lbf}

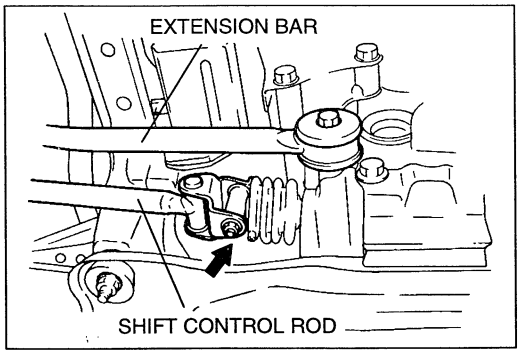
2. Install a new cotter pin.



Stabilizer control link

Install the stabilizer control link.

Tightening torque:
37—53 N·m {3.7—5.5 kgf·m, 27—39 ft·lbf}

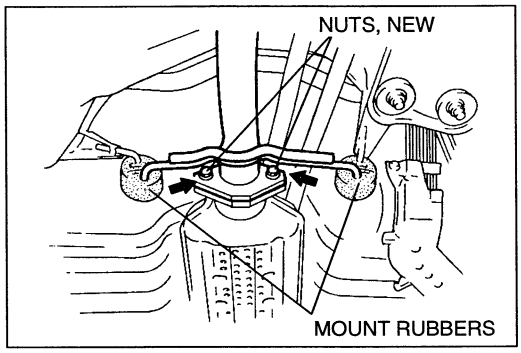


Extension bar (MTX)
Install the extension bar to the transaxle.

Tightening torque:
38—51 N·m {3.8—5.5 kgf·m, 28—38 ft·lbf}

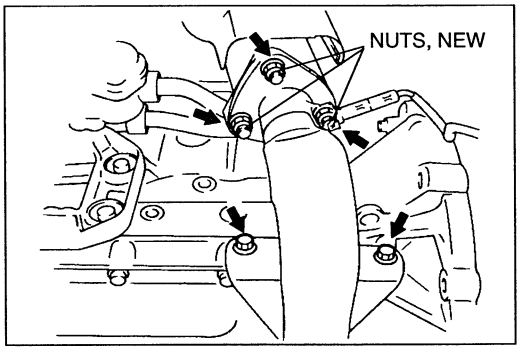
Shift control rod (MTX)
Install the shift control rod to the transaxle.

Tightening torque:
16—22 N·m {1.6—2.3 kgf·m, 12—16 ft·lbf}



Front exhaust pipe
1. Install a new gasket and connect the front exhaust pipe to the exhaust pipe. Hand tighten the new nuts.
2. Connect the exhaust pipe to the vehicle body by the mount rubbers.
3. Tighten the exhaust pipe mounting nuts.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

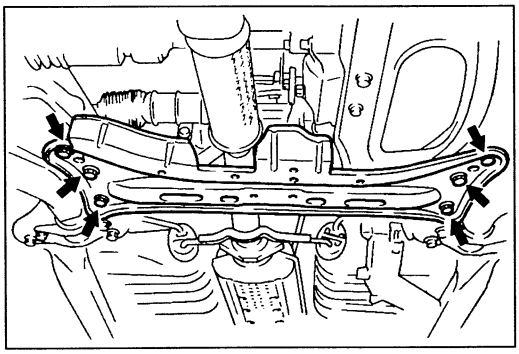


Exhaust pipe
1. Install a new gasket and the exhaust pipe. Hand tighten the new nuts.
2. Hand tighten the bracket bolts.
3. Tighten the exhaust pipe mounting nuts.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

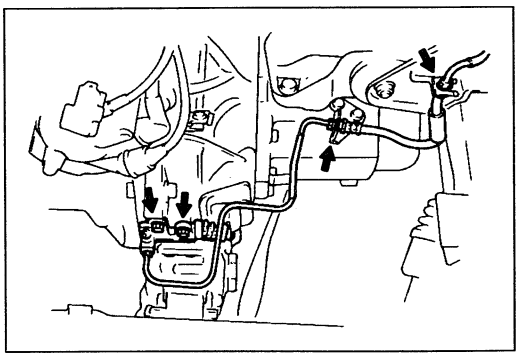
4. Tighten the bracket bolts.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



Transverse member
Install the transverse member.

Tightening torque:
94—131 N·m {9.5—13.4 kgf·m, 69—96.9 ft·lbf}

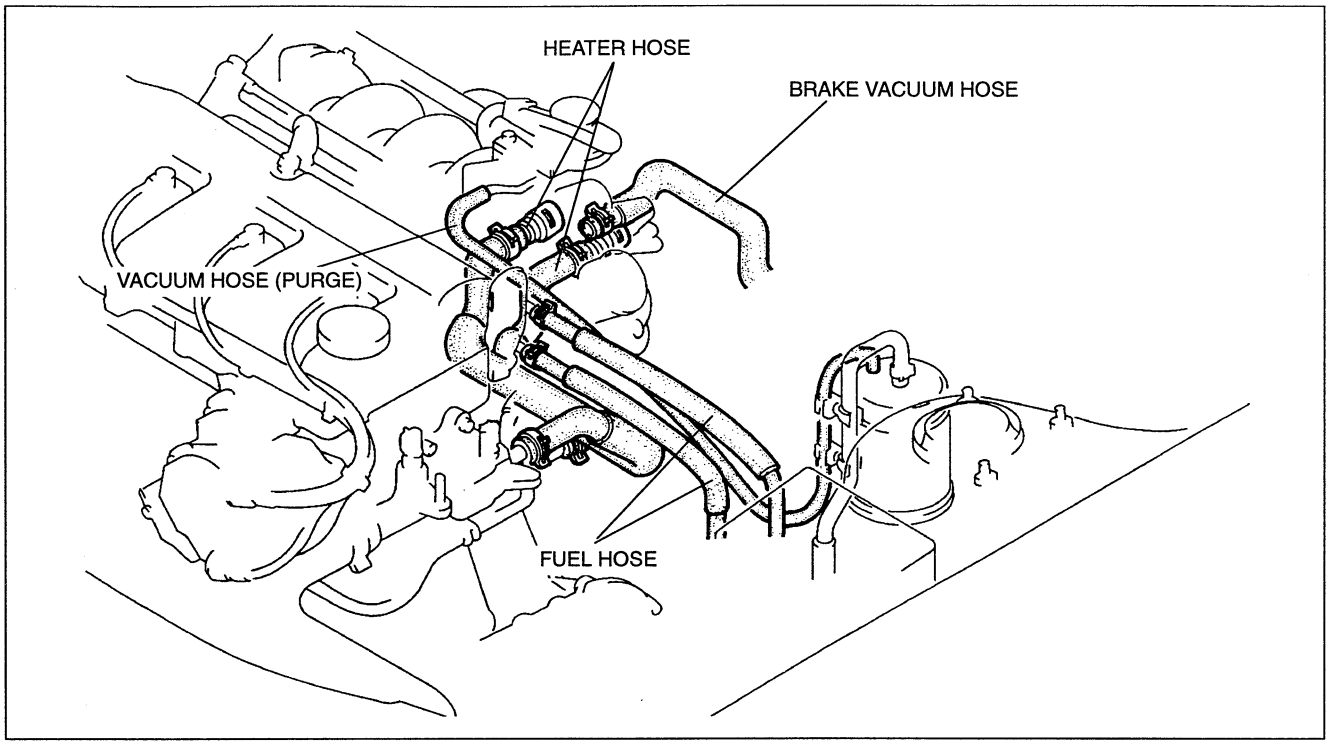


Clutch release cylinder
Install the clutch release cylinder.

Tightening torque:
16—22 N·m {1.6—2.3 kgf·m, 12—16 ft·lbf}

Step 4

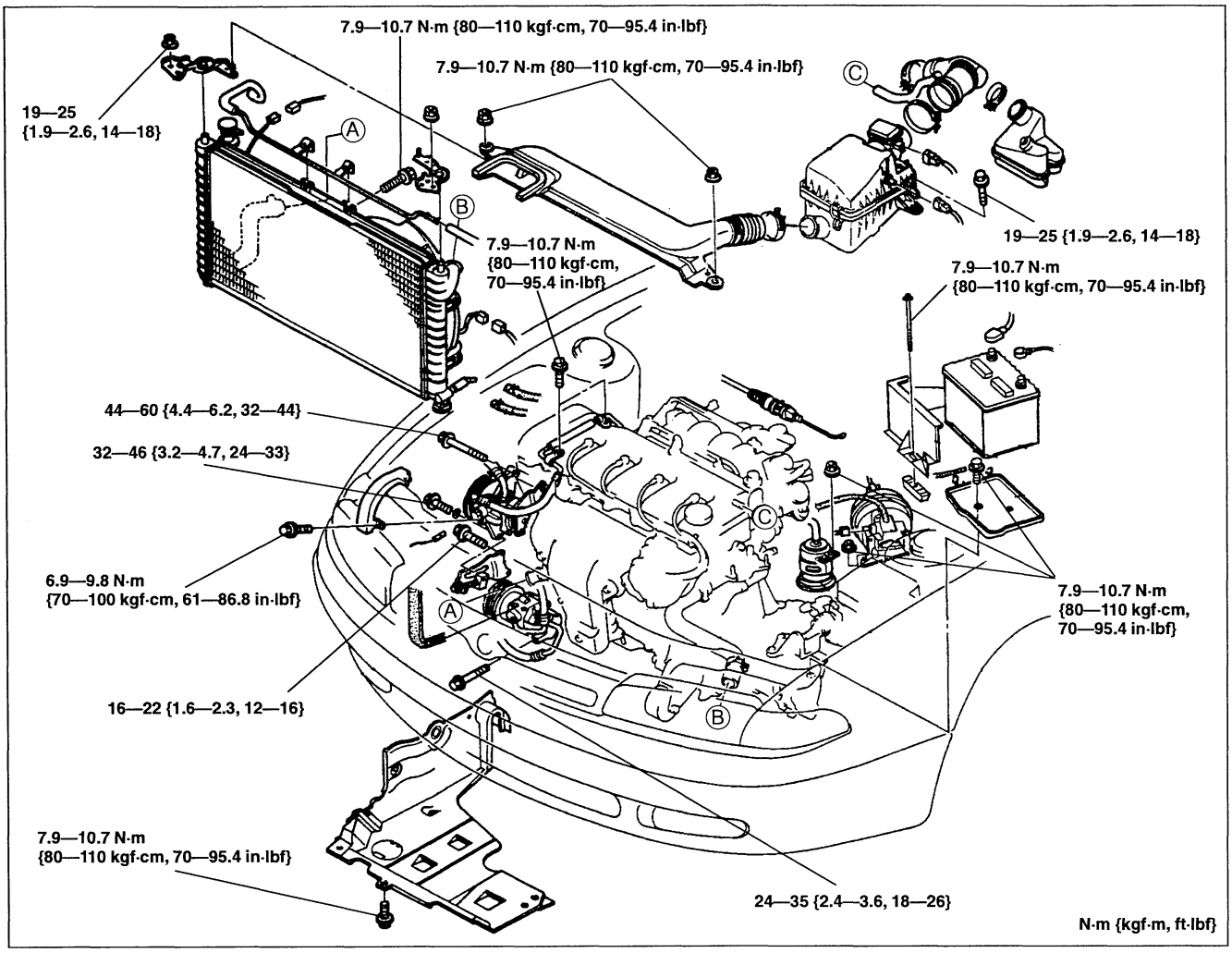
Connect the hoses shown in the figure.

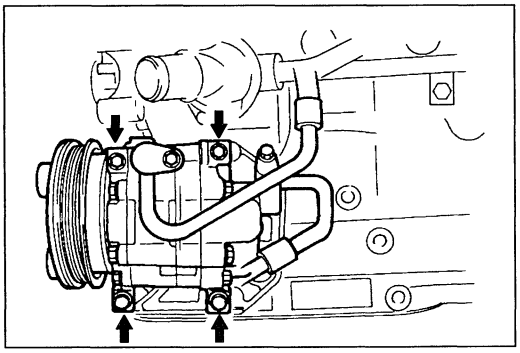


Step 5

Connect the harness connectors.

Step 6
Torque Specifications

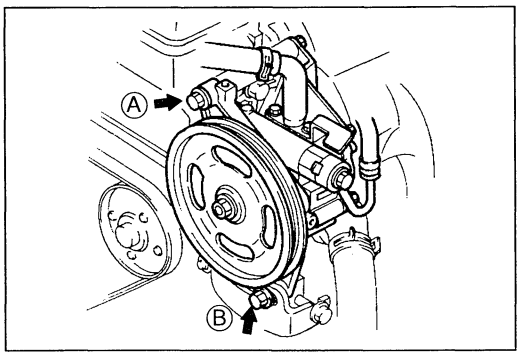




A/C compressor (if equipped)

Install the A/C compressor to the bracket.

Tightening torque:
24—35 N·m {2.4—3.6 kgf·m, 18—26 ft·lbf}



P/S oil pump and adjuster

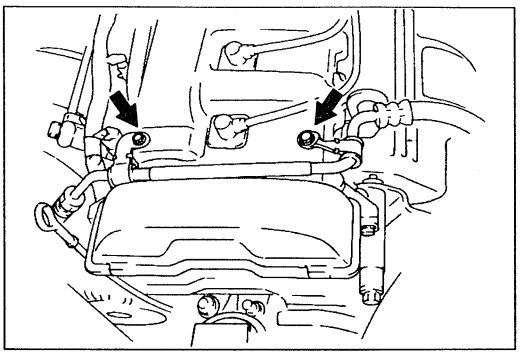
1. Install the P/S oil pump adjuster.

   Tightening torque:
   16—22 N·m {1.6—2.3 kgf·m, 12—16 ft·lbf}

2. Install the P/S oil pump.

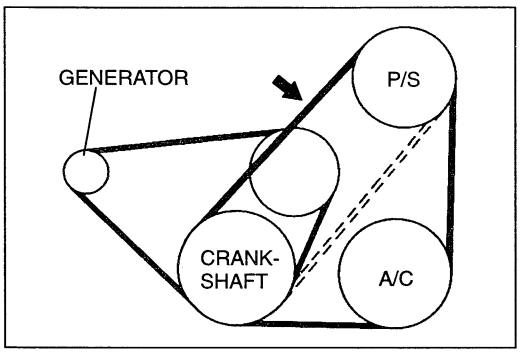
   Tightening torque
   Ⓐ: 44—60 N·m {4.4—6.2 kgf·m, 32—44 ft·lbf}
   Ⓑ: 32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}

3. Connect the P/S oil pump pressure switch connector.

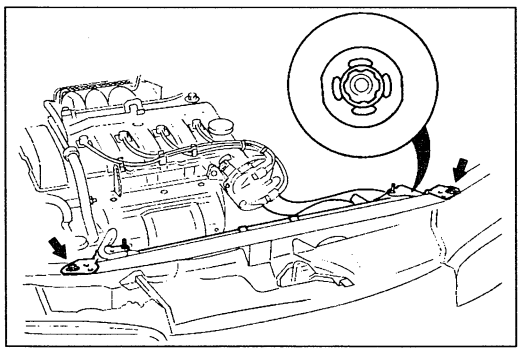


4. Install the P/S pipe brackets to the cylinder head cover.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

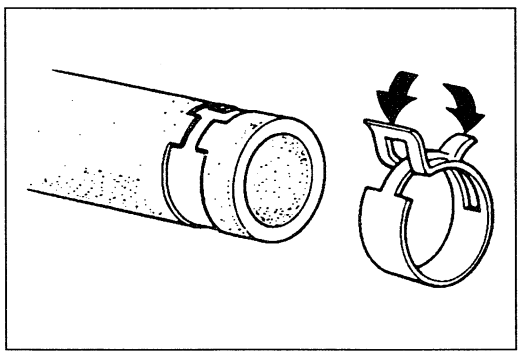


Drive belt
1. Install the drive belt.
2. Adjust the drive belt deflections. (Refer to page B1–6.)

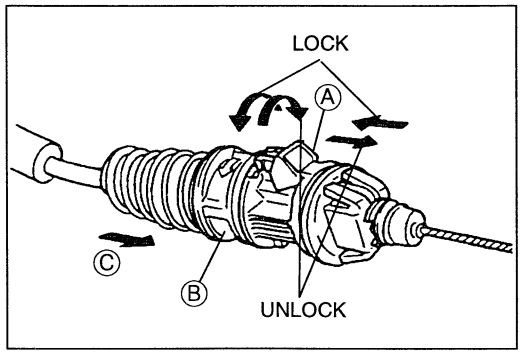


Radiator and cooling fan assembly
1. Install the radiator and cooling fan assembly.
   Verify that the radiator is centerd in the radiator upper brackets.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



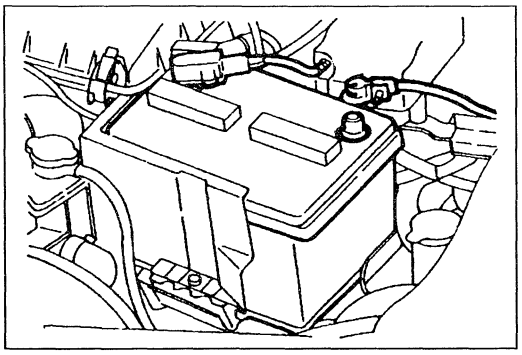
2. Connect the upper and lower radiator hoses.
3. Connect the coolant reservoir hose.
4. Connect the cooling fan motor connector.
5. Connect the oil cooler hoses. (ATX)



Accelerator cable
1. Verify that the throttle valve is fully closed.
2. Measure the free play of the accelerator cable.

Free play: 1.5—4.0 mm {0.06—0.16 in}

3. If not as specified, turn stopper Ⓑ while pressing lock button Ⓐ to release the lock.
4. Push the spring in direction Ⓒ and adjust the cable free play.
5. Lock stopper Ⓐ after locking stopper Ⓑ.

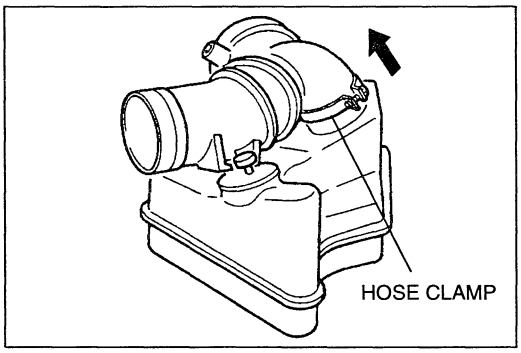


Battery

1. Install the battery.

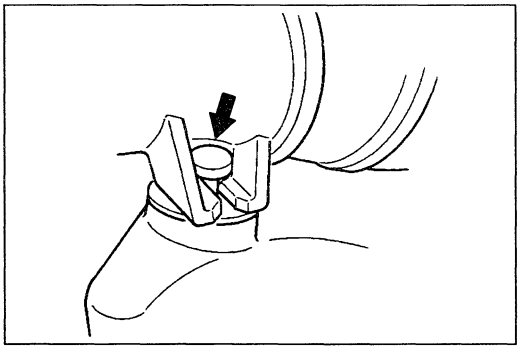
   Tightening torque:
   7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

2. Connect the positive battery terminal.

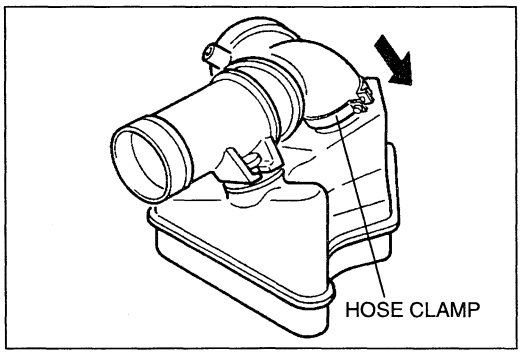


Resonance chamber No.2

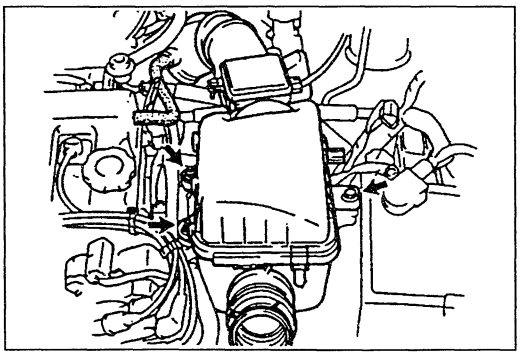
1. Slide the hose clamp onto the hose and push it onto resonance chamber No.2.



2. Rotate the hose and hook it securely onto the locating knob.



3. Tighten the hose clamp.

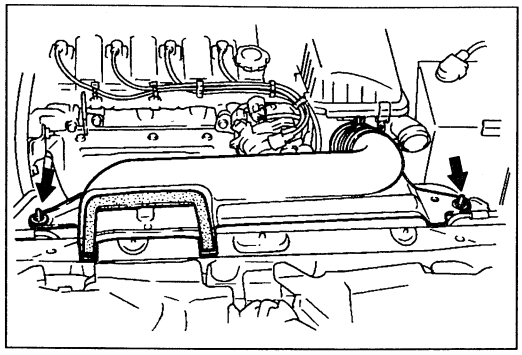


Air cleaner assembly

1. Install the air cleaner assembly.

   Tightening torque:
   19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

2. Connect the mass air flow sensor connector.
3. Connect the intake air temperature sensor connector.



Fresh-air duct
Install the fresh-air duct.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

Splash shield
Install the splash shield.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

Steps After Installation
1. Fill with the specified amount and type of engine oil. (Refer to section D1.)
2. Fill the radiator with the specified amount and type of engine coolant. (Refer to section E1.)
3. Fill with the specified amount and type of transaxle oil. (Refer to sections J, K2.)
4. Install the hood and front wheels.
5. Start the engine and:
   (1) check the engine oil, transaxle oil, and engine coolant leakage.
   (2) check the ignition timing and idle speed. (Refer to sections F1, F3.)
   (3) check the operation of the emission control system.
6. Turn off the engine and check drive belt deflection. (Refer to page B1–6.)
7. Perform a road test.
8. Recheck the engine oil and coolant levels.

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

ENGINE
(KL)

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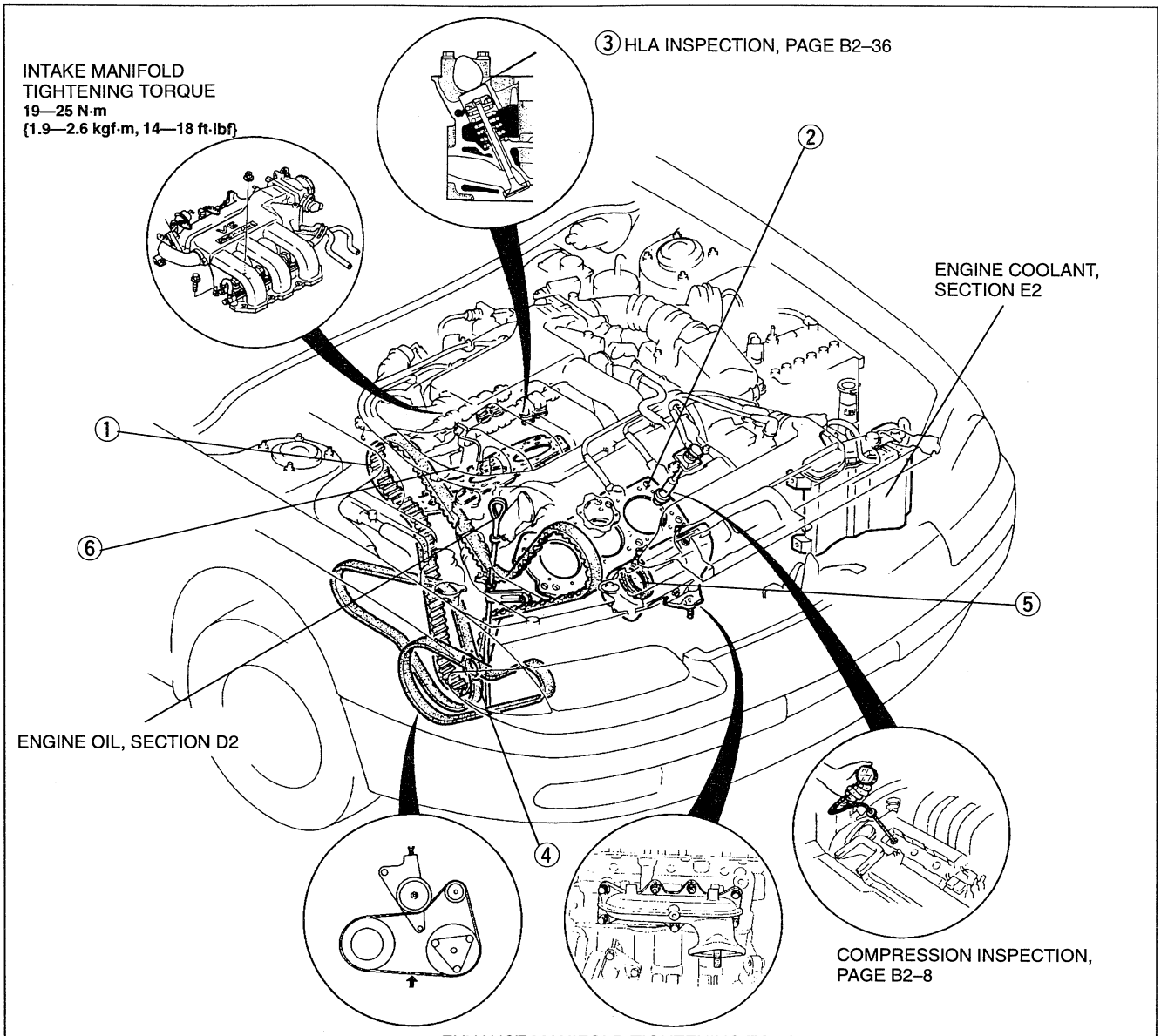

DRIVE BELT
DEFLECTION AT 98 N {10 kgf, 22 lbf}

mm {in}

DRIVE BELT	NEW	USED	LIMIT
GENERATOR	6.0—7.0 {0.24—0.27}	7.0—8.0 {0.28—0.31}	9.0 {0.35}
GENERATOR+A/C	5.5—6.5 {0.22—0.25}	6.5—7.5 {0.26—0.29}	8.0 {0.31}
P/S	6.0—7.0 {0.24—0.27}	7.0—8.0 {0.28—0.31}	9.0 {0.35}

COMPRESSION — kPa {kgf/cm^2, psi}–rpm

STANDARD	1,402 {14.3, 203}–250
MINIMUM	981 {10.0, 142}–250
MAX. DIFFERENCE BETWEEN CYLINDERS	196 {2.0, 28}

1. Timing belt
Removal / Installation ..... page B2–10
2. Cylinder head gasket
Replacement ..... page B2–20
3. HLA
Removal / Installation ..... page B2–34
4. Front oil seal
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5. Rear oil seal
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6. Engine
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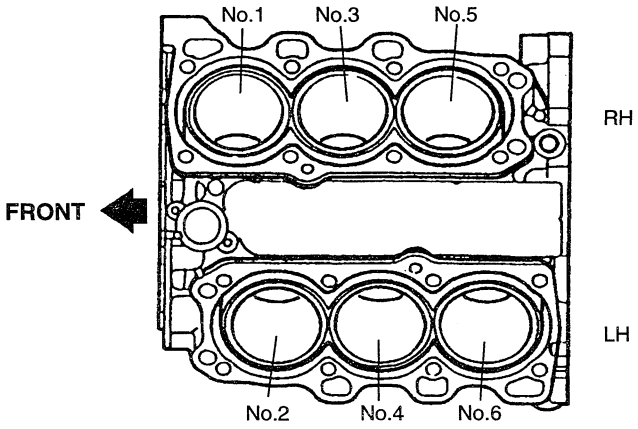
OUTLINE

SPECIFICATIONS

Item \ Engine				KL
Type				Gasoline, 4-cycle
Cylinder arrangement and number				60°-V configuration, 6 cylinders
Combustion chamber				Pentroof
Valve system				DOHC, belt-driven, 24 valves
Displacement			ml {cc, cu in}	2,496 {2,496, 152.3}
Bore × stroke			mm {in}	84.5 × 74.2 {3.33 × 2.92}
Compression ratio				9.2
Compression pressure			kPa {kgf/cm^2, psi}–rpm	1,402 {14.3, 203}–250
Valve timing	IN	Open	BTDC	8°
		Close	ABDC	47°
	EX	Open	BBDC	50°
		Close	ATDC	5°
Valve clearance		IN	mm {in}	0 {0}: Maintenance-free
		EX	mm {in}	0 {0}: Maintenance-free

Cylinder Arrangement



TROUBLESHOOTING GUIDE

Problem	Possible Cause	Action	Page
Difficult starting	**Malfunction of engine-related components**		
	Burnt valve	Replace	B2–73
	Worn piston, piston ring, or cylinder	Replace or repair	B2–80, 81
	Damaged cylinder head gasket	Replace	B2–20
	Malfunction of fuel system	Refer to section F2	
	Malfunction of electrical system	Refer to section G	
Poor idling	**Malfunction of engine-related components**		
	Malfunction of HLA*	Replace	B2–34
	Poor valve-to-valve seat contact	Repair or replace	B2–75
	Damaged cylinder head gasket	Replace	B2–20
	Malfunction of fuel system	Refer to section F2	
	Malfunction of ignition system	Refer to section G	

* Tappet noise may occur if the engine has not been started for an extended period of time. The noise should stop after the engine reaches normal operating temperature. (HLA troubleshooting: Refer to page B2–7.)

Problem	Possible Cause	Action	Page
Insufficient power	**Insufficient compression**		
	Malfunction of HLA*	Replace	B2–34
	Compression leakage from valve seat	Repair	B2–75
	Stuck valve	Replace	B2–73
	Weak or broken valve spring	Replace	B2–76
	Damaged cylinder head gasket	Replace	B2–20
	Cracked or distorted cylinder head	Replace	B2–72
	Stuck, damaged, or worn piston ring	Replace	B2–81
	Cracked or worn piston	Replace	B2–80
	Malfunction of fuel system	Refer to section F2	
	Malfunction of ignition system	Refer to section G	
	Others		
	Slipping clutch	Refer to section H	
	Dragging brake	Refer to section P	
	Incorrect tire size	Refer to section Q	
Abnormal combustion	**Malfunction of engine-related components**		
	Malfunction of HLA*	Replace	B2–34
	Stuck or burnt valve	Replace	B2–73
	Weak or broken valve spring	Replace	B2–76
	Carbon accumulation in combustion chamber	Eliminate carbon	
	Malfunction of fuel system	Refer to section F2	
	Malfunction of ignition system	Refer to section G	
Excessive oil consumption	**Oil working up**		
	Worn piston ring groove or stuck piston ring	Replace	B2–81
	Worn piston or cylinder	Replace or repair	B2–80, 81
	Oil working down		
	Worn valve seal	Replace	B2–64
	Worn valve stem or guide	Replace	B2–73, 74
	Oil leakage	Refer to section D2	
Engine noise	**Crankshaft or bearing-related parts**		
	Excessive main bearing oil clearance	Replace or repair	B2–89
	Main bearing heat-damaged	Replace	B2–83
	Excessive crankshaft end play	Replace or repair	B2–92
	Excessive connecting rod bearing oil clearance	Replace or repair	B2–93
	Connecting rod bearing heat-damaged	Replace	B2–83
	Piston-related parts		
	Worn cylinder	Replace or repair	B2–80
	Worn piston or piston pin	Replace	B2–80, 81
	Damaged piston ring	Replace	B2–81
	Bent connecting rod	Replace	B2–82
	Valve train-related parts		
	Malfunction of HLA*	Replace	B2–79
	Broken valve spring	Replace	B2–76
	Excessive valve guide clearance	Replace	B2–73
	Malfunction of timing belt auto tensioner	Replace	B2–84
	Malfunction of friction gear	Replace	B2–76
	Malfunction of cooling system	Refer to section E2	
	Malfunction of fuel system	Refer to section F2	
	Others		
	Malfunction of water pump bearing	Refer to section E2	
	Improper drive belt tension	Adjust	B2– 5
	Malfunction of generator bearing	Refer to section G	
	Exhaust gas leakage	Refer to section F2	
	Malfunction of timing belt tensioner	Replace	B2–10

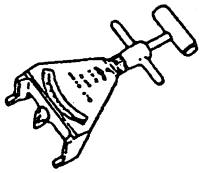
* Tappet noise may occur if the engine has not been started for an extended period of time. The noise should stop after the engine reaches normal operating temperature. (HLA troubleshooting: Refer to page B2–7.)

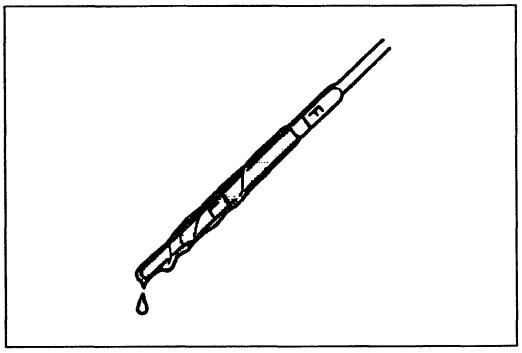
Warning

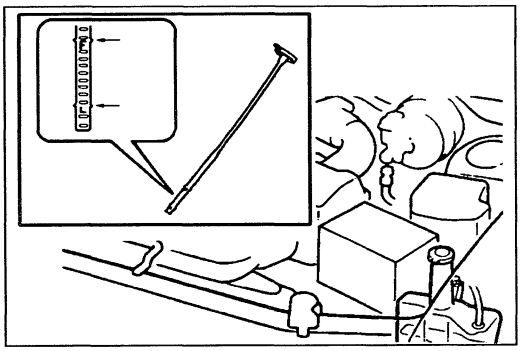
- **Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.**

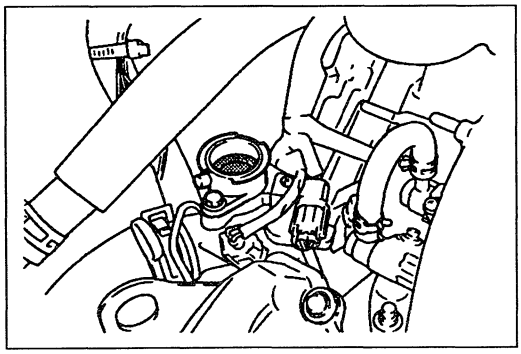
ENGINE TUNE-UP

PREPARATION
SST

49 9200 020A V-ribbed belt tension gauge		For inspection of drive belt tension







ENGINE OIL
Inspection

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 dipstick 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 dipstick represents 1.0 L {1.1 US qt, 0.9 Imp qt}.

ENGINE COOLANT
Inspection
Coolant level (Engine cold)

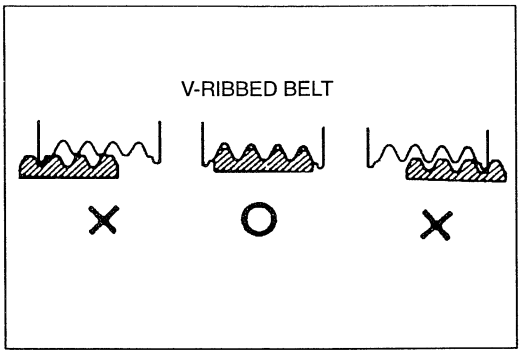
Warning
- **Removing the radiator cap or the coolant filler cap while the engine is running, or when the engine and radiator are hot is dangerous. Scalding coolant and steam can shoot out and cause serious injury. It can also damage the engine and cooling system. Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes. When you're sure all the pressure is gone, press down on the cap—still using a cloth—turn it, and remove it.**

1. Verify that the coolant level is at the filler neck.
2. Verify that the coolant level on the dipstick is between the F and L marks.
3. Add coolant if necessary.

Note
- The distance between the L and F marks on the dipstick represents 0.5 L {0.5 US qt, 0.4 Imp qt}.

Coolant quality

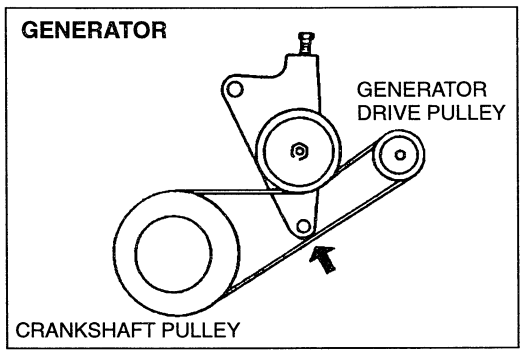
1. Verify that there is no buildup of rust or scale around the radiator cap, filler cap, and filler neck.
2. Verify that the coolant is free of oil. Replace the coolant if necessary.



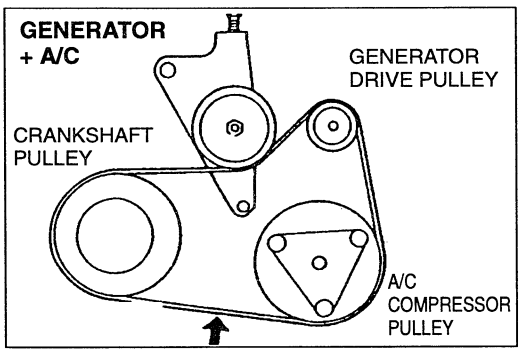
DRIVE BELT

Inspection

1. Check the drive belts for wear, cracks, and fraying. Replace if necessary.
2. Verify that the drive belts are correctly mounted on the pulleys.



3. Check the drive belt deflection when the engine is cold, or at least 30 minutes after the engine has stopped. Apply moderate pressure **98 N {10 kgf, 22 lbf}** midway between the specified pulleys.



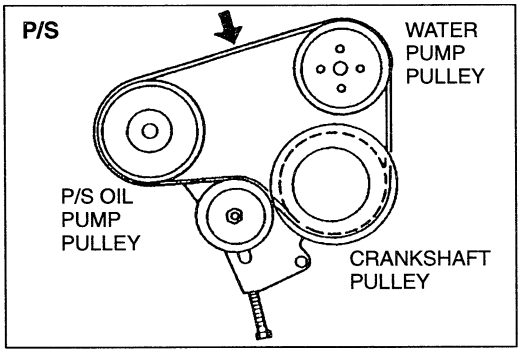
Deflection

mm {in}

Drive belt	*New	Used	Limit
Generator	6.0—7.0 {0.24—0.27}	7.0—8.0 {0.28—0.31}	9.0 {0.35}
Generator + A/C	5.5—6.5 {0.22—0.25}	6.5—7.5 {0.26—0.29}	8.0 {0.31}
P/S	6.0—7.0 {0.24—0.27}	7.0—8.0 {0.28—0.31}	9.0 {0.35}

* A belt that has been on a running engine for less than five minutes.

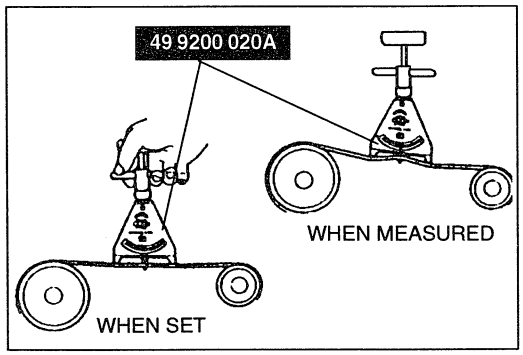
4. If the deflection is not within the specification, adjust it. (Refer to page B2–7.)



Drive belt tension check

Belt tension can be checked in place of belt deflection.

1. Check the drive belt tension when the engine is cold, or at least 30 minutes after the engine has stopped. Using the **SST**, check the belt tension between any two pulleys.



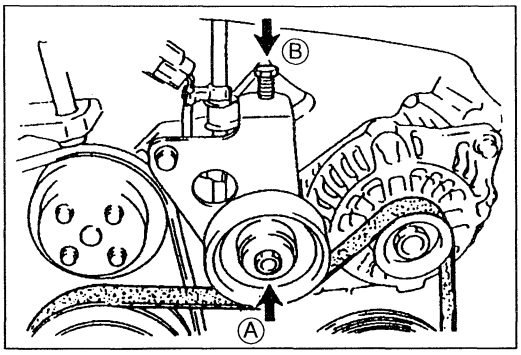
Tension

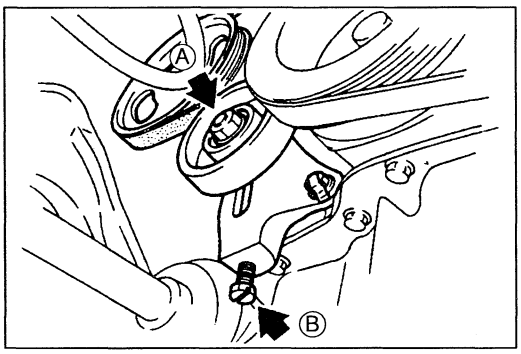
N {kgf, lbf}

Drive belt	*New	Used	Limit
Generator	690—880 {70—90, 160—190}	500—680 {50—70, 110—150}	440 {45, 99}
Generator + A/C	690—880 {70—90, 160—190}	500—680 {50—70, 110—150}	440 {45, 99}
P/S	540—680 {55—70, 130—150}	400—530 {40—55, 88—120}	340 {35, 77}

* A belt that has been on a running engine for less than five minutes.

2. If the tension is not within the specification, adjust it.





Adjustment
Generator+A/C, Generator
1. Loosen idler pulley locknut Ⓐ.
2. Adjust the belt deflection by turning adjusting bolt Ⓑ.

Deflection
(Generator+A/C)
New: 5.5—6.5 mm {0.22—0.25 in}
Used: 6.5—7.5 mm {0.26—0.29 in}
(Generator)
New: 6.0—7.0 mm {0.24—0.27 in}
Used: 7.0—8.0 mm {0.28—0.31 in}

3. Tighten pulley locknut Ⓐ.

Tightening torque:
32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}

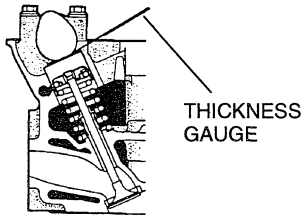
P/S
1. Loosen idler pulley locknut Ⓐ.
2. Adjust the belt deflection by turning adjusting bolt Ⓑ.

Deflection
New: 6.0—7.0 mm {0.24—0.27 in}
Used: 7.0—8.0 mm {0.28—0.31 in}

3. Tighten pulley locknut Ⓐ.

Tightening torque:
32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}

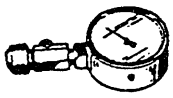
HLA TROUBLESHOOTING GUIDE

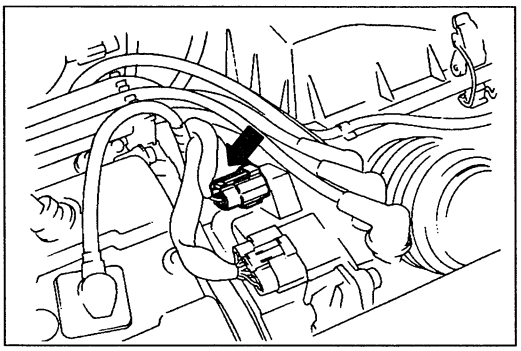
Problem	Possible Cause	Action
1. Noise when engine is first started after oil is changed. 2. Noise when engine is started after setting one day or more.	Oil leakage in oil passage or in HLA	Run engine at 2,000—3,000 rpm. If noise stops with 20 minutes*, HLA is normal. If not, replace HLA. * Time required for engine oil to circulate within HLA includes tolerance for engine oil condition and ambient temperature.
3. Noise when engine is started after new HLA is installed.	Oil leakage in HLA	
4. Noise during idle after warm up.	Insufficient oil pressure	Check oil pressure. If lower than specification, check for cause. (Refer to section D2.)
	Faulty HLA	Measure valve clearance. If more than 0.15 mm {0.0059 in}, replace HLA. 
5. Noise 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.

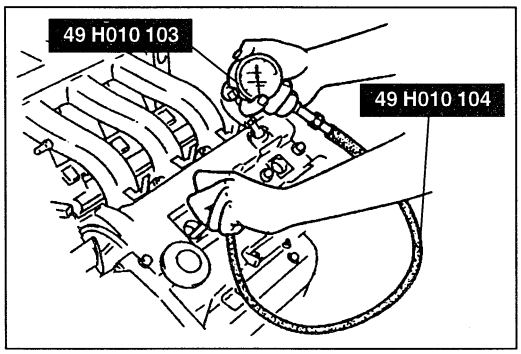
COMPRESSION

If the engine exhibits low power, poor fuel economy, or poor idle, check the following:
1. Ignition system (Refer to section G.)
2. Compression (Refer to below.)
3. Fuel system (Refer to section F2.)

PREPARATION
SST

49 H010 103 Compression gauge 	For inspection of compression	49 H010 104 Adapter 	For inspection of compression





INSPECTION
1. Verify that the battery is fully charged. Recharge it if necessary. (Refer to section G.)
2. Warm up the engine to the normal operating temperature.
3. Stop the engine and allow it to cool for about 10 minutes.
4. Remove the all spark plugs.
5. Disconnect the primary wire connector from the ignition coil.
6. Install the **SST** to No.1 spark plug hole.
7. Fully depress the accelerator pedal and crank the engine.
8. Record the maximum gauge reading.
9. Check each cylinder as above.

Compression

kPa {kgf/cm^2, psi}-rpm

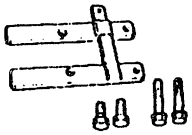
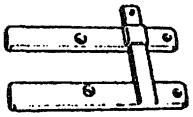
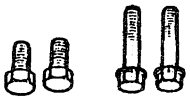
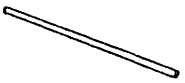
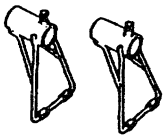
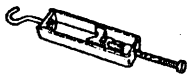
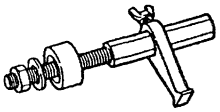
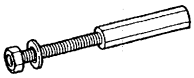
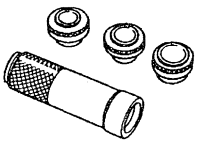
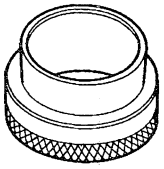
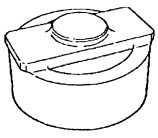
Standard	1,402 {14.3, 203}-250
Minimum	981 {10.0, 142}-250
max. difference between cylinders	196 {2.0, 28}

10. If the compression in one or more cylinders is low, pour a small amount of clean engine oil into the cylinder and recheck the compression.
    (1) If the compression increases, the piston, piston rings, or cylinder wall may be worn.
    (2) If the compression stays low, a valve may be stuck or improperly seated.
    (3) If the compression in adjacent cylinders stays low, the cylinder head gasket may be damaged or the cylinder head distorted.
11. Connect the ignition coil connector.
12. Install the all spark plugs.

Tightening torque:
15—22 N·m {1.5—2.3 kgf·m, 11—16 ft·lbf}

ON-VEHICLE MAINTENANCE

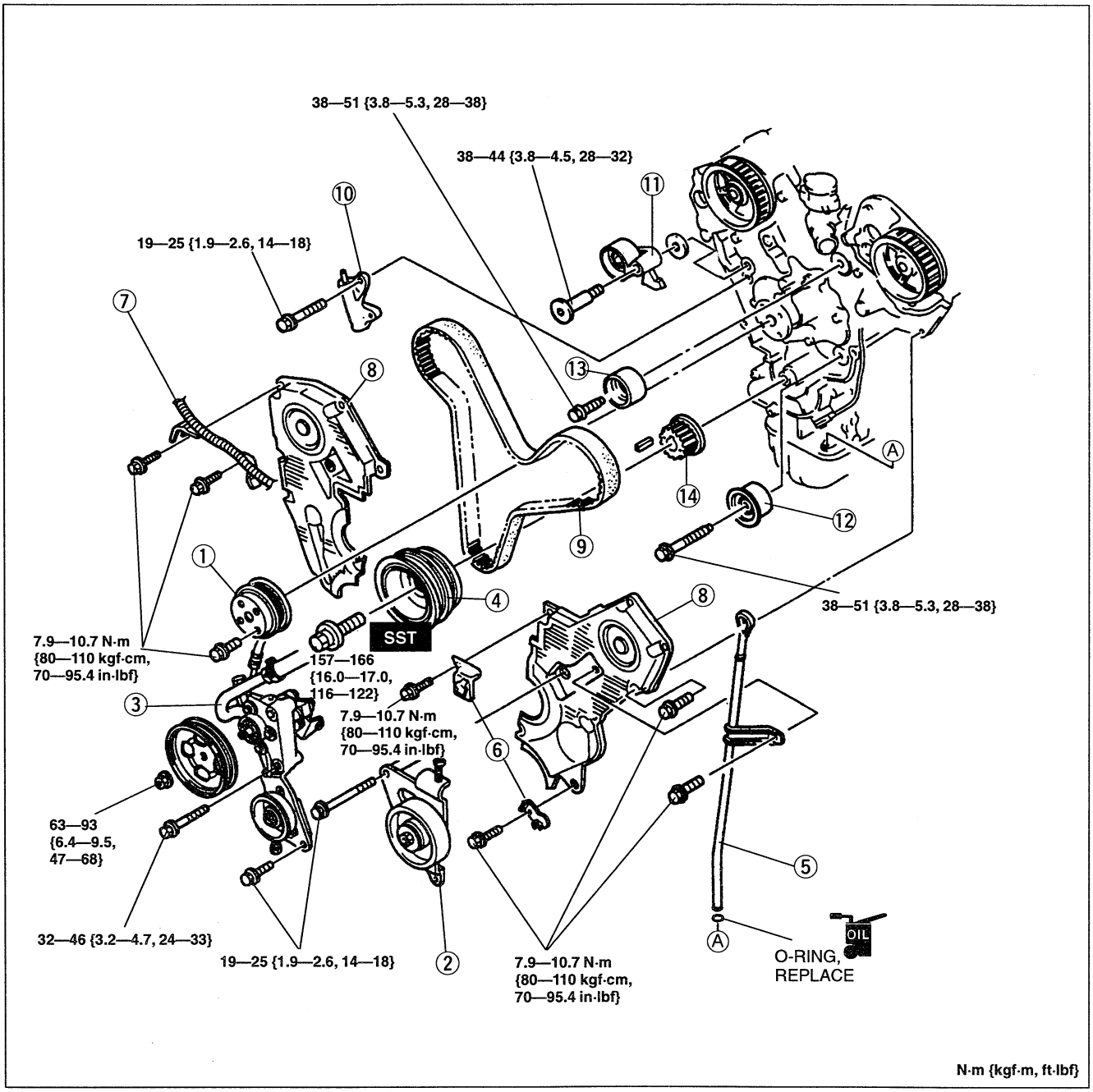
PREPARATION
SST

49 S120 710 Holder, coupling flange 	For prevention of crankshaft rotation	49 E011 1A1 Set, holder 	For prevention of crankshaft rotation
49 E011 101 Holder (Part of 49 E011 1A1) 	For prevention of crankshaft rotation	49 E011 102 Bolts (Part of 49 E011 1A1) 	For prevention of crankshaft rotation
49 G017 5A0 Support, engine 	For support of engine	49 G017 501 Bar (Part of 49 G017 5A0) 	For support of engine
49 G017 502 Support (Part of 49 G017 5A0) 	For support of engine	49 G017 503 Hook (Part of 49 G017 5A0) 	For support of engine
49 E011 1A0 Brake set, ring gear 	For prevention of crankshaft rotation	49 E011 103 Shaft (Part of 49 E011 1A0) 	For prevention of crankshaft rotation
49 E011 104 Collar (Part of 49 E011 1A0) 	For prevention of crankshaft rotation	49 E011 105 Stopper (Part of 49 E011 1A0) 	For prevention of crankshaft rotation
49 F401 330B Installer set, bearing 	For installation of camshaft oil seal	49 F401 337A Attachment C (Part of 49 F401 330B) 	For installation of camshaft oil seal
49 G019 017 Installer, oil seal 	For installation of rear oil seal	—	—

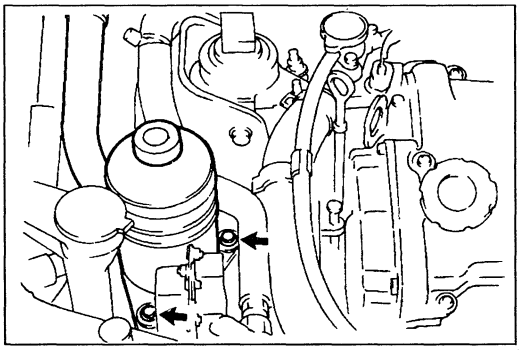
TIMING BELT
Removal / Installation

Warning
- **Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.**

1. Disconnect the negative battery cable.
2. Remove the splash shield and right front wheel.
3. Remove the drive belts.
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**.

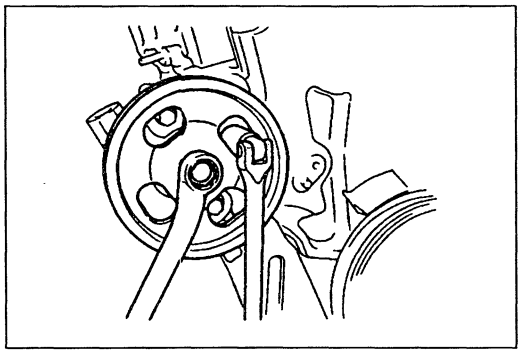


1. Water pump pulley
2. Idler pulley bracket
3. P/S oil pump
   - Removal Note ..... below
   - Installation Note ..... page B2–19
4. Crankshaft pulley
   - Removal Note ..... page B2–12
   - Installation Note ..... page B2–18
5. Dipstick and pipe
   - Removal Note ..... page B2–12
   - Installation Note ..... page B2–18
6. Crankshaft position sensor harness bracket
7. Engine harness bracket
8. Timing belt cover
   - Removal Note ..... page B2–13
   - Installation Note ..... page B2–17
9. Timing belt
   - Removal Note ..... page B2–13
   - Inspection ..... page B2–83
   - Installation Note ..... page B2–15
10. Timing belt auto tensioner
    - Inspection ..... page B2–84
    - Installation Note ..... page B2–14
11. Tensioner pulley
12. No.2 idler pulley
13. No.1 idler pulley
14. Timing belt pulley
    - Removal Note ..... page B2–14



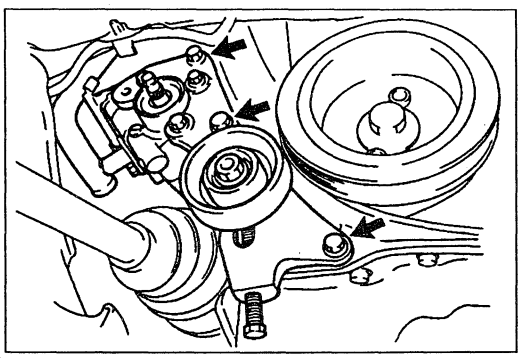
Removal Note
P/S oil pump

1. Remove the bolts shown and secure the P/S oil reservoir away from the engine.

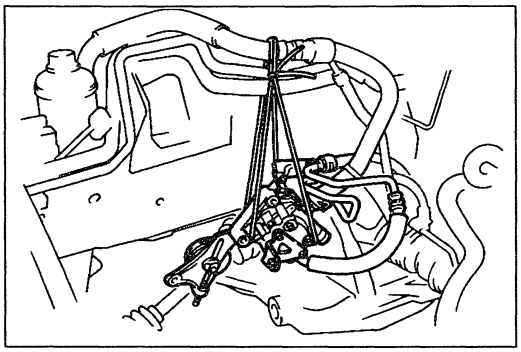


2. Loosen the pulley nut as shown.
3. Remove the pulley.

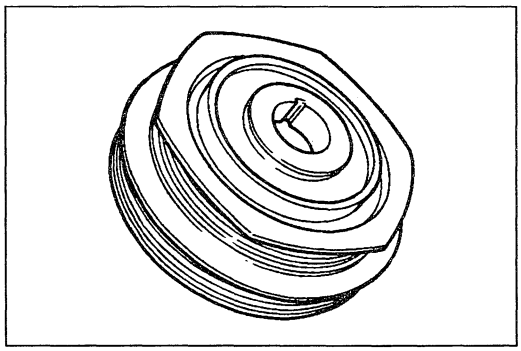
4. Remove the bolt shown.



5. Remove the bolts shown and remove the P/S oil pump.

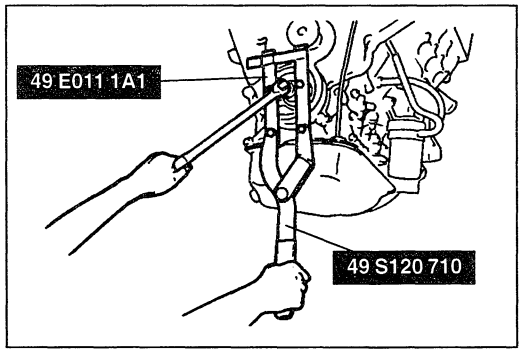


6. Position the P/S oil pump away from the engine and secure it with wire.

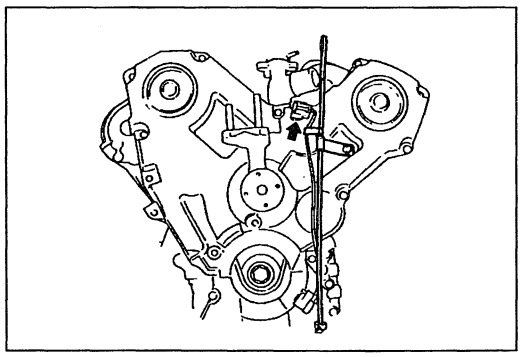


Crankshaft pulley

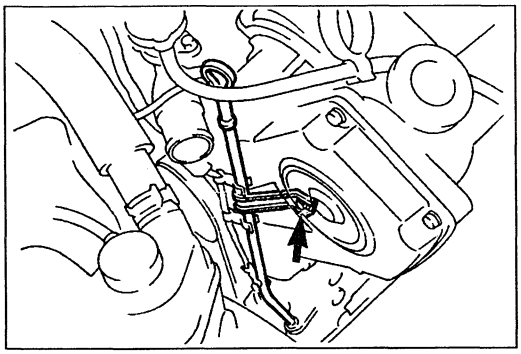
Caution
- **The crankshaft position sensor rotor is on the rear of the pulley, and can be damaged easily.**



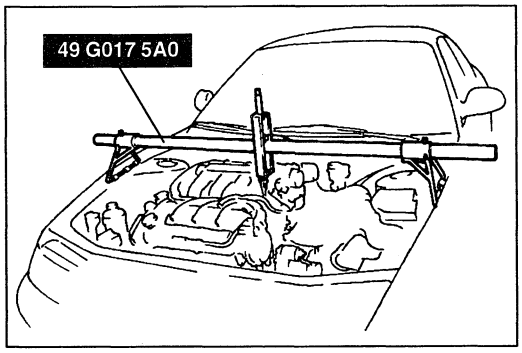
1. Install the **SST** with bolts (M10 × 1.25) to the crankshaft pulley.
2. Remove the crankshaft pulley bolt and the pulley.



Dipstick and pipe
1. Disconnect the crankshaft position sensor connector.
2. Remove the clip from the dipstick pipe.

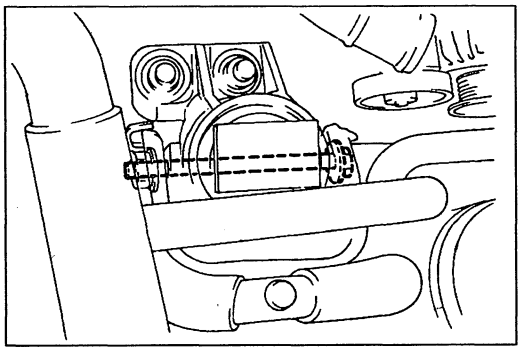


3. Remove the dipstick and pipe.
4. Plug the hole in the engine after removing the pipe.

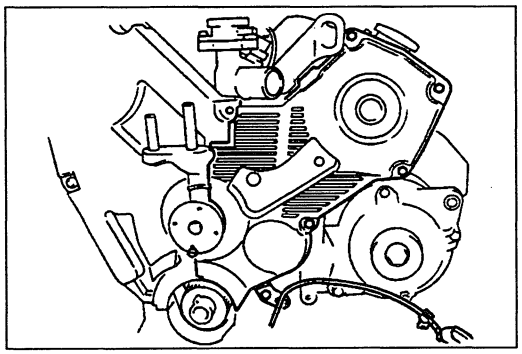


Timing belt cover

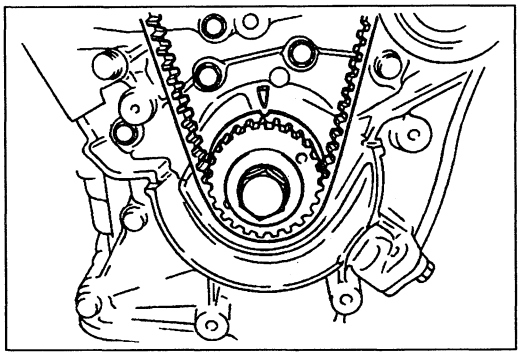
1. Support the engine by using the **SST** (engine support).



2. Remove the No.3 engine mount.

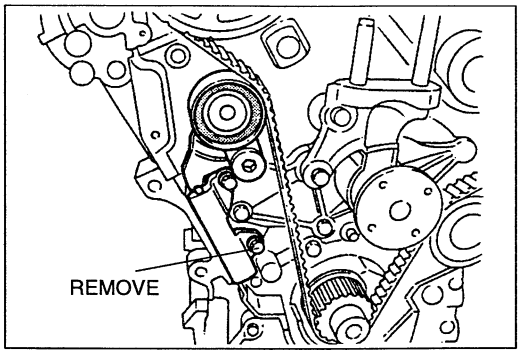


3. Remove the right and left timing belt covers.



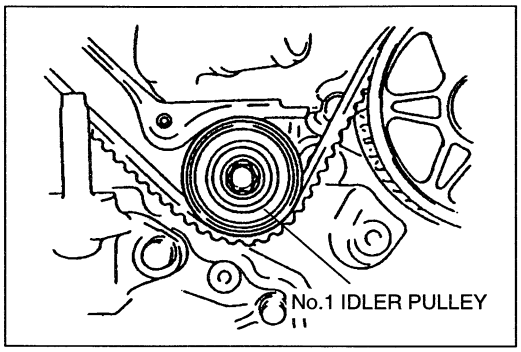
Timing belt

1. Install the crankshaft pulley bolt into the crankshaft.
2. Turn the crankshaft clockwise so that the No.1 piston is at TDC of the compression stroke.
3. Mark the timing belt rotation on the belt for proper reinstallation.



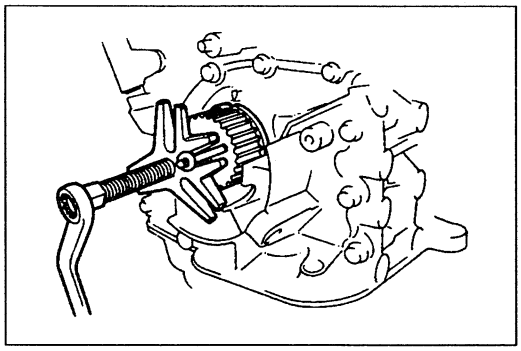
4. Loosen the auto tensioner bolts and remove the lower bolt.

Caution
- **When removing the bolt, hold the tensioner so that the bolt holes are aligned, otherwise the threads can be damaged.**



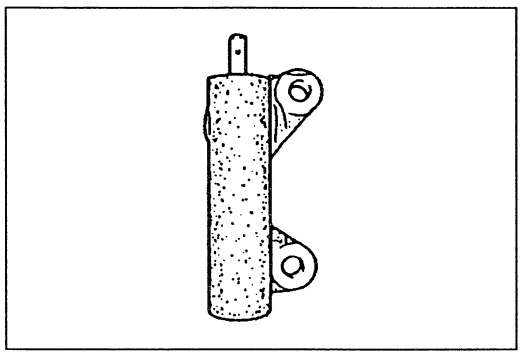
5. Remove the No.1 idler pulley and remove the timing belt.

Caution
- **When removing the pulley bolt, hold the pulley so that the bolt holes are aligned, otherwise the threads can be damaged.**
- **The following will damage the belt and shorten its life; Forcefully twisting it, turning it inside out, bending it, or allowing oil or grease on it.**



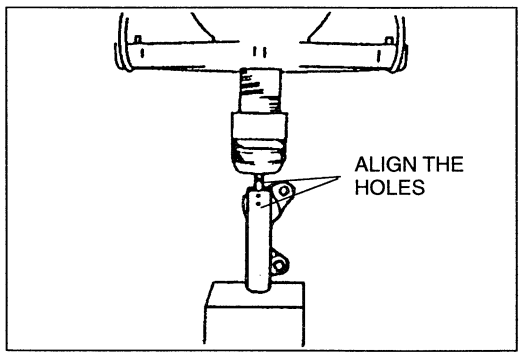
Timing belt pulley

Note
- If necessary, remove the pulley by using a steering wheel puller.



Inspection

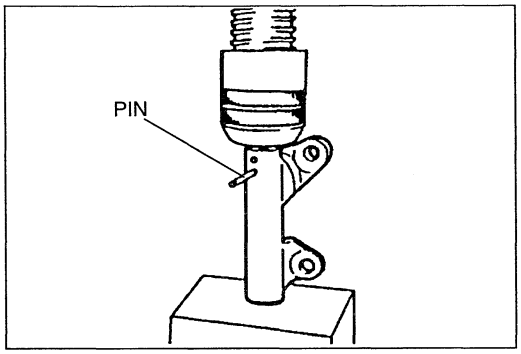
Inspect the following and repair or replace as necessary.
(1) Timing belt (Refer to page B2–83.)
(2) Timing belt auto tensioner (Refer to page B2–84.)
(3) Timing belt pulley (Refer to page B2–84.)
(4) Camshaft pulleys (Refer to page B2–84.)



Installation Note
Timing belt auto tensioner

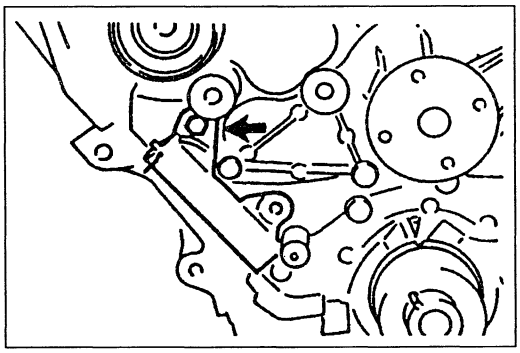
1. Slowly press in the tensioner rod by using a press or a vise.

Caution
- **Do not press the tensioner rod to more than 9,807 N {1,000 kgf, 2,200 lbf}. It will damage the tensioner.**



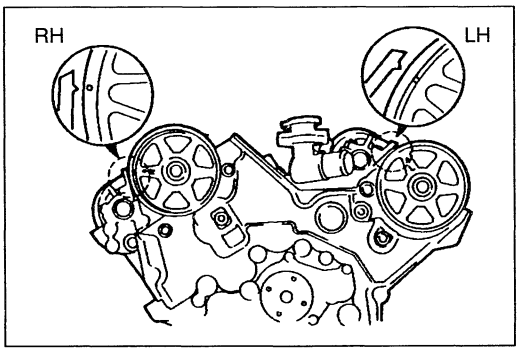
2. Insert a pin into the second hole in the body as shown to hold the tensioner rod.

   Pin diameter: 1.6 mm {0.063 in}



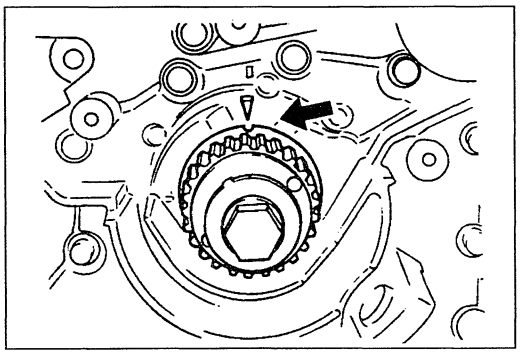
3. Set the tensioner in place and snugly tighten the tensioner upper bolt.

   Note
   - This must be done to reduce the timing belt resistance when the idler pulley is installed.

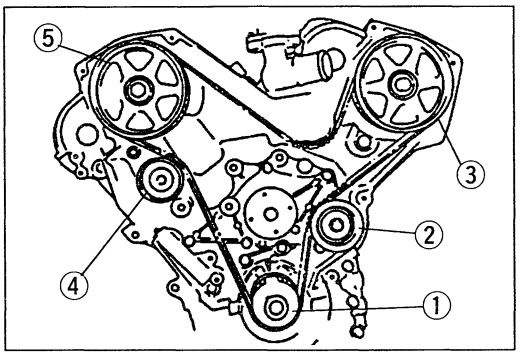


Timing belt

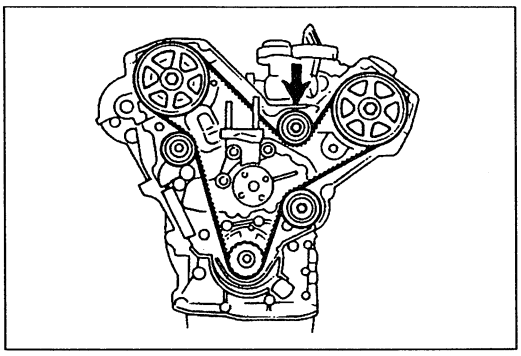
1. Turn the camshaft pulleys clockwise and align the timing marks of the camshaft pulleys with those of the cylinder heads.



2. Using the crankshaft bolt, turn the crankshaft clockwise and align the timing marks of the timing belt pulley and the oil pump.

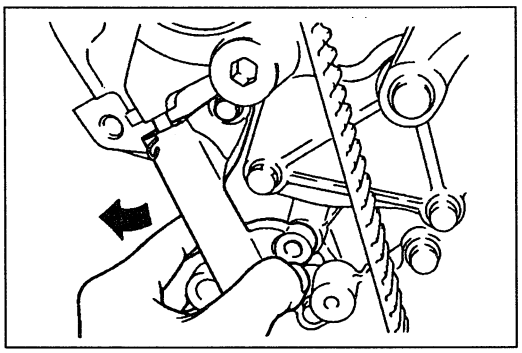


3. With the No.1 idler pulley removed, install the timing belt on the pulleys in the order shown below.
   ① Timing belt pulley
   ② No.2 idler pulley
   ③ LH camshaft pulley
   ④ Tensioner pulley
   ⑤ RH camshaft pulley
4. Verify that there is tension between pulleys ③ and ①, and between pulleys ① and ⑤.



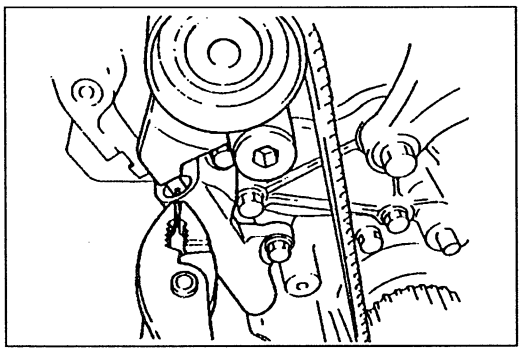
5. Install the No.1 idler pulley while applying the pressure on the timing belt.

   Tightening torque:
   38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

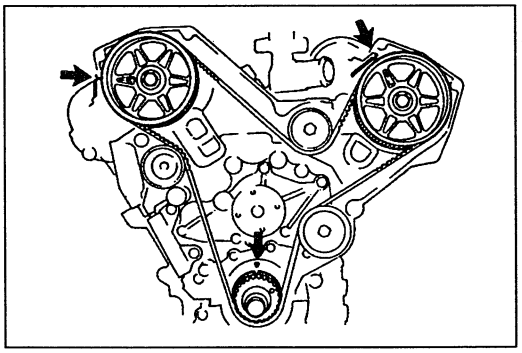


6. Push the auto tensioner in the direction of the arrow and tighten the bolts.

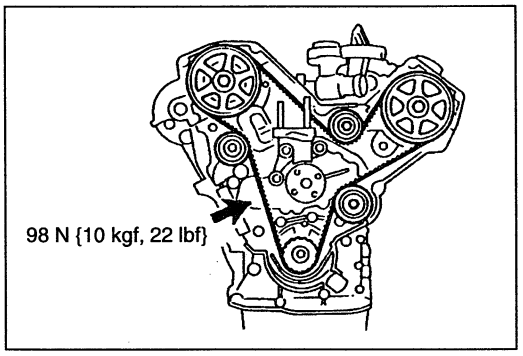
   Tightening torque:
   19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



7. Remove the pin from the auto tensioner to apply tension to the belt.

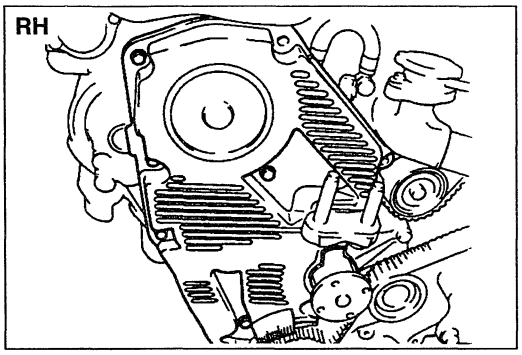


8. Turn the crankshaft clockwise twice, and align the timing marks.
9. Verify that all timing marks are correctly aligned. If necessary, repeat the procedure beginning from installation of the timing belt auto tensioner.



10. Check the timing belt deflection by applying moderate pressure **98 N {10 kgf, 22 lbf}** midway between the timing belt pulley and the tensioner pulley. If not correct, replace the auto tensioner.

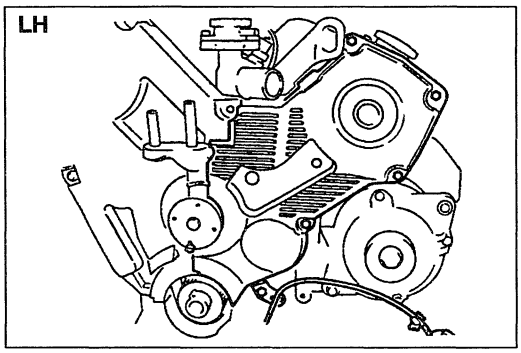
    Deflection: 6.0—8.0 mm {0.24—0.31 in}



Timing belt cover

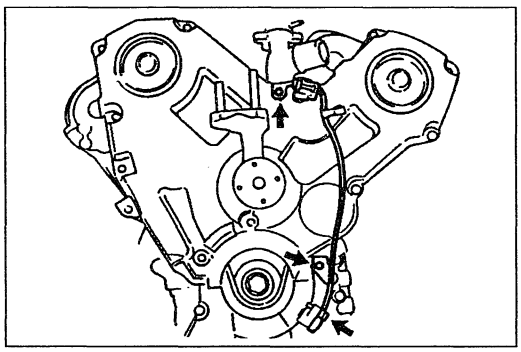
1. Install the right timing belt cover.

   Tightening torque:
   7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



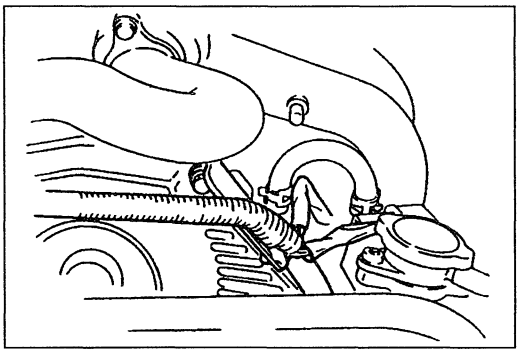
2. Install the left timing belt cover.

   Tightening torque:
   7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



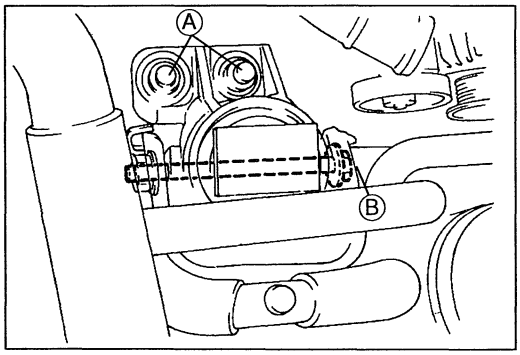
3. Install the crankshaft position sensor connector bracket on the left timing belt cover.

   Tightening torque:
   7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



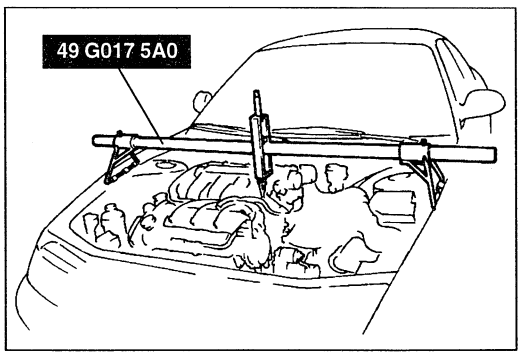
4. Install the harness bracket on the right timing belt cover.

   Tightening torque:
   7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

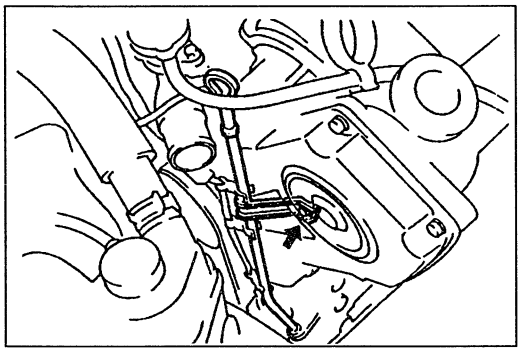


5. Install the No.3 engine mount.

   Tightening torque
   Ⓐ: 75—104 N·m {7.6—10.7 kgf·m, 55—77.3 ft·lbf}
   Ⓑ: 86—116 N·m {8.7—11.9 kgf·m, 63—86.0 ft·lbf}



6. Remove the **SST** (engine support).

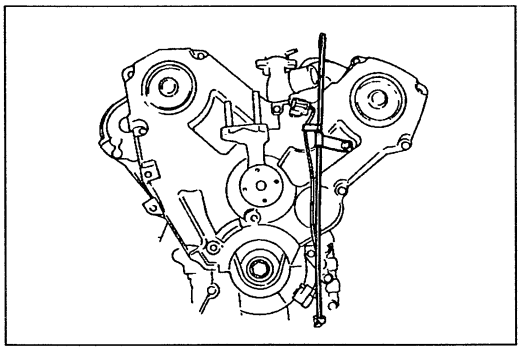


Dipstick and pipe

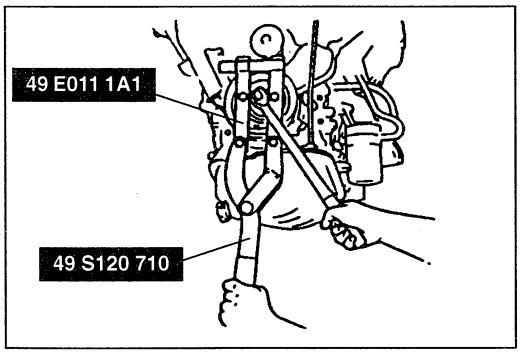
1. Apply clean engine oil to a new O-ring and install it on the pipe.
2. Remove the plug from the engine and install the pipe.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

3. Install the dipstick.



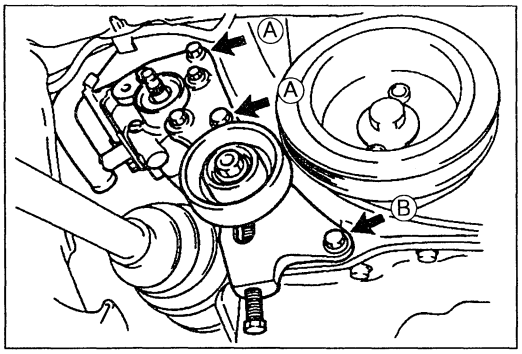
4. Install the crankshaft position sensor harness and clip to the dipstick pipe.
5. Connect the connector.



Crankshaft pulley

1. Remove the crankshaft pulley bolt.
2. Install the crankshaft pulley and hand tighten the crankshaft pulley bolt.
3. Install the **SST** to the crankshaft pulley.
4. Tighten the crankshaft pulley bolt.

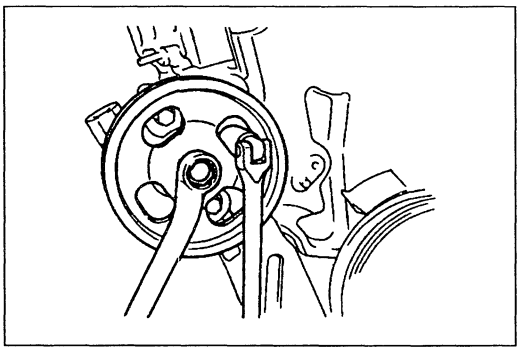
Tightening torque:
157—166 N·m {16.0—17.0 kgf·m, 116—122 ft·lbf}



P/S oil pump

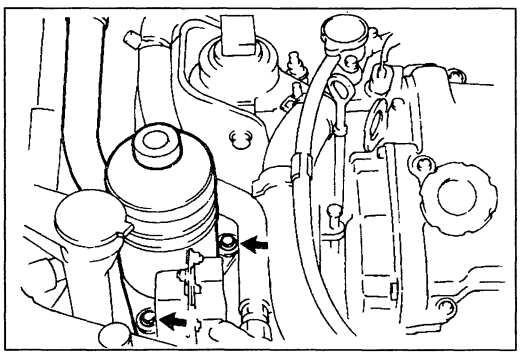
1. Install the P/S oil pump.

Tightening torque
Ⓐ: 32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}
Ⓑ: 19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



2. Install the P/S oil pump pulley and hand tighten the pulley nut.
3. Tighten the pulley nut by using a **12 mm {0.47 in}** socket on one of the P/S oil pump mounting bolts.

Tightening torque:
63—93 N·m {6.4—9.5 kgf·m, 47—68 ft·lbf}



4. Install the P/S oil reservoir and the engine ground.

Tightening torque:
6.9—9.8 N·m {70—100 kgf·cm, 61—86.6 in·lbf}

Steps After Installation

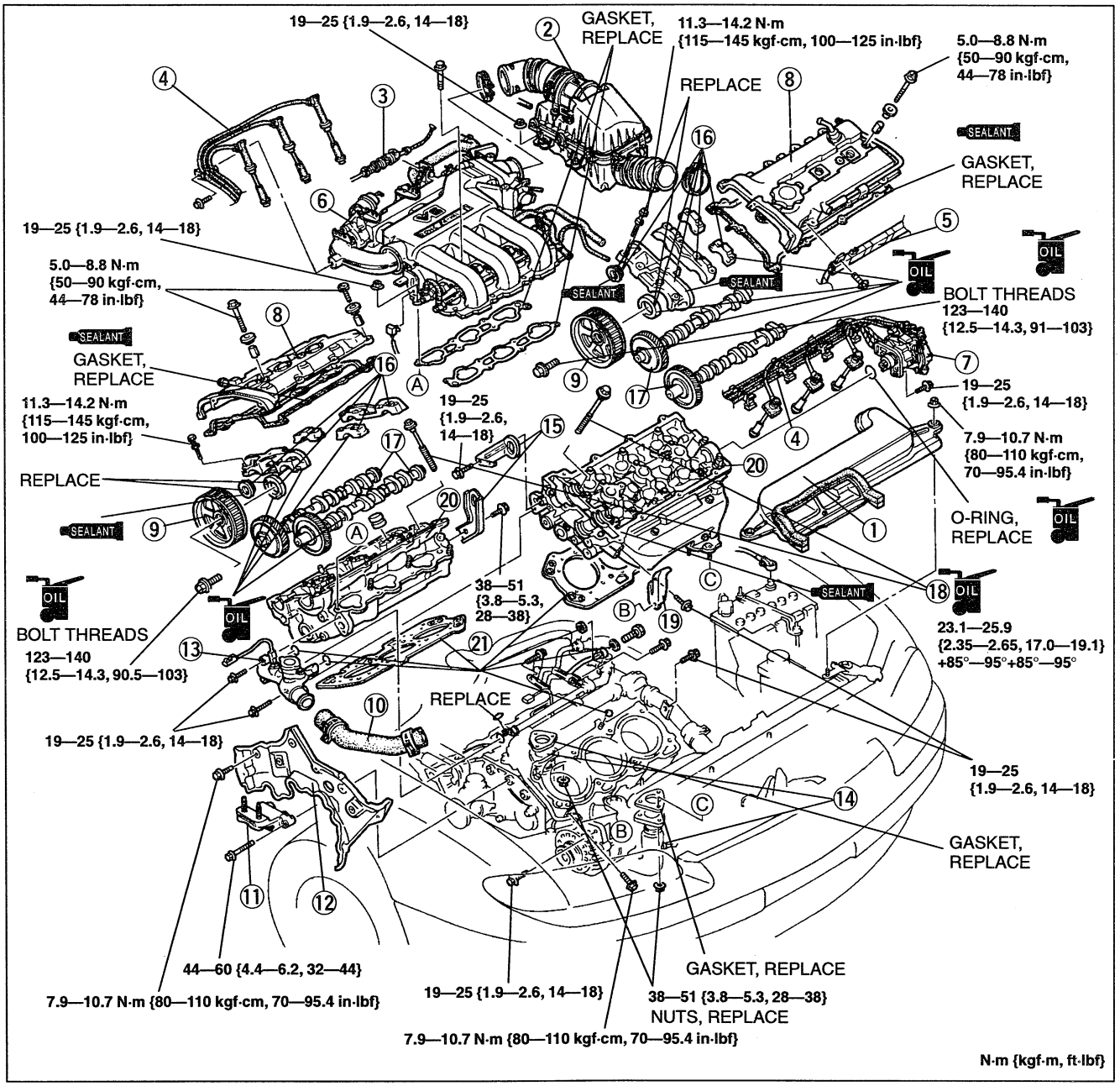
1. Install the drive belts. (Refer to page B2–7.)
2. Install the splash shield and the right front wheel.
3. Perform the necessary engine adjustments. (Refer to section F2.)

CYLINDER HEAD GASKET
Replacement

Warning

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on section F2.**
- **Do not support the engine by using a jack under the oil pan. It will damage the oil pan. Reinstall the engine mount No.3 to support the engine after removing the timing belt.**

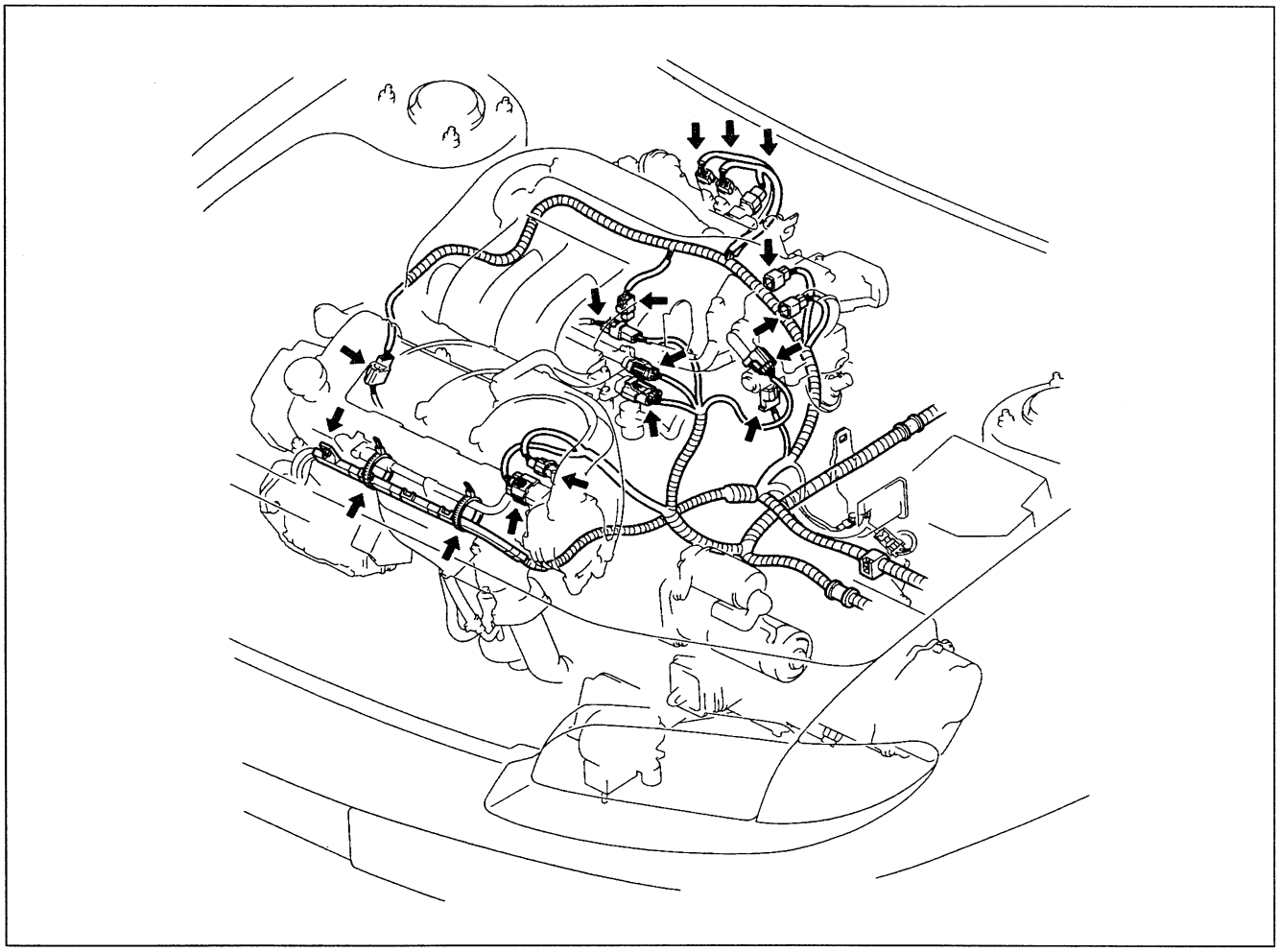
1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to section E2.)
3. Remove the timing belt. (Refer to page B2–10.)
4. Remove in the order shown in the figure, referring to **Removal Note**.
5. Install in the reverse order of removal, referring to **Installation Note**.

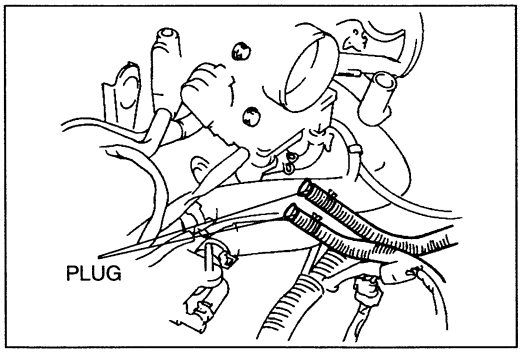


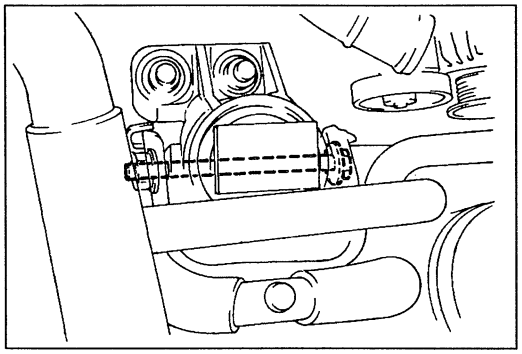
1. Fresh-air duct
2. Air cleaner assembly
3. Accelerator cable
   - Installation Note ..... page B2–33
4. High-tention leads
5. Harness
   - Removal Note ..... page B2–22
   - Installation Note ..... page B2–33
6. Intake manifold assembly
   - Removal Note ..... page B2–22
   - Installation Note ..... page B2–32
7. Distributor
   - Installation Note ..... page B2–31
8. Cylinder head cover
   - Removal Note ..... page B2–24
   - Installation Note ..... page B2–30
9. Camshaft pulley
   - Removal Note ..... page B2–24
   - Installation Note ..... page B2–29
10. Radiator hose, upper
11. No.3 engine mount bracket
    - Removal Note ..... page B2–24
    - Installation Note ..... page B2–29
12. Seal plate
13. Water outlet
14. Exhaust pipe
15. Engine hanger
16. Camshaft cap, blind cap, and oil seal
    - Removal Note ..... page B2–24
    - Installation Note ..... page B2–28
17. Camshaft
    - Installation Note ..... page B2–27
18. Cylinder head bolt
    - Removal Note ..... page B2–25
19. Generator strap
20. Cylinder head
    - Installation Note ..... page B2–26
21. Cylinder head gasket and O-ring

Removal Note
Harness

Disconnect the harness connectors shown in the figure.





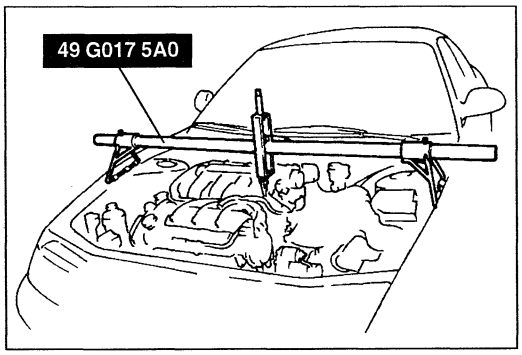


Intake manifold assembly

Warning

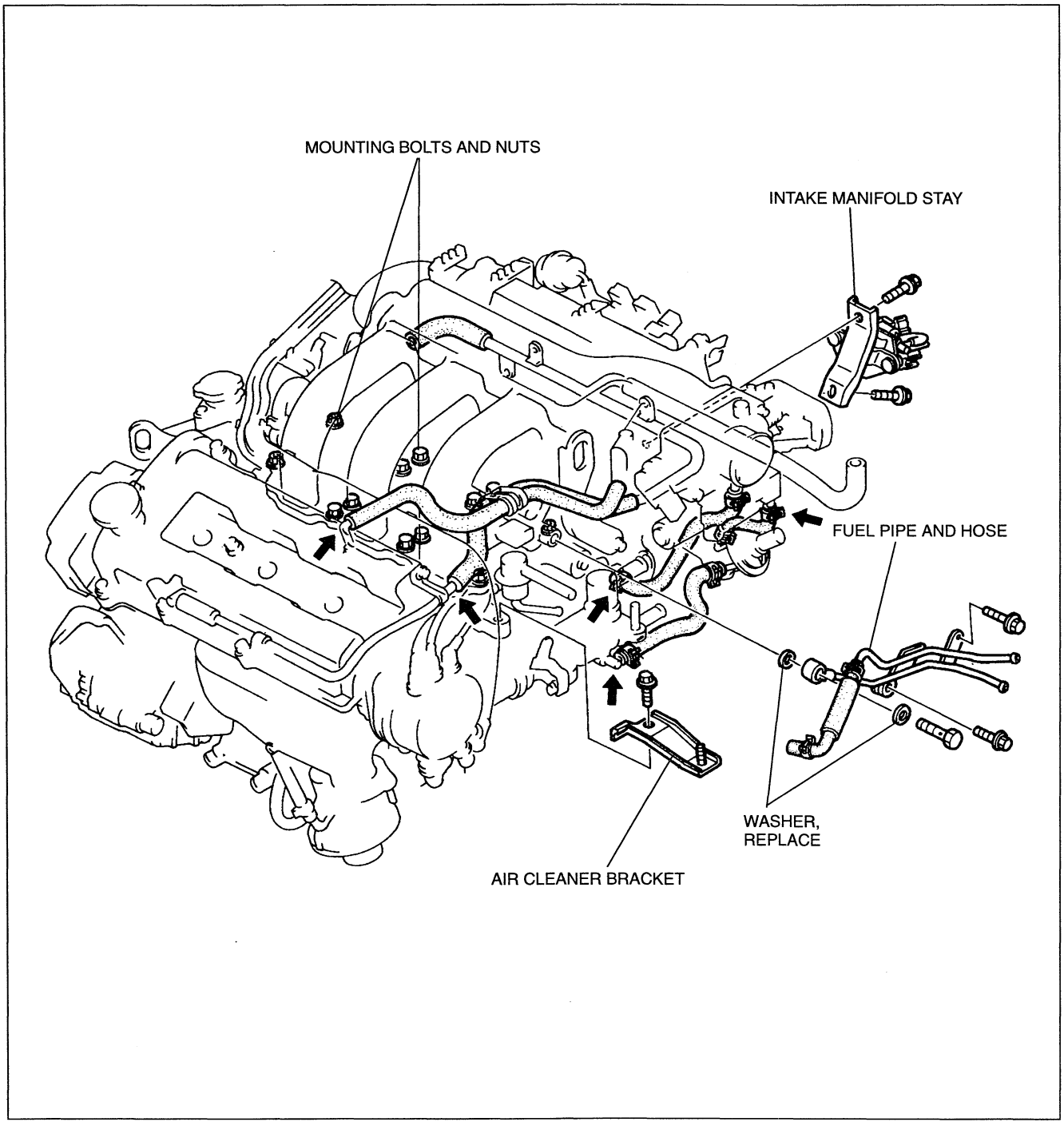
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on section F2.**

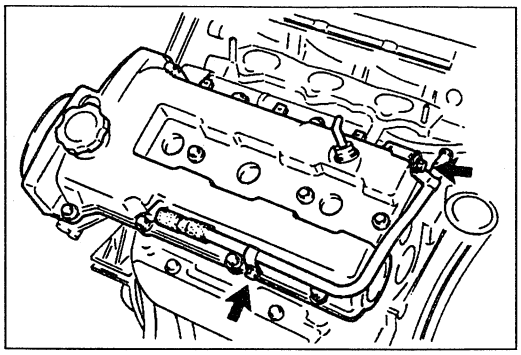
1. Plug the disconnected hoses to avoid fuel leakage.
2. Temporarily install the No.3 engine mount bracket to support the engine.



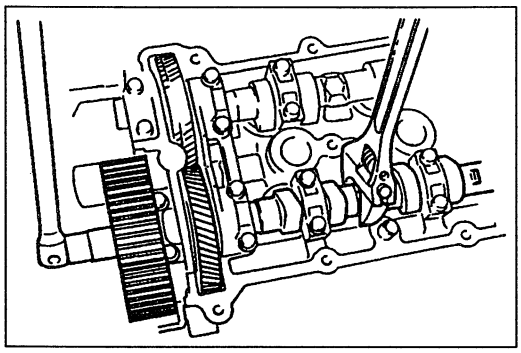
3. Remove the **SST** installed for timing belt removal.

4. Remove the stays, bracket, fuel pipe, and hoses as shown in the figure.
5. Loosen the mounting bolts and nuts in two or three steps.

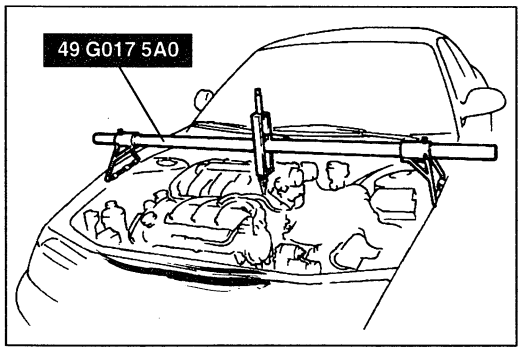




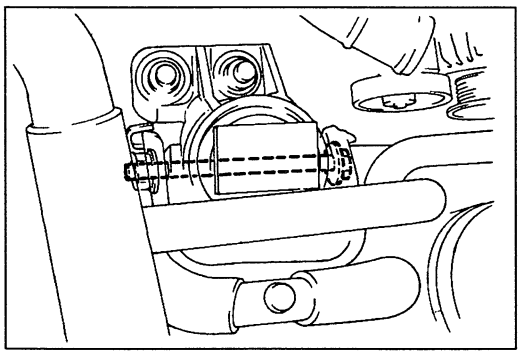
Cylinder head cover
1. Remove the bolts shown in the figure.
2. Disconnect the ventilation pipe (left cylinder head).
3. Remove the cylinder head cover.



Camshaft pulley
1. Hold the camshaft by using a wrench on the cast hexagon as shown, and loosen the camshaft pulley bolt.
2. Remove the camshaft pulley.



No.3 engine mount bracket
1. Install the **SST** and support the engine.

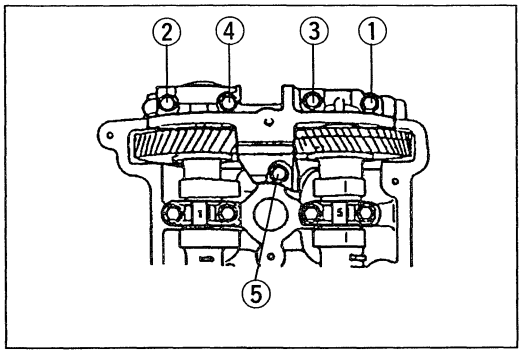


2. Disconnect the No.3 engine mount bracket from the engine mount rubber.
3. Remove the No.3 engine mount bracket from the engine.

Camshaft cap, blind cap, and oil seal

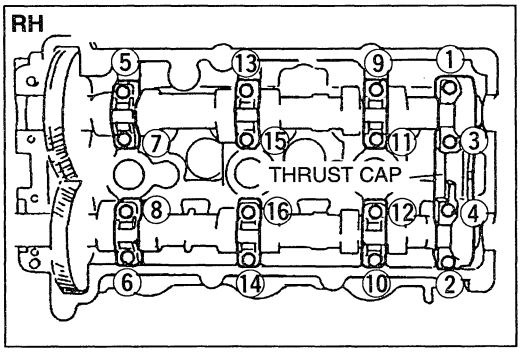
Perform this same procedure for the right and left cylinder heads.

Caution
- **When the camshaft lobe is pressing on the HLA, removing the camshaft caps can damage the cylinder head thrust journal support.**



1. Loosen the front camshaft cap bolts in five or six steps in the order shown.
2. Remove the front camshaft cap.

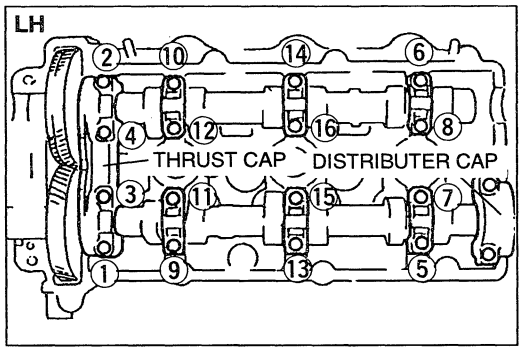
Note
- Bolt ⑤ fits only the right cylinder head.



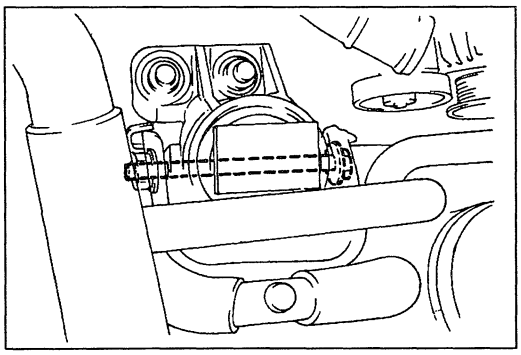
3. Loosen the camshaft cap bolts gradually in five or six steps in the order shown.

Caution
- **Remove the thrust caps only after removing all camshaft caps. Otherwise, the thrust caps can be damaged.**

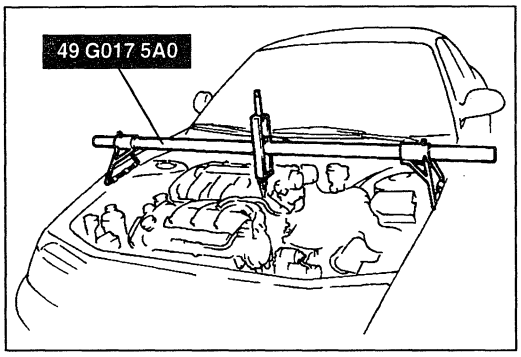
4. Remove the camshaft caps.



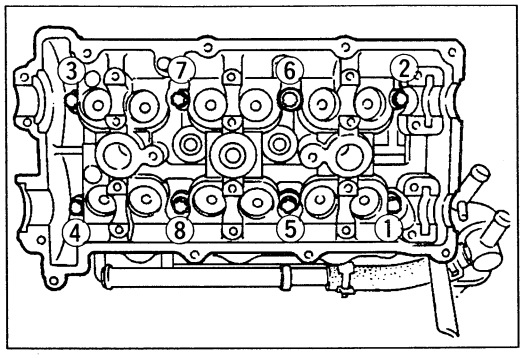
Note
- Before removing the camshaft caps, note their locations. They are identified as follows;
  Right head: numbers
  Left head: letters



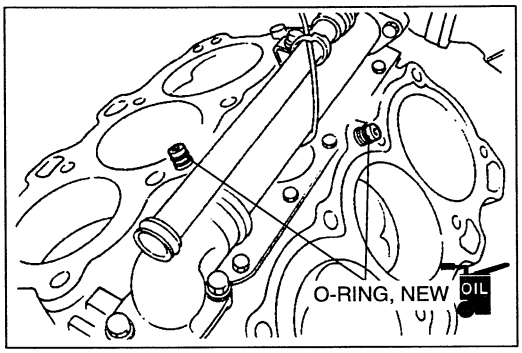
Cylinder head bolt
1. Temporarily install the No.3 engine mount bracket to support the engine.



2. Remove the **SST** (engine support).

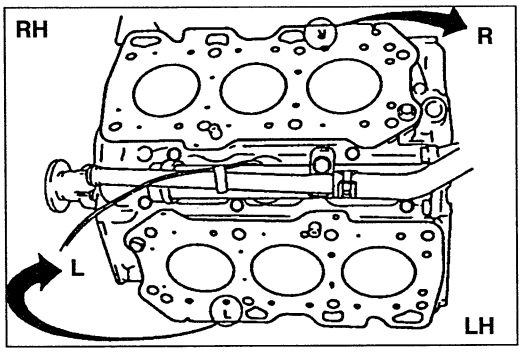


3. Loosen the cylinder head bolts in two or three steps in the order shown.
4. Remove the cylinder head bolts.

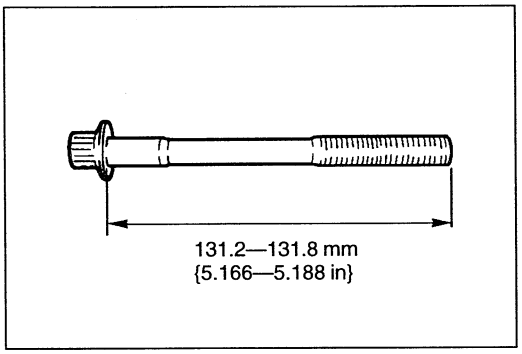


Installation Note
Cylinder head

1. Apply clean engine oil to new O-rings and install them to the oil control plugs.

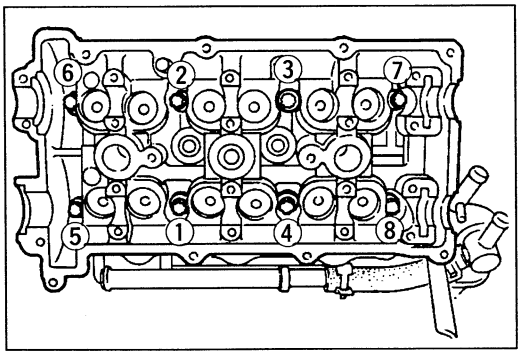


2. Thoroughly remove all dirt, oil, and other material from the decks of the cylinder block.
3. Turn the crankshaft clockwise and apply engine oil to the cylinder walls.
4. Place a new cylinder head gasket on the left bank with the **L** mark.
5. Place a new cylinder head gasket on the right bank with the **R** mark.



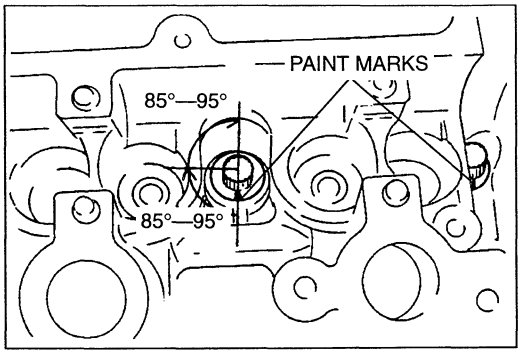
6. Install the cylinder head to the cylinder block.
7. Tighten the cylinder head bolts as described below.
   (1) Before installation, measure the length of each bolt. Replace a bolt if it exceeds the maximum length.

   Length: 131.2—131.8 mm {5.166—5.188 in}
   Maximum: 132.5 mm {5.217 in}

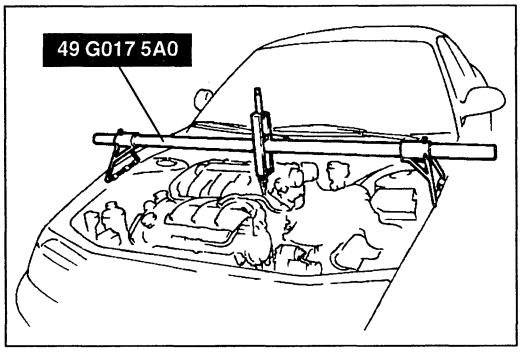


   (2) Apply clean engine oil to the threads and the seat face of each bolt, and install them.
   (3) Tighten the bolts in two or three steps in the order shown.

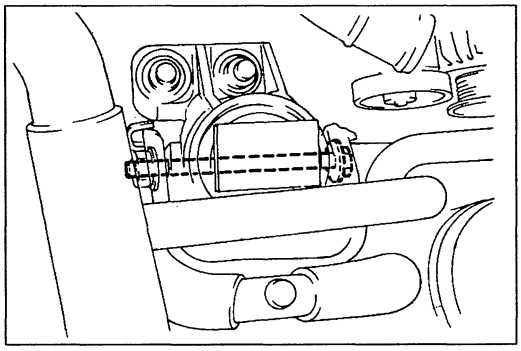
   Tightening torque:
   23.1—25.9 N·m {2.35—2.65 kgf·m, 17.0—19.1 ft·lbf}



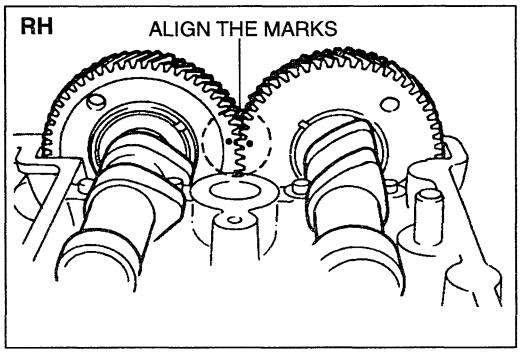
(4) Put a paint mark on each bolt head.
(5) Using the marks as a reference, tighten the bolts by turning each **85°—95°** in the sequence shown.
(6) Further tighten each bolt by turning another **85°—95°**.



8. Support the engine by using the **SST**.



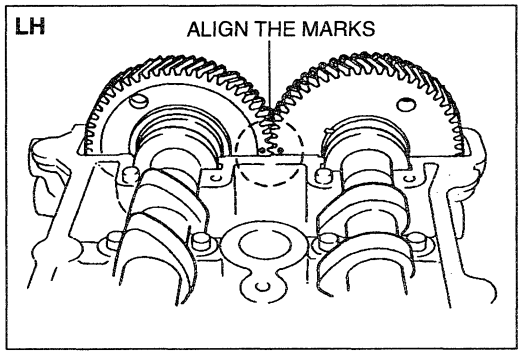
9. Disconnect the No.3 engine mount bracket.
10. Remove the No.3 engine mount bracket from the engine.

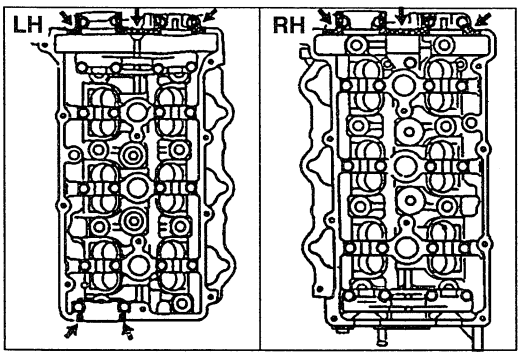


Camshaft

Caution
- **Camshafts must be assembled in the following procedure. Otherwise, camshaft can be broken or damaged because there is little camshaft clearance.**

1. Apply clean engine oil to the camshaft journals and the supports
2. Install the camshafts so that the intake camshaft gear mark and exhaust camshaft gear mark align.
3. Remove the oil, dirt from the mating surfaces between the front camshaft cap and the cylinder head, and degrease.

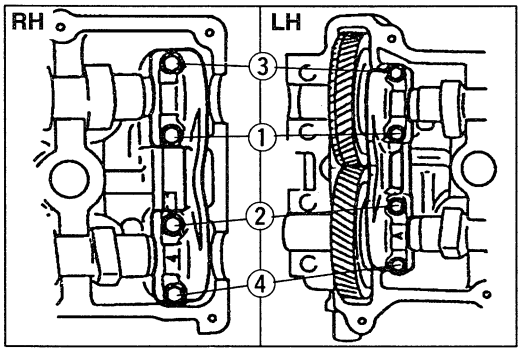




Camshaft cap, blind cap, and oil seal

1. Apply silicone sealant to the shaded areas shown.

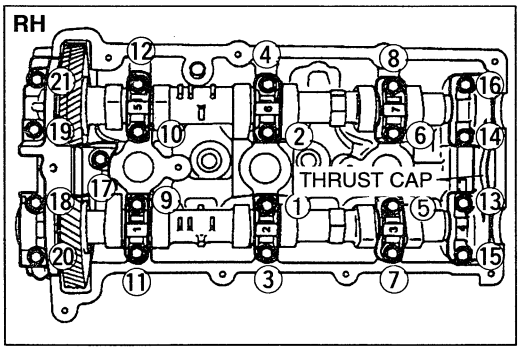
   Thickness: ϕ1.5—2.5 mm {0.06—0.09 in}



Caution

- **Install the thrust caps (RH is marked 4, LH is marked A) first. Otherwise, camshaft can be broken or damaged.**

2. Install the thrust caps onto the cylinder heads. Hand tighten the bolts in five or six steps in the order shown, until the thrust caps fully seated on the cylinder heads.

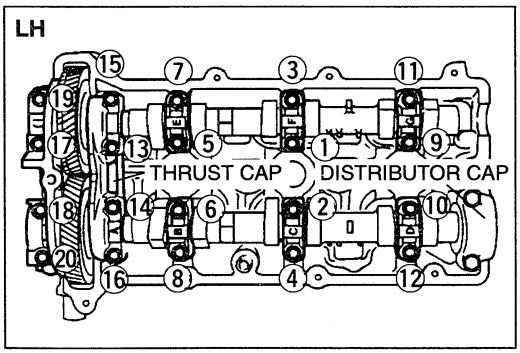


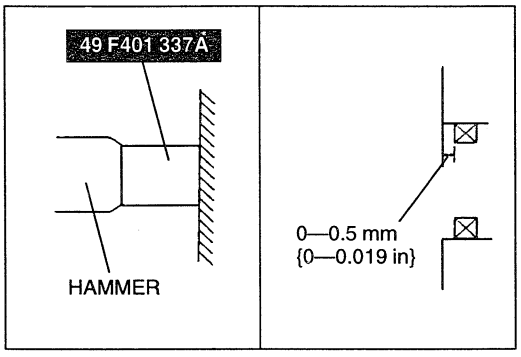
3. Install the camshaft caps onto the cylinder heads. Hand tighten the bolts gradually in five or six steps in the order shown, until the camshaft caps fully seated on the cylinder heads.
4. Tighten the bolts in the order shown.

   Tightening torque:
   11.3—14.2 N·m {115—145 kgf·cm, 100—125 in·lbf}

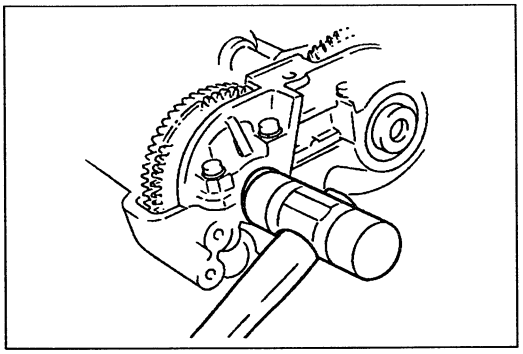
5. Retighten the bolts in the order shown.

   Tightening torque:
   11.3—14.2 N·m {115—145 kgf·cm, 100—125 in·lbf}

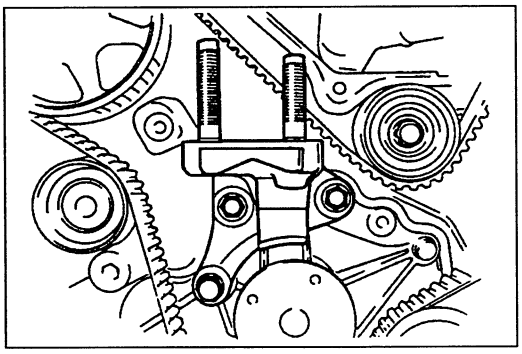




6. Apply clean engine oil to the lip of the new camshaft oil seal.
7. Push the oil seal slightly in by hand.
8. Using the **SST** and a hammer, tap the camshaft oil seal in evenly until it is flush with the edge of the front camshaft cap.



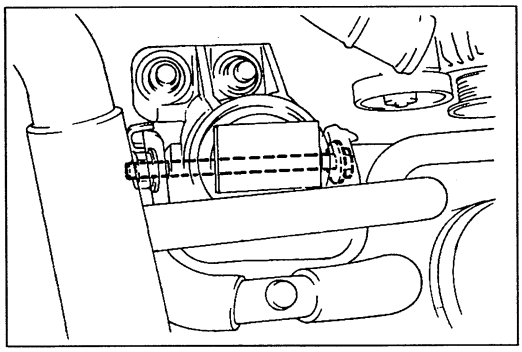
9. Tap in the blind cap by using a plastic hammer.



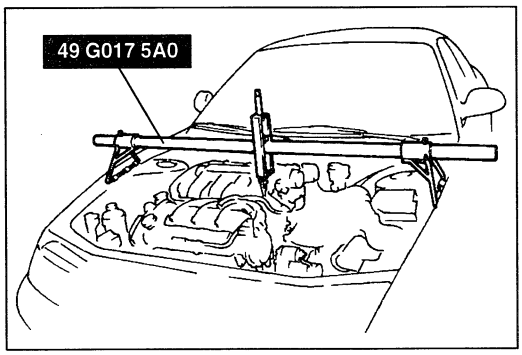
No.3 engine mount bracket

1. Install the No.3 engine mount bracket to the engine.

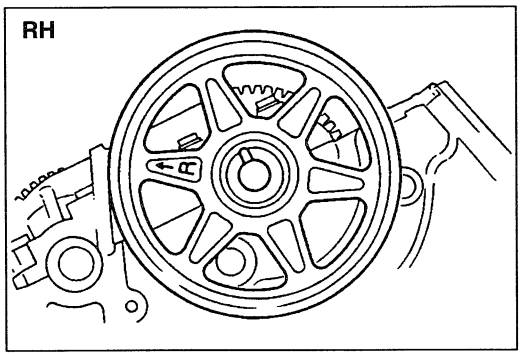
   Tightening torque:
   44—60 N·m {4.4—6.2 kgf·m, 32—44 ft·lbf}



2. Temporarily install the No.3 engine mount bracket to the engine mount rubber.



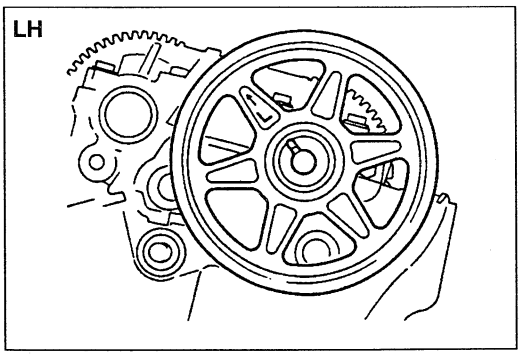
3. Remove the **SST** (engine support).



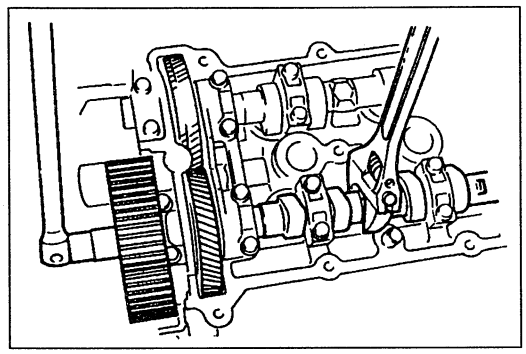
Camshaft pulley

The right and left pulleys are different and must be installed on the same head that they were removed from.

1. Install the RH camshaft pulley so that the "R" mark can be seen and the groove aligns with the camshaft knock pin.

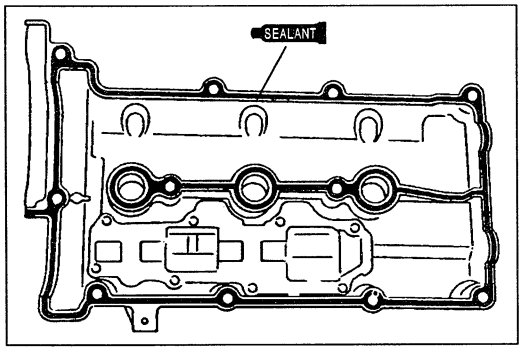


2. Install the LH camshaft pulley so that the "L" mark can be seen and the groove aligns with the camshaft knock pin.

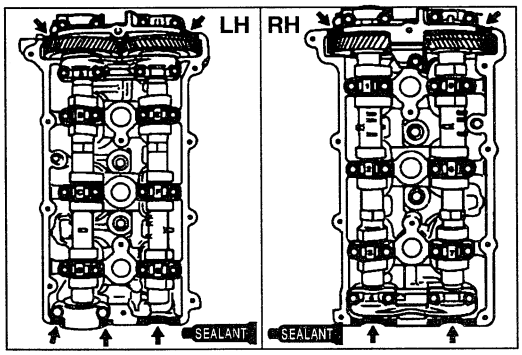


3. Apply engine oil to the camshaft pulley bolt threads and hand tighten the bolt.
4. Hold the camshaft by using a wrench on the cast hexagon as shown, and tighten the camshaft pulley bolt.

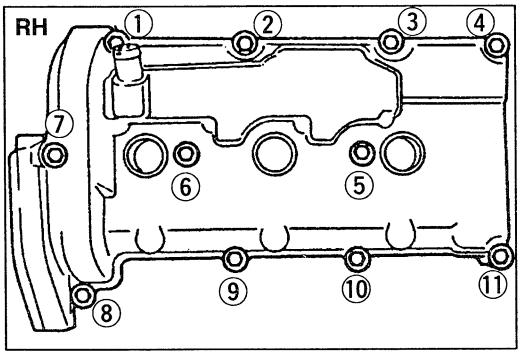
Tightening torque:
123—140 N·m {12.5—14.3 kgf·m, 90.5—103 ft·lbf}



Cylinder head cover
1. Remove all old silicone sealant from the cylinder head and cover.
2. Coat a new cylinder head cover gasket with silicone sealant, and install onto the cylinder head cover.

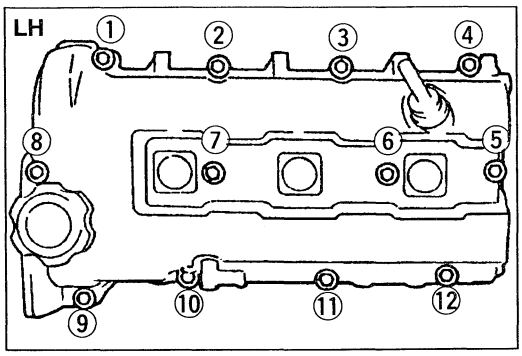


3. Remove all dirt and other material from the cylinder head, and apply silicone sealant to the shaded areas shown.



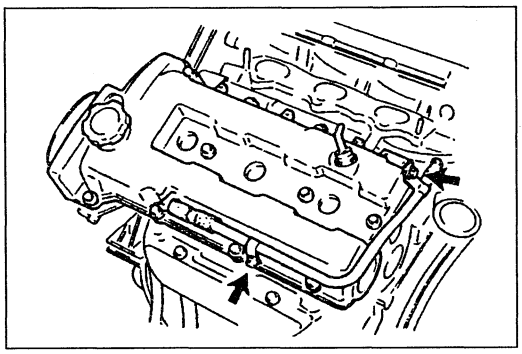
4. Install the cylinder head cover and tighten the bolts in five or six steps in the order shown.

Tightening torque:
5.0—8.8 N·m {50—90 kgf·cm, 44—78 in·lbf}



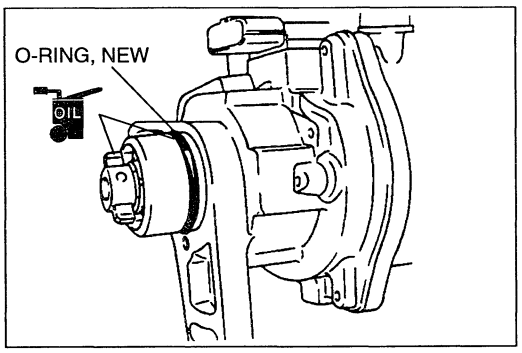
5. Recheck the torque of the bolts indicated, and tighten them if necessary.

   RH: ⑤, ⑥
   LH: ⑥, ⑦



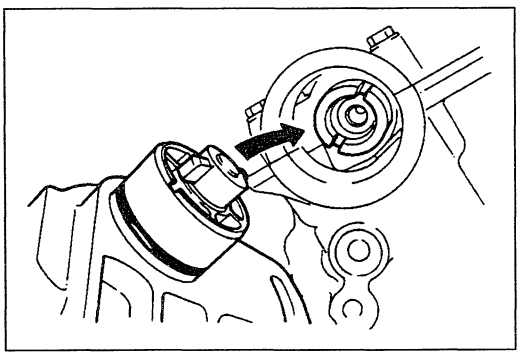
6. Install the ventilation pipe to the left cylinder head cover.

   Tightening torque:
   7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

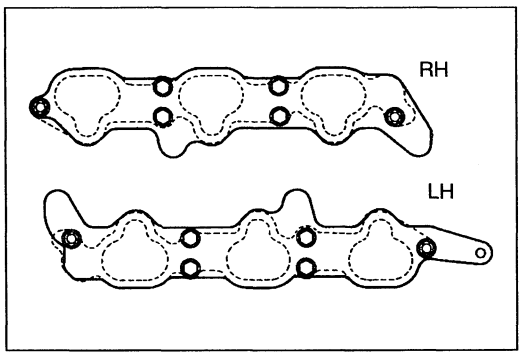


Distributor

1. Apply clean engine oil to a new O-ring and position it on the distributor.
2. Apply clean engine oil to the drive blade.

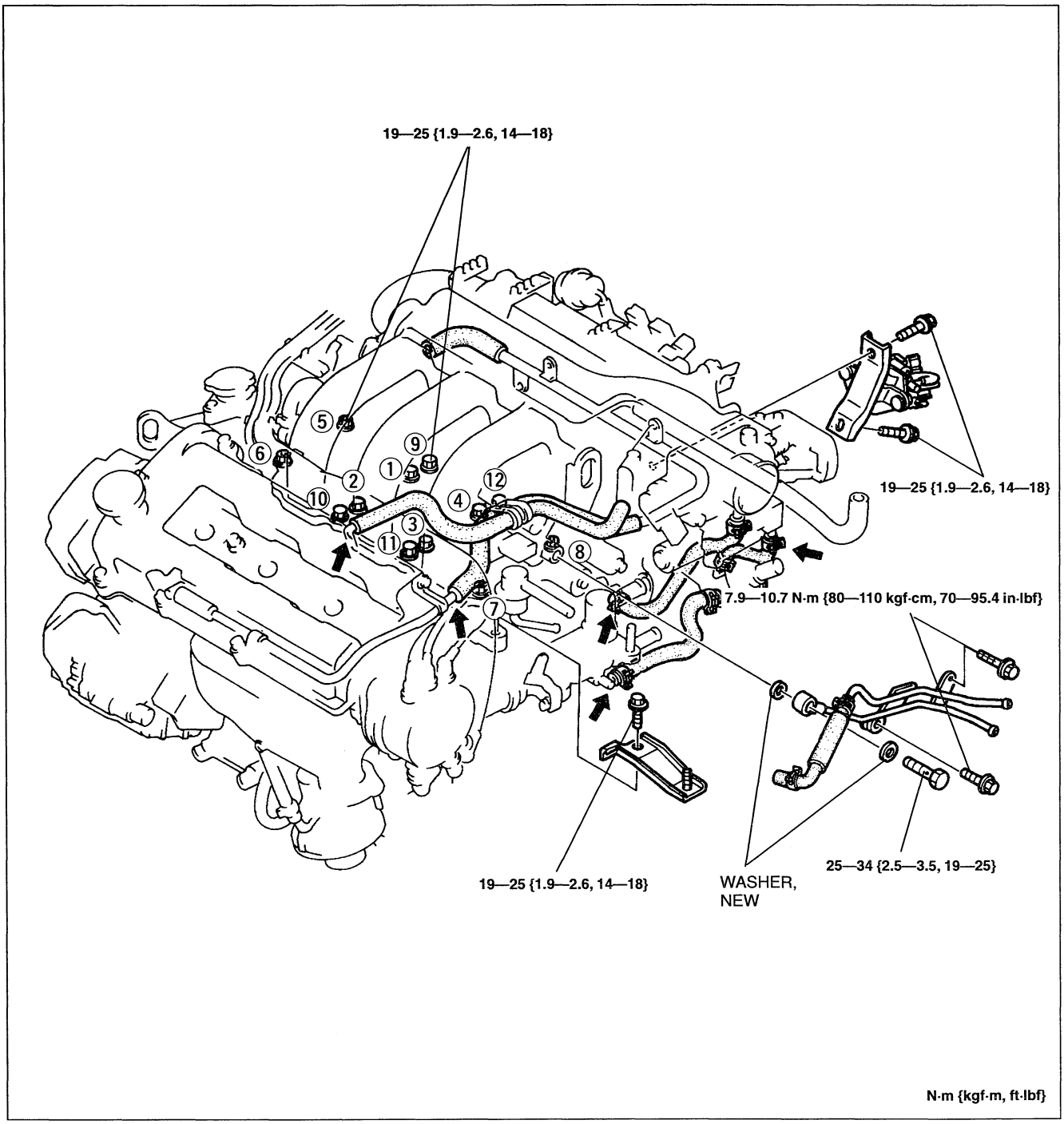


3. Install the distributor with the blade fit into the camshaft groove.
4. Hand tighten the distributor mounting bolts.



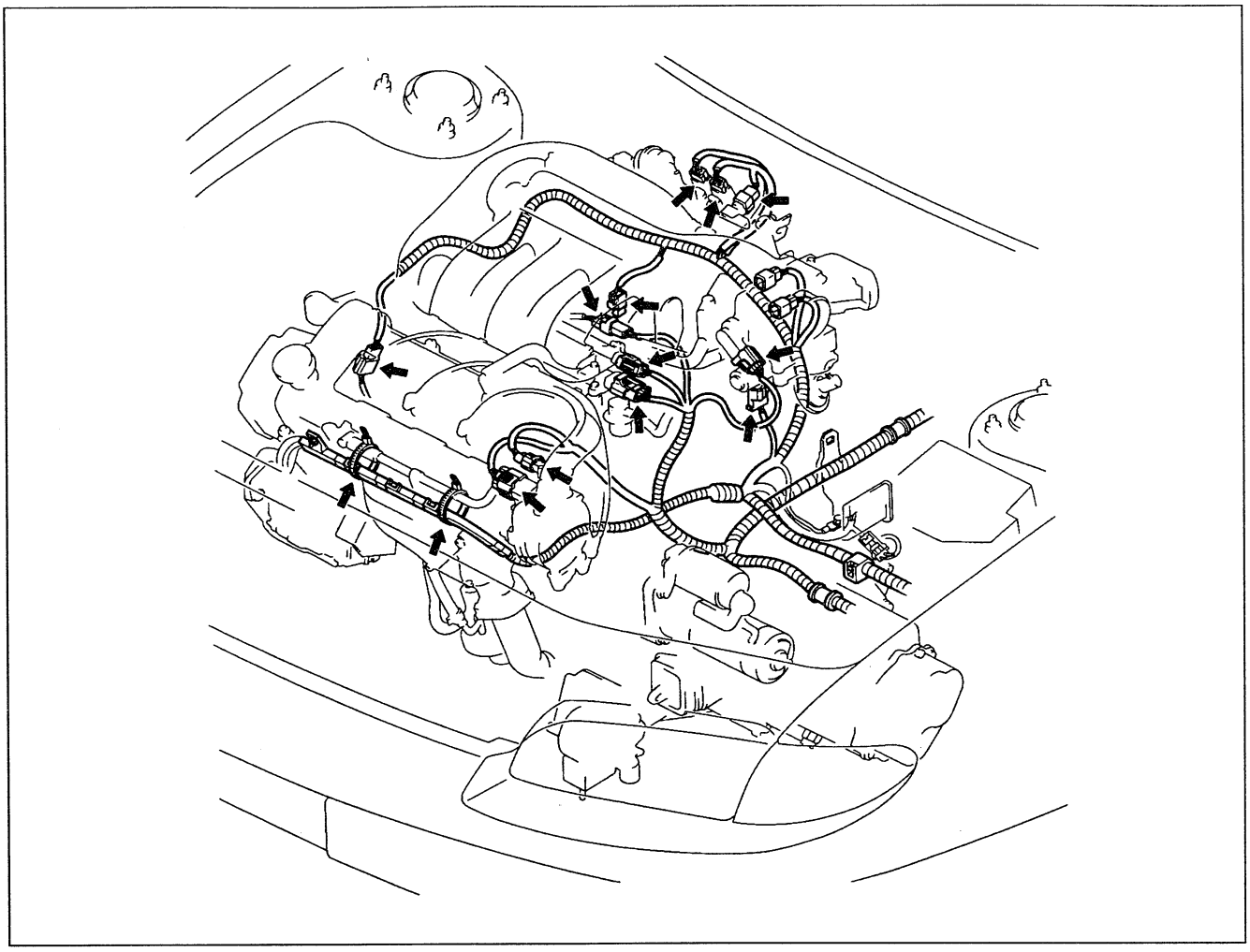
Intake manifold assembly

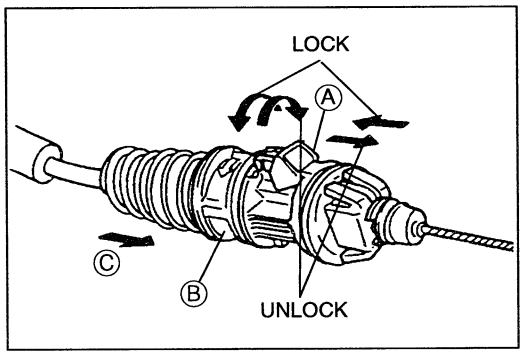
1. Install a new gasket and the intake manifold. Hand tighten the bolts and nuts.
2. Connect the stays, bracket, fuel pipe, and hoses as shown in the figure.
3. Tighten the intake manifold bolts and nuts in two or three steps.



Harness

Connect the harness connectors shown in the figure.





Accelerator cable

1. Verify that the throttle valve is fully closed.
2. Measure the free play of the accelerator cable.

   Free play: 1.5—4.5 mm {0.06—0.17 in}

3. If not as specified, turn stopper Ⓑ while pressing lock button Ⓐ to release the lock.
4. Push the spring in direction Ⓒ and adjust the cable free play.
5. Lock stopper Ⓐ after locking stopper Ⓑ.

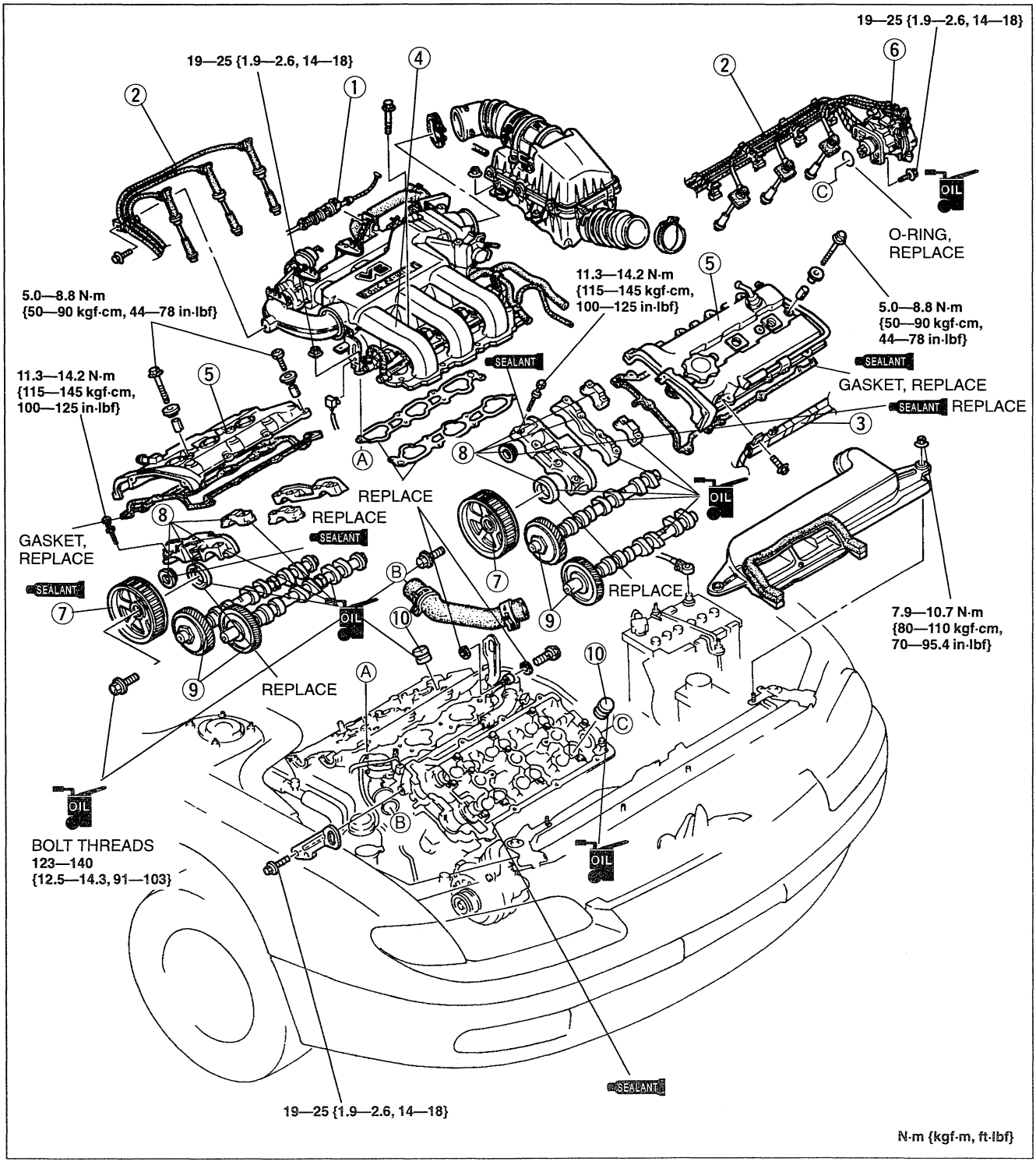
Steps After Installation

1. Install the timing belt. (Refer to page B2–10.)
2. Fill the radiator and coolant reservoir with the specified amount and type of engine coolant. (Refer to section E2.)
3. Start the engine and
   (1) check the engine oil and engine coolant leakage.
   (2) check the ignition timing and idle speed. (Refer to section F2.)
   (3) check the operation of the emission control system.
4. Recheck the engine coolant and engine oil levels.

HLA
Removal / Installation

Caution
- **Removal and installation of the HLA must be carried out only when the problem cannot be solved by the HLA troubleshooting. (Refer to page B2–7.)**

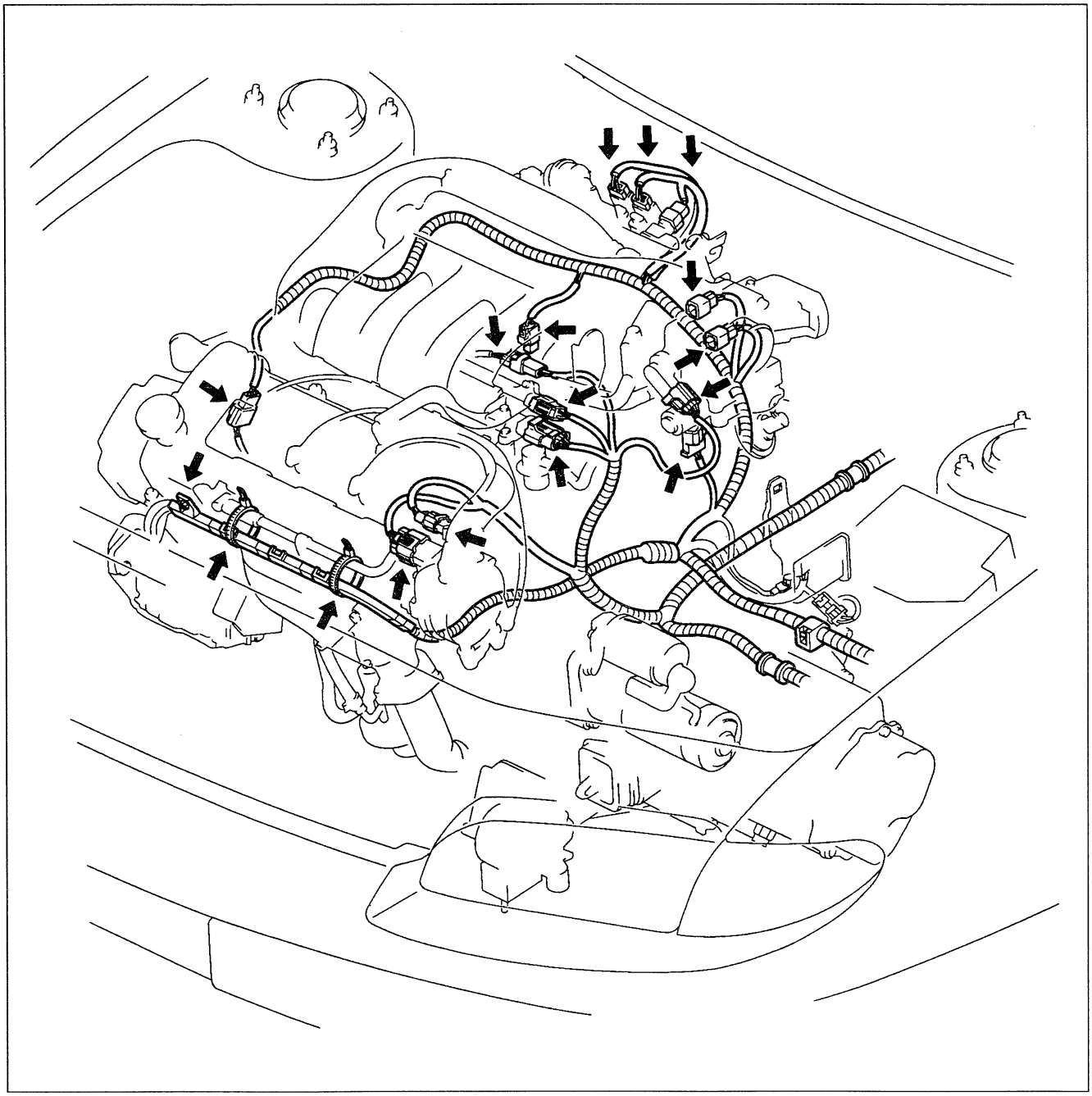
1. Disconnect the negative battery cable.
2. Remove the timing belt. (Refer to page B2–10.)
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal, referring to **Installation Note**.



1. Accelerator cable
   Installation Note ..... page B2–33
2. High-tension lead
3. Harness
   Removal Note ..... below
4. Intake manifold assembly
   Removal Note ..... page B2–22
   Installation Note ..... page B2–32
5. Cylinder head cover
   Installation Note ..... page B2–30
6. Distributor
   Installation Note ..... page B2–31
7. Camshaft pulley
   Removal Note ..... page B2–24
   Installation Note ..... page B2–29
8. Camshaft cap, blind cap, and oil seal
   Removal Note ..... page B2–24
   Installation Note ..... page B2–28
9. Camshaft
   Installation Note ..... page B2–27
10. HLA
    Removal Note ..... page B2–36
    Installation Note ..... page B2–36

Removal note
Harness

Disconnect the harness connectors shown in the figure.

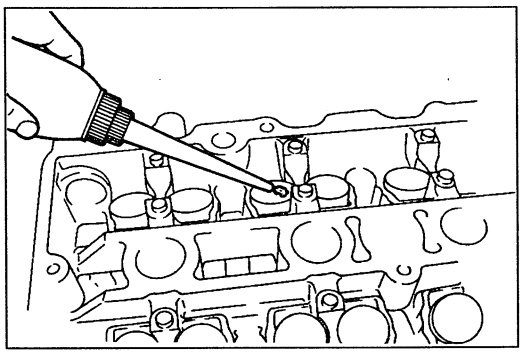


HLA

Caution
- **The HLA must be reinstalled in the same positions from which they were removed. If they are not, it can cause premature and uneven wear.**

Note
- Mark the HLA to show their original positions.

1. Remove the HLA from the cylinder head.
2. Store the HLA upside down in an oil-filled container.



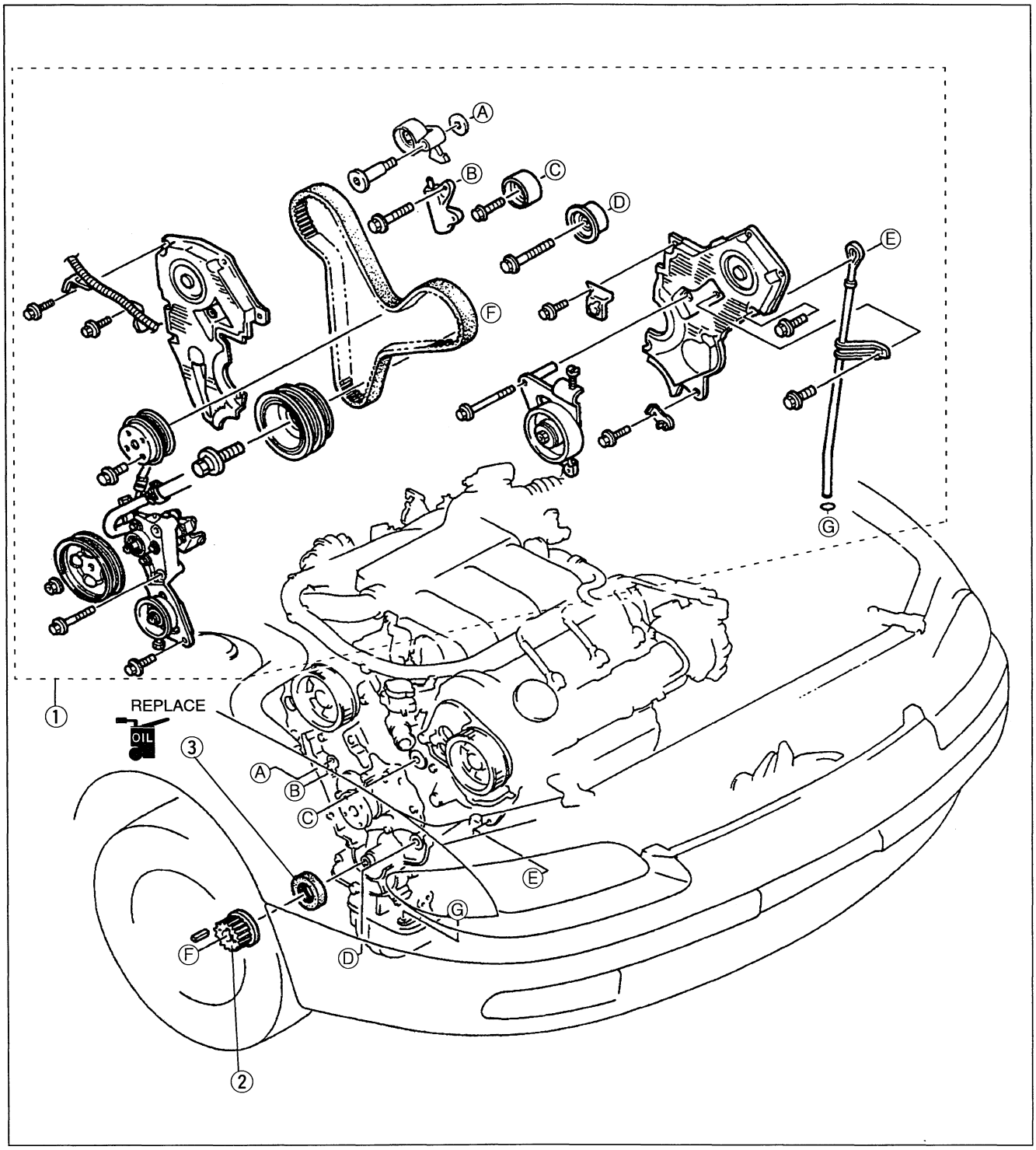
Installation Note
HLA
1. Apply clean engine oil to the friction surfaces.
2. If the HLA are being reused, install them in the positions from which they were removed.
3. Verify that the HLA move smoothly in their bores.

Steps After Installation
1. Install the timing belt. (Refer to page B2–10.)
2. Fill the engine with the specified amount and type of engine oil. (Refer to section D2.)
3. Fill the radiator and coolant reservoir with the specified amount and type or engine coolant. (Refer to section E2.)
4. Connect the negative battery cable.
5. Start the engine and
   (1) check the engine oil and engine coolant leakage.
   (2) check the ignition timing and idle speed. (Refer to section F2.)
   (3) check the operation of the emission control system. (Refer to section F2.)
6. Recheck the engine coolant and oil levels.

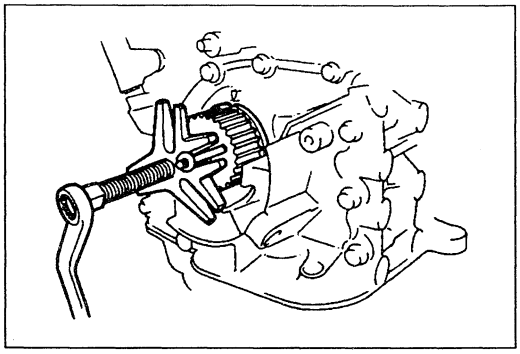
FRONT OIL SEAL

Replacement

1. Disconnect the negative battery cable.
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**.



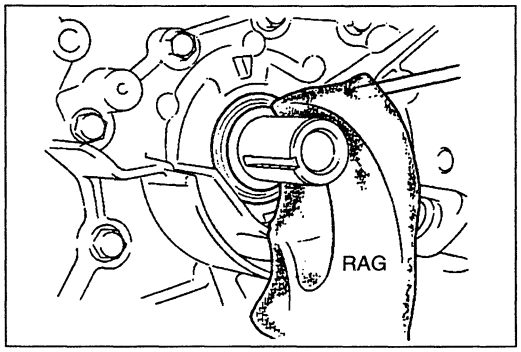
1. Timing belt
   Removal / Installation ..... page B2–10
2. Timing belt pulley
   Removal Note ..... page B2–38
   Installation Note ..... page B2–38
3. Oil seal
   Removal Note ..... page B2–38
   Installation Note ..... page B2–38



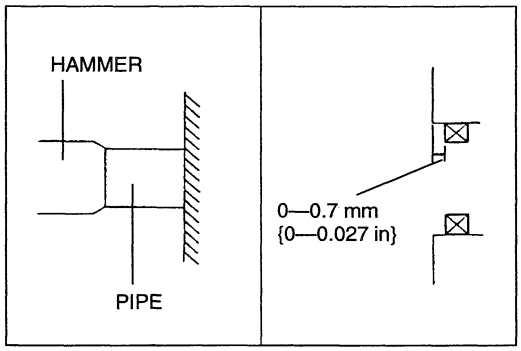
Removal Note
Timing belt pulley

Note
- If necessary, remove the pulley by using a steering wheel puller.

1. Remove the timing belt pulley.
2. Remove the timing belt pulley key.

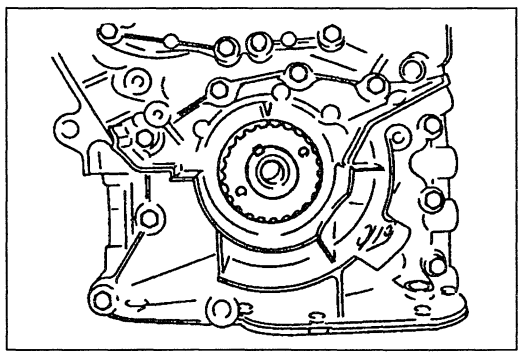


Oil seal
1. Cut the oil seal lip with a razor knife.
2. Remove the oil seal by using a screwdriver protected with a rag.



Installation Note
Oil seal
1. Apply clean engine oil to the lip of the new oil seal.
2. Push the oil seal slightly in by hand.
3. Using a pipe and a hammer, tap the oil seal in evenly until it is flush with the edge of the oil pump body.

Note
- Oil seal outer diameter: 54.5 mm {2.15 in}
- Oil seal inner diameter: 43.0 mm {1.69 in}



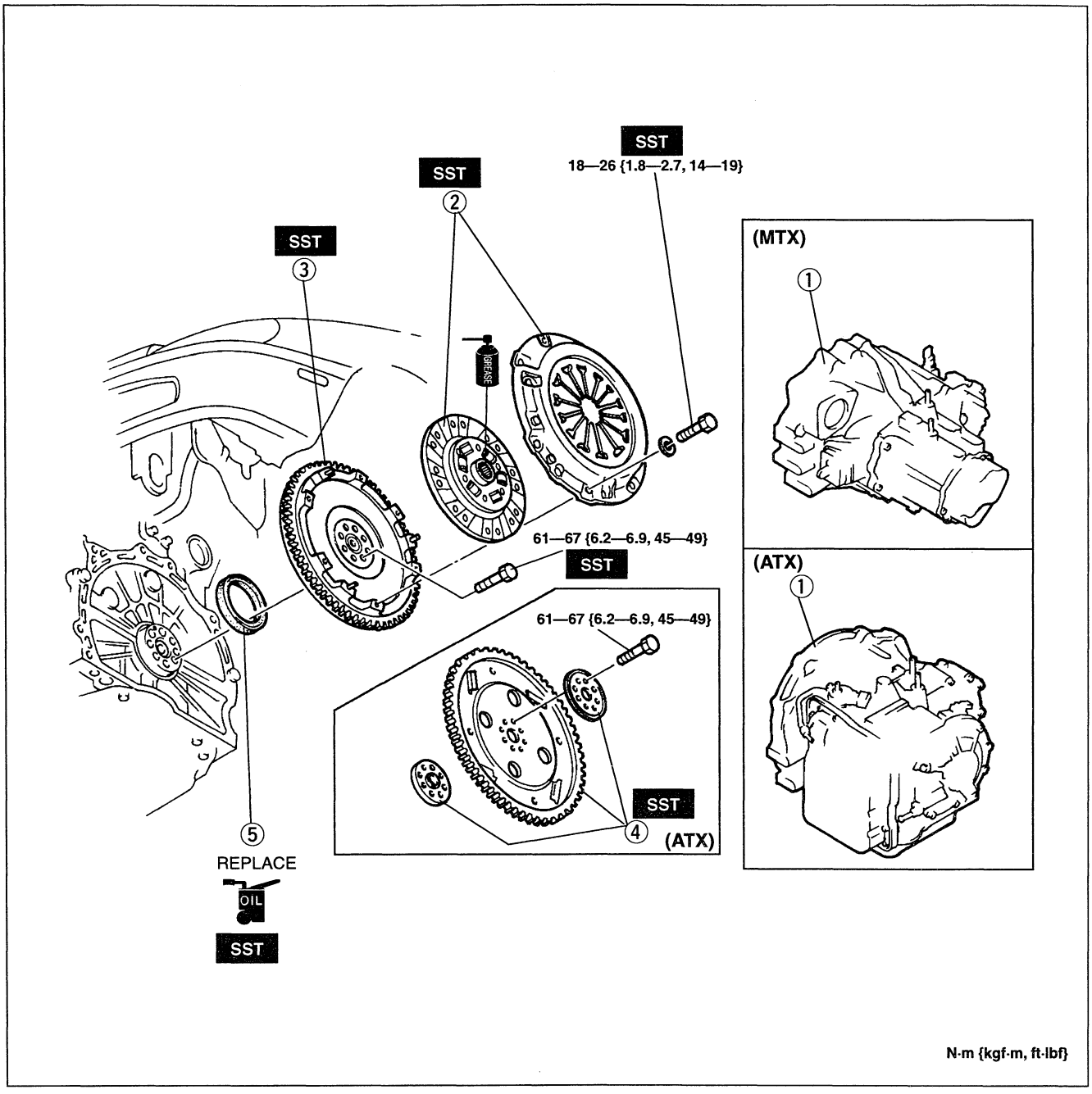
Timing belt pulley
1. Install the timing belt pulley.
2. Install the timing belt pulley key with the tapered side toward the oil pump body.

Steps After Installation
1. Connect the negative battery cable.
2. Start the engine and check follows:
   - Ignition timing. (Refer to section F2.)

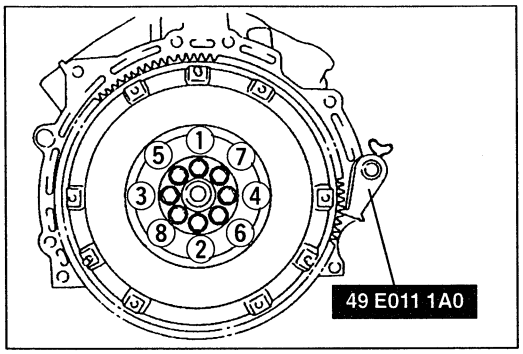
REAR OIL SEAL

Replacement

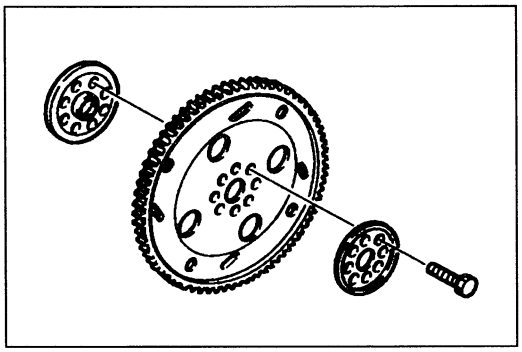
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.



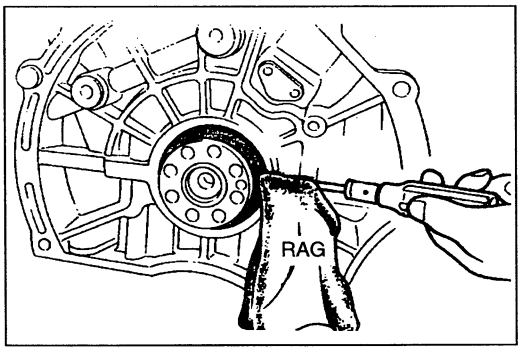
1. Transaxle
   MTX
   Removal / Installation ..... section J
   ATX
   Removal / Installation ..... section K1
2. Clutch cover, clutch disc (MTX)
   Removal / Installation ..... section H
3. Flywheel (MTX)
   Removal Note ..... page B2–40
   Installation Note ..... page B2–40
4. Drive plate, backing plate, adapter (ATX)
   Removal Note ..... page B2–40
   Installation Note ..... page B2–41
5. Oil seal
   Removal Note ..... page B2–40
   Installation Note ..... page B2–40



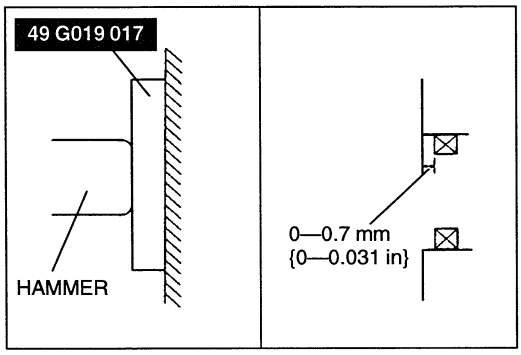
Removal Note
Flywheel (MTX)
1. Hold the flywheel by using the **SST**.
2. Remove the flywheel mounting bolts in two or three steps in the order shown in the figure.
3. Remove the flywheel.



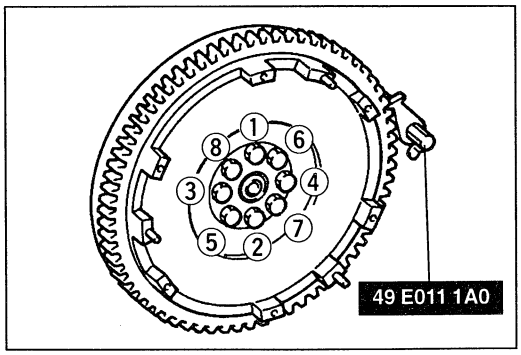
Drive plate, backing plate, adapter (ATX)
1. Hold the drive plate by using the **SST**.
2. Remove the drive plate mounting bolts. (Refer to above.)
3. Remove the backing plate, drive plate, and adapter.



Oil seal
1. Cut the oil seal lip with a razor knife.
2. Remove the oil seal by using a screwdriver protected with a rag.

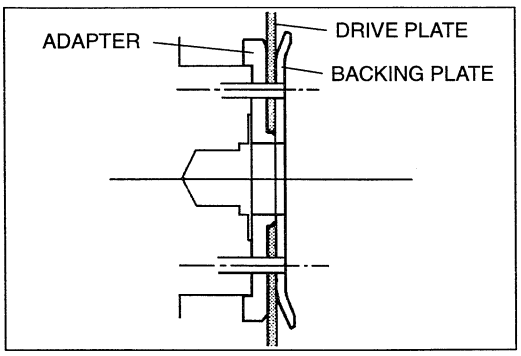


Installation Note
Oil seal
1. Apply clean engine oil to the lip of the new oil seal.
2. Push the oil seal slightly in by hand
3. Using the **SST** and a hammer, tap the oil seal in evenly until it is flush with the edge of the rear cover.



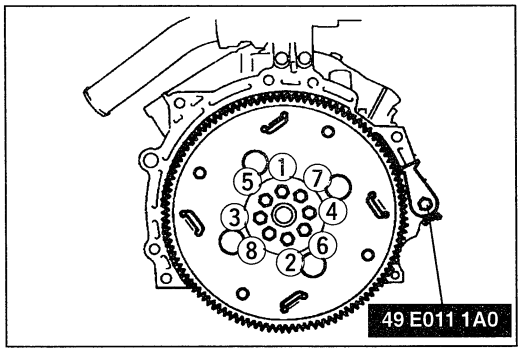
Flywheel (MTX)
1. Set the flywheel onto the crankshaft.
2. Hand tighten the mounting bolts.
3. Hold the flywheel by using the **SST**.
4. Tighten the bolts in two or three steps in the order shown.

Tightening torque:
61—67 N·m {6.2—6.9 kgf·m, 45—49 ft·lbf}



Drive plate (ATX)

1. Install the following parts to the crankshaft.
   (1) Adapter
   (2) Drive plate
   (3) Backing plate
2. Hand tighten the mounting bolts.



3. Hold the drive plate by using the **SST**.
4. Tighten the bolts in two or three steps in the order shown.

Tightening torque:
61—67 N·m {6.2—6.9 kgf·m, 45—49 ft·lbf}

Steps after installation

1. Connect the negative battery cable.
2. Start the engine and perform engine adjustments as necessary.
3. Check the oil level.

REMOVAL

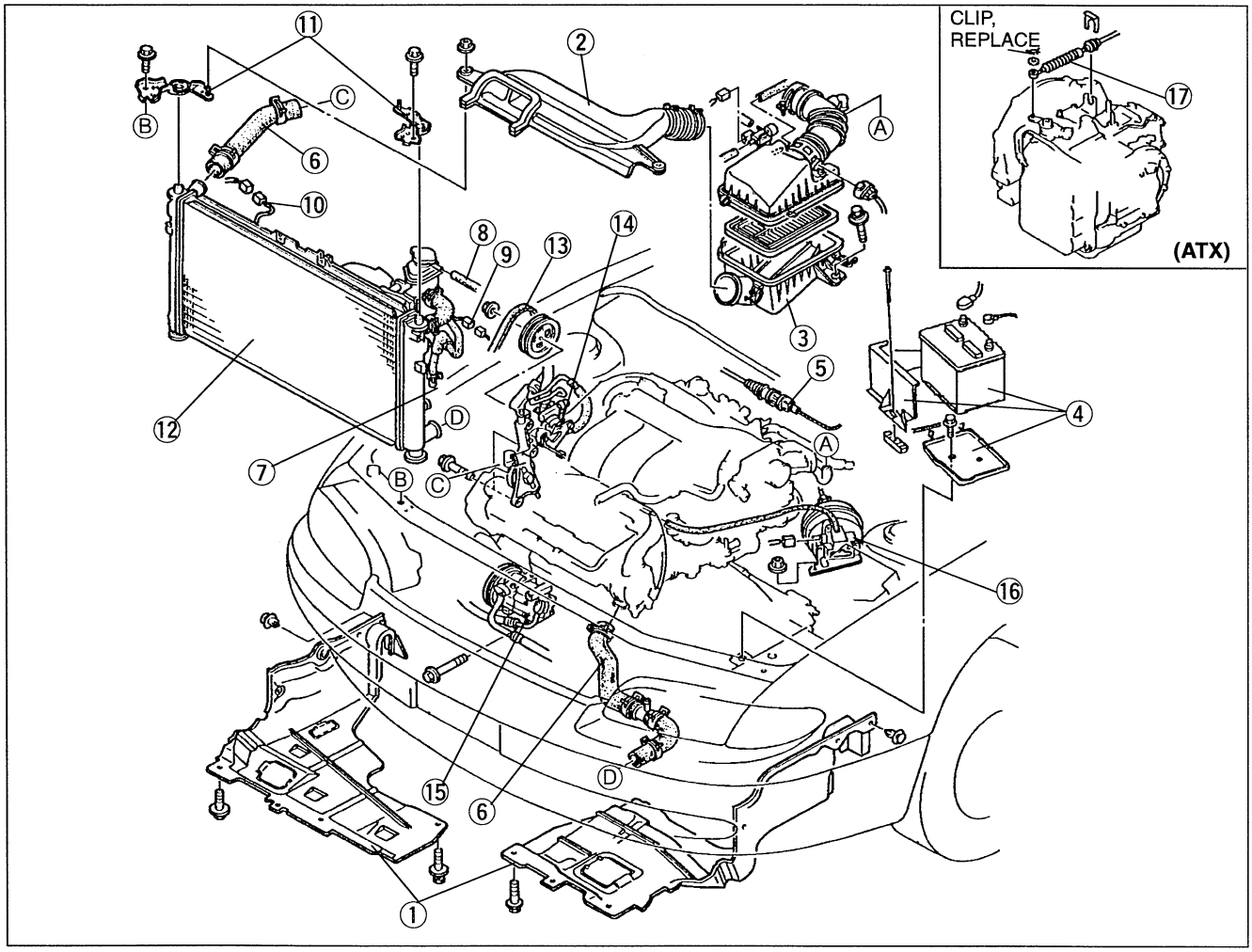
Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on section F2.**

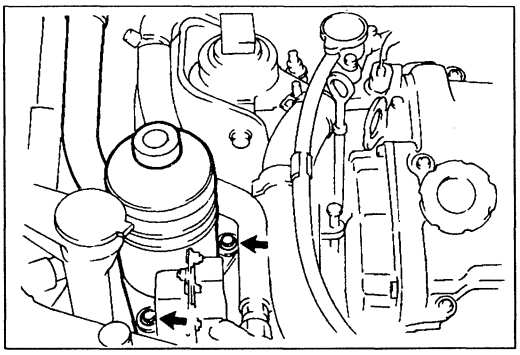
PROCEDURE

1. Disconnect the negative battery cable.
2. Drain the engine coolant and transaxle oil. (Refer to section E2 and sections J, K1.)
3. Remove the hood and front wheels.
4. Remove in the order shown in the figure, referring to **Removal Note**.

Step 1

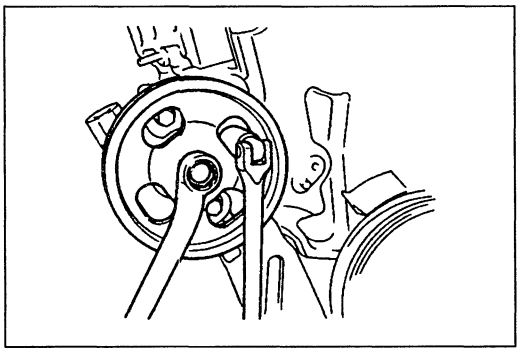


1. Splash shield
2. Fresh-air duct
3. Air cleaner assembly
4. Battery and carrier
5. Accelerator cable
6. Radiator hoses
7. Oil cooler hose (ATX)
8. Coolant reservoir hose
9. Cooling fan motor connector
10. Condenser fan motor connector
11. Radiator bracket
12. Radiator and cooling fan assembly
13. Drive belts
    Removal Note ..... page B2– 5
14. P/S oil pump
    Removal Note ..... page B2–43
15. A/C compressor (if equipped)
    Removal Note ..... page B2–44
16. Cruise actuator
    Removal / Installation ..... section T
17. Control cable (ATX)



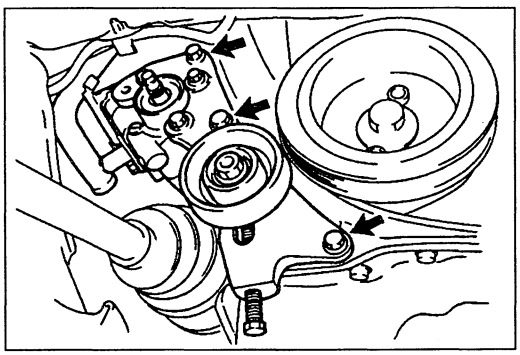
Removal Note
P/S oil pump

1. Remove the bolts shown in the figure and secure the P/S oil reservoir away from the engine.

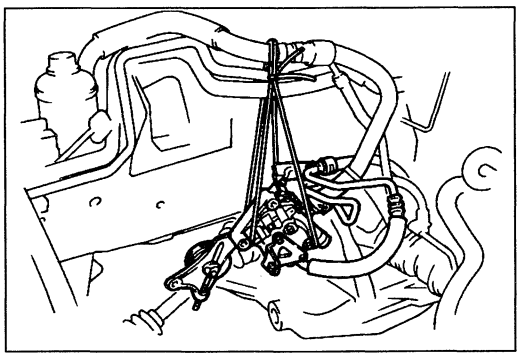


2. Loosen the pulley nut as shown.
3. Remove the pulley.

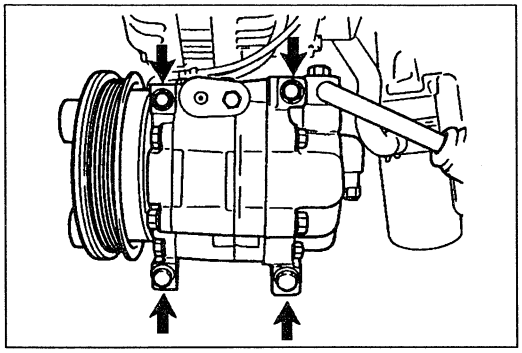
4. Remove the bolt shown in the figure.



5. Remove the bolts shown in the figure and remove the P/S oil pump.



6. Position the P/S oil pump away from the engine and secure it with wire.

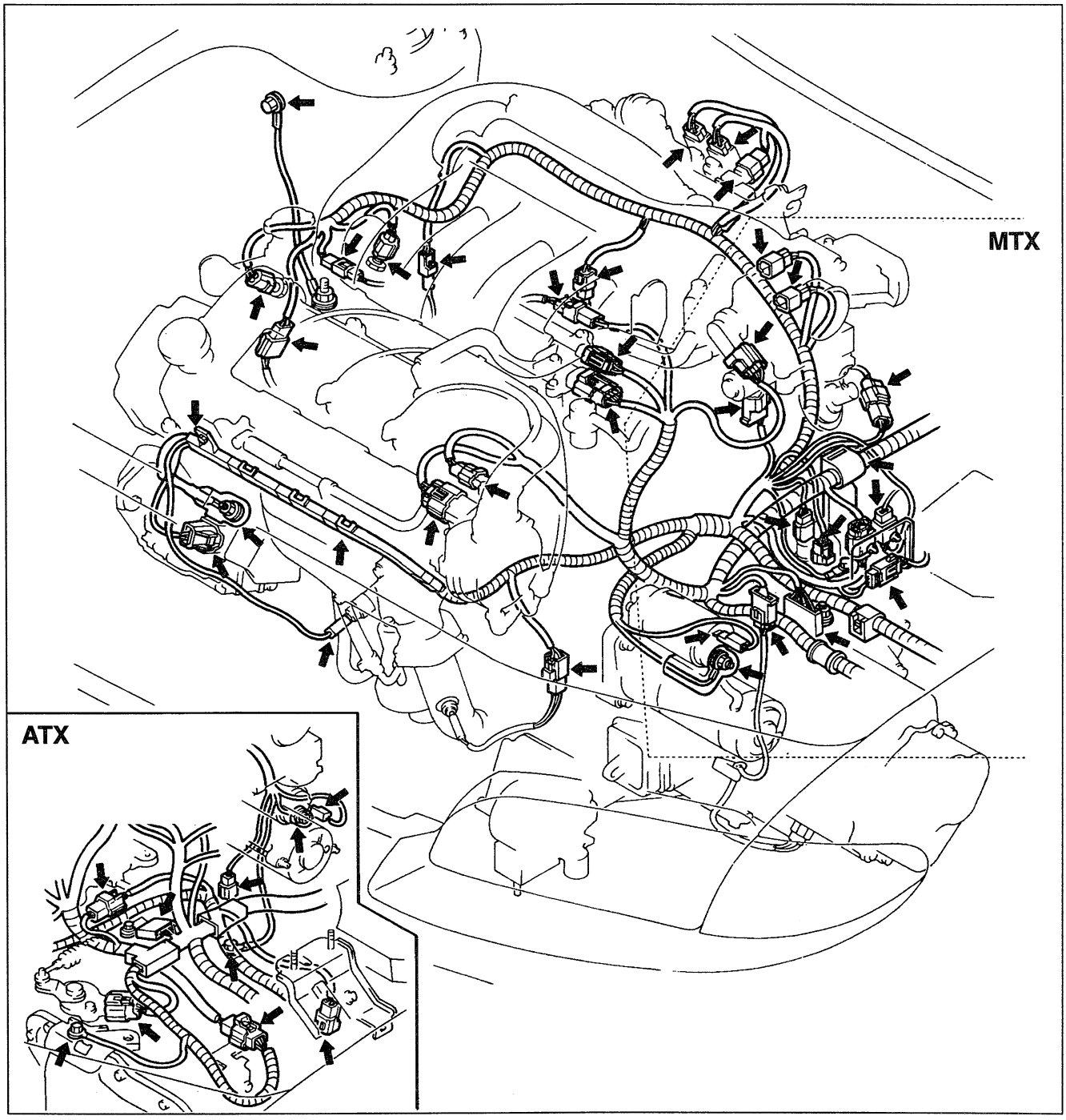


A/C compressor (if equipped)

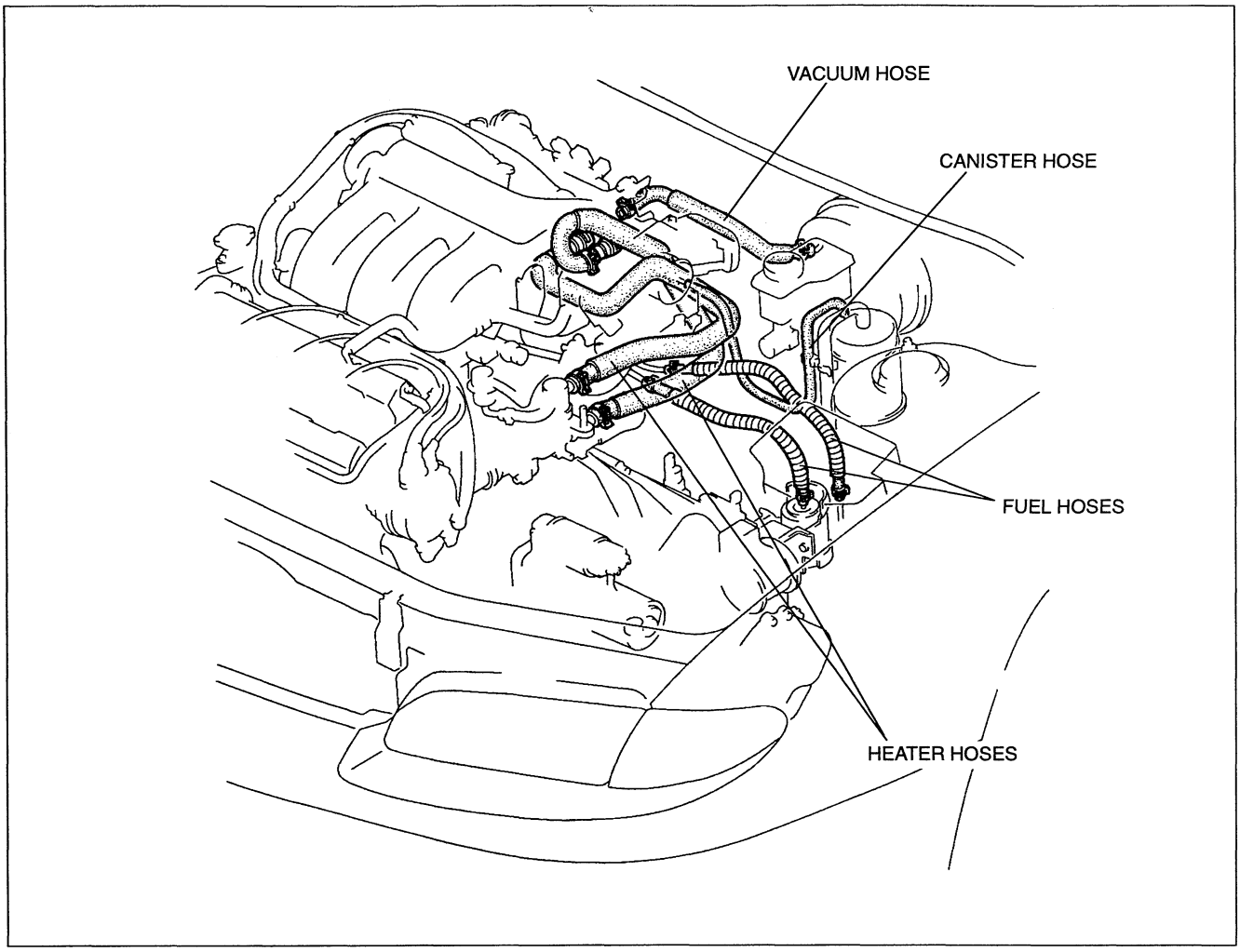
1. Remove the A/C compressor with the hoses still connected.
2. Position the compressor away from the engine and secure it with wire.

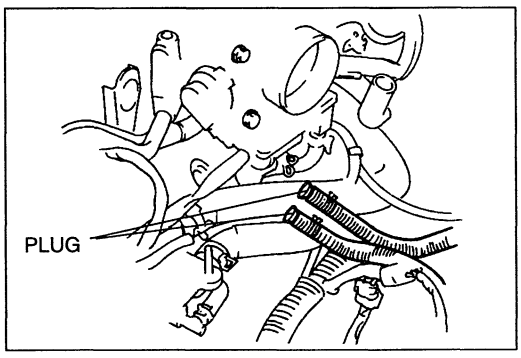
Step 2

Disconnect the harness connectors shown in the figure.



Step 3
Disconnect the hoses shown in the figure.

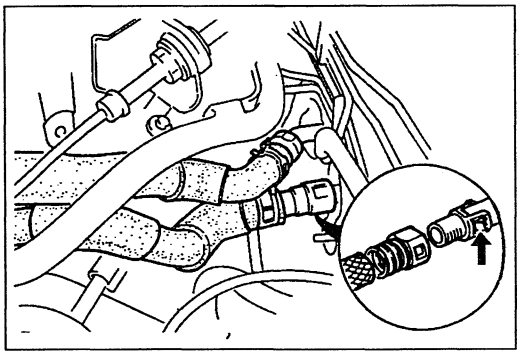




Removal note
Fuel hose

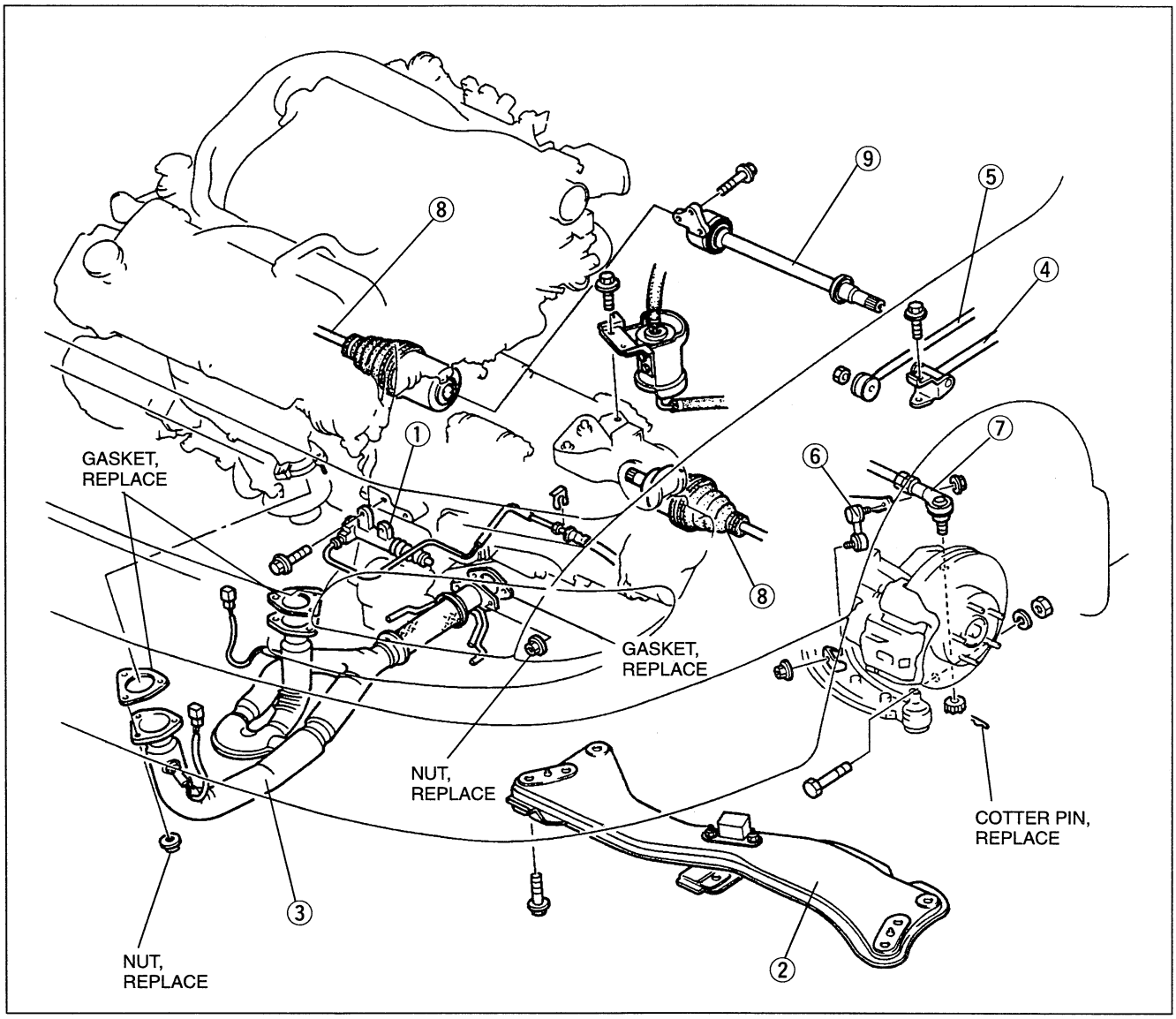
Warning
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

Plug the disconnected hoses to avoid fuel leakage.

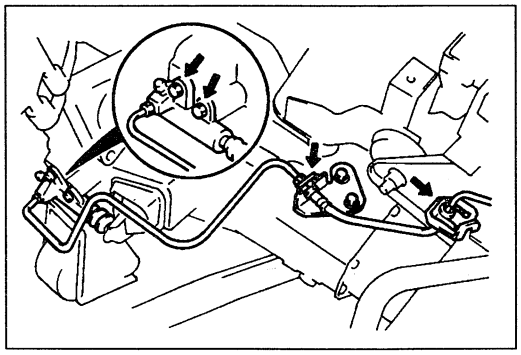


Heater hose
Press the heater hose retainer tabs and remove the heater hoses.

Step 4



1. Clutch release cylinder (MTX)
   Removal Note ..... below
2. Transverse member
3. Front exhaust pipe
4. Shift control rod (MTX)
5. Extension bar (MTX)
6. Stabilizer control link
7. Tie-rod end ball joint
   Removal Note ..... page B2–47
8. Drive shaft
   Removal Note ..... page B2–47
9. Joint shaft
   Removal Note ..... page B2–47

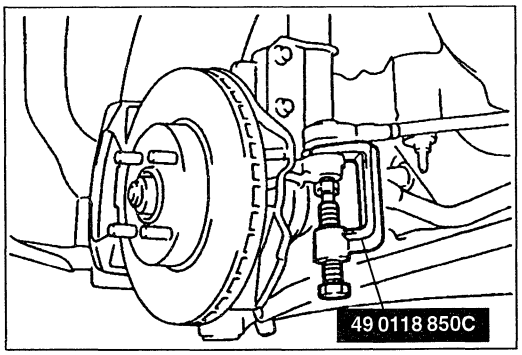


Removal Note
Clutch release cylinder (MTX)

1. Remove the bolts and clips as shown.

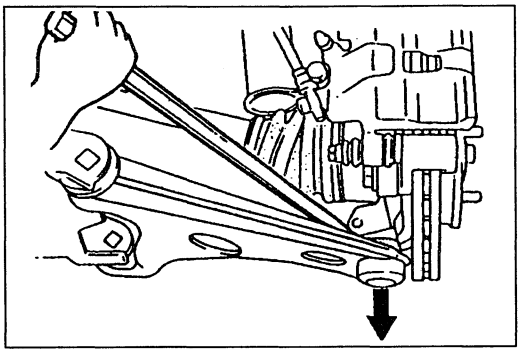
   Caution
   - **Bending the pipe can cause kinks or cracks.**

2. Remove the release cylinder and position it away from the transaxle with the hose still connected.



Tie-rod end ball joint

1. Remove the cotter pin and loosen the nut so that it is flush with the end of the ball joint stud.
2. Separate the knuckle arm and ball joint by using the **SST**.

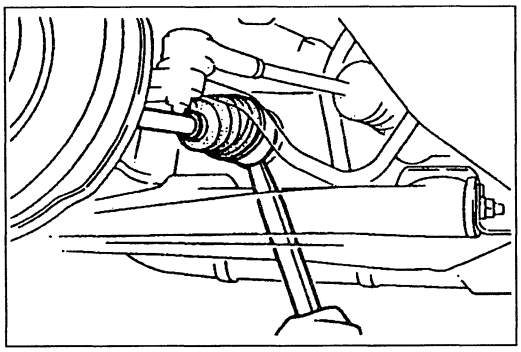


Drive shaft

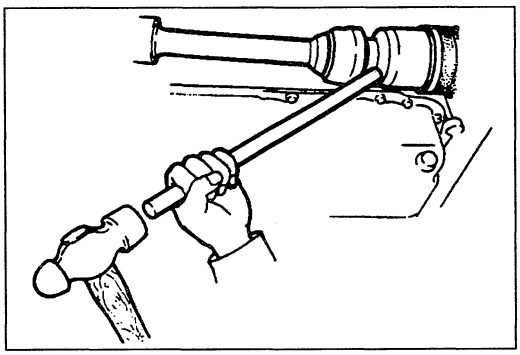
1. Remove the bolts and nuts at the left and right lower arm ball joints.

   Caution
   - **The ball joint dust boots and oil seals are damaged easily if this procedure is not done correctly.**

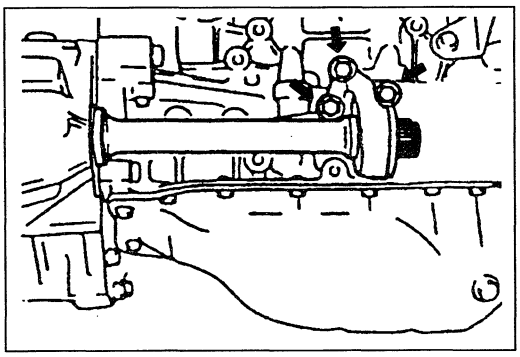
2. Pry the lower arms downward to separate them from the knuckles.



3. Separate the drive shafts from the transaxle by prying with a bar inserted between the shaft and the case (Left side).



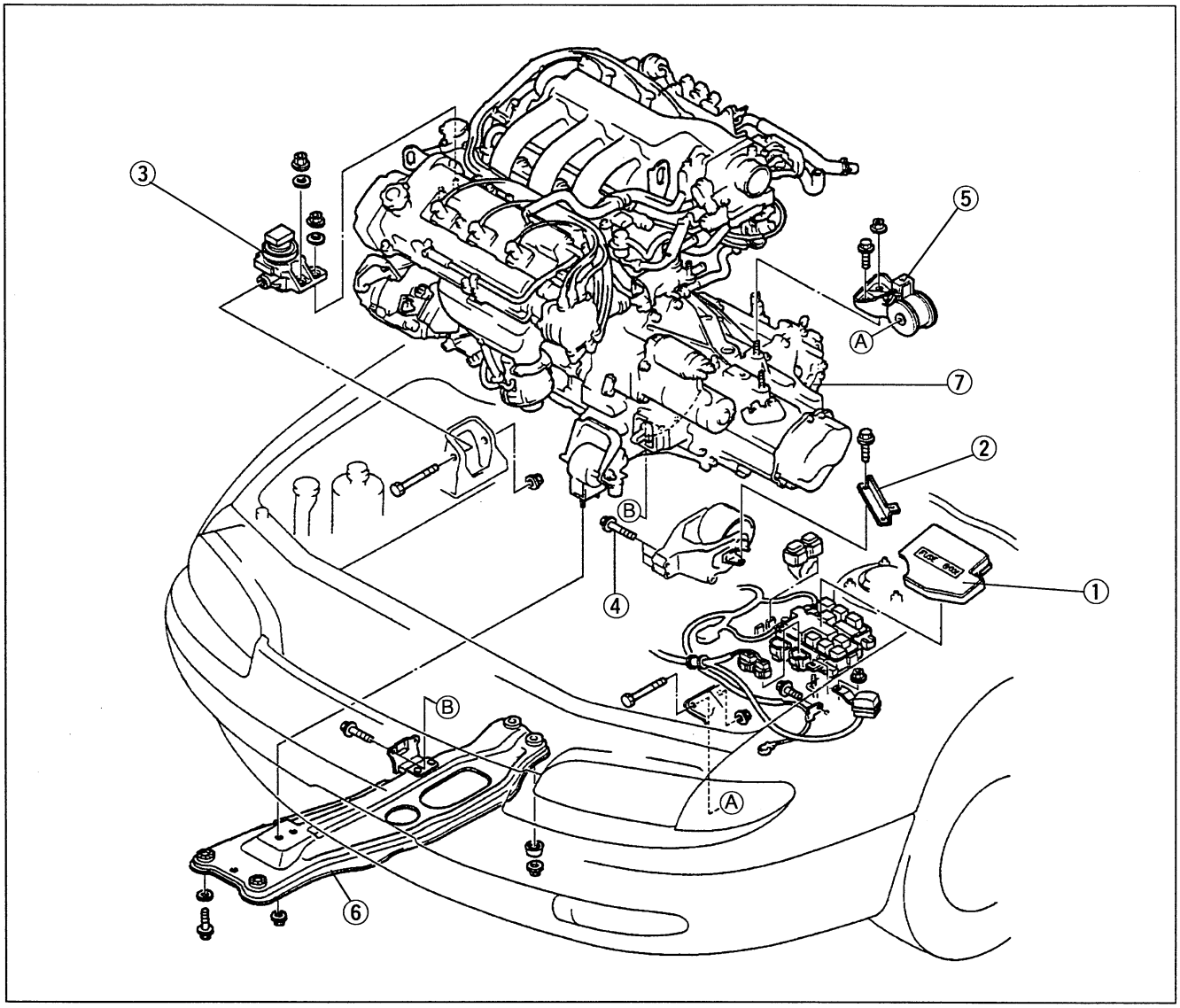
4. As shown in the figure, insert a pry bar between the drive shaft and the joint shaft and tap on the bar to uncouple them. (Right side)



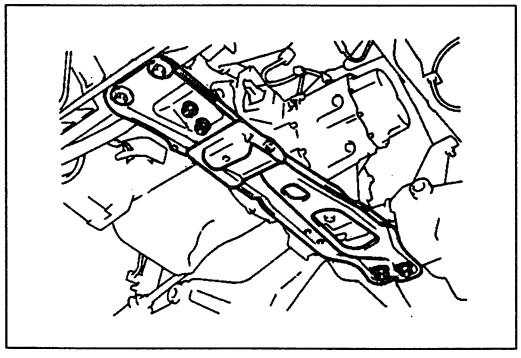
Joint shaft

1. Remove the joint shaft mounting bolts.
2. Remove the joint shaft.

Step 5



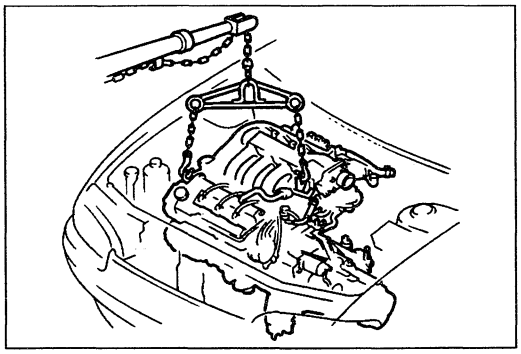
1. Fuse box
2. No.1 engine mount stay bracket
3. No.3 engine mount rubber
4. No.1 engine mount bolts
5. No.4 engine mount rubber and bracket
6. Engine mount member
   Removal Note ..... below
7. Engine and transaxle assembly
   Removal Note ..... page B2–49



Removal Note
Engine mount member

Caution
- **Removing the member without first suspending the engine can cause the engine to tilt or fall and cause injury. Suspend the engine properly before removing the member.**

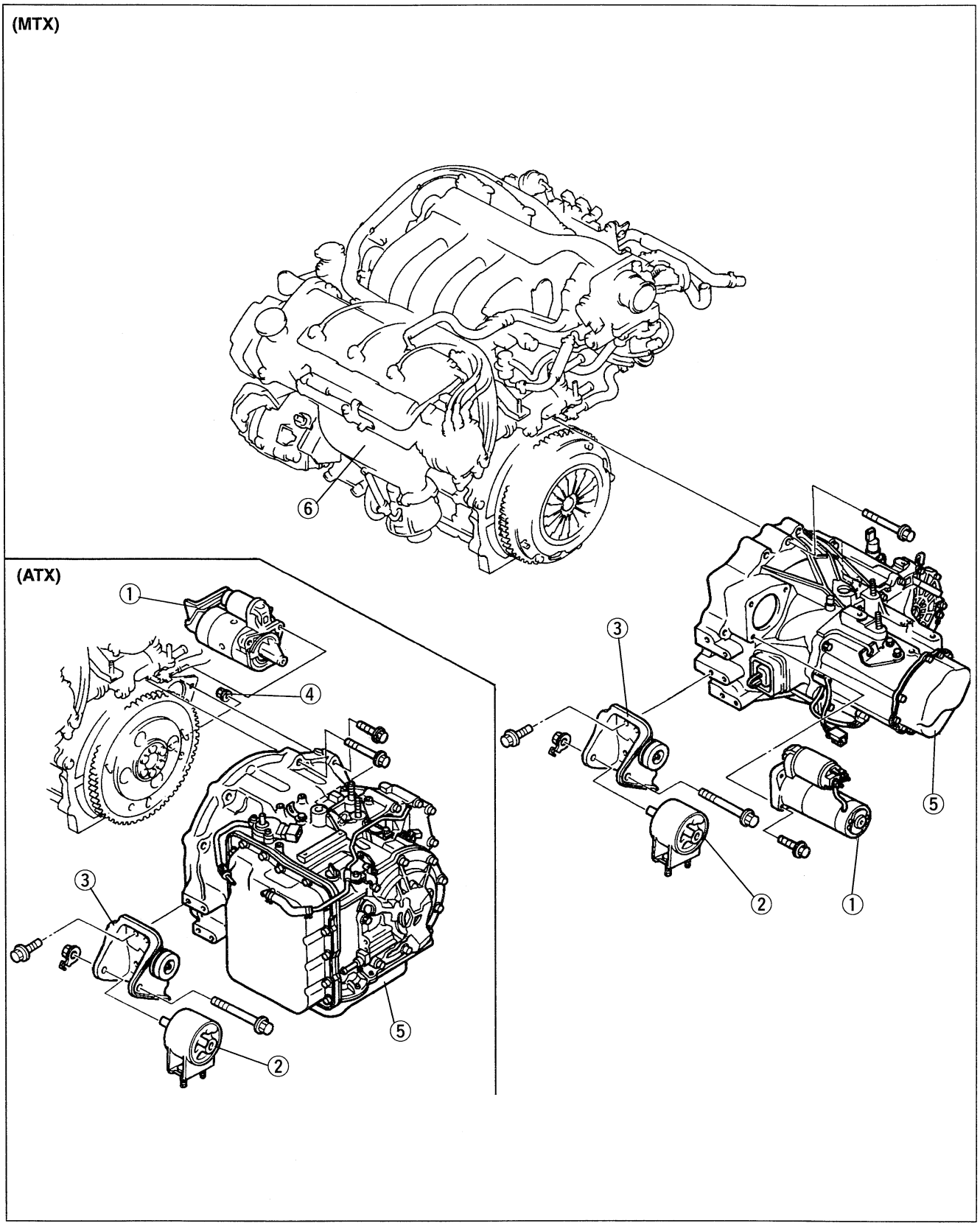
1. Suspend the engine by using a chain block.
2. Remove the No.2 engine mount nuts.
3. Remove the No.5 engine mount rubber bolts and engine mount member bolts and nuts and remove the No.5 engine mount rubber and engine mount member.



Engine and transaxle assembly

Slowly lift the engine and transaxle assembly as a unit. Keep the engine from swinging or bumping into components in the engine compartment.

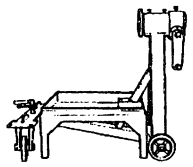
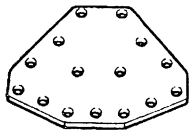
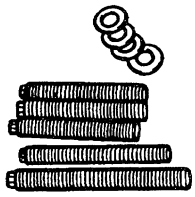
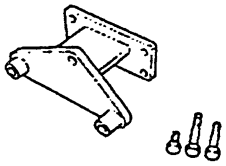
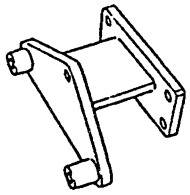
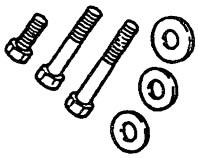
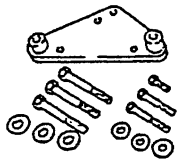
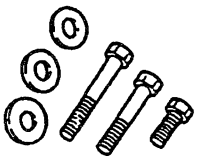
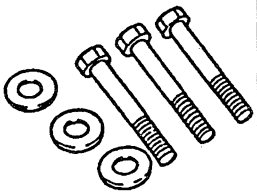
Step 6

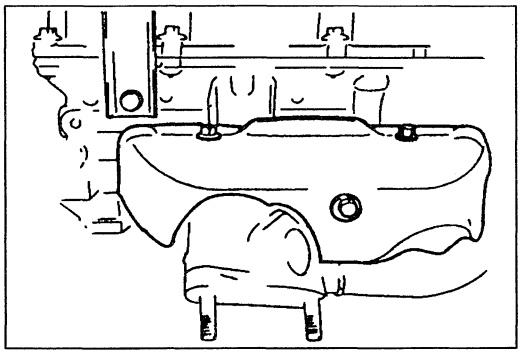


1. Starter
2. No.2 engine mount rubber
3. No.2 engine mount bracket
4. Torque converter mounting nuts (ATX)
5. Transaxle
6. Engine assembly

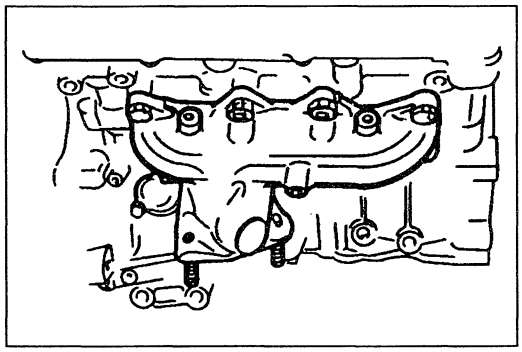
ENGINE STAND MOUNTING

PREPARATION
SST

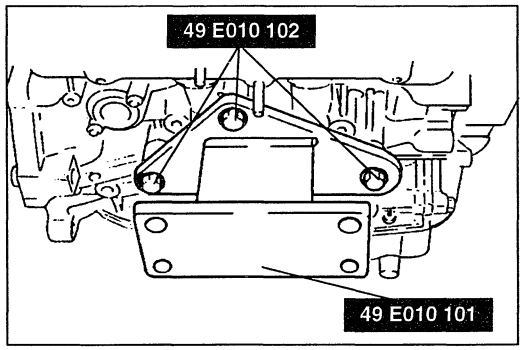
49 0107 680A Engine stand 	For disassembly / assembly of engine	49 L010 1A0 Hanger set, engine 	For disassembly / assembly of engine
49 L010 101 Plate (Part of 49 L010 1A0) 	For disassembly / assembly of engine	49 L010 102 Arms (Part of 49 L010 1A0) 	For disassembly / assembly of engine
49 L010 103 Hooks (Part of 49 L010 1A0) 	For disassembly / assembly of engine	49 L010 104 Nuts (Part of 49 L010 1A0) 	For disassembly / assembly of engine
49 L010 105 Bolts (Part of 49 L010 1A0) 	For disassembly / assembly of engine	49 L010 106 Bolts (Part of 49 L010 1A0) 	For disassembly / assembly of engine
49 E010 1A0 Hanger set, engine 	For disassembly / assembly of engine	49 E010 101 Body (Part of 49 E010 1A0) 	For disassembly / assembly of engine
49 E010 102 Bolt (Part of 49 E010 1A0) 	For disassembly / assembly of engine	49 E010 1A1 Hanger set, engine 	For disassembly / assembly of engine
49 E010 103 Hanger (Part of 49 E010 1A1) 	For disassembly / assembly of engine	49 E010 102 Bolt (Part of 49 E010 1A1) 	For disassembly / assembly of engine
49 E010 104 Bolt (Part of 49 E010 1A1) 	For disassembly / assembly of engine	—	—



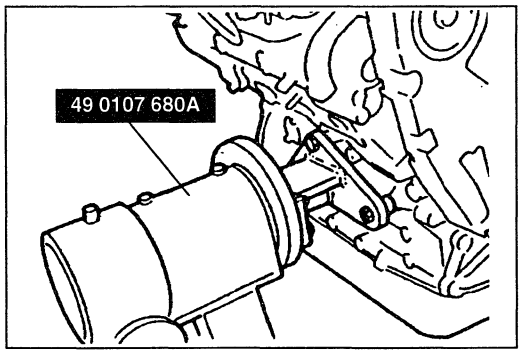
PROCEDURE
When using SST (49 E010 1A0)
1. Remove the right exhaust manifold insulator.
2. Remove the EGR valve bolts.



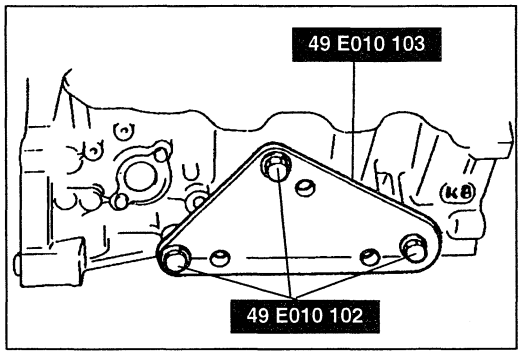
3. Remove the right exhaust manifold and gasket together with the EGR valve and pipe.



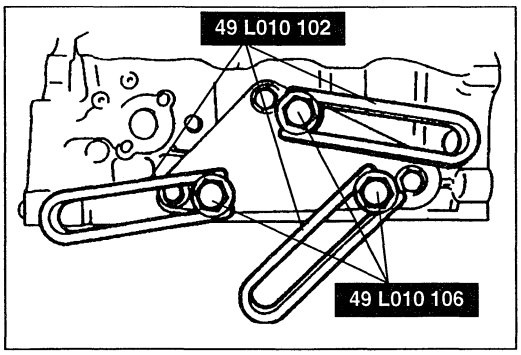
4. Install the **SST** at the positions as shown.



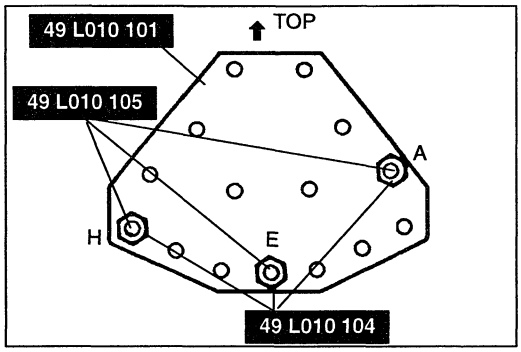
5. Mount the engine on the **SST**.
6. Drain the coolant. (Refer to page B2–53.)



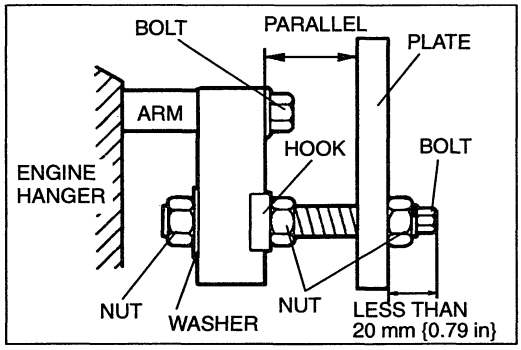
When using SST
(49 E010 1A1 and 49 L010 1A0)
1. Remove the right exhaust manifold insulator.
2. Remove the EGR valve bolts.
3. Remove the right exhaust manifold and gasket together with the EGR valve and pipe.
4. Install the **SST** as shown.



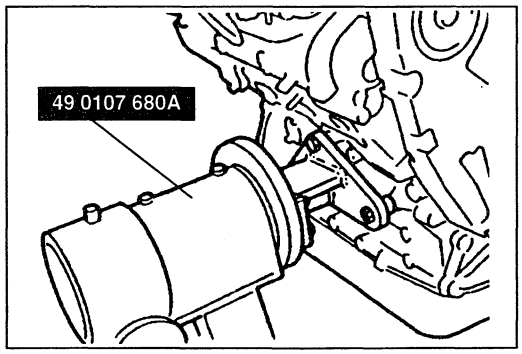
5. Install the **SST** (arms) to the holes as shown, and hand tighten the **SST** (bolts).



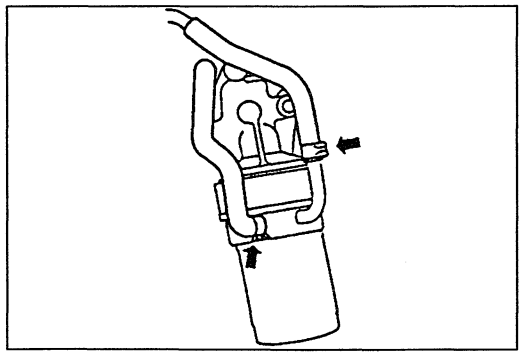
6. Assemble the **SST** (bolts, nuts and plate) as shown.



7. Install the **SST** assembled in step 6 to the **SST** installed in step 5.
8. Adjust the **SST** (bolts) so that less than **20 mm {0.79 in}** of thread is exposed.
9. Make the **SST** (plate and arms) parallel by adjusting the **SST** (bolts and nuts).
10. Tighten the **SST** (bolts and nuts) to affix the **SST** firmly.

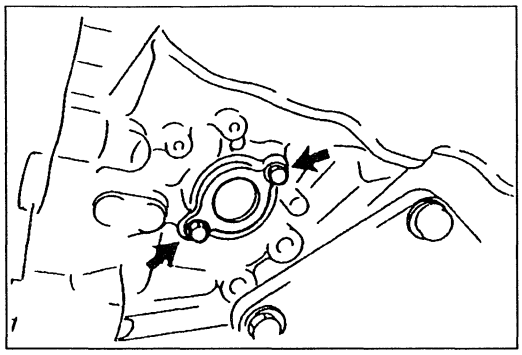


11. Mount the engine on the **SST**.
12. Drain the coolant. (Refer to below.)



Coolant Draining

1. After installing the engine to the engine stand, disconnect the oil cooler hoses as shown to drain the coolant.

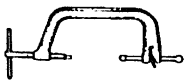
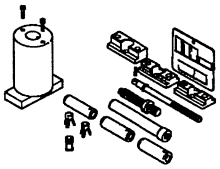
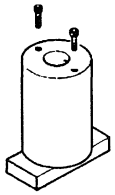
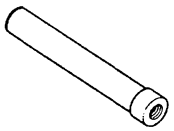
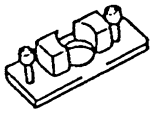
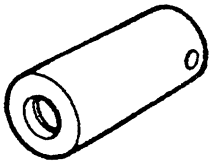
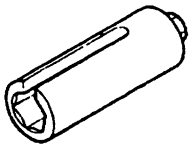
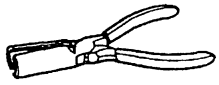
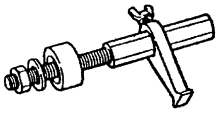
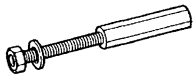
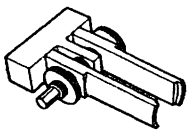
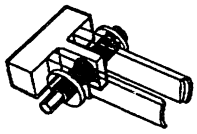


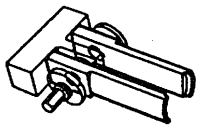
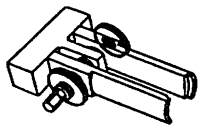
2. Remove the blind cover and drain the engine coolant (cylinder block, right side).
3. After draining the coolant, install a new gasket and reinstall the blind cover.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

DISASSEMBLY

PREPARATION
SST

49 0636 100B Arm, valve spring lifter 	For removal / installation of valves	49 L011 0A0B Tool set, piston pin setting 	For removal / installation of piston pins
49 L011 001 Body, support block (Part of 49 L011 0A0B) 	For removal / installation of piston pins	49 L011 006 Installer, piston pin (Part of 49 L011 0A0B) 	For removal / installation of piston pins
49 E011 002 Screw 	For removal / installation of piston pins	49 D011 002B Head, support block (Part of 49 L011 0A0B) 	For removal / installation of piston pins
49 E011 001 Guide 	For removal / installation of piston pins	49 G014 001 Wrench, oil filter 	For removal / installation of oil filter
49 H018 001 Wrench, knock sensor 	For removal of knock sensor	49 S120 170 Remover, valve seal 	For removal of valve seals
49 E011 1A0 Brake, ring gear 	For prevention of crankshaft rotation	49 E011 103 Shaft (Part of 49 E011 1A0) 	For prevention of crankshaft rotation
49 E011 104 Collar (Part of 49 E011 1A0) 	For prevention of crankshaft rotation	49 E011 105 Stopper (Part of 49 E011 1A0) 	For prevention of crankshaft rotation
49 B012 0A2 Pivot 	For removal / installation of valves	49 B012 012 Body (Part of 49 B012 0A2) 	For removal / installation of valves

49 B012 013 Foot (Part of 49 B012 0A2) 	For removal / installation of valves	49 B012 014 Locknut (Part of 49 B012 0A2) 	For removal / installation of valves

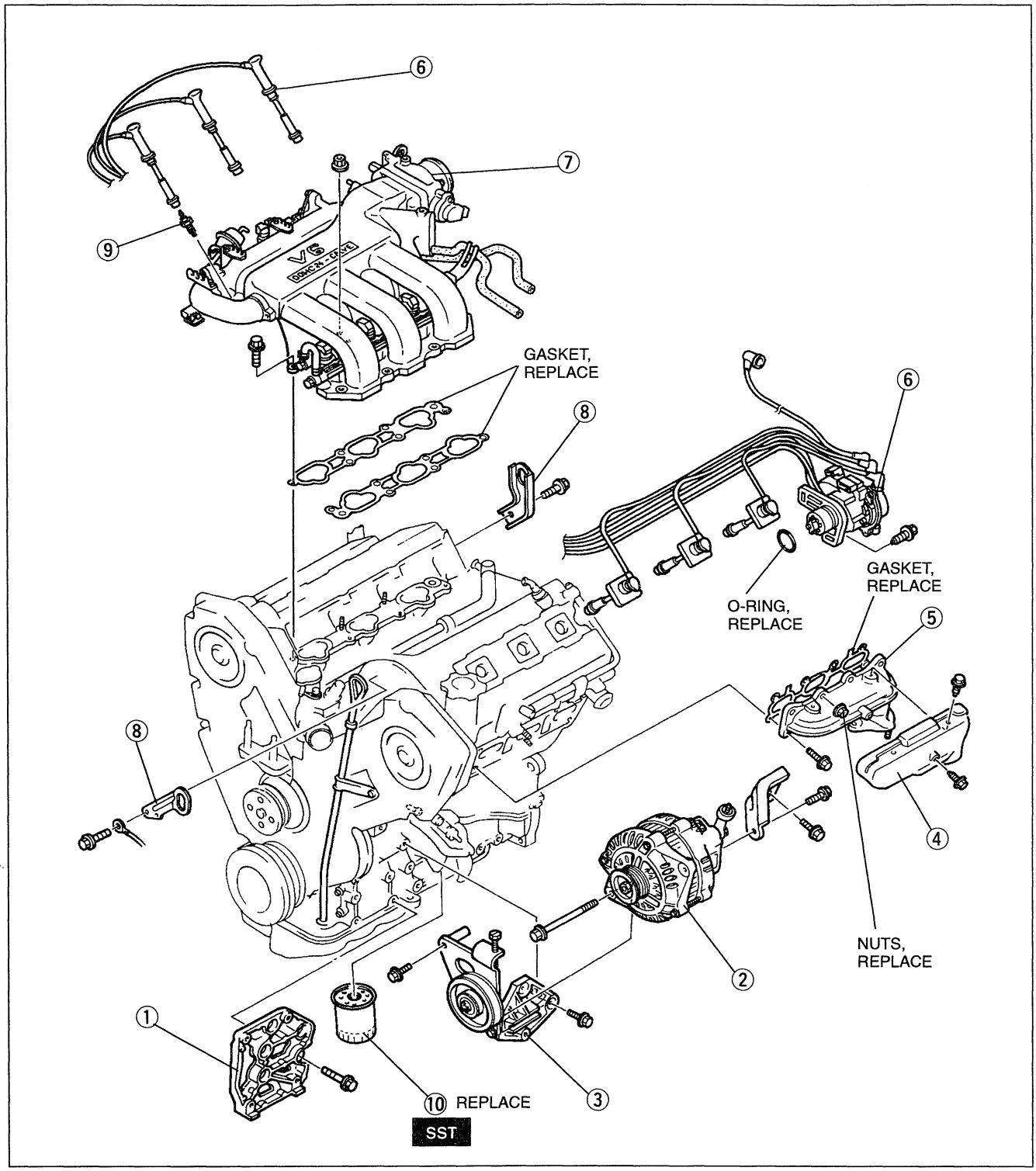
1. Code or arrange all identical parts (such as HLA, pistons, piston rings, connecting rods, and valve springs) so that they can be reinstalled in the cylinder from which they were removed.
2. Clean the parts by using a steam cleaner. Blow dry with compressed air.

Warning

- **Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by wasing with soap and water immediately after this work.**

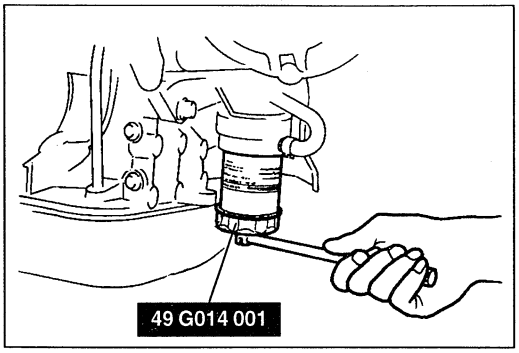
AUXILIARY PARTS

1. Drain the engine oil.
2. Disassemble in the order shown in the figure, referring to **Disassembly Note**.



1. A/C compressor bracket (if equipped)
2. Generator
3. Bracket and tensioner
4. Exhaust manifold insulator (LH)
5. Exhaust manifold (LH)
6. Distributor and high-tension lead
7. Intake manifold assembly
8. Engine hanger
9. Spark plug
10. Oil filter

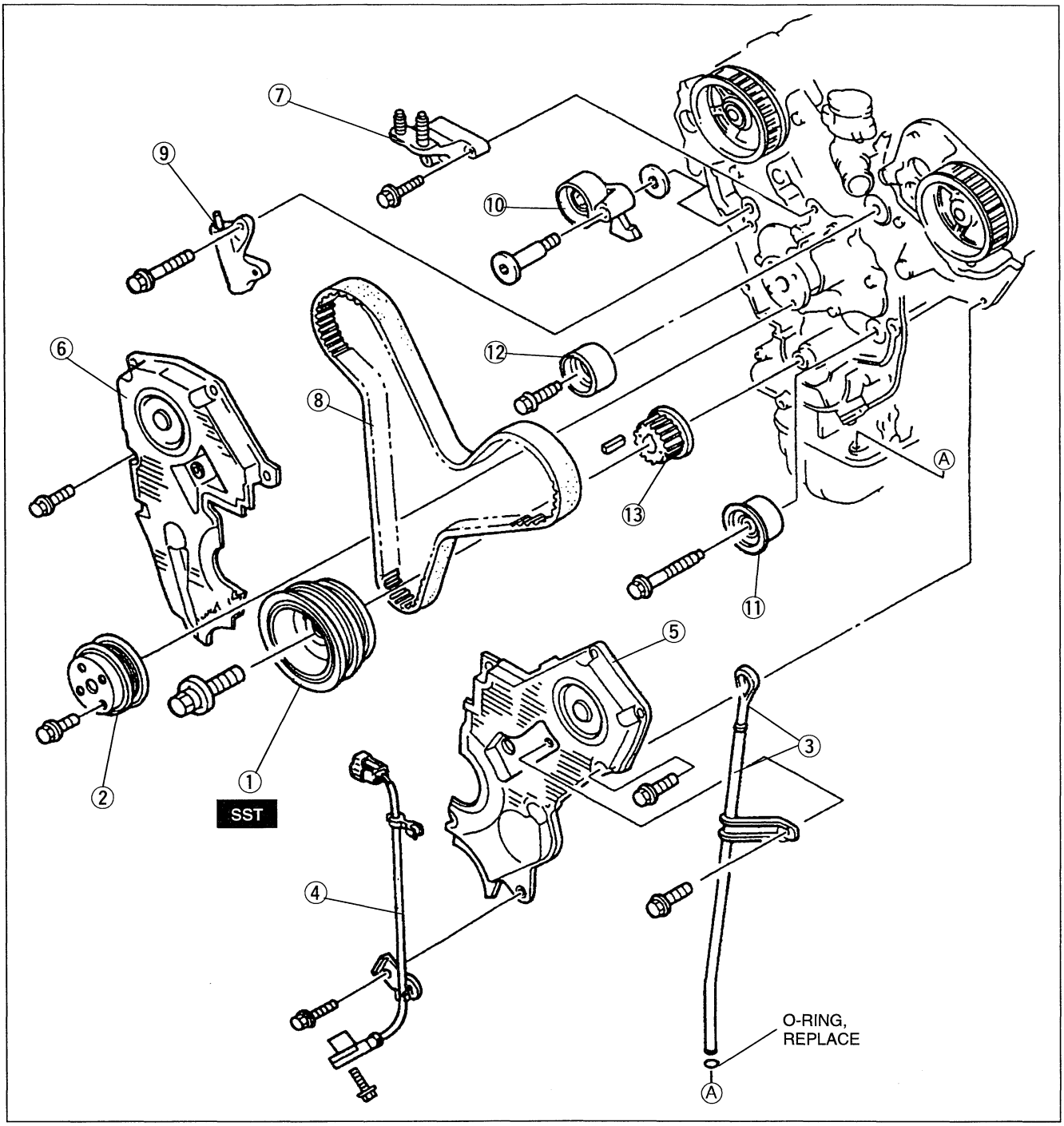
Disassembly Note ..... page B2–58



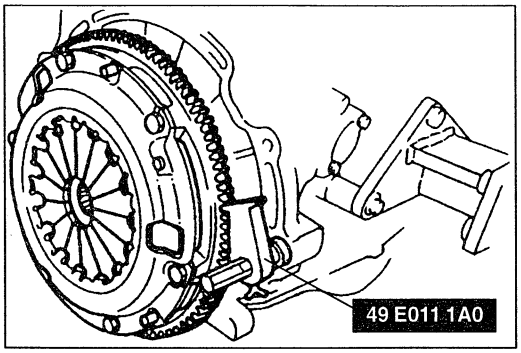
Disassembly Note
Oil filter
Remove the oil filter by using the **SST**.

TIMING BELT

Disassemble in the order shown in the figure, referring to **Disassembly Note**.

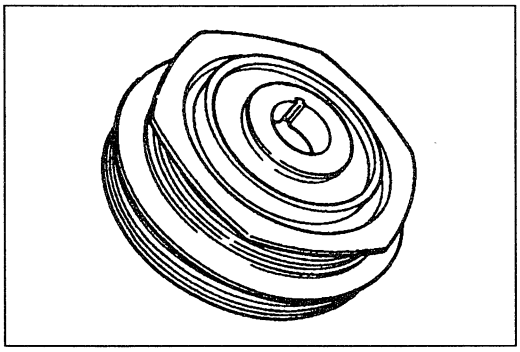


1. Crankshaft pulley
   Disassembly Note ..... page B2–60
2. Water pump pulley
3. Dipstick and pipe
4. Crankshaft position sensor
5. Timing belt cover (LH)
6. Timing belt cover (RH)
7. No.3 engine mount bracket
8. Timing belt
   Disassembly Note ..... page B2–60
9. Timing belt auto tensioner
   Disassembly Note ..... page B2–60
10. Tensioner pulley
11. No.2 idler pulley
12. No.1 idler pulley
13. Timing belt pulley
    Disassembly Note ..... page B2–61



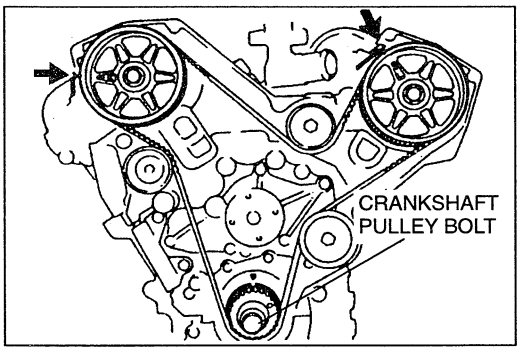
Disassembly Note
Crankshaft pulley

1. Hold the flywheel (MTX) or drive plate (ATX) by using the **SST**.



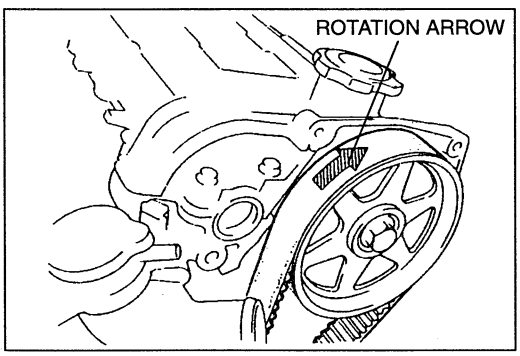
Caution
- **The crankshaft position sensor rotor is on the rear of the pulley, and can be damaged easily.**

2. Remove the pulley bolt.
3. Remove the crankshaft pulley.

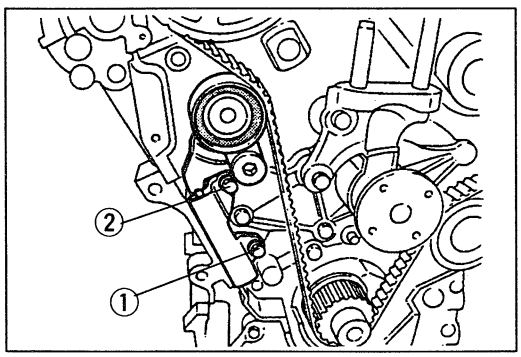


Timing belt

1. Temporarily install the crankshaft pulley bolt.
2. Turn the crankshaft clockwise to align the timing marks of the pulleys.

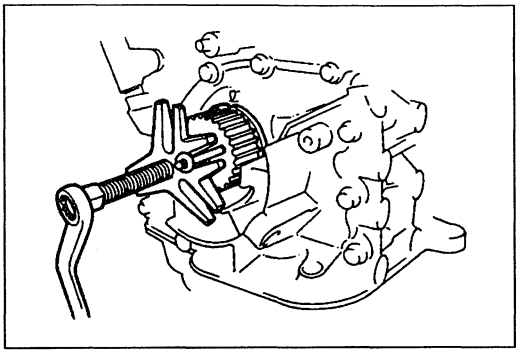


3. Mark the timing belt rotation direction for proper reinstallation.



Caution
- **When removing the bolt, hold the tensioner so that the bolt holes are aligned, otherwise the threads can be damaged.**

4. Remove the auto tensioner bolts in the order shown.
5. Remove the timing belt.



Timing belt pulley

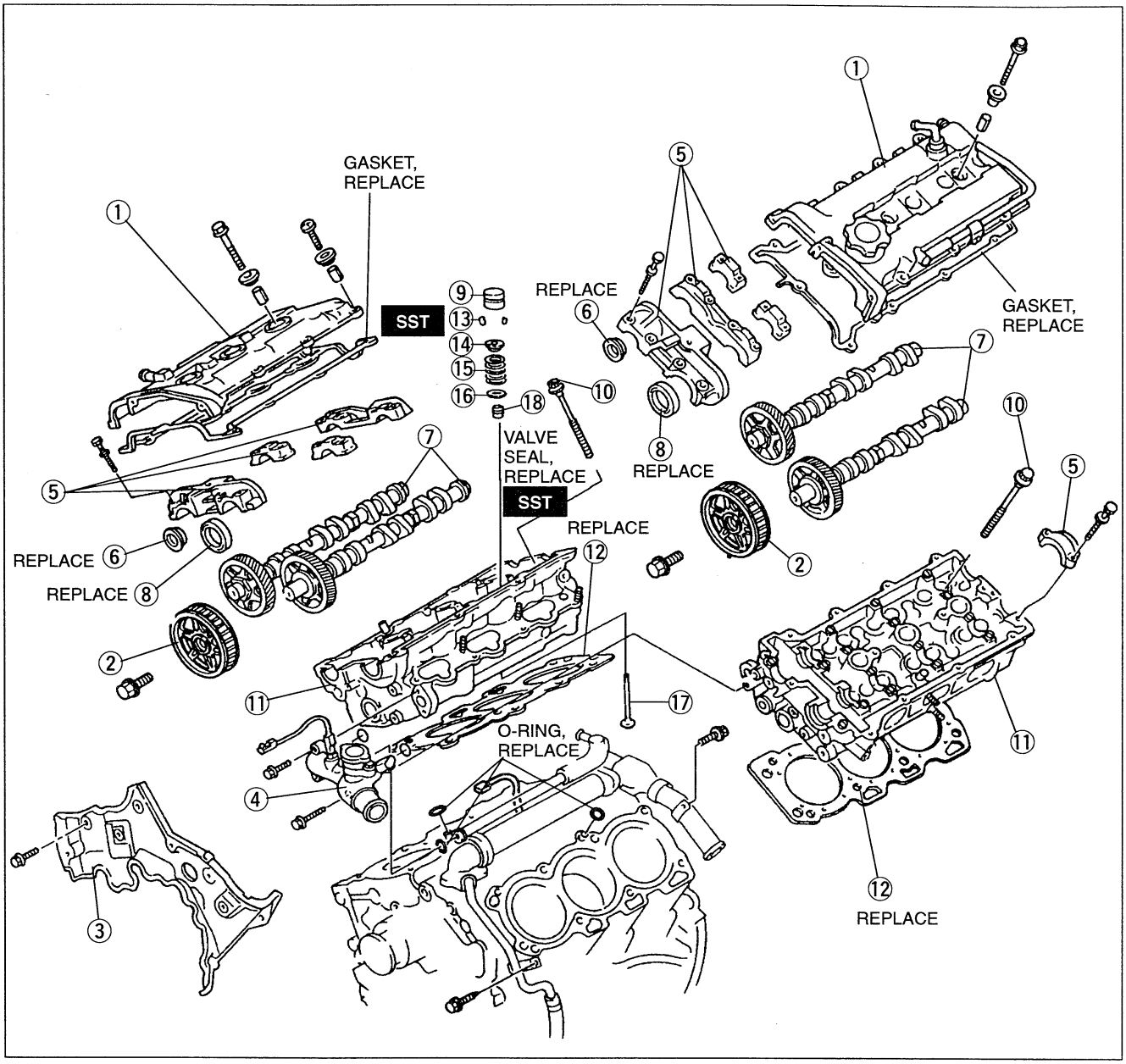
1. Remove the timing belt pulley.
2. Remove the timing belt pulley key.

Note

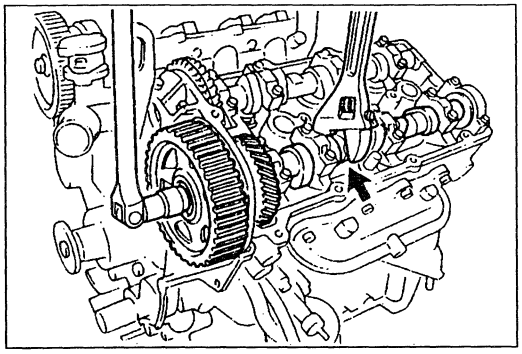
- If necessary, remove the pulley by using a steering wheel puller.

CYLINDER HEAD

Disassemble in the order shown in the figure, referring to **Disassembly Note**.



1. Cylinder head cover
2. Camshaft pulley
   - Disassembly Note ..... page B2–63
   - Inspection ..... page B2–84
3. Seal plate
4. Water outlet
5. Camshaft cap
   - Disassembly Note ..... page B2–63
6. Blind cap
7. Camshaft
   - Inspection ..... page B2–64
8. Camshaft oil seal
9. HLA
   - Disassembly Note ..... page B2–64
   - Inspection ..... page B2–79
10. Cylinder head bolt
    - Disassembly Note ..... page B2–64
11. Cylinder head
    - Inspection ..... page B2–72
12. Cylinder head gasket
13. Valve keeper
    - Disassembly Note ..... page B2–64
14. Valve spring seat, upper
15. Valve spring
    - Inspection ..... page B2–76
16. Valve spring seat, lower
17. Valve
    - Inspection ..... page B2–73
18. Valve seal
    - Disassembly Note ..... page B2–64

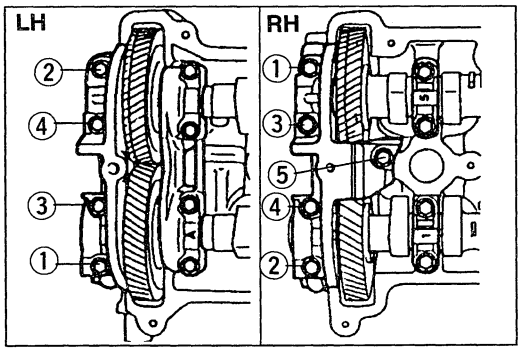


Disassembly Note
Camshaft pulley

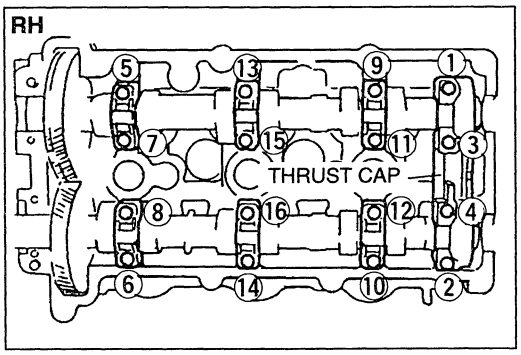
1. Hold the camshaft by using a wrench on the cast hexagon of the camshaft as shown.
2. Remove the camshaft pulley bolt.
3. Remove the camshaft pulley.

Camshaft cap

Caution
- **When the camshaft lobe is pressing on the HLA, removing the camshaft caps can damage the cylinder head thrust journal support.**



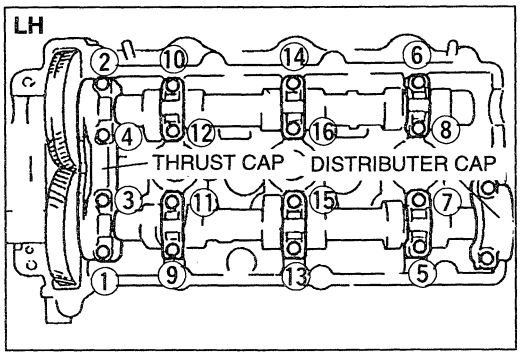
1. Loosen the front camshaft cap bolts in five or six steps in the order shown.
2. Remove the front camshaft caps.

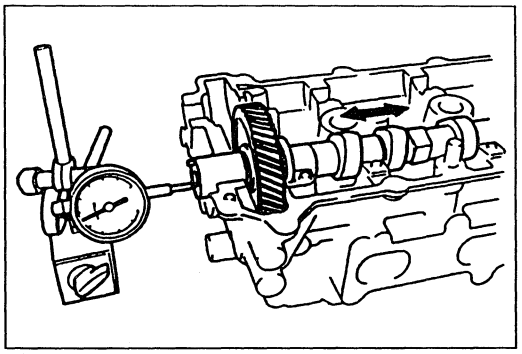


3. Loosen the remaining camshaft cap bolts in five or six steps in the order shown.

Caution
- **Remove the thrust caps only after removing all camshaft caps. Otherwise, the thrust caps can be damaged.**

4. Remove the camshaft caps.
5. Remove the distributor cap. (LH)





Camshaft

Inspect the following when removing the camshaft.

(1) Camshaft end play (Refer to page B2–79.)
(2) Camshaft journal oil clearance (Refer to page B2–79.)

HLA

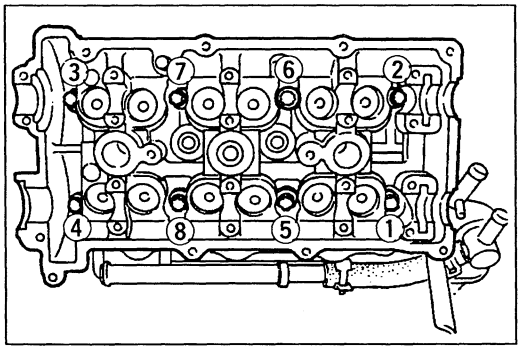
Caution

- **The HLA must be reinstalled in the same positions from which they were removed. If they are not, it can cause premature and uneven wear.**

Note

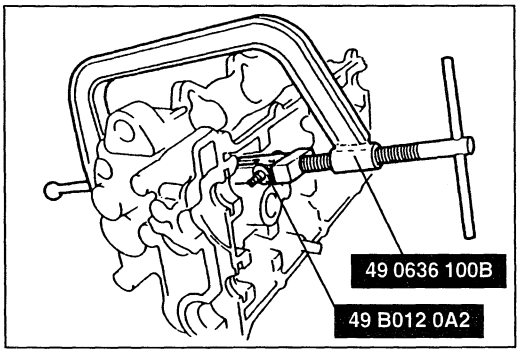
- Mark the HLA to show their original positions.

1. Remove the HLA from the cylinder head.
2. Store the HLA upside down in an oil-filled container.



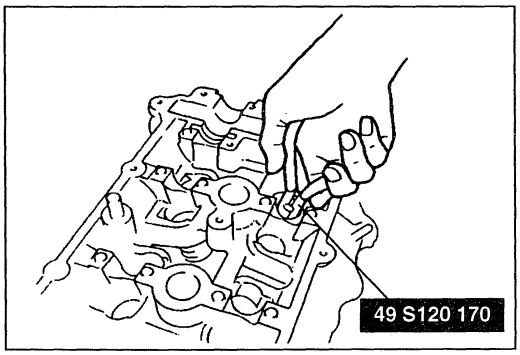
Cylinder head bolt

1. Loosen the cylinder head bolts in two or three steps in the order shown.
2. Remove the cylinder head bolts.



Valve keeper

1. Set the **SST** against the upper valve spring seat as shown.
2. Compress the spring and remove the valve keepers.

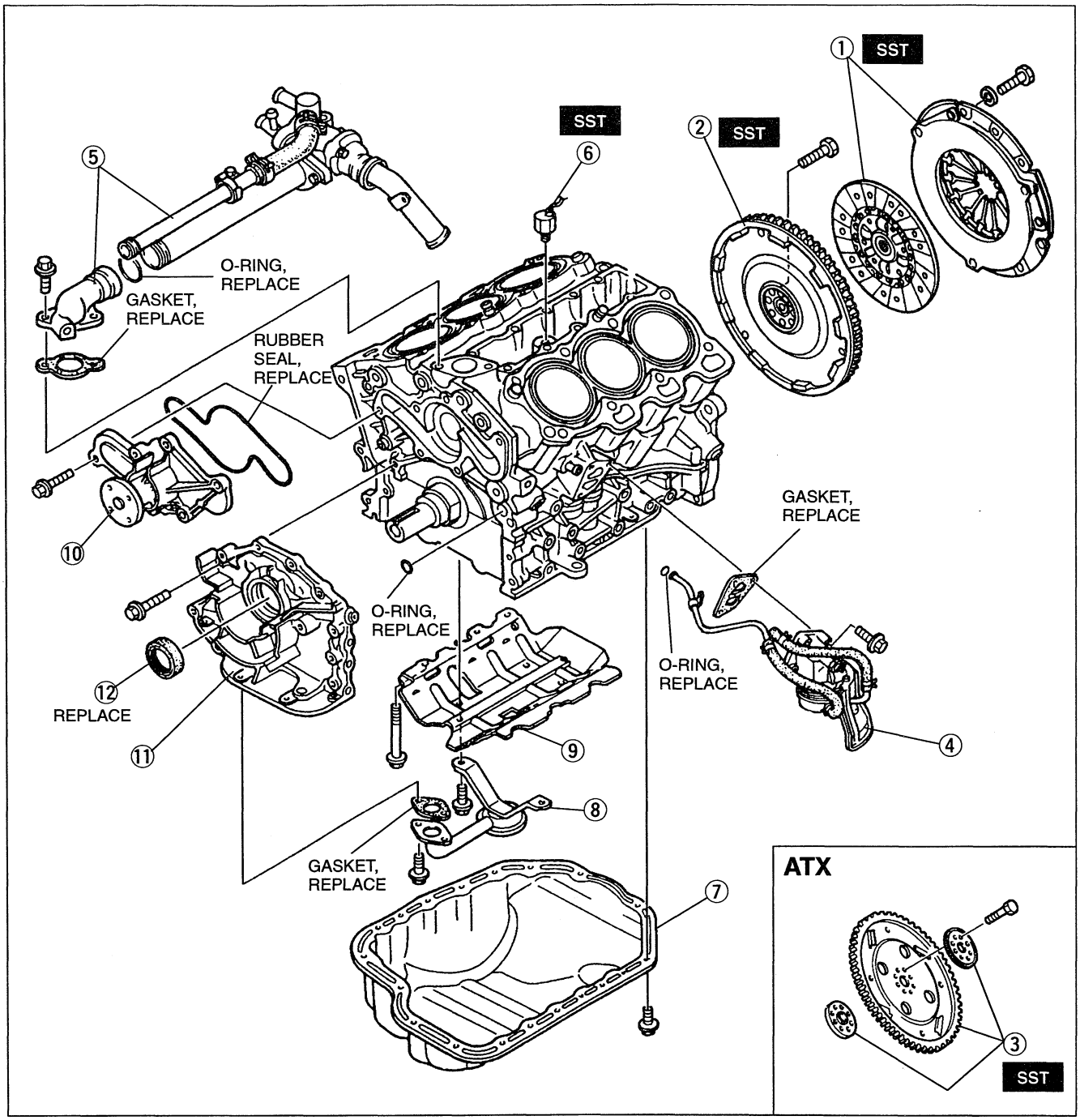


Valve seal

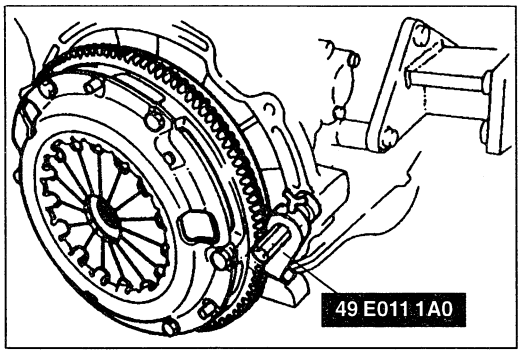
Using the **SST**, remove and discard the valve seal.

CYLINDER BLOCK (EXTERNAL PARTS)

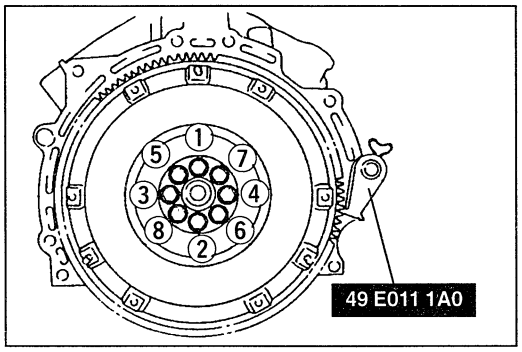
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



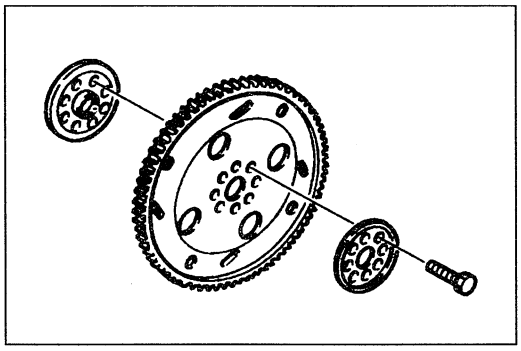
1. Clutch cover, clutch disc (MTX)
   Disassembly Note ..... page B2–66
2. Flywheel (MTX)
   Disassembly Note ..... page B2–66
3. Backing plate, drive plate, and adapter (ATX)
   Disassembly Note ..... page B2–66
4. Oil cooler
5. Water pipe and thermostat housing
   Disassembly Note ..... page B2–66
6. Knock sensor
   Disassembly Note ..... page B2–67
7. Oil pan
   Disassembly Note ..... page B2–67
8. Oil strainer
9. Oil baffle
10. Water pump
11. Oil pump
12. Front oil seal
    Disassembly Note ..... page B2–67



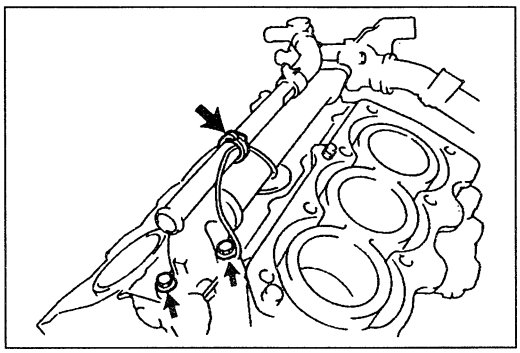
Disassembly Note
Clutch cover, clutch disc (MTX)
1. Hold the flywheel by using the **SST**.
2. Remove the clutch cover bolts in two or three steps.
3. Remove the clutch cover.
4. Remove the clutch disc.



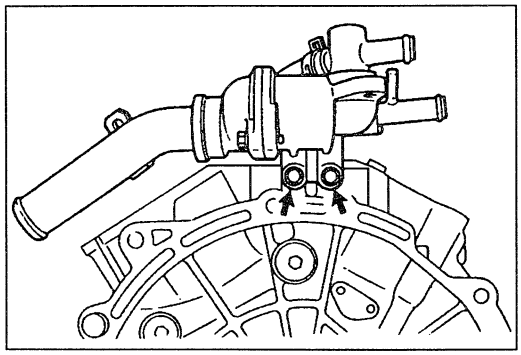
Flywheel (MTX)
1. Hold the flywheel by using the **SST**.
2. Remove the flywheel bolts in two or three steps in the order shown.
3. Remove the flywheel.
4. Remove the **SST**.



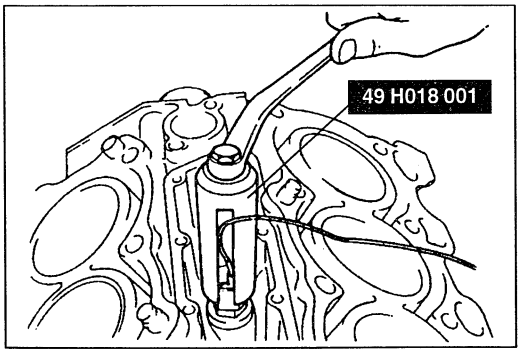
Backing plate, drive plate, and adapter (ATX)
1. Hold the drive plate by using the **SST**.
2. Remove the drive plate bolts in two or three steps. (Refer to above.)
3. Remove the backing plate, drive plate, and adapter.
4. Remove the **SST**.



Water pipe and thermostat housing
1. Disconnect the clip and separate the knock sensor harness from the water pipe.

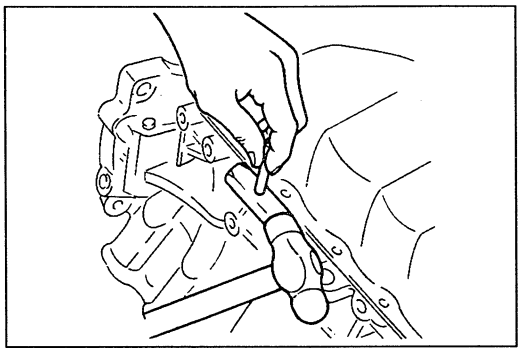


2. Remove the water pipe and thermostat housing as an assembly.



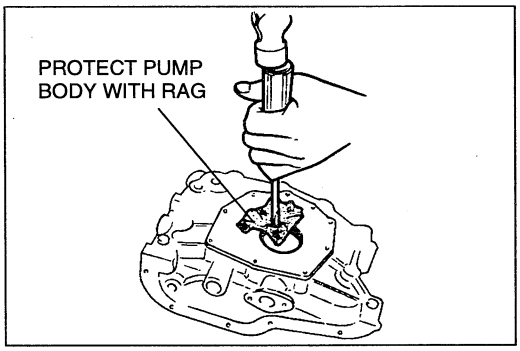
Knock sensor

Remove the knock sensor by using the **SST**.



Oil pan

1. Remove the oil pan mounting bolts.
2. Separate the oil pan from the lower cylinder block by using a scraper or a separator tool.

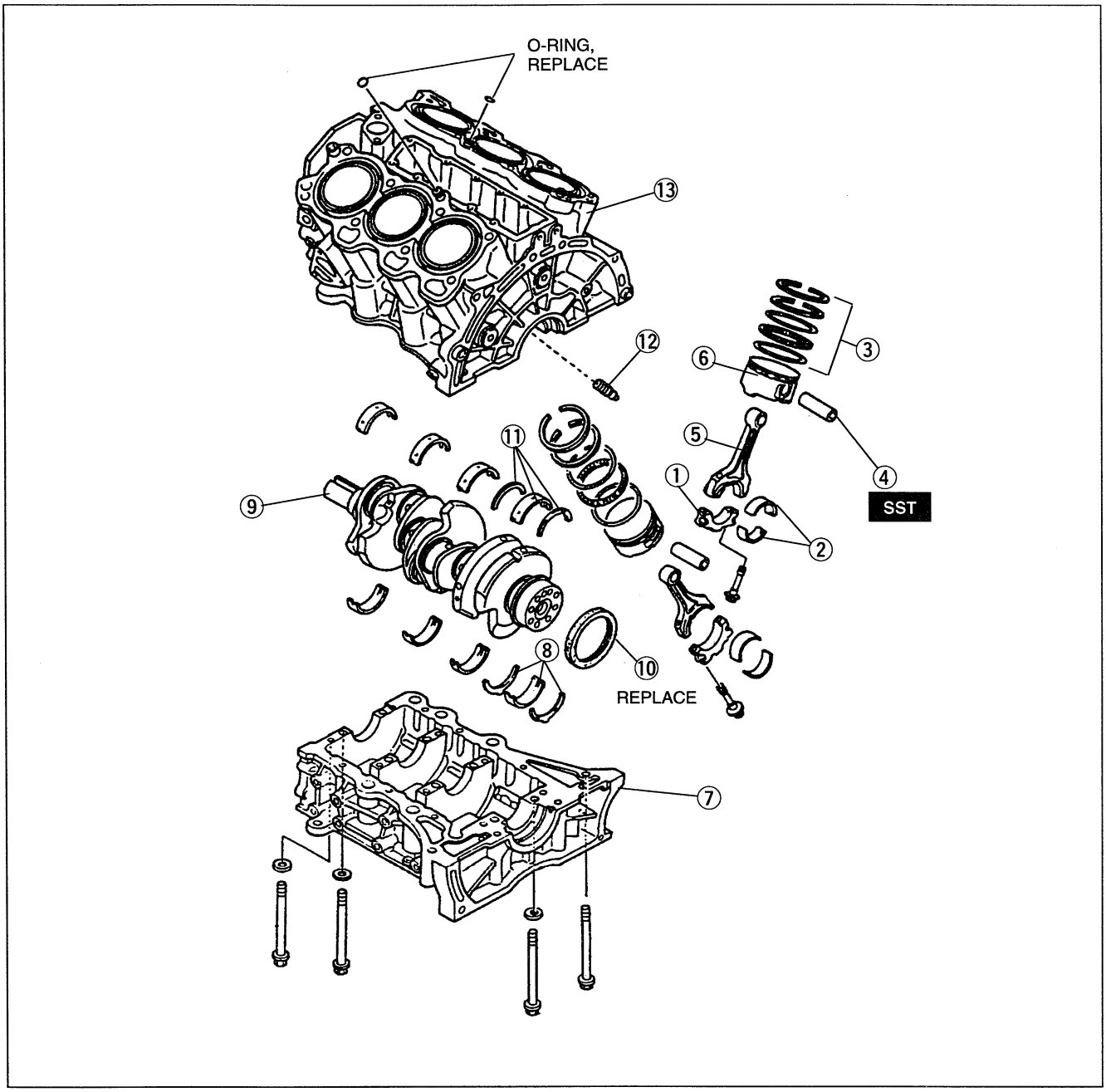


Front oil seal

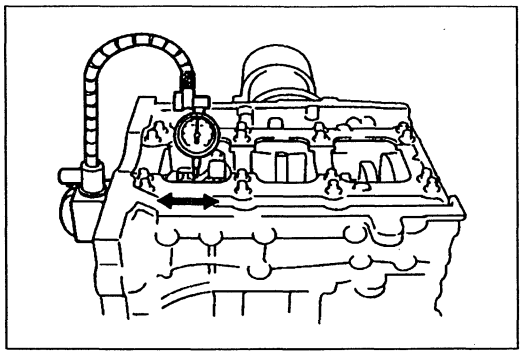
Remove the oil seal by using a screwdriver protected with a rag.

CYLINDER BLOCK (INTERNAL PARTS)

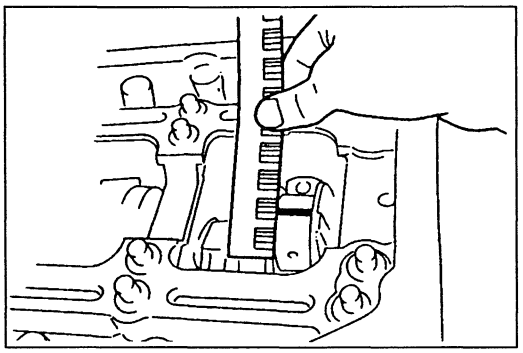
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



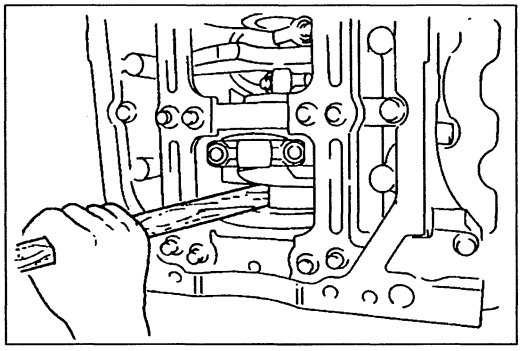
1. Connecting rod cap
   Disassembly Note ..... page B2–69
2. Connecting rod bearing
   Inspection ..... page B2–83
3. Piston ring
   Disassembly Note ..... page B2–69
   Inspection ..... page B2–81
4. Piston pin
   Disassembly Note ..... page B2–69
   Inspection ..... page B2–81
5. Connecting rod
   Disassembly Note ..... page B2–69
   Inspection ..... page B2–82
6. Piston
   Inspection ..... page B2–80
7. Lower cylinder block
   Disassembly Note ..... page B2–70
8. Main bearing and thrust bearing, lower
9. Crankshaft
   Inspection ..... page B2–82
10. Rear oil seal
11. Main bearing and thrust bearing, upper
12. Oil jet
    Inspection ..... page B2–83
13. Cylinder block
    Inspection ..... page B2–80



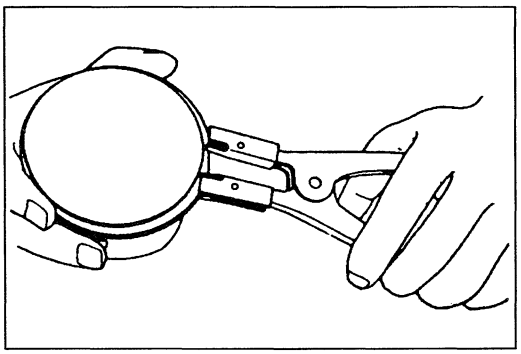
Disassembly Note
Connecting rod cap
Before removing the connecting rod caps, measure the connecting rod side clearance. (Refer to page B2–94.)



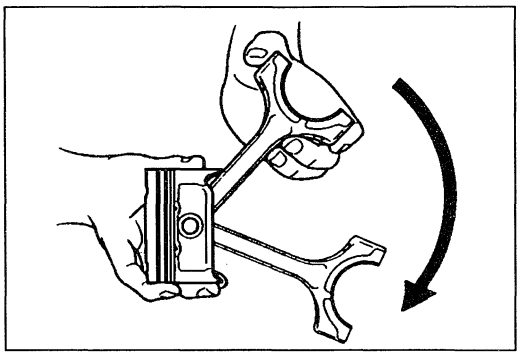
Connecting rod
1. Before removing the connecting rods, measure the connecting rod bearing oil clearance by using Plastigage. (Refer to page B2–93.)



2. Remove the Plastigage from the journals and bearings.
3. Use the handle of a hammer to push the piston and connecting rod assembly through the top of the cylinder block.



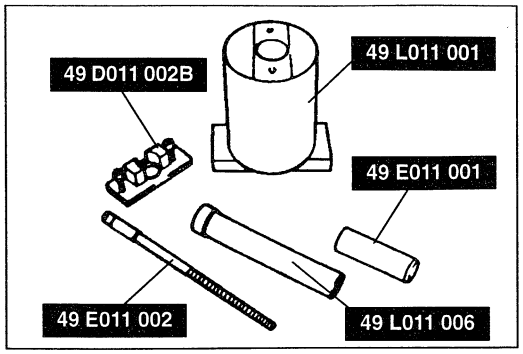
Piston ring
Remove the piston rings by using a piston ring expander.



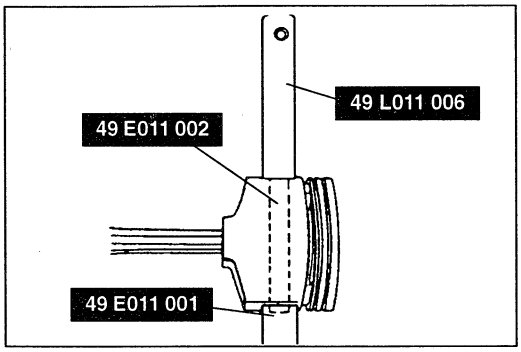
Piston pin

Caution
- **The connecting rods must be reinstalled in the same positions from which they were removed. If they are not, it can cause premature and uneven wear.**

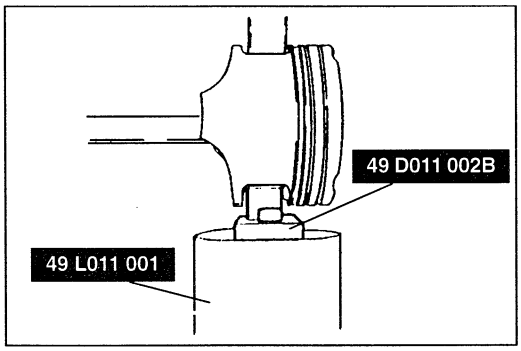
1. Before disassembling the piston and connecting rod, check the oscillation torque as shown. If the large end does not drop by its own weight, replace the piston or the piston pin.



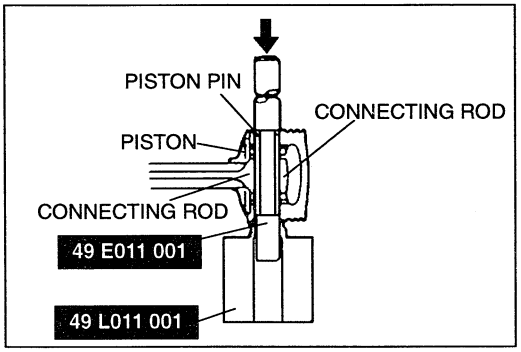
2. Use the **SSTs** shown in the figure and a press.



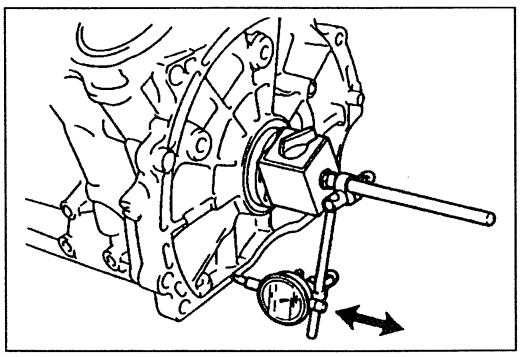
3. Assemble the **SST** into the piston pin as shown.



4. Verify that the **SST** fits squarely into the piston before pressing.

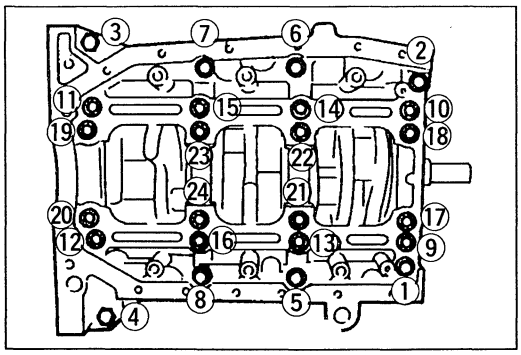


5. Set the piston and connecting rod on the **SST** as shown.
6. Press out the piston pin.
   While removing the piston pin, note the pressing pressure. If it is less than **4,903 N {500 kgf, 1,100 lbf}**, replace the piston pin or the connecting rod.

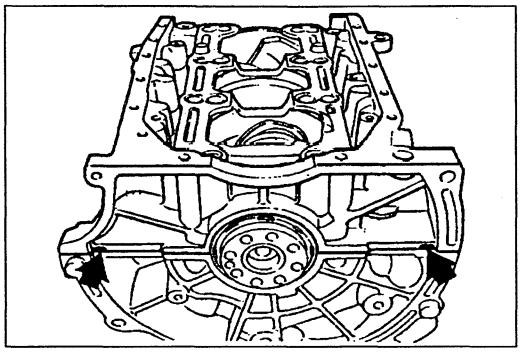


Lower cylinder block

1. Before removing the lower cylinder block, measure the crankshaft end play. (Refer to page B2–92.)



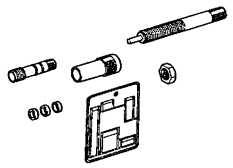
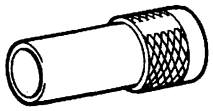
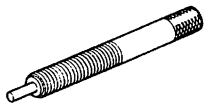
2. Loosen the lower cylinder block bolts in two or three steps in the order shown.



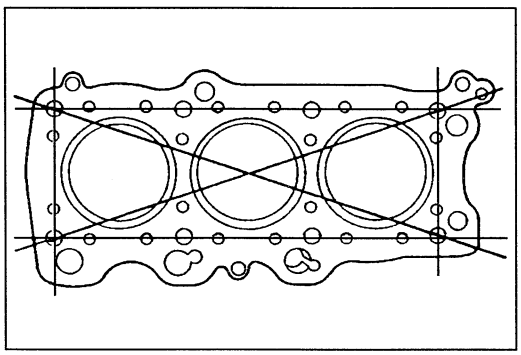
3. Insert a screwdriver only at the points as shown.
4. Remove the lower cylinder block.

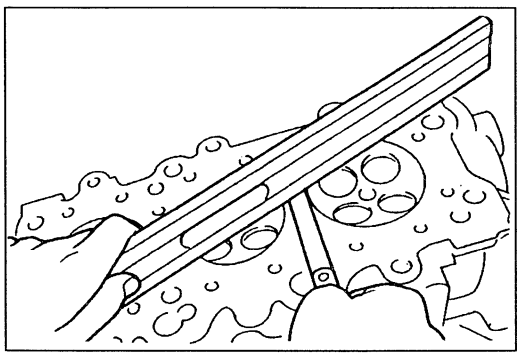
INSPECTION / REPAIR

PREPARATION
SST

49 B012 005 Remover & installer, valve guide 	For removal / installation of valve guide	49 L012 0A0 Installer set, valve seal & valve guide 	For installation of valve guide
49 L012 002 Body (Part of 49 L012 0A0) 	For installation of valve guide	49 L012 003 Installer (Part of 49 L012 0A0) 	For installation of valve guide
49 L012 004 Nut (Part of 49 L012 0A0) 	For installation of valve guide	—	—

1. Clean all parts, being sure to remove all gasket fragments, dirt, oil, etc.
2. Perform the inspections and repairs in the order specified.





CYLINDER HEAD

1. Inspect the cylinder head for damage, cracks, and leakage of water and oil. Replace if necessary.
2. Using a straightedge, measure the cylinder head for distortion in the six directions as shown.

   Distortion: 0.10 mm {0.004 in} max.

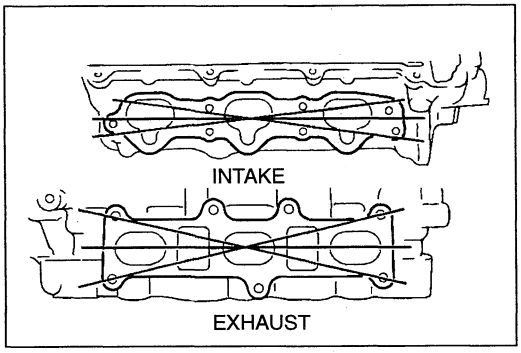
3. Inspect for the following and repair or replace.
   (1) Sunken valve seats
   (2) Damaged intake and exhaust manifold contact surfaces
   (3) Excessive camshaft oil clearances and end play

4. If the distortion exceeds the specification, grind the cylinder head.

   Grinding: 0.15 mm {0.006 in} max.

5. If the cylinder head height is not within the specification, replace it.

   Height: 133.4—133.6 mm {5.252—5.259 in}

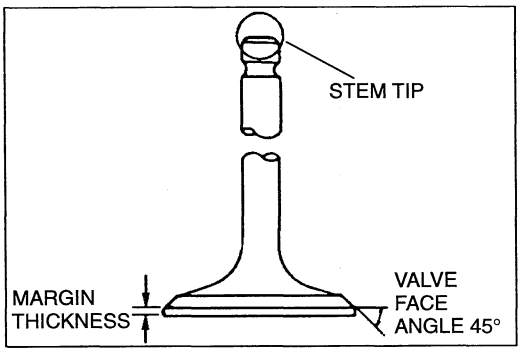


6. Using a straightedge, measure the intake and exhaust manifold contact surfaces for distortion in the six directions as shown.

   Distortion: 0.10 mm {0.004 in} max.

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

   Grinding: 0.15 mm {0.006 in} max.

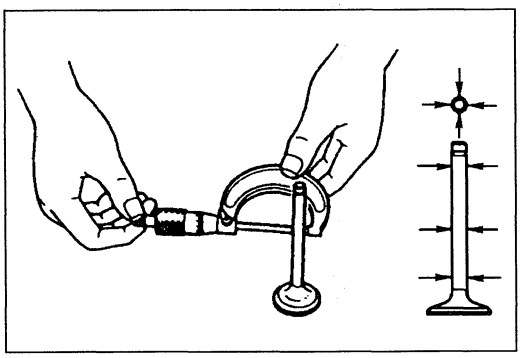


VALVE MECHANISM

Valve and Valve Guide

1. Inspect each valve for the following. Replace or resurface as necessary.
   (1) Damaged or bent stem
   (2) Rough or damaged face
   (3) Damaged or unevenly worn stem tip
2. Measure the valve head margin thickness. Replace the valve if necessary.

   Margin thickness
   IN: 0.9 mm {0.0354 in} min.
   EX: 1.0 mm {0.0394 in} min.

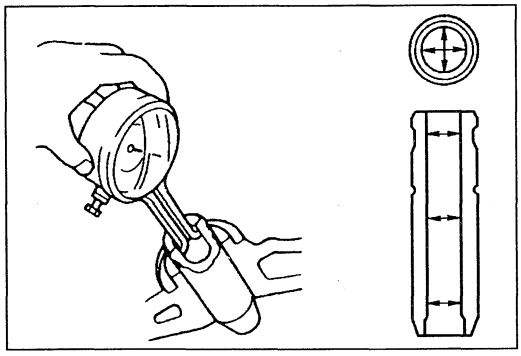


3. Measure the valve length and replace the valve if necessary.

Length

mm {in}

Standard	IN	93.91 {3.697}
	EX	94.99 {3.740}
Minimum	IN	93.41 {3.678}
	EX	94.49 {3.720}

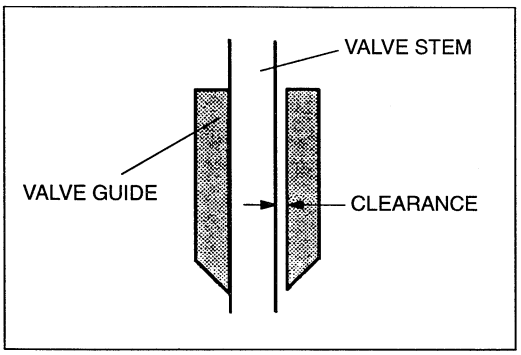


4. Measure the valve stem diameter and replace the valve if necessary.

   Diameter
   Standard
   IN: 5.970—5.985 mm {0.2351—0.2356 in}
   EX: 5.965—5.980 mm {0.2349—0.2354 in}
   Minimum IN: 5.920 mm {0.2331 in}
   EX: 5.915 mm {0.2329 in}

5. Measure the valve guide inner diameter and replace the guide if necessary.

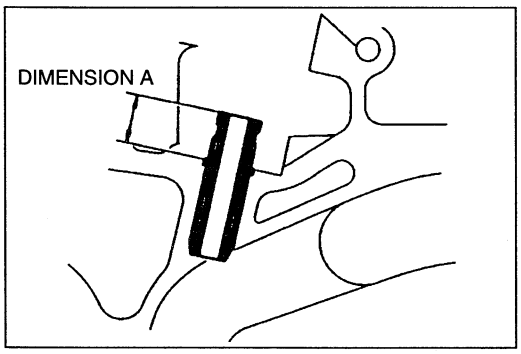
   Inner diameter
   IN: 6.01—6.03 mm {0.2367—0.2374 in}
   EX: 6.01—6.03 mm {0.2367—0.2374 in}



6. Calculate the valve stem-to-guide clearance.
   Subtract the outer diameter of the valve stem from the inner diameter of the corresponding valve guide.

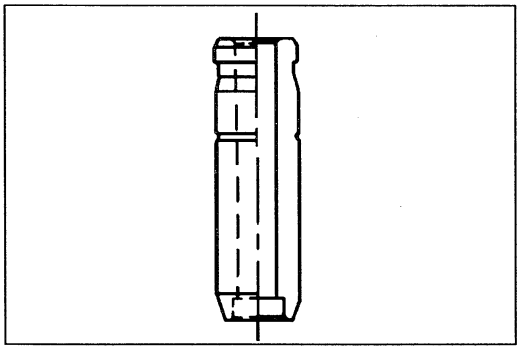
   Clearance
   IN: 0.025—0.060 mm {0.0010—0.0023 in}
   EX: 0.030—0.065 mm {0.0012—0.0025 in}
   Maximum: 0.20 mm {0.0078 in}

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



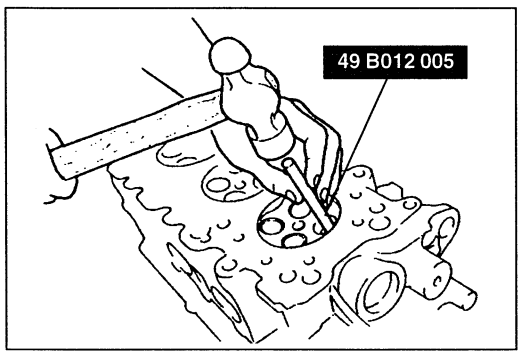
8. Measure the valve guide projection height (dimension A). Replace the guide if necessary.

   Dimension A
   IN: 14.7—15.3 mm {0.579—0.602 in}
   EX: 12.2—12.8 mm {0.481—0.503 in}

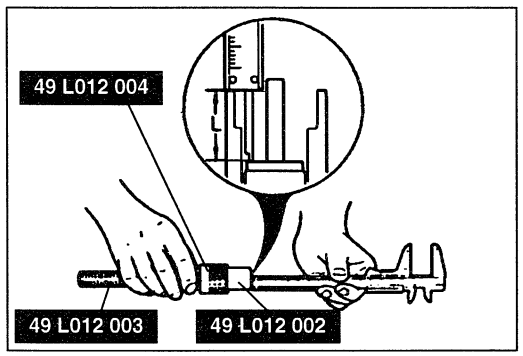


Replacement of valve guide

Note
- The intake and exhaust valve guides are the same.



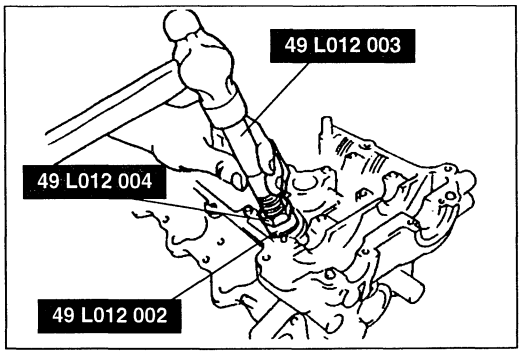
1. Remove the valve guide from the combustion chamber side by using the **SST** and a hammer.



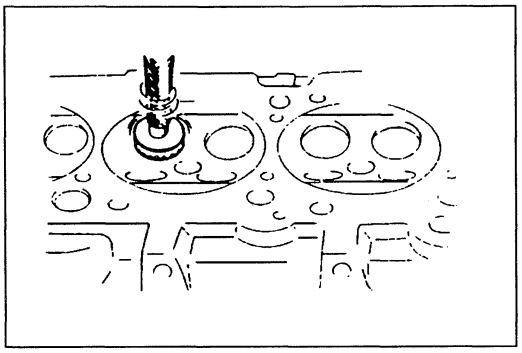
2. Assemble the **SST** so that the depth L is as specified.

   Depth L
   IN: 14.7—15.3 mm {0.579—0.602 in}
   EX: 12.2—12.8 mm {0.481—0.503 in}

3. Tighten the locknut.

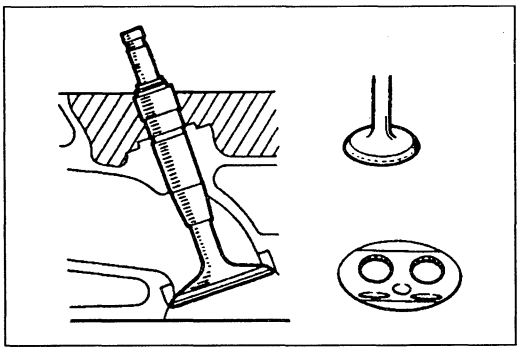


4. Tap the valve guide in from the side opposite the combustion chamber until the **SST** contacts the cylinder head.
5. Verify that the valve guide projection height is within the specification. (Refer to page B2–74.)
6. If not within the specification, repeat steps 2–4.

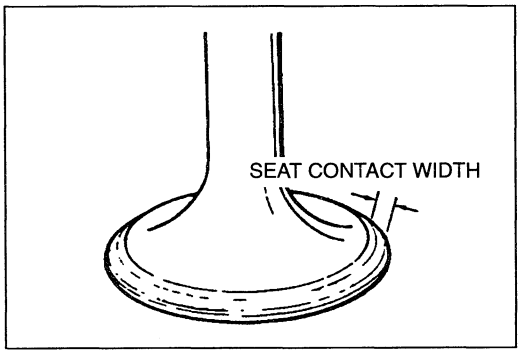


Valve Seat

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 by using a **45°** valve seat cutter and/or resurface the valve face.

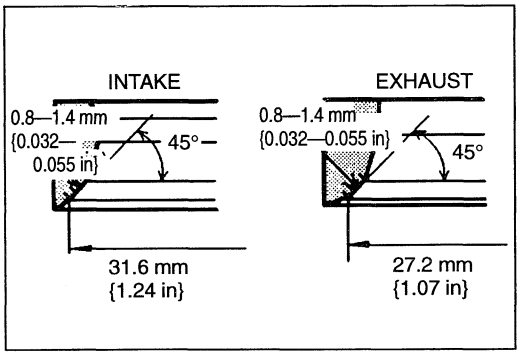


3. Apply a thin coat of Prussian blue to the valve face.
4. Check the valve seating by pressing the valve against the seat.
   (1) If blue does not appear 360° around the valve face, replace the valve.
   (2) If blue does not appear 360° around the valve seat, resurface the seat.

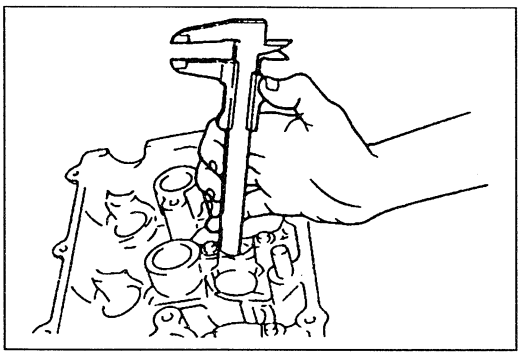


5. Measure the seat contact width.

   Width: 0.8—1.4 mm {0.032—0.055 in}



   (1) If the valve seating position on the valve face is too high, correct the valve seat by using a **75°** cutter.
   (2) If the valve seating position of the valve face is too low, correct the valve seat by using a **45°** cutter.
6. Seat the valve to the valve seat by using a lapping compound.

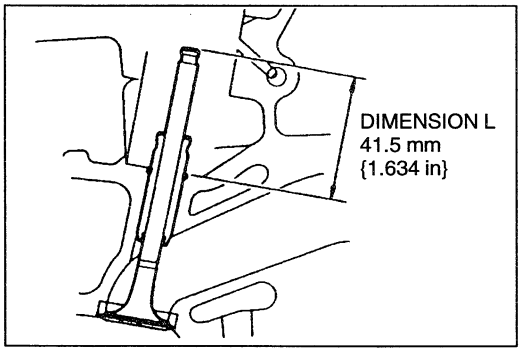


7. Check the sinking of the valve seat.
   Measure the protruding length (dimension **L**) of the valve stem.

   Dimension L: 41.5 mm {1.634 in}

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

   41.5—42.0 mm {1.634—1.653 in}

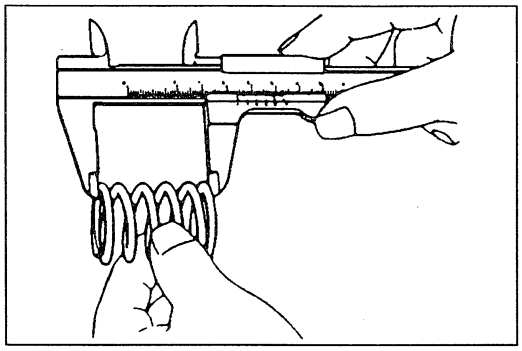


   (2) If **L** is as below, insert a washer onto the spring seat area so that **L** will be as specified.

   42.1—43.0 mm {1.658—1.692 in}

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

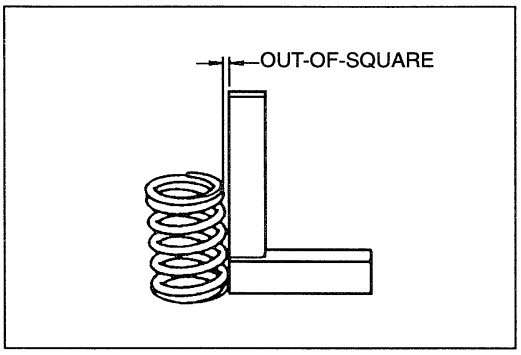
   43.1 mm {1.697 in}



Valve Spring

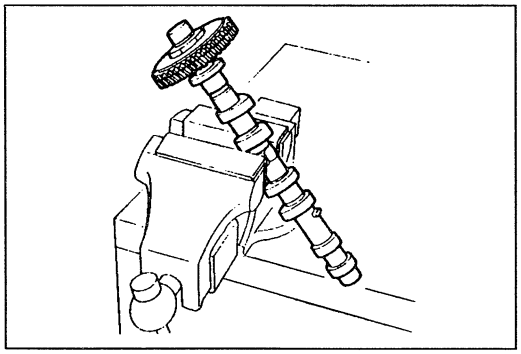
1. Inspect the valve springs for cracks and damage.
2. Measure the free length of each spring.

   Free length
   Standard: 46.92 mm {1.847 in}
   Minimum:
   38.7 mm {1.524 in} with a set load of 233.0—263.6 N {23.75—26.88 kgf, 52.25—59.13 lbf}



3. If not within the specification, measure spring pressure when the spring length is compressed to **35.5 mm {1.398 in}**. Replace if necessary.
4. Measure the out-of-square of the springs. Replace if necessary.

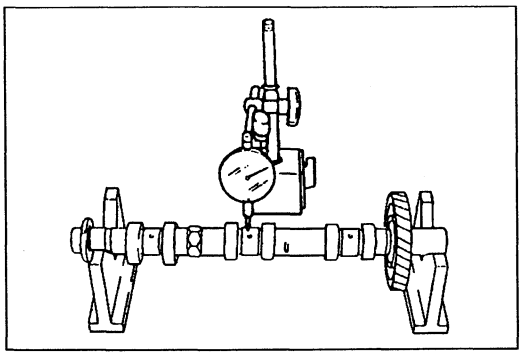
   Out-of-square: 1.63 mm {0.0642 in} max.



CAMSHAFT

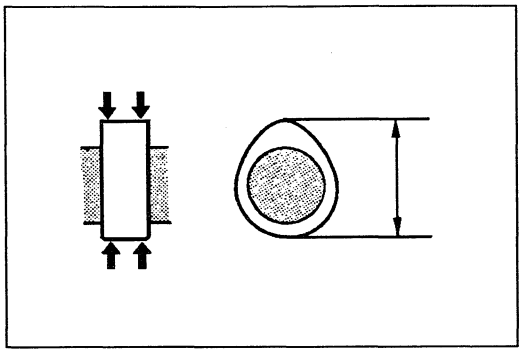
1. Visually inspect the helical gear and the friction gear. Replace the camshaft assembly if a problem is found with the helical gear. Replace the friction gear if a problem is found with it.
2. Secure the camshaft cast hexagon in a vise protected with aluminum plates.
3. Loosen the locknut and remove the friction gear.
4. Assemble the friction gear so that the matching marks align.

   Tightening torque:
   69—78 N·m {7.0—8.0 kgf·m, 51—57 ft·lbf}



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

   Runout: 0.02 mm {0.0008 in} max.

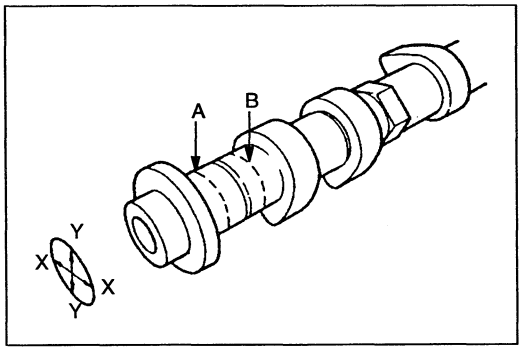


6. Check the camshaft for wear and damage. Replace it if necessary.
7. Measure the camshaft lobe height at the two points as shown. Replace the camshaft if necessary.

Height

mm {in}

IN	Standard	43.549 {1.7145}
	Minimum	43.349 {1.7067}
EX	Standard	43.549 {1.7145}
	Minimum	43.349 {1.7067}

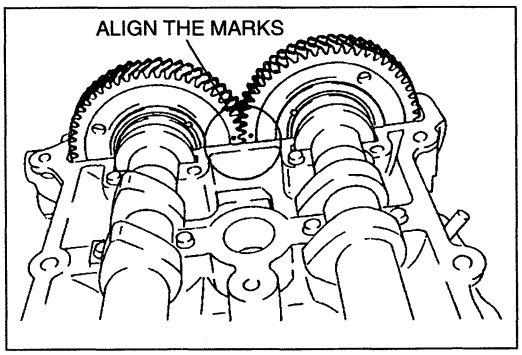


8. Measure the journal diameters in X and Y directions at the two points (A and B) as shown. Replace the camshaft if necessary.

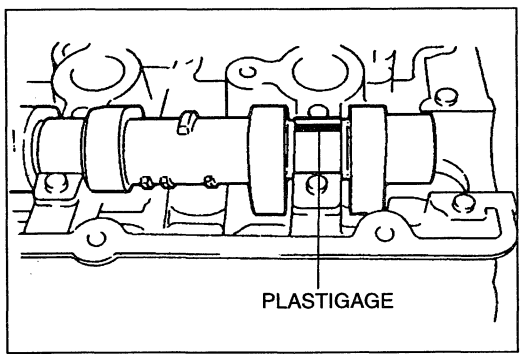
Journal diameter

mm {in}

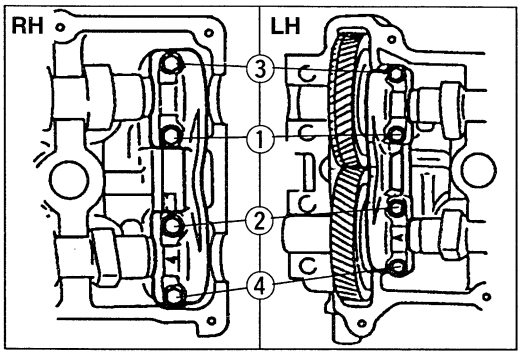
Journals	Standard	Minimum
No.1 (RH EX, LH IN) and No.5	25.940—25.960 {1.0213—1.0220}	25.890 {1.0193}
No.1 (RH IN, LH EX)	29.975—29.995 {1.1802—1.1809}	29.925 {1.1781}
No.2—No.4	25.910—25.930 {1.0201—1.0208}	25.860 {1.0181}



9. Measure the camshaft oil clearances with the HLA removed.
   (1) Remove all oil, dirt, etc. from the journals and the camshaft saddles.
   (2) Set the camshafts on the cylinder head.

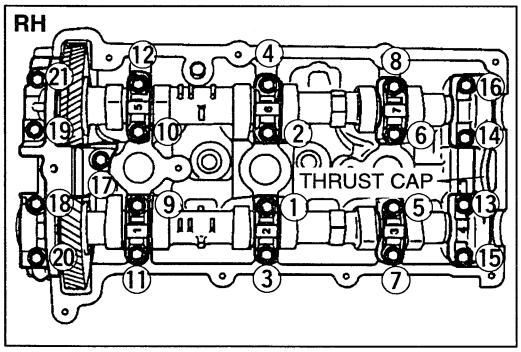


   (3) Position Plastigage atop each journal in the journal axial direction.



Caution
- **Install the thrust caps (RH is marked 4, LH is marked A) first. Otherwise, camshaft can be broken or damaged.**

(4) Install the thrust caps onto the cylinder heads. Hand tighten the bolts in five or six steps in the order shown, until the thrust caps fully seated on the cylinder heads.

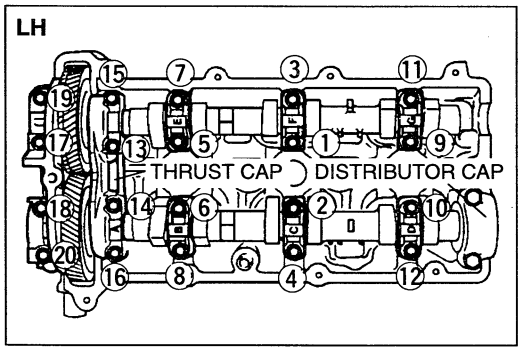


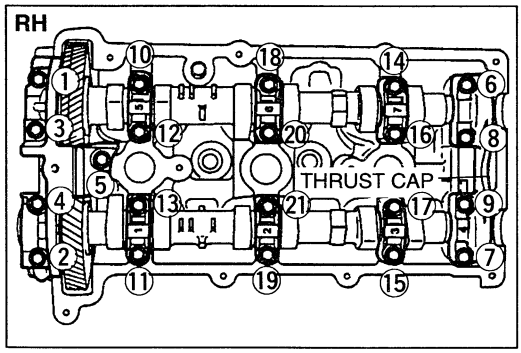
(5) Install the camshaft caps onto the cylinder heads. Hand tighten the bolts in five or six steps in the order shown, until the camshaft caps fully seated on the cylinder heads.
(6) Tighten the bolts in the order shown.

Tightening torque:
11.3—14.2 N·m {115—145 kgf·cm, 100—125 in·lbf}

(7) Retighten the bolts in the order shown.

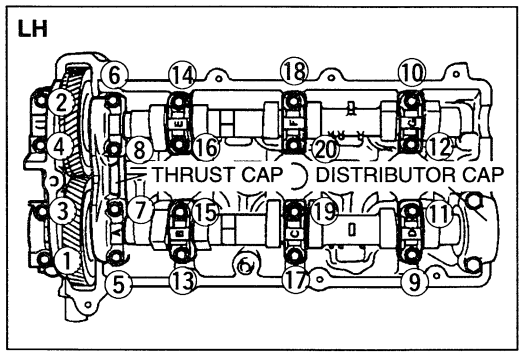
Tightening torque:
11.3—14.2 N·m {115—145 kgf·cm, 100—125 in·lbf}



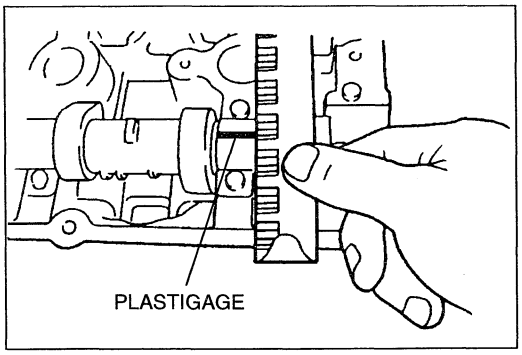


(8) Loosen the camshaft cap bolts in five or six steps in the order shown.

Caution
- **Remove the thrust caps only after removing all camshaft caps. Otherwise, the thrust caps can be damaged.**



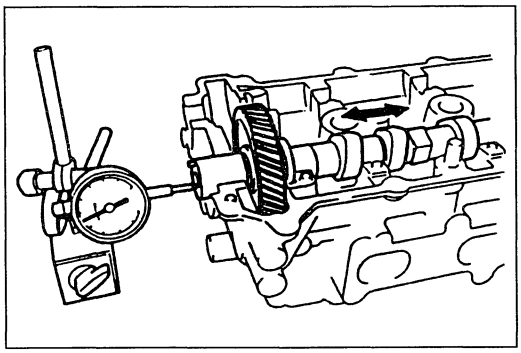
(9) Remove the camshaft caps.



(10) Measure the oil clearance.

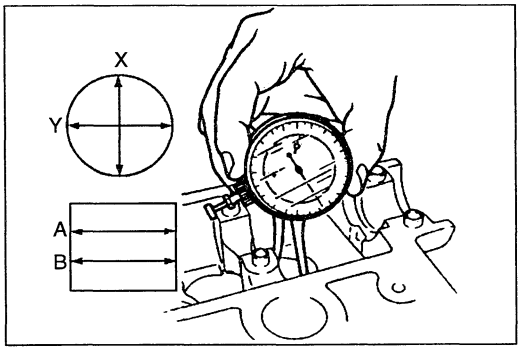
Oil clearance
No.1, No.5: 0.040—0.081 mm {0.0016—0.0031 in}
No.2—No.4: 0.070—0.111 mm {0.0028—0.0043 in}
Maximum
No.1, No.5: 0.120 mm {0.0047 in}
No.2—No.4: 0.150 mm {0.0059 in}

(11) If the oil clearance exceeds the maximum, replace the camshaft or the cylinder head.



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

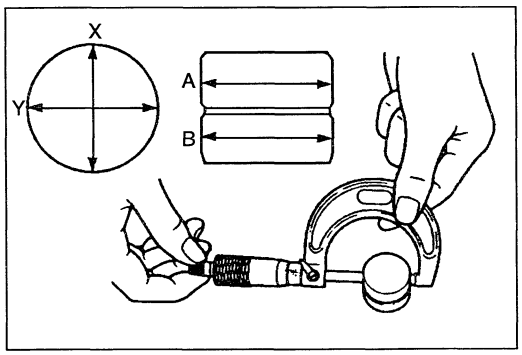
End play: 0.05—0.10 mm {0.0020—0.0039 in}
Maximum: 0.14 mm {0.0056 in}



HLA

1. Measure the HLA bore in X and Y directions at two points (A and B) as shown.

Diameter: 30.000—30.025 mm {1.1811—1.1820 in}



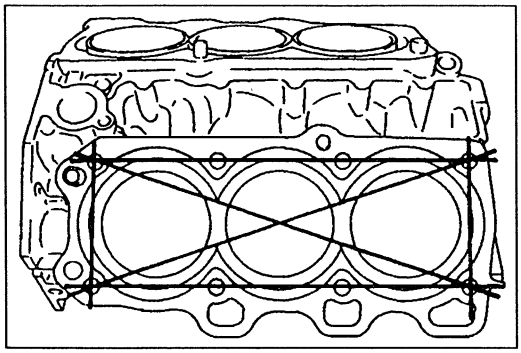
2. Measure the HLA diameter in X and Y directions at two points (A and B) as shown.

Diameter: 29.959—29.975 mm {1.1795—1.1801 in}

3. Calculate the clearance between the HLA diameter and the related HLA bore.

Clearance:
0.025—0.066 mm {0.00099—0.00259 in}
Maximum: 0.180 mm {0.0071 in}

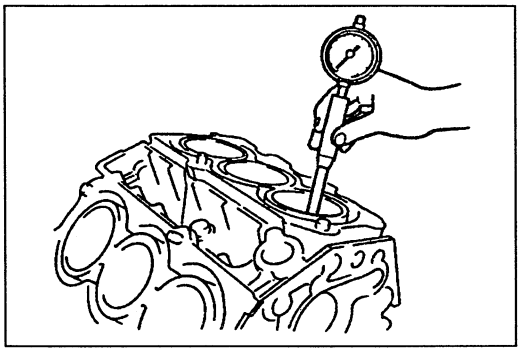
4. If the clearance exceeds the maximum, replace the HLA and/or the cylinder head.



CYLINDER BLOCK

1. Check the cylinder block for the following and repair or replace as necessary.
   (1) Leakage damage
   (2) Cracks
   (3) Scoring of wall
2. Using a straightedge, measure the cylinder block decks for distortion in six directions as shown.

Distortion: 0.15 mm {0.006 in} max.

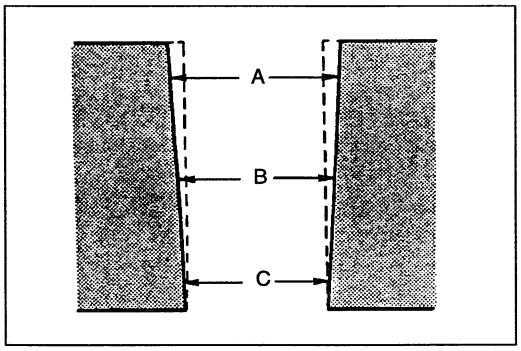


3. If distortion exceeds the maximum, replace the cylinder block.
4. Measure the cylinder bores in X and Y directions at three points (A,B and C) as shown.

Cylinder bore

mm {in}

Standard	84.500—84.522 {3.3268—3.3276}
0.25 {0.01} oversize	84.750—84.772 {3.3367—3.3374}
0.50 {0.02} oversize	85.000—85.022 {3.3465—3.3473}



Cylinder bore

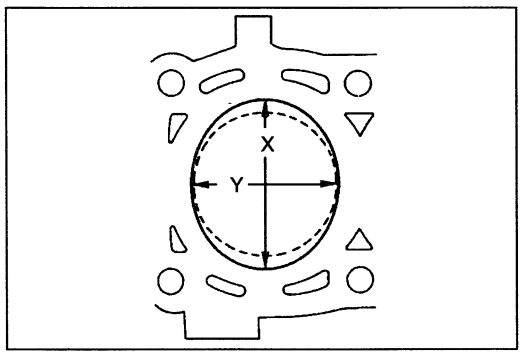
Base the boring diameter on the diameter of an oversize piston. All cylinders must be the same diameter.

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

Taper: 0.022 mm {0.0009 in} max.

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

Out-of-round: 0.020 mm {0.0008 in} max.

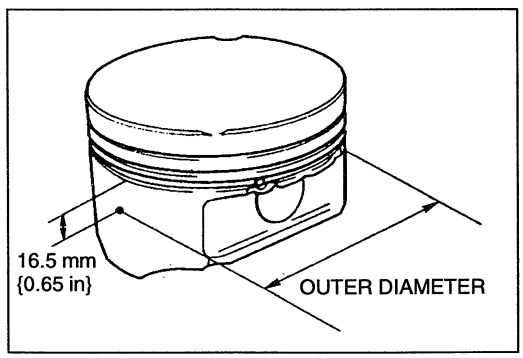


5. If the upper part of a cylinder wall shows uneven wear, remove the ridge by using a ridge reamer.

PISTON, PISTON RING, AND PISTON PIN

Piston

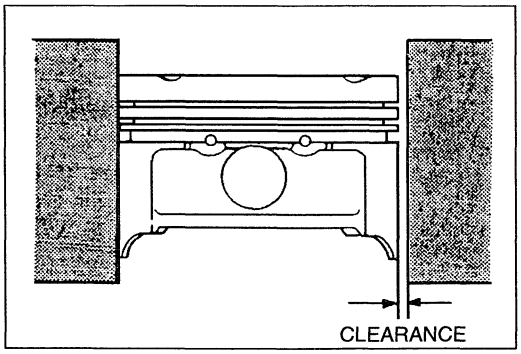
1. Inspect the outer circumferences of all pistons for seizing and scoring. Replace as necessary.
2. Measure the outer diameter of each piston at a right angle **(90°)** to the piston pin, **16.5 mm {0.65 in}** below the oil ring groove lower edge.



Piston diameter

mm {in}

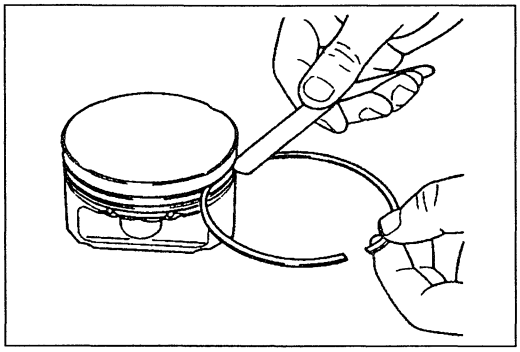
Standard	84.437—84.461 {3.3243—3.3252}
0.25 {0.01} oversize	84.687—84.711 {3.3342—3.3350}
0.50 {0.02} oversize	84.937—84.961 {3.3440—3.3449}



3. Measure the piston-to-cylinder clearance.

   Clearance: 0.028—0.056 mm {0.0012—0.0022 in}
   Maximum: 0.13 mm {0.0051 in}

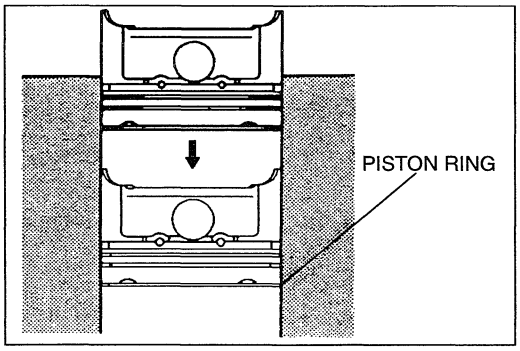
4. If the clearance exceeds the maximum, replace the piston or rebore the cylinders to fit oversize pistons.
   If the piston is replaced, the piston rings must also be replaced.



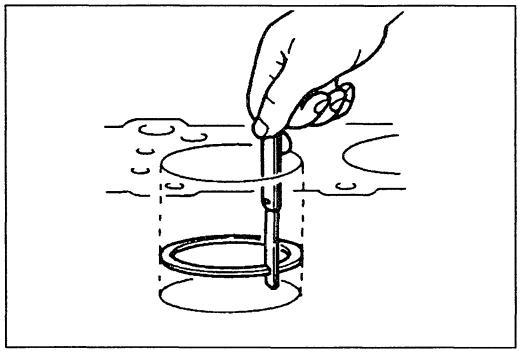
Piston and Piston Rings

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

   Clearance
   Top: 0.020—0.065 mm {0.0008—0.0025 in}
   Second: 0.030—0.065 mm {0.0012—0.0025 in}
   Oil: 0.025—0.052 mm {0.0010—0.0020 in}
   Maximum: 0.15 mm {0.006 in}

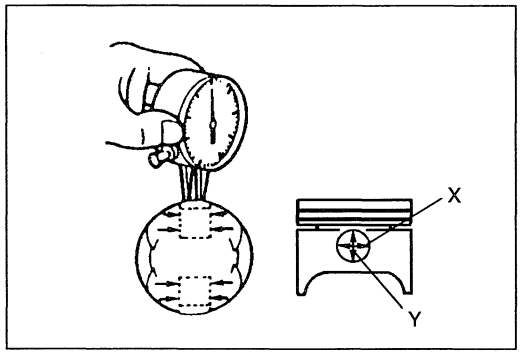


2. If the clearance exceeds the maximum, replace the piston.
3. Inspect the piston rings for damage, abnormal wear, and breakage. Replace as necessary.
4. Insert the piston ring into the cylinder by hand and use the piston to push it to the bottom of the ring travel.



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

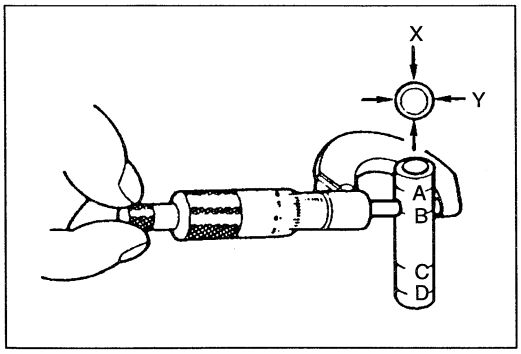
   End gap
   Top: 0.15—0.30 mm {0.0060—0.0118 in}
   Second: 0.25—0.40 mm {0.010—0.015 in}
   Oil rail: 0.20—0.70 mm {0.008—0.027 in}
   Maximum: 1.0 mm {0.0394 in}



Piston and Piston pin

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

   Diameter: 19.988—20.000 mm {0.7870—0.7874 in}



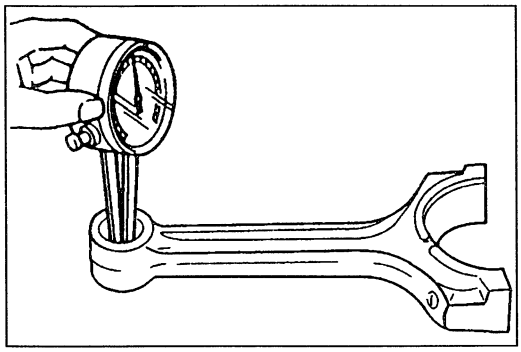
2. Measure the piston pin diameter in X and Y directions at four points as shown.

   Diameter: 19.974—19.980 mm {0.7864—0.7866 in}

3. Calculate the related piston pin-to-piston clearance.

   Clearance: 0.008—0.026 mm {0.0004—0.0010 in}

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



CONNECTING ROD

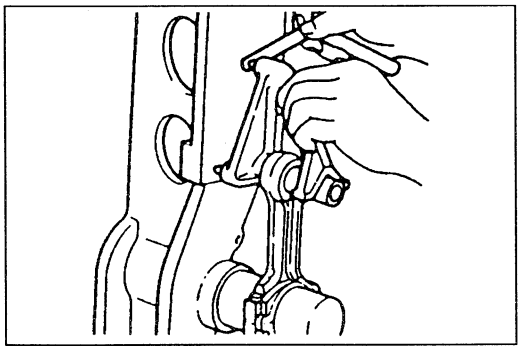
1. Measure the connecting rod small end bore.

   Diameter: 19.943—19.961 mm {0.7852—0.7858 in}

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

   Interference: 0.013—0.037 mm {0.0006—0.0014 in}

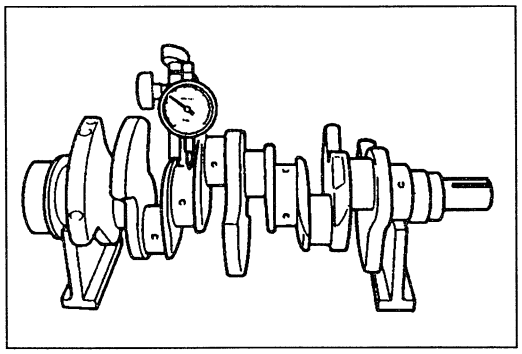
   If the connecting rod is replaced, the connecting rod cap and bolts must also be replaced because they are a matched set.



3. Check each connecting rod for bending. Replace the connecting rod if necessary.

   Bend: 0.05 mm {0.002 in}/50 mm {1.9685 in}

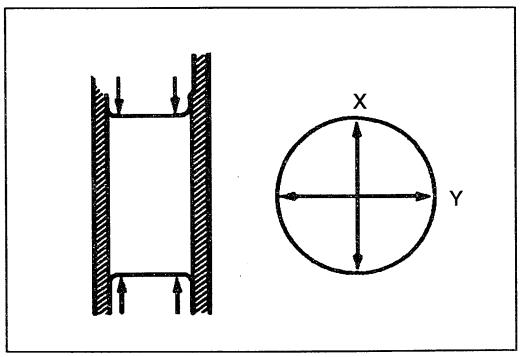
   Length (center to center):
   137.80—137.90 mm {5.4252—5.4291 in}



CRANKSHAFT

1. Check the journals and pins for damage, scoring, and oil hole clogging.
2. Set the crankshaft No.1 and No.4 main journals on V-blocks.
3. Measure the crankshaft runout at the No.2 and No.3 main journals. Replace the crankshaft if necessary.

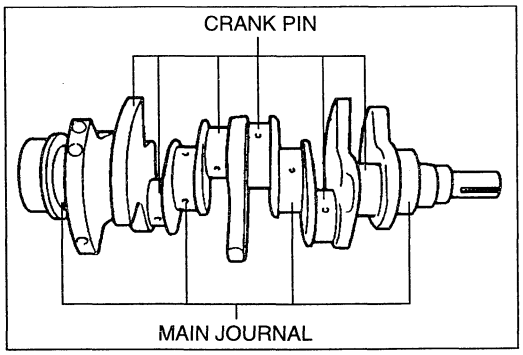
   Runout: 0.015 mm {0.0005 in} max.



4. Measure each journal diameter in X and Y directions at two points as shown.

   Main journal
   Diameter:
   61.938—61.955 mm {2.4385—2.4391 in}
   Out-of-round: 0.05 mm {0.002 in} max.

   Crankpin journal
   Diameter:
   52.940—52.955 mm {2.0843—2.0848 in}
   Out-of-round: 0.05 mm {0.002 in} max.



5. If the diameter is less than the minimum, grind the journals to match undersize bearings.

Undersize bearing: 0.25 mm {0.01 in}

Main journal diameter undersize

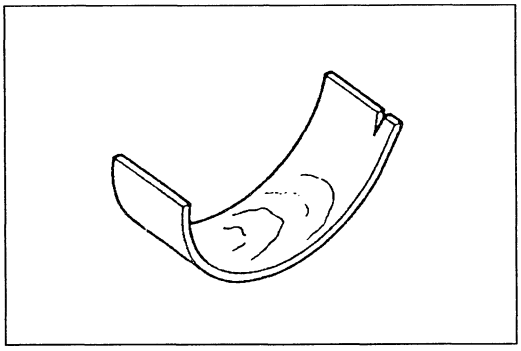
mm {in}

Bearing size	Journal diameter
0.25 {0.01} undersize	61.688—61.705 {2.4287—2.4293}

Crank pin journal diameter undersize

mm {in}

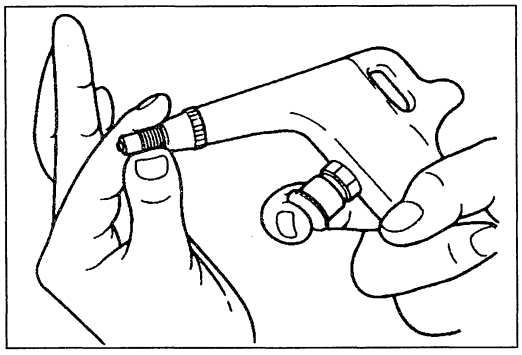
Bearing size	Journal diameter
0.25 {0.01} undersize	52.690—52.705 {2.0745—2.0749}



BEARING

Main Bearing and Connecting Rod Bearing

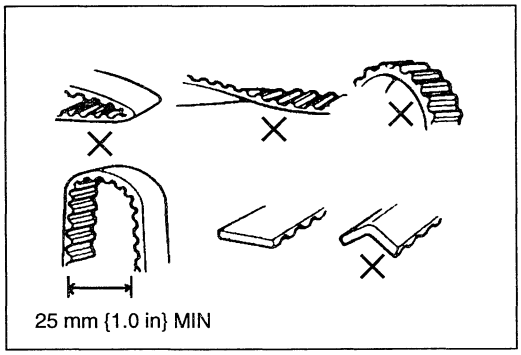
Check the main bearing and the connecting rod bearings for peeling, scoring, and other damage.



OIL JET

Check that air passes through the oil jet when compressed air is applied to it. If air does not pass through the oil jet, replace it.

Compressed air:
216—274 kPa {2.2—2.8 kgf/cm^2, 32—39 psi}

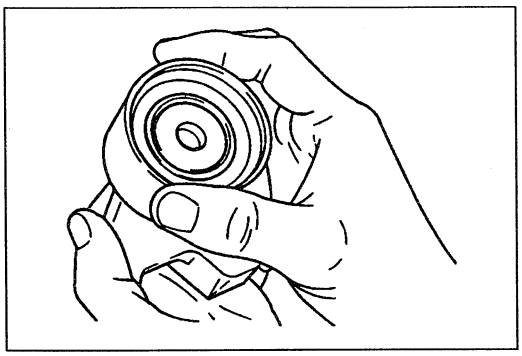


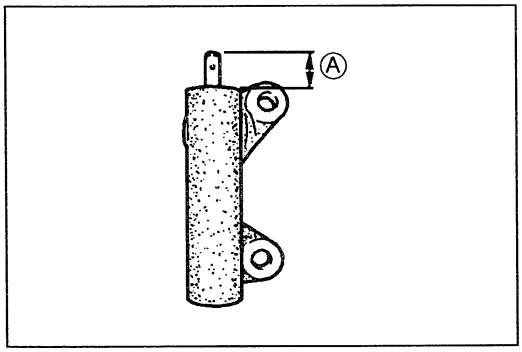
TIMING BELT

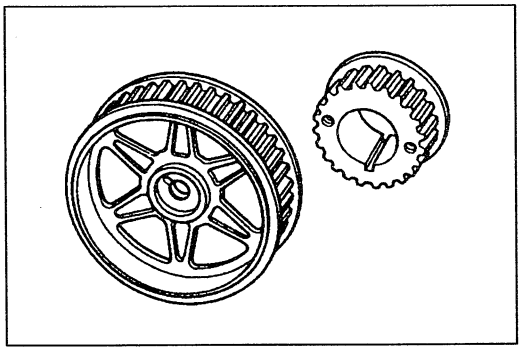
1. Replace the timing belt if there is any oil or grease on it.
2. Check the timing belt for damage, wear, peeling, cracks, and hardening. Replace it if necessary.

Caution

- **The following will damage the belt and shorten its life; Forcefully twisting it, turning it inside out, bending it, or allowing oil or grease on it.**







TIMING BELT AUTO TENSIONER

Caution
- **Using cleaning fluids or a steam cleaner to clean the tensioner can dissolve the grease in its sealed bearing.**

1. Use a clean, soft rag to wipe the idler contact surface.
2. If the idler does not rotate smoothly, replace it.
3. If there are oil leaks, or if there are scratches or abnormal noise when turning the idler, replace it.
4. Check the tensioner pulley for rough rotation and abnormal noise. Replace it if necessary.
5. Check the auto tensioner for oil leakage. Replace it if necessary.
6. Check the tensioner rod projection Ⓐ. Replace the auto tensioner if necessary.

Projection Ⓐ (free length):
14—16 mm {0.56—0.62 in}

PULLEY

Timing Belt Pulley and Camshaft Pulley

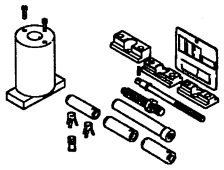
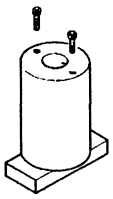
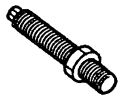
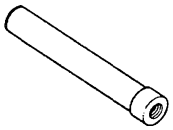
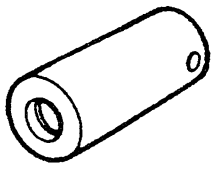
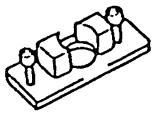
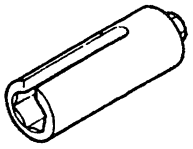
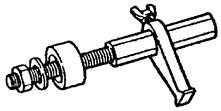
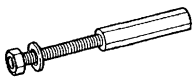
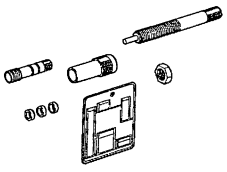
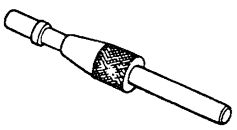
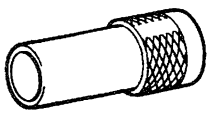
Inspect the teeth of each pulley for wear, deformation, and other damage. Replace as necessary.

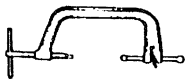
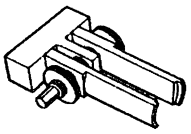
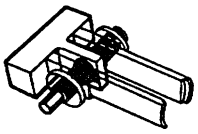
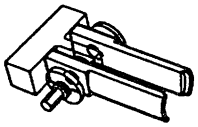
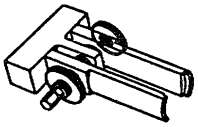
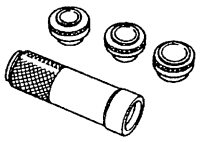
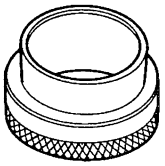
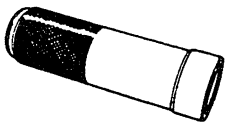
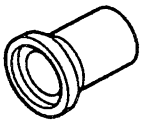
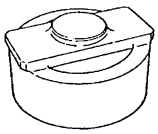
TIMING BELT COVER

Inspect the timing belt covers for damage and cracks. Replace as necessary.

ASSEMBLY

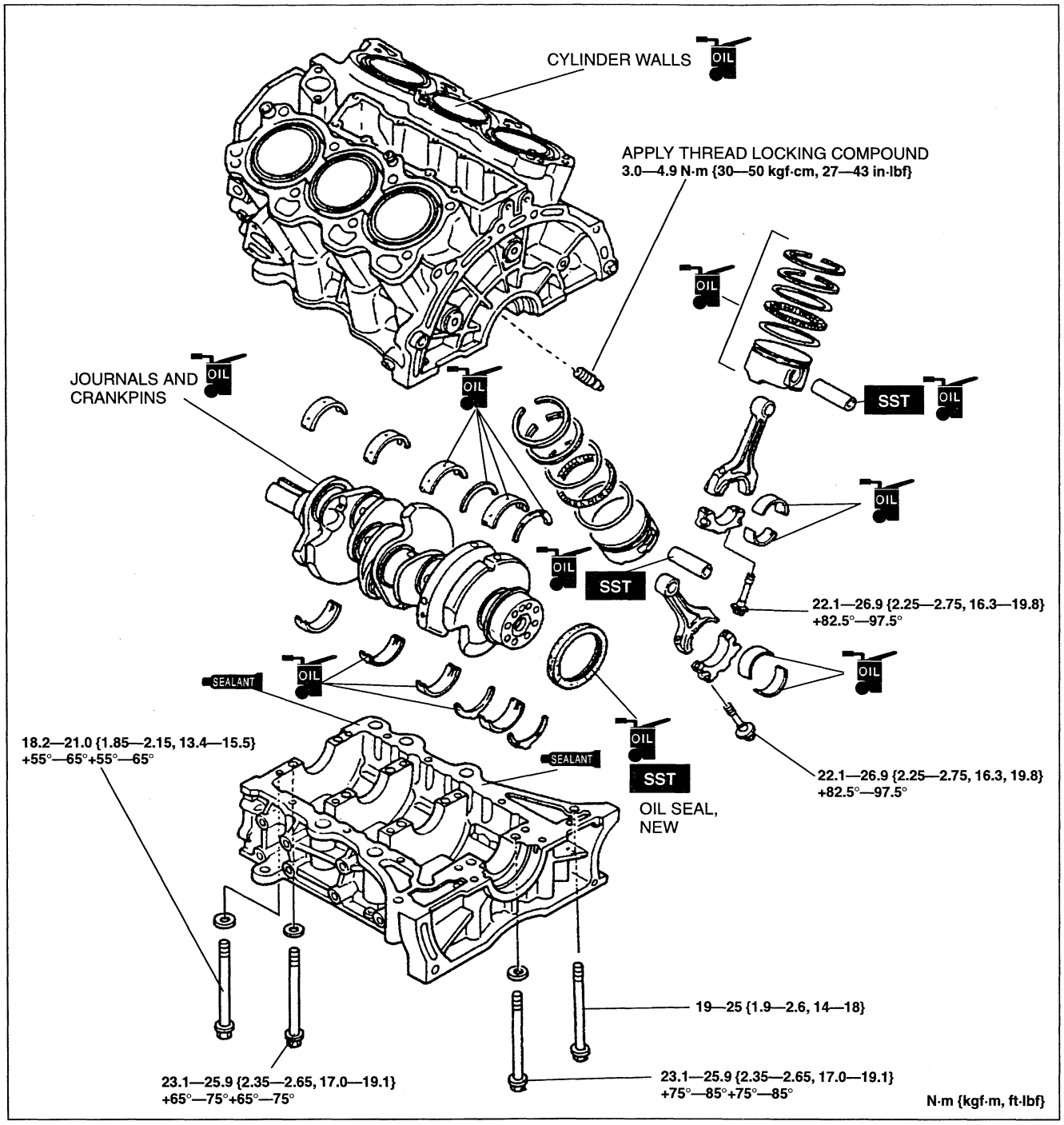
PREPARATION
SST

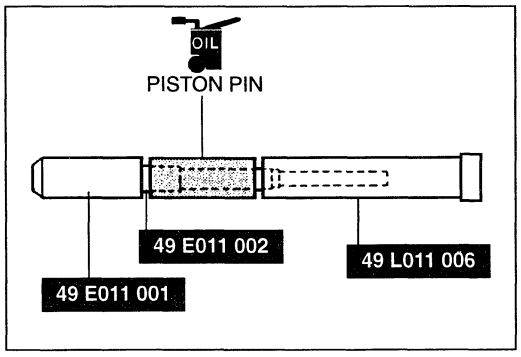
49 L011 0A0B Tool set, piston pin setting 	For removal / installation of piston pins	49 L011 001 Body, support block (Part of 49 L011 0A0B) 	For removal / installation of piston pins
49 L011 005 Bolt, stopper (Part of 49 L011 0A0B) 	For removal / installation of piston pins	49 L011 006 Puller & installer (Part of 49 L011 0A0B) 	For removal / installation of piston pins
49 E011 001 Guide 	For removal / installation of piston pins	49 E011 002 Screw 	For removal / installation of piston pins
49 D011 002B Head, support block (Part of 49 L011 0A0B) 	For removal / installation of piston pins	49 H018 001 Wrench, knock sensor 	For installation of knock sensor
49 E011 1A0 Brake, ring gear 	For prevention of engine rotation	49 E011 103 Shaft (Part of 49 E011 1A0) 	For prevention of engine rotation
49 E011 104 Collar (Part of 49 E011 1A0) 	For prevention of engine rotation	49 E011 105 Stopper (Part of 49 E011 1A0) 	For prevention of engine rotation
49 L012 0A0 Installer set, valve seal & valve guide 	For installation of valve seals	49 SE01 310A Centering tool, clutch disc 	For installation of clutch disc
49 L012 001 Installer (Part of 49 L012 0A0) 	For installation of valve seals	49 L012 002 Body (Part of 49 L012 0A0) 	For installation of valve seals

49 L012 005 Spacer (Part of 49 L012 0A0) 	For installation of valve seals	49 0636 100B Arm, valve spring lifter 	For removal / installation of valves
49 B012 0A2 Pivot 	For removal / installation of valves	49 B012 012 Body (Part of 49 B012 0A2) 	For removal / installation of valves
49 B012 013 Foot (Part of 49 B012 0A2) 	For removal / installation of valves	49 B012 014 Locknut (Part of 49 B012 0A2) 	For removal / installation of valves
49 F401 330B Installer set, bearing 	For installation of camshaft oil seal	49 F401 337A Attachment C (Part of 49 F401 330B) 	For installation of camshaft oil seal
49 F401 331 Body (Part of 49 F401 330B) 	For installation of camshaft oil seal	49 H010 401 Installer, oil seal 	For installation of front oil seal
49 G019 017 Installer, oil seal 	For installation of rear oil seal	49 G014 001 Wrench, oil filter 	For removal / installation of oil filter

1. Do not reuse gaskets or oil seals.
2. Clean all parts before reinstallation.
3. Apply clean engine oil to all sliding and rotating parts.
4. Replace plain bearings if they are peeled, burned, or otherwise damaged.
5. Tighten all bolts and nuts to the specified torque.

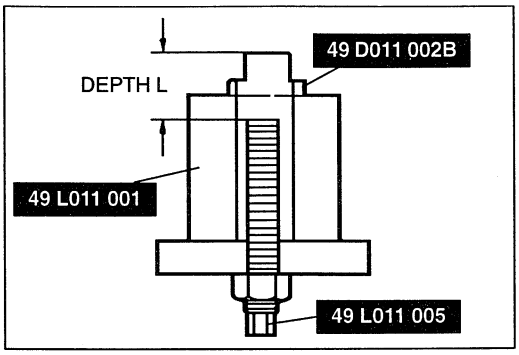
CYLINDER BLOCK (INTERNAL PARTS)
Torque Specifications





Connecting Rod

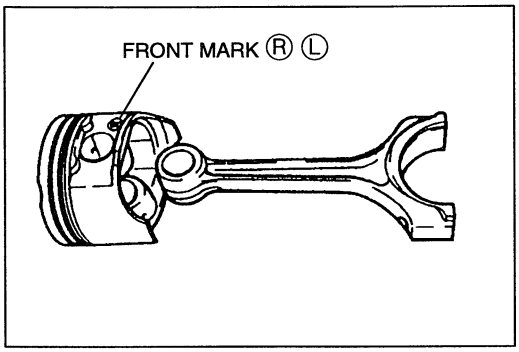
1. Assemble the **SST** (tool set, piston pin setting) to the piston pin.
2. Apply clean engine oil to the piston pin.



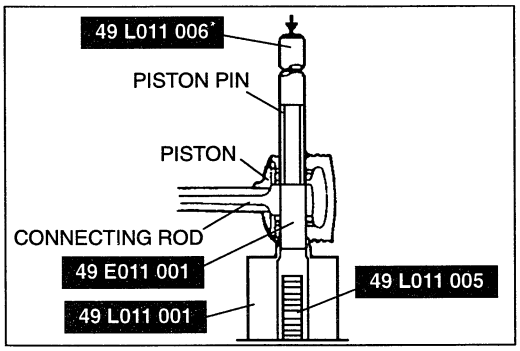
3. Set the **SST** (stopper bolt) so that the depth L is as specified.

   Depth L: 61.5 mm {2.421 in}

4. Tighten the locknut.

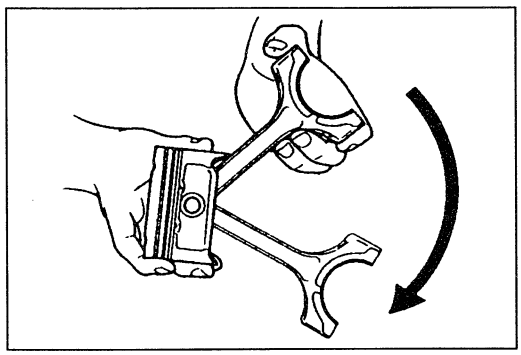


5. Assemble the piston and the connecting rod.
6. Insert the **SST** (tool set, piston pin setting) assembled in step 1 into the piston pin hole.
7. Mount the piston and connecting rod onto the **SST** (support block).



8. Verify that the **SST** fits squarely into the piston before pressing.
9. Press the piston pin into the piston and connecting rod until the **SST** (piston pin guide) contacts the **SST** (stopper bolt).
10. While inserting the piston pin, note the pressing force. If it is not within the specification, replace the piston pin and/or the connecting rod.

    Pressing force:
    3,923—12,748 N {400—1,300 kgf, 880—2,860 lbf}

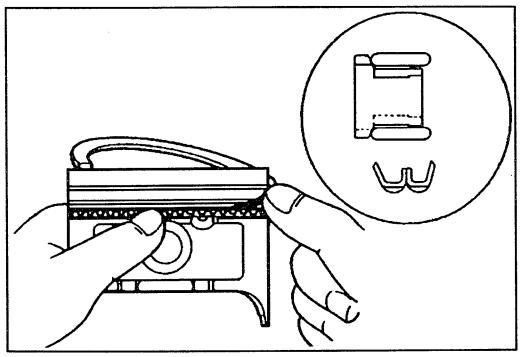


11. Check the connecting rod oscillation torque. (Refer to page B2–69.)

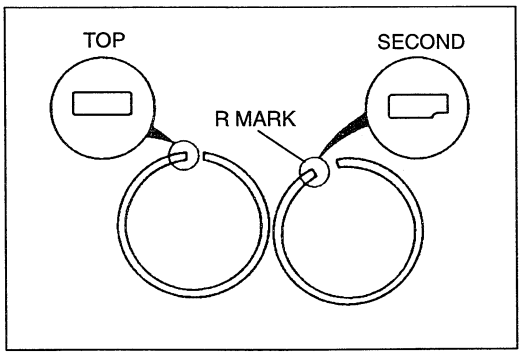
Piston Ring

Caution
- **If reusing an oil ring, it must be reinstalled in the same place and face the same direction as when removed. If this is not done, it can cause premature and uneven wear.**

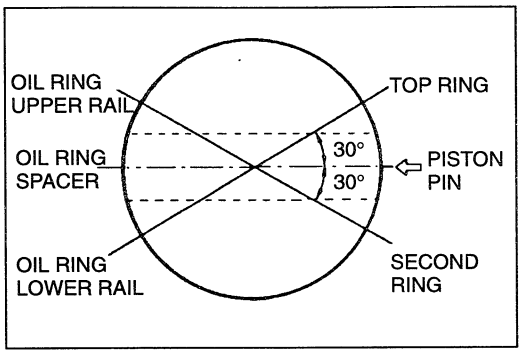
Note
- The upper and lower rails are the same. They can be installed with either face upward.



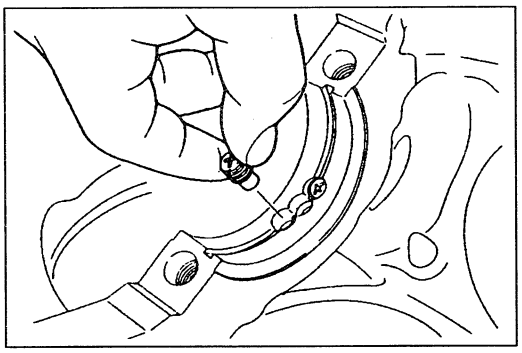
1. Install the three-piece oil rings on the pistons.
   (1) Apply clean engine oil to the oil ring spacer and rails.
   (2) Install the oil ring spacer so that the opening faces upward.
   (3) Install the upper rail and lower rail.
2. Verify that the spacer tang separates the rails, and that the rails turn smoothly in both directions.



3. Install the rings with the R marks facing upward.
4. Using a piston ring expander, install the second ring with the scraper face downward.
5. Using a piston ring expander, install the top ring.
6. Apply clean engine oil to the piston rings.



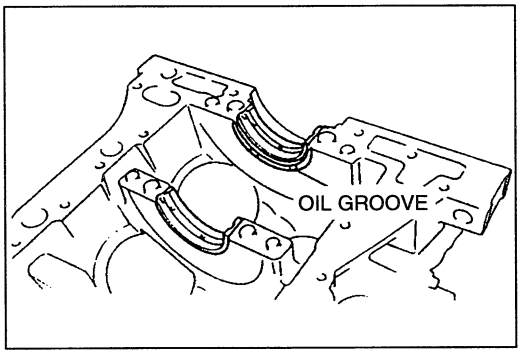
7. Position the end gap of each ring as shown.



Oil jet

1. Apply a thread locking compound to the oil jet threads.
2. Install the oil jets into the upper cylinder block.

Tightening torque:
3.0—4.9 N·m {30—50 kgf·cm, 27—43 in·lbf}



Crankshaft

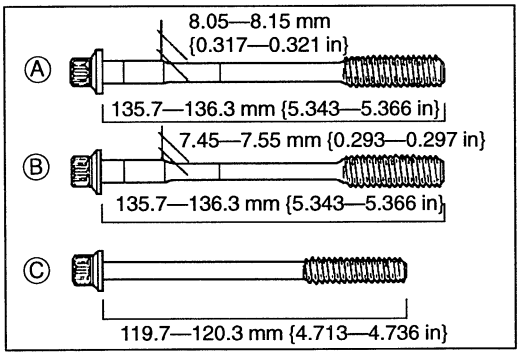
1. Measure the main bearing oil clearances as described below.

Oil clearance inspection

2. Install the upper main bearings (with oil groove) and the upper thrust bearings.
   (1) Remove any foreign material and oil from the journals and bearings.
   (2) Install the upper main bearings and upper thrust bearings.

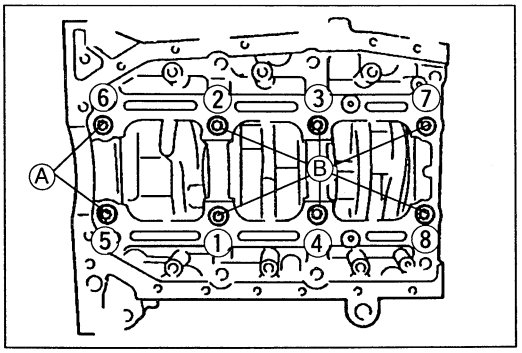
Note

- No.4 bearing is wider than other bearings.



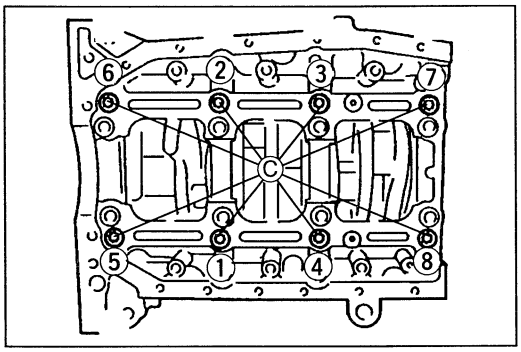
   (3) Install the lower cylinder block along with the lower main bearings and lower thrust bearings.
   (4) Measure the length of each lower cylinder block bolt. Replace any that exceed the maximum length.

Main bolt (A and B)
Length: 135.7—136.3 mm {5.343—5.366 in}
Maximum: 138.5 mm {5.452 in}
Sub bolt (C)
Length: 119.7—120.3 mm {4.713—4.736 in}
Maximum: 121.0 mm {4.763 in}

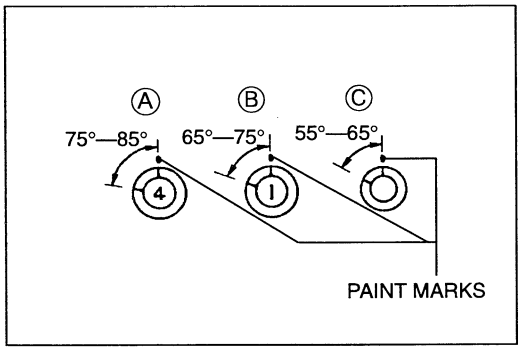


(5) Apply clean engine oil to the bolt threads and seat faces of the lower cylinder block bolts.
(6) Tighten the bolts in two or three steps in the order shown.

Tightening torque
Main bolts Ⓐ, Ⓑ: 23.1—25.9 N·m {2.35—2.65 kgf·m, 17.0—19.1 ft·lbf}
Sub bolts Ⓒ: 18.2—21.0 N·m {1.85—2.15 kgf·m, 13.4—15.5 ft·lbf}



Note
- Bolts Ⓐ are marked "4" on the head.
- Bolts Ⓑ are marked "I" on the head.
- Bolts Ⓒ are no marked on the head.

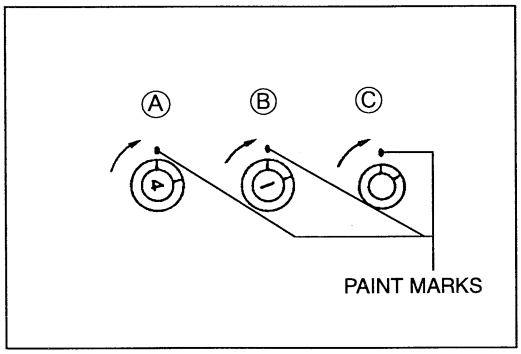


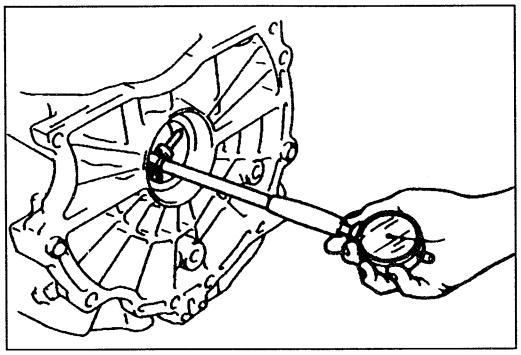
(7) Put a paint mark on the lower cylinder block next to the Ⓐ, Ⓑ, Ⓒ bolt flange marks as shown.
(8) Using the marks as a reference, further tighten the Ⓐ, Ⓑ, Ⓒ bolts in the order shown.

Main bolt Ⓐ (No.4 journals): 75°—85°
Main bolt Ⓑ (No.1—No.3 journals): 65°—75°
Sub bolt Ⓒ: 55°—65°

(9) Tighten the bolts till the mark on each bolt flange aligns with the corresponding paint mark.

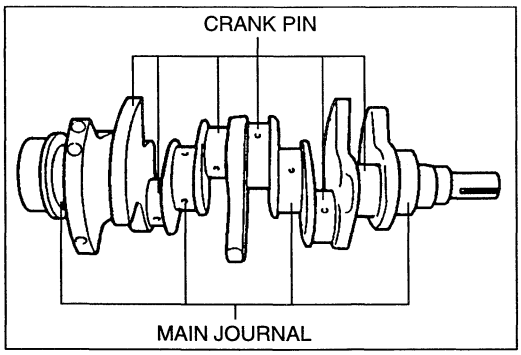
(10) Further tighten each bolt by performing steps (7), (8).





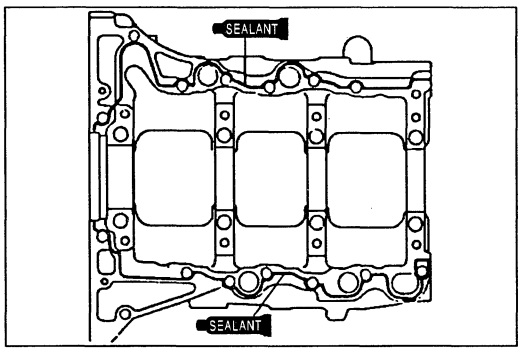
(11) After tightening, measure the cylinder block No.1—No.4 journal bore diameter.
(12) Subtract the main journal diameter from the bore diameter.
(13) If the oil clearance exceeds the maximum, replace the bearing or grind the crankshaft and install undersize main bearings. (Refer to page B2–83.)

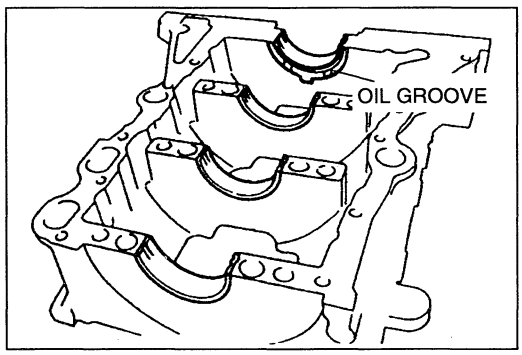
Oil clearance: 0.037—0.057 mm {0.0015—0.0022 in}
Maximum: 0.064 mm {0.0025 in}



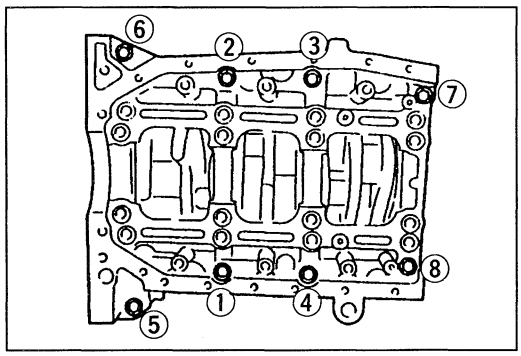
Main journal diameter
Standard:
61.938—61.955 mm {2.4385—2.4391 in}
0.25 mm {0.01 in} undersize:
61.688—61.705 mm {2.4287—2.4293 in}

(14) Remove the lower cylinder block in the reverse order of step (6).



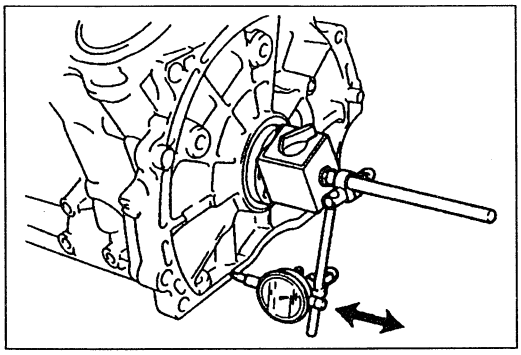


3. Install the lower cylinder block as follows:
   (1) Install the upper thrust bearings in the upper cylinder block.
   (2) Apply clean engine oil to the main bearings, thrust bearings, and main journals.
   (3) Install the crankshaft in the upper cylinder block.
   (4) Remove any foreign material, oil, and sealant from the contact surfaces of the upper cylinder block and lower cylinder block.
   (5) Apply a continuous bead of silicone sealant to the contact surface as shown.
   (6) Install the lower cylinder block, lower main bearings, and lower thrust bearings within five minutes of applying the sealant.
   (7) Install the lower cylinder block along with the lower main bearings and lower thrust bearings.
   (8) Apply clean engine oil to the threads and seat faces of the lower cylinder block bolts.
   (9) Tighten the main bolts Ⓐ, Ⓑ and sub cap bolts Ⓒ as in steps 2—(6)/2—(10).



(10) Tighten the lower cylinder block bolts in the order shown.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

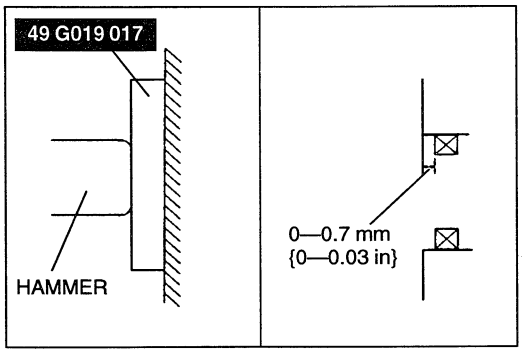


4. Inspect the crankshaft end play.

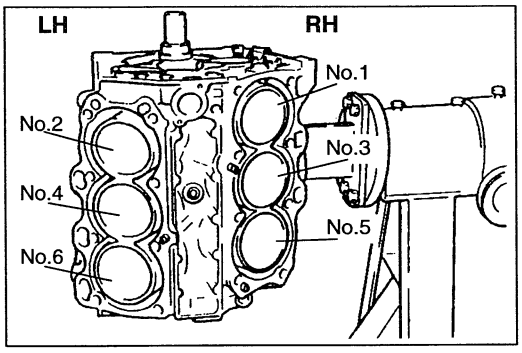
   End play: 0.08—0.282 mm {0.0032—0.0111 in}
   Maximum: 0.32 mm {0.0126 in}

5. If the end play exceeds the maximum, grind the crankshaft and install oversize thrust bearings or replace the crankshaft and thrust bearing.

   Thrust bearing width
   Standard:
   2.000—2.050 mm {0.0788—0.0807 in}
   0.25 mm {0.01 in} oversize:
   2.125—2.175 mm {0.0837—0.0856 in}
   0.50 mm {0.02 in} oversize:
   2.250—2.300 mm {0.0886—0.0905 in}



6. Apply clean engine oil to the lip of the new oil seal.
7. Push the oil seal slightly in by hand.
8. Using the **SST** and a hammer, tap the oil seal in evenly until it is flush with the edge of the rear cover.

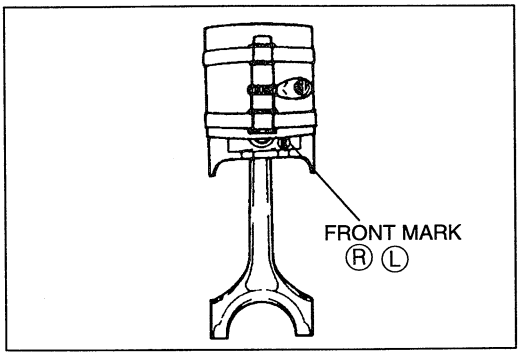


Piston and Connecting Rod Assembly

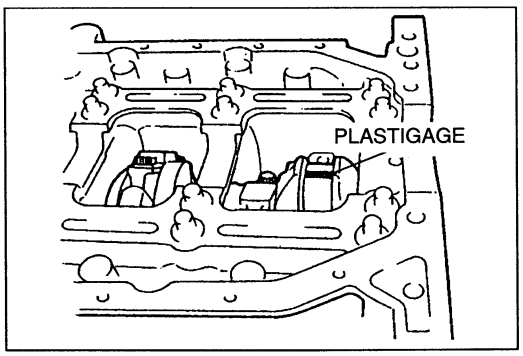
1. Rotate the engine on the engine stand as shown.

   Note
   - Assembly is easier if the pistons are installed with the crankpin at the BDC position.

2. Remove any foreign material and oil from the connecting rod journals and bearings.
3. Install the upper connecting rod bearings in the connecting rods.
4. Apply clean engine oil to the cylinder walls, pistons, piston rings and connecting rod cap bolts.

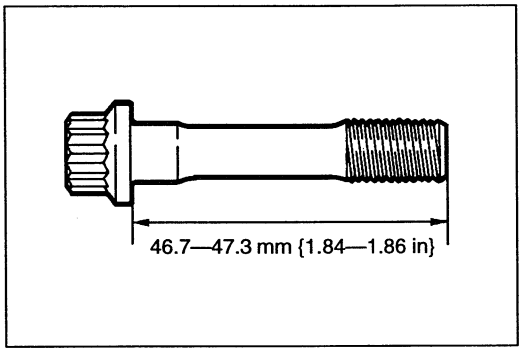


5. Check the piston rings for proper end gap positioning.
6. Insert the piston assemblies into the cylinder block with the Ⓛ mark (left bank) and the Ⓡ mark (right bank) facing the front of the engine. Use a piston installer tool to install.



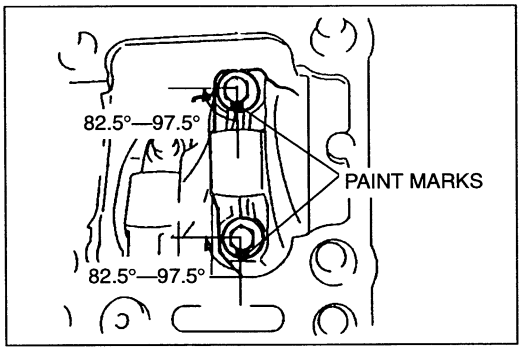
Connecting Rod Cap

1. Measure the connecting rod bearing oil clearances as follows.
   (1) Measure the oil clearance with the connecting rod in BDC position.
   (2) Do not rotate the crankshaft when measuring the oil clearances.



   (3) Position Plastigage atop the journals in the axial direction.
   (4) Remove any foreign material and oil from the lower connecting rod bearing and connecting rod cap.
   (5) Install the connecting rod bearing in the cap.
   (6) Measure the length of connecting rod cap bolt. Replace it if the length exceeds the maximum.

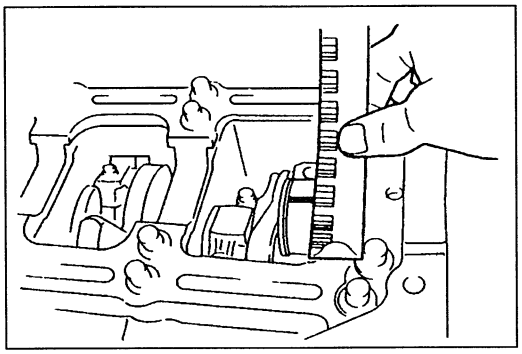
Length: 46.7—47.3 mm {1.84—1.86 in}
Maximum: 48.0 mm {1.89 in}



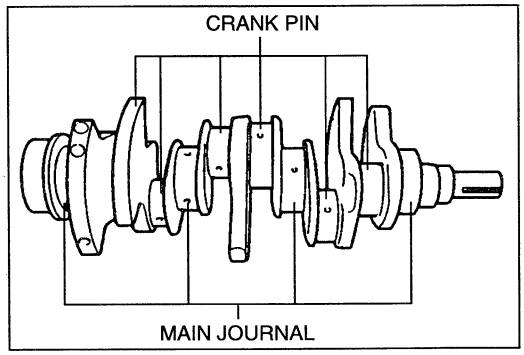
   (7) Apply clean engine oil to the threads and seat faces of the connecting rod cap bolts.
   (8) Install the connecting rod cap.
   (9) Tighten the connecting rod cap bolts.

Tightening torque:
22.1—26.9 N·m {2.25—2.75 kgf·m, 16.3—19.8 ft·lbf}

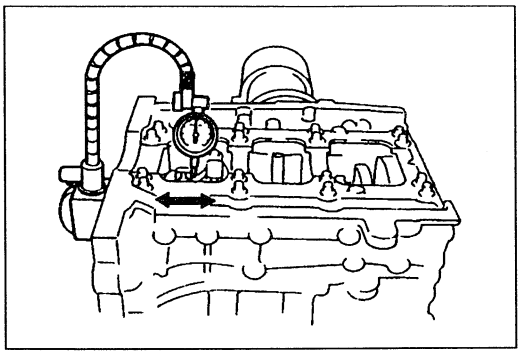
   (10) Put a paint mark on each bolt head.
   (11) Using this mark as a reference, tighten the bolts **82.5°—97.5°**.
   (12) Remove the connecting rod cap.
   (13) Measure the Plastigage at each journal at the widest point for the smallest clearance, and the narrowest point for the largest clearance.



Oil clearance: 0.023—0.043 mm {0.0010—0.0016 in}
Maximum: 0.08 mm {0.0031 in}



   (14) If the oil clearance exceeds the maximum, grind the crankshaft and install undersize bearings. (Refer to page B2–83.)

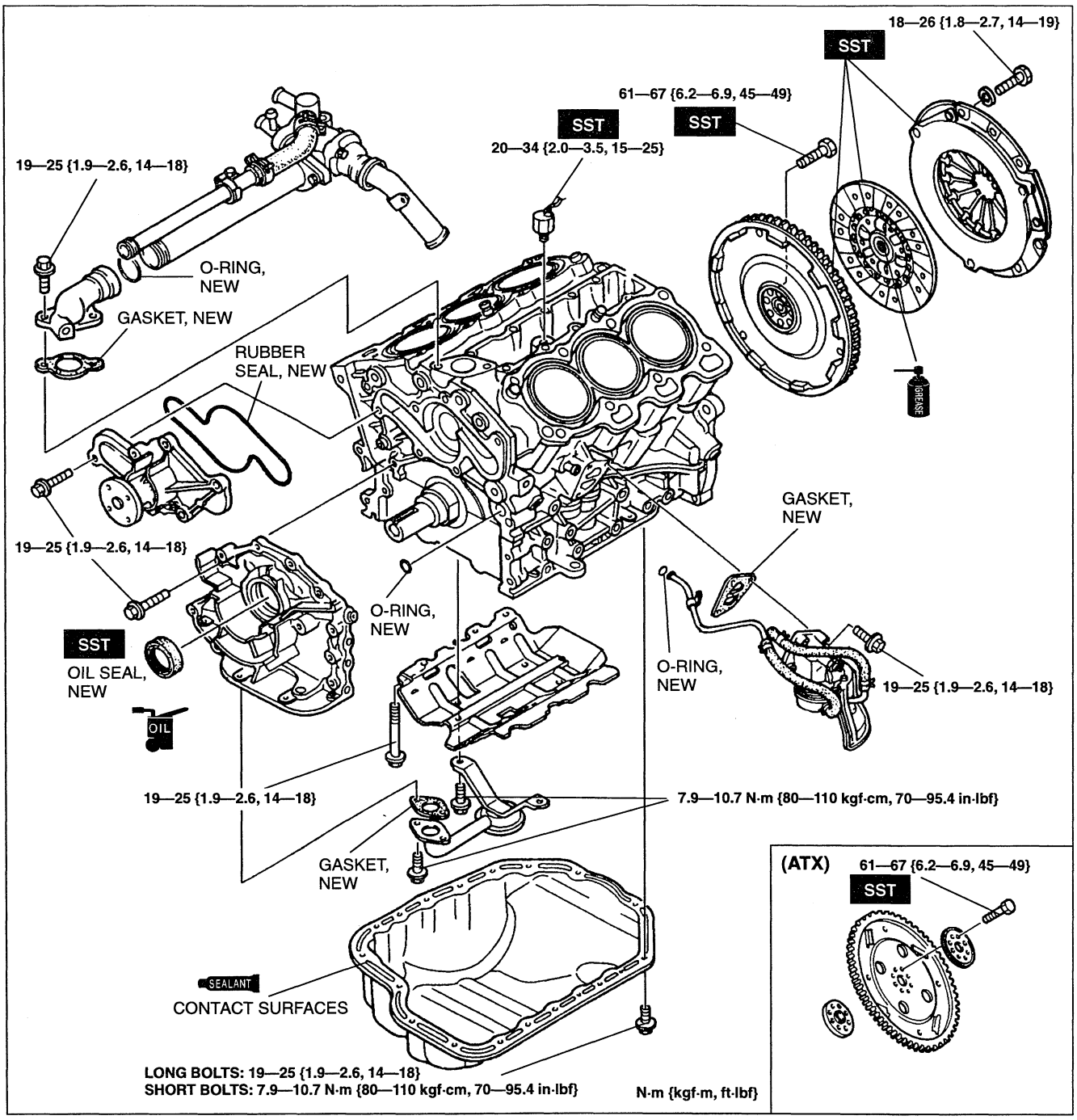


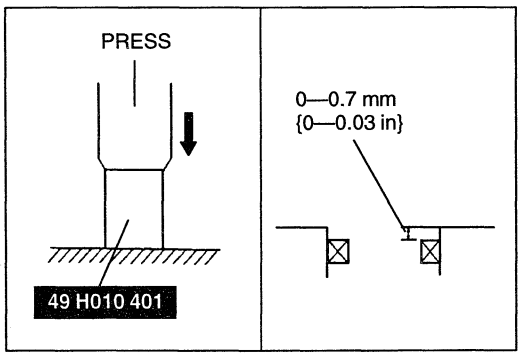
2. Install the connecting rod caps as follows.
   (1) Remove the Plastigage from the journals and bearings.
   (2) Apply clean engine oil to the connecting rod bearings.
   (3) Install the connecting rod bearings and caps.
   (4) Apply engine oil to the threads and seat faces of the cap bolts and tighten them as in step 1.
   (5) Verify that the crankshaft rotates smoothly by hand.
3. Measure the connecting rod side clearances.
   (1) Measure each connecting rod side clearance.

   Side clearance: 0.178—0.330 mm {0.0071—0.0129 in}
   Maximum: 0.40 mm {0.0157 in}

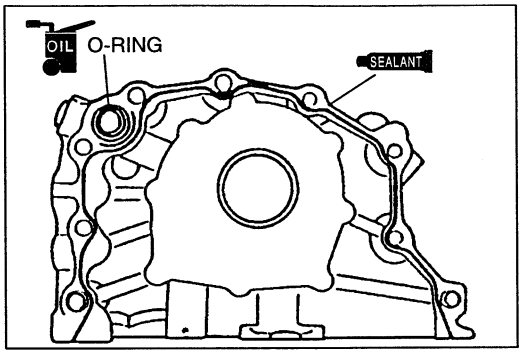
   (2) If the clearance exceeds the maximum, replace the connecting rod and cap assembly.

CYLINDER BLOCK (EXTERNAL PARTS)
Torque Specifications



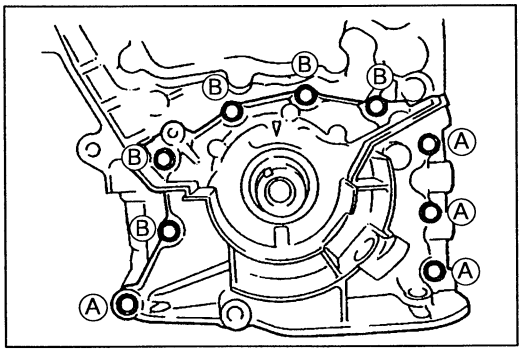


Oil Pump
1. Apply clean engine oil to the new oil seal.
2. Install the oil seal into the oil pump body by hand.
3. Press the oil seal into the oil pump body by using the **SST**.



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

Caution
- **Keep the oil hole free of sealant to prevent engine damage.**

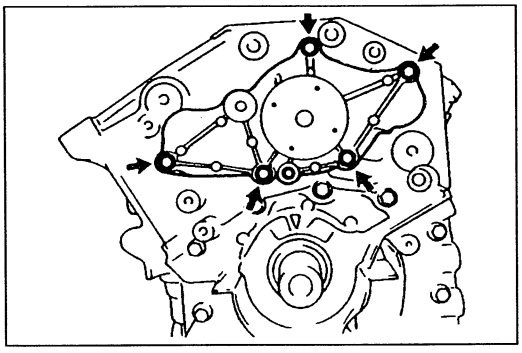


7. Apply clean engine oil to the oil seal lip.
8. Install the oil pump within five minutes of applying the sealant, making sure that the O-ring doesn't come out.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

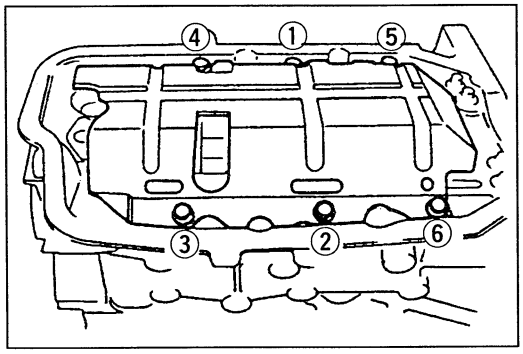
Bolt length
Ⓐ: 40 mm {1.57 in}
Ⓑ: 25 mm {0.98 in}

9. Cut away the portion of the gasket that projects toward the oil pan.



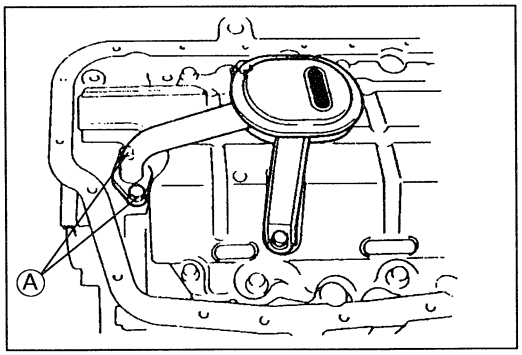
Water Pump
1. Remove all dirt, grease, and other material from the water pump mounting surface.
2. Install a new rubber seal and the water pump.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



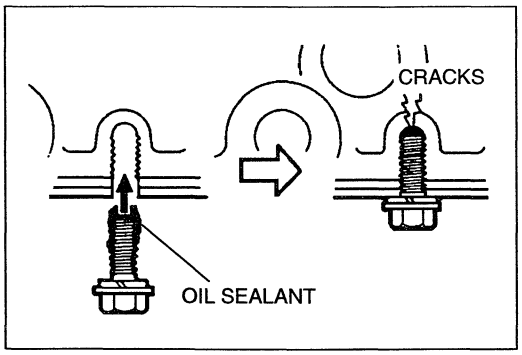
Oil Baffle
1. Remove any dirt or other material from the oil baffle.
2. Install the oil baffle and tighten the bolts gradually in two or three steps in the order shown.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



Oil Strainer
Install a new gasket and the oil strainer onto the oil pump body. Tighten bolts Ⓐ first.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

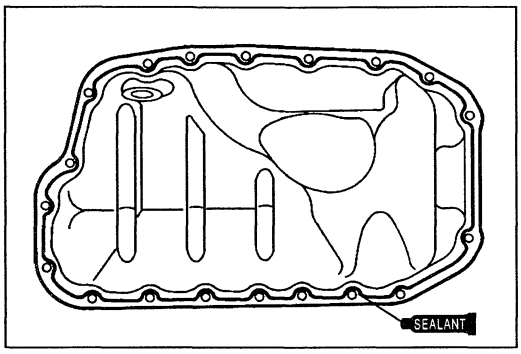


Oil Pan

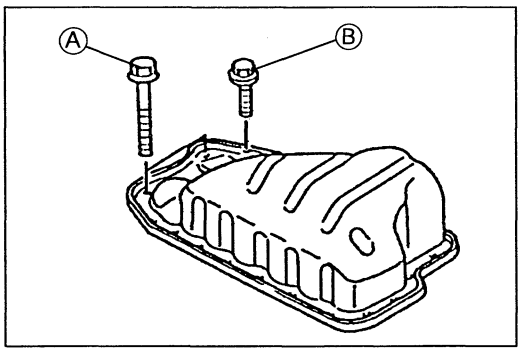
1. Remove the sealant from the oil pan bolts and bolt holes in the lower cylinder block.

Caution

- **If the bolts are reused, remove the old sealant from the bolt threads. Tightening a bolt that has old sealant on it can cause thread damage.**



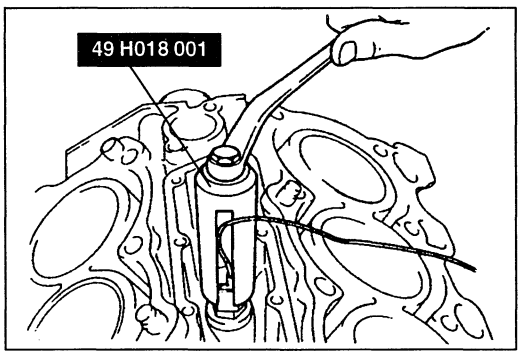
2. Remove any dirt and oil from the contact surfaces.
3. Apply a continuous bead of silicone sealant to the oil pan along the inside of the bolt holes, and overlap the ends.



4. Install the oil pan within five minutes of applying the sealant.

Tightening torque

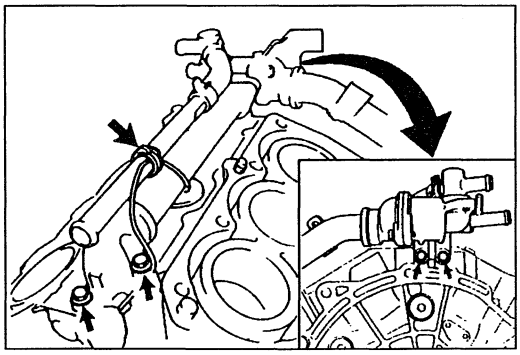
Ⓐ: 19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}
Ⓑ: 7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



Knock Sensor

Install the knock sensor by using the **SST**.

Tightening torque:
20—34 N·m {2.0—3.5 kgf·m, 15—25 ft·lbf}



Water Pipe and Thermostat Housing

1. Install a new gasket and install the water pipe and thermostat housing as an assembly.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

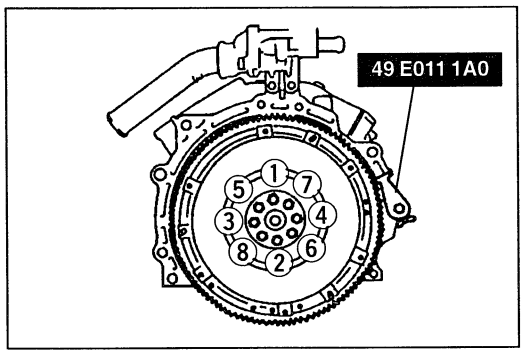
2. Secure the knock sensor harness to the water pipe with the clip as shown.

Oil Cooler

1. Install a new gasket and the oil cooler.

   Tightening torque:
   19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

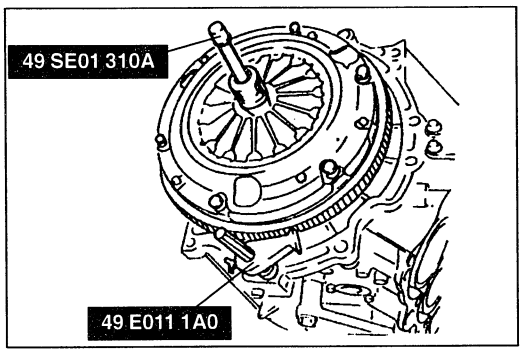
2. Connect the water hoses.



Flywheel (MTX)

1. Set the flywheel onto the crankshaft.
2. Hold the flywheel by using the **SST**.
3. Tighten the bolts in two or three steps in the order shown.

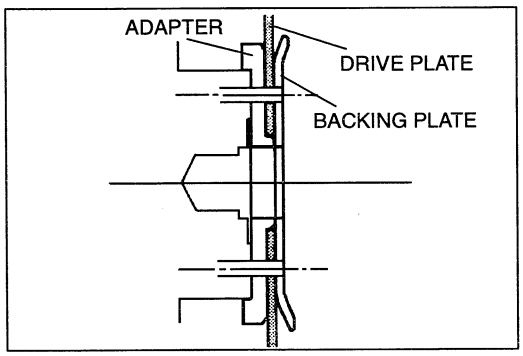
   Tightening torque:
   61—67 N·m {6.2—6.9 kgf·m, 45—49 ft·lbf}



Clutch Disc and Clutch Cover (MTX)

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

Tightening torque:
18—26 N·m {1.8—2.7 kgf·m, 14—19 ft·lbf}



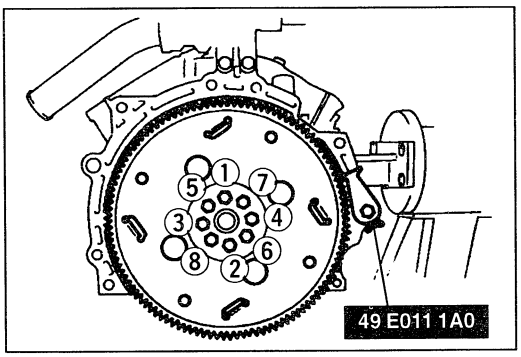
Drive Plate (ATX)

Caution

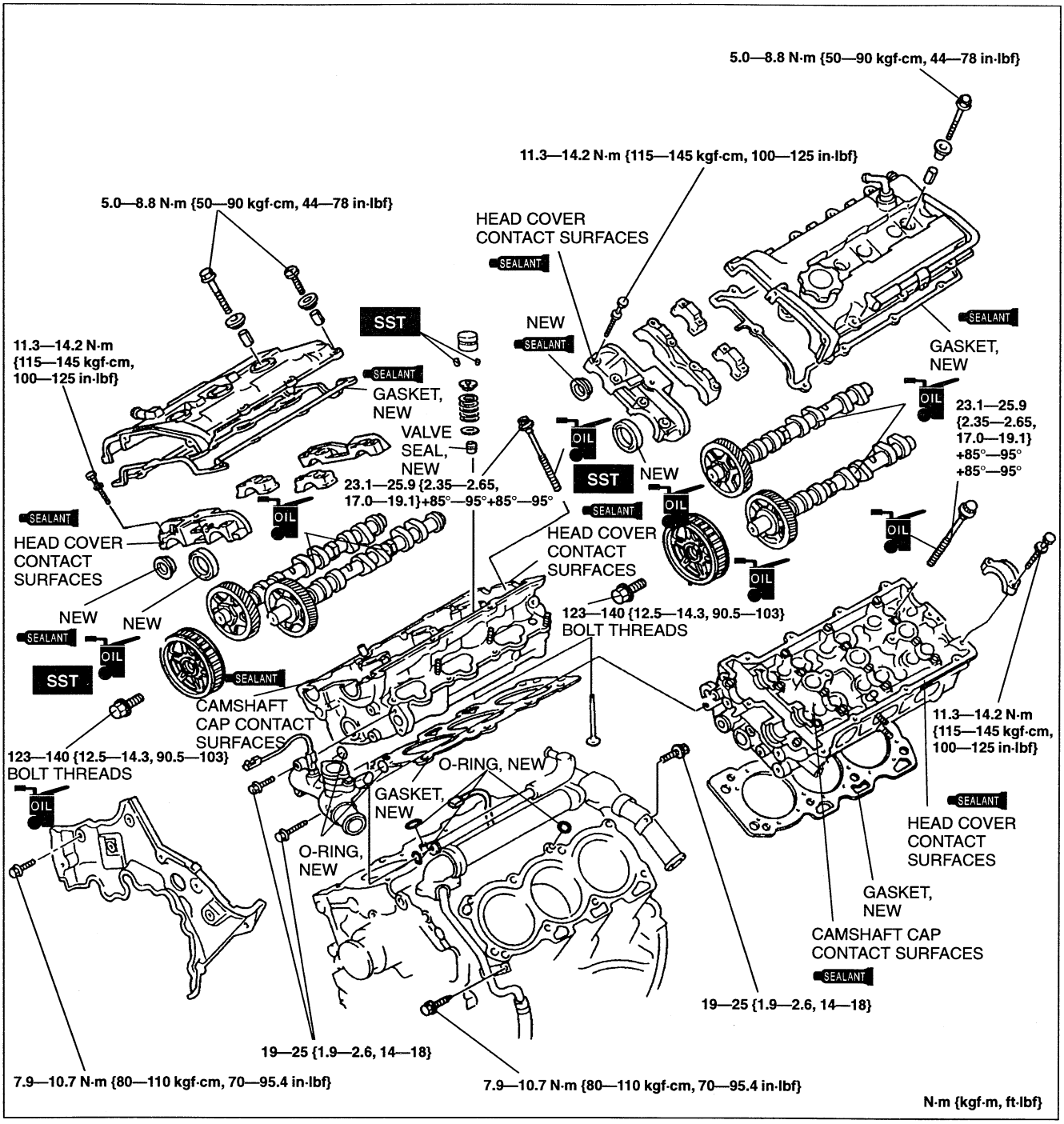
- **Verify that the adapter and the backing plate are mounted in the directions shown. Incorrect mounting can damage the engine and transmission.**

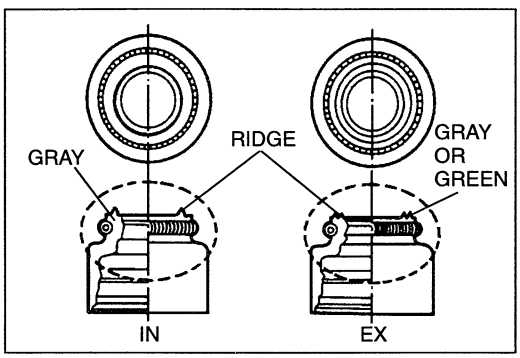
1. Install the following parts to the crankshaft.
   (1) Adapter
   (2) Drive plate
   (3) Backing plate
2. Hand tighten the lock bolts.
3. Hold the drive plate by using the **SST**.
4. Tighten the bolts in two or three steps in the order shown.

   Tightening torque:
   61—67 N·m {6.2—6.9 kgf·m, 45—49 ft·lbf}



CYLINDER HEAD
Torque Specifications

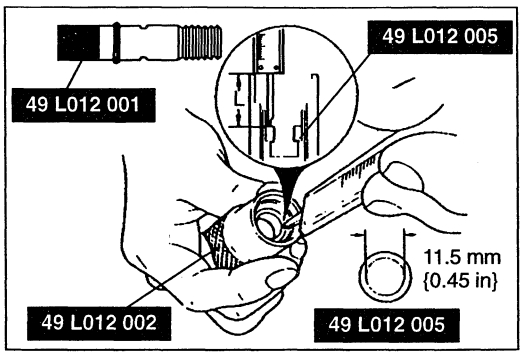




Valve Seal

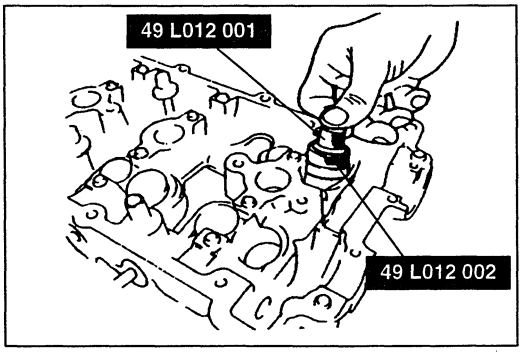
The intake and exhaust valve seals are different as shown.

	Ridge	Color
Intake	No or One	Gray
Exhaust	Two	Gray or Green



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

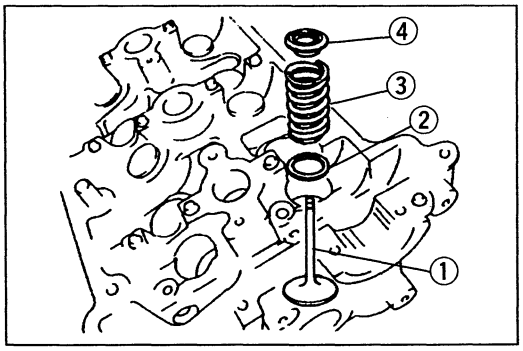
Depth L
IN: 16.3 mm {0.642 in}
EX: 13.8 mm {0.543 in}



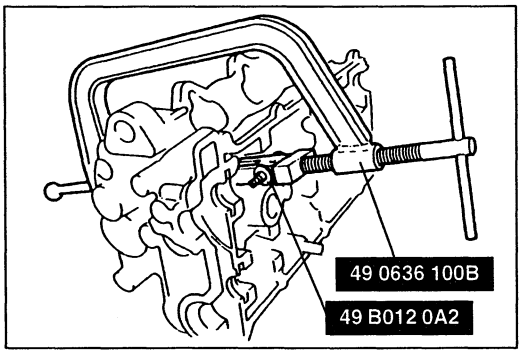
2. Slide the valve seal onto the valve guide with the **SST**.
3. Set the **SST** against the valve seal.

Caution
- **Using a hammer will damage the valve seal.**

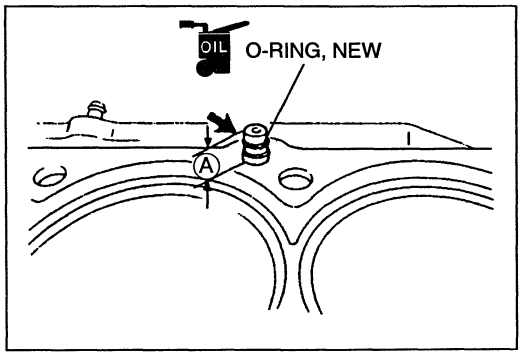
4. Using the **SST**, press the valve seal on by hand until the **SST** touches the cylinder head.



Valve and Valve Spring
1. Install the lower spring seat.
2. Install the valve.
3. Install the valve spring with the closer pitch toward the cylinder head.
4. Install the upper spring seat.



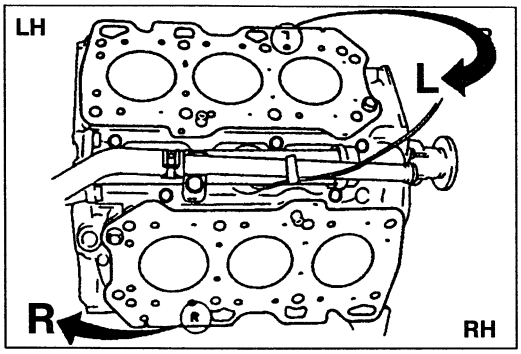
5. Compress the valve spring with the **SST**, and install the valve keepers.
6. Remove the **SST**.
7. Tap the end of the valve stem lightly two or three times with a plastic hammer to verify that the keepers are fully seated.
8. Using a flashlight, verify that all valve springs are fully seated in the cylinder head.



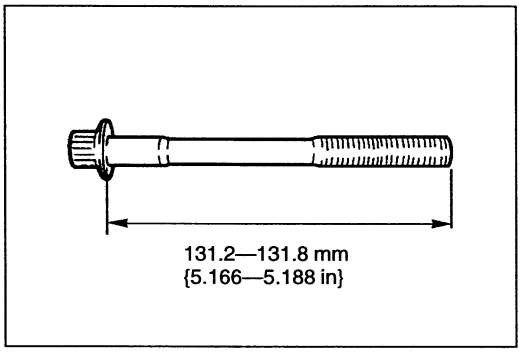
Cylinder Head
1. Measure the amount of the oil control plug projection from the deck of the cylinder block.

Projection Ⓐ: 13.0—14.0 mm {0.52—0.55 in}

2. Apply clean engine oil to new O-rings and install them to the oil control plugs.

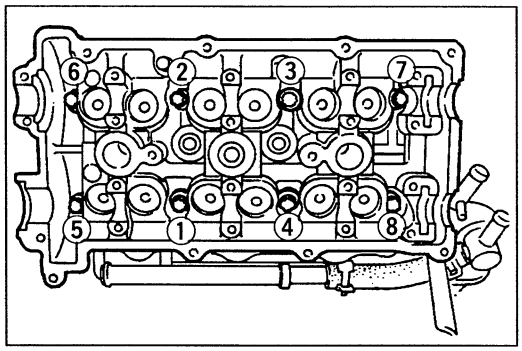


3. Thoroughly remove all dirt, oil, and other material from the decks of the cylinder block.
4. Turn the crankshaft clockwise and apply engine oil to the cylinder walls.
5. Place a new cylinder head gasket on the left bank with the L mark.
6. Place a new cylinder head gasket on the right bank with the R mark.



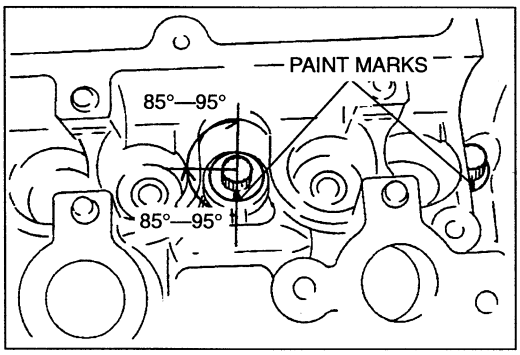
7. Install the cylinder heads to the cylinder block.
8. Tighten the cylinder head bolts as described below.
   (1) Before installation, measure the length of each bolt. Replace a bolt if it exceeds the maximum length.

Length: 131.2—131.8 mm {5.166—5.188 in}
Maximum: 132.5 mm {5.217 in}

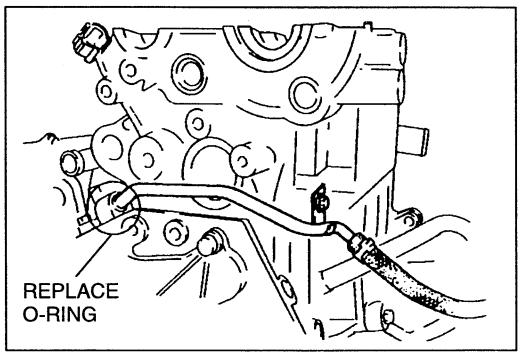


   (2) Apply clean engine oil to the threads and the seat face of each bolt and install them.
   (3) Tighten the bolts in two or three steps in the order shown.

Tightening torque:
23.1—25.9 N·m {2.35—2.65 kgf·m, 17.0—19.1 ft·lbf}

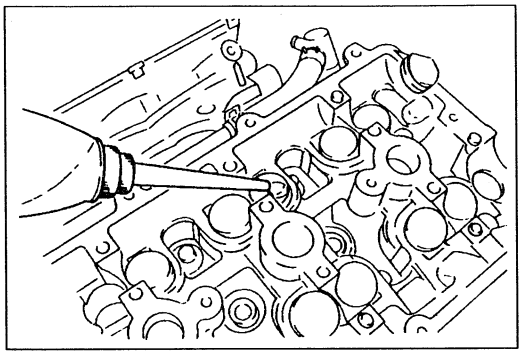


   (4) Put a paint mark on each bolt head.
   (5) Using the marks as a reference, tighten the bolts by turning each **85°—95°** in the sequence shown.
   (6) Further tighten each bolt by turning another **85°—95°**.



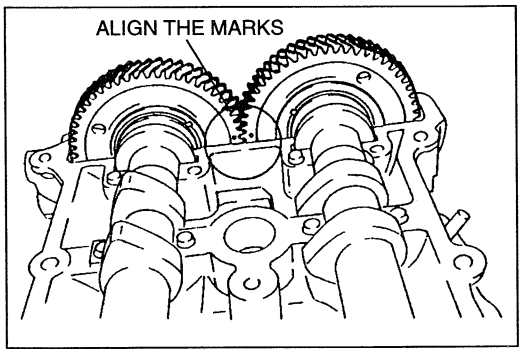
9. Connect the water pipe to the water pipe elbow and secure to the cylinder head.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



HLA

1. Apply clean engine oil to the friction surfaces.
2. If the HLA are being reused, install them in the positions from which they were removed.
3. Verify that the HLA move smoothly in their bores.

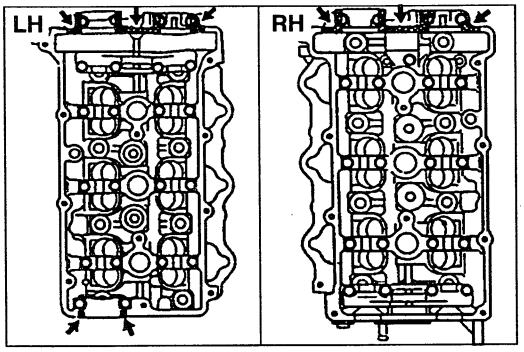


Camshaft

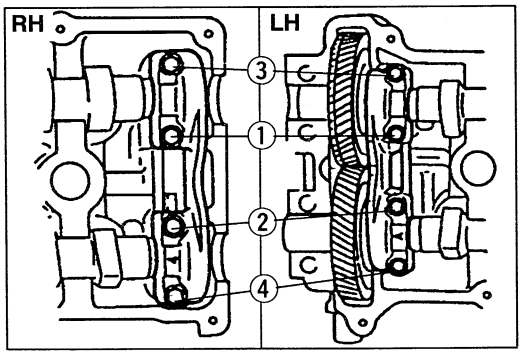
Caution

- **Camshafts must be assembled in the following procedure. Otherwise, camshaft can be broken or damaged because there is little camshaft clearance.**

1. Apply clean engine oil to the camshaft journals and the supports.
2. Install the camshafts so that the intake camshaft gear mark and exhaust camshaft gear mark align.
3. Remove the oil and dirt from the mating surfaces between the front camshaft cap and the cylinder head, and degrease.
4. Apply a light coat of silicone sealant to the shaded areas shown.



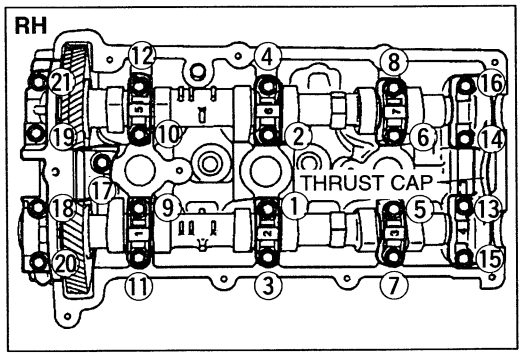
Thickness: ϕ1.5—2.5 mm {0.06—0.09 in}



Caution

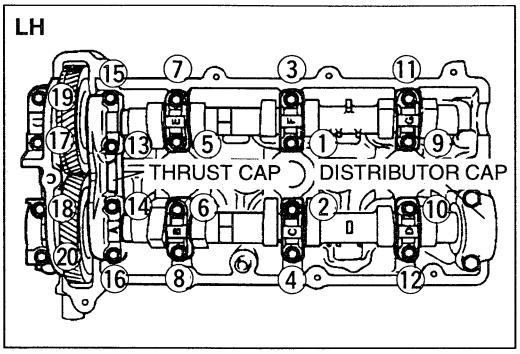
- **Install the thrust caps (RH is marked 4, LH is marked A) first. Otherwise, camshaft can be broken or damaged.**

5. Install the thrust caps onto the cylinder heads. Hand tighten the bolts in five or six steps in the order shown, until the thrust caps fully seated on the cylinder heads.



6. Install the camshaft caps onto the cylinder heads. Hand tighten the bolts gradually in five or six steps in the order shown, until the camshaft caps fully seated on the cylinder heads.
7. Tighten the bolts in the order shown.

Tightening torque:
11.3—14.2 N·m {115—145 kgf·cm, 100—125 in·lbf}

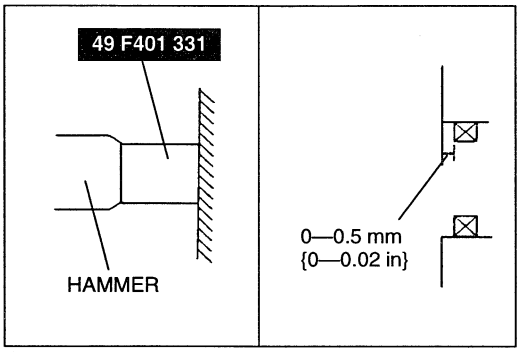


8. Retighten the bolts in the order shown.

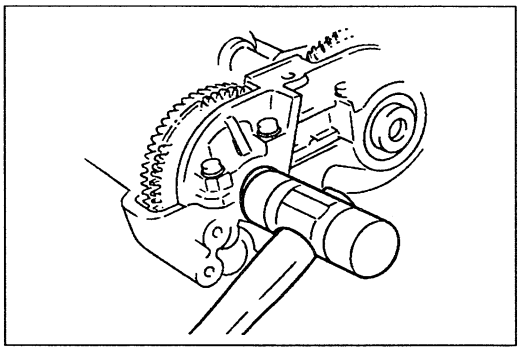
Tightening torque:
11.3—14.2 N·m {115—145 kgf·cm, 100—125 in·lbf}

9. Install the distributor cap onto the cylinder head. (LH)
10. Tighten the distributor cap bolts.

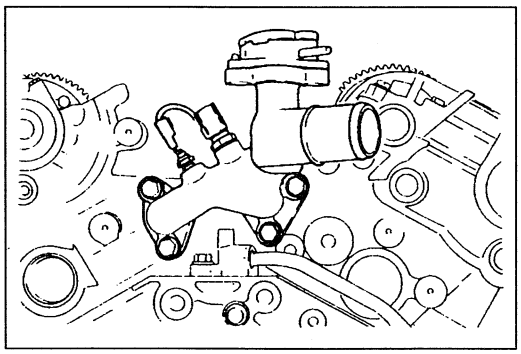
Tightening torque:
11.3—14.2 N·m {115—145 kgf·cm, 100—125 in·lbf}



11. Apply clean engine oil to the lip of the new camshaft oil seal.
12. Push the oil seal slightly in by hand.
13. Using the **SST** and a hammer, tap the camshaft oil seal in evenly until it is flush with the edge of the camshaft cap.

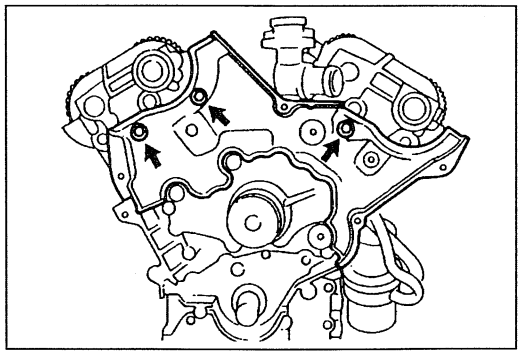


14. Tap in the new blind cap by using a plastic hammer.



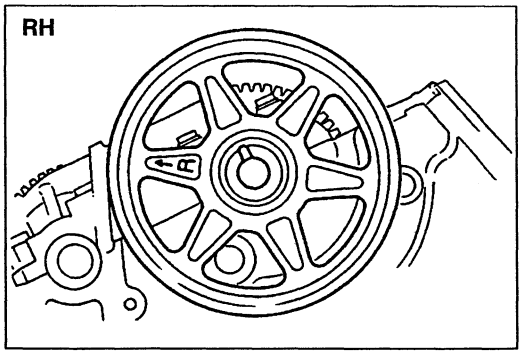
Water Outlet
Install the water outlet with new O-rings.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



Seal Plate
Install the seal plate.

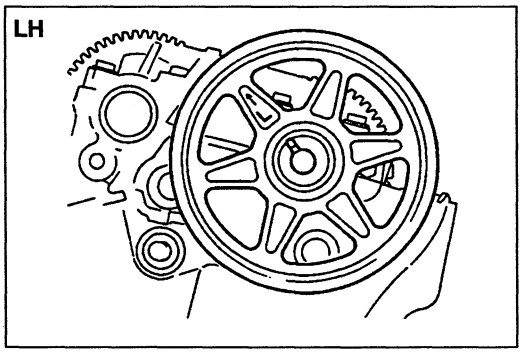
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



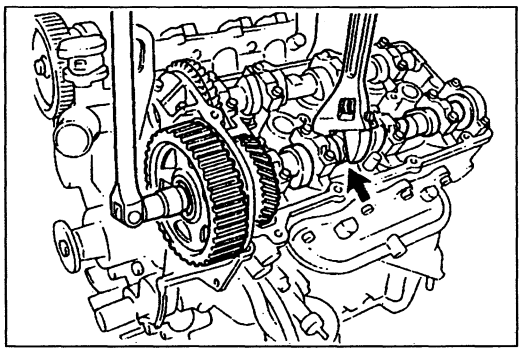
Camshaft Pulley

The right and left pulleys are different and must be installed on the same head that they were removed from.

1. Install the RH camshaft pulley so that the "R" mark can be seen and the groove aligns with the camshaft knock pin.



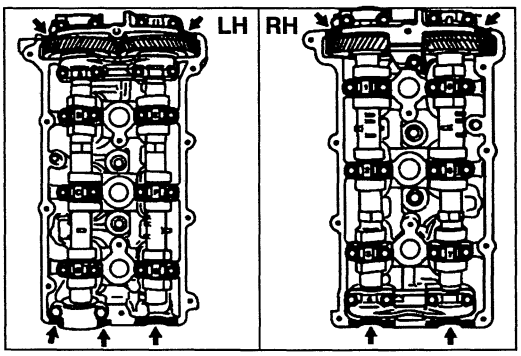
2. Install the LH camshaft pulley so that the "L" mark can be seen and the groove aligns with the camshaft knock pin.



Camshaft Pulley Bolt

1. Apply clean engine oil to the camshaft pulley bolt threads.
2. Hold the camshaft by using a wrench on the cast hexagon as shown, and tighten the camshaft pulley bolt.

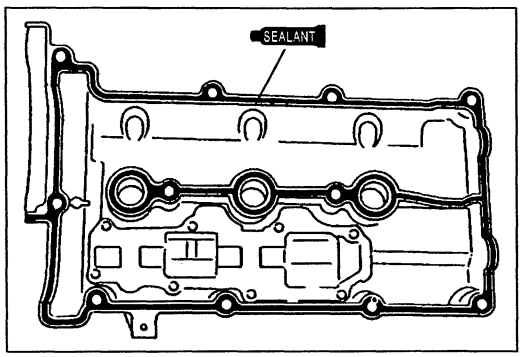
Tightening torque:
123—140 N·m {12.5—14.3 kgf·m, 90.5—103 ft·lbf}



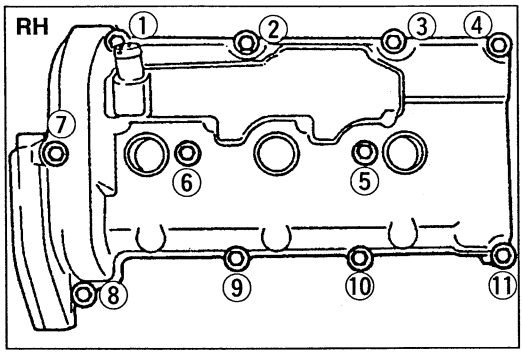
Cylinder Head Cover

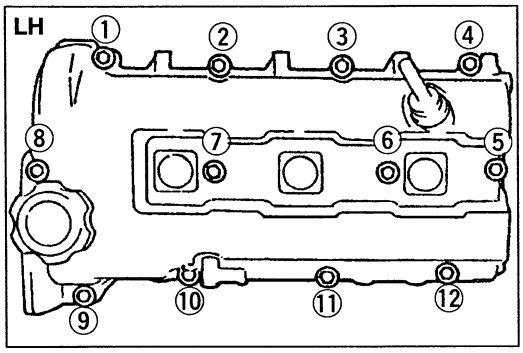
1. Remove all dirt, old sealant and other material from the cylinder head and cover.
2. Apply silicone sealant to the shaded ares shown.

Thickness: ϕ1.5—2.5 mm {0.06—0.09 in}



3. Coat a new gasket with silicone sealant.
4. Install the gasket onto the cylinder head cover.





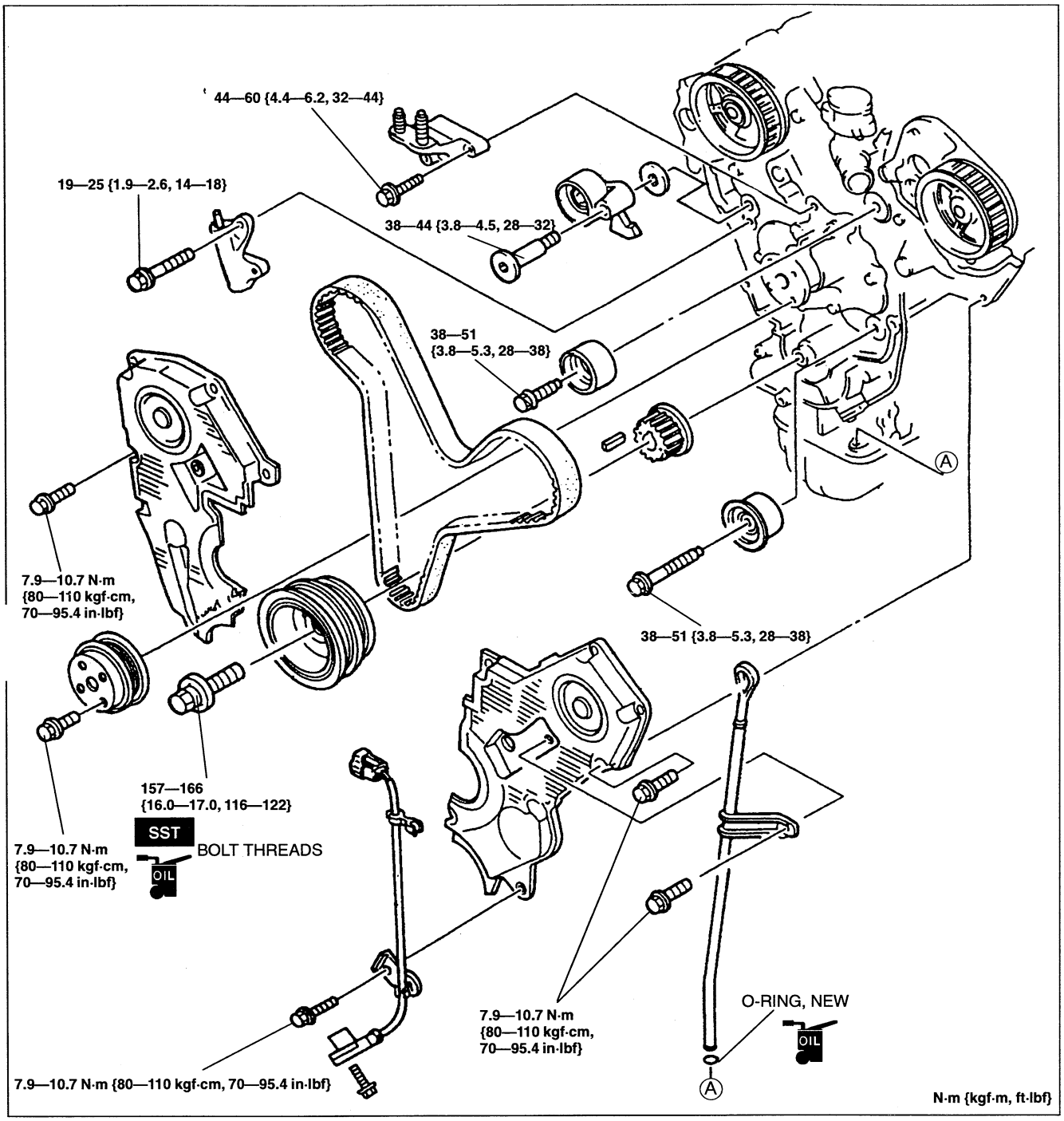
5. Install the cylinder head cover and tighten the bolts in five or six steps in the order shown.

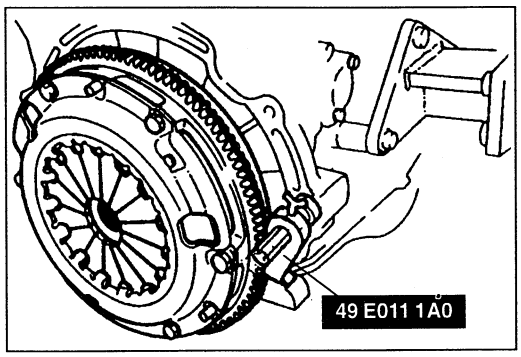
   Tightening torque:
   5.0—8.8 N·m {50—90 kgf·cm, 44—78 in·lbf}

6. Recheck the torque of the bolts indicated, and tighten them if necessary.

   RH: ⑤, ⑥
   LH: ⑥, ⑦

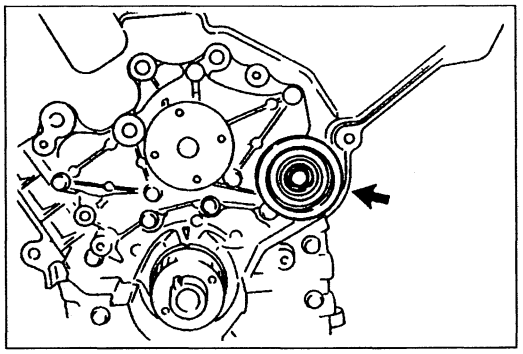
TIMING BELT
Torque Specification





Timing Belt Pulley

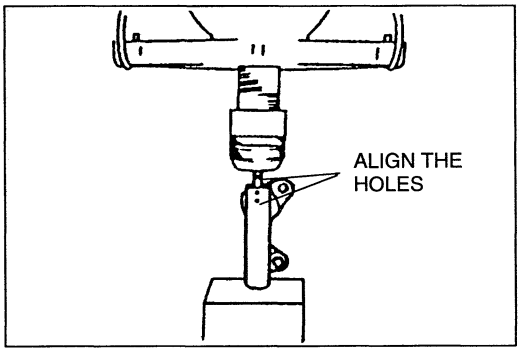
1. Hold the flywheel by using the **SST**.
2. Install the timing belt pulley key and the timing belt pulley on the crankshaft.
3. Temporarily tighten the timing belt pulley bolt.



No.2 Idler Pulley

Install the No.2 idler pulley to the cylinder block.

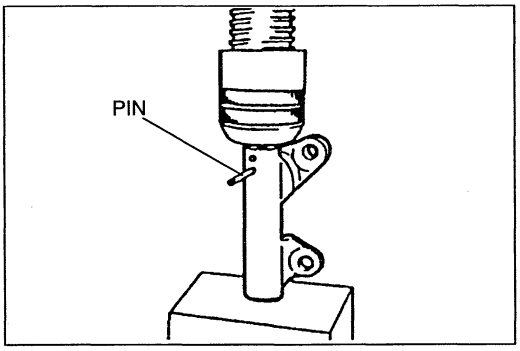
Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



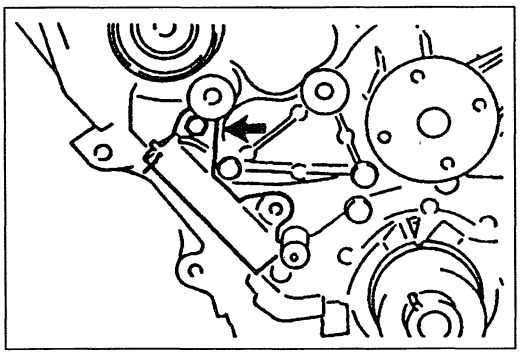
Timing Belt Auto Tensioner

1. Press in the tensioner rod slowly, using a press or a vise.

Caution
- **Do not press the tensioner rod to more than 9,807 N {1,000 kgf, 2,200 lbf}. It will damage the tensioner.**



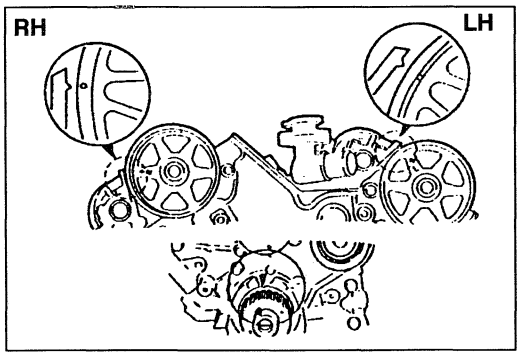
2. Insert a pin to hold the tensioner rod in the body.



3. Install the auto tensioner to the cylinder block and hand tighten the upper tensioner bolt so that the tensioner can move.

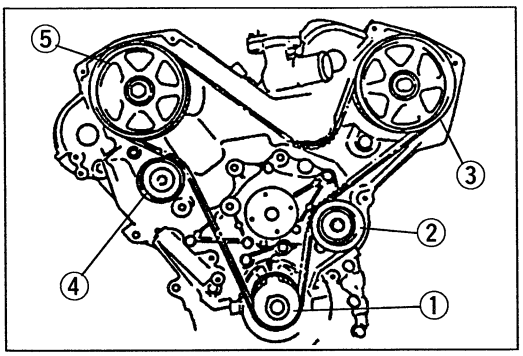
Note
- This must be done to reduce the timing belt resistance when the idler pulley is installed.

4. Temporarily install the tensioner pulley.

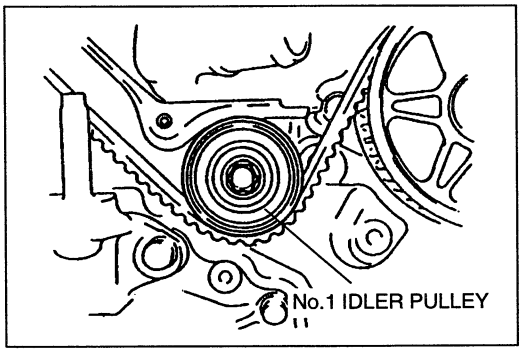


Timing Belt

1. Align the matching marks of the pulleys.

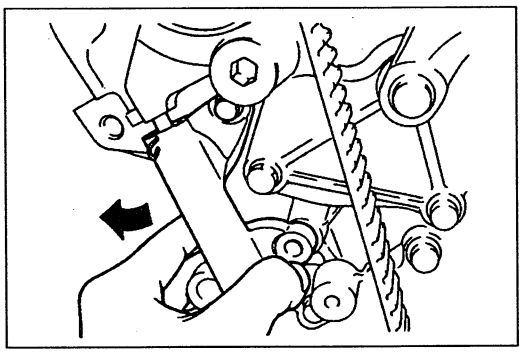


2. Install the timing belt on the pulleys in the order described below.
   ① Timing belt pulley
   ② No.2 idler pulley
   ③ LH camshaft pulley
   ④ Tensioner pulley
   ⑤ RH camshaft pulley
3. Verify that there is tension between pulleys ③ and ①, and between pulleys ① and ⑤.



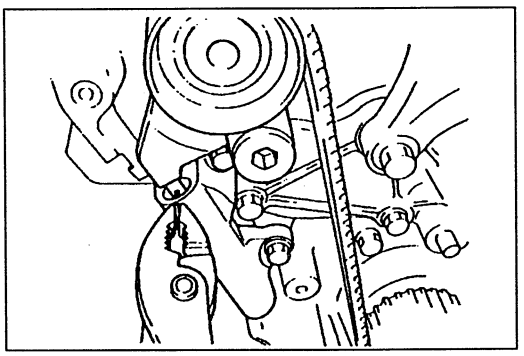
4. Install the No.1 idler pulley while applying the pressure on the timing belt.

   Tightening torque:
   38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



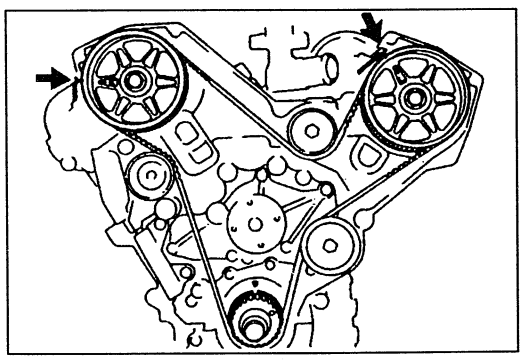
5. Push the auto tensioner in the direction of the arrow and install the lower bolt.
6. Tighten the upper and lower tensioner bolts to the specified torque.

   Tightening torque:
   19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

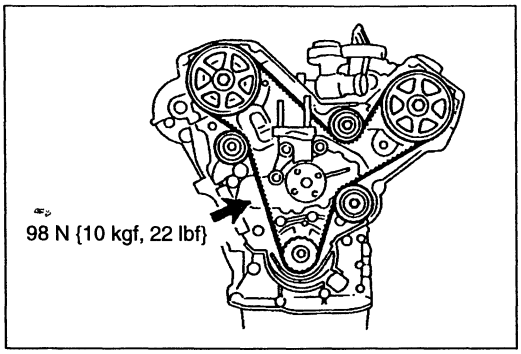


7. Remove the pin from the auto tensioner, and apply tension to the belt.
8. Tighten the tensioner pulley.

   Tightening torque:
   38—44 N·m {3.8—4.5 kgf·m, 28—32 ft·lbf}

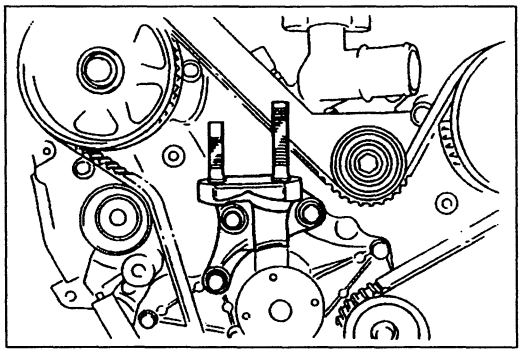


9. Turn the crankshaft clockwise twice, and align the timing marks.
10. Verify that the timing marks are correctly aligned. If not, repeat the procedure from **Timing Belt Auto Tensioner**. (Refer to page B2–107.)



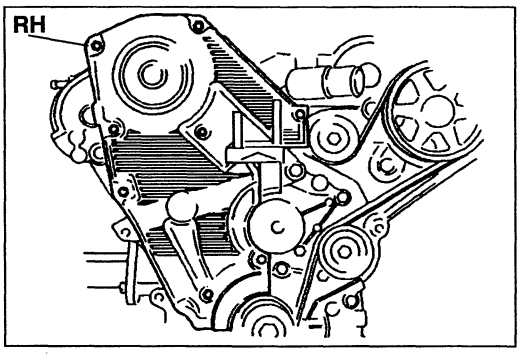
11. Check the timing belt deflection. If it is incorrect, replace the auto tensioner.

Deflection: 6.0—8.0 mm {0.24—0.31 in}



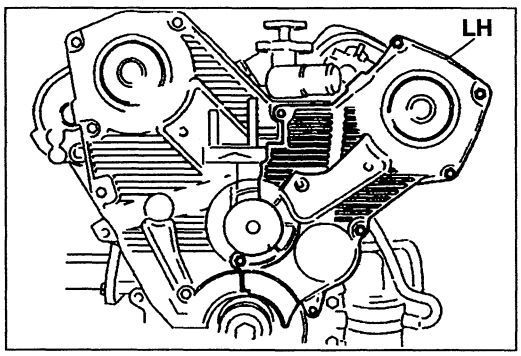
No.3 engine mount bracket
Install the No.3 engine mount bracket.

Tightening torque:
44—60 N·m {4.4—6.2 kgf·m, 32—44 ft·lbf}



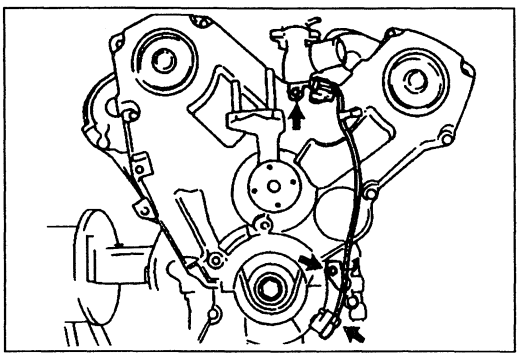
Timing Belt Cover
1. Install the right timing belt cover.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



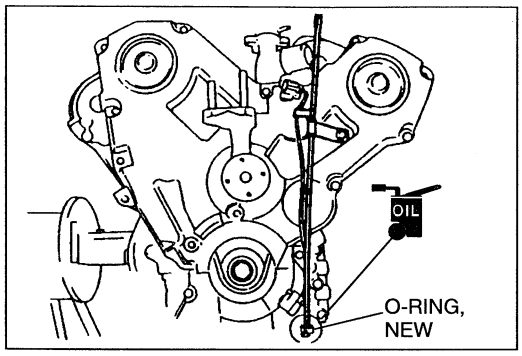
2. Install the left timing belt cover.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



Crankshaft Position Sensor
Install the crankshaft position sensor.

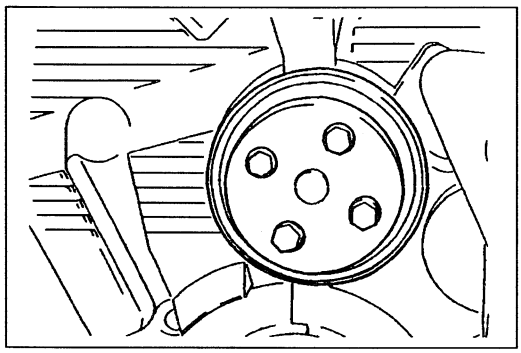
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



Dipstick and Pipe

Install the dipstick and pipe with the clip.

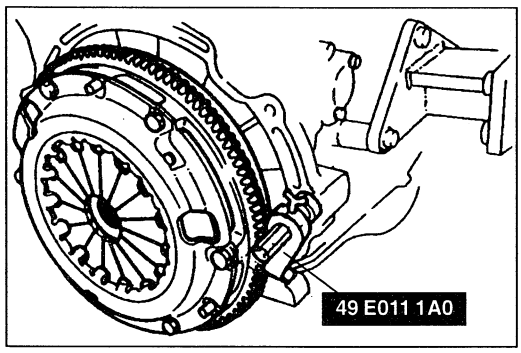
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



Water Pump Pulley

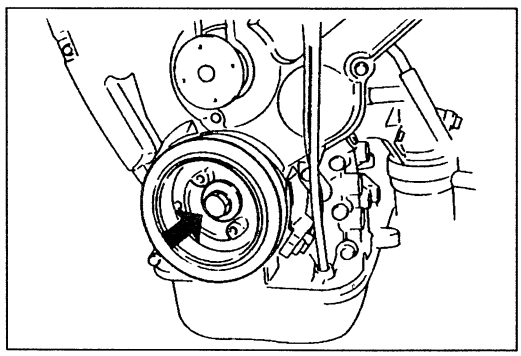
Install the water pump pulley.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



Crankshaft Pulley

1. Hold the flywheel (MTX) or drive plate (ATX) by using the **SST**.



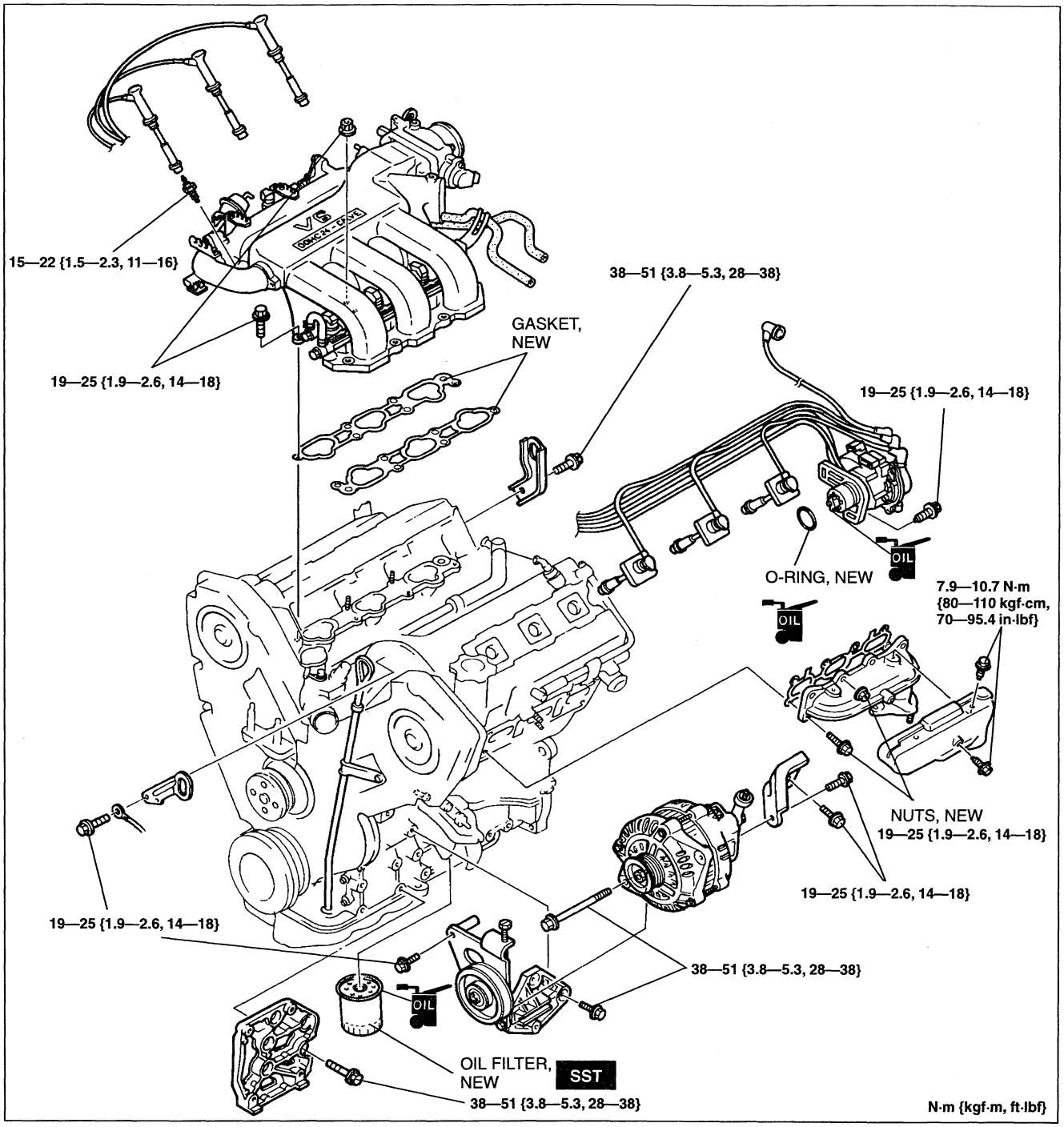
2. Remove the crankshaft pulley bolt.

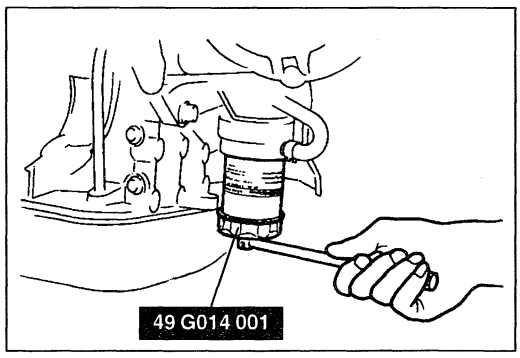
Caution
- **Install the crankshaft pulley carefully. The crankshaft position sensor rotor is on the rear of the pulley, and can be damaged easily.**

3. Install the crankshaft pulley onto the crankshaft.
4. Apply clean engine oil to the bolt threads.
5. Tighten the crankshaft pulley.

Tightening torque:
157—166 N·m {16.0—17.0 kgf·m, 116—122 ft·lbf}

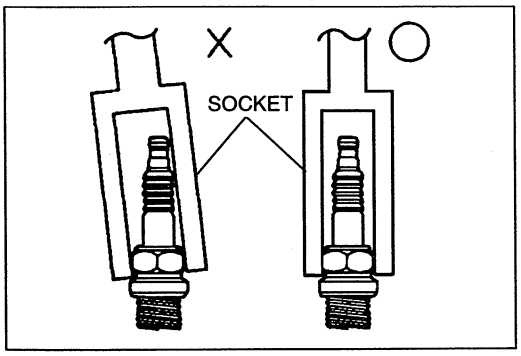
AUXILIARY PARTS
Torque Specifications





Oil Filter

1. Apply clean engine oil to the rubber seal of the new oil filter.
2. Install the filter and tighten it by hand until the rubber seal contacts the oil cooler.
3. Tighten the filter 1–1/6 turns by using the **SST**.

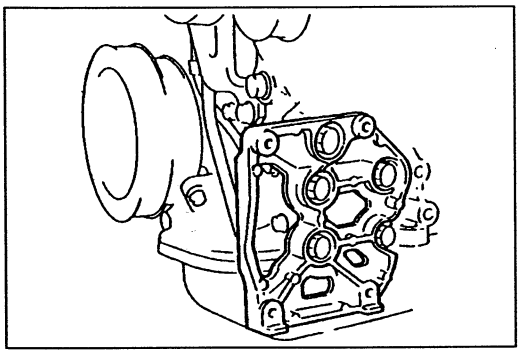


Spark Plug

Caution
- **To avoid breaking the spark plug, be sure to fit the socket squarely over it.**

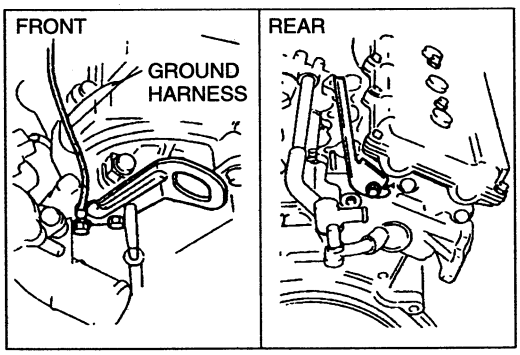
Install the spark plugs.

Tightening torque:
15—22 N·m {1.5—2.3 kgf·m, 11—16 ft·lbf}



A/C Compressor Bracket (If equipped)
Install the A/C compressor bracket.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m 28—38 ft·lbf}

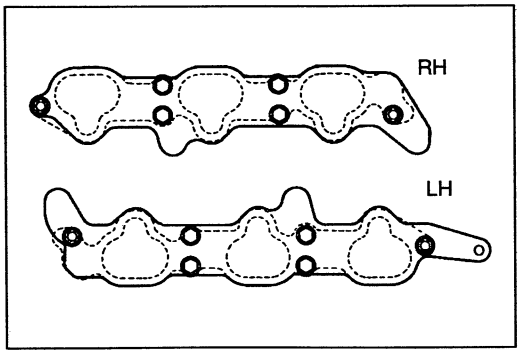


Engine Hanger
1. Install the front engine hanger and the ground harness.

   Tightening torque:
   19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

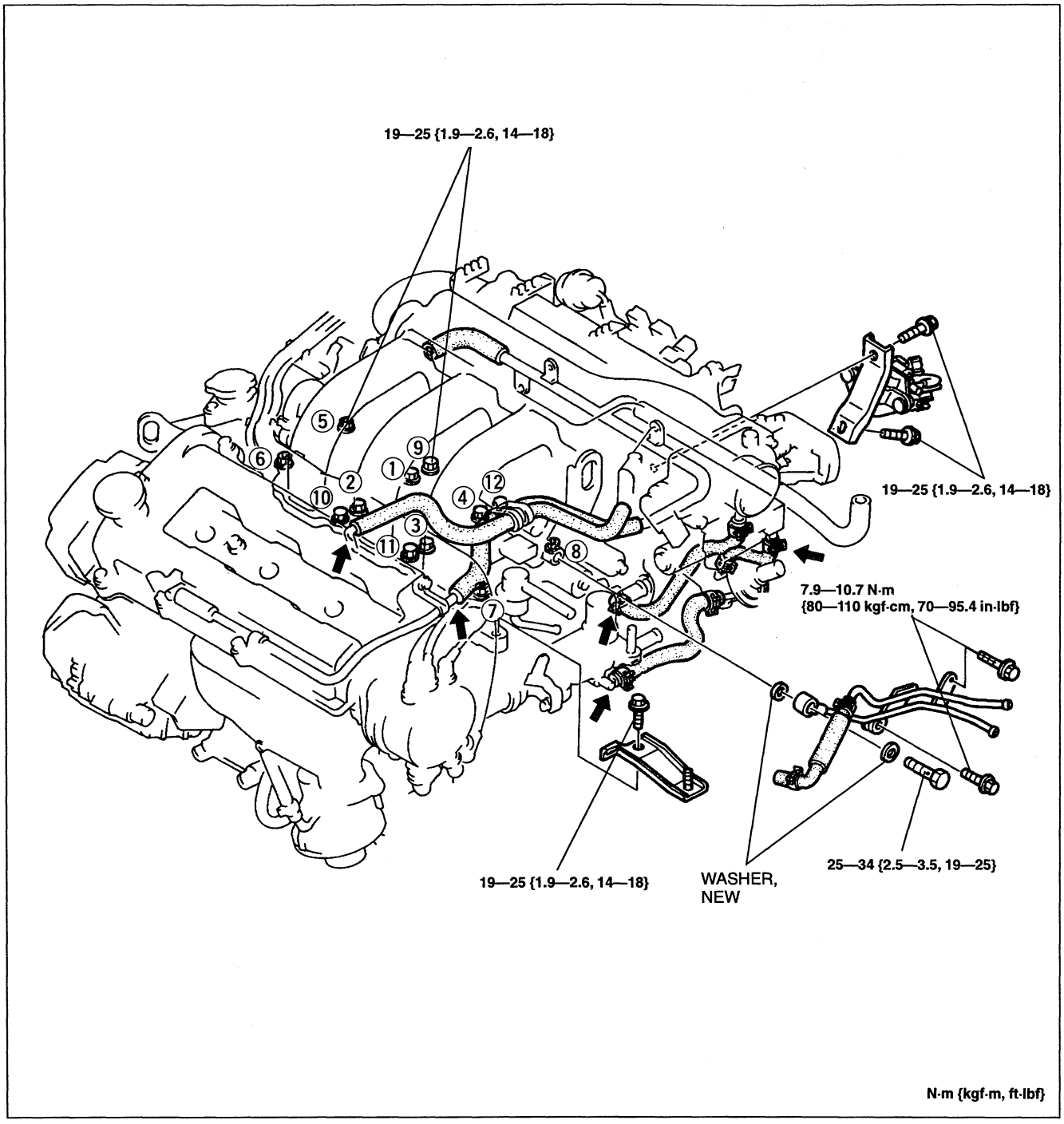
2. Install the rear engine hanger.

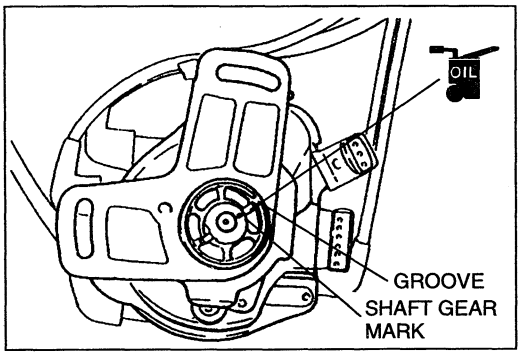
   Tightening torque:
   38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



Intake Manifold Assembly
1. Install new gaskets and the intake manifold assembly. Hand tighten the bolts and nuts.

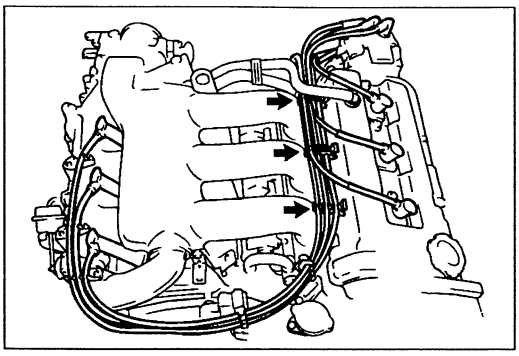
2. Connect the stays, bracket, fuel pipe, and hoses in the order shown in the figure.
3. Tighten the intake manifold bolts and nuts in two or three steps.





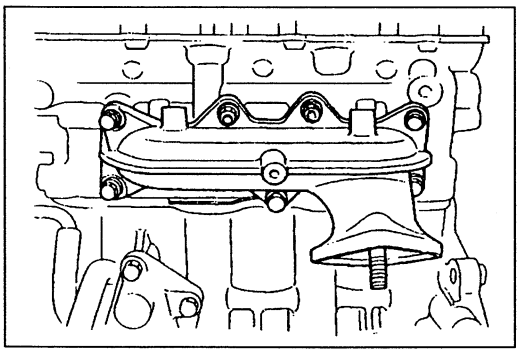
Distributor

1. Apply clean engine oil to a new O-ring and position it on the distributor.
2. Apply engine oil to the drive blade.
3. Align the groove of the distributor body and shaft gear mark as shown.
4. Install the distributor with the blade fit into the camshaft groove.



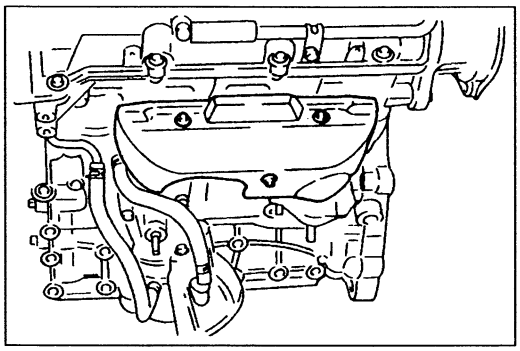
5. Hand tighten the distributor mounting bolts.
6. Connect the high-tension leads.

Note
- Adjust the ignition timing after engine installation. (Refer to section G.)



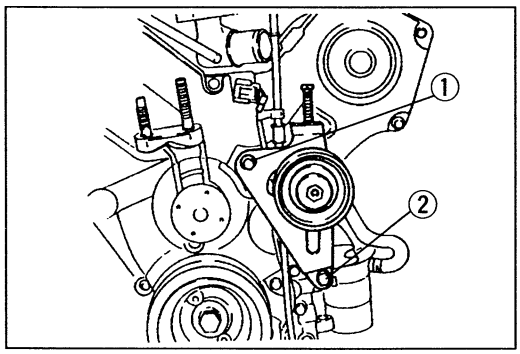
Exhaust Manifold Assembly (Left)
1. Place the new gasket in position.
2. Install the left exhaust manifold.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



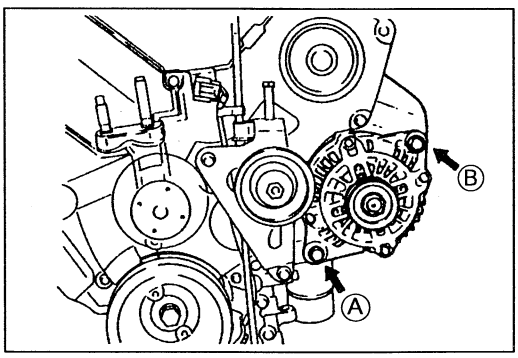
Exhaust Manifold Insulator (Left)
Install the left exhaust manifold insulator.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



Bracket and Tensioner
1. Install the bracket and tensioner.
2. Hand tighten bolt ①, then bolt ②.
3. Tighten bolt ②, then bolt ① to the specified torque.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



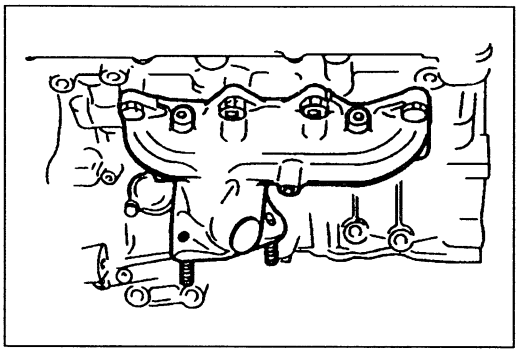
Generator
Install the generator and the bracket.

Tightening torque
Ⓐ: 38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}
Ⓑ: 19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

ENGINE STAND DISMOUNTING

PROCEDURE

1. Remove the engine from the engine stand.
2. Remove the **SST** from the engine in the reverse order of installation. (Refer to page B2–52.)

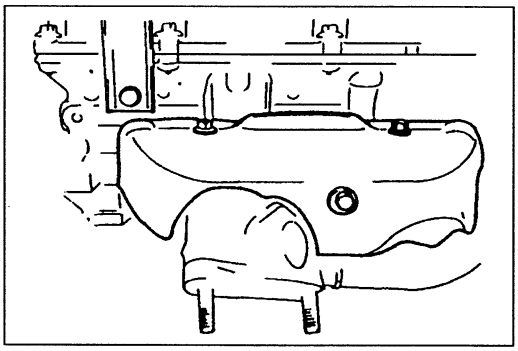


3. Install the new gasket and the right exhaust manifold together with the EGR valve and pipe.

   Tightening torque:
   19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

4. Tighten the EGR valve bolts.

   Tightening torque:
   19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



5. Install the right exhaust manifold insulator.

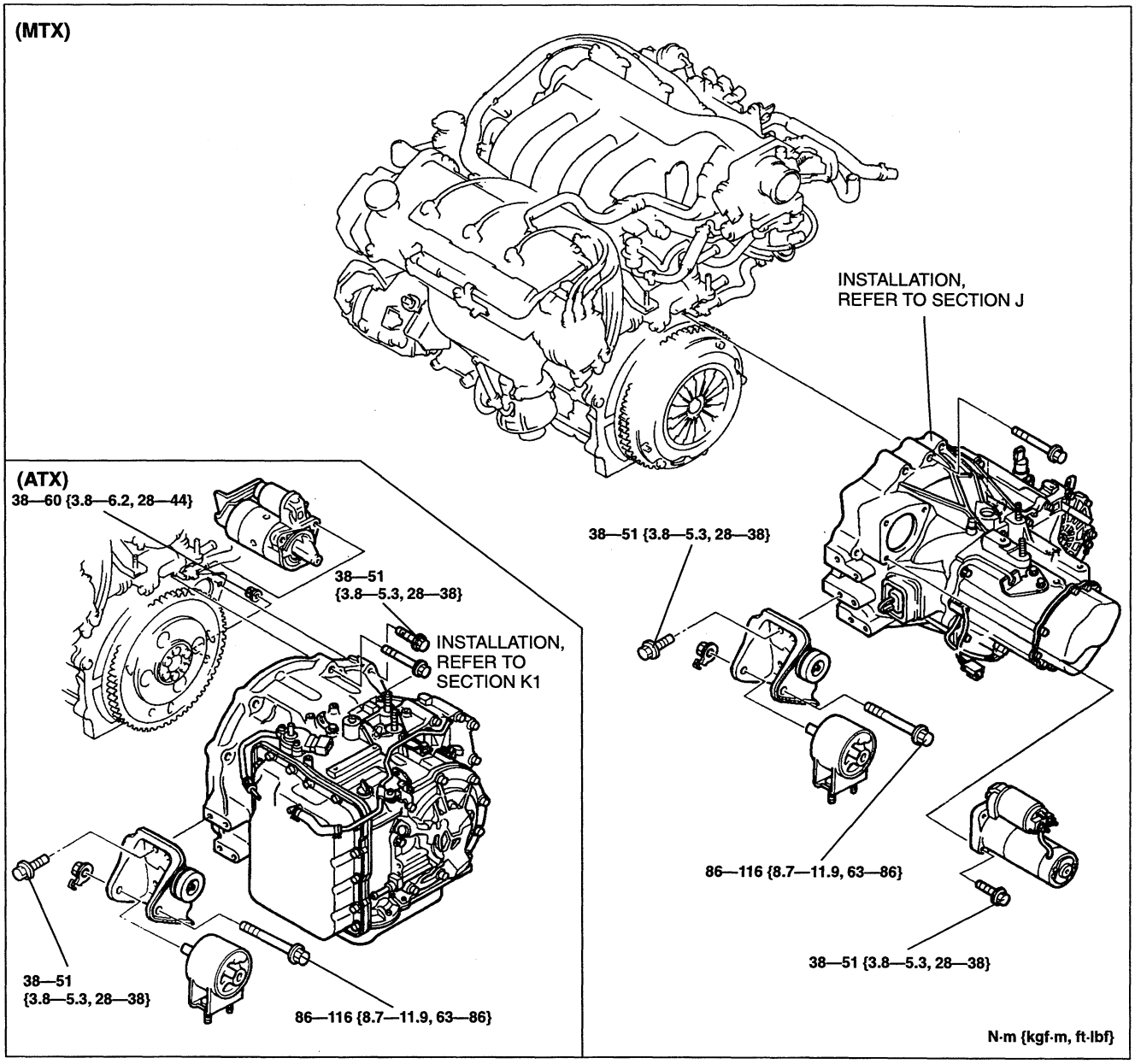
   Tightening torque:
   7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

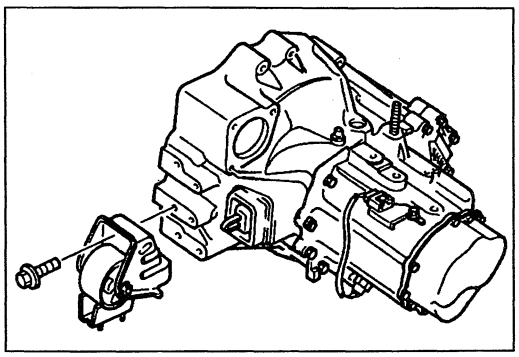
INSTALLATION

PROCEDURE

Tighten all bolts and nuts to the specified torques.

Step 1
Torque Specifications

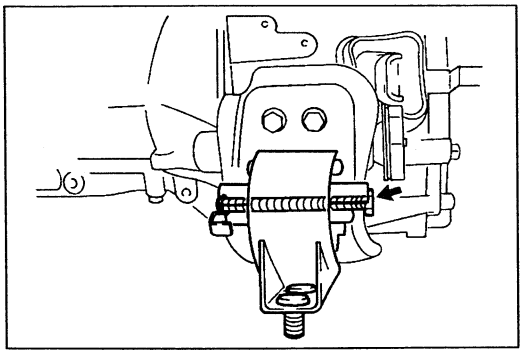




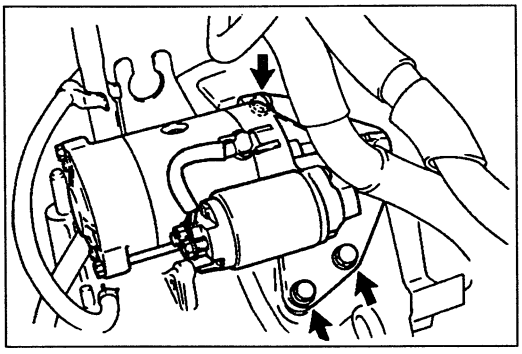
No.2 Engine mount rubber and bracket

1. Install the mount rubber bracket.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



2. Install the No.2 engine mount rubber and hand tighten the through bolt.



Starter

Install the starter to the transaxle housing.

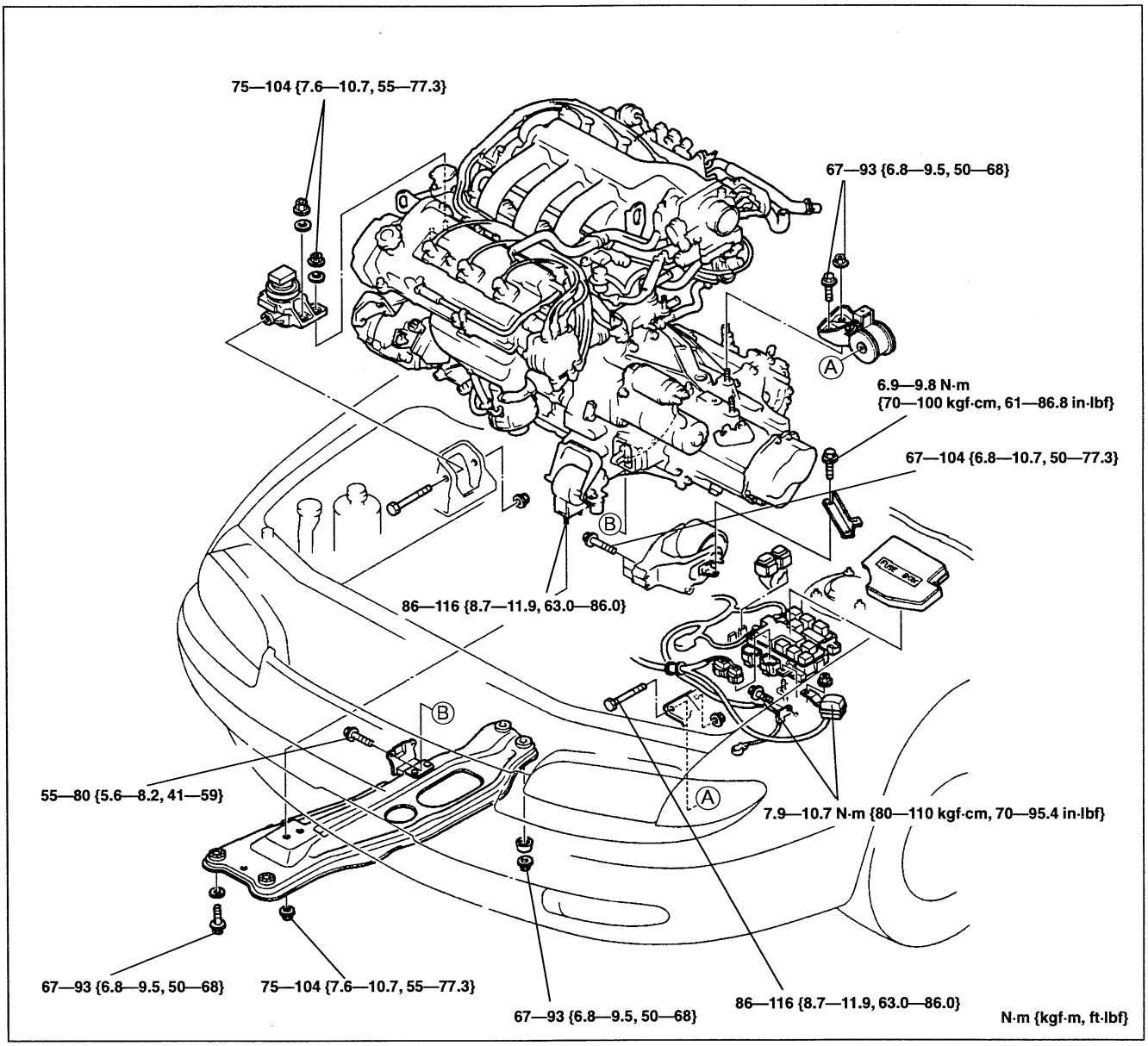
Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

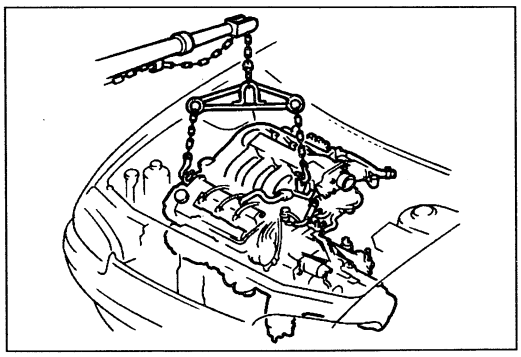
Step 2

Warning

- **A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.**

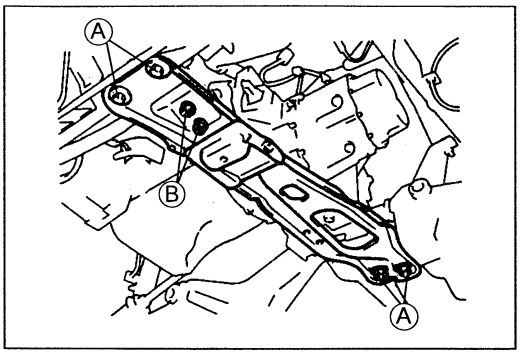
Torque Specifications





Engine and transaxle assembly

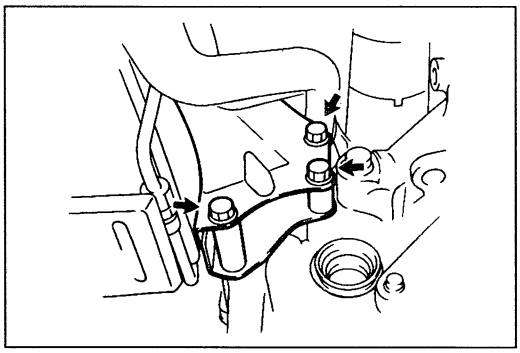
1. Suspend the engine and transaxle assembly.
2. Slowly lower the engine and transaxle assembly as a unit. Keep the engine from swinging or bumping into components in the engine compartment.
3. Install the engine and transaxle assembly in the engine compartment.
4. Align the engine mounts with the engine mount member mounting holes.



Engine mount member

Install bolts and nuts Ⓐ as shown and hand tighten nuts Ⓑ.

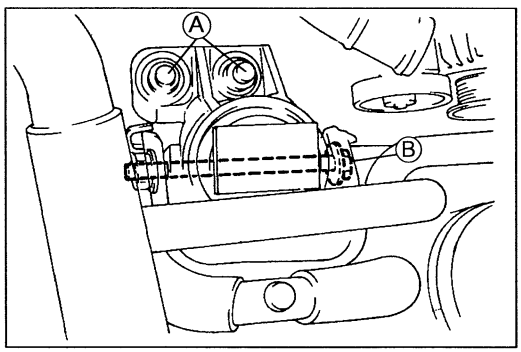
Tightening torque:
67—93 N·m {6.8—9.5 kgf·m, 50—68 ft·lbf}



Engine mount

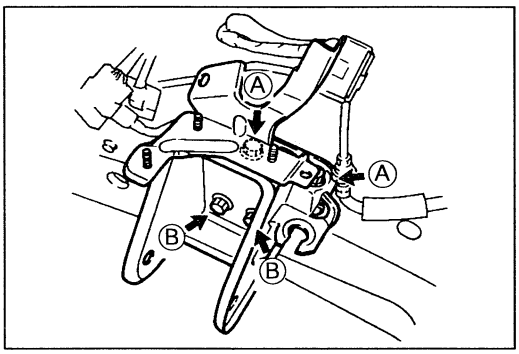
1. Install the No.1 engine mount mounting bolts.

Tightening torque:
67—104 N·m {6.8—10.7 kgf·m, 50—77.3 ft·lbf}



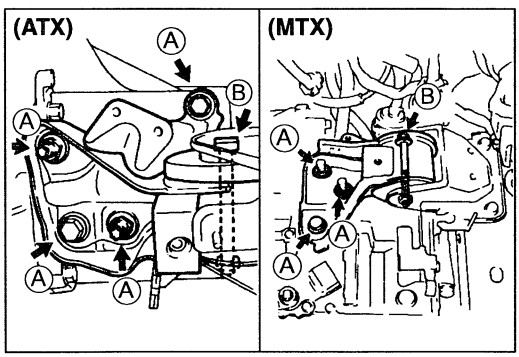
2. Install the No.3 engine mount rubber.

Tightening torque
Ⓐ: 75—104 N·m {7.6—10.7 kgf·m, 55—77.3 ft·lbf}
Ⓑ: 86—116 N·m {8.7—11.9 kgf·m, 63—86.0 ft·lbf}



3. Install the No.4 engine mount bracket.
4. Hand tighten bolts Ⓐ.
5. Tighten bolts Ⓑ.
6. Tighten bolts Ⓐ.

Tightening torque
Ⓐ: 59—80 N·m {6.0—8.2 kgf·m, 44—59 ft·lbf}
Ⓑ: 59—80 N·m {6.0—8.2 kgf·m, 44—59 ft·lbf}

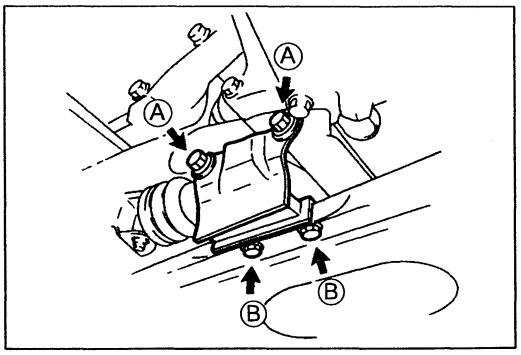


7. Install the No.4 engine mount rubber.

Tightening torque
Ⓐ: 67—93 N·m {6.8—9.5 kgf·m, 50—68 ft·lbf}
Ⓑ: 86—116 N·m {8.7—11.9 kgf·m, 63—86.0 ft·lbf}

8. Remove the chain block from the engine hangers.
9. Tighten the No.2 engine mount rubber mounting bolt. (Refer to page B2–117.)

Tightening torque:
86—116 N·m {8.7—11.9 kgf·m, 63—86.0 ft·lbf}

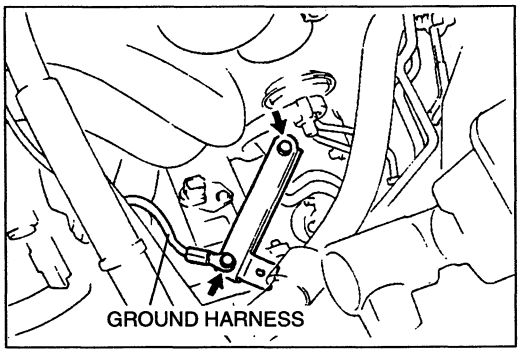


10. Tighten the No.2 engine mount nuts Ⓑ.
(Refer to page B2–119.)

Tightening torque:
75—104 N·m {7.6—10.7 kgf·m, 55—77.3 ft·lbf}

11. Install the No.5 engine mount rubber.

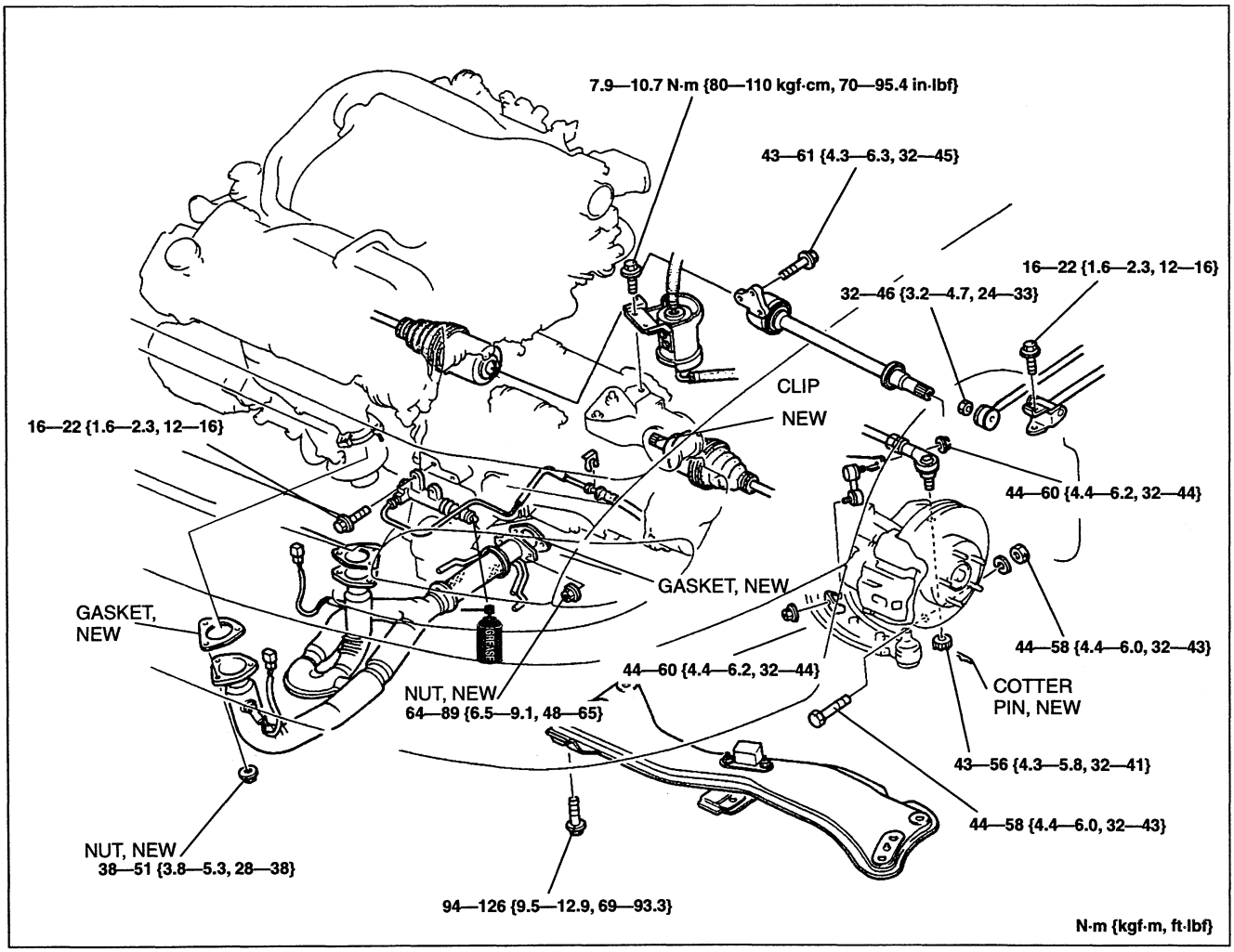
Tightening torque
Ⓐ: 55—80 N·m {5.6—8.2 kgf·m, 41—59 ft·lbf}
Ⓑ: 44—60 N·m {4.4—6.2 kgf·m, 32—44 ft·lbf}

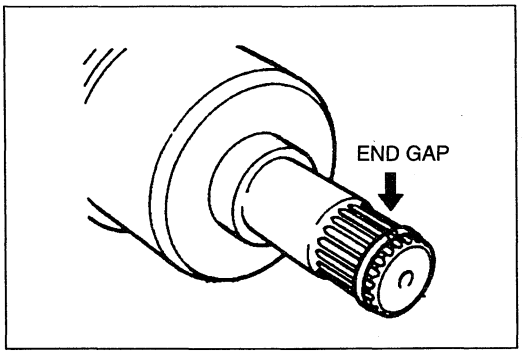


12. Install the No.1 engine mount stay bracket and ground harness.

Tightening torque:
6.9—9.8 N·m {70—100 kgf·cm, 61—86.8 in·lbf}

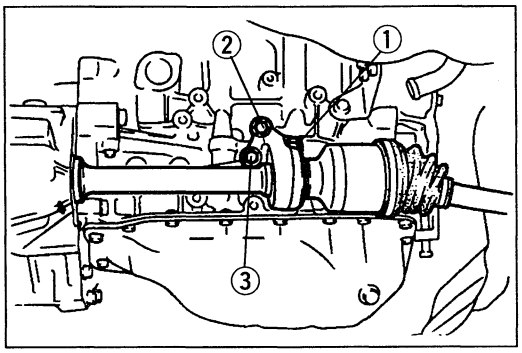
Step 3
Torque specifications





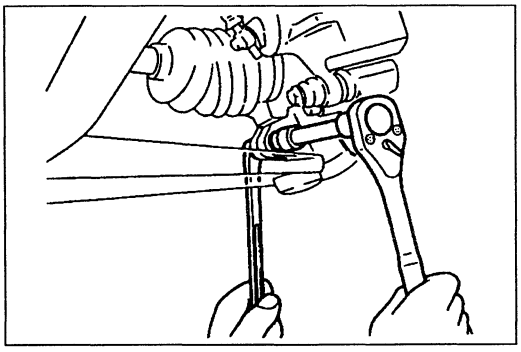
Drive shaft

1. Apply grease to the ends of the drive shafts.
2. Install new clips with the end gap upward and install the drive shafts.



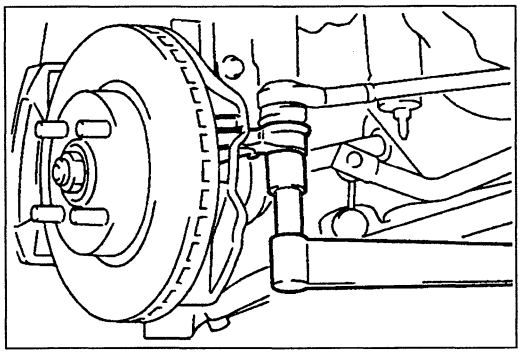
3. Install the joint shaft.
4. Tighten the bolts in the order shown.

Tightening torque:
43—61 N·m {4.3—6.3 kgf·m, 32—45 ft·lbf}



5. Coat the ball joints with grease.
6. Install the lower arm ball joints to the knuckles and tighten the through bolts.

Tightening torque:
44—58 N·m {4.4—6.0 kgf·m, 32—43 ft·lbf}

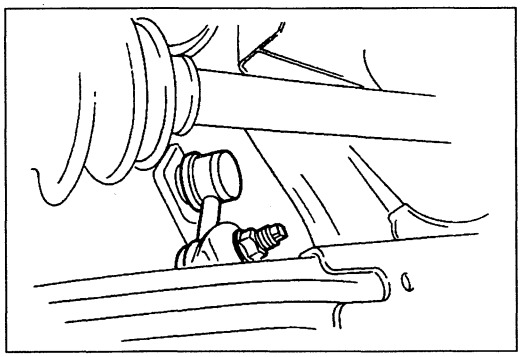


Tie-rod end ball joint

1. Install the tie-rod ends to the knuckles and tighten them.

Tightening torque:
43—56 N·m {4.3—5.8 kgf·m, 32—41 ft·lbf}

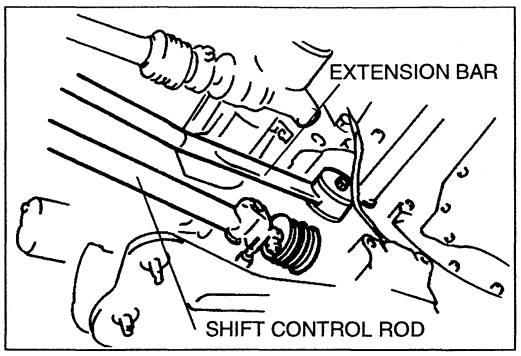
2. Install new cotter pins.



Stabilizer control link

Install the stabilizer control link.

Tightening torque:
44—60 N·m {4.4—6.2 kgf·m, 32—44 ft·lbf}

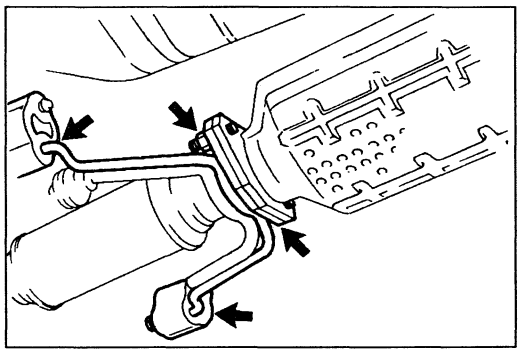


Extension bar (MTX)
Install the extension bar to the transaxle.

Tightening torque:
32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}

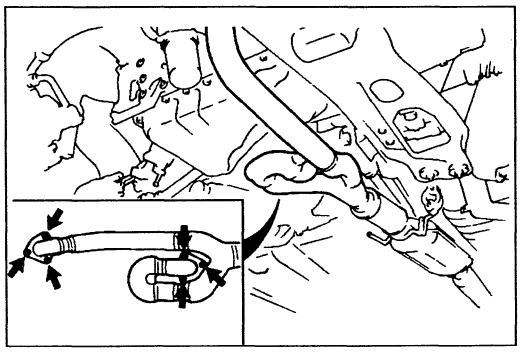
Shift control rod (MTX)
Install the shift control rod to the transaxle.

Tightening torque:
16—22 N·m {1.6—2.3 kgf·m, 12—16 ft·lbf}



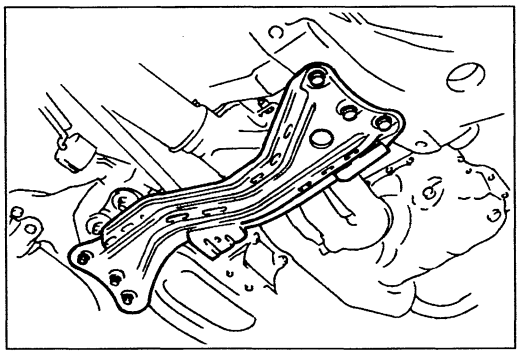
Front exhaust pipe
1. Connect the front exhaust pipe to the exhaust pipe with a new gasket. Hand tighten the new nuts.
2. Install the exhaust pipe to the vehicle body with mount rubbers.
3. Tighten the nuts.

Tightening torque:
64—89 N·m {6.5—9.1 kgf·m, 48—65 ft·lbf}



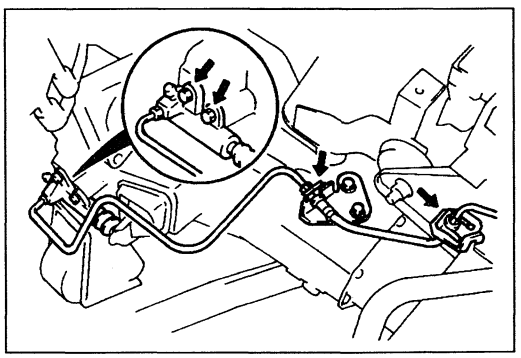
4. Install the front exhaust pipe with new gaskets.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



Transverse member
Install the transverse member.

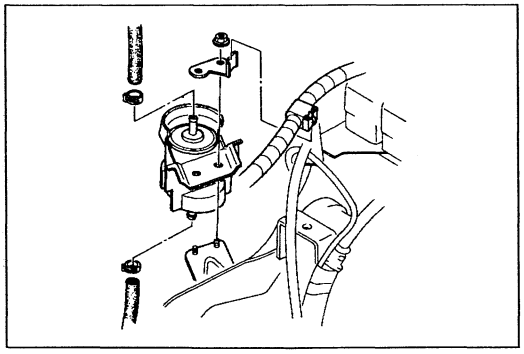
Tightening torque:
94—126 N·m {9.5—12.9 kgf·m, 69—93.3 ft·lbf}



Clutch release cylinder (MTX)
1. Install the clutch release cylinder.

Tightening torque:
16—22 N·m {1.6—2.3 kgf·m, 12—16 ft·lbf}

2. Mount the pipe in the brackets and install the clips.



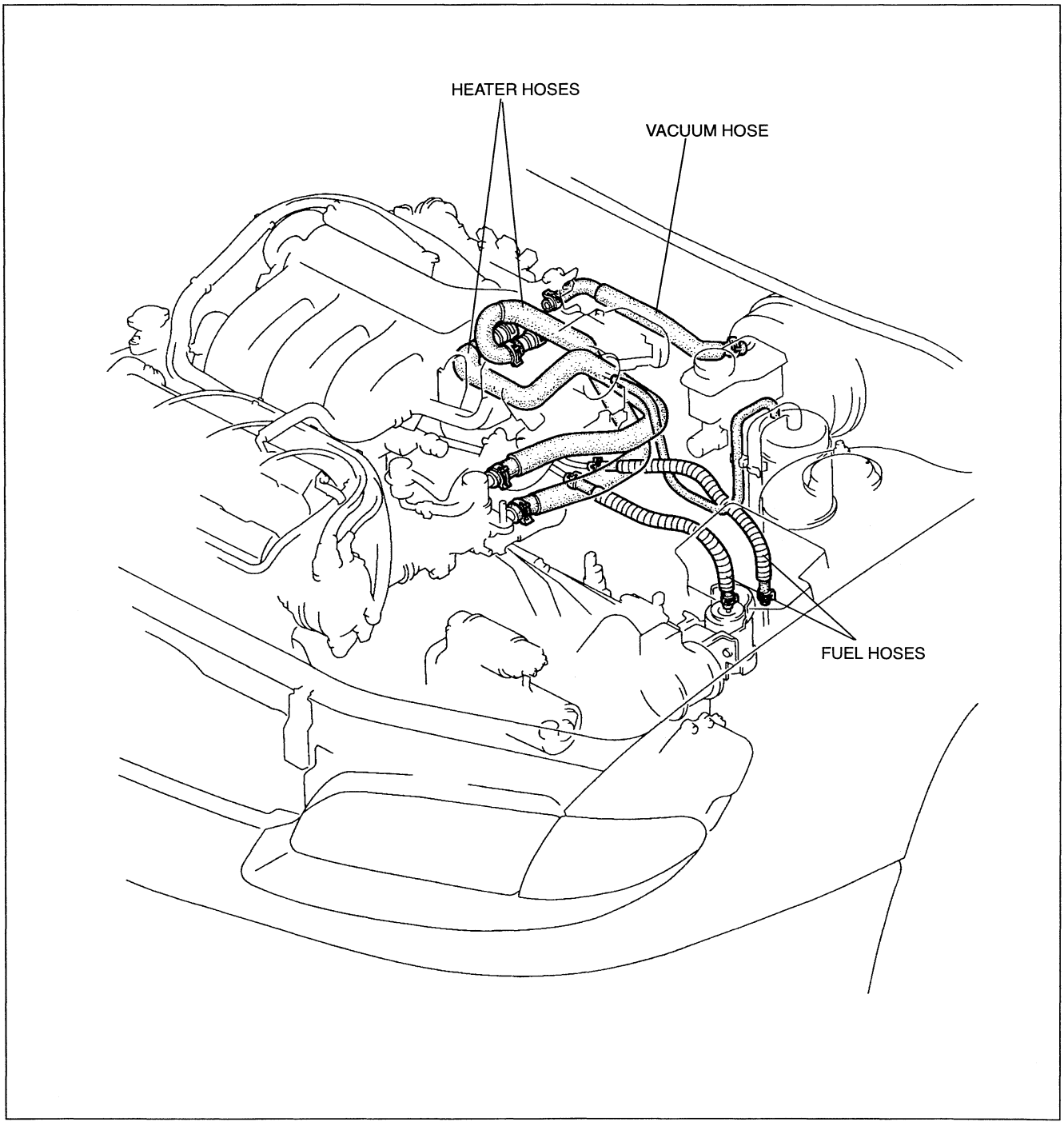
Fuel filter

Install the harness bracket and the fuel filter.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

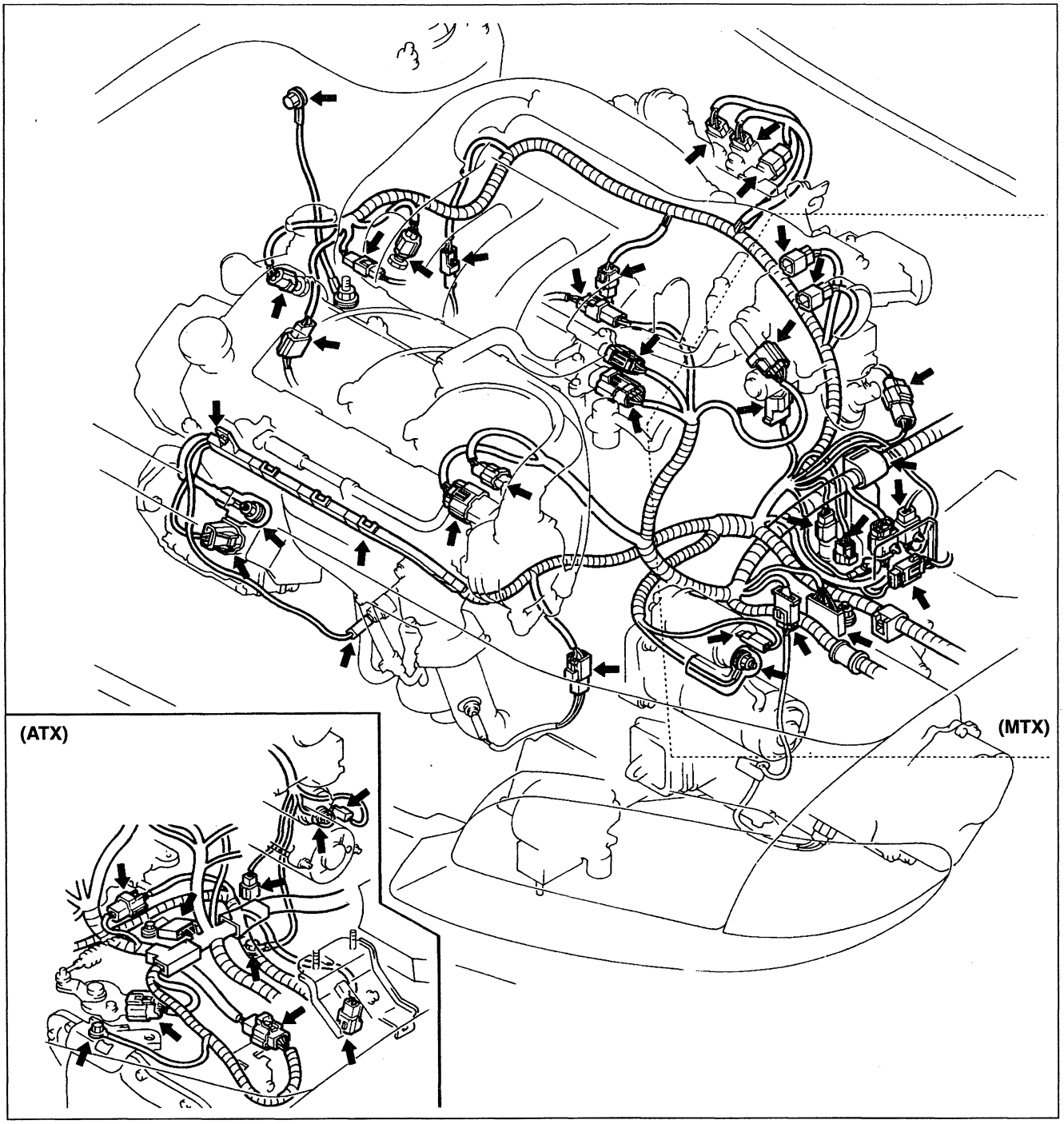
Step 4

Connect the hoses shown in the figure.

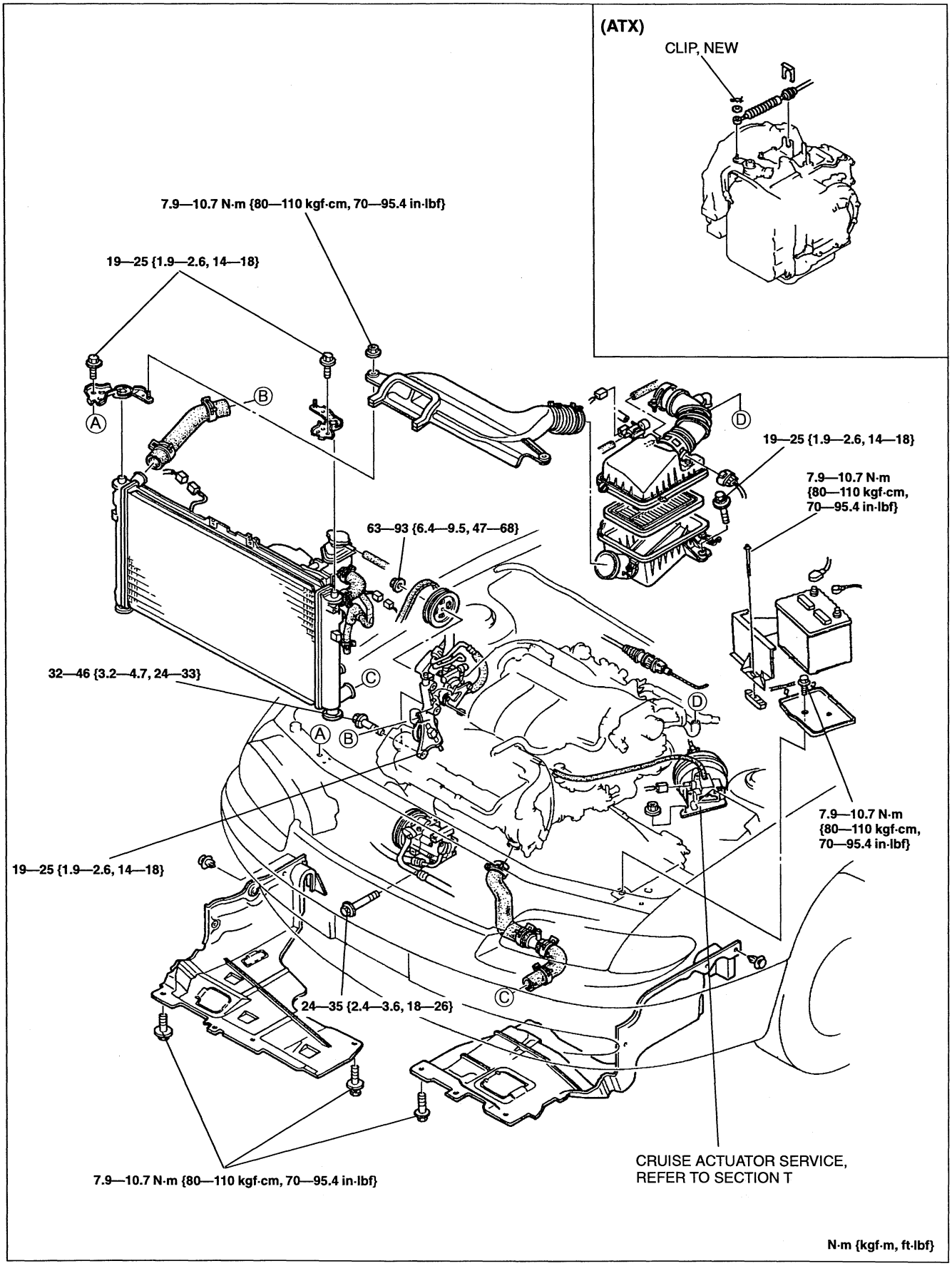


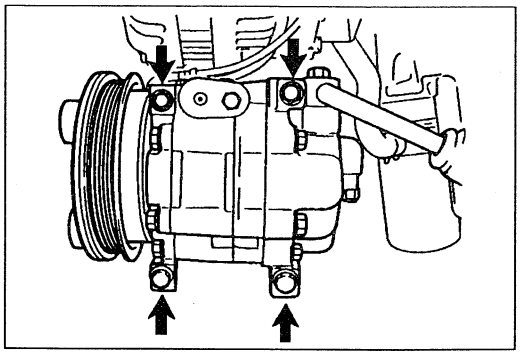
Step 5

Connect the harness connectors shown in the figure.



Step 6
Torque Specifications

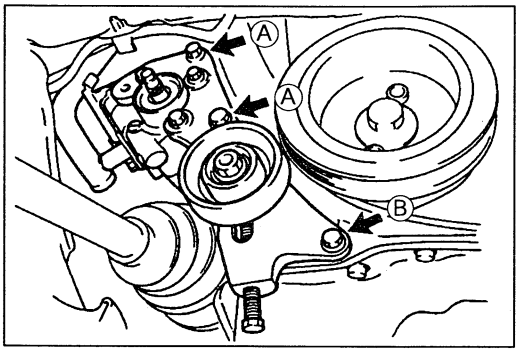




A/C compressor

Install the A/C compressor to the bracket.

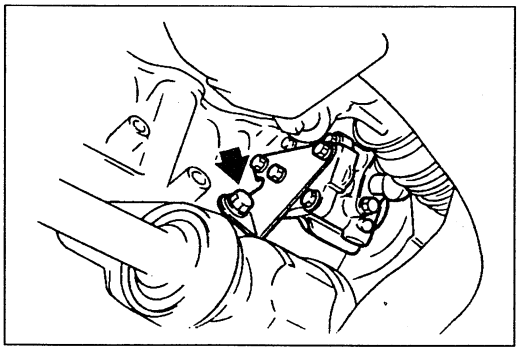
Tightening torque:
24—35 N·m {2.4—3.6 kgf·m, 18—26 ft·lbf}



P/S oil pump and bracket

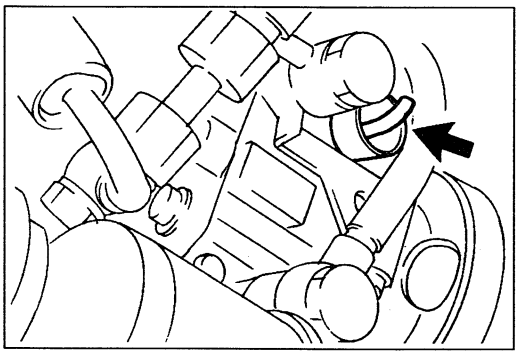
1. Install the P/S oil pump.

Tightening torque
Ⓐ: 32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}
Ⓑ: 19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

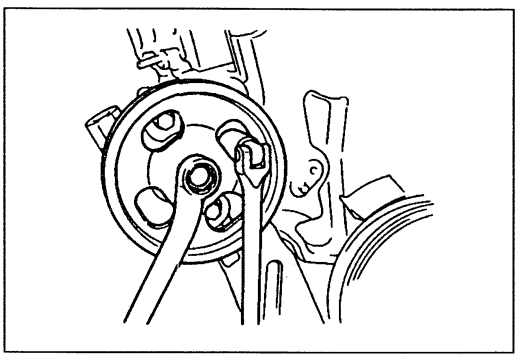


2. Tighten the bolt shown in the figure.

Tightening torque:
32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}

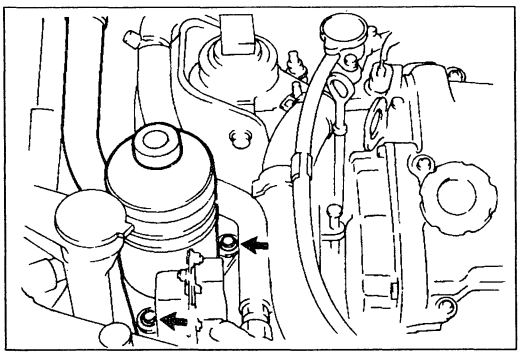


3. Connect the P/S pressure switch connector.



4. Install the P/S oil pump pulley to the pump body and hand tighten the nut.
5. Tighten the pulley nut by using a 12 mm {0.47 in} socket wrench through the pulley hole as shown.

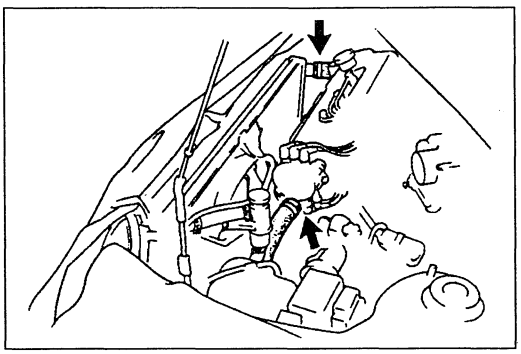
Tightening torque:
63—93 N·m {6.4—9.5 kgf·m, 47—68 ft·lbf}



6. Install the P/S oil reservoir and the engine ground.

Tightening torque:
6.9—9.8 N·m {70—100 kgf·cm, 61—86.6 in·lbf}

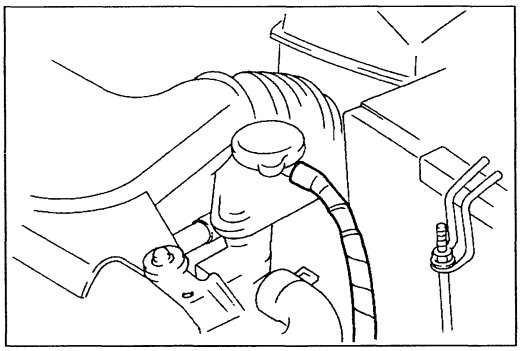
Drive belt
1. Install the P/S and/or A/C drive belt.
2. Adjust the drive belt deflection. (Refer to page B2–6.)



Radiator and cooling fan assembly
1. Install the radiator.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

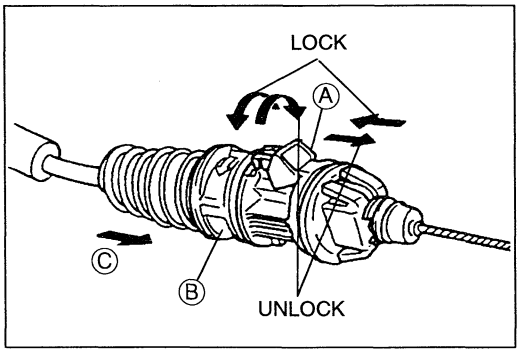
2. Connect the oil cooler hoses. (ATX)
3. Connect the upper and lower radiator hoses.



4. Install the cooling fan assembly.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

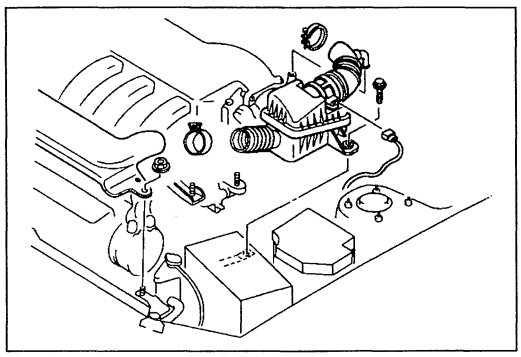
5. Connect the coolant reservoir hose.
6. Connect the cooling fan motor connector.



Accelerator cable
Inspection / Adjustment
1. Verify that the throttle valve is fully closed.
2. Measure the free play of the accelerator cable.

Free play: 1.5—4.0 mm {0.06—0.15 in}

3. If not as specified, turn stopper Ⓑ while pressing lock button Ⓐ to release the lock.
4. Push the spring in direction Ⓒ and adjust the cable free play.
5. Lock Ⓐ after locking stopper Ⓑ.



Air cleaner assembly
1. Install the air cleaner assembly.
2. Connect the hoses.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

3. Connect the mass air flow sensor connector.

Fresh-air duct
Install the fresh-air duct.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

Steps After Installation
1. Fill the engine with the specified amount and type of engine oil. (Refer to section D2.)
2. Fill the radiator with the specified amount and type of engine coolant. (Refer to section E2.)
3. If the transaxle was drained, fill it with the specified amount and type of transaxle oil. (MTX: Refer to section J, ATX: Refer to section K1.)
4. Install the front wheels.
5. Start the engine and
   (1) check the engine oil, transaxle oil, and engine coolant leakage.
   (2) check the ignition timing and idle speed. (Refer to section F2.)
   (3) check the operation of the emission control system.
6. Turn off the engine and check drive belt deflection. (Refer to page B2–6.)
7. Perform a road test.
8. Recheck the oil and coolant levels.

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

LUBRICATION SYSTEM (FS)

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ENGINE OIL D1– 6
INSPECTION D1– 6
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INSPECTION D1–12

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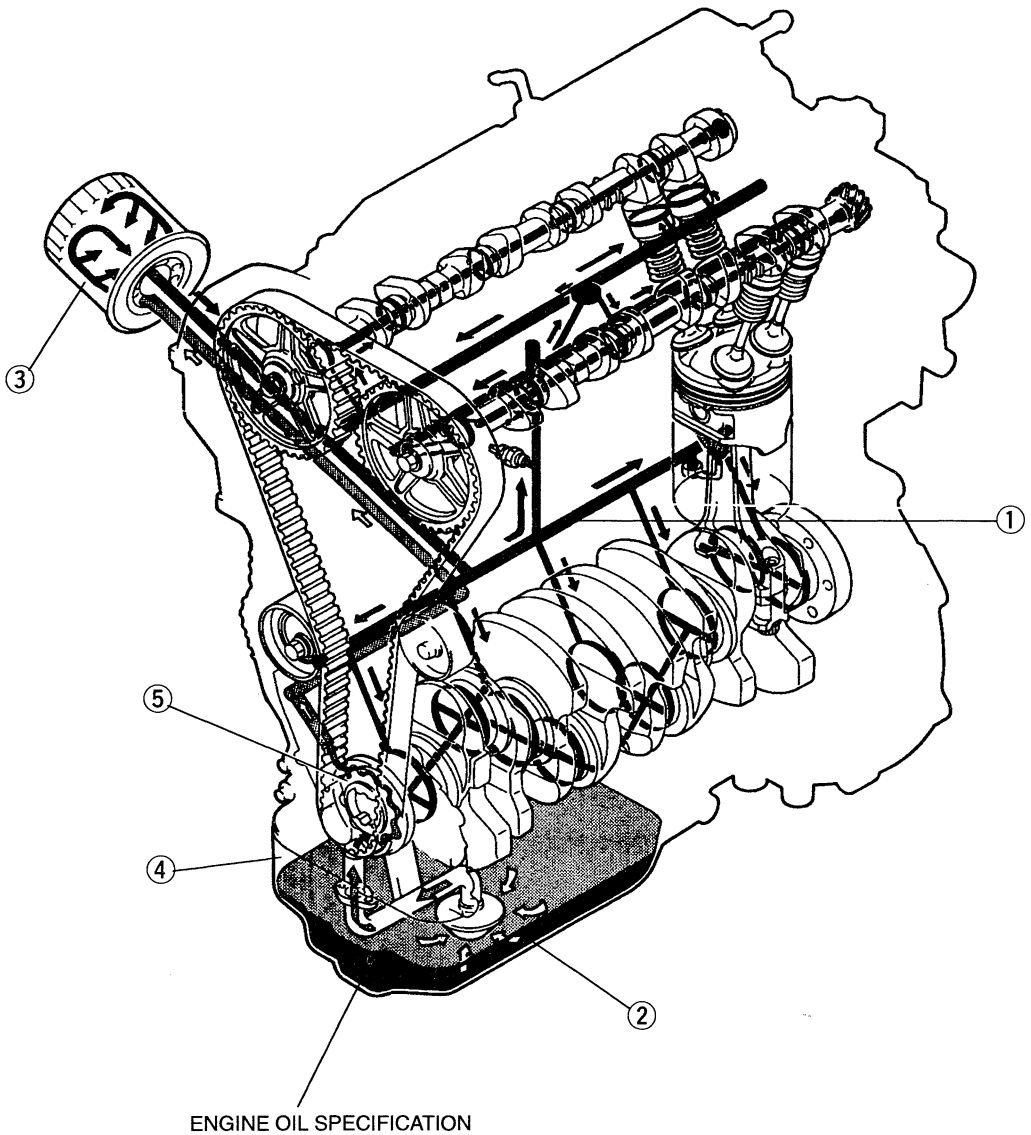


ENGINE OIL SPECIFICATION
API SERVICE SG, SH (ECII)
ILSAC
TOTAL CAPACITY
3.7 L {3.9 US qt, 3.3 Imp qt}

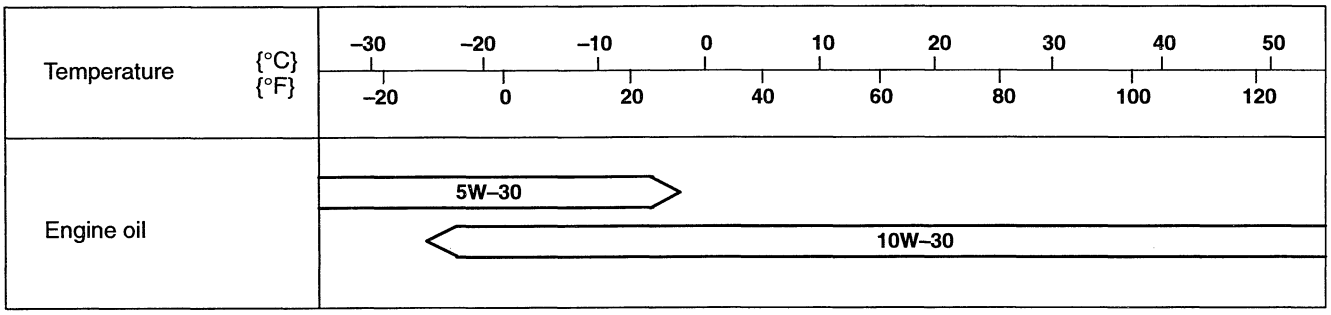
1. Oil pressure
Inspection ..... page D1–4
2. Engine oil
Inspection ..... page D1–6
Replacement ..... page D1–6
3. Oil filter
Replacement ..... page D1–7
4. Oil pan
Removal / Installation ..... page D1– 8
5. Oil pump
Disassembly / Assembly ..... page D1–11
Inspection ..... page D1–12

OUTLINE

SPECIFICATIONS

Item \ Engine		FS
Lubrication system		Force-fed type
Oil pump	Type	Trochoid gear
	Relief pressure kPa {kgf/cm^2, psi}	442—539 {4.5—5.5, 64—78}
Oil filter	Type	Full-flow, paper element
	By-pass pressure differential kPa {kgf/cm^2, psi}	79—117 {0.8—1.2, 12—17}
Oil pressure switch activation pressure kPa {kgf/cm^2, psi}		14.8—27.4 {0.15—0.28, 2.14—3.98}
Oil capacity	Total (dry engine) L {US qt, Imp qt}	3.7 {3.9, 3.3}
	Engine oil replacement L {US qt, Imp qt}	3.3 {3.5, 2.9}
	Engine oil replacement (with oil filter) L {US qt, Imp qt}	3.5 {3.7, 3.1}
Engine oil		API Service SG, SH (EC II) ILSAC

Recommended SAE Viscosity



Anticipated ambient temperature range before succeeding oil change, °C {°F}

TROUBLESHOOTING GUIDE

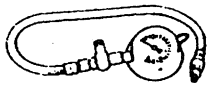
Problem	Possible Cause	Remedy	Page
Engine hard starting	Improper engine oil	Replace	D1– 6
	Insufficient engine oil	Add oil	D1– 6
Excessive oil consumption	Oil working up or down in cylinder	Refer to section B1	
	Oil leakage	Repair	—
Oil pressure drop	Insufficient engine oil	Add oil	D1– 6
	Oil leakage	Repair	—
	Worn and/or damaged oil pump rotor	Replace	D1–11
	Worn plunger (inside oil pump) or weak spring	Replace	D1–11
	Clogged oil strainer	Clean	—
	Excessive main bearing or connecting rod bearing clearance	Refer to section B1	
Warning light illuminates while engine is running	Oil pressure drop	As described above	—
	Malfunction of oil pressure switch	Refer to 1996 626/MX–6 Body Electrical Trouble-shooting Manual	
	Malfunction of electrical system	Refer to 1996 626/MX–6 Body Electrical Trouble-shooting Manual	

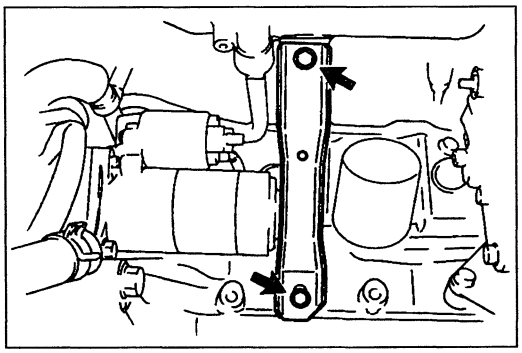
Warning

- **Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.**

OIL PRESSURE

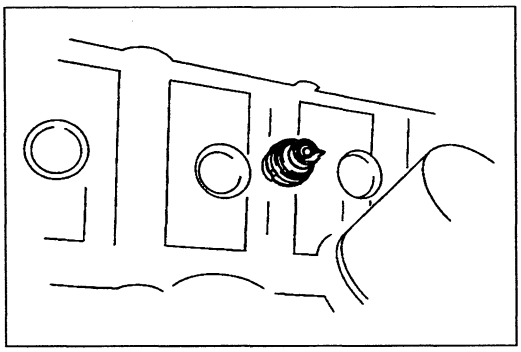
PREPARATION
SST

49 0187 280 Gauge, oil pressure		For inspection of oil pressure

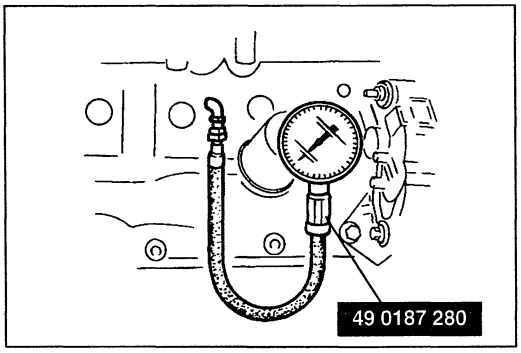


INSPECTION

1. Remove the intake manifold bracket.



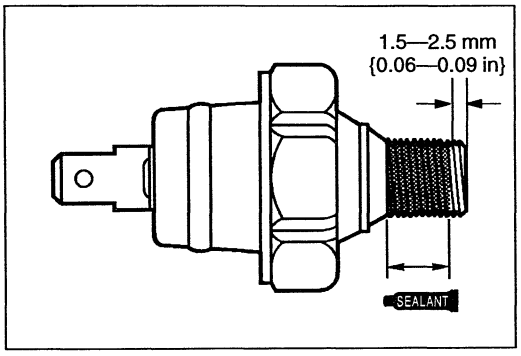
2. Remove the oil pressure switch.



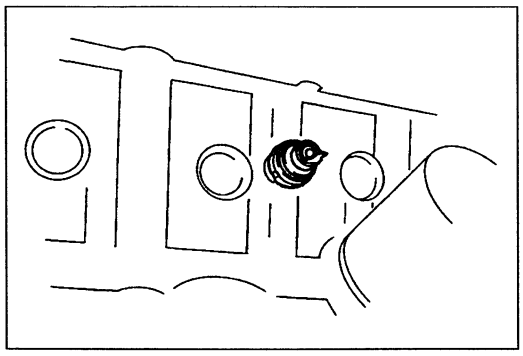
3. Screw the **SST** into the oil pressure switch installation hole.
4. Warm up the engine to normal operating temperature.
5. Run the engine at the specified speed, and note the gauge readings.

Note
- Oil pressure varies with oil viscosity and temperature.

Oil pressure: 393—490 kPa
{4.0—5.0 kgf/cm^2, 57—71 psi}–3,000 rpm

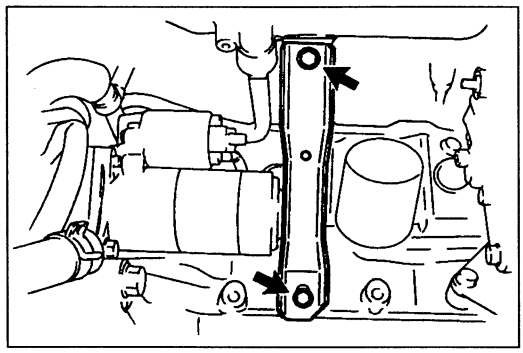


6. If the pressure is not as specified, check for the cause and repair as necessary.
(Refer to Troubleshooting Guide, page D1–3.)
7. Apply silicone sealant to the oil pressure switch threads as shown.



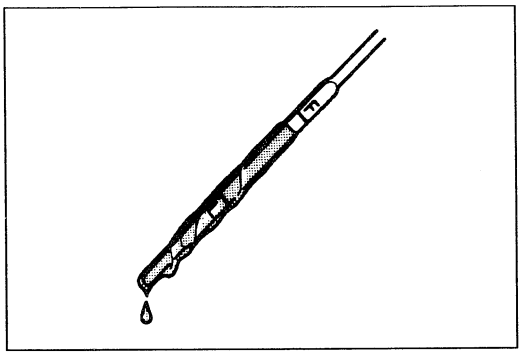
8. Remove the **SST** and install the oil pressure switch.

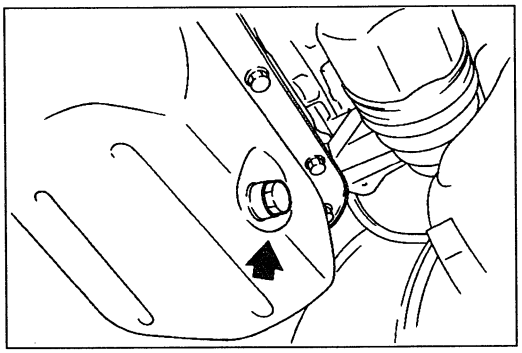
Tightening torque:
12—17 N·m {1.2—1.8 kgf·m, 8.7—13.0 ft·lbf}

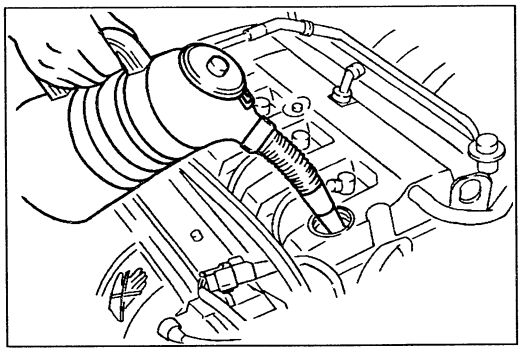


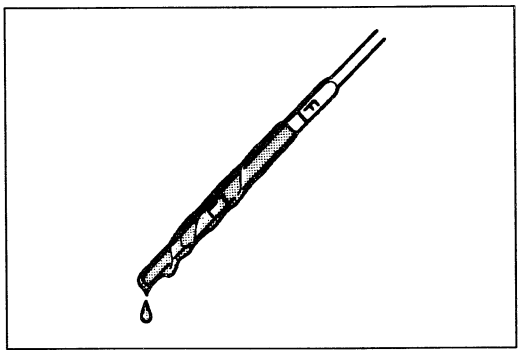
9. Install the intake manifold bracket.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}









ENGINE OIL

INSPECTION

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 dipstick and check the oil level and condition.
5. Add or replace oil as necessary.

Note

- The distance between the L and F marks on the dipstick represents 1.0 L {1.1 US qt, 0.9 Imp qt}.

REPLACEMENT

Warning

- **When the engine and the oil are hot, they can badly burn. Don't burn yourself with either.**

1. Remove the oil filler cap and the oil pan drain plug.
2. Drain the oil into a container.
3. Install the drain plug.

Tightening torque:
30—41 N·m {3.0—4.2 kgf·m, 22—30 ft·lbf}

4. Refill the engine with the specified type and amount of engine oil.

Oil capacity

L {US qt, Imp qt}

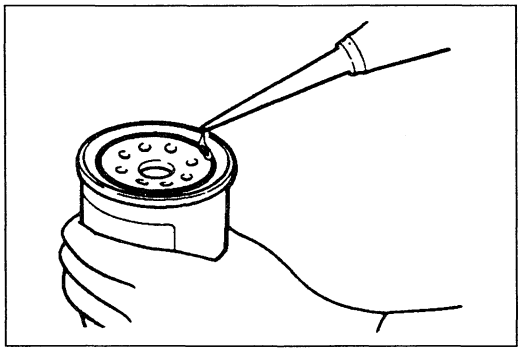
Total (dry engine)	3.7 {3.9, 3.3}
Engine oil replacement	3.3 {3.5, 2.9}
Engine oil replacement (with oil filter)	3.5 {3.7, 3.1}

5. Refit the oil filler cap.
6. Run the engine and check for leaks.
7. Check the oil level and add oil if necessary.

OIL FILTER

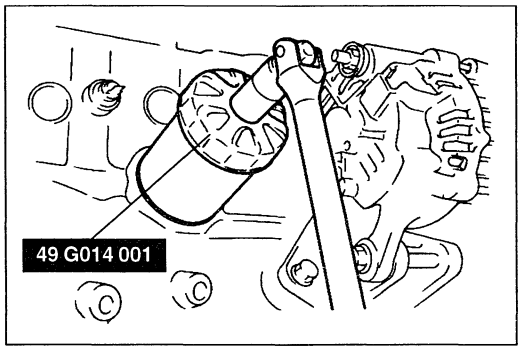
PREPARATION
SST

49 G014 001 Oil filter wrench		For removal / installation of oil filter



REPLACEMENT

1. Remove the oil filter by using the **SST**.
2. Use a clean rag to wipe off the mounting surface on the engine.
3. Apply clean engine oil to the O-ring of the new filter.



4. Install the oil filter and tighten it by hand until the O-ring contacts the cylinder block.
5. Tighten the filter 1 and 1/6 turns by using the **SST**.

   Tightening torque:
   14—17 N·m {1.4—1.8 kgf·m, 11—13 ft·lbf}

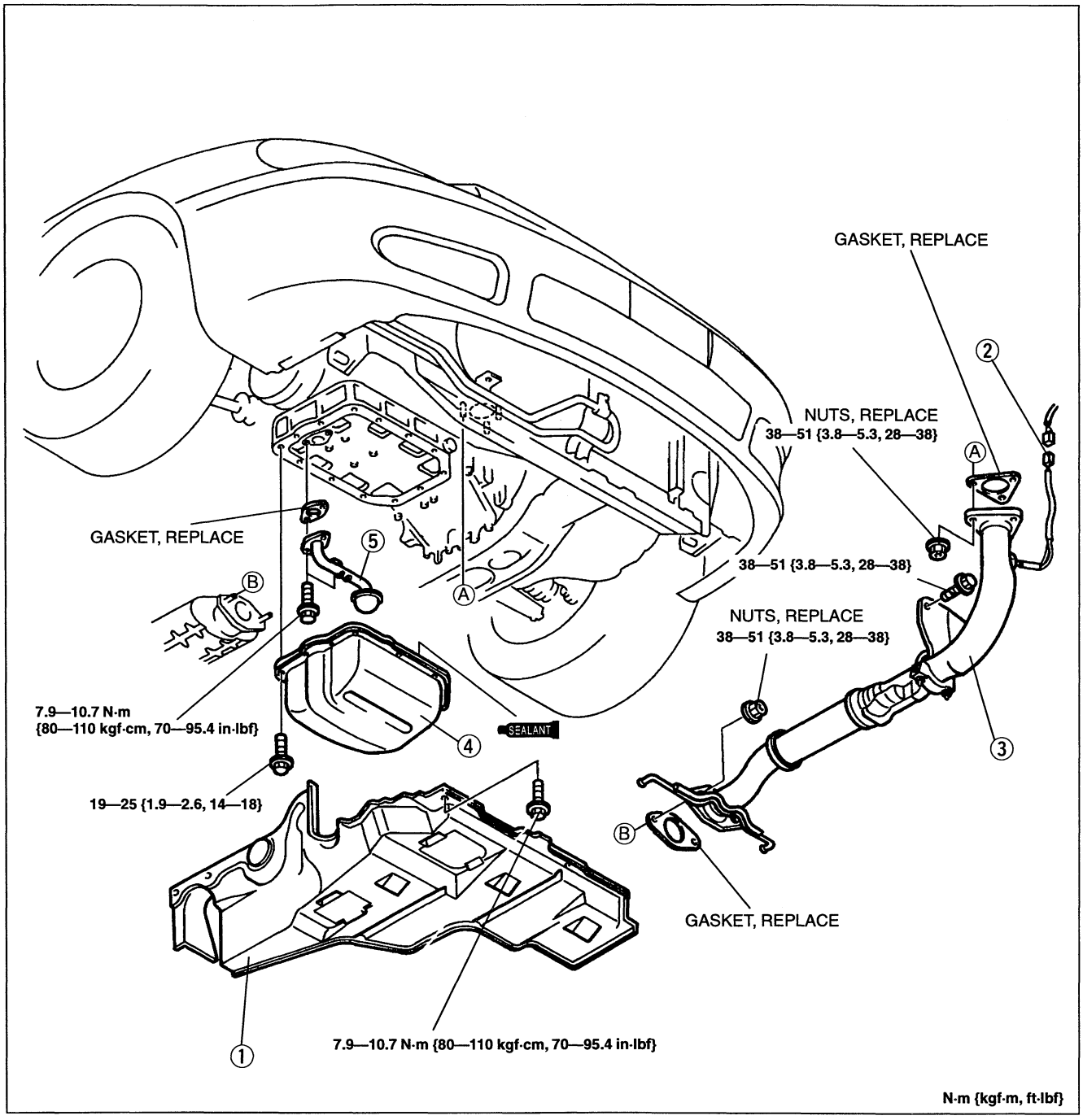
6. Start the engine and check for leaks.
7. Check the oil level and add if necessary.

   Oil filter capacity: 0.2 L {0.2 US qt, 0.2 Imp qt}

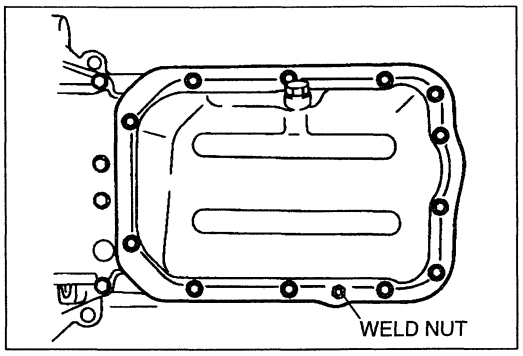
OIL PAN

REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the engine oil. (Refer to page D1–6.)
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal, referring to **Installation Note**.

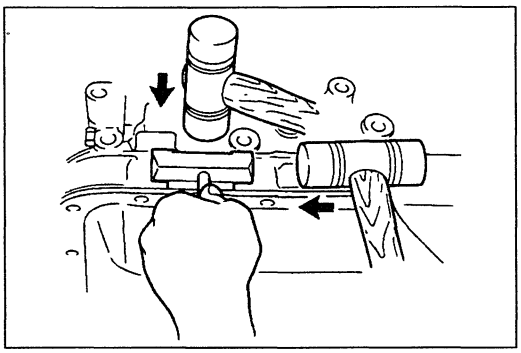


1. Splash shield
2. Heated oxygen sensor connector
3. Front exhaust pipe
4. Oil pan
   - Removal Note ..... page D1–9
   - Installation Note ..... page D1–9
5. Oil strainer
   - Removal Note ..... page D1–9
   - Installation Note ..... page D1–9

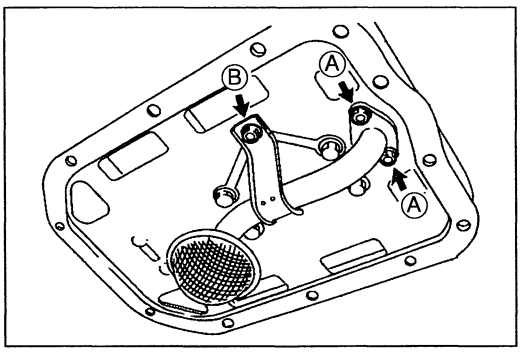


Removal Note
Oil pan
1. Remove the oil pan mounting bolts.

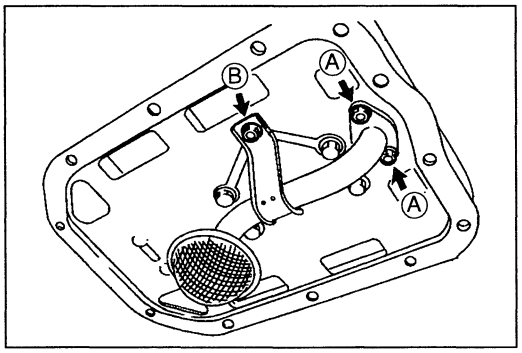
Caution
- **Pry tools can easily scratch the oil pan upper block and oil pan contact surfaces. Prying off the oil pan can also easily bend the oil pan flange. Refer to the following instructions before removing the oil pan.**



2. Remove the sealant on the bolt threads.
3. Screw in an oil pan bolt in the weld nut hole to make a small gap between the oil pan upper block and the oil pan.
4. Separate the oil pan from the oil pan upper block by using a scraper or a separator tool.
5. Remove the oil pan.

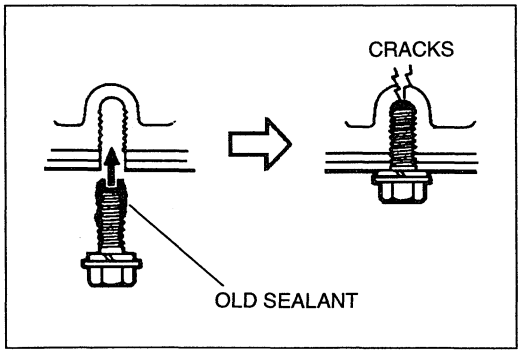


Oil strainer
1. Remove bolt Ⓑ.
2. Remove bolts Ⓐ.
3. Remove the oil strainer and gasket.



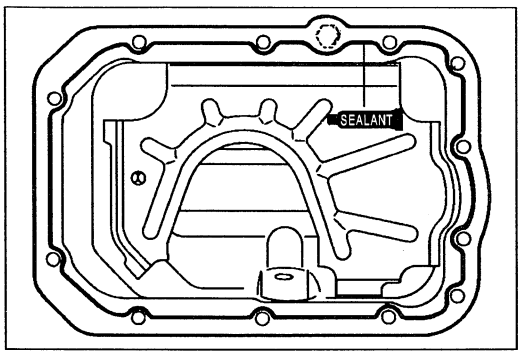
Installation Note
Oil strainer
1. Install the oil strainer with a new gasket.
2. Tighten the bolts marked Ⓐ first.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

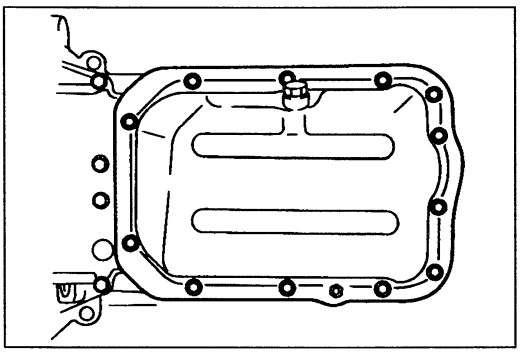


Oil pan

Caution
- **If the bolts are reused, remove the old sealant from the bolt threads. Tightening a bolt that has old sealant on it can cause thread damage.**



1. Remove all foreign material from the contact surfaces.
2. Apply silicone sealant to the oil pan as shown.



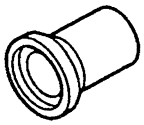
3. Install the oil pan within five minutes of applying the sealant.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

Steps After Installation
1. Fill with the specified amount and type of engine oil. (Refer to page D1–6.)
2. Connect the negative battery cable.
3. Start the engine and check for leaks.
4. Check the oil level and add oil if necessary.

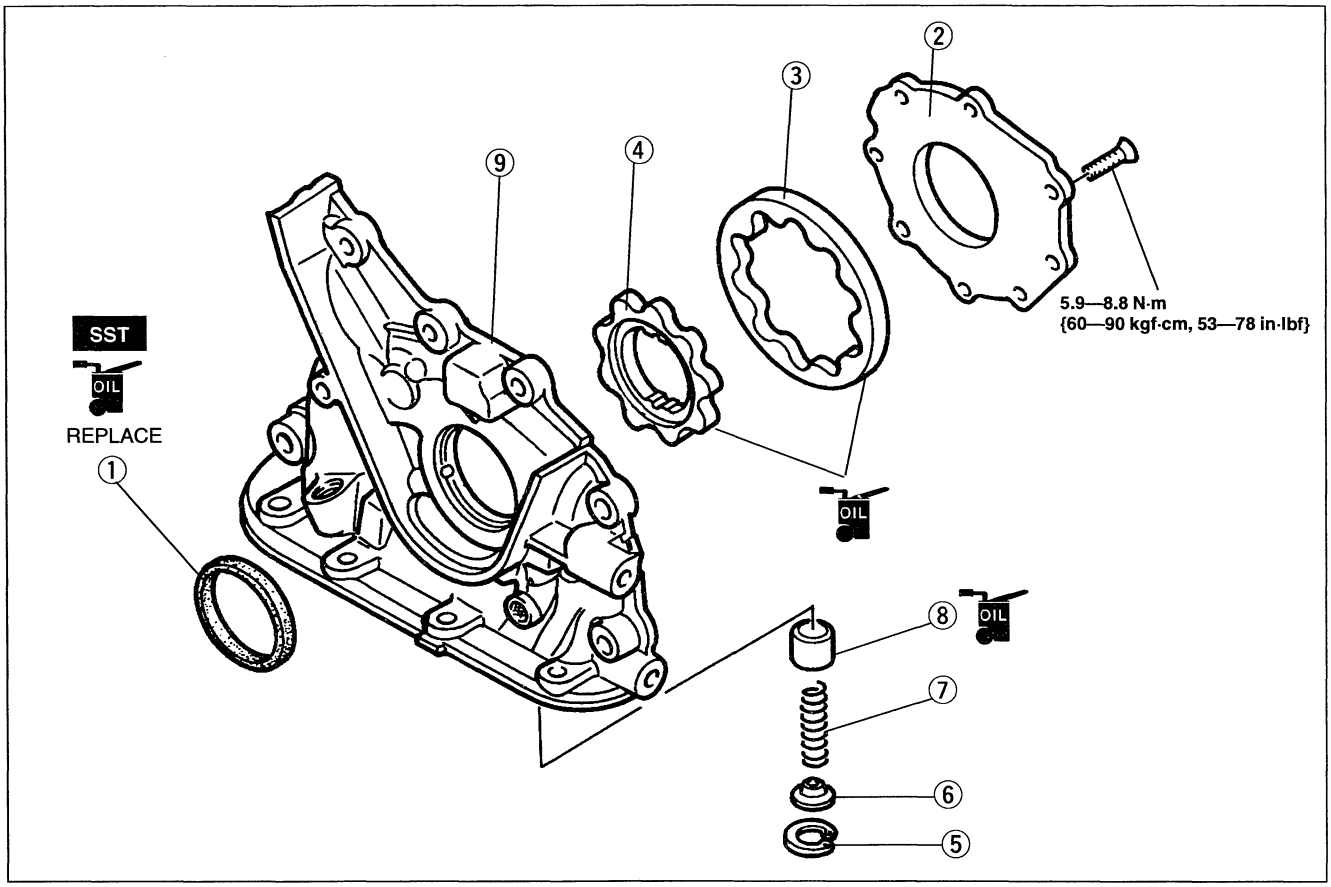
OIL PUMP

PREPARATION
SST

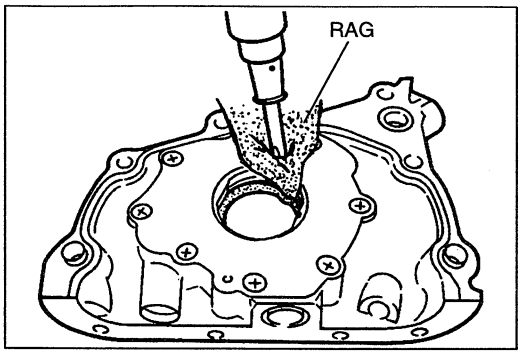
49 H010 401 Installer, oil seal		For installation of front oil seal

DISASSEMBLY / ASSEMBLY

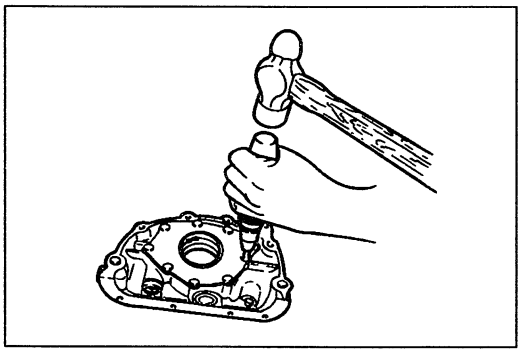
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



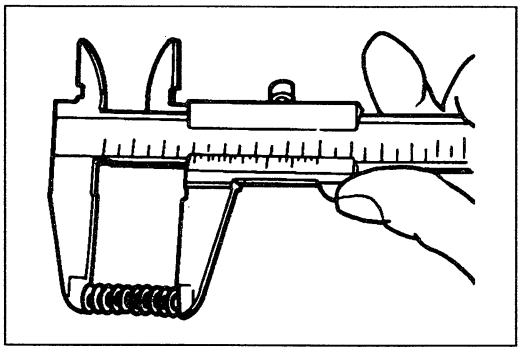
1. Oil seal
   - Disassembly Note ..... page D1–12
   - Assembly Note ..... page D1–13
2. Pump cover
   - Disassembly Note ..... page D1–12
   - Assembly Note ..... page D1–13
3. Outer rotor
   - Inspection ..... page D1–12
   - Assembly Note ..... page D1–13
4. Inner rotor
   - Inspection ..... page D1–12
   - Assembly Note ..... page D1–13
5. Snap ring
6. Spring seat
7. Pressure spring
   - Inspection ..... page D1–12
8. Control plunger
9. Pump body



Disassembly Note
Oil seal
Remove the oil seal with a screwdriver protected with a rag.

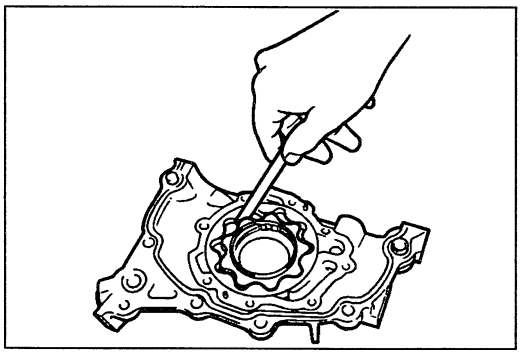


Pump cover
1. Remove the pump cover mounting bolts with an impact screwdriver.
2. Remove the pump cover.



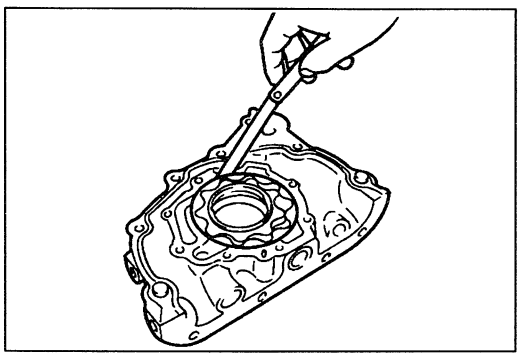
INSPECTION
Pressure spring
1. Inspect the spring for weakness and damage.
2. Measure the free length. Replace the spring if necessary.

Free length: 46.79 mm {1.842 in}

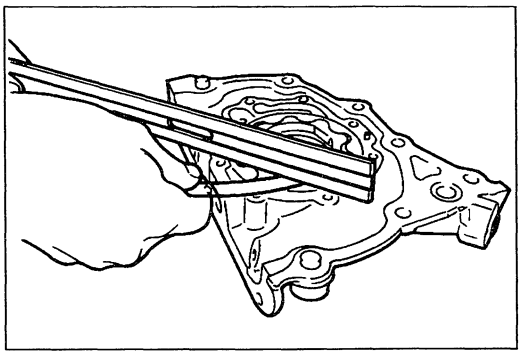


Rotor Clearance
Measure the following clearance. Replace the rotor if necessary.

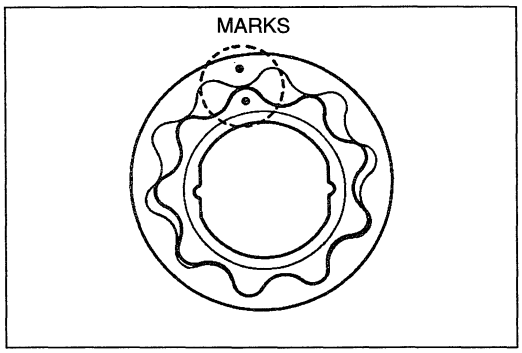
Inner rotor-to-tooth tip clearance:
0.02—0.18 mm {0.0008—0.0070 in}
Maximum: 0.200 mm {0.0079 in}



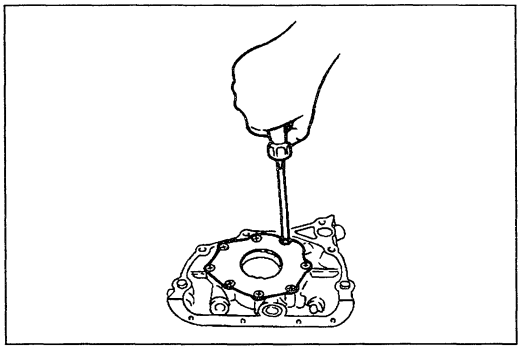
Outer rotor-to-pump body clearance:
0.113—0.186 mm {0.0045—0.0073 in}
Maximum: 0.210 mm {0.0083 in}



Side clearance:
0.035—0.095 mm {0.0014—0.037 in}
Maximum: 0.120 mm {0.0047 in}



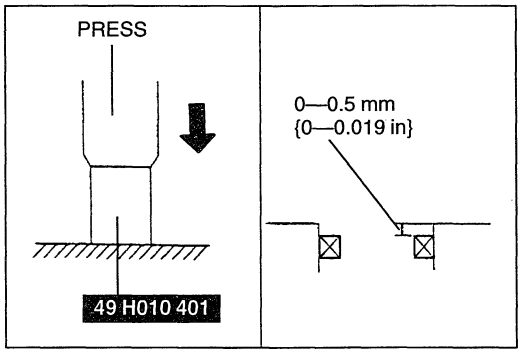
Assembly Note
Inner and outer rotor
1. Apply clean engine oil to the friction surface of the pump body and the rotors.
2. Install the inner and outer rotors into the oil pump body with the marks aligned as shown.



Pump cover
1. Install the pump cover.

   Tightening torque:
   5.9—8.8 N·m {60—90 kgf·cm, 53—78 in·lbf}

2. Verify that the inner rotor turns smoothly when turned by hand.



Oil seal
1. Apply clean engine oil to the new oil seal.
2. Install the oil seal into the oil pump body by hand.
3. Press the oil seal into the oil pump body by using the **SST**.

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

LUBRICATION SYSTEM (KL)

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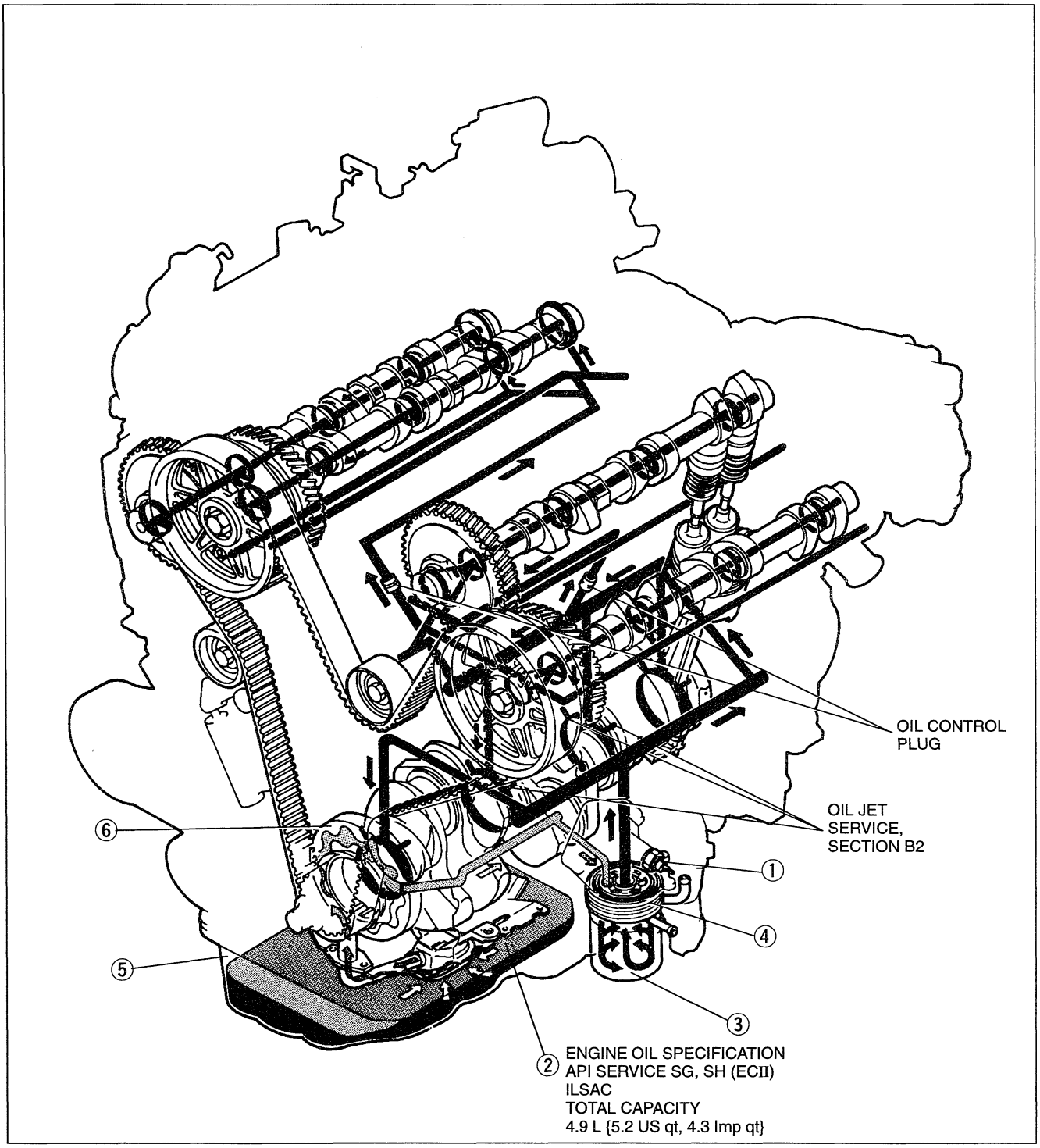

1. Oil pressure
Inspection ..... page D2–4
2. Engine oil
Inspection ..... page D2–5
Replacement ..... page D2–5
3. Oil filter
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5. Oil pan
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6. Oil pump
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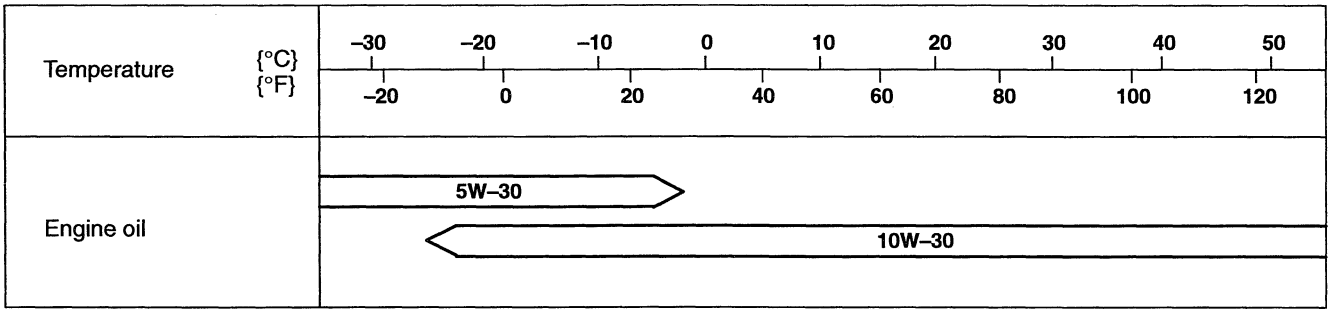
Inspection ..... page D2–12

OUTLINE

SPECIFICATIONS

Item \ Engine		KL
Lubrication system		Force-fed type
Oil pump	Type	Trochoid gear
	Relief pressure kPa {kgf/cm^2, psi}	491—588 {5.0—6.0, 72—85}
Oil filter	Type	Full-flow, paper element
	By-pass pressure differential kPa {kgf/cm^2, psi}	79—117 {0.8—1.2, 12—17}
Oil capacity	Total (dry engine) L {US qt, Imp qt}	4.9 {5.2, 4.3}
	Engine oil replacement L {US qt, Imp qt}	3.7 {3.9, 3.3}
	Engine oil replacement (with oil filter) L {US qt, Imp qt}	4.0 {4.2, 3.5}
Engine oil		API Service SG, SH (EC II) ILSAC

Recommended SAE Viscosity



Anticipated ambient temperature range before succeeding oil change, °C {°F}

TROUBLESHOOTING GUIDE

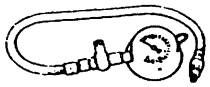
Problem	Possible Cause	Remedy	Page
Engine hard starting	Improper engine oil	Replace	D2– 5
	Insufficient engine oil	Add oil	D2– 5
Excessive oil consumption	Oil working up or down in cylinder	Refer to section B2	
	Oil leakage	Repair	—
Oil pressure drop	Insufficient engine oil	Add oil	D2– 5
	Oil leakage	Repair	—
	Worn and/or damaged oil pump rotor	Replace	D2–11
	Worn plunger (inside oil pump) or weak spring	Replace	D2–11
	Clogged oil strainer	Clean	—
	Excessive main bearing or connecting rod bearing clearance	Refer to section B2	
Warning light illuminates while engine is running	Oil pressure drop	As described above	—
	Malfunction of oil pressure switch	Refer to 1996 626/MX–6 Body Electrical Trouble-shooting Manual	
	Malfunction of electrical system	Refer to 1996 626/MX–6 Body Electrical Trouble-shooting Manual	

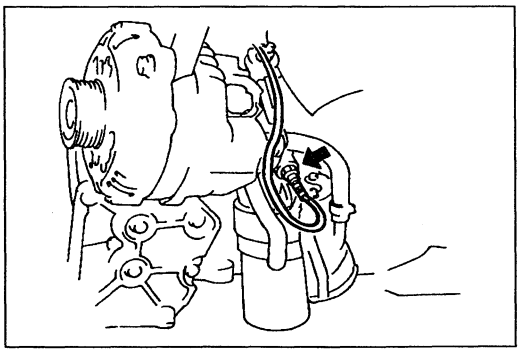
Warning

- **Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.**

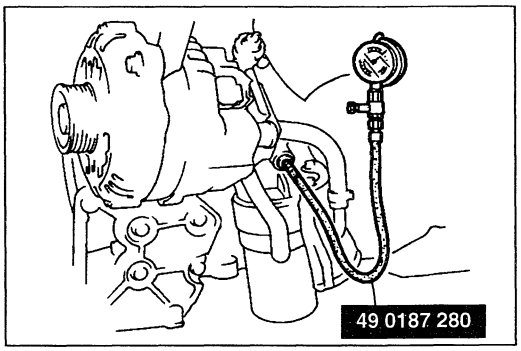
OIL PRESSURE

PREPARATION
SST

49 0187 280 Gauge, oil pressure		For inspection of oil pressure



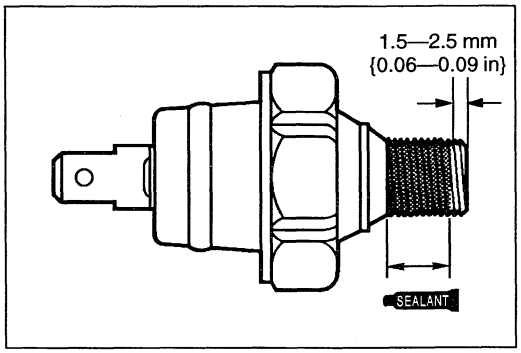
INSPECTION
1. Remove the oil pressure switch.



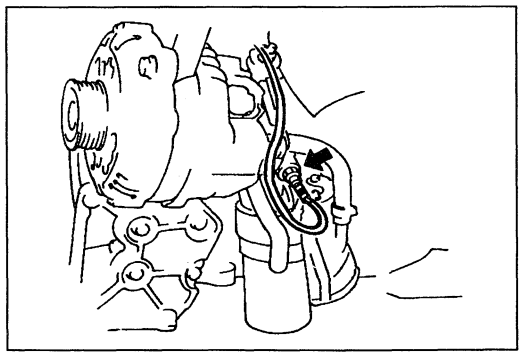
2. Screw the **SST** into the oil pressure switch installation hole.
3. Warm up the engine to normal operating temperature.
4. Run the engine at the specified speed, and note the gauge readings.

Note
- Oil pressure varies with oil viscosity and temperature.

Oil pressure: 334—490 kPa
{3.4—5.0 kgf/cm^2, 49—71 psi}–3,000 rpm

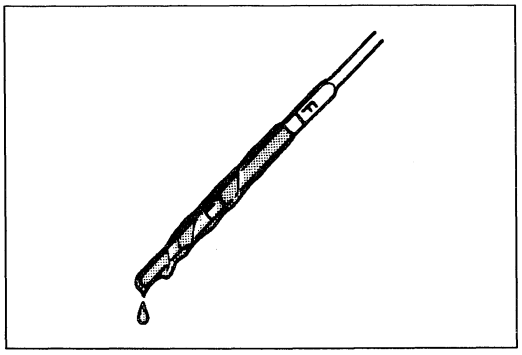


5. If the pressure is not as specified, check for the cause and repair as necessary.
(Refer to Troubleshooting Guide, page D2–3.)
6. Apply silicone sealant to the oil pressure switch threads as shown.



7. Remove the **SST** and install the oil pressure switch.

Tightening torque:
12—17 N·m {1.2—1.8 kgf·m, 8.7—13.0 ft·lbf}



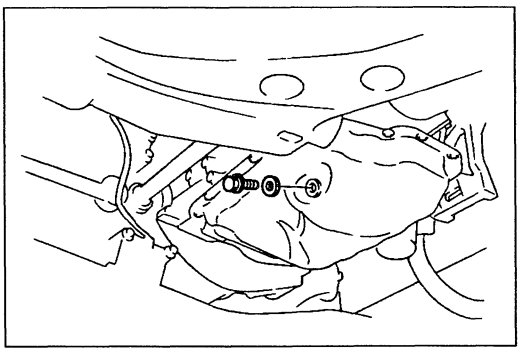
ENGINE OIL

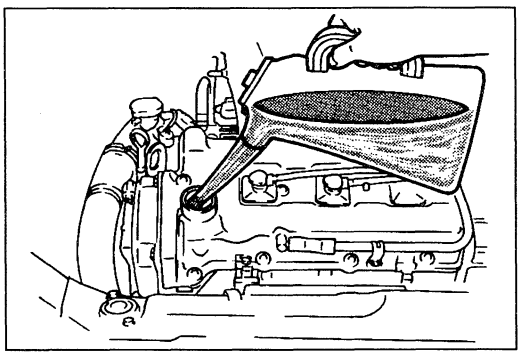
INSPECTION

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 dipstick and check the oil level and condition.
5. Add or replace oil as necessary.

Note

- The distance between the L and F marks on the dipstick represents 1.0 L {1.1 US qt, 0.9 Imp qt}.





REPLACEMENT

Warning

- **When the engine and the oil are hot, they can badly burn. Don't burn yourself with either.**

1. Remove the oil filler cap and the oil pan drain plug.
2. Drain the oil into a container.
3. Install a new gasket and the drain plug.

Tightening torque:
30—41 N·m {3.0—4.2 kgf·m, 22—30 ft·lbf}

4. Refill the engine with the specified type and amount of engine oil.

Oil capacity

L {US qt, Imp qt}

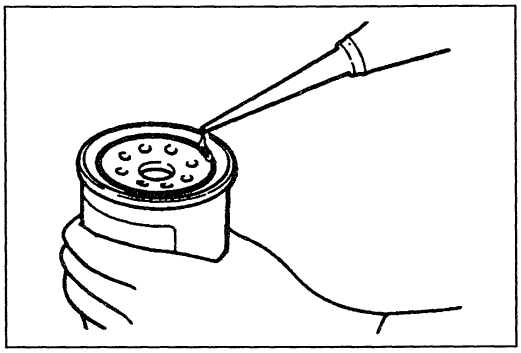
Total (dry engine)	4.9 {5.2, 4.3}
Engine oil replacement	3.7 {3.9, 3.3}
Engine oil replacement (with oil filter)	4.0 {4.2, 3.5}

5. Refit the oil filler cap.
6. Run the engine and check for leaks.
7. Check the oil level and add oil if necessary.

OIL FILTER

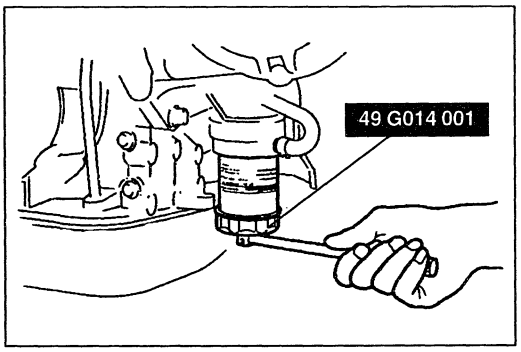
PREPARATION
SST

49 G014 001 Wrench, oil filter		For removal / installation of oil filter



REPLACEMENT

1. Remove the oil filter by using the **SST**.
2. Use a clean rag to wipe off the mounting surface on the oil cooler base.
3. Apply clean engine oil to the O-ring of the new filter.



4. Install the oil filter and tighten it by hand until the O-ring contacts the oil cooler base.
5. Tighten the filter 1 and 1/6 turns by using the **SST**.

   Tightening torque:
   14—17 N·m {1.4—1.8 kgf·m, 11—13 ft·lbf}

6. Start the engine and check for leaks.
7. Check the oil level and add oil if necessary.

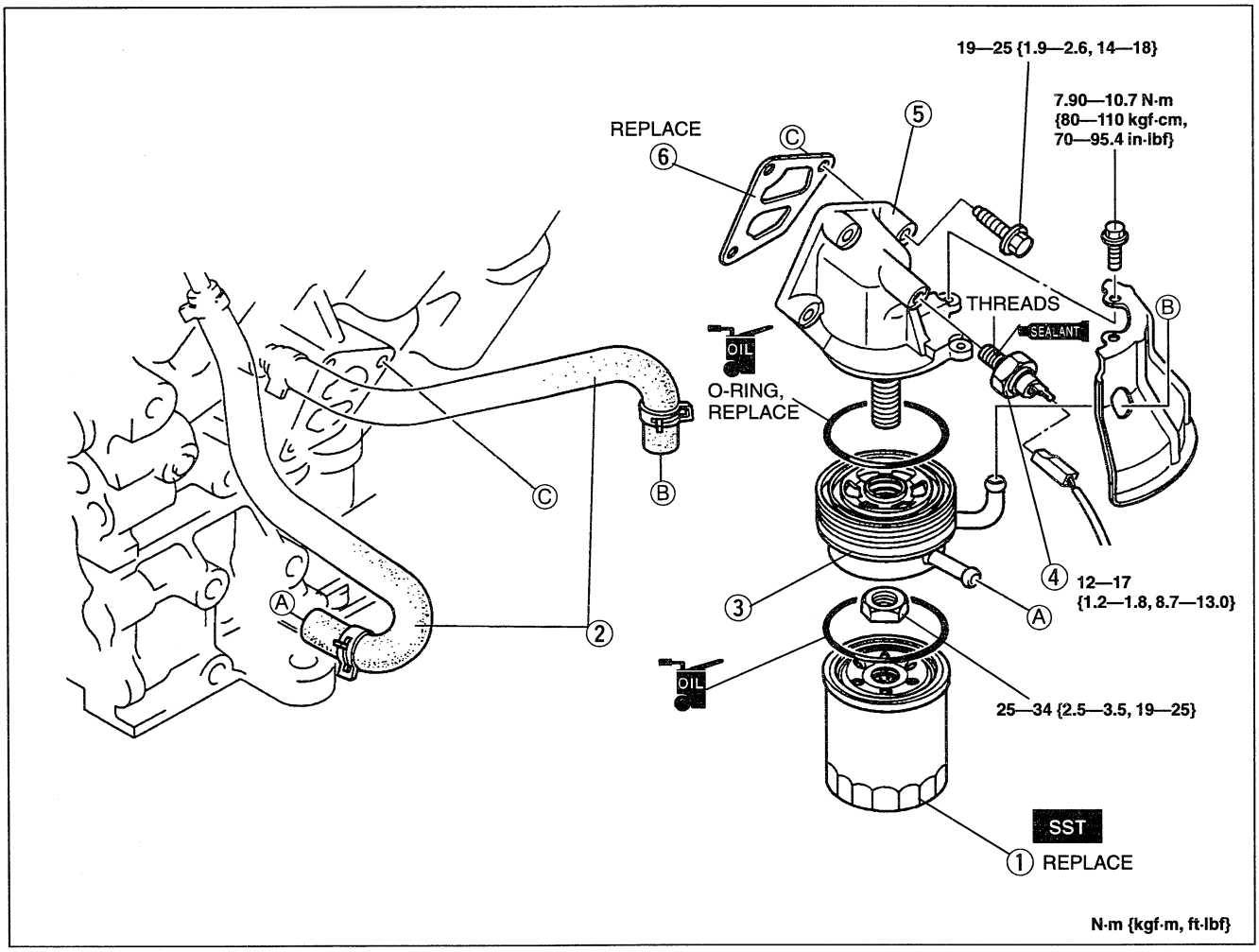
   Oil filter capacity: 0.3 L {0.3 US qt, 0.3 Imp qt}

OIL COOLER

PREPARATION
SST

49 G014 001 Wrench, oil filter		For removal / installation of oil filter

REMOVAL / INSTALLATION
1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to section E2.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.



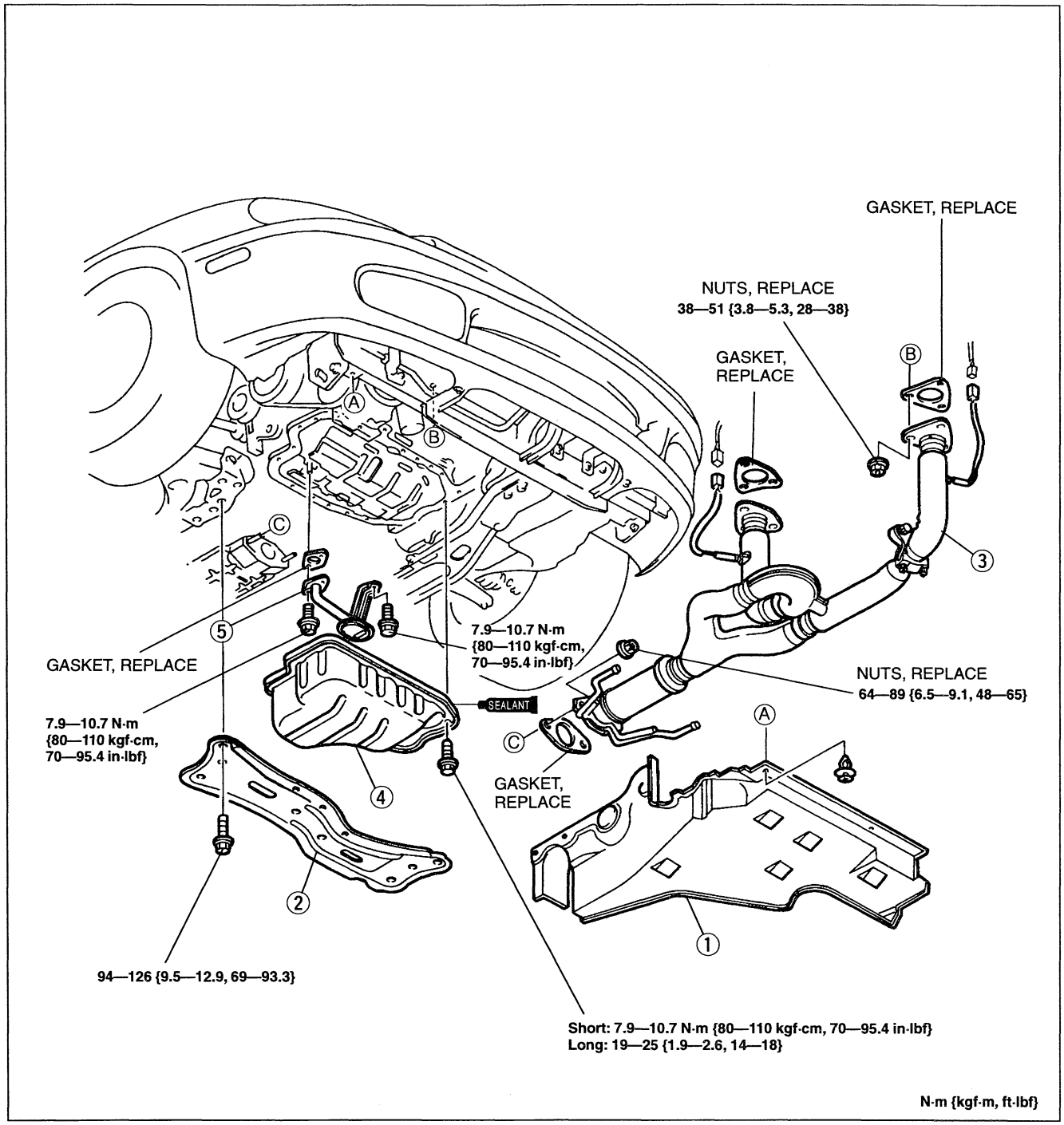
1. Oil filter
   Replacement ..... page D2–6
2. Oil cooler hose
3. Oil cooler
4. Oil pressure switch
5. Oil filter body
6. Gasket

Steps After Installation
1. Fill with the specified amount and type of engine coolant. (Refer to section E2.)
2. Check for leaks.

OIL PAN

REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the engine oil. (Refer to page D2–5.)
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal, referring to **Installation Note**.



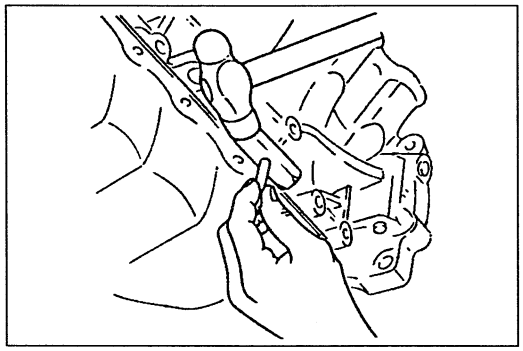
1. Splash shield
2. Transverse member
3. Front exhaust pipe
4. Oil pan
   - Removal Note ..... page D2–9
   - Inspection ..... page D2–9
   - Installation Note ..... page D2–9
5. Oil strainer

Removal Note
Oil pan

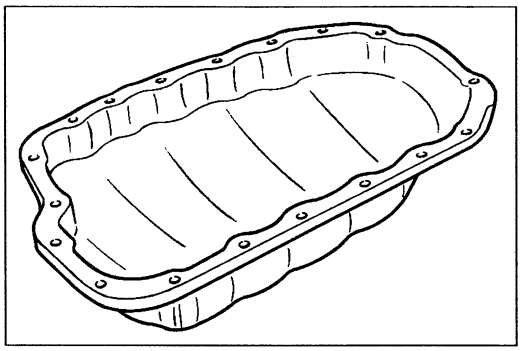
1. Remove the oil pan mounting bolts.

Caution

- **Pry tools can easily scratch the lower cylinder block and oil pan contact surfaces. Prying off the oil pan can also easily bend the oil pan flange. Refer to the following instructions before removing the oil pan.**

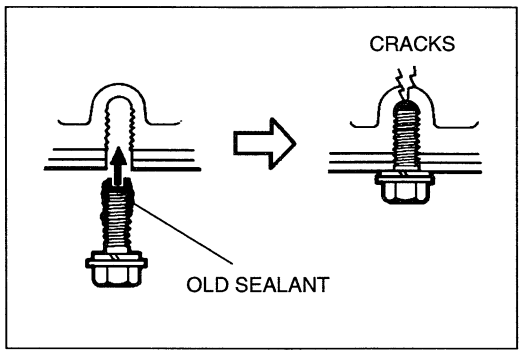


2. Separate the oil pan from the lower cylinder block by using a scraper or a separator tool.
3. Remove the oil pan.



INSPECTION
Oil Pan

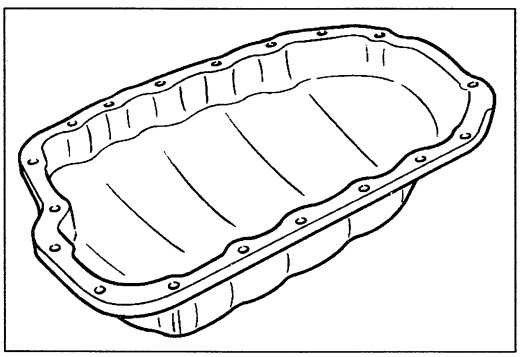
Visually check for cracks, deformation and damage. Repair or replace if necessary.



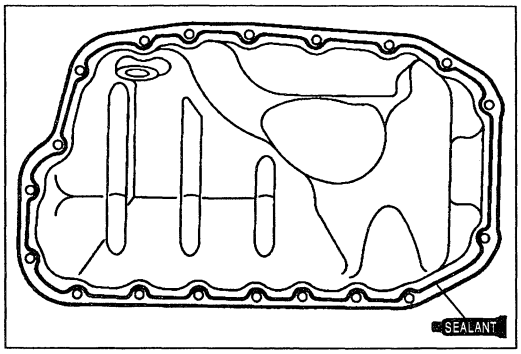
Installation Note
Oil pan

Caution

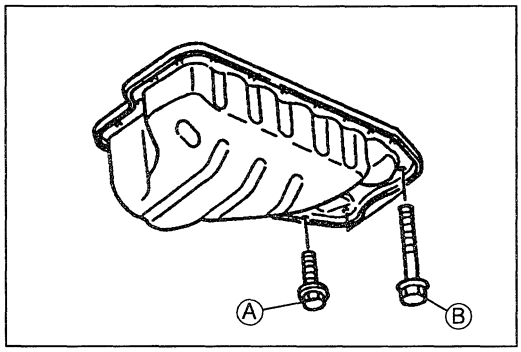
- **If the bolts are reused, remove the old sealant from the bolt threads. Tightening a bolt that has old sealant on it can cause thread damage.**



1. Remove all foreign material from the contact surfaces.



2. Apply silicone sealant to the oil pan flange as shown.



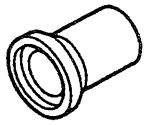
3. Install the oil pan within five minutes of applying the sealant.

Tightening torque
Ⓐ: 7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}
Ⓑ: 19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

Steps After Installation
1. Fill with the specified amount and type of engine oil. (Refer to page D2–5.)
2. Connect the negative battery cable.
3. Start the engine and check for leaks.
4. Check the oil level and add oil if necessary.

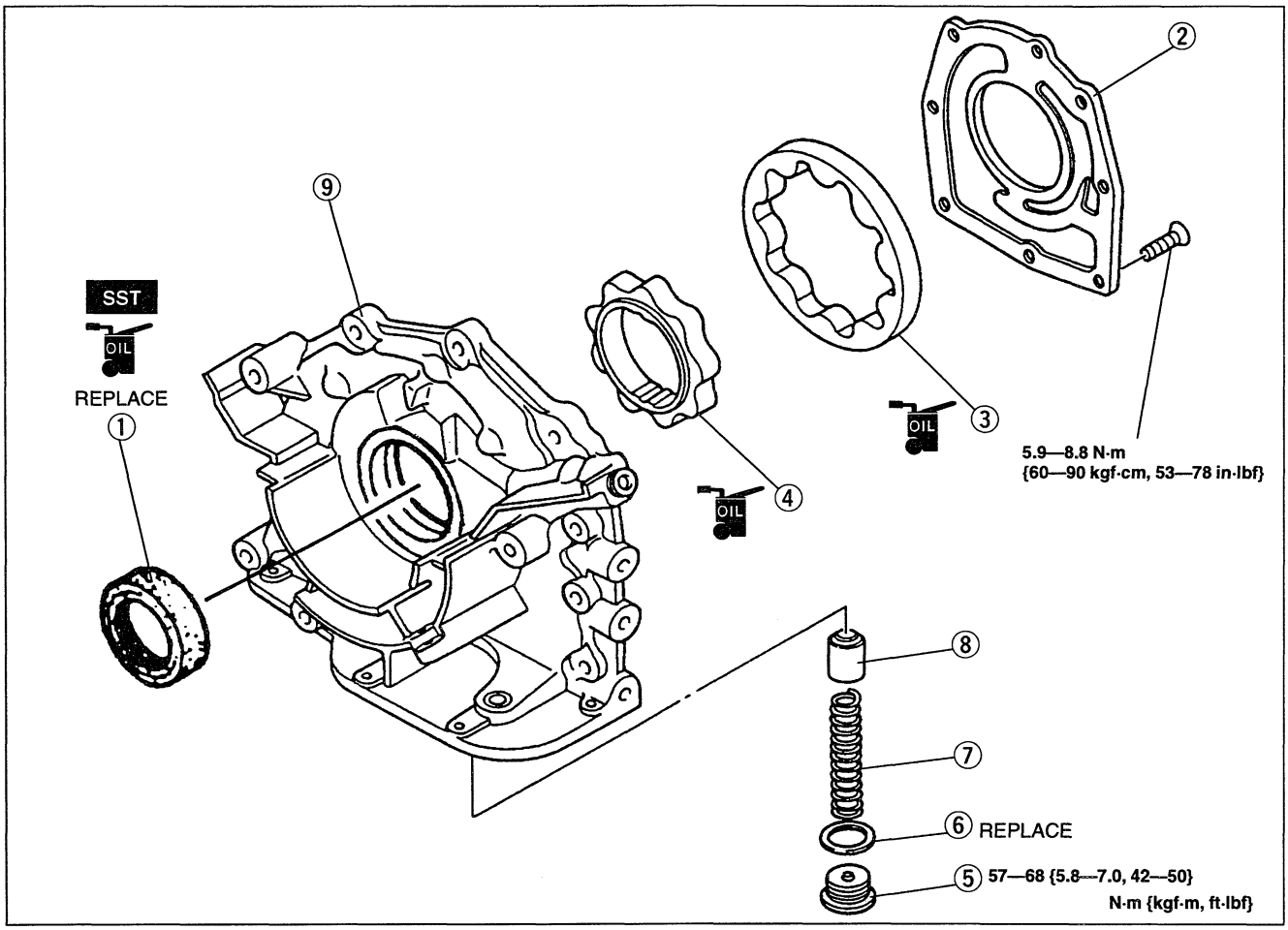
OIL PUMP

PREPARATION
SST

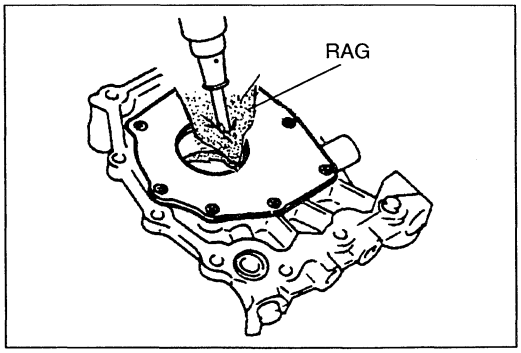
49 H010 401 Installer, oil seal		For installation of front oil seal

DISASSEMBLY / ASSEMBLY

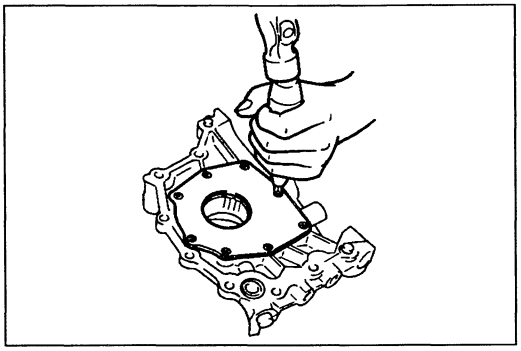
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



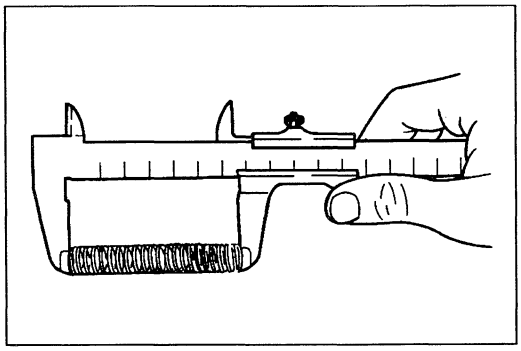
1. Oil seal
   - Disassembly Note ..... page D2–12
   - Assembly Note ..... page D2–13
2. Pump cover
   - Disassembly Note ..... page D2–12
   - Assembly Note ..... page D2–13
3. Outer rotor
   - Inspection ..... page D2–12
   - Assembly Note ..... page D2–13
4. Inner rotor
   - Inspection ..... page D2–12
   - Assembly Note ..... page D2–13
5. Blind plug
6. Spring seat
7. Pressure spring
   - Inspection ..... page D2–12
8. Control plunger
9. Pump body



Disassembly Note
Oil seal
Remove the oil seal with a screwdriver protected with a rag.

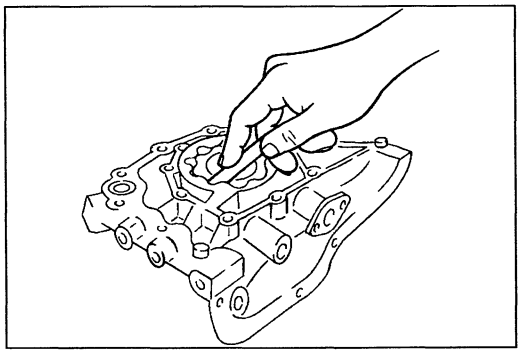


Pump cover
1. Remove the pump cover mounting bolts with an impact screwdriver.
2. Remove the pump cover.



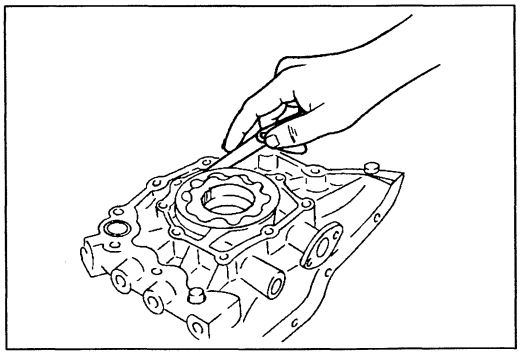
INSPECTION
Pressure Spring
1. Inspect the spring for weakness and damage.
2. Measure the spring free length. Replace the spring if necessary.

Free length: 46.79 mm {1.842 in}

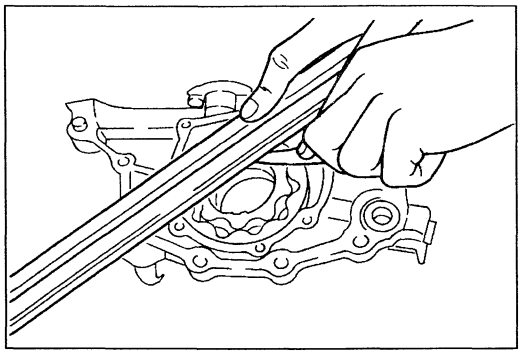


Rotor Clearance
Measure the following clearances. Replace the rotor if necessary.

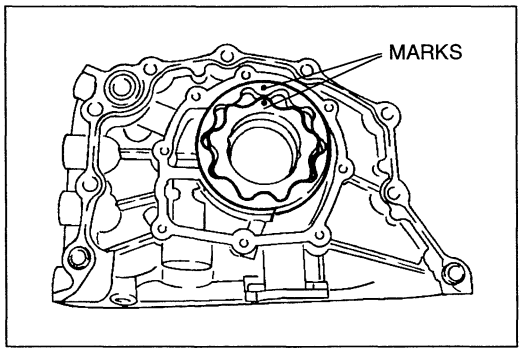
Inner rotor-to-tooth tip clearance:
0.02—0.18 mm {0.0008—0.0070 in}
Maximum: 0.20 mm {0.0079 in}



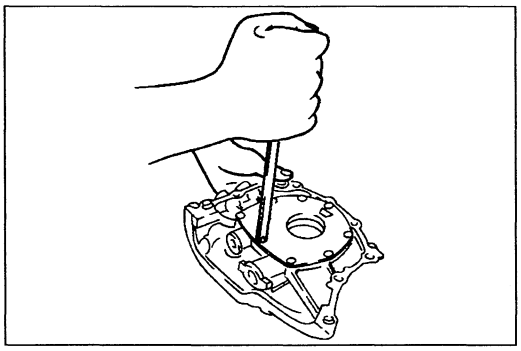
Outer rotor-to-pump body clearance:
0.113—0.186 mm {0.0045—0.0073 in}
Maximum: 0.22 mm {0.0087 in}



Side clearance: 0.03—0.09mm {0.0012—0.0035 in}
Maximum: 0.13mm {0.0051 in}



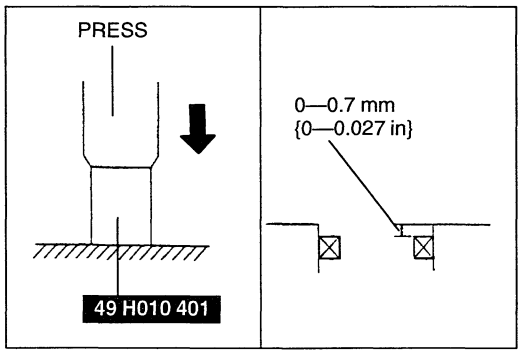
Assembly Note
Inner and outer rotor
1. Apply clean engine oil to the friction surface of the pump body and the rotors.
2. Install the inner and outer rotors into the oil pump body with the marks aligned as shown.



Pump cover
1. Install the pump cover.

   Tightening torque:
   5.9—8.8 N·m {60—90 kgf·cm, 53—78 in·lbf}

2. Verify that the oil pump rotates smoothly when turned by hand.



Oil seal
1. Apply clean engine oil to the new oil seal.
2. Install the oil seal into the oil pump body by hand.
3. Press the oil seal into the oil pump body by using the **SST**.

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

COOLING SYSTEM (FS)

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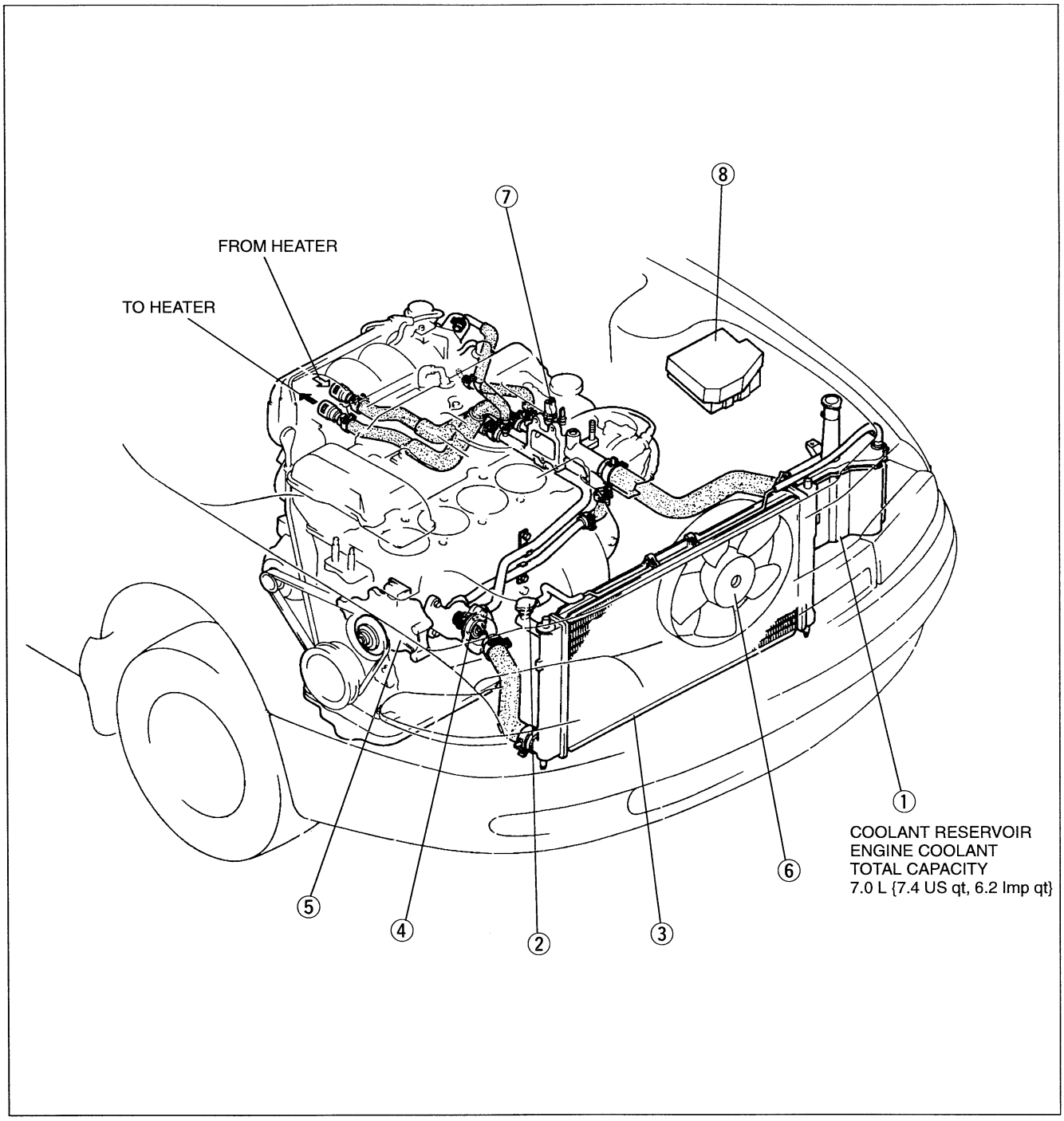

1. Engine coolant
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2. Radiator cap
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3. Radiator
Removal / Inspection / Installation ..... page E1–8
4. Thermostat
Removal / Inspection / Installation ..... page E1–9
5. Water pump
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6. Cooling fan motor
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8. Cooling fan relay
Removal ..... page E1–14
Inspection ..... page E1–14

OUTLINE

SPECIFICATIONS

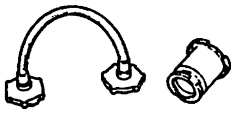
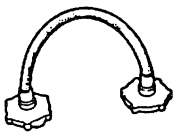
Item \ Engine			FS
Cooling system			Water-cooled, forced circulation
Coolant capacity		L {US qt, Imp qt}	7.0 {7.4, 6.2}
Water pump	Type		Centrifugal, V-ribbed belt-driven
	Water seal		Unified mechanical seal
Thermostat	Type		Wax, bottom-bypass
	Opening temperature	°C {°F}	80—84 {176—183}
	Full-open temperature	°C {°F}	95 {203}
	Full-open lift	mm {in}	8.5 {0.33}min.
Radiator	Type		Corrugated fin
	Cap valve opening pressure	kPa {kgf/cm^2, psi}	94—122 {0.95—1.25, 13.6—17.7}
Cooling fan	Type		Electric
	Blade	Outer diameter mm {in}	340 {13.4}
		Number	4
	Motor	Current A	5.6—7.6

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Action	Page
Overheating	Coolant level insufficient	Add	E1– 4
	Coolant leakage	Repair or replace	—
	Radiator fins clogged	Repair	E1– 8
	Radiator cap malfunction	Replace	E1– 7
	Cooling fan malfunction	Replace	E1–12
	Thermostat malfunction	Replace	E1– 9
	Water passage clogged	Clean	E1– 4
	Water pump malfunction	Replace	E1–11
Corrosion	Impurities in coolant	Replace	E1– 5

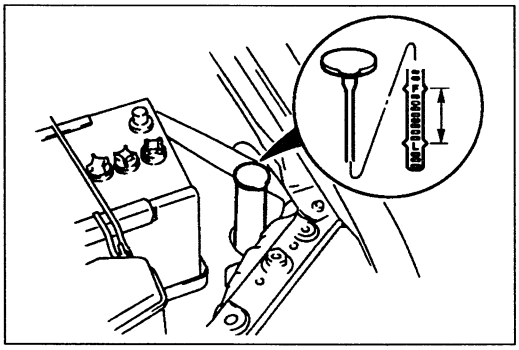
ENGINE COOLANT

PREPARATION
SST

49 9200 145 Adapter set, radiator cap tester 	For inspection of cooling system	49 9200 146 Adapter A (Part of 49 9200 145) 	For inspection of cooling system

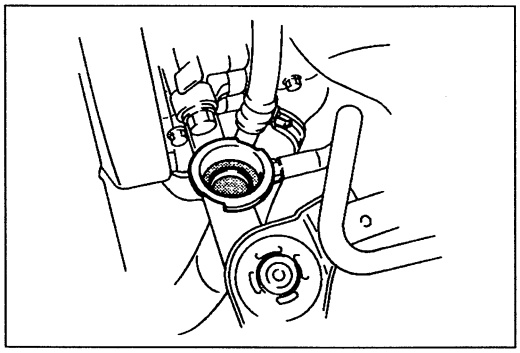
INSPECTION

Warning
- **Removing the radiator cap or the radiator drain plug while the engine is running, or when the engine and radiator are hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
  When you're sure all the pressure is gone, press down on the cap — still using a cloth — turn it, and remove it.

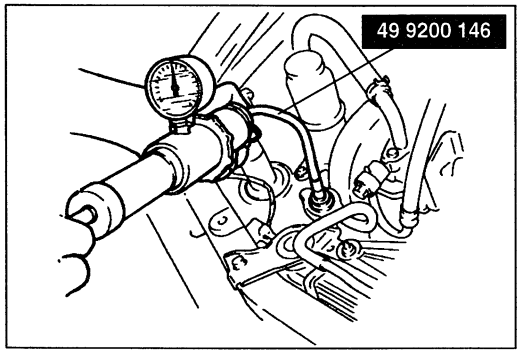


Coolant Level (Engine cold)
1. Verify that the coolant level is at the filler neck.
2. Verify that the coolant level on the coolant dipstick is between the F and L marks.
3. Add coolant if necessary.

Note
- The distance between the L and F marks on the dipstick represents 0.55 L {0.58 US qt, 0.48 Imp qt}.

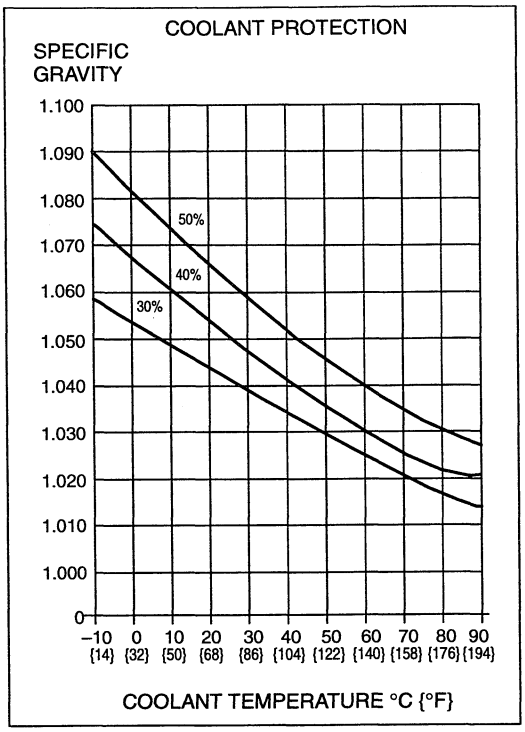


Coolant Quality
1. Verify that there is no buildup of rust or scale around the radiator cap and filler neck.
2. Verify that the coolant is free of oil. Replace the coolant if necessary.



Coolant Leakage
1. Connect a radiator tester and the **SST** to the radiator filler neck.
2. Apply **123 kPa {1.25 kgf/cm^2, 17.8 psi}** pressure to the system.
3. Verify that the pressure is held. If not, check for coolant leakage.

Caution
- **Applying more than 123 kPa {1.25 kgf/cm^2, 17.8 psi} can damage the hoses, fittings and other components, and cause leaks.**



Coolant Protection

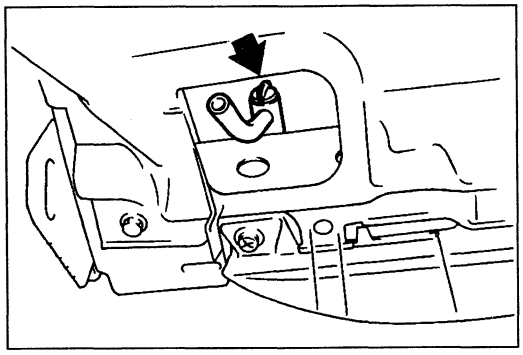
Caution

- **The engine has aluminum parts that can be damaged by alcohol or methanol antifreeze. Do not use alcohol or methanol in the cooling system. Use only ethylene-glycol-based coolant.**
- **Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will cut down on the coolant's effectiveness.**

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

Antifreeze solution mixture percentage

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



REPLACEMENT

Draining

Warning

- **Removing the radiator cap or the radiator drain plug while the engine is running, or when the engine and radiator are hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
  When you're sure all the pressure is gone, press down on the cap — still using a cloth — turn it, and remove it.

1. Remove the radiator cap and loosen the radiator drain plug.
2. Drain the coolant into a container.
3. Flush the cooling system with water until all traces of color are gone.
4. Let the system drain completely.
5. Tighten the drain plug.

Refilling

Use the proper amount and mixture of ethylene-glycol based coolant. (Refer to Coolant Protection, page E1–5.)

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

   Filling pace: 1.0 L {1.1 US qt, 0.9 Imp qt}/min. max.

2. Fill the coolant reservoir up to the F mark.
3. Fully install the radiator cap.
4. Start the engine and let it idle until it warms up.
5. If the temperature increases beyond normal, there is excessive air in the system. Stop the engine and allow it to cool; then repeat steps 1—3.
6. Run the engine at 2,200—2,800 rpm for five minutes.
7. Stop the engine and allow it to cool.
8. Repeat steps 1—7; then go to step 9.

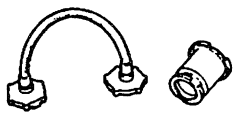
   Warning

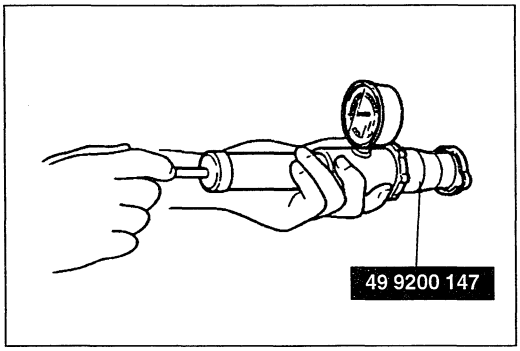
   - **Removing the radiator cap or the radiator drain plug while the engine is running, or when the engine and radiator are hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.**
     Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.
     When you're sure all the pressure is gone, press down on the cap — still using a cloth — turn it, and remove it.

9. Remove the radiator cap and verify that the engine coolant level is near the filler neck. If not, repeat steps 1—9.
10. Fill the reservoir up to the F mark.

RADIATOR CAP

PREPARATION
SST

49 9200 145 Adapter set, radiator cap tester 	For inspection of radiator cap	49 9200 147 Adapter B (Part of 49 9200 145) 	For inspection of radiator cap

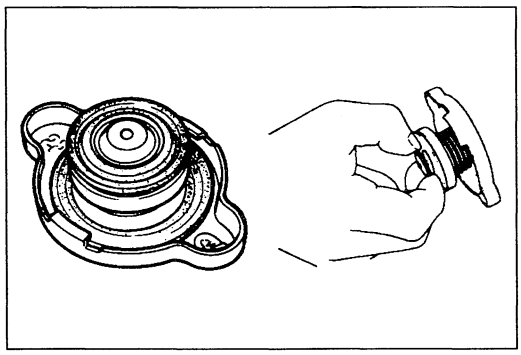


INSPECTION
Radiator Cap Valve

Warning

- **Removing the radiator cap while the engine is running, or when the engine and radiator are hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system. Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
  When you're sure all the pressure is gone, press down on the cap — still using a cloth — turn it, and remove it.

1. Remove all foreign material (such as water residue) from between the radiator cap valve and the valve seat.
2. Attach the radiator cap to a radiator cap tester with the **SST**. Apply pressure gradually to **94—122 kPa {0.95—1.25 kgf/cm^2, 13.6—17.7 psi}**.
3. Verify that the pressure is held for at least **10 seconds**.



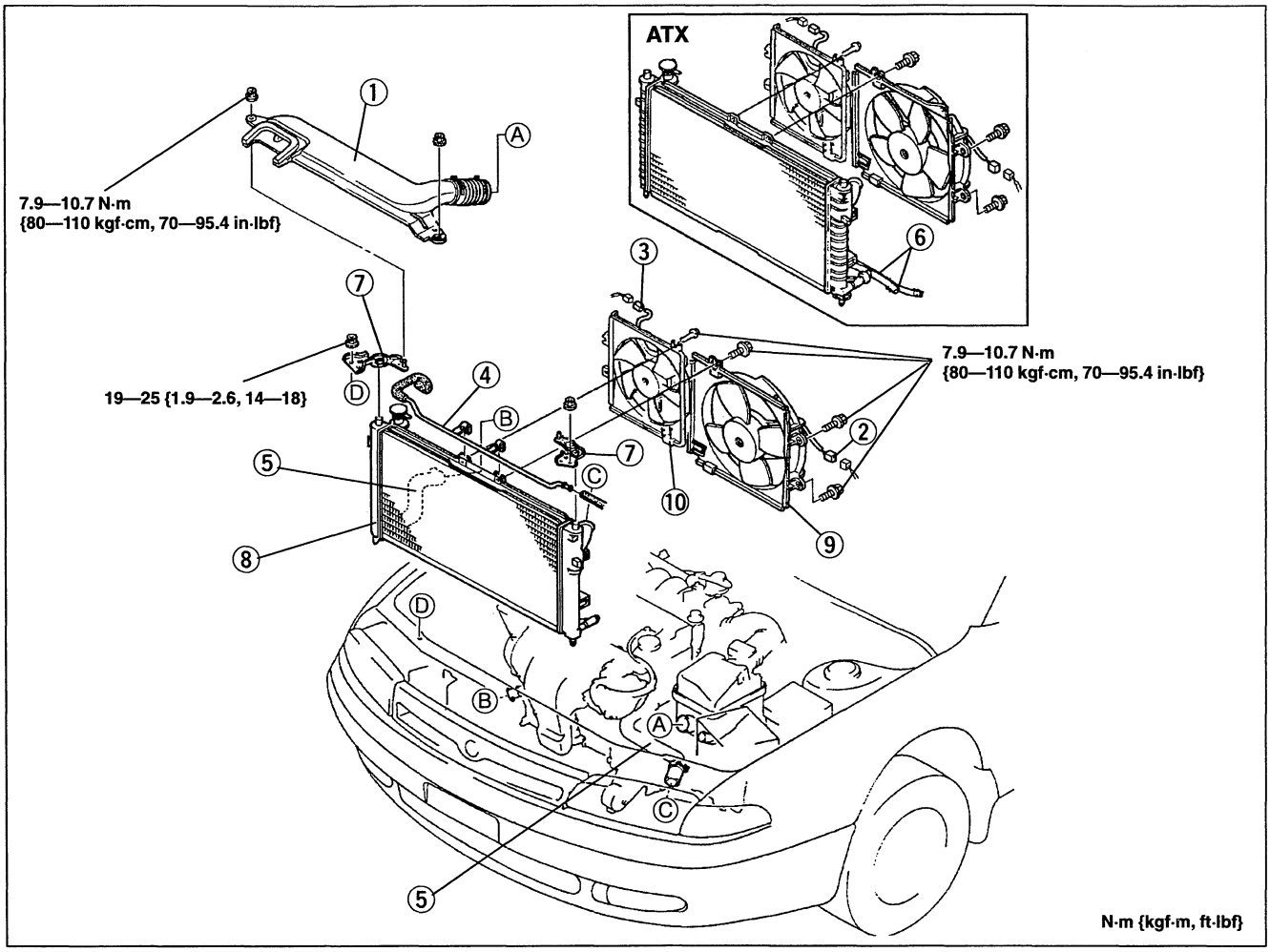
Negative Pressure Valve

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

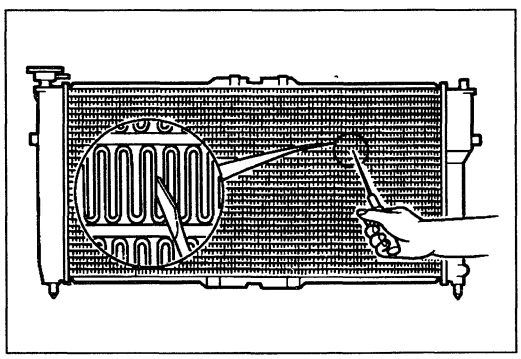
RADIATOR

REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to page E1–5.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.



1. Fresh-air duct
2. Cooling fan motor connector
3. Condenser fan motor connector
4. Coolant reservoir pipe
5. Radiator hose (upper and lower)
6. Oil cooler hose (ATX)
7. Radiator bracket
8. Radiator
   Inspection ..... below
9. Cooling fan and radiator cowling assembly
10. Condenser fan and radiator cowling assembly



INSPECTION

Radiator

Check for the following and repair or replace as necessary.

1. Cracks, damage, and water leakage.
2. Bent fins (Repair with a screwdriver.)
3. Distorted and bent radiator inlet and outlet.

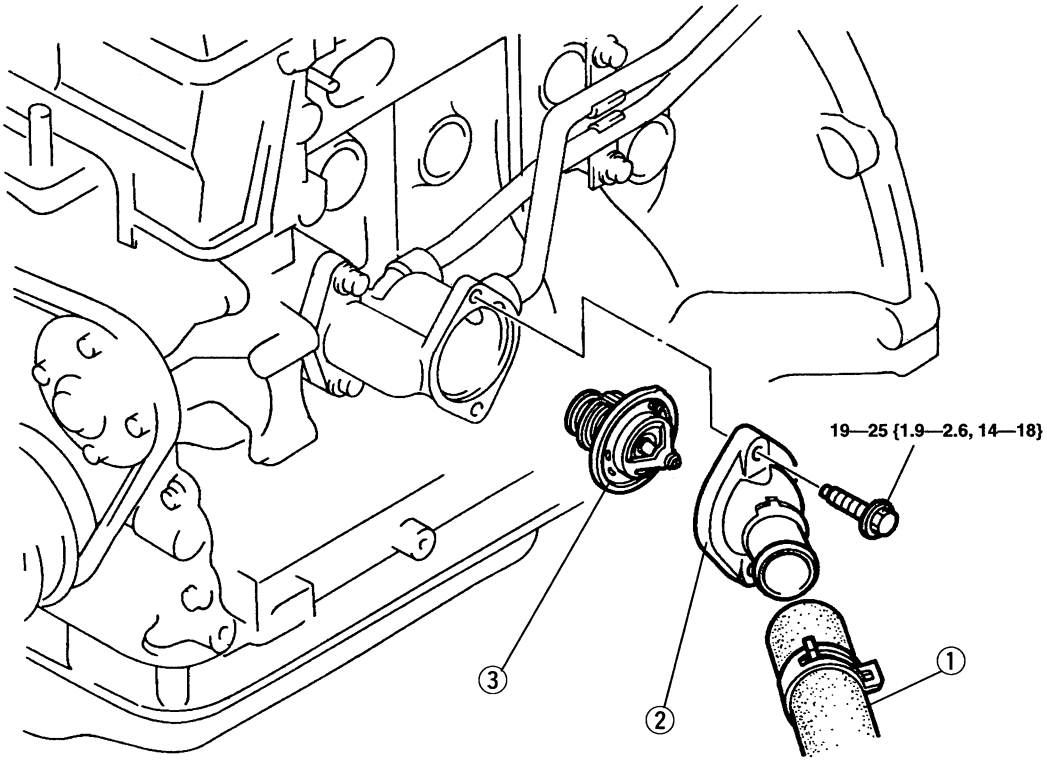
Steps After Installation

1. Fill the radiator with the specified amount and type of engine coolant. (Refer to page E1–6.)
2. Check for leaks.

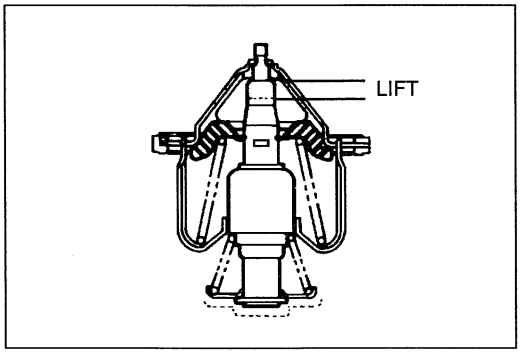
THERMOSTAT

REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to page E1–5.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal, referring to **Installation Note**.



1. Radiator hose, lower
2. Thermostat cover
3. Thermostat
   Inspection ..... below
   Installation Note ..... page E1–10

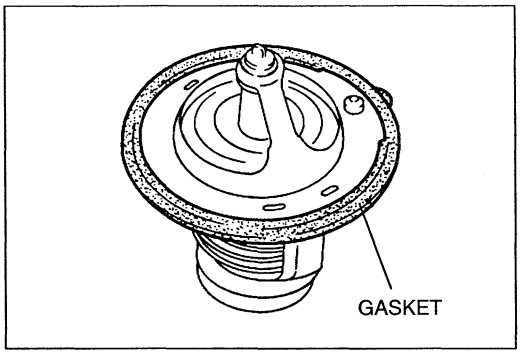


INSPECTION

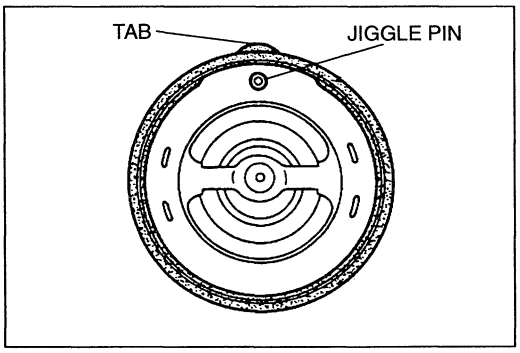
Thermostat

1. Visually check that the thermostat valve is airtight.
2. Place the thermostat and a thermometer in water.
3. Heat the water and check the following.

Initial-opening temperature: 80—84°C {176—183°F}
Full-open temperature: 95°C {203°F}
Full-open lift: 8.5mm {0.33 in} min.

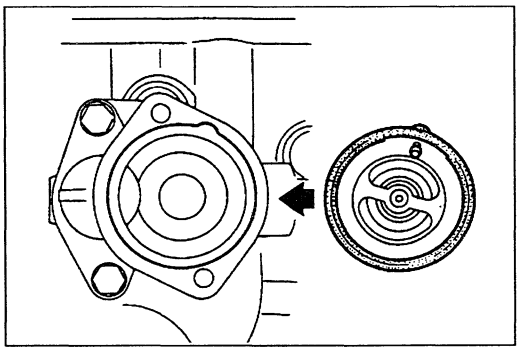


4. If the gasket of the thermostat is damaged, replace the thermostat assembly.



Installation Note
Thermostat

1. Verify that the jiggle pin is aligned with the projection of the thermostat gasket as shown.



2. Install the thermostat and gasket into the thermostat housing, aligning the tab to the housing, as shown in the figure.

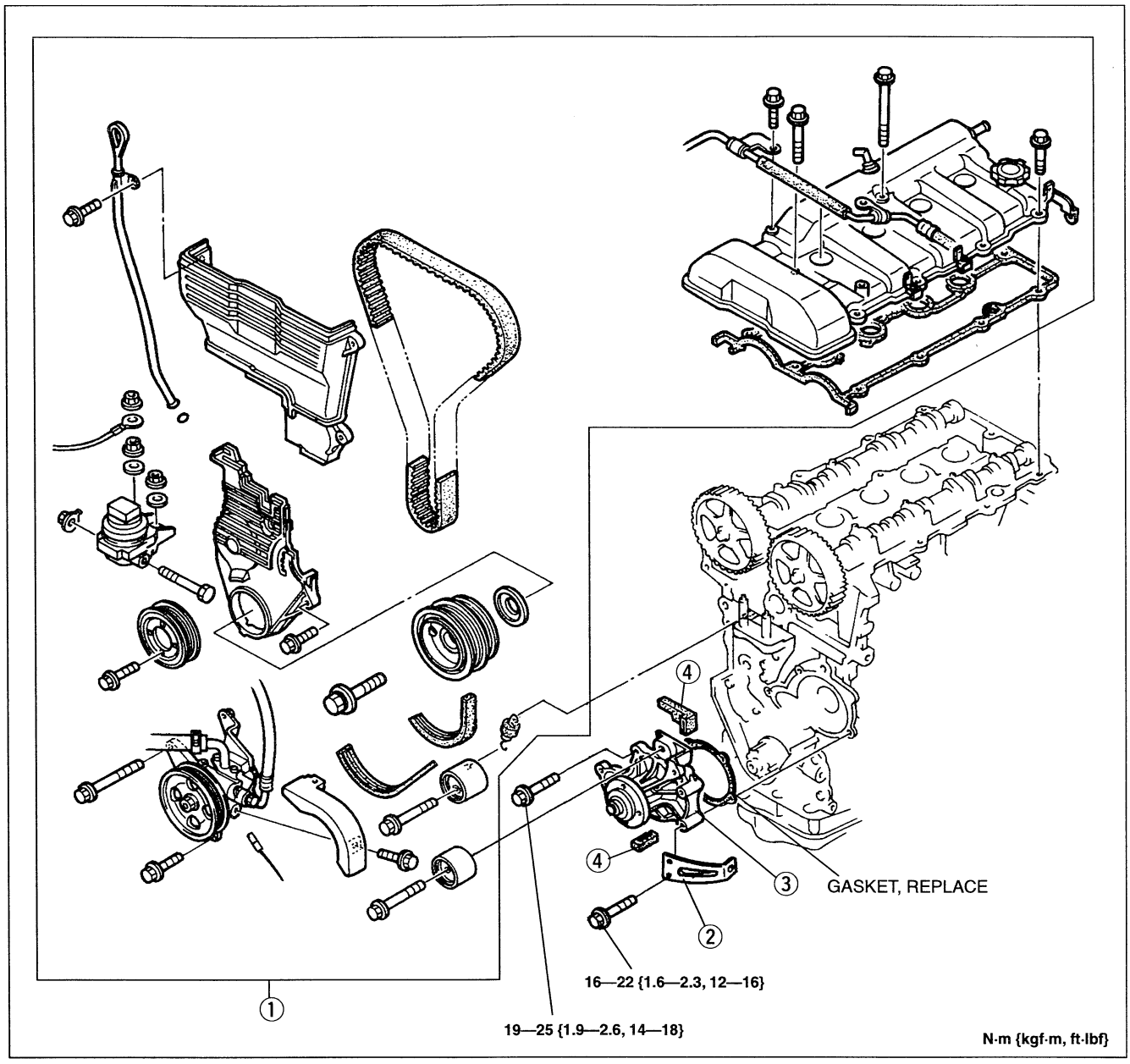
Steps After Installation

1. Fill the radiator with the specified amount and type of engine coolant. (Refer to page E1–6.)
2. Check for leaks.

WATER PUMP

REMOVAL / INSTALLATION

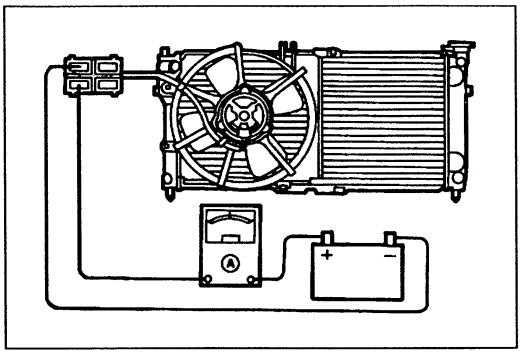
1. Disconnect the negative battery cable.
2. Drain the coolant. (Refer to page E1–5.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.



1. Timing belt
   Removal / Installation ..... section B1
2. P/S oil pump adjuster
3. Water pump assembly
   Inspect for cracks, damaged mounting surface, bearing condition, and leakage
4. Water pump rubber seal

Steps After Installation

1. Fill the radiator with the specified amount and type of engine coolant. (Refer to page E1–6.)
2. Check for leaks.



COOLING FAN MOTOR

INSPECTION

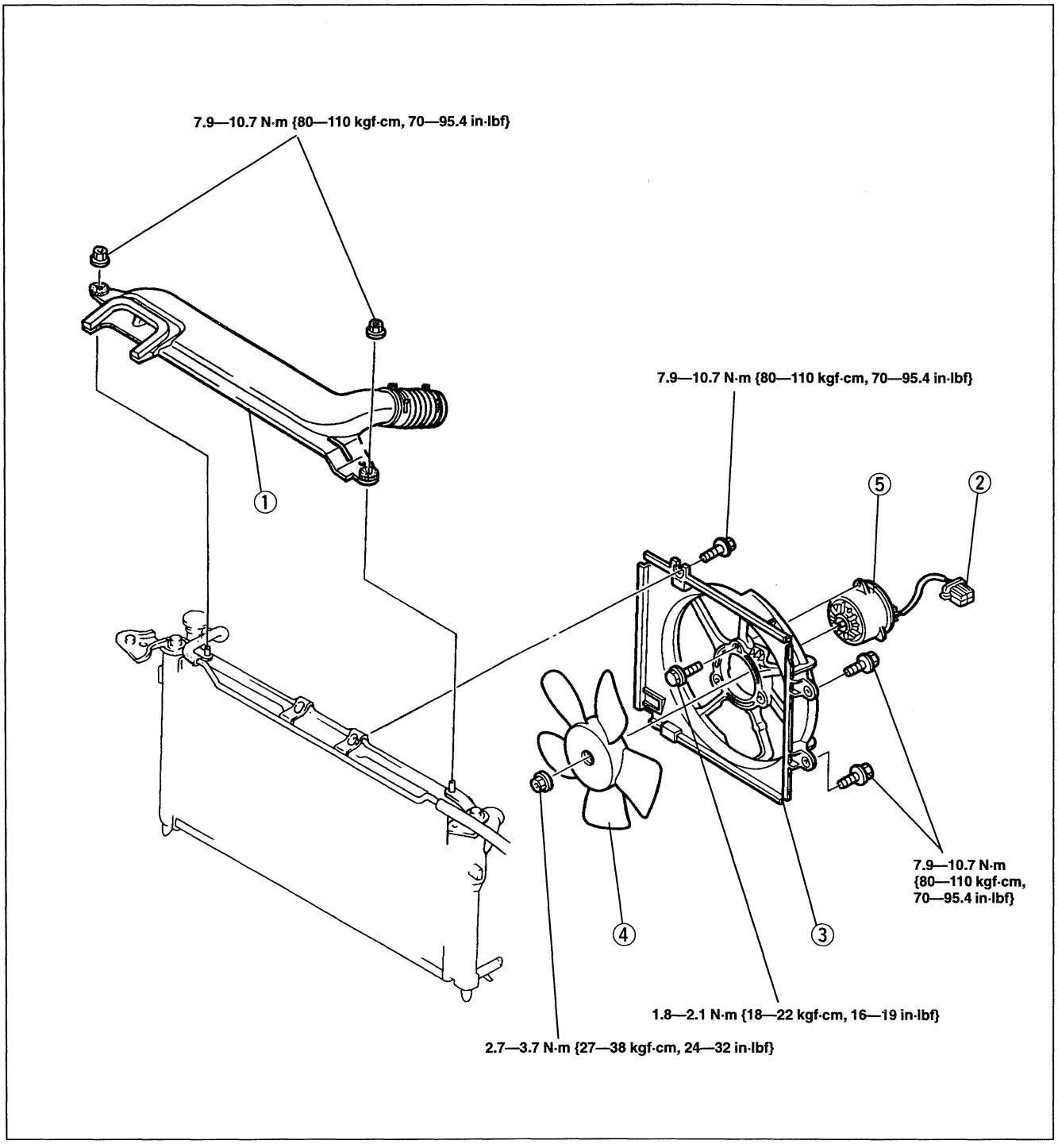
1. Verify that the battery is fully charged.
2. Disconnect the cooling fan motor connector.
3. Connect battery positive voltage and an ammeter to the cooling fan motor connector.
4. Verify that current draw is as specified.

   Current: 5.6—7.6A

5. If current is not within the specification or the cooling fan does not turn smoothly, replace the cooling fan motor.

REPLACEMENT

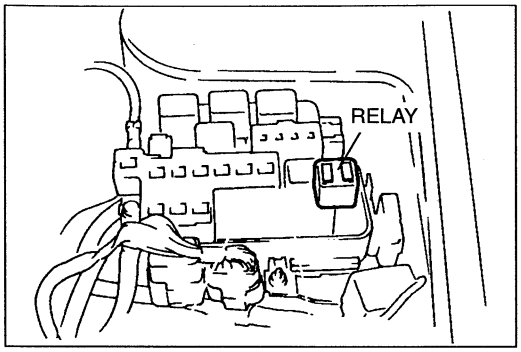
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.



1. Fresh-air duct
2. Cooling fan motor connector
3. Radiator cowling
4. Cooling fan blade
5. Cooling fan motor

Steps After Installation

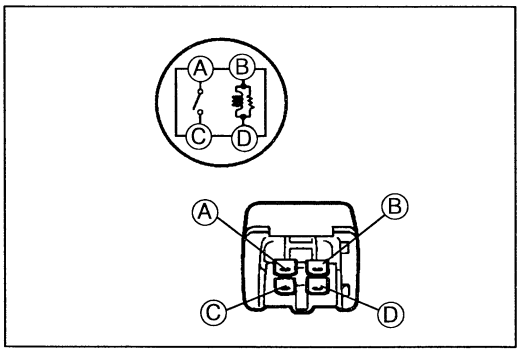
1. Fill the radiator with the specified amount and type of engine coolant. (Refer to page E1–6.)
2. Check for leaks.



COOLING FAN RELAY

REMOVAL

1. Disconnect the negative battery cable.
2. Remove the cooling fan relay shown in the figure.



INSPECTION

1. Check continuity of the cooling fan relay as shown.

Terminal	Continuity
A—C	No
B—D	Yes

2. Apply battery positive voltage between terminals B and D.Check for continuity between terminals A and C.
3. If not as specified, replace the cooling fan relay.

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

COOLING SYSTEM (KL)

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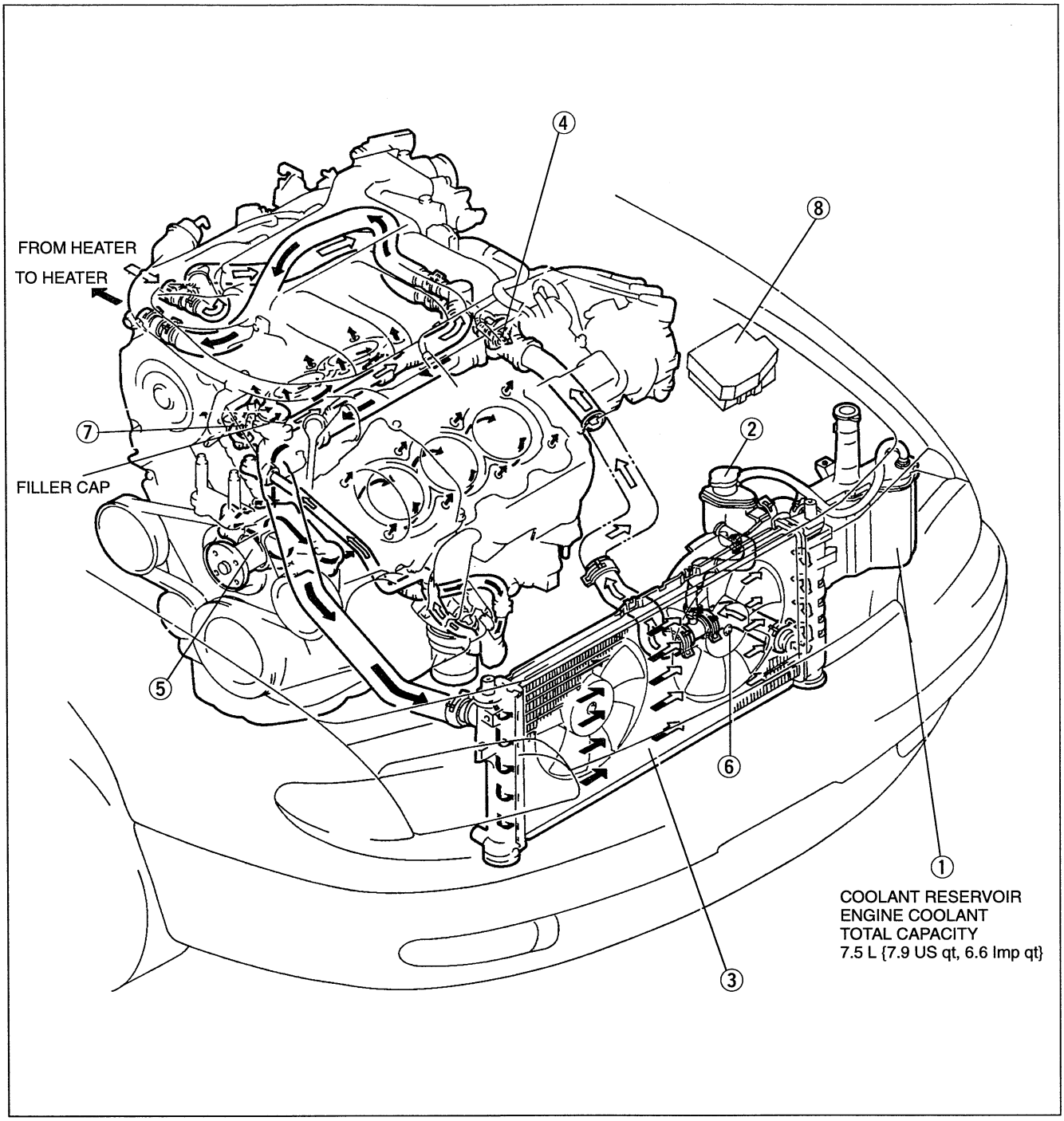

1. Engine coolant
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Replacement ..... page E2– 5
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4. Thermostat
Removal / Installation ..... page E2– 9
Inspection ..... page E2–10
5. Water pump
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6. Cooling fan motor
Inspection ..... page E2–12
Replacement ..... page E2–13
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Removal / Inspection / Installation ..... section F2
8. Cooling fan relay
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Inspection ..... page E2–14

OUTLINE

SPECIFICATIONS

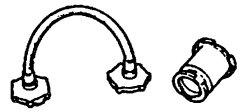
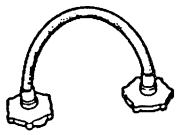
Item \ Engine			KL
Cooling system			Water-cooled, forced circulation
Coolant capacity		L {US qt, Imp qt}	7.5 {7.9, 6.6}
Water pump	Type		Centrifugal, V-ribbed belt-driven
	Water seal		Unified mechanical seal
Thermostat	Type		Wax, bottom-bypass
	Opening temperature	°C {°F}	80—84 {176—183}
	Full-open temperature	°C {°F}	95 {203}
	Full-open lift	mm {in}	8.5 {0.33} min.
Radiator	Type		Corrugated fin
	Cap valve opening pressure	kPa {kgf/cm^2, psi}	74—102 {0.75—1.05, 10.7—14.9}
Cooling fan	Type		Electric
	Blade	Outer diameter mm {in}	340 {13.4}
		Number	5
	Motor	Current A	8.0—14.0 (Low) 11.5—17.5 (High)

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Action	Page
Overheating	Coolant level insufficient	Add	E2- 4
	Coolant leakage	Repair or replace	—
	Radiator fins clogged	Repair	E2- 8
	Radiator cap malfunction	Replace	E2- 7
	Cooling fan malfunction	Replace	E2-12
	Thermostat malfunction	Replace	E2- 9
	Water passage clogged	Clean	E2- 4
	Water pump malfunction	Replace	E2-11
Corrosion	Impurities in coolant	Replace coolant	E2- 5

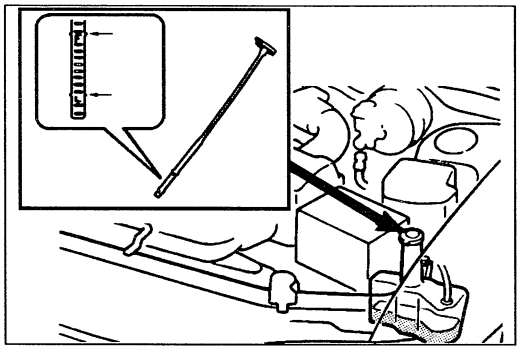
ENGINE COOLANT

PREPARATION
SST

49 9200 145 Adapter set, radiator cap tester 	For inspection of cooling system	49 9200 146 Adapter A (Part of 49 9200 145) 	For inspection of cooling system

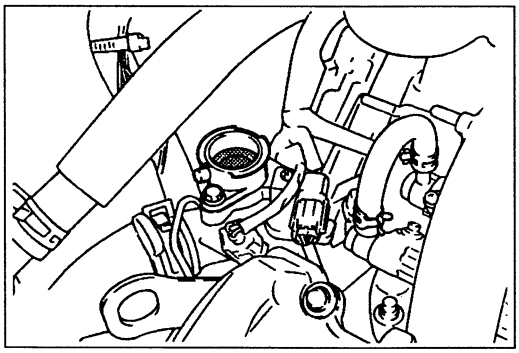
INSPECTION

Warning
- **Removing the radiator cap or the coolant filler cap while the engine is running, or when the engine and radiator are hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
  When you're sure all the pressure is gone, press down on the cap — still using a cloth — turn it, and remove it.

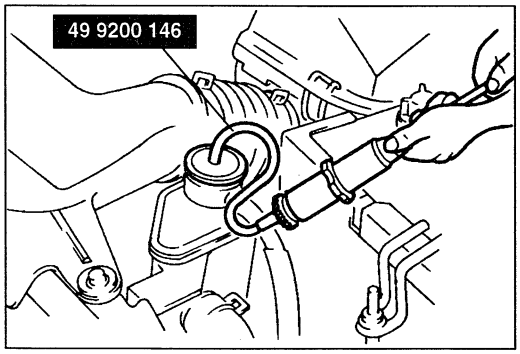


Coolant Level (Engine cold)
1. Verify that the coolant level is at the filler neck.
2. Verify that the coolant level on the coolant dipstick is between the F and L marks.
3. Add coolant if necessary.

Note
- The distance between the L and F marks on the dipstick represents 0.5 L {0.5 US qt, 0.4 Imp qt}.

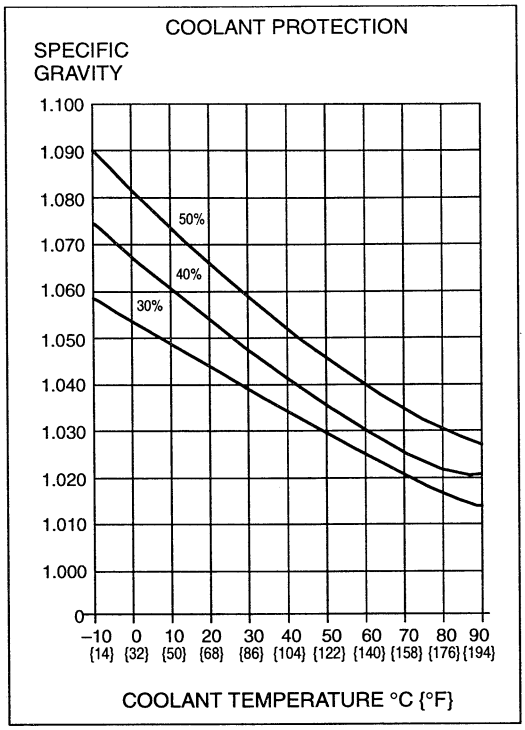


Coolant Quality
1. Verify that there is no buildup of rust or scale around the radiator cap, filler cap or filler neck.
2. Verify that coolant is free of oil. Replace the coolant if necessary.



Coolant Leakage
1. Connect a radiator tester and the **SST** to the radiator filler neck.
2. Apply **102 kPa {1.05 kgf/cm^2, 14.9 psi}** pressure to the system.
3. Verify that the pressure is held. If not, check for coolant leakage.

Caution
- **Applying more than 102 kPa {1.05 kgf/cm^2, 14.9 psi} can damage the hoses, fittings, and other components, and cause leaks.**



Coolant Protection

Caution

- **The engine has aluminum parts that can be damaged by alcohol or methanol antifreeze. Do not use alcohol or methanol in the cooling system. Use only ethylene-glycol-based coolant.**
- **Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will cut down on the coolant's effectiveness.**

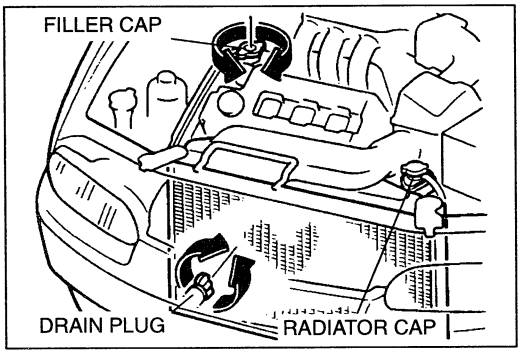
1. Measure the coolant temperature and specific gravity with a thermometer and a hydrometer.
2. Determine the coolant protection by referring to the graph shown.
3. If the coolant protection is not proper, add water or coolant as necessary.

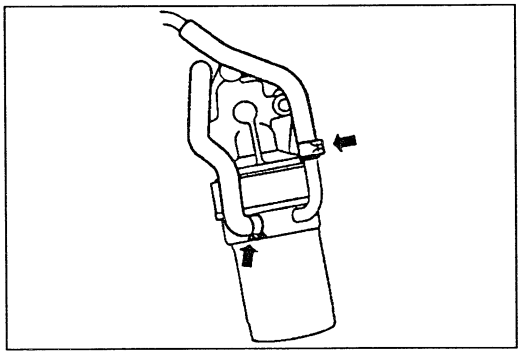
Antifreeze solution mixture percentage

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

REPLACEMENT

Draining





Warning

- **Removing the radiator cap or the coolant filler cap while the engine is running, or when the engine and radiator are hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
  When you're sure all the pressure is gone, press down on the cap — still using a cloth — turn it, and remove it.

1. Remove the filler cap and loosen the radiator drain plug.
2. Disconnect the oil cooler hoses.
3. Drain the coolant into a container.
4. Flush the cooling system with water until all traces of color are gone.
5. Let the system drain completely.
6. Tighten the drain plug and connect the oil cooler hoses.

Refilling

Use the proper amount and mixture of ethylene-glycol based coolant. (Refer to Coolant Protection, page E2–5.)

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

   Filling pace: 1.0 L {1.1 US qt, 0.9 Imp qt}/min. max.

2. Fill the coolant reservoir up to the F mark.
3. Fully install the filler cap.
4. Start the engine and let it idle until it warms up.
5. If the temperature increases beyond normal, there is excessive air in the system. Stop the engine and allow it to cool; then repeat steps 1—3.
6. Run the engine at 2,200—2,800 rpm for five minutes.
7. Stop the engine and allow it to cool.
8. Repeat steps 1—7; then go to step 9.

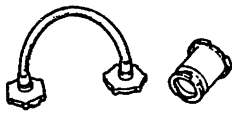
   Warning

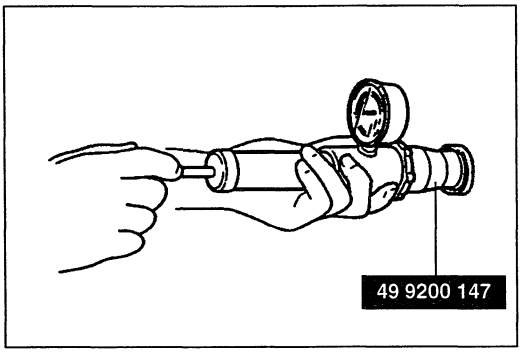
   - **Removing the radiator cap or the coolant filler cap while the engine is running, or when the engine and radiator are hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
     When you're sure all the pressure is gone, press down on the cap — still using a cloth — turn it, and remove it.

9. Remove the filler cap and verify that the engine coolant level is near the filler neck. If not, repeat steps 1—9.
10. Fill the reservoir up to the F mark.

RADIATOR CAP

PREPARATION
SST

49 9200 145 Adapter set, radiator cap tester 	For inspection of radiator cap	49 9200 147 Adapter B (Part of 49 9200 145) 	For inspection of radiator cap

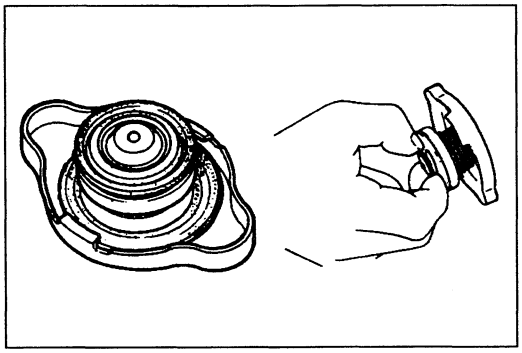


INSPECTION
Radiator Cap Valve

Warning

- **Removing the radiator cap while the engine is running, or when the engine and radiator are hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.**
  Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.
  When you're sure all the pressure is gone, press down on the cap — still using a cloth — turn it, and remove it.

1. Remove all foreign material (such as water residue) from between the radiator cap valve and the valve seat.
2. Attach the radiator cap to a radiator cap tester with the **SST**. Apply pressure gradually to **74—102 kPa {0.75—1.05 kgf/cm^2, 10.7—14.9 psi}**.
3. Verify that the pressure is held for at least **10 seconds**.



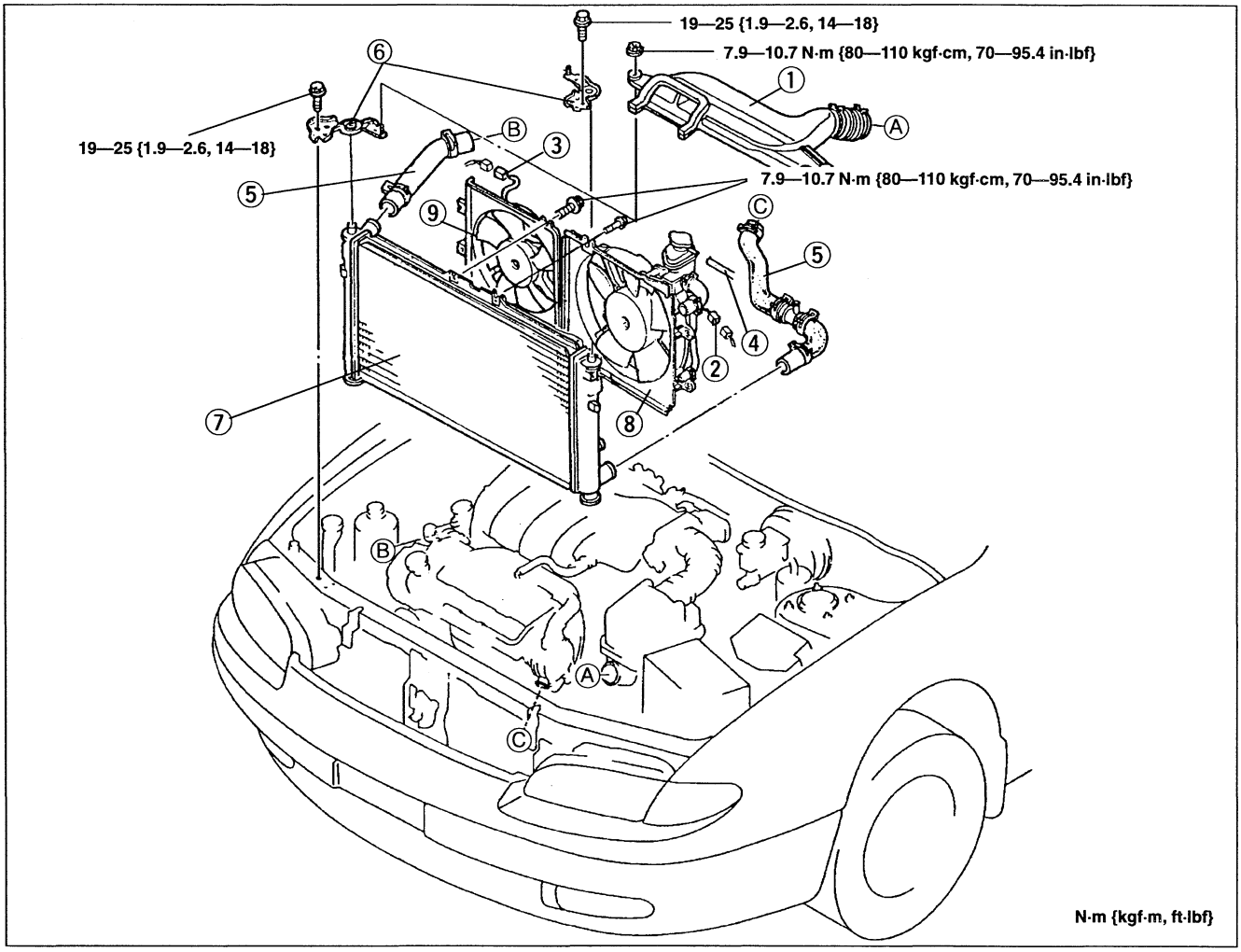
Negative Pressure Valve

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

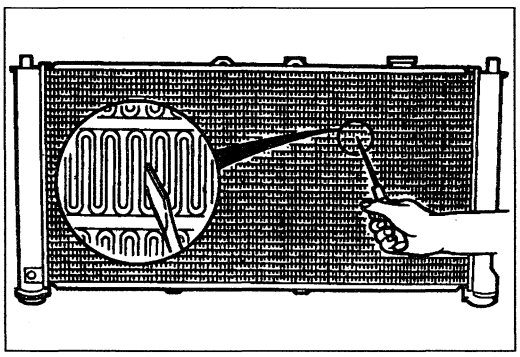
RADIATOR

REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to page E2–5.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.



1. Fresh-air duct
2. Cooling fan motor connector
3. Condenser fan motor connector
4. Coolant reservoir hose
5. Radiator hose (upper and lower)
6. Radiator bracket
7. Radiator
   Inspection ..... below
8. Cooling fan and radiator cowling assembly
9. Condenser fan and radiator cowling assembly



INSPECTION

Radiator

Check for the following and repair or replace as necessary.

1. Cracks, damage, and water leakage.
2. Bent fins. (Repair with a screwdriver.)
3. Distorted and bent radiator inlet and outlet.

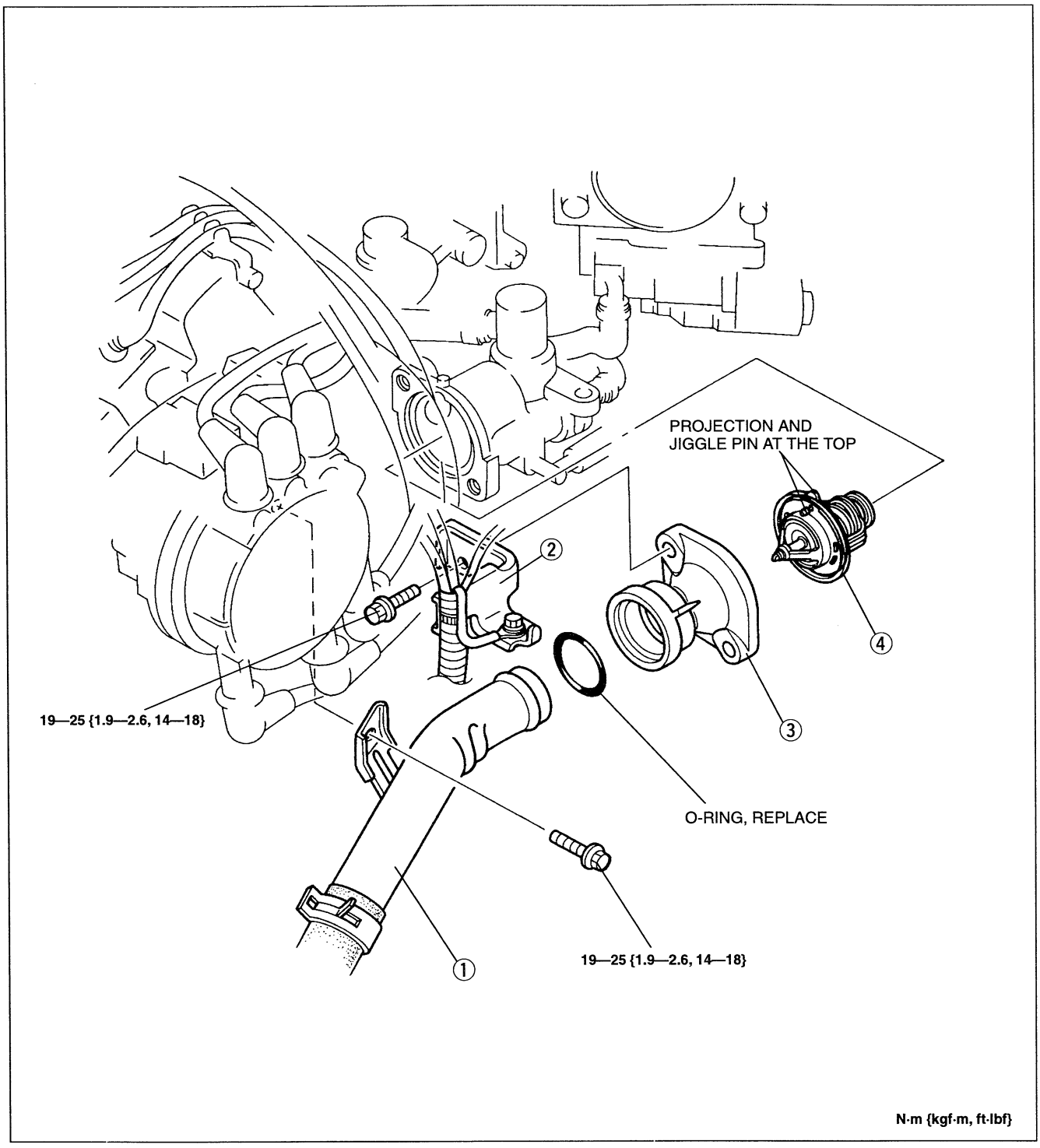
Steps After Installation

1. Fill the radiator with the specified amount and type of engine coolant. (Refer to page E2–6.)
2. Check for leaks.

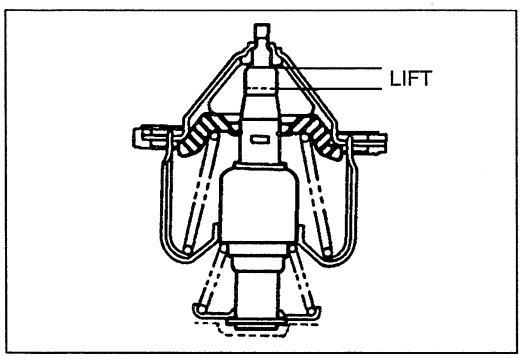
THERMOSTAT

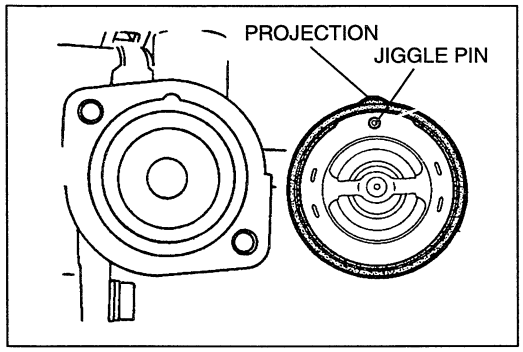
REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to page E2–5.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal, referring to **Installation Note**.



1. Water inlet pipe
2. Engine harness bracket
3. Thermostat cover
4. Thermostat
   - Inspection . . . . . page E2–10
   - Installation Note . . . . . page E2–10





INSPECTION

1. Visually check that the thermostat valve is airtight.
2. Place the thermostat and a thermometer in water.
3. Heat the water and check the following.

   Initial-opening temperature: 80—84°C {176—183°F}
   Full-open temperature: 95°C {203°F}
   Full-open lift: 8.5mm {0.33 in} min.

4. If the gasket of the thermostat is damaged, replace the thermostat assembly.

Installation Note
Thermostat

Install the thermostat into the cylinder head with the jiggle pin and projection at the top.

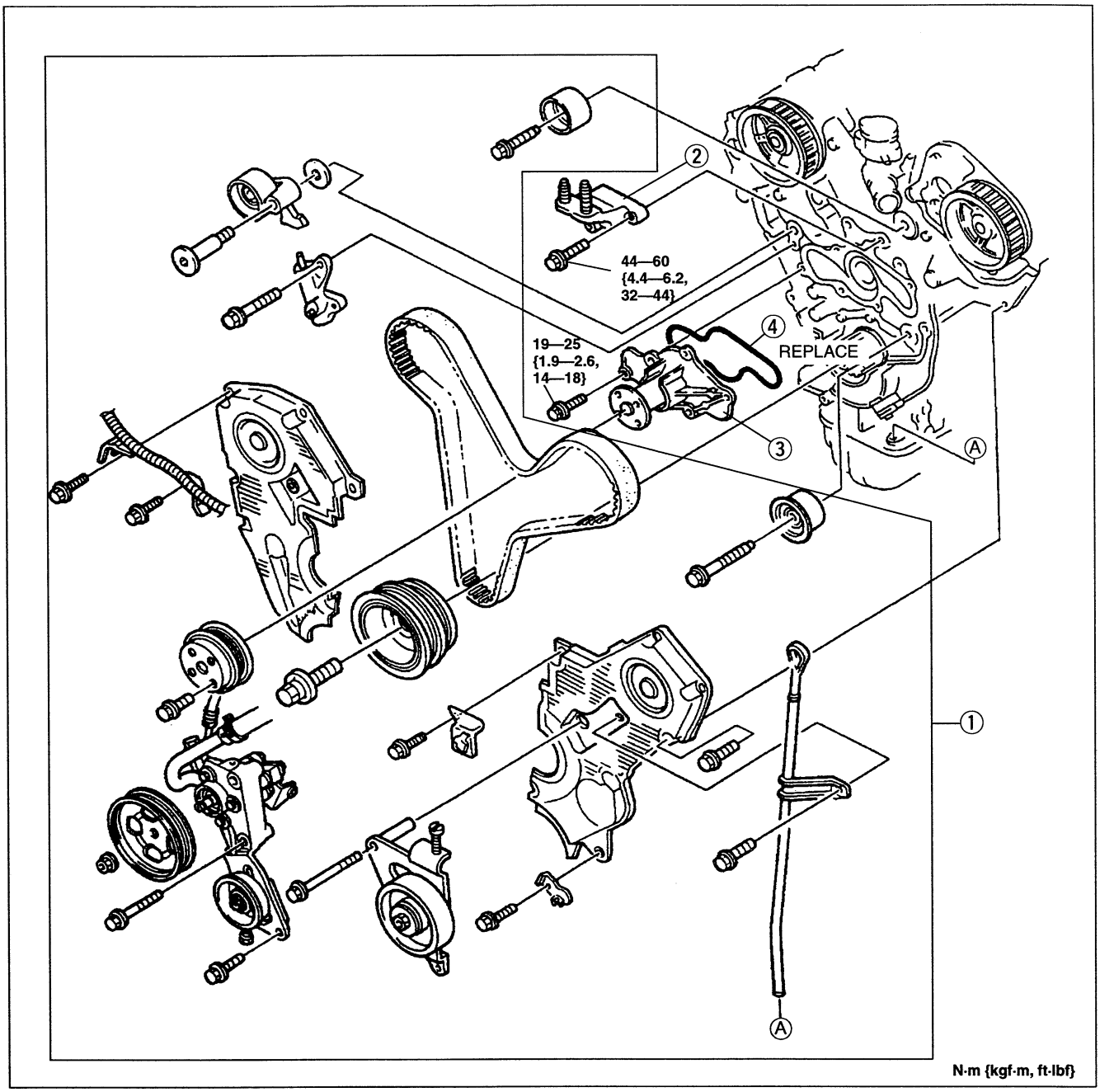
Steps After Installation

1. Fill the radiator with the specified amount and type of engine coolant. (Refer to page E2–5.)
2. Check for leaks.

WATER PUMP

REMOVAL / INSTALLATION

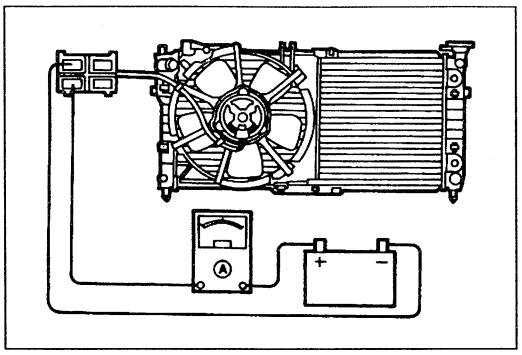
1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to page E2–5.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.



1. Timing belt
   Removal / Installation ..... section B2
2. No.3 engine mount bracket
3. Water pump assembly
   Inspect for cracks, damaged mounting surface, bearing condition, and leakage
4. Water pump rubber seal

Steps After Installation

1. Fill the radiator with the specified amount and type of engine coolant. (Refer to page E2–6.)
2. Check for leaks.

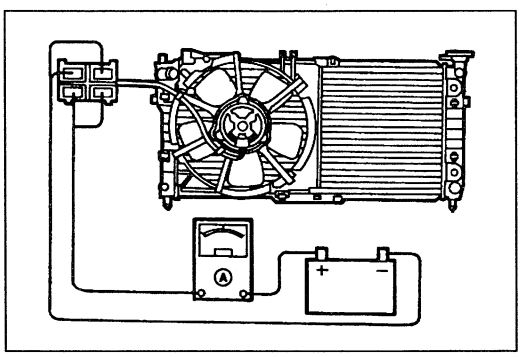


COOLING FAN MOTOR

INSPECTION

1. Verify that the battery is fully charged.
2. Disconnect the cooling fan motor connector.
3. Connect battery positive voltage and an ammeter to the cooling fan motor connector for low-speed inspection.
4. Verify that the current draw is as specified.

Current: 8.0—14.0A



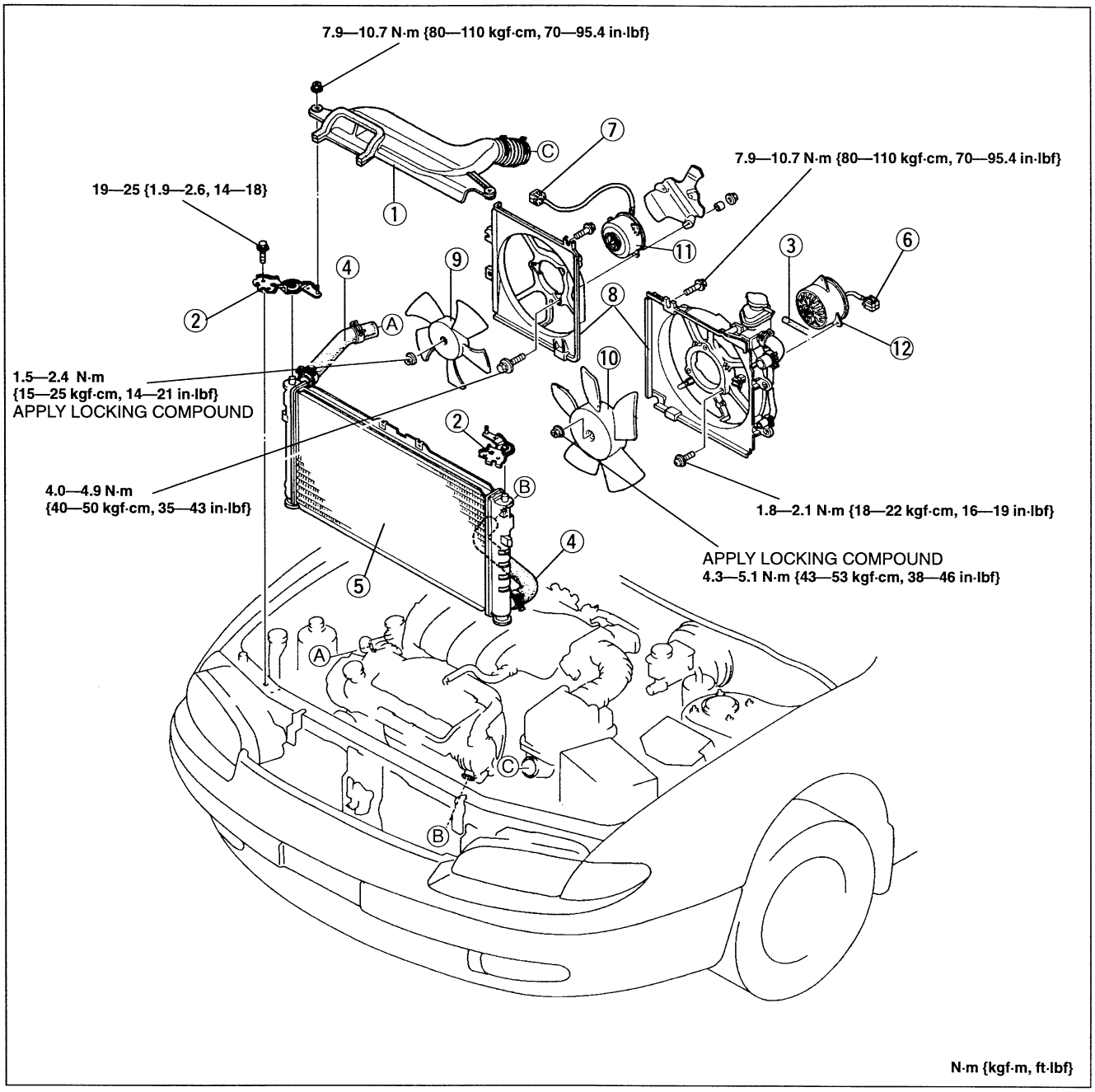
5. Connect battery positive voltage and an ammeter to the cooling fan motor connector for high-speed inspection.
6. Verify that the current draw is as specified.

Current: 11.5—17.5A

7. If current is not within the specification or the cooling fan does not turn smoothly, replace the cooling fan motor.

REPLACEMENT

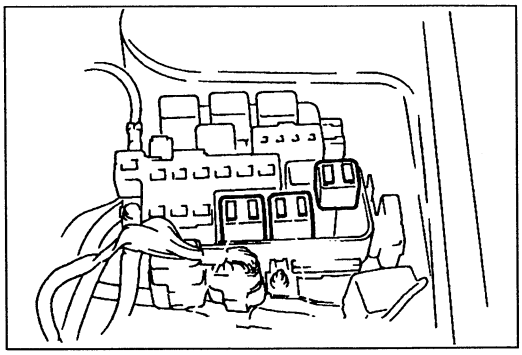
1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to page E2–5.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.



1. Fresh-air duct
2. Radiator bracket
3. Coolant reservoir hose
4. Radiator hose (upper and lower)
5. Radiator
6. Cooling fan motor connector
7. Condenser fan motor connector
8. Radiator cowling
9. Condenser fan
10. Cooling fan
11. Condenser fan motor
12. Cooling fan motor

Steps After Installation

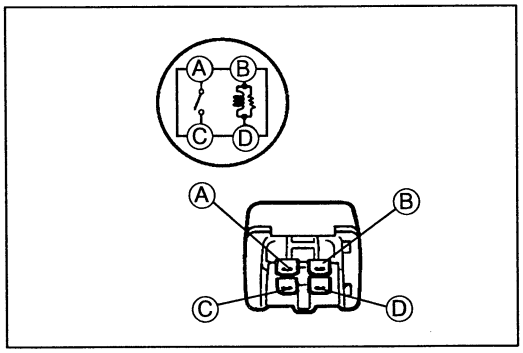
1. Fill the radiator with the specified amount and type of engine coolant. (Refer to page E2–6.)
2. Check for leaks.



COOLING FAN RELAY

REMOVAL

1. Disconnect the negative battery cable.
2. Remove the cooling fan relay from the place shown in the figure.



INSPECTION

1. Check continuity of the cooling fan relay as shown.

Terminal	Continuity
A—C	No
B—D	Yes

2. Apply battery positive voltage between terminals B and D.Check for continuity between terminals A and C.
3. If not as specified, replace the cooling fan relay.

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

FUEL AND EMISSION CONTROL SYSTEMS (FS MTX)

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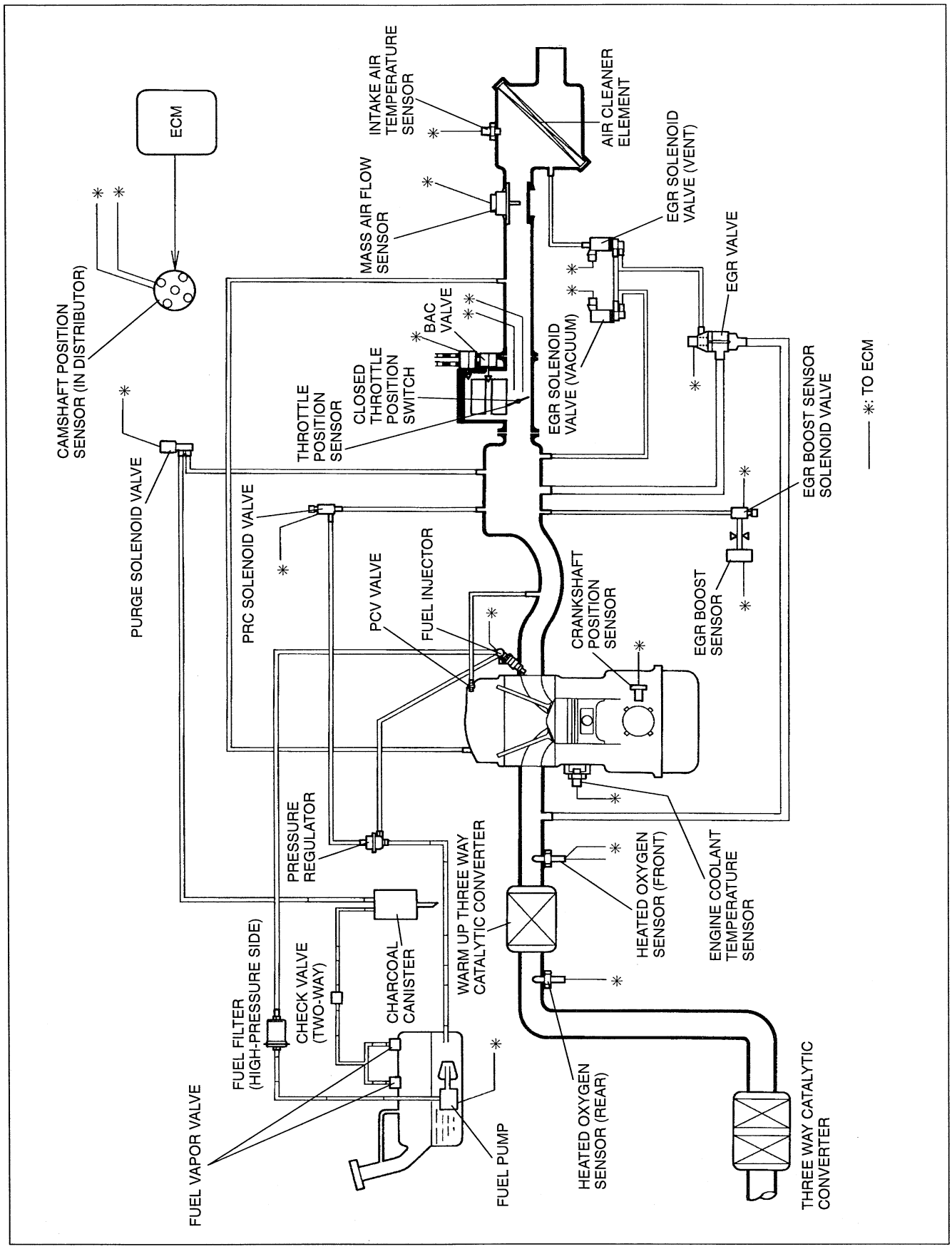
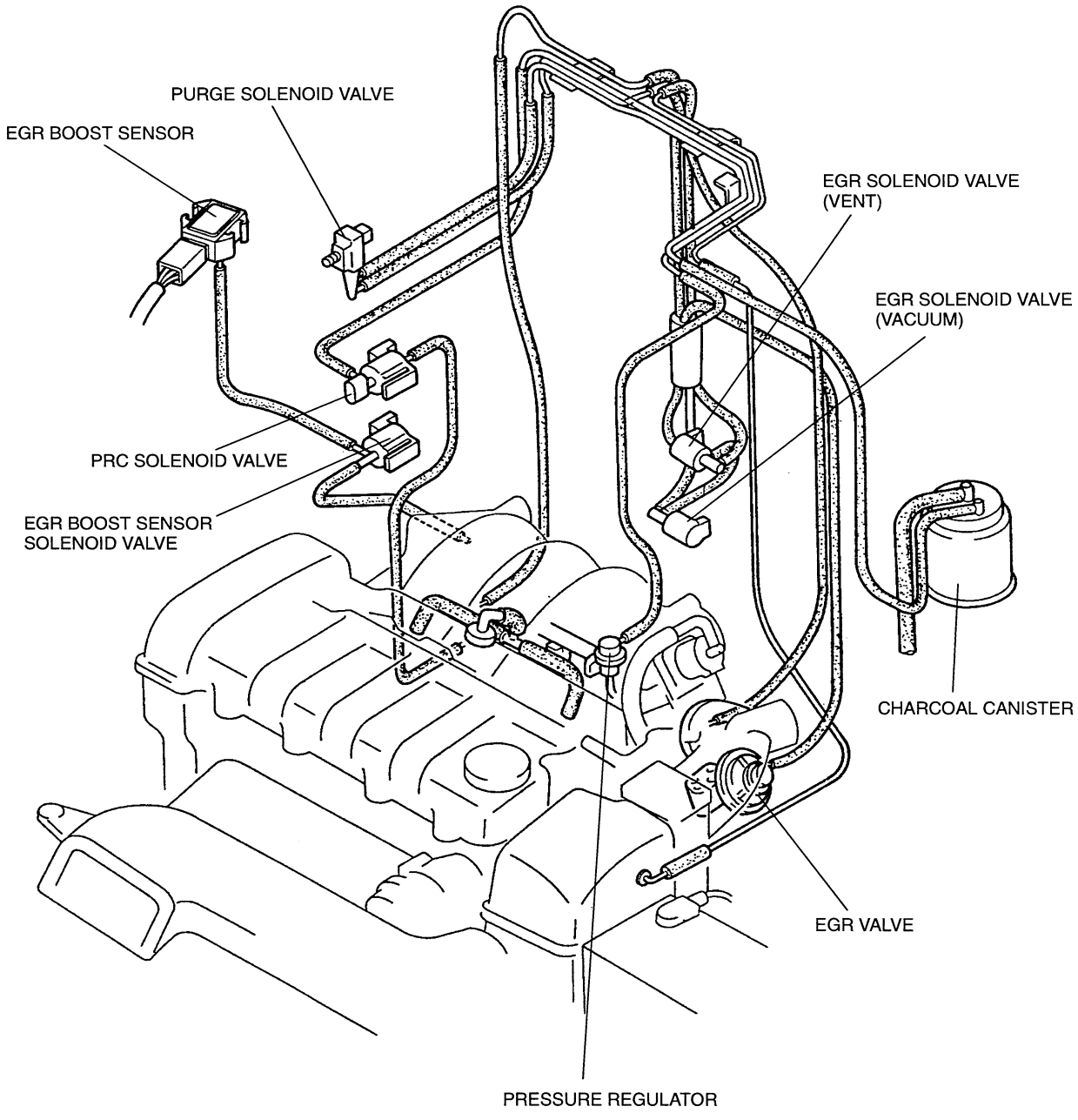
SYMPTOM TROUBLESHOOTING .. F1–121

OUTLINE

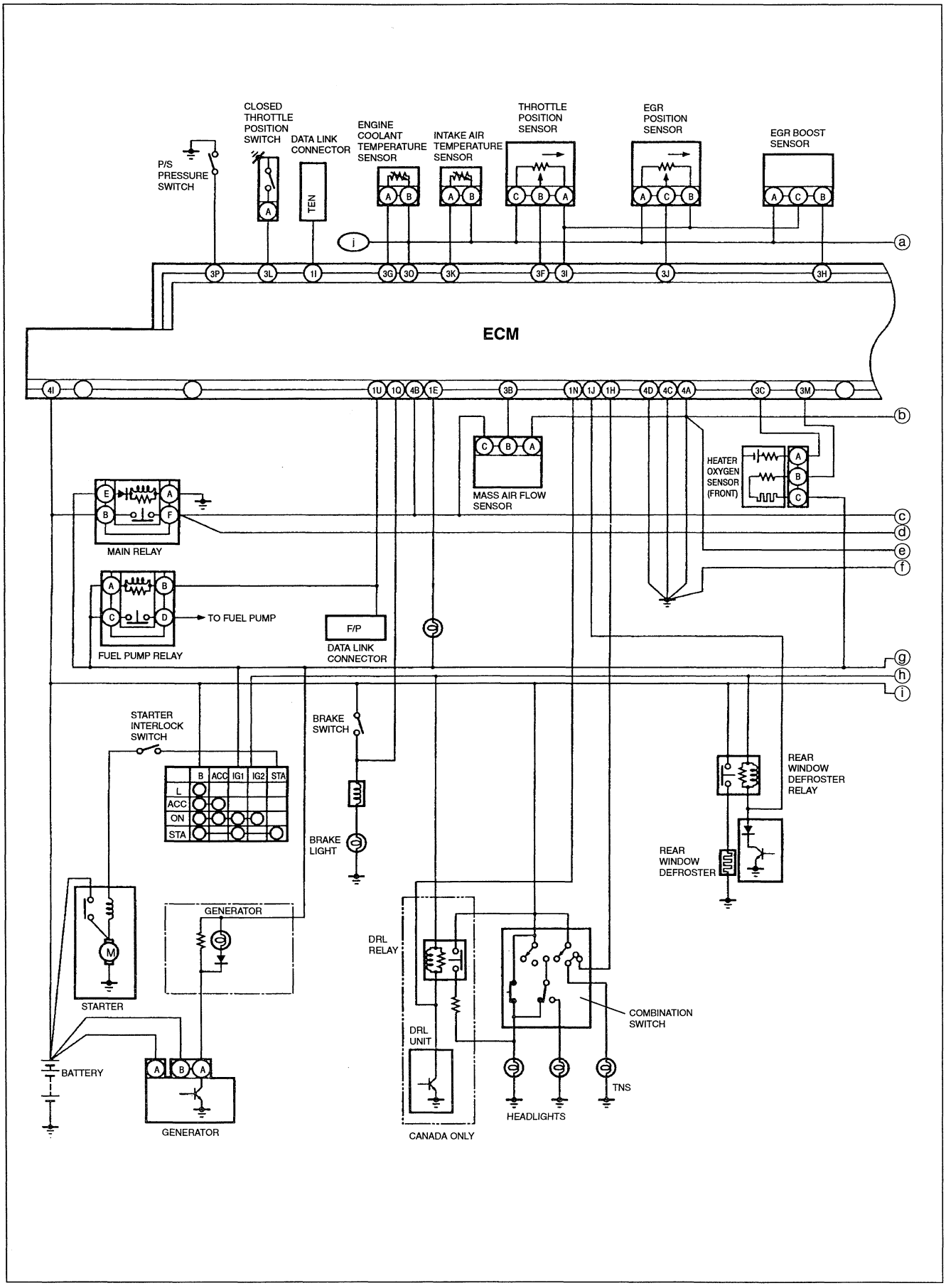
SYSTEM DIAGRAM

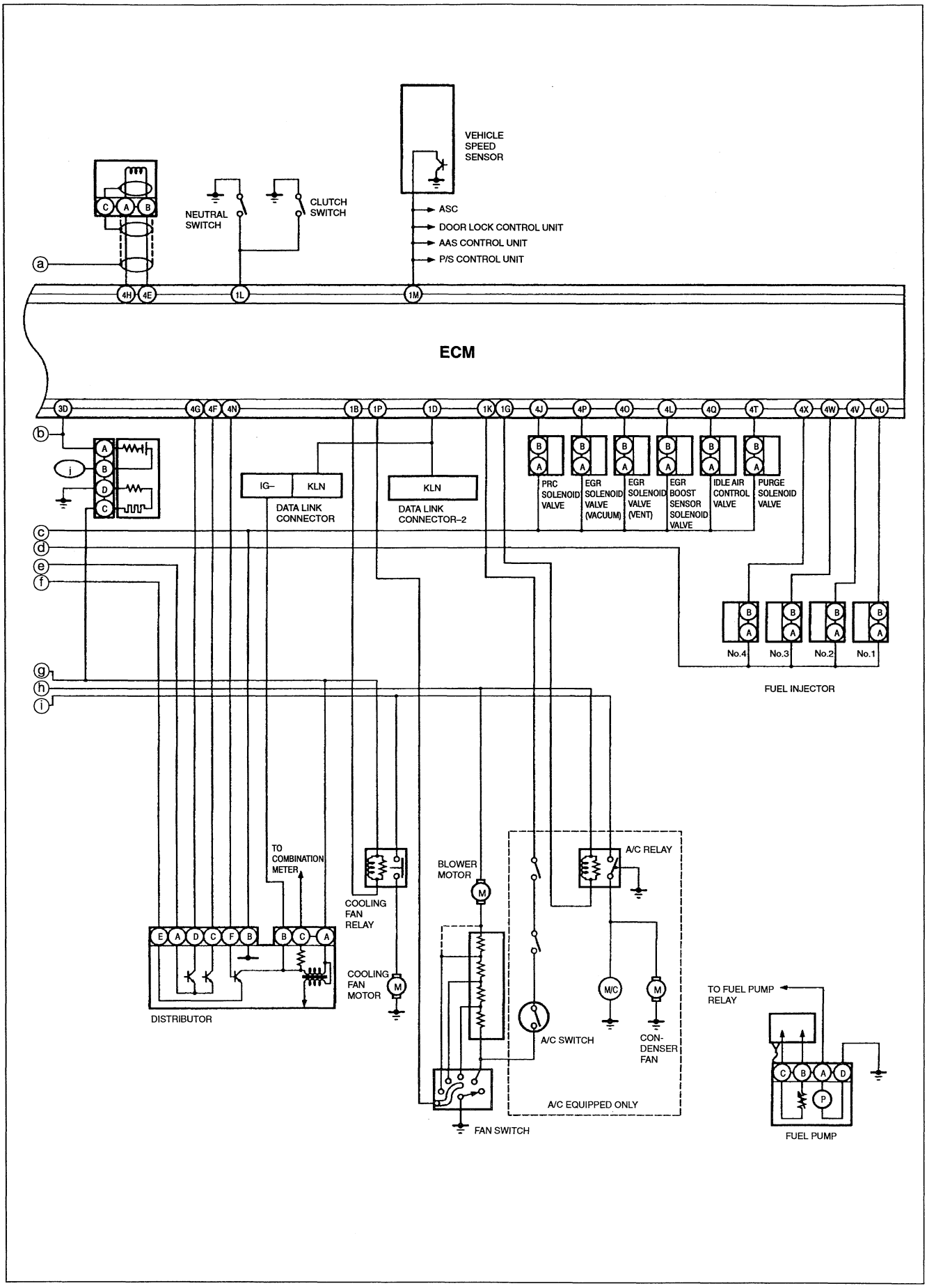


VACUUM HOSE ROUTING DIAGRAM



WIRING DIAGRAM




VEHICLE SPEED SENSOR
ASC
DOOR LOCK CONTROL UNIT
AAS CONTROL UNIT
P/S CONTROL UNIT
NEUTRAL SWITCH
CLUTCH SWITCH
ECM
DATA LINK CONNECTOR
DATA LINK CONNECTOR-2
PRC SOLENOID VALVE
EGR SOLENOID VALVE (VACUUM)
EGR SOLENOID VALVE (VENT)
EGR BOOST SENSOR SOLENOID VALVE
IDLE AIR CONTROL VALVE
PURGE SOLENOID VALVE
No.4
No.3
No.2
No.1
FUEL INJECTOR
TO COMBINATION METER
COOLING FAN RELAY
COOLING FAN MOTOR
DISTRIBUTOR
BLOWER MOTOR
A/C RELAY
A/C SWITCH
CON-DENSER FAN
A/C EQUIPPED ONLY
FAN SWITCH
TO FUEL PUMP RELAY
FUEL PUMP

SPECIFICATIONS

Item \ Engine			FS MTX
Idle speed		rpm	650—750 (700 ± 50)
Ignition timing*1		BTDC	11—13° (12 ± 1°)
Throttle body			
Type			Horizontal draft
Throat diameter		mm {in}	55 {2.2}
Fuel pump			
Maximum output pressure		kPa {kgf/cm^2, psi}	640 {6.5, 92}
Fuel filter			
Type	Low-pressure side		Nylon element (in fuel pump)
	High-pressure side		Paper element
Pressure regulator			
Regulating pressure		kPa {kgf/cm^2, psi}	260—320 {2.6—3.3, 37—46}
Fuel injector			
Type			High-ohmic
Type of drive			Voltage
Resistance	Ω	20°C {68°F}	12—16
Volume		ml {cc, fl oz}/15 sec.	47—68 {47—68, 1.4—2.0}
Idle air control valve			
Resistance	Ω	23°C {73°F}	7.7—9.3
Purge solenoid valve			
Resistance	Ω	20°C {68°F}	30—34
Pressure regulator control solenoid valve			
Resistance	Ω	20°C {68°F}	36—43
EGR solenoid valve (vent and vacuum)			
Resistance	Ω	20°C {68°F}	30—45
Camshaft position sensor			
Type			Hall effect
Mass air flow sensor			
Type			Heat resistor
Engine coolant temperature sensor			
Resistance	kΩ	20°C { 68°F}	2.20—2.70
		80°C {176°F}	0.29—0.35
Fuel tank			
Capacity		L {US gal, Imp gal}	58.5 {15.5, 12.9}
Air cleaner element			
Element type			Oil permeated
Fuel			
Specification			Unleaded—(R+M)/2 method 87 or higher

***1 TEN terminal of data link connector grounded**

COMPONENT DESCRIPTIONS

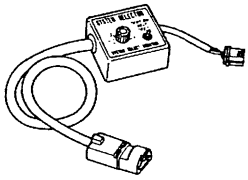
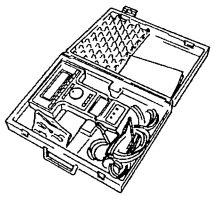
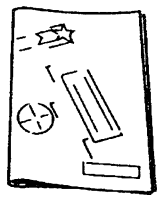
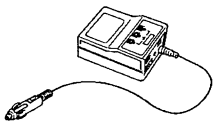
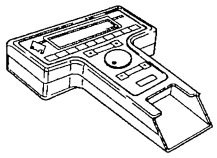
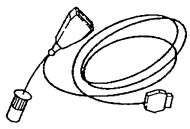
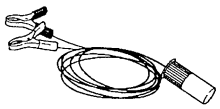
Component	Function	Remark
A/C relay	Controls A/C compressor magnetic clutch	—
Air cleaner	Filters air entering throttle body	• Intake air temperature sensor mounted in air cleaner
Air valve	Supplies bypass air into intake manifold (engine cold)	• Engine speed increased to shorten warm-up period • Thermowax type • Installed in BAC valve
Brake switch	Detects braking; sends signal to ECM	—
Bypass air control (BAC) valve	Supplies bypass air into intake manifold	• Consists of air valve and idle air control valve
Camshaft position sensor [SGC signal, SGT signal]	Detects No.1 cylinder TDC; sends signal to ECM (SGC signal) Detects crank angle at 180° intervals; sends signal to ECM (SGT signal)	• Installed in distributor
Charcoal canister	Stores fuel tank fumes (engine stopped)	—
Check valve (two-way)	Controls pressure in fuel tank	—
Closed throttle position switch	Detects idle condition; sends signal to ECM	• Installed in throttle body
Clutch switch	Detects clutch condition; sends signal to ECM	• Switch OFF when clutch pedal released
Crankshaft position sensor	Detects crank angle via crankshaft pully rotain, and sends signal to ECM	• NE signal
Data link connector	Concentrated service connector terminals for serviceability 1. Initial set 2. Fuel pump check 3. Engine speed output 4. CIS self-diagnosis (serial communication) 5. Supply battery positive voltage 6. Ground	• 25-pin (located near battery) 1. TEN terminal 2. F/P terminal 3. IG– terminal 4. KLN terminal 5. +B terminal 6. GND terminal
Data link connector–2	Concentrated service connector terminals for diagnosis of electrical system	• For on-board diagnosis and service/ inspection
EGR boost sensor	Detects EGR pipe pressure or barometric pressure and sends signal to ECM	• For EGR check control
EGR boost sensor solenoid valve	Supplies/cuts off EGR pipe pressure or barometric pressure to EGR boost sensor	• For EGR check control
EGR valve	Recirculates portion of exhaust gas	—
EGR solenoid valves	Controls vacuum to EGR valve	—
EGR valve position sensor	Detects EGR valve position	• Installed in EGR valve

Component	Function	Remark
Engine control module	**Detects the following:** 1. A/C operation 2. Air/fuel ratio (oxygen concentration) 3. Braking signal 4. Crankshaft position 5. E/L operation 6. Engine coolant temperature 7. Engine speed 8. Ignition ON signal 9. In-gear condition 10. Intake air amount 11. Intake air temperature 12. No.1 piston TDC (compression stroke) 13. P/S operation 14. Diagnostic test mode signal (ignition timing, idle speed, diagnostic trouble code no.) 15. Throttle valve opening angle 16. Throttle valve closed throttle position 17. Vehicle speed **Controls operation of following:** 1. A/C (cut-off) 2. On-board diagnostic system 3. Fuel injection system 4. Idle speed control 5. Ignition system 6. Purge control system 7. Exhaust gas recirculation 8. Pressure regulator control system 9. Cooling fan control 10. Fuel pump control	 1. Air conditioning switch 2. Heated oxygen sensor 3. Brake light switch 4. Crankshaft position sensor (NE signal) 5. Fan switch, cooling fan relay, headlight switch, and rear window defroster switch 6. Engine coolant temperature sensor 7. Camshaft position sensor (SGT signal) 8. Ignition switch 9. Neutral and clutch switch 10. Mass air flow sensor 11. Intake air temperature sensor 12. Camshaft position sensor (SGC signal) 13. P/S pressure switch 14. Data link connector (TEN terminal) 15. Throttle position sensor 16. Closed throttle position switch 17. Vehicle speed sensor 1. A/C relay 2. NGS 3. Fuel injector 4. Idle air control valve 5. Ignition control module 6. Purge solenoid valve 7. EGR solenoid valves 8. PRC solenoid valve 9. Cooling fan relay 10. Fuel pump relay
Engine coolant temperature sensor	Detects coolant temperature; sends signals to ECM	• Installed in engine
Fuel filter	Filters particles from fuel	—
Fuel injector	Injects fuel into intake port	• Controlled by signals from ECM
Fuel pump	Provides fuel to fuel injectors	• Operates while engine is running • Installed in fuel tank
Fuel pump relay	Voltage for fuel pump while engine is running, controlled by ECM	—
Fuel vapor valve	Prevents fuel from flowing into charcoal canister	—
Heated oxygen sensor	Detects oxygen concentration; sends signal to ECM	• Zirconic and platinum coating • With heater
Idle air control valve	Supplies bypass air to intake manifold	• Controlled by duty signal from ECM • Installed in BAC valve
Ignition control module	Receives spark signal from ECM and generates high voltage in ignition coil	• Installed in distributor
Intake manifold	Supplies intake air to all cylinders	—
Intake air temperature senser	Detects intake air temperature;sends signal to ECM	• Installed in air cleaner

Component	Function	Remark
Main relay	Supplies current to output devices and ECM	—
Mass air flow sensor	Detects amount of intake air; sends signal to ECM	• Heat resistor type
Neutral switch	Detects in-gear condition; sends signal to ECM	• Switch ON in neutral
PCV valve	Controls blowby gas introduced into engine	—
Pressure regulator	Adjusts fuel pressure supply to fuel injectors	—
Pressure regulator valve	Controls vacuum to pressure regulator	—
Purge solenoid valve	Controls evaporative fumes from charcoal canister to intake manifold	• Controlled by duty signal from ECM
P/S pressure switch	Detects P/S operation; sends signal to ECM	• P/S pressure switch ON when steering wheel turned
Resonance chamber	Reduces intake air suction noise and increases engine torque	—
Three way catalytic converter	Reduces HC, CO, NOx by chemical reaction	• Monolith type
Throttle body	Controls intake air amount	—
Throttle position sensor	Detects throttle valve opening angle; sends signal to ECM	• Installed on throttle body
Vehicle speed sensor	Detects vehicle speed; sends signal to ECM	• Installed in instrument cluster

ENGINE TUNE-UP

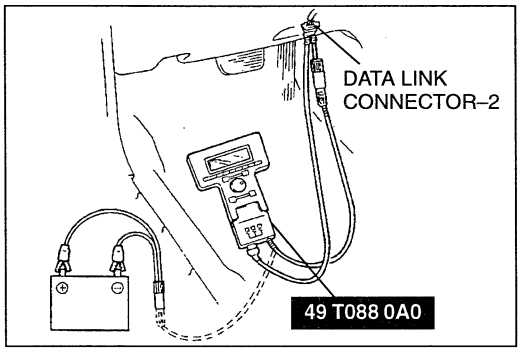
PREPARATION
SST

49 B019 9A0 System Selector 	For inspection of ignition timing and idle speed	49 T088 0A0 NGS set 	For inspection of ignition timing and idle speed
49 T088 010B Program Card 	For inspection of ignition timing and idle speed	49 T088 008A Instruction Manual 	For inspection of ignition timing and idle speed
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of ignition timing and idle speed	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of ignition timing and idle speed
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of ignition timing and idle speed	49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of ignition timing and idle speed

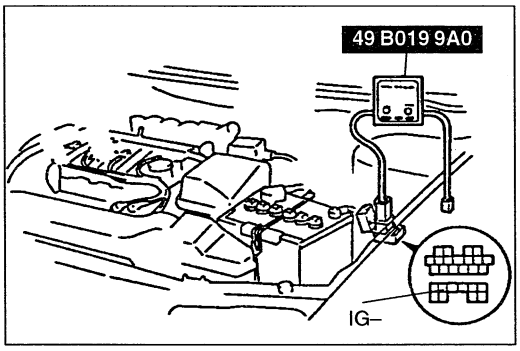
ADJUSTMENT

Preparation

1. Warm up the engine to normal operating temperature.
2. Shift the transaxle into Neutral.
3. Turn off all electrical loads.
   - Headlight
   - Blower
   - Rear window defroster
   - Power steering
4. Wait until the cooling fan stops.



5. Connect the **SST** (NGS) to the data link connector-2 and select the "PID/DATA MONTOR AND RECORD" function. (Refer to page F1–94.)

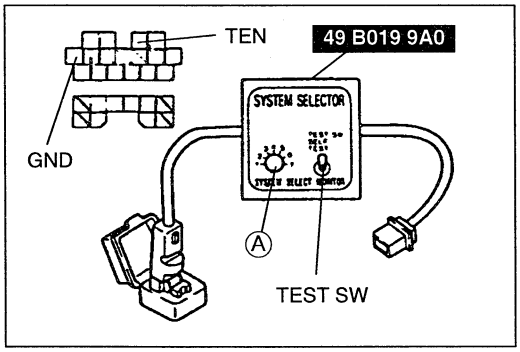


Ignition Timing

1. Perform Preparation. (Refer to above.)
2. Verify that the idle speed is within the specification.

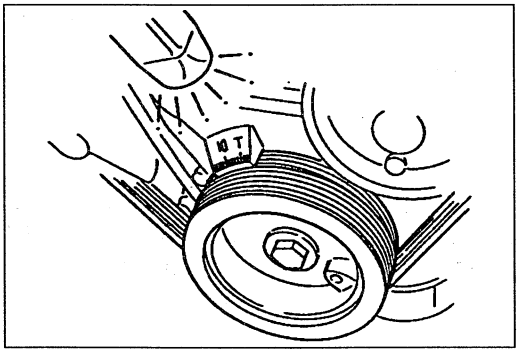
   Idle speed: 650—750 (700 ± 50) rpm

3. If not within the specification, adjust the idle speed. (Refer to page F1–12.)



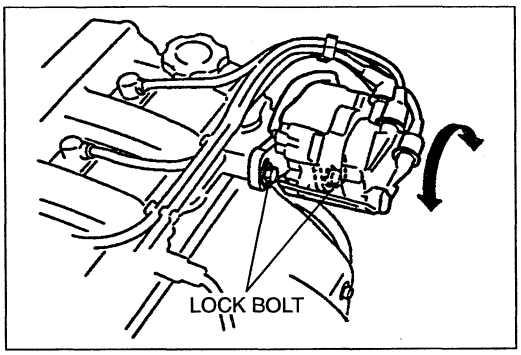
4. Connect the **SST** (System Selector) to the data link connector.
5. Set switch A to position 1.
6. Set the test switch to SELF TEST.
7. Verify that the idle speed is within the specification.

   Idle speed (SELF TEST MODE): 500—800 rpm



8. Connect a timing light to the high-tension lead of No.1 cylinder.
9. Verify that the timing mark (yellow) on the crankshaft pully and the mark on the timing belt cover are aligned.

   Ignition timing: BTDC 11—13° (12 ± 1°)

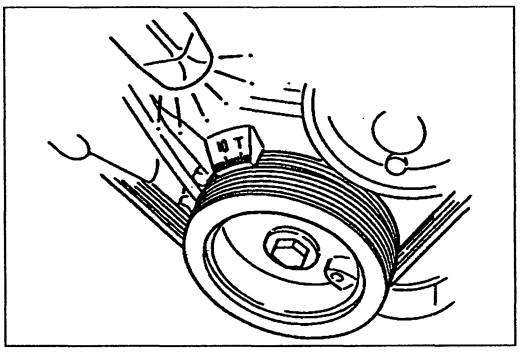


10. If the marks are not aligned, loosen the distributor lock bolts and turn the distributor to make the adjustment.
11. Tighten the distributor lock bolts to the specified torque.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

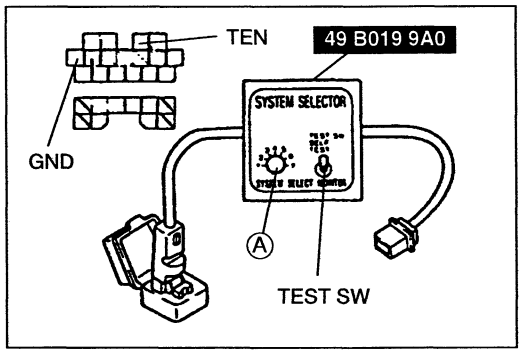
12. Disconnect the **SSTs**.
13. Verify that the ignition timing is within the specification.

Ignition timing: BTDC 6—18°

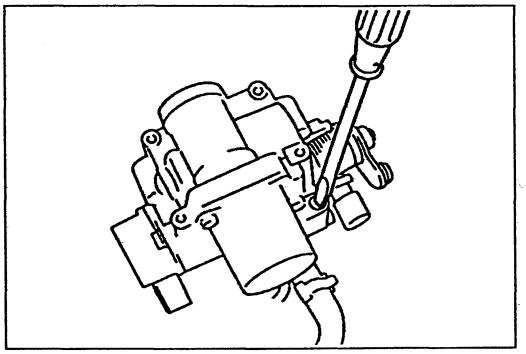


Idle Speed
1. Perform Preparation. (Refer to page F1–11.)
2. Verify that the idle speed is within the specification.

Idle speed (Neutral): 650—750 (700 ± 50) rpm



3. If not within the specification, connect the **SST** (System Selector) to the data link connector.
4. Set switch A to position 1.
5. Set the test switch to SELF TEST.



6. Adjust the idle speed by turning the air adjusting screw.

Idle speed (SELF TEST MODE):
500—800 rpm

Caution
- **The throttle adjusting screw is set at the factry and must not be adjusted. Any adjustment will negatively effect the engine performance.**

7. Disconnect the **SSTs**.

Idle-up Speed

1. Perform Preparation. (Refer to page F1–11.)
2. Verify that the idle speed is within the specification.

Specification: 650—750 (700 ± 50) rpm

3. If not within the specification, adjust the idle speed.
4. Check the idle speed with the following load conditions.

Load condition	Idle speed (rpm)
No load	650—750
Cooling fan ON	725—825
Fan switch ON at 3rd or higher	725—825
Head light switch ON	725—825
Rear window defroster switch ON	725—825
P/S ON	650—750
A/C ON	725—825

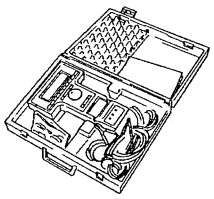
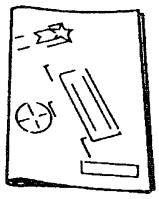
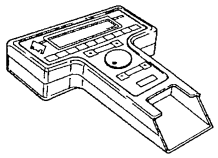
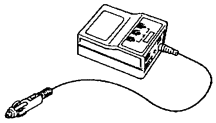
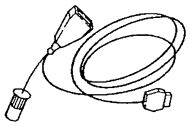
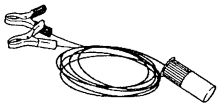
Note

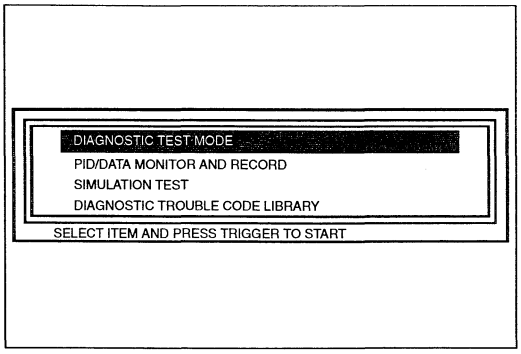
- Excludes temporary idle speed drop just after the electrical loads are turned ON.

5. If not as specified with all load conditions, inspect the idle air control valve.
   If not as specified with any one of load conditions, check related input switches, harnesses and connectors.

ON-BOARD DIAGNOSTIC SYSTEM

PREPARATION
SST

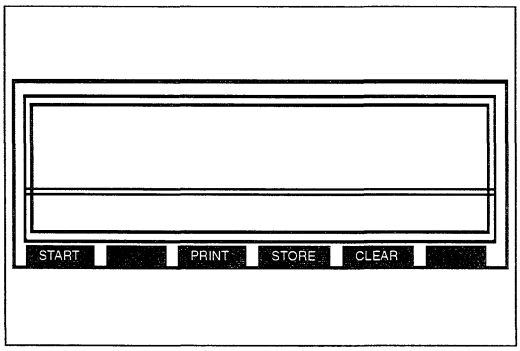
49 T088 0A0 NGS set 	For diagnosis of ECM and input/output systems	49 T088 010B Program Card 	For diagnosis of ECM and input/output systems
49 T088 008A Instruction Manual 	For diagnosis of ECM and input/output systems	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For diagnosis of ECM and input/output systems
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For diagnosis of ECM and input/output systems	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For diagnosis of ECM and input/output systems
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For diagnosis of ECM and input/output systems	—	—



DIAGNOSTIC TROUBLE CODE NUMBER

Inspection

1. Connect the **SST** (NGS) to the data link connector–2. (Refer to page F1–94.)
2. Refer to the manufacturer-provided instruction manual for the NGS operation.
3. Select "DIAGNOSTIC TROUBLE CODES" function and press trigger.
4. When "NO CODES RECEIVED/SYSTEM PASSED" is displayed, all systems monitord are judged OK.
5. When any of the diagnostic trouble codes is displayed, carry out troubleshooting according to the code.
6. When "LINK MONITOR ERROR" is displayed, check connection of the NGS.
7. After all problems have been repaired, carry out "After Repair Procedure." (Refer to below.)



After-repair Procedure

1. After repairs, connect the **SST** (NGS) to the data link connector–2. (Refer to page F1–94.)
2. Select "CLEAR" function and erase diagnostic trouble codes from the NGS memory.
3. Perform diagnostic trouble code inspection again and verify that no diagnostic trouble codes are displayed.

Service Code Numbers

Code No.	Display on the NGS	Condition	Page
P0100	MAF/VAF—CIRCUIT MALFUNCTION	Mass air flow circuit malfunction	F1–18
P0110	IAT—CIRCUIT MALFUNCTION	Intake air temperature circuit malfunction	F1–19
P0115	ECT—CIRCUIT MALFUNCTION	Engine coolant temperature circuit malfunction	F1–20
P0120	TP—CIRCUIT MALFUNCTION	Throttle position circuit malfunction	F1–21
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Code No.	Display on the NGS	Condition	Page
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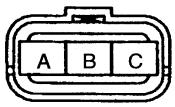
Diagnostic trouble code No. P0100	MAF/VAF—CIRCUIT MALFUNCTION
Symptom	Input voltage from mass air flow sensor is below 0.1 V or above 4.9 V when ignition switch is turned on
Possible cause	• Mass air flow sensor malfunction • Open or short circuit in wiring from main relay terminal F to mass air flow sensor terminal C • Open or short circuit in wiring from ECM terminal 3B to mass air flow sensor terminal B • Open circuit in wiring from ECM terminal 4A to mass air flow sensor terminal A

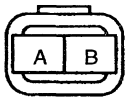
STEP	INSPECTION		ACTION
1	Does mass air flow sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3B voltage OK? ☞ **page F1–96**	Yes	Go to step 6
		No	Go to next step
3	Disconnect mass air flow sensor connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal C?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — Mass air flow sensor terminal C)
4	Is there continuity between connector terminal A and ECM terminal 4A?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between connector terminal B and ECM terminal 3B	Yes	Replace mass air flow sensor ☞ **page F1–48**
		No	Repair or replace wiring harness
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0110	IAT—CIRCUIT MALFUNCTION
Symptom	Input from intake air temperature sensor is below 0.1 V or above 4.9 V when ignition switch is turned on
Possible cause	• Intake air temperature sensor malfunction • Open or short circuit in wiring from intake air temperature sensor terminal A to ECM terminal 3K • Open or short circuit in wiring from intake air temperature sensor terminal B to ECM terminal 3O

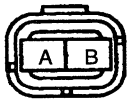
STEP	INSPECTION		ACTION
1	Does intake air temperature sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3K voltage OK? ☞ **page F1–97**	Yes	Go to step 6
		No	Go to next step
3	Disconnect intake air temperature sensor connector. Turn ignition switch to ON. Is there 5 V at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (ECM terminal 3K — Intake air temperature sensor terminal A)
4	Is there continuity between connector terminal B and ECM terminal 3O?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is intake air temperature sensor OK? ☞ **page F1–105**	Yes	Go to next step
		No	Replace intake air temperature sensor ☞ **page F1–105**
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness of connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0115	**ECT—CIRCUIT MALFUNCTION**
Symptom	Input voltage from engine coolant temperature sensor is below 0.2 V or above 4.9 V when ignition switch is turned on
Possible cause	• Engine coolant temperature sensor malfunction • Open or short circuit in wiring from engine coolant temperature sensor terminal A to ECM terminal 3G • Open or short circuit in wiring from engine coolant temperature sensor terminal B to ECM terminal 3O

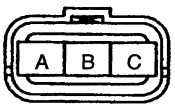
STEP	INSPECTION		ACTION
1	Does engine coolant temperature sensor or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3G voltage OK? ☞ **page F1–96**	Yes	Go to step 6
		No	Go to next step
3	Disconnect engine coolant temperature sensor connector. Turn ignition switch ON. Is there 5 V at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (ECM terminal 3G — Engine coolant temperature sensor terminal A)
4	Is there continuity between connector terminal B and ECM terminal 3O?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is engine coolant temperature sensor OK? ☞ **page F1–104**	Yes	Go to next step
		No	Replace engine coolant temperature sensor ☞ **page F1–104**
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0120	TP—CIRCUIT MALFUNCTION
Symptom	Input voltage from throttle position sensor is below 0.1 V or above 4.9 V when ignition switch is turned on
Possible cause	• Throttle position sensor malfunction • Open or short circuit in wiring from throttle position sensor terminal A to ECM terminal 3I • Open or short circuit in wiring from throttle position sensor terminal B to ECM terminal 3F • Open or short circuit in wiring from throttle position sensor terminal C to ECM terminal 3O

STEP	INSPECTION		ACTION
1	Does throttle position sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3F voltage OK? ☞ **page F1–96**	Yes	Go to next step
		No	Go to step 4
3	Is voltage increase linear according to throttle valve opening angle?	Yes	Go to step 7
		No	Replace throttle position sensor ☞ **page F1–104**
4	Disconnect throttle position sensor connector. Turn ignition switch to ON. Is there 5 V at connector terminal C?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (ECM terminal 3I — Throttle position sensor terminal A)
5	Is there continuity between connector terminal C and ECM terminal 3O?	Yes	Go to next step
		No	Repair or replace wiring harness
6	Is there continuity between connector terminal A and ECM terminal 3I?	Yes	Replace throttle position sensor ☞ **page F1–104**
		No	Repair or replace wiring harness
7	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0125	EXCESSIVE TIME TO ENTER CLOSED LOOP
Symptom	Engine coolant temperature sensor signal does not rise normally because of engine coolant system malfunction
Possible cause	• Engine coolant temperature sensor malfunction • Thermostat malfunction • Cooling fan system malfunction • Water pump malfunction • Engine coolant passage clogged or leaks • Engine coolant level and protection

STEP	INSPECTION		ACTION
1	Is electric fan control system OK?	Yes	Go to next step
		No	Repair or replace cooling fan system
2	Is engine coolant temperature sensor resistance OK? ☞ **page F1–104**	Yes	Go to next step
		No	Replace engine cooling temperature sensor
3	Is cooling system OK? ☞ **section E1**	Yes	Go to next step
		No	Repair or replace
4	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Temporary system malfunction

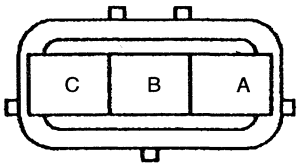
* During nornal driving

Diagnostic trouble code No. P0130	HO2S 11—CIRCUIT MALFUNCTION
Symptom	• Heated oxygen sensor (Front) deterioration

STEP	INSPECTION		ACTION
1	Is heated oxygen sensor (Front) OK?	Yes	Replace ECM
		No	Replace heated oxygen sensor (Front)

Diagnostic trouble code No. P0134	O2S 11—CIRCUIT NO ACTIVITY DETECTED
Symptom	When heated oxygen sensor (Front) signal does not exceed 0.5 V after engine is started, or stays below 0.5 V for two minutes after engine has reached normal operating temperature and runing at 1,500 rpm or over
Possible cause	• Heated oxygen sensor (Front) malfunction • Open or short circuit in wiring from heated oxygen sensor (Front) terminal A to ECM terminal 3C • Intake-air system, fuel system, ignition system malfunction

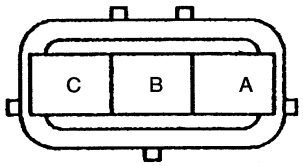
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Front) connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3C voltage OK? ☞ **page F1–96**	Yes	Go to step 5
		No	Go to next step
3	Disconnect heated oxygen sensor (Front) connector. Is there continuity between connector terminal A and ECM terminal 3C?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Are following units OK? Fuel injector ☞ **page F1–65** Pressure regulator ☞ **page F1–63** Mass air flow sensor ☞ **page F1–99** Engine coolant temperature sensor ☞ **page F1–104** Spark plug ☞ **section G** Air suction (Air/Fuel ratio rich or lean)	Yes	Replace heated oxygen sensor (Front) ☞ **page F1–72**
		No	Repair or replace
5	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0135	O2S 11—HEATER CIRCUIT MALFUNCTION
Symptom	Open or short circuit is observed in heated oxygen sensor heater (Front) system when ignition switch is turned on
Possible cause	• Heated oxygen sensor heater (Front) malfunction • Open or short circuit in wiring from heated oxygen sensor (Front) terminal C to ignition switch • Open or short circuit in wiring from heated oxygen sensor (Front) terminal B to ECM terminal 3M

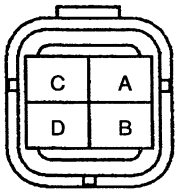
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Front) connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3M voltage OK? ☞ page F1–97	Yes	Go to step 6
		No	Go to next step
3	Disconnect heated oxygen sensor (Front) connector and turn ignition switch to ON. Is there battery positive voltage at connector terminal C?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Ignition switch — Heated oxygen sensor (Front) terminal C)
4	Is there continuity between connector terminal B and ECM terminal 3M?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between connector terminals B and C?	Yes	Go to next step
		No	Replace heated oxygen sensor (Front) ☞ page F1–72
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ page F1–93
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0140	O2S 12—CIRCUIT NO ACTIVITY DETECTED
Symptom	When heated oxygen sensor (Rear) signal does not exceed 0.5 V after engine is started, or stays below 0.5 V for five minutes after engine has reached normal operating temperature and running at 1,500 rpm or over
Possible cause	• Heated oxygen sensor (Rear) malfunction • Open or short circuit in wiring from heated oxygen sensor (Rear) terminal A to ECM terminal 3D • Open circuit in wiring from heated oxygen sensor (Rear) terminal B to ECM terminal 3O • Intake-air system, fuel system or ignition system malfunction

STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Rear) connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3D voltage OK? ☞ **page F1–96**	Yes	Go to step 6
		No	Go to next step
3	Disconnect heated oxygen sensor (Rear) connector. Is there continuity between connector terminal B and ECM terminal 3O?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is there continuity between connector terminal A and ECM terminal 3D?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Are following units OK? Fuel injector ☞ **page F1–65** Pressure regulator ☞ **page F1–63** Mass air flow sensor ☞ **page F1–99** Engine coolant temperature sensor ☞ **page F1–104** Spark plug ☞ **section G** Air suction (Air/fuel ratio rich)	Yes	Replace heated oxygen sensor (Rear) ☞ **page F1–72**
		No	Repair or replace
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0170	BANK1—FUEL TRIM MALFUNCTION
Symptom	Air/fuel ratio stays rich or lean longer than specified period because of system malfunction
Possible cause	• Pressure regulator malfunction • Fuel injector malfunction • Fuel pump malfunction • Engine coolant temperature sensor malfunction • Mass air flow sensor malfunction • Heated oxygen sensor malfunction • Throttle position sensor • Closed throttle position switch • Purge solenoid valve malfunction • Leakage in intake-air system • ECM malfunction • Open or short circuit in wiring between ECM terminals 4U, 4V, 4W, 4X to fuel injector • Intake air temperature sensor malfunction • EGR boost sensor malfunction • PCV valve malfunction

STEP	INSPECTION		ACTION
1	Is there air leakage in intake-air system components? ☞ **page F1–48**	Yes	Repair or replace intake-air system
		No	Go to next step
2	Is fuel line pressure OK? ☞ **page F1–57**	Yes	Go to step 5
		No	Go to next step
3	Is fuel pump maximum pressure OK? ☞ **page F1–61**	Yes	Go to next step
		No	Repair or replace fuel pump ☞ **page F1–62**
4	Is pressure regulator OK? ☞ **page F1–63**	Yes	Go to next step
		No	Replace pressure regulator ☞ **page F1–64**
5	Is fuel injector OK? ☞ **page F1–65**	Yes	Go to next step
		No	Replace fuel injector ☞ **page F1–65**
6	Is engine coolant temperature sensor OK? ☞ **page F1–104**	Yes	Go to next step
		No	Replace engine coolant temperature sensor ☞ **page F1–104**
7	Is mass air flow sensor OK? ☞ **page F1–99**	Yes	Go to next step
		No	Replace mass air flow sensor ☞ **page F1–48**
8	Is throttle position sensor OK? ☞ **page F1–101**	Yes	Go to next step
		No	Adjust throttle position sensor ☞ **page F1–102**
9	Is closed throttle position switch OK? ☞ **page F1–101**	Yes	Go to next step
		No	Replace throttle body ☞ **page F1–48**
10	Is intake air temperature sensor OK? ☞ **page F1–105**	Yes	Go to next step
		No	Replace intake air temperatur sensor ☞ **page F1–105**
11	Is EGR boost sensor OK? ☞ **page F1–107**	Yes	Go to next step
		No	Replace EGR boost sensor ☞ **page F1–92**
12	Is purge solenoid valve OK? ☞ **page F1–81**	Yes	Go to next step
		No	Replace purge solenoid valve ☞ **page F1–81**
13	Is PCV valve OK? ☞ **page F1–78**	Yes	Go to next step
		No	Replace PCV valve
14	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Temporary system malfunction

* During Idling

Diagnostic trouble code No. P0300	RANDOM MISFIRE DETECTED
Symptom	ECM input signal from crankshaft position sensor signal is irregular
Possible cause	• Ignition system malfunction • Low fuel • Low battery positive voltage • Fuel system malfunction • Insufficient compression • Crankshaft position sensor air gap incorrect • Exhaust gas recirculation system malfunction

STEP	INSPECTION		ACTION
1	Is ignition system OK? ☞ **section G**	Yes	Go to next step
		No	Repair or replace as necessary
2	Is crankshaft position sensor air gap correct? ☞ **page F1–100**	Yes	Go to next step
		No	Repair or replace crankshaft position sensor ☞ **page F1–101**
3	Is fuel system OK? ☞ **page F1–55**	Yes	Go to next step
		No	Repair or replace as necessary
4	Is exhaust gas recirculation control system OK? ☞ **page F1–74**	Yes	Go to next step
		No	Repair or replace as necessary
5	Is compression at all cylinders normal? ☞ **section B1**	Yes	Go to next step
		No	Repair or replace as necessary
6	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Temporary system malfunction

* During normal driving

Diagnostic trouble code No. P0301	CYLINDER 1 MISFIRE DETECTED
Symptom	ECM input signal from crankshaft position sensor signal for cylinder No.1 is irregular
Possible cause	• Ignition system of cylinder No.1 malfunction • Low fuel • Low battery positive voltage • Fuel system malfunction • Insufficient compression in cylinder No.1 • Crankshaft position sensor air gap incorrect • Exhaust gas recirculation system malfunction

STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.1 OK? ☞ **section G**	Yes	Go to next step
		No	Repair or replace as necessary
2	Is crankshaft position sensor air gap OK? ☞ **page F1–100**	Yes	Go to next step
		No	Repair or replace crankshaft position sensor ☞ **page F1–101**
3	Is fuel injector at cylinder No.1 OK? ☞ **page F1–65**	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.1 ☞ **page F1–65**
4	Is fuel system OK? ☞ **page F1–55**	Yes	Go to next step
		No	Repair or replace as necessary
5	Is exhaust gas recirculation control system OK? ☞ **page F1–74**	Yes	Go to next step
		No	Repair or replace as necessary
6	Is compression at cylinder No.1 normal? ☞ **section B1**	Yes	Go to next step
		No	Repair or replace as necessary
7	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Temporary system malfunction

* During normal driving

Diagnostic trouble code No. P0302	CYLINDER 2 MISFIRE DETECTED
Symptom	ECM input signal from crankshaft position sensor signal for cylinder No.2 is irregular
Possible cause	• Ignition system of cylinder No.2 malfunction • Low fuel • Low battery positive voltage • Fuel system malfunction • Insufficient compression in cylinder No.2 • Crankshaft position sensor air gap incorrect • Exhaust gas recirculation system malfunction

STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.2 OK? ☞ **section G**	Yes	Go to next step
		No	Repair or replace as necessary
2	Is crankshaft position sensor air gap OK? ☞ **page F1–100**	Yes	Go to next step
		No	Repair or replace crankshaft position sensor ☞ **page F1–101**
3	Is fuel injector at cylinder No.2 OK? ☞ **page F1–65**	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.2 ☞ **page F1–65**
4	Is fuel system OK? ☞ **page F1–55**	Yes	Go to next step
		No	Repair or replace as necessary
5	Is exhaust gas recirculation control system OK? ☞ **page F1–74**	Yes	Go to next step
		No	Repair or replace as necessary
6	Is compression at cylinder No.2 normal? ☞ **section B1**	Yes	Go to next step
		No	Repair or replace as necessary
7	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Temporary system malfunction

* During normal driving

Diagnostic trouble code No. P0303	CYLINDER 3 MISFIRE DETECTED
Symptom	ECM input signal from crankshaft position sensor signal for cylinder No.3 is irregular
Possible cause	• Ignition system of cylinder No.3 malfunction • Low fuel • Low battery positive voltage • Fuel system malfunction • Insufficient compression in cylinder No.3 • Crankshaft position sensor air gap incorrect • Exhaust gas recirculation system malfunction

STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.3 OK? ☞ **section G**	Yes	Go to next step
		No	Repair or replace as necessary
2	Is crankshaft position sensor air gap OK? ☞ **page F1–100**	Yes	Go to next step
		No	Repair or replace crankshaft position sensor ☞ **page F1–101**
3	Is fuel injector at cylinder No.3 OK? ☞ **page F1–65**	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.3 ☞ **page F1–65**
4	Is fuel system OK? ☞ **page F1–55**	Yes	Go to next step
		No	Repair or replace as necessary
5	Is exhaust gas recirculation control system OK? ☞ **page F1–74**	Yes	Go to next step
		No	Repair or replace as necessary
6	Is compression at cylinder No.3 normal? ☞ **section B1**	Yes	Go to next step
		No	Repair or replace as necessary
7	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Temporary system malfunction

* During normal driving

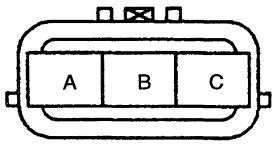
Diagnostic trouble code No. P0304	CYLINDER 4 MISFIRE DETECTED
Symptom	ECM input signal from crankshaft position sensor signal for cylinder No.4 is irregular
Possible cause	• Ignition system of cylinder No.4 malfunction • Low fuel • Low battery positive voltage • Fuel system malfunction • Insufficient compression in cylinder No.4 • Crankshaft position sensor air gap incorrect • Exhaust gas recirculation system malfunction

STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.4 OK? ☞ **section G**	Yes	Go to next step
		No	Repair or replace as necessary
2	Is crankshaft position sensor air gap OK? ☞ **page F1–100**	Yes	Go to next step
		No	Repair or replace crankshaft position sensor ☞ **page F1–101**
3	Is fuel injector at cylinder No.4 OK? ☞ **page F1–65**	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.4 ☞ **page F1–65**
4	Is fuel system OK? ☞ **page F1–55**	Yes	Go to next step
		No	Repair or replace as necessary
5	Is exhaust gas recirculation control system OK? ☞ **page F1–74**	Yes	Go to next step
		No	Repair or replace as necessary
6	Is compression at cylinder No.4 normal? ☞ **section B1**	Yes	Go to next step
		No	Repair or replace as necessary
7	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Temporary system malfunction

* During normal driving

Diagnostic trouble code No. P0335	CRANKSHAFT POS SENSOR—CKT MALFUNCTION
Symptom	No NE signal input from crankshaft position sensor for 1.5 seconds while engine running
Possible cause	• Crankshaft position sensor malfunction • Open or short circuit in wiring from ECM terminal 4E to crankshaft position sensor terminal B • Open or short circuit in wiring from ECM terminal 4H to crankshaft position sensor terminal A

STEP	INSPECTION		ACTION
1	Does crankshaft position sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Disconnect crankshaft position sensor connector. Is there continuity between connector terminal B and ECM terminal 4E? Is there continuity between connector terminal A and ECM terminal 4H?	Yes	Go to next step
		No	Repair or replace wiring harness
3	Is crankshaft position sensor air gap OK? ☞ **page F1–100**	Yes	Go to next step
		No	Replace crankshaft position sensor or crankshaft pulley ☞ **page F1–101** ☞ **section B1**
4	Is crankshaft position sensor OK? ☞ **page F1–100**	Yes	Go to next step
		No	Replace crankshaft position sensor ☞ **page F1–101**
5	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0340	CAMSHAFT POS SENSOR—CKT MALFUNCTION
Symptom	No SGT signal input from camshaft position sensor for 1.5 seconds while engine running
Possible cause	• Camshaft position sensor malfunction • Open or short circuit in wiring from ECM terminal 4F to distributor terminal C • Open or short circuit in wiring from ECM terminal 4A to distributor terminal A

STEP	INSPECTION		ACTION
1	Does distributor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Disconnect distributor connector. Is there continuity between connector terminal C and ECM terminal 4F? Is there continuity between connector terminal A and ECM terminal 4A?	Yes	Go to next step
		No	Repair or replace wiring harness
3	Is camshaft position sensor OK? ☞ **page F1–100**	Yes	Go to next step
		No	Replace distributor ☞ **section G**
4	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0400	EGR—FLOW MALFUNCTION
Symptom	Exhaust gas recirculation system does not function normally because of electrical or mechanical trouble
Possible cause	• EGR valve malfunction • EGR boost sensor malfunction • EGR boost sensor solenoid valve malfunction • EGR valve position sensor malfunction • EGR solenoid valve (vacuum, vent) malfunction • Clogs or leakage in piping connecting following units • EGR boost sensor, EGR boost sensor solenoid valve and intake manifold • Air cleaner, EGR solenoid valve (vent) and EGR valve • Intake manifold, EGR solenoid valve (vaccum) and EGR valve • Warm up three way catalytic converter

STEP	INSPECTION		ACTION
1	Is diagnostic trouble code for EGR solenoid valve (vaccum, vent), EGR boost sensor solenoid valve or EGR boost sensor displayed?	Yes	Carry out inspection as required according to diagnostic trouble code
		No	Go to next step
2	Is EGR valve position sensor OK? ☞ **page F1–106**	Yes	Go to next step
		No	Repair or replace EGR valve ☞ **page F1–77**
3	Check each hose for damage. Are they OK? • Intake manifold—EGR solenoid valve (vent) • EGR solenoid valve (vent)—EGR solenoid valve (vaccum) • EGR solenoid valve (vaccum)-EGR valve	Yes	Go to next step
		No	Repair or replace as necessary
4	EGR boost sensor OK? ☞ **page F1–107**	Yes	Go to next step
		No	Replace EGR boost sensor ☞ **page F1–92**
5	Check each hose for damage. Are they OK? • EGR passage—EGR boost sensor solenoid valve • EGR boost sensor—EGR boost sensor solenoid valve	Yes	Go to next step
		No	Repair or replace as necessary
6	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Temporary system malfunction

* During driving when coolant temperature is over 55°C {131°F} and engine speed is over 1,000 rpm [10 km/h {6.2 mph}]

Diagnostic trouble code No. P0420	BANK1 CAT—EFFICIENCY BELOW LIMIT
Symptom	• Warm up three way catalytic converter deterioration • Leakage in exhaust system

STEP	INSPECTION		ACTION
1	Is heated oxygen sensor (Rear) OK? ☞ page F1–105	Yes	Replace warm up three way catalytic converter ☞ page F1–72
		No	Replace heated oxygen sensor (Rear) ☞ page F1–72

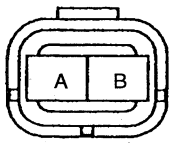
Diagnostic trouble code No. P0440	EVAP SYSTEM—MALFUNCTION
Symptom	Evaporative emission control system does not function normally because of mechanical trouble
Possible cause	• Purge solenoid valve malfunction • Charcoal canister malfunction • Check valve malfunction • Fuel vapor valve malfunction • Clogs or leakage in piping connecting following units • Intake manifold and purge solenoid valve • Purge solenoid valve and charcoal canister • Charcoal canister, check valve, and fuel vapor valve

STEP	INSPECTION		ACTION
1	Is ECM terminal 4T voltage OK?	Yes	Go to next step
		No	Inspect purge solenoid valve
2	Are evaporative emission control system related hose free of clogs and leakage?	Yes	Go to next step
		No	Repair or replace as necessary
3	Is charcoal canister OK?	Yes	Go to next step
		No	Repair or replace as necessary
4	Is check valve OK?	Yes	Go to next step
		No	Repair or replace as necessary
5	Is fuel vapor valve OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace ECM
		No	Temporary system malfunction

* During driving after engine warm-up

Diagnostic trouble code No. P0443	EVAP SYSTEM—PURGE CTRL VALVE CKT MALF
Symptom	Open or short circuit is observed in purge solenoid valve system when ignition switch is turned on
Possible cause	• Purge solenoid valve malfunction • Open or short circuit in wiring from purge solenoid valve terminal A to main relay terminal F • Open or short circuit in wiring from purge solenoid valve terminal B to ECM terminal 4T

STEP	INSPECTION		ACTION
1	Does purge solenoid valve connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 4T voltage OK? ☞ page F1–98	Yes	Go to step 6
		No	Go to next step
3	Disconnect purge solenoid valve connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — Purge solenoid valve terminal A)
4	Is there continuity between connector terminal B and ECM terminal 4T?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between purge solenoid valve terminals A and B?	Yes	Go to next step
		No	Replace purge solenoid valve
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ page F1–93
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



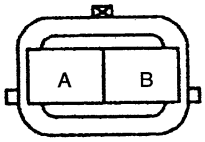
HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0500	VEHICLE SPEED SENSOR—MALFUNCTION
Symptom	No vehicle speed sensor signal input from vehicle speed sensor while driving
Possible cause	• Speedometer sensor malfunction • Open or short circuit in wiring from ignition switch to speedometer sensor • Open or short circuit in wiring from speedometer sensor to GND • Open or short circuit in wiring from speedometer sensor to vehicle speed sensor • Open or short circuit in wiring from vehicle speed sensor to ECM terminal 1M

STEP	INSPECTION		ACTION
1	Does vehicle speed sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 1M voltage OK? ☞ page F1–96	Yes	Go to step 5
		No	Go to next step
3	Is there continuity between vehicle speed sensor terminal and ECM terminal 1M?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is there continuity between vehicle speed sensor and speedometer sensor terminals? ☞ Mazda 1996 626/MX-6 BETM	Yes	Go to next step
		No	Repair or replace speedometer sensor and wiring harness ☞ Mazda 1996 626/MX-6 BETM
5	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ page F1–93
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

Diagnostic trouble code No. P0505	IDLE CONTROL SYSTEM MALFUNCTION
Symptom	• Mechanical trouble is observed in idle air control system • Open or short circuit is observed in idle air control system when ignition switch is turned on
Possible cause	• Idle air control valve malfunction • Leakage in intake-air system • Open or short circuit in wiring from idle air control valve terminal A to main relay terminal F • Open or short circuit in wiring from idle air control valve terminal B to ECM terminal 4Q

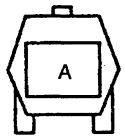
STEP	INSPECTION		ACTION
1	Does idle air control valve connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 4Q voltage OK? ☞ **page F1–98**	Yes	Go to step 6
		No	Go to next step
3	Disconnect idle air control valve connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — Idle air control valve terminal A)
4	Is there continuity between connector terminal B and ECM terminal 4Q?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between idle air control valve terminals A and B?	Yes	Go to next step
		No	Replace BAC valve ☞ **page F1–48**
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0510	CLOSED THROTTLE POS—MALFUNCTION
Symptom	Input voltage from closed throttle position switch stays 0 V or above 1.2 V for more than 26 seconds after ignition switch is turned on
Possible cause	• Closed throttle position switch malfunction • Open or short circuit in wiring from closed throttle position switch terminal A to ECM terminal 3L

STEP	INSPECTION		ACTION
1	Does throttle position sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3L voltage OK? ☞ **page F1–97**	Yes	Go to step 5
		No	Go to next step
3	Is there continuity between connector terminal A and ECM terminal 3L?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is closed throttle position switch OK? ☞ **page F1–101**	Yes	Go to next step
		No	Replace closed throttle position switch ☞ **page F1–48**
5	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0703	TORQUE CONV/BRAKE SW—MALFUNCTION
Symptom	No signal input from brake switch to ECM when brake pedal is kept depressed for more than 26 seconds, or signal input when brake pedal is not depressed
Possible cause	• Brake switch malfunction • Open or short circuit in wiring from ECM terminal 1Q to brake switch terminal • Open or short circuit in wiring from brake switch terminal to battery terminal

STEP	INSPECTION		ACTION
1	Does brake switch connector or ECM connector have poor connection?	Yes	Repair or replace
		No	Go to next step
2	Is ECM terminal 1Q voltage OK? ☞ page F1–96	Yes	Go to step 4
		No	Go to next step
3	Is there continuity between brake switch terminal and ECM terminal 1Q?	Yes	Check for open or short circuit in wiring harness. (Battery — Brake switch) Check brake switch. ☞ Mazda 1996 626/MX-6 BETM
		No	Repair or replace wiring harness
4	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ page F1–93
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

Diagnostic trouble code No. P1000	MORE DRIVING NEEDED TO COMPLETE TEST
Possible cause	Following diagnostic trouble code detection conditions not satisfied

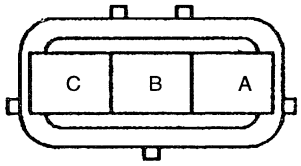
Diagnosed circuit	Code No.
O_2 sensor circuit malfunction	P0130
O_2 sensor heater circuit malfunction	P0135
Fuel trim malfunction	P0170
Random misfire detected Cylinder 1 misfire detected Cylinder 2 misfire detected Cylinder 3 misfire detected Cylinder 4 misfire detected	P0300 P0301 P0302 P0303 P0304
Exhaust gas recirculation flow malfunction	P0400
Catalyst system efficiency below threshold	P0420

Note
• DTC No. P1000 will be deleted while MIL is illuminated

Action	Carry out troubleshooting according to symptom

Diagnostic trouble code No. P1170	HO2S 11—INVERSION
Symptom	Heated oxygen sensor (Front) signal remains unchanged for more than 20 seconds after engine is in feedback zone
Possible cause	• Heated oxygen sensor (Front) malfunction • Open or short circuit in wiring from heated oxygen sensor (Front) terminal A to ECM terminal 3C • Intake-air system, fuel system, ignition system malfunction

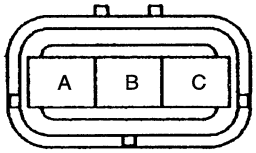
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Front) connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3C voltage OK? ☞ **page F1–96**	Yes	Go to step 5
		No	Go to next step
3	Disconnect heated oxygen sensor (Front) connector. Is there continuity between connector terminal A and ECM terminal 3C?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Are following units OK? Fuel injector ☞ **page F1–65** Pressure regulator ☞ **page F1–63** Mass air flow sensor ☞ **page F1–99** Engine coolant temperature sensor ☞ **page F1–104** Spark plug ☞ **section G** Air suction (Air/fuel ratio rich or lean)	Yes	Replace heated oxygen sensor (Front) ☞ **page F1–72**
		No	Repair or replace
5	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1195	EGRBS—OPEN OR SHORT
Symptom	Input voltage from EGR boost sensor is below 0.03 V or above 4.9 V when ignition switch is turned on
Possible cause	• EGR boost sensor malfunction • Open or short circuit in wiring from ECM terminal 3H to EGR boost sensor terminal B • Open or short circuit in wiring from ECM terminal 3I to EGR boost sensor terminal C • Open circuit in wiring from ECM terminal 3O to EGR boost sensor terminal A

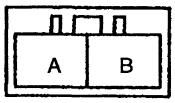
STEP	INSPECTION		ACTION
1	Does EGR boost sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3H voltage OK? ☞ page F1–96	Yes	Go to step 5
		No	Go to next step
3	Disconnect EGR boost sensor connector. Turn ignition switch to ON. Is there 5V at connector terminal C?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (ECM terminal 3I — EGR boost sensor terminal C)
4	Is there continuity between connector terminal A and ECM terminal 3O?	Yes	Replace EGR boost sensor
		No	Repair or replace wiring harness.
5	Erase diagnostic trouble code from memory. Is same code present after rechecking?	Yes	Replace ECM ☞ page F1–93
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1250	PRC—OPEN OR SHORT
Symptom	Open or short circuit is observed in PRC solenoid valve system when ignition switch is turned on
Possible cause	• PRC solenoid valve malfunction • Open or short circuit in wiring from PRC solenoid valve terminal A to main relay terminal F • Open or short circuit in wiring from PRC solenoid valve terminal B to ECM terminal 4J

STEP	INSPECTION		ACTION
1	Does PRC solenoid valve connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 4J voltage OK? ☞ **page F1–97**	Yes	Go to step 6
		No	Go to next step
3	Disconnect PRC solenoid valve connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — PRC solenoid valve terminal A)
4	Is there continuity between connector terminal B and ECM terminal 4J?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between PRC solenoid valve terminals A and B?	Yes	Go to next step
		No	Replace PRC solenoid valve ☞ **page F1–64**
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

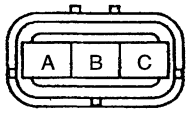
Diagnostic trouble code No. P1345	SGC SIGNAL—NO SGC SIGNAL
Symptom	No SGC signal input from camshaft position sensor while engine rotates five cycles
Possible cause	• Camshaft position sensor malfunction • Open or short circuit in wiring from ECM terminal 4A to distributor terminal A • Open or short circuit in wiring from ECM terminal 4G to distributor terminal D

STEP	INSPECTION		ACTION
1	Does camshaft position sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Disconnect distributor connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal B?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — Distributor terminal B)
3	Is there continuity between connector terminal D and ECM terminal 4G?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is ECM terminal 4G voltage OK? ☞ **page F1–97**	Yes	Go to step 6
		No	Go to next step
5	Is camshaft position sensor OK? ☞ **page F1–100**	Yes	Go to next step
		No	Replace distributor ☞ **section G**
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1402	EGRS—OPEN OR SHORT
Symptom	Input voltage from EGR valve position sensor is below 0.2 V or above 4.8 V when ignition switch is turned on
Possible cause	• EGR valve position sensor malfunction • Open or short circuit in wiring from EGR valve position sensor terminal B to ECM terminal 3I • Open or short circuit in wiring from EGR valve position sensor terminal C to ECM terminal 3J • Open or short circuit in wiring from EGR valve position sensor terminal A to ECM terminal 3O

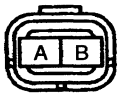
STEP	INSPECTION		ACTION
1	Does EGR valve position sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3J voltage OK? ☞ **page F1–97**	Yes	Go to step 7
		No	Go to next step
3	Disconnect EGR valve position sensor connector. Turn ignition switch to ON. Is there 5 V at connector terminal B?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (ECM terminal 3I — EGR valve position sensor terminal B)
4	Is there continuity between connector terminal C and ECM terminal 3J?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between connector terminal A and ECM terminal 3O?	Yes	Go to next step
		No	Repair or replace wiring harness
6	Is resistance of EGR valve position sensor OK? ☞ **page F1–106**	Yes	Go to next step
		No	Replace EGR valve ☞ **page F1–77**
7	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1485	EGR (VACUUM)—OPEN OR SHORT
Symptom	Open or short circuit is observed in EGR solenoid valve (vacuum) system when ignition switch is turned on
Possible cause	• EGR solenoid valve (vacuum) malfunction • Open or short circuit in wiring from EGR solenoid valve (vacuum) terminal A to main relay terminal F • Open or short circuit in wiring from EGR solenoid valve (vacuum) terminal B to ECM terminal 4P

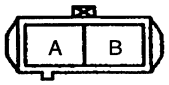
STEP	INSPECTION		ACTION
1	Does EGR solenoid valve (vacuum) connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 4P voltage OK? ☞ **page F1–98**	Yes	Go to step 6
		No	Go to next step
3	Disconnect EGR solenoid valve connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — EGR solenoid valve (vacuum) terminal A)
4	Is there continuity between connector terminal B and ECM terminal 4P?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between EGR solenoid valve (vacuum) terminals A and B?	Yes	Go to next step
		No	Replace EGR solenoid valve (vacuum) ☞ **page F1–73**
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking.	Yes	Replace ECM ☞ **page F1–93**
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1486	EGR (VENT)—OPEN OR SHORT
Symptom	Open or short circuit is observed in EGR solenoid valve (vent) system when ignition switch is turned on
Possible cause	• EGR solenoid valve (vent) malfunction • Open or short circuit in wiring from EGR solenoid valve (vent) terminal A to main relay terminal F • Open or short circuit in wiring from EGR solenoid valve (vent) terminal B to ECM terminal 4O

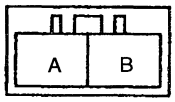
STEP	INSPECTION		ACTION
1	Does EGR solenoid valve (vent) connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 4O voltage OK? ☞ page F1–98	Yes	Go to step 6
		No	Go to next step
3	Disconnect EGR solenoid vale (vent) connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — EGR solenoid valve (vent) terminal A)
4	Is there continuity between connector terminal B and ECM terminal 4O?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between EGR solenoid valve (vent) terminals A and B?	Yes	Go to next step
		No	Replace EGR solenoid valve (vent) ☞ page F1–73
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking.	Yes	Replace ECM ☞ page F1–93
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1487	EGRCHK SOL—OPEN OR SHORT
Symptom	Open or short circuit is observed in EGR boost sensor solenoid valve system when ignition switch is turned on
Possible cause	• EGR boost sensor solenoid valve malfunction • Open or short circuit in wiring from EGR boost sensor solenoid valve terminal A to main relay terminal F • Open or short circuit in wiring from EGR boost sensor solenoid valve B to ECM terminal 4L

STEP	INSPECTION		ACTION
1	Does EGR boost sensor solenoid valve connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 4L voltage OK? ☞ page F1–98	Yes	Go to step 6
		No	Go to next step
3	Disconnect EGR boost sensor solenoid valve connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Main relay terminal F — EGR boost sensor solenoid valve terminal A)
4	Is there continuity between connector terminal B and ECM terminal 4L?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between EGR boost sensor solenoid valve terminals A and B?	Yes	Go to next step
		No	Replace EGR boost sensor solenoid valve ☞ page F1–77
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ page F1–93
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1608	PCME (CPU)—MALFUNCTION
Symptom	ECM does not diagnose output devices
Possible cause	• ECM malfunction • Short circuit in wiring output device

STEP	INSPECTION	ACTION
—	—	Replace ECM ☞ page F1–93

Diagnostic trouble code No. P1794	BAT—BAT OR CIRCUIT FAIL
Symptom	Battery positive voltage is not constantly applied to ECM terminal 4B
Possible cause	• Battery malfunction • Open or short circuit in wiring from ECM terminal 4B to battery positive cable • Burnt fuse

STEP	INSPECTION		ACTION
1	Is battery fully charged? ☞ section G	Yes	Go to next step
		No	Charge battery ☞ section G
2	Does battery positive voltage present at ECM terminal 4B?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (ECM terminal 4B — Main relay — Battery)
3	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ page F1–93
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

Diagnostic trouble code No. P1797	PNS—OPEN OR SHORT
Symptom	• ECM judges neutral/clutch switch OFF for more than 5 seconds while vehicle stopped and engine running
Possible cause	• Clutch/neutral switch malfunction • ECM malfunction • Open or short circuit in wiring from neutral/clutch switch terminal to ECM terminal 1L

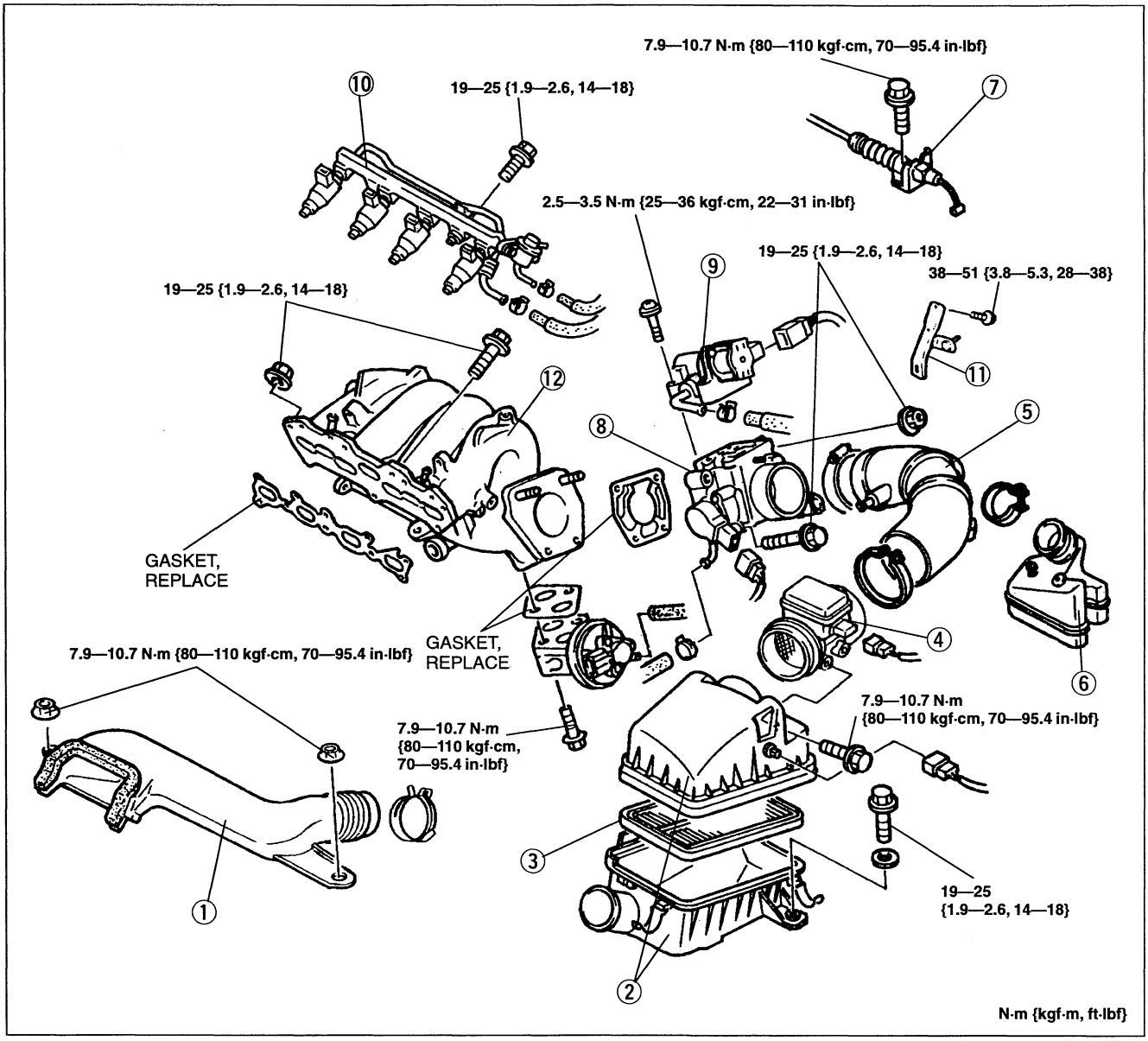
STEP	INSPECTION		ACTION
1	Does ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 1L voltage OK? ☞ page F1–95	Yes	Go to step 5
		No	Go to next step
3	Is there continuity between neutral/clutch switch terminal and ECM terminal 1L?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is neutral/clutch switch OK? ☞ page F1–108	Yes	Go to next step
		No	Repair or replace neutral/clutch switch ☞ section K, page F1–108
5	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM ☞ page F1–93
		No	Intermitent poor connection of harness or connector (Repair connector and/or harness)

INTAKE-AIR SYSTEM

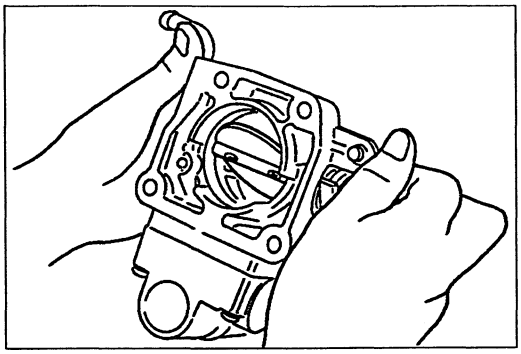
COMPONENT PARTS

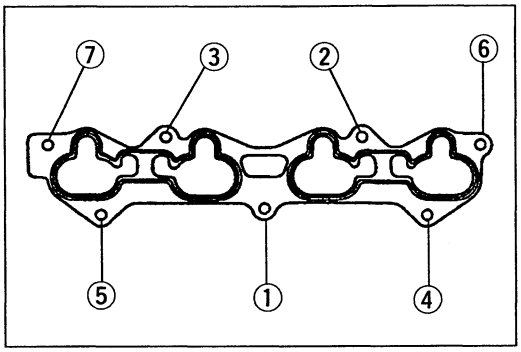
Removal / Inspection / Installation

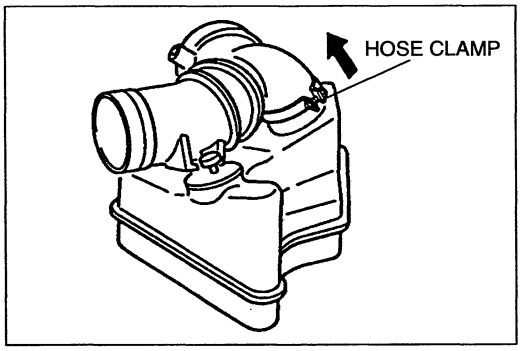
1. Remove in the order shown in the figure.
2. Inspect the intake-air system components and repair or replace them as necessary.
3. Install in the reverse order of removal, referring to **Installation note**.

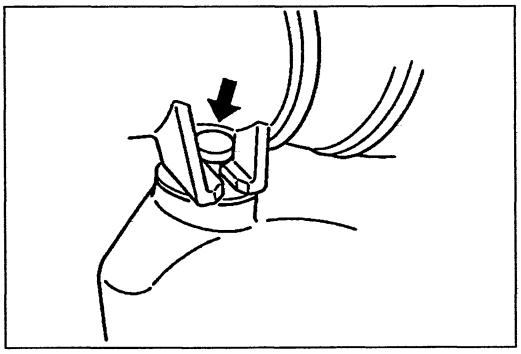


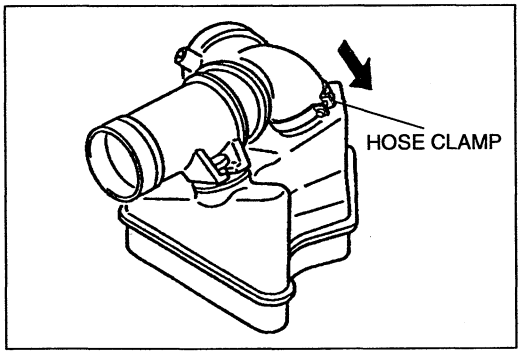
1. Fresh-air duct
   Inspect for damage
2. Air cleaner
   Inspect for excessive dirt and damage
3. Air cleaner element
4. Mass air flow sensor
   Inspection ..... page F1–99
5. Air hose
   Inspect for damage
6. Resonance chamber
   Inspect for damage
   Installation note ..... page F1–49
7. Accelerator cable
   Inspection / Adjustment ..... page F1–50
8. Throttle body
   Inspection ..... page F1–49
9. BAC valve
   Inspection ..... page F1–53
10. Fuel distributor
11. Intake manifold bracket
12. Intake manifold
    Installation note ..... page F1–49











THROTTLE BODY
Inspection
1. Check the throttle body for wear, deposits, and coolant leakage.
2. Verify that the throttle valve moves smoothly when the throttle lever is moved from the closed throttle position to the wide open throttle.
3. Replace the throttle body if necessary.

Caution
- **Do not remove the thin seal coating from the throttle valve or bore. It is necessary for proper operation.**

INTAKE MANIFOLD
Installation note
1. Tighten the bolts in the order shown in the figure.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

2. Refill the radiator with the specified engine coolant. (Refer to section E.)
3. Check for engine coolant leakage.

RESONANCE CHAMBER
Installation note
1. Slide the hose clamp onto the hose and push it onto resonance chamber.

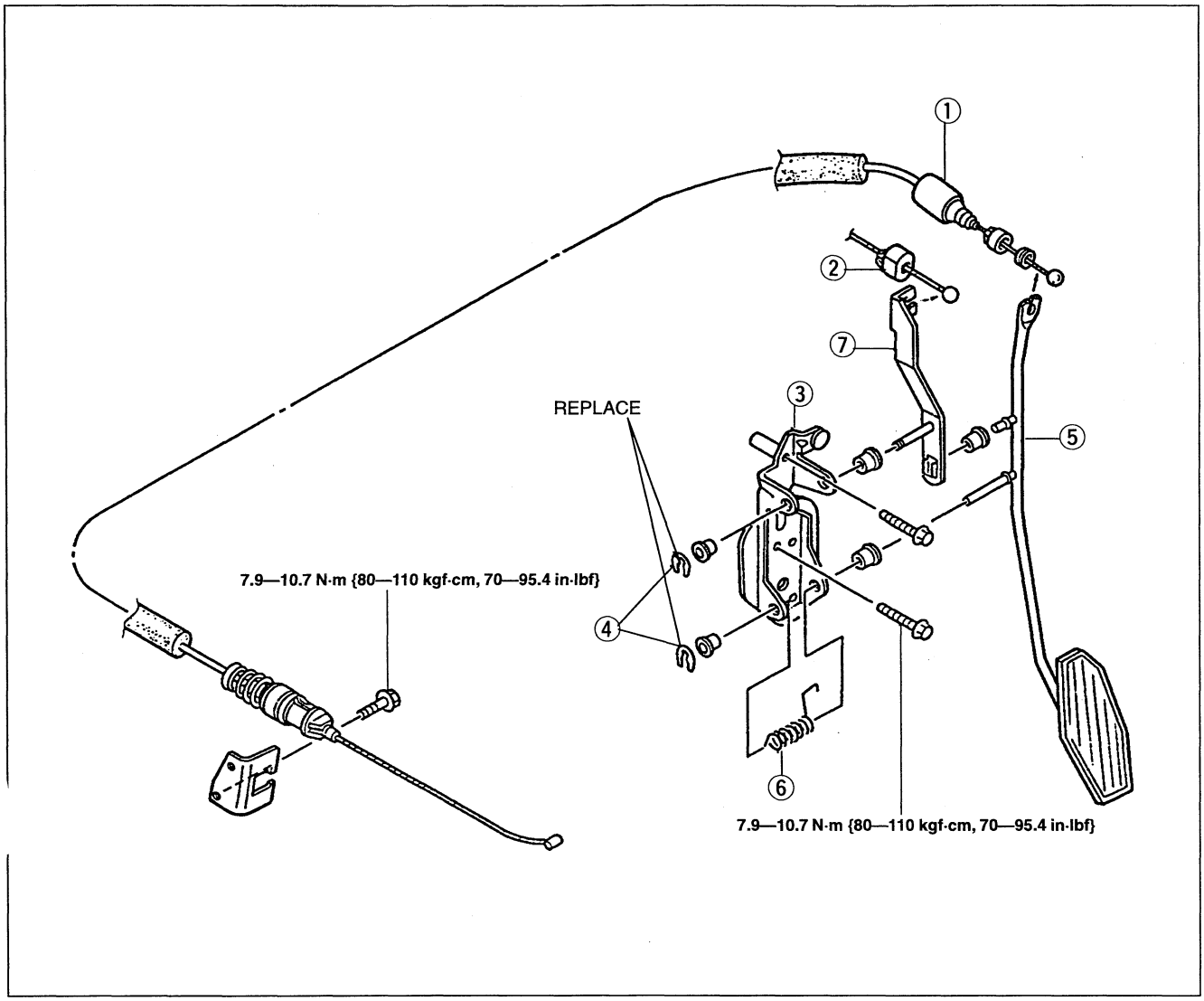
2. Rotate the hose and hook it securely onto the locating knob.

3. Tighten the hose clamp.

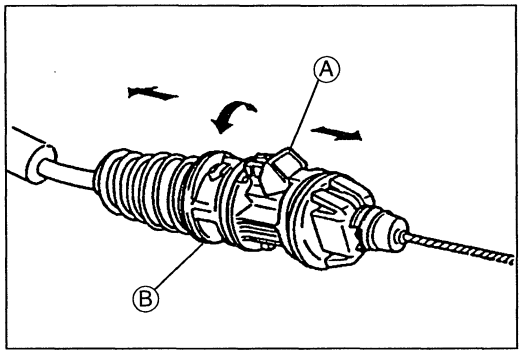
ACCELERATOR PEDAL

Removal / Installation

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



1. Accelerator cable
   Inspection / Adjustment ..... below
2. Cruise actuator cable
   Adjustment ... 1996 626/MX-6 Body Electrical Troubleshooting Manual section Q
3. Retainer
4. Clip
5. Accelerator pedal
6. Return spring
7. Bracket



ACCELERATOR CABLE

Inspection / Adjustment

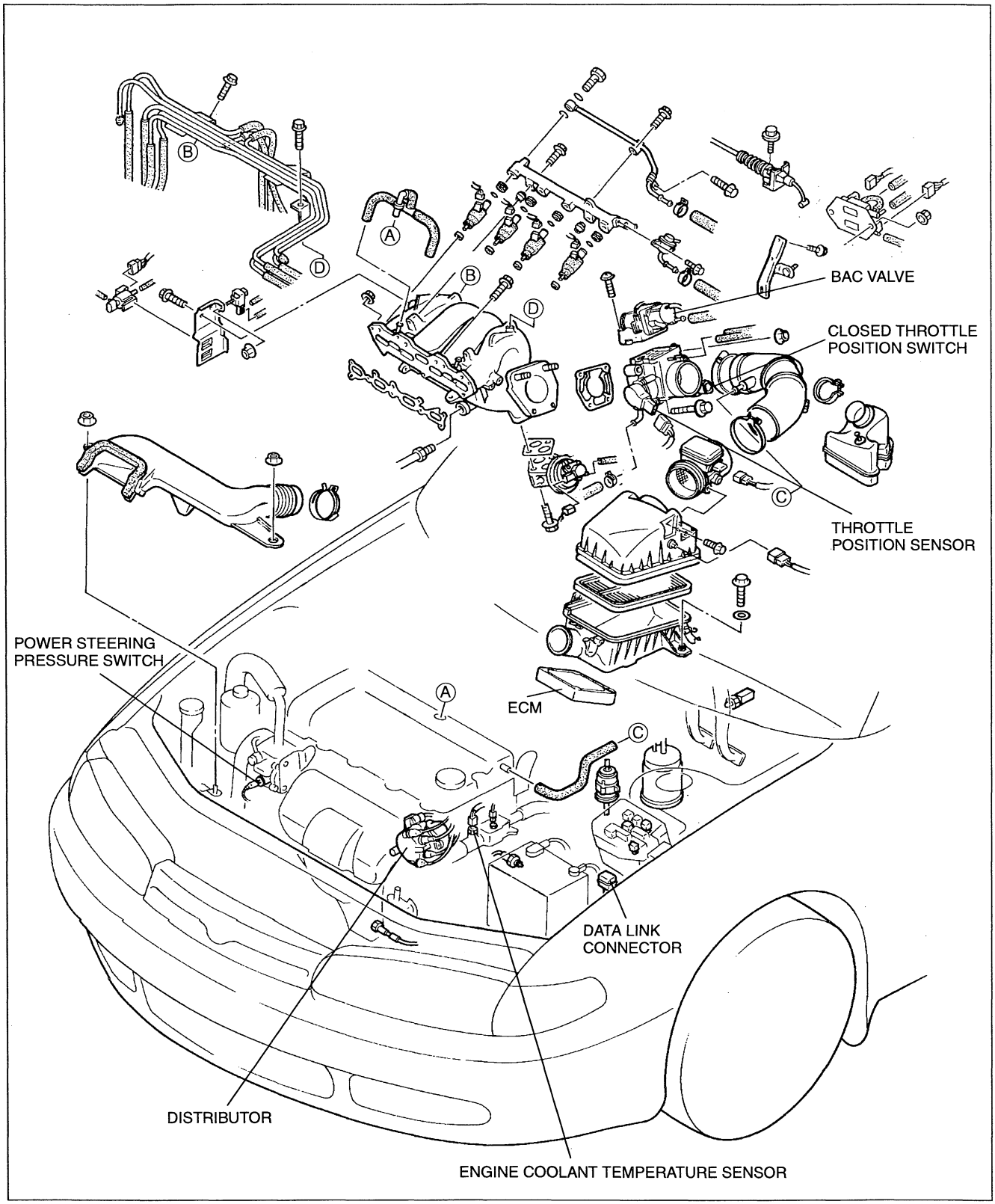
1. Verify that the throttle valve is in the closed throttle position.
2. Measure the free play of the accelerator cable.

   Free play: 1.5—4.0 mm {0.06—0.16 in}

3. If not as specified, adjust the cable free play by turning stopper Ⓑ while pressing lock button Ⓐ with the closed throttle position.
4. Reset the cable lock.

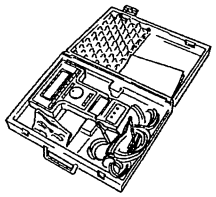
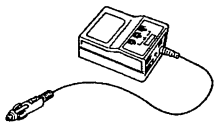
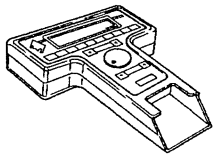
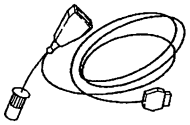
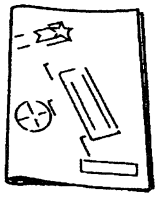
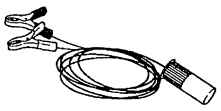
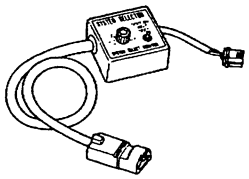
IDLE AIR CONTROL SYSTEM

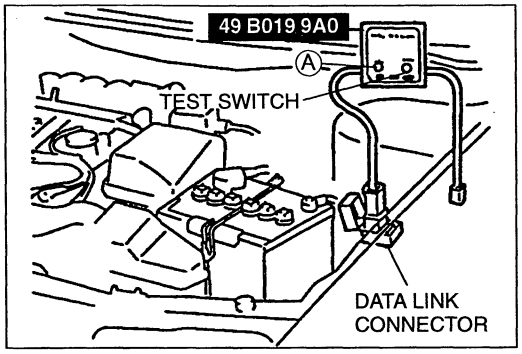
DESCRIPTION

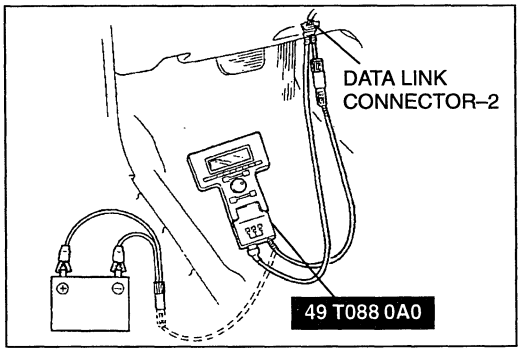


The idle air control system controls the bypass air amount that passes through the throttle body to improve startability, warm-up, idle smoothness, and drivability.

PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of idle air control valve and air valve	49 T088 010B Program Card 	For inspection of idle air control valve and air valve
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of idle air control valve and air valve	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of idle air control valve and air valve
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of idle air control valve and air valve	49 T088 008A Instruction Manual 	For inspection of idle air control valve and air valve
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of idle air control valve and air valve	49 B019 9A0 System Selector 	For inspection of idle air control valve and air valve





SYSTEM INSPECTION

Air Valve

1. Verify that the engine coolant temperature is below 20°C {68°F}.
2. Connect the **SST** to the data link connector.
3. Set switch Ⓐ to position 1 and the test switch to SELF TEST.
4. Start the engine.
5. Verify that the idle speed decreases gradually as the engine warms up.

Idle Air Control Valve

1. Start the engine and run it at idle.
2. Disconnect the IAC valve connector and verify that the engine rotation changes.
3. If the engine condition will not change, do as follows.
   (1) Connect the **SST** to the data link connector–2.
   (2) Verify that diagnostic trouble code No. P0505 is not displayed. If code No. P0505 is shown, carry out troubleshooting of the code No. P0505.
   (3) Change the duty value of the IAC valve to 100% by using the simulation function and verify that the idle speed increases.
      I. If the idle speed increase, replace the ECM. (Refer to page F1–93.)
      II. If the idle speed does not change, replace the BAC valve. (Refer to page F1–48.)
4. Warm-up the engine to normal operating temperature and run it idle.
5. Turn the electrical load ON and verify that the engine speed is within the specification.

Specification

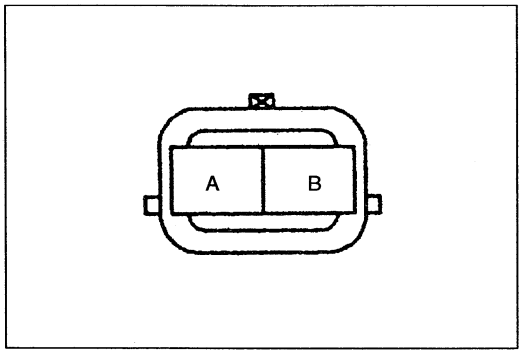
Engine condition	Engine speed (rpm)
No load	650—750
E/L operated*	725—825
A/C operated	725—825
P/S operated	650—750

* Fan switch (ON at 3rd or higher)
Headlight switch
Rear window defroster switch
Cooling fan

Note

- Excludes temporary idle speed drop just after the electrical load are turned on.

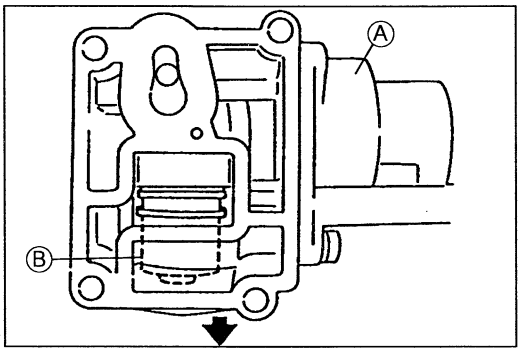
6. If not as specified, check the related switches and wiring harnesses.



IDLE AIR CONTROL VALVE
Inspection
1. Disconnect the idle air control valve connector.
2. Measure the resistance of the valve.

   Resistance: 7.7—9.3 [at 23°C {73°F}]

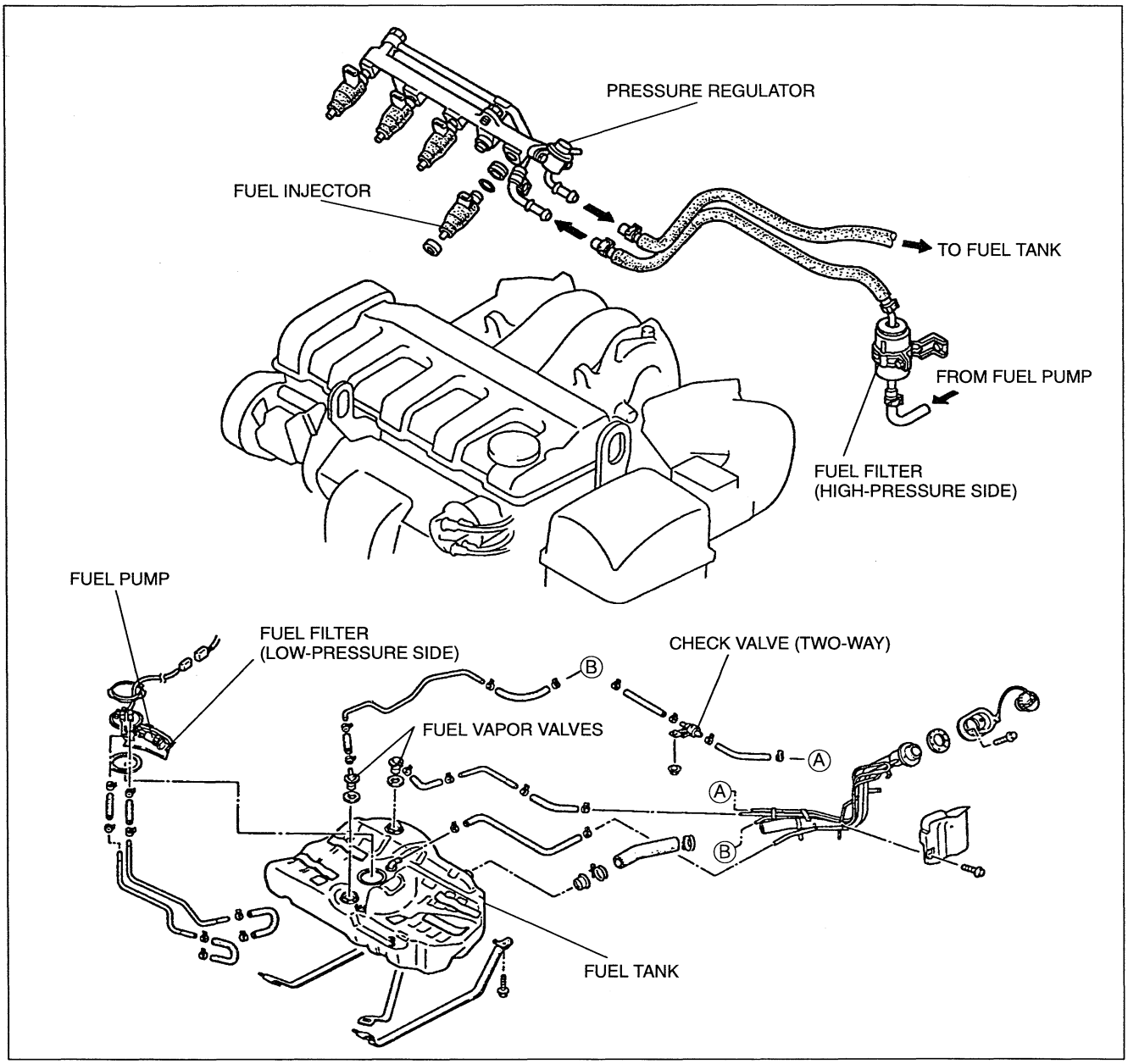
3. If not as specified, replace the BAC valve.



AIR VALVE
Inspection
1. Remove the BAC valve. (Refer to page F1–48.)
2. Cool the BAC valve to below 0°C {32°F}.
3. Heat the BAC valve at point Ⓐ by using a blow drier, and verify that part Ⓑ moves in the direction of the arrow in the figure.
4. If not as specified, replace the BAC valve.

FUEL SYSTEM

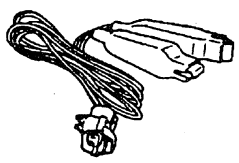
DESCRIPTION

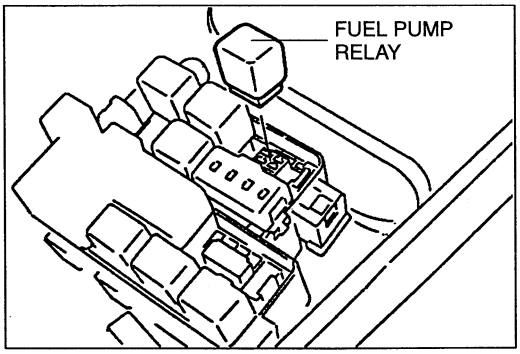


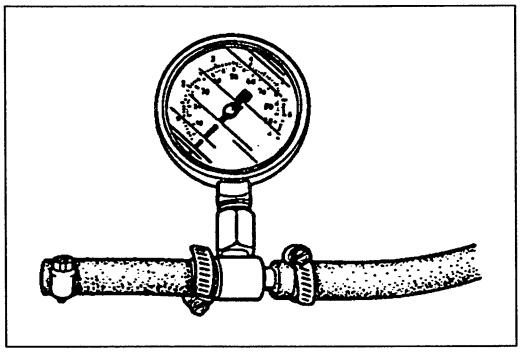
This system supplies the fuel to the fuel injectors at a constant pressure. Fuel is metered and injected into the intake manifold according to injection control signals from the ECM. The system consists of the fuel tank, fuel pump, fuel filters, pressure regulator, pressure regulator control solenoid valve, fuel injectors, and fuel pump relay.

PREPARATION

SST

49 L018 901 Injector checker		For inspection of fuel injector





Fuel Pressure and Servicing Fuel System

Warning

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

Fuel in the fuel system is under high pressure when the engine is not running.

Warning

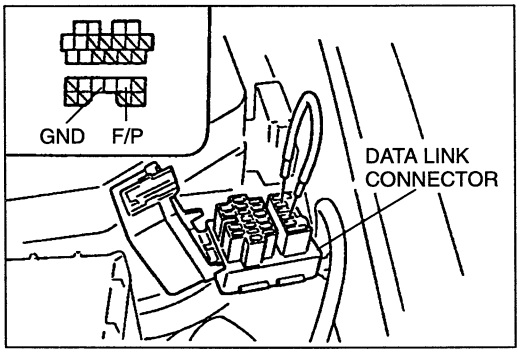
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the following "Fuel Line Safety Procedures".**

Fuel Line Safety Procedures

A. Release the fuel pressure before disconnecting a fuel line.
   1. Start the engine.
   2. Remove the fuel pump relay.
   3. After the engine stalls, turn the ignition swicth to OFF.
   4. Install the fuel pump relay.

B. Avoid leakage
   1. When disconnecting a fuel line hose, wrap a rag around it to protect against fuel leakage.
   2. Plug the hose after removal.

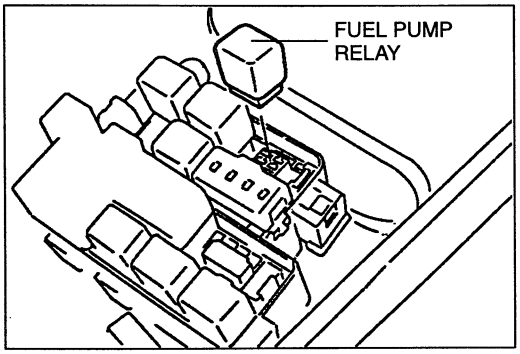
C. Use a fuel pressure gauge correctly; install hose clamps to secure the fuel pressure gauge to the fuel filter and the main hose to prevent leakage.



Priming Fuel System

After the fuel pressure has been released for repairs or inspection, the system must be primed to avoid excessive cranking when the engine is first started. Follow the steps below.

1. Connect the data link connector terminals F/P and GND with a jumper wire.
2. Turn the ignition switch to ON for **approx. 10 sec.** and check for fuel leaks.
3. Turn the ignition switch to OFF and disconnect the jumper wire.

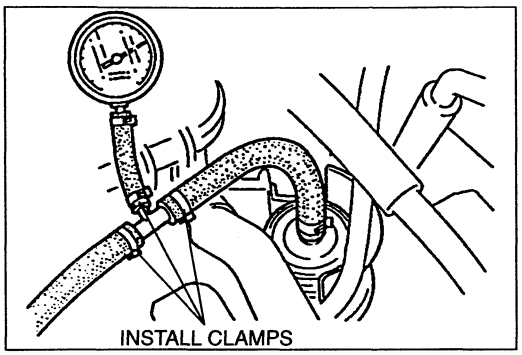


SYSTEM INSPECTION

Fuel Pressure Hold Inspection

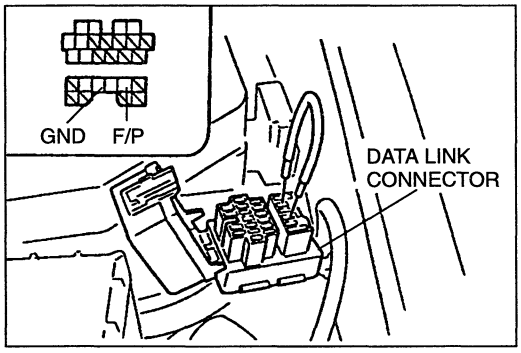
Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" above.**

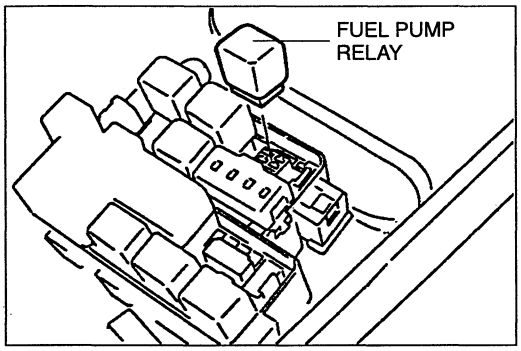


1. Disconnect the negative battery cable.
2. Install a fuel pressure gauge between the fuel filter and the main fuel hose. (Install clamps as shown.)
3. Connect the negative battery cable.
4. Connect the data link connector terminals F/P and GND with a jumper wire.
5. Turn the ignition switch to ON for **10 sec.** to operate the fuel pump.
6. Turn the ignition switch to OFF and disconnect the jumper wire.
7. Observe the fuel pressure **after 5 min.**

Fuel pressure:
More than 150 kPa {1.5 kgf/cm^2, 21 psi}

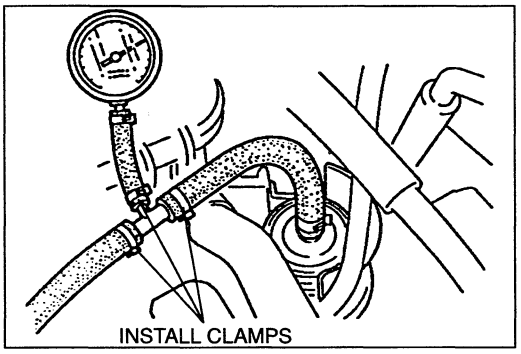


8. If not as specified, perform the following inspections.
   - Fuel pump hold pressure. (Refer to page F1–60.)
   - Pressure regulator hold pressure. (Refer to page F1–64.)
   - Injector fuel leakage. (Refer to page F1–66.)



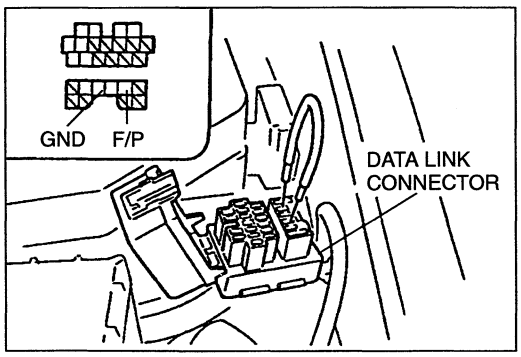
Fuel Line Pressure Inspection

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F1–56.**



1. Disconnect the negative battery cable.
2. Install a fuel pressure gauge between the fuel filter and the main fuel hose. (Install clamps as shown.)
3. Connect the negative battery cable.
4. Connect data link connector terminals F/P and GND with a jumper wire.
5. Turn the ignition switch to ON.
6. Measure the fuel line pressure.

Fuel line pressure:
260—320 kPa {2.6—3.3 kgf/cm^2, 37—46 psi}

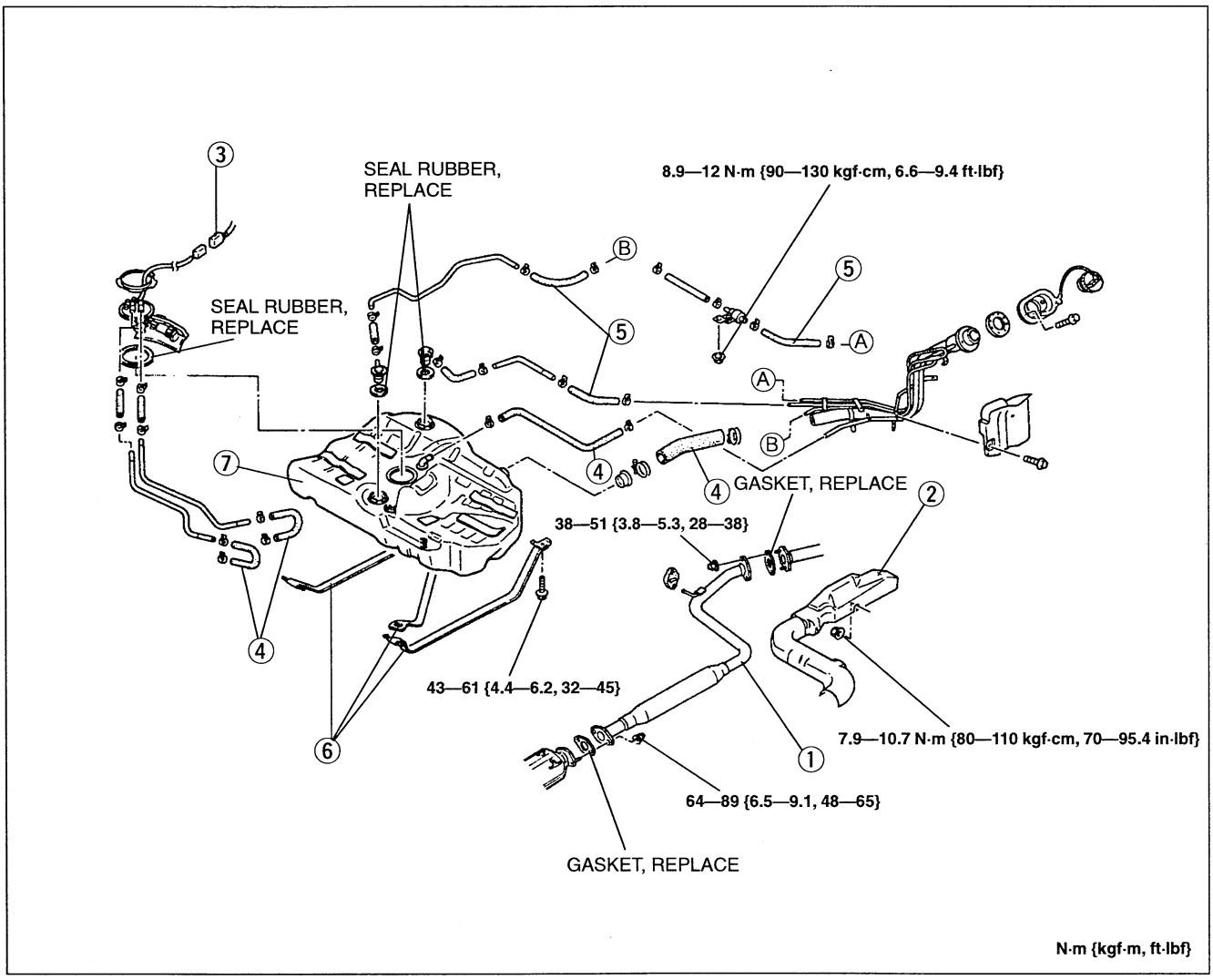


7. If not as specified, perform the following inspections.
   - Fuel pump maximum pressure. (Refer to page F1–61.)
   - Fuel line clogging and restriction.
   - Fuel filter clogging and restriction.
   - Pressure regulator hold pressure. (Refer to page F1–64.)

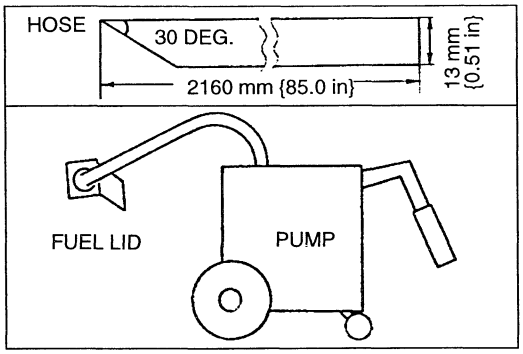
FUEL TANK
Removal / Inspection / Installation

Warning
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F1–56.**
- **Repairing a fuel tank that has not been properly steam cleaned can be dangerous. Explosion or fire may cause death or serious injury. Always properly steam clean a fuel tank before repairing it.**

1. Suck up the fuel from the fuel tank. (Refer to **Removal note** on page F1–59.)
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, referring to **Installation note**.



1. Presilencer
2. Insulator
3. Connector
4. Fuel hoses
   Installation note ..... page F1–59
5. Evaporative hoses
   Installation note ..... page F1–59
6. Fuel tank strap
7. Fuel tank
   Inspect for cracks and corrosion
   Removal note ..... page F1–59



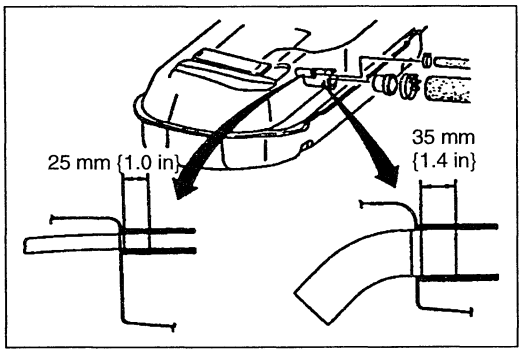
Removal note

1. Remove the filler cap and insert a hose into the fuel tank through the filler pipe.
2. Start the pump and suck up the fuel into a container.

Note

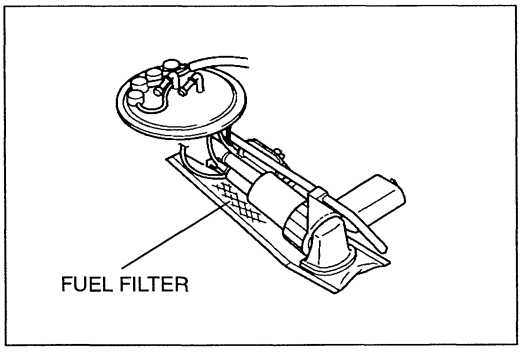
- For easier work, prepare a hose of the following size.

Outer diameter: 13 mm {0.51 in}
Length: 2160 mm {85.0 in}

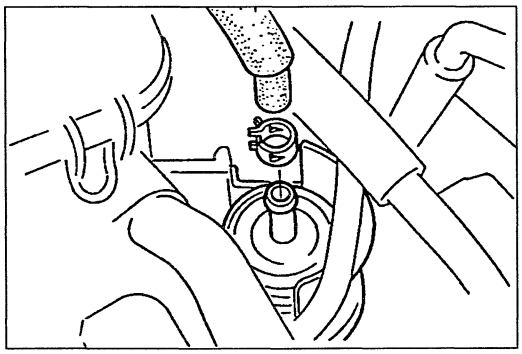


Installation note

1. Push the ends of the main fuel hose, fuel return hose, and evaporative hoses onto the fuel tank fittings **at least 25 mm {1.0 in}**.
2. Push the fuel filler hoses onto the fuel tank pipes and filler pipes **at least 35 mm {1.4 in}**.



FUEL FILTER
Replacement
Low-pressure side (in-tank filter)
(Refer to page F1–62.)



High-pressure side

The fuel filter must be replaced at the intervals outlined in the maintenance schedule.

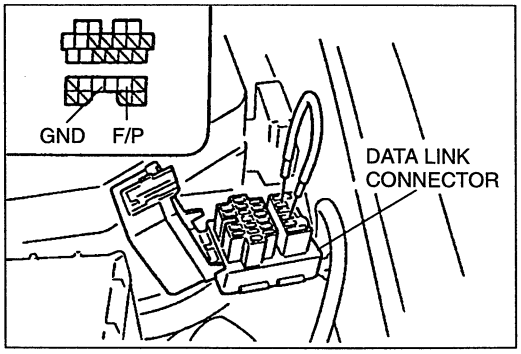
Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F1–56.**

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

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

4. Verify that the fuel hoses are pushed fully onto the fuel filter nipples.
5. Secure the fuel hoses with clips.
6. Start the engine and verify that the fuel line joints do not leak.

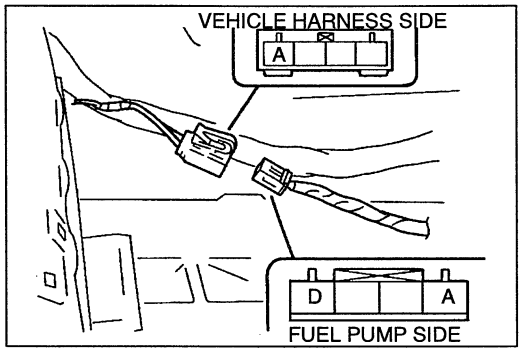


FUEL PUMP

Inspection

Fuel pump operation

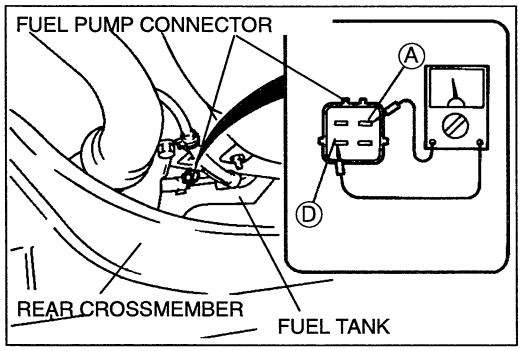
1. Connect the data link connector terminals F/P and GND with a jumper wire as shown.
2. Remove the fuel filler cap.
3. Turn the ignition switch to ON.
4. Listen at the filler inlet for the operational sound of the fuel pump.
5. Install the fuel filler cap.



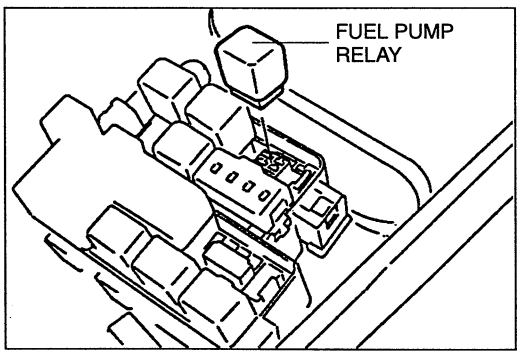
6. If no sound was heard, measure the voltage between terminal A of the vehicle harness side fuel pump connector and a ground (in the RH trunk compartment trim).

   Voltage: B+

7. If the voltage is not correct, check the fuel pump relay and related wiring harness.
8. If the voltage is correct, check for continuity between terminals A and D of the fuel pump side connector (in the RH trunk compartment trim).



9. If there is continuity, check fuel pump ground circuit for open.
10. If there is no continuity, check for continuity between terminals A and D of the fuel pump connector as shown. (Underside of body)
11. If there is continuity, check terminal A and/or D harness between fuel pump connector to vehicle harness.
12. If there is no continuity, remove the fuel tank and replace the fuel pump. (Refer to page F1–62.)

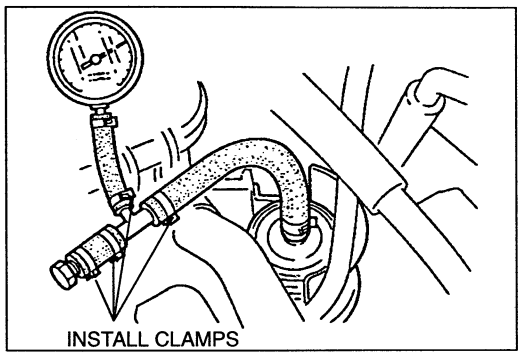


Hold pressure

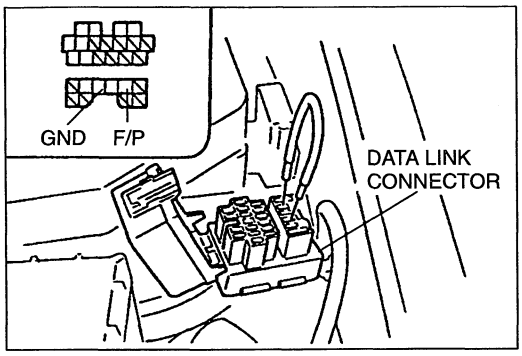
Perform this inspection if the fuel pressure hold inspection is not as specified. (Refer to page F1–56.)

Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F1–56.**



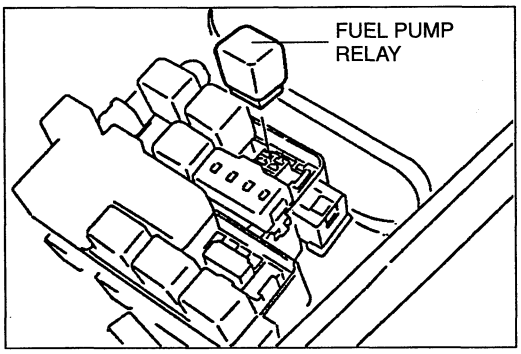
1. Disconnect the negative battery cable.
2. Connect a fuel pressure gauge to the fuel filter and plug the outlet of the gauge as shown. (Install clamps as shown.)
3. Connect the negative battery cable.



4. Connect data link connector terminals F/P and GND with a jumper wire.
5. Turn the ignition switch to ON **for 10 sec.** to operate the fuel pump.
6. Turn the ignition switch to OFF and disconnect the jumper wire.
7. Observe the fuel pressure **after 5 min.**.

Fuel pressure: More than 340 kPa {3.5 kgf/cm^2, 50 psi}

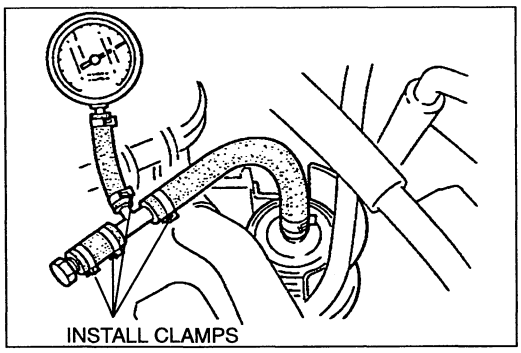
8. If not as specified, replace the fuel pump.



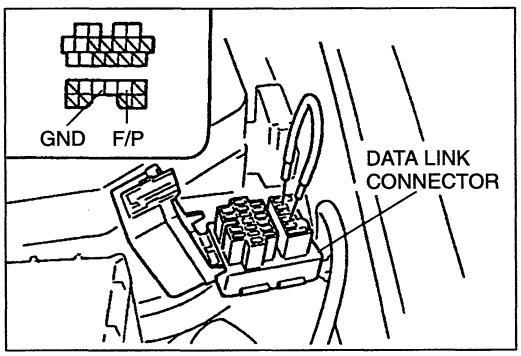
Fuel pump maximum pressure

Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F1–56.**



1. Disconnect the negative battery cable.
2. Connect a fuel pressure gauge to the fuel filter and plug the outlet of the gauge as shown. (Install clamps as shown.)
3. Connect the negative battery cable.



4. Connect data link connector terminals F/P and GND with a jumper wire.
5. Turn the ignition switch to ON to operate the fuel pump.
6. Measure the pump maximum pressure.

Fuel pump maximum pressure:
450—630 kPa {5.0—6.5 kgf/cm^2, 64—92 psi}

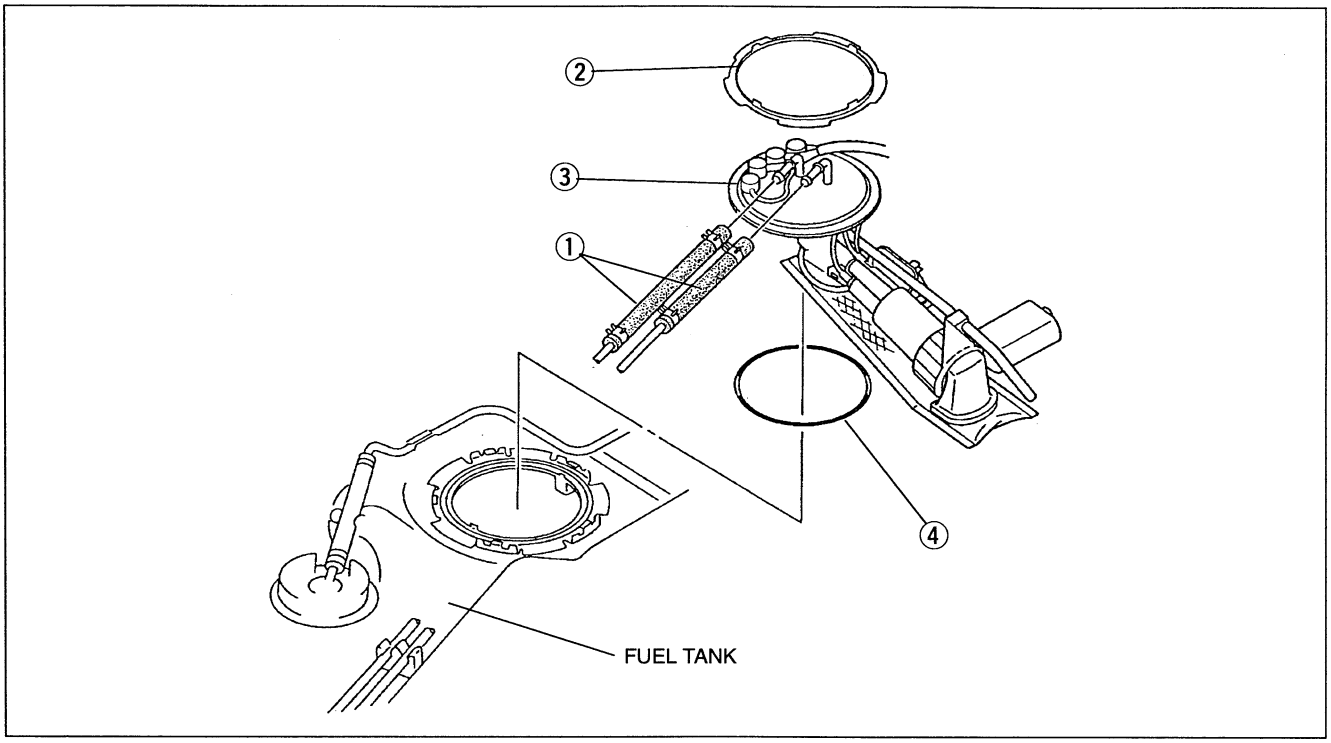
7. Turn the ignition switch to OFF and disconnect the jumper wire.
8. If not as specified, replace the fuel pump.

Removal / Installation

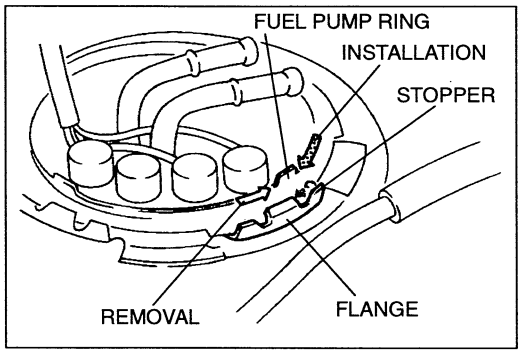
1. Remove the fuel tank.
2. Remove the fuel pump, referring to **Removal note**.
3. Install in the reverse order of removal, referring to **Installation note**.

Note

- Replace the fuel pump as an assembly.



1. Fuel hose
2. Fuel pump ring
   Removal / Installation Note ..... below
3. Fuel pump
4. Fuel pump gasket

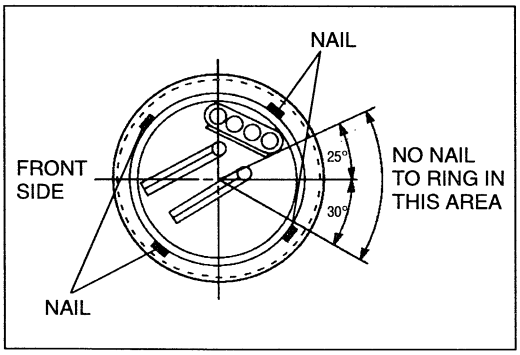


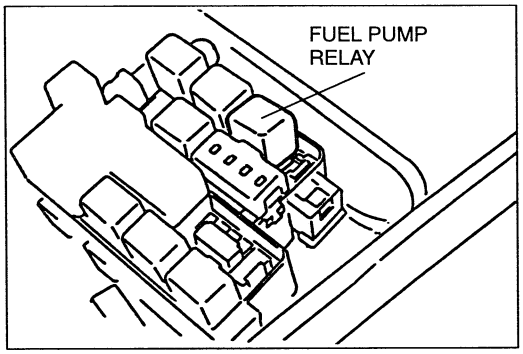
Removal note

Rotate the fuel pump ring counterclockwise and remove it.

Installation note

Rotate the fuel pump ring clockwise until the flange touches the stopper.



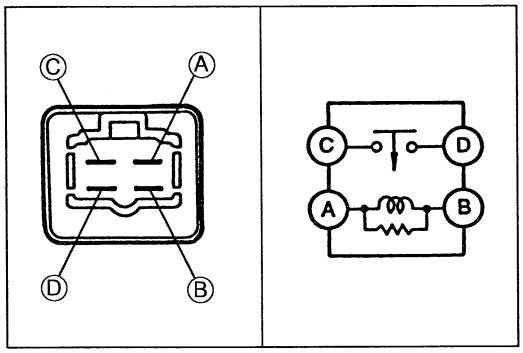


FUEL PUMP RELAY

Inspection

Operation check

Listen for clicking of the fuel pump relay while turning the ignition switch from OFF to START.

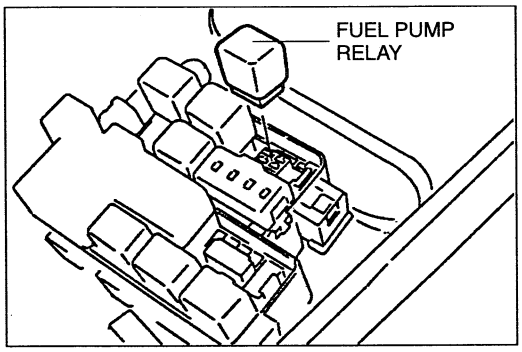


Continuity inspection

Check continuity between the terminals of the relay.

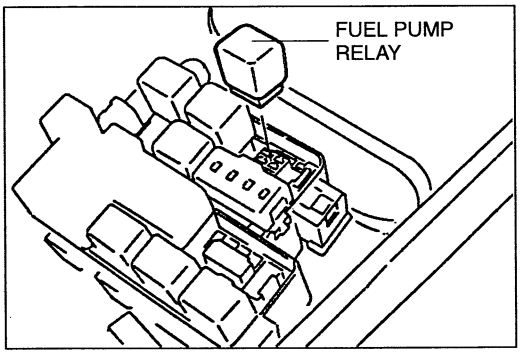
B+: Battery positive voltage

Terminal A—B	Terminal C—D
B+ applied	Continuity
B+ not applied	No continuity



Replacement

1. Remove the relay from main fuse block No.1.
2. Install in the reverse order of removal.



PRESSURE REGULATOR

Inspection

Fuel line pressure

Warning

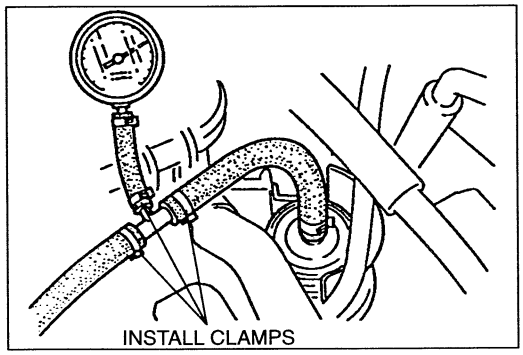
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F1–56.**

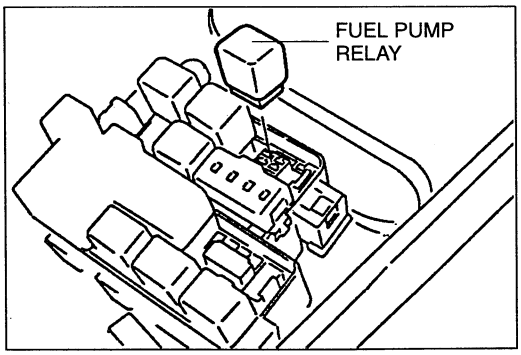
1. Disconnect the negative battery cable.
2. Connect a fuel pressure gauge between the fuel filter and the main fuel hose. (Install clamps as shown.)
3. Connect the negative battery cable.
4. Start the engine and run it at idle.
5. Measure the fuel line pressure.

Fuel line pressure:
210—260 kPa {2.1—2.7 kgf/cm^2, 30—38 psi}

6. Disconnect the vacuum hose from the pressure regulator and measure the fuel line pressure.

Fuel line pressure:
260—320 kPa {2.6—3.3 kgf/cm^2, 37—46 psi}



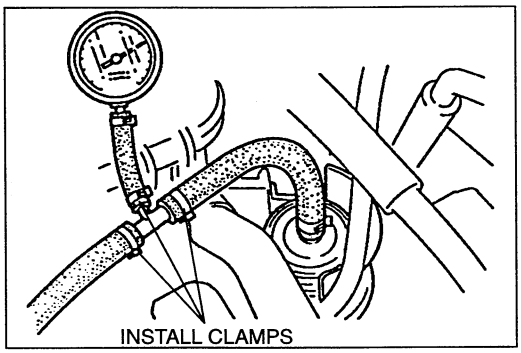


Hold pressure

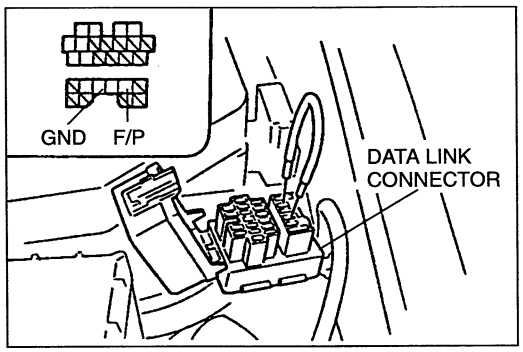
Perform this inspection if the fuel pressure hold inspection is not as specified. (Refer to page F1–56.)

Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F1–56.**



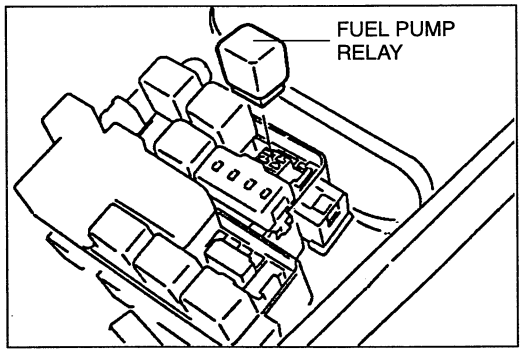
1. Disconnect the negative battery terminal.
2. Connect a fuel pressure gauge between the fuel filter and the main fuel hose. (Install clamps as shown.)
3. Connect the negative battery terminal.



4. Connect the data link connector terminals F/P and GND with a jumper wire.
5. Turn the ignition switch to ON **for 10 sec.** to operate the fuel pump.
6. Turn the ignition switch to OFF and disconnect the jumper wire.
7. Pinch the fuel return hose with a plier.
8. Observe the fuel pressure **for 5 min.**.

Fuel pressure: More than 147 kPa {1.5 kgf/cm^2, 21 psi}

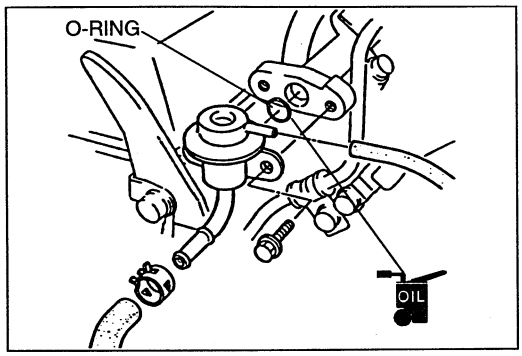
9. If not as specified, replace the pressure regulator.



Replacement

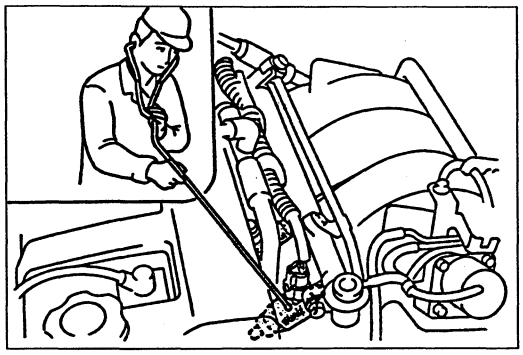
Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F1–56.**



1. Disconnect the vacuum hose.
2. Disconnect the fuel return hose.
3. Remove the pressure regulator.
4. Install a new O-ring.
5. Install in the reverse order of removal.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



FUEL INJECTOR

Inspection

Operation check

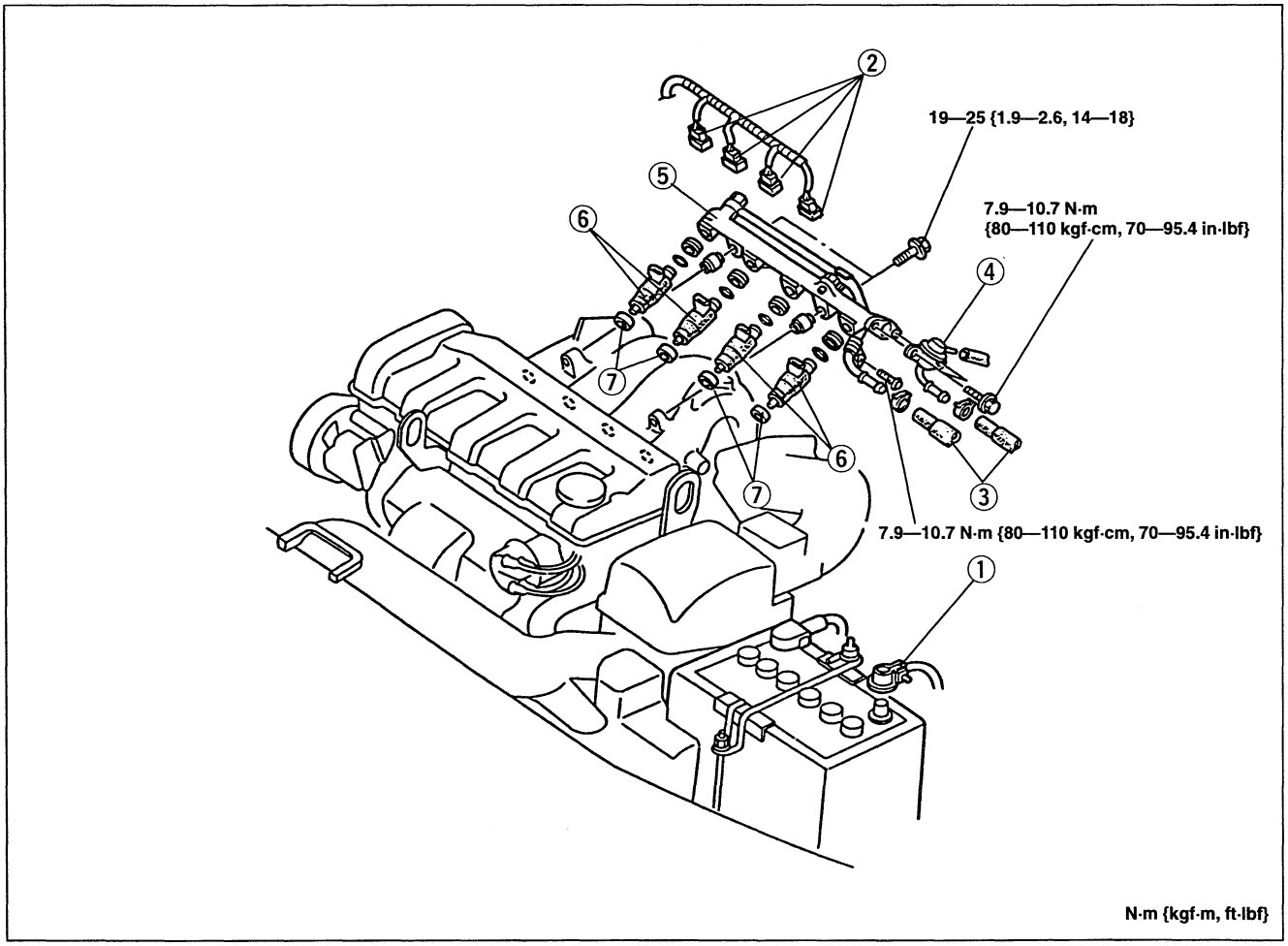
1. Warm up the engine and let it idle.
2. Listen for the operational sound of each fuel injector with a screwdriver or a sound scope.
3. If no sound is heard, measure the fuel injector resistance. (Refer to page F1–67.)
4. If the fuel injector resistance is OK, check wiring to the fuel injector and the voltages of the ECM terminals 4U, 4V, 4W and 4X. (Refer to page F1–98.)

Removal / Installation

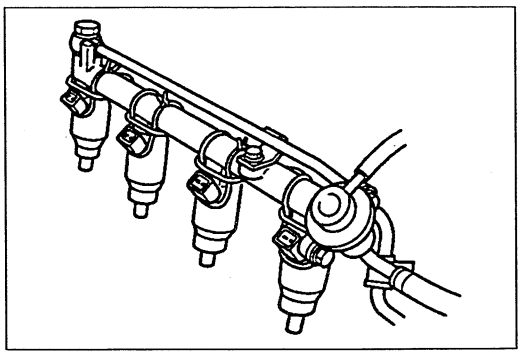
Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F1–56.**

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal, referring to **Installation note**.



1. Negative battery cable
2. Fuel injector connector
3. Fuel hose
4. Pressure regulator
   Inspection ..... page F1–63
5. Fuel distributor
6. Fuel injector
   Installation note ..... page F1–67
7. Insulator

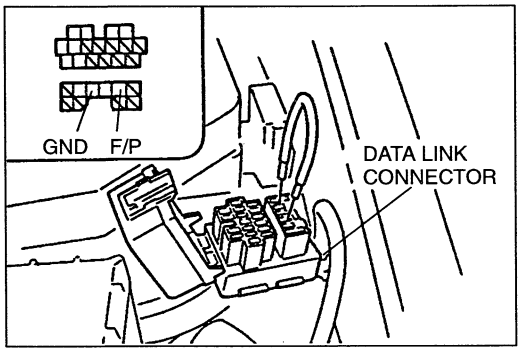


Fuel leakage test

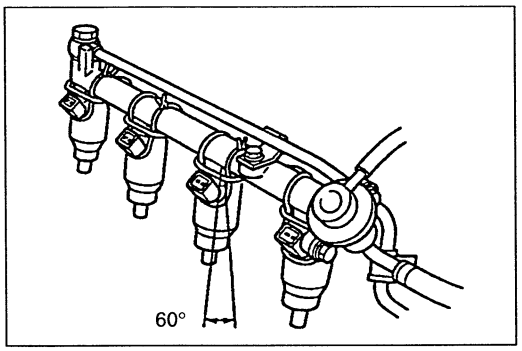
1. Remove the fuel injectors together with the fuel distributor. (Refer to page F1–65.)
2. Fasten the fuel injectors firmly to the pipe with wire.

Warning

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**



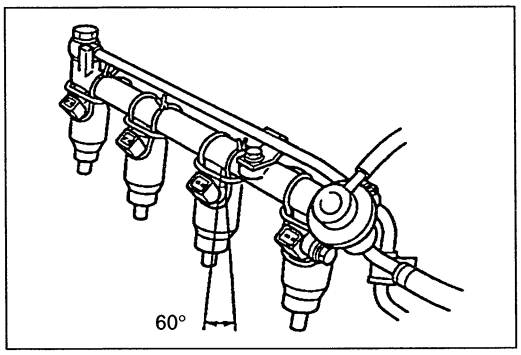
3. Connect the data link connector terminals F/P and GND with a jumper wire.
4. Turn the ignition switch to ON.



5. Tilt the fuel injectors **approx. 60 degrees** and verify that there is no fuel leaks from the fuel injector nozzles.

Leakage specification
If there is more than one drop per 2 minutes, replace the fuel injector.

6. Turn the ignition switch to OFF and disconnect the jumper wire.

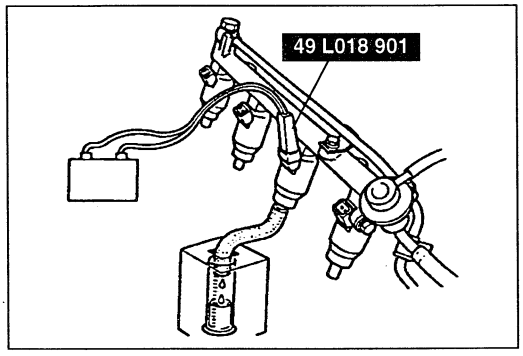


Volume test

1. Remove the fuel injectors together with the fuel distributor. (Refer to page F1–65.)
2. Fasten the fuel injectors firmly to the pipe with wire.

Warning

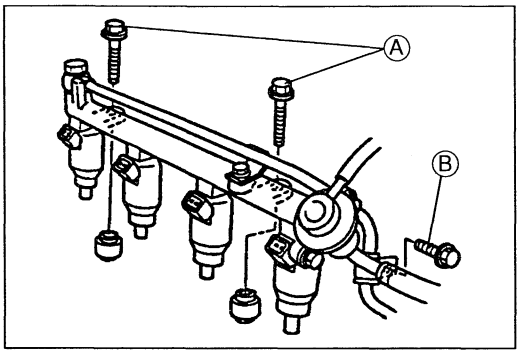
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**



3. Connect the **SST** to the battery and an fuel injector.
4. Check the injection volume with a graduated container.

Injection volumes:
47—68 ml {47—68 cc, 1.4—2.0 fl oz}/15 sec.

5. If not as specified, replace the fuel injectors.

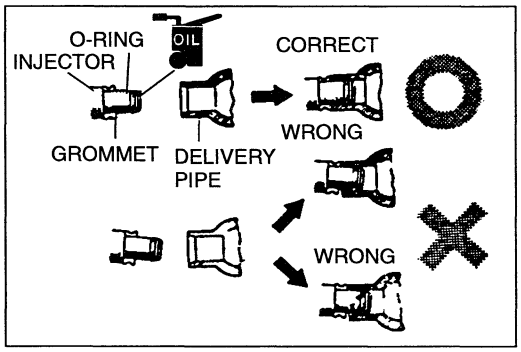


Installation

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

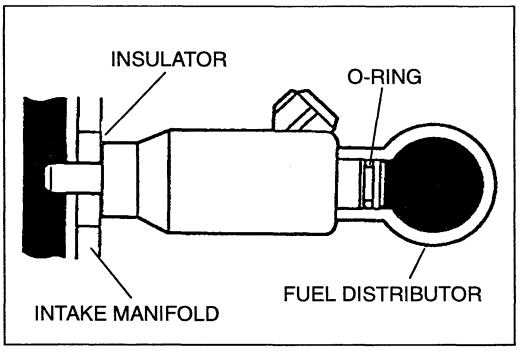
Tightening torque

A: 19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}
B: 7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

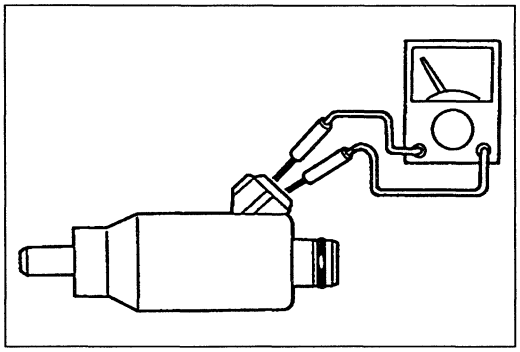


Installation note

1. Use new fuel injector O-rings.
2. Apply a small amount of clean engine oil to the O-rings before installing them.



3. Install new fuel injector insulators.
4. Install the fuel injectors.



Inspection

Fuel injector resistance

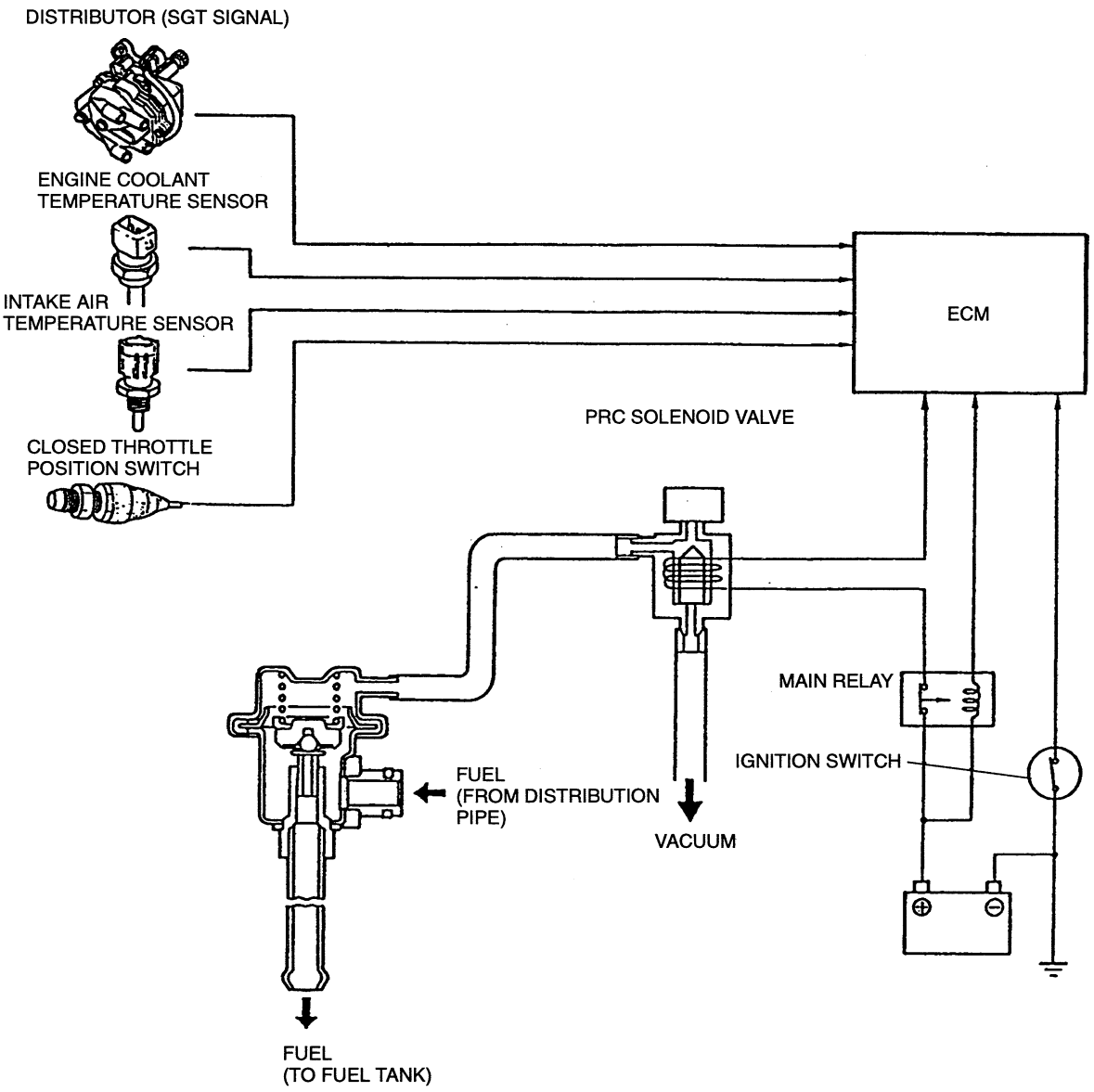
1. Disconnect the fuel injector harness.
2. Measure the resistance of the fuel injector.

Resistance: 12—16Ω (at 20°C {68°F})

3. If not as specified, replace the fuel injector.

PRESSURE REGULATOR CONTROL SYSTEM

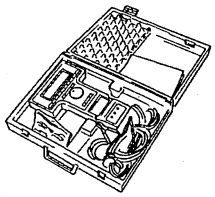
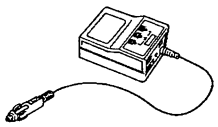
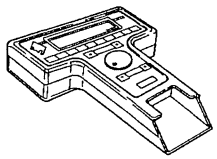
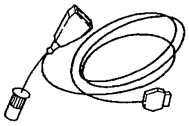
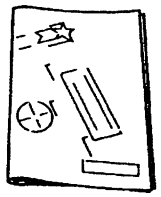
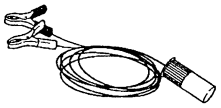
DESCRIPTION

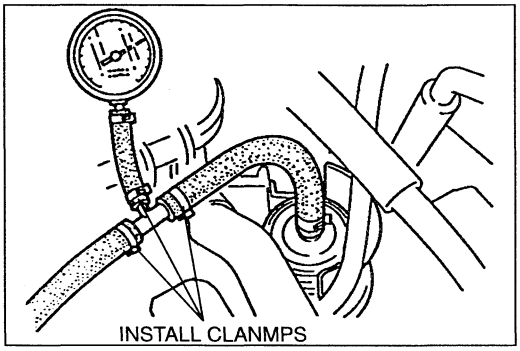


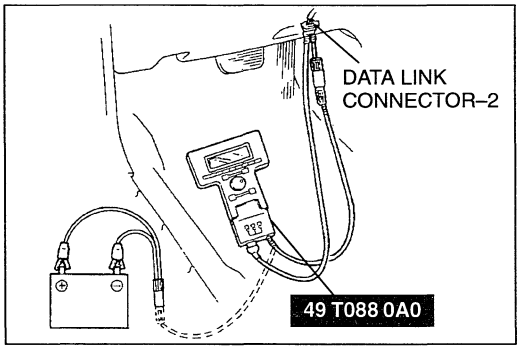
Operating condition			Operating time
Coolant temperature	Intake air temperature	Engine condition	
Above 70°C {158°F}	Above 20°C {68°F}	Closed throttle position switch ON and engine speed below 1,500 rpm	Approx. 102 sec.

To prevent vapor lock of the fuel during hot restart idle, vacuum to the pressure regulator is momentarily cut and the fuel injection pressure is increased to slightly more than **284 kPa {2.9 kgf/cm^2, 41.2 psi}**.

PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of PRC system	49 T088 010B Program Card 	For inspection of PRC system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of PRC system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of PRC system
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of PRC system	49 T088 008A Instruction Manual 	For inspection of PRC system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of PRC system	—	—





SYSTEM INSPECTION

Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F1–56.**

1. Install the fuel pressure gauge.
2. Measure the fuel pressure under the following conditions.

Specifications

	Fuel pressure (kPa { kgf/cm^2 })		
Idling	210—250 { 2.1—2.6 }	210—250 { 2.1—2.6 }	260—310 { 2.6—3.2 }
During 102 sec. of hot start	260—310 { 2.6—3.2 }		
After 102 sec. of hot start	210—250 { 2.1—2.6 }		
Judgement	Normal	Not normal (Perform Inspection 1)	Not normal (Perform Inspection 2)

3. If the fuel pressure is not within the specification, carry out either Inspection 1 or Inspection 2 as required.

Inspection 1

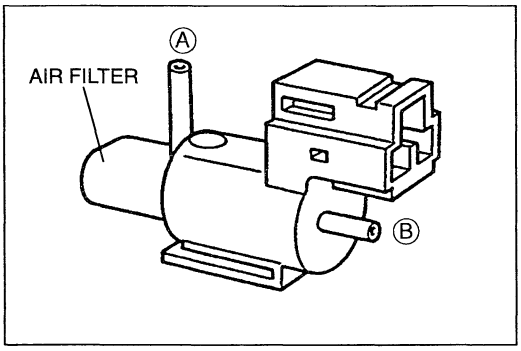
1. Stop the engine.
2. Connect the **SST** to the data link connector–2.
3. Verify that diagnostic trouble code No. P1250 is not displayed. If code No. P1250 is shown, carry out troubleshooting of the code No. P1250. (Refer to page F1–41.)
4. Start the engine and run it at idle.
5. Turn the PRC solenoid valve from OFF to ON by using the "SIMULATION TEST" function and check if the fuel pressure changes.
   (1) If the pressure changes, check the following.
   - ECM terminal voltage (Refer to page F1–95.)
   - Intake air temperature signal
   - Closed throttle position switch

   (2) If the pressure does not change, do as follows.
   I. Stop the engine.
   II. Turn the ignition switch to ON.
   III. Turn the PRC solenoid valve from OFF to ON by using the "SIMULATION TEST" function and check if the operation sound of the valve is heard.
   a. If the operation sound is heard, check the following.
   - Pressure regulator (Refer to page F1–63.)

   b. If the operation sound is not heard, check the following.
   - PRC solenoid valve (Refer to page F1–71.)

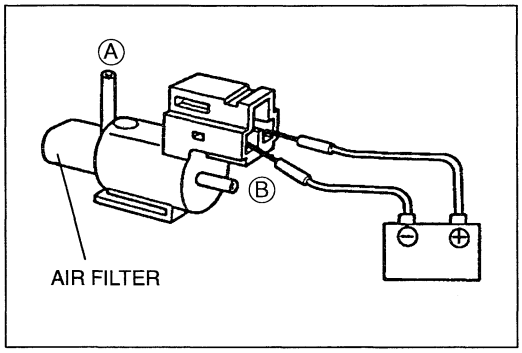
Inspection 2

1. Stop the engine.
2. Connect the **SST** to the data link connector–2.
3. Verify that diagnostic trouble code No. P1250 is not displayed. If code No. P1250 is shown, carry out troubleshooting of the code No. P1250. (Refer to page F1–41.)
4. By using the "PID/DATA MONITOR AND RECORD" function, verify that the PRC solenoid valve is OFF.
5. If the PRC solenoid valve is ON, check the following.
   - ECM terminal voltage (Refer to page F1–95.)
   - Engine coolant temperature signal
   - Intake air temperature signal
6. Turn the PRC solenoid valve from OFF to ON by using the "SIMULATION TEST" function and check if the operation sound of the valve is heard.
   (1) If the operation sound of the valve is heard.
   - Loose or damaged vacuum hose between the pressure regulator, PRC solenoid valve, and intake manifold.
   (2) If the operation sound is not heard, check the following.
   - PRC solenoid valve (Refer to page F1–71.)



Solenoid Valve

1. Remove the solenoid valve.
2. Blow through the solenoid valve from port Ⓐ.
3. Verify that air flows from port Ⓑ.



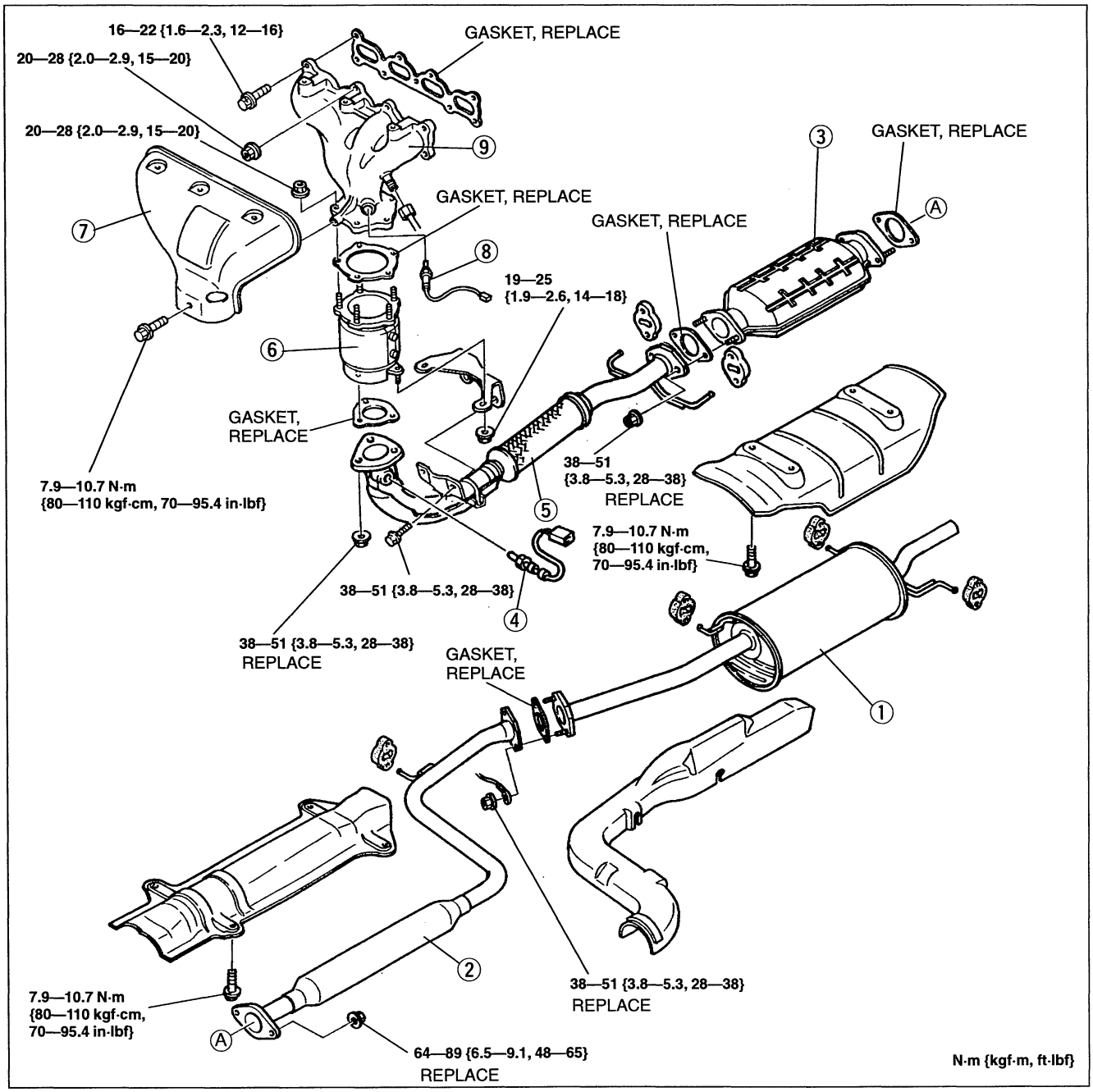
4. Apply battery positive voltage to solenoid valve terminal.
5. Blow through the solenoid valve from port Ⓐ.
6. Verify that air flows from the valve air filter.
7. If not as specified, replace the solenoid valve.

EXHAUST SYSTEM

COMPONENT PARTS

Removal / Inspection / Installation

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



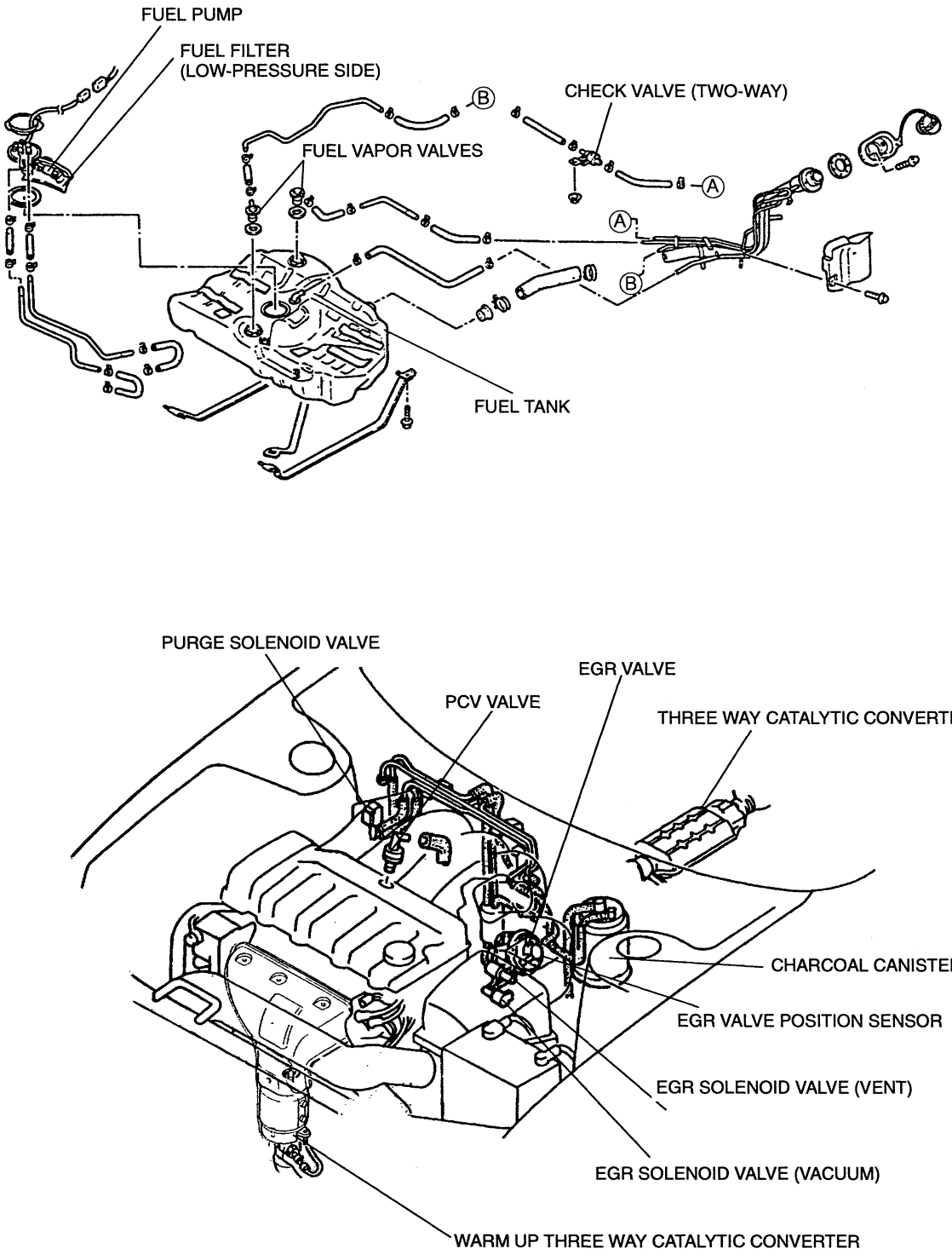
1. Main silencer
   Inspect for deterioration and restriction
2. Presilencer
   Inspect for deterioration and restriction
3. Three way catalytic converter
   Inspect for deterioration and restriction
4. Heated oxygen sensor (rear)
   Inspection ..... page F1–106
5. Front pipe assembly
   Inspect for deterioration and restriction
6. Warm up three way catalytic converter
   Inspect for deterioration and restriction
7. Exhaust manifold insulator
8. Heated oxygen sensor (front)
   Inspection ..... page F1–105
9. Exhaust manifold
   Inspect for deterioration and cracks

OUTLINE OF EMISSION CONTROL SYSTEM

STRUCTURAL VIEW

The following systems are employed to reduce CO, HC, and NOx emissions.

1. Exhaust gas recirculation
2. Positive crankcase ventilation (PCV) system
3. Fuel evaporative system
4. Three way catalytic converter

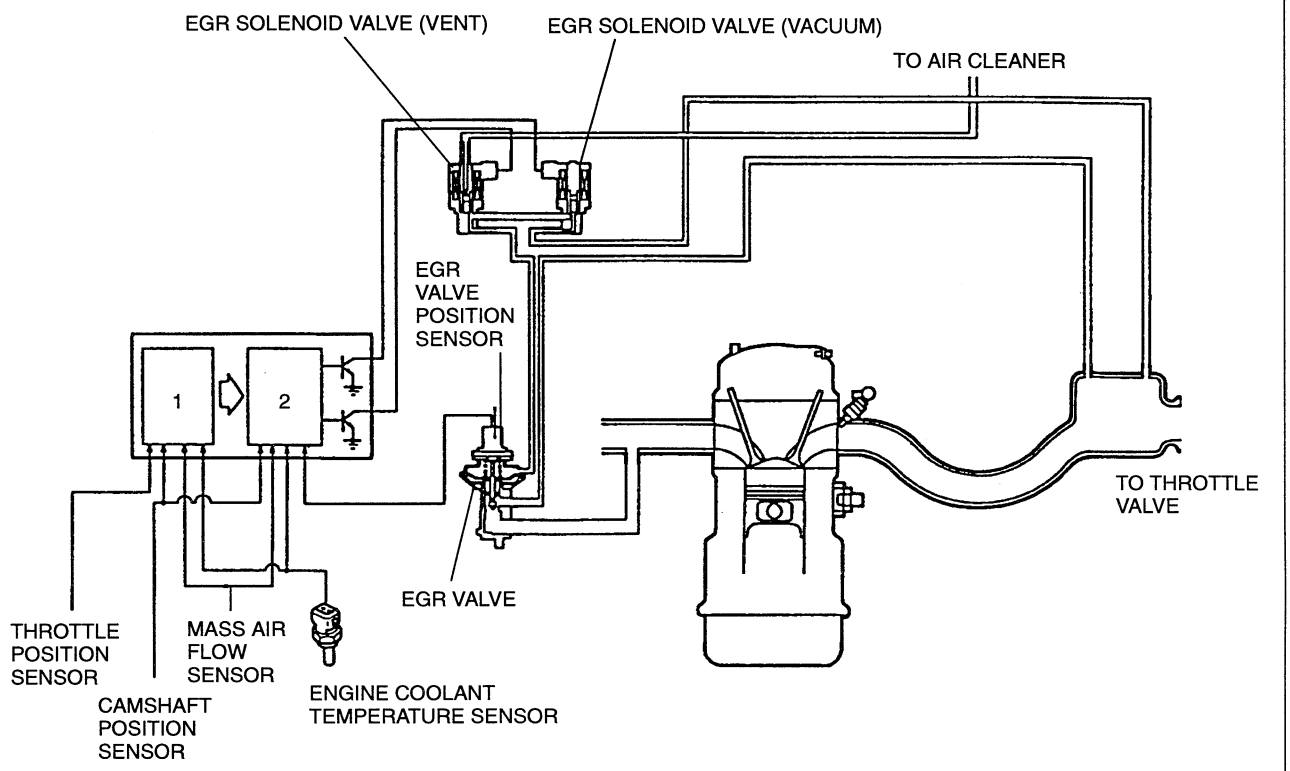


EXHAUST GAS RECIRCULATION

DESCRIPTION

This system recirculates a small amount of exhaust gas into the intake manifold to reduce the combustion temperature and the NOx emissions.

This system consists of the EGR valve, EGR valve position sensor, two duty-solenoid valves, ECM, and input devices.



1: DETECTION OF ENGINE RUNNING CONDITION
2: DETERMINATION OF EGR GAS AMOUNT

OPERATION

Cold engine (coolant temperature: below 55°C {131°F})

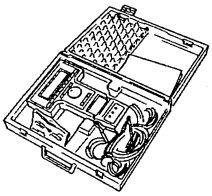
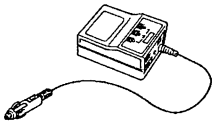
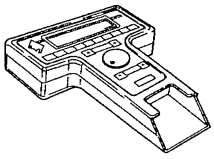
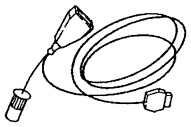
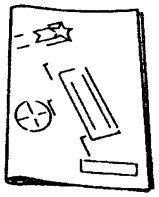
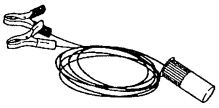
EGR operation is stopped to improve drivability when the engine is cold.

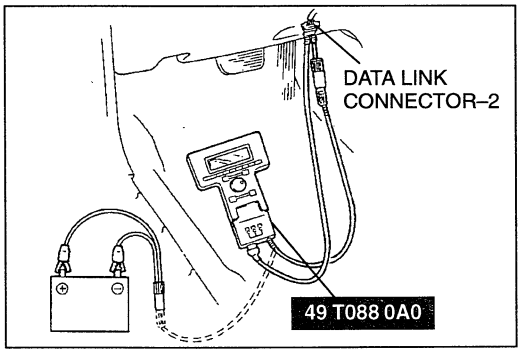
Warm engine

The ECM controls the EGR solenoid valves (vacuum and vent) to supply EGR gases as described below.

Operating condition	EGR operation	Remark
Idle	Stopped	Closed throttle position switch: ON
Deceleration		
High speed/Low speed		Above 4,250/Below 1,000 rpm
Heavy load		—
Acceleration	Reduced EGR gas amount	—
Warming up		Coolant temperature: Between 55°C {131°F} and 60°C {140°F}
Other	Controls supplied EGR gas amount by using signal from EGR valve position sensor	—

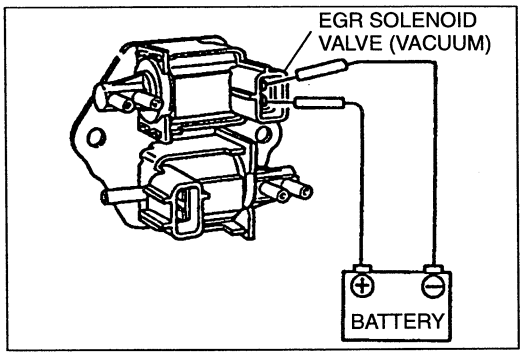
PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of EGR system	49 T088 010B Program Card 	For inspection of EGR system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of EGR system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of EGR system
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of EGR system	49 T088 008A Instruction Manual 	For inspection of EGR system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of EGR system	—	—



SYSTEM INSPECTION

1. Connect the **SST** to the data link connector–2.
2. Start the engine and let it at idle.
3. Increase the duty value of the EGR solenoid valve (vacuum) from 0% to 100% by using the "SIMULATION TEST" function. Operate the EGR solenoid valve (vacuum) and check if the engine speed becomes unstable or the engine stalls.
4. If the engine speed will not change, stop the engine and do as follows.
   (1) Turn the ignition switch to ON.
   (2) Verify that diagnostic trouble code No. P1485, P1486 are not displayed. If code No. P1485, P1486 are shown, carry out troubleshooting of the code No. P1485, P1486. (Refer to page F1–44, 45.)
   (3) Increase the duty value of the EGR solenoid valve (vacuum) from 0% to 100% by using the "SIMULATION TEST" function. Operate the EGR solenoid valve (vacuum) and check if operation sound of the valve is heard.
      I. If the operation sound is heard, check the following.
         • Loose or damaged vacuum hose
         • EGR valve (Refer to page F1–77.)
         • EGR solenoid valve (vent) (Refer to page F1–76.)
      II. If the operation sound is not heard, check the following.
         • EGR solenoid valve (vacuum) (Refer to page F1–76.)



EGR SOLENOID VALVE (VACUUM)

Inspection

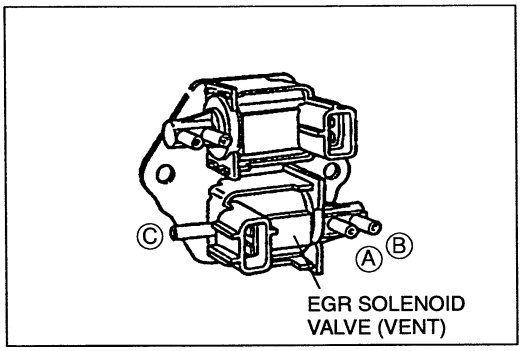
1. Remove the EGR solenoid valve (vacuum).
2. Apply battery positive voltage to terminal A and ground terminal B of the EGR solenoid valve (vacuum). Verify that air flows as shown below.

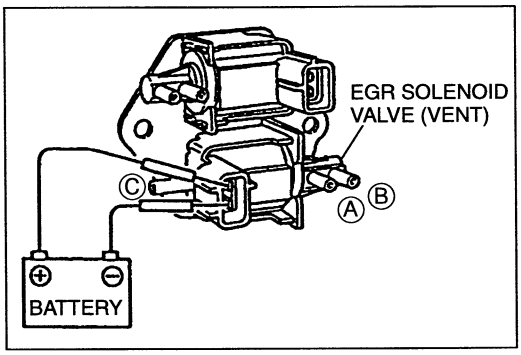
Specification

B+: Battery positive voltage

Termianl A—B	Air flow
B+ applied	Yes
B+ not applied	No

3. If not as specified, replace the EGR solenoid valve (vacuum).





EGR SOLENOID VALVE (VENT)

Inspection

1. Remove the EGR solenoid valve (vent).
2. Verify that air flows as shown below.

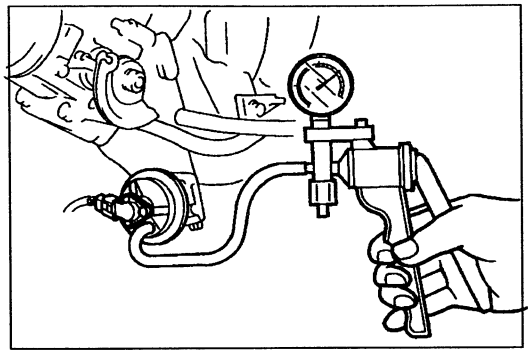
Specification

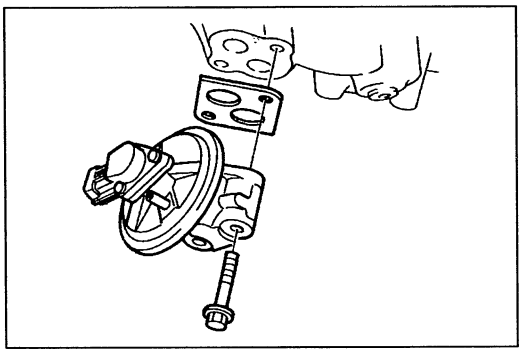
Port	Air flow
A—B	Yes
A—C	Yes
B—C	Yes

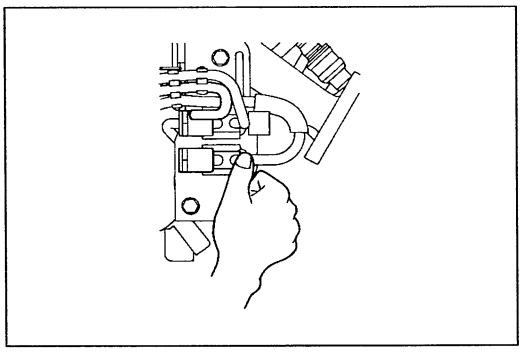
3. If not as specified, replace the EGR solenoid valve (vent).
4. Apply battery positive voltage to terminal A and ground terminal B of the EGR solenoid valve (vent). Verify that air flows as shown below.

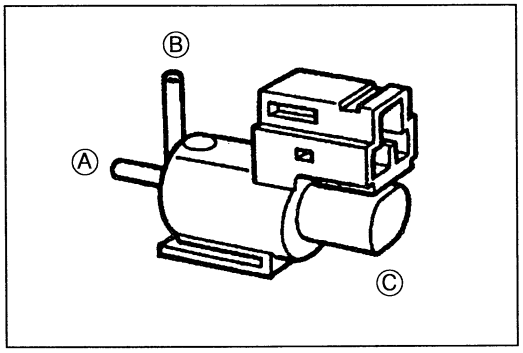
Specification

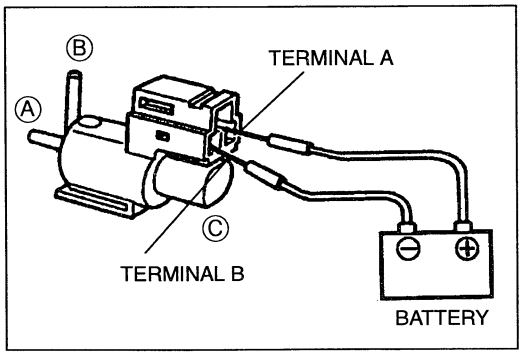
Port	Air flow
A—B	Yes
A—C	No
B—C	No











EGR VALVE

Inspection

1. Start the engine and let it idle.
2. Connect a vacuum pump as shown and apply vacuum.
3. Verify that the engine runs roughly or stalls at more than the specified vacuum.

   Specification:
   5.4—7.7 kPa {40—60 mmHg, 1.6—2.3 inHg}

4. If not as specified, replace the EGR valve.

Replacement

Plug the water hoses after disconnecting them.

1. Remove the EGR valve in the sequence shown below.
   (1) Vacuum hose
   (2) EGR valve position sensor connector
   (3) EGR valve and gasket
2. Install a new gasket, and then install the EGR in the reverse order of removal.

EGR BOOST SENSOR SWITCHING CONTROL SYSTEM

SYSTEM INSPECTION

1. Warm up the engine to normal operating temperature and let it at idle.
2. Disconnect the vacuum hose from the EGR boost sensor side of the EGR boost sensor solenoid valve.
3. Put a finger on the port of the EGR boost sensor solenoid valve and verify that no vacuum is felt.

EGR BOOST SENSOR SOLENOID VALVE

Inspection

1. Remove the EGR boost sensor solenoid valve.
2. Blow air into each part and verify that air flows as specified below.

Ports	Air flow
A—B	No
A—C	No
B—C	Yes

3. If not as specified, replace the EGR boost sensor solenoid valve.
4. Apply battery positive voltage between the terminals of the EGR boost sensor solenoid valve.
5. Blow air into each port and verify that air flows as specified below.

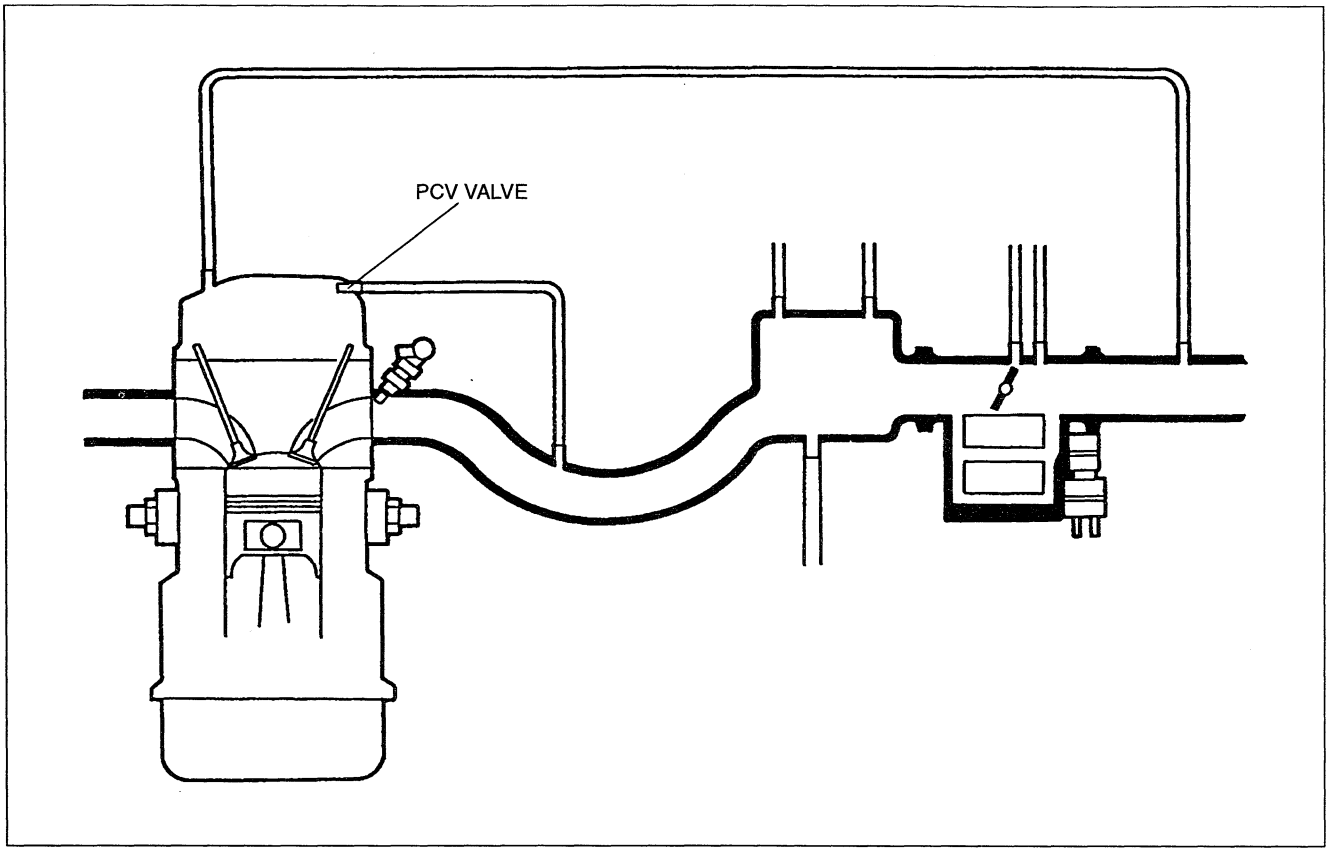
Ports	Air flow
A—B	Yes
A—C	No
B—C	No

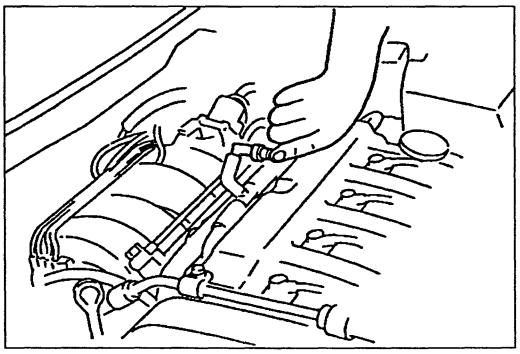
6. If not as specified, replace the EGR boost sensor solenoid valve.

POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

DESCRIPTION

The PCV valve is operated by the intake manifold vacuum.When the engine is running at idle, the PCV valve is slightly open and a small amount of blowby gas is drawn into the intake manifold to be burned.As the engine speed rises, the PCV valve is opened further, allowing a larger amount of blowby gas to be drawn into the intake manifold.

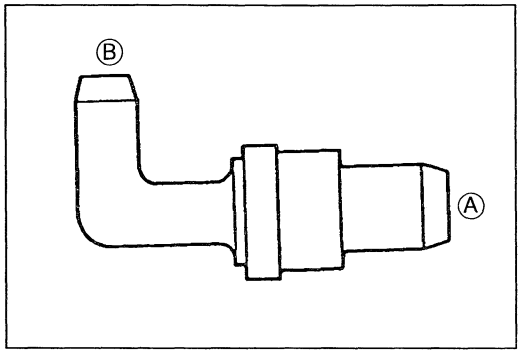




PCV VALVE

Inspection

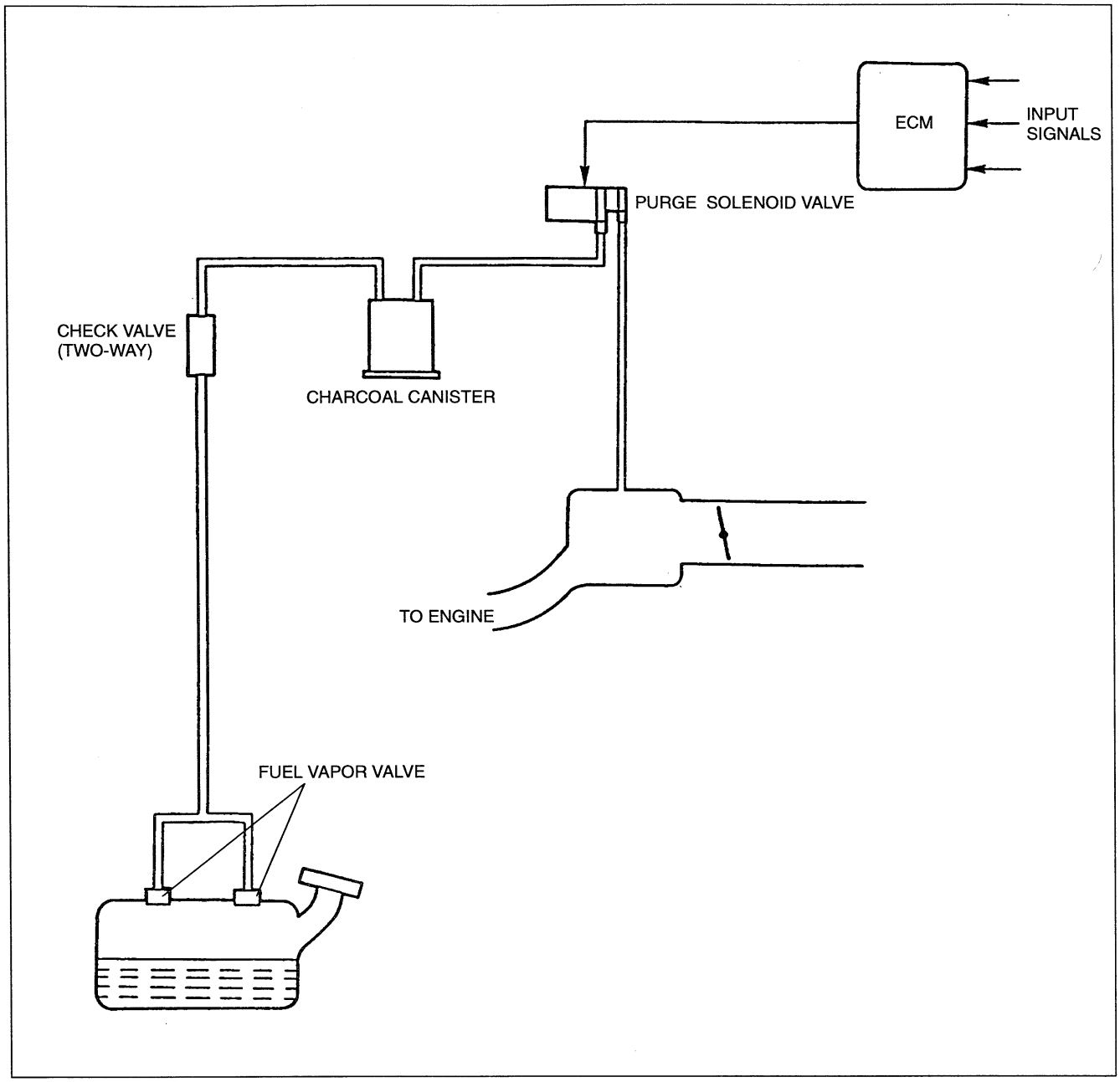
1. Verify that the engine coolant temperature is below 20°C {68°F}.
2. Start the engine and let it idle.
3. Disconnect the PCV valve with the ventilation hose from the cylinder head cover.
4. Block the PCV valve opening.
5. Verify that vacuum is felt.



6. Remove the PCV valve.
7. Blow through the valve from port Ⓐ and verify that air comes out of port Ⓑ.
8. Blow through the valve from port Ⓑ and verify that no air comes out of port Ⓐ.
9. Replace the PCV valve if not as specified.

FUEL EVAPORATIVE SYSTEM

DESCRIPTION



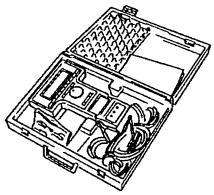
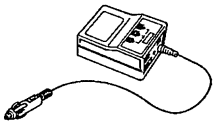
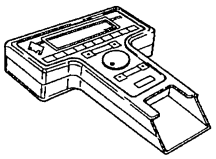
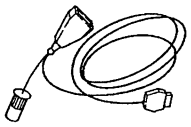
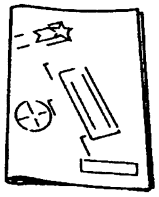
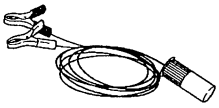
The fuel evaporative system consists of the fuel vapor valve, two-way check valve, charcoal canister, purge solenoid valve, ECM, and input devices. The amount of evaporative fumes introduced into the engine and burned is controlled by the solenoid valve to correspond to the engine's operating conditions. To obtain the best engine performance, the purge solenoid valve is controlled by the ECM.

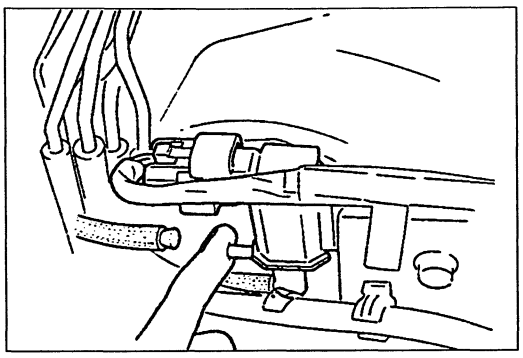
Operation

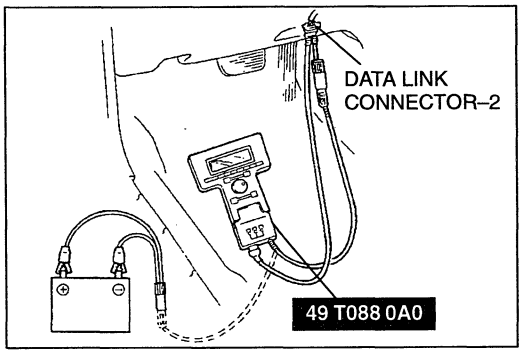
The purge solenoid valve is controlled by duty signals from the ECM to perform purging of the charcoal canister. Purging is done when these conditions are met:

1. After warm-up (Coolant temperature above 80°C {176°F})
2. Driving in gear
3. Engine speed more than 1,000 rpm
4. Accelerator pedal depressed (closed throttle position switch OFF)
5. Heated oxygen sensor functioning normally

PREPARATION
SST

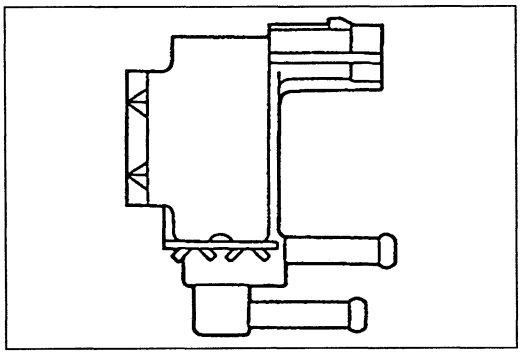
49 T088 0A0 NGS set 	For inspection of fuel evaporative system	49 T088 010B Program Card 	For inspection of fuel evaporative system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of fuel evaporative system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of fuel evaporative system
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of fuel evaporative system	49 T088 008A Instruction Manual 	For inspection of fuel evaporative system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of fuel evaporative system	—	—





SYSTEM INSPECTION

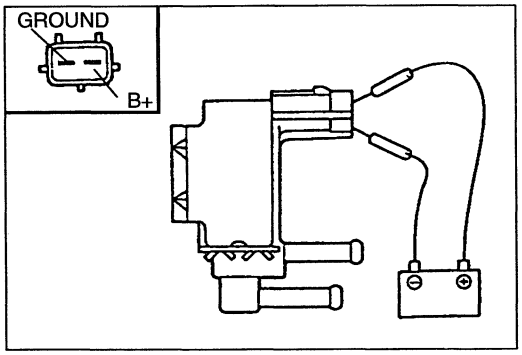
1. Start and warm up the engine to the normal operating temperature.
2. Let the engine idle.
3. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
4. Put a finger to the purge solenoid valve and verify that there is no vacuum applied.
5. If there is vacuum, do as follows.
   (1) Connect the **SST** to the data link connector–2.
   (2) Vefity that diagnostic trouble code No. P0443 is not displayed. If code No. P0443 is shown, carry out troubleshooting of the code No. P0443.
   (Refer to page F1–35.)
6. Reconnect the vacuum hose.
7. Connect the **SST** to the data link connector–2.
8. Increase the duty value of the purge solenoid valve from 0% to 100% by using the "SIMULATION TEST" function. Operate the purge solenoid valve and check if the idle condition changes.
9. If the condition does not change, do as follows.
   (1) Turn the ignition switch to ON.
   (2) Verify that diagnostic trouble code No. P0443 is not displayed. If code No. P0443 is shown, carry out troubleshooting of the code No. P0443.
   (Refer to page F1–35.)
   (3) Increase duty value of the purge solenoid valve from 0% to 100% by using the "SIMULATION TEST" function. Operate the purge solenoid valve and check if the operation sound of the valve is heard.
      I. If the operation sound is heard, check the following.
         • Loose or damaged vacuum hose
      II. If the operation sound is not heard, check the following.
         • Purge solenoid valve (Refer to page F1–81.)



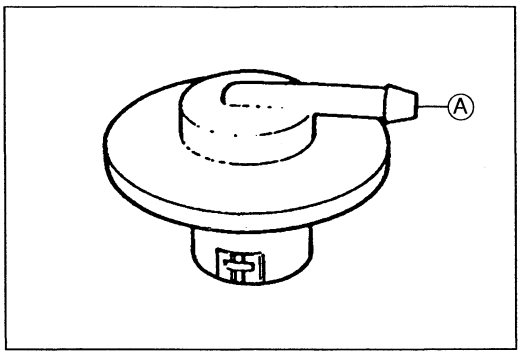
PURGE SOLENOID VALVE

Inspection

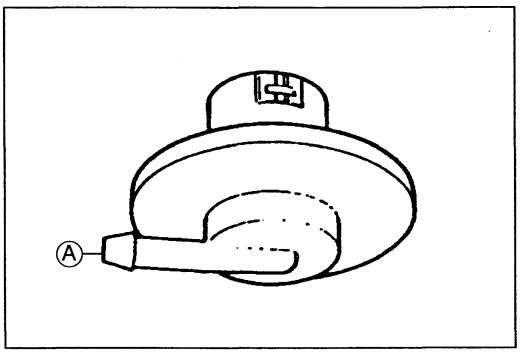
1. Disconnect the vacuum hoses from the solenoid valve.
2. Verify that no air flows through the valve.



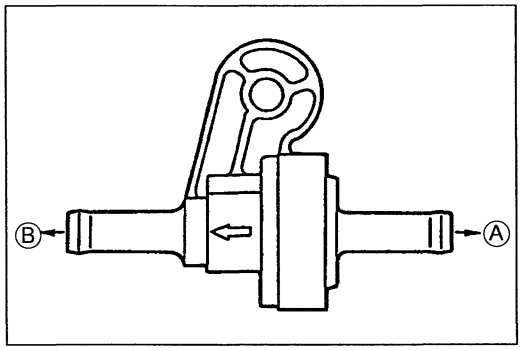
3. Disconnect the solenoid valve connector and supply battery positive voltage as shown in the figure.
4. Verify that air flows through the valve.
5. If not as specified, replace the solenoid valve.



FUEL VAPOR VALVE
Inspection
1. Hold the valve as shown and verify that air flows through the valve from port Ⓐ.

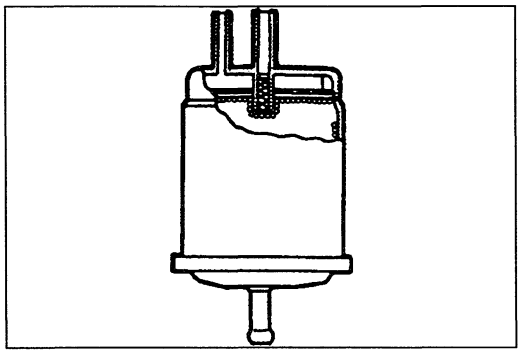


2. Invert the valve as shown and verify that no air flows through the valve from port Ⓐ.
3. Replace the fuel vapor valve if necessary.



CHECK VALVE (TWO-WAY)
Inspection
1. Remove the valve.
2. Check the operation of the valve by using a vacuum pump.

Apply approx. 3.5 kPa {26 mmHg,1.0 inHg} vacuum at port A	Valve opens
Apply approx. 5.9 kPa {44 mmHg,1.7 inHg} vacuum at port B	Valve opens



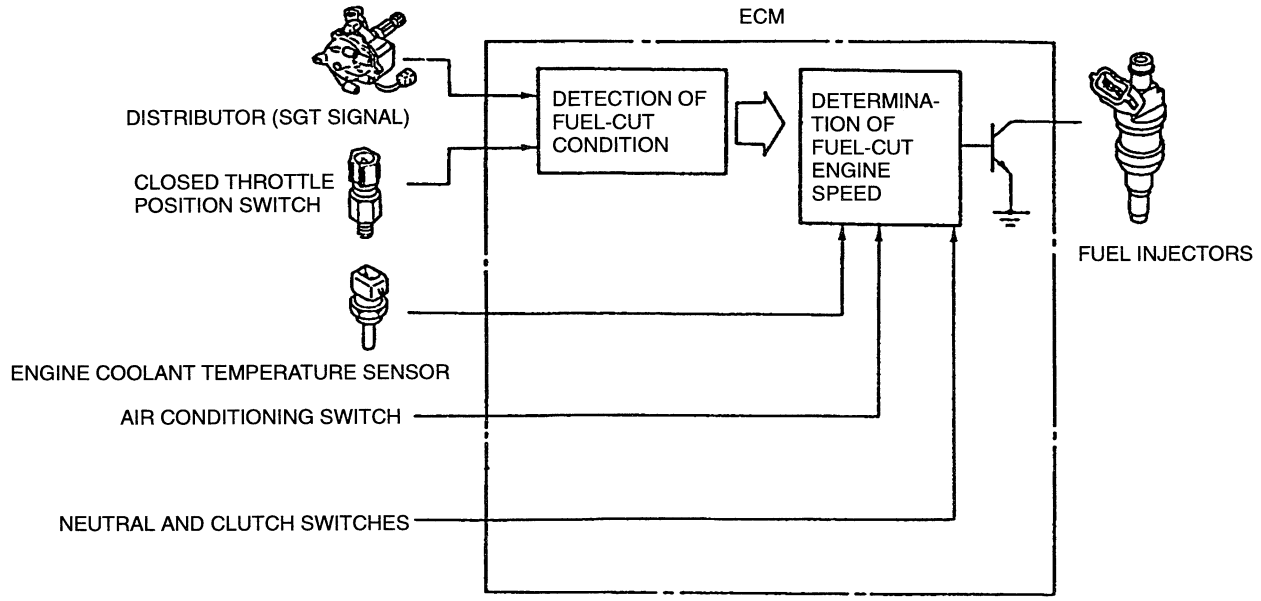
CHARCOAL CANISTER
Inspection
1. Visually check for damage.
2. Replace the charcoal canister if necessary.

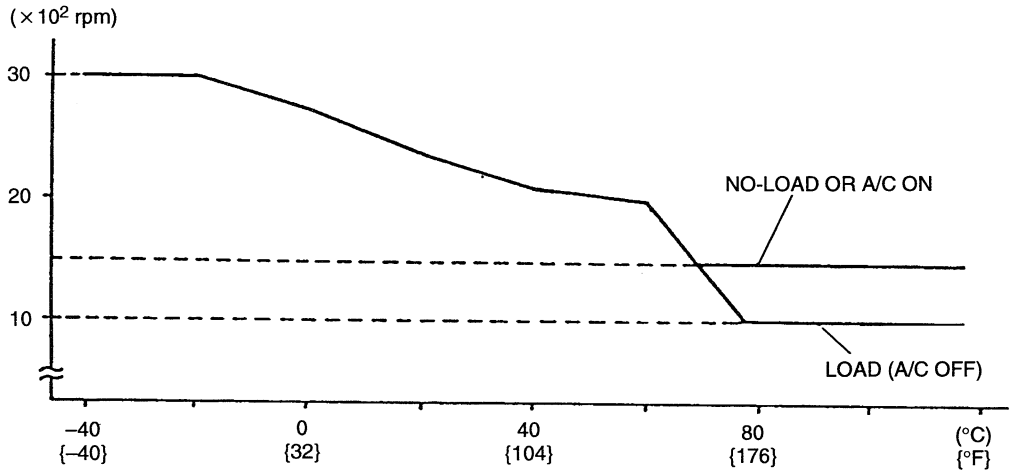
FUEL-CUT CONTROL SYSTEM

DESCRIPTION

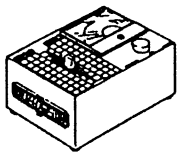
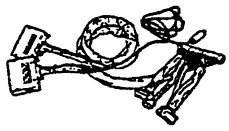
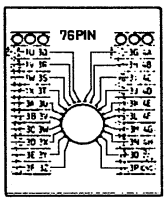
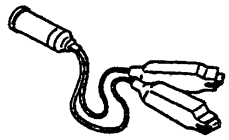
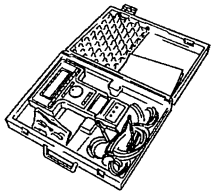
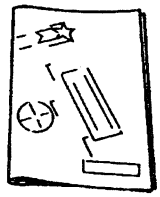
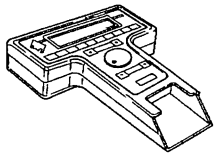
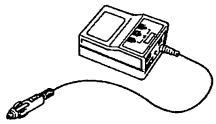
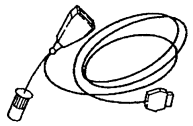
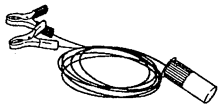
This system is used to improve the fuel economy, to prevent engine bucking during deceleration, and to protect the engine from overrevving.

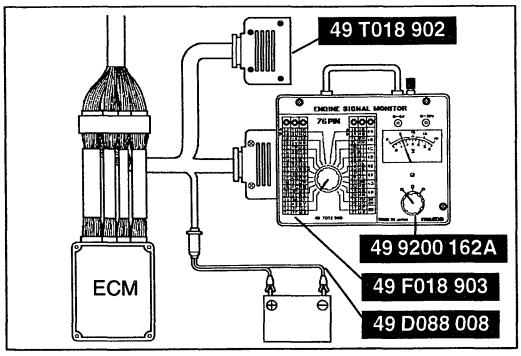
Deceleration fuel-cut

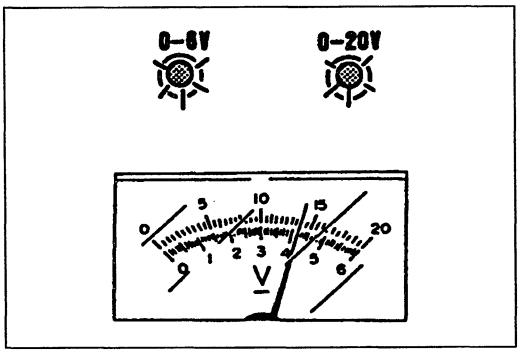


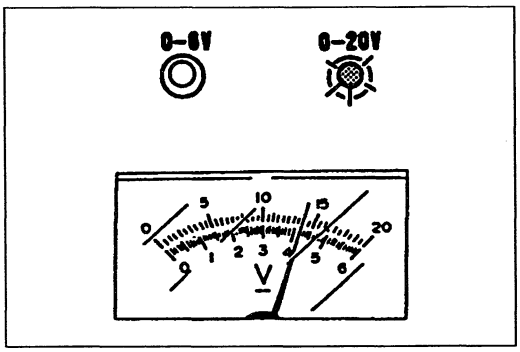


PREPARATION
SST

49 9200 162A Engine Signal Monitor 	For inspection of ECM terminal voltage	49 T018 902 Adapter harness 	For inspection of ECM terminal voltage
49 F018 903 Sheet 	For inspection of ECM terminal voltage	49 D088 008 Harness adaptor, power 	For inspection of ECM terminal voltage
49 T088 0A0 NGS set 	For inspection of ECM terminal voltage and input/output devices	49 T088 008A Instruction Manual 	For inspection of ECM terminal voltage and input/output devices
49 T088 010B Program Card 	For inspection of ECM terminal voltage and input/output devices	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of ECM terminal voltage and input/output devices
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of ECM terminal voltage and input/output devices	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of ECM terminal voltage and input/output devices
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of ECM terminal voltage and input/output devices	—	—







SYSTEM INSPECTION

1. Connect the **SST** (NGS) to the data link connector-2 and select the "PID/DATA MONITOR AND RECORD" function. (Refer to page F1–94.)
2. Connect the **SSTs** (Engine Signal Monitor) to the ECM.
3. Warm up the engine to normal operating temperature and let it idle.

Warning

- **Performing this test with the transaxle in any range or position other than neutral can be dangerous. Before performing this test, verify that the transaxle is in neutral.**

4. Set the **SST** (Engine Signal Monitor) to the terminals 4U, 4V, 4W and 4X and verify that the green and red lamps flash alternately.
5. Increase the engine speed to **4,000 rpm** and then suddenly release the throttle.
6. Verify that the red indicator lamp illuminates while the engine speed is above **approx. 1,500 rpm** on deceleration.

Caution

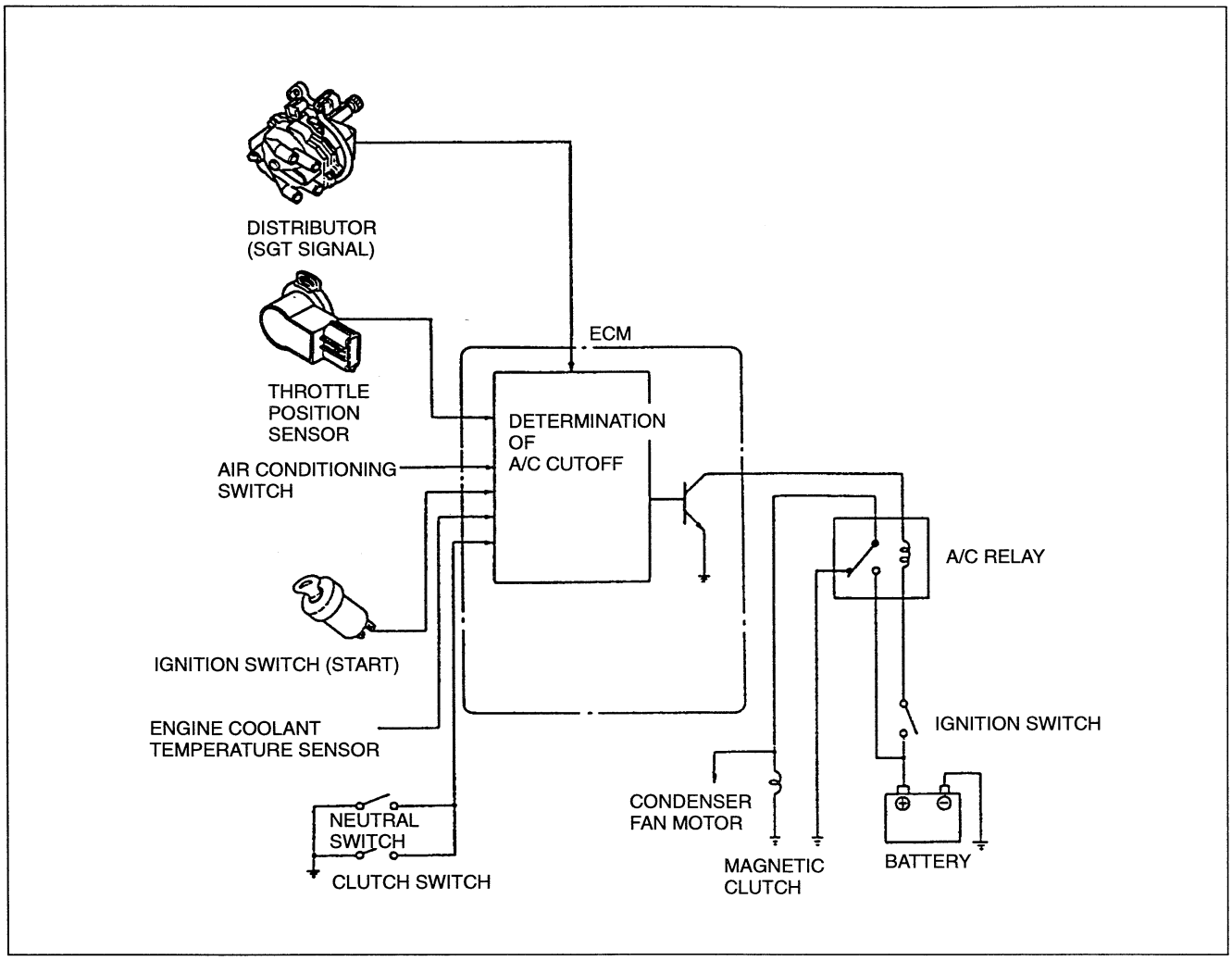
- **Holding the maximum rpm for more than 3 seconds can damage the engine.**

7. Increase the engine speed and verify that the maximum rpm does not exceed **approx. 6,800 rpm** while the engine is at normal operating temperature.

A/C CUTOFF SYSTEM

DESCRIPTION

An A/C cutoff system is used to improve idle smoothness just after starting the engine and to improve acceleration performance.

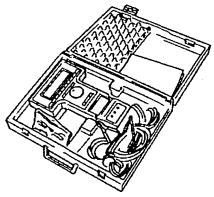
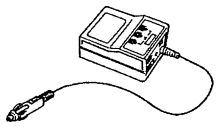
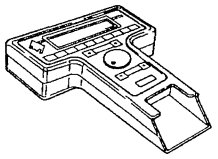
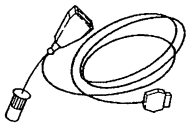
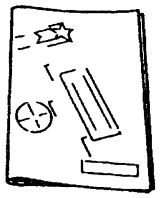
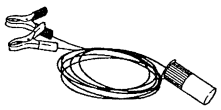


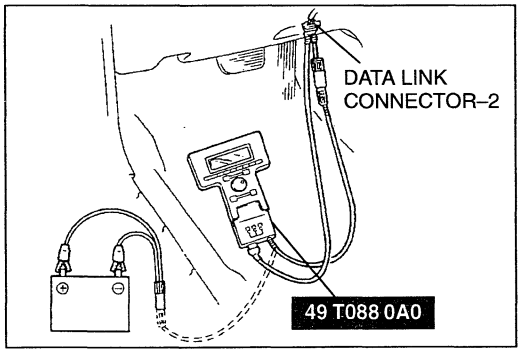
Operation

The A/C clutch operation is cancelled under the conditions below.

Engine condition	Purpose	Cutoff period
After engine starting	Improve engine starting	Approx. 4 sec.
Throttle valve wide open throttle	Improve drivability	Approx. 5 sec.
Coolant temp. above 116°C {241°F}	Prevent engine overheating	Until coolant temp. decrease below 113°C {235°F}

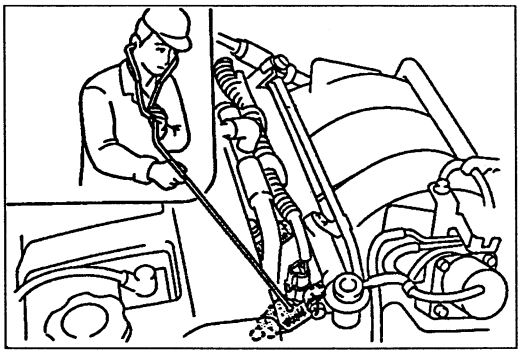
PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of A/C cut off system	49 T088 010B Program Card 	For inspection of A/C cut off system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of A/C cut off system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of A/C cut off system
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of A/C cut off system	49 T088 008A Instruction Manual 	For inspection of A/C cut off system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of A/C cut off system	—	—



SYSTEM INSPECTION

1. Position the vehicle on a chassis roller and start the engine.
2. Shift the transaxle into other than Neutral and release the clutch pedal.
3. Turn the A/C switch and the fan switch to on.
4. Fully open the throttle valve. Then, 3—6 seconds after, check if the operation sound of the A/C compressor electromagnetic clutch is heard.
5. If the operation sound is not heard, do as follows.
   (1) Connect the **SST** to the data link connector–2.
   (2) Turn the A/C relay from OFF to ON by using the "SIMULATION TEST" function and check for the operation sound of the relay.
      I. If the operation sound is heard, check the following.
         • ECM terminal voltage (Refer to page F1–95.)
           • Load/no load judgement signal
           • Closed throttle position switch signal
      II. If the operation sound is not heard, check the following.
         • A/C relay (Refer to Mazda 1996 626/MX–6 BETM.)
         • Open circuit in wiring harnesses and connectors (Main relay — A/C relay — ECM)



DECHOKE CONTROL SYSTEM

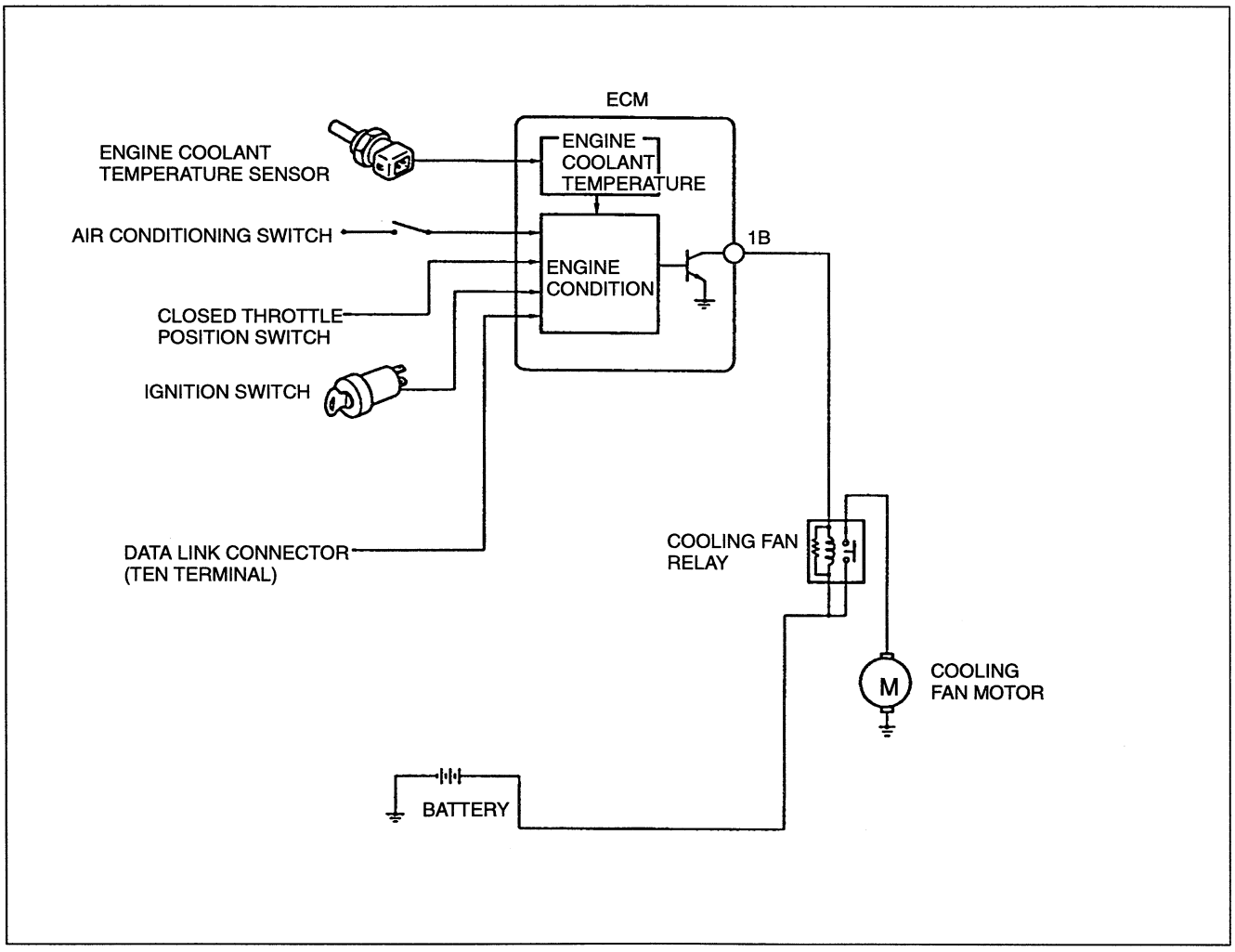
SYSTEM OPERATION

1. Turn the ignition switch to START and verify that the fuel injector operating sound is heard.
2. Depress the accelerator pedal fully and turn the ignition switch to START. Verify that no fuel injector operating sound is heard.
3. If operating sound is heard, check the ECM terminal 3B voltage. (Refer to page F1–96.)

COOLING FAN CONTROL SYSTEM

DESCRIPTION

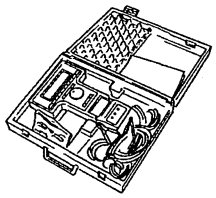
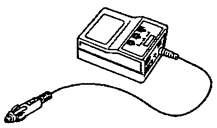
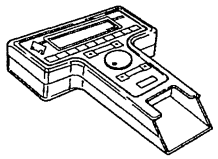
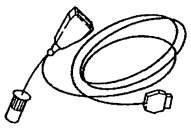
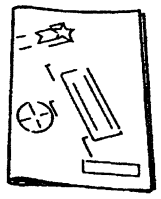
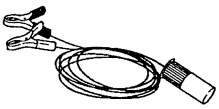
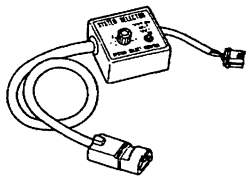
To improve reliability, the cooling fan is controlled by the ECM. This system consists of the cooling fan motor, fan relays, ECM, and input devices.

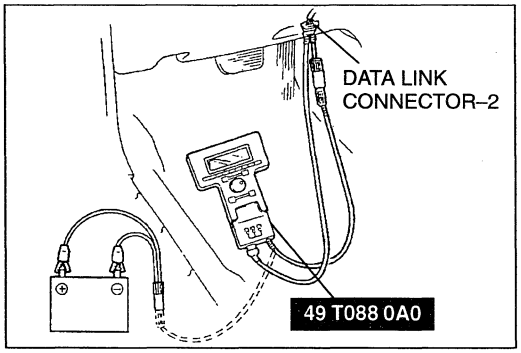


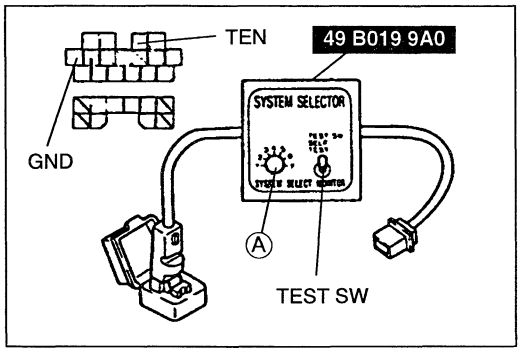
Cooling fan operation

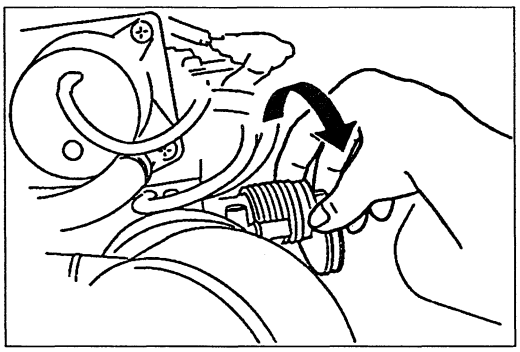
Engine condition	Fan relay
Coolant temperature above 97°C {207°F}	ON
Air conditioning switch ON	ON
TEN terminal grounded and closed throttle position switch ON	ON
ECTS malfunction	ON

PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of cooling fan control system	49 T088 010B Program Card 	For inspection of cooling fan control system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of cooling fan control system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of cooling fan control system
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of cooling fan control system	49 T088 008A Instruction Manual 	For inspection of cooling fan control system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of cooling fan control system	49 B019 9A0 System Selector 	For inspection of cooling fan control system





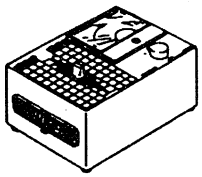
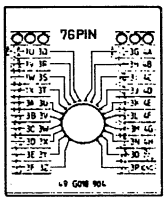
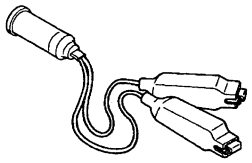
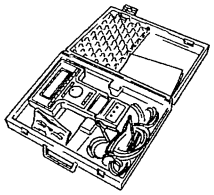
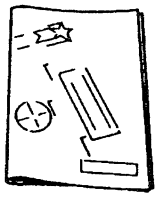
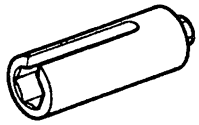
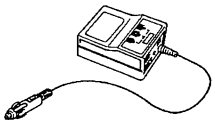
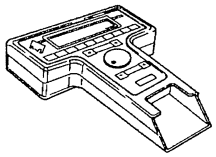
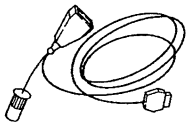
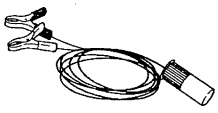


SYSTEM INSPECTION

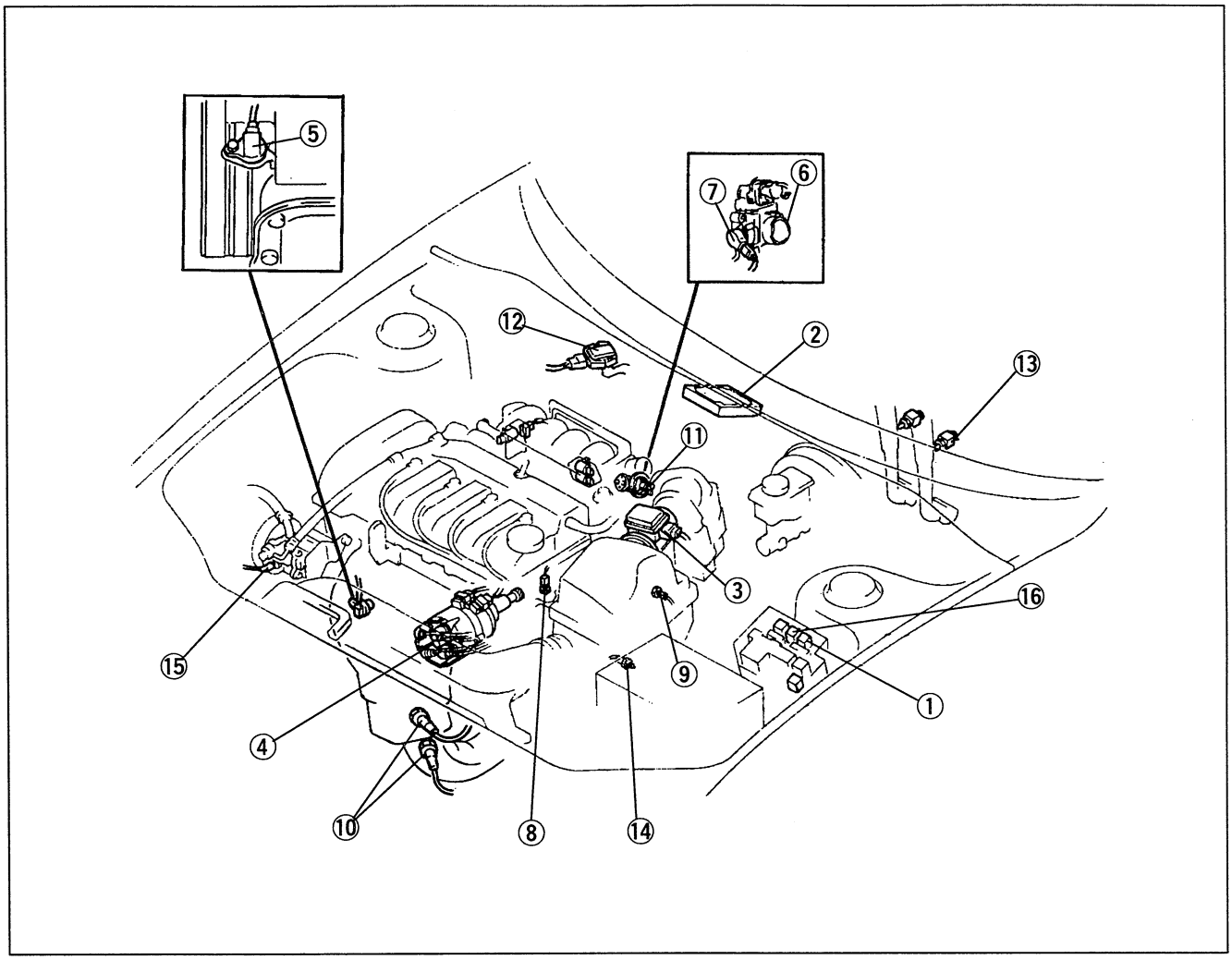
1. Verify that the engine is cold.
2. Turn the ignition switch to ON.
3. Verify that the cooling fan is not operating.
4. If the cooling fan is operating, do as follows.
   (1) Connect the **SST** to the data link connector–2.
   (2) By using the "PID/DATA MONITOR AND RECORD" function, verify that the cooling fan control signal is OFF.
      I. If the cooling fan control signal is ON, check the following.
         • ECM terminal voltage (Refer to page F1–95.)
         • Engine coolant temperature signal
      II. If the cooling fan control signal is OFF, check the following.
         • Cooling fan relay (Refer to section E.)
         • Short circuit in wiring harnesses and connectors (Main relay — Fan relay — ECM)
5. Connect the **SST** and set system select switch to 1 and self test switch to SELF TEST.
6. Rotate the throttle link by hand and verify that the cooling fan operates.
7. If the cooling fan does not operate, do as follows.
   (1) Connect the **SST** to the data link connector–2.
   (2) Turn the cooling fan relay from OFF to ON by using the "SIMULATION TEST" function and check for the cooling fan operation.
      I. If the cooling fan operates, check the following.
         • ECM terminal voltage (Refer to page F1–95.)
         • Test mode signal
         • Closed throttle position switch signal
      II. If the cooling fan does not operate, do as follows.
         a. Turn the cooling fan relay from OFF to ON by using the "SIMULATION TEST" function. Operate the cooling fan relay and check if the operation sound of the relay is heard.
         b. If the operation sound is heard, check the following.
            • Wiring harnesses and connectors (Cooling fan relay — Cooling fan motor)
            • Cooling fan motor (Refer to section E.)
         c. If the operation sound is not heard, check the following.
            • Cooling fan relay (Refer to section E.)
            • Open circuit in wiring harnesses and connectors (Main relay — Cooling fan relay — ECM)

CONTROL SYSTEM

PREPARATION
SST

49 9200 162A Monitor, Engine Signal 	For inspection of ECM terminal voltage	49 T018 902 Adapter harness 	For inspection of ECM terminal voltage
49 F018 903 Sheet 	For inspection of ECM terminal voltage	49 D088 008 Harness adapter, Power 	For inspection of ECM terminal voltage
49 T088 0A0 NGS set 	For inspection of ECM terminal voltage and input/output devices	49 T088 008A Instruction Manual 	For inspection of ECM terminal voltage and input/output devices
49 T088 010B Program Card 	For inspection of ECM terminal voltage and input/output devices	49 T018 001 Wrench, O_2 sensor 	For replacement of heated oxygen sensor
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of ECM terminal voltage and input/output devices	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of ECM terminal voltage and input/output devices
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of ECM terminal voltage and input/output devices	49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of ECM terminal voltage and input/output devices

STRUCTURAL VIEW

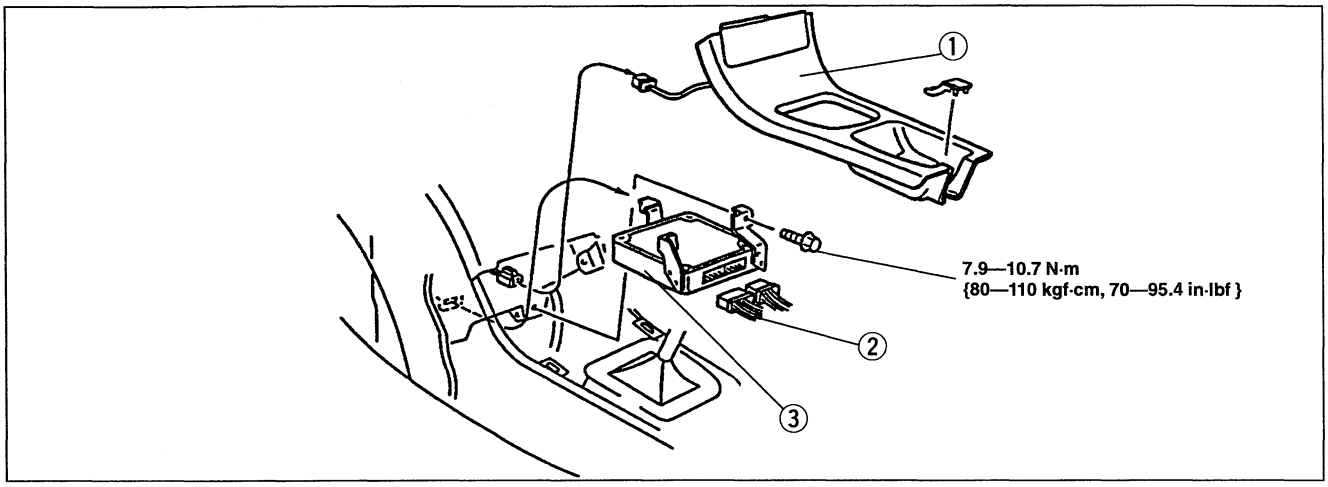


1. Fuel pump relay
   - Inspection ..... page F1– 63
   - Replacement ..... page F1– 63
2. Engine control module
   - Removal / Installation ..... page F1– 93
   - Inspection ..... page F1– 93
3. Mass air flow sensor
   - Inspection ..... page F1– 99
4. Camshaft position sensor
   - Inspection ..... page F1–100
5. Crankshaft position sensor
   - Inspection ..... page F1–100
   - Replacement ..... page F1–101
6. Closed throttle position switch
   - Inspection ..... page F1–101
7. Throttle position sensor
   - Inspection ..... page F1–101
   - Adjustment ..... page F1–102
   - Replacement ..... page F1–105
8. Engine coolant temperature sensor
   - Removal ..... page F1–104
   - Inspection ..... page F1–104
   - Installation ..... page F1–105
9. Intake air temperature sensor
   - Inspection ..... page F1–105
   - Replacement ..... page F1–105
10. Heated oxygen sensor
    - Inspection ..... page F1–105
11. EGR valve position sensor
    - Inspection ..... page F1–106
12. EGR boost sensor
    - Inspection ..... page F1–107
13. Clutch switch
    - Inspection ..... page F1–108
    - Replacement ..... page F1–108
14. Neutral switch
    - Inspection ..... page F1–108
    - Replacement ..... page F1–108
15. P/S pressure switch
    - Inspection ..... page F1–109
    - Replacement ..... page F1–109
16. Main relay
    - Inspection ..... page F1–109

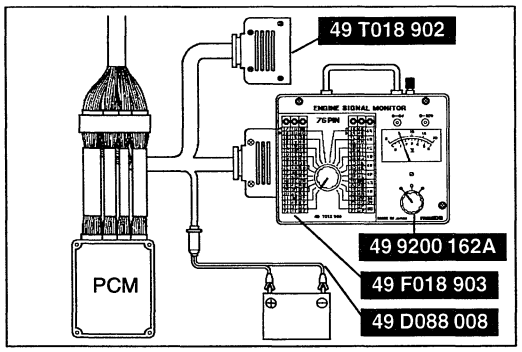
ENGINE CONTROL MODULE

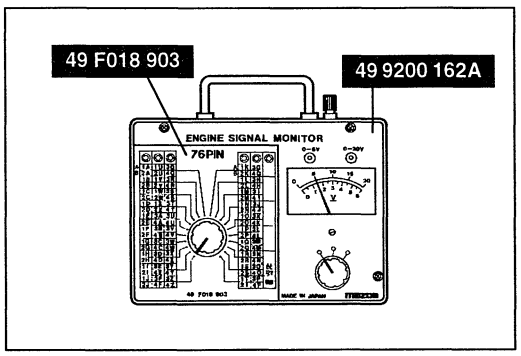
Removal / Installation

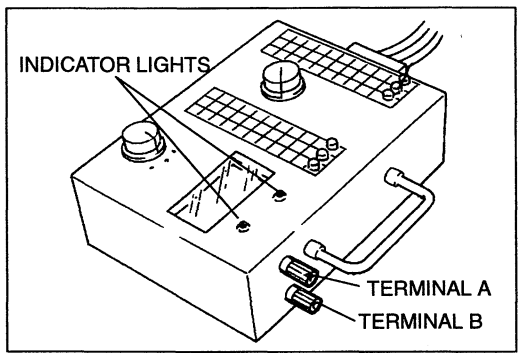
1. Disconnect the battery negative terminal.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.



1. Center console
2. ECM connector
3. ECM







Inspection

Caution

- **The ECM terminal voltages vary with cange in measuring conditions and vehicle conditions. Always carry out a total inspectioin of the input systems, output systems, and ECM to determine the cause of trouble. Otherwise, a wrong diagnosis will be made.**

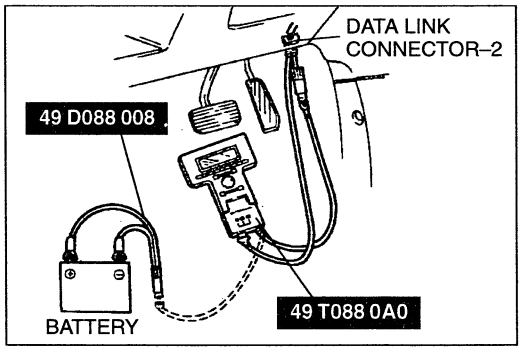
1. Disconnect the negative battery cable.
2. Remove the center console.
   (Refer to Mazda 1996 626/MX-6 BETM.)
3. Disconnect the ECM connector.
4. Connect the **SST** (Adapter Harness) to the ECM connector.
5. Connect the **SSTs** (Monitor, Engine Signal and Harness Adapter, Power) to the **SST** (Adapter Harness). Use connector A of the Adapter harness for ECM terminals 1A through 1V and 3A through 3P. Use connector B for ECM terminals 4A through 4Z.
6. Place the **SST** (Sheet) on the **SST** (Monitor, Engine Signal).
7. Measure the voltage at each ECM terminal by switching the selector switch and the monitor switch.
8. If any incorrect voltage is detected, check related systems, wiring harnesses and connectors referring to the Possible malfunction in the terminal voltage list.

Caution

- **Disconnecting the connectors of the ECM and the SST (Adapter Harness) while the battery is connected can damage the ECM and the SST (Monitor, Engine Signal). Disconnect the negative battery cable and the SST (Harness Adapter, Power) before disconnecting the connectors.**
- **Applying voltage to terminals A and B of the SST (Monitor, Engine Signal) can damage the SST (Monitor, Engine Signal).**

Note

- The indicator lights of the **SST** (Monitor, Engine Signal), provided for confirmation of the voltmeter range, is also used for detection of the pulse such as the fuel injector control signal, which is difficult to detect by using the voltmeter.
- Terminals A and B of the **SST** (Monitor, Engine Signal) are for connection of an external instrument. By connecting an external instrument such as a circuit tester or an oscilloscope, various inspections in addition to the measurement of the ECM terminal voltages are made possible.

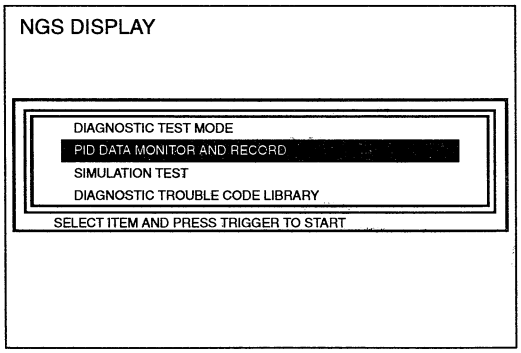


Using SST (NGS)

1. In the passenger compartment, connect the **SST** to the data link connector–2 as shown in the figure.
2. Referring to the NGS instruction manual, select the "PID/DATA MONITOR AND RECORD" function.
3. Referring to the 1996 Service Highlight, inspect each ECM input/output signal.

Note

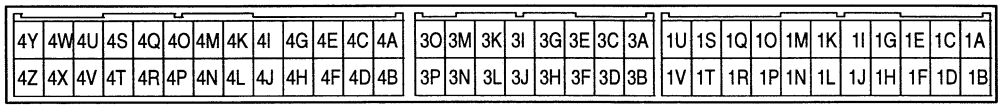
- The "PID/DATA MONITOR AND RECORD" function is to monitor the calculation value of input/output signals in the ECM. Deviation in the value does not always indicate malfunction in the related input/output devices.
- For inspection of the input/output signals other than in the link monitor table, check voltage at the applicable ECM terminal by using the **SST** (Monitor, Engine Signal).



4. If normal output signal cannot be detected when all input signals are normal, replace the ECM.
(Refer to page F1–93).

Terminal voltage (Reference)

B+: Battery positive voltage
*1: In data link connector



Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
1A	—	—	—		—	—
1B	Cooling fan control	Cooling fan relay	Cooling fan operating/Terminal TEN ground and throttle valve open		Below 1.0	• Cooling fan relay (Refer to section E)
			Cooling fan stop		B+	
1C	—	—	—		—	—
1D	Diagnostic trouble code output	Data link connector, Data link connector-2 (Terminal KLN)	Carry out inspection according to diagnostic trouble code Diagnostic trouble code output is a part of serial communication Judgement by terminal voltage is not possible (Refer to page F1–14)		—	• On-board diagnostic system
1E	MIL	Malfunction indicator light	Light illuminated for 3 sec. after ignition switch OFF→ON		Below 2.5	
			Light not illuminated after 3 sec.		B+	
			Light illuminated		Below 2.5	
			Light not illuminated		B+	
1F	—	—	—		—	—
1G	A/C control	A/C relay	Ignition switch ON		B+	• A/C relay (Refer to Mazda 1996 626/MX-6 BETM)
			Idle	A/C operating	Below 1.0	
				A/C stop	B+	
1H	Headlight	Headlight switch	Headlight switch OFF		Below 1.0	• Headlight switch (Refer to Mazda 1996 626/MX-6 BETM)
			Headlight switch ON		B+	
1I	Diagnostic test mode	Data link connector (Terminal TEN)	Ignition switch ON	Open terminal TEN*1	B+	• ECM terminal 1I – *1TEN harness
				Short terminal TEN*1	Below 1.0	
1J	Rear window defroster	Rear window defroster switch	Ignition switch ON	Rear window defroster switch OFF	Below 1.0	• Rear window defroster switch (Refer to Mazda 1996 626/MX-6 BETM))
				Rear window defroster switch ON	B+	
1K	A/C	A/C amplifier	Ignition switch ON	A/C switch and blower switch ON	Below 1.0	• A/C switch • Refrigerant pressure switch • A/C amplifier (Refer to Mazda 1996 626/MX-6 BETM)
				A/C switch OFF	B+	
1L	Load/No load distinction	Neutral/clutch switch	Ignition switch ON	Other than neutral position and clutch pedal released	B+	• Neutral switch (Refer to page F1–108) • Clutch switch (Refer to page F1–108)
				Neutral position or clutch pedal depressed	Below 1.0	

B+: Battery positive voltage
*1: In data link connector

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
1M	Vehicle speed	Vehicle speed sensor	Ignition switch ON		Below 1.0 or 4.0—5.0	• Vehicle speed sensor (Refer to Mazda 1996 626/MX-6 BETM)
			Driving		Approx. 3.0	
1N	DRL (CANADA)	DRL unit	Daytime running light ON		Below 1.0	• DRL unit (Refer to Mazda 1996 626/MX-6 BETM)
			Datytime running light OFF		Above 11.0	
1O	—	—	—		—	—
1P	Blower	Fan switch	Ignition switch ON	Fan switch OFF, ON at 1st or 2nd	B+	• Fan switch (Refer to Mazda 1996 626/MX-6 BETM)
				Fan switch ON at 3rd or higher	Below 1.0	
1Q	Brake	Brake switch	Brake pedal released		Below 1.0	• Brake switch (Refer to section P)
			Brake pedal depressed		B+	
1R	—	—	—		—	—
1S	—	—	—		—	—
1T	—	—	—		—	—
1U	Fuel pump control	Fuel pump relay	Ignition switch ON		B+	• Fuel pump relay (Refer to page F1–63)
			Cranking		Below 1.0	
			Idle			
1V	—	—	—		—	—
3A	—	—	—		—	—
3B	Mass air flow sensor (HRP)	Mass air flow sensor	Ignition switch ON		1.0—1.5	• Mass air flow sensor (Refer to page F1–99)
			Idle		1.5—5.0	
3C	Heated oxygen sensor (Front)	Heated oxygen sensor (Front)	Idle	After warm up	0—1.0	• Heated oxygen sensor (Front) (Refer to page F1–105)
			Acceleration		0—1.0	
			Deceleration		0—1.0	
3D	Heated oxygen sensor (Rear)	Heated oxygen sensor (Rear)	Idle	After warm up	0—1.0	• Heated oxygen sensor (Rear) (Refer to page F1–105)
			Acceleration		0.5—1.0	
			Deceleration		0—0.5	
3E	—	—	—		—	—
3F	Throttle position (TVO)	Throttle position sensor	Ignition switch ON	Closed throttle position	0.3—0.7	• Throttle position sensor (Refer to page F1–101) • ECM terminal 3I voltage
				Wide open throttle	3.4—5.3	
3G	Engine coolant temperature	Engine coolant temperature sensor	Ignition switch ON	Engine coolant temp 20 °C { 68 °F }	Approx. 3.16	• Engine coolant temperature sensor (Refer to page F1–104)
				After warm up	Below 1.0	
3H	Barometric pressure/EGR boost	EGR boost sensor	Ignition switch ON		Approx. 4.5	• EGR boost sensor (Refer to page F1–107)
			Idle			
3I	Constant voltage (Vref)	Throttle position sensor EGR valve position sensor	Ignition switch ON		Approx. 5.0	• ECM terminal 4B voltage

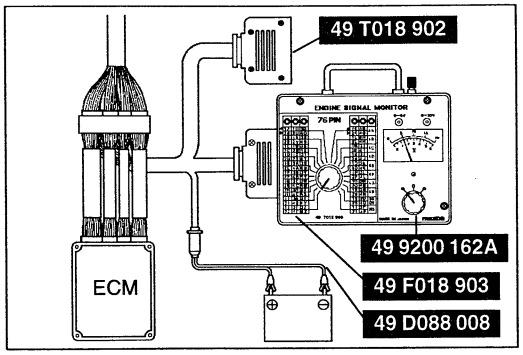
B+: Battery positive voltage
*1: In data link connector

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
3J	EGR valve position	EGR valve position sensor	Ignition switch ON		Approx. 0.8	• EGR valve position sensor (Refer to page F1–106) • ECM terminal 3I voltage
			Idle			
3K	Intake air temperature	Intake air temperature sensor	Ignition switch ON	Intake air temperature 20 °C { 68 °F }	Approx. 2.76	• Intake air temperature sensor (Refer to page F1–105)
3L	Closed throttle position	Closed throttle position switch	Ignition switch ON	Accelerator pedal released	Below 1.0	• Closed throttle position switch (Refer to page F1–101)
				Accelerator pedal depressed	B+	
3M	Heated oxygen sensor (Front) heater	Heated oxygen sensor	Constant		Below 1.0	• Heated oxygen sensor (Front)
3N	—	—	—		—	—
3O	Analogue sensor ground	Ground	Constant		Below 1.0	• ECM 3O terminal harness (Open)
3P	Power steering pressure	Power steering pressure switch	Ignition switch ON		B+	• Power steering pressure switch (Refer to page F1–109)
			Idle	P/S not operating		
				P/S operating	Below 1.0	
4A	ECM ground	Ground	Constant		Below 1.0	• ECM 4A terminal harness (Open)
4B	Power supply	Main relay	Ignition switch	OFF	Below 1.0	• Main relay (Refer to page F1–109)
				ON	B+	
4C	Fuel injector ground	Ground	Constant		Below 1.0	• ECM 4C terminal harness (Open)
4D	Output device ground	Ground	Constant		Below 1.0	• ECM 4D terminal harness (Open)
4E	NE⊖	Crankshaft position sensor	Ignition switch ON		Approx. 2.4	• Crankshaft position sensor (Refer to page F1–100)
			Idle			
4F	SGT	Camshaft position sensor (In distributor)	Ignition switch ON		Below 1.0 or Approx. 5.0	• Camshaft position sensor (Refer to page F1–100)
			Idle		Approx. 2.0	
4G	SGC		Ignition switch ON		Below 1.0 or Approx. 5.0	
			Idle		Approx. 0.9—1.3	
4H	NE⊕	Crankshaft position sensor	Ignition switch ON		Approx. 2.4	• Crankshaft position sensor (Refer to page F1–100)
			Idle			
4I	Back-up power supply	Battery	Constant		B+	• ECM 4I terminal — battery harness and connector
4J	Pressure regulator control	PRC solenoid valve	Idle (Hot condition)		Below 1.0	• PRC solenoid valve (Refer to page F1–71)
			Other		B+	
4K	—	—	—		—	—

B+: Battery positive voltage
*1: In data link connector

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
4L	EGR boost sensor switching control	EGR boost sensor solenoid valve	Ignition switch ON		B+	• EGR boost sensor solenoid valve (Refer to page F1–77)
			Idle			
4M	—	—	—		—	—
4N	IGT	Ignition control module (In distributor)	Ignition switch ON		Approx. 0	• Ignition control module (Refer to section G)
			Idle		Approx. 0.3	
4O	EGR control (Vent)	EGR solenoid valve (Vent)	Ignition switch ON		B+	• EGR solenoid valve (Vent) (Refer to page F1–76)
			Idle			
4P	EGR control (Vacuum)	EGR solenoid valve (Vacuum)	Ignition switch ON		B+	• EGR solenoid valve (Vacuum) (Refer to page F1–76)
			Idle			
4Q	Idle air control	Idle air control valve	Ignition switch ON		Approx. 0.7	• Idle air control valve (Refer to page F1–54)
			Idle	After warm up (No load)	Approx. 10*	
4R	—	—	—		—	—
4S	—	—	—		—	—
4T	Purge control	Purge solenoid valve	Ignition switch ON		B+	• Purge solenoid valve (Refer to page F1–81)
			Idle			
4U	Fuel injector control	Fuel injector No.1	Ignition switch ON		B+	• Fuel injector (Refer to page F1–65)
4V		Fuel injector No.2		Idle	B+*	
4W		Fuel injector No.3				
4X		Fuel injector No.4				
4Y	—	—	—		—	—
4Z	—	—	—		—	—

* Engine Signal Monitor: Green and red lights flash



MASS AIR FLOW SENSOR

Inspection

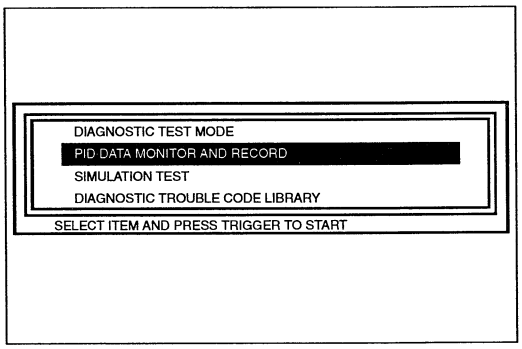
Using the SST (Engine Signal Monitor)

1. Check the mass air flow sensor for damage and cracks.
2. Connect the **SSTs** to the ECM. (Refer to page F1–93.)
3. Measure the voltage at ECM terminal 3B. (Refer to page F1–95.)
4. Verify that the voltage is within the specification.

Specification

Measuring condition	Voltage (V)
Ignition switch ON	1.0—1.5
Idle	1.5—5.0

5. If not as specified, inspect the harness and connector between the mass air flow sensor and the ECM terminal.
6. If there is correct terminal voltage and harness continuity, replace the mass air flow sensor. (Refer to page F1–48.)



Using the SST (NGS)

1. Check the mass air flow sensor for damage and cracks.
2. Connect the **SSTs** to the data link connector–2. (Refer to page F1–94.)
3. Select the "PID/DATA MONITOR AND RECORD" function of the NGS.
4. Select "MAF V" on the NGS display. The NGS measures and shows the voltage.

Specification

Measuring condition	Voltage (V)
Ignition switch ON	1.0—1.5
Idle	1.5—5.0

5. If not as specified, inspect the harness and connector between the mass air flow sensor and the ECM terminal.
6. If there is correct terminal voltage and harness continuity, replace the mass air flow sensor. (Refer to page F1–48.)

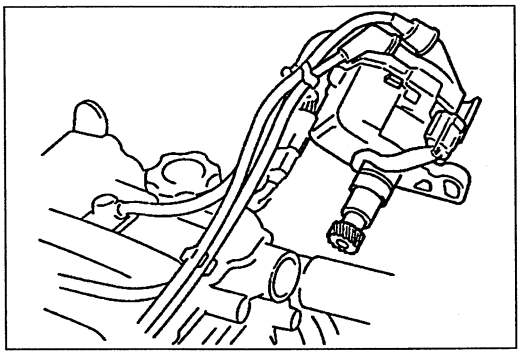
Note

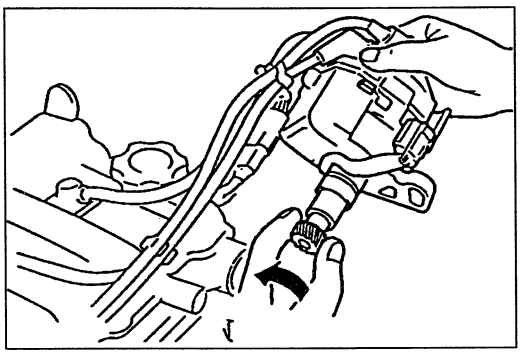
- The scan tool shows the mass airflow rate and load value.

Specification

Engine speed (rpm)	Mass intake airflow amount (g/s)	Engine load calculated value (%)
650—750 (Idle)	1.9—3.0	15.0—19.0
2,500*	6.7—9.1	14.0—18.0

* No load, in neutral or park.





CAMSHAFT POSITION SENSOR

Inspection

1. Remove the distributor. (Refer to section G.)
2. Disconnect the fuel injector connector.
3. Connect the distributor 6-pin connector.

Warning

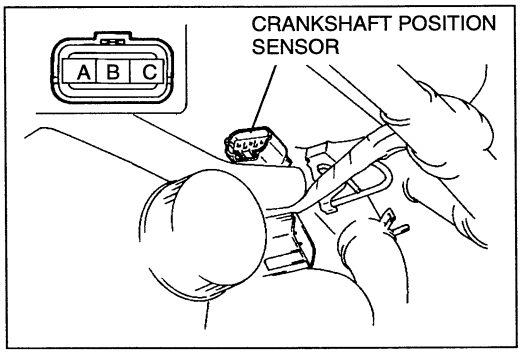
- **Turning the ignition switch to ON with the fuel injector connector still connected will actuate the fuel injector.**
- **Turning the ignition switch to ON with the distributor 3-pin connector still connected will generate sparks, which can cause electrical shock. Disconnect the connector and avoid it from grounding to the vehicle body.**

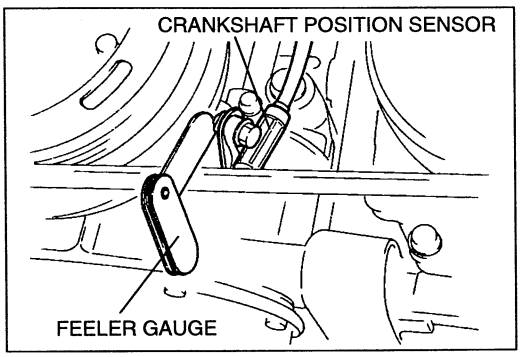
4. Connect the **SSTs** to the ECM. (Refer to page F2–93.)
5. Turn the ignition switch to ON.
6. Measure the voltage at ECM terminals 4F and 4G.
7. Rotate the distributor drive by hand and check the output signal.

Specification

ECM terminal	Signal	
4F	SGT	Approx. 5 V (4 pulses/rev)
4G	SGC	Approx. 5 V (1 pulse/rev)

8. If not as specified, inspect the wiring harness and connector between the distributor and the ECM terminal.
9. If there is correct terminal voltage and harness continuity, replace the distributor. (Refer to section G.)





CRANKSHAFT POSITION SENSOR

Inspection

Resistance

1. Disconnect the crankshaft position sensor connector.
2. Measure the resistance between terminals A and B by using an ohmmeter.

Specification: 520—580 Ω [20°C {68°F}]

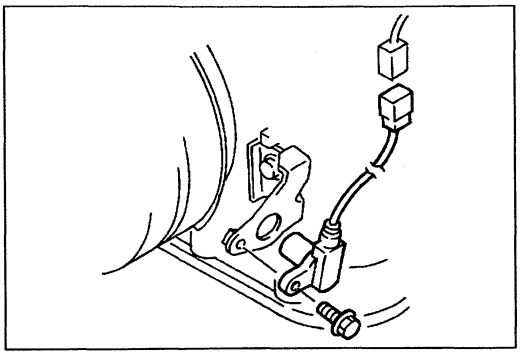
3. If not as specified, replace the crankshaft position sensor.

Air gap

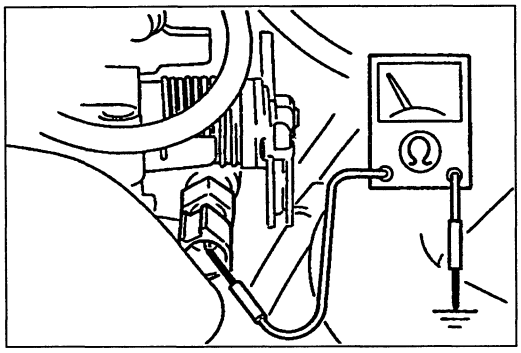
1. Measure the air gap between the crankshaft pulley and the crankshaft position sensor by using a feeler gauge.

Specification: 0.5—1.5 mm {0.020—0.059 in}

2. If not as specified, replace the crankshaft pulley or the crankshaft position sensor.



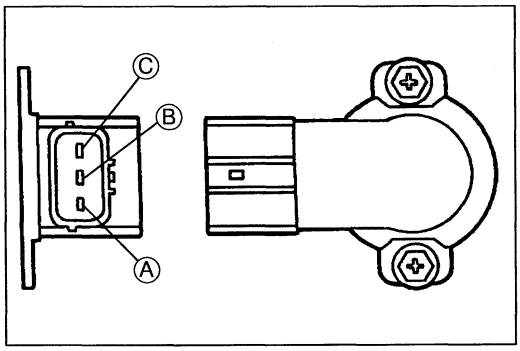
Replacement
1. Disconnect the negative battery cable.
2. Remove the crankshaft position sensor.
3. Install in the reverse order of removal.



CLOSED THROTTLE POSITION SWITCH
Inspection
1. Disconnect the closed throttle position switch connector.
2. Check continuity between the switch and a ground.

Throttle valve	Continuity
Closed throttle position	Yes
Open	No

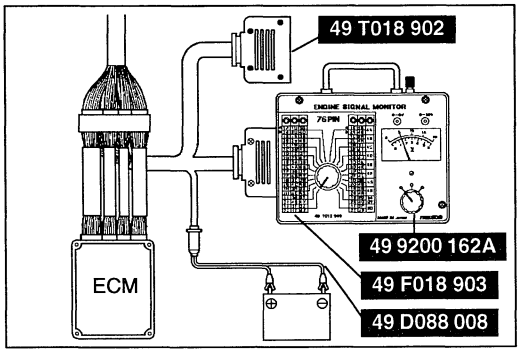
3. If not as specified, check the condition of the wiring harness of the closed throttle position switch. Replace the closed throttle position switch and the throttle body (as an assembly), if necessary.
(Refer to page F1–48.)



THROTTLE POSITION SENSOR
Inspection of resistance
1. Disconnect the throttle position sensor connector.
2. Using an ohmmeter, measure the resistance between throttle position sensor terminals A and C.

   Resistance: 4—6 kΩ

3. If not as specified, replace the throttle position sensor.
4. Reconnect the throttle position sensor connector.



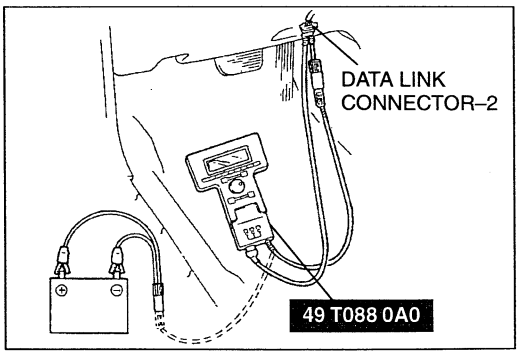
Inspection of output voltage
Using the SST (Engine signal monitor)
1. Connect the **SSTs** to the ECM as shown.
2. Turn ignition switch to ON.
3. Measure voltage at ECM terminal 3F under the following conditions.

Specification

Throttle valve condition	Terminal voltage (V)
Closed throttle position	0.3—0.7
Wide open throttle	3.4—5.3

(The voltage increase is linear according to the throttle valve opening angle)

4. Disconnect the **SSTs**.
5. If not as specified, adjust the throttle position sensor.



Using the SST (NGS)

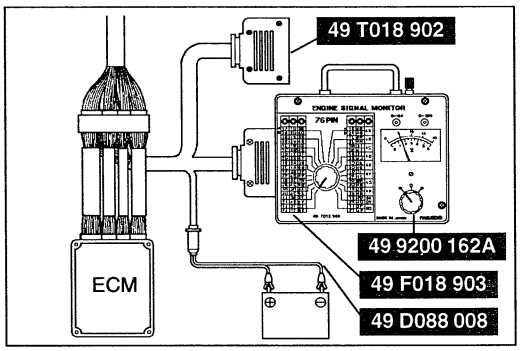
1. Connect the **SSTs** to the data link connector–2.
2. Select the "PID/DATA MONITOR AND RECORD" function of NGS.
3. Select "TP V" on the **SST** display.
4. Measure the TPS output voltage under the following conditions.

Specification

Throttle valve condition	TPS output voltage (V)
Closed throttle position	0.3—0.7
Wide open throttle	3.4—5.3

(The voltage increase is linear according to the throttle valve opening angle)

5. Disconnect the **SSTs**.
6. If not as specified, adjust the throttle position sensor.

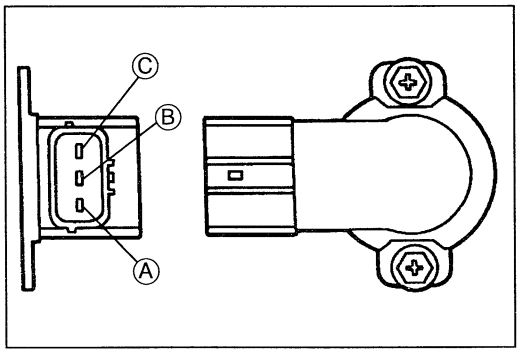


Adjustment

Using the SST (Engine signal monitor)

1. Verify that the throttle valve is fully closed.
2. Connect the **SSTs** to the ECM as shown.
3. Disconnect the throttle position sensor connector.
4. Turn the ignition switch to ON.
5. Using a voltmeter, measure the voltage at connector side terminal A.

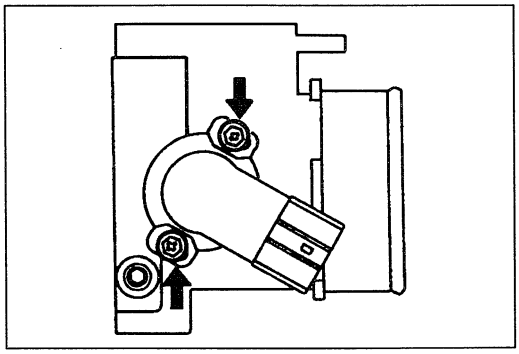
Specification: 4.5—5.5 V



6. Reconnect the throttle position sensor connector.
7. Loosen the sensor mounting screws.
8. Adjust the sensor output voltage by rotating the sensor.

Specification (Closed throttle position)

Connector terminal A voltage (V)	ECM terminal 3F voltage (V)
4.5—4.9	0.4—0.5
4.9—5.1	0.4—0.6
5.1—5.5	0.5—0.6



9. Tighten the sensor mounting screws.

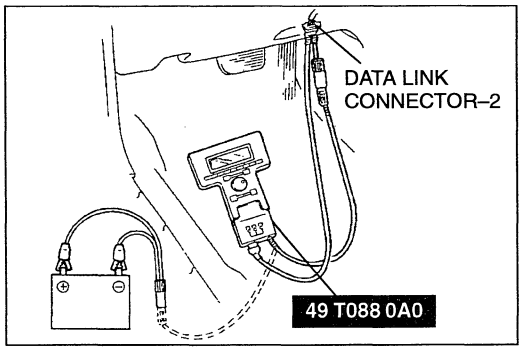
Tightening torque:
1.6—2.3 N·m {16—24 kgf·cm, 14—21 in·lbf}

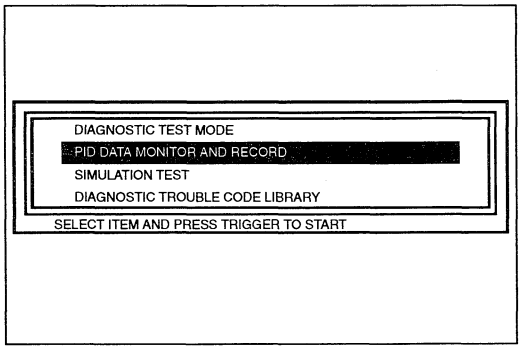
10. Fully open the throttle valve and verify that the ECM terminal voltage are within the specification.

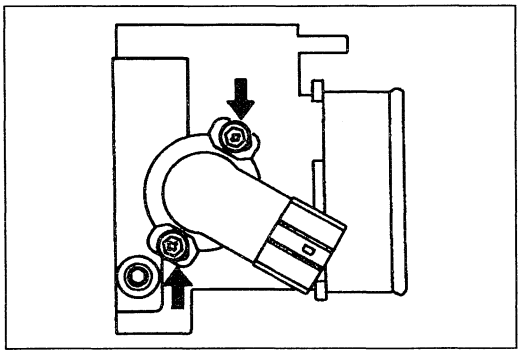
Specification (Wide open throttle)

Connector terminal A voltage (V)	ECM terminal 3F voltage (V)
4.5—4.7	3.5—4.4
4.7—4.8	3.6—4.5
4.8—4.9	3.7—4.6
4.9—5.0	3.7—4.8
5.0—5.1	3.8—4.9
5.1—5.3	4.0—5.0
5.3—5.4	4.1—5.1
5.4—5.5	4.2—5.2

11. Disconnect the **SST**.
12. If not as specified, replace the throttle position sensor.







Using the SST (NGS)

1. Verify that the throttle valve is closed throttle position.
2. Connect the **SSTs** to the data link connector–2.
3. Disconnect the throttle position sensor connector.
4. Turn the ignition switch to ON.
5. Using a voltmeter measure the voltage at connector side terminal A.

   Specification: 4.5—5.5 V

6. Reconnect the throttle position sensor connector.
7. Loosen the sensor mounting screws.
8. Select the "PID/DATA MONITOR AND RECORD" function of NGS.
9. Select "TP V" on the NGS display.
10. Adjust the TPS output voltage by rotating the sensor.

Specification (Closed throttle position)

Connector terminal A voltage (V)	TPS output voltage (V)
4.5—4.9	0.4—0.5
4.9—5.1	0.4—0.6
5.1—5.5	0.5—0.6

11. Tighten the sensor mounting screws.

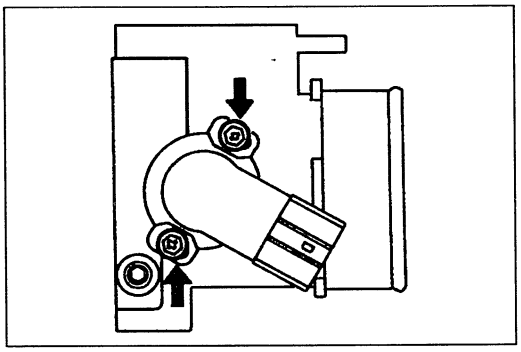
    Tightening torque:
    1.6—2.6 N·m {16—24 kgf·m, 14—21 in·lbf}

12. Wide open throttle and verify that the TPS terminal voltage are within the specification.

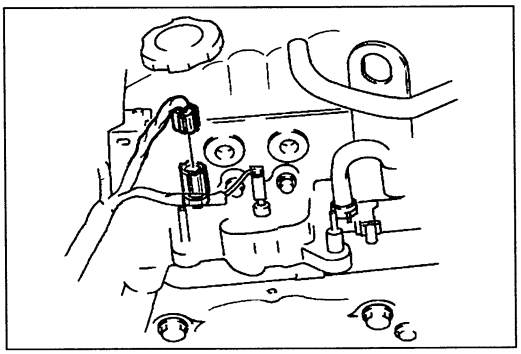
Specification (Wide open throttle)

Connector terminal A voltage (V)	TPS output voltage (V)
4.5—4.7	3.5—4.4
4.7—4.8	3.6—4.5
4.8—4.9	3.7—4.6
4.9—5.0	3.7—4.8
5.0—5.1	3.8—4.9
5.1—5.3	4.0—5.0
5.3—5.4	4.1—5.1
5.4—5.5	4.2—5.2

13. Disconnect the **SSTs**.
14. If not as specified, replace the throttle position sensor.



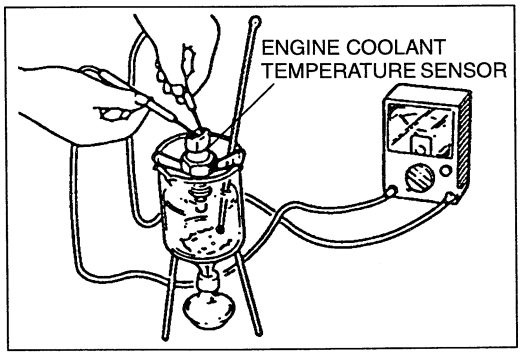
Replacement
1. Disconnect the air hose. (Refer to page F1–48.)
2. Disconnect the throttle position sensor connector.
3. Remove the screws.
4. Remove the throttle position sensor.
5. Install the throttle position sensor.
6. Adjust the throttle position sensor output voltage. (Refer to page F1–102.)
7. Connect the air hose.



ENGINE COOLANT TEMPERATURE SENSOR
Removal

Note
- The engine coolant temperature sensor is at the rear of the engine.

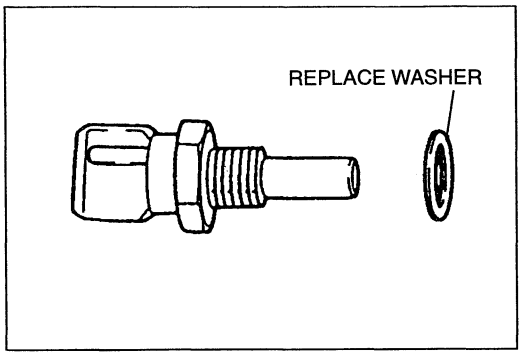
1. Disconnect the engine coolant temperature sensor connector.
2. Remove the engine coolant temperature sensor.



Inspection
1. Place the sensor in water with a thermometer and heat the water gradually.
2. Measure the resistance of the sensor.

Water temperature	Resistance (kΩ)
20°C {68°F}	2.2—2.7
80°C {176°F}	0.29—0.35

3. If not as specified, replace the engine coolant temperature sensor.

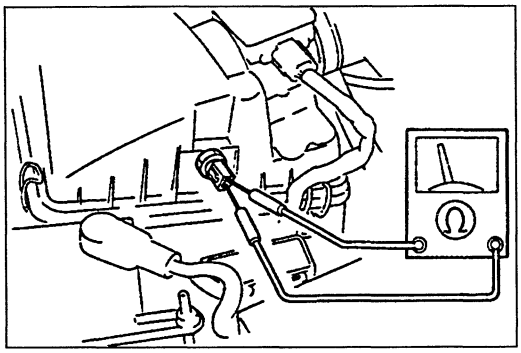


Installation

1. Install a new washer and the engine coolant temperature sensor.

   Tightening torque:
   25—29 N·m {2.5—3.0 kgf·m, 19—21 ft·lbf}

2. Connect the engine coolant temperature sensor connector.
3. Start the engine and check for coolant leakage.



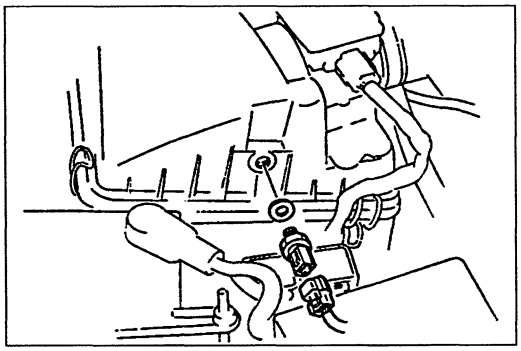
INTAKE AIR TEMPERATURE SENSOR

Inspection

1. Disconnect the intake air temperature sensor connector.
2. Check the resistance of the sensor.

Temperature	Resistance
25°C { 77°F}	29.7—36.3 kΩ
85°C {185°F}	3.3—3.7 kΩ

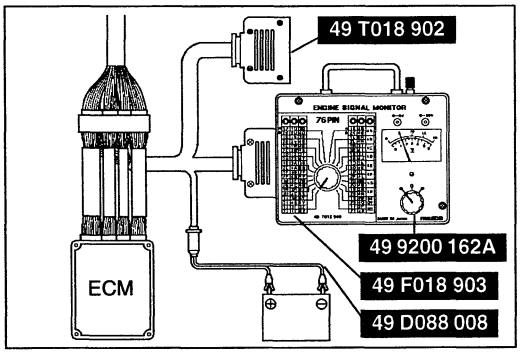
3. If not as specified, replace the intake air temperature sensor.



Replacement

1. Disconnect the intake air temperature sensor connector.
2. Remove the sensor.
3. Install the sensor and tighten it to the specified torque.

   Tightening torque:
   7.9—11.7 N·m {80—120 kgf·cm, 70—104 in·lbf}



HEATED OXYGEN SENSOR

Inspection

Sensor

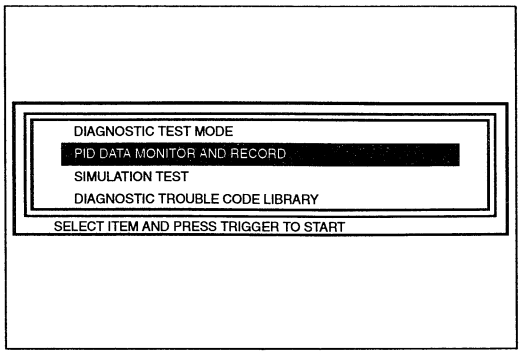
Using the SST (Engine signal monitor)

1. Warm up the engine to normal operating temperature.
2. Connect the **SSTs** to the ECM. (Refer to page F1–93.)
3. Measure the voltage at ECM terminals 3C and 3D.

Spcification

Engine condition	ECM terminal 3C	ECM terminal 3D
Idle	Below 1.0 V	Below 1.0 V
Deceleration	0—1.0 V	0—0.5 V
Acceleration	0—1.0 V	0.5—1.0 V

4. If not as specified, inspect the following.
   - Fuel system
   - On-board diagnostic system (Refer to page F1–14.)
   - Intake-air system
5. If all the systems are OK, replace the heated oxygen sensor. (Refer to page F1–72.)



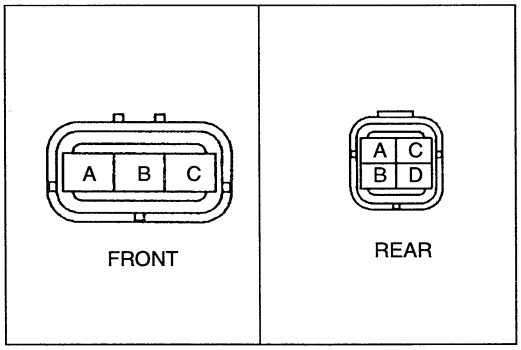
Using the SST (NGS)

1. Connect the **SSTs** to the data link connector–2. (Refer to page F1–94.)
2. Select the "PID/DATA MONITOR AND RECORD" function of the NGS.
3. Select "FHO2S, RHO2S" on the NGS display. The NGS measures and shows the voltage.

Spcification

Engine condition	Voltage (FHO2S)	Voltage (RHO2S)
Idle	Below 1.0 V	Below 1.0 V
Deceleration	0—1.0 V	0—0.5 V
Acceleration	0—1.0 V	0.5—1.0 V

4. If not as specified, inspect the following.
   - Fuel system
   - On-board diagnostic system (Refer to page F1–14.)
   - Intake-air system
5. If all the systems are OK, replace the heated oxygen sensor. (Refer to page F1–72.)

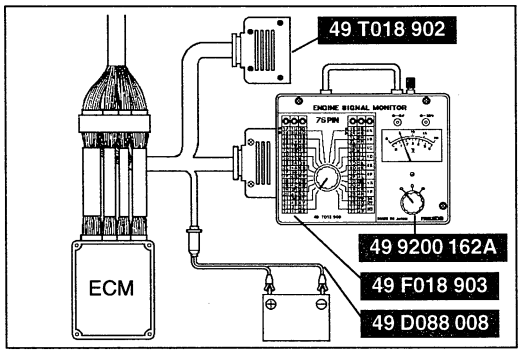


Heater

1. Disconnect the heated oxygen sensor connector.
2. Measure the resistance between heated oxygen sensor heater (FRONT B—C, REAR C—D terminals) by using an ohmmeter.

   Specification: Approx. 6 Ω [20°C {68°F}]

3. If not as specified, replace the heated oxygen sensor. (Refer to page F1–72.)

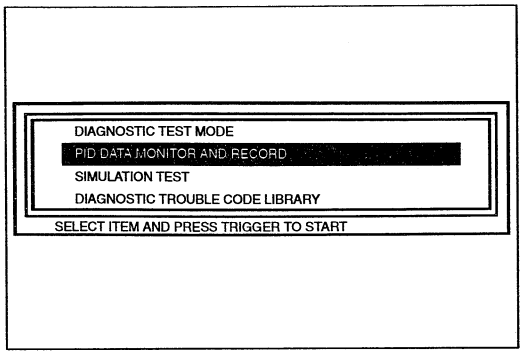


EGR VALVE POSITION SENSOR
Inspection of output voltage
Using the SST (Engine signal monitor)

1. Connect the **SST** to the ECM as shown and connect a vacuum pump to the EGR valve.
2. Turn the ignition switch to ON.
3. Measure the voltage at the terminals as shown in the table.

Terminal	ECM	Vacuum	
		0 kPa {0 mmHg, 0 inHg}	20.0 kPa {150 mmHg, 5.90 inHg}
B	3I	4.5—5.5 V	
A	3O	0 V	
C	3J	Approx. 0.8 V	Approx. 4.9 V

4. If not correct at 3J terminal, check the wiring harness and 3I terminal of the ECM.



Using the SST (NGS)

1. Connect the **SSTs** (NGS) to the data link connector–2.
2. Select the "PID/DATA MONITOR AND RECORD" function of NGS and connect a vacuum pump.
3. Select "EGR" on the NGS display NGS measures and shown in the specification.

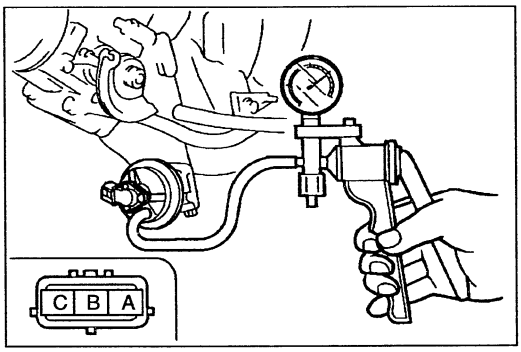
Spcification

Vacuum	EGR valve position signal voltage
0 kPa {0 mmHg, 0 inHg}	Approx. 0.8 V
20.0 kPa {150 mmHg, 5.90 inHg}	Approx. 4.9 V

4. If not correct EGR valve position signal voltage, check the wiring harness and 3I terminal of the ECM.

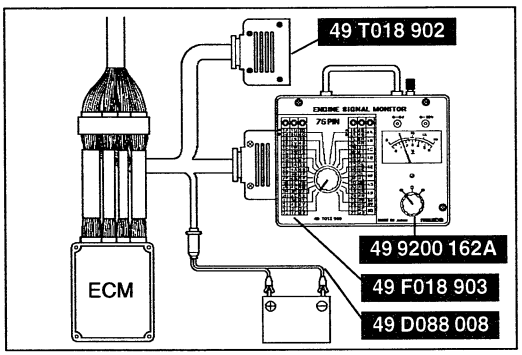
Inspection of resistance

1. Disconnect the EGR valve position sensor connector, and connect an ohmmeter.
2. Disconnect the vacuum hose from the EGR valve, and connect a vacuum pump.
3. Measure the resistance between the terminals as shown while vacuum is applied.



Terminal	Vacuum	
	0 kPa {0 mmHg, 0 inHg}	20.0 kPa {150 mmHg, 5.90 inHg}
A—B	Approx. 2.7 kΩ	
A—C	Approx. 0.5 kΩ	Approx. 2.7 kΩ
B—C	Approx. 2.4 kΩ	Approx. 0.1 kΩ

4. If not as specified, replace the EGR valve.



EGR BOOST SENSOR

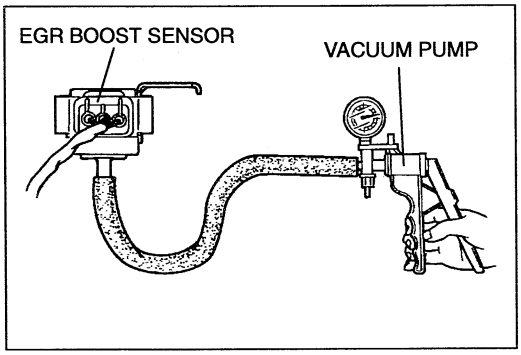
Inspection

Using the SST (Engine Signal Monitor)

1. Connect the **SSTs** to the ECM as shown.
2. Apply vacuum or pressure to the EGR boost sensor by using a vacuum pump. Measure the ECM terminal 3H.

Specification

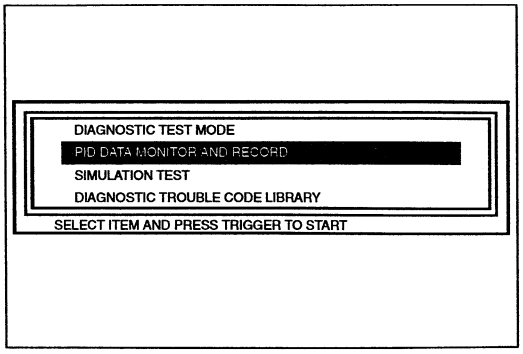
15 kPa {112.5 mmHg, 4.4 inHg}: 0.270—0.330 V
40 kPa {300 mmHg, 11.8 inHg}: 1.395—1.705 V
95 kPa {712.5 mmHg, 28.1 inHg}: 3.870—4.730 V
105 kPa {787.5 mmHg, 31.0 inHg}: 4.320—5.280 V



3. If not as specified, replace the EGR boost sensor.

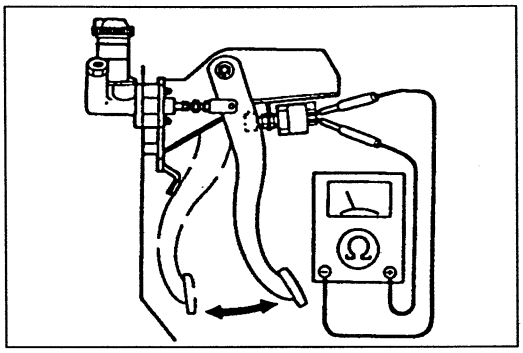
Using the SST (NGS)

1. Connect the **SSTs** to the data link connector–2.
2. Select the "PID/DATA MONITOR AND RECORD" function of NGS and connect a vacuum pump.
3. Select "BARO V" on the NGS display. The NGS measures and shows the voltage.



Specification
15 kPa {112.5 mmHg, 4.4 inHg}: 0.270—0.330 V
40 kPa {300 mmHg, 11.8 inHg}: 1.395—1.705 V
95 kPa {712.5 mmHg, 28.1 inHg}: 3.870—4.730 V
105 kPa {787.5 mmHg, 31.0 inHg}: 4.320—5.280 V

4. If not as specified, replace the EGR boost sensor.



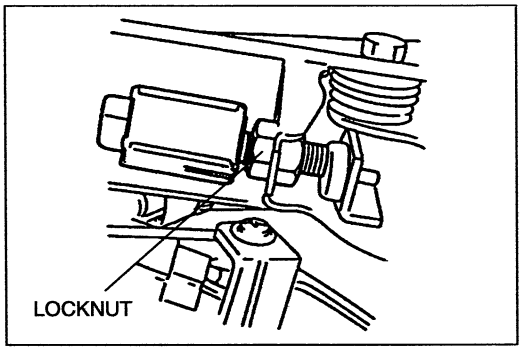
CLUTCH SWITCH

Inspection

1. Disconnect the clutch switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

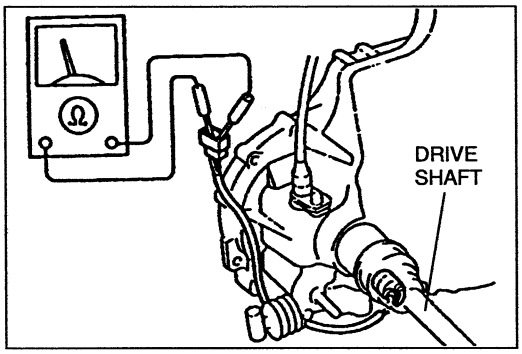
Pedal	Continuity
Depressed	Yes
Released	No

4. If not as specified, replace the clutch switch.



Replacement

1. Disconnect the clutch switch connector.
2. Loosen the locknuts.
3. Remove the clutch switch.
4. Install in the reverse order of removal.
5. Adjust the pedal height. (Refer to section H.)



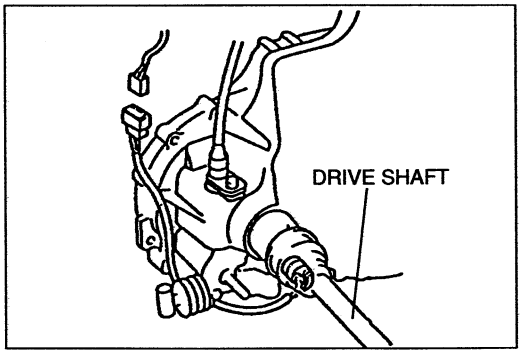
NEUTRAL SWITCH

Inspection

1. Disconnect the neutral switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

Transaxle	Continuity
Neutral	Yes
Other ranges/positions	No

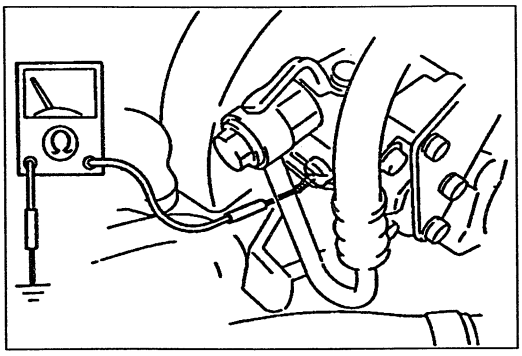
4. If not as specified, replace the neutral switch.

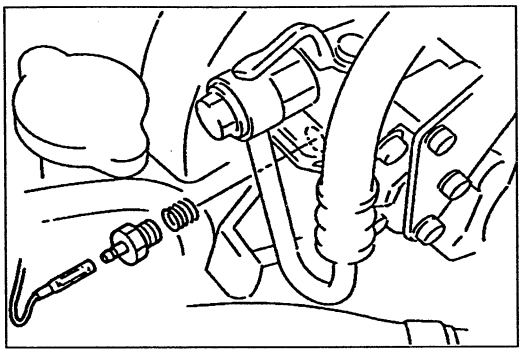


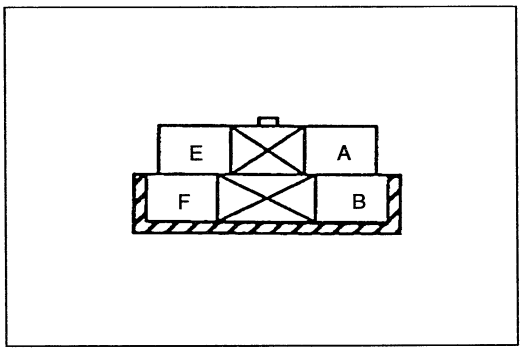
Replacement

Replace the neutral switch as shown in the figure.

Tightening torque:
20—29 N·m {2.0—3.0 kgf·m, 15—21 ft·lbf}







P/S PRESSURE SWITCH

Inspection

1. Disconnect the P/S pressure switch connector.
2. Connect an ohmmeter to the sensor.
3. Start the engine and run it at idle. Check continuity of the sensor while turning the steering wheel.

Steering wheel	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:
17—22 N·m {1.7—2.3 kgf·m, 13—16 ft·lbf}

MAIN RELAY

Inspection

1. Verify that the main relay clicks when the ignition switch is turned ON and OFF.
2. Apply battery positive voltage (B+) to terminal E and ground terminal A of the relay.
3. Check continuity of the relay as shown.

B+: Battery positive voltage

Terminals	B+ not applied	B+ applied
B—F	No continuity	Continuity

4. If not as specified, replace the main relay.

TROUBLESHOOTING GUIDE

QUICK DIAGNOSIS CHART

This Quick Diagnosis Chart shows the relationship between troubleshooting items and inspection points.

Item	Possible parts and reference page		Fuel system					Intake-air system				Emission control system								Ignition system					
			F1–65	F1–60	F1–63	F1–63	F1–59	F1–48	F1–13	F1–49	F1–48	F1–76	F1–81	F1–77	F1–72	F1–82	F1–82	F1–82	F1–78	section G					
			Fuel injector	Fuel pump	Fuel pump relay	Pressure regulator	Fuel filter	Air leakage	Idle speed adjustment	Throttle body	Air cleaner element	EGR solenoid valve (vent and vacuum)	Purge solenoid valve	EGR valve, EGR function control	Three way catalytic converter	Fuel vapor valve	Check valve (two-way)	Charcoal canister	PCV valve	Distributor	Ignition control module (in distributor)	Ignition coil (in distributor)	High-tension lead	Spark plug	Ignition timing
1	Main or other fuse melts		○	○	○							○	○							○		○			
2	Will not crank or cranks slowly																								
3	Cranks normally but will not start	No combustion	○	○	○															○					
4		Partial combustion — when engine cold	○							○										○	○	○			
5		Partial combustion — after warm-up				○																			
6	Cranks normally but hard to start	Any engine temp.		○		○																			
7		When engine cold	○							○														○	
8		After warm-up				○																			
9	Engine stalls	Idle at any engine temp.	○	○	○			○				○	○	○					○	○		○			
10		During fast idle										○	○	○											
11		Idle after warm-up							○																
12		Idle with A/C, P/S, and/or E/L ON																							
13		Driveaway	○			○	○													○	○				
14		On acceleration		○	○	○						○									○				
15		While cruising		○	○																○	○			
16		On deceleration		○	○			○	○					○								○			
17	Rough idle	Idle at any engine temp.	○	○	○			○		○		○	○	○					○	○		○	○		
18		During fast idle																						○	
19		Idle after warm-up						○																	
20		Idle with A/C, P/S, and/or E/L ON							○																
21		On deceleration												○											
22	Poor acceleration	Driveaway	○				○				○			○											
23		On acceleration	○			○	○														○			○	
24	High idle speed after warm-up								○																

*** 1996 626/MX–6 Body Electrical Troubleshooting Manual**

Control system																					Possible parts and reference page		
F1–99	F1–104	F1–101	F1–105	F1–100	BETM*	F1–108	F1–109	BETM*	F1–54	F1–93	BETM*	F1–70	BETM*	BETM*	section E	BETM*	BETM*	BETM*	F1–109	section G			
Mass air flow sensor	Engine coolant temperature sensor	Throttle position sensor	Heated oxygen sensor	Camshaft position sensor	Vehicle speed sensor	Clutch and neutral switches	P/S pressure switch	Brake switch	Idle air control valve	ECM	A/C relay	PRC solenoid valve	Blower switch	Condenser fan relay	Cooling fan relay	Air conditioning switch	Headlight switch	Rear window defroster	Main relay	Starter, Starter interlock switch			Item
○			○					○	○	○	○	○	○	○	○		○	○	○		Main or other fuse melts		1
																				○	Will not crank or cranks slowly		2
										○									○		No combustion	Cranks normally but will not start	3
○									○												Partial combustion — when engine cold		4
									○												Partial combustion — after warm-up		5
	○									○											Any engine temp.	Cranks normally but hard to start	6
										○											When engine cold		7
												○									After warm-up		8
○	○									○											Idle at any engine temp.	Engine stalls	9
																					During fast idle		10
○									○										○		Idle after warm-up		11
							○		○	○	○		○				○	○			Idle with A/C, P/S, and/or E/L ON		12
	○									○											Driveaway		13
○										○											On acceleration		14
○										○									○		While cruising		15
○			○			○			○	○									○		On deceleration		16
○	○								○	○											Idle at any engine temp.	Rough idle	17
									○												During fast idle		18
○	○								○										○		Idle after warm-up		19
							○		○	○	○		○				○	○			Idle with A/C, P/S, and/or E/L ON		20
																					On deceleration		21
○																					Driveaway	Poor acceleration	22
○										○											On acceleration		23
	○	○							○	○											High idle speed after warm-up		24

*** 1996 626/MX–6 Body Electrical Troubleshooting Manual**

Item	Possible parts and reference page	Fuel system					Intake-air system				Emission control system								Ignition system					
		F1–65	F1–60	F1–63	F1–63	F1–59	F1–48	F1–13	F1–49	F1–48	F1–76	F1–81	F1–77	F1–72	F1–82	F1–82	F1–82	F1–78	section G					
		Fuel injector	Fuel pump	Fuel pump relay	Pressure regulator	Fuel filter	Air leakage	Idle speed adjustment	Throttle body	Air cleaner element	EGR solenoid valve (vent and vacuum)	Purge solenoid valve	EGR valve, EGR function control	Three way catalytic converter	Fuel vapor valve	Check valve (two-way)	Charcoal canister	PCV valve	Distributor	Ignition control module (in distributor)	Ignition coil (in distributor)	High-tension lead	Spark plug	Ignition timing
25	Idle fluctuates/Idle hunts	○					○											○					○	
26	Hesitates/Stumbles on acceleration	○	○	○	○						○		○						○	○		○		
27	Surges while cruising	○																					○	
28	Lack of power	○				○				○				○					○					
29	Poor fuel economy				○		○																	
30	A/C does not work																							
31	Knocking/Pinging																							
32	Fuel odor											○			○	○	○							
33	Exhaust sulfur smell																							
34	High oil consumption																	○						
35	NGS displays "LINK COMMUNICATION ERROR"																							
36	MIL never ON																							

*** 1996 626/MX–6 Body Electrical Troubleshooting Manual**

Control system																							Possible parts and reference page / Item	
Mass air flow sensor	Engine coolant temperature sensor	Throttle position sensor	Heated oxygen sensor	Camshaft position sensor	Vehicle speed sensor	Clutch and neutral switches	P/S pressure switch	Brake switch	Idle air control valve	ECM	A/C relay	PRC solenoid valve	Blower switch	Condenser fan relay	Cooling fan relay	Air conditioning switch	Headlight switch	Rear window defroster	Main relay	Starter, Starter interlock switch				
F1–99	F1–104	F1–101	F1–105	F1–100	BETM*	F1–108	F1–109	BETM*	F1–54	F1–93	BETM*	F1–70	BETM*	BETM*	section E	BETM*	BETM*	BETM*	F1–109	section G				
		○							○	○											Idle fluctuates/Idle hunts	25
○		○								○											Hesitates/Stumbles on acceleration	26
○										○											Surges while cruising	27
○																					Lack of power	28
			○																		Poor fuel economy	29
										○	○		○			○					A/C does not work	30
																					Knocking/Pinging	31
																					Fuel odor	32
																					Exhaust sulfur smell	33
																					High oil consumption	34
																					NGS displays "LINK COMMUNICATION ERROR"	35
																					MIL never ON	36

*** 1996 626/MX–6 Body Electrical Troubleshooting Manual**

INPUT DEVICE \ OUTPUT DEVICE		FUEL INJECTOR		FUEL PUMP RELAY	IGNITION CONTROL MODULE	A/C RELAY (A/C CUT-OFF)	BAC VALVE (IDLE AIR CONTROL VALVE)	COOLING FAN RELAY	PURGE SOLENOID VALVE	EGR SOLENOID VALVE	PRESSURE REGULATOR CONTROL SOLENOID VALVE	SELF-DIAGNOSIS CHECKER (DIAGNOSTIC TROUBLE CODE) AND MALFUNCTION INDICATOR LIGHT (MIL)	SELF-DIAGNOSIS CHECKER (MONITOR LIGHT)
		FUEL INJECTION AMOUNT	FUEL INJECTION TIMING										
CAMSHAFT POSITION SENSOR	SGT SIGNAL	○	○	○	○		○		○	○	○	○	
	SGC SIGNAL		○									○	
CLOSED THROTTLE POSITION SWITCH		○	○		○		○	○	○	○			○
THROTTLE POSITION SENSOR		○	○			○				○	○	○	
MASS AIR FLOW SENSOR		○			○		○		○	○		○	
ENGINE COOLANT TEMPERATURE SENSOR		○			○	○	○	○	○	○	○	○	
INTAKE AIR TEMPERATURE SENSOR		○					○				○	○	
HEATED OXYGEN SENSOR		○							○			○	○
AIR CONDITIONING SWITCH						○	○	○					○
P/S PRESSURE SWITCH							○						○
BRAKE SWITCH													○
E/L SIGNAL*							○						○
NEUTRAL AND CLUTCH SWITCHES		○			○		○		○				○
DATA LINK CONNECTOR (TEN TERMINAL)					○		○	○			○	○	○
VEHICLE SPEED SENSOR							○						
DAYTIME RUNNING LIGHT (CANADA)							○						
EGR VALVE POSITION SENSOR												○	

* E/L SIGNAL: Blower fan control switch at third position or higher, headlights headlights ON, rear window defroster ON or cooling fan ON.

Output devices and engine condition

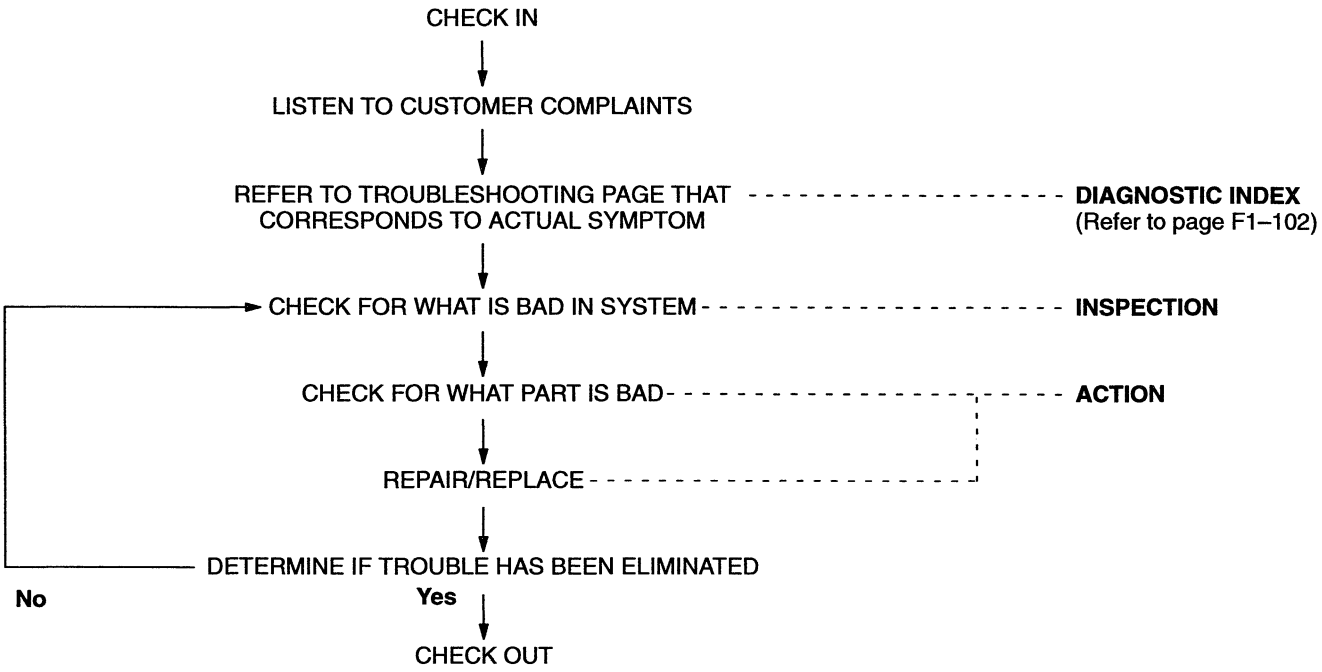
ENGINE CONDITION / OUTPUT DEVICE		CRANKING (COLD ENGINE)	WARMING UP (DURING IDLE)	MEDIUM LOAD		ACCELERATION	HEAVY LOAD	DECELERATION	IDLE	IG: ON (ENGINE NOT RUNNING)	REMARK
				COLD	WARM						
FUEL INJECTOR	FUEL INJECTION AMOUNT	Rich			Normal	Rich		Fuel cut*	Normal	No injection	* Engine speed: Above 1,500 rpm
FUEL PUMP RELAY		ON								OFF	
IGNITION CONTROL MODULE		Fixed at BTDC 6°	Advanced: depends on engine condition								
PURGE SOLENOID VALVE		OFF			ON (Purge)			OFF			
EGR SOLENOID VALVE (VACUUM)		OFF		ON* (Fixed)	ON* (Closed loop)	ON* (Fixed)	OFF				* Engine speed: 1,000—4,250 rpm
EGR SOLENOID VALVE (VENT)		ON (Fixed)		OFF	ON (Closed loop)	OFF	ON				
PRESSURE REGULATOR CONTROL SOLENOID VALVE		OFF (Vacuum to pressure regulator)							ON*	OFF	* During hot start
BAC VALVE	IAC VALVE	ON (Closed loop duty)		ON (Fixed duty)					ON (Closed loop duty)	OFF	
	AIR VALVE	OPEN			CLOSED					—	
A/C RELAY		OFF (A/C cut)	ON			OFF (A/C cut)	ON			OFF	

USING THIS SECTION

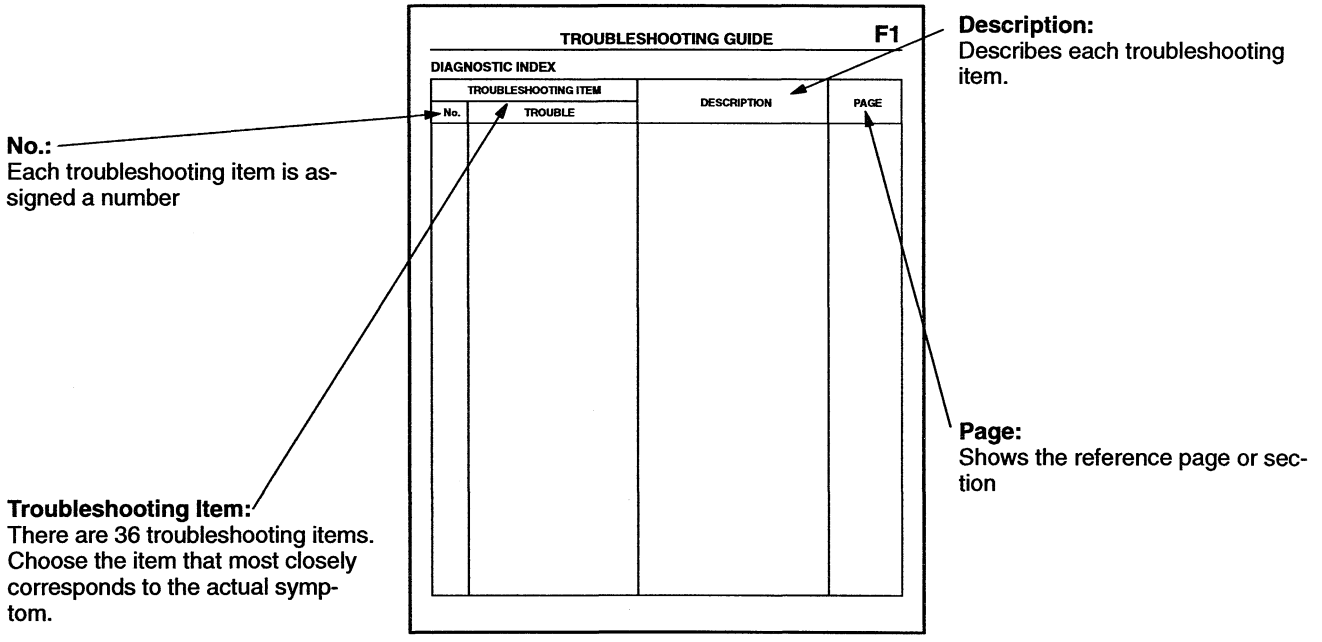
Introduction

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

Work flow



Diagnostic index



Troubleshooting chart

9 10 11	**ENGINE STALLS**	• **IDLE AT ANY ENGINE TEMP.** • **DURING FAST IDLE** • **IDLE AFTER WARM-UP**

DESCRIPTION • Engine stops unexpectedly at idle and/or during fast idle operation

[TROUBLESHOOTING HINTS]

①Fuel injector
- Fuel leakage from injector(s)
- Fuel injector(s) clogged

②Fuel pump
- Maximum pressure low

③Fuel pump relay
- Poor connection of connector

④Air leakage in intake-air system

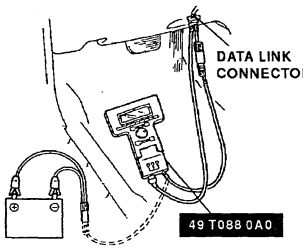
⑤Distributor
- Cap and/or rotor damaged
- Poor connection of connector

⑥Mass air flow sensor
- Poor connection of connector

⑦Engine coolant temperature senosr
- Poor connection of connector

⑧EGR valve
- EGR valve stuck

⑨BAC valve
- Air valve stuck

STEP	INSPECTION		ACTION
1	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14** 	Yes	**No DTCs displayed** • If symptom occurs at idle at any engine temp., go to next step • If symptom occurs during fast idle operation, go to step 8 • If symptom occurs at idle after warm-up, go to step 9
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Do Engine Signal Monitor lights flash for specified terminals while cranking engine? ☞ **page F1–93** **Terminal: 4U, 4V, 4W, 4X**	Yes	Go to next step
		No	Check follows according to results: If light does not flash and 0V indicated for each terminal; • Continuity of fuel injector(s) • Continuity between ECM and fuel injector(s) • Condition of injection connector and ECM connector Repair or replace parts and/or wiring harness as necess

DESCRIPTION:
This further describes the system. Confirm that the chart addresses the actual symptom before beginning troubleshooting.

TROUBLESHOOTING HINTS:
This describes the possible point of malfunction.

STEP:
This shows the order of troubleshooting. Proceed with troubleshooting as indicated.

INSPECTION:
This describes an inspection to quickly determine the malfunction of parts. If a detailed procedure is necessary to perform the INSPECTION, refer to the page specified by the "☞" mark.

ACTION:
This recommends the appropriate action to take as a result (Yes/No) of the INSPECTION. How to perform the action is described on the reference page specified by the "☞" mark.

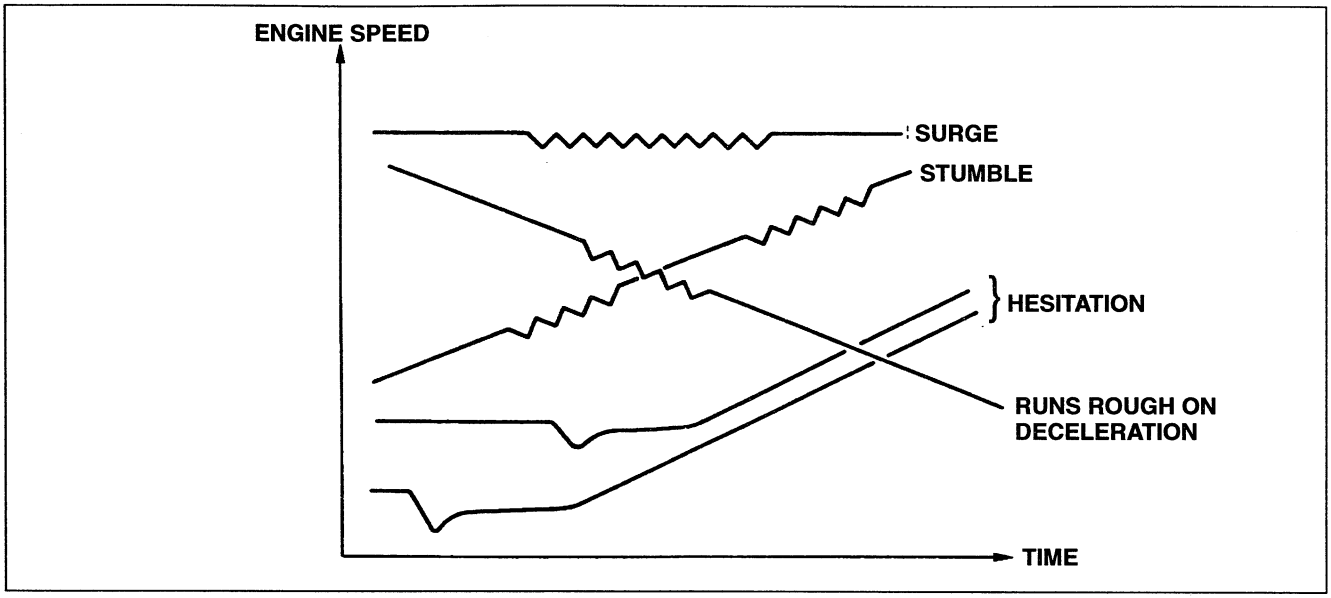
DIAGNOSTIC INDEX

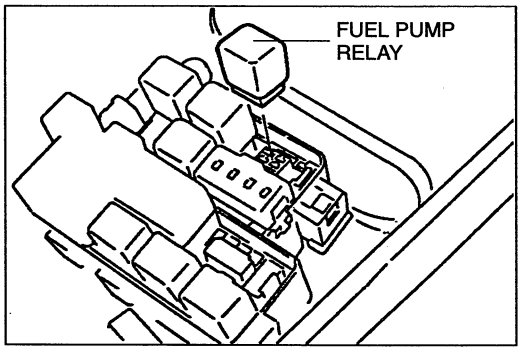
TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
1	Main or other fuse melts		—	F1–121
2	Will not crank or cranks slowly		Starter does not work Starter cranks engine at slow speed	section G
3	Cranks normally but will not start	No combustion	Starter cranks engine at normal speed but engine shows no indication of firing	F1–122
4		Partial combustion — when engine cold	Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is cold or at initial starting Engine will not continue running when cold or when ignition switch is returned from STA to ignition position	F1–122
5		Partial combustion — when engine warm	Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is warm Engine will not continue running when warm or when ignition switch is returned from STA to ignition position	F1–124
6	Cranks normally but hard to start	Any engine temp.	Starter cranks engine at normal speed but engine requires excessive cranking time before starting at any engine temperature Engine starts after stalling a few times at any engine temperature	F1–125
7		When engine cold	Starter cranks engine at normal speed but engine requires excessive cranking time before starting when engine is cold Engine starts after stalling a few times when engine is cold	
8		After warm-up	Starter cranks engine at normal speed but engine requires excessive cranking time before starting after warm-up	
9	Engine stalls	Idle at any engine temp.	Engine stops unexpectedly at any engine temp.	F1–127
10		During fast idle	Engine stops unexpectedly during fast-idle operation	
11		Idle after warm-up	Engine stops unexpectedly at idle after warm-up	
12		Idle with A/C, P/S, and/or E/L ON	Engine stops unexpectedly when A/C, P/S, and/or E/L turned ON at idle	F1–130
13		Driveaway	Engine stops unexpectedly upon driveaway	F1–131
14		On acceleration	Engine stops unexpectedly at begining of acceleration or during acceleration	F1–132
15		While cruising	Engine stops unexpectedly while cruising	
16		On deceleration	Engine stops unexpectedly at begining of deceleration or recovery from deceleration Exhaust afterburn	F1–134
17	Rough idle	Idle at any engine temp.	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at any engine temp. Idle speed too slow and excessive engine shake at any engine temp.	F1–136
18		During fast idle	Fast-idle speed too slow and excessive engine shake during fast idle, but returns to normal after warm-up	
19		Idle after warm-up	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle after warm-up	
20		Idle with A/C, P/S, and/or E/L ON	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when A/C, P/S, and/or E/L ON	F1–139
21		On deceleration	Engine shakes at begining of deceleration, during deceleration, or recovery from deceleration Exhaust afterburn	F1–140

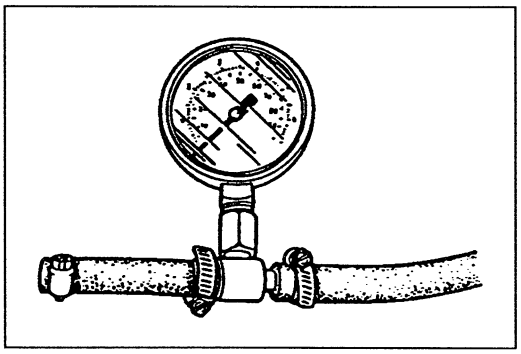
TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
221	Poor acceleration	Driveaway	Engine speed increases normally but vehicle speed slowly increases during driveaway	F1–143
23		On acceleration	Engine speed increases normally but vehicle speed slowly increases during acceleration	
24	High idle speed after warm-up		Idle speed continues at fast idle after warm-up Engine speed returns slowly to idle after accelerator is released	F1–145
25	Idle fluctuates/Idle hunts		Engine speed changes back and forth between specified idle speed and higher speed	F1–146
26	Hesitates/Stumbles on acceleration		Momentary pause at beginning of acceleration or during acceleration	F1–148
27	Surges while cruising		Momentary minor irregularity in engine output at steady vehicle speed	F1–150
28	Lack of power		Performance poor under load (i.e., power down when climbing hills)	F1–151
29	Poor fuel economy		Fuel economy unsatisfactory	F1–151
30	A/C does not work		A/C compressor magnetic clutch does not engage when Air conditioning switch ON	F1–151
31	Knocking/Pinging		Noise produced when air/fuel mixture is ignited by something other than spark plug (i.e., hot spot in combustion chamber)	F1–151
32	Fuel odor		Gasoline fuel smell or visible leaks	F1–152
33	Exhaust sulfur smell		Rotten egg smell from exhaust	F1–152
34	High oil consumption		Oil consumption excessive	F1–152
35	NGS displays "LINK COMMUNICATION ERROR"		NGS displays "link communication error"	F1–152
36	MIL never ON		NGS indicates Diagnostic Trouble Code No. but MIL never ON	F1–152

Description of Drivability Problems

STUMBLE : Mildly irregular performance during acceleration.
HESITATION : A dip or flat spot in performance just after the accelerator pedal is depressed.
SURGE : Continuous irregular performance during cruising.







Fuel Pressure Release and Servicing Fuel System

Warning

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

Fuel in the fuel system is under high pressure when the engine is not running.

Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the following "Fuel Line Safety Procedures".**

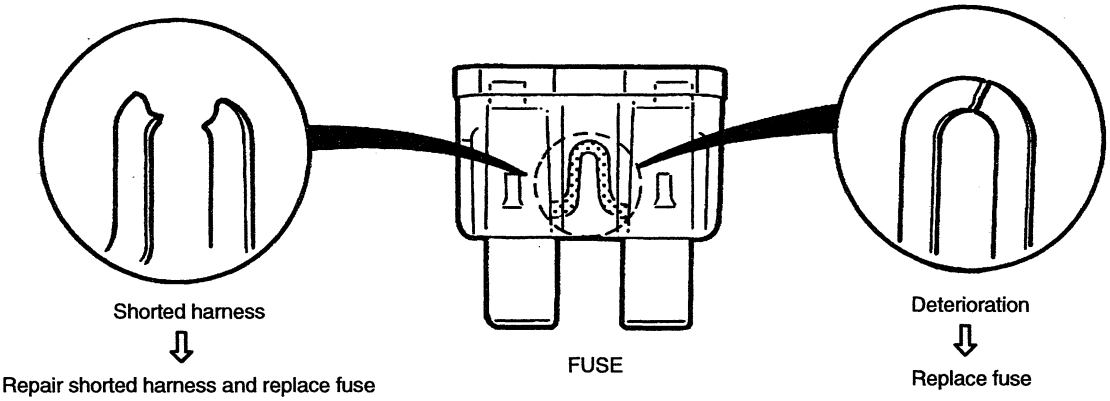
Fuel Line Safety Procedures

1. Release the fuel pressure before disconnecting a fuel line.
   (1) Start the engine.
   (2) Remove the fuel pump relay.
   (3) After the engine stalls, turn the ignition switch to OFF.
   (4) Install the fuel pump relay.
2. Avoid leakage.
   (1) When disconnecting a fuel line hose, wrap a rag around it to protect against fuel leakage.
   (2) Plug the hose after removal.
3. Install hose clamps to secure the fuel pressure gauge to the fuel filter and the main hose.

SYMPTOM TROUBLESHOOTING

1	MAIN OR OTHER FUSE MELTS

[TROUBLESHOOTING HINTS]
Check the condition of the fuse



Damaged Fuse	Related Wiring Harness
MAIN (100A)	Main fuse — Generator
BTN (60A)	BTN fuse — ROOM fuse
ROOM (15A)	ROOM fuse — ECM terminal 4I
EGI INJ (30A)	Main relay — Fuel injectors ECM terminal 4B Distributor PRC solenoid valve EGR solenoid valve (vent and vacuum) Idle air control valve Purge solenoid valve Mass air flow sensor
EGI INJ (15A)	ENGINE fuse — Main relay Main relay
METER (15A)	METER fuse — Data link connector terminal +B
WIPER (20A)	WIPER fuse — Heated oxygen sensor

3	CRANKS NORMALLY BUT WILL NOT START	• NO COMBUSTION
DESCRIPTION	• Starter cranks engine at normal speed but engine shows no indication of firing	

[TROUBLESHOOTING HINTS]

① Distributor
- Poor connection of connector
- Open in ignition coil ☞ **section G**

② Main relay
- Poor connection of connector
- Malfunction of relay ☞ **page F1–109**

③ ECM
- No IGT signal output from ECM terminal 4N to ignition control module (in distributor) ☞ **section G**

4	CRANKS NORMALLY BUT WILL NOT START	• PARTIAL COMBUSTION — WHEN ENGINE COLD
DESCRIPTION	• Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is cold at initial starting • Engine will not continue running when cold or when ignition switch is returned from STA to IG position • Refer to "ENGINE STALLS" if this symptom appears after engine stalls • Fuel in tank • Battery in normal condition	

[TROUBLESHOOTING HINTS]

① BAC valve
- Malfunction of air valve
- Idle air control valve stuck

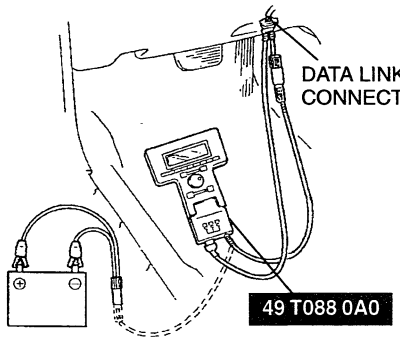
② Fuel injector
- Poor connection

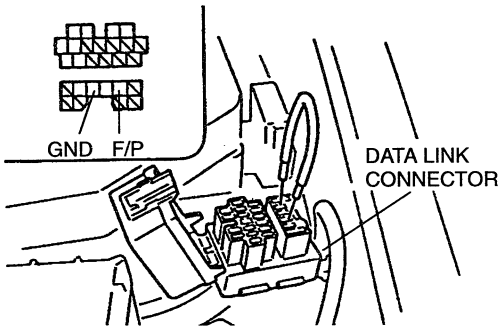
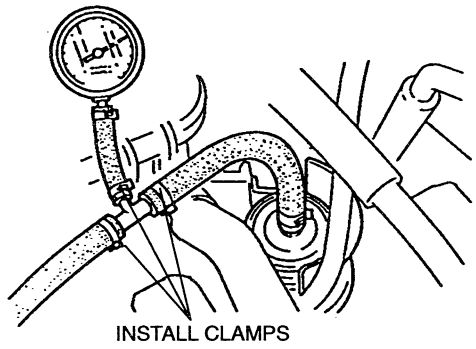
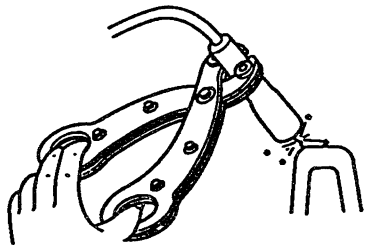
③ Fuel pump relay
- Poor connection

④ Fuel pump
- Poor connection of connector

⑤ Distributor
- Cap and/or rotor damaged
- Poor connection of connector

⑥ Mass air flow sensor
- Poor connection of connector

STEP	INSPECTION		ACTION
1	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14**  	Yes	**No DTCs displayed** Go to next step
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Does engine start when throttle valve held quarter open?	Yes	Check air valve operation ☞ **page F1–54**
		No	Go to next step
3	Do Engine Signal Monitor lights flash for specified terminals while cranking engine? ☞ **page F1–93** **Terminal: 4U, 4V, 4W, 4X**	Yes	Go to next step
		No	Check follows according to results: If light does not flash and 0V indicated for each terminal; • Continuity of fuel injector • Continuity between ECM and fuel injector(s) • Condition of fuel injector connector and ECM connector female terminals Repair or replace parts and/or wiring harness as necessary

STEP	INSPECTION		ACTION
4	Connect jumper wire between F/P and GND terminals of data link connector; will engine start?  	Yes	Check follows: • 1U terminal voltage at ECM ☞ **page F1–93** • Continuity between 1U terminal and fuel pump relay connector terminal • Condition of ECM and fuel pump relay connector female terminals
		No	Check if fuel pump operating sound is heard • If yes, go to next step • If no, check fuel pump and wiring harness ☞ **page F1–60**
5	Are mass air flow sensor terminal voltages at ECM correct? ☞ **page F1–93** **3B terminal: 1.0—1.5V (Ign. ON)** **1.5—5.0V (Engine running)**	Yes	Go to next step
		No	Check as follows: • Ground of mass air flow sensor • Continuity between mass air flow sensor and ECM connector • Condition of mass air flow sensor and ECM connector female terminals
6	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F1–57** **Fuel line pressure:** **260—320 kPa {2.7—3.3 kgf/cm², 37—46 psi}**  	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F1–63** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F1–61**
7	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Go to next step
		No	Check follows • Distributor cap and rotor ☞ **section G** • High-tension leads ☞ **section G**
8	Are fuel injectors OK? • No fuel leakage ☞ **page F1–66** • Fuel injectors not clogged ☞ **page F1–65**	Yes	Go to next step
		No	Replace fuel injector(s) ☞ **page F1–65**
9	Try known good ECM; does condition improve? ☞ **page F1–93**		

5	CRANKS NORMALLY BUT WILL NOT START	• PARTIAL COMBUSTION — AFTER WARM-UP
DESCRIPTION	• Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is warm • Engine will not continue running when ignition switch is returned from STA to IG position	
[TROUBLESHOOTING HINTS] ① Pressure regulator • Hold fuel pressure low ☞ page F1–63 ② Throttle body • Carbon on throttle valve ☞ page F1–49		

6 7 8	**CRANKS NORMALLY BUT HARD TO START**	• **ANY ENGINE TEMP.** • **WHEN ENGINE COLD** • **AFTER WARM-UP**

DESCRIPTION	• Starter cranks engine at normal speed but engine requires excessive cranking time before starting • Engine starts after stalling a few times • Battery in normal condition • Engine runs normally at idle (if idle condition not OK, refer to "Rough idle" [Nos. 19—23])

[TROUBLESHOOTING HINTS]

① Fuel injector
- Fuel leakage from injector(s)

② Fuel pump
- Malfunction of pump

③ Pressure regulator
- Pressure regulator stuck

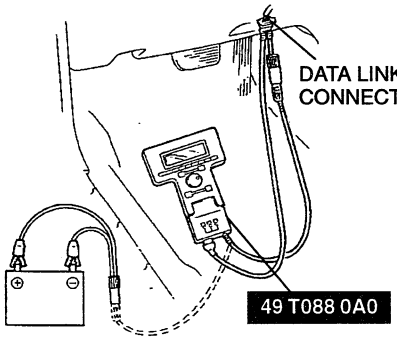
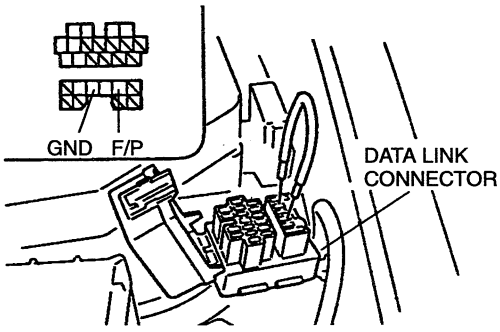
④ Spark plug
- Dirty or worn spark plug(s)

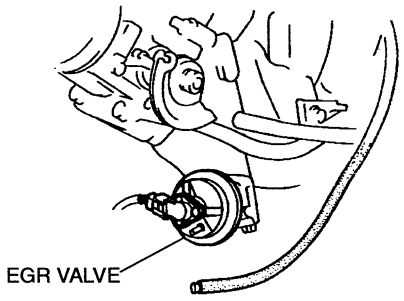
⑤ PRC solenoid valve
- PRC solenoid valve

⑥ Throttle body
- Carbon on throttle valve

⑦ EGR solenoid valve (vacuum or vent)
- Solenoid valve stuck

⑧ EGR control valve
- EGR control valve stuck

STEP	INSPECTION		ACTION
1	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14** 	Yes	**No DTCs displayed** Go to next step
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F1–57** **Fuel line pressure:** **260—320 kPa {2.6—3.3 kgf/cm², 37—46 psi}** 	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F1–63** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F1–61**

STEP	INSPECTION		ACTION
3	Is fuel line pressure held after ignition switch turned OFF? ☞ **page F1–56** **Fuel line pressure:** **More than 150 kPa {1.5 kgf/cm², 21 psi} for 5 min.**	Yes	• If symptom occurs at any engine temp., go to step 6 • If symptom occurs when engine cold, go to next step • If symptom occurs after warm-up, go to step 6
		No	Plug outlet of pressure regulator; is fuel line pressure held after ignition switch turned OFF? ☞ **page F1–56** • If yes, replace pressure regulator ☞ **page F1–64** • If no, check fuel pump hold pressure ☞ **page F1–60** If fuel pump OK, check fuel injectors for fuel leakage ☞ **page F1–66**
4	Is inside of throttle body clean?	Yes	Go to next step
		No	Clean throttle body
5	Disconnect vacuum hose from EGR valve and plug it; does condition improve?  	Yes	Check follows: • EGR solenoid valve for sticking • Condition of solenoid valve connector female terminal(s)
		No	Check if EGR valve moves smoothly ☞ **page F1–77** • If yes, go to next step • If no, replace EGR valve ☞ **page F1–77**
6	Try known good ECM; does condition improve? ☞ **page F1–93**		

9 10 11	**ENGINE STALLS**	• **IDLE AT ANY ENGINE TEMP.** • **DURING FAST IDLE** • **IDLE AFTER WARM-UP**

DESCRIPTION • Engine stops unexpectedly at idle and/or during fast idle operation

[TROUBLESHOOTING HINTS]

① Fuel injector
- Fuel leakage from injector(s)
- Fuel injector(s) clogged

② Fuel pump
- Maximum pressure low

③ Fuel pump relay
- Poor connection of connector

④ Air leakage in intake-air system

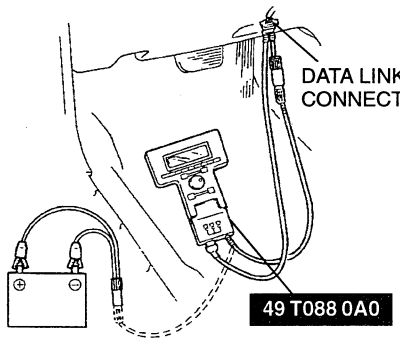
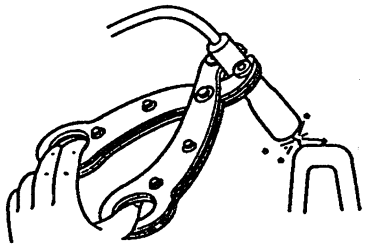
⑤ Distributor
- Cap and/or rotor damaged
- Poor connection of connector

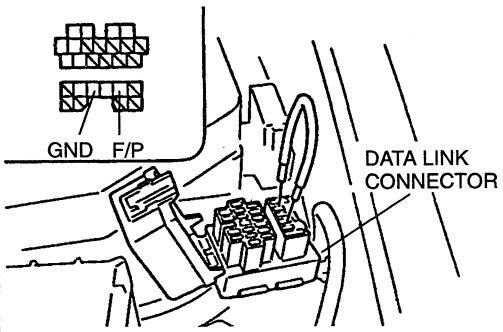
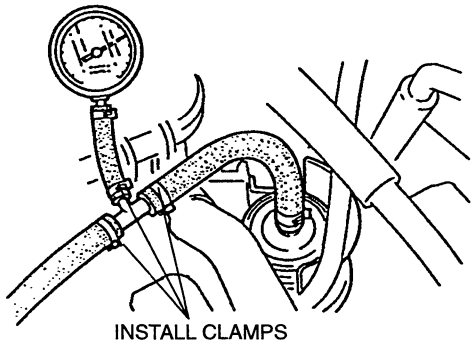
⑥ Mass air flow sensor
- Poor connection of connector

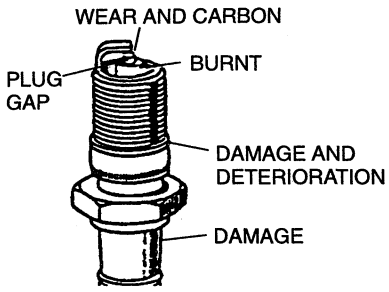
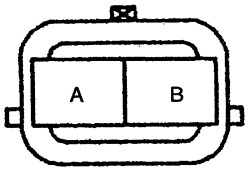
⑦ Engine coolant temperature senosr
- Poor connection of connector

⑧ EGR valve
- EGR valve stuck

⑨ BAC valve
- Air valve stuck

STEP	INSPECTION		ACTION
1	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14**  	Yes	**No DTCs displayed** • If symptom occurs at idle at any engine temp., go to next step • If symptom occurs during fast idle operation, go to step 8 • If symptom occurs at idle after warm-up, go to step 9
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Do Engine Signal Monitor lights flash for specified terminals while cranking engine? ☞ **page F1–93** **Terminal: 4U, 4V, 4W, 4X**	Yes	Go to next step
		No	Check follows according to results: If light does not flash and 0V indicated for each terminal; • Continuity of fuel injector(s) • Continuity between ECM and fuel injector(s) • Condition of injection connector and ECM connector Repair or replace parts and/or wiring harness as necessary
3	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Go to next step
		No	Check follows: • Distributor cap and rotor ☞ **section G** • High-tension lead(s) ☞ **section G**

STEP	INSPECTION		ACTION
4	Connect jumper wire between F/P and GND terminal of data link connector; will engine run? 	Yes	Check follows: • 1U terminal voltage at ECM ☞ **page F1–93** • Continuity between 1U terminal and fuel pump relay connector terminal • Condition of ECM and fuel pump relay connector female terminals
		No	Check if fuel pump operating sound is heard • If yes, go to next step • If no, check fuel pump circuit
5	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F1–57** **Fuel line pressure:** **260—320 kPa {2.6—3.3 kgf/cm², 37—46 psi}** 	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F1–63** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F1–61**
6	Is air leakage felt or heard at intake-air system components while racing engine to higher speed?	Yes	Repair or replace
		No	Go to next step
7	Is engine compression correct? ☞ **section B1** **Engine compression (Minimum):** **820 kPa (8.4 kgf/cm², 120 psi]–300 rpm**	Yes	Go to step 9
		No	Check for cause ☞ **section B1**
8	Does engine start with throttle valve held quarter open?	Yes	Check follows: • Operation of air valve ☞ **page F1–54** • Operation of EGR valve ☞ **page F1–77**
		No	Go to next step
9	Does following terminal voltage at ECM decrease smoothly? ☞ **page F1–93** **Terminal 3G voltage: Approx. 0.5—2.5V**	Yes	Go to next step
		No	Check follows: • Ground of engine coolant temperature sensor • Continuity between engine coolant temperature sensor and ECM connector • Condition of engine coolant temperature sensor and ECM connector female terminals

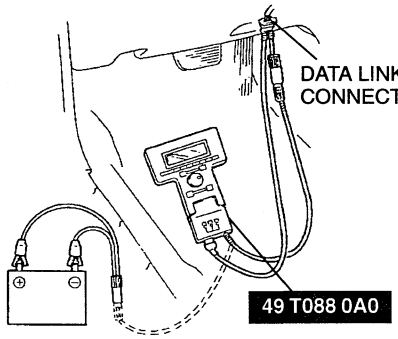
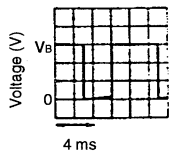
STEP	INSPECTION		ACTION
10	Are spark plugs OK? ☞ **section G** 	Yes	• If symptom occurs at any engine temp., go to step 14 • If symptom occurs at fast idle operation, go to step 14 • If symptom occurs at idle after warm-up, go to next step
		No	Clean or replace ☞ **section G**
11	Is resistance of idle air control valve correct? ☞ **page F1–54** **Resistance: 7.7—9.3Ω [at 20°C {68°F}]** 	Yes	Go to next step
		No	Replace BAC valve ☞ **page F1–48**
12	Try a known good BAC valve; does condition improve?	Yes	Replace BAC valve ☞ **page F1–48**
		No	Reinstall BAC valve and go to next step
13	Is front heated oxygen sensor (front) operation OK? ☞ **page F1–105**	Yes	Go to next step
		No	Check follows: • Poor connection of engine coolant temperature sensor connector
14	Are fuel injectors OK? • No fuel leakage ☞ **page F1–66** • Fuel injectors not clogged ☞ **page F1–65**	Yes	Go to next step
		No	Replace fuel injector(s) ☞ **page F1–65**
15	Try a known good ECM; does condition improve? ☞ **page F1–93**		

12	ENGINE STALLS	• IDLE WITH A/C, P/S, AND/OR E/L ON
DESCRIPTION	• Engine stops unexpectedly when A/C, P/S, and/or E/L turned ON at idle • Idle condition is normal when A/C, P/S, and E/L are OFF	

[TROUBLESHOOTING HINTS]

① E/L switch malfunction
- Air conditioning switch
- Headlight switch
- Rear window defroster switch
- P/S pressure switch
- Blower switch

② Idle air control valve
- Solenoid valve stuck

STEP	INSPECTION		ACTION
1	Are terminal voltages at ECM connector correct? ☞ **page F1–93** • 1P Fan switch • 1H Headlight switch • 1J Rear window defroster switch • 1K Air conditioning switch • 3P P/S pressure switch	Yes	Go to next step
		No	Check for cause
2	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14** 	Yes	**No DTCs displayed** Go to next step
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
3	Is terminal voltage at ECM connector correct at idle? ☞ **page F1–93** **4Q terminal: idle air control valve** 	Yes	Check BAC valve and replace ☞ **page F1–54**
		No	Try known good ECM and check if condition improves ☞ **page F1–93**

13	ENGINE STALLS	• DRIVEAWAY
DESCRIPTION	• Engine stops unexpectedly upon driveaway • Idle condition normal	

[TROUBLESHOOTING HINTS]

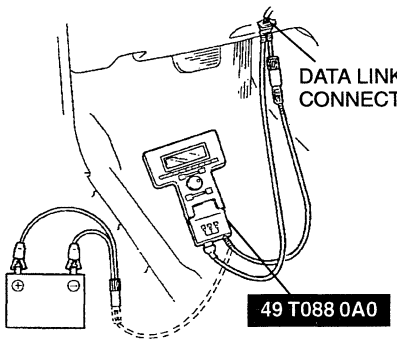
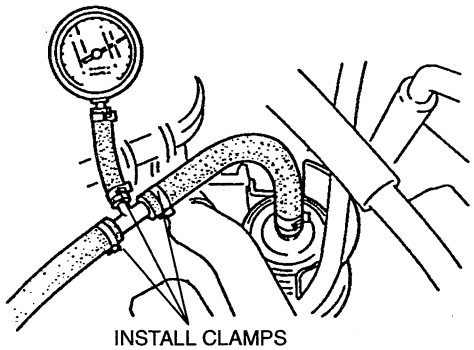
① Fuel injector
- Fuel leakage from fuel injector(s)
- Fuel injector(s) clogged

② Pressure regulator
- Diaphragm damaged

③ Fuel filter
- Fuel filter clogged

④ Distributor
- Poor connection of connector
- Cap and/or rotor damaged

⑤ Engine coolant temperature sensor
- Poor connection of connector

STEP	INSPECTION		ACTION
1	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14**  	Yes	**No DTCs displayed** Go to next step
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Using Engine Signal Monitor, do voltage reading and light operation change as follows upon driveaway? ☞ **page F1–93** Terminal / Condition: 3B – Voltage gradually increases 3G – Voltage does not change suddenly 4U, 4V, 4W, 4X – Flashing of green and red lights becomes quicker	Yes	Go to next step
		No	Check follows: • Condition of female terminals in related connector • Continuity between injector connector and ECM connector
3	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F1–57** **Fuel line pressure:** **260—320 kPa {2.6—3.3 kgf/cm², 37—46 psi}**  	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F1–63** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F1–61**
4	Are fuel injectors OK? • No fuel leakage ☞ **page F1–66** • Fuel injectors not clogged ☞ **page F1–65**	Yes	Try a known good ECM; does condition improve? ☞ **page F1–93**
		No	Replace fuel injector ☞ **page F1–65**

14 15	ENGINE STALLS	• ON ACCELERATION/WHILE CRUISING

DESCRIPTION
- Engine stops unexpectedly at beginning of acceleration or during acceleration
- Engine stops unexpectedly while cruising

[TROUBLESHOOTING HINTS]

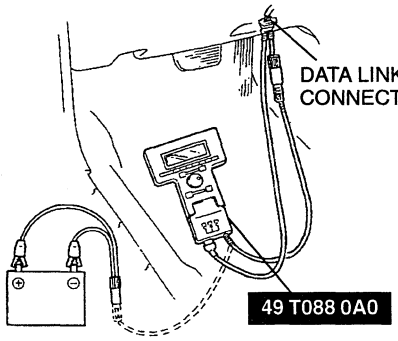
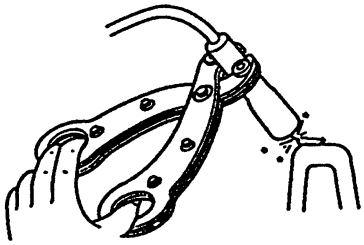
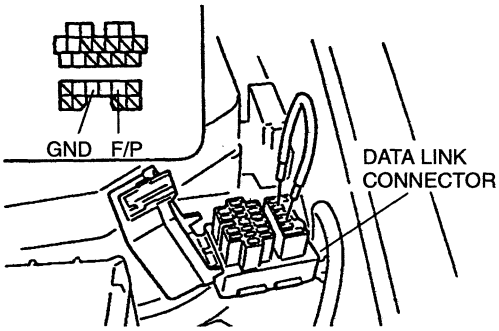
① Fuel pump
- Poor connection

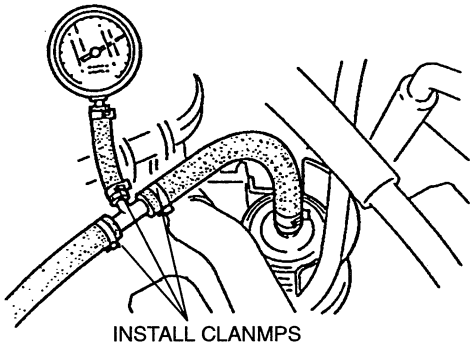
② Pressure regulator
- Diaphragm damaged

③ Distributor
- Poor connection of connector
- Cap and/or rotor damaged

④ Mass air flow sensor
- Poor connection of connector

⑤ Main relay
- Poor connection of connector

STEP	INSPECTION		ACTION
1	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14**  	Yes	**No DTCs displayed** Go to next step
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plugs ☞ **section G** ➪ If OK, go to next step ➪ If not OK, clean or replace spark plug
		No	Check as follows: • Distributor cap and rotor ☞ **section G** • High-tension lead(s) ☞ **section G** • Condition of distributor connector female terminals
3	Are mass air flow sensor connector terminals and connection good? ☞ **page F1–99**	Yes	Go to next step
		No	Repair connector terminal(s)
4	Ground terminal F/P of data link connector with ignition switch ON; is operation sound of fuel pump heard?  	Yes	Go to next step
		No	Check as follows: • Poor connection of fuel pump relay • Poor connection of fuel pump connector • Melted CIS INJ fuse (30A) Refer to "No.1 — MELTS MAIN OR OTHER FUSE" • Poor connection of main relay • Operation of main relay ☞ **page F1–109**

STEP	INSPECTION		ACTION
5	Is fuel line pressure correct at idle? ☞ page F1–63 **Fuel line pressure:** **210—250 kPa {2.1—2.6 kgf/cm^2, 30—36 psi}**  INSTALL CLANMPS	Yes	Go to next step
		No	Check pressure regulator ☞ page F1–63
6	Try a known good ECM; does condition improve? ☞ page F1–93		

16	ENGINE STALLS	• ON DECELERATION
DESCRIPTION	• Engine stops unexpectedly at beginning of deceleration or recovery from deceleration • Exhaust afterburn	

[TROUBLESHOOTING HINTS]

① Fuel pump
- Poor connection

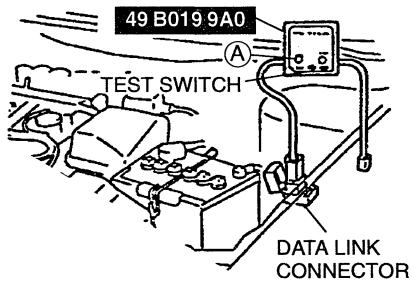
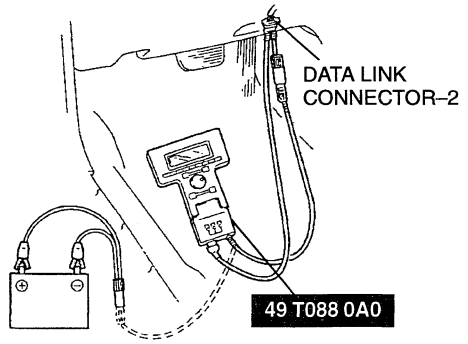
② Idle speed
- Idle speed too low

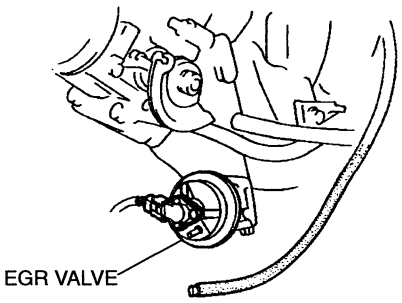
③ Distributor
- Poor connection of connector

④ Mass air flow sensor
- Poor connection of connector

⑤ Idle air control valve
- Solenoid valve stuck

⑥ EGR valve
- Solenoid valve stuck
- EGR valve stuck

STEP	INSPECTION		ACTION
1	Connect System Selector to data link connector and set test switch to SELF TEST; is idle speed correct after warm-up? ☞ **page F1–12** **Idle speed: 500—800 rpm** 	Yes	Go to step 3
		No	Remove System Selector and go to next step
2	Does idle speed drop in following conditions? Condition • Electrical load ON • Air conditioner ON • P/S operating	Yes	Check follows; • Circuit from idle air control valve to ECM for open and short ☞ **page F1–93** • Idle air control valve for sticking ☞ **page F1–54**
		No	Adjust idle speed ☞ **page F1–12**
3	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14** 	Yes	**No DTCs displayed** Go to next step
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
4	Are mass air flow sensor connector terminals and connection good?	Yes	Go to next step
		No	Repair connector terminal
5	Are following terminals and connections good? • Distributor connector • Fuel pump connector • Main relay • ECM connector	Yes	Go to next step
		No	Repair connector terminal

STEP	INSPECTION		ACTION
6	Disconnect vacuum hose from EGR valve and plug it; does condition improve?  	Yes	Check follows: • EGR solenoid valve • Condition of solenoid valve connectors female terminals
		No	Go to next step
7	Try a known good ECM; does condition improve? ☞ page F1–93		

17 18 19	ROUGH IDLE	• IDLE AT ANY ENGINE TEMP./DURING FAST IDLE/ IDLE AFTER WARM-UP

DESCRIPTION

- Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at any engine temp.
- Idle speed too slow and excessive engine shake at any engine temp.
- Fast idle speed too slow and excessive engine shake during fast idle, but returns to normal after warm-up
- Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle after warm-up

[TROUBLESHOOTING HINTS]

① Fuel injector
- Fuel leakage from fuel injector(s)
- Fuel injector(s) clogged

② Fuel pump
- Maximum pressure low

③ Fuel pump relay
- Poor connection of connector

④ Air leakage
- Leakage in intake-air system

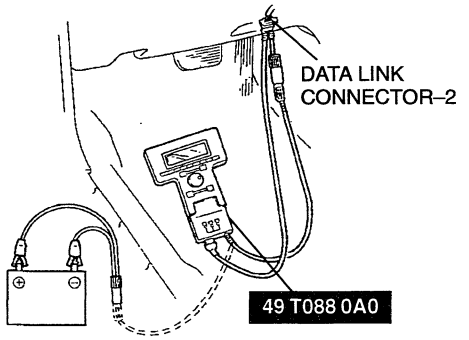
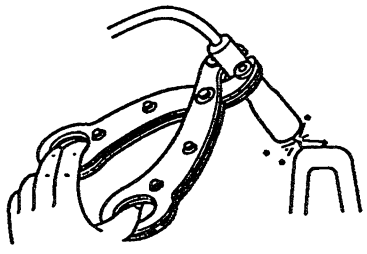
⑤ Distributor
- Cap and/or rotor damaged
- Poor connection of connector

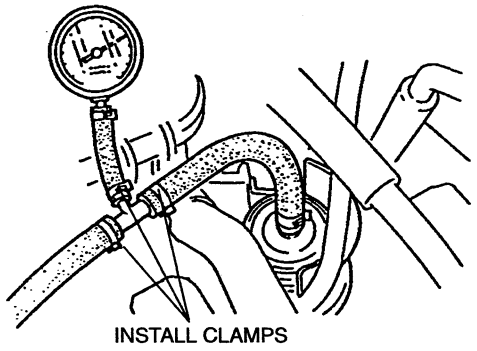
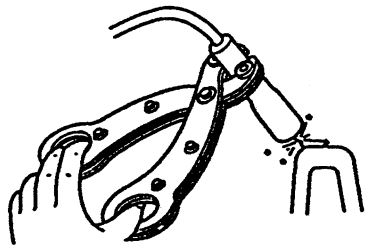
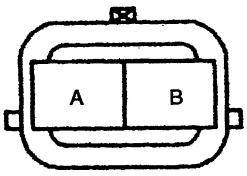
⑥ Mass air flow sensor
- Poor connection of connector

⑦ Engine coolant temperature sensor
- Poor connection of connector

⑧ EGR valve
- EGR valve stuck

⑨ BAC valve
- Air valve stuck

STEP	INSPECTION		ACTION
1	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14** 	Yes	**No DTCs displayed** • If symptom occurs at idle at any engine temp., go to next step • If symptom occurs during fast idle operation, go to step 6 • If symptom occurs at idle after warm-up, go to step 7
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Do Engine Signal Monitor lights flash for specified terminals while cranking engine? ☞ **page F1–93** **Terminal: 4U, 4V, 4W, 4X**	Yes	Go to next step
		No	Check as follows according to results: Does not flash and 0V indicated for individual terminal(s) • Continuity of fuel injector(s) ☞ **page F1–65** • Continuity between ECM and fuel injector(s) • Condition of fuel injector connector and ECM connector Repair or replace parts and/or wiring harness as necessary
3	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Go to next step
		No	Check distributor cap and rotor Check follows: • Distributor cap and rotor ☞ **section G** • High-tension lead(s) ☞ **section G**

STEP	INSPECTION		ACTION
4	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F1–57** **Fuel line pressure:** **260—320 kPa {2.6—3.3 kgf/cm², 37—46 psi}**  INSTALL CLAMPS	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F1–63** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F1–61**
5	Is there air leakage at intake air system components while racing engine to higher speed?	Yes	Repair or replace
		No	Go to next step
6	Is engine compression correct? ☞ **section B1** **Engine compression (minimum):** **820 kPa {8.4 kgf/cm², 120 psi}**	Yes	Go to next step
		No	Check for cause ☞ **section B1**
7	Connect engine signal monitor to ECM and set to position 3G Does following terminal voltage in ECM increase smoothly? ☞ **page F1–93** **Terminal 3G voltage: Approx. 0.5—2.5V**	Yes	Go to next step
		No	Check as follows: • Ground of engine coolant temperature sensor • Continuity between engine coolant temperature sensor and ECM connector • Condition in engine coolant temperature sensor and ECM conncetor female terminals
8	Are spark plugs OK? ☞ **section G** 	Yes	• If symptom occurs at any engine temp., go to step 12 • If symptom occurs during fast idle operation, go to step 12 • If symptom occurs at idle after warm-up, go to next step
		No	Clean or replace
9	Is resistance of idle air control valve correct? **Resistance: 7.7—9.3Ω [at 20°C {68°F}]**  	Yes	Go to next step
		No	Replace BAC valve ☞ **page F1–48**

STEP	INSPECTION		ACTION
10	Try a known good BAC valve; does condition improve?	Yes	Replace BAC valve ☞ **page F1–48**
		No	Reinstall BAC valve Go to next step
11	Are fuel injectors OK? • No fuel fuel leakage ☞ **page F1–66** • Fuel injectors not clogged ☞ **page F1–65**	Yes	Go to next step
		No	Replace fuel injector(s) ☞ **page F1–65**
12	Is front heated oxygen sensor (front) operation correct? ☞ **page F1–106**	Yes	Go to next step
		No	Replace front heated oxygen sensor
13	Try a known good ECM; does condition improve? ☞ **page F1–93**		

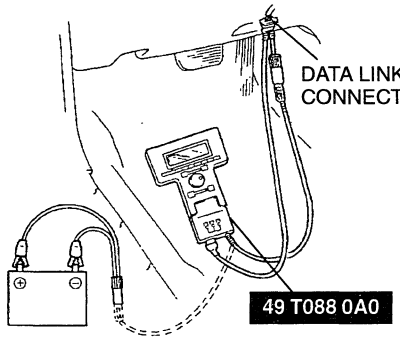
20	ROUGH IDLE	• IDLE WITH A/C, P/S AND/OR E/L ON
DESCRIPTION	• Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when A/C, P/S and/or E/L ON	

[TROUBLESHOOTING HINTS]

① Idle speed
- Idle speed too low

② E/L signal does not input to ECM
- Air conditioning switch
- Headlight switch
- Rear window defroster switch
- Blower switch
- P/S pressure switch

③ Idle air control valve
- Solenoid valve stuck

STEP	INSPECTION		ACTION
1	Connect System Selector to data link connector and set test switch to SELF TEST; is idle speed correct after warm-up? ☞ **page F1–12** **Idle speed: 500—800 rpm**	Yes	Go to next step
		No	Adjust idle speed and go to next step ☞ **page F1–12**
2	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14**  	Yes	**No DTCs displayed** Go to next step
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
3	Are terminal voltages at ECM connector correct? ☞ **page F1–93** • 1K Air conditioning switch • 1H Headlight switch • 1J Rear window defroster switch • 1P Fan switch • 3P P/S pressure switch	Yes	Go to next step
		No	Check for cause ☞ **page F1–93**
4	Warm up engine Does idle speed change when idle air control valve connector disconnected?	Yes	Go to next step
		No	Check idle air control valve for sticking ☞ **page F1–54**
5	Does air conditioner operate continuously with ignition switch ON and A/C switch and blower switch OFF?	Yes	Check as follows: • Malfunction of A/C relay ☞ **1996 626/MX–6 Body Electrical Troubleshooting Manual section G** • Wiring harness between A/C relay and ECM terminal 1G for short circuit ☞ **page F1–95**
		No	Go to next step
6	Try a known good ECM; does condition improve? ☞ **page F1–93**		

21	ROUGH IDLE	• ON DECELERATION
DESCRIPTION	• Engine shakes at beginning of deceleration, during deceleration, or recovery from deceleration • Exhaust afterburn	

[TROUBLESHOOTING HINTS]

① Fuel pump
- Poor connection of connector

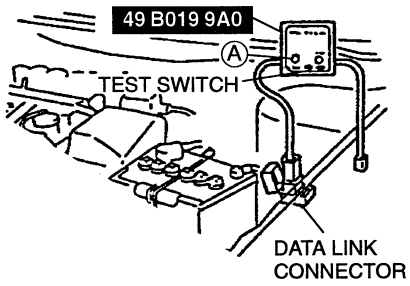
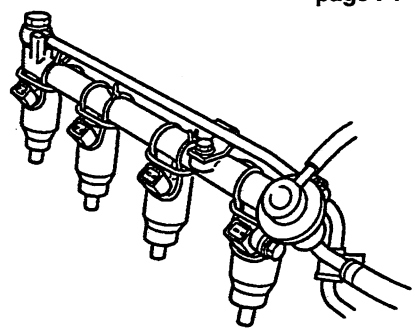
② Fuel injector
- Fuel leakage from injector(s)

③ Idle speed
- Idle speed too low

④ Distributor
- Poor connection of connector

⑤ Mass air flow sensor
- Poor connection of connector

⑥ Idle air contol valve
- Solenoid valve stuck

STEP	INSPECTION		ACTION
1	Connect System Selector to data link connector and set test switch to SELF TEST; is idle speed correct after warm-up? ☞ page F1–12 **Idle speed: 500—800 rpm** 	Yes	Go to step 3
		No	Remove System Selector and go to next step
2	Does idle speed drop in following conditions? Condition: • Electrical load ON • Air conditioner ON • P/S operating	Yes	Adjust idle speed ☞ page F1–12
		No	Check as follows: • Wiring harness from idle air control valve to ECM for short and open circuit ☞ page F1–93 • Idle air control valve stuck ☞ page F1–54
3	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ page F1–14	Yes	**No DTCs displayed** Go to next step
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ page F1–16 **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
4	Is there fuel leakage from fuel injector nozzles or fuel injector holder? ☞ page F1–65 	Yes	Reinstall or replace fuel injector ☞ page F1–65
		No	Go to next step
5	Are mass air flow sensor connector terminal and connection condition good?	Yes	Go to next step
		No	Repair connector terminal

STEP	INSPECTION		ACTION
6	Are following connections good? • Distributor connector • Fuel pump connector • Main relay • ECM connector	Yes	Go to next step
		No	Repair connector terminal
7	Try a known good ECM; does condition improve? ☞ page F1–93		

22 23	POOR ACCELERATION	• DRIVEAWAY • ON ACCELERATION

DESCRIPTION • Engine speed increases normally but vehicle speed slowly increases during driveaway or acceleration

[TROUBLESHOOTING HINTS]

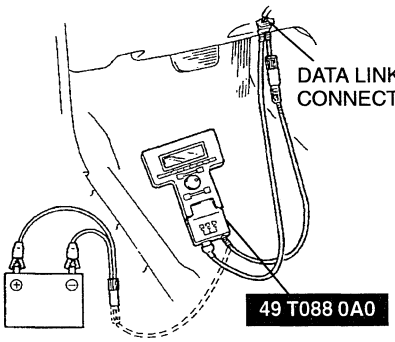
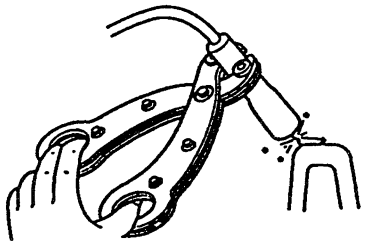
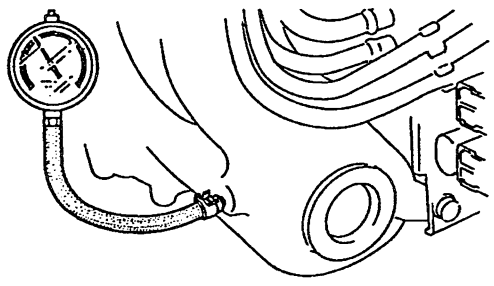
① Fuel injector
- Fuel leakage from injector(s)

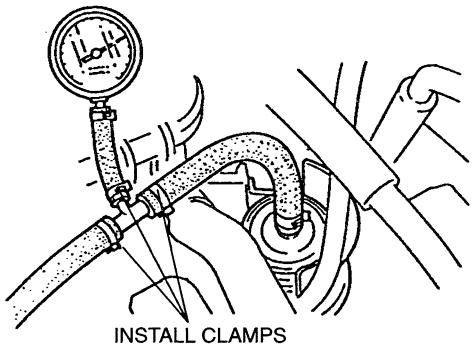
② Pressure regurator
- Pressure regulator malfunction

③ Fuel filter
- Clogged filter

④ Distributor
- Poor connection of connector
- Cap and/or rotor damage

⑤ Mass air flow sensor
- Poor connection of connector

STEP	INSPECTION		ACTION
1	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14**  	Yes	**No DTCs displayed** Go to next step
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plugs ➪ If OK, go to next step ➪ If not OK, clean or replace spark plug
		No	Check follows: • Distributor cap and rotor ☞ **section G** • High-tension lead(s) ☞ **section G** • Condition of distributor connector female terminals
3	Is connection of mass air flow sensor connector OK?	Yes	Go to next step
		No	Repair terminal
4	Is intake manifold vacuum correct at idle? **Vacuum:** **More than 60.0 kPa{450 mmHg, 17.7 inHg}** 	Yes	Go to next step
		No	Check as follows: • Intake-air system components and installation • Vacuum hoses for disconnection and damage

STEP	INSPECTION		ACTION
5	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? ☞ **page F1–63** **Fuel line pressure:** **210—260 kPa {2.1—2.7 kgf/cm^2, 30—38 psi}**  INSTALL CLAMPS	Yes	Go to next step
		No	**Low pressure** Check follows: • Fuel filter for clogging • Operation of pressure regulator ☞ **page F1–63** • Fuel leakage from fuel injector(s) ☞ **page F1–66**
6	Try a known good ECM; does condition improve? ☞ **page F1–93**		

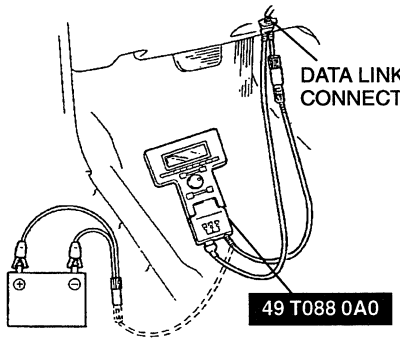
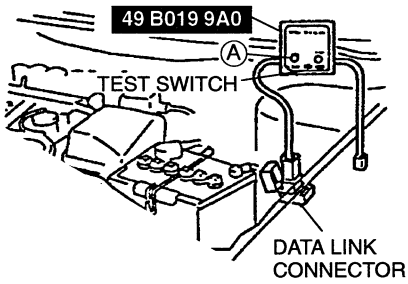
24	HIGH IDLE SPEED AFTER WARM-UP
DESCRIPTION	• Idle speed continues at fast idle after warm-up • Engine speed returns slowly to idle after accelerator is released

[TROUBLESHOOTING HINTS]

① Engine coolant temperature sensor
- Poor connection of connector

② Throttle position sensor
- Poor connection of connector
- Incorrect adjustment

③ BAC valve
- Idle air control valve or air valve stuck

STEP	INSPECTION		ACTION
1	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14**  	Yes	**No DTCs displayed** Go to next step
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Connect System Selector to the data link connector and set switch Ⓐ to position 1 Does idle speed decrease when test switch is set to SELF-TEST?  	Yes	Check condition of engine coolant temperature sensor and throttle position sensor connector female terminals ➪ If OK, go to next step ➪ If not OK, repair the female connector
		No	Check if idle air control valve or air valve stuck ➪ If OK, go to step 4 ➪ If not OK, replace BAC valve
3	Is following terminal voltage at ECM correct? **Terminal 3F:** **0.3—0.7V (Closed throttle position)** **3.4—5.3V (Wide open throttle)**	Yes	Go to next step
		No	Replace throttle body ☞ **page F1–49**
4	Try a known good ECM; does condition improve? ☞ **page F1–93**		

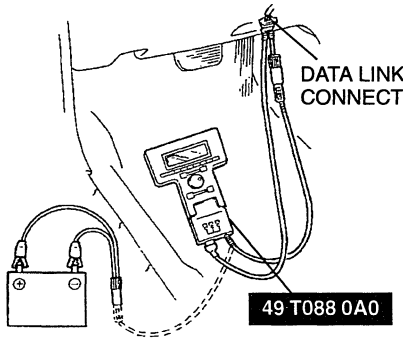
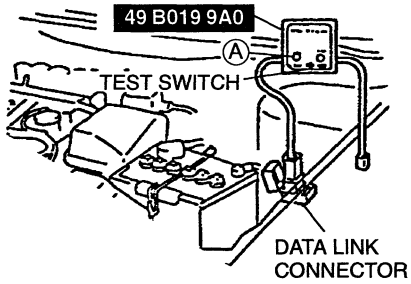
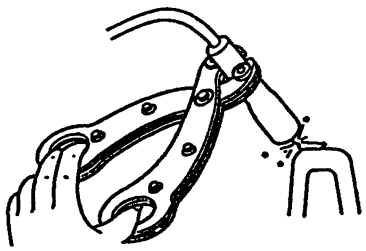
25	• **IDLE FLUCTUATES** • **IDLE HUNTS**
DESCRIPTION	• Engine speed changes back and forth between specified idle speed and higher speed

[TROUBLESHOOTING HINTS]

① PCV valve
- PCV valve stuck

② Spark plug
- Spark plug(s) damaged

③ Idle air control valve
- Solenoid valve stuck

STEP	INSPECTION		ACTION
1	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14** 	Yes	**No DTCs displayed** Go to next step
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Is following terminal voltage at ECM correct? **Terminal 3L:** **Below 1.0V (accelerator pedal released)** **B+ (accelerator pedal depressed)**	Yes	Go to next step
		No	Check follows: • Wiring harness from closed throttle position switch to ECM for short and open circuit Replace throttle body if necessary ☞ **page F1–49**
3	Connect System Selector to data link connector and set switch Ⓐ to position 1 Does idle hunting stop when test switch is set to SELF-TEST? 	Yes	Check follows: • Idle air control valve for sticking • Poor sealing between throttle body and BAC valve
		No	Go to next step
4	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plug(s) ➪ If OK, go to next step ➪ If not OK, replace spark plug(s)
		No	Check as follows: • Distributor cap and rotor ☞ **section G**

STEP	INSPECTION		ACTION
5	Is PCV valve stuck? ☞ page F1–78	Yes	Replace PCV valve
		No	Go to next step
6	Try a known good ECM; does condition improve? ☞ page F1–93		

26	• **HESITATES** • **STUMBLES ON ACCELERATION**
DESCRIPTION	• Momentary pause at beginning of acceleration or during acceleration

[TROUBLESHOOTING HINTS]

① Fuel injector
- Fuel leakage from injector(s)

② Fuel pump
- Poor connection of connector

③ Pressure regulator
- Pressure regulator stuck

④ EGR valve
- EGR valve stuck

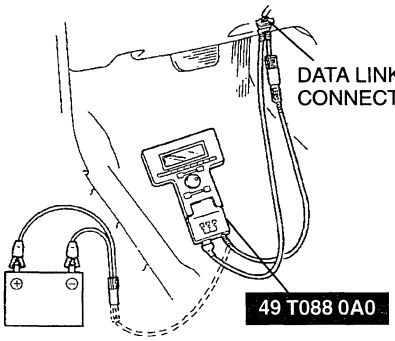
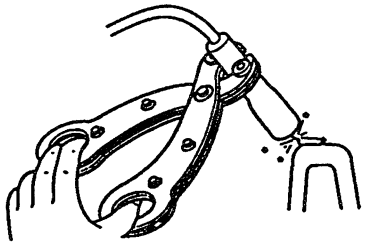
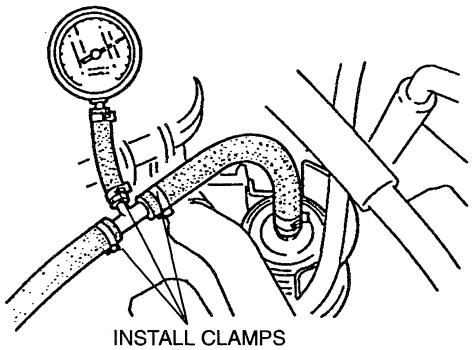
⑤ EGR solenoid valve
- Solenoid valve stuck

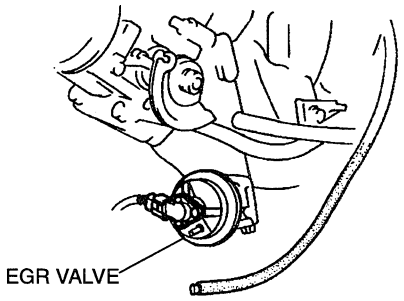
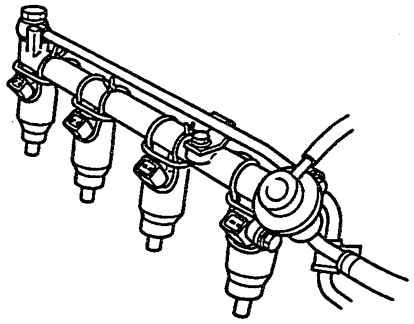
⑥ Distributor
- Poor connection of connector
- Cap and/or rotor damage

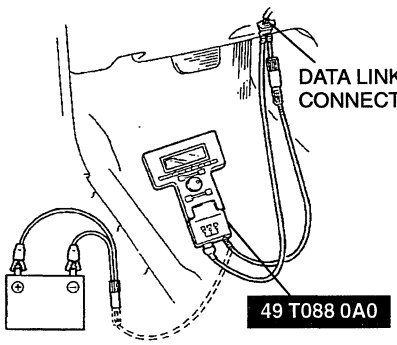
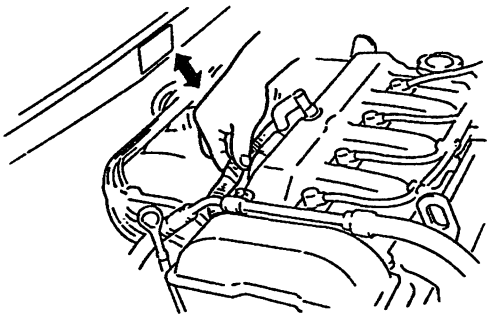
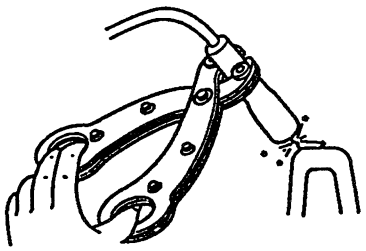
⑦ High-tension lead(s)
- Lead(s) damaged

⑧ Mass air flow sensor
- Poor connection of connector

⑨ Throttle position sensor
- Poor connection of connector

STEP	INSPECTION		ACTION
1	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14**  	Yes	**No DTCs displayed** Go to next step
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Go to next step
		No	Check as follows: • Distributor cap and rotor ☞ **section G** • High-tension lead(s) ☞ **section G** • Condition of distributor and ECM connector female terminals
3	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F1–63** **Fuel line pressure:** **260—320 kPa {2.6—3.3 kgf/cm², 37—46 psi}**  	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F1–63** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F1–61**

STEP	INSPECTION		ACTION
4	Does fuel pressure increase when throttle valve opened?	Yes	Go to next step
		No	Check pressure regulator ☞ page F1–63
5	Disconnect vacuum hose from EGR valve and plug it; does condition improve?  	Yes	Check follows: • EGR solenoid valve for sticking • Condition of solenoid valve connectors female terminals
		No	Go to next step
6	Are following terminal voltages at ECM connector correct? **Terminal 3B:** **Approx. 1.0—1.5V (Ign switch ON)** **Approx. 1.5—5V (Engine running)** ☞ page F1–93	Yes	Go to next step
		No	Check condition of mass air flow sensor and ECM connector female terminals • If OK, replace mass air flow sensor • If not OK, repair female terminal
7	Are following terminal voltages at ECM correct? **Terminal 3F:** **0.3—0.7V (Closed throttle position)** **3.4—5.3V (Wide open throttle)**	Yes	Go to next step
		No	Check female terminal condition in throttle postion sensor connector and ECM connector • If OK, replace throttle position sensor ☞ page F1–104 • If not OK, repair female terminal
8	Is there fuel leakage from fuel injector(s)? **Fuel leakage: Less than 1 drop/2 min.** 	Yes	Check follows: • Poor installation of fuel injector ☞ page F1–65
		No	Go to next step
9	Try a known good ECM; does condition improve? ☞ page F1–93		

27	SURGES WHILE CRUISING		
DESCRIPTION	• Momentary minor irregularity in engine output at steady vehicle speed		
[TROUBLESHOOTING HINTS] ① Fuel injector • Poor connection of connector ② Spark plug • Spark plug(s) damaged ③ Mass air flow sensor • Poor connection of connector			
STEP	INSPECTION		ACTION
1	Is there no DTCs displayed on **SST** with ignition switch ON? ☞ **page F1–14**  	Yes	**No DTCs displayed** Go to next step
		No	**DTC No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F1–16** **"LINK COMMUNICATION ERROR" displays** Refer to No.35 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Does mass air flow sensor operate correctly? ☞ **page F1–99**	Yes	Go to next step
		No	Check follows: • Condition of mass air flow sensor and ECM connector female terminals
3	Does idle become rough when shaking connector of injector? 	Yes	Check follows: • Condition of fuel injector and ECM connector female terminals
		No	Go to next step
4	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plug(s) for damage ⇨ If OK, go to next step ⇨ If not OK, replace spark plug(s)
		No	Check follows: • Distributor cap and rotor for damage ☞ **section G**
5	Try a known good ECM; does condition improve? ☞ **page F1–93**		

28	LACK OF POWER
DESCRIPTION	• Performance poor under load (i.e., power down when climbing hills)

[TROUBLESHOOTING HINTS]

① Mass air flow sensor
- Poor connection of connector

② Intake air temperature sensor
- Poor connection of connector

③ Distributor
- Damaged distributor cap or rotor — ☞ **section G**

④ Fuel injector
- Fuel injector harness shorted to ground

⑤ Fuel filter
- Clogged filter

⑥ Air cleaner element
- Clogged element — ☞ **page F1–48**

⑦ Three way catalyst
- Clogged three way catalytic converter — ☞ **page F1–72**

29	POOR FUEL ECONOMY
DESCRIPTION	• Fuel economy unsatisfactory

[TROUBLESHOOTING HINTS]

① Air leakage
- Poor installation of air intake hose, throttle body, intake manifold, EGR valve and/or EGR function control
- Vacuum hose damaged or disconnected

② Heated oxygen sensor
- Open in harness — ☞ **page F1–105**

③ Pressure regulator
- Hold fuel pressure high — ☞ **page F1–64**
- Vacuum hose disconnected or damaged

30	A/C DOES NOT WORK
DESCRIPTION	• A/C compressor magnetic clutch does not engage with air conditioning switch ON

[TROUBLESHOOTING HINTS]

① A/C relay
- Poor connection of connector
- Relay malfunction

☞ **1996 626/MX–6 Body Electrical Trobleshooting Manual section G**

② Air conditioning switch
- Does not send signal to ECM terminal 1K — ☞ **page F1–93**

③ ECM
- Does not send signal to A/C relay with ignition switch ON

☞ **1996 626/MX–6 Body Electrical Trobleshooting Manual section G**

31	• KNOCKING • PINGING
DESCRIPTION	• Noise produced when air/fuel mixture is ignited by something other than spark plug (i.e., hot spot in combustion chamber)

[TROUBLESHOOTING HINTS]

① Ignition timing
- Incorrect ignition timing

② Carbon deposits in cylinder
- Carbon deposits in cylinder — ☞ **section B1**

32	FUEL ODOR
DESCRIPTION	• Gasoline fuel smell or visible leaks
[TROUBLESHOOTING HINTS] ① Purge solenoid valve • Open or short in harness ② Charcoal canister • Canister full of fuel and leaking	☞ page F1–81

33	EXHAUST SULFUR SMELL
DESCRIPTION	• Rotten egg smell from exhaust
[TROUBLESHOOTING HINTS] High sulfur content fuel used	

34	HIGH OIL CONSUMPTION
DESCRIPTION	• Oil consumption excessive
[TROUBLESHOOTING HINTS] PCV valve • PCV valve stuck open	☞ page F1–78

35	NGS DISPLAYS "LINK COMMUNICATION ERROR"
DESCRIPTION	• NGS displays "LINK COMMUNICATION ERROR"
[TROUBLESHOOTING HINTS] ① Open or short circuit in wiring between DLC2 KLN terminal and ECM terminal 1D ② ECM • Vref terminal voltage incorrect • Open or short circuit in wiring between main relay and ECM terminal 4B • Open circuit in ground terminals of ECM	☞ page F1–93

36	MIL NEVER ON
DESCRIPTION	• NGS indicates DTC but MIL never ON
[TROUBLESHOOTING HINTS] ① Wiring harness between ECM 1E terminal and MIL • Open in harness ② Light burnt	

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

FUEL AND EMISSION CONTROL SYSTEMS (KL)

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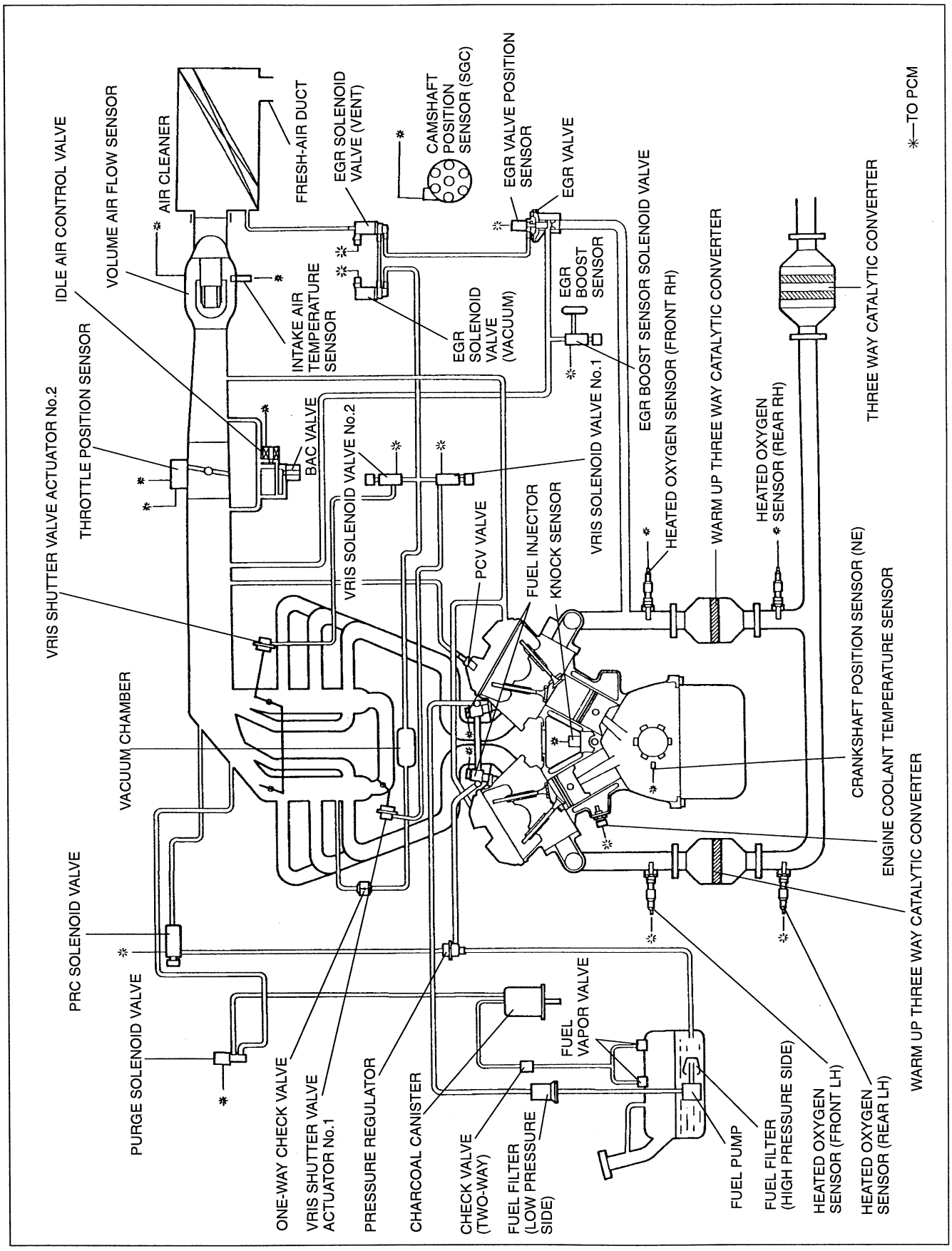
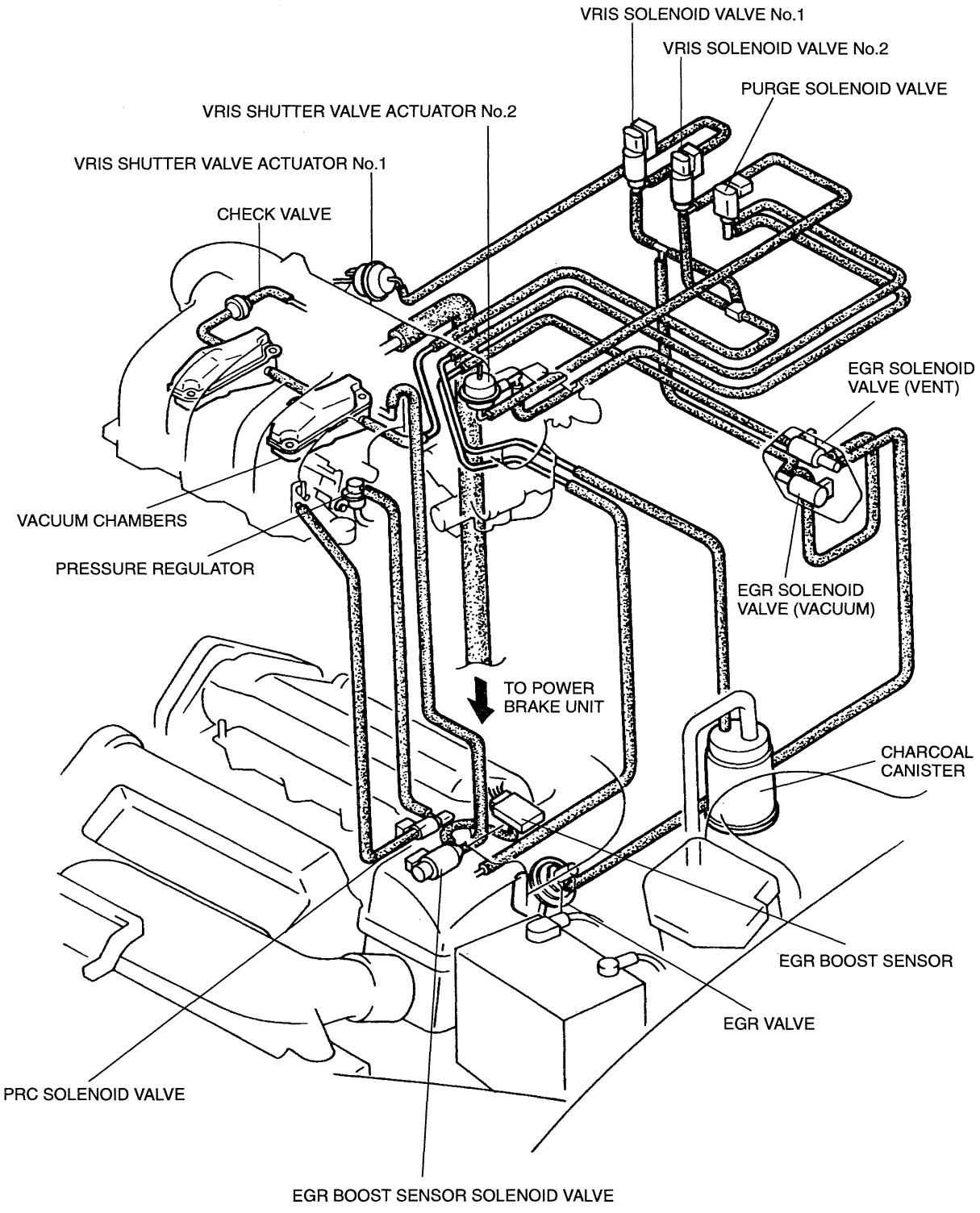
OUTLINE

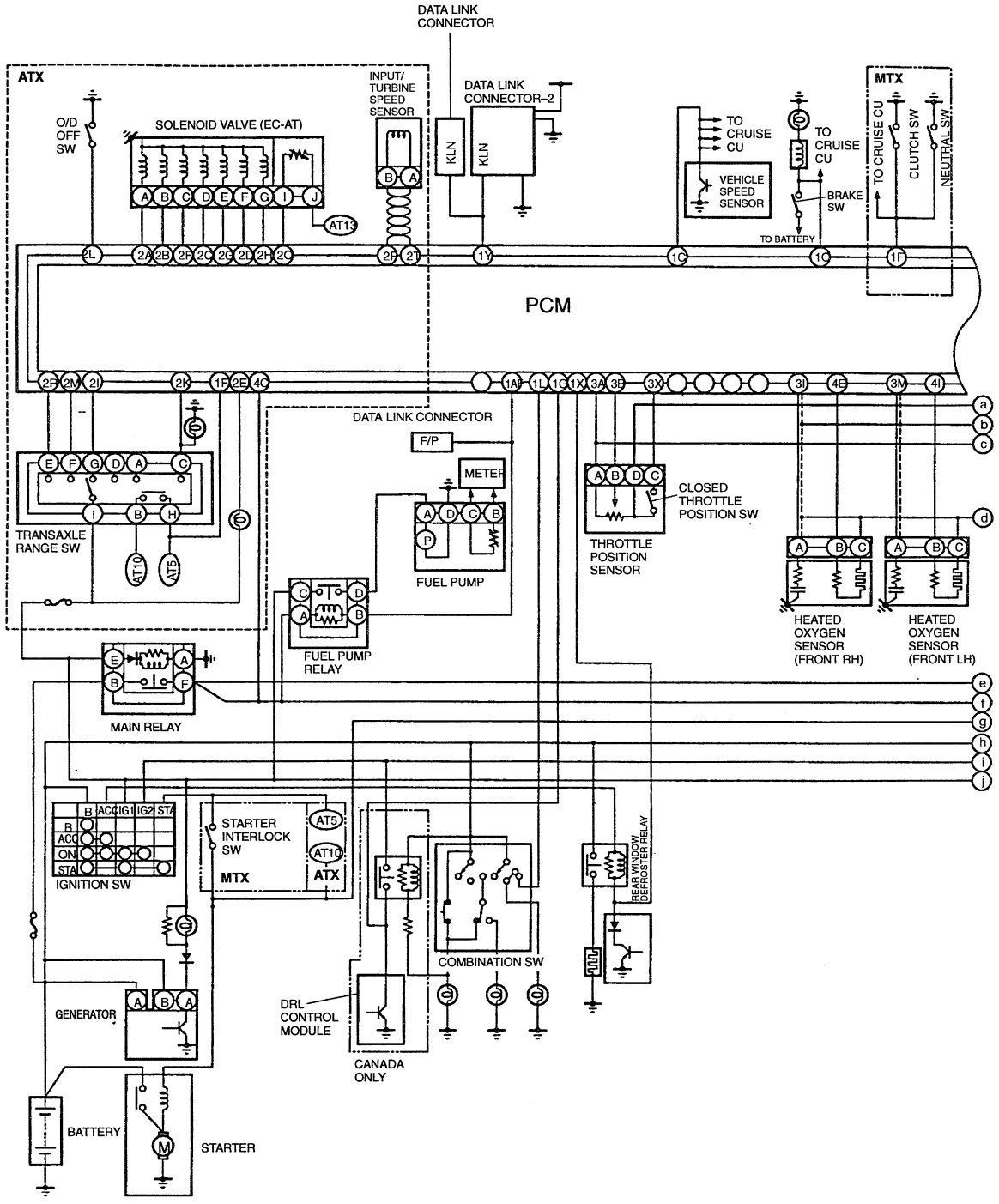
SYSTEM DIAGRAM

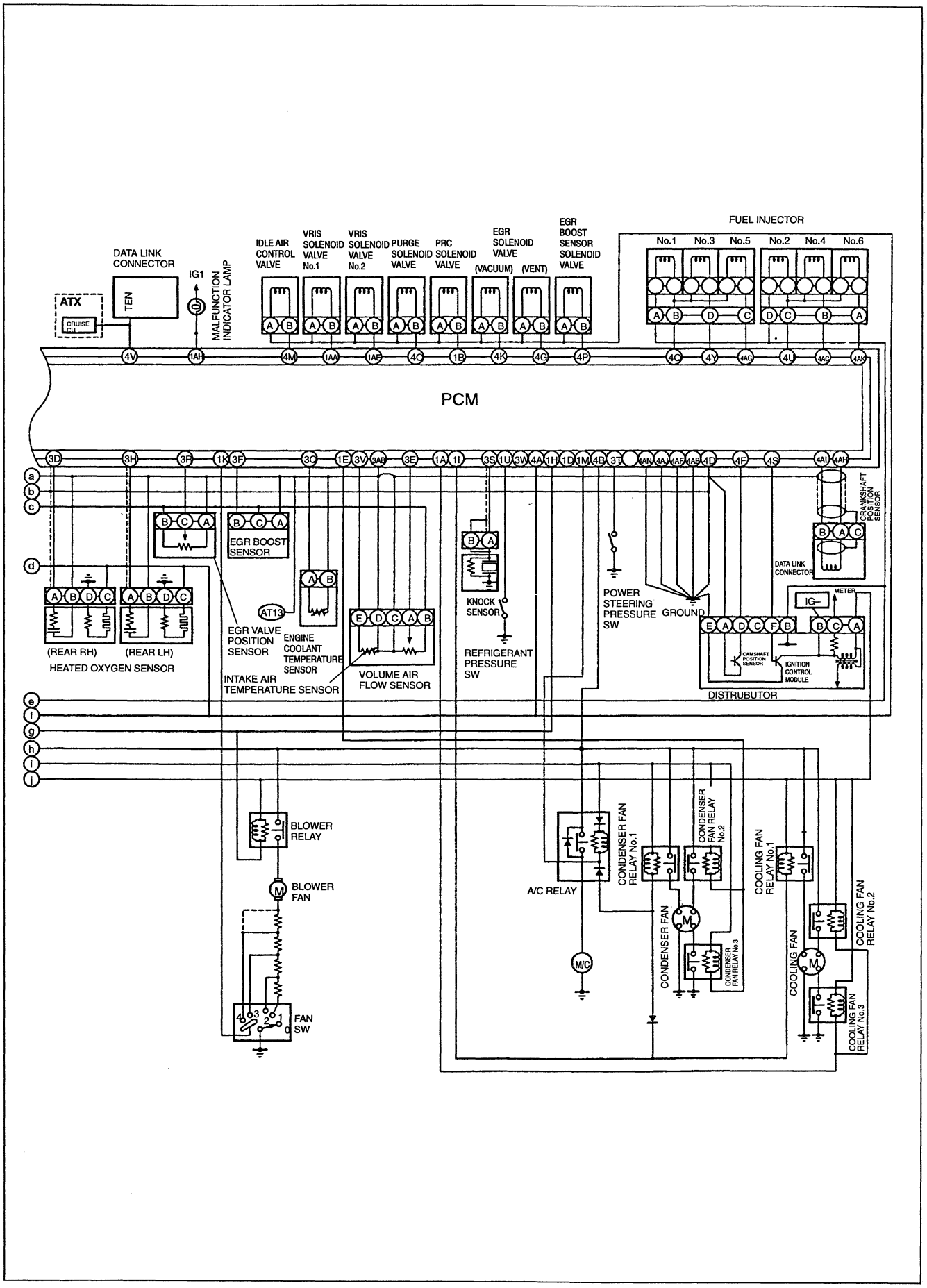


VACUUM HOSE ROUTING DIAGRAM



SYSTEM WIRING DIAGRAM




DATA LINK CONNECTOR
IG1
MALFUNCTION INDICATOR LAMP
ATX
CRUISE CU
TEN
IDLE AIR CONTROL VALVE
VRIS SOLENOID VALVE No.1
VRIS SOLENOID VALVE No.2
PURGE SOLENOID VALVE
PRC SOLENOID VALVE
EGR SOLENOID VALVE
(VACUUM)
(VENT)
EGR BOOST SENSOR SOLENOID VALVE
FUEL INJECTOR
No.1
No.3
No.5
No.2
No.4
No.6
PCM
EGR BOOST SENSOR
EGR VALVE POSITION SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
INTAKE AIR TEMPERATURE SENSOR
VOLUME AIR FLOW SENSOR
KNOCK SENSOR
REFRIGERANT PRESSURE SW
POWER STEERING PRESSURE SW
GROUND
CRANKSHAFT POSITION SENSOR
DATA LINK CONNECTOR
METER
IG
CAMSHAFT POSITION SENSOR
IGNITION CONTROL MODULE
DISTRUBUTOR
(REAR RH)
(REAR LH)
HEATED OXYGEN SENSOR
BLOWER RELAY
BLOWER FAN
FAN SW
A/C RELAY
CONDENSER FAN RELAY No.1
CONDENSER FAN RELAY No.2
CONDENSER FAN
CONDENSER FAN RELAY No.3
M/C
COOLING FAN RELAY No.1
COOLING FAN
COOLING FAN RELAY No.2
COOLING FAN RELAY No.3

SPECIFICATIONS

Item			Specification
Idle speed rpm			600—700 (650 ± 50)
Ignition timing* BTDC			9°—11° (10° ± 1°)
Throttle body			
Type			Horizontal draft
Throat diameter mm {in}			60 {2.4}
Fuel pump			
Type			Impeller (in-tank)
Maximum output pressure kPa {kgf/cm^2, psi}			640 {6.5, 92}
Fuel filter			
Type	Low-pressure side		Nylon element (in fuel pump)
	High-pressure side		Paper element
Pressure regulator			
Regulating pressure kPa {kgf/cm^2, psi}			280 {2.9, 41}
Fuel injector			
Type			High-ohmic, side-feed
Type of drive			Voltage
Resistance Ω		20°C {68°F}	13.8
Idle air control valve			
Solenoid resistance Ω		20°C {68°F}	10.7—12.3
Purge solenoid valve			
Solenoid resistance Ω		20°C {68°F}	30—34
Camshaft position sensor (SGC signal)			
Type			Hall effect pick-up
Volume air flow sensor			
Type			Measuring core type
Resistance Ω	E2 ↔ VS	Closed throttle position	20—600
		Wide open throttle	20—1,000
	E2 ↔ VC		200—400
	E2 ↔ THA (Intake air temperature sensor)	–20°C {–4°F}	10,000—20,000
		20°C {68°F}	2,000—3,000
		60°C {140°F}	400—700
Engine coolant temperature sensor			
Resistance kΩ		–20°C {–4°F}	13.5—16.5
		20°C {68°F}	2.20—2.70
		80°C {176°F}	0.29—0.35
		91°C {196°F}	0.226—0.241
		97°C {207°F}	0.193—0.205
		108°C {226°F}	0.145—0.153
		110°C {230°F}	0.137—0.146
Fuel tank			
Capacity L {US gal, Imp gal}			58.5 {15.5, 12.9}
Air cleaner			
Element type			Oil permeated
Fuel			
Specification			Unleaded— (R+M)/2 method 91 or higher

* TEN terminal of data link connector grounded.

COMPONENT DESCRIPTIONS

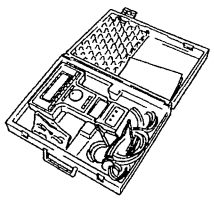
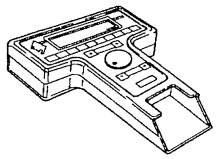
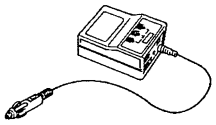
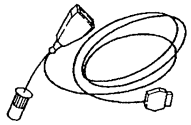
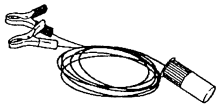
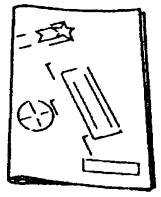
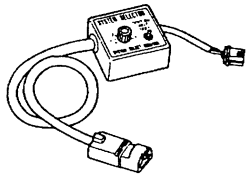
Component	Function	Remark
A/C relay	Supplies/cuts off battery power to A/C compressor magnetic clutch	• Normal open type • Actuated by PCM A/C control signal
A/C switch	Detect A/C operation and sends signal to PCM	—
Air cleaner	Filters air entering throttle body and reduces air intake noise	• Air cleaner element: Wet filter paper
BAC valve	Supplies intake air to engine, bypassing throttle valve	• Consists of air valve integrated with idle air control valve
Battery	Supplies power for engine start, ignition, and operation of electrical devices	—
Brake switch	Detects brake pedal operation and sends signal to PCM	—
Camshaft position sensor	Detects No.1 cylinder's compression stroke TDC and sends signal to PCM	• SGC signal • Installed in distributor
Charcoal canister	Stores fuel vapor from fuel tank Draws fresh air through vent cap and purges fuel vapor. Supplies/cuts off fuel vapor to intake manifold via purge solenoid valve	• Actuated by PCM purge control signal • For evaporative emission control
Check valve	Supplies and maintains intake manifold vacuum in vacuum chamber	• For variable resonance induction system (VRIS)
	When pressure in fuel tank is positive, supplies fuel vapor to charcoal canister. When pressure is negative, supplies fresh air to tank	• Actuated by pressure difference • For evaporative emission control
Closed throttle position switch	Detects closed throttle position and sends signal to PCM	• Installed in throttle position sensor
Condenser fan relay	Supplies/cuts off battery power to condenser fan	• Normal open type • Actuated by PCM condenser fan control signal
Cooling fan relay	Supplies/cuts off battery power to cooling fan	• Normal open type • Actuated by PCM cooling fan control signal
Crankshaft position sensor	Detects crank angle in every 60° via crankshaft pulley rotation, and sends signal to PCM	• NE signal • PCM converts NE signal (pulse wave) into SGT signal (square wave)
Data link connector–2	Concentrated service connector terminals for diagnosis of electrical system	• For on-board diagnosis and service/inspection
Distributor	Supplies secondary current to spark plugs	• Includes ignition control module and camshaft position sensor • Actuated by PCM IGT signal
EGR valve	Supplies/cuts off exhaust gas from exhaust manifold to intake manifold	• Includes EGR valve position sensor • For EGR control • Actuated by EGR solenoid valves (vacuum, vent)
EGR valve position sensor	Detects EGR valve position and sends signal to PCM	• For EGR control • Installed in EGR valve
EGR boost sensor	Detects EGR pipe pressure or barometric pressure and sends signal to PCM	—
EGR boost sensor solenoid valve	Supplies/cuts off EGR pipe pressure or barometric pressure to EGR boost sensor	• For EGR boost sensor switching control
EGR solenoid valve (vent and vacuum)	Supplies/cuts off intake manifold vacuum or air from air cleaner to EGR valve	• For EGR control • Actuated by PCM EGR control signal

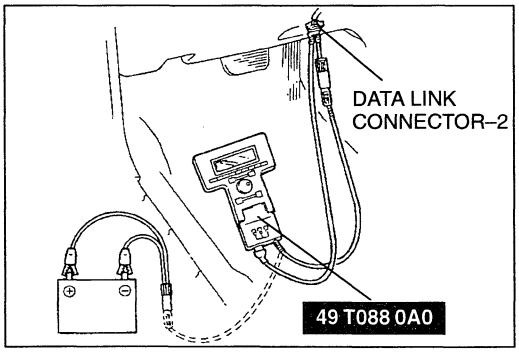
Component	Function	Remark
Engine coolant temperature sensor	Detects engine coolant temperature and sends signal to PCM	—
Filler cap	Prevents fuel vapor in fuel tank escaping into atmosphere Depending on vacuum in fuel tank, opens vacuum valve and lets fresh air into tank	—
Fresh-air duct	Supplies fresh air to air cleaner	• Equipped with resonance chamber
Front fog light switch	Detects front fog light operation and sends signal to PCM (except DRL equipped vehicle)	—
Fuel filter (high-pressure side)	Filters fine dirt particles in fuel discharged from fuel pump	—
Fuel filter (low-pressure side)	Filters fuel in tank	• Installed in fuel pump assembly
Fuel injector	Injects fuel into intake port	• Side feed type • Nozzle: 2 spray ports • Actuated by PCM fuel injection control signal
Fuel pump	Supplies/cuts off fuel in tank to fuel injectors	• Actuated by fuel pump relay
Fuel pump relay	Supplies/cuts off battery power to fuel pump	• Normal open type • Actuated by PCM fuel pump control signal or by grounding data link connector terminal F/P
Fuel tank	Stores fuel	—
Fuel vapor valve	Prevents fuel in fuel tank from flowing into charcoal canister when vehicle body tilted	• For evaporative emission control
Generator	Charges battery and supplies current to electrical devices	• Includes voltage regulator
Heated oxygen sensor	Detects exhaust gas oxygen concentration and sends signal to PCM	• With heater
Idle air control valve	Supplies intake air to engine, bypassing throttle valve	• For idle air control • Actuated by PCM idle air control signal
Ignition switch	Starts engine and supplies/cuts off current to electrical devices	—
Intake air temperature sensor	Detects intake-air temperature and sends signal to PCM	• Installed in volume air flow sensor assembly
Main relay	Supplies battery power to electrical devices	• Normal open type • Actuated when ignition switch is at ON or STA position
Neutral/clutch switch (MTX)	Detects load/no load condition and sends signal to PCM	—
PCV valve	Sends blowby gas in cylinder head into intake manifold	• Actuated by intake manifold vacuum • For blowby gas recirculation
Power steering pressure switch	Detects power steering (P/S) operation and sends signal to PCM	—
Powertrain control module (PCM)	Controls engine and automatic transaxle operation according to vehicle conditions	• 4-block, 100-pin type
PRC solenoid valve	Supplies fresh air or intake manifold vacuum to pressure regulator	• For pressure regulator control • Actuated by PCM pressure regulator control signal
Pressure regulator	Adjusts fuel pressure against intake manifold vacuum or atmospheric pressure	• Control pressure: 284 kPa {2.90 kg/cm^2, 41.2 psi}
Purge solenoid valve	Supplies/cuts off fuel vapor from charcoal canister to intake manifold	• For purge control • Actuated by PCM purge control signal
Rear window defroster switch	Detect electrical load condition of rear window defroster and sends signal to PCM	—

Component	Function	Remark
Refrigerant pressure switch	Detects A/C operation and sends signal to PCM	—
Resonance chamber	Reduces intake air pulsation noise	—
Starter	Starts engine by rotating flywheel ring gear	—
Throttle body	Adjusts intake air amount by varying (non-stage) throttle opening angle in response to accelerator pedal operation	—
Throttle position sensor	Detects throttle valve opening angle and sends signal to PCM	• Includes closed throttle position switch • Installed in throttle body assembly
Transaxle range switch (ATX)	Detects N, P and other ranges and sends signal to PCM	
Vacuum chamber	Maintains intake manifold vacuum using check valve, and supplies vacuum	• For VRIS control
Vehicle speed sensor	Detects pulse signal from speedometer sensor and sends vehicle speed signal to PCM	—
Volume air flow sensor	Detects amount of intake air and sends signal to PCM	• Measuring core type
VRIS shutter valve actuators No.1 & No.2	Open and close VRIS shutter valves No.1 & No.2	• For VRIS control • Actuated by VRIS solenoid valves No.1 & No.2
VRIS shutter valves No.1 & No.2	Alter length of intake air pipes	• For VRIS control • Actuated by VRIS shutter valve actuators No.1 & No.2
VRIS solenoid valves No.1 & No.2	Supply fresh air or vacuum chamber vacuum to VRIS shutter valve actuators No.1 & No.2	• For VRIS control • Actuated by PCM VRIS control signal
Warm up three way catalytic converter (RH, LH)	Reduces HC, CO, NOx in exhaust gas by chemical reaction	• For exhaust gas cleaning

ENGINE TUNE-UP

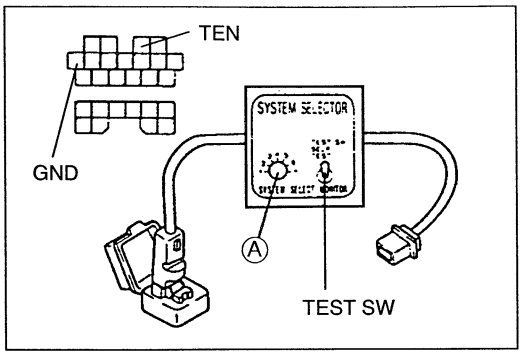
PREPARATION
SST

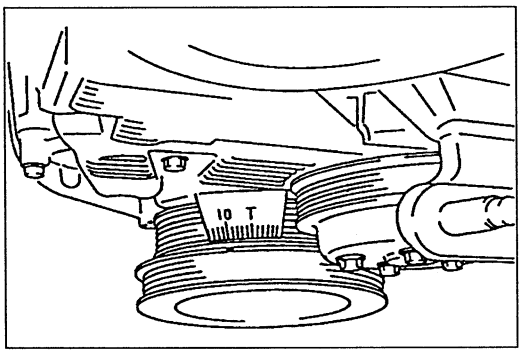
49 T088 0A0 NGS set 	For inspection of ignition timing and idle speed	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of ignition timing and idle speed
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of ignition timing and idle speed	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of ignition timing and idle speed
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of ignition timing and idle speed	49 T088 008A Instruction Manual 	For inspection of ignition timing and idle speed
49 T088 010B Program Card 	For inspection of ignition timing and idle speed	49 B019 9A0 System Selector 	For inspection of ignition timing and idle speed

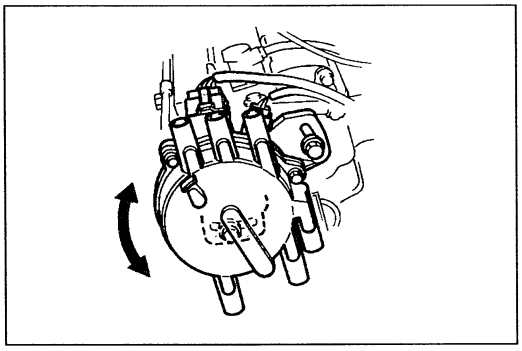


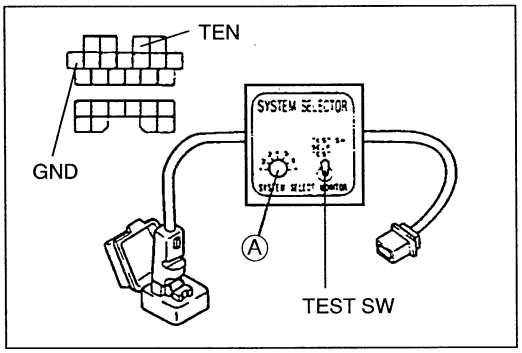
ADJUSTMENT
Preparation

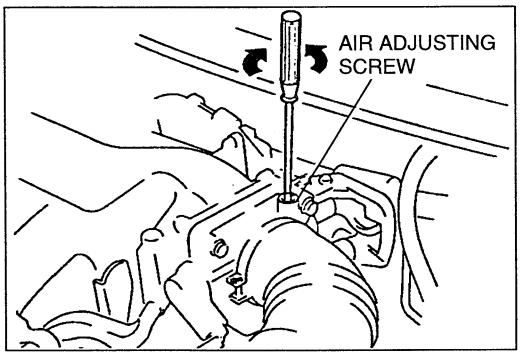
1. Warm up the engine to normal operating temperature.
2. Shift the selector lever to park/neutral position.
3. Turn off all electrical loads.
   - Headlight
   - Blower motor
   - Rear window defroster
   - A/C
   - Power steering
4. Wait until the cooling fan stops.
5. Connect the **SSTs** (NGS) to the data link connector-2 and select the PID DATA MONITOR AND RECORD function.











Ignition Timing

1. Perform "Preparation". (Refer to page F2–10.)
2. Verify that the idle speed is within the specification.

   Specification: 600—700 (650 ± 50) rpm

3. If not as specified, adjust the idle speed. (Refer to below.)
4. Connect the **SST** (system selector) to the data link connector.
5. Set switch Ⓐ to position 1.
6. Set the test switch to SELF TEST.
7. Verify that the idle speed is within the specification.

   Specification: 550—750 rpm

8. If not as specified, adjust the idle speed. (Refer to below.)
9. Connect a timing light to the high-tension lead of No.1 cylinder.
10. Verify that the timing mark (yellow) is within the specification.

    Specification: BTDC 9—11° (10 ± 1°)

11. If not as specified, loosen the distributor lock bolts and turn the distributor to make the adjustment.
12. Tighten the distributor lock bolts to the specified torque.

    Tightening torque:
    19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

13. Disconnect the **SSTs**.
14. Verify that the ignition timing is within the specification.

    Specification: BTDC 6—18°

Idle Speed

1. Perform "Preparation". (Refer to page F2–10.)
2. Verify that the idle speed is within the specification.

   Specification: 600—700 (650 ± 50) rpm

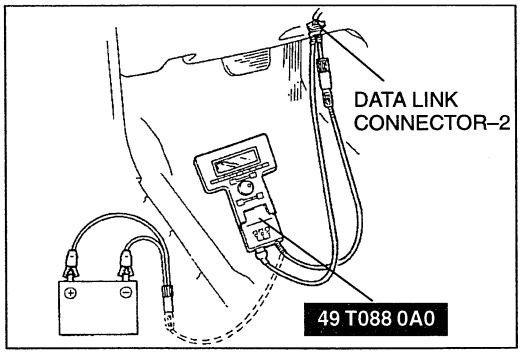
3. If not as specified, connect the **SST** (system selector) to the data link connector.
4. Set switch Ⓐ to position 1.
5. Set the test switch to SELF TEST.

   Caution
   - **The throttle adjusting screw is set at the factory and must not be adjusted. Any adjustment will negatively effect the engine performance.**

6. Adjust the idle speed by turning the air adjusting screw.

   Specification: 600—700 (650 ± 50) rpm

7. Disconnect the **SSTs**.



Idle-up Speed

1. Perform "Preparation". (Refer to page F2–10.)
2. Verify that the idle speed is within the specification.

   Specification: 600—700 (650 ± 50) rpm

3. If not as specified, adjust the idle speed. (Refer to page F2–11.)
4. Verify that the idle speed is within the specification with the load condition.

Specification

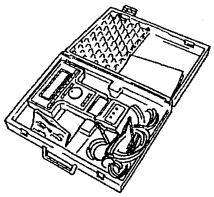
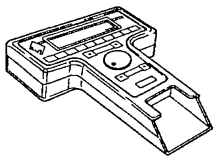
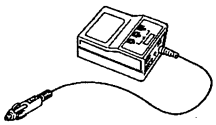
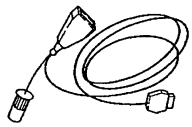
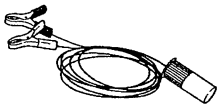
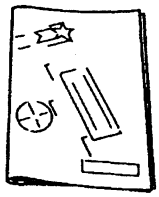
Load condition	Idle speed (rpm)*1
No load	600—700
E/L ON*2	600—700
A/C ON	775—875
P/S ON	600—700

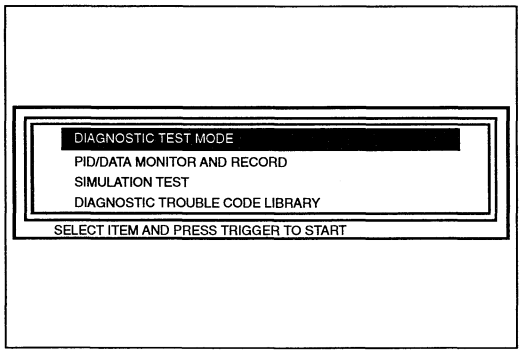
*1: Excludes temporary idle speed drop just after the electrical loads are turned on.
*2:
- Blower motor operating at high speed
- Headlight switch turned on
- Rear window defroster switch turned on

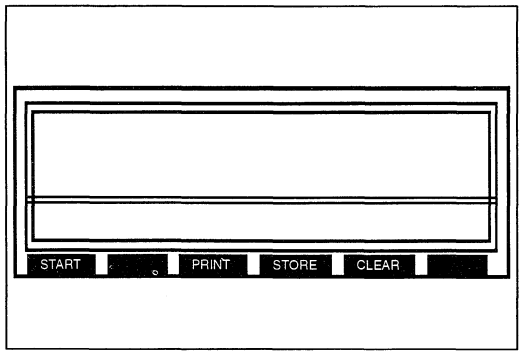
5. If not as specified with all load conditions, inspect the idle air control valve.
   If not as specified with any one of load conditions, check related input switches, harness and connectors.

ON-BOARD DIAGNOSTIC SYSTEM

PREPARATION
SST

49 T088 0A0 NGS set 	For diagnosis of PCM and input/output systems	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For diagnosis of PCM and input/output systems
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For diagnosis of PCM and input/output systems	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For diagnosis of PCM and input/output systems
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For diagnosis of PCM and input/output systems	49 T088 008A Instruction Manual 	For diagnosis of PCM and input/output systems
49 T088 010B Program Card 	For diagnosis of PCM and input/output systems	—	—





DIAGNOSTIC TROUBLE CODE NUMBER
Inspection

1. Connect the **SSTs** (NGS) to the data link connector–2. (Refer to page F2–107.)
2. Refer to the manufacturer-provided instruction manual for the NGS operation.
3. Select "DIAGNOSTIC TEST MODE" function and press trigger.
4. When "NO CODES RECEIVED/SYSTEM PASSED" is displayed, all systems monitord are judged OK.
5. When any of the diagnostic trouble codes is displayed, carry out troubleshooting according to the code. (Refer to page F2–14.)
6. When "LINK MONITOR ERROR" is displayed, check connection of the NGS.
7. After all problems have been repaired, carry out "After Repair Procedure." (Refer to below.)

After Repair Procedure

1. After repairs, connect the NGS to the data link connector–2.
2. Select "CLEAR" function and erase diagnostic trouble codes from the NGS memory.
3. Perform diagnostic trouble code inspection again and verify that no diagnostic trouble codes are displayed.

Diagnostic Trouble Code Numbers

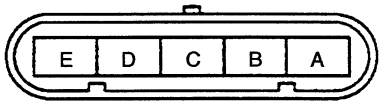
Code No.	Display on the NGS	Condition	Page
P0100	MAF/VAF-CIRCUIT MALFUNCTION	Mass or Volume air flow circuit malfunction	F2–17
P0110	IAT-CIRCUIT MALFUNCTION	Intake air temperature circuit malfunction	F2–18
P0115	ECT-CIRCUIT MALFUNCTION	Engine coolant temperature circuit malfunction	F2–19
P0120	TP-CIRCUIT MALFUNCTION	Throttle position circuit malfunction	F2–20
P0125	EXCESSIVE TIME TO ENTER CLOSED LOOP	Excessive time to enter closed loop fuel control	F2–21
P0130	O2S 11-CIRCUIT MALFUNCTION	O_2 sensor circuit malfunction	F2–21
P0134	O2S 11-CIRCUIT NO ACTIVITY DETECTED	O_2 sensor circuit no activity detected	F2–22
P0135	O2S 11-HEATER CIRCUIT MALFUCTION	O_2 sensor heater circuit malfunction	F2–23
P0140	O2S 12-CIRCUIT NO ACTIVITY DETECTED	O_2 sensor circuit no activity detected	F2–24
P0150	O2S 21-CIRCUIT MALFUNCTION	O_2 sensor circuit malfunction	F2–24
P0154	O2S 21-CIRCUIT NO ACTIVITY DETECTED	O_2 sensor circuit no activity detected	F2–25
P0155	O2S 21-HEATER CIRCUIT MALFUNCTION	O_2 sensor heater circuit malfunction	F2–26
P0160	O2S 22-CIRCUIT NO ACTIVITY DETECTED	O_2 sensor circuit no activity detected	F2–27
P0170	BANK 1-FUEL TRIM MALFUNCTION	Fuel trim malfunction	F2–28
P0173	BANK 2-FUEL TRIM MALFUNCTION	Fuel trim malfunction	F2–29
P0300	RANDOM MISFIRE DETECTED	Random misfire detected	F2–30

Code No.	Display on the NGS	Condition	Page
P0301	CYLINDER 1 MISFIRE DETECTED	Cylinder 1 misfire detected	F2–31
P0302	CYLINDER 2 MISFIRE DETECTED	Cylinder 2 misfire detected	F2–32
P0303	CYLINDER 3 MISFIRE DETECTED	Cylinder 3 misfire detected	F2–33
P0304	CYLINDER 4 MISFIRE DETECTED	Cylinder 4 misfire detected	F2–34
P0305	CYLINDER 5 MISFIRE DETECTED	Cylinder 5 misfire detected	F2–35
P0306	CYLINDER 6 MISFIRE DETECTED	Cylinder 6 misfire detected	F2–36
P0325	KNOCK SENSOR 1-CIRCUIT MALFUNCTION	Knock sensor 1 circuit malfunction	F2–37
P0335	CRANKSHAFT POS SENSOR-CKT MALFUNCTION	Crankshaft position sensor circuit malfunction	F2–37
P0400	EGR-FLOW MALFUNCTION	Exhaust gas recirculation flow malfunction	F2–38
P0420	BANK1 CAT EFFICIENCY BELOW LIMIT	Catalyst system efficiency below threshold	F2–38
P0430	BANK2 CAT EFFICIENCY BELOW LIMIT	Catalyst system efficiency below threshold	F2–38
P0440	EVAP SYSTEM-MALFUNCTION	Evaporative emission control system malfunction	F2–39
P0443	EVAP SYSTEM-PURGE CTRL VALVE CKT MALF	Evaporative emission control system purge control valve circuit malfunction	F2–40
P0505	IDLE CONTROL SYSTEM-MALFUNCTION	Idle control system malfunction	F2–41
P0510	CLOSED THROTTLE POS SWITCH-MALFUNCTION	Closed throttle position switch malfunction	F2–42
P0703	TORQUE CONV/BRAKE SW-MALFUNCTION	Brake switch input malfunction	F2–43

Code No.	Display on the NGS	Condition	Page
P1000	MORE DRIVING NEEDED TO COMPLETE TEST	Check off all OBD-II systems is not complete since last memory clear	F2–44
P1170	HO2S 11-INVERSION	Heated oxygen sensor (Front RH) (Inversion)	F2–45
P1173	HO2S 21-INVERSION	Heated oxygen sensor (Front LH) (Inversion)	F2–46
P1195	EGRBS-OPEN OR SHORT	EGR boost sensor	F2–47
P1196	STA SW-OPEN OR SHORT	Ignition switch (Start)	F2–47
P1345	SGC SIGNAL-NO SGC SIGNAL	SGC signal	F2–48
P1402	EGRS-OPEN OR SHORT	EGR valve position sensor	F2–49
P1521	VRIS1-OPEN OR SHORT	VRIS solenoid valve No.1 open or short	F2–50
P1522	VRIS2-OPEN OR SHORT	VRIS solenoid valve No.2 open or short	F2–51
P1609	PCME (CPU)-MALFUNCTION	PCM's knock control integrated circuit is damaged	F2–52
P1720	VSS2-NO VSS2 SIGNAL	Speedometer sensor	F2–52
P1794	BAT-BAT OR CIRCUIT FAIL	Battery	F2–53
P1797	PNS-OPEN OR SHORT	No P or N range signal or neutral/ clutch signal	F2–53

Diagnostic trouble code No. P0100	MAF/VAF-CIRCUIT MALFUNCTION
Symptom	Input voltage from volume air flow sensor is below 0.6 V or above 4.9 V when ignition switch is turned on
Possible cause	• Volume air flow sensor malfunction • Open or short circuit in wiring from PCM terminal 3E to volume air flow sensor terminal A • Open or short circuit in wiring from PCM terminal 3A to volume air flow sensor terminal B • Open or short circuit in wiring from PCM terminal 3AB to volume air flow sensor terminal C

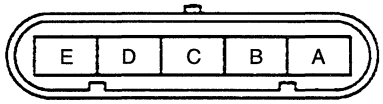
STEP	INSPECTION		ACTION
1	Does volume air flow sensor connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 3E voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect volume air flow sensor connector. Turn ignition switch to ON. Is there 5 V at connector terminal B?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (PCM terminal 3A — Volume air flow sensor terminal B)
4	Is there continuity between connector terminal C and PCM terminal 3AB?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between connector terminal A and PCM terminal 3E?	Yes	Go to next step
		No	Repair or replace wiring harness
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0110	IAT-CIRCUIT MALFUNCTION
Symptom	Input from intake air temperature sensor is below 0.1 V or above 4.9 V when ignition switch is turned on
Possible cause	• Intake air temperature sensor malfunction • Open or short circuit in wiring from volume air flow sensor terminal E to PCM terminal 3V • Open or short circuit in wiring from volume air flow sensor terminal D to PCM terminal 3AB

STEP	INSPECTION		ACTION
1	Does volume air flow sensor connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 3V voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect volume air flow sensor connector. Turn ignition switch to ON. Is there 5 V at connector terminal E?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (PCM terminal 3V — Volume air flow sensor terminal E)
4	Is there continuity between connector terminal D and PCM terminal 3AB?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is intake air temperature sensor OK?	Yes	Go to next step
		No	Replace volume air flow sensor
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection or harness of connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0115	ECT-CIRCUIT MALFUNCTION
Symptom	Input voltage from engine coolant temperature sensor is below 0.2 V or above 4.9 V when ignition switch is turned on
Possible cause	• Engine coolant temperature sensor malfunction • Open or short circuit in wiring from engine coolant temperature sensor terminal A to PCM terminal 3Q • Open or short circuit in wiring from engine coolant temperature sensor terminal B to PCM terminal 3AB

STEP	INSPECTION		ACTION
1	Does engine coolant temperature sensor or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 3Q voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect engine coolant temperature sensor connector. Turn ignition switch to ON. Is there 5 V at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (PCM terminal 3Q — Engine coolant temperature sensor terminal A)
4	Is there continuity between connector terminal B and PCM terminal 3AB?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is engine coolant temperature sensor OK?	Yes	Go to next step
		No	Replace engine coolant temperature sensor
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0120	TP-CIRCUIT MALFUNCTION
Symptom	Input voltage from throttle position sensor is below 0.1 V or above 4.8 V when ignition switch is turned on
Possible cause	• Throttle position sensor malfunction • Open or short circuit in wiring from throttle position sensor terminal B to PCM terminal 3B • Open or short circuit in wiring from throttle position sensor terminal A to PCM terminal 3A • Open or short circuit in wiring from throttle position sensor terminal D to PCM terminal 3AB

STEP	INSPECTION		ACTION
1	Does throttle position sensor connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 3B voltage OK?	Yes	Go to next step
		No	Go to step 4
3	Is voltage increase linear according to the throttle valve opening angle?	Yes	Go to step 7
		No	Replace throttle position sensor
4	Disconnect throttle position sensor connector. Turn ignition switch to ON. Is there 5 V at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (PCM terminal 3A — Throttle position sensor terminal A)
5	Is there continuity between connector terminal D and PCM terminal 3AB?	Yes	Go to next step
		No	Repair or replace wiring harness
6	Is there continuity between connector terminal B and PCM terminal 3B?	Yes	Replace throttle position sensor
		No	Repair or replace wiring harness
7	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0125	EXCESSIVE TIME TO ENTER CLOSED LOOP
Symptom	Engine coolant temperature sensor signal does not rise normally because of engine coolant system malfunction
Possible cause	• Engine coolant temperature sensor malfunction • Thermostat malfunction • Engine cooling fan system malfunction • Water pump malfunction • Engine coolant passage clogged and leakage • Engine coolant level and protection

STEP	INSPECTION		ACTION
1	Is engine cooling fan system OK?	Yes	Go to next step
		No	Repair or replace engine cooling fan system
2	Is engine coolant temperature sensor OK?	Yes	Go to next step
		No	Replace engine coolant temperature sensor
3	Is cooling system OK?	Yes	Go to next step
		No	Repair or replace
4	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace PCM
		No	Temporary system malfunction

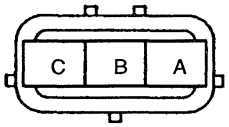
* During normal driving

Diagnostic trouble code No. P0130	O2S 11-CIRCUIT MALFUNCTION
Symptom	• Heated oxygen sensor (Front RH) deterioration • Leakage in exhaust system

STEP	INSPECTION		ACTION
1	Is heated oxygen sensor (Front RH) OK?	Yes	Replace PCM
		No	Repair or replace heated oxygen sensor (Front RH)

Diagnostic trouble code No. P0134	O2S 11-CIRCUIT NO ACTIVITY DETECTED
Symptom	When heated oxygen sensor (Front RH) signal does not exceed 0.5 V after the engine is started, or stays below 0.5 V for two minutes after the engine has reached normal operating temperature and running at 1,500 rpm or over
Possible cause	• Heated oxygen sensor (Front RH) malfunction • Open or short circuit in wiring from heated oxygen sensor (Front RH) terminal A to PCM terminal 3I • Intake-air system, fuel system, ignition system malfunction

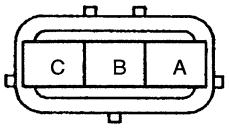
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Front RH) connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 3I voltage OK?	Yes	Go to step 5
		No	Go to next step
3	Disconnect heated oxygen sensor (Front RH) connector. Is there continuity between connector terminal A and PCM terminal 3I?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Are following units OK? • Fuel injector • Pressure regulator • Volume air flow sensor • Engine coolant temperature sensor • Spark plug • Air suction (Air/Fuel ratio rich or lean)	Yes	Replace heated oxygen sensor (Front RH)
		No	Repair or replace
5	Erase diagnostic trouble code from memory. Run the engine at 1,500—2,000 rpm for more than 3 minutes to activate heated oxygen sensor. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0135	O2S 11-HEATER CIRCUIT MALFUNCTION
Symptom	Open or short circuit is observed in heated oxygen sensor heater (Front RH) system when ignition switch is turned on
Possible cause	• Heated oxygen sensor heater (Front RH) malfunction • Open or short circuit in wiring from heated oxygen sensor (Front RH) terminal C to main relay • Open or short circuit in wiring from heated oxygen sensor (Front RH) terminal B to PCM terminal 4E

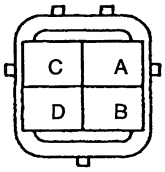
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Front RH) connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 4E voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect heated oxygen sensor (Front RH) connector and turn ignition switch to ON. Is there battery positive voltage at connector terminal C?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — Heated oxygen sensor (Front RH) terminal C)
4	Is there continuity between connector terminal B and PCM terminal 4E?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between connector terminals B and C?	Yes	Go to next step
		No	Replace heated oxygen sensor (Front RH)
6	Erase diagnostic trouble code from memory. Run the engine at 1,500—2,000 rpm for more than 3 minutes to activate heated oxygen sensor. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0140	O2S 12-CIRCUIT NO ACTIVITY DETECTED
Symptom	When heated oxygen sensor (Rear RH) signal does not exceed 0.5 V after engine is started, or stays below 0.5 V for two minutes after engine has reached normal operating temperature and running at 1,500 rpm or over
Possible cause	• Heated oxygen sensor (Rear RH) malfunction • Open or short circuit in wiring from heated oxygen sensor (Rear RH) terminal A to PCM terminal 3D • Open circuit in wiring from heated oxygen sensor (Rear RH) terminal B to PCM terminal 3AB • Intake-air system, fuel system or ignition system malfunction

STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Rear RH) connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 3D voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect heated oxygen sensor (Rear RH) connector. Is there continuity between connector terminal B and PCM terminal 3AB?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is there continuity between connector terminal A and PCM terminal 3D?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Are following units OK? • Fuel injector • Pressure regulator • Volume air flow sensor • Engine coolant temperature sensor • Spark plug • Air suction (Air/Fuel ratio rich)	Yes	Replace heated oxygen sensor (Rear RH)
		No	Repair or replace
6	Erase diagnostic trouble code from memory. Run the engine at 1,500—2,000 rpm for more than 3 minutes to activate heated oxygen sensor. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



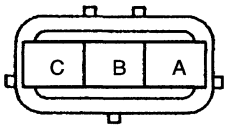
HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0150	O2S 21-CIRCUIT MALFUNCTION
Symptom	• Heated oxygen sensor (Front LH) deterioration • Leakage in exhaust system

STEP	INSPECTION		ACTION
1	Is heated oxygen sensor (Front LH) OK?	Yes	Replace PCM
		No	Repair or replace heated oxygen sensor (Front LH)

Diagnostic trouble code No. P0154	**O2S 21-CIRCUIT NO ACTIVITY DETECTED**
Symptom	When heated oxygen sensor (Front LH) signal does not exceed 0.5 V after the engine is started, or stays below 0.5 V for two minutes after the engine has reached normal operating temperature and running at 1,500 rpm or over
Possible cause	• Heated oxygen sensor (Front LH) malfunction • Open or short circuit in wiring from heated oxygen sensor (Front LH) terminal A to PCM terminal 3M • Intake-air system, fuel system or ignition system malfunction

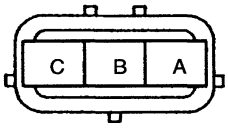
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Front LH) connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 3M voltage OK?	Yes	Go to step 5
		No	Go to next step
3	Disconnect heated oxygen sensor (front LH) connector. Is there continuity between connector terminal A and PCM terminal 3M?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Are following units OK? • Fuel injector • Pressure regulator • Volume air flow sensor • Engine coolant temperature sensor • Spark plug • Air suction (Air/Fuel ratio rich or lean)	Yes	Replace heated oxygen sensor (Front LH)
		No	Repair or replace
5	Erase diagnostic trouble code from memory. Run the engine at 1,500—2,000 rpm for more than 3 minutes to activate heated oxygen sensor. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0155	**O2S 21-HEATER CIRCUIT MALFUNCTION**
Symptom	Open or short circuit is observed in heated oxygen sensor heater (Front LH) system when ignition switch is turned on
Possible cause	• Heated oxygen sensor (Front LH) malfunction • Open or short circuit in wiring from heated oxygen sensor (Front LH) terminal C to main relay • Open or short circuit in wiring from heated oxygen sensor (Front LH) terminal B to PCM terminal 4I

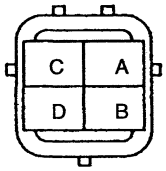
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Front LH) connector and PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 4I voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect heated oxygen sensor (Front LH) connector and turn ignition switch to ON. Is there battery positive voltage at connector terminal C?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — Heated oxygen sensor (Front LH) terminal C)
4	Is there continuity between connector terminal B and PCM terminal 4I?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between connector terminals B and C?	Yes	Go to next step
		No	Replace heated oxygen sensor (Front LH)
6	Erase diagnostic trouble code from memory. Run the engine at 1,500—2,000 rpm for more than 3 minutes to activate heated oxygen sensor. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0160	O2S 22-CIRCUIT NO ACTIVITY DETECTED
Symptom	When heated oxygen sensor (Rear LH) signal does not exceed 0.5 V after the engine is started, or stays below 0.5 V for two minutes after the engine has reached normal operating temperature and running at 1,500 rpm or over
Possible cause	• Heated oxygen sensor (Rear LH) malfunction • Open or short circuit in wiring from heated oxygen sensor (Rear LH) terminal A to PCM terminal 3H • Open circuit in wiring from heated oxygen sensor (Rear LH) terminal B to PCM terminal 3AB • Intake-air system, fuel system, ignition system malfunction

STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Rear LH) connector and PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 3H voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect heated oxygen sensor (Rear LH) connector. Is there continuity between connector terminal B and PCM terminal 3AB?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is there continuity between connector terminal A and PCM terminal 3H?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Are following units OK? • Fuel injector • Pressure regulator • Volume air flow sensor • Engine temperature sensor • Spark plug • Air suction (Air/Fuel ratio rich)	Yes	Replace heated oxygen sensor (Rear LH)
		No	Repair or replace
6	Erase diagnostic trouble code from memory. Run the engine at 1,500—2,000 rpm for more than 3 minutes to activate heated oxygen sensor. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0170	BANK 1-FUEL TRIM MALFUNCTION
Symptom	Right hand air/fuel ratio stays rich or lean longer than specified period because of system malfunction
Possible cause	• Pressure regulator malfunction • Fuel injector malfunction • Fuel pump malfunction • Engine coolant temperature sensor malfunction • Volume air flow sensor malfunction • Heated oxygen sensor malfunction • Purge solenoid valve malfunction • Leakage in intake-air system • PCM malfunction • Open or short circuit in wiring between PCM terminals 4Q, 4Y, 4AG to fuel injector • Intake air temperature sensor malfunction • EGR boost sensor malfunction • PCV valve malfunction

STEP	INSPECTION		ACTION
1	Is there air leakage in intake-air system components?	Yes	Repair or replace intake air device system
		No	Go to next step
2	Is fuel line pressure OK?	Yes	Go to step 5
		No	Go to next step
3	Is fuel pump maximum pressure OK?	Yes	Go to next step
		No	Repair or replace fuel pump
4	Is pressure regulator OK?	Yes	Go to next step
		No	Repair or replace pressure regulator
5	Is fuel injector OK?	Yes	Go to next step
		No	Replace fuel injector
6	Is engine coolant temperature sensor OK?	Yes	Go to next step
		No	Replace engine coolant temperature sensor
7	Is volume air flow sensor OK?	Yes	Go to next step
		No	Replace volume air flow sensor
8	Is throttle position sensor OK?	Yes	Go to next step
		No	Adjust throttle position sensor
9	Is closed throttle position switch OK?	Yes	Go to next step
		No	Adjust throttle position sensor
10	Is intake air temperature sensor OK?	Yes	Go to next step
		No	Replace intake air temperature sensor
11	Is EGR boost sensor OK?	Yes	Go to next step
		No	Replace EGR boost sensor
12	Is purge solenoid valve OK?	Yes	Go to next step
		No	Replace PRG solenoid valve
13	Is PCV valve OK?	Yes	Go to next step
		No	Replace PCV valve
14	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace PCM
		No	Temporary system malfunction

* During idling

Diagnostic trouble code No. P0173	BANK 2-FUEL TRIM MALFUNCTION
Symptom	Left hand air/fuel ratio stays rich or lean longer than specified period because of system malfunction
Possible cause	• Pressure regulator malfunction • Fuel injector malfunction • Fuel pump malfunction • Engine coolant temperature sensor malfunction • Volume air flow sensor malfunction • Heated oxygen sensor malfunction • Purge solenoid valve malfunction • Leakage in intake-air system • PCM malfunction • Open or short circuit in wiring between PCM terminals 4U, 4AC, 4AK to fuel injector • Intake air temperature sensor malfunction • EGR boost sensor malfunction • PCV valve malfunction

STEP	INSPECTION		ACTION
1	Is there air leakage in intake-air system components?	Yes	Repair or replace intake air device system
		No	Go to next step
2	Is fuel line pressure OK?	Yes	Go to step 5
		No	Go to next step
3	Is fuel pump maximum pressure OK?	Yes	Go to next step
		No	Repair or replace fuel pump
4	Is pressure regulator OK?	Yes	Go to next step
		No	Repair or replace pressure regulator
5	Is fuel injector OK?	Yes	Go to next step
		No	Replace fuel injector
6	Is engine coolant temperature sensor OK?	Yes	Go to next step
		No	Replace engine coolant temperature sensor
7	Is volume air flow sensor OK?	Yes	Go to next step
		No	Replace volume air flow sensor
8	Is throttle position sensor OK?	Yes	Go to next step
		No	Adjust throttle position sensor
9	Is closed throttle position switch OK?	Yes	Go to next step
		No	Adjust throttle position sensor
10	Is intake air temperature sensor OK?	Yes	Go to next step
		No	Replace intake air temperature sensor
11	Is EGR boost sensor OK?	Yes	Go to next step
		No	Replace EGR boost sensor
12	Is purge solenoid valve OK?	Yes	Go to next step
		No	Replace purge solenoid valve
13	Is PCV valve OK?	Yes	Go to next step
		No	Replace PCV valve
14	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace PCM
		No	Temporary system malfunction

* During idling

Diagnostic trouble code No. P0300	RANDOM MISFIRE DETECTED
Symptom	PCM input signal from crankshaft position sensor signal is irregular
Possible cause	• Ignition system malfunction • Low fuel • Low battery voltage • Fuel system (RH or LH) malfunction • Insufficient compression • Crankshaft position sensor air gap incorrect • Exhaust gas recirculation system malfunction

STEP	INSPECTION		ACTION
1	Is ignition system OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Is ignition timing within specification?	Yes	Go to next step
		No	Adjust ignition timing
3	Is crankshaft position sensor air gap OK?	Yes	Go to next step
		No	Repair or replace crankshaft position sensor
4	Is fuel system (RH and LH) OK?	Yes	Go to next step
		No	Repair or replace as necessary
5	Is exhaust gas recirculation system OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Is compression at all cylinders normal?	Yes	Go to next step
		No	Repair or replace as necessary
7	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace PCM
		No	Temporary system malfunction

* During normal driving

Diagnostic trouble code No. P0301	CYLINDER 1 MISFIRE DETECTED
Symptom	PCM input signal from crankshaft position sensor signal for cylinder No.1 is irregular
Possible cause	• Ignition system of cylinder No.1 malfunction • Low fuel • Low battery voltage • Fuel system (RH or LH) malfunction • Insufficient compression in cylinder No.1 • Crankshaft position sensor air gap incorrect • Exhaust gas recirculation system malfunction

STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.1 OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Is ignition timing within specification?	Yes	Go to next step
		No	Adjust ignition timing
3	Is crankshaft position sensor air gap OK?	Yes	Go to next step
		No	Repair or replace crankshaft position sensor
4	Is fuel injector at cylinder No.1 OK?	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.1
5	Is fuel system (RH and LH) OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Is exhaust gas recirculation system OK?	Yes	Go to next step
		No	Repair or replace as necessary
7	Is compression at cylinder No.1 normal?	Yes	Go to next step
		No	Repair or replace as necessary
8	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace PCM
		No	Temporary system malfunction

* During normal driving

Diagnostic trouble code No. P0302	CYLINDER 2 MISFIRE DETECTED
Symptom	PCM input signal from crankshaft position sensor signal for cylinder No.2 is irregular
Possible cause	• Ignition system of cylinder No.2 malfunction • Low fuel • Low battery voltage • Fuel system (RH or LH) malfunction • Insufficient compression in cylinder No.2 • Crankshaft position sensor air gap incorrect • Exhaust gas recirculation system malfunction

STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.2 OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Is ignition timing within specification?	Yes	Go to next step
		No	Adjust ignition timing
3	Is crankshaft position sensor air gap OK?	Yes	Go to next step
		No	Repair or replace crankshaft position sensor
4	Is fuel injector at cylinder No.2 OK?	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.2
5	Is fuel system (RH or LH) OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Is exhaust gas recirculation system OK?	Yes	Go to next step
		No	Repair or replace as necessary
7	Is compression at cylinder No.2 normal?	Yes	Go to next step
		No	Repair or replace as necessary
8	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace PCM
		No	Temporary system malfunction

* During normal driving

Diagnostic trouble code No. P0303	CYLINDER 3 MISFIRE DETECTED
Symptom	PCM input signal from crankshaft position sensor signal for cylinder No.3 is irregular
Possible cause	• Ignition system of cylinder No.3 malfunction • Low fuel • Low battery voltage • Fuel system (RH or LH) malfunction • Insufficient compression in cylinder No.3 • Crankshaft position sensor air gap incorrect • Exhaust gas recirculation system malfunction

STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.3 OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Is ignition timing within specification?	Yes	Go to next step
		No	Adjust ignition timing
3	Is crankshaft position sensor air gap OK?	Yes	Go to next step
		No	Repair or replace crankshaft position sensor
4	Is fuel injector at cylinder No.3 OK?	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.3
5	Is fuel system (RH and LH) OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Is exhaust gas recirculation system OK?	Yes	Go to next step
		No	Repair or replace as necessary
7	Is compression at cylinder No.3 normal?	Yes	Go to next step
		No	Repair or replace as necessary
8	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace PCM
		No	Temporary system malfunction

* During normal driving

Diagnostic trouble code No. P0304	CYLINDER 4 MISFIRE DETECTED
Symptom	PCM input signal from crankshaft position sensor signal for cylinder No.4 is irregular
Possible cause	• Ignition system of cylinder No.4 malfunction • Low fuel • Low battery voltage • Fuel system (RH or LH) malfunction • Insufficient compression in cylinder No.4 • Crankshaft position sensor air gap incorrect • Exhaust gas recirculation system malfunction

STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.4 OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Is ignition timing within specification?	Yes	Go to next step
		No	Adjust ignition timing
3	Is crankshaft position sensor air gap OK?	Yes	Go to next step
		No	Repair or replace crankshaft position sensor
4	Is fuel injector at cylinder No.4 OK?	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.4
5	Is fuel system (RH and LH) OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Is exhaust gas recirculation system OK?	Yes	Go to next step
		No	Repair or replace as necessary
7	Is compression at cylinder No.4 normal?	Yes	Go to next step
		No	Repair or replace as necessary
8	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace PCM
		No	Temporary system malfunction

* During normal driving

Diagnostic trouble code No. P0305	CYLINDER 5 MISFIRE DETECTED
Symptom	PCM input signal from crankshaft position sensor signal for cylinder No.5 is irregular
Possible cause	• Ignition system of cylinder No.5 malfunction • Low fuel • Low battery voltage • Fuel system (RH or LH) malfunction • Insufficient compression in cylinder No.5 • Crankshaft position sensor air gap incorrect • Exhaust gas recirculation system malfunction

STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.5 OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Is ignition timing within specification?	Yes	Go to next step
		No	Adjust ignition timing
3	Is crankshaft position sensor air gap OK?	Yes	Go to next step
		No	Repair or replace crankshaft position sensor
4	Is fuel injector at cylinder No.5 OK?	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.5
5	Is fuel system (RH and LH) OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Is exhaust gas recirculation system OK?	Yes	Go to next step
		No	Repair or replace as necessary
7	Is compression at cylinder No.5 normal?	Yes	Go to next step
		No	Repair or replace as necessary
8	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace PCM
		No	Temporary system malfunction

* During normal driving

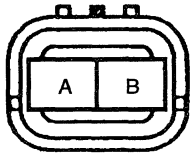
Diagnostic trouble code No. P0306	CYLINDER 6 MISFIRE DETECTED
Symptom	PCM input signal from crankshaft position sensor signal for cylinder No.6 is irregular
Possible cause	• Ignition system of cylinder No.6 malfunction • Low fuel • Low battery voltage • Fuel system (RH or LH) malfunction • Insufficient compression in cylinder No.6 • Crankshaft position sensor air gap incorrect • Exhaust gas recirculation system malfunction

STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.6 OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Is ignition timing within specification?	Yes	Go to next step
		No	Adjust ignition timing
3	Is crankshaft position sensor air gap OK?	Yes	Go to next step
		No	Repair or replace crankshaft position sensor
4	Is fuel injector at cylinder No.6 OK?	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.6
5	Is fuel system (RH and LH) OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Is exhaust gas recirculation system OK?	Yes	Go to next step
		No	Repair or replace as necessary
7	Is compression at cylinder No.6 normal?	Yes	Go to next step
		No	Repair or replace as necessary
8	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace PCM
		No	Temporary system malfunction

* During normal driving

Diagnostic trouble code No. P0325	KNOCK SENSOR 1-CIRCUIT MALFUNCTION
Symptom	Input voltage from knock sensor is malfunction level preset in PCM when ignition switch is turned on
Possible cause	• Knock sensor malfunction • Knock sensor installation incorrect • Open or short circuit in wiring from PCM terminal 3S to knock sensor terminal A

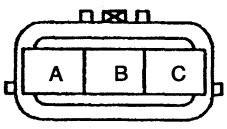
STEP	INSPECTION		ACTION
1	Does knock sensor connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Disconnect knock sensor connector. Is there continuity between connector A and PCM terminal 3S?	Yes	Go to next step
		No	Repair or replace wiring harness
3	Is resistance of knock sensor OK?	Yes	Go to next step
		No	Repair or replace knock sensor
4	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0335	CRANKSHAFT POS SENSOR-CKT MALFUNCTION
Symptom	No NE signal input from crankshaft position sensor for 1.5 seconds while engine running
Possible cause	• Crankshaft position sensor malfunction • Open or short circuit in wiring from PCM terminal 4AH to crankshaft position sensor terminal A • Open or short circuit in wiring from PCM terminal 4AL to crankshaft position sensor terminal B

STEP	INSPECTION		ACTION
1	Does crankshaft position sensor connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Disconnect the crankshaft position sensor connector. Is there continuity between connector terminal B and PCM terminal 4AL? Is there continuity between connector terminal A and PCM terminal 4AH?	Yes	Go to next step
		No	Repair or replace wiring harness
3	Is crankshaft position sensor air gap OK?	Yes	Go to next step
		No	Replace crankshaft position sensor or crankshaft pulley
4	Is crankshaft position sensor OK?	Yes	Go to next step
		No	Replace crankshaft position sensor
5	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0400	EGR-FLOW MALFUNCTION
Symptom	Exhaust gas recirculation does not function normally because of electrical or mechanical trouble

Possible cause	• EGR valve malfunction
	• EGR boost sensor malfunction
	• EGR boost sensor solenoid valve malfunction
	• EGR valve position sensor malfunction
	• EGR solenoid valve (vacuum, vent) malfunction
	• Clogs or leakage in piping connecting following units
	  • EGR boost sensor, EGR boost sensor solenoid valve and intake manifold
	  • Air cleaner, EGR solenoid valve (vent) and EGR valve
	  • Intake manifold, EGR solenoid valve (vaccum) and EGR valve
	  • Warm up three way catalytic converter and EGR valve

STEP	INSPECTION		ACTION
1	Is diagnostic trouble code for EGR solenoid valve (vaccum, vent), EGR boost sensor and EGR boost sensor solenoid valve?	Yes	Carry out inspection as required according to diagnostic trouble code
		No	Go to next step
2	Is EGR valve position sensor OK?	Yes	Go to next step
		No	Repair or replace EGR valve
3	Check each hose for damage. Are they OK? • Intake manifold—EGR solenoid valve (vent) • EGR solenoid valve (vent)—EGR solenoid valve (vaccum) • EGR solenoid valve (vaccum)—EGR valve	Yes	Go to next step
		No	Repair or replace as necessary
4	Is EGR boost sensor OK?	Yes	Go to next step
		No	Replace EGR boost sensor
5	Check each hose for damage? • EGR passage—EGR boost sensor solenoid valve • EGR boost sensor—EGR boost sensor solenoid valve	Yes	Go to next step
		No	Repair or replace as necessary
6	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace PCM
		No	Temporary system malfunction

* During driving when coolant temperature is over 55°C {131°F} and engine speed is over 1,000 rpm (10 km/h {6.2 mph})

Diagnostic trouble code No. P0420	BANK 1 CAT EFFICIENCY BELOW LIMIT
Symptom	• Warm up three way catalytic converter (RH) deterioration • Leakage in exhaust system

STEP	INSPECTION		ACTION
1	Is heated oxygen sensor (Rear RH) OK?	Yes	Replace warm up three way catalytic converter (RH)
		No	Replace heated oxygen sensor (Rear RH)

Diagnostic trouble code No. P0430	BANK 2 CAT EFFICIENCY BELOW LIMIT
Symptom	• Warm up three way catalytic converter (LH) deterioration • Leakage in exhaust system

STEP	INSPECTION		ACTION
1	Is heated oxygen sensor (Rear LH) OK?	Yes	Replace warm up three way catalytic converter (LH)
		No	Replace heated oxygen sensor (Rear LH)

Diagnostic trouble code No. P0440	EVAP SYSTEM-MALFUNCTION
Symptom	Evaporative emission control system does not function normally because of mechanical trouble

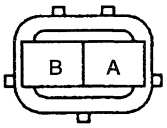
Possible cause	• Purge solenoid valve malfunction
	• Charcoal canister malfunction
	• Check valve malfunction
	• Fuel vapor valve malfunction
	• Clogs or leakage in piping connecting following units
	  • Intake manifold and purge solenoid valve
	  • Purge solenoid valve and charcoal canister
	  • Charcoal canister, check valve, and fuel vapor valve

STEP	INSPECTION		ACTION
1	Is PCM terminal 4O voltage OK?	Yes	Go to next step
		No	Inspect purge solenoid valve
2	Are evaporative emission control system-related hose free of clogs and leakage?	Yes	Go to next step
		No	Repair or replace as necessary
3	Is charcoal canister OK?	Yes	Go to next step
		No	Repair or replace as necessary
4	Is check valve OK?	Yes	Go to next step
		No	Repair or replace as necessary
5	Is fuel vapor valve OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Erase diagnostic trouble code from memory. Is same code No. present after *rechecking?	Yes	Replace PCM
		No	Temporary system malfunction

* During driving after engine warm-up

Diagnostic trouble code No. P0443	EVAP SYSTEM-PURGE CTRL VALVE CKT MALF
Symptom	Open or short circuit is observed in purge solenoid valve system when ignition switch is turned on
Possible cause	• Purge solenoid valve malfunction • Open or short circuit in wiring from purge solenoid valve terminal A to main relay terminal F • Open or short circuit in wiring from purge solenoid valve terminal B to PCM terminal 4O

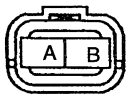
STEP	INSPECTION		ACTION
1	Does purge solenoid valve connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 4O voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect purge solenoid valve connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — Purge solenoid valve terminal A)
4	Is there continuity between connector terminal B and PCM terminal 4O?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between purge solenoid valve terminals A and B?	Yes	Go to next step
		No	Replace purge solenoid valve
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0505	IDLE CONTROL SYSTEM-MALFUNCTION
Symptom	• Mechanical trouble is observed in idle air control system • Open or short circuit is observed in idle air control system when ignition switch is turned on
Possible cause	• Idle air control valve malfunction • Leakage in intake-air system • Open or short circuit in wiring from idle air control valve terminal A to main relay terminal F • Open or short circuit in wiring from idle air control valve terminal B to PCM terminal 4M

STEP	INSPECTION		ACTION
1	Does idle air control valve connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 4M voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect idle air control valve connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — Idle air control valve terminal A)
4	Is there continuity between connector terminal B and PCM terminal 4M?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between idle air control valve terminals A and B?	Yes	Go to next step
		No	Replace idle air control valve
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P0510	CLOSED THROTTLE POS SWITCH-MALFUNCTION
Symptom	Input voltage from closed throttle position switch (in throttle position sensor) stays 0 V or above 12 V for more than 33.2 seconds after ignition switch is turned on
Possible cause	• Closed throttle position switch (in throttle position sensor) malfunction • Throttle position sensor malfunction • Open or short circuit in wiring from throttle position sensor terminal C to PCM terminal 3X • Open or short circuit in wiring from throttle position sensor terminal D to PCM terminal 3AB

STEP	INSPECTION		ACTION
1	Does throttle position sensor connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 3X voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Is there continuity between connector terminal D and PCM terminal 3AB?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is there continuity between connector terminal C and PCM terminal 3X?	Yes	Replace throttle position sensor
		No	Repair or replace wiring harness
5	Is closed throttle position switch (in throttle position sensor) OK?	Yes	Go to next step
		No	Repair or replace throttle position sensor
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

HARNESS SIDE CONNECTOR

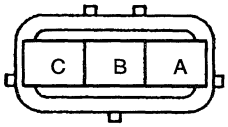
Diagnostic trouble code No. P0703	TORQUE CONV/BRAKE SW-MALFUNCTION
Symptom	No signal input from brake switch to PCM when brake pedal is kept depressed for more than 33 seconds, or signal input when brake pedal is not depressed
Possible cause	• Brake switch malfunction • Open or short circuit in wiring from PCM terminal 1O to brake switch terminal • Open or short circuit in wiring from brake switch terminal to battery terminal

STEP	INSPECTION		ACTION
1	Does brake switch connector or PCM connector have poor connection?	Yes	Repair or replace
		No	Go to next step
2	Is PCM terminal 1O voltage OK?	Yes	Go to step 4
		No	Go to next step
3	Is there continuity between brake switch and PCM terminal 1O?	Yes	Check for open or short circuit in wiring harness. (Battery — Brake switch) Check brake switch.
		No	Repair or replace wiring harness
4	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

<table>
<tr><td>Diagnostic trouble code No. P1000</td><td>MORE DRIVING NEEDED TO COMPLETE TEST</td></tr>
<tr><td>Possible cause</td><td>Following diagnostic trouble code detection conditions not satisfied
<table>
<tr><th>Diagnosed circuit</th><th>Code No.</th></tr>
<tr><td>Excessive time to enter closed loop fuel control</td><td>P0125</td></tr>
<tr><td>O_2 sensor circuit malfunction</td><td>P0130
P0150</td></tr>
<tr><td>O_2 sensor heater circuit malfunction</td><td>P0135
P0155</td></tr>
<tr><td>Fuel trim malfunction</td><td>P0170</td></tr>
<tr><td>Misfire detected</td><td>P0300, P0301
P0302, P0303
P0304, P0305
P0306</td></tr>
<tr><td>Exhaust gas recirculation flow malfunction</td><td>P0400</td></tr>
<tr><td>Catalyst system efficiency below threshold</td><td>P0420
P0430</td></tr>
<tr><td>Evaporative emission control system malfunction</td><td>P0440</td></tr>
</table></td></tr>
<tr><td>ACTION</td><td>Carry out troubleshooting according to symptom</td></tr>
</table>

Diagnostic trouble code No. P1170	HO2S 11-INVERSION
Symptom	Heated oxygen sensor (Front RH) signal remains unchanged for more than 20 seconds after engine control has entered feedback zone
Possible cause	• Heated oxygen sensor (Front RH) malfunction • Open or short circuit in wiring from heated oxygen sensor (Front RH) terminal A to PCM terminal 3I • Intake-air system, fuel system, ignition system malfunction

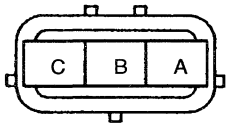
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Front RH) connector or PCM connector have poor connection?	Yes	Repair or replace
		No	Go to next step
2	Is PCM terminal 3I voltage OK?	Yes	Go to step 5
		No	Go to next step
3	Disconnect heated oxygen sensor (Front RH) connector. Is there continuity between connector terminal A and PCM terminal 3I?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Are following units OK? • Fuel injector • Pressure regulator • Volume air flow sensor • Engine coolant temperature sensor • Spark plug • Air suction (Air/Fuel ratio rich or lean)	Yes	Replace heated oxygen sensor (Front RH)
		No	Repair or replace
5	Erase diagnostic trouble code from memory. Run the engine at 1,500—2,000 rpm for more than 3 minutes to activate heated oxygen sensor. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1173	HO2S 21-INVERSION
Symptom	Heated oxygen sensor (Front LH) signal remains unchanged for more than 20 seconds after engine control has entered feedback zone
Possible cause	• Heated oxygen sensor (Front LH) malfunction • Open or short circuit in wiring from heated oxygen sensor (Front LH) terminal A to PCM terminal 3M • Intake-air system, fuel system, ignition system malfunction

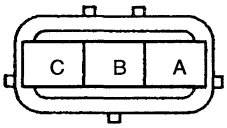
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Front LH) connector or PCM connector have poor connection?	Yes	Repair or replace
		No	Go to next step
2	Is PCM terminal 3M voltage OK?	Yes	Go to step 5
		No	Go to next step
3	Disconnect heated oxygen sensor (Front LH) connector. Is there continuity between connector terminal A and PCM terminal 3M?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Are following units OK? • Fuel injector • Pressure regulator • Volume air flow sensor • Engine coolant temperature sensor • Spark plug • Air suction (Air/Fuel ratio rich or lean)	Yes	Replace heated oxygen sensor (Front LH)
		No	Repair or replace
5	Erase diagnostic trouble code from memory. Run the engine at 1,500—2,000 rpm for more than 3 minutes to activate heated oxygen sensor. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1195	EGRBS-OPEN OR SHORT
Symptom	Input voltage from EGR boost sensor is malfunction level preset in PCM when ignition switch is turned on
Possible cause	• EGR boost sensor malfunction • Open or short circuit in wiring from PCM terminal 3F to EGR boost sensor terminal B • Open or short circuit in wiring from PCM terminal 3A to EGR boost sensor terminal C • Open circuit in wiring from PCM terminal 3AB to EGR boost sensor terminal A

STEP	INSPECTION		ACTION
1	Does EGR boost sensor connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 3F voltage OK?	Yes	Go to step 5
		No	Go to next step
3	Disconnect EGR boost sensor connector. Turn ignition switch to ON. Is there 5 V at connector terminal C?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (PCM terminal 3A — EGR boost sensor terminal C)
4	Is there continuity between connector terminal A and PCM terminal 3AB?	Yes	Replace EGR boost sensor
		No	Repair or replace wiring harness
5	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



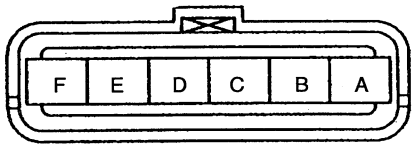
HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1196	STA SW-OPEN OR SHORT
Symptom	Input signal from starter to PCM continues for more than 33 seconds
Possible cause	• Starter malfunction • Open or short circuit in wiring from starter terminal S and PCM terminal 1H

STEP	INSPECTION		ACTION
1	Does starter connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 1H voltage OK?	Yes	Go to step 4
		No	Go to next step
3	Disconnect starter connector. Is there continuity between connector terminal S and PCM terminal 1H?	Yes	Replace starter
		No	Repair or replace
4	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

Diagnostic trouble code No. P1345	SGC SIGNAL-NO SGC SIGNAL
Symptom	No SGC signal input from camshaft position sensor while engine rotates two cycles
Possible cause	• Camshaft position sensor malfunction • Open or short circuit in wiring from distributor 6-pin connector terminal B to main relay terminal F • Open or short circuit in wiring from PCM terminal 4F to distributor 6-pin connector terminal D

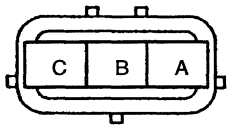
STEP	INSPECTION		ACTION
1	Does distributor 6-pin connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Disconnect distributor connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal B?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — Distributor 6-pin connector terminal B)
3	Is there continuity between connector terminal D and PCM terminal 4F?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is PCM terminal 4F voltage OK?	Yes	Go to step 6
		No	Go to next step
5	Is camshaft position sensor OK?	Yes	Go to next step
		No	Replace distributor
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1402	EGRS-OPEN OR SHORT
Symptom	Input voltage from EGR valve position sensor is below 0.2 V or above 4.8 V when ignition switch is turned on
Possible cause	• EGR valve position sensor malfunction • Open or short circuit in wiring from EGR valve position sensor terminal C to PCM terminal 3R • Open or short circuit in wiring from EGR valve position sensor terminal B to PCM terminal 3A • Open or short circuit in wiring from EGR valve position sensor terminal A to PCM terminal 3AB

STEP	INSPECTION		ACTION
1	Does EGR valve position sensor connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 3R voltage OK?	Yes	Go to step 7
		No	Go to next step
3	Disconnect EGR valve position sensor connector. Turn ignition switch to ON. Is there 5 V at connector terminal B?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (PCM terminal 3A — EGR valve position sensor terminal B)
4	Is there continuity between connector terminal A and PCM terminal 3AB?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between connector terminal C and PCM terminal 3R?	Yes	Go to next step
		No	Repair or replace wiring harness
6	Is resistance of EGR valve position sensor OK?	Yes	Go to next step
		No	Replace EGR control valve
7	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1521	VRIS1-OPEN OR SHORT
Symptom	Open or short circuit is observed in VRIS solenoid valve No.1 system when ignition switch is turned on
Possible cause	• VRIS solenoid No.1 malfunction • Open or short circuit in wiring from VRIS solenoid valve No.1 terminal B to PCM terminal 1AA • Open or short circuit in wiring from VRIS solenoid valve No.1 terminal A to main relay terminal F

STEP	INSPECTION		ACTION
1	Does VRIS solenoid valve No.1 connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 1AA voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect VRIS solenoid valve No.1 connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — VRIS solenoid valve No.1 terminal A)
4	Is there continuity between connector terminal B and PCM terminal 1AA?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between VRIS solenoid valve No.1 terminals A and B?	Yes	Go to next step
		No	Replace VRIS solenoid valve No.1
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1522	VRIS2-OPEN OR SHORT
Symptom	Open or short circuit is observed in VRIS solenoid valve No.2 system when ignition switch is turned on
Possible cause	• VRIS solenoid No.2 malfunction • Open or short circuit in wiring from VRIS solenoid valve No.2 terminal B to PCM terminal 1AE • Open or short circuit in wiring from VRIS solenoid valve No.2 terminal A to main relay terminal F

STEP	INSPECTION		ACTION
1	Does VRIS solenoid valve No.2 connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 1AE voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect VRIS solenoid valve No.2 connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal F — VRIS solenoid valve No.2 terminal A)
4	Is there continuity between connector terminal B and PCM terminal 1AE?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between VRIS solenoid valve No.2 terminals A and B?	Yes	Go to next step
		No	Replace VRIS solenoid valve No.2
6	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

HARNESS SIDE CONNECTOR

Diagnostic trouble code No. P1609	PCME (CPU)-MALFUNCTION		
Symptom	PCM's knock control integrated circuit is damaged		
Possible cause	PCM's knock control integrated circuit is damaged		
STEP	INSPECTION		ACTION
1	Erase diagnostic trouble code from memory. Is same code No. present after recheking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

Diagnostic trouble code No. P1720	VSS2-NO VSS2 SIGNAL		
Symptom	No vehicle speed sensor signal input from vehicle speed sensor while driving		
Possible cause	• Speedometer sensor malfucntion • Open or short circuit in wiring from ignition switch to speedometer sensor • Open or short circuit in wiring from speedometer sensor to GND • Open or short circuit in wiring from speedometer sensor to vehicle speed sensor • Open or short circuit in wiring from vehicle speed sensor to PCM terminal 1C		
STEP	INSPECTION		ACTION
1	Does vehicle speed sensor connector and PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 1C voltage OK?	Yes	Go to step 5
		No	Go to next step
3	Is there continuity between vehicle speed sensor terminal and PCM terminal 1C?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is there continuity between vehicle speed sensor and speedometer sensor terminals?	Yes	Go to next step
		No	Repair or replace speedometer sensor and wiring harness
5	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

* During driving after engine warm-up

Diagnostic trouble code No. P1794	BAT-BAT OR CIRCUIT FAIL
Symptom	Battery positive voltage is not constantly applied to PCM terminal 4B
Possible cause	• Battery malfunction • Open or short circuit in wiring from PCM terminal 4B to batterry positive cable • Burnt fuse

STEP	INSPECTION		ACTION
1	Is battery fully charged?	Yes	Go to next step
		No	Charge the battery
2	Does battery positive voltage present at PCM terminal 4B?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (PCM terminal 4B — Battery)
3	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

Diagnostic trouble code No. P1797	PNS-OPEN OR SHORT
Symptom	• PCM judges N position for more than 33 seconds when shift lever is in D range (ATX) • PCM judges neutral/clutch switch OFF for more than 5 seconds while vehicle stopped and engine running (MTX)
Possible cause	• Transaxle range switch malfunction • Neutral/clutch switch malfunction • Open or short circuit in wiring from transaxle range switch terminal H to PCM terminal 1F

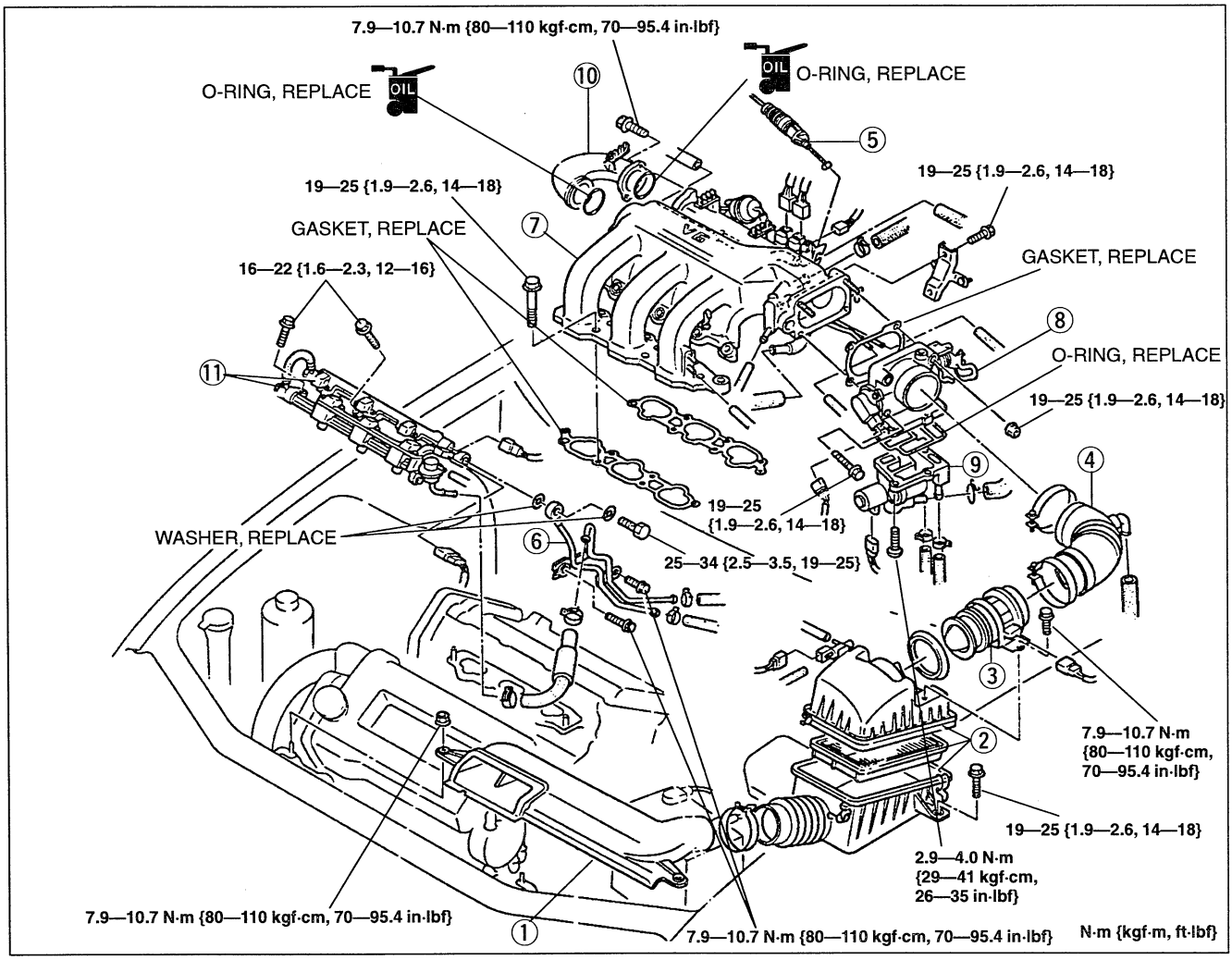
STEP	INSPECTION		ACTION
1	Does PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCM terminal 1F voltage OK?	Yes	Go to step 5
		No	Go to next step
3	Is there continuity between transaxle range switch terminal H and PCM terminal 1F or neutral/clutch switch terminal and PCM terminal 1F?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is transaxle range switch OK? (ATX) Is neutral/clutch switch OK? (MTX)	Yes	Go to next step
		No	Repair or replace transaxle range switch (ATX) Repair or replace neutral/clutch switch (MTX)
5	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace PCM
		No	Intermitent poor connection of harness or connector (Repair connector and/or harness)

INTAKE-AIR SYSTEM

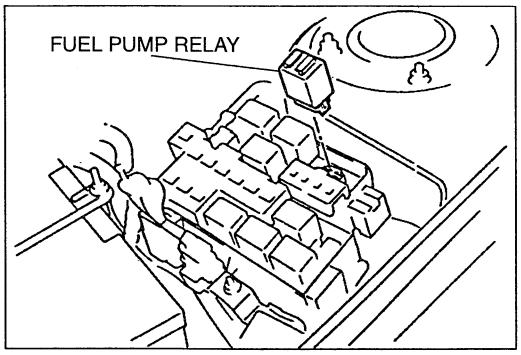
COMPONENT PARTS
Removal / Inspection / Installation

Warning
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F2–67.**

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.

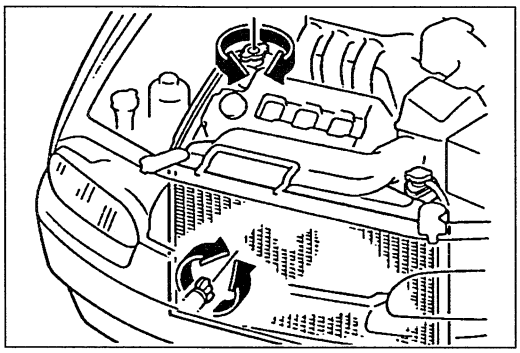


1. Fresh-air duct
   Inspect for damage and cracks
2. Air cleaner
   Inspect for damage and cracks
3. Volume air flow sensor
4. Air intake hose
   Inspect for damage
5. Accelerator cable
   Inspection / Adjustment ..... page F2–56
6. Fuel pipe
7. Intake manifold
   Inspection ..... page F2–57
8. Throttle body
   Inspection ..... page F2–55
9. BAC valve
   Inspection ..... page F2–60
10. Air intake pipe
    Inspection ..... page F2–57
11. Fuel distributor

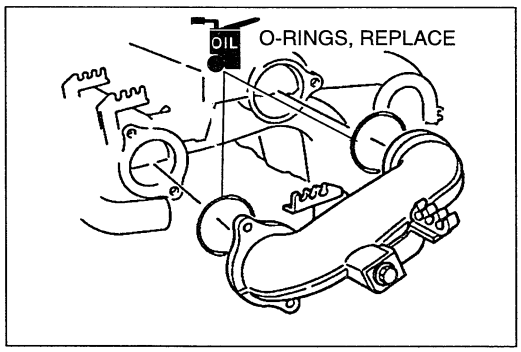


Removal Note
Fuel hose

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injurles or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F2–67.**

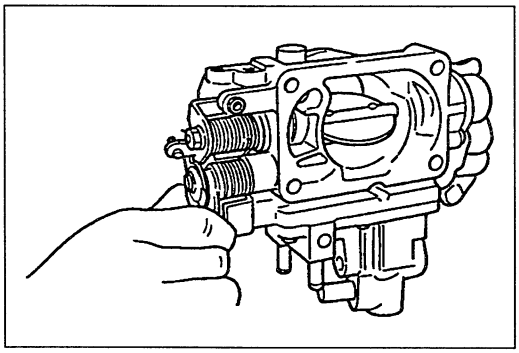


Water hose
1. Loosen the drain plug and drain the coolant from the radiator. (Refer to section E2.)
2. Remove the water hose from the BAC valve.
3. After installation of the throttle body, refill the radiator. (Refer to section E2.)



Installation Note
Air intake pipe
1. Apply a small amount of clean engine oil to new O-rings before installing them.
2. Install the air intake pipe.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

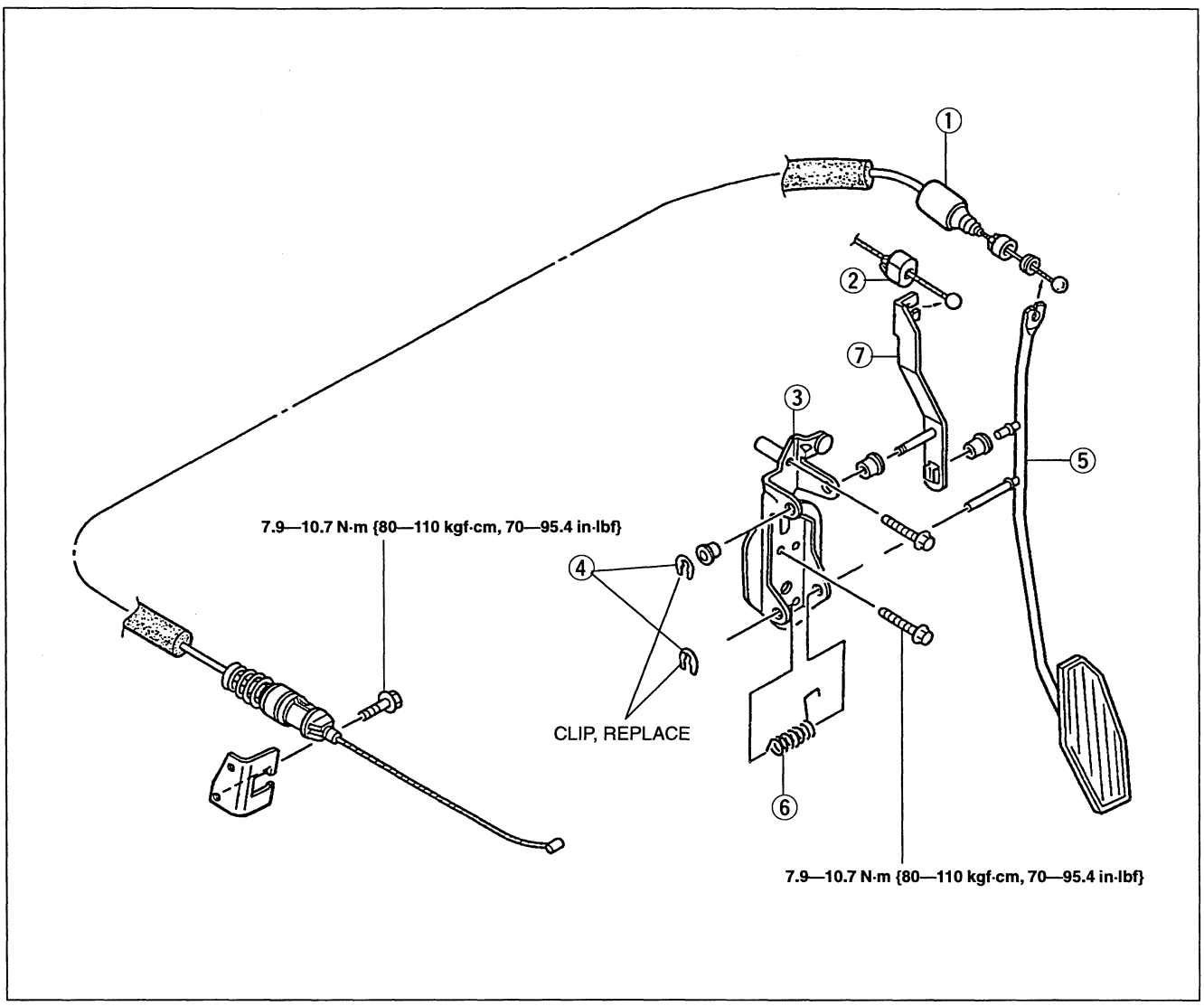


THROTTLE BODY
Inspection
1. Check the throttle body for wear, coolant leakage, and deposits.
2. Verify that the throttle valve moves smoothly from closed throttle position to wide open throttle.
3. Replace the throttle body, if necessary.

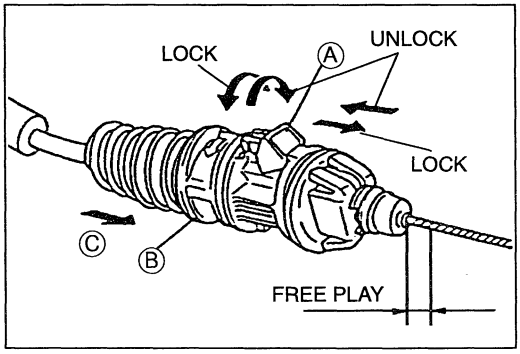
ACCELERATOR PEDAL

Removal / Inspection / Installation

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



1. Accelerator cable
   Inspection / Adjustment ..... below
2. Cruise actuator cable
3. Retainer
4. Clip
5. Accelerator pedal
   Inspect for damage
6. Return spring
7. Bracket



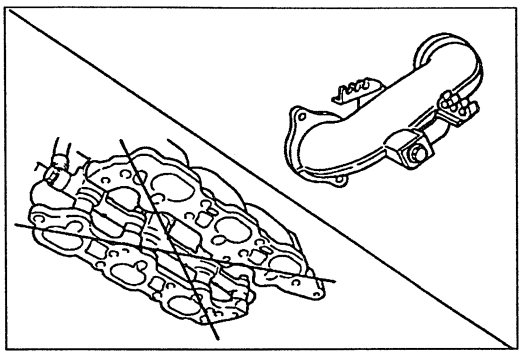
ACCELERATOR CABLE

Installation / Adjustment

1. Verify that the throttle valve is closed throttle position.
2. Measure the free play of the accelerator cable.

   Free play: 1.5—4.5 mm {0.06—0.17 in}

3. If not as specified, turn stopper B while pressing lock button A to release the lock.
4. Push the spring in direction C and adjust the cable free play.
5. Lock stopper A after locking stopper B.



AIR INTAKE PIPE/INTAKE MANIFOLD

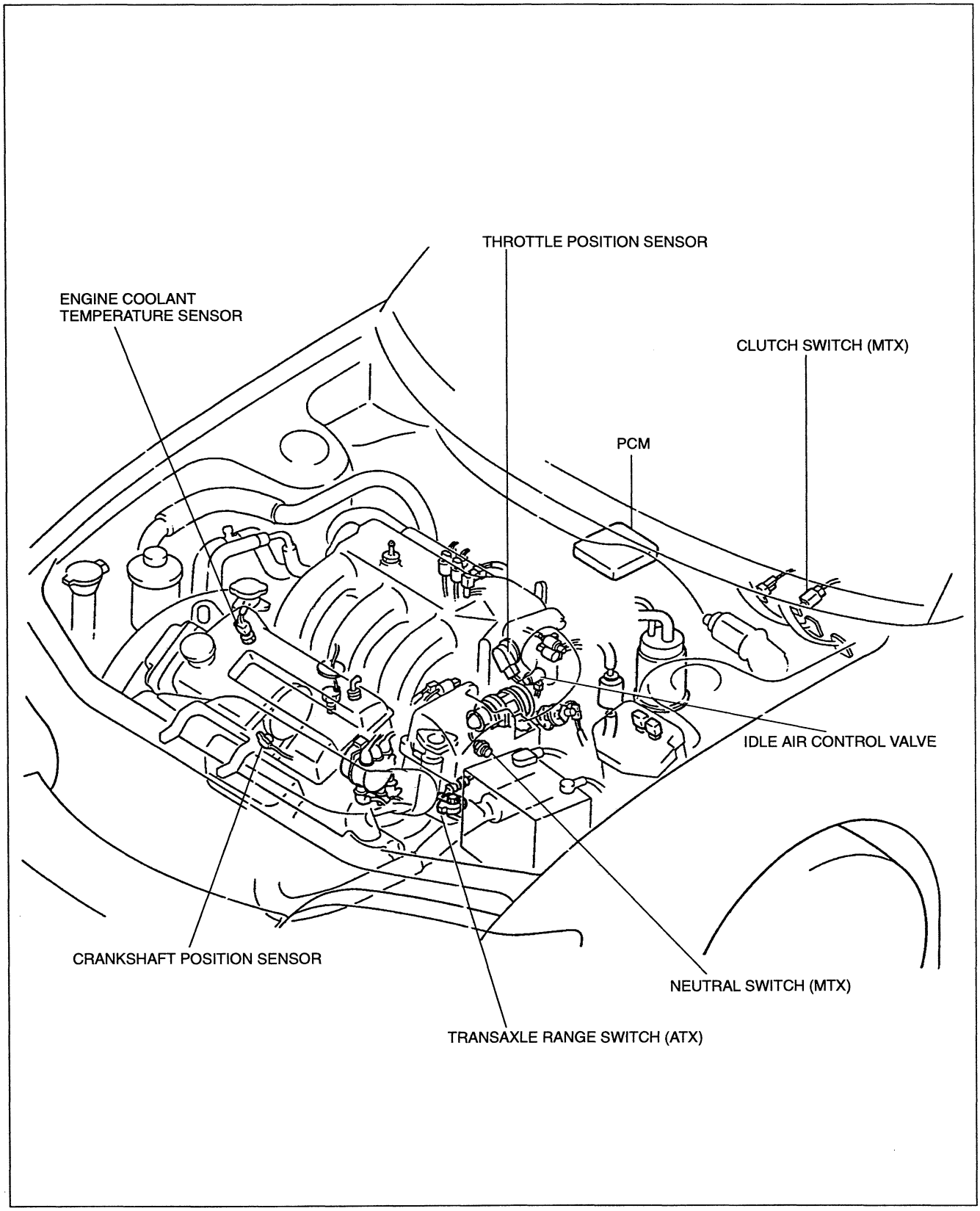
Inspection

1. Check for damage and cracks.
2. Verify flatness of the air intake pipe and intake manifold contact surface as shown.
3. Replace the air intake pipe and/or intake manifold, if necessary.

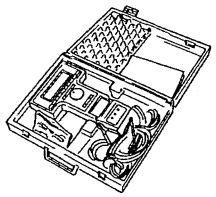
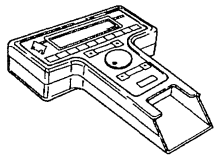
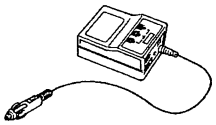
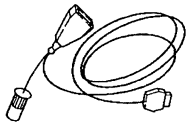
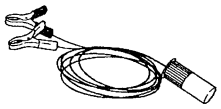
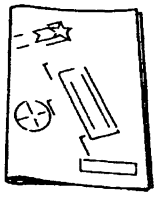
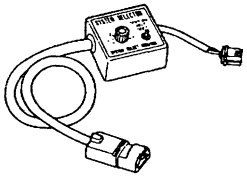
IDLE AIR CONTROL SYSTEM

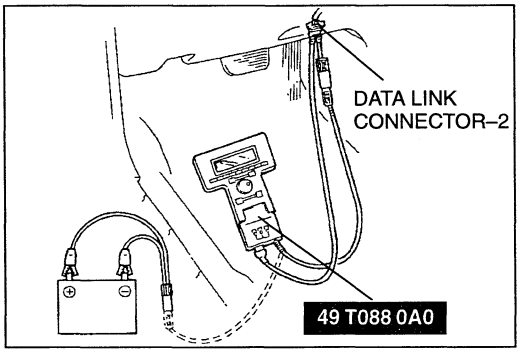
DESCRIPTION

The idle air control system controls the bypass air amount that passes through the throttle body to improve idle stability, warm-up, and drivability. This system consists of the idle air control valve, air valve, PCM, and input devices.



PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of idle air control system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of idle air control system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of idle air control system	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of idle air control system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of idle air control system	49 T088 008A Instruction Manual 	For inspection of idle air control system
49 T088 010B Program Card 	For inspection of idle air control system	49 B019 9A0 System Selector 	For inspection of idle air control system



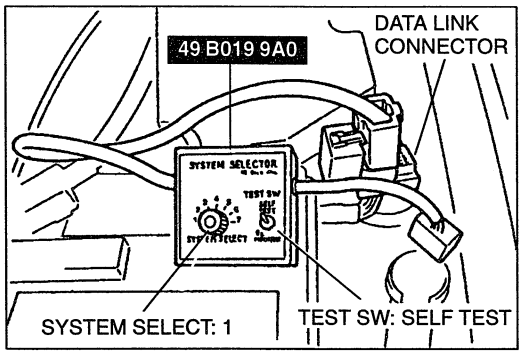
SYSTEM INSPECTION

1. Start the engine and run it at idle.
2. Disconnect the IAC valve connector and verify that the engine rotation becomes rough or the engine stalls.
3. If the engine condition will not change, do as follows.
   (1) Connect the **SSTs**.
   (2) Verify that diagnostic trouble code No. P0505 is not displayed. If code No. P0505 is shown, carry out troubleshooting of the code No. P0505.
   (3) Change the duty value of the IAC valve to 100% by using the SIMULATION TEST function and verify that the idle speed increases.
      I. If the idle speed increases, replace the PCM. (Refer to page F2–106.)
      II. If the idle speed does not change, replace the BAC valve. (Refer to page F2–60.)
4. Warm up the engine to normal operating temperature and run it at idle.
5. Turn the electrical loads on and verify that the engine speed is within the specification.

Engine speed (rpm)

No load	600—700
E/L operated	600—700
A/C operated	775—875
P/S operated	600—700

6. If not as specified, check the related switches and wiring harnesses.

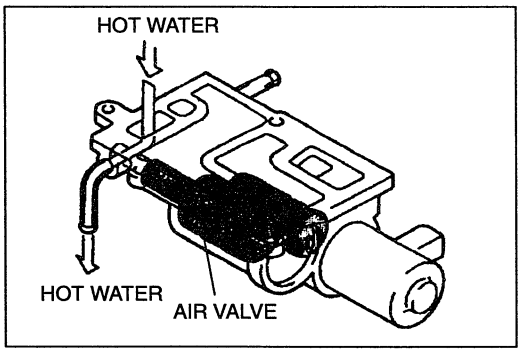


BAC VALVE

Inspection

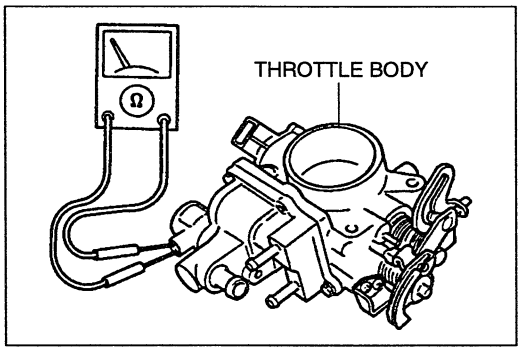
Air valve system inspection

1. Verify that the engine coolant temperature is below 20°C {68°F}.
2. Connect the **SST** to the data link connector.
3. Set the system select to position 1 and test switch to SELF TEST.
4. Start the engine.
5. Verify that the idle speed decreases gradually as the engine warms up.



Air valve inspection

1. Remove the BAC valve. (Refer to above.)
2. Circulate water in the BAC valve coolant passage to cool the air valve.
3. Circulate hot water in the BAC valve coolant passage and verify that the air valve operates.
4. If not, replace the BAC valve.



Idle air control valve

1. Remove the throttle body. (Refer to page F2–54.)
2. Measure the resistance of the idle air control valve.

   Resistance: 10.7—12.3Ω [at 20°C {68°F}]

3. If not as specified, replace the BAC valve.

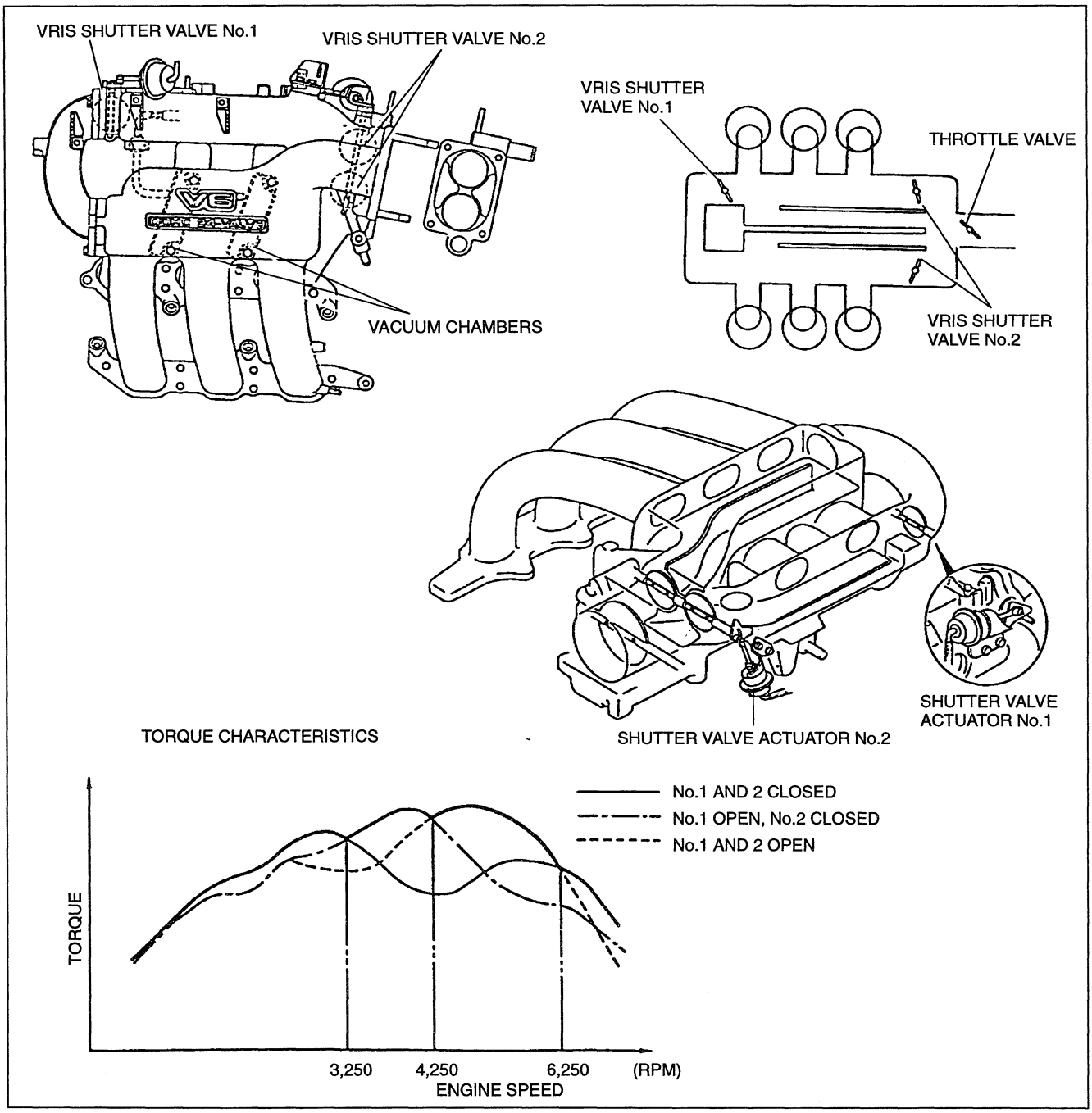
Removal / Installation

(Refer to page F2–54.)

VARIABLE RESONANCE INDUCTION SYSTEM (VRIS)

DESCRIPTION

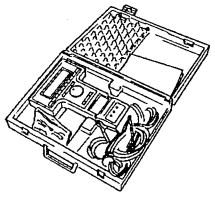
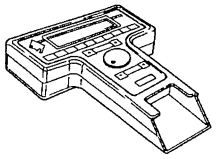
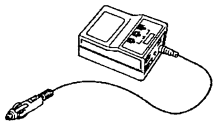
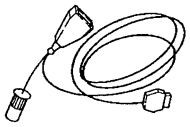
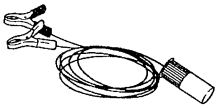
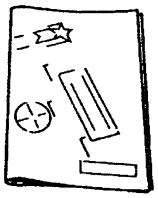
The inside of the dynamic chamber is divided into two sections, interconnected by two shutter valves and connecting pipes for variable resonance induction operation.This system opens and closes the shutter valves according to the engine speed to improve the charging efficiency by utilizing the pressure waves of the intake air.There are two vacuum chambers under the left bank of the intake manifold that are used to supply constant vacuum to the VRIS shutter valve actuators during wide-open throttle operation and other low-vacuum, low-speed situations.

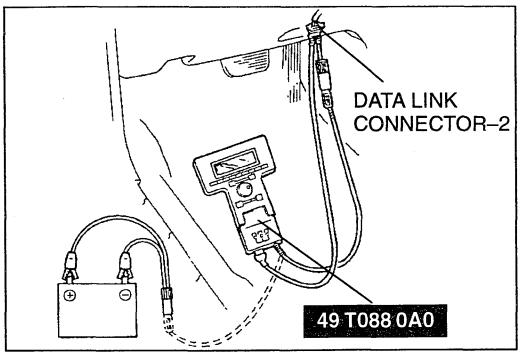


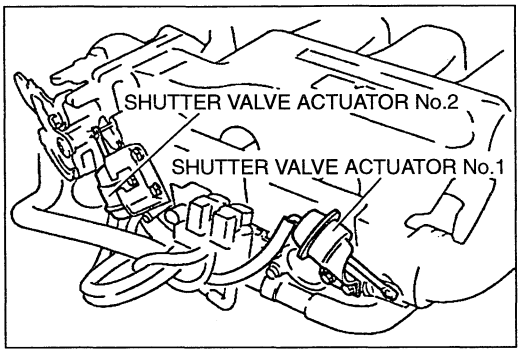
Operation

Engine speed rpm	0—3,250	3,250—4,250	4,250—6,250	6,250—7,500
VRIS shutter valve No.1	Closed	Open	Open	Closed
VRIS shutter valve No.2	Closed	Closed	Open	Closed

PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of VRIS	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of VRIS
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of VRIS	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of VRIS
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of VRIS	49 T088 008A Instruction Manual 	For inspection of VRIS
49 T088 010B Program Card 	For inspection of VRIS	—	—





SYSTEM INSPECTION

1. Start the engine.
2. Verify that the rods of the shutter valve actuator 1 and 2 are not pulled.
3. If the rods are pulled, do as follows.
   (1) Stop the engine.
   (2) Connect the **SSTs**.
   (3) Verify that diagnostic trouble code No. P1521 or P1522 is not displayed. If code No. P1521 or P1522 is shown, carry out troubleshooting of the code No. P1521, P1522. (Refer to page F2–13.)
   (4) If diagnostic trouble codes are not shown, do as follows.
      I. Start the engine and run it at idle.
      II. Turn the VRIS solenoid valve from ON to OFF by using the SIMULATION TEST function and check if operation sound of the valve is heard.
      III. If the operation sound is heard, check the following.
      • Shutter valve actuators (Refer to page F2–65.)
      IV. If the operation sound is not heard, check the following.
      • VRIS solenoid valve (Refer to page F2–65.)
4. Position the vehicle on a chassis roller and shift the selector lever to D.
5. Check the rod operation under the following conditions.

Rod operation

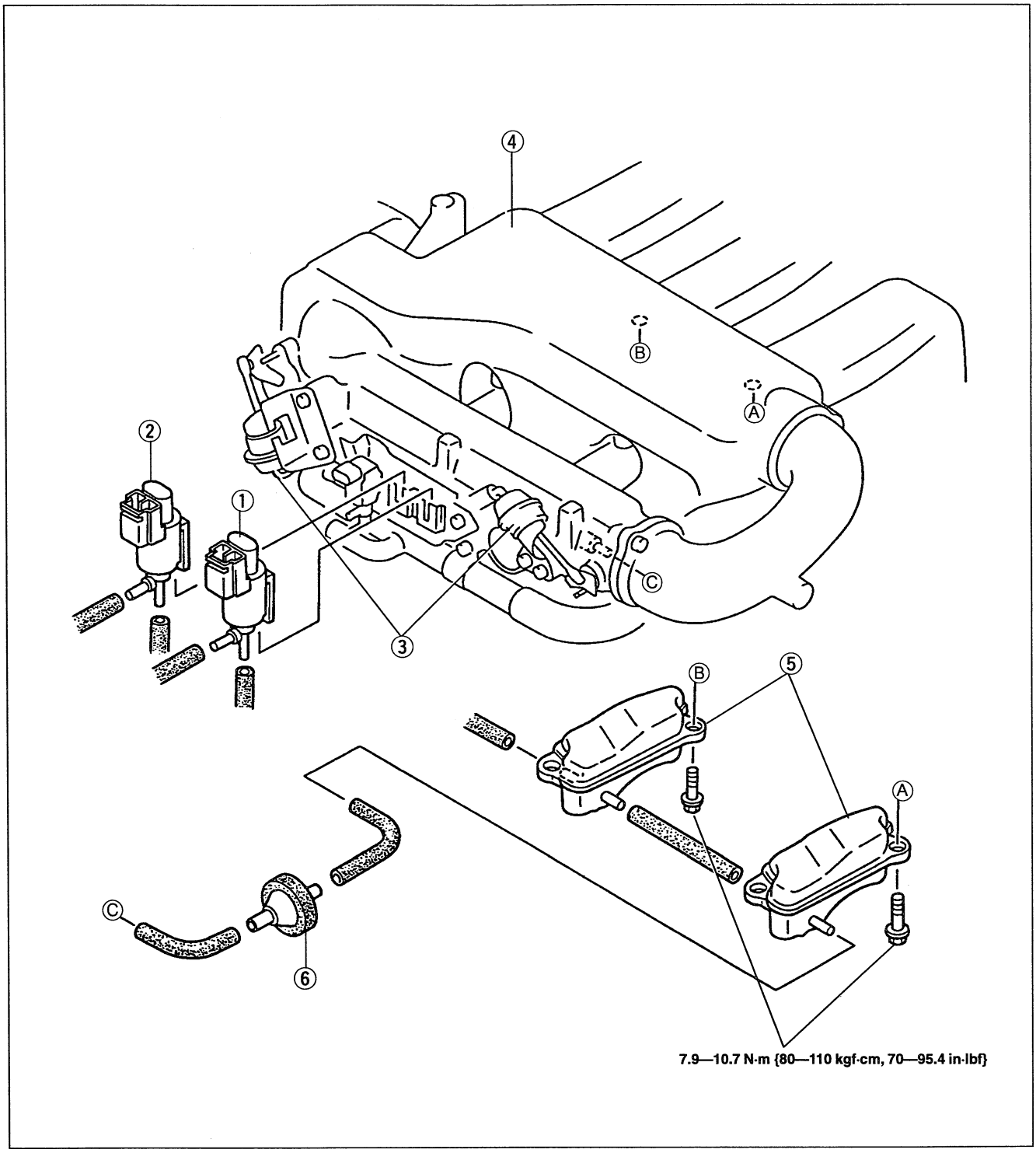
Engine speed (rpm)	0	3250	4250	6250	7500
Shutter valve actuator 1	Not operate	Operate			Not operate
Shutter valve actuator 2	Not operate			Operate	Not operate

6. Rod operation is not as specified, do as follows.
   (1) Stop the engine.
   (2) Install the **SSTs**.
   (3) Verify that diagnostic trouble code No. P1521 or P1522 is not displayed. If code No. P1521 or P1522 is shown, carry out troubleshooting of the code No. P1521, P1522. (Refer to page F2–13.)
   (4) If diagnostic trouble codes are not shown, do as follows.
      I. Start the engine and run it at idle.
      II. Turn the VRIS solenoid valve from ON to OFF by using SIMULATION TEST function and check if operation sound of the valve is heard.
      III. If the operation sound is heard, check the following.
      • Loose or damaged vacuum hose
      • Shutter valve actuators (Refer to page F2–65.)
      • Throttle position sensor (Refer to page F2–117.)
      IV. If the operation sound is not heard, check the following.
      • VRIS solenoid valve (Refer to page F2–65.)

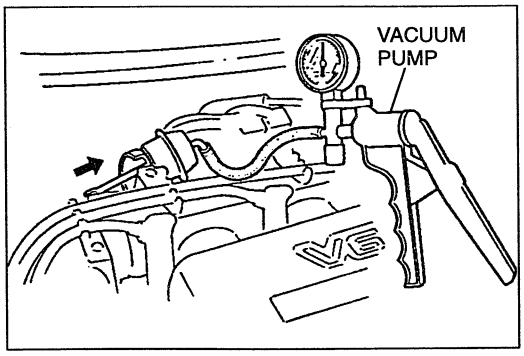
COMPONENT PARTS

Removal / Inspection / Installation

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



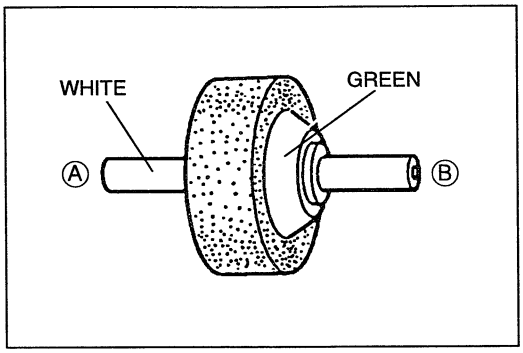
1. VRIS solenoid valve No.1
   Inspection ..... page F2–65
2. VRIS solenoid valve No.2
   Inspection ..... page F2–65
3. VRIS shutter valve actuator
   Inspection ..... page F2–65
4. Intake manifold (Refer to page F2–49)
5. Vacuum chamber
   Inspection ..... page F2–65
6. Check valve
   Inspection ..... page F2–65



VRIS SHUTTER VALVE ACTUATOR (No.1, No.2)

Inspection

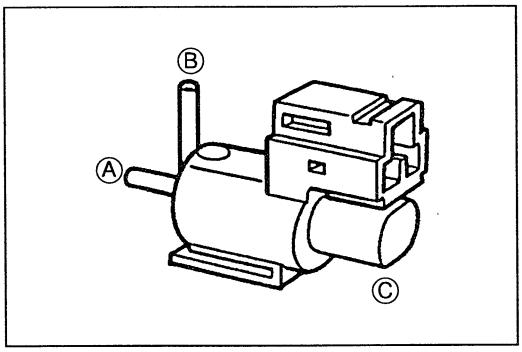
1. Disconnect the vacuum hose from the shutter valve actuator.
2. Connect a vacuum pump to the actuator.
3. Apply vacuum and verify that the rod is pulled into the actuator.



CHECK VALVE

Inspection

1. Remove the check valve.
2. Blow through A and verify that air flows from B.
3. Blow through B and verify that air does not flow from A.

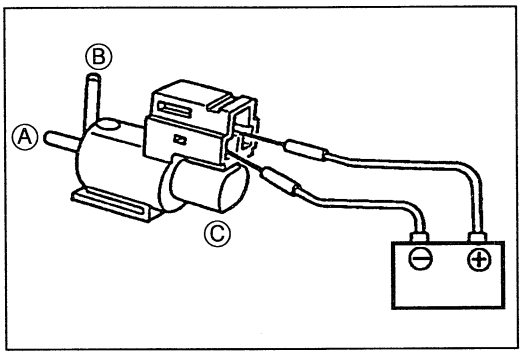


VRIS SOLENOID VALVE (No.1, No.2)

Inspection

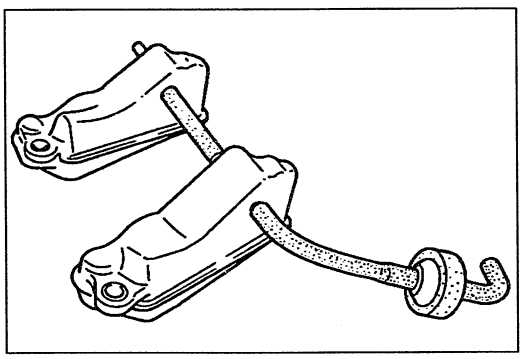
1. Disconnect the solenoid valve.
2. Verify that air flow between each port as shown below.

Port	Airflow
A—B	No
A—C	No
B—C	Yes



3. Apply battery positive voltage and a ground to the terminals of the solenoid valve.
4. Verify that air flow between each port as shown below.

Port	Airflow
A—B	Yes
A—C	No
B—C	No



VACUUM CHAMBER

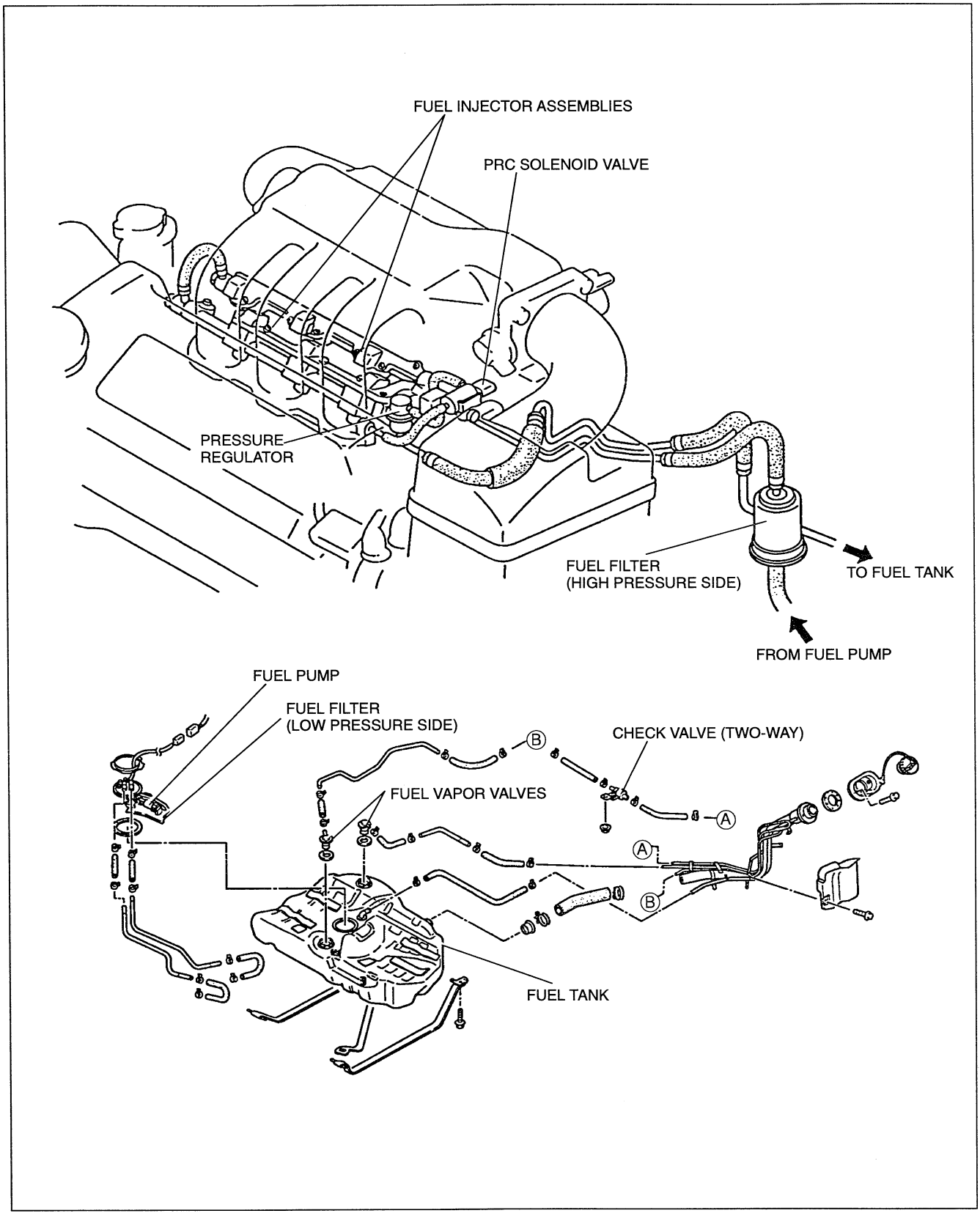
Inspection

1. Visually check the vacuum chambers for clogging, damage, and cracks.
2. Replace if necessary.

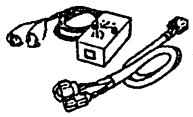
FUEL SYSTEM

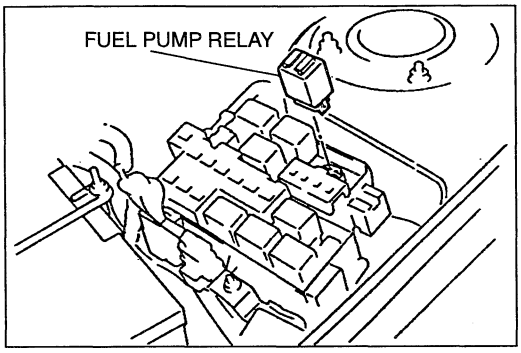
DESCRIPTION

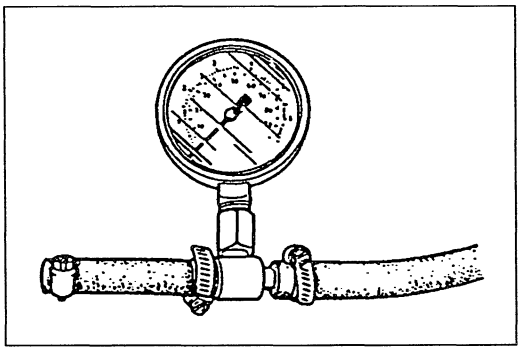
This system supplies fuel to the fuel injectors at a constant pressure. Fuel is metered and injected into the intake manifold ports according to injection control signals from the PCM. The system consists of the fuel tank, fuel pump, fuel filters, fuel distributor, pressure regulator, fuel injectors, and fuel pump relay.



PREPARATION
SST

49 E018 9A0 Checker set, injector		For inspection of fuel injectors





Fuel Pressure Release and Servicing Fuel System

Warning
- **Fuel vapor is hazardous. It can very easly ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

Fuel in the fuel system is under high pressure when the engine is not running.

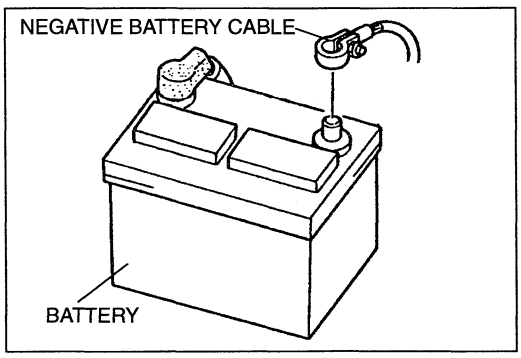
Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the following "Fuel Line Safety Procedures".**

Fuel Line Sately Procedures

A. Release the fuel pressure before disconnecting a fuel line.
   1. Start the engine.
   2. Remove the fuel pump relay.
   3. After the engine stalls, turn the ignition switch to OFF.
   4. Install the fuel pump relay.

B. Avoid leakage.
   1. When disconnecting a fuel line hose, wrap a rag around it to protect against fuel leakage.
   2. Plug the hose after removal.

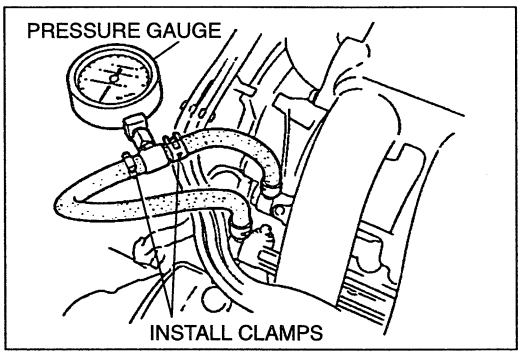
C. Install hose clamps to secure the fuel pressure gauge to fuel filter and the main hose.



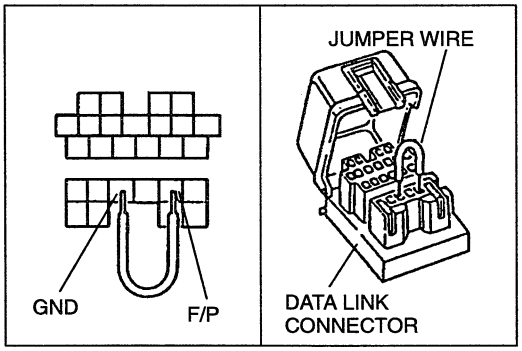
SYSTEM INSPECTION
Fuel Pressure Hold Inspection

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" above.**

1. Disconnect the negative battery cable.



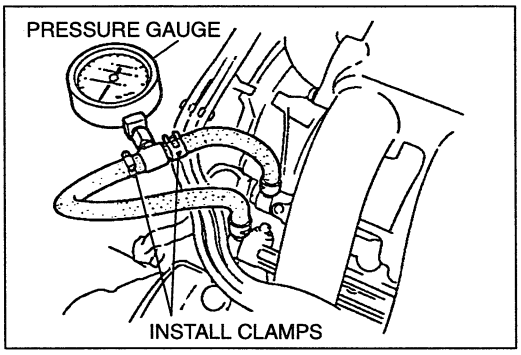
2. Install a fuel pressure gauge.
3. Connect the negative battery cable.

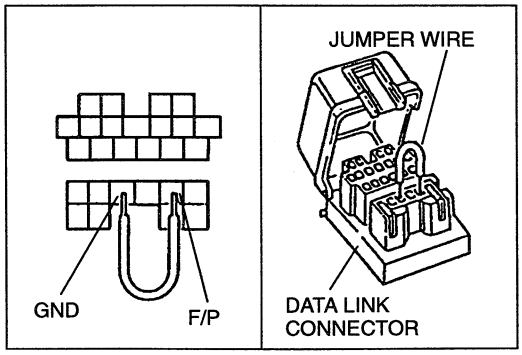


4. Connect the data link connector terminals F/P and GND with a jumper wire.
5. Turn the ignition switch to ON for **10 sec.** to operate the fuel pump.
6. Turn the ignition switch to OFF and disconnect the jumper wire.
7. Observe the fuel pressure **after 5 min.**

   Fuel pressure:
   More than 150 kPa {1.5 kgf/cm^2, 21 psi}

8. If not as specified, perform the following inspections.
   - Fuel pump (Refer to page F2–71.)
   - Pressure regulator (Refer to page F2–78.)
   - Fuel injector leakage (Refer to page F2–74.)





Fuel Line Pressure Inspection

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injurles or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F2–67.**

1. Disconnect the negative battery cable.
2. Install a fuel pressure gauge. (Install clamps as shown.)
3. Connect the negative battery cable.
4. Connect the data link connector terminals F/P and GND with a jumper wire.
5. Turn the ignition switch to ON.
6. Measure the fuel line pressure.

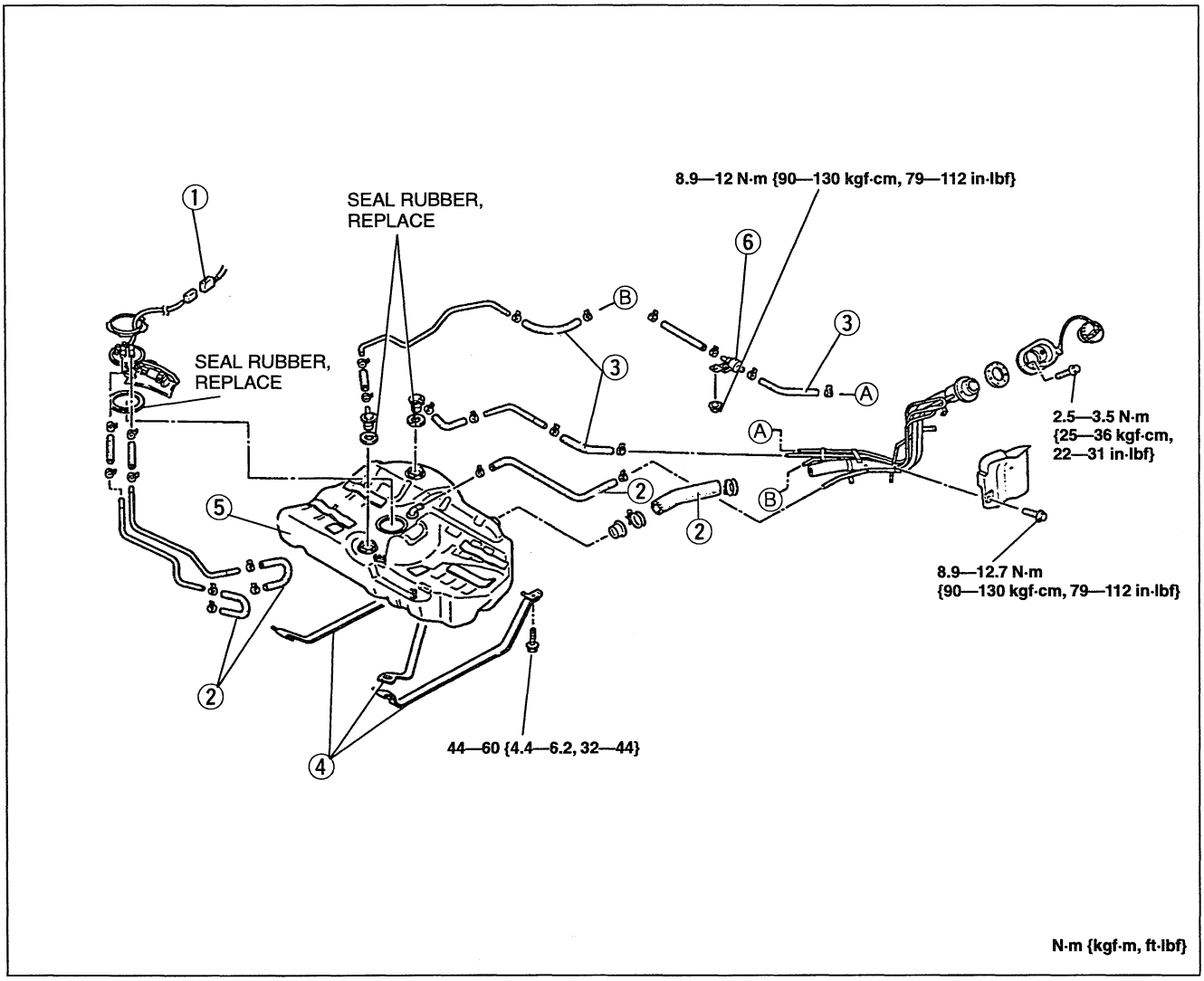
   Fuel line pressure:
   270—310 kPa {2.7—3.2 kgf/cm^2, 39—45 psi}

Pressure low — Measure fuel pump maximum pressure. (Refer to Page F2–71.) If as specified, fuel line or fuel filter might be clogged or restricted.
Pressure high — Replace pressure regulator.

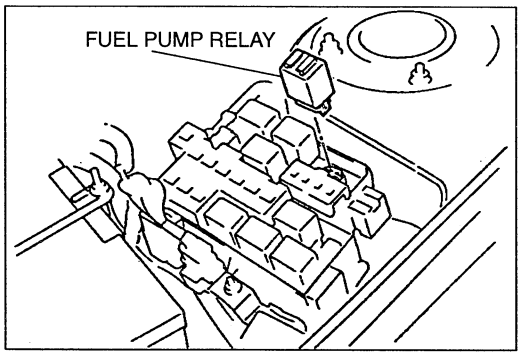
FUEL TANK
Removal / Inspection / Installation

Warning
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F2–67.**
- **Repairing a fuel tank that has not been properly steam cleaned can be dangerous. Explosion or fire may cause death or serious injury. Always properly steam clean a fuel tank before repairing it.**

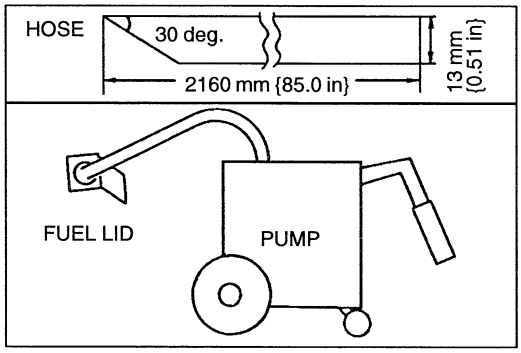
1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.



1. Connector
2. Fuel hoses
   Installation Note ..... page F2–70
3. Evaporative hoses
   Installation Note ..... page F2–70
4. Fuel tank strap
5. Fuel tank
   Inspect for cracks and corrosion
6. Check valve (Two-way)
   Inspection ..... page F2–94



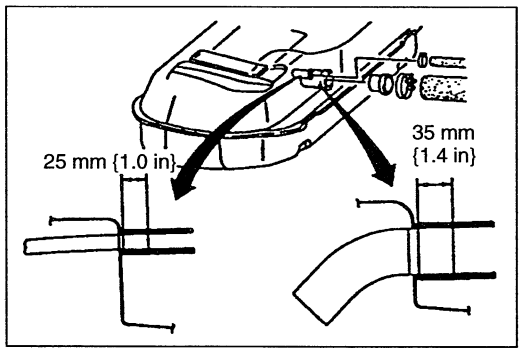
Removal Note
Before removing the fuel tank, drain the fuel from the tank.
1. Remove the fuel pump relay.
2. Start the engine.
3. After the engine stalls, turn off the ignition switch.
4. Install the fuel pump relay.



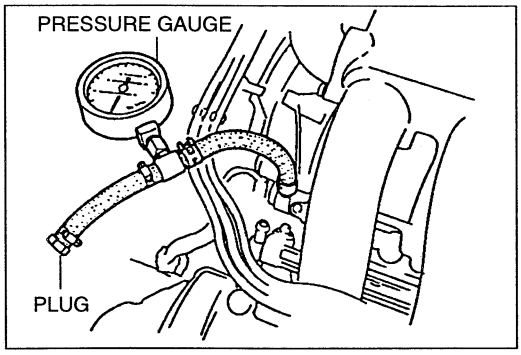
5. Remove the filler cap and insert a hose into the fuel tank through the filler pipe.
6. Start the pump and suck up the fuel into a container.

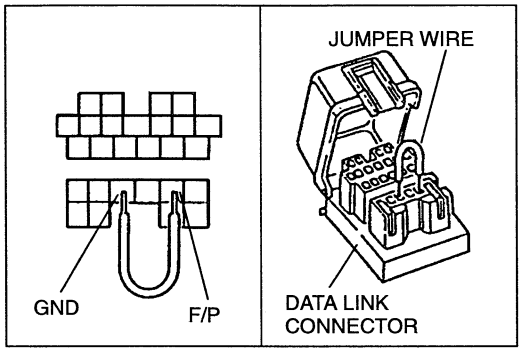
Note
- For easier work, prepare a hose of following size.

Outer diameter: 13 mm {0.51 in}
Length: 2,160 mm {85.0 in}



Installation Note
1. Push the ends of the main fuel hose, fuel return hose, and evaporative hoses onto the fuel tank fittings **at least 25 mm {1.0 in}**.
2. Push the fuel filler hose onto the fuel tank pipe and filler pipe **at least 35 mm {1.4 in}**.





FUEL PUMP

Inspection

Fuel pump maximum pressure

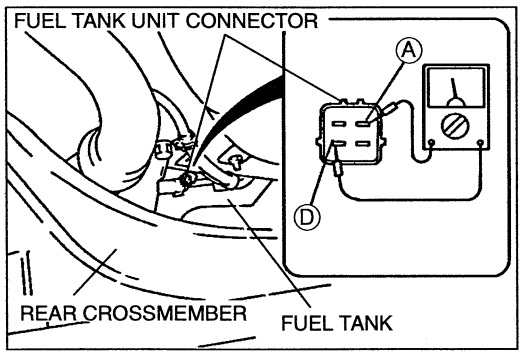
Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F2–67.**

1. Disconnect the negative battery cable.
2. Connect a fuel pressure gauge to the main fuel pipe and plug the outlet of the gauge as shown. (Install clamps as shown.)
3. Connect the negative battery cable.
4. Connect the data link conector terminals F/P and GND by using a jumper wire.
5. Turn the ignition switch to ON to operate the fuel pump.
6. Measure the pump maximum pressure.

Fuel pump maximum pressure:
500—630 kPa {5.0—6.5 kgf/cm^2, 72—92 psi}

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

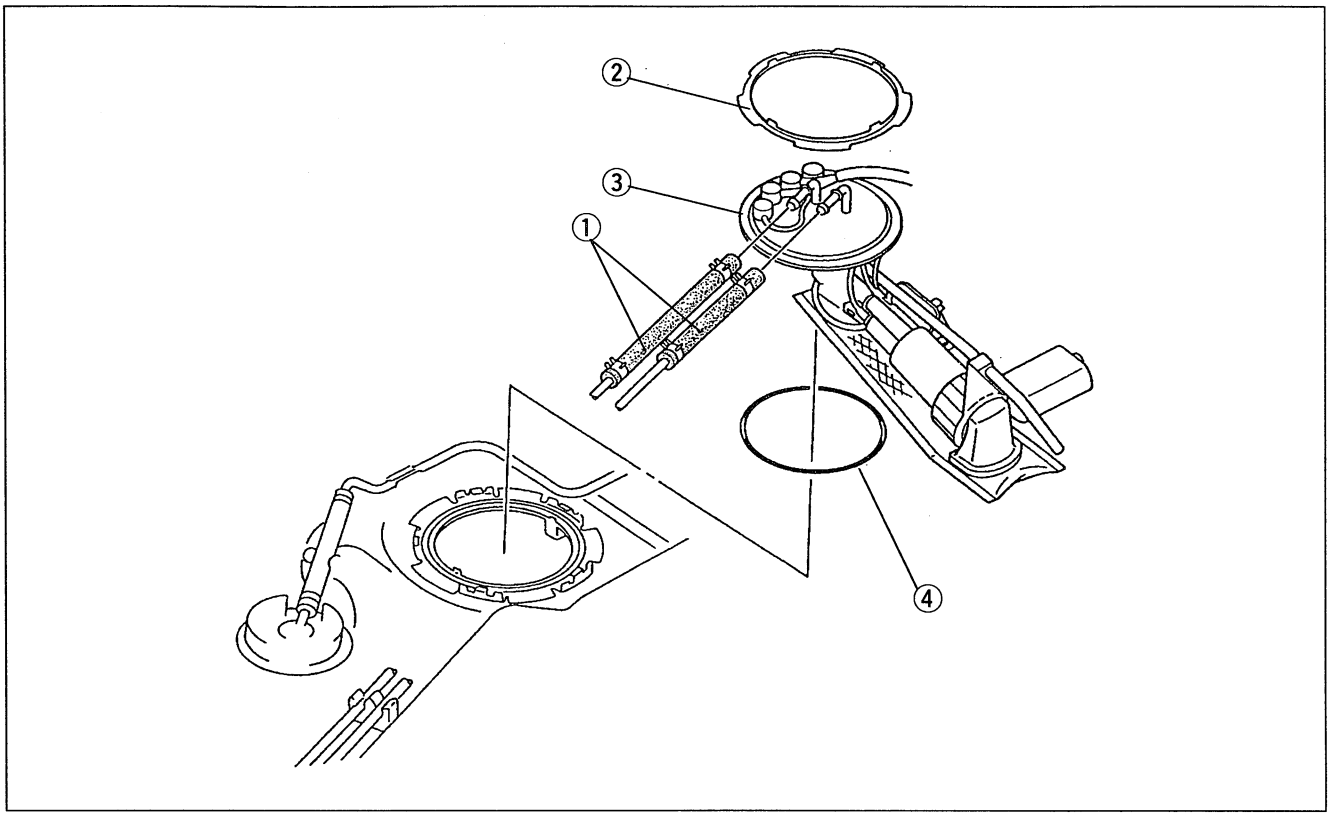


Continuity Inspection

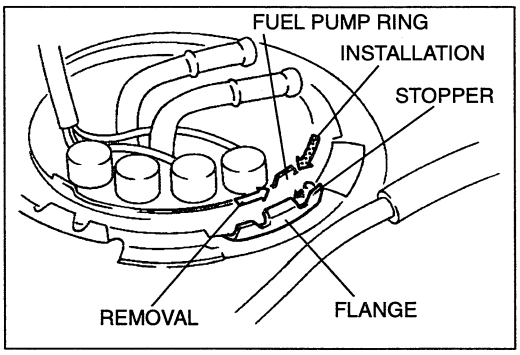
1. Disconnect the fuel tank unit connector.
2. Check for continuity between fuel tank unit connectors Ⓐ and Ⓓ.
3. If there is none, replace the fuel pump.

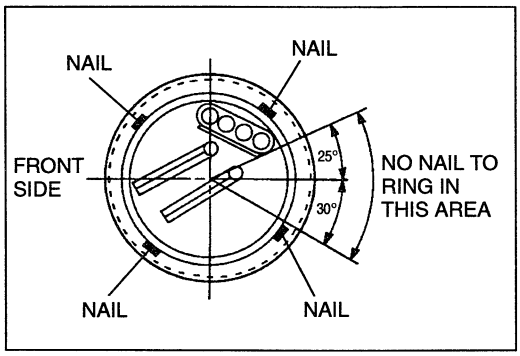
Removal / Installation

1. Remove the fuel tank. (Refer to page F2–69.)
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of disassembly, referring to **Installation Note**.



1. Fuel hose
2. Fuel pump ring
   Removal / Installation Note ..... Below
3. Fuel pump
4. Fuel pump gasket





Removal Note

Rotate the fuel pump ring counterclockwise, and remove it.

Installation Note

Rotate the fuel pump ring clockwise until the flange touches the stopper.

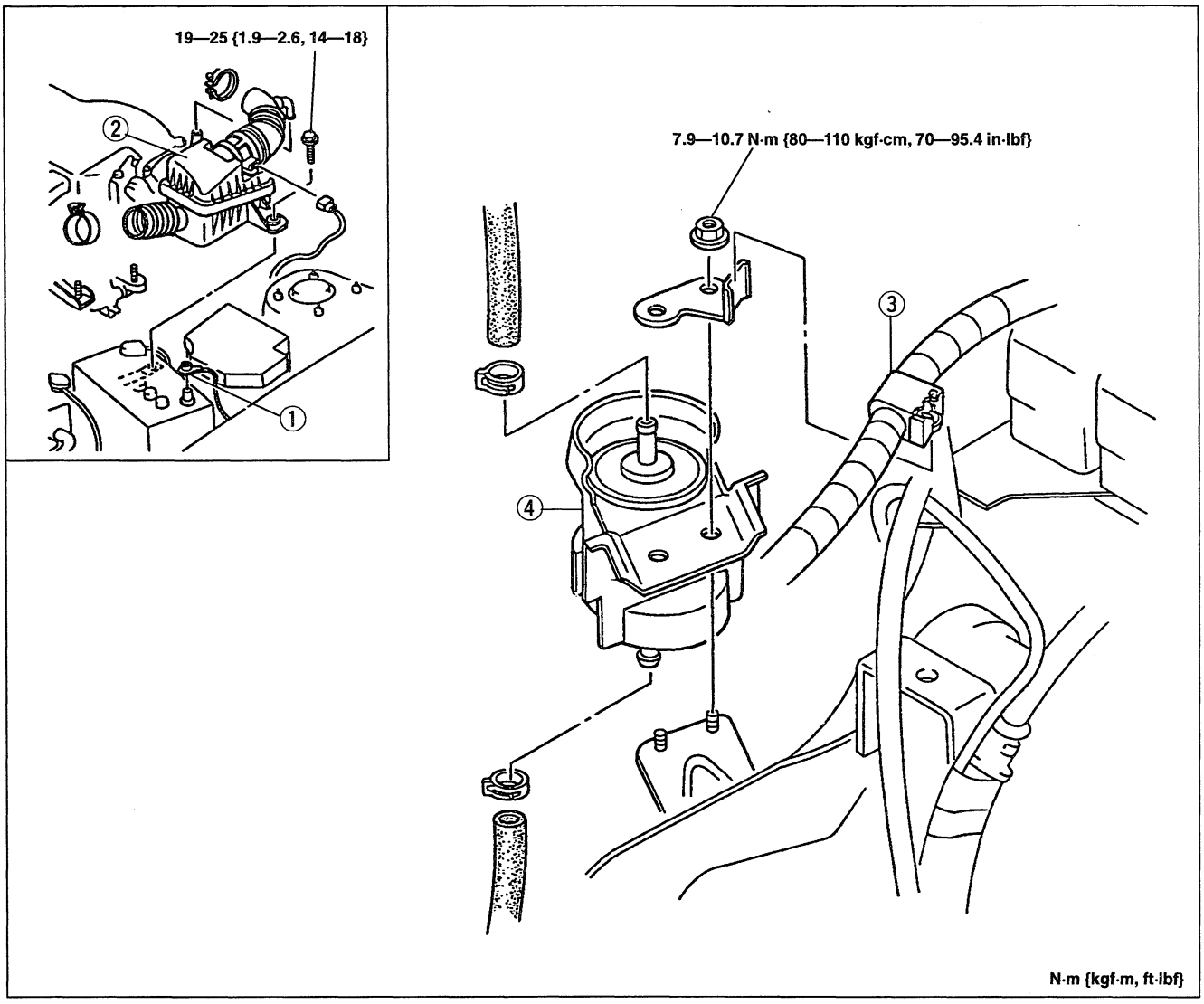
FUEL FILTER

Replacement

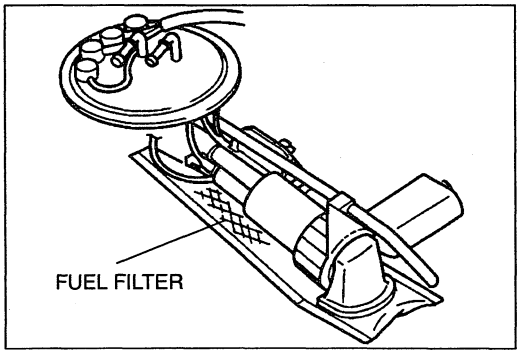
High pressure side

The fuel filter must be replaced at the intervals outlined in the maintenance schedule.

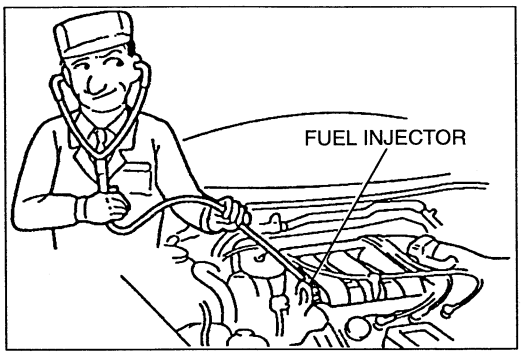
1. Disconnect the fuel hoses from the fuel filter.
2. Remove the fuel filter and bracket.
3. Install in the reverse order of removal.
4. Verify that the fuel hoses are pushed fully onto the fuel filter nozzles.



1. Negative battery cable
2. Air cleaner
3. Harness
4. Fuel filter (High pressure side)



Low pressure side (in-tank filter)
(Refer to page F2–69.)



FUEL INJECTOR

Inspection (On-vehicle)

1. Warm up the engine and let it idle.
2. Listen for operational sound of each fuel injector with a screwdriver or a sound scope.

Note

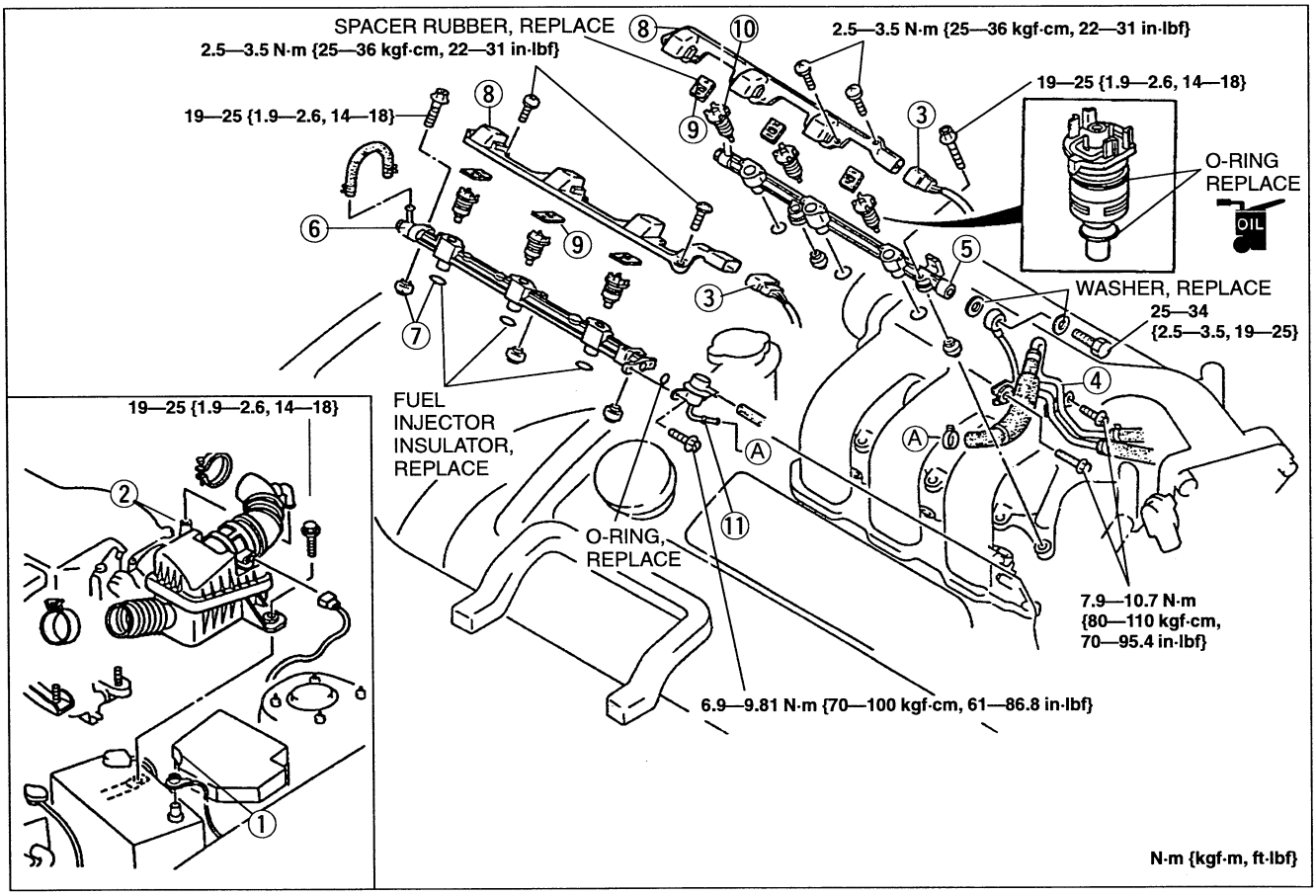
- The best way to judge the performance of an fuel injector is to compere its sound with the sound of other fuel injectors.

Removal / Installation

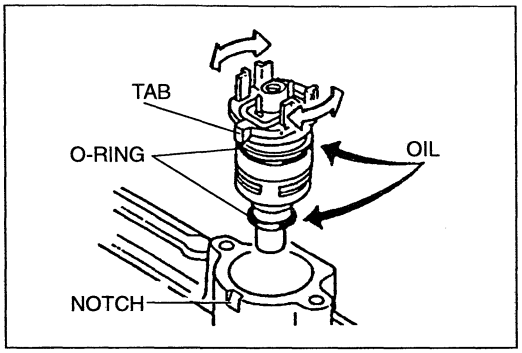
Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F2–67.**

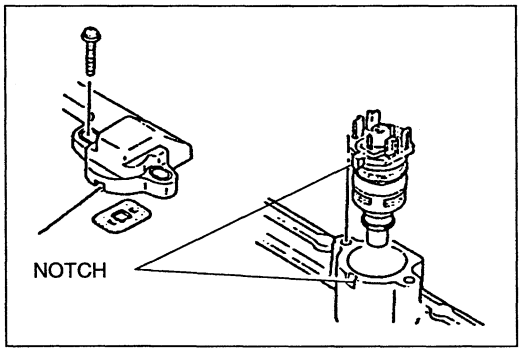
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal, referring to **Installation Note**.



1. Negative battery cable
2. Air cleaner housing
3. Fuel injector connector
4. Fuel hose and fuel pipe
5. Fuel distributor (RH)
   Installation note ..... page F2–75
6. Fuel distributor (LH)
   Installation note ..... page F2–75
7. Insulator
8. Accumulated connector
9. Spacer
10. Fuel injector
    Installation note ..... page F2–75
11. Pressure regulator
    Inspection ..... page F2–78

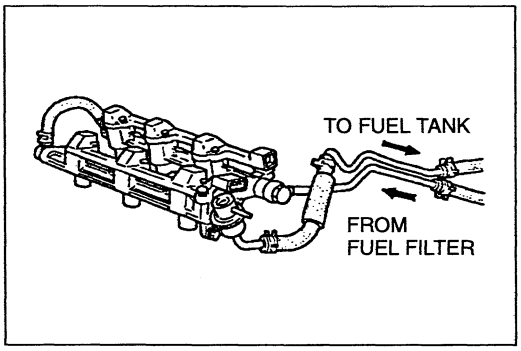


Installation Note
Fuel injector installation
1. Install new O-rings.
2. Apply a small amount of clean engine oil to the O-rings before installing them.
3. Verify that the fuel injector holder is clean.
4. Clean the holder with gasoline, if necessary.
5. Install the fuel injector squarely into the distribution pipe while turning it back and forth.

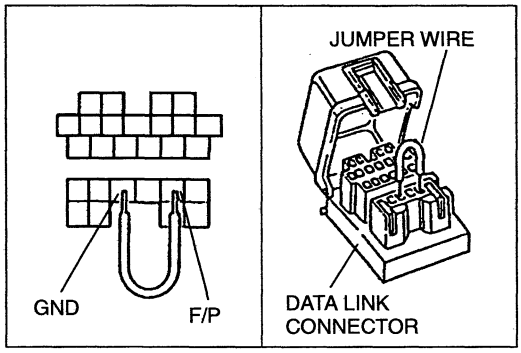


6. Fit the fuel injector tab into the notch in the distribution pipe.
7. Install the harness.

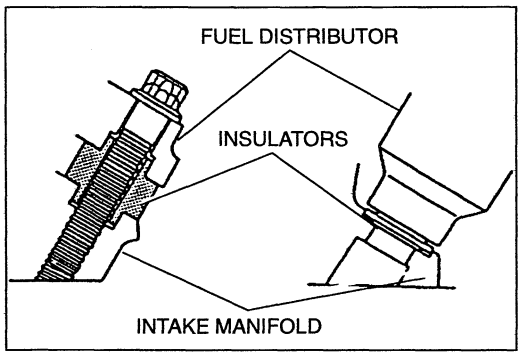
Tightening torque:
2.5—3.5 N·m {25—36 kgf·cm, 22—31 in·lbf}



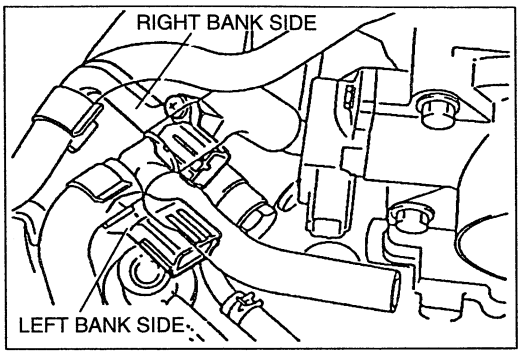
Fuel leakage test
1. With the fuel injector assembly removed, install the fuel hoses as shown in the figure.

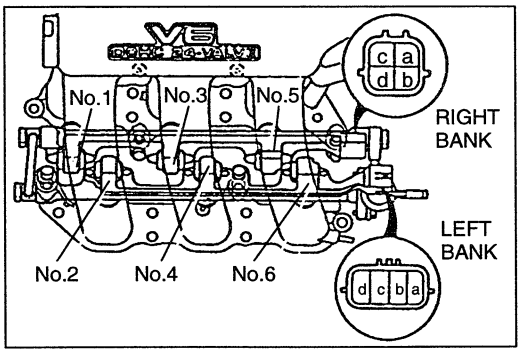


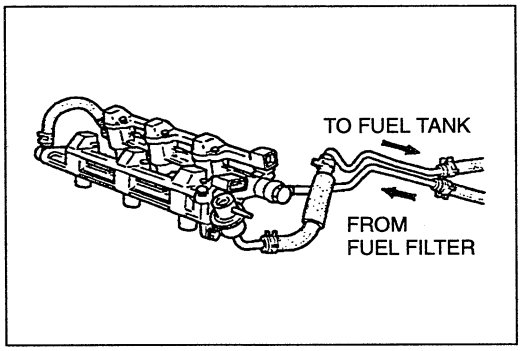
2. Connect the data link connector terminals F/P and GND with a jumper wire.
3. Turn the ignition switch to ON and check for fuel leaks from the fuel distributor.
4. If fuel leaks, check the fuel injector O-rings and fuel distributor for damage.

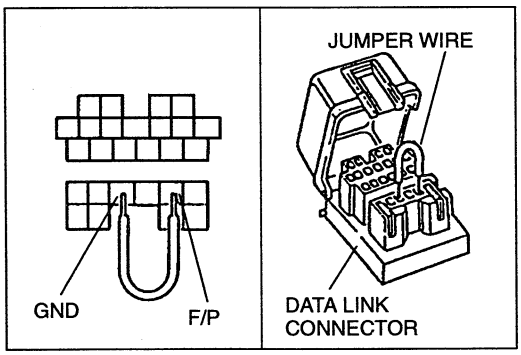


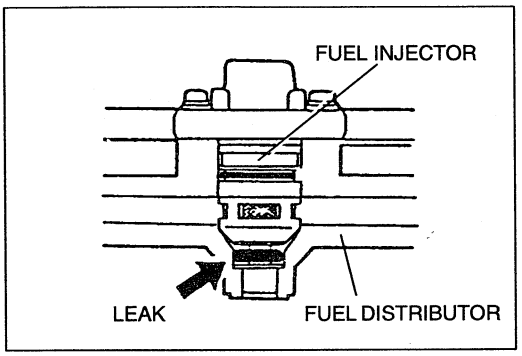
Fuel distributor installation
1. Install new fuel injector insulators.
2. Install the insulators, making sure that each is pressed in fully, and that it is not twisted or bent. Incorrectly installed insulators can cause rough idle.











Inspection

Note
- It is not necessary to remove the fuel injectors to perform the following procedures.

Injector resistance
1. Disconnect the fuel injector connectors.
2. Measure resistance of the injectors.

Harness	Terminal	Injector No.
Right Bank	a—b	1
	a—c	5
	a—d	3
Left Bank	d—c	2
	d—b	4
	d—a	6

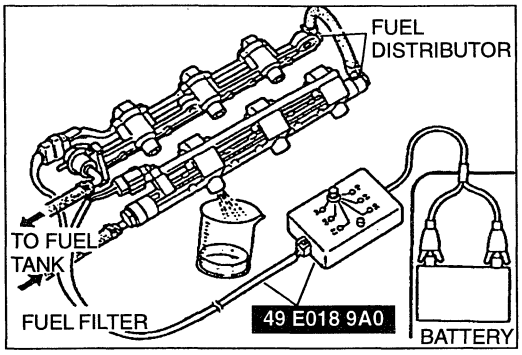
Resistance: Approx. 13.8Ω [20°C {68°F}]

3. If not as specified, check continuity of the harness and check for poor connection.
4. If the harness is OK, replace the fuel injector.

Fuel leakage test
1. Remove the fuel distributor assembly from the intake manifold. (Refer to page F2–64.)
2. Connect the fuel hoses.
3. Connect the data link connector terminals F/P and GND by using a jumper wire.
4. Turn the ignition switch to ON and check for fuel leaks from the fuel injectors.

Fuel leakage: Less than 1 drop/2 min.

5. If not as specified, remove the leaking fuel injector and check the O-rings and fuel distributor for damage. Replace as necessary.
6. Install the fuel injector.
7. Turn the ignition switch to ON and check for fuel leaks from fuel injector.
8. If not as specified, replace the fuel injector.

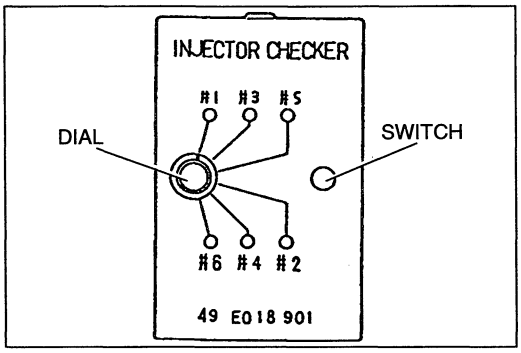


Volume Test

1. Remove the fuel injectors and fuel distributor assembly.
2. Connect the **SST** as shown in the figure.

Warning

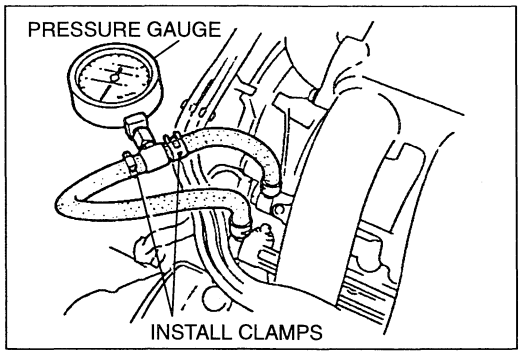
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

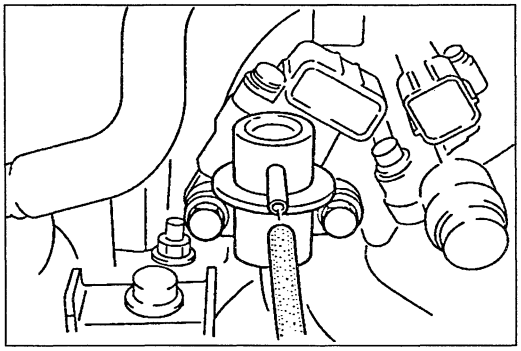


3. Measure the injection volume of each fuel injector by using a graduated container.

Injection volume:
48—56 cm^3 {48—56 cc, 2.9—3.4 cu in}/15 sec.

4. If not as specified, replace the fuel injector.





PRESSURE REGULATOR

Inspection

Fuel line pressure

Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F2–67.**

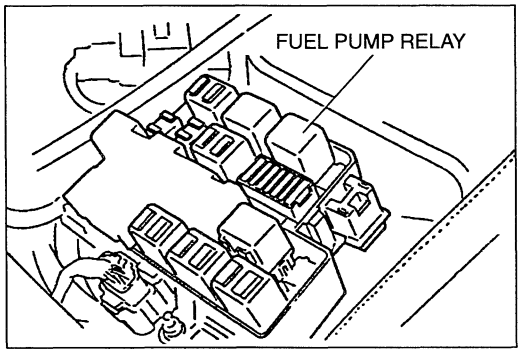
1. Disconnect the negative battery cable.
2. Connect a fuel pressure gauge between the fuel filter and the main fuel hose. (Install clamps as shown.)
3. Connect the negative battery cable.
4. Start the engine and let it idle.
5. Measure the fuel line pressure.

Fuel line pressure:
210—250 kPa {2.1—2.6 kgf/cm^2, 30—36 psi}

6. Disconnect the vacuum hose from the pressure regulator and plug it.
7. Measure the fuel line pressure again.

Fuel line pressure:
270—310 kPa {2.7—3.2 kgf/cm^2, 39—45 psi}

8. If not as specified, replace the pressure regulator.

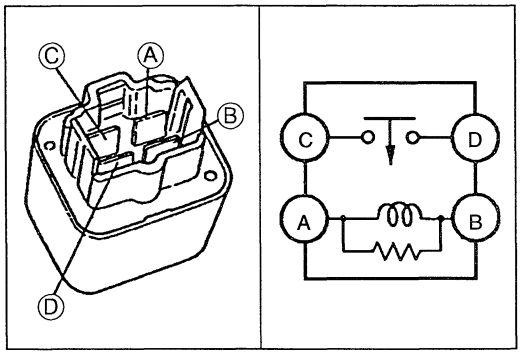


FUEL PUMP RELAY

Inspection

Operation check

Listen for clicking of the fuel pump relay while cranking the engine.



Continuity inspection

1. Apply battery positive voltage (B+) and check continuity between terminals of the relay.

B+: Battery positive voltage

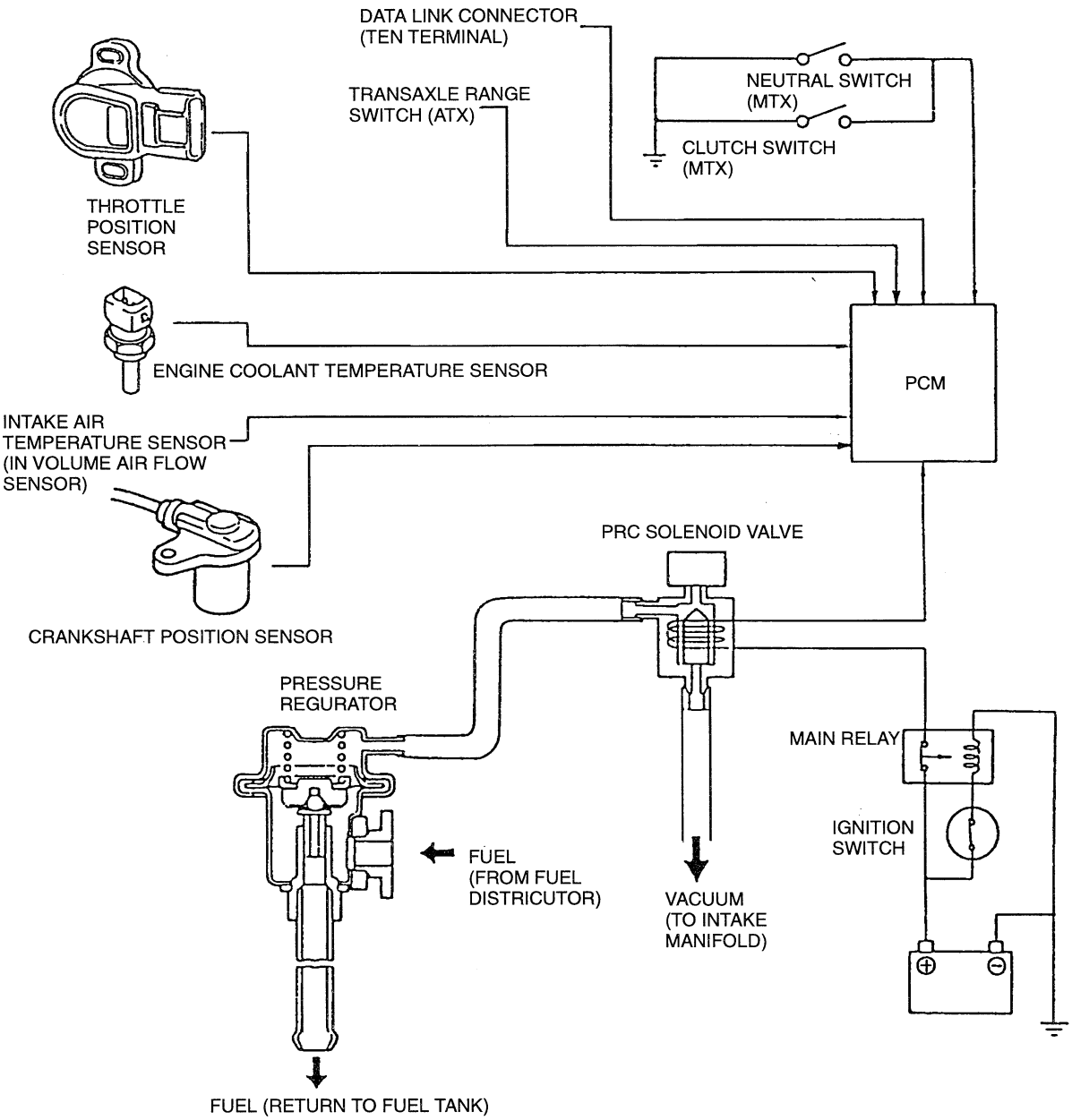
Terminal A—B	Terminal C—D
B+ applied	Yes
B+ not applied	No

2. If not as specified, replace the fuel pump relay.

PRESSURE REGULATOR CONTROL SYSTEM

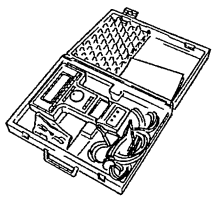
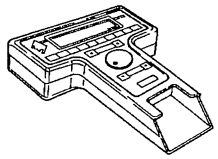
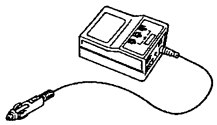
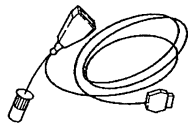
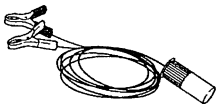
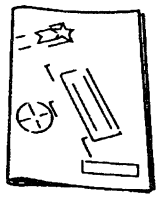
DESCRIPTION

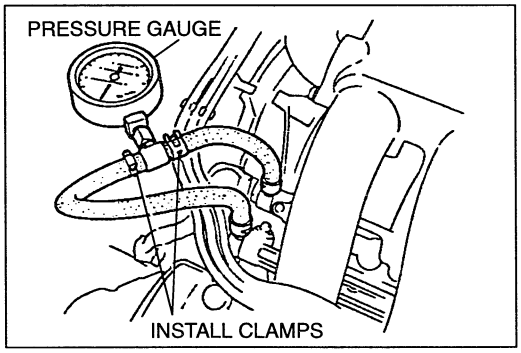
To prevent percolation of the fuel during hot restart idle, vacuum to the pressure regulator is momentarily cut and the fuel injection pressure is increased to slightly more than **280 kPa {2.9 kgf/cm^2, 41 psi}**. Pressure in the fuel line at idle is **approx. 230 kPa {2.3 kgf/cm^2, 33 psi}**.



Operating condition			Operating time (sec)
Coolant temperature	Intake air temperature	Engine condition	
Above 70°C {158°F}	Above 75°C {167°F}	Engine speed less than 1,500 rpm	Approx. 120

PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of pressure regulator control system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of pressure regulator control system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of pressure regulator control system	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of pressure regulator control system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of pressure regulator control system	49 T088 008A Instruction Manual 	For inspection of pressure regulator control system
49 T088 010B Program Card 	For inspection of pressure regulator control system	—	—



SYSTEM INSPECTION

Warning

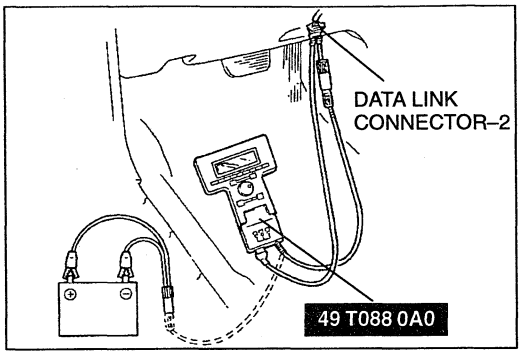
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F2–67.**

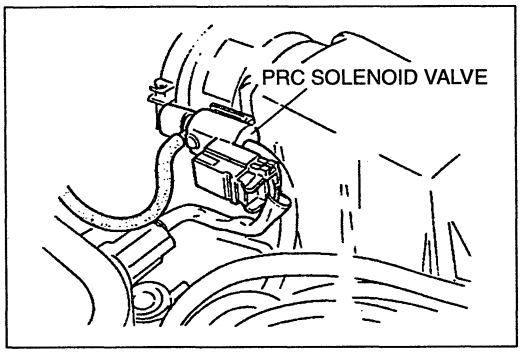
1. Install the fuel pressure gauge.
2. Measure the fuel pressure under the following conditions.

Specifications

	Fuel pressure (kPa { kgf/cm^2 })		
Idling	210—250 { 2.1—2.6 }	210—250 { 2.1—2.6 }	260—310 { 2.6—3.2 }
During 120 sec. of hot start	260—310 { 2.6—3.2 }		
After 120 sec. of hot start	210—250 { 2.1—2.6 }		
Judgement	Normal	Not normal (Perform Inspection 1)	Not normal (Perform Inspection 2)

3. If the fuel pressure is not within the specification, carry out either Inspection 1 or Inspection 2 as required.





Inspection 1

1. Stop the engine.
2. Connect the **SSTs**.
3. Start the engine and run it at idle.
4. Turn the PRC solenoid valve from OFF to ON by using the SIMULATION TEST function and check if the fuel pressure changes.
   (1) If the pressure changes, check the following.
   - PCM terminal voltage (Refer to page F2–106.)
     - Engine coolant temperature signal
     - Intake air temperature signal
     - Closed throttle position signal

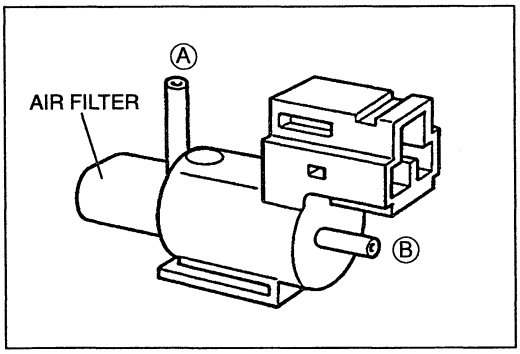
   (2) If the pressure does not change, do as follows.
   I. Stop the engine.
   II. Turn the ignition switch to ON.
   III. Turn the PRC solenoid valve from OFF to ON by using the simulation function and check if the operation sound of the valve is heard.
   a. If the operation sound is heard, check the following.
   - Pressure regulator (Refer to page F2–78.)

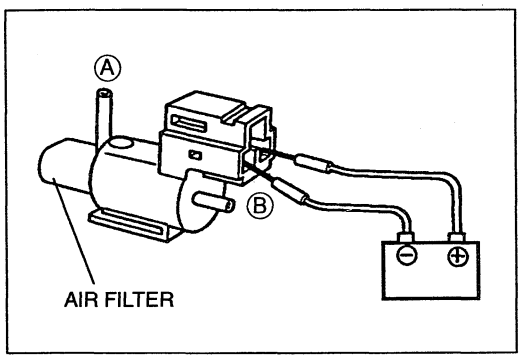
   b. If the operation sound is not heard, check the following.
   - PRC solenoid valve (Refer to below.)
   - Wiring between PRC solenoid valve and PCM terminal 1B

Inspection 2

1. Stop the engine.
2. Install the **SSTs**.
3. By using the PID DATA MONITOR AND RECORD function, verify that the PRC solenoid valve is OFF.
4. If the PRC solenoid valve is ON, check the following.
   - PCM terminal voltage (Refer to page F2–105.)
     - Engine coolant temperature signal
     - Intake air temperature signal
5. Turn the PRC solenoid valve from OFF to ON by using the SIMULATION TEST function and check if the operation sound of the valve is heard.
   (1) If the operation sound is heard, check the following.
   - Loose or damaged vacuum hose between the pressure regulator, PRC solenoid valve, and intake manifold.

   (2) If the operation sound is not heard, check the following.
   - PRC solenoid valve (Refer to below.)
   - Wiring between PRC solenoid valve and PCM terminal 1B





PRC SOLENOID VALVE

1. Remove the solenoid valve.
2. Blow through the solenoid valve from port A.
3. Verify that air flows from port B.
4. Apply battery voltage to solenoid valve terminal.
5. Blow through the solenoid valve from port A.
6. Verify that air flows from the valve air filter.
7. If not as specified, replace the solenoid valve.

EXHAUST SYSTEM

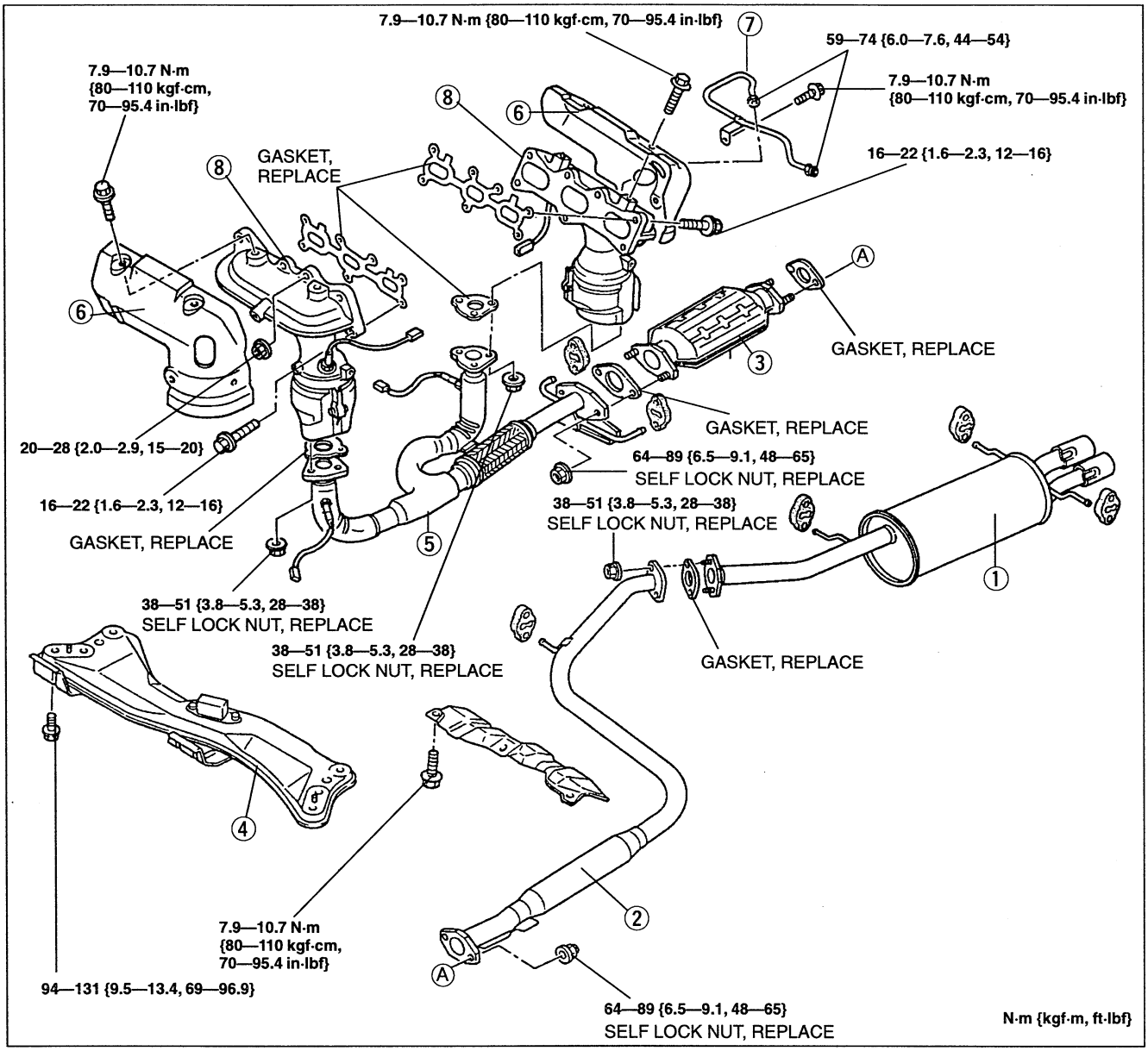
COMPONENTS PARTS

Inspection (On-vehicle)

Start the engine and verify that there is no exhaust gas leakage from the exhaust system components.

Removal / Inspection / Installation

1. Remove in the order shown in the figure.
2. Check all parts and repair or replace as necessary.
3. Install in the reverse order of removal.

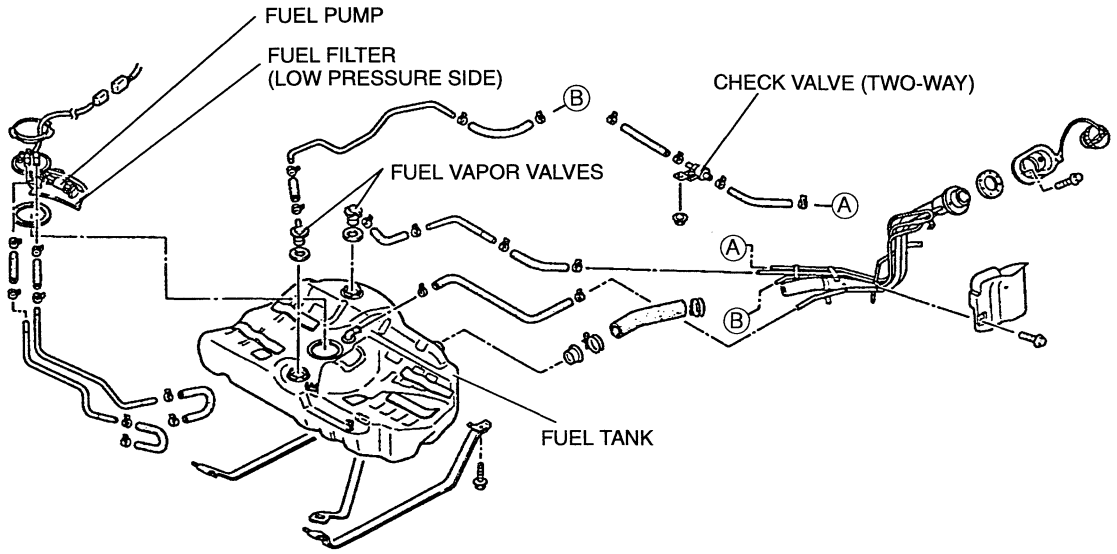


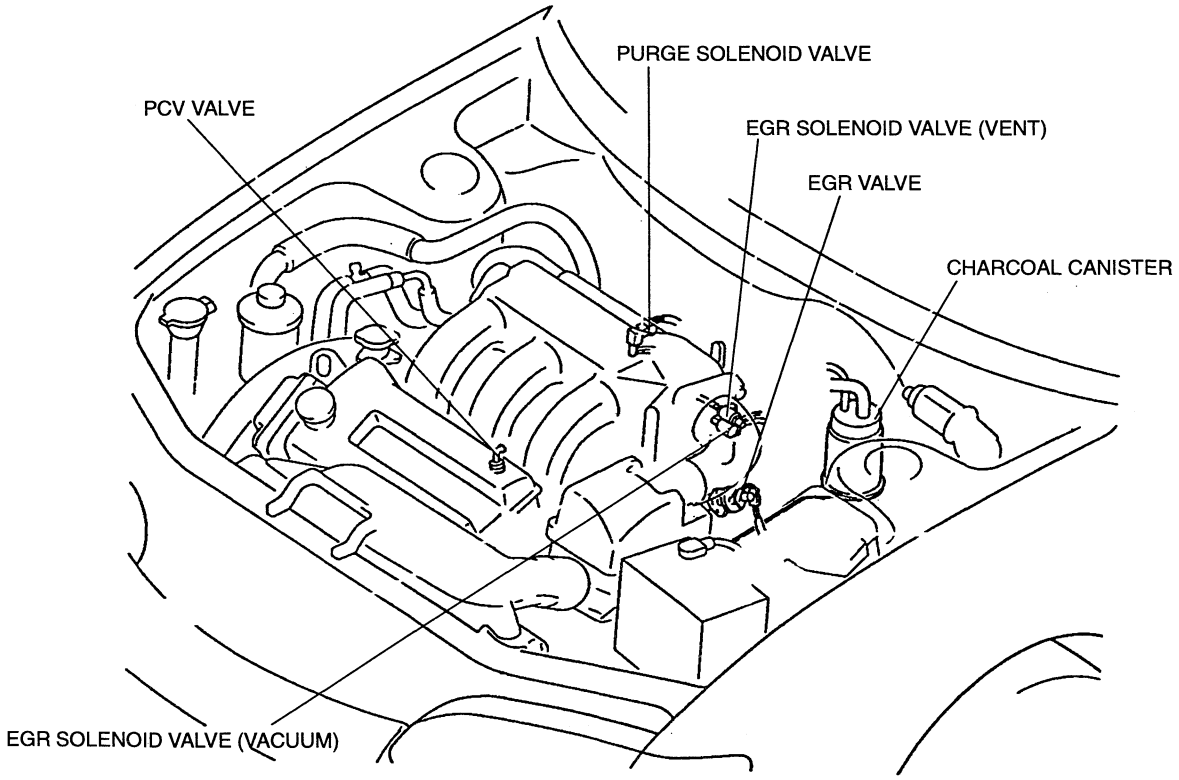
1. Main silencer
   Inspect for deterioration and restriction
2. Pre silencer
   Inspect for deterioration and restriction
3. Three way catalytic converter
   Inspect for deterioration and restriction
4. Transverse member
5. Front pipe
   Inspect for deterioration and cracks
6. Insulator
7. EGR pipe
   Inspect for deterioration and cracks
8. Warm up three way catalytic converter
   Inspect for deterioration and cracks

OUTLINE OF EMISSION CONTROL SYSTEM

DESCRIPTION

To reduce exhaust gas emissions, the positive crankcase ventilation (PCV) system and fuel evaporative system are employed.This system consists of the deceleration control system, fuel evaporative system, EGR function control system, and PCV system.
The purpose of these systems is to reduce CO, HC and NOx emissions.



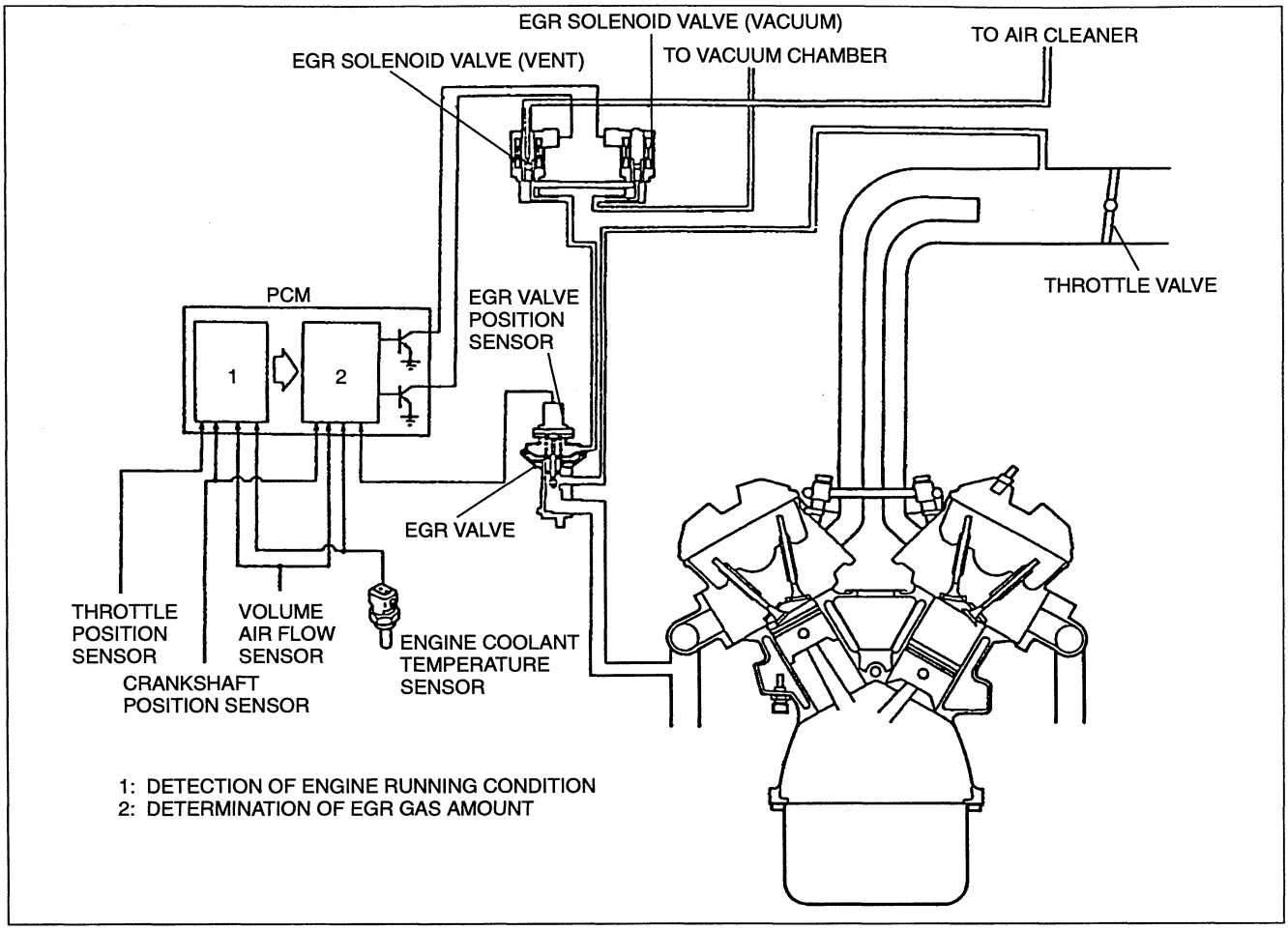


EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM

DESCRIPTION

This system recirculates a small amount of exhaust gas into the intake manifold to reduce the combustion temperature, and reduce the NOx emissions.

This system consists of the EGR valve, EGR valve position sensor, two solenoid valves, PCM and input devices.



Operation

Cold engine (Coolant temperature below 55°C {131°F})

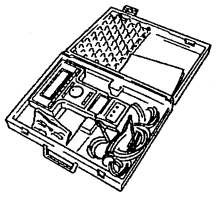
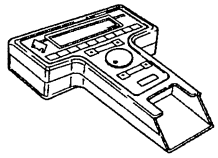
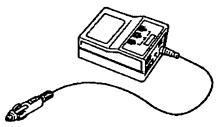
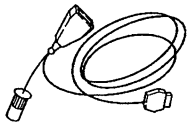
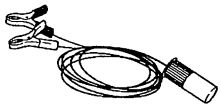
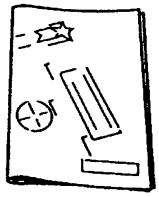
EGR operation is stopped to improve drivability when the engine temperature is cold.

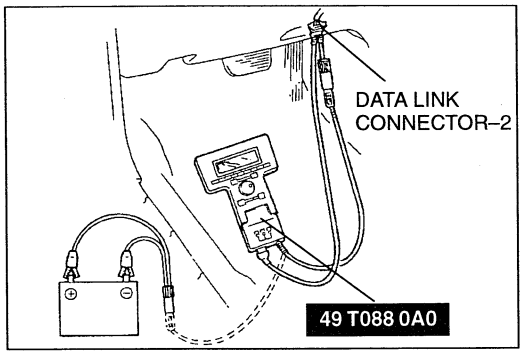
Warm engine

The PCM controls the solenoid valves (vacuum side and vent side) to supply EGR gases as described below.

Operating condition	EGR operation	Remark
Idle	Stopped	Idle switch: ON
Deceleration		
High speed		Above 5,500 rpm
Heavy load		—
Acceleration	Reduced EGR gas amount	—
Warming up		Coolant temperature: Between 55°C {131°F} and 60°C {140°F}
Other	Control supply of EGR gas amount by using signal from EGR valve position sensor	—

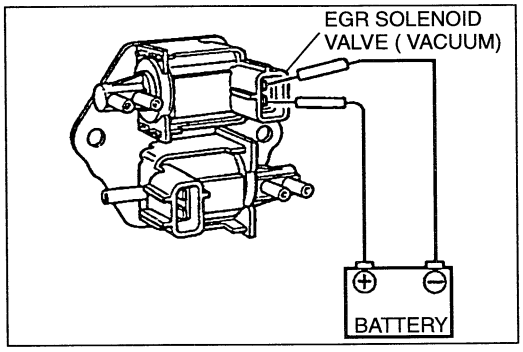
PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of EGR control system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of EGR control system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of EGR control system	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of EGR control system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of EGR control system	49 T088 008A Instruction Manual 	For inspection of EGR control system
49 T088 010B Program Card 	For inspection of EGR control system	—	—



SYSTEM INSPECTION

1. Connect the **SSTs**.
2. Start the engine and let it idle.
3. Increase the duty value of the EGR solenoid valve (vacuum) from 0% to 100% by using the SIMULATION TEST function. Operate the EGR solenoid valve (vacuum) and check if the engine speed becomes unstable or the engine stalls.
4. If the engine speed will not change, stop the engine and do as follows.
   (1) Turn the ignition switch to ON.
   (2) Increase the duty value of the EGR solenoid valve (vacuum) from 0% to 100% by using the SIMULATION TEST function. Operate the EGR solenoid valve (vacuum) and check if operation sound of the solenoid valve is heard.
      I. If the operation sound is heard, check the following.
         • Loose or damaged vacuum hose
         • EGR valve (Refer to page F2–88.)
         • EGR solenoid valve (vent) (Refer to page F2–87.)
      II. If the operation sound is not heard, check the following.
         • EGR solenoid valve (vacuum) (Refer to below.)
         • Wiring between EGR solenoid valve (vacuum) and PCM terminal 4K.



EGR SOLENOID VALVE

Inspection

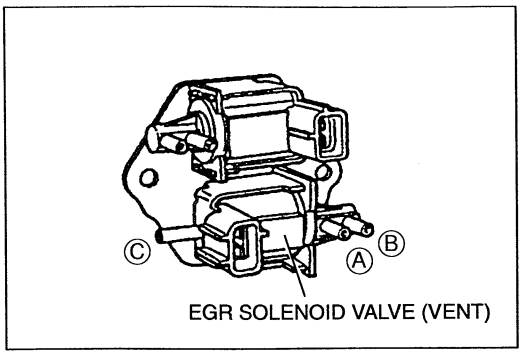
EGR solenoid valve (vacuum)

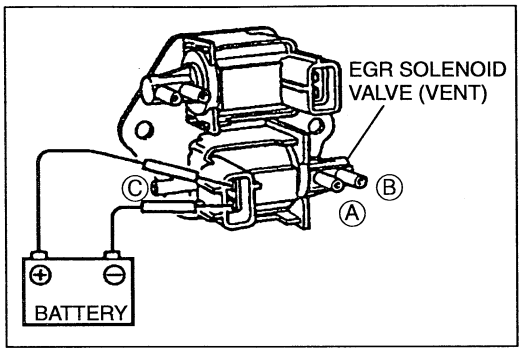
1. Remove the EGR solenoid valve (vacuum).
2. Apply battery positive voltage to terminal A and ground terminal B of the EGR solenoid valve (vacuum). Verify that air flows as shown below.

Specification B+: Battery positive voltage

Terminal A–B	Air flow
B+ applied	Yes
B+ not applied	No

3. If not as specified, replace the EGR solenoid valve (vacuum).





EGR solenoid valve (vent)

1. Remove the EGR solenoid valve (vent).
2. Verify that air flows as shown below.

Specification

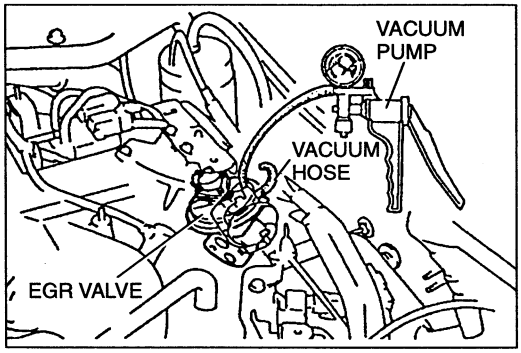
Port	Air flow
A–B	Yes
A–C	Yes
B–C	Yes

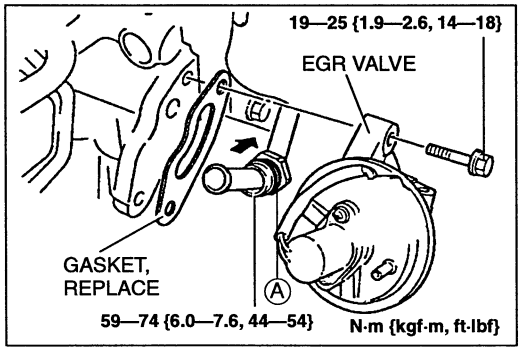
3. If not as specified, replace the EGR solenoid valve (vent).
4. Apply battery positive voltage to terminal A and ground terminal B of the EGR solenoid valve (vent). Verify that air flows as shown below.

Specification

Port	Air flow
A–B	Yes
A–C	No
B–C	No

5. If not as specified, replace the EGR solenoid valve (vent).





EGR VALVE

Inspection

1. Start the engine and let it idle.
2. Connect a vacuum pump as shown in the figure and apply vacuum.
3. Verify that the engine runs roughly or stalls at more than the specified vacuum.

   Specification:
   3.4—9.9 kPa {25—75 mmHg, 1.0—2.9 inHg}

4. If not as specified, replace the EGR valve.

Replacement

1. Disconnect the EGR hose.
2. Disconnect the vacuum hose.
3. Disconnect the EGR valve position sensor connector.
4. Remove the EGR valve.
5. Remove the gasket.
6. Install in the reverse order of removal.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·cm, 1.7—2.2 in·lbf}

Note

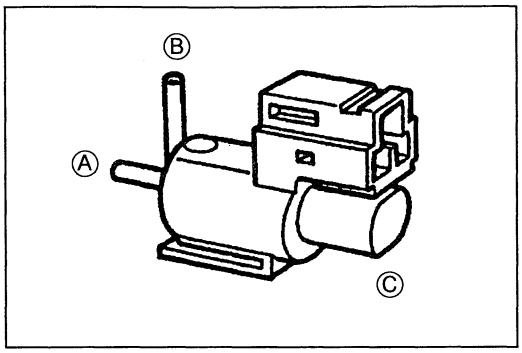
- If nut A is difficult to remove (stuck), first remove the following and then remove the nut together with the EGR pipe from under the vehicle.
  (Refer to page F2–82.)

  ① Transverse member
  ② Front pipe
  ③ Insulator
  ④ EGR pipe
  ⑤ Warm up three way catalytic converter

EGR BOOST SENSOR SWITCHING CONTROL SYSTEM

SYSTEM INSPECTION

1. Warm up the engine to normal operating temperature and let it idle.
2. Disconnect the vacuum hose from the EGR boost sensor side of the EGR boost sensor solenoid valve.
3. Put a finger on the port of the EGR boost sensor solenoid valve and verify that no vacuum is felt.
4. If not as specified, check the EGR boost sensor and wiring harnesses and connectors.

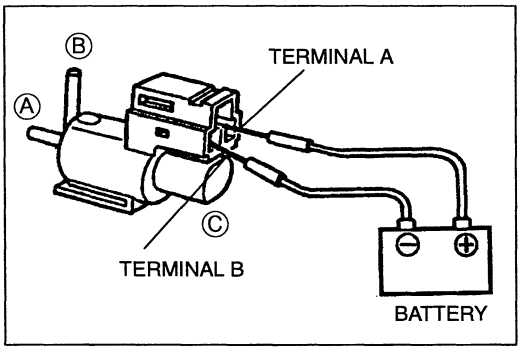


EGR BOOST SENSOR SOLENOID VALVE

Inspection

1. Remove the EGR boost sensor solenoid valve.
2. Blow air into each port and verify that air flows as specified below.

Ports	Air flow
A—B	No
A—C	No
B—C	Yes



3. If not as specified, replace the EGR boost sensor solenoid valve.
4. Apply battery positive voltage between the terminals of the EGR boost sensor solenoid valve.
5. Blow air into each port and verify that air flows as specified below.

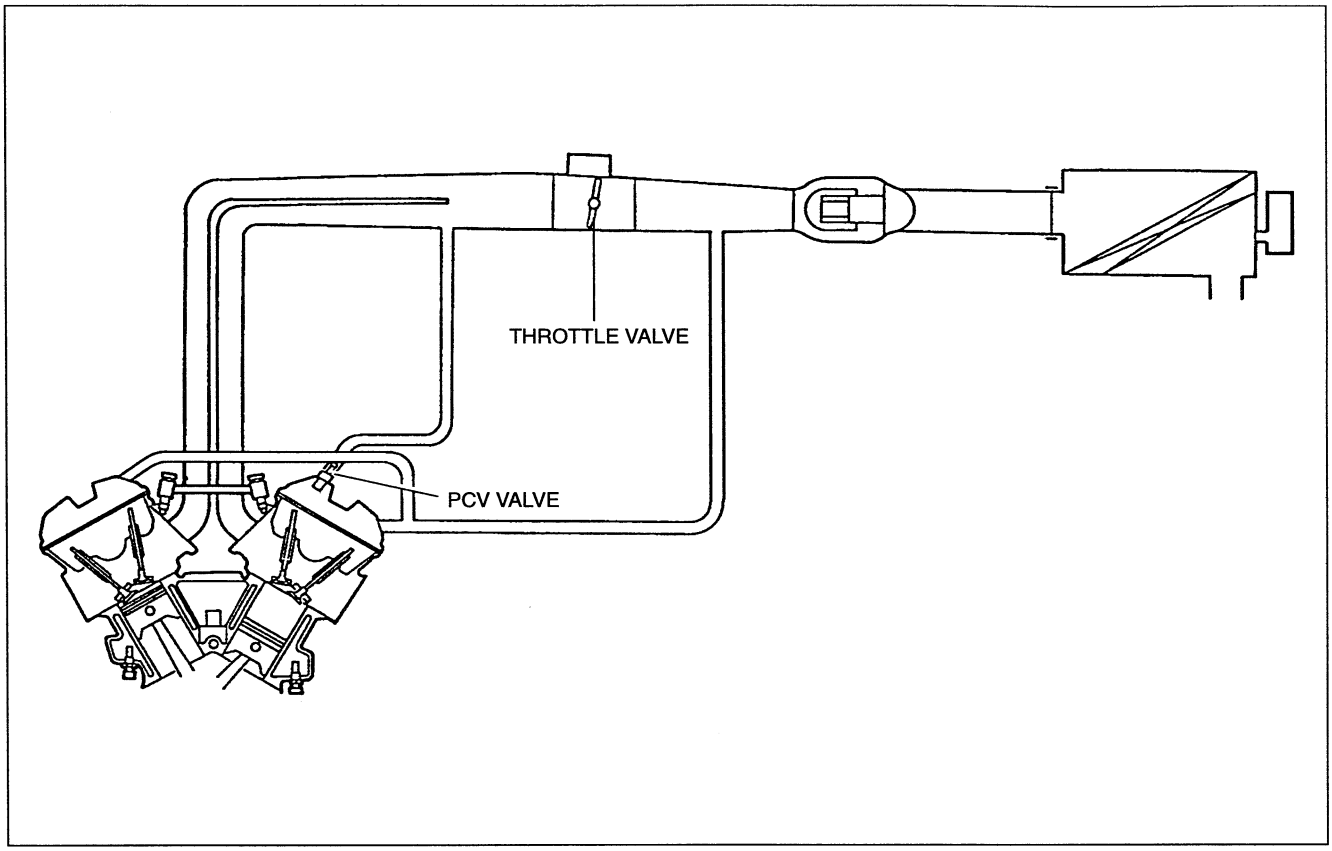
Ports	Air flow
A—B	Yes
A—C	No
B—C	No

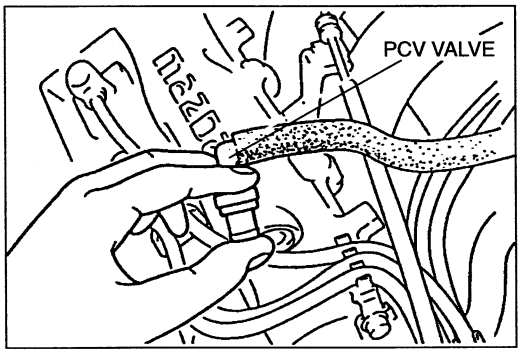
6. If not as specified, replace the EGR boost sensor solenoid valve.

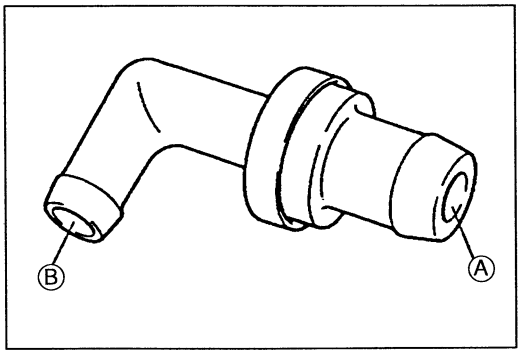
POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

DESCRIPTION

The PCV valve is operated by the intake manifold vacuum.When the engine is running at idle, the PCV valve is slightly open and a small amount of blowby gas is drawn into the dynamic chamber to be burned. As the engine speed rises, the PCV valve is opened further, allowing a larger amount of blowby gas to be drawn into the dynamic chamber.







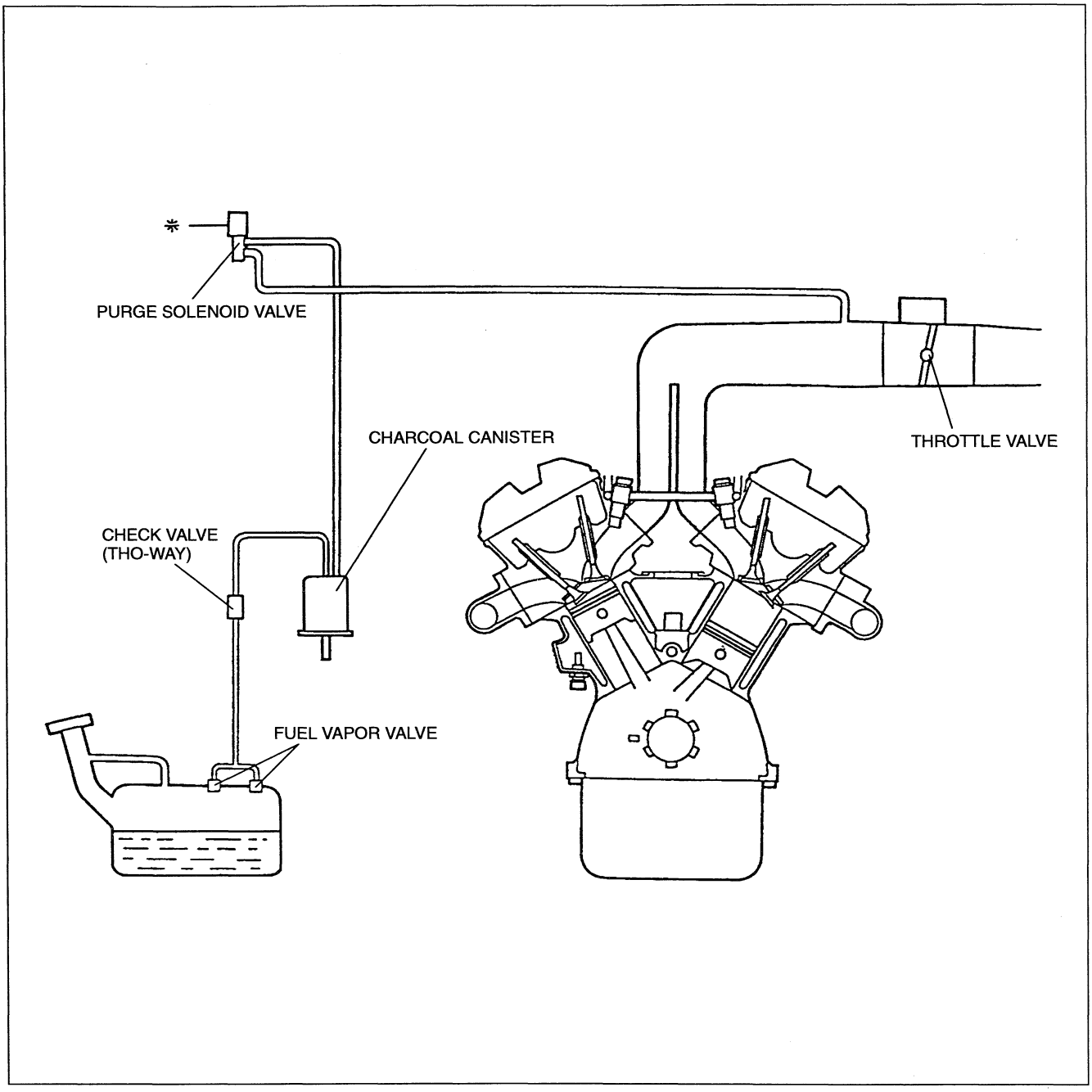
PCV VALVE

Inspection

1. Verify that the engine coolant temperature is below 20°C {68°F}.
2. Start the engine and let it idle.
3. Disconnect the PCV valve along with the ventilation hose from the cylinder head cover.
4. Block the PCV valve opening.
5. Verify that vacuum is felt.
6. Remove the PCV valve.
7. Blow through the valve from port A and verify that air comes out of port B.
8. Blow through the valve from port B and verify that no air comes out of port A.
9. Replace the PCV valve if not as specified.

EVAPORATIVE EMISSIOM SYSTEM

DESCRIPTION



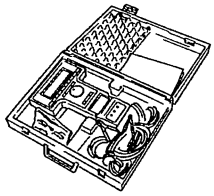
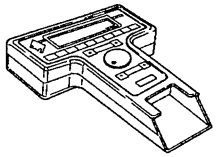
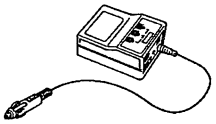
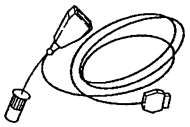
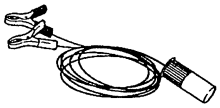
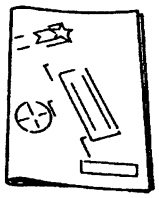
The fuel evaporative system consists of the fuel vapor valve, check valve (two-way), charcoal canister, purge solenoid valve, PCM, and input devices. The amount of evaporative fumes introduced into the engine and burned is controlled by the solenoid valve to correspond to the engine's operating conditions. To provide the best engine performance, the solenoid valve is controlled by the PCM.

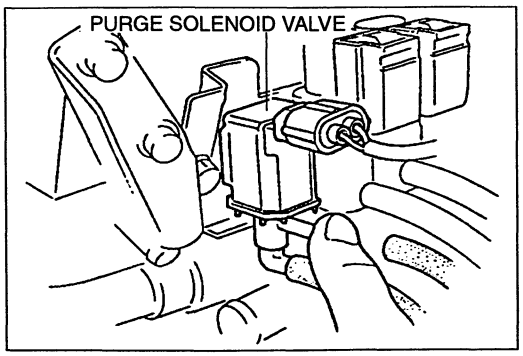
Operation

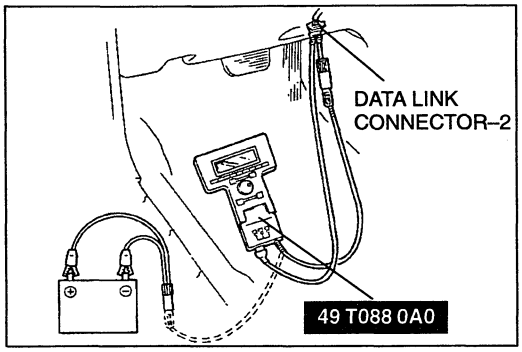
The purge solenoid valve is controlled by duty signals from the PCM to perform purging of the charcoal canister. Purging is done when these conditions are met:

(1) After warm up
(2) Driving in gear
(3) Accelerator pedal depressed (closed throttle position switch OFF)
(4) Heated oxygen sensor functioning normally

PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of evaporative emission system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of evaporative emission system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of evaporative emission system	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of evaporative emission system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of evaporative emission system	49 T088 008A Instruction Manual 	For inspection of evaporative emission system
49 T088 010B Program Card 	For inspection of evaporative emission system	—	—

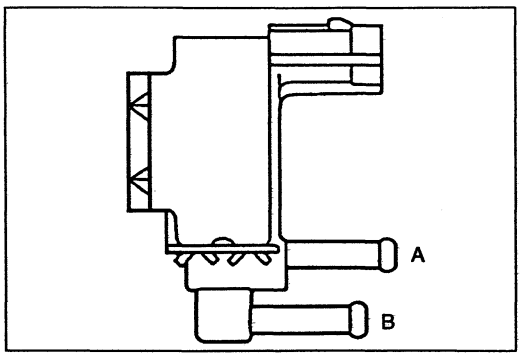




SYSTEM INSPECTION

1. Start and warm up the engine to the normal operating temperature.
2. Let the engine idle.
3. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
4. Put a finger to the purge solenoid valve and verify that there is no vacuum applied.
5. If there is vacuum, do as follows.
   (1) Connect the **SSTs**.
   (2) Vefity that diagnostic trouble code No. P0443 is not displayed. If code No. P0443 is shown, carry out troubleshooting of the code No. P0443.
   (Refer to page F2–13.)
   (3) If diagnostic trouble codes are not shown, check the following.
   • Purge solenoid valve (Refer to below.)
6. Reconnect the vacuum hose.
7. Install the **SSTs**.
8. Increase the duty value of the purge solenoid valve from 0% to 100% by using the SIMULATION TEST function. Operate the purge solenoid valve and check if the idle condition changes.
9. If the condition does not change, do as follows.
   (1) Turn the ignition switch to ON.
   (2) Verify that diagnostic trouble code No. P0443 is not displayed. It code No. P0443 is shown, carry out troubleshooting of the code No. P0443.
   (Refer to page F2–13.)
   (3) Increase duty value of the purge solenoid valve from 0% to 100% by using the SIMULATION TEST function. Operate the purge solenoid valve and check if the operation sound of the valve is heard.
   I. If the operation sound is heard, check the following.
   • Loose or damaged vacuum hose
   II. If the operation sound is not heard, check the following.
   • Purge solenoid valve (Refer to below.)

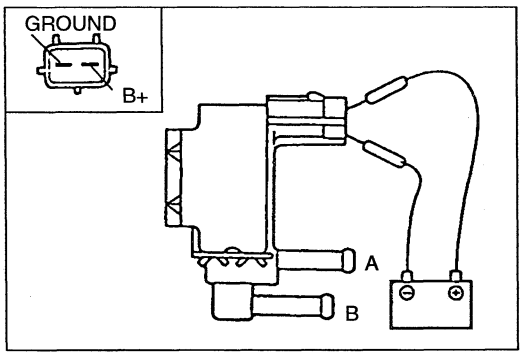
1. Warm up the engine to normal operating temperature.
2. Run the engine at idle.
3. Disconnect the vacuum hose from the purge solenoid valve.
4. Check that no vacuum is felt.



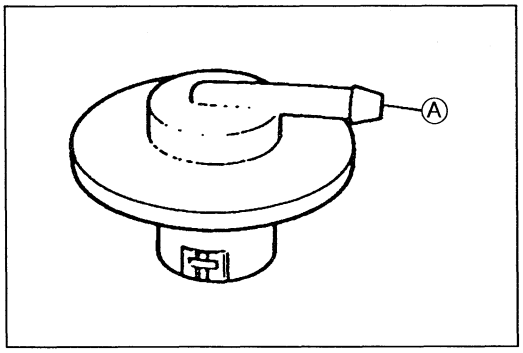
PURGE SOLENOID VALVE

Inspection

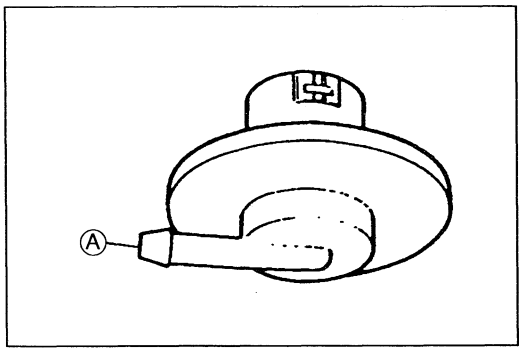
1. Remove the purge solenoid valve.
2. Blow through the purge solenoid valve from hose A and verify that no air flows.



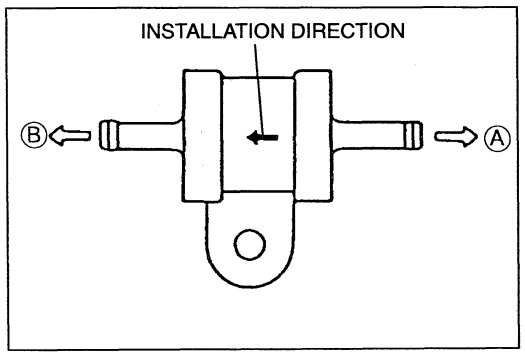
3. Apply battery positive voltage to the purge solenoid valve and verify that air flows through the valve from A to B.
4. If not as specified, replace the purge solenoid valve.



FUEL VAPOR VALVE
Inspection
1. Verify that air flows through the valve from port A when the valve is held as shown in the figure.

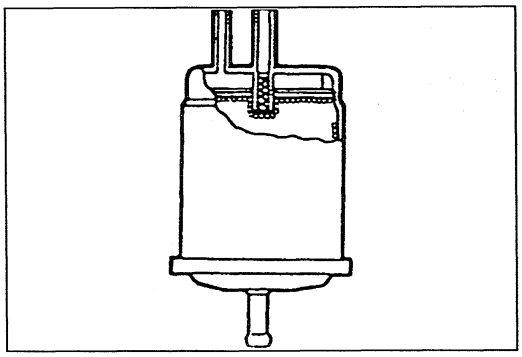


2. Verify that no air flows through the valve from port A when the valve is held as shown.
3. If not as specified, replace the fuel vapor valve.



CHECK VALVE (TWO-WAY)
Inspection
1. Remove the valve.
2. Check the operation of the valve by using a vacuum pump.

Apply approx. 4.9 kPa {37 mmHg, 1.5 inHg} vacuum at port A	Airflow
Apply approx. 5.9 kPa {44 mmHg, 1.7 inHg} vacuum at port B	Airflow

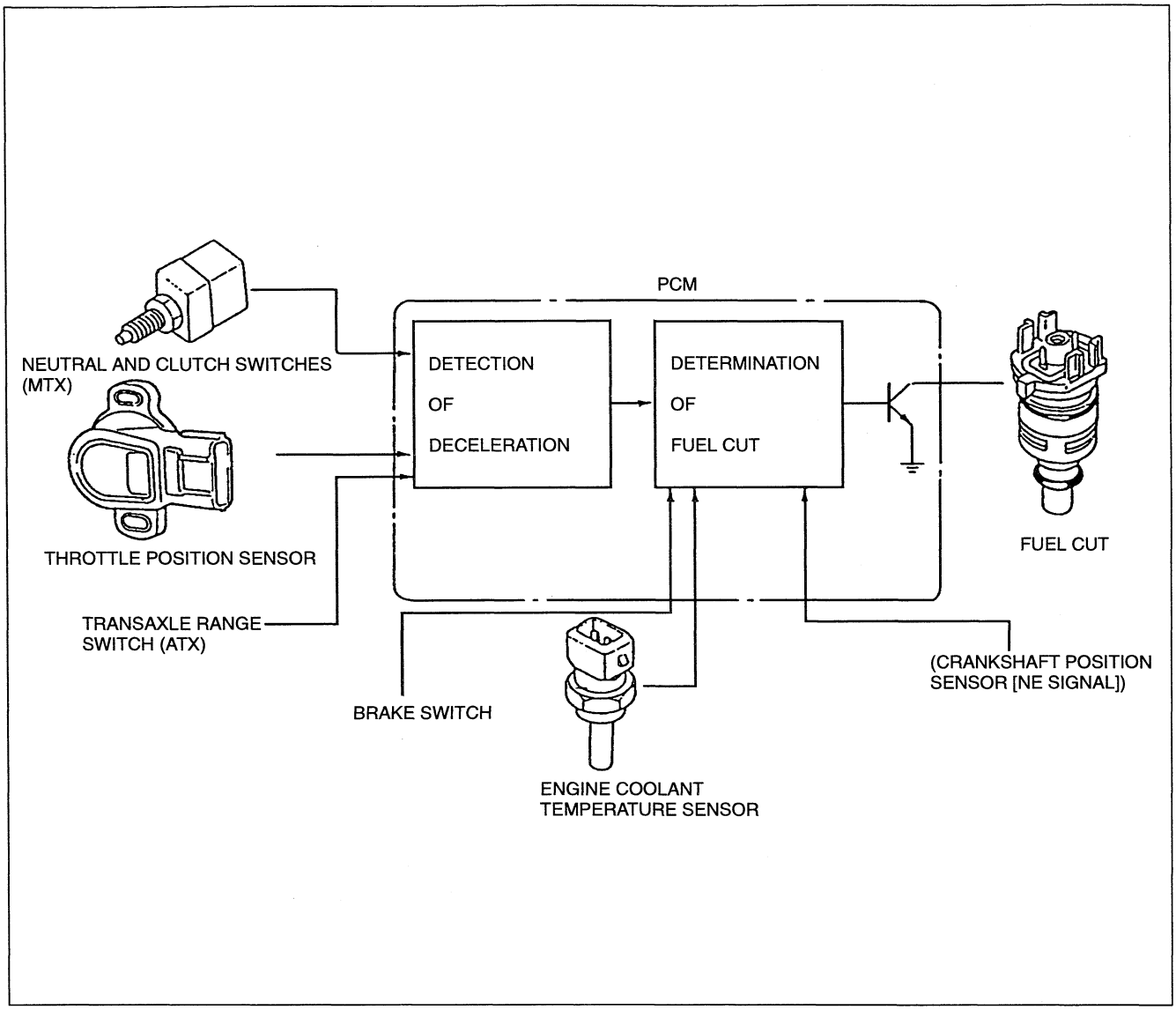


CHARCOAL CANISTER
Inspection
1. Remove the charcoal canister.
2. Visually check the charcoal canister for damage and leakage.
3. Blow through each port and verify that air flows.

FUEL-CUT CONTROL SYSTEM

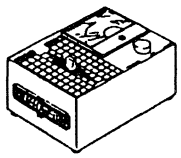
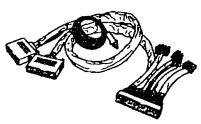
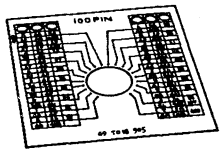
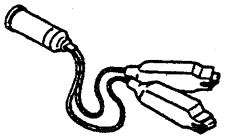
DESCRIPTION

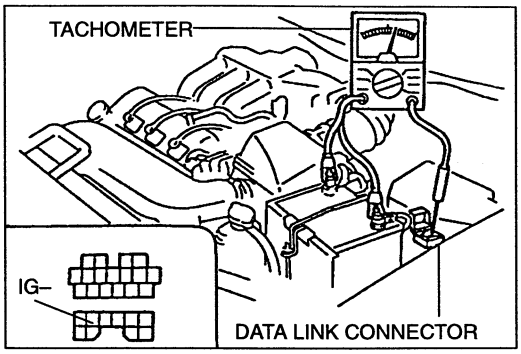
This system is used to improve fuel economy, to prevent engine bucking during deceleration, and to protect the engine from overreving.



PREPARATION

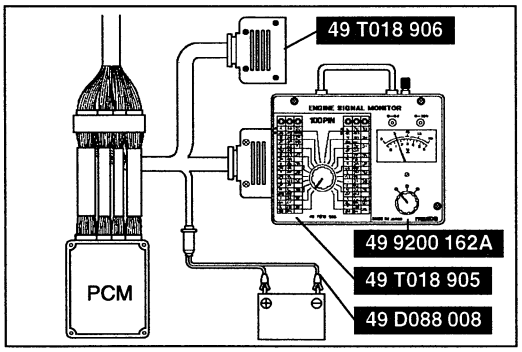
SST

49 9200 162A Engine Signal Monitor 	For inspection of PCM	49 T018 906 Adapter harness 	For inspection of PCM
49 T018 905 Sheet 	For inspection of PCM	49 D088 008 Harness adapter, power 	For inspection of PCM

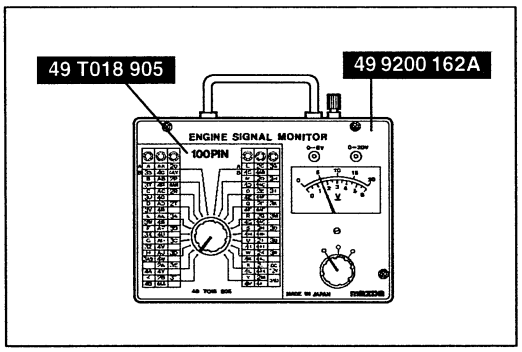


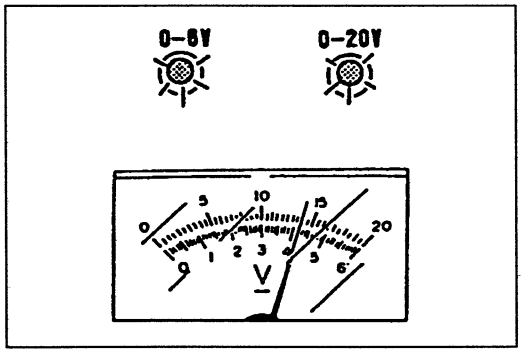
SYSTEM INSPECTION

1. Connect a tachometer to the data link connector terminal **IG–**.

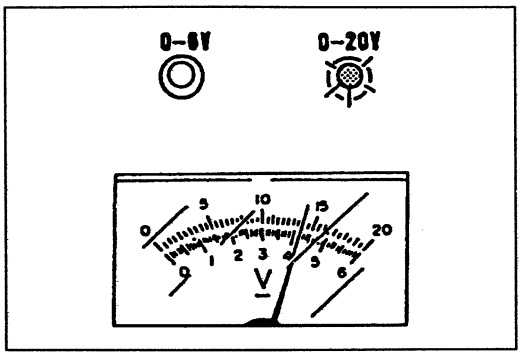


2. Connect the **SSTs** to the PCM.
3. Warm up the engine to normal operating temperature and let it idle.





4. Set the **SST** to positions 4Q, 4U, 4Y, 4AC, 4AG and 4AK and make sure the green and red lights flash alternately at each position.



5. Increase the engine speed to **4,000 rpm**; then suddenly release the throttle.
6. Verify that the red indicator lamp illuminates while the engine speed is above approximately **1,200 rpm (MTX)/ 1,500 rpm (ATX)** on deceleration.
7. Increase the engine speed and verify that the maximum rpm does not exceed the specification.

Caution

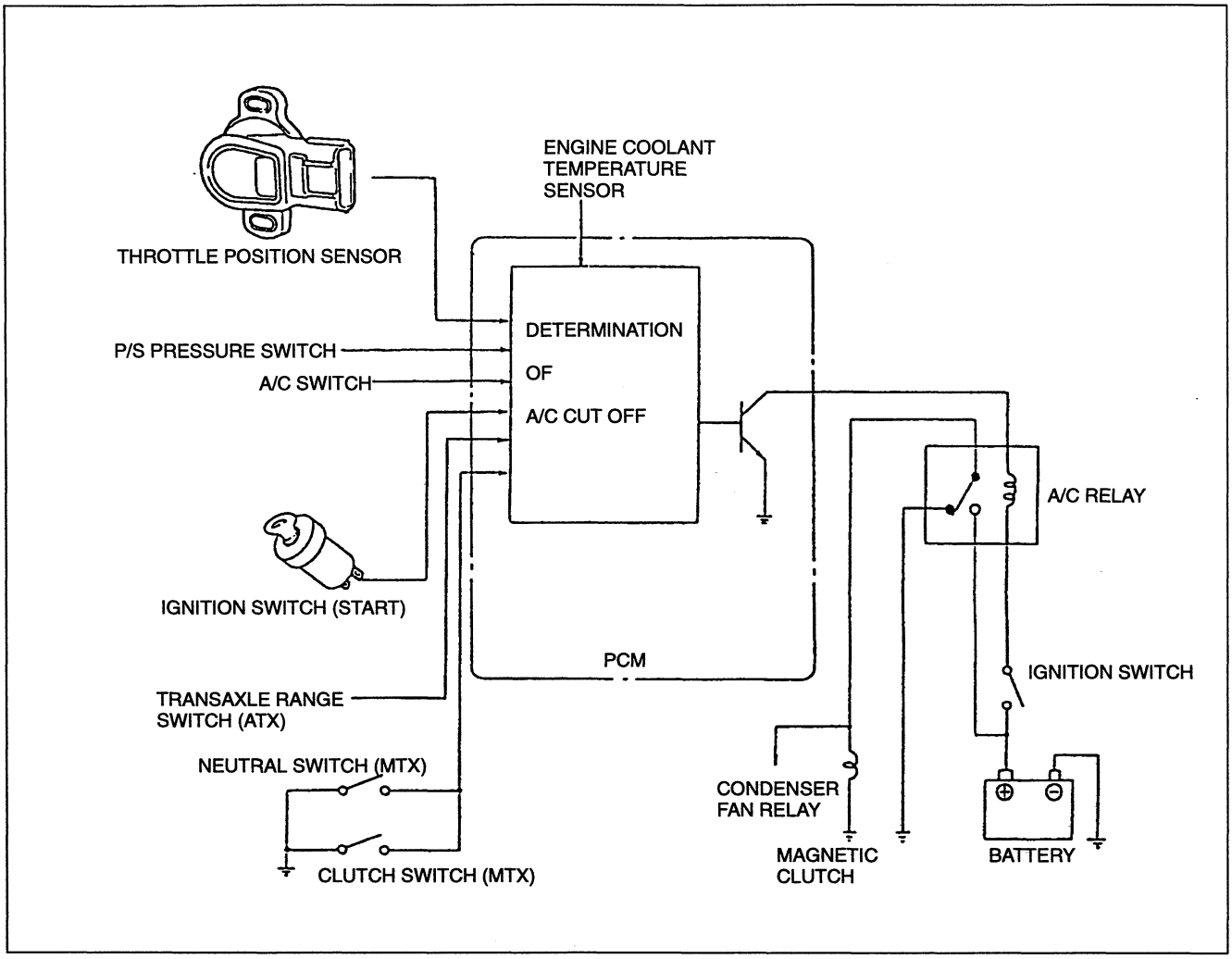
- **Holding the maximum rpm for more than 3 seconds can damage the engine.**

Specification: Approx. 7,500 rpm

A/C CUT OFF SYSTEM

DESCRIPTION

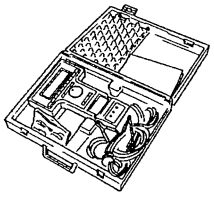
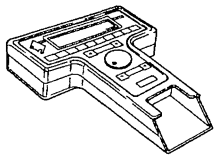
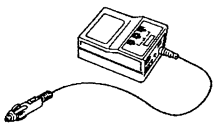
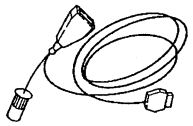
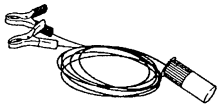
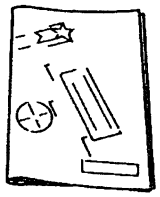
An A/C cut off system is used to improve idle smoothness immediately after starting the engine and to improve acceleration performance.

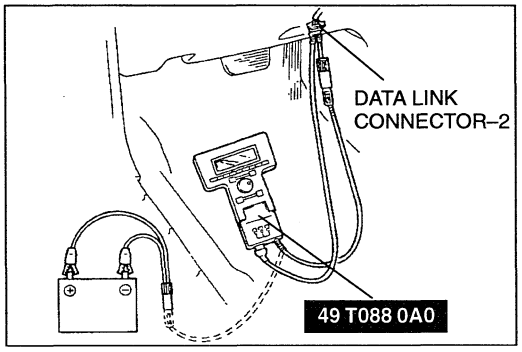


Operation

Engine condition	Purpose	Cut off period
After engine started	Improved idle	Approx. 3 sec.
Throttle valve wide open throttle	Improved driveability	Approx. 5 sec.
Water temperature over 113°C {236°F}	Prevent engine from over heating	Water temperature under 107°C {225°F}

PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of A/C cut off system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of A/C cut off system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of A/C cut off system	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of A/C cut off system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of A/C cut off system	49 T088 008A Instruction Manual 	For inspection of A/C cut off system
49 T088 010B Program Card 	For inspection of A/C cut off system	—	—



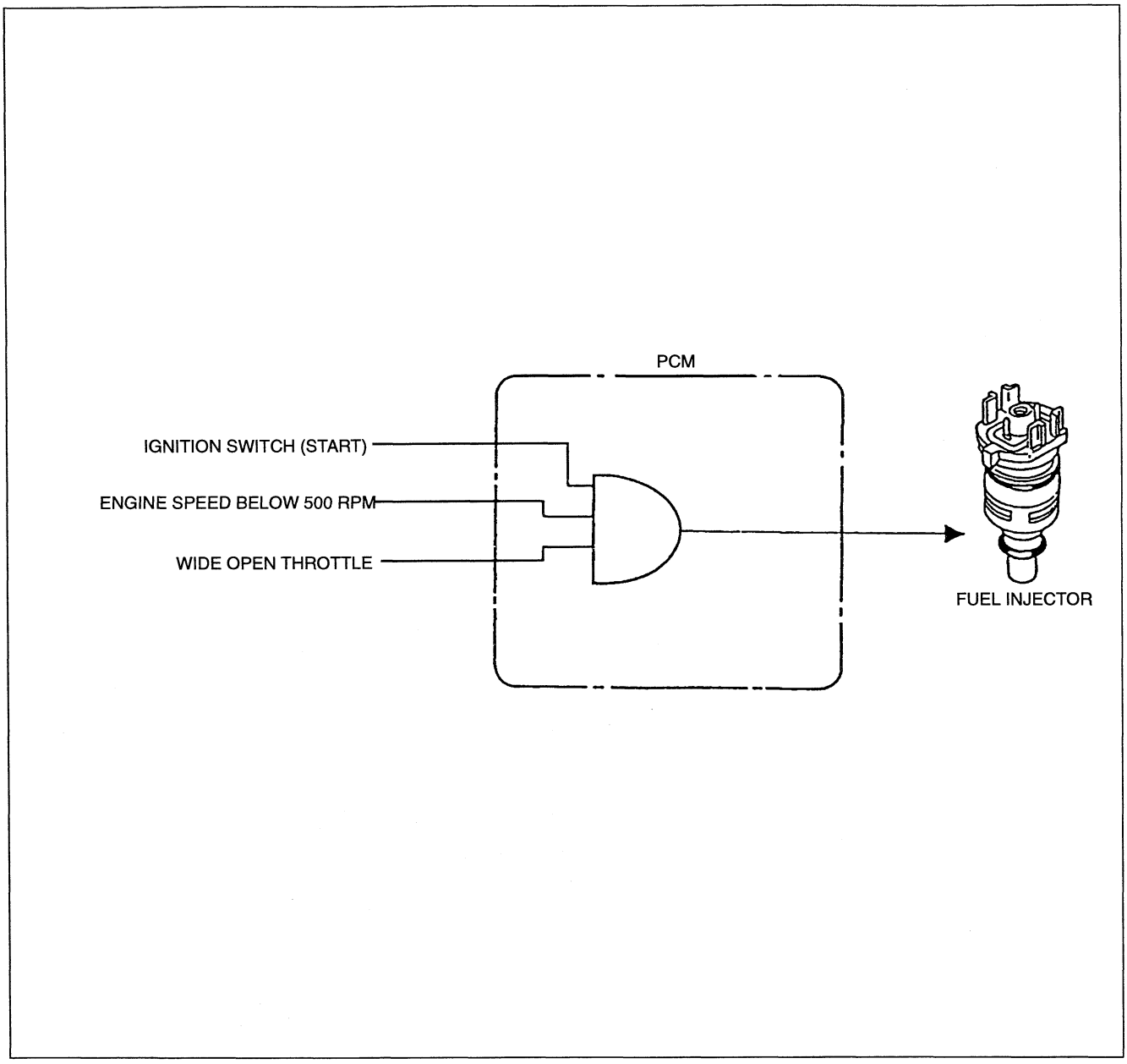
SYSTEM INSPECTION

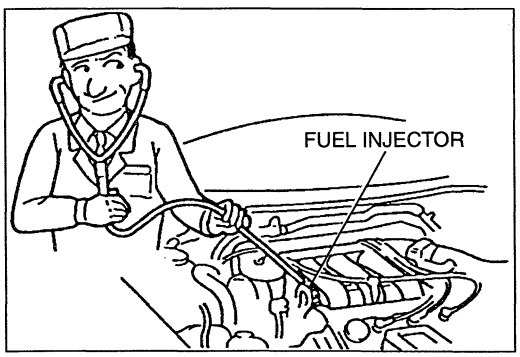
1. Position the vehicle on a chassis roller and start the engine.
2. (MTX) Shift the transaxle into other than Neutral and release the clutch pedal.
   (ATX) Shift the selector lever into other than P and N.
3. Turn the A/C switch and the fan switch on.
4. Fully open the throttle valve. Then, 3—6 seconds after, check if the operation sound of the A/C compressor electromagnetic clutch is heard.
5. If the operation sound if not heard, do as follows.
   (1) Connect the **SSTs**.
   (2) Turn the A/C relay from OFF to ON by using the SIMULATION TEST function and check for the operation sound of the relay.
      I. If the operation sound is heard, check the following.
         • PCM terminal voltage (Refer to page F2–106.)
           • Load/no load distinction signal
           • Closed throttle position signal
      II. If the operation sound is not heard, check the following.
         • A/C relay (Refer to 1996 Mazda 626/MX-6 BETM.)
         • Open circuit in wiring harnesses and connector (Main relay — A/C relay — PCM)

DECHOKE CONTROL SYSTEM

DESCRIPTION

To facilitate starting the engine when the spark plugs become fouled, such as when the engine is flooded, fuel injection is cut if the throttle valve is held wide open during cranking.This allows the spark plugs to dry and purges excess fuel from the cylinders.





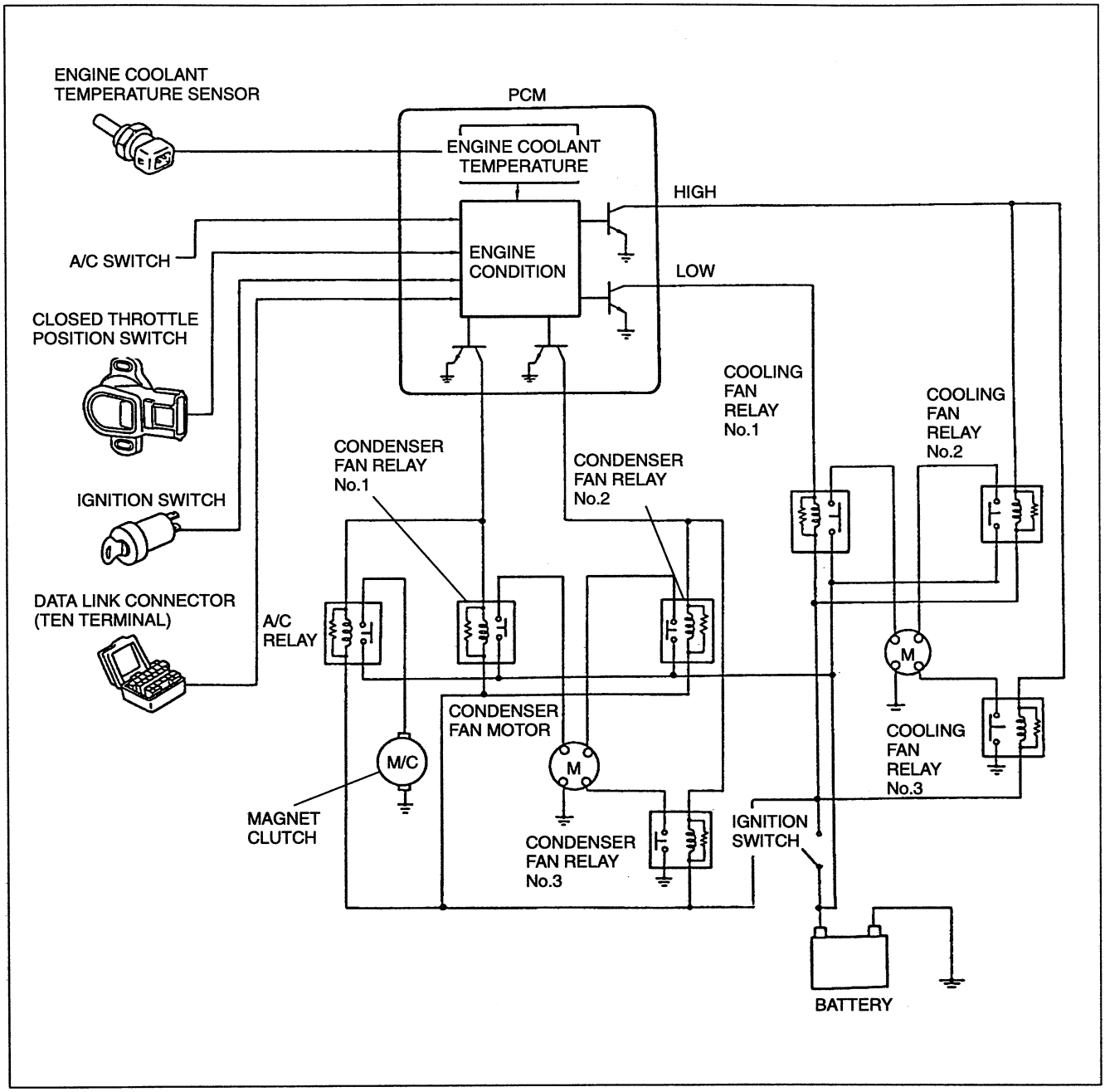
SYSTEM INSPECTION

1. Turn the ignition switch to START and verify that fuel injector operating sound is heard while the engine is cranking.
2. Depress the accelerator pedal fully and turn the ignition switch to START. Verify that no fuel injector operating sound is heard while cranking.
3. If operating sound is heard, check the PCM terminal 1H voltage. (Refer to page F2–106.)

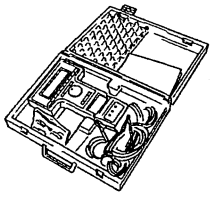
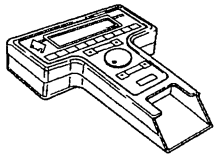
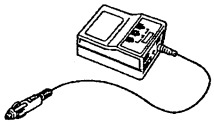
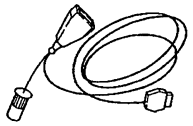
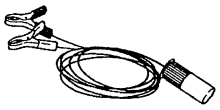
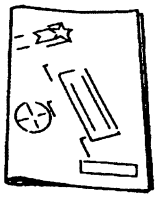
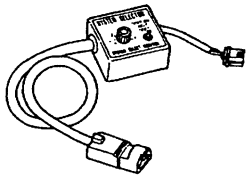
ELECTRICAL FAN CONTROL SYSTEM

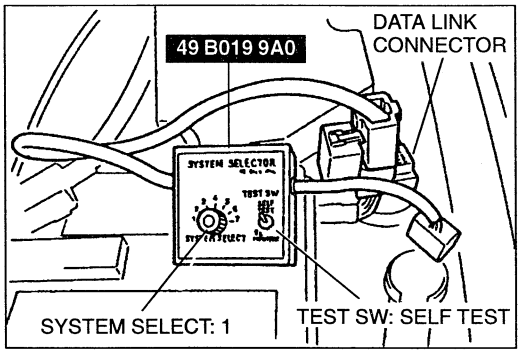
DESCRIPTION

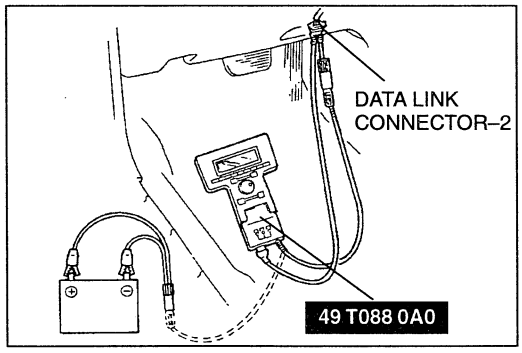
To improve idle smoothness and engine reliability, the PCM and the electrical fan control system control the electric fan operation. This system consists of the cooling fan, condenser fan, fan relays, PCM, and input devices.



PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of electrical fan control system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of electrical fan control system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of electrical fan control system	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of electrical fan control system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of electrical fan control system	49 T088 008A Instruction Manual 	For inspection of electrical fan control system
49 T088 010B Program Card 	For inspection of electrical fan control system	49 B019 9A0 System Selector 	For inspection of electrical fan control system



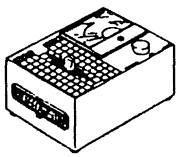
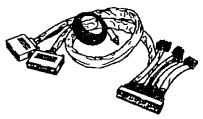
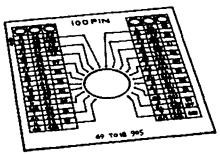
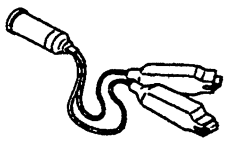
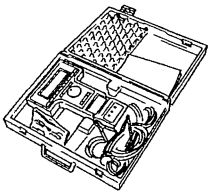
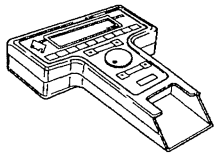
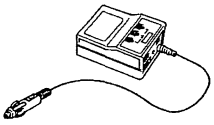
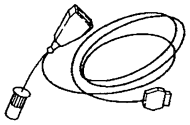
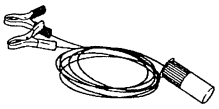
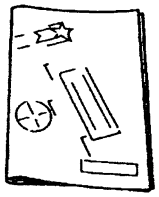
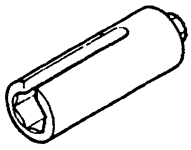


SYSTEM INSPECTION

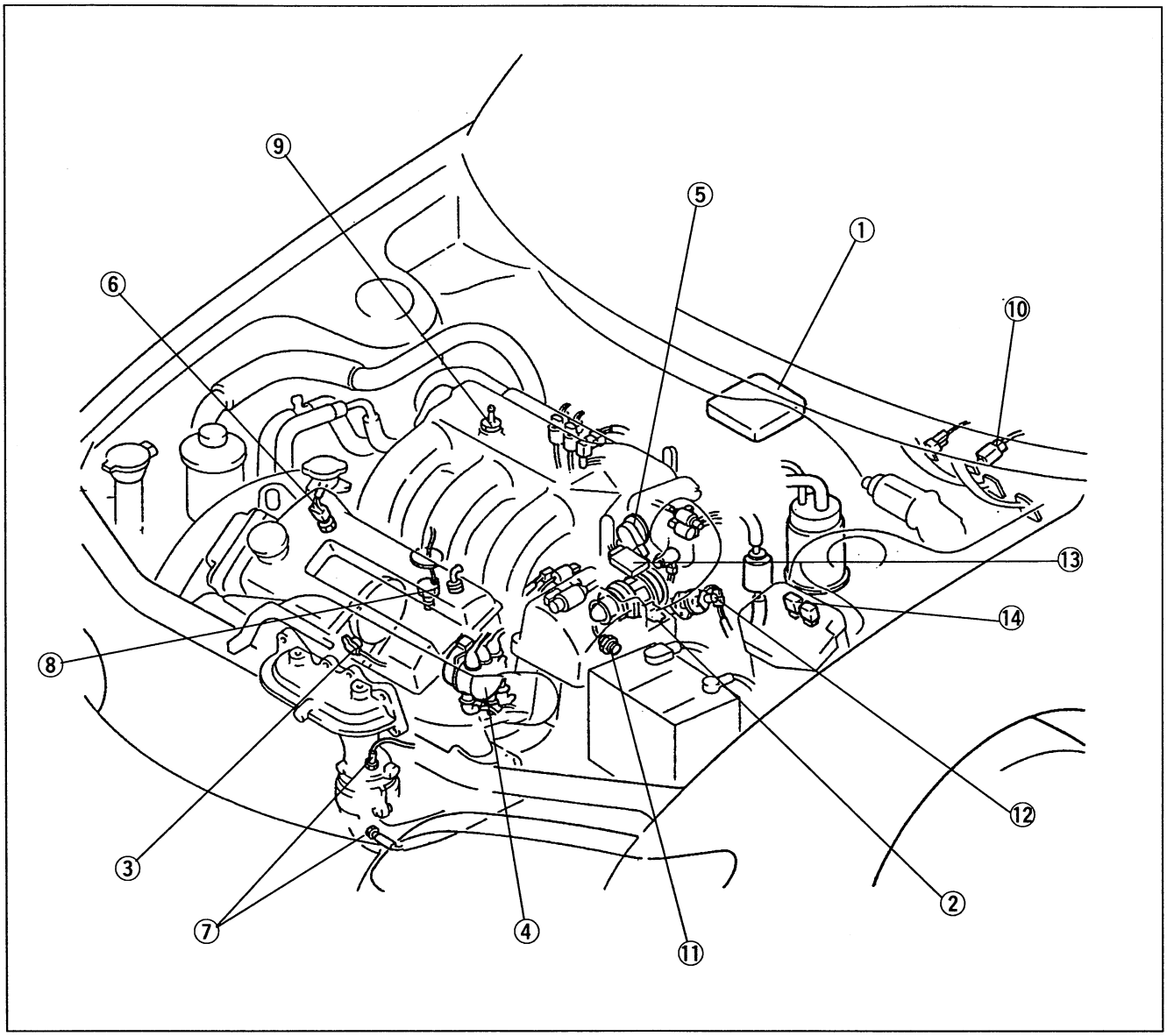
1. Verify that the engine is cold.
2. Turn the ignition switch to ON.
3. Verify that the cooling fan is not operating.
4. If the cooling fan is operating, do as follows.
   (1) Connect the **SSTs**.
   (2) By using the PID DATA MONITOR AND RECORD function, verify that the cooling fan control signal is OFF.
      I. If the cooling fan control signal is ON, check the following.
         • PCM terminal voltage (Refer to page F2–105.)
         • Engine coolant temperature signal
      II. If the cooling fan control signal is OFF, check the following.
         • Fan relay
         (Refer to 1996 Mazda 626/MX-6 BETM.)
         • Short circuit in wiring harnesses and connectors (Main relay — Fan relay — PCM)
5. Connect the **SST** and set system select switch to 1 and self test switch to SELF TEST.
6. Depress the accelerator pedal and verify that the cooling fan operates.
7. If the cooling fan does not operate, do as follows.
   (1) Install the **SSTs**.
   (2) Turn the fan relay from OFF to ON by using the SIMULATION TEST function and check for the cooling fan operation.
      I. If the cooling fan operates, check the following.
         • PCM terminal voltage (Refer to page F2–105.)
         • Diagnostic test mode signal
         • Closed throttle position signal
      II. If the cooling fan does not operate, do as follows.
         a. Turn the fan relay from OFF to ON by using the simulation function. Operate the fan relay and check if the operation sound of the relay is heard.
         b. If the operation sound is heard, check the following.
            • Wiring harnesses and connectors (Fan relay — Fan motor)
            • Fan motor (Refer to section E.)
         c. If the operation sound is not heard, check the following.
            • Fan relay
            (Refer to 1996 Mazda 626/MX-6 BETM.)
            • Open circuit in wiring harnesses and connectors (Main relay — Fan relay — PCM)

CONTROL SYSTEM

PREPARATION
SST

49 9200 162A Monitor, Engine Signal 	For inspection of PCM terminal voltage	49 T018 906 Adapter harness 	For inspection of PCM terminal voltage
49 T018 905 Sheet 	For inspection of PCM terminal voltage	49 D088 008 Harness adapter, Power 	For inspection of PCM terminal voltage
49 T088 0A0 NGS set 	For inspection of PCM terminal voltage and input/output devices	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices	49 T088 008A Instruction Manual 	For inspection of PCM terminal voltage and input/output devices
49 T088 010B Program Card 	For inspection of PCM terminal voltage and input/output devices	49 H018 001 Knock sensor wrench 	For replacement of knock sensor

STRUCTURAL VIEW

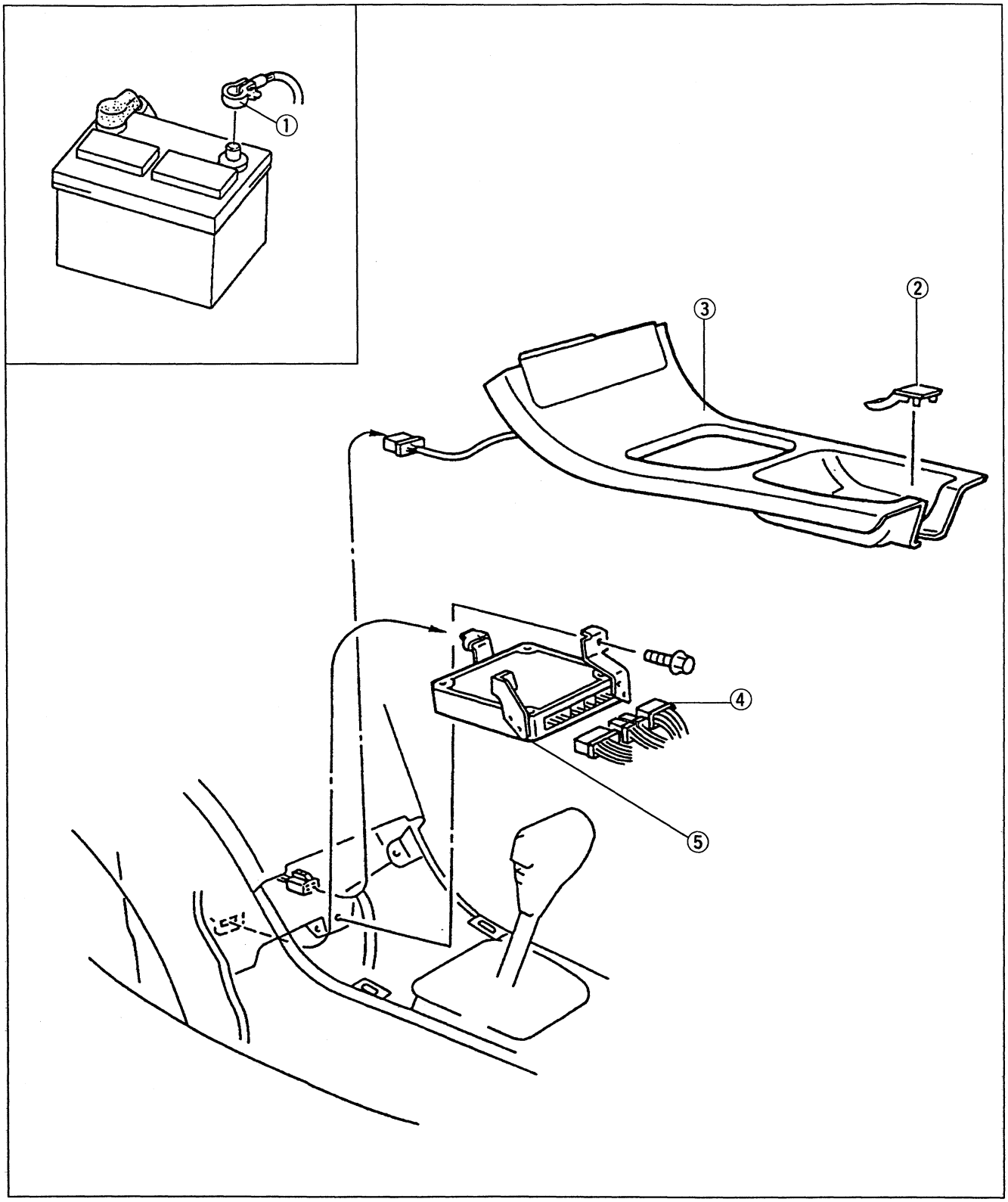


1. Powertrain control module (PCM)
   - Removal / Installation ..... page F2–105
   - Inspection ..... page F2–106
2. Volume air flow sensor
   - Inspection ..... page F2–115
3. Crankshaft position sensor
   - Inspection ..... page F2–116
   - Replacement ..... page F2–116
4. Camshaft position sensor
   - Inspection ..... page F2–117
5. Throttle position sensor
   - Inspection ..... page F2–117
   - Adjustment ..... page F2–118
   - Replacement ..... page F2–120
6. Engine coolant temperature sensor
   - Inspection ..... page F2–120
7. Heated oxygen sensor (front, rear)
   - Inspection ..... page F2–121
8. Knock sensor
   - Inspection ..... page F2–122
   - Replacement ..... page F2–122
9. P/S pressure switch
   - Inspection ..... page F2–123
10. Clutch switch
    - Inspection ..... page F2–123
    - Replacement ..... page F2–123
11. Neutral switch
    - Inspection ..... page F2–123
12. EGR valve position sensor
    - Inspection ..... page F2–124
13. EGR boost sensor
    - Inspection ..... page F2–124
14. Main relay
    - Inspection ..... page F2–125

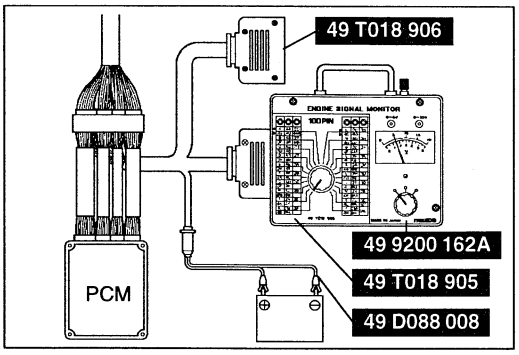
POWERTRAIN CONTROL MODULE (PCM)

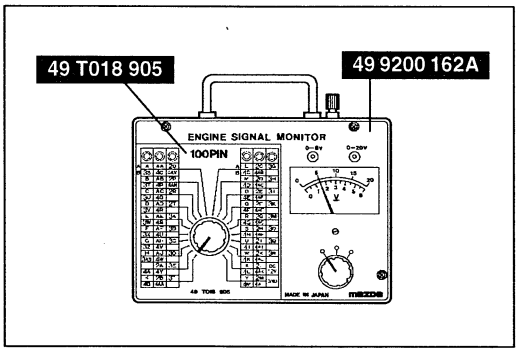
Removal / Installation

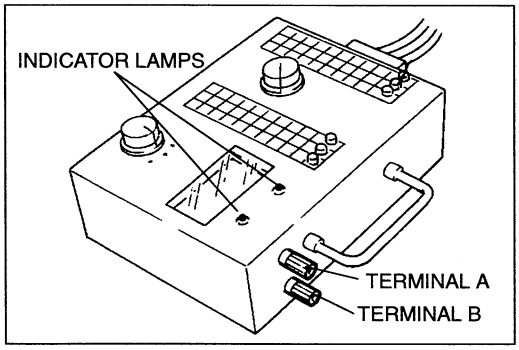
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.



1. Negative battery cable
2. Cover
3. Center console (Refer to section S)
4. PCM connector
5. PCM







Inspection

Caution

- **The PCM terminal voltages vary with change in measuring conditions and vehicle conditions. Always carry out a total inspectioin of the input systems, output systems, and PCM to determine the cause of trouble. Otherwise, a wrong diagnosis will be made.**

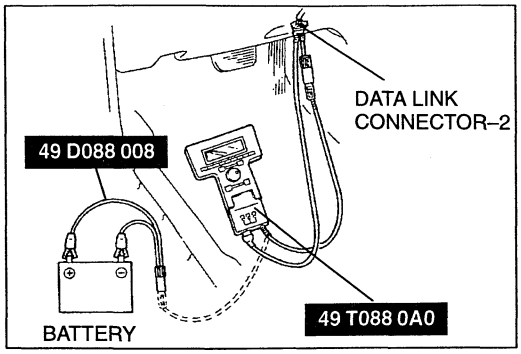
1. Disconnect the negative battery cable.
2. Remove the center console. (Refer to page F2–105.)
3. Disconnect the PCM connector.
4. Connect the **SST** (Adapter harness) to the PCM connector.
5. Connect the **SSTs** (Monitor, Engine Signal and Harness adapter, power) to the **SST** (Adapter harness). Use connector A of the adapter harness for PCM terminals 1A through 1AJ and 2A through 2T, and 3A through 3R. Use connector B for PCM terminals 3S through 3AB and 4A through 4AN.
6. Place the **SST** (Sheet) on the **SST** (Monitor, Engine Signal).
7. Measure the voltage at each PCM terminal by switching the selector switch and the monitor switch.
8. If any incorrect voltage is detected, check related systems, wiring harnesses and connectors referring to the possible malfunction in the terminal voltage list.

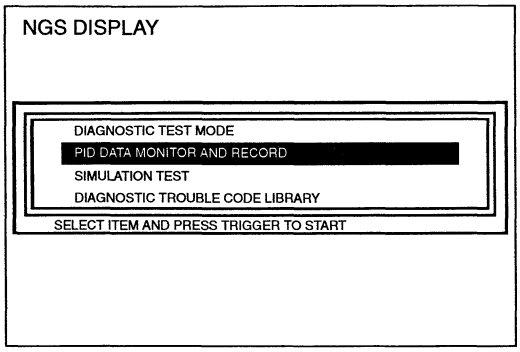
Caution

- **Disconnecting the connectors of the PCM and the SST (Adapter harness) while the battery is connected can damage the PCM and the SST (Monitor, Engine Signal). Disconnect the negative battery cable and the SST (Harness adapter, power) before disconnecting the connectors.**
- **Applying voltage to terminals A and B of the SST (Monitor, Engine Signal) can damage the SST (Monitor, Engine Signal).**

Note

- The indicator lights of the **SST** (Monitor, Engine Signal), provided for confirmation of the voltmeter range, is also used for detection of the pulse such as the fuel injector control signal, which is difficult to detect by using the voltmeter.
- Terminals A and B of the **SST** (Monitor, Engine Signal) are for connection of an external instrument. By connecting an external instrument such as a circuit tester or an oscilloscope, various inspections in addition to the measurement of the PCM terminal voltages are made possible.





Using SST (NGS)

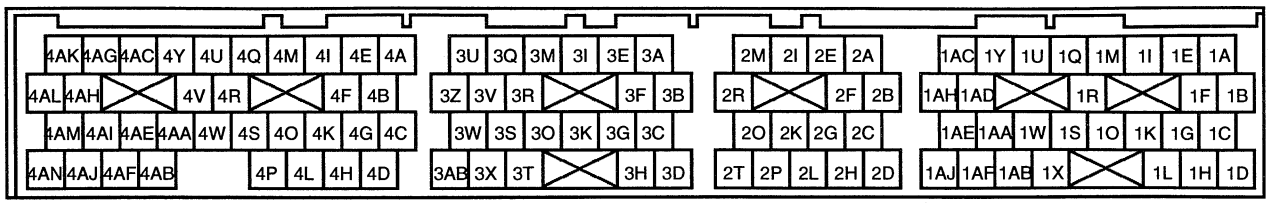
1. Connect the **SSTs** to the data link connector–2 as shown in the figure.
2. Referring to the NGS operational manual, select the PID DATA MONITOR AND RECORD or PID DATA MONITOR function.
3. Referring to the 1996 Service Highlights, inspect each PCM input/output signal.

Note

- The PID DATA MONITOR AND RECORD function is to monitor the calculation value of input/output signals in the PCM. Deviation in the value does not always indicate malfunction in the related input/output devices (sensors and solenoids).
- When normal output signal cannot be detected while all input signals are normal, replace the PCM.

Terminal voltage (Reference)

B+: Battery positive voltage



Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
1A	Cooling fan high speed control	Cooling fan relay No.2, No.3	Ignition switch ON	Cooling fan high speed operating	Below 1.0	• Cooling fan relay No.2, No.3
				Cooling fan stop	B+	
1B	Pressure regulator control	PRC solenoid valve	Idle (Hot start)		Below 1.0	• PRC solenoid valve
			Other		B+	
1C	Vehicle speed	Vehicle speed sensor	Ignition switch ON		0 or 5.0	• Vehicle speed sensor
			Driving		Approx. 2.5	
1D	—	—	—		—	—
1E	Condenser fan high speed control	Condenser fan relay No.2, No.3	Ignition switch ON	Condenser fan high speed operating	Below 1.0	• Condenser fan relay No.2, No.3
				Condenser fan stop	B+	
1F	Load/No load distinction	Neutral/clutch switch (MTX)	Ignition switch ON	Other than neutral and clutch pedal released	B+	• Neutral/clutch switch
				Neutral or clutch pedal depressed	Below 1.0	
		Transaxle range switch (ATX)	Ignition switch ON	Other than park/neutral position	B+	• Transaxle range switch
				Park/neutral position	Below 1.0	
1G	DRL (CANADA)	DRL control module	Daytime running light OFF		Above 11.0	• DRL control module
			Daytime running light ON		Below 1.0	
1H	Start	Ignition switch (START)	While cranking		Approx. 10	• PCM terminal 1H — Ignition switch harness
			Ignition switch ON		Below 1.0	
1I	Cooling fan and condenser fan control	Cooling fan relay No.1, Condenser fan relay No.1	Ignition switch ON	Cooling fan operating	Below 1.0	• Cooling fan relay No.1 • Condenser fan relay No.1
				Cooling fan stop	B+	
1J	—	—	—		—	—
1K	Blower	Fan switch	Ignition switch ON	Fan switch OFF	B+	• Fan switch
				Fan switch 3rd or higher	Below 1.0	
1L	Headlight	Headlight switch	Headlight switch OFF		Below 1.0	• Headlight switch
			Headlight switch ON		B+	
1M	A/C control	A/C relay	Idle	A/C operating	Below 1.0	• A/C relay
				A/C stop	B+	
1N	—	—	—		—	—
1O	Brake	Brake switch	Brake pedal released		Below 1.0	• Brake switch
			Brake pedal depressed		B+	
1P	—	—	—		—	—
1Q	—	—	—		—	—
1R	—	—	—		—	—

B+: Battery positive voltage

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
1S	—	—	—		—	—
1T	—	—	—		—	—
1U	A/C pressure signal	Refrigerant pressure sw	Idle	A/C switch ON and fan switch max.	Below 1.0	• Refrigerant pressure switch
				A/C stop	B+	
1V	—	—	—		—	—
1W	—	—	—		—	—
1X	Rear window defroster	Rear window defroster relay	Ignition switch ON	Rear window defroster switch OFF	B+	• Rear window defroster switch
				Rear window defroster switch ON	Below 1.0	
1Y	Diagnostic trouble code input	Data link connector-2 (Terminal KLN)	Carry out inspection according to diagnostic trouble codes Diagnostic trouble code output is a part of serial communication Judgement by terminal voltage is not possible		—	• On-board diagnosis system
1Z	—	—	—		—	—
1AA	VRIS No.1 control	VRIS solenoid valve No.1	Ignition switch ON		B+	• VRIS solenoid valve No.1
1AB	—	—	—		—	—
1AC	—	—	—		—	—
1AD	—	—	—		—	—
1AE	VRIS No.2 control	VRIS solenoid valve No.2	Ignition switch ON		B+	• VRIS solenoid valve No.2
1AF	Fuel pump control	Fuel pump relay	Ignition switch ON		B+	• Fuel pump relay
			Cranking		Below 1.0	
			Idle			
1AG	—	—	—		—	—
1AH	MIL	Malfunction indicator lamp	Malfunction indicator lamp OFF		B+	• PCM terminal 1AH — MIL harness
			Malfunction indicator lamp ON		Below 1.0—B+	
1AI	—	—	—		—	—
1AJ	—	—	—		—	—
2A	Shift solenoid A (ATX)	Shift solenoid A	Solenoid valve ON		B+	• Shift solenoid A • Wiring and/or connector from terminal 2A to shift solenoid A
			Solenoid valve OFF		Below 1.0	
2B	Shift solenoid B (ATX)	Shift solenoid B	Solenoid valve ON		B+	• Shift solenoid B • Wiring and/or connector from terminal 2B to shift solenoid B
			Solenoid valve OFF		Below 1.0	
2C	TCC* control solenoid valve (ATX)	TCC control solenoid valve	TCC operation		B+	• TCC control solenoid valve • Wiring and/or connector from terminal 2C to TCC control solenoid valve
			TCC non operation		Below 1.0	
2D	TCC* solenoid valve (ATX)	TCC solenoid valve	TCC slip operation→TCC operation		B+→ Below 1.0	• TCC solenoid valve • Wiring and/or connector from terminal 2D to TCC solenoid valve
			TCC non operation		Below 1.0	

*: TCC = Torque converter clutch

B+: Battery positive voltage

Terminal	Signal	Connected to	Test condition	Voltage (V)	Possible malfunction
2E	O/D OFF indicator light (ATX)	O/D OFF indicator light	O/D OFF mode	Below 1.0	• O/D OFF indicator light • Wiring and/or connector from terminal 2E to O/D OFF indicator light
			Except O/D OFF mode	B+	
2F	Shift solenoid C (ATX)	Shift solenoid C	Solenoid valve ON	B+	• Shift solenoid C • Wiring and/or connector from terminal 2F to shift solenoid C
			Solenoid valve OFF	Below 1.0	
2G	3–2 timing solenoid valve (ATX)	3–2 timing solenoid valve	Solenoid valve ON	B+	• 3–2 timing solenoid valve • Wiring and/or connector from terminal 2G to 3–2 timing solenoid valve
			Solenoid valve OFF	Below 1.0	
2H	Pressure control solenoid (ATX)	Pressure control solenoid	Throttle valve closed throttle position	8.0	• Pressure control solenoid • Wiring and/or connector from terminal 2H to pressure control solenoid
			Throttle valve wide open throttle	1.6	
2I	Transaxle range switch (D range) (ATX)	Transaxle range switch	D range	B+	• Transaxle range switch • Wiring and/or connector from terminal 2I to transaxle range switch
			Other ranges All positions	Below 1.0	
2J	—	—	—	—	—
2K	Transaxle range switch (R position) (ATX)	Transaxle range switch	R position	B+	• Transaxle range switch • Wiring and/or connector from terminal 2K to transaxle range switch
			All ranges Other positions	Below 1.0	
2L	O/D OFF switch (ATX)	O/D OFF switch	O/D OFF switch released	B+	• O/D OFF switch • Wiring and/or connector from terminal 2L to O/D OFF switch
			O/D OFF switch depressed	Below 1.0	
2M	Transaxle range switch (S range) (ATX)	Transaxle range switch	S range	B+	• Transaxle range switch • Wiring and/or connector from terminal 2M to transaxle range switch
			Other ranges All positions	Below 1.0	
2N	—	—	—	—	—

B+: Battery positive voltage

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
2O	Transaxle fluid temperature sensor (ATX)	Transaxle fluid temperature sensor	Verify that voltage decreases according to ATF temperature rise For reference, if the ATF is 20°C {68°F} the voltage should be 3.5 V If the ATF is 130°C {260°F} the voltage should be 0.6 V		Approx. 0.6—4.8	• Transaxle fluid temperature sensor • Wiring and/or connector from terminal 2O to transaxle fluid temperature sensor
2P	Input/turbine speed sensor (ATX)	Input/turbine speed sensor	Ignition switch ON		Below 1.0	• Input/turbine speed sensor • Wiring and/or connector from terminal 2P to input/turbine speed sensor
			Engine running (P position)		0.1—1.0	
2Q	—	—	—		—	—
2R	Transaxle range switch (L range) (ATX)	Transaxle range switch	L range		B+	• Transaxle range switch • Wiring and/or connector from terminal 2R to transaxle range switch
			Other ranges All positions		Below 1.0	
2S	—	—	—		—	—
2T	Ground (Input/ turbine speed sensor) (ATX)	Input/turbine speed sensor	Constant		Below 1.0	—
3A	Constant voltage (Vref)	Throttle position sensor EGR valve position sensor	Ignition switch ON		Approx. 5.0	• PCM terminal 4A voltage
3B	Throttle position sensor	Throttle position sensor	Ignition switch ON	Accelerator pedal released	0.1—1.1	• Throttle position sensor • PCM terminal 3A voltage
				Accelerator pedal depressed	2.8—4.5	
3C	—	—	—		—	—
3D	Heated oxygen sensor (rear RH)	Heated oxygen sensor (rear RH)	Ignition switch ON		Below 1.0	• Heated oxygen sensor (rear RH)
			Idle	Engine cold	Approx. 0	
				After warm up	0.1—0.9	
3E	Volume air flow sensor	Volume air flow sensor	Ignition switch ON		Approx. 4	• Volume air flow sensor
			Idle		Approx. 3	
3F	EGR boost	EGR boost sensor	Ignition switch ON		Approx. 4.5	• EGR boost sensor
			Idle			
3G	—	—	—		—	—
3H	Heated oxygen sensor (rear LH)	Heated oxygen sensor (rear LH)	Ignition switch ON		Below 1.0	• Heated oxygen sensor (rear RH)
			Idle	Engine cold	Approx. 0	
				After warm up	0.1—0.9	
3I	Heated oxygen sensor (RH)	Heated oxygen sensor (front RH)	Ignition switch ON		Below 1.0	• Heated oxygen sensor
			Idle	Engine cold	Below 0.5	
				After warms up	0.1—0.9	
			Acceleration (After warms up)		0.5—1.0	
			Deceleration (After warms up)		0—0.5	
3J	—	—	—		—	—
3K	—	—	—		—	—
3L	—	—	—		—	—

B+: Battery positive voltage

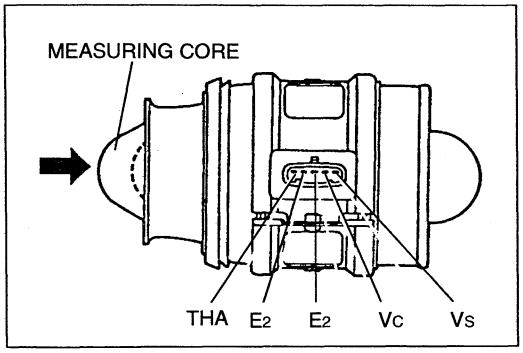
Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
3M	Heated oxygen sensor (LH)	Heated oxygen sensor (front LH)	Idnition switch ON		Below 1.0	• Heated oxygen sensor
			Idle	Engine cold	Below 0.5	
				After warms up	0.1—0.9	
			Acceleration (After warms up)		0.5—1.0	
			Deceleration (After warms up)		0—0.5	
3N	—	—	—		—	—
3O	—	—	—		—	—
3P	—	—	—		—	—
3Q	Engine coolant temperature	Engine coolant temperature sensor	Ignition switch ON	Engine coolant temp 20°C {68°F}	Approx. 3	• Engine coolant temperature sensor
				After warms up	Approx. 0.8	
3R	EGR valve position	EGR valve position sensor	Ignition switch ON		Approx. 0.8	• EGR valve position sensor
			Driving		Approx. 2.2—2.7	
3S	Knock	Knock sensor	Ignition switch ON		Approx. 0.7	• Knock sensor
3T	Power steering pressure	Power steering pressure switch	Ignition switch ON		B+	• Power steering pressure switch
			Idle	P/S not operating		
				P/S operating	Below 1.0	
3U	—	—	—		—	—
3V	Intake-air temperature	Intake air temperature sensor	Ignition switch ON	Intake-air temperature 20°C {68°F}	Approx. 2	• Intake air temperature sensor
3W	—	—	—		—	—
3X	Closed throttle position	Closed throttle position switch (In throttle position sensor)	Ignition switch ON	Accelerator pedal released	Below 1.0	• Throttle position sensor
				Accelerator pedal depressed	B+	
3Y	—	—	—		—	—
3Z	—	—	—		—	—
3AA	—	—	—		—	—
3AB	Analogue sensor ground	Ground	Constant		Below 1.0	• PCM terminal 3AB harness (Open)
4A	Power supply	Main relay (FUEL INJ relay)	Ignition switch OFF		Below 1.0	• Main relay
			Ignition switch ON		B+	
4B	Back-up power supply	Battery	Constant		B+	• PCM terminal 4B — Battery harness and connector
4C	Power supply (ATX)	Main relay (FUEL INJ relay)	Ignition switch OFF		Below 1.0	• Main relay
			Ignition switch ON		B+	
4D	Output device ground	Ground	Constant		Below 1.0	• PCM terminal 4D harness (Open)
4E	Heated oxygen sensor (front RH) heater control	Heated oxygen sensor (front RH)	Idle		Below 1.0	• Heated oxygen sensor
4F	SGC	Camshaft position sensor (In distributor)	Ignition switch ON		0 or Approx. 5.0	• Camshaft position sensor
			Idle		Approx. 2.5	

B+: Battery positive voltage

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
4G	EGR vent control	EGR solenoid valve (vent)	Ignition switch ON		B+	• EGR solenoid valve (vent)
			Idle			
4H	—	—	—		—	—
4I	Heated oxygen sensor (front LH) heater control	Heated oxygen sensor (front LH)	Idle		Below 1.0	• Heated oxygen sensor
4J	—	—	—		—	—
4K	EGR vacuum control	EGR solenoid valve (vacuum)	Ignition switch ON		B+	• EGR solenoid valve (vacuum)
			Idle			
4L	—	—	—		—	—
4M	Idle air control	Idle air control valve	Ignition switch ON		Approx. 6	• Idle air control valve
			Idle (After warms up)		Approx. 10	
4N	—	—	—		—	—
4O	Purge control	Purge solenoid valve	Ignition switch ON		B+	• Purge solenoid valve
			Idle			
4P	EGR boost sensor switching control	EGR boost sensor solenoid valve	Ignition switch ON		Below 1.0	• EGR boost sensor solenoid valve
			Idle			
4Q	Fuel injector control No.1	Fuel injector (No.1 cylinder)	Ignition switch ON/Idle		B+	• Fuel injector
4R	—	—	—		—	—
4S	IGT control	Ignition control module (Distributor)	Ignition switch ON		Approx. 0	• Ignition control module
			Idle		Approx. 0.6	
4T	—	—	—		—	—
4U	Fuel injector control No.2	Fuel injector (No.2 cylinder)	Ignition switch ON/Idle		B+	• Fuel injector
4V	Diagnostic test mode	Data link connector (Terminal TEN)	Ignition switch ON	Open terminal TEN	B+	• PCM terminal 1I — Data link connector terminal TEN harness
				Terminal TEN ground	Below 1.0	
4W	—	—	—		—	—
4X	—	—	—		—	—
4Y	Fuel injector control No.3	Fuel injector (No.3 cylinder)	Ignition switch ON/Idle		B+	• Fuel injector
4Z	—	—	—		—	—
4AA	—	—	—		—	—
4AB	Fuel injector ground	Ground	Constant		Below 1.0	• PCM terminal 4AB harness (Open)
4AC	Fuel injector control No.4	Fuel injector (No.4 cylinder)	Ignition switch ON/Idle		B+	• Fuel injector
4AD	—	—	—		—	—
4AE	—	—	—		—	—
4AF	PCM ground	Ground	Constant		Below 1.0	• PCM terminal 4AF harness (Open)
4AG	Fuel injector control No.5	Fuel injector (No.5 cylinder)	Ignition switch ON/Idle		B+	• Fuel injector
4AH	NE⊕	Crankshaft position sensor	Ignition switch ON		0	• Crankshaft position sensor
			Idle		Approx. 0	
4AI	—	—	—		—	—

B+: Battery positive voltage

Terminal	Signal	Connected to	Test condition	Voltage (V)	Possible malfunction
4AJ	PCM ground	Ground	Constant	Below 1.0	• PCM terminal 4AJ harness (Open)
4AK	Fuel injector control No.6	Fuel injector (No.6 cylinder)	Ignition switch ON/Idle	B+	• Fuel injector
4AL	NE⊖	Crankshaft position sensor	Constant	0	• Crankshaft position sensor
4AM	—	—	—	—	—
4AN	PCM ground	Ground	Constant	Below 1.0	• PCM terminal 4AN harness (Open)



VOLUME AIR FLOW SENSOR

Inspection

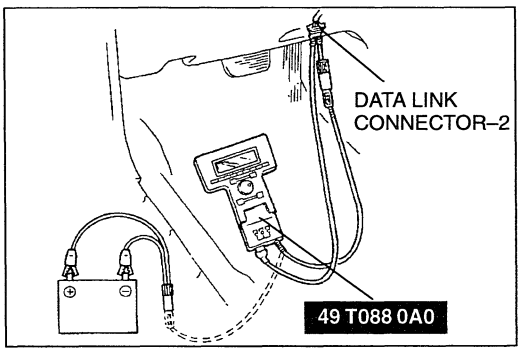
1. Check the volume air flow sensor body for cracks and damage. Replace as necessary.
2. Verify that the measuring core opens smoothly.
3. Measure resistance of the volume air flow sensor.

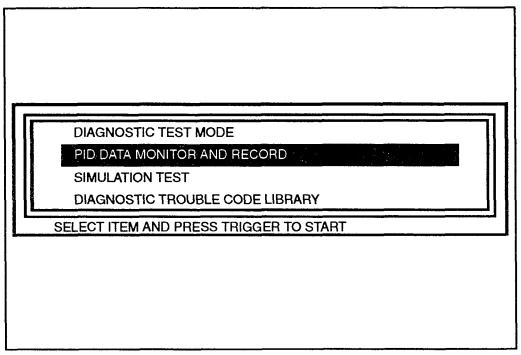
Terminal	Resistance (Ω)
E_2↔Vs	20—600 (Closed: 20°C {68°F}) 20—1,000 (Open: 20°C {68°F})
E_2↔Vc	200—400 (Closed↔Open: 20°C {68°F})
E_2↔THA (intake air temperature sensor)	−20°C {−4°F} 10,000—20,000 20°C {68°F} 2,000— 3,000 60°C {140°F} 400— 700

4. If not as specified, replace the volume air flow sensor.

Using SST (NGS)

1. Check the volume air flow sensor for damage and cracks.
2. Warm up the engine to normal operating temperature.
3. Shift the selector lever to park/neutral position.
4. Trun off all electrical loads.
   - Headlight
   - Blower motor
   - Rear window defroster
   - Power steering
   - A/C
5. Wait until the cooling fan stops.
6. Connect the **SSTs** to the data link connector–2.
7. Select the PID/DATA MONITOR AND RECORD function of the NGS.
8. Select "VAF V" on the NGS display. NGS measures and shows the voltage.





Specifications

	Ignition switch ON	Idle
Voltage (V)	Approx. 4	Approx. 3

9. If not as specified, perform following inspection.
   Harness continuity
   - Between PCM terminal 3E and volume air flow sensor terminal A
   - Between PCM terminal 3A and volume air flow sensor terminal B
   - Between PCM terminal 3AB and volume air flow sensor terminal C

   Terminal voltage
   - Volume air flow sensor terminal B voltage: approx. 5 V
10. If there is incorrect terminal voltage or harness continuity, replace the volume air flow sensor.
    (Refer to page F2–54.)

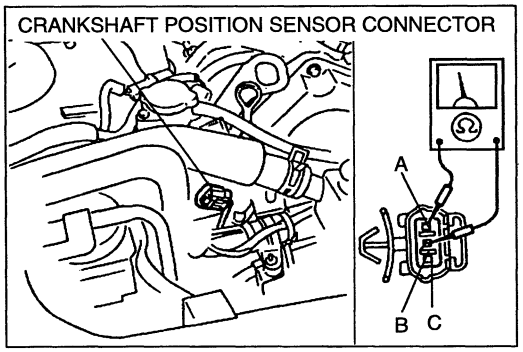
Note

- The scan tool shows the volume air flow rate and load value.

Specification

Engine speed (rpm)	Intake mass air flow (g/s)		Engine load calculated value (%)	
	MTX	ATX	MTX	ATX
600—700 (Idle)	2.9—3.7	2.9—4.0	19.0—22.0	19.0—23.0
Approx. 2,500*	9.9—12.1	9.9—12.7	16.0—19.0	16.0—20.0

* No load, in neutral or park



CRANKSHAFT POSITION SENSOR

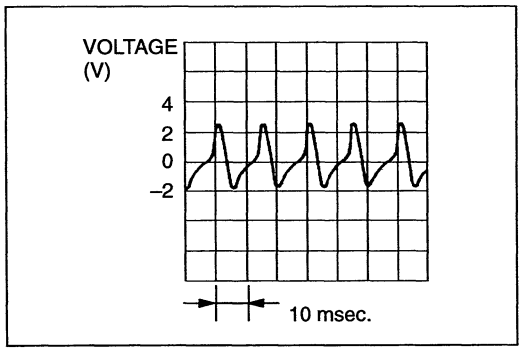
Inspection

Resistance

1. Disconnect the crankshaft position sensor connector.
2. Measure the resistance between terminals A and B by using an ohmmeter.

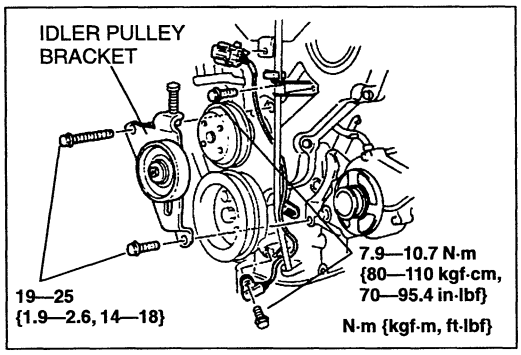
   Specification: 520—580 Ω [20°C {68°F}]

3. If not as specified, replace the crankshaft position sensor.



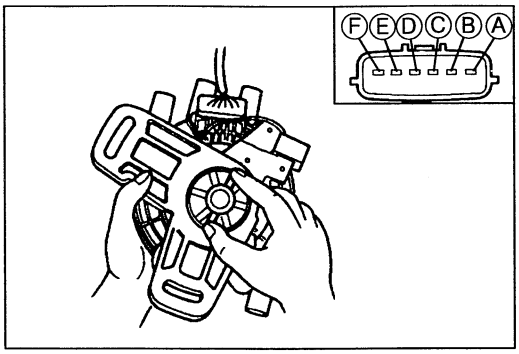
NE signal illustration

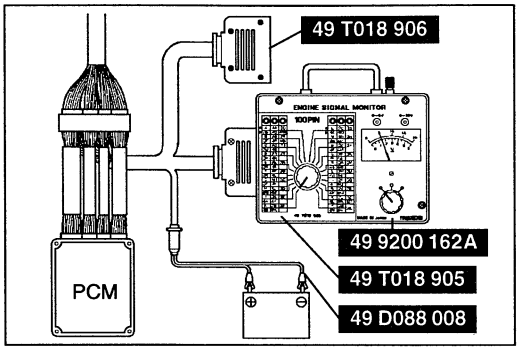
- After warm-up idle with no load condition.

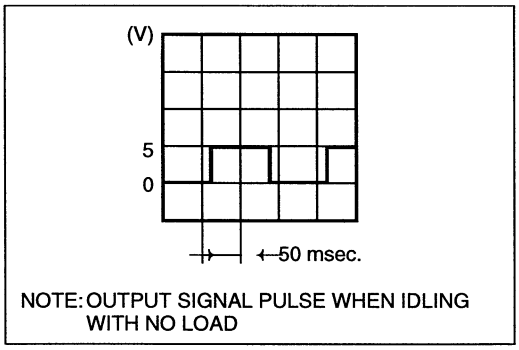


Replacement

1. Disconnect the negative battery cable.
2. Remove the idler pulley bracket.
3. Remove the dipsitck pipe.
4. Remove the crankshaft position sensor.
5. Install in the reverse order of removal.
6. Adjust the drive belt deflections. (Refer to section B2.)







NOTE: OUTPUT SIGNAL PULSE WHEN IDLING WITH NO LOAD

CAMSHAFT POSITION SENSOR

Inspection

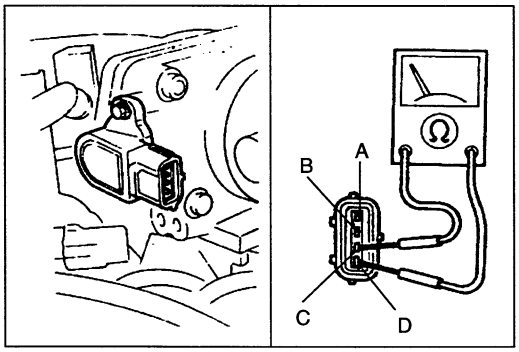
1. Remove the distributor. (Refer to section G.)
2. Connect the distributor 6-pin connector.
3. Connect the **SSTs** to the PCM. (Refer to page F2–106.)
4. Turn the ignition switch to ON.
5. Rotate the distributor drive by hand and check the output signal.

Specification

Signal	Terminal	Voltage
SGC	4F	Approx. 5 V (1 pulse/rev)

6. If not as specified, inspect following.
   Harness continuity
   - Between PCM terminal 4F and distributor (6-pin) terminal D
   - Between PCM terminal 3AB and distributor (6-pin) terminal A
   - Between main relay terminal D and distributor (6-pin) B terminal

   Terminal voltage
   - Distributor (6-pin) terminal B: B+
7. If there is correct terminal voltage and harness continuity, replace the distributor. (Refer to section G.)

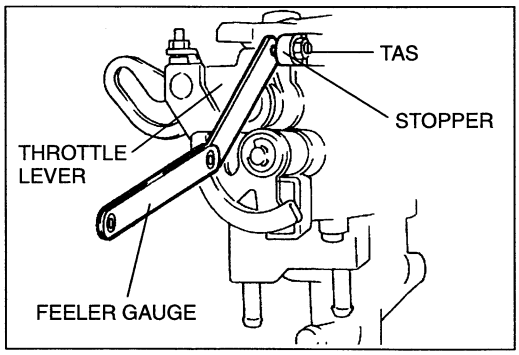


THROTTLE POSITION SENSOR

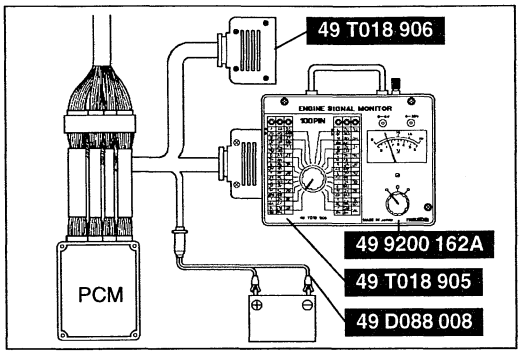
Inspection

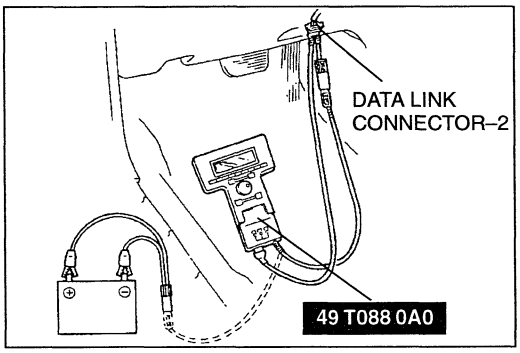
Closed throttle position switch

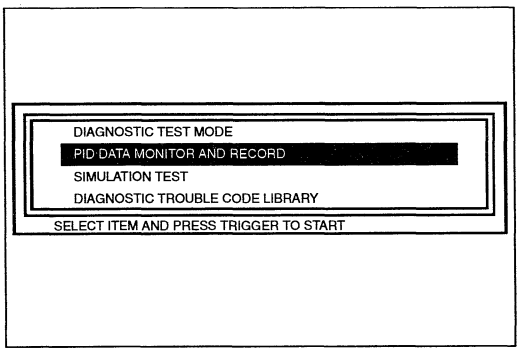
1. Verify that the throttle valve is at the closed throttle position.
2. Disconnect the throttle position sensor connector.
3. Check for continuity between throttle position sensor connector terminals C and D by using an ohmmeter.
4. If no continuity, adjust the throttle position sensor.



5. Insert a 0.50 mm {0.020 in} feeler gauge between the throttle adjusting screw (TAS) and the throttle lever. Verify that there is no continuity.
6. If there is continuity, adjust the throttle position sensor. (Refer to page F2–119.)







Throttle position sensor
Using SSTs (engine signal monitor)
1. Remove the PCM. (Refer to page F2–105.)
2. Connect the **SSTs** to the PCM.
3. Verify that the throttle valve is at the closed throttle position.
4. Turn the ignition switch to ON.
5. Measure the PCM terminal 3B voltage by using a voltmeter.

Specification
Closed throttle position: 0.1—1.1 V
Wide open throttle: 2.8—4.5 V
(Verify that the voltage increase is directly proportioned to the throttle valve opening angle.)

6. If not as specified, adjust the throttle position sensor.

Using SST (NGS)
1. Connect the **SSTs** to the data link connector–2.
2. Verify that the throttle valve is at the closed throttle position.
3. Turn the ignition switch to ON.
4. Select the PID/DATA MONITOR AND RECORD function of the NGS.
5. Select "TP V" on the NGS display. NGS measures and shows the voltage.

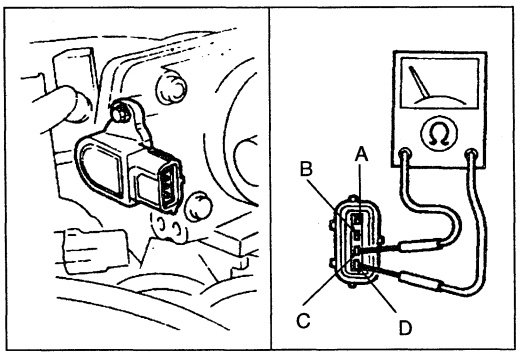
Specification
Closed throttle position: 0.1—1.1 V
Wide open throttle: 2.8—4.5 V
(Verify that the voltage increase is directly proportioned to the throttle valve opening angle.)

6. If not as specified, adjust the throttle position sensor. (Refer to page F2–119.)

Adjustment

Caution
- **The throttle position sensor is adjusted at the factory before shipment. Unnecessary adjustment will negatively effect the engine performance.**
- **Adjusting the throttle position sensor by using the throttle adjusting screw (TAS) will negatively effect the engine performance.**

Closed throttle position switch
1. Verify that the throttle valve is at the closed throttle position.
2. Disconnect the throttle position sensor connector.
3. Loosen the attaching screws.
4. Insert a feeler gauge between the throttle adjusting screw (TAS) and the throttle lever. Adjust the continuity between the closed throttle position switch terminals C and D by using an ohmmeter.



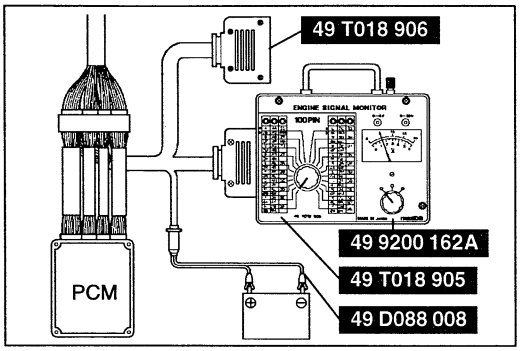
Specification

Clearance	Continuity
0.15 mm {0.006 in}	Yes
0.50 mm {0.020 in}	No

5. Tighten the attaching screws.

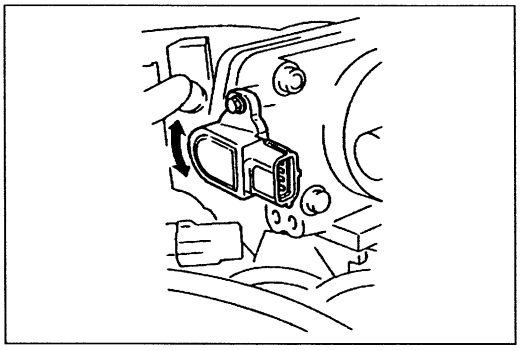
Tightening torque:
1.6—2.3 N·m {16—24 kgf·m, 14—20 in·lbf}

6. If not adjusted, replace the throttle position sensor. (Refer to below.)



Throttle position sensor
Using SSTs (engine signal monitor)
1. Remove the PCM. (Refer to page F2–105.)
2. Connect the **SSTs** to the PCM.
3. Verify that the throttle valve is at the closed throttle position.
4. Loosen the attaching screws.
5. Turn the ignition switch to ON.
6. Adjust the throttle position sensor so that the PCM terminal 3B voltage is as specified, by using a voltmeter.

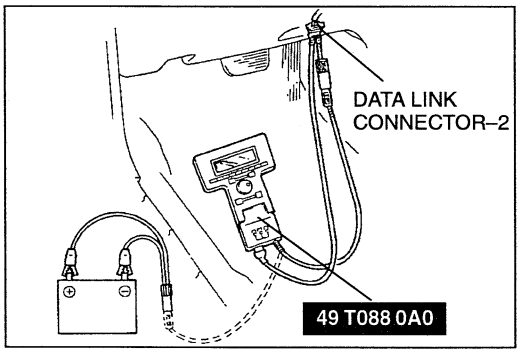
Specification
Closed throttle position: 0.1—1.1 V
Wide open throttle: 2.8—4.5 V
(Verify that the voltage increase is directly proportioned to the throttle valve opening angle.)



7. Tighten the attaching screws.

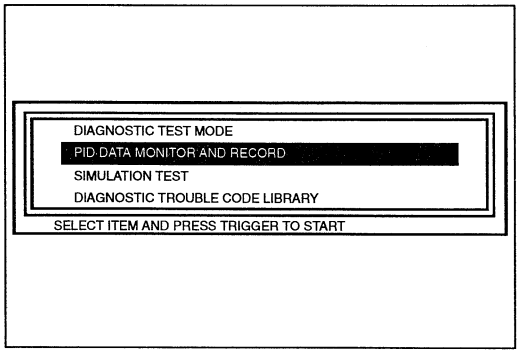
Tightening torque:
1.6—2.3 N·m {16—24 kgf·cm, 14—20 in·lbf}

8. If not adjusted, inspect the throttle position sensor harness.
9. If harness is OK, replace the throttle position sensor.



Using SST (NGS)
1. Connect the **SSTs** to the data link connector–2.
2. Verify that the throttle valve is at the closed throttle position.
3. Loosen the attaching screws.
4. Turn the ignition switch to ON.
5. Select the PID/DATA MONITOR AND RECORD function of the NGS.
6. Select "TP V" on the NGS display. NGS measures and shows the voltage.

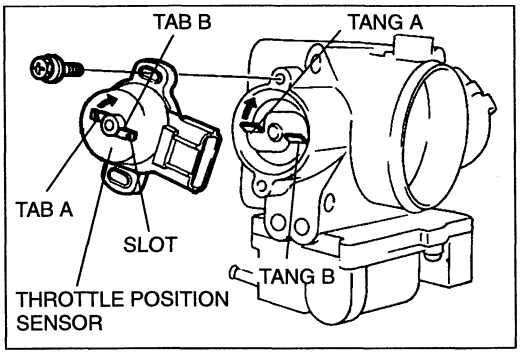
Specification
Closed throttle position: 0.1—1.1 V
Wide open throttle: 2.8—4.5 V
(Verify that the voltage increase is directly proportioned to the throttle valve opening angle.)



7. Tighten the attaching screws.

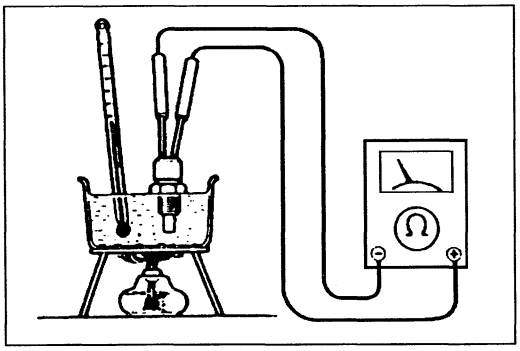
Tightening torque:
1.6—2.3 N·m {16—24 kgf·cm, 14—20 in·lbf}

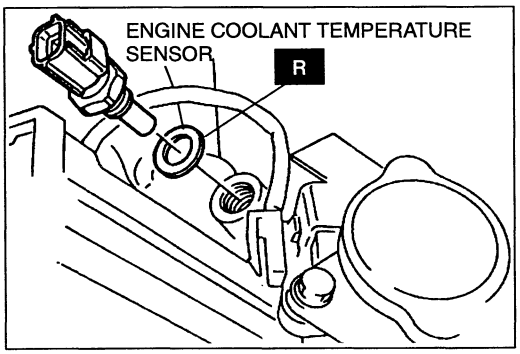
8. If not adjusted, replace the throttle position sensor.



Replacement

1. Disconnect the throttle position sensor connector.
2. Remove the attaching screws.
3. Remove the throttle position sensor.
4. Verify that the throttle valve is at the closed throttle position.
5. Open the throttle valve slightly and catch the tang of the throttle body on the throttle position sensor plastic tabs. Adjust tang A on throttle body with tab A on throttle position sensor. Note tangs on the throttle body mate with the tab on the throttle position sensor on the side of the tab without a slot.
6. Position the throttle position sensor on the throttle body so that the mounting holes align.
7. Install and hand tighten the attaching screws.
8. Release the throttle.
9. Adjust the throttle position sensor output voltage and closed throttle position switch. (Refer to page F2–118.)





ENGINE COOLANT TEMPERATURE SENSOR

Inspection

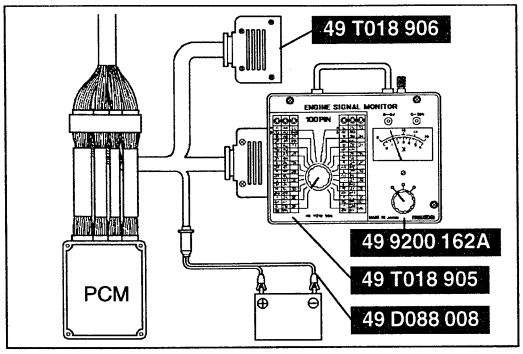
1. Remove the engine coolant temperature sensor.
2. Place the sensor in water with a thermometer, and heat the water gradually.
3. Measure the resistance of the sensor by using an ohmmeter.

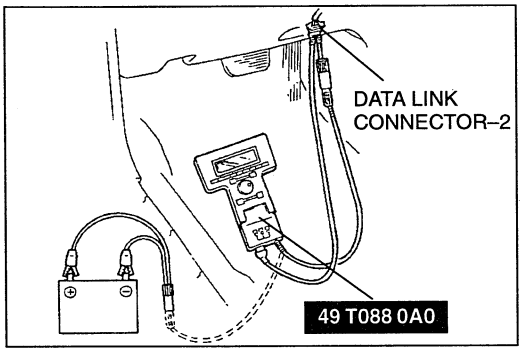
Spcification

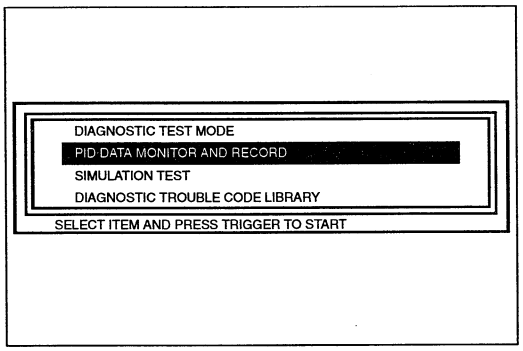
Temperature (C°{F°})	Resistance (kΩ)
20 {68}	2.2—2.7
80 {176}	0.29—0.35

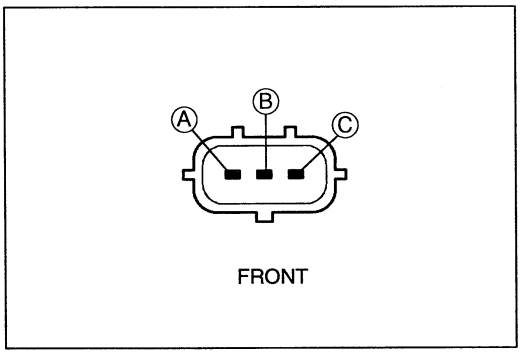
4. If not as specified, replace the engine coolant temperature sensor.

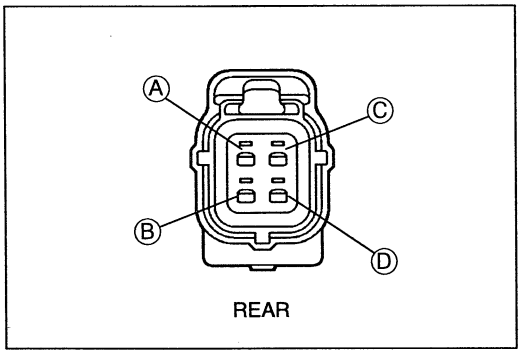
Tightening torque:
16—23 N·m {1.6—2.4 kgf·m, 12—17 ft·lbf}











HEATED OXYGEN SENSOR (FRONT, REAR)

Inspection

Using the SSTs (engine signal monitor)

1. Remove the PCM. (Refer to page F2–105.)
2. Connect the **SSTs** to the PCM.
3. Warm up the engine to normal operating temperature.
4. Measure the voltage at PCM terminals 3D, 3H, 3I and 3M.

Specification

Engine condition	PCM terminal voltage (V)			
	3I	3M	3D	3H
	Heated oxygen sensor (front RH)	Heated oxygen sensor (rear RH)	Heated oxygen sensor (front LH)	Heated oxygen sensor (rear LH)
IG-ON	Below 1.0			
Idle	Below 1.0			
Deceleration	0—0.5	0—1.0	0—0.5	0—1.0
Acceleration	0.5—1.0	0—1.0	0.5—1.0	0—1.0

5. If not as specified, inspect the following.
   - Intake-air system
   - Fuel system
   - On-board diagnostic system

   If these systems are OK, replace the heated oxygen sensor.

   Tightening torque:
   30—49 N·m {3.0—5.0 kgf·m, 22—36 ft·lbf}

Using the NGS

1. Connect the **SSTs** to the data link connector–2.
2. Select the PID/DATA MONITOR AND RECORD function of NGS.
3. Select "FHO2S R", "RHO2S R", "FHO2S L" and "RHO2S L" on the NGS display. NGS measures and shows the voltage.

Specification

Engine condition	Voltage (V)			
	FHO2S R	RHO2S R	FHO2S L	RHO2S L
IG-ON	Below 1.0			
Idle	Below 1.0			
Deceleration	0—0.5	0—1.0	0—0.5	0—1.0
Acceleration	0.5—1.0	0—1.0	0.5—1.0	0—1.0

4. If not as specified, inspect the following.
   - Intake-air system
   - Fuel system
   - On-board diagnostic system

   If these systems are OK, replace the heated oxygen sensor.

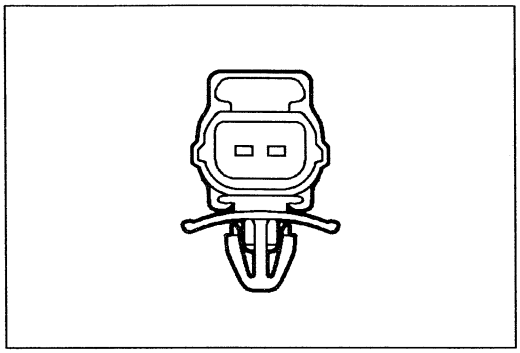
   Tightening torque:
   30—49 N·m {3.0—5.0 kgf·m, 22—36 ft·lbf}

Heater

1. Disconnect the heated oxygen sensor connector.
2. Measure the resistance between heated oxygen sensor (front) terminals B and C by using an ohmmeter. Measure the resistance between heated oxygen sensor (rear) terminals C and D by using an ohmmeter.

   Specification: Approx. 6 Ω (20°C {68°F})
3. If not as specified, replace the heated oxygen sensor.

   Tightening torque:
   30—49 N·m {3.0—5.0 kgf·m, 22—36 ft·lbf}



KNOCK SENSOR
Inspection
1. Verify that the ignition switch is OFF.
2. Disconnect the knock sensor connector.
3. Measure the resistance between knock sensor terminal A and the knock sensor body by using an ohmmeter.

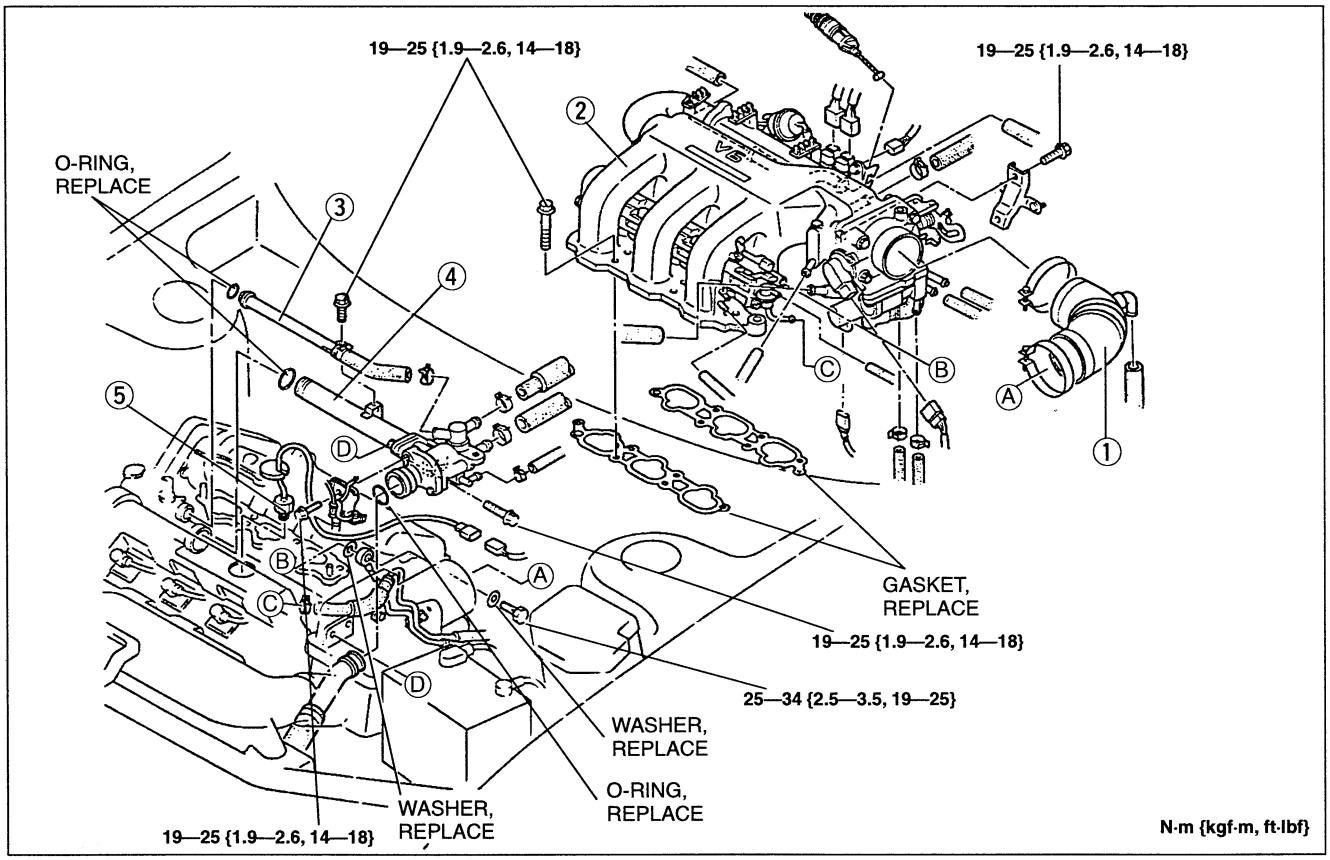
   Specification: Approx. 560 kΩ [20°C {68°F}]

4. If not as specified, replace the knock sensor. (Refer to below.)

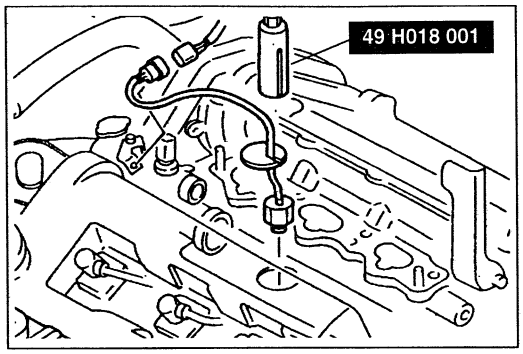
Replacement

Warning
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F2–67.**

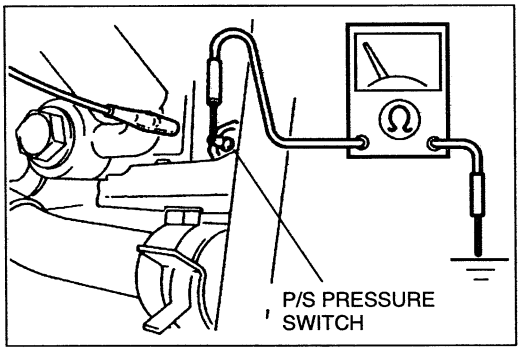
1. Disconnect the negative battery cable.
2. Drain the coolant from the radiator. (Refer to section E2.)
3. Remove in the order shown in the figure, referring to **Removal note**.
4. Install in the reverse order of removal, referring to **Installation note**.
5. Refill the radiator with the specified engine coolant.



1. Air hose
2. Intake manifold
   Removal Note ..... page F2–123
3. Bypass pipe
4. Water pipe
5. Knock sensor
   Removal / Installation Note .. page F2–123



Removal / Installation note
Knock sensor
Use the **SST** to remove and install the knock sensor.



POWER STEERING PRESSURE SWITCH

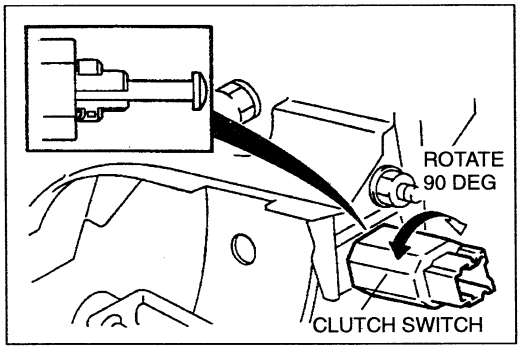
Inspection

1. Disconnect the P/S pressure switch connector.
2. Start the engine.
3. Check for continuity between P/S pressure switch and a ground by using an ohmmeter.

O—O: Continuity

Condition	Terminal A	Ground
Steering wheel not turned		
Steering wheel being turned	O	O

4. If not as specified, replace the P/S pressure switch. (Refer to section N.)



CLUTCH SWITCH (MTX)

Inspection

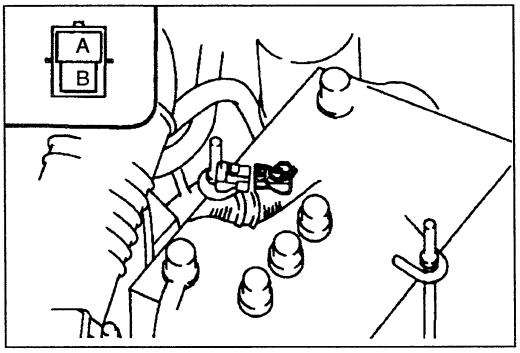
1. Disconnect the clutch switch connector.
2. Check for continuity between terminals of the clutch switch by using an ohmmeter.

O—O: Continuity

Termianl / Condition	A	B
Clutch pedal not depressed		
Clutch pedal depressed	O	O

3. If not as specified, replace the clutch switch. (Refer to below.)

Replacement
Replace the clutch switch as shown in the figure.



NEUTRAL SWITCH (MTX)

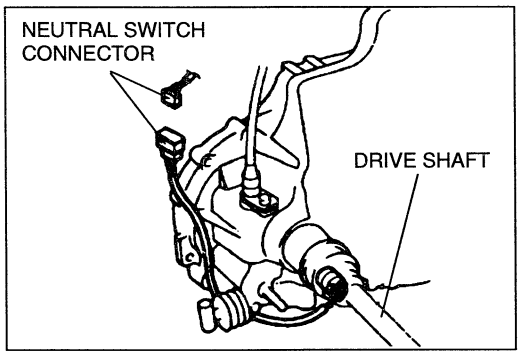
Inspection

1. Disconnect the neutral switch connector.
2. Check for continuity between terminals of the neutral switch by using an ohmmeter.

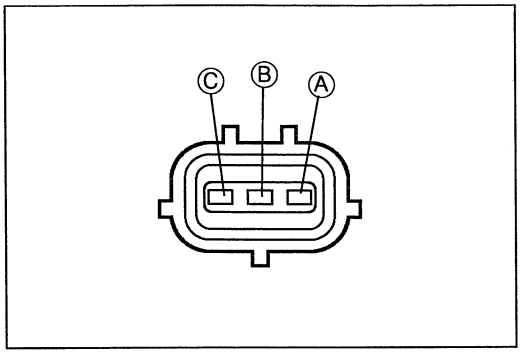
O—O: Continuity

Terminal / Condition	A	B
Neutral position	O	O
Others		

3. If not as specified, replace the neutral switch.



Tightening torque:
20—29 N·m {2.0—3.0 kgf·m, 15—21 ft·lbf}



EGR VALVE POSITION SENSOR

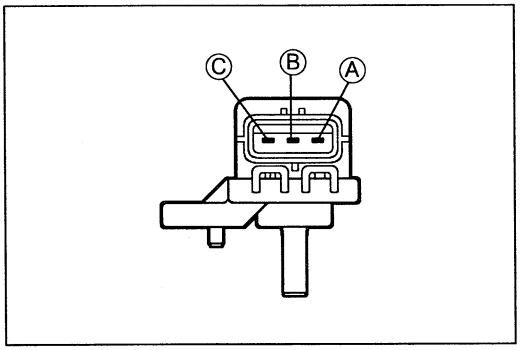
Inspection

1. Disconnect EGR valve position sensor connector.
2. Disconnect the vacuum hose from the EGR valve and connect the vacuum pump to the EGR valve.
3. Use an ohmmeter to measure the resistance between the terminals as shown in the table.

Specification

Terminal	Vacuum	
	0 kPa {0 mmHg, 0 inHg}	20.0 kPa {150 mmHg, 5.90 inHg}
A—B	Approx. 2.7 kΩ	
A—C	Approx. 0.5 kΩ	Approx. 2.7 kΩ
B—C	Approx. 2.4 kΩ	Approx. 0.1 kΩ

4. If not as specified, replace the EGR valve. (Refer to page F2–88.)



EGR BOOST SENSOR

Inspection

1. Warm up the engine to normal operating temperature and let it idle.
2. Verify that the intake air system. (Refer to page F2–54.)
3. Measure the voltage between terminals A and B by using a voltmeter, from the rear side of the connector.

   Specification: Approx. 0.8 V

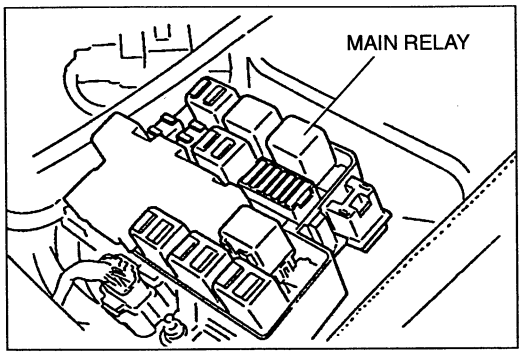
4. Disconnect the vacuum hose from the EGR boost sensor.
5. Disconnect the vacuum hose from the intake manifold side of the EGR boost sensor solenoid valve and connect the vacuum hose to the EGR boost sensor.
6. Measure the voltage between terminals A and B by using a voltmeter, from the rear side of the connector.

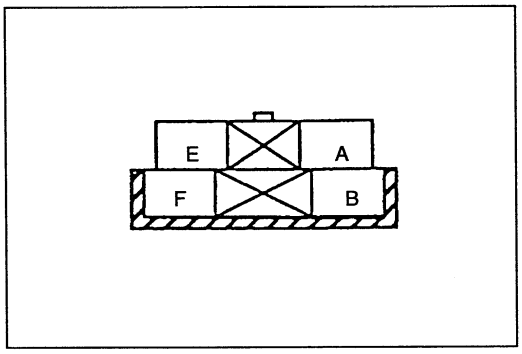
   Specification: Approx. 4 V

7. Apply vacuum or pressure to the EGR boost sensor by using a vacuum pump. Measure the voltage between terminals A and B by using a voltmeter, from the rear side of the connector.

   Specification
   20.0 kPa {150 mmHg, 5.91 inHg}: 0.783—0.849 V
   46.7 kPa {350 mmHg, 13.8 inHg}: 1.772—1.912 V
   101.3 kPa {760 mmHg, 30.0 inHg}: 3.92—4.08 V

8. Turn off the ignition switch.
9. If not as specified, replace the EGR boost sensor.





MAIN RELAY
Inspection

1. Remove the main relay.
2. Check for continuity between terminals of the relay by using an ohmmeter.

O—O: Continuity B+: Battery positive voltage

Step \ Terminal	E	A	B	F
1	O——	——O		
2	B+	Ground	O——	——O

3. If not as specifed, replace the main relay.

TROUBLESHOOTING GUIDE

QUICK DIAGNOSIS CHART

This Quick Diagnosis Chart shows the relationship between troubleshooting items and inspection points.

Item		Possible parts and reference page	Fuel system					Intake air system						Evaporative emission system								Ignition system						Control system				
			F2–74	F2–71	F2–78	F2–78	F2–73	F2–54	F2–11	F2–55	F2–54	F2–65	F2–65	F2–86	F2–86	F2–93	F2–124	F2–88	F2–94	F2–94	F2–94	F2–90	section G						F2–115	F2–120	F2–117	F2–121	F2–117
			Fuel injector	Fuel pump	Fuel pump relay	Pressure regulator	Fuel filter	Air leakage	Idle speed	Throttle body	Air cleaner	Vacuum chamber	Check valve	EGR solenoid valve (vacuum)	EGR solenoid valve (vent)	Purge solenoid valve	EGR valve position sensor	EGR valve	Fuel vapor valve	Check valve (two-way)	Charcoal canister	PCV valve	Distributor	Ignition control module (in distributor)	Ignition coil (in distributor)	High-tension lead	Spark plug	Ignition timing	Volume air flow sensor	Engine coolant temperature sensor	Throttle position sensor	Heated oxygen sensor (Front RH or Front LH)	Camshaft position sensor
1	Melts main or other fuse		○	○	○																										○	
2	Will not crank or cranks slowly																															
3	Cranks normally but will not start	No combustion																				○										
4		Partial combustion — when engine cold	○	○	○					○												○	○	○				○				
5		Partial combustion — after warm-up				○																										
7	Cranks normally but hard to start	Any engine temp.		○		○																										
8		When engine cold	○							○				○	○											○						
9		After warm-up				○																										
10	Engine stalls	Idle at any engine temp.	○	○	○			○														○		○				○	○			
11		During fast idle																○														
12		Idle after warm-up																										○				
13		Idle with A/C, P/S, and/or E/L ON																														
14		Idle when shifted from N or P to other ranges																														
15		Driveaway	○			○	○															○	○						○			
16		On acceleration		○		○																	○					○				
17		While cruising		○																			○	○				○				
18		On deceleration		○					○									○						○				○			○	
19	Engine rough	Idle at any engine temp.	○	○	○			○		○				○								○		○	○			○	○			
20		During fast idle																								○						
21		Idle after warm-up						○																				○				
22		Idle with A/C, P/S, and/or E/L ON							○																							
23		Idle when shifted from N or P to other ranges							○																							
24		On deceleration																○														
25	Poor acceleration	Driveaway	○				○																					○				
26		On acceleration	○			○	○																○			○		○				
27	High idle speed after warm-up																												○		○	

Control system																		Automatic transaxle system										Possible parts and reference page		
BETM*	F2–123	F2–123	BETM*	F2–60	F2–105	BETM*	F2–81	F2–65	BETM*	section U	section E	F2–122	BETM*	BETM*	BETM*	F2–125	section G	section K1												
Vehicle speed sensor	Clutch and neutral switches	P/S pressure switch	Brake switch	Idle air control valve	PCM	A/C relay, Condenser fan relay	PRC solenoid valve	VRIS solenoid valve (nos.1, 2)	Fan switch	Condenser fan relay	Cooling fan relay	Knock sensor	Air conditioning switch	Headlight switch	Rear window defroster	Main relay	Starter	Vehicle speed pulse generator	Transaxle range switch	O/D off switch	TCC solenoid valve	TCC control solenoid valve	Oil pump	Control valve body	Transaxle fluid temperature	Torque converter	Reverse clutch			Item
			○		○																							Melts main or other fuse		1
																	○											Will not crank or cranks slowly		2
					○											○												No combustion	Cranks normally but will not start	3
				○																								Partial combustion — when engine cold		4
				○																								Partial combustion — after warm-up		5
					○																							Any engine temp.	Cranks normally but hard to start	7
					○																							When engine cold		8
							○																					After warm-up		9
					○																							Idle at any engine temp.	Engine stalls	10
																												During fast idle		11
				○												○												Idle after warm-up		12
		○		○	○	○			○					○	○						○	○						Idle with A/C, P/S, and/or E/L ON		13
				○	○																○	○	○	○				Idle when shifted from N or P to other ranges		14
					○																							Driveaway		15
					○																							On acceleration		16
					○											○												While cruising		17
	○			○	○											○								○				On deceleration		18
					○																							Idle at any engine temp.	Engine rough	19
				○																								During fast idle		20
				○												○												Idle after warm-up		21
		○		○	○	○			○					○	○													Idle with A/C, P/S, and/or E/L ON		22
																												Idle when shifted from N or P to other ranges		23
																												On deceleration		24
					○														○					○				Driveaway	Poor acceleration	25
				○	○													○	○					○				On acceleration		26
			○	○																								High idle speed after warm-up		27

* 1996 Mazda 626/MX-6 Body Electrical Troubleshooting Manual

Item	Possible parts and reference page	Fuel system					Intake air system						Evaporative emission system									Ignition system						Control system				
		F2–74	F2–71	F2–78	F2–78	F2–73	F2–54	F2–11	F2–55	F2–54	F2–65	F2–65	F2–86	F2–86	F2–93	F2–124	F2–88	F2–94	F2–94	F2–94	F2–90	section G						F2–115	F2–120	F2–117	F2–121	F2–117
		Fuel injector	Fuel pump	Fuel pump relay	Pressure regulator	Fuel filter	Air leakage	Idle speed	Throttle body	Air cleaner body	Vacuum chamber	Check valve	EGR solenoid valve (vacuum)	EGR solenoid valve (vent)	Purge solenoid valve	EGR valve position sensor	EGR valve	Fuel vapor valve	Check valve (two-way)	Charcoal canister	PCV valve	Distributor	Ignition control module (in distributor)	Ignition coil (in distributor)	High-tension lead	Spark plug	Ignition timing	Volume air flow sensor	Engine coolant temperature sensor	Throttle position sensor	Heated oxygen sensor (Front RH or Front LH)	Camshaft position sensor
28	Idle fluctuates/Idle hunts																				○					○						
29	Hesitates/Stumbles on acceleration	○	○		○								○				○					○	○		○		○		○			
30	Surges while cruising	○																								○	○					
31	Lack of power	○				○				○												○					○					
32	Poor fuel economy				○		○																							○		
33	A/C does not work																															
34	Knocking/Pinging																															
35	Fuel odor														○					○												
36	Exhaust sulfur smell																															
37	High oil consumption																				○											
38	NGS displays "LINK COMMUNICATION ERROR"																															
39	MIL never ON																															

Control system																						Automatic transaxle system										Possible parts and reference page	
BETM*	F2–123	F2–123	NETM*	F2–60	F2–105	BETM*	F2–81	F2–65	BETM*	BETM*	section E	F2–122	BETM*	BETM*	BETM*	F2–125	section G	section K1															
Vehicle speed sensor	Clutch and neutral switches	Steering pressure sensor	Brake switch	Idle air control valve	PCM	A/C relay, Condenser fan relay	PRC solenoid valve	VRIS solenoid valve (nos.1, 2)	Fan switch	Condenser fan relay	Cooling fan relay	Knock sensor	Air conditioning switch	Headlight switch	Rear window defroster	Main relay	Starter	Vehicle speed pulse generator	Transaxle range switch	O/D off switch	TCC solenoid valve	TCC control solenoid valve	Oil pump	Control valve body	Transaxle fluid temperature	Torque converter	Reverse clutch	Item	
				○	○																							Idle fluctuates/Idle hunts	28
					○																							Hesitates/Stumbles on acceleration	29
					○													○			○	○	○	○	○			Surges while cruising	30
																									○	○		Lack of power	31
																					○							Poor fuel economy	32
					○	○							○															A/C does not work	33
												○																Knocking/Pinging	34
																												Fuel odor	35
																												Exhaust sulfur smell	36
																												High oil consumption	37
																												NGS displays "LINK COMMUNICATION ERROR"	38
																												MIL never ON	39

* 1996 Mazda 626/MX-6 Body Electrical Troubleshooting Manual

RELATIONSHIP CHART

INPUT DEVICE \ OUTPUT DEVICE		FUEL INJECTOR: FUEL INJECTION AMOUNT	FUEL INJECTOR: FUEL INJECTION TIMING	FUEL PUMP RELAY	IGNITION CONTROL MODULE	A/C RELAY (A/C CUT-OFF) AND CONDENSER FAN LOW RELAY	CONDENSER FAN HIGH RELAY No.1, No.2	BAC VALVE (IDLE AIR CONTROL VALVE)	COOLING FAL RELAY No.1	COOLING FAN RELAY No.2, No.3	SOLENOID VALVE: PURGE CONTROL	SOLENOID VALVE: VRIS (No.1 AND No.2) CONTROL	SOLENOID VALVE: EGR CONTROL	SOLENOID VALVE: PRESSURE REGULATOR CONTROL	NGS (DIAGNOSTIC TROUBLE CODE)
CAMSHAFT POSITION SENSOR	SGC SIGNAL	○	○	○	○										○
CRANKSHAFT POSITION SENSOR (NE SIGNAL)		○	○		○			○			○	○	○	○	○
THROTTLE POSITION SENSOR	CLOSED THROTTLE POSITION SWITCH	○	○		○			○	○	○	○		○		
	THROTTLE POSITION SENSOR	○	○		○	○		○				○	○	○	○
VOLUME AIR FLOW SENSOR		○			○						○		○		○
ENGINE COOLANT TEMPERATURE SENSOR		○			○	○	○	○	○	○	○		○	○	○
INTAKE AIR TEMPERATURE SENSOR		○						○			○			○	○
HEATED OXYGEN SENSOR		○									○				○
KNOCK SENSOR					○										○
AIR CONDITIONING SWITCH						○	○	○	○						
P/S PRESSURE SWITCH						○		○							
IGNITION SWITCH (START SIGNAL)		○	○	○	○	○	○	○	○	○		○		○	
BRAKE SWITCH		○													
TRANSAXLE RANGE SWITCH (ATX)		○			○	○		○			○			○	
E/L SIGNAL*								○							
NEUTRAL AND CLUTCH SWITCHES (MTX)		○			○	○		○			○			○	
DATA LINK CONNECTOR (TEN TERMINAL)					○			○	○	○				○	○
EGR VALVE POSITION SENSOR					○								○		○
EGR BOOST SENSOR		○				○		○							○
VEHICLE SPEED SENSOR								○			○				

* E/L SIGNAL: Fan switch third position or higher, headlight ON, rear window defroster ON.

Output devices and engine condition

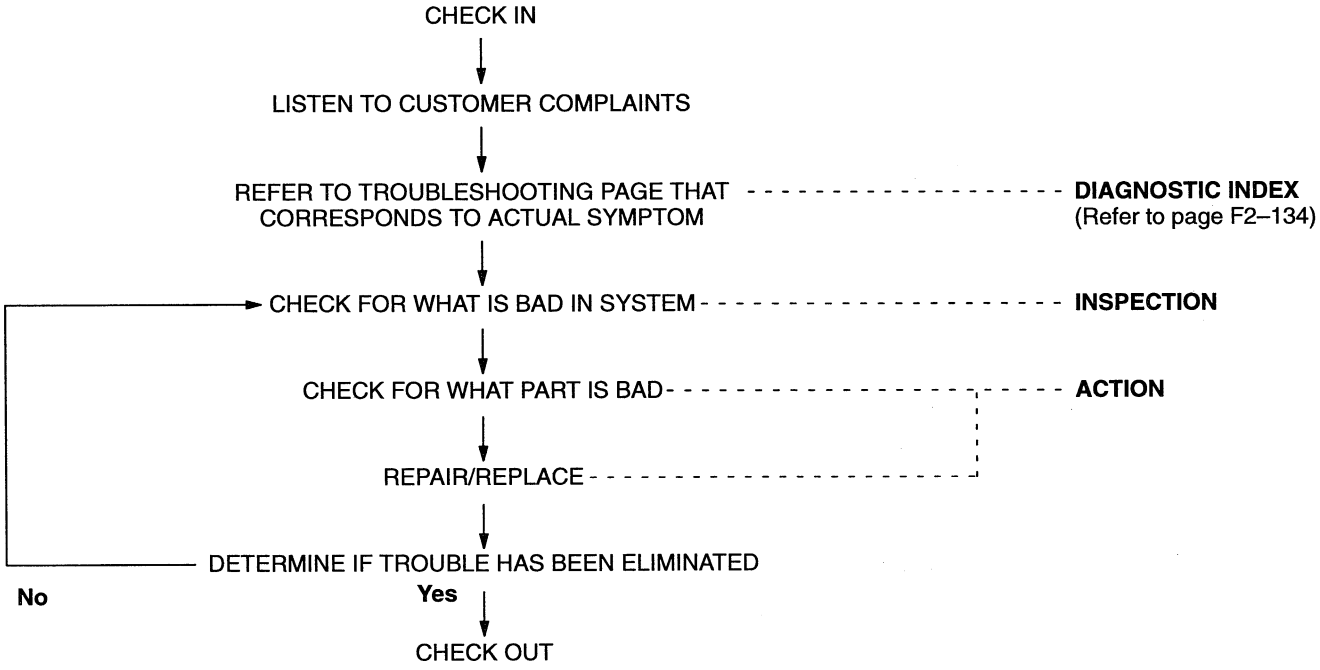
ENGINE CONDITION / OUTPUT DEVICE		CRANKING (COLD ENGINE)	WARMING UP (DURING IDLE)	MEDIUM LOAD		ACCELERATION	HEAVY LOAD	DECELERATION	IDLE	IG: ON (ENGINE NOT RUNNING)	REMARK
				COLD	WARM						
FUEL INJECTOR	FUEL INJECTION AMOUNT	Rich			Normal	Rich		Fuel cut*	Normal	No injection	* Engine speed: Above 1,500 rpm (ATX)/1,200 rpm (MTX)
FUEL PUMP RELAY		ON								OFF	
IGNITION CONTROL MODULE		Fixed at BTDC 7°	Advanced: depends on engine condition								
PURGE SOLENOID VALVE		OFF			ON (Purge)			OFF			
EGR SOLENOID VALVE (VENT)		OFF			ON*			OFF			System operates: Amount of EGR changes
EGR SOLENOID VALVE (VACUUM)											
PRC SOLENOID VALVE		OFF (Vacuum to pressure regulator)							ON*	OFF	* During hot start only
VRIS SOLENOID VALVE No.1		ON				ON*				OFF	* Engine speed: 3,250—6,250 rpm
VRIS SOLENOID VALVE No.2		OFF				ON*				OFF	* Engine speed: 4,250—6,250 rpm
BAC VALVE	IDLE AIR CONTROL VALVE	ON (Closed loop duty)		ON (Fixed duty)					ON (Closed loop duty)	OFF	
	AIR VALVE	OPEN			CLOSED					—	
A/C RELAY		OFF (A/C cut)	ON			OFF (A/C cut)	ON			OFF	

USING THIS SECTION

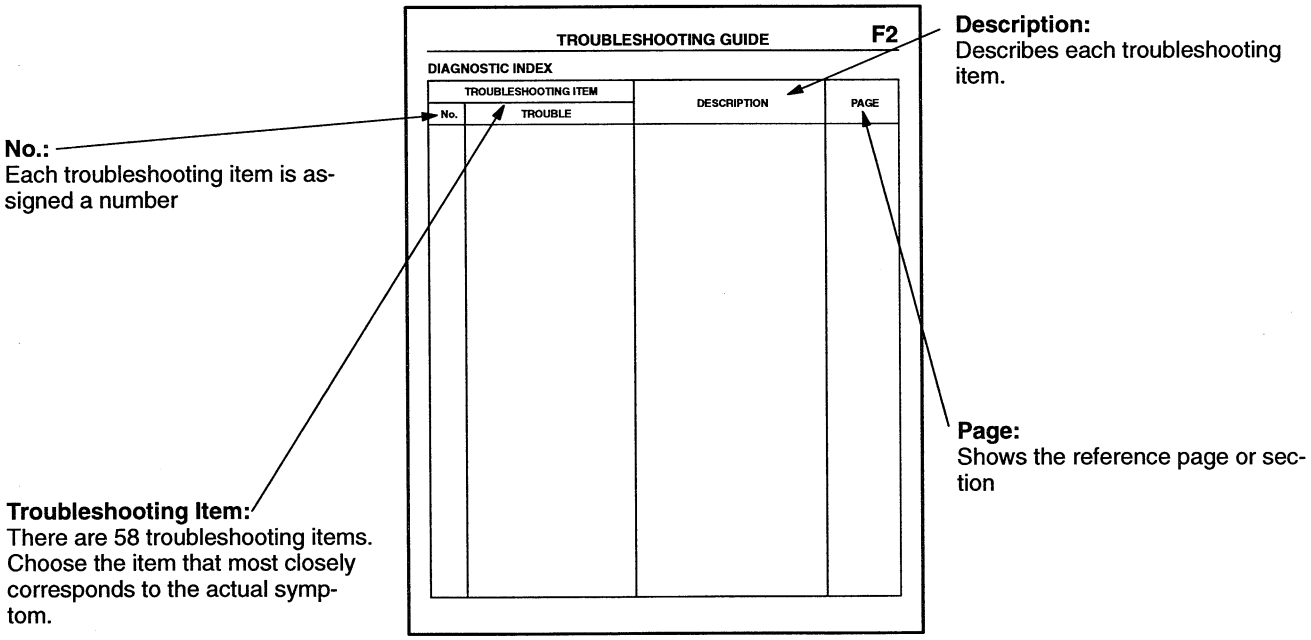
Introduction

Most of the fuel and emission control systems are electronically controlled, often making it difficult to diagnose problems, especially intermittent problems. Before undertaking actual checks, take 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 the intermittent ones. Through a talk with the customer, you will usually find out what the symptoms are and under what conditions they occur.

Work flow



Diagnostic index



Troubleshooting chart

13, 14	ENGINE STALLS	• IDLE WITH A/C, P/S, and/or E/L ON • IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGES
DESCRIPTION	• Engine stops unexpectedly when A/C, P/S, and/or E/L turned ON at idle • Engine stops unexpectedly when shifted from N or P to other ranges at idle • Idle condition is normal when A/C, P/S, and E/L are OFF and in N and P	

[TROUBLESHOOTING HINTS]
① Monitor switch functions (SST)
- A/C switch
- Headlight switch
- Rear window defroster
- Blower switch

② Solenoid valve (ISC)
- Solenoid valve stuck

STEP	INSPECTION		ACTION
1	Are switches correct when checked by using Self-Diagnosis Checker monitor lamp while ignition switch ON? ☞ page F2–44 • Blower switch • Headlight switch • Rear window defroster switch • Selector lever	Yes	Go to next step
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞ page F2–45
2	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ page F2–18	Yes	"00" displayed Go to next step
		No	Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F2–20 "88" flashes No.38 SELF-DIAGNOSIS "88"

DESCRIPTION:
Further describes the system. Confirm that the chart addresses the actual symptom before beginning troubleshooting.

TROUBLESHOOTING HINTS:
This describes the possible point of malfunction.

STEP:
This shows the order of troubleshooting. Proceed with troubleshooting as indicated.

INSPECTION:
This describes an inspection to quickly determine the malfunction of parts. If a detailed procedure is necessary to perform the INSPECTION, refer to the page specified by the "☞" mark.

ACTION:
This recommends the appropriate action to take as a result (Yes/No) of the INSPECTION. How to perform the action is described on the reference page specified by the "☞" mark.

DIAGNOSTIC INDEX

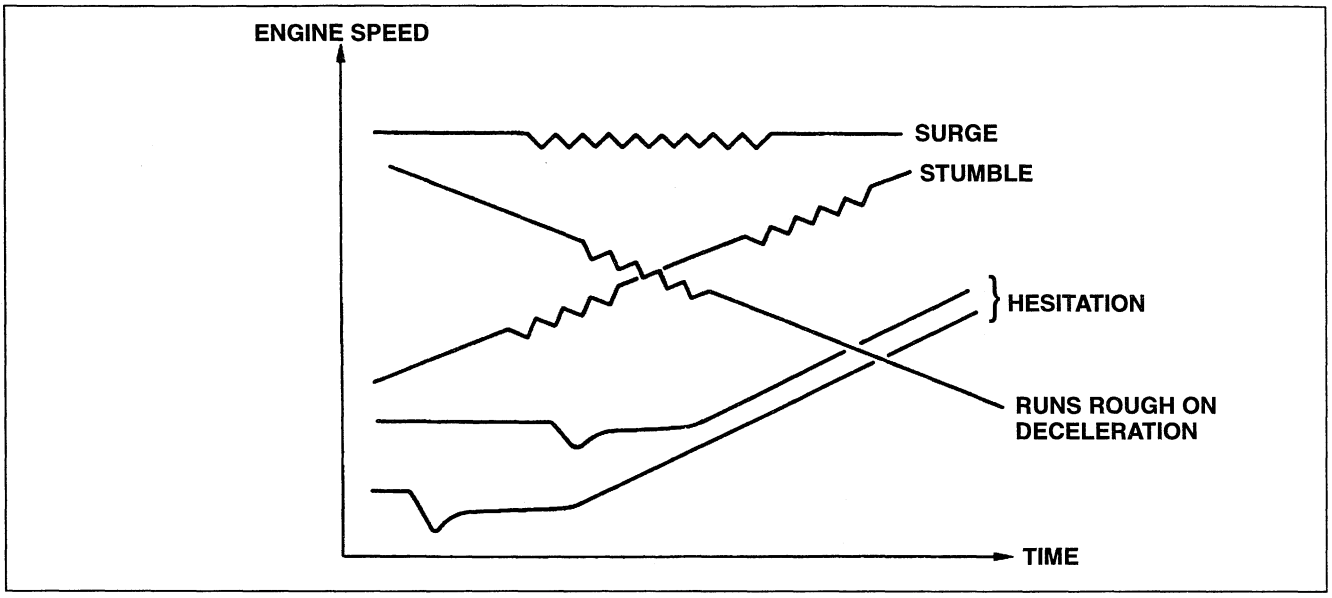
TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
1	Melts main or other fuse			F2–138
2	Will not crank or cranks slowly		Starter does not work Starter cranks engine at slow speed	section G
3	Cranks normally but will not start	No combustion	Starter cranks engine at normal speed but engine shows no indication of firing	F2–139
4		Partial combustion —when engine cold	Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is cold or at initial starting Engine will not continue running when cold when ignition switch is returned from STA to ON position	F2–139
5		Partial combustion —after warm-up	Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is warm Engine will not continue running when warm when IGN switch is returned from STA to ON position	F2–141
6	Will start in positions and ranges other than P and N		Engine starts in all positions and ranges	section K1
7	Cranks normally but hard to start	Any engine temp.	Starter cranks engine at normal speed but engine requires excessive cranking time before starting at any engine temperature Engine starts after stalling a few times at any engine temperature	F2–142
8		When engine cold	Starter cranks engine at normal speed but engine requires excessive cranking time before starting when engine is cold Engine starts after stalling a few times when engine is cold	
9		After warm-up	Starter cranks engine at normal speed but engine requires excessive cranking time before starting after warm-up	
10	Engine stalls	Idle at any engine temp.	Engine stops unexpectedly at any engine temp.	F2–144
11		During fast idle	Engine stops unexpectedly during fast-idle operation	
12		Idle after warm-up	Engine stops unexpectedly at idle after warm-up	
13		Idle with A/C, P/S, and/or E/L ON	Engine stops unexpectedly when A/C, P/S, and/or E/L turned ON at idle	F2–147 section K1
*14		Idle when shifted from N or P to other ranges	Engine stops unexpectedly when shifted from N or P to other ranges at idle	
15		Driveaway	Engine stops unexpectedly upon driveaway	F2–148
16		On acceleration	Engine stops unexpectedly at begining of acceleration or during acceleration	F2–150
17		While cruising	Engine stops unexpectedly while cruising	
*18		On deceleration	Engine stops unexpectedly at begining of deceleration or recovery from deceleration exhaust afterburn	F2–152 section K1
19	Engine runs rough	Idle at any engine temp.	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at any engine temp. Idle speed too slow and excessive engine shake at any engine temp.	F2–154
20		During fast idle	Fast idle speed too slow and excessive engine shake during fast idle, but returns to normal after warm-up	
21		Idle after warm-up	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle after warm-up	

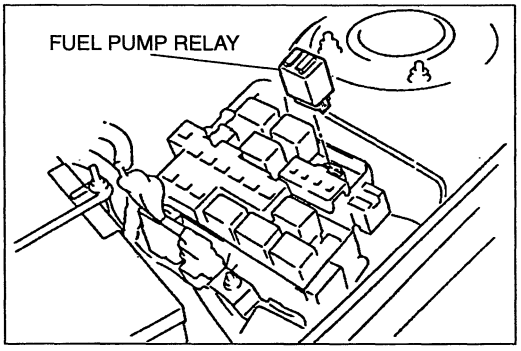
TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
22	Engine runs rough	Idle with A/C, P/S, and/or E/L ON	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when A/C, P/S, and/or E/L ON	F2–158
23		Idle when shifted from N or P to other range	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when shifted from P or N to other range	
*24		On deceleration	Engine shakes at begining of deceleration, during deceleration, or recovery from deceleration Exhaust afterburn	F2–159 section K1
*25	Poor acceleration	Driveaway	Engine speed increases normally but vehicle speed slowly increases during driveaway	F2–161 section K1
*26		On acceleration	Engine speed increases normally but vehicle speed slowly increases during acceleration	
27	High idle speed after warm-up		Idle speed continues at fast idle after warm-up Engine returns slowly to idle after accelerator is released	F2–163
28	Idle fluctuates/Idle hunts		Engine speed changes back and forth between specified idle speed and higher speed	F2–164
29	Hesitates/Stumbles on acceleration		Momentary pause at begining of acceleration or during acceleration	F2–166
*30	Surges while cruising		Momentary minor irregularity in engine output at steady vehicle speed	F2–169 section K1
*31	Lack of power		Performance poor under load (i.e., power down when climbing hills)	F2–170 section K1
*32	Poor fuel economy		Fuel economy unsatisfactory	F2–170 section K1
33	A/C does not work		A/C compressor magnetic clutch does not engage when air conditioning switch ON	F2–170
34	Knocking/Pinging		Sound produced when air/fuel mixture is ignited by something other than spark plug (i.e., hot spot in combustion chamber)	F2–170
35	Fuel odor		Gasoline fuel smell or visible leaks	F2–171
36	Exhaust sulfur smell		Rotten egg smell from exhaust	F2–171
37	High oil consumption		Oil consumption excessive	F2–171
38	NGS displays "LINK COMMUNICATION ERROR"		NGS displays "LINK COMMUNICATION ERROR"	F2–171
39	MIL never ON		Self-Diagnosis Checker indicates Diagnostic Trouble Code No. of input device but MIL never ON	F2–171
40	Vehicle does not move in D, S, L and/or R ranges		No creep at all Vehicle does not move when accelerator pedal depressed after shifted to D, S, L and/or R range	section K1
41	Vehicle moves in N range		Vehicle creeps in N range Vehicle moves when accelerator pedal not depressed	section K1
42	Vehicle moves in P range		Vehicle rolls in P range, and drivetrain not locked up	section K1
43	Excessive creep		Vehicle moves quickly in D, S, L and R ranges (accelerator pedal not depressed) **Note** • Excessive N to R range and N to D range shift shock felt	section K1
44	No shift		Single range shift (1st→2nd, 2nd→3rd or 3rd→O/D) only Sometimes shifts correctly **Note** • Gear position held in hold mode	section K1

TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
45	Abnormal shift		Shifts incorrectly (incorrect shift pattern) (ex) Vehicle shifts 1st→O/D directly when accelerating with accelerator pedal depressed slightly	section K1
46	Frequent shifting		Downshift occurs when accelerator depressed slightly in D, S and L ranges (except hold mode)	section K1
47	Shift point high or low		Shift points do not match shift diagram Shifts delayed when accelerating Shifts occur too fast when accelerating and engine speed does not increase	section K1
48	No lockup		No lockup when vehicle speed reaches lockup range	section K1
49	No kickdown		Does not downshift when accelerator pedal depressed more than 7/8 within kickdown range	section K1
50	Engine speed flares up	When accelerating	Engine speed flares up on acceleration	section K1
51		When upshifting and/or downshifting	Engine flares up when accelerator pedal depressed for upshifting Engine flares up suddenly when accelerator pedal depressed for downshifting	section K1
52	Engine speed flares up Excessive shift shock	P, N to R and/or N to D	Strong shift shock felt at idle when shifting from N to D or R range	section K1
53		When upshifting and/or downshifting	Excessive shift shock felt when accelerating at upshifting During cruising, excessive shift shock felt when accelerator pedal depressed at downshifting	section K1
54	No engine braking		Engine speed drops to idle but vehicle does not slow when accelerator pedal released during cruising at medium to high speed Engine speed drops to idle but vehicle does not slow when accelerator pedal released when in L range at low vehicle speed	section K1
55	No mode change		Mode does not change to/from normal mode in D range Hold mode not selected or not cancelled	section K1
56	Transaxle noise	All ranges	Transaxle noisy in all ranges when vehicle is idling	section K1
57		D, S, L, R ranges	Abnormal noise from transaxle in D, S, L, R	section K1
58	Transaxle overheats		ATF smells burnt and/or is discolored	section K1

Description of Drivability Problems

STUMBLE : Mildly irregular performance during acceleration.
HESITATION : A dip or flat spot in performance just after the accelerator pedal is depressed.
SURGE : Continuous irregular performance during cruising.

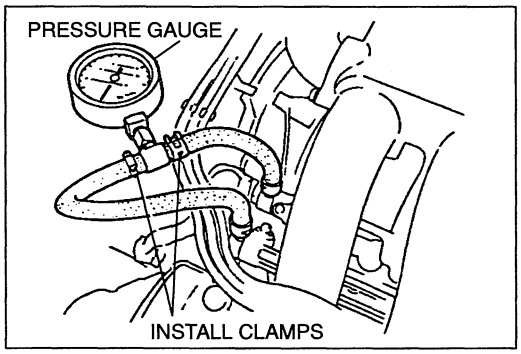




Fuel Pressure Release and Servicing Fuel System

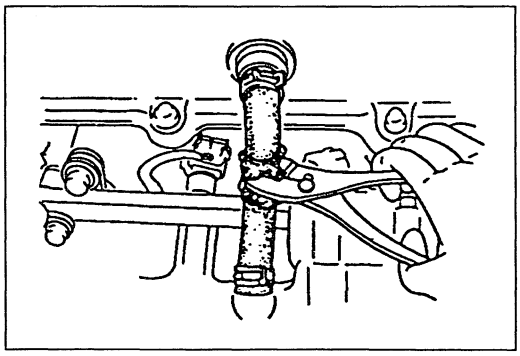
Warning

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**



Fuel Line Safety Procedures

1. Release the fuel pressure before disconnecting a fuel line.
   (1) Start the engine.
   (2) Remove the fuel pump relay.
   (3) After the engine stalls, turn the ignition switch to OFF.
   (4) Install the fuel pump relay.
2. Avoid leakage.
   (1) When disconnecting a fuel line hose, wrap a rag around it to protect against fuel leakage.
   (2) Plug the hose after removal.
3. Install hose clamps to secure the fuel pressure gauge to the fuel filter and the main hose.



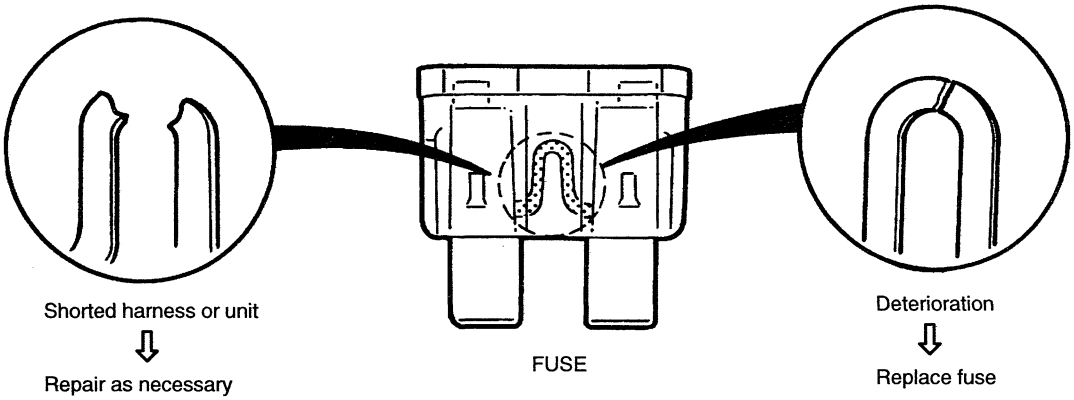
Pinching Hose

When pinching an air hose or a fuel hose with pliers, wrap the hose with a rag to prevent damage.

SYMPTOM TROUBLESHOOTING

1	MELTS MAIN OR OTHER FUSE

[TROUBLESHOOTING HINTS]
Check the condition of the fuse



Damaged Fuse	Related Wiring Harness
MAIN (100A)	Main fuse — Generator
BTN (60A)	BTN fuse — ROOM fuse
ROOM (15A)	ROOM fuse — PCM terminal 4B
EGI INJ (30A)	Main relay — Fuel pump relay Fuel pump relay — Fuel pump Main relay — Fuel injectors PCM terminal 4A Distributor Heated oxygen sensor PRC solenoid valve VRIS solenoid valve No.1 VRIS solenoid valve No.2 EGR solenoid valve (Vacuum) EGR solenoid valve (Vent) Idle air control valve Purge solenoid valve
EGI INJ (15A)	ENGINE fuse — Main relay
METER (15A)	METER fuse — Data link connector terminal B+

3	CRANKS NORMALLY BUT WILL NOT START	• NO COMBUSTION
DESCRIPTION	• Starter cranks engine at normal speed but engine shows no indication of firing	

[TROUBLESHOOTING HINTS]

① Distributor
- Poor connection of connector
- Open in ignition coil

☞ **section G**

② Main relay
- Poor connection of connector
- Malfunction of relay

☞ **page F2–125**

③ PCM
- No IGT signal output from PCM terminal 4S to ignition control module (in distributor)

☞ **page F2–106**

4	CRANKS NORMALLY BUT WILL NOT START	• PARTIAL COMBUSTION — WHEN ENGINE COLD
DESCRIPTION	• Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is cold at initial starting • Engine will not continue running when cold when ignition switch is returned from STA to ON position • Refer to "ENGINE STALLS" if this symptom appears after engine stall • Fuel in tank • Battery in normal condition	

[TROUBLESHOOTING HINTS]

① BAC valve
- Malfunction of air valve
- Idle air control valve stuck

② Fuel injector
- Poor connection

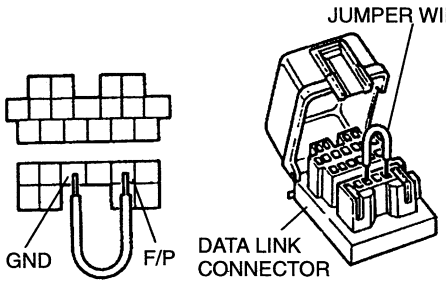
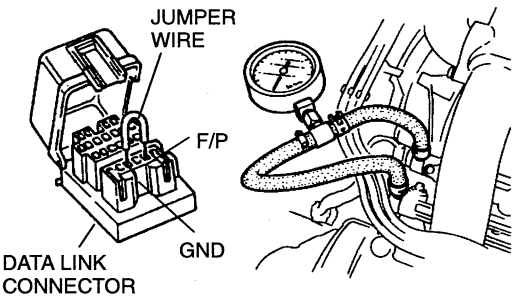
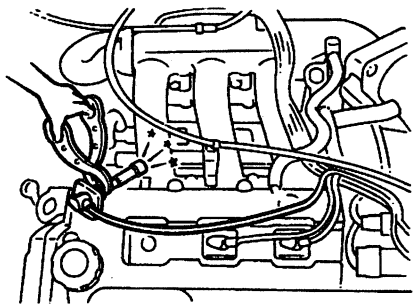
③ Fuel pump relay
- Poor connection

④ Fuel pump
- Poor connection of connector

⑤ Distributor
- Cap and/or rotor damaged
- Poor connection of connector

⑥ Volume air flow sensor
- Measuring core stuck

STEP	INSPECTION		ACTION
1	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** Go to next step
		No	**Diagnostic Trouble Code No.** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Does engine start when throttle valve held quarter open?	Yes	Check air valve operation ☞ **page F2–59**
		No	Go to next step
3	Do Engine Signal Monitor lights flash for specified terminals while cranking engine? ☞ **pages F2–106** **Terminal: 4Q, 4U, 4Y, 4AC, 4AG, 4AK**	Yes	Go to next step
		No	Check as follows according to results: Does not flash and 0V indicated for individual terminals • Continuity of fuel injector • Continuity between PCM and fuel injector(s) ☞ **page F2–4** • Condition of fuel injector connector and PCM connector female terminals Repair or replace parts and/or wiring harness as necessary

STEP	INSPECTION		ACTION
4	Connect jumper wire between F/P and GND terminals of data link connector; will engine start? 	Yes	Check as follows: • 1AF terminal voltage at PCM ☞ **page F2–106** • Continuity between 1AF terminal and fuel pump relay connector terminal • Condition of PCM and fuel pump relay connector female terminals
		No	Check if fuel pump operating sound is heard • If yes, go to next step • If no, check fuel pump and wiring harness ☞ **page F2–4**
5	Is following terminal voltage at PCM correct? ☞ **page F2–106** **3E terminal: Approx. 4.0V (ign. ON)**	Yes	Go to next step
		No	Check as follows: • Movement of measuring core in volume air flow sensor • Ground of volume air flow sensor • Continuity between volume air flow sensor and PCM connector • Condition of volume air flow sensor and PCM connector female terminals
6	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F2–68** **Fuel line pressure:** **270—310 kPa {2.7—3.2 kgf/cm², 39—45 psi}** 	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F2–78** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F2–71**
7	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Go to next step
		No	Check as follows ☞ **section G** • Distributor cap and rotor ☞ **section G** • High-tension leads ☞ **section G**

STEP	INSPECTION		ACTION
8	Are fuel injectors OK? • No fuel leakage ☞ **page F2–76** • Fuel injectors not clogged ☞ **page F2–74**	Yes	Go to next step
		No	Replace fuel injector(s) ☞ **page F2–74**
9	Try known good PCM; does condition improve? ☞ **page F2–106**		

5	**CRANKS NORMALLY BUT WILL NOT START**	• **PARTIAL COMBUSTION — AFTER WARM UP**
DESCRIPTION	• Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is warm • Engine will not continue running when ignition switch is returned from STA to ON position	
[TROUBLESHOOTING HINTS] ① Pressure regulator • Fuel hold pressure low ☞ **page F2–78** ② Throttle body • Carbon on throttle valve ☞ **page F2–55**		

7 8 9	**CRANKS NORMALLY BUT HARD TO START**	• **ANY ENGINE TEMP.** • **WHEN ENGINE COLD** • **AFTER WARM-UP**

DESCRIPTION	• Starter cranks engine at normal speed but engine requires excessive cranking time before starting • Engine starts after stalling a few times • Battery in normal condition • Engine runs normally at idle (if idle condition not OK, refer to "Engine runs rough" [Nos. 19, 20, 21, 22 or 23])

[TROUBLESHOOTING HINTS]

① Fuel injector
- Fuel leakage from fuel injector(s)

② Fuel pump
- Malfunction of pump

③ Pressure regulator
- Pressure regulator stuck

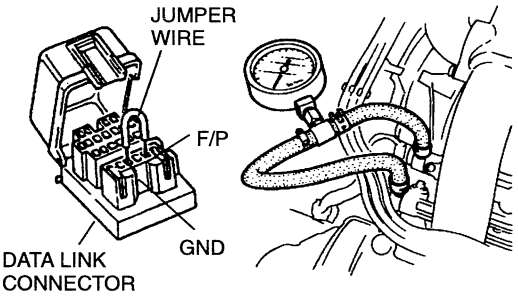
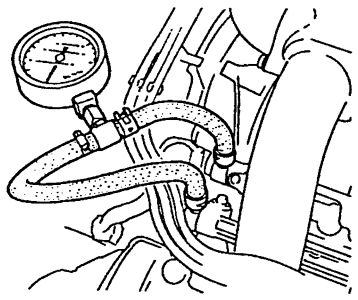
④ Spark plug
- Dirty or worn spark plug(s)

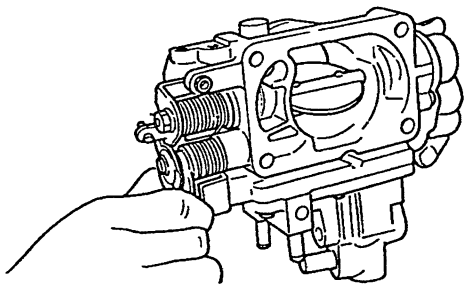
⑤ PRC solenoid valve
- Solenoid valve stuck

⑥ Throttle body
- Carbon on throttle plate

⑦ EGR solenoid valve (vacuum or vent)
- Solenoid valve stuck

⑧ EGR valve
- EGR valve stuck

STEP	INSPECTION		ACTION
1	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** Go to next step
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–20** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F2–68** **Fuel line pressure:** **270—310 kPa {2.7—3.2 kgf/cm², 39—45 psi}**  	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F2–78** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F2–71**
3	Is fuel line pressure held after ignition switch turned OFF? ☞ **page F2–67** **Fuel line pressure:** **More than 150 kPa {1.5 kgf/cm², 21 psi} for 5 min.** 	Yes	• If symptom occurs at any engine temp., go to step 6 • If symptom occurs when engine cold, go to next step • If symptom occurs after warm-up, go to step 6
		No	Plug outlet of pressure regulator, Is fuel line pressure held after ignition switch turned OFF? ☞ **page F2–67** • If yes, replace pressure regulator ☞ **page F2–78** • If no, check fuel pump hold pressure ☞ **page F2–67** If fuel pump OK, check fuel injectors for fuel leakage ☞ **page F2–76**

STEP	INSPECTION		ACTION
4	Is inside of throttle body clean? 	Yes	Clean throttle body
		No	Go to next step
5	Disconnect vacuum hose from EGR valve and plug it; does condition improve?	Yes	Check as follows: • EGR solenoid valve (vacuum) for sticking • EGR solenoid valve (vent) for sticking • Condition of solenoid valve connector
		No	Check if EGR valve moves smoothly ☞ **page F2–88** • If yes, go to next step • If no, replace EGR valve ☞ **page F2–88**
6	Try known good PCM; does condition improve? ☞ **page F2–106**		

10 11 12	**ENGINE STALLS**	• **IDLE AT ANY ENGINE TEMP** • **DURING FAST IDLE** • **IDLE AFTER WARM-UP**

DESCRIPTION • Engine stops unexpectedly at idle and/or during fast idle operation

[TROUBLESHOOTING HINTS]

① Injector
- Fuel leakage from fuel injector(s)
- Fuel injector(s) clogged

② Fuel pump
- Maximum pressure low

③ Fuel pump relay
- Poor connection of connector

④ Air leakage in intake-air system

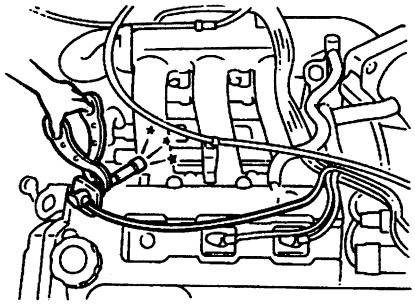
⑤ Distributor
- Cap and/or rotor damaged
- Poor connection of connector

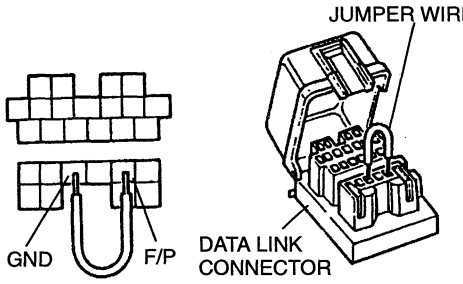
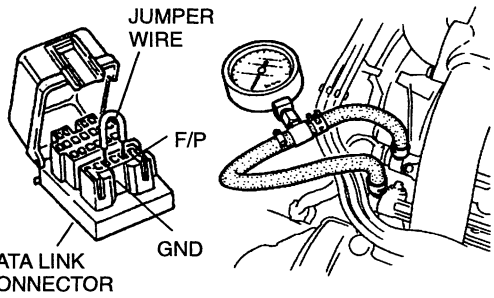
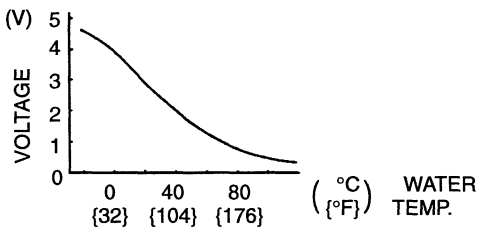
⑥ Volume air flow sensor
- Measuring core stuck

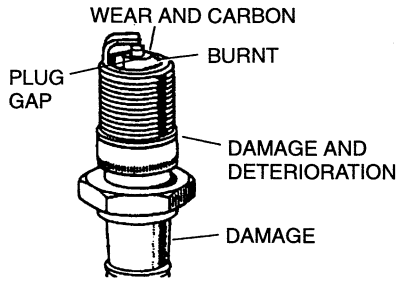
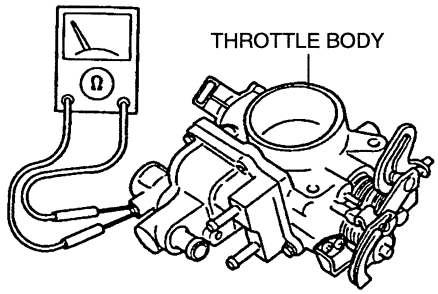
⑦ Engine coolant temperature sensor
- Poor connection of connector

⑧ EGR valve
- EGR valve stuck

⑧ BAC valve
- Air valve stuck

STEP	INSPECTION		ACTION
1	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** • If symptom occurs at idle at any engine temp., go to next step • If symptom occurs during fast idle operation, go to step 8 • If symptom occurs at idle after warm-up, go to step 9
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Do Engine Signal Monitor lights flash for specified terminals while cranking engine? **Terminal: 4Q, 4U, 4Y, 4AC, 4AG, 4AK**	Yes	Go to next step
		No	Check as follows according to results: Does not flash and 0V indicated for individual terminal(s) • Continuity of fuel injector(s) • Continuity between PCM and fuel injector(s) ☞ **page F2–4** • Condition of injection connector and PCM connector Repair or replace parts and/or wiring harness as necessary
3	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Go to next step
		No	Check as follows: • Distributor cap and rotor ☞ **section G** • High-tension lead(s)

STEP	INSPECTION		ACTION
4	Connect jumper wire between F/P and GND terminal of data link connector; will engine run? 	Yes	Check as follows: • 1AF terminal voltage at PCM ☞ **page F2–106** • Continuity between 1AF terminal and fuel pump relay connector terminal • Condition of PCM and fuel pump relay connector female terminals
		No	Check if fuel pump operating sound is heard? • If yes, go to next step • If no, check fuel pump circuit
5	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F2–68** **Fuel line pressure:** **270—310 kPa {2.7—3.2 kgf/cm², 39—45 psi}** 	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F2–78** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F2–71**
6	Is air leakage felt or heard at intake air system components while racing engine to higher speed?	Yes	Repair or replace
		No	Go to next step
7	Is engine compression correct? ☞ **section B2** **Engine compression (Minimum):** **981 kPa {10.0 kgf/cm², 143 psi}/250 rpm**	Yes	Go to step 9
		No	Check for cause ☞ **section B2**
8	Does engine start with throttle valve held quarter open?	Yes	Check as follows: • Operation of air valve ☞ **page F2–60** • Operation of EGR valve ☞ **page F2–88** • Operation of EGR control ☞ **page F2–86**
		No	Go to next step
9	Does following terminal voltage at PCM increase smoothly? ☞ **page F2–106** **3Q terminal: Engine coolant temperature sensor** 	Yes	Go to next step
		No	Check as follows: • Engine coolant temperature sensor resistance • Continuity between engine coolant temperature sensor and PCM connector

STEP	INSPECTION		ACTION
10	Are spark plugs OK? ☞ **section G** 	Yes	• If symptom occurs at any engine temp., go to step 14 • If symptom occurs at fast idle operation, go to step 14 • If symptom occurs at idle after warm-up, go to next step
		No	Clean or replace ☞ **section G**
11	Is resistance of idle air control valve correct? ☞ **page F2–60** **Resistance: 10.7—12.3Ω [at 20°C {68°F}]** 	Yes	Go to next step
		No	Replace BAC valve ☞ **page F2–60**
12	Try a known good BAC valve; does condition improve?	Yes	Replace BAC valve ☞ **page F2–60**
		No	Reinstall BAC valve and go to next step
13	Is oxygen sensor operation OK? ☞ **page F2–121**	Yes	Go to next step
		No	Check follows: • Poor connection of engine coolant temperature sensor connector • Incorrect installation of throttle position sensor
14	Are fuel injectors OK? • No fuel leakage ☞ **page F2–76** • Fuel injectors not clogged ☞ **page F2–74**	Yes	Go to next step
		No	Replace fuel injector(s) ☞ **page F2–74**
15	Try a known good PCM; does condition improve? ☞ **page F2–106**		

13 14	ENGINE STALLS	• IDLE WITH A/C, P/S, AND/OR E/L ON • IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGES

DESCRIPTION
- Engine stops unexpectedly when A/C, P/S, and/or E/L turned ON at idle
- Engine stops unexpectedly when shifted from N or P to other ranges at idle
  Idle condition is normal when A/C, P/S, and E/L are OFF and in N and P

[TROUBLESHOOTING HINTS]

① E/L signal malfunction
- Air conditioning switch
- Headlight switch
- Rear window defroster
- Fan switch

② Idle air control valve
- Solenoid valve stuck

STEP	INSPECTION		ACTION
1	Do following terminal voltages in PCM correct? ☞ **page F2–106** • 1F Transaxle range switch (ATX) • 1G Foglight switch • 1L Headlight switch • 1K Fan switch • 1X Rear window defroster switch • 3T P/S pressure switch	Yes	Go to next step
		No	Check as follows • Switch operation • Continuity between switch and PCM terminals
2	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** Go to next step
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
3	Is terminal voltage at PCM correct at idle? ☞ **page F2–106** **4M terminal: Approx. 6.0V (at idle)**	Yes	Check BAC valve and replace if necessary ☞ **page F2–60** If OK, go to "ENGINE STALLS — IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGES" in section K1 of this manual
		No	Try known good PCM and check if condition improves ☞ **page F2–106**

15	ENGINE STALLS	• DRIVEAWAY
DESCRIPTION	• Engine stops unexpectedly upon driveaway • Idle condition normal	

[TROUBLESHOOTING HINTS]

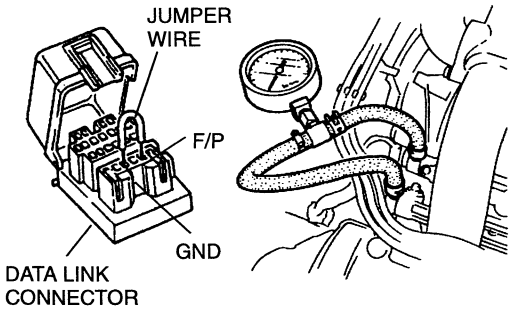
① Fuel injector
- Fuel leakage from fuel injector(s)
- Fuel injector(s) clogged

② Pressure regulator
- Diaphragm damaged

③ Fuel filter
- Fuel filter clogged

④ Distributor
- Poor connection of connector
- Cap and/or rotor damaged

⑤ Engine coolant temperature sensor
- Poor connection of connector

STEP	INSPECTION		ACTION
1	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** Go to next step
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Using Engine Signal Monitor, do voltage reading and light operation change as follows upon driveaway? Terminal / Condition 3E: Voltage gradually increases 3Q: Voltage does not suddenly change 4Q, 4U, 4Y, 4AC, 4AG, 4AK: Flashing of green and red lights becomes quicker	Yes	Go to next step
		No	Check as follows: • Condition of female terminals in related connector • Continuity between injector connector and PCM connector
3	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F2–68** **Fuel line pressure:** **270—310 kPa {2.7—3.2 kgf/cm², 38—46 psi}**  	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F2–78** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F2–71**

STEP	INSPECTION		ACTION
4	Are fuel injectors OK? • No fuel leakage ☞ **page F2–76** • Fuel injectors not clogged ☞ **page F2–74**	Yes	Go to next step
		No	Replace fuel injector(s) ☞ **page F2–74**
5	Try a known good PCM; does condition improve? ☞ **page F2–106**		

16 17	ENGINE STALLS	• ON ACCELERATION/WHILE CRUISING
DESCRIPTION	• Engine stops unexpectedly at beginning of acceleration or during acceleration • Engine stops unexpectedly while cruising	

[TROUBLESHOOTING HINTS]

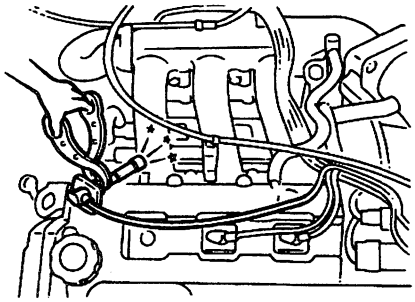
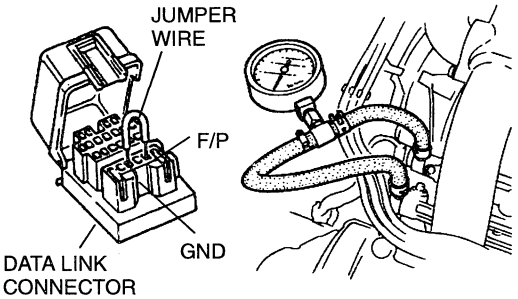
① Fuel pump
- Poor connection

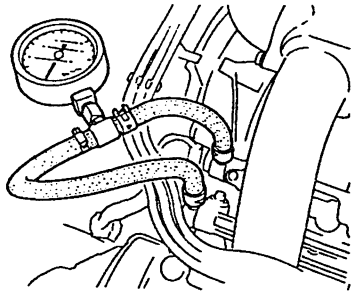
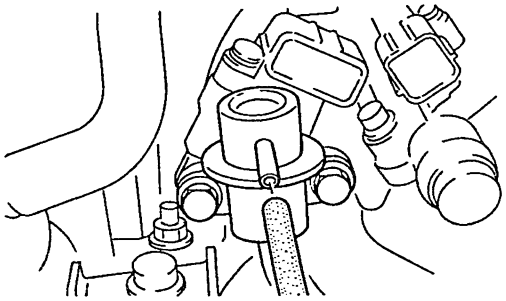
② Pressure regulator
- Diaphragm damaged

③ Distributor
- Poor connection of connector
- Cap and/or rotor damaged

④ Volume air flow sensor
- Poor connection of connector
- Measuring core stuck

⑤ Main relay
- Poor connection of connector

STEP	INSPECTION		ACTION
1	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** Go to next step
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plugs ☞ **section G** ➪ If OK, go to next step ➪ If not OK, clean or replace spark plug
		No	Check as follows: • Distributor cap and rotor ☞ **section G** • High-tension lead(s) ☞ **section G** • Condition of distributor connector female terminals
3	Are volume air flow sensor connector terminals good?	Yes	Verify that measuring core of volume air flow sensor moves smoothly • If OK, go to next step • If not OK, replace air flow sensor
		No	Repair connector terminal(s)
4	Ground terminal F/P of data link connector with ignition switch ON; is operation sound of fuel pump heard? 	Yes	Go to next step
		No	Check as follows: • Poor connection of fuel pump relay • Poor connection of fuel pump connector • Melted EGI INJ fuse (30A) ☞ **page F2–138** Refer to "No.1 — MELTS MAIN OR OTHER FUSE" • Poor connection of main relay • Operation of main relay ☞ **page F2–125**

STEP	INSPECTION		ACTION
5	Is fuel line pressure correct at idle? ☞ page F2–78 **Fuel line pressure:** **210—250 kPa {2.1—2.6 kgf/cm^2, 30—36 psi}**  **Pressure regulator vacuum hose disconnected** **270—310 kPa {2.7—3.2 kgf/cm^2, 39—45 psi}** 	Yes	Go to next step
		No	Check pressure regulator ☞ page F2–78
6	Try a known good PCM; does condition improve? ☞ page F2–106		

18	ENGINE STALLS	• ON DECELERATION
DESCRIPTION	• Engine stops unexpectedly at beginning of deceleration or recovery from deceleration • Exhaust afterburn	

[TROUBLESHOOTING HINTS]

① Fuel pump
- Poor connection

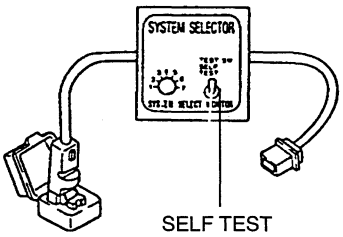
② Idle speed
- Idle speed too low

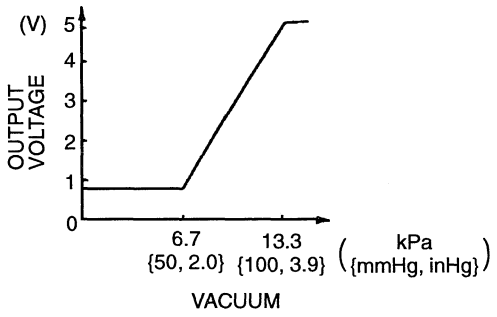
③ Distributor
- Poor connection of connector

④ Volume air flow sensor
- Poor connection of connector

⑤ Idle air control valve
- Solenoid valve stuck

⑥ EGR valve
- Solenoid valve stuck
- EGR valve stuck

STEP	INSPECTION		ACTION
1	Connect System Selector to data link connector and set test switch to SELF TEST; is idle speed correct after warm-up? ☞ **page F2–11** **Idle speed: 600—700 (650 ± 50) rpm**  	Yes	Go to step 3
		No	Remove System Selector and go to next step
2	Does idle speed drop in following conditions? Condition • Electrical loads ON • Air conditioner ON • P/S operating	Yes	Check follows; • Circuit from idle air control valve to PCM for open and short ☞ **page F2–4** • Idle air control valve for sticking ☞ **page F2–60**
		No	Adjust idle speed ☞ **page F2–11**
3	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** Go to next step
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
4	Are volume air flow sensor connector terminals and connection good?	Yes	Verify that measuring core of volume air flow sensor moves smoothly • If OK, go to next step • If not OK, replace air flow sensor
		No	Repair connector terminal

STEP	INSPECTION		ACTION
5	Connect Engine Signal Monitor to PCM and set to position 3R Does following terminal voltage at PCM increase smoothly when vacuum applied to EGR valve? **Terminal 3R voltage:**  	Yes	Go to next step
		No	Check EGR valve for sticking ☞ page F2–88
6	Are following terminals and connections good? • Distributor connector • Fuel pump connector • Main relay • PCM connector	Yes	Go to "ENGINE STALLS — ON DECELERATION" in section K1 of this manual
		No	Repair connector terminal

19 20 21	ENGINE RUNS ROUGH	• IDLE AT ANY ENGINE TEMP/DURING FAST IDLE/ IDLE AFTER WARM-UP

DESCRIPTION

- Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at any engine temp.
- Idle speed too slow and excessive engine shake at any engine temp.
- Fast idle speed too slow and excessive engine shake during fast idle, but returns to normal after warm-up
- Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle after warm-up

[TROUBLESHOOTING HINTS]

① Fuel injector
- Fuel leakage from injector(s)
- Fuel injector(s) clogged

② Fuel pump
- Maximum pressure low

③ Fuel pump relay
- Poor connection of connector

④ Air leakage
- Leakage in intake-air system

⑤ Distributor
- Cap and/or rotor damaged
- Poor connection of connector

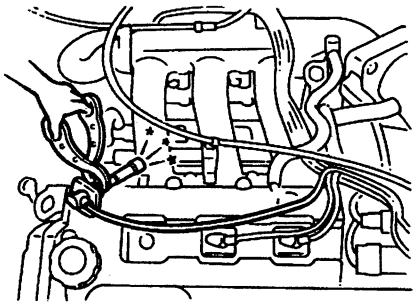
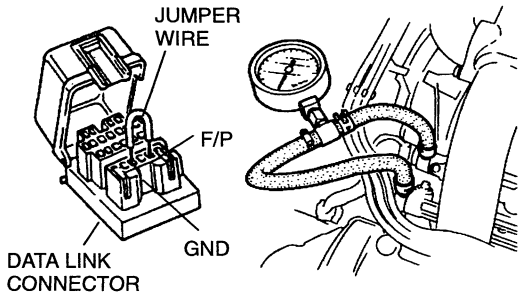
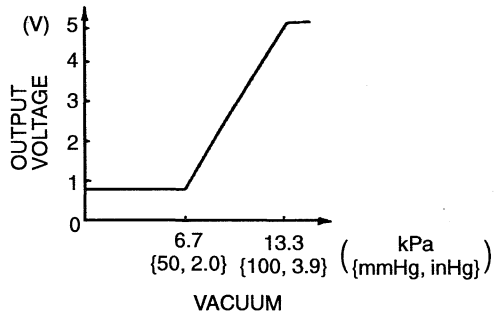
⑥ Volume airflow sensor
- Measuring core stuck

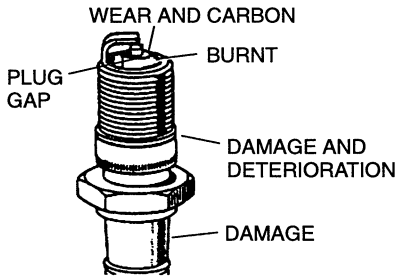
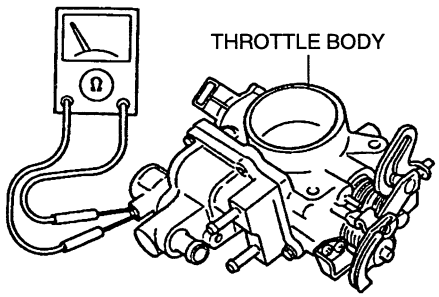
⑦ Engine coolant temperature sensor
- Poor connection of connector

⑧ EGR valve
- EGR valve stuck

⑨ BAC valve
- Air valve stuck

STEP	INSPECTION		ACTION
1	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** • If symptom occurs at idle at any engine temp., go to next step • If symptom occurs during fast idle operation, go to step 9 • If symptom occurs at idle after warm-up, go to step 10
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Do Engine Signal Monitor lights flash for specified terminals while cranking engine? **Terminal: 4Q, 4U, 4Y, 4AC, 4AG, 4AK**	Yes	Go to next step
		No	Check as follows according to results: Does not flash and 0V indicated for individual terminal(s) • Continuity of fuel injector(s) ☞ **page F2–76** • Continuity between PCM and fuel injector(s) • Condition of injection connector and PCM connector Repair or replace parts and/or wiring harness as necessary

STEP	INSPECTION		ACTION
3	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Go to next step
		No	Check distributor cap and rotor ☞ **section G** Check follows: • Distributor cap and rotor • High-tension lead(s)
4	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F2–78** **Fuel line pressure:** **270—310 kPa {2.7—3.2 kgf/cm², 39—45 psi}** 	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F2–78** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F2–71**
5	Is there air leakage at intake air system components while racing engine to higher speed?	Yes	Repair or replace
		No	Go to next step
6	Connect Engine Signal Monitor to PCM and set the position 3R Does following terminal voltage at PCM increase smoothly when vacuum applied to EGR control valve? **Terminal 3R voltage:** 	Yes	Go to next step
		No	Check EGR control valve for sticking ☞ **page F2–88**
7	Is engine compression correct? ☞ **section B2** **Engine compression (minimum):** **981 kPa {10.0 kgf/cm², 143 psi}/250 rpm**	Yes	Go to next step
		No	Check for cause ☞ **section B2**

STEP	INSPECTION		ACTION
8	Connect Engine Signal Monitor to PCM and set to position 3E Does following terminal voltage in PCM increase smoothly? ☞ **page F2–106** **Terminal 3E voltage:** **Approx. 4V (Ignition SW: ON)**	Yes	Go to next step
		No	Check follows: • Movement of measuring core in volume air flow sensor • Ground of volume air flow sensor • Continuity between volume air flow sensor and PCM connector • Condition in volume air flow sensor and PCM connector female terminals
9	Are spark plugs OK? ☞ **section G**  	Yes	• If symptom occurs at any engine temp., go to step 13 • If symptom occurs during fast idle operation, go to step 13 • If symptom occurs at idle after warmup, go to next step
		No	Clean or replace
10	Is resistance of idle air control valve correct? **Resistance: 10.7—12.3Ω [at 20°C {68°F}]**  	Yes	Go to next step
		No	Replace BAC valve ☞ **page F2–60**
11	Try a known good BAC valve; does condition improve?	Yes	Replace BAC valve ☞ **page F2–60**
		No	Reinstall BAC valve Go to next step
12	Is heated oxygen sensor operation correct? ☞ **page F2–121**	Yes	Go to next step
		No	Check follows: • Poor connection of engine coolant temperature sensor connector • Incorrect installation of throttle position sensor

STEP	INSPECTION		ACTION
13	Are fuel injectors OK? • No fuel leakage ☞ **page F2–76** • Fuel injectors not clogged ☞ **page F2–74**	Yes	Go to next step
		No	Replace fuel injector ☞ **page F2–74**
14	Try a known good PCM; does condition improve? ☞ **page F2–106**		

22 23	ENGINE RUNS ROUGH	• IDLE WITH A/C, P/S AND/OR E/L ON • IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGES

DESCRIPTION	• Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when A/C, P/S and/or E/L ON • Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when shifted from P or N to other range

[TROUBLESHOOTING HINTS]

① Idle speed
- Idle speed too low

② E/L signal malfunction
- Air conditioning switch
- Headlight switch
- Rear window defroster switch
- Fan switch

③ Idle air control valve
- Solenoid valve stuck

STEP	INSPECTION		ACTION
1	Connect System Selector to data link connector and set test switch to SELF TEST; is idle speed correct after warm-up? ☞ **page F2–11** **Idle speed: 600—700 (650 ± 50) rpm**	Yes	Go to next step
		No	Adjust idle speed and go to next step ☞ **page F2–11**
2	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** Go to next step
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
3	Do following terminals voltage in PCM correct? ☞ **page F2–106** • 1F Transaxle range switch (ATX) • 1G Foglight switch • 1L Headlight switch • 1K Fan switch • 1X Rear window defroster switch • 3T P/S pressure switch	Yes	If symptom occurs at idle when shifted from N or P to other range, go to next step
		No	Check as follows: • Switch operation • Continuity between switch and PCM terminal After checking, go to step 5
4	Warm-up engine Does idle speed change when idle air control valve connector disconnected?	Yes	• If symptom occurs at idle with A/C, P/S and/or E/L ON, go to next step • If symptom occurs at idle when shifted from N or P to other range, go to "ENGINE RUNS ROUGH — IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGE" in section K1 of this manual
		No	Check idle air control valve for sticking ☞ **page F2–60**
5	Does air conditioner operate continuously with ignition switch ON and A/C switch and blower switch OFF?	Yes	Check follows: • Malfunction of A/C relay ☞ **1996 Mazda 626/MX-6 BETM** • Wiring harness between A/C relay and PCM terminal 1D for short circuit ☞ **page F2–106**
		No	Go to next step
6	Try a known good PCM; does condition improve? ☞ **page F2–106**		

24	ENGINE RUNS ROUGH	• ON DECELERATION
DESCRIPTION	• Engine shakes at beginning of deceleration, during deceleration, or recovery from deceleration • Exhaust afterburn	

[TROUBLESHOOTING HINTS]

① Fuel pump
- Poor connection of connector

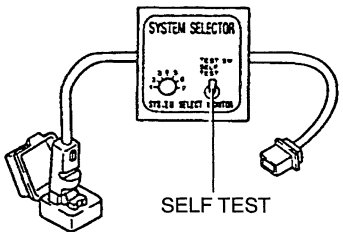
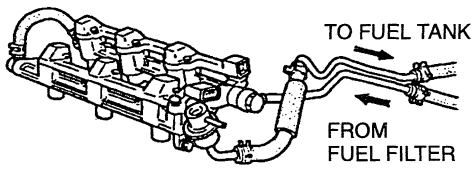
② Fuel injector
- Fuel leakage from fuel injector(s)

③ Idle speed
- Idle speed too low

④ Distributor
- Poor connection of connector

⑤ Volume air flow sensor
- Poor connection of connector
- Measuring core stuck

⑥ Idle air contol valve
- Solenoid valve stuck

STEP	INSPECTION		ACTION
1	Connect System Selector to data link connector and set test switch to SELF TEST; is idle speed correct after warm-up? ☞ **page F2–11** **Idle speed: 600—700 (650 ± 50) rpm** 	Yes	Go to step 3
		No	Remove System Selector and go to next step
2	Does idle speed drop in following conditions? Condition: • Electrical loads ON • Air conditioner ON • P/S operating	Yes	Adjust idle speed ☞ **page F2–11**
		No	Check as follows: • Wiring harness from idle air control valve to PCM for short and open circuit ☞ **page F2–4** • Idle air control valve stuck ☞ **page F2–60**
3	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** Go to next step
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
4	Is there fuel leakage from fuel injector nozzles or injector holder? ☞ **page F2–75** 	Yes	Reinstall or replace fuel injector ☞ **page F2–74**
		No	Go to next step
5	Are volume air flow sensor connector terminal and connection good?	Yes	Verify that measuring core of volume air flow sensor moves smoothly • If OK, go to next step • If not OK, replace volume air flow sensor
		No	Repair connector terminal

STEP	INSPECTION		ACTION
6	Are following connections good? • Distributor connector • Fuel pump connector • Main relay • PCM connector	Yes	Go to next step
		No	Repair connector terminal
7	Try a known good PCM; does condition improve? ☞ page F2–106	Yes	Replace PCM
		No	Go to "ENGINE RUNS ROUGH — ON DECELERATION" in section K1 of this manual

25 26	POOR ACCELERATION	• DRIVEAWAY • ON ACCELERATION

DESCRIPTION • Engine speed increases normally but vehicle speed slowly increases during driveaway or acceleration

[TROUBLESHOOTING HINTS]

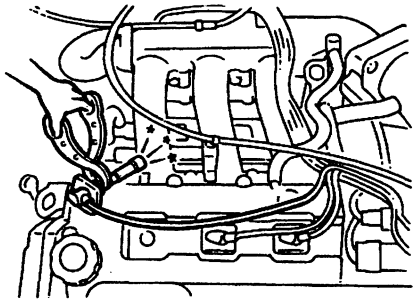
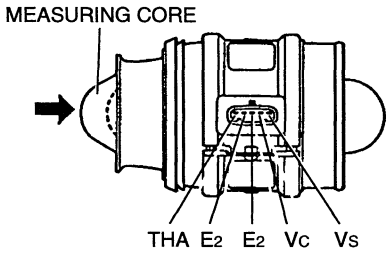
① Fuel injector
- Fuel leakage from fuel injector(s)

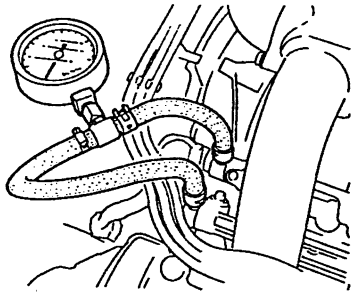
② Pressure regurator
- Pressure regulator malfunction

③ Fuel filter
- Clogged filter

④ Distributor
- Poor connection of connector
- Cap and/or rotor damaged

⑤ Volume airflow sensor
- Poor connection of connector
- Measuring core stuck

STEP	INSPECTION		ACTION
1	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** Go to next step
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plugs ➪ If OK, go to next step ➪ If not OK, clean or replace spark plug
		No	Check as follows: • Distributor cap and rotor ☞ **section G** • High-tension lead(s) ☞ **section G** • Condition of distributor connector female terminals
3	Does measuring core in volume air flow sensor move smoothly? ☞ **page F2–115** 	Yes	Check condition of volume air flow sensor connector female terminals ➪ If OK, go to next step ➪ If not OK, repair terminal
		No	Replace volume air flow sensor
4	Is intake manifold vacuum correct at idle? **Vacuum:** **More than 60.0 kPa{450 mmHg, 17.7 inHg}**	Yes	Go to next step
		No	Check follows: • Intake-air system components and installation • Vacuum hoses for disconnection and damage • Shutter valve actuator for damage

STEP	INSPECTION		ACTION
5	Is fuel line pressure correct at idle? ☞ page F2–78 **Fuel line pressure:** **210—250 kPa {2.1—2.6 kgf/cm^2, 30—36 psi}** 	Yes	Go to next step
		No	**Low pressure** Check follows: • Fuel filter for clogging • Operation of pressure regulator ☞ page F2–78 • Fuel leakage from fuel injector(s) ☞ page F2–75
6	Try a known good PCM; does condition improve? ☞ page F2–106	Yes	Replace PCM
		No	Go to "POOR ACCELERATION — DRIVEAWAY/ON ACCELERATION" in section K1 of this manual

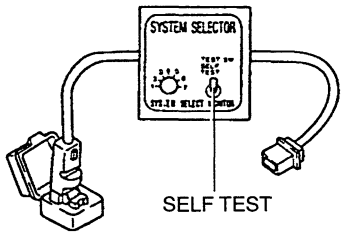
27	HIGH IDLE SPEED AFTER WARM-UP
DESCRIPTION	• Idle speed continues at fast idle after warm-up • Engine returns slowly to idle after accelerator is released

[TROUBLESHOOTING HINTS]

① Engine coolant temperature sensor
- Poor connection of connector

② Throttle position sensor
- Poor connection of connector
- Incorrect adjustment

③ BAC valve
- Idle air control valve or air valve stuck

STEP	INSPECTION		ACTION
1	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** Go to next step
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Connect System Selector to the data link connector and set system select to position 1 Does idle speed down with the test switch SELF-TEST?  	Yes	Check condition of engine coolant temperature sensor and throttle position sensor connector female terminals ➪ If OK, go to next step ➪ If not OK, repair female connector
		No	Check if idle air control valve or air valve stuck ➪ If OK, go to step 4 ➪ If not OK, replace BAC valve
3	Is following terminal voltage at PCM correct? **Terminal 3B:** **0.1—1.1V (throttle valve closed throttle position)** **2.8—4.5V (throttle valve wide open throttle)**	Yes	Go to next step
		No	Adjust or replace throttle position sensor ☞ **page F2–117**
4	Try a known good PCM; does condition improve? ☞ **page F2–106**		

B+: Battery positive voltage

28	• **IDLE FLUCTUATES** • **IDLE HUNTS**
DESCRIPTION	• Engine speed changes back and forth between specified idle speed and higher speed

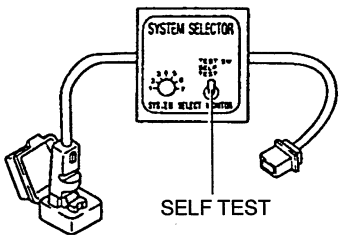
[TROUBLESHOOTING HINTS]

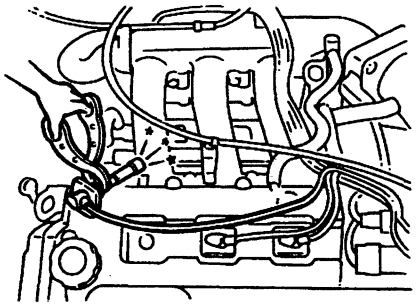
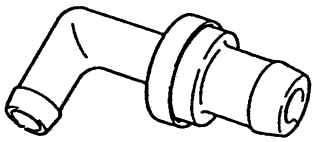
① PCV valve
- PCV valve stuck

② Spark plug
- Spark plug(s) damaged

③ Throttle position sensor
- Incorrect adjustment

④ Idle air control valve
- Idle air control valve stuck

STEP	INSPECTION		ACTION
1	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** Go to next step
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Is following terminal voltage at PCM correct? **Terminal 3X:** **Below 1.0V (accelerator pedal released)** **B+ (accelerator pedal depressed)**	Yes	Go to next step
		No	Check follows: • Throttle position sensor adjustment ☞ **page F2–117**
3	Connect System Selector to data link connector and set system select to position 1 Does idle hunting stop when test switch to SELF-TEST?  	Yes	Check follows: • Idle air control valve for sticking • Poor sealing between throttle body and BAC valve
		No	Go to next step

STEP	INSPECTION		ACTION
4	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plug(s) ➪ If OK, go to next step ➪ If not OK, replace spark plug(s)
		No	Check as follows: • Distributor cap and rotor for damage ☞ **section G**
5	Is PCV valve stuck? ☞ **page F2–78** 	Yes	Replace PCV valve
		No	Go to next step
6	Try a known good PCM; does condition improve? ☞ **page F2–106**		

29	• HESITATES • STUMBLES ON ACCELERATION
DESCRIPTION	• Momentary pause at begining of acceleration or during acceleration

[TROUBLESHOOTING HINTS]

① Fuel injector
- Fuel leakage from injector(s)

② Fuel pump
- Poor connection of connector

③ Pressure regulator
- Pressure regulator stuck

④ EGR valve
- EGR control stuck

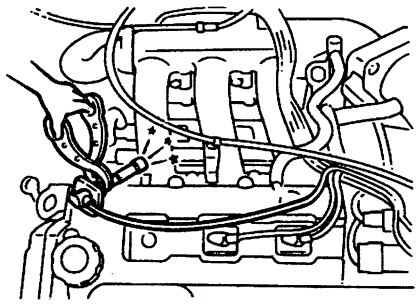
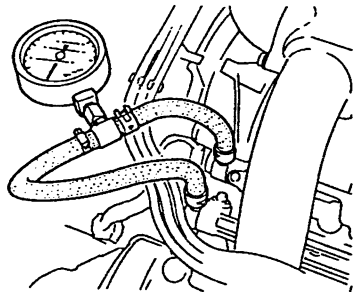
⑤ EGR solenoid valve (vacuum)
- Solenoid valve stuck

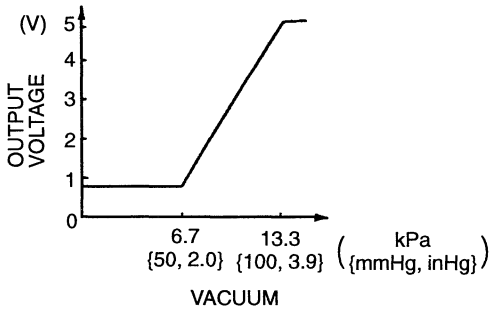
⑥ Distributor
- Poor connection of connector
- Cap and/or rotor damaged

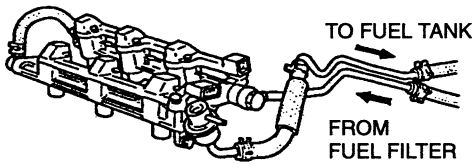
⑦ High-tension lead(s)
- Lead(s) damaged

⑧ Volume air flow sensor
- Poor connection of connector
- Measuring core stuck

⑨ Throttle position sensor
- Poor connection of connector

STEP	INSPECTION		ACTION
1	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** Go to next step
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Go to next step
		No	Check follows: • Distributor cap and rotor for damage ☞ **section G** • High-tension lead(s) for damage ☞ **section G** • Condition of distributor connector female terminals
3	Is fuel line pressure correct at idle? ☞ **page F2–78** **Fuel line pressure:** **210—250 kPa {2.1—2.6 kgf/cm², 30—36 psi}** 	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator ☞ **page F2–78** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞ **page F2–71**
4	Does fuel pressure increase when throttle valve opened?	Yes	Go to next step
		No	Check pressure regulator ☞ **page F2–78**

STEP	INSPECTION		ACTION
5	Disconnect vacuum hose from EGR valve and plug it; does condition improve?	Yes	Check follows: • EGR solenoid valve (vacuum) for sticking • EGR solenoid valve (vent) for sticking • Condition of solenoid valve connectors female terminals
		No	Go to next step
6	Connect Engine Signal Monitor to PCM and set the position 3R. Is following terminal voltage at PCM increase smoothly when vacuum applied to EGR valve? **Terminal 3R voltage:**  	Yes	Go to next step
		No	Check EGR valve for sticking ☞ **page F2–88**
7	Is following terminal voltage at PCM correct? **3E terminal:** **Approx. 4V (ignition switch ON)** **Approx. 2.8V (idle)**	Yes	Verify that measuring core of volume air flow sensor moves smoothly • If OK, go to next step • If not OK, replace volume air flow sensor
		No	Check condition of volume air flow sensor and PCM connectors female terminals • If OK, replace volume air flow sensor • If not OK, repair female terminal

STEP	INSPECTION		ACTION
8	Is terminal 3B voltage at PCM correct? **3B terminal:** **0.1—1.1V (throttle valve closed throttle position)** **2.8—4.5V (throttle valve wide open throttle)**	Yes	Go to next step
		No	Check female terminal condition in throttle postion sensor connector and PCM connector • If OK, replace throttle position sensor ☞ **page F2–117** • If not OK, repair female terminal
9	Is there fuel leakage from fuel injector(s)? **Fuel leakage: Less than 1 drop/2 min.**  	Yes	Check follows: • Poor installation of fuel injector ☞ **page F2–74**
		No	Go to next step
10	Try a known good PCM; does condition improve? ☞ **page F2–106**		

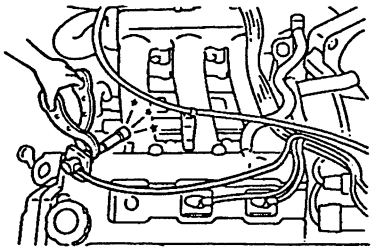
30	SURGES WHILE CRUISING
DESCRIPTION	• Momentary minor irregularity in engine output at steady vehicle speed.

[TROUBLESHOOTING HINTS]

① Fuel injector
- Poor connection of connector

② Spark plug
- Spark plug(s) damaged

③ Volume air flow sensor
- Poor connection of connector
- Measuring core stuck

STEP	INSPECTION		ACTION
1	Is "NO CODES RECEIVED" displayed on **SST** with ignition switch ON? ☞ **page F2–13**	Yes	**"NO CODES RECEIVED" displayed** Go to next step
		No	**Diagnostic Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F2–13** **"LINK COMMUNICATION ERROR" displays** Refer to No.38 "NGS DISPLAYS LINK COMMUNICATION ERROR"
2	Connect Engine Signal Monitor to PCM and set to position 3E Does output voltage of volume air flow sensor gradually increase in conjunction with increase of engine speed?	Yes	Go to next step
		No	Check follows: • Smooth movement of measuring core in volume air flow sensor • Condition of volume air flow sensor and PCM connectors female terminals
3	Does idle become rough when shaking connector of fuel injector?	Yes	Check as follows: • Condition of fuel injector and PCM connectors female terminals
		No	Go to next step
4	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plug(s) for damage ➪ If OK, go to next step ➪ If not OK, replace spark plug(s)
		No	Check follows: • Distributor cap and rotor for damage ☞ **section G**
5	Try a known good PCM; does condition improve? ☞ **page F2–106**	Yes	Replace PCM
		No	Go to "SURGES WHILE CRUISING" in section K1 of this manual

31	LACK OF POWER
DESCRIPTION	• Performance poor under load (i.e., power down when climbing hills)

[TROUBLESHOOTING HINTS]

① Volume air flow sensor
- Open or short circuit in wiring of intake air temperature sensor (Code No.P0110 output) ☞ **page F2–13**
- Poor connection of connector

② Distributor
- Damaged distributor cap or rotor ☞ **section G**

③ Fuel injector
- Fuel injector harness shorted to ground

④ Fuel filter
- Clogged filter

⑤ Air cleaner element
- Clogged element ☞ **page F2–54**

⑥ Three way catalytic converter
- Clogged three way catalytic converter ☞ **page F2–82**

32	POOR FUEL ECONOMY
DESCRIPTION	• Fuel economy unsatisfactory

[TROUBLESHOOTING HINTS]

① Air leakage
- Poor installation of air intake hose, throttle body, intake manifold and/or EGR valve
- Vacuum hose damaged or disconnected ☞ **page F2–3**

② Oxygen sensor
- Open in harness (Code No.P0130, P0134, P0140, P0150, P0154, P0160 output) ☞ **page F2–13**

③ Pressure regulator
- Hold fuel pressure high ☞ **page F2–67**
- Vacuum hose disconnected or damaged ☞ **page F2–3**

33	A/C DOES NOT WORK
DESCRIPTION	• A/C compressor magnetic clutch does not engage with air conditioning switch ON

[TROUBLESHOOTING HINTS]

① A/C relay
- Poor connection of connector
- Relay malfunction ☞ **1996 Mazda 626/MX–6 BETM**

② PCM
- Does not send signal to A/C relay with ignition switch ON ☞ **page F2–106**

34	• KNOCKING • PINGING
DESCRIPTION	• Sound produced when air/fuel mixture is ignited by something other than spark plug (i.e., hot spot in combustion chamber)

[TROUBLESHOOTING HINTS]

Knock sensor
- Open or short in harness (Code No.P0325 output) ☞ **page F2–13**

35	FUEL ODOR
DESCRIPTION	• Gasoline fuel smell or visible leaks
[TROUBLESHOOTING HINTS] ① Purge solenoid valve • Open or short in harness (Code No.P0443 output) ① Charcoal canister • Canister full of fuel and leaking	☞ page F2–13

36	EXHAUST SULFUR SMELL
DESCRIPTION	• Rotten egg smell (sulfur) from exhaust
[TROUBLESHOOTING HINTS] High sulfer content fuel used	

37	HIGH OIL CONSUMPTION
DESCRIPTION	• Oil consumption excessive
[TROUBLESHOOTING HINTS] PCV valve • PCV valve stuck open	☞ page F2–90

38	NGS DISPLAYS "LINK COMMUNICATION ERROR"
DESCRIPTION	• NGS displays "LINK COMMUNICATION ERROR"
[TROUBLESHOOTING HINTS] ① Open or short circuit in wiring DLC2 terminal KLN and PCM terminal 1Y ② PCM • Vref terminal open or short • Open or short circuit in wiring between main relay and PCM terminal 4A • Open circuit in wiring between earth point and PCM ground terminals	☞ page F2–4

39	MIL NEVER ON
DESCRIPTION	• NGS displays diagnostic trouble codes but MIL never ON
[TROUBLESHOOTING HINTS] ① Bulb burnt ② PCM 1AH terminal circuit open	

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

FUEL AND EMISSION CONTROL SYSTEMS (FS ATX)

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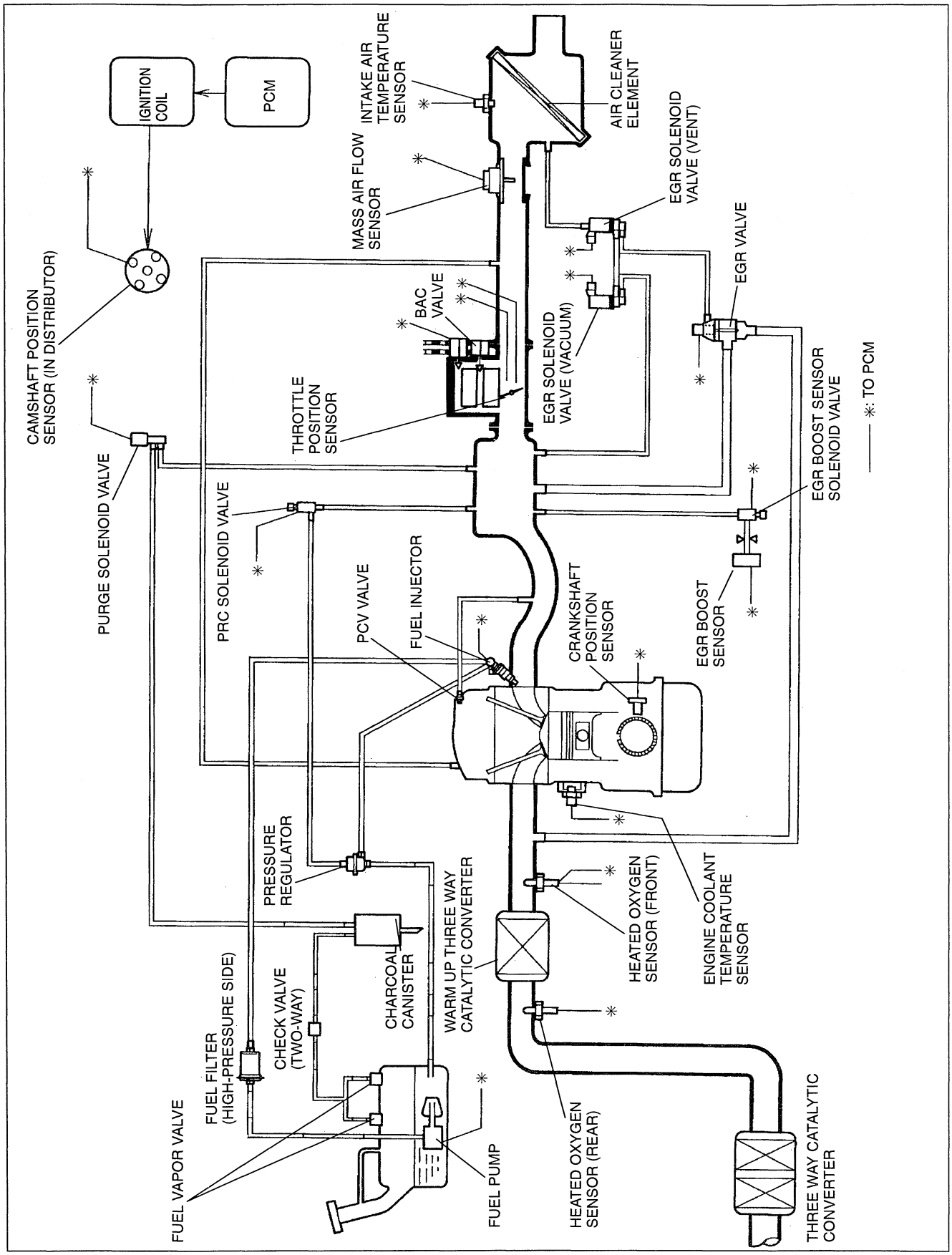
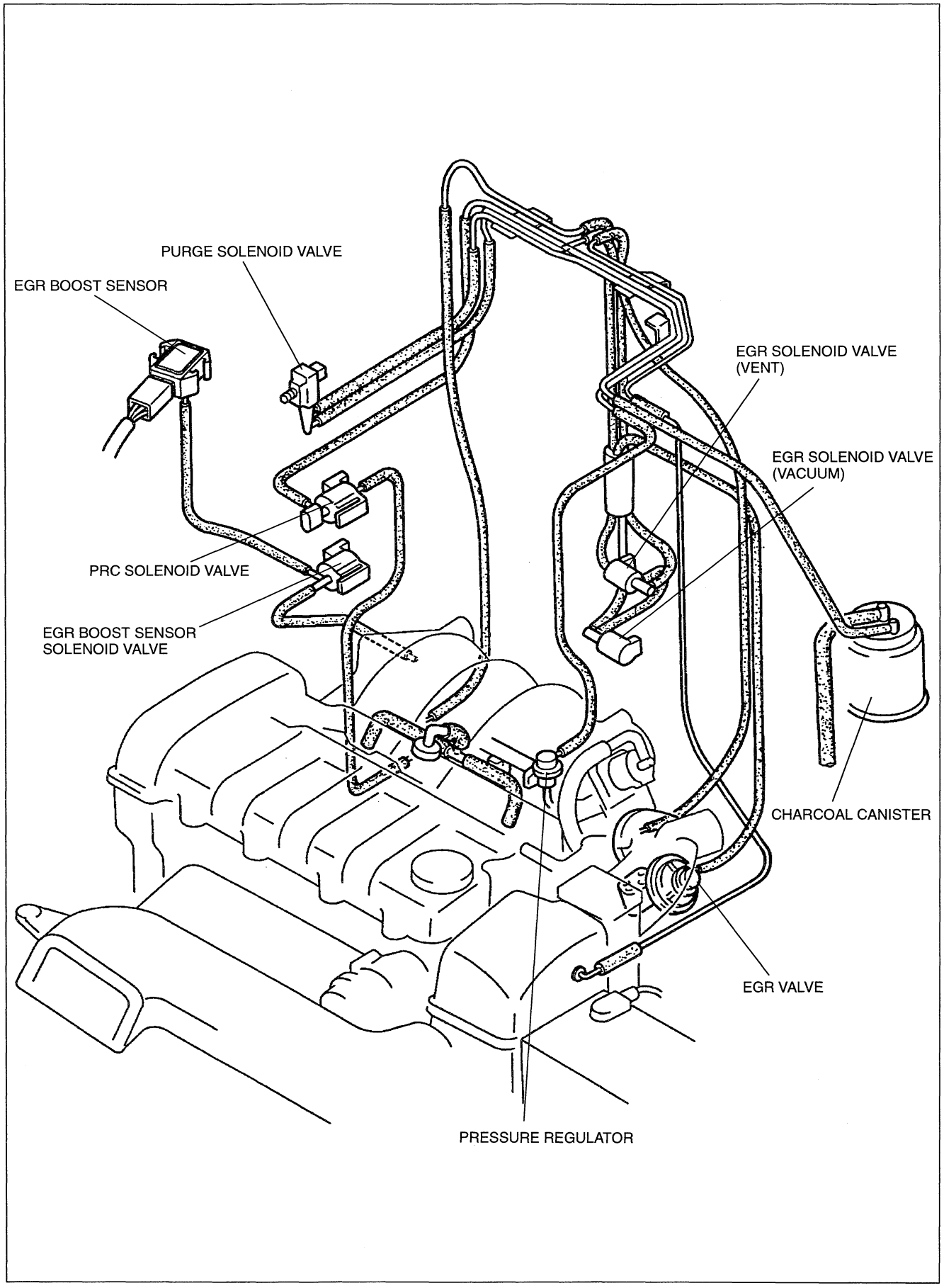
OUTLINE

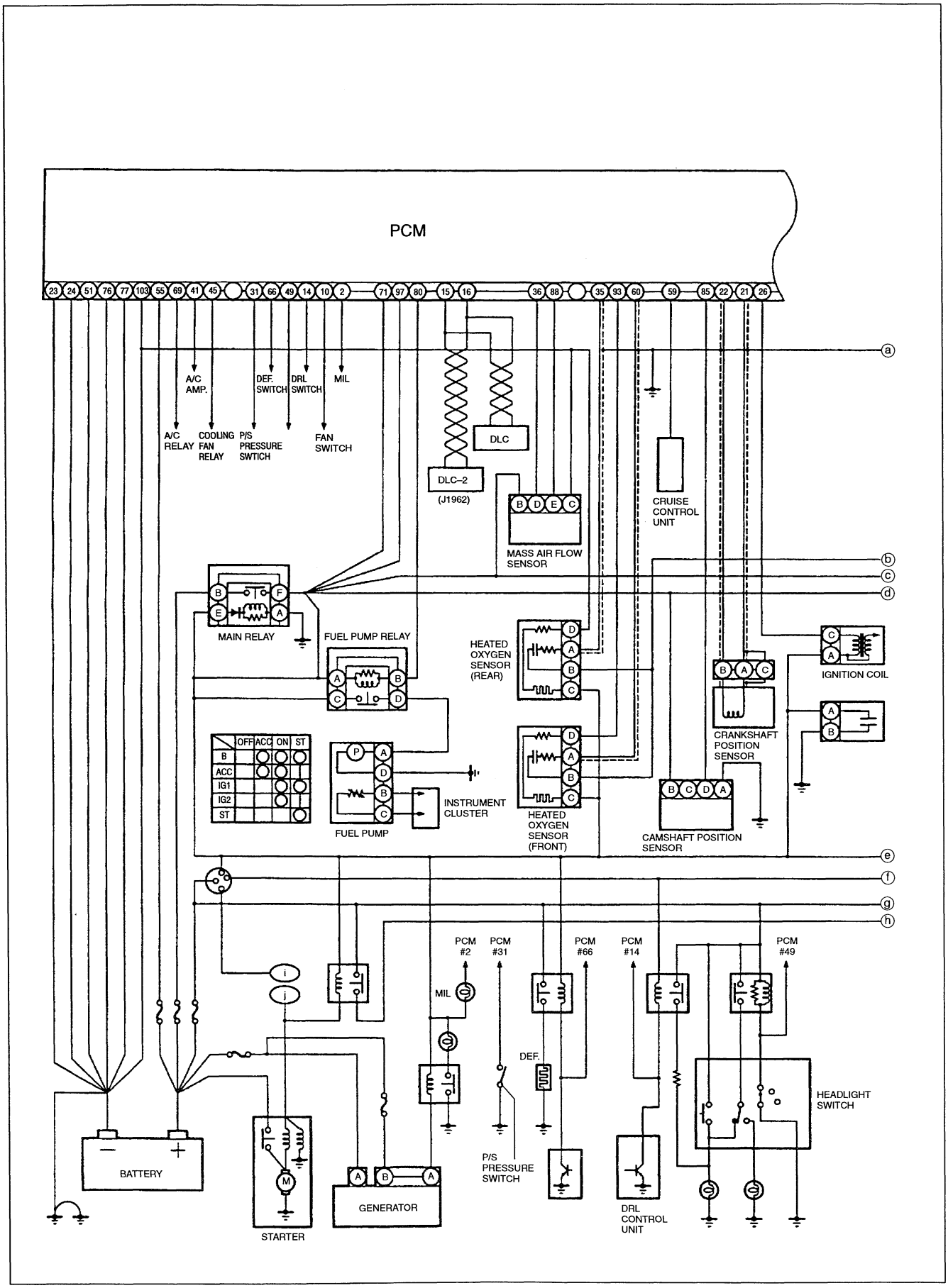
SYSTEM DIAGRAM

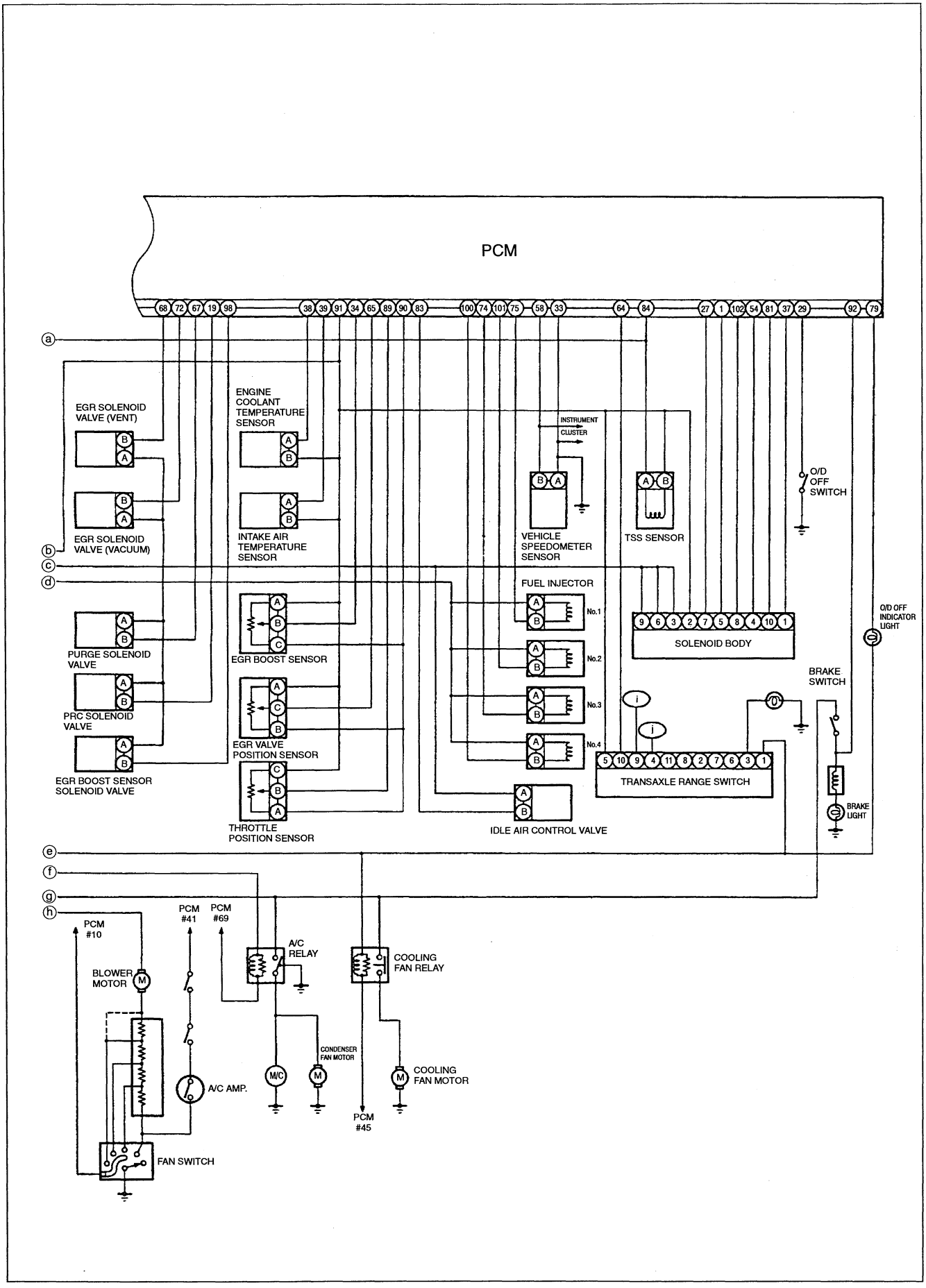


VACUUM HOSE ROUTING DIAGRAM



WIRING DIAGRAM




PCM
68 72 67 19 98 38 39 91 34 65 89 90 83 100 74 101 75 58 33 64 84 27 1 102 54 81 37 29 92 79
EGR SOLENOID VALVE (VENT)
EGR SOLENOID VALVE (VACUUM)
ENGINE COOLANT TEMPERATURE SENSOR
INTAKE AIR TEMPERATURE SENSOR
INSTRUMENT CLUSTER
VEHICLE SPEEDOMETER SENSOR
TSS SENSOR
O/D OFF SWITCH
FUEL INJECTOR
No.1
No.2
No.3
No.4
SOLENOID BODY
O/D OFF INDICATOR LIGHT
BRAKE SWITCH
TRANSAXLE RANGE SWITCH
BRAKE LIGHT
PURGE SOLENOID VALVE
PRC SOLENOID VALVE
EGR BOOST SENSOR SOLENOID VALVE
EGR BOOST SENSOR
EGR VALVE POSITION SENSOR
THROTTLE POSITION SENSOR
IDLE AIR CONTROL VALVE
PCM #10
PCM #41
PCM #69
A/C RELAY
COOLING FAN RELAY
BLOWER MOTOR
CONDENSER FAN MOTOR
A/C AMP.
COOLING FAN MOTOR
PCM #45
FAN SWITCH

SPECIFICATIONS

Item \ Engine/Transaxle			FS ATX
Idle speed (Target speed)		rpm	650—750 (700 ± 50)
Ignition timing (Target timing)		BTDC	11—13° (12 ± 1°)
Throttle body			
Type			Horizontal draft
Throat diameter		mm {in}	55 {2.2}
Fuel pump			
Maximum output pressure		kPa {kgf/cm^2, psi}	640 {6.5, 92}
Fuel filter			
Type	Low-pressure side		Nylon element (in fuel pump)
	High-pressure side		Paper element
Pressure regulator			
Regulating pressure		kPa {kgf/cm^2, psi}	260—320 {2.6—3.3, 37—46}
Fuel injector			
Type			High-ohmic
Type of drive			Voltage
Resistance	Ω	20°C {68°F}	12—16
Volume		ml {cc, fl oz}/15 sec.	47—68 {47—68, 1.4—2.0}
Idle air control valve			
Resistance	Ω	23°C {73°F}	7.7—9.3
Purge solenoid valve			
Resistance	Ω	20°C {68°F}	30—34
Pressure regulator control solenoid valve			
Resistance	Ω	20°C {68°F}	36—43
EGR solenoid valve (vent and vacuum)			
Resistance	Ω	20°C {68°F}	30—45
Camshaft position sensor			
Type			Hall element
Mass air flow sensor			
Type			Hot wire
Engine coolant temperature sensor			
Resistance	kΩ	20°C { 68°F}	35.473—39.207
		60°C {140°F}	7.171—7.925
Fuel tank			
Capacity		L {US gal, Imp gal}	58.5 {15.5, 12.9}
Air cleaner element			
Element type			Oil permeated
Fuel			
Specification			Unleaded—(R+M)/2 method 87 or higher

COMPONENT DESCRIPTIONS

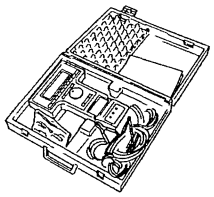
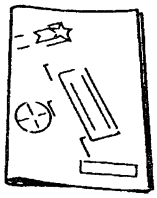
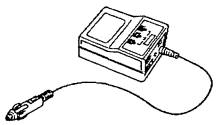
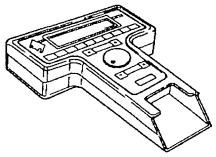
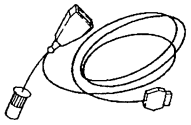
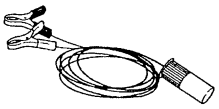
Component	Function	Remark
A/C relay	Controls A/C compressor magnetic clutch	—
Air cleaner	Filters air entering throttle body	• Intake air temperature sensor mounted in air cleaner
Air valve	Supplies bypass air into intake manifold (engine cold)	• Engine speed increased to shorten warm-up period • Thermowax type • Installed in BAC valve
Brake switch	Detects braking; sends signal to PCM	—
Bypass air control (BAC) valve	Supplies bypass air into intake manifold	• Consists of air valve and idle air control valve
Camshaft position sensor [SGC signal]	Detects No.1 cylinder TDC; sends signal to PCM	• Installed in distributor
Charcoal canister	Stores fuel tank fumes (engine stopped)	—
Check valve (two-way)	Controls pressure in fuel tank	—
Closed throttle position switch	Detects idle condition; sends signal to PCM	• Installed in throttle body
Crankshaft position sensor [NE signal]	Detects crank angle via crankshaft pully rotain, and sends signal to PCM	—
Data link connector–2	Concentrated service connector terminals for diagnosis of electrical system	• For on-board diagnosis and service/ inspection
EGR boost sensor	Detects EGR pipe pressure or barometric pressure and sends signal to PCM	• For EGR boost sensor switching control
EGR boost sensor solenoid valve	Supplies/cuts off EGR pipe pressure or barometric pressure to EGR boost sensor	• For EGR boost sensor switching control
EGR valve	Recirculates portion of exhaust gas	—
EGR solenoid valves	Controls vacuum to EGR valve	—
EGR valve position sensor	Detects EGR valve position	• Installed in EGR valve

Component	Function	Remark
Powertrain control module	**Detects the following:** 1. A/C operation 2. Air/fuel ratio (oxygen concentration) 3. Braking signal 4. Crankshaft position 5. E/L operation 6. Engine coolant temperature 7. Ignition ON signal 8. In-gear condition 9. Intake air amount 10. Intake air temperature 11. No.1 piston TDC (compression stroke) 12. P/S operation 13. Throttle valve opening angle 14. Throttle valve closed throttle position 15. Vehicle speed **Controls operation of following:** 1. A/C (cut-off) 2. On-board diagnostic system 3. Fuel injection system 4. Idle speed control 5. Ignition system 6. Purge control system 7. Exhaust gas recirculation 8. Pressure regulator control system 9. Cooling fan control 10. Fuel pump control	 1. Air conditioning switch 2. Heated oxygen sensor 3. Brake light switch 4. Crankshaft position and engine speed 5. Fan switch, cooling fan relay, headlight switch, and rear window defroster switch 6. Engine coolant temperature sensor 7. Ignition switch 8. Neutral and clutch switch 9. Mass air flow sensor 10. Intake air temperature sensor 11. Camshaft position sensor (SGC signal) 12. P/S pressure switch 13. Throttle position sensor 14. Closed throttle position switch 15. Vehicle speedometer sensor 1. A/C relay 2. NGS 3. Fuel injector 4. Idle air control valve 5. Ignition control module 6. Purge solenoid valve 7. EGR solenoid valves 8. PRC solenoid valve 9. Cooling fan relay 10. Fuel pump relay
Engine coolant temperature sensor	Detects engine coolant temperature; sends signals to PCM	• Installed in engine
Fuel filter	Filters particles from fuel	—
Fuel injector	Injects fuel into intake port	• Controlled by signals from PCM
Fuel pump	Provides fuel to fuel injectors	• Operates while engine is running • Installed in fuel tank
Fuel pump relay	Voltage for fuel pump while engine is running, controlled by PCM	—
Fuel vapor valve	Prevents fuel from flowing into charcoal canister	—
Heated oxygen sensor	Detects oxygen concentration; sends signal to PCM	• Zirconic and platinum coating • With heater
Idle air control valve	Supplies bypass air to intake manifold	• Controlled by duty signal from PCM • Installed in BAC valve
Intake manifold	Supplies intake air to all cylinders	—
Intake air temperature senser	Detects intake air temperature;sends signal to PCM	• Installed in air cleaner
Main relay	Supplies current to output devices and PCM	—
Mass air flow sensor	Detects amount of intake air; sends signal to PCM	• Hot wire type
PCV valve	Controls blowby gas introduced into engine	—

Component	Function	Remark
PRC solenoid valve	Controls vacuum to pressure regulator	—
Pressure regulator	Adjusts fuel pressure supply to fuel injectors	—
Purge solenoid valve	Controls evaporative fumes from charcoal canister to intake manifold	• Controlled by duty signal from PCM
P/S pressure switch	Detects P/S operation; sends signal to PCM	• P/S pressure switch ON when steering wheel turned
Resonance chamber	Reduces intake air suction noise and increases engine torque	—
Three way catalytic converter	Reduces HC, CO, NOx by chemical reaction	• Monolith type
Throttle body	Controls intake air amount	—
Throttle position sensor	Detects throttle valve opening angle; sends signal to PCM	• Installed on throttle body
Transaxle range switch	Detects in-gear condition; sends signal to PCM	—
Vehicle speed sensor	Detects vehicle speed; sends signal to PCM	• Installed in automatic transaxle

ENGINE TUNE-UP

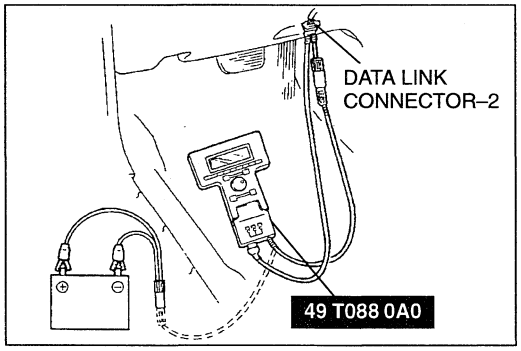
PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of ignition timing and idle speed	49 T088 010B Program Card 	For inspection of ignition timing and idle speed
49 T088 008A Instruction Manual 	For inspection of ignition timing and idle speed	49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of ignition timing and idle speed
49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of ignition timing and idle speed	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of ignition timing and idle speed
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of ignition timing and idle speed	—	—

ADJUSTMENT

Preparation

1. Warm up the engine to normal operating temperature.
2. Shift the selector lever to P range.
3. Turn off all electrical loads.
   - Headlight
   - Blower
   - Rear window defroster
   - Power steering
4. Wait until the cooling fan stops.

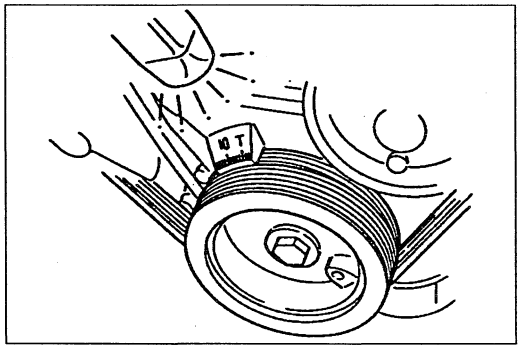


5. Connect the **SST** (NGS) to the data link connector-2 and select the "PID/DATA MONITOR AND RECORD" function. (Refer to page F3–151.)

Ignition Timing

1. Perform Preparation. (Refer to above.)
2. Connect a timing light to the engine.
3. Verify that the ignition timing is within specification.

   Specification: BTDC 6—18°



4. If the ignition timing is not within specification, check the installation of distributor. (Refer to section G)

Idle Speed

1. Perform Preparation. (Refer to above.)
2. Using the **SST** (NGS), verify that the idle speed is within the specification.

   Idle speed (P range): 650—750 (700 ± 50) rpm

3. If not within the specification, race the engine and operate the A/C with no load.
4. Stop racing and the A/C, and check the idle speed.
5. Idle speed below the specification
   Disconnect the IAC valve connector and check the engine speed.
   (1) If the engine speed does not change, inspect the IAC solenoid valve. (Refer to page F3–108.)
   (2) If the engine speed changes excessively (due to engine stall), inspect the PCM and related wiring harness and connectors.

   Idle speed over the specification
   Disconnect the IAC valve connector and check the engine speed.
   (1) If the engine speed does not change, adjust with the air adjusting screw (AAS).

   Idle speed (P range): 650—750 (700 ± 50) rpm

   (2) If the engine speed changes excessively, inspect the PCM and related wiring harnesses and connectors.

Caution

- **The throttle adjusting screw is set at the factory and must not be adjusted. Any adjustment will negatively effect the engine performance.**

Idle-up Speed

1. Perform Preparation. (Refer to page F3–11.)
2. Verify that the idle speed is within the specification.

   Specification: 650—750 (700 ± 50) rpm

3. If not within the specification, adjust the idle speed.
4. Check the idle speed with the following load conditions.

Load condition	Idle speed (rpm)
No load	650—750
Cooling fan ON	675—775
Fan switch ON at 3rd or higher	675—775
Head light switch ON	675—775
Rear window defroster switch ON	675—775
P/S ON	650—750
A/C ON	725—825

Note

- Excludes temporary idle speed drop just after the electrical loads are turned ON.

5. If not as specified with all load conditions, inspect the idle air control valve.
   If not as specified with any one of load conditions, check related input switches, harnesses and connectors.

ON-BOARD DIAGNOSTIC SYSTEM

DESCRIPTION

Quick Test Description

Quick Test is divided into three special tests: Key On Engine Off Self-Test, Key On Engine Running Self-Test and Continuous Memory DTC access. Quick Test also provides a quick check of the powertrain control system and is usually performed at the start of each diagnostic procedure and at the end of most pinpoint tests for verification of repair and to ensure no other faults exist.

Key On Engine Off Self-Test

Key On Engine Off is a functional test of the powertrain control system performed on demand. A fault has to be present at the time of testing for the Key On Engine Off Self-Test to detect the fault. When a fault is detected, a Diagnostic Trouble Code (DTC) will be output on the data link when requested by a scan tool.

Key On Engine Running Self-Test

Key On Engine Running is a functional test of the powertrain control system performed on demand with the engine running and vehicle stopped. A check of the inputs and outputs is made during operating conditions and at normal temperature. A fault has to be present at the time of testing. When a fault is detected, a Diagnostic Trouble Code (DTC) will be output on the data link when requested by a scan tool.

Continuous Memory DTC Access Self-Test

Continuous Memory DTC access is also a functional test of the powertrain control system. The Continuous Memory self-test is always active. The test consists of all the OBD II monitors and the comprehensive component monitor, and is designed to detect failures contributing to driveability and emission concerns. As part of Quick Test, the technician may perform a specific drive cycle before running Quick Test. This is necessary to detect certain faults not tested during other self-test operations. All self-tests are menu driven in the New Generation Star (NGS) scan tool.

Parameter Identification (PID) Access

The PID mode allows access to certain data values, analog and digital inputs and outputs, calculated values, and system status information.

Brake On/Off Test

On vehicles equipped with Brake On/Off (BOO) input, the brake pedal **MUST** be depressed and released after the Key On Engine Running self-test is initiated.

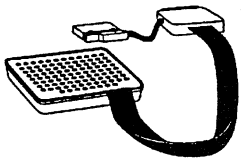
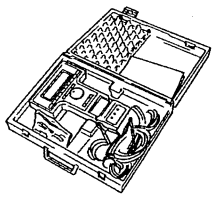
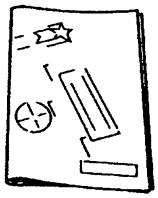
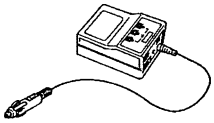
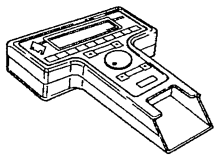
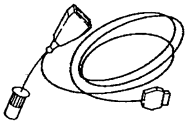
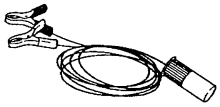
O/D OFF Switch Test

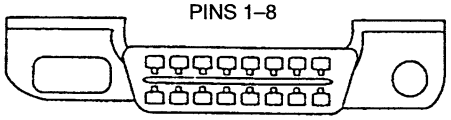
On vehicles equipped with an O/D OFF switch, the switch **MUST** be cycled after the Key On Engine Running self-test is initiated.

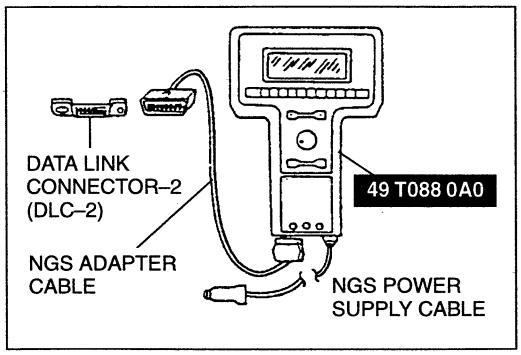
Wiggle/Tap Test

The wiggle/tap test is performed by the technician in an attempt to re-create an intermittent fault.

PREPARATION
SST

49 UN01 130 104 Pin Breakout Box 	For inspection of PCM terminal voltage	49 T088 0A0 NGS set 	For inspection of PCM terminal voltage and input/output devices
49 T088 008A Instruction Manual 	For inspection of PCM terminal voltage and input/output devices	49 T088 010B Program Card 	For inspection of PCM terminal voltage and input/output devices
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices	49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices

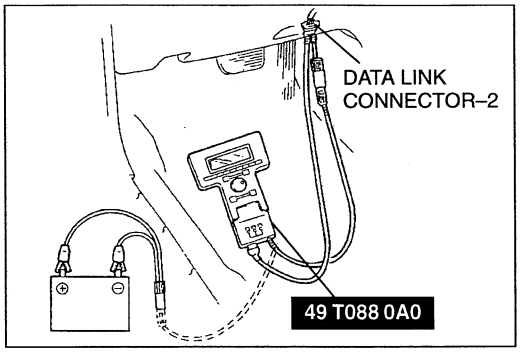




ON-BOARD DIAGNOSTIC TEST
New Generation Star (NGS) Hook-up Procedure

Note
- Make sure Key is Off.

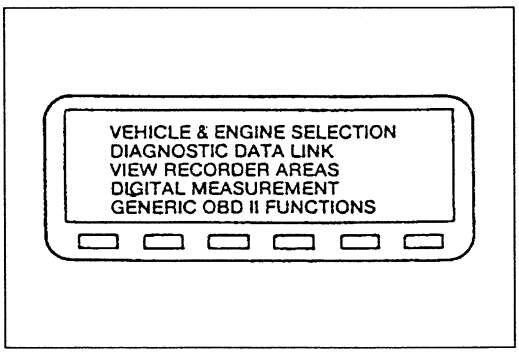
1. Insert the vehicle interface module and program card into the **SST** (NGS) control unit.
2. Plug the NGS OBD II adapter into the interface module and the large 5 pin connector into the vehicle data link connector–2 (DLC–2) located under the dash to left of the center console.
3. Plug the (NGS) tester power cable into the cigarette lighter or use a battery hook-up adapter.
4. Listen for a double beep. The **SST** (NGS) is now initialized. Begin the functional test of powertrain control system.



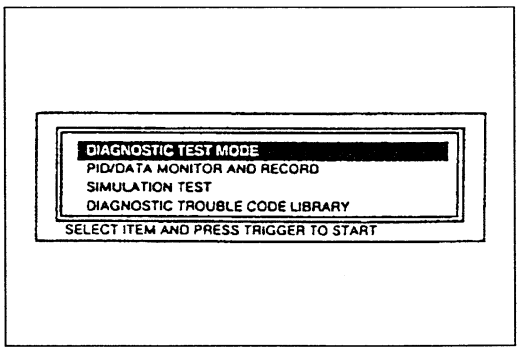
Key On Engine Off Quick-Test Procedure

Note
- Start the engine and bring up to operating temperature before running the Quick-Test.

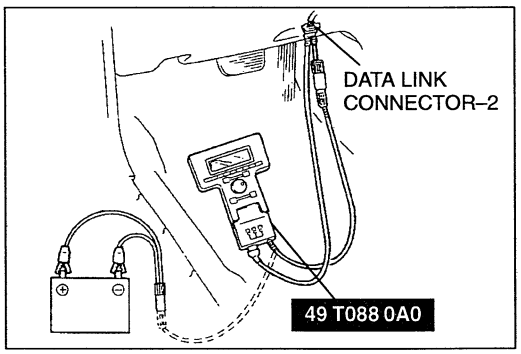
1. Perform the necessary vehicle preparation and visual inspection (Refer to page F3–10.). Hook-up the **SST** (NGS) to the vehicle.
2. Select vehicle and engine selections.
3. Select vehicle year and model.



4. Select diagnostic data link.
5. Select PCM.



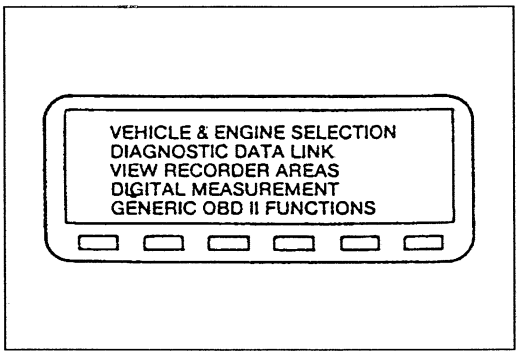
6. Select diagnostic test mode.
7. Select key ON engine off on-demand self-test.
8. Turn the key ON. Press start and trigger. Follow the operating procedures from the menu.

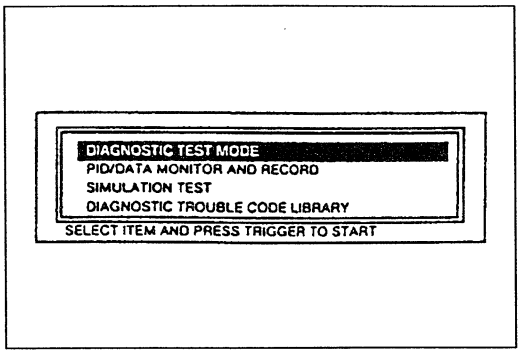


Key On Engine Running Quick-Test Procedure

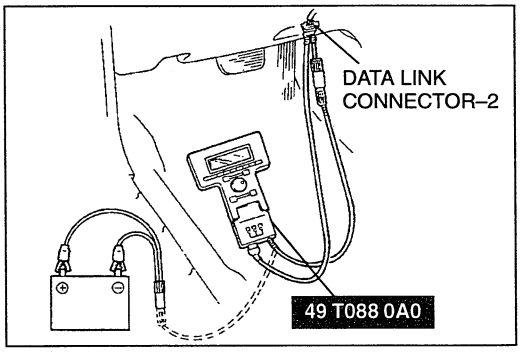
Note
- Start the engine and bring up to normal operating temperature before running the Quick-Test.

1. Perform the necessary vehicle preparation and visual inspection (Refer to page F3–10.). Hook-up the **SST** (NGS) to the vehicle.
2. Select vehicle and engine selection.
3. Select vehicle year and model.
4. Select Diagnostic data link.
5. Select PCM.





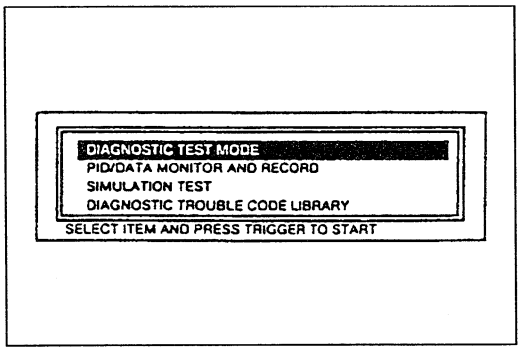
6. Select diagnostic test mode.
7. Select key ON engine running on-demand self-test.
8. Start the vehicle. Press start and trigger.
9. Follow the operating instructions from the menu and perform BOO, and O/D OFF switch cycling, if equipped.

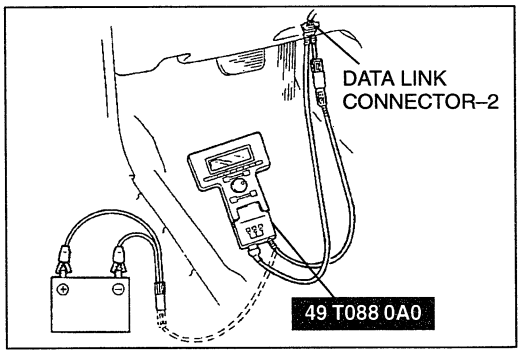


Accessing All Continuous Memory DTC's Procedure

Note
- Start the engine and bring up to operating temperature before running the Quick-Test.

1. Perform the necessary vehicle preparation and visual inspection (Refer to page F3–10.). Hook the **SST** (NGS) to the vehicle.
2. Select vehicle and engine selection menu.
3. Select vehicle year and model.
4. Select Diagnostic data link.
5. Select PCM.
6. Select Diagnostic test mode.
7. Select Retrieve/Clear continuous DTC's.
8. Turn the key ON. Press start.
9. Follow the operating instruction from the menu.

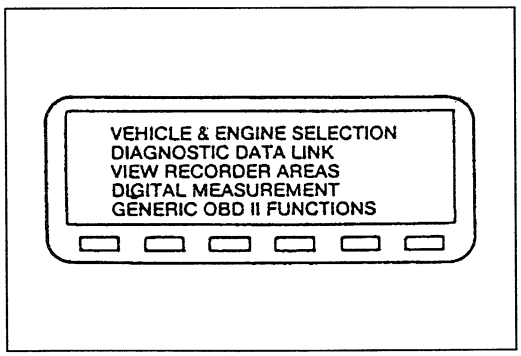


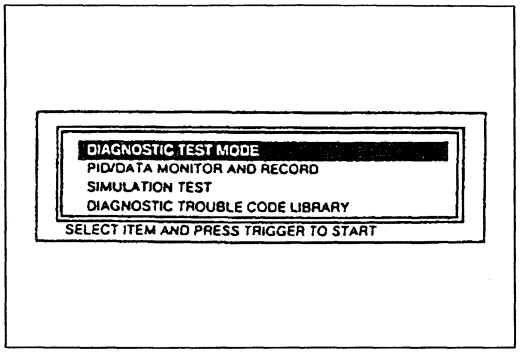


Output Control Test Procedure

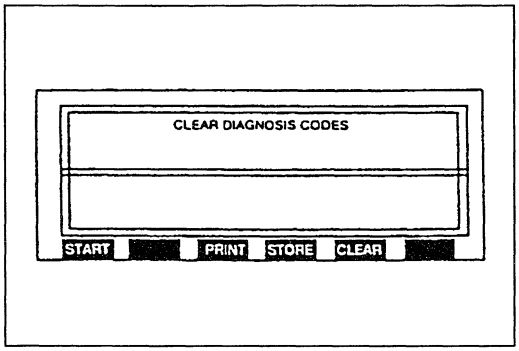
Note
- Start the engine and bring up to operating temperature before running the Output Control Test.

1. Perform the necessary vehicle preparation and visual inspection. (Refer to page F3–10.). Hook up the **SST** (NGS) to the vehicle.
2. Select vehicle and engine selection.
3. Select vehicle year and model.
4. Select diagnostic data link.
5. Select PCM.





6. Select diagnostic test mode.
7. Select active tests.
8. Select output control.
9. Turn the key ON. Press start and trigger. Follow the operating instructions from the menu.



After Repair Procedure

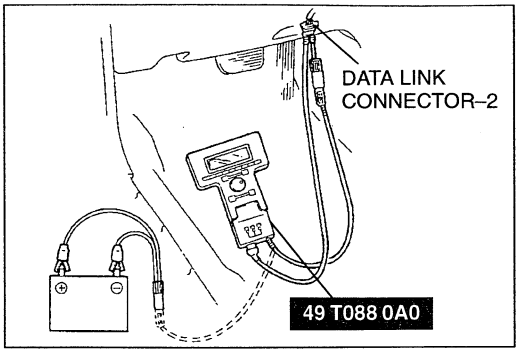
1. Connect the **SST** (NGS) to the Data Link Connector.
2. Select Clear codes function and clear the DTC's.
3. Perform Quick-Test to ensure that the customer's concern has been resolved. If DTC P1000 is present, go to the DTC P1000 chart.

OBD II Drive Cycle

Note

- Only perform this procedure when instructed to do so.

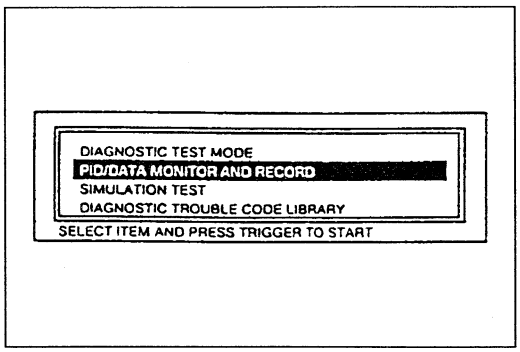
1. Start and warm the engine until the engine coolant temperature is over 82°C {180°F}.
2. Drive the vehicle or let it idle for four minutes.
3. Stop the vehicle and let it idle for 40 seconds.
   - D range
4. Open the throttle 1/4—1/2 and increase the speed to 25 km/h {40 mph} for 10 seconds.
5. Fix the throttle opening and drive the vehicle at 25 km/h {40 mph} for 30 seconds.
6. Stop the vehicle and let it idle for 40 seconds.
   - D range
7. Drive the vehicle at 22 km/h {35 mph} for four minutes.
8. Stop the vehicle and let it idle for 30 seconds.
9. Drive the vehicle at 19 km/h {30 mph} for six minutes.
10. Stop the vehicle and let it idle for 30 seconds.
11. Drive the vehicle at 16—25 km/h {25—40 mph} for three minutes while observing the following condition.
    a. Stop and idle for 10 seconds at least five times.
    b. The throttle opening is 1/4—1/2 when accelerating from idle.
    c. Shift between three different speeds while driving at 16—25 km {25—40 mph}.
12. Drive the vehicle at a constant speed between 16—25 km/h {25—30 mph} for one minute.
13. Within eight seconds, accelerate to 35—37 km/h {55—60 mph}.
14. Drive the vehicle at a constant speed between 35—37 km/h {55—60 mph} for two minutes.



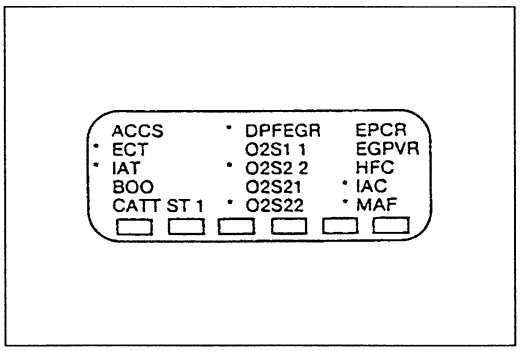
Accessing OBD II PID Mode Procedure

Note
- Start the engine and bring up to operating temperature before running the Quick-Test.

1. Hook-up the **SST** (NGS).
2. Select vehicle and engine selection menu.
3. Select vehicle year and model.
4. Select Diagnostic data link.
5. Select PCM.

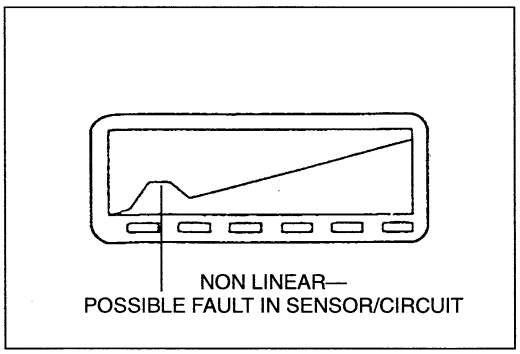


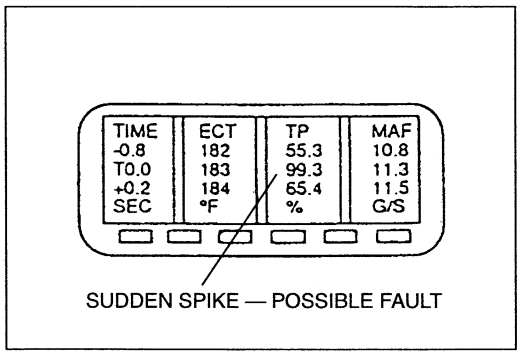
6. Select PID/DATA MONITOR AND RECORD.
7. Turn the key ON or start the engine.



8. Select the PID values to view and press the trigger.
9. Select start to begin.

Note
- Refer to the manufacturer provided instruction manual for other NGS diagnostic testing procedures.





DIAGNOSTIC TROUBLE CODE

Note

- If the DTC that you want to find is not in the following chart, please refer to the "Diagnostic Trouble Code" chart in section K2.

No.	Diagnosed Circuit	Condition	Page
P0102	Mass Air Flow (MAF) Sensor	Circuit low input	F3–21
P0103		Circuit high input	F3–24
P0106	EGR/BARO sensor	Input signal out of self-test range	F3–25
P0107		Input signal less than self-test minimum	F3–27
P0108		Input signal greater than self-test maximum	F3–28
P0112	Intake Air Temperature (IAT) sensor	Circuit low input	F3–29, 30
P0113		Circuit high input	F3–30, 31
P0117	Engine Coolant Temperature (ECT) sensor	Circuit low input	F3–30
P0118		Circuit high input	F3–30, 31
P0121	Throttle Position (TP) sensor	In-range operating circuit failure	F3–32
P0122		Circuit low input	F3–33
P0123		Circuit high input	F3–34
P0125	Engine Coolant Temperature (ECT) sensor	Insufficient coolant temperature to enter a closed loop fuel control	F3–35
P0131	Upstream Heated Oxygen Sensor (HO2S 11)	Circuit out of range low voltage	F3–36
P0133		Circuit low response	F3–37
P0135	Upstream Heated Oxygen Sensor Heater (HTR 11)	Circuit malfunction	F3–39
P0136	Downstream Heated Oxygen Sensor (HO2S 12)	Circuit malfunction	F3–41
P0141	Downstream Heated Oxygen Sensor Heater (HTR 12)	Circuit malfunction	F3–39
P0171	Adaptive fuel control system	System too lean	F3–43
P0172		System too rich	
P0230	Fuel pump	Circuit malfunction	F3–49, 50
P0300	Ignition	Random misfire detected	F3–51
P0301		Cylinder #1 misfire detected	
P0302		Cylinder #2 misfire detected	
P0303		Cylinder #3 misfire detected	
P0304		Cylinder #4 misfire detected	
P0320	Ignition Engine Speed	Input circuit malfunction	—
P0340	Camshaft Position (CMP) sensor	Circuit malfunction (CID)	F3–54
P0400	Exhaust Gas Recirculation (EGR)	Flow malfunction	F3–56
P0420	Catalyst system	Efficiency below threshold	F3–58
P0440	Evaporative emission control system	Purge control malfunction	F3–62
P0443		Purge control solenoid or valve circuit malfunction	F3–64
P0500	Vehicle Speed Sensor (VSS)	Sensor malfunction	F3–65
P0505	Idle Air Control (IAC) system	System malfunction	F3–66
P0603	Powertrain Control Module (PCM)	Keep Alive Memory (KAM) test error	F3–68
P0605		Read Only Memory (ROM) test error	Replace PCM
P0703	Brake on/off (BOO) switch	Input malfunction	F3–69
P1000	OBD-II drive cycle	OBD-II Monitor testing not complete	F3–71
P1001	Activate Self-Test	Standard Corporate Protocol (SCP) comunication error	—
P1100	Mass Air Flow (MAF) sensor	Sensor intermittent	F3–72
P1101		Out of Self-Test range	F3–73
P1112	Intake Air Temperature (IAT) sensor	Sensor intermittent	F3–30
P1116	Engine Coolant Temperature (ECT) sensor	Out of Self-Test range	F3–76
P1117		Sensor intermittent	F3–30

No.	Diagnosed Circuit	Condition	Page
P1120	Throttle Position (TP) sensor	Out of range low	F3–77
P1121		Sensor inconsistent with MAF sensor	F3–78
P1124		Sensor out of Self-Test range	F3–79
P1125		Circuit intermittent	F3–80
P1127	Heated Oxygen Sensor Heater (HTR)	Exhaust system too cool	F3–81
P1130	Upstream Heated Oxygen Sensor (HO2S 11)	Lack of upstream Heated Oxygen Sensor (HO2S 11) switch, adaptive fuel at limit	F3–43
P1131		Lack of HO2S 11 switch, sensor indicates lean	
P1132		Lack of upstream Heated Oxygen Sensor (HO2S 11) switch, sensor indicates rich	
P1137	Downstream Heated Oxygen Sensor (HO2S 12)	Lack of downstream Heated Oxygen Sensor (HO2S 12) switch, sensor indicates lean	F3–41
P1138		Lack of HO2S 12 switch, sensor indicates rich	
P1235	Fuel pump	Fuel pump control out of range	F3–49, 50
P1236			
P1270	Over Reving Condition	Engine RPM or vehicle speed limiter reached	F3–82
P1351	Ignition	Ignition Diagnostic Monitor (IDM) signal out of Self-Test range	—
P1359	Spark output	Circuit malfunction	—
P1400	Differential Pressure Feedback Electronic (DPFE) sensor	Circuit low voltage detected	F3–83
P1401		Circuit high voltage detected	F3–84
P1407	Exhaust Gas Recirculation (EGR) system	No flow detected (valve stuck closed or inoperative)	F3–56
P1408		Flow out of Self-Test range	F3–86
P1460	Wide Open Throttle Air Conditioning Cutoff	Circuit malfunction	F3–89, 90
P1474	Fan Control (FC) system	Fan control primary circuit malfunction	F3–91
P1500	Vehicle Speed Sensor (VSS)	Circuit intermittent	F3–92
P1504	Idle Air Control (IAC) system	Circuit intermittent	F3–66
P1505		System at adaptive clip	F3–93
P1506		Overspeed error	F3–97
P1507		Underspeed error	F3–66
P1605	Powertrain Control Module (PCM)	Keep Alive Memory (KAM) test error	Replace PCM
P1650	Power Steering Pressure (PSP) switch	Out of Self-Test range	F3–99
P1651		Input malfunction	
P1703	Brake on/off (BOO) switch	Out of Self-Test range	F3–100

Caution

- **Do not disconnect the battery to clear diagnostic trouble codes. This will erase the keep alive memory information which may cause a driveability concern.**
- **After repairing a failure, perform the After Repair Procedure to verify the fault has been corrected.**

CODE No.	P0102
DESCRIPTION	• Diagnostic Trouble Code (DTC) P0102 indicates the MAF signal went below 0.39 volts (refer to Voltage to Mass Air Flow Conversion Table) sometime during normal engine operation (Continuous) or during Key On Engine Running (KOER) Self-Test

[Possible Cause]
- Damaged MAF sensor
- MAF sensor disconnected
- MAF circuit open
- VPWR circuit open
- PWR GND circuit open
- MAF RTN circuit open
- MAF circuit shorted to ground
- Air Intake Leak (near MAF sensor)
- Throttle Position (TP) system (possible closed throttle indication)
- Damaged PCM

STEP	INSPECTION		ACTION
1	CHECK MAF SIGNAL LOW INPUT TO PCM • Check broken/loose air outlet tube clamps (throttle body and air cleaner assembly ends), cracks/holes in air outlet tube, worn gaskets between MAF sensor and air cleaner assembly. Service as necessary. • Start engine and bring to idle. **NOTE:** If a KOER DTC P0505 is present, go to Diagnostic Trouble Code Charts. If a stabilized idle is not at least 700 rpm, go to TROUBLESHOOTING GUIDE. • Run engine up 1500 rpm for 5 seconds, then bring it back to idle. • Access MAF V PID (MAF PID) with a Scan Tool. • **Is the MAF V PID (MAF PID) less than 0.39 volts (refer to Voltage to Mass Air Flow Conversion Table)?**	Yes	The MAF SIG voltage is lower than acceptable minimum. Go to next Step.
		No	For KOER reading between 0.60 and 1.00 volt (refer to Voltage to Mass Air Flow Conversion Table) Go to Step 10. All others: Go to Step 13.
2	CHECK VPWR CIRCUIT VOLTAGE • Key off. • Disconnect MAF sensor. • Key on, engine off. • Measure the voltage between VPWR circuit at the MAF sensor vehicle harness connector and the battery negative post. • **Is the voltage greater than 10.5 volts?**	Yes	VPWR harness circuit from CCRM to MAF sensor OK. Go to next Step.
		No	Service open VPWR circuit. RESET KAM (REFER to PCM Reset). RETURN Quick Test.
3	CHECK CONTINUITY OF VPWR CIRCUIT • Key off. • MAF sensor disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc, Service as necessary. • Install breakout box, leave PCM disconnected. • Measure resistance between VPWR circuit at the MAF sensor vehicle harness connector and Test Pin 71 or 97 (VPWR) at the brakeout box. • **Is resistance less than 5.0 ohms?**	Yes	VPWR harness circuit to PCM is OK. Go to next Step.
		No	Service open VPWR harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
4	CHECK MAF CIRCUIT FOR SHORTS TO GROUND AND MAF RTN CIRCUIT • Key off. • MAF sensor disconnected. • Breakout box installed, PCM disconnected. • Disconnect Scan Tool from Data Link Connector (DLC). • Measure the resistance between Test Pin 88 (MAF SIG) and Test Pins 36 (MAF RTN) and 24 or 103 (PWR GND) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	MAF SIG, NAF RTN and GROUND harness circuits to PCM are OK. RECONNECT Scan Tool. Go to next Step.
		No	Service short circuit between MAF SIG and GROUND or MAF RTN. REMOVE brakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

STEP	INSPECTION		ACTION
5	CHECK CONTINUITY OF MAF SIG CIRCUIT • Key off. • MAF sensor disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between MAF circuit at the MAF sensor vehicle harness connector and Test Pin 88 (MAF SIG) at the breakout box. • **Is resistance less than 5.0 ohms?**	Yes	MAF SIG harness circuit to PCM is OK. Go to next Step.
		No	SERVICE open in MAF SIG harness circuit. REMOVE brakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
6	CHECK PWR GND CIRCUIT TO MAF SENSOR • Key off. • MAF sensor disconnected. • Breakout box installed. • Key on, engine off. • Measure the voltage between VPWR circuit and PWR GND circuit at the MAF sensor vehicle harness connector. • **Is the voltage greater less than 10.5 volts?**	Yes	PWR GND harness circuit from battery negative post to MAF sensor is OK. Go to Step 8.
		No	Go to next Step.
7	CHECK PWR GND CIRCUIT CONTINUITY • Key off. • MAF sensor disconnected. • Breakout box installed. • Disconnect PCM. • Disconnect Scan Tool from DLC. • Measure the resistance between PWR GND circuit at the MAF sensor vehicle harness connector and battery negative post. • **Is resistance less than 10 ohms?**	Yes	PWR GND harness circuit to MAF sensor is OK. RECONNECT Scan Tools. Go to next Step.
		No	SERVICE open in PWR GND harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
8	CHECK MAF RTN CIRCUIT CONTINUITY • Key off. • MAF sensor disconnected. • Breakout box installed, PCM disconnected. • Measure the resistance between MAF RTN circuit at the MAF sensor vehicle harness connector and Test Pin 36 (MAF RTN) at the breakout box. • **Is the resistance less than 5.0 ohms?**	Yes	MAF RTN harness circuit to PCM is OK. Go to next Step.
		No	SERVICE open in MAF RTN harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
9	CHECK MAF CIRCUIT FOR SHORT TO GROUND IN PCM • Key off. • MAF sensor disconnected. • Breakout box installed. • Reconnect PCM to breakout box. • Disconnect Scan Tool from DLC (if applicable). • Measure the resistance between Test Pin 88 (MAF SIG) and Test Pins 36 (MAF RTN) and 24 or 103 (PWR GND) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	RECONNECT Scan Tool. Go to next Step.
		No	MAF SIG short to PWR GND or MAF RTN in the PCM. REMOVE breakout box. RECONNECT MAF sensor. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
10	CHECK MAF CIRCUIT OUTPUT • Key off. • MAF sensor connected. • Breakout box installed, PCM connected. • Key on, engine running. **NOTE:** If a stabilized idle is not at least 700 rpm, go to TROUBLESHOOTING GUIDE. • Measure the voltage between Test Pin 88 (MAF SIG) at the breakout box and battery negative post. • **Is the voltage at idle between 0.34 and 1.96 volts?**	Yes	MAF SIG to the PCM is OK. Go to next Step.
		No	MAF SIG or PWR GND is open in the MAF sensor, or MAF SIG is shorted to MAF RTN in the MAF sensor. REPLACE MAF sensor. REMOVE breakout box. RECONNECT PCM. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

STEP	INSPECTION		ACTION
11	VERIFY MAF CIRCUIT INPUT AND OUTPUT • Key off. • MAF sensor connected. • Breakout box installed, PCM connected. • Key on, engine running. • Measure the voltage between Test Pin 88 (MAF SIG) and Test Pin 36 (MAF RTN) at the breakout box. • **Is the voltage between 0.34 and 1.96 volts?**	Yes	MAF RTN in MAF sensor is OK. Go to next Step.
		No	MAF RTN open in the MAF sensor. REPLACE MAF sensor. REMOVE breakout box. RECONNECT PCM. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
12	CHECK MAF CIRCUIT OUTPUT WITH SCAN TOOL • Key off. • MAF sensor connected. • Breakout box installed, PCM connected. • Key on, engine running. • Access MAF PID (MAF V PID) with a Scan Tool at idle. • **Is the MAF V PID (MAF PID) between 0.34 and 1.96 volts (refer to Voltage to Mass Air Flow Conversion Table at the beginning of this Test)?**	Yes	Unable to identify fault at this time. Check possible intermittent.
		No	MAF SIG or MAF RTN is open or shorted together in the PCM. REPLACE PCM. REMOVE breakout box. RECONNECT PCM. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
13	CHECK MAF SENSOR OUTPUT VOLTAGE **NOTE:** DTC P1101 could be generated by a low charged vehicle battery or the garage exhaust ventilation system. Service the battery as necessary. Then remove ventilation system and properly vent to outside atmosphere. Return KOEO Self-Test. • Key off. • Check that the MAF sensor in corrected. If not, service as necessary. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Scan Tool connected. • Install breakout box, connect PCM to breakout box. • Key on, engine off. • Measure between Test Pin 88 (MAF SIG) and Test Pins 24 or 103 (PWR GND) at the breakout box. • **Is the voltage greater than 0.20 volts?**	Yes	The MAF SIG voltage is greater than expected. Go to Step 7.
		No	Go to Step 3.

CODE No.	P0103
DESCRIPTION	• DTC P0103 indicates that the Mass Air Flow (MAF) sensor signal went above 3.90 volts during normal engine operation (continuous) or during self test

[Possible Cause]
- Blocked MAF sensor screen
- Damaged MAF sensor
- MAF SIG harness short to VPWR
- Damaged PCM

STEP	INSPECTION		ACTION
1	CHECK MAF SIGNAL HIGH INPUT TO PCM • Start engine and bring to idle. **NOTE:** If a KOER DTC P0505 is present, go to Code No. P0505. If stabilized idle is not at least 700 rpm, go directly Symptom flow charts. • Run throttle up to 1500 rpm for 5 seconds, and bring it back to idle. • Access MAF V PID (MAF PID) with a Scan Tool. **NOTE:** MAF V PID (MAF PID) should be greater than 3.9 volts. • Key off. • Disconnect MAF sensor. • Jumper PWR GND nad SIG RTN pins at the MAF sensor vehicle harness connector. • Key on, engine running. • Again access MAF V PID with a Scan Tool. • **Did the MAF V PID (MAF PID) drop from the previous reading below 0.39 volts?**	Yes	MAF SIG shorted to VPWR in MAF sensor. REMOVE Jumper. REPLACE MAF sensor. RESET KAM (Refer to PCM Reset). RERUN Quick Test.
		No	Power short circuit, but not in MAF sensor. REMOVE Jumper. Go to next Step.
2	RERUN SELF-TEST WITH MAF SENSOR DISCONNECTED • Key off. • Disconnect MAF sensor. • Disconnect Powertrain Control Module (PCM). • Inspect for damage or pushed out pins, corrosion loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Key on, engine off. • Measure the voltage between Test Pin 88 (MAF SIG) and Test pin 24 on 103 (PWR GND) at breakout box. • **Is the voltage greater than 105. volts?**	Yes	SERVICE short between MAF SIG and Power (excluding VREF), in harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (Refer to PCM Reset). RERUN Quick Test.
		No	Go to next Step.
3	CHECK MAF SIG FOR SHORT TO VPWR • Key off. • MAF sensor disconnected. • Disconnect Scan Tool from data link connector. • Measure resistance between Test Pin 88 (MAF SIG) and Test Pins 71 or 97 (VPWR) at the breakout box. • **Is resistance greater than 10,000 ohms?**	Yes	MAF SIG shorted to power in the PCM. REPLACE damaged PCM. REMOVE breakout box. RECONNECT MAF sensor. RESET KAM (Refer to PCM Reset). RERUN Quick Test.
		No	SERVICE short between MAF SIG and VREF in harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (Refer to PCM Reset). RERUN Quick Test.

NOTE: DTC P0103 could be generated by foreign material blocking the mass air flow sensor screen causing an air flow restriction. If contaminants are found on the screen, check air filter installation in air cleaner tray and proper sealing of air cleaner and air tube before proceeding. Rerun Quick Test after repair.

CODE No.	P0106
DESCRIPTION	• DTC P0106 indicates that the EGR/BARO sensor input signal is out of self-test range

[Possible Cause]
- Damaged EGR/BARO sensor
- Damaged EGRC solenoid valve
- Damaged EGRC solenoid valve to EGR/BARO sensor hose
- Damaged PCM
- Damaged harness connector
- Damaged harness

STEP	INSPECTION		ACTION
1	CHECK EGR/BARO SENSOR VREF VOLTAGE • Key on, engine off. • EGR/BARO sensor disconnected. • Measure voltage between VREF and SIG RTN circuits at the EGR/BARO sensor vehicle harness connector. • Key off. • **Is voltage between 4.0 and 6.0 volts?**	Yes	Go to next Step.
		No	REPAIR open in VREF circuit.
2	CHECK CONTINUITY OF EGR/BARO SENSOR HARNESS CIRCUITS • Key off. • EGR/BARO sensor disconnected. • Disconnect the PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure the resistance between EGR/BARO SIG circuit at the EGR/BARO sensor vehicle harness connector and Test Pin 34 at the breakout box. • Measure the resistance between EGR/BARO SIG RTN circuit at the EGR/BARO sensor vehicle harness connector and Test Pin 91 at the breakout box. • **Is each resistance less than 5 ohms?**	Yes	Go to next Step.
		No	Service open in appropriate. EGR/BARO sensor harness circuit. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
3	CHECK EGR/BARO SENSOR SIG CIRCUITS FOR SHORT TO GROUND AND POWER • Key off. • EGR/BARO sensor disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between Test Pin 34 (EGR/BARO SIG) and Test Pins 91 (SIG RTN), 51 (PWR GND) and 103 (PWR GND) at the breakout box. • Measure resistance between Test Pin 34 (EGR/BARO SIG) and Test Pins 71 (VPWR), 90 (VREF) and 97 (VPWR) at the breakout box. • **Is resistance greater than 10,000 ohms?**	Yes	Go to next Step.
		No	SERVICE short in EGR/BARO sensor SIG circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
4	CHECK RESPONSE OF EGR/BARO SENSOR TO MANUALLY APPLIED SIGNAL • Key off. • Disconnect hose from EGR check solenoid to EGR/BARO sensor. Inspect for damage, blockage, etc. Service as necessary. • Breakout box installed, PCM connected. • Key on. • Using a hard held pump, slowly apply and maintain 21"-Hg, while measuring the EGR/BARO sensor voltage response at Test Pin 34 (EGR/BARO SIG) of the breakout box. • **Is the voltage response between 0.8 and 1.5 volts?**	Yes	REMOVE the vacuum pump. RECONNECT all components. Go to next Step.
		No	REPLACE the EGR/BARO sensor. REMOVE breakout box. RECONNECT all compoents. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

STEP	INSPECTION		ACTION
5	CHECK VPWR AT EGRC SOLENOID • Key off. • EGRC solenoid disconnected. • Key on, engine idling. • Measure voltage between VPWR circuit and chassis ground at the EGRC solenoid vehicle harness connector. • **Is EGRC VPWR voltage greater than 10.5 volts?**	Yes	Go to next Step.
		No	SERVICE open in EGRC solenoid VPWR circuit. RECONNECT all compoents. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
6	CHECK RESISTANCE OF EGRC SOLENOID • Key off. • EGRC solenoid disconnected. • Measure solenoid resistance. • **Is resistance between 30 and 70 ohms?**	Yes	Go to next Step.
		No	REPLACE the EGRC solenoid. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
7	CHECK EGRC SOLENOID CIRCUIT CONTINUITY • Key off. • EGRC solenoid disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure the resistance between Test Pin 98 (EGRC) at the breakout box and the EGRC circuit at the solenoid vehicle harness connector. • **Is the resistance less than 5.0 ohms?**	Yes	Go to next Step.
		No	SERVICE open in EGRC harness circuit. REMOVE the breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
8	CHECK EGRC SOLENOID CIRCUIT FOR SHORT TO POWER AND GROUND • Key off. • EGRC solenoid disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between Test Pin 98 (EGRC) and Test Pins 71, 97 (VPWR) and 90 (VREF) at the breakout box. • Measure resistance between Test Pin 98 (EGRC) and Test Pins 51, 103 (PWR GND) and 91 (SIG RTN) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	REMOVE breakout box. RECONNECT all components. Go to next Step.
		No	SERVICE short in EGRC solenoid harness circuit. REMOVE the breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
9	CHECK EGRC SOLENOID VALVE OPERATION • Key off. • Breakout box installed, PCM connected. • Disconnect the vacuum line from the intake manifold vacuum reservoir to the EGRC solenoid at the EGRC solenoid. • Install vacuum pump at the input port of the EGRC solenoid, applry 8 to 10"-Hg of vacuum to the EGRC solenoid. • Disconnect the vacuum line from the EGRC solenoid to EGR/BARO sensor at the EGRC solenoid, install a vacuum gauge at the unattached end of the vacuum line. • Key on. • Momentarily jumper to ground Test Pin 98 (EGRC) at the breakout box and observe the vacuum gauge. • Key off. • **Was a vacuum signal indicated by the vacuum gauge?**	Yes	REPLACE the damaged PCM. REMOVE the breakout box. REMOVE the vacuum gauge and vacuum pump. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	REPLACE the damaged EGRC solenoid. REMOVE the breakout box. REMOVE the vacuum gauge and vacuum pump. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

CODE No.	P0107
DESCRIPTION	• DTC P0107 indicates that the EGR/BARO SIG circuit input is less than the self-test minimum

[Possible Cause]
- Damaged EGR/BARO sensor
- Damaged EGRC solenoid valve
- Damaged EGRC solenoid valve to EGR/BARO sensoe hose
- Damaged PCM
- Damaged harness connector
- Damaged harness

STEP	INSPECTION		ACTION
1	CHECK EGR/BARO SENSOR VREF VOLTAGE • Key on, engine off. • EGR/BARO sensor disconnected. • Measure voltage between VREF circuit and SIG RTN circuit at the EGR/BARO sensor vehicle harness connector. • **Is voltage between 4.0 and 6.0 volts?**	Yes	Go to next Step.
		No	REPAIR open in VREF circuit.
2	CHECK CONTINUITY OF EGR/BARO SENSOR SIG CIRCUIT • Key off. • EGR/BARO sensor disconnected. • Disconnect the PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave the PCM disconnected. • Measure the resistance between EGR/BARO SIG circuit at the EGR/BARO sensor vehicle harness connector and Test Pin 34 at the breakout box. • **Is resistance less than 5 ohms?**	Yes	Go to next Step.
		No	RESET KAM (REFER to PCM Reset). RERUN Quick Test.
3	CHECK EGR/BARO SIG CIRCUIT FOR SHORT TO GROUND • Key off. • EGR/BARO sensor disconnected. • Breakout box installed, PCM disconnect. • Measure resistance between Test Pin 34 (EGR/BARO SIG) and Test Pins 91 (SIG RTN), 51 (PWR GND) and 103 (PWR GND) at the breakout box. • **Is resistance greater than 10,000 ohms?**	Yes	Go to next Step.
		No	SERVICE short in EGR/BARO sensor SIG circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
4	CHECK RESPONSE OF EGR/BARO SENSOR TO MANUALLY APPLIED SIGNAL • Key off. • Disconnect hose from EGR check solenoid to EGR/BARO sensor. Inspect for damage, blockage, etc. Service as necessary. • Breakout box installed, PCM connected. • Key on. • Using a hand held pump, slowly apply and maintain 21"-Hg, while measuring the EGR/BARO sensor voltage response at Test Pin 34 (EGR/BARO SIG) of the breakout box. • **Is the voltage response between 0.8 and 1.5 volts?**	Yes	REMOVE the vacuum pump. RECONNECT all components. Go to DTC P0106 Troubleshooting Step 5.
		No	REPLACE the EGR/BARO sensor. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

CODE No.	P0108
DESCRIPTION	• DTC P0108 indicates that the EGR/BARO SIG circuit input is greater than the self-test maximum

[Possible Cause]
- Damaged EGR/BARO sensor
- Damaged EGRC solenoid valve
- Damaged EGRC solenoid valve to EGR/BARO sensoe hose
- Damaged PCM
- Damaged harness connector
- Damaged harness

STEP	INSPECTION		ACTION
1	CHECK EGR/BARO SENSOR VREF VOLTAGE • Key on, engine off. • EGR/BARO sensor disconnected. • Measure voltage between VREF circuit and SIG RTN circuit at the EGR/BARO sensor vehicle harness connector. • **Is voltage between 4.0 and 6.0 volts?**	Yes	Go to next Step.
		No	REPAIR open in VREF circuit.
2	CHECK CONTINUITY OF EGR/BARO SENSOR SIG CIRCUIT • Key off. • EGR/BARO sensor disconnected. • Disconnect the PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave the PCM disconnected. • Measure the resistance between EGR/BARO SIG RTN circuit at the EGR/BARO sensor vehicle harness connector and Test Pin 91 at the breakout box. • **Is resistance less than 5 ohms?**	Yes	Go to next Step.
		No	SERVICE open in EGR/BARO sensor SIG circuit. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
3	CHECK EGR/BARO SIG CIRCUIT FOR SHORT TO POWER • Key off. • EGR/BARO sensor disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between Test Pin 34 (EGR/BARO SIG) and Test Pins 71, 97 (VPWR) and 90 (VREF) at the breakout box. • **Is resistance greater than 10,000 ohms?**	Yes	Go to next Step.
		No	SERVICE short in EGR/BARO sensor SIG circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
4	CHECK RESPONSE OF EGR/BARO SENSOR TO MANUALLY APPLIED SIGNAL • Key off. • Disconnect hose from EGR check solenoid to EGR/BARO sensor. Inspect for damage, blockage, etc. Service as necessary. • Breakout box installed, PCM connected. • Key on. • Using a hand held pump, slowly apply and maintain 21"-Hg, while measuring the EGR/BARO sensor voltage response at Test Pin 34 (EGR/BARO SIG) of the breakout box. • **Is the voltage response between 0.8 and 1.5 volts?**	Yes	REMOVE the vacuum pump. RECONNECT all components. Go to DTC P0106 Troubleshooting Step 5.
		No	REPLACE the EGR/BARO sensor. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

CODE No.	P0112, P0177
DESCRIPTION	• DTC P0117 (ECT) or P0112 (IAT) indicates that the corresponding sensor's signal is less than the Self-Test minimum. The IAT and ECT sensor minimum is 0.2 volt 121°C {250°F}

[Possible Cause]
- Grounded circuit in harness
- Damaged Powertrain Control Module (PCM)
- Damaged sensor
- Improper harness connection

STEP	INSPECTION		ACTION
1	SIMULATE OPPOSITE SIGNAL TO PCM • Key off. • Disconnect vehicle harness from suspect sensor. Inspect for damaged or pushed out pins or loose wires, etc. Service as necessary. • Key on. • **Is the ECT or IAT PID more than 4.2 volts (less than –40°C {–40°F})?**	Yes	REPLACE sensor. RECONNECT harness. RERUN Quick Test.
		No	Go to next Step.
2	CHECK VREF CIRCUIT VOLTAGE AT THROTTLE POSITION SENSOR • Key off. • Suspect temperature sensor disconnected. • Disconnect TP sensor. • Key on, engine off. • Measure voltage between VREF circuit and SIG RTN circuit at the TP sensor vehicle harness connector. • **Is voltage between 4.5 volts and 5.5 volts?**	Yes	RECONNECT TP sensor. Go to next Step.
		No	REPAIR open in VREF circuit.
3	CHECK TEMPERATURE SENSOR SIGNAL CIRCUIT FOR SHORT TO GROUND • Key off. • Suspect temperature sensor disconnected. • Disconnect Powertrain Control Module (PCM) Inspect for damaged or pushed out pins, corrosion loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected Measure resistance between Test Pin 7 (ECT) or 25 (IAT) and Test Pins 40, 46 and 60 at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	REPLACE PCM. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	SENSOR short circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

CODE No.	P0112, P1112, P0113, P0117, P1117, P0118
DESCRIPTION	• Diagnostic Trouble Codes (DTCs) P0112, P1112 or P0113 (IAT DTCs) and P0117, P1117 or P0118 (ECT DTCs) are not received during KOEO and KOER Self-Test, but are output during continuous Memory Self-Test and may be intermittent

[Possible Cause]
- Damaged IAT or ECT sensor
- Damaged harness
- Low coolant (ECT)
- Damaged harness connector
- Damaged PCM

STEP	INSPECTION		ACTION
1	• Key off. • Scan Tool connected. • Key on. • Monitor the ECT or IAT PID. • While observing the PID, perform the following: – Tap on the sensor to simulate road shock – Wiggle the sensor connector • **Is there any change in the temperature reading?**	Yes	DISCONNECT and INSPECT connectors. If OK, REPLACE the sensor. RESET KAM (Refer to PCM Reset). RERUN Quick test. For Continuous DTCs P1112 and P1117, COMPLETE Comprehensive Component Monitor Drive cycle (Refer to Drive cycles).
		No	Go to next Step.
2	CHECK EEC-V VEHICLE HARNESS • Still monitoring PID. • While obsering the approprate PID, perform the following: – Hold the vehicle harness close to the sensor connector. Wiggle, shake and bend small section of wiring harness while working toward the PCM • **Is there any damage in the temperature reading?**	Yes	ISOLATE fault. SERVICE as necessary. RESET KAM (Refer to PCM Reset). RERUN Quick test. For Continuous DTCs P1112 and P1117, COMPLETE Comprehensive Component Monitor Drive cycle (Refer to Drive cycles).
		No	Go to next Step.
3	CHECK PCM AND VEHICLE HARNESS CONNECTORS • Key off. • Disconnect Powertrain Control Module (PCM) Disconnect sensor connector. Inspect for damage, loose or pushed outpins, loose or poorly crimped wires. • **Are connectors and terminals OK?**	Yes	Fault is not present. RESET KAM (Refer to PCM Reset). RERUN Quick test. For Continuous DTCs P1112 and P1117, COMPLETE Comprehensive Component Monitor Drive cycle (Refer to Drive cycles).
		No	SERVICE as necessary. RESET KAM (Refer to PCM Reset). RERUN Quick test. For Continuous DTCs P1112 and P1117, COMPLETE Comprehensive Component Monitor Drive cycle (Refer to Drive cycles).

CODE No.	P0113, P0118
DESCRIPTION	• DTC P0118 (ECT) or P0113 (IAT) indicates that the corresponding sensor signal is greater than the Self-Test maximum. The maximum for ECT and IAT sensor is 4.6 volt or –50°C {–46°F}

[Possible Cause]
- Open in harness (IAT or ECT)
- Damaged sensor
- Improper harness connection
- Damaged Powertrain Control Module (PCM)

STEP	INSPECTION		ACTION
1	• Key off. • Disconnect suspect temperature sensor. • Connect a jumper wire between the sensor signal circuit and SIG RTN circuit at the temperature sensor vehicle harness connector. • Scan Tool installed. • Key on. **NOTE:** If a Scan tool communication problem exists, remove jumper wire immediatery and go to Step 3 • Access ECT or IAT PID. • **Is the ECT or IAT PID less than 0.2 volts (greater than 120°C {248°F})?**	Yes	REPLACE suspect sensor. REMOVE jumper wire. RECONNECT vehicle harness. RERUN Quick Test.
		No	REMOVE jumper wire. Go to next Step.
2	CHECK CONTINUITY OF SENSOR SIGNAL AND SIG RTN CIRCUITS • Key off. • Suspect temperature sensor disconnected. • Disconnect Powertrain Control Module (PCM) Inspect for damaged or pushed out pins, corrosion, loose wire, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure resistance between sensor signal circuit at the temperature sensor vehicle harness connector and Test Pin 38 (ECT) or 39 (IAT) at the breakout box. • Measure resistance between SIG RTN circuit at the temperature sensor vehicle harness connector and Test Pin 91 (SIG RTN) at the breakout box. • **Is each resistance less than 5.0 ohms?**	Yes	REPLACE PCM. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
		No	SERVICE open circuit. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
3	CHECK FOR SENSOR SIGNAL SHORTED TO VREF • Key off. • Suspect temperature sensor disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure resistance between sensor signal circuit Test Pin 38 (ECT) or 39 (IAT) and VREF at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	REPLACE PCM. RERUN Quick Test.
		No	LOCATE and REPAIR short to VREF. RERUN Quick Test.

CODE No.	P0121		
DESCRIPTION	• DTC P0121 indicates an in-range operating TP sensor circuit failure		
STEP	INSPECTION		ACTION
1	DTC P0121 OR UNABLE TO EXIT KOER SELF-TEST (TP IN-RANGE ERROR) • Key off. • Start engine, bring to idle (closed throttle position). • Activate Key On Engine Running (KOER) Self-Test with the Scan Tool. • **Is DTC P0121 present or does KOER Self-Test fail to terminate?**	Yes	KEEP engine running at idle. Go to next Step.
		No	Go to TROUBLESHOOTING GUIDE, for possible fast idle concerns.
2	ATTEMPT TO RECREATE DTC P0121 OR DRIVEABILITY SYMPTOM • Key on, engine running. • Attempt to take vehicle for a drive, while still in Key On Engine Running Self-Test on Scan Tool. **NOTE:** If KOER Self-Test terminates when placing the selector in gear (drive or reverse). Go to next Step directly. • Turn ignition to the key off position, wait 15 seconds. • Again, start engine. • Activate KOER Self-Test with the Scan Tool. • **Is DTC P0121 still present or does KOER Self-Test again fail to terminate?**	Yes	Go to next Step.
		No	RERUN Quick Test. Go to TROUBLESHOOTING GUIDE, for possible fast idle concerns.
3	CHECK TP CIRCUIT • Check for opens in the TP SIG and SIG RTN harness wires between both the TP sensor and the PCM vehicle harness connectors. • **Is an open indicated?**	Yes	SERVICE open in TP SIG or SIG RTN harness circuit. RERUN Quick Test. If a driveability symptom is still present, go to TROUBLESHOOTING GUIDE.
		No	REPLACE TP sensor. RERUN Quick Test. If a driveability symptom is still present, go to TROUBLESHOOTING GUIDE.

CODE No.	P0122
DESCRIPTION	• DTC P0122 indicates Throttle Position (TP) Sensor signal is less than the Self-Test minimum value of 3.43% (0.17 volts)

[Possible Cause]
- TP not seated properly (tightened down)
- Damaged TP sensor
- Open TP SIG or VREF harness
- TP SIG harness short to SIG RTN or PWR GND
- Damaged Powertrain Control Module (PCM)

STEP	INSPECTION		ACTION
1	ATTEMPT TO GENERATED DTC P0123 OR P0121 • Key off. • Disconnect TP sensor. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Leave TP sensor disconnected. • Jumper VREF circuit to TP circuit at TP sensor vehicle harness connector. • Key on, engine off. **NOTE:** If any Scan Tool communication problem exists, remove jumper and go directly Step 4 • **Is DTC P0123 or P0121 present (ignore all other DTC's)?**	Yes	TP SIG shorted to SIG RTN in TP sensor, or TP SIG or VREF open in TP sensor. REPLACE TP sensor. REMOVE jumper wire. RERUN Quick Test.
		No	VREF or TP SIG open in harness or PCM or TP SIG shorted to SIG RTN (or PWR GND) in harness or PCM. REMOVE jumper wire. Go to next Step.
2	CHECK VREF CIRCUIT VOLTAGE • Key off. • TP sensor disconnected. • Key on engine off. • Measure voltage between VREF circuit and SIG RTN circuit at the TP sensor vehicle harness connector. • **Is voltage between 4.0 and 6.0 volts?**	Yes	Go to next Step.
		No	KEY off. RECONNECT all components. REPAIR open in VREF circuit.
3	CHECK TP CIRCUIT CONTINUITY • Key off. • TP sensor disconnected. • Disconnect Powertrain Control Module (PCM) Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure resistance between TP circuit at the TP sensor vehicle harness connector and Test Pin 89 (TP SIG) at the breakout box. • **Is the resistance less than 5.0 ohms?**	Yes	TP SIG harness circuit to PCM is OK. Go to next Step.
		No	SERVICE open in TP SIG harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
4	CHECK TP CIRCUIT FOR SHORTS TO SIG RTN OR PWR GND • Key off. • TP sensor disconnected. • PCM disconnected. • Measure resistance between Test Pin 89 (TP SIG) and test Pins 91 (SIG RTN) and 24 or 103 (PWR GND) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	TP SIG open or shorted to SIG RTN (or PWR GND) in the PCM. REPLACE PCM. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	SERVICE TP SIG shorted to SIG RTN (or PWR GND) in the harness. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

CODE No.	P0123
DESCRIPTION	• DTC P0123 indicates Throttle Position (TP) Sensor signal is greater than the Self-Test maximum value of 92.27% (4.60 volts)

[Possible Cause]
- TP seated properly (tightened down)
- Damaged TP sensor
- TP SIG harness short to VREF or VPWR
- VREF haness short to VPWR
- Open SIG RTN harness circuit
- Damaged Powertrain Control Module (PCM)

STEP	INSPECTION		ACTION
1	ATTEMPT TO GENERATE DTC P0122 • Key off. • Disconnect TP sensor. Inspect for damaged of pushed out pins, corrosion, loose wires, etc. Service as necessary. • Leave TP sensor disconnected. • Key on, engine off. • Access TP PID (TPV PID) with the Scan Tool. • **Is the TP PID (TPV PID) less than 3.43% (0.17 volts)?**	Yes	TP SIG is either shorted to VREF in TP sensor or SIG RTN is open in the TP sensor or harness. Go to next Step.
		No	TP SIG circuit is shorted to VREF or VPWR. Go to Step 3.
2	CHECK VREF CIRCUIT VOLTAGE • Key off. • TP sensor disconnected. • Key on, engine off. • Measure voltage between VREF circuit and SIG RTN circuit at the TP sensor vehicle harness connector. • **Is voltage between 4.0 and 6.0 volts?**	Yes	TP SIG shorted to VREF on SIG RTN open in the TP sensor. REPLACE TP sensor. RERUN Quick Test.
		No	KEY off. RECONNECT all components. REPAIR open in VREF circuit.
3	CHECK TP SENSOR CIRCUIT FOR SHORTS TO POWER • Key off. • TP sensor disconnected. • Disconnect Powertrain Control Module (PCM), Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure resistance between Test Pin 89 (TP SIG) and Test Pins 90 (VREF) and 71 or 97 (VPWR) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	TP SIG is shorted to VREF or VPWR in PCM. REPLACE PCM. REMOVE breakout box. RECONNECT TP sensor. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	SERVICE Short circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

NOTE: An intermittent fault can cause a Continuous Memory DTC P0123. If Continuous Memory DTC P0123 still present after Step 1 through Step 3, go to CODE No. P1120 or P1125.

CODE No.	P0125
DESCRIPTION	• DTC P0125 indicates the ECT sensor has not achieved the required temperature level to enter closed loop operating conditions within a specified amount of time after starting engine. This code will light the MIL

[Possible Cause]
- Insufficient warm up time
- Leaky or stuck open thermostat
- Low coolant

STEP	INSPECTION		ACTION
1	DTC P0125 INDICATES EXCESSIVE TIME TO ENTER CLOSED LOOP FUEL CONTROL • Check coolant level. • **Is the coolant level fill correct?**	Yes	Check the thermostat. ☞ **section E**
		No	FILL to proper level. RESET KAM (Refer to PCM reset). COMPLETE Comprehensive Component. Monitor Drive Cycle (Refer to Drive cycles).

CODE No.	P0131		
DESCRIPTION	• DTC P0131 is set when the HO2S generates a negative voltage		
[Possible Cause] • Contaminated HO2S (water, fuel, etc) • Crossed HO2S signal/signal return wiring			
STEP	INSPECTION		ACTION
1	CONTAMINATED HO2S/VOLTAGE SHIFT • Check for water in HO2S connector. • **Is there water in the HO2S connector?**	Yes	REPAIR source of water entry. Dryout connector REPLACE HO2S. RERUN Quick Test.
		No	Go to next Step.
2	VERIFY WIRING IS IN PROPER PIN LOCATION • Key off. • Suspect sensor disconnected. • Install breakout box, leave PCM disconnected. • Use the following list to measure the resistance between the appropriate test pins at the breakout box and the HO2S Signal and Signal RTN at the harness connector(s). – HO2S-11=P0131 – HO2S Signal Test Pin 60 – HO2S Signal RTN Test Pin 91 • **Is the resistance less than 5.0 ohms?**	Yes	REPLACE HO2S. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
		No	REPAIR wiring as necessary. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.

CODE No.	P0133
DESCRIPTION	• DTC P0133 indicate the response rate of HO2S is below some caliblated window

[Possible Cause]
- Contaminated HO2S
- Exhaust leaks
- Shorted/Open wires
- Excessive fueling
- MAF meter
- Air leaks

STEP	INSPECTION		ACTION
1	HO2S RESPONSE TEST • Key off. • Scan Tool connected. • Key on, engine off. • Access Generic OBD II functions and trigger. • Scroll to Oxygen Sensor Test and trigger. • Scroll to Manufacturer Specific Test ID and trigger. • Scroll to Test ID: (41H) and trigger. • **Is the measurement for the HO2S fault greater than 0.6 volt?**	Yes	RESET KAM (Refer to PCM Reset). COMPLETE OBD II drive cycle. REPEAT Test Step. If test results are greater than 0.6 volt; testing is complete.
		No	Oxygen sensor test results are out of an acceptable range. Go to next Step.
2	CHECK FOR SOURCE OF POTENTIAL HO2S CONTAMINATION • Investigate the following items as a potential source of HO2S contamination. – Use of unapproved silicon sealers – Fuel contaminated by silicon additives – Excessive oil burning (i.e. rings, valve seals and oil overfill) – Glycol (antifreeze) leaking internally in the engine – Lead contaminated fuel – Use of unapproved cleaning agents • **Are any of the above conditions present?**	Yes	REPAIR source of contamination. REPLACE HO2S and oil/filter. RESET KAM (REFER to PCM Repair). COMPLETE a OBD II Drive cycle.
		No	Go to next Step.
3	CHECK FOR UNMETERED AIR LEAKS Fuel calculations can be affected by unmetered air leaks. • Carefully inspect the following areas for potential air leaks. – Hoses connecting to MAF – Hoses connecting to throttle body – Intake manifold gasket leaks – PCV disconnected – Vacuum lines disconnected – Improperly seated dip stick and tube – Exhaust leaks at flanges and gaskets • **Are there any air leaks?**	Yes	Air leaks located. REPAIR source of air leak. RESET KAM (REFER to PCM Repair). COMPLETE a OBD II drive cycle.
		No	Go to next Step.
4	CHECK OF HO2S CIRCUIT WIRING WITH PCM CONNECTED • Key off. • PCM connected. • Suspect HO2S disconnected. • Jumper HO2S Signal to VPWR at the HO2S harness connector. • Scan Tool connected. • Key on, engine off. • Access the correct HO2S PID. **NOTE:** HO2S displayed as O2S on Scan Tool. • **Is the voltage greater than 1.50 volts?**	Yes	HO2S signal circuit is not faulty. REPLACE HO2S. CHANGE oil/filter. RESET KAM (REFER to PCM Reset). COMPLETE a OBD II drive cycle.
		No	Go to next Step.

STEP	INSPECTION		ACTION
5	CHECK RESISTANCE OF HO2S SIGNAL CIRCUIT • Key off. • PCM disconnected, breakout box installed. • Measure the resistance between HO2S Signal Test Pin at the breakout box and the HO2S harness connector. • Measure the resistance between Signal RTN test pin at the breakout box and the HO2S harness connector. – HO2S-11 = Sig. Pin 60 – HO2S-11 = Sig. RTN Pin 91 • **Is the resistance less than 5.0 ohms?**	Yes	Go to next Step.
		No	Resistance is high. SERVICE open circuit. REMOVE breakout box. RECONNECT all components. COMPLETE a OBD II drive cycle.
6	CHECK FOR SHORT IN HO2S CIRCUIT • Key off. • Breakout box installed. PCM disconnected. • Measure the resistance between the HO2S Signal Test Pin at the breakout box and VPWR circuit and HO2S Signal Test Pin and Signal return circuit at the breakout box. – HO2S-11 = Sig. Pin 60 – VPWR = 71/97 – Signal RTN = 91 • **Is the resistance greater than 10,000 ohms?**	Yes	REPLACE PCM. COMPLETE a OBD II drive cycle.
		No	SERVICE short circuit. REMOVE breakout box. RECONNECT all components. COMPLETE a OBD II drive cycle.

CODE No.	P0135, P0141
DESCRIPTION	• DTC P0135 and P0141 indicate a short to ground, or open, or short to VPWR in the HO2S heater circuit

[Possible Cause]

- Shorts to B+ in harness or HO2S
- Water in connectors
- Cut or pulled wires
- Disconnected wiring
- Open VPWR circuit
- Open GND circuit
- Low Battery Voltage
- Corrosion or poor mating terminals
- Damaged PCM

STEP	INSPECTION		ACTION
1	HO2S HEATER SIGNAL CIRCUIT IS OPEN, SHORTED TO GROUND, SHORTED TO B+ OR EXCESSIVE CURRENT DRAW DTC/HO2S Reference List DTC P0135 = HO2S HTR-11 DTC P0141 = HO2S HTR-12 • Visually inspect the HO2S circuit for exposed wiring, contamination, corrosion and proper assembly. **NOTE:** On some applications, a vehicle hoist may be required to access the HO2S harness. • **Were any concerns found during the visual inspection?**	Yes	REPAIR any concerns found in the visual inspection. RERUN Quick Test.
		No	Go to next Step.
2	PERFORM KEY ON KOER SELF TEST • Key off. • Scan tool connected. • Key on, engine on. • Engine at 2,000 rpm for 10 minutes. • Return to idle. • Activate key on, engine running (KOER) self test. • **Are DTCs P0135 or P0141 present?**	Yes	Go to next Step.
		No	Fault may be intermittent. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary).
3	MONITOR HEATER CURRENT PID'S • Key on. • Scan Tool connected. • Access HTR11CM, HTR12CM, PID's and monitor. **NOTE:** HTR11CM = H02S Heater 11 Current Monitor. This is the test results of the HO2S heater circuit that the EEC performs. The number within the PID indicates the HO2S heater circuit location. The value displayed must be within the acceptable range indicated. • **Are all PID values between 0.3 and 3.0 amps?**	Yes	Go to Step 6.
		No	HO2S HTR circuit failed EEC Heater Current Monitor Test. Use the PID(s) with the values out of range to determine which HO2S HTR circuit is at fault and Go to next Step.
4	CHECK FOR VPWR AT THE VEHICLE HO2S HARNESS CONNECTOR • Key off. • Disconnect the appropriate HO2S(s). • Inspect both ends of the connector(s) for damaged or pushed out pins, moisture, corrosion, contamination, etc. Service as necessary. • Key on, engine off. • Measure the voltage between VPWR and SIG RTN circuit at the HO2S vehicle harness connector (refer to schematic at the beginning of this pinpoint test). • **Is the voltage greater than 10.5 volts?**	Yes	Go to Step 5.
		No	Go to next Step.

STEP	INSPECTION		ACTION
5	CHECK FOR OPEN VPWR CIRCUIT • Key off. • Install breakout box, PCM disconnected. • Suspect sensor disconnected. • Measure the resistance between the VPWR Test Pin at the breakout box and VPWR at the HO2S vehicle harness connector. • **Is the resistance less than 4.0 ohms?**	Yes	Go to next Step.
		No	CHECK Fuse if fuse is OK, REPAIR open circuit. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
6	CHECK HO2S HEATER RESISTANCE • Key off. • HO2S disconnected. • Connect DVOM to HO2S HTR GND and VPWR Test Pins at the HO2S connector, and measure the resistance. • **Is the resistance between 3.0 and 30 ohms?**	Yes	FOR faults with heater current PID(s) out of range Go to Step 9. ALL others Go to next Step.
		No	REPLACE HO2S. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
7	CHECK FOR HEATER GND AND VPWR SHORTED TO HO2S CASE • Suspect sensor disconnected. • Measure the resistance between the HO2S Heater GND at the HO2S connector and the HO2S case. • Measure the resistance between the HO2S VPWR at the HO2S sensor connector and the HO2S sensor case. • **Is the resistance greater than 10,000 ohms?**	Yes	Go to next Step.
		No	REPLACE HO2S. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
8	CHECK FOR SHORTS TO OTHER GROUNDS AND VPWR IN THE HO2S HEATER GROUND HARNESS CIRCUITS • Key off. • Suspect sensor disconnect. • Disconnect PCM. • Breakout box installed, leave PCM disconnected. • Use the following list to measure the resistance between the appropriate test pins at the breakout box. – DTC P0135 = HO2S HTR-11 (HTR GND) Test Pin 93 and Test Pins 24, 76, 103, 91 and 97 – DTC P0141 = HO2S HTR-12 (HTR GND) Test Pin 95 and Test Pins 24, 76, 103, 91 and 97 • **Is the resistance greater than 10,000 ohms?**	Yes	Go to next Step.
		No	REPAIR shorted circuit. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
9	CHECK FOR OPEN HO2S HEATER GROUND HARNESS CIRCUIT • Key off. • Suspect sensor disconnected. • Breakout box installed, PCM disconnected. • Use the following list to measure the resistance bewteen the appropriate test pins at the breakout box and the HO2S HTR GND at the vehicle harness connector. – HO2S HTR-11 Test Pin 93 (HTR GND) – HO2S HTR-12 Test Pin 95 (HTR GND) • **Is the resistance less than 4.0 ohms?**	Yes	Open or shorted or excessive resistance in the HTR circuit or in the PCM. REPLACE PCM. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
		No	REPAIR open or cause of excessive resistance in the harness. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.

CODE No.	P0136, P1137, P1138
DESCRIPTION	• DTC 0136 indicate the output voltage of the downstream HO2S is less than some calibratable functional window. KOER DTCs P1137 and P1138 can only be retrived during KOER Self-Test when the fuel control is ramped rich and lean and monitored for a voltage change on the downstream HO2S

[Possible Cause]
- Wiring Concerns
  - Pinched, shorted, and corroded wiring and pins
  - Crossed sensor wires
- Other Concerns
  - Exhaust leaks
  - Contaminated or defective sensor

STEP	INSPECTION		ACTION
1	DTC 0136 MONITOR DOWNSTREAM HO2S OUTPUT VOLTAGE FOR ACTIVITY. P1137, P1138 LACK OF HO2S SWITCHING • **Are any of the above concerns present?**	Yes	SERVICE as necessary. RESET KAM (Refer to PCM Reset). COMPLETE a HO2S monitor drive cycle (Refer to Drive cycle). RERUN Quick Test.
		No	CONTINUOUS DTC's P0136. Go to next Step. All others. Go to Step 28.
2	CHECK FOR KOER DTCS P1137 or P1138 • Key off. • Scan Tool connected. • Key on, engine idling and stabilized. • Activate KOER Self-Test. • Check for DTCS. • **Are DTCs P1137 and P1138 present?**	Yes	Go to next Step.
		No	FOR DTCs P0136. The fault that produced the DTC is an intermittent. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary).
3	CHECK EXHAUST SYSTEM FOR LEAKS **NOTE:** Any exhaust leaks between the engine and the end of the catalyst may cause DTC P0136. • Key off. • Place vehicle on a hoist, transmission in park, emergency brake applied, raise vehicle. • Inspect the following: – Exhaust flanges for leaks – HO2S torque – Check for punctures and cracks in catalyst and pipes leading to them • **Are there any exhaust leaks?**	Yes	REPLACE or REPAIR as required. RESET KAM (REFER to PCM Reset). COMPLETE a HO2S Monitor Drive Cycle (REFER to Drive Cycles). RERUN Quick Test.
		No	Go to next Step.
4	CHECK HO2S HARNESS CIRCUIT FOR SHORT TO VPWR AND GROUND • Key off. • Breakout box installed, PCM disconnected. Inspect both ends of connector for damaged or pushed out pins, moisture, corrosion, loose pins, etc. and service as necessary. • HO2S disconnected. • Measure the resistance between HO2S Signal Test Pin and SIG RTN Test Pin at breakout box. • Measure the resistance between HO2S Signal Test Pin and VPWR and VREF Test Pin at the breakout box. • Measure the resistance between HO2S Signal Test Pin and PWR GND Test Pin at the breakout box. HO2S-12 SIG = Test Pin 35 HO2S SIG RTN = Test Pin 91 PWR GND = Test Pins 24, 76 and 103 VPWR = Test Pins 71 and 97 VREF = Test Pin 90 • **Is resistance greather than 10,000 ohms?**	Yes	Go to next Step.
		No	SERVICE short in harness. RESET KAM (REFER to PCM Reset). COMPLETE a Drive Cycle (REFER to Drive Cycles). RERUN Quick Test.

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td rowspan="2">5</td><td rowspan="2">CHECK CONTINUITY OF HO2S AND HO2S GROUND CIRCUITS
• Key off.
• Breakout box installed, PCM disconnected.
• Disconnect suspect HO2S from harness.
• Measure the resistance between HO2S Signal Test Pin at the brakeout box and the HO2S vehicle harness connector. Record readings.
• Measure resistance between SIG RTN Test Pin at the breakout box and HO2S SIG RTN vehicle harness connector. Record readings.
– HO2S-12 SIG = Test Pin 35
– HO2S SIG RTN = Test Pin 91
• Is resistance reading less than 5.0 ohms?</td><td>Yes</td><td>Go to next Step.</td></tr>
<tr><td>No</td><td>REPAIR open circut in harness.
REMOVE breakout box.
RECONNECT all components.
COMPLETE a Drive Cycle (REFER to Drive Cycles).
RERUN Quick Test.</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">CHECK HO2S CIRCUIT CONTINUITY
• Key off.
• PCM connected to vehicle harness.
• Suspect HO2S connected to vehicle harness.
• Scan Tool connected.
• Key on, engine off.
• Access the correct HO2S PID.

NOTE: HO2S displayed as O2S on Scan Tool.

<table><tr><th>DTC</th><th>HO2S</th><th>PINS</th></tr><tr><td>P0136</td><td>HO2S-12</td><td>35 and 97</td></tr></table>
• Is the voltage leading operator than 1.5 volts?</td><td>Yes</td><td>Go to Step 9.</td></tr>
<tr><td>No</td><td>Go to next Step.</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">CHECK CONTINUITY OF HO2S GROUND CIRCUIT IN THE PCM
• Key off.
• PCM connected to breakout box. Vehicle harness disconnected from breakout box.
• Measure the resistance between SIG RTN Test Pin and PWR GND Test Pin at the breakout box.
• Is the resistance reading less than 5.0 ohms?</td><td>Yes</td><td>REMOVE breakout box.
RECONNECT PCM.
Go to next Step.</td></tr>
<tr><td>No</td><td>REPLACE PCM.
REMOVE breakout box.
RECONNECT all comonents.</td></tr>
<tr><td rowspan="2">8</td><td rowspan="2">APPLY 12 VOLTS TO HO2S CIRCUIT
• Key off.
• HO2S disconnected.
• Jumper VPWR to HO2S signal circuit at the vehicle harness connector.
• Key on.
• Access HO2S PID and Monitor.
• Is the PID voltage greater than 1.5 volts?</td><td>Yes</td><td>REPLACE HO2S.
RECONNECT all components.
COMPLETE a Drive Cycle (REFER to Drive Cycles).
RERUN Quick Test.</td></tr>
<tr><td>No</td><td>REPLACE PCM.
RECONNECT all components.
COMPLETE a Drive Cycle (REFER to Drive Cycles).
RERUN Quick Test.</td></tr>
<tr><td rowspan="2">9</td><td rowspan="2">CHECK FOR OVER VOLTAGE ON THE HO2S CIRCUIT IN THE PCM
• Key on.
• PCM connected to vehicle harness.
• HO2S disconnected.
• Inspect both ends of connect for damaged or pushed out pins, moisture, corrosion, Loose pins, etc. and service as necessary.
• Measure the voltage between SIG RTN Test Pin at the HO2S vehicle harness connector and battery negative post.
• Measure the voltage between HO2S Signal Test Pin at the HO2S vehicle harness connector and battery negative post.
• Are the voltage readings greater than 1.5 volts?</td><td>Yes</td><td>REPLACE PCM.
RECONNECT all components.
COMPLETE a Drive Cycle (REFER to Drive Cycles).
RERUN Quick Test.</td></tr>
<tr><td>No</td><td>REPLACE HO2S.
RECONNECT all components.
COMPLETE a Drive Cycle (REFER to Drive Cycles).
RERUN Quick Test.</td></tr>
</table>

CODE No.	DTC P0171, P0172, P1130, P1131, P1132
DESCRIPTION	• DTC P0171 indicate the fuel/air ratio is too lean. The fuel adaptive system is at the rich correction limit • DTC P0172 indicate the fuel/air ratio is too rich. The fuel adaptive system is at the lean correction limit • DTC P1130 indicate the fuel control system has reached its maximum compensation for lean or rich condition and the HO2S is not switching • DTC P1131 indicate the fuel/air ratio is correcting rich for an overly lean condition. The HO2S voltage is less than 0.45 volts • DTC P1132 indicate the fuel/air ratio is correcting lean for an overly rich condition. The HO2S voltage is greater than 0.45 volts

[Possible Cause]

Fuel System
- Excessive fuel pressure
- Leaking fuel injector(s)
- Low fuel pressure
- Contaminated injector(s)

Base Engine
- Oil over fill
- Cam timing
- Cylinder compression
- Exhaust leaks before or near the HO2S's

Induction System
- Air leaks after the MAF sensor
- Vacuum leaks
- Restricted air inlet
- PCV system
- Fuel purge system
- Improperly seated Dipstick

EGR System
- Leaking gasket
- Stuck open EGR valve
- Leaking diaphragm

STEP	INSPECTION		ACTION
1	Visual checks: • Check air intake for leaks, obstructions, and damage. • Check air filter, air filter housing for blockage. • Verify integrity of the PCV system. • Check for vacuum leaks. • **Are there any of the above concerns?**	Yes	REPAIR as necessary. RERUN Quick Test.
		No	Go to next Step.
2	INITIATE KOER SELF-TEST • Key off. • Scan Tool connected. • Disconnect Fuel Vapor hose from intake manifold and plug fiting at intake manifold. • Start engine and run at 2,000 rpm for 1 minute and return to idle. • Enter Key On Engine Running (KOER) Self-Test. • **Are HO2S DTCs P1131 or P1132 present?**	Yes	Go to next Step.
		No	For DTC P0171, P0172, P1130 Go to next Step. If DTC P1132 are no longer present. RECONNECT Fuel Vapor line. All others: The fault that produced the DTC is an intermittent. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary).
3	CHECK FUEL PRESSURE **WARNING: THE FUEL SYSTEM IS PRESSURIZED WHEN THE ENGINE IS NOT RUNNING. TO PREVENT INJURY OR FIRE, USE CAUTION WHEN WORKING ON THE FUEL SYSTEM.** • Key off. • Install fuel pressure gauge. • Verify vacuum source to fuel pressure regulator. **If engine will start:** • Start engine and idle. Record fuel pressure. • Increase engine speed to 2,500 rpm and maintain for one minute. Record fuel pressure. **No Start:** • Cycle key on and off several times. Record fuel pressure. • **Is the fuel pressure between 35—40 psi (240—280 kPa)?**	Yes	Fuel system is capable of required fuel pressure. Go to next Step.
		No	Fuel pressure out of specification.
4	CHECK SYSTEM ABILITY TO HOLD FUEL PRESSURE • Fuel pressure gauge installed. • Cycle key on and off several times. • Verify there are no external leaks (repair as necessary). • **Does the fuel pressure remain within 5 psi of the highest reading after one minute?**	Yes	For DTCs P0171, P0172 and P1130 Go to next Step. For No starts: Go to Step 6. For Fuel Control DTC displayed with misfire DTC's. Go to Step 7. All other DTCs: Go to Step 11.
		No	Excessive pressure less.

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td rowspan="2">5</td><td rowspan="2">CHECK SYSTEM ABILITY TO HOLD FUEL PRESSURE WITH KEY ON
• Fuel pressure gauge installed.
• Cycle key on then off several times.
• Turn key on and engine off, monitor fuel pressure gauge.
• Does the fuel pressure remain within 5 psi of the highest reading after 10 seconds?</td><td>Yes</td><td>For DTCs P0171 and P1130 Go to Step 7.</td></tr>
<tr><td>No</td><td>For DTC P0172 Go to Step 9.</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">CHECK ABILITY OF INJECTOR(S) TO DELIVER FUEL
• Pressure gauge installed.
• Cycle key several times.
• Monitor pressure gauge while cranking the engine for at least five seconds.
• Was there a pressure drop greater than 5 psi (34 kPa)?</td><td>Yes</td><td>The EEC-V System is not the cause of the no start.
REMOVE the fuel pressure gauge.
REFER to TROUBLESHOOTING GUIDE for further diagnosis.</td></tr>
<tr><td>No</td><td>REMOVE fuel pressure gauge.
RECONNECT IFS switch.
Go to next Step.</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">CHECK RESISTANCE OF INJECTOR(S) AND HARNESS
• Key off.
• Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary.

NOTE: This erases Continuous Memory DTCs.

• Install breakout box, leave PCM disconnected.

NOTE: If a misfire DTC(s) are displayed with the Fuel Control DTC(s), use the misfire DTC(s) to determine the injector circuit(s) requiring testing.

• Measure resistance between suspect injector Test Pin(s) and Test Pin 71 or 97 at the breakout box using the chart below.

<table><tr><th>Cyl. No.</th><th>Test Pin</th></tr><tr><td>1</td><td>75</td></tr><tr><td>2</td><td>101</td></tr><tr><td>3</td><td>74</td></tr><tr><td>4</td><td>100</td></tr></table>
• Is the resistance between 11.0—18.0 ohms?</td><td>Yes</td><td>Fuel injector and harness resistance is OK.
Go to Step 10.</td></tr>
<tr><td>No</td><td>Go to next Step.</td></tr>
<tr><td rowspan="2">8</td><td rowspan="2">CHECK CONTINUITY OF FUEL INJECTOR HARNESS
• Key off.
• Breakout box installed, PCM disconnected.
• Disconnect injector harness connector at the suspect injector.
• Measure the resistance between Test Pin 71 or 97 at the breakout box and the VPWR pin at the injector harness connector.
• Measure resistance between the Injector Test Pin(s) at the breakout box and the Injector Signal Pin at the injector connector. (Refer to chart in Step 7 for Injector Pin location.)
• Is each resistance less than 5.0 ohms?</td><td>Yes</td><td>Go to next Step.</td></tr>
<tr><td>No</td><td>SERVICE open harness circuit.
REMOVE breakout box.
RECONNECT PCM and fuel injectors.
RERUN Quick Tests.</td></tr>
</table>

STEP	INSPECTION		ACTION
9	CHECK INJECTOR HARNESS CIRCUIT FOR SHORT TO POWER OR GROUND • Key off. • Breakout box installed, PCM disconnected. • Suspect fuel injector harness disconnected. • Measure resistance between the Injector Test Pin(s) and Test Pin 71 or 97, 24, 76 and 103 at the breakout box (refer to chart in Step 7). • Measure the resistance between the Injector Test Pin(s) at the breakout box and chassis ground. • **Is each resistance greater than 10,000 ohms?**	Yes	Go to Step 10.
		No	SERVICE short circuit. REMOVE breakout box. RECONNECT PCM and all fuel injector(s). RERUN Quick Test.
10	CHECK INJECTOR DRIVER SIGNAL Requires standrad 12 volt test lamp. • Key off. • Breakout box installed. • Connect PCM to breakout box. • Connect test lamp between Test Pin 71 or 97 and each injector Test Pin (refer to chart in Step 7). • Crank or start engine. **NOTE:** Properly operating system will show a dim glow at idle on the test lamp. • **Does test lamp have a dim glow while cranking or running engine?**	Yes	REMOVE breakout box. RECONNECT PCM. Go to next Step.
		No	No light/Continuous bright light. REPLAE PCM. REMOVE breakout box. RERUN Quick Test.
11	FLOW TEST FUEL INJECTOR(S) • **Is the leakage and flow within specification?**	Yes	DTCs P0171 and P0172 The fault that produced the DTC is an intermittent. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary). DTC P1130 Go to Step 13. All others: Go to next Step.
		No	REPLACE Fuel injector. RERUN Quick Test.
12	CHECK CYLINDER COMPRESSION **NOTE:** Use the Misfire DTC(s) displayed on prior DTC retrieval to determine which cylinder(s) to check compression. • Check cylinder compression. Refer to Section B1. • **Are cylinder compression readings within specification?**	Yes	For DTCs P1130 and P1131 Go to next Step. For DTC P1132 Go To Step 19. Misfire DTC's displayed with Fuel Control DTC's Go to DTCs P0300, P0301, P0302, P0303, P0304.
		No	REPAIR as necessary. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
13	CHECK HO2S INTEGRITY Diagnostic Trouble Code DTC P1131 and/or P1130 indicate HO2S always lean, slow to switch, lack of switching or fuel at adaptive limit. Possible causes: – Moisture inside the HO2S harness connector resulting in a short to ground – HO2S coated with contaminates – HO2S circuit open – HO2S circuit shorted to ground • Key off. • Inspect HO2S harness for chafing, burned out wires or other damage and service. • Inspect HO2S and connector for indications of submersions in water, oil, coolant, etc., and service. • Run engine at 2,000 rpm for two minutes. • Key off. • Activate Key On Engine Running (KOER) Self-Test. • **Is DTC P1131 present?**	Yes	Go to next Step.
		No	HO2S system is OK. Fuel delivery system is OK. Faults may have been repaired while doing inspection. Testing is complete at this time.

STEP	INSPECTION		ACTION
14	CHECK HO2S ABILITY TO GENERATE A VOLTAGE GREATER THAN 0.5 VOLT Any vacuum or air leaks in non-EEC areas could cause DTCs P1131 and P1130. Possible causes: – Leaking vacuum actuators – Engine sealing – EGR system – PCV system – Unmetered air leaks between throttle body and Mass Air Flow (MAF) sensor assembly – Silicone contaminated HO2S • Key off. • Disconnect the suspect HO2S from vehicle harness. • Connect DVOM to the HO2S Signal and HO2S SIG RTN or HO2S GND at the HO2S sensor connector. • DVOM on 20 volt scale. • Run engine at 2,000 rpm for two minutes. • Rerun KOER Self-Test and monitor HO2S voltage. • **Does DVOM indicate greater than 0.5 volt during or at the end of Self-Test?**	Yes	Go to next Step.
		No	REPLACE HO2S. RERUN Quick Test.
15	CHECK CONTINUITY OF HO2S AND HO2S GROUND CIRCUITS • Key off. • Breakout box installed, PCM disconnected. • Disconnect suspect HO2S from harness. Inspect both ends of connetor for damaged or pushed out pins, moisture, corrosion, loose pins, etc., and service. • Measure the resistance between HO2S Signal Test Pin at the breakout box and the HO2S vehicle harness connector. Use the Pin assignment below and record the reading. • Measure resistance between SIG RTN test pin at the breakout box and HO2S SIG RTN vehicle harness connector. Record readings. – HO2S-11 SIG = Test Pin 60 – HO2S-21 SIG = Test Pin 87 – HO2S SIG RTN = Test Pin 91 • **Is the resistance reading less than 5.0 ohms?**	Yes	Go to next Step.
		No	SERVICE open circuit. REMOVE breakout box. RECONNECT PCM and HO2S. RERUN Quick Test.
16	CHECK HO2S CIRCUIT WIRING HARNESS FOR SHORT TO GROUND • Key off. • Breakout box installed, PCM disconnected. • HO2S disconnected. • Measure resistance between the HO2S Signal Test Pin and Test Pins 24, 51, 76, 77 and 103 at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	Go to next Step.
		No	SERVICE short circuit. REMOVE breakout box. RECONNECT PCM and HO2S. RERUN Quick Test.
17	CHECK HO2S FOR SHORT TO GROUND • Key off. • Breakout box installed, PCM disconnected. • HO2S connected. • Measure resistance between PWR GND/SIG RTN Test Pin and HO2S Signal Test Pin at the breakout box. HO2S-11 SIG = Test Pin 60 HO2S-21 SIG = Test Pin 87 HO2S PWR GND = Test Pin 24, 76 and 103 HO2S SIG RTN = Test Pin 91 • **Is reistance greater than 10,000 ohms?**	Yes	For DTCs 1130 Go to next Step. For DTCs 1131 Go to Step 23. For KOER DTCs P1131. REMOVE breakout box. RECONNECT HO2S. REPLACE PCM.
		No	REPLACE HO2S. REMOVE breakout box. RECONNECT PCM. RERUN Quick Test.

STEP	INSPECTION		ACTION
18	CHECK FOR DTCS P1132 AND P1152 WITH P1130 AND P1150 • Key off. • Scan Tool connected. • Activate Key On Engine Running (KOER) Self-Test. • **Is DTC P1132 present?**	Yes	Go to next Step.
		No	The fault that produced the DTC is an intermittent. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary).
19	CHECK FOR HO2S SIGNAL SHORTED TO POWER Diagnostic Trouble Codes (DTCs) P1132 and/or P1130 indicate HO2S always rich. Possible caues: – Moisture inside the HO2S harness connector resulting in a short to power – HO2S circuit shorted to power DTC P1130, P1132=HO2S-11 • Key on, engine off. • Scan Tool connected. • Access the Parameter Identification (PID) for the DTC generated. **NOTE:** HO2S displayed as O2S on Scan Tool. • **Is the voltage greater than 1.0 volt and less than 4.0 volts?**	Yes	An over voltage condition exists in the HO2S circuit. Go to next Step.
		No	Go to Step 22.
20	CHECK FOR SHORTS TO VOLTAGE SOURCE IN THE HARNESS CIRCUIT • Key off. • Suspect sensor disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Use the following list to measure the resistance between the appropriate test pins at the breakout box. – DTC P1130, P1132=HO2S-11 Test Pin 60 and Test Pins 71, 93 and 97 – DTC P1150, P1152=HO2S-21 Test Pin 87 and Test Pins 71, 93 and 97 • **Is the resistance greater than 10,000 ohms?**	Yes	REMOVE breakout box. RECONNECT PCM. Go to next Step.
		No	REPAIR short to power. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
21	CHECK FOR HO2S SIGNAL SHORTED TO HO2S HEATER CIRCUIT IN THE SENSOR • Key off. • Suspect HO2S sensor disconnected. • Scan Tool connected. • Key on, engine off. • Access HO2S PID corresponding to DTCs received. **NOTE:** HO2S displayed as O2S on Scan Tool. • **Is the HO2S voltage less than 0.2 volt?**	Yes	REPLACE HO2S. RECONNECT all components. RERUN Quick Test.
		No	REPLACE PCM. RECONNECT all components. RERUN Quick Test.
22	ATTEMPT TO GENERATE DTCS P1131 AND P1151 • Key off. • HO2S disconnected. • Jumper HO2S Signal at the HO2S harness vehicle connector to the battery negative post. • Activate Key On Engine Running (KOER) Self-Test. • **Are DTCs P1131 or P1151 present?**	Yes	REMOVE jumper. Go to next Step.
		No	REMOVE jumper. RECONNECT HO2S. DISCONNECT PCM. INSPECT both ends of connector for damaged or pushed out pins, moisture, corrosion, loose pins, etc. and service as necessary. If OK, REPLACE PCM. RERUN KOER Self-Test.

STEP	INSPECTION		ACTION
23	HO2S CHECK • Key off. • Suspect HO2S disconnected. • Connect DVOM to HO2S Signal circuit and HO2S SIG RTN at the HO2s sensor connector. • DVOM on 20 volt scale. • Disconnect vacuum hose from vacuum tree. • Start engine and run at 2,000 rpm. • **Does the DVOM indicate less than 0.4 volt within 30 seconds?**	Yes	RECONNECT vacuum hose and HO2S. Go to next Step.
		No	REPLACE HO2S. RECONNECT vacuum hose. RERUN Quick Test.
24	MONITOR HO2S (PID) FOR NORMAL SWITCHING • Key on, engine running. • Engine at operating temperature. • Access suspect HO2S PID using Scan Tool. **NOTE:** HO2S displayed as O2S on Scan Tool. • Access HO2S PID while wiggling, bending, and shaking small sections of the EEC harness from the PCM to the HO2S. • **Did the HO2S voltage stay high (greater than 0.45 volt) or low (less than 0.45 volt)?**	Yes	ISOLATE cause of lack of HO2S switches and service. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	Go to next Step.
25	TEST DRIVE WHILE MONITORING HO2S PID FOR NORMAL SWITCHING **NOTE:** This test step requires an observer to monitor PID for proper operation. • Scan Tool still attached. • Access HO2S PID. • While observer views PID, test drive vehicle under different road conditions in an attempt to simulate the original fault. • **Does HO2S appear to switch properly?**	Yes	UNABLE to duplicate fault. CLEAR any DTCs. Testing complete at this time.
		No	REPLACE HO2S. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

CODE No.	P0230, P1235, P1236 (KOEO, KOER)
DESCRIPTION	• DTCs P0230, P1235 or P1236 indicate a fuel pump circuit failure

[Possible Cause]
- Damaged FPR
- Damaged PCM
- Open or shorted circuit

STEP	INSPECTION		ACTION
1	CHECK FOR VPWR TO FPR • Disconnect the FPR. • Key on, engine off. • Measure voltage between VPWR circuit at the FPR vehicle harness connector and chassis ground. • **Is voltage greater than 10.5 volts?**	Yes	Go to next Step.
		No	SERVICE open in VPWR circuit between the ignition switch and the FPR. RECONNECT the FPR. RERUN Quick Test.
2	CHECK FPR • Key off. • FPR disconnected. • Check FPR coil resistance: – Measure resistance between terminals A and B at the FPR – Resistance should be less than 5 ohms • Check FPR for internal shorts. – Measure resistance between terminals C and D at the FPR – Resistance should be greater than 10,000 ohms • **Are all resistance checks OK?**	Yes	Go to next Step.
		No	REPLACE FPR. RERUN Quick Test.
3	CHECK FUEL PUMP CIRCUIT FOR SHORT TO POWER • Key off. • FPR disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Key on, engine off. • Measure voltage between Test Pin 80 (FP) at the breakout box and chassis ground. • **Is voltage less than 1.0 volt?**	Yes	Go to next Step.
		No	SERVICE short to power. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
4	CHECK FUEL PUMP CIRCUIT FOR SHORT TO GROUND • Key off. • Disconnect NGS from DLS. • Breakout box installed, PCM disconnected. • FPR disconnected. • Measure resistance between Test Pin 80 and Test Pins 51 or 103 (PWR GND) and 91 (SIG RTN) at the breakout box. • **Is resistance greater than 10,000 ohms?**	Yes	Go to next Step.
		No	SERVICE short circuit. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
5	CHECK FUEL PUMP CIRCUIT CONTINUITY • Key off. • Breakout box installed, PCM disconnected. • FPR disconnected. • Measure resistance between Fuel Pump circuit at the FPR vehicle harness connector and Test Pin 80 at the breakout box. • **Is resistance less than 5.0 ohms?**	Yes	REPLACE PCM. RECONNECT all components. RERUN Quick Test.
		No	SERVICE open circuit. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.

CODE No.	P0230, P1235, P1236 (CONTINUOUS)
DESCRIPTION	• DTCs P0230, P1235 or P1236 indicate a fuel pump circuit failure has occurred during vehicle operation

[Possible Cause]
- Open in VPWR to FPR
- Open coil in FPR
- Open in Fuel Pump circuit (PCM Pin 80)

STEP	INSPECTION		ACTION
1	CHECK EEC-V HARNESS • NGS connected. • Key on, engine off. Wait 5 seconds. • Access FPA PID. The FPA PID will be off, indicating that the PCM detects VPWR voltage through the FPR coil and FP circuit (Pin 80) to the PCM. • Observe the FPA PID for an indication of a fault while performing the following (the FPA PID will turn on, when an open is detected (this is because the PCM will not detect VPWR voltage on Pin 80 (FP))): – Shake, wiggle, bend the fuel pump circuit between the PCM (Pin 80) and the FPR – Shake, wiggle bend the VPWR circuit between the ignition switch and the FPR – Lightly tap the FPR (to simulate road shock) • Key off. • Inspect the PCM and FPR connectors for corrosion, damaged pins, etc. • **Is a fault indicated?**	Yes	ISOLATE fault and SERVICE as necessary. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	REPAIR open in VREF circuit.

CODE No.	P0300, P0301, P0302, P0303, P0304
DESCRIPTION	• DTC P0300 indicates multiple cylinders misfiring, or cannot identify cylinder due to Camshaft Position sensor failure

[Possible Cause]
- Ignition system
- Fuel injection
- Fuel pressure
- Evaporative system
- Canister purge
- Base engine
- Running out of fuel

STEP	INSPECTION		ACTION
1	CHECK POSSIBLE CAUSES TO MISFIRE **NOTE:** Running out of fuel may turn on the MIL and possibly store a Continuous Misfire DTC. • **Has the vehicle recently run out of fuel?**	Yes	OBD II system OK. COMPLETE PCM. RESET to clear DTCs. RETURN vehicle to customer.
		No	Go to next Step.
2	CHECK FOR OTHER CONTINUOUS MEMORY (DTCS) Check for other Continuous Memory DTCs which COULD cause the Misfire DTC. Possible causes: – Camshaft Position Sensor (CID) – Octane Adjust (Oct Adj) – Ignition Coil Primary Circuit – Knock Sensor (KS) • **Are there any other Continuous Memory DTCs present?**	Yes	ADDRESS the next Continuous DTC. DISREGARD Misfire DTC at this time. Go to DTC charts.
		No	Go to next Step.
3	CHECK FOR ON-DEMAND SELF-TEST DTCS **NOTE:** CHECK for any Key On Engine off DTCs, which could cause the Misfire DTC. • **Are any Key On Engine Off DTCs displayed on the Scan Tool?**	Yes	Go to DTC charts and PROCEED as required.
		No	CHECK spark plugs and secondary wires. If OK, Go to next Step.
4	CHECK FOR KEY ON ENGINE RUNNING DTCS **NOTE:** Check for any Key On Engine Running DTC's which could cause the misfire DTC's. • **Are any Key On Engine Running DTC's displayed on the Scan Tool?**	Yes	If DTC P1131 or P1151 are present, Go to DTC charts and PROCEED as required.
		No	Go to next Step.
5	CHECK RESISTANCE OF INJECTOR(S) AND HARNESS • Key off. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires etc. Service as necessary. **NOTE:** This erases Continuous Memory DTCs. • Install breakout box, leave PCM disconnected. • Measure resistance between suspect injector test pin and Test Pin 71 or 97 at the breakout box. • **Is the resistance between 11.0–18.0 ohms?**	Yes	Injector and harness resistance is OK, Go to next Step.
		No	Go to DTC P0171, P0172, P1130, P1131, P1132. Step 8 to evaluate fuel injectors.

STEP	INSPECTION		ACTION
6	CHECK INJECTOR DRIVER SIGNAL **NOTE:** Requires a standard 12 volt test lamp. • Key off. • Breakout box installed. • Connect PCM to breakout box. • Connect Test Lamp between Test Pin 71 or 97 and suspect injector test pin. • Start engine. • **Does test lamp have a dim glow while running engine?** **NOTE:** Properly operating system will show a dim glow on the Test Lamp.	Yes	Go to next Step.
		No	No light or bright light. REPLACE PCM. REMOVE breakout box. RERUN Quick Test.
7	CHECK FUEL PRESSURE **WARNING: THE FUEL SYSTEM WILL REMAIN PRESSURIZED WHEN ENGINE IS NOT RUNNING. TO PREVENT INJURY OR FIRE, USE CAUTION WHILE WORKING ON THE FUEL SYSTEM.** • Key off. • Install fuel pressure gauge. • Start and run engine at idle. Record fuel pressure. • Increase engine speed to 2,500 rpms and maintain for one minute. Note and compare fuel pressure. • **Is fuel pressure between 35—40 psi (240—280 kPa)?**	Yes	Go to next Step.
		No	CHECK THE FUEL SYSTEM.
8	CHECK ABILITY OF FUEL SYSTEM TO HOLD FUEL PRESSURE • Start and run engine at idle. Note fuel pressure. • Increase engine speed to 2,500 rpms and maintain for one minute. • Visually look for fuel leaking at the injector O-ring, fuel pressure regulator and the fuel lines to the fuel charging assembly. Service as necessary. • Turn engine off. • Key on, engine off. • **Does fuel pressure remain at specification within 5 psi for 60 seconds?**	Yes	Go to next Step.
		No	CHECK System is at fault.
9	CHECK FUEL INJECTOR FOR FLOW AND LEAKAGE • Verify that the flow rate for each fuel injector is within specification. • **Is flow rate for each injector within specification?**	Yes	Fuel Delivery System is not considered the likely area to have caused the Misfire DTC. Go to next Step to evaluate the Vacuum System.
		No	REPLACE or CLEAN the defective injector(s) as required. RERUN Quick Test.
10	CHECK VACUUM SYSTEM • Visually inspect all vacuum lines for damage, such as pinched lines, cracks, proper routing and assembly. **NOTE:** Some vacuum leaks can be found audibly. • **Is the vehicle vacuum system OK?**	Yes	Go to next Step.
		No	SERVICE the vacuum system. RERUN Quick Test.
11	CHECK EVAPORATIVE EMISSION SYSTEM The Misfire Monitor can be influenced by Evaporative Emission System. The next four steps will evaluate the Evaporative Emission System. • Check the carbon canister for fuel saturation. • **Is there an excess amount of liquid fuel present in the canister?**	Yes	REPLACE carbon canister. RERUN Quick Test.
		No	Go to next Step. CHECK fuel tank vent system.

STEP	INSPECTION		ACTION
12	PRESSURE TEST EVAPORATIVE SYSTEM • Remove vapor line at canister. • Install a TEE in the line. • Install a pressure gauge to one side of TEE. • Supply air to the other side of TEE, up to a maximum of 75 psi. • **Is evaporative emission system holding pressure?**	Yes	RECONNECT canister line, Go to next Step.
		No	SERVICE as necessary. RERUN Quick Test.
13	CHECK VACUUM IN EVAPORATIVE SYSTEM • Check for blockage/restrictions or cut hoses between engine vacuum port and carbon canister. • Check for blockage in fuel tank vent system. • **Is there a fault indicated?**	Yes	REPLACE damaged vacuum hoses, or REMOVE blockage/restrictions. RERUN Quick Test.
		No	Go to next Step.
14	CHECK CANISTER PURGE SOLENOID (CANP) This step will verify the mechanical integrity of (CANP). The solenoid and circuit have been checked electrically and reported during KOEO Self-Test. • Key off. • Disconnect (CANP) solenoid. • Connect 12 volt DC power source to solenoid. **CAUTION must be observed for proper pin orientation.** • Connect positive power source to VPWR circuit and negative lead to CANP circuit at the CANP solenoid harness connector. • Apply 53 kPa (16 in-Hg) of vacuum to the manifold side of the CANP solenoid. Apply power source. • **Does the solenoid open and pass air freely?**	Yes	Evaporative System is functioning properly. Go to next Step for Base Engine concerns.
		No	REPLACE Canister Purge solenoid. RERUN Quick Test.
15	CHECK FOR BASE ENGINE CONCERNS The purpose of this step is to determine if there are any Base Engine concerns that may have caused the Misfire DTC or drive concern. Perform the following tests in order to evaluate Base Engine integrity. • Perform an Engine Compression test. • Perform Dynamic Valve Train analysis. • Check Positive Crankcase Ventilation System. • Check possible leakage points. Refer to section B. • **Is any service required?**	Yes	SERVICE as necessary. RERUN Quick Test.
		No	The cause of the Misfire DTC is intermittent and diagnosis will be in the Ignition System. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary). FOLLOW instructions for using the Ignition Intermittent Analyzer, also known as the DIST tool.

CODE No.	P0340
DESCRIPTION	• DTC P0340 Indicates that Self-Test has detected a Camshaft Position (CMP) sensor circuit failure

[Possible Cause]
- CID circuit open
- CID circuit shorted to GND
- CID circuit shorted to PWR
- PWR GND open
- VPWR open
- Damaged CMP Sensor
- Damaged PCM

STEP	INSPECTION		ACTION
1	START ENGINE • Start engine. • **Will the engine start?**	Yes	Go to next Step.
		No	DTC P0340 is not the cause of the no start. Go to No start symptom.
2	CLEAR AND ATTEMPT TO RE-GENERATE DTC P0340 • Complete PCM Reset to clear DTCs (refer to PCM Reset). • Start engine. • Increase rpm to greater than 1,500 rpm for 10 seconds. Repeat two times. • Key off. • Retrieve all Continuous Memory DTCs. • **Is DTC P0340 present?**	Yes	Go to next Step.
		No	The fault that produced DTC P0340 is intermittent. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary).
3	CHECK VPWR TO CMP SENSOR • Key off. • Disconnect CMP sensor vehicle harness connector. • Key on, engine off. • Measure voltage between VPWR circuit at the CMP vehicle harness connector and battery negative post. • **Is voltage greater than 10.5 volts?**	Yes	Go to next Step.
		No	SERVICE open in VPWR circuit. RECONNECT all components. COMPLETE PCM. Reset to clear DTCs.
4	CHECK PWR GND TO CMP SENSOR • Key off. • CMP sensor disconnected. • Measure resistance between PWR GND circuit at the CMP vehicle harness connector and battery negative post. • **Is resistance less than 5.0 ohms?**	Yes	Go to next Step.
		No	SERVICE open in PWR GND circuit. COMPLETE PCM. Reset to clear DTCs (REFER to PCM Reset). RERUN Quick Test.
5	CHECK CONTINUITY TO PCM • Key off. • CMP sensor vehicle harness connector disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure resistance between CID circuit at the CMP vehicle harness connector and Test Pin 85 (CID) at the breakout box. • **Are resistance measurements less than 5.0 ohms?**	Yes	Go to next Step.
		No	SERVICE open circuit. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
6	CHECK CID FOR SHORT TO POWER • Key off. • CMP sensor disconnected. • Breakout box installed, PCM disconnected. • Key on, engine off. • Measure voltage between Test Pin 85 (CID) and Test Pins 51 and 103 (PWR GND) at the breakout box. • **Is voltage less than 1.0 volt?**	Yes	Go to next Step.
		No	SERVICE CID circuit for short to power. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.

STEP	INSPECTION		ACTION
7	CHECK CID FOR SHORT TO GND • Key off. • Breakout box installed, PCM disconnected. • CMP sensor disconnected. • Measure resistance between Test Pin 85 (CID) and Test Pins 51, 103 (PWR GND) and 91 (SIG RTN). • **Is each resistance greater than 10,000 ohms?**	Yes	Go to next Step.
		No	SERVICE CID circuit for short to GND or SIG RTN. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
8	CHECK FOR SHORTS IN PCM • Key off. • CMP sensor disconnected. • Breakout box installed. • Connect PCM to breakout box. • Measure resistance between Test Pin 85 (CID) and Test Pins 51, 103 (PWR GND), 71, 97 (VPWR), 91 (SIG RTN), and 23 (IGN GND) at the breakout box. • **Is each resistance greater than 500 ohms?**	Yes	Go to next Step.
		No	REPLACE PCM. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
9	CHECK CMP SENSOR OUTPUT • Key off. • Breakout box installed, PCM connected. • Reconnect CMP sensor. • DVOM on AC scale (to monitor less than 5.0 volts). • Measure voltage between Test Pin 85 (CID) and Test Pins 51 and 103 (PWR GND) at the breakout box while running engine at varying rpm. • **Does AC voltage vary greater than 0.1 volt AC?**	Yes	REPLACE PCM. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
		No	REPLACE CMP sensor. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.

CODE No.	P0400, P1407
DESCRIPTION	• DTC P0400 indicates an EGR valve/flow failure • DTC P1407 indicates the EGR valve did not move

[Possible Cause]
- Damaged EGRV solenoid
- Damaged EGRA solenoid
- Damaged EGR valve
- Damaged EGR/BP sensor
- Damaged EGRC solenoid
- Restriction in exhaust system
- Damaged PCM
- Damaged harness connector
- Damaged harness

STEP	INSPECTION		ACTION
1	OUTPUT ALL DTCs • Output all components memory, KOEO and KOER self-test DTCs. • **Is P0106, P0107, P0108, P1400, P1401 or P1408 output?** **NOTE:** If any other DTCs are output, record them and address them after completing this trouble-shooting.	Yes	Go to DTC P0106, P0107, P0108, P1400, P1401 or P1408 troubleshooting.
		No	Go to next Step.
2	CHECK VPWR TO EGRC SOLENOID • Key off. • EGRC solenoid disconnected. • Key on, engine off. • Measure voltage between VPWR circuit and chassis ground at the EGRC solenoid vehicle harness connector. • **Is EGRC VPWR voltage greater than 10.5 volts?**	Yes	Go to next Step.
		No	SERVICE open in EGRC solenoid VPWR circuit. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
3	CHECK RESISTANCE OF EGRC SOLENOID • Key off. • EGRC solenoid disconnected. • Measure solenoid resistance. • **Is resistance between 30 and 70 ohms?**	Yes	Go to next Step.
		No	REPLACE the EGRC solenoid. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
4	CHECK EGRC SOLENOID CIRCUIT CONTINUITY • Key off. • EGRC solenoid disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure the resistance between Test Pin 98 (EGRC) at the breakout box and the EGRC circuit at the solenoid vehicle harness connector. • **Is the resistance less than 5.0 ohms?**	Yes	Go to next Step.
		No	SERVICE open in EGRC harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
5	CHECK EGRC SOLENOID CIRCUIT FOR SHORT TO POWER AND SHORT TO GROUND • Key off. • EGRC solenoid disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between Test Pin 98 (EGRC) and Test Pins 71, 97 (VPWR) and 90 (VREF) at the breakout box. • Measure resistance between Test Pin 98 (EGRC) and Test Pins 51, 103 (PWR GND) and 91 (SIG RTN) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	REMOVE breakout box. RECONNECT all components. Go to next Step.
		No	SERVICE short in EGRC solenoid harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

STEP	INSPECTION		ACTION
6	CHECK OPERATION OF EGRC SOLENOID VALVE • Key off. • Breakout box installed, PCM connected. • Disconnect the vacuum line from the EGRC solenoid to the intake manifold vacuum reservoir at the EGRC solenoid. Inspect vacuum line for damage, service as necessary. • Install vacuum pump at the input port of the EGRC solenoid and apply 8 to 10"-Hg of vacuum. • Disconnect the vacuum line from the EGRC solenoid to EGR/BP sensor at the EGR/BP sensor. Inspect vacuum line for damage, service as necessary. • Install a vacuum gauge at the unattached end of the vacuum line. • Key on. • Jumper Test Pin 98 (EGRC) to ground at the breakout box and observe the vacuum gauge. Remove jumper. • Apply 8 to 10"-Hg of vacuum to the EGRC solenoid once again. • Again jumper Test Pin 98 (EGRC) to ground at the breakout box and observe the vacuum gauge. Remove jumper. • Key off. • **Was a vacuum signal indicated at any time by the vacuum gauge?**	Yes	REMOVE the vacuum pump and gauge. RECONNECT all vacuum lines. Intermittent poor connection or component malfunction. (REPAIR or REPLACE as necessary).
		No	REPLACE the damaged EGRC solenoid. REMOVE breakout box. REMOVE the vacuum gauge and vacuum pump. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

CODE No.	P0420
DESCRIPTION	• Diagnostic Trouble Code (DTC) P0420 indicates that catalyst system efficiency is below the acceptable threshold

[Possible Cause]

- Use of leaded fuel
- Oil contamination
- Cylinder misfiring
- Damaged HO2S
- Damaged ECT sensor
- Downstream HO2S wires improperly connected
- Fuel pressure too high
- Damaged exhaust system pipe
- Damaged exhaust manifold
- Damaged muffler/tail-pipe assembly
- Damaged catalytic converter

STEP	INSPECTION		ACTION
1	CHECK FOR MISFIRE MONITOR DTC **NOTE 1:** Complete the spark timing check in Quick Test before proceeding with this test step. Spark timing retarded below specification may increase exhaust gas temperature and decrease catalyst efficiency overtime. **NOTE 2:** Be sure customer has not: (1) Refueled vehicle with leaded gasoline. (2) Experienced high vehicle all consumption. **NOTE 3:** If entering this Pinpoint Test for symptoms only, go immediately to Step 5. **NOTE 4:** Internal deterioration of a catalytic converter is usually caused by abnormal engine operation upstream of the catalyst. Events that may produce higher than normal temperatures in the catalyst are particularly suspect. For example, misfiring can cause higher than normal catalyst operating temperatures. • Key on, engine off. • Retrieve and record all Continuous Memory DTCs (MIL and non-MIL). • **Were any of the following misfire monitor DTCs recorded: P0300, P0301, P0302, P0303 and P0304?**	Yes	Go to address the misfire monitor DTC.
		No	Go to next Step.
2	CHECK FOR HO2S MONITOR DTC **NOTE 1:** Incorrect HO2S signal input (e.g. rich/lean input signal when the engine is operating under lean/rich conditions) may cause an abnormal temperature increase in the catalyst. **NOTE 2:** Non-California applications will not have an active HO2S monitor. As a result, a Catalyst Efficiency Monitor DTC can be generated for a rear HO2S concern. To check for a rear HO2S concern on these applications, Go to heated oxygen sensor inspection. If any repair actions are necessary, run KOER Self-Test, to verify the repair. If repair actions are not necessary, go to Step 3. • **Were any of the following HO2S monitor DTCs recorded: P0136 and P0141 (rear HO2S)?**	Yes	Go to address the HO2S Monitor DTC.
		No	Go to next Step.
3	CHECK FOR ANY OTHER DTCS **NOTE:** ECT sensor DTCs can be an indication that the thermostat is not operating correctly or that the coolant level is not filled to specifications, producing above normal operating temperatures. • **Were any of the following ECT sensor DTCs recorded in: P0117, P0118, P0125 and P1117?**	Yes	Go to address the ECT sensor DTCs.
		No	Go to next Step.
4	CHECK FOR ANY OTHER DTCS • **Were any other DTCs recorded in (not including the initial P0420 DTC)?**	Yes	Go to address the DTCs.
		No	Go to next Step.

STEP	INSPECTION		ACTION
5	CHECK REAR HO2S WIRING **NOTE:** If the electrical connections of the rear HO2S are interchanged/crossed, the Catalyst Efficiency Monitor Test will be failed. • Inspect the wiring of each rear HO2S for proper routing and connection. • **Are the HO2S wires improperly routed?**	Yes	Correctry route/connect the rear HO2S harness circuit(s). COMPLETE the PCM Reset to clear all DTCs (REFER to PCM Reset). RERUN Quick Test.
		No	No EEC-V root causes related to the DTCs or symptoms Go to next Step.
6	CHECK FUEL PRESSURE **WARNING: THE FUEL SYSTEM WILL REMAIN PRESSURIZED WHEN THE ENGINE IS NOT RUNNING. TO PREVENT INJURY OR FIRE, USE CAUTION WHEN WORKING ON THE FUEL SYSTEM.** **NOTE:** Fuel pressures above specification may produce an abnormally rich air/fuel mixture. The rich air/fuel mixture may cause higher than normal catalyst operating temperatures. • Key off. • Inspect the vacuum hose going to the fuel pressure regulator for proper installation, cracks, etc. Service as necessary. • Install fuel pressure gauge. • Verify vacuum source to fuel pressure regulator. • Start and run the engine at idle. Record the fuel pressure. • Increase engine speed to 2,500 rpm and maintain for one minute. Record the fuel pressure. • **Is the fuel pressure between 35 and 40 psi (240—280 kPa)?**	Yes	Fuel pressure is OK. REMOVE the fuel pressure gauge. Go to next Step.
		No	Fuel pressure is out to specification. Inspect the Fuel Delivery Systems. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
7	CHECK FOR OBVIOUS LEAK SOURCES IN THE EXHAUST SYSTEM **NOTE:** If a catalyst is in series with a leaking exhaust system, it can fail the Catalyst Efficiency Monitor test. • Key off. • Inspect the following for leaks, cracks, loose connections or punctures: – Exhaust manifold – Front exhaust pipe – Rear exhaust pipe – Silencer/tail-pipe assembly • **Are the above components free of cracks and punctures, etc.?**	Yes	CHECK that the exhaust manifold to catalyst inlet pipe joint is tight. Go to next Step.
		No	REPLACE/REPAIR the leak source(s). RESET KAM (REFER to PCM Reset). RERUN Quick Test.
8	CHECK FOR OBVIOUS RESTRICTIONS IN THE EXHAUST SYSTEM • Inspect the following for dents, areas of collapsed material and unusual bending: – Front exhaust pipe – Rear exhaust pipe – Silencer/tail-pipe assembly • **Are the above components free of dents and areas of collapsed material or unusual bending, etc.?**	Yes	Go to next Step.
		No	REPLACE/REPAIR the restricted component(s) as necessary. COMPLETE PCM. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

STEP	INSPECTION		ACTION
9	CHECK MANIFOLD VACUUM FOR INDICATION OF EXCESSIVE EXHAUST SYSTEM RESTRICTION • Attach a vacuum gauge to the intake manifold vacuum source. • Install a tachometer. • Observe the vacuum gauge needle while performing the following: **NOTE:** The vacuum gauge reading may be normal when the engine is first started and idled. However, excessive restriction in the exhaust system will cause the vacuum gauge needle to drop to a low point even while the engine is idled. – Start the engine and gradually increase the rpm to 2,000 with the transmission in NEUTRAL • Decrease engine speed to base idle rpm. • Key off. • **Did manifold vacuum rise above 16 inches Hg with the engine rpm at 2,000?**	Yes	Go to next Step.
		No	Manifold vacuum did not reach an acceptable level. An excessive restriction may be present. Go to Step 11.
10	CHECK MANIFOLD VACUUM FOR INDICATION OF MODERATE EXHAUST SYSTEM RESTRICTION • Vacuum gauge installed. • Tachometer installed. • Key on, engine idling. • Increase the engine speed gradually from base idle rpm to 2,000 rpm with the transmission in NEUTRAL. • Observe the speed the vacuum gauge needle rises, while maintaining the increased engine rpm. **NOTE 1:** On a non-restricted exhaust system, the vacuum gauge needle will rise quickly to the normal range as the increased rpm is maintained. **NOTE 2:** On a restricted exhaust system, the vacuum gauge needle will rise slowly to the normal range as the increased rpm in maintained. **NOTE 3:** The rate of speed the vacuum gauge needle rises to the normal range is slower on a restricted system than on a non-restricted system as the increased rpm is maintained. • Decrease engine speed to base idle rpm. • Key off. • **Is the rate of speed that the vacuum gauge needle rises back to the normal range (above 16 inches Hg) much slower than that of a non-restricted system?**	Yes	A moderate restriction may be present. Go to next Step.
		No	No indications of restrictions or leaks have been detected in the exhaust system. If here because of DTC P0420 the catalytic converter is chemically inactive. REPLACE the catalytic converter, being careful to avoid improper routing of the rear HO2S. COMPLETE PCM. RESET KAM (REFER to PCM Reset). RERUN Quick Test. REMOVE the vacuum gauge and tachometer. For further diagnosis of symptom (e.g. Lack of Power, Loss of Power, or No Start). REFER to TROUBLESHOOTING GUIDE.
11	CHECK MANIFOLD VACUUM WITH EXHAUST MANIFOLD DISCONNECTED FOR INDICATION OF A RESTRICTION • Key off. • Disconnect exhaust system immediately after the exhaust manifold. • Repeat the vacuum measurement found in Step 10. • **Did the vacuum needle QUICKLY rise above 16 inches Hg with the engine rpm at 2,000?** **NOTE:** An intake manifold gasket leak can also cause the vacuum gauge needle to remain well below the normal range.	Yes	The exhaust system restriction is downstream of the exhaust manifold. RECONNECT exhaust system at exhaust manifold Go to next Step.
		No	A restriction is present in the exhaust manifold. REMOVE the vacuum gauge and tachometer. INSPECT each exhaust port for casting flash/restrictions by dropping a length of chain into it. (NOTE: Do not use a wire or lamp to check the ports. The restriction may be large enough for either to pass through, but small enough to cause excessive back pressure at high engine rpm.) REPLACE the exhaust manifold if unable to remove the casting flash/restriction. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

STEP	INSPECTION		ACTION
12	CHECK MANIFOLD VACUUM WITH SILENCER/ TAIL-PIPE ASSEMBLY DISCONNECTED FOR INDICATION OF A RESTRICTION • Key off. • Disconnect silencer/tail-pipe assembly located after the catalytic converter. • Repeat the vacuum measurement found in test Step 10. • **Did the vacuum needle QUICKLY rise above 16 inches Hg with the engine rpm at 2,000?**	Yes	There is a restriction in the silencer/tail-pipe assembly. REPLACE the silencer/tail-pipe assembly. REMOVE the vacuum gauge and tachometer. COMPLETE PCM. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	There is a restriction in the catalytic converter. REMOVE the vacuum gauge and tachometer. REPLACE the catalytic converter, being careful to avoid improper routing of the rear HO2S and INSPECT the silencer to be certain converter debris has not entered. RECONNECT silencer/tail-pipe assembly. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

CODE No.	P0440
DESCRIPTION	• DTC P0440 indicates the Evaporative Emission System purge control has been damaged **NOTE:** If DTC P0443 was received, it should be addressed before P0440

[Possible Cause]

- Damaged vapor line between EVAP canister purge solenoid and intake manifold vacuum reservoir
- Damaged EVAP canister purge solenoid
- Damaged vapor line between EVAP canister purge solenoid and charcoal canister
- Damaged charcoal canister
- Damaged vapor line between charcoal canister and check valve
- Damaged check valve
- Damaged vapor line between check valve and fuel vapor valves
- Damaged PCM

STEP	INSPECTION		ACTION
1	CHECK FOR MANIFOLD VACUUM AT EVAP CANISTER PURGE SOLENOID • Key off. • Disconnect vapor line between EVAP canister purge solenoid and intake manifold vacuum reservoir at the EVAP canister purge solenoid valve. • Key on, engine idling. • Place a finger over the opening of the unattached vapor line end. • Remove the finger from the vapor line. • Key off. • **Was a vacuum signal present?**	Yes	RECONNECT the vapor line to the EVAP canister purge solenoid. Go to next Step.
		No	INSPECT the vapor line for damage or disconnect. SERVICE as necessary. If vapor line is OK, check intake manifold vacuum reservoir for blockage. VERIFY a symptom no longer exists. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
2	CHECK EVAP CANISTER PURGE SOLENOID MECHANICAL OPERATION: DE-ENERGIZED • Key off. • Disconnect the vapor line between the EVAP canister purge solenoid and the intake manifold vacuum reservoir at the EVAP canister purge solenoid. • Install vacuum pump at intake manifold side of the EVAP canister purge solenoid. • Disconnect the vapor line between the EVAP canister purge solenoid and the charcoal canister at the EVAP canister purge solenoid. • Install vacuum gauge at the charcoal canister side of the EVAP canister purge solenoid. • Apply 8 in-Hg of vacuum to the EVAP canister purge solenoid while observing the vacuum gauge. • **Does the vacuum gauge indicate a vacuum signal is passing through the EVAP canister purge solenoid?**	Yes	REMOVE vacuum gauge and pump. REPLACE the EVAP canister purge solenoid. RECONNECT all vapor lines. VERIFY a symptom no longer exists. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	Go to next Step.
3	CHECK EVAP CANISTER PURGE SOLENOID MECHANICAL OPERATION: ENERGIZED • Key off. • Install breakout box, leave PCM connected. • Vacuum pump installed at intake manifold side of the EVAP canister purge solenoid with 8 in-Hg applied to the EVAP canister purge solenoid. • Vacuum gauge installed at charcoal canister side of EVAP canister purge solenoid. • Key on. • Momentarily jumper to ground Test Pin 67 (EVAP canister purge solenoid SIG) at the breakout box and observe the vacuum gauge. • Key off. • **Was a vacuum signal indicated by the vacuum gauge?**	Yes	REMOVE the vacuum gauge and pump from the EVAP canister purge solenoid. RECONNECT vapor line between EVAP canister purge solenoid and intake manifold vacuum reservoir. Go to next Step.
		No	REPLACE the EVAP canister purge solenoid. REMOVE the vacuum gauge and pump from the EVAP canister purge solenoid. RECONNECT all vapor lines. VERIFY a symptom no longer exists. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

STEP	INSPECTION		ACTION
4	CHECK VAPOR LINE: CHARCOAL CANISTER TO EVAP CANISTER PURGE SOLENOID • Key off. • Disconnect vapor line between charcoal canister and EVAP canister purge solenoid at both ends. • Inspect vapor line for blockage or obstructions. Service as necessary. • Plug one end of the vapor line and install a vacuum pump at the remaining end. • Apply 16 in-Hg of vacuum with the vacuum pump. • Observe the vacuum display for at least 15 seconds. • Release the vacuum applied by the vacuum pump. • **Did the vapor line hold the vacuum?**	Yes	REMOVE the plug from the remaining end. RECONNECT the vapor line. Go to next Step.
		No	REPLACE the vapor line. REMOVE the vacuum pump. RECONNECT all components. VERIFY a symptom no longer exists. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
5	CHECK CHARCOAL CANISTER • Check for cracks or other damage to the charcoal canister. • **Is the charcoal canister cracked or damaged?**	Yes	REPLACE the damaged charcoal canister. RECONNECT all components. VERIFY a symptom no longer exists. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	Go to next Step.
6	CHECK VAPOR LINE: CHECK VALVE TO CHARCOAL CANISTER • Key off. • Disconnect vapor line between charcoal canister and check valve at both ends. • Inspect vapor line for blockage or obstruction. Service as necessary. • Plug one end of the vapor line and install a hand held pressure pump with gauge at the remaining end. • Apply 1.0 in-Hg of pressure to the vapor line with the pressure pump. • Observe the pressure gauge on the pump for at least 15 seconds. • **Did the vapor line hold a constant pressure?**	Yes	REMOVE the pressure pump. REMOVE the plug from the remaining end. RECONNECT the vapor line. Go to next Step.
		No	REPLACE the vapor line. REMOVE the vacuum pump. VERIFY a symptom no longer exists. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
7	VERIFY OPERATION OF THE CHECK VALVE **NOTE:** A properly functioning check valve will allow the passage of fuel vapor in only one direction. • Key off. • Disconnect both vapor lines from the check valve. • Apply 1.0 in-Hg of pressure to the charcoal canister side of the check valve while placing a finger near the opening at other end of check valve. • **Was air flow detected from the check valve?**	Yes	REPLACE the check valve. REMOVE the pressure pump. RECONNECT all components. VERIFY a symptom no longer exists. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	RECONNECT all components. Go to next Step.
8	CHECK VAPOR LINE: CHECK VALVE TO FUEL TANK VALVES • Key off. • Disconnect vapor line between check valve and fuel tank at both ends. • Inspect vapor line for blockage or obstruction. Service as necessary. • Plug both ends of the vapor line at the fuel tank and install a hand held pressure pump with gauge at the check valve end. • Apply 1.0 in-Hg of pressure to the vapor line with the pressure pump. • Observe the pressure gauge on the pump for at least 15 seconds. • **Did the vapor line hold a constant pressure?**	Yes	REMOVE the pressure pump. REMOVE the plugs from the remaining ends. RECONNECT the vapor line. CHECK the fuel vapor valve for sticking.
		No	REPLACE the vapor line. REMOVE the vacuum pump. VERIFY a symptom no longer exists. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

CODE No.	P0443
DESCRIPTION	• DTC P0443 indicates a failure in the EVAP canister purge solenoid circuit

[Possible Cause]
- VPWR circuit open
- EVAP canister purge solenoid SIG open in harness
- EVAP canister purge solenoid SIG circuit short to PWR GND or SIG RTN
- Damaged EVAP canister purge solenoid
- Damaged PCM

STEP	INSPECTION		ACTION
1	CHECK EVAP CANISTER PURGE SOLENOID VPWR • Key off. • Disconnect EVAP canister purge solenoid. • Key on, engine off. • Measure voltage between VPWR at the EVAP canister purge solenoid vehicle harness connector and battery ground. • **Is voltage greater than 10.5 volts?**	Yes	Go to next Step.
		No	SERVICE open in VPWR harness circuit. RECONNECT all components. VERIFY a symptom no longer exists. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
2	CHECK EVAP CANISTER PURGE SOLENOID RESISTANCE • Key off. • EVAP canister purge solenoid disconnected. • Measure resistance between EVAP canister purge solenoid SIG and VPWR circuits at the vehicle harness connector. • **Is resistance between 27 and 35 ohms?**	Yes	Go to next Step.
		No	REPLACE EVAP canister purge solenoid. VERIFY a symptom no longer exists. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
3	CHECK CONTINUITY OF EVAP CANISTER PURGE SOLENOID SIG CIRCUIT • Key off. • EVAP canister purge solenoid disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure resistance between Test Pin 67 (EVAP canister purge solenoid SIG) at the breakout box and the EVAP canister purge solenoid SIG circuit at the solenoid vehicle harness connector. • **Is the resistance less than 5.0 ohms?**	Yes	Go to next Step.
		No	SERVICE open in harness circuit. REMOVE breakout box. RECONNECT all components. VERIFY a symptom no longer exists. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
4	CHECK EVAP CANISTER PURGE SOLENOID SIG CIRCUIT FOR SHORT PWR GND • Key off. • EVAP canister purge solenoid disconnected. • Breakout box installed. • Disconnect Scan Tool from DLC. • Measure the resistance between Test Pin 67 (EVAP canister purge solenoid SIG) and Test Pins 24 and 103 (PWR GND). • **Is each resistance greater than 10,000 ohms?**	Yes	REPLACE the damaged PCM. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	SERVICE harness short circuit. REMOVE breakout box. RECONNECT all components. VERIFY a symptom no longer exists. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

CODE No.	P0500
DESCRIPTION	• DTC P0500 indicates the VSS input signal has been detected out of Self-Test range

[Possible Cause]
- Damaged VSS
- Damaged PCM
- Open in VSS(+)/VSS(–) harness circuit
- Short to GND or SIG RTN in VSS(+)/VSS(–) harness circuit
- Short to PWR

STEP	INSPECTION		ACTION
1	CHECK CONTINUITY OF VSS HARNESS CIRCUIT • Key off. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc, Service as necessary. • Install breakout box. PCM disconnected. • Disconnect VSS. • Measure resistance between test pin 58 at the breakout box and VSS (+) circuit at VSS vehicle harness connector. • Measure resistance between test pin 33 at the breakout box VSS (–) circuit at VSS vehicle harness connector. • **Is each resistance less than 5.0 ohms?**	Yes	Go to next Step.
		No	SERVICE open in harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RUN VSS Drive Cycle to verify repair.
2	CHECK VSS HARNESS CIRCUITS FOR SHORTS TO SIG RTN AND GROUND • Key off. • VSS disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between Test Pin 58 and Test Pins 51, 103, 33, 91 and 71 at breakout box. • Measure resistance between Test Pins 33 and 71 at the breakout box. • **Is each resistance greater than 500 ohms?**	Yes	Go to next Step.
		No	SERVICE short circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RUN VSS Drive cycle verify the repair.
3	CHECK VSS RESISTANCE • Key off. • VSS disconnected. • Measure the resistance of the VSS. • **Is resistance between 190 and 250 ohms?**	Yes	REMOVE breakout box. REPLACE PCM. RECONNECT VSS. RUN VSS Drive cycle verify the repair.
		No	REPLACE VSS. REMOVE breakout box. RECONNECT PCM. RUN VSS Drive cycle verify the repair.

CODE No.	P0505, P1504, P1507
DESCRIPTION	• DTC P0505 indicates that Self-Test has detected an IAC system malfunction • DTC P1504 indicates that Self-Test has detected an IAC circuit malfunction • DTC P1507 indicates that Self-Test has detected an IAC underspeed error

[Possible Cause]
- IAC circuit open
- IAC circuit shorted to PWR
- IAC short to GND (P1504)
- VPWR circuit open
- Air inlet plugged (P0505, P1507)
- Air inlet leakage (P1507)
- Damaged IAC valve assembly
- Damaged Throttle body (P0505, P1507)
- Damaged PCM

STEP	INSPECTION		ACTION
1	CHECK VPWR TO IAC SOLENOID • Key off. • Disconnect IAC solenoid vehicle harness connector. • Key on. • Measure voltage between VPWR circuit at the IAC solenoid vehicle harness connector and battery ground. • **Is voltage greater than 10.5 volts?**	Yes	Go to next Step.
		No	SERVICE open in VPWR to IAC solenoid. RECONNECT all components. RERUN Quick Test.
2	CHECK IAC SOLENOID RESISTANCE • Key off. • IAC solenoid vehicle harness connector disconnected. • Measure solenoid resistance. **NOTE:** Due to diode in solenoid, place DVOM (+) lead on VPWR pin and (–) lead on IAC pin. • **Is resistance between 6.0 and 13.0 ohms?**	Yes	Go to next Step.
		No	REPLACE IAC valve assembly. RECONNECT all components. RERUN Quick Test.
3	CHECK IAC SOLENOID FOR AN INTERNAL SHORT TO IAC CASE • Key off. • IAC solenoid vehicle harness connector disconnected. • Measure resistance from either IAC solenoid pin to IAC valve assembly case. • **Is resistance greater than 10,000 ohms?**	Yes	For DTC P1504 Go to Step 6. All other: Go to next Step.
		No	REPLACE IAC valve assembly. RECONNECT all components. RERUN Quick Test.
4	CHECK AIR INLET FOR PLUGGING • Key off. • Inspect the entire inlet air system for debris blockage and other damage. • Remove and inspect the air filter element for excessive dirt. • **Is the air inlet system OK?**	Yes	Go to next Step.
		No	SERVICE as necessary. RECONNECT all components. RERUN Quick Test.
5	CHECK FOR VACUUM LEAKS • Key on. • With engine running at idle, listen for vacuum leaks. • Inspect the entire inlet air system from the MAF sensor to the intake manifold for leaks such as: – Cracked or punctured inlet air tube – Loose inlet air tube at air cleaner housing or throttle body – IAC valve assembly or gasket seal – EGR valve gasket seal – Vacuum supply connector and hose – PCV connectors and hose • **Are any leaks detected in the above areas?**	Yes	SERVICE as necessary. RECONNECT all components. RERUN Quick Test.
		No	Go to next Step.

STEP	INSPECTION		ACTION
6	CHECK IAC CIRCUIT CONTINUITY • Key off. • IAC solenoid disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure resistance between Test Pin 83 (IAC) at the breakout box and IAC circuit at IAC solenoid vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	Go to next Step.
		No	SERVICE open circuit. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
7	CHECK IAC CIRCUIT FOR SHORT TO PWR • Key off. • Breakout box installed. PCM disonnected. • IAC solenoid disconnected. • Key on, engine off. • Measure voltage between Test Pin 83 (IAC) at the breakout box and chassis ground. • **Is voltage less than 1.0 volt?**	Yes	Go to next Step.
		No	SERVICE short circuit. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
8	CHECK IAC CIRCUIT FOR SHORT TO GROUND • Key off. • Breakout box installed, PCM disconnected. • IAC solenoid disconnected. • Measure resistance between Test Pin 83 (IAC) and Test Pins 51 and 103 (PWR GND) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	Go to next Step.
		No	SERVICE short circuit. RECONNECT all components. RERUN Quick Test.
9	CHECK IAC SIGNAL FROM PCM • Key off. • Breakout box installed. • Reconnect PCM to breakout box. • Reconnect IAC solenoid. • Connect DVOM between Test Pin 83 (IAC) and Test Pin 51 (PWR GND) at the breakout box. • Start engine. • Slowly increase rpm to 3,000 rpm. • **Is voltage between 3.0 and 11.5 volts?**	Yes	For continuous Memory DTCs P1504 and P1507. Go to next Step. INSPECT Throttle body for damage, SERVICE as necessary. If OK, REPLACE IAC valve assembly. RESET KAM (Refer to PCM reset). RERUN Quick Test.
		No	REPLACE PCM. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
10	CHECK IAC SYSTEM FOR INTERMITTENT OPEN OR SHORT • Key on engine running. • Access IAC and RPM PID switch a NGS. • With engine at normal operating temperature, accessories off and at idle, the IAC duty cycle should between 20% and 40%. • Observe the IAC and RPM PIDs for an indication of a fault while performing the following at idle: – Lightly tap on IAC valve assembly and wiggle harness connector to simulate road shock – Grasp the vehicle harness closest to the IAC valve assembly. Shake and bend a small section of the harness from the IAC to the dash panel and from the dash panel to PCM • **Do the IAC or RPM PIDs suddenly change in value indicating a fault?**	Yes	ISOLATE fault and SERVICE as necessary. RECONNECT all components. RESET KAM (REFER to PCM Reset).
		No	For idle quality, starting, or stalling symptoms currently present: REPLACE IAC valve assembly. RECONNECT all components. RESET KAM (REFER to PCM Reset). All others: Unable to duplicate and/or identify fault at this time. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary).

CODE No.	P0603, P1605
DESCRIPTION	• DTC P0603/P1605 indicates the PCM has experienced a power interrupt in KAPWR circuit

[Possible Cause]
- Battery terminals corrosion or loose connections
- Improper KAPWR circuit wire routing
- Harness open in KAPWR circuit
- Damaged PCM

STEP	INSPECTION		ACTION
1	CHECK BATTERY TERMINALS **NOTE:** If KAPWR is interrupted to the PCM (i.e. when a breakout box is installed or the battery is disconnected), DTC P0603/P1605 may be generated on the first power-up. • Inspect the battery cables for loose connections, corrosion, etc. • **Are the battery terminal connections in good condition?**	Yes	Battery terminals are OK? Go to next Step.
		No	SERVICE battery terminals as necessary. RERUN Quick Test.
2	INSPECT ENGINE COMPARTMENT FOR PROPER WIRE ROUTING • Inspect EEC-V wiring for proximity to ignition components or wires. • **Is wiring too close to ignition components or wires?**	Yes	REROUTE as necessary. RERUN Quick Test.
		No	Engine compartment wire routing is OK. Go to next Step.
3	CHECK KEEP ALIVE POWER (KAPWR) TO PCM • Key off. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure voltage between Test Pin 55 (KAPWR) and Test Pin 51 or 103 (PWR GND) at the breakout box. • While observing DVOM, grasp the EEC-V harness and wiggle, shake or bend a small section while working from the PCM to the dash panel. • **Does the DVOM indicate less than 10.5 volts?**	Yes	ISOLATE and SERVICE open in KAPWR circuit. REMOVE breakout box. RECONNECT the PCM. RERUN Quick Test.
		No	No open in KAPWR harness circuit detected. REMOVE breakout box. RECONNECT the PCM. Go to next Step.
4	CHECK FOR REPEAT OF DTC P0603/P1605 • Activate Key On Engine Off Self-Test. • **Is DTC P0603/P1605 present?**	Yes	REPLACE the PCM. RERUN Quick Test.
		No	SERVICE other DTCs as necessary. If none, testing is complete. DTC P0603/P1605 was due to previous service action mentioned in the NOTE in Step 1.

CODE No.	P0703
DESCRIPTION	• DTC P0703 indicates that when the brake pedal was depressed and released during Key On Engine Running Self-Test the brake switch signal did not cycle high and low

[Possible Cause]
- Brake pedal not depressed and released during the Key On Engine Running Self-Test
- Brake pedal depressed during entire Key On Engine Running Self-Test
- Open to GROUND or POWER
- Damaged brake switch
- Damaged PCM

STEP	INSPECTION		ACTION
1	VERIFY BRAKE PEDAL WAS PRESSED • **Was the brake pedal pressed and released during KOER Self-Test?**	Yes	Go to next Step.
		No	RERUN Key On Engine Running Self-Test. PRESS and RELEASE brake pedal.
2	CHECK OPERATION OF STOPLIGHTS • Key on. • Check stoplight operation. • **Does stoplights operate normally?**	Yes	Go to next Step.
		No	If stoplights never on Go to Step 4. If stoplights always on Go to Step 6.
3	CHECK FOR BOO CIRCUIT CYCLING • Key off. • Disconnect PCM Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure voltage between brake switch Test Pin 92 and Test Pins 76 and 77 at the breakout box while depressing and releasing brake. • **Does the voltage cycle?**	Yes	REPALCE PCM. REMOVE breakout box. RERUN Quick Test.
		No	SERVICE open in brake switch circuit between PCM and brake switch connection to brake circuit. RERUN Quick Test.
4	CHECK FOR POWER TO BRAKE SWITCH **NOTE:** Using a 12V test light, verify integrity of related fuses in fuse panel and check condition of stoplight bulbs before starting this test. • Key off. • Disconnect brake switch (located on brake pedal). • Measure B+ input voltage between stoplight switch and chassis ground. • **Is voltage greater than 10 volts?**	Yes	Go to next Step.
		No	SERVICE open B+ circuit to brake switch. RECONNECT brake switch connector. RERUN Quick Test.
5	VERIFY INTEGRITY OF BRAKE SWITCH • Brake switch disconnected. • Connect DVOM test probes to brake switch terminals at the brake switch. • DVOM on ohms scale. • Press brake pedal while monitoring reading. • **Is the resistance less than 5.0 ohms?**	Yes	SERVICE open circuit between brake switch and stoplight ground. RECONNECT brake switch. RERUN Quick Test.
		No	REPLACE brake switch. RECONNECT brake switch. RERUN Quick Test.
6	VERIFY BRAKE SWITCH IS NOT ALWAYS CLOSED • Key off. • Stoplight switch disconnected. • Key on, engine off. • **Are stoplights still on?**	Yes	Go to next Step.
		No	VERIFY proper installation of brake switch. If OK, REPLACE stoplight switch. RECONNECT harness connector. RERUN Quick Test.
7	CHECK FOR SHORT TO POWER IN PCM • Key off. • Stoplight switch disconnected. • Disconnect Powertrain Control Module (PCM). • Key on, engine off. • **Are stoplights still on?**	Yes	Go to next Step.
		No	REPALCE PCM. RECONNECT brake switch. RERUN Quick Test.

STEP	INSPECTION		ACTION
8	CHECK FOR SHORT TO POWER IN SHIFTLOCK ACTUATOR • Key off. • PCM disconnected. • Brake switch disconnected. • Disconnect shiftlock actuator, cruise control module and ABS module (if equipped) to isolate brake switch wiring. • Key on, engine off. • **Are stoplights still on?**	Yes	SERVICE short to power in brake switch/Stoplight circuit. RECONNECT PCM brake switch and accessories. RERUN Quick Test.
		No	SERVICE short in accessories (i.e. shiftlock actuator, ABS module, etc.). RECONNECT all components. RERUN Quick Test.

CODE No.	P1000
DESCRIPTION	• Diagnostic Trouble Code (DTC) P1000 indicates that not all of the On Board Diagnostic II (OBD II) monitors have completed. In some states, this DTC must be cleared to pass an inspection/maintenance test. The customer should be informed that the law specifies additional city and highway driving must be done to complete the check of the On Board Diagnostic system. This additional driving must occur before the vehicle is tested at the inspection/maintenance station. The amount of driving required varies with individual driving patterns. To complete this requirement in the shortest amount of time, refer to Drive Cycles

[Possible Cause]

DTC P1000 is set by the PCM with any of following conditions

- The vehicle is new from the factory and has not yet been through a complete OBD II Drive Cycle
- The battery or PCM has been disconnected
- An OBD II monitor failure had occurred before completion of an OBD II Drive Cycle
- The PCM DTCs have been erased with NGS as part of the normal repair process

DTC P1000 may not be removed from the PCM because:

- There is a thermostat stuck open and a DTC is not output
- There is an open VSS circuit and a DTC is not output

STEP	INSPECTION		ACTION
1	CHECK FOR OTHER DTCS This INSPECTION should be used only if a Diagnostic Trouble Code (DTC) P1000 was received in Continuous Memory. Ignore any DTC P1000s in KOEO or KOER. DTC P1000 indicates that all of the OBD II monitors have not yet been successfully tested. • **Were any other DTCs received with the P1000?**	Yes	Go to DTC Charts, for SERVICE other DTCs.
		No	No EEC-V system faults have been detected. Go to next Step.
2	REQUEST TO REMOVE P1000 A complete OBD II Drive Cycle has not yet been performed to remove the DTC P1000 from the PCM. • **Has the customer requested the DTC P1000 be removed from the PCM memory?** **NOTE:** It is not necessary to remove the DTC P1000 from the PCM by driving the vehicle unless it is requested by the customer to pass an inspection/maintenance test. Inform the customer of the need for additional driving when required to pass an inspection/maintenance test.	Yes	PERFORM the OBD II drive cycle. If DTC P1000 is still present, Go to next Step.
		No	No faults in the EEC-V system have been detected. INFORM the customer that if the law in this states requires additional driving in order to remove the DTC P1000 from the PCM memory, it must be performed before an inspection/maintenance test. RETURN other symptoms.
3	CHECK VSS PID Perform a short road test and look for a change in the VSS PID. • **Was the VSS PID greater than zero MPH/KPH?**	Yes	Go to next Step.
		No	SERVICE open VSS circuit. RERUN the OBD II Drive Cycle. RERUN Quick Test.
4	CHECK ECT TEMPERATURE Drive the vehicle long enough to obtain the highest engine operating temperature and record the ECT temperature PID. • **Was the ECT PID reading greater than 180°F/82°C?**	Yes	ADDITIONAL driving is required. PERFORM the OBD II Drive Cycle. RERUN Quick Test.
		No	REPLACE the cooling system thermostat. PERFORM the OBD II Drive Cycle. RERUN Quick Test.

NOTE: The only way a DTC P1000 can be removed from memory is when all the OBD II monitors have successfully completed during normal vehicle operation.

CODE No.	P1100
DESCRIPTION	• Continuous Memory DTC P1100 indicates the MAF sensor signal went below 0.39 volts or above 3.90 volts (refer to Voltage to Mass Air Flow Conversion Table at beginning of this Test) sometime during the last 40 warm-up cycles

[Possible Cause]
- MAF sensor connector with poor continuity
- MAF harness with poor continuity
- MAF harness intermittent short
- MAF sensor internal intermittent open or short

STEP	INSPECTION		ACTION
1	CHECK FOR MAF CIRCUIT INTERMITTENT VOLTAGE INPUT • Start engine and bring to idle. **NOTE:** If a stabilized idle is not at least 700 rpm, go to TROUBLESHOOTING GUIDE. • Scan Tool connected. • Run throttle up to 1,500 rpm for 5 seconds, and bring back to idle. • Access MAF V PID (MAF PID) for a fault indication while performing the following: – Lightly tap on MAF sensor and wiggle harness connector to simulate road shock • **Is the MAF V PID (MAF PID) changing below the minimum 0.39 volts or above a maximum 3.90 volts (refer to Voltage to Mass Air Flow Conversion Table at beginning of this Test)?**	Yes	DISCONNECT and INSPECT the MAF sensor connector. If OK, REPLACE the MAF sensor. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	Go to next Step.
2	CHECK MAF HARNESS TO PCM FOR INTERMITTENT OPENS OR SHORTS • Key off. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, reconnect PCM. • Key on, engine off. • Connect DVOM between Test Pin 88 (MAF SIG) and Test Pin 36 (MAF RTN) at the breakout box. • While viewing DVOM, do the following: – Grasp the vehicle harness closest to the MAF sensor connector – Shake and bend a small section of the harness all the way to the dash panel – Wiggle, shake and bend the harness from the dash panel to the PCM • **Is the voltage changing below the minimum 0.39 volts or above the maximum 3.90 volts?**	Yes	ISOLATE fault and SERVICE as necessary. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	Unable to duplicate and/or identify fault at this time. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary).

CODE No.	P1101
DESCRIPTION	• Key On Engine Running (KOER) DTC P1101 indicates the MAF signal was not between 0.34 and 1.96 volts during KOER Self-Test

STEP	INSPECTION		ACTION
1	CHECK FOR MAF SENSOR CONTINUOUS MEMORY CODES • Drive vehicle for 6 to 10 minutes. • Rerun KOEO and Continuous Memory Self-Test. • **Is a Continuous Memory DTC present with the KOER DTC P1101?**	Yes	For Continuous Memory DTC P0102: Go to address the MAF sensor Monitor DTC. For Continuous Memory DTC P0103: Go to address the MAF sensor Monitor DTC. For all other Continuous Memory DTCs: Go to Powertrain Diagnostic Code Charts.
		No	Go to next step.
2	CHECK MAF SENSOR OUTPUT VOLTAGE **NOTE:** DTC P1101 could be generated by a low charged vehicle battery or the garage exhaust ventilation system. Service the battery as necessary. Then remove ventilation system and properly vent to outside atmosphere. Rerun KOEO Self-Test. • Key off. • Check that the MAF sensor in corrected. If not, service as necessary. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Scan Tool connected. • Install breakout box, connect PCM to breakout box. • Key on, engine off. • Measure between Test Pin 88 (MAF SIG) and Test Pins 24 or 103 (PWR GND) at the breakout box. • **Is the voltage greater than 0.20 volts?**	Yes	The MAF GIG voltage is greater than expected. Go to next Step.
		No	Go to Step 9.
3	CHECK PWR GND CIRCUIT CONTINUITY • Key off. • MAF sensor disconnected. • Breakout box installed. • Disconnect PCM. • Disconnect Scan Tool from DLC. • Measure the resistance between PWR GND circuit at the MAF sensor vehicle harness connector and battery negative post. • **Is the resistance less than 10 ohms?**	Yes	PWR GND harness circuit to MAF sensor is OK. RECONNECT Scan Tool. Go to next Step.
		No	SERVICE open in PWR GND harness circut. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
4	CHECK MAF RTN CIRCUIT CONTINUITY • Key off. • MAF sensor disconnected. • Breakout box installed, PCM disconnected. • Measure the resistance between MAF RTN circuit at the MAF sensor vehicle harness connector and Test Pin 36 (MAF RTN) at the breakout box. • **Is the resistance less than 5.0 ohms?**	Yes	MAF RTN harness circuit to PCM is OK. Go to next Step.
		No	SERVICE open in MAF RTN harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
5	CHECK MAF CIRCUIT FOR SHORT TO GROUND IN PCM • Key off. • MAF sensor disconnected. • Breakout box installed. • Reconnect PCM to breakout box. • Disconnect Scan Tool from DLC (if applicable). • Measure the resistance between Test Pin 88 (MAF SIG) and Test Pins 36 (MAF RTN) and 24 or 103 (PWR GND) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	RECONNECT Scan Tool. Go to next Step.
		No	MAF SIG shorted to PWR GND or MAF RTN in the PCM. REMOVE breakout box. RECONNECT MAF sensor. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

STEP	INSPECTION		ACTION
6	CHECK MAF CIRCUIT OUTPUT • Key off. • MAF sensor connected. • Breakout box installed, PCM connected. • Key on, engine running. **NOTE:** If a stabilized idle is not at least 700 rpm, go to TROUBLESHOOTING GUIDE. • Measure the voltage between Test Pin 88 (MAF SIG) at the breakout box and battery negative post. • **Is the voltage at idle between 0.34 and 1.96 volts?**	Yes	MAF SIG to the PCM is OK. Go to next Step.
		No	MAF SIG or RWR GND is open in the MAF sensor, or MAF SIG is shorted to MAF RTN in the MAF sensor. REPLACE MAF sensor. REMOVE breakout box. RECONNECT PCM. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
7	VERIFY MAF CIRCUIT INPUT AND OUTPUT • Key off. • MAF sensor connected. • Breakout box installed, PCM connected. • Key on, engine running. • Measure the voltage between Test Pin 88 (MAF SIG) and Test Pin 36 (MAF RTN) at the breakout box. • **Is the voltage between 0.34 and 1.96 volts?**	Yes	MAF RTN in MAF sensor is OK. Go to next Step.
		No	MAF RTN open in the MAF sensor. REPLACE MAF sensor. REMOVE breakout box. RECONNECT PCM. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
8	CHECK MAF CIRCUIT OUTPUT WITH SCAN TOOL • Key off. • MAF sensor connected. • Breakout box installed, PCM connected. • Key on, engine running. • Access MAF V PID (MAF PID) with a Scan Tool at idle. • **Is the MAF V PID (MAF PID) between 0.34 and 1.96 volts (refer to Voltage to Mass Air Flow Conversion Table at the beginning of this Test)?**	Yes	Unable to identify fault at this time. Check possible intermittent.
		No	MAF SIG or MAF RTN is open or shorted together in the PCM. REPALCE PCM. REMOVE breakout box. RECONNECT PCM. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
9	CHECK CONTINUITY OF VPWR CIRCUIT • Key off. • MAF sensor disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure resistance between VPWR circuit at the MAF sensor vehicle harness connector and Test Pin 71 or 97 (VPWR) at the breakout box. • **Is resistance less than 5.0 ohms?**	Yes	VPWR harness circuit to PCM is OK. Go to next Step.
		No	Service open in VPWR harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
10	CHECK MAF CIRCUIT FOR SHORTS TO GROUND AND MAF RTN CIRCUIT • Key off. • MAF sensor disconnected. • Breakout box installed, PCM disconnected. • Disconnect Scan Tool from Data Link Connector (DLC). • Measure the resistance between Test Pin 88 (MAF SIG) and Test Pins 36 (MAF RTN) and 24 or 103 (PWR GND) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	MAF SIG, MAF RTN and GROUND harness circuits to PCM are OK. RECONNECT Scan Tool. Go to next Step.
		No	Service short circuit between MAF SIG and GROUND or MAF RTN. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
11	CHECK CONTINUITY OF MAF SIG CIRCUIT • Key off. • MAF sensor disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between MAF circuit at the MAF sensor vehicle harness connector and Test Pin 88 (MAF SIG) at the breakout box. • **Is resistance less than 5.0 ohms?**	Yes	MAF SIG harness circuit to PCM is OK. Go to next Step.
		No	SERVICE open in MAF SIG harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

STEP	INSPECTION		ACTION
12	CHECK PWR GND CIRCUIT TO MAF SENSOR • Key off. • MAF sensor disconnected. • Breakout box installed. • PCM connected to breakout box. • Key on, engine off. • Measure the voltage between VPWR circuit and PWR GND circuit at the MAF sensor vehicle harness connector. • **Is the voltage greater than 10.5 volts?**	Yes	PWR GND harness circuit from battery negative post to MAF sensor is OK. Go to Step 4.
		No	Go to Step 3.

CODE No.	P1116
DESCRIPTION	• DTC P1116 (ECT) indicates that the corresponding sensor is out of Self-Test range. Correct range of measure is 0.3 to 3.7 volts

[Possible Cause]
- Low coolant levle (ECT)
- Damaged harness connector
- Overheated condition
- Poor thermostat operation
- Damaged sensor

STEP	INSPECTION		ACTION
1	CHECK OPERATION, INSTALLATION OF TEMPERATURE SENSOR • Run engine at 2,000 rpm until engine temperature becomes stabilized. NO STARTS: – Go to Step 3 Vehicle that STALLS: – Return to Symptom Flow Chart • Check that upper radiator hose is hot and pressurized. • Rerun Key On Engine Running (KOER) Self-Test. • **Is DTC P1116 present?**	Yes	For symptom of cooling system concern. Do not service DTC P1116, service next DTC. If no other DTC's exists. RETURN to Symptom Flow Charts. All others: Go to next Step.
		No	Engine was not at closed loop operating condition. SERVICE other DTC's as necessary.
2	CHECK VREF CIRCUIT VOLTAGE AT THROTTLE POSITION SENSOR • Key off. • Disconnect TP sensor. • Measure voltage between VREF circuit and SIG RTN circuit at the TP sensor vehicle harness connector. • **Is voltage between 4.5 volts and 5.5 volts?**	Yes	There is sufficient VREF voltage. RECONNECT TP sensor. Go to next Step.
		No	REPAIR open in VREF circuit.
3	CHECK RESISTANCE OF TEMPERATURE SENSOR WITH ENGINE OFF • Key off. • Disconnect suspect temperature sensor. • Measure resistance between sensor signal circuit and SIG RTN circuit at the temperature sensor. Refer to the corresponding chart at the beginning of this Test for resistance specifications. • **Is resistance within specifications**	Yes	For ECT sensor with a NO START: Do not service DTC P1116 at this time. RETURN to Symptom Flow Charts. All others: Go to next Step.
		No	REPLACE suspect sensor. RECONNECT vehicle harness. RERUN Quick Test.
4	CHECK RESISTANCE OF TEMPERATURE SENSOR WITH ENGINE RUNNING **NOTE:** Verify that engine is at operating temperature before taking ECT readings. • Key off. • Suspect temperature sensor disconnected. • Run engine for two minutes at 2,000 rpm. • Measure resistance between sensor signal circuit and SIG RTN circuit at the temperature sensor. Refer to the chart at the beginning of this Test for resistance specifications. • **Is resistance within specification?**	Yes	REPALCE PCM. RECONNECT vehicle harness. RERUN Quick Test.
		No	REPLACE suspect sensor. RECONNECT vehicle harness. RERUN Quick Test.

NOTE: Engine may have cooled down. Always warm engine before taking ECT sensor resistance measurements. Check for open thermostat.

CODE No.	P1120 THROTTLE POSITION SENSOR
DESCRIPTION	• DTC P1120 indicates Throttle Position (TP) signal within the Self-Test range but below the closed throttle position range of 3.43 to 9.80% (0.17 to 0.49 volts)

[Possible Cause]
- Frayed wires
- Corrosion on TP sensor, PCM or harness connectors
- VREF harness open or shorts
- Damaged TP sensor
- Damaged PCM

STEP	INSPECTION		ACTION
1	CHECK FRAYED TP CIRCUIT WIRES OR CORROSION ON CONNECTORS • Do a complete visual inspection of the harness connector at the TP sensor (including pins) for corrosion. • Do a complete visual inspection of the harness wires between the TP sensor and the PCM for insulation fraying and corrosion. • **Is a fault present?**	Yes	SERVICE as necessary. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	Go to next Step.
2	CHECK FOR STUCK TP SENSOR • Key on, engine off. • Access TP PID (TPV PID) with the Scan Tool. • Slowly move throttle from closed throttle position to wide open throttle position and observe the TP PID (TPV PID). • **While opening the throttle, the TP PID (TPV PID) below 9.80% (0.49 volts)?**	Yes	Go to next Step.
		No	Go to Code No. P1120 or P1125.
3	CHECK VREF CIRCUIT VOLTAGE • Key off. • TP sensor disconnected. • Key on, engine off. • Measure voltage between VREF circuit and SIG RTN circuit at the TP sensor vehicle harness connector. • **Is the voltage between 4.0 and 6.0 volts?**	Yes	Go to next Step.
		No	Key off. RECONNECT all components. REPAIR open in VREF circuit.
4	CHECK TP CIRCUIT CONTINUITY • Key off. • TP sensor disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure the resistance between TP circuit at the TP sensor vehicle harness connector and Test Pin 89 (TP SIG) at the breakout box. • **Is the resistance less than 5.0 ohms?**	Yes	TP SIG harness circuit to PCM is OK. Go to next Step.
		No	SERVICE corrosion or open in TP SIG harness circuit. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
5	CHECK TP SENSOR SIGNAL TO PCM • Key off. • Connect PCM to breakout box. • Connect TP sensor. • Start engine and idle for 2 minutes. • Slowly open the throttle from closed position, while doing next step. • Measure the voltage between Test Pin 89 (TP SIG) and Test Pin 91 (SIG RTN) at the breakout box. • **Is the voltage at any time between 0.17 to 0.49 volts?**	Yes	TP sensor is damaged. REPLACE TP sensor. REMOVE breakout box. RERUN Quick Test.
		No	RERUN Quick Test. If DTC P1120 is still present, Go to Code No. P1120 or P1125.

CODE No.	P1121 (Continuous)
DESCRIPTION	• Continuous Memory Diagnostic Trouble Code (DTC) P1121 indicates throttle position is inconsistent with MAF sensor

[Possible Cause]
- Damaged TP sensor
- TP sensor not seated properly (almost completely detached from throttle body)
- Air leak between MAF sensor and throttle body

STEP	INSPECTION		ACTION
1	TP SENSOR AND MAF SENSOR RATIONALITY CHECK • Attempt to start engine. • **Does the engine run?**	Yes	Go to next Step.
		No	CHECK for major leaks, cracks, and openings between MAF sensor and throttle body.
2	CHECK MECHANICAL OPERATION OF TP SENSOR • Key on, engine off. • Access TP PID (TPV PID) with the Scan Tool. • Slowly move throttle from closed throttle position to wide open throttle position and observe the TP PID (TPV PID) for smooth reading change. • **While opening and closing the throttle, is there a sudden drop in the TP PID (TPV PID) below 13.23% (0.66 volts) or a sudden jump in the TP PID (TPV PID) above 24.02% (1.20 volts)?**	Yes	TP sensor has internal substrate problem. REPLACE TP sensor. RERUN Quick Test.
		No	Go to next Step.
3	CHECK TP SENSOR SIGNAL HIGH VERSUS THE ENGINE LOAD WHILE DRIVING VEHICLE • Key on, engine running. • Do normal drive, exercising the throttle and TP sensor while accessing PIDS. • Access TP PID (TPV PID) and LOAD PID with the Scan Tool and record readings. • **Is the TP PID (TPV PID) greater than 49.02% (2.44 volts) and the LOAD PID reading less than 25%?**	Yes	CHECK for air leaks between the MAF sensor and the throttle body including air noise sounds while engine is running. SERVICE as necessary. If OK, REPLACE the TP sensor. RERUN Quick Test.
		No	Go to next Step.
4	CHECK TP SENSOR SIGNAL LOW VERSUS THE ENGINE LOAD • Key on, engine running. **NOTE:** If the vehicle is a No Start, go to TROUBLESHOOTING GUIDE. • Access TP PID (TPV PID) and LOAD PID with the Scan Tool and record readings. • **Is the TP PID (TPV PID) reading less than 4.90% (0.24 volts) and the LOAD PID reading greater than 60%?**	Yes	CHECK for TP sensor loosely connected to the throttle body (screws not securely tightened down). SERVICE as necessary. RESET KAM (REFER to PCM Reset). DRIVE vehicle exercising the throttle. RERUN Quick Test. If Continuous Memory P1121 is now present, REPLACE MAF sensor.
		No	Go to next Step.
5	CHECK TP SENSOR SIGNAL LOW VERSUS THE ENGINE LOAD WHILE DRIVING VEHICLE • Key on, engine running. • Do normal drive, exercising the throttle and TP sensor near higher gears (preferably overdrive) while accessing PIDS. • Access TP PID (TPV PID) and LOAD PID with the Scan Tool and record readings. • **Is the TP PID (TPV PID) reading less than 4.90% (0.24 volts) and the LOAD PID reading greater than 60%?**	Yes	CHECK for TP sensor loosely connected to the throttle body (screws not securely tightened down). SERVICE as necessary. RESET KAM (REFER to PCM Reset). DRIVE vehicle exercising the throttle. RERUN Quick Test. If Continuous Memory P1121 is now present, REPLACE MAF sensor.
		No	Unable to identify the fault at this time. If vehicle is still a No start, Go to Troubleshooting.

CODE No.	P1124
DESCRIPTION	• Throttle Position Sensor's rotational setting are not in the Self-Test range of 13.23 to 24.02% (0.66 to 1.20 volts)

[Possible Cause]
- Binding or bent throttle linkage
- TP sensor may not be seated properly (tightened down)
- Throttle plate below closed Throttle position
- Throttle plate/screw misadjusted
- Damaged TP sensor
- Damaged Powertrain Control Module (PCM)

STEP	INSPECTION		ACTION
1	CHECK FOR OTHER DTCS • Check for DTC P1400 KOEO or KOER Self-Test. • **Is KOEO or KOER DTC P1400 present with KOEO DTC P1400?**	Yes	PROCEED as directed with DTC P1400.
		No	Go to next Step.
2	CHECK FOR STUCK THROTTLE PLATE OR LINKAGE • Visually inspect throttle body and throttle linkage for binding or sticking. • Verify the throttle plate and linkage is at closed throttle position. • **Does throttle move freely and return to closed throttle position?**	Yes	Throttle plate and linkage are OK.
		No	SERVICE as necessary. RERUN Quick Test.

CODE No.	P1125 (Continuous)
DESCRIPTION	• Continuous Memory DTC P1125 indicates the TP sensor signal went below 9.80% (0.49 volts) or above 92.27% (4.60 volts) same time during the last 80 warm up cycles

[Possible Cause]
- TP sensor connector with poor continuity
- TP harness with poor continuity
- TP harness intermittent short
- TP sensor internal electrical or substrate open or electrical short

STEP	INSPECTION		ACTION
1	CHECK FOR TP CIRCUIT INTERMITTENT VOLTAGE INPUT Start engine and bring to idle. Run throttle up to 1,500 rpm for 5 seconds. Key on, engine running. Access TP PID (TPV PID) for a fault indication with a Scan Tool while performing the following: – Lightly tap on TP sensor and wiggle harness connector to simulate road shock • **Is the TP PID (TPV PID) changing below the minimum 9.80% (0.49 volts) or above the maximum 92.27% (4.60 volts)?**	Yes	DISCONNECT and INSPECT the TP sensor connector. If OK, REPLACE the TP sensor. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	Go to next Step.
2	CHECK TP HARNESS TO PCM FOR INTERMITTENT OPENS OR SHORTS • Key off. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, reconnect PCM. • Key on, engine off. • Connect DVOM between Test Pin 89 (TP SIG) and Test Pin 91 (SIG RTN) at the breakout box. • While viewing DVOM, do the following: – Grasp the vehicle harness closest to the TP sensor connector – Shake and bend a small section of the harness all the way to the dash panel – Wiggle, shake and bend the harness from the dash panel to the PCM • **Is the voltage changing below the minimum 0.49 volts or above the maximum 4.60 volts?**	Yes	ISOLATE fault and SERVICE as necessary. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	Unable duplicate and/or identify fault at this time. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary).

CODE No.	P1127 KOER
DESCRIPTION	• DTC P1127 indicates the HO2S Heater was not on KOER Self-Test, therefore accurate testing of the HO2S Heater is energized when certain temperature criteria is met. The HO2S Heater energize times are based on exhaust temperature modeling, which allows for upstream heaters being energized independent of the down-stream heaaters

[Possible Cause]
• Exhaust system too cool

STEP	INSPECTION		ACTION
1	• Key off. • Scan tool connected. • Key on, engine on. • Access HRT 11A, 12A and X1 and Monitor PID's. • **Do all PID's Indicate on?**	Yes	RERUN Quick Test. SERVICE any other DTC.
		No	RUN engine until all PID's indicate on. RERUN Quick Test. SERVICE any other DTC's.

CODE No.	P1270
DESCRIPTION	• DTC P1270 indicates the vehicle has been operated in a manner which caused the engine or vehicle speed to exceed a calibrated limit

[Possible Cause]
- Wheel slippage (water, ice, mud, snow, etc.)
- Engine over revved in neutral
- Vehicle driven at high rate of speed

STEP	INSPECTION		ACTION
1	EXCESSIVE ENGINE RPM/VEHICLE SPEED • **Has the vehicle been operated in any of the above conditions?**	Yes	RESET KAM (REFER to PCM Reset). RETURN vehicle to customer with information about DTC P1270.
		No	RESET KAM (REFER to PCM Reset). If there are other driveability concerns, Go to Trouble-shooting. If there are no other symptoms, RETURN vehicle to customer.

CODE No.	P1400
DESCRIPTION	• DTC P1400 indicates that the EGRP SIG circuit input is less than the Self-Test minimum

[Possible Cause]
- Damaged EGRP sensor/EGR valve assembly
- Damaged PCM
- Damaged harness connector
- Damaged harness

STEP	INSPECTION		ACTION
1	VERIFY EGRP SIGNAL VOLTAGE • Key on, engine off. • Access EGRV (EGR Valve position sensor input) PID with NGS. • **Is EGRV PID less than 0.2 volts?**	Yes	Go to Step 6.
		No	Go to next Step.
2	ATTEMPT TO GENERATE OPPOSITE CODE • Key off. • Disconnect EGRP sensor. • Jumper the VREF circuit to the EGRP sensor SIG circuit at the sensor vehicle harness connector. • Rerun KOEO and KOER self-tests (If the vehicle will not start, immediately remove the jumper wire and proceed to Step 5). • **Is DTC P1401 present (ignore all other DTCs)?**	Yes	REPLACE the EGRP sensor/EGR valve assembly. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	REMOVE the jumper wire. Go to next Step.
3	CHECK EGRP SENSOR VREF VOLTAGE • Key on, engine off. • EGRP sensor disconnected. • Measure voltage between VREF circuit and SIG RTN circuit at the EGRP sensor vehicle harness connector. • **Is voltage between 4.0 and 6.0 volts?**	Yes	Go to next Step.
		No	REPAIR open in VREF circuit.
4	CHECK CONTINUITY OF EGRP SIG RTN CIRCUIT • Key off. • EGRP sensor disconnected. • Disconnect the PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave the PCM disconnected. • Measure the resistance between EGRP SIG RTN circuit at the EGRP sensor vehicle harness connector and Test Pin 91 at the breakout box. • **Is resistance less than 5 ohms?**	Yes	Go to next Step.
		No	RESET KAM (REFER to PCM Reset). RERUN Quick Test.
5	CHECK EGRP SIG CIRCUIT FOR SHORT TO GROUND • Key off. • EGRP sensor disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between Test Pin 65 (EGRP SIG) and Test Pins 91 (SIG RTN), 51 (PWR GND) an 103 (PWR GND) at the breakout box. • **Is resistance greater than 10,000 ohms?**	Yes	REPLACE damaged PCM. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	SERVICE short in EGRP SIG circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
6	WIGGLE TEST SENSOR AND HARNESS • Key on, engine off. • Access EGRV PID with NGS. • Observe EGRV PID for an indication of a fault while performing the following: – Lightly tap on EGRP sensor. Wiggle the EGRP sensor connector and vehicle harness between sensor and PCM. A fault is indicated by a sudden change in EGRV PID voltage • **Is a fault indicated?**	Yes	ISOLATE fault and SERVICE as necessary. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary).

CODE No.	P1401
DESCRIPTION	• DTC P1401 indicates the EGRP SIG circuit input is greater than the self-test maximum

[Possible Cause]
- Damaged EGRP sensor/EGR valve assembly
- Damaged EGRV solenoid
- Damaged PCM
- Damaged harness connector
- Damaged harness

STEP	INSPECTION		ACTION
1	VERIFY EGRP SIGNAL VOLTAGE • Key on, engine off. • Access EGRV (EGR Valve position sensor input) PID with NGS. • **Is EGRV PID greater than 4.0?**	Yes	Go to DTC P1408 Troubleshooting Step 3.
		No	Go to next Step.
2	ATTEMPT TO GENERATE OPPOSITE DTC • Key off. • Disconnect EGRP sensor. • Connect a jumper wire bewteen the EGRP sensor SIG and SIG RTN circuits at the EGRP sensor vehicle harness connector. • Rerun KOEO and KOER self-tests (If the vehicle will not start, immediately remove the jumper wire and proceed to Step 5). • **Is DTC P1400 present (ignore all other DTCs)?**	Yes	REMOVE jumper wire. Go to Step 6.
		No	REMOVE jumper wire. Go to next Step.
3	CHECK CONTINUITY OF EGRP SENSOR SIG CIRCUIT • Key off. • EGRP sensor disconnected. • Disconnect the PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave the PCM disconnected. • Measure the resistance between EGRP sensor SIG circuit at the EGRP sensor vehicle harness connector and Test Pin 65 (EGRP SIG) at the breakout box. • **Is resistance less than 5 ohms?**	Yes	Go to next Step.
		No	SERVICE open in EGRP sensor SIG circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
4	CHECK CONTINUITY OF EGRP SENSOR SIG RTN CIRCUIT • Key off. • EGRP sensor disconnected. • PCM disconnected, breakout box installed. • Measure the resistance between EGRP sensor SIG RTN circuit at the EGRP sensor vehicle harness connector and Test Pin 91 (SIG RTN) at the breakout bos. • **Is resistance less than 5 ohms?**	Yes	Go to next Step.
		No	SERVICE open in EGRP sensor SIG RTN circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
5	CHECK EGRP SENSOR SIG CIRCUIT FOR SHORT TO POWER • Key off. • EGRP sensor disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between Test Pin 65 (EGRP SIG) and Test Pins 71 (VPWR), 90 (VREF) and 97 (VPWR) at the breakout box. • **Is resistance greater than 10,000 ohms?**	Yes	REPLACE the damaged PCM. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	SERVICE short to power in EGRP sensor SIG circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
6	CHECK EGRV SOLENOID CIRCUIT FOR SHORT TO GROUND • Key off. • EGRV solenoid disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between Test Pin 72 (EGRV) and Test Pins 23, 77 and 103 (PWR GND) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	REMOVE breakout box. RECONNECT all components. Go to next Step.
		No	SERVICE short in EGRV solenoid harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

STEP	INSPECTION		ACTION
7	CHECK EGRV SOLENOID-VALVE • Key off. • Breakout box installed, PCM connected. • Disconnect the vacuum line from the EGRV solenoid to the EGRA solenoid. Install a vacuum gauge at the unattached end of the vacuum line. • Disconnect the vacuum line from the intake manifold vacuum reservoir to the EGRV solenoid. • Install vacuum pump at the input port ot the EGRV solenoid and apply 8 to 10"-Hg of vacuum to the EGRV solenoid while observing the vacuum gauge. • **Is a vacuum signal indicated by the vacuum gauge?**	Yes	REPLACE the damaged EGRV solenoid. REMOVE breakout box. REMOVE vacuum gauge and pump. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	Go to next Step.
8	CHECK PCM CONTROL OF EGRV SOLENOID • Key off. • Breakout box installed, PCM connected. • Vacuum gauge installed between the EGRV and EGRA solenoids. • Vacuum pump installed at input port of the EGRV solenoid and apply 8 to 10"-Hg of vacuum is applied to the EGRV solenoid. • Key on and observe the vacuum gauge. • **Is a vacuum signal indicated by the vacuum gauge once the key is on?**	Yes	REPLACE the damaged PCM. REMOVE breakout box. REMOVE the vacuum gauge and pump. RECONNECT all components. RERUN Quick Test.
		No	Go to next Step.
9	CHECK EGRV SOLENOID ELECTRO-MECHANICAL OPERATION • Key off. • Breakout box installed, PCM connected. • Vacuum gauge installed between the EGRV and EGRA solenoids. • Vacuum pump installed at input port of the EGRV solenoid and appy 8 to 10"-Hg of vacuum is applied to the EGRV solenoid. • Key on. • Momentarily jumper Test Pin 72 (EGRV) to Test Pin 103 (PWR GRND) at the breakout box and observe the vacuum gauge. • Key off. • **Was a vacuum signal indicated by the vacuum gauge?**	Yes	REPLACE the EGRP sensor/EGR valve assembly. REMOVE breakout box. REMOVE the vacuum gauge and pump. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	REPLACE the EGRV solenoid-valve. REMOVE the breakout box. REMOVE the vacuum gauge and pump. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

CODE No.	P1408
DESCRIPTION	• DTC P1408 indicates a lack of EGR valve movement was detected by the EGRP sensor circuit during KOER self-test

[Possible Cause]
- Damaged vacuum lines
- Damaged EGRA solenoid
- Damaged EGR valve
- Damaged EGRV solenoid
- Damaged PCM
- Damaged harness connector
- Damaged harness

STEP	INSPECTION		ACTION
1	CHECK FOR VACUUM SIGNAL TO EGR VALVE • Key off. • Disconnect vacuum line from the EGRA solenoid to the EGR valve at the EGR valve. • Install vacuum gauge at unattached end of the disconnected vacuum line. • Rerun KOER self-test while observing the vacuum gauge (ignore any DTCs output during KOER). • Key off. • **Did the vacuum gauge indicate a vacuum signal was present during part of KOER self-test?**	Yes	DISCONNECT the vacuum gauge. Go to next Step.
		No	DISCONNECT the vacuum gauge. REMOVE and INSPECT the vacuum line. If OK, RECONNECT the vacuum line and go to Step 3, otherwise SERVICE the vacuum line as necessary and RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
2	CHECK RESPONSE OF EGR VALVE TO MANUALLY APPLIED VACUUM SIGNAL • Key off. • Vacuum line from the EGRA solenoid to the EGR valve disconnected at the EGR valve. • Install the breakout box, PCM connected. • Key on. • Using a hand held vacuum pump, slowly apply and remove 7"-Hg of vacuum repeatedly, while measuring the EGRP sensor voltage response at Test Pin 65 (EGRP SIG) of the breakout box. • **Based on EGRP sensor voltage, does the EGR valve open and close in as the vacuum signal is applied and removed?**	Yes	REMOVE the vacuum pump. REMOVE breakout box. REPLACE the damaged PCM. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	REMOVE the vacuum pump. REMOVE breakout box. REPLACE the damaged EGRP sensor/EGR valve assembly. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
3	CHECK FOR VACUUM SIGNAL TO EGRA SOLENOID • Key off. • Disconnect vacuum line from the EGRV solenoid to the EGRA solenoid at the EGRA solenoid input port. • Install vacuum gauge at unattached end of the disconnected vacuum line. • Rerun KOER self-test while observing the vacuum gauge (ignore any DTCs output during KOER). • Key off. • **Did the vacuum gauge indicate a vacuum signal was present during part of KOER self-test?**	Yes	REMOVE the vacuum gauge. RECONNECT the vacuum line. Go to next Step.
		No	DISCONNECT the vacuum gauge. REMOVE and INSPECT the vacuum line. If OK, RECONNECT the vacuum line and go to Step 9, otherwise SERVICE the vacuum line as necessary and RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
4	CHECK VPWR TO EGRA SOLENOID • Key off. • EGRA solenoid disconnected. • Key on, engine off. • Measure voltage between VPWR circuit and chassis ground at the EGRA solenoid vehicle harness connector. • **Is EGRA VPWR voltage greater than 10.5 volts?**	Yes	Go to next Step.
		No	SERVICE open in EGRA solenoid VPWR circuit. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
5	CHECK RESISTANCE OF EGRA SOLENOID • Key off. • EGRA solenoid disconnected. • Measure solenoid resistance. • **Is resistance between 30 and 70 ohms?**	Yes	Go to next Step.
		No	REPLACE the EGRA solenoid. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

STEP	INSPECTION		ACTION
6	CHECK EGRA SOLENOID CIRCUIT CONTINUITY • Key off. • EGRA solenoid disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure the resistance between Test Pin 68 (EGRA) at the breakout box and the EGRA circuit at the solenoid vehicle harness connector. • **Is the resistance less than 5.0 ohms?**	Yes	Go to next Step.
		No	SERVICE open in EGRA harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
7	CHECK EGRA SOLENOID CIRCUIT FOR SHORT TO POWER AND SHORT TO GROUND • Key off. • EGRA solenoid disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between Test Pin 68 (EGRA) and Test Pins 71, 97 (VPWR) and 90 (VREF) at the breakout box. • Measure resistance between Test Pin 68 (EGRA) and Test Pins 51, 103 (PWR GND) and 91 (SIG RTN) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	REMOVE breakout box. RECONNECT all components. Go to next Step.
		No	SERVICE short in EGRA solenoid harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
8	CHECK EGRA SOLENOID VALVE FUNCTION • Key off. • Breakout box installed, PCM connected. • Disconnect the vacuum line from the EGRV solenoid to EGRA solenoid at the EGRA solenoid. • Install vacuum pump at the input port of the EGRA solenoid, apply 8 to 10"-Hg of vacuum to the EGRA solenoid. • Disconnect the vacuum line from the EGRA solenoid to EGR valve at the EGR valve, install a vacuum gauge at the unattached end of the vacuum line. • Disconnect the vacuum line from the EGRA solenoid to the air cleaner at the air cleaner, plug the vacuum line at the unattached end. • Key on. • Momentarily jumper to ground Test Pin 68 (EGRA) at the breakout box and observe the vacuum gauge. • Key off. • **Was a vacuum signal indicated by the vacuum gauge?**	Yes	REPLACE the damaged EGRA solenoid. REMOVE breakout box. REMOVE the vacuum gauge and vacuum pump. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	REPLACE the damaged PCM. REMOVE breakout box. REMOVE the vacuum gauge and vacuum pump. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
9	CHECK VPWR TO EGRV SOLENOID • Key off. • EGRV solenoid disconnected. • Key on, engine off. • Measure voltage between VPWR circuit and chassis ground at the EGRV solenoid vehicle harness connector. • **Is EGRV VPWR voltage greater than 10.5 volts?**	Yes	Go to next Step.
		No	SERVICE open in EGRV solenoid VPWR circuit. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
10	CHECK RESISTANCE OF EGRV SOLENOID • Key off. • EGRV solenoid disconnected. • Measure solenoid resistance. • **Is resistance between 30 and 70 ohms?**	Yes	Go to next Step.
		No	REPLACE the EGRV solenoid. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

STEP	INSPECTION		ACTION
11	CHECK EGRV SOLENOID CIRCUIT CONTINUITY • Key off. • EGRV solenoid disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure the resistance between Test Pin 72 (EGRV) at the breakout box and the EGRV circuit at the solenoid vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	Go to next Step.
		No	SERVICE open in EGRV harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
12	CHECK EGRV SOLENOID CIRCUIT FOR SHORT TO POWER • Key off. • EGRV solenoid disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between Test Pin 72 (EGRV) and Test Pins 71, 97 (VPWR) and 90 (VREF) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	REMOVE breakout box. RECONNECT all components. Go to next Step.
		No	SERVICE short in EGRV solenoid harness circuit. REMOVE breakout box. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
13	CHECK EGRV SOLENOID VALVE FUNCTION • Key off. • Breakout box installed, PCM connected. • Disconnect the vacuum line from the intake manifold vacuum reservoir to the EGRV solenoid at the EGRV solenoid. • Install vacuum pump at the input port of the EGRV solenoid and apply 8 to 10"-Hg of vacuum to the EGRV solenoid. • Disconnect the vacuum line from EGRV solenoid to the EGRA solenoid at the EGRA solenoid, install a vacuum gauge at the unattached end of the vacuum line. • Key on. • Momentarily jumper Test Pin 72 (EGRV) to ground at the breakout box and observe the vacuum gauge. • Key off. • **Was a vacuum signal indicated by the vacuum gauge?**	Yes	REPLACE the damaged PCM. REMOVE breakout box. REMOVE the vacuum pump and vacuum gauge. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	REPLACE the damaged EGRV solenoid. REMOVE breakout box. REMOVE the vacuum pump and vacuum gauge. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.

CODE No.	P1460		
DESCRIPTION	• KOEO KOER DTC P1460 indicates an A/C relay primary circuit fault		
[Possible Cause] • Open or shorted circuit • Damaged A/C relay • Damaged Powertrain Control Module (PCM)			
STEP	INSPECTION		ACTION
1	CHECK FOR IGN RUN VOLTAGE TO A/C RELAY **NOTE:** Verify A/C and defrost were off during KOEO/KOER Self-Test. • Key off. • Disconnect A/C relay. • Key on. • Measure voltage between IGN RUN circuit at A/C relay vehicle harness connector and chassis ground. • **Is voltage greater than 10.5 volts?**	Yes	Go to next Step.
		No	VERIFY condition of related fuses. If OK, SERVICE open circuit. RECONNECT all components. RERUN Quick Test.
2	CHECK A/C RELAY • Key off. • A/C relay disconnected. • Check A/C relay coil resistance: – Measure resistance between ACON pin and IGN RUN pin at the A/C relay – Resistance should be between 50 and 100 ohms • Check A/C relay for internal shorts: – Measure resistance between ACON pin and the following pins at the A/C relay: B+, power-to-clutch, ground – Resistances should be greater than 10,000 ohms • **Are all resistance checks OK?**	Yes	Go to next Step.
		No	REPLACE A/C relay. RECONNECT all components. RERUN Quick Test.
3	CHECK ACON CIRCUIT FOR SHORT TO POWER • Key off. • A/C relay disconnected. • Disconnect Powertrain Control Module (PCM). Inspect for damaged or pushed out pins, corrosion, loose wire, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Key on, engine off. • Measure voltage between Test Pin 69 (ACON) at the breakout box and chassis ground. • **Is voltage less than 1.0 volt?**	Yes	Go to next Step.
		No	SERVICE short to power. REMOVE breakout box. RECONNECT all components.
4	CHECK ACON CIRCUIT FOR SHORT TO GROUND • Key off. • A/C relay disconnected. • Disconnect Scan Tool from DLC. • Breakout box installed, PCM disconnected. • Measure resistance between Test Pin 69 at the breakout box and chassis ground. • **Is resistance greater than 10,000 ohms?**	Yes	Go to next Step.
		No	SERVICE short to ground. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
5	CHECK ACON CIRCUIT CONTINUITY • Key off. • A/C relay disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between Test Pin 69 at breakout box and ACON circuit at A/C relay vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	REPLACE PCM. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
		No	SERVICE open circuit. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.

CODE No.	P1460
DESCRIPTION	• A Continuous Memory DTC P1460 indicates that a ACON circuit failure has occurred during vehicle operation

[Possible Cause]
- Open or short in ACON circuit (PCM pin 69)
- Open IGN RUN to A/C Relay

STEP	INSPECTION		ACTION
1	CHECK ACON CIRCUIT FOR INTERMITTENT CONCERNS • Key off. • Scan Tool connected. • Disconnect A/C Cycling Switch (Low Pressure (LP) Switch). • Install a jumper wire in the A/C Cycling/LP Switch vehicle harness connector (to complete the circuit). • Key on, engine off. • A/C demand switch on. • Check WAC circuit for open or short to power (this test will check ACON for short to ground) while performing the following (the A/C clutch will click on when a fault is detected): – Shake, wiggle, bend the ACON circuit between the PCM (pin 69) and the A/C relay – Lightly tap on the A/C relay (to simulate road shock) • **Is a fault indicated?**	Yes	ISOLATE fault and SERVICE as necessary. REMOVE jumper wire. RECONNECT all components. COMPLETE PCM Reset to clear DTCs (REFER to PCM Reset). RERUN Quick Test.
		No	Go to next Step.
2	CHECK ACON CIRCUIT FOR INTERMITTENT CONCERNS • Key on, engine off. • Jumper wire installed in A/C Cycling or LP switch. • A/C demand on. • Scan Tool connected. • Access Output Test Mode on Scan Tool. • Turn outputs on (to turn on the A/C clutch). • Check ACON circuit for open or short to power and open in VPWR or IGN RUN circuit while performing the following (the A/C clutch will click off when a fault is detected): – Shake, wiggle, bend the ACON circuit between the PCM (pin 69) and the A/C relay – Shake, wiggle, bend the VPWR or IGN RUN circuit to the WAC or A/C relay – Lightly tap on the A/C relay (to simulate road shock) • Key off, A/C off. • **Is a fault indicated?**	Yes	ISOLATE fault and SERVICE as necessary. REMOVE jumper wire. RECONNECT all components. COMPLETE PCM Reset to clear DTCs (REFER to PCM Reset). RERUN Quick Test.
		No	Unable to duplicate and/or identify fault at this time. REMOVE jumper wire. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary).

CODE No.	P1474
DESCRIPTION	• DTC P1474 indicates a Fan Control (FC) primary circuit failure

[Possible Cause]
- Open or shorted FC circuit
- Open VPWR circuit to FC relay
- Damaged FC relay
- Damaged PCM

STEP	INSPECTION		ACTION
1	CHECK FOR VPWR TO FAN CONTROL (FC) RELAY • Key off. • Disconnect Fan Control relay. • Key on. • Measure voltage between the VPWR circuit at the Fan Control relay vehicle harness connector and the battery negative post. • **Is voltage greater than 10.5 volts?**	Yes	Go to next Step.
		No	SERVICE open VPWR circuit to Fan Control relay. RECONNECT Fan Control relay. RERUN Quick Test.
2	CHECK FOR FC CIRCUIT CYCLING • Key on, engine off. • Scan Tool connected. • Access Output Test Mode on Scan Tool. • Connect DVOM positive lead to the VPWR circuit and the negative lead to the FC circuit at the FC relay vehicle harness connector. • While observing DVOM, command the cooling fan on and off a couple times. • **Does voltage change more than 0.5 volts when the cooling fan output is commanded on and off?**	Yes	Key off. REPLACE Fan Control relay. RERUN Quick Test.
		No	Key off. Go to next Step.
3	CHECK FC CIRCUIT FOR SHORT TO POWER • Key off. • FC relay disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Key on, engine off. • Measure voltage between the FC circuit at the FC relay vehicle harness connector and the battery negative post. • Key off. • **Was voltage less than 1.0 volt?**	Yes	Go to next Step.
		No	SERVICE FC circuit short to power. RECONNECT all components. RERUN Quick Test.
4	CHECK FC CIRCUIT FOR SHORT TO GROUND • Key off. • Disconnect Scan Tool from DLC. • FC relay disconnected. • PCM disconnected. • Install breakout box, leave PCM disconnected. • Measure resistance between Test Pin 28 (FC) and Test Pins 51, 103 (PWR GND) and 91 (SIG RTN) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	Go to next Step.
		No	SERVICE FC circuit short to ground. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
5	CHECK FC CIRCUIT CONTINUITY • Key off. • FC relay disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between Test Pin 28 at the breakout box and the FC circuit at the FC relay vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	REPLACE PCM. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
		No	SERVICE open FC circuit. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.

CODE No.	P1500		
DESCRIPTION	• DTC P1500 indicates the VSS input signal was intermittent		
[Possible Cause] • Damaged VSS • Damaged PCM • Intermittent VSS connections • Intermittent open in VSS harness circuit(s) • Intermittent short in VSS harness circuit(s)			
STEP	INSPECTION		ACTION
1	VISUAL INSPECTION • Key off. • Visually inspect the VSS and VSS harness circuits for any potential failures. Use the following check list for reference: – Loose VSS connector – Pushed out VSS connector pins – Damaged VSS wiring harness insulation – Incorrect harness routing – Incorrect VSS mounting • **Did the visual inspection reveal a potential failure?**	Yes	SERVICE fault as necessary. RESET KAM (REFER to PCM Reset). RUN VSS Drive Cycle to verify the repair.
		No	RECONNECT all components. Unable to duplicate or identify fault at this time. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary).

CODE No.	P1505
DESCRIPTION	• DTC P1505 indicates the IAC system has reached the adaptive clip

[Possible Cause]
- Air leaks
- Plugged air filter element
- Throttle body/linkage binding
- Contaminated or damaged IAC valve assembly
- Damaged throttle body

STEP	INSPECTION		ACTION
1	CHECK INLET AIR CONNECTION • Key off. • Inspect the entire inlet air system for leaks such as loose connection at throttle body or air cleaner, cracked or punctured ducting, etc. • **Is there a leak or loose connection in the air inlet system?**	Yes	Service as necessary. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	Go to next Step.
2	CHECK FOR A PLUGGED AIR FILTER • Key off. • Remove air filter element and check for excessive dirt or moisture. • **Is the air filter plugged?**	Yes	SERVICE as necessary. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	Go to next Step.
3	INSPECT THROTTLE BODY AND LINKAGE • Key off. • Disconnect accelerator cable and air cleaner tube from throttle body. • Exercise both cable and throttle body linkage separately while checking for binding, interference and full freedom of travel. • **Is a fault indicated?**	Yes	Go to next Step.
		No	Go to Step 8.
4	CHECK ACCELERATOR AND SPEED CONTROL CABLES FOR FREEDOM OF TRAVEL • Key off. • Disconnect accelerator cable and speed control cable from throttle body linkage. • Inspect cables for freedom of travel from accelerator pedal/speed control device to throttle body linkage cable connector. • **Do cables travel freely?**	Yes	Go to next Step.
		No	SERVICE cable as necessary.
5	VERIFY THROTTLE RETURN SCREW SETTING • Key off. • Cables removed from throttle body linkage. • Remove the clean air tube from the throttle body and verify that there is no foreign material or debris preventing the throttle plate from rotating to the fully closed position. • Verify that the Throttle Return Screw (TRC) is in contact with the throttle linkage lever arm when the throttle is in the closed plate (idle) position. • **Does the TRC screw contact lever arm?**	Yes	Go to Step 7.
		No	The following adjustment should be made only in the event TRC screw does not contact the throttle lever arm. Do not adjust TRC screw to try to correct idle quality concerns. 1) PLACE a 0.002 inch feeler gauge between the TRC screw and lever arm. ADJUST TRC screw until it just contacts the feeler gauge. 2) REMOVE the feeler gauge and turn the screw clockwise a half turn. 3) Go to next Step.
6	VERIFY TP SENSOR IN RANGE • Key on, engine off. • Access TP PID with the Scan Tool. • Slowly move throttle from closed to wide open throttle position and observe the TP PID for smooth reading change. • Release throttle and allow to return to fully closed position. • **While at closed throttle position, is the TP PID reading between 13% (0.66 volt) and 24% (1.20 volts)?**	Yes	REMOVE Scan Tool. Go to next Step.
		No	REMOVE Scan Tool. REPLACE throttle body assembly.

STEP	INSPECTION		ACTION
7	CHECK FOR THROTTLE BODY STICKING, BINDING, GRABBING • Key off. • Cables removed from throttle body linkage. • Clean air tube removed from throttle body. • Snap throttle from open to closed position several times. • Gently cycle throttle by hand from closed to wide open position. Inspect for freedom of travel particularly during the initial throttle opening. • Check for foreign material or debris in the throttle bore and plate area that can cause sticking or binding. **NOTE:** Throttle bodies use a special coating/sealant on the throttle bore and plate area to make them tolerant to engine sludge accumulation. Sludge or oil film deposits in this area do not cause a sticking or binding condition and do not require servicing. DO NOT CLEAN THE THROTTLE BORE AND PLATE AREA. CLEANING WILL DAMAGE THE THROTTLE BODY ASSEMBLY. • **Does the throttle rotate freely without sticking, binding or grabbing condition?**	Yes	RECONNECT accelerator cable and clean air tube to the throttle body assembly. REFER to TROUBLESHOOTING GUIDE if the drive symptom persists.
		No	REPLACE throttle body assembly. RECONNECT all components.
8	CHECK FOR PROPER OPERATION OF RELATED ENGINE SYSTEMS • Verify that the following engine systems have been properly diagnosed and corrected before proceeding with the Air Intake system diagnostics: – Positive Crankcase Ventilation (PCV) System – Ignition System – Exhaust System – Engine Cooling System (engine coolant temperature is above 180 degrees F) – Incorrect fuel pressure, plugged fuel filter, fuel quality (contamination) • **Have the systems been properly checked and are they functioning correctly?**	Yes	Go to next Step.
		No	Go to TROUBLESHOOTING GUIDE, with the symptom, for direction.
9	CHECK FOR VACUUM LEAKS • Key on, engine running. • With engine at idle, listen for vacuum leaks. • Inspect the entire inlet air system from the Mass Air Flow (MAF) sensor to the intake manifold for leaks such as: – Cracked or punctured inlet air tube – Loose connections on the inlet air tube at the air cleaner housing or throttle body – Idle Air Control (IAC) valve assembly or gasket seal – EGR valve gasket seal leak to intake manifold – Intake manifold assembly or gasket seal – EGR valve diaphragm or control solenoid – Vacuum supply connectors and hose – PCV connectors and hose • **Are any leaks detected in the above areas?**	Yes	SERVICE as necessary.
		No	Go to next Step.

STEP	INSPECTION		ACTION
10	CHECK IDLE • Key off. • Transmission in Park (wheels blocked and parking brake engaged). • A/C, heater and all accessories are off. • Key on, engine running. • Engine at normal operating temperature and cooling fan off. **WARNING: DO NOT UNPLUG COOLING FAN. IT MAY CAUSE ENGINE OVERHEATING.** • Connect Scan Tool. • Access engine RPM PID. **NOTE:** Engine idle RPM is controlled by the PCM and cannot be adjusted. The PCM is calibrated to control idle at the speeds listed in the Hot Idle PID Value Table at the beginning of the test. When performing this test, verify the RPM is within the specification. If the engine is allowed to idle for an extended period of time, or if the engine temperature is hot enough to require cooling fan operation, it may be necessary to turn the engine off and repeat this test procedure. • Access IAC PID, idle air percent duty cycle. • **Do the RPM and IAC PID readings match the values in the Hot Idle PID Value Table at the beginning of the test?**	Yes	Go to next Step.
		No	Go to Step 12.
11	CHECK IDLE CONTROL RESPONSE • Transmission still in Park. • A/C, heater and all accessories off. • Engine at normal operating temperature and cooling fan off, but not unplugged. **WARNING: DO NOT UNPLUG COOLING FAN. IT MAY CAUSE ENGINE OVERHEATING.** • Key on, engine running. • Goose throttle and let it return to the idle position. • **Does the engine stall or does the RPM fluctuate excessively before returning to the idle speed specified?**	Yes	Go to next Step.
		No	Air Intake system is OK. DISCONNECT Scan Tool. Go to TROUBLESHOOTING GUIDE to check other possible causes of the drive symptoms.
12	CHECK IAC SOLENOID FOR PROPER FUNCTION • Transmission still in Park. • A/C, heater and all accessories off. • Engine at normal operating temperature and cooling fan off, but not unplugged. **WARNING: DO NOT UNPLUG COOLING FAN. IT MAY CAUSE ENGINE OVERHEATING.** • Key on, engine running. • Disconnect IAC solenoid vehicle harness connector. • **Does the RPM drop or engine stall?**	Yes	Fast Idle Symptom: Go to Step 14. All Other Symptom: Go to next Step.
		No	IAC solenoid is defective, REPLACE IAC solenoid only. RESET KAM (REFER to PCM Reset). **NOTE:** Do not attempt to clean the IAC solenoid.

STEP	INSPECTION		ACTION
13	THROTTLE BODY VISUAL/FUNCTIONAL CHECK • Key off. • Remove throttle body assembly. • Hold throttle body up to a light source. With the throttle plate closed, no light should be visible between the plate and bore (sludge tolerant coating intact). The hole in the throttle plate (in some applications only) should be visible and unobstructed. • Rotate the throttle lever and allow it to return. It should not stick or bind and should return to the closed plate position (TRC screw contacting lever) freely when released. • **Does the throttle body pass these visual/functional checks?**	Yes	Throttle body is functioning properly. REINSTALL throttle body assembly. RETURN to TROUBLESHOOTING GUIDE to check other possible causes of symptom.
		No	Throttle body is defective. REPLACE entire throttle body assembly. RESET KAM (REFER to PCM Reset).
14	CHECK IAC CIRCUIT FOR SHORT TO GROUND • Key off. • IAC solenoid disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure resistance between Test Pin 83 (IAC). and Test Pins 51 or 103 (PWR GND) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	REPLACE damaged PCM. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
		No	SERVICE short circuit. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.

CODE No.	DTC P1506		
DESCRIPTION	• DTC P1506 indicates Self-Test has detected an IAC over speed error		
[Possible Cause] • IAC circuit short to GND • IAC assembly stuck open • Vacuum leak • Damaged IAC assembly • Damaged throttle body • Damaged PCM			
STEP	INSPECTION		ACTION
1	CHECK FOR VACUUM LEAKS • Key on, engine running. • With the engine at idle, listen for vacuum leaks. • Inspect the entire inlet air system from the Mass Air Flow (MAF) sensor to the intake manifold for damage or leaks such as: – Cracked or punctured inlet air tube – Loose inlet air tube at the air cleaner housing or throttle body – IAC valve assembly or gasket seal – Intake manifold assembly or gasket seal – EGR valve gasket seal – Vacuum supply connectors and hose – PCV valve connectors and hose • **Are any leaks detected in the above areas?**	Yes	SERVICE as necessary. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
		No	Go to next Step.
2	CHECK EVAP SYSTEM FOR A STUCK OPEN VALVE OR SOLENOID • Key off. • Disconnect hoses at EVAP Canister Purge Valve or solenoid. • Connect a hand vacuum pump to the fuel vapor port to carbon canister at the EVAP Canister Purge Valve or to either port if equipped with a EVAP Canister Purge solenoid. • Apply 16 in-Hg (53 kPa) of vacuum to EVAP Canister Purge Valve or Solenoid. • **Does the EVAP Canister Purge Valve or solenoid hold vacuum for 20 seconds?**	Yes	RECONNECT all components. Go to next Step.
		No	REPLACE EVAP Valve or solenoid. RECONNECT all components. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
3	CHECK IAC SOLENOID FOR PROPER FUNCTION • Key on, engine running. • Bring engine to normal operating temperature. • Transmission in Park or Neutral. • Disconnect IAC solenoid vehicle harness connector. • **Does the RPM drop or engine stall?**	Yes	Go to next Step.
		No	INSPECT throttle body for damage or defect. SERVICE as necessary. If OK, REPLACE IAC valve assembly. RESET KAM (REFER to PCM Reset). RERUN Quick Test.
4	CHECK IAC CIRCUIT FOR SHORT TO GND • Key off. • IAC solenoid disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure resistance between Test Pin 83 (IAC) and Test Pins 51 and 103 (PWR GND) at the breakout box. • **Is each resistance greater than 10,000 ohms?**	Yes	For Fast Idle Symptom currently present: REPLACE PCM. REMOVE breakout box. RECONNECT all components. RERUN Quick Test. All others: RECONNECT all components. Go to next Step.
		No	SERVICE short circuit. RECONNECT all components. RERUN Quick Test.

STEP	INSPECTION		ACTION
5	CHECK IAC SYSTEM FOR INTERMITTENT OPEN OR SHORT • Key on, engine running. • Access IAC and RPM PIDs with a NGS. • With engine at normal operating temperature, accessories off and at idle, the IAC duty cycle should between 20% and 40%. • Observe the IAC and RPM PIDs for an indication of a fault while performing the following at idle: – Lightly tap on IAC valve assembly and wiggle harness connector to simulate road shock – Grasp the vehicle harness closest to the IAC valve assembly. Shake and bend a small section of the harness from the IAC to the dash panel and from the dash panel to PCM • **Do the IAC or RPM PIDs suddenly change in valve indicating a fault?**	Yes	ISOLATE fault and SERVICE as necessary. RECONNECT all components. RESET KAM (REFER to PCM Reset).
		No	For idle quality, starting, or stalling symptoms currently present: REPLACE IAC valve assembly. RECONNECT all components. RESET KAM (REFER to PCM Reset). All othres: Unable to duplicate and/or identify fault at this time. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary).

CODE No.	P1650, P1651
DESCRIPTION	• DTC P1651 indicates PSP signal malfunction • DTC P1650 indicates PSP signal out of self-test range

[Possible Cause]
- PSP switch/shorting bar damaged
- SIG RTN open or shorted to GND
- PCM damaged
- PSP signal circuit open or shorted to SIG RTN

STEP	INSPECTION		ACTION
1	VERIFY ELECTRICAL FUNCTION • Key on, engine running. • View PSP PID with Scan Tool while turning the steering wheel back and forth. • **Does the Scan Tool indicate voltage Low/High or High/Low?**	Yes	Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary).
		No	Go to next Step.
2	CHECK PSP SWITCH OPERATION • Key off. • Install tachometer vehicle harness connector and inspect both ends for damage, Service as necessary. • Disconnect PSP switch. • Jumper PSP circuit at the PSP switch vehicle harness connector. • **Does engine rpm increase?**	Yes	REPLACE PSP switch. VERIFY repair.
		No	REMOVE jumper wire. Go to next Step.
3	CHECK CONTINUITY OF PSP CIRCUITS • Key off. • PSP switch disconnected. • Disconnect PCM Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure resistance between Test Pin 31 at the breakout gox and PSP circuit at the PSP switch vehicle harness connector. • **Is each resistance less than 5.0 ohms?**	Yes	Go to next Step.
		No	SERVICE open circuit. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
4	CHECK PSP CIRCUIT FOR SHORT • Key off. • PSP switch disconnected. • Breakout box installed, leave PCM disconnected. • Measure resistance between Test Pin 31 and Test Pin 91 at the breakout box. • Measure resistance between Test Pin 31 at the breakout box chassis ground. • **Is either resistance less than 10,000 ohms?**	Yes	SERVICE short in harness. REMOVE breakout box. RECONNECT all components. VERIFY repair.
		No	Go to next Step.
5	CHECK PSP SWITCH RESISTANCE • Key off. • PSP switch vehicle harness disconnected. • Start engine and let idle in Park/Neutral. • Measure resistance between the PSP switch terminals while turning the steering wheel. • **Is the resistance less than 5.0 ohms?**	Yes	REPLACE PCM. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.
		No	REPLACE PSP switch. REMOVE breakout box. RECONNECT all components. RERUN Quick Test.

CODE No.	P1703
DESCRIPTION	• DTC P1703 indicates that during Key On Engine Off (KOEO) Self-Test, voltage was seen on the Brake Switch Test Pin at the PCM

[Possible Cause]
- Brake pedal pressed and released during the Key On Engine Off Self-Test
- Brake pedal depressed during entire Key On Engine Running Self-Test
- BOO Test Pin shorted to B+
- Defective brake switch

STEP	INSPECTION		ACTION
1	VERIFY BRAKE PEDAL WAS PRESSED • Was the brake pedal pressed and released during KOEO Self-Test?	Yes	RERUN KOEO Self-Test. Avoid pressing brake pedal during Test.
		No	Go to next Step.
2	CHECK OPERATION OF STOPLIGHTS • Key on. • Check stoplight operation. • **Does stoplights operate normally?**	Yes	Go to next Step.
		No	If stoplights never on Go to Step 4. If stoplights always on Go to Step 6.
3	CHECK FOR BOO CIRCUIT CYCLING • Key off. • Disconnect PCM Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, leave PCM disconnected. • Measure voltage between brake switch Test Pin 92 and Test Pin 76 and 77 at the breakout box while depressing and releasing brake. • **Does the voltage cycle?**	Yes	REPLACE PCM. REMOVE breakout box. RERUN Self-Test.
		No	SERVICE open in brake switch circuit between PCM and brake switch connection to brake circuit. RERUN Self-Test.
4	CHECK FOR POWER TO BRAKE SWITCH **NOTE:** Using a 12V test light, verify integrity of related fuses in fuse panel and check condition of stoplight bulbs before starting this test. • Key off. • Disconnect brake switch (located on brake pedal). • Measure B+ input voltage between stoplight. switch and chassis ground. • **Is voltage greater than 10 volts?**	Yes	Go to next Step.
		No	SERVICE open B+ circuit to brake switch. RECONNECT brake switch connector. RERUN Quick Test.
5	VERIFY INTEGRITY OF BRAKE SWITCH • Brake switch disconnected. • Connect DVOM test probes to brake switch terminals at the brake switch. • DVOM on ohms scale. • Press brake pedal while monitoring reading. • **Is the resistance less than 5.0 ohms?**	Yes	SERVICE open circuit between brake switch and stoplight ground. RECONNECT brake switch. RERUN Quick Test.
		No	REPLACE brake switch. RECONNECT brake switch. RERUN Quick Test.
6	VERIFY BRAKE SWITCH IS NOT ALWAYS CLOSED • Key off. • Stoplight switch disconnected. • Key on, engine off. • **Are stoplights still on?**	Yes	Go to next Step.
		No	VERIFY proper installation of brake switch. If OK. REPLACE stoplight switch. RECONNECT harness connector. RERUN Quick Test.
7	CHECK FOR SHORT TO POWER IN PCM • Key off. • Stoplight switch disconnected. • Disconnect Powertrain Control Module (PCM). • Key on, engine off. • **Are stoplights still on?**	Yes	Go to next Step.
		No	REPLACE PCM. RECONNECT all components. RERUN Quick Test.

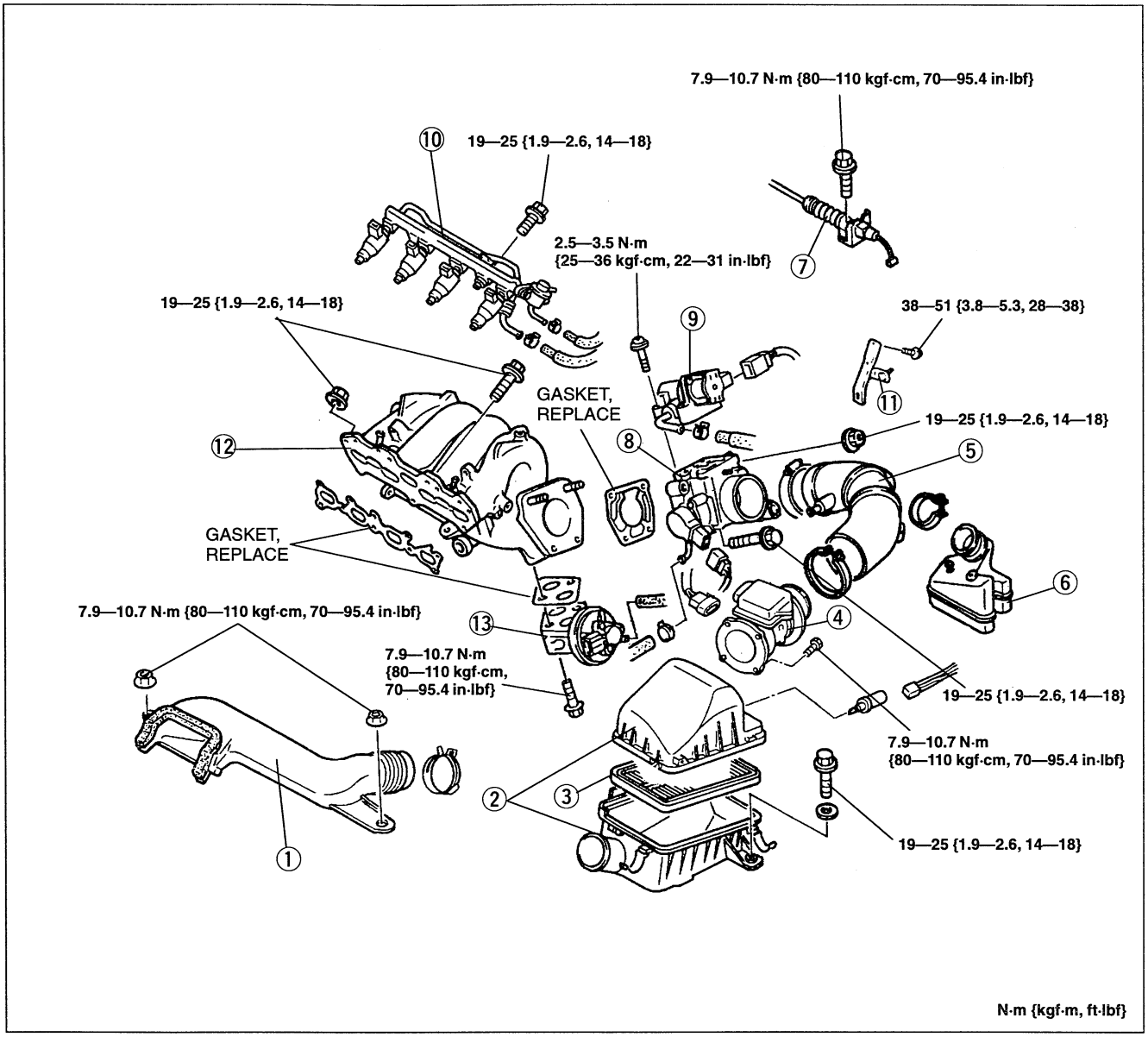
STEP	INSPECTION		ACTION
8	CHECK FOR SHORT TO POWER IN SHIFTLOCK ACTUATOR. • Key off. • PCM disconnected • Brake switch disconnected. • Disconnect shiftlock actuator, cruise control module and ABS module (if equipped) to isolate brake switch wiring. • Key on, engine off. • **Are stoplights still on?**	Yes	SERVICE short to power in brake switch/Stoplight circuit. RECONNECT PCM brake switch and accessories. RERUN Quick Test.
		No	SERVICE short in accessories (i.e. shiftlock actuator, ABS module, etc.). RECONNECT all components. RERUN Quick Test.

INTAKE-AIR SYSTEM

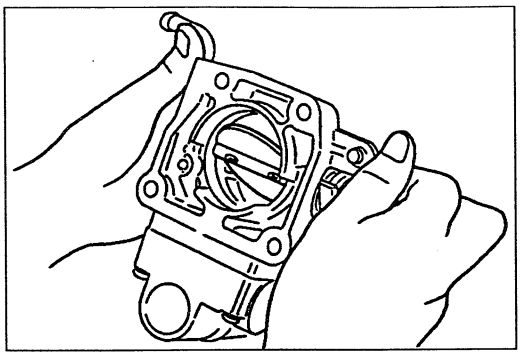
COMPONENT PARTS

Removal / Inspection / Installation

1. Remove in the order shown in the figure.
2. Inspect the intake-air system components and repair or replace them as necessary.
3. Install in the reverse order of removal, referring to **Installation note**.



1. Fresh-air duct
   Inspect for damage
2. Air cleaner
   Inspect for excessive dirt and damage
3. Air cleaner element
4. Mass air flow sensor
   Inspection ..... page F3–157
5. Air hose
   Inspect for damage
6. Resonance chamber
   Inspect for damage
   Installation note ..... page F3–103
7. Accelerator cable
   Inspection / Adjustment ..... page F3–104
8. Throttle body
   Inspection ..... page F3–103
9. BAC valve
   Inspection ..... page F3–108
10. Fuel distributor
11. Intake manifold bracket
12. Intake manifold
    Installation note ..... page F3–103



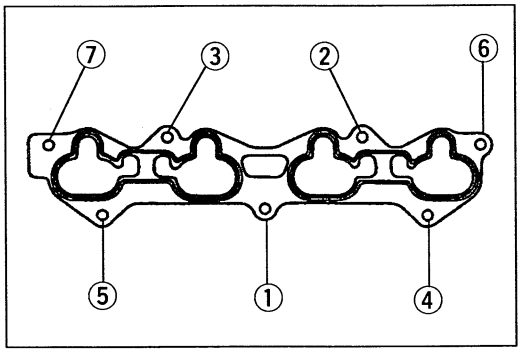
THROTTLE BODY

Inspection

1. Check the throttle body for wear, deposits, and coolant leakage.
2. Verify that the throttle valve moves smoothly when the throttle lever is moved from the closed throttle position to the wide open throttle.
3. Replace the throttle body if necessary.

Caution

- **Do not remove the thin seal coating from the throttle valve or bore. It is necessary for proper operation.**



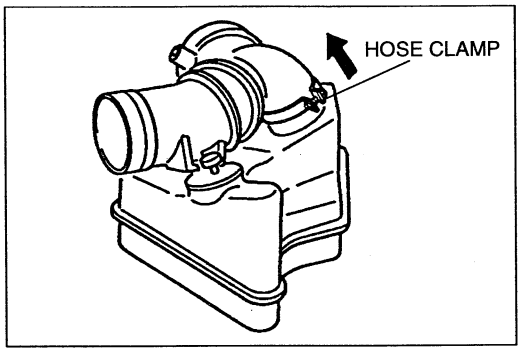
INTAKE MANIFOLD

Installation note

1. Tighten the bolts in the order shown in the figure.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

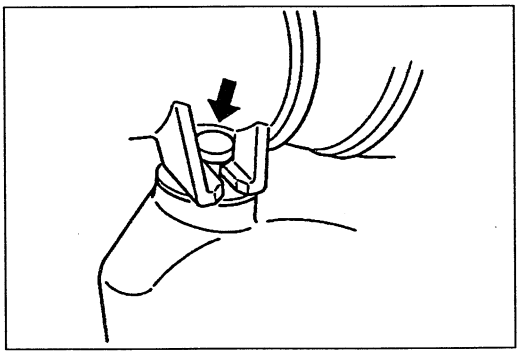
2. Refill the radiator with the specified engine coolant. (Refer to section E.)
3. Check for engine coolant leakage.



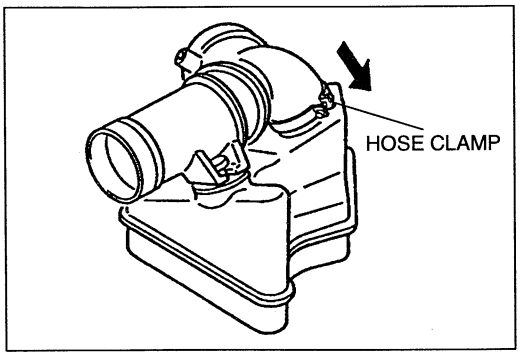
RESONANCE CHAMBER

Installation note

1. Slide the hose clamp onto the hose and push it onto resonance chamber.



2. Rotate the hose and hook it securely onto the locating knob.

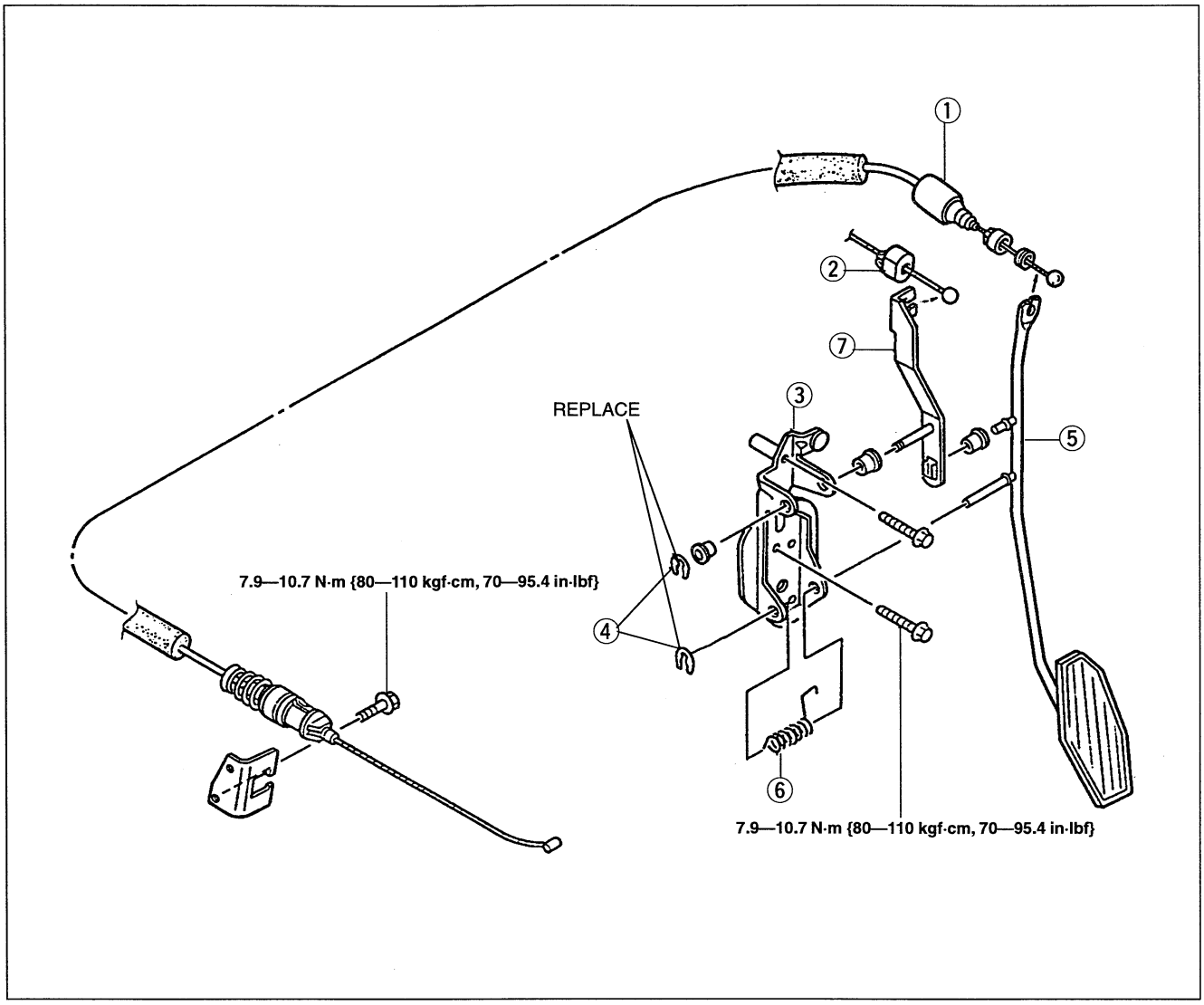


3. Tighten the hose clamp.

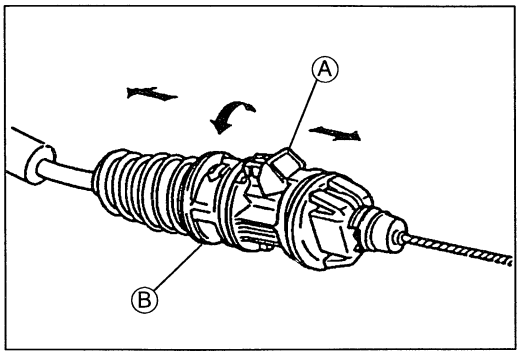
ACCELERATOR PEDAL

Removal / Installation

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



1. Accelerator cable
   Inspection / Adjustment ..... below
2. Cruise actuator cable
   Adjustment ... 1996 626/MX-6 Body Electrical Troubleshooting Manual section Q
3. Retainer
4. Clip
5. Accelerator pedal
6. Return spring
7. Bracket



ACCELERATOR CABLE

Inspection / Adjustment

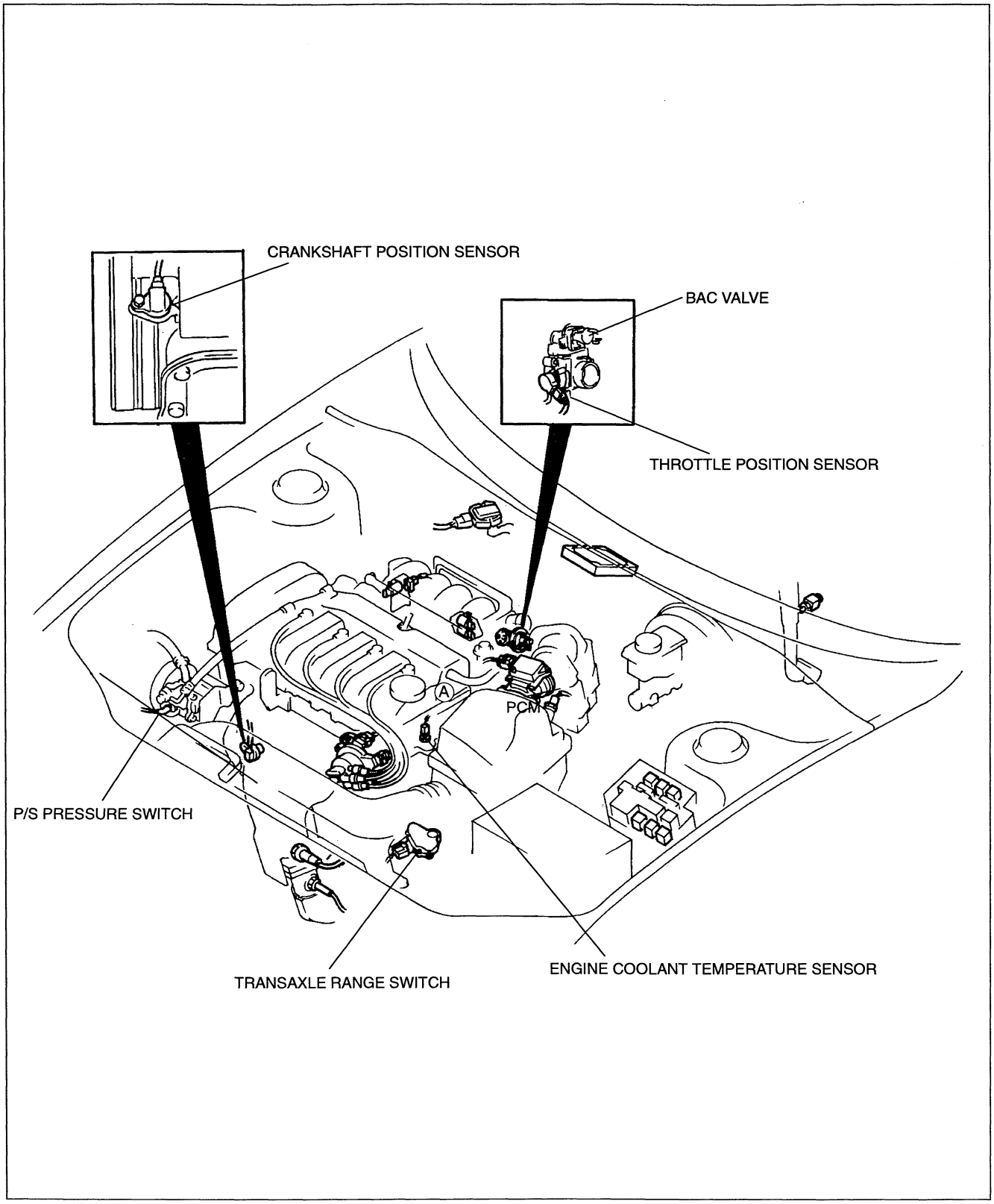
1. Verify that the throttle valve is in the closed throttle position.
2. Measure the free play of the accelerator cable.

   Free play: 1.5—4.0 mm {0.06—0.16 in}

3. If not as specified, adjust the cable free play by turning stopper Ⓑ while pressing lock button Ⓐ with the closed throttle position.
4. Reset the cable lock.

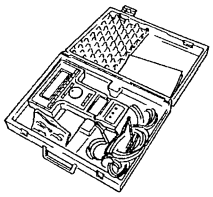
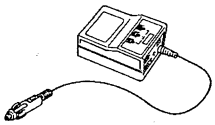
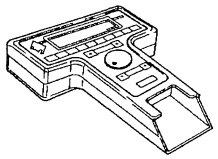
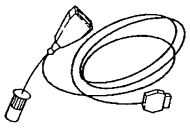
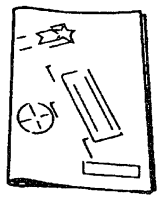
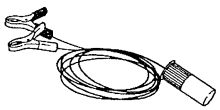
IDLE AIR CONTROL SYSTEM

DESCRIPTION



The idle air control system controls the bypass air amount that passes through the throttle body to improve startability, warm-up, idle smoothness, and drivability.

PREPARATION
SST

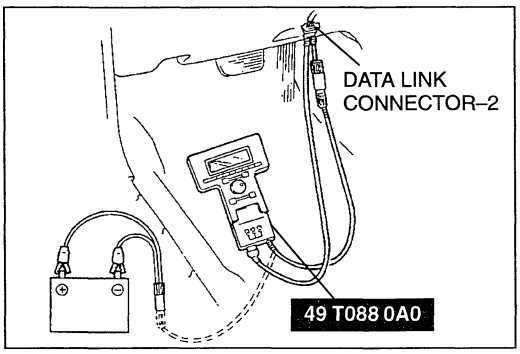
49 T088 0A0 NGS set 	For inspection of idle air control valve	49 T088 010B Program Card 	For inspection of idle air control valve
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of idle air control valve	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of idle air control valve
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of idle air control valve	49 T088 008A Instruction Manual 	For inspection of idle air control valve
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of idle air control valve	—	—

SYSTEM INSPECTION

Air Valve

Note
- This inspection must be done with the engine cold. Engine coolant below 20°C {68°F}.

1. Start the engine.
2. Verify that the idle speed decreases gradually as the engine warms up.
3. If the engine speed does not decrease inspect the idle air control valve and air valve. (Refer to page F3–108.)



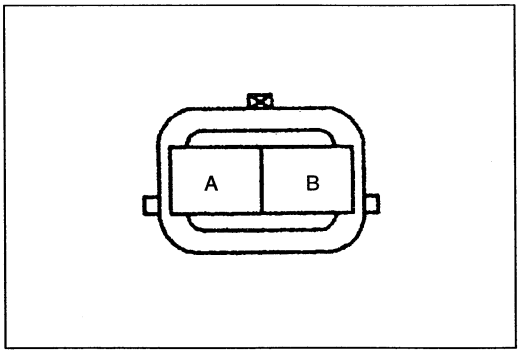
Idle Air Control Valve

1. Start the engine and run it at idle.
2. Disconnect the IAC valve connector and verify that the engine speed changes.
3. If the engine condition will not change, do as follows.
   (1) Connect the **SSTs** (NGS) to the data link connector–2.
   (2) Select the "SIMULATION TEST" function on the NGS display.
   (3) Change the duty value of the IAC valve to 100% by using the "SIMULATION TEST" function and verify that the idle speed increases.
      I. If the idle speed increase, replace the PCM. (Refer to page F3–150.)
      II. If the idle speed does not change, replace the BAC valve. (Refer to page F3–102.)
4. Warm up the engine to normal operating temperature and run it idle.
5. Turn the electrical load ON and verify that the engine speed is within the specification.

Load condition	Idle speed (rpm)
No load	650—750
Cooling fan ON	675—775
Fan switch ON at 3rd or higher	675—775
Head light switch ON	675—775
Rear window defroster switch ON	675—775
P/S ON	650—750
A/C ON	725—825

Note
- Excludes temporary idle speed drop just after the electrical loads are turned ON.

6. If not as specified, check the related switches and wiring harnesses.



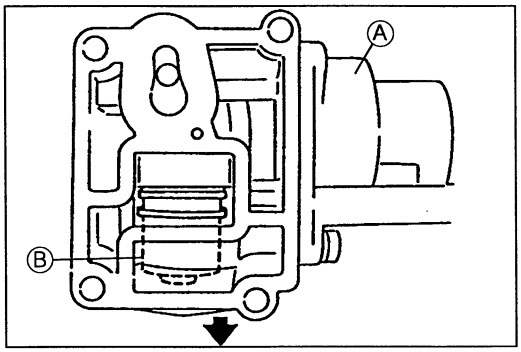
IDLE AIR CONTROL VALVE

Inspection

1. Disconnect the idle air control valve connector.
2. Measure the resistance of the valve.

   Resistance: 7.7—9.3 [at 23°C {73°F}]

3. If not as specified, replace the BAC valve.



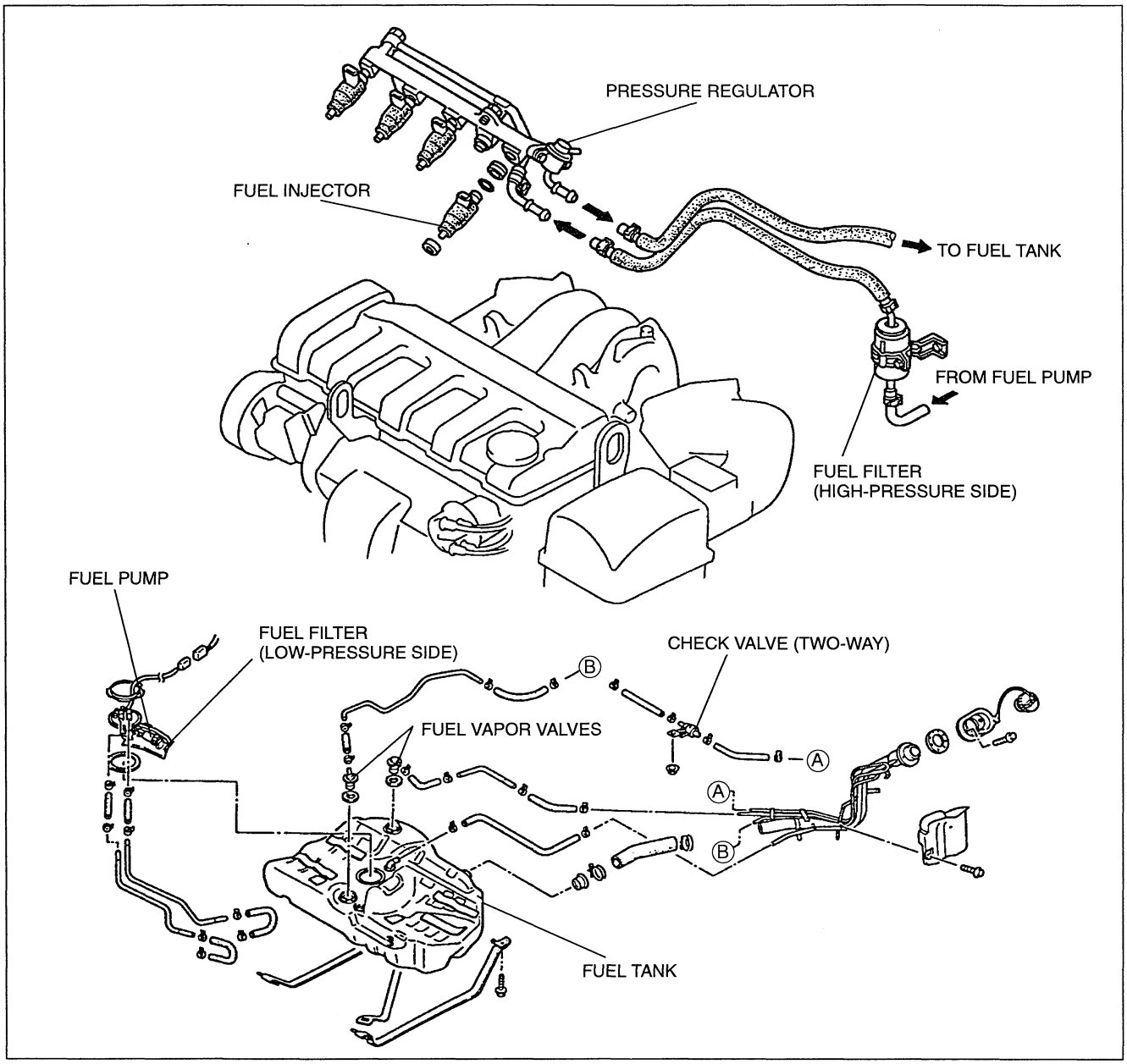
AIR VALVE

Inspection

1. Remove the BAC valve. (Refer to page F3–102.)
2. Cool the BAC valve to below 0°C {32°F}.
3. Heat the BAC valve at point Ⓐ by using a blow drier, and verify that part Ⓑ moves in the direction of the arrow in the figure.
4. If not as specified, replace the BAC valve.

FUEL SYSTEM

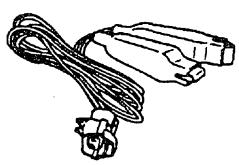
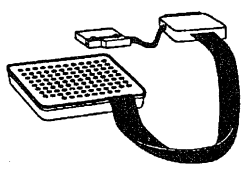
DESCRIPTION

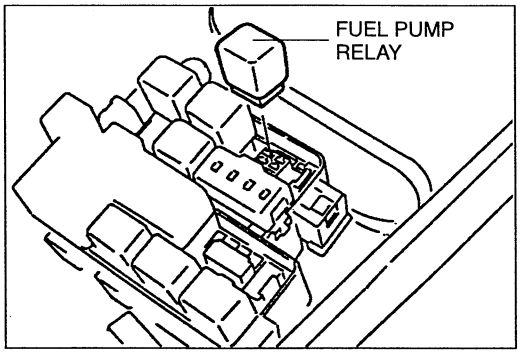


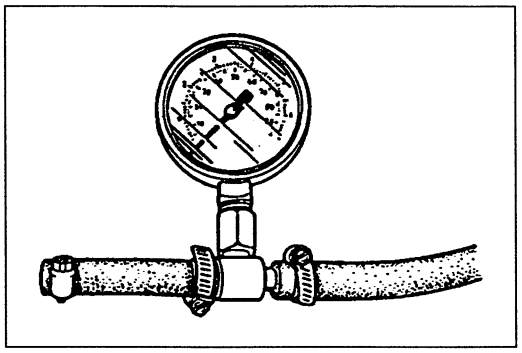
This system supplies the fuel to the fuel injectors at a constant pressure. Fuel is metered and injected into the intake manifold according to injection control signals from the PCM. The system consists of the fuel tank, fuel pump, fuel filters, pressure regulator, pressure regulator control solenoid valve, fuel injectors, and fuel pump relay.

PREPARATION

SST

49 L018 901 Injector checker		For inspection of fuel injector	49 UN01 130 104 Pin Breakout Box		For inspection of PCM terminal voltage





Fuel Pressure and Servicing Fuel System

Warning

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

Fuel in the fuel system is under high pressure when the engine is not running.

Warning

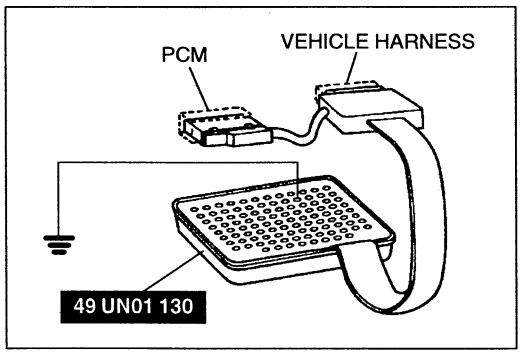
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the following "Fuel Line Safety Procedures".**

Fuel Line Safety Procedures

A. Release the fuel pressure before disconnecting a fuel line.
   1. Start the engine.
   2. Remove the fuel pump relay.
   3. After the engine stalls, turn the ignition swicth to OFF.
   4. Install the fuel pump relay.

B. Avoid leakage
   1. When disconnecting a fuel line hose, wrap a rag around it to protect against fuel leakage.
   2. Plug the hose after removal.

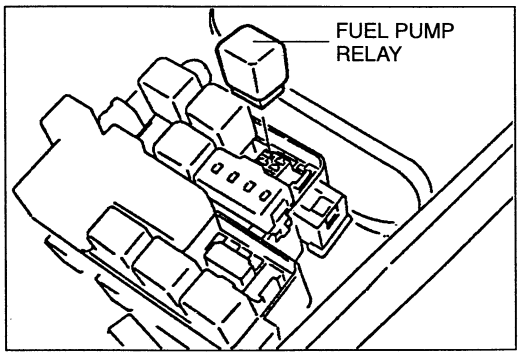
C. Use a fuel pressure gauge correctly; install hose clamps to secure the fuel pressure gauge to the fuel filter and the main hose to prevent leakage.



Priming Fuel System

After the fuel pressure has been released for repairs or inspection, the system must be primed to avoid excessive cranking when the engine is first started. Follow the steps below.

1. Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST**.
2. Turn the ignition switch to ON for **approx. 10 sec.** and check for fuel leaks.
3. Turn the ignition switch to OFF and disconnect the jumper wire.

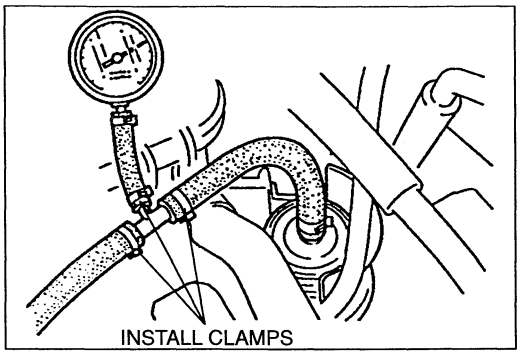


SYSTEM INSPECTION

Fuel Pressure Hold Inspection

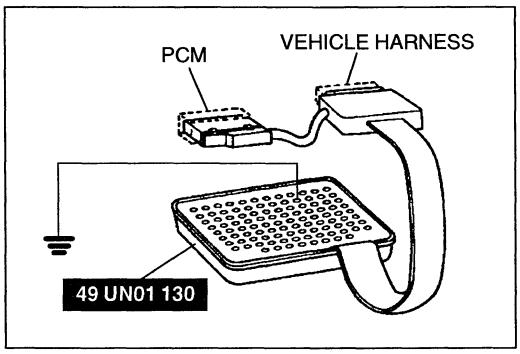
Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" above.**

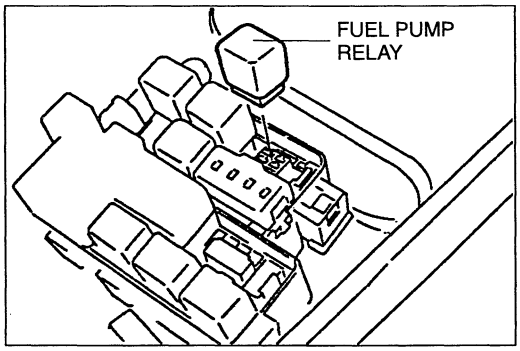


1. Disconnect the negative battery cable.
2. Install a fuel pressure gauge between the fuel filter and the main fuel hose. (Install clamps as shown.)
3. Connect the negative battery cable.
4. Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST**.
5. Turn the ignition switch to ON for **10 sec.** to operate the fuel pump.
6. Turn the ignition switch to OFF and disconnect the jumper wire.
7. Observe the fuel pressure **after 5 min**.

Fuel pressure:
More than 150 kPa {1.5 kgf/cm^2, 21 psi}

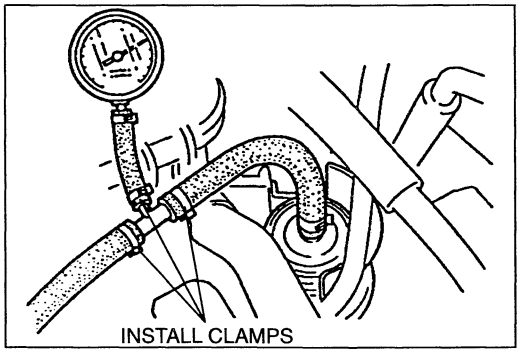


8. If not as specified, perform the following inspections.
   - Fuel pump hold pressure. (Refer to page F3–114.)
   - Pressure regulator hold pressure. (Refer to page F3–118.)
   - Injector fuel leakage. (Refer to page F3–120.)



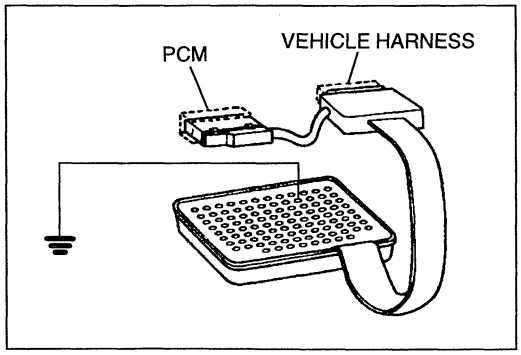
Fuel Line Pressure Inspection

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F3–110.**



1. Disconnect the negative battery cable.
2. Install a fuel pressure gauge between the fuel filter and the main fuel hose. (Install clamps as shown.)
3. Connect the negative battery cable.
4. Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST**.
5. Turn the ignition switch to ON.
6. Measure the fuel line pressure.

Fuel line pressure:
260—310 kPa {2.6—3.2 kgf/cm^2, 37—46 psi}

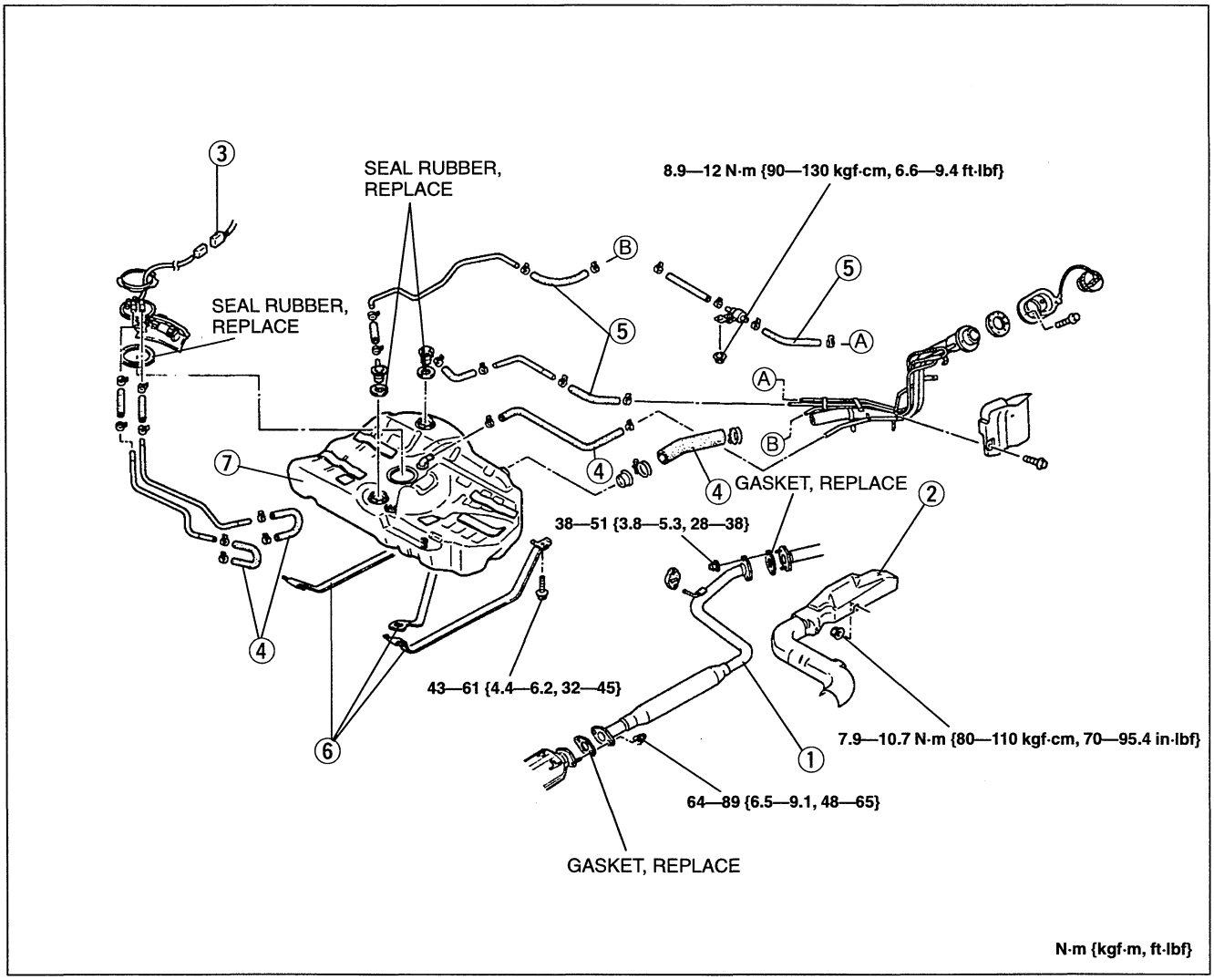


7. If not as specified, perform the following inspections.
   - Fuel pump maximum pressure. (Refer to page F3–115.)
   - Fuel line clogging and restriction.
   - Fuel filter clogging and restriction.
   - Pressure regulator hold pressure. (Refer to page F3–118.)

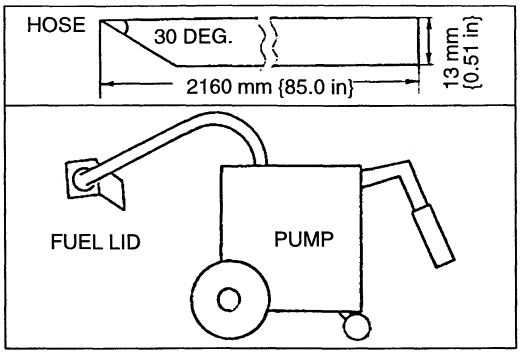
FUEL TANK
Removal / Inspection / Installation

Warning
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F3–110.**
- **Repairing a fuel tank that has not been properly steam cleaned can be dangerous. Explosion or fire may cause death or serious injury. Always properly steam clean a fuel tank before repairing it.**

1. Suck up the fuel from the fuel tank. (Refer to **Removal note** on page F3–113.)
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, referring to **Installation note**.



1. Presilencer
2. Insulator
3. Connector
4. Fuel hoses
   Installation note ..... page F3–113
5. Evaporative hoses
   Installation note ..... page F3–113
6. Fuel tank strap
7. Fuel tank
   Inspect for cracks and corrosion
   Removal note ..... page F3–113



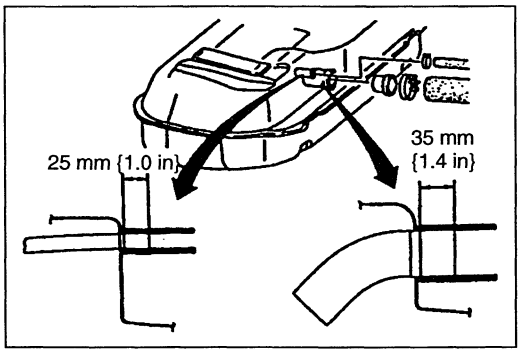
Removal note

1. Remove the filler cap and insert a hose into the fuel tank through the filler pipe.
2. Start the pump and suck up the fuel into a container.

Note

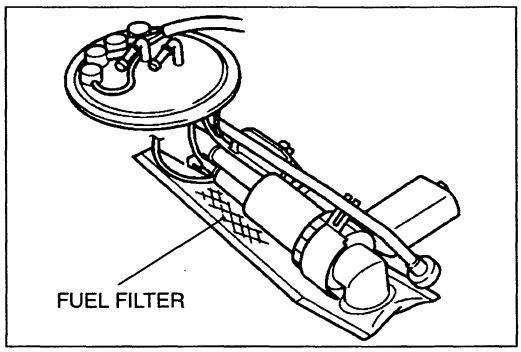
- For easier work, prepare a hose of the following size.

Outer diameter: 13 mm {0.51 in}
Length: 2160 mm {85.0 in}

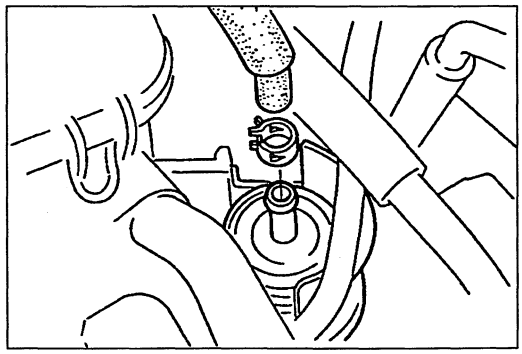


Installation note

1. Push the ends of the main fuel hose, fuel return hose, and evaporative hoses onto the fuel tank fittings **at least 25 mm {1.0 in}**.
2. Push the fuel filler hoses onto the fuel tank pipes and filler pipes **at least 35 mm {1.4 in}**.



FUEL FILTER
Replacement
Low-pressure side (in-tank filter)
(Refer to page F3–116.)



High-pressure side

The fuel filter must be replaced at the intervals outlined in the maintenance schedule.

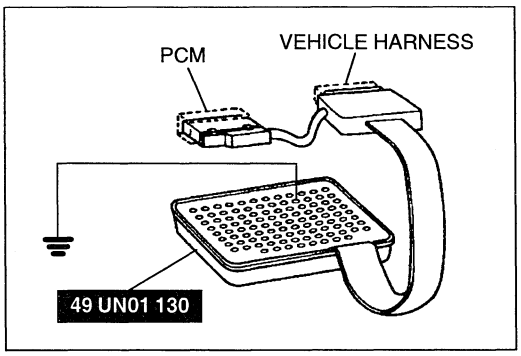
Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F3–110.**

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

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

4. Verify that the fuel hoses are pushed fully onto the fuel filter nipples.
5. Secure the fuel hoses with clips.
6. Start the engine and verify that the fuel line joints do not leak.

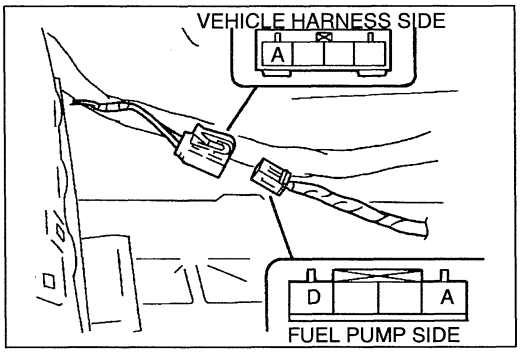


FUEL PUMP

Inspection

Fuel pump operation

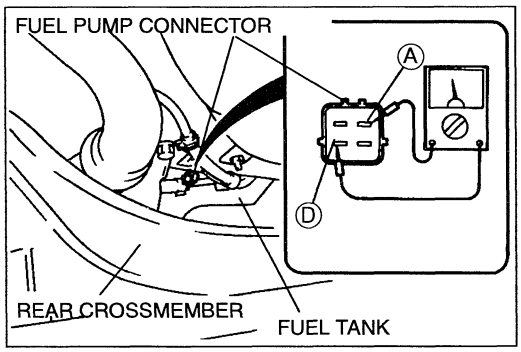
1. Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST**.
2. Remove the fuel filler cap.
3. Turn the ignition switch to ON.
4. Listen at the filler inlet for the operational sound of the fuel pump.
5. Install the fuel filler cap.



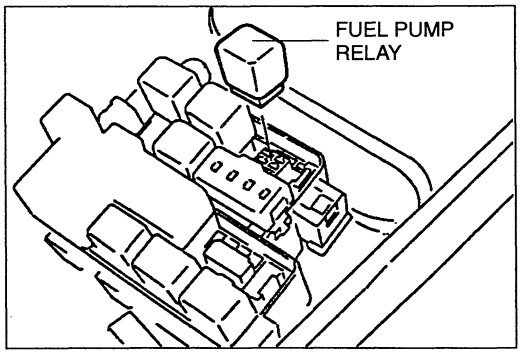
6. If no sound was heard, measure the voltage between terminal A of the vehicle harness side fuel pump connector and a ground (in the RH trunk compartment trim).

   Voltage: B+

7. If the voltage is not correct, check the fuel pump relay and related wiring harness.
8. If the voltage is correct, check for continuity between terminals A and D of the fuel pump side connector (in the RH trunk compartment trim).



9. If there is continuity, check fuel pump ground circuit for open.
10. If there is no continuity, check for continuity between terminals A and D of the fuel pump connector as shown. (Underside of body)
11. If there is continuity, check terminal A and/or D harness between fuel pump connector to vehicle harness.
12. If there is no continuity, remove the fuel tank and replace the fuel pump. (Refer to page F3–116.)

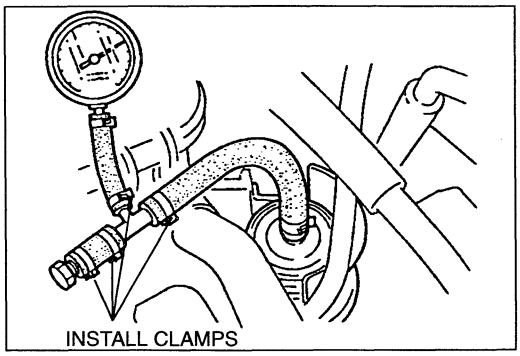


Hold pressure

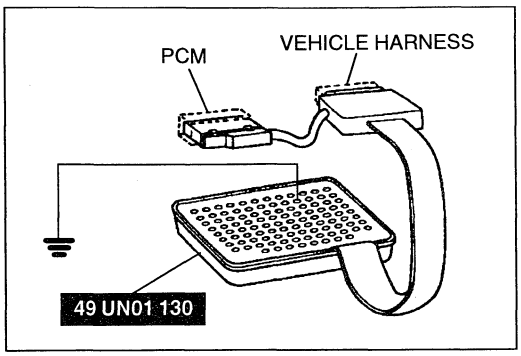
Perform this inspection if the fuel pressure hold inspection is not as specified. (Refer to page F3–110.)

Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F3–110.**



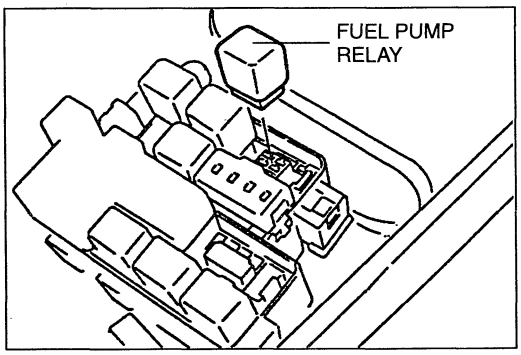
1. Disconnect the negative battery cable.
2. Connect a fuel pressure gauge to the fuel filter and plug the outlet of the gauge as shown. (Install clamps as shown.)
3. Connect the negative battery cable.



4. Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST**.
5. Turn the ignition switch to ON **for 10 sec.** to operate the fuel pump.
6. Turn the ignition switch to OFF and disconnect the jumper wire.
7. Observe the fuel pressure **after 5 min.**.

Fuel pressure: More than 340 kPa {3.5 kgf/cm^2, 50 psi}

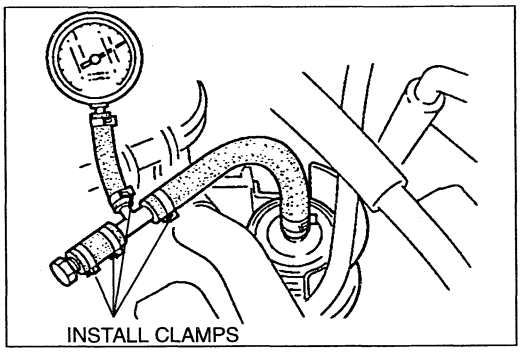
8. If not as specified, replace the fuel pump.



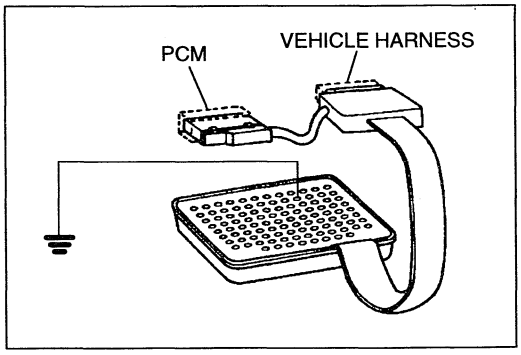
Fuel pump maximum pressure

Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F3–110.**



1. Disconnect the negative battery cable.
2. Connect a fuel pressure gauge to the fuel filter and plug the outlet of the gauge as shown. (Install clamps as shown.)
3. Connect the negative battery cable.



4. Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST**.
5. Turn the ignition switch to ON to operate the fuel pump.
6. Measure the pump maximum pressure.

Fuel pump maximum pressure:
450—630 kPa {5.0—6.5 kgf/cm^2, 72—92 psi}

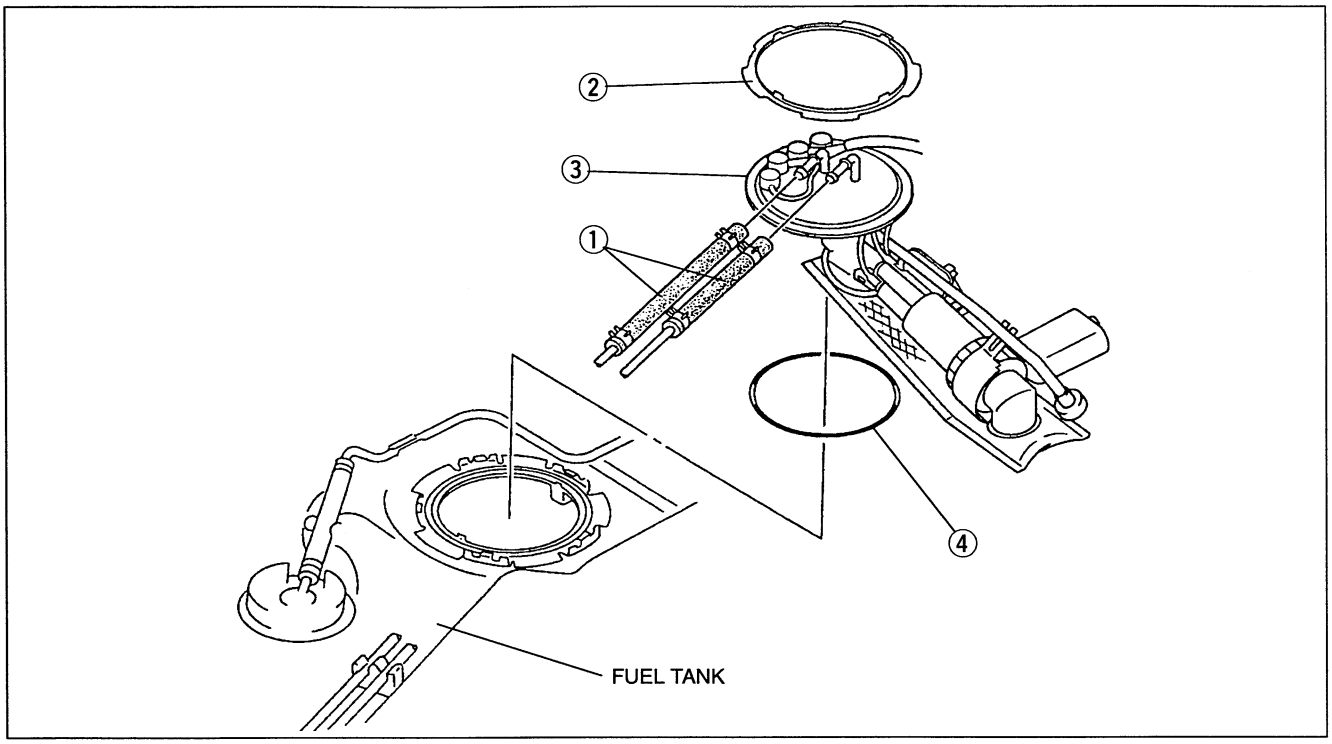
7. Turn the ignition switch to OFF and disconnect the jumper wire.
8. If not as specified, replace the fuel pump.

Removal / Installation

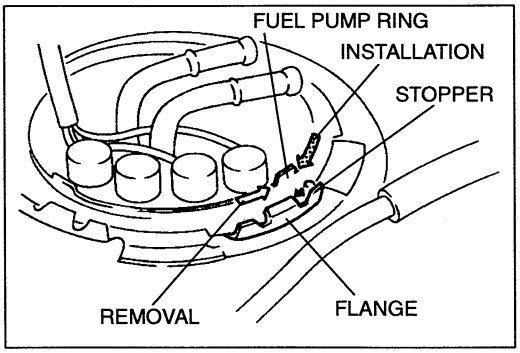
1. Remove the fuel tank.
2. Remove the fuel pump, referring to **Removal note**.
3. Install in the reverse order of removal, referring to **Installation note**.

Note

- Replace the fuel pump as an assembly.



1. Fuel hose
2. Fuel pump ring
   Removal / Installation Note ..... below
3. Fuel pump
4. Fuel pump gasket

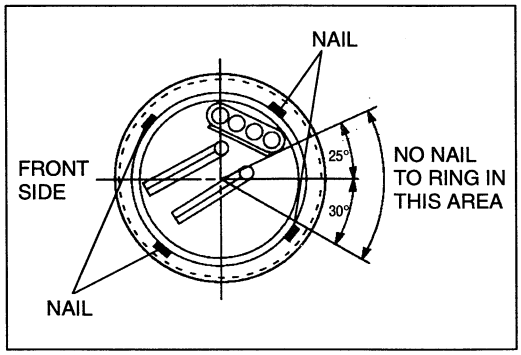


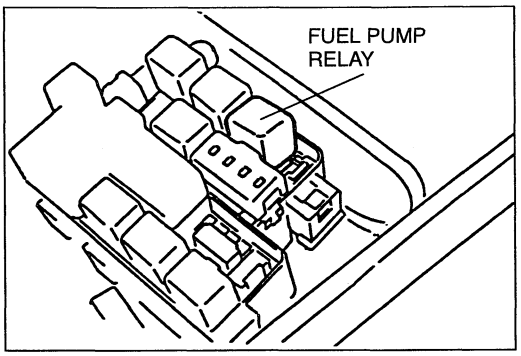
Removal note

Rotate the fuel pump ring counterclockwise and remove it.

Installation note

Rotate the fuel pump ring clockwise until the flange touches the stopper.



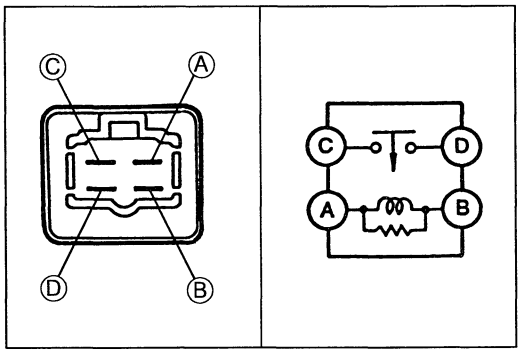


FUEL PUMP RELAY

Inspection

Operation check

Listen for clicking of the fuel pump relay while turning the ignition switch from OFF to START.

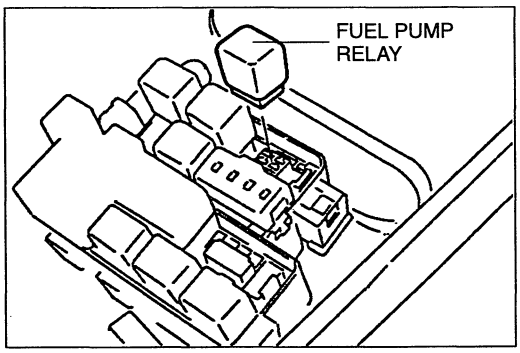


Continuity inspection

Check continuity between the terminals of the relay.

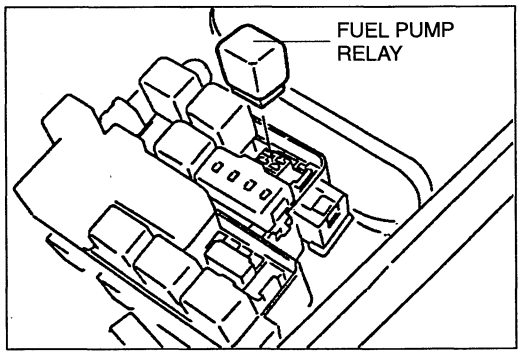
B+: Battery positive voltage

Terminal A—B	Terminal C—D
B+ applied	Continuity
B+ not applied	No continuity



Replacement

1. Remove the relay from main fuse block No.1.
2. Install in the reverse order of removal.



PRESSURE REGULATOR

Inspection

Fuel line pressure

Warning

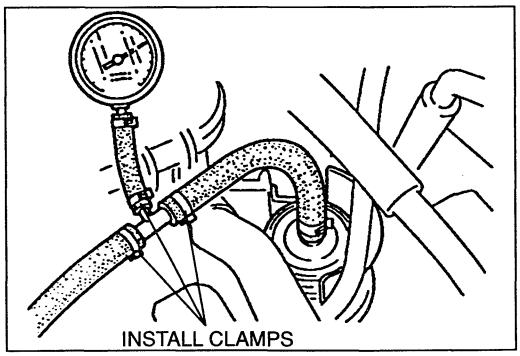
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F3–110.**

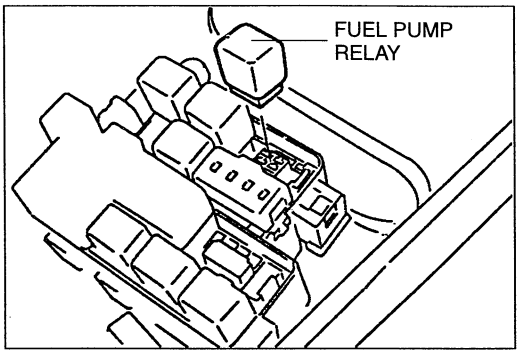
1. Disconnect the negative battery cable.
2. Connect a fuel pressure gauge between the fuel filter and the main fuel hose. (Install clamps as shown.)
3. Connect the negative battery cable.
4. Start the engine and run it at idle.
5. Measure the fuel line pressure.

Fuel line pressure:
210—260 kPa {2.1—2.6 kgf/cm^2, 30—37 psi}

6. Disconnect the vacuum hose from the pressure regulator and measure the fuel line pressure.

Fuel line pressure:
260—310 kPa {2.6—3.2 kgf/cm^2, 37—46 psi}



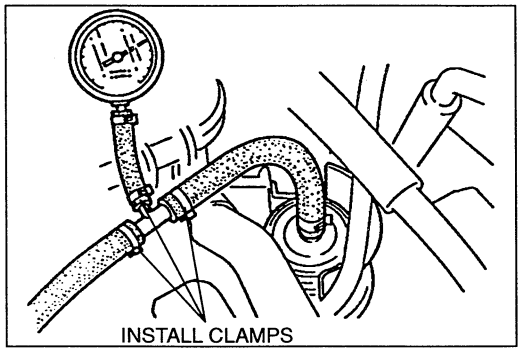


Hold pressure

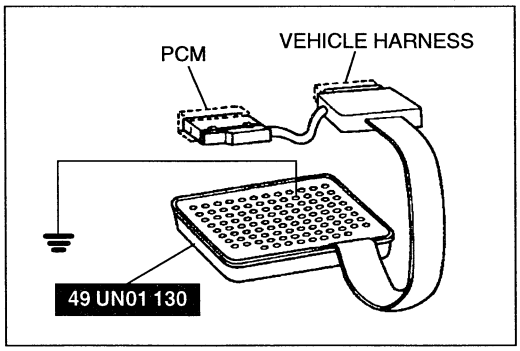
Perform this inspection if the fuel pressure hold inspection is not as specified. (Refer to page F3–110.)

Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F3–110.**



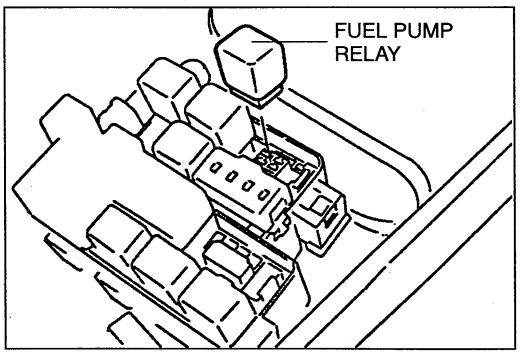
1. Disconnect the negative battery terminal.
2. Connect a fuel pressure gauge between the fuel filter and the main fuel hose. (Install clamps as shown.)
3. Connect the negative battery terminal.



4. Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST**.
5. Turn the ignition switch to ON **for 10 sec.** to operate the fuel pump.
6. Turn the ignition switch to OFF and disconnect the jumper wire.
7. Pinch the fuel return hose with a plier.
8. Observe the fuel pressure **for 5 min.**.

   Fuel pressure: More than 147 kPa {1.5 kgf/cm^2, 21 psi}

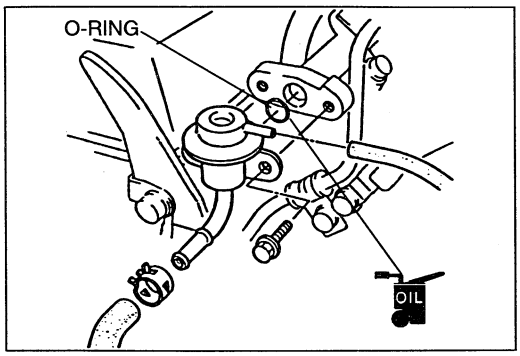
9. If not as specified, replace the pressure regulator.



Replacement

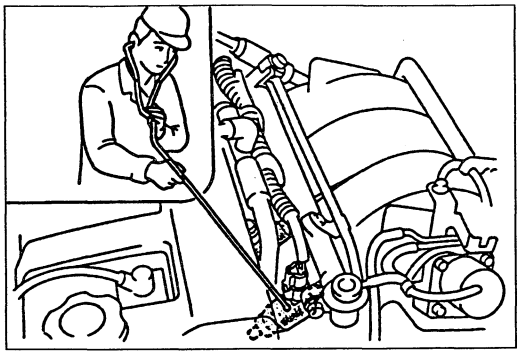
Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F3–110.**



1. Disconnect the vacuum hose.
2. Disconnect the fuel return hose.
3. Remove the pressure regulator.
4. Install a new O-ring.
5. Install in the reverse order of removal.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

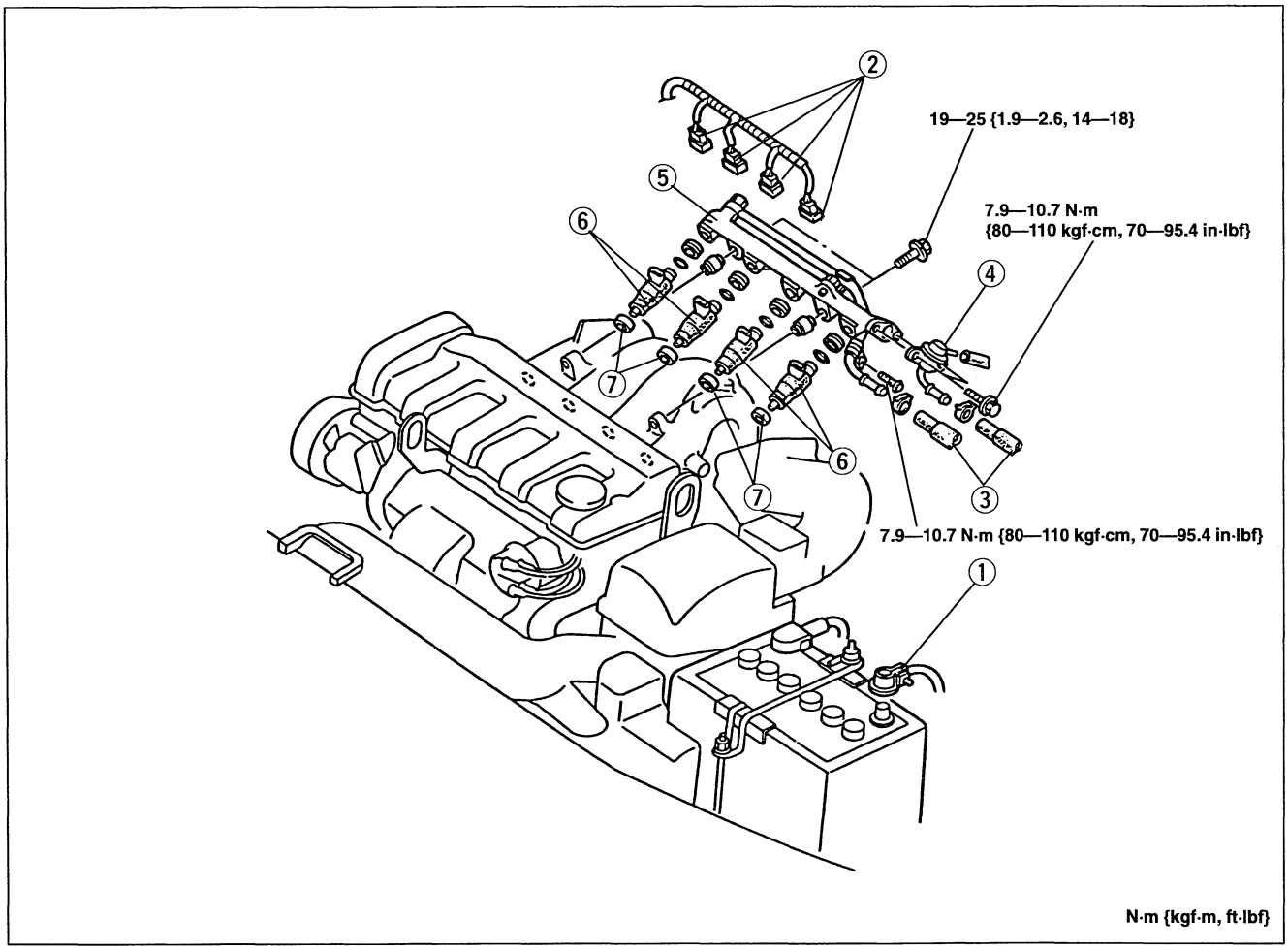


FUEL INJECTOR
Inspection
Operation check
1. Warm up the engine and let it idle.
2. Listen for the operational sound of each fuel injector with a screwdriver or a sound scope.
3. If no sound is heard, measure the fuel injector resistance. (Refer to page F3–121.)
4. If the fuel injector resistance is OK, check wiring to the fuel injector and the voltages of the PCM terminals 74, 75, 100 and 101. (Refer to page F3–150.)

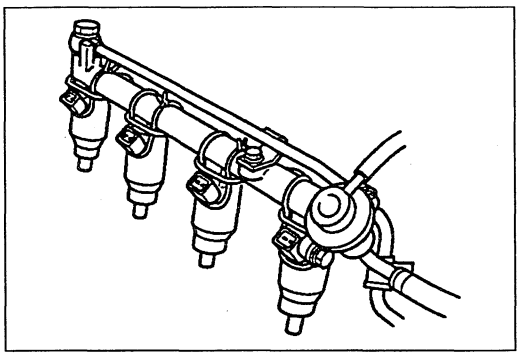
Removal / Installation

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F3–110.**

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal, referring to **Installation note**.



1. Negative battery cable
2. Fuel injector connector
3. Fuel hose
4. Pressure regulator
   Inspection ..... page F3–117
5. Fuel distributor
6. Fuel injector
   Installation note ..... page F3–121
7. Insulator

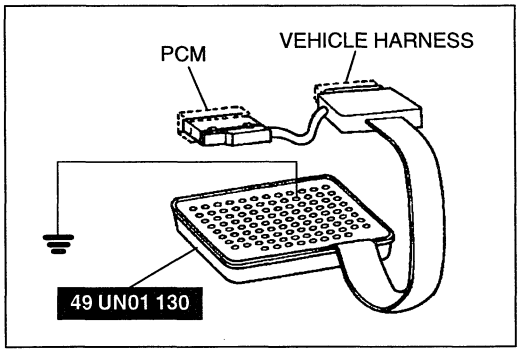


Fuel leakage test

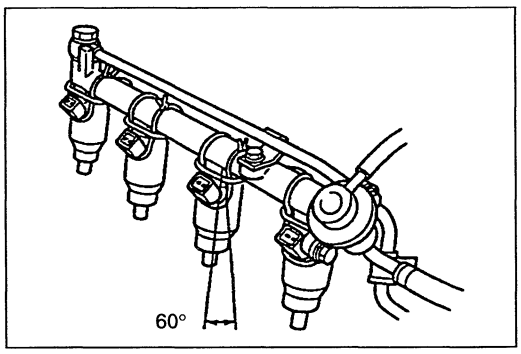
1. Remove the fuel injectors together with the fuel distributor. (Refer to page F3–119.)
2. Fasten the fuel injectors firmly to the pipe with wire.

Warning

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**



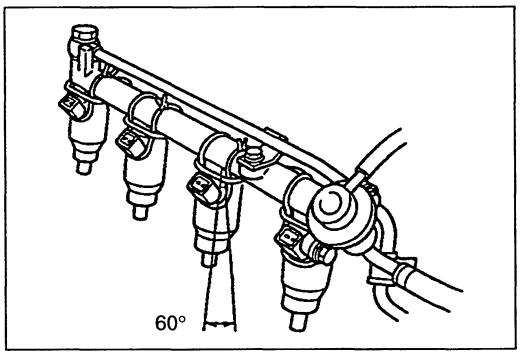
3. Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST**.
4. Turn the ignition switch to ON.



5. Tilt the fuel injectors **approx. 60 degrees** and verify that there is no fuel leaks from the fuel injector nozzles.

Leakage specification
If there is more than one drop per 2 minutes, replace the fuel injector.

6. Turn the ignition switch to OFF and disconnect the jumper wire.

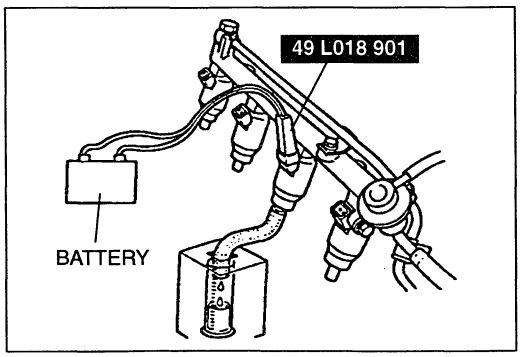


Volume test

1. Remove the fuel injectors together with the fuel distributor. (Refer to page F3–119.)
2. Fasten the fuel injectors firmly to the pipe with wire.

Warning

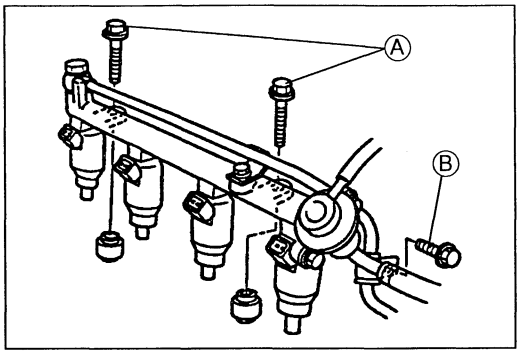
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**



3. Connect the **SST** to the battery and an fuel injector.
4. Check the injection volume with a graduated container.

Injection volumes:
47—68 ml {47—68 cc, 1.4—2.0 fl oz}/15 sec.

5. If not as specified, replace the fuel injectors.

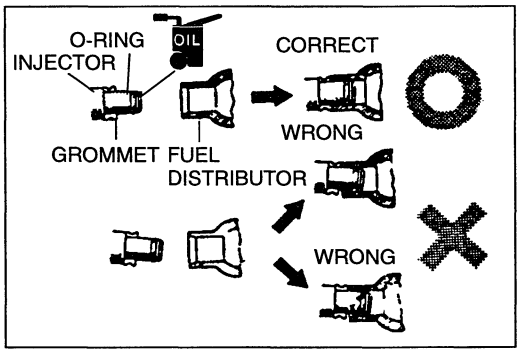


Installation

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

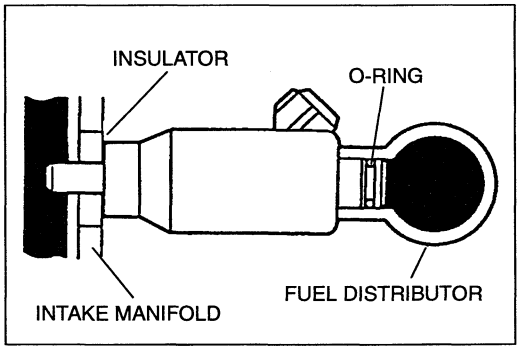
Tightening torque

A: 19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}
B: 7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

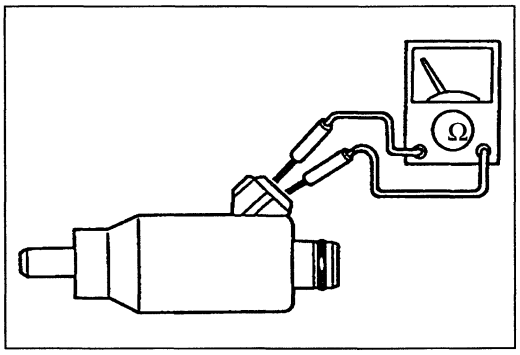


Installation note

1. Use new fuel injector O-rings.
2. Apply a small amount of clean engine oil to the O-rings before installing them.



3. Install new fuel injector insulators.
4. Install the fuel injectors.



Inspection

Fuel injector resistance

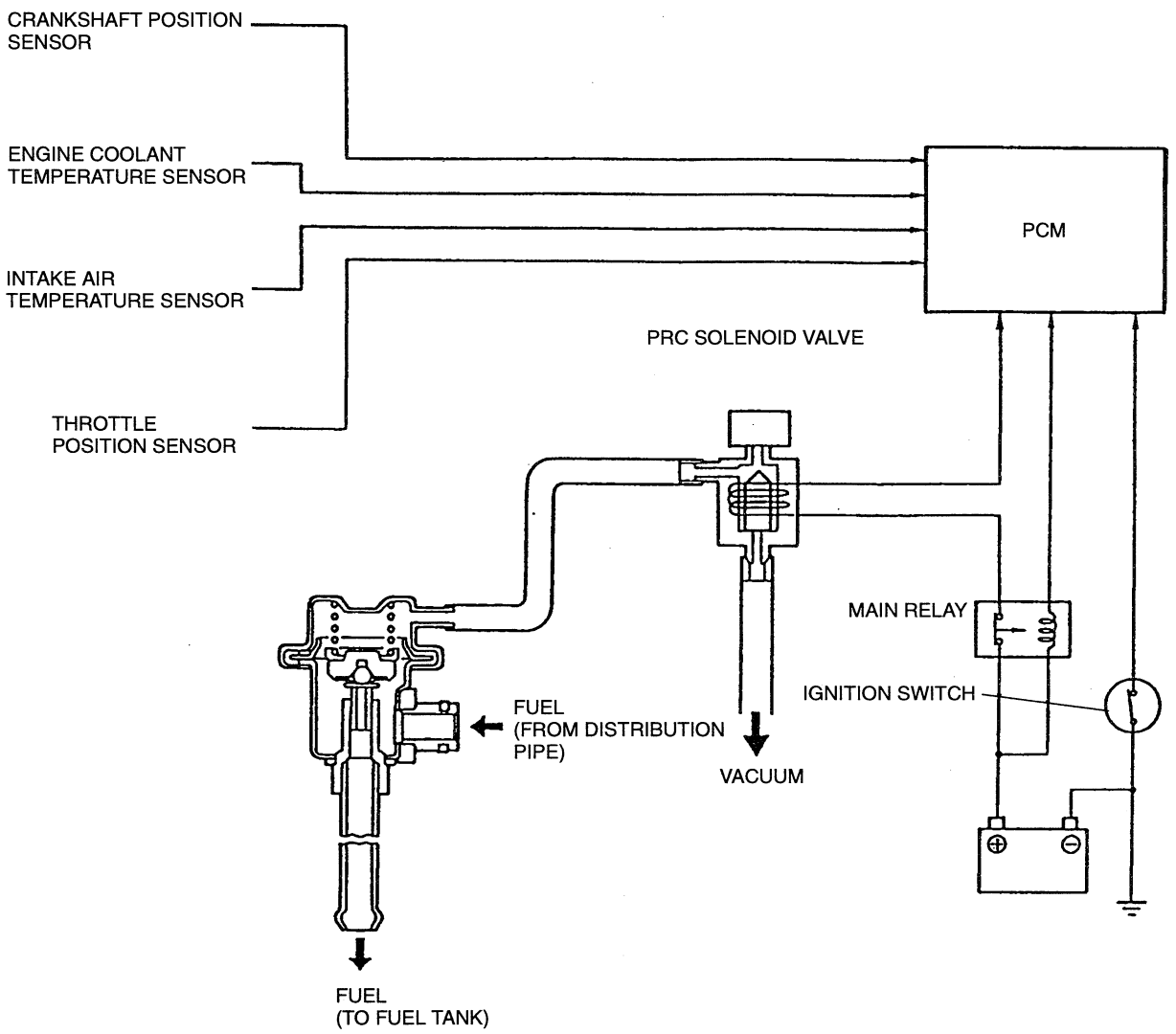
1. Disconnect the fuel injector harness.
2. Measure the resistance of the fuel injector.

Resistance: 12—16Ω (at 20°C {68°F})

3. If not as specified, replace the fuel injector.

PRESSURE REGULATOR CONTROL SYSTEM

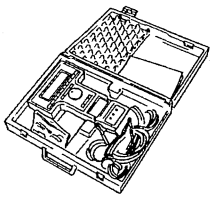
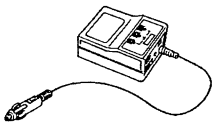
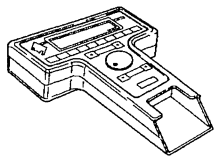
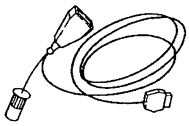
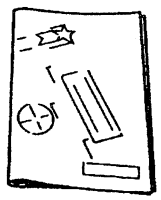
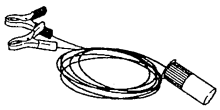
DESCRIPTION

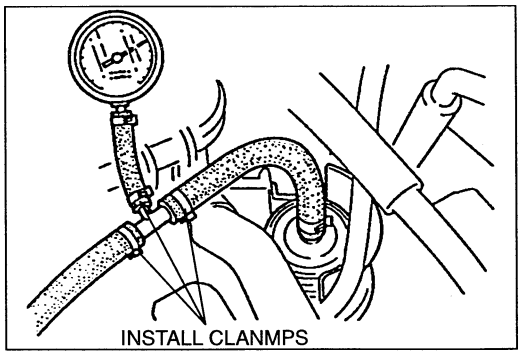


Operating condition			Operating time
Coolant temperature	Intake air temperautre	Engine condition	
—	—	While in crank	During crank
Above 90°C {194°F}	Above 35°C {95°F}	Close throttle	When the time since the engine started is less than 10 seconds.
Above 90°C {194°F}	Above 35°C {95°F}	Close throttle and engine speed is less than equal 1,000 rpm.	Engine has been started less than 2 minutes.

To prevent vapor lock of the fuel during hot restart idle, vacuum to the pressure regulator is momentarily cut and the fuel injection pressure is increased to slightly more than **284 kPa {2.9 kgf/cm^2, 41.2 psi}**.

PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of PRC system	49 T088 010B Program Card 	For inspection of PRC system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of PRC system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of PRC system
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of PRC system	49 T088 008A Instruction Manual 	For inspection of PRC system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of PRC system	—	—



SYSTEM INSPECTION

Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on page F3–110.**

1. Install the fuel pressure gauge.
2. Measure the fuel pressure under the following conditions.

Specifications

	Fuel pressure (kPa { kgf/cm², psi})		
Idling	210—260 { 2.1—2.6, 30—37 }	210—260 { 2.1—2.6, 30—37 }	260—310 { 2.6—3.2, 37—46 }
During 120 sec. of hot start	260—310 { 2.6—3.2 , 37—46}		
After 120 sec. of hot start	210—260 { 2.1—2.6 , 37—46}	210—260 { 2.1—2.6, 30—37 }	260—310 { 2.6—3.2, 37—46 }
Judgement	Normal	Not normal (Perform Inspection 1)	Not normal (Perform Inspection 2)

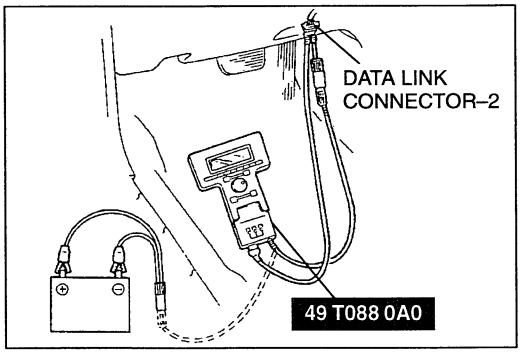
3. If the fuel pressure is not within the specification, carry out either Inspection 1 or Inspection 2 as required.

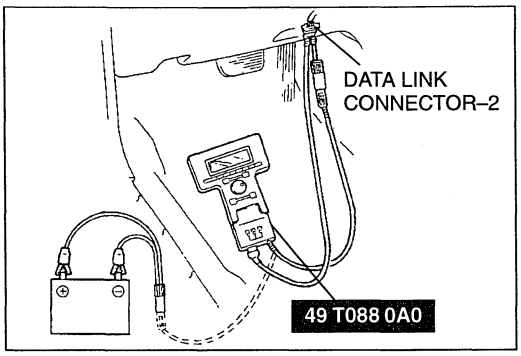
Inspection 1

1. Stop the engine.
2. Connect the **SSTs** (NGS) to the data link connector–2.
3. Start the engine and run it at idle.
4. Select the "SIMULATION TEST" function on the NGS display.
   (1) Turn the PRC solenoid valve from ON to OFF by using the "SIMULATION TEST" function and check if the fuel pressure changes.
   (2) If the pressure changes, check the following.
   - PCM terminal voltage (Refer to page F3–150.)
     - Engine coolant temperature signal
     - Intake air temperature signal
     - Throttle valve TVO signal

   (3) If the pressure does not change, do as follows.
   I. Stop the engine.
   II. Turn the ignition switch to ON.
   III. Turn the PRC solenoid valve from ON to OFF by using the "SIMULATION TEST" function and check if the operation sound of the valve is heard.
   a. If the operation sound is heard, check the following.
   - Pressure regulator (Refer to page F3–117.)

   b. If the operation sound is not heard, check the following.
   - PRC solenoid valve (Refer to page F3–126.)
   - Wiring between PRC solenoid valve and PCM terminal 19

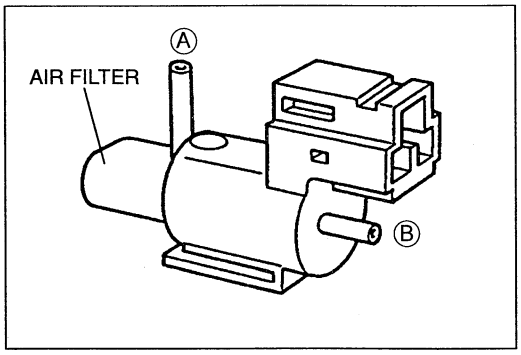




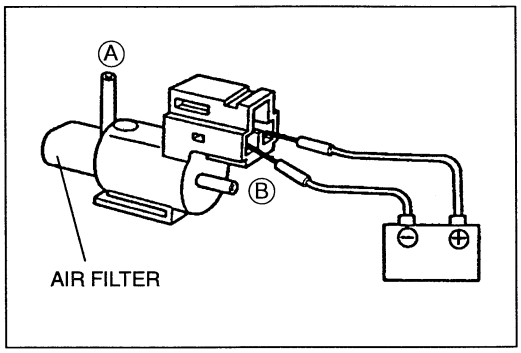
Inspection 2

1. Stop the engine.
2. Install the **SSTs** (NGS) to the data link connector–2.
3. Turn the ignition switch to ON.
4. Select the "PID/DATA MONITOR AND RECORD" function on the NGS display.
5. Select the pressure regulator solenoid valve and verify that the PRC solenoid valve is ON.
6. If the PRC solenoid valve is OFF, check the following.
   - PCM terminal voltage (Refer to page F3–150.)
   - Engine coolant temperature signal
   - Intake air temperature signal
7. Select the "SIMULATION TEST" function on the NGS display.
8. Turn the PRC solenoid valve from ON to OFF by using the "SIMULATION TEST" function and check if the operation sound of the valve is heard.
   (1) If the operation sound is heard, check the following.
   - Loose or damaged vacuum hose between the pressure regulator, PRC solenoid valve, and intake manifold

   (2) If the operation sound is not heard, check the following.
   - PRC solenoid valve (Refer to page F3–126.)
   - Wiring between PRC solenoid valve and PCM terminal 19



PRC SOLENOID VALVE
Inspection
1. Remove the solenoid valve.
2. Blow through the solenoid valve from port Ⓐ.
3. Verify that air flows from port Ⓑ.



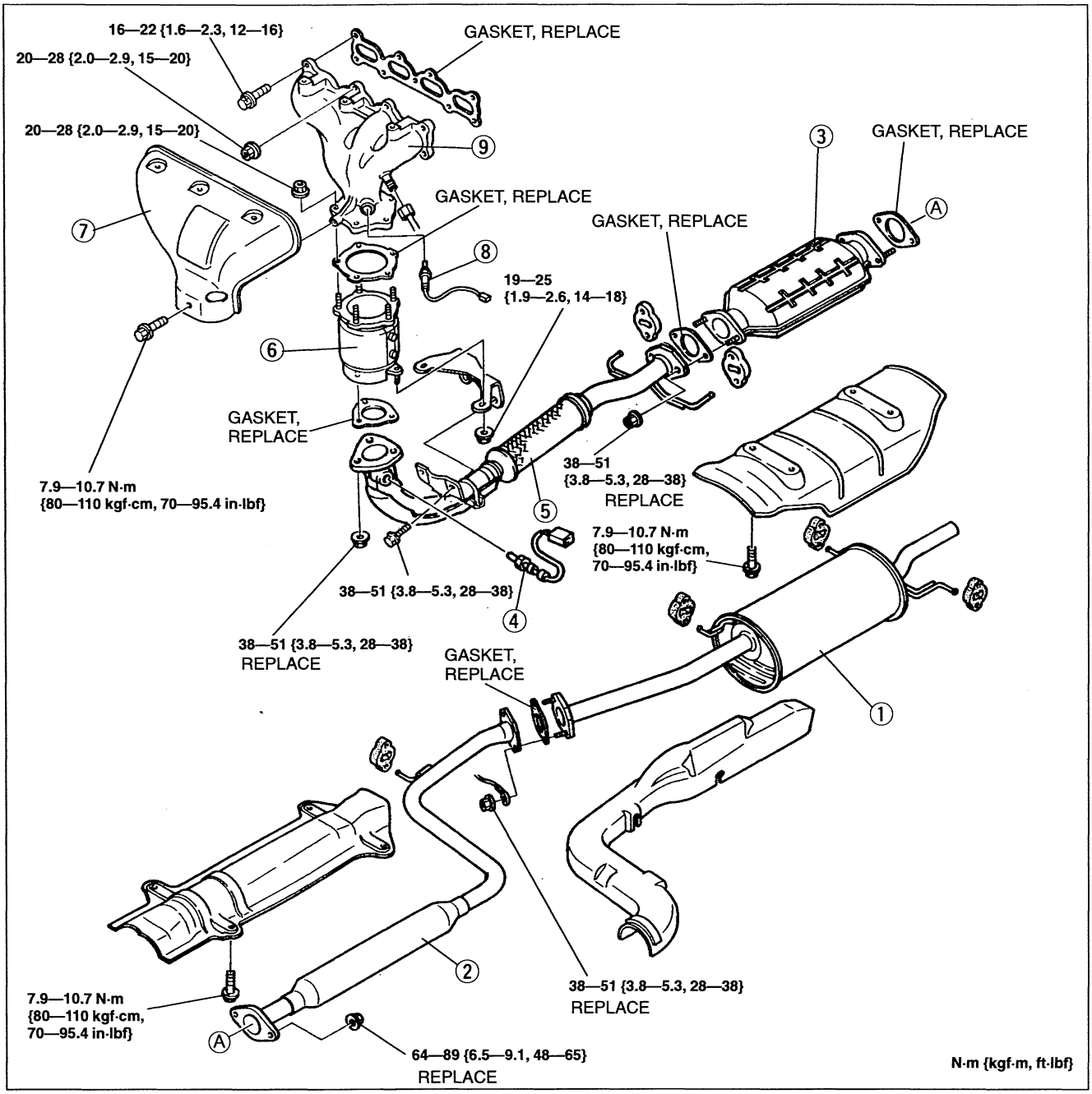
4. Apply battery positive voltage to solenoid valve terminal.
5. Blow through the solenoid valve from port Ⓐ.
6. Verify that air flows from the valve air filter.
7. If not as specified, replace the solenoid valve.

EXHAUST SYSTEM

COMPONENT PARTS

Removal / Inspection / Installation

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



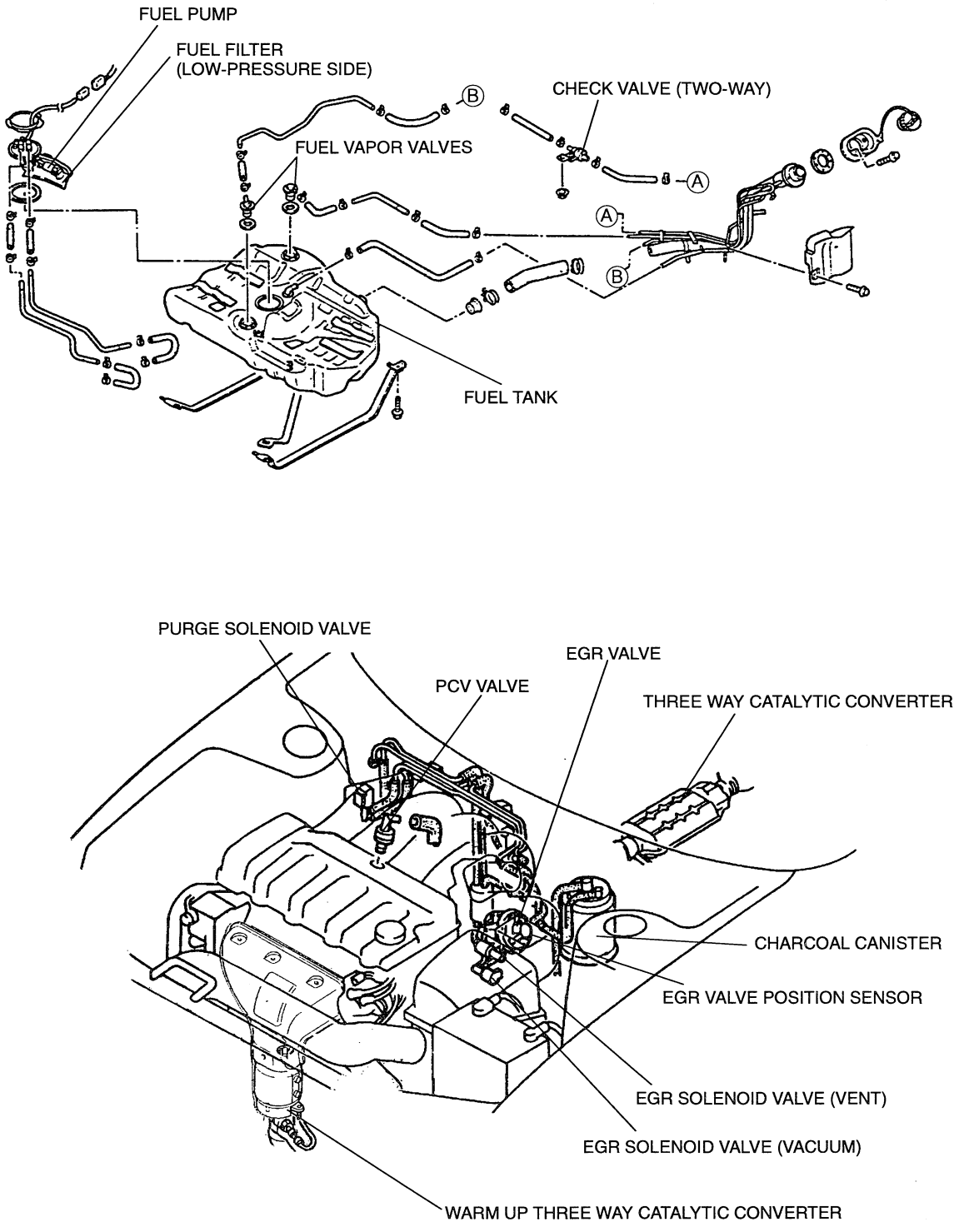
1. Main silencer
   Inspect for deterioration and restriction
2. Presilencer
   Inspect for deterioration and restriction
3. Three way catalytic converter
   Inspect for deterioration and restriction
4. Heated oxygen sensor (rear)
   Inspection ..... page F3–163
5. Front pipe assembly
   Inspect for deterioration and restriction
6. Warm up three way catalytic converter
   Inspect for deterioration and restriction
7. Exhaust manifold insulator
8. Heated oxygen sensor (front)
   Inspection ..... page F3–163
9. Exhaust manifold
   Inspect for deterioration and cracks

OUTLINE OF EMISSION CONTROL SYSTEM

STRUCTURAL VIEW

The following systems are employed to reduce CO, HC, and NOx emissions.

1. Exhaust gas recirculation
2. Positive crankcase ventilation (PCV) system
3. Fuel evaporative system
4. Three way catalytic converter

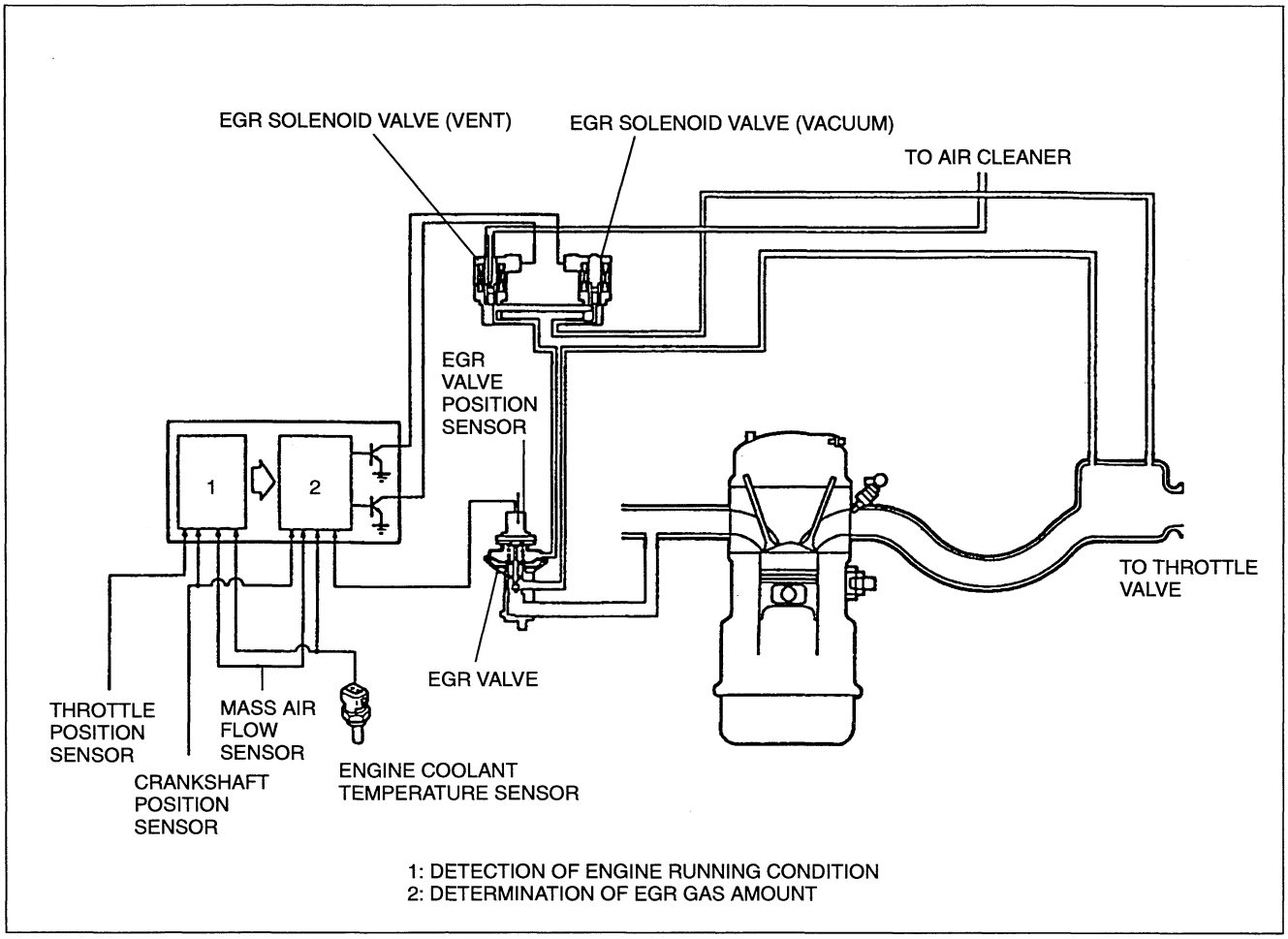


EXHAUST GAS RECIRCULATION

DESCRIPTION

This system recirculates a small amount of exhaust gas into the intake manifold to reduce the combustion temperature and the NOx emissions.

This system consists of the EGR valve, EGR valve position sensor, two duty-solenoid valves, EGR boost sensor solenoid valve, EGR boost sensor, PCM, and input devices.



OPERATION

The EGR valve position can be precisely varied depended on engine operating conditions. Spark advance can be adjusted to compensate for EGR flow.

Cold engine (coolant temperature: below 26°C {78°F})

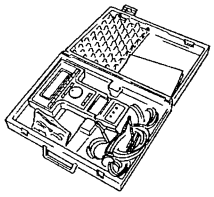
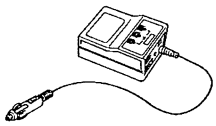
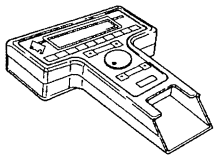
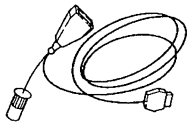
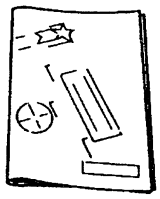
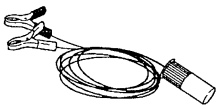
EGR operation is stopped to improve drivability when the engine is cold.

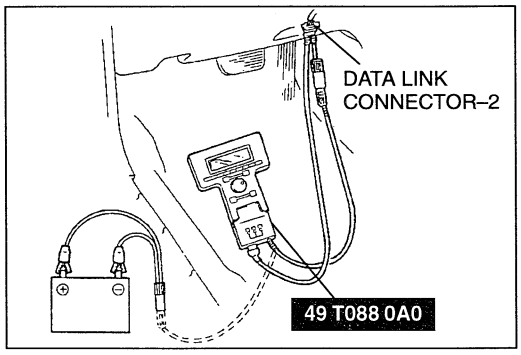
Function

EGR operates when the follow conditions are met.

Operating condition
TP, MAF, ECT, IAT or EGR valve position sensor have not failed
While not in crank
After warm up (warming up)
Engine speed above 1,000 rpm
Except in heavy load

PREPARATION
SST

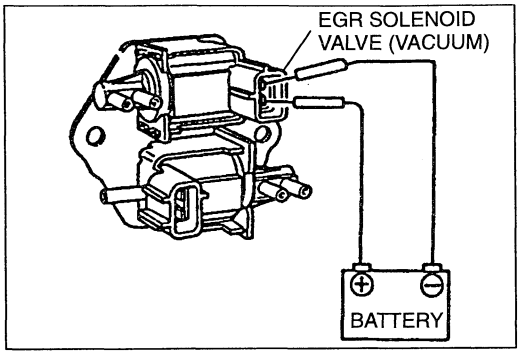
49 T088 0A0 NGS set 	For inspection of EGR system	49 T088 010B Program Card 	For inspection of EGR system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of EGR system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of EGR system
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of EGR system	49 T088 008A Instruction Manual 	For inspection of EGR system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of EGR system	—	—



SYSTEM INSPECTION

1. Connect the **SSTs** (NGS) to the data link connector–2.
2. Start the engine and let it at idle.
3. Select the "SIMULATION TEST" function on the NGS display.
4. Increase the duty value of the EGR solenoid valve (vacuum) from 0% to 100% by using the "SIMULATION TEST" function. Operate the EGR solenoid valve (vacuum) and check if the engine speed becomes unstable or the engine stalls.
5. If the engine speed will not change, stop the engine and do as follows.
   (1) Turn the ignition switch to ON.
   (2) Select the "SIMULATION TEST" function.
   (3) Increase the duty value of the EGR solenoid valve (vacuum) from 0% to 100% by using the "SIMULATION TEST" function. Operate the EGR solenoid valve (vacuum) and check if operation sound of the valve is heard.
   I. If the operation sound is heard, check the following.
      - Loose or damaged vacuum hose
      - EGR valve (Refer to page F3–132.)
      - EGR solenoid valve (vent) (Refer to page F3–131.)

   II. If the operation sound is not heard, check the following.
      - EGR solenoid valve (vacuum) (Refer to page F3–131.)
      - Wiring between EGR solenoid valve (vacuum) and PCM terminal 72



EGR SOLENOID VALVE (VACUUM)

Inspection

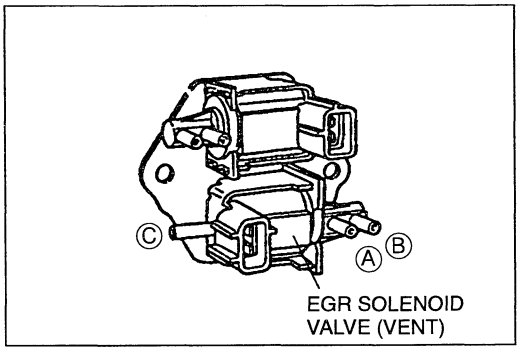
1. Remove the EGR solenoid valve (vacuum).
2. Apply battery positive voltage to terminal A and ground terminal B of the EGR solenoid valve (vacuum). Verify that air flows as shown below.

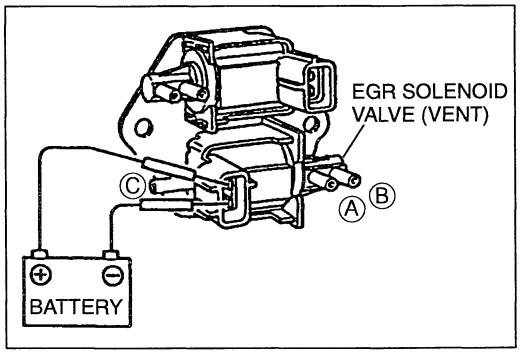
Specification

B+: Battery positive voltage

Termianl A—B	Air flow
B+ applied	Yes
B+ not applied	No

3. If not as specified, replace the EGR solenoid valve (vacuum).





EGR SOLENOID VALVE (VENT)

Inspection

1. Remove the EGR solenoid valve (vent).
2. Verify that air flows as shown below.

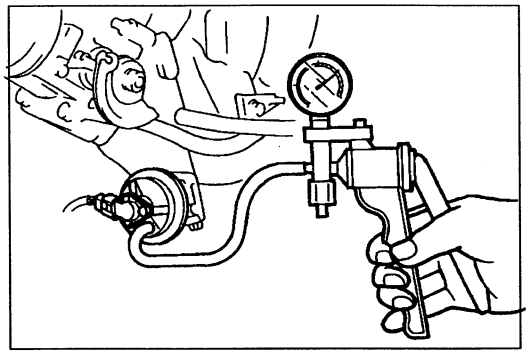
Specification

Port	Air flow
A—B	Yes
A—C	Yes
B—C	Yes

3. If not as specified, replace the EGR solenoid valve (vent).
4. Apply battery positive voltage to terminal A and ground terminal B of the EGR solenoid valve (vent). Verify that air flows as shown below.

Specification

Port	Air flow
A—B	Yes
A—C	No
B—C	No



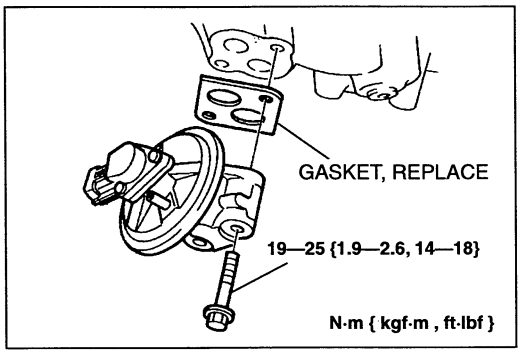
EGR VALVE

Inspection

1. Start the engine and let it idle.
2. Connect a vacuum pump as shown and apply vacuum.
3. Verify that the engine runs roughly or stalls at more than the specified vacuum.

   Specification:
   5.4—7.7 kPa {40—60 mmHg, 1.6—2.3 inHg}

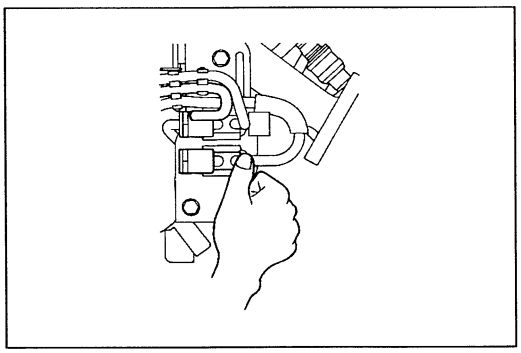
4. If not as specified, replace the EGR valve.



Replacement

Plug the water hoses after disconnecting them.

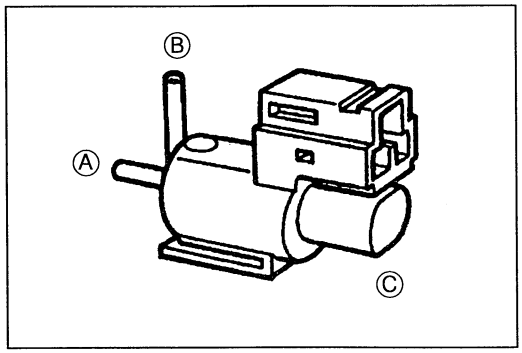
1. Remove the EGR valve in the sequence shown below.
   (1) Vacuum hose
   (2) EGR valve position sensor connector
   (3) EGR valve and gasket
2. Install a new gasket, and then install the EGR in the reverse order of removal.



EGR BOOST SENSOR SWITCHING CONTROL SYSTEM

SYSTEM INSPECTION

1. Warm up the engine to normal operating temperature and let it at idle.
2. Disconnect the vacuum hose from the EGR boost sensor side of the EGR boost sensor solenoid valve.
3. Put a finger on the port of the EGR boost sensor solenoid valve and verify that no vacuum is felt.



EGR BOOST SENSOR SOLENOID VALVE

Inspection

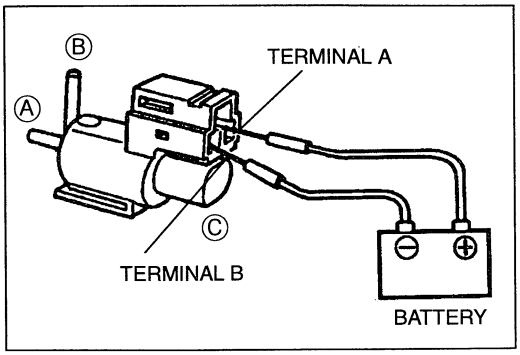
1. Remove the EGR boost sensor solenoid valve.
2. Blow air into each part and verify that air flows as specified below.

Ports	Air flow
A—B	No
A—C	No
B—C	Yes

3. If not as specified, replace the EGR boost sensor solenoid valve.
4. Apply battery positive voltage between the terminals of the EGR boost sensor solenoid valve.
5. Blow air into each port and verify that air flows as specified below.

Ports	Air flow
A—B	Yes
A—C	No
B—C	No

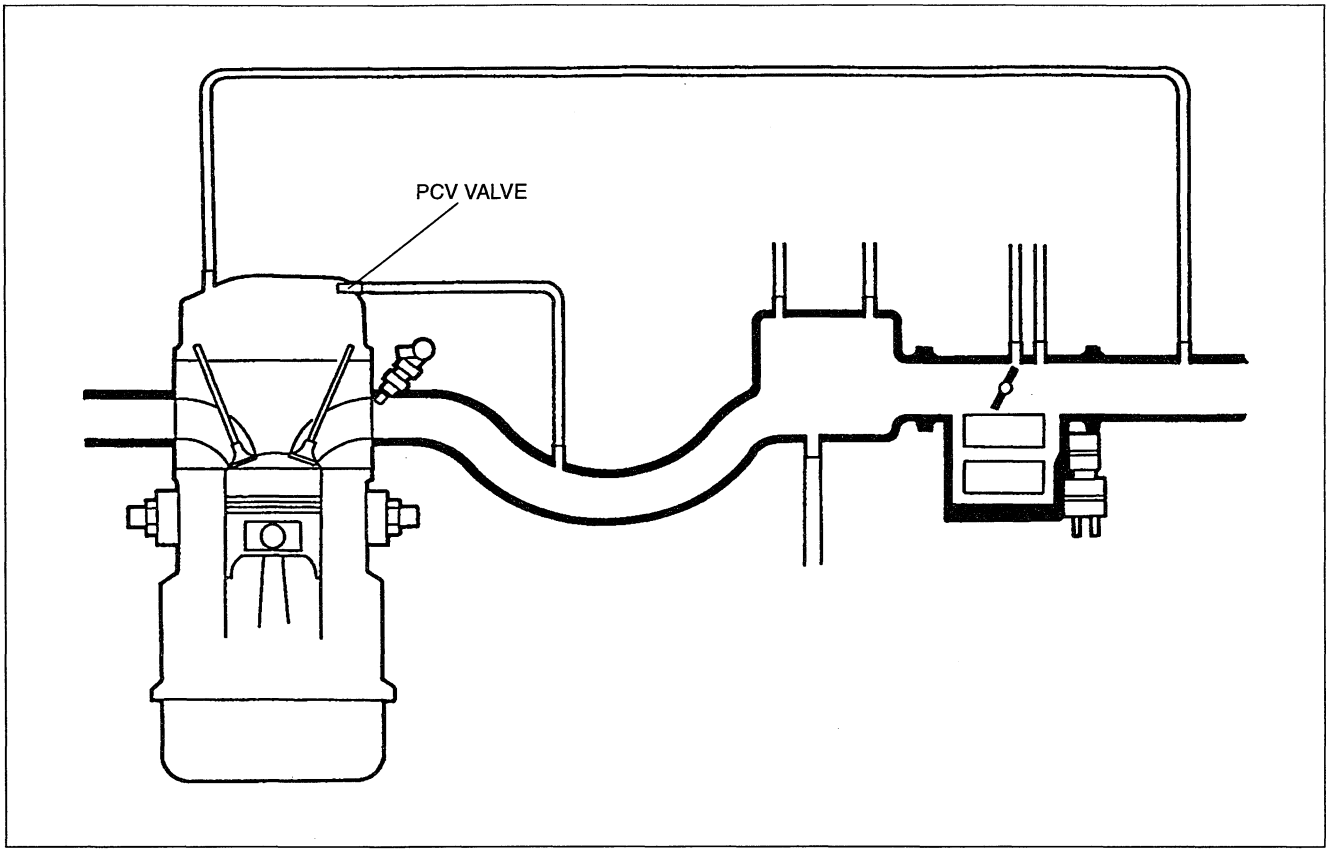
6. If not as specified, replace the EGR boost sensor solenoid valve.

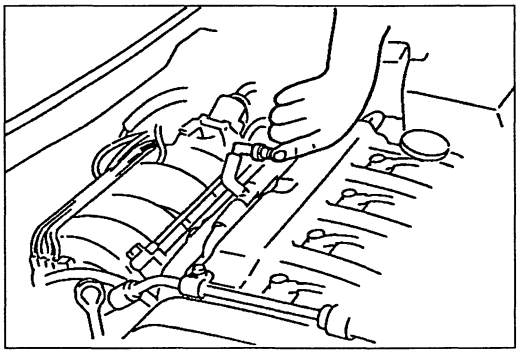


POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

DESCRIPTION

The PCV valve is operated by the intake manifold vacuum.When the engine is running at idle, the PCV valve is slightly open and a small amount of blowby gas is drawn into the intake manifold to be burned.As the engine speed rises, the PCV valve is opened further, allowing a larger amount of blowby gas to be drawn into the intake manifold.

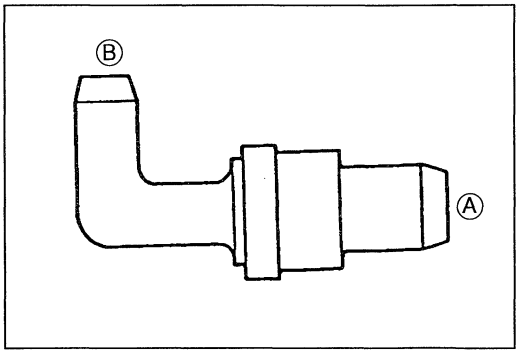




PCV VALVE

Inspection

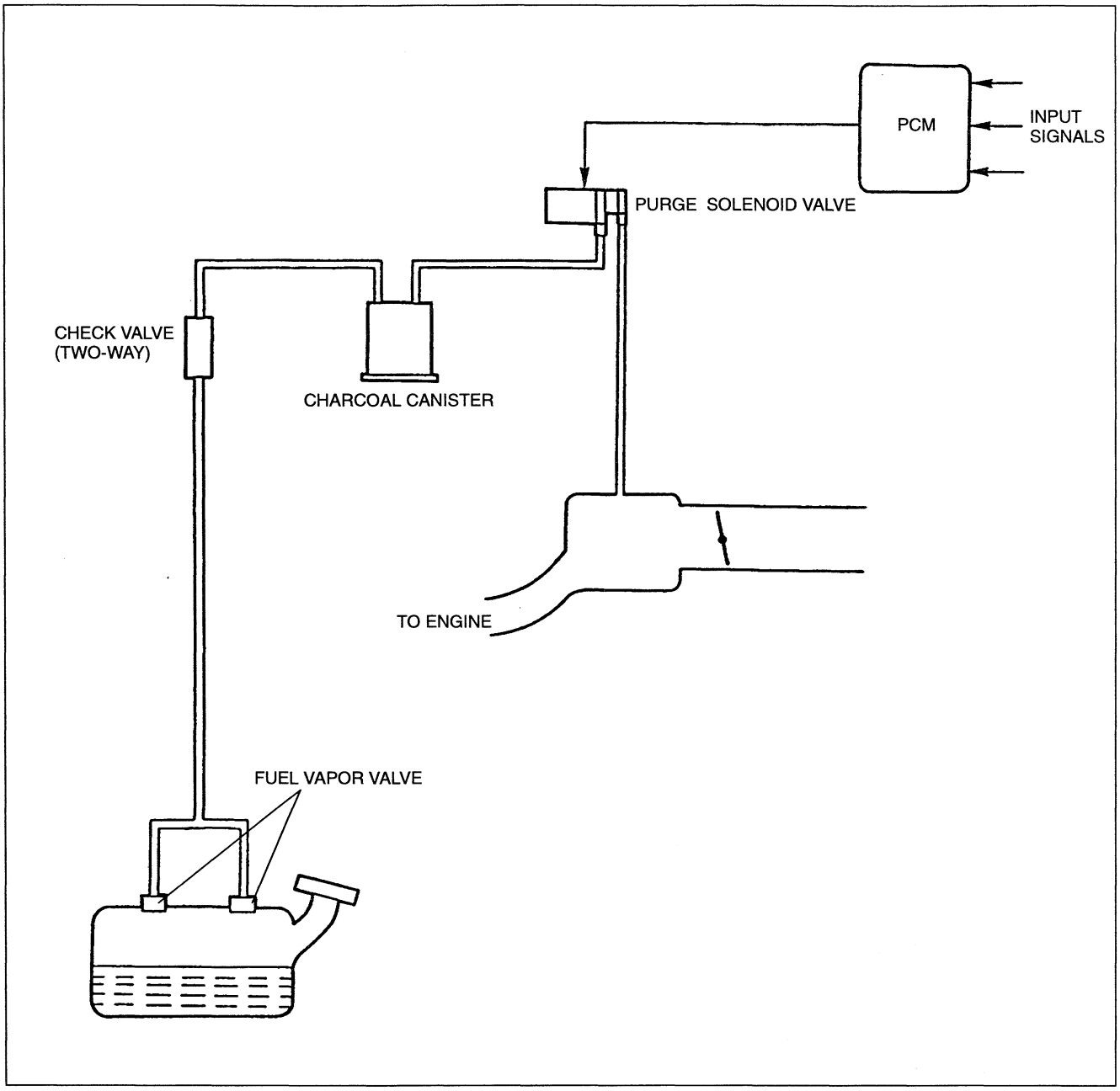
1. Verify that the engine coolant temperature is below 20°C {68°F}.
2. Start the engine and let it idle.
3. Disconnect the PCV valve with the ventilation hose from the cylinder head cover.
4. Block the PCV valve opening.
5. Verify that vacuum is felt.



6. Remove the PCV valve.
7. Blow through the valve from port Ⓐ and verify that air comes out of port Ⓑ.
8. Blow through the valve from port Ⓑ and verify that no air comes out of port Ⓐ.
9. Replace the PCV valve if not as specified.

FUEL EVAPORATIVE SYSTEM

DESCRIPTION



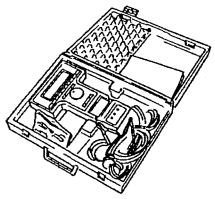
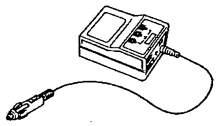
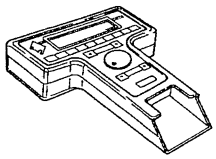
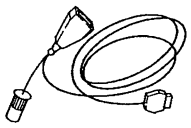
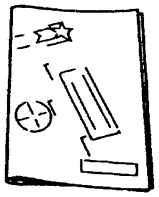
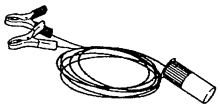
The fuel evaporative system consists of the fuel vapor valve, two-way check valve, charcoal canister, purge solenoid valve, PCM, and input devices. The amount of evaporative fumes introduced into the engine and burned is controlled by the solenoid valve to correspond to the engine's operating conditions. To obtain the best engine performance, the purge solenoid valve is controlled by the PCM.

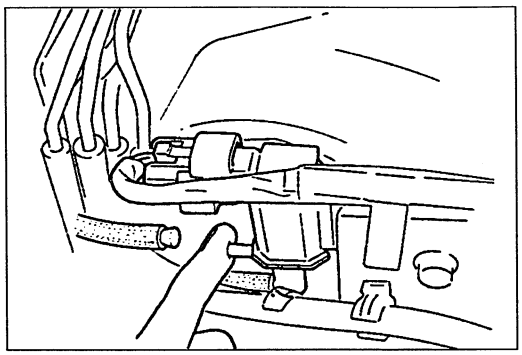
Operation

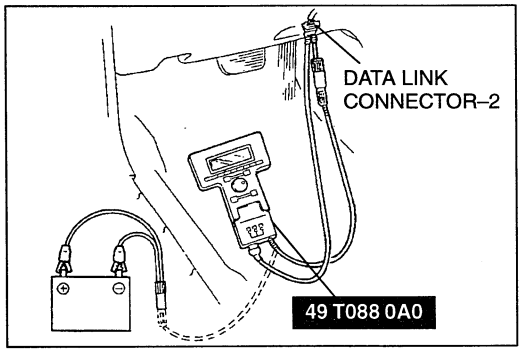
The purge solenoid valve is controlled by duty signals from the PCM to perform purging of the charcoal canister. Purging is done when these conditions are met:

1. After warm-up
2. Driving in gear
3. Accelerator pedal depressed
4. Heated oxygen sensor functioning normally

PREPARATION
SST

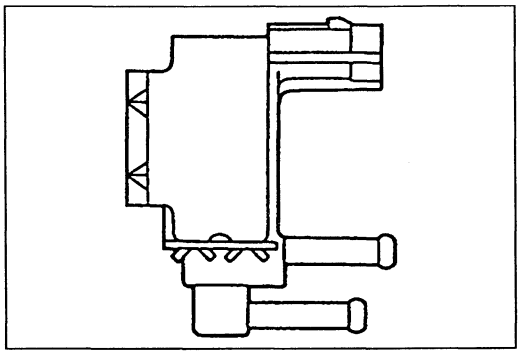
49 T088 0A0 NGS set 	For inspection of fuel evaporative system	49 T088 010B Program Card 	For inspection of fuel evaporative system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of fuel evaporative system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of fuel evaporative system
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of fuel evaporative system	49 T088 008A Instruction Manual 	For inspection of fuel evaporative system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of fuel evaporative system	—	—



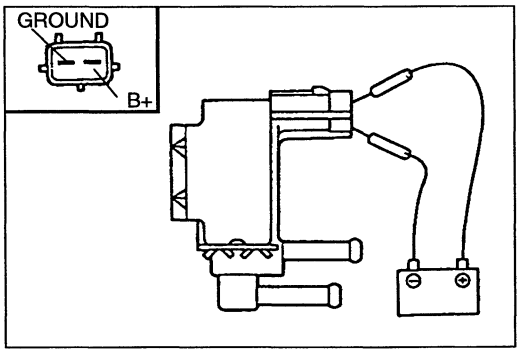


SYSTEM INSPECTION

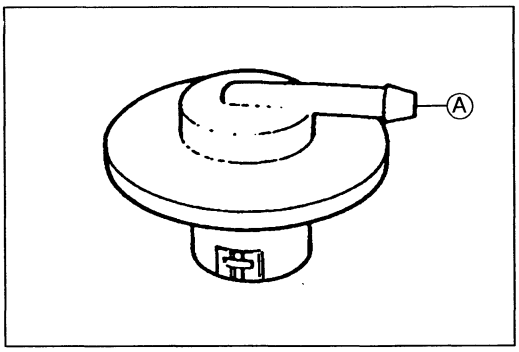
1. Start and warm up the engine to the normal operating temperature.
2. Let the engine idle.
3. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
4. Put a finger to the purge solenoid valve and verify that there is no vacuum applied.
5. If there is vacuum, do as follows.
   (1) Connect the **SSTs** (NGS) to the data link connector–2.
   (2) Vefity that diagnostic trouble code No. P0443 is not displayed. If code No. P0443 is shown, carry out troubleshooting of the code No. P0443.
   (Refer to page F3–14.)
   (3) If diagnostic trouble codes are not shown, check the following.
   • Purge solenoid valve (Refer to page F3–137.)
6. Reconnect the vacuum hose.
7. Connect the **SSTs** (NGS) to the data link connector–2.
8. Select the "SIMULATION TEST" function on the NGS display.
9. Increase the duty value of the purge solenoid valve from 0% to 100% by using the "SIMULATION TEST" function. Operate the purge solenoid valve and check if the idle condition changes.
10. If the condition does not change, do as follows.
    (1) Turn the ignition switch to ON.
    (2) Verify that diagnostic trouble code No. P0443 is not displayed. If code No. P0443 is shown, carry out troubleshooting of the code No. P0443.
    (Refer to page F3–14.)
    (3) Select the "SIMULATION TEST" function on the NGS display.
    (4) Increase duty value of the purge solenoid valve from 0% to 100% by using the "SIMULATION TEST" function. Operate the purge solenoid valve and check if the operation sound of the valve is heard.
    I. If the operation sound is heard, check the following.
    • Loose or damaged vacuum hose
    II. If the operation sound is not heard, check the following.
    • Purge solenoid valve (Refer to page F3–137.)



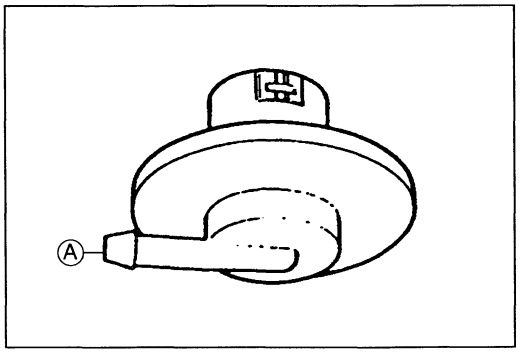
PURGE SOLENOID VALVE
Inspection
1. Disconnect the vacuum hoses from the solenoid valve.
2. Verify that no air flows through the valve.



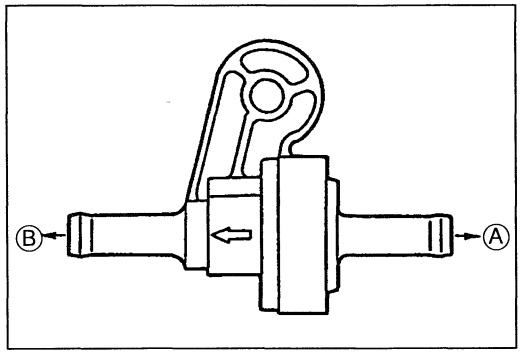
3. Disconnect the solenoid valve connector and supply battery positive voltage as shown in the figure.
4. Verify that air flows through the valve.
5. If not as specified, replace the solenoid valve.



FUEL VAPOR VALVE
Inspection
1. Hold the valve as shown and verify that air flows through the valve from port Ⓐ.

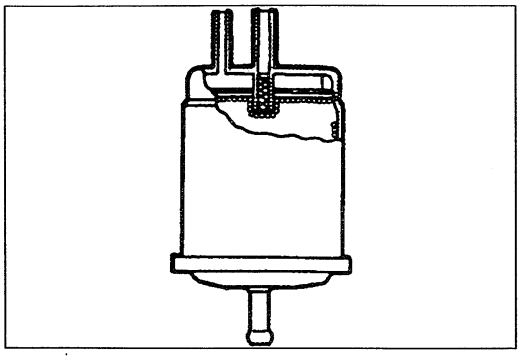


2. Invert the valve as shown and verify that no air flows through the valve from port Ⓐ.
3. Replace the fuel vapor valve if necessary.



CHECK VALVE (TWO-WAY)
Inspection
1. Remove the valve.
2. Check the operation of the valve by using a vacuum pump.

Apply approx. 3.5 kPa {26 mmHg,1.0 inHg} vacuum at port A	Valve opens
Apply approx. 5.9 kPa {44 mmHg,1.7 inHg} vacuum at port B	Valve opens



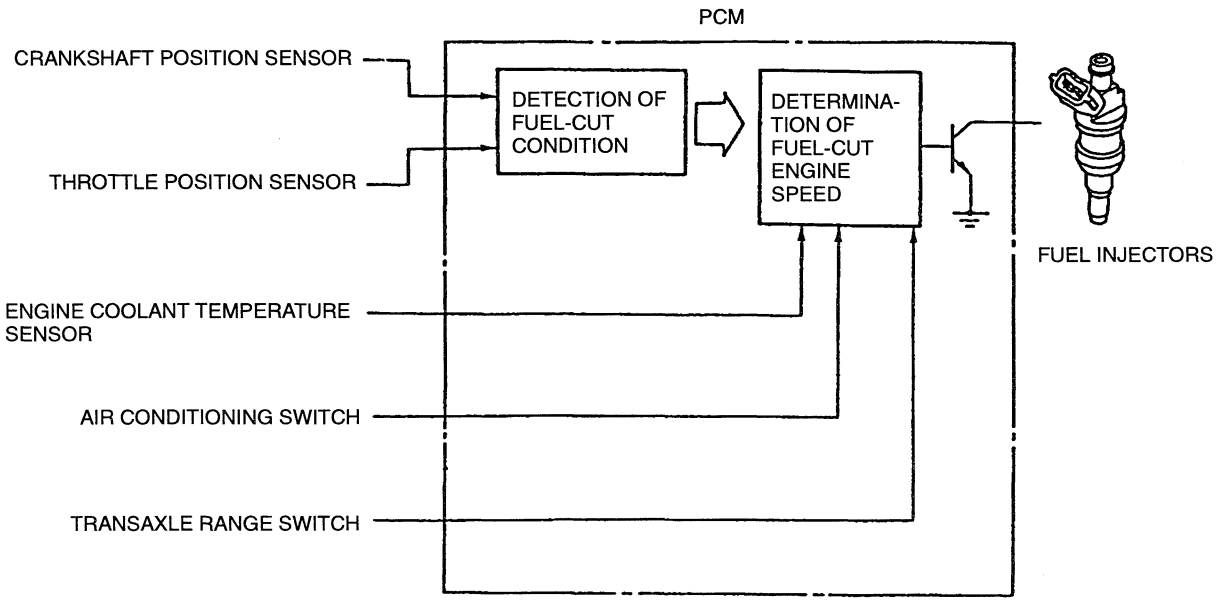
CHARCOAL CANISTER
Inspection
1. Visually check for damage.
2. Replace the charcoal canister if necessary.

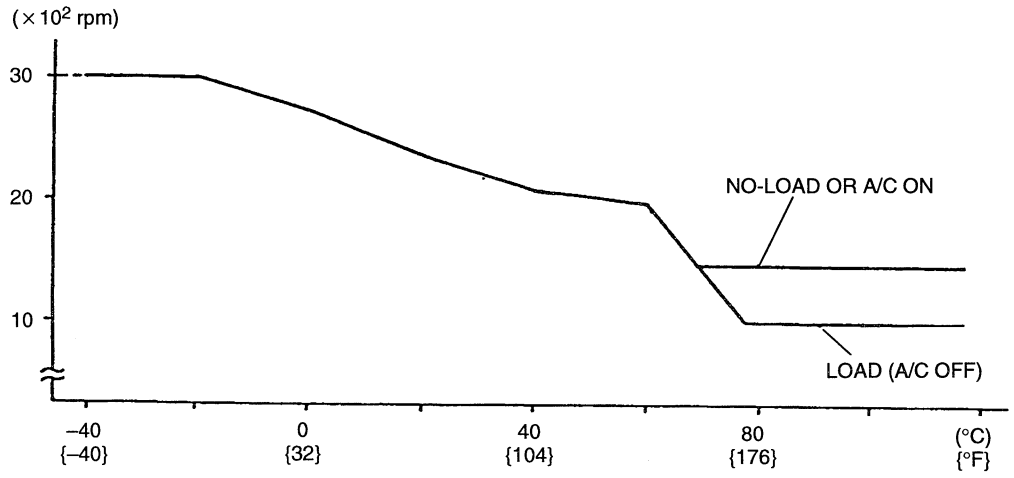
FUEL-CUT CONTROL SYSTEM

DESCRIPTION

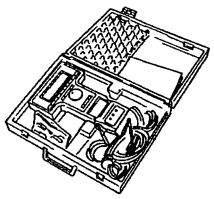
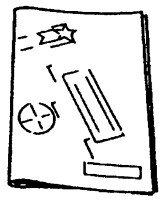
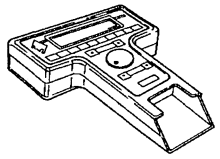
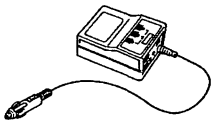
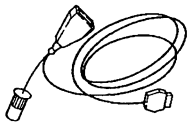
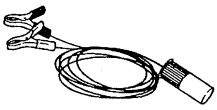
This system is used to improve the fuel economy, to prevent engine bucking during deceleration, and to protect the engine from overrevving.

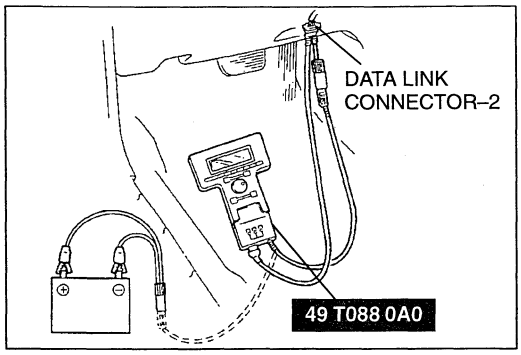
Deceleration fuel-cut





PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of PCM terminal voltage and input/output devices	49 T088 008A Instruction Manual 	For inspection of PCM terminal voltage and input/output devices
49 T088 010B Program Card 	For inspection of PCM terminal voltage and input/output devices	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices	—	—



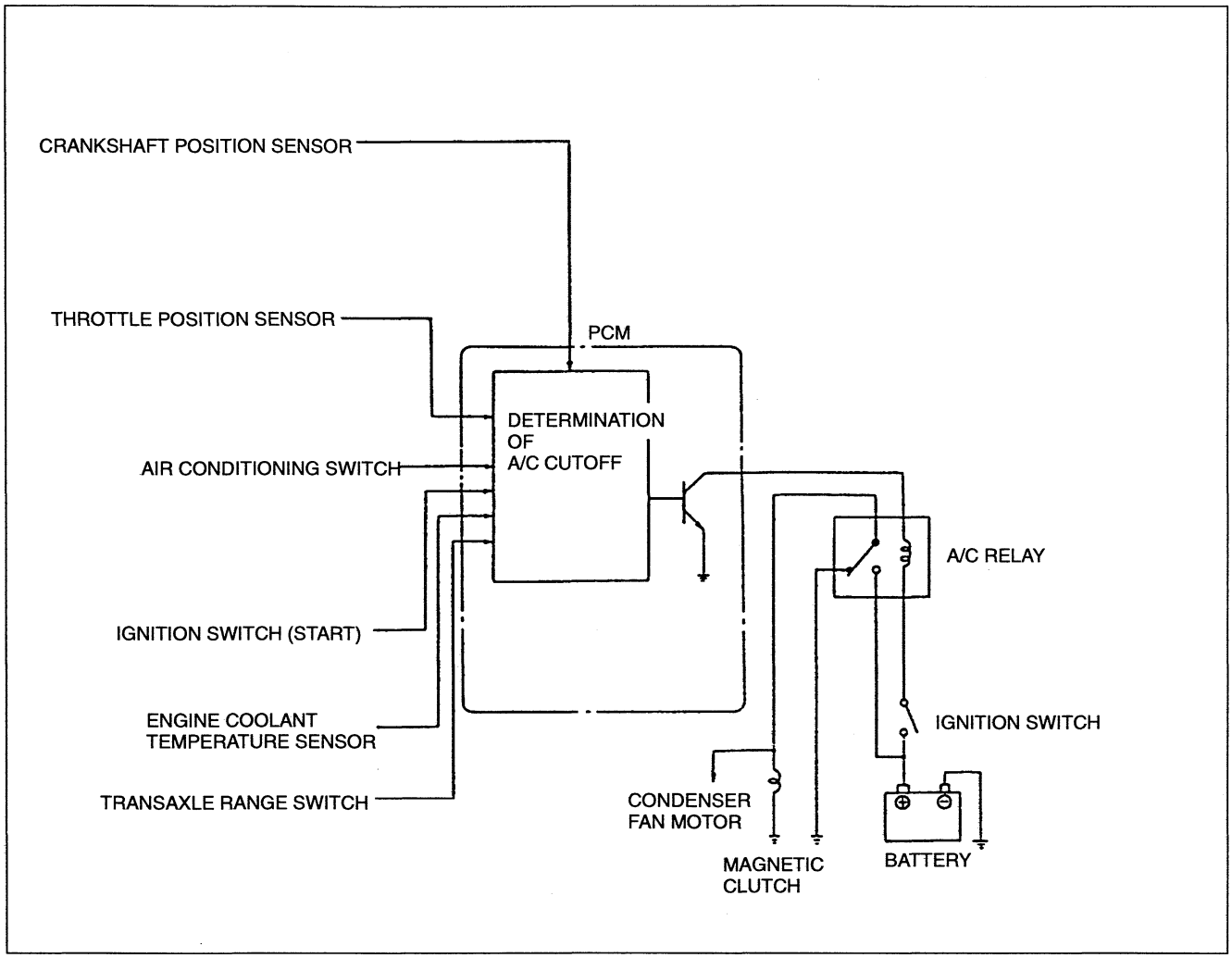
SYSTEM INSPECTION

1. Warm up the engine to normal operating temperature and let it idle.
2. Connect the **SSTs** (NGS) to the data link connector–2.
3. Select the "PID/DATA MONITOR AND RECORD" function on the NGS display. Confirm that the transaxle is in P position.
4. Select the engine revolution and fuel injector on the NGS display.
5. Increase the engine speed to 3,000 rpm, then suddenly release the throttle.
6. Verify that the fuel injection duration is 0 msec while the engine speed is above approx. 2,500 rpm on deceleration.

A/C CUTOFF SYSTEM

DESCRIPTION

An A/C cutoff system is used to improve idle smoothness just after starting the engine and to improve acceleration performance.

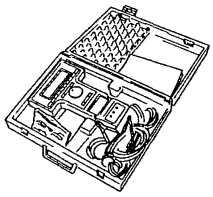
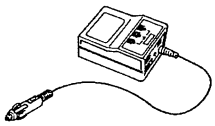
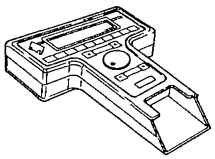
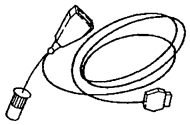
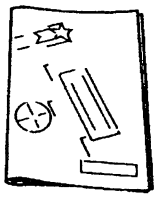
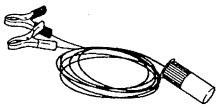


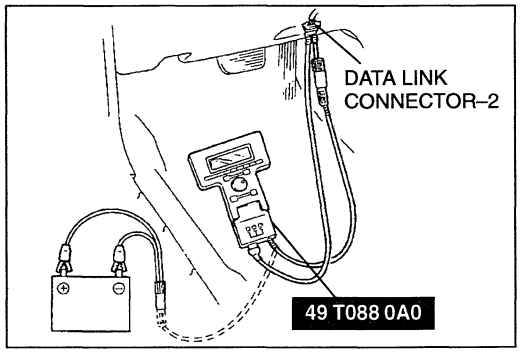
Operation

The A/C clutch operation is cancelled under the conditions below.

Engine condition	Purpose	Cutoff period
After engine starting	Improve engine starting	Approx. 4 sec.
Wide open throttle	Improve drivability	Approx. 8 sec.
Acceleration from idle		Approx. 2 sec.
Coolant temp. above 117°C {242°F}	Prevent engine overheating	Until coolant temp. decrease below 107°C {224°F}

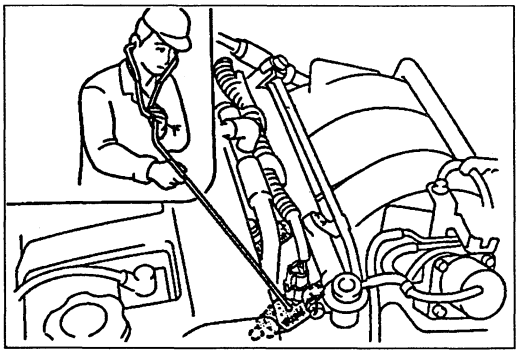
PREPARATION
SST

49 T088 0A0 NGS set 	For inspection of A/C cut off system	49 T088 010B Program Card 	For inspection of A/C cut off system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of A/C cut off system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of A/C cut off system
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of A/C cut off system	49 T088 008A Instruction Manual 	For inspection of A/C cut off system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of A/C cut off system	—	—



SYSTEM INSPECTION

1. Start the engine and let it idle.
2. Turn the A/C switch and the fan switch ON.
3. Fully open the throttle valve. Then, 3—6 seconds after, check if the operation sound of the A/C compressor electromagnetic clutch is heard.
4. Turn the A/C switch and the fan switch OFF.
5. If the operation sound is not heard, do as follows.
   (1) Connect the **SSTs** (NGS)to the data link connector–2.
   (2) Select the "SIMULATION TEST" function on the NGS display.
   (3) Turn the A/C relay from OFF to ON by using the "SIMULATION TEST" function and check for the operation sound of the relay.
      I. If the operation sound is heard, check the following.
         • PCM terminal voltage (Refer to page F3–150.)
         • Throttle position sensor TVO signal
      II. If the operation sound is not heard, check the following.
         • A/C relay (Refer to Mazda 1996 626/MX–6 BETM.)
         • Open circuit in wiring harnesses and connectors (Main relay — A/C relay — PCM)



DECHOKE CONTROL SYSTEM

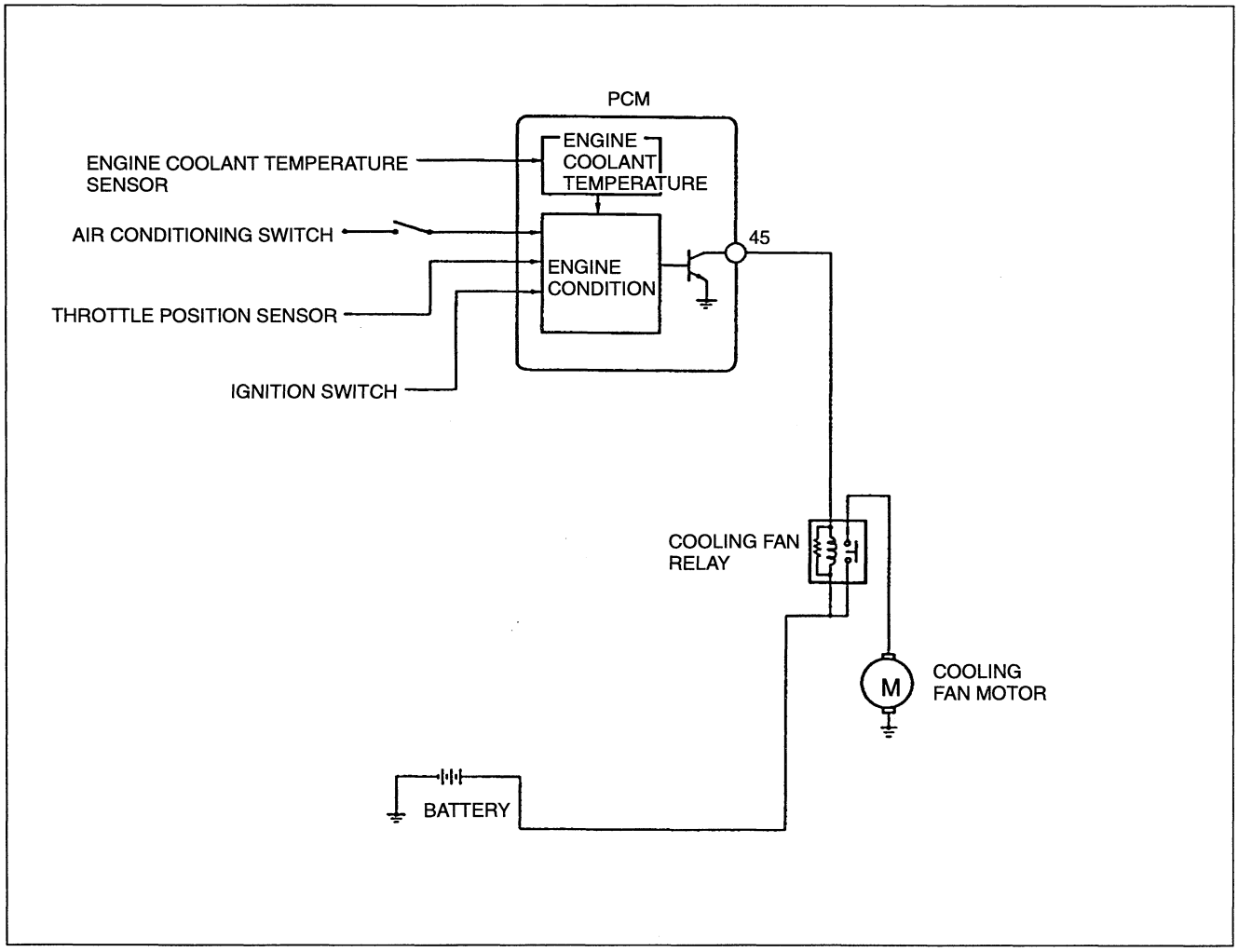
SYSTEM INSPECTION

1. Turn the ignition switch to START and verify that the fuel injector operating sound is heard.
2. Depress the accelerator pedal fully and turn the ignition switch to START. Verify that no fuel injector operating sound is heard.
3. If operating sound is heard, check the PCM terminal 88 voltage. (Refer to page F3–150.)

COOLING FAN CONTROL SYSTEM

DESCRIPTION

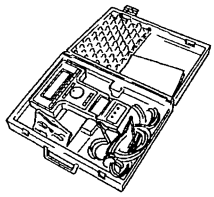
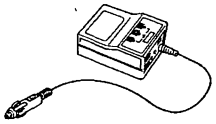
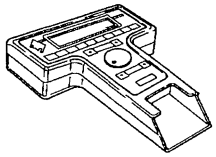
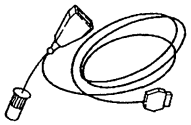
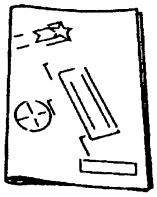
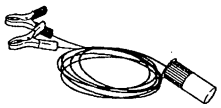
To improve reliability, the cooling fan is controlled by the PCM. This system consists of the cooling fan motor, fan relays, PCM, and input devices.

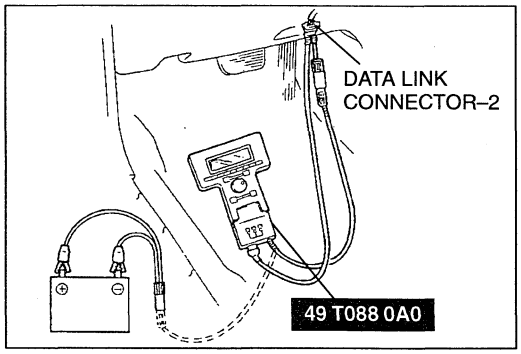


Cooling fan operation

Engine condition	Fan relay
Engine coolant temperature above 97°C {207°F}	ON
Air conditioning switch ON	ON
Engine coolant temperature sensor malfunction	ON

PREPARATION
SST

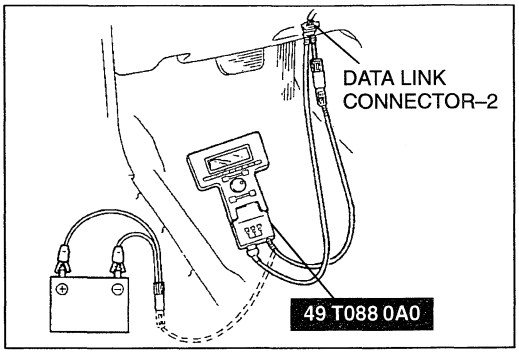
49 T088 0A0 NGS set 	For inspection of cooling fan control system	49 T088 010B Program Card 	For inspection of cooling fan control system
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of cooling fan control system	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of cooling fan control system
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of cooling fan control system	49 T088 008A Instruction Manual 	For inspection of cooling fan control system
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of cooling fan control system	—	—



SYSTEM INSPECTION

Cooling Fan

1. Verify that the engine is cold.
2. Turn the ignition switch to ON.
3. Verify that the cooling fan is not operating.
4. If the cooling fan is operating, do as follows.
   (1) Connect the **SSTs** (NGS) to the data link connector–2.
   (2) Select the "PID/DATA MONITOR AND RECORD" function on the NGS display.
   (3) Select the "Cooling Fan" and verify that the cooling fan control signal is OFF.
      I. If the cooling fan control signal is ON, check the following.
         • PCM terminal voltage (Refer to page F3–150.)
         • Engine coolant temperature signal
      II. If the cooling fan control signal is OFF, check the following.
         • Cooling fan relay (Refer to section E1.)
         • Short circuit in wiring harnesses and connectors (Main relay — Cooling fan relay — PCM)
5. Start the engine.
6. Verify that the cooling fan is operating when engine is hot.
7. If the cooling fan does not operate, do as follows.
   (1) Connect the **SSTs** (NGS) to the data link connector–2.
   (2) Select the "SIMULATION TEST" function.
   (3) Turn the cooling fan relay from OFF to ON by using the "SIMULATION TEST" function and check for the cooling fan operation.
      I. If the cooling fan operates, check the following.
         • PCM terminal voltage (Refer to page F3–150.)
         • Engine coolant temperature signal
      II. If the cooling fan does not operate, do as follows.
         a. Select the "SIMULATION TEST" function and turn the cooling fan relay from OFF to ON by using the "SIMULATION TEST" function. Operate the cooling fan relay and check if the operation sound of the relay is heard.
         b. If the operation sound is heard, check the following.
            • Wiring harnesses and connectors (Cooling fan relay — Cooling fan motor)
            • Cooling fan motor (Refer to section E1.)
         c. If the operation sound is not heard, check the following.
            • Cooling fan relay (Refer to section E1.)
            • Open circuit in wiring harnesses and connectors (Main relay — Cooling fan relay — PCM)

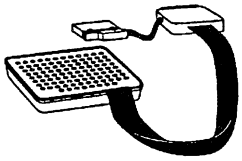
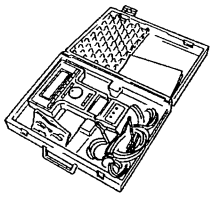
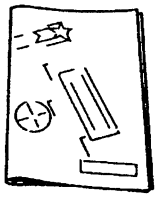
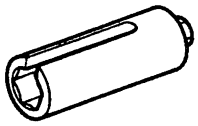
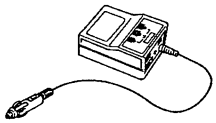
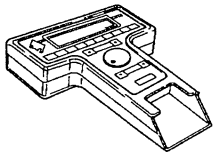
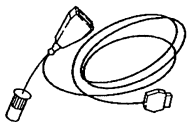
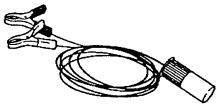


Condenser Fan relay

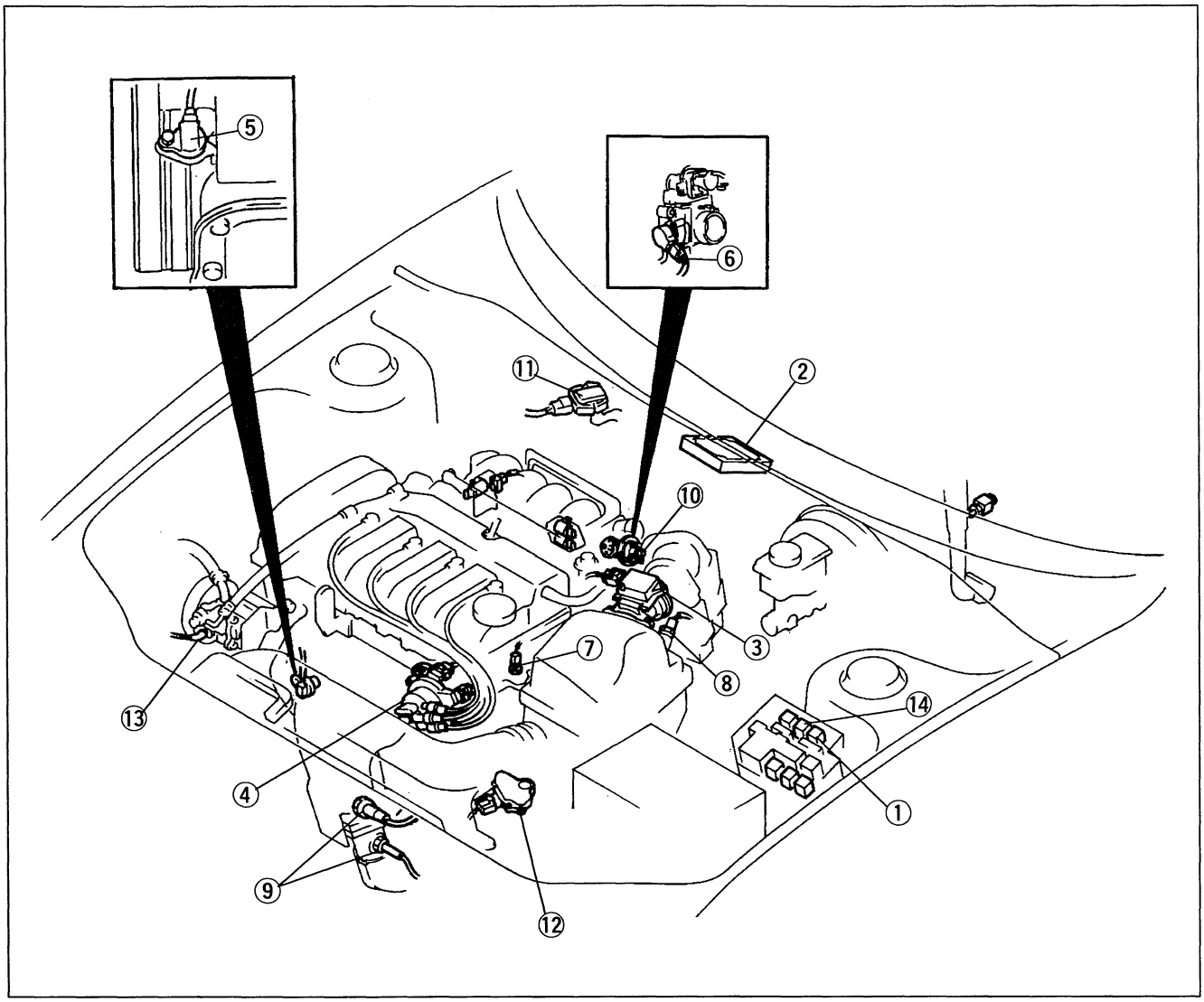
1. Verify that the A/C switch and fan switch are OFF.
2. Start the engine and let it idle.
3. Verify that the cooling fan is not operating.
4. If the condenser fan is operating, check the short circuit in wiring between condenser fan relay and PCM terminal 69.
5. Turn the A/C switch and fan switch ON.
6. Verify that the condenser fan is operating.
7. Turn the A/C switch and fan switch off.
8. If the condenser fan does not operate, do as follows.
   (1) Connect the **SSTs** (NGS) to the data link connector–2.
   (2) Select the "SIMULATION TEST" function on the NGS display.
   (3) Turn the condenser fan relay from OFF to ON by using the "SIMULATION TEST" function and check for the condenser fan operation.
      I. If the condenser fan operates, check the following.
         • PCM terminal voltage (Refer to page F3–150.)
         • A/C signal
         • Blower signal
      II. If the condenser fan does not operate, do as follows.
         a. Select the "SIMULATION TEST" function and turn the condenser fan relay from OFF to ON by using the "SIMULATION TEST" function. Operate the condenser fan relay and check if the operation sound of the relay is heard.
         b. If the operation sound is heard, check the following.
            • Wiring harness and connectors (Condenser fan relay — Condenser fan motor)
            • Condenser fan motor (Refer to Mazda 1996 626/MX-6 BETM.)
         c. If the operation sound is not heard, check the following.
            • Condenser fan relay (Refer to Mazda 1996 626/MX-6 BETM.)
            • Open circuit in wiring harness and connectors (Main relay — Condenser fan relay — PCM)

CONTROL SYSTEM

PREPARATION
SST

49 UN01 130 104 Pin Breakout Box 	For inspection of PCM terminal voltage and input/output devices	49 T088 0A0 NGS set 	For inspection of PCM terminal voltage and input/output devices
49 T088 008A Instruction Manual 	For inspection of PCM terminal voltage and input/output devices	49 T088 010B Program Card 	For inspection of PCM terminal voltage and input/output devices
49 T018 001 Wrench, O_2 sensor 	For replacement of heated oxygen sensor	49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices
49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices	49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For inspection of PCM terminal voltage and input/output devices	—	—

STRUCTURAL VIEW

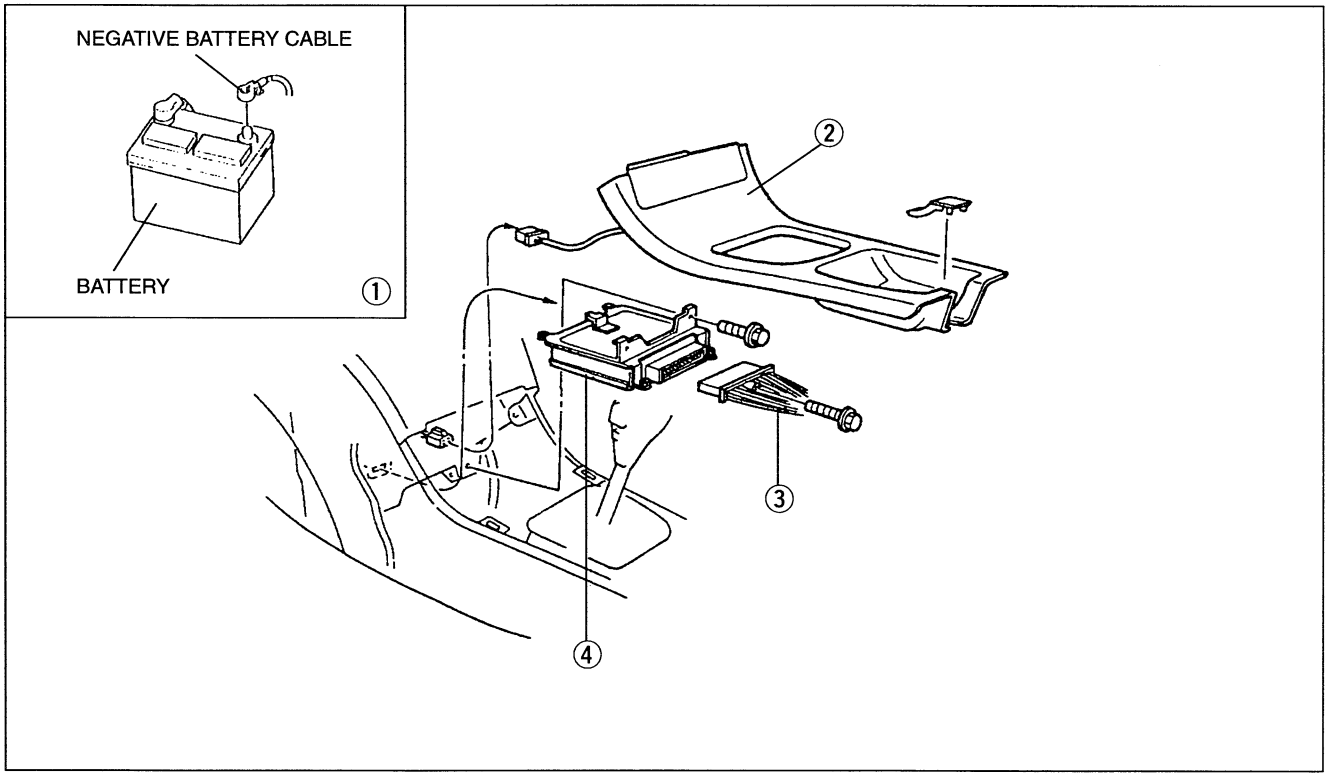


1. Fuel pump relay
   - Inspection ..... page F3–117
   - Replacement ..... page F3–117
2. Powertrain control module
   - Removal / Installation ..... page F3–150
   - Inspection ..... page F3–150
3. Mass air flow sensor
   - Inspection ..... page F3–157
4. Camshaft position sensor
   - Inspection ..... page F3–158
5. Crankshaft position sensor
   - Inspection ..... page F3–158
   - Replacement ..... page F3–159
6. Throttle position sensor
   - Inspection ..... page F3–159
   - Adjustment ..... page F3–160
   - Replacement ..... page F3–162
7. Engine coolant temperature sensor
   - Removal ..... page F3–162
   - Inspection ..... page F3–162
   - Installation ..... page F3–163
8. Intake air temperature sensor
   - Inspection ..... page F3–163
   - Replacement ..... page F3–163
9. Heated oxygen sensor
   - Inspection ..... page F3–163
10. EGR valve position sensor
    - Inspection ..... page F3–164
11. EGR boost sensor
    - Inspection ..... page F3–165
12. Transaxle range switch
    - Inspection ..... section K2
    - Replacement ..... section K2
13. P/S pressure switch
    - Inspection ..... page F3–166
    - Replacement ..... page F3–166
14. Main relay
    - Inspection ..... page F3–166

POWERTRAIN CONTROL MODULE (PCM)
Removal / Installation

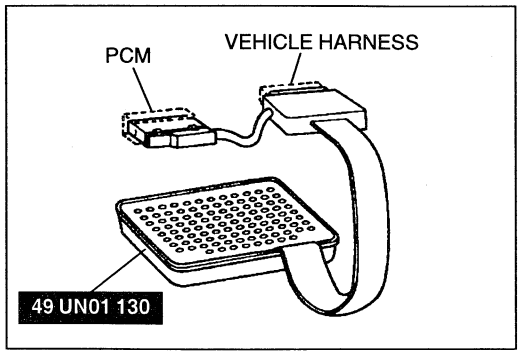
Caution
- **Powertrain control module is sensitive to static electrical charges. If exposed to these charges, damage may result.**
  If service of powertrain control module is required, use the following safeguards to avoid damage to components.
  1. Leave the PCM in their original packaging until ready to install in vehicles.
  2. Avoid touching PCM connector pins.
  3. Avoid laying modules on nonconductive surfaces.

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal.

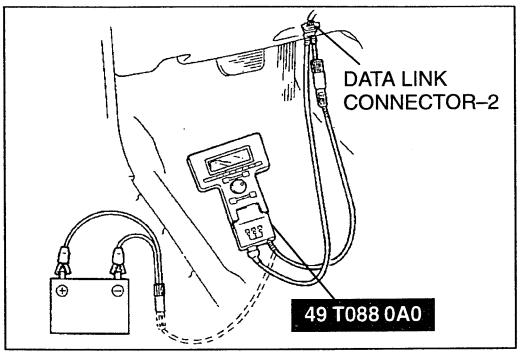


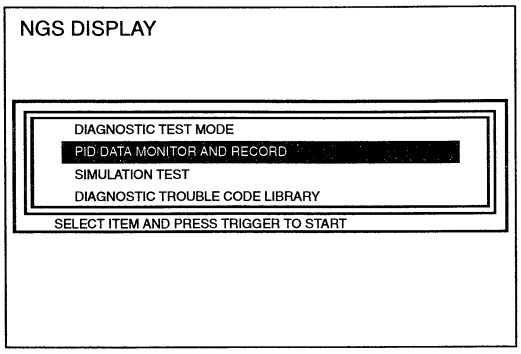
1. Negative battery cable
2. Console
3. PCM connector
4. PCM

Removal Note
- The PCM stores information about vehicle operating conditions and uses this information to compensate for component tolerance. When an emission related component is replaced, Keep Alive Memory (KAM) should be cleared to erase the information stored by the PCM from the original component.



Inspection
Using SST (104 Pin Breakout Box)
1. Disconnect the PCM connectors.
2. Connect the **SST** to the PCM as shown.
3. Measure the voltage at each terminal.
   (Refer to pages F3–152 through F3–156.)
4. If any PCM terminal voltage is incorrect, check the related input or output devices and wiring. If not problem is found, replace the PCM. (Refer to above.)





Using SST (NGS)

1. In the passenger compartment, connect the **SST** to the data link connector–2 as shown in the figure.
2. Referring to the NGS instruction manual, select the "PID/DATA MONITOR AND RECORD" function.
3. Referring to the 1996 Service Highlight, inspect each PCM input/output signal.

   Note
   - The "PID/DATA MONITOR AND RECORD" function is to monitor the calculation value of input/output signals in the PCM. Deviation in the value does not always indicate malfunction in the related input/output devices.
   - For inspection of the input/output signals other than in the link monitor table, check voltage at the applicable PCM terminal by using the **SST** (104 Pin Breakout Box).

4. If normal output signal cannot be detected when all input signals are normal, replace the PCM.
   (Refer to page F3–150.)

Terminal voltage (Reference)

B+: Battery positive voltage
*1: In data link connector

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
1	Shift solenoid 2 (SS2)	Solenoid body	ON		B+	• Solenoid body (Refer to section K2)
			OFF		Below 1.0	
2	MIL	Malfunction indicator lamp	Malfunction indicator lamp OFF		B+	• PCM terminal 2 — MIL
			Malfunction indicator malp ON		Below 1.0	
3	—	—	—		—	—
4	—	—	—		—	—
5	—	—	—		—	—
6	—	—	—		—	—
7	—	—	—		—	—
8	—	—	—		—	—
9	—	—	—		—	—
10	Blower	Fan switch	Ignition switch ON	Fan switch OFF or ON at 1st or 2nd	9.6	• Fan switch (Refer to Mazda 1996 626/MX-6 BETM)
				Fan switch ON at 3rd or higher	Below 1.0	
11	—	—	—		—	—
12	—	—	—		—	—
13	—	—	—		—	—
14	DRL (CANADA)	DRL unit	Daytime running light ON		Below 1.0	• DRL unit (Refer to Mazda 1996 626/MX-6 BETM)
			Daytime running light OFF		Above 11.0	
15	Diagnostic trouble code output	Data link connector-2 terminal BUS–	Carry out inspection according to diagnostic trouble code Diagnostic trouble code output is a part of serial communication Judgement by terminal voltage is not possible (Refer to page F2–55)		—	• On-board diagnostic system
16	Diagnostic trouble code input	Data link connector, Data link connector-2 (Terminal BUS+)	Carry out inspection according to diagnostic trouble code Diagnostic trouble code output is a part of serial communication Judgement by terminal voltage is not possible (Refer to page F1–56)		—	• On-board diagnostic system
17	—	—	—		—	—
18	—	—	—		—	—
19	Pressure regulator control	PRC solenoid valve	Idle (Hot condition)		Below 1.0	• PRC solenoid valve (Refer to page F3–126)
			Other		B+	
20	—	—	—		—	—
21	NE⊕	Crankshaft position sensor	Ignition switch ON		Approx. 1.5	• Crankshaft position sensor (Refer to page F3–158)
			Idle			
22	NE⊖	Crankshaft position sensor	Ignition switch ON		Approx. 1.5	• Crankshaft position sensor (Refer to page F3–158)
			Idle			
23	Ground	Ground	Constant		Below 1.0	• PCM 23 terminal harness (Open)
24	Ground	Ground	Constant		Below 1.0	• PCM 24 terminal harness (Open)
25	—	—	—		—	—

B+: Battery positive voltage
*1: In data link connector

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
26	IGT	Ignition coil	Ignition switch ON		B+	• Ignition coil (Refer to section G)
			Idle		B+	
27	Shift solenoid 1 (SS1)	Solenoid body	ON		B+	• Solenoid body (Refer to section K2)
			OFF		Below 1.0	
28	—	—	—		—	—
29	O/D OFF switch	O/D OFF switch	O/D off switch	Release	B+	• O/D OFF switch (Refer to section K2)
				Push	Below 1.0	
30	—	—	—		—	—
31	Power steering pressure	Power steering pressure switch	Ignition switch ON		B+	• Power steering pressure switch (Refer to page F3–166)
			Idle	P/S not operating		
				P/S operating	Below 1.0	
32	—	—	—		—	—
33	Ground	Vehicle speedometer sensor (VSS) (–)	Constant		Below 1.0	• Vehicle speedometer sensor (Refer to section K2)
34	Barometric pressure/EGR boost	EGR boost sensor	Ignition switch ON		Approx. 4.5	• EGR boost sensor (Refer to page F3–165)
			Idle			
35	Heated oxygen sensor (Rear)	Heated oxygen sensor (Rear)	Idle	After warm up	0—1.0	• Heated oxygen sensor (Refer to page F3–163)
			Acceleration		0—1.0	
			Deceleration		0—1.0	
36	Ground	Mass air flow sensor	Constant		Below 1.0	• Mass air flow sensor (Refer to page F3–157)
37	Transaxle fluid temperature	Transaxle fluid temperature (TFT) sensor	After warm up (Idle)		0.7	• Transaxle fluid temperature (TFT) sensor (Refer to section K2)
38	Engine coolant temperature	Engine coolant temperature sensor	Ignition switch ON	Engine coolant temp 20°C {68°F}	Approx. 5.0	• Engine coolant temperature sensor (Refer to page F3–162)
				After warm up	Below 1.0	
39	Intake air temperature	Intake air temperature sensor	Ignition switch ON	Intake air temperature 20°C {68°F}	Approx. 2.2	• Intake air temperature sensor (Refer to page F3–163)
40	—	—	—		—	—
41	A/C	A/C amplifier	Idle	A/C switch and blower switch ON	Below 1.2	• A/C switch • Refrigerant pressure switch • A/C amplifier (Refer to Mazda 1996 626/MX-6 BETM)
				A/C siwtch OFF	B+	
42	—	—	—		—	—
43	—	—	—		—	—
44	—	—	—		—	—
45	Cooling fan control	Cooling fan relay	Cooling fan operating		Below 1.0	• Cooling fan relay (Refer to section E1)
			Cooling fan stops		B+	
46	—	—	—		—	—

B+: Battery positive voltage
*1: In data link connector

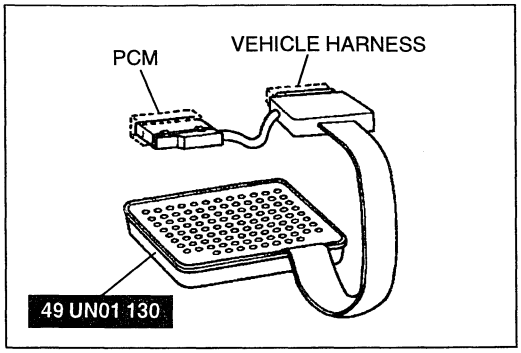
Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
47	—	—	—		—	—
48	—	—	—		—	—
49	Headlight	Headlight switch	Headlight switch OFF		Below 1.0	• Headlight switch (Refer to Mazda 1996 626/MX-6 BETM)
			Headlight switch ON		B+	
50	—	—	—		—	—
51	Ground	Ground	Constant		Below 1.0	• PCM terminal 51 harness (open)
52	—	—	—		—	—
53	—	—	—		—	—
54	Torque converter clutch solenoid valve (TCC)	Solenoid body	Torque converter clutch operation		B+	• Solenoid body (Refer to section K2)
			Torque converter clutch non-operation		0	
55	Back-up power supply	Battery	Constant		B+	• PCM 55 terminal — Battery harness and connector
56	—	—	—		—	—
57	—	—	—		—	—
58	Vehicle speed	Vehicle speedometer sensor (VSS) (+)	Idle (AC range)		Approx. 0.1	• Vehicle speedometer sensor (Refer to section K2)
			48 km/h {30 mph} (AC range)		Approx. 8.0	
			88 km/h {55 mph} (A/C range)		Approx. 12.7	
59	Cruise control	Cruise control unit	Ignition switch ON		B+	• Cruise control system (Refer to Mazda 1996 626/MX-6 BETM)
60	Heated oxygen sensor (Front)	Heated oxygen sensor (Front)	Idle	After warm up	0—1.0	• Heated oxygen sensor (Refer to page F3–163)
			Acceleration		0.5—1.0	
			Deceleration		0—0.5	
61	—	—	—		—	—
62	—	—	—		—	—
63	—	—	—		—	—
64	Transaxle range	Transaxle range switch	Ignition switch ON	P position	4.5	• Transaxle range switch (Refer to section K2)
				R position	3.7	
				N position	2.9	
				D range	2.2	
				S range	1.4	
				L range	0.7	
65	EGR valve position	EGR valve position sensor	Ignition switch ON		Approx. 0.7	• EGR valve position sensor (Refer to page F3–164) • PCM terminal 90 voltage
			Idle			
66	Rear window defroster	Rear window defroster switch	Ignition switch ON	Rear window defroster switch OFF	B+	• Rear window defroster switch (Refer to Mazda 1996 626/MX-6 BETM)
				Rear window defroster switch ON	Below 1.0	

B+: Battery positive voltage
*1: In data link connector

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
67	Purge control	Purge solenoid valve	Ignition switch ON		B+	• Purge solenoid valve (Refer to page F3–137)
			Idle			
68	EGR control (Vent)	EGR solenoid valve (Vent)	Ignition switch ON		B+	• EGR solenoid valve (Vent) (Refer to page F3–131)
			Idle			
69	A/C control	A/C relay	Ignition switch ON		B+	• A/C relay (Refer to Mazda 1996 626/MX-6 BETM)
			Idle	A/C operating	Below 1.0	
				A/C stop	B+	
70	—	—	—		—	—
71	Power supply	Main relay	Ignition switch	OFF	Below 1.0	• Main relay (Refer to page F3–166)
				ON	B+	
72	EGR control (Vacuum)	EGR solenoid valve (Vacuum)	Ignition switch ON		B+	• EGR solenoid valve (Vacuum) (Refer to page F3–131)
			Idle			
73	—	—	—		—	—
74	Fuel injector control	Fuel injector No.3	Ignition switch ON		B+	• Fuel injector (Refer to page F3–119)
75		Fuel injector No.1		Idle	B+	
76	Ground	Ground	Constant		Below 1.0	• PCM 76 terminal harness (Open)
77	Ground	Ground	Constant		Below 1.0	• PCM 77 terminal harness (Open)
78	—	—	—		—	—
79	O/D OFF indicator light	O/D OFF indicator light	Idle	SW OFF	B+	• O/D off switch (Refer to section K2)
				SW ON (O/D OFF)	Below 1.0	
80	Fuel pump control	Fuel pump relay	Ignition switch ON		B+	• Fuel pump relay (Refer to page F1–117)
			Cranking		Below 1.0	
			Idle			
81	Electronic pressure control (EPC)	Solenoid body	Idle		8.3	• Solenoid body (Refer to section K2)
			48 km/h {30 mph}		9.7	
			88 km/h {55 mph}		11.1	
82	—	—	—		—	—
83	Idle air control	Idle air control valve	Ignition switch ON		B+	• Idle air control valve (Refer to page F3–108)
			Idle	After warm up (No load)	Approx. 10	
84	Turbine shaft speed (TSS)	Turbine shaft speed (TSS) sensor	Idle	S or L range	0	• TSS sensor (Refer to section K2)
				D or R range	0	
				P or N range	0.6—0.7	
			Driving	48 km/h {30 mph}	0.8	
				88 km/h {55 mph}	11.8	
85	SGC	Camshaft position sensor (In distributor)	Ignition switch ON		0 or Approx. 5.0	• Camshaft position sensor (Refer to page F3–158)
			Idle		Approx. 6.5	
86	—	—	—		—	—
87	—	—	—		—	—

B+: Battery positive voltage
*1: In data link connector

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
88	Mass air flow sensor (HRP)	Mass air flow sensor	Ignition switch ON		0.15—0.20	• Mass air flow sensor (Refer to page F3–157)
			Idle		0.6—1.1	
89	Throttle position (TVO)	Throttle position sensor	Ignition switch ON	Closed throttle position	0.3—0.7	• Throttle position sensor (Refer to page F3–159) • PCM terminal 90 voltage
				Wide open throttle	3.4—5.3	
90	Constant voltage (Vref)	Throttle position sensor EGR valve position sensor EGR boost sensor	Ignition switch ON		Approx. 5.0	• PCM terminal 90 voltage
91	Ground	Ground	Constant		Below 1.0	• PCM 91 terminal harness
92	Brake	Brake switch	Brake pedal released		Below 1.0	• Brake switch (Refer to section P)
			Brake pedal depressed		B+	
93	Heated oxygen sensor (Front) heater control	Heated oxygen sensor (Front)	Idle		Below 1.0	• Heated oxygen sensor (Front)
			Ignition switch ON		B+	
94	—	—	—		—	—
95	—	—	—		—	—
96	—	—	—		—	—
97	Power supply	Main relay	Ignition switch	OFF	Below 1.0	• Main relay (Refer to page F3–166)
				ON	B+	
98	EGR boost sensor switching control	EGR boost sensor solenoid valve	Ignition switch ON		B+	• EGR boost sensor solenoid valve (Refer to page F1–132)
			Idle			
99	—	—	—		—	—
100	Fuel injector control	Fuel injector No.4	Ignition switch ON		B+	• Fuel injector (Refer to page F3–119)
101		Fuel injector No.2		Idle	B+	
102	3–2 Timing/ coasting clutch solenoid (3–2 T/CCS)	Solenoid body	Idle (P/R/N/D range)		8.5	• Solenoid body (Refer to section K2)
			Idle (S/L range)		B+	
103	Ground	Ground	Constant		Below 1.0	• PCM 103 terminal harness
104	—	—	—		—	—



MASS AIR FLOW SENSOR

Inspection

Using the SST (104 Pin Breakout Box)

1. Check the mass air flow sensor for damage and cracks.
2. Connect the **SSTs** to the PCM. (Refer to page F3–150.)
3. Measure the voltage at PCM terminal 88. (Refer to page F3–155.)
4. Verify that the voltage is within the specification.

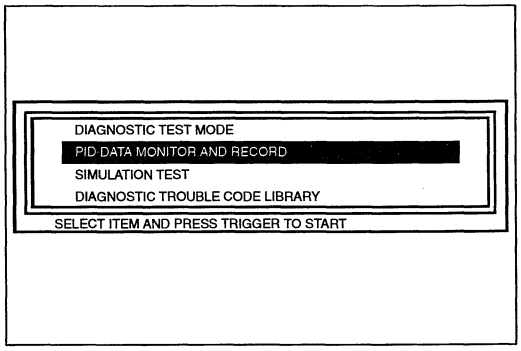
Specification

Measuring condition	Voltage (V)
Ignition switch ON	0.15—0.20
Idle	0.6—1.1

5. If not as specified, inspect the harness and connector between the mass air flow sensor and the PCM terminal.
6. If there is correct terminal voltage and harness continuity, replace the mass air flow sensor. (Refer to page F3–102.)

Using the SST (NGS)

1. Check the mass air flow sensor for damage and cracks.
2. Connect the **SSTs** to the data link connector–2. (Refer to page F3–151.)
3. Select the "PID/DATA MONITOR AND RECORD" function of the NGS.
4. Select the mass air flow sensor on the NGS. The NGS measures and shows the voltage.



Specification

Measuring condition	Voltage (V)
Ignition switch ON	0.15—0.20
Idle	0.6—1.1

5. If not as specified, inspect the harness and connector between the mass air flow sensor and the PCM terminal.
6. If there is correct terminal voltage and harness continuity, replace the mass air flow sensor. (Refer to page F3–102.)

Note

- The scan tool shows the mass airflow rate and load value.

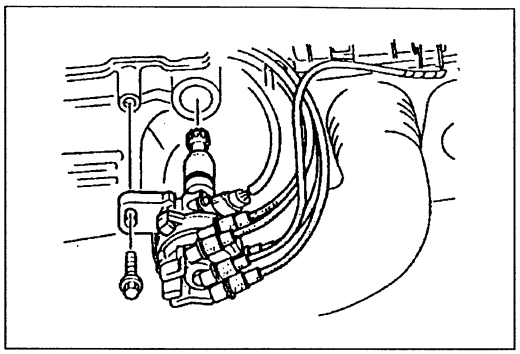
Specification

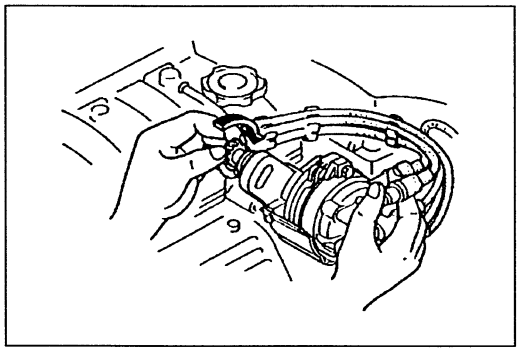
Engine speed (rpm)	Mass intake airflow amount (g/s)	Engine load calculated value (%)
650—750 (Idle)	2.2—3.1	18.0—23.0
2,500*	8.7—9.8	17.0—20.0

* No load, in neutral or park.

MAF conversion table

Voltage signal (V)	0.34	0.39	0.60	1.00	1.96	3.90
Mass intake airflow amount (g/s)	0.82	0.88	1.25	3.44	14.48	135.95





CAMSHAFT POSITION SENSOR

Inspection

1. Remove the distributor. (Refer to section G.)
2. Disconnect the fuel injector connector.
3. Connect the distributor 4-pin connector.

Warning

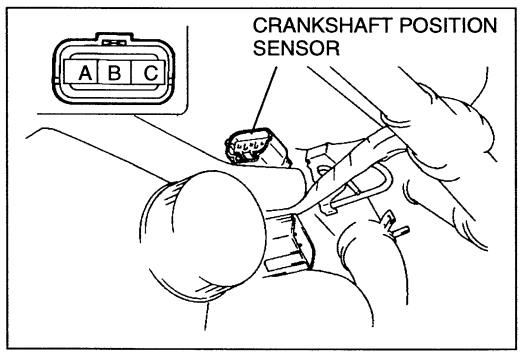
- **Turning the ignition switch to ON with the fuel injector connector still connected will actuate the fuel injector.**
- **Doing this procedure with the high-tension lead (ignition coil side) still connected will generate sparks and cause electrical shock. Disconnect the high-tension lead (ignition coil side) and avoid them from grounded to the vehicle body.**

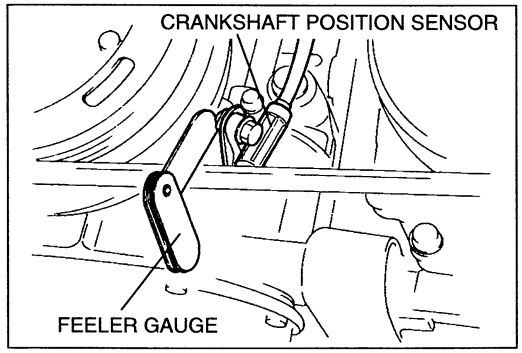
4. Connect the **SSTs** to the PCM. (Refer to page F2–150.)
5. Turn the ignition switch to ON.
6. Measure the voltage at PCM terminal 85.
7. Rotate the distributor drive by hand and check the output signal.

Specification

PCM terminal	Signal	
85	SGC	Approx. 5 V (1 pulse/rev)

8. If not as specified, inspect the wiring harness and connector between the distributor and the PCM terminal.
9. If there is correct terminal voltage and harness continuity, replace the distributor. (Refer to section G.)





CRANKSHAFT POSITION SENSOR

Inspection

Resistance

1. Disconnect the crankshaft position sensor connector.
2. Measure the resistance between terminals A and B by using an ohmmeter.

Specification: 520—580 Ω [20°C {68°F}]

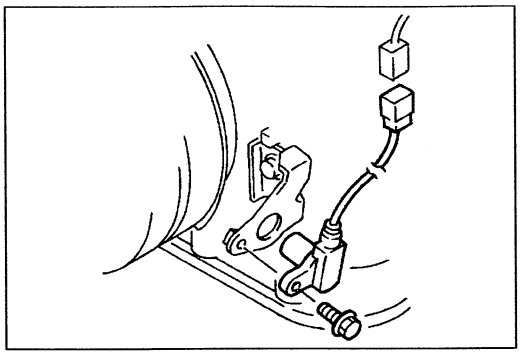
3. If not as specified, replace the crankshaft position sensor.

Air gap

1. Measure the air gap between the crankshaft pulley and the crankshaft position sensor by using a feeler gauge.

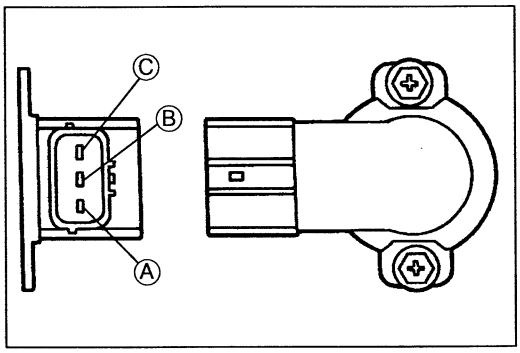
Specification: 0.5—1.5 mm {0.020—0.059 in}

2. If not as specified, replace the crankshaft pulley or the crankshaft position sensor.



Replacement
1. Disconnect the negative battery cable.
2. Remove the crankshaft position sensor.
3. Install in the reverse order of removal.

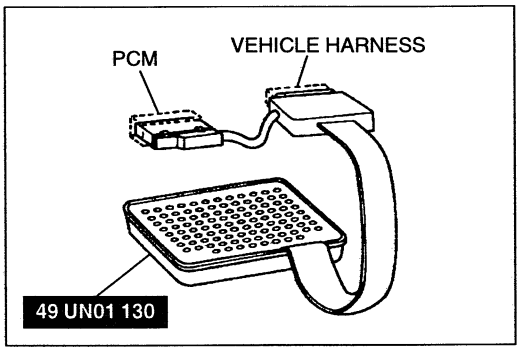
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



THROTTLE POSITION SENSOR
Inspection of resistance
1. Disconnect the throttle position sensor connector.
2. Using an ohmmeter, measure the resistance between throttle position sensor terminals A and C.

Resistance: 4—6 kΩ

3. If not as specified, replace the throttle position sensor.
4. Reconnect the throttle position sensor connector.



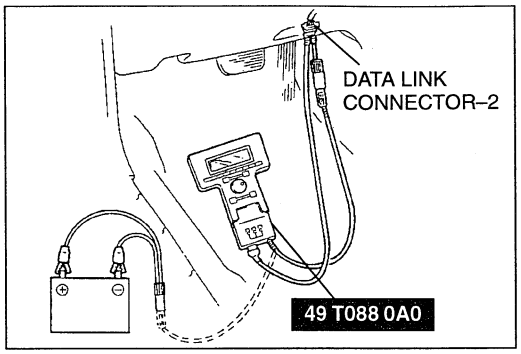
Inspection of output voltage
Using the SST (104 Pin Breakout Box)
1. Connect the **SST** to the PCM as shown.
2. Turn ignition switch to ON.
3. Measure voltage at PCM terminal 89 under the following conditions.

Specification

Throttle valve condition	Terminal voltage (V)
Closed throttle position	0.3—0.7
Wide open throttle	3.4—5.3

(The voltage increase is linear according to the throttle valve opening angle)

4. Disconnect the **SST**.
5. If not as specified, adjust the throttle position sensor.



Using the SST (NGS)

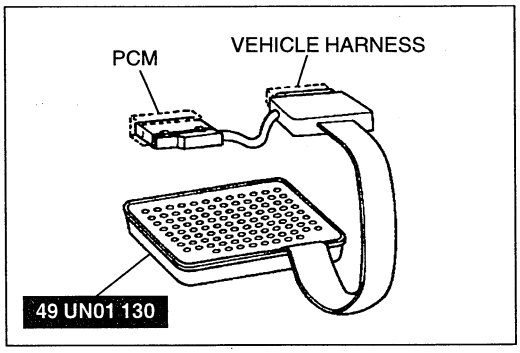
1. Connect the **SSTs** to the data link connector–2.
2. Select the "PID/DATA MONITOR AND RECORD" function of NGS.
3. Select TPS on the **SST** display.
4. Measure the TPS output voltage under the following conditions.

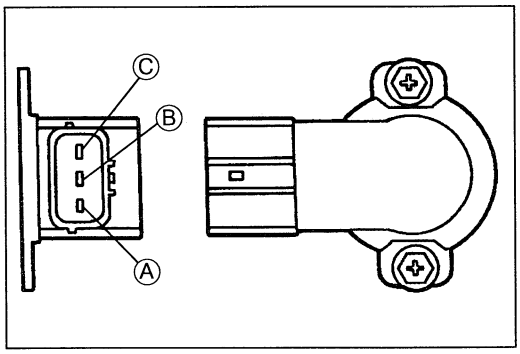
Specification

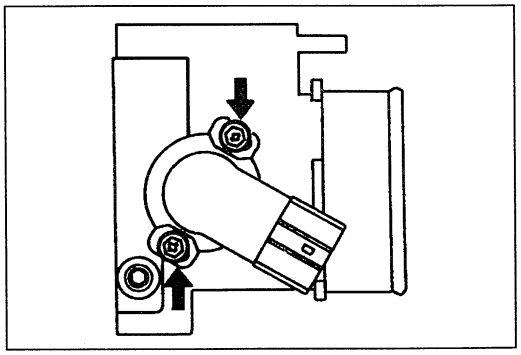
Throttle valve condition	TPS output voltage (V)
Closed throttle position	0.3—0.7
Wide open throttle	3.4—5.3

(The voltage increase is linear according to the throttle valve opening angle)

5. Disconnect the **SSTs**.
6. If not as specified, adjust the throttle position sensor.







Adjustment

Using the SST (104 Pin Breakout Box)

1. Verify that the throttle valve is fully closed.
2. Connect the **SST** to the PCM as shown.
3. Disconnect the throttle position sensor connector.
4. Turn the ignition switch to ON.
5. Using a voltmeter, measure the voltage at connector side terminal A.

Specification: 4.5—5.5 V

6. Reconnect the throttle position sensor connector.
7. Loosen the sensor mounting screws.
8. Adjust the sensor output voltage by rotating the sensor.

Specification (Closed throttle position)

Connector terminal A voltage (V)	PCM terminal 89 voltage (V)
4.5—4.9	0.4—0.5
4.9—5.1	0.4—0.6
5.1—5.5	0.5—0.6

9. Tighten the sensor mounting screws.

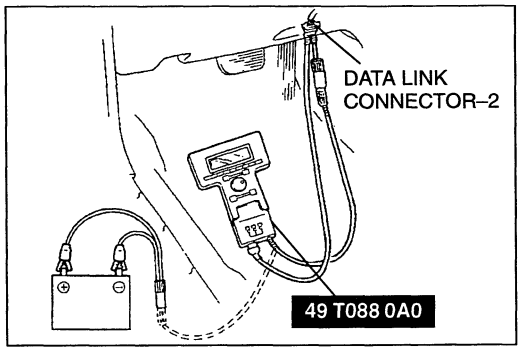
Tightening torque:
1.6—2.3 N·m {16—24 kgf·cm, 14—21 in·lbf}

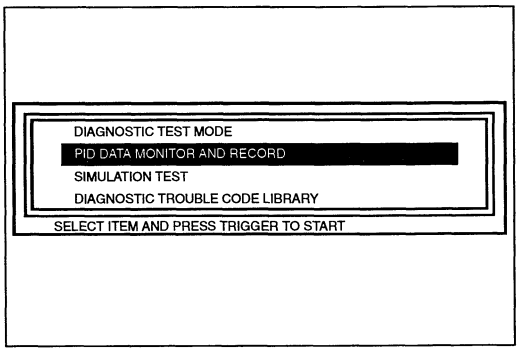
10. Fully open the throttle valve and verify that the PCM terminal voltage are within the specification.

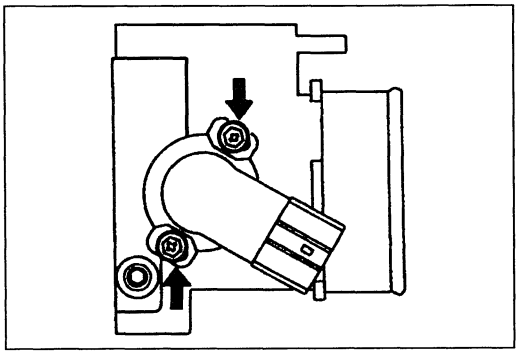
Specification (Wide open throttle)

Connector terminal A voltage (V)	PCM terminal 89 voltage (V)
4.5—4.7	3.5—4.4
4.7—4.8	3.6—4.5
4.8—4.9	3.7—4.6
4.9—5.0	3.7—4.8
5.0—5.1	3.8—4.9
5.1—5.3	4.0—5.0
5.3—5.4	4.1—5.1
5.4—5.5	4.2—5.2

11. Disconnect the **SST**.
12. If not as specified, replace the throttle position sensor.







Using the SST (NGS)

1. Verify that the throttle valve is closed throttle position.
2. Connect the **SSTs** to the data link connector–2.
3. Disconnect the throttle position sensor connector.
4. Turn the ignition switch to ON.
5. Using a voltmeter measure the voltage at connector side terminal A.

   Specification: 4.5—5.5 V

6. Reconnect the throttle position sensor connector.
7. Loosen the sensor mounting screws.
8. Select the "PID/DATA MONITOR AND RECORD" function of NGS.
9. Select the TPS on the NGS.
10. Adjust the TPS output voltage by rotating the sensor.

Specification (Closed throttle position)

Connector terminal A voltage (V)	TPS output voltage (V)
4.5—4.9	0.4—0.5
4.9—5.1	0.4—0.6
5.1—5.5	0.5—0.6

11. Tighten the sensor mounting screws.

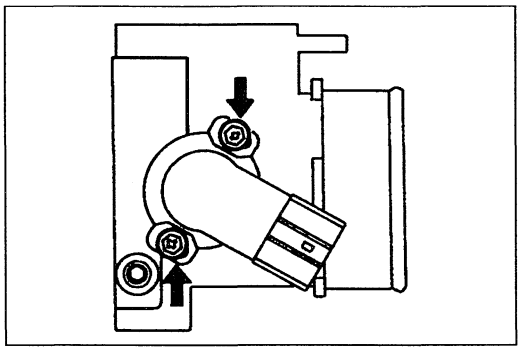
    Tightening torque:
    1.6—2.3 N·m {16—24 kgf·cm, 14—21 in·lbf}

12. Wide open throttle and verify that the TPS terminal voltage are within the specification.

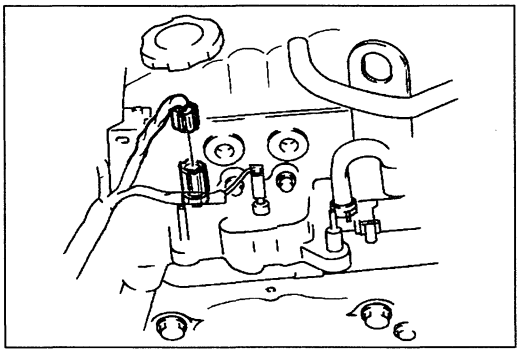
Specification (Wide open throttle)

Connector terminal A voltage (V)	TPS output voltage (V)
4.5—4.7	3.5—4.4
4.7—4.8	3.6—4.5
4.8—4.9	3.7—4.6
4.9—5.0	3.7—4.8
5.0—5.1	3.8—4.9
5.1—5.3	4.0—5.0
5.3—5.4	4.1—5.1
5.4—5.5	4.2—5.2

13. Disconnect the **SSTs**.
14. If not as specified, replace the throttle position sensor.



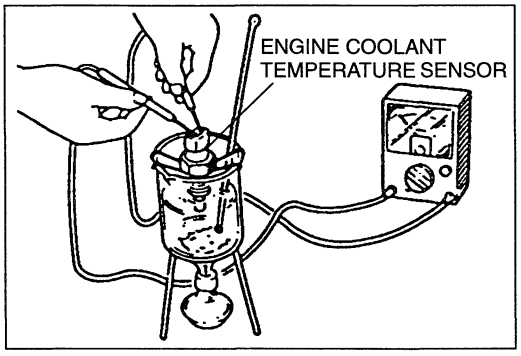
Replacement
1. Disconnect the air hose. (Refer to page F3–102.)
2. Disconnect the throttle position sensor connector.
3. Remove the screws.
4. Remove the throttle position sensor.
5. Install the throttle position sensor.
6. Adjust the throttle position sensor output voltage. (Refer to page F3–159.)
7. Connect the air hose.



ENGINE COOLANT TEMPERATURE SENSOR
Removal

Note
- The engine coolant temperature sensor is at the rear of the engine.

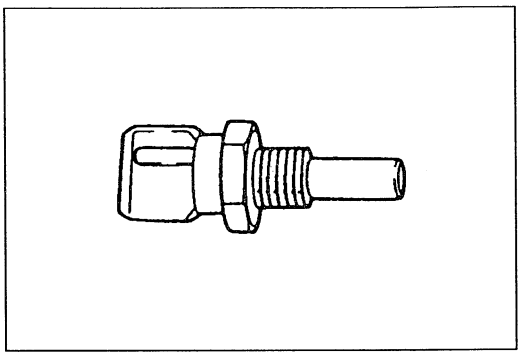
1. Disconnect the engine coolant temperature sensor connector.
2. Remove the engine coolant temperature sensor.



Inspection
1. Place the sensor in water with a thermometer and heat the water gradually.
2. Measure the resistance of the sensor.

Water temperature	Resistance (kΩ)
20°C { 68°F}	35.4—39.3
60°C {140°F}	7.1—8.0

3. If not as specified, replace the engine coolant temperature sensor.

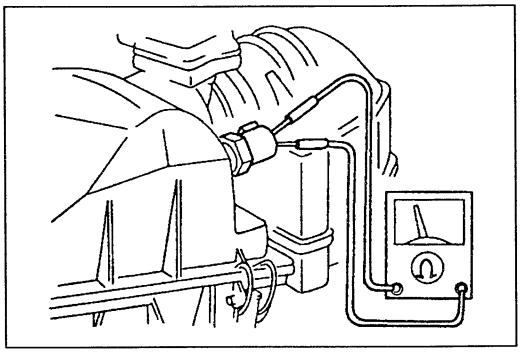


Installation

1. Install a new washer and the engine coolant temperature sensor.

   Tightening torque:
   15.7—23.5 N·m {1.6—2.4 kgf·m, 11.6—17.3 ft·lbf}

2. Connect the engine coolant temperature sensor connector.
3. Start the engine and check for coolant leakage.



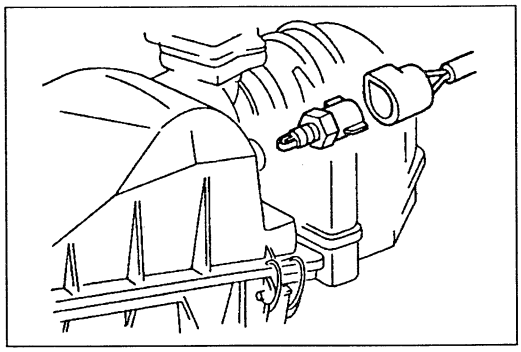
INTAKE AIR TEMPERATURE SENSOR

Inspection

1. Disconnect the intake air temperature sensor connector.
2. Check the resistance of the sensor.

Temperature	Resistance
20°C {68°F}	35.4—39.3 kΩ
60°C {140°F}	7.1—8.0 kΩ

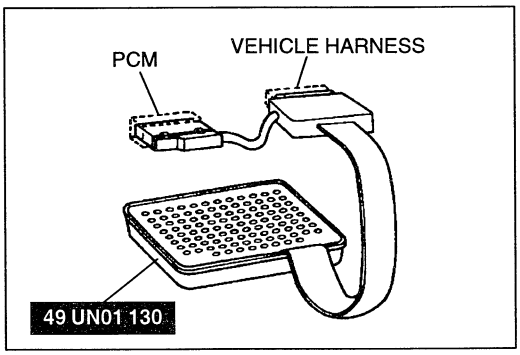
3. If not as specified, replace the intake air temperature sensor.



Replacement

1. Disconnect the intake air temperature sensor connector.
2. Remove the sensor.
3. Install the sensor and tighten it to the specified torque.

   Tightening torque:
   10.8—16.27 N·m {1.1—1.6 kgf·m, 8.0—11.5 ft·lbf}



HEATED OXYGEN SENSOR

Inspection

Sensor

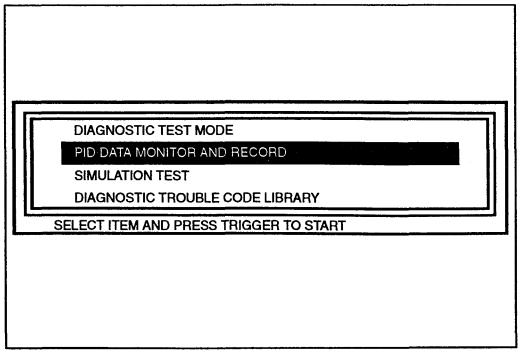
Using the SST (104 Pin Breakout Box)

1. Warm up the engine to normal operating temperature.
2. Connect the **SST** to the PCM. (Refer to page F3–150.)
3. Measure the voltage at PCM terminals 35 and 60.

Spcification

Engine condition	PCM terminal 35	PCM terminal 60
Idle	0—1.0 V	0—1.0 V
Deceleration	0—1.0 V	0—0.1 V
Acceleration	0—1.0 V	0—1.0 V

4. If not as specified, inspect the following.
   - Fuel system
   - On-board diagnostic system (Refer to page F3–14.)
   - Intake-air system
5. If all the systems are OK, replace the heated oxygen sensor. (Refer to page F3–127.)



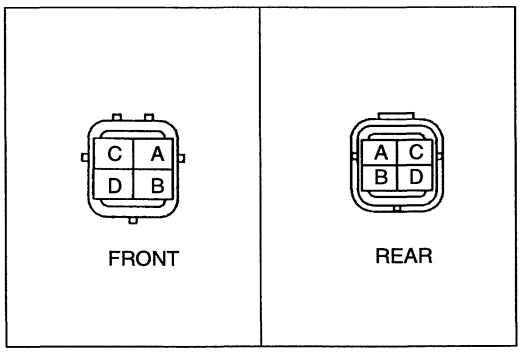
Using the SST (NGS)

1. Connect the **SSTs** to the data link connector–2. (Refer to page F3–151.)
2. Select the "PID/DATA MONITOR AND RECORD" function of the NGS.
3. Select the heated oxygen sensor (front), (rear) on the NGS. The NGS measures and shows the voltage.

Spcification

Engine condition	Voltage Heated oxygen sensor (front)	Voltage Heated oxygen sensor (rear)
Idle	0—1.0 V	0—1.0 V
Deceleration	0—0.5 V	0—1.0 V
Acceleration	0.5—1.0 V	0—1.0 V

4. If not as specified, inspect the following.
   - Fuel system
   - On-board diagnostic system (Refer to page F3–14.)
   - Intake-air system
5. If all the systems are OK, replace the heated oxygen sensor. (Refer to page F3–127.)

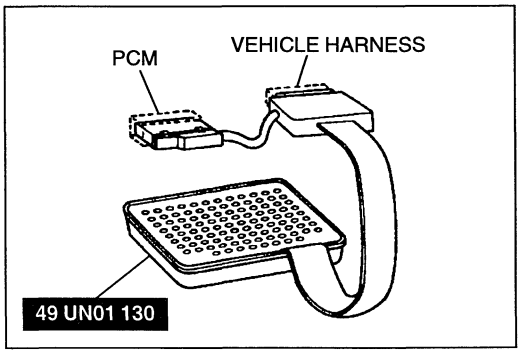


Heater

1. Disconnect the heated oxygen sensor connector.
2. Measure the resistance between heated oxygen sensor terminals C and D by using an ohmmeter.

   Specification: Approx. 6 Ω [20°C {68°F}]

3. If not as specified, replace the heated oxygen sensor. (Refer to page F3–127.)

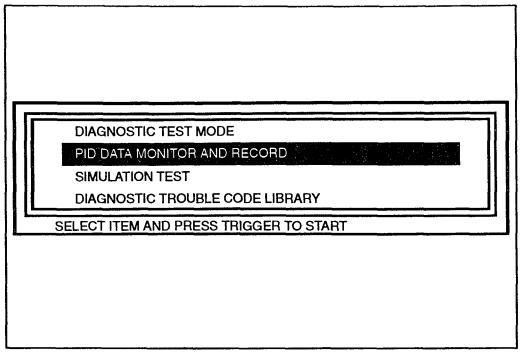


EGR VALVE POSITION SENSOR
Inspection of output voltage
Using the SST (104 Pin Breakout Box)

1. Connect the **SST** to the PCM as shown and connect a vacuum pump to the EGR valve.
2. Turn the ignition switch to ON.
3. Measure the voltage at the terminals as shown in the table.

Terminal	PCM	Vacuum	
		0 kPa {0 mmHg, 0 inHg}	20.0 kPa {150 mmHg, 5.90 inHg}
B	90	4.5—5.5 V	
A	91	0 V	
C	65	Approx. 0.8 V	Approx. 4.9 V

4. If not correct at 65 terminal, check the wiring harness and 90 terminal of the PCM.



Using the SST (NGS)

1. Connect the **SSTs** (NGS) to the data link connector–2.
2. Select the "PID/DATA MONITOR AND RECORD" function of NGS and connect a vacuum pump.
3. Select EGR valve position sensor on the NGS. The NGS measures and shown in the specification.

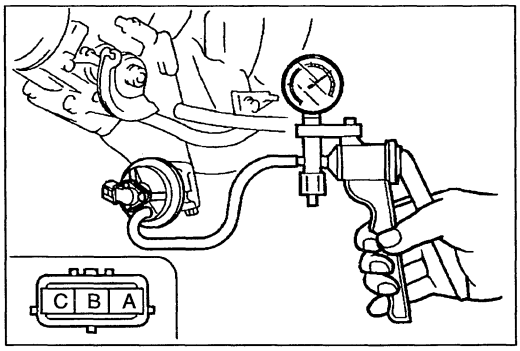
Spcification

Vacuum	EGR valve position signal voltage
0 kPa {0 mmHg, 0 inHg}	Approx. 0.8 V
20.0 kPa {150 mmHg, 5.90 inHg}	Approx. 4.9 V

4. If not correct EGR valve position signal voltage, check the wiring harness and 90 terminal of the PCM.

Inspection of resistance

1. Disconnect the EGR valve position sensor connector, and connect an ohmmeter.
2. Disconnect the vacuum hose from the EGR valve, and connect a vacuum pump.
3. Measure the resistance between the terminals as shown while vacuum is applied.



Terminal	Vacuum	
	0 kPa {0 mmHg, 0 inHg}	20.0 kPa {150 mmHg, 5.90 inHg}
A—B	Approx. 2.7 kΩ	
A—C	Approx. 0.5 kΩ	Approx. 2.7 kΩ
B—C	Approx. 2.4 kΩ	Approx. 0.1 kΩ

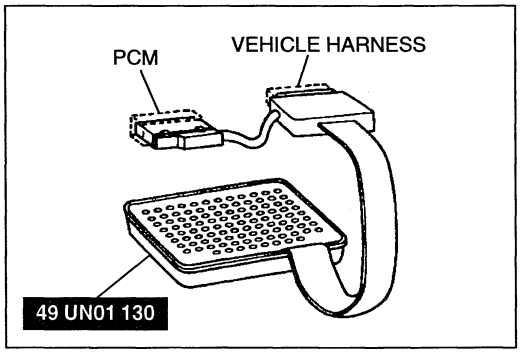
4. If not as specified, replace the EGR valve.

EGR BOOST SENSOR

Inspection

Using the SST (104 Pin Breakout Box)

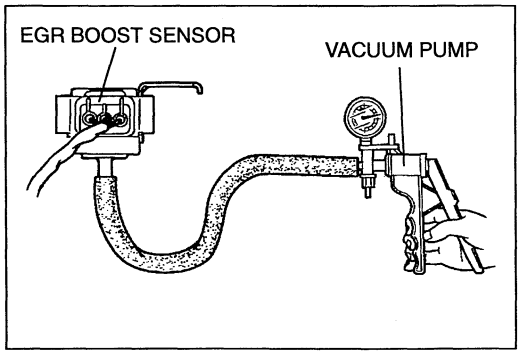
1. Connect the **SST** to the PCM as shown.
2. Apply vacuum or pressure to the EGR boost sensor by using a vacuum pump. Measure the PCM terminal 34.



Specification

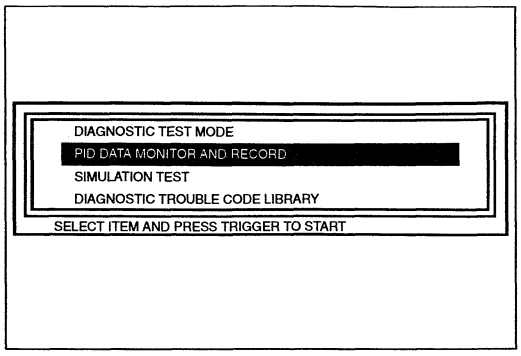
15 kPa {112.5 mmHg, 4.4 inHg}: 0.270—0.330 V
40 kPa {300 mmHg, 11.8 inHg}: 1.395—1.705 V
95 kPa {712.5 mmHg, 28.1 inHg}: 3.870—4.730 V
105 kPa {787.5 mmHg, 31.0 inHg}: 4.320—5.280 V

3. If not as specified, replace the EGR boost sensor.



Using the SST (NGS)

1. Connect the **SSTs** to the data link connector–2.
2. Select the "PID/DATA MONITOR AND RECORD" function of NGS and connect a vacuum pump.
3. Select the EGR boost sensor on the NGS. The NGS measures and shows the voltage.



Specification
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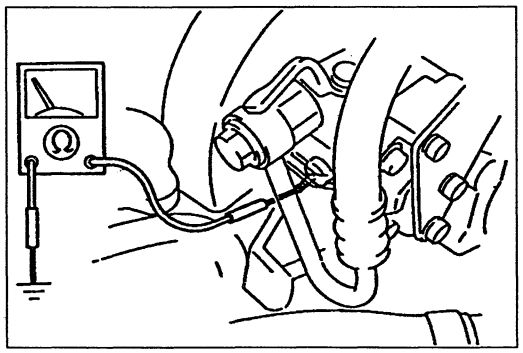
95 kPa {712.5 mmHg, 28.1 inHg}: 3.870—4.730 V
105 kPa {787.5 mmHg, 31.0 inHg}: 4.320—5.280 V

4. If not as specified, replace the EGR boost sensor.



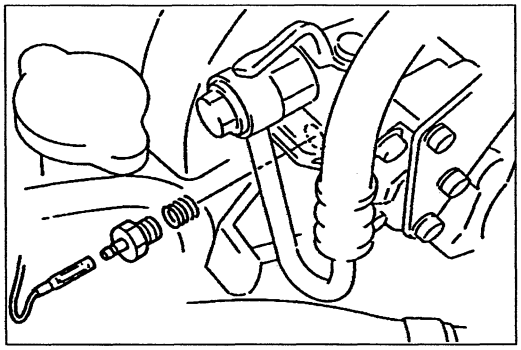
P/S PRESSURE SWITCH

Inspection

1. Disconnect the P/S pressure switch connector.
2. Connect an ohmmeter to the sensor.
3. Start the engine and run it at idle. Check continuity of the sensor while turning the steering wheel.

Steering wheel	Continuity
Turning	Yes
Not turning	No

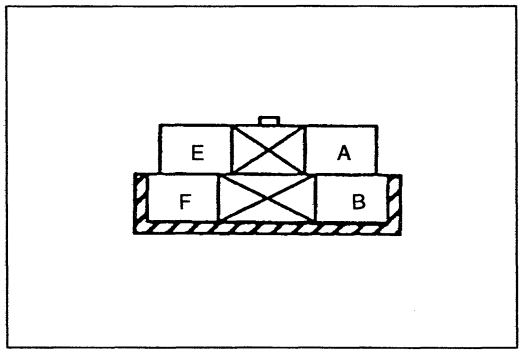
4. If not as specified, replace the P/S pressure switch.



Replacement

Replace the P/S pressure switch as shown in the figure.

Tightening torque:
17—22 N·m {1.7—2.3 kgf·m, 13—16 ft·lbf}



MAIN RELAY

Inspection

1. Verify that the main relay clicks when the ignition switch is turned ON and OFF.
2. Apply battery positive voltage (B+) to terminal E and ground terminal A of the relay.
3. Check continuity of the relay as shown.

B+: Battery positive voltage

Terminals	B+ not applied	B+ applied
B—F	No continuity	Continuity

4. If not as specified, replace the main relay.

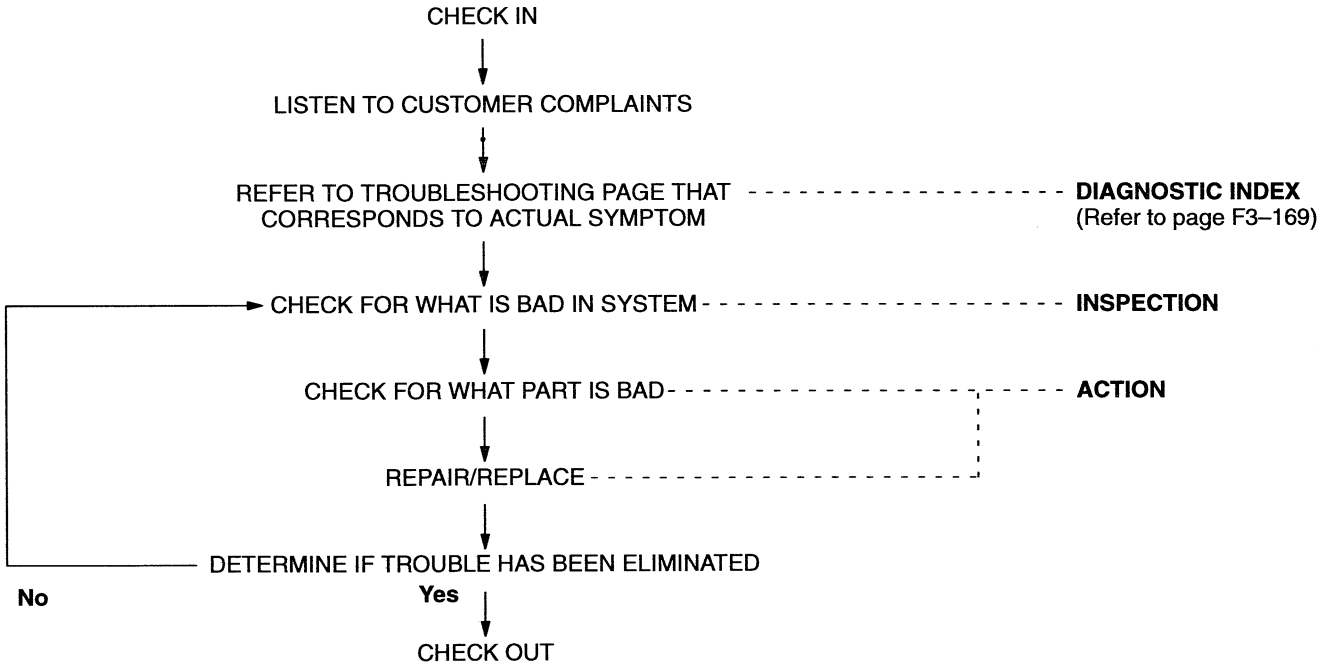
TROUBLESHOOTING GUIDE

USING THIS SECTION

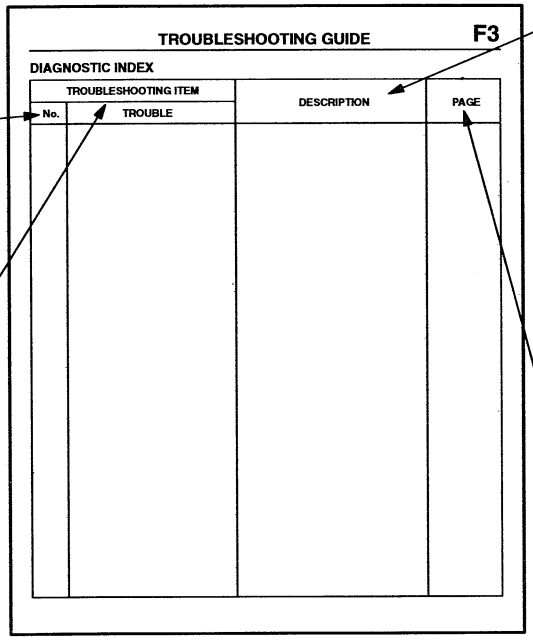
Introduction

Most of the fuel and emission control systems are electronically controlled, often making it difficult to diagnose problems, especially intermittent problems. Before undertaking actual checks, take 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 the intermittent ones. Through a talk with the customer, you will usually find out what the symptoms are and under what conditions they occur.

Work flow



Diagnostic index



Description:
Describes each troubleshooting item.

No.:
Each troubleshooting item is assigned a number.

Page:
Shows the reference page or section

Troubleshooting Item:
There are 30 troubleshooting items. Choose the item that most closely corresponds to the actual symptom.

Troubleshooting chart

13, 14	ENGINE STALLS	• IDLE WITH A/C, P/S, and/or E/L ON • IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGES
DESCRIPTION	• Engine stops unexpectedly when A/C, P/S, and/or E/L turned ON at idle • Engine stops unexpectedly when shifted from N or P to other ranges at idle • Idle condition is normal when A/C, P/S, and E/L are OFF and in N and P	

[TROUBLESHOOTING HINTS]
① Monitor switch functions (SST)
- A/C switch
- Headlight switch
- Rear window defroster
- Blower switch

② Solenoid valve (ISC)
- Solenoid valve stuck

STEP	INSPECTION		ACTION
1	Are switches correct when checked by using Self-Diagnosis Checker monitor lamp while ignition switch ON? ☞ page F2–44 • Blower switch • Headlight switch • Rear window defroster switch • Selector lever	Yes	Go to next step
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞ page F2–45
2	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ page F2–18	Yes	"00" displayed Go to next step
		No	Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F2–20 "88" flashes No.38 SELF-DIAGNOSIS "88"

DESCRIPTION:
Further describes the system. Confirm that the chart addresses the actual symptom before beginning troubleshooting.

TROUBLESHOOTING HINTS:
This describes the possible point of malfunction.

STEP:
This shows the order of troubleshooting. Proceed with troubleshooting as indicated.

INSPECTION:
This describes and inspection to quickly determine the malfunction of parts. If a detailed procedure is necessary to perform the INSPECTION, refer to the page specified by the "☞" mark.

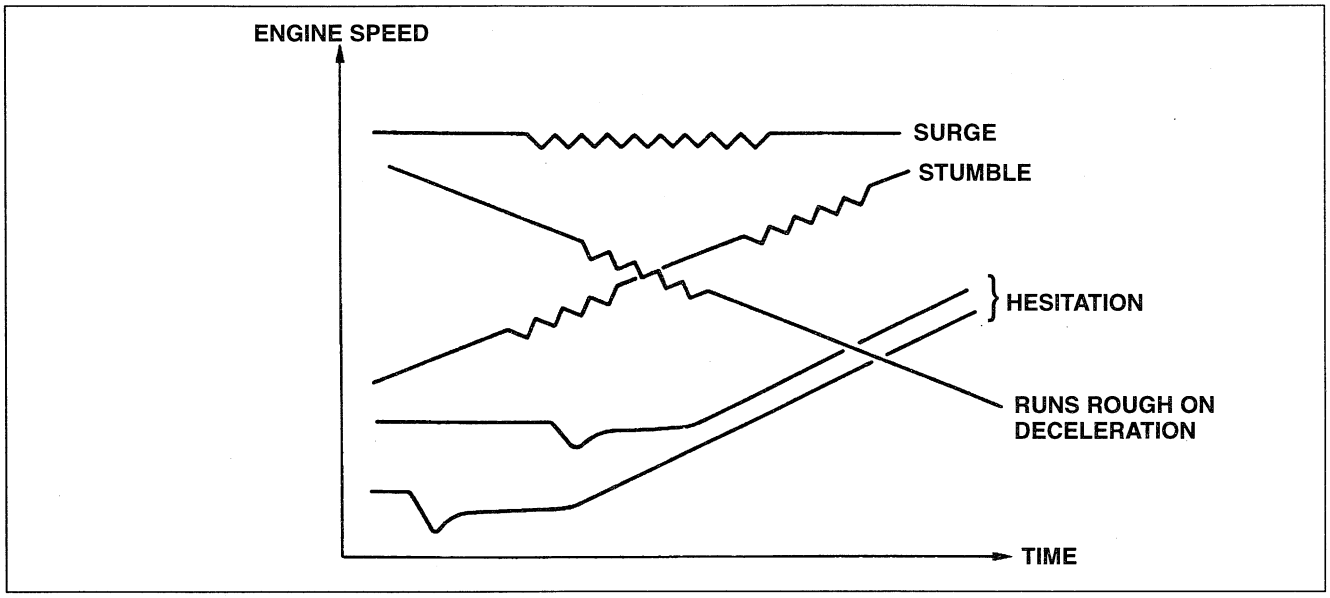
ACTION:
This recommends the appropriate action to take as a result (Yes/No) of the INSPECTION. How to perform the action is described on the reference page specified by the "☞" mark.

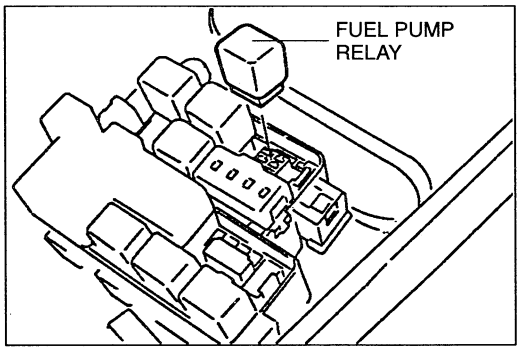
DIAGNOSTIC INDEX

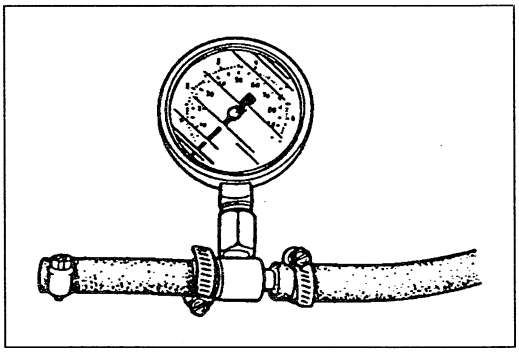
TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
1	Melts main or other fuse		—	F3–171
2	Will not crank		Starter does not work	F3–172
3	Hard start/long crank/erratic start/erratic crank		Starter cranks engine at normal speed but engine requires excessive cranking time before starting	F3–173
4	Engine stalls	After start At idle	Engine stops unexpectedly at idle and/or after start	F3–175
5	Cranks normally but will not start		Starter cranks engine at normal speed but engine will not run	F3–177
6	Slow return to idle		Engine takes more time than normal to return to idle speed	F3–179
7	Engine runs rough/ rolling idle	At idle	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake Idle speed too slow and excessive engine shake	F3–180
8	Fast idle/runs on		Engine speed continues at fast idle after warm-up Engine runs after ignition switch is turned off	F3–182
9	Low idle/stalls during deceleration		Engine stops unexpectedly at beginning of deceleration or recovery from deceleration	F3–182
10	Engine stalls/quits	Acceleration/cruise	Engine stops unexpectedly at beginning of acceleration or during acceleration Engine stops unexpectedly while cruising	F3–183
	Engine runs	Acceleration/cruise	Engine speed fluctuates during acceleration or cruising	F3–183
	Misses	Acceleration/cruise	Engine misses during acceleration or cruising	F3–183
	Buck/jerk	Acceleration/cruise deceleration	Vehicle bucks/jerks during acceleration, cruising, or deceleration	F3–183
	Hesitation/stumble	Acceleration	Momentary pause at beginning of acceleration, or during acceleration	F3–183
11	Surges	Acceleration/cruise	Momentary minor irregularity in engine output	F3–186
12	Backfires	Idle/acceleration/ deceleration	Sound produced from exhaust system	F3–188
13	Lack/loss of power	Acceleration/cruise	Performance poor under load (i.e., power down when climbing hills)	F3–189
14	Knocking/pinging	Acceleration/cruise	Sound produced when air/fuel mixture is ignition by something other than spark plug (i.e., hot spot in combustion chamber)	F3–191
15	Poor fuel economy		Fuel economy unsatisfactory	F3–192
16	Emissions compliance		Fails emissions test	F3–194
17	MIL never on		Malfunction indicator lamp never on	F3–196
18	Automatic transaxleconcerns	Upshift/downshift/ engagement	Automatic transmission concerns not related to engine performance	section K2
19	High oil consumption/leaks		Oil consumption excessive	F3–197
20	Cooling system concerns	Overheating	Engine runs at higher than normal temperature/overheats	F3–197
21	Cooling system concerns	Runs cold	Engine does not reach normal operating temperature	F3–197
22	Exhaust smoke		Blue, black, or white smoke from exhaust system	F3–198
23	Fuel odor (in engine compartment)		Gasoline fuel smell or visible leaks	F3–199
24	Engine noise		Engine noise from under hood	F3–200
25	Vibration concerns (engine)		Vibration from under hood or driveline	F3–201
26	A/C does not work		A/C compressor magnetic clutch does not engage when A/C is turned on	F3–201
27	A/C always on/ A/C compressor runs continuously		A/C compressor magnetic clutch does not disengage	F3–202
28	A/C does not cut off under wide open throttle conditions		A/C compressor magnetic clutch does not disengage under wide open throttle	F3–202
29	Exhaust sulphur smell		Rotten egg smell (sulphur) from exhaust	F3–203
30	Intermittent concerns		Symptom occurs randomly and is difficult to diagnose	F3–204

Description of Drivability Problems

STUMBLE : Mildly irregular performance during acceleration.
HESITATION : A dip or flat spot in performance just after the accelerator pedal is depressed.
SURGE : Continuous irregular performance during cruising.







Fuel Pressure Release and Servicing Fuel System

Warning

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

Fuel in the fuel system is under high pressure when the engine is not running.

Warning

- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the following "Fuel Line Safety Procedures".**

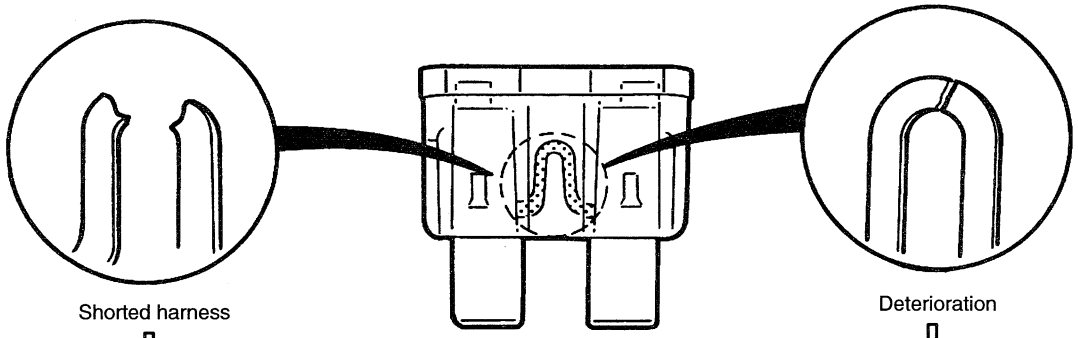
Fuel Line Safety Procedures

1. Release the fuel pressure before disconnecting a fuel line.
   (1) Start the engine.
   (2) Remove the fuel pump relay.
   (3) After the engine stalls, turn the ignition switch to OFF.
   (4) Install the fuel pump relay.
2. Avoid leakage.
   (1) When disconnecting a fuel line hose, wrap a rag around it to protect against fuel leakage.
   (2) Plug the hose after removal.
3. Install hose clamps to secure the fuel pressure gauge to the fuel filter and the main hose.

SYMPTOM TROUBLESHOOTING

1	MELTS MAIN OR OTHER FUSE	—

[TROUBLESHOOTING HINTS]
Check the condition of the fuse



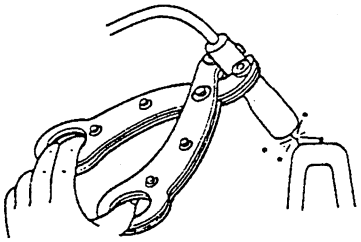
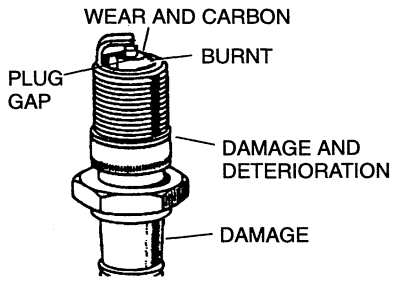
Damaged Fuse	Related Wiring Harness
MAIN (100A)	Main fuse — Generator
BTN (60A)	BTN fuse — ROOM fuse
ROOM (15A)	ROOM fuse — PCM terminal
EGI INJ (30A)	Main relay — Fuel injectors Main relay — PCM terminal Main relay — Ignition coil Main relay — PRC solenoid valve Main relay — EGR solenoid valve (vacuum and vent) Main relay — Idle air control valve Main relay — Purge solenoid valve Main relay — Mass air flow sensor
ENGINE (15A)	ENGINE fuse — Main relay ENGINE fuse — Fuel pump relay
METER (15A)	METER fuse — Transaxle range switch
WIPER (20A)	WIPER fuse — Heated oxygen sensor

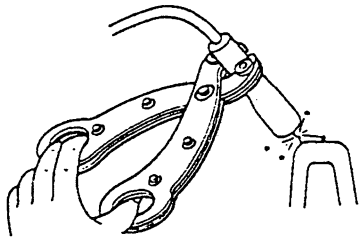
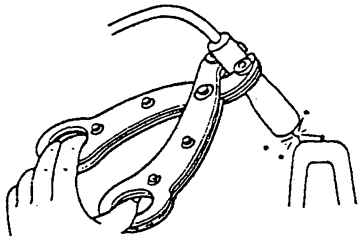
2	WILL NOT CRANK		
DESCRIPTION	• Starter does not work		
STEP	INSPECTION		ACTION
1	Is a clicking sound heard from the starter relay when the ignition switch is turned to START?	Yes	Go to next step
		No	Go to Step 3
2	Check the starting system ☞ **section G** Is the starting system OK?	Yes	Check for seized/hydrolocked engine, flywheel (Refer to section B1)
		No	Service as required (Refer to section G)
3	Do any other electrical accessories work?	Yes	Go to next Step
		No	Check the charging system (Refer to section G)
4	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
5	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

3	HARD START/LONG CRANK/ERRATIC START/ERRATIC CRANK		
DESCRIPTION	• Starter cranks engine at normal speed but engine requires excessive cranking time before start • Battery in normal condition		
STEP	INSPECTION		ACTION
1	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause (Refer to related chart)
2	Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Is fuel line pressure correct with ignition switch ON? ☞ **page F3–111** **Fuel line pressure:** **260—310 kPa {2.6—3.2 kgf/cm², 37—46 psi}**	Yes	Go to next Step
		No	Zero or low: • Check fuel pump circuit ☞ **page F3–117** • Check pressure regulator diaphragm High: • Check pressure regulator for high pressure cause ☞ **page F3–117** • Check for clogged fuel return line
3	Is fuel line pressure held after ignition switch is turned off? ☞ **page F3–111** **Fuel line pressure:** **More than 150 kPa {1.5 kgf/cm², 21 psi} for 5 min.**	Yes	Go to next Step
		No	Check pressure regulator diaphragm condition If condition is OK, check fuel injector ☞ **page F3–119** If condition is not OK, replace pressure regulator
4	Disconnect the vacuum hose from the pressure regulator and plug hose. Start the engine Does the fuel line pressure remain within ±20 kPa {0.21 kgf/cm², 3 psi} while driving vehicle?	Yes	Go to next Step
		No	Check for clogged fuel filter ☞ **page F3–113**
5	Connect the vacuum hose to the pressure regulator. Install a vacuum gauge to the intake manifold. Start the engine. Does fuel pressure gauge reading increase as the vacuum gauge reading decreases and/or does fuel pressure gauge reading decrease as the vacuum gauge reading increases?	Yes	Go to next Step
		No	Connect vacuum pump to pressure regulator. Start the engine. Check that fuel pressure reading changed as vacuum changes • If changes, check vacuum line • If no change, replace pressure regulator
6	Is idle speed correct? ☞ **page F3–11**	Yes	Go to next Step
		No	Adjust idle speed ☞ **page F3–11**
7	Is there a restriction in the exhaust system?	Yes	Check exhaust system ☞ **page F3–127**
		No	Go to next Step
8	Remove PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next Step
		No	Replace PCV valve
9	Check for contaminated mass air flow sensor. Is there any contamination?	Yes	Replace the mass air flow sensor
		No	Go to next Step
10	Disconnect vacuum hose from EGR valve and plug it. Does condition improve?	Yes	Check as follows: • EGR solenoid valve (vacuum) for sticking • Condition of EGR solenoid valve (vacuum) connector female terminal(s)
		No	Check if EGR valve moves smoothly • If yes, Go to next Step • If no, replace EGR valve

STEP	INSPECTION		ACTION
11	Check starting system ☞ **section G** Is starting system normal?	Yes	Verify test results If OK, return to diagnostic index to service any additional symptoms
		No	Repair or replace components as required

4	ENGINE STALLS		• AFTER START • AT IDLE
DESCRIPTION	• Engine stops unexpectedly at idle and/or after start		
STEP	INSPECTION		ACTION
1	Does the vehicle stall at idle in park/neutral with all accessories off?	Yes	Go to Step 3
		No	Go to next Step
2	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and/or Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to Step 4
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
3	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to Step 10
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
4	Attempt to start engine at part throttle Will engine run smooth at part throttle?	Yes	Check idle air control valve and wiring harness ☞ **page F3–108**
		No	Go to next Step
5	Disconnect vacuum hose from EGR valve and plug it Is drive symptom eliminated?	Yes	Check EGR vent on vacuum hose to EGR valve for obstruction or leak • If OK, replace EGR solenoid valve (vacuum) • If not OK, repair or replace vacuum line
		No	Go to next Step
6	Does EGR valve seat properly (fully closed)?	Yes	Go to next Step
		No	Check as follows: • EGR valve malfunction • EGR flange gasket leaking • EGR valve attaching nuts or bolts loose or missing • EGR valve contamination • EGR solenoid valve (vacuum) malfunction
7	Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Is fuel line pressure correct when the ignition switch is cycled ON and OFF? ☞ **page F3–111** **Fuel line pressure:** **260—310 kPa {2.6—3.2 kgf/cm², 37—46 psi}**	Yes	Go to next Step
		No	Zero or low: • Check fuel pump circuit ☞ **page F3–117** • Check pressure regulator diaphragm High: • Check pressure regulator for high pressure cause ☞ **page F3–117** • Check for clogged fuel return line
8	Visually look for fuel leakage at fuel injector O-ring, pressure regulator, and fuel line. Service as necessary. Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Does fuel pressure remain at specification for 60 seconds? ☞ **page F3–111**	Yes	Go to next Step
		No	Check pressure regulator diaphragm condition • If condition is OK, check fuel injector ☞ **page F3–119** • If condition is not OK, replace pressure regulator

STEP	INSPECTION		ACTION
9	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	• If symptom occurs during parking maneuvers, Go to next Step • If symptom occurs during A/C ON, go to Step 11
		No	Check as follows: ☞ **section G** • Distributor cap and rotor • High-tension lead(s) • Ignition coil
10	Disconnect the power steering pressure switch Does rpm increase?	Yes	Replace power steering pressure switch
		No	Check for short circuit in wiring harness from power steering pressure switch to PCM
11	Is there correct voltage at terminal 41 of PCM when the A/C is ON? **Specification: Below 1.0 V**	Yes	Go to next step ☞ **page F3–150**
		No	Check for open circuit in wiring harness from A/C pressure switch to PCM
12	Is there a restriction in the exhaust system?	Yes	Check exhaust system ☞ **page F3–127**
		No	Go to next Step
13	Is air leakage felt or heard at intake air system components while racing engine to higher speed?	Yes	Repair or replace
		No	Go to next Step
14	Are spark plugs OK? ☞ **section G** 	Yes	Go to next Step
		No	Clean or replace ☞ **section G**
15	Is engine compression correct? ☞ **section B1**	Yes	Go to next Step
		No	Check for cause ☞ **section B1**
16	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

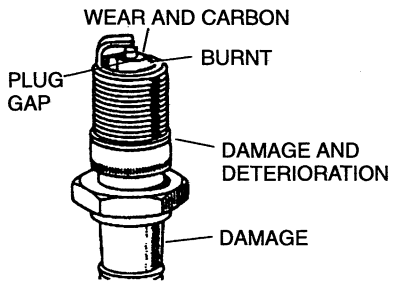
5	CRANKS NORMALLY BUT WILL NOT START		
DESCRIPTION	• Starter cranks engine at normal speed but engine will not run • Refer to "ENGINE STALLS" if this symptom appears after engine stall • Fuel in tank • Battery in normal condition		
STEP	**INSPECTION**		**ACTION**
1	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
2	Disconnect the throttle position sensor connector Is there correct voltage at terminal of the throttle position sensor connector terminal a Ⓐ with the ignition switch ON? **Specification: 4.5—5.5 V**	Yes	Go to next Step
		No	Check voltage at PCM terminals 55, 71, 90, and 97
3	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Go to Step 5
		No	Go to next Step
4	Is a strong blue spark visible at disconnected center high-tension lead from coil while cranking engine? 	Yes	Check as follows: • Ignition control module ☞ **section G** • Distributor cap • Rotor • High-tension leads
		No	Check the spark output signal and crankshaft position sensor signal at PCM ☞ **page F3–150** • If OK, go to Step 11 • If not OK, check wiring harness
5	Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Is fuel line pressure correct when the ignition switch is cycled ON and OFF 5 times? **Fuel line pressure:** **260—310 kPa {2.6—3.2 kgf/cm^2, 37—46 psi}**	Yes	Go to next Step
		No	Check fuel pump ☞ **page F3–114**
6	Visually look for fuel leakage at fuel injector O–ring, pressure regulator, and fuel line. Service as necessary. Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Does fuel pressure remain at specification for 60 seconds?	Yes	Go to next Step
		No	Check pressure regulator diaphragm condition • If condition is OK, check fuel injector ☞ **page F3–119** • If condition is not OK, replace pressure regulator

STEP	INSPECTION		ACTION
7	Crank engine for 5 sec. Does pressure drop more than 34 kPa {0.35 kgf/cm^2, 5 psi} by the end of five second crank cycle?	Yes	Go to next Step

		No	Check resistance of fuel injector(s) at PCM connector
			☞ **page F3–121**
			• If resistance is OK, check as follows:
			  • Fuel injector drive signal
			  • Injection flow rate
			  • PCM
			• If resistance is not OK, check as follows:
			  • Open circuit in fuel injector circuit

8	Does engine start when throttle valve held quarter open?	Yes	Check idle air control valve and wiring harness ☞ **page F3–108**
		No	Go to next Step
9	Disconnect vacuum hose from EGR valve and plug it Is drive symptom eliminated?	Yes	Check EGR vent or vacuum hose to EGR valve for obstruction or leak • If OK, replace EGR solenoid valve (vacuum) If not OK, repair or replace vacuum line
		No	Go to next Step
10	Does EGR valve seat properly (fully closed)?	Yes	Go to next Step
		No	Check as follows: • EGR valve malfunction • EGR flange gasket leaking • EGR valve attaching nuts or bolts loose or missing • EGR valve contamination • EGR solenoid valve (vacuum) malfunction
11	Is there a restriction in exhaust system?	Yes	Check exhaust system ☞ **page F3–127**
		No	Go to next Step
12	Is engine compression correct? ☞ **section B1**	Yes	Go to next Step
		No	Check for causes ☞ **section B1**
13	Verify test result. If OK, return to diagnostic index to service any additional symptoms		

6	SLOW RETURN TO IDLE		
DESCRIPTION	• Engine takes more time than normal to return to idle speed		
STEP	INSPECTION		ACTION
1	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ page F3–14	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
2	Is the throttle body free of contamination? ☞ page F3–103	Yes	Go to next Step
		No	Clean or replace the throttle body
3	Is air leakage felt or heard at intake air system components while racing engine to higher speed?	Yes	Repair or replace
		No	Go to next Step
4	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

7	ENGINE RUNS ROUGH/ROLLING IDLE		• AT IDLE
DESCRIPTION	• Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake • Idle speed too slow and excessive engine shake		
STEP	INSPECTION		ACTION
1	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
2	Start the engine and disconnect the idle air control valve connector Does the rpm drop or does the engine stall?	Yes	Go to next Step
		No	Check the idle air control valve and wiring harness ☞ **page F3–108**
3	Disconnect the vacuum hose from the EGR valve and plug it Is the drive symptom eliminated?	Yes	Check EGR vent or vacuum hose to EGR valve for obstruction or leak • If OK, replace EGR solenoid valve (vacuum) • If not OK, repair or replace vacuum line
		No	Go to next Step
4	Does EGR valve seat properly?	Yes	Go to next Step
		No	Check as follows: • EGR valve malfunction • EGR flange gasket leaking • EGR valve attaching nuts or bolts loose or missing • EGR valve contamination • EGR solenoid valve (vacuum) malfunction
5	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? ☞ **page F3–117** **Fuel line pressure:** **210—260 kPa {2.1—2.6 kgf/cm², 30—37 psi}**	Yes	Go to next Step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ **page F3–115** High: • Check pressure regulator for high pressure cause ☞ **page F3–117** • Check for clogged fuel return line
6	Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned ON? ☞ **page F3–118**	Yes	Go to next Step
		No	Check pressure regulator diaphragm
7	Run engine at 2000 rpm for two minutes Are there any diagnostic trouble codes? ☞ **page F3–14**	Yes	Check heated oxygen sensor harness ☞ **page F3–163**
		No	Check heated oxygen sensor heater harness Go to next Step ☞ **page F3–164**
8	Are spark plugs OK? ☞ **section G**  	Yes	Go to next Step
		No	Clean or replace ☞ **section G**

STEP	INSPECTION		ACTION
9	Remove PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next Step
		No	Replace PCV valve
10	Start the engine and bring to normal operating temperature. Disconnect hose from remote air cleaner. Place a stiff piece of paper over the hose end Does vacuum hold the paper?	Yes	Go to next Step
		No	Check fuel evaporative system as follows: Disconnect evaporative hose and place a stiff piece of paper over hose Does vacuum hold paper? ☞ **page F3–3** • If yes, malfunction of fuel evaporative system • If no, check for vacuum leak in PCV system, oil cap, PCV valve, rocker cover for bolt torque/gasket leak
11	Remove a plug line to charcoal canister. Remove gas cap and install a vacuum pump/gauge gas cap. Apply air pressure **Air pressure:** **20—27 kPa {0.21—0.28 kgf/cm^2, 3—4 psi}** Is either a vacuum or fuel leak detected?	Yes	Repair or replace
		No	Go to next Step
12	Check for blockage/restrictions or opens (hoses) between engine vacuum port and charcoal canister. Check for blockage in fuel tank vent system Is a fault detected?	Yes	Replace vacuum hose
		No	Go to next Step
13	Check purge solenoid valve Is the solenoid valve operating properly? ☞ **page F3–137**	Yes	Go to next Step
		No	Repair or replace
14	Is there a restriction in the exhaust system?	Yes	Check exhaust system ☞ **page F3–127**
		No	Go to next Step
15	Is there air leakage at intake air system components while racing engine to higher speed?	Yes	Repair or replace
		No	Go to next Step
16	Is engine compression correct? ☞ **section B1**	Yes	Go to next Step
		No	Check for cause ☞ **section B1**
17	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

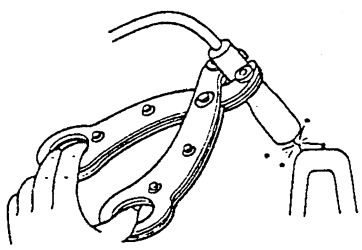
8	FAST IDLE/RUNS ON		
DESCRIPTION	• Engine speed continues at fast idle after warm-up • Engine runs after ignition switch is turned off		
STEP	INSPECTION		ACTION
1	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
2	Is there air leakage felt or heard at intake air system components while racing engine to higher speed?	Yes	Repair or replace parts as necessary
		No	Go to next Step
3	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

9	LOW IDLE/STALLS DURING DECELERATION		
DESCRIPTION	• Engine stops unexpectedly at beginning of deceleration or recovery from deceleration		
STEP	INSPECTION		ACTION
1	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
2	Does idle speed drop in the following conditions? **Condition** • **Air conditioner ON**	Yes	Check as follows: • Circuit from idle air control valve to PCM for open and short ☞ **page F3–150** • Idle air control valve for sticking ☞ **page F3–107** If OK go to next step
		No	Adjust idle speed ☞ **page F3–11**
3	Check the following: • EGR valve • EGR solenoid valve (vacuum) Are any of the components faulty?	Yes	Repair or replace
		No	Go to next Step
4	Are the following terminals and connections good? • Distributor connector • Ignition coil connector • Fuel pump connector • Main relay • PCM connector	Yes	Verify test results. If OK, return to diagnostic index to service any additional symptoms
		No	Repair connector terminal

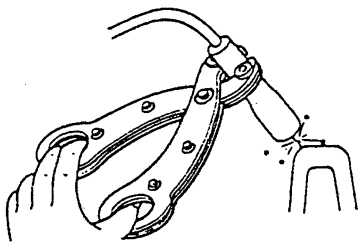
10	**ENGINE STALLS/QUITS** **ENGINE RUNS ROUGH** **MISSES** **BUCK/JERK** **HESITATION/STUMBLE**	• **ACCELERATION/CRUISE** • **ACCELERATION/CRUISE** • **ACCELERATION/CRUISE** • **ACCELERATION/CRUISE/DECELERATION** • **ACCELERATION**

DESCRIPTION

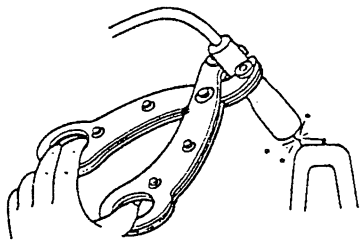
- Engine stops unexpectedly at beginning of acceleration or during acceleration
- Engine stops unexpectedly while cruising
- Engine speed fluctuates during acceleration or cruising
- Engine misses during acceleration or cruising
- Vehicle bucks/jerks during acceleration, cruising, or deceleration
- Momentary pause at beginning of acceleration or during acceleration

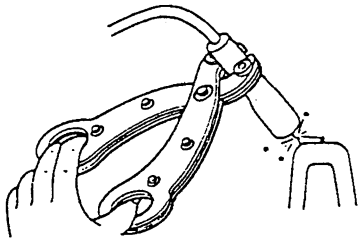
STEP	INSPECTION		ACTION
1	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
2	Disconnect vacuum line at EGR valve and plug it Is drive symptom eliminated?	Yes	Check as follows: • EGR solenoid valve (vacuum) for sticking
		No	Go to next Step
3	Does EGR valve seat properly (fully closed)?	Yes	Go to next Step
		No	Check as follows: • EGR valve operation • EGR valve contamination • EGR solenoid valve (vacuum) • Pressure/vacuum signal hose leak
4	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? ☞ **page F3–117** **Fuel line pressure:** **210—260 kPa {2.1—2.6 kgf/cm², 30—37 psi}**	Yes	Go to next Step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ **page F3–115** High: • Check pressure regulator for high pressure cause ☞ **page F3–117** • Check for clogged fuel return line
5	Does fuel pressure remain at specification for 60 seconds?	Yes	Go to next Step
		No	Check pressure regulator diaphragm • If condition is OK, check fuel injector ☞ **page F3–119** • If condition is not OK, replace pressure regulator
6	Run engine at 2000 rpm for two minutes Are diagnostic trouble codes present?	Yes	Check heated oxygen sensor wiring harness
		No	Check heated oxygen sensor heater ☞ **page F3–164** If OK, go to next Step
7	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plugs ☞ **section G** • If OK, go to next Step • If not OK, clean or replace spark plug
		No	Check as follows: ☞ **section G** • Distributor • High-tension leads • Ignition coil • Condition of distributor connector female terminals

STEP	INSPECTION		ACTION
8	Check that throttle lever is resting on throttle valve stop screw and/or throttle valve orifice plug Are any faults present?	Yes	Adjust as necessary
		No	Go to next Step
9	Is there air leakage felt or heard at intake air system components while racing engine to higher speed?	Yes	Repair or replace parts as necessary
		No	Go to next Step
10	Remove PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next Step
		No	Replace PCV valve
11	Start the engine and bring to normal operating temperature. Disconnect hose from remote air cleaner. Place a stiff piece of paper over the hose end Does vacuum hold the paper?	Yes	Go to next Step
		No	Check fuel evaporative system as follows: Disconnect evaporative hose and place a stiff piece of paper over hose Does vacuum hold paper? • If yes, malfunction of fuel evaporative system ☞ **page F3–134** • If no, check for vacuum leak in PCV system, oil cap, PCV valve, rocker cover for bolt torque/gasket leak
12	Is there a restriction in the exhaust system?	Yes	Check exhaust system ☞ **page F3–127**
		No	Go to next Step
13	Remove a plug line to canister. Remove gas cap and install vacuum pump/gauge gas cap. Apply air pressure **Air pressure:** **20—27 kPa {0.21—0.28 kgf/cm^2, 3—4 psi}** Is either a vacuum or fuel leak detected?	Yes	Repair or replace
		No	Go to next Step
14	Check for blockage/restrictions or opens (hoses) between engine vacuum port and charcoal canister. Check for blockage in fuel tank vent system Is a fault detected?	Yes	Replace vacuum hose
		No	Go to next Step
15	Check purge solenoid valve Is the solenoid valve operating properly? ☞ **page F3–137**	Yes	Go to next Step
		No	Replace the purge solenoid valve
16	Measure resistance of the heated oxygen sensor heater Is the resistance within specification? **Resistance: Approx. 6 Ω (at 20°C {68°F})**	Yes	Go to next Step
		No	Replace heated oxygen sensor
17	Measure voltage of heated oxygen sensor heater Is voltage more than 10.5 V?	Yes	Go to section B1 If engine OK, go to next Step
		No	Check heated oxygen sensor heater circuit ☞ **page F3–164**
18	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

11	SURGES		• ACCELERATION/CRUISE
DESCRIPTION	• Momentary minor irregularity in engine output		
STEP	INSPECTION		ACTION
1	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
2	Disconnect the vacuum hose from the EGR valve and plug it Is the drive symptom eliminated?	Yes	Check EGR vent on vacuum hose to EGR valve for obstruction or leak • If OK, replace EGR solenoid valve (vacuum) • If not OK, repair or replace vacuum line
		No	Go to next Step
3	Does EGR valve seat properly?	Yes	Go to next Step
		No	Check as follows: • EGR valve malfunction • EGR flange gasket leaking • EGR valve attaching nuts or bolts loose or missing • EGR valve contamination • EGR solenoid valve (vacuum) malfunction
4	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? ☞ **page F3–117** **Fuel line pressure: 210—260 kPa {2.1—2.6 kgf/cm^2, 30—37 psi}**	Yes	Go to next Step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ **page F3–115** High: • Check pressure regulator for high pressure cause ☞ **page F3–117** • Check for clogged fuel return line
5	Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned ON? ☞ **page F3–118**	Yes	Go to next Step
		No	Check pressure regulator for high pressure cause ☞ **page F3–117**
6	Run engine at 2000 rpm for two minutes Are there any diagnostic trouble codes? ☞ **page F3–14**	Yes	Check heated oxygen sensor wiring harness
		No	Check heated oxygen sensor heater harness Go to next step ☞ **page F3–164**
7	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plug(s) for damage • If OK, go to next Step • If not OK, replace spark plug(s)
		No	Check as follows: • Distributor cap and rotor for damage ☞ **section G**
8	Remove PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next Step
		No	Replace PCV valve
9	Check charcoal canister for fuel saturation Is excess amount of liquid fuel present in canister?	Yes	Replace charcoal canister
		No	Check fuel tank vent system Go to next Step

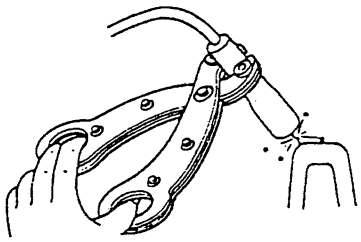
STEP	INSPECTION		ACTION
10	Is there a restriction in the exhaust system?	Yes	Check exhaust system ☞ page F3–127
		No	Go to next Step
11	Measure resistance of the heated oxygen sensor heater Is the resistance within specification? **Resistance: Approx. 6 Ω (at 20°C {68°F})**	Yes	Go to next Step
		No	Replace heated oxygen sensor
12	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

12	BACKFIRES		• IDLE/ACCELERATION/DECELERATION
DESCRIPTION	• Sound produced from exhaust system		
STEP	INSPECTION		ACTION
1	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
2	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plugs ☞ **section G** • If OK, go to next Step • If not OK, clean or replace spark plug
		No	Check as follows: ☞ **section G** • Distributor • High-tension leads • Ignition coil • Condition of distributor connector female terminals
3	Is engine compression correct? ☞ **section B1**	Yes	Go to next Step
		No	Check for cause ☞ **section B1**
4	Is there arestriction in the exhaust system?	Yes	Check exhaust system ☞ **page F3–127**
		No	Go to next Step
5	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

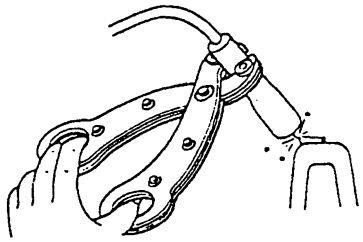
13	LACK/LOSS OF POWER		• ACCELERATION/CRUISE
DESCRIPTION	• Performance poor under load (i.e., power down when climbing hills)		
STEP	INSPECTION		ACTION
1	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ page F3–14	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
2	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plugs ☞ section G • If OK, go to next Step • If not OK, clean or replace spark plug
		No	Check as follows: ☞ section G • Distributor • High-tension leads • Ignition coil • Condition of distributor connector female terminals
3	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? ☞ page F3–117 **Fuel line pressure:** **210—260 kPa {2.1—2.6 kgf/cm², 30—37 psi}**	Yes	Go to next Step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ page F3–115 High: • Check pressure regulator for high pressure cause ☞ page F3–117 • Check for clogged fuel return line
4	Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned ON? ☞ page F3–118	Yes	Go to next Step
		No	Check pressure regulator for high pressure cause ☞ page F3–117
5	Is there a restriction in the exhaust system?	Yes	Check exhaust system ☞ page F3–127
		No	Go to next Step
6	Is there air leakage felt or heard at intake air system components while racing engine to higher speed?	Yes	Repair or replace
		No	Go to next Step
7	Is engine compression correct? ☞ section B1	Yes	Go to next Step
		No	Check for cause ☞ section B1
8	Is the brake system functioning properly? ☞ section P	Yes	Go to next Step
		No	Check for cause ☞ section P
9	Disconnect the vacuum hose from the EGR valve and plug it Is the drive symptom eliminated?	Yes	Check EGR vent on vacuum hose to EGR valve for obstruction or leak • If OK, replace EGR solenoid valve (vacuum) • If not OK, repair or replace vacuum lines
		No	Go to next Step

STEP	INSPECTION		ACTION
10	Does EGR valve seat properly?	Yes	Go to next Step
		No	Check as follows: • EGR valve malfunction • EGR flange gasket leaking • EGR valve attaching nuts or bolts loose or missing • EGR valve contamination • EGR solenoid valve (vacuum) malfunction
11	Is terminal 41, 69 voltage at PCM correct? ☞ page F3–150	Yes	Go to next Step
		No	Refer to Mazda 1996 626/MX-6 BETM
12	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

14	KNOCKING/PINGING		• ACCELERATION/CRUISE
DESCRIPTION	• Sound produced when air/fuel mixture is ignited by something other than spark plug (i.e., hot spot in combustion chamber)		
STEP	INSPECTION		ACTION
1	Does vehicle overheat when knocking/pinging occurs?	Yes	Inspect cooling system for cause of overheating ☞ **section E1**
		No	Go to next Step
2	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
3	Is engine compression correct? ☞ **section B1**	Yes	Go to next Step
		No	Check for cause ☞ **section B1**
4	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? ☞ **page F3–117** **Fuel line pressure: 210—260 kPa {2.1—2.6 kgf/cm^2, 30—37 psi}**	Yes	Go to next Step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ **page F3–115** High: • Check pressure regulator for high pressure cause ☞ **page F3–117** • Check for clogged fuel return line
5	Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned ON? ☞ **page F3–118**	Yes	Go to next Step
		No	Check pressure regulator for high pressure cause ☞ **page F3–117**
6	Disconnect the vacuum hose from the EGR valve and plug it Is the drive symptom eliminated?	Yes	Check EGR vent on vacuum hose to EGR valve for obstruction or leak • If OK, replace EGR solenoid valve (vacuum) • If not OK, repair or replace vacuum lines
		No	Go to next Step
7	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

15	POOR FUEL ECONOMY		
DESCRIPTION	• Fuel economy unsatisfactory		
STEP	INSPECTION		ACTION
1	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
2	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? ☞ **page F3–117** **Fuel line pressure:** **210—260 kPa {2.1—2.6 kgf/cm², 30—37 psi}**	Yes	Go to next Step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ **page F3–115** High: • Check pressure regulator for high pressure cause ☞ **page F3–117** • Check for clogged fuel return line
3	Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned ON? ☞ **page F3–118**	Yes	Go to next Step
		No	Check pressure regulator for high pressure cause ☞ **page F3–117**
4	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plugs ☞ **section G** • If OK, go to next Step • If not OK, clean or replace spark plug
		No	Check as follows: ☞ **section G** • Distributor • High-tension leads • Ignition coil • Condition of distributor connector female terminals
5	Is there a restriction in the exhaust system?	Yes	Check exhaust system ☞ **page F3–127**
		No	Go to next Step
6	Does the engine cooling system function properly? ☞ **page F3–144** ☞ **section E1**	Yes	Go to next Step
		No	Check for cause ☞ **section E1**
7	Does EGR valve seat properly (fully closed)?	Yes	Go to next Step
		No	Check as follows: • EGR valve operation • EGR valve contamination • EGR solenoid valve (vacuum) • Pressure/vacuum signal hose leak
8	Remove the PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next Step
		No	Replace PCV valve
9	Is the brake system functioning properly? ☞ **section P**	Yes	Go to next Step
		No	Check for cause ☞ **section P**

STEP	INSPECTION		ACTION
10	Is engine compression correct? ☞ **section B1**	Yes	Go to next Step
		No	Check for cause ☞ **section B1**
11	Check for contaminated mass air flow sensor Is there any contamination?	Yes	Replace the mass air flow sensor
		No	Go to next Step
12	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

16	POOR FUEL ECONOMY		
DESCRIPTION	• Fuel economy unsatisfactory		
STEP	INSPECTION		ACTION
1	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
2	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plugs ☞ **section G** • If OK, go to next Step • If not OK, clean or replace spark plug
		No	Check as follows: ☞ **section G** • Distributor • High-tension leads • Ignition coil • Condition of distributor connector female terminals
3	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? ☞ **page F3–117** **Fuel line pressure:** **210—260 kPa {2.1—2.6 kgf/cm², 30—37 psi}**	Yes	Go to next Step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ **page F3–115** High: • Check pressure regulator for high pressure cause ☞ **page F3–117** • Check for clogged fuel return line
4	Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned ON? ☞ **page F3–118**	Yes	Go to next Step
		No	Check pressure regulator for high pressure cause ☞ **page F3–117**
5	Remove the PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next Step
		No	Replace PCV valve
6	Check charcoal canister for fuel saturation Is excess amount of liquid fuel present in canister?	Yes	Replace charcoal canister
		No	Check fuel tank vent system Go to next Step
7	Is there a restriction in the exhaust system?	Yes	Check exhaust system ☞ **page F3–127**
		No	Go to next Step
8	Does EGR valve seat properly?	Yes	Go to next Step
		No	Check as follows: • EGR valve malfunction • EGR flange gasket leaking • EGR valve attaching nuts or bolts loose or missing • EGR valve contamination • EGR solenoid valve (vacuum) malfunction
9	Is the engine running at the proper operating temperature?	Yes	Go to next Step
		No	Check cooling system or cause ☞ **section E1**

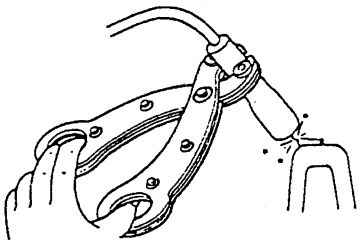
STEP	INSPECTION		ACTION
10	Is engine compression correct? ☞ **section B1**	Yes	Go to next Step
		No	Check for cause ☞ **section B1**
11	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

17	MIL NEVER ON		
DESCRIPTION	• Malfunction indicator light never on		
STEP	INSPECTION		ACTION
1	Is number 2 fuse burnt?	Yes	Repair wiring harness and replace fuse
		No	Go to next Step
2	Is there correct voltage at the MIL fuse? **Specification: More than 10.5 V**	Yes	Go to next Step
		No	Repair open in wiring harness between fuse block and ignition switch
3	Remove the malfunction indicator lamp bulb Is the voltage correct on the positive side of the malfunction indicator light bulb socket? **Specification: More than 10.5 V**	Yes	Go to next Step
		No	Repair open in wiring harness between fuse block and malfunction indicator light bulb socket
4	Apply 12 volts and a ground to the malfunction indicator lamp bulb Does the malfunction indicator light bulb illuminate?	Yes	Go to next Step
		No	Replace malfunction indicator light bulb
5	Disconnect the PCM. Install **SST** (104 Pin Breakout Box) to the PCM connector Does continuity exist between malfunction indicator lamp socket and test pin 2?	Yes	Replace PCM ☞ **page F3–150**
		No	Repair open circuit in wiring harness between PCM and malfunction indicator light socket

19	HIGH OIL CONSUMPTION/LEAKS		
DESCRIPTION	• Oil consumption excessive		
STEP	INSPECTION		ACTION
1	Remove PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next step
		No	Replace PCV valve
2	Is blue smoke coming from exhaust?	Yes	Check for cause ☞ **Mazda 1996 626/MX-6 BETM**
		No	Go to next step
3	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

20	COOLING SYSTEM CONCERNS		• OVERHEATING
DESCRIPTION	• Engine runs at higher than normal temperature/overheats		
STEP	INSPECTION		ACTION
1	Is drive belt OK? ☞ **section G**	Yes	Go to next step
		No	Replace drive belt ☞ **section G**
2	Is cooling system operating properly? ☞ **page F3–144** ☞ **section E1**	Yes	Go to next step
		No	Check for cause ☞ **section E1**
3	Inspect engine block for leaks or blockage Is fault present? ☞ **section E1**	Yes	Repair or replace
		No	Go to next step
4	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

21	COOLING SYSTEM CONCERNS		• RUNS COLD
DESCRIPTION	• Engine does not reach normal operating temperature		
STEP	INSPECTION		ACTION
1	Is coolant system operating properly? ☞ **page F3–144** ☞ **section E1**	Yes	Go to next step
		No	Check for cause ☞ **section E1**
2	Is complaint "Lack of passenger compartment heat" and the engine is operating at normal temperature?	Yes	Refer to Mazda 1996 626/MX-6 BETM
		No	Go to next step
3	Is temperature gauge working properly?	Yes	Go to next step
		No	Refer to Mazda 1996 626/MX-6 BETM
4	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

22	EXHAUST SMOKE		
DESCRIPTION	• Blue, black, or white smoke from exhaust system		
STEP	INSPECTION		ACTION
1	What is the color of smoke coming from exhaust system?	Blue	Go to next step
		White	Go to step 4
		Black	Go to step 5
2	Remove PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next step
		No	Replace PCV valve
3	Is engine compression correct? ☞ **section B1**	Yes	Verify test results. If OK, return to diagnostic index to service any additional symptoms
		No	Check for cause ☞ **section B1**
4	Does cooling system hold pressure? ☞ **section E1**	Yes	Verify test results. If OK, return to diagnostic index to service any additional symptoms
		No	Check for cause ☞ **section E1**
5	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
6	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? ☞ **page F3–117** **Fuel line pressure:** **210—260 kPa {2.1—2.6 kgf/cm², 30—37 psi}**	Yes	Go to next Step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ **page F3–115** High: • Check pressure regulator for high pressure cause ☞ **page F3–117** • Check for clogged fuel return line
7	Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned ON? ☞ **page F3–118**	Yes	Go to next Step
		No	Check pressure regulator diaphragm • If OK, check fuel injector ☞ **page F3–119** • If not OK, replace pressure regulator
8	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Check spark plugs ☞ **section G** • If OK, go to next Step • If not OK, clean or replace spark plug
		No	Check as follows: • Distributor • High-tension leads • Ignition coil • Condition of distributor connector female terminals
9	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

23	FUEL ODOR (IN ENGINE COMPARTMENT)		
DESCRIPTION	• Gasoline fuel smell or visible leaks		
STEP	INSPECTION		ACTION
1	Visually look for fuel leakage at fuel injector O-ring, pressure regulator, and fuel line. Service as necessary. Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Does fuel line pressure remain at specification for 60 seconds? ☞ **page F3–128** **Fuel line pressure:** **260—310 kPa {2.6—3.2 kgf/cm², 37—46 psi}**	Yes	Go to next step
		No	Check pressure regulator diaphragm condition • If condition is OK, check fuel injector ☞ **page F3–119** • If condition is not OK, replace pressure regulator
2	Start the engine and bring to normal operating temperature. Disconnect hose from remote air cleaner. Place a stiff piece of paper over the hose end. Does vacuum hold the paper?	Yes	Go to next step
		No	Check fuel evaporative system as follows: Disconnect evaporative hose and place a stiff piece of paper over hose Does vacuum hold the paper? • If yes, malfunction of fuel evaporative system ☞ **page F3–134** • If no, check for vacuum leak in PCV system, oil cap, PCV valve, rocker cover for bolt torque/gasket leak
3	Remove a plug line to charcoal canister. Remove gas cap and install a vacuum pump/gauge gas cap. Apply air pressure **Air pressure:** **20—27 kPa {0.21—0.28 kgf/cm², 3—4 psi}** Is either vacuum or fuel leak detected?	Yes	Repair or replace
		No	Go to next step
4	Check for blockage/restrictions or open (hoses) between engine vacuum port and charcoal canister. Check for blockage in fuel tank vent system Is a fault detected?	Yes	Replace vacuum hose
		No	Go to next step
5	Check purge solenoid valve Is the solenoid operating properly? ☞ **page F3–137**	Yes	Go to next step
		No	Replace the purge solenoid valve
6	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
7	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

24	ENGINE NOISE		
DESCRIPTION	• Engine noise from under hood		
STEP	INSPECTION		ACTION
1	Is a squeal, click or chirp sound present?	Yes	Check as follows: • Engine oil level • Drive belts • Tappets and push rods
		No	Go to next step
2	Is a rumble or grind sound present?	Yes	Check drive belt
		No	Go to next step
3	Is a rattle sound present?	Yes	Check location of rattle for loose parts
		No	Go to next step
4	Is a hiss sound present?	Yes	Check as follows: • Engine cooling system for leaks • Vacuum leaks • Spark plug loose • Intake air system leaks • Fuel evaporative system leaks
		No	Go to next step
5	Is a snap sound present?	Yes	Check secondary ignition system for shorts
		No	Go to next step
6	Is a rap or roar sound present?	Yes	Check exhaust system for loose parts
		No	Go to next step
7	Is a knock sound present?	Yes	Go to the "KNOCKING/PINGING" diagnostic chart
		No	Go to next step
8	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

25	VIBRATION CONCERNS (ENGINE)		
DESCRIPTION	• Vibration from under hood or driveline		
STEP	INSPECTION		ACTION
1	Check the following components for loose attaching bolts or worn parts: • Cooling fan • Drive belt and pulleys • Engine mounts Is a fault present?	Yes	Repair or replace
		No	Go to next step
2	Check the following system for malfunctioning components: • Wheels • Transaxle • Driveline • Suspension Is a fault present?	Yes	Repair or replace
		No	Go to next step
3	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

26	A/C DOES NOT WORK		
DESCRIPTION	• A/C compressor magnetic clutch does not engage when A/C is turned on		
STEP	INSPECTION		ACTION
1	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
2	Disconnect the A/C compressor connector. Start the engine and turn on the A/C switch After 10 seconds, is there correct voltage at terminal (PU) of the A/C compressor connector? **Specification: More than 10.5 V**	Yes	Refer to Mazda 1996 626/MX-6 BETM
		No	Go to next step
3	Check the A/C relay Is the A/C relay OK?	Yes	Repair or replace relation harness. Go to next step
		No	Replace A/C relay
4	Verify test results. If OK, return to diagnostic index to service any additional symptoms		

27	A/C ALWAYS ON/A/C COMPRESSOR RUNS CONTINUOUSLY		
DESCRIPTION	• A/C compressor magnetic clutch does not disengage		
STEP	INSPECTION		ACTION
1	Disconnect the A/C compressor connector Start the engine and turn OFF the Air conditioning switch Is there correct voltage at terminal (PU) of the A/C compressor connector? **Specification: Less than 2.0 V**	Yes	Refer to Mazda 1996 626/MX-6 BETM
		No	Go to next step
2	Does the A/C compressor stop when the Air conditioning switch	Yes	Refer to Mazda 1996 626/MX-6 BETM
		No	Go to next step
3	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed**
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble code displayed** Check for cause

28	A/C DOES NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS		
DESCRIPTION	• A/C compressor magnetic clutch does not disengage under wide open throttle		
STEP	INSPECTION		ACTION
1	Remove the wide open throttle A/C relay Is there correct voltage at battery power terminal of the A/C relay connector with the ignition switch ON? **Specification: Less than 10.5 V**	Yes	Go to next Step
		No	Repair A/C power circuit
2	Is the A/C relay OK? ☞ **Mazda 1996 626/MX-6 BETM**	Yes	Go to next Step
		No	Repair A/C relay
3	Is there correct voltage at terminal 69 of the PCM? ☞ **page F3–150**	Yes	Check wiring harness between A/C relay and PCM for open or short circuit
		No	Replace PCM

29	EXHAUST SULPHUR SMELL
DESCRIPTION	• Rotten egg smell (sulphur) from exhaust NOTE: • Some slight sulphur smell may be normal. Catalysts with less than 8—16 thousand kilometers (5—10 thousand miles) are more likely to have a sulphur smell concern due to the highly active state of new catalysts. Replacing the catalyst if no catalyst if no problem is found may actually make the symptom worse.

STEP	INSPECTION		ACTION
1	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? ☞ **page F3–117** **Fuel line pressure:** **210—260 kPa {2.1—2.6 kgf/cm^2, 30—37 psi}**	Yes	Go to next Step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ **page F3–115** High: • Check pressure regulator for high pressure cause ☞ **page F3–117** • Check for clogged fuel return line
2	Connect PCM terminal No.80 and a ground by using a jumper wire and the **SST** (104 Pin Breakout Box) Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned on? ☞ **page F3–118**	Yes	Go to next Step
		No	Check pressure regulator diaphragm ☞ **page F3–128**
3	Is the pass diagnostic trouble code displayed during Key On Engine Off inspection and Key On Engine Running inspection? ☞ **page F3–14**	Yes	**Pass diagnostic trouble code displayed** Go to next Step
		No	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause
4	Check charcoal canister for fuel saturation. Is excess amount of liquid fuel present in canister?	Yes	Replace charcoal canister
		No	Check fuel tank vent system If OK, try different brand of fuel to resolve concern If not OK, service fuel tank vent system

30	INTERMITTENT CONCERNS		
DESCRIPTION	• Symptom occurs randomly and is difficult to diagnose		
STEP	INSPECTION		ACTION
1	Talk to customer. Review the vehicle servic history Does the vehicle have a number of previous repairs and components replaced for a certain symptom?	Yes	Go to next step
		No	Go to diagnostic chart for symptom
2	Is an engine analyzer available?	Yes	Follow the instructions supplied with the engine analyzer to diagnose the concern
		No	Go to next step
3	Will the engine start?	Yes	Go to next step
		No	Go to "CRANKS NORMALLY BUT WILL NOT START" diagnostic chart
4	Start the engine and run it at idle. Raise the hood, shake wiring harness and pull wires at connectors for ignition components Does the engine quit?	Yes	Service wiring harness or connector
		No	Go to next step
5	Run the engine at idle. Close the hood Turn the A/C on, blower on at medium speed, and allow engine to run for 15 minutes Does the engine quit?	Yes	Go to step 9
		No	Go to next step
6	Stop the engine. Let the vehicle hot soak for 10 minutes with the hood closed Will the engine restart?	Yes	Go to next step
		No	Go to "CRANKS NORMALLY BUT WILL NOT START" diagnostic chart
7	Start the engine and run it at idle. Raise the hood, shake wiring harness and pull wires at connectors for ignition components Does the engine quit?	Yes	Service wiring harness or connector
		No	Go to next step
8	Road test the vehicle Does the engine quit?	Yes	Go to next step
		No	Symptom not duplicated. Return to diagnostic index to service any additional concerns
9	Raise the hood. Shake wiring harness, pull wires at connectors, separate and reconnect connectors for ignition components Does the engine start?	Yes	Service wiring harness or connector
		No	Go to diagnostic chart No.2, No.3

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

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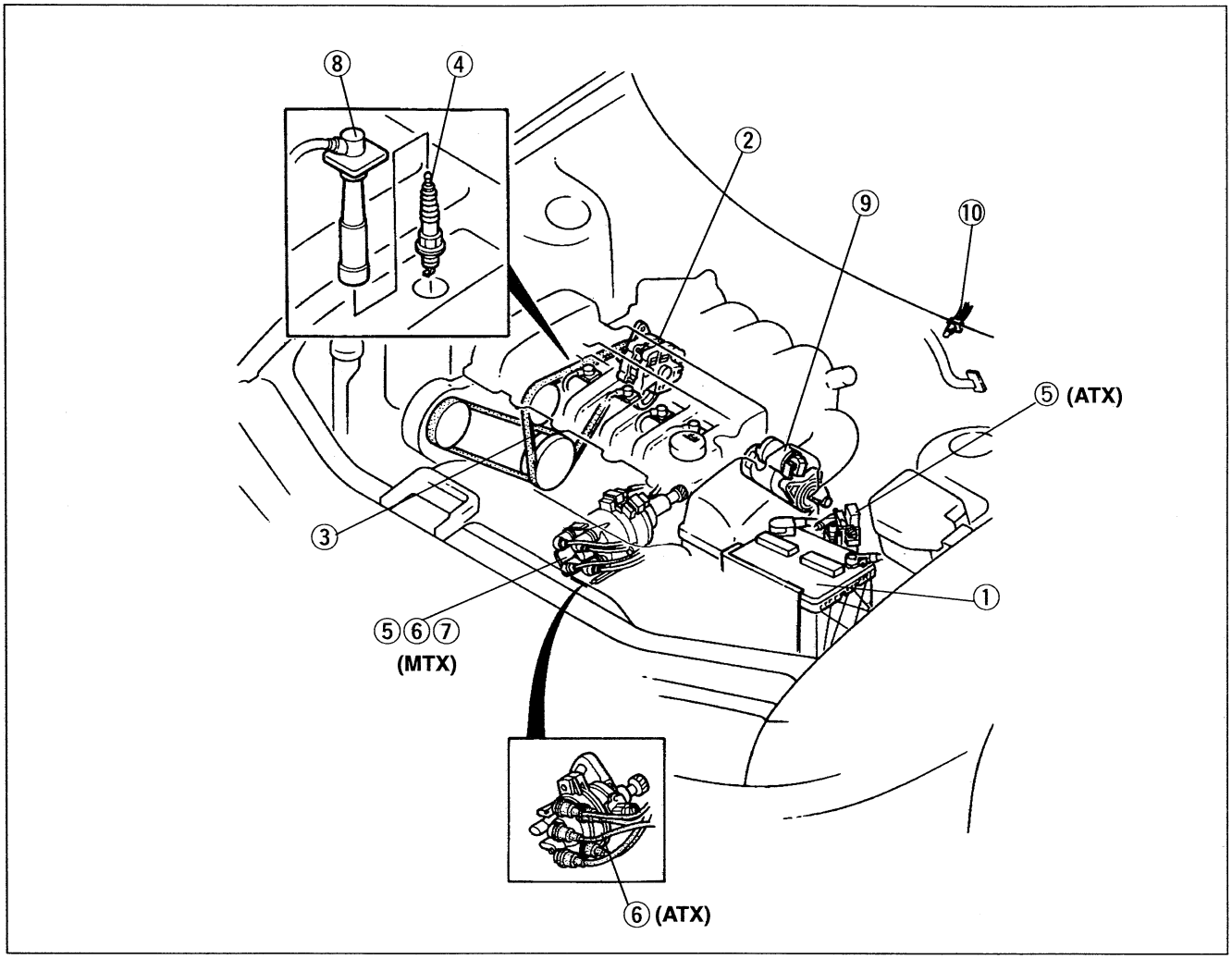

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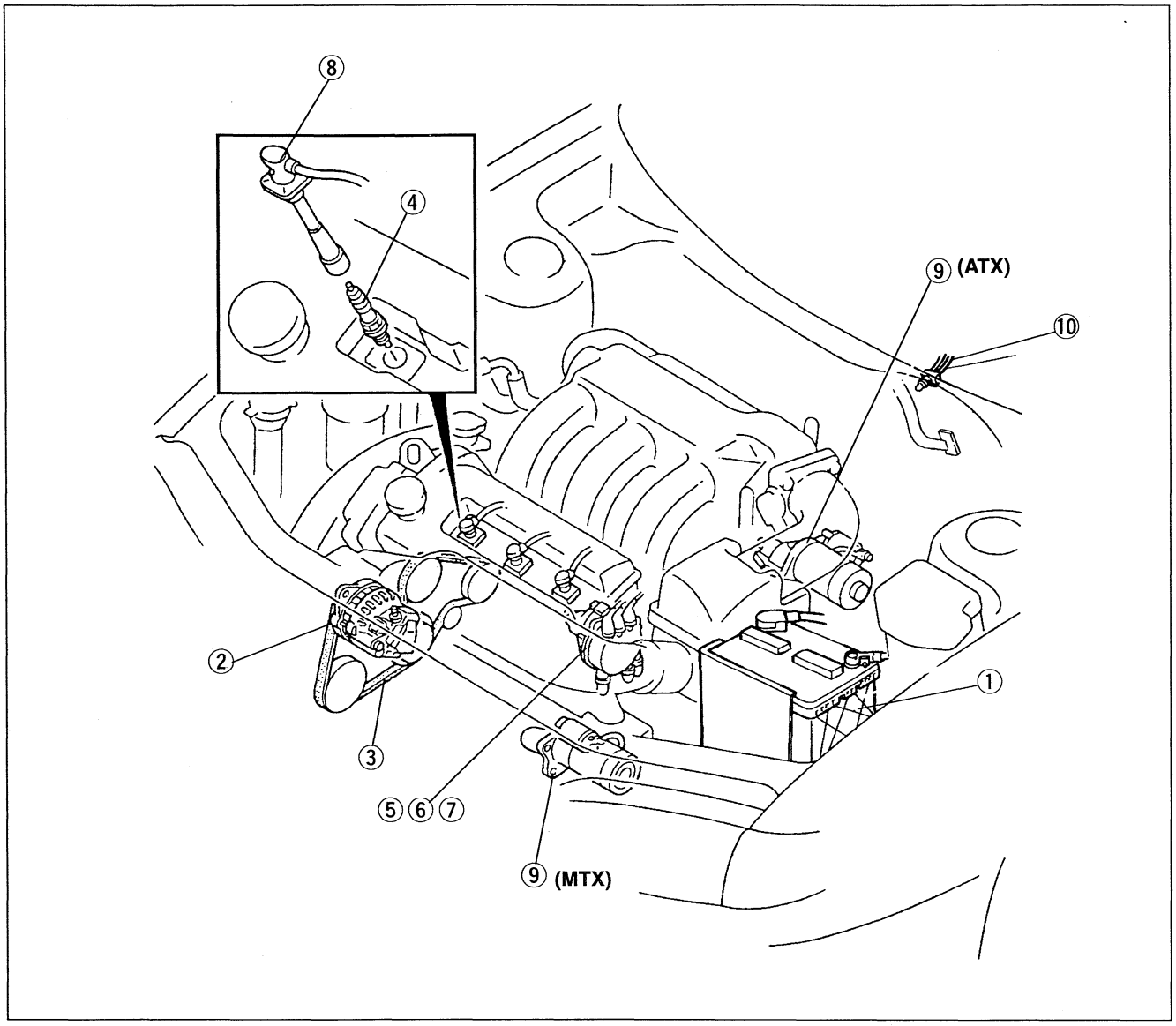
   - Disassembly / Assembly ..... page G–24
   - Inspection ..... page G–25
7. Ignition control module [MTX]
   - Inspection ..... page G–26
   - Replacement ..... page G–26
8. High-tension lead
   - Removal / Installation ..... page G–26
   - Inspection ..... page G–26
9. Starter
   - Inspection (on vehicle) ..... page G–28
   - Removal / Installation ..... page G–28
   - Performance inspection ..... page G–31
10. Starter interlock switch [MTX]
   - Inspection ..... page G–32

KL



1. Battery
Inspection . . . . . page G– 9
Recharging . . . . . page G–10
2. Generator
Removal / Installation . . . . . page G–12
3. Drive belt
Inspection . . . . . page G–13
Adjustment . . . . . page G–14
Replacement . . . . . page G–14
4. Spark plug
Removal / Installation . . . . . page G–18
Spark test . . . . . page G–19
Inspection . . . . . page G–19
5. Ignition coil
Inspection . . . . . page G–19
Replacement . . . . . page G–21
6. Distributor
Spark test . . . . . page G–21
Electronic spark advance
Inspection . . . . . page G–21
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7. Ignition control module
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Inspection (on vehicle) . . . . . page G–28
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10. Starter interlock switch [MTX]
Inspection . . . . . page G–32

OUTLINE

SPECIFICATIONS

Item \ Engine/Transaxle				FS		KL	
				MTX	ATX	MTX	ATX
Battery	Positive voltage			12			
	Type and capacity (5-hour rate)			GROUP 58RG (48AH)			
Dark current*1			mA	Max. 20			
Generator	Type			A.C.			
	Output		V–A	12–80		12–90	
	Regulator type			Voltage regulator, in generator			
	Regulated voltage		V	14.1—14.7			
	Brush length mm {in}		Standard	21.5 {0.85}			
			Minimum	8.0 {0.32}			
	Brush spring force N {gf, lbf}		Standard	3.14—4.31 {320—440, 0.71—0.96}			
			Minimum	1.57—2.35 {160—240, 0.36—0.52}			
	Drive belt deflection mm {in}/98 N{10 kgf, 22 lbf}		New	6.5—7.0 {0.26—0.27}		6.0—7.0 {0.24—0.27}	5.5—6.5*3 {0.22—0.25}
			Used	7.0—9.0 {0.28—0.35}		7.0—8.0 {0.28—0.31}	6.5—7.5*3 {0.26—0.29}
			Limit	10 {0.39}		9.0 {0.35}	8.0 {0.31}*3
Starter	Type			Coaxial reduction			Reduction
	Output		V–kW	12–1.4		12–1.7	12–1.6
	Brush length mm {in}		Standard	17.5 {0.69}			17.0 {0.67}
			Minimum	12 {0.48}			11.5 {0.45}
	Spring balance N {kgf, lbf}		Standard	17.6—23.6 {1.79—2.41, 3.94—5.30}		16.7—22.5 {1.70—2.30, 3.74—5.06}	16.3—21.9 {1.66—2.24, 3.66—4.92}
			Maximum	6.9 {0.7, 1.5}		9.32 {0.95, 2.09}	8.8 {0.9, 2.0}
	Armature	Runout mm {in}	Standard	0.05 {0.002}			
			Maximum	0.1 {0.004}			
		Minimum diameter	mm {in}	28.8 {1.14}			31.4 {1.24}
		Segment groove depth mm {in}	Standard	0.4—0.6 {0.016—0.023}			
			Minimum	0.2 {0.008}			
Distributor	Camshaft position sensor type			Hall element			
	Spark advance			Electronic spark advance			
Ignition timing • TEN terminal of data link connector grounded [KL and FS (MTX)]			BTDC	11—13°	—	9—11°	
Ignition coil	Resistance [at 20° {68°F}]		Primary coil winding Ω	0.49—0.73	0.4	0.49—0.73	
			Secondary coil winding kΩ	20—31	8.7	20—31	
Spark plug	Type		NGK	BKR5E-11*2 BKR6E-11		ZFR5F-11*2 ZFR6F-11	
			NIPPONDENSO	K16PR-U11*2 K20PR-U11		—	
	Plug gap		mm {in}	1.0—1.1 {0.040—0.043}			
Firing order				1—3—4—2		1—2—3—4—5—6	

*1 Dark current is the constant flow of current while the ignition is OFF (i.e., audio unit, clock. etc.)
*2 Standard plug
*3 Generator + A/C

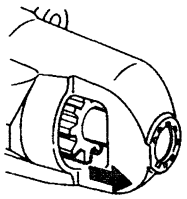
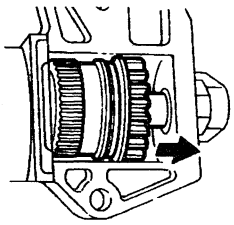
TROUBLESHOOTING GUIDE

DIAGNOSTIC INDEX

No.	Troubleshooting items	Page
1	Will not crank—starter motor does not operate	below
2	Will not crank—starter motor spins	G– 6
3	Cranks slowly	G– 6
4	Generator warning light illuminates while engine running	G– 6
5	Discharged battery	G– 6
6	Misfire	G–17

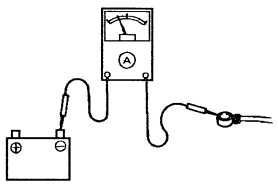
SYMPTOM TROUBLESHOOTING

1	Will not crank — starter motor does not operate		
STEP	INSPECTION		ACTION
1	Does engine crank with fully charged battery?	Yes	Check charging system ☞ page G–8
		No	Go to next step
2	Is starter interlock switch OK? [MTX]	Yes	Go to next step
		No	Check starter interlock switch ☞ page G–32
3	Is battery positive voltage present at terminal B?	Yes	Go to next step
		No	Check wiring harness
4	Is battery positive voltage present at terminal S with ignition switch in START position?	Yes	• Check magnetic switch • Check yoke • Check armature
		No	• Check transaxle range switch ☞ section K1 or K2 • Check ignition switch • Check wiring harness

2	Will not crank — starter motor spins		
STEP	INSPECTION		ACTION
1	Is drive pinion pushed out while cranking (Is click heard)?  FS, KL [MTX]  KL [ATX]	Yes	Remove starter and check ring gear teeth and starter drive pinion teeth
		No	Check magnetic switch

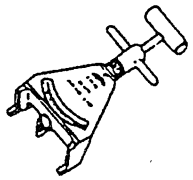
3	Cranks slowly		
STEP	INSPECTION		ACTION
1	Does engine crank normally with fully charged battery?	Yes	Check charging system ☞ page G–8
		No	Go to next step
2	Are starter cable connections loose or corroded?	Yes	Repair connection
		No	Check starter for binding (brush, armature, etc.)

4	Generator warning light illuminates while engine running		
STEP	INSPECTION		ACTION
1	Is battery positive voltage correct at idle? **Specification: 14.1—14.7V**	Yes	Check wiring harness between generator terminal L and generator warning light
		No	Check charging system ☞ page G–8

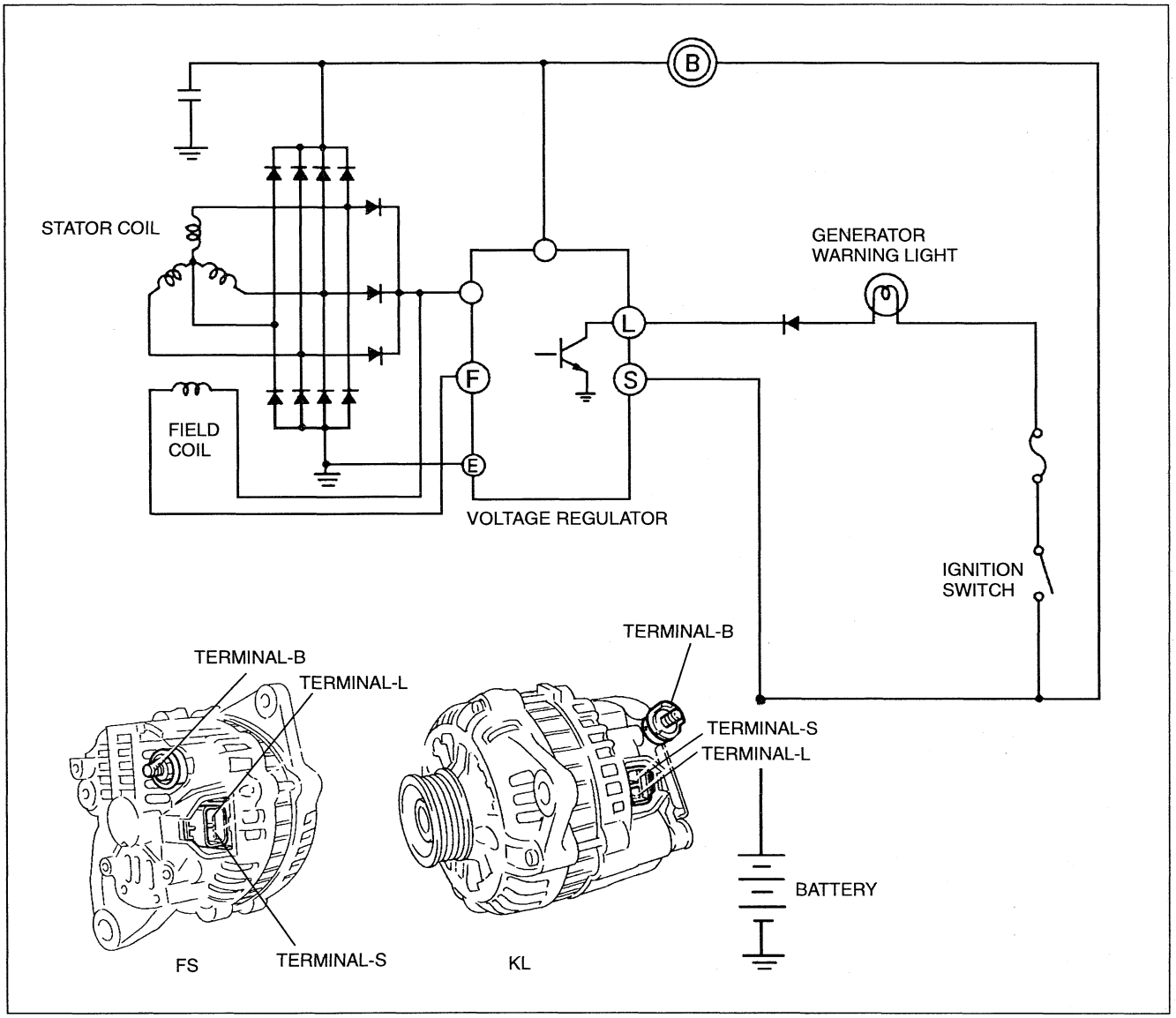
5	Discharged battery		
STEP	INSPECTION		ACTION
1	Is charging system OK? ☞ page G–8	Yes	Turn ignition switch OFF and measure dark current as shown  **Dark current: 20 mA max.**
		No	Repair or replace parts as necessary

CHARGING SYSTEM

PREPARATION
SST

49 9200 020A Tension gauge, V-ribbed belt		For inspection of drive belt tension

CIRCUIT DIAGRAM

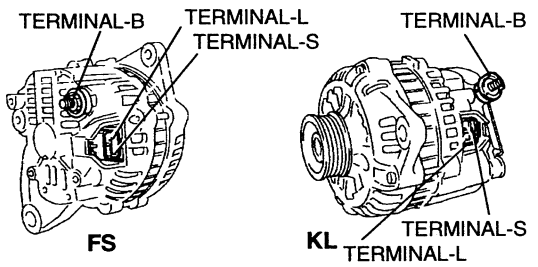
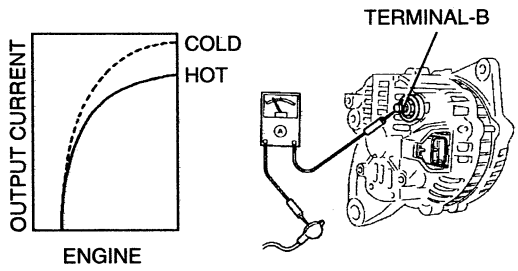


The generator has an on-board diagnosis system to warn the operator of the following problems in the charging system. If a problem arises, the generator warning light illuminates.

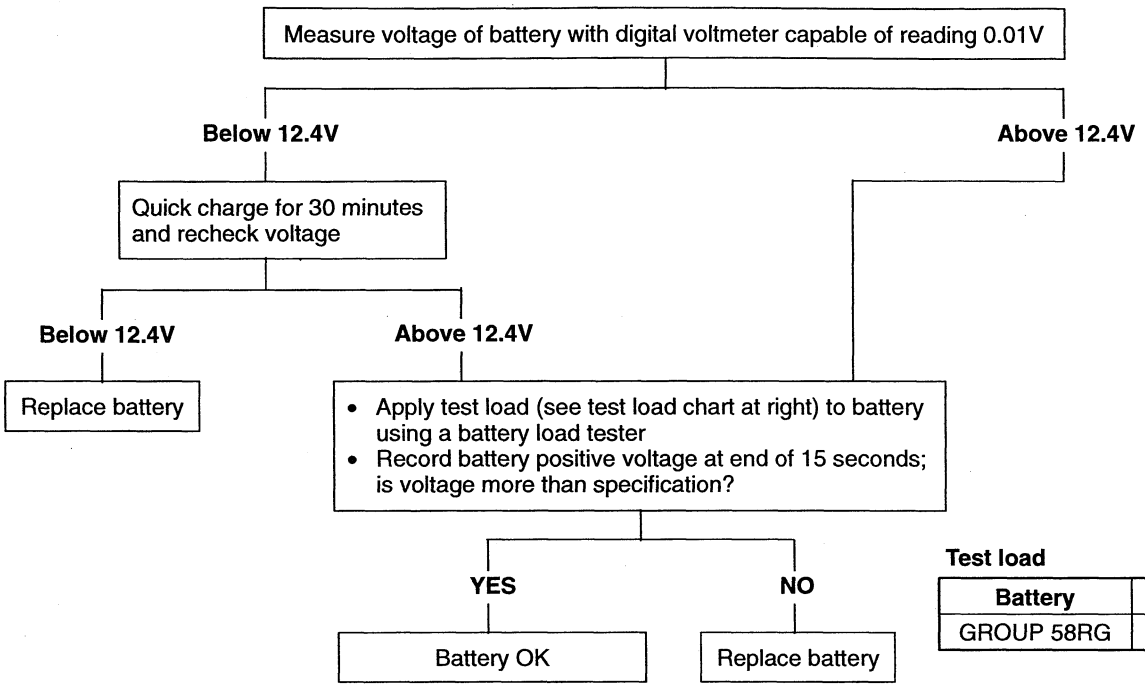
1. Terminal S circuit open
2. No voltage output
3. Field coil circuit open
4. Terminal B circuit open
5. Voltage output too high

TROUBLESHOOTING

B+: Battery positive voltage

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>1</td><td>Check battery positive voltage; is it correct?
Specification: Above 12.4V</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check battery ☞ page G–9</td></tr>
<tr><td>2</td><td>Does generator warning light illuminate with ignition switch ON?</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check warning light bulb and wiring harness (Generator warning light—Terminal L)</td></tr>
<tr><td>3</td><td>Does generator warning light go out after engine started?</td><td>Yes</td><td>Go to step 5</td></tr>
<tr><td></td><td></td><td>No</td><td>Go to next step</td></tr>
<tr><td>4</td><td>Is voltage at generator terminals correct?
Specifications:
<table>
<tr><th>Terminal</th><th>Ign: ON (V)</th><th>Idle (V)</th></tr>
<tr><td>B</td><td>B+</td><td>14.1—14.7</td></tr>
<tr><td>L</td><td>Approx.1</td><td>13.2—13.8</td></tr>
<tr><td>S</td><td>B+</td><td>14.1—14.7</td></tr>
</table>

</td><td>Yes</td><td>Check wiring harness (Battery—Terminal B)</td></tr>
<tr><td></td><td></td><td>No</td><td>• Check wiring harness
• Replace generator ☞ page G–11</td></tr>
<tr><td>5</td><td>1. Connect an ammeter (90A min.) between terminal B and harness
2. Start engine
3. Turn all electrical loads ON and depress brake pedal
4. Is output current 80A (FS), 90A (KL) or more at 2,500—3,000 rpm?
Caution
• Grounding terminal B will damage generator internal circuit

</td><td>Yes</td><td>Charging system normal</td></tr>
<tr><td></td><td></td><td>No</td><td>Go to next step</td></tr>
<tr><td>6</td><td>Is drive belt tension OK? ☞ page G–13</td><td>Yes</td><td>Replace generator ☞ page G–11</td></tr>
<tr><td></td><td></td><td>No</td><td>• Adjust drive belt tension
• Replace drive belt</td></tr>
</table>

BATTERY
Inspection
Battery discharge test

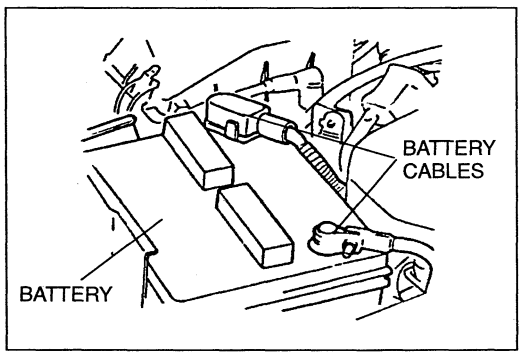


Test load

Battery	Load (A)
GROUP 58RG	174

Battery positive voltage with load

Approximate battery temp.	Minimum voltage (V)
21°C {70°F}	9.6
15°C {60°F}	9.5
10°C {50°F}	9.4
4°C {40°F}	9.3
−1°C {30°F}	9.1
−7°C {20°F}	8.9
−12°C {10°F}	8.7
−18°C { 0°F}	8.5



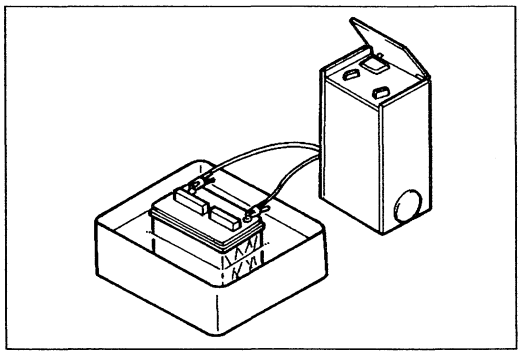
Terminal and cable

Removing the label on top of the battery or removing the vent caps will void the battery's warranty.

Note

- Because this is a maintenance-free battery, it is not necessary to check the fluid level.

1. Verify that the battery top is clean. If necessary, clean with baking soda and water.
2. Verify that cables are in good condition and not frayed or corroded. Repair or replace if necessary.
3. Verify that cable clamps are tight.



Recharging

Warning

- **Hydrogen gas is produced during normal battery operation. A battery-related explosion can cause serious injury. Keep all flames (including cigarretts), heat, and sparks away from the top and surrounding area of open battery cells.**

Caution

- **Do not quick charge for over 30 minutes. It will damage the battery.**

Place the battery in a pan of water to prevent it from overheating. The water level should come up about 3/4 way on the battery. Keep water off the top of the battery.

Caution

- **To prevent damage to electrical components or the battery, turn all accessories off and stop the engine before performing maintenance or recharging the battery.**
- **When disconnecting the battery, remove the negative cable first and install it last to prevent damage to electrical components or the battery.**

Slow charging

Perform a slow charge, referring to the following table.

Type	Voltage (V)	Hour (H)	Amperage (A)
GROUP 58RG	11.9—12.0	9	Max. 4.8
	11.7—11.9	10	
	blow 11.7	12	

Quick charging

Remove the battery from the vehicle to perform a quick charge.

Type	Minutes (M)	Amperage (A)
GROUP 58RG	30	32

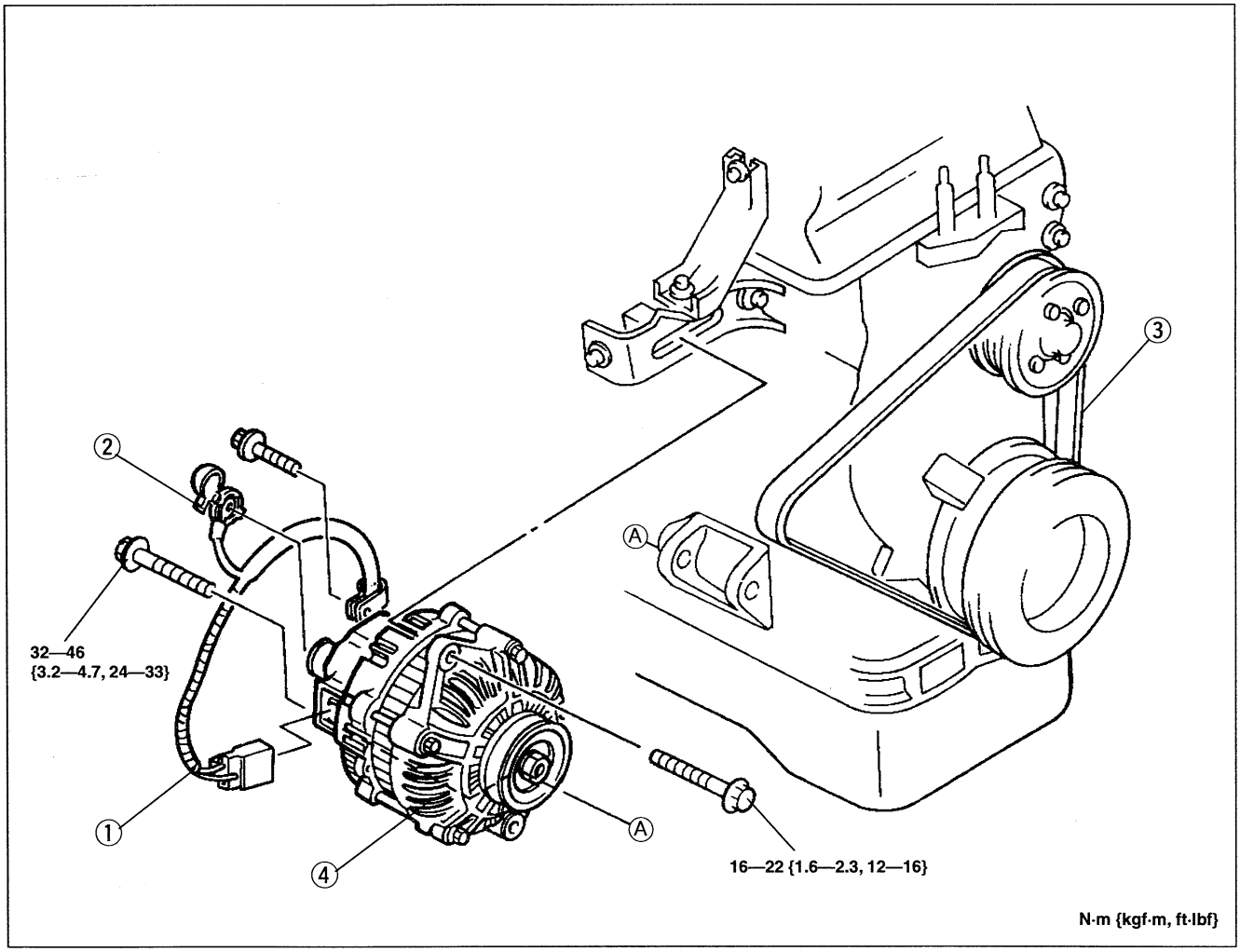
GENERATOR
Removal / Installation

Caution
- **Reversing the battery connections or using high-voltage testers will damage the rectifier.**
- **Do not start the engine while the connector is disconnected from terminals L and S. It can damage the generator.**
- **When the battery cables are connected, touching the vehicle body with generator terminal B will generate sparks. This can cause personal injury, fire, and damage to the electrical components. Always disconnect the battery before performing the following operation.**

Note
- Battery positive voltage is always present at generator terminal B when the battery is connected.

1. Disconnect the negative battery cable.
2. Remove the warm up three way catalytic converter. (Refer to section F1 or F3.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.

FS



1. Connector
2. Terminal B wire
   Inspect for damage and corrosion
3. Drive belt
   Adjustment ..... page G–14
4. Generator

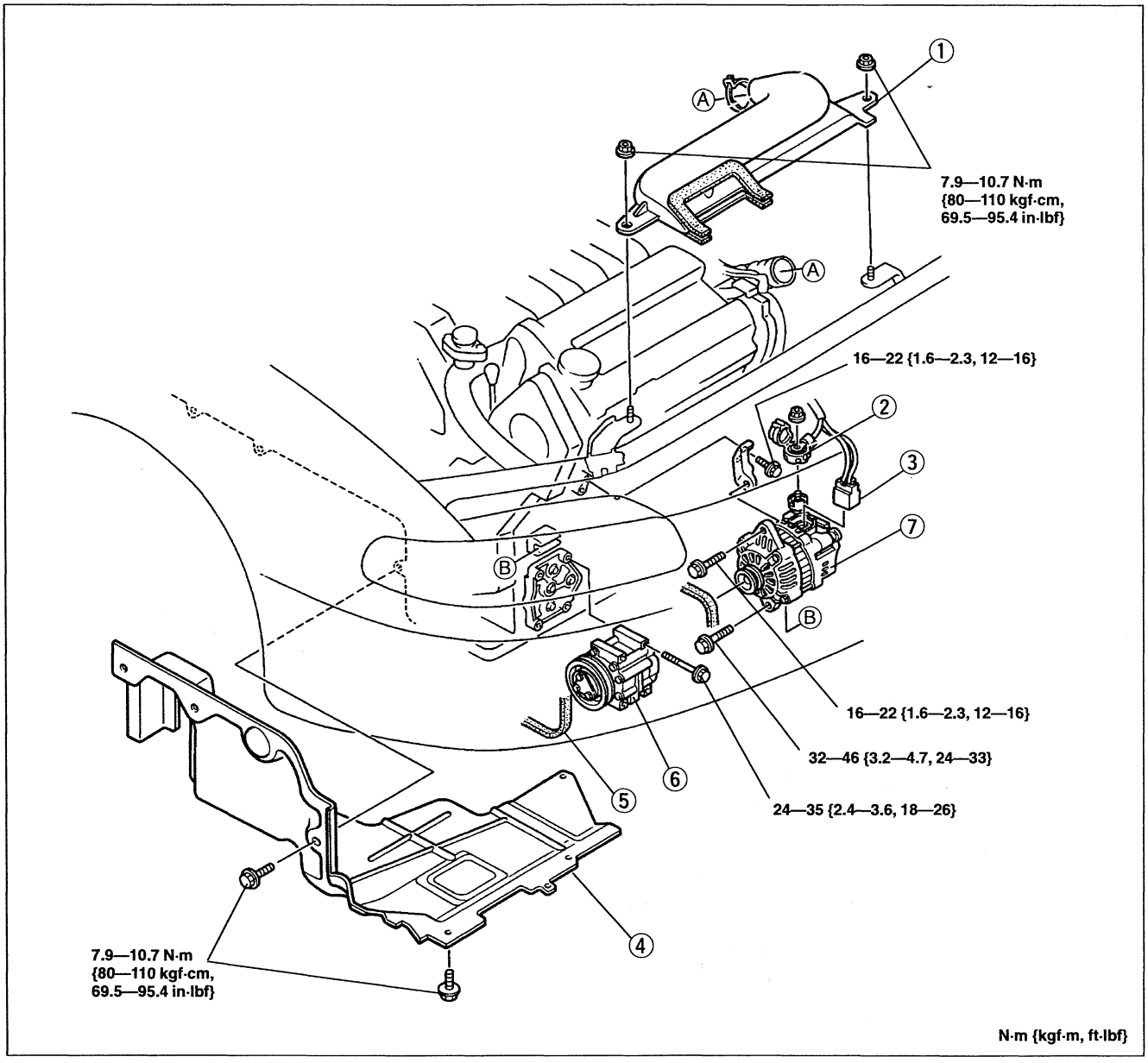
KL

Caution

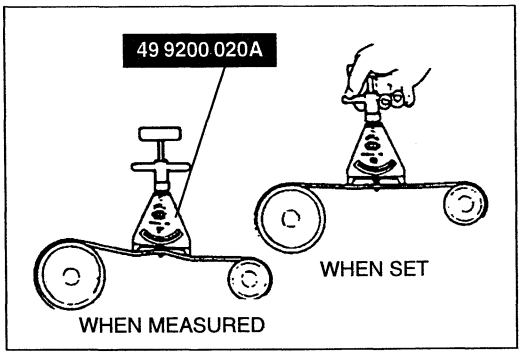
- **Reversing the battery connections or using high-voltage testers will damage the rectifier.**
- **Do not start the engine while the connector is disconnected from terminals L and S. It can damage the generator.**
- **When the battery cables are connected, touching the vehicle body with generator terminal B will generate sparks. This can cause personal injury, fire, and damage to the electrical components. Always disconnect the battery before performing the following operation.**

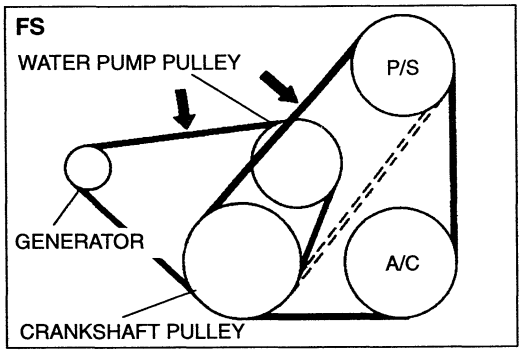
Note

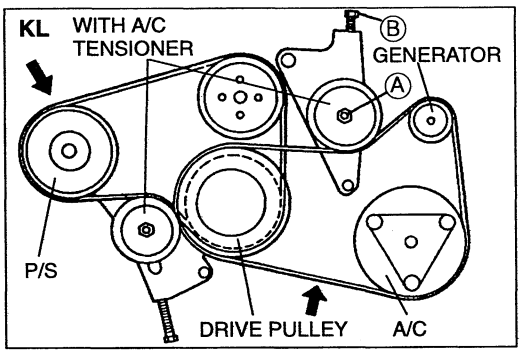
- Battery positive voltage is always present at generator terminal B when the battery is connected.

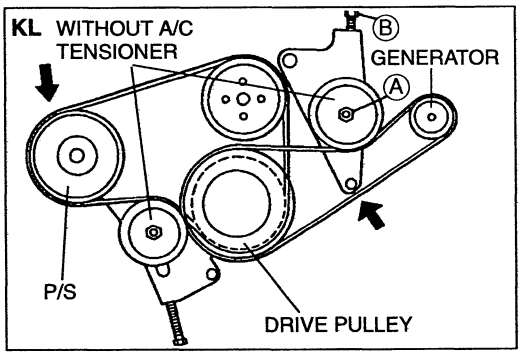


1. Fresh-air duct
2. Generator terminal B wire
   Inspect for damage and corrosion
3. Connector
4. Splash shield
5. Drive belt
   Adjustment ..... page G–14
6. Compressor
7. Generator









DRIVE BELT

Inspection

1. Check the drive belts and pulleys for wear, cracks, and damage. Replace if necessary.
2. Measure the drive belt tension by using a tension gauge.
3. Measure the deflection by applying moderate pressure **98 N {10 kgf, 22 lbf}** midway between the pulleys.
4. Adjust the belt if necessary.

Tension

FS

N {kgf, lbf}

Drive belt	New*	Used	Limit
Generator	740—830 {75—85, 170—180}	500—680 {50—70, 110—150}	390 {40, 88}
P/S, P/S + A/C	590—780 {60—80, 140—170}	500—680 {50—70, 110—150}	390 {40, 88}

KL

N {kgf, lbf}

Drive belt	New*	Used	Limit
Generator	690—880 {70—90, 160—190}	500—680 {50—70, 110—150}	440 {45, 99}
Generator + A/C	690—880 {70—90, 160—190}	500—680 {50—70, 110—150}	440 {45, 99}
P/S	540—680 {55—70, 130—150}	400—530 {40—55, 88—120}	340 {35, 77}

Deflection

FS

mm {in}

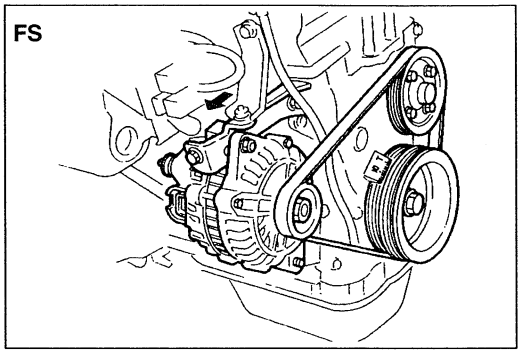
Drive belt	New*	Used	Limit
Generator	6.5—7.0 {0.26—0.27}	7.0—9.0 {0.28—0.35}	10 {0.39}
P/S, P/S + A/C	7.5—9.0 {0.30—0.35}	8.0—9.5 {0.32—0.37}	11 {0.43}

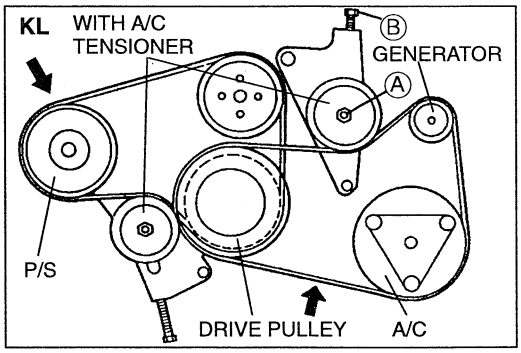
KL

mm {in}

Drive belt	New*	Used	Limit
Generator	6.0—7.0 {0.24—0.27}	7.0—8.0 {0.28—0.31}	9.0 {0.35}
Generator + A/C	5.5—6.5 {0.22—0.25}	6.5—7.5 {0.26—0.29}	8.0 {0.31}
P/S	6.0—7.0 {0.24—0.27}	7.0—8.0 {0.28—0.31}	9.0 {0.35}

* A belt that has been on a running engine for less than five minutes.





Adjustment

FS

1. Loosen the generator mounting bolt and adjusting bolt.
2. Move the generator to set the specified deflection.
3. Tighten all bolts and recheck the tension.

Tightening torque
Mounting bolt:
32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}
Adjusting bolt:
16—22 N·m {1.6—2.3 kgf·m, 12—16 ft·lbf}

KL

1. Loosen tensioner locknut A.
2. Tighten adjuster bolt B.
3. Tighten tensioner locknut A.

Tightening torque
Locknut:
32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}

Replacement

FS

1. Remove the A/C and P/S drive belt if equipped. Refer to section B1.
2. Loosen the generator mounting bolt and adjusting bolt.
3. Remove the generator drive belt.
4. Install the new generator drive belt and adjust it to specifications.
5. Tighten all bolts to the specified torque.

Tightening torque
Mounting bolt:
32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}
Adjusting bolt:
16—22 N·m {1.6—2.3 kgf·m, 12—16 ft·lbf}

6. Install the A/C and P/S drive belt if equipped, and adjust to specifications. Refer to section B1.

KL

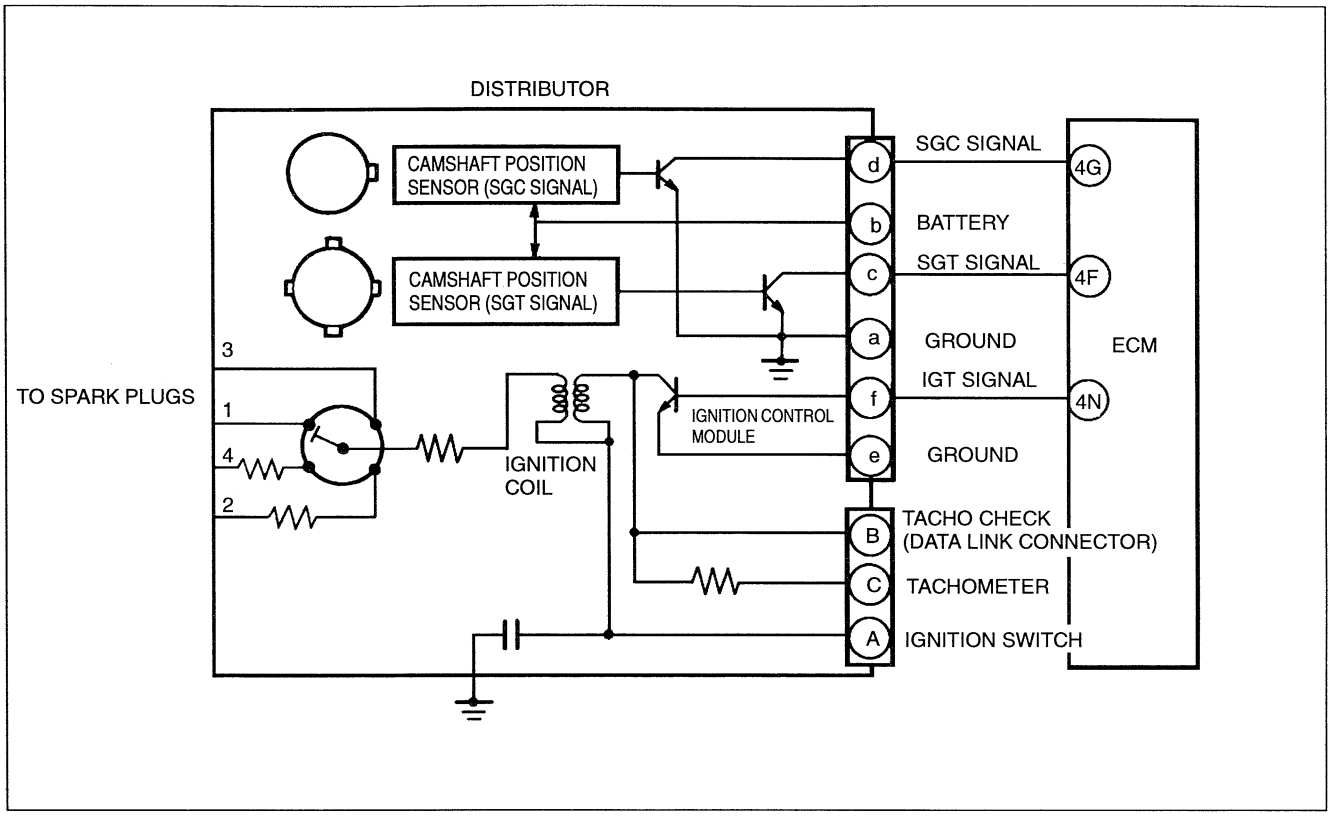
1. Loosen tensioner locknut A.
2. Remove the generator drive belt.
3. Install the new generator drive belt and adjust it to specifications.
4. Tighten tensioner locknut A.

Tightening torque
Locknut:
32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}

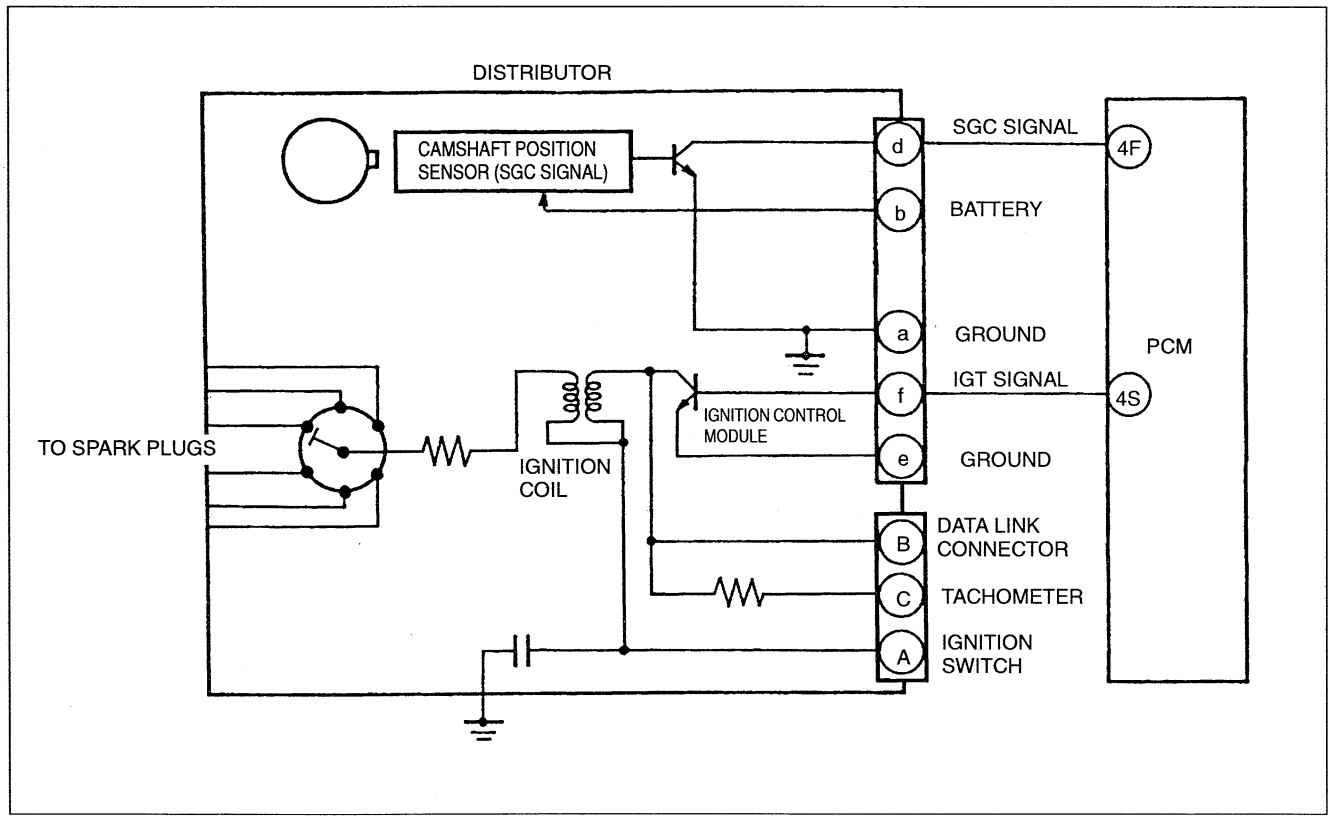
ELECTRONIC IGNITION SYSTEM

CIRCUIT DIAGRAM

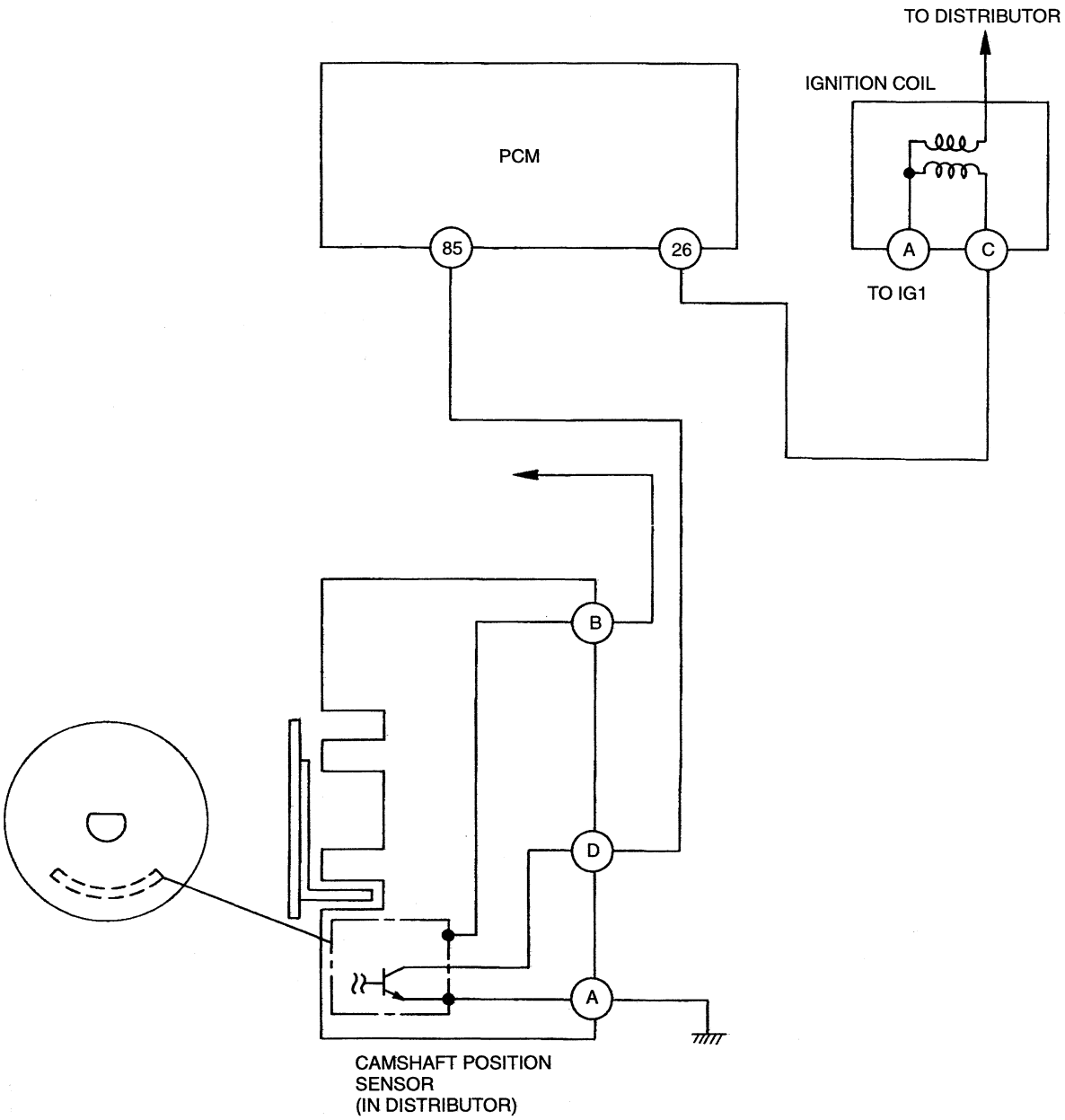
FS [MTX]



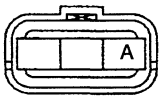
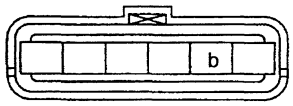
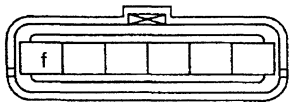
KL



FS [ATX]


TO DISTRIBUTOR
IGNITION COIL
PCM
85
26
A
C
TO IG1
B
D
A
CAMSHAFT POSITION
SENSOR
(IN DISTRIBUTOR)

TROUBLESHOOTING
KL, FS (MTX)

6	Misfire		
STEP	INSPECTION		ACTION
1	Disconnect high-tension lead from spark plug; is there a strong blue spark while cranking engine? ☞ page G–21	Yes	System normal
		No	Go to next step
2	Are ECM (PCM) and distributor connectors securely connected?	Yes	Go to next step
		No	Repair or replace
3	(KL) Is diagnostic trouble code No. 0335 or 1345 also shown? (FS [MTX]) Is diagnostic trouble code No. 0335, 0340 or 1345 also shown? 	Yes	Carry out troubleshooting of corresponding diagnostic trouble code No.
		No	Go to next step
4	Is battery positive voltage present at terminal A of distributor 3P wire harness with ignition switch in ON position?	Yes	Go to next step
		No	Check wire harness and connector between distributor terminal A and ignition switch
5	Is ignition coil normal? ☞ page G–19	Yes	Go to next step
		No	Replace ignition coil
6	Is battery positive voltage present at terminal ⓑ of distributor 6P wire harness with ignition switch in ON position? 	Yes	Go to next step
		No	Check wire harness and connector between distributor terminal ⓑ and ignition switch
7	Is approx. 0.6 V present at terminal ⓕ of distributor 6P wire harness while cranking engine? 	Yes	Replace distributor
		No	Go to next step
8	Is approx. 0.6 V present at ECM (PCM) terminal 4S (KL) or 4N (FS [MTX]) while cranking engine?	Yes	Check wire harness and connector between distributor terminal ⓕ and ECM (PCM) terminal 4S (KL) or 4N (FS [MTX])
		No	Replace ECM (PCM)

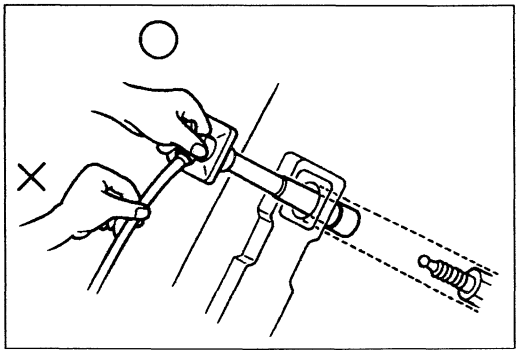
FS (ATX)

6	Misfire		
STEP	INSPECTION		ACTION
1	Disconnect high-tension lead from spark plug; is there a strong blue spark while cranking engine?	Yes	System normal
		No	Go to next step
2	Are PCM and IG coil connectors securely connected?	Yes	Go to next step
		No	Repair or replace
3	Is diagnostic trouble code No. 0335 or 1345 also shown?	Yes	Carry out troubleshooting of corresponding diagnostic trouble code No.
		No	Go to next step
4	Is battery positive voltage present at terminal A of ignition coil wire harness with ignition switch in ON position? ☞ page G–16	Yes	Go to next step
		No	Check wire harness and connector between ignition coil terminal A and ignition switch
5	Is ignition coil normal? ☞ page G–19	Yes	Go to next step
		No	Replace ignition coil
6	Is approx. 0.6 V present at PCM terminal 26 while cranking engine?	Yes	Check wire harness and connector between ignition coil terminal C and PCM
		No	Replace PCM

IGNITION TIMING

Adjustment

Adjust the ignition timing.
(Refer to section F1 or F2.)



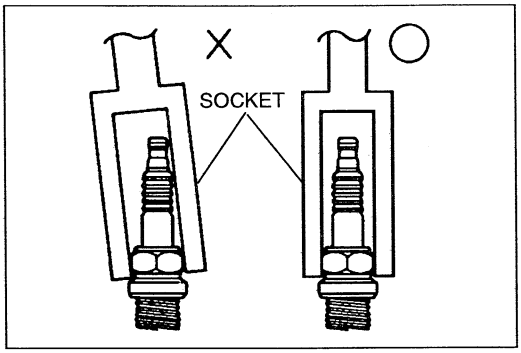
SPARK PLUG

Removal / Installation

1. Remove and install the high-tension leads carefully.

Caution

- **Pulling on the wire part of the spark plug lead may break it. To remove the lead, pull only on the boot.**

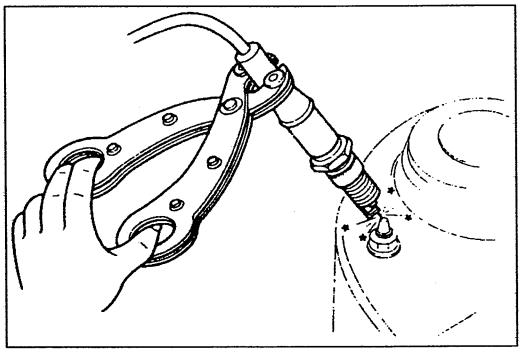


2. Remove and install the spark plug with a plug socket.

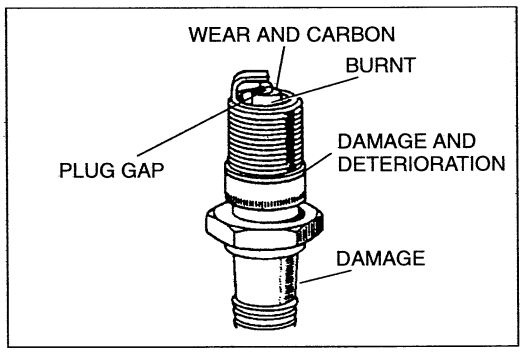
Caution
- **To avoid breaking the spark plug, be sure to fit the socket squarely over it.**

3. Apply anti-seize compound or molybdenum-based lubricant to the spark plug threads.
4. Tighten the spark plug to the specified torque.

Tightening torque:
15—22 N·m {1.5—2.3 kgf·m, 11—16 ft·lbf}



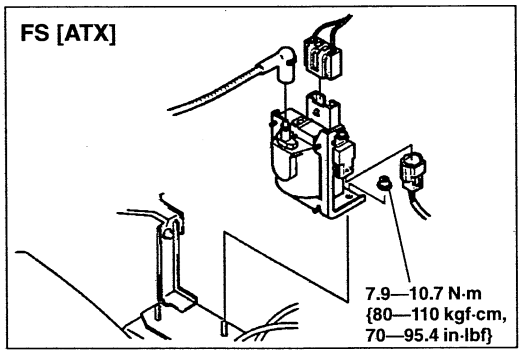
Spark test
1. Remove the spark plug.
2. Connect the spark plug to a high-tension lead.
3. Hold the high-tension lead and spark plug with insulated pliers **5—10 mm {0.20—0.39 in}** from a ground.
4. Crank the engine and verify that there is a strong blue spark. If not, replace the spark plug or high-tension lead as necessary.



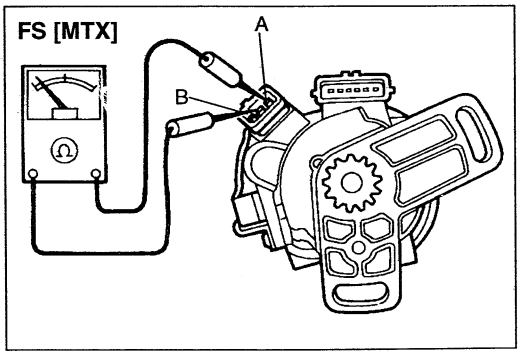
Inspection

Check the following points. If a problem is found, replace the spark plug.
- Damaged insulation
- Worn electrodes
- Carbon deposits
  If cleaning is necessary, use a plug cleaner or a wire brush. Clean the upper insulator, also.
- Damaged gasket
- Burnt

Plug gap: 1.0—1.1 mm {0.040—0.043 in}



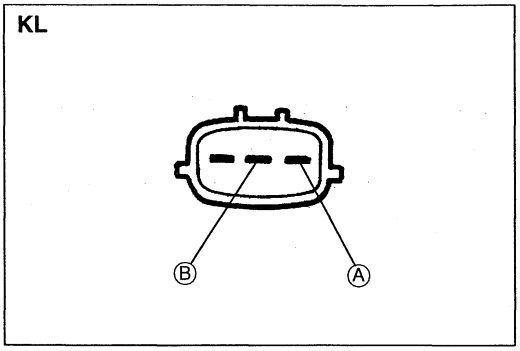
IGNITION COIL
Removal / Installation
(FS [ATX])
1. Disconnect the negative battery cable.
2. Disconnect the ignition coil connector and high-tension lead from the ignition coil.
3. Disconnect the condensor connector from the condensor.
4. Remove the ignition coil.
5. Install in the reverse order of removal.

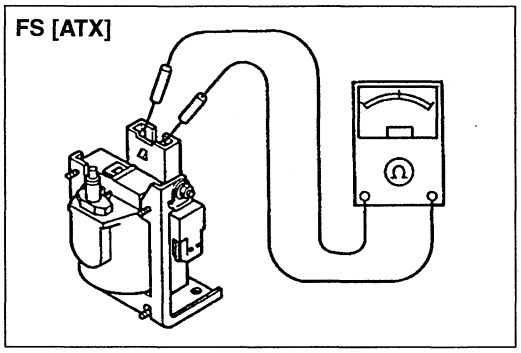


Inspection
Primary coil winding
FS [MTX], KL
1. Disconnect the 3-pin connector from the distributor.
2. Use an ohmmeter to measure resistance of the primary coil winding.

Specification: 0.49—0.73 Ω [at 20°C {68°F}]

3. If not within the specification, replace the distributor. (Refer to page G–22.)



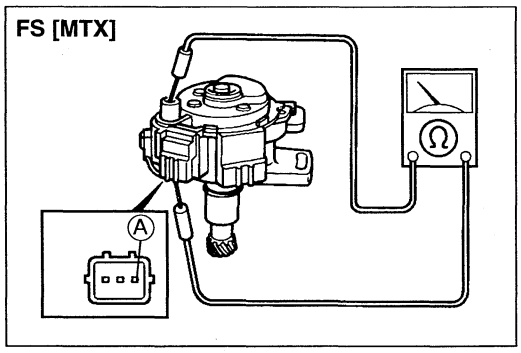


FS [ATX]

1. Disconnect the ignition coil connector from the ignition coil.
2. Use an ohmmeter to measure resistance of the primary coil winding.

   Specification: Approx. 0.4 Ω [at 20°C {68°F}]

3. If not as specified, replace the ignition coil. (Refer to page G–19.)

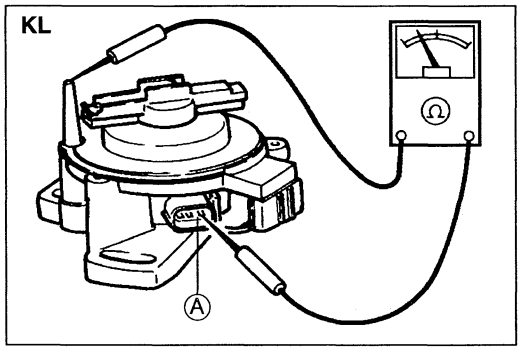


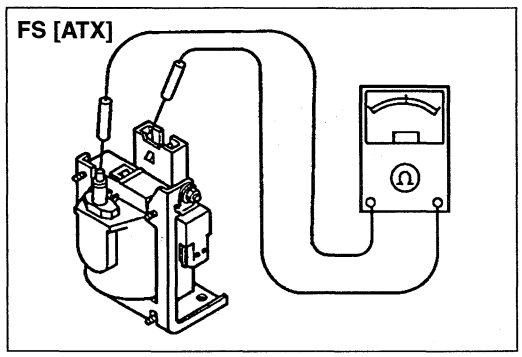
Secondary coil winding
FS [MTX], KL

1. Disconnect the 3-pin connector from the distributor.
2. Remove the distributor cap.
3. Use an ohmmeter to measure resistance of the secondary coil winding.

   Specification: 20—31 kΩ [at 20°C {68°F}]

4. If not within the specification, replace the distributor. (Refer to page G–22.)





FS [ATX]

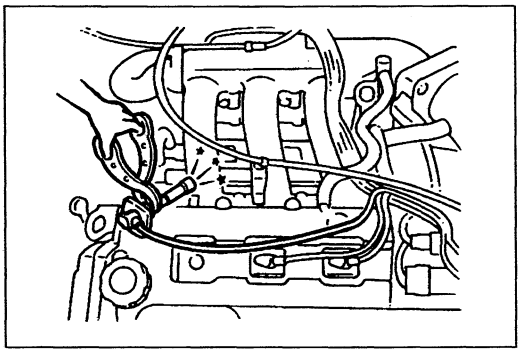
1. Disconnect the high-tension lead from the ignition coil.
2. Use an ohmmeter to measure resistance of the secondary coil winding.

   Specification: Approx. 8.7 kΩ [at 20°C {68°F}]

3. If not within the specification, replace the ignition coil. (Refer to page G–19.)

Replacement

1. Remove and replace the distributor (FS [MTX], KL). (Refer to page G–22.)
2. Remove and replace the ignition coil. (FS [ATX]) (Refer to page G–19.)
3. Adjust the ignition timing. (Refer to section F1 or F2.)

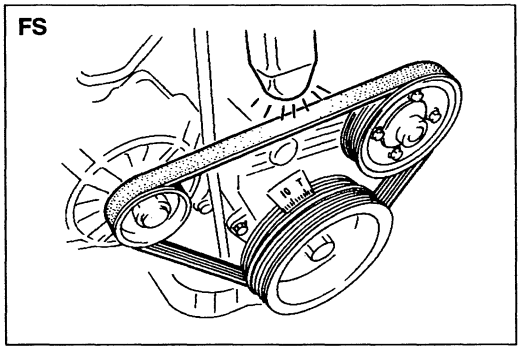


DISTRIBUTOR

Spark Test

1. Disconnect the high-tension lead from a spark plug.
2. Hold the lead and spark plug with insulated pliers **5—10 mm {0.20—0.39 in}** from a ground.
3. Crank the engine and verify that a strong blue spark is visible.
4. If no spark, refer to page G–17 "No.6 MISFIRE".

FS



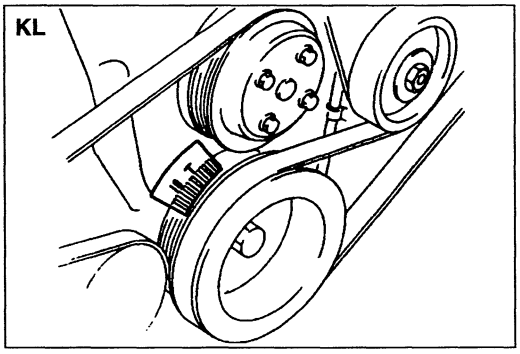
Electronic Spark Advance Inspection

Verify that the ignition timing advances with engine acceleration.

Note

- The amount of advance depends on various factors and is not specified.

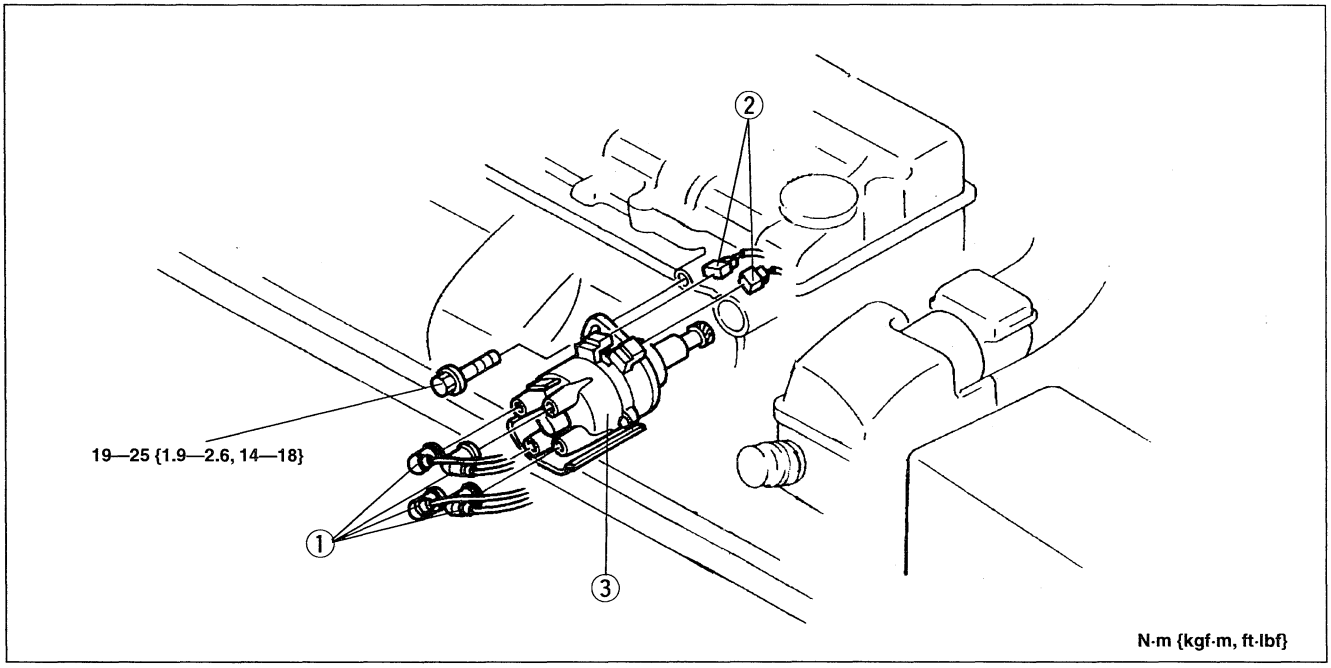
KL



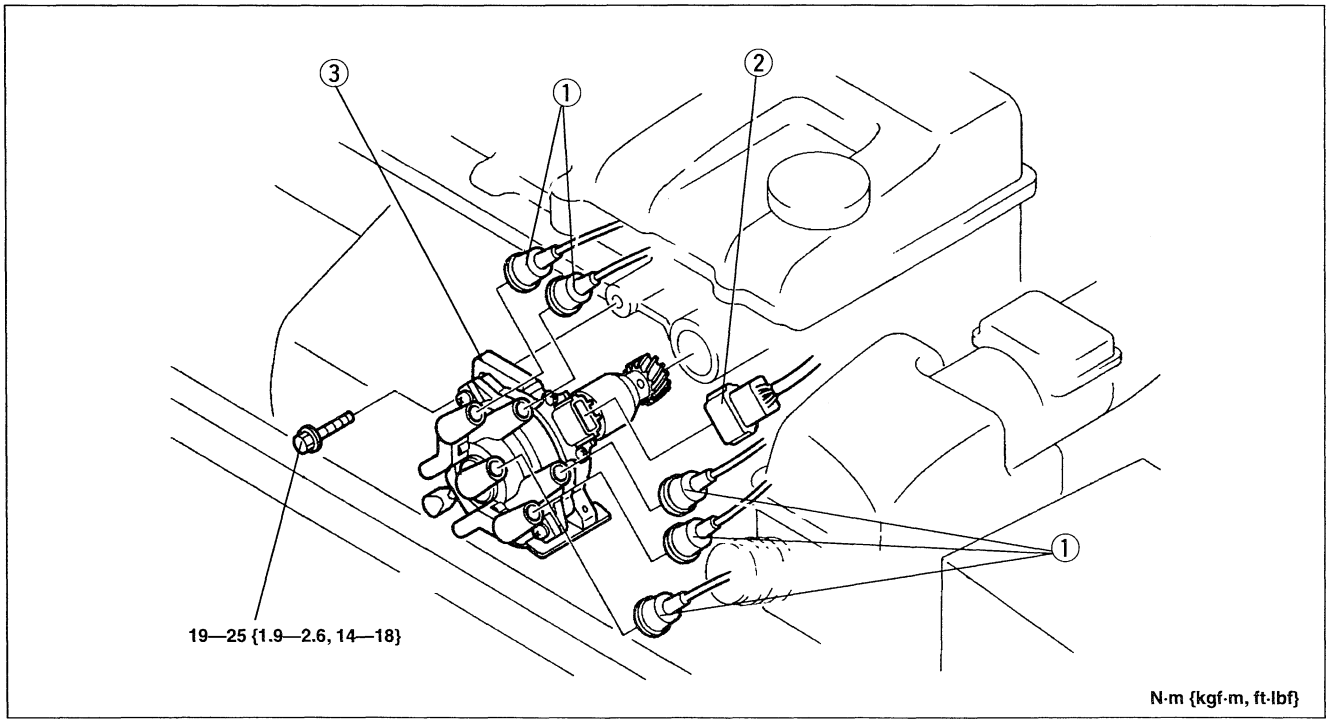
Removal / Installation

1. Disconnect the negative battery cable.
2. Remove the fresh-air duct. (Refer to section F1, F2 or F3.)
3. Remove the air cleaner. (KL) (Refer to section F2.)
4. Remove in the order shown in the figure.
5. Install in the reverse order of removal (KL), referring to **Installation Note (FS)**. (Refer to page G–23.)

FS [MTX]



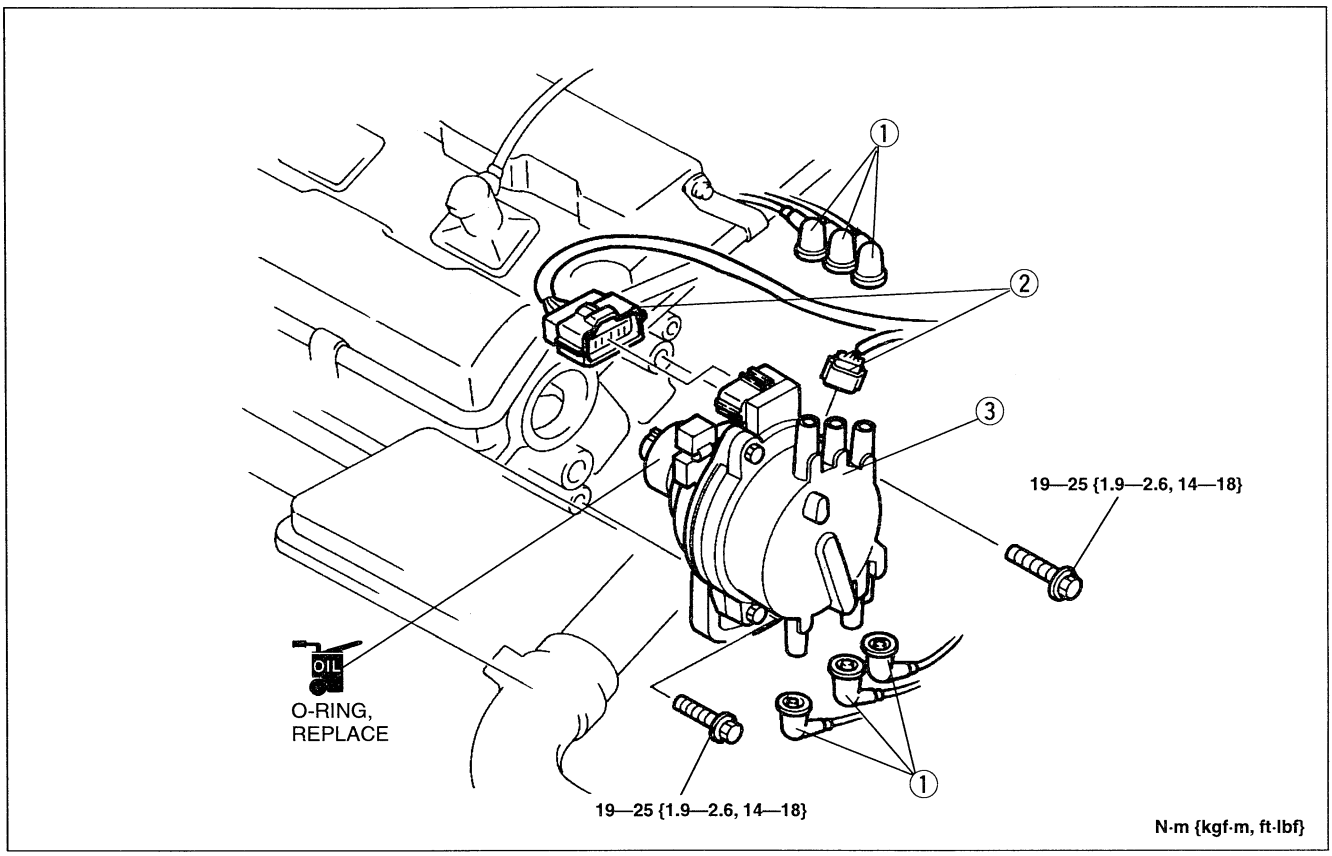
FS [ATX]



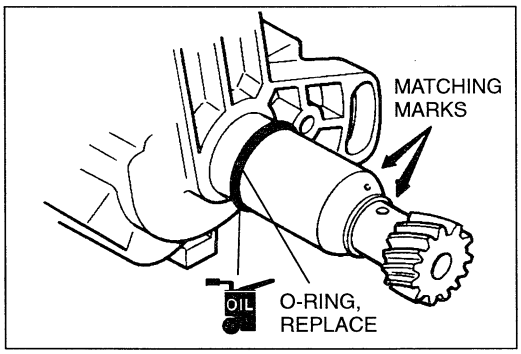
1. High-tension lead
2. Connector
3. Distributor

Installation Note . . . . . page G–23

KL



1. High-tension lead
2. Connector
3. Distributor



Installation Note (FS)

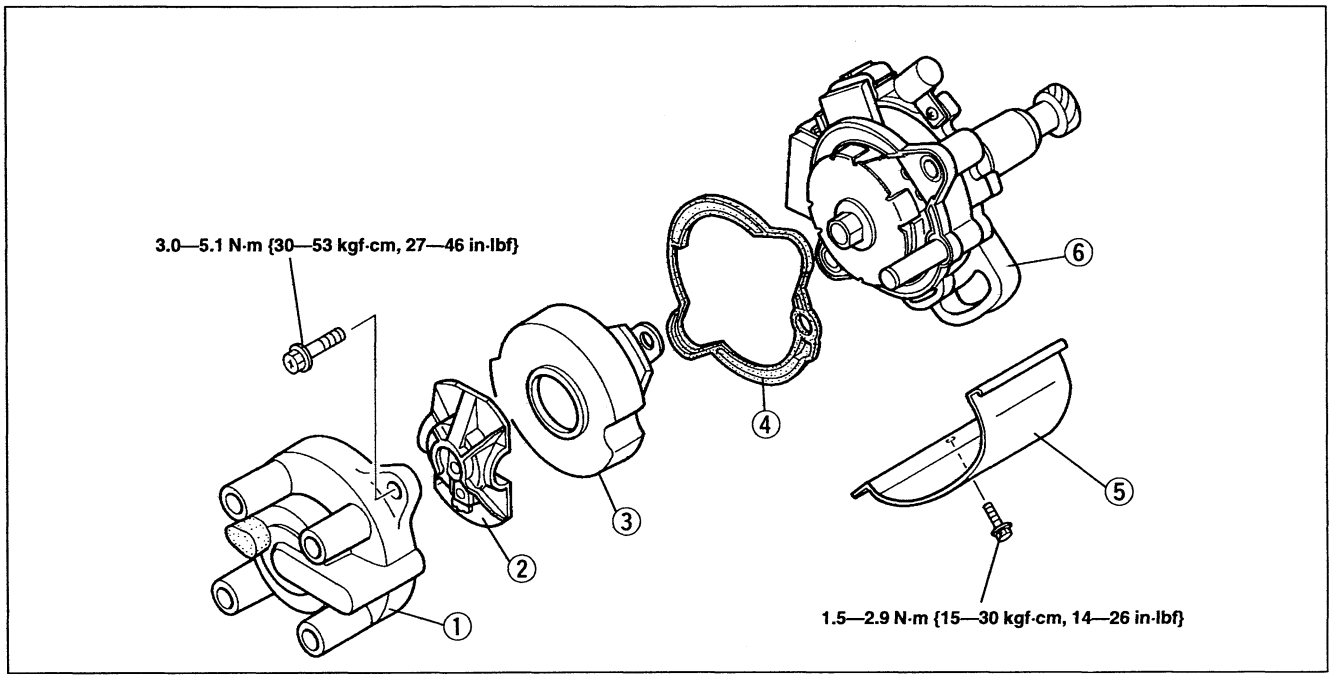
1. Verify that the No.1 cylinder is at top dead center and the distributor matching marks are aligned.
2. Install the distributor and connect the high-tension leads and distributor connector.
3. Tighten the locknut or bolts to the specified torque.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

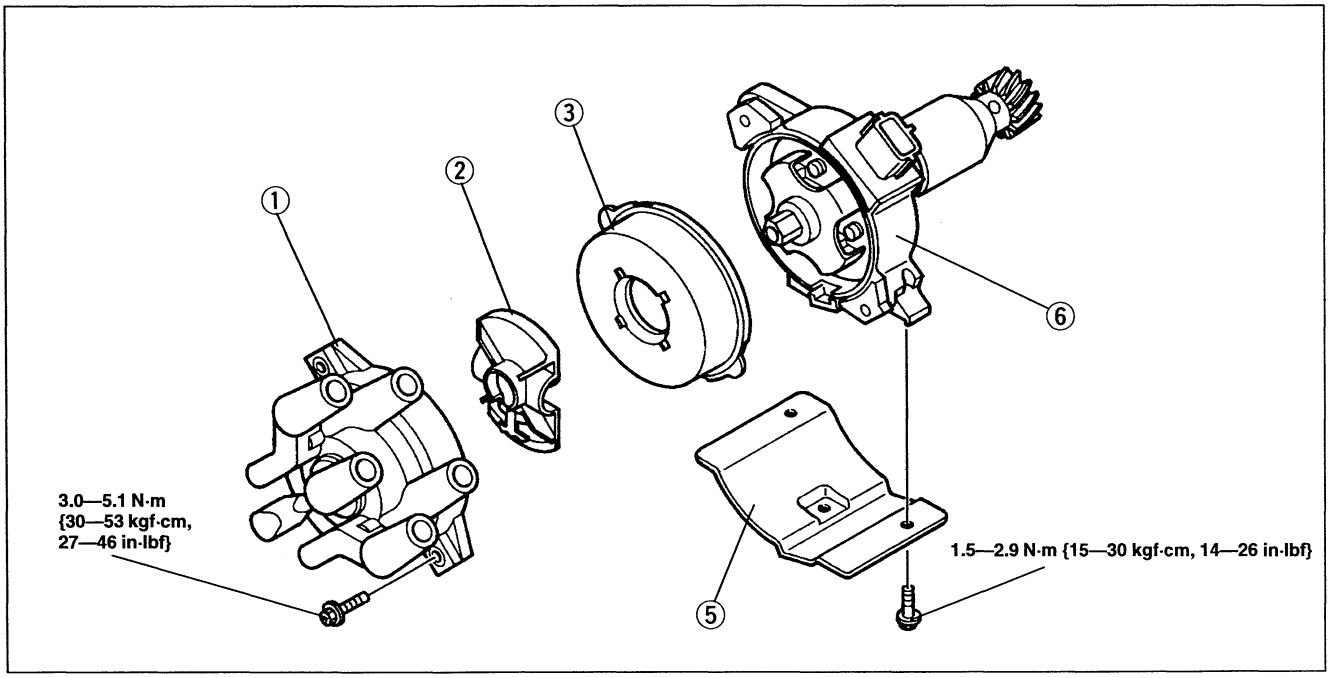
Disassembly / Assembly

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.

FS [MTX]

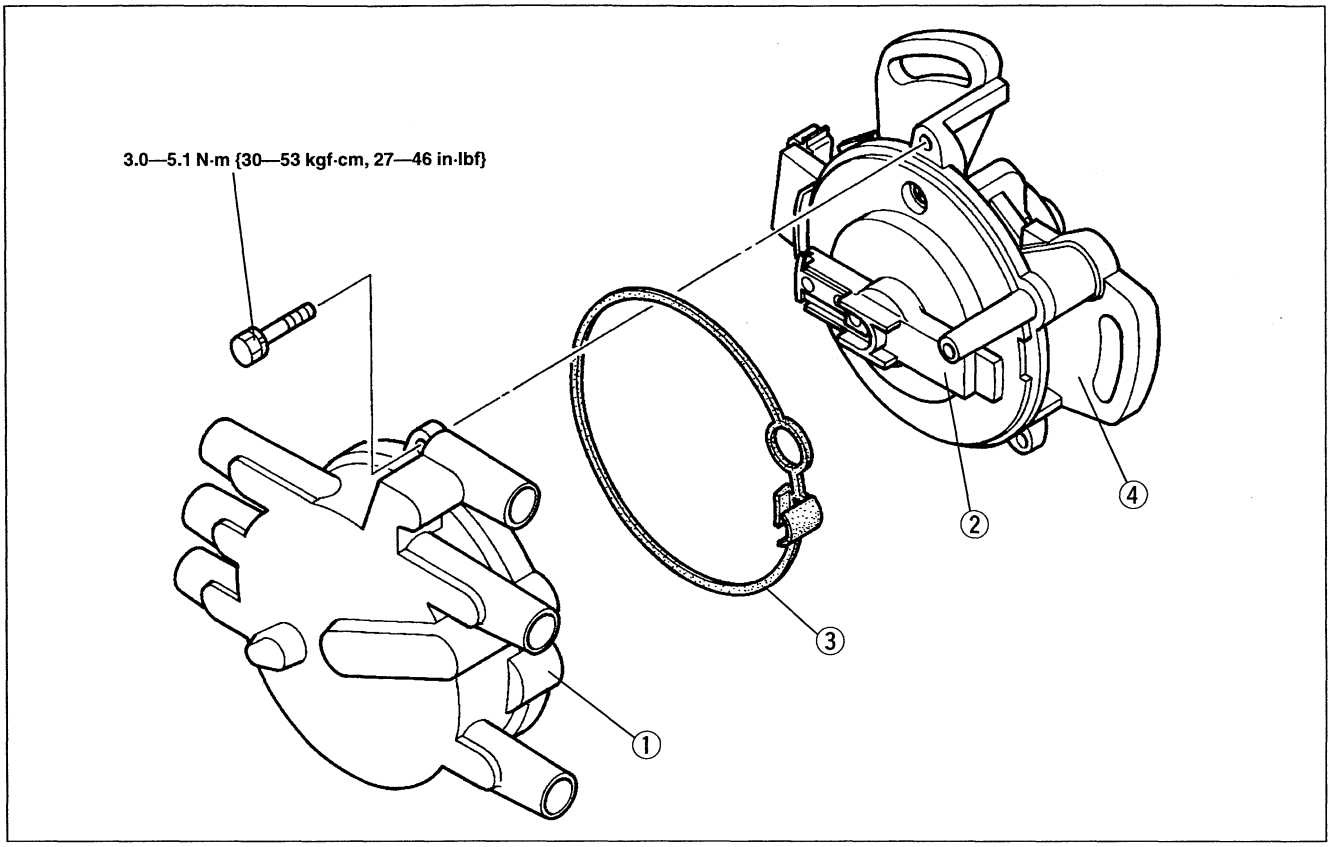


FS [ATX]

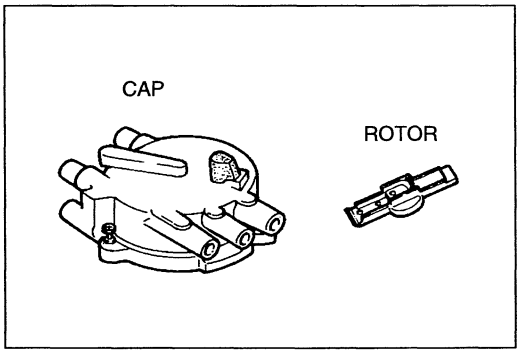


1. Cap
2. Rotor
3. Cover
4. Packing (FS [MTX])
5. Insulator
6. Distributor
   (Incorporates camshaft position sensor, ignition control module, and ignition coil) [MTX]
   (Incorporates camshaft position sensor) [ATX]

KL



1. Cap
2. Rotor
3. Packing
4. Distributor
   (Incorporates camshaft position sensor, ignition control module, and ignition coil)



Inspection

Cap and rotor

1. Check for corrosion, damage, and cracks.
2. Replace if necessary.

IGNITION CONTROL MODULE

Inspection

1. Mesure the voltage of the ECM (FS [MTX]) or PCM (KL) terminals as follows. (Refer to sections F1 or F2.)

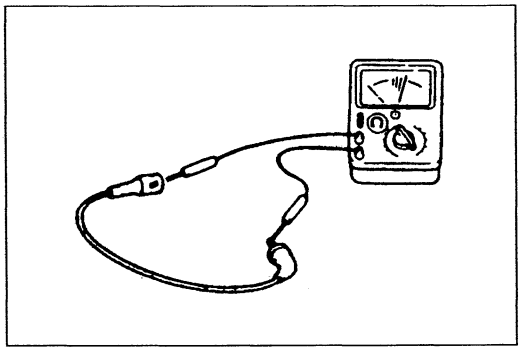
FS [MTX]
- 2F (Ignition control module)

KL
- 1G (Ignition control module)

2. Check the condition of the connector, distributor, ignition coil, and high-tension leads.
3. If all are normal but misfire still occurs, replace the distributor.

Replacement

1. Replace the distributor. (Refer to page G–22.)
2. Adjust the ignition timing. (Refer to sections F1 or F2.)



HIGH-TENSION LEAD

Removal / Installation

Caution
- **Reinstall the high-tension leads to their original positions. Incorrect installation can damage the leads and cause power loss, and negatively effect electronic components.**

Inspection

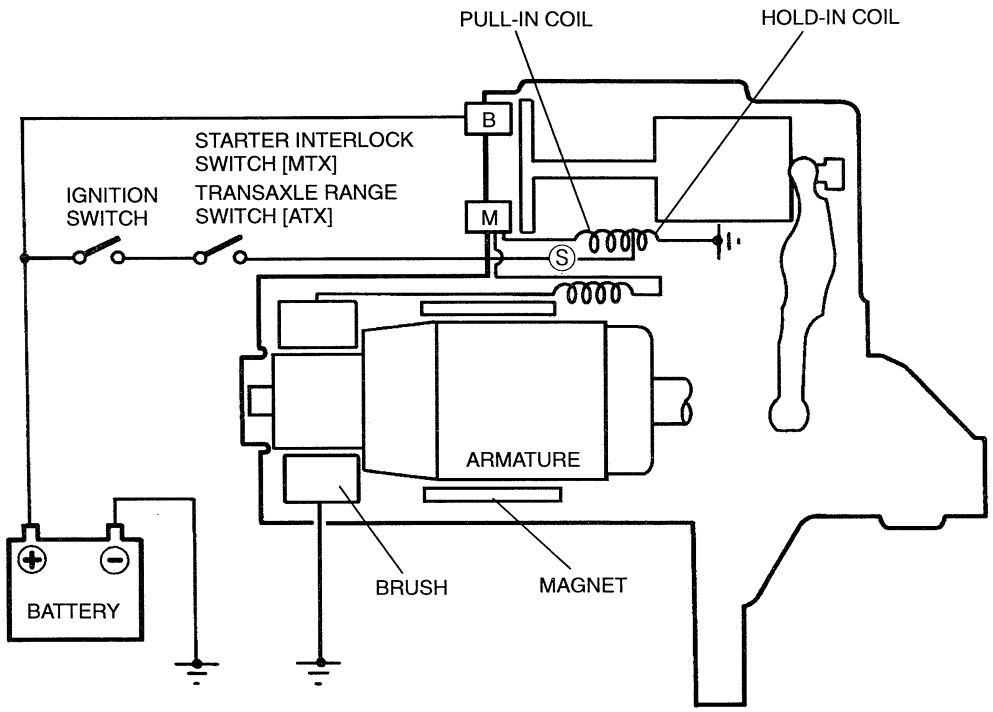
1. Measure the resistance of the high-tension leads.

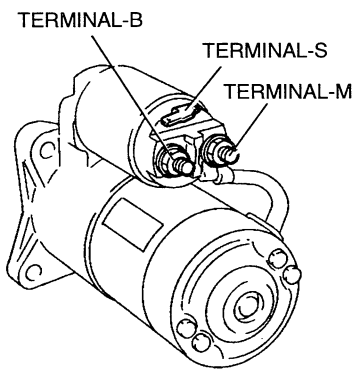
   Specification: 16 kΩ per 1 m {3.28 ft}

2. If not as specified, replace the high-tension lead set.

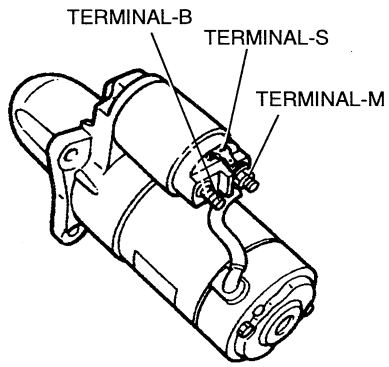
STARTING SYSTEM

CIRCUIT DIAGRAM

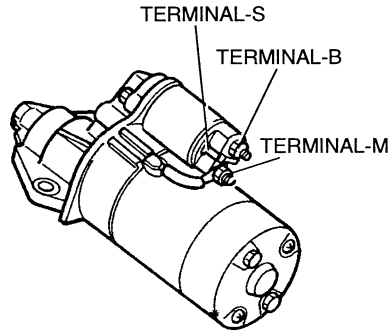




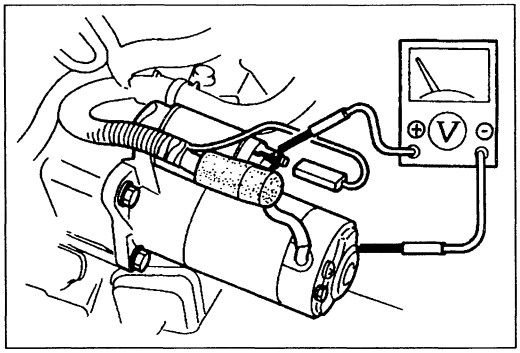
FS



KL [MTX]



KL [ATX]



STARTER

Inspection (on vehicle)

1. Measure the battery positive voltage.

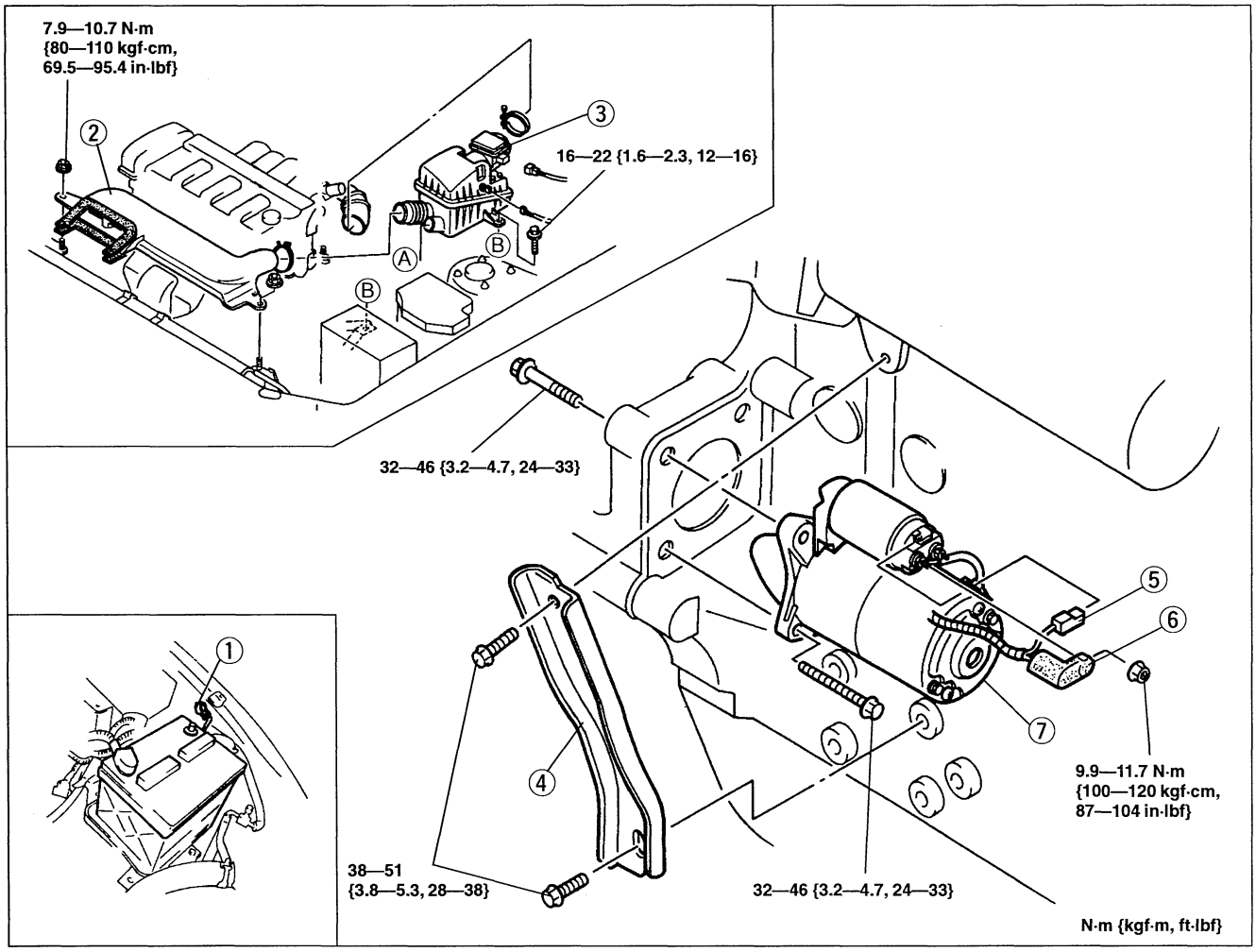
   Specification: Above 12.4V

2. Crank the engine and verify that the starter turns smoothly.
3. If the starter does not turn, check the voltage at terminal S.
4. If the voltage is **more than 8V**, remove and inspect the starter. If the voltage is **less than 8V**, check the wiring harness, ignition switch, starter interlock switch [MTX], and transaxle range switch [ATX].

Removal / Installation

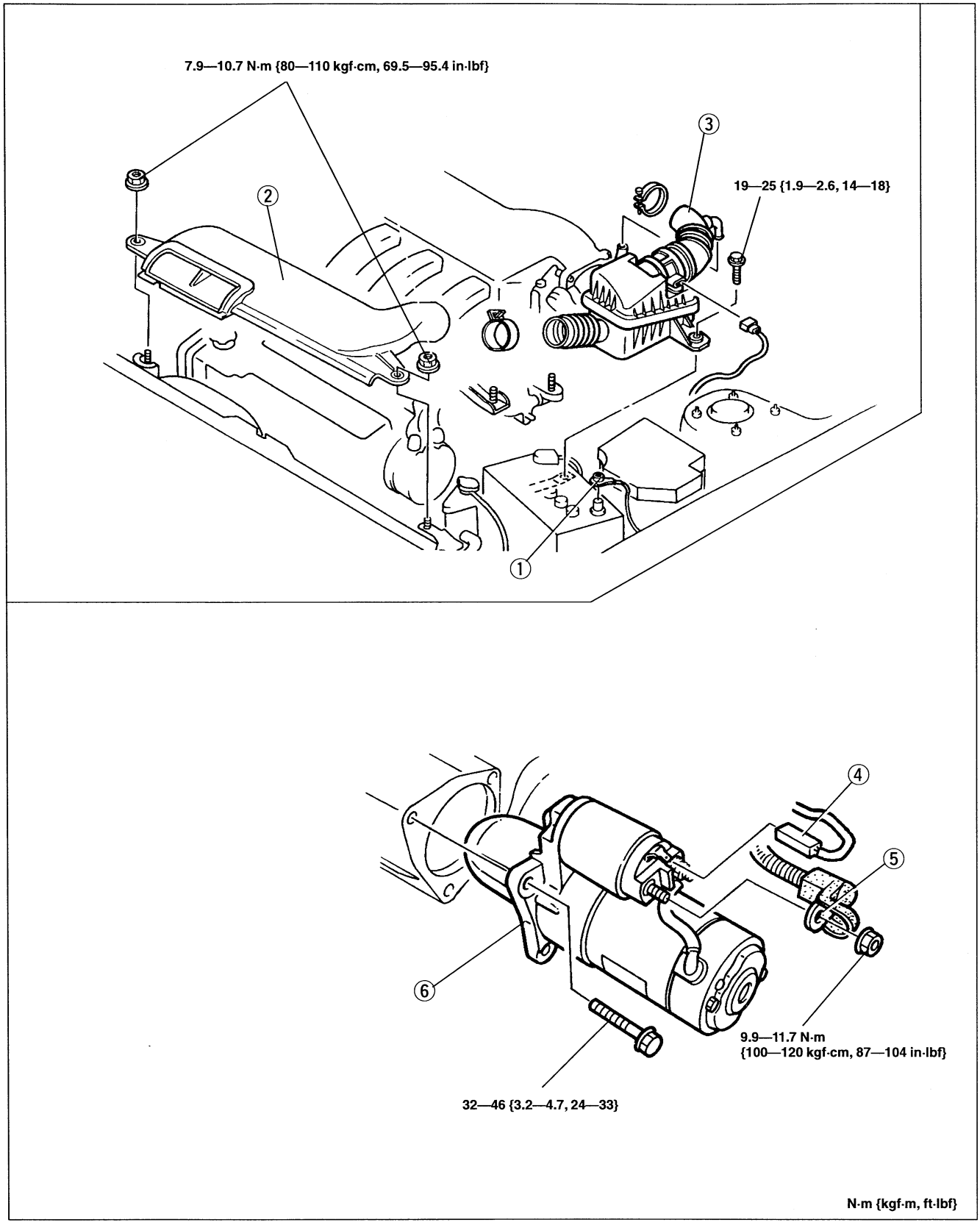
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.

FS



1. Negative battery cable
2. Fresh-air duct
3. Air cleaner
4. Intake manifold bracket
5. Terminal S wire
6. Terminal B wire
7. Starter

KL [MTX]



1. Negative battery cable
2. Fresh-air duct
3. Air cleaner
4. Terminal S wire
5. Terminal B wire
6. Starter

KL [ATX]

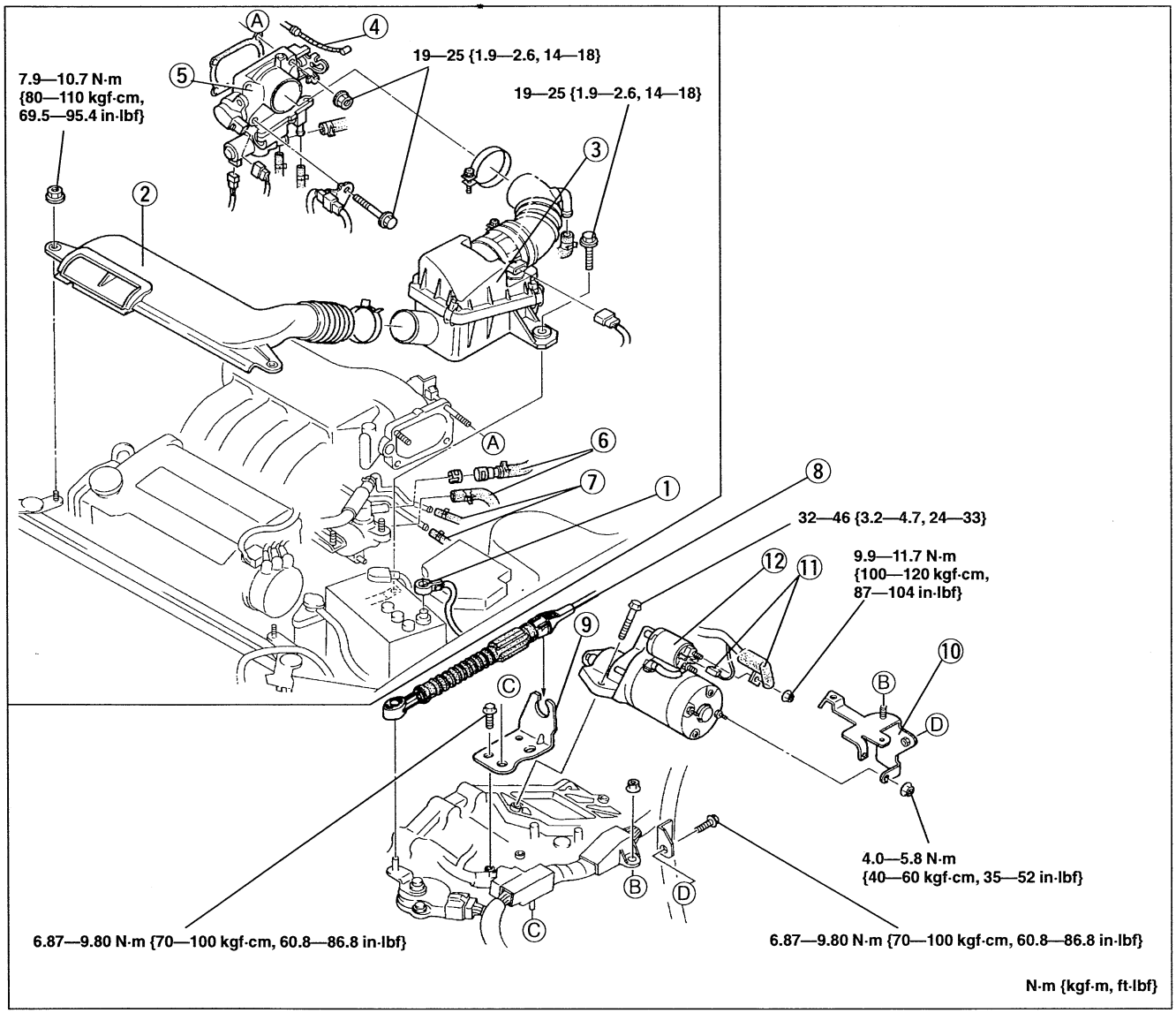
Warning

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on section F2.**

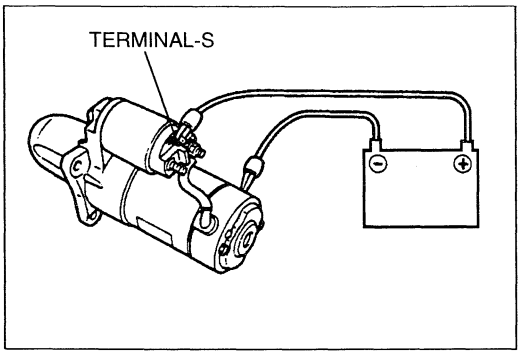
Before performing this operation, drain the engine coolant. (Refer to section E2.)

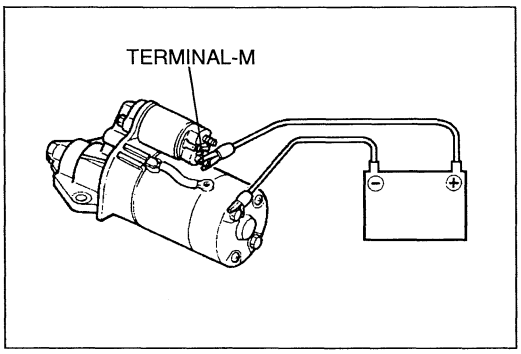
Fuel Line Safety Procedures

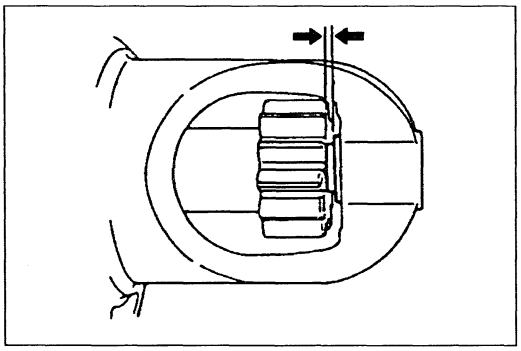
1. Start the engine.
2. Remove the fuel pump relay.
3. After the engine stalls, turn the ignition switch to OFF.
4. Install the fuel pump relay.



1. Negative battery cable
2. Fresh-air duct
3. Air cleaner
4. Accelerator cable
5. Throttle body
6. Coolant hose
7. Fuel line
8. Selector cable
9. Cable bracket
10. Starter bracket
11. Terminal S and B wire
12. Starter







Performance Inspection

Magnetic switch

Disconnect terminal S wire, and perform the following tests. Replace the magnetic switch if necessary.

Pull-in test

Connect battery positive voltage as shown and verify that the pinion is ejected.

Caution

- **Applying power continuously for more than 10 seconds will damage the starter.**

Hold-in test

After completing the pull-in test, disconnect the wire from terminal M (with pinion ejected) and verify that the pinion does not return.

Adjustment of pinion gap

1. Disconnect the wire from terminal M.
2. Apply battery positive voltage between terminal S and the starter body.
3. Measure the clearance (pinion gap) between the pinion and the stopper.

Caution

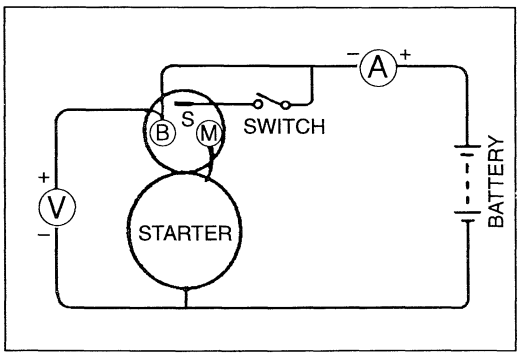
- **Applying power continuously for more than 10 seconds will damage the starter.**

Pinion gap: 0.5—2.0 mm {0.020—0.078 in}

4. If the pinion gap is not within the specification, increase or decrease the number of washers between the magnetic switch and the drive housing.

Note

- The gap becomes smaller as the number of washers is increased.



No load test

1. Connect the starter, battery, voltmeter and ammeter as shown.

Note

- Use fully charged battery.

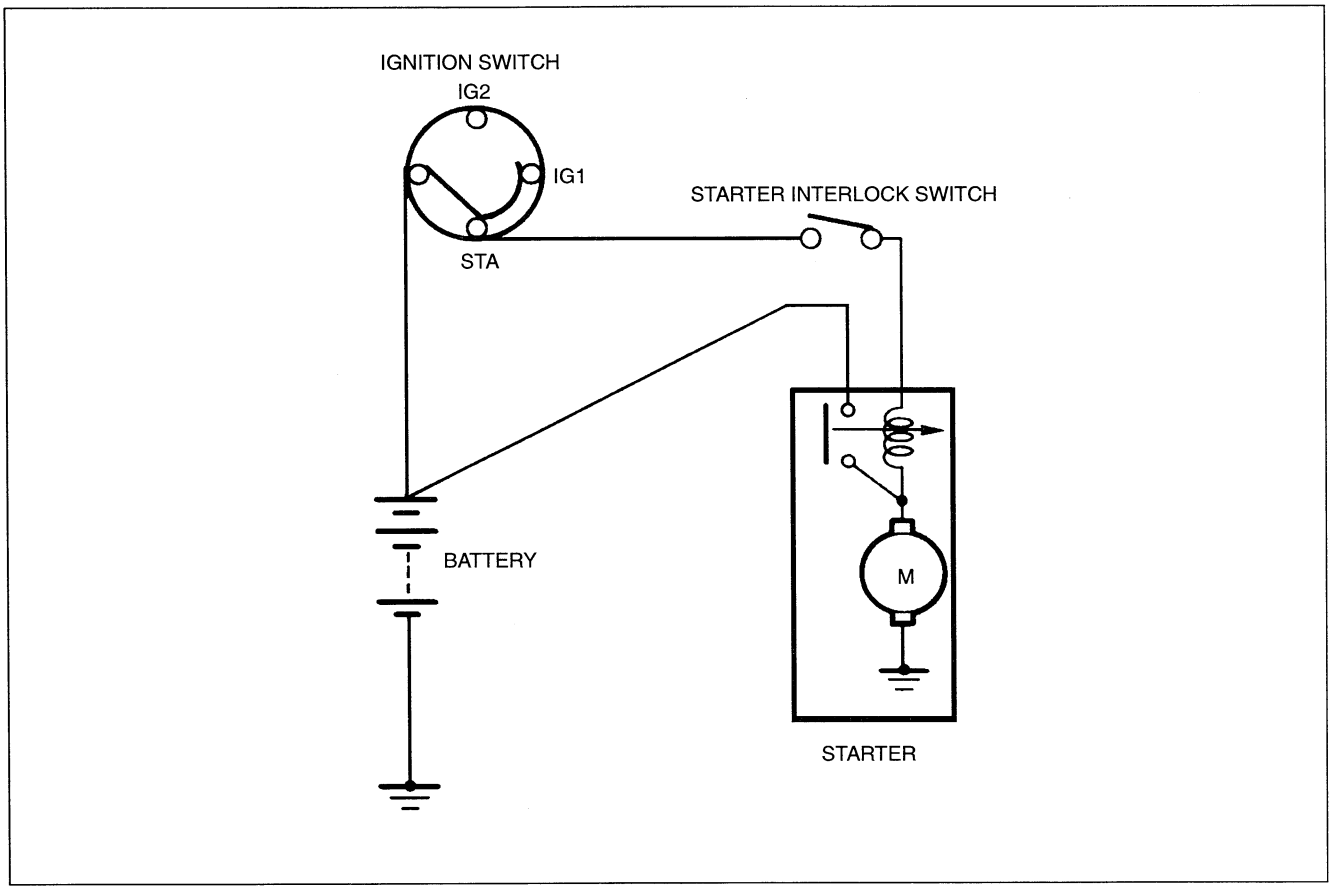
2. Operate the starter and verify that it turns smoothly.
3. Measure the voltage and current as described below.

Specification

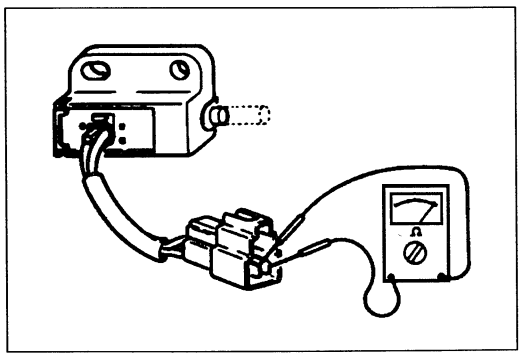
Engine		FS		KL	
		MTX	ATX	MTX	ATX
Voltage	V	11	11	11	11
Current	A	90	90	90	70

4. If not as specified, repair or replace inner parts as necessary.

STARTER INTERLOCK SWITCH



This system is similar to that of the transaxle range switch on an ATX vehicle.
If the clutch pedal is not depressed during starting, battery power will not be supplied to the starter and it will not operate.



Inspection

1. Disconnect the starter interlock switch connector.
2. Connect a circuit tester to the switch.
3. Check the continuity.

Pedal	Continuity
Depressed	Yes
Released	No

4. Replace the switch if necessary.

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

CLUTCH

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INSPECTION H–20

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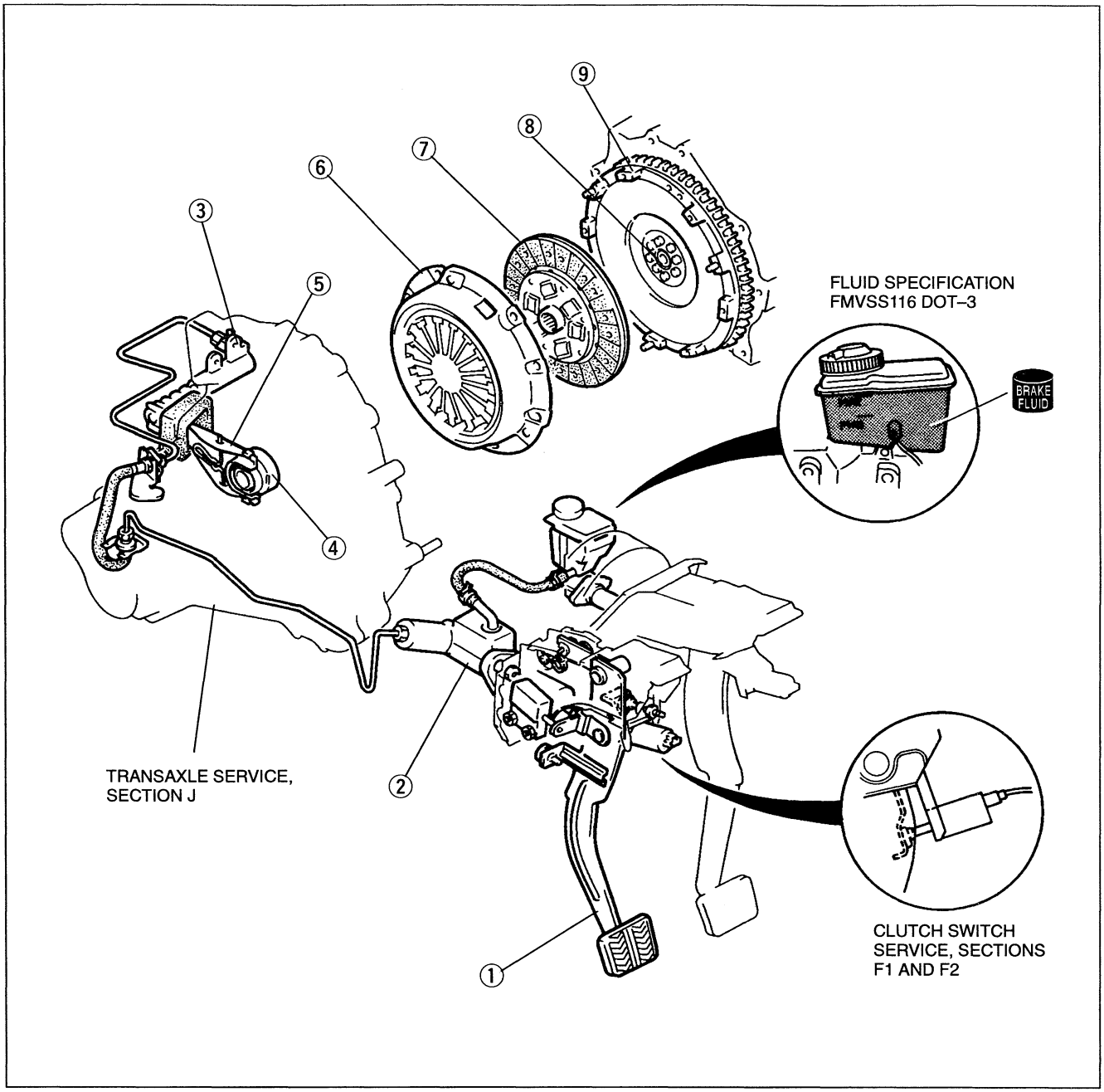

1. Clutch pedal
   Adjustment ..... page H– 5
   Removal / Installation ..... page H– 6
   Overhaul ..... page H– 7
2. Clutch master cylinder
   Removal / Installation ..... page H– 8
   Air bleeding ..... page H–10
   Overhaul ..... page H–11
3. Clutch release cylinder
   Removal / Installation ..... page H–13
   Overhaul ..... page H–14
4. Clutch release collar
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5. Clutch release fork
   Removal / Installation ..... page H–16
6. Clutch cover
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7. Clutch disc
   Removal / Installation ..... page H–16
   Inspection ..... page H–19
8. Pilot bearing
   Inspection ..... page H–20
   Removal / Installation ..... page H–16
9. Flywheel
   Removal / Installation ..... page H–16
   Inspection ..... page H–20

OUTLINE

SPECIFICATIONS

Item \ Engine/Transaxle				FS	KL
				G25M–R	
Clutch control				Hydraulic	
Clutch pedal	Type			Suspended	
	Pedal ratio			6.55	
	Full stroke		mm {in}	135 {5.31}	
	Height		mm {in}	186—211 {7.32—8.31} (with carpet)	
Clutch disc	Outer diameter		mm {in}	225 {8.86}	
	Inner diameter		mm {in}	150 {5.91}	
	Thickness	Flywheel side	mm {in}	3.5 {0.14}	
		Pressure plate side	mm {in}	3.8 {0.15}	
Clutch cover	Type			Diaphragm spring	
	Set load		N {kgf, lbf}	4,610 {470, 1,030}	5,200 {530, 1,170}
Clutch master cylinder	Inner diameter		mm {in}	15.87 {0.6248}	
Clutch release cylinder	Inner diameter		mm {in}	19.05 {0.7500}	
Clutch fluid				FMVSS116 DOT–3	

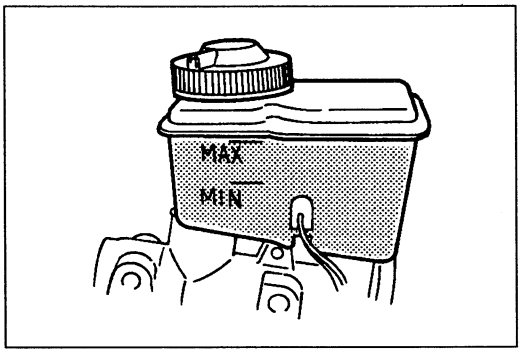
TROUBLESHOOTING GUIDE

Problem	Possible cause	Action	Page
Slipping	Clutch disc facing worn	Replace	H–16
	Clutch disc facing surface hardened or oiled	Repair or replace	H–16, 19
	Pressure plate damaged	Replace	H–16
	Diaphragm spring damaged or weakened	Replace	H–16
	Insufficient clutch pedal play	Adjust	H– 5
	Clutch pedal sticking	Repair or replace	H– 6
	Flywheel damaged	Repair or replace	H–16, 20
Poor disengagement	Excessive runout or damaged clutch disc	Replace	H–16
	Clutch disc splines rusted or worn	Remove rust or replace	H–16
	Oil on facing	Repair or replace	H–16, 19
	Diaphragm spring weakened	Replace	H–16
	Excessive clutch pedal play	Adjust	H– 5
	Insufficient clutch fluid	Add fluid	H– 4
	Leakage of clutch fluid	Locate and repair or replace	—
Vibration of clutch when accelerating	Oil on facing	Repair or replace	H–16, 19
	Torsion rubbers weakened	Replace	H–16
	Clutch disc facing hardened or damaged	Repair or replace	H–16, 19
	Clutch disc facing rivets loose	Replace	H–16
	Pressure plate damaged or has excessive runout	Replace	H–16
	Flywheel surface hardened or damaged	Repair or replace	H–16, 20
	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 collar damaged	Replace	H–16
	Poor lubrication of release collar sleeve	Lubricate or replace	H–16
	Torsion rubbers weakened	Replace	H–16
	Excessive crankshaft end play	Repair	Refer to section B
	Pilot bearing worn or damaged	Replace	H–16, 20
	Worn pivot points or release fork	Replace	H–16

CLUTCH FLUID

PREPARATION
SST

49 0259 770B Wrench, flare nut 	For air bleeding system



INSPECTION

Note
- A common reservoir is used for the clutch and brake system fluids.

1. Verify that the fluid level in the reservoir is between the MAX and MIN marks.
2. If the fluid level is extremely low check the clutch and brake systems for leakage.

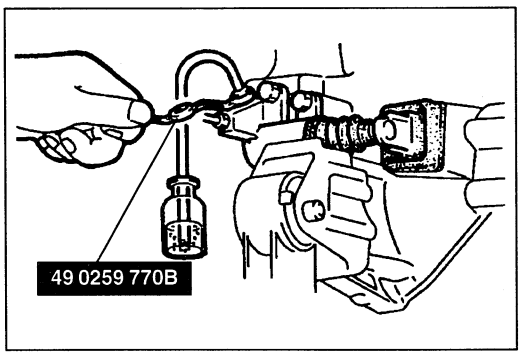
REPLACEMENT

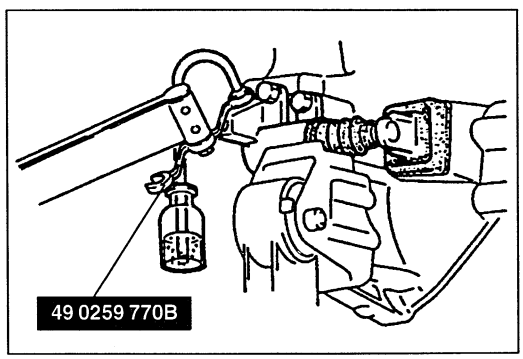
Caution
- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

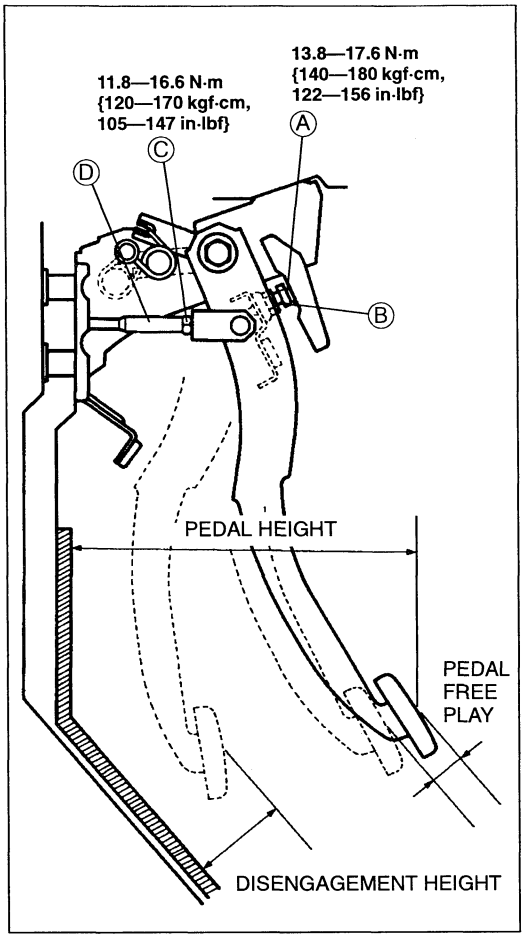
1. Remove the brake fluid from the reservoir by using a suction pump, and fill the reservoir with new fluid of the specified type.
2. Remove the bleeder cap from the clutch release cylinder and attach a vinyl hose to the bleeder plug.
3. Insert the other end of the vinyl hose into a clear container.
4. Working with another person, have the person depress the clutch pedal several times, then hold it down.
5. With the clutch pedal depressed, loosen the bleeder screw by using the **SST** to let the fluid escape. Close the bleeder screw.
6. Repeat steps 4 and 5 until only clean fluid is seen. Make sure the reservoir is always 3/4 full or more during this procedure.
7. Modify the bleeder screw tightening torque to allow for a torque wrench-**SST** combination.
   (Refer to section GI "Torque Formulas".)
8. Tighten the bleeder screw by using the **SST**.

   Tightening torque:
   5.9—8.8 N·m {60—90 kgf·cm, 53—78 in·lbf}

9. Fill the reservoir to MAX with new fluid of the specified type.
10. Slowly pump the clutch pedal several times. Verify that there is no fluid leakage.
11. Check the operation of the clutch system.
12. Check the operation of the brake system.







CLUTCH PEDAL

ADJUSTMENT

Height

Inspection

1. Measure the distance from the upper surface of the pedal pad to the carpet.

   Pedal height: 186—211 mm {7.32—8.31 in} (with carpet)

2. If necessary, adjust the pedal height

Adjustment

1. Loosen locknut Ⓐ and turn adjusting bolt Ⓑ until the height is correct.
2. Tighten locknut Ⓐ.

   Tightening torque:
   13.8—17.6 N·m {140—180 kgf·cm, 122—156 in·lbf}

3. After adjustment, measure the pedal free play.

Free Play

Inspection

1. Depress the clutch pedal by hand until clutch resistance is felt.

   Free play: 1—3 mm {0.04—0.12 in}
   Total free play: 5—14 mm {0.20—0.55 in}

2. If necessary, adjust the pedal free play.

Adjustment

1. Loosen locknut Ⓒ and turn push rod Ⓓ until the pedal free play is correct.
2. Verify that the disengagement height (from the upper surface of the pedal pad to the carpet) is correct when the pedal is fully depressed.

   Minimum disengagement height:
   67 mm {2.64 in} (with carpet)

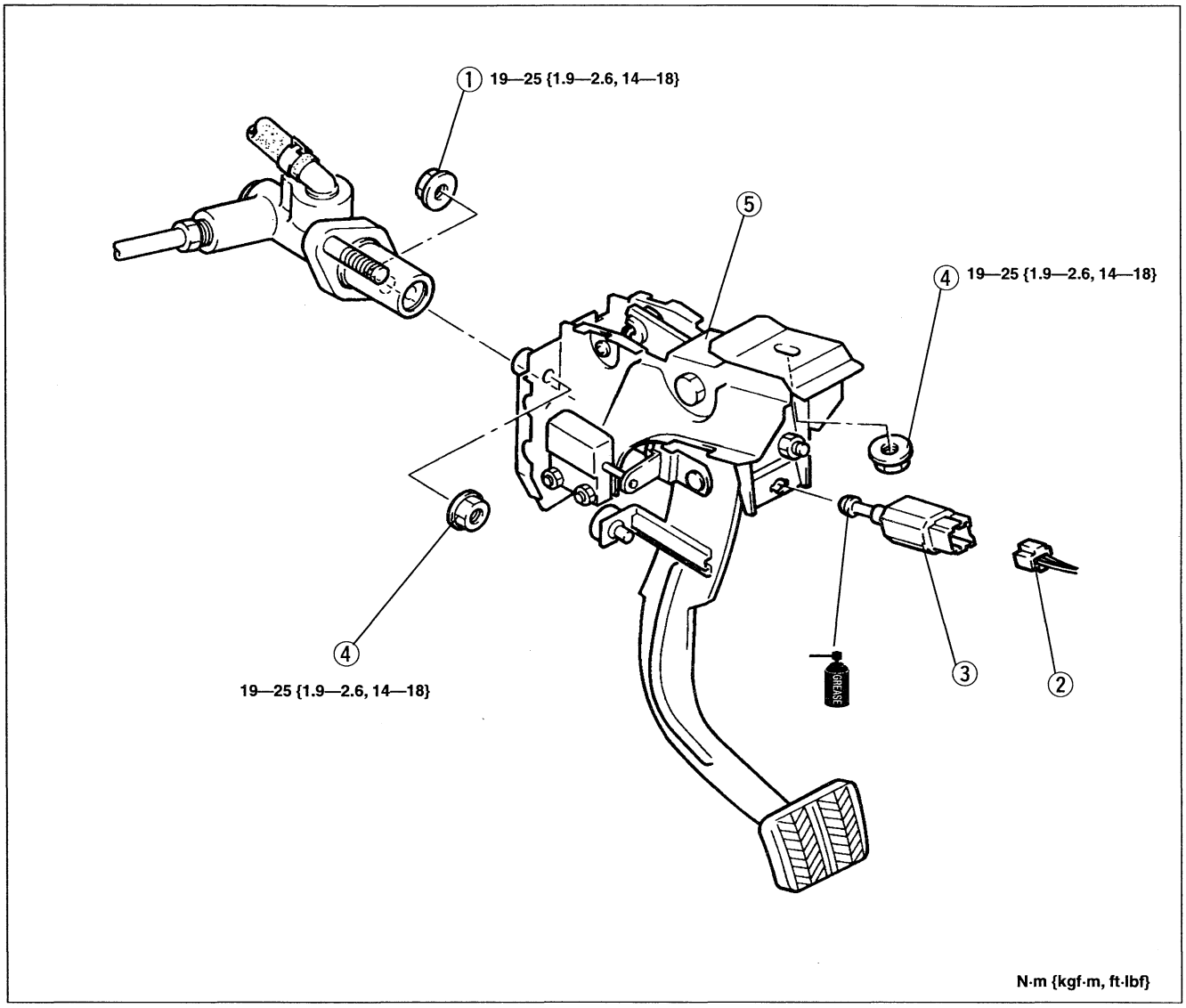
3. Tighten locknut Ⓒ.

   Tightening torque:
   11.8—16.6 N·m {120—170 kgf·cm, 105—147 in·lbf}

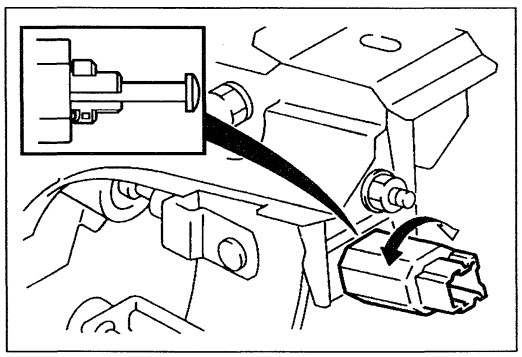
4. After adjustment, measure the pedal height.

REMOVAL / INSTALLATION

1. Remove the brake pedal. (Refer to section P.)
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal.
4. Inspect and adjust the clutch pedal height and free play. (Refer to page H–5.)



1. Nut
2. Clutch switch connector
3. Clutch switch
   Removal Note ..... below
4. Nuts
5. Clutch pedal assembly
   Adjustment ..... page H–5
   Overhaul ..... page H–7



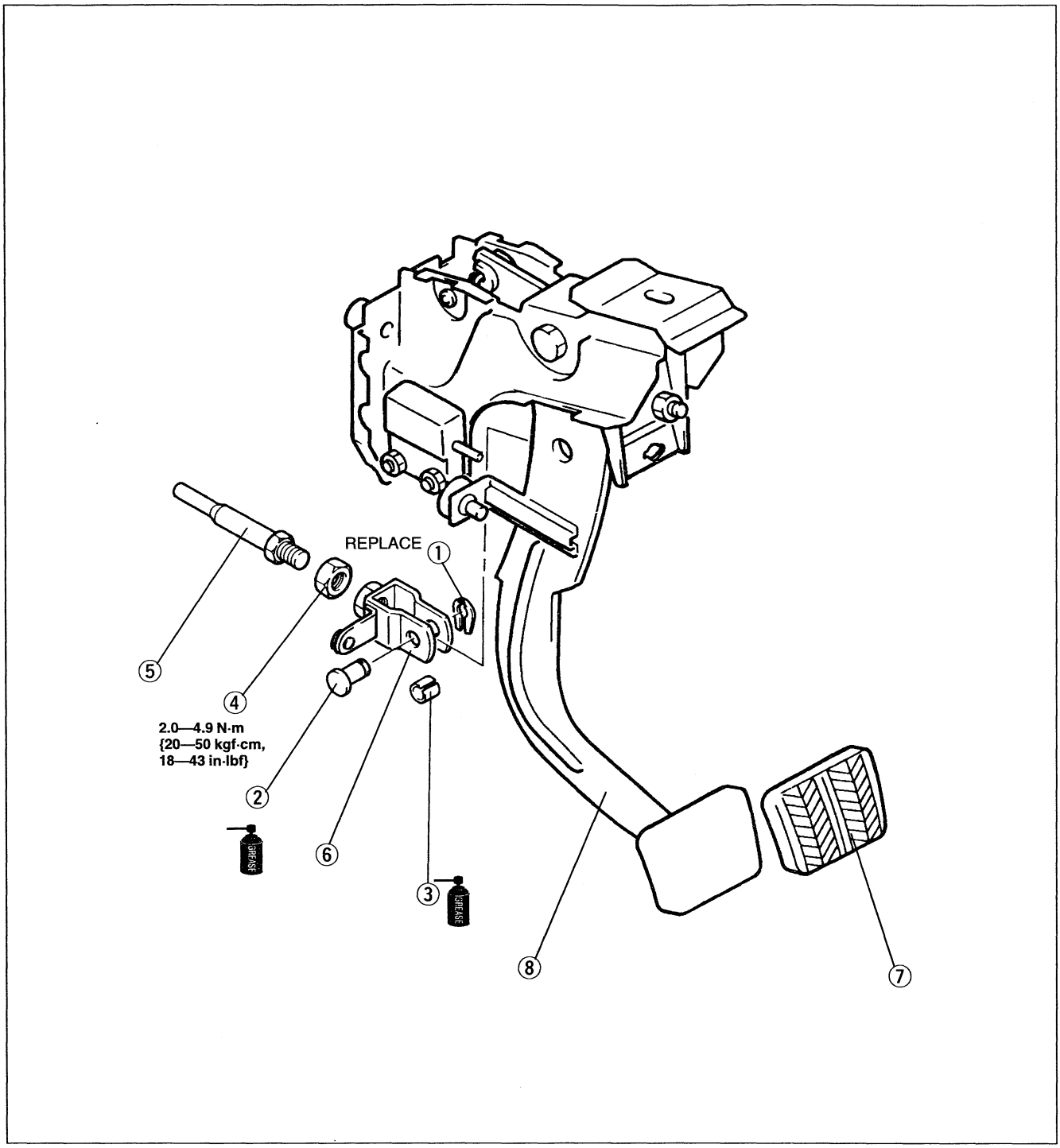
Removal Note

Clutch switch

Turn the clutch switch 90 degrees in either direction and remove from the bracket.

OVERHAUL

1. Disassemble in the order shown in the figure.
2. Apply lithium-based grease to all bushings and pins.
3. Assemble in the reverse order of disassembly.



1. Clip
2. Pin
3. Bushing
4. Nut
5. Push rod
6. Clevis
7. Pedal pad
8. Clutch pedal

CLUTCH MASTER CYLINDER

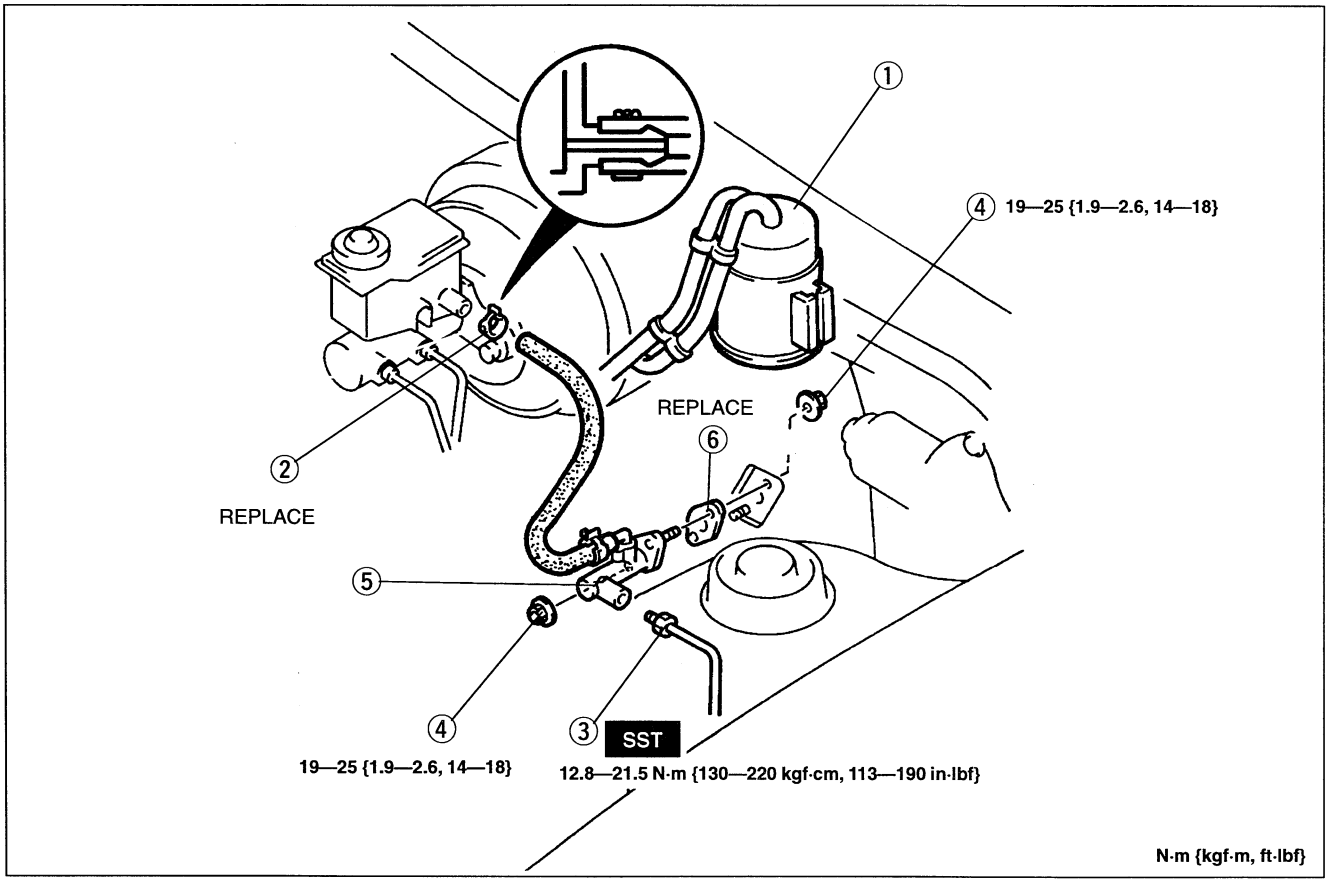
PREPARATION
SST

49 0259 770B Wrench, flare nut		For disconnecting/ connecting clutch pipe

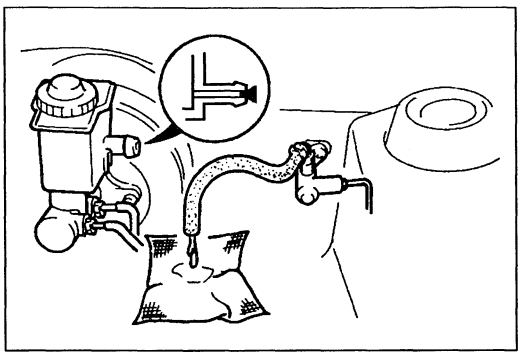
REMOVAL / INSTALLATION

Caution
- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

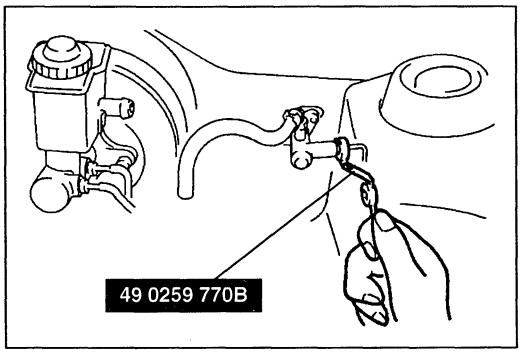
1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal, referring to **Installation Note**.
3. After installation, bleed the clutch and the brake system. (Refer to page H–10.)
4. Inspect and adjust the clutch pedal height and free play. (Refer to page H–5.)



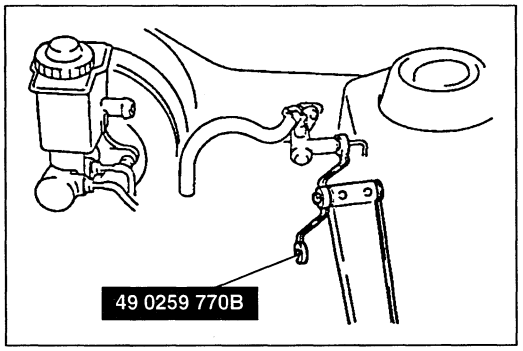
1. Charcoal canister
2. Clamp
   - Removal Note ..... page H–9
   - Installation Note ..... page H–9
3. Clutch pipe
   - Removal Note ..... page H–9
   - Installation Note ..... page H–9
4. Nuts
5. Clutch master cylinder
   - Overhaul ..... page H–11
   - Air bleeding ..... page H–10
6. Gasket



Removal Note
Clamp
1. Disconnect the hose from the reservoir.
2. Plug the outlet of the reservoir.

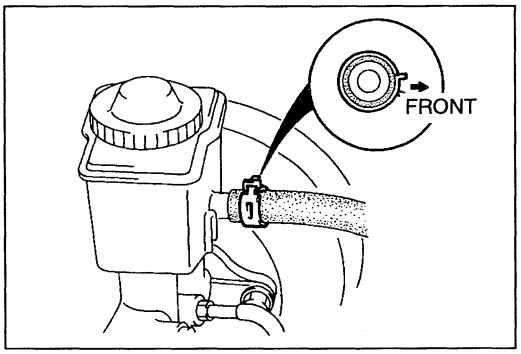


Clutch pipe
Loosen the clutch pipe by using the **SST**.

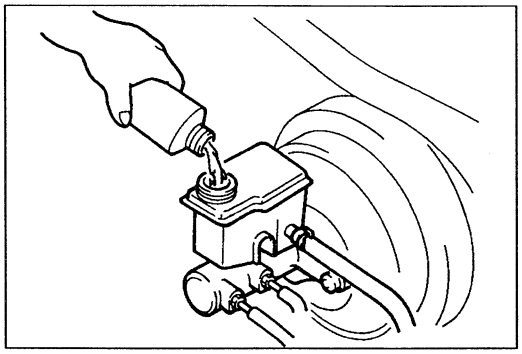


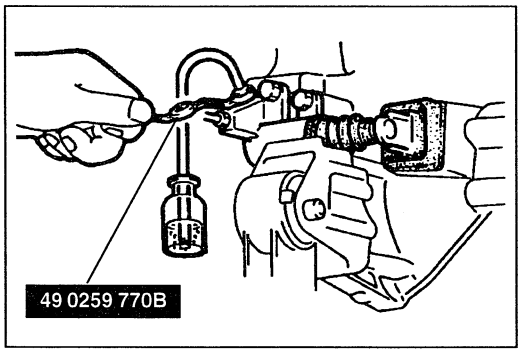
Installation Note
Clutch pipe
1. Modify the clutch pipe tightening torque to allow for a torque wrench-**SST** combination.
   (Refer to section GI "Torque Formulas".)
2. Tighten the clutch pipe by using the **SST**.

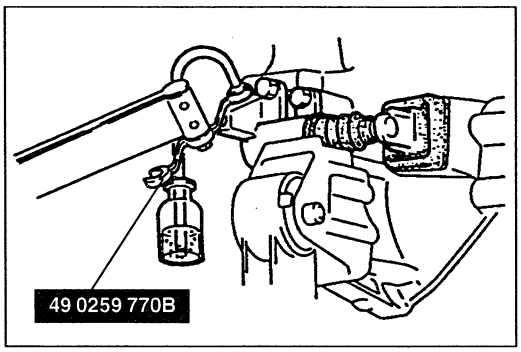
Tightening torque:
12.8—21.5 N·m {130—220 kgf·cm, 113—190 in·lbf}



Clamp
Connect the hose and install the clamp as shown in the figure.







AIR BLEEDING

The clutch hydraulic system must be bled to remove air that enters whenever a hydraulic line is disconnected.

Caution

- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

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 into a clear container.
3. Working with another person, have the person depress the clutch pedal several times, then hold it down.
4. With the clutch pedal depressed, loosen the bleeder screw by using the **SST** to let fluid and air escape. Close the bleeder screw by using the **SST**.
5. Repeat steps 3 and 4 until no air bubbles are seen. Make sure the reservoir is always 3/4 full or more during this procedure.
6. Modify the bleeder screw tightening torque to allow for a torque wrench-**SST** combination.
   (Refer to section GI "Torque Formulas".)
7. Tighten the bleeder screw by using the **SST**.

   Tightening torque:
   5.9—8.8 N·m {60—90 kgf·cm, 53—78 in·lbf}

8. Fill the reservoir to MAX with new fluid of the specified type.
9. Slowly pump the clutch pedal several times. Verify that there is no fluid leakage.
10. Check the operation of the clutch system.
11. Check the operation of the brake system.

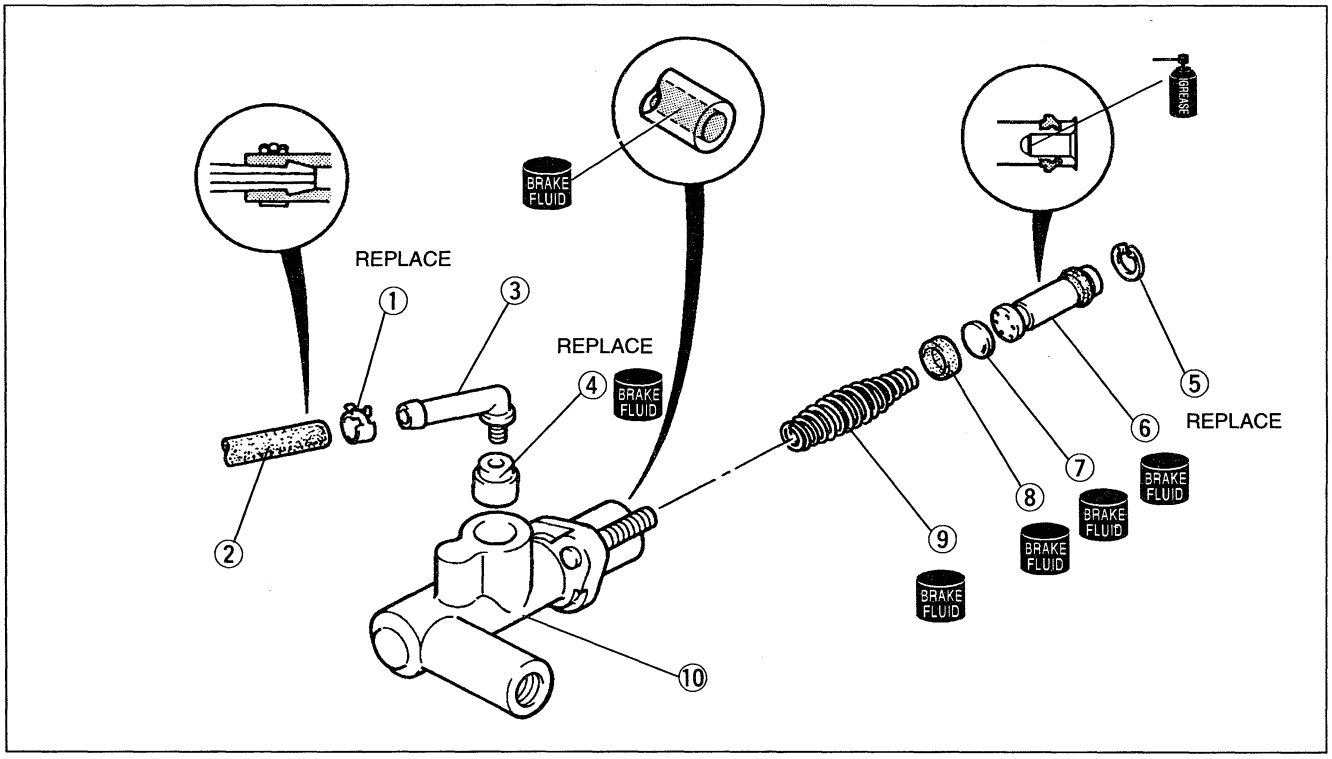
OVERHAUL

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.

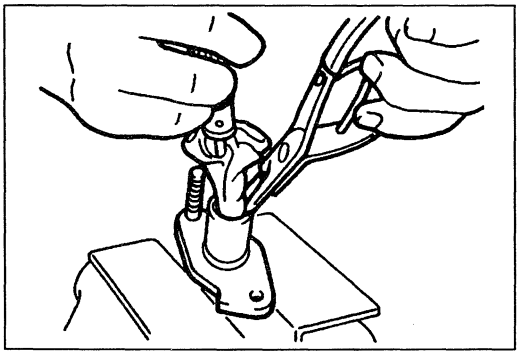
Warning

- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eyewear whenever using compressed air.**

2. Wipe all parts, and clean all ports, passages, and inner parts with compressed air.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



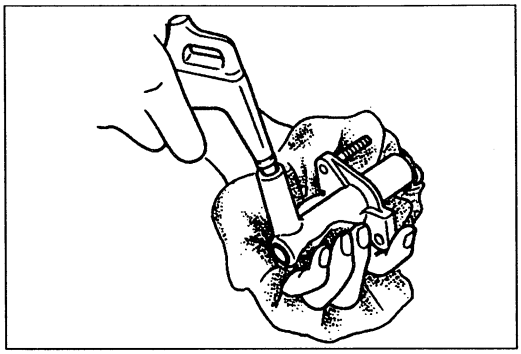
1. Clamp
2. Hose
3. Joint
4. Bushing
5. Snap ring
   Disassembly Note ..... below
   Assembly Note ..... page H–12
6. Piston and secondary cup assembly
   Disassembly Note ..... page H–12
   Assembly Note ..... page H–12
7. Spacer
8. Primary cup
   Inspect for wear and cracks
9. Return spring
10. Master cylinder body



Disassembly Note

Snap ring

While holding the piston down with a cloth-wrapped pin punch, remove the snap ring.

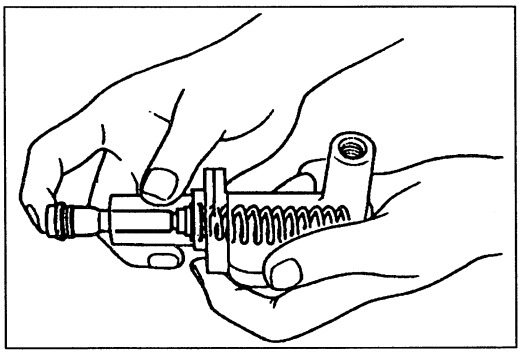


Piston and secondary cup assembly

Warning

- **Applying compressed air to the cylinder assembly can make the contents suddenly pop out, possibly causing injury. Hold a rag over the cylinder opening when using compressed air.**

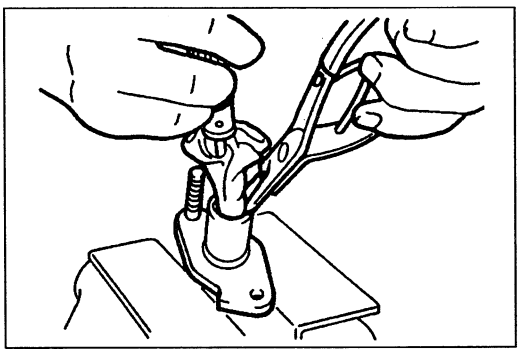
Remove the piston and secondary cup assembly, spacer, and primary cup by applying compressed air through the clutch pipe installation hole.



Assembly Note

Piston and secondary cup assembly

1. Apply new fluid of the specified type to the cylinder bore and all internal parts.
2. Verify that all parts are completely free of dirt, dust, and other small particles.
3. Install the spring, primary cup, spacer, and piston and secondary cup assembly into the master cylinder body.



Snap ring

While holding the piston down with a cloth-wrapped pin punch, install the snap ring.

CLUTCH RELEASE CYLINDER

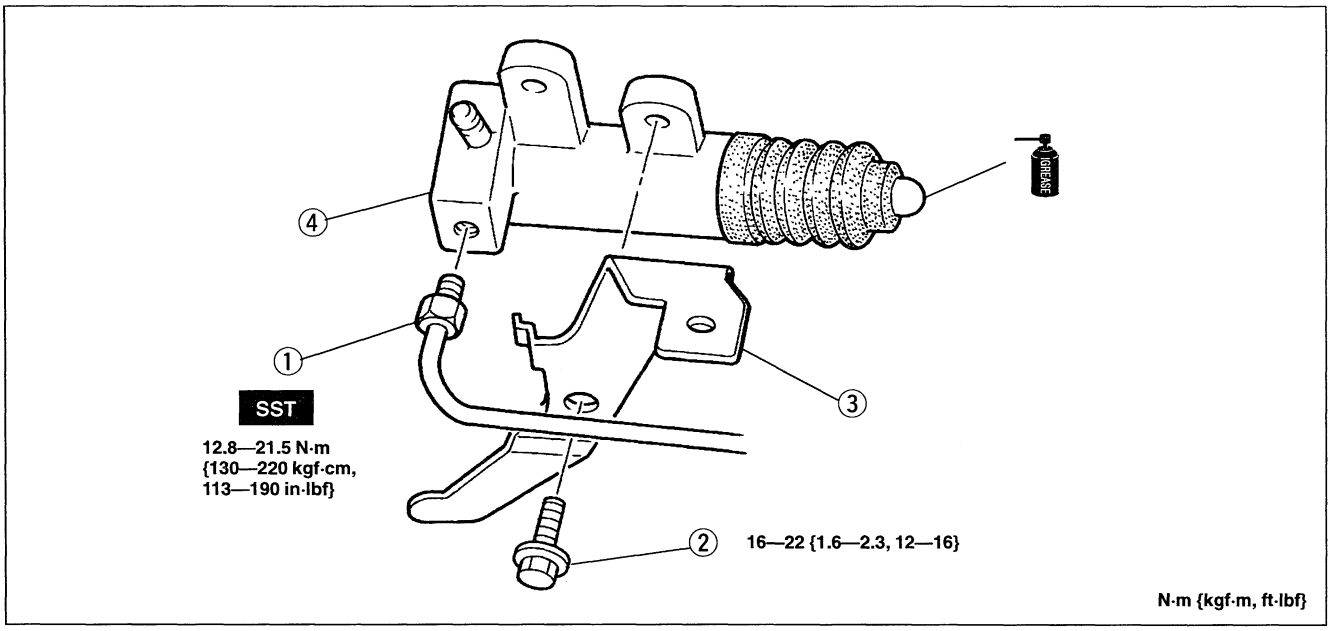
PREPARATION
SST

49 0259 770B Wrench, flare nut		For disconnecting/ connecting clutch pipe

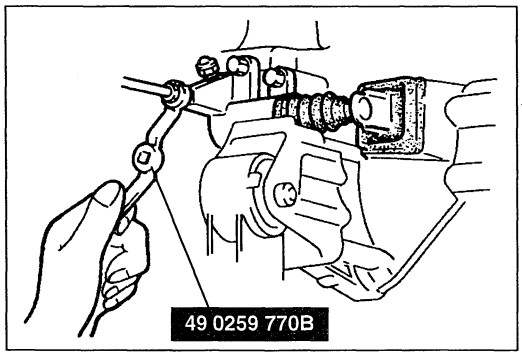
REMOVAL / INSTALLATION

Caution
- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

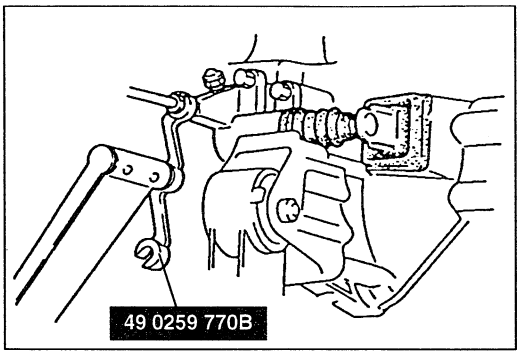
1. Remove in the order shown in the figure, referring to **Removal Note.**
2. Install in the reverse order of removal, referring to **Installation Note.**
3. After installation, bleed the clutch system. (Refer to page H–10.)



1. Clutch pipe
   Removal Note ..... below
   Installation Note ..... page H–14
2. Bolt
3. Clutch bracket (FS engine model only)
4. Clutch release cylinder
   Overhaul ..... page H–14



Removal Note
Clutch pipe
Disconnect the clutch pipe by using the **SST**, and plug the clutch pipe immediately.



Installation Note
Clutch pipe
1. Modify the clutch pipe tightening torque to allow for a torque wrench-**SST** combination.
   (Refer to section GI "Torque Formulas".)
2. Tighten the clutch pipe by using the **SST**.

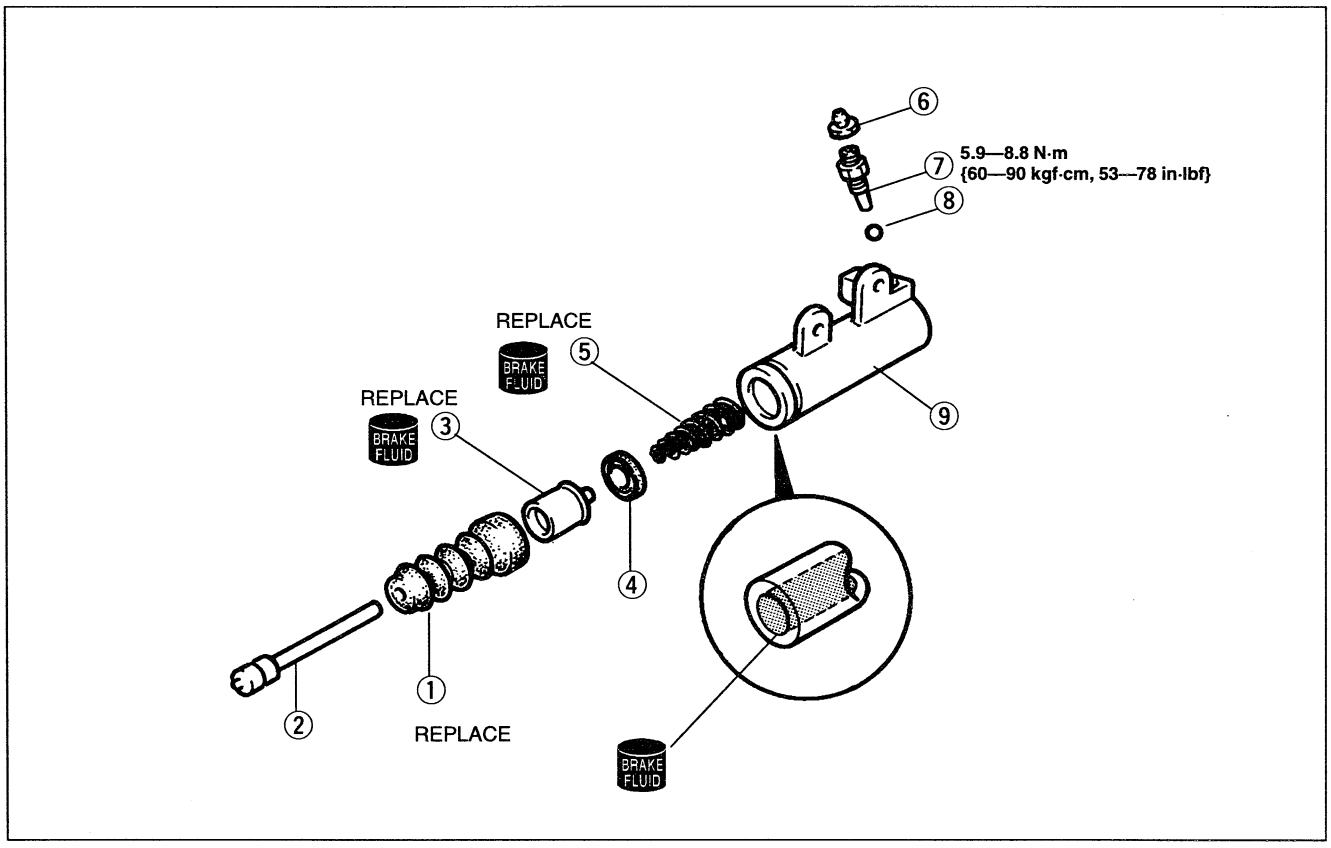
Tightening torque:
12.8—21.5 N·m {130—220 kgf·cm, 113—190 in·lbf}

OVERHAUL

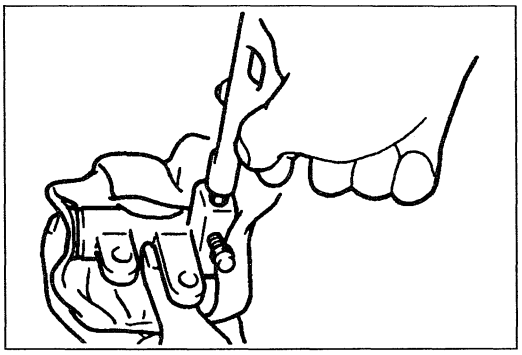
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.

Warning
- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eyewear whenever using compressed air.**

2. Wipe all parts, and clean all ports passages, and inner parts with compressed air.
3. Assemble in the reverse order of disassembly.



1. Boot
2. Push rod
3. Piston and cup assembly
   Disassembly Note . . . . . page H–15
4. Oil seal
5. Return spring
6. Bleeder cap
7. Bleeder screw
8. Steel ball
9. Release cylinder body



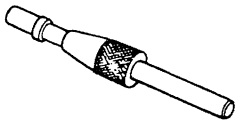
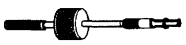
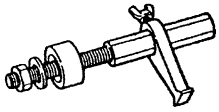
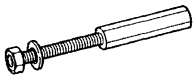
Disassembly Note
Piston and cup assembly

Warning
- **Applying compressed air to the cylinder assembly can make the contents suddenly pop out, possibly causing injury. Hold a rag over the cylinder opening when using compressed air.**

Remove the piston and cup assembly by applying compressed air through the clutch pipe installation hole.

CLUTCH UNIT

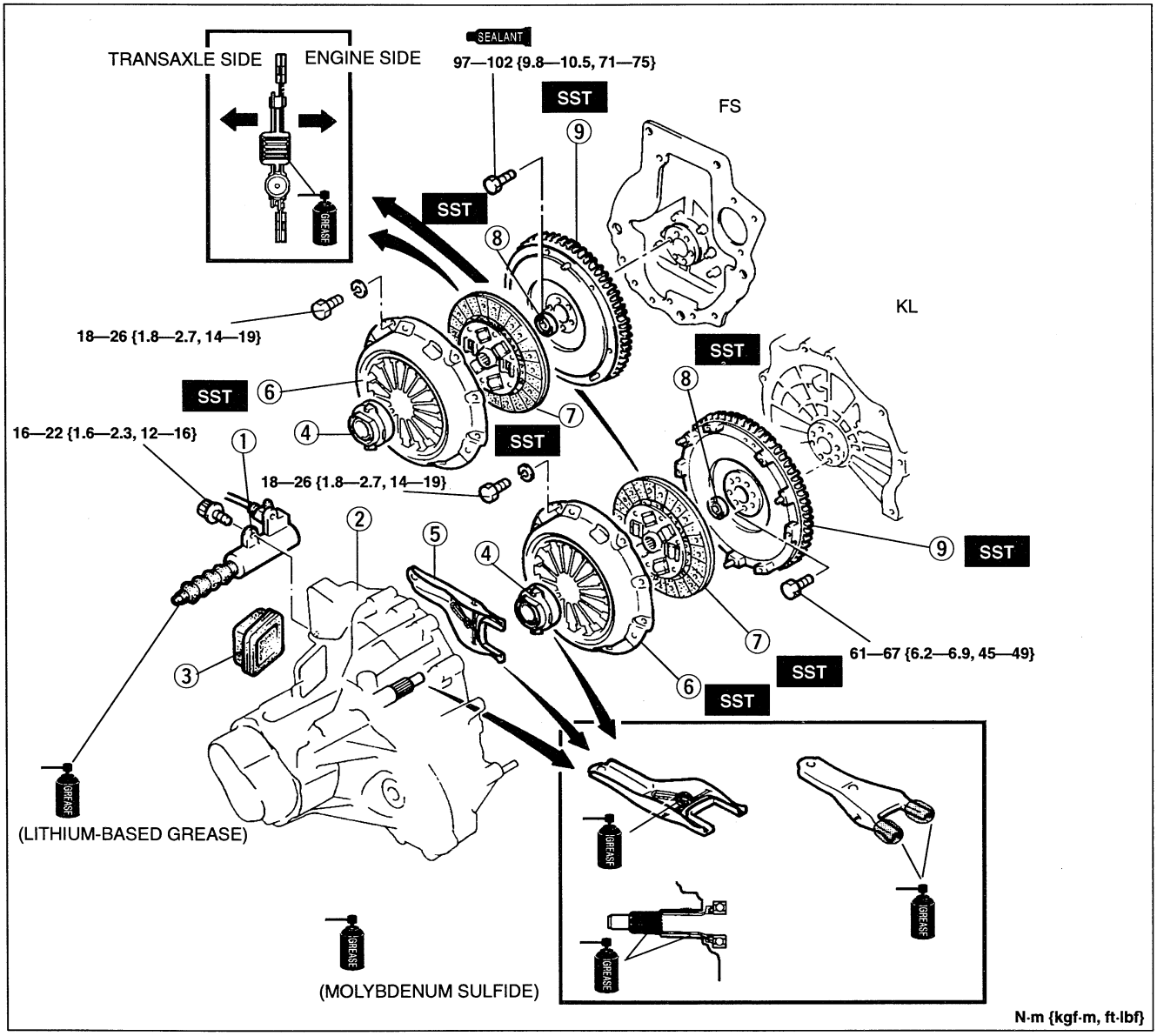
PREPARATION
SST

49 SE01 310A Centering tool, clutch disc 	For support of clutch disc	49 1285 071 Puller, bearing 	For removal of pilot bearing
49 1285 073 Chuck (Part of 49 1285 071) 	For removal of pilot bearing	49 E011 1A0 Brake, ring gear 	For prevention of engine rotation
49 E011 103 Shaft (Part of 49 E011 1A0) 	For prevention of engine rotation	49 E011 105 Stopper (Part of 49 E011 1A0) 	For prevention of engine rotation
49 E011 104 Collar (Part of 49 E011 1A0) 	For prevention of engine rotation	—	—

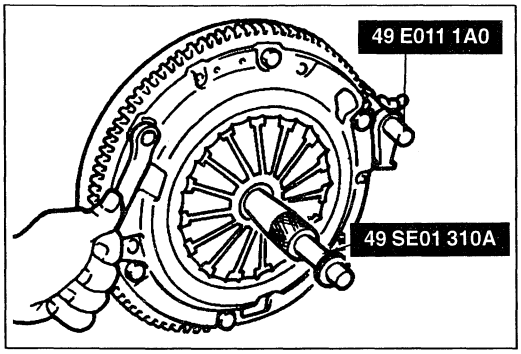
REMOVAL / INSTALLATION

Note
- The clutch release cylinder can be removed from the transaxle with the clutch pipe connected.

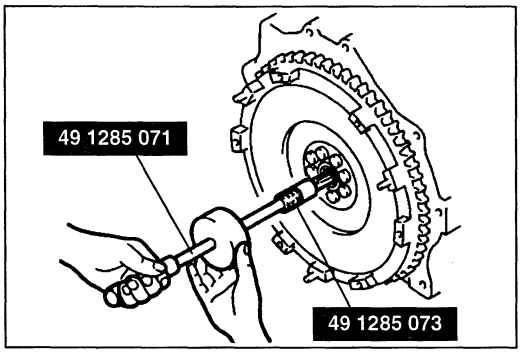
1. Remove in the order shown in the figure, referring to **Removal Note.**
2. Install in the reverse order of removal, referring to **Installation Note**.



1. Clutch release cylinder
2. Transaxle
   Service ..... section J
3. Boot
4. Clutch release collar
   Inspection ..... page H–20
5. Clutch release fork
6. Clutch cover
   Removal Note ..... page H–17
   Inspection ..... page H–18
   Installation Note ..... page H–18
7. Clutch disc
   Removal Note ..... page H–17
   Inspection ..... page H–19
   Installation Note ..... page H–18
8. Pilot bearing
   Inspection ..... page H–20
   Removal Note ..... page H–17
   Installation Note ..... page H–18
9. Flywheel
   Removal Note ..... page H–17
   Inspection ..... page H–20
   Installation Note ..... page H–17



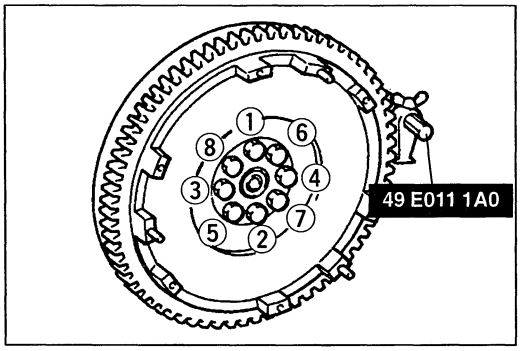
Removal Note
Clutch cover and clutch disc
1. Install the **SST**.
2. Loosen each bolt one turn at a time in a crisscross pattern until the spring tension is released.
3. Remove the clutch cover and disc.



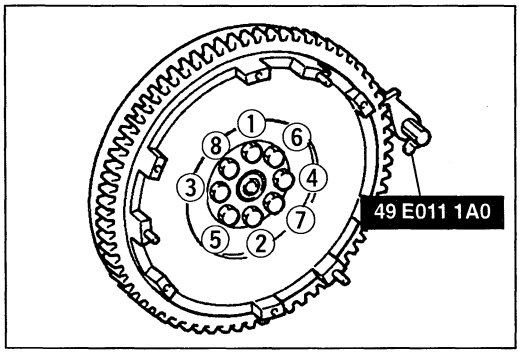
Pilot bearing

Note
- The pilot bearing does not need to be removed unless you are replacing it.

Use the **SST** to remove the pilot bearing.

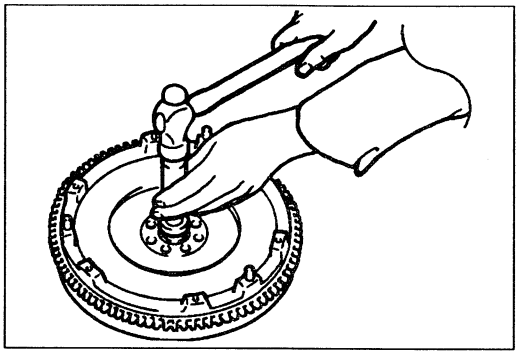


Flywheel
1. Hold the flywheel by using the **SST** or equivalent tool.
2. Remove the bolts evenly and gradually in the pattern shown.
3. Remove the flywheel.
4. Inspect for oil leakage from the crankshaft rear oil seal. If there is any such leakage or if the oil seal is damaged, refer to section B and replace the crankshaft oil seal.



Installation Note
Flywheel
Flywheel bolts on FS-engine models require sealant. New bolts have sealant already applied at the factory. However, when reusing bolts, remove all old sealant and then apply new sealant. Remove the old sealant from the bolt holes in the crankshaft, whether using new or reused bolts. These steps help to ensure that engine oil does not leak from the crankshaft bolt holes.
1. Install the flywheel to the crankshaft.
2. Hand-tighten the flywheel installation bolts.
3. Install the **SST** or equivalent tool to the flywheel.
4. Tighten the flywheel installation bolts evenly and gradually in the pattern shown in the figure.

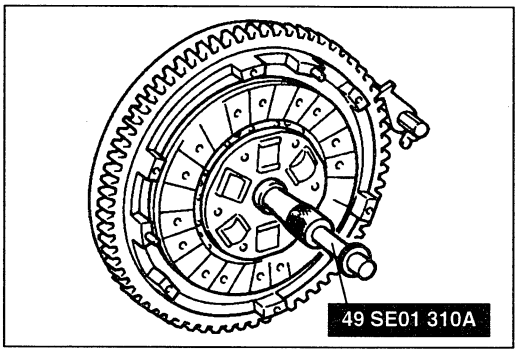
Tightening torque
FS: 97—102 N·m {9.8—10.5 kgf·m, 71—75 ft·lbf}
KL: 61—67 N·m {6.2—6.9 kgf·m, 45—49 ft·lbf}



Pilot bearing

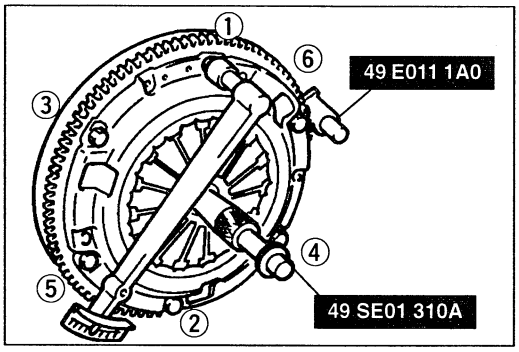
Install a new pilot bearing by using a suitable pipe.

Pipe outer diameter: 35.0 mm {1.378 in}
Bearing installation depth: 0—0.4 mm {0—0.016 in}



Clutch disc

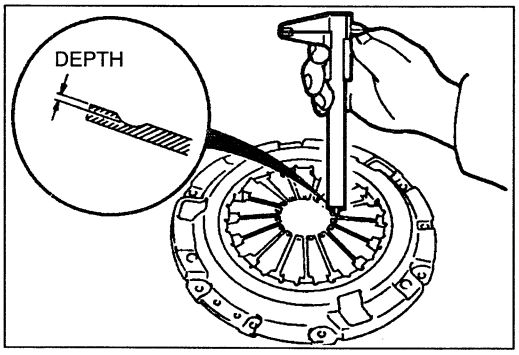
1. Clean the clutch disc splines and main drive gear splines.
2. Apply organic molybdenum sulfide grease to the splines.
3. Hold the clutch disc in position by using the **SST**.



Clutch cover

1. Align the dowel holes with the flywheel dowels and install the clutch cover.
2. Install the **SST** or equivalent tool.
3. Tighten the bolts evenly and gradually in the pattern shown.

Tightening torque:
18—26 N·m {1.8—2.7 kgf·m, 14—19 ft·lbf}

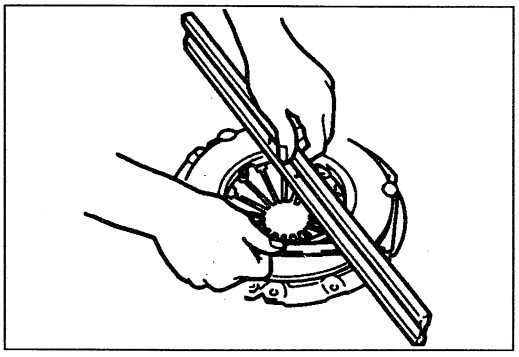


CLUTCH COVER

INSPECTION

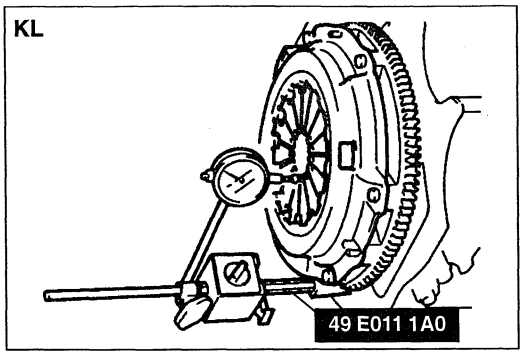
1. Measure the wear of the diaphragm spring fingers.

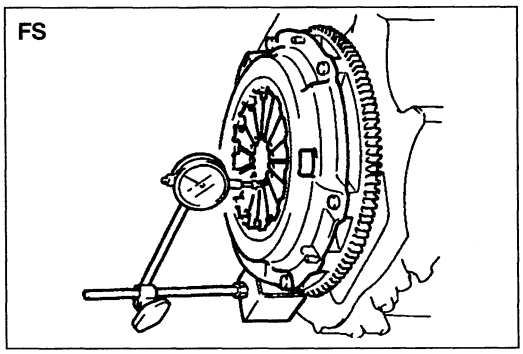
Depth: 0.5 mm {0.020 in} max.



2. Measure the flatness of the pressure plate surface by using a straightedge and a feeler gauge as shown in the figure.

Maximum clearance: 0.50 mm {0.020 in}



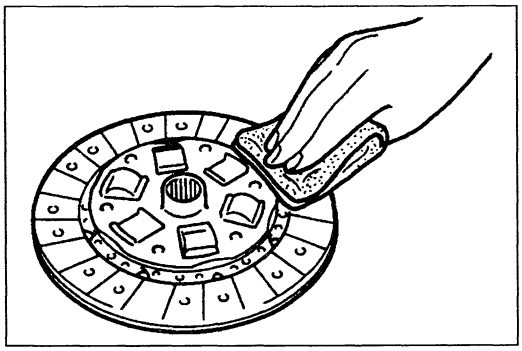


The KL engine is made of aluminum, so the magnet will not hold the dial indicator to the engine block as it would for the FS engine. Therefore, use the **SST** to hold the dial indicator when checking the runout of the diaphragm spring fingers on the KL engine.

3. Rotate the flywheel and check for misaligned diaphragm spring fingers.

   Misalignment: 0.600 mm {0.0236 in} max.

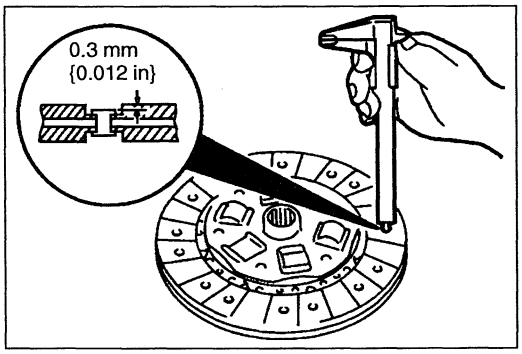
4. Replace the clutch cover if not as specified.



CLUTCH DISC

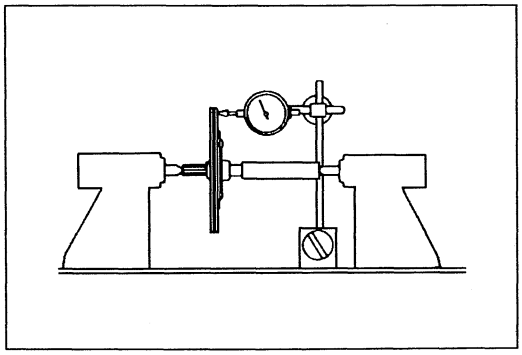
INSPECTION

1. Inspect the contact surface of the clutch disc for scoring, cracks, burning, and oil contamination.
2. Remove minor scoring or burning by using emery paper. Repair if scoring or burning is major. Replace if cracked or oil-soaked.
3. Inspect for loose facing rivets and dampers. Replace the clutch disc if either is loose.



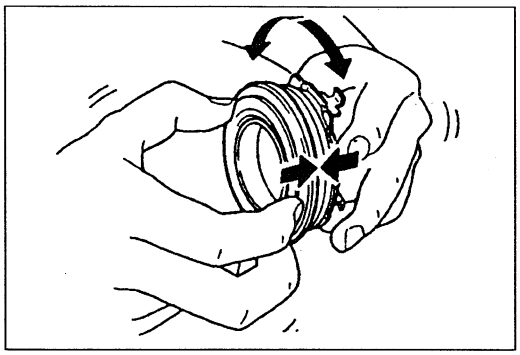
4. Using vernier calipers, measure the thickness of the lining at a rivet head on both sides. Replace the clutch disc if its thickness is less than minimum.

   Thickness: 0.3 mm {0.012 in} min.



5. Measure the clutch disc runout by using a dial indicator. Replace the clutch disc if runout is excessive.

   Runout: 0.700 mm {0.0276 in} max.

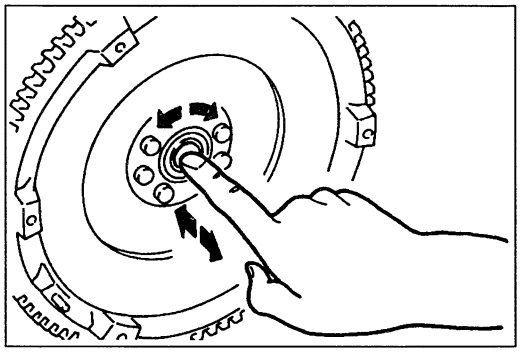


CLUTCH RELEASE COLLAR

INSPECTION

Caution
- **Cleaning the clutch release collar with cleaning fluids or a steam cleaner can wash the grease out of the sealed bearing.**

1. Turn the collar while applying force in the axial direction.
2. If the collar sticks or has excessive resistance, replace it.

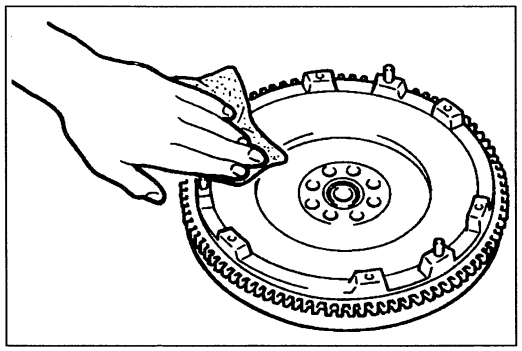


PILOT BEARING

INSPECTION

Note
- The pilot bearing can be inspected while it is in the flywheel.

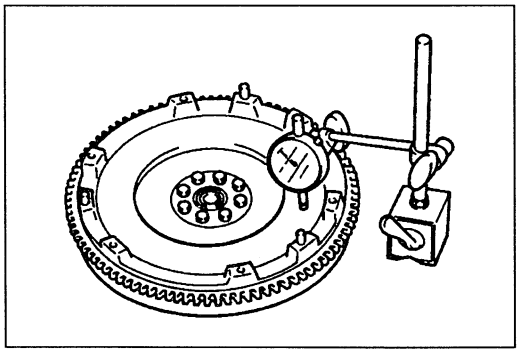
1. Turn the bearing while applying force in the axial direction.
2. If the bearing sticks or has excessive resistance, replace it.



FLYWHEEL

INSPECTION

1. Inspect the contact surface for scoring, cracks, and burning.
2. Remove minor scoring or burning by using emery paper. Repair if scoring or burning is major. Replace if cracked.



3. Inspect the ring gear teeth for wear and damage. If necessary, replace the ring gear.
4. Measure the flywheel runout by using a dial indicator. Replace the flywheel if runout is excessive.

Runout: 0.200 mm {0.0079 in} max.

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

MANUAL TRANSAXLE (G25M–R)

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TRANSAXLE OIL ..... J– 7
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REPLACEMENT ..... J– 8
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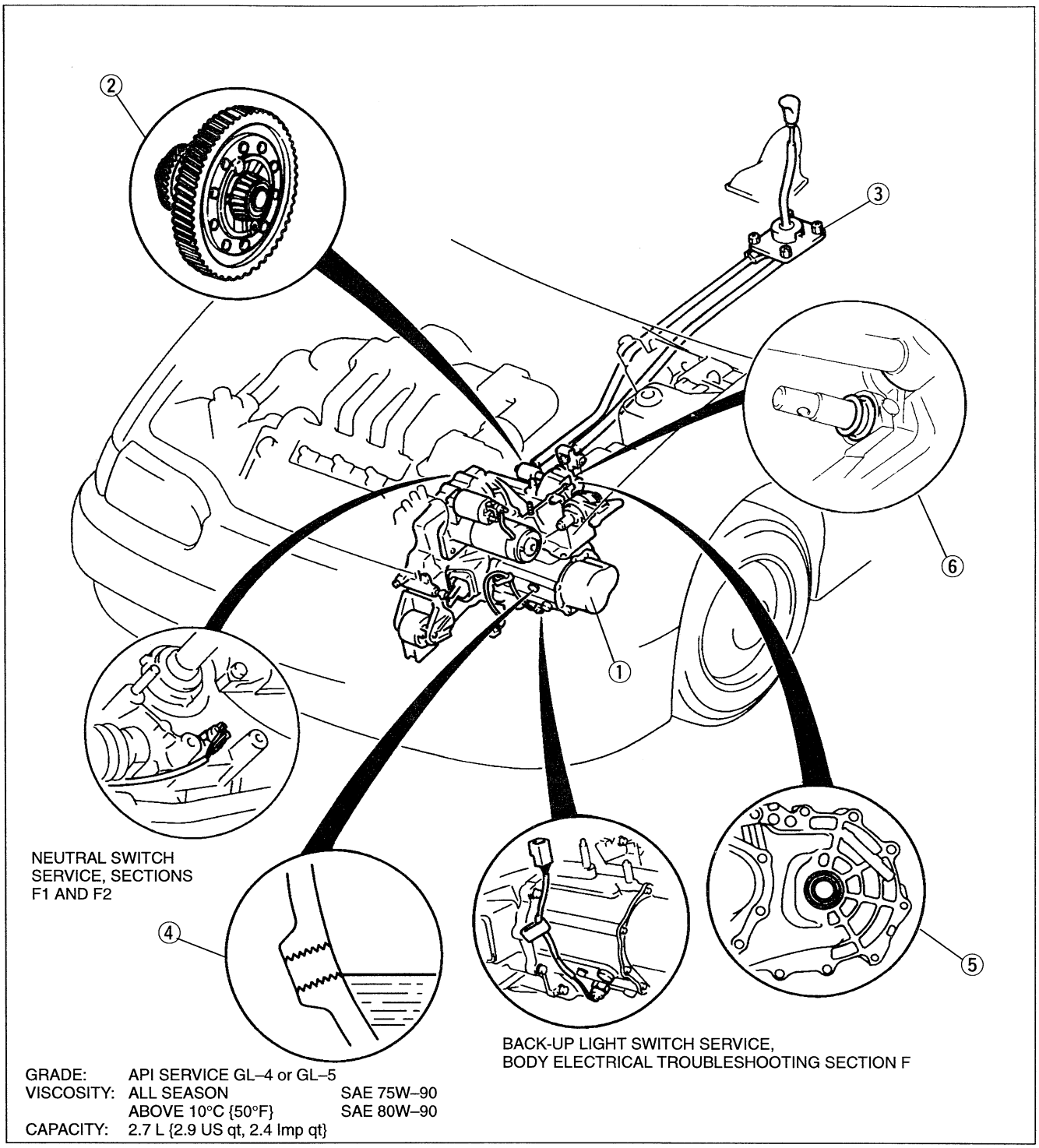

1. Transaxle
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2. Differential
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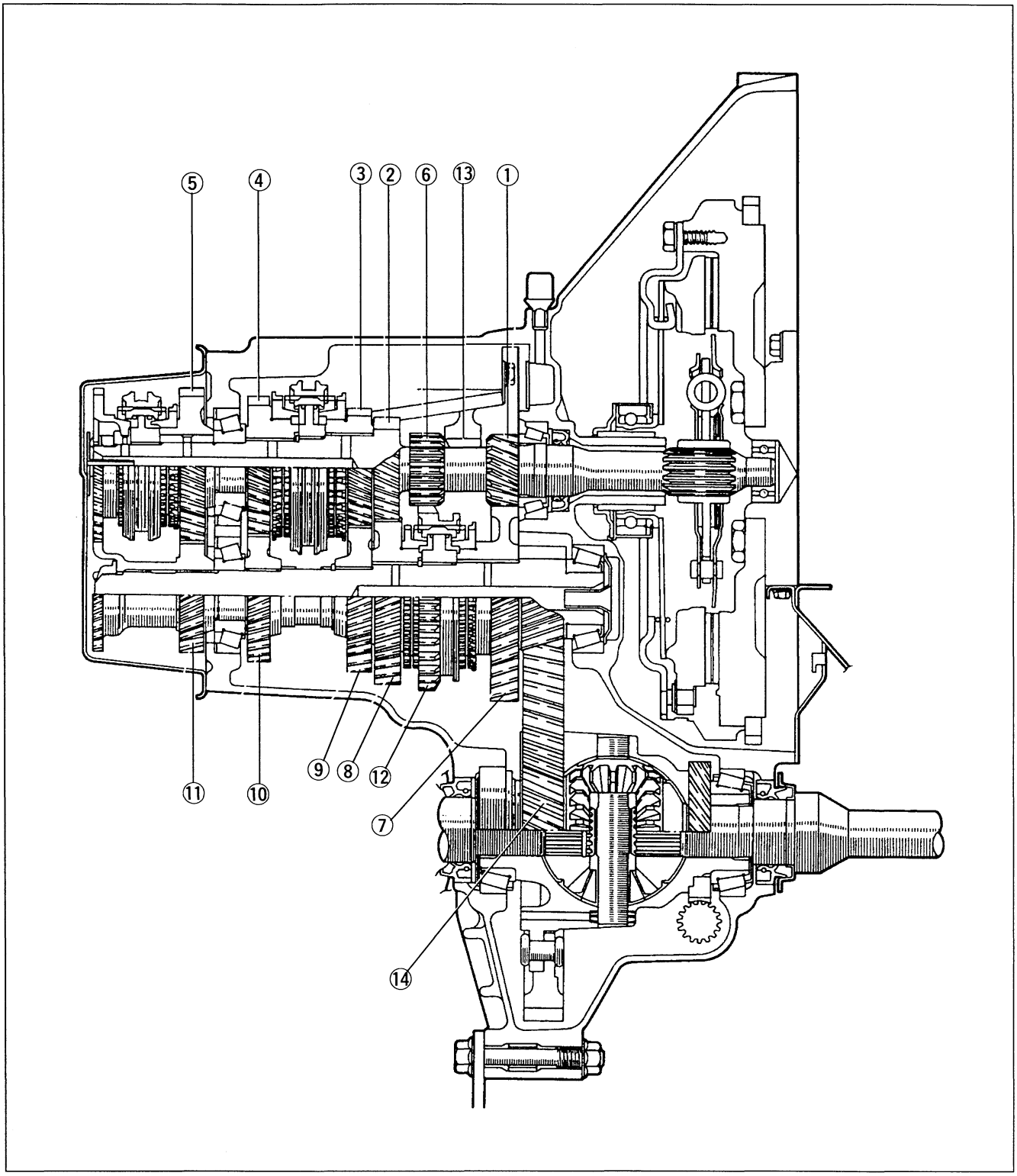
3. Shift mechanism
Overhaul ..... page J–56
4. Transaxle oil
Inspection ..... page J– 7
Replacement ..... page J– 7
5. Oil seal (differential)
Replacement ..... page J– 8
6. Oil seal (change rod assembly)
Replacement ..... page J– 9

OUTLINE

SPECIFICATIONS

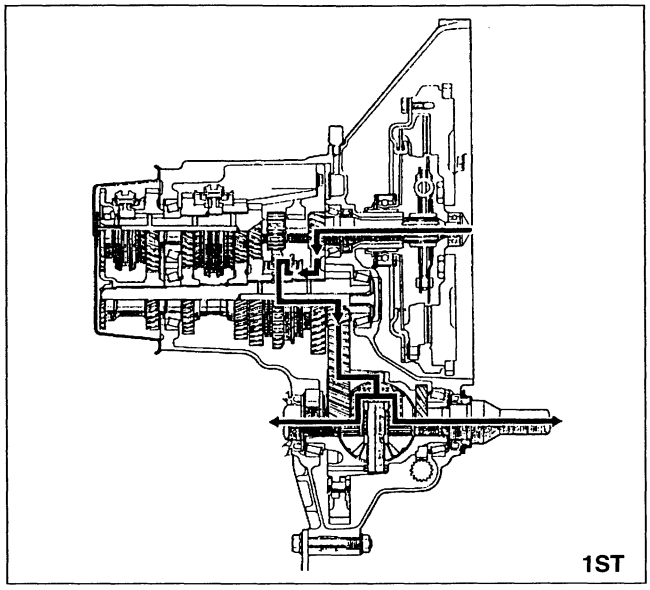
Item \ Engine/Transaxle			FS	KL
			G25M–R	
Transaxle control			Floor shift	
Synchromesh system			Forward: Synchromesh Reverse: Selective sliding and synchromesh	
Gear ratio	1st		3.307	
	2nd		1.833	
	3rd		1.233	1.310
	4th		0.914	1.030
	5th		0.717	0.795
	Reverse		3.166	
Final gear ratio			4.105	
Oil	Grade		API service GL–4 or GL–5	
	Viscosity	All season	SAE 75W–90	
		Above 10°C {50°F}	SAE 80W–90	
	Capacity	L {US qt, Imp qt}	2.7 {2.9, 2.4}	

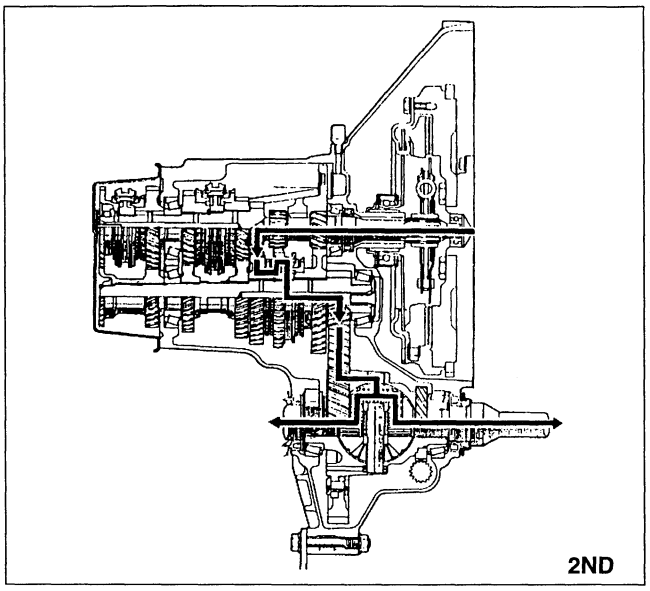
STRUCTURAL VIEW

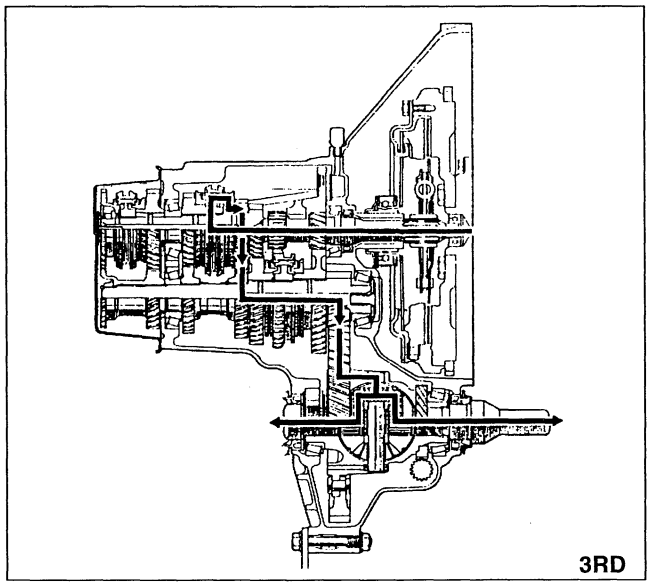


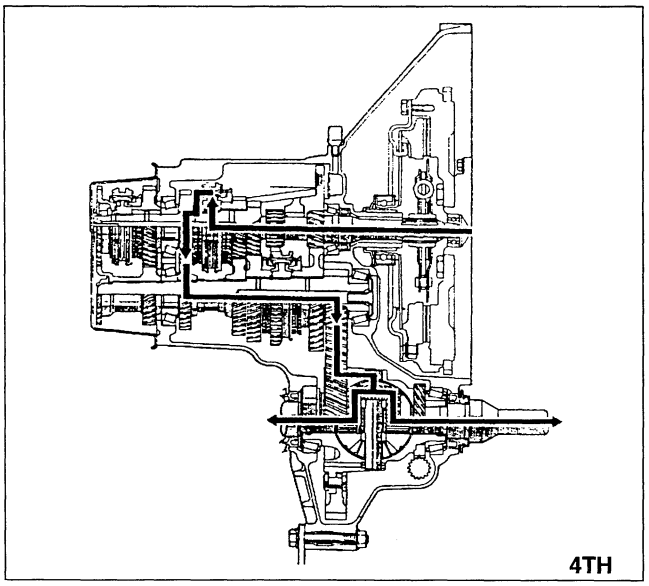
1. 1st gear
2. 2nd gear
3. 3rd gear
4. 4th gear
5. 5th gear
6. Reverse gear
7. 1st gear
8. 2nd gear
9. Secondary 3rd gear
10. Secondary 4th gear
11. Secondary 5th gear
12. Clutch hub sleeve (Reverse gear)
13. Reverse idler gear
14. Ring gear

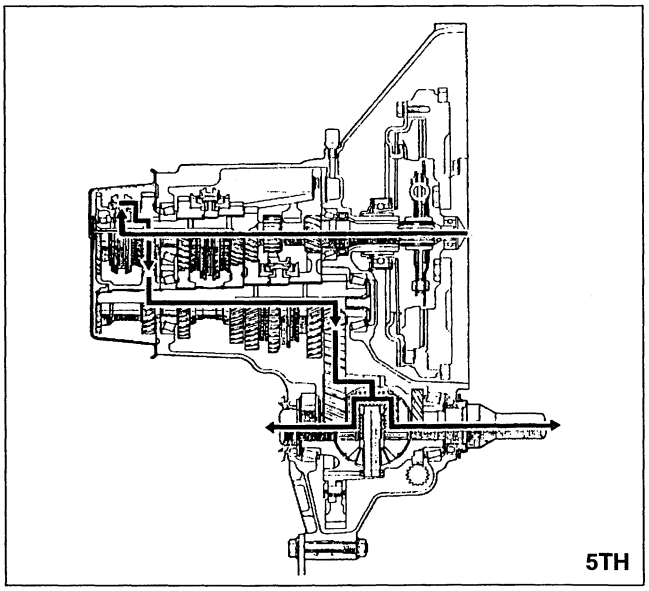
POWER FLOW

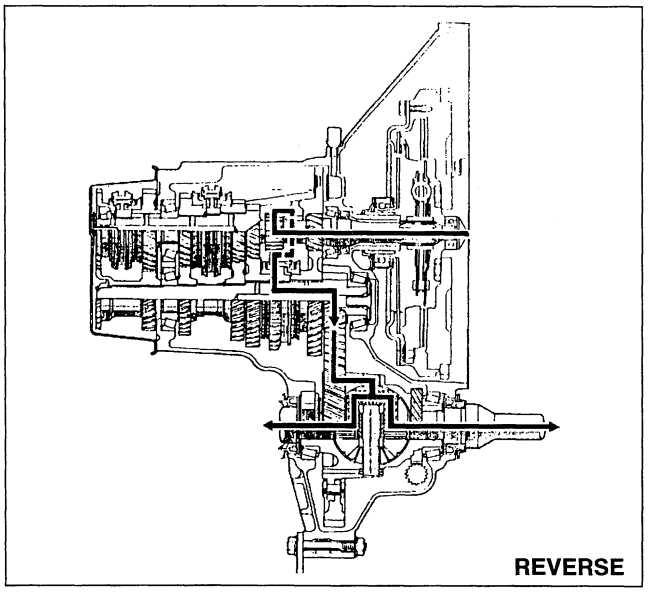






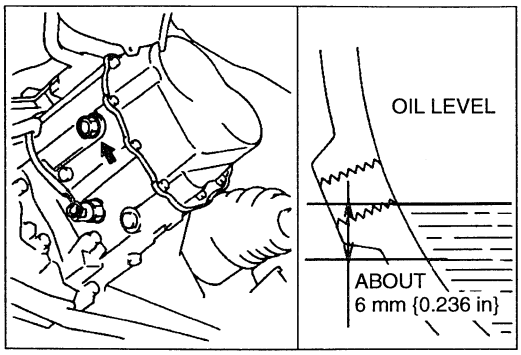


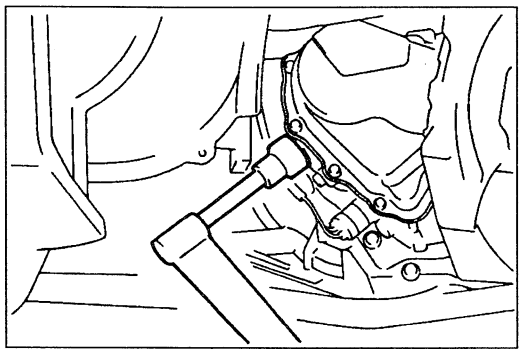


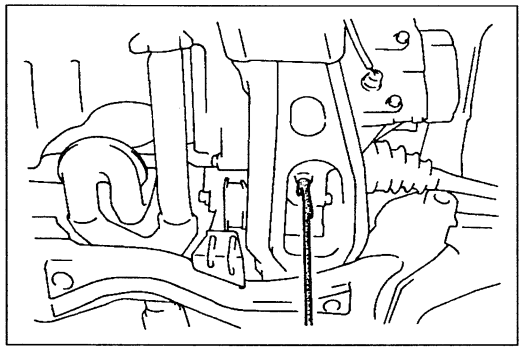


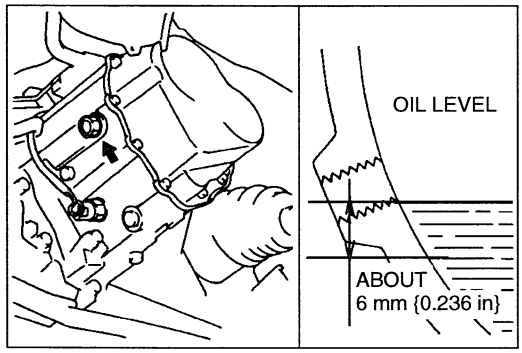
TROUBLESHOOTING GUIDE

Problem	Possible cause	Action	Page
Shift lever won't shift smoothly or is hard to shift	Seized shift lever ball seat	Replace	J–58
	Seized change control rod joint	Replace	J–58
	Bent change control rod	Replace	J–58
Too much play in shift lever	Worn change control rod bushing	Replace	J–58
	Worn shift lever ball seat	Replace	J–58
Difficult to shift	Bent change control rod	Replace	J–58
	No grease in transaxle control	Lubricate with grease	J–58
	Insufficient oil	Add oil	J– 7
	Deterioration of oil quality	Replace with specified oil	J– 7
	Wear or play of shift fork or shift rod	Replace	J–18
	Worn synchronizer ring	Replace	J–24, 26
	Worn synchronizer cone of gear	Replace	J–24, 26
	Bad contact of synchronizer ring and cone of gear	Replace	J–24, 26
	Excessive longitudinal play of gears	Replace	J–24, 26
	Worn bearing	Replace	J–24, 26
	Worn synchronizer key spring	Replace	J–24, 26
	Excessive primary shaft gear bearing preload	Adjust	J–38
	Improperly adjusted change guide plate	Adjust	J–21
Won't stay in gear	Bent change control rod	Replace	J–58
	Worn change control rod bushing	Replace	J–58
	Improperly installed extension bar	Tighten	J–58
	Worn shift fork	Replace	J–18
	Worn clutch hub	Replace	J–24, 26
	Worn clutch hub sleeve	Replace	J–24, 26
	Worn gear sliding surface of shaft gears	Replace	J–24, 26
	Worn gear sliding surface of gear	Replace	J–24, 26
	Worn steel sliding groove of control end	Replace	J–18
	Weak spring pressing against steel ball	Replace	J–18
	Excessive thrust clearance	Replace	J—18, 24, 26
	Worn bearing	Replace	J–24, 26
	Improperly installed or loose engine mount	Tighten	J–48, 50
Abnormal noise	Insufficient oil	Add oil	J– 7
	Deterioration of oil quality	Replace with specified oil	J– 7
	Worn bearing	Adjust or replace	J–24, 26
	Worn sliding surfaces of gears or shafts	Replace	J–24, 26
	Excessive gear backlash	Replace	J–24, 26
	Damaged gear teeth	Replace	J–24, 26
	Foreign material in gears	Replace	J–24, 26
	Damaged differential gear or excessive backlash	Replace	J–55









TRANSAXLE OIL

INSPECTION

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Remove the oil level plug and washer.
3. Verify that the oil level is near the lower edge of the plug port.
4. If the oil level is low, add the specified amount and type of oil through the plug port.

Specified oil
Grade: API service GL–4 or GL–5
Viscosity: All season SAE 75W–90
Above 10°C {50°F} SAE 80W–90

5. Install a new washer and the oil level plug.

Tightening torque:
40—58 N·m {4.0—6.0 kgf·m, 29—43 ft·lbf}

J

REPLACEMENT

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Remove the drain plug and washer.
3. Drain the oil into a suitable container.
4. Install a new washer and the drain plug.

Tightening torque:
40—58 N·m {4.0—6.0 kgf·m, 29—43 ft·lbf}

5. Remove the oil level plug and washer. Add the specified amount and type of oil through the plug port until the level reaches the lower edge of the port.

Specified oil
Grade: API service GL–4 or GL–5
Viscosity: All season SAE 75W–90
Above 10°C {50°F} SAE 80W–90

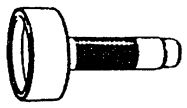
Capacity: 2.7 L {2.9 US qt, 2.4 Imp qt}

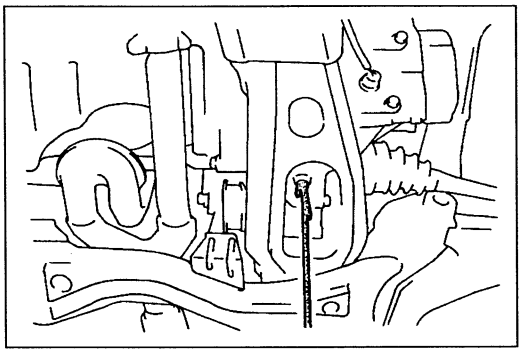
6. Install a new washer and the oil level plug.

Tightening torque:
40—58 N·m {4.0—6.0 kgf·m, 29—43 ft·lbf}

OIL SEAL (DIFFERENTIAL)

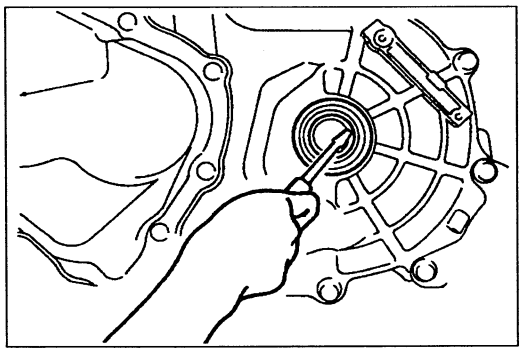
PREPARATION
SST

49 B001 795 Installer, oil seal		For Installation of oil seal

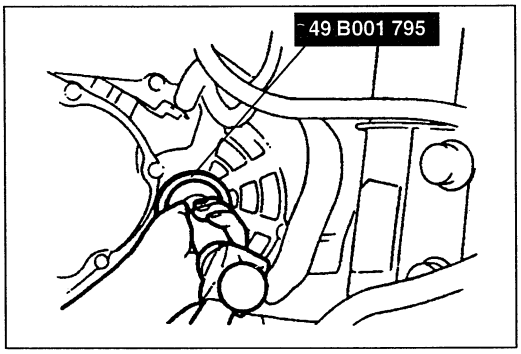


REPLACEMENT

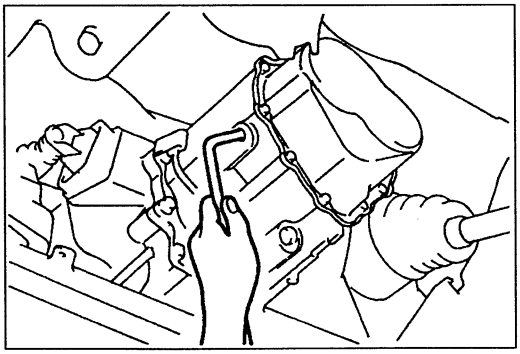
1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Remove the drain plug and washer. (Refer to page J–7.)
3. Drain the oil into a suitable container.
4. Separate the drive shaft and joint shaft from the transaxle. (Refer to pages J–12, 14.)



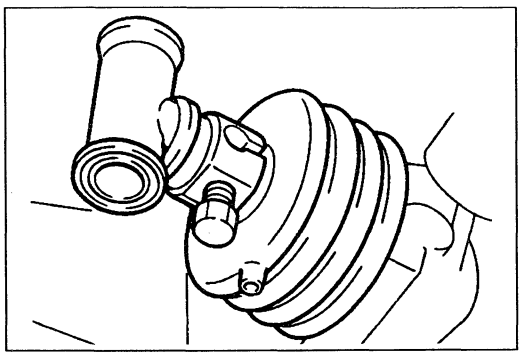
5. Remove the oil seal.



6. Using the **SST** and a hammer, tap the new oil seal in evenly until the **SST** contacts the transaxle case.
7. Coat the lip of the oil seal with transaxle oil.



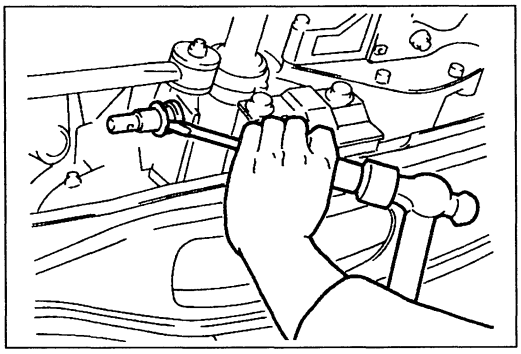
8. Insert the drive shaft and joint shaft to the transaxle. (Refer to pages J–47, 49.)
9. Add the specified amount and type of oil. (Refer to page J–7.)



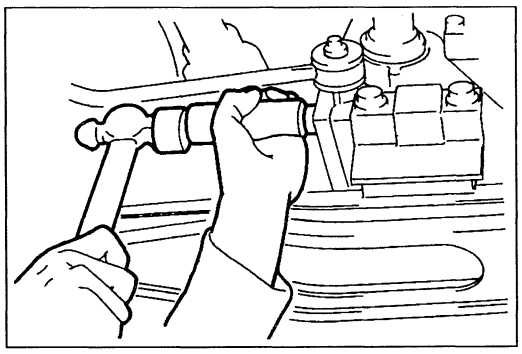
OIL SEAL (CHANGE ROD ASSEMBLY)

REPLACEMENT

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Remove the drain plug and washer. (Refer to page J–7.)
3. Drain the oil into a suitable container.
4. Remove the transverse member.
5. Disconnect the change control rod from the transaxle.
6. Remove the joint and boot from the change rod assembly.

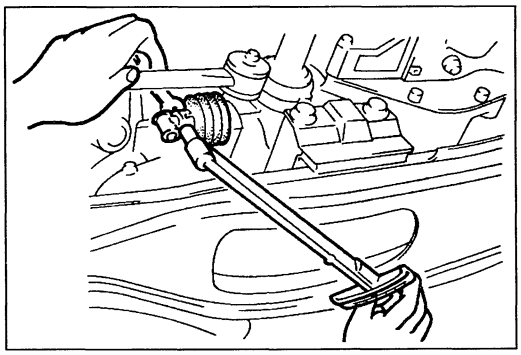


7. Remove the oil seal.



8. Install the new oil seal by using a pipe.
9. Coat the lip of the oil seal with transaxle oil.

Outer diameter of pipe: 26.0 mm {1.02 in}

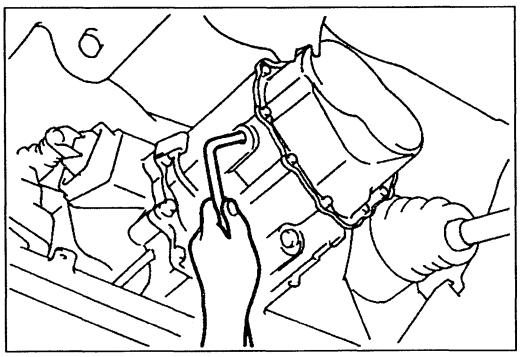


10. Install the boot and joint to the change rod assembly with the boot draining hole facing downward.

Tightening torque:
13.8—18.6 N·m {140—190 kgf·cm, 122—164 in·lbf}

11. Connect the change control rod.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

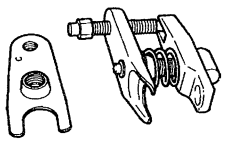
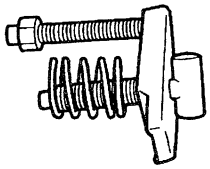
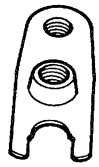
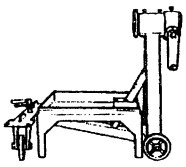
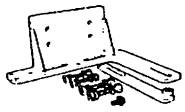
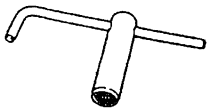
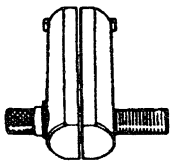
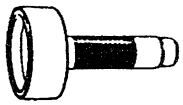
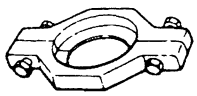
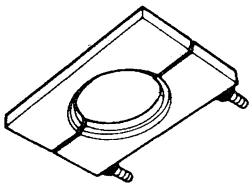
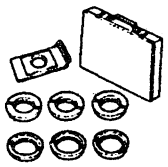
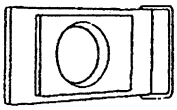
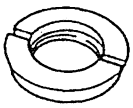
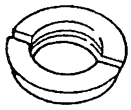
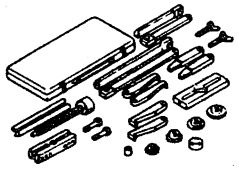


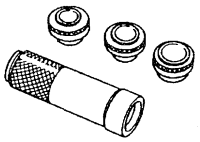
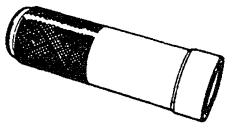
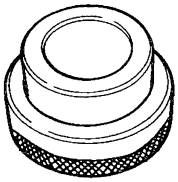
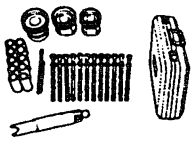
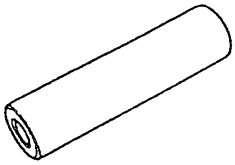
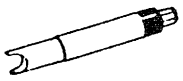
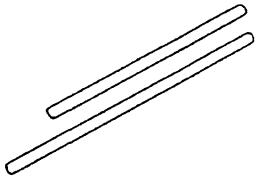
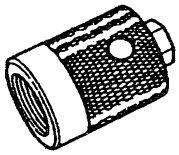
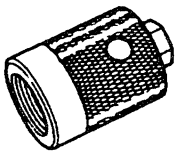
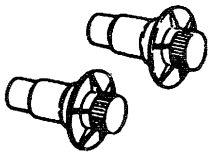
12. Add the specified amount and type of oil. (Refer to page J–7.)
13. Install the transverse member.

Tightening torque:
94—131 N·m {9.5—13.4 kgf·m, 69—96 ft·lbf}

TRANSAXLE

PREPARATION
SST

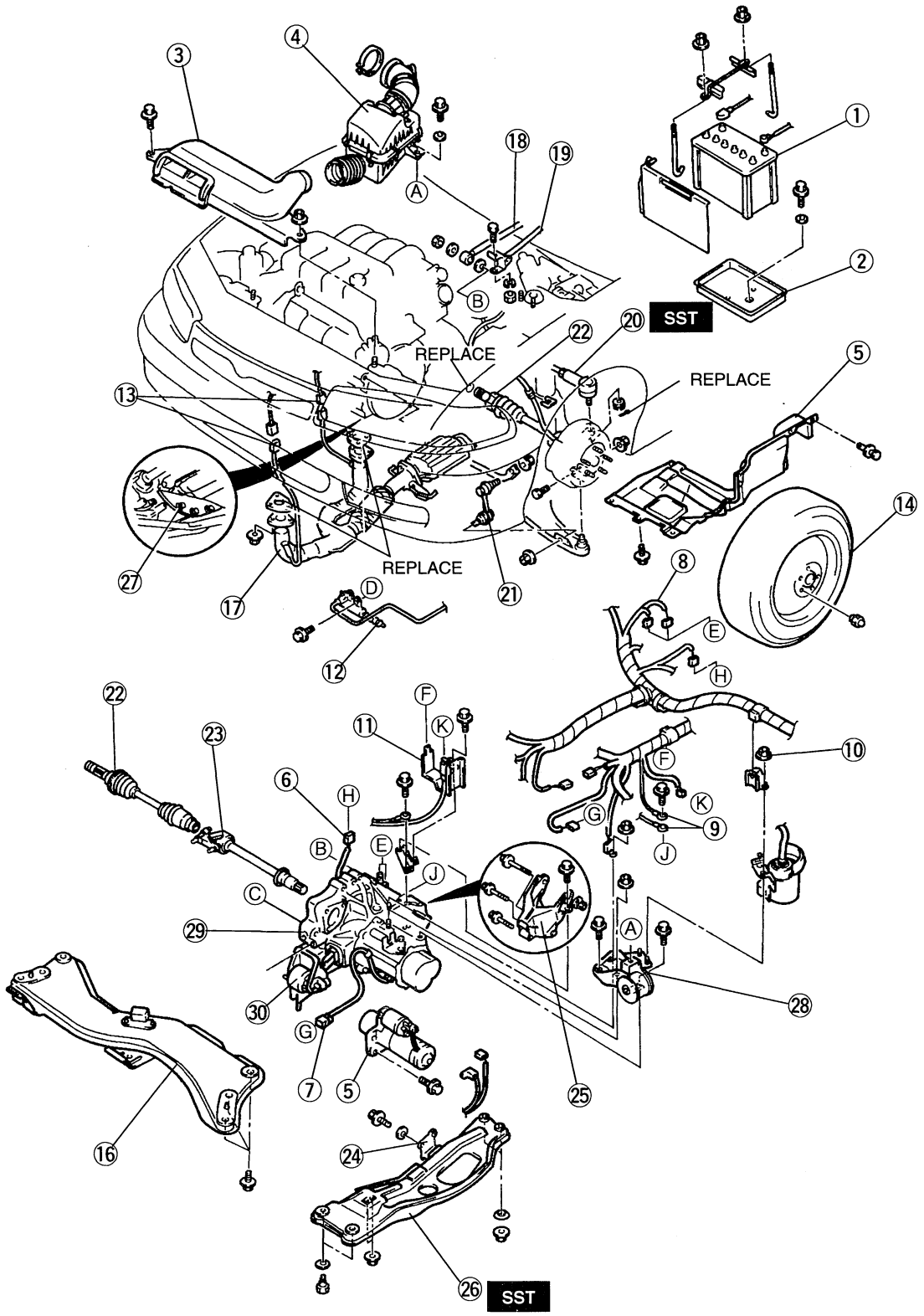
49 G017 5A0 Support, engine 	For support of engine	49 T028 3A0 Puller set, ball joint 	For removal of ball joint
49 T028 303 Body (Part of 49 T028 3A0) 	For removal of ball joint	49 T028 304 Attachment (Part of 49 T028 3A0) 	For removal of ball joint
49 0107 680A Engine stand 	For disassembly / assembly of transaxle	49 G019 0A0 Hanger, transaxle 	For disassembly / assembly of transaxle
49 G030 440 Holder, primary shaft 	For holding primary shaft	49 FT01 361 Remover, bearing 	For removal of bearing race
49 B001 795 Installer, oil seal 	For installation of oil seal	49 0636 145 Puller, fan pulley boss 	For removal of bearing
49 G030 370 Removing plate 	For removal of secondary 3rd gear and 2nd gear	49 G017 1A0 Remover set, bearing 	For removal of bearing
49 F401 366A Plate (Part of 49 G017 1A0) 	For removal of bearing	49 B092 373 Attachment G (Part of 49 G017 1A0) 	For removal of bearing
49 B092 374 Attachment H (Part of 49 G017 1A0) 	For removal of bearing	49 0839 425C Puller set, bearing 	For removal of bearing

49 F401 330B Installer set, bearing 	For installation of bearing	49 F401 331 Body (Part of 49 F401 330B) 	For installation of bearing
49 F401 335A Attachment A (Part of 49 F401 330B) 	For installation of bearing	49 F401 336B Attachment B (Part of 49 F401 330B) 	For installation of bearing
49 G030 380D Shim selector set 	For adjustment of bearing preload	49 G030 381 Selector ϕ68 (Part of 49 G030 380D) 	For adjustment of bearing preload
49 G030 382A Selector ϕ58 (Part of 49 G030 380D) 	For adjustment of bearing preload	49 F401 382A Selector ϕ52 (Part of 49 G030 380D) 	For adjustment of bearing preload
49 F401 384 Collar (Part of 49 G030 380D) 	For adjustment of bearing preload	49 G019 021 Bolt set (Part of 49 G030 380D) 	For adjustment of bearing preload
49 FT01 515A Adapter, preload (Part of 49 G030 380D) 	For adjustment of bearing preload	49 F401 385 Bar (Part of 49 G030 380D) 	For adjustment of bearing preload
49 B017 102 Adapter, preload 	For adjustment of bearing preload	49 G017 202 Adapter, preload 	For adjustment of bearing preload
49 G030 455 Holder, diff. side gear 	For holding side gears	—	—

REMOVAL

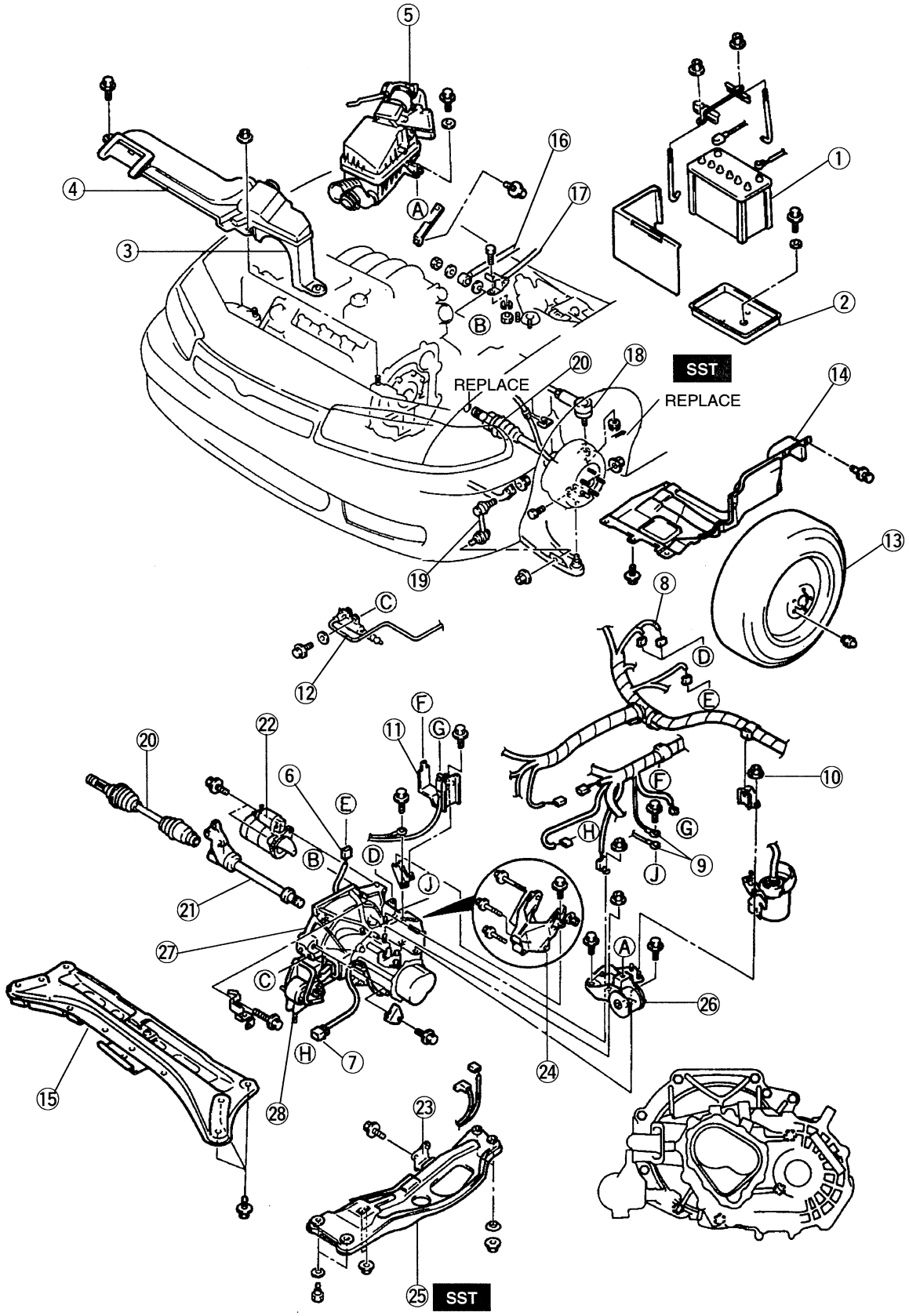
1. Disconnect the negative battery cable.
2. On level ground, jack up the vehicle and support it evenly on safety stands.
3. Drain the transaxle oil into a suitable container.
4. Remove in the order shown in the figure, referring to **Removal Note**.

KL ENGINE

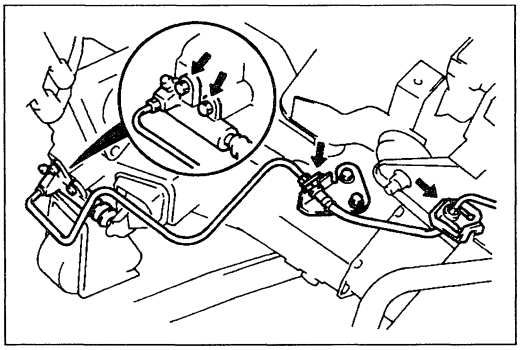


1. Battery
2. Battery carrier
3. Fresh air duct
4. Air cleaner housing assembly
5. Starter
6. Neutral switch connector
7. Back-up light switch connector
8. Vehicle speedometer sensor (speedometer driven gear) connector
9. Ground
10. Fuel filter mounting nuts
11. Harness bracket
12. Clutch release cylinder
    Removal Note ..... page J–15
13. Oxygen sensor connector
14. Wheels and tires
15. Splash shields
16. Transverse member
17. Exhaust pipe
18. Extension bar
19. Change control rod
20. Tie-rod ends
    Service ..... section N
21. Stabilizer control links
22. Drive shafts
    Removal Note ..... page J–15
23. Joint shaft
    Service ..... section M
24. No.5 engine mount
25. No.1 engine mount bracket
26. Engine mounting member
    Removal Note ..... page J–16
27. Undercover
28. No.4 engine mount
29. Transaxle
    Removal Note ..... page J–16
30. No.2 engine mount

FS ENGINE



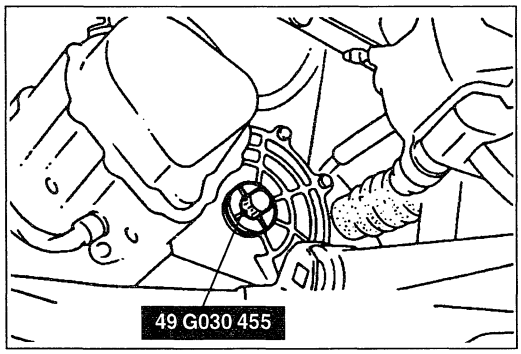
1. Battery
2. Battery carrier
3. Resonance chamber
4. Fresh air duct
5. Air cleaner housing assembly
6. Neutral switch connector
7. Back-up light switch connector
8. Vehicle speedometer sensor (speedometer driven gear) connector
9. Ground
10. Fuel filter mounting nuts
11. Harness bracket
12. Clutch release cylinder
    Removal Note ..... below
13. Wheels and tires
14. Splash shields
15. Transverse member
16. Extension bar
17. Change control rod
18. Tie-rod ends
    Service ..... section N
19. Stabilizer control links
20. Drive shafts
    Removal Note ..... below
21. Joint shaft
    Service ..... section M
22. Starter
23. No.5 engine mount
24. No.1 engine mount bracket
25. Engine mounting member
    Removal Note ..... below
26. No.4 engine mount
27. Transaxle
    Removal Note ..... page J–16
28. No.2 engine mount



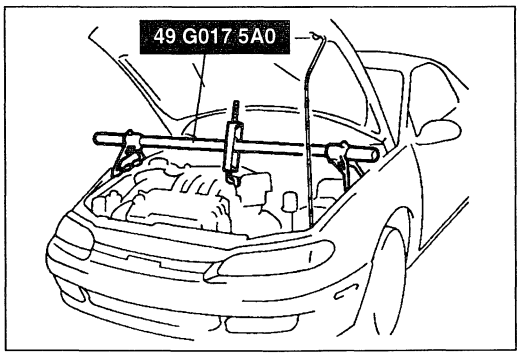
Removal Note
Clutch release cylinder

Caution
- **Bending the clutch pipe can cause kinks or cracks.**

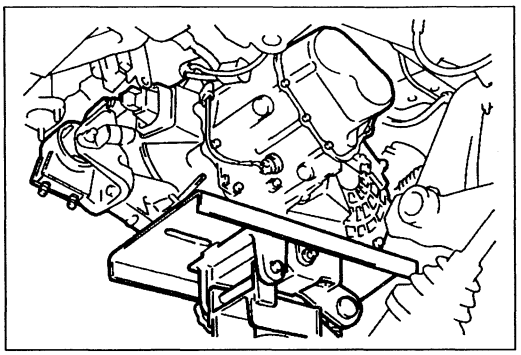
1. Remove the bolts and clips shown. (For the FS engine model, remove the clutch bracket.)
2. Put the clutch release cylinder and the clutch pipe in a place where they will not interfere with transaxle removal.



Drive shafts
1. Remove the drive shafts. (Refer to section M.)
2. Suspend the drive shaft with a rope.
3. Install the **SST** into the transaxle to hold the side gears.

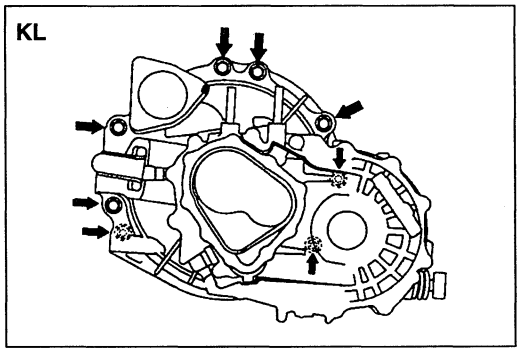


Engine mounting member
1. Support the engine by using the **SST**.
2. Remove the engine mounting member.

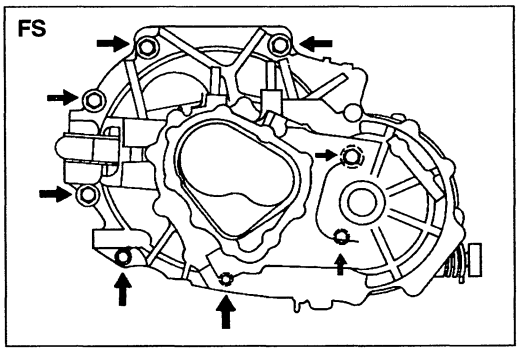


Transaxle

1. Loosen the **SST** (engine support) and lean the engine toward the transaxle.
2. Support the transaxle on a jack.



3. Remove the transaxle mounting bolts.
4. Remove the transaxle.



DISASSEMBLY

Precaution

1. Clean the transaxle exterior thoroughly with a steam cleaner or cleaning solvent before disassembly.

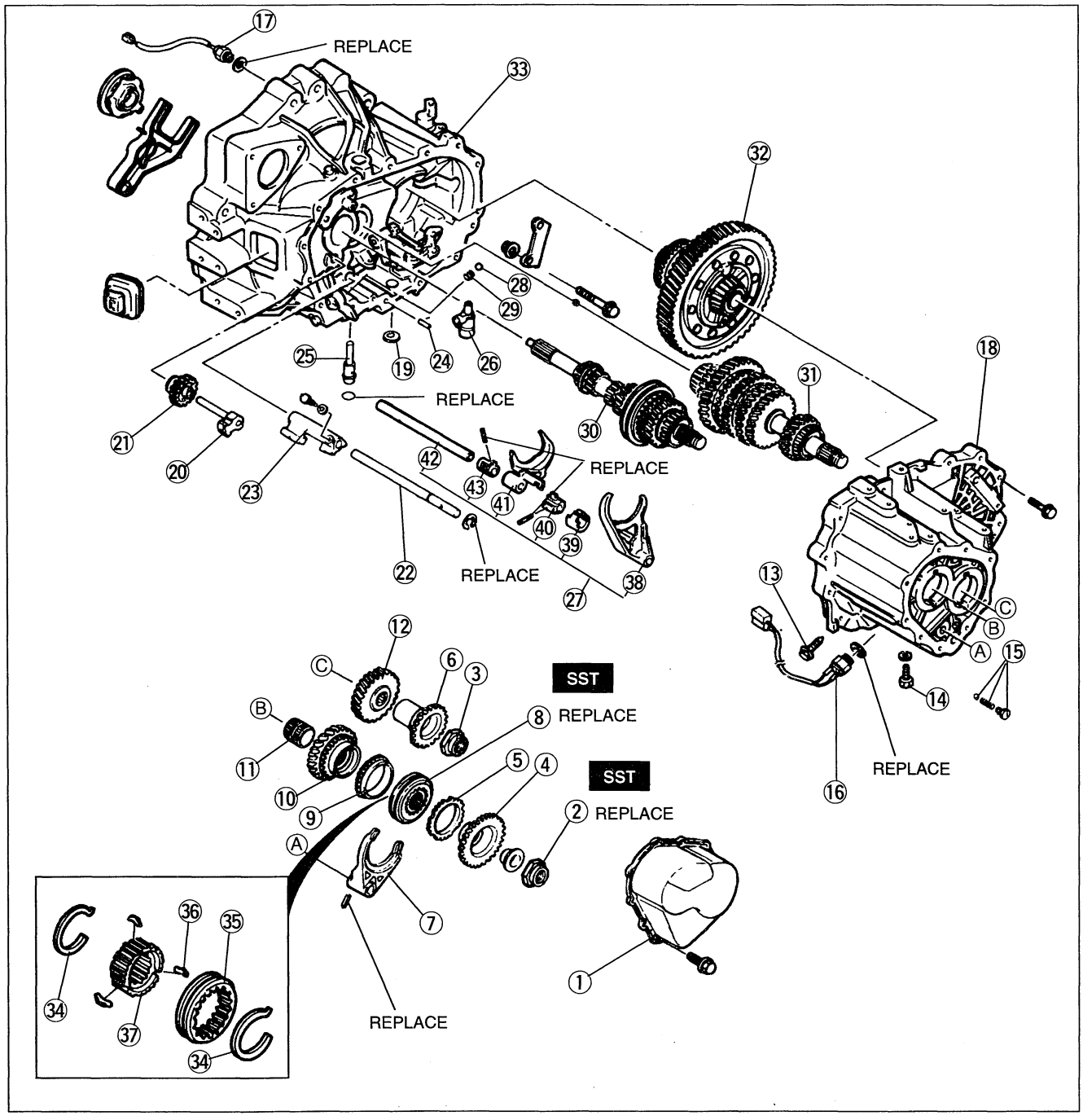
Warning

- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eyewear whenever using compressed air.**

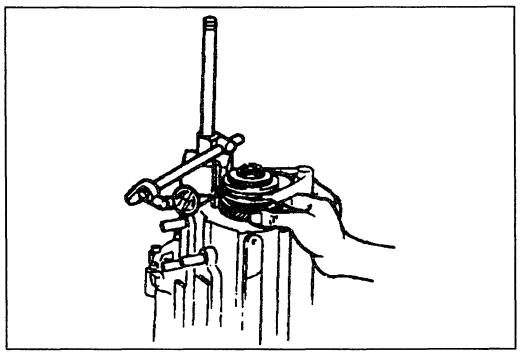
2. Clean the removed parts (except sealed bearings) and all sealing surfaces with cleaning solvent, and dry with compressed air.
3. Clean out all holes and passages with compressed air, and check that there are no obstructions.

5th/Reverse Gear and Housing Parts

1. Measure the 5th gear thrust clearance, referring to **Preinspection**.
2. Disassemble in the order shown in the figure, referring to **Disassembly Note**.



1. Rear cover
2. Locknut (primary shaft)
   Disassembly Note ..... below
3. Locknut (secondary shaft)
   Disassembly Note ..... below
4. Primary reverse synchronizer gear
   Inspection ..... page J–28
5. Reverse synchronizer ring
   Inspection ..... page J–28
6. Secondary reverse synchronizer gear
   Inspection ..... page J–28
7. 5th/reverse shift fork
8. 5th/reverse clutch hub assembly
   Inspection ..... page J–28
9. 5th synchronizer ring
   Inspection ..... page J–28
10. 5th gear
    Preinspection ..... below
    Inspection ..... page J–28
11. Gear sleeve
12. Secondary 5th gear
    Inspection ..... page J–28
13. Lock bolt
14. Guide bolt
15. Lock bolt, ball, and spring
16. Back-up light switch
17. Neutral switch
18. Transaxle case assembly
19. Magnet
20. Reverse idler shaft
21. Reverse idler gear
    Inspection ..... page J–29
22. 5th/reverse shift rod
23. 5th/reverse shift rod end
24. Pin
25. Crank lever shaft
26. Crank lever assembly
27. Shift fork and shift rod assembly
    Disassembly Note ..... page J–19
28. Steel ball
29. Spring
30. Primary shaft gear assembly
31. Secondary shaft gear assembly
32. Differential assembly
33. Clutch housing
34. Synchronizer key springs
35. Clutch hub sleeve
36. Synchronizer keys
37. Clutch hub
38. 3rd/4th shift fork
39. Interlock sleeve
40. Control lever
41. 1st/2nd shift fork
42. Control rod
43. Control end

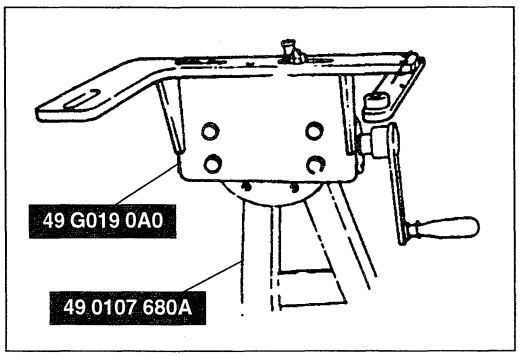


Preinspection
5th gear thrust clearance

1. Measure the 5th gear thrust clearance by using a dial indicator.

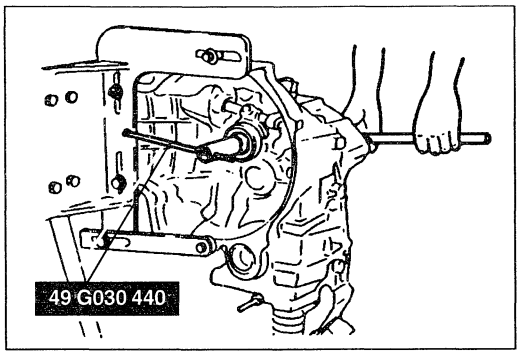
   Clearance: 0.100—0.220 mm {0.0039—0.0087 in}
   Maximum: 0.270 mm {0.0106 in}

2. If the clearance exceeds the maximum, check the contact surfaces of the 5th gear and the clutch hub. Replace worn or damaged parts.

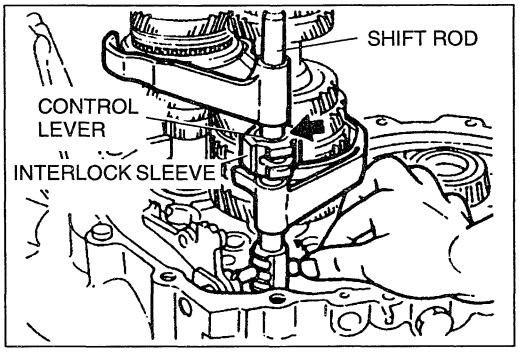


Disassembly note
Locknut

1. Mount the transaxle on the **SST**.

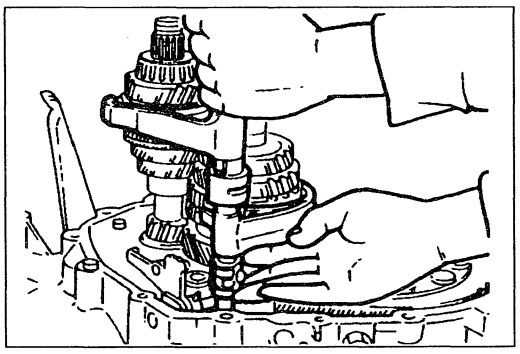


2. Lock the primary shaft with the **SST**.
3. Shift to 1st gear to lock the rotation of the primary shaft.
4. Uncrimp the tabs of the locknuts.
5. Remove the locknuts from the primary and secondary shafts.



Shift fork and shift rod assembly

1. Align the ends of the interlock sleeve and of the control lever (arrow). Turn the shift rod counterclockwise.
2. While holding the 1st/2nd shift fork with one hand and the 3rd/4th shift fork with the other, raise them both at the same time and shift each of the clutch hub sleeves.

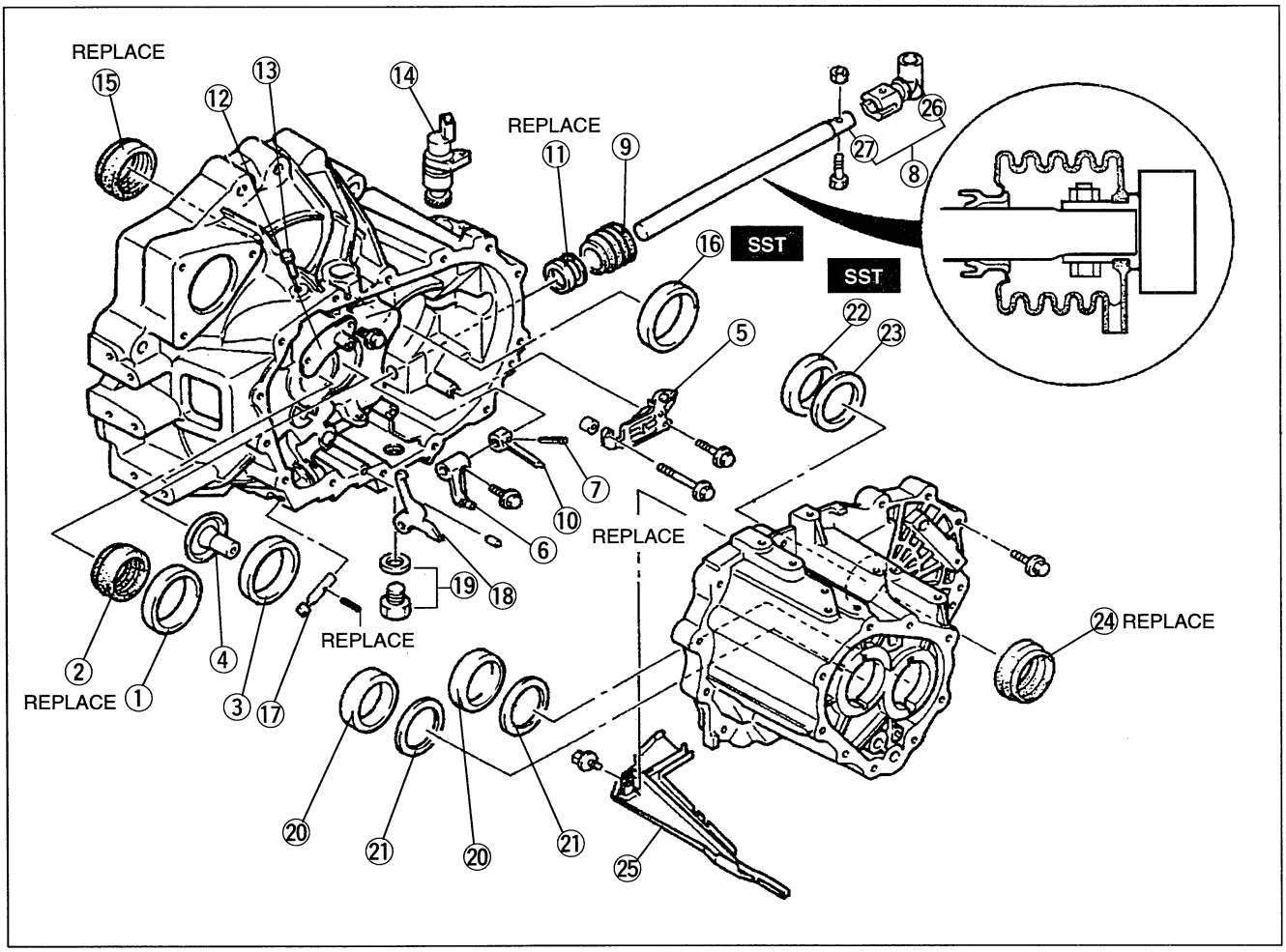


3. Lift the control end and remove the steel ball, and at the same time, remove the control rod from the clutch housing.
4. Separate the shift rod and shift fork assembly from each of the clutch hub sleeves.

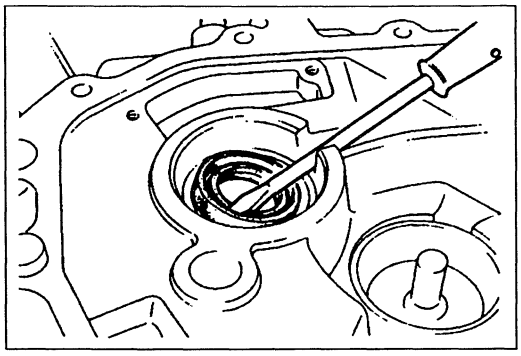
Clutch Housing and Transaxle Case Components

Note
- The oil seals do not need to be removed unless you are replacing them.

Disassemble in the order shown in the figure, referring to **Disassembly Note**.



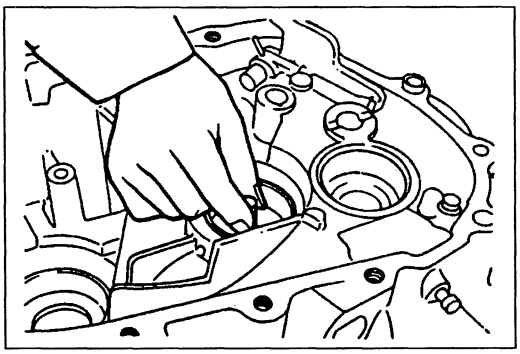
1. Bearing race (primary shaft)
2. Oil seal (primary shaft)
   Disassembly Note ..... page J–21
3. Bearing race (secondary shaft)
   Disassembly Note ..... page J–21
4. Funnel
5. Guide plate assembly
6. Change arm
7. Roll pin
   Disassembly Note ..... page J–21
8. Change rod assembly
9. Boot
10. Selector
11. Oil seal (change rod assembly)
    Disassembly Note ..... page J–21
12. Bleeder cover assembly
13. Bleeder
14. Vehicle speedometer sensor (speedometer driven gear)
    Inspection ..... page J–30
15. Oil seal (differential)
    Disassembly Note ..... page J–21
16. Bearing race (differential)
    Disassembly Note ..... page J–22
17. Reverse lever shaft
    Disassembly Note ..... page J–22
18. Reverse lever
    Inspection ..... page J–29
19. Drain plug and washer
20. Bearing race (transaxle case)
    Disassembly Note ..... page J–22
21. Adjustment shim(s)
22. Bearing race (differential)
    Disassembly Note ..... page J–22
23. Adjustment shim(s)
24. Oil seal (differential)
    Disassembly Note ..... page J–21
25. Oil passage
26. Joint
27. Change rod



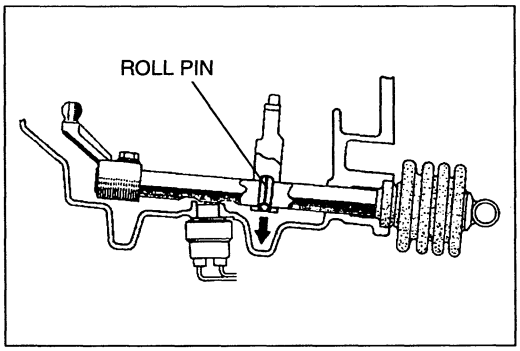
Disassembly note
Oil seal (primary shaft)

Caution
- **The clutch housing is made of aluminum, and is therefore easily dented and scratched by metal tools. When removing the oil seal, keep contact with the clutch housing to a minimum.**

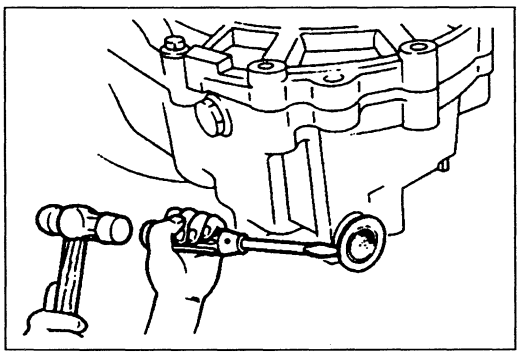
Remove the oil seal from the clutch housing as shown in the figure.



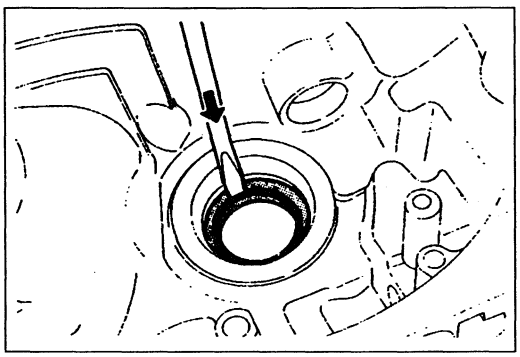
Bearing race (secondary shaft)
Remove the bearing race by lifting it and the funnel out together.



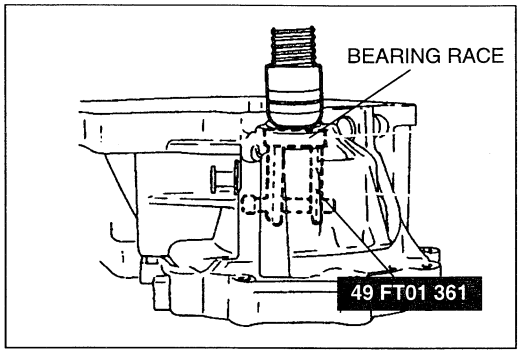
Roll pin
Align the groove for removal of the clutch housing pin with the position of the roll pin; then tap the pin out by using a pin punch.



Oil seal (change rod assembly)
Remove the oil seal.

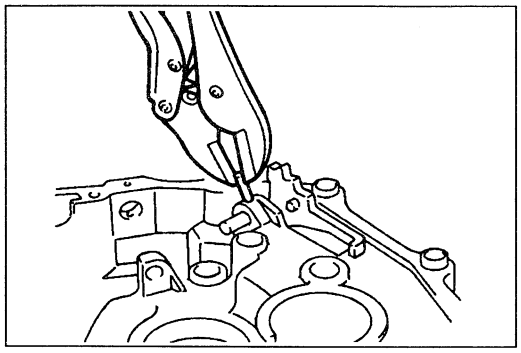


Oil seal (differential)
Remove the oil seal.



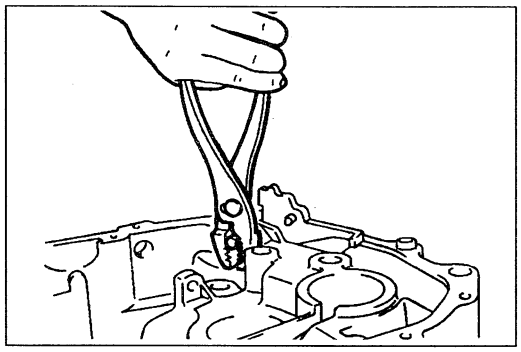
Bearing race (differential)

1. Install the **SST** onto the differential bearing race, and support the **SST** so that it does not fall.
2. Remove the bearing race by using the **SST**.

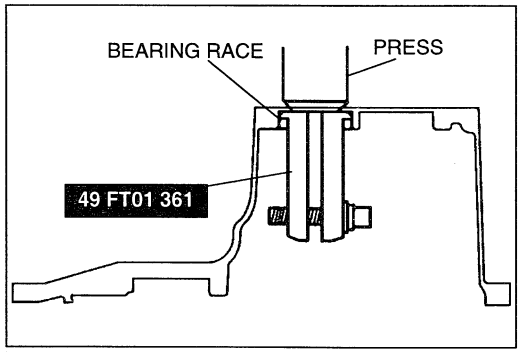


Reverse lever shaft

1. Remove the roll pin by using pliers.



2. Protect the reverse lever shaft with a rag and use pliers to remove the shaft.

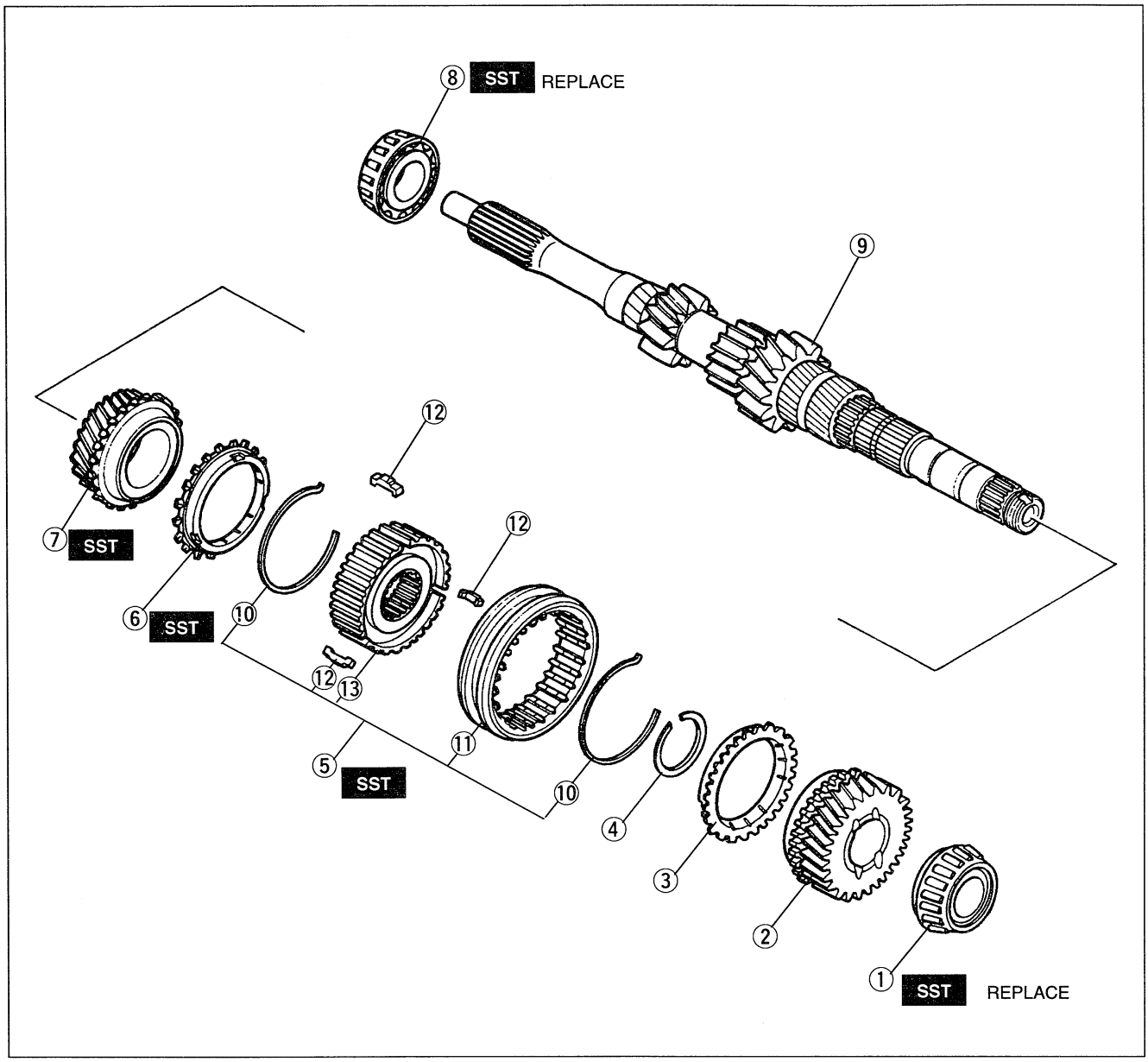


Bearing race (transaxle case)

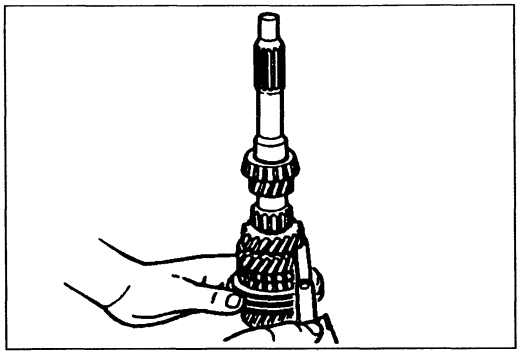
Remove the bearing race by using the **SST**.

Primary Shaft Assembly

1. Measure the thrust clearance of all gears before disassembly, referring to **Preinspection**.
2. Disassemble in the order shown in the figure, referring to **Disassembly Note**.



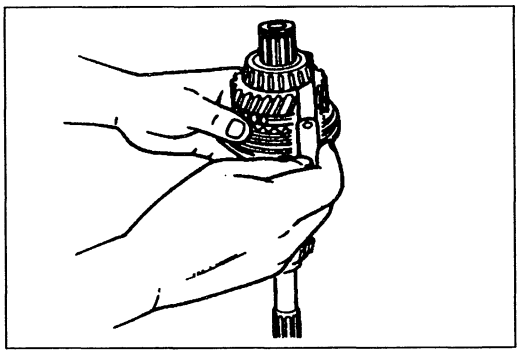
1. Bearing (4th gear end)
   - Disassembly Note ..... page J–24
   - Inspection ..... page J–29
2. 4th gear
   - Preinspection ..... page J–24
   - Inspection ..... page J–28
3. 4th synchronizer ring
   - Inspection ..... page J–28
4. Retaining ring
5. 3rd/4th clutch hub assembly
   - Disassembly Note ..... page J–24
   - Inspection ..... page J–28
6. 3rd synchronizer ring
   - Disassembly Note ..... page J–24
   - Inspection ..... page J–28
7. 3rd gear
   - Preinspection ..... page J–24
   - Disassembly Note ..... page J–24
   - Inspection ..... page J–28
8. Bearing (primary shaft end)
   - Disassembly Note ..... page J–24
   - Inspection ..... page J–29
9. Primary shaft gear
   - Inspection ..... page J–29
10. Synchronizer key springs
11. 3rd/4th clutch hub sleeve
12. Synchronizer keys
13. 3rd/4th clutch hub



Preinspection
3rd gear thrust clearance
1. Measure the clearance between the 3rd gear and 2nd gear.

   Clearance: 0.05—0.20 mm {0.002—0.008 in}
   Maximum: 0.25 mm {0.010 in}

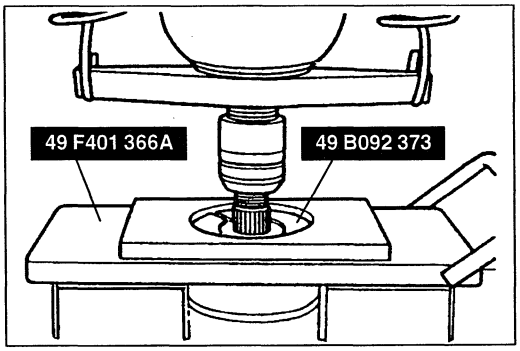
2. If the clearance exceeds the maximum, check the contact surfaces of the 3rd gear, 2nd gear and 3rd/4th clutch hub. Replace worn and damaged parts.



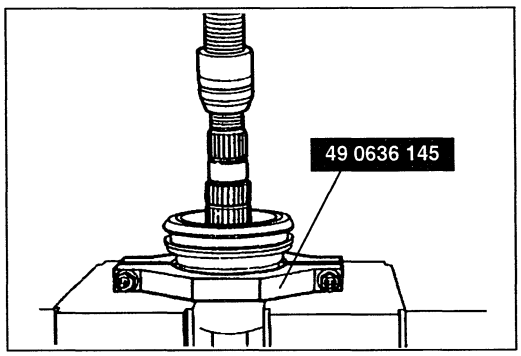
4th gear thrust clearance
1. Measure the clearance between the 4th gear and the ball bearing.

   Clearance: 0.17—0.37 mm {0.007—0.015 in}
   Maximum: 0.42 mm {0.017 in}

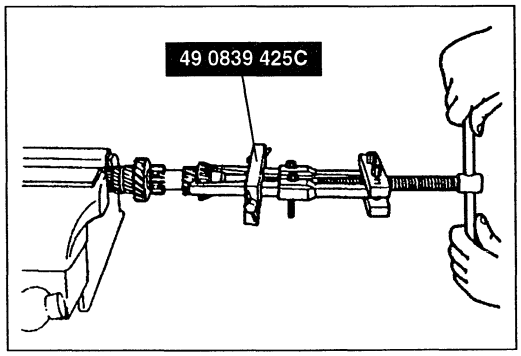
2. If the clearance exceeds the maximum, check the contact surfaces of the 4th gear, ball bearing, and 3rd/4th clutch hub. Replace worn and damaged parts.



Disassembly note
Bearing (4th gear end)
1. Support the primary shaft to keep it from falling.
2. Remove the bearing by using the **SST**.



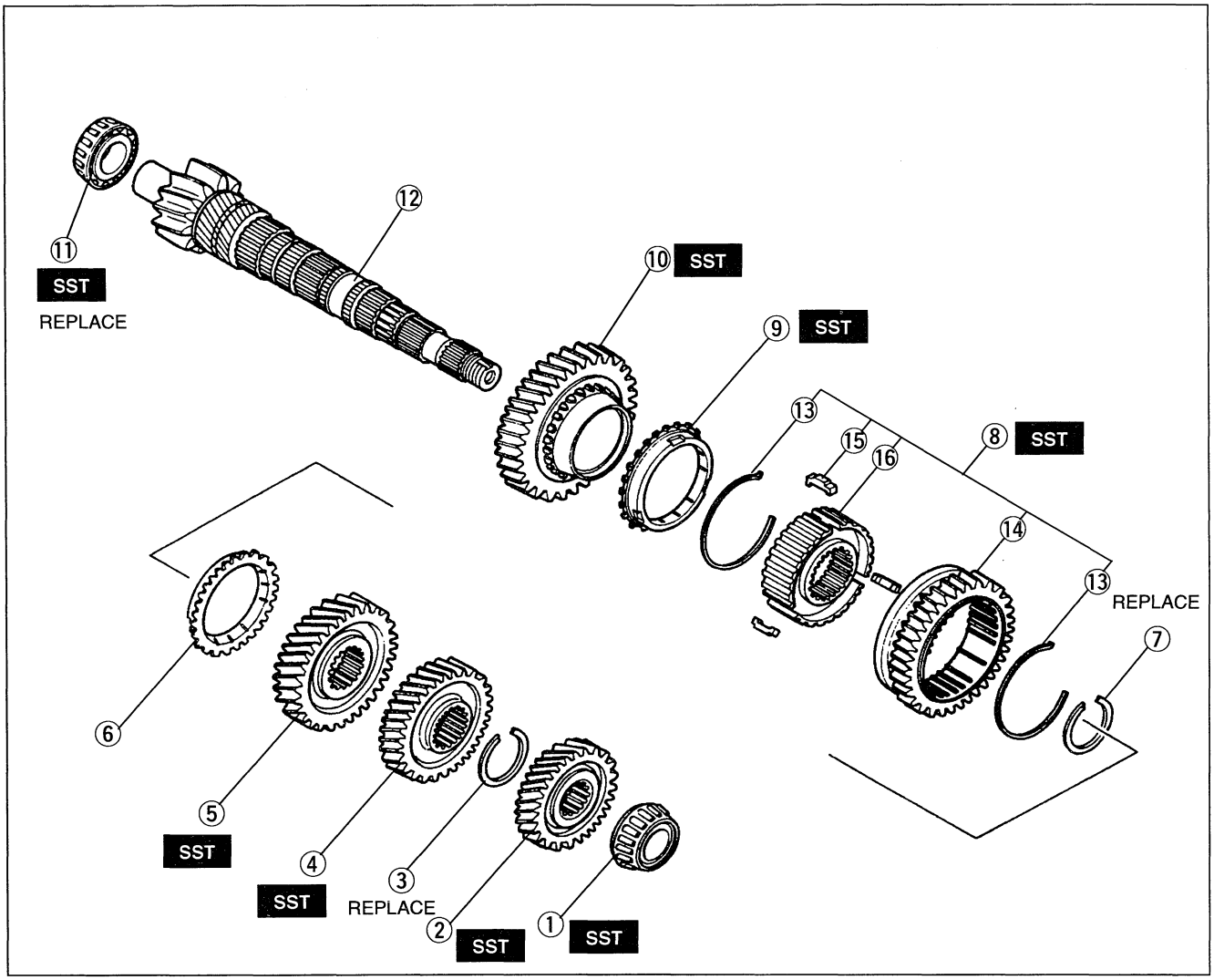
3rd/4th clutch hub assembly, 3rd synchronizer ring and 3rd gear
1. Support the primary shaft to keep it from falling.
2. Remove the 3rd/4th clutch hub assembly, 3rd synchronizer ring, and 3rd gear by using the **SST**.



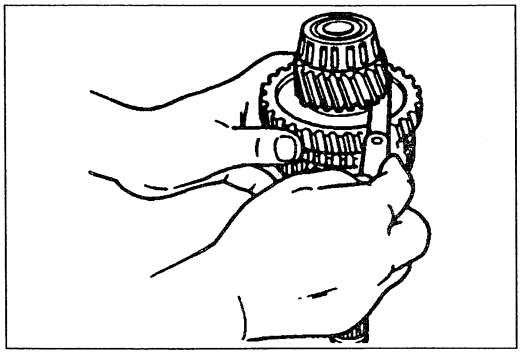
Bearing (primary shaft end)
Remove the bearing by using the **SST**.

Secondary Shaft Assembly

1. Measure the thrust clearance of 1st gear and 2nd gear before disassembly, referring to **Preinspection**.
2. Disassemble in the order shown in the figure, referring to **Disassembly Note**.



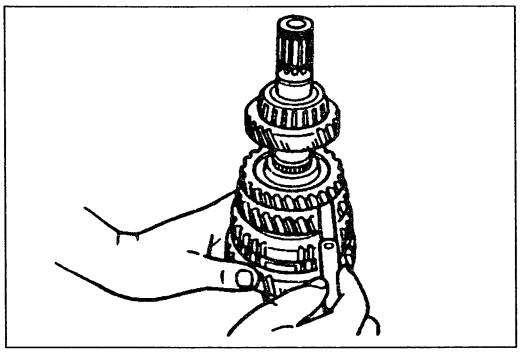
1. Bearing
   - Disassembly Note ..... page J–26
   - Inspection ..... page J–29
2. Secondary 4th gear
   - Disassembly Note ..... page J–26
   - Inspection ..... page J–28
3. Retaining ring
4. Secondary 3rd gear
   - Disassembly Note ..... page J–26
   - Inspection ..... page J–28
5. 2nd gear
   - Preinspection ..... page J–26
   - Disassembly Note ..... page J–26
   - Inspection ..... page J–28
6. 2nd synchronizer ring
   - Inspection ..... page J–28
7. Retaining ring
8. 1st/2nd clutch hub assembly
   - Disassembly Note ..... page J–26
   - Inspection ..... page J–28
9. 1st synchronizer ring
   - Disassembly Note ..... page J–26
   - Inspection ..... page J–28
10. 1st gear
    - Preinspection ..... page J–26
    - Disassembly Note ..... page J–26
    - Inspection ..... page J–28
11. Bearing (secondary shaft end)
    - Disassembly Note ..... page J–27
    - Inspection ..... page J–29
12. Secondary shaft gear
    - Inspection ..... page J–29
13. Synchronizer key springs
14. Clutch hub sleeve (reverse gear)
15. Synchronizer keys
16. 1st/2nd clutch hub



Preinspection
1st gear thrust clearance
1. Measure the clearance between the 1st gear and the differential drive gear.

   Clearance: 0.05—0.28 mm {0.002—0.011 in}
   Maximum: 0.33 mm {0.013 in}

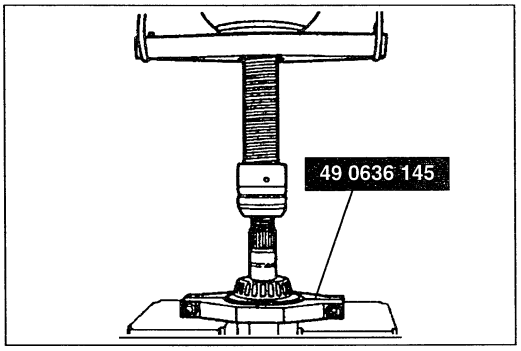
2. If the clearance exceeds the maximum, check the contact surfaces of the 1st gear, differential drive gear of the secondary shaft gear, and 1st/2nd clutch hub assembly. Replace worn and damaged parts.



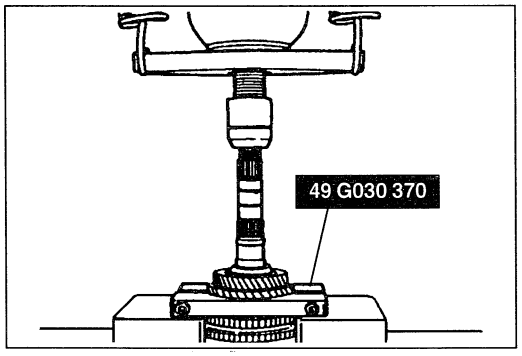
2nd gear thrust clearance
1. Measure the clearance between the 2nd gear and secondary 3rd gear.

   Clearance: 0.18—0.46 mm {0.007—0.018 in}
   Maximum: 0.51 mm {0.020 in}

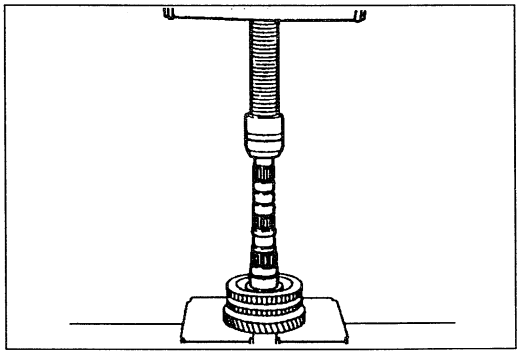
2. If the clearance exceeds the maximum, check the contact surfaces of the 2nd gear, secondary 3rd gear, and 1st/2nd clutch hub assembly. Replace worn and damaged parts.



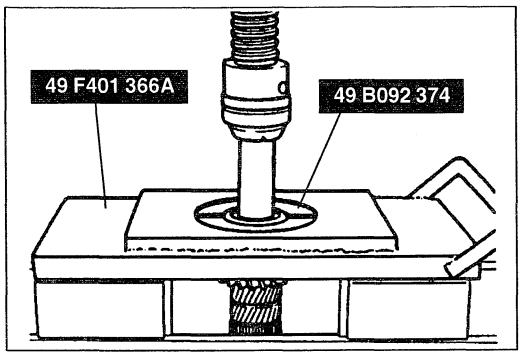
Disassembly note
Bearing and secondary 4th gear
1. Support the secondary shaft to keep it from falling.
2. Remove the bearing and secondary 4th gear by using the **SST**.



Secondary 3rd gear and 2nd gear
1. Shift the gears to 1st gear.
2. Support the secondary shaft to keep it from falling.
3. Remove the secondary 3rd gear and 2nd gear by using the **SST**.



1st/2nd clutch hub assembly, 1st synchronizer ring, and 1st gear
1. Support the secondary shaft to keep it from falling.
2. Remove the 1st/2nd clutch hub assembly, 1st synchronizer ring, and 1st gear by using a press.

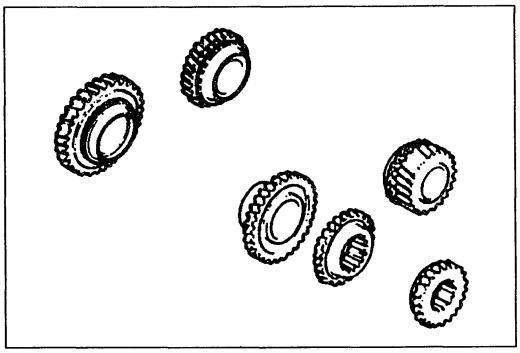


Bearing (secondary shaft end)

1. Support the secondary shaft to keep it from falling.
2. Remove the bearing by using the **SSTs**.

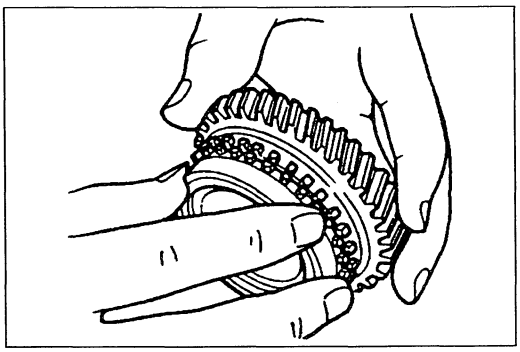
INSPECTION

Inspect all parts and repair or replace as necessary.



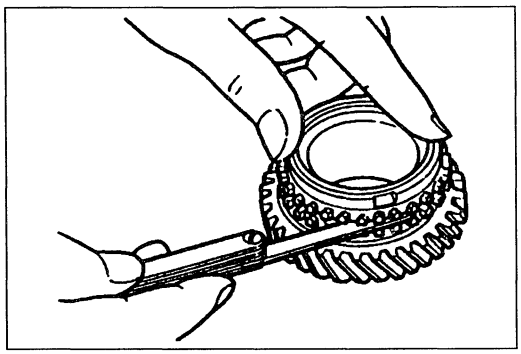
Gears

1. Inspect the synchronizer cones for wear.
2. Inspect the gear teeth for damage, wear, and cracks.
3. Inspect the synchronizer ring matching teeth for damage and wear.



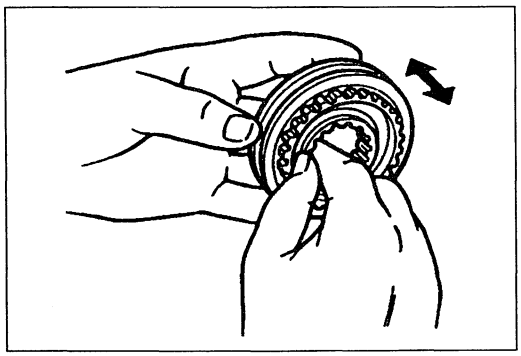
Synchronizer Ring

1. Inspect the synchronizer ring teeth for damage, wear, and cracks.
2. Inspect the tapered surface for wear and cracks.



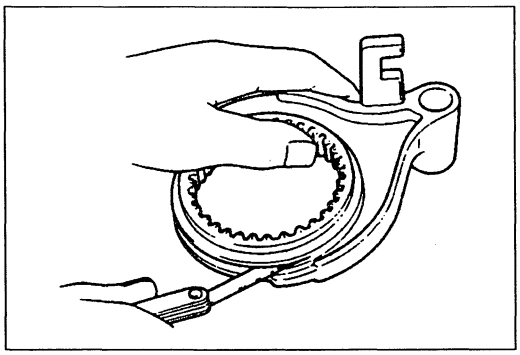
3. Set the synchronizer ring squarely in the gear.
4. Measure the clearance between the synchronizer ring and the flank surface of the gear all around the circumference.

Standard clearance: 1.50 mm {0.059 in}
Minimum: 0.80 mm {0.031 in}



Clutch Hub Assembly

1. Inspect the clutch hub sleeve and hub operation.
2. Inspect the gear teeth for damage, wear, and cracks.
3. Inspect the synchronizer keys for damage, wear, and cracks.

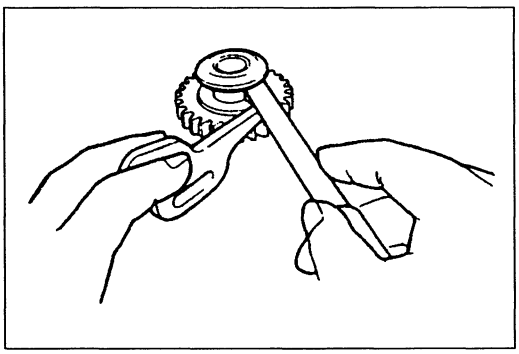


4. Measure the clearance between the hub sleeve and shift fork.

Clearance

mm {in}

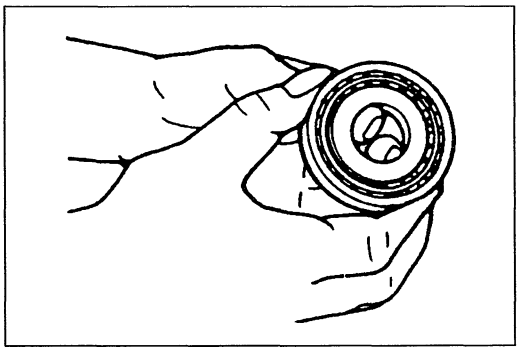
	Standard	Maximum
1st/2nd	0.10—0.45 {0.004—0.018}	0.95 {0.037}
3rd/4th	0.10—0.40 {0.004—0.016}	0.90 {0.035}
5th/Rev.	0.10—0.36 {0.004—0.014}	0.86 {0.034}



Reverse Idler Gear and Reverse Lever

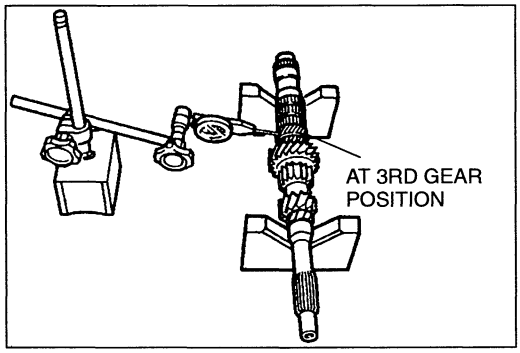
1. Inspect the gear teeth for damage, wear, and cracks.
2. Measure the clearance between the reverse idler gear bushing and the reverse lever.

Standard clearance:
0.10—0.35 mm {0.004—0.014 in}
Maximum: 0.85 mm {0.033 in}



Bearing

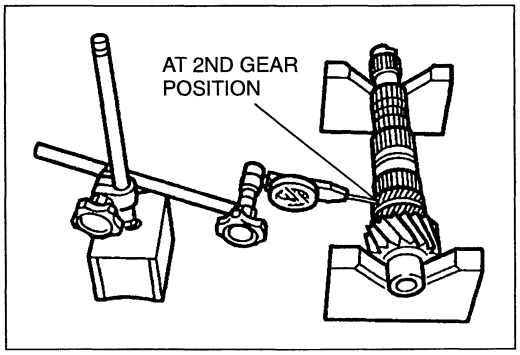
Inspect for damage and rough rotation.



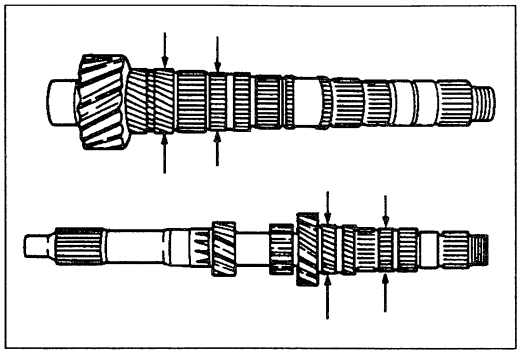
Primary Shaft Gear and Secondary Shaft Gear

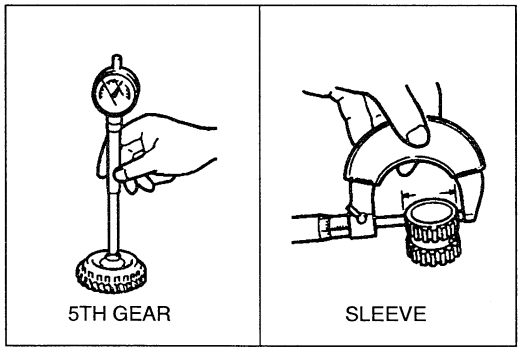
1. Inspect the gear contact surface for damage and wear.
2. Inspect the splines for damage and wear.
3. Inspect the gear teeth for damage, wear, and cracks.
4. Inspect the oil passage for blockage.
5. Measure the shaft gear runout.

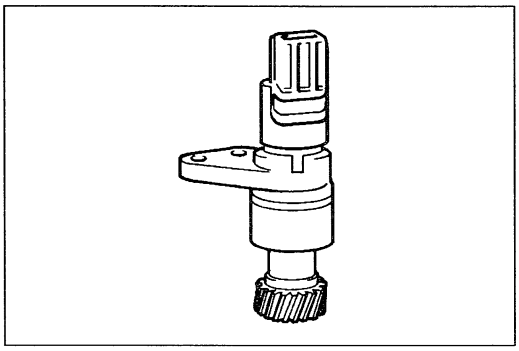
Primary shaft gear runout:
0.050 mm {0.0020 in} max.



Secondary shaft gear runout:
0.015 mm {0.0006 in} max.







6. Measure the clearance between the shaft and the gears.

Clearance

mm {in}

	Shaft (Outer dia.)	Gear (Inner dia.)	Sleeve (Outer dia.)	Clearance
1st	39.445—39.470 {1.5529—1.5539}	39.500—39.525 {1.5551—1.5561}	—	0.030—0.080 {0.0012—0.0031}
2nd	34.945—34.970 {1.3758—1.3768}	35.000—35.025 {1.3780—1.3789}	—	
3rd	35.945—35.970 {1.4152—1.4161}	36.000—36.025 {1.4173—1.4183}	—	
4th	30.945—30.970 {1.2183—1.2193}	31.000—31.025 {1.2205—1.2215}	—	
5th	—	34.000—34.025 {1.3386—1.3396}	33.945—33.970 {1.3364—1.3374}	

Vehicle Speedometer Sensor (Speedometer Driven Gear)

1. Inspect the teeth for damage and wear.
2. Inspect the O-ring for damage and wear.

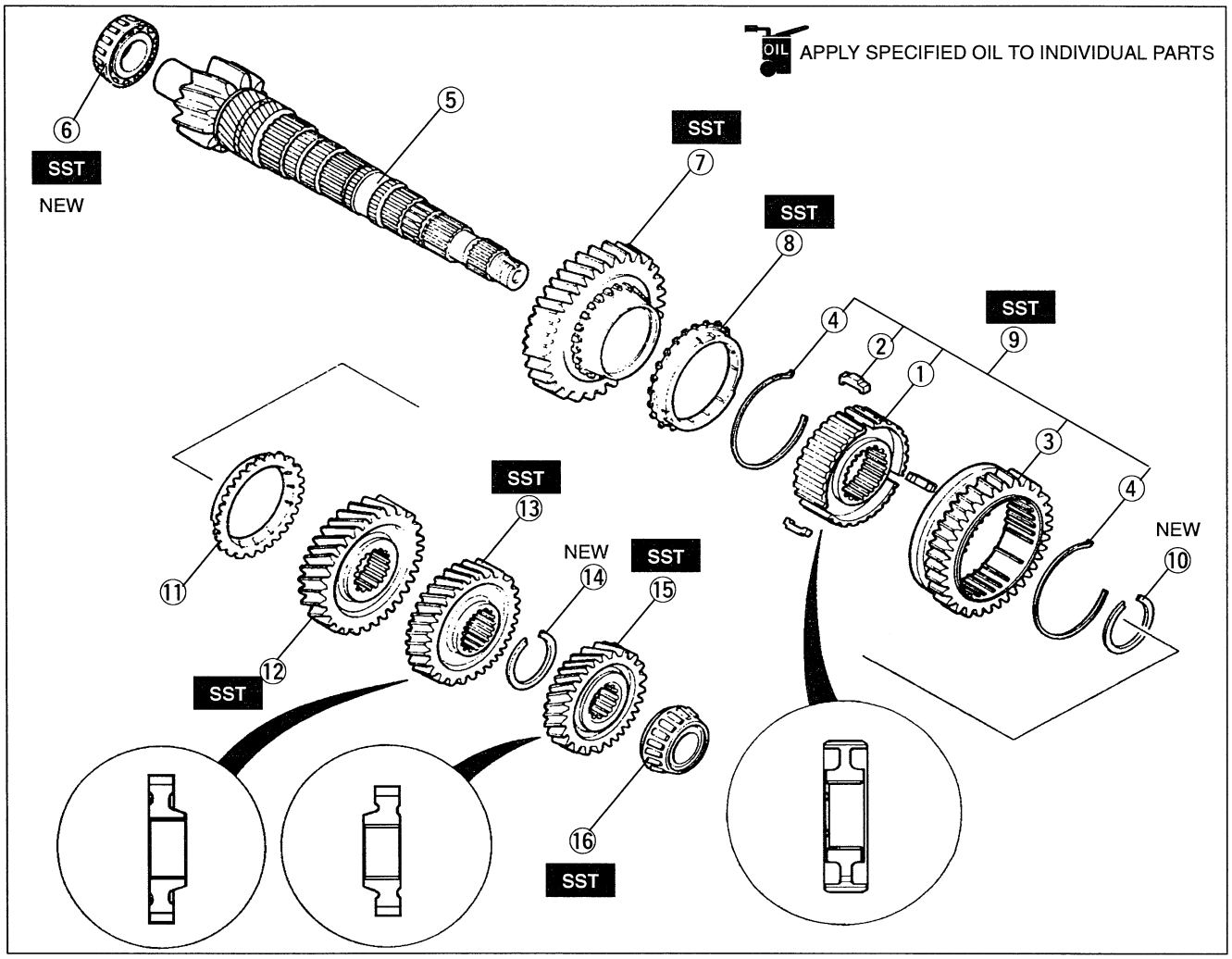
ASSEMBLY

Precaution

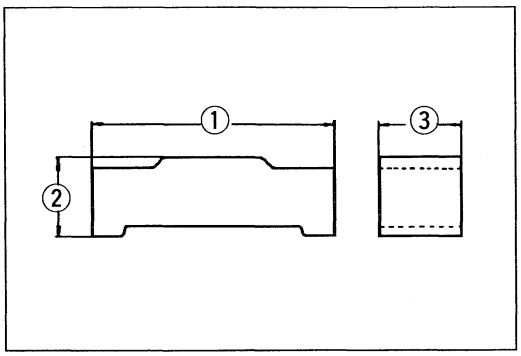
1. All O-rings and gaskets must be replaced with the new ones included in the overhaul kit.
2. Verify that all parts are completely cleaned before assembly.
3. Assemble parts within 10 minutes after applying sealant. Allow the sealant to cure for at least 30 minutes after assembly before filling the transaxle with transaxle oil.
4. Bearing races and bearings must be replaced as sets.

Secondary Shaft Assembly

Assemble in the order shown in the figure, referring to **Assembly Note**.



1. 1st/2nd clutch hub
   Assembly Note ..... page J–32
2. Synchronizer keys
3. Clutch hub sleeve (reverse gear)
4. Synchronizer key springs
5. Secondary shaft gear
6. Bearing (secondary shaft end)
   Assembly Note ..... page J–32
7. 1st gear
   Assembly Note ..... page J–32
8. 1st synchronizer ring
   Assembly Note ..... page J–32
9. 1st/2nd clutch hub assembly
   Assembly Note ..... page J–32
10. Retaining ring
11. 2nd synchronizer ring
    Assembly Note ..... page J–33
12. 2nd gear
    Assembly Note ..... page J–33
13. Secondary 3rd gear
    Assembly Note ..... page J–33
14. Retaining ring
15. Secondary 4th gear
    Assembly Note ..... page J–33
16. Bearing
    Assembly Note ..... page J–33

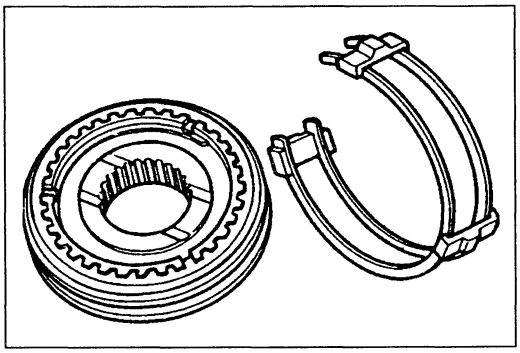


Assembly note
Clutch hub

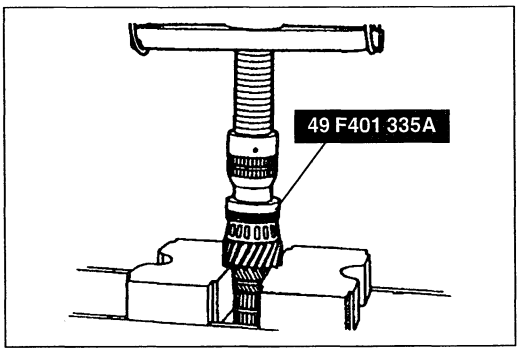
Synchronizer key dimensions

mm {in}

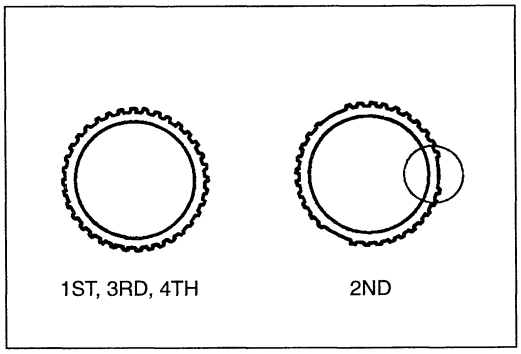
	①	②	③
1st/2nd	19.0 {0.748}	4.3 {0.17}	5.0 {0.20}
3rd/4th 5th/Rev.	17.0 {0.669}	4.3 {0.17}	5.0 {0.20}



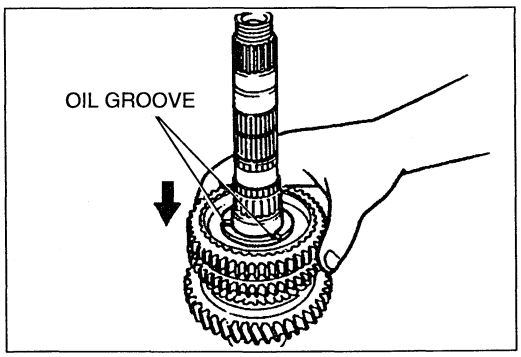
Install the synchronizer keys and springs in the clutch hub.



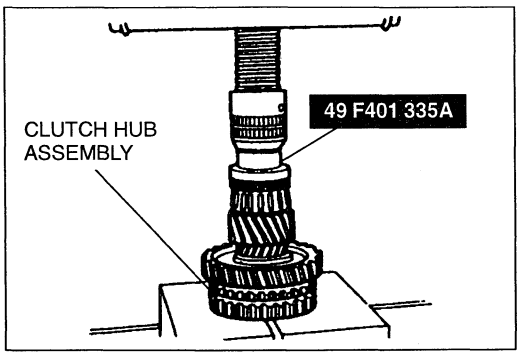
Bearing (secondary shaft end)
Install the new bearing by using the **SST**.



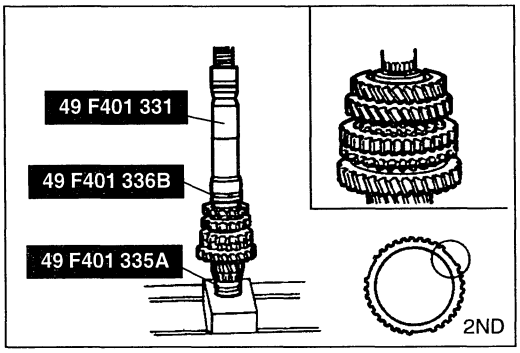
1st gear, 1st synchronizer ring and 1st/2nd clutch hub assembly
The 2nd synchronizer ring has teeth missing at three places around its outer edge to help distinguish it from the other synchronizer rings.



1. Assemble the 1st gear, 1st synchronizer ring, and 1st/2nd clutch hub assembly.
2. Align the synchronizer ring grooves and synchronizer keys.

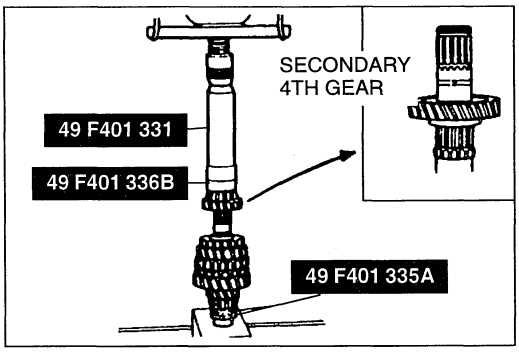


3. Press the 1st/2nd clutch hub assembly on by using the **SST**.



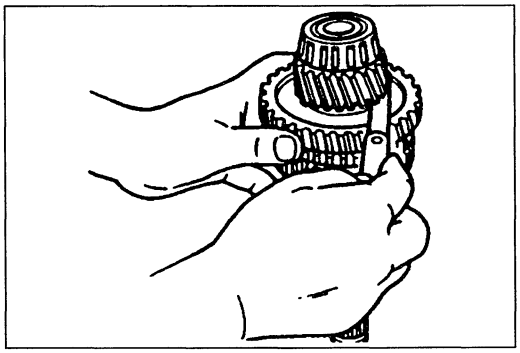
2nd synchronizer ring, 2nd gear and secondary 3rd gear

1. Install the 2nd synchronizer ring and 2nd gear.
2. Install the secondary 3rd gear by using the **SSTs**.



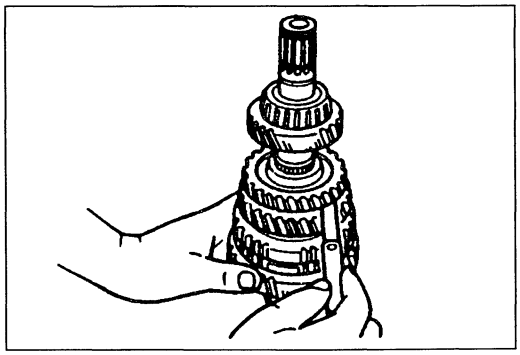
Secondary 4th gear and bearing

1. Install the secondary 4th gear and the bearing by using the **SST**.



2. Measure the clearance between the 1st gear and the differential drive gear.

   Clearance: 0.05—0.28 mm {0.002—0.011 in}
   Maximum: 0.33 mm {0.013 in}



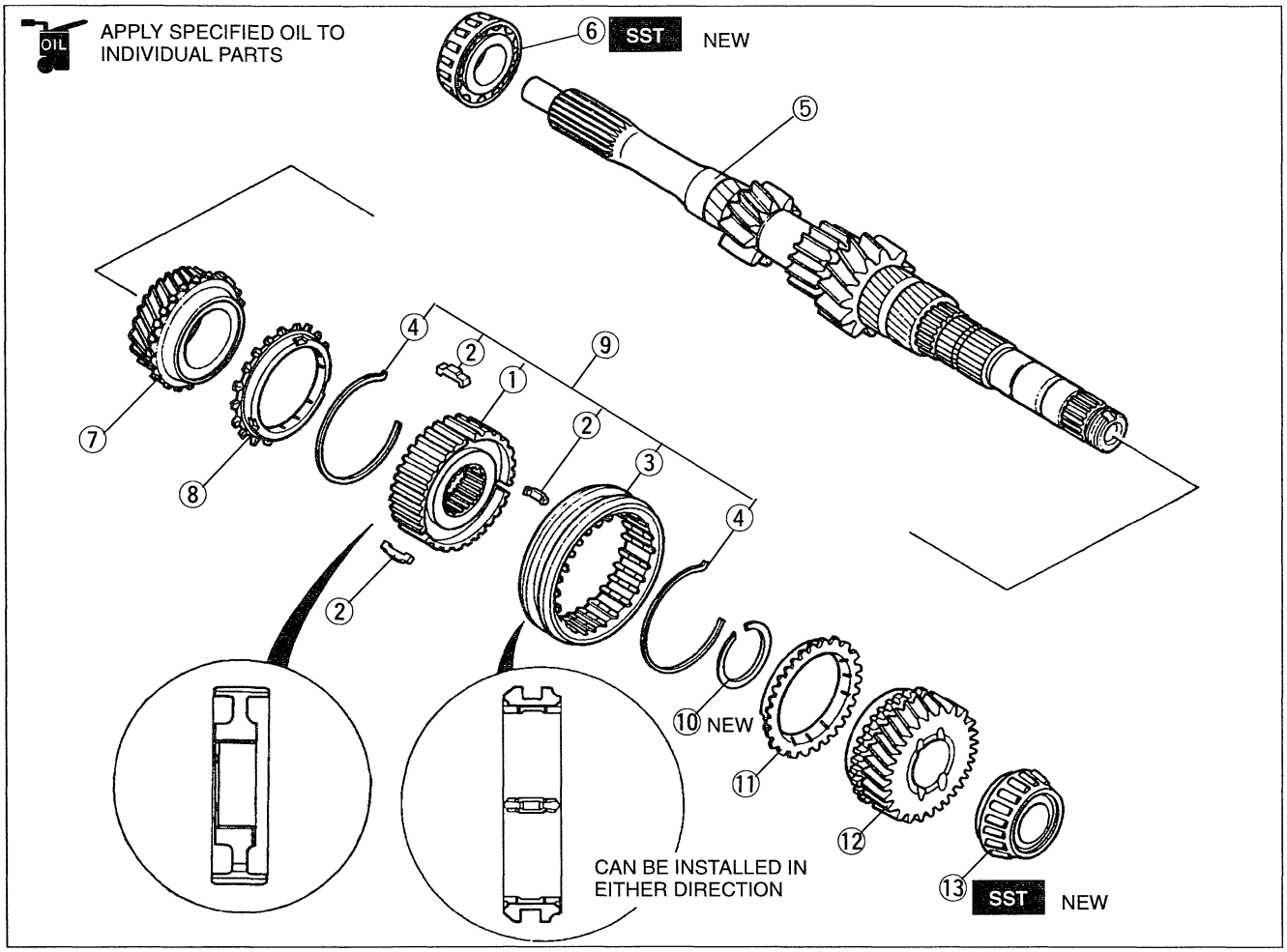
3. Measure the clearance between the 2nd gear and the secondary 3rd gear.

   Clearance: 0.18—0.46 mm {0.007—0.018 in}
   Maximum: 0.51 mm {0.020 in}

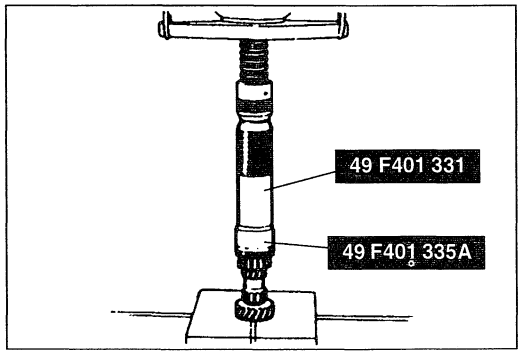
4. If not as specified, reassemble the secondary shaft assembly.

Primary Shaft Assembly

Assemble in the order shown in the figure, referring to **Assembly Note**.



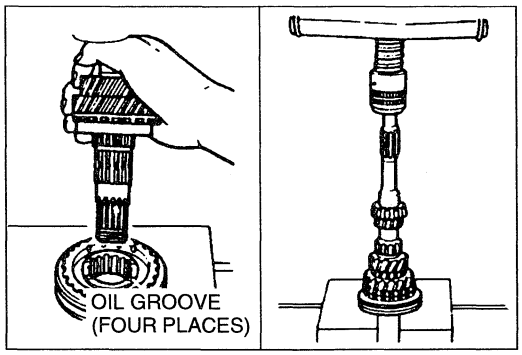
1. 3rd/4th clutch hub
   Assembly Note ..... page J–32
2. Synchronizer keys
3. 3rd/4th clutch hub sleeve
4. Synchronizer key springs
5. Primary shaft gear
6. Bearing (primary shaft end)
   Assembly Note ..... below
7. 3rd gear
   Assembly Note ..... page J–35
8. 3rd synchronizer ring
   Assembly Note ..... page J–35
9. 3rd/4th clutch hub assembly
   Assembly Note ..... page J–35
10. Retaining ring
11. 4th synchronizer ring
    Assembly Note ..... page J–35
12. 4th gear
    Assembly Note ..... page J–35
13. Bearing
    Assembly Note ..... page J–35



Assembly note

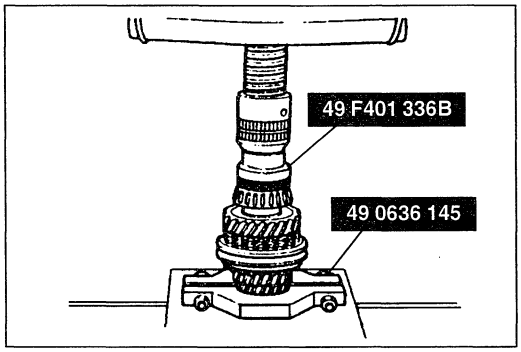
Bearing (primary shaft end)

Install the new bearing by using the **SST**.



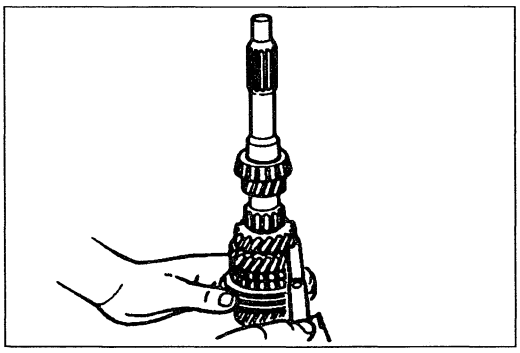
3rd gear, 3rd synchronizer ring, and 3rd/4th clutch hub assembly

Install the 3rd gear, 3rd synchronizer ring, and 3rd/4th clutch hub assembly by using a press.



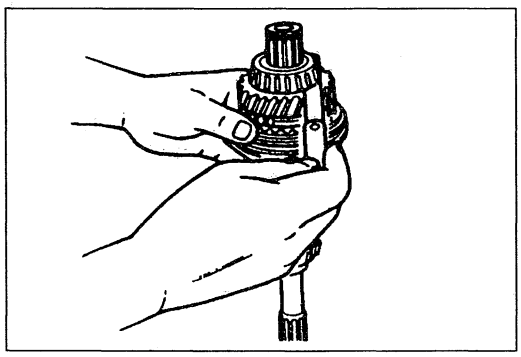
4th synchronizer ring, 4th gear, and bearing

1. Install the 4th synchronizer ring, 4th gear, and a new bearing by using the **SSTs**.



2. Measure the clearance between the 3rd gear and 2nd gear.

   Clearance: 0.05—0.20 mm {0.002—0.008 in}
   Maximum: 0.25 mm {0.010 in}



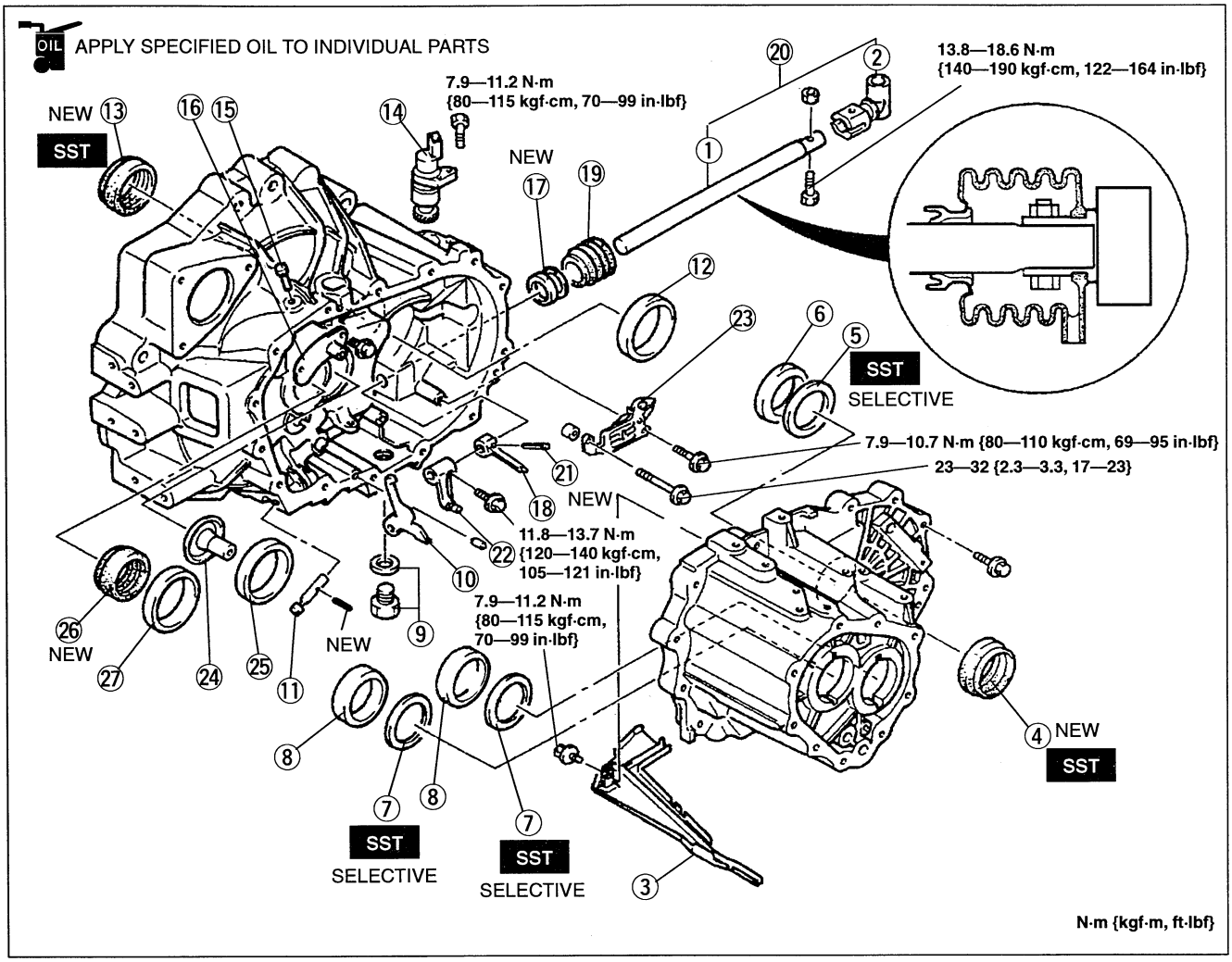
3. Measure the clearance between the 4th gear and bearing.

   Clearance: 0.17—0.37 mm {0.007—0.015 in}
   Maximum: 0.42 mm {0.017 in}

4. If not as specified, reassemble the primary shaft assembly.

Clutch Housing and Transaxle Case Components

1. Select the adjustment shim(s), referring to **Bearing Preload Adjustment**.
2. Assemble in the order shown in the figure, referring to **Assembly Note**.
3. Verify that the bearing preload is within specification, referring to **Bearing Preload**.



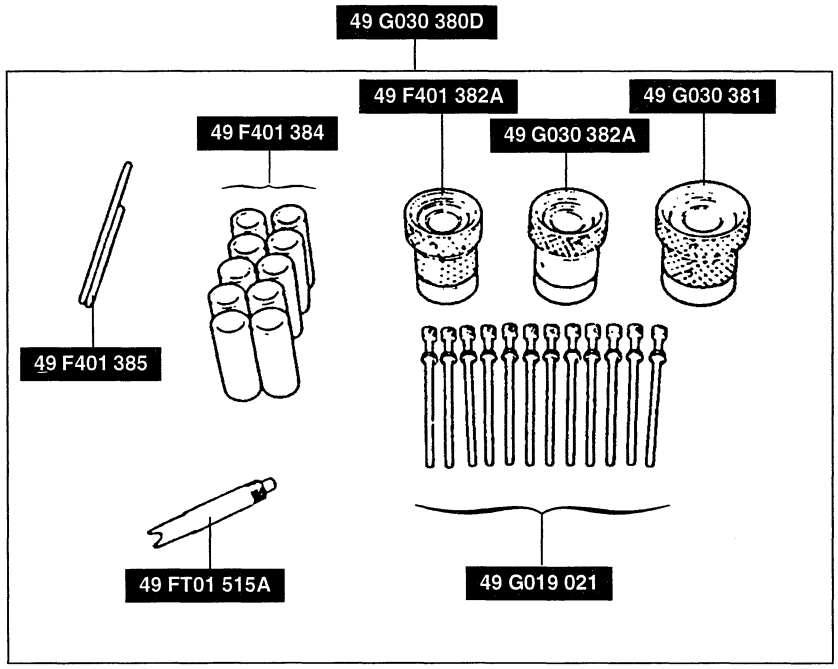
1. Change rod
2. Joint
3. Oil passage
4. Oil seal (differential)
   Assembly Note ..... page J–40
5. Adjustment shim(s)
   Bearing preload adjustment ... page J–37
6. Bearing race (differential)
   Assembly Note ..... page J–40
7. Adjustment shim(s)
   Bearing preload adjustment ... page J–37
8. Bearing race (transaxle case)
   Assembly Note ..... page J–40
9. Drain plug and washer
10. Reverse lever
11. Reverse lever shaft
12. Bearing race (differential)
    Assembly Note ..... page J–40
13. Oil seal (differential)
    Assembly Note ..... page J–40
14. Vehicle speedometer sensor (speedometer driven gear)
15. Bleeder
16. Bleeder cover assembly
17. Oil seal (change rod assembly)
    Assembly Note ..... page J–41
18. Selector
19. Boot
    Assembly Note ..... page J–41
20. Change rod assembly
21. Roll pin
22. Change arm
23. Guide plate assembly
24. Funnel
25. Bearing race (secondary shaft)
26. Oil seal (primary shaft)
    Assembly Note ..... page J–41
27. Bearing race (primary shaft)

Bearing preload adjustment

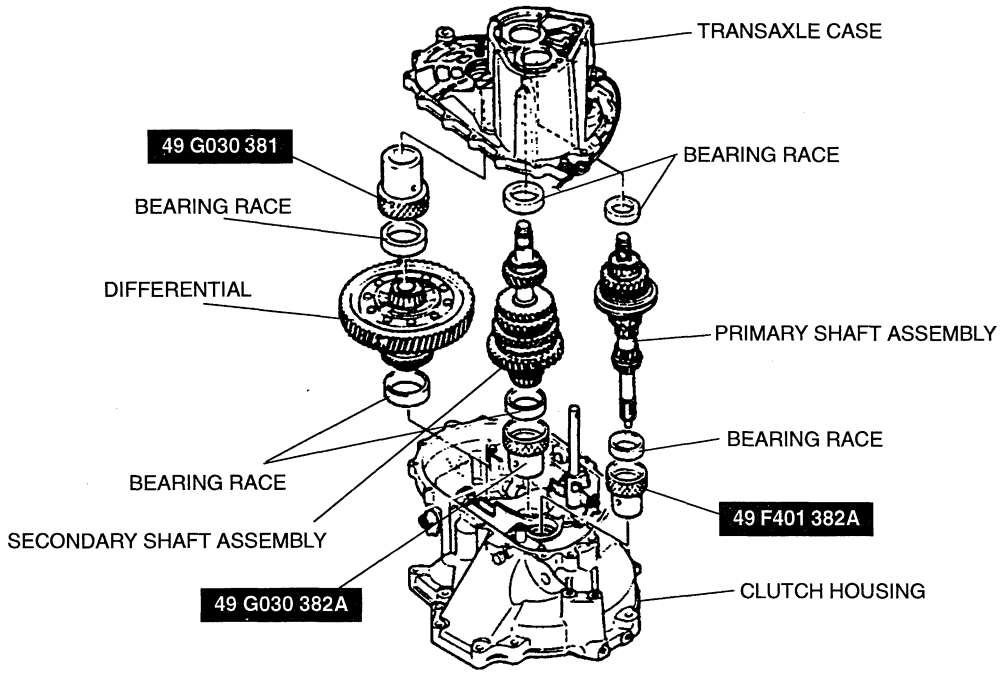
When replacing any of the parts listed in the table below, adjust the bearing preload by selecting and installing the proper adjustment shim(s).

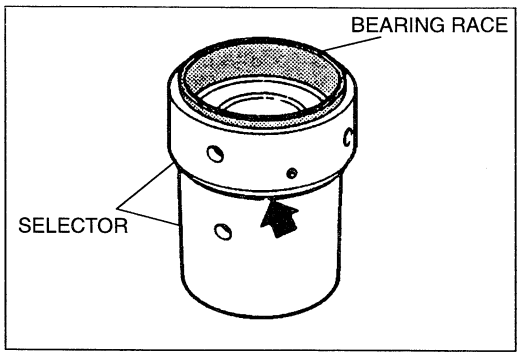
Primary shaft assembly	Secondary shaft assembly	Differential
• Transaxle case • Clutch housing • Primary shaft gear bearing • Primary shaft gear	• Transaxle case • Clutch housing • Secondary shaft gear bearing • Secondary shaft gear • Secondary 4th gear	• Transaxle case • Clutch housing • Differential side bearing • Ring gear and case assembly

SST

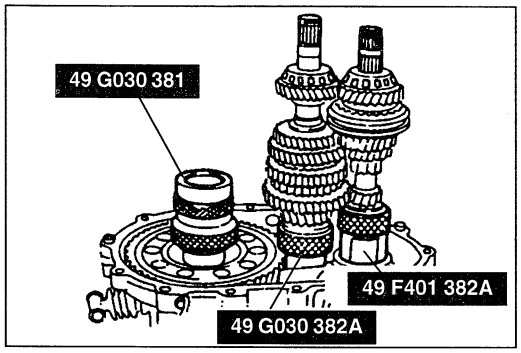


SST USAGE

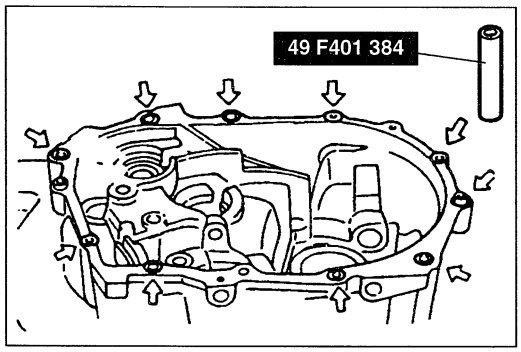




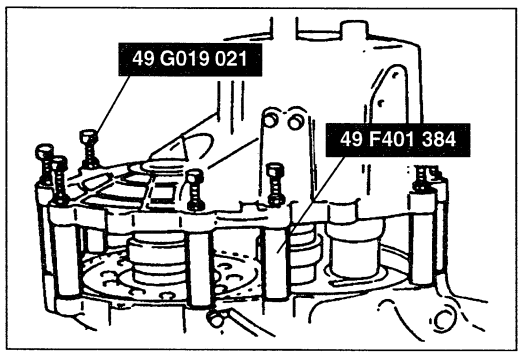
1. Install the primary and secondary shaft bearing races into the transaxle case (with the shims removed).
2. Mount the clutch housing onto the transaxle hanger, and set the differential bearing race into the clutch housing. Position a piece of pipe against the bearing race and tap it in until it contacts the clutch housing.
3. Set the bearing races into the **SSTs** (selector) as shown in the figure.
4. Turn the selector to eliminate the gap indicated by the arrow.



5. Set the differential assembly into the clutch housing, and set the bearing race and the **SST** (selector) on the differential. Set the assembled selectors for the primary and secondary shaft in the clutch housing.
   Mount the shaft gear assemblies as shown in the figure.

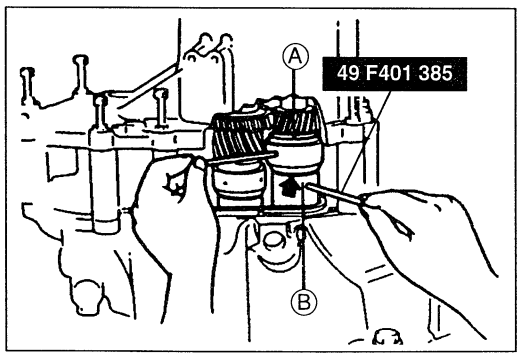


6. Set the **SST** (collars) in the positions shown in the figure.

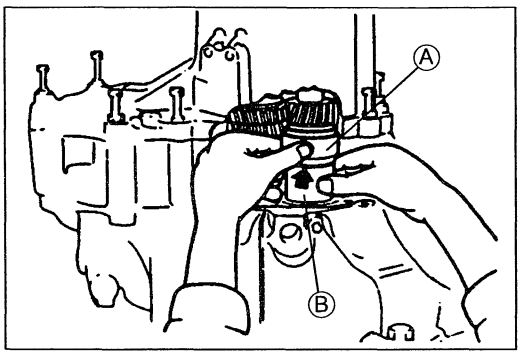


7. Install the transaxle case and tighten the **SST** (bolts) to the specified torque.

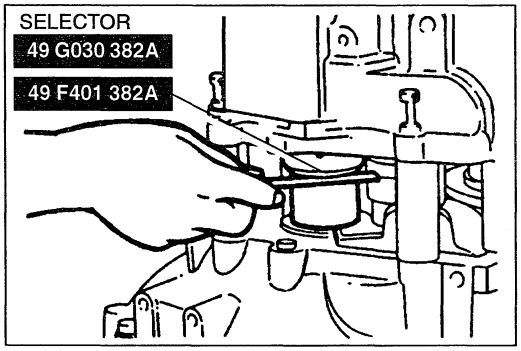
   Tightening torque:
   38—51 N·m {3.8—5.5 kgf·m, 28—38 ft·lbf}



8. To seat the bearings, mount the **SST** (bars) on parts Ⓐ and Ⓑ of the selectors, and turn the selectors so the gaps are widened. Then turn the **SST** in the reverse direction until the gaps are eliminated.



9. Manually expand the selector until it no longer turns by hand.
10. Verify that both the primary and secondary shafts turn smoothly.



11. Measure the clearance between the two halves of the **SST** (selector) around the circumference by using a feeler gauge.
12. Take the maximum reading and determine the shim to be used. Use no more than two shims.

<Primary shaft adjustment shim>

- Select the thinner shim from the table to obtain the standard clearance.

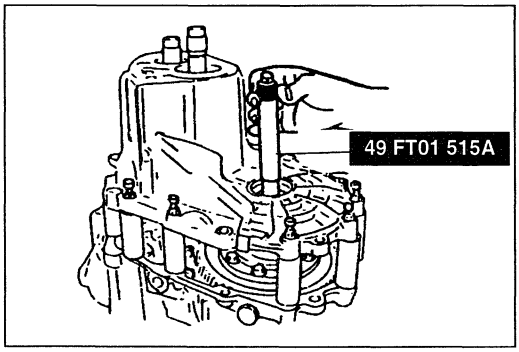
Standard clearance: 0—0.05 mm {0—0.002 in}
Example: Reading from step 11 =
0.57 mm {0.022 in}
Shim selection range:
(0.57 mm {0.022 in}–0.05 mm {0.002 in})
—(0.57 mm {0.022 in}–0 mm {0 in})
= 0.52 mm {0.020 in}—0.57 mm {0.022 in}
Shim: 0.55 mm {0.022 in}

Thickness (Shaft gears) mm {in}	
0.20 {0.008}	0.50 {0.020}
0.25 {0.010}	0.55 {0.022}
0.30 {0.012}	0.60 {0.024}
0.35 {0.014}	0.65 {0.026}
0.40 {0.016}	0.70 {0.028}
0.45 {0.018}	

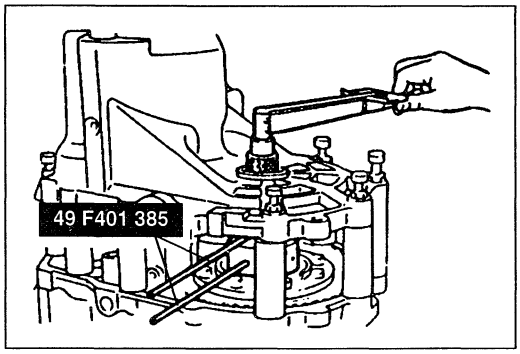
<Secondary shaft adjustment shim>

- Select the thinner shim from the table to obtain the standard clearance.

Tightening amount: 0.03—0.08 mm {0.001—0.003 in}
Example: Reading from step 11 =
0.57 mm {0.022 in}
Shim selection range:
(0.57 mm {0.022 in} + 0.03 mm {0.001 in})
—(0.57 mm {0.022 in} + 0.08 mm {0.003 in})
= 0.60 mm {0.024 in}—0.65 mm{0.026 in}
Shim: 0.60 mm {0.024 in}

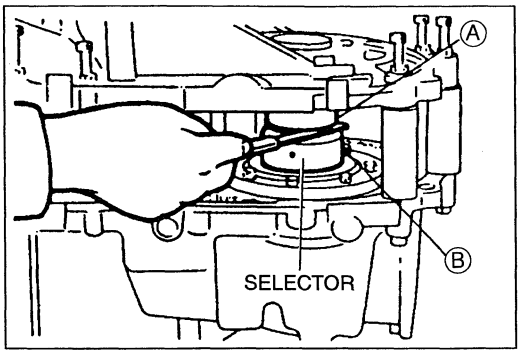


13. Install the **SST** to the differential.



14. Turn the **SST** by using a torque wrench. Adjust the **SST** (selector) with the **SST** (bars) until the specified preload is obtained.

Preload: 0.5 N·m {5.0 kgf·cm, 4.3 in·lbf}

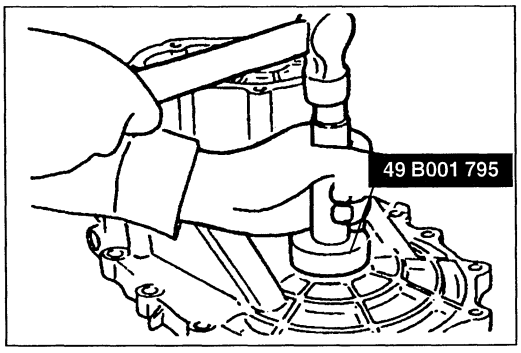


15. Measure the gap between Ⓐ and Ⓑ around the circumference of the **SST** (selector) by using a feeler gauge.
16. Add **0.15 mm {0.006 in}** to the measured clearance and select a combination of two shims closest in value to that measurement. Use no more than two shims.

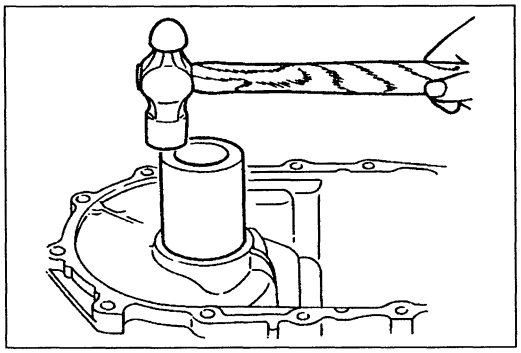
Thickness	mm {in}
0.10 {0.004}	0.70 {0.028}
0.20 {0.008}	0.75 {0.030}
0.25 {0.010}	0.80 {0.031}
0.30 {0.012}	0.85 {0.033}
0.35 {0.014}	0.90 {0.035}
0.40 {0.016}	0.95 {0.037}
0.45 {0.018}	1.00 {0.039}
0.50 {0.020}	1.05 {0.041}
0.55 {0.022}	1.10 {0.043}
0.60 {0.024}	1.15 {0.045}
0.65 {0.026}	1.20 {0.047}

Example: 0.32 mm {0.013 in}
0.32 mm {0.013 in} + 0.15 mm {0.006 in}
= 0.47 mm {0.019 in}.
Nearest shim (on thick side) to 0.47 mm {0.019 in} is 0.50 mm {0.020 in}.

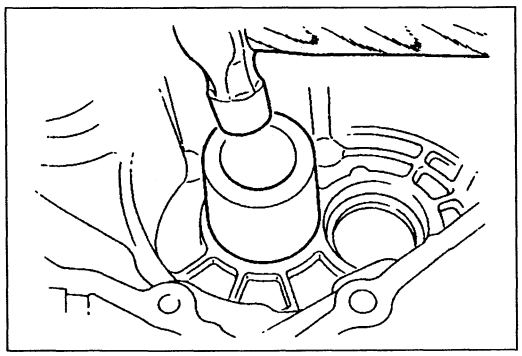
17. Remove the transaxle case and the **SSTs**.
18. Remove the selectors, the primary shaft assembly, and the differential.
19. Remove the bearing races.



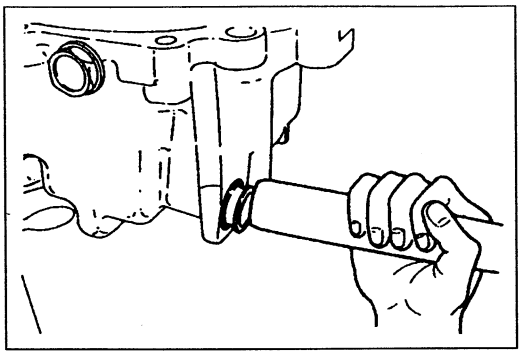
Assembly note
Oil seal (differential)
1. Using the **SST** and a hammer, tap the new oil seal in evenly until the **SST** contacts the transaxle case.
2. Coat the lip of the oil seal with transaxle oil.



Bearing race (differential)
1. Install the adjustment shim(s) to the differential case.
2. Apply transaxle oil to the bearing race, and install it to the differential case by using a pipe.

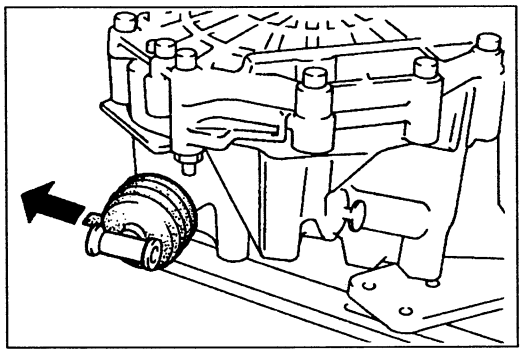


Bearing race (transaxle case)
1. Install the adjustment shim(s) to the primary and secondary shaft bearing seats in the transaxle case.
2. Apply transaxle oil to each bearing race, and install them to the transaxle case by using a pipe.

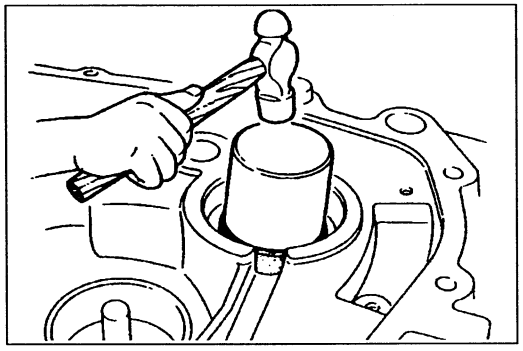


Oil seal (change rod assembly)
1. Install the new oil seal by using a pipe.
2. Coat the lip of the oil seal with transaxle oil.

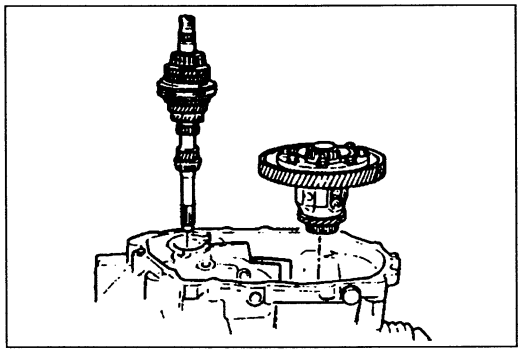
Outer diameter of pipe: 26.0 mm {1.02 in}



Boot
Install the boot so that the drain hole is facing downward when mounted on the vehicle.

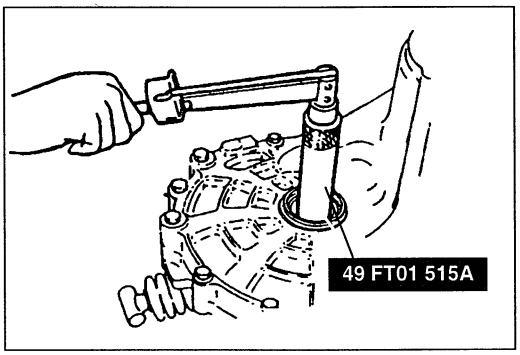


Oil seal (primary shaft)
Apply transaxle oil to the outer circumference of the oil seal, and install it to the transaxle case by using a pipe.



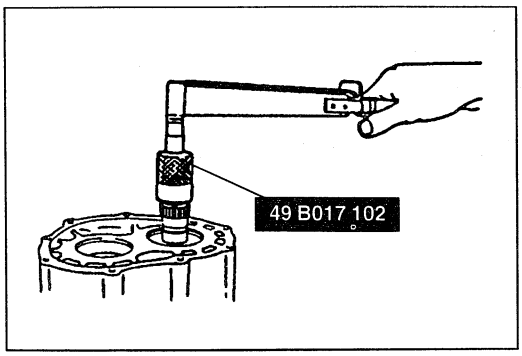
Bearing preload
Verify the shaft gears and the differential bearing preloads. Readjust the bearing preloads if they are not within specification.
1. Set the primary shaft gear assembly and the differential into the clutch housing.
2. Install the transaxle case, and tighten to the specified torque.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



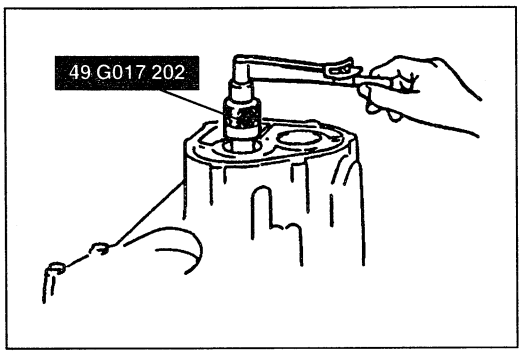
3. Install the **SST** to the differential.
4. Connect a torque wrench to the **SST** and measure the preload.

Preload: 1.4—1.9 N·m {14—20 kgf·cm, 13—17 in·lbf}



5. Remove the **SST**.
6. With the transaxle facing in the direction shown in the figure, install the **SST** to the primary shaft gear assembly.
7. Connect a torque wrench to the **SST** and measure the preload.

Preload:
0.1—0.2 N·m {1.0—2.5 kgf·cm, 0.9—2.1 in·lbf}



8. Remove the **SST**, transaxle case, primary shaft gear assembly, and differential.
9. Install the secondary shaft gear assembly and transaxle case, and tighten to the specified torque.

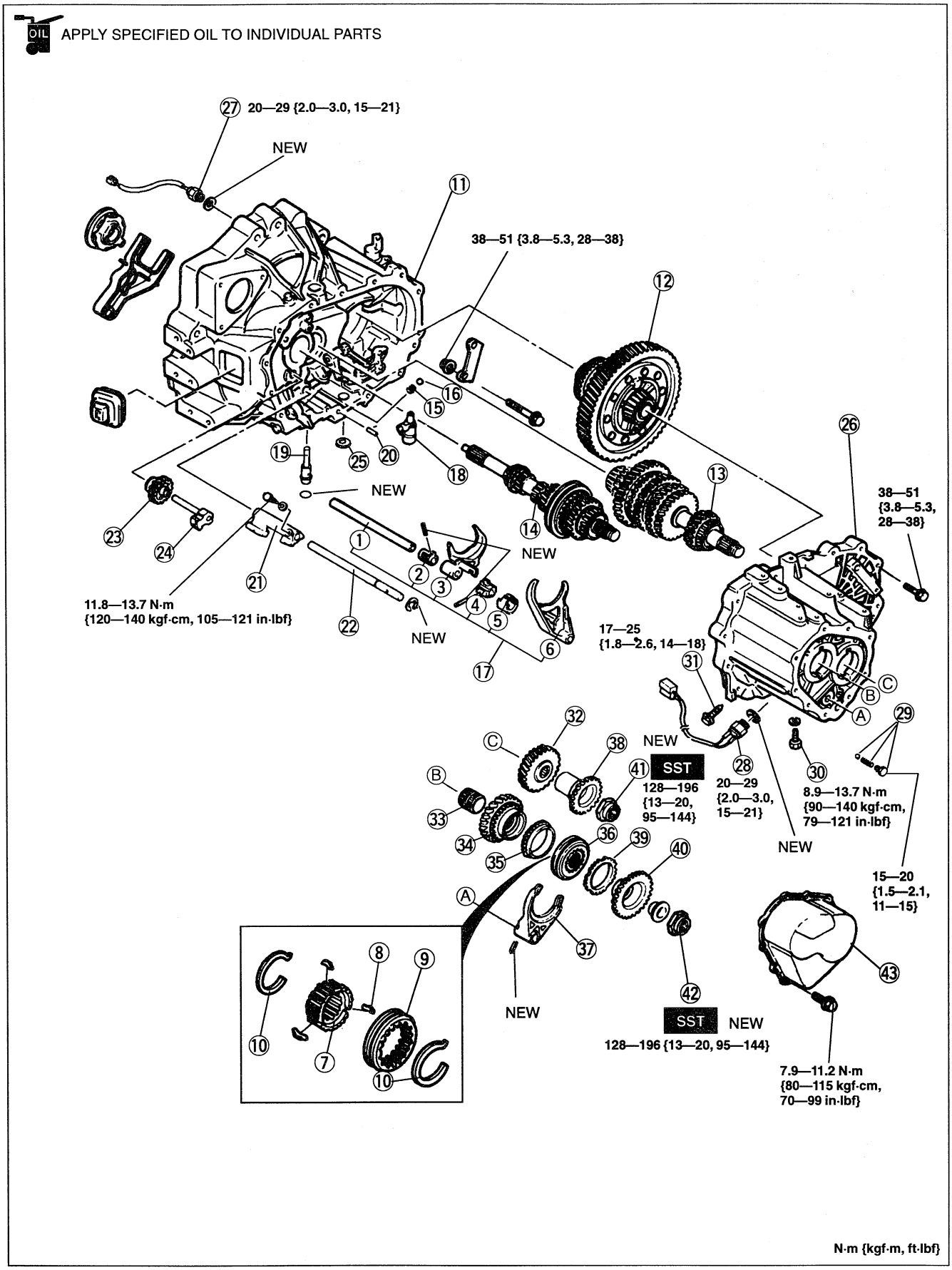
Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

10. Install the **SST** to the secondary shaft gear assembly.
11. Connect a torque wrench to the **SST** and measure the preload.

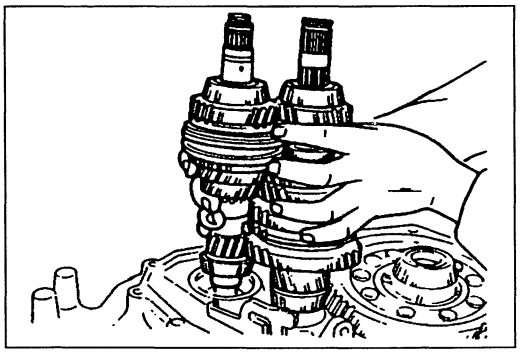
Preload:
0.2—0.4 N·m {2.0—4.0 kgf·cm, 1.8—3.4 in·lbf}

5th/Reverse Gear and Housing Parts

Assemble in the order shown in the figure, referring to **Assembly Note**.

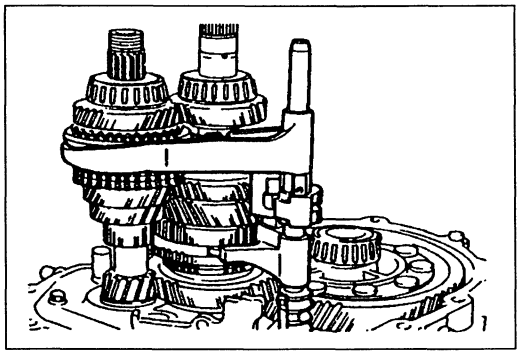


1. Control rod
2. Control end
3. 1st/2nd shift fork
4. Control lever
5. Interlock sleeve
6. 3rd/4th shift fork
7. Clutch hub
8. Synchronizer keys
9. Clutch hub sleeve
10. Synchronizer key springs
11. Clutch housing
12. Differential assembly
13. Secondary shaft gear assembly
    Assembly Note ..... below
14. Primary shaft gear assembly
    Assembly Note ..... below
15. Spring
16. Steel ball
17. Shift fork and shift rod assembly
    Assembly Note ..... below
18. Crank lever assembly
    Assembly Note ..... page J–45
19. Crank lever shaft
    Assembly Note ..... page J–45
20. Pin
21. 5th/reverse shift rod end
    Assembly Note ..... page J–45
22. 5th/reverse shift rod
    Assembly Note ..... page J–45
23. Reverse idler gear
    Assembly Note ..... page J–45
24. Reverse idler shaft
    Assembly Note ..... page J–45
25. Magnet
26. Transaxle case assembly
    Assembly Note ..... page J–46
27. Neutral switch
28. Back-up light switch
29. Lock bolt, ball, and spring
30. Guide bolt
31. Lock bolt
32. Secondary 5th gear
    Assembly Note ..... page J–46
33. Gear sleeve
34. 5th gear
35. 5th synchronizer ring
36. 5th/reverse clutch hub assembly
    Assembly Note ..... page J–46
37. 5th/reverse shift fork
    Assembly Note ..... page J–46
38. Secondary reverse synchronizer gear
39. Reverse synchronizer ring
40. Primary reverse synchronizer gear
41. Locknut (secondary shaft)
    Assembly Note ..... page J–46
42. Locknut (primary shaft)
    Assembly Note ..... page J–46
43. Rear cover



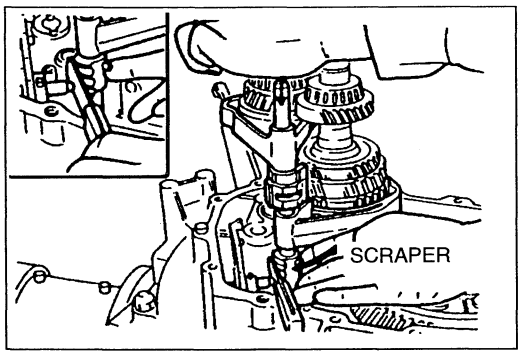
Assembly note
Primary shaft gear assembly and secondary shaft gear assembly

Install the primary and secondary shaft gear assemblies together.

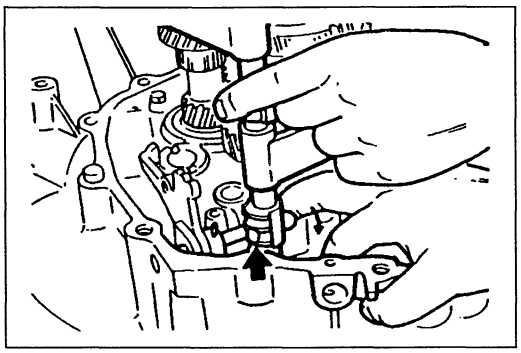


Shift fork and shift rod assembly

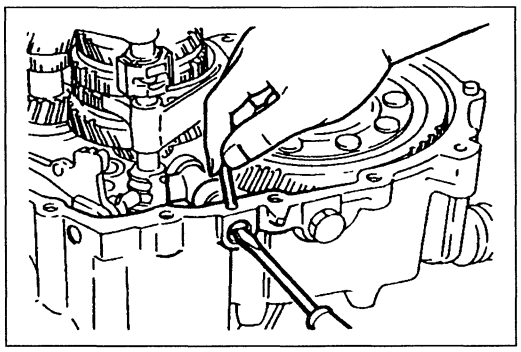
1. Shift to 2nd gear and position the shift fork and shift rod assembly as shown.



2. Insert the spring seat and spring into the reverse lever shaft. Install the steel ball, and place a scraper so that it contacts the steel ball.
3. With the edge of the control end against the scraper, push the control end in the direction of the arrow so that the ball goes into the shaft. This will line up the rod with the shift rod coupling hole in the clutch housing.

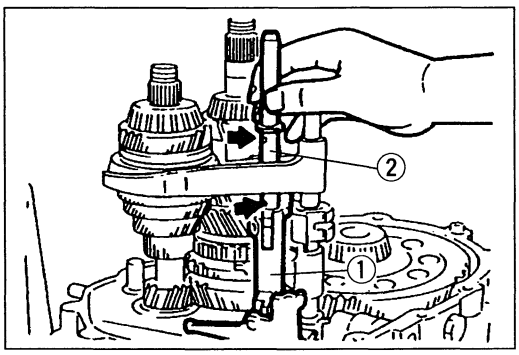


4. Set each clutch hub sleeve to the neutral position, and tap the shift rod from above so that the steel ball goes into the center groove (of the three grooves in the control end).
5. Pull up on the ball part of the control end so that the steel ball goes into the detent in the groove.



Crank lever assembly and crank lever shaft

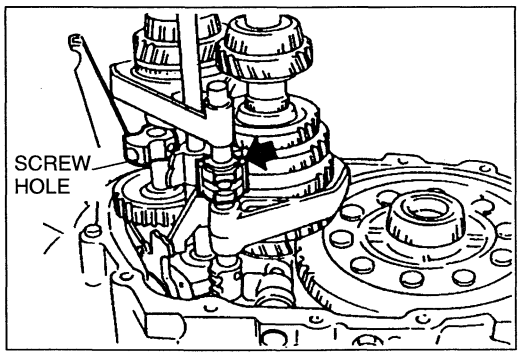
1. Install a new O-ring to the crank lever shaft.
2. Fit the crank lever between the change arm and the control end, and connect the crank lever shaft to the crank lever.
3. Align the pin holes of the crank lever shaft and the clutch housing, and insert a new pin.



5th/reverse shift rod end and 5th/reverse shift rod

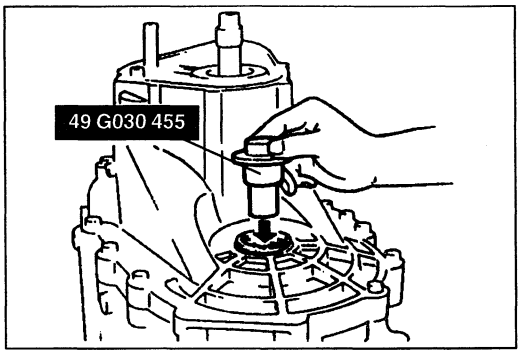
1. Install the shift rod ② into the shift rod end ①.
2. Align the mark on the shift rod with the mounting bolt hole in the shift rod end as shown in the figure, and tighten the gate mounting bolt.

Tightening torque:
11.8—13.7 N·m {120—140 kgf·cm, 105—121 in·lbf}



Reverse idler gear and reverse idler shaft

1. Install the reverse idler gear and the reverse idler shaft.
2. Attach the magnet to the clutch housing.
3. Align the end of the interlock sleeve with the control lever (arrow), and at the same time, face the reverse idler shaft screw hole in the direction shown in the figure.

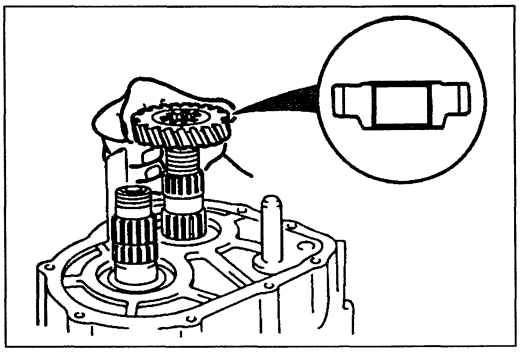


Transaxle case assembly

1. Apply a thin coat of sealant to the contact surfaces of the clutch housing and transaxle case, and tighten the transaxle case installation bolts to the specified torque.

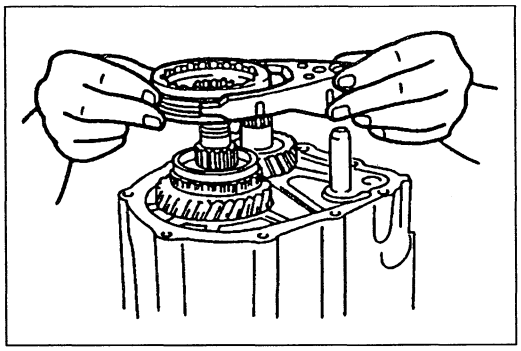
   Tightening torque:
   38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

2. Insert the **SSTs** through the drive shaft and joint shaft hole.



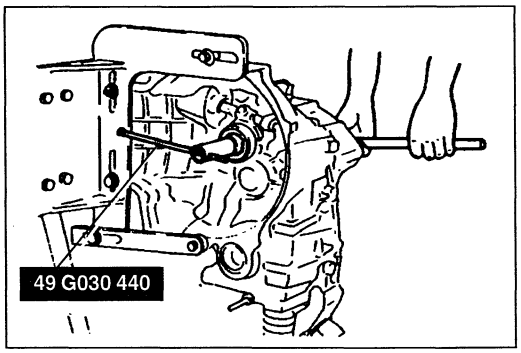
Secondary 5th gear

Install the secondary 5th gear as shown.



5th/reverse clutch hub assembly and 5th/reverse shift fork

Install the 5th/reverse clutch hub assembly and the 5th/reverse shift fork together.

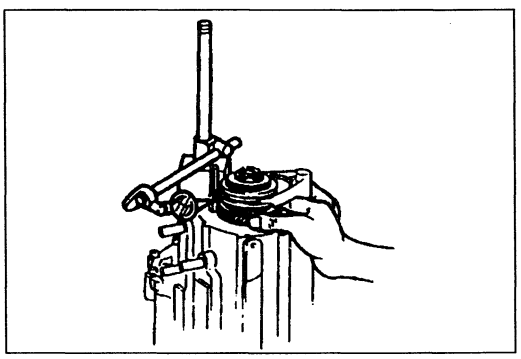


Locknut

1. Shift to 1st gear.
2. Lock the primary shaft by using the **SST**.
3. Tighten new locknuts onto the primary and secondary shafts.

   Tightening torque:
   128—196 N·m {13—20 kgf·m, 95—144 ft·lbf}

4. Stake the locknuts.



5. Measure the 5th gear thrust clearance by using a dial indicator.

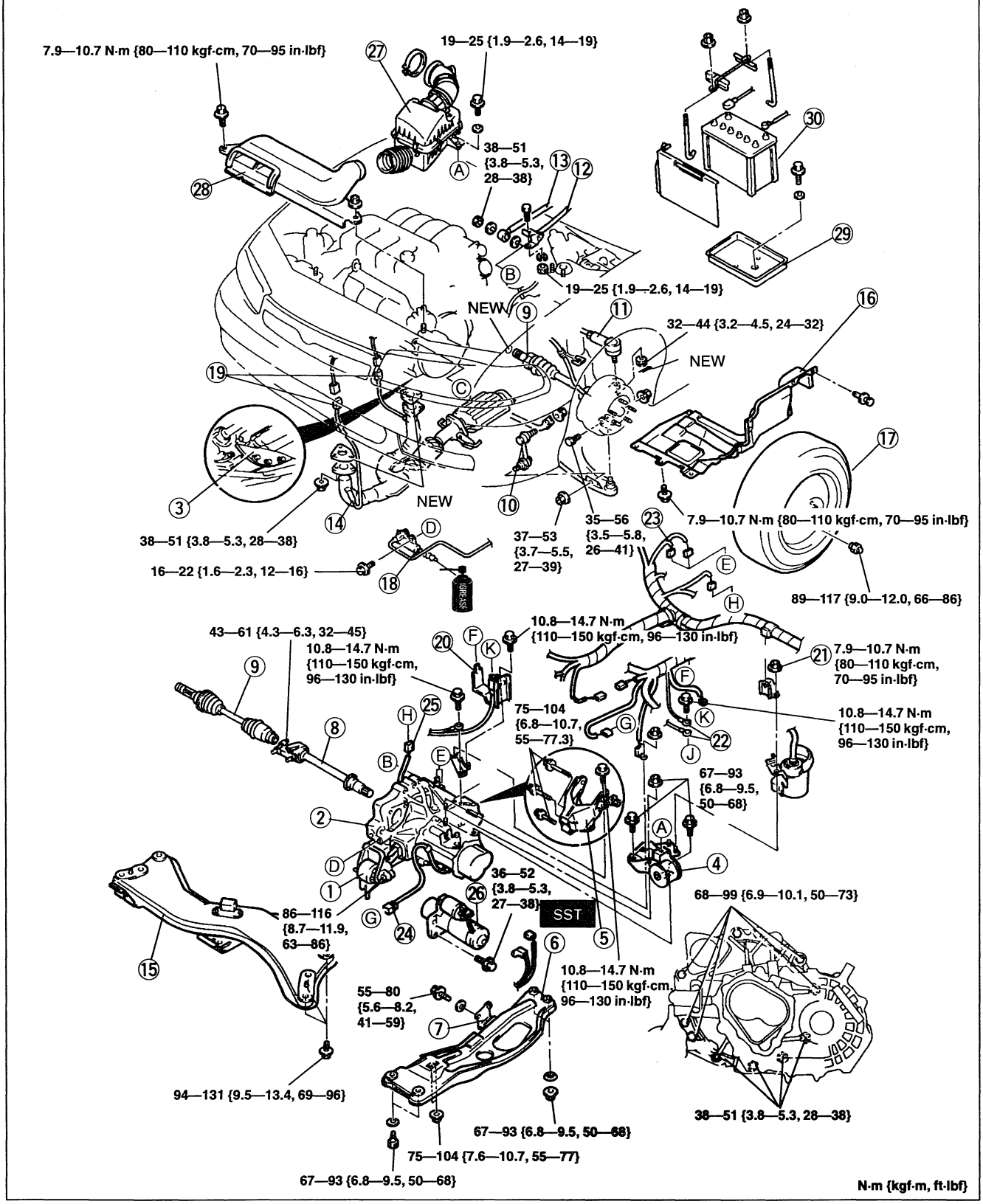
   Clearance: 0.100—0.220 mm {0.0039—0.0087 in}
   Maximum: 0.270 mm {0.0106 in}

6. If not as specified, reassemble the transaxle.

INSTALLATION

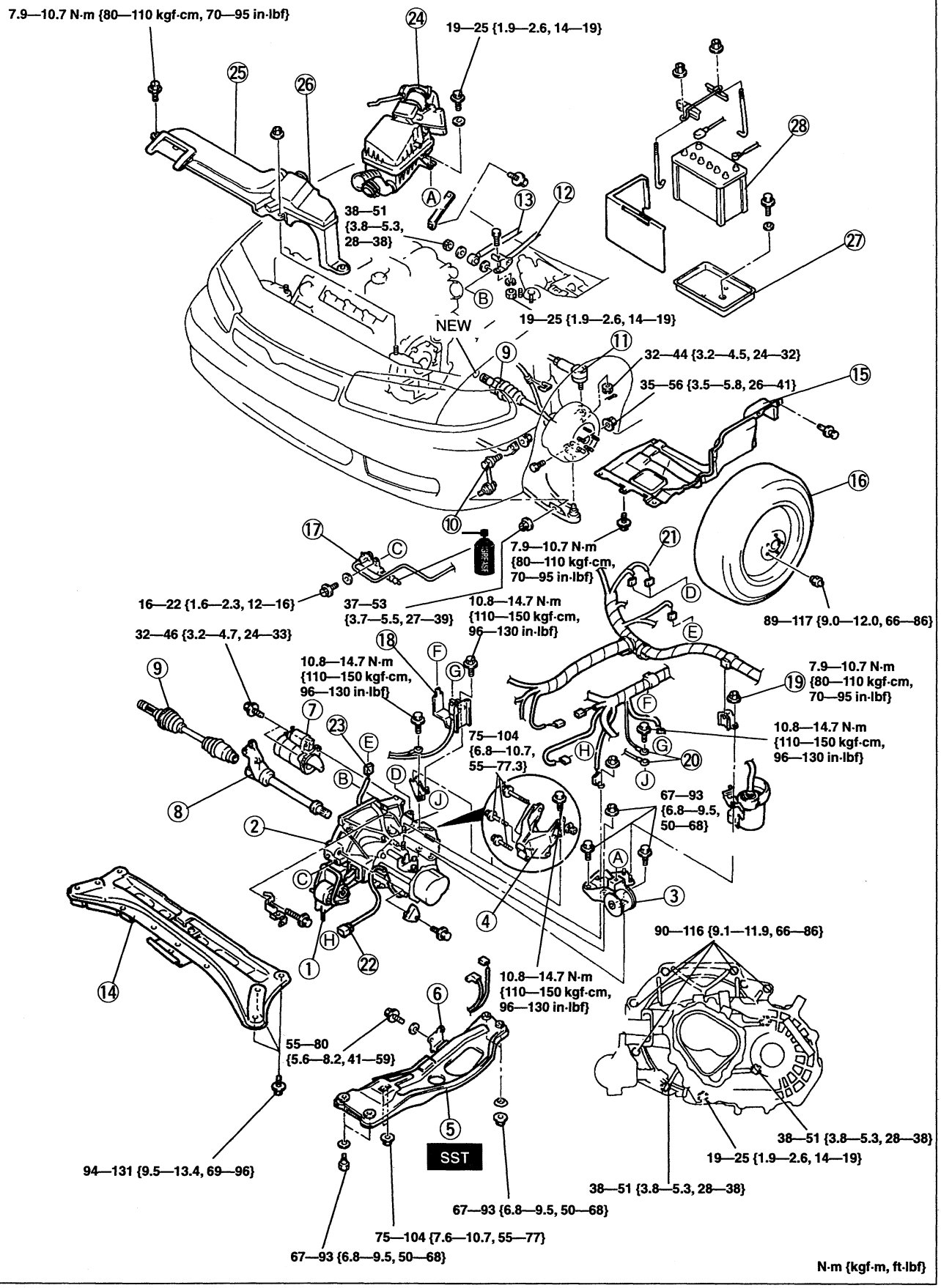
1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Install in the order shown in the figure, referring to **Installation Note**.
3. Add the specified amount and type of transaxle oil. (Refer to page J–7.)
4. Warm up the engine and transaxle, inspect for oil leakage, and check transaxle operation.

KL ENGINE

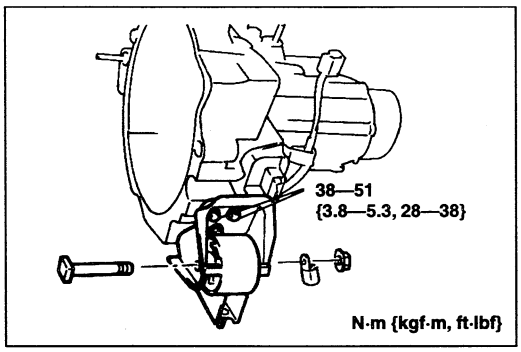


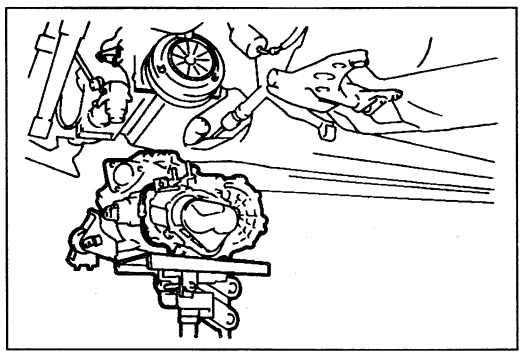
1. No.2 engine mount
   Installation Note ..... page J–50
2. Transaxle
   Installation Note ..... page J–50
3. Undercover
4. No.4 engine mount
5. No.1 engine mount bracket
   Installation Note ..... page J–50
6. Engine mounting member
   Installation Note ..... page J–51
7. No.5 engine mount
8. Joint shaft
   Service ..... section M
9. Drive shafts
   Installation Note ..... page J–51
10. Stabilizer control link
11. Tie-rod ends
    Service ..... section N
12. Change control rod
13. Extension bar
14. Exhaust pipe
15. Transverse member
16. Splash shields
17. Wheels and tires
18. Clutch release cylinder
19. Oxygen sensor connector
20. Harness bracket
    Installation Note ..... page J–51
21. Fuel filter mount nuts
22. Ground
23. Vehicle speedometer sensor (speedometer driven gear) connector
24. Back-up light switch connector
25. Neutral switch connector
26. Starter
27. Air cleaner housing assembly
28. Fresh air duct
29. Battery carrier
30. Battery

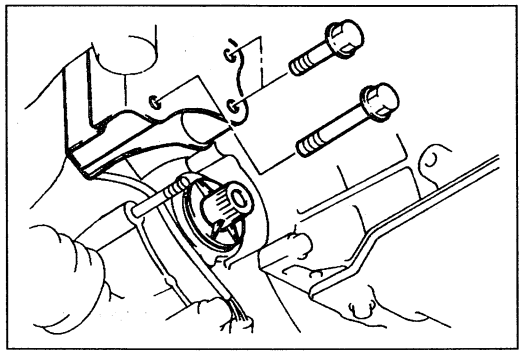
FS ENGINE


7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}
19—25 {1.9—2.6, 14—19}
38—51 {3.8—5.3, 28—38}
NEW
19—25 {1.9—2.6, 14—19}
32—44 {3.2—4.5, 24—32}
35—56 {3.5—5.8, 26—41}
16—22 {1.6—2.3, 12—16}
37—53 {3.7—5.5, 27—39}
10.8—14.7 N·m {110—150 kgf·cm, 96—130 in·lbf}
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}
89—117 {9.0—12.0, 66—86}
32—46 {3.2—4.7, 24—33}
10.8—14.7 N·m {110—150 kgf·cm, 96—130 in·lbf}
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}
75—104 {6.8—10.7, 55—77.3}
10.8—14.7 N·m {110—150 kgf·cm, 96—130 in·lbf}
67—93 {6.8—9.5, 50—68}
90—116 {9.1—11.9, 66—86}
10.8—14.7 N·m {110—150 kgf·cm, 96—130 in·lbf}
55—80 {5.6—8.2, 41—59}
38—51 {3.8—5.3, 28—38}
19—25 {1.9—2.6, 14—19}
94—131 {9.5—13.4, 69—96}
SST
38—51 {3.8—5.3, 28—38}
67—93 {6.8—9.5, 50—68}
75—104 {7.6—10.7, 55—77}
67—93 {6.8—9.5, 50—68}
N·m {kgf·m, ft·lbf}

1. No.2 engine mount
   Installation Note ..... below
2. Transaxle
   Installation Note ..... below
3. No.4 engine mount
4. No.1 engine mount bracket
   Installation Note ..... below
5. Engine mounting member
   Installation Note ..... page J–51
6. No.5 engine mount
7. Starter
8. Joint shaft
   Service ..... section M
9. Drive shafts
   Installation Note ..... page J–51
10. Stabilizer control link
11. Tie-rod ends
    Service ..... section N
12. Change control rod
13. Extension bar
14. Transverse member
15. Splash shields
16. Wheels and tires
17. Clutch release cylinder
18. Harness bracket
    Installation Note ..... page J–51
19. Fuel filter mount bolts
20. Ground
21. Vehicle speedometer sensor (speedometer driven gear) connector
22. Back-up light switch connector
23. Park/neutral switch connector
24. Air cleaner housing assembly
25. Fresh air duct
26. Resonance chamber
27. Battery carrier
28. Battery







Installation Note
No.2 engine mount
1. Install the No.2 engine mount bracket to the transaxle.

   Tightening torque:
   38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

2. Hand-tighten the engine mount nut.

Transaxle
1. Set the transaxle on a jack and lift it into place.
2. Install the transaxle mounting bolts.

   Tightening torque
   KL: 68—99 N·m {6.9—10.1 kgf·m, 50—73 ft·lbf}
   FS: 90—116 N·m {9.1—11.9 kgf·m, 66—86 ft·lbf}

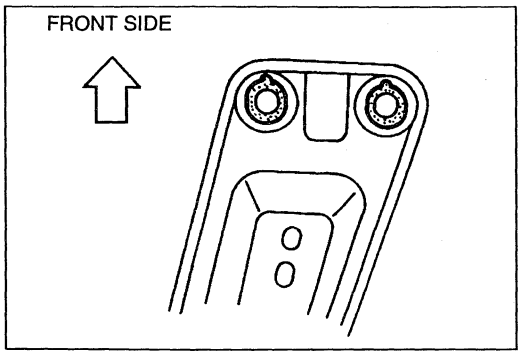
3. Hand-tighten the No.4 engine mount bolts and nuts.

No.1 engine mount

Caution
- **Align the transaxle bolt holes and the engine mount exactly. Any misalignment can result in bolts and bolt holes becoming damaged or stripped during installation.**

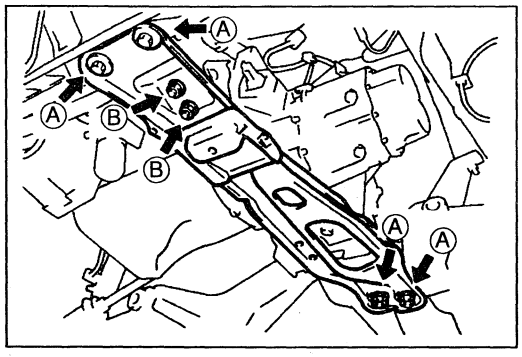
1. Use the **SST** (engine support) to make sure the transaxle bolt holes and No.1 engine mount meet evenly.
2. Set the 3 bolts in the holes, and tighten them to the specified torque.

   Tightening torque:
   75—104 N·m {6.8—10.7 kgf·m, 55—77.3 ft·lbf}



Engine mounting member

1. Install the engine mount bushings as shown in the figure.
2. Install the engine mounting member, making sure that the No.1 engine mount stud bolts pass through the mounting member installation hole.

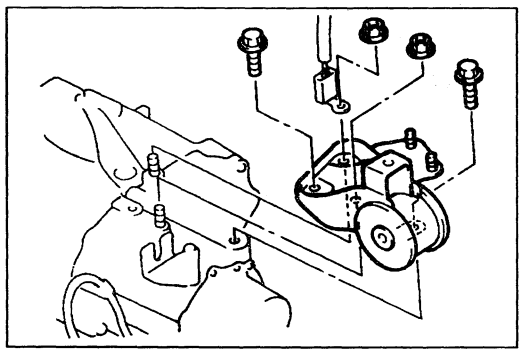


3. Install the bolts and nuts as shown.

Tightening torque
A: 67—93 N·m {6.8—9.5 kgf·m, 50—68 ft·lbf}
B: 75—104 N·m {7.6—10.7 kgf·m, 55—77 ft·lbf}

4. Tighten the No.2 engine mount rubber nut.

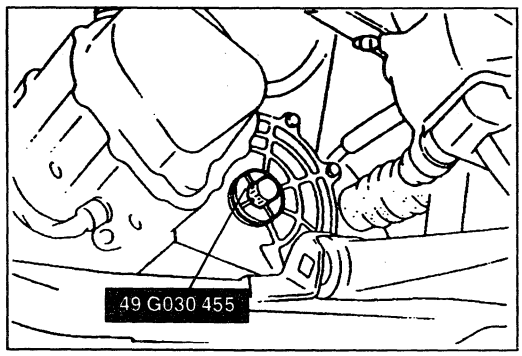
Tightening torque:
86—116 N·m {8.7—11.9 kgf·m, 63—86 ft·lbf}



5. Tighten the No.4 engine mount bolts and nuts.

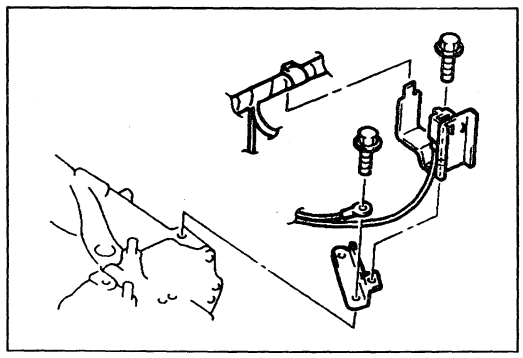
Tightening torque:
67—93 N·m {6.8—9.5 kgf·m, 50—68 ft·lbf}

6. Remove the **SST** (engine support).



Drive shafts

1. Remove the **SST** from the transaxle case.
2. Install the drive shafts. (Refer to section M.)



Harness bracket

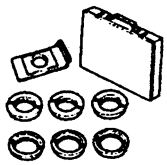
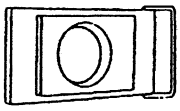
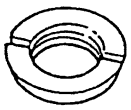
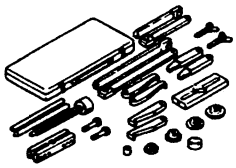
Install the harness bracket as shown in the figure.

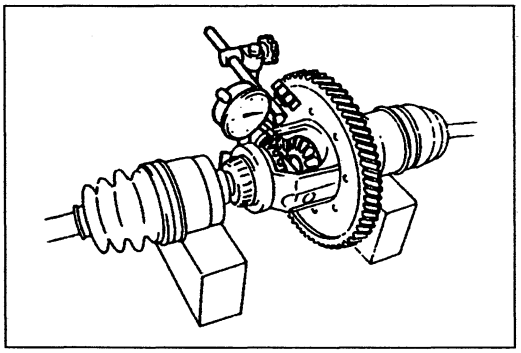
After warming up the engine, do the following.
- **Check the amount of oil. (Refer to page J–7.)**
- **Conduct a road test and verify the following.**

1. There is no abnormal noise in each shift position.
2. Smooth shift change is possible.
3. Transaxle does not jump out of gear.
4. Speedometer operates correctly.
5. Back-up lights operate correctly.

DIFFERENTIAL

PREPARATION
SST

49 G017 1A0 Remove set, bearing 	For removal of bearing	49 F401 366A Plate (Part of 49 G017 1A0) 	For removal of side bearing
49 B092 375 Attachment J (Part of 49 G017 1A0) 	For removal of side bearing	49 0839 425C Puller set, bearing 	For removal of side bearing
49 G030 338 Attachment E 	For installation of side bearing	—	—



PREINSPECTION
Backlash of Side Gear and Pinion Gear

Measure the backlash by the following procedure.
1. Install the left drive shaft and the joint shaft in the differential assembly.
2. Support the drive shaft and the joint shaft on V-blocks.
3. Measure the backlash of both pinion gears.

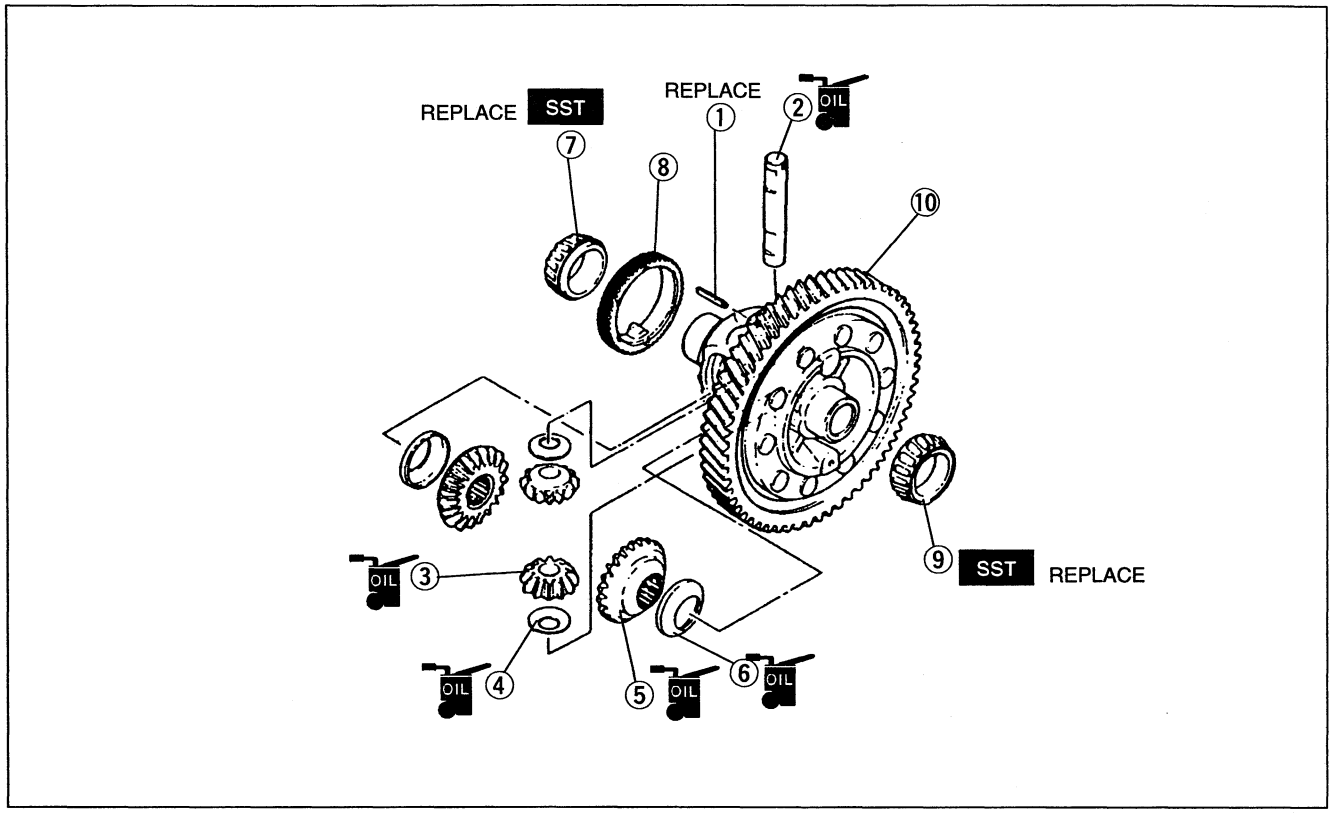
   Backlash: 0.050—0.150 mm {0.0020—0.059 in}

4. If not as specified, replace parts as necessary.

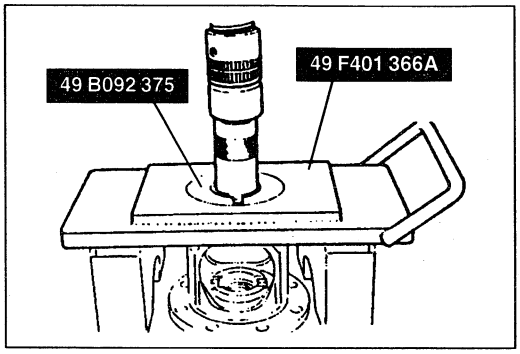
DISASSEMBLY / INSPECTION / ASSEMBLY

Note
- The bearings do not need to be removed unless you are replacing them.

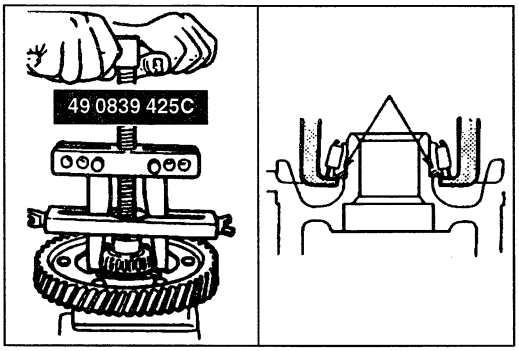
1. Before disassembly, inspect the backlash of the side gears and pinion gears, referring to **Preinspection**.
2. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.
4. Measure the backlash after assembly, referring to **Backlash of Side Gear and Pinion Gear**.



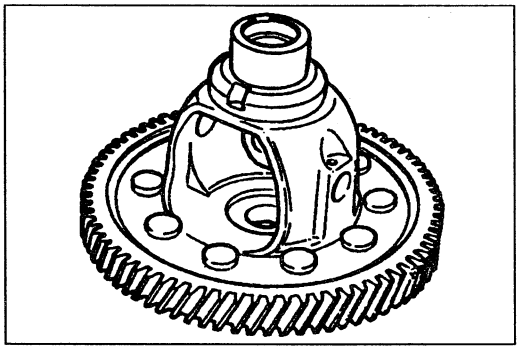
1. Roll pin
   Assembly Note ..... page J–55
2. Pinion shaft
3. Pinion gear
   Preinspection ..... above
   Inspection of backlash ..... page J–55
4. Thrust washer
5. Side gear
   Preinspection ..... above
   Inspection of backlash ..... page J–55
6. Thrust washer
7. Bearing (side opposite ring gear)
   Disassembly Note ..... page J–54
   Inspection ..... page J–54
   Assembly Note ..... page J–55
8. Speedometer drive gear
9. Bearing (ring gear side)
   Disassembly Note ..... page J–54
   Inspection ..... page J–54
   Assembly Note ..... page J–54
10. Ring gear and gear case assembly
    Inspection ..... page J–54



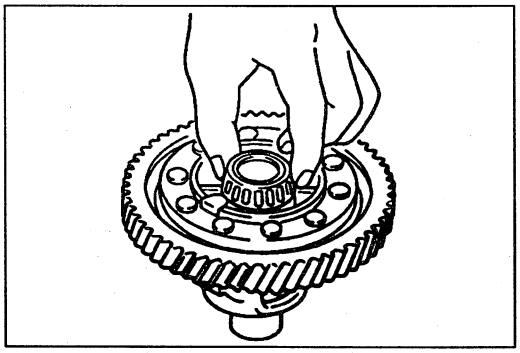
Disassembly Note
Bearing (side opposite ring gear)
While supporting the gear case, remove the bearing by using the **SST**.



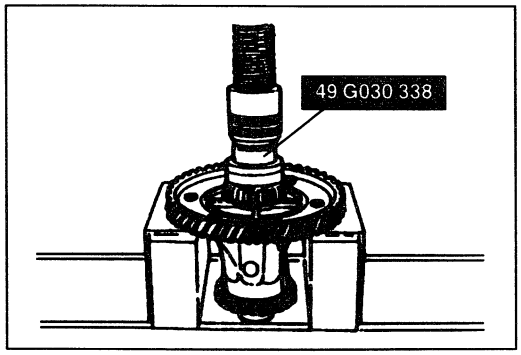
Bearing (ring gear side)
Remove the bearing by using the **SST**.



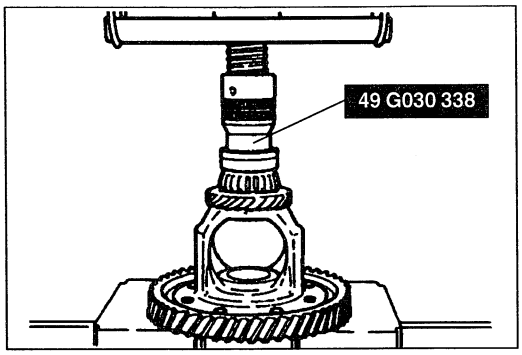
Inspection
Ring gear and gear case assembly
Inspect the ring gear for wear and cracks. Refer to page J–38 for bearing preload adjustment if the ring gear and gear case assembly is being replaced.



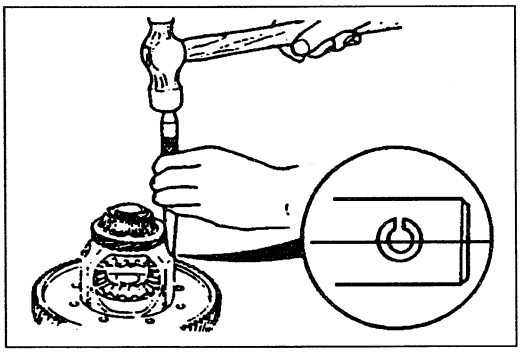
Bearing
Inspect for wear and rough rotation. If replacing the bearing, replace the bearing and race as an assembly.



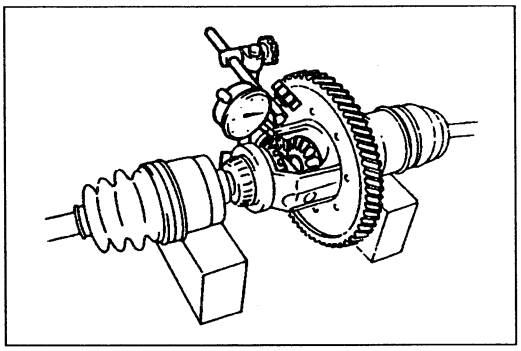
Assembly Note
Bearing (ring gear side)
Install the new bearing by using the **SST**.



Bearing (side opposite ring gear)
1. Install the speedometer drive gear.
2. Install the new bearing by using the **SST**.



Roll pin
Install the new roll pin with the split facing as shown.



Backlash of Side Gear and Pinion Gear
Measure the backlash by the following procedure.
1. Install the left drive shaft and the joint shaft in the differential assembly.
2. Support the drive shaft and the joint shaft on V-blocks.
3. Measure the backlash of both pinion gears.

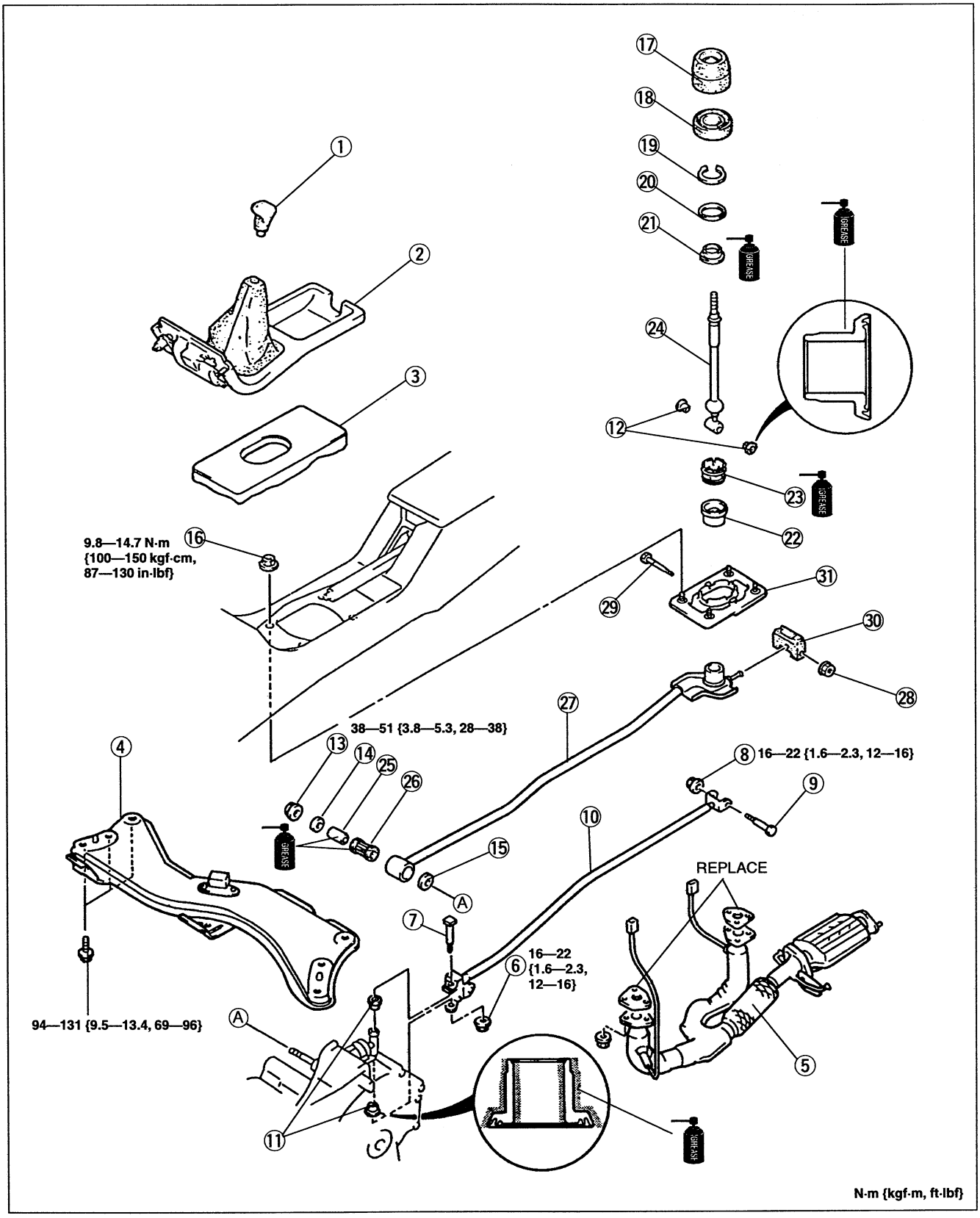
   Backlash: 0.050—0.150 mm {0.0020—0.059 in}

4. If not as specified, replace parts as necessary.

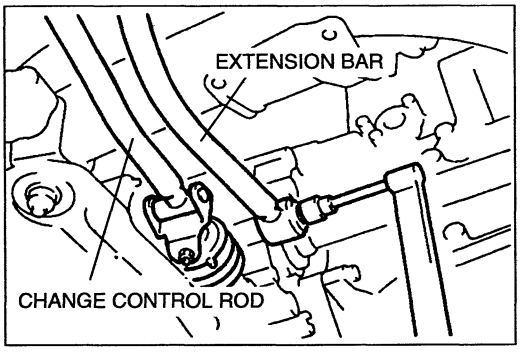
SHIFT MECHANISM

OVERHAUL

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



1. Shift lever knob
2. Front console
3. Insulator
4. Transverse member
5. Exhaust pipe
6. Nut
7. Bolt
8. Nut
9. Bolt
10. Change control rod
11. Bushings
12. Bushings
13. Nut
14. Washer
15. Washer
16. Nuts (base plate)
    Assembly Note ..... below
17. Assist boot
18. Mounting rubber boot
19. Retaining ring
20. O-ring
21. Upper ball seat
22. Boot
23. Lower ball seat
24. Gear shift lever
25. Pipe
26. Bushing
27. Extension bar
28. Nut
29. Bolt
30. Rubber mount
31. Base plate



Assembly Note
Nuts (base plate)

1. Install the base plate to the floor; then install the extension bar onto the transaxle.

   Tightening torque:
   38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

2. Tighten the base plate nuts to the specified torque.

   Tightening torque:
   9.8—14.7 N·m {100—150 kgf·cm, 87—130 in·lbf}

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

AUTOMATIC TRANSAXLE (GF4A–EL)

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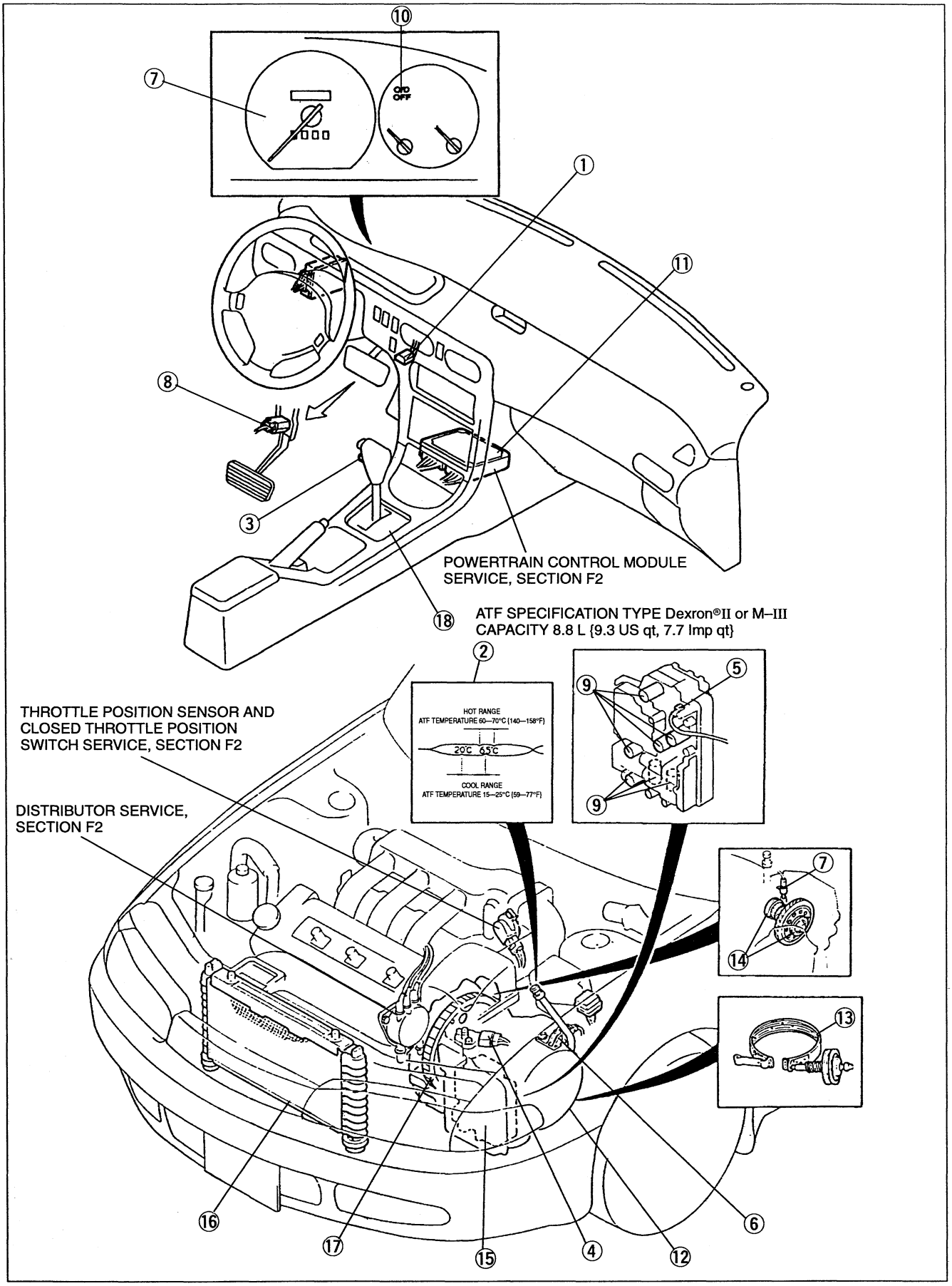
⑩
⑦
OD OFF
①
⑪
⑧
③
POWERTRAIN CONTROL MODULE SERVICE, SECTION F2
⑱
ATF SPECIFICATION TYPE Dexron®II or M–III
CAPACITY 8.8 L {9.3 US qt, 7.7 Imp qt}
②
HOT RANGE
ATF TEMPERATURE 60—70°C (140—158°F)
20°C 65°C
COOL RANGE
ATF TEMPERATURE 15—25°C (59—77°F)
⑤
⑨
⑨
THROTTLE POSITION SENSOR AND CLOSED THROTTLE POSITION SWITCH SERVICE, SECTION F2
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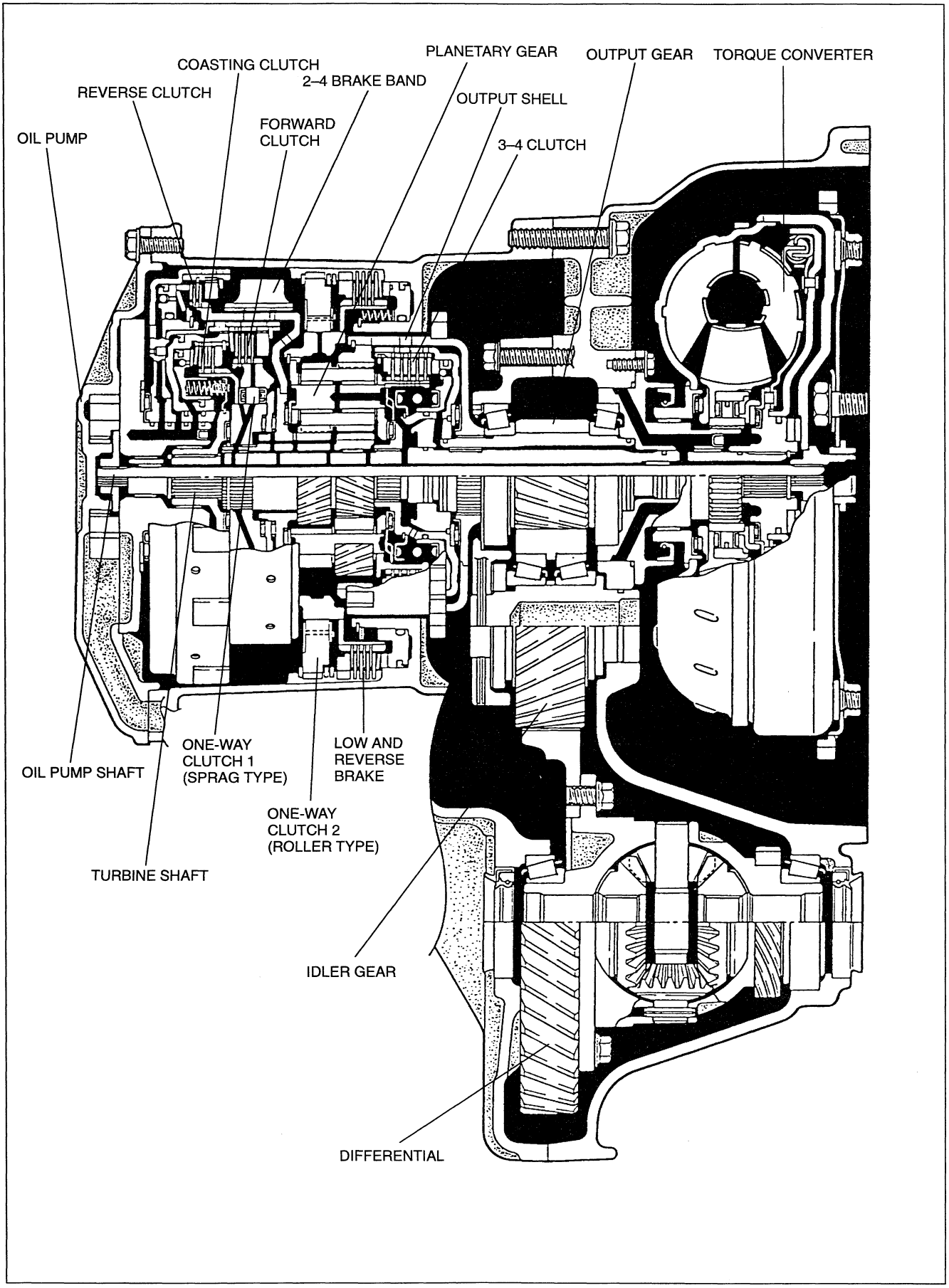
OUTLINE

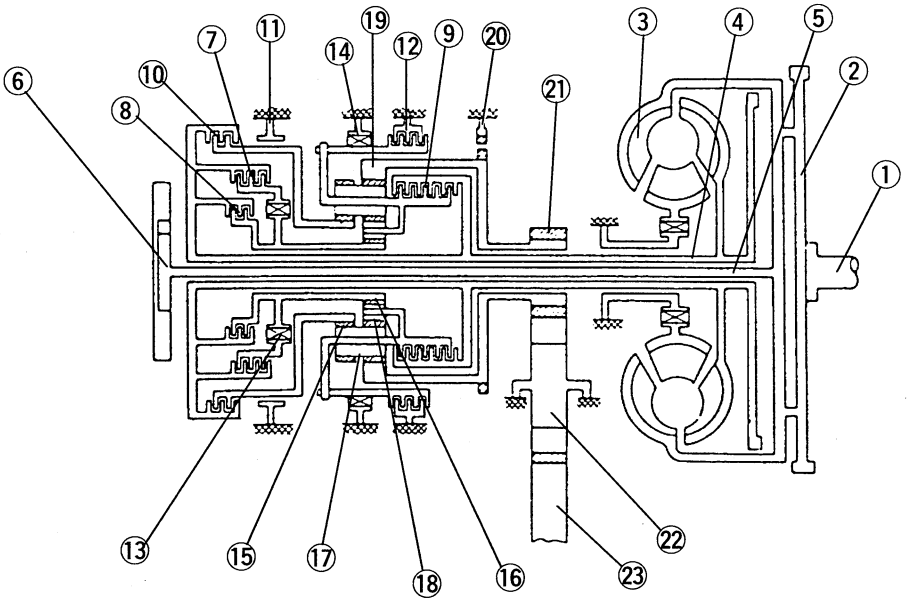
SPECIFICATIONS

Item \ Transaxle/Engine			GF4A-EL
			KL
Transaxle control			Floor shift
Torque converter clutch mechanism			Equipped
Gear ratio		First gear	2.800
		Second gear	1.540
		Third gear	1.000
		Fourth gear	0.700
		Reverse	2.333
Final gear ratio			4.157
Automatic transaxle fluid (ATF)	Type		M-III or Dexron®II
	Capacity L {US qt, Imp qt}		8.8 {9.3, 7.7}
Torque converter stall torque ratio			2.05
Number of drive/driven plates	Forward clutch		3/3
	Coasting clutch		2/3
	3-4 clutch		4/4
	Reverse clutch		2/2
	Low and reverse brake		4/4
Band servo (piston outer dia./retainer inner dia.) mm {in}			78.0/40.0 {3.07/1.57}
Number of planetary gear teeth	Large sun gear		36
	Small sun gear		30
	Long pinion gear		24
	Short pinion gear		22
	Internal gear		84
Number of output gear teeth			19
Number of idler gear teeth			42
Number of ring gear teeth			79

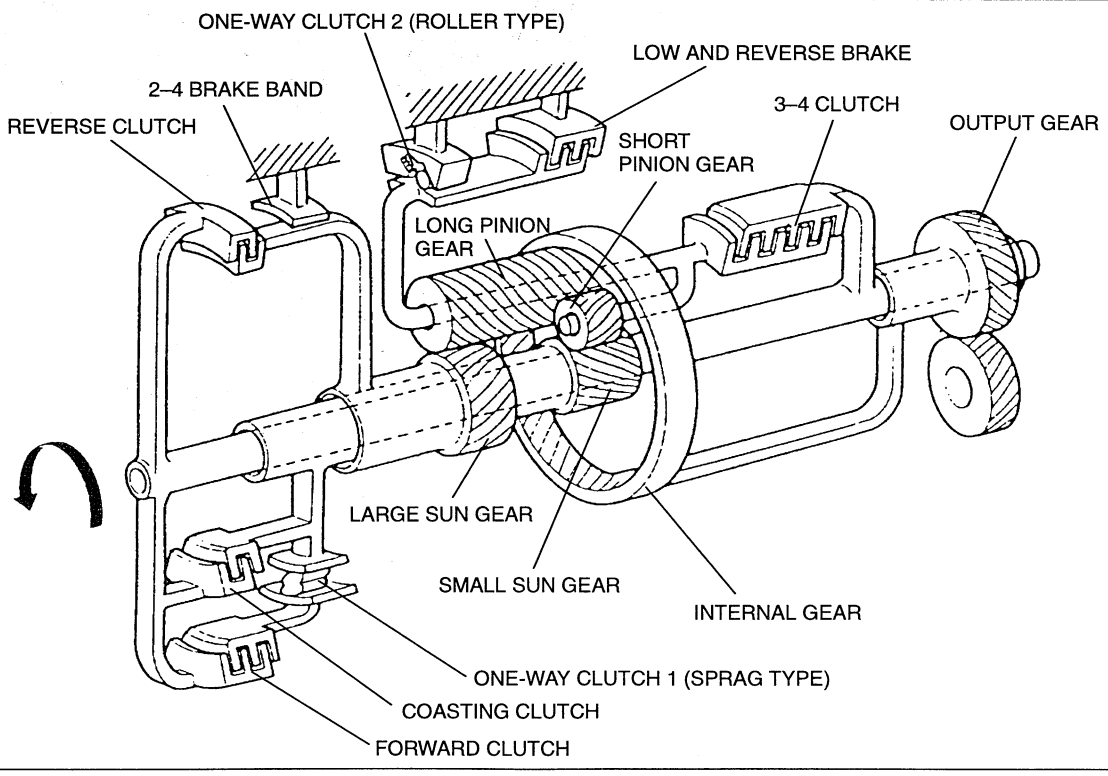
CROSS-SECTIONAL VIEW



POWER FLOW DIAGRAM



1. Crankshaft
2. Drive plate
3. Torque converter
4. Turbine shaft
5. Oil pump shaft
6. Oil pump
7. Forward clutch
8. Coasting clutch
9. 3-4 clutch
10. Reverse clutch
11. 2–4 brake band
12. Low and reverse brake
13. One-way clutch 1 (Sprag type)
14. One-way clutch 2 (Roller type)
15. Large sun gear
16. Small sun gear
17. Long pinion gear
18. Short pinion gear
19. Internal gear
20. Parking gear
21. Output gear
22. Idler gear
23. Ring gear

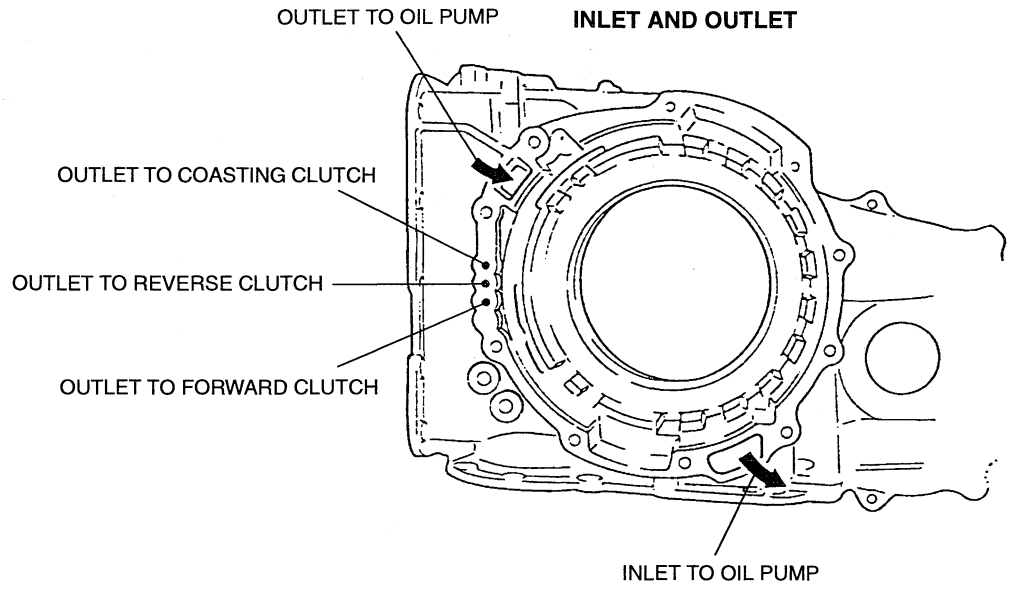


OPERATION OF COMPONENTS

Position/ Range	Mode	Gear		Engine braking effect	Forward clutch	Coasting clutch	3–4 clutch	Reverse clutch	2–4 brake		Low and reverse brake	One-way clutch 1 (Sprag type)	One-way clutch 2 (Roller type)
									Applied	Released			
P	—	—		—									
R	—	Reverse	Below approx. 4 km/h {2.5 mph}	Yes				○			○		
			Above approx. 5 km/h {3 mph}	Yes				○			○		
		—	Above approx. 30 km/h {19 mph}	No				○					
N	—	—	Below approx. 4 km/h {2.5 mph}	—									
			Above approx. 5 km/h {3 mph}	—									
D	☆ O/D OFF SW OFF POWER/ NORMAL	First gear		No	○							○	○
		Second gear		No	○				○			○	
		Third gear		Yes	○	○	○		⊗	○		○	
		Fourth gear		Yes	○		○		○			◎	
	☆ O/D OFF SW ON POWER/ NORMAL	Second gear	Below approx. 14 km/h {8.7 mph}	Yes	○	○			○			○	
			Above approx. 17 km/h {10.5 mph}	No	○				○			○	
		Third gear		Yes	○	○	○		⊗	○		○	
		*Fourth gear		Yes	○		○		○			◎	
2	—	Second gear		Yes	○	○			○			○	
		*Third gear		Yes	○	○	○		⊗	○		○	
		*Fourth gear		Yes	○		○		○			◎	
1	—	First gear		Yes	○	○					○	○	○
		*Second gear		Yes	○	○			○			○	

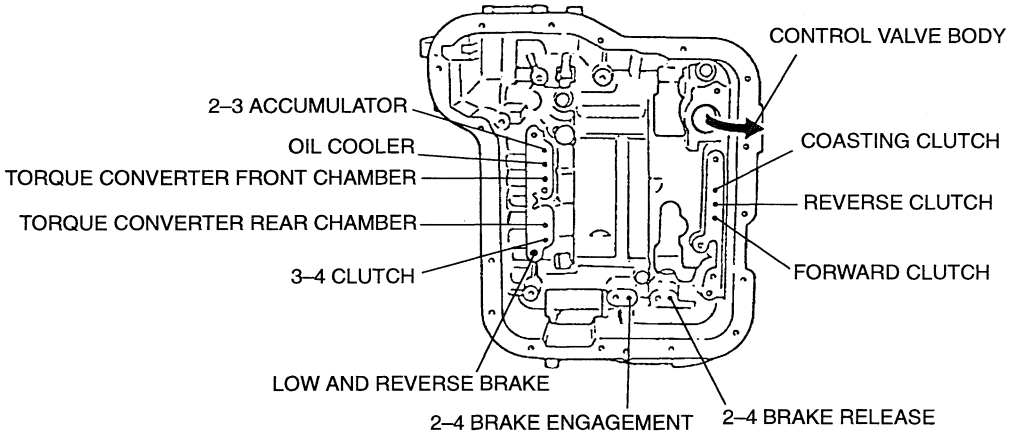
○ Operating.
⊗ Operating but not contributing to the power transmission.
◎ POWER is not transmitted.
* Engine overspeed protection.
☆ The powertrain control module automatically switches between POWER and NORMAL modes corresponding to the speed at which the accelerator pedal is depressed.

FLUID PASSAGE LOCATIONS
Transaxle Case



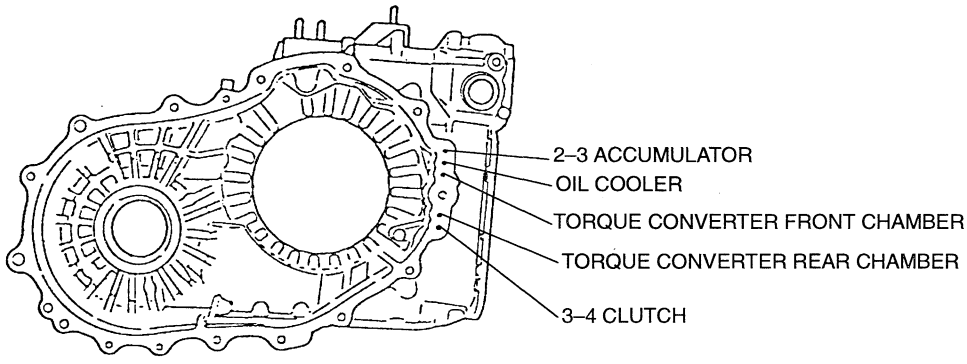
TRANSAXLE CASE

INLET



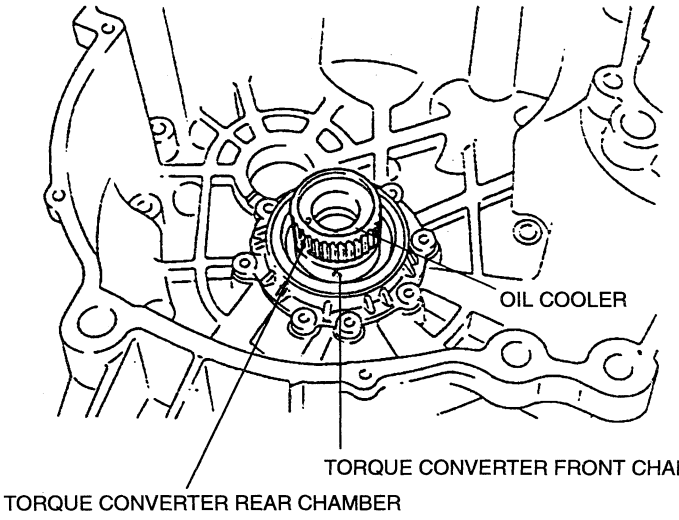
TRANSAXLE CASE

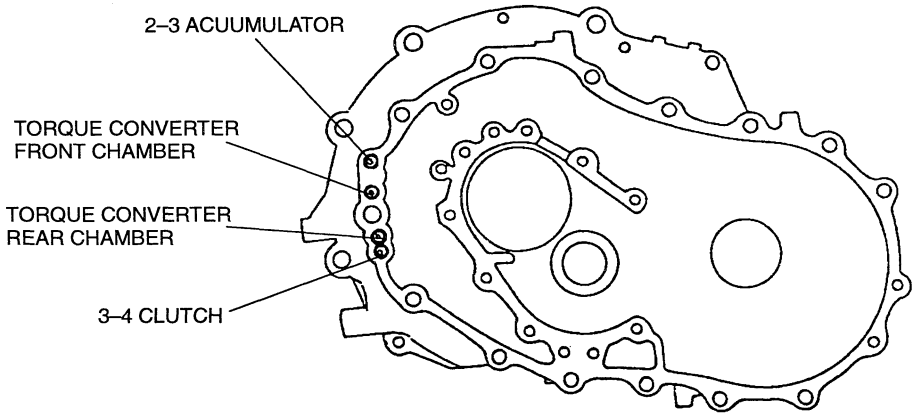
OUTLET



TRANSAXLE CASE

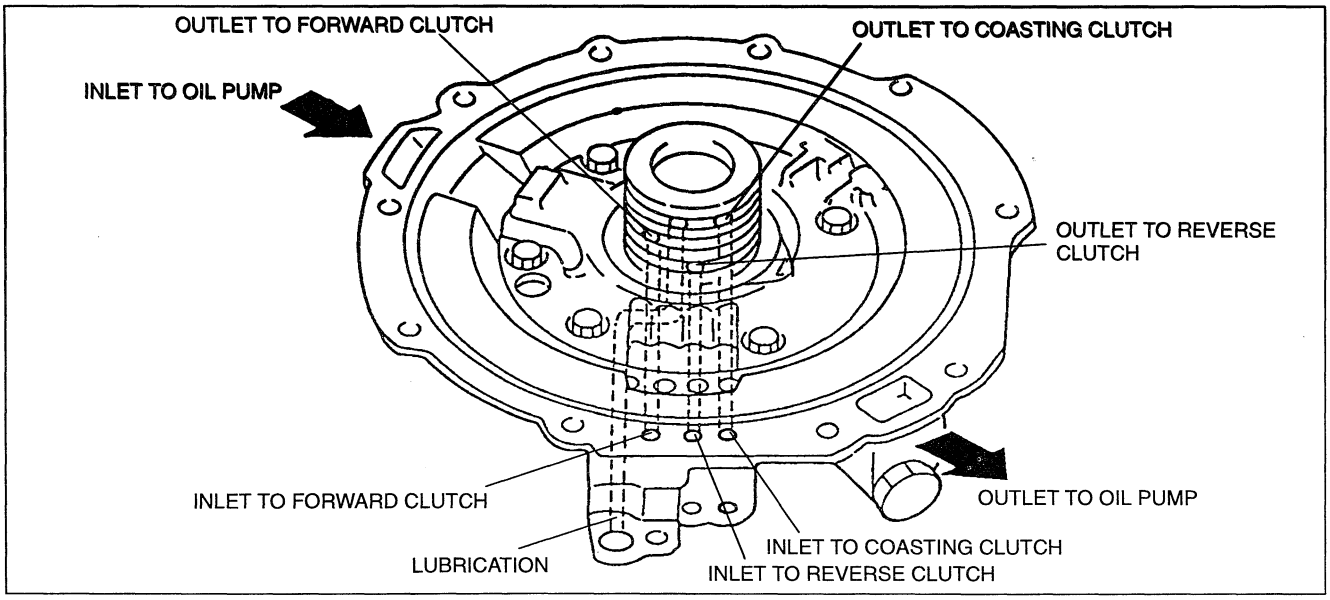
Clutch Housing



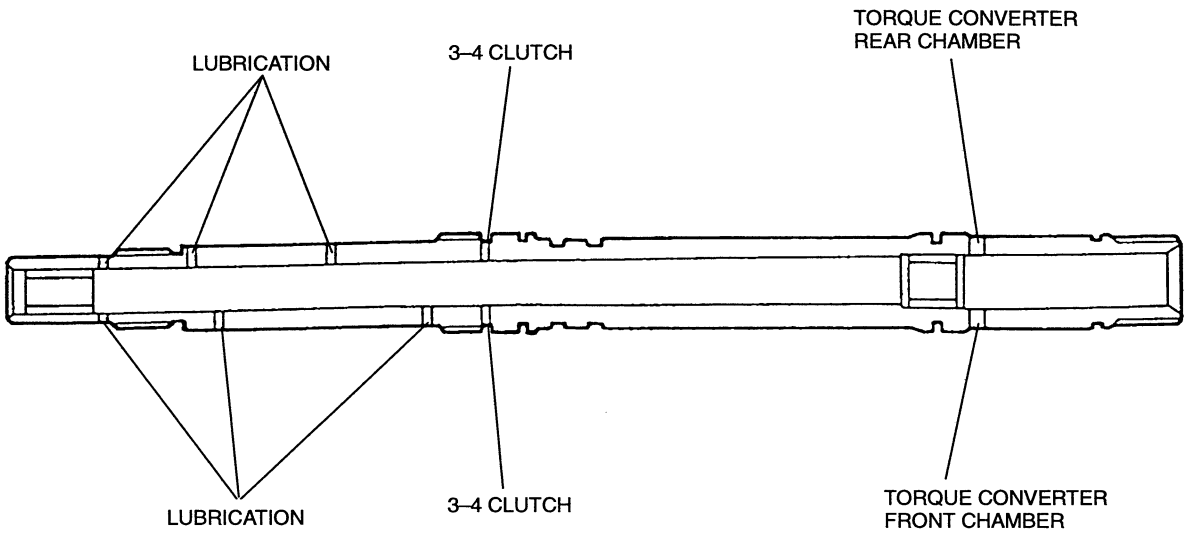


TRANSAXLE HOUSING

Oil Pump

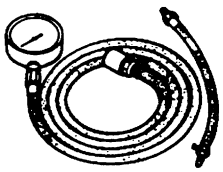
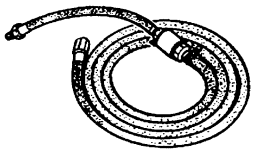


Turbine Shaft



MECHANICAL SYSTEM TEST

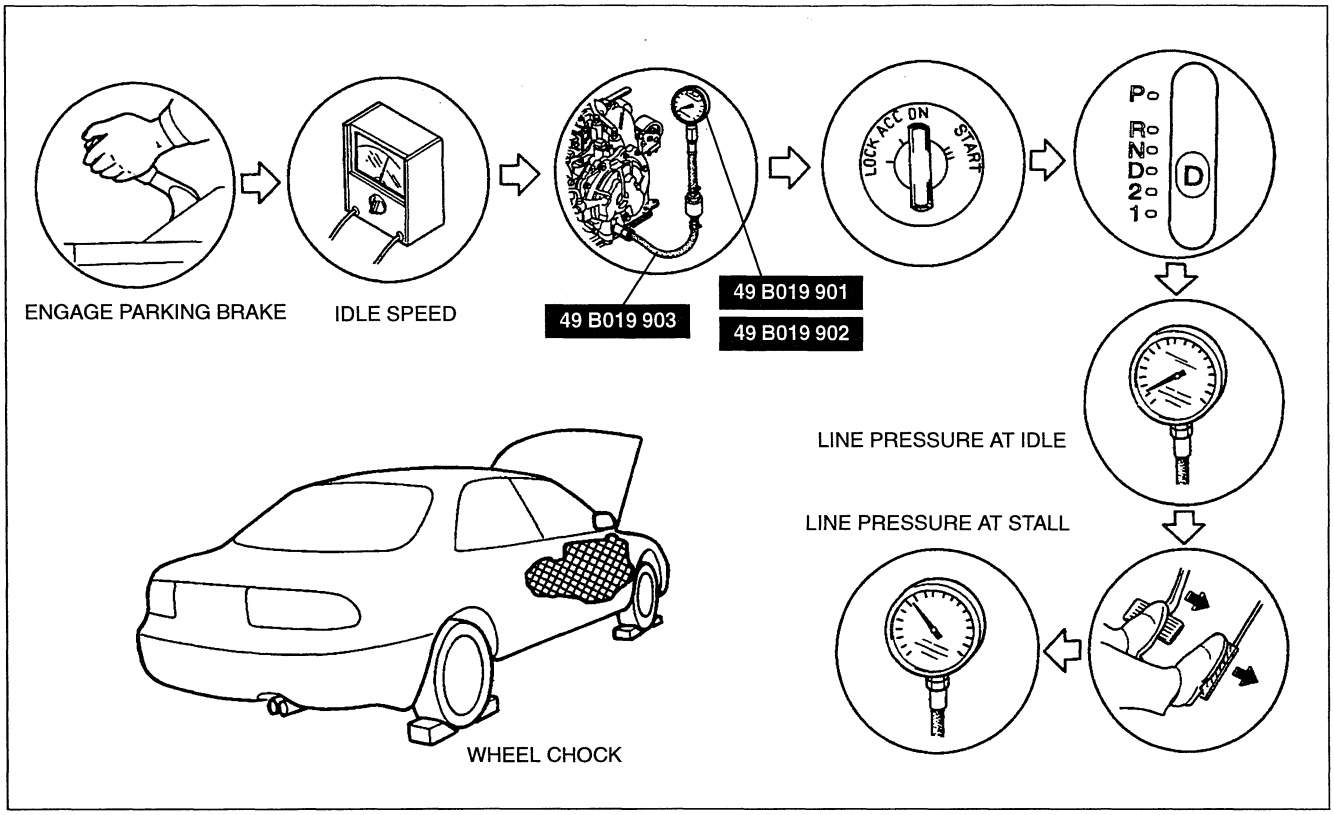
PREPARATION
SST

49 0378 400B Gauge set, oil pressure 	For oil pressure test	49 B019 901 Oil pressure gauge 	For oil pressure test
49 B019 902 Oil pressure gauge (Part of 49 0378 400B) 	For oil pressure test	49 B019 903 Hose (Part of 49 0378 400B) 	For oil pressure test

MECHANICAL SYSTEM TEST PREPARATION

1. Engage the parking brake and use wheel chocks at the front and rear of the wheels.
2. Check the engine coolant. (Refer to section E2.)
3. Check the engine oil. (Refer to section B2.)
4. Check the ATF levels. (Refer to page K1–18.)
5. Check the idle speed and ignition timing in P position. (Refer to section F2.)

LINE PRESSURE TEST
Procedure



1. Start the engine.
2. Shift the selector lever to D range and read the line pressure at idle.
3. Connect the **SST** (49 B019 902) to the line pressure inspection port.

Caution
- **If the accelerator pedal is pressed for longer than 5 seconds while the brake pedal is pressed, the transaxle could be damaged. Therefore, do step 5 and 6 within 5 seconds of each other.**

Warning
- **Slight variations in line pressure data are due to changes in ATF temperature, which are brought about by line pressure control.**
  The following line pressure date is for ATF temperature of 80°C {176°F}.

4. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
5. Read the line pressure as soon as the engine speed becomes constant, then release the accelerator pedal.
6. Shift the selector to N position and let the engine at idle for 1 minute or more to cool the ATF.
7. Read the line pressure at idle and at the engine stall speed for each range in the same manner.

Specified line pressure:

Position/ Range	Line pressure kPa {kgf/cm^2, psi}	
	Idle	Stall
D, 2, 1	420—530 {4.2—5.5, 60—78}	1,100—1,170 {11.2—12.0, 160—170}
R	730—1,010 {7.4—10.3, 110—146}	1,910—2,020 {19.4—20.7, 276—294}

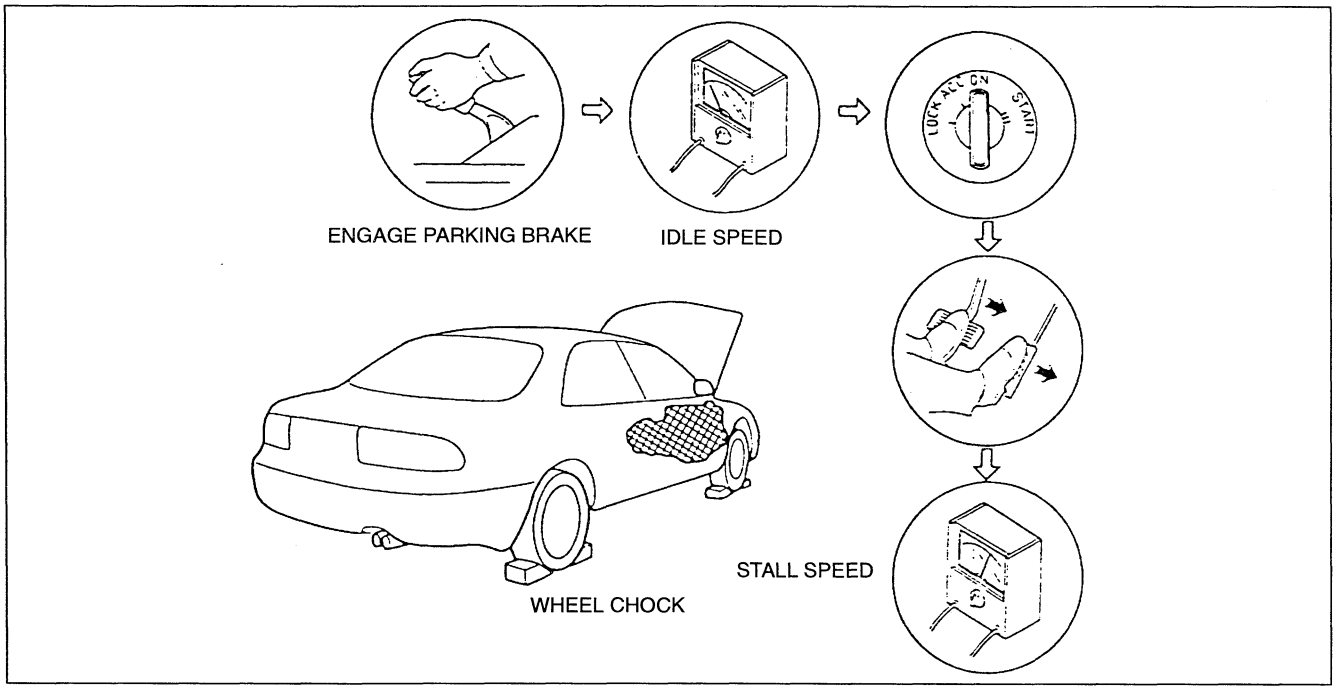
8. Install a new square head plug in the inspection port.

Tightening torque: 5.0—9.8 N·m {50—100 kgf·cm, 44—86.7 in·lbf}

Evaluation of Line Pressure Test

Line pressure	Possible cause
Low pressure in every position	Worn oil pump Oil leaking from oil pump, control valve body, and/or transaxle case Pressure regulator valve sticking Pressure control solenoid malfunction Pressure modulator valve sticking Solenoid reducing valve sticking
Low pressure in D and 2 only	Oil leaking from hydraulic circuit of forward clutch
Low pressure in 1 and R only	Oil leaking from hydraulic circuit of low and reverse brake
Low pressure in R only	Oil leaking from hydraulic circuit of reverse clutch
Higher than specification	Pressure control solenoid malfunction Pressure regulator valve sticking Pressure modulator valve sticking Solenoid reducing valve sticking

STALL TEST
Procedure



1. Start the engine.
2. Shift the selector lever to D range.

Caution
- **If the accelerator pedal is pressed for longer than 5 seconds while the brake pedal is pressed, the transaxle could be damaged. Therefore, do steps 4 and 5 within 5 seconds of each other.**

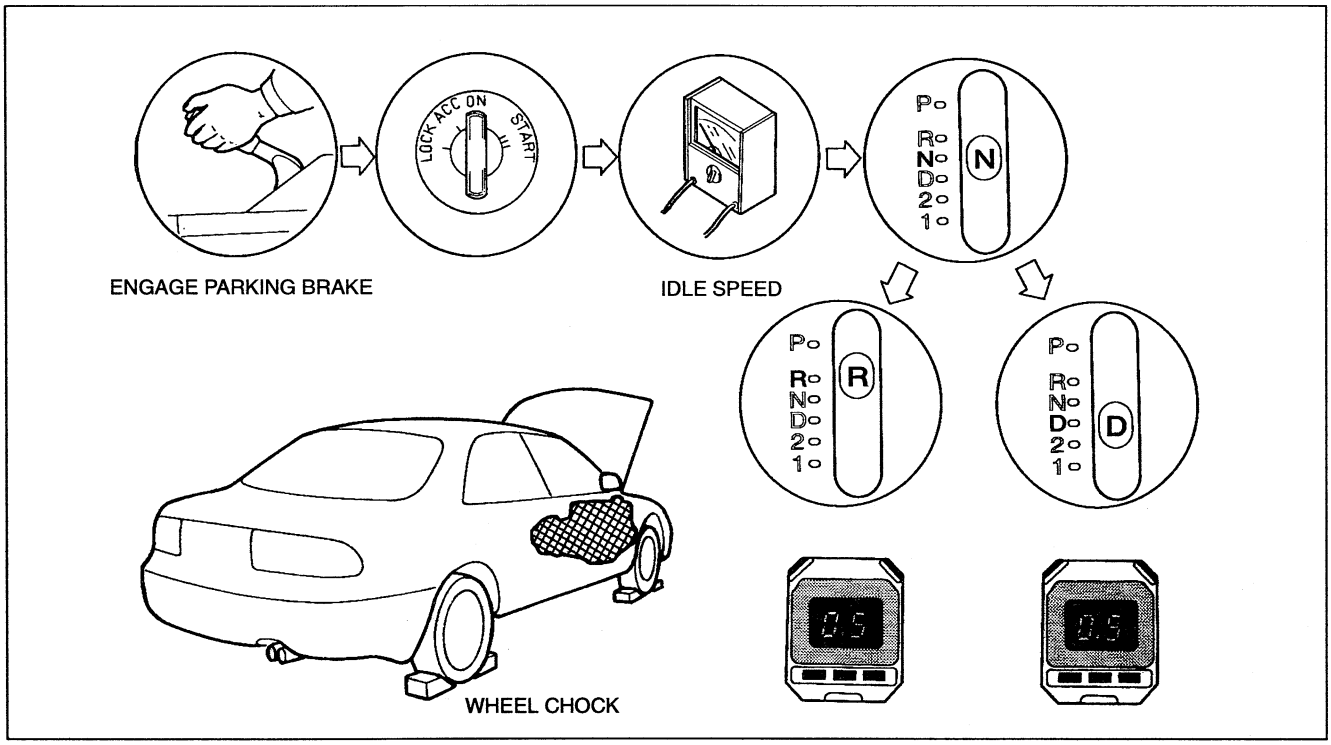
3. Firmly depress the brake pedal with the left foot, and gently depress the accelerator pedal with the right.
4. When the engine speed no longer increases, quickly read the engine speed and release the accelerator.
5. Shift the selector to N position and let the engine idle for 1 minute or more to cool the ATF.
6. Perform stall tests for the remaining ranges in the same manner.
   (1) D range
   (2) 2 range
   (3) 1 range

Engine stall speed: 2,270—2,500 rpm

Evaluation of Stall Test

Condition		Possible cause	
Above specification	In all ranges and R position	Insufficient line pressure	Worn oil pump
			Oil leaking from oil pump, control valve, and/or transaxle case
			Pressure regulator valve sticking
			Pressure control solenoid malfunction
			Pressure modulator valve sticking
	In forward ranges	Forward clutch slipping One-way clutch 1 slipping	
	In D range	One-way clutch 2 slipping	
	In D (O/D OFF) and 2 ranges	2–4 brake band slipping	
	In 1 range and R position	Low and reverse brake slipping	
	In R position	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 breaking felt in 1 range ... Reverse clutch b) Engine breaking not felt in 1 range ... Low and reverse brake	
Below specification		Engine out of tune	
		One-way clutch slipping within torque converter	

TIME LAG TEST
Procedure



1. Start the engine.
2. Shift from N position to D range.
3. Use a stopwatch to measure the time it takes from shifting until shock is felt.
4. Shift the selector to N position and run the engine at idle speed for at least one (1) minute.
5. Do the time lag test for the following shifts in the same manner. Make three measurements for each test and average the results.
6. Perform the test for the following shifts in the same manner.
   (1) N position → D range
   (2) N position → D range (O/D OFF mode)
   (3) N position → R position

Time lag: N position → D range ..... below approx. 0.9 second
N position → R position ... below approx. 1.1 second

Evaluation of Time Lag Test

Condition		Possible Cause
N → D shift	More than specification	Insufficient line pressure Forward clutch slipping One-way clutch 1 slipping One-way clutch 2 slipping
N → D (O/D OFF) shift	More than specification	Insufficient line pressure Forward clutch slipping 2–4 brake band slipping One-way clutch 1 slipping
N → R shift	More than specification	Insufficient line pressure Low and reverse brake slipping Reverse clutch slipping

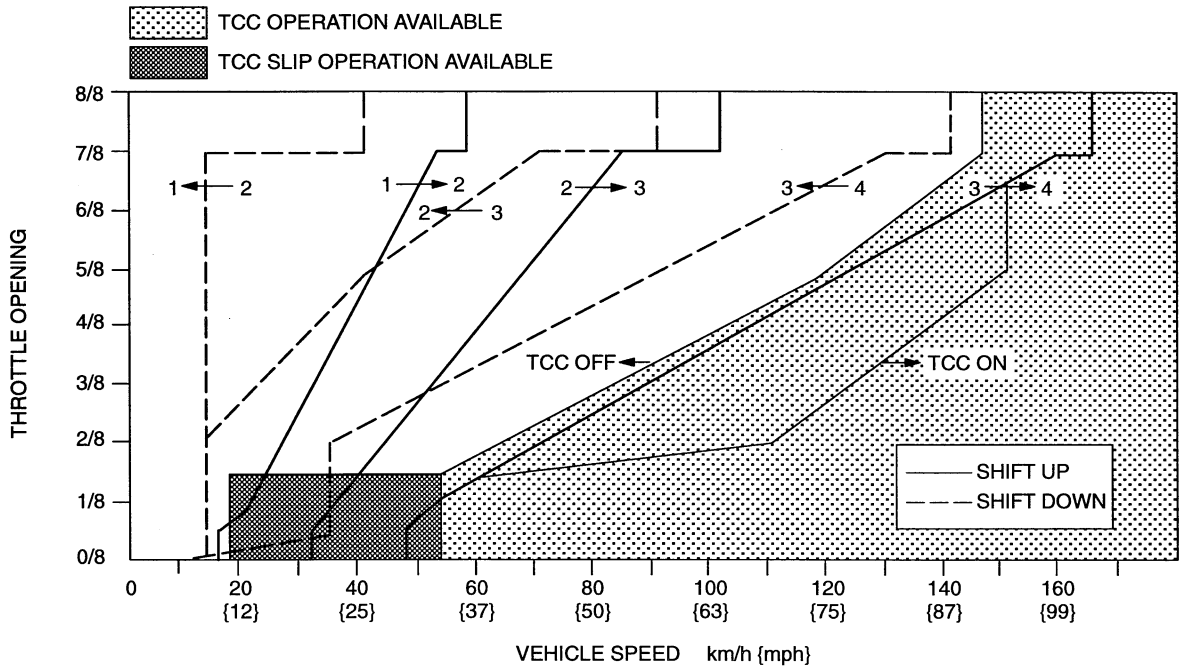
ROAD TEST

ROAD TEST PREPARATION

1. Before testing, check and correct the engine coolant, engine oil, and ATF levels as necessary.
2. Warm the engine thoroughly to raise the ATF temperature to operating level (**60—70°C {140—158°F}**).
3. Check the idle speed and ignition timing in P position. (Refer to section F2.)

SHIFT DIAGRAM

D range (Except O/D OFF mode)



D RANGE TEST

D range (Except O/D OFF Mode)

Note

- The POWER mode and the NORMAL mode are automatically selected by the powertrain control module.

1. Shift the selector lever to D range.
2. Accelerate the vehicle with half- and wide open throttle.
3. Verify that 1→2, 2→3, and 3→4 upshifts and downshifts are obtained. The shift points must be as shown in the D range shift diagram.
4. Drive the vehicle in fourth, third, and second gears and verify that kickdown occurs for 4→3, 4→2, 4→1, 3→2, 3→1, 2→1, and that the shift points are as shown in the D range shift diagram.
5. Decelerate the vehicle and verify that engine braking effect is felt in fourth and third gears.
6. Drive the vehicle and verify that torque converter clutch operation is obtained. (only for NORMAL mode)

D range (O/D OFF Mode)

1. Shift the selector lever to D range and select the O/D OFF mode.
2. Accelerate the vehicle with half- and wide open throttle.
3. Verify that 1→2 and 2→3 upshifts and downshifts are obtained. The shift points must be as shown in the D range O/D OFF shift diagram.
4. Drive the vehicle in third and second gears and verify that kickdown occurs for 3→2, 3→1, 2→1, and that the shift points are as shown in the D range O/D OFF shift diagram.
5. Decelerate the vehicle and verify that engine braking effect is felt in third gear.
6. Drive the vehicle and verify that torque converter clutch operation is obtained. (only for NORMAL mode)

Noise and vibration

Drive the vehicle in second gear (O/D OFF) and listen closely for any out of the ordinary noise or vibration. The torque converter, drive shaft, and differential can be sources of abnormal noise and vibration if they are not functioning properly. Check these when searching for sources of noise and vibration.

Shift point

Range/Mode			Throttle condition (throttle position sensor voltage)	Shift	Vehicle speed km/h {mph}	Turbine speed (rpm)
D	O/D OFF switch OFF	POWER	Wide open throttle (3.0—4.4 V)	$D_1 \rightarrow D_2$	57—63 {36—39}	6,050—6,600
				$D_2 \rightarrow D_3$	99—107 {62—66}	5,750—6,200
				$D_3 \rightarrow D_4$	162—172 {101—106}	6,100—6,500
			Half throttle	$D_1 \rightarrow D_2$	39—49 {25—30}	4,150—5,150
				$D_2 \rightarrow D_3$	69—87 {43—53}	4,050—5,000
				$D_3 \rightarrow D_4$	114—138 {71—85}	4,300—5,150
			Closed throttle position (0.1—1.1 V)	$D_4 \rightarrow D_1$	11—17 {7—10}	300—400
			Kickdown	$D_4 \rightarrow D_3$	135—145 {84—89}	3,600—3,800
				$D_3 \rightarrow D_2$	86—94 {54—58}	3,250—3,500
				$D_2 \rightarrow D_1$	37—43 {23—26}	2,150—2,450
		NORMAL	Wide open throttle (3.0—4.4 V)	$D_1 \rightarrow D_2$	57—63 {36—39}	6,050—6,600
				$D_2 \rightarrow D_3$	99—107 {62—66}	5,750—6,200
				$D_3 \rightarrow D_4$	162—172 {101—106}	6,100—6,500
				TCC ON (D_4)	162—172 {101—106}	6,100—6,500
			Half throttle	$D_1 \rightarrow D_2$	32—40 {20—24}	3,400—4,200
				$D_2 \rightarrow D_3$	53—69 {33—42}	3,100—4,000
				$D_3 \rightarrow D_4$	92—119 {58—73}	3,500—4,450
				TCC ON (D_4)	124—148 {77—91}	3,300—3,900
			Closed throttle position (0.1—1.1 V)	$D_4 \rightarrow D_1$	11—17 {7—10}	300—400
			Kickdown	$D_4 \rightarrow D_3$	135—145 {84—89}	3,600—3,800
				$D_3 \rightarrow D_2$	86—94 {54—58}	3,250—3,500
				$D_2 \rightarrow D_1$	37—43 {23—26}	2,150—2,450
	O/D OFF switch ON	POWER	Wide open throttle (3.0—4.4 V)	$D_1 \rightarrow D_2$	57—63 {36—39}	6,050—6,600
				$D_2 \rightarrow D_3$	99—107 {62—66}	5,750—6,200
			Half throttle	$D_1 \rightarrow D_2$	39—49 {25—30}	4,150—5,150
				$D_2 \rightarrow D_3$	69—87 {43—53}	4,050—5,000
			Closed throttle position (0.1—1.1 V)	$D_3 \rightarrow D_1$	11—17 {7—10}	450—600
			Kickdown	$D_3 \rightarrow D_2$	86—94 {54—58}	3,250—3,500
				$D_2 \rightarrow D_1$	37—43 {23—26}	2,150—2,450
		NORMAL	Wide open throttle (3.0—4.4 V)	$D_1 \rightarrow D_2$	57—63 {36—39}	6,050—6,600
				$D_2 \rightarrow D_3$	99—107 {62—66}	5,750—6,200
			Half throttle	$D_1 \rightarrow D_2$	32—41 {20—25}	3,400—4,300
				$D_2 \rightarrow D_3$	53—69 {33—42}	3,100—4,000
			Closed throttle position (0.1—1.1 V)	$D_3 \rightarrow D_1$	11—17 {7—10}	450—600
			Kickdown	$D_3 \rightarrow D_2$	86—94 {54—58}	3,250—3,500
				$D_2 \rightarrow D_1$	37—43 {23—26}	2,150—2,450

2 RANGE TEST
1. Shift the selector lever to 2 range.
2. Accelerate the vehicle with half- and wide open throttle, and verify that second gear is held.
3. Decelerate the vehicle and verify that engine braking effect is felt.

Noise and vibration
Drive the vehicle in second gear and listen closely for any out of the ordinary noise or vibration. The torque converter, drive shaft, and differential can be sources of abnormal noise and vibration if they are not functioning properly. Check these when searching for sources of noise and vibration.

Shift point

Range	Throttle condition (throttle position sensor voltage)	Shift	Vehicle speed km/h {mph}	Turbine speed (rpm)
2	—	TCC ON (S_3)	105—115 {66—71}	4,000—4,300
		D_4 (S_4)→S_3	162—168 {101—104}	4,300—4,400
		S_3→S_2	98—104 {61—64}	3,700—3,900

1 RANGE TEST
1. Shift the selector lever to 1 range.
2. Accelerate the vehicle with half- and wide open throttle, and verify that first gear is held.
3. Decelerate the vehicle and verify that engine braking effect is felt.

Noise and vibration
Drive the vehicle in second gear and listen closely for any out of the ordinary noise or vibration. The torque converter, drive shaft, and differential can be sources of abnormal noise and vibration if they are not functioning properly. Check these when searching for sources of noise and vibration.

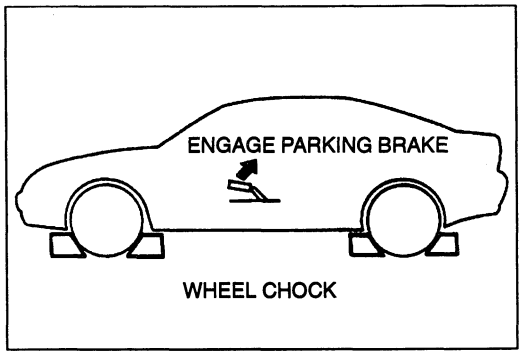
Shift point

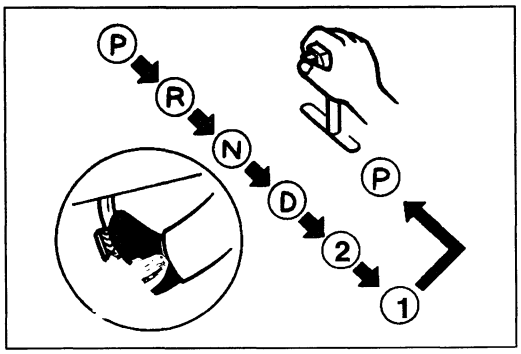
Range	Throttle condition (throttle position sensor voltage)	Shift	Vehicle speed km/h {mph}	Turbine speed (rpm)
1	—	L_2→L_1	43—49 {27—30}	2,500—2,800

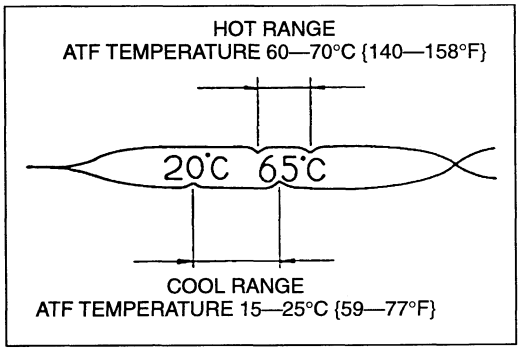
P POSITION TEST
Shift into P position on a gentle slope, release the brake, and verify that the vehicle does not roll.

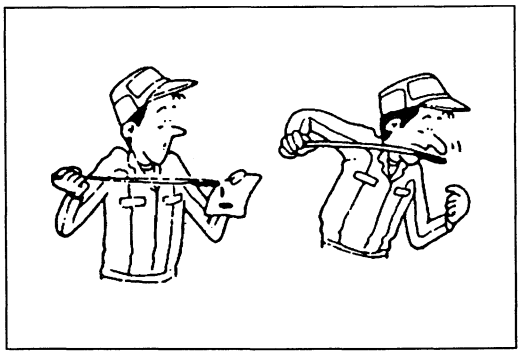
Evaluation

Condition	Possible Cause
No 1–2 up- or downshift	Stuck shift solenoid A Stuck 1–2 shift valve
No 2–3 up- or downshift	Stuck shift solenoid B Stuck 2–3 shift valve
No 3–4 up- or downshift	Stuck shift solenoid C Stuck 3–4 shift valve
TCC non operation shift	Stuck torque converter clutch control solenoid valve Stuck torque converter clutch control valve
Incorrect shift point	Misadjusted throttle position sensor Stuck shift valves
Excessive shift shock or slippage	Stuck accumulators Stuck or no one-way check orifice Worn clutches, brakes, or one-way clutch
No engine braking effect	Worn clutches or brakes









AUTOMATIC TRANSAXLE FLUID (ATF)

ATF
Inspection
Level

1. Park the vehicle on level ground.
2. Apply the parking brake and position wheel chocks securely to prevent the vehicle from rolling.
3. Warm up the engine until the ATF reaches **60—70°C {140—158°F}**.
4. While depressing the brake pedal, shift the selector lever to each range (P—1), pausing momentarily in each range.
5. Shift back to P position.

Note

- In some cases it may be necessary to inspect the ATF in the cool range **15—25°C {59—77°F}** before warming up the engine.

6. Ensure that the ATF level is in the HOT (65°C) range. Add ATF to the specification, if necessary.

ATF type: Dexron®II or M-III

Condition

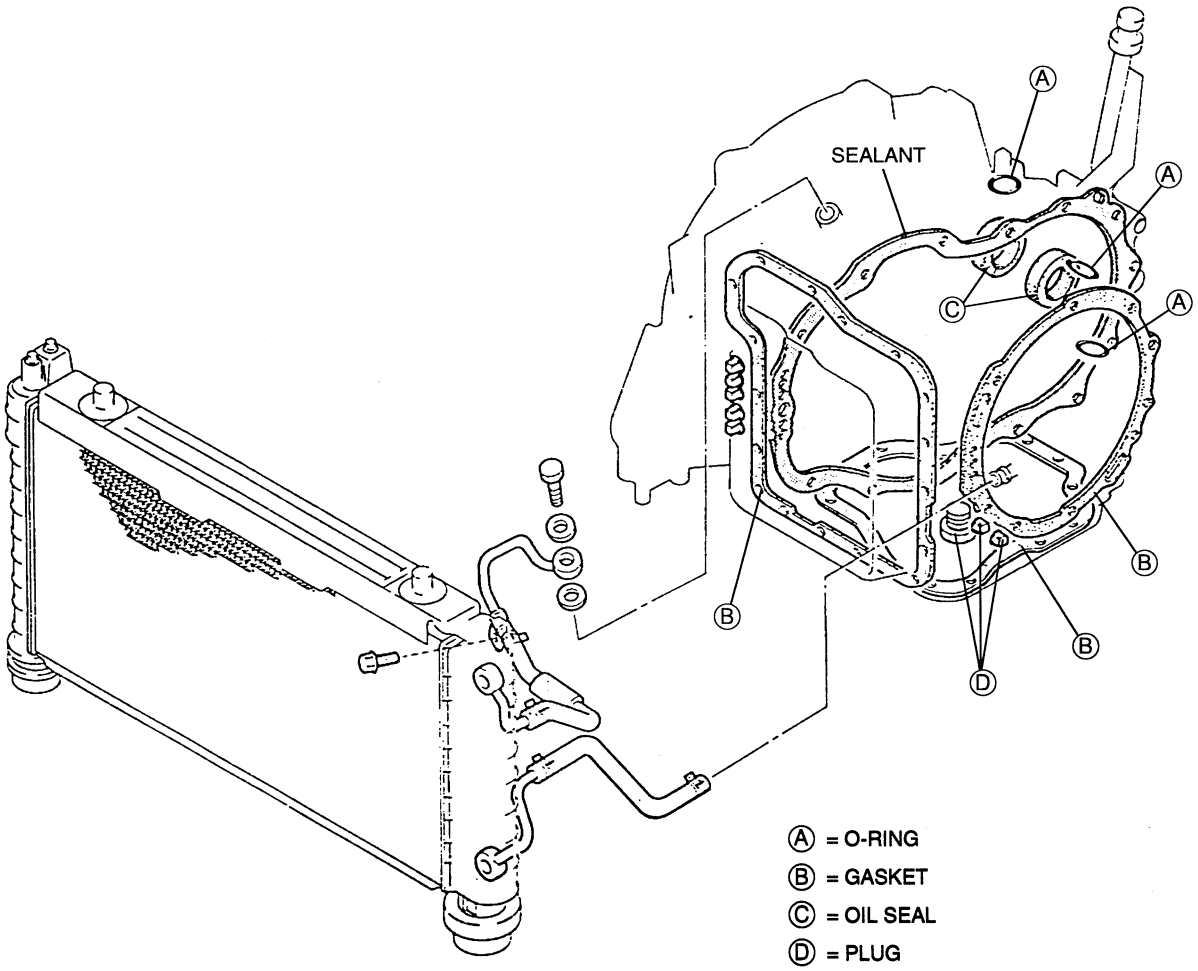
Determine whether the transaxle should be disassembled by noting:

1. If the ATF is muddy or varnished.
2. If the ATF smells strange or unusual.

Fluid leaks

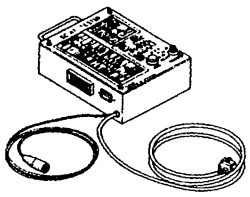
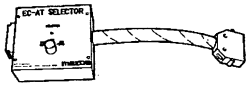
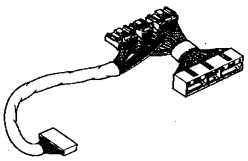
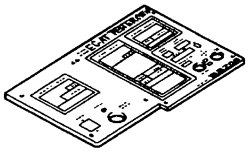
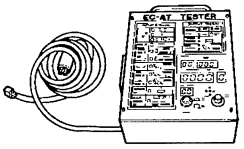
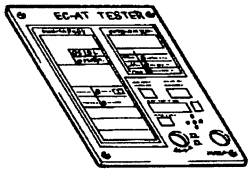
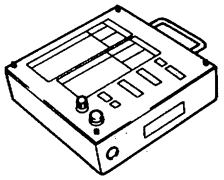
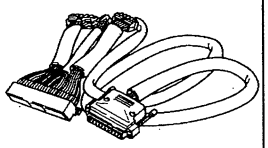
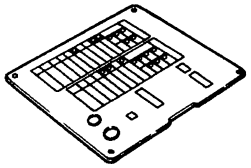
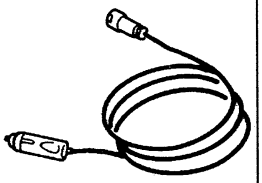
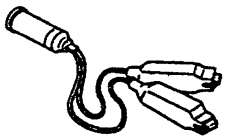
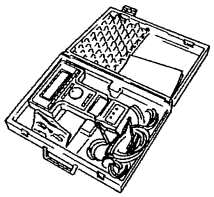
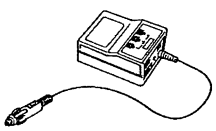
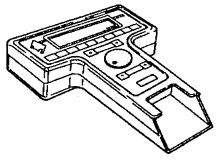
Check for ATF leaks of the transaxle at the points shown below and repair or replace as necessary.

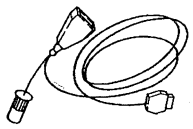
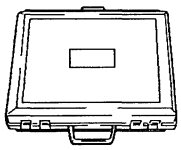
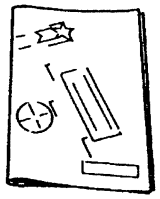
1. Gaskets, O-rings, and plugs.
2. Oil hoses, oil pipes, and connections.
3. Oil cooler.



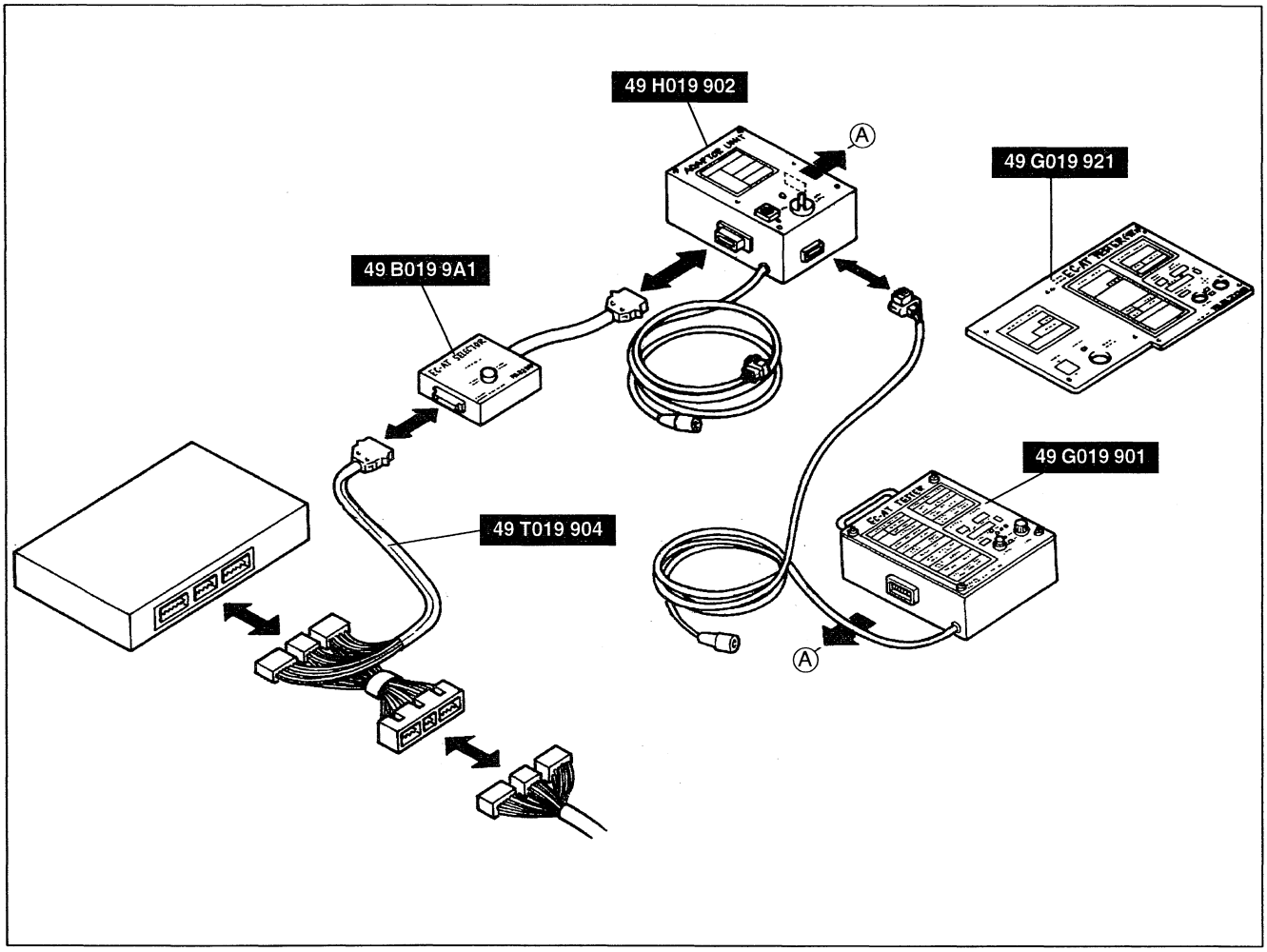
ELECTRICAL SIGNAL INSPECTION

PREPARATION
SST

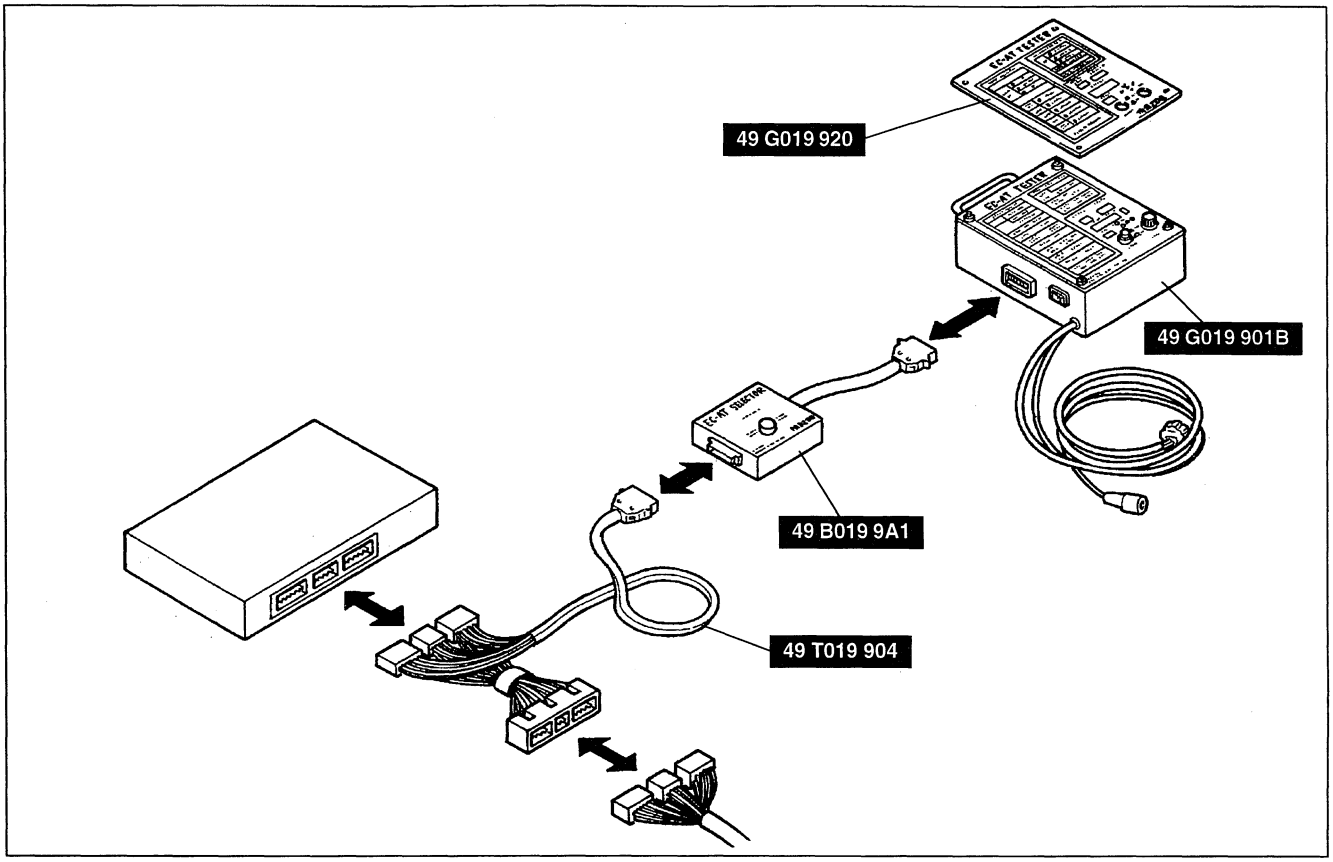
49 G019 901 EC-AT Tester 	For inspection of electrical signal	49 H019 902 Adapter 	For inspection of electrical signal
49 B019 9A1 Adapter 	For inspection of electrical signal	49 T019 904 Adapter Harness 	For inspection of electrical signal
49 G019 921 Panel 	For inspection of electrical signal	49 G019 901B EC-AT Tester 	For inspection of electrical signal
49 G019 920 Panel 	For inspection of electrical signal	49 G019 901C EC-AT Tester 	For inspection of electrical signal
49 T019 905 Adapter Harness 	For inspection of electrical signal	49 T019 906 Panel 	For inspection of electrical signal
49 G019 929 Power Harness 	For inspection of electrical signal	49 D088 008 Harness Adapter Power 	For inspection of electrical signal
49 T088 0A0 NGS set 	For inspection of electrical signal	49 T088 010B Program Card 	For inspection of electrical signal
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For inspection of electrical signal	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For inspection of electrical signal

49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For inspection of electrical signal	49 T088 009 Case (Part of 49 T088 0A0) 	For inspection of electrical signal
49 T088 006 Battery Hook up Adapter (Part of 49 T088 0A0) 	For inspection of electrical signal	49 T088 008 Instruction Manual 	For inspection of electrical signal

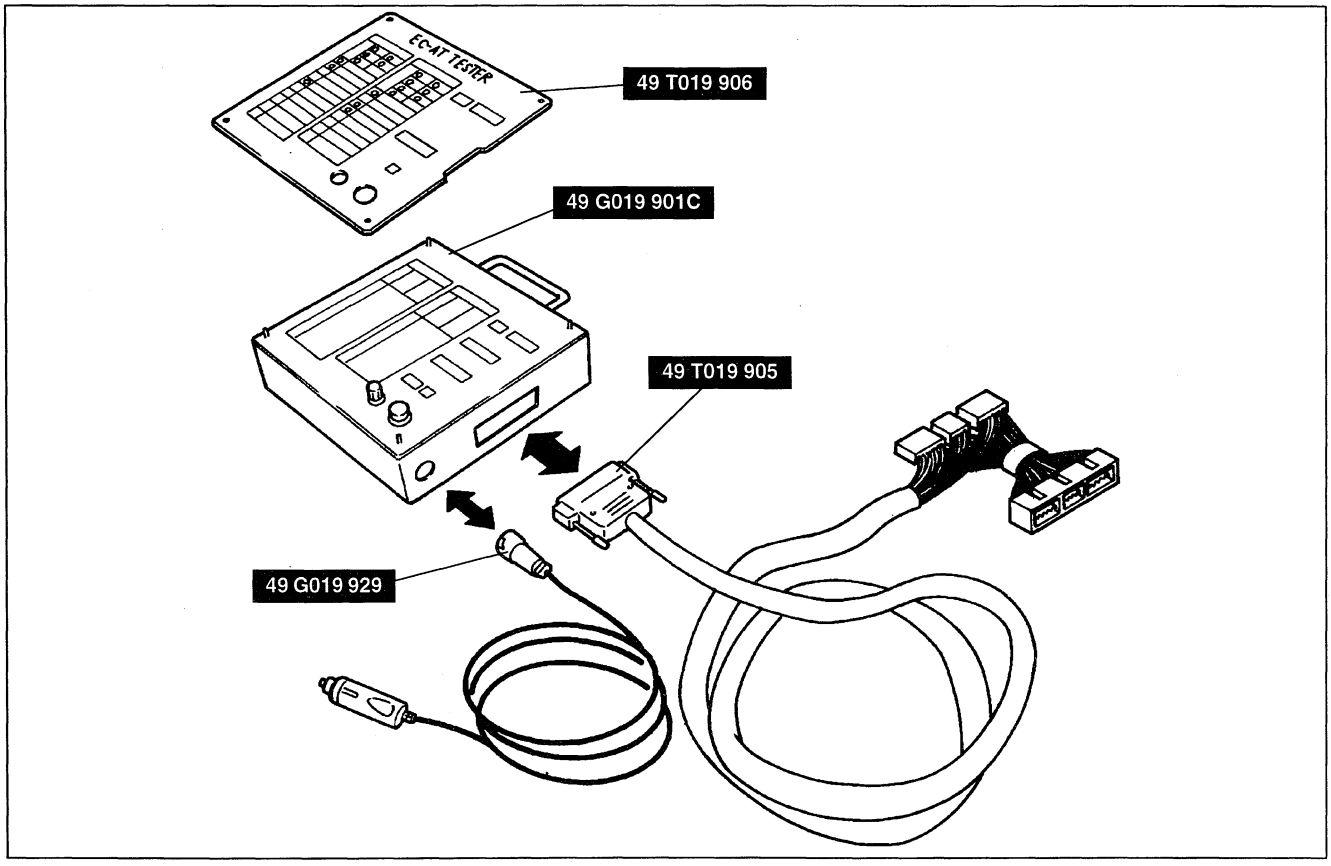
ELECTRICAL SIGNAL INSPECTION
Assembly of SST
EC-AT tester (49 G019 901), adapter (49 H019 902) and adapter (49 B019 9A1)



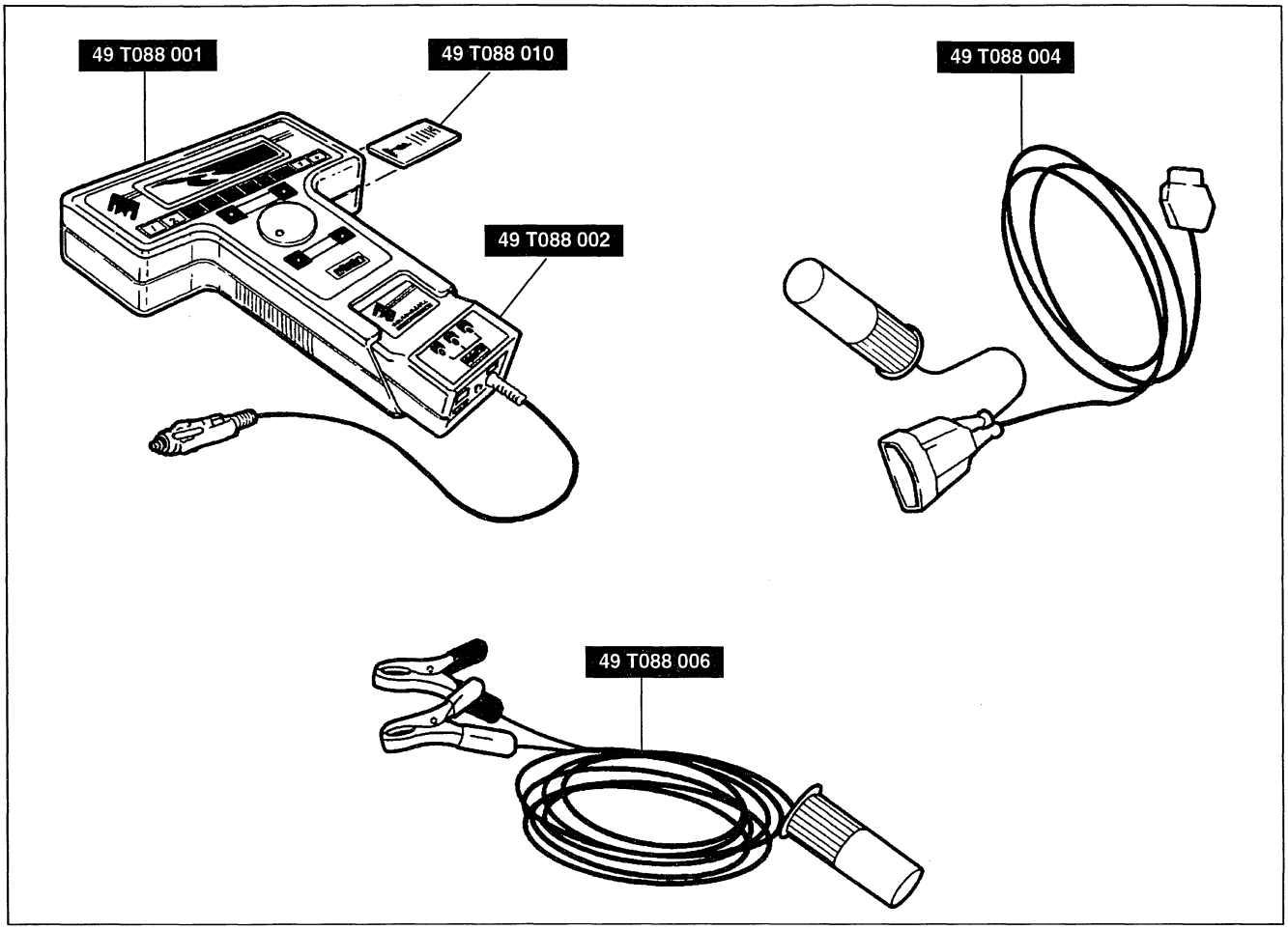
EC-AT tester (49 G019 901B) and adapter (49 B019 9A1)

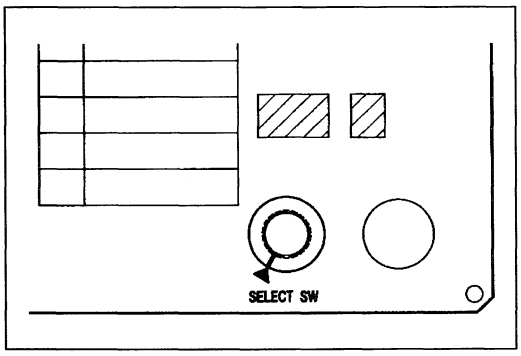


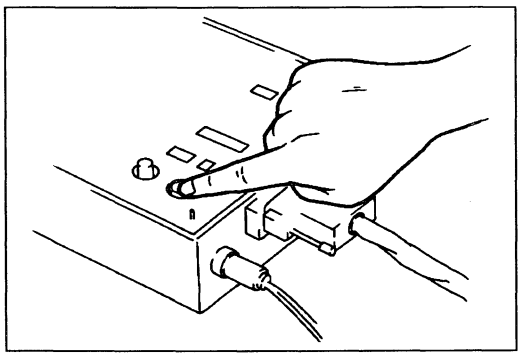
EC-AT tester (49 G019 901C)



NGS



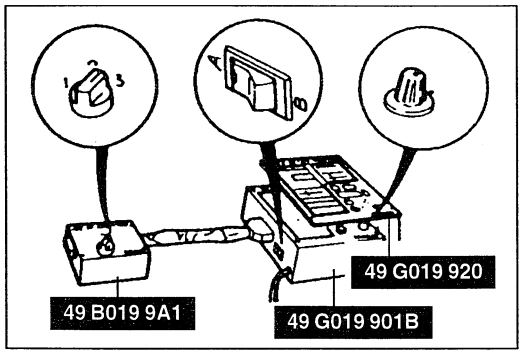




Inspection Procedure

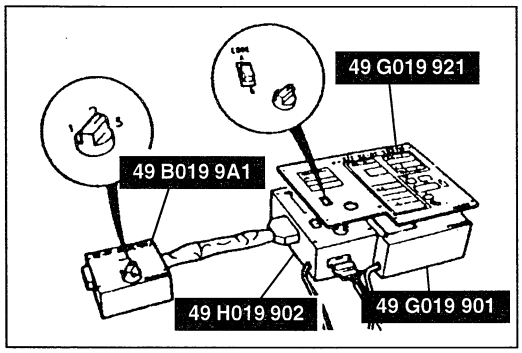
Caution
- **Do not connect the NGS to the data link connector 2 when EC-AT tester is connected to the power-train control module.**
  Doing so can cause incorrect test results.

When using the EC-AT tester (49 G019 901C)
1. Assemble the **SST**. (Refer to page K1–22.)
2. Turn the EC-AT tester select switch to the ▲ mark on the panel.
3. Turn the ignition switch and the EC-AT tester main switch to ON.
4. Check indication of the respective light or digital display in each condition, referring to the indication table on the following page.



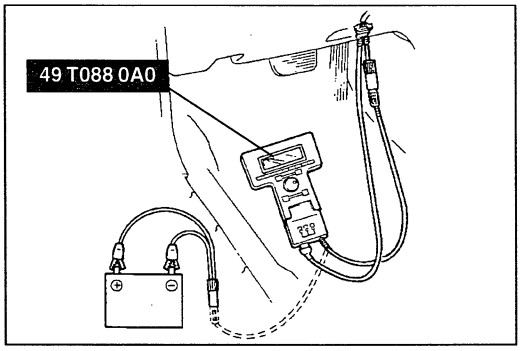
When using the EC-AT tester (49 G019 901B)

1. Assemble the **SST**. (Refer to page K1–22.)
2. Set the EC-AT selector switch to position 3.
3. Set the EC-AT tester vehicle switch to 626/MX-6 position.
4. Set the EC-AT tester select switch to position A.
5. Turn the ignition switch and the EC-AT tester main switch to ON.
6. Check indication of the respective light or digital display in each condition, referring to the indication table on the following page.



When using the EC-AT tester (49 G019 901) and adapter unit (49 H019 902)

1. Assemble the **SST**. (Refer to page K1–21.)
2. Set the EC-AT selector switch to position 3.
3. Set the adapter unit vehicle switch to 626/MX-6 position.
4. Set the adapter unit select switch to position A.
5. Turn the ignition switch and the EC-AT tester main switch to ON.
6. Check indication of the respective light or digital display in each condition, referring to the indication table on the following page.



When using the NGS

1. Assemble the **SST (NGS)**. (Refer to page K1–23.)
2. Select the PID/DATA MONITOR AND RECORD function. (Refer to section F2.)

Indication Table
Indication table of light and digital display
EC-AT tester (49 G019 901)

Item		Indication	Condition	Possible cause
Input (Light)				
Transaxle range switch (INHIBITOR SW)	P, N	ON	P or N position	Transaxle range switch or wiring
		OFF	R position, all ranges	
	D	ON	D range	
		OFF	Other ranges, all positions	
	2 (S)	ON	2 range	
		OFF	Other ranges, all positions	
	1 (L)	ON	1 range	
		OFF	Other ranges, all positions	
O/D OFF switch (HOLD switch)		ON	O/D OFF switch depressed	O/D OFF switch or wiring
		OFF	O/D OFF switch released	
Closed throttle position switch (IDLE SW)		ON	Closed throttle position	Closed throttle position switch or wiring
		OFF	Other positions	
Brake switch (BRAKE LIGHT SW)		ON	Brake pedal depressed	Brake switch or wiring
		OFF	Brake pedal released	
Input (Digital Display)				
Throttle position sensor voltage (THROTTLE SENSOR V.)		PCM terminal voltage	Constant	Throttle position sensor or wiring
VEHICLE SPEED km/h		Vehicle speed	Vehicle moving	Vehicle speed sensor, vehicle speedometer sensor or wiring
DRUM SPEED rpm		Drum speed	All the time	Input/turbine speed sensor or wiring
Output (Light)				
SOLENOID VALVE	Shift solenoid A (1–2)	ON	2GR, 3GR or 4GR	Powertrain control module, shift solenoid A or wiring
		OFF	1GR	
	Shift solenoid B (2–3)	ON	1GR or 2GR	Powertrain control module, shift solenoid B or wiring
		OFF	3GR or 4GR	
	Shift solenoid C (3–4)	ON	1GR, 2GR or 4GR	Powertrain control module, shift solenoid C or wiring
		OFF	3GR	
	TCC control (LOCKUP CONTROL)	ON	TCC operation	Powertrain control module, TCC control solenoid valve or wiring
		OFF	TCC non-operation	
	3–2 TIMING	ON	1→2, 2→3, 3→4, 3→2, 3→1, 2→1 shift	Powertrain control module, 3–2 timing solenoid valve or wiring
		OFF	Other than above	
O/D OFF indicator light (HOLD INDICATOR)		ON	O/D OFF mode	Powrtrain control module, O/D OFF indicator light or wiring
		OFF	Except O/D OFF mode	
Output (Digital Display)				
GEAR		1	First gear	—
		2	Second gear	
		3	Third gear	
		4	Fourth gear	

EC-AT tester (49 G019 901B)

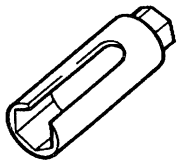
Item		Indication	Condition	Possible cause
Input (Light)				
Transaxle range switch (INHIBITOR SW)	P, N	ON	P or N position	Transaxle range switch or wiring
		OFF	R position, all ranges	
	D	ON	D range	
		OFF	Other ranges, all positions	
	2 (S)	ON	2 range	
		OFF	Other ranges, all positions	
	1 (L)	ON	1 range	
		OFF	Other ranges, all positions	
O/D OFF switch (HOLD switch)		ON	O/D OFF switch depressed	O/D OFF switch or wiring
		OFF	O/D OFF switch released	
Closed throttle position switch (IDLE SW)		ON	Closed throttle position	Closed throttle position switch or wiring
		OFF	Other positions	
Brake switch (BRAKE LIGHT SW)		ON	Brake pedal depressed	Brake switch or wiring
		OFF	Brake pedal released	
Input (Digital Display)				
Throttle position sensor voltage (THROTTLE SENSOR V.)		PCM terminal voltage	Constant	Throttle position sensor or wiring
Vehicle speed		Vehicle speed	Vehicle moving	Vehicle speed sensor, vehicle speedometer sensor or wiring
Turbine speed		Drum speed	All the time	Input/turbine speed sensor or wiring
Output (Light)				
SOLENOID VALVE	Shift solenoid A (1–2)	ON	2GR, 3GR or 4GR	Powertrain control module, shift solenoid A or wiring
		OFF	1GR	
	Shift solenoid B (2–3)	ON	1GR or 2GR	Powertrain control module, shift solenoid B or wiring
		OFF	3GR or 4GR	
	Shift solenoid C (3–4)	ON	1GR, 2GR or 4GR	Powertrain control module, shift solenoid C or wiring
		OFF	3GR	
	TCC control (LOCKUP CONTROL)	ON	TCC operation	Powertrain control module, TCC control solenoid valve or wiring
		OFF	TCC non-operation	
	3–2 TIMING	ON	1→2, 2→3, 3→4, 3→2, 3→1, 2→1 shift	Powertrain control module, 3–2 timing solenoid valve or wiring
		OFF	Other than above	
HOLD indicator light (HOLD INDICATOR)		ON	O/D OFF mode	Powrtrain control module, O/D OFF indicator light or wiring
		OFF	Except O/D OFF mode	
Output (Digital Display)				
GEAR		1	First gear	—
		2	Second gear	
		3	Third gear	
		4	Fourth gear	

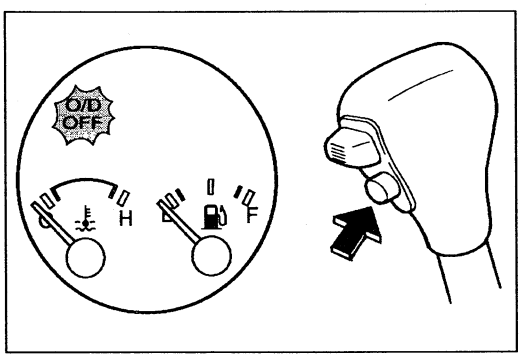
EC-AT tester (49 G019 901C)

Item		Indication	Condition	Possible cause
Input (Light)				
Transaxle range switch	P/N	ON	P or N position	Transaxle range switch or wiring
		OFF	R position, all ranges	
	R	ON	R position	
		OFF	Other positions, all ranges	
	D	ON	D range	
		OFF	Other ranges, all positions	
	2 (S)	ON	2 range	
		OFF	Other ranges, all positions	
	1 (L)	ON	1 range	
		OFF	Other ranges, all positions	
HOLD/O/D OFF switch		Bright	O/D OFF switch depressed	O/D OFF switch or wiring
		Dim	O/D OFF switch released	
Brake switch		ON	Brake pedal depressed	Brake switch or wiring
		OFF	Brake pedal released	
Closed throttle position switch		ON	Closed throttle position	Closed throttle position switch or wiring
		OFF	Other position	
4GR INHIBIT SIGNAL		ON	RESUME/ACCEL switch OFF and vehicle speed kept at preset speed	ASC control module or wiring
		OFF	RESUME/ACCEL switch ON or vehicle speed 8km/h {5 mph} lower than preset speed	
Input (Digital Display)				
Throttle position sensor (V)		PCM terminal voltage	Constant	Throttle position sensor or wiring
Vehicle speed (km/h)		Vehicle speed	Vehicle moving	Vehicle speed sensor, vehicle speedometer sensor or wiring
Turbine speed (rpm)		Drum speed	All the time	Input/turbine speed sensor or wiring
Transaxle fluid temperature sensor (TFT SENSOR) (V)		PCM terminal voltage	ATF temperature	Transaxle fluid temperature sensor or wiring
Output (Light)				
SOLENOID VALVE	Shift solenoid A	ON	2GR, 3GR or 4GR	Powertrain control module, shift solenoid A or wiring
		OFF	1GR	
	Shift solenoid B	ON	1GR or 2GR	Powertrain control module, shift solenoid B or wiring
		OFF	3GR or 4GR	
	Shift solenoid C	ON	1GR, 2GR or 4GR	Powertrain control module, shift solenoid C or wiring
		OFF	3GR	
	TCC control	ON	TCC operation	Powertrain control module, TCC control solenoid valve or wiring
		OFF	TCC non-operation	
	3–2 timing	ON	1→2, 2→3, 3→4, 3→2, 3→1, 2→1 shift	Powertrain control module, 3–2 timing solenoid valve or wiring
		OFF	Other than above	
	TCC	Bright	IG SW ON	Powertrain control module, TCC solenoid valve or wiring
		Dim	TCC slip operation	
	Pressure control	ON (Bright↔Dim)	While driving (Accelerator pedal released↔depressed)	Powertrain control module, pressure control solenoid wiring
HOLD/O/D OFF INDICATOR LIGHT		ON	O/D OFF mode	Powrtrain control module, O/D OFF indicator light or wiring
		OFF	Except O/D OFF mode	
Output (Digital Display)				
Gear Position		1	First gear	—
		2	Second gear	
		3	Third gear	
		4	Fourth gear	

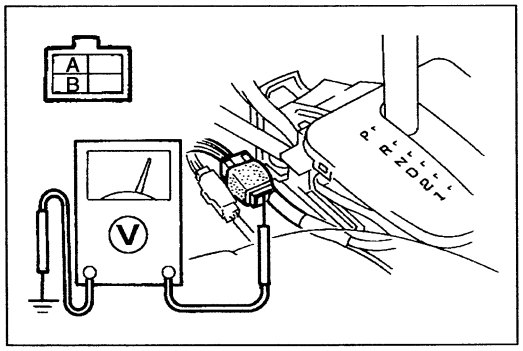
ELECTRICAL SYSTEM COMPONENTS

PREPARATION
SST

49 G019 031 Wrench		For disassembly / assembly of transaxle fluid temperature sensor



O/D OFF SWITCH
Inspection
Inspection of operation
1. Turn the ignition switch from OFF to ON.
2. Verify that the O/D OFF indicator is not illuminated. Depress the O/D OFF switch and verify that the O/D OFF indicator light illuminates.
3. If not as specified, check the terminal voltage of the O/D OFF switch.



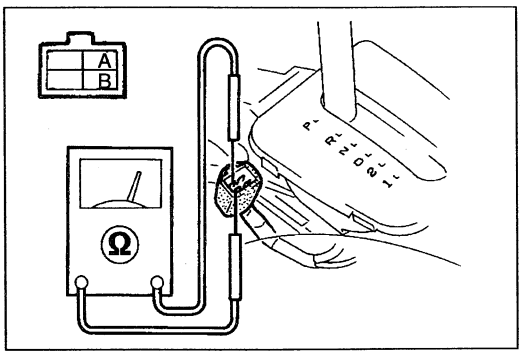
Inspection of voltage
1. Remove the front console.
2. Turn the ignition switch to ON.
3. Measure voltage at the O/D OFF switch connector terminals.

B+: Battery positive voltage

Position		Connector terminal	
		A	B
Normal	(V)	B+	0
Depressed	(V)	0	0

(V): Voltage

4. If not as specified, check the continuity of the O/D OFF switch.



Inspection of continuity

1. Disconnect the negative battery cable.
2. Disconnect the O/D OFF switch connector.
3. Check continuity of the switch.

Position	Terminal	
	A	B
Normal		
Depressed	O———	———O

O——O: Continuity

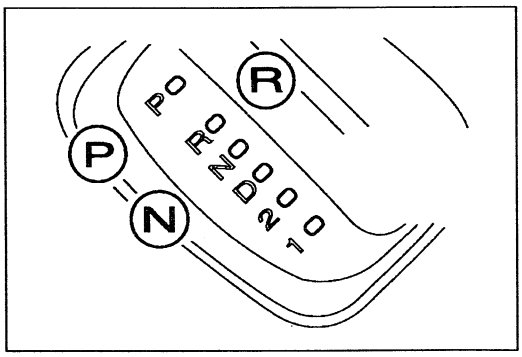
4. If not as specified, replace the selector lever knob assembly. (Refer to below.)
5. If the switch is OK, check the wiring harness. (O/D OFF switch—powertrain control module, O/D OFF switch—Body ground.)
6. Install the front console.
7. Connect the negative battery cable.

Replacement

1. Disconnect the negative battery cable.
2. Remove the front console.
3. Remove the indicator panel installation screws.
4. Disconnect the connector and remove the O/D OFF switch terminals.
5. Remove the selector lever knob assembly.
6. Install a new selector lever knob assembly.

Tightening torque:
2.0—2.9 N·m {20—30 kgf·cm, 18—26 in·lbf}

7. Install the O/D OFF switch terminals and connect the connector.
8. Install the indicator panel installation screws. (Refer to page K1–171.)
9. Install the front console.
10. Connect the negative battery cable.

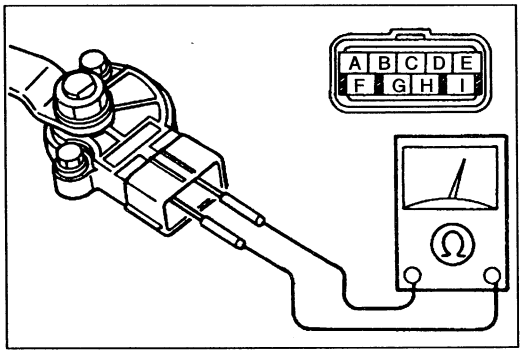


TRANSAXLE RANGE SWITCH

Inspection

Inspection of operation

1. Verify that the starter operates only with the ignition switch at the START position and the selector lever in P and N positions.
2. Verify that the back-up lights illuminate when shifted to R position with the ignition switch in the ON position.
3. Check the transaxle range switch if not as specified.



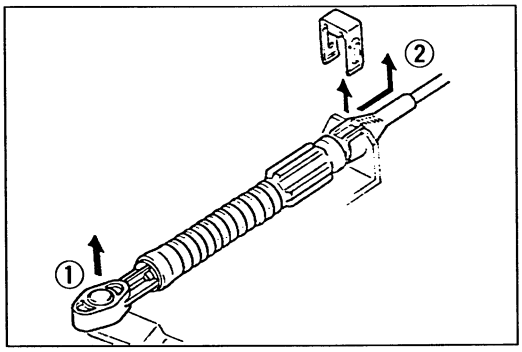
Inspection of continuity

1. Disconnect the negative battery cable.
2. Remove the resonance chamber, fresh-air duct, and air cleaner assembly.
3. Disconnect the transaxle range switch connector.
4. Check continuity of the transaxle range switch.

Position/ Range	Connector terminal								
	A	B	C	D	E	F	G	H	I
P	○				○				
						○			○
R	○			○					
N	○							○	
						○			○
D	○	○							
2	○						○		
1	○		○						

○—○: Continuity

5. If not as specified, replace or adjust the transaxle range switch.
6. Connect the transaxle range switch connector.
7. Install the resonance chamber, fresh-air duct, and air cleaner assembly.
8. Connect the negative battery cable.



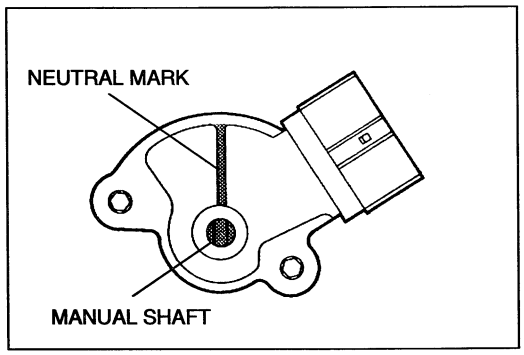
Replacement

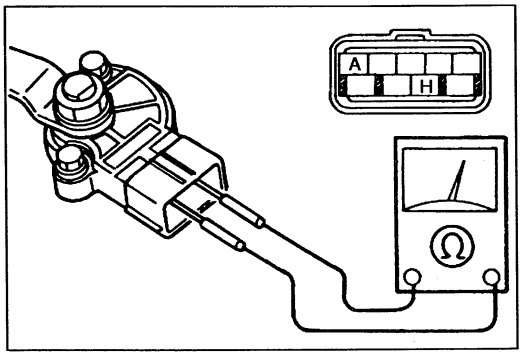
1. Disconnect the negative battery cable.
2. Remove the resonance chamber, fresh-air duct, and air cleaner assembly.
3. Disconnect the transaxle range switch connector.
4. Remove the clip.
5. Remove the selector cable in the order shown in the figure.
   ① Disconnect the selector cable from the manual shaft lever.
   ② Pull out the selector cable from the cable bracket and remove it.
6. Remove the manual shaft nut.
7. Remove the lock-washer and lever.
8. Remove the transaxle range switch.
9. Rotate the manual shaft to N position.
10. Turn the transaxle range switch so that the neutral mark is in line with the flat, straight surfaces on either side of the manual shaft.
11. Hand tighten the transaxle range switch bolts.
12. Verify that there is continuity between terminals A and H of the transaxle range switch connector.
13. Tighten the transaxle range switch mounting bolts.

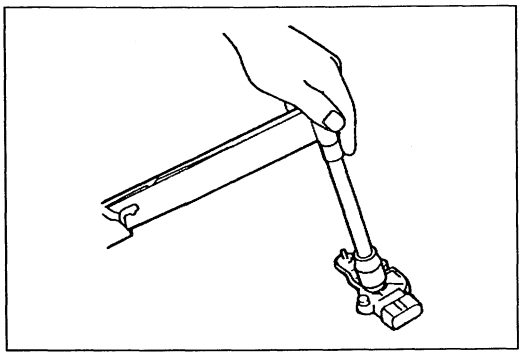
    Tightening torque:
    7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

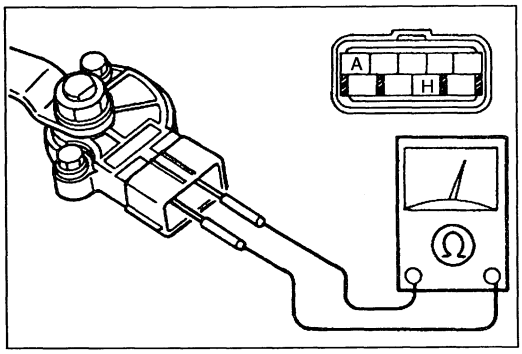
14. Install the lever and spring washer.
15. Tighten the manual shaft nut by using a torque wrench.

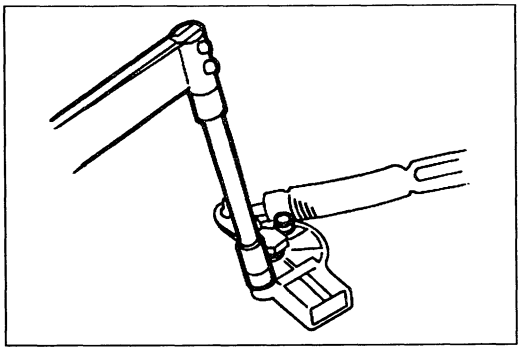
    Tightening torque:
    32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}

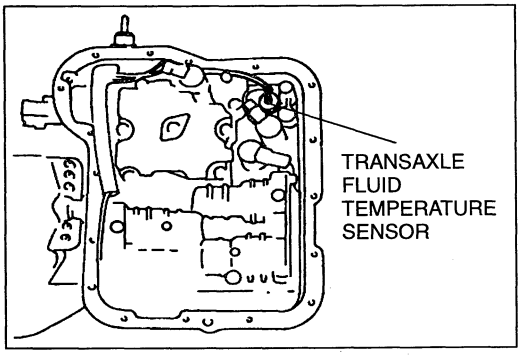


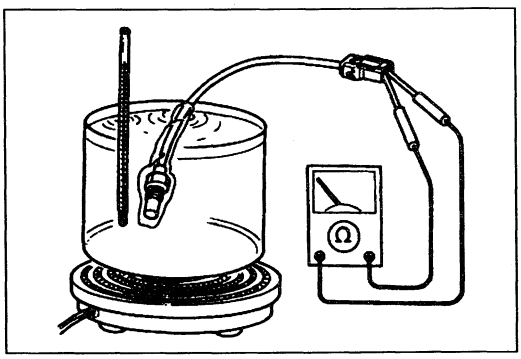












16. Verify that the selector lever range position and transaxle range switch are aligned; then connect the selector cable and install a new spring pin and clip.
17. Check continuity of the transaxle range switch. (Refer to page K1–30.)
18. Connect the transaxle range switch connector.
19. Install the air cleaner assembly, fresh-air duct, and resonance chamber.
20. Connect the negative battery cable.
21. Check operation of the transaxle range switch. (Refer to page K1–29.)

Adjustment

1. Disconnect the negative battery cable.
2. Remove the resonance chamber, fresh-air duct, and air cleaner assembly.
3. Remove the spring pin and clip and disconnect the selector cable.
4. Rotate the manual shaft to N position.
5. Disconnect the transaxle range switch connector.
6. Loosen the transaxle range switch mounting bolts.
7. Connect an ohmmeter between terminals Ⓐ and Ⓗ.
8. Adjust the switch to the point where there is continuity between the terminals.
9. Tighten the transaxle range switch mounting bolts.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

10. Verify that the selector lever range position and transaxle range switch are aligned.
11. Connect the transaxle range switch connector.
12. Connect the selector cable and install a new spring pin and clip.
13. Install the air cleaner assembly, fresh-air duct, and resonance chamber.

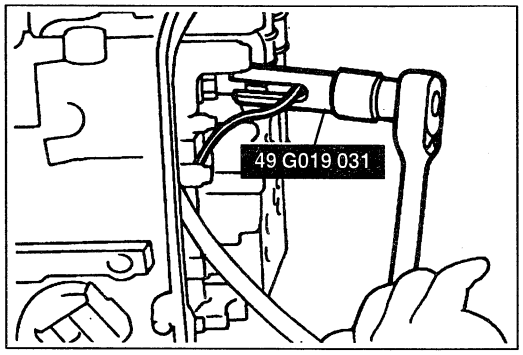
TRANSAXLE FLUID TEMPERATURE SENSOR

Inspection

1. Refer to "Replacement" below for removal of the transaxle fluid temperature sensor.
2. Place the transaxle fluid temperature sensor in ATF with a thermometer as shown and heat the ATF gradually.
3. Measure resistance between the terminals of the transaxle fluid temperature sensor.

ATF temperature °C {°F}	Resistance (kΩ)
–20 {–4}	13.47—17.17
0 {32}	5.445—6.678
20 {68}	2.441—2.894
40 {104}	1.193—1.374
60 {140}	0.6284—0.7048
80 {176}	0.3527—0.3865
100 {212}	0.2091—0.2245
120 {248}	0.1301—0.1372
130 {266}	0.1044—0.1090

4. If not correct, replace the transaxle fluid temperature sensor.
5. Refer to "Replacement" for installation of the transaxle fluid temperature sensor.

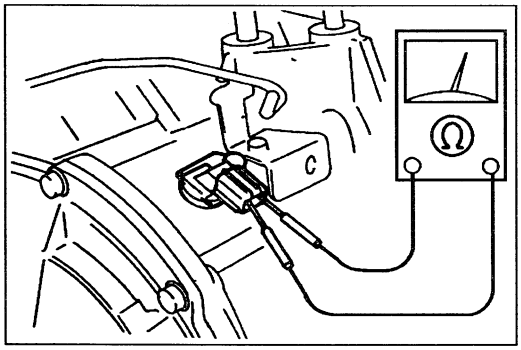


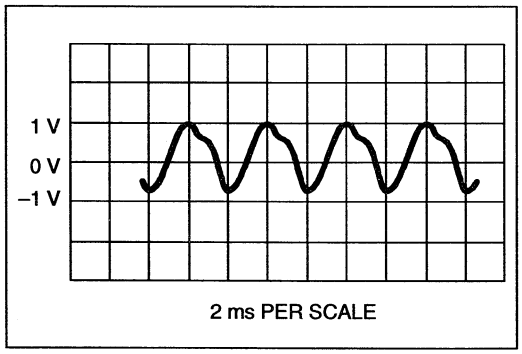
Replacement

1. Remove the control valve body cover. (Refer to page K1–125.)
2. Disconnect the transaxle fluid temperature sensor connector.
3. Remove the transaxle fluid temperature sensor by using the **SST**.
4. Install a new transaxle fluid temperature sensor by using the **SST**.

   Tightening torque:
   7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

5. Connect the transaxle fluid temperature sensor connector.
6. Install the control valve body cover. (Refer to page K1–125.)
7. Carry out the line pressure test. (Refer to page K1–11.)





INPUT/TURBINE SPEED SENSOR

Inspection

Inspection of resistance

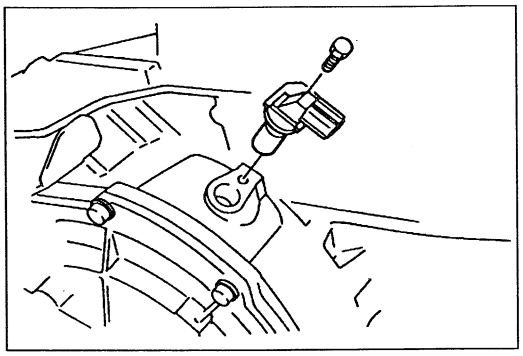
1. Refer to "Replacement" below for disconnection of the input/turbine speed sensor connector.
2. Measure resistance between the terminals of the input/turbine speed sensor.

   Resistance: 253—604 Ω
   (ATF temperature: –40—160°C {–40—320°F})

3. If not correct, replace the input/turbine speed sensor.
4. Refer to "Replacement" for connection of the input/turbine speed sensor connector.

Inspection of wave form

1. Connect the oscilloscope to the powertrain control module at terminals 2P and 2T.
2. Inspect the wave form as shown in the figure.

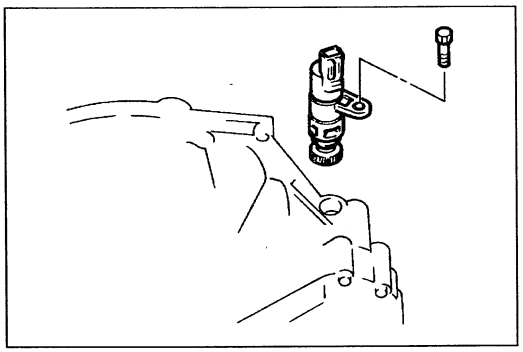


Replacement

1. Disconnect the negative battery cable.
2. Remove the resonance chamber, fresh-air duct, and air cleaner assembly.
3. Remove the fuel filter mounting nuts.
4. Disconnect the input/turbine speed sensor connector.
5. Remove the input/turbine speed sensor.
6. Apply ATF to a new O-ring and install it on a new input/turbine speed sensor.
7. Install the input/turbine speed sensor.

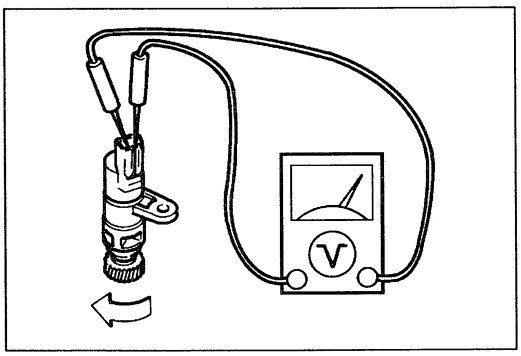
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

8. Connect the input/turbine speed sensor connector.
9. Install the fuel filter mounting nuts.
10. Install the resonance chamber, fresh-air duct, and air cleaner assembly.
11. Connect the negative battery cable.



VEHICLE SPEEDOMETER SENSOR
Inspection
Inspection of voltage

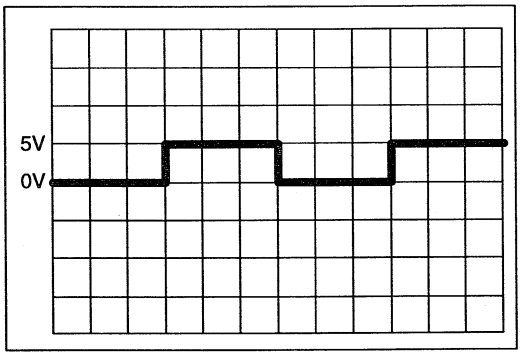
1. Remove the vehicle speedometer sensor.



2. Measure the voltage between terminals of the vehicle speedometer sensor while rotating the driven gear.

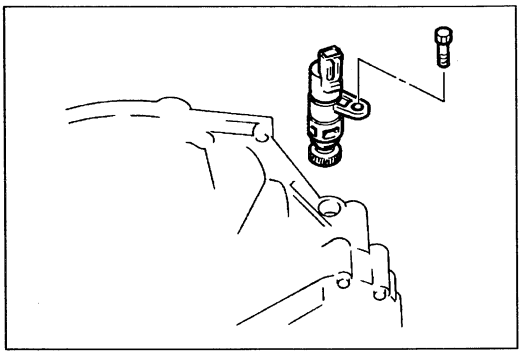
Meter needle	Action
Moves slightly under 5V	Repair wiring harness (Instrument cluster—Vehicle speedometer sensor)
Does not move	Replace vehicle speedometer sensor

3. Install the vehicle speedometer sensor.



Inspection of wave form

1. Connect the oscilloscope to the powertrain control module at terminal 1C.
2. Inspect the wave form as shown in the figure.

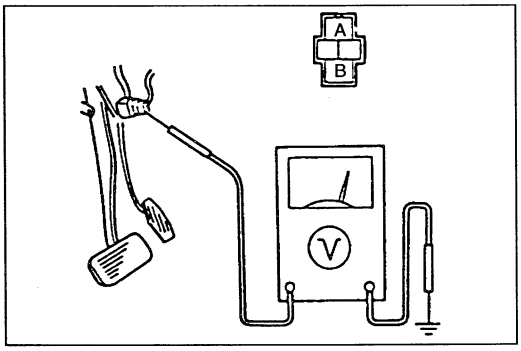


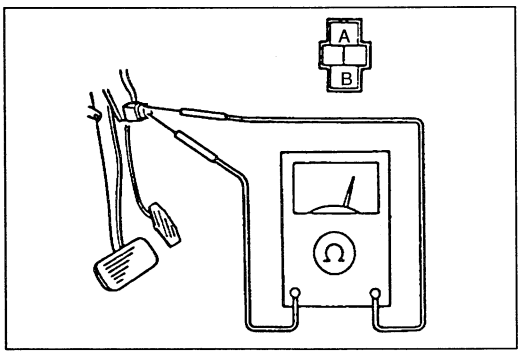
Replacement

1. Disconnect the negative battery cable.
2. Remove the air cleaner assembly, battery and battery carrier.
3. Disconnect the vehicle speedometer sensor connector.
4. Remove the vehicle speedometer sensor.
5. Apply ATF to a new O-ring and install it on a new vehicle speedometer sensor.
6. Install the vehicle speedometer sensor.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}

7. Connect the vehicle speedometer sensor connector.
8. Install the battery, battery carrier, and air cleaner assembly.
9. Connect the negative battery cable.





BRAKE SWITCH

Inspection

Inspection of voltage

1. Turn the ignition switch to ON.
2. Measure voltage at the brake switch connector.

B+: Battery positive voltage

Condition	Connector terminal (V)	
	A	B
Pedal depressed	B+	0
Pedal released	0	0

(V): Voltage

3. If not as specified, check the wiring harness (Stop fuse—Brake switch, Brake switch—Powertrain control module) and the continuity of the switch.

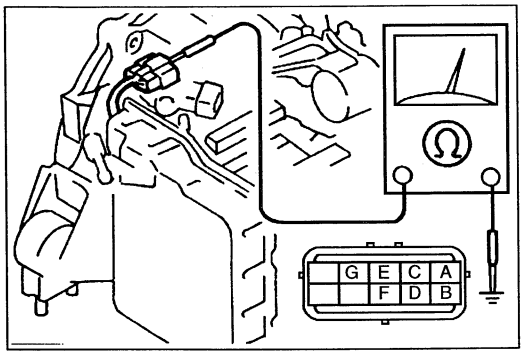
Inspection of continuity

1. Disconnect the negative battery cable.
2. Disconnect the brake switch connector.
3. Check continuity between terminals A and B of the switch.

Condition	Terminal	
	A	B
Pedal depressed		
Pedal released	O————	————O

O——O: Continuity

4. If not as specified, replace the brake switch.
5. Connect the brake switch connector.
6. Connect the negative battery cable.



SOLENOID VALVES

Inspection

Inspection of resistance

1. Disconnect the negative battery cable.
2. Remove the resonance chamber, fresh-air duct and air cleaner assembly.
3. Disconnect the solenoid valve connector.
4. Measure the resistance between terminals A through G and a ground.

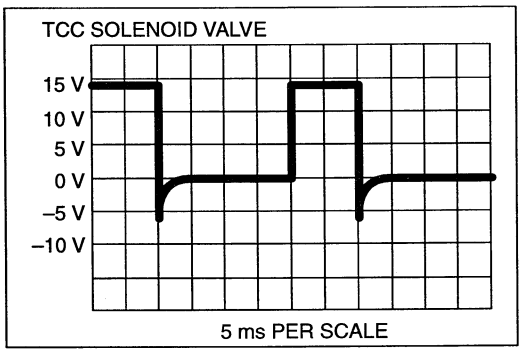
ATF temperature: –40—160°C {–40—320°F}

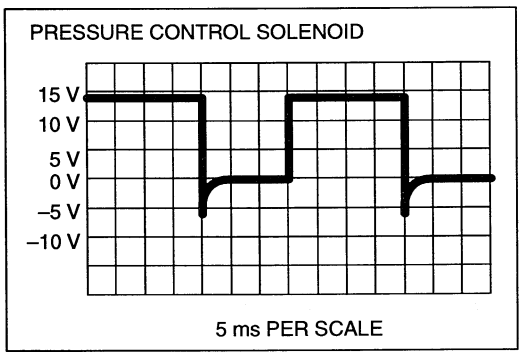
Terminal	Solenoid valve	Resistance (Ω)
A	Shift solenoid A	11—27
B	Shift solenoid B	11—27
C	Shift solenoid C	11—27
D	Torque converter clutch control	11—27
E	3-2 timing	11—27
F	Torque converter clutch	9—18
G	Pressure control	9—18

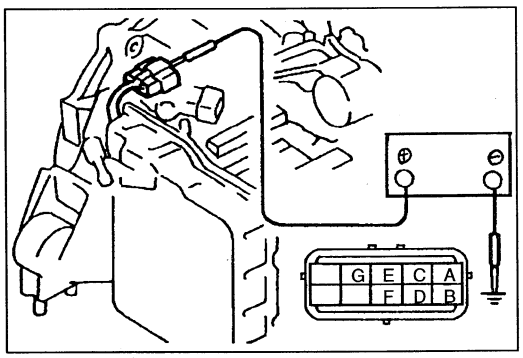
5. If not correct, check the wiring harness or replace the solenoid valve(s), if necessary.
6. Connect the solenoid valve connector.
7. Install the resonance chamber, fresh-air duct and air cleaner assembly.
8. Connect the negative battery cable.

Inspection of wave form

1. Connect the oscilloscope to the powertrain control module at terminals 2D and 2H.
2. Inspect the wave form as shown in the figure.

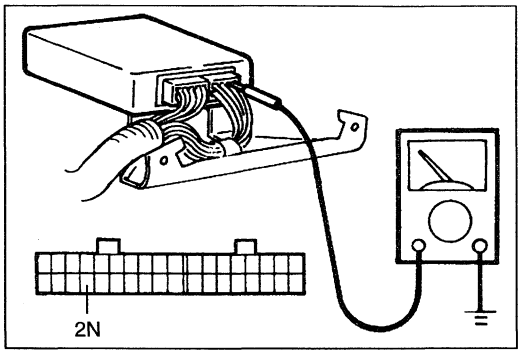


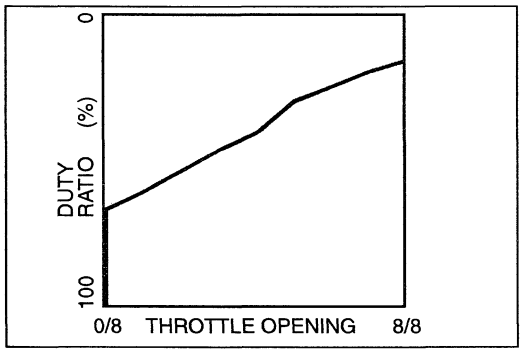




Inspection of operation

1. Disconnect the negative battery cable.
2. Disconnect the solenoid valve connector.
3. Apply battery voltage to each terminal of A—G.
4. Verify that each control valve operates with a “click”.
5. If the “click” is not heard, replace the solenoid valve.





Inspection of output duty
Pressure control solenoid

1. Connect the (+) terminal of a dwell meter to terminal 2H at the powertrain control module and the (–) terminal to a ground.
   Set the dwell meter selector to the 4 cylinder position.
2. Engage the parking brake and use wheel chocks at the front and rear of the wheels.
3. Start the engine.
4. Depress the brake pedal firmly.
5. Shift the selector lever to D range.

Note
- The dwell meter indicates the OFF duty ratio.

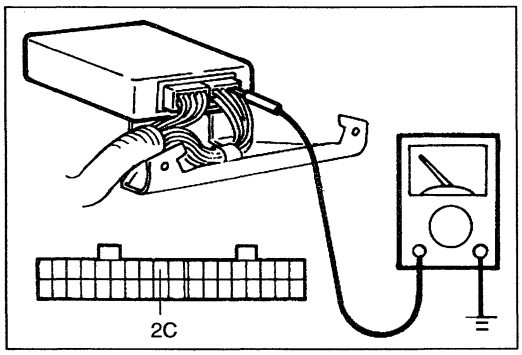
6. Check the duty ratio by depressing and releasing the accelerator pedal.

Throttle opening	Duty ratio (ON %)
Closed throttle position (0/8)	Approx. 67
Wide open throttle (8/8)	Approx. 23

Note
- The relationship between the dwell angle (°) and duty ratio (%) is as follows:

Dwell angle (°)	0	18	36	54	72	90
Duty ratio (%)	0	20	40	60	80	100

7. Depress the accelerator pedal slowly and verify that the duty ratio charges as shown in the graph.
8. If not as specified, check the powertrain control module (Refer to section F2.) and pressure control solenoid. (Refer to page K1–35.)



Torque converter clutch solenoid

1. Connect the (+) terminal of a dwell meter to terminal 2D of the powertrain control module and the (–) terminal to a ground.
2. Drive the vehicle.

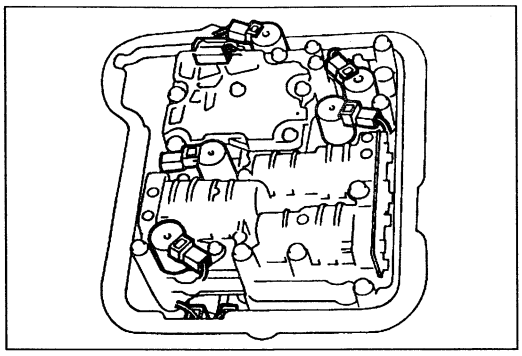
Note
- The dwell meter indicates the OFF duty ratio.

3. Check the duty ratio in the torque converter clutch condition.

Condition	Duty ratio (ON %)
Slip TCC operation	Approx. 65
Except slip TCC operation	0
TCC operation↔Slip TCC operation↔Complete TCC	Approx. 0↔65↔0

Note
- See above note for dwell and duty relationship.

4. If not as specified, check the powertrain control module. (Refer to section F2.), and torque converter clutch solenoid valve. (Refer to page K1–35.)

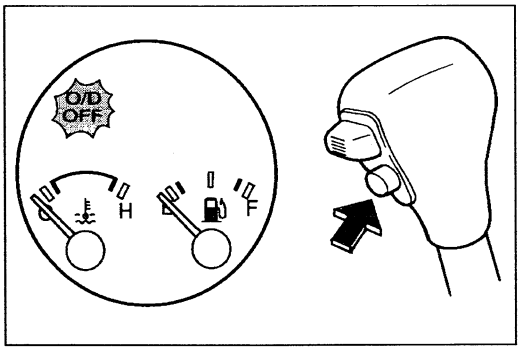


Replacement

1. Remove the control valve body. (Refer to page K1–125.)
2. Remove the solenoid valve(s).
3. Apply ATF to a new O-ring and install it on the solenoid valve.
4. Install the solenoid valve in the control valve body.

   Tightening torque:
   6.5—7.8 N·m {66—80 kgf·cm, 58—69 in·lbf}

5. Install the control valve body. (Refer to page K1–125.)
6. Carry out the time lag test and line pressure test. (Refer to page K1–10.)
7. Carry out the road test. (Refer to page K1–15.)



O/D OFF INDICATOR LIGHT

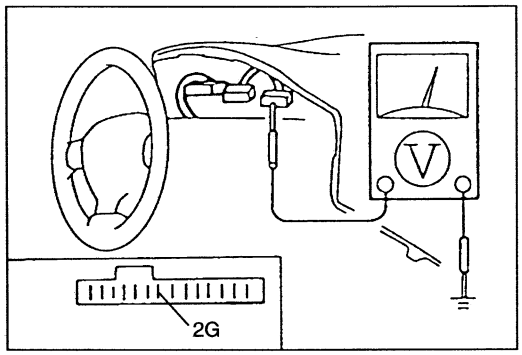
Inspection

Inspection of operation

1. Turn the ignition switch from OFF to ON.

   Note
   - The O/D OFF indicator light will flash if a malfunction exists in any of the EC-AT system components.

2. Verify that the O/D OFF indicator light is not illuminated.
3. Depress the switch and verify that the O/D OFF indicator illuminates.
4. If the O/D OFF switch function is not as specified, after checking the O/D OFF switch (Refer to page K1–28.), check the terminal voltage of the O/D OFF indicator light.

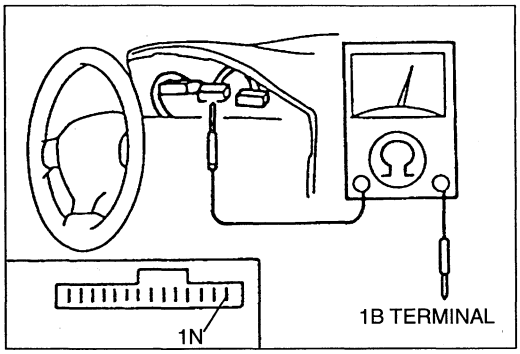


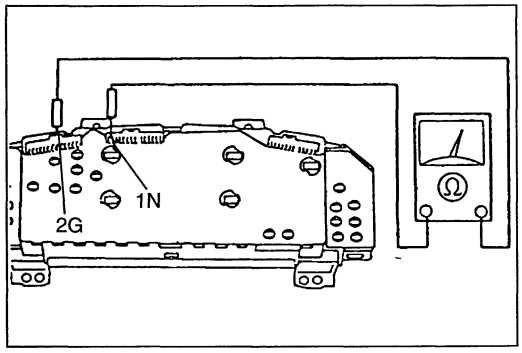
Inspection of voltage

1. Remove the instrument cluster. (Refer to Body Electrical Troubleshooting segment section C1.)
2. Turn the ignition switch to ON.
3. Measure voltage between terminal 2G and a ground.

B+: Battery positive voltage

Voltage	Action
B+	Go to next step
Other	• Replace METER fuse • Repair wiring harness (METER fuse—Instrument cluster)





Inspection of continuity

1. Disconnect the negative battery cable.
2. Disconnect the instrument cluster connector.
3. Check continuity between terminal 1N and powertrain control module terminal 1B.

Terminals	Continuity
1N—1B	Yes

4. If not correct, check the wiring harness (instrument cluster—powertrain control module).
5. If correct, go to the next step.
6. Check continuity between terminals 2G and 1N.

Terminals	Continuity
2G—1N	Yes

7. If not correct, replace the instrument cluster or bulb.
8. Install the instrument cluster. (Refer to Body Electrical Troubleshooting segment section C1.)
9. Connect the negative battery cable.

POWERTRAIN CONTROL MODULE

Inspection

Note

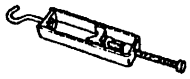
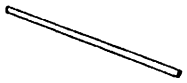
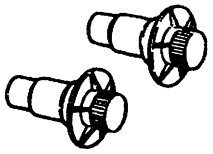
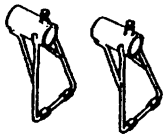
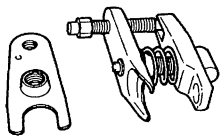
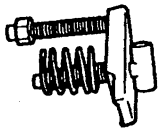
- As the powertrain control module is integrated, refer to section F2 for the terminal voltage.

TRANSAXLE

TRANSAXLE UNIT (REMOVAL)

Preparation

SST

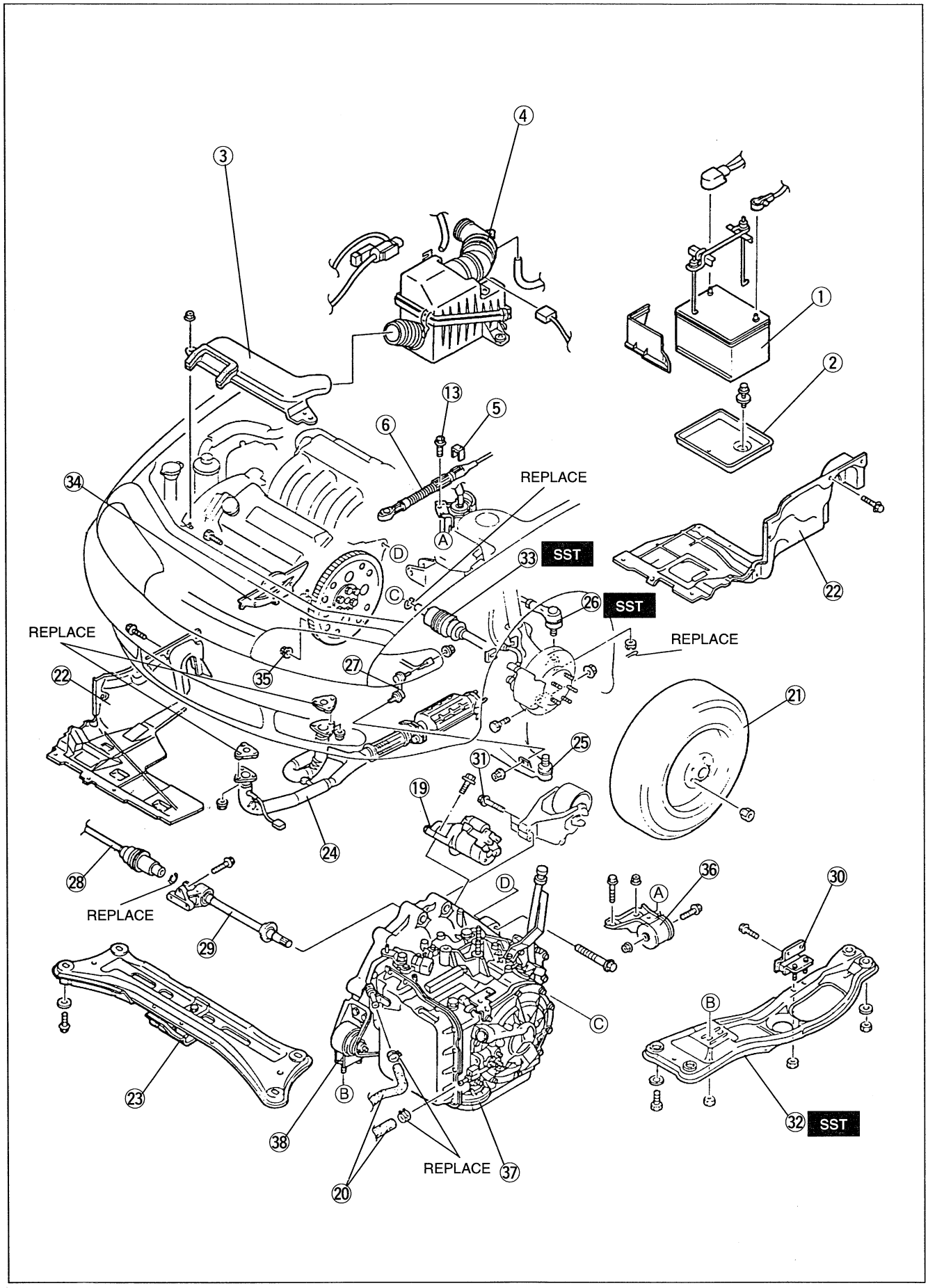
49 G017 5A0 Support, engine 	For support of engine	49 G017 503 Hook (Part of 49 G017 5A0) 	For support of engine
49 G017 501 Bar (Part of 49 G017 5A0) 	For support of engine	49 G030 455 Holder, diff. side gear 	For holding side gear
49 G017 502 Support (Part of 49 G017 5A0) 	For support of engine	49 T028 3A0 Puller, ball joint 	For removal of tie rod end
49 T028 303 Body (Part of 49 T028 3A0) 	For removal of tie rod end	49 T028 304 Attachment (Part of 49 T028 3A0) 	For removal of tie rod end

Removal

The oil pan could contain small chips, shavings, and other particles helpful in checking the condition of the transaxle and diagnosing certain problems.

To ensure that all foreign particles stay in the oil pan, make sure that the transaxle is never tipped completely over while the oil pan is still installed.

1. Disconnect the negative battery cable.
2. Raise the vehicle on a vehicle hoist.
3. Drain the ATF into a container.
4. Remove in the order shown in the figure, referring to **Removal Note**.
5. After removal, remove the oil pan to check the condition of the transaxle.


4
3
1
2
13
5
6
REPLACE
34
A
D
C
33
SST
26
SST
REPLACE
22
22
REPLACE
35
27
21
25
31
19
24
28
REPLACE
29
D
36
A
30
C
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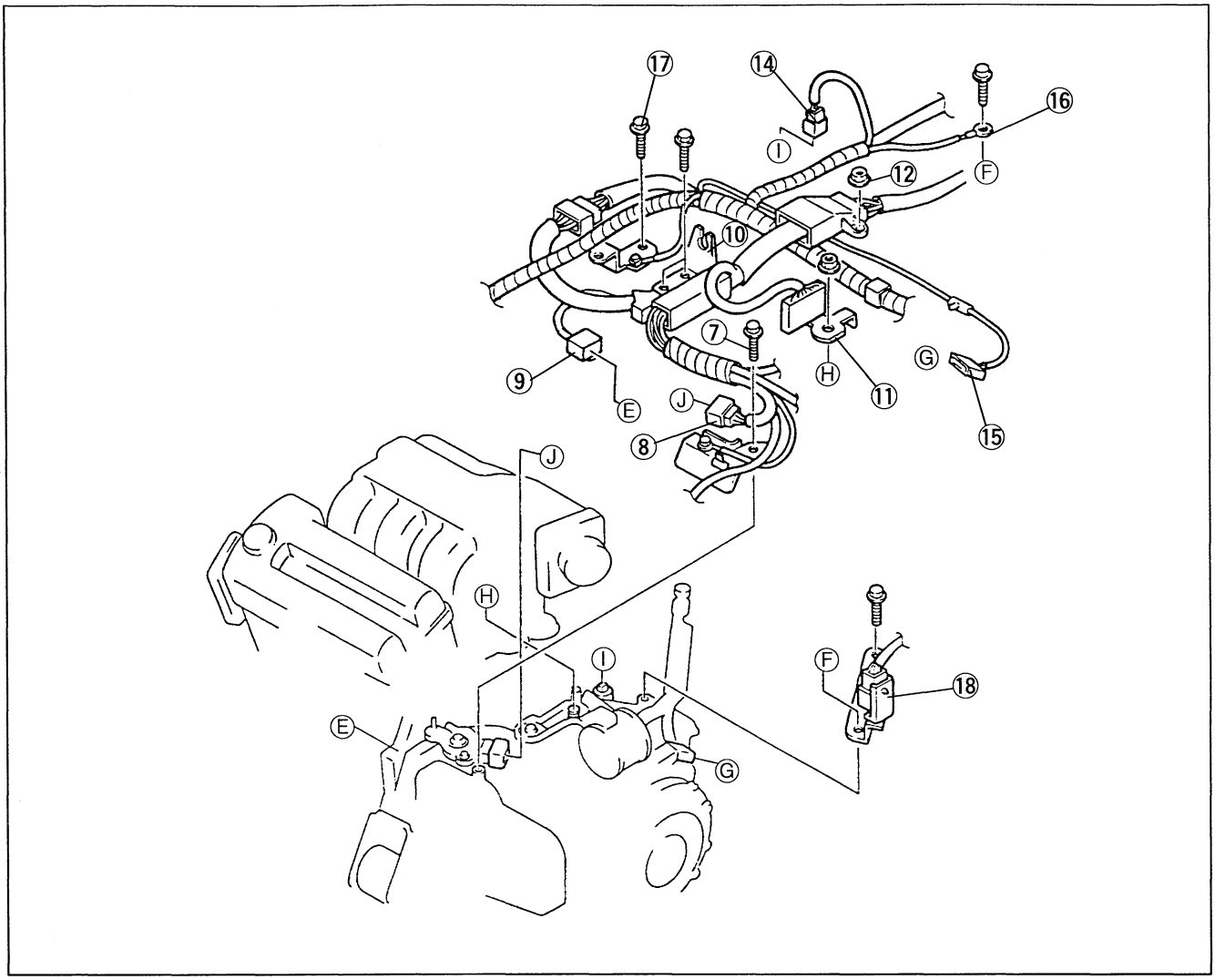
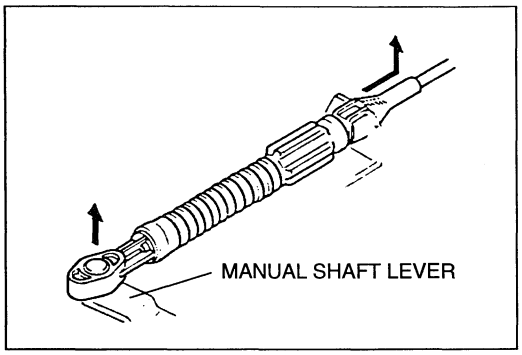
23
38
B
20
REPLACE
37
32
SST

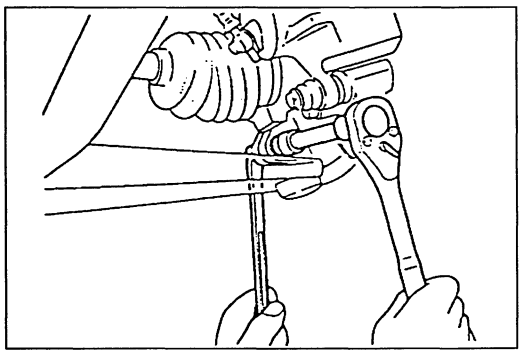


1. Battery
2. Battery carrier
3. Fresh-air duct
4. Air cleaner assembly
5. Clip
6. Selector cable
   Removal Note ..... page K1–42
7. Bolt
8. Transaxle range switch connector
9. Solenoid valve connector
10. Harness bracket
11. Ground
12. Nut
13. Fuel filter mounting bolts
14. Vehicle speedometer sensor connector
15. Input/turbine speed sensor connector
16. Ground
17. Bolt
18. Engine mount stay
19. Starter
20. Oil hose
21. Wheel and tire
22. Splash shield
23. Transverse member
24. Exhaust pipe
25. Lower arm
    Removal Note ..... page K1–42
26. Tie-rod end
    Removal Note ..... page K1–42
27. Stabilizer control link
28. Drive shaft
    Removal Note ..... page K1–42
29. Joint shaft
30. No.5 engine mount rubber
31. No.1 engine mount bolts
32. Engine mounting member
    Removal Note ..... page K1–43
33. Drive shaft
    Removal Note ..... page K1–42
34. Undercover
35. Torque converter nuts
    Removal Note ..... page K1–43
36. No.4 engine mount
37. Transaxle
    Removal Note ..... page K1–44
38. No.2 engine mount



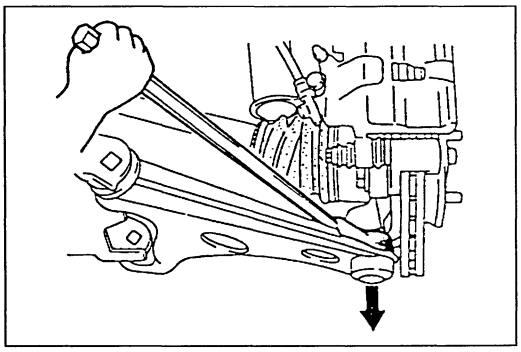
Removal note
Selector cable

1. Disconnect the selector cable from the manual shaft lever.
2. Pull out the selector cable from the cable bracket and remove it.

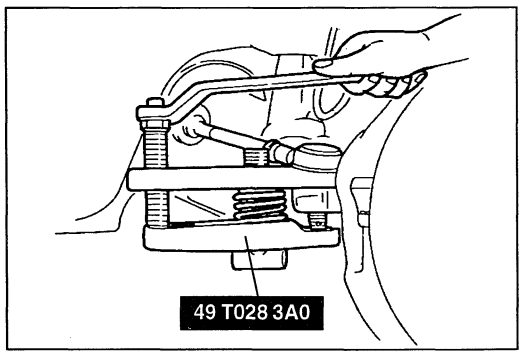


Lower arm

1. Remove the clinch bolt from the lower arm ball joint.



2. Wrap a rag around the ball joint dust boot.
3. Pry the lower arm out of the knuckle.

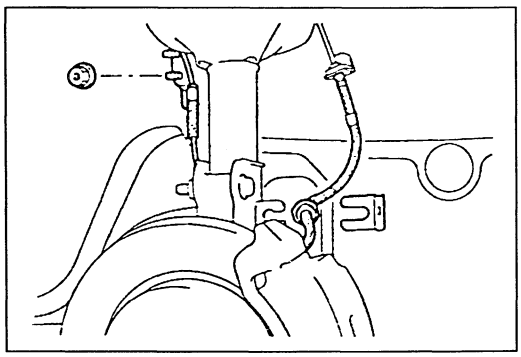


Tie-rod end

Caution

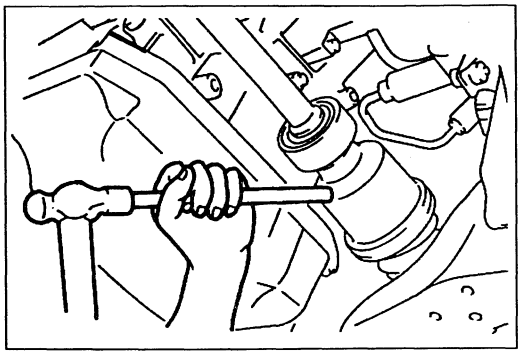
- **The sharp edges of the SST can slice the tie-rod end dust boot. Install the SST so that the sharp edges are between the dust boot and the knuckle.**

1. Remove the cotter pin and nut.
2. Disconnect the tie-rod end from the knuckle by using the **SST**.

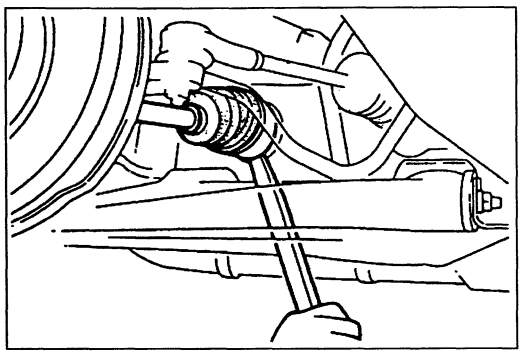


Drive shaft

1. Remove the clip.
2. Remove the ABS wheel-speed sensor harness mounting nuts.

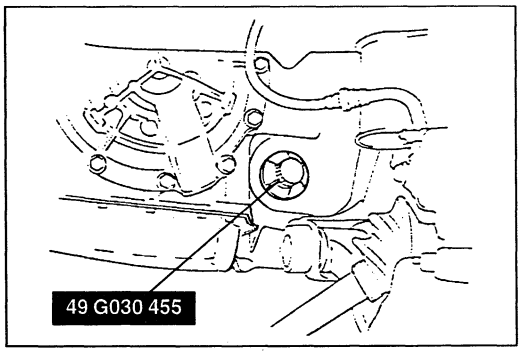


3. Separate the drive shaft (right side) from the joint shaft by using a brass bar and a hammer.

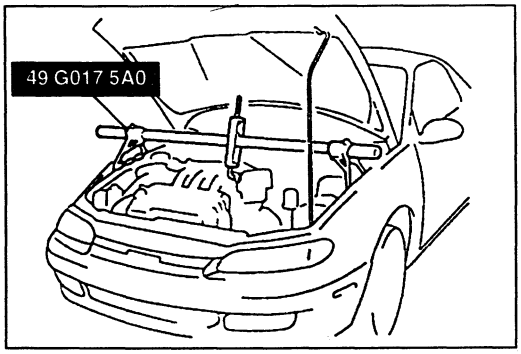


Caution
- **The sharp edges of the drive shaft snap ring can slice or puncture the oil seal. Be careful when removing the drive shaft from the transaxle.**

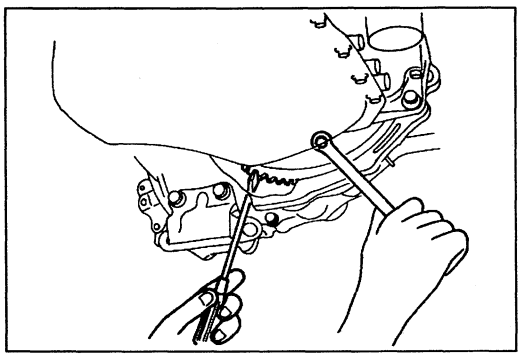
4. Separate the left-side drive shaft from the transaxle by prying with a bar inserted between the outer ring and the transaxle, as shown in the figure.
5. Suspend the drive shaft with a rope.



6. Install the **SST** into the transaxle to hold the side gear.

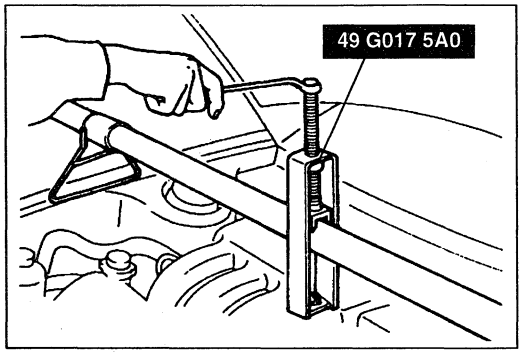


Engine mounting member
1. Support the engine by using the **SST** before removing the engine mounting member.
2. Remove the engine mounting member.



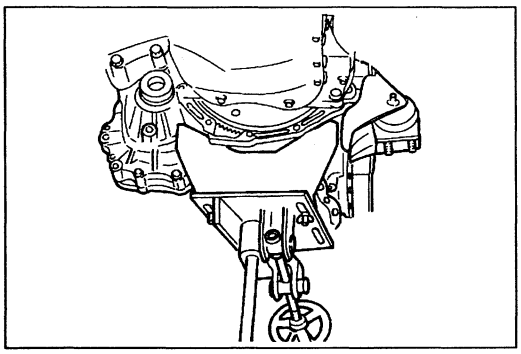
Torque converter nuts

Hold the drive plate and remove the torque converter nuts.



Transaxle

1. Loosen the **SST** (engine support) and lean the engine toward the transaxle.

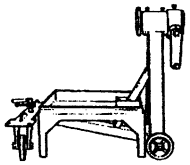
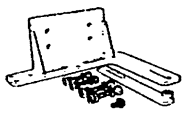
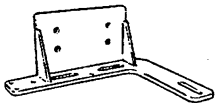
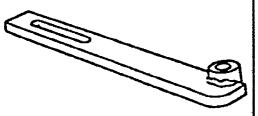
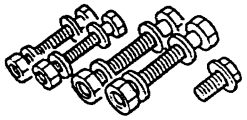
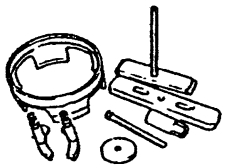
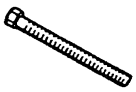
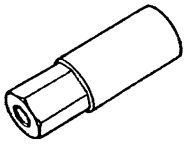
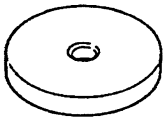
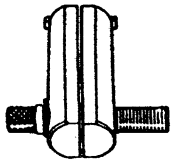


2. Support the transaxle on a jack.
3. Remove the transaxle mounting bolts.
4. Remove the transaxle.

TRANSAXLE UNIT (DISASSEMBLY)

Preparation

SST

49 0107 680A Engine stand 	For disassembly of transaxle	49 G019 0A0 Hanger, transaxle 	For disassembly of transaxle
49 G019 001 Body (Part of 49 G019 0A0) 	For disassembly of transaxle	49 G019 002 Stay (Part of 49 G019 0A0) 	For disassembly of transaxle
49 G019 003 Bolt set (Part of 49 G019 0A0) 	For disassembly of transaxle	49 G019 0A7A Compressor set, return spring 	For disassembly of low and reverse brake piston
49 G019 028 Bolt (Part of 49 G019 0A7A) 	For disassembly of low and reverse brake piston	49 G019 029 Nut (Part of 49 G019 0A7A) 	For disassembly of low and reverse brake piston
49 G019 030 Plate (Part of 49 G019 0A7A) 	For disassembly of servo	49 FT01 361 Remover, bearing 	For removal of bearing race

Disassembly

Precaution

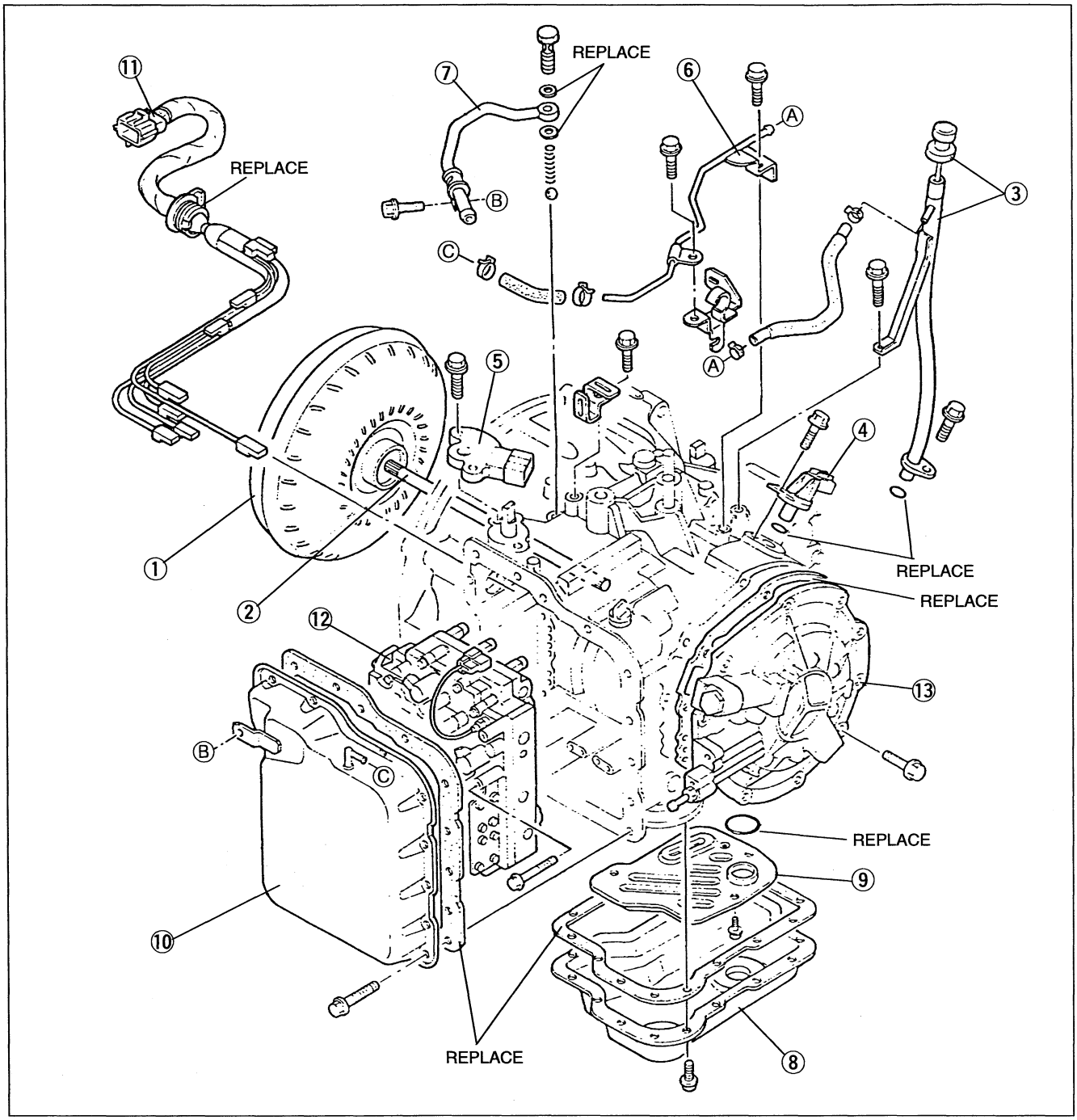
General notes:

1. Disassemble the transaxle in a clean area (dustproof work space) to prevent entry of dust into the mechanisms.
2. Inspect the individual transaxle components in accordance with the QUICK DIAGNOSIS CHART during disassembly. (Refer to page K1–196.)
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 look alike; arrange them so that they do not get mixed up.
6. Disassemble the control valve assembly and thoroughly clean it when a clutch or brake band is burnt or when the ATF has deteriorated.

Cleaning notes:

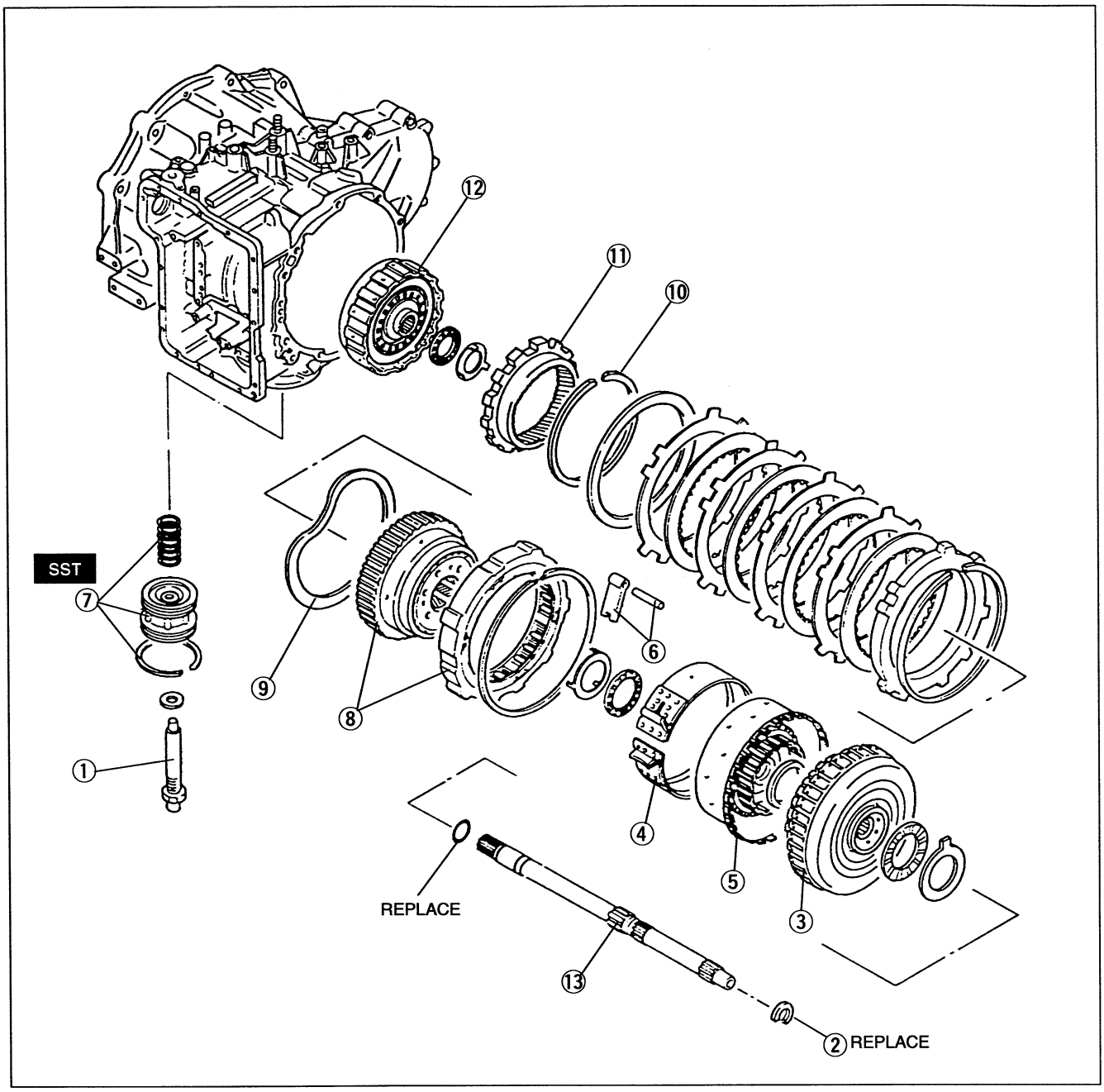
1. Clean the transaxle exterior thoroughly with a steam cleaner or cleaning solvents before disassembly.
2. Clean the removed parts with cleaning solvent, and dry with compressed air. Clean out all holes and passages with compressed air, and verify that there are no obstructions.
3. Wear eye protection when using compressed air to clean components.

Components



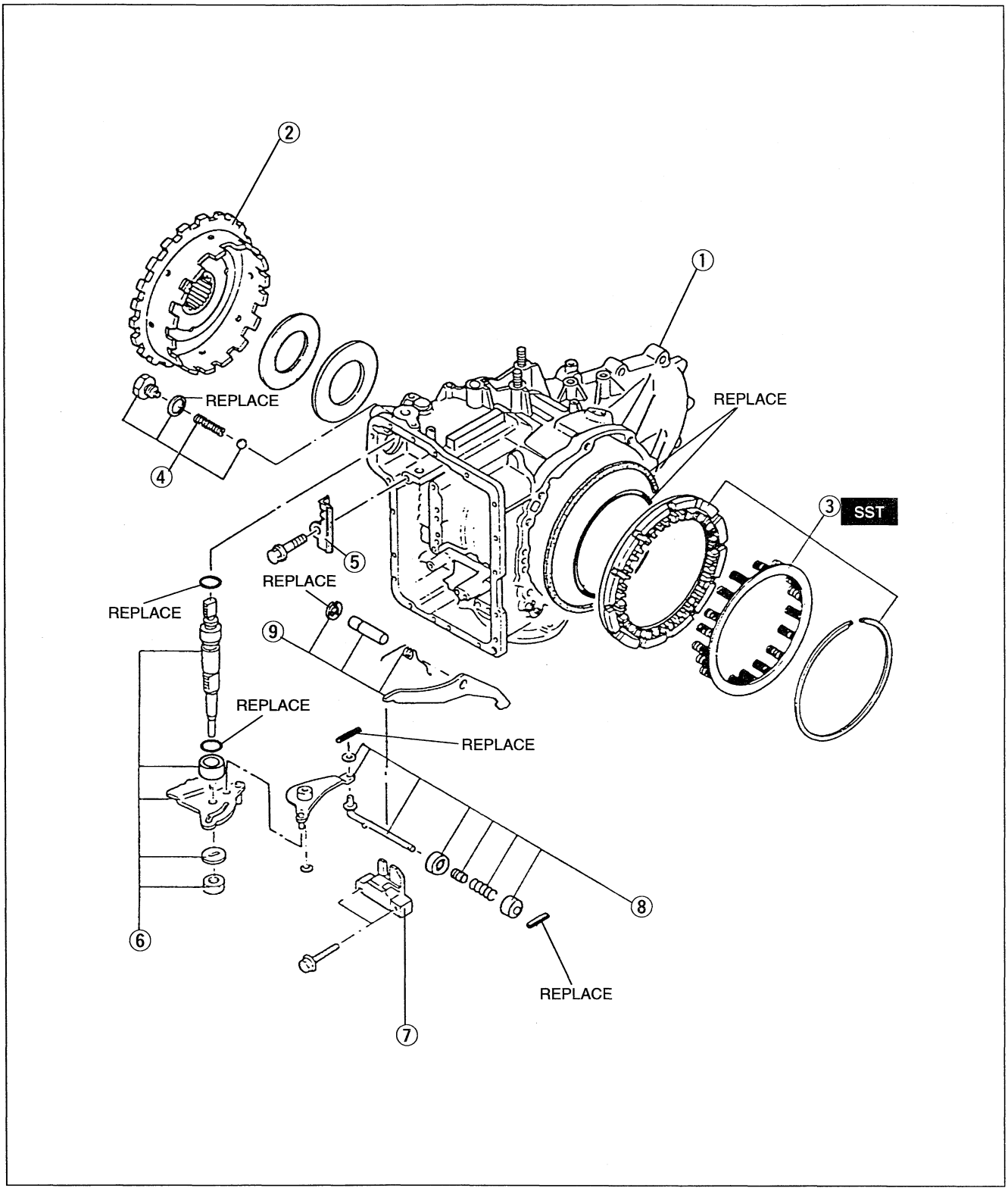
1. Torque converter
   Inspection ..... page K1–58
2. Oil pump shaft
3. ATF dipstick and oil filler tube
4. Input/turbine speed sensor
   Inspection ..... page K1–33
5. Transaxle range switch
   Inspection ..... page K1–30
   Adjustment ..... page K1–32
6. Breather hose
7. Oil pipe
8. Oil pan
9. Oil strainer
10. Control valve body cover
11. Coupler assembly
12. Control valve body
    Disassembly / Inspection .... page K1– 97
    Assembly ..... page K1–115
    On-vehicle
    removal / installation ..... page K1–125
13. Oil pump
    Disassembly / Inspection /
    Assembly ..... page K1– 61

Components (Cont'd)



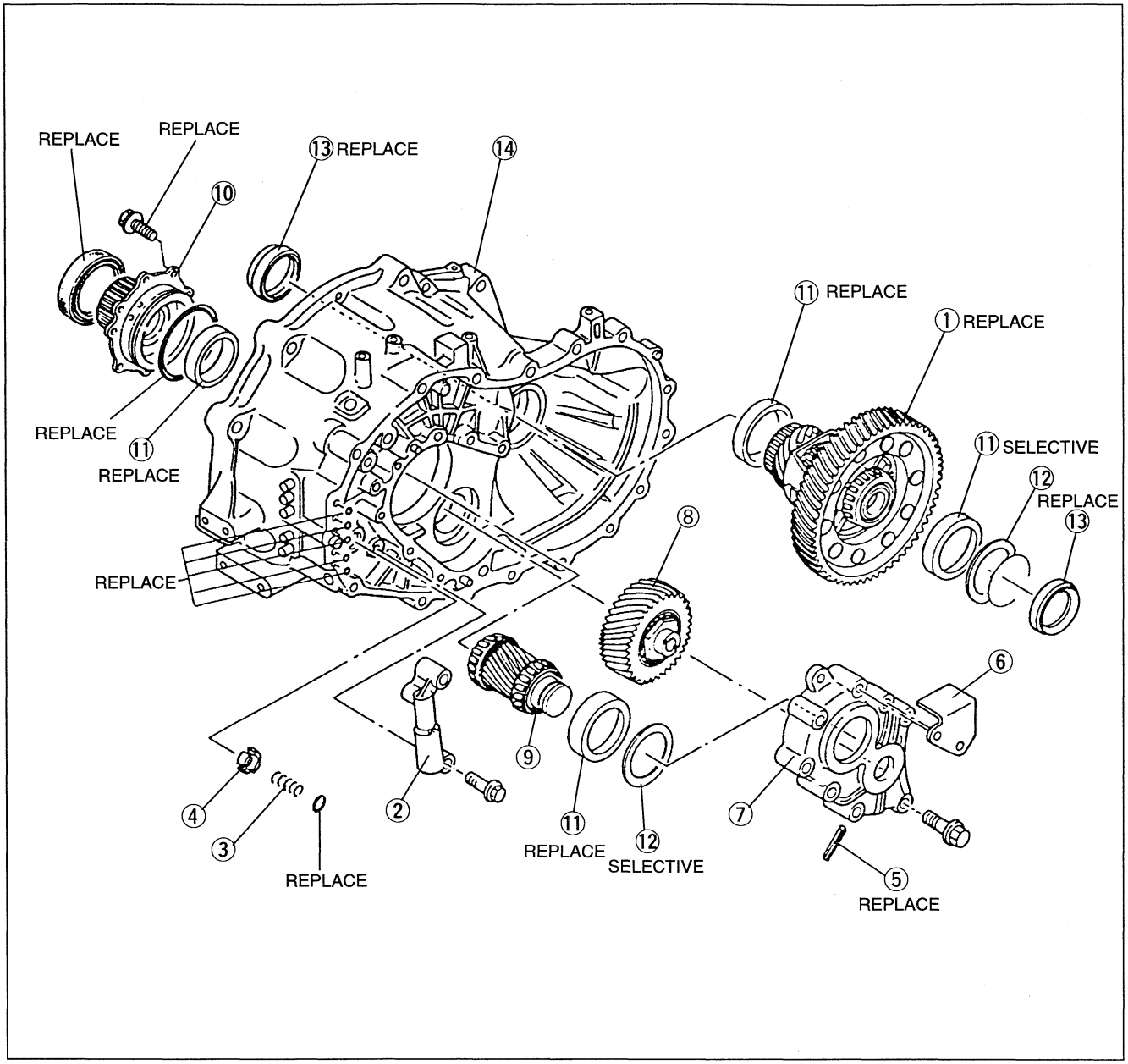
1. Piston stem
2. Snap ring
3. Clutch assembly
   Preinspection . . . . . page K1–65
   Disassembly / Inspection / Assembly . . . . . page K1–66
4. 2–4 brake band
   Disassembly / Inspection / Assembly . . . . . page K1–88
5. Small sun gear and one-way clutch 1
   Preinspection . . . . . page K1–74
   Disassembly / Inspection / Assembly . . . . . page K1–74
6. Anchor strut and shaft
7. Band servo
8. One-way clutch 2 and carrier hub assembly
   Preinspection . . . . . page K1–77
   Disassembly / Inspection / Assembly . . . . . page K1–77
9. Friction plate
10. Snap ring
11. Internal gear
12. 3–4 clutch
    Preinspection . . . . . page K1–79
    Disassembly / Inspection / Assembly . . . . . page K1–80
13. Turbine shaft

Components (Cont'd)

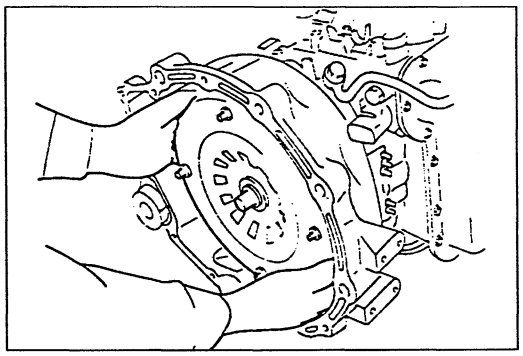


1. Transaxle case
2. Output shell
3. Low and reverse brake
   Preinspection . . . . . page K1–83
   Disassembly / Inspection / Assembly . . . . . page K1–84
4. Plug, packing, spring, and detent ball
5. Bracket
6. Manual shaft and manual plate
7. Actuator support
8. Parking assist lever
9. Parking pawl

Components (Cont'd)



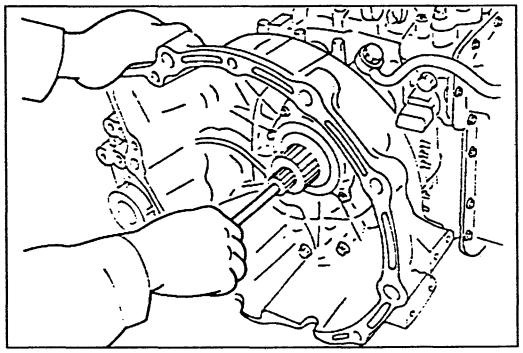
1. Differential
   - Preinspection . . . . . page K1–127
   - Disassembly / Inspection / Assembly . . . . . page K1–128
2. 2–3 accumulator
   - Disassembly / Inspection / Assembly . . . . . page K1– 59
3. Orifice check valve spring
   - Inspection . . . . . page K1– 59
4. Orifice check valve
5. Roll pin
6. Baffle plate
7. Bearing housing
8. Idler gear
   - Disassembly / Inspection / Assembly . . . . . page K1– 90
9. Output gear
   - Disassembly / Inspection / Assembly . . . . . page K1– 93
10. Bearing cover assembly
    - Disassembly / Inspection / Assembly . . . . . page K1– 95
11. Bearing race
12. Adjustment shim (bearing preload)
    - Adjustment . . . . . page K1–131
13. Oil seal
    - On-vehicle replacement . . . . . page K1– 96
14. Converter housing



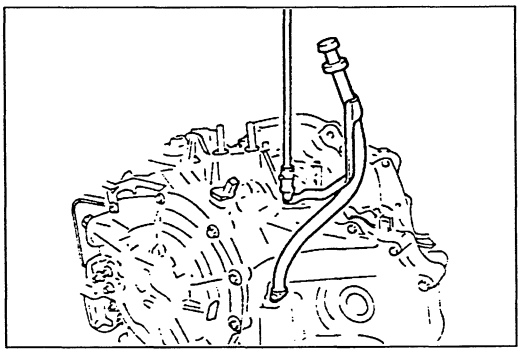
Disassembly procedure

Note

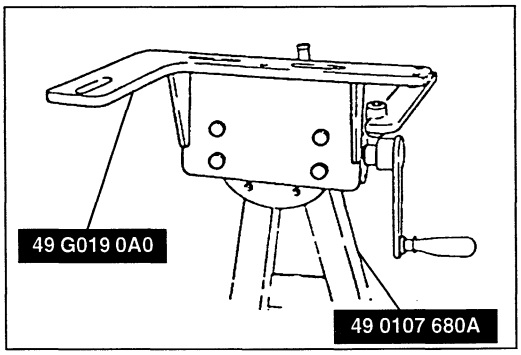
- The oil pan could contain small chips, shavings, and other particles helpful in checking the condition of the transaxle and diagnosing certain problems. To ensure that all foreign particles stay in the oil pan, make sure that the transaxle is never tipped completely over while the oil pan is still installed.
- Remove the torque converter, and immediately turn it so that the hole faces upward.This will help to keep any remaining fluid from spilling.



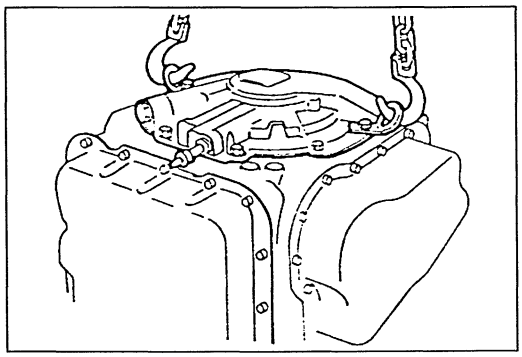
1. Remove the torque converter from the converter housing.
2. Pull out the oil pump shaft by hand.



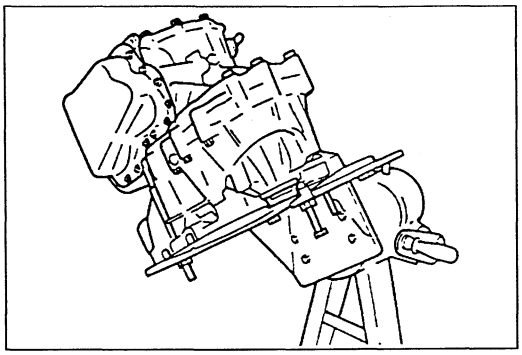
3. Remove the ATF dipstick and oil filler tube.
4. Remove the O-ring from the oil filler tube.
5. Remove the breather hose.



6. Assemble the **SST**.

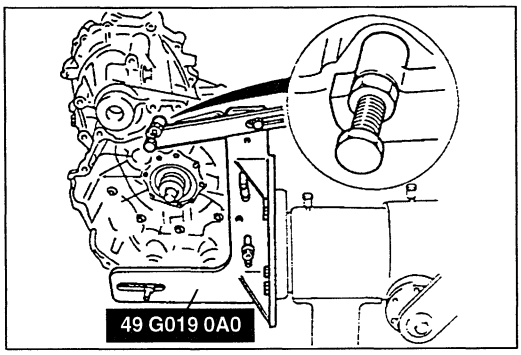


7. Attach suitable hangers to the oil pump as shown.

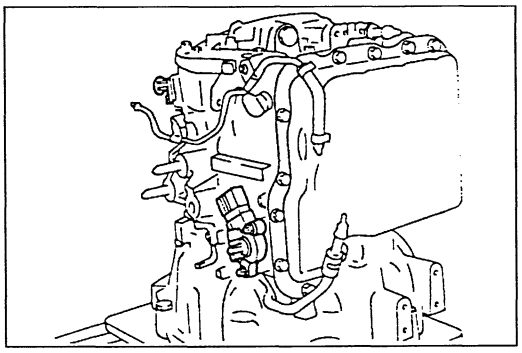


Warning

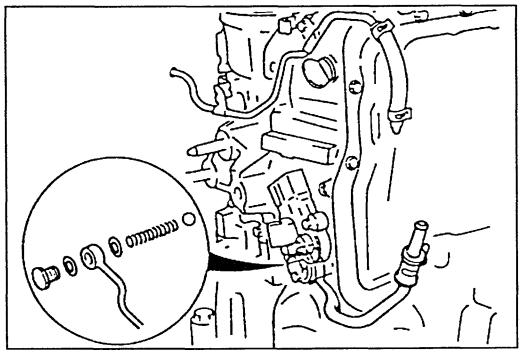
- **Although the stand has a self-locking brake system, there is a possibility that the brake may not hold when the transaxle is held in a lopsided position on the stand. This would cause the transmission to turn suddenly, causing serious injury. Never keep the transaxle tilted to one side. Always hold the rotating handle firmly when turning the transaxle.**



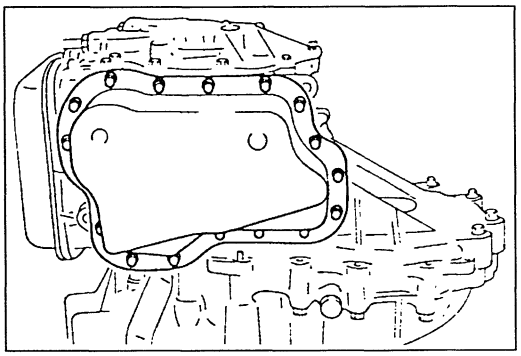
8. Lift the transaxle and mount it on the **SST**.



9. Remove the input/turbine speed sensor, and transaxle range switch.
10. Remove the O-ring from the input/turbine speed sensor.



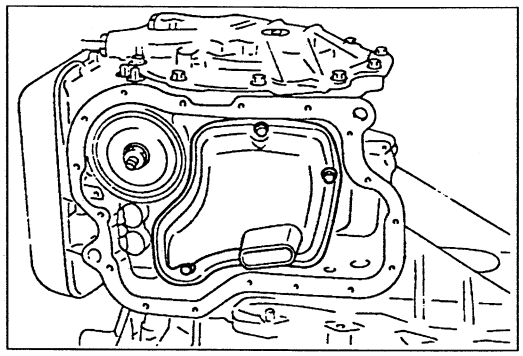
11. Remove the connector bolt.
12. Remove the packings, oil pipe, spring, and steel ball.



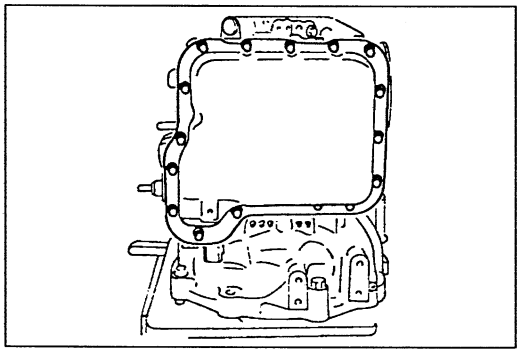
13. Remove the oil pan and gasket.
    Examine any material found in the pan or on the magnet to determine the condition of the transaxle.

Clutch facing material	Drive plate and brake band wear
Steel (magnetic)	Bearing, gear, and driven plate wear
Aluminum (nonmagnetic) ..	Bushing of cast aluminum part wear

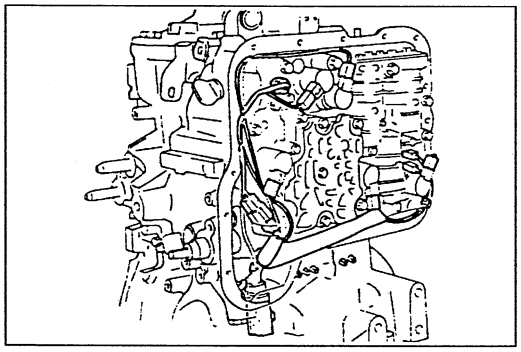
    If large amounts of material are found, replace the torque converter and carefully check the transaxle for the cause.



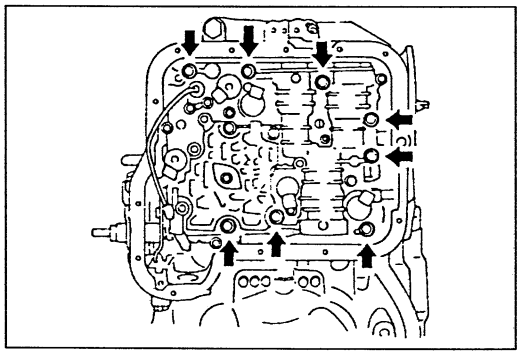
14. Remove the oil strainer and O-ring.



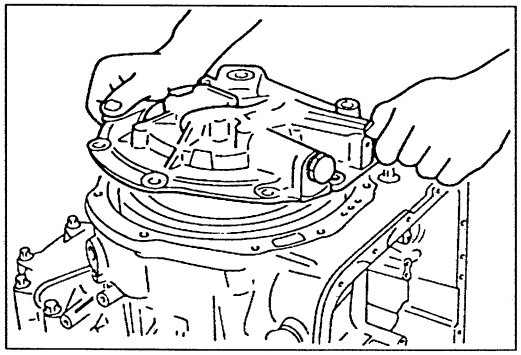
15. Remove the control valve body cover and gasket.



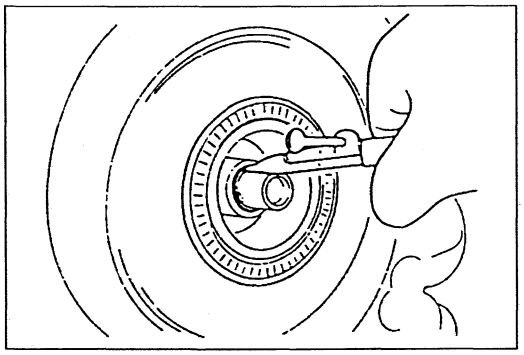
16. Disconnect the solenoid connectors and transaxle fluid temperature sensor connector.
17. Remove the coupler assembly.
18. Remove the O-ring from the coupler assembly.



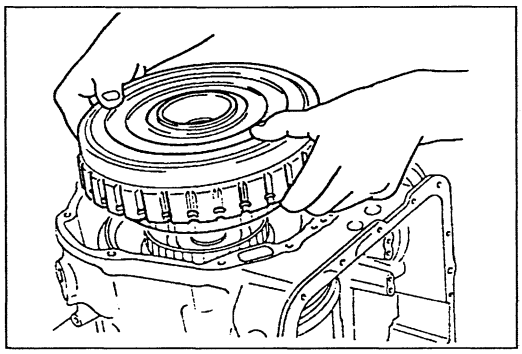
19. Loosen the indicated bolts evenly and gradually.
20. Remove the control valve body as an assembly.



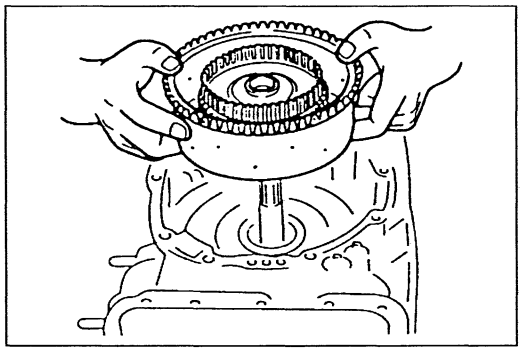
21. Remove the oil pump and gasket.



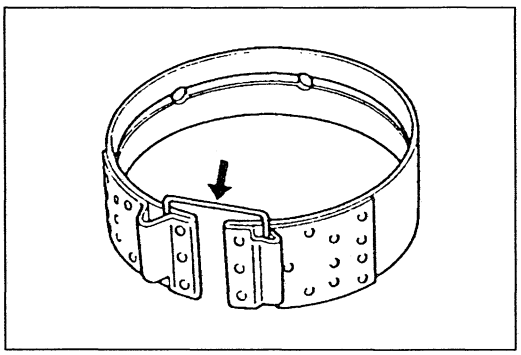
22. Remove the clutch assembly.
    (1) Remove the turbine shaft snap ring.



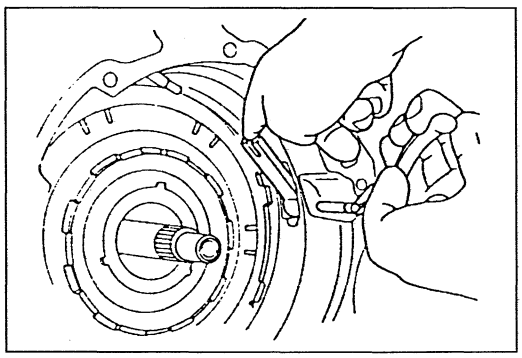
    (2) Pull the reverse and forward drum and remove the clutch assembly.



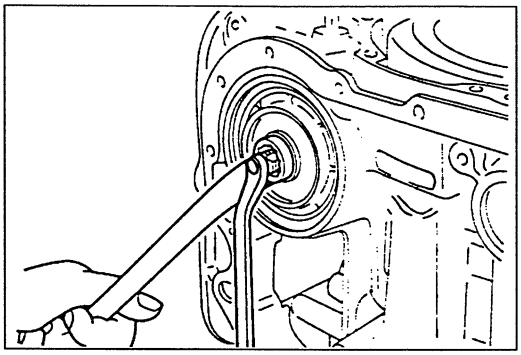
23. Remove the small sun gear and one-way clutch 1.



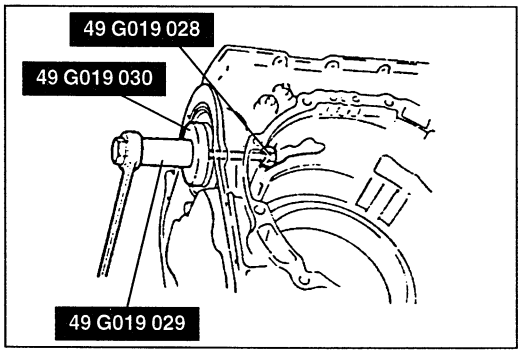
24. Remove the 2–4 brake band, and hold it together with a piece of wire as shown the figure.



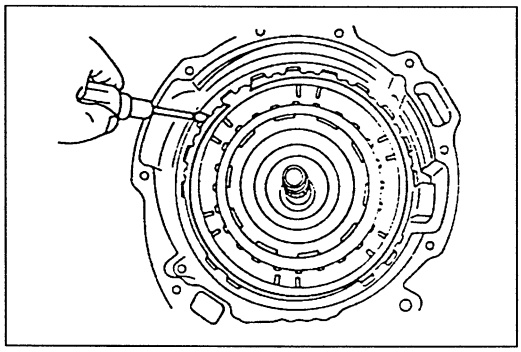
25. Pull the anchor shaft while holding the anchor strut, then remove the strut.



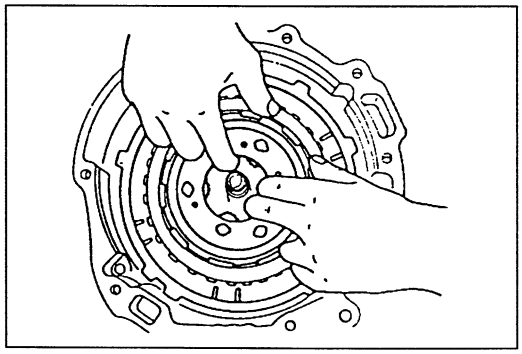
26. Remove the piston stem from the band servo.



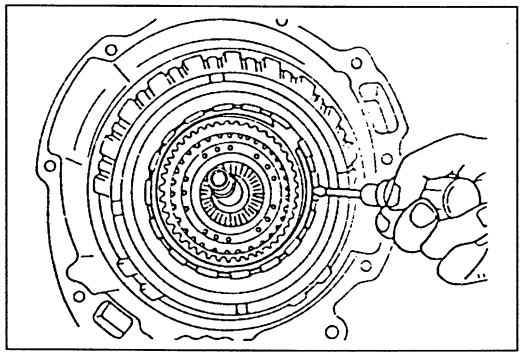
27. Remove the band servo.
    (1) Remove the snap ring by using the **SST**.
    (2) Remove the band servo and spring.



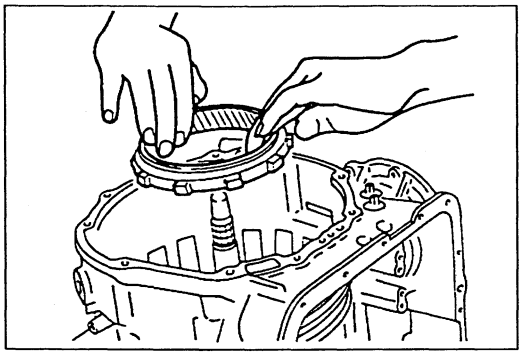
28. Remove the one-way clutch 2 and carrier hub assembly.
    (1) Remove the snap ring.



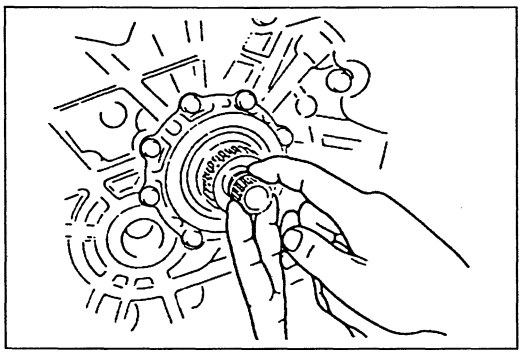
    (2) Remove the one-way clutch 2 together with the carrier hub assembly.
    (3) Remove the friction plate.



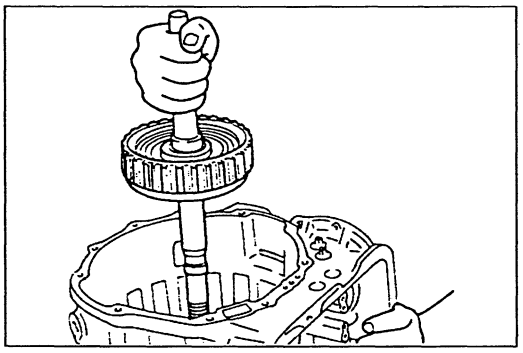
29. Remove the internal gear.
    (1) Remove the snap ring.



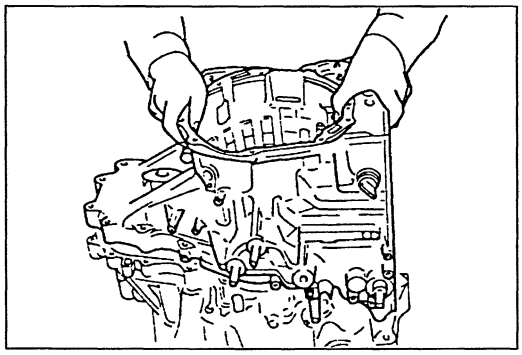
(2) Remove the internal gear from the output shell.



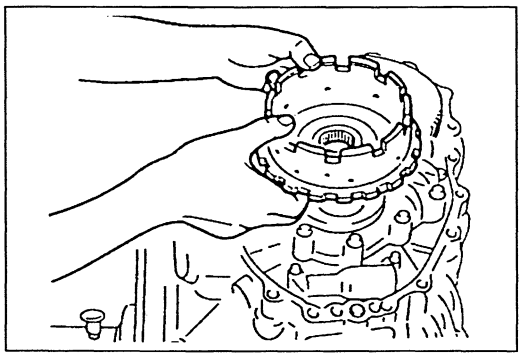
30. Remove the 3–4 clutch assembly.
    (1) Remove the O-ring from the turbine shaft at the converter housing side.



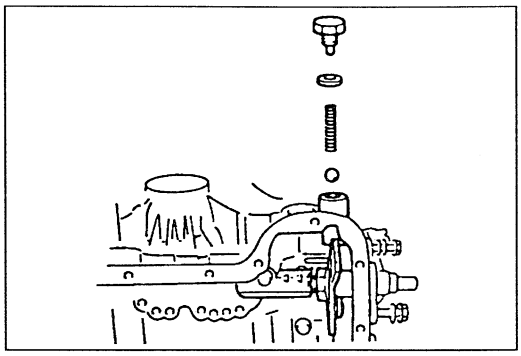
(2) Pull out the turbine shaft to remove the 3–4 clutch assembly.
(3) Remove the 3–4 clutch assembly.



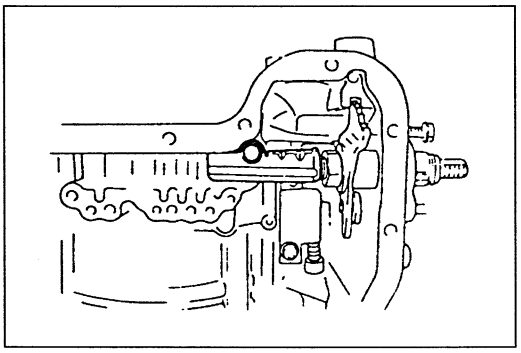
31. Remove the bolts, and remove the transaxle case by tapping lightly with a plastic hammer.



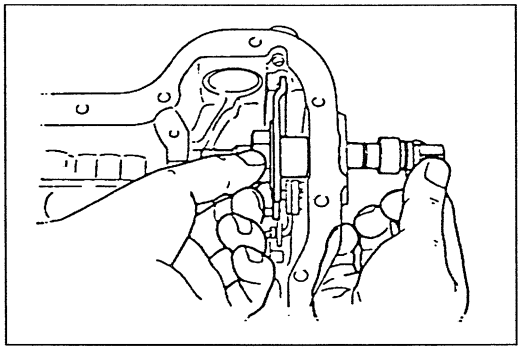
32. Remove the output shell from the output gear.



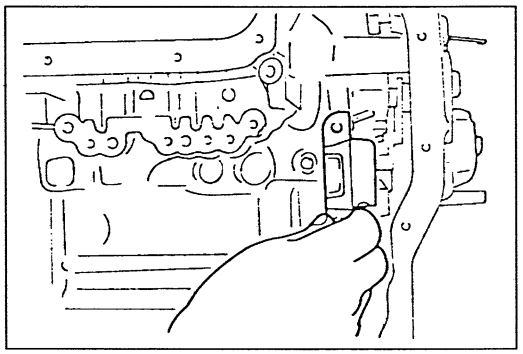
33. Remove the manual shaft and manual plate.
    (1) Remove the plug, packing, spring, and detent ball.



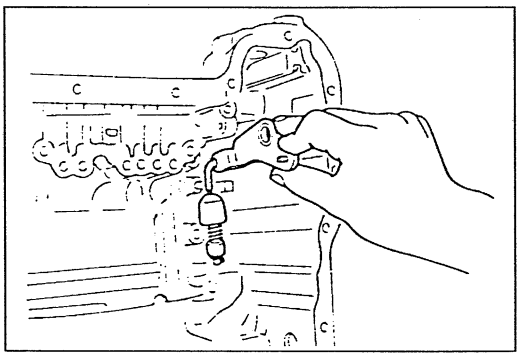
(2) Remove the bracket.



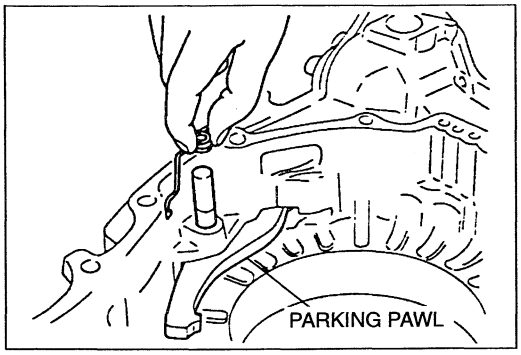
(3) Loosen the nut and pull out the manual shaft.
(4) Remove the nut, washer, spacer, and manual plate.



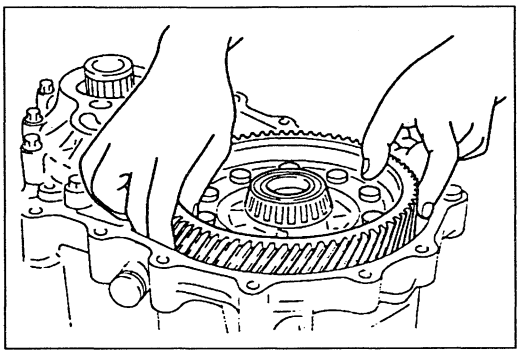
34. Remove the actuator support.



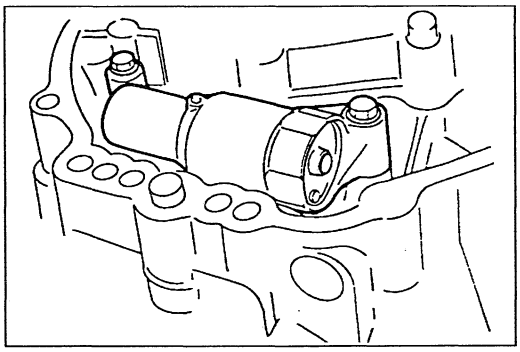
35. Remove the snap ring and remove the parking assist lever.



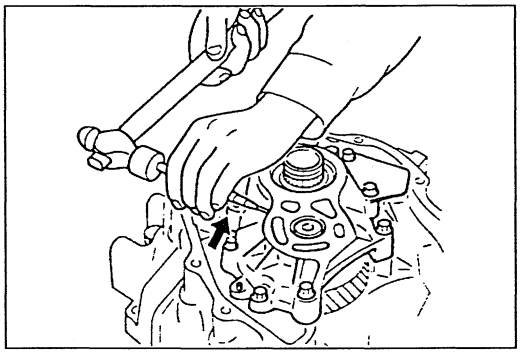
36. Remove the parking pawl.
    (1) Remove the snap ring.
    (2) Pull the parking shaft, and remove the spring and parking pawl.



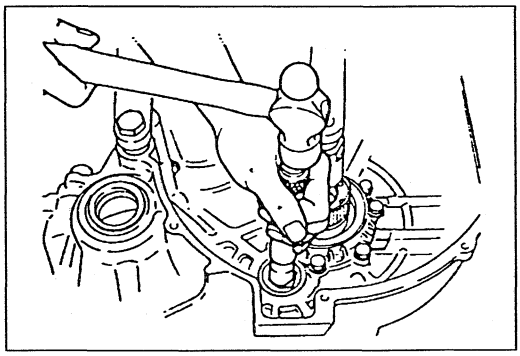
37. Remove the differential assembly.



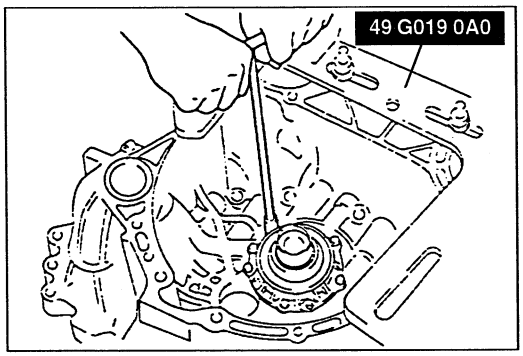
38. Remove the 2–3 accumulator.
39. Remove the orifice check valve spring and orifice check valve.



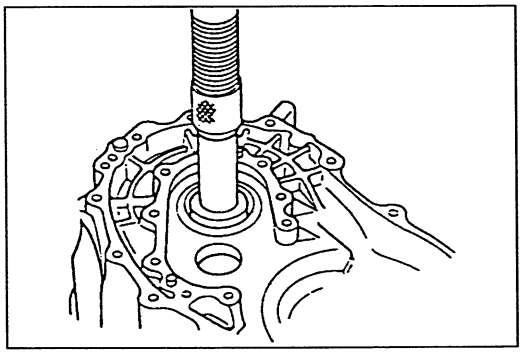
40. Remove the bearing housing.
    (1) Remove the bolt indicated in the figure for access to the roll pin.
    (2) Remove the roll pin by using a pin punch.
    (3) Remove the baffle plate.
    (4) Remove the bearing housing by tapping lightly with a plastic hammer.



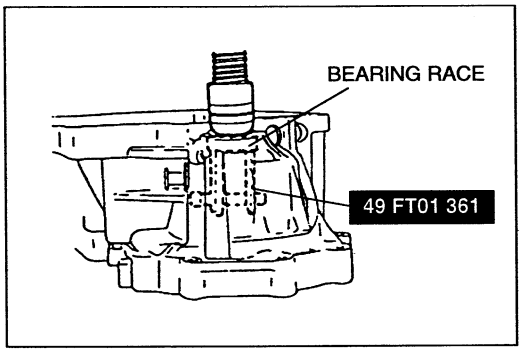
41. Remove the idler gear and output gear by tapping out from the torque converter side.
    Support the idler gear and output gear with one hand to keep them from falling.



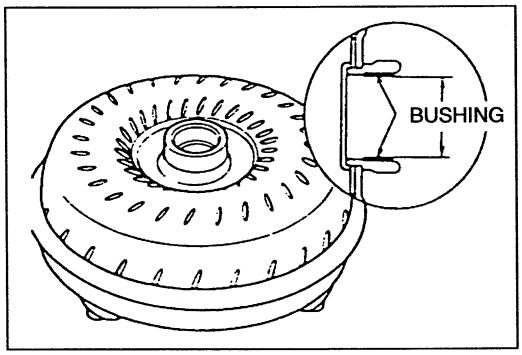
42. Remove the bearing cover assembly.
    (1) Remove the converter housing from the **SST** (transaxle hanger).
    (2) Remove the bearing cover bolts.

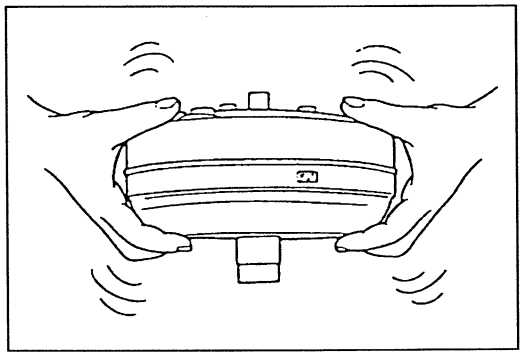


(3) Press the bearing cover assembly out of the converter housing by using a pipe **(approx. 80 mm {3.1 in} dia)**.
Support the bearing cover with one hand to keep them from folling.



43. Press out the bearing races by using the **SST**.





TORQUE CONVERTER

The torque converter is welded together and cannot be disassembled.

Inspection

1. Check the outer part of the converter for damage or cracks, and replace if necessary.
2. Check whether there is any rust on the pilot hub of the converter or on the boss. If there is any, remove it completely.
3. Measure the bushing of the converter boss. Replace the converter assembly if the bushing is excessively worn.

Bushing inner diameter
Standard: 53.030 mm {2.0878 in}
Maximum: 53.075 mm {2.0896 in}

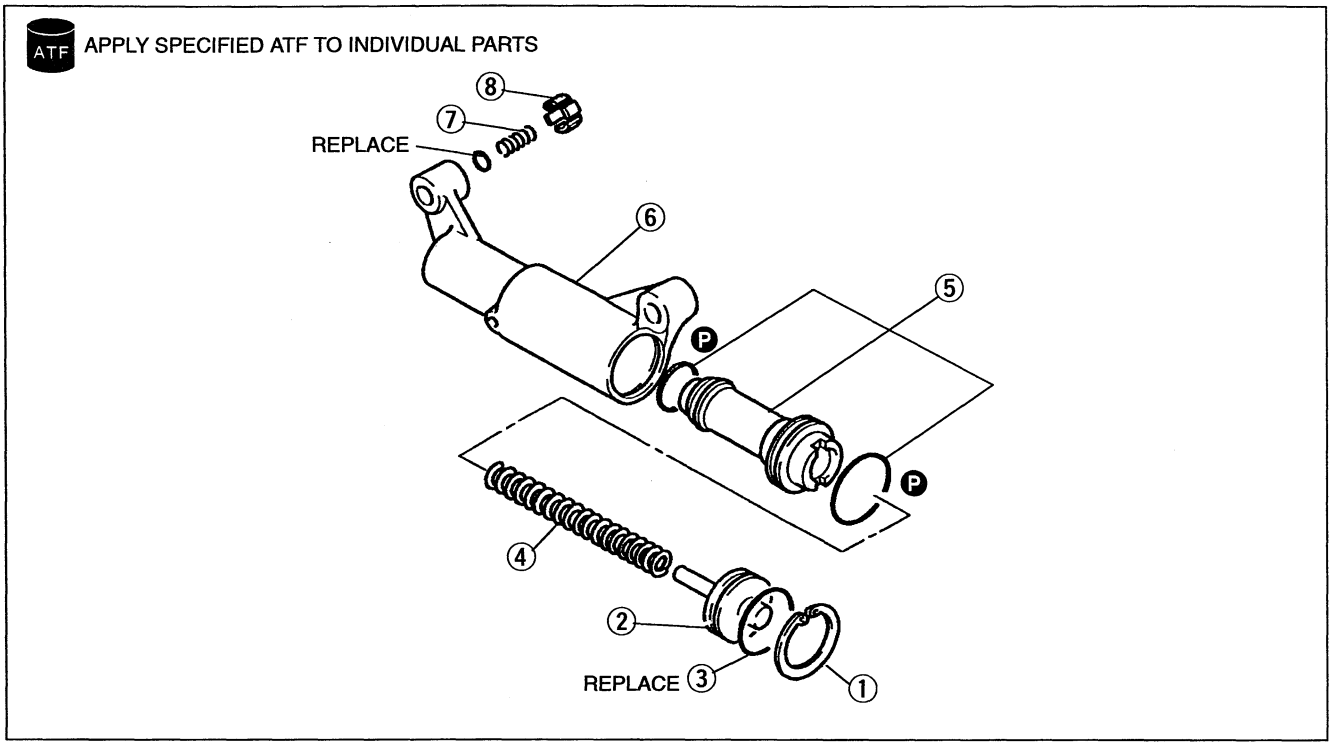
Wash Inside of Converter

1. Drain any ATF remaining in the converter.
2. Pour in ATF **(approx. 0.5 L {0.5 US qt, 0.4 Imp qt})**.
3. Shake the converter to clean the inside. Pour out the ATF.
4. Pour in ATF again.
5. Shake the converter to clean the inside. Pour out the ATF.

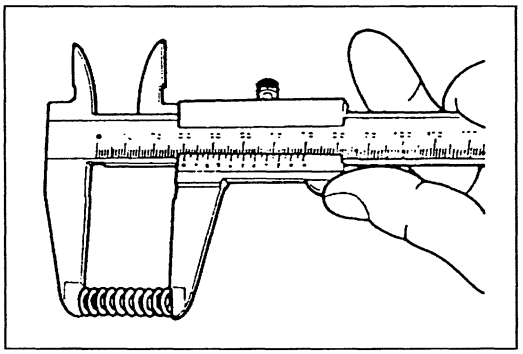
2–3 ACCUMULATOR

Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



1. Snap ring
2. Stopper plug
3. O-ring
4. 2–3 accumulator spring
   Inspection ..... below
5. 2–3 accumulator piston
6. 2–3 accumulator body
7. Orifice check valve spring
   Inspection ..... below
8. Orifice check valve



Inspection

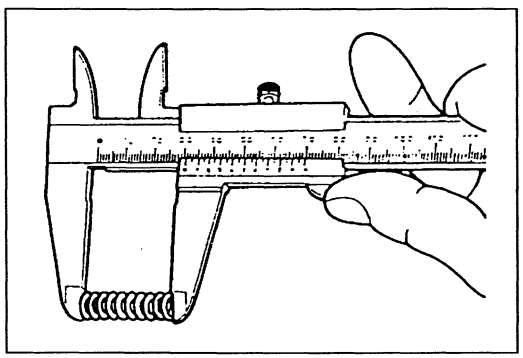
2–3 accumulator spring

1. Measure the spring free length.

Specification

Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
11.5 {0.453}	77.7 {3.059}	23.3	1.4 {0.055}

2. If not as specified, replace the 2–3 accumulator spring.



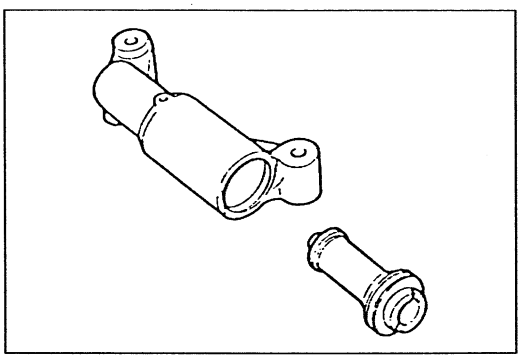
Orifice check valve spring

1. Measure the spring free length.

Specification

Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
8.0 {0.315}	13.0 {0.512}	3.5	0.4 {0.016}

2. If not as specified, replace the orifice check valve spring.

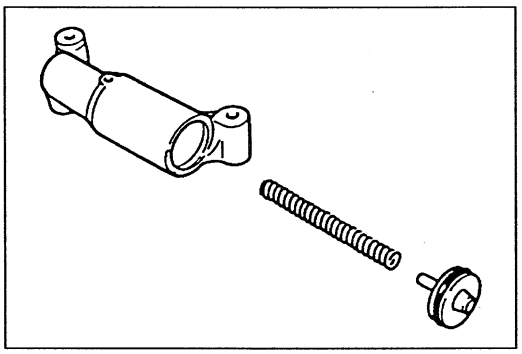


Assembly procedure

1. Apply ATF to the large and small seal rings and install them onto the accumulator piston.

   Seal ring inner diameter
   Large seal ring: 23.6 mm {0.929 in}
   Small seal ring: 14.6 mm {0.575 in}

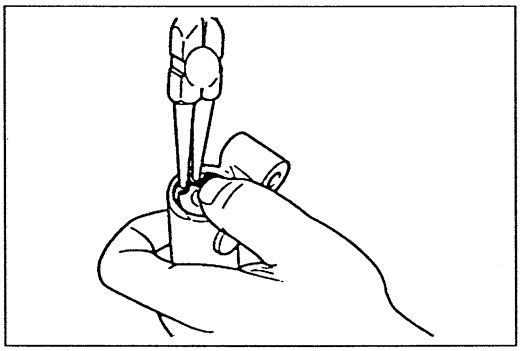
2. Install the 2–3 accumulator piston.



3. Install the spring to the piston.
4. Install the stopper plug.
   (1) Apply ATF to the O-ring and install it onto the stopper plug.

   O-ring inner diameter: 23.7 mm {0.933 in}

   (2) Install the stopper plug.

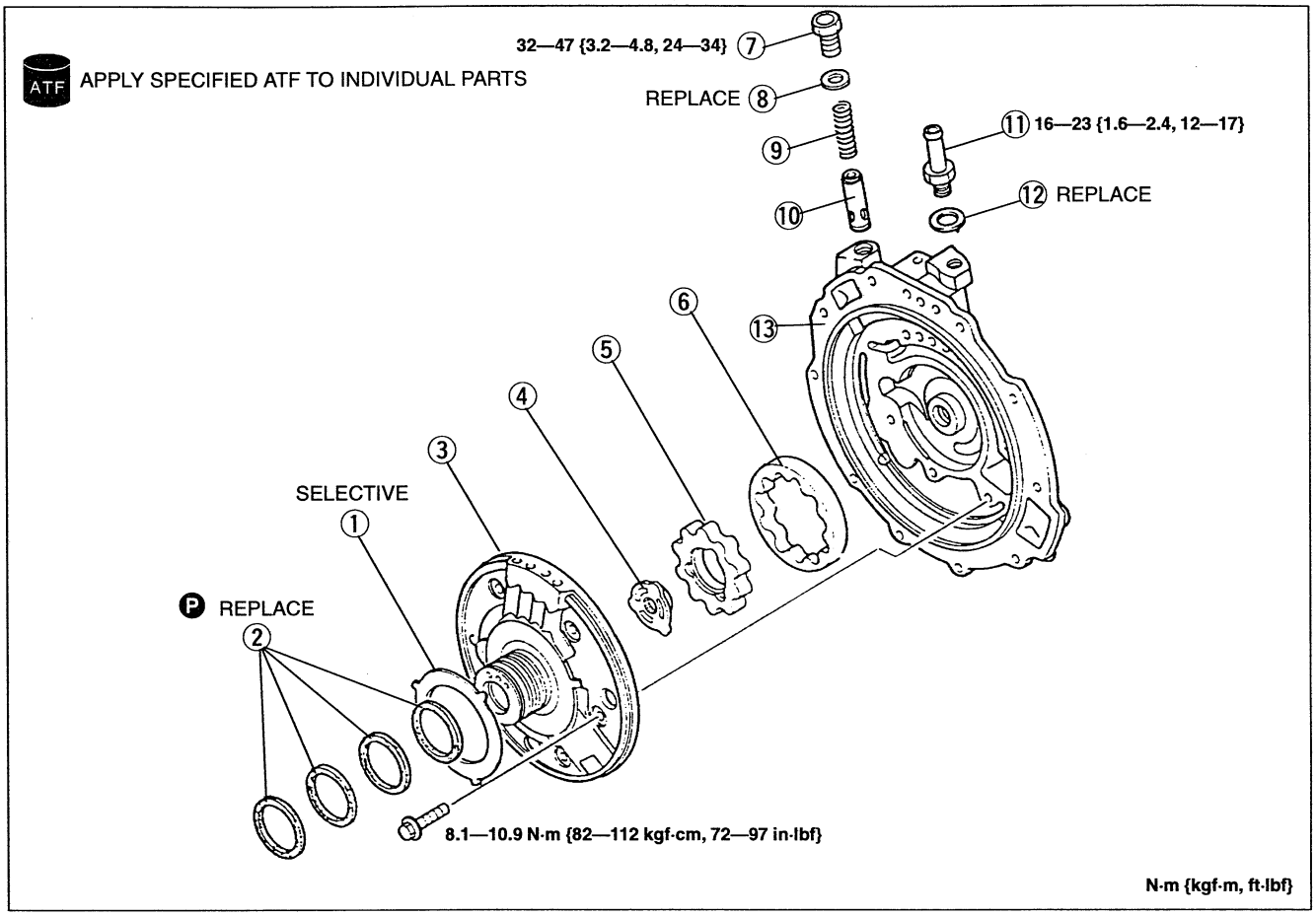


5. Install the stopper plug into the accumulator body by applying even pressure to the perimeter of the stopper plug and accumulator piston.
6. Install the snap ring while holding in the stopper plug.

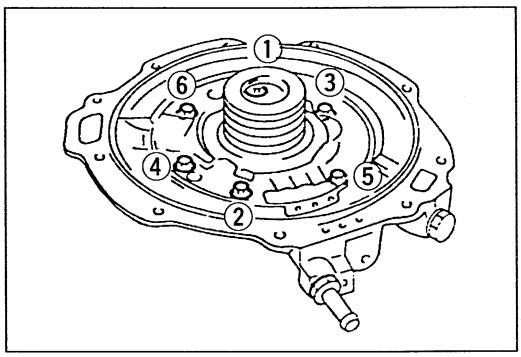
OIL PUMP

Disassembly / Inspection / 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 Procedure**.



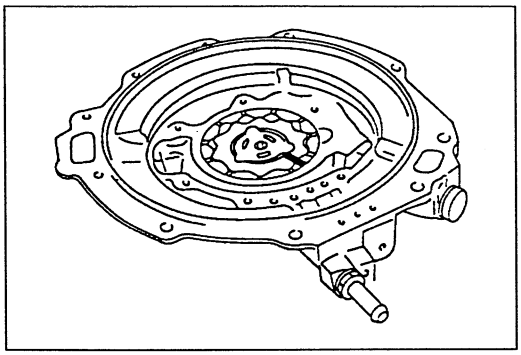
1. Bearing race
2. Seal ring
3. Oil pump cover
   Disassembly Note ..... below
4. Oil pump flange
5. Inner rotor
   Disassembly Note ..... page K1–62
   Inspection ..... page K1–62
6. Outer rotor
   Disassembly Note ..... page K1–62
   Inspection ..... page K1–62
7. Plug
8. Packing
9. Spring
   Inspection ..... page K1–62
10. Spool
    Inspection ..... page K1–62
11. Oil pipe
12. Packing
13. Oil pump housing
    Inspection ..... page K1–62



Disassembly note

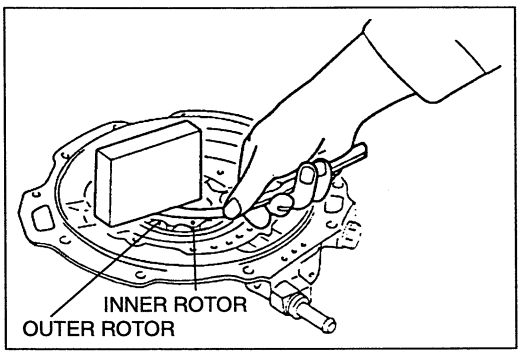
Oil pump cover

1. Loosen the mounting bolts evenly in the order shown.
2. Remove the oil pump cover from the oil pump housing.



Inner rotor, outer rotor

Mark the outer and inner rotors without scratching or denting them, and remove them from the oil pump housing.



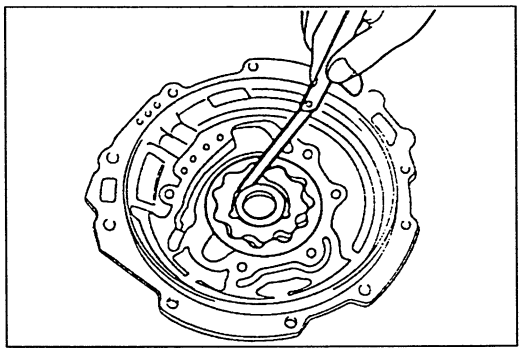
Inspection

Oil pump housing, outer rotor, inner rotor

1. Measure the clearance between the end of the oil pump housing and the outer rotor and inner rotor at four places along their circumferences.

   Clearance
   Standard: 0.02—0.04 mm {0.0008—0.0015 in}
   Maximum: 0.05 mm {0.0019 in}

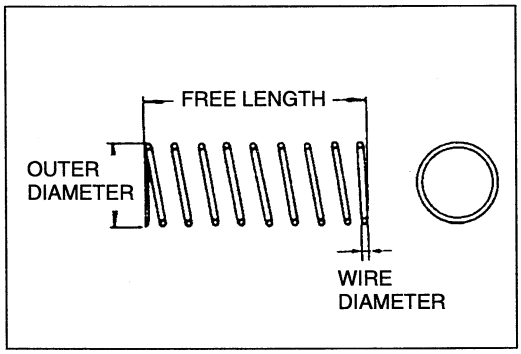
2. If not as specified, replace the pump assembly.



3. Measure the clearance between the oil pump boss and the inner rotor.

   Oil clearance
   Standard: 0.040—0.115 mm {0.0016—0.0045 in}
   Maximum: 0.125 mm {0.0049 in}

4. If not within the specification, replace the oil pump assembly.



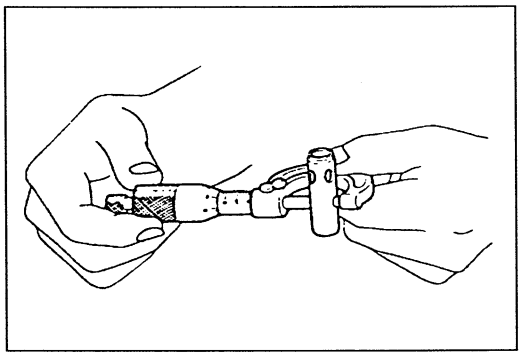
Spring

1. Measure the spring free length.

Specification

Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
13.0 {0.512}	53.0 {2.087}	12.0	1.2 {0.047}

2. If not as specified, replace the spring.

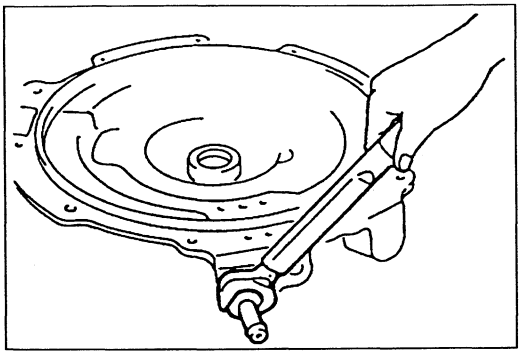


Spool

1. Measure the spool diameter.

   Outer diameter
   Standard: 13.970—13.980 mm {0.5500—0.5503 in}
   Minimum: 13.970 mm {0.5500 in}

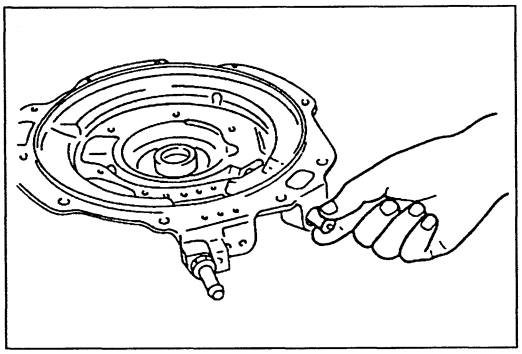
2. If not as specified, replace the oil pump assembly.



Assembly procedure

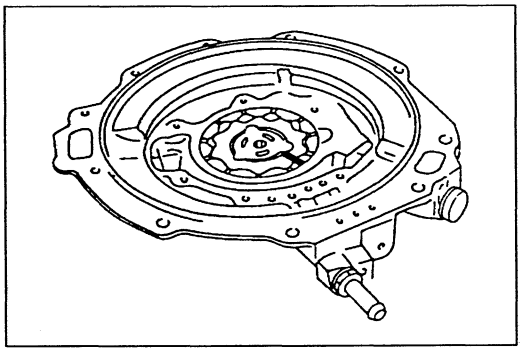
1. Install a new packing and the oil pipe.

Tightening torque:
16—23 N·m {1.6—2.4 kgf·m, 12—17 ft·lbf}

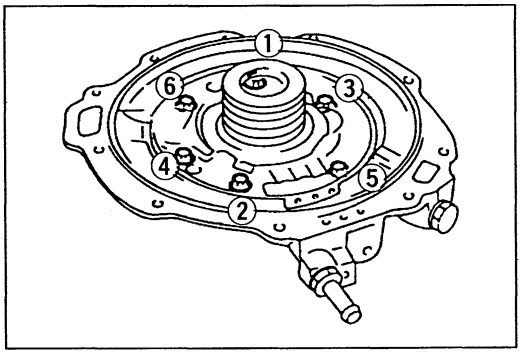


2. Apply ATF to the spool.
3. Install the spool and spring into the oil pump housing.
4. Verify that the spool moves smoothly.
5. Install a new packing and the plug.

Tightening torque:
32—47 N·m {3.2—4.8 kgf·m, 24—34 ft·lbf}

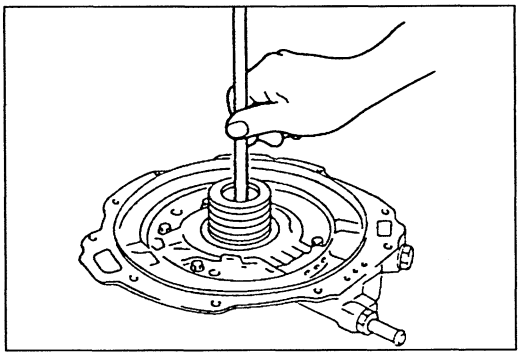


6. Apply ATF to the outer and inner rotors and oil pump flange.
7. Align the marks and install the outer and inner rotors.
8. Install the oil pump flange.

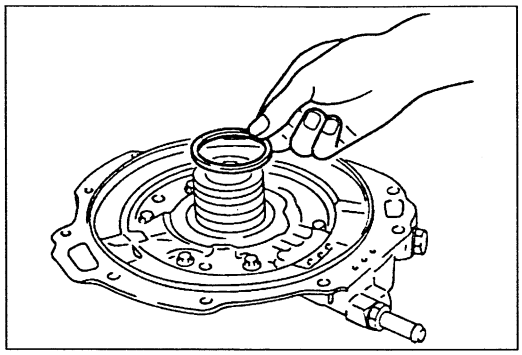


9. Mount the oil pump cover onto the oil pump housing.
10. Tighten the bolts evenly and gradually in the order shown.

Tightening torque:
8.1—10.9 N·m {82—112 kgf·cm, 72—97 in·lbf}

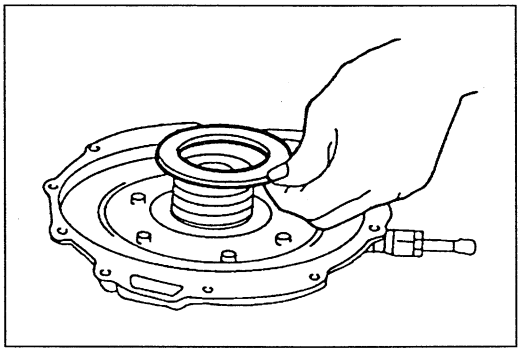


11. Install the oil pump shaft and verify smooth oil pump operation.



12. Apply petroleum jelly to the new seal rings and install them onto the oil pump cover.

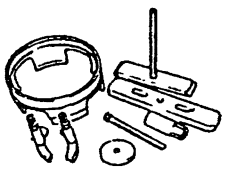
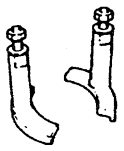
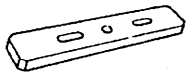
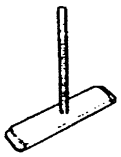
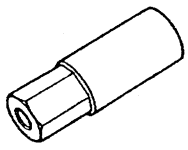
Seal ring inner diameter: 55.9 mm {2.20 in}

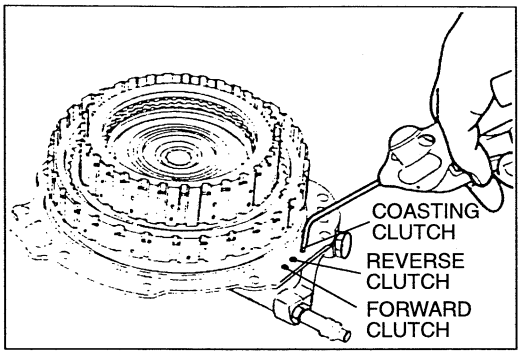


13. Apply petroleum jelly to the bearing race and secure it onto the oil pump cover.

Bearing race outer diameter: 88.0 mm {3.46 in}

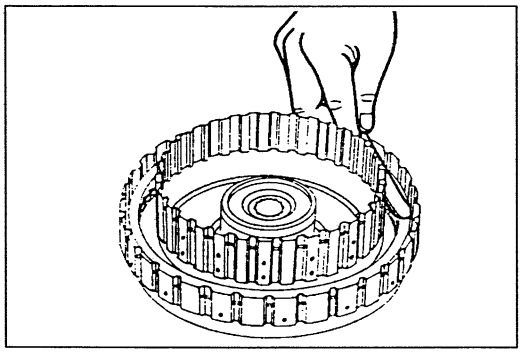
CLUTCH ASSEMBLY
Preparation
SST

49 G019 0A7A Compressor set, return spring 	For disassembly / assembly of coasting clutch and reverse clutch	49 G019 024 Body A (Part of 49 G019 0A7A) 	For disassembly / assembly of reverse clutch
49 G019 025 Body B (Part of 49 G019 0A7A) 	For disassembly / assembly of coasting clutch	49 G019 026 Plate (Part of 49 G019 0A7A) 	For disassembly / assembly of coasting clutch and reverse clutch
49 G019 027 Attachment A (Part of 49 G019 0A7A) 	For disassembly / assembly of coasting clutch and reverse clutch	49 G019 029 Nut (Part of 49 G019 0A7A) 	For disassembly / assembly of coasting clutch and reverse clutch



Preinspection
Reverse, forward, coasting clutch operation
1. Set the clutch assemblies onto the oil pump.
2. Check the clutch operation by applying compressed air through the fluid passages as shown.

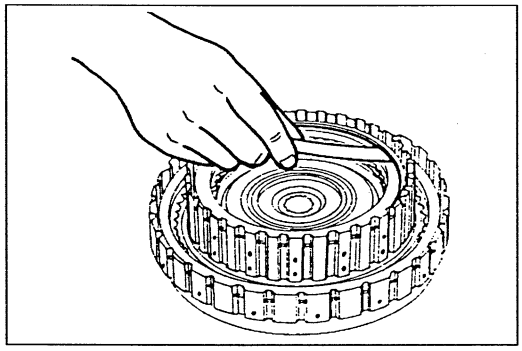
Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.



Clutch clearance
Reverse clutch
1. Measure the clearance between the retaining plate and the drive plate. Make several measurements and calculate the average value.

Clearance: 1.5—1.8 mm {0.059—0.071 in}

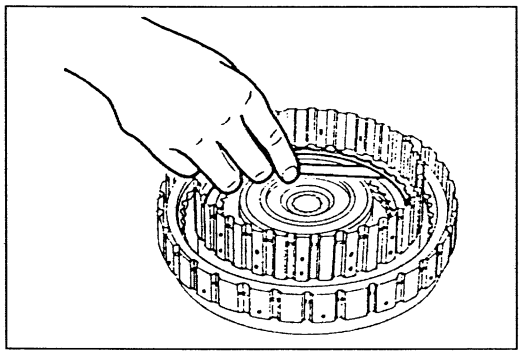
2. If not as specified, replace parts as necessary.
3. Select and install the correct snap ring when assembling.



Forward clutch
1. Measure the clearance between the retaining plate and the snap ring. Make several measurements and calculate the average value.

Clearance: 1.0—1.2 mm {0.039—0.047 in}

2. If not as specified, replace parts as necessary.
3. Select and install the correct snap ring when assembling.



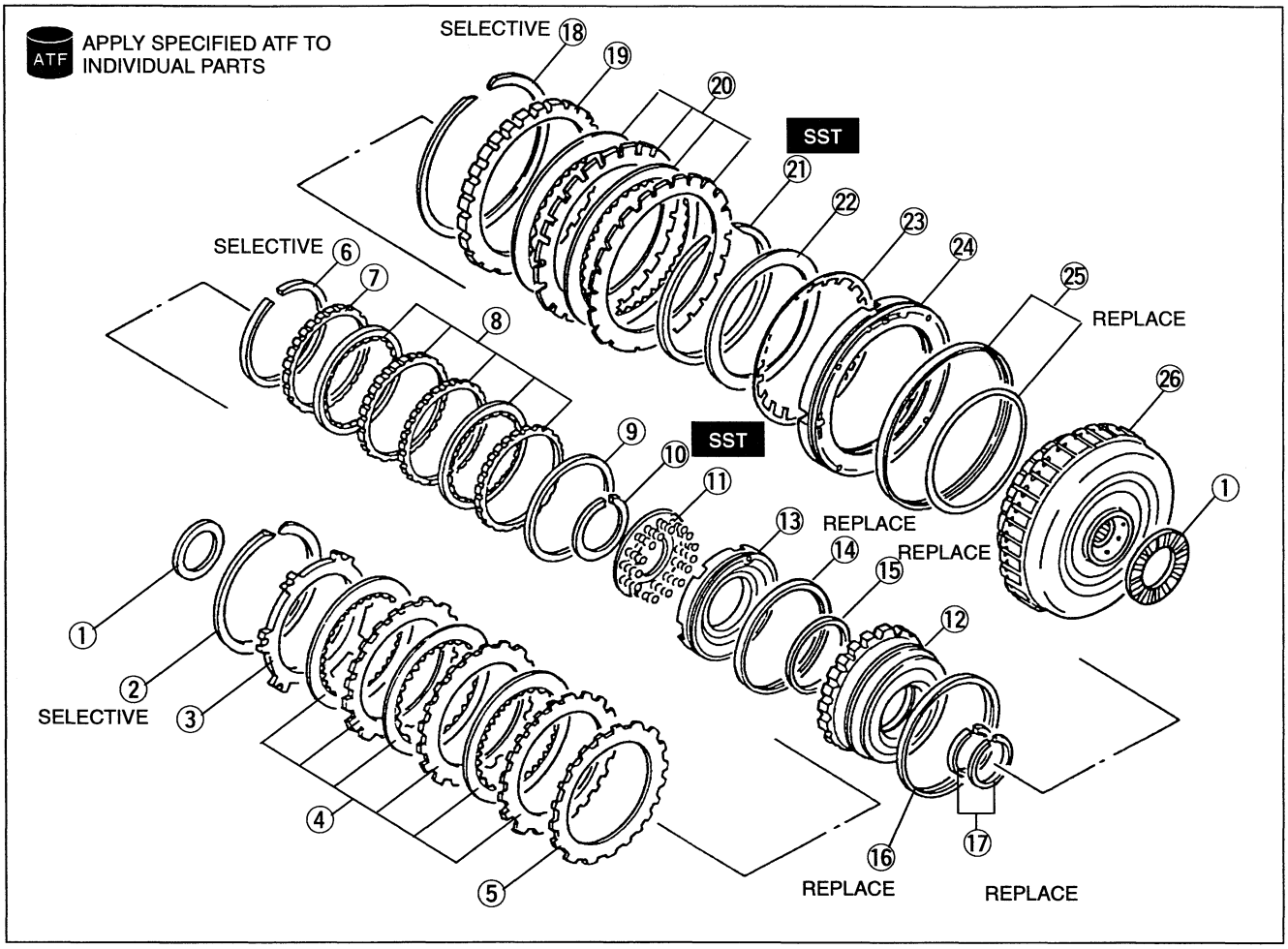
Coasting clutch
1. Remove the snap ring, retaining plate, drive plates, driven plates and dished plate of the forward clutch.
2. Measure the clearance between the retaining plate and the snap ring. Make several measurements and calculate the average value.

Clearance: 1.0—1.2 mm {0.039—0.047 in}

3. If not as specified, replace parts as necessary.
4. Select and install the correct snap ring when assembling.

Disassembly / Inspection / 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 Procedure**.



1. Thrust bearing

—Forward clutch—

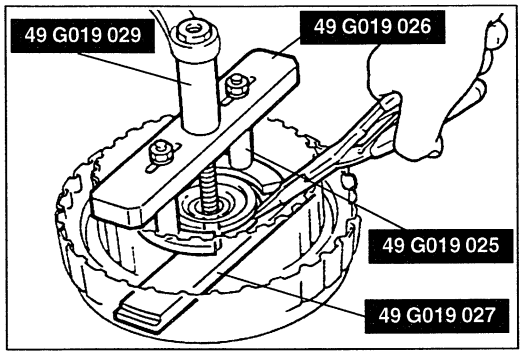
2. Snap ring
3. Retaining plate
4. Drive and driven plates
   Inspection ..... page K1–68
5. Dished plate

—Coasting clutch—

6. Snap ring
7. Retaining plate
8. Drive and driven plates
   Inspection ..... page K1–68
9. Dished plate
10. Snap ring
    Disassembly Note ..... page K1–67
11. Spring and retainer assembly
    Inspection ..... page K1–68
12. Coasting clutch drum
    Disassembly Note ..... page K1–67
13. Coasting piston
    Disassembly Note ..... page K1–67
    Inspection ..... page K1–68
14. Outer seal
15. Inner seal
16. Outer seal
17. Seal rings

—Reverse clutch—

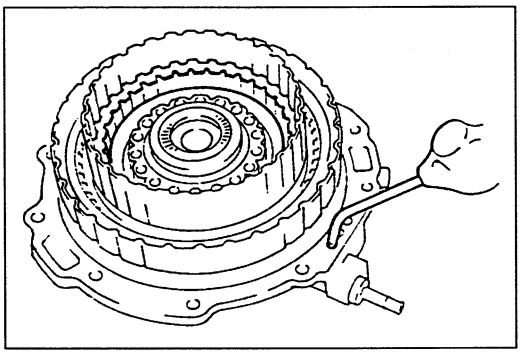
18. Snap ring
19. Retaining plate
20. Drive and driven plates
    Inspection ..... page K1–68
21. Snap ring
    Disassembly Note ..... page K1–67
22. Return spring stopper
23. Piston return spring
24. Reverse piston
    Disassembly Note ..... page K1–68
    Inspection ..... page K1–69
25. Seal rings (inner and outer)
26. Reverse and forward drum



Disassembly note
Snap ring (Coasting clutch)

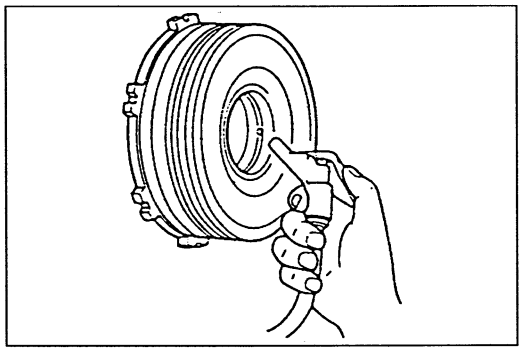
Caution
- **Depress the piston return spring only enough to remove the snap ring. Overpressing will damage the retainer assembly edges.**

1. Install the **SST** in the coasting clutch drum as shown.
2. Compress the spring and retainer assembly.
3. Remove the snap ring.
4. Remove the **SST**, and remove the spring and retainer assembly.



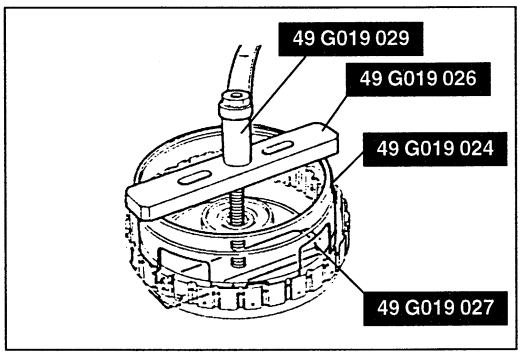
Coasting clutch drum
1. Set the reverse and forward drum onto the oil pump.
2. Remove the coasting clutch drum from the reverse and forward drum by applying compressed air through the fluid passage.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.



Coasting piston
Remove the coasting clutch piston from the coasting clutch drum by applying compressed air through the fluid passage.

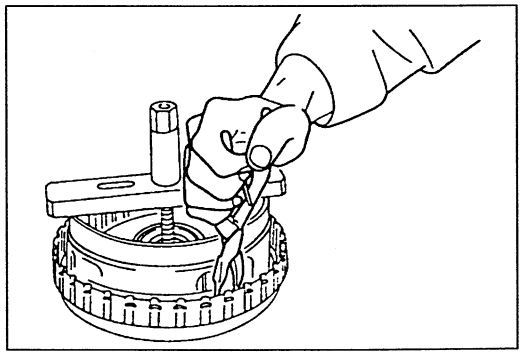
Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.



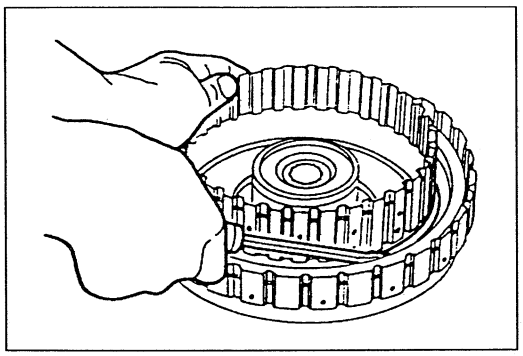
Snap ring (Reverse clutch)

Caution
- **Depress the piston return spring only enough to remove the snap ring. Overpressing will damage the retainer assembly edges.**

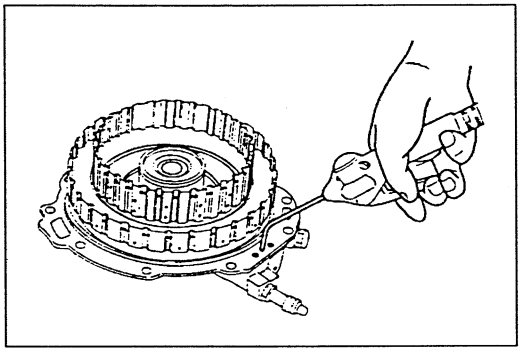
1. Install the **SST** in the reverse and forward drum as shown.
2. Compress the piston return spring.



3. Remove one end of the snap ring from the groove with snap ring pliers.



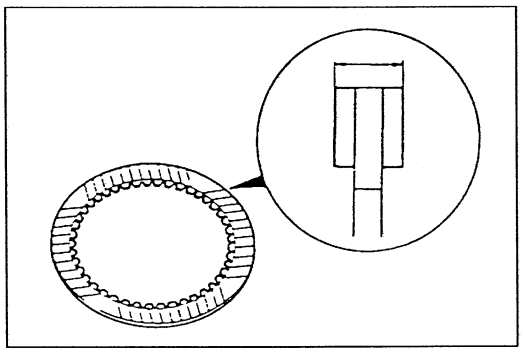
4. Remove the **SST** from the reverse and forward drum.
5. Remove the snap ring by using a screw driver.



Reverse piston

1. Place the reverse and forward drum on the oil pump.
2. Remove the reverse piston by applying compressed air through the fluid passage.

   Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

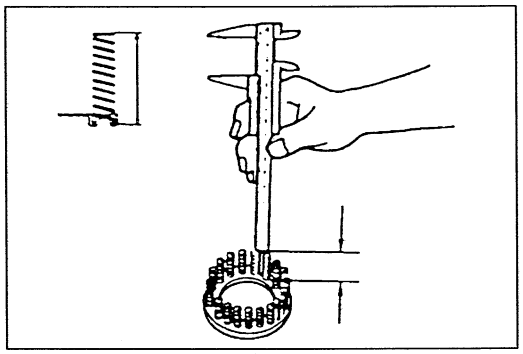


Inspection
Drive plates

1. Measure the facing thickness in three places and calculate the average value.

   Standard: 1.6 mm {0.063 in}
   Minimum: 1.4 mm {0.055 in}

2. If not within the specification, replace the drive plates.

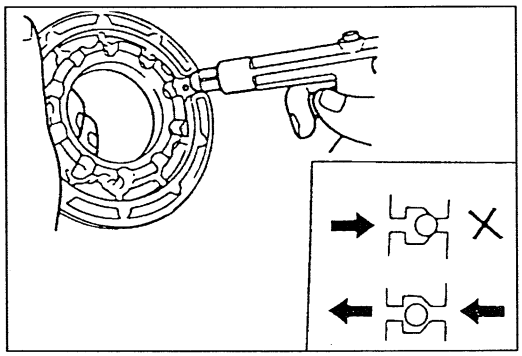


Spring and retainer assembly

1. Measure the free length of the spring assembly and check for deformation.

   Free length: 20.6 mm {0.811 in}

2. If not within the specification, replace the spring and retainer assembly.

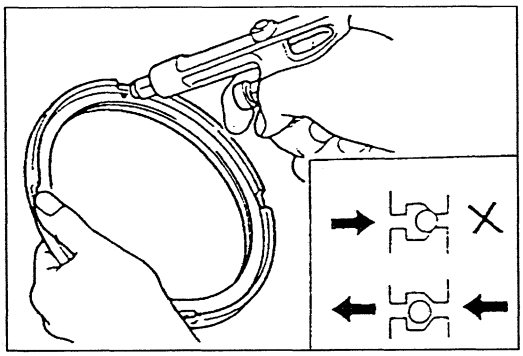


Coasting piston

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: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

3. Replace the coasting piston if damaged or malfunctioning.

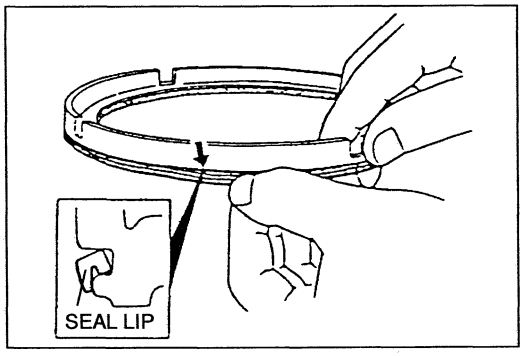


Reverse piston

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: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

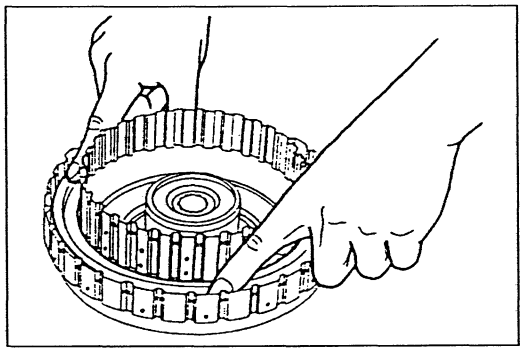
3. Replace the reverse piston if damaged or malfunctioning.



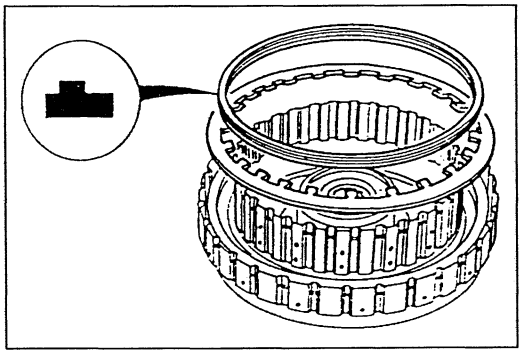
Assembly procedure
Reverse clutch

1. Install the reverse piston.
   (1) Apply ATF to the inner and outer faces of the seals and install them to the reverse piston.

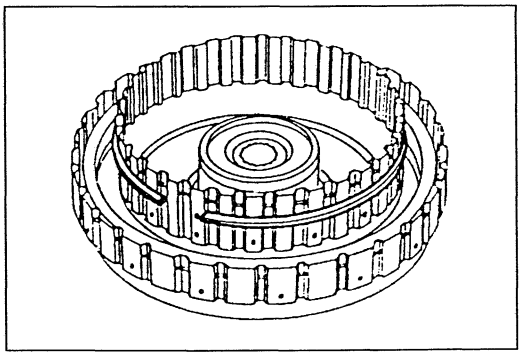
   Seal ring inner diameter
   Inner seal: 160.5 mm {6.319 in}
   Outer seal: 188.0 mm {7.402 in}



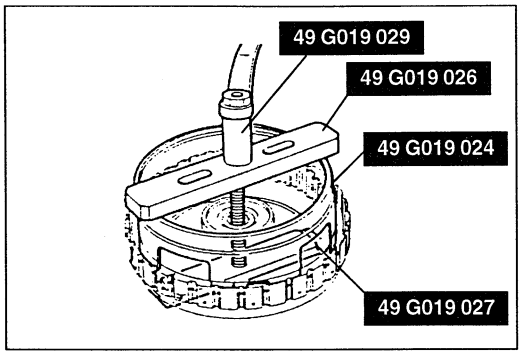
   (2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the reverse and forward drum.
   (3) Install the reverse piston by pushing evenly around the circumference, being careful not to damage the seal rings.



2. Install the piston return spring with the tabs facing upward away from the reverse piston.
3. Install the return spring stopper with the step facing upward.



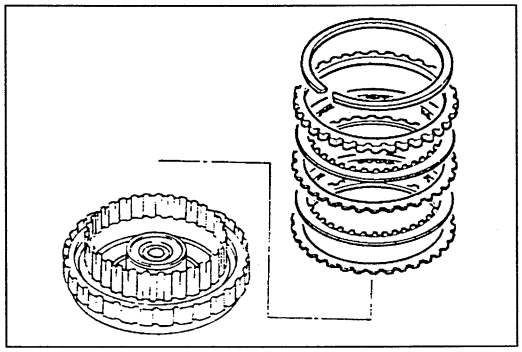
4. Install the snap ring half-way down the reverse and forward drum as shown.



5. Install the **SST** on the reverse and forward drum.

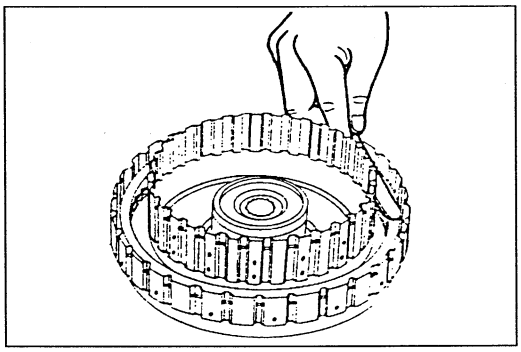
Caution
- **Depress the piston return spring only enough to install the snap ring. Overpressing will damage the retainer assembly edges.**

6. Compress the piston return spring assembly.
7. Install the snap ring by using a screwdriver.
8. Remove the **SST**.



9. Install the drive and driven plates in the following order. Driven-Drive-Driven-Drive.
10. Install the retaining plate.
11. Install the snap ring by using a screwdriver.
12. Measure the reverse clutch clearance.
    (1) Measure the clearance between the retaining plate and the drive plate.
    (2) If the clearance is not within the specification, adjust it by selecting a proper snap ring from below.

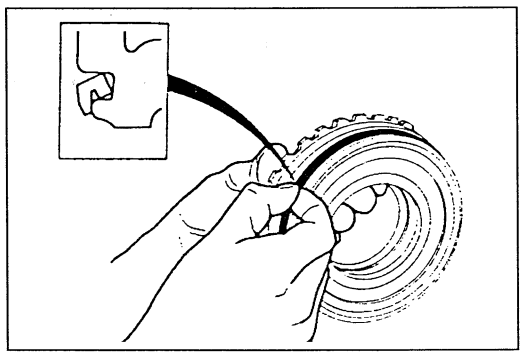
Reverse clutch clearance:
1.5—1.8 mm {0.059—0.071 in}



Snap ring sizes

mm {in}

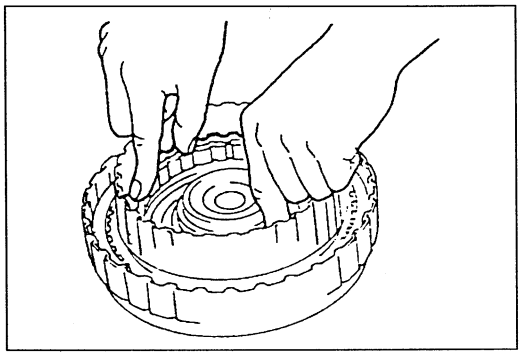
2.0 {0.079}	2.2 {0.087}	2.4 {0.094}
2.6 {0.102}	2.8 {0.110}	—

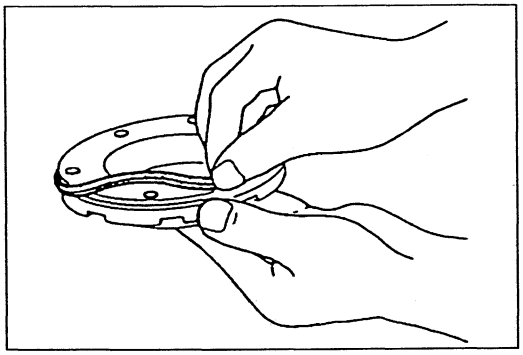


Coasting clutch
1. Install the coasting clutch drum.
   (1) Apply ATF to the inner and outer faces of the seals, and install them onto the coasting clutch drum.

Seal ring inner diameter
Inner seal: 71.02 mm {2.796 in}
Outer seal: 137.0 mm {5.394 in}

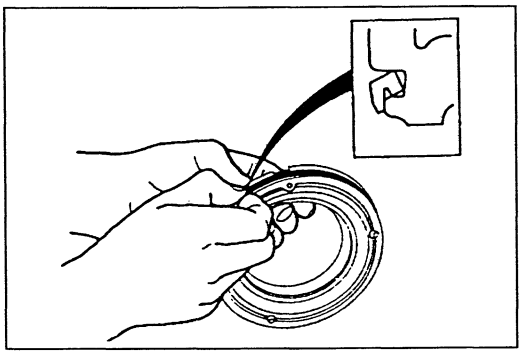
   (2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the reverse and forward drum.
   (3) Install the coasting clutch drum into the reverse and forward drum as shown.



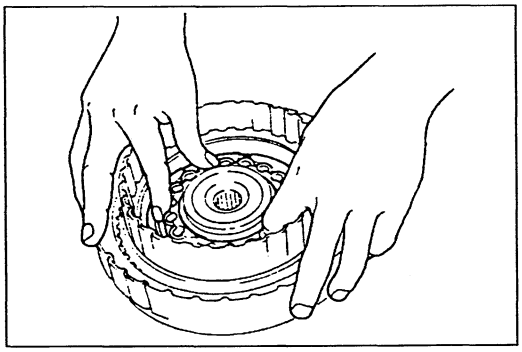


2. Install the coasting piston.
   (1) Apply ATF to the inner and outer faces of the seals and install them onto the coasting piston.

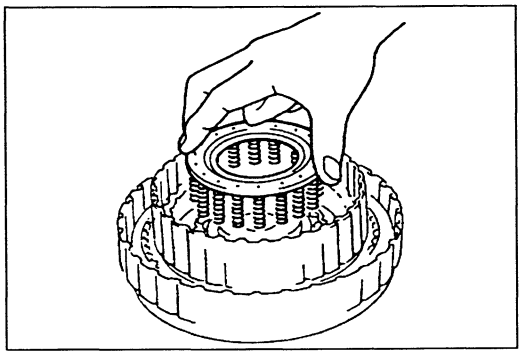
Seal ring inner diameter
Outer seal: 122.0 mm {4.803 in}



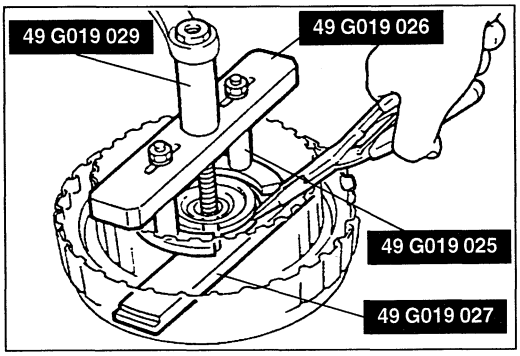
(2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the coasting clutch drum.



(3) Install the coasting piston by pushing evenly around the circumference being careful not to damage the outer seal.



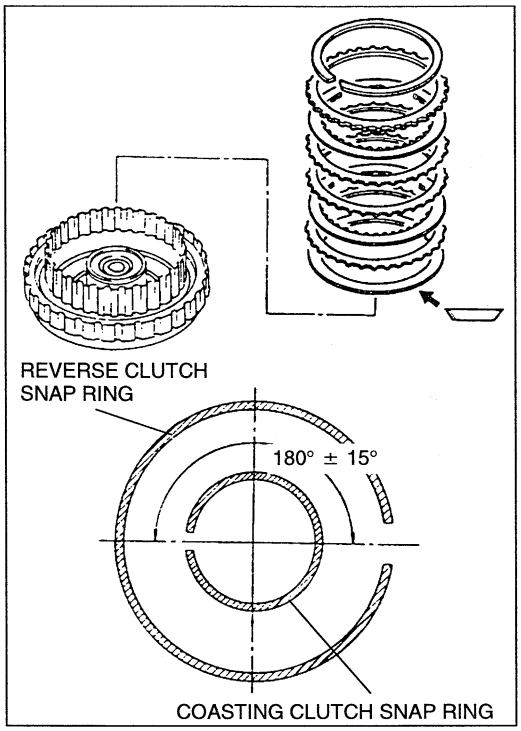
3. Install the spring and retainer assembly.



4. Install the **SST** in the coasting clutch.

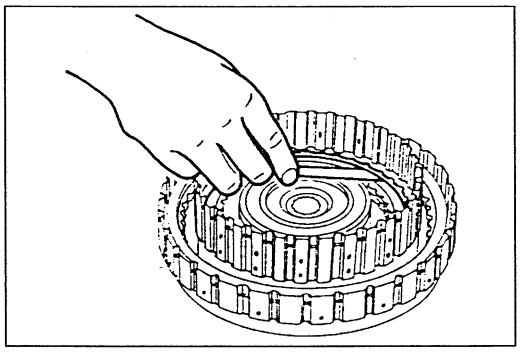
Caution
- **Depress the piston return spring only enough to install the snap ring. Overpressing will damage the retainer assembly edges.**

5. Compress the spring and retainer assembly.
6. Install the snap ring.
7. Remove the **SST**.



8. Install the dished plate with the dished side upward.
9. Install the drive and driven plates in the following order. Driven-Drive-Driven-Driven-Drive
10. Install the retaining plate.
11. Install the coasting clutch snap ring in the direction shown in the figure.
12. Measure the clearance between the retaining plate and the snap ring. Make several measurements and calculate the average value. If the clearance is not within specification, adjust it by selecting a proper snap ring from below.

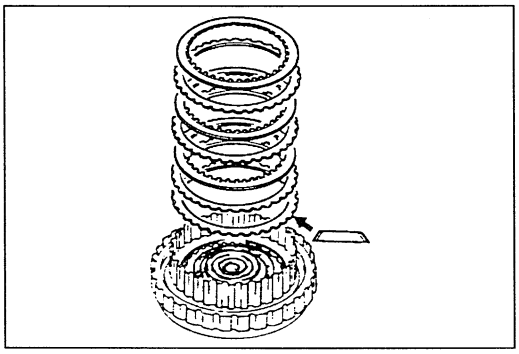
Coasting clutch clearance:
1.0—1.2 mm {0.039—0.047 in}



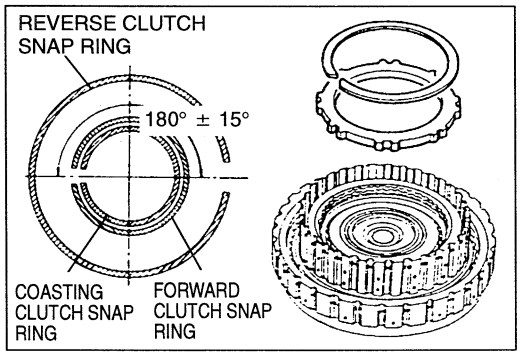
Snap ring sizes

mm {in}

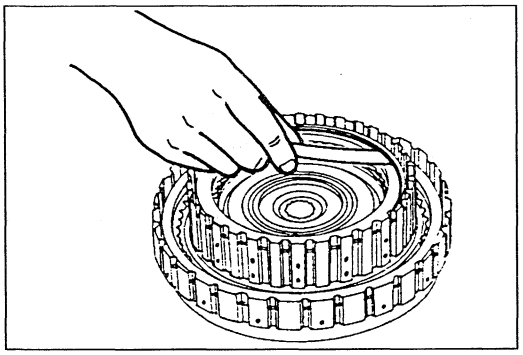
1.50 {0.059}	1.65 {0.065}	1.80 {0.071}
1.95 {0.077}	2.10 {0.083}	2.25 {0.089}



Forward clutch
1. Install the dished plate with the dished side downward.
2. Install the drive and driven plates in the following order. Driven-Drive-Driven-Drive-Driven-Drive.

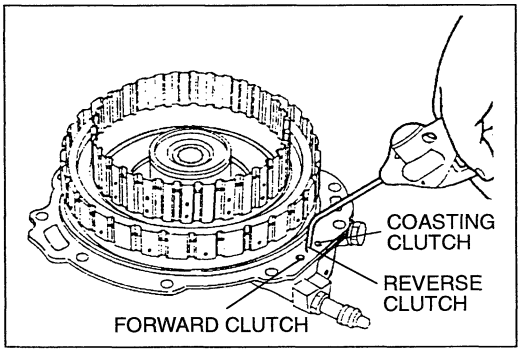


3. Install the retaining plate.
4. Install the snap ring in the direction shown in the figure.



5. Measure the clearance between the retaining plate and the snap ring. Make several measurements and calculate the average value. If the clearance is not within specification, adjust it by selecting a proper snap ring from below.

Forward clutch clearance:
1.0—1.2 mm {0.039—0.047 in}



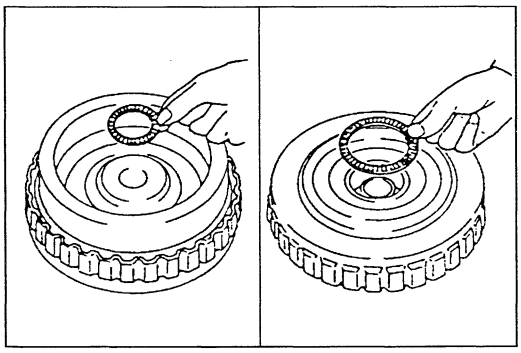
Snap ring sizes

mm {in}

2.00 {0.079}	2.15 {0.085}	2.30 {0.091}
2.45 {0.097}	2.60 {0.102}	2.75 {0.108}

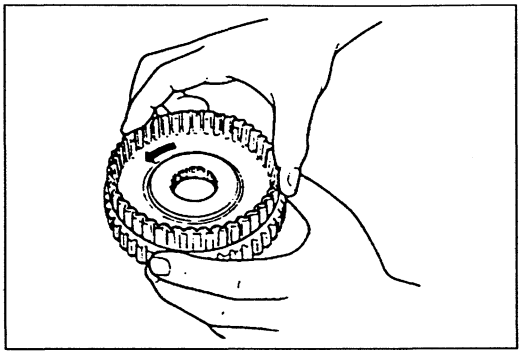
6. Check the clutch operation as follows.
   (1) Set the clutch assembly onto the oil pump.
   (2) Check the clutch operation by applying compressed air through the fluid passages shown.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.



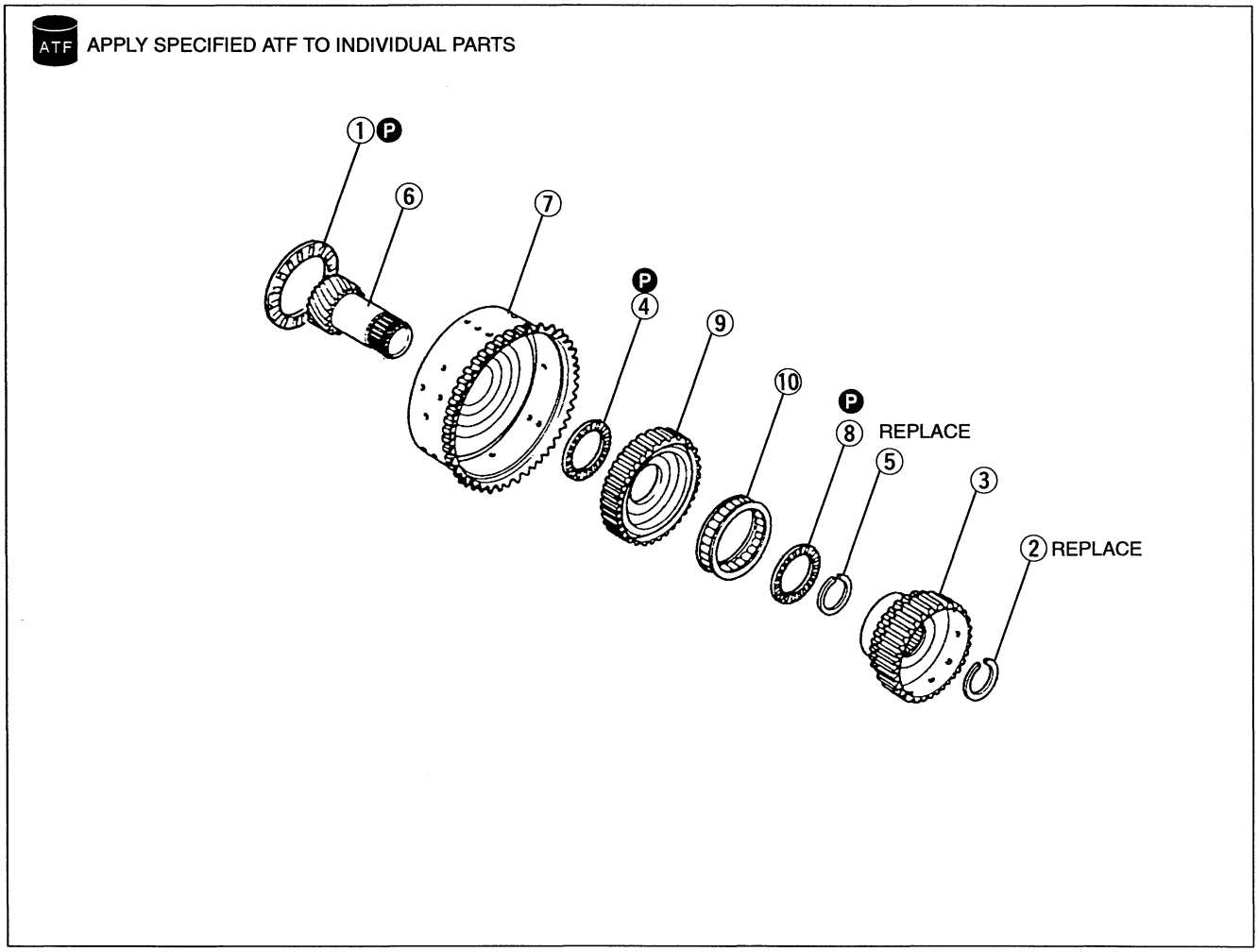
7. Apply petroleum jelly to the thrust bearings, and secure them on the reverse and forward drum.

Thrust bearing outer diameter
Oil pump side: 86.0 mm {3.39 in}
Small sun gear and one-way clutch side:
56.1 mm {2.21 in}

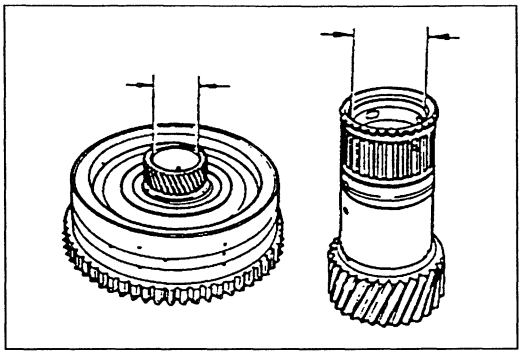


SMALL SUN GEAR AND ONE-WAY CLUTCH 1
Preinspection
One-way clutch 1 operation
While holding the one-way clutch outer race, verify that the one-way clutch inner race rotates smoothly when turned counterclockwise and locks when turned clockwise. If not as specified, replace the one-way clutch 1.

Disassembly / Inspection / Assembly
1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



1. Thrust bearing
2. Snap ring
3. One-way clutch inner race
4. Thrust bearing
5. Snap ring
6. Small sun gear
   Inspection ..... page K1–75
7. Sun gear drum
   Inspection ..... page K1–75
8. Thrust bearing
9. One-way clutch outer race
10. One-way clutch 1

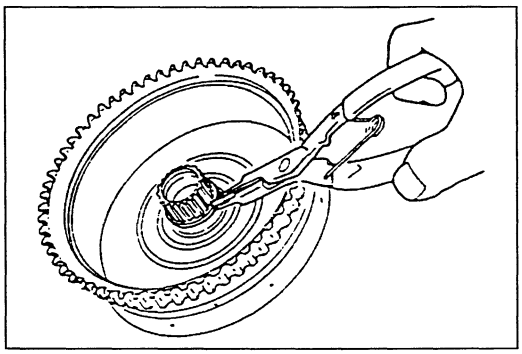


Inspection
Small sun gear, sun gear drum

1. Measure the small sun gear and sun gear drum inner diameters.

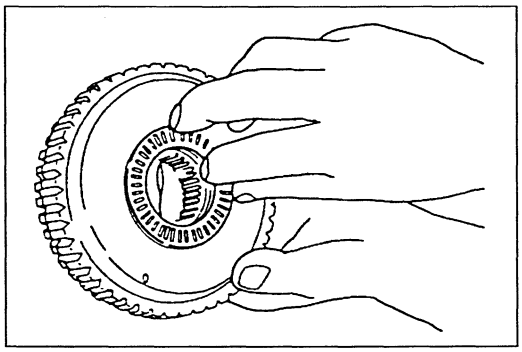
   Inner diameter
   Small sun gear: 24.0 mm {0.945 in} max.
   Sun gear drum: 33.4 mm {1.31 in} max.

2. If not within the specification, replace the small sun gear or sun gear drum.



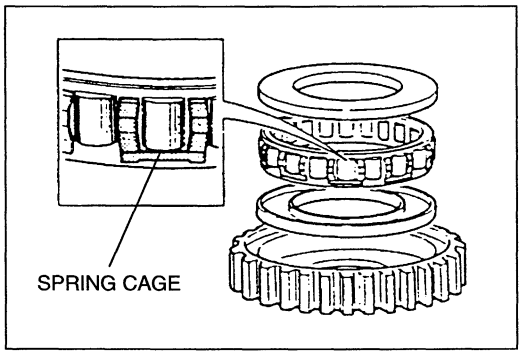
Assembly procedure

1. Install the small sun gear into the sun gear drum.
2. Install a new snap ring.



3. Apply petroleum jelly to the thrust bearing and secure it to the one-way clutch inner race.

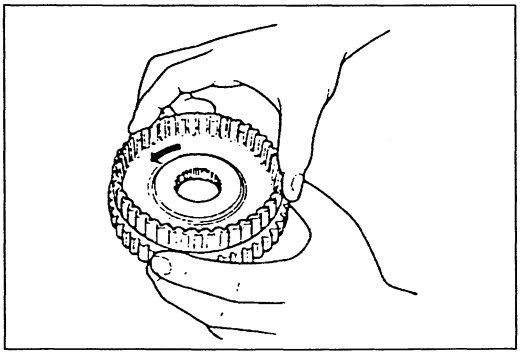
   Thrust bearing outer diameter: 62.5 mm {2.46 in}

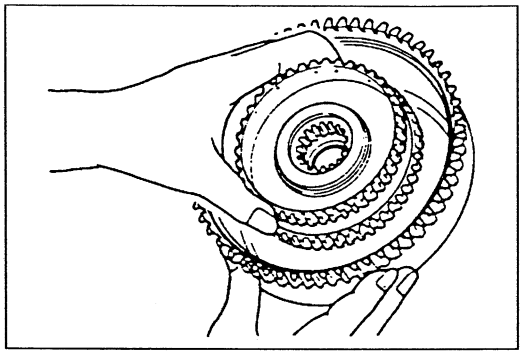


4. Verify that the spring cage of the one-way clutch faces toward the outer race as shown.
5. Apply petroleum jelly to the thrust bearing and secure it to the one-way clutch 1.

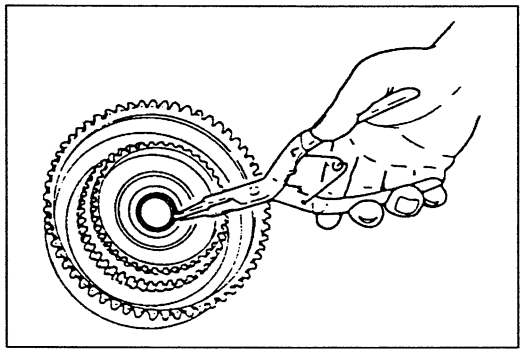
   Thrust bearing outer diameter: 62.5 mm {2.46 in}

6. Apply ATF to the one-way clutch and one-way clutch outer race.
7. Install the one-way clutch inner race into the one-way clutch outer race by turning the inner race counterclockwise. If the one-way clutch inner race turns or locks in both directions, replace the one-way clutch 1.
8. Apply ATF to the one-way clutch inner race.
9. Hold the one-way clutch outer race. Verify that the inner race rotates smoothly in the counterclockwise direction only. If the one-way clutch inner race turns only clockwise, the spring cage could be installed upside down.

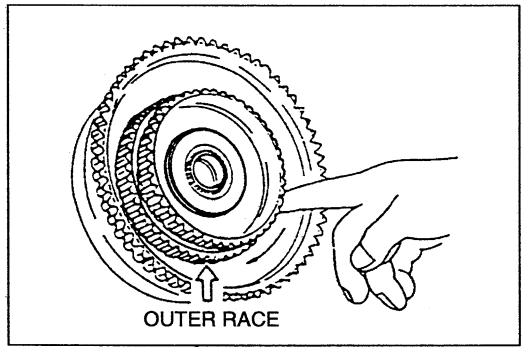




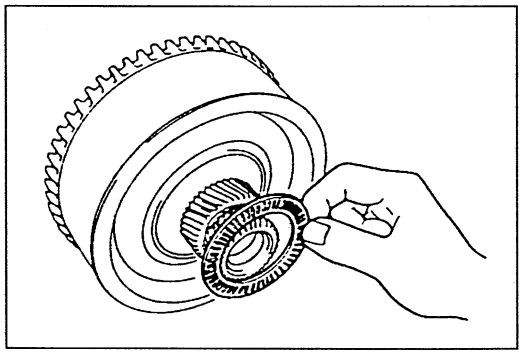
10. Align the splines of the one-way clutch inner race with the splines on the small sun gear hub as shown in the figure.



11. Install a new snap ring.

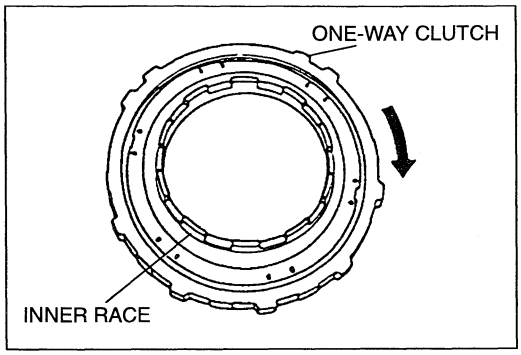


12. Verify that when the small sun gear is held, the one-way clutch outer race turns smoothly and only clockwise.



13. Apply petroleum jelly to the thrust bearing and secure it to the sun gear drum.

    Thrust bearing outer diameter: 72.0 mm {2.83 in}



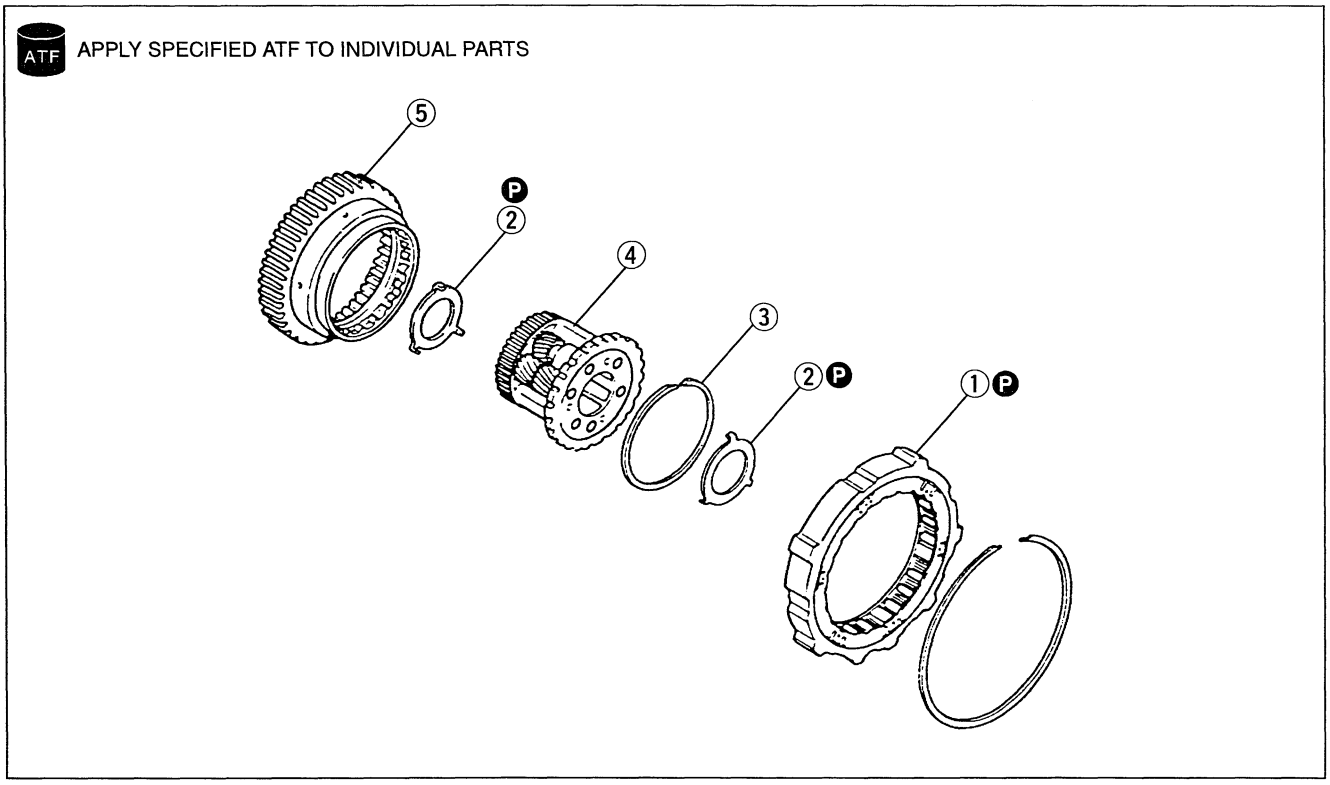
ONE-WAY CLUTCH 2 AND CARRIER HUB ASSEMBLY

Preinspection

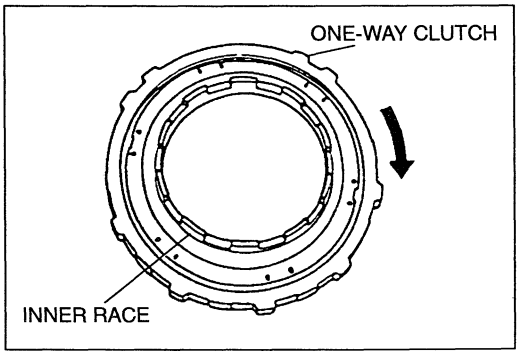
While holding the one-way clutch inner race, verify that the one-way clutch rotates smoothly when turned clockwise and locks when turned counterclockwise. If not as specified, replace the one-way clutch 2.

Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



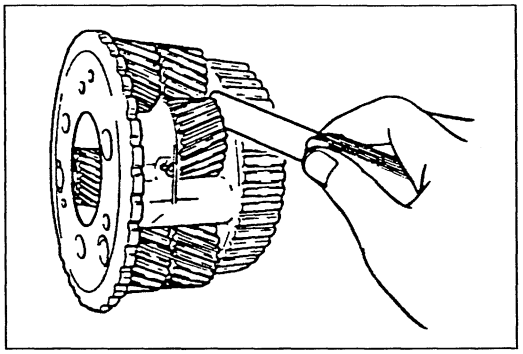
1. One-way clutch 2
   Inspection ..... below
2. Bearing race
3. Snap ring
4. Carrier hub assembly
   Inspection ..... page K1–78
5. Inner race (low and reverse hub)



Inspection

One-way clutch 2

1. Inspect for detached rollers, damage, or wear.
2. Install the inner race into the one-way clutch 2, and verify that the one-way clutch 2 turns smoothly and only clockwise. If the one-way clutch 2 turns or locks in both directions, replace the one-way clutch 2. If the one-way clutch 2 turns only counterclockwise, it is installed upside down.



Carrier hub assembly

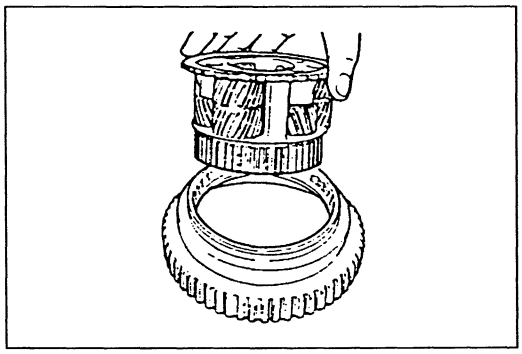
Check for the following and repair or replace as necessary.

(1) Damaged or worn gear and operation.

(2) Clearance between pinion washers and planetary carrier.

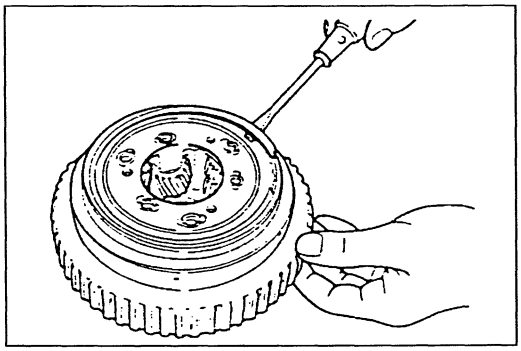
Clearance: 0.2—0.7 mm {0.008—0.027 in}

(3) Replace the carrier hub assembly if necessary.

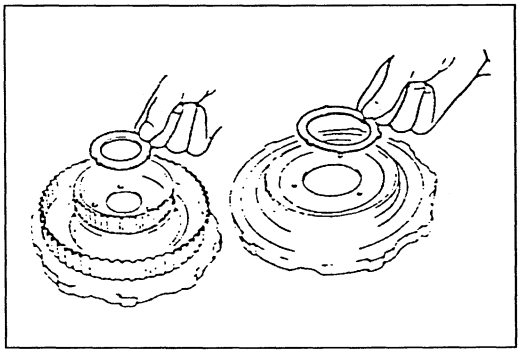


Assembly procedure

1. Install the carrier hub assembly to the inner race.



2. Install the snap ring.



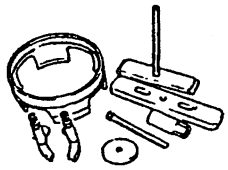
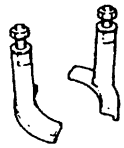
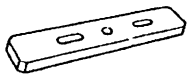
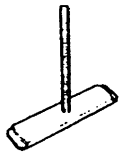
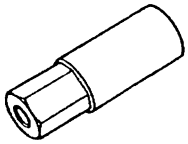
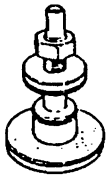
3. Apply petroleum jelly to the bearing races and the thrust bearing.
4. Install the tabs of the bearing races into the alignment holes on each side of the one-way clutch/carrier hub assembly.
5. Install the thrust bearing to the sun gear drum side of the one-way clutch and carrier hub assembly.

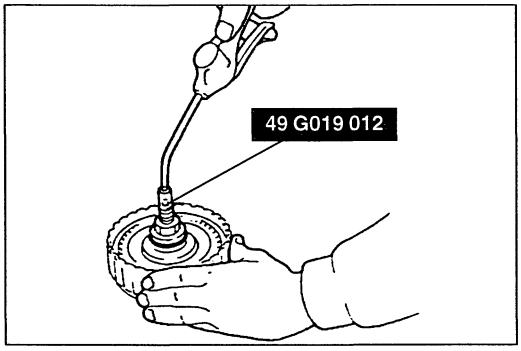
Bearing race outer diameter

Sun gear drum side: 72.0 mm {2.83 in}

3–4 clutch side: 57.0 mm {2.24 in}

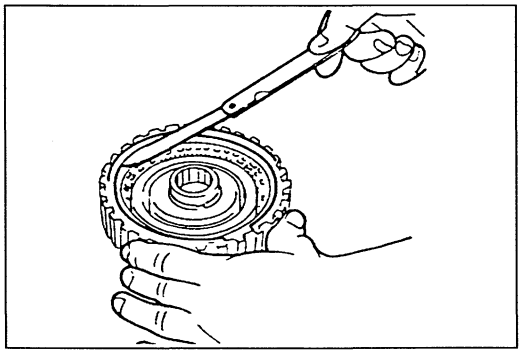
3–4 CLUTCH
Preparation
SST

49 G019 0A7A Compressor set, return spring 	For disassembly / assembly of 3–4 clutch	49 G019 025 Body B (Part of 49 G019 0A7A) 	For disassembly / assembly of 3–4 clutch
49 G019 026 Plate (Part of 49 G019 0A7A) 	For disassembly / assembly of 3–4 clutch	49 G019 027 Attachment A (Part of 49 G019 0A7A) 	For disassembly / assembly of 3–4 clutch
49 G019 029 Nut (Part of 49 G019 0A7A) 	For disassembly / assembly of 3–4 clutch	49 G019 012 Leak checker 	For clutch operation inspection



Preinspection
3–4 clutch operation
1. Remove the thrust bearing.
2. Install the **SST** to the 3–4 clutch.
3. Check the 3–4 clutch operation by applying compressed air as shown.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

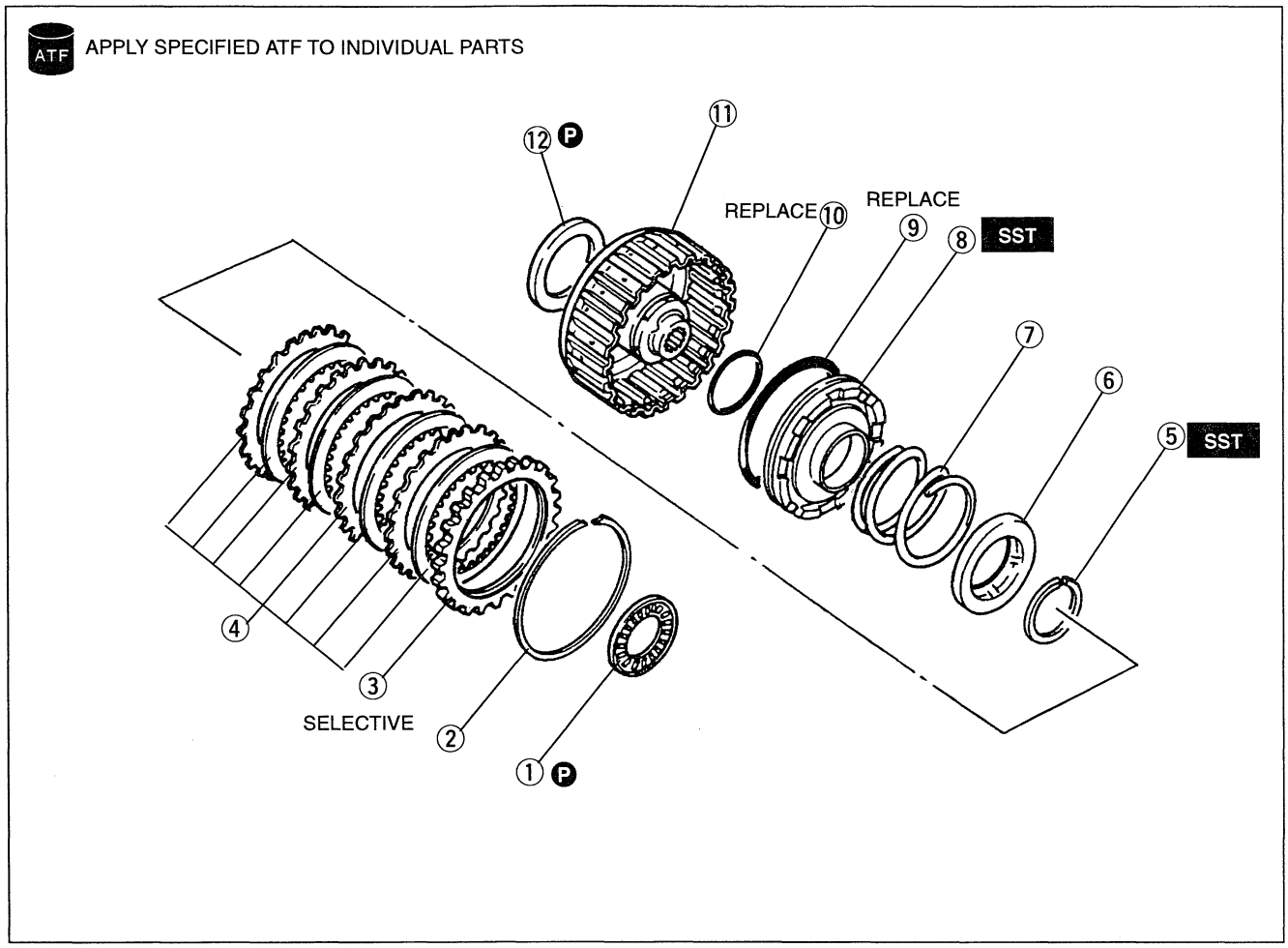


Clearance
1. Measure the clearance between the retaining plate and the snap ring. Make several measurements and calculate the average value. If the clearance is not within specification, replace parts as necessary.
2. Select and install the correct retaining plate when assembling.

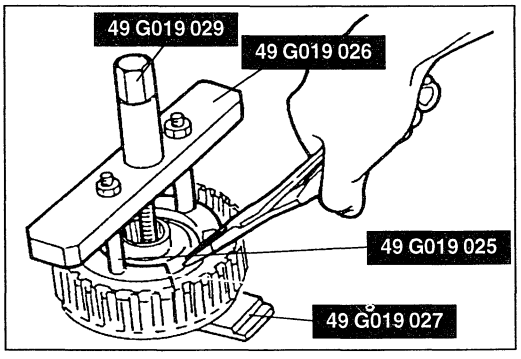
Clearance: 1.3—1.5 mm {0.051—0.059 in}

Disassembly / Inspection / 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 Procedure**.



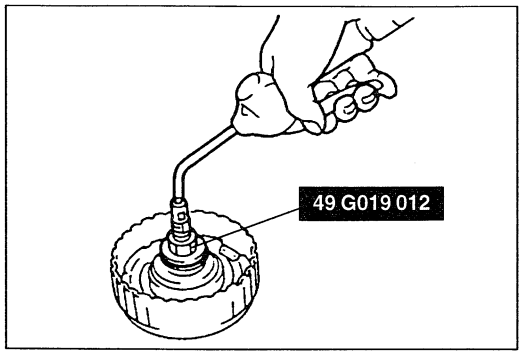
1. Thrust bearing
2. Snap ring
3. Retaining plate
4. Drive and driven plates
   Inspection ..... page K1–81
5. Snap ring
   Disassembly Note ..... below
6. Spring retainer
7. Return spring
   Inspection ..... page K1–81
8. 3–4 clutch piston
   Disassembly Note ..... page K1–81
   Inspection ..... page K1–81
9. Outer seal
10. Inner seal
11. 3–4 clutch drum
12. Thrust bearing



Disassembly note

Snap ring

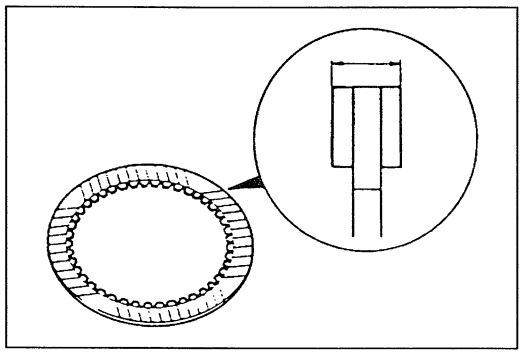
1. Install the **SST** to the 3–4 clutch as shown.
2. Compress the spring retainer and return spring.
3. Remove the snap ring.
4. Remove the **SST**, then remove the spring retainer and return spring.



3–4 clutch piston

Remove the 3–4 clutch piston by using the **SST** and compressed air.

Air pressure: 390 kPa {4.0 kgf/cm², 57 psi} max.



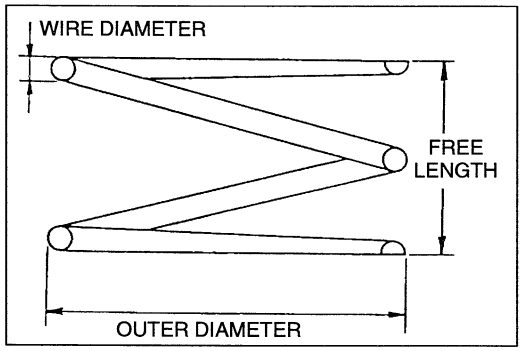
Inspection

Drive plates

1. Measure the facing thickness in three places, and calculate the average value.

   Standard: 1.6 mm {0.063 in}
   Minimum: 1.4 mm {0.055 in}

2. If not within the specification, replace the drive plates.



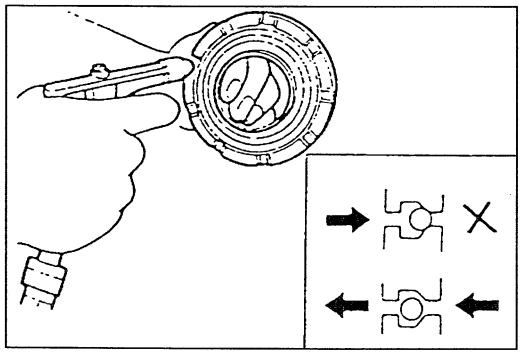
Return spring

1. Measure the spring free length.

Specifications

Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
83.3 {3.28}	38.7 {1.52}	1.0	5.5 {0.22}

2. If not within the specification, replace the spring.

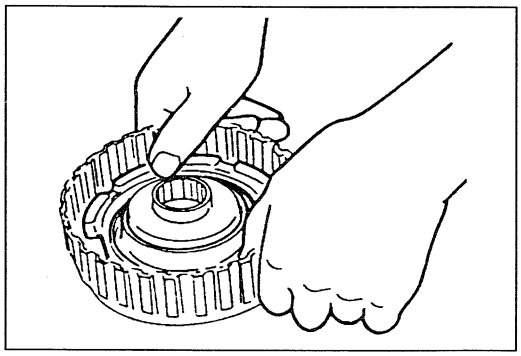


3–4 clutch piston

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: 390 kPa {4.0 kgf/cm², 57 psi} max.

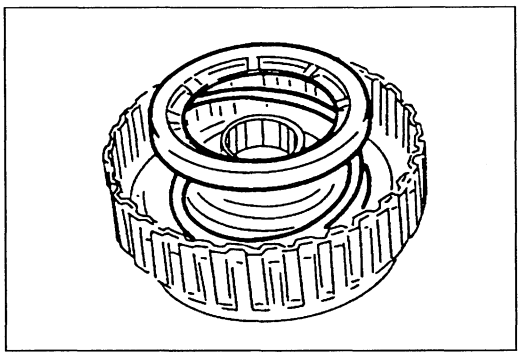
3. Replace the 3–4 clutch piston if damaged or malfunctioning.



Assembly procedure

1. Install the 3–4 clutch piston.
   (1) Apply ATF to the inner and outer seals, and install them onto the 3–4 clutch piston.
   (2) Install the piston by pushing evenly around the circumference, being careful not to damage the seal rings.

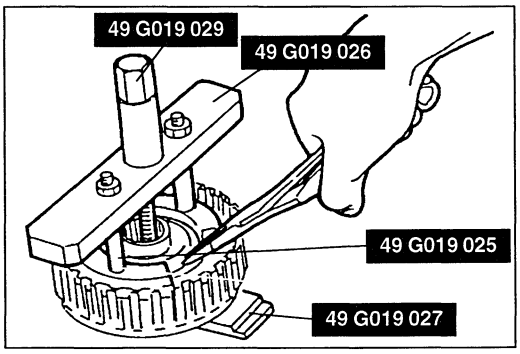
   Seal ring inner diameter
   Inner seal: 59.0 mm {2.32 in}
   Outer seal: 105.5 mm {4.154 in}

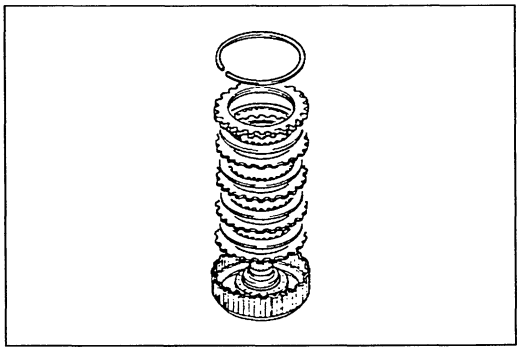


2. Install the return spring and spring retainer.
3. Install the **SST** to the 3–4 clutch as shown.

Caution
- **Depress the return spring only enough to install the snap ring. Overpressing will damage the retainer assembly edges.**

4. Compress the return spring and spring retainer.
5. Install the snap ring. Do not align the snap ring end gap with the return spring stopper.
6. Remove the **SST**.
7. Install the drive and driven plates in the following order. Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive.
8. Install the retaining plate.





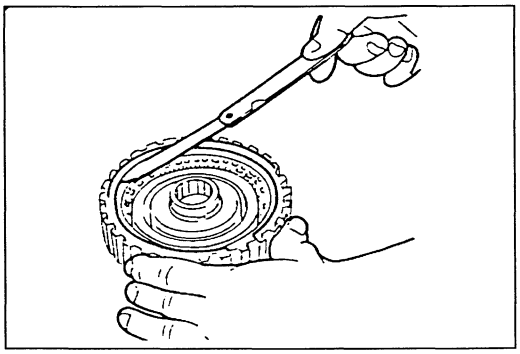
9. Install the snap ring. Do not align the snap ring end gap with the return spring stopper.
10. Measure the clearance between the retaining plate and the snap ring. Make several measurements and calculate the average value. If the clearance is not within the specification, adjust it by selecting a proper retaining plate from below.

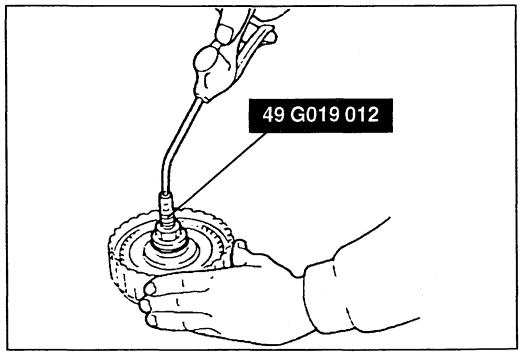
3–4 clutch clearance: 1.3—1.5 mm {0.051—0.059 in}

Retaining plate

mm {in}

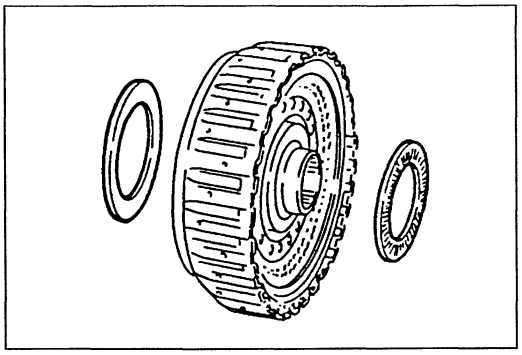
3.8 {0.15}	3.91 {0.154}	4.04 {0.159}
4.17 {0.164}	4.3 {0.169}	4.43 {0.174}
4.56 {0.18}	4.69 {0.185}	4.8 {0.189}





11. Install the **SST** as shown, and check clutch operation by applying compressed air.

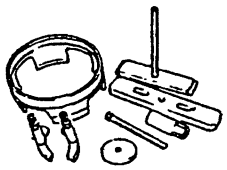
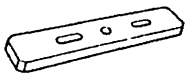
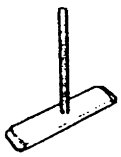
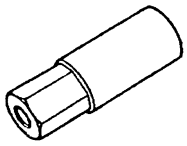
Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

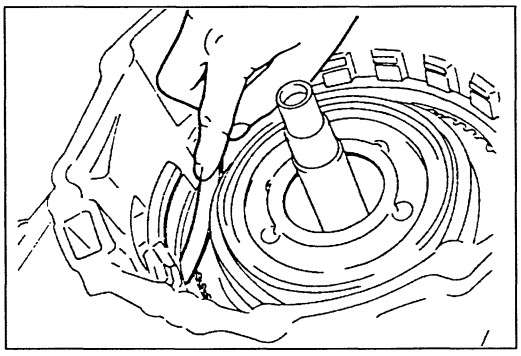


12. Apply petroleum jelly to the thrust bearings and secure them to both sides of the 3–4 clutch drum.

Thrust bearing outer diameter
Carrier hub side: 56.0 mm {2.20 in}
Bearing race outer diameter
Output shell side: 72.0 mm {2.83 in}

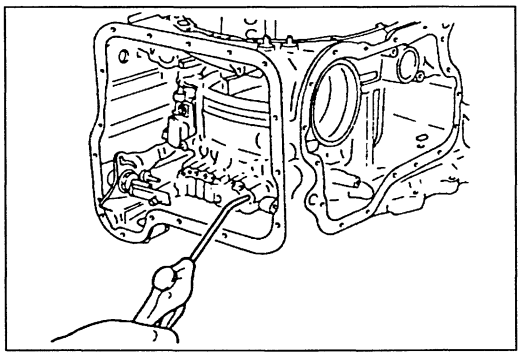
LOW AND REVERSE BRAKE
Preparation
SST

49 G019 0A7A Compressor set, return spring 	For disassembly / assembly of low and reverse brake	49 G019 026 Plate (Part of 49 G019 0A7A) 	For disassembly / assembly of low and reverse brake
49 G019 027 Attachment A (Part of 49 G019 0A7A) 	For disassembly / assembly of low and reverse brake	49 G019 029 Nut (Part of 49 G019 0A7A) 	For disassembly / assembly of low and reverse brake
49 G019 024 Body A (Part of 49 G019 0A7A) 	For disassembly / assembly of low and reverse brake	—	—



Preinspection
Low and reverse brake operation
Check the low and reverse brake operation by applying compressed air as shown.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.



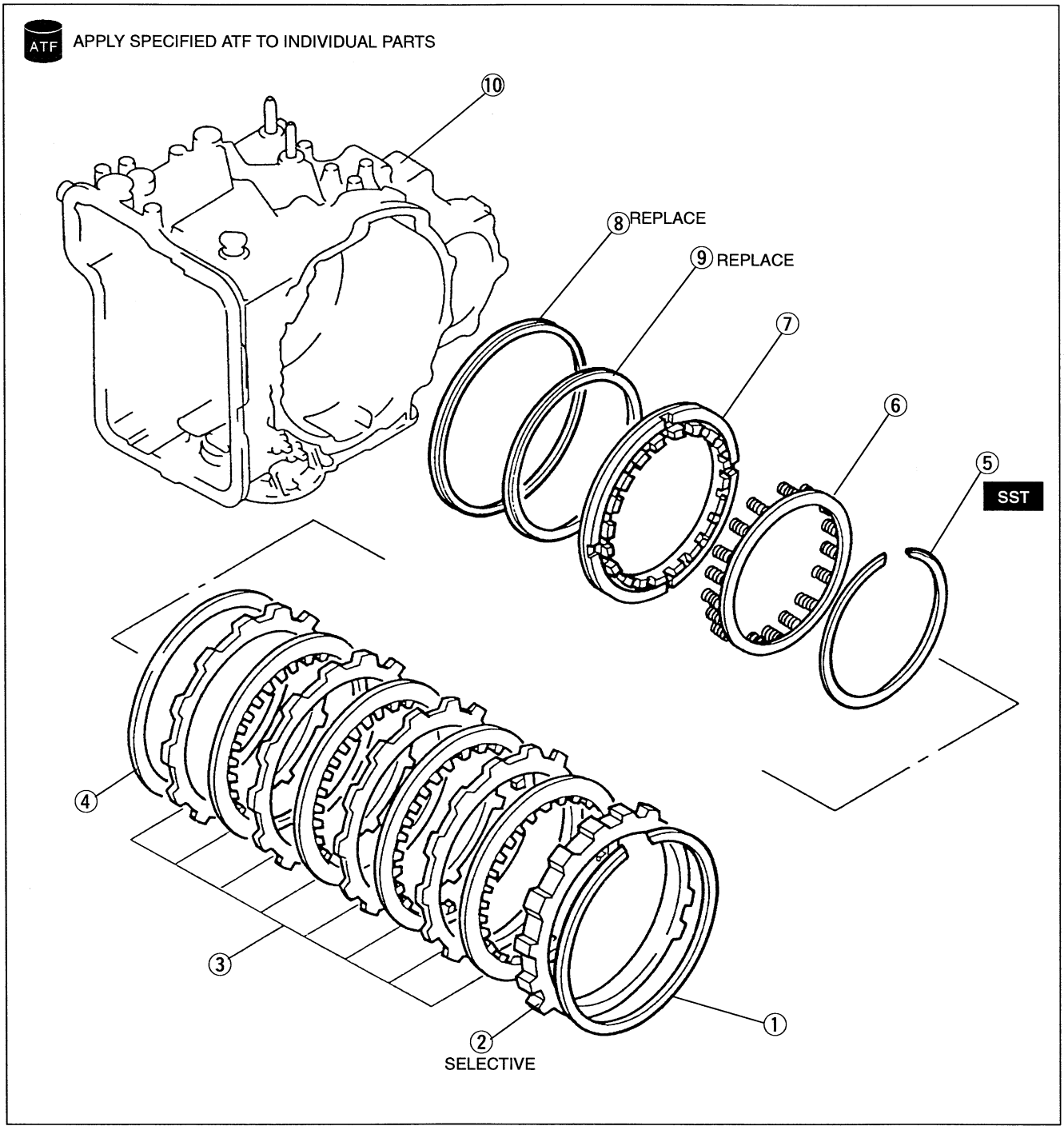
Low and reverse brake clearance
1. Measure the clearance between the retaining plate and the snap ring. Make several measurements and calculate the average value. If the clearance is not within the specification, replace parts as necessary.

Low and reverse brake clearance:
1.5—1.8 mm {0.059—0.071 in}

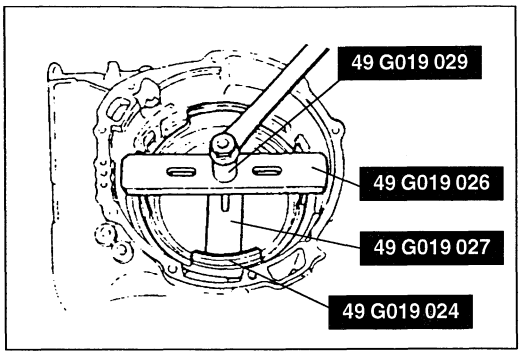
2. Select and install the correct retaining plate when assembling.

Disassembly / Inspection / 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 Procedure**.



1. Snap ring
2. Retaining plate
3. Drive and driven plates
   Inspection . . . . . page K1–85
4. Dished plate
5. Snap ring
   Disassembly Note . . . . . page K1–85
6. Spring and retainer assembly
   Inspection . . . . . page K1–85
7. Low and reverse brake piston
   Disassembly Note . . . . . page K1–85
8. Outer seal
9. Inner seal
10. Transaxle case

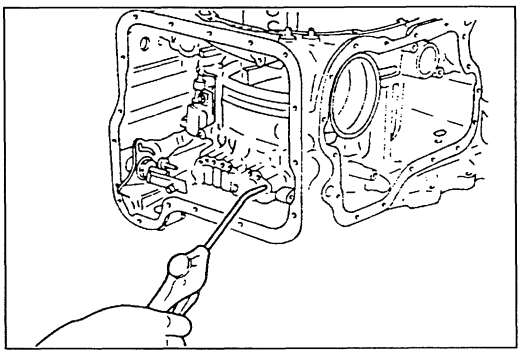


Disassembly note
Snap ring

1. Install the **SST** in the transaxle case as shown.

Caution
- **Depress the return spring only enough to install the snap ring. Overpressing will damage the retainer assembly edges.**

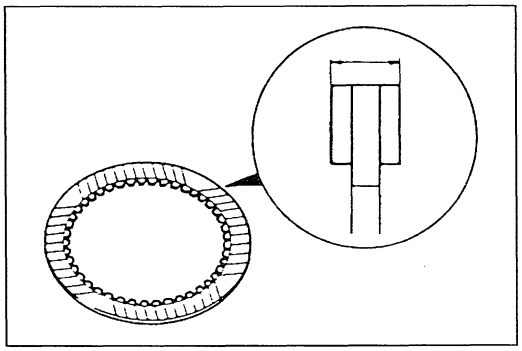
2. Compress the spring and retainer assembly.
3. Remove the snap ring.
4. Remove the **SST** and remove the spring and retainer assembly.



Low and reverse brake piston

Remove the low and reverse brake piston by applying compressed air through the fluid passage.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

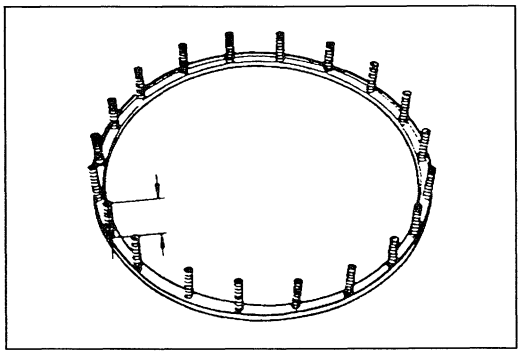


Inspection
Drive plates

1. Measure the facing thickness in three places, and calculate the average value.

Standard: 1.6 mm {0.063 in}
Minimum: 1.4 mm {0.055 in}

2. If not within the specification, replace the drive plates.

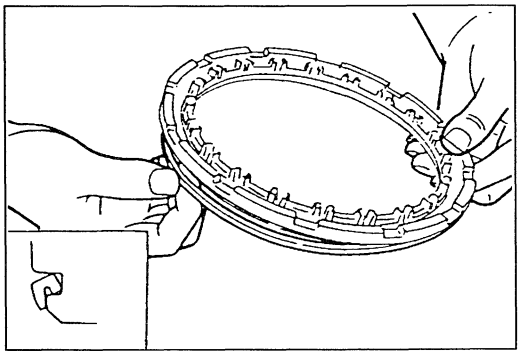


Spring and retainer assembly

1. Measure the free length of each spring and check for deformation.

Free length: 18.07 mm {0.711 in}

2. If not within the specification, replace the spring and retainer assembly.

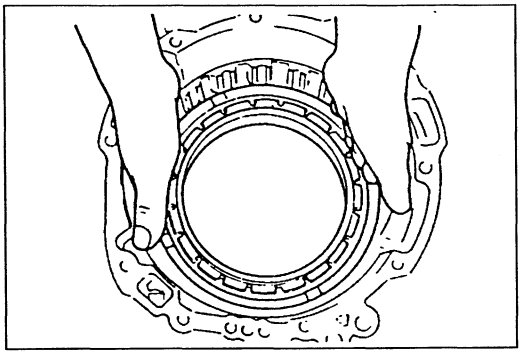


Assembly procedure

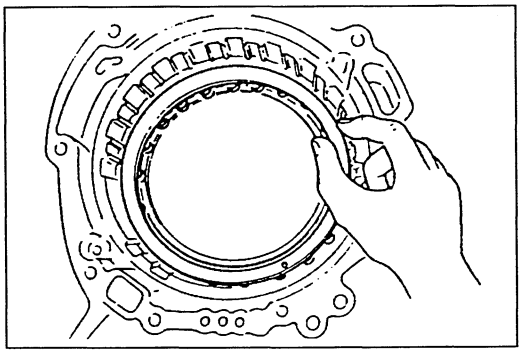
1. Install the low and reverse brake piston.
   (1) Apply ATF to the new inner and outer seals, and install them onto the low and reverse brake piston.

Seal ring inner diameter
Inner seal: 156.5 mm {6.161 in}
Outer seal: 188.0 mm {7.402 in}

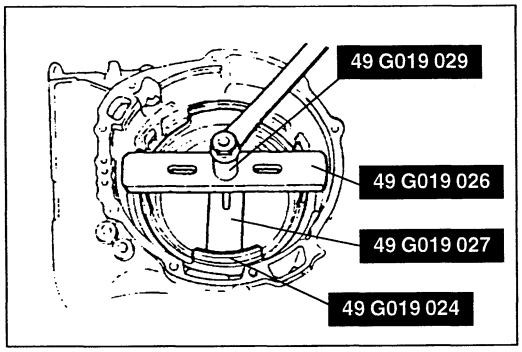
   (2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the case.



(3) Install the low and reverse brake piston by pushing evenly around the circumference, being careful not to damage the outer seal.



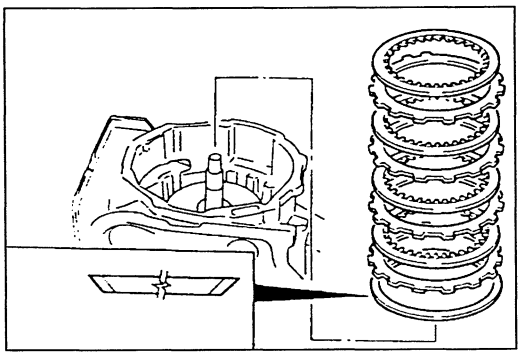
2. Install the spring and retainer assembly.



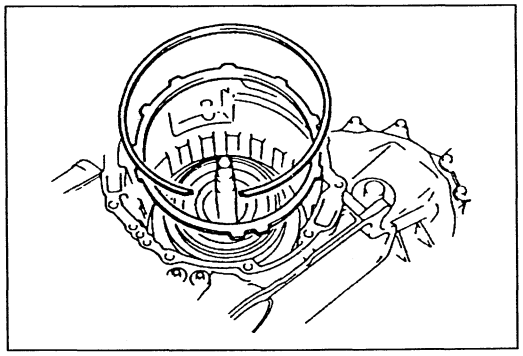
3. Install the **SST** in the transaxle case as shown.

Caution
- **Depress the spring and retainer assembly only enough to install the snap ring. Overpressing will damage the retainer assembly edges.**

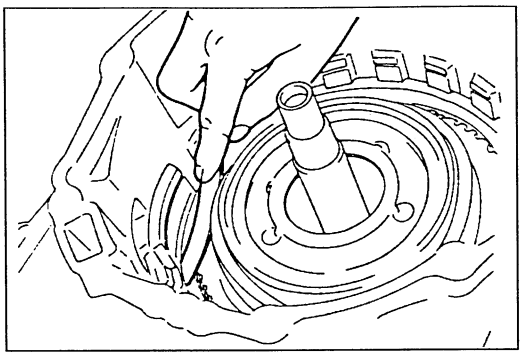
4. Compress the spring and retainer assembly.



5. Install the snap ring.
6. Remove the **SST**.
7. Install the dished plate as shown in the figure.
8. Install the drive and driven plates in the following order. Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive

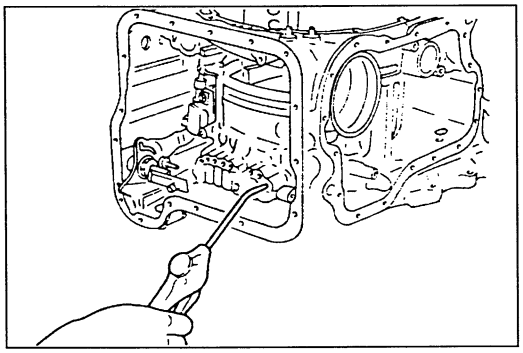


9. Install the retaining plate.
10. Install the snap ring.



11. Measure the clearance between the low and reverse retaining plate and the snap ring. Make several measurements and calculate the average value. If the clearance is not within the specification, adjust by selecting a proper retaining plate from below.

Low and reverse brake clearance:
1.5—1.8 mm {0.059—0.071 in}



Retaining plate sizes

mm {in}

7.0 {0.276}	7.2 {0.283}	7.4 {0.291}
7.6 {0.299}	—	—

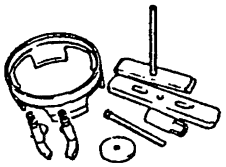
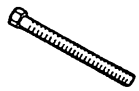
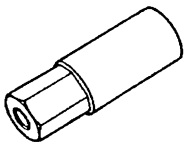
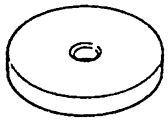
12. Check the low and reverse brake operation by applying compressed air through the fluid passage as shown in the figure.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

2–4 BRAKE BAND (DISASSEMBLY / INSPECTION / ASSEMBLY)

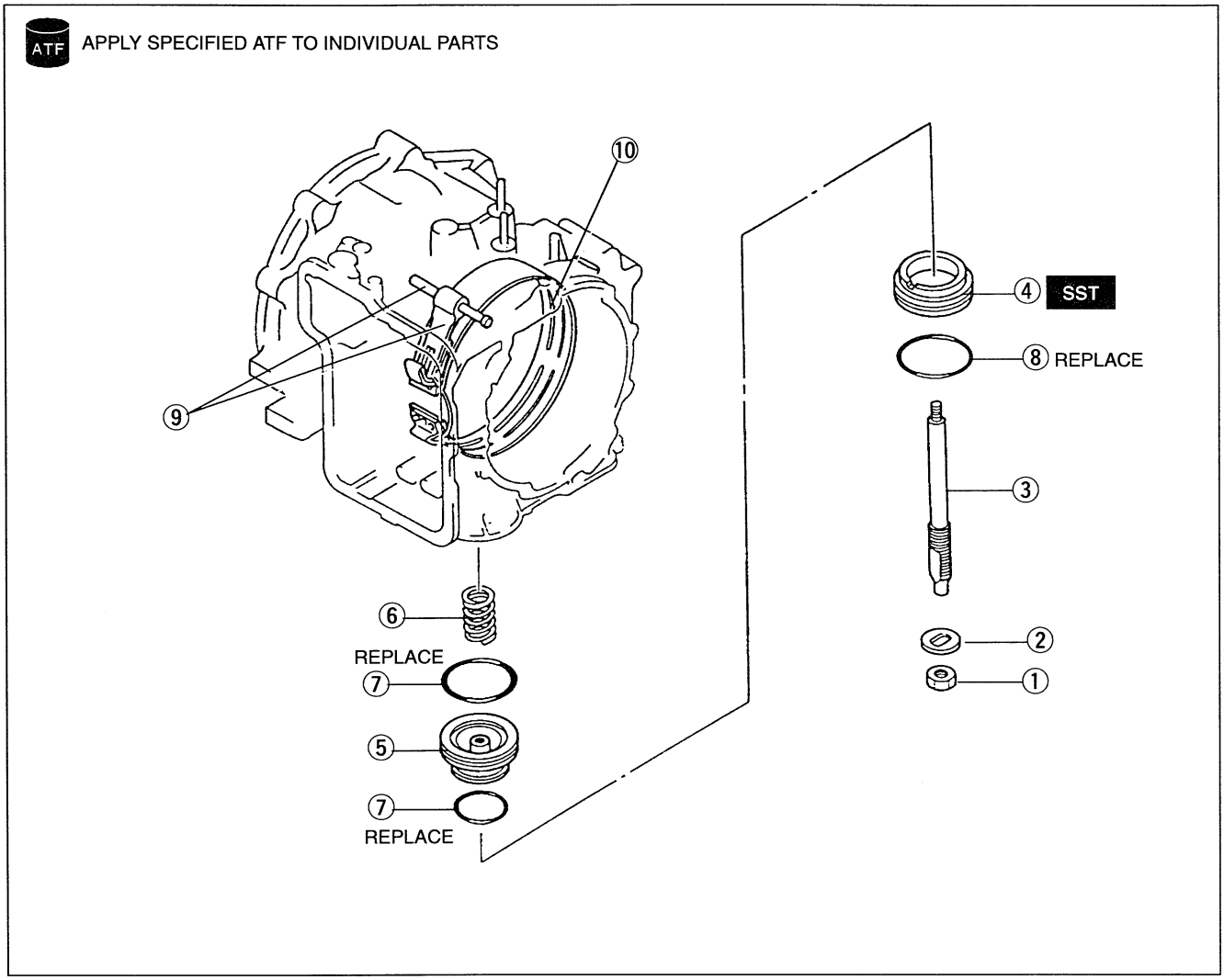
Preparation

SST

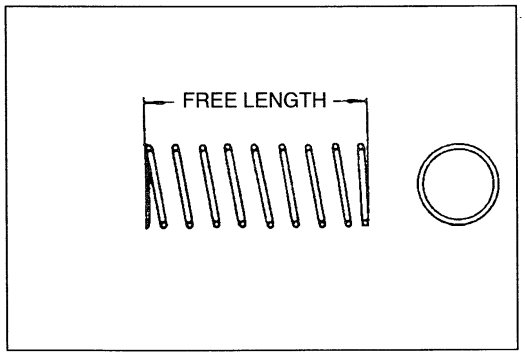
49 G019 0A7A Compressor set, return spring 	For assembly of 2–4 brake band	49 G019 028 Bolt (Part of 49 G019 0A7A) 	For assembly of 2–4 brake band
49 G019 029 Nut (Part of 49 G019 0A7A) 	For assembly of 2–4 brake band	49 G019 030 Plate (Part of 49 G019 0A7A) 	For assembly of 2–4 brake band

Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



1. Nut
2. Washer
3. Piston stem
4. Servo retainer
   Assembly Note ..... page K1–89
5. Band servo piston
   Assembly Note ..... page K1–89
6. Servo return spring
   Inspection ..... below
7. D-ring
8. O-ring
9. Band strut
10. 2–4 brake band
    Inspection ..... page K1–89



Inspection

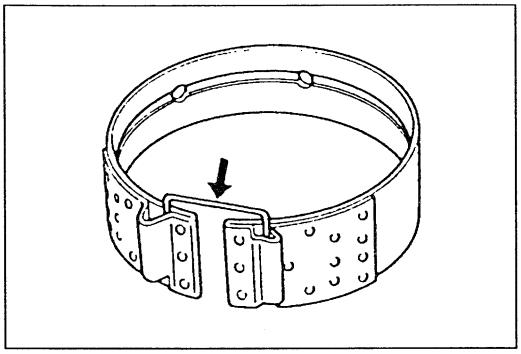
Servo return spring

1. Measure the spring free length.

Specifications

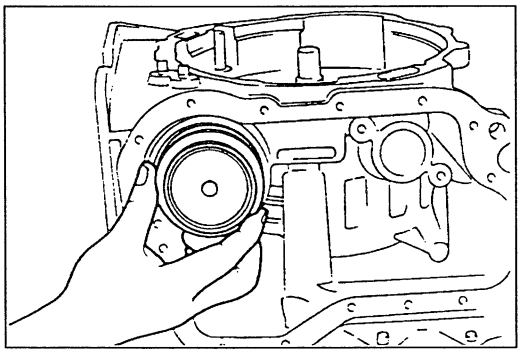
Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
27.7 {1.09}	43.25 {1.703}	4.5	3.2 {0.13}

2. If not within the specification, replace the spring.



2–4 brake band

1. Remove the 2–4 brake band, and hold it together with a wire as shown in the figure.
2. Check the 2–4 brake band for wear and burning.
3. Replace the 2–4 brake band if damage of malfunction.



Assembly note

Servo retainer, band servo piston

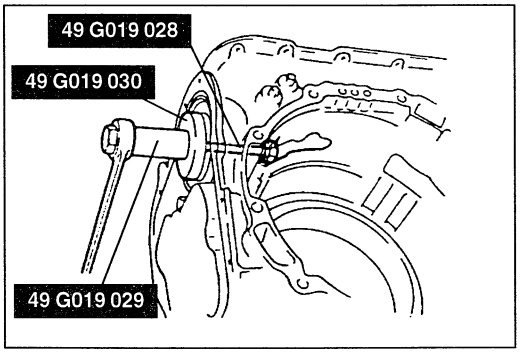
Install the servo into the transaxle case.

(1) Apply ATF to a new D-ring and install it onto the band servo piston.

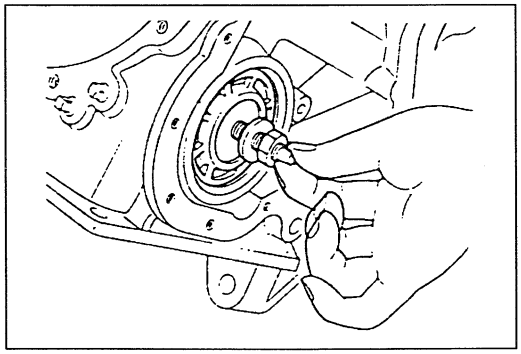
D-ring inner diameter
Small D-ring: 29.4 mm {1.16 in}
Large D-ring: 65.9 mm {2.59 in}

(2) Assemble the servo piston and servo retainer.
(3) Apply ATF to new O-rings and install them onto the servo retainer.

O-ring inner diameter: 72.9 mm {2.87 in}



(4) Install the servo return spring and servo retainer assembly into the transaxle case.
(5) Press the servo retainer assembly by using the **SST**.
(6) Install the snap ring.

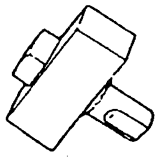
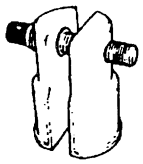
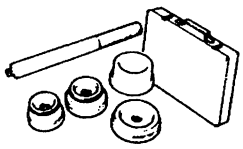
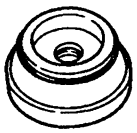
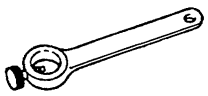


(7) Install the piston stem, washer, and nut to the band servo piston.

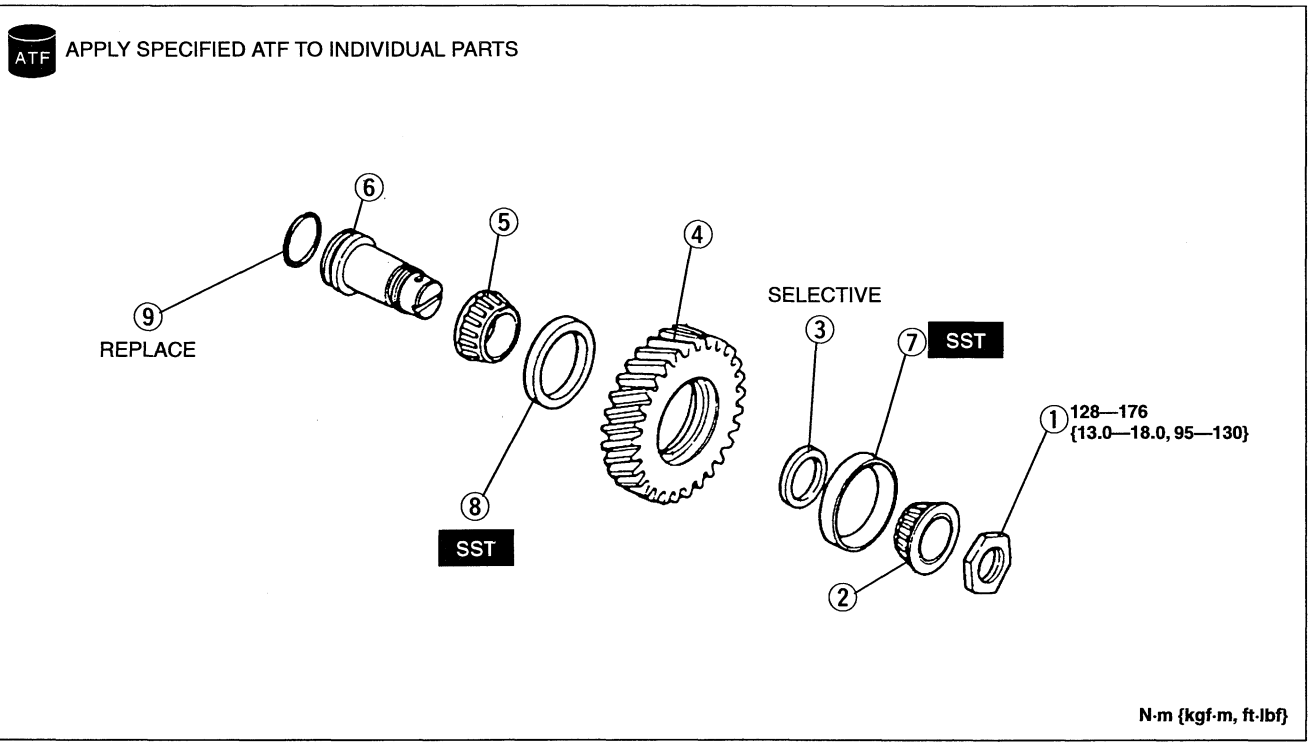
Note

- Refer to page K1–151 to adjust the brake band during transaxle assembly.

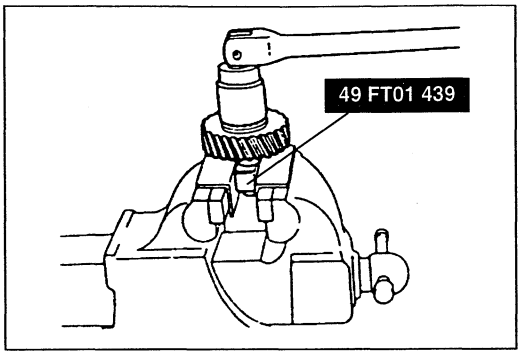
IDLER GEAR
Preparation
SST

49 FT01 439 Holder, idler gear shaft 	For removal / installation of locknut	49 G019 013 Remover, bearing 	For removal of bearing race
49 F027 0A1 Installer set, bearing 	For installation of bearing race	49 F027 007 Attachment 72 (Part of 49 F027 0A1) 	For installation of bearing race
49 0180 510B Preload attachment 	For adjustment of bearing preload	—	—

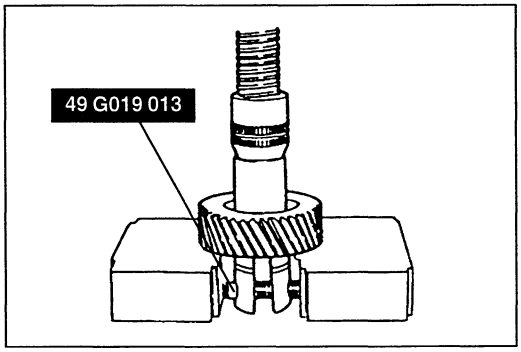
Disassembly / Inspection / Assembly
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



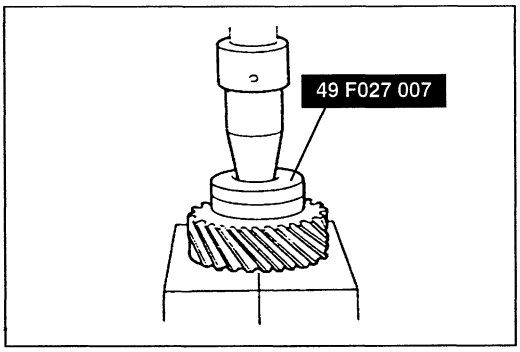
1. Locknut
   Disassembly Note ..... page K1–91
2. Bearing
3. Spacer
4. Idler gear
5. Bearing
6. Idler gear shaft
7. Bearing race
   Disassembly Note ..... page K1–91
8. Bearing race
   Disassembly Note ..... page K1–91
9. O-ring



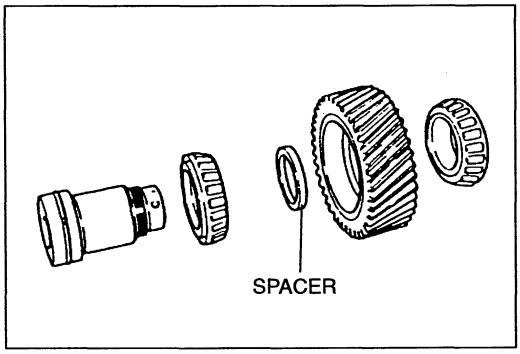
Disassembly note
Locknut
1. Secure the **SST** and the idler gear assembly in a vise.
2. Remove the locknut.



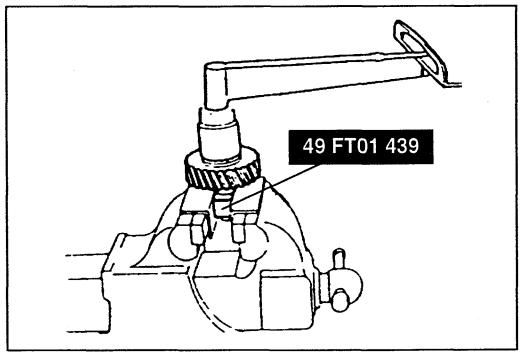
Bearing race
Remove the bearing race from the idler gear by using the **SST**.



Assembly procedure
1. Press the new bearing race in by using the **SST**.



2. Install the bearing onto the idler gear shaft, then install the idler gear, spacer, and bearing.

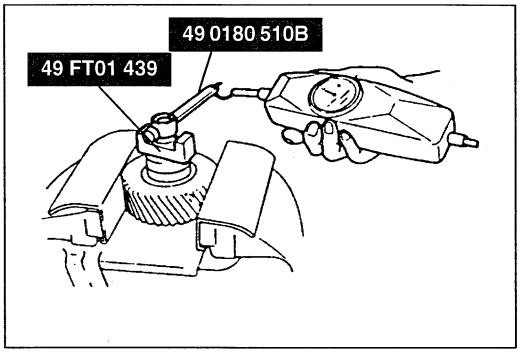


3. Secure the **SST** and the idler gear assembly in a vise.
4. Install the locknut.

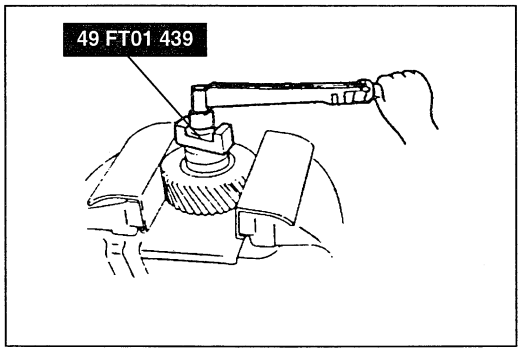
Tightening torque:
128—176 N·m {13.0—18.0 kgf·m, 95—130 ft·lbf}

5. Apply ATF to a new O-ring and install it onto the idler gear shaft.

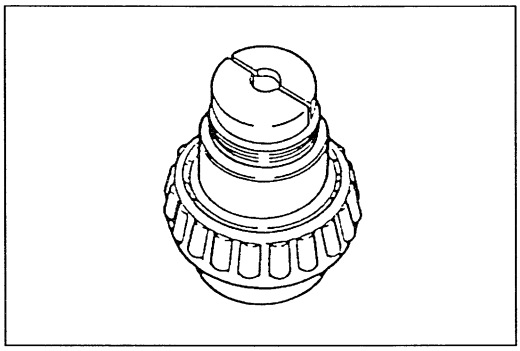
O-ring inner diameter: 33.0 mm {1.30 in}



6. Secure the idler gear in a vise.
7. Use the **SST** to measure the bearing preload at the point that the idler shaft starts to turn.



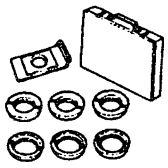
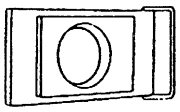
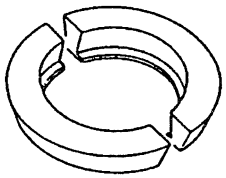
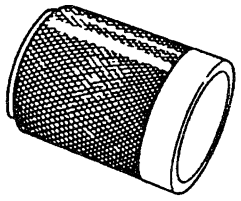
Preload:
0.03—0.88 N·m {0.3—9.0 kgf·cm, 0.3—7.8 in·lbf}
Pull scale reading:
0.3—8.8 N {0.03—0.90 kgf, 0.07—1.98 lbf}



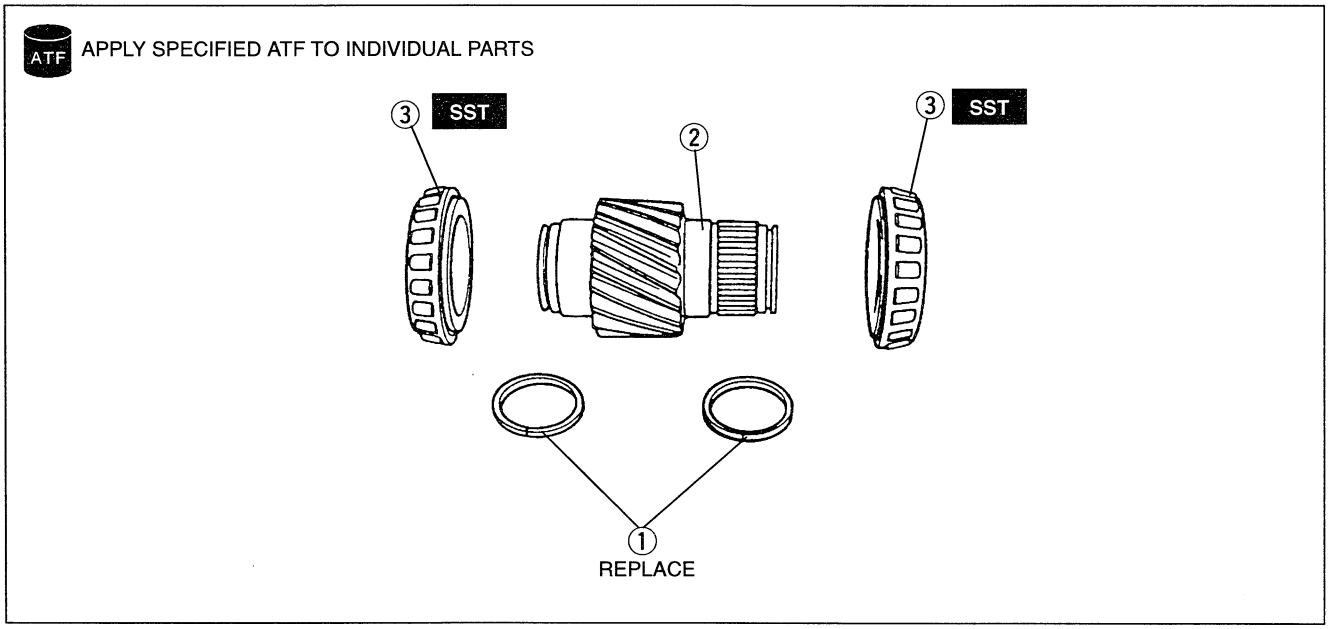
8. If the specified preload cannot be obtained within the specified tightening torque, adjust by selecting the proper adjustment spacers from below. A thicker spacer reduces the preload, and a thinner spacer increases the preload.

Thickness of shim mm {in}			
4.540 {0.179}	4.575 {0.180}	4.610 {0.181}	4.645 {0.183}
4.680 {0.184}	4.715 {0.186}	4.750 {0.187}	4.785 {0.188}
4.820 {0.190}	4.855 {0.191}	4.890 {0.193}	4.925 {0.194}
4.960 {0.195}	4.995 {0.197}	5.030 {0.198}	5.065 {0.199}
5.100 {0.201}	5.135 {0.202}	5.170 {0.204}	5.205 {0.205}
5.240 {0.206}	5.275 {0.208}	5.310 {0.209}	

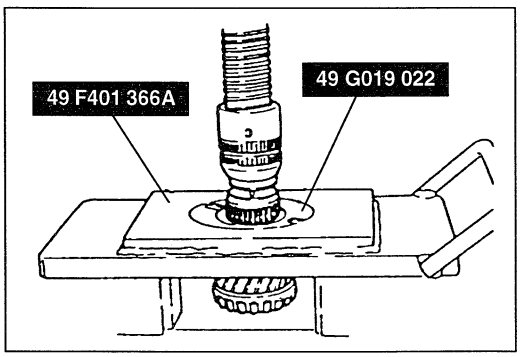
OUTPUT GEAR
Preparation
SST

49 G017 1A0 Remover set, bearing		For removal of bearing	49 F401 366A Plate (Part of 49 G017 1A0) 	For removal of bearing
49 G019 022 Attachment K		For removal of bearing	49 G019 011 Installer, bearing 	For installation of bearing

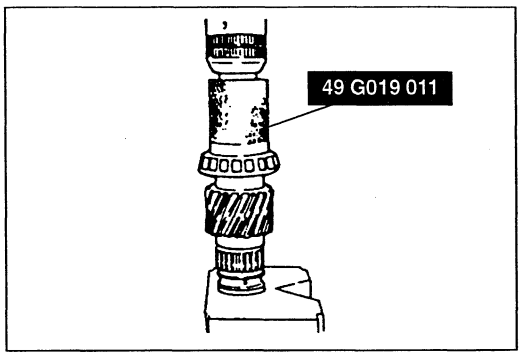
Disassembly / Inspection / Assembly
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



1. Seal ring
2. Output gear
3. Bearing
   Disassembly Note ..... below

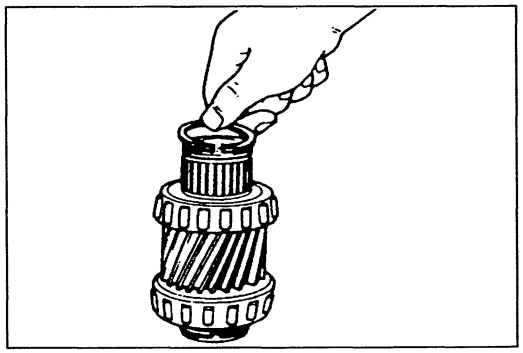


Disassembly note
Bearing
Remove the bearings from the output gear by using the **SST**.



Assembly procedure

1. Press the new bearings onto the output gear by using the **SST**.



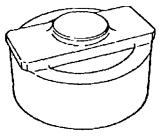
2. Apply ATF to new seal rings and assemble them to each side of the output gear.

   Seal ring outer diameter: 36.9 mm {1.45 in}

BEARING COVER ASSEMBLY

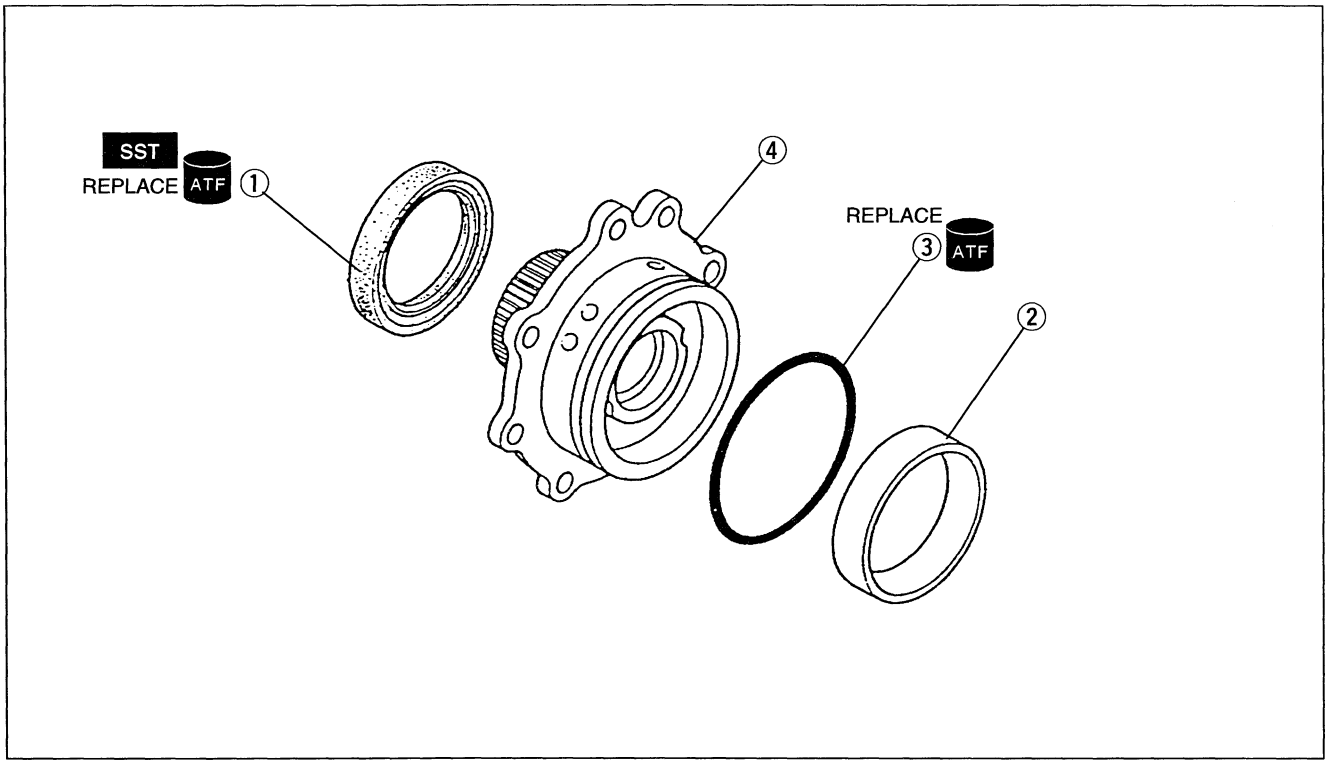
Preparation

SST

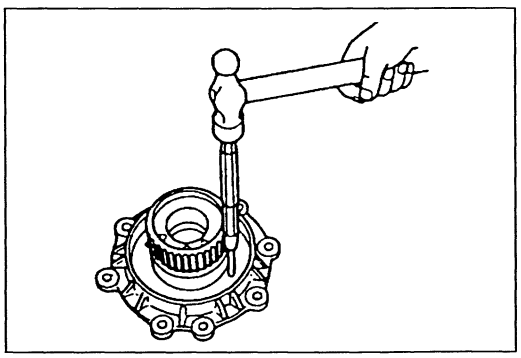
49 G019 017 Installer, oil seal		For installation of oil seal

Disassembly / Inspection / 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 Procedure**.



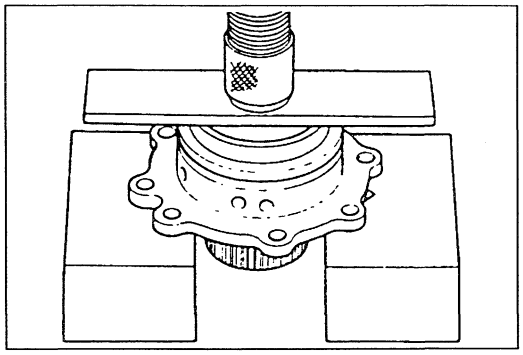
1. Oil seal
2. Bearing race
   Disassembly Note ..... below
3. O-ring
4. Bearing cover



Disassembly note

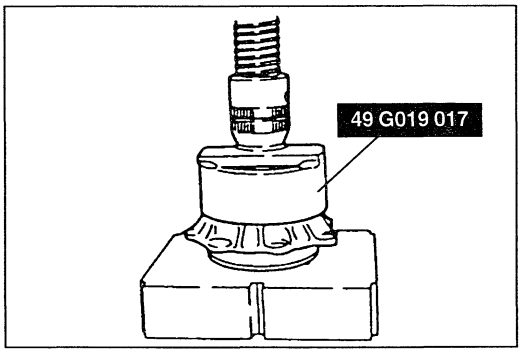
Bearing race

Remove the bearing race by using a pin punch and a hammer.



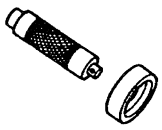
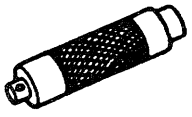
Assembly procedure
1. Press the new bearing race into the bearing cover.
2. Apply ATF to a new O-ring and install it onto the bearing cover.

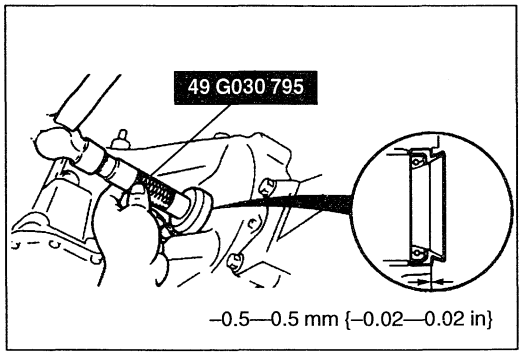
   O-ring inner diameter: 85.1 mm {3.35 in}



3. Press a new oil seal into the bearing cover by using the **SST**.

OIL SEAL (TRANSAXLE)
Preparation
SST

49 G030 795 Installer, oil seal 	For installation of oil seal	49 G030 796 Body (Part of 49 G030 795) 	For installation of oil seal
49 G030 797 Handle (Part of 49 G030 795) 	For installation of oil seal	—	—

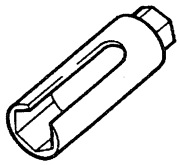


On-vehicle Replacement
1. Remove the drive shaft and joint shaft. (Refer to page K1–39.)
2. Remove the oil seal by using a screwdriver.
3. Tap the new oil seal into the transaxle case by using the **SST**.
4. Install the drive shaft and joint shaft. (Refer to page K1–154.)
5. Using the **SST** and a hammer, tap the new oil seal in evenly until the **SST** contacts the transaxle case.
6. Coat the lip of the oil seal with transaxle oil.

CONTROL VALVE BODY (DISASSEMBLY / INSPECTION)

Preparation

SST

49 G019 031 Wrench		For removal of transaxle fluid temperature sensor

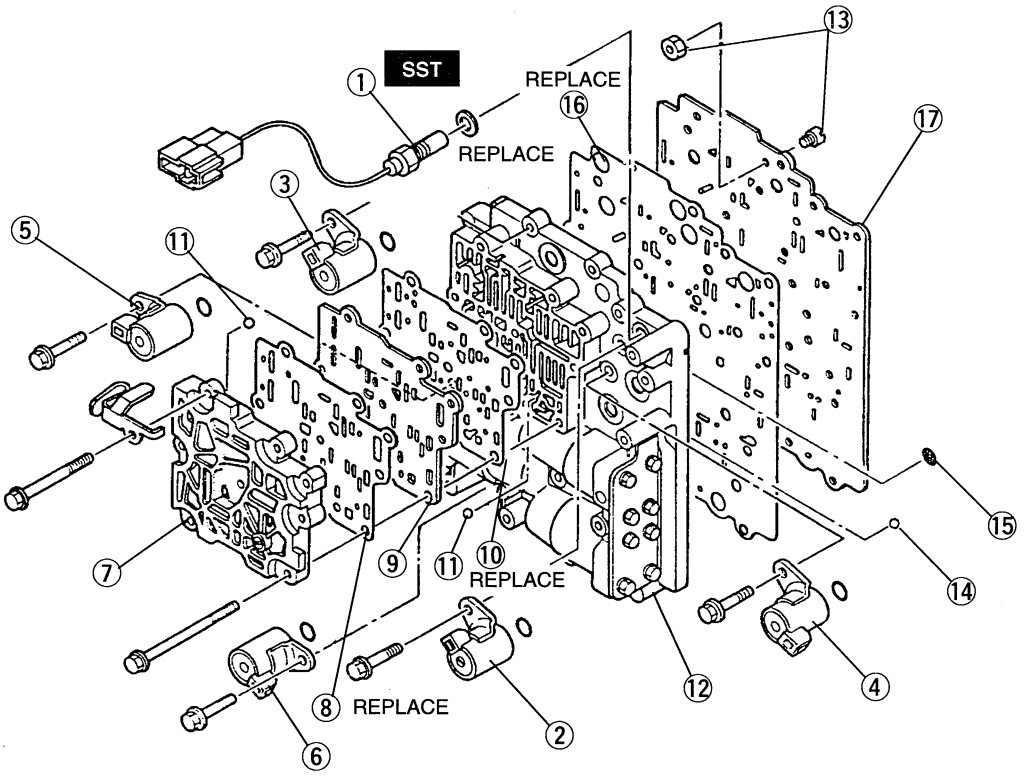
Disassembly / Inspection

Caution
- **Denting or scratching these precisely machined components will reduce the ability of the transaxle to shift properly. When handing these components or the valve body that contains them, be careful not to drop or hit them.**

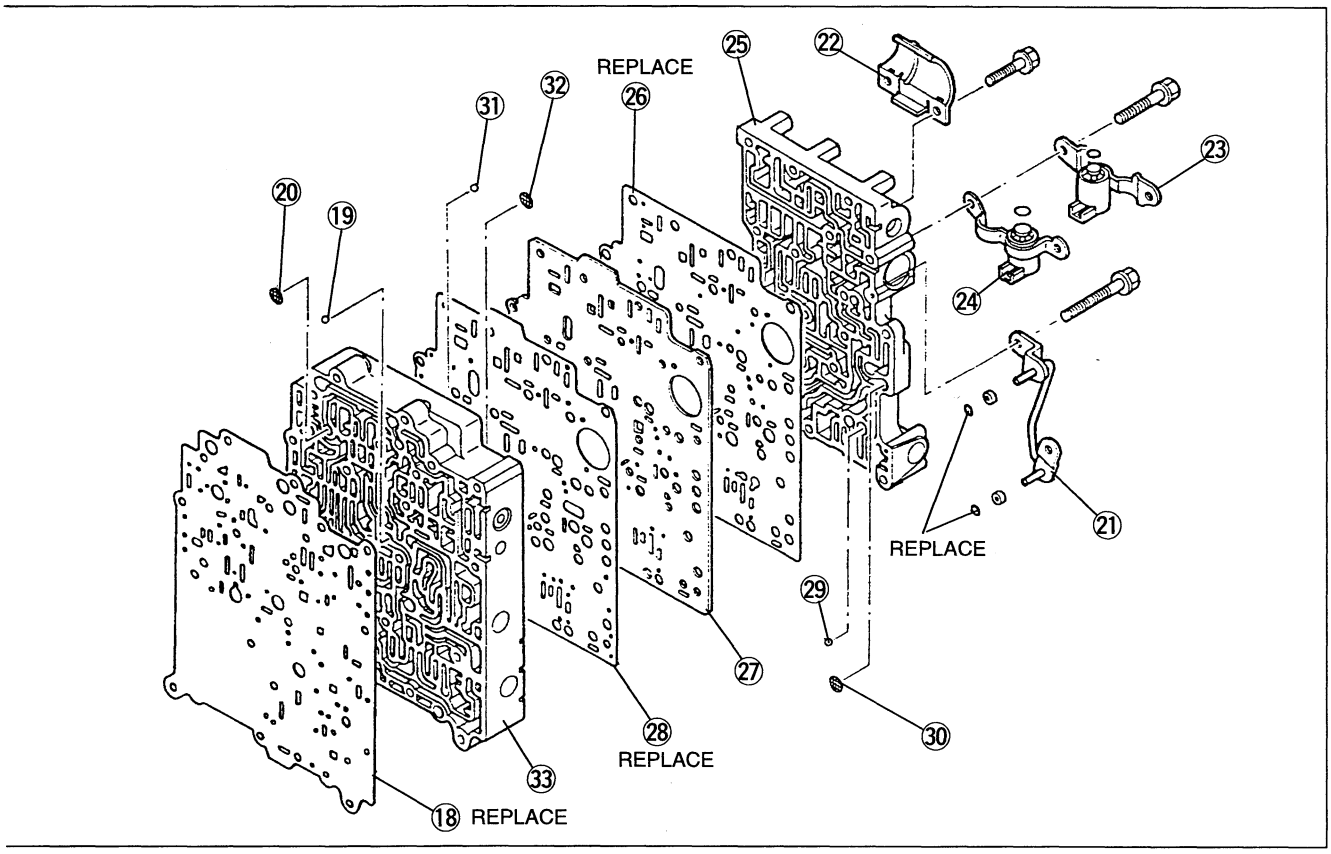
1. Disassemble in the order shown in the figure, referring to **Disassembly Procedure**.
2. Neatly arrange the removed parts to avoid confusing the similar parts.

Warning
- **Using compressd air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eyewear whenever using compressed air.**

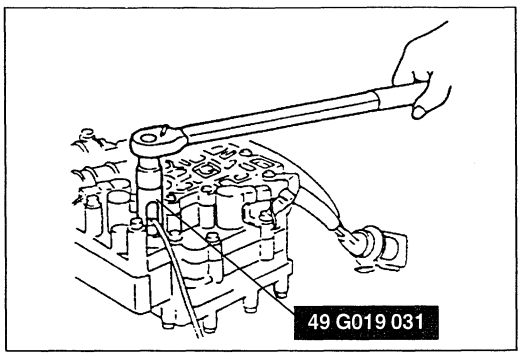
3. Clean the removed parts with cleaning solvent, and dry them with compressed air. Clean out all holes and passages with compressed air.



1. Transaxle fluid temperature sensor
2. Pressure control solenoid
   Inspection ..... page K1–35
3. Torque converter clutch solenoid valve
   Inspection ..... page K1–35
4. 3–2 timing solenoid valve
   Inspection ..... page K1–35
5. Shift solenoid A
   Inspection ..... page K1–35
6. Torque converter clutch control solenoid valve
   Inspection ..... page K1–35
7. Front control valve body
8. Front/premain front gasket
9. Premain separator plate
10. Front/premain rear gasket
11. Rubber balls
12. Premain control valve body
    Disassembly / Inspection / Assembly ..... page K1–104
13. Jet orifice and nut
14. Rubber ball
15. Oil strainer
16. Premain/main front gasket
17. Main separator plate

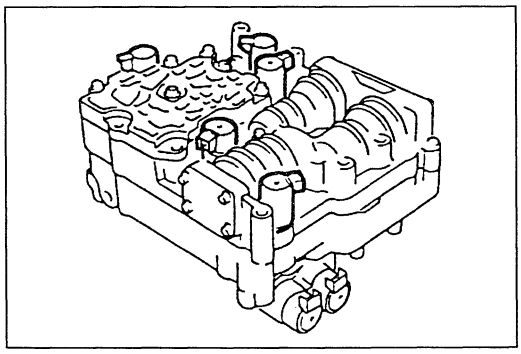


18. Premain/main rear gasket
19. Rubber ball
20. Oil strainer
21. Oil pipe assembly
22. Oil baffle
23. Shift solenoid B
    Inspection ..... page K1– 35
24. Shift solenoid C
    Inspection ..... page K1– 35
25. Rear control valve body
    Disassembly / Inspection / Assembly ..... page K1–112
26. Main/rear rear gasket
27. Rear separator plate
28. Main/rear front gasket
29. Rubber ball
30. Oil strainer
31. Rubber ball
32. Oil strainer
33. Main control valve body
    Disassembly / Inspection / Assembly ..... page K1–108

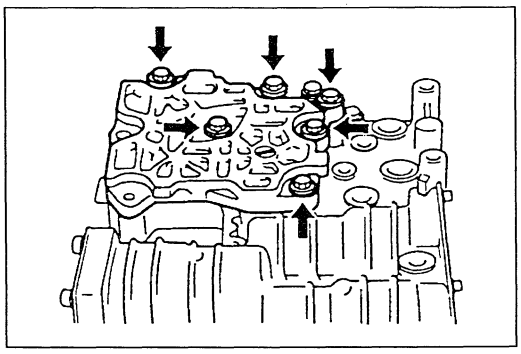


Disassembly procedure

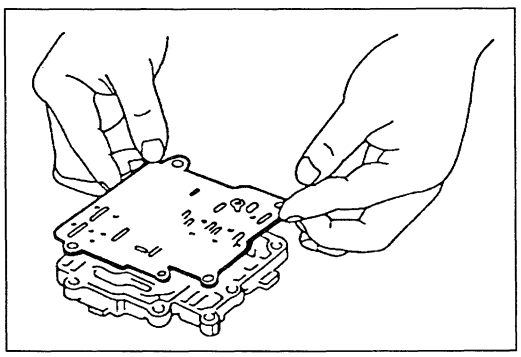
1. Remove the transaxle fluid temperature sensor by using the **SST**.



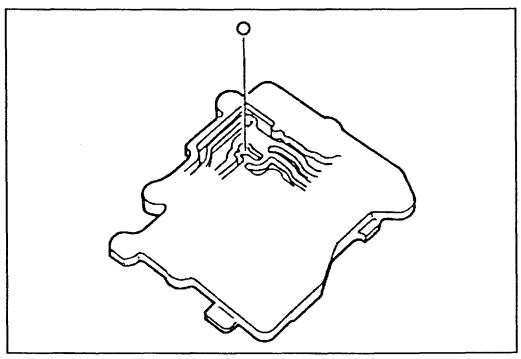
2. Remove the shift solenoid A and pressure control, torque converter clutch, 3–2 timing, and torque converter clutch control solenoid valves.
3. Remove the O-rings from the solenoid valves.



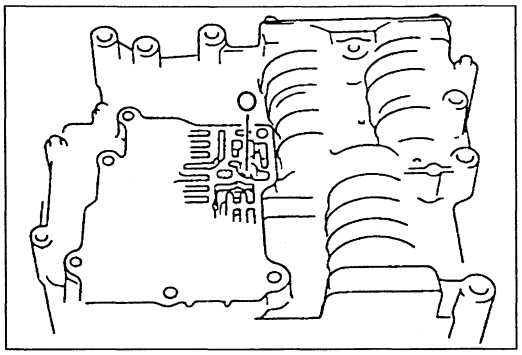
4. Remove the bolts indicated and remove the front control valve body and premain separator plate and gaskets.



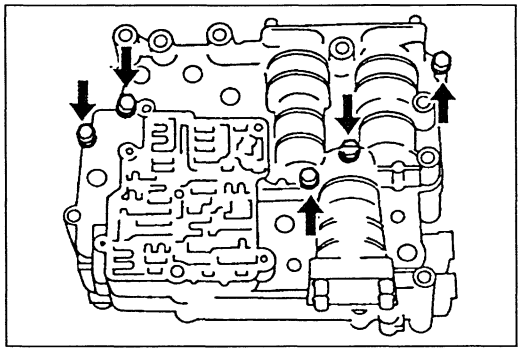
5. Remove the front/premain gaskets and separator plate from the front control body.



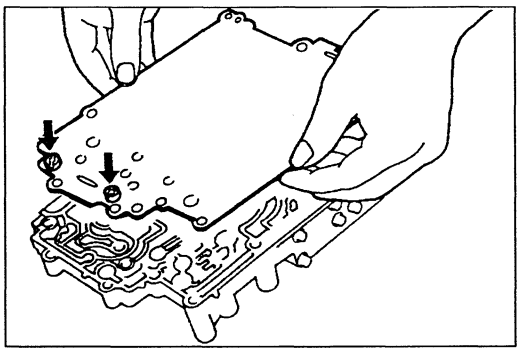
6. Remove the rubber ball from the front control valve body.



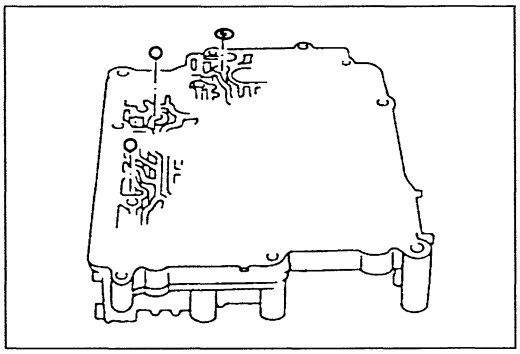
7. Remove the rubber ball from the premain control valve body.



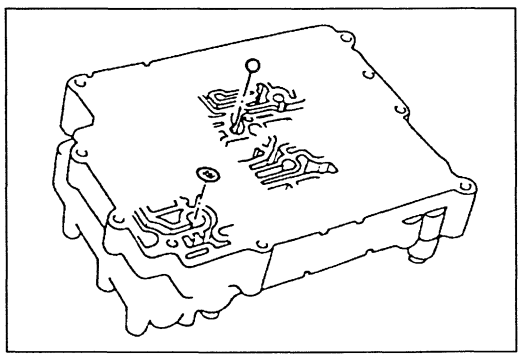
8. Remove the bolts and remove the premain control valve body and the main separator plate and gaskets.



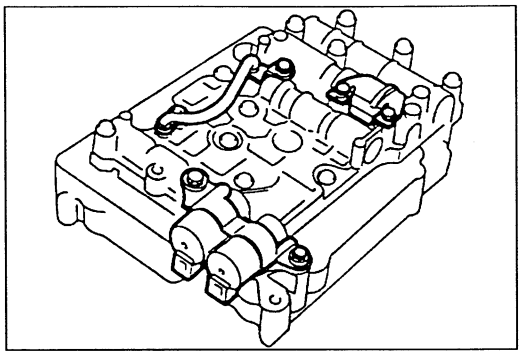
9. Remove the premain/main gaskets and separator from the premain control valve body.
10. Remove the jet orifices and nuts from the main separator plate.



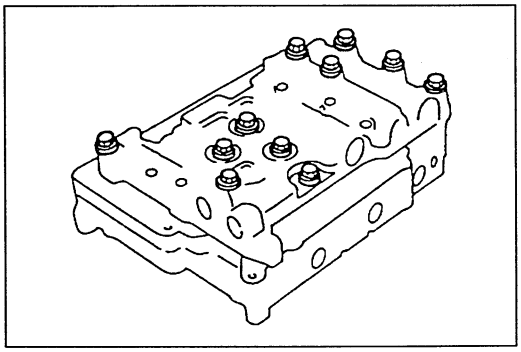
11. Remove the rubber balls and oil strainer from the premain control valve body.



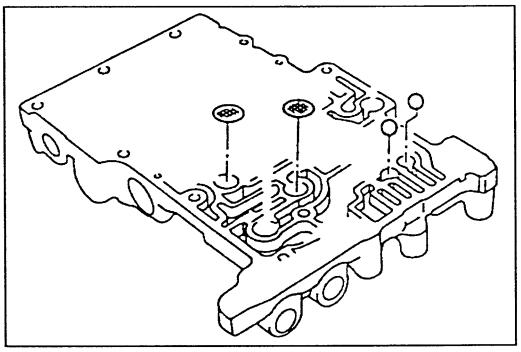
12. Remove the rubber balls and oil strainer from the main control valve body.



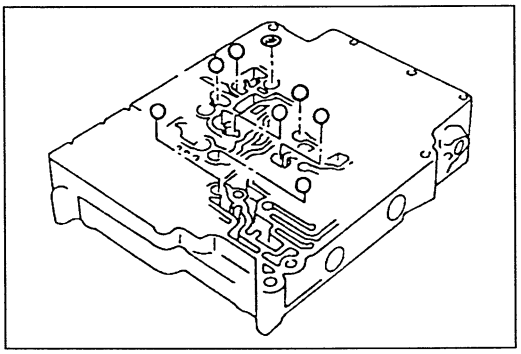
13. Turn the assembly over and remove the oil pipe, oil baffle, shift solenoid B and C.



14. Remove the bolts shown in the figure and remove the rear separator plate and gaskets.



15. Remove the main/rear gaskets and separator from the rear control valve body.
16. Remove the rubber balls and oil strainers from the rear control valve body.



17. Remove the rubber balls and oil strainers from the main control valve body.

MEMO

PREMAIN CONTROL VALVE BODY
Disassembly / Inspection / Assembly

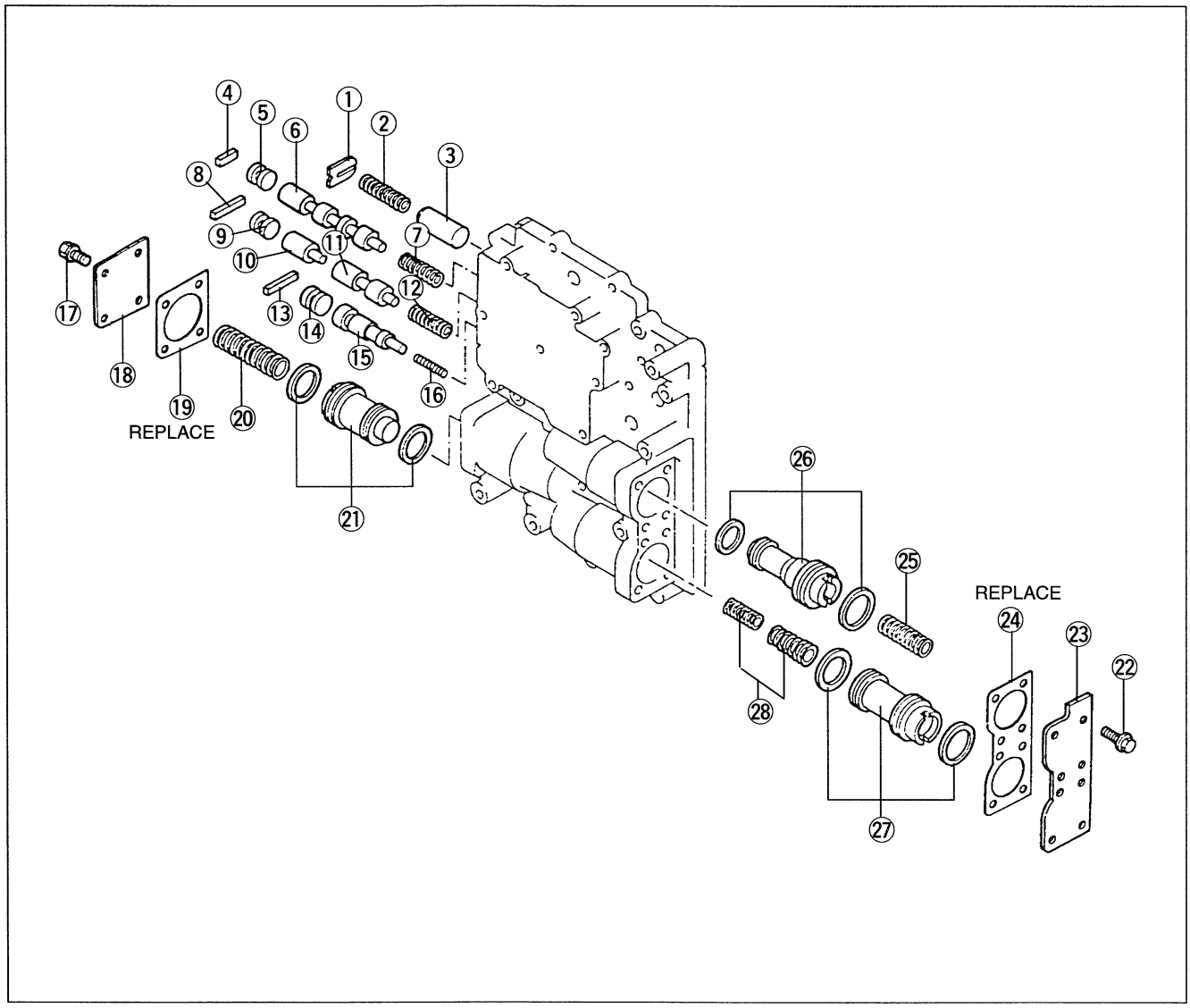
Caution
- **Denting or scratching these precisely machined components will reduce the ability of the transaxle to shift properly. When handling these components or the valve body that contains them, be careful not to drop or hit them.**

Note
- If a valve does not slide out under its own weight, place the valve body open-side down and tap on the valve body lightly with a plastic hammer.

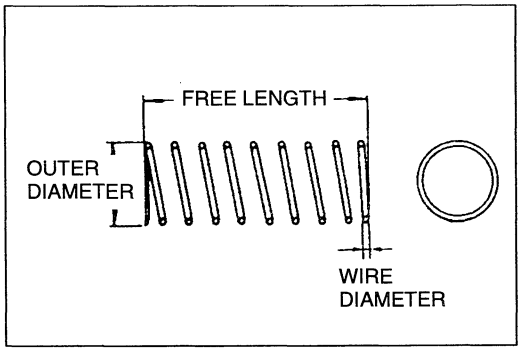
1. Disassemble in the order shown in the figure, noting the proper reassembly direction of the valves and internal parts.

Warning
- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eyewear whenever using compressed air.**

2. Clean all parts and bores with compressed air and apply ATF to them immediately before assembly.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.

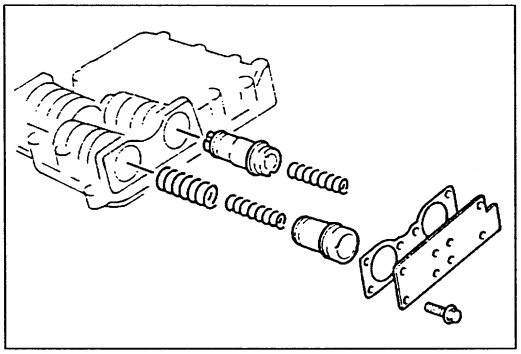


1. Spring retainer
2. Pressure modifier accumulator spring
   Inspection ..... below
3. Pressure modifier accumulator valve
4. Stop pin
5. Stop plug
6. 3–2 timing valve
7. 3–2 timing spring
   Inspection ..... below
8. Stop pin
9. Stop plug
10. Cut back valve A
11. Cut back valve B
12. Cut back spring
    Inspection ..... below
13. Stop pin
14. Stop plug
15. Bypass valve
16. Bypass spring
    Inspection ..... below
17. Bolts
18. 1–2 accumulator plate
19. 1–2 accumulator gasket
20. 1–2 accumulator spring (small, large)
    Inspection ..... below
21. 1–2 accumulator piston and seal rings
22. Bolts
23. N–R accumulator plate
24. N–R accumulator gasket
25. N–D accumulator spring
    Inspection ..... below
26. N–D accumulator piston and seal ring
27. N–R accumulator piston and seal ring
28. N–R accumulator spring (small, large)
    Inspection ..... below



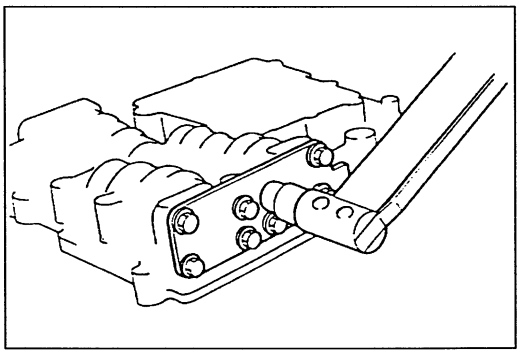
Inspection
1. Measure the spring free length.
2. If not within the specifications, replace the spring.

Spring \ Item		Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}	Identification color
Pressure modifier accumulator spring		8.2 {0.32}	38.2 {1.50}	16.5	1.2 {0.047}	Light green
3–2 timing spring		8.25 {0.325}	35.4 {1.394}	12.5	0.85 {0.033}	Light blue
Cut back spring		8.2 {0.32}	29.8 {1.17}	7.4	0.6 {0.02}	Purple
Bypass spring		6.3 {0.25}	29.5 {1.16}	11.7	0.6 {0.02}	Dark green
1–2 accumulator spring	Small	14.8 {0.583}	81.6 {3.213}	17.7	1.7 {0.067}	Gray
	Large	20.2 {0.795}	81.6 {3.213}	12.5	2.3 {0.091}	Dark green
N–D accumulator spring		9.8 {0.39}	52.9 {2.08}	12.0	1.0 {0.039}	White
N–R accumulator spring	Small	7.2 {0.28}	60.1 {2.37}	26.2	1.0 {0.039}	—
	Large	11.2 {0.441}	56.0 {2.20}	15.2	1.6 {0.063}	—



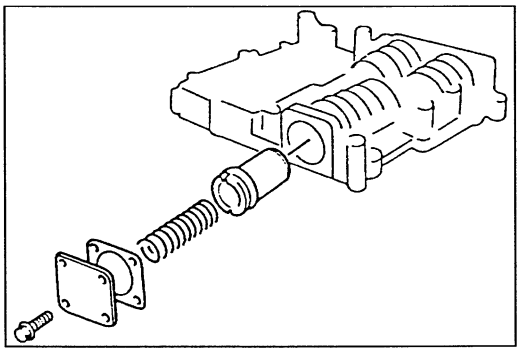
Assembly procedure

1. Apply ATF to the seal rings, and install them to the N–D accumulator piston.
2. Insert the piston and N–D accumulator spring.
3. Apply ATF to the seal rings, and install them to the N–R accumulator piston.
4. Insert the piston and N–R accumulator spring.

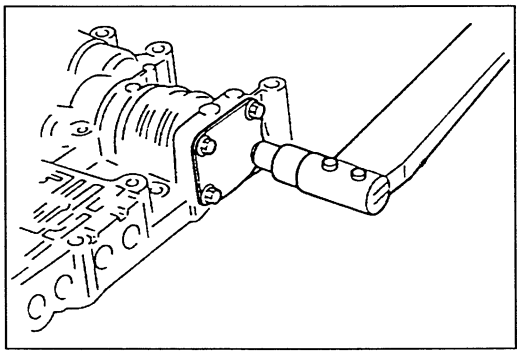


5. Insert the N–R accumulator gasket plate.
6. Tighten the plate bolt.

Tightening torque:
6.5—7.8 N·m {66—80 kgf·cm, 58—69 in·lbf}

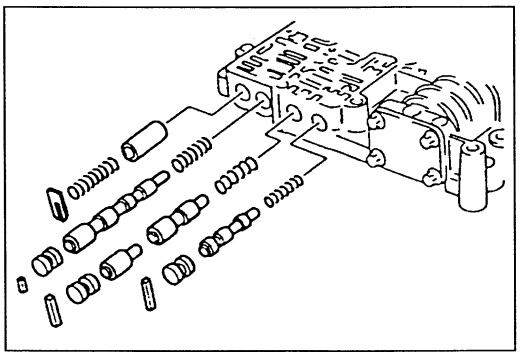


7. Apply ATF to the seal rings, and install them onto the 1–2 accumulator piston.
8. Install the piston and 1–2 accumulator spring.



9. Install the 1–2 accumulator gasket and plate.
10. Tighten the plate bolt.

Tightening torque:
6.5—7.8 N·m {66—80 kgf·cm, 58—69 in·lbf}



11. Install the bypass valve spring, bypass valve, stop plug, and stop pin.
12. Install the cut back spring, cut back valve B, cut back valve A, stop plug, and stop pin.
13. Install the 3–2 timing spring, 3–2 timing valve, stop plug, and stop pin.
    Install the pressure modifier accumulator valve, pressure modifier accumulator spring, and spring retainer.

MEMO

MAIN CONTROL VALVE BODY
Disassembly / Inspection / Assembly

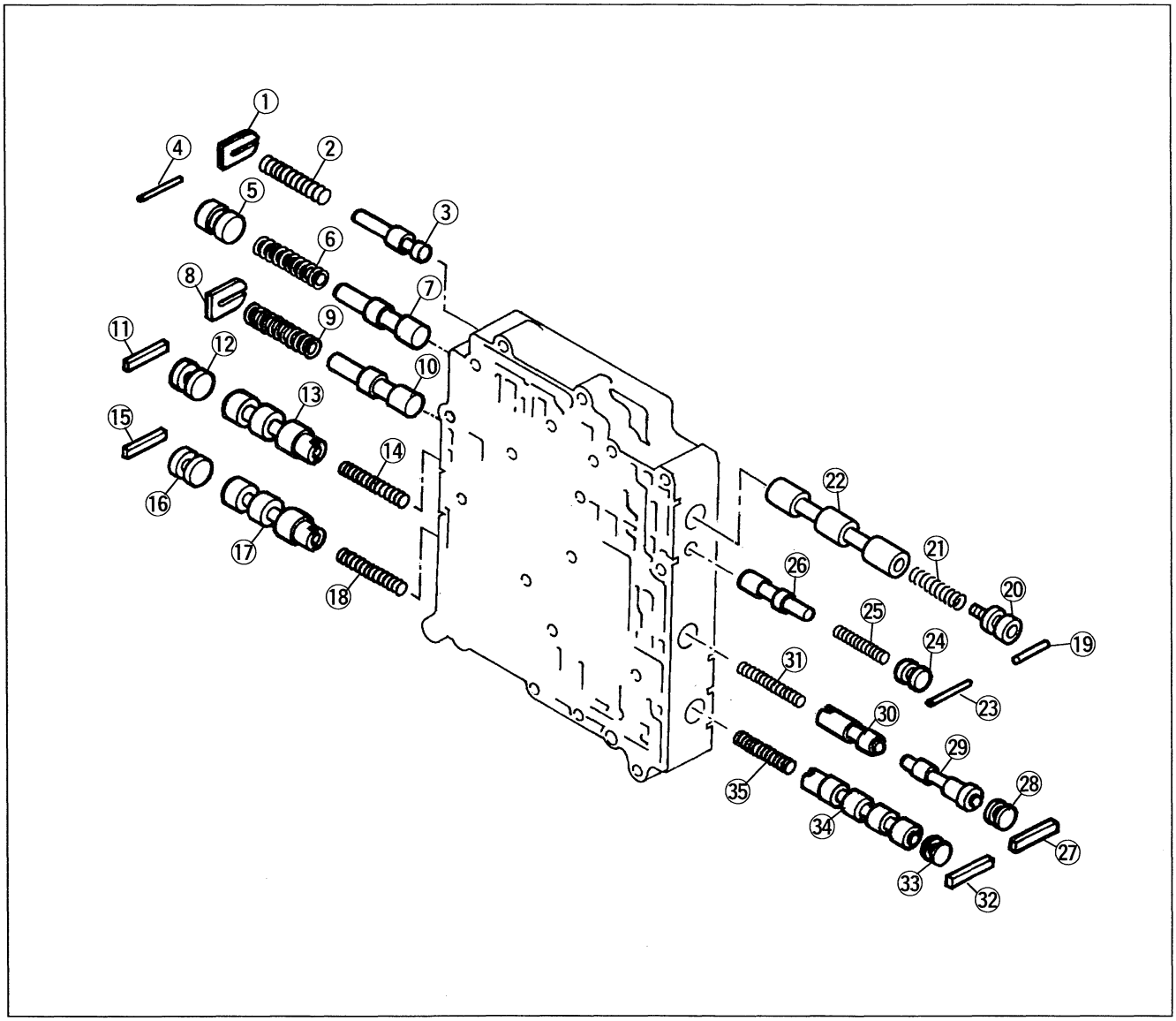
Caution
- **Denting or scratching these precisely machined components will reduce the ability of the transaxle to shift properly. When handling these components or the valve body that contains them, be careful not to drop or hit them.**

Note
- If a valve does not slide out under its own weight, place the valve body open-side down and tap on the valve body lightly with a plastic hammer.

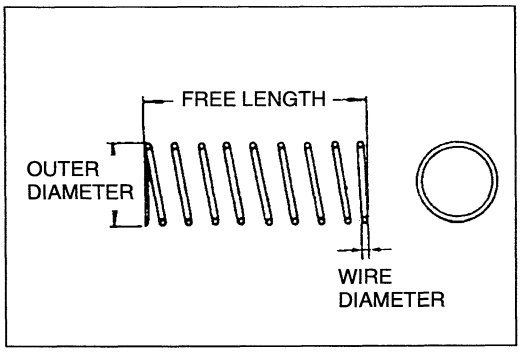
1. Disassemble in the order shown in the figure, noting the proper reassembly direction of the valves and internal parts.

Warning
- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eyewear whenever using compressed air.**

2. Clean all parts and bores with compressed air and apply ATF to them immediately before assembly.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.

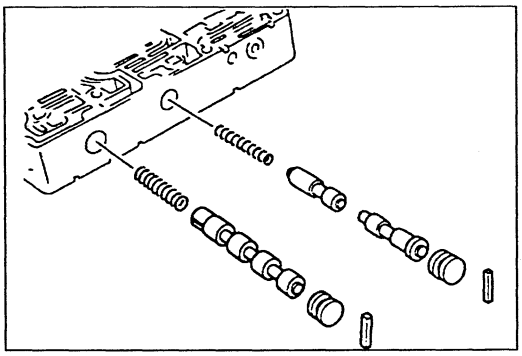


1. Spring retainer
2. Converter relief spring
   Inspection ..... below
3. Converter relief valve
4. Stop pin
5. Stop plug
6. Solenoid reducing spring
   Inspection ..... below
7. Solenoid reducing valve
8. Spring retainer
9. Low-reducing spring
   Inspection ..... below
10. Low-reducing valve
11. Stop pin
12. Stop plug
13. 1–2 shift valve
14. 1–2 shift spring
    Inspection ..... below
15. Stop pin
16. Stop plug
17. 2–3 shift valve
18. 2–3 shift spring
    Inspection ..... below
19. Stop pin
20. Stop plug
21. Pressure modifier spring
    Inspection ..... below
22. Pressure modifier valve
23. Stop pin
24. Stop plug
25. Coast timing spring
    Inspection ..... below
26. Coast timing valve
27. Stop pin
28. Stop plug
29. Torque converter clutch shift valve A
30. Torque converter clutch shift valve B
31. Torque converter clutch shift spring
    Inspection ..... below
32. Stop pin
33. Stop plug
34. 3–4 shift valve
35. 3–4 shift spring
    Inspection ..... below



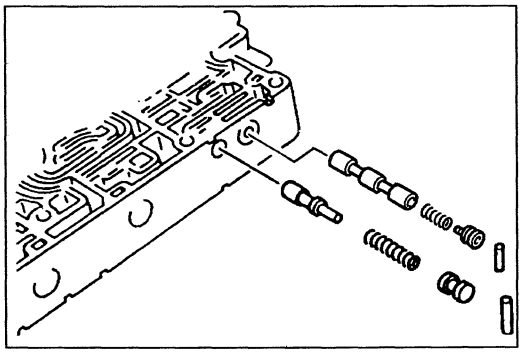
Inspection
1. Measure the spring free length.
2. If not within the specifications, replace the spring.

Item / Spring	Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}	Identification color
Convertor relief spring	7.4 {0.29}	32.3 {1.27}	13.5	1.1 {0.043}	—
Solenoid reducing spring	8.0 {0.31}	39.7 {1.56}	12.0	0.9 {0.03}	Red
Low reducing spring	8.7 {0.34}	38.3 {1.51}	12.5	0.9 {0.03}	Yellow
1–2 shift spring	7.4 {0.29}	36.6 {1.44}	12.0	0.8 {0.031}	Purple
2–3 shift spring	7.4 {0.29}	36.6 {1.44}	12.0	0.8 {0.031}	Purple
Coast timing spring	6.2 {0.24}	28.0 {1.10}	16.0	0.6 {0.02}	Light blue
Torque converter clutch shift spring	6.0 {0.24}	40.0 {1.57}	13.8	0.5 {0.02}	White
3–4 shift spring	7.4 {0.29}	36.6 {1.44}	12.0	0.8 {0.031}	Purple
Pressure modifier spring	5.0 {0.20}	19.0 {0.75}	12.7	0.6 {0.02}	—

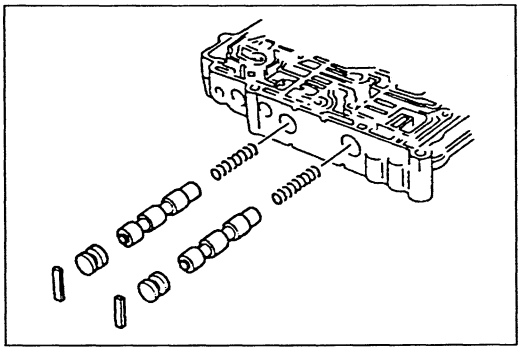


Assembly procedure

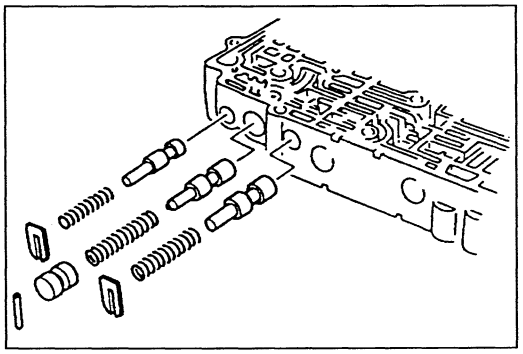
1. Install the 3–4 shift spring, 3–4 shift valve, stop plug, and stop pin.
2. Install the torque converter clutch shift spring, torque converter clutch shift valve B, torque converter clutch shift valve A, stop plug, and stop pin.



3. Install the coast timing valve, coast timing spring, stop plug, and stop pin.
4. Install the pressure modifier valve, pressure modifier spring, stop plug, and stop pin.



5. Install the 1–2 shift spring, 1–2 shift valve, stop plug, and stop pin.
6. Install the 2–3 shift spring, 2–3 shift valve, stop plug, and stop pin.



7. Install the low-reducing valve, low-reducing spring, spring retainer.
8. Install the solenoid reducing valve, stop plug, and stop pin.
9. Install the converter relief valve, converter relief spring, and spring retainer.

MEMO

REAR CONTROL VALVE BODY
Disassembly / Inspection / Assembly

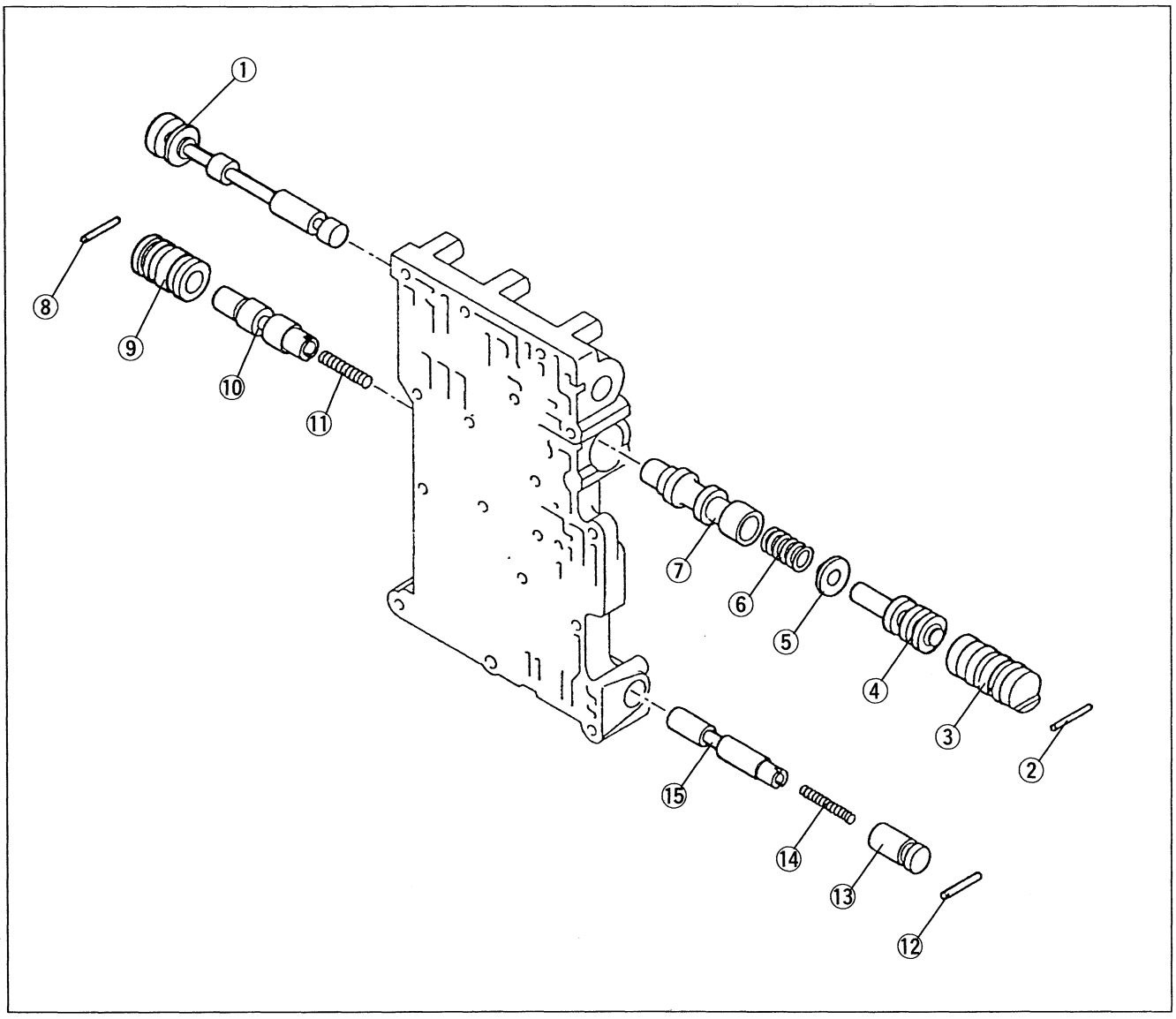
Caution
- **Denting or scratching these precisely machined components will reduce the ability of the transaxle to shift properly. When handing these components or the valve body that contains them, be careful not drop or hit them.**

Note
- If a valve does not slide out under its own weight, place the valve body open-side down and tap on the valve body lightly with a plastic hammer.

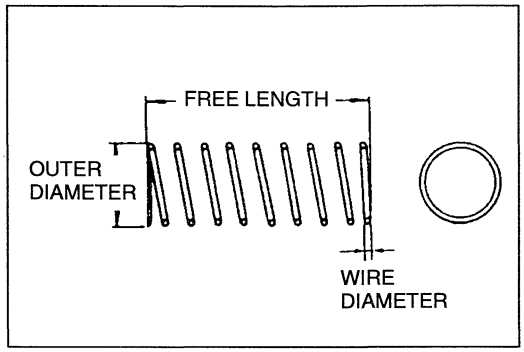
1. Disassemble in the order shown in the figure, noting the proper reassembly direction of the valves and internal parts.

Warning
- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eyewear whenever using compressed air.**

2. Clean all parts and bores with compressed air and apply ATF to them immediately before assembly.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



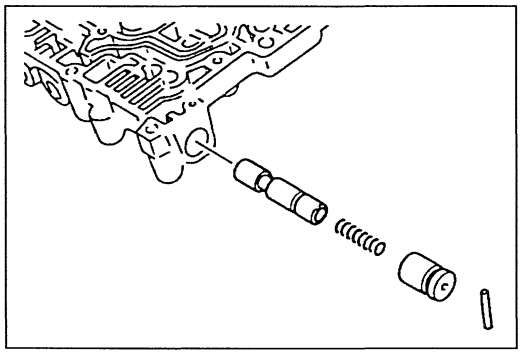
1. Manual valve
2. Stop pin
3. Pressure regulator plug sleeve
4. Pressure regulator plug
5. Pressure regulator spring seat
6. Pressure regulator spring
   Inspection ..... below
7. Pressure regulator valve
8. Stop pin
9. Torque converter clutch control plug
10. Torque converter clutch control valve
11. Torque converter clutch control spring
    Inspection ..... below
12. Stop pin
13. 2–3 timing plug
14. 2–3 timing spring
    Inspection ..... below
15. 2–3 timing valve



Inspection

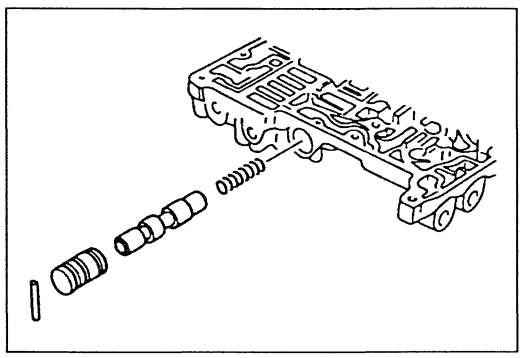
1. Measure the spring free length.
2. If not within the specifications, replace the spring.

Item / Spring	Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}	Identification color
Pressure regulator spring	12.0 {0.472}	33.9 {1.33}	7.0	1.1 {0.043}	—
Torque converter clutch control spring	5.8 {0.23}	33.1 {1.30}	12.6	0.55 {0.022}	White
2–3 timing spring	4.7 {0.19}	22.3 {0.878}	14.0	0.65 {0.026}	White

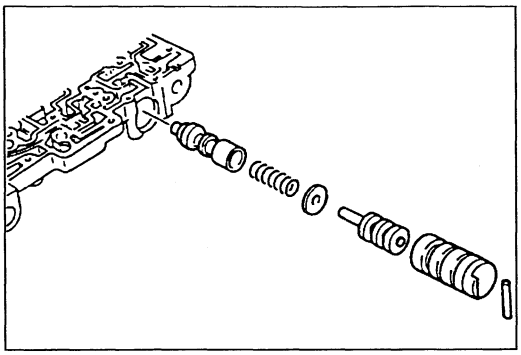


Assembly procedure

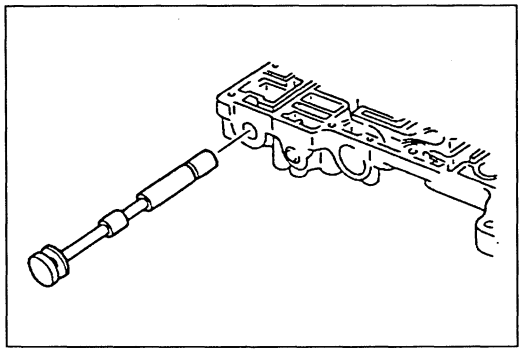
1. Install the 2–3 timing valve, 2–3 timing spring, 2–3 timing plug, and stop pin.



2. Install the torque converter clutch control spring, torque converter clutch control valve, torque converter clutch control plug, and stop pin.

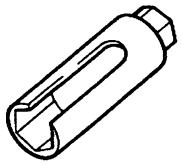


3. Install the pressure regulator valve, pressure regulator spring, pressure regulator spring seat, pressure regulator plug, pressure regulator plug sleeve, and stop pin.



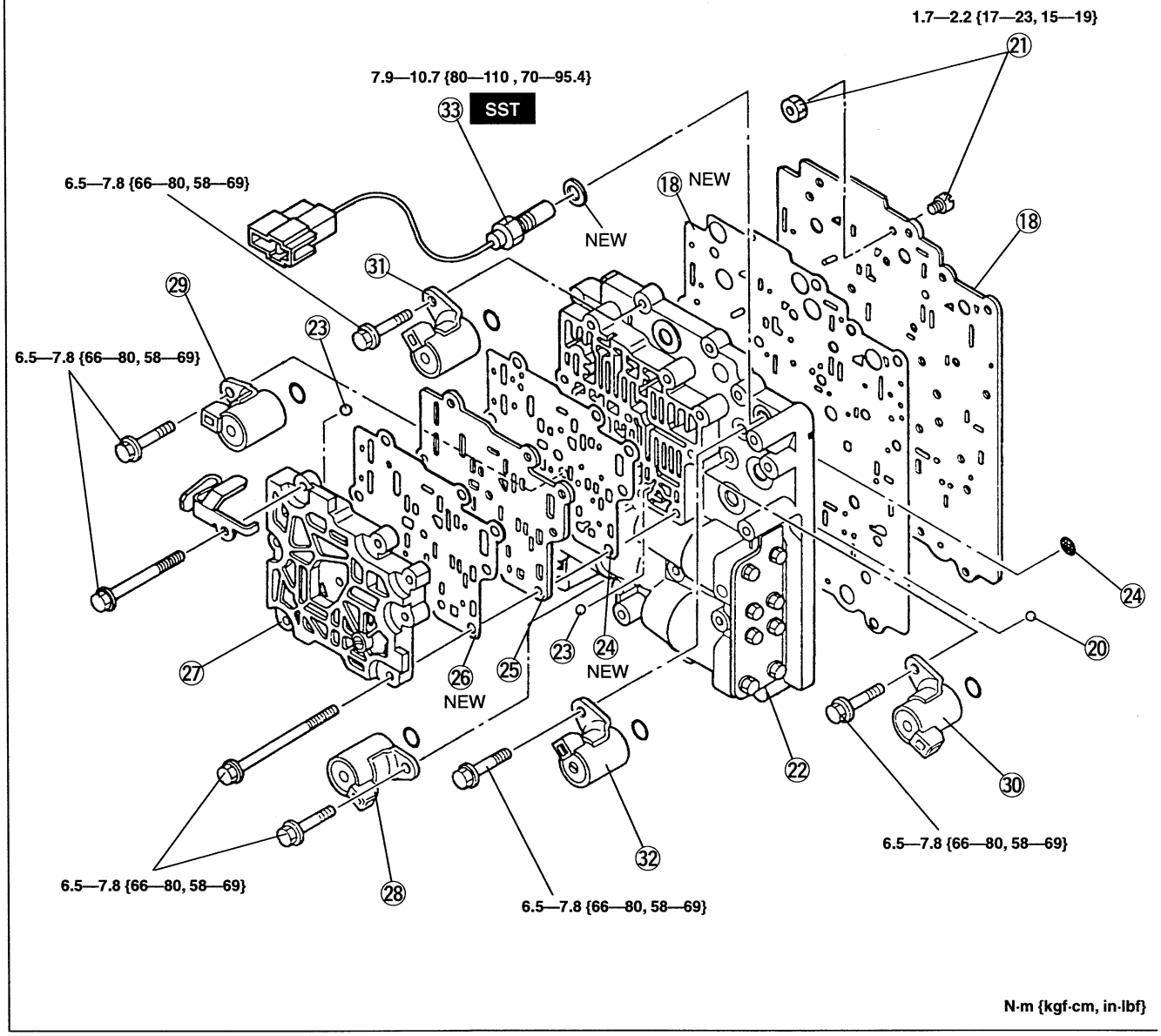
4. Install the manual valve.

CONTROL VALVE BODY (ASSEMBLY)
Preparation
SST

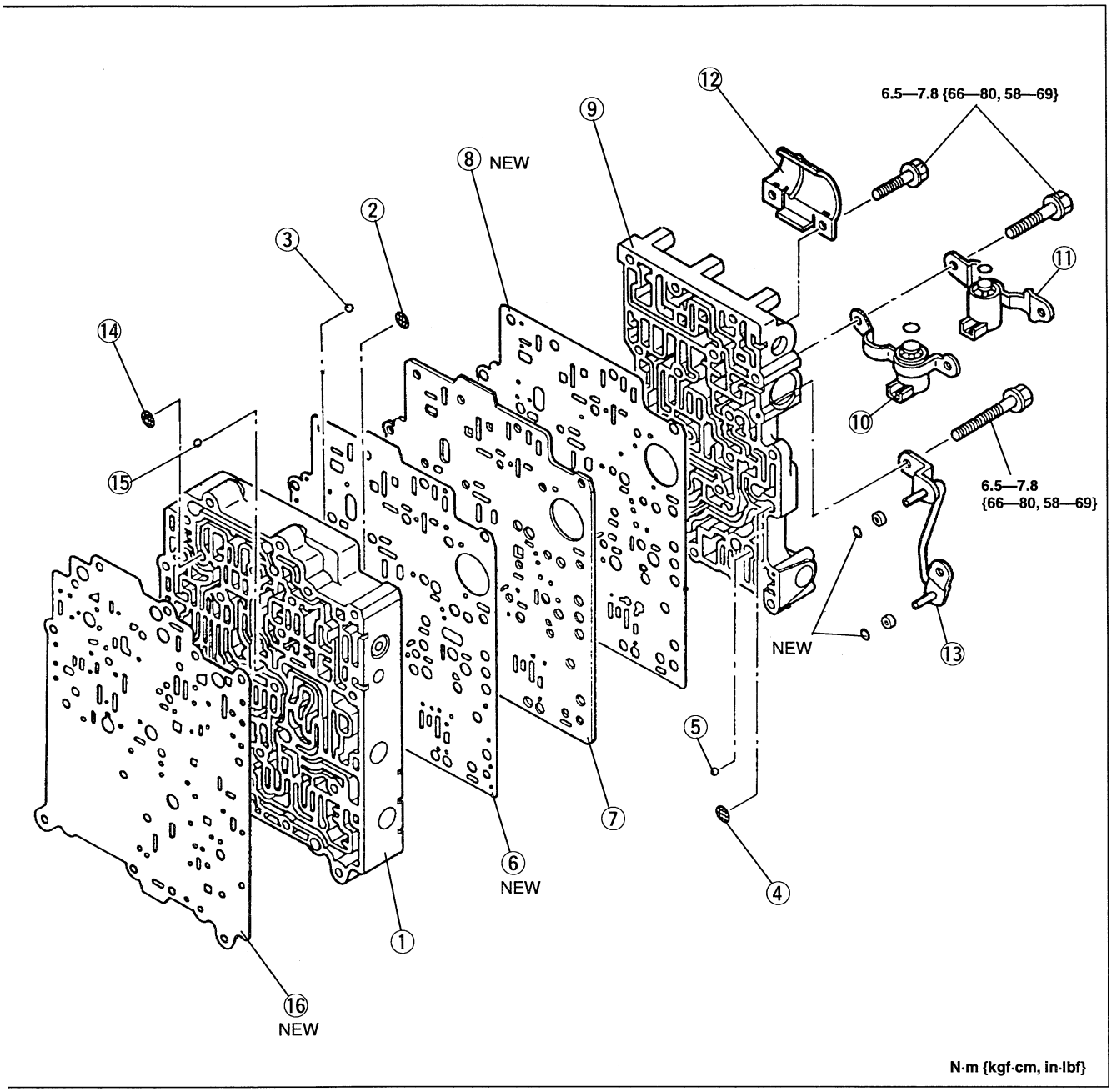
49 G019 031 Wrench		For Installation of transaxle fluid temperature sensor

Assembly

1. Verify that all parts are clean and free of dust or other small particles.
2. Apply ATF to all O-rings and gaskets.
3. Assemble in the order shown in the figure, referring to **Assembly Procedure**.



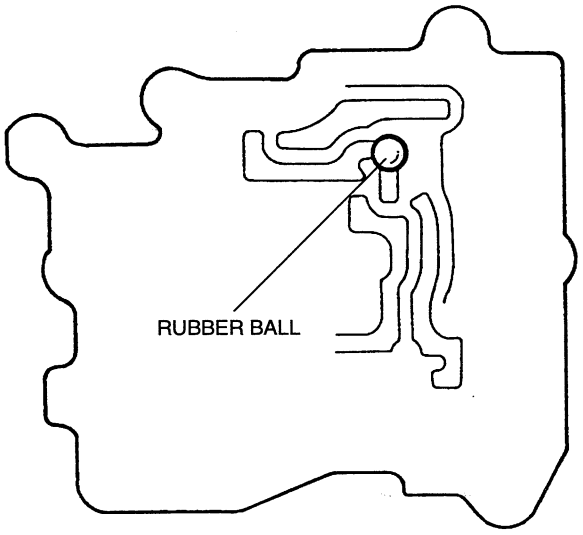
1. Main control valve body
2. Oil strainer
   Installation position ..... page K1–118
3. Rubber ball
   Installation position ..... page K1–118
4. Oil strainer
   Installation position ..... page K1–118
5. Rubber ball
   Installation position ..... page K1–118
6. Main/rear front gasket
7. Rear separator plate
8. Main/rear rear gasket
9. Rear control valve body
   Bolt installation position ..... page K1–120
10. Shift solenoid C
11. Shift solenoid B
12. Oil baffle
13. Oil pipe assembly
14. Oil strainer
    Installation position ..... page K1–118
15. Rubber ball
    Installation position ..... page K1–118
16. Premain/main rear gasket



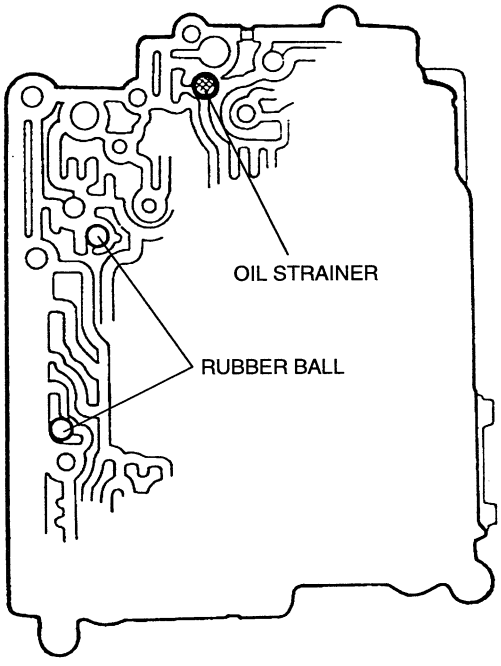
17. Main separator plate
18. Premain/main front gasket
19. Oil strainer
    Installation position ..... page K1–118
20. Rubber ball
    Installation position ..... page K1–118
21. Jet orifice and nut
22. Premain control valve body
    Bolt installation position ..... page K1–120
23. Rubber ball
    Installation position ..... page K1–118
24. Front/premain rear gasket
25. Premain separator plate
26. Front/premain front gasket
27. Front control valve body
    Bolt installation position ..... page K1–120
28. Torque converter clutch control solenoid valve
29. Shift solenoid A
30. 3–2 timing solenoid valve
31. Torque converter clutch solenoid valve
32. Pressure control solenoid
33. Transaxle fluid temperature sensor

Rubber ball, oil strainer installation positions

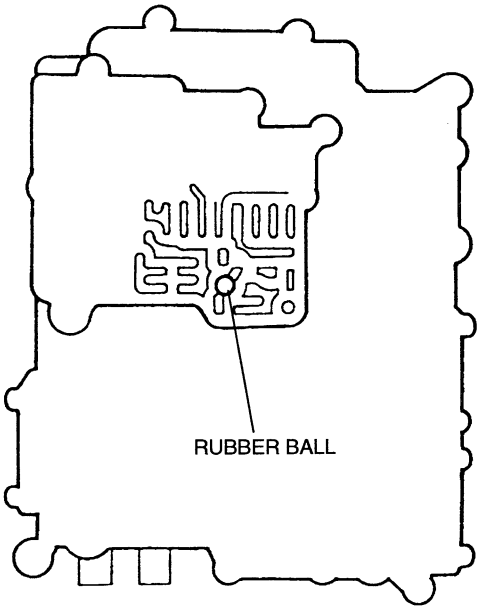
FRONT CONTROL VALVE BODY



PREMAIN CONTROL VALVE BODY
(MAIN CONTROL VALVE BODY SIDE)

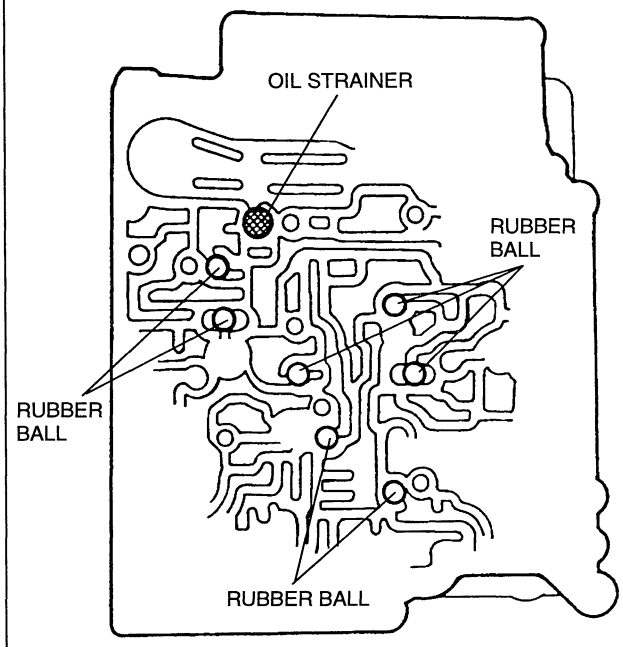


(FRONT CONTROL VALVE BODY SIDE)

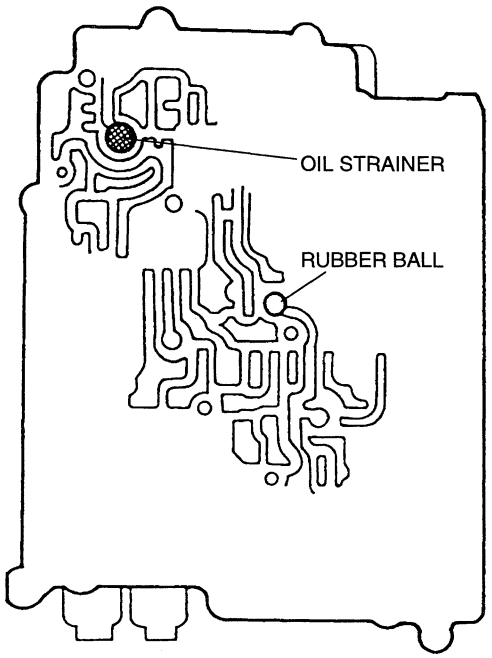


MAIN CONTROL VALVE BODY

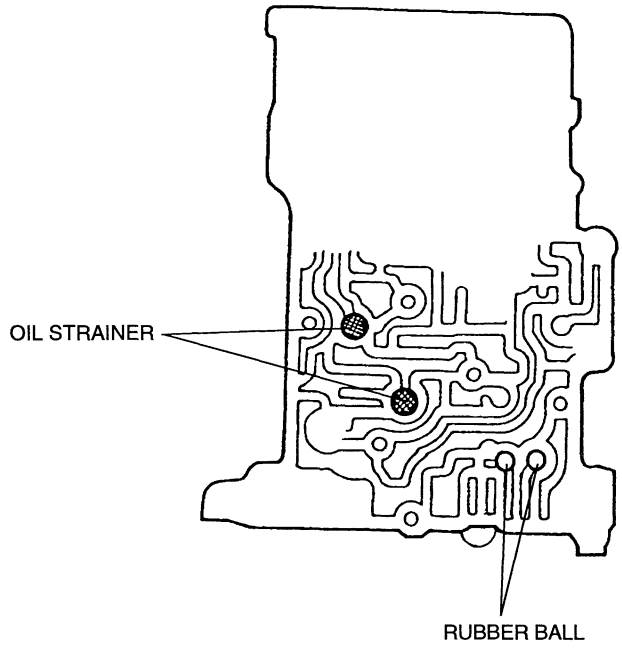
(REAR CONTROL VALVE BODY SIDE)



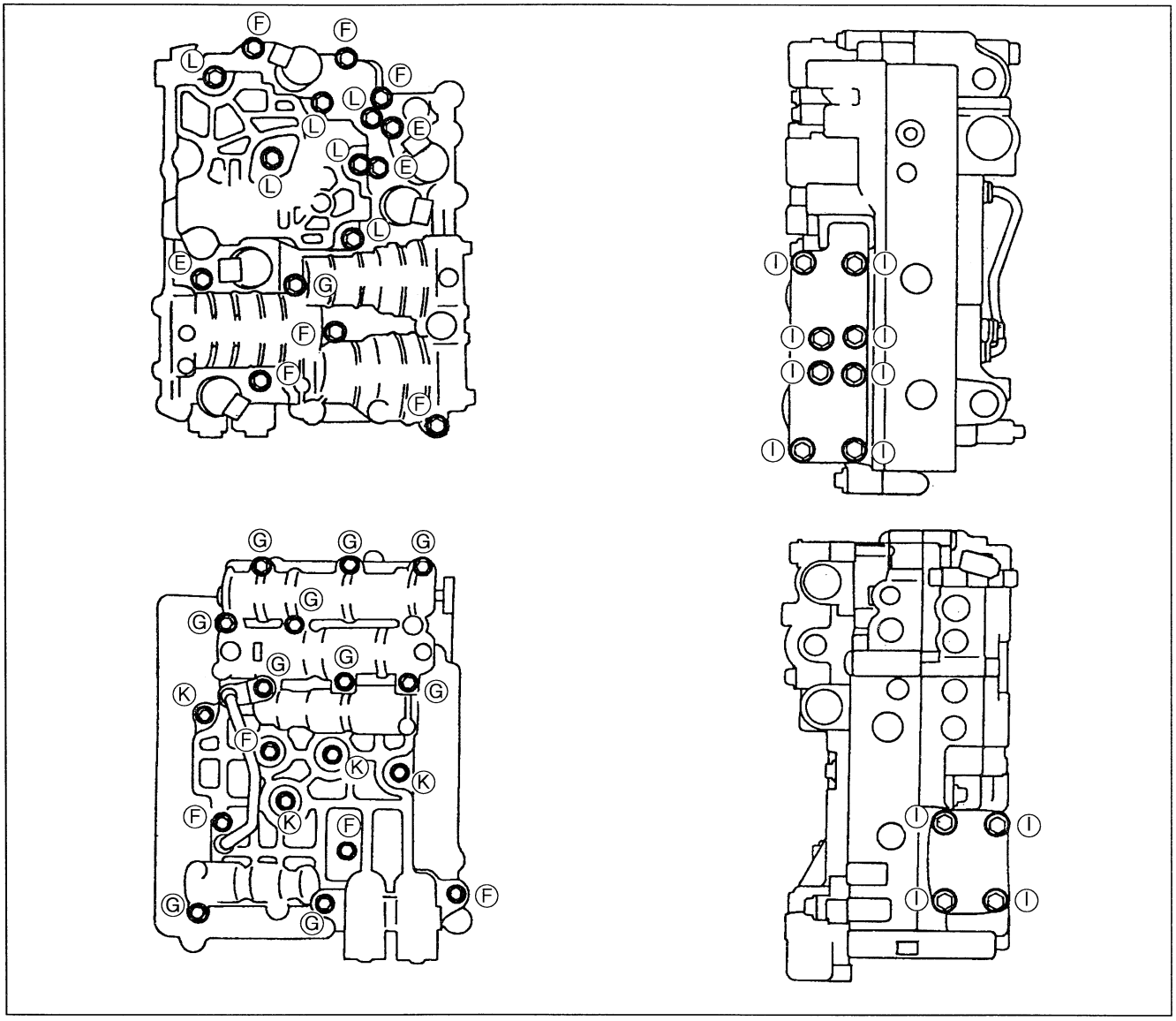
(PREMAIN CONTROL VALVE BODY SIDE)

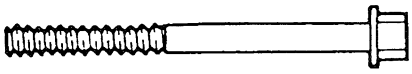
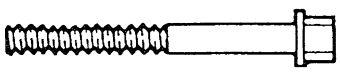


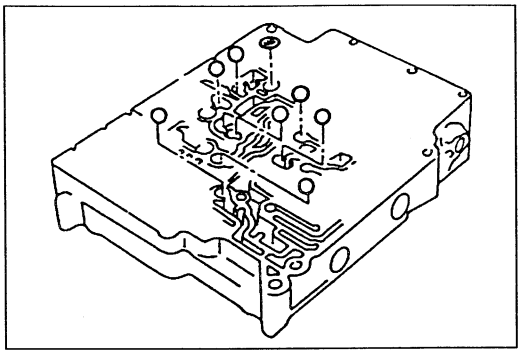
REAR CONTROL VALVE BODY



Bolt installation positions and external parts locations

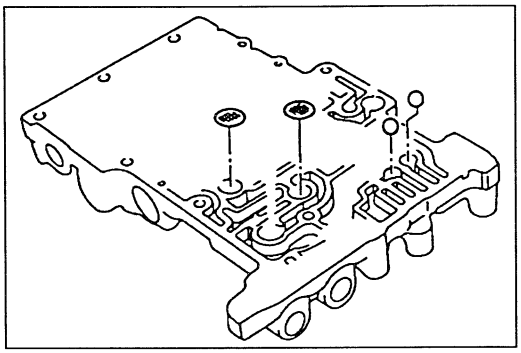


Identification mark	Bolt	Length mm {in}	Tightening torque N·m {kgf·cm, in·lbf}
L		50 {2.0}	6.5—7.8 {66—80, 58—69}
G		40 {1.6}	
F		30 {1.2}	
K		20 {0.79}	
E		12 {0.47}	
I		16 {0.63}	

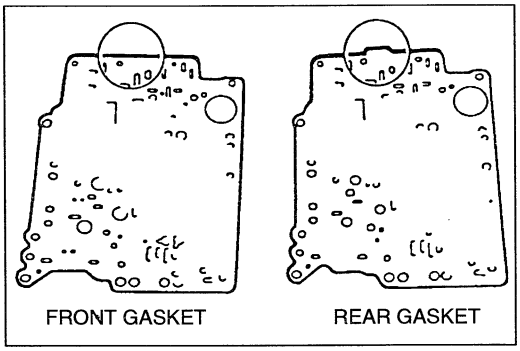


Assembly procedure

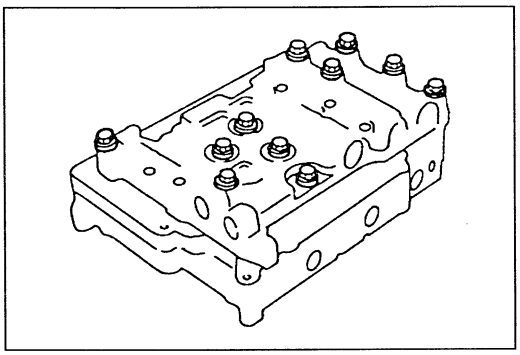
1. Install the oil strainers and rubber balls into the main control valve body.
   (Refer to Installation position, page K1–118.)



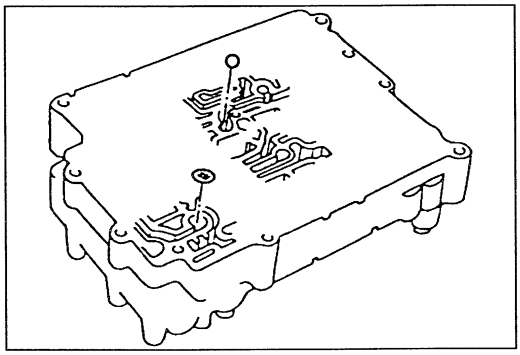
2. Install the oil strainers and rubber balls into the rear control valve body.
   (Refer to Installation position, page K1–118.)



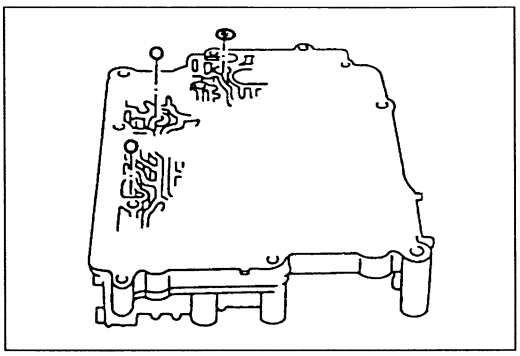
3. Set the new main/rear front gasket, rear separator plate, and new main/rear rear gasket on the rear control valve body. Refer to the figure to distinguish the two gaskets.



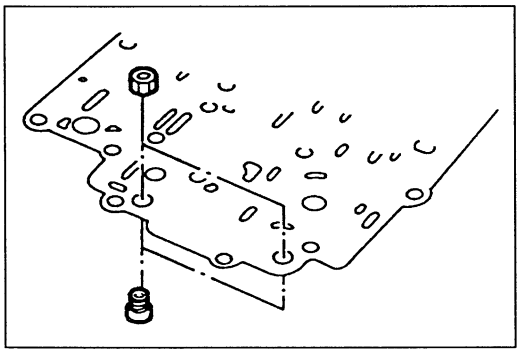
4. Set the rear control valve body onto the main control valve body.
5. Install and hand tighten the bolts shown. Each type of bolt has a different letter on its head. Match the bolt letter with the letter stamped next to its installation hole on the valve body. Refer to page K1–120 for bolt installation position and description.



6. Install the oil strainer and rubber balls into the main control valve body.
   (Refer to Installation position, page K1–118.)

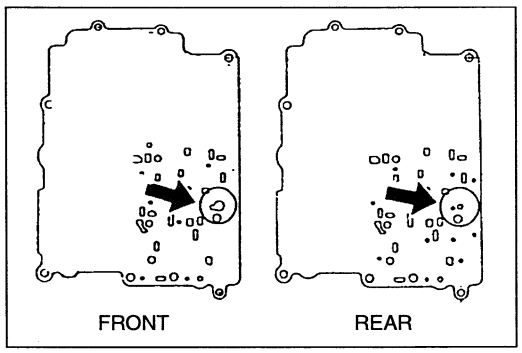


7. Install the oil strainer and rubber balls into the premain control valve body.
(Refer to Installation position, page K1–118.)

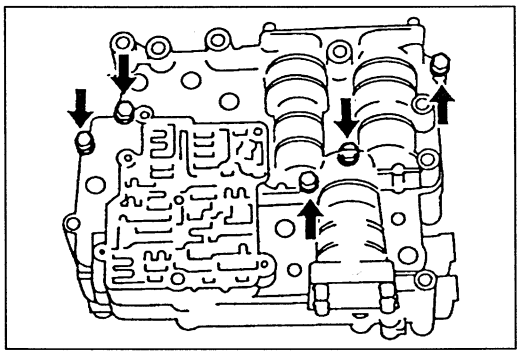


8. Install the jet orifices and nuts to the main separator plate.

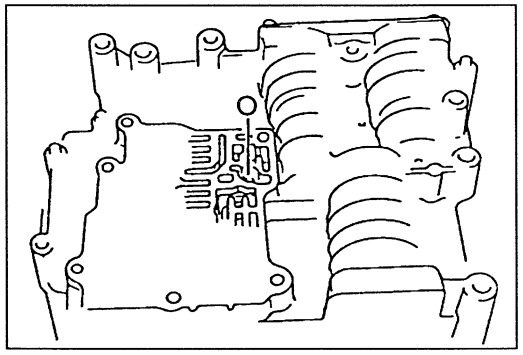
Tightening torque:
1.7—2.2 N·m {17—23 kgf·cm, 15—19 in·lbf}



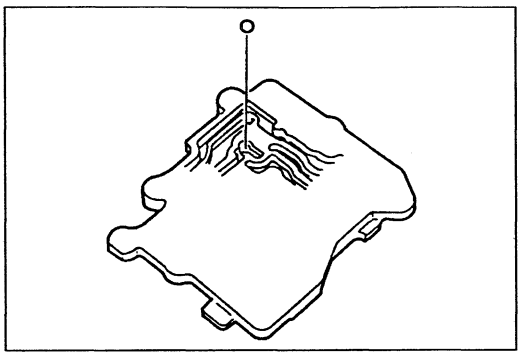
9. Set a new premain/main rear gasket, main separator plate, and new premain/main front gasket on the premain control valve body. Refer to the figure to distinguish the two gaskets.



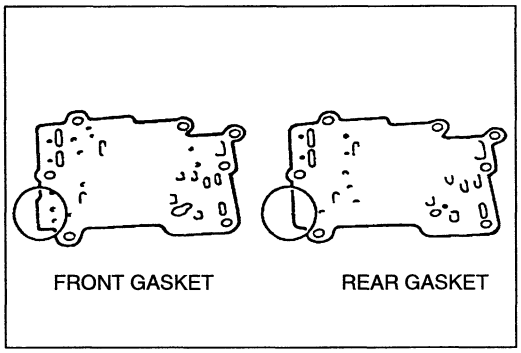
10. Set the premain control valve body onto the main control valve body.
11. Install and hand tighten the bolts shown in the figure. Each type of bolt has a different letter on its head. Match the bolt letter with the letter stamped next to its installation hole on the valve body. Refer to page K1–120 for bolt installation position and description.



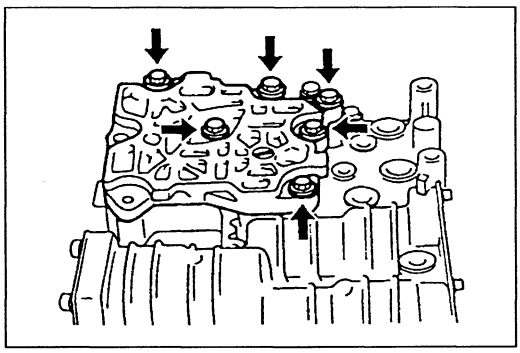
12. Install the rubber ball into the premain control valve body. (Refer to Installation position, page K1–118.)



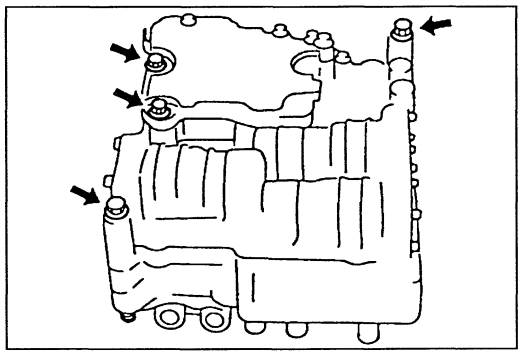
13. Install the rubber ball into the front control valve body. (Refer to Installation position, page K1–118.)



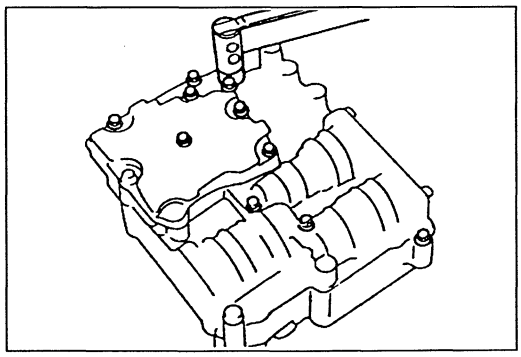
14. Set a new front/premain rear gasket, premain separator plate, and new front/premain front gasket on the front control valve body. Refer to the figure to distinguish the two gaskets.



15. Set the front control valve body onto the premain control valve body.
16. Install and hand tighten the bolts shown. Each type of bolt has a different letter on its head. Match the bolt letter with the letter stamped next to its installation hole on the valve body. Refer to page K1–120 for bolt installation position and description.

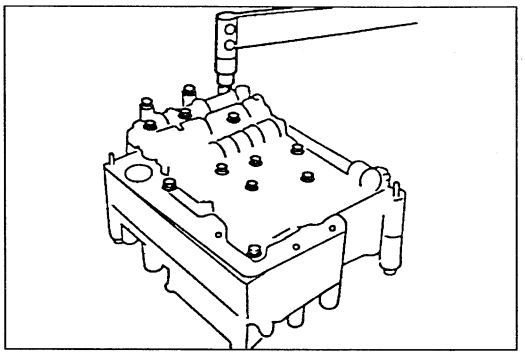


17. Install four control valve body bolts as shown for alignment.



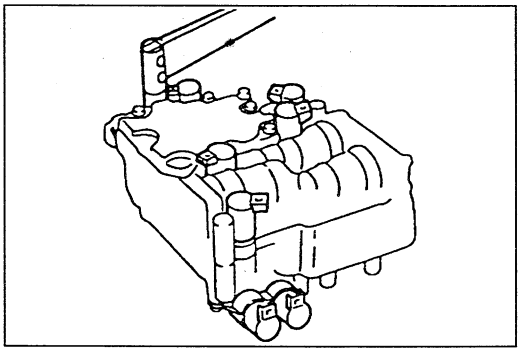
18. Tighten the mounting bolts.
    (1) Tighten the front control body.

    Tightening torque:
    6.5—7.8 N·m {66—80 kgf·cm, 58—69 in·lbf}



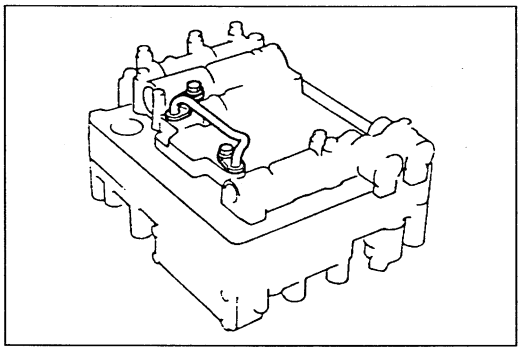
(2) Tighten the rear control valve body.

Tightening torque:
6.5—7.8 N·m {66—80 kgf·cm, 58—69 in·lbf}



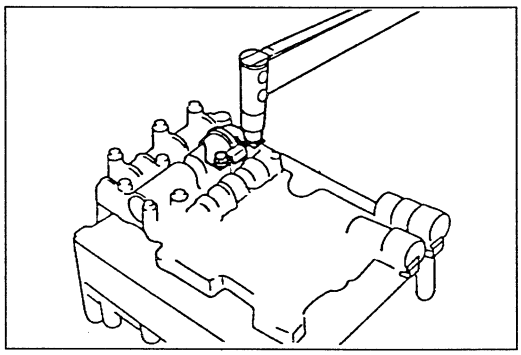
19. Apply ATF to new O-rings and install them onto the solenoid valves.
20. Install the solenoid valves.

Tightening torque:
6.5—7.8 N·m {66—80 kgf·cm, 58—69 in·lbf}



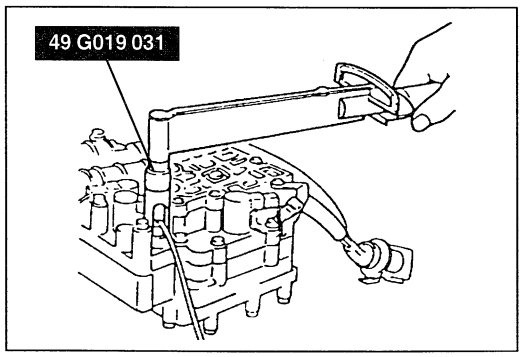
21. Apply ATF to new O-rings and install them onto the oil pipe assembly.
22. Install the oil pipe assembly.

Tightening torque:
6.5—7.8 N·m {66—80 kgf·cm, 58—69 in·lbf}



23. Install the oil baffle.

Tightening torque:
6.5—7.8 N·m {66—80 kgf·cm, 58—69 in·lbf}



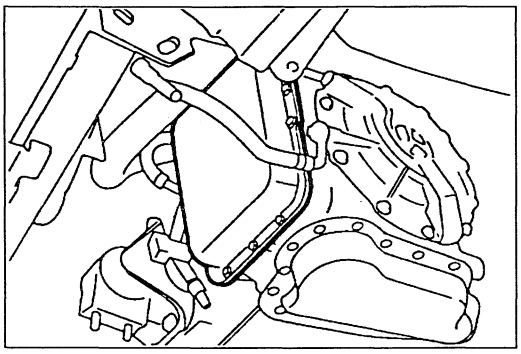
24. Install the transaxle fluid temperature sensor by using the **SST**.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

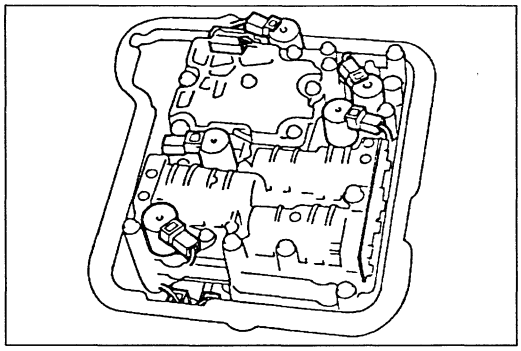
CONTROL VALVE BODY (ON-VEHICLE REMOVAL / INSTALLATION)

On-vehicle Removal

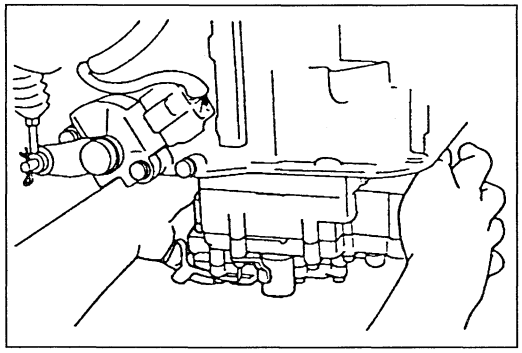
1. Clean the transaxle exterior thoroughly with a steam cleaner or cleaning solvents.
2. Disconnect the negative battery cable.
3. Drain the ATF and engine coolant into separate containers.
4. Remove the splash shield.
5. Remove the oil cooler hose and radiator hose.



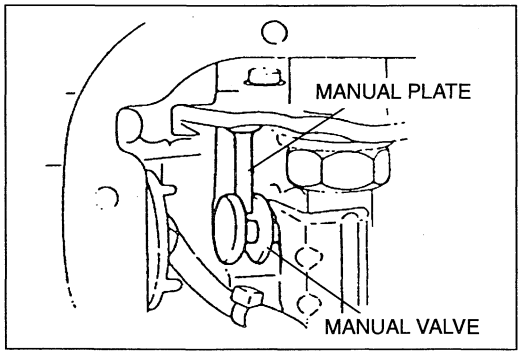
6. Remove the control valve body cover and gasket.



7. Disconnect the solenoid connectors and transaxle fluid temperature sensor connector.

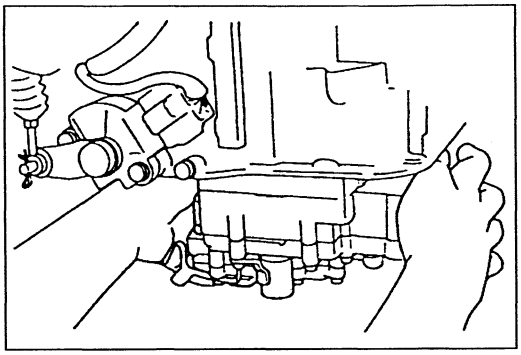


8. Remove the control valve body assembly.



On-vehicle Installation

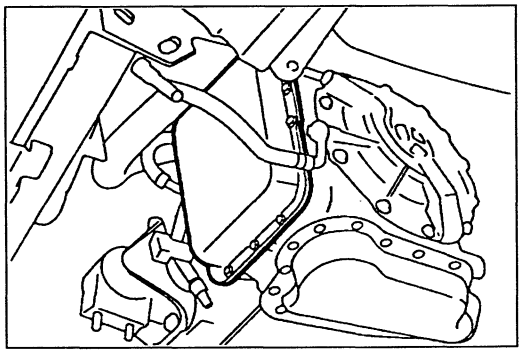
1. Align the manual plate and the manual valve.



2. Install the control valve body assembly.

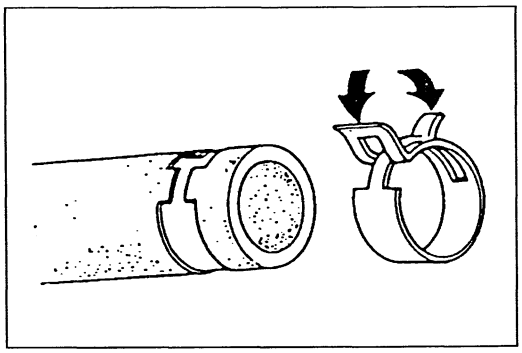
   Tightening torque:
   10.8—14.7 N·m {110—150 kgf·cm, 95.5—130 in·lbf}

3. Match the harness colors and connect the solenoid connectors and transansaxle fluid temperature sensor connector.

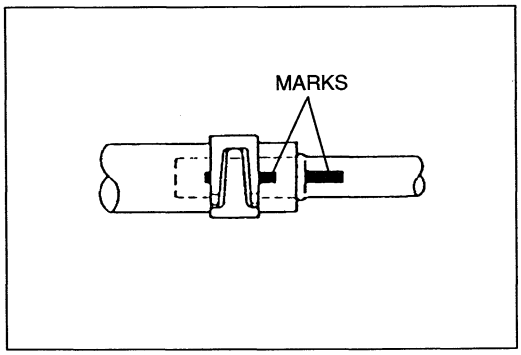


4. Install a new gasket and the control valve body cover.

   Tightening torque:
   8.4—10.7 N·m {85—110 kgf·cm, 74—95.4 in·lbf}

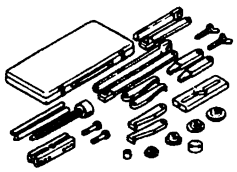
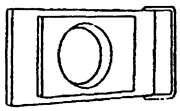
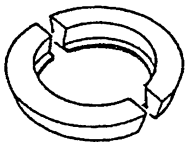
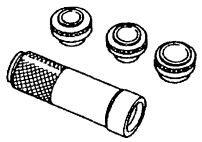
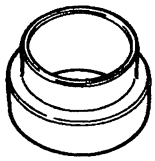


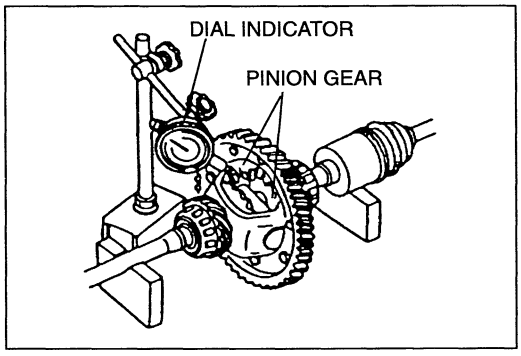
Caution
- **If reusing the hose clamp, position it in the original location on the hose and squeeze the clamp lightly with large pliers to ensure a tight fit.**



5. Align the marks, and slide the oil cooler hose onto the oil cooler pipe until it is fully seated as shown.
6. Install the hose clamp onto the hose at the center of the mark and at the angle shown.
7. Verify that the hose clamp does not interfere with any other parts.
8. Slide the radiator hose onto the radiator pipe until it is fully seated.
9. Install the hose clamp on the hose.
10. Squeeze it lightly with large pliers to ensure a good fit.
11. Install the splash shield.
12. Fill the radiator and reservoir with the specified amount and type of engine coolant. (Refer to sections E1, E2.)
13. Connect the negative battery cable.
14. Fill the transaxle with the specified ATF. (Refer to page K1–18.)
15. Check for leakage of ATF from the oil pan or the oil hose connecting points. (Refer to page K1–18.)
16. Carry out the mechanical system test. (Refer to page K1–10.)
17. Carry out the road test. (Refer to page K1–15.)

DIFFERENTIAL
Preparation
SST

49 0839 425C Puller set, bearing 	For removal of bearing	49 F401 366A Plate 	For removal of bearing
49 B092 371 Attachment E 	For removal of bearing	49 F401 330B Installer set, bearing 	For installation of bearing
49 F401 337A Attachment C (Part of 49 F401 330B) 	For installation of bearing	—	—



Preinspection
Backlash of side gear and pinion gear

1. Before disassembly, measure the backlash of the side gears.

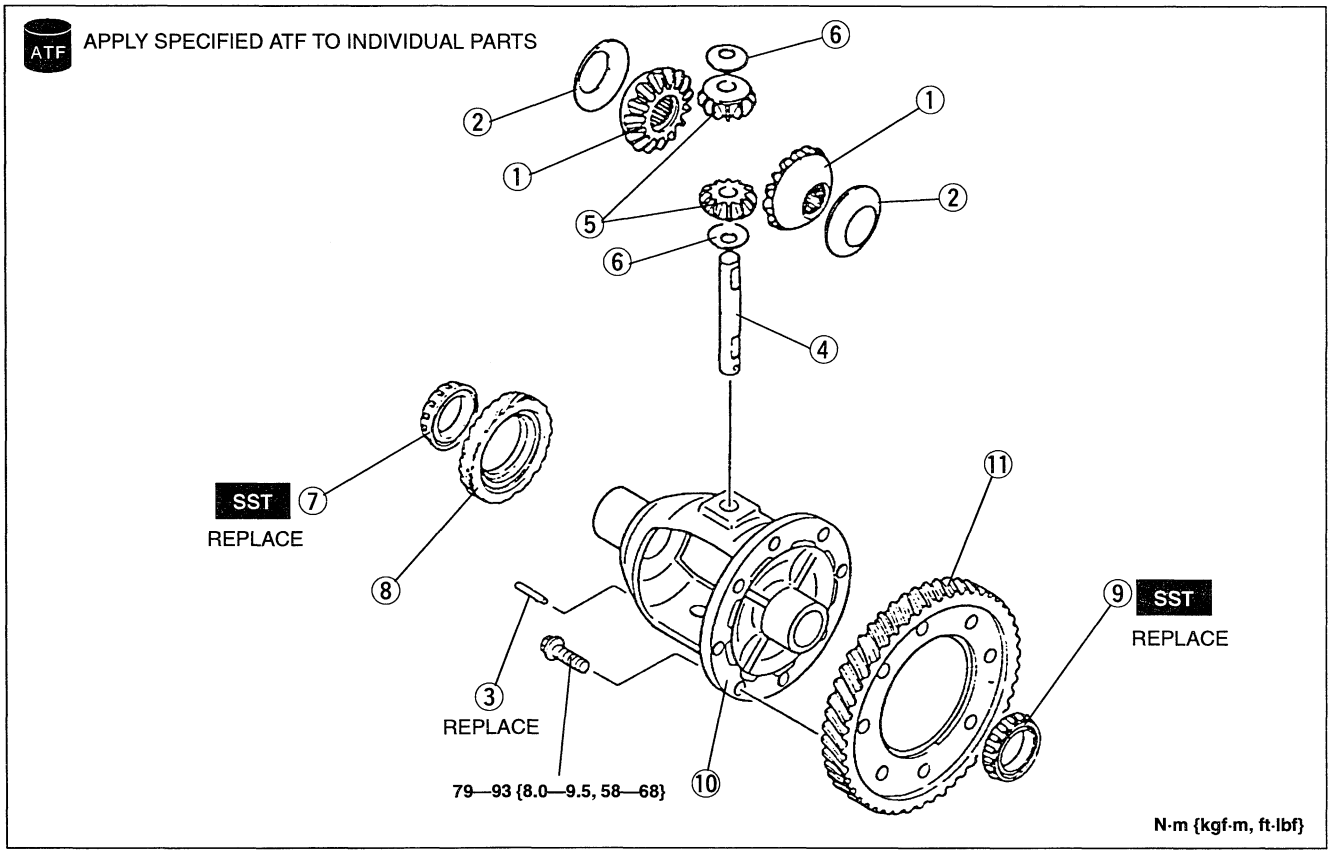
   Backlash
   Standard : 0.05—0.15 mm {0.0020—0.0059 in}
   Maximum : 0.50 mm {0.020 in}

2. If the backlash exceeds the maximum, replace worn and damaged parts.

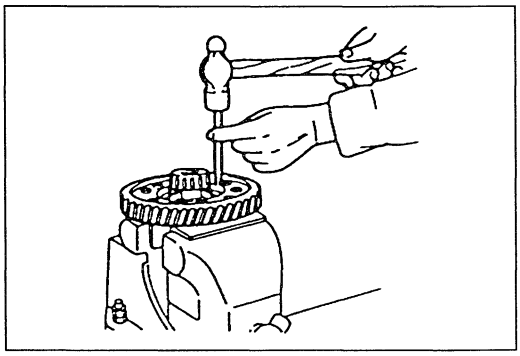
Disassembly / Inspection / Assembly

Note
- The bearings do not need to be removed unless you are replacing them.

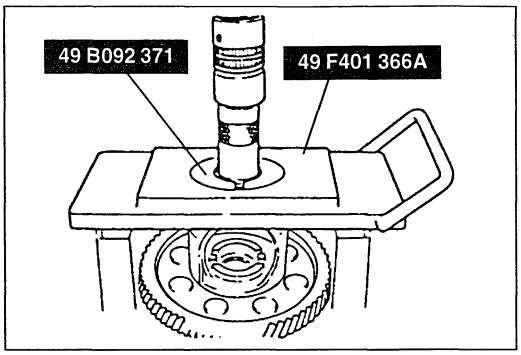
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



1. Side gear
   Preinspection ..... page K1–127
2. Thrust washer
3. Roll pin
   Disassembly Note ..... below
4. Pinion shaft
5. Pinion gear
6. Thrust washer
7. Bearing
   Disassembly Note ..... page K1–129
8. Speedometer drive gear
9. Bearing
   Disassembly Note ..... page K1–129
10. Gear case
11. Ring gear

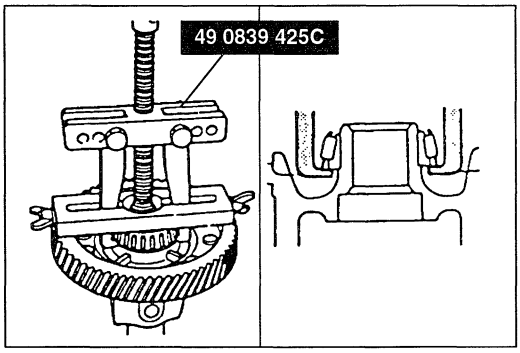


Disassembly note
Roll pin
1. Place the gear case in a vise.
2. Insert a **2.0 mm {0.079 in}** punch into the roll pin hole from the ring gear side, and remove the roll pin by using a hammer.

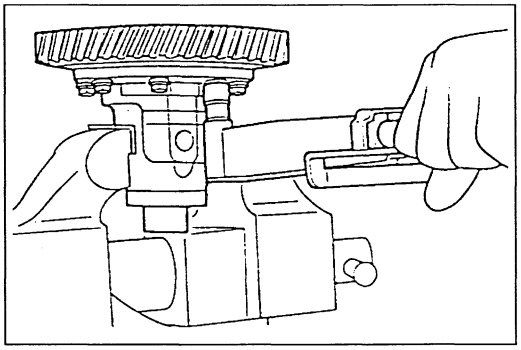


Bearing

1. Remove the bearing (speedometer drive gear side) from the gear case by using the **SST**.



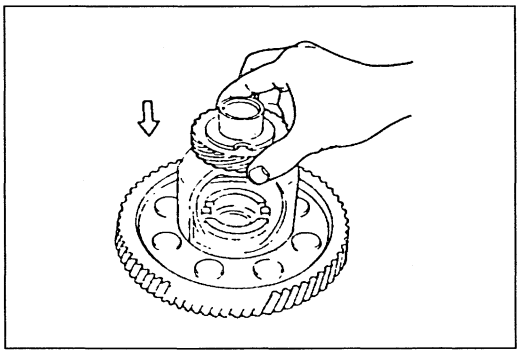
2. Remove the bearing (ring gear side) by using a combination of parts from the **SST**.



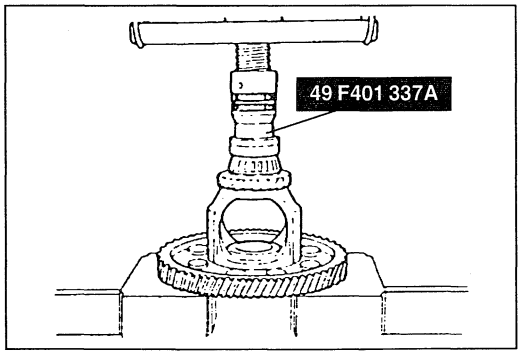
Assembly procedure

1. Install the ring gear to the gear case.

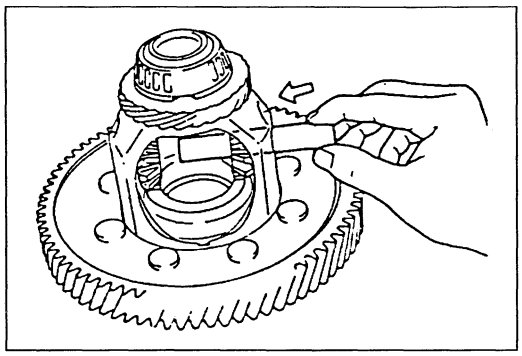
   Tightening torque:
   79—93 N·m {8.0—9.5 kgf·m, 58—68 ft·lbf}



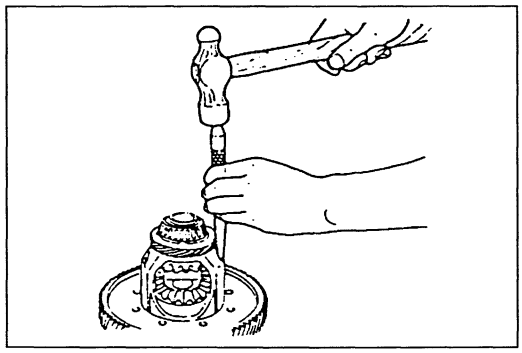
2. Set the speedometer drive gear onto the gear case assembly.



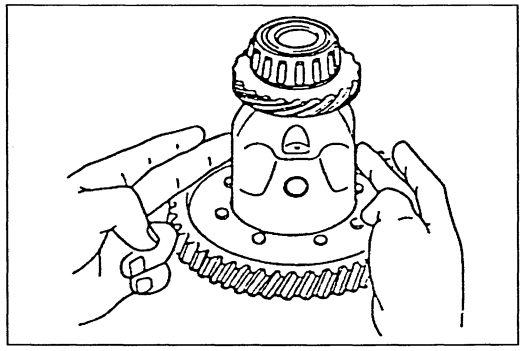
3. Install the new bearings and bearing races by using the **SST**.
   (1) Press the new bearing (speedometer drive gear side) onto the gear case by using the **SST**.
   (2) Press on the other new bearing (ring gear side) in the same manner.



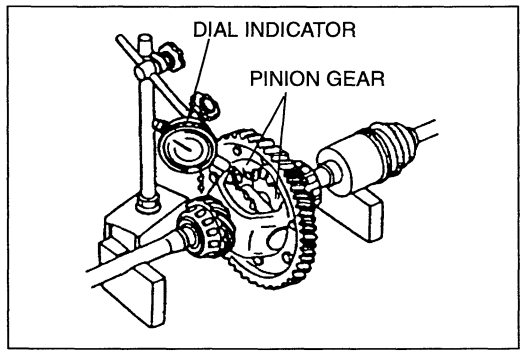
4. Apply ATF to the thrust washers and pinion shaft.
5. Install the pinion gears and thrust washers into the gear case.
6. Install the pinion shaft.



7. Install the roll pin, and crimp it to prevent it from coming out of the gear case.



8. Apply ATF to the thrust washers.
9. Install the thrust washers and side gears into the gear case, then turn the side gears and align them with the drive shaft holes.



10. Measure the backlash of the side gears as follows:
    (1) Install the left and right drive shafts in the differential assembly.
    (2) Support the drive shafts on V-blocks.
    (3) Measure the backlash of both side gears.

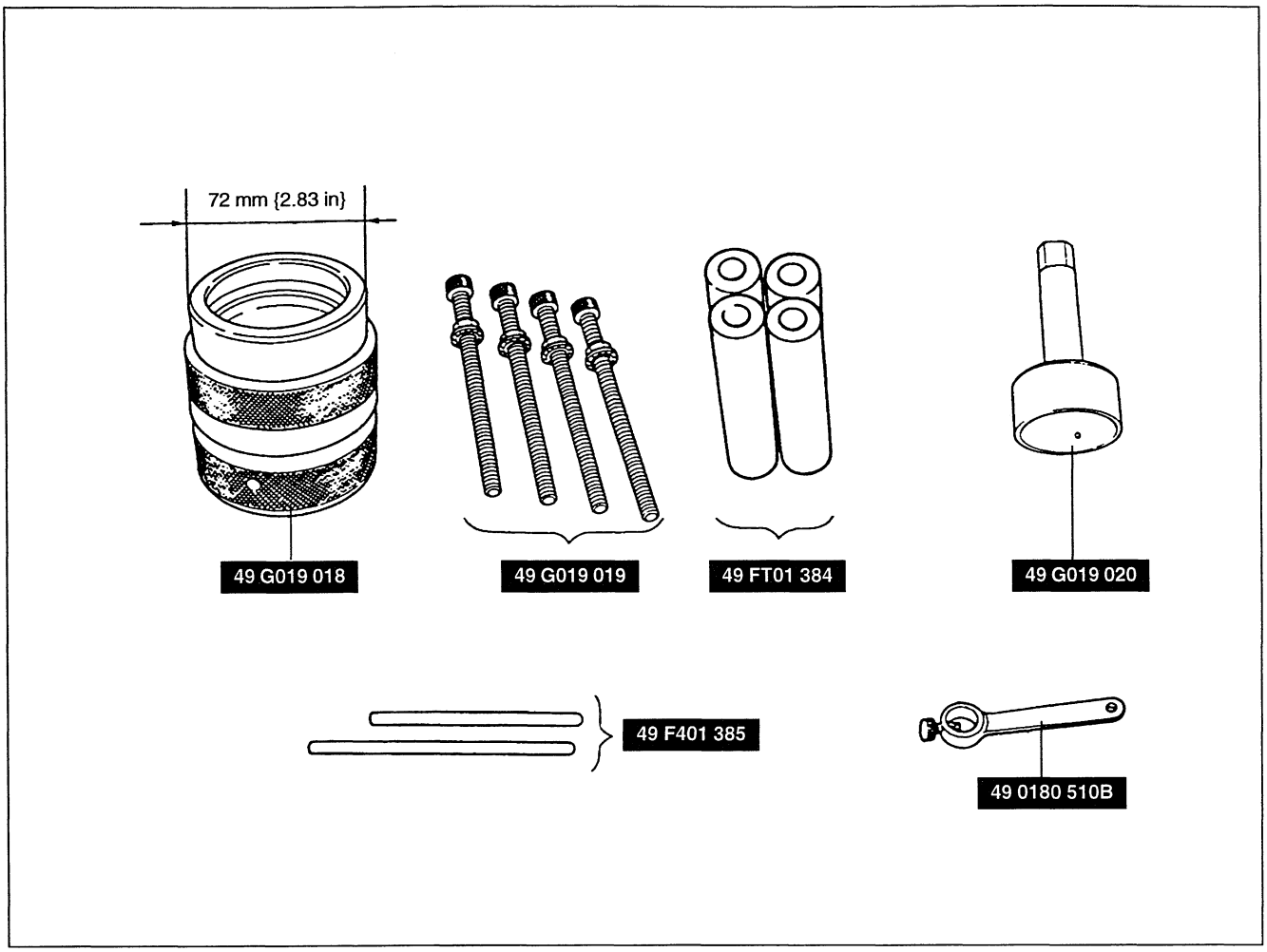
    Backlash
    Standard : 0.05—0.15 mm {0.0020—0.0059 in}
    Maximum : 0.50 mm {0.020 in}

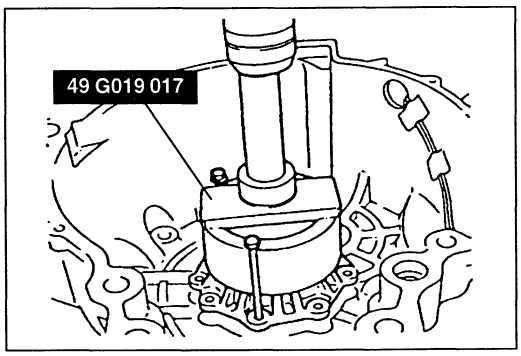
11. If the backlash exceeds the maximum, rebuild or replace the differential assembly.

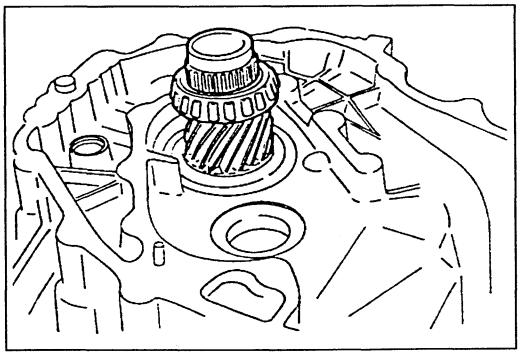
BEARING PRELOAD

Procedure

1. Use the **SSTs** shown below to measure and adjust the output gear bearing preload.



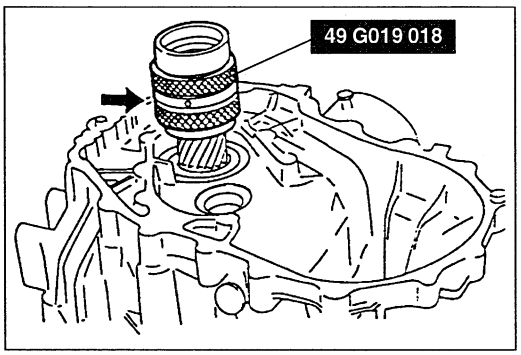




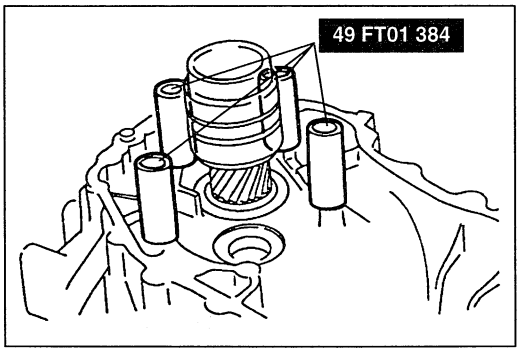
(1) Align the bearing cover with guide bolts as shown.
(2) Press in the bearing cover by using the **SST**.
(3) Remove the guide bolts and install the bearing cover installation bolts.

Tightening torque:
10.8—13.7 N·m {110—140 kgf·cm, 95.5—121 in·lbf}

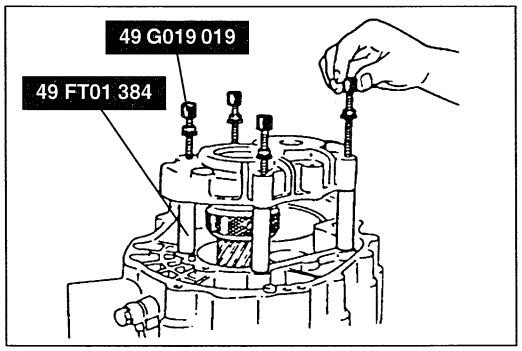
(4) Mount the converter housing onto the **SST** (transaxle hanger).
(5) Remove the bearing race and adjustment shims from the bearing housing using a pin punch and a hammer.
(6) Set the output gear into the converter housing.



(7) Install the bearing race removed in step (5) to the selector, and install the selector and bearing race to the ouput gear.
(8) Turn the selector to eliminate the gap indicated by the arrow.

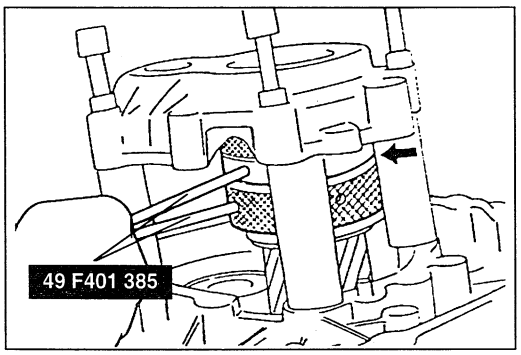


(9) Set the four **SSTs** on the converter housing in the positions shown.

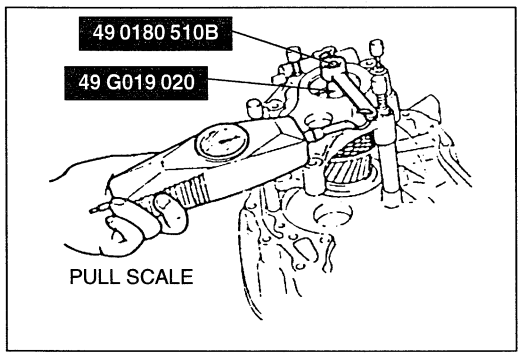


(10) Set the bearing housing on the **SSTs** (selector) and install the four **SSTs** (bolts). Tighten the bolts to the specified torque.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

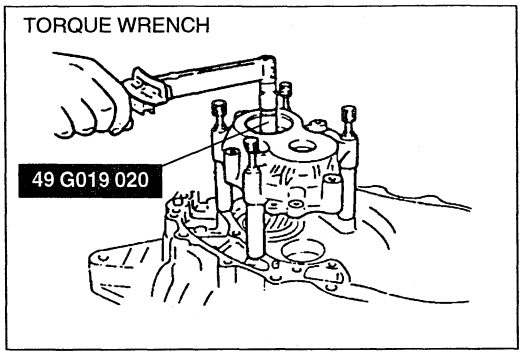


(11) Turn the **SST** (selector) to increase the clearance (arrow) with the **SST** (bars) until it no longer turns.
(12) Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).

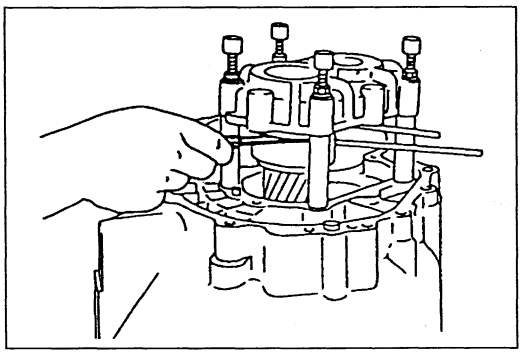


(13) Mount the **SST** and a pull scale or a torque wrench on the output gear.
(14) Adjust the clearance of the **SST** (selector) to obtain the specified preload/pull scale reading.

Preload: 1.1—1.9 N·m {11—20 kgf·cm, 10—17 in·lbf}
Reading on pull scale:
11—19 N {1.1—2.0 kgf, 2.5—4.4 lbf}

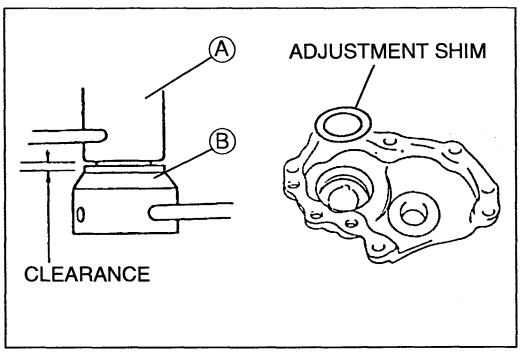


(15) Measure the bearing preload at the point that the output gear starts to turn.

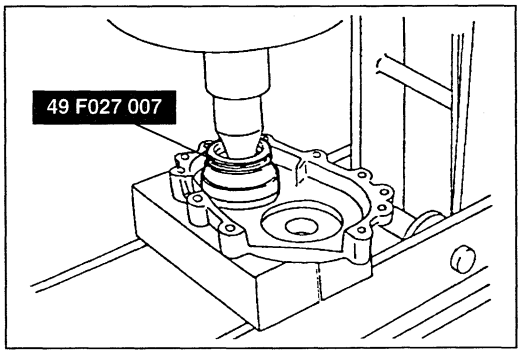


(16) Measure the gap around the circumference of the **SST** (selector) by using a feeler gauge.
(17) Take the maximum reading and determine the shim to be used. Use no more than one shim.

Thickness of shim mm {in}		
0.350 {0.0138}	0.375 {0.0148}	0.400 {0.0157}
0.425 {0.0167}	0.450 {0.0177}	0.475 {0.0187}
0.500 {0.0197}	0.525 {0.0207}	0.550 {0.0217}
0.575 {0.0226}	0.600 {0.0236}	0.625 {0.0246}
0.650 {0.0256}	0.675 {0.0266}	0.700 {0.0276}
0.725 {0.0285}	0.750 {0.0295}	0.775 {0.0305}
0.800 {0.0315}	0.825 {0.0325}	0.850 {0.0335}
0.875 {0.0344}	0.900 {0.0354}	0.925 {0.0364}
0.950 {0.0374}	0.975 {0.0384}	1.000 {0.0394}
1.025 {0.0404}	1.050 {0.0413}	1.075 {0.0423}
1.100 {0.0433}	1.125 {0.0443}	1.150 {0.0453}
1.175 {0.0463}	1.200 {0.0472}	1.225 {0.0482}
1.250 {0.0492}	1.275 {0.0502}	1.300 {0.0512}
1.325 {0.0522}	1.350 {0.0531}	1.375 {0.0541}
1.400 {0.0551}		

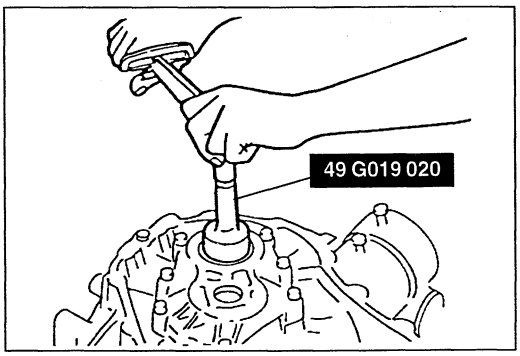


(18) Remove the bearing housing and the **SST**.
(19) Install the required shim and press the bearing race into the bearing housing by using the **SST**.



(20) Install the bearing housing.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

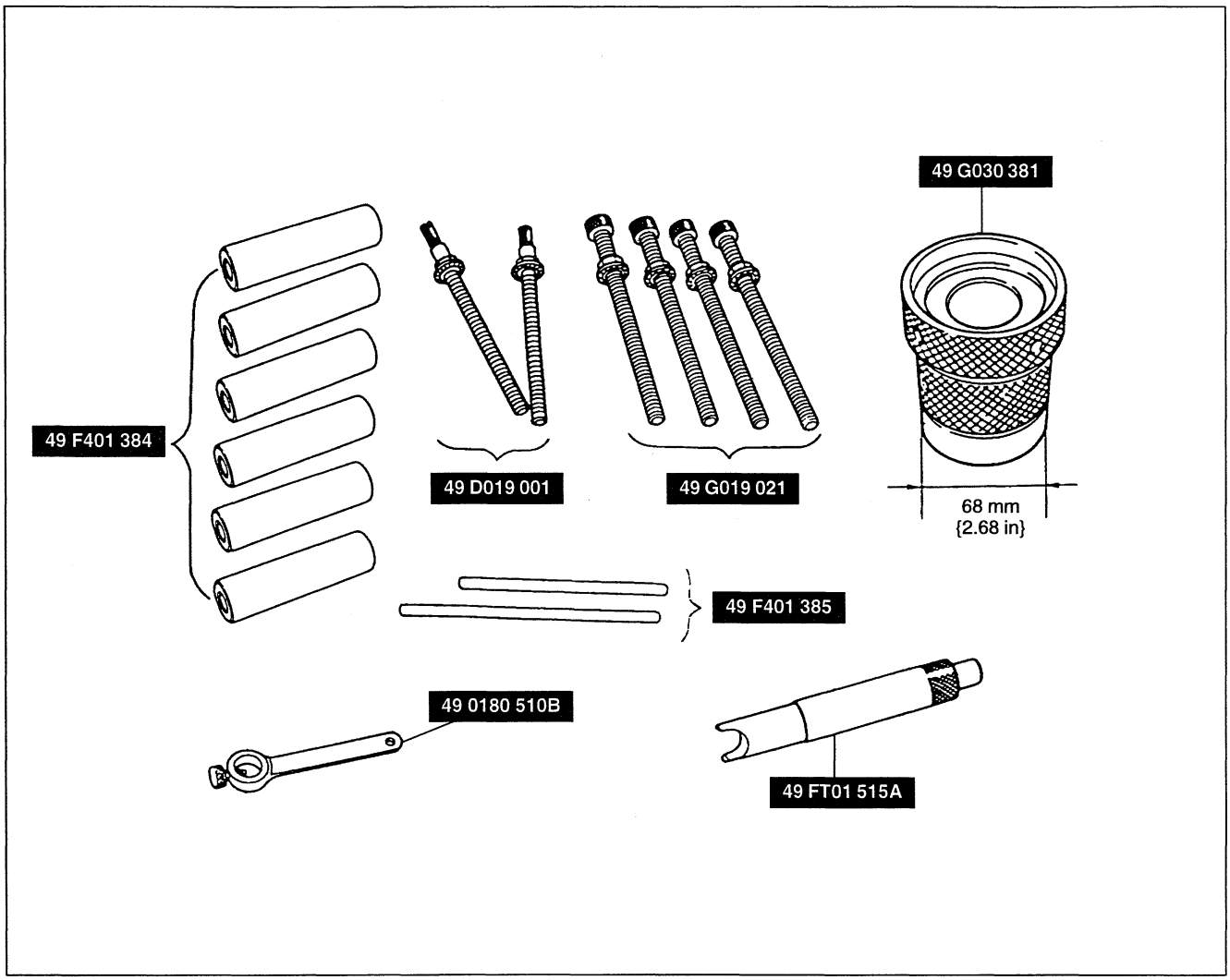


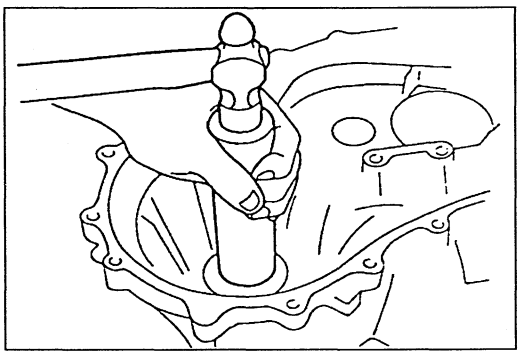
(21) Check that the preload/pull scale reading is within the specification. If not, return to step (5).

Preload: 1.1—1.9 N·m {11—20 kgf·cm, 10—17 in·lbf}
Reading on pull scale:
11—19 N {1.1—2.0 kgf, 2.5—4.4 lbf}

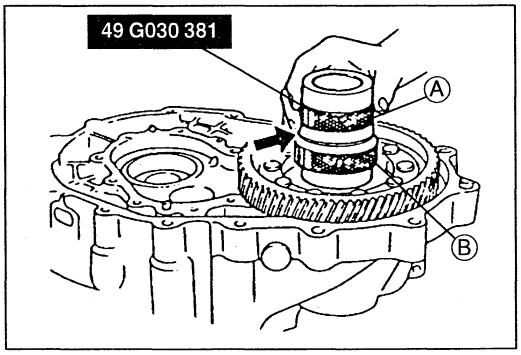
(22) Remove the bearing housing and output gear assembly.

2. Use the **SSTs** shown below to measure and adjust the differential side bearing preload.

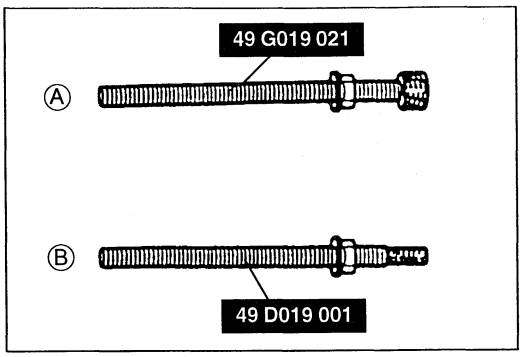




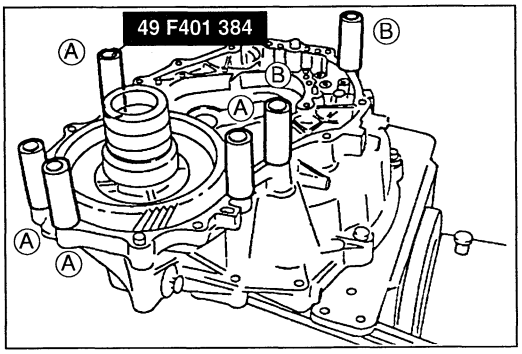
(1) Remove the bearing race and adjustment shims from the transaxle case. (Refer to page K1–58.)
(2) Install the bearing race into the converter housing by using a pipe and a hammer.



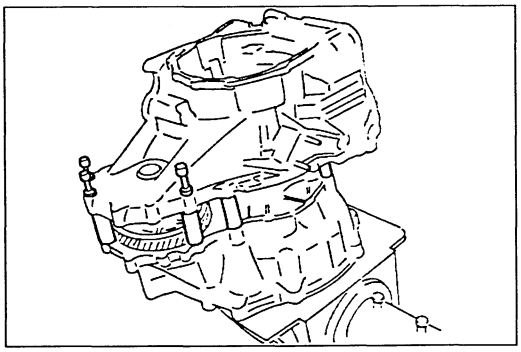
(3) Set the differential assembly into the converter housing.
(4) Turn the selector to eliminate the gap indicated by the arrow.
(5) Install the bearing race removed in step (1) into the **SST** and set them onto the differential assembly.



(6) Install the **SSTs** as shown in the figure.

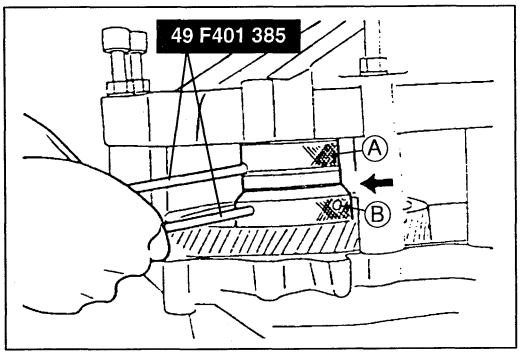


(7) Set the six **SSTs** in the positions shown.

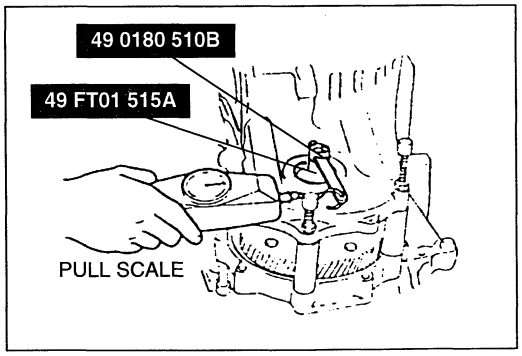


(8) Set the transaxle case on the **SSTs** (selectors).
(9) Tighten the **SSTs** (bolts) to the specified torque.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

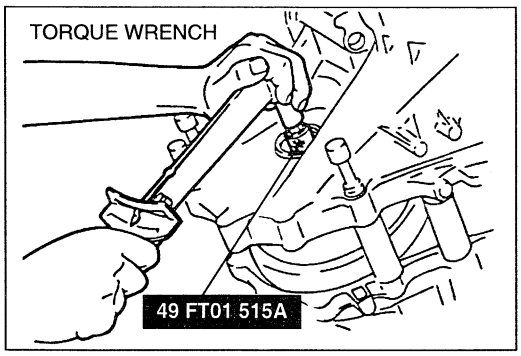


(10) Turn the **SST** (selector) to increase the clearance (arrow) by using the **SST** (bars), until it no longer turns.
(11) Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).



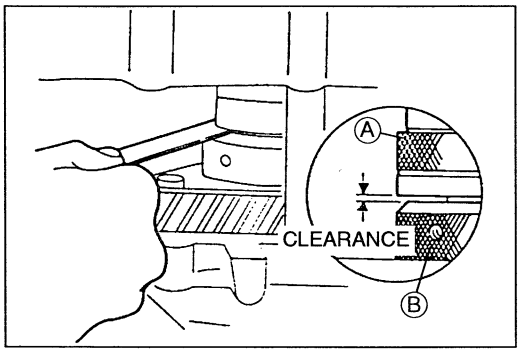
(12) Insert the **SST** through the oil seal hole of the transaxle case and attach it to the pinion shaft.
(13) Mount the **SST** and a pull scale or a torque wrench to the **SST**.
(14) Measure the bearing preload at the point that the differential starts to turn.
(15) Adjust the clearance of the **SST** (selector) to obtain the specified preload/pull scale reading.

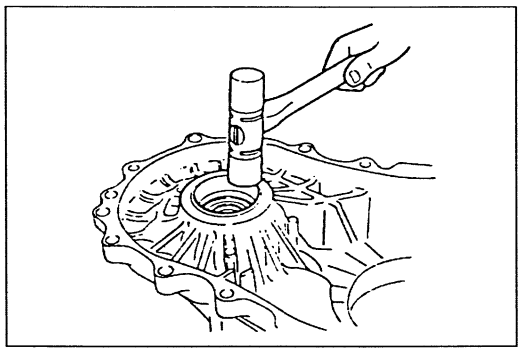
Preload: 0.49 N·m {5.0 kgf·cm, 4.3 in·lbf}
Reading on pull scale: 4.9 N {0.5 kgf, 1.1 lbf}



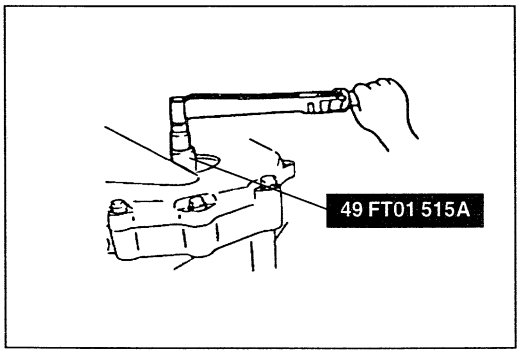
(16) Measure the gap between A and B around the circumference of the **SST** (selector) by using a feeler gaude.
(17) Select a maximum of three adjustment shims to equal the measurement clearance plus **0.3 mm {0.012 in}**.

Thickness of shim mm {in}			
0.10 {0.004}	0.15 {0.006}	0.20 {0.008}	0.25 {0.010}
0.30 {0.012}	0.35 {0.014}	0.40 {0.016}	0.45 {0.018}
0.50 {0.020}	0.55 {0.022}	0.60 {0.024}	0.65 {0.026}
0.70 {0.028}	0.75 {0.030}	0.80 {0.031}	0.85 {0.033}
0.90 {0.035}	0.95 {0.037}	1.00 {0.039}	1.05 {0.041}
1.10 {0.043}	1.15 {0.045}	1.20 {0.047}	





(18) Remove the transaxle case and **SST** (selector).
(19) Install the required shim(s) and tap the bearing race into the transaxle case.



(20) Install the transaxle case.

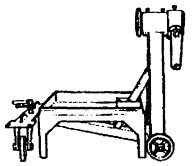
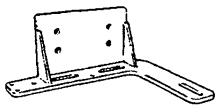
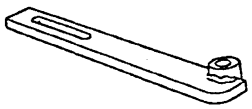
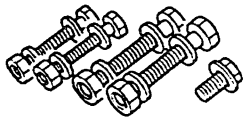
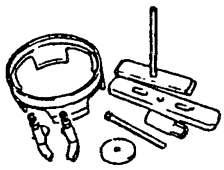
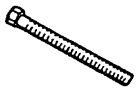
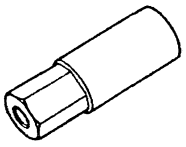
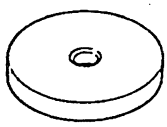
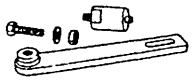
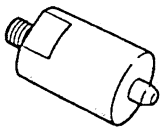
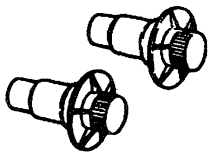
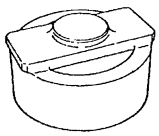
Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

(21) Check that the preload is within the specification. If not, return to step (1).

Preload: 3.0—3.9 N·m {30—40 kgf·cm, 27—34 in·lbf}
Reading on pull scale:
30—39 N {3.0—4.0 kgf, 6.6—8.8 lbf}

(22) Remove the transaxle case.

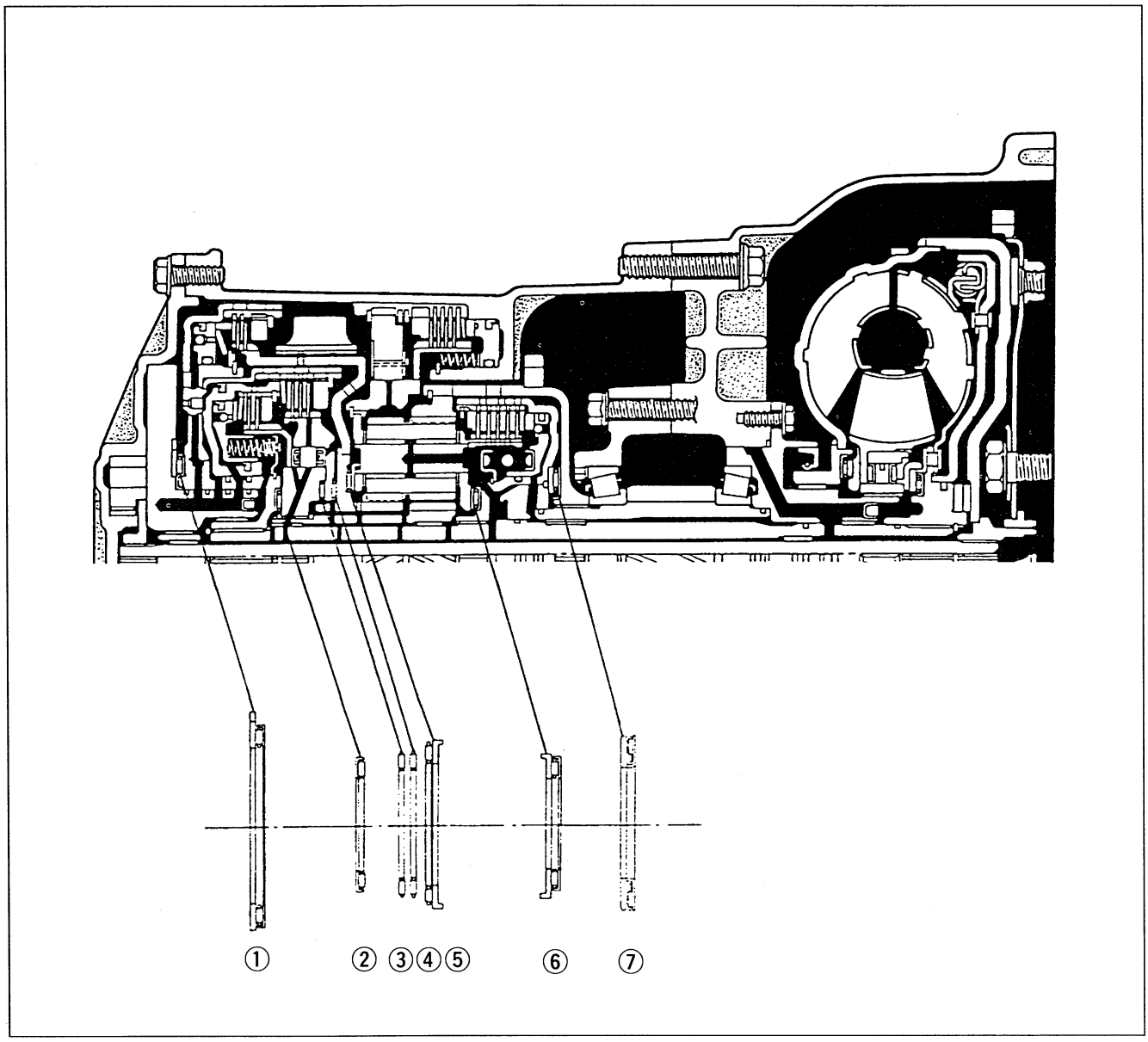
TRANSAXLE UNIT (ASSEMBLY)
Preparation
SST

49 0107 680A Engine stand 	For assembly of transaxle	49 G019 0A0 Hanger, transaxle 	For assembly of transaxle
49 G019 001 Body (Part of 49 G019 0A0) 	For assembly of transaxle	49 G019 002 Stay (Part of 49 G019 0A0) 	For assembly of transaxle
49 G019 003 Bolt set (Part of 49 G019 0A0) 	For assembly of transaxle	49 G019 0A7A Compressor set, return spring 	For assembly of low and reverse brake piston
49 G019 028 Bolt (Part of 49 G019 0A7A) 	For assembly of low and reverse brake piston	49 G019 029 Nut (Part of 49 G019 0A7A) 	For assembly of low and reverse brake piston
49 G019 030 Plate (Part of 49 G019 0A7A) 	For assembly of band servo	49 G019 0A2 Holder, turbine shaft 	For holding turbine shaft
49 G019 014 Stay (Part of 49 G019 0A2) 	For holding turbine shaft	49 G019 015 Adaptor (Part of 49 G019 0A2) 	For holding turbine shaft
49 G019 016 Bolt (Part of 49 G019 0A2) 	For holding turbine shaft	49 G030 455 Holder, differential side gear 	For holding differential side gear
49 G019 017 Installer, oil seal 	For installation of bearing cover	49 F027 007 Attachment ϕ72 	For installation of bearing rece

Assembly
Precaution

1. Select the adjustment shim(s), referring to **Bearing Preload**.
2. If the drive plates or 2–4 brake band are replaced with new ones, soak the new part in ATF for at least two hours before installation.
3. Before assembly, apply ATF to all seal rings, rotating parts, O-rings, and sliding parts.
4. All O-rings, seals, and gaskets must be replaced with the new ones included in the overhaul kit.
5. Use petroleum jelly, not grease, during reassembly.
6. When it is necessary to replace a bushing, replace the subassembly that includes the bushing.
7. Assemble the housing within 10 minutes after applying sealant, and allow it to cure at least 30 minutes after assembly before filling the transaxle with ATF.

Bearing and race locations

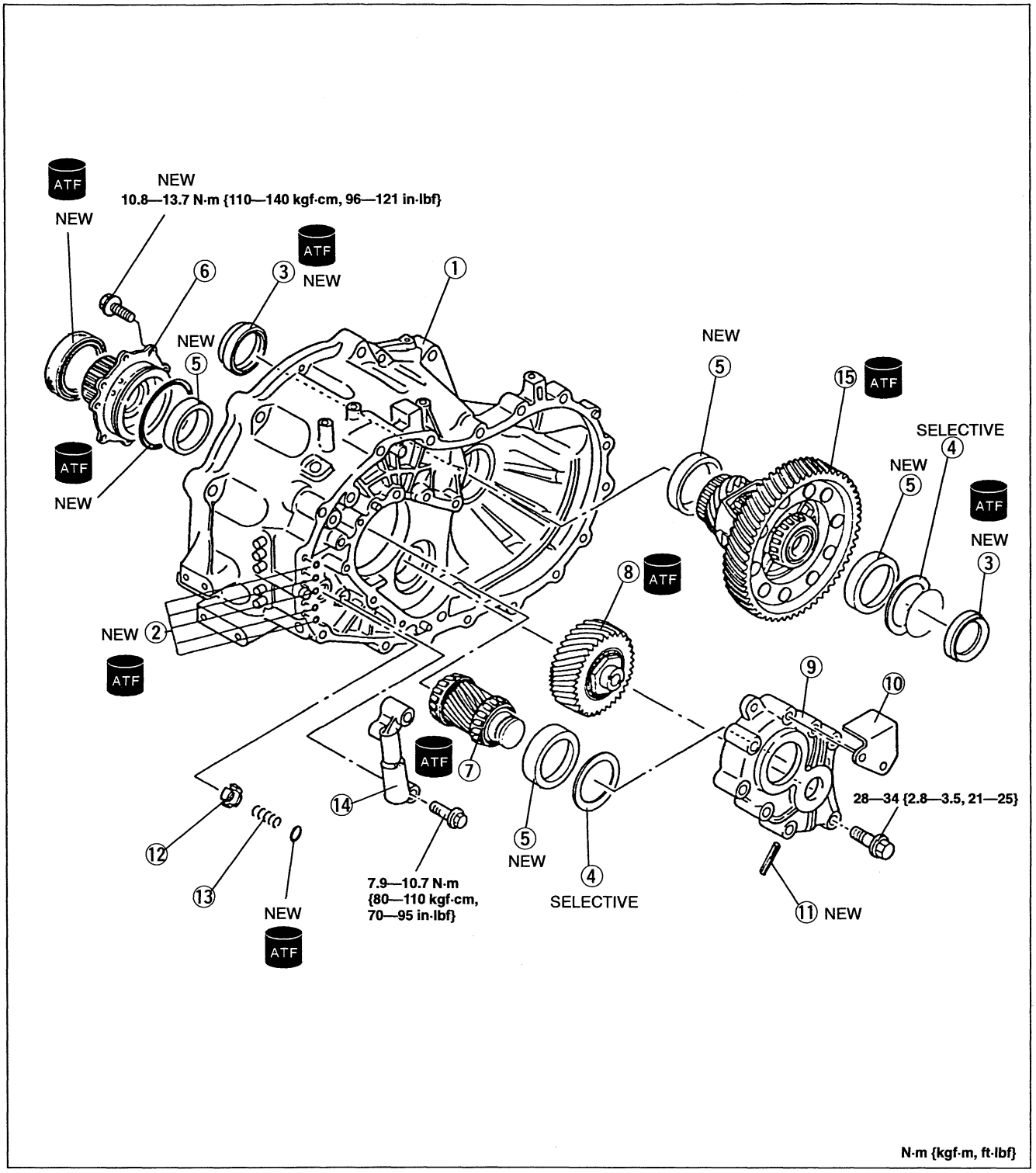


Outer diameter of bearing and race

		1	2	3	4	5	6	7
Bearing	mm {in}	86.0 {3.39}	*56.1 {2.21}	*62.5 {2.46}	*62.5 {2.46}	72.0 {2.83}	56.0 {2.20}	71.0 {2.80}
Race	mm {in}	88.0 {3.46}	—	—	—	72.0 {2.83}	57.0 {2.24}	72.0 {2.83}

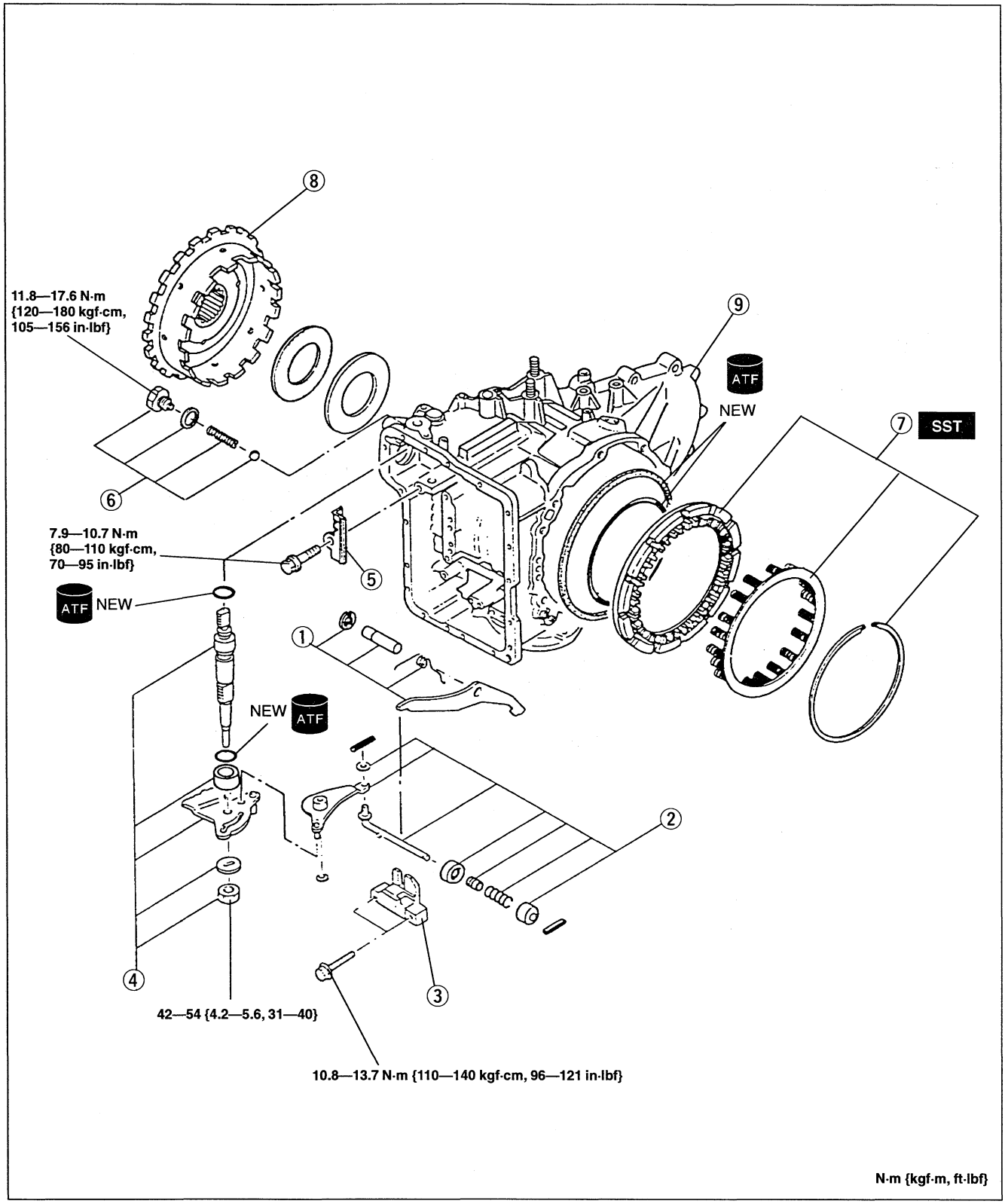
* One-piece units

Components



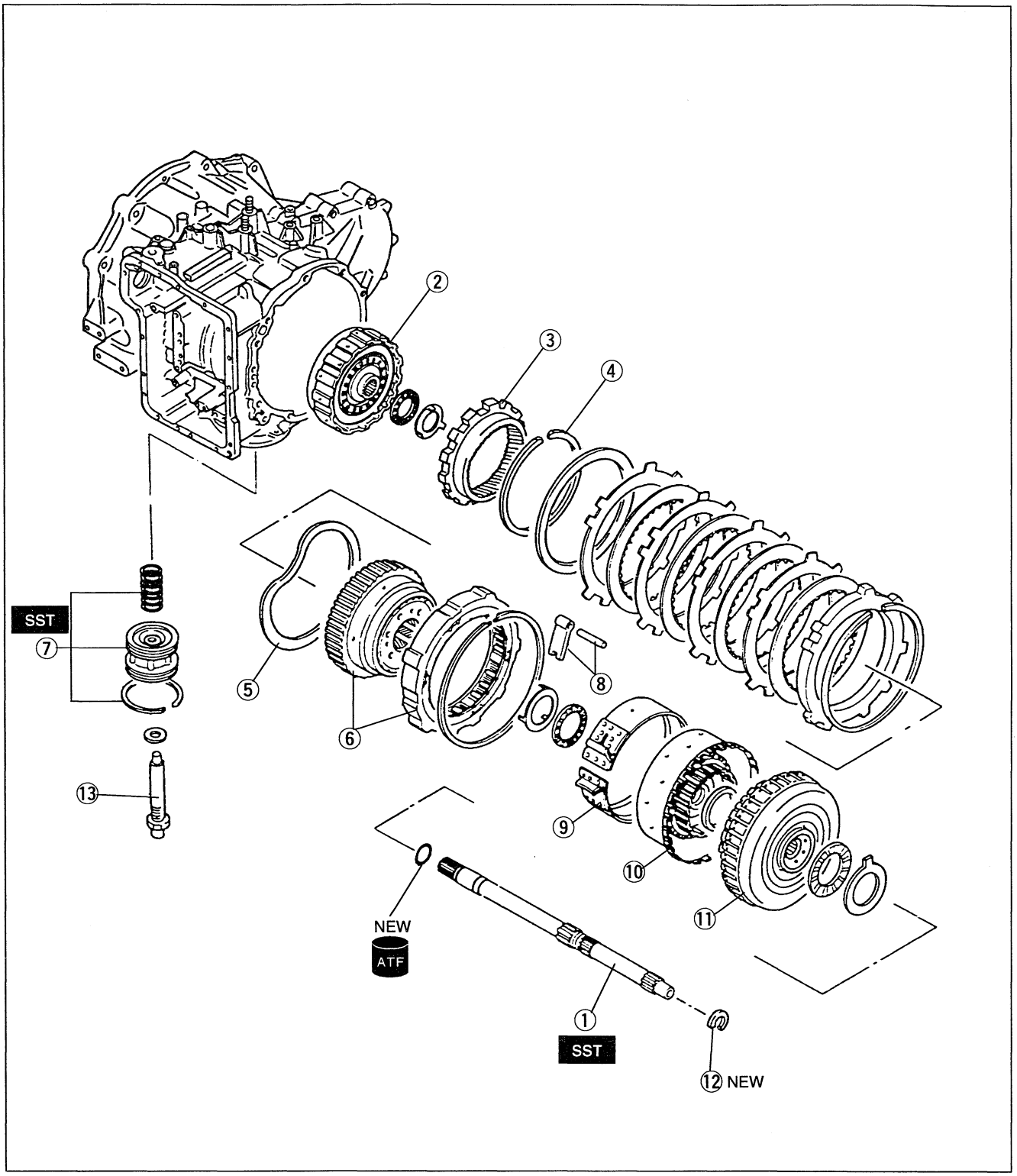
1. Converter housing
2. O-ring
3. Oil seal
4. Adjustment shim
5. Bearing race
6. Bearing cover assembly
7. Output gear
8. Idler gear
9. Bearing housing
10. Baffle plate
11. Roll pin
12. Orifice check valve
13. Orifice check valve spring
14. 2–3 accumulator
15. Differential

Components (Cont'd)



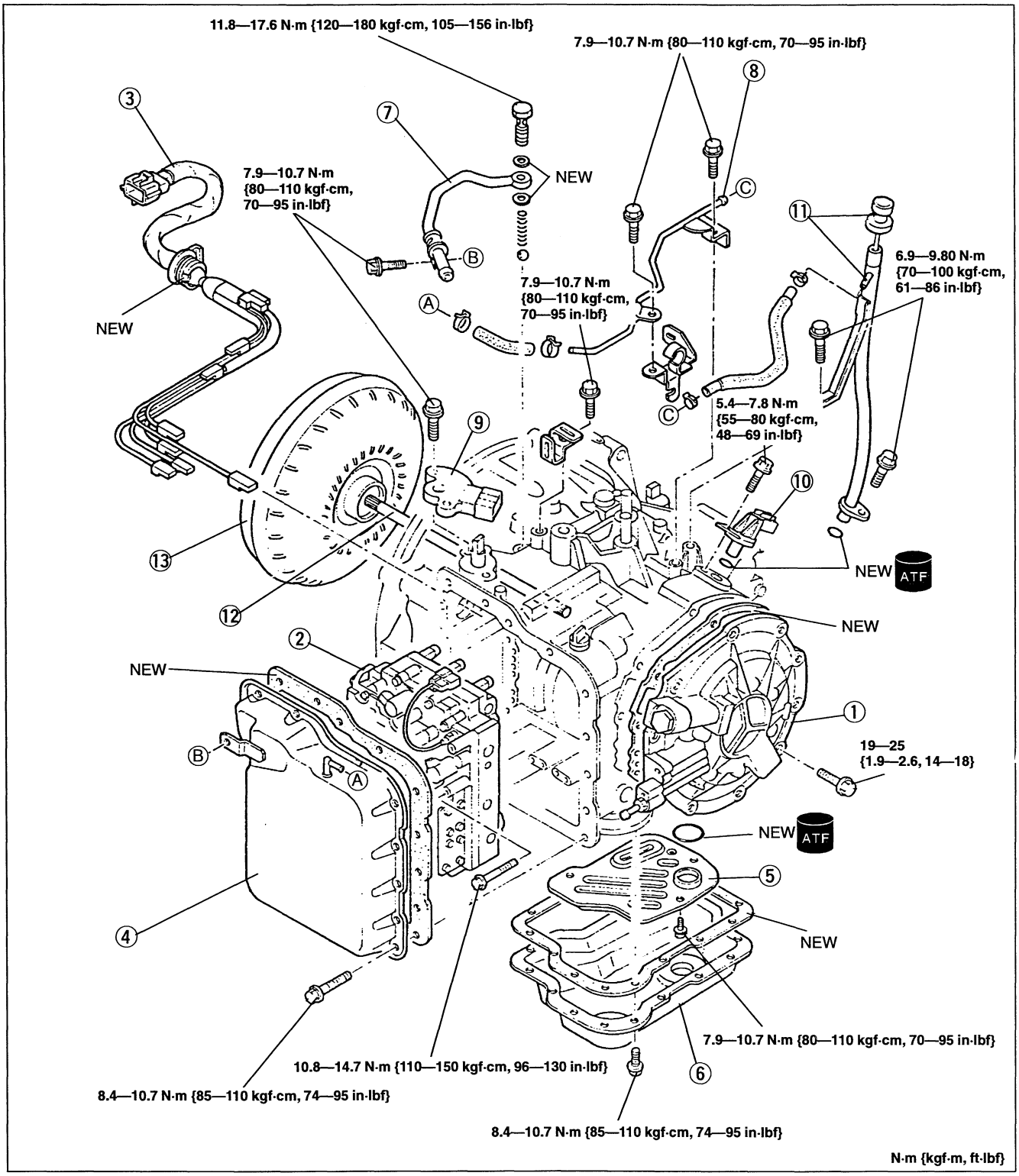
1. Parking pawl
2. Parking assist lever
3. Actuator support
4. Manual shaft and manual plate
5. Bracket
6. Plug, packing, spring, and detent ball
7. Low and reverse brake
8. Output shell
9. Transaxle case

Components (Cont'd)

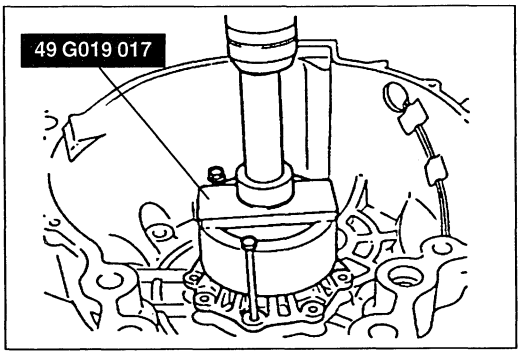


1. Turbine shaft
2. 3–4 clutch
3. Internal gear
4. Snap ring
5. Friction plate
6. One-way clutch 2 and carrier hub assembly
7. Band servo
8. Anchor strut and shaft
9. 2–4 brake band
10. Small sun gear and one-way clutch 1
11. Clutch assembly
12. Snap ring
13. Piston stem

Components (cont'd)



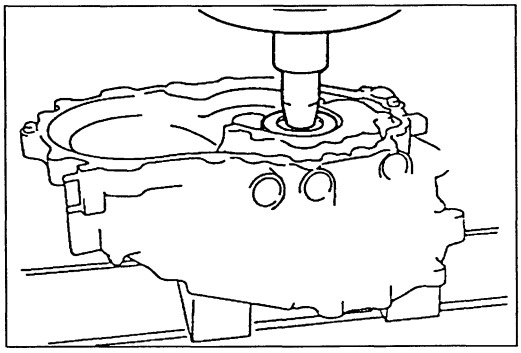
1. Oil pump
2. Control valve body
3. Coupler assembly
4. Control valve body cover
5. Oil strainer
6. Oil pan
7. Oil pipe
8. Breather hose
9. Transaxle range switch
10. Input/turbine speed sensor
11. ATF dipstick and oil filler tube
12. Oil pump shaft
13. Torque converter



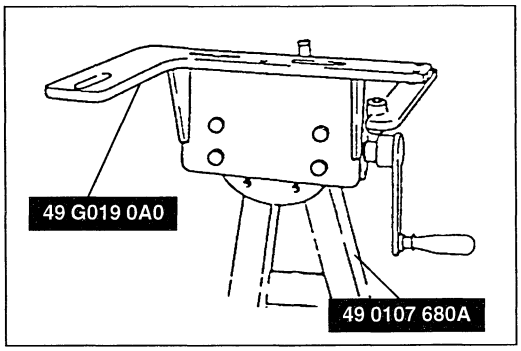
Assembly procedure

1. Remove any old locking compound from the bolt holes.
2. Align the bearing cover with guide bolts as shown and press it in. Install and tighten the new mounting bolts.

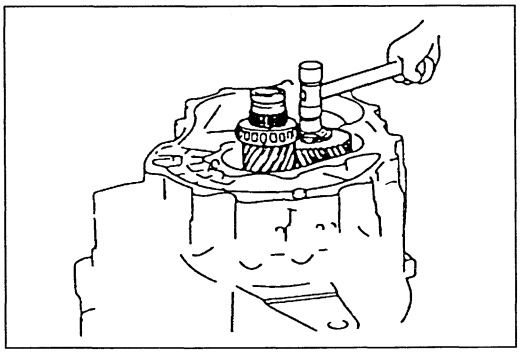
Tightening torque:
10.8—13.7 N·m {110—140 kgf·cm, 96—121 in·lbf}



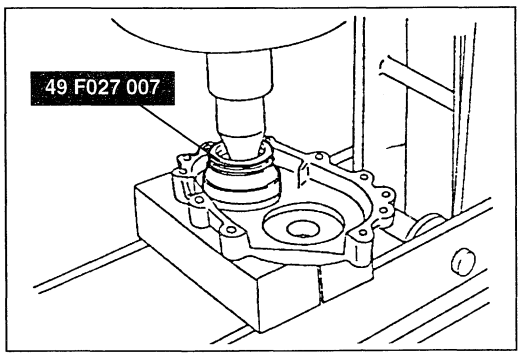
3. Press the bearing race into the converter housing.



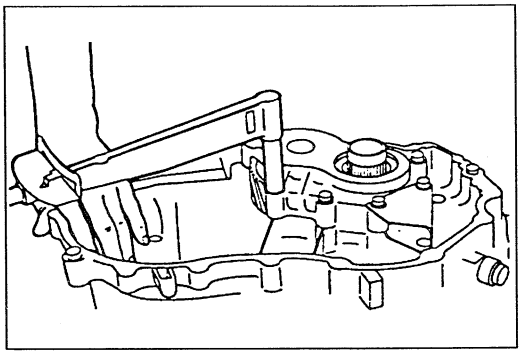
4. Assemble the **SST**.



5. Install the idler gear and output gear by tapping in with a plastic hammer.

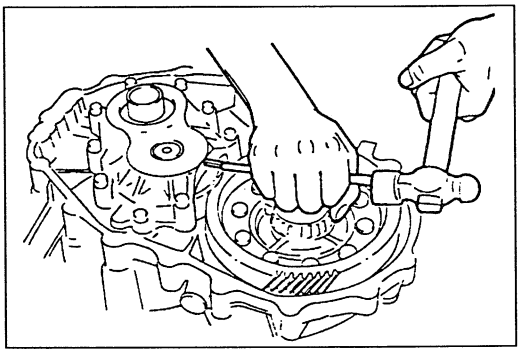


6. Install the selected shim(s) and bearing race into the bearing housing by using the **SST**.

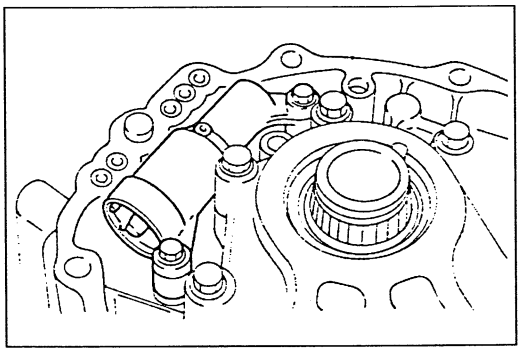


7. Install the bearing housing.
   (1) Install the bearing housing and tighten the bolts evenly and gradually.

Tightening torque:
26—30 N·m {2.6—3.1 kgf·m, 19—22 ft·lbf}

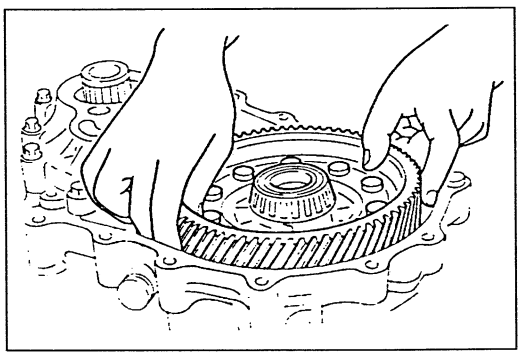


   (2) Align the slot of the idler shaft with the mark on the bearing housing.
   (3) Tap a new roll pin in by using a pin punch and a hammer.

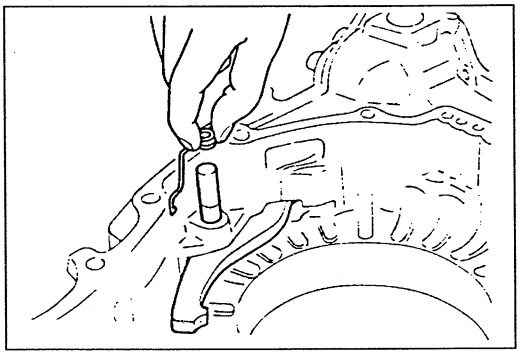


8. Install the 2–3 accumulator piston.
   (1) Install the orifice check valve spring and orifice check valve.
   (2) Apply ATF to new O-rings and install them into the 2–3 accumulator.
   (3) Install the 2–3 accumulator piston.

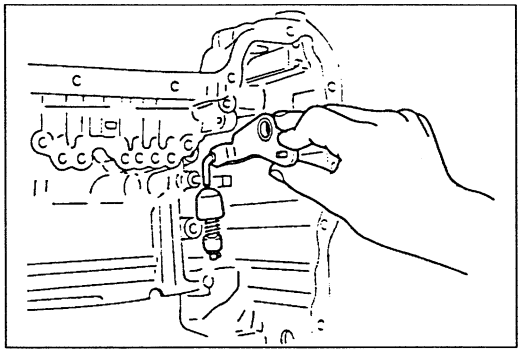
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}



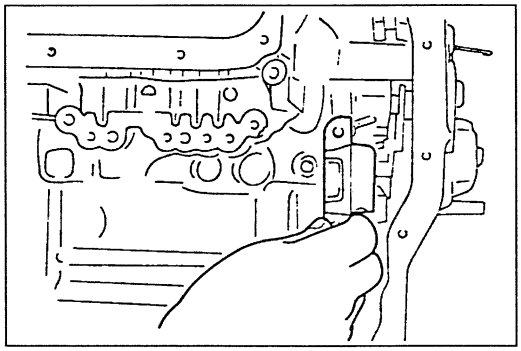
9. Install the bearing race into the bearing housing.
10. Install the differential.
11. Install the selected shim(s) and bearing race into the transaxle case.



12. Install the parking pawl.
   (1) Install the parking pawl and shaft.
   (2) Install the spring and snap ring.

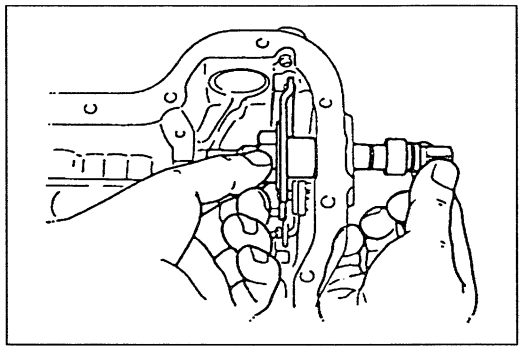


13. Install the parking assist lever and snap ring.



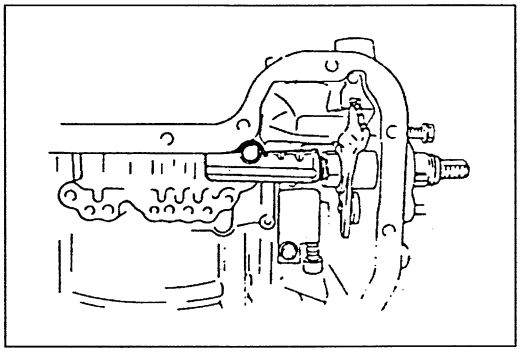
14. Install the actuator support.

Tightening torque:
10.8—13.7 N·m {110—140 kgf·cm, 96—121 in·lbf}



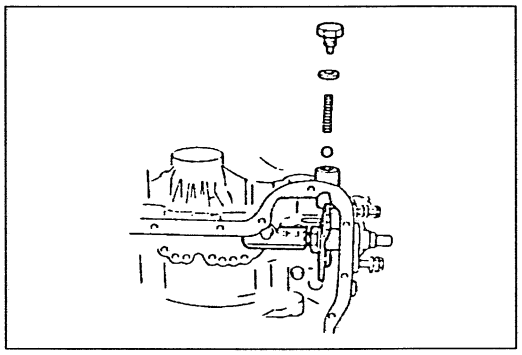
15. Install the manual shaft and manual plate.
(1) Install the manual plate, spacer, washer, and nut.
(2) Tighten the nut to the specified torque.

Tightening torque:
42—54 N·m {4.2—5.6 kgf·m, 31—40 ft·lbf}



(3) Install the bracket.

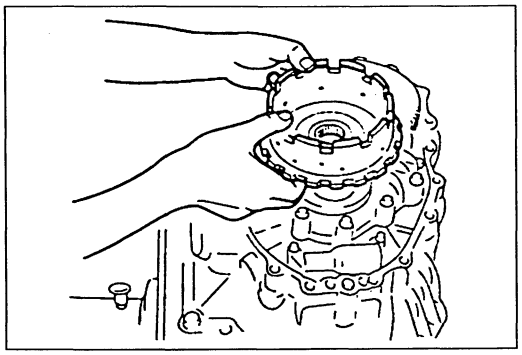
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}



(4) Install the detent ball, spring, washer and plug. Tighten the plug.

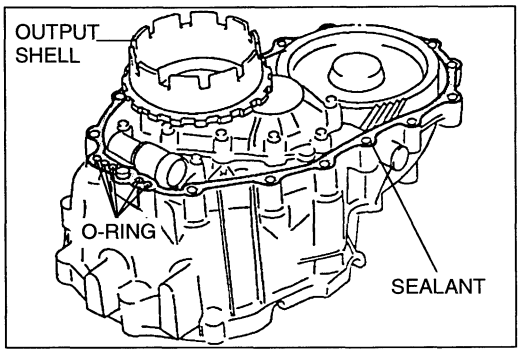
Tightening torque:
11.8—17.6 N·m {120—180 kgf·cm, 105—156 in·lbf}

(5) Move the manual shaft and verify that the parking pawl operates correctly.



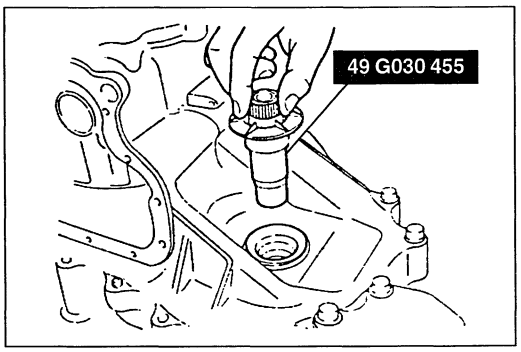
16. Install the output shell to the output gear, and install the bearing race onto the output shell.

    Thrust bearing outer diameter: 71.0 mm {2.80 in}



17. Apply a light coat of silicone sealant to the contact surfaces of the converter housing and the transaxle case.
18. Install new O-rings into the converter housing.
19. Install the transaxle case on the converter housing, and tighten the bolts evenly and gradually.

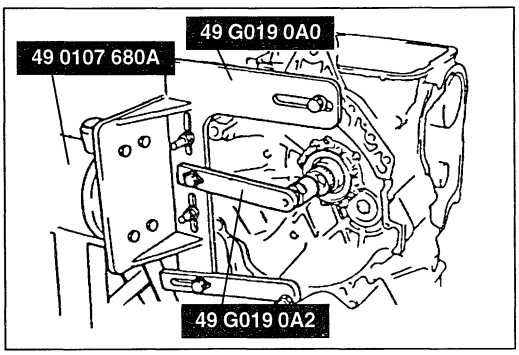
    Tightening torque:
    38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



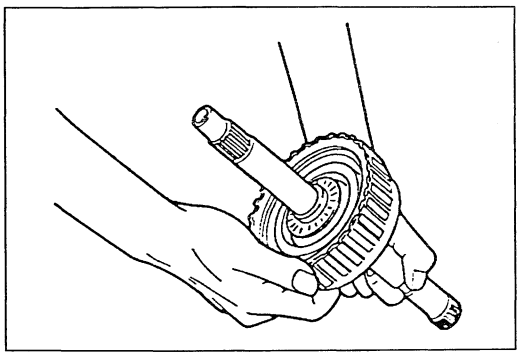
20. Install the No.1 engine mount.

    Tightening torque:
    68—77 N·m {6.9—7.9 kgf·m, 50—57 ft·lbf}

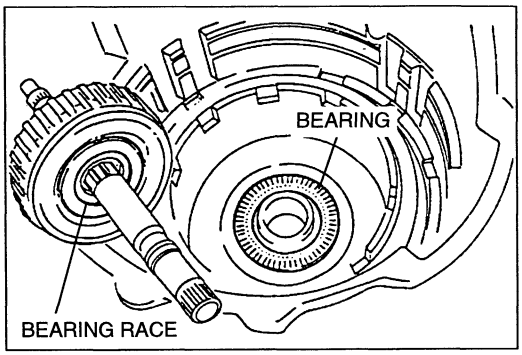
21. Install the **SST** into the differential side gears.



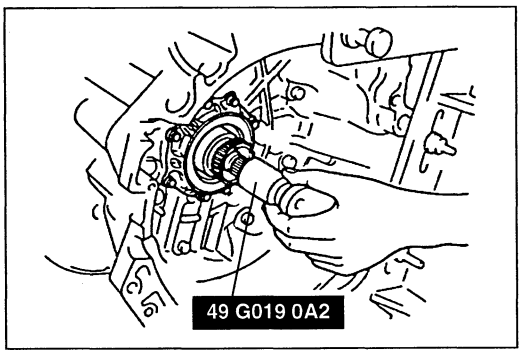
22. Install the **SSTs** to hold the turbine shaft.



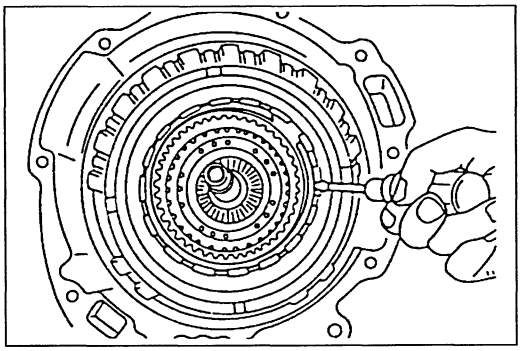
23. Install the turbine shaft and 3–4 clutch assembly.
    (1) Assemble the turbine shaft and 3–4 clutch assembly.



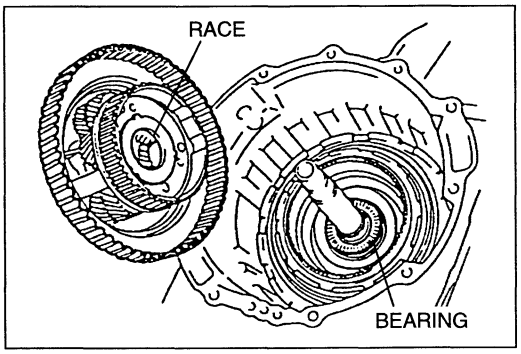
(2) Verify that the thrust bearing and race are properly installed.
(3) Install the turbine shaft and 3–4 clutch assembly into the transaxle case.



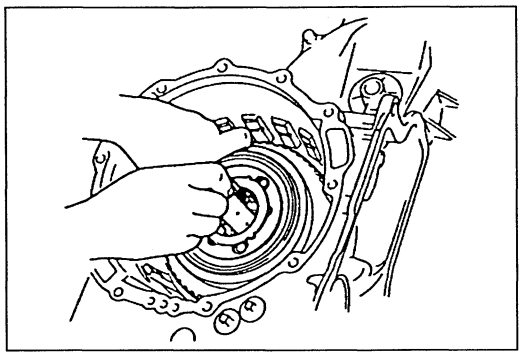
24. Adjust the **SST** position so that it contacts and holds the turbine shaft.



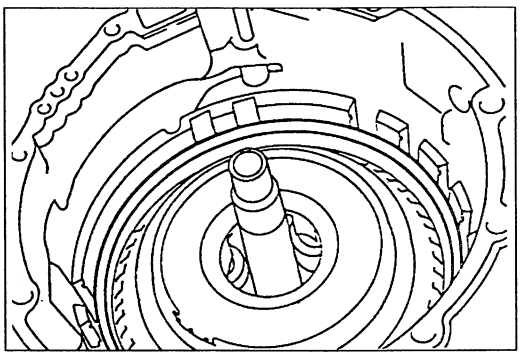
25. Install the internal gear.
(1) Install the internal gear to the output shell.
(2) Install the snap ring.



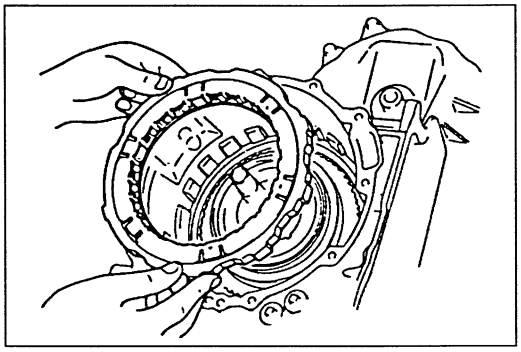
26. Install the carrier hub assembly.
(1) Verify that the thrust bearing and bearing race are installed in the correct position.



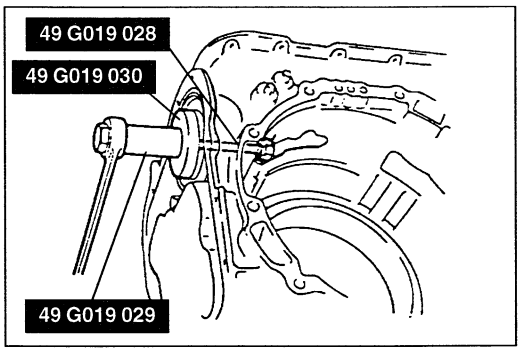
(2) Hold the turbine shaft with one hand to prevent it from rotating.
(3) Install the carrier hub assembly into the 3–4 clutch drum by rotating it.



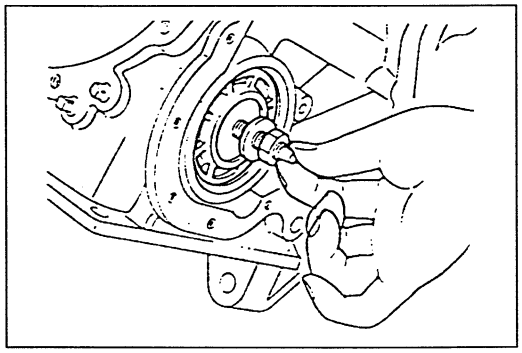
27. Install the friction plate.



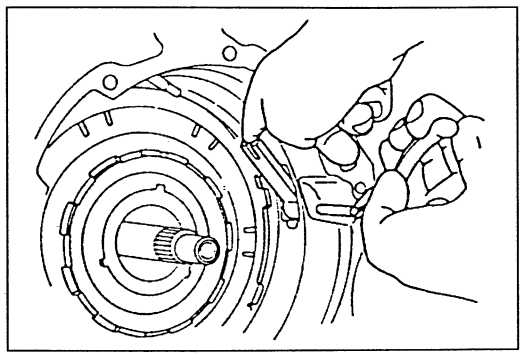
28. Install the one-way clutch 2.
    (1) Hold the one-way clutch 2 horizontally.
    (2) Install it by turning the carrier hub assembly counter-clockwise.
    (3) Install the snap ring.



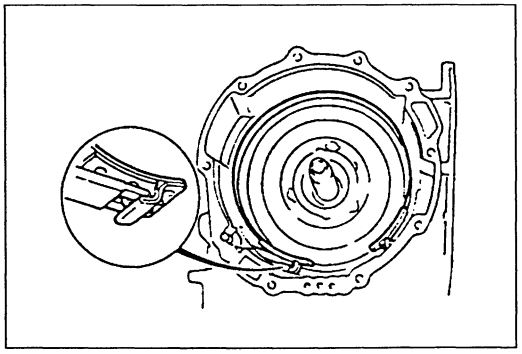
29. Install the band servo to the transaxle case.
    (1) Install the servo return spring and band servo.
    (2) Compress the servo by using the **SST**.
    (3) Install the snap ring.
    (4) Remove the **SST**.



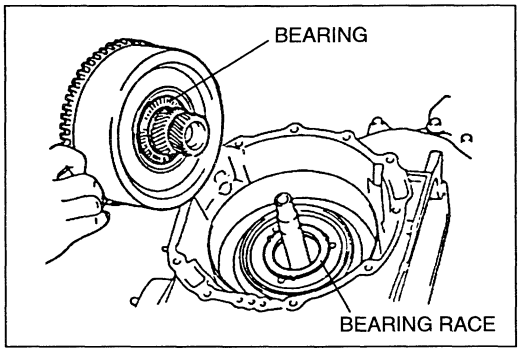
30. Install the piston stem.
31. Hand tighten the piston stem by hand.



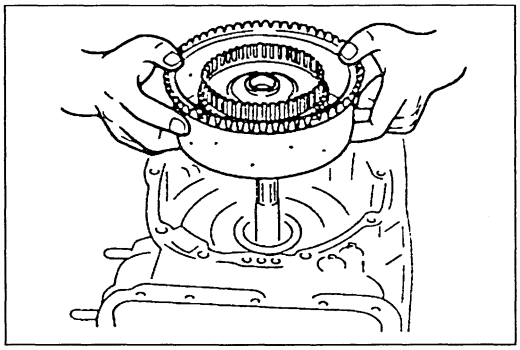
32. Install the anchor strut.



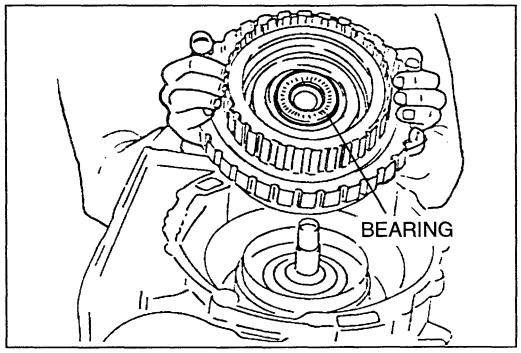
33. Install the 2–4 brake band in the transaxle case, and interlock it to the anchor strut as shown.



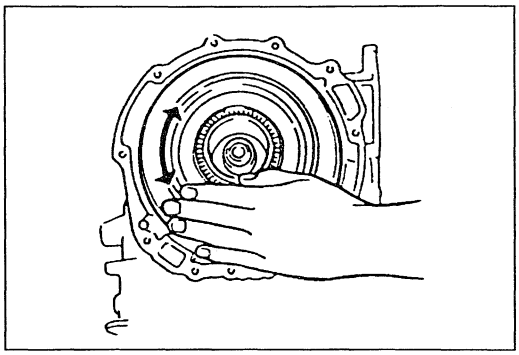
34. Install the small sun gear and one-way clutch 1.
    (1) Verify that the thrust bearing and bearing race are installed in the correct position.



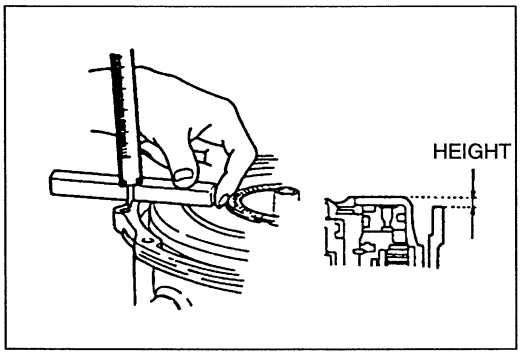
    (2) Install the small sun gear and one-way clutch 1 assembly by rotating it.



35. Install the clutch assembly.
    (1) Verify that the thrust bearing is installed in the correct position.

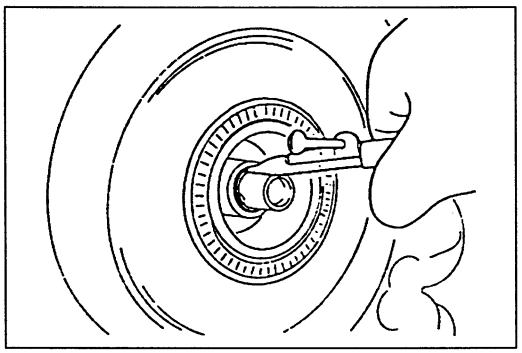


    (2) Install the clutch assembly by rotating it.

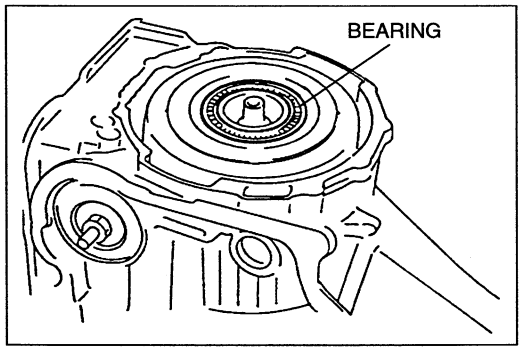


(3) Measure the height difference between the reverse and foward drum and the transaxle case. If not within the specification, reassemble beginning with step 22.

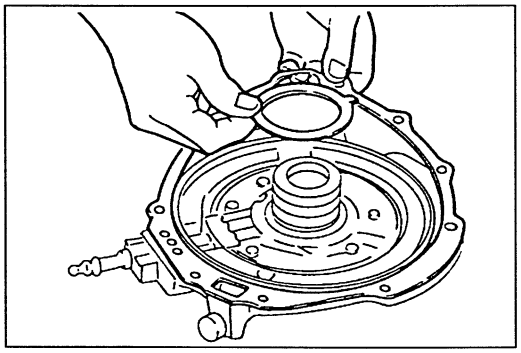
Height difference:
0.7—1.9 mm {0.028—0.075 in} max.



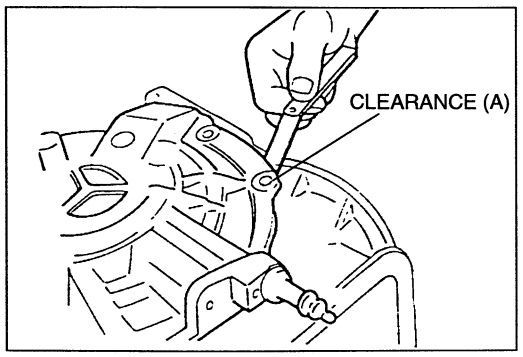
36. Install the new snap ring into the bottom ring groove of the turbine shaft.



37. Use the following procedure to adjust the total end play and select a suitable bearing race.
(1) Set the thrust bearing onto the clutch assembly.

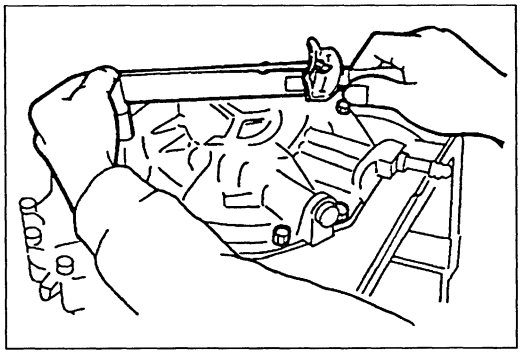


(2) Remove the bearing race and the oil pump gasket.
(3) Set the thickest bearing race **(2.2 mm {0.087 in})** onto the oil pump.
(4) Set the oil pump onto the clutch assembly.



(5) Measure clearnce A between the transaxle case and the oil pump. Make several measurements and calculate the average value.
(6) Select a suitable bearing race from the chart below.

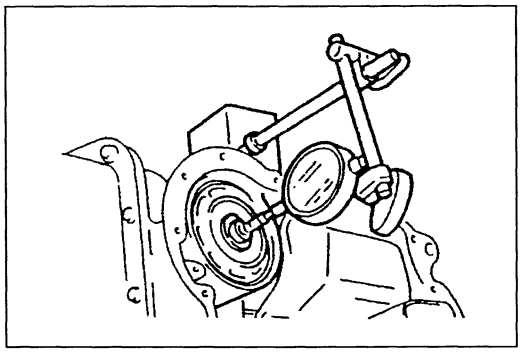
Clearance A mm {in}	Select this bearing race mm {in}
0.91—1.10 {0.036—0.043}	1.2 {0.047}
0.71—0.90 {0.028—0.035}	1.4 {0.055}
0.51—0.70 {0.020—0.028}	1.6 {0.063}
0.31—0.50 {0.012—0.020}	1.8 {0.071}
0.11—0.30 {0.004—0.011}	2.0 {0.079}
0—0.10 {0—0.003}	2.2 {0.087}



(7) Remove the oil pump.
(8) Place the selected bearing race and a new gasket onto the oil pump.
(9) Install the oil pump onto the clutch assembly, and tighten the bolts evenly and gradually.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

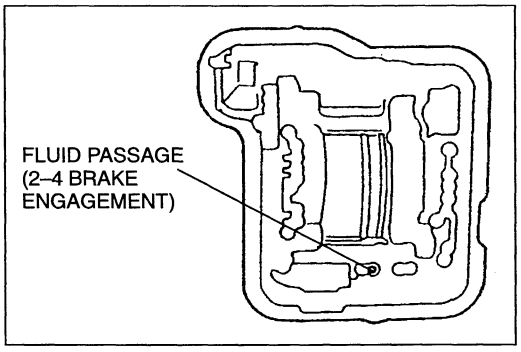
(10) Install the oil pipe.



38. Adjust the 2–4 brake band.
(1) Loosen the locknut and tighten the piston stem to the specified torque.

Tightening torque:
11.8—14.7 N·m {120—150 kgf·cm, 105—130 in·lbf}

(2) Install a dial indicator and magnetic base to the oil pump. Set the dial indicator against the piston stem.

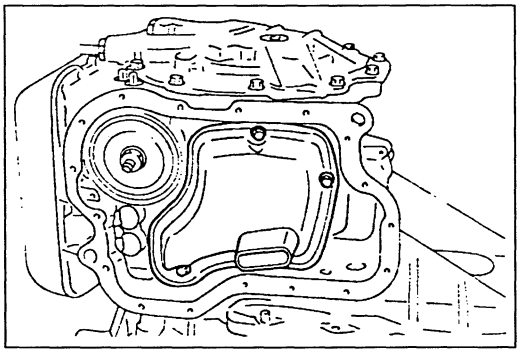


(3) Loosen the piston stem to the specification by applying compressed air through the fluid passage (2–4 brake engagement).

Air pressure: 390—400 kPa {3.9—4.1 kgf/cm^2}
Stroke: 1.2—1.4 mm {0.0473—0.0551 in}

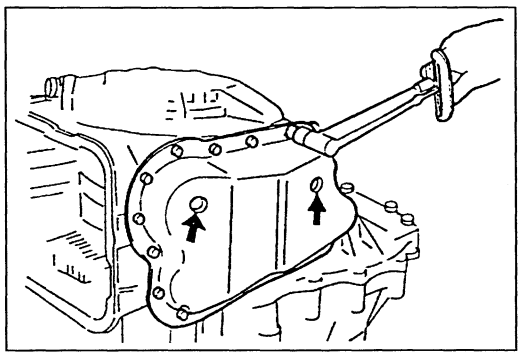
(4) Hold the piston stem and tighten the locknut to the specified torque.

Tightening torque:
25—39 N·m {2.5—4.0 kgf·m, 19—28 ft·lbf}



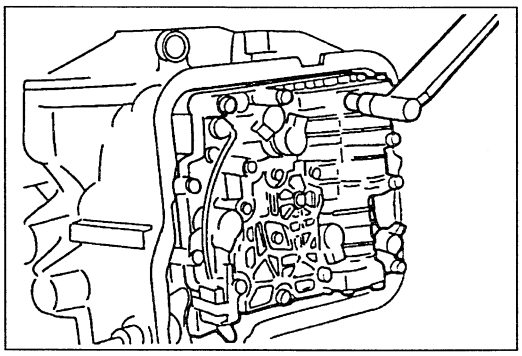
39. Install a new O-ring and oil strainer to the transaxle.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}



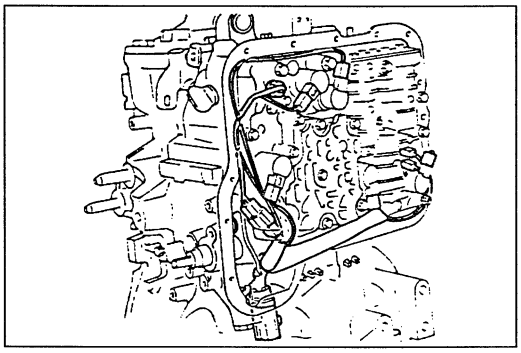
40. Install the magnets inside the oil pan in the positions shown in the figure.
41. Install a new gasket and the oil pan.

Tightening torque:
8.4—10.7 N·m {85—110 kgf·cm, 74—95 in·lbf}

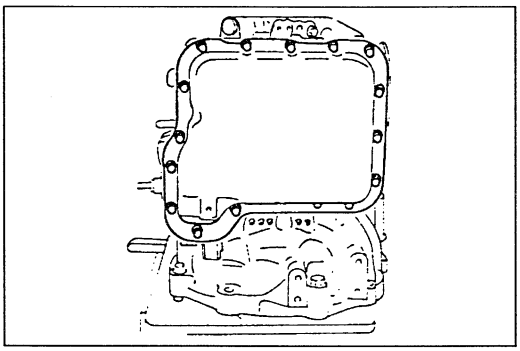


42. Align the manual valve with the pin on the manual plate.
43. Install the control valve body into the transaxle case, and tighten the bolts evenly and gradually.

Tightening torque:
10.8—14.7 N·m {110—150 kgf·cm, 96—130 in·lbf}

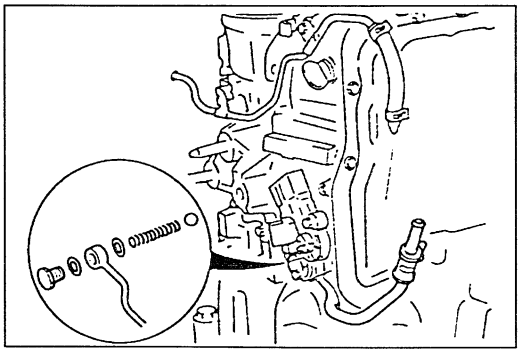


44. Install a new O-ring to the coupler assembly.
45. Install the coupler assembly.
46. Match the harness colors, and connect the solenoid connectors and transaxle fluid temperature sensor connector.



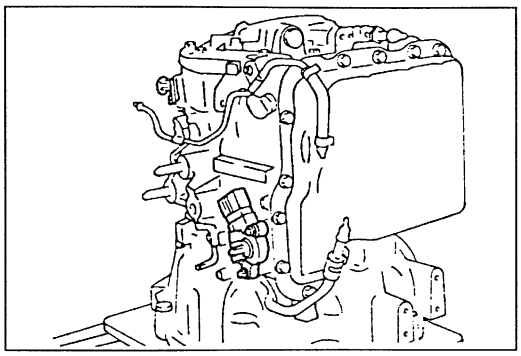
47. Install a new gasket and control valve body cover, and tighten the bolts evenly and gradually.

Tightening torque:
8.4—10.7 N·m {85—110 kgf·cm, 74—95 in·lbf}



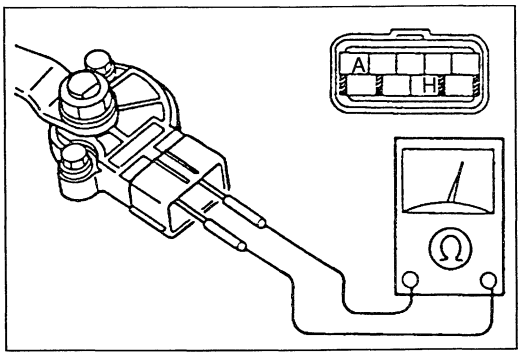
48. Install the steel ball, spring, oil pipe, and packing.
49. Install the connecting bolt.

Tightening torque:
11.8—17.6 N·m {120—180 kgf·cm, 105—156 in·lbf}



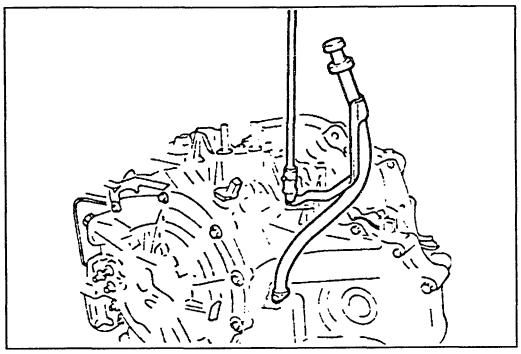
50. Install the input/turbine speed sensor.

Tightening torque:
5.4—7.8 N·m {55—80 kgf·cm, 48—69 in·lbf}



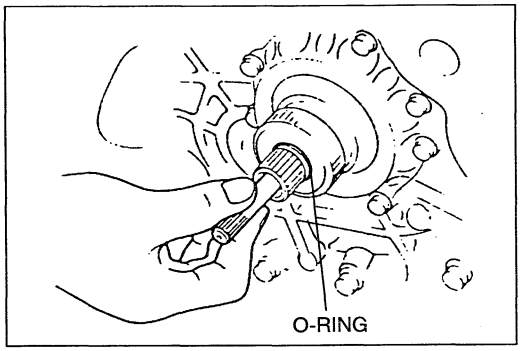
51. Install the transaxle range switch.
52. Adjust the transaxle range switch.
    (1) Connect an ohmmeter between terminals Ⓐ and Ⓗ.
    (2) Rotate the manual shaft fully counterclockwise, then return it two notches to the N position.
    (3) Adjust the switch to the point where there is continuity between the terminals.
    (4) Tighten the switch.

    Tightening torque:
    7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}

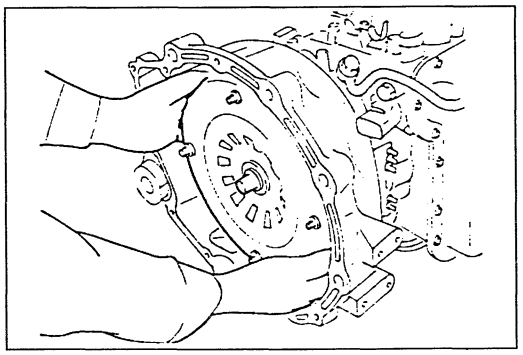


53. Remove the transaxle from the **SST** (transaxle hanger).
54. Install the ATF dipstick and oil filler tube along with a new O-ring to the transaxle case.

    Tightening torque:
    6.9—9.8 N·m {70—100 kgf·cm, 61—86 in·lbf}



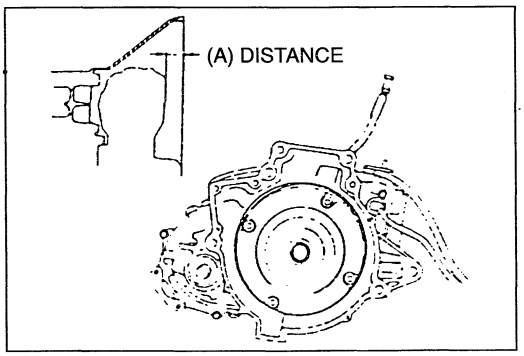
55. Install the oil pump shaft.
56. Install a new O-ring onto the turbine shaft.



57. If the torque converter is completely empty, hold it upright, and fill it with **2.0 L {2.1 US qt, 1.8 Imp qt}** of ATF. If the torque converter has not been completely drained, add the same amount of ATF that was drained out.

    ATF type: Dexron®II or M–III

58. Carefully install the torque converter to the torque converter housing. Rotate the torque converter to align the splines.



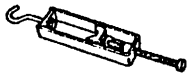
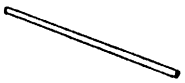
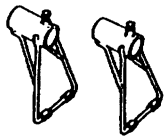
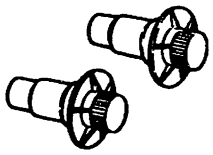
59. To ensure that the torque converter is installed accurately, measure distance A between the end of the torque converter and the face of the converter housing.

    Distance A: 14.0 mm {0.551 in}

TRANSAXLE UNIT (INSTALLATION)

Preparation

SST

49 G017 5A0 Support, engine 	For support of engine	49 G017 503 Hook (Part of 49 G017 5A0) 	For support of engine
49 G017 501 Bar (Part of 49 G017 5A0) 	For support of engine	49 G017 502 Support (Part of 49 G017 5A0) 	For support of engine
49 G030 455 Holder, differential side gear 	For holding differential side gear	—	—

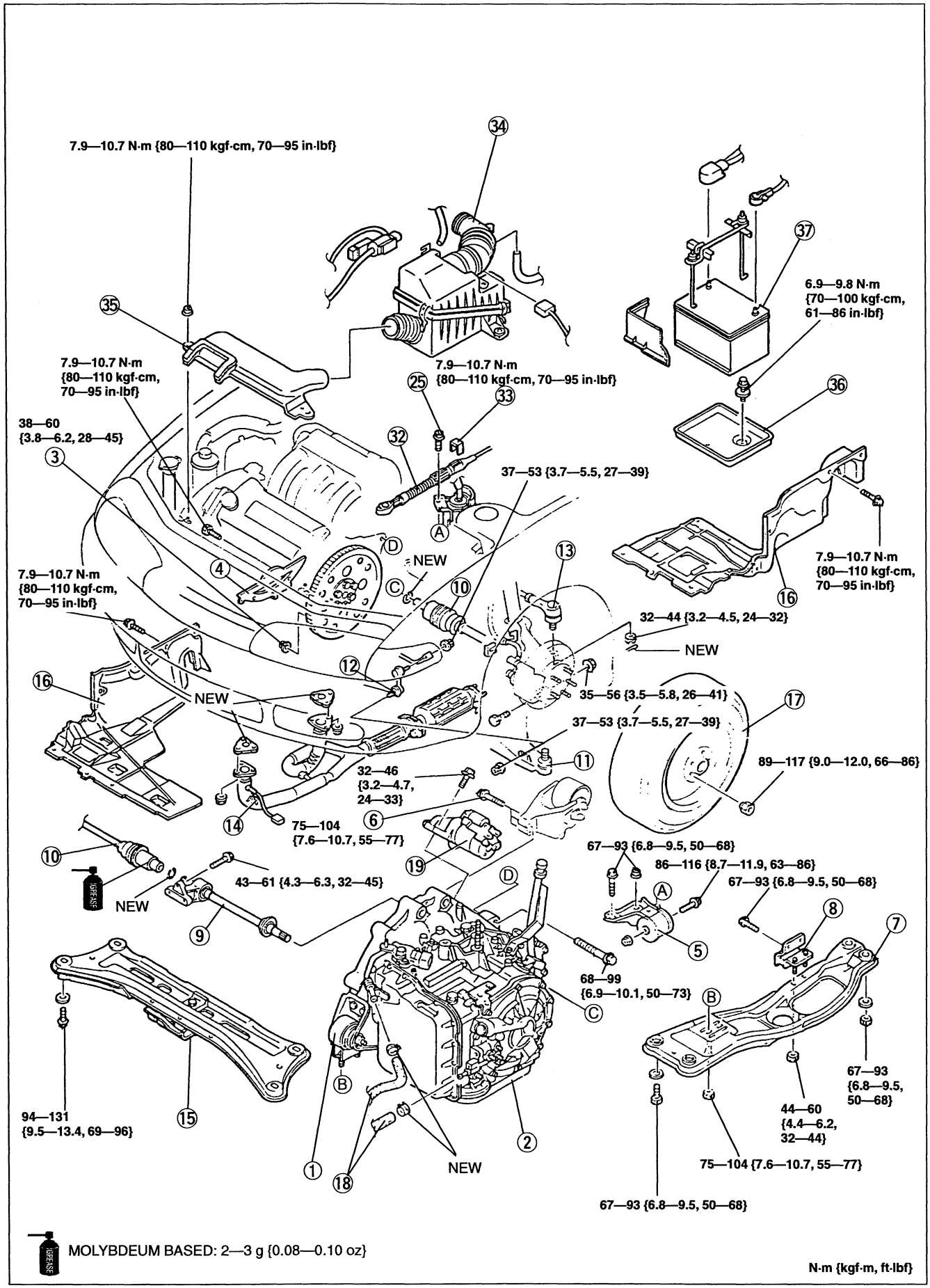
Installation

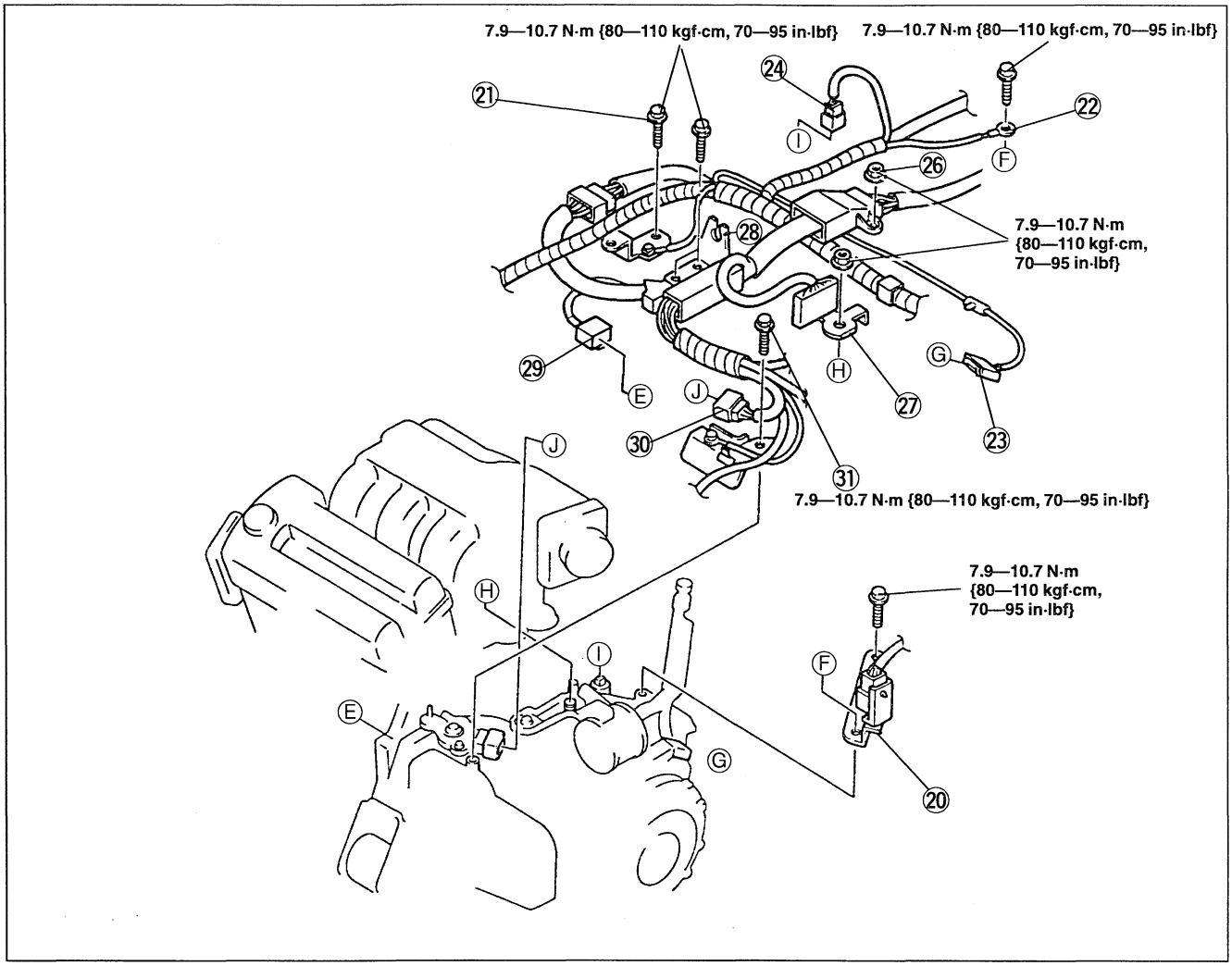
1. Install in the order shown in the figure, referring to **Installation Note**.
2. Fill the transaxle with the specified ATF after installation. (Refer to page K1–18.)
3. Check for leakage of ATF from all connecting points. (Refer to page K1–18.)
4. Connect the negative battery cable.
5. Check operation of the transaxle range switch. (Refer to page K1–28.)
6. Check operation of the selector lever. (Refer to page K1–170.)
7. Carry out the mechanical system test. (Refer to page K1–10.)

Service item \ Test item	Line pressure test	Stall test	Time lag test
Automatic transaxle replacement	○		
Automatic transaxle overhaul	○	○	○
Torque converter replacement	○	○	
Oil pump replacement	○		
Clutch system replacement	○		
Differential replacement	○		

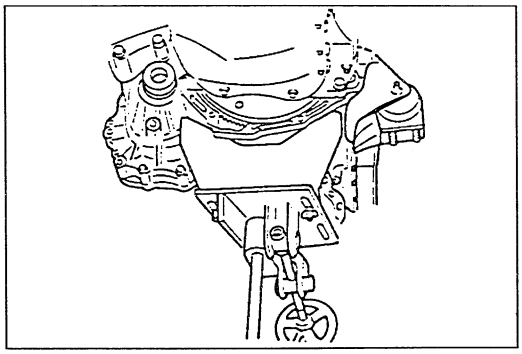
○: Test to be performed after work

8. Carry out the road test. (Refer to page K1–15.)

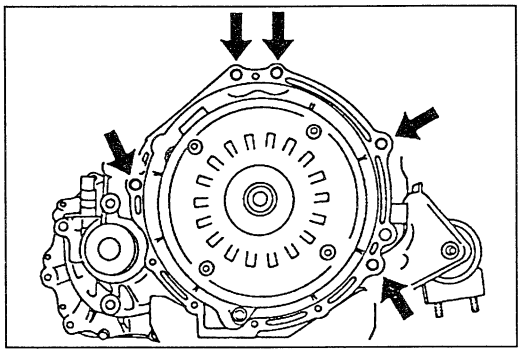

7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}
34
35
37
6.9—9.8 N·m {70—100 kgf·cm, 61—86 in·lbf}
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}
25
33
36
38—60 {3.8—6.2, 28—45}
3
32
37—53 {3.7—5.5, 27—39}
A
D
NEW
C
4
10
13
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}
16
32—44 {3.2—4.5, 24—32}
NEW
12
35—56 {3.5—5.8, 26—41}
17
37—53 {3.7—5.5, 27—39}
89—117 {9.0—12.0, 66—86}
11
32—46 {3.2—4.7, 24—33}
14
75—104 {7.6—10.7, 55—77}
6
19
67—93 {6.8—9.5, 50—68}
86—116 {8.7—11.9, 63—86}
67—93 {6.8—9.5, 50—68}
10
43—61 {4.3—6.3, 32—45}
NEW
9
5
8
7
68—99 {6.9—10.1, 50—73}
B
C
67—93 {6.8—9.5, 50—68}
44—60 {4.4—6.2, 32—44}
94—131 {9.5—13.4, 69—96}
15
2
1
18
NEW
75—104 {7.6—10.7, 55—77}
67—93 {6.8—9.5, 50—68}
MOLYBDEUM BASED: 2—3 g {0.08—0.10 oz}
N·m {kgf·m, ft·lbf}



1. No.2 engine mount
2. Transaxle
   Installation Note ..... page K1–157
3. Torque converter nut
4. Undercover
5. No.4 engine mount
6. No.1 engine mount bolt
   Installation Note ..... page K1–157
7. Engine mounting member
   Installation Note ..... page K1–157
8. No.5 engine mount rubber
9. Joint shaft
   Installation Note ..... page K1–158
10. Drive shaft
    Installation ..... section M
11. Lower arm
    Installation Note ..... page K1–158
12. Stabilizer control link
13. Tie-rod end
    Installation Note ..... page K1–159
14. Exhaust pipe
15. Transverse member
16. Splash shield
17. Wheel and tire
18. Oil hose
    Installation Note ..... page K1–159
19. Starter
20. Engine mount stay
    Installation Note ..... page K1–159
21. Bolt
22. Ground
23. Input/turbine speed sensor connector
24. Vehicle speedometer sensor connector
25. Fuel filter mounting bolts
26. Nut
27. Ground
28. Harness bracket
29. Solenoid valve connector
30. Transaxle range switch connector
31. Bolt
32. Selector cable
    Installation Note ..... page K1–160
33. Clip
34. Air cleaner assembly
35. Fresh-air duct
36. Battery carrier
37. Battery



Installation note
Transaxle
1. Set the transaxle on a jack and lift it into place.



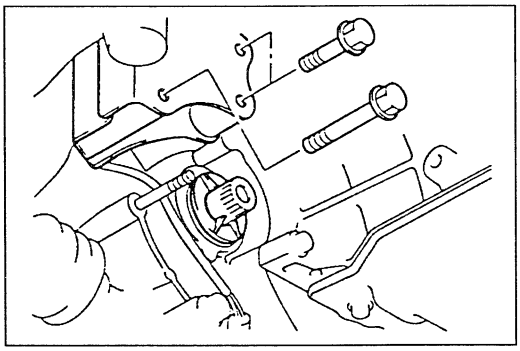
2. Install the transaxle mounting bolts.

   Tightening torque:
   68—99 N·m {6.9—10.1 kgf·m, 50.0—73.0 ft·lbf}

3. Install the torque converter nuts.

   Tightening torque:
   38—60 N·m {3.8—6.2 kgf·m, 28—45 ft·lbf}

4. Hand tighten No.4 engine mount nuts.

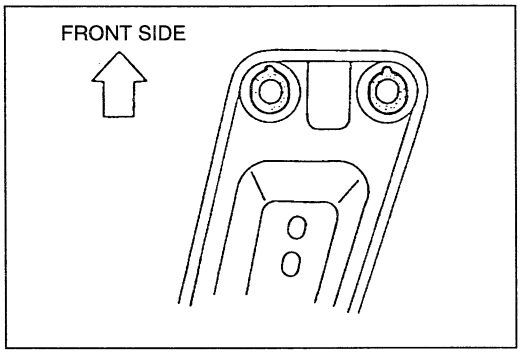


No.1 engine mount bolt

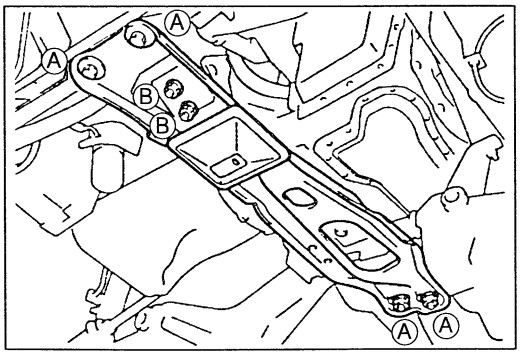
Caution
- **Align the transaxle bolt holes and the engine mount exactly. Any misalignment can result in boltes and bolt holes becoming damaged or stripped during installation.**

1. Use the **SST** (engine support) to make sure the transaxle bolt holes and No.1 engine mount align.
2. Tighten the bolts to the specified torque.

   Tightening torque:
   75—104 N·m {7.6—10.7 kgf·m, 55—77 ft·lbf}



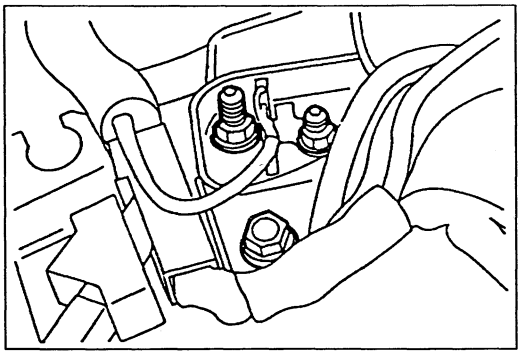
Engine mounting member
1. Install the engine mount bushings as shown in the flgure.
2. Install the engine mounting member, marking sure that the No.2 engine mount stud bolts pass through the mounting member installation hole.



3. Install the bolts and nuts Ⓐ as shown.

   Tightening torque
   A: 67—93 N·m {6.8—9.5 kgf·m, 50—68 ft·lbf}

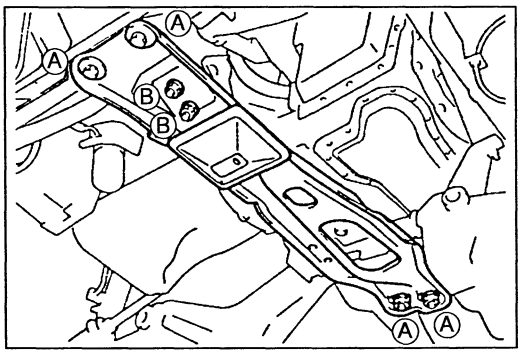
4. Loosely tighten the nuts Ⓑ as shown.



5. Tighten No.4 engine mount nuts.

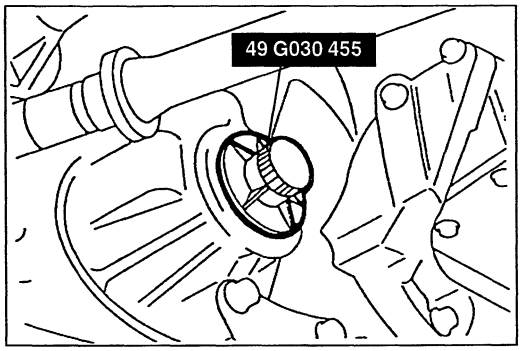
Tightening torque:
67—93 N·m {6.8—9.5 kgf·m, 50—68 ft·lbf}

6. Remove the **SST** (engine support).

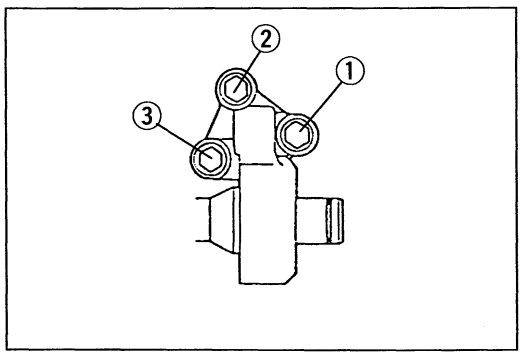


7. Tighten the nuts Ⓑ as shown.

Tightening torque
B: 75—104 N·m {7.6—10.7 kgf·m, 55.0—77.3 ft·lbf}

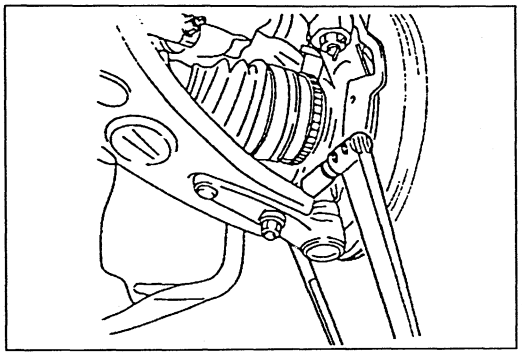


Joint shaft
1. Remove the **SST** from the transaxle case.



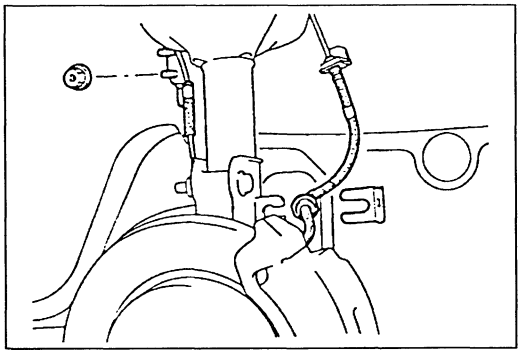
2. Verify that there is no damage to the oil seal.
3. Install the joint shaft to transaxle.

Tightening torque:
43—61 N·m {4.3—6.3 kgf·m, 32—45 ft·lbf}



Lower arm
1. Connect the lower arm to the knuckle and tighten the clinch bolt.

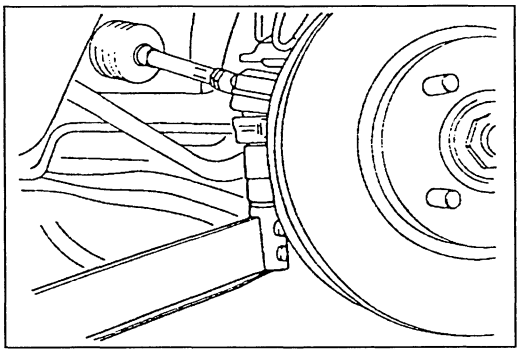
Tightening torque:
44—58 N·m {4.4—6.0 kgf·m, 32—43 ft·lbf}



2. Install the ABS wheel-speed sensor harness mounting nuts.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 69.5—95.4 in·lbf}

3. Install the clip.

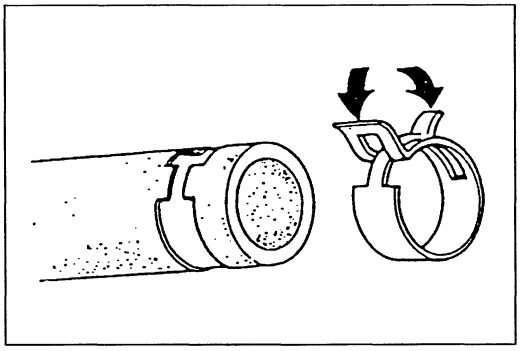


Tie rod end

1. Install the locknut.

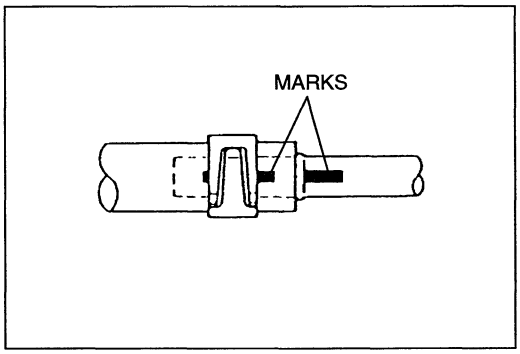
Tightening torque:
43—56 N·m {4.3—5.8 kgf·m, 32—41 ft·lbf}

2. Secure the locknut by using a new cotter pin.

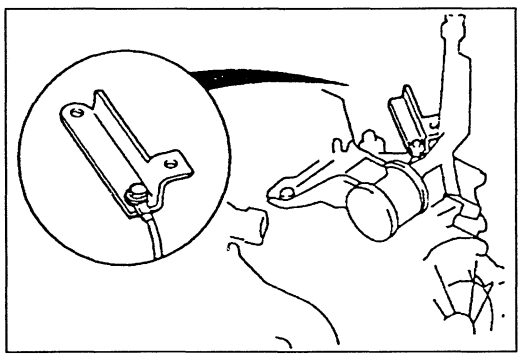


Oil hose

Caution
- **If reusing the hose clamp, position it in the original location on the hose and squeeze the clamp lightly with large pliers to ensure a tight fit.**

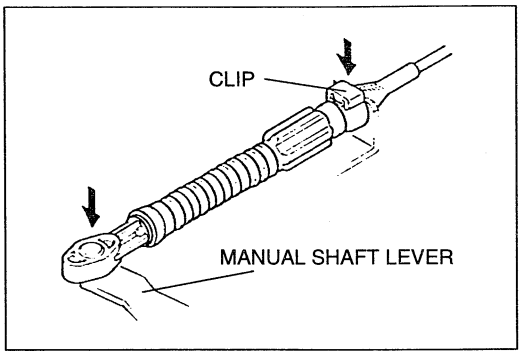


1. Align the marks, and slide the oil cooler hose onto the oil cooler pipe until it is fully seated as shown.
2. Install the hose clamp onto the hose at the center of the mark and at the angle shown.
3. Verify that the hose clamp does not interfere with any other parts.



Engine mount stay

Install the engine mount stay as shown.



Selector cable

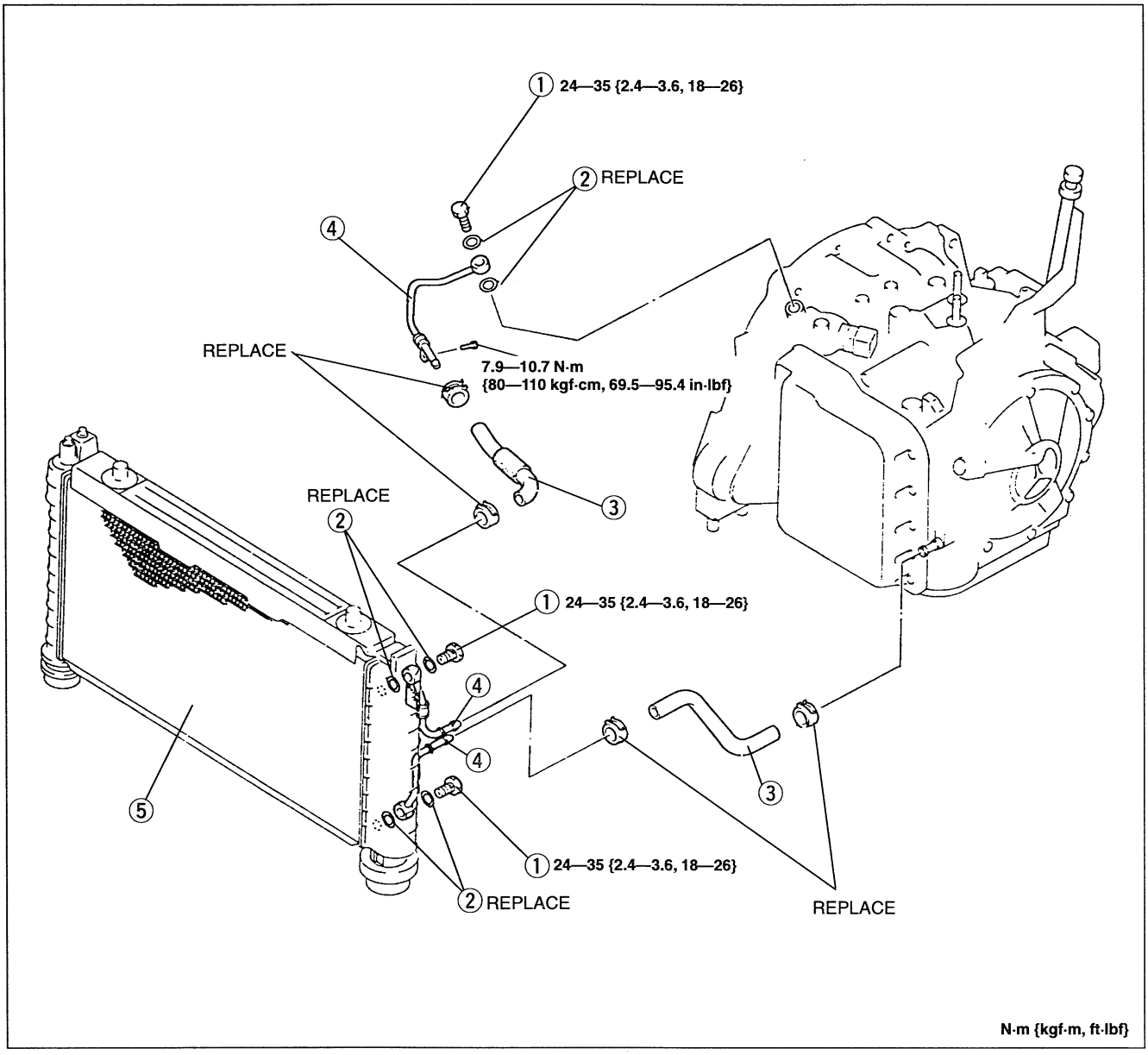
1. Install the selector cable to the cable bracket.
2. Install the clip to the selector cable.
3. Connect the selector cable to the manual shaft lever.

OIL COOLER

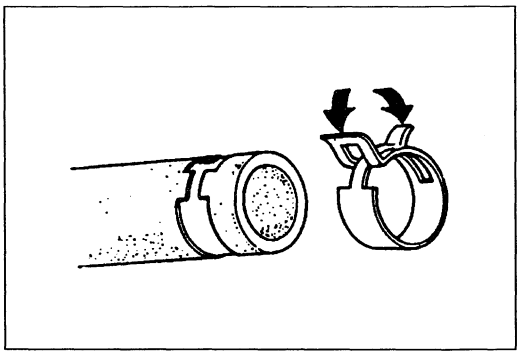
OIL COOLER

Removal / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. Add ATF to the specified level.
5. Connect the negative battery cable.
6. Inspect for oil leakage from the oil pipes and oil hoses.
7. Inspect the ATF level and condition. (Refer to page K1–18.)
8. Carry out the line pressure test. (Refer to page K1–11.)
9. Carry out the road test. (Refer to page K1–15.)

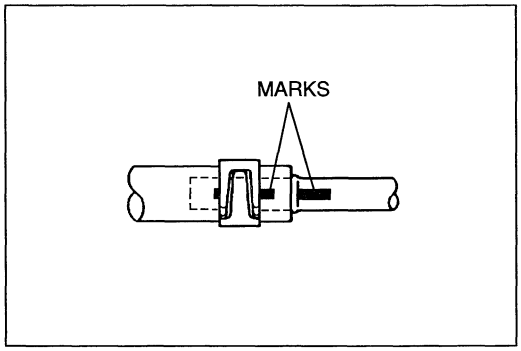


1. Connector bolts
2. Washers
3. Oil hose
   Installation Note ..... page K1–162
4. Oil pipe
5. Radiator
   Service ..... section E2



Installation note
Oil hose

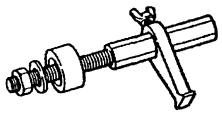
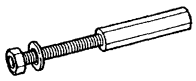
Caution
- **If reusing the hose clamp, position it in the original location on the hose, and squeeze the clamp lightly with large pliers to ensure a tight fit.**



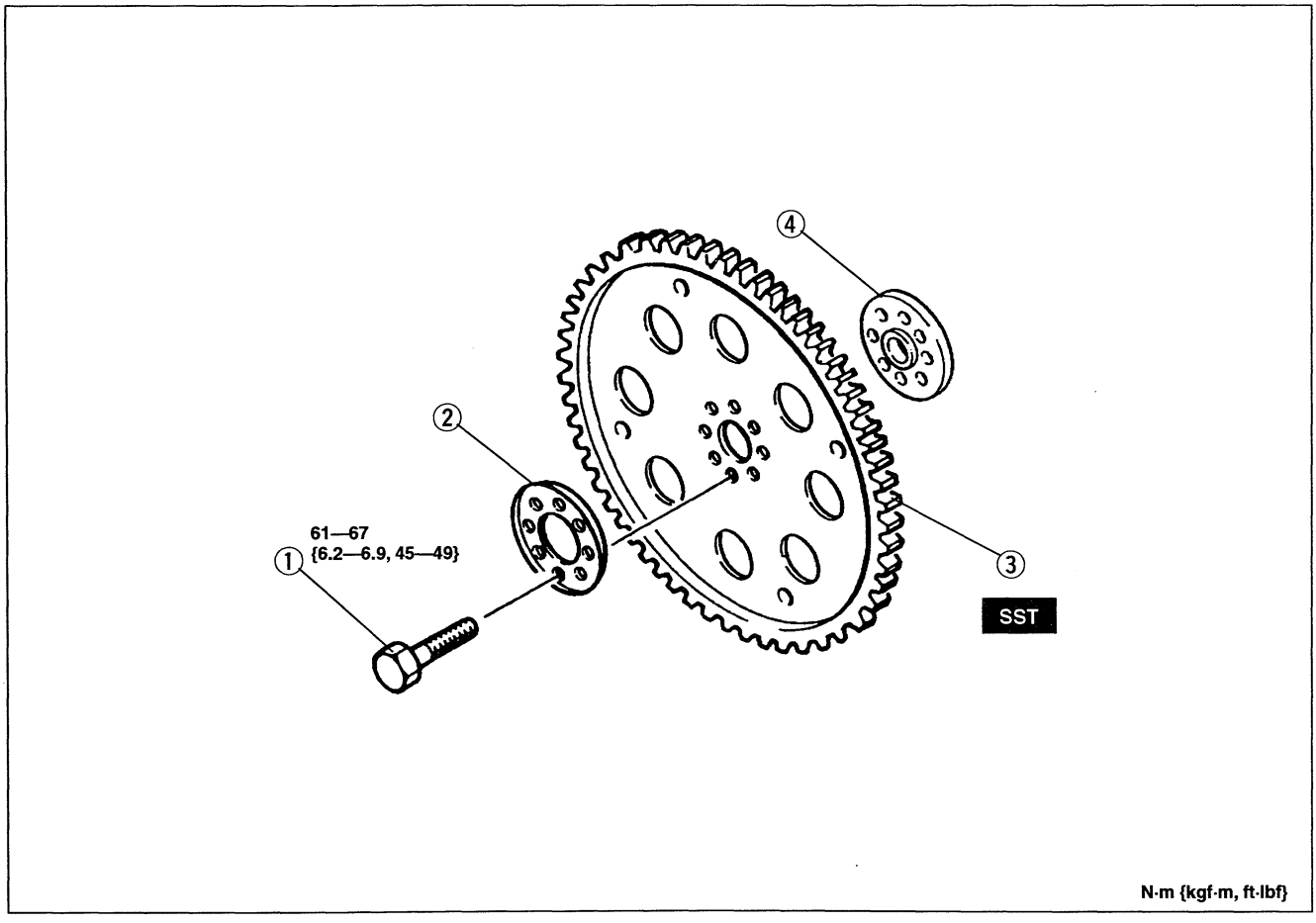
1. Align the marks, and slide the oil cooler hose onto the oil cooler pipe until it is fully seated as shown.
2. Install the hose clamp onto the hose at the center of the mark and at the angle shown.
3. Verify that the hose clamp does not interfere with any other parts.

DRIVE PLATE

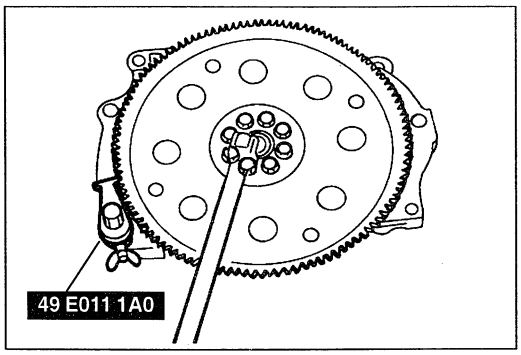
PREPARATION
SST

49 E011 1A0 Brake set, ring gear 	For holding drive plate	49 E011 103 Shaft (Part of 49 E011 1A0) 	For holding drive plate
49 E011 104 Collar (Part of 49 E011 1A0) 	For holding drive plate	49 E011 105 Stopper (Part of 49 E011 1A0) 	For holding drive plate

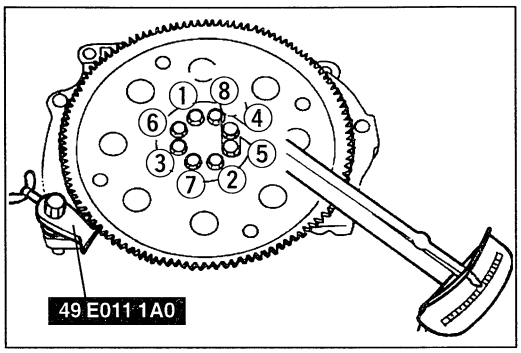
DRIVE PLATE
Removal / Installation
1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal, referring to **Installation Note**.



1. Drive plate mounting bolts
   Removal Note ..... page K1–164
   Installation Note ..... page K1–164
2. Backing plate
3. Drive plate
4. Adapter



Removal note
Drive plate mounting bolts
1. Set the **SST** or equivalent against the drive plate.
2. Remove the bolts and the drive plate.

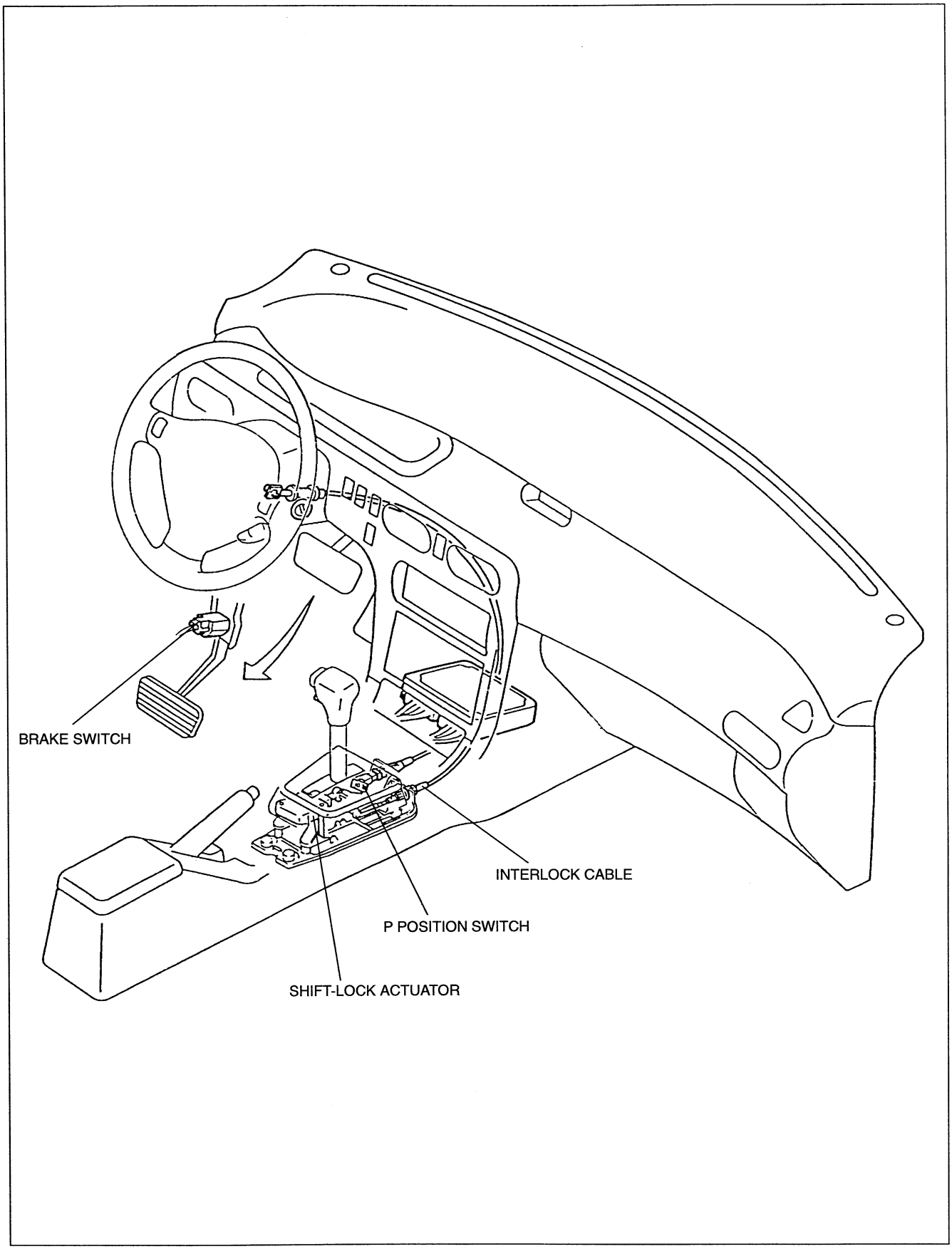


Installation note
Drive plate mounting bolts
1. Set the **SST** or equivalent against the drive plate.
2. Tighten the drive plate mounting bolts in two or three steps in the order shown.

Tightening torque:
61—67 N·m {6.2—6.9 kgf·m, 45—49 ft·lbf}

SHIFT MECHANISM

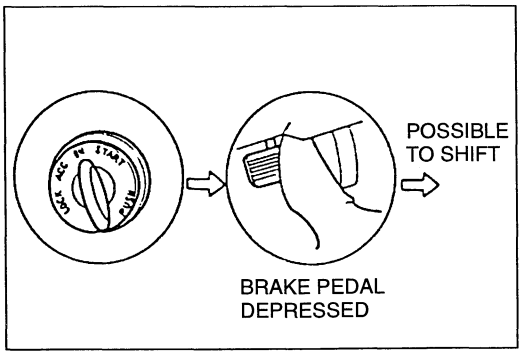
SHIFT-LOCK SYSTEM COMPONENTS

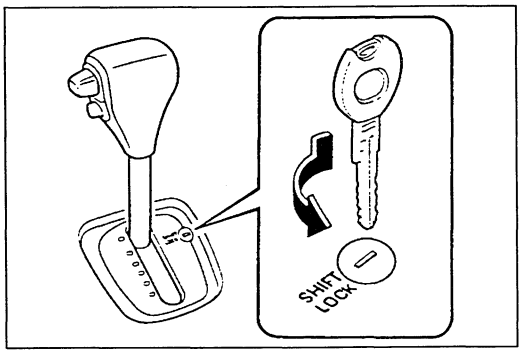


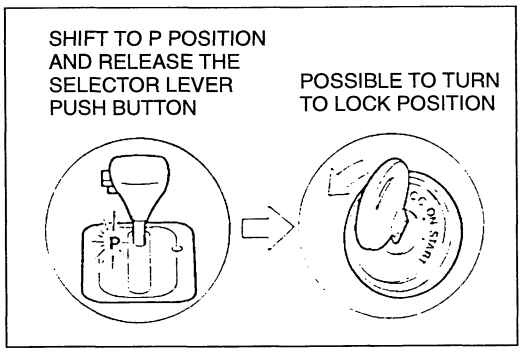
Troubleshooting
Diagnosis chart

Problem	Possible cause	Action	Page
Selector lever cannot be moved from P position with brake pedal depressed and ignition switch ON	MAIN 100A fuse burned	Replace	*section Z1
	IG KEY 40A fuse burned	Replace	*section Z1
	BTN 60A fuse burned	Replace	*section Z1
	IG1 system malfunction • Wire harness broken • Poor connection • METER 15A fuse burned	 Repair or replace Connect firmly Replace	 *section Z1 *section Z1 *section Z1
	Ignition switch malfunction	Inspect and replace	*section Z4
	Stoplight system malfunction • Wire harness broken • Poor connection • STOP 20A fuse burned	 Repair or replace Connect firmly Replace	 *section Z1 *section Z1 *section Z1
	Brake switch remains OFF	Adjust or replace	section P
	P position switch system malfunction • Wire harness broken (poor ground) • Poor connection	 Repair or replace Connect firmly	 *section Z1 *section Z1
	P position switch remains OFF	Inspect	K1–168
	Shift-lock actuator malfunction • Wire harness broken • Poor connection • Shift-lock actuator malfunction	 Repair or replace Connect firmly Replace	 *section Z1 *section Z1 K1–169
	Misadjustment of selector lever	Adjust or repair	K1–170
Selector lever can be moved from P position with ignition switch ON, but without brake pedal depressed	BTN 60A fuse burned	Replace	*section Z1
	STOP 20A fuse burned	Replace	*section Z1
	Brake switch remains ON	Adjust or replace	section P
	Shift-lock actuator malfunction	Inspect and replace	K1–169
	Misadjustment of selector lever	Adjust or repair	K1–170
Selector lever can be moved from P position with ignition switch OFF and brake pedal depressed	BTN 60A fuse burned	Replace	*section Z1
	STOP 20A fuse burned	Replace	*section Z1
	Ignition switch malfunction	Inspect and replace	*section Z4
	Shift-lock actuator malfunction	Inspect and replace	K1–169
	Misadjustment of selector lever	Adjust or repair	K1–170
Shift-lock actuator operation heard when brake pedal depressed with ignition switch ON in other than P position	P position switch remains ON	Inspect	K1–168
	Misadjustment of selector lever	Adjust or repair	K1–170
Selector lever remains locked when emergency override key cylinder operated	Emergency override key cylinder not fully turned	Turn fully and hold emergency override key cylinder, move selector lever	—
	Broken emergency override key cylinder	Replace	K1–175
	Misadjustment of indicator panel	Adjust	K1–171
Ignition key can be turned to lock position with selector lever in other than P position	Interlock cable malfunction • Disconnected • Kinked • Stuck • Spring damage	Inspect and replace	K1–172
	Key cylinder malfunction	Replace	section N
Ignition key cannot be turned to lock position with selector lever in P position	Interlock cable malfunction • Disconnected • Kinked • Stuck • Spring damaged	Inspect and replace	K1–172
	Key cylinder malfunction	Replace	section N

* Refer to 1996 626/MX–6 Body Electrical Troubleshooting Manual.







SHIFT-LOCK

Inspection

1. Turn the ignition switch to ON (engine off).
2. Verify that the selector lever is in P position.
3. Without the brake pedal depressed, verify that the selector lever cannot be shifted from P position.
4. Depress the brake pedal and verify that the selector lever can be shifted from P position.
5. If not as specified, check the P position switch continuity and/or shift-lock actuator terminal voltage and continity. (Refer to pages K1–168, 169.)

EMERGENCY OVERRIDE KEY CYLINDER

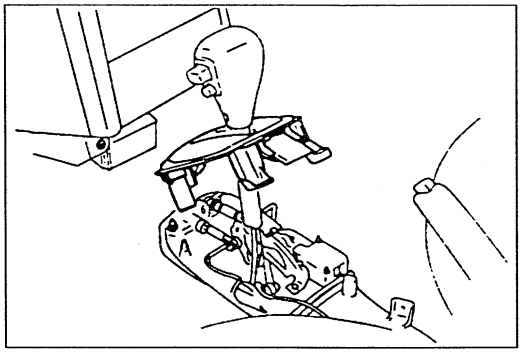
Inspection

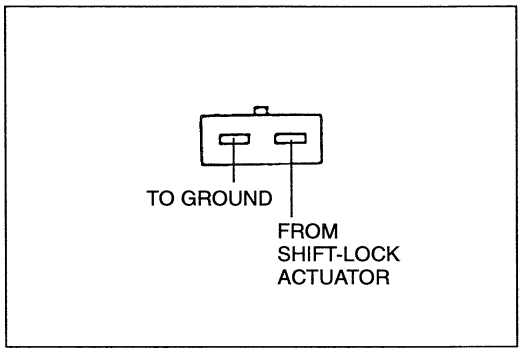
1. Turn the ignition switch to OFF.
2. Verify that the selector lever is in P position.
3. Without the brake pedal depressed, verify that the selector lever cannot be shifted from P position.
4. Insert the ignition key into the emergency override key cylinder beside the selector lever, turn the ignition key counterclockwise and hold it. Verify that the selector lever can be shifted from P position.
5. If not as specified, replace the emergency override key cylinder.

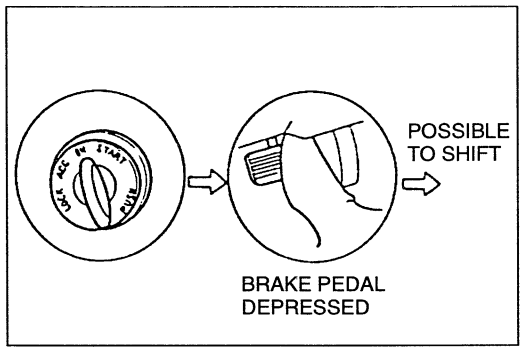
KEY INTERLOCK

Inspection

1. Turn the ignition switch to ON (engine off).
2. Shift the selector lever to R position.
3. Verify that the ignition key cannot be turned to LOCK position.
4. Shift the selector lever to P position and release the selector lever push button.
5. Verify that the ignition key can be turnned to LOCK position.
6. If not as specified, inspect and repair as necessary, referring to Troubleshooting. (Refer to page K1–166.)







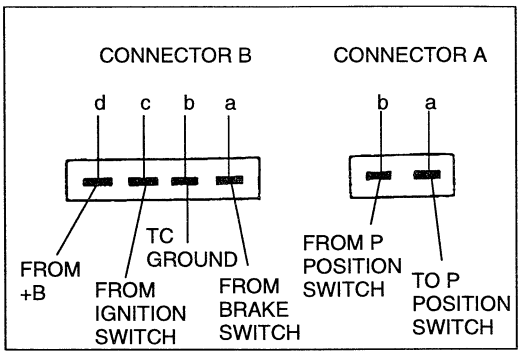
P POSITION SWITCH

Inspection

1. Disconnect the negative battery cable.
2. Remove the front console. (Refer to page K1–172.)
3. Remove the indicator screws and lift up the indicator panel.
4. Disconnect the P position switch connector.
5. Check continuity between the terminals.

Position/Range	Selector lever release button	Continuity
P	Released	Yes
	Depressed	No
Except P	—	No

6. If not as specified, replace the selector lever assembly.
7. Install and adjust the indicator panel. (Refer to page K1–171.)
8. Install the front console. (Refer to page K1–172.)
9. Connect the negative battry cable.
10. Check for correct operation of the shift-lock system. (Refer to page K1–167.)



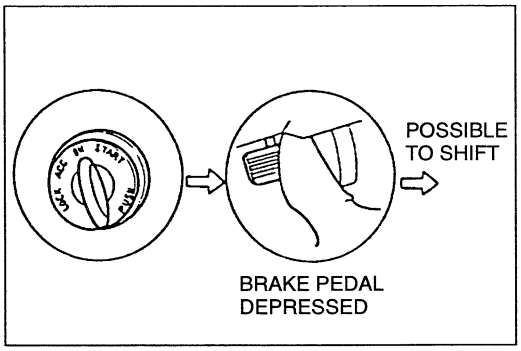
SHIFT-LOCK ACTUATOR

Inspection

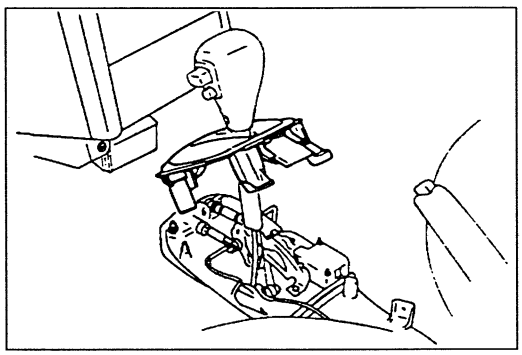
1. Remove the front console. (Refer to page K1–172.)
2. Shift the selector lever to P position.
3. Turn the ignition switch to ON (engine off), and check terminal voltages and continuity, referring to the chart below. When checking continuity between terminal b (harness side) and ground, disconnect connector B.

B+: Battery positive voltage

Connector	Terminal	⊖ probe connected to	Condition	Measurement value
A	a	B—b	P position, selector lever release button not depressed	0 Ω
A	b	B—b	Constant	0 Ω
B	a	B—b	Brake pedal released → depressed	0V → B+
B	b (harness side)	Body	Constant	0 Ω
B	c	B—b	Ignition switch ON	B+
B	d	B—b	Ignition switch OFF	B+

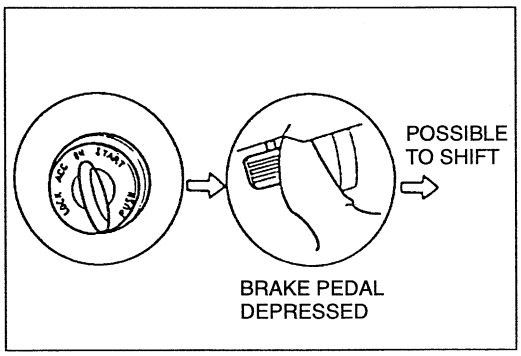


4. If not as specified, repair the wire harness and/or replace the shift-lock actuator.
5. Install the front console. (Refer to page K1–172.)
6. Verify correct operation of the shift-lock system. (Refer to page K1–167.)

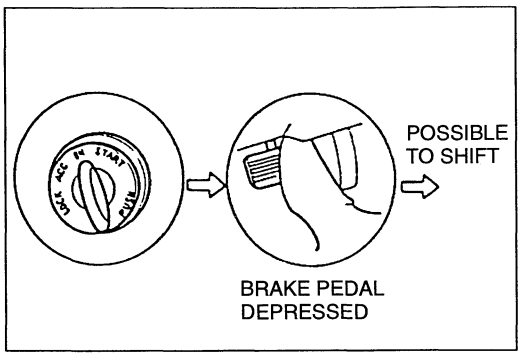


Replacement

1. Disconnect the negative battery cable.
2. Remove the front console. (Refer to page K1–172.)
3. Remove the indicator screws and lift up the indicator panel.
4. Disconnect the shift-lock actuator connector.
5. Disconnect the P position switch connector.
6. Remove the shift-lock actuator.



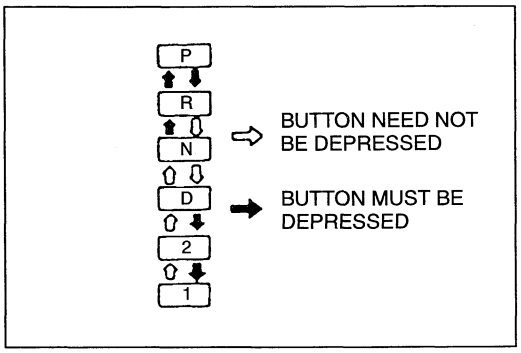
7. Install the new shift-lock actuator.
8. Connect the P position switch connector.
9. Connect the shift-lock actuator connector.
10. Install and adjust the indicator panel. (Refer to page K1–171.)
11. Install the front console. (Refer to page K1–172.)
12. Connect the negative battery cable.
13. Verify correct operation of the shift-lock system. (Refer to page K1–167.)



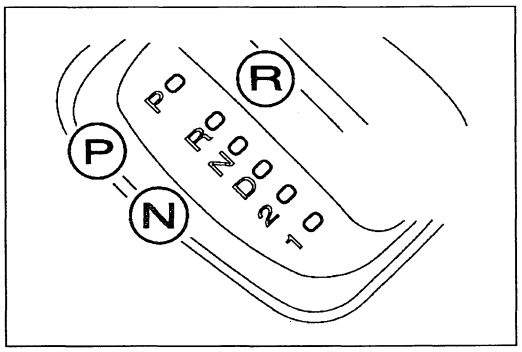
SELECTOR LEVER

Inspection

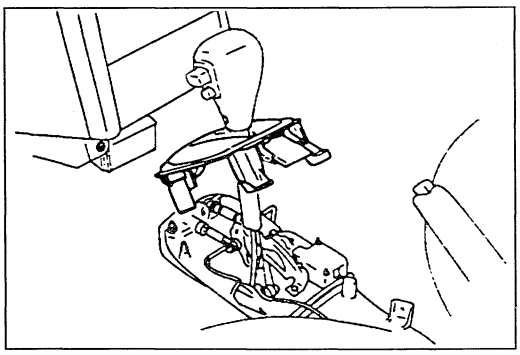
1. Turn the ignition switch to ON (engine off).
2. With the brake pedal depressed, verify that there is a "click" at each range when shifted in the pattern shown.



3. Verify that the selector lever can only be shifted as shown.
4. Verify that there is a "click" at each range when shifted from P position → 1 range.
5. Verify that the positions of the selector lever and the indicator are aligned.
6. If not as specified, adjust the indicator panel. (Refer to page K1–171.)



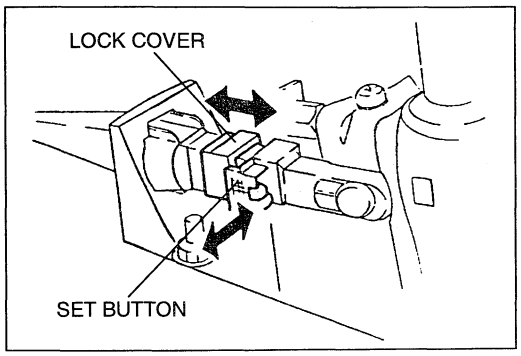
7. If not as specified, adjust the transaxle range switch. (Refer to page K1–29.)
8. Verify that the vehicle operates in selected range.



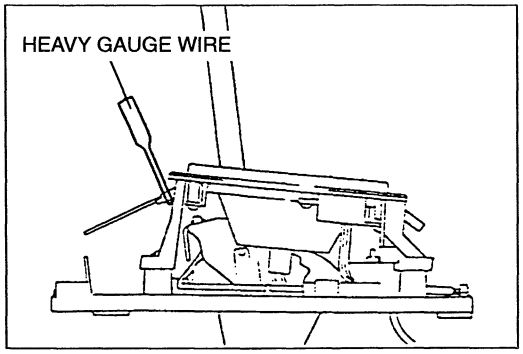
Adjustment

Selector lever

1. Remove the front console. (Refer to page K1–172.)
2. Shift the selector lever to P position.
3. Remove the indicator screws and lift up the indicator panel.

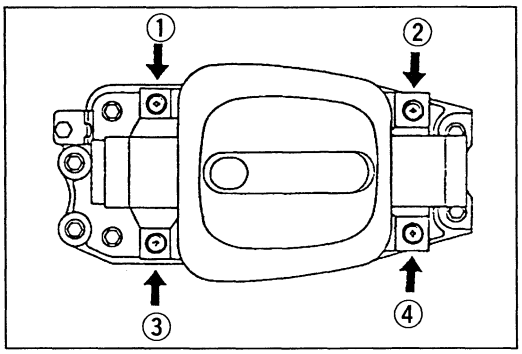


4. Slide the lock cover.
5. Disconnect the set button.
6. Push the selector lever to adjust P position.
7. Connect the set button.
8. Slide the lock cover and lock the set button.
9. Install and adjust the indicator panel. (Refer to page K1–171.)
10. Install the front console. (Refer to page K–172.)
11. Verify correct operation of the selector lever. (Refer to above.)



Indicator panel

1. Loosen the indicator panel screws.
2. Shift the selector lever to P position.
3. Align the alignment screws in the slider with the holes in the indicator panel. Install heavy-gauge wire to hold the slider.



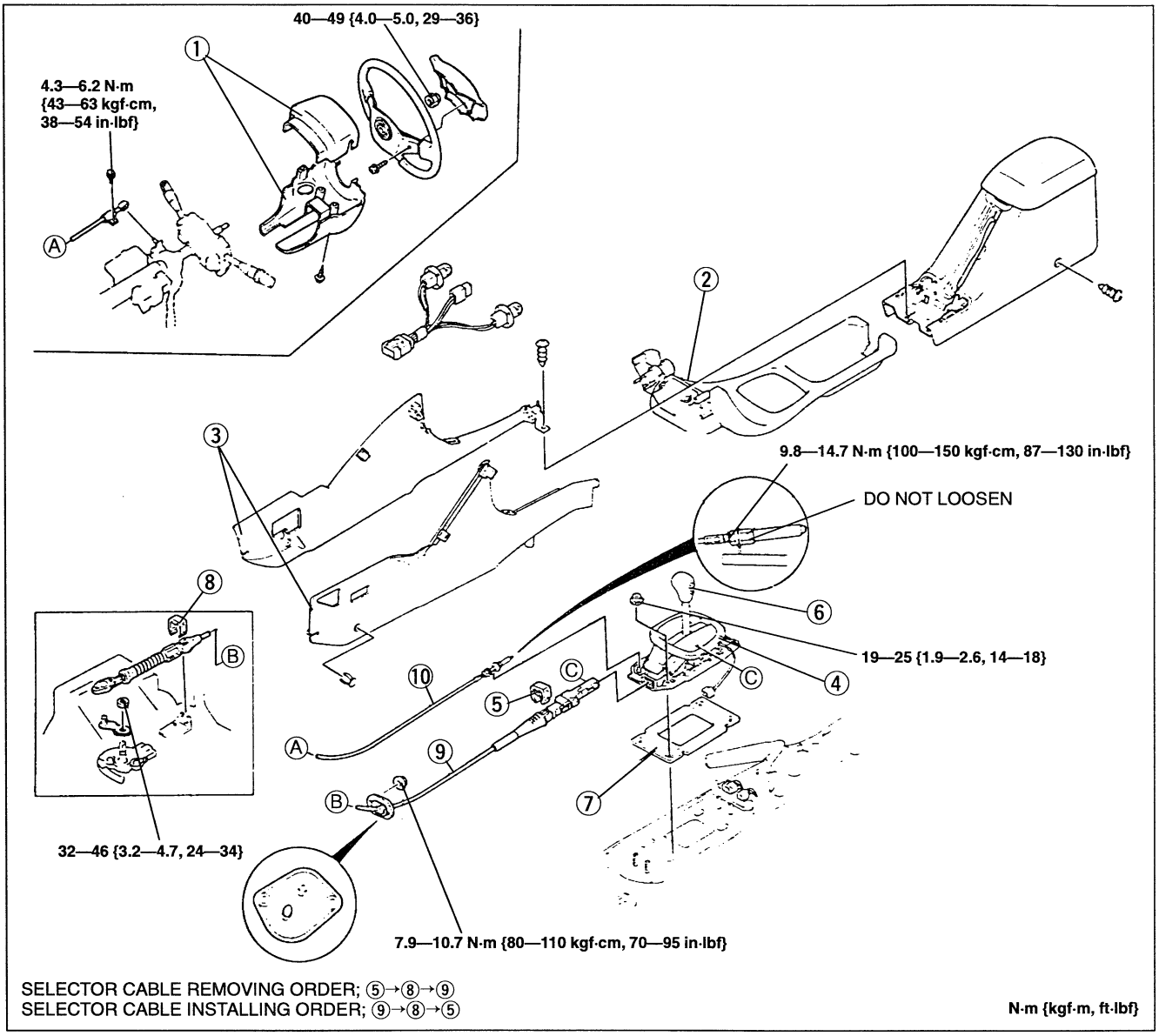
4. Tighten the indicator panel screws in the order shown in the figure.

   Tightening torque:
   2.0—2.9 N·m {20—30 kgf·cm, 18—26 in·lbf}

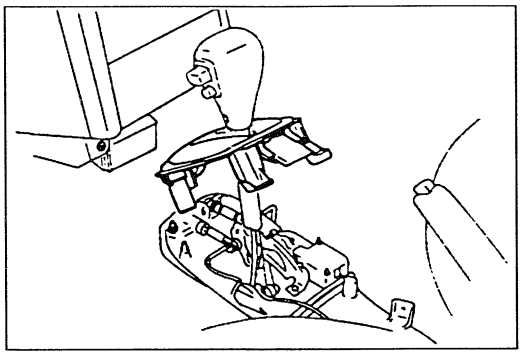
5. Remove the wire.
6. Verify that the selector lever properly aligns with the indicator in each range.

Removal / Inspection / Installation

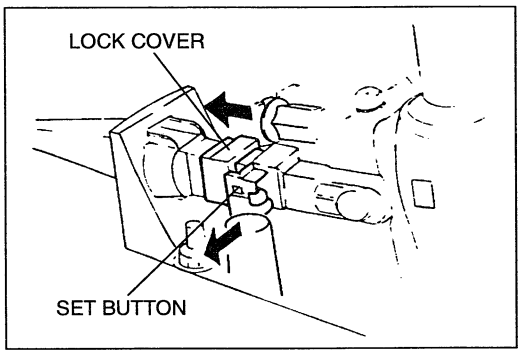
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. After installation, check the shift-lock, emergency override button, and key interlock operations.



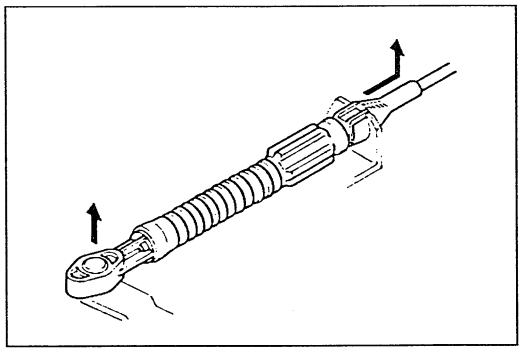
1. Steering column cover
2. Front console
3. Side wall
4. Indicator panel
   - Removal Note ..... page K1–173
   - Installation Note ..... page K1–174
5. Clip
6. Selector lever
   - Removal Note ..... page K1–173
   - Installation Note ..... page K1–174
   - Inspection ..... page K1–170
   - Disassembly / Inspection / Assembly ..... page K1–175
7. Insulator
8. Clip
9. Selector cable
   - Removal Note ..... page K1–173
   - Installation Note ..... page K1–173
10. Interlock cable



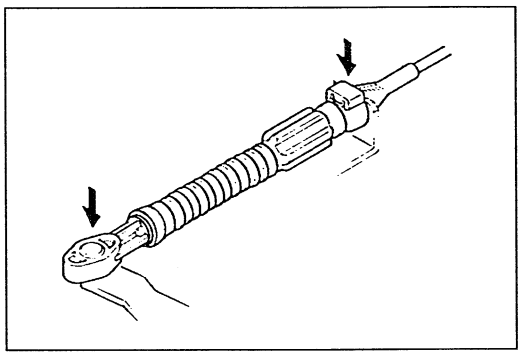
Removal note
Indicator panel
Remove the indicator screws and lift up the indicator panel.



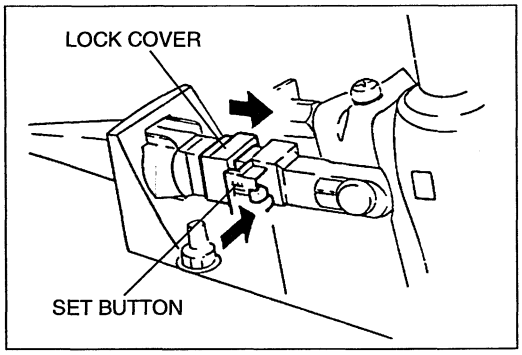
Selector lever
1. Slide the lock cover.
2. Disconnect the set button.
3. Pull out the selector cable from the selector lever.
4. Remove the interlock cable from the selector lever.
5. Remove the selector lever.



Selector cable
1. Disconnect the selector cable from the manual shaft lever.
2. Pull out the selector cable from the cable bracket and remove it.



Installation note
Selector cable
1. Install the selector cable to the cable bracket.
2. Install the clip to the selector cable.
3. Connect the selector cable to the manual shaft lever.

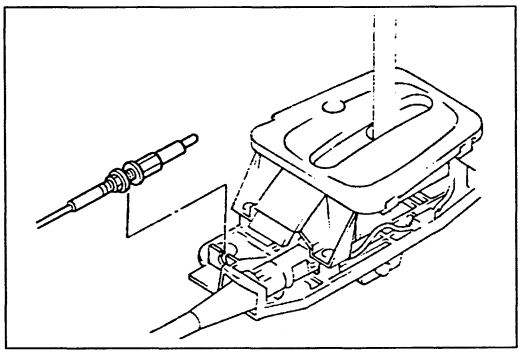


Selector lever

1. Install the selector lever.

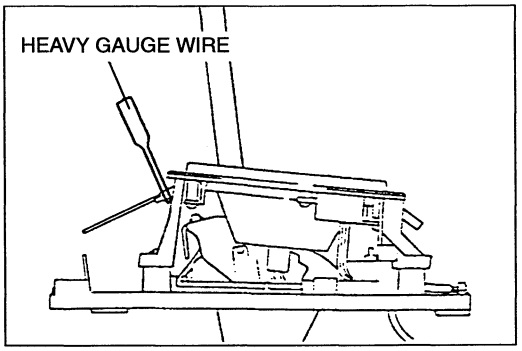
   Tightening torque:
   16—22 N·m {1.6—2.3 kgf·m, 12—16 ft·lbf}

2. Install the selector cable to the selector lever.
3. Push the selector lever adjust P position.
4. Connect the set button.
5. Slide the lock cover and lock the set button.



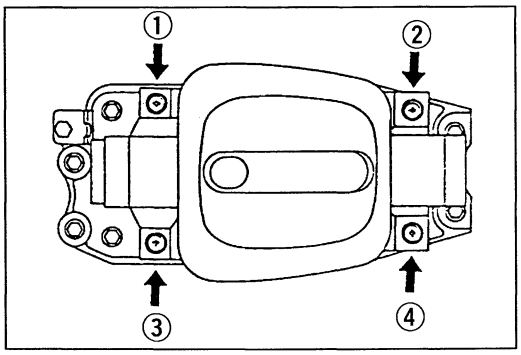
6. Install the interlock cable to the selector lever.

   Tightening torque:
   9.8—14.7 N·m {100—150 kgf·cm, 87—130 in·lbf}



Indicator panel

1. Shift the selector lever to P position.
2. Align the alignment screws in the slider with the holes in the indicator panel. Install heavy-gauge wire to hold the slider.



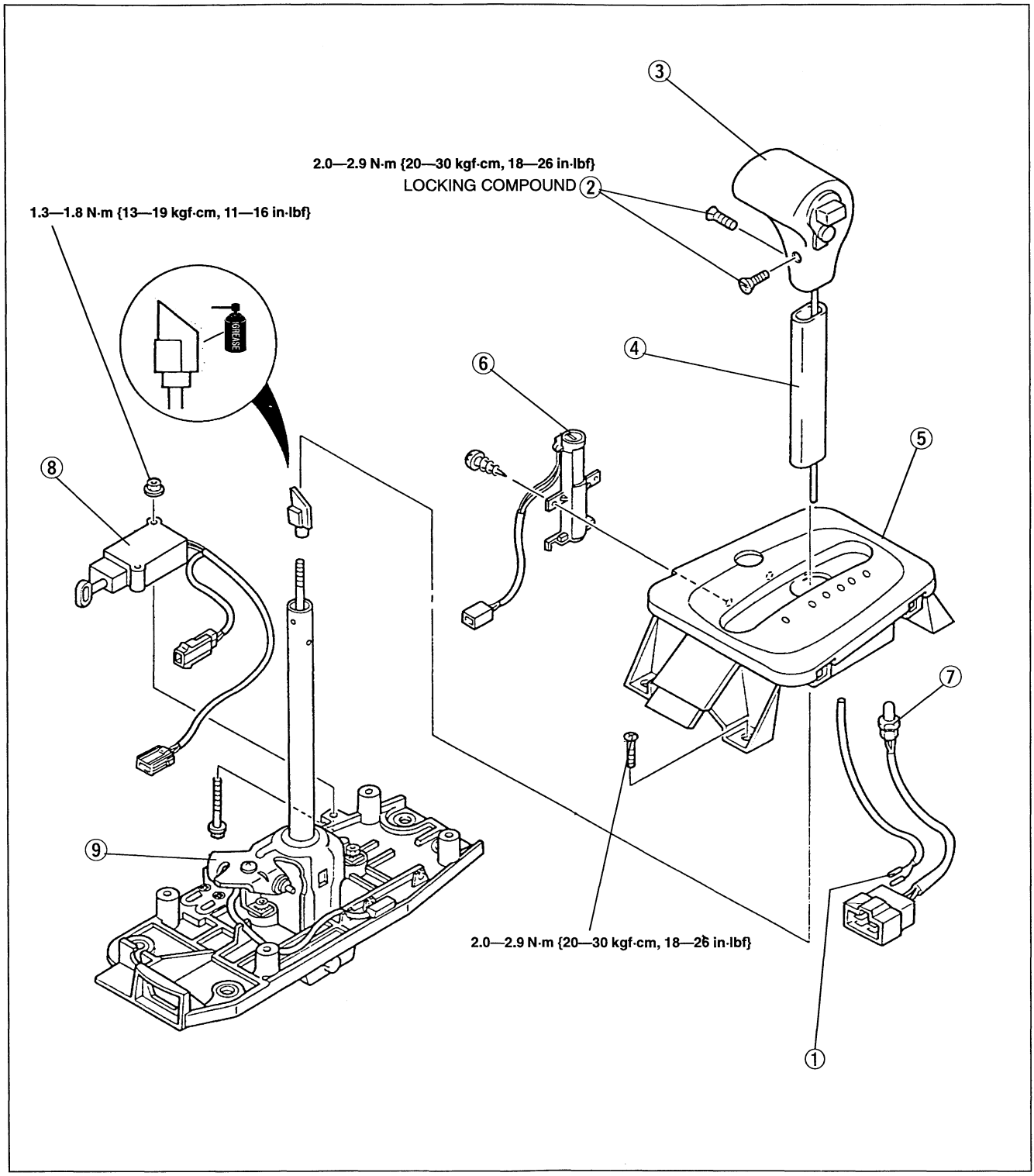
3. Tighten the indicator panel screws in the order shown in the figure.

   Tightening torque:
   2.0—2.9 N·m {20—30 kgf·cm, 18—26 in·lbf}

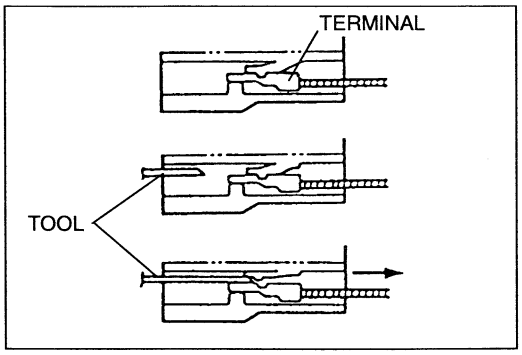
4. Remove the wire.
5. Verify that the selector lever properly aligns with the indicator in each range.

Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly.



1. Connector pin
   Disassembly Note ..... page K1–176
2. Screws
3. Selector lever knob
4. Cover
5. Indicator panel
6. Emergency override key cylinder
7. Position indicator light
8. Shift-lock actuator
   Inspection ..... page K1–169
9. Selector lever

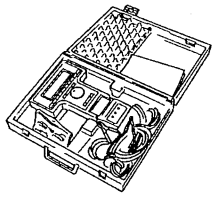
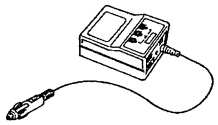
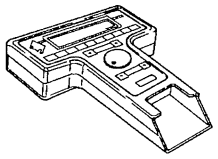
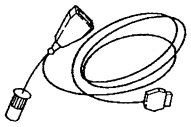
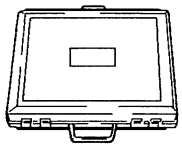
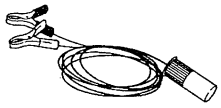
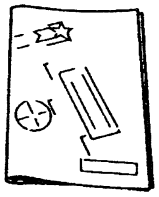


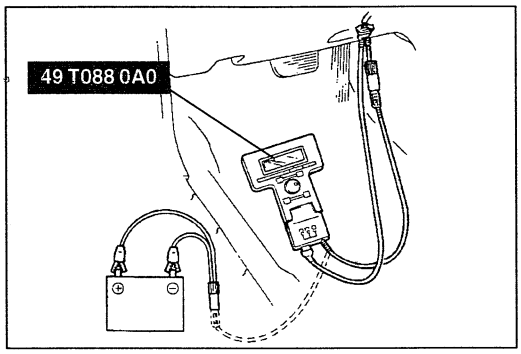
Disassembly note
Connector pin

1. Insert a thin piece of metal from the terminal side of the connector, and pry up the terminal locking top.
2. Pull the terminal out of the connector.

ON-BOARD DIAGNOSTIC SYSTEM

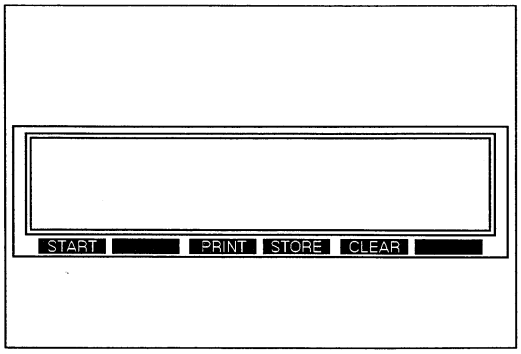
PREPARATION
SST

49 T088 0A0 NGS set 	For diagnosis of EC-AT	49 T088 010B Program Card 	For diagnosis of EC-AT
49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For diagnosis of EC-AT	49 T088 001 Control Unit (Part of 49 T088 0A0) 	For diagnosis of EC-AT
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0) 	For diagnosis of EC-AT	49 T088 009 Case (Part of 49 T088 0A0) 	For diagnosis of EC-AT
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For diagnosis of EC-AT	49 T088 008 Instruction Manual 	For diagnosis of EC-AT



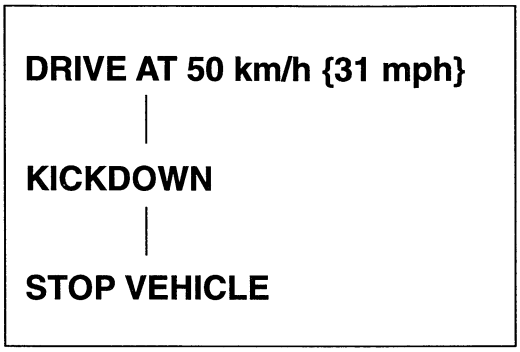
DIAGNOSTIC TROUBLE CODE
Inspection Procedure

1. Connect the **SST** (NGS) to the data link connector 2 and battery.
2. Turn the ignition switch to ON.
3. Check the diagnostic trouble code(s), referring to the **SST** (NGS). (Refer to section F2.)
4. If a diagnostic trouble code(s) is displayed, check for the cause by using the number on the diagnostic trouble code table. (Repair as necessary.)
5. Following repairs, do the After-Repair procedure to verify that there are no remaining codes.

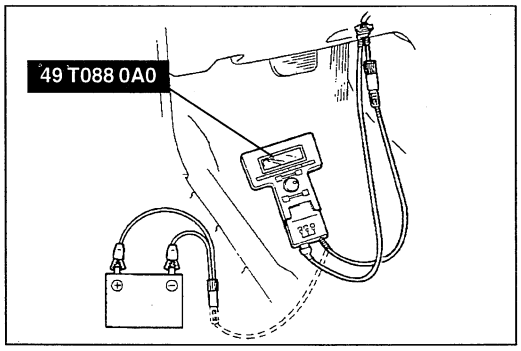


After-Repair Procedure

1. Cancel the diagnostic trouble code memory by using the **SST** (NGS). (Refer to section F2.)
2. Remove the **SST** (NGS) from the data link connector 2.



3. Drive the vehicle at 50 km/h {31 mph}, and depress the accelerator pedal fully to activate kickdown. Stop the vehicle gradually.



4. Connect the **SST** (NGS) to the data link connector 2 and battery.
5. Turn the ignition switch to ON.
6. Verify that no diagnostic trouble codes are displayed. (Refer to section F2.)
7. Remove the **SST** from the data link connector 2.

Troubleshooting

If a diagnostic trouble code is shown on the **SST**, check for the cause by using the chart related to the code shown.

Diagnostic trouble code

Code No.	Display on the NGS	Condition	Page
P0705	TRANS RANGE SENSOR — CKT MALFUNCTION	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	K1–180
P0710	TRANS FLUID TEMP SENS — CKT MALFUNCTION	Transmission Fluid Temperature Sensor Circuit Malfunction	K1–181
P0715	INPUT/TSS CIRCUIT MALFUNCTION	Input/Turbine Speed Sensor Circuit Malfunction	K1–182
P0731	GEAR 1 INCORRECT RATIO	Gear 1 Incorrect Ratio	K1–183
P0732	GEAR 2 INCORRECT RATIO	Gear 2 Incorrect Ratio	K1–184
P0733	GEAR 3 INCORRECT RATIO	Gear 3 Incorrect Ratio	K1–185
P0734	GEAR 4 INCORRECT RATIO	Gear 4 Incorrect Ratio	K1–186
P0740	TORQUE CONV CLUTCH SYS — MALFUNCTION	Torque Converter Clutch System Malfunction	K1–187
P0745	PRESSURE CTRL SOLENOID — MALFUNCTION	Pressure Control Solenoid Malfunction	K1–188
P0750	SHIFT SOLENOID A — MALFUNCTION	Shift Solenoid A Malfunction	K1–189
P0755	SHIFT SOLENOID B — MALFUNCTION	Shift Solenoid B Malfunction	K1–190
P0760	SHIFT SOLENOID C — MALFUNCTION	Shift Solenoid C Malfunction	K1–191
P1743	SOLENOID TCC — OPEN OR SHORT	Torque converter clutch control solenoid valve	K1–192
P1744	SOLENOID TCC — OPEN OR SHORT	Torque converter clutch solenoid valve	K1–193
P1765	3–2 TIMING SOL. V — OPEN OR SHORT	3–2 timing solenoid valve	K1–194

DIAGNOSTIC TROUBLE CODE P0705	TRANS RANGE SENSOR—CKT MALFUNCTION (Transmission Range Sensor Circuit Malfunction (PRNDL Input))
DETAILS	No input signal or input of two or more signals from transaxle range switch
POSSIBLE CAUSE	• Transaxle range switch malfunction • Damaged wiring or connectors between transaxle range switch and powertrain control module • Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Are powertrain control module and transaxle range switch connections at the connector and connector pins OK?	**Yes**	Go to next step
		No	Repair or replace connector(s) Inspection step 6 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect the EC-AT tester to powertrain control module • Are transaxle range switch range and EC-AT tester display correct? ☞ **page K1–20**	**Yes**	Go to step 6
		No	Go to next step
3	Check for continuity between terminals of transaxle range switch and powertrain control module • Disconnect negative battery cable • Disconnect transaxle range switch and powertrain control module connectors • Is there continuity between the terminals?	**Yes**	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When **Yes**, go to step 6 • When **No**, go to next step
4	Check for continuity between terminal of the transaxle range switch as follows • Disconnect negative battery cable • Disconnect transaxle range switch connector • Is there continuity between the terminals?	**Yes**	Go to next step
		No	Repair or adjust the transaxle range switch ☞ **page K1–29** Go to step 2 • When **Yes**, go to step 6 • When **No**, go to next step
5	Check for continuity between terminal of transaxle range switch and main relay • Disconnect negative battery cable • Disconnect transaxle range switch and main relay • Is there continuity between the terminals?	**Yes**	Go to next step
		No	Repair or replace connectors and wiring
6	After diagnostic trouble code has been cleared, re-check if diagnostic trouble code is shown ☞ **page K1–178**	**Yes**	Replace the powertrain control module ☞ **section F2**
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

Item	Indication	Condition
P/N	ON	P or N position
	OFF	R position, all ranges
R	ON	R position
	OFF	Other position, all ranges
D	ON	D range
	OFF	Other ranges, all positions
2	ON	2 range
	OFF	Other ranges, all positions
1	ON	1 range
	OFF	Other ranges, all positions

DIAGNOSTIC TROUBLE CODE P0710	TRANS FLUID TEMP SENS—CKT MALFUNCTION (Transmission Fluid Temperature Sensor Circuit Malfunction)
DETAILS	Powertrain control module input voltage is less than 0.09V or over 5.0V
POSSIBLE CAUSE	• Transaxle fluid temperature sensor malfunction • Damaged wiring or connectors between transaxle fluid temperature sensor and powertrain control module • Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Are powertrain control module and transaxle fluid temperature sensor connections at the connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector Inspection step 6 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to powertrain control module • Is transaxle fluid temperature sensor voltage correct? **Voltage** **ATF temp. 20°C {68°F}: Approx. 3.5V** **40°C {104°F}: Approx. 2.7V** **80°C {176°F}: Approx. 1.3V** ☞ **page K1–20**	Yes	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of transaxle fluid temperature sensor and powertrain control module • Disconnect negative battery cable • Disconnect transaxle fluid temperature sensor and powertrain control module connectors • Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When **Yes**, go to step 5 • When **No**, go to next step
4	Measure resistance between transaxle fluid temperature sensor terminals • Disconnect negative battery cable • Disconnect transaxle fluid temperature sensor connector • Is resistance between terminals correct? **Resistance** **ATF temp. 20°C {68°F}: 2.495—2.717 kΩ** **40°C {104°F}: 1.191—1.278 kΩ** **80°C {176°F}: 0.3492—0.3655 kΩ** ☞ **page K1–31**	Yes	Go to next step
		No	Replace transaxle fluid temperature sensor ☞ **page K1–31**
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown ☞ **page K1–178**	Yes	Replace the powertrain control module ☞ **section F2**
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

DIAGNOSTIC TROUBLE CODE P0715	INPUT/TSS CIRCUIT MALFUNCTION (Input/Turbine Speed Sensor Circuit Malfunction)
DETAILS	Signal from input/turbine speed sensor is not input to powertrain control module when vehicle is moving
POSSIBLE CAUSE	• Input/turbine speed sensor malfunction • Damaged harness or connectors between input/turbine speed sensor and powertrain control module • Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Are powertrain control module and input/turbine speed sensor connection at the connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector Inspection step 6 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to powertrain control module • Is speed indicated on EC-AT tester after engine is started and vehicle is idling? ☞ **page K1–20**	Yes	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of input/turbine speed sensor and powertrain control module • Disconnect negative battery cable • Disconnect input/turbine speed sensor and powertrain control module connectors • Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When **Yes**, go to step 5 • When **No**, go to next step
4	Measure resistance between input/turbine speed sensor terminals • Disconnect negative battery cable • Disconnect input/turbine speed sensor connector • Is resistance between terminals correct? **Resistance: 253—604 Ω** ☞ **page K1–31**	Yes	Go to next step
		No	Replace the input/turbine speed sensor ☞ **page K1–31**
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown ☞ **page K1–178**	Yes	Replace the powertrain control module ☞ **section F2**
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

DIAGNOSTIC TROUBLE CODE P0731	GEAR 1 INCORRECT RATIO (Gear 1 Incorrect Ratio)
DETAILS	Powertrain control module outputs solenoid pattern of first gear when gear ratio is other than first gear
POSSIBLE CAUSE	• ATF level low • Solenoid valve malfunction • Line pressure low • Control valve stuck • Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Is diagnostic trouble code P0750, P0755, or P0760 indicated? ☞ page K1–177	Yes	Refer to flowchart for diagnostic trouble code P0750, P0755, or P0760 and perform troubleshooting ☞ page K1–189, 190, 191
		No	Go to next step
2	Are amount and condition (color) of ATF OK? Check for ATF leakage at transaxle connection and gasket Color ① Transparent red: Normal ② Black: Defective part in powertrain ③ Light red: Water mixed in fluid ④ Reddish brown: Deteriorated ATF ☞ page K1–18	Yes	Go to next step
		No	Adjust ATF amount or replace ATF if necessary • If ATF color is ②, measure line pressure at idle when pressure is less than specification, go to step 3 • If ATF color is ③ or ④, replace ATF
3	Is turbine speed OK under following conditions? • EC-AT tester connected to powertrain control module • Throttle is 2/8 open, and vehicle speed is 20 km/h {12 mph} in D range (O/D OFF SW OFF) **Turbine speed: Approx. 2,100 rpm** ☞ page K1–20	Yes	Go to step 8
		No	Above specification: Go to next step Below specification: Go to step 6
4	Check line pressure in D range (O/D OFF SW OFF) • Is line pressure OK? **Line pressure when in D range (O/D OFF SW OFF)** **Idling: 420—530 kPa {4.2—5.5 kgf/cm², 60—78 psi}** **Stalled: 1,100—1,170 kPa {11.2—12.0 kgf/cm², 160—170 psi}** ☞ page K1–11	Yes	Go to next step
		No	Repair or replace any defective parts • Line pressure is low only when in D or 2 range: ATF leakage in forward clutch circuit
5	Check stall speed in D range (O/D OFF SW OFF) • Is stall speed OK? **Stall speed when in D range (O/D OFF SW OFF): 2,270—2,500 rpm** ☞ page K1–12	Yes	Go to next step
		No	Repair or replace any defective parts • High in all range: Shifting of forward clutch, one-way clutch 1 • High in D range: Shifting of one-way clutch 2
6	Inspect operation of shift solenoid A, B, C • Disconnect negative battery cable • Disconnect solenoid connector • Is it operating OK? ☞ page K1–35	Yes	Go to next step
		No	Replace shift solenoid A, B, or C ☞ page K1–35 Go to step 3 • When **Yes**, go to step 8 • When **No**, go to next step
7	Check operation of each valve and inspect return spring • Is each valve operating OK and is return spring OK?	Yes	Go to next step
		No	Repair or replace control valve and replace return spring
8	After diagnostic trouble code has been cleared, re-check if diagnostic trouble code is shown ☞ page K1–178	Yes	Replace powertrain control module ☞ section F2
		No	Problem is a temporary slip of clutch, and should be investigated further

DIAGNOSTIC TROUBLE CODE P0732	GEAR 2 INCORRECT RATIO (Gear 2 Incorrect Ratio)
DETAILS	Powertrain control module output solenoid pattern of second gear when gear ratio is other than second gear
POSSIBLE CAUSE	• ATF level low • Forward clutch slippage • 2–4 brake band slippage • Solenoid valve malfunction • Line pressure low • One-way clutch 1 slippage • Control valve stuck • Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Is diagnostic trouble code P0750, P0755, or P0760 indicated? ☞ **page K1–177**	**Yes**	Refer to flowchart for diagnostic trouble code P0750, P0755, or P0760 and perform troubleshooting ☞ **page K1–189, 190, 191**
		No	Go to next step
2	Are amount and condition (color) of ATF OK? Check for ATF leakage at transaxle connection and gasket Color ① Transparent red: Normal ② Black: Defective part in powertrain ③ Light red: Water mixed in fluid ④ Reddish brown: Deteriorated ATF ☞ **page K1–18**	**Yes**	Go to next step
		No	Adjust ATF amount or replace ATF if necessary • If ATF color is ②, measure line pressure at idle when pressure is less than specification, go to step 4 • If ATF color is ③ or ④, replace ATF
3	Is turbine speed OK under following conditions? • EC-AT tester connected to powertrain control module • Throttle is 2/8 open, and vehicle speed is 20 km/h {12 mph} is 2 range **Turbine speed: Approx. 1,100 rpm** ☞ **page K1–20**	**Yes**	Go to step 8
		No	Above specification: Go to next step Below specification: Go to step 6
4	Check line pressure in D, 2 range • Is line pressure OK? **Line pressure when in D, 2 range** **Idling: 420—530 kPa {4.2—5.5 kgf/cm², 60—78 psi}** **Stalled: 1,100—1,170 kPa {11.2—12.0 kgf/cm², 160—170 psi}** ☞ **page K1–11**	**Yes**	Go to next step
		No	Repair or replace any defective parts • ATF leakage in 2–4 brake band circuit • ATF leakage in forward clutch circuit
5	Check stall speed in D, 2 range • Is stall speed OK? **Stall speed when in D, 2 range: 2,270—2,500 rpm** ☞ **page K1–12**	**Yes**	Go to next step
		No	Repair or replace any defective parts • 2–4 brake band slipping • Forward clutch slipping
6	Inspect operation of shift solenoid A, B, C • Disconnect negative battery cable • Disconnect solenoid connector • Is it operating OK? ☞ **page K1–29**	**Yes**	Go to next step
		No	Replace shift solenoid A, B, or C ☞ **page K1–29** Go to step 3 • When **Yes**, go to step 8 • When **No**, go to next step
7	Check operation of each valve and inspect return spring • Is each valve operating OK and is return spring OK?	**Yes**	Go to next step
		No	Repair or replace control valve and replace return spring
8	After diagnostic trouble code has been cleared, re-check if diagnostic trouble code is shown ☞ **page K1–178**	**Yes**	Replace the powertrain control module ☞ **section F2**
		No	Problem is a temporary slip of clutch, and should be investigated further

DIAGNOSTIC TROUBLE CODE P0733	GEAR 3 INCORRECT RATIO (Gear 3 Incorrect Ratio)
DETAILS	Powertrain control module output solenoid pattern of third gear when gear ratio is other than third gear
POSSIBLE CAUSE	• ATF level low • Forward clutch slippage • 3–4 clutch slippage • Solenoid valve malfunction • Line pressure low • One-way clutch 1 slippage • Control valve stuck • Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Is diagnostic trouble code P0750, P0755, or P0760 indicated? ☞ page K1–177	Yes	Refer to flowchart for diagnostic trouble code P0750, P0755, or P0760 and perform troubleshooting ☞ page K1–189, 190, 191
		No	Go to next step
2	Are amount and condition (color) of ATF OK? Check for ATF leakage at transaxle connection and gasket Color ① Transparent red: Normal ② Black: Defective part in powertrain ③ Light red: Water mixed in fluid ④ Reddish brown: Deteriorated ATF ☞ page K1–18	Yes	Go to next step
		No	Adjust ATF amount or replace ATF if necessary • If ATF color is ②, measure line pressure at idle when pressure is less than specification, go to step 4 • If ATF color is ③ or ④, replace ATF
3	Is turbine speed OK under following conditions? • Solenoid connector disconnected • EC-AT tester connected to powertrain control module • Throttle is 2/8 open, and vehicle speed is 20 km/h {12 mph} in third gear in D range **Turbine speed: Approx. 800 rpm** ☞ page K1–20	Yes	Go to step 8
		No	Above specification: Go to next step Below specification: Go to step 6
4	Check line pressure when solenoid connector is disconnected • Solenoid connector disconnected • Is line pressure OK? **Line pressure when third gear in D range** **Stalled: 844—902 kPa {8.6—9.2 kgf/cm², 123—130 psi}** ☞ page K1–11	Yes	Go to next step
		No	Repair or replace any defective parts • ATF leakage in 3–4 clutch
5	Check stall speed when solenoid connector is disconnected • Solenoid connector disconnected • Is stall speed OK? **Stall speed when third gear in D range:** **2,270—2,500 rpm** ☞ page K1–12	Yes	Go to next step
		No	Repair or replace any defective parts • 3–4 clutch slipping
6	Inspect operation of shift solenoid A, B, C • Disconnect negative battery cable • Disconnect solenoid connector • Is it operating OK? ☞ page K1–29	Yes	Go to next step
		No	Replace shift solenoid A, B, or C ☞ page K1–29 Go to step 3 • When **Yes**, go to step 8 • When **No**, go to nest step
7	Check operation of each valve and inspect return spring • Is each valve operating OK and is return spring OK?	Yes	Go to next step
		No	Repair or replace control valve and replace return spring
8	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown ☞ page K1–178	Yes	Replace powertrain control module ☞ section F2
		No	Problem is a temporary slip of clutch, and should be investigated further

DIAGNOSTIC TROUBLE CODE P0734	GEAR 4 INCORRECT RATIO (Gear 4 Incorrect Ratio)
DETAILS	Powertrain control module output solenoid pattern of fourth gear when gear ratio is other than fourth gear
POSSIBLE CAUSE	• ATF level low • 2–4 brake band slippage • Control valve stuck • Powertrain control module malfunction • Line pressure low • 3–4 clutch slippage • Solenoid valve malfunction

STEP	INSPECTION		ACTION
1	Is diagnostic trouble code P0750, P0755, or P0760 indicated? ☞ page K1–177	Yes	Refer to flowchart for diagnostic trouble code P0750, P0755, or P0760 and perform troubleshooting ☞ page K1–189, 190, 191
		No	Go to next step
2	Are amount and condition (color) of ATF OK? Check for ATF leakage at transaxle connection and gasket Color ① Transparent red: Normal ② Black: Defective part in powertrain ③ Light red: Water mixed in fluid ④ Reddish brown: Deteriorated ATF ☞ page K1–18	Yes	Go to next step
		No	Adjust ATF amount or replace ATF if necessary • If ATF color is ②, measure line pressure at idle when pressure is less than specification, repair or replace any defective parts • If ATF color is ③ or ④, replace ATF
3	Is diagnostic trouble code P0732 (Gear 2 incorrect ratio) indicated? ☞ page K1–177	Yes	Refer to flowchart for diagnostic trouble code P0732 (Gear 2 incorrect ratio), and perform troubleshooting ☞ page K1–184
		No	Go to next step
4	Is diagnostic trouble code P0733 (Gear 3 incorrect ratio) indicated? ☞ page K1–177	Yes	Refer to flowchart for diagnostic trouble code P0733 (Gear 3 incorrect ratio), and perform troubleshooting ☞ page K1–185
		No	Go to next step
5	Inspect operation of shift solenoid A, B, C • Disconnect negative battery cable • Disconnect solenoid connector • Is it operating OK? ☞ page K1–35	Yes	Go to next step
		No	Replace shift solenoid A, B, or C ☞ page K1–35 Inspection step 7 • Yes: Go to next step • No: End of flowchart
6	Check operation of each valve and inspect return spring • Is each valve operating OK and is return spring OK?	Yes	Go to next step
		No	Repair or replace control valve and replace return spring
7	After diagnostic trouble code has been cleared, re-check if diagnostic trouble code is shown ☞ page K1–178	Yes	Replace powertrain control module ☞ section F2
		No	Problem is a temporary slip of clutch, and should be investigated further

DIAGNOSTIC TROUBLE CODE P0740	TORQUE CONV CLUTCH SYS—MALFUNCTION (Torque Converter Clutch System Malfunction)
DETAILS	Powertrain control module outputs torque converter clutch signal, but no torque converter clutch obtained
POSSIBLE CAUSE	• ATF level low • Torque converter clutch slippage • Torque converter clutch solenoid valve malfunction • Powertrain control module malfunction • Line pressure low • Control valve stuck • Torque converter clutch control solenoid valve malfunction

STEP	INSPECTION		ACTION
1	Are amount and condition (color) of ATF OK? Check for ATF leakage at transaxle connection and gasket Color ① Transparent red: Normal ② Black: Defective part in powertrain ③ Light red: Water mixed in fluid ④ Reddish brown: Deteriorated ATF ☞ **page K1–18**	**Yes**	Go to next step
		No	Adjust ATF amount or replace ATF if necessary • If ATF color is ②, disassemble transaxle and repair or replace any defective parts as necessary • If ATF color is ③ or ④, replace ATF
2	Check line pressure in D range (O/D OFF SW OFF) • Is line pressure OK? **Line pressure when in D range (O/D OFF SW OFF)** **Idling: 420—530 kPa {4.2—5.5 kgf/cm², 60—78 psi}** **Stalled: 1,100—1,170 kPa {11.2—12.0 kgf/cm², 160—170 psi}** ☞ **page K1–11**	**Yes**	Go to next step
		No	Repair or replace any defective parts • ATF leakage in transaxle case, oil pump, control valve
3	Inspect operation of solenoid valve • Disconnect negative battery cable • Disconnect solenoid connector • Is it operating OK? ☞ **page K1–35**	**Yes**	Go to next step
		No	Replace torque converter clutch solenoid valve or torque converter clutch control solenoid valve ☞ **page K1–35**
4	Check operation of each valve and inspect return spring • Is each valve operating OK and is return spring OK?	**Yes**	Go to next step
		No	Repair or replace control valve and replace return spring
5	Check difference between engine speed and turbine speed during torque converter clutch operation in fourth gear • Connect EC-AT tester to powertrain control module • Check difference between engine speed and turbine speed during torque converter clutch operation in fourth gear Is there a difference between engine speed and turbine speed? ☞ **page K1–20**	**Yes**	Replace torque converter
		No	Go to next step
6	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown ☞ **page K1–178**	**Yes**	Replace powertrain control module ☞ **section F2**
		No	Problem is a temporary slip of clutch, and should be investigated further

DIAGNOSTIC TROUBLE CODE P0745	PRESSURE CTRL SOLENOID—MALFUNCTION (Pressure Control Solenoid Malfunction)
DETAILS	• Damaged wiring or connectors between pressure control solenoid and powertrain control module • Short or open circuit in pressure control solenoid • Short or open circuit in powertrain control module internal transistors
POSSIBLE CAUSE	• Damaged wiring or connectors between pressure control solenoid and powertrain control module • Short or open circuit in pressure control solenoid • Short or open circuit in powertrain control module internal transistors

STEP	INSPECTION		ACTION
1	Are powertrain control module and pressure control solenoid connections at connector and connector pins OK?	**Yes**	Go to next step
		No	Repair or replace connector(s) Inspection step 5 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to powertrain control module • Does indication on EC-AT tester display change according to throttle opening angle? **Indication** **Pressure control solenoid: Light (Wide open throttle)—Dark (Closed throttle position)** ☞ **page K1–20**	**Yes**	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of pressure control solenoid and powertrain control module • Disconnect negative battery cable • Disconnect solenoid connector and powertrain control module connectors • Is there continuity between terminals?	**Yes**	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When **Yes**, go to step 5 • When **No**, go to next step
4	Measure resistance between pressure control solenoid terminals • Disconnect negative battery cable • Disconnect solenoid connector • Is resistance between terminals correct? **Resistance: 9—18 Ω** ☞ **page K1–35**	**Yes**	Go to next step
		No	Replace pressure control solenoid ☞ **page K1–35**
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown ☞ **page K1–178**	**Yes**	Replace the powertrain control module ☞ **section F2**
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

DIAGNOSTIC TROUBLE CODE P0750	SHIFT SOLENOID A—MALFUNCTION (Shift Solenoid A Malfunction)
DETAILS	• Damaged wiring or connectors between shift solenoid A and powertrain control module • Short or open circuit in shift solenoid A • Short or open circuit in powertrain control module internal transistor
POSSIBLE CAUSE	• Damaged wiring or connectors between shift solenoid A and powertrain control module • Short or open circuit in shift solenoid A • Short or open circuit in powertrain control module internal transistor

STEP	INSPECTION		ACTION
1	Are powertrain control module and shift solenoid A connections at connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector(s) Inspection step 6 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to powertrain control module • Is light for shift solenoid A normally off and illuminated when valve is on? ☞ page K1–20	Yes	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of shift solenoid A and powertrain control module • Disconnect negative battery cable • Disconnect solenoid connector and powertrain control module connector • Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When **Yes**, go to step 6 • When **No**, go to next step
4	Measure resistance at shift solenoid A terminal • Disconnect negative battery cable • Disconnect solenoid connector • Is resistance correct? **Resistance: 11—27 Ω** ☞ page K1–35	Yes	Go to next step
		No	Replace shift solenoid A ☞ page K1–35
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown ☞ page K1–178	Yes	Replace powertrain control module ☞ section F2
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

DIAGNOSTIC TROUBLE CODE P0755	SHIFT SOLENOID B—MALFUNCTION (Shift Solenoid B Malfunction)
DETAILS	• Damaged wiring or connectors between shift solenoid B and powertrain control module • Short or open circuit in shift solenoid B • Short or open circuit in powertrain control module internal transistors
POSSIBLE CAUSE	• Damaged wiring or connectors between shift solenoid B and powertrain control module • Short or open circuit in shift solenoid B • Short or open circuit in powertrain control module internal transistors

STEP	INSPECTION		ACTION
1	Are powertrain control module and shift solenoid B connections at connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector(s) Inspection step 6 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to powertrain control module • Is light for shift solenoid B normally off and illuminated when valve is on? ☞ **page K1–20**	Yes	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of shift solenoid B and powertrain control module • Disconnect negative battery cable • Disconnect solenoid connector and powertrain control module connector • Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When **Yes**, go to step 5 • When **No**, go to next step
4	Measure resistance at shift solenoid B terminal • Disconnect negative battery cable • Disconnect solenoid connector • Is resistance correct? **Resistance: 11—27 Ω** ☞ **page K1–35**	Yes	Go to next step
		No	Replace shift solenoid B ☞ **page K1–35**
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown ☞ **page K1–178**	Yes	Replace powertrain control module ☞ **section F2**
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

DIAGNOSTIC TROUBLE CODE P0760	SHIFT SOLENOID C—MALFUNCTION (Shift Solenoid C Malfunction)
DETAILS	• Damaged wiring or connectors between shift solenoid C and powertrain control module • Short or open circuit in shift solenoid C • Short or open circuit in powertrain control module internal transistor
POSSIBLE CAUSE	• Damaged wiring or connectors between shift solenoid C and powertrain control module • Short or open circuit in shift solenoid C • Short or open circuit in powertrain control module internal transistor

STEP	INSPECTION		ACTION
1	Are powertrain control module and shift solenoid C connections at connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector(s) Inspection step 5 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to powertrain control module • Is light for shift solenoid C normally off and illuminated when valve is on? ☞ **page K1–20**	Yes	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of shift solenoid C and powertrain control module • Disconnect negative battery cable • Disconnect solenoid connector and powertrain control module connector • Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When **Yes**, go to step 5 • When **No**, go to next step
4	Measure resistance at shift solenoid C terminal • Disconnect negative battery cable • Disconnect solenoid connector • Is resistance correct? **Resistance: 11—27 Ω** ☞ **page K1–35**	Yes	Go to next step
		No	Replace shift solenoid C ☞ **page K1–35**
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown ☞ **page K1–178**	Yes	Replace powertrain control module ☞ **section F2**
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

DIAGNOSTIC TROUBLE CODE P1743	SOLENOID TCC—OPEN OR SHORT (Torque converter clutch control solenoid valve)
DETAILS	• Damaged wiring or connectors between torque converter clutch control solenoid valve and powertrain control module • Short or open circuit in torque converter clutch control solenoid valve • Short or open circuit in powertrain control module internal transistors
POSSIBLE CAUSE	• Damaged wiring or connectors between torque converter clutch control solenoid valve and powertrain control module • Short or open circuit in torque converter clutch control solenoid valve • Short or open circuit in powertrain control module internal transistor

STEP	INSPECTION		ACTION
1	Are powertrain control module and torque converter clutch control solenoid valve connections at connector and connector pins OK?	**Yes**	Go to next step
		No	Repair or replace connector(s) Inspection step 5 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to powertrain control module • Is light for torque converter clutch control solenoid valve normally off and illuminated when valve is on? ☞ **page K1–20**	**Yes**	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of torque converter clutch control solenoid valve and powertrain control module • Disconnect negative battery cable • Disconnect solenoid connector and powertrain control module connector • Is there continuity between terminals?	**Yes**	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When **Yes**, go to step 5 • When **No**, go to next step
4	Measure resistance at torque converter clutch control solenoid valve terminal • Disconnect nagative battery cable • Disconnect solenoid connector • Is resistance correct? **Resistance: 11—27 Ω** ☞ **page K1–35**	**Yes**	Go to next step
		No	Replace torque converter clutch control solenoid valve ☞ **page K1–35**
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown ☞ **page K1–178**	**Yes**	Replace powertrain control module ☞ **section F2**
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

DIAGNOSTIC TROUBLE CODE P1744	SOLENOID TCC—OPEN OR SHORT (Torque converter clutch solenoid valve)
DETAILS	• Damaged wiring or connectors between torque converter clutch solenoid valve and powertrain control module • Short or open circuit in torque converter clutch solenoid valve • Short or open circuit in powertrain control module internal transistor
POSSIBLE CAUSE	• Damaged wiring or connectors between torque converter clutch solenoid valve and powertrain control module • Short or open circuit in torque converter clutch solenoid valve • Short or open circuit in powertrain control module internal transistor

STEP	INSPECTION		ACTION
1	Are powertrain control module and torque converter clutch solenoid valve connections at connector and connector pins OK?	**Yes**	Go to next step
		No	Repair or replace connector(s) Inspection step 5 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to powertrain control module • Does indication on EC-AT tester display change when torque converter clutch slip operation occure? **Indication** **Light (torque converter clutch slip operation)—Dark (torque converter clutch operation)** ☞ **page K1–20**	**Yes**	Go to step 5
		No	Go to next step
3	Check for continuity between terminal of torque converter clutch solenoid valve and powertrain control module • Disconnect negative battery cable • Disconnect solenoid connector and powertrain control module connector • Is there continuity between terminals?	**Yes**	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When **Yes**, go to step 5 • When **No**, go to next step
4	Measure resistance at torque converter clutch solenoid valve terminal • Disconnect negative battery cable • Disconnect solenoid connector • Is resistance correct? **Resistance: 9—18 Ω** ☞ **page K1–35**	**Yes**	Go to next step
		No	Replace torque converter clutch solenoid valve ☞ **page K1–35**
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown ☞ **page K1–178**	**Yes**	Replace powertrain control module ☞ **section F2**
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

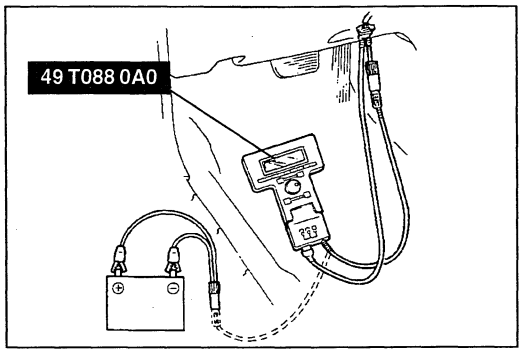
DIAGNOSTIC TROUBLE CODE P1765	3–2 TIMING SOL. V—OPEN OR SHORT (3–2 timing solenoid valve)
DETAILS	• Damaged wiring or connectors between 3–2 timing solenoid valve and powertrain control module • Short or open circuit in 3–2 timing solenoid valve • Short or open circuit in powertrain control module internal transistors
POSSIBLE CAUSE	• Damaged wiring or connectors between 3–2 timing solenoid valve and powertrain control module • Short or open circuit in 3–2 timing solenoid valve • Short or open circuit in powertrain control module internal transistors

STEP	INSPECTION		ACTION
1	Are powertrain control module and 3–2 timing solenoid valve connections at connector and connector pins OK?	**Yes**	Go to next step
		No	Repair or replace connector(s) Inspection step 5 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to powertrain control module • Is light for 3–2 timing solenoid valve normally off and illuminated when valve is on? ☞ **page K1–20**	**Yes**	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of 3–2 timing solenoid valve and powertrain control module • Disconnect negative battery cable • Disconnect solenoid connector and powertrain control module connector • Is there continuity between terminals?	**Yes**	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When **Yes**, go to step 5 • When **No**, go to next step
4	Measure resistance at 3–2 timing solenoid valve terminal • Disconnect negative battery cable • Disconnect solenoid connector • Is resistance correct? **Resistance: 11—27 Ω** ☞ **page K1–35**	**Yes**	Go to next step
		No	Replace 3–2 timing solenoid valve ☞ **page K1–35**
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown ☞ **page K1–178**	**Yes**	Replace powertrain control module ☞ **section F2**
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

TROUBLESHOOTING GUIDE

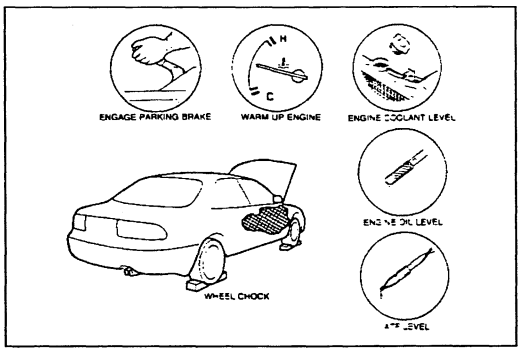
GENERAL NOTES

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; therefore, when troubleshooting, begin with those points which can be inspected quickly and easily. The recommended troubleshooting sequence is described below.



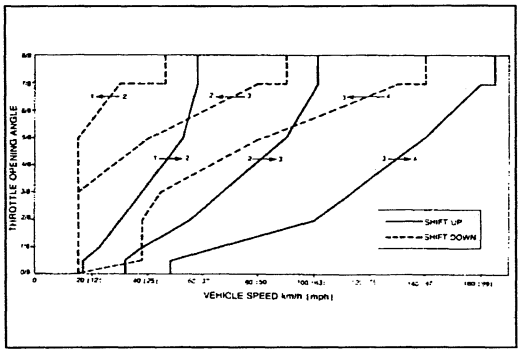
Step 1: On-board diagnostic system inspection

Check for diagnostic trouble code(s) memorized in the powertrain control module with the NGS.
(Refer to page K1–177.)



Step 2: Mechanical system test

Check the engine stall speed, time lag, and line pressure. (Refer to page K1–10.)



Step 3: Road test

Check the shift point, shift schedule, and shift shock. (Refer to page K1–15.)

QUICK DIAGNOSIS CHART

OUTLINE

The Quick Diagnosis Chart shows various problems and the various components that might be the cause of the problem.

1. Components indicated in the "On-board diagnosis" line of the QUICK DIAGNOSIS CHART (I) are diagnosed by the powertrain control module on-board diagnostic system. NGS can be used for easy retrieval of the diagnostic trouble code numbers.
2. Components indicated in the "Adjustment" line of the QUICK DIAGNOSIS CHART (I) indicate that there is a possibility that the problem may be the result of an incorrect adjustment. Check the adjustment of each component, and readjust if necessary.
3. Components indicated in the "Stall test" line of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the stall test.
4. Components indicated in the "Time lag test" line of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the time lag test.
5. Components indicated in the "Line pressure test" line of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the line pressure test.
6. Components indicated in the "Road test" line of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the road test.
7. QUICK DIAGNOSIS CHART (II) shows the relationship between the troubleshooting item and inspection point.

QUICK DIAGNOSIS CHART (I)

Possible parts and reference page / Item	Preliminary							Emission control system																Electronic system						
	ATF level and condition	Selector lever	Idle speed and ignition timing	Stall test	Time lag test	Line presure test	Road test	Air leakage	Mass air flow sensor	Engine coolant temperature sensor (EGI)	Oxygen sensor (right side, left side)	IAC valve	Fuel injector	Ignition control module (in distributor)	Ignition coil (in distributor)	Spark plug	Fuel pump	Main relay	Generator	Pressure regulator	Fuel filter	Air cleaner element	Camshaft	O/D OFF switch	Transaxle range switch	Throttle position sensor	Closed throttle position switch	Input/turbine speed sensor	Vehicle speedometer sensor
	K1–18	K1–170	section F2	K1–12	K1–13	K1–11	K1–15	section F2	section F2	section F2	section F2	section F2	section F2	section G	section G	section G	section F2	section F2	section G	section F2	section F2	section F2	section B2	K1–28	K1–29	section F2	section F2	K1–32	K1–33
On-board diagnosis																									○	○		○	○
Adjustment	○	○	○																						○	○			
Stall test																													
Time lag test																													
Line pressure test																													
Road test																													

QUICK DIAGNOSIS CHART (I)

Electronic system												Hydraulic control system							Powertrain											Possible parts and reference page
	Brake switch	Transaxle fluid temperature sensor	Barometric pressure sensor	Shift solenoid A	Shift solenoid B	Shift solenoid C	Torque converter clutch control solenoid valve	3–2 timing solenoid valve	Torque converter clutch solenoid valve	Pressure control solenoid	Powertrain control module	Oil pump	Control valve body	1–2 accumulator	2–3 accumulator	N–D accumulator	N–R accumulator	Torque converter	Forward clutch	Coasting clutch	Reverse clutch	3–4 clutch	2–4 brake band	Low and reverse brake	One-way clutch 1 (sprag type)	One-way clutch 2 (roller type)	Planetary gear	Parking mechanism	Differential	Item
	K1–34	K1–31	section F2	K1–35	K1–35	K1–35	K1–35	K1–35	K1–35	K1–35	section F2	K1–61	K1–97	K1–97	K1–97	K1–97	K1–97	K1–58	K1–64	K1–64	K1–64	K1–79	K1–87	K1–83	K1–74	K1–77	K1–77	K1–45	K1–127	
	○			○	○	○	○	○	○	○																				On-board diagnosis
										○		○	○				○	○	○		○									Adjustment
												○	○	○		○	○	○	○		○									Stall test
															○	○			○		○	○	○	○	○	○				Time lag test
										○		○	○					○	○			○	○	○	○					Line pressure test
													○							○		○	○	○	○			○		Road test

QUICK DIAGNOSIS CHART (II)

Item			Possible parts and reference page	Preliminary							Emission control system															Electronic system					
				ATF level and condition	Selector lever	Idle speed and ignition timing	Stall test	Time lag test	Line presure test	Road test	Air leakage	Mass air flow sensor	Engine coolant temperature sensor (EGI)	Oxygen sensor (right side, left side)	IAC valve	Fuel injector	Ignition control module (in distributor)	Ignition coil (in distributor)	Spark plug	Fuel pump	Main relay	Generator	Pressure regulator	Fuel filter	Air cleaner element	O/D OFF switch	Transaxle range switch	Throttle position sensor	Closed throttle position switch	Input/turbine speed sensor	Vehicle speedometer sensor	
				K1–18	K1–170	section F2	K1–12	K1–13	K1–11	K1–15	section F2	section F2	section F2	section F2	section F2	section F2	section G	section G	section G	section F2	section F2	section G	section F2	section F2	section F2	K1–28	K1–29	section F2	section F2	K1–32	K1–33	
6	Will start in positions and ranges other than P and N				○																					○					
14	Engine stalls	Idle when shifted from N or P to other ranges													○											○					
18		On deceleration	○		○							○		○	○			○		○	○											
24	Engine runs rough	On deceleration	○																													
25	Poor accel-eration	Driveaway										○				○								○			○					
26		On acceleration														○							○	○		○						
30	Surges while cruising										○				○				○								○		○		
31	Lack of power										○				○								○	○							
32	Poor fuel economy									○			○										○								
40	Vehicle does not move in D, 2, 1 ranges and/or R position		○	○					○																						
41	Vehicle moves in N position			○																												
42	Vehicle moves in P position			○																												
43	Excessive creep								○																			○				
44	No shift		○						○																○		○		○	○		
45	Abnormal shift		○																							○	○		○			
46	Frequent shifting																										○			○		
47	Shift point high or low		○						○																	○	○		○	○		
48	TCC non operation		○						○								○								○	○	○		○	○		
49	No kickdown								○																○	○	○					
50	Engine speed flares up	When accelerating	○	○					○																		○					
51		When upshifting and/or downshifting	○	○					○																		○		○			
52	Excessive shift shock	P, N to R and/or N to D							○																	○	○		○			
53		When upshifting and/or downshifting	○																								○		○			
54	No engine braking		○						○								○									○	○	○	○	○		
55	No mode changes																										○					
56	Transaxle noise	All ranges	○																													
57		D, 2, 1, ranges and R position	○																													
58	Transaxle overheats		○																								○		○	○		

QUICK DIAGNOSIS CHART (II)

Electronic system												Hydraulic control system						Powertrain										Possible parts and reference page		
K1–34	K1–31	section F2	K1–35	K1–35	K1–35	K1–35	K1–35	K1–35	K1–35	K1–35	section F2	K1–61	K1–97	K1–97	K1–97	K1–97	K1–97	K1–58	K1–64	K1–64	K1–64	K1–79	K1–87	K1–83	K1–74	K1–77	K1–77	K1–45	K1–127	
Brake switch	Transaxle fluid temperature sensor	Engine speed input signal	Shift solenoid A	Shift solenoid B	Shift solenoid C	Torque converter clutch control solenoid valve	3–2 timing solenoid valve	Torque converter clutch solenoid valve	Pressure control solenoid	Powertrain control module	Oil pump	Control valve body	1–2 accumulator	2–3 accumulator	N–D accumulator	N–R accumulator	Torque converter	Forward clutch	Coasting clutch	Reverse clutch	3–4 clutch	2–4 brake band	Low and reverse brake	One-way clutch 1 (sprag type)	One-way clutch 2 (roller type)	Planetary gear	Parking mechanism	Differential	Item		
																													Will start in positions and ranges other than P and N		6
			○								○	○																Idle when shifted from N or P to other ranges	Engine stalls	14
										○		○																On deceleration		18
																												On deceleration	Engine runs rough	24
										○		○																Driveaway	Poor acceleration	25
						○				○		○																On acceleration		26
		○								○		○																Surges while cruising		30
																	○		○									Lack of power		31
						○		○																				Poor fuel economy		32
			○						○	○	○	○					○	○	○		○	○		○	○	○	○	Vehicle does not move in D, 2, 1 ranges and/or R position		40
																	○	○										Vehicle moves in N position		41
																											○	Vehicle moves in P position		42
										○	○																	Excessive creep		43
			○	○	○				○	○	○	○						○	○		○	○		○		○		○	No shift		44
			○	○	○					○		○																Abnormal shift		45
												○										○						Frequent shifting		46
	○								○	○	○							○	○		○	○		○		○			Shift point high or low		47
○	○	○	○	○	○	○	○	○	○	○		○						○											TCC non operation		48
									○	○		○																	No kickdown		49
	○								○	○	○	○						○			○	○		○	○	○			When accelerating	Engine speed flares up	50
	○						○		○	○	○	○						○	○		○	○		○	○	○			When upshifting and/or downshifting		51
	○		○	○	○				○	○	○	○			○	○	○			○	○		○	○	○	○			P, N to R and/or N to D	Excessive shift shock	52
	○		○	○	○		○		○	○	○	○						○			○								When upshifting and/or downshifting		53
	○	○	○	○	○	○	○	○	○	○	○	○					○	○	○		○	○	○	○		○			No engine braking		54
										○																			No mode changes		55
																					○						○	All ranges	Transaxle noise	56
																	○											D, 2, 1, ranges and R position		57
	○	○	○	○	○	○	○	○	○	○	○	○	○					○		○			○	○	○				Transaxle overheats		58

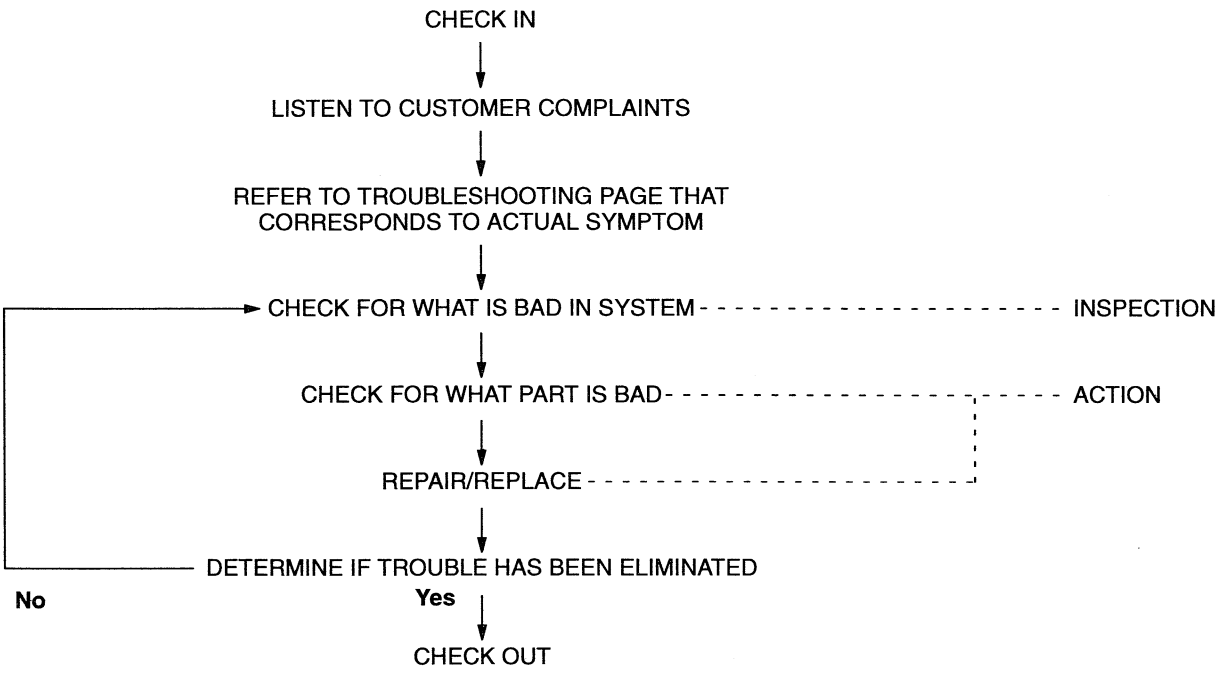
SYMPTOM TROUBLESHOOTING

USING THIS SECTION

Introduction

Most of the automatic transaxle control system is electronicaly controlled, often making it difficult to diagnose problems in the system, especially intermittent problems. Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability 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



Diagnosis Index

No.:
Each troubleshooting item is assigned a number

Troubleshooting Item:
There are 58 troubleshooting items. Choose the item that most closely corresponds to the actual symptom.

Description:
Describes each troubleshooting item.

Page:
Shows the reference page or section

DIAGNOSTIC INDEX

No.	TROUBLESHOOTING ITEM TROUBLE		DESCRIPTION	PAGE
1	Melts main or other fuse			section F2
2	Will not crank or cranks slowly		Starter does not work Starter cranks engine at slow speed	section F2
3	Cranks normally but will not start	No combustion	Starter cranks engine at normal speed but engine shows no indication of firing	section F2
4		Partial combustion — when engine cold	Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is cold or at initial starting Engine will not continue running when cold when ignition switch is returned from STA to IG position	section F2
5		Partial combustion — when engine warm	Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is warm Engine will not continue running when warm when IGN switch is returned from STA to IG position	section F2
6	Will start in positions and ranges other than P and N		Engine starts in all positions and ranges	K1–201
7	Cranks normally but hard to start	Any engine temp.	Starter cranks engine at normal speed but engine requires excessive cranking time before starting at any engine temperature Engine starts after stalling a few times at any engine temperature	section F2
8		When engine cold	Starter cranks engine at normal speed but engine requires excessive cranking time before starting when engine is cold Engine starts after stalling a few times when engine is cold	section F2
9		After warm-up	Starter cranks engine at normal speed but engine requires excessive cranking time before starting after warm-up	section F2
10	Engine stalls	Idle at any engine temp.	Engine stops unexpectedly at any engine temp.	section F2
11		During fast idle	Engine stops unexpectedly during fast-idle operation	section F2
12		Idle after warm-up	Engine stops unexpectedly at idle after warm-up	section F2
13		Idle with A/C, P/S, and/or E/L ON	Engine stops unexpectedly when A/C, P/S, and/or E/L turned ON at idle	section F2
*14		Idle when shifted from N or P to other position all ranges	Engine stops unexpectedly when shifted from N or P to other ranges at idle	section F2 K1–201
15		Driveaway	Engine stops unexpectedly upon driveaway	section F2
16		On acceleration	Engine stops unexpectedly at beginning of acceleration or during acceleration	section F2
17		While cruising	Engine stops unexpectedly while cruising	section F2
*18		On deceleration	Engine stops unexpectedly at beginning of deceleration or recovery from deceleration exhaust afterburn	section F2 K1–203
19	Engine rough	Idle at any engine temp.	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at any engine temp. Idle speed too slow and excessive engine shake at any engine temp.	section F2
20		During fast idle	Fast idle speed too slow and excessive engine shake during fast idle, but returns to normal after warm-up	section F2
21		Idle after warm-up	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle after warm-up	section F2

Troubleshooting chart

14	ENGINE STALLS	• IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGES
DESCRIPTION	• Engine stops unexpectedly when shifted from N or P to other ranges at idle	

[TROUBLESHOOTING HINTS]
① Engine idle speed low
② Control valve stuck (pressure regulator valve, converter relief valve, solenoid reducing valve, torque converter clutch shift valve and/or torque converter clutch control valve)
③ Shift solenoid A and/or torque converter clutch control solenoid valve worn
④ Transaxle range switch worn or misadjusted

STEP	INSPECTION		ACTION
1	Are ignition timing and idle speed OK? ☞ **section F2**	Yes	Go to next step
		No	Adjust ignition timing and/or idle speed ☞ **section F2**
2	Is problem corrected when 10 pin connector of solenoid valve is dis…	Yes	Go to next step
		No	Overhaul control valve body and repair or replace … necessary If large amounts of material are found, ov… repair or replace parts as necess…

DESCRIPTION:
Further describes the symptom. Confirm that the chart addresses the actual symptom before beginning troubleshooting.

TROUBLESHOOTING HINTS:
This describes the possible point of malfunction.

STEP:
This shows the order of troubleshooting. Proceed with troubleshooting as indicated.

INSPECTION:
This describes an inspection to quickly determine the malfunction of parts. If a detailed procedure is necessary to perform the INSPECTION, refer to the page shown by the "☞" mark.

ACTION
This recommends the appropriate action to take as a result (Yes/No) of the INSPECTION. How to perform the action is described on the reference page shown by the "☞" mark.

DIAGNOSTIC INDEX

TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
1	Burnt main or other fuse			section F2
2	Will not crank or cranks slowly		Starter does not work Starter cranks engine at slow speed	section F2
3	Cranks normally but will not start	No combustion	Starter cranks engine at normal speed but engine shows no indication of firing	section F2
4		Partial combustion — when engine cold	Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is cold or at initial starting Engine will not continue running when cold when ignition switch is returned from STA to ON position	section F2
5		Partial combustion — when engine warm	Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is warm Engine will not continue running when warm when ignition switch is returned from STA to ON position	section F2
6	Will start in positions and ranges other than P and N		Engine starts in all positions and ranges	K1–205
7	Cranks normally but hard to start	Any engine temp.	Starter cranks engine at normal speed but engine requires excessive cranking time before starting at any engine temperature Engine starts after stalling a few times at any engine temperature	section F2
8		When engine cold	Starter cranks engine at normal speed but engine requires excessive cranking time before starting when engine is cold Engine starts after stalling a few times when engine is cold	section F2
9		After warm-up	Starter cranks engine at normal speed but engine requires excessive cranking time before starting after warm-up	section F2
10	Engine stalls	Idle at any engine temp.	Engine stops unexpectedly at any engine temp.	section F2
11		During fast idle	Engine stops unexpectedly during fast-idle operation	section F2
12		Idle after warm-up	Engine stops unexpectedly at idle after warm-up	section F2
13		Idle with A/C, P/S, and/or E/L ON	Engine stops unexpectedly when A/C, P/S, and/or E/L turned ON at idle	section F2
*14		Idle when shifted from N or P to other position and all ranges	Engine stops unexpectedly when shifted from N or P to other ranges at idle	section F2 K1–205
15		Driveaway	Engine stops unexpectedly upon driveaway	section F2
16		On acceleration	Engine stops unexpectedly at beginning of acceleration or during acceleration	section F2
17		While cruising	Engine stops unexpectedly while cruising	section F2
*18		On deceleration	Engine stops unexpectedly at beginning of deceleration or recovery from deceleration exhaust afterburn	section F2 K1–207
19	Engine rough	Idle at any engine temp.	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at any engine temp. Idle speed too slow and excessive engine shake at any engine temp.	section F2
20		During fast idle	Fast idle speed too slow and excessive engine shake during fast idle, but returns to normal after warm-up	section F2
21		Idle after warm-up	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle after warm-up	section F2

* Refer to section F2 before referring to K1 section.

TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
22	Engine runs rough	Idle with A/C, P/S, and/or E/L ON	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when A/C, P/S, and/or E/L ON	section F2
23		Idle when shifted from N or P to other range	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when shifted from P or N to other range	section F2
*24		On deceleration	Engine shakes at beginning of deceleration, during deceleration, or recovery from deceleration Exhaust afterburn	section F2 K1–208
*25	Poor acceleration	Driveaway	Engine speed increases normally but vehicle speed slowly increases during driveaway	section F2 K1–209
*26		On acceleration	Engine speed increases normally but vehicle speed slowly increases during acceleration	
27	High idle speed after warm-up		Idle speed continues at fast idle after warm-up, engine returns slowly to idle after accelerator is released	section F2
28	Idle fluctuates/Idle hunts		Engine speed changes back and forth between specified idle speed and higher speed	section F2
29	Hesitates/Stumbles on acceleration		Momentary pause at beginning of acceleration or during acceleration	section F2
*30	Surges while cruising		Momentary minor irregularity in engine output at steady vehicle speed	section F2 K1–211
*31	Lack of power		Performance poor under load (i.e., power down when climbing hills)	section F2 K1–212
*32	Poor fuel economy		Fuel economy unsatisfactory	section F2 K1–212
33	A/C does not work		A/C compressor magnetic clutch does not engage when A/C switch ON	section F2
34	Knocking/Pinging		Sound produced when air/fuel mixture is ignited by something other than spark plug (i.e., hot spot in combustion chamber)	section F2
35	Fuel odor		Gasoline fuel smell or visible leaks	section F2
36	Exhaust sulfur smell		Rotten egg smell from exhaust	section F2
37	High oil consumption		Oil consumption excessive	section F2
38	NGS displays "LINK COMMUNICATION ERROR"		NGS displays "LINK COMMUNICATION ERROR" with ignition switch ON	section F2
39	MIL never ON		Self-Diagnosis Checker indicates diagnostic trouble code No. of input device but MIL never ON	section F2
40	Vehicle does not move in D, 2, 1 ranges and/or R position		No creep at all Vehicle does not move when accelerator pedal depressed after shifted to D, 2, 1 ranges and/or R position	K1–212
41	Vehicle moves in N position		Vehicle creeps in N position Vehicle moves when accelerator pedal not depressed	K1–212
42	Vehicle moves in P position		Vehicle rolls in P position, and drivetrain TCC non operation	K1–212
43	Excessive creep		Vehicle moves quickly in D, 2, 1 ranges and R position (accelerator pedal not depressed) Excessive N to R position and N to D range shift shock felt	K1–212
44	No shift		Single range shift (1→2, 2→3, or 3→4) only Sometimes shifts correctly With gear position in O/D OFF mode: Shifts sigle ranges only (1–2, 2–3, or 3–4) Shifts incorrectly at times	K1–213

* Refer to section F2 before referring to K1 section.

TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
45	Abnormal shift		Shifts incorrectly (incorrect shift pattern) (ex) Vehicle shifts 1→4 directly when accelerating with accelerator pedal depressed slightly	K1–215
46	Frequent shifting		Downshift occurs when accelerator depressed slightly in D (except O/D OFF mode), 2 and 1 ranges	K1–217
47	Shift point high or low		Shift points do not match shift diagram Shifts delayed when accelerating Shifts occur too fast when accelerating and engine speed does not increase	K1–218
48	TCC non operation		TCC non operation when vehicle speed reaches TCC operation range	K1–220
49	No kickdown		Does not downshift when accelerator pedal depressed more than 7/8 within kickdown range	K1–220
50	Engine speed flares up	When accelerating	Engine speed flares up on acceleration	K1–220
51		When upshifting and/or downshifting	Engine flares up when accelerator pedal depressed for upshifting Engine flares up suddenly when accelerator pedal depressed for downshifting	K1–221
52	Excessive shift shock	P, N to R and/or N to D	Strong shift shock felt at idle when shifting from N position to D range or R position	K1–223
53		When upshifting and/or downshifting	Excessive shift shock felt when accelerating at upshifting During cruising, excessive shift shock felt when accelerator pedal depressed at downshifting	K1–226
54	No engine braking		Engine speed drops to idle but vehicle does not slow when accelerator pedal released during cruising at medium to high speed Engine speed drops to idle but vehicle does not slow when accelerator pedal released when in 1 range at low vehicle speed	K1–229
55	No mode change		Mode does not change to/from normal mode in D range O/D OFF mode not selected or not cancelled	K1–231
56	Transaxle noise	All ranges	Transaxle noisy in all ranges when vehicle is idling	K1–231
57		D, 2, 1 ranges, R position	Abnormal noise from transaxle in D, 2, 1, R	K1–231
58	Transaxle overheats		ATF smells burnt and/or is discolored	K1–231

SYMPTOM TROUBLESHOOTING CHART

6	WILL START IN POSITIONS AND RANGES OTHER THAN P AND N
DESCRIPTION	• Engine starts in all positions and ranges

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary
① Selector lever installation or adjustment incorrect ☞ page K1–170
② Transaxle range switch worn or misadjusted ☞ page K1–29

14	ENGINE STALLS	• IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGES
DESCRIPTION	• Engine stops unexpectedly when shifted from N or P to other ranges at idle	

[TROUBLESHOOTING HINTS]
① Engine idle speed low
② Control valve stuck (pressure regulator valve, converter relief valve, solenoid reducing valve, torque converter clutch shift valve and/or torque converter clutch control valve)
③ Shift solenoid A and/or torque converter clutch control solenoid valve worn
④ Transaxle range switch worn or misadjusted

STEP	INSPECTION		ACTION
1	Are ignition timing and idle speed OK? ☞ section F2	Yes	Go to next step
		No	Adjust ignition timing and/or idle speed ☞ section F2
2	Is problem corrected when 10-pin connector of solenoid valve is disconnected?	Yes	Go to next step
		No	Overhaul control valve body and repair or replace parts as necessary If large amounts of material are found, overhaul transaxle and repair or replace parts as necessary
3	Are measurements at powertrain control module terminals OK? B+: Battery positive voltage	Yes	Go to next step
		No	If resistance not OK, check for malfunctioning parts and wiring • Shift solenoid A ☞ page K1–35 • Torque converter clutch control solenoid valve ☞ page K1–35 If resistance OK but voltage not, replace powertrain control module ☞ section F2

Term.	Unit	Spec.	Condition	Page
2A	Ω	11—27	Constant (Ign:OFF)	—
	V	0	Solenoid OFF	section F2
		B+	Solenoid ON	
2C	Ω	11—27	Constant (Ign:OFF)	—
	V	0	TCC non operation	section F2
		B+	TCC operation	

Unit: Ω → Resistance
V → Voltage

Terminal	Function
2A	Shift solenoid A
2C	Torque converter clutch control solenoid valve

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Are measurements at powertrain control module terminals OK?
B+: Battery positive voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">1F</td><td rowspan="2">V</td><td>0</td><td>P and N positions</td><td rowspan="10">section F2</td></tr>
<tr><td>B+</td><td>Other position, all ranges</td></tr>
<tr><td rowspan="2">2K</td><td rowspan="2">V</td><td>B+</td><td>R position</td></tr>
<tr><td>0</td><td>Other position, all ranges</td></tr>
<tr><td rowspan="2">2I</td><td rowspan="2">V</td><td>B+</td><td>D range</td></tr>
<tr><td>0</td><td>Other range, all positions</td></tr>
<tr><td rowspan="2">2M</td><td rowspan="2">V</td><td>B+</td><td>2 range</td></tr>
<tr><td>0</td><td>Other range, all positions</td></tr>
<tr><td rowspan="2">2R</td><td rowspan="2">V</td><td>B+</td><td>1 range</td></tr>
<tr><td>0</td><td>Other range, all positions</td></tr>
</table>
Unit: V → Voltage
<table>
<tr><th>Terminal</th><th>Function</th></tr>
<tr><td>1F,2K,2I,2M,2R</td><td>Transaxle range switch</td></tr>
</table></td><td>Yes</td><td>Replace powertrain control module
☞ section F2</td></tr>
<tr><td></td><td>No</td><td>Check transaxle range switch
☞ page K1–29</td></tr>
</table>

18	ENGINE STALLS	• ON DECELERATION
DESCRIPTION	• Engine stalls when brake pedal depressed while driving at low speed or stopping	

[TROUBLESHOOTING HINTS]
① ATF level low
② Control valve stuck

STEP	INSPECTION		ACTION
1	Is ATF level OK? ☞ page K1–18 **Level: Between notches on dipstick**	Yes	Go to next step
		No	Adjust ATF level ☞ page K1–18
2	Is line pressure OK? ☞ page K1–11 **Specified line pressure kPa {kgf/cm², psi}** Position/Range: D, 2, 1 — Idle: 420—530 {4.2—5.5, 60—78} — Stall: 1,100—1,170 {11.2—12.0, 160—170} Position/Range: R — Idle: 730—1,010 {7.4—10.3, 110—146} — Stall: 1,910—2,020 {19.4—20.7, 276—294}	Yes	Go to No.18 "ENGINE STALLS ON DECELERATION" ☞section F2
		No	Replace control valve body assembly ☞ page K1–125 If problem remains, overhaul transaxle and repair or replace parts as necessary

24	ENGINE RUNS ROUGH	• ON DECELERATION
DESCRIPTION	• Engine shakes at beginning of deceleration, during deceleration, or recovery from deceleration • Exhaust afterburn	
[TROUBLESHOOTING HINTS] ① ATF level low		

STEP	INSPECTION		ACTION
1	Is ATF level OK? ☞ page K1–18 **Level: Between notches on dipstick**	Yes	Go to No.24 "ENGINE RUNS ROUGH ON DECELERATION" ☞section F2
		No	Adjust ATF level ☞ page K1–18

25, 26	POOR ACCELERATION	• DRIVEAWAY • ON ACCELERATION
DESCRIPTION	• Engine speed increases normally but vehicle speed slowly increases during acceleration	

[TROUBLESHOOTING HINTS]

① Transaxle range switch worn or misadjusted
② Torque converter clutch control solenoid valve worn
③ Line pressure low
④ Powertrain slippage
⑤ Control valve stuck (pressure regulator valve, pressure modifier valve, solenoid reducing valve)
⑥ Engine power low
⑦ Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Does NGS display "SYSTEM PASSED (NO DTCS AVAILABLE)" with ignition switch ON? ☞ page K1–177	Yes	Go to next step
		No	Diagnostic trouble code(s) displayed • Check for cause of code(s) ☞ page K1–177
2	Is line pressure OK? ☞ page K1–11 **Specified line pressure** **kPa {kgf/cm², psi}**	Yes	Go to next step
		No	Replace control valve body assembly ☞ page K1–125 If problem remains, overhaul transaxle and repair or replace parts as necessary
3	Is engine stall speed OK? ☞ page K1–12 **rpm**	Yes	Go to step 5
		No	Overhaul transaxle and repair or replace parts as necessary
4	Are resistance and output duty of torque converter clutch control solenoid valve at powertrain control module OK?	Yes	Overhaul transaxle and repair or replace parts as necessary
		No	If resistance not OK, check torque converter clutch control solenoid valve and wiring ☞ page K1–35 If resistance OK but voltage is not, go to next step

Position/ Range	Idle	Stall
D, 2, 1	420—530 {4.2—5.5, 60—78}	1,100—1,170 {11.2—12.0, 160—170}
R	730—1,010 {7.4—10.3, 110—146}	1,910—2,020 {19.4—20.7, 276—294}

Engine	Engine stall speed
KL	2,270—2,500

B+: Battery positive voltage

Term.	Unit	Spec.	Condition	Page
2C	Ω	11—27	Constant (Ign:OFF)	—
	V	0	TCC non operation	section F2
		B+	TCC operation	

Unit: Ω → Resistance
V → Voltage

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>5</td><td>Disconnect solenoid 10-pin connector; is vehicle driven as follows?

<table><tr><th>Position/Range</th><th>Gear position</th></tr><tr><td>D range</td><td>Third gear (fixed)</td></tr><tr><td>2 range</td><td>Third gear (fixed)</td></tr><tr><td>1 range</td><td>First gear (fixed)</td></tr><tr><td>R position</td><td>Reverse (fixed)</td></tr></table></td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace control valve body assembly
☞ page K1–125
If problem remains, overhaul transaxle and repair or replace parts as necessary</td></tr>
<tr><td>6</td><td>Drive vehicle in D, 2 and 1 ranges; does vehicle start from stop in first gear?

Is engine speed (drum rpm) at 20 km/h {12 mph} and throttle opening OK?

Engine speed: Approx. 2,100 rpm
Throttle opening: 4/8</td><td>Yes</td><td>Overhaul transaxle and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>Go to next step</td></tr>
<tr><td>7</td><td>Are measurements at powertrain control module terminals OK?

B+: Battery positive voltage
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">1F</td><td rowspan="2">V</td><td>0</td><td>P and N positions</td><td rowspan="10">section F2</td></tr><tr><td>B+</td><td>Other position, all ranges</td></tr><tr><td rowspan="2">2K</td><td rowspan="2">V</td><td>B+</td><td>R position</td></tr><tr><td>0</td><td>Other position, all ranges</td></tr><tr><td rowspan="2">2I</td><td rowspan="2">V</td><td>B+</td><td>D range</td></tr><tr><td>0</td><td>Other range, all positions</td></tr><tr><td rowspan="2">2M</td><td rowspan="2">V</td><td>B+</td><td>2 range</td></tr><tr><td>0</td><td>Other range, all positions</td></tr><tr><td rowspan="2">2R</td><td rowspan="2">V</td><td>B+</td><td>1 range</td></tr><tr><td>0</td><td>Other range, all positions</td></tr></table>Unit: V → Voltage

<table><tr><th>Terminal</th><th>Function</th></tr><tr><td>1F,2K,2I,2M,2R</td><td>Transaxle range switch</td></tr></table></td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check transaxle range switch and wiring
If problem remains, return to step 5 ☞ page K1–29</td></tr>
<tr><td>8</td><td>Replace with known good powertrain control module; is problem corrected?
☞ section F2</td><td>Yes</td><td>Replace powertrain control module
☞ section F2</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace torque convertor
☞ page K1–58</td></tr>
</table>

30 SURGES WHILE CRUISING

DESCRIPTION • Momentary minor irregularity in engine output at steady vehicle speed

[TROUBLESHOOTING HINTS]
① Input/turbine speed sensor malfunction
② Control valve stuck
③ Throttle position sensor malfunction or misadjusted
④ Engine speed input signal malfunction
⑤ Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Is resistance of input/turbine speed sensor at powertrain control module OK? Term. | Unit | Spec. | Condition 2P↔2T | Ω | 253—604 | Constant (Ign:OFF) Unit: Ω → Resistance Terminal | Function 2P | Input/turbine speed sensor 2T | Ground (input)	Yes	Go to next step
		No	Check input/turbine speed sensor and wiring ☞ page K1–32
2	Is line pressure OK? ☞ page K1–11 **Specified line pressure** **kPa {kgf/cm², psi}** Position/Range | Idle | Stall D, 2, 1 | 420—530 {4.2—5.5, 60—78} | 1,100—1,170 {11.2—12.0, 160—170} R | 730—1,010 {7.4—10.3, 110—146} | 1,910—2,020 {19.4—20.7, 276—294}	Yes	Overhaul transaxle and repair or replace parts as necessary
		No	Go to next step
3	Are measurements at powertrain control module terminals OK? Term. | Unit | Spec. | Condition | Page 4F | V | 0 or 4.5—5.5 | Engine stopped (ignition switch ON) | section F2 4F | V | 2.0—3.0 | Engine running at idle | section F2 3B | V | 0.1—1.1 | Throttle valve closed throttle position | section F2 3B | V | 3.1—4.4 | Throttle valve wide open throttle | section F2 Unit: V → Voltage Terminal | Function 4F | Engine speed input signal 3B | Throttle position sensor	Yes	Check for malfunctioning parts and wiring • Engine speed input signal ☞ section F2 • Throttle position sensor ☞ section F2
		No	Overhaul transaxle and repair or replace parts as necessary

31	LACK OF POWER
DESCRIPTION	• Performance poor under load (i.e., power down when climbing hills)

[TROUBLESHOOTING HINTS]
Inspect parts; repair, adjust, or replace malfunctioning parts as necessary

① Torque converter worn	☞ page K1–58
② Powertrain burned (reverse clutch)	☞ page K1–64

32	POOR FUEL ECONOMY
DESCRIPTION	• Fuel economy unsatisfactory

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Torque converter clutch solenoid valve worn	☞ page K1–35
② Torque converter clutch control solenoid valve worn	☞ page K1–35

40	VEHICLE DOES NOT MOVE IN D, 2, 1 RANGES, AND/OR R POSITION
DESCRIPTION	• No creep at all • Vehicle does not move when accelerator pedal depressed after shifted to D, 2, 1 ranges, and/or R position

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low	☞ page K1–18
② Selector lever installation or adjustment incorrect	☞ page K1–170
③ Line pressure low	☞ page K1–11
④ Powertrain slippage (forward clutch, coasting clutch, 3–4 clutch, 2–4 brake band, one-way clutch 1, 2, or planetary gear)	☞ page K1–45
⑤ Control valve stuck (manual valve, solenoid reducing valve)	☞ page K1–125
⑥ Pressure control solenoid and/or shift solenoid A worn	☞ page K1–35
⑦ Parking mechanism worn	☞ page K1–45
⑧ Powertrain control module malfunction	☞ section F2

41	VEHICLE MOVES IN N POSITION
DESCRIPTION	• Vehicle creeps in N position • Vehicle moves when accelerator pedal not depressed

[TROUBLESHOOTING HINTS]
Inspect parts; repair, adjust, or replace malfunctioning parts as necessary

① Selector lever installation or adjustment incorrect	☞ page K1–176
② Powertrain burnt (forward clutch, coasting clutch)	☞ page K1–45
③ Control valve stuck (manual valve)	☞ page K1–125

42	VEHICLE MOVES IN P POSITION
DESCRIPTION	• Vehicle rolls in P position, and drivetrain TCC non operation

[TROUBLESHOOTING HINTS]
Inspect parts; repair, adjust, or replace malfunctioning parts as necessary

① Selector lever installation or adjustment incorrect	☞ page K1–170
② Parking mechanism worn	☞ page K1–45

43	EXCESSIVE CREEP
DESCRIPTION	• Vehicle moves quickly in D, 2, 1 ranges, and R position (accelerator pedal not depressed) • Excessive N to R position and N to D range shift shock felt

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Engine idle speed misadjusted	☞ section F2
② Line pressure at idle high	☞ page K1–11
③ Closed throttle position switch malfunction	☞ section F2
④ Powertrain control module malfunction	☞ section F2

44	NO SHIFT
DESCRIPTION	• With gear position in O/D OFF mode: Shifts in single ranges only (1–2, 2–3, or 3–4) Shifts incorrectly at times

[TROUBLESHOOTING HINTS]

① ATF level low
② Shift solenoid A, B, C worn
③ Control valve stuck
④ O/D OFF switch malfunction
⑤ Input/turbine speed sensor malfunction
⑥ Vehicle speedometer sensor malfunction
⑦ Poor ground
⑧ Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞ **page K1–18**	Yes	Go to next step
		No	Problem within transaxle Go to next step, and check for the main cause. When problem is found and corrected, overhaul transaxle and repair or replace parts as necessry
2	Does NGS display "SYSTEM PASSED (NO DTCS AVAILABLE)" with ignition switch ON? ☞ **page K1–177**	Yes	Go to next step
		No	Diagnostic trouble code(s) displayed • Check for cause of code(s) ☞ **page K1–177**
3	Disconnect solenoid 10-pin connector; is vehicle driven as follows?	Yes	Go to next step
		No	Replace control valve body assembly ☞ **page K1–125** If problem remains, overhaul transaxle and repair or replace parts as necessary
4	Drive vehicle in D, 2 and 1 ranges; does vehicle start from stop in first gear? Is engine speed (drum rpm) at 20 km/h {12 mph} and throttle opening OK? **Engine speed: Approx. 2,100 rpm** **Throttle opening: 4/8**	Yes	Go to step 6
		No	Go to next step

Position/Range	Gear position
D range	Third gear (fixed)
2 range	Third gear (fixed)
1 range	First gear (fixed)
R position	Reverse (fixed)

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>5</td><td>Are measurements at powertrain control module terminals OK?

B+: Battery positive voltage
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="3">2A</td><td>Ω</td><td>11—27</td><td>Constant (Ign:OFF)</td><td>—</td></tr><tr><td rowspan="2">V</td><td>0</td><td>Solenoid OFF</td><td rowspan="2">section F2</td></tr><tr><td>B+</td><td>Solenoid ON</td></tr><tr><td rowspan="3">2B</td><td>Ω</td><td>11—27</td><td>Constant (Ign:OFF)</td><td>—</td></tr><tr><td rowspan="2">V</td><td>0</td><td>Solenoid OFF</td><td rowspan="2">section F2</td></tr><tr><td>B+</td><td>Solenoid ON</td></tr><tr><td rowspan="3">2F</td><td>Ω</td><td>11—27</td><td>Constant (Ign:OFF)</td><td>—</td></tr><tr><td rowspan="2">V</td><td>0</td><td>Solenoid OFF</td><td rowspan="2">section F2</td></tr><tr><td>B+</td><td>Solenoid ON</td></tr></table>Unit: Ω → Resistance
V → Voltage

<table><tr><th>Terminal</th><th>Function</th></tr><tr><td>2A</td><td>Shift solenoid A</td></tr><tr><td>2B</td><td>Shift solenoid B</td></tr><tr><td>2F</td><td>Shift solenoid C</td></tr></table></td><td>Yes</td><td>Replace control valve body assembly
If problem remains, overhaul transaxle and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Shift solenoid A ☞ page K1–35
• Shift solenoid B ☞ page K1–35
• Shift solenoid C ☞ page K1–35
If resistance OK but voltage is not, go to next step</td></tr>
<tr><td>6</td><td>Are measurements at powertrain control module terminals OK?

B+: Battery positive voltage
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">2L</td><td rowspan="2">V</td><td>0</td><td>Switch depressed</td><td rowspan="2">section F2</td></tr><tr><td>B+</td><td>Switch released</td></tr><tr><td>2P↔2T</td><td>Ω</td><td>253—604</td><td>Constant (Ign: OFF)</td><td>—</td></tr><tr><td rowspan="2">1C</td><td rowspan="2">V</td><td>0 or 4.0—5.0</td><td>Vehicle stopped</td><td rowspan="2">section F2</td></tr><tr><td>2.0—3.0</td><td>Vehicle moving</td></tr></table>Unit: Ω → Resistance
V → Voltage

<table><tr><th>Terminal</th><th>Function</th></tr><tr><td>1L</td><td>O/D OFF switch</td></tr><tr><td>1C</td><td>Vehicle speedometer sensor</td></tr><tr><td>2P</td><td>Input/turbine speed sensor</td></tr><tr><td>2T</td><td>Ground (input)</td></tr></table></td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• O/D OFF switch ☞ page K1–28
• Input/turbine speed sensor ☞ page K1–32
• Vehicle speedometer sensor ☞ page K1–33
If problem remains, return to step 3</td></tr>
<tr><td>7</td><td>Is voltage between 4AF terminal of powertrain control module and transaxle case OK?

Specified voltage: 0 V</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Problem in ground circuit
Repair wiring or replace connector</td></tr>
<tr><td>8</td><td>Replace with known good powertrain control module; is problem corrected?
☞ section F2</td><td>Yes</td><td>Replace powertrain control module
☞ section F2</td></tr>
<tr><td></td><td></td><td>No</td><td>Overhaul transaxle and repair or replace parts as necessary</td></tr>
</table>

45	ABNORMAL SHIFT
DESCRIPTION	• Shifts incorrectly (incorrect shift pattern) (Ex) Vehicle shifts 1 → 4 directly when accelerating with accelerator pedal depressed slightly

[TROUBLESHOOTING HINTS]

① ATF level low
② Shift solenoid A, B, C worn
③ Poor ground
④ Throttle position sensor malfunction or misadjusted
⑤ Input/turbine speed sensor malfunction
⑥ Transaxle range switch worn
⑦ Powertrain control module malfunction
⑧ Stuck control valves

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞ page K1–18	Yes	Go to next step
		No	Problem within transaxle Go to next step, and check for the main cause. When the problem is found and corrected, overhaul the transaxle and repair or replace parts as necessary
2	Does NGS display "SYSTEM PASSED (NO DTCS AVAILABLE)" with ignition switch ON? ☞ page K1–177	Yes	Go to next step
		No	Diagnostic trouble code(s) displayed • Check for cause of code(s) ☞ page K1–177
3	Are measurements at powertrain control module terminals OK? B+: Battery positive voltage	Yes	Go to next step
		No	If resistance not OK, check for malfunctioning parts and wiring • Shift solenoid A ☞ page K1–35 • Shift solenoid B ☞ page K1–35 • Shift solenoid C ☞ page K1–35 If resistance OK but voltage is not, go to next step

Term.	Unit	Spec.	Condition	Page
2A	Ω	11—27	Constant (Ign:OFF)	—
	V	0	Solenoid OFF	section F2
		B+	Solenoid ON	
2B	Ω	11—27	Constant (Ign:OFF)	—
	V	0	Solenoid OFF	section F2
		B+	Solenoid ON	
2F	Ω	11—27	Constant (Ign:OFF)	—
	V	0	Solenoid OFF	section F2
		B+	Solenoid ON	

Unit: Ω → Resistance
V → Voltage

Terminal	Function
2A	Shift solenoid A
2B	Shift solenoid B
2F	Shift solenoid C

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Is voltage between 4AF terminal of powertrain control module and transaxle case OK?

Specified voltage: 0 V</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Problem in ground circuit
Check for wiring</td></tr>
<tr><td>5</td><td>Are measurements at powertrain control module terminals OK?

B+: Battery positive voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">3B</td><td rowspan="2">V</td><td>0.1—1.1</td><td>Throttle valve closed throttle position</td><td rowspan="2">section F2</td></tr>
<tr><td>3.1—4.4</td><td>Throttle valve wide open throttle</td></tr>
<tr><td>2P↔2T</td><td>Ω</td><td>253—604</td><td>Constant (Ign: OFF)</td><td>—</td></tr>
<tr><td rowspan="2">1F</td><td rowspan="2">V</td><td>0</td><td>P and N positions</td><td rowspan="8">section F2</td></tr>
<tr><td>B+</td><td>Other positions all ranges</td></tr>
<tr><td rowspan="2">2K</td><td rowspan="2">V</td><td>B+</td><td>R position</td></tr>
<tr><td>0</td><td>Other positions all ranges</td></tr>
<tr><td rowspan="2">2I</td><td rowspan="2">V</td><td>B+</td><td>D range</td></tr>
<tr><td>0</td><td>Other ranges all positions</td></tr>
<tr><td rowspan="2">2M</td><td rowspan="2">V</td><td>B+</td><td>2 range</td></tr>
<tr><td>0</td><td>Other ranges all positions</td></tr>
<tr><td rowspan="2">2R</td><td rowspan="2">V</td><td>B+</td><td>1 range</td></tr>
<tr><td>0</td><td>Other ranges all positions</td></tr>
</table>
Unit: Ω → Resistance
V → Voltage</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Throttle position sensor ☞ section F2
• Input/turbine speed sensor ☞ page K1–32
• Transaxle range switch ☞ page K1–29</td></tr>
<tr><td>6</td><td>Replace with known good powertrain control module; is problem corrected?
☞ section F2</td><td>Yes</td><td>Replace powertrain control module
☞ section F2</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace control valve body assembly
If problem remains, overhaul transaxle and repair or replace parts as necessary</td></tr>
</table>

46	FREQUENT SHIFTING
DESCRIPTION	• Downshift occurs when accelerator depressed slightly in D (except O/D OFF mode), 2 and 1 ranges

[TROUBLESHOOTING HINTS]
① Poor ground
② Throttle position sensor malfunction or misadjusted
③ Powertrain control module malfunction
④ Vehicle speedometer sensor malfunction
⑤ Powertrain burnt (2–4 brake band)

STEP	INSPECTION		ACTION
1	Are there any diagnostic trouble code(s) displayed on the NGS when ignition switch is ON? ☞ page K1–177	Yes	Diagnostic trouble code(s) displayed • Check for cause of code(s) ☞ page K1–177
		No	Go to next step
2	Is voltage between 4AF terminal of powertrain control module and transaxle case OK? **Specified voltage: 0 V**	Yes	Go to next step
		No	Problem in ground circuit Repair wiring or replace connector
3	Is input voltage of throttle position sensor at powertrain control module OK? B+: Battery positive voltage Unit: V → Voltage	Yes	Go to next step
		No	Check throttle position sensor and wiring ☞ section F2
4	Is input voltage of vehicle speedometer sensor at powertrain control module OK? B+: Battery positive voltage Unit: V → Voltage	Yes	Go to next step
		No	Check vehicle speedometer sensor and wiring ☞ page K1–33
5	Replace with known good powertrain control module; is problem corrected? ☞ section F2	Yes	Replace powertrain control module ☞ section F2
		No	Replace control valve body assembly If problem remains, overhaul transaxle and repair or replace parts as necessary

Term.	Unit	Spec.	Condition	Page
3B	V	0.1—1.1	Throttle valve closed throttle position	section F2
		3.1—4.4	Throttle valve wide open throttle	

Term.	Unit	Spec.	Condition	Page
1C	V	0 or 4.0—5.0	Vehicle stopped	section F2
		2.0—3.0	Vehicle moving	

47	SHIFT POINT HIGH OR LOW
DESCRIPTION	• Shift points do not match shift diagram • Shifts delayed when accelerating • Shifts occur too fast when accelerating and engine speed does not increase

[TROUBLESHOOTING HINTS]

① Pressure control solenoid worn
② Throttle position sensor malfunction or misadjusted
③ Transaxle fluid temperature sensor malfunction
④ Input/turbine speed sensor malfunction
⑤ Vehicle speedometer sensor malfunction
⑥ Transaxle range switch malfunction

STEP	INSPECTION		ACTION
1	Does NGS display "SYSTEM PASSED (NO DTCS AVAILABLE)" with ignition switch ON? ☞ **page K1–177**	Yes	Go to next step
		No	Diagnostic trouble code(s) displayed • Check for cause of code(s) ☞ **page K1–177**
2	Are resistance and output duty of pressure control solenoid at powertrain control module OK?	Yes	Go to next step
		No	If resistance not OK, check pressure control solenoid and wiring ☞ **page K1–35** If resistance OK but duty is not, go to next step
3	Is input voltage of throttle position sensor at powertrain control module OK?	Yes	Go to next step
		No	Check throttle position sensor and wiring ☞ **section F2**

Term.	Unit	Spec.	Condition	Page
2H	Ω	9—18	Constant (Ign:OFF)	—
	%	Approx. 67	Throttle valve closed throttle position	section F2
		Approx. 23	Throttle valve wide open throttle	

Unit: Ω → Resistance
% → ON duty

B+: Battery positive voltage

Term.	Unit	Spec.	Condition	Page
3B	V	0.1—1.1	Throttle valve closed throttle position	section F2
		3.1—4.4	Throttle valve wide open throttle	

Unit: V → Voltage

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Is input voltage of transaxle fluid temperature sensor at powertrain control module OK?

B+: Battery positive voltage
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">2O↔4D</td><td rowspan="2">V</td><td>Approx. 3.5</td><td>ATF temp. 20°C {68°F}</td><td rowspan="2">section F2</td></tr><tr><td>Approx. 0.6</td><td>ATF temp. 130°C {266°F}</td></tr></table>Unit: V → Voltage

<table><tr><th>Terminal</th><th>Function</th></tr><tr><td>2O</td><td>Transaxle fluid temperature sensor</td></tr><tr><td>4D</td><td>Ground (input)</td></tr></table></td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check transaxle fluid temperature sensor and wiring
☞ page K1–31</td></tr>
<tr><td>5</td><td>Are measurements at powertrain control module terminals OK?

B+: Battery positive voltage
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td>2P↔2T</td><td>Ω</td><td>253—604</td><td>Constant (Ign: OFF)</td><td>—</td></tr><tr><td rowspan="2">1C</td><td rowspan="2">V</td><td>0 or 4.0—5.0</td><td>Vehicle stopped</td><td rowspan="10">section F2</td></tr><tr><td>2.0—3.0</td><td>Vehicle moving</td></tr><tr><td rowspan="2">1F</td><td rowspan="2">V</td><td>0</td><td>P and N positions</td></tr><tr><td>B+</td><td>Other positions all ranges</td></tr><tr><td rowspan="2">2K</td><td rowspan="2">V</td><td>B+</td><td>R position</td></tr><tr><td>0</td><td>Other positions all ranges</td></tr><tr><td rowspan="2">2I</td><td rowspan="2">V</td><td>B+</td><td>D range</td></tr><tr><td>0</td><td>Other ranges all positions</td></tr><tr><td rowspan="2">2M</td><td rowspan="2">V</td><td>B+</td><td>2 range</td></tr><tr><td>0</td><td>Other ranges all positions</td></tr><tr><td rowspan="2">2R</td><td rowspan="2">V</td><td>B+</td><td>1 range</td></tr><tr><td>0</td><td>Other ranges all positions</td></tr></table>Unit: Ω → Resistance
V → Voltage

<table><tr><th>Terminal</th><th>Function</th></tr><tr><td>1C</td><td>Vehicle speedometer sensor</td></tr><tr><td>1F,2K,2I,2M</td><td>Transaxle range switch</td></tr><tr><td>2P</td><td>Input/turbine speed sensor</td></tr><tr><td>2T</td><td>Ground (input)</td></tr></table></td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Input/turbine speed sensor ☞ page K1–32
• Vehicle speedometer sensor ☞ page K1–33
• Transaxle range switch ☞ page K1–29</td></tr>
<tr><td>6</td><td>Is line pressure OK?
☞ page K1–11

Specified line pressure kPa {kgf/cm², psi}
<table><tr><th>Range</th><th>Idle</th><th>Stall</th></tr><tr><td>D, 2, 1</td><td>420—530 {4.2—5.5, 60—78}</td><td>1,100—1,170 {11.2—12.0, 160—170}</td></tr><tr><td>R</td><td>730—1,010 {7.4—10.3, 110—146}</td><td>1,910—2,020 {19.4—20.7, 276—294}</td></tr></table></td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace control valve body assembly
If problem remains, overhaul transaxle and repair or replace parts as necessary</td></tr>
</table>

48	TCC NON OPERATION
DESCRIPTION	• TCC non operation when vehicle speed reaches torque converter clutch range

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low	☞ page K1–18
② Shift solenoid A, B, C, torque converter clutch control, 3–2 timing, torque converter clutch and/or pressure control solenoid worn	☞ page K1–35
③ O/D OFF switch worn	☞ page K1–28
④ Transaxle range switch worn or misadjusted	☞ page K1–29
⑤ Brake switch malfunction	☞ page K1–34
⑥ Control valve stuck (torque converter clutch shift valve, torque converter clutch control valve, solenoid reducing valve)	☞ page K1–125
⑦ Transaxle fluid temperature sensor malfunction	☞ page K1–31
⑧ Throttle position sensor malfunction or misadjusted	☞ section F2
⑨ Input/turbine speed sensor malfunction	☞ page K1–32
⑩ Vehicle speedometer sensor malfunction	☞ page K1–33
⑪ Powertrain control module malfunction	☞ section F2
⑫ Torque converter worn	☞ page K1–58

49	NO KICKDOWN
DESCRIPTION	• Does not downshift when accelerator pedal depressed more than 7/8 within kickdown range

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Throttle position sensor malfunction or misadjusted	☞ section F2
② O/D OFF switch worn	☞ page K1–28
③ Transaxle range switch worn or misadjusted	☞ page K1–29
④ Pressure control solenoid worn	☞ page K1–35
⑤ Control valve stuck (pressure regulator valve, pressure modifier valve, solenoid reducing valve)	☞ page K1–125
⑥ Powertrain control module malfunction	☞ section F2

50	ENGINE SPEED FLARES UP	• WHEN ACCELERATING
DESCRIPTION	• Engine speed flares up on acceleration	

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low	☞ page K1–18
② Selector lever installation or adjustment incorrect	☞ page K1–170
③ Throttle position sensor malfunction or misadjusted	☞ section F2
④ Line pressure low	☞ page K1–11
⑤ Powertrain slippage (forward clutch, 3–4 clutch, 2–4 brake band, one-way clutch 1, 2, planetary gear)	☞ page K1–45
⑥ Control valve stuck (pressure regulator valve, solenoid reducing valve)	☞ page K1–125
⑦ Pressure control solenoid worn	☞ page K1–35
⑧ Transaxle fluid temperature sensor malfunction	☞ page K1–31
⑨ Powertrain control module malfunction	☞ section F2

51	ENGINE SPEED FLARES UP	• WHEN UPSHIFTING AND/OR DOWNSHIFTING

DESCRIPTION
- Engine flares up when accelerator pedal depressed for upshifting
- Engine flares up suddenly when accelerator pedal depressed for downshifting

[TROUBLESHOOTING HINTS]
① ATF level low
② Selector lever installation or adjustment incorrect
③ Throttle position sensor malfunction or misadjusted
④ Line pressure low
⑤ Powertrain slippage (forward clutch, coasting clutch, 3–4 clutch, 2–4 brake band, one-way clutch 1, 2, planetary gear)
⑥ Control valve stuck (pressure regulator valve, pressure modifier valve, solenoid reducing valve)
⑦ Pressure control solenoid worn
⑧ 3–2 timing solenoid valve worn
⑨ Input/turbine speed sensor malfunction
⑩ Transaxle fluid temperature sensor malfunction
⑪ Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞ page K1–18	Yes	Go to next step
		No	Problem within transaxle. Go to next step, and check for main cause. When problem is found and corrected, overhaul transaxle and repair or replace parts as necessry
2	Does NGS display "SYSTEM PASSED (NO DTCS AVAILABLE)" with ignition switch ON? ☞ page K1–177	Yes	Go to next step
		No	Diagnostic trouble code(s) displayed • Check for cause of code(s) ☞ page K1–177
3	Is line pressure OK? ☞ page K1–11 **Specified line pressure** **kPa {kgf/cm², psi}**	Yes	Overhaul transaxle and repair or replace parts as necessary
		No	Check selector lever operation ☞ page K1–170 ➪ If OK, go to next step ➪ If not OK, adjust, repair, or replace selector lever ☞ page K1–170

Position/ Range	Idle	Stall
D, 2, 1	420—530 {4.2—5.5, 60—78}	1,100—1,170 {11.2—12.0, 160—170}
R	730—1,010 {7.4—10.3, 110—146}	1,910—2,020 {19.4—20.7, 276—294}

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Are resistance and output duty of pressure control solenoid valve at powertrain control module OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="3">2H</td><td>Ω</td><td>9—18</td><td>Constant (Ign:OFF)</td><td>—</td></tr><tr><td rowspan="2">%</td><td>Approx. 67</td><td>Throttle valve closed throttle position</td><td rowspan="2">section F2</td></tr><tr><td>Approx. 23</td><td>Throttle valve wide open throttle</td></tr></table>Unit: Ω → Resistance
% → ON duty</td><td>Yes</td><td>Replace control valve body assembly
If problem remains, overhaul transaxle and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check pressure control solenoid and wiring ☞ page K1–35
If resistance OK but duty is not, go to next step</td></tr>
<tr><td>5</td><td>Are resistance and output voltage of 3–2 timing solenoid valve at powertrain control module OK?
B+: Battery positive voltage
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="3">2G</td><td>Ω</td><td>11—27</td><td>Constant (Ign:OFF)</td><td>—</td></tr><tr><td rowspan="2">V</td><td>0</td><td>Other than above</td><td rowspan="2">section F2</td></tr><tr><td>B+</td><td>1→2, 2→3, 3→4, 3→2, 2→1 shift</td></tr></table>Unit: Ω → Resistance
V → Voltage</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check 3–2 timing solenoid valve and wiring ☞ page K1–35
If resistance OK but voltage is not, go to next step</td></tr>
<tr><td>6</td><td>Is input voltage of throttle position sensor at powertrain control module OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">3B</td><td rowspan="2">V</td><td>0.1—1.1</td><td>Throttle valve closed throttle position</td><td rowspan="2">section F2</td></tr><tr><td>3.1—4.4</td><td>Throttle valve wide open throttle</td></tr></table>Unit: V → Voltage</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check throttle position sensor and wiring ☞ section F2</td></tr>
<tr><td>7</td><td>Are measurements at powertrain control module terminals OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td>2R↔2T</td><td>Ω</td><td>253—604</td><td>Constant (Ign: OFF)</td><td>—</td></tr><tr><td rowspan="2">2O↔4D</td><td rowspan="2">V</td><td>Approx. 3.5</td><td>ATF temp. 20°C {68°F}</td><td rowspan="2">section F2</td></tr><tr><td>Approx. 0.6</td><td>ATF temp. 130°C {266°F}</td></tr></table>Unit: Ω → Resistance
V → Voltage
<table><tr><th>Terminal</th><th>Function</th></tr><tr><td>2P</td><td>Input/turbine speed sensor</td></tr><tr><td>2T</td><td>Ground (input)</td></tr><tr><td>2O</td><td>Transaxle fluid temperature sensor</td></tr><tr><td>4D</td><td>Ground (input)</td></tr></table></td><td>Yes</td><td>Replace powertrain control module ☞ section F2</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Input/turbine speed sensor ☞ page K1–32
• Transaxle fluid temperature sensor ☞ page K1–31</td></tr>
</table>

52	EXCESSIVE SHIFT SHOCK	• P, N TO R AND/OR N TO D
DESCRIPTION	• Strong shift shock felt at idle when shifting from N position to D range or R position	

[TROUBLESHOOTING HINTS]

① Idle speed high
② Throttle position sensor malfunction or misadjusted
③ Line pressure high
④ Control valve stuck (pressure regulator valve, cutback valve, solenoid reducing valve)
⑤ Powertrain slippage
⑥ Pressure control solenoid worn
⑦ Shift solenoid A, B and/or C worn
⑧ Transaxle fluid temperature sensor malfunction
⑨ N-D, or N-R accumulator worn
⑩ Input/turbine speed sensor malfunction
⑪ Transaxle range switch worn or misadjusted
⑫ Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Are ignition timing and idle speed OK? ☞ **section F2**	Yes	Go to next step
		No	Adjust ignition timing and/or idle speed ☞ **section F2**
2	Does NGS display "SYSTEM PASSED (NO DTCS AVAILABLE)" with ignition switch ON? ☞ **page K1–177**	Yes	Go to next step
		No	Diagnostic trouble code(s) displayed • Check for cause of code(s) ☞ **page K1–177**
3	Is line pressure OK? ☞ **page K1–11** **Specified line pressure** **kPa {kgf/cm², psi}** Position/Range: D, 2, 1 — Idle: 420—530 {4.2—5.5, 60—78} — Stall: 1,100—1,170 {11.2—12.0, 160—170} Position/Range: R — Idle: 730—1,010 {7.4—10.3, 110—146} — Stall: 1,910—2,020 {19.4—20.7, 276—294}	Yes	Go to next step
		No	Go to step 5
4	Is engine stall speed OK? ☞ **page K1–12** **rpm** Engine: KL — Engine stall speed: 2,270—2,500	Yes	Go to step 8
		No	Overhaul transaxle and repair or replace parts as necessary
5	Are resistance and output duty of pressure control solenoid at powertrain control module OK? Term.: 2H — Unit: Ω — Spec.: 9—18 — Condition: Constant (Ign:OFF) — Page: — Term.: 2H — Unit: % — Spec.: Approx. 67 — Condition: Throttle valve closed throttle position — Page: section F2 Term.: 2H — Unit: % — Spec.: Approx. 23 — Condition: Throttle valve wide open throttle — Page: section F2 Unit: Ω → Resistance % → ON duty	Yes	Overhaul transaxle and repair or replace parts as necessary
		No	If resistance not OK, check pressure control solenoid and wiring ☞ **page K1–35** If resistance OK but duty is not, go to next step

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>6</td><td>Is input voltage of throttle position sensor at powertrain control module OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">3B</td><td rowspan="2">V</td><td>0.1—1.1</td><td>Throttle valve closed throttle position</td><td rowspan="2">section F2</td></tr><tr><td>3.1—4.4</td><td>Throttle valve wide open throttle</td></tr></table>Unit: V → Voltage</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check throttle position sensor and wiring
☞ section F2</td></tr>
<tr><td>7</td><td>Are measurements at powertrain control module terminals OK?
B+: Battery positive voltage
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="3">2A</td><td>Ω</td><td>11—27</td><td>Constant (Ign:OFF)</td><td>—</td></tr><tr><td rowspan="2">V</td><td>0</td><td>Solenoid OFF</td><td rowspan="2">section F2</td></tr><tr><td>B+</td><td>Solenoid ON</td></tr><tr><td rowspan="3">2B</td><td>Ω</td><td>11—27</td><td>Constant (Ign:OFF)</td><td>—</td></tr><tr><td rowspan="2">V</td><td>0</td><td>Solenoid OFF</td><td rowspan="2">section F2</td></tr><tr><td>V_B</td><td>Solenoid ON</td></tr><tr><td rowspan="3">2F</td><td>Ω</td><td>11—27</td><td>Constant (Ign:OFF)</td><td>—</td></tr><tr><td rowspan="2">V</td><td>0</td><td>Solenoid OFF</td><td rowspan="2">section F2</td></tr><tr><td>B+</td><td>Solenoid ON</td></tr></table>Unit: Ω → Resistance
V → Voltage
<table><tr><th>Terminal</th><th>Function</th></tr><tr><td>2A</td><td>Shift solenoid A</td></tr><tr><td>2B</td><td>Shift solenoid B</td></tr><tr><td>2F</td><td>Shift solenoid C</td></tr></table></td><td>Yes</td><td>Replace control valve body assembly
If problem remains, overhaul transaxle and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Shift solenoid A ☞ page K1–35
• Shift solenoid B ☞ page K1–35
• Shift soelnoid C ☞ page K1–35

If resistance OK but voltage is not, go to next step</td></tr>
</table>

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>8</td><td>Are measurements at powertrain control module terminals OK?
B+: Battery positive voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td>2P↔2T</td><td>Ω</td><td>253—604</td><td>Constant
(Ign: OFF)</td><td>—</td></tr>
<tr><td rowspan="2">2O↔4D</td><td rowspan="2">V</td><td>Approx. 3.5</td><td>ATF temp.
20°C {68°F}</td><td rowspan="11">section F2</td></tr>
<tr><td>Approx. 0.6</td><td>ATF temp.
130°C {266°F}</td></tr>
<tr><td rowspan="2">1F</td><td rowspan="2">V</td><td>0</td><td>P and N positions</td></tr>
<tr><td>B+</td><td>Other positions
all ranges</td></tr>
<tr><td rowspan="2">2K</td><td rowspan="2">V</td><td>B+</td><td>R position</td></tr>
<tr><td>0</td><td>Other positions
all ranges</td></tr>
<tr><td rowspan="2">2I</td><td rowspan="2">V</td><td>B+</td><td>D range</td></tr>
<tr><td>0</td><td>Other ranges
all positions</td></tr>
<tr><td rowspan="2">2M</td><td rowspan="2">V</td><td>B+</td><td>2 range</td></tr>
<tr><td>0</td><td>Other ranges
all positions</td></tr>
<tr><td rowspan="2">2R</td><td rowspan="2">V</td><td>B+</td><td>1 range</td></tr>
<tr><td>0</td><td>Other ranges
all positions</td></tr>
</table>
Unit: V → Voltage
Ω → Resistance
<table>
<tr><th>Terminal</th><th>Function</th></tr>
<tr><td>1F,2F,2I,2M,2R</td><td>Transaxle range switch</td></tr>
<tr><td>2O</td><td>Transaxle fluid temperature sensor</td></tr>
<tr><td>4D</td><td>Ground (input)</td></tr>
<tr><td>2P</td><td>Input/turbine speed sensor</td></tr>
<tr><td>2T</td><td>Ground (input)</td></tr>
</table></td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Transaxle fluid temperature sensor ☞ page K1–31
• Input/turbine speed sensor ☞ page K1–32
• Transaxle range switch ☞ page K1–29</td></tr>
<tr><td>9</td><td>Replace with known good powertrain control module; is problem corrected?
☞ section F2</td><td>Yes</td><td>Replace powertrain control module
☞ section F2</td></tr>
<tr><td></td><td></td><td>No</td><td>Overhaul transaxle and repair or replace parts as necessary</td></tr>
</table>

53	EXCESSIVE SHIFT SHOCK	• WHEN UPSHIFTING AND/OR DOWNSHIFTING
DESCRIPTION	• Excessive shift shock felt when accelerating at upshifting • During cruising, excessive shift shock felt when accelerator pedal depressed at downshifting	

[TROUBLESHOOTING HINTS]

① ATF level low
② Throttle position sensor malfunction or misadjusted
③ Line pressure high
④ Powertrain slippage
⑤ Control valve stuck (pressure regulator valve, solenoid reducing valve, pressure modifier valve)
⑥ Shift solenoid A, B, C, 3–2 timing, and/or pressure control solenoid worn
⑦ Input/turbine speed sensor malfunction
⑧ Transaxle fluid temperature sensor malfunction
⑨ Barometric pressure sensor malfunction

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞ page K1–18	Yes	Go to next step
		No	Problem within transaxle Go to next step, and check for main cause. When problem is found and corrected, overhaul transaxle and repair or replace parts as necessary
2	Does NGS display "SYSTEM PASSED (NO DTCS AVAILABLE)" with ignition switch ON? ☞ page K1–177	Yes	Go to next step
		No	Diagnostic trouble code(s) displayed Check for cause of code(s) ☞ page K1–177
3	Is line pressure OK? ☞ page K1–11 **Specified line pressure** **kPa {kgf/cm², psi}** Position/Range: D, 2, 1 — Idle: 420—530 {4.2—5.5, 60—78} — Stall: 1,100—1,170 {11.2—12.0, 160—170} Position/Range: R — Idle: 730—1,010 {7.4—10.3, 110—146} — Stall: 1,910—2,020 {19.4—20.7, 276—294}	Yes	Go to next step
		No	Go to step 5
4	Is engine stall speed OK? ☞ page K1–12 **rpm** Engine: KL — Engine stall speed: 2,270—2,500	Yes	Go to step 7
		No	Overhaul transaxle and repair or replace part as necessary

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>5</td><td>Are resistance and output duty of pressure control solenoid valve at powertrain control module OK?

<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="3">2H</td><td>Ω</td><td>9—18</td><td>Constant (Ign:OFF)</td><td>—</td></tr>
<tr><td rowspan="2">%</td><td>Approx. 67</td><td>Throttle valve closed throttle position</td><td rowspan="2">section F2</td></tr>
<tr><td>Approx. 23</td><td>Throttle valve wide open throttle</td></tr>
</table>
Unit: Ω → Resistance
% → ON duty</td><td>Yes</td><td>Overhaul transaxle and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check pressure control solenoid valve and wiring ☞ page K1–35

If resistance OK but duty is not, go to next step</td></tr>
<tr><td>6</td><td>Is input voltage of throttle position sensor at powertrain control module OK?

<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">3B</td><td rowspan="2">V</td><td>0.1—1.1</td><td>Throttle valve closed throttle position</td><td rowspan="2">section F2</td></tr>
<tr><td>3.1—4.4</td><td>Throttle valve wide open throttle</td></tr>
</table>
Unit: V → Voltage</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check throttle position sensor and wiring ☞ section F2</td></tr>
<tr><td>7</td><td>Are measurements at powertrain control module terminals OK?

B+: Battery positive voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="3">2A</td><td>Ω</td><td>11—27</td><td>Constant (Ign: OFF)</td><td>—</td></tr>
<tr><td rowspan="2">V</td><td>0</td><td>Solenoid OFF</td><td rowspan="2">section F2</td></tr>
<tr><td>B+</td><td>Solenoid ON</td></tr>
<tr><td rowspan="3">2B</td><td>Ω</td><td>11—27</td><td>Constant (Ign: OFF)</td><td>—</td></tr>
<tr><td rowspan="2">V</td><td>0</td><td>Solenoid OFF</td><td rowspan="2">section F2</td></tr>
<tr><td>B+</td><td>Solenoid ON</td></tr>
<tr><td rowspan="3">2F</td><td>Ω</td><td>11—27</td><td>Constant (Ign: OFF)</td><td>—</td></tr>
<tr><td rowspan="2">V</td><td>0</td><td>Solenoid OFF</td><td rowspan="2">section F2</td></tr>
<tr><td>B+</td><td>Solenoid ON</td></tr>
<tr><td rowspan="3">2G</td><td>Ω</td><td>11—27</td><td>Constant (Ign: OFF)</td><td>—</td></tr>
<tr><td rowspan="2">V</td><td>B+</td><td>1→2, 2→3, 3→4, 3→2, 2→1 shift</td><td rowspan="2">section F2</td></tr>
<tr><td>0</td><td>Other than above</td></tr>
</table>
Unit: Ω → Resistance
V → Voltage

<table>
<tr><th>Terminal</th><th>Function</th></tr>
<tr><td>2A</td><td>Shift solenoid A</td></tr>
<tr><td>2B</td><td>Shift solenoid B</td></tr>
<tr><td>2F</td><td>Shift solenoid C</td></tr>
<tr><td>2G</td><td>3–2 timing solenoid valve</td></tr>
</table></td><td>Yes</td><td>Replace control valve body assembly
If problem remains, overhaul transaxle and repair or replace parts necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Shift solenoid A ☞ page K1–35
• Shift solenoid B ☞ page K1–35
• Shift solenoid C ☞ page K1–35
• 3–2 timing solenoid valve ☞ page K1–35

If resistance OK but voltage not, replace powertain control module</td></tr>
</table>

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>8</td><td>Are measurements at powertrain control module terminlas OK?
B+: Battery positive voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td>2P↔2T</td><td>Ω</td><td>253—604</td><td>Constant (Ign: OFF)</td><td>—</td></tr>
<tr><td rowspan="2">2O↔4D</td><td rowspan="2">V</td><td>Approx.3.5</td><td>ATF temp. 20°C {68°F}</td><td rowspan="3">section F2</td></tr>
<tr><td>Approx. 0.6</td><td>ATF temp. 130°C {266°F}</td></tr>
<tr><td rowspan="2">3F</td><td rowspan="2">V</td><td>Below approx. 3.5</td><td>Atmospheric pressure more than 89.6 kPa {672 mmHg, 26.5 inHg} (below approx. 1,500 m {4,921 ft})</td></tr>
<tr><td>Above approx. 3.5</td><td>Atmospheric pressure less than 89.6 kPa {672 mmHg, 26.5 inHg} (above approx. 1,500 m {4,921 ft})</td><td></td></tr>
</table>
Unit: Ω → Resistance
V → Voltage
<table>
<tr><th>Terminal</th><th>Function</th></tr>
<tr><td>3F</td><td>Barometric pressure sensor</td></tr>
<tr><td>2P</td><td>Input/turbine speed sensor</td></tr>
<tr><td>2T</td><td>Ground (input)</td></tr>
<tr><td>2O</td><td>Transaxle fluid temperature sensor</td></tr>
<tr><td>4D</td><td>Ground (input)</td></tr>
</table></td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Input/turbine speed sensor ☞ page K1–32
• Transaxle fluid temperature sensor ☞ page K1–31
• Barometric pressure sensor ☞ section F2</td></tr>
<tr><td>9</td><td>Replace with known good powertrain control module; is problem corrected? ☞ section F2</td><td>Yes</td><td>Replace powertrain control module ☞ section F2</td></tr>
<tr><td></td><td></td><td>No</td><td>Overhaul transaxle and repair or replace parts as necessary</td></tr>
</table>

54	NO ENGINE BRAKING
DESCRIPTION	• Engine speed drops to idle but vehicle does not slow when accelerator pedal released during cruising at medium to high speed • Engine speed drops to idle but vehicle does not slow when accelerator pedal released when in 1 range at low vehicle speed

[TROUBLESHOOTING HINTS]

① ATF level low
② Powertrain slippage
③ Control valve stuck (pressure regulator valve, solenoid reducing valve, pressure modifier valve)
④ IAC valve worn
⑤ Shift solenoid B and/or C worn
⑥ Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞ **page K1–18**	Yes	Go to next step
		No	Problem within transaxle Go to next step, and check for main cause. When problem is found and corrected, overhaul transaxle and repair or replace parts as necessry
2	Does NGS display "SYSTEM PASSED (NO DTCS AVAILABLE)" with ignition switch ON? ☞ **page K1–177**	Yes	Go to next step
		No	Diagnostic trouble code(s) displayed • Check for cause of code(s) ☞ **page K1–177**
3	Is there slippage when accelerating or shifting?	Yes	Go to No.50 "ENGINE SPEED FLARES UP—WHEN ACCELERATING" or No.51 "ENGINE SPEED FLARES UP—WHEN UPSHIFTING AND/OR DOWNSHIFTING" ☞ **page K1–220**
		No	Go to next step
4	Is engine braking felt in 1 range? ☞ **page K1–15**	Yes	Go to next step
		No	Replace control valve body assembly If problem remains, overhaul transaxle and repair or replace parts as necessary
5	Is engine stall speed OK? ☞ **page K1–12** **rpm** **Engine** / **Engine stall speed**: KL / 2,270—2,500	Yes	Go to next step
		No	Overhaul transaxle and repair or replace part as necessary
6	Does IAC valve operate correctly? ☞ **section F2**	Yes	Go to next step
		No	Replace IAC valve ☞ **section F2**

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>7</td><td>Are measurements at powertrain control module terminals OK?
B+: Battery positive voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="3">2B</td><td>Ω</td><td>11—27</td><td>Constant (Ign: OFF)</td><td>—</td></tr>
<tr><td rowspan="2">V</td><td>0</td><td>Solenoid OFF</td><td rowspan="2">section F2</td></tr>
<tr><td>B+</td><td>Solenoid ON</td></tr>
<tr><td rowspan="3">2F</td><td>Ω</td><td>11—27</td><td>Constant (Ign: OFF)</td><td>—</td></tr>
<tr><td rowspan="2">V</td><td>0</td><td>Solenoid OFF</td><td rowspan="2">section F2</td></tr>
<tr><td>B+</td><td>Solenoid ON</td></tr>
</table>
Unit: Ω → Resistance
V → Voltage
<table>
<tr><th>Terminal</th><th>Function</th></tr>
<tr><td>2B</td><td>Shift solenoid B</td></tr>
<tr><td>2F</td><td>Shift solenoid C</td></tr>
</table></td><td>Yes</td><td>Replace control valve body assembly
If problem remains, overhaul transaxle and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Shift solenoid B ☞ page K1–35
• Shift solenoid C ☞ page K1–35

If resistance OK but voltage is not, replace powertrain control module</td></tr>
</table>

55	NO MODE CHANGE
DESCRIPTION	• Mode does not change to/from normal mode in D range • O/D OFF mode not selected or not cancelled

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Throttle position sensor malfunction or misadjusted	☞ section F2
② Powertrain control module malfunction	☞ section F2

56	TRANSAXLE NOISE	• ALL RANGES
DESCRIPTION	• Transaxle noisy in all ranges when vehicle is idling	

[TROUBLESHOOTING HINTS]
Inspect parts; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low	☞ page K1–18
② Powertrain burnt	☞ page K1–45

57	TRANSAXLE NOISE	• D, 2, 1 RANGES, R POSITION
DESCRIPTION	• Abnormal noise from transaxle in D, 2, 1, R	

[TROUBLESHOOTING HINTS]
Inspect parts; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low	☞ page K1–18
② Torque converter worn	☞ page K1–58

58	TRANSAXLE OVERHEATS
DESCRIPTION	• ATF smells burnt and/or is discolored

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low	☞ page K1–18
② Powertrain burnt (forward clutch, reverse clutch, low and reverse brake, one-way clutch 1, 2)	☞ page K1–48
③ Torque converter clutch piston burnt	☞ page K1–58
④ Shift solenoid A, B, C, torque converter clutch control, 3–2 timing, torque converter clutch, and/or pressure control solenoid worn	☞ page K1–35
⑤ Throttle position sensor malfunction or misadjusted	☞ section F2
⑥ Input/turbine speed sensor malfunction	☞ page K1–32
⑦ Vehicle speedometer sensor malfunction	☞ page K1–33
⑧ Transaxle fluid temperature sensor malfunction	☞ page K1–31
⑨ Powertrain control module	☞ section F2
⑩ Oil cooler circuit malfunction	☞ page K1–18

SERVICE POINTS

OUTLINE

O/D OFF Switch

- If there is an open or short circuit in the O/D OFF switch or harness, selection to/from O/D OFF mode is not possible.

Transaxle Range Switch

- If there is an open or short circuit in the transaxle range switch or harness, diagnostic trouble code P0705 is displayed by the on-board diagnostic system, and O/D OFF mode is canceled.
- If a malfunciton occurs in the wiring of the transaxle range switch, the powertrain control module cannot determine the range position, and shifting may be abnormal in D, 2, and 1 ranges. There may not be a shift to fourth gear.

Throttle Position Sensor

- If there is an open or short circuit in the throttle position sensor or harness, diagnostic trouble code P0120 is displayed by the on-board diagnostic system, and O/D OFF mode is canceled.
- If a malfunction occurs in the throttle position sensor, the powertrain control module judges the throttle opening to be at a constant 4/8 stroke.

Closed Throttle Position Switch

- If there is an open circuit in the closed throttle position switch or harness, the powertrain control module does not correct throttle characteristics. In case of misadjustment of throttle position sensor, torque converter clutch operation is not canceled when cruising (closed throttle position) and vehicle jolts when accelerator pedal is depressed or released.
- If there is a short circuit in the closed throttle position switch or harness, the line pressure will be low (does not match throttle characteristics) and the transaxle may slip when shifting.

Input/Turbine Speed Sensor

- If there is no input signal from the input/turbine speed sensor, diagnostic trouble code P0715 is displayed by the on-board diagnostic system and O/D OFF mode is canceled.
- If a malfunction occurs in the input/turbine speed sensor, shifting is made based on signals from speedometer.
- If a malfunction occurs in the input/turbine speed sensor and vehicle speedometer sensor at the same time, shift solenoid A, B and C go to OFF, and D and 2 ranges go to third gear position. 1 range goes to first gear position, and torque converter clutch operation is inhibited.

Vehicle Speedometer Sensor

- If there is no input signal from the vehicle speedometer sensor, diagnostic trouble code P0500 is displayed by the on-board diagnostic system and O/D OFF mode is canceled.
- If a malfunction occurs in the vehicle speedometer sensor, shifting is made normal based on signals from input/turbine speed sensor.

Brake Switch

- If there is an open circuit in the brake switch or harness, torque converter clutch operation is not canceled when brake pedal is pressed.
- If there is a short circuit in the brake switch or harness, torque converter clutch operation and slip torque converter clutch operation is inhibited, but slip torque converter clutch functions when coasting.

Transaxle Fluid Temperature Sensor

- If there is an open or short circuit in the transaxle fluid temperature sensor or harness, diagnostic trouble code P0710 is displayed by the on-board diagnostic system but O/D OFF mode operates normally.
- If a malfunction occurs in the transaxle fluid temperature sensor, shift shock will be strong.
- The O/D OFF indicator light does not flash if there is an open and short circuit in the transaxle fluid temperature sensor or harness; however the diagnostic trouble code No. is memorized in the powertrain control module.

Fourth Gear Inhibit Signal (ASC Signal)
- If there is an open circuit in the fourth gear inhibit circuit, there is no input signal from the cruise control unit and acceleration feeling (driving performance) will deteriorate when the vehicle speed drops 8 km/h {5 mph} below the set speed or RESUME/ACCEL switch is operated during cruise control operation.
- If there is a short in the fourth gear inhibit signal circuit, there is no shift to fourth gear.

Engine Speed Input Signal
- If there is no input signal from the engine speed input signal, diagnostic trouble code P0335 is displayed by the on-board diagnosis function, and O/D OFF mode is canceled.

Barometric Pressure Sensor
- If there is an open or short circuit in the barometric pressure sensor circuit, the line pressure is not controlled correctly at high altitude and shift shock will be strong.

Shift Solenoid A
- If there is an open or short circuit in the shift solenoid A or harness, diagnostic trouble code P0750 is displayed by the on-board diagnostic system and O/D OFF mode is canceled.
- If a malfunction occurs in the shift solenoid A, the solenoid valve turns OFF and torque converter clutch operation is canceled.

Shift Solenoid B
- If there is an open or short circuit in the shift solenoid B or harness, diagnostic trouble code P0755 is displayed by the on-board diagnostic system and O/D OFF mode is canceled.
- If a malfunction occurs in the shift solenoid B, the solenoid valve turns OFF and torque converter clutch operation is canceled.

Shift Solenoid C
- If there is an open or short circuit in the shift solenoid C or harness, diagnostic trouble code P0760 is displayed by the on-board diagnostic system and O/D OFF mode is canceled.
- If a malfunction occurs in the shift solenoid C, the solenoid valve turns OFF and torque converter clutch operation is canceled.

Torque Converter Clutch Control Solenoid Valve
- If there is an open or short circuit in the torque converter clutch control solenoid valve or harness, diagnostic trouble code P1743 is displayed by the on-board diagnostic system and O/D OFF mode is canceled.
- If a malfunction occurs in the torque converter clutch control solenoid valve, the solenoid valve turns OFF and torque converter clutch operation is canceled.

3–2 Timing Solenoid Valve
- If there is an open or short circuit in the 3–2 timing solenoid valve or harness, diagnostic trouble code P1765 is displayed by the on-board diagnostic system and O/D OFF mode is canceled.
- If a malfunction occurs in the 3–2 timing solenoid valve, the solenoid valve turns OFF and torque converter clutch operation is canceled.

Torque Converter Clutch Solenoid Valve
- If there is an open or short circuit in the torque converter clutch solenoid valve or harness, diagnostic trouble code P1744 is displayed by the on-board diagnostic system and O/D OFF mode is canceled.
- If a malfunction occurs in the torque converter clutch solenoid valve, the solenoid valve turns OFF and torque converter clutch operation is canceled.

Pressure Control Solenoid
- If there is an open or short circuit in the pressure control solenoid or harness, diagnostic trouble code P0745 is displayed by the on-board diagnostic system and O/D OFF mode is canceled.
- If a malfunction occurs in the pressure control solenoid, line pressure is set at maximum to make driving possible.
- If a malfunction occurs in pressure control solenoid, torque converter clutch operation is conceled.

O/D OFF Indicator Light

- If there is an open circuit in the O/D OFF indicator light harness or the bulb is burnt out, the light will not illuminate.
- If there is a short circuit in the O/D OFF indicator light harness, the light will remain illuminated.

ELECTRICAL DIAGNOSIS SUPPORT

O/D OFF Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2L terminal — O/D OFF switch	Mode does not change when O/D OFF switch is operated	Mode does not change when O/D OFF switch is operated	Mode may not change when O/D OFF switch is operated
O/D OFF switch — ground		No symptom	

Transaxle Range Switch

Note

- If fuse burnt out while driving, powertrain control module judges condition as the R position.
- When ignition switch is turned from OFF to ON after fuse burnt out, powertrain control module judges condition as the R position.

R Position Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2K terminal — R position switch	No symptom	Meter 15 A fuse burns out when R position is selected	No symptom
R position switch — battery		Fuse burns out	

1 Range Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2R terminal — 1 range switch	First gear is fixed in 1 range (solenoid pattern same as R position)	Meter 15 A fuse burns out when 1 range is selected	No symptom
1 range switch — battery		Fuse burns out	

2 Range Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2M terminal — 2 range switch	Third gear is fixed in 2 range (solenoid pattern same as R position)	Meter 15 A fuse burns out when 2 range is selected	No symptom
2 range switch — battery		Fuse burns out	

D Range Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2I terminal — D range switch	Third gear is fixed in D range (solenoid pattern same as R position)	Meter 15 A fuse burns out when D range is selected	No symptom
D range switch — battery		Fuse burns out	

P, N Position Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 1F terminal — P, N position switch	No symptom	Meter 15 A fuse burns out when ignition switch turned to START	No symptom
P, N position switch — starter	Starter does not operate		

Throttle Position Sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 3A terminal — throttle position sensor	Code P0120 output Shift point incorrect and shift shock strong Torque converter clutch operation will be inhibited	Code P0120 output Shift point incorrect and shift shock strong Torque converter clutch operation will be inhibited	Line pressure will be abnormal and clutches may slip if powertrain control module does not judge malfunction Vehicle may jolt
Powertrain control module 3B terminal — throttle position sensor			

Closed Throttle Position Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 3X terminal — closed throttle position switch	Vehicle jolts when accelerator pedal depressed or released	Clutches may slip when shifting	Vehicle may jolt

Input/Turbine Speed Sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2P terminal — input/turbine speed sensor	Code P0715 output Shifting does not match shift diagram and fourth gear is cancelled	Code P0715 output Shifting does not match shift diagram and fourth gear is cancelled	NA
Input/turbine speed sensor — ground		NA	

Vehicle Speedometer Sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 1C terminal — vehicle speedometer sensor	Code P0500 output	Code P0500 output	NA
		NA	

Brake Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 1O terminal — brake switch	Torque converter clutch operation will not be inhibited	Torque converter clutch operation will be inhibited	NA

Transaxle Fluid Temperature Sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2O terminal — transaxle fluid temperature sensor	Code P0710 output Shift shock will be strong	No Code P0710 output Shift shock will be strong	NA
Transaxle fluid temperature sensor — ground		NA	

Fourth Gear Inhibit Signal (ASC Signal)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 4V terminal — cruise control unit	Fourth gear not inhibited when fourth gear inhibitor signal ON	Does not shift to fourth gear	NA

NA: Not applicable

Barometric Pressure Sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 3F terminal — barometric pressure sensor	Shift shock will be strong at high altitude	Shift shock will be strong at high altitude	NA

Shift Solenoid A

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2A terminal — shift solenoid A	Code P0750 output Shifting will be performed by remaining normal solenoid valve(s), but does not match shift diagram and torque converter clutch operation is canceled	Code P0750 output Shifting will be performed by remaining normal solenoid valve(s), but does not match shift diagram and torque converter clutch operation is canceled	Shifting may be abnormal if powertrain control module does not judge malfunction
Shift solenoid A — ground		No symptom	

Shift Solenoid B

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2B terminal — shift solenoid B	Code P0755 output Shifting will be performed by remaining normal solenoid valve(s), but does not match shift diagram and torque converter clutch operation is canceled	Code P0755 output Shifting will be performed by remaining normal solenoid valve(s), but does not match shift diagram and torque converter clutch operation is canceled	Shifting may be abnormal if powertrain control module does not judge malfunction
Shift solenoid B — ground		No symptom	

Shift Solenoid C

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2F terminal — shift solenoid C	Code P0760 output Shifting will be performed by remaining normal solenoid valve(s), but does not match shift diagram and torque converter clutch operation is canceled	Code P0760 output Shifting will be performed by remaining normal solenoid valve(s), but does not match shift diagram and torque converter clutch operation is canceled	Shifting may be abnormal if powertrain control module does not judge malfunction
Shift solenoid C — ground		No symptom	

Torque Converter Clutch Control Solenoid Valve

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2C terminal — torque converter clutch control solenoid valve	Code P1743 output Torque converter clutch will not operate	Code P1743 output Torque converter clutch will not operate	Torque converter clutch may not be operated in torque converter clutch operation zone
Torque converter clutch control solenoid valve — ground		No symptom	

3–2 Timing Solenoid Valve

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2G terminal — 3–2 timing solenoid valve	Code P1765 output Shift shock may be strong Torque converter clutch operation is canceled	Code P1765 output Shift shock may be strong Torque converter clutch operation is canceled	Shifting may be abnormal
3–2 timing solenoid valve — ground		No symptom	

NA: Not applicable

Torque Converter Clutch Solenoid Valve

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2D terminal — torque converter clutch solenoid valve	Code P1744 output Torque converter clutch will not operate	Code P1744 output Torque converter clutch will not operate	Torque converter clutch may not operate in torque converter clutch operation zone
Torque converter clutch solenoid valve — ground		No symptom	

Pressure Control Solenoid

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2H terminal — Pressure control solenoid	Code P0745 output Shift shock and select shock will be strong	Code P0745 output Shift shock and select shock will be strong	Shifting may be abnormal if transaxle control module does not judge malfunction
Pressure control solenoid — ground		No symptom	

O/D OFF Indicator Light

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2E terminal — O/D OFF indicator light	O/D OFF indicator light will not illuminate	O/D OFF indicator light will be illuminated	NA

Battery Power (Backup)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 4B terminal — battery	Memory functions that rely on self-diagnosis, such as diagnostic trouble code memory, do not operate	ROOM 15A fuse burns out	NA

Battery Power

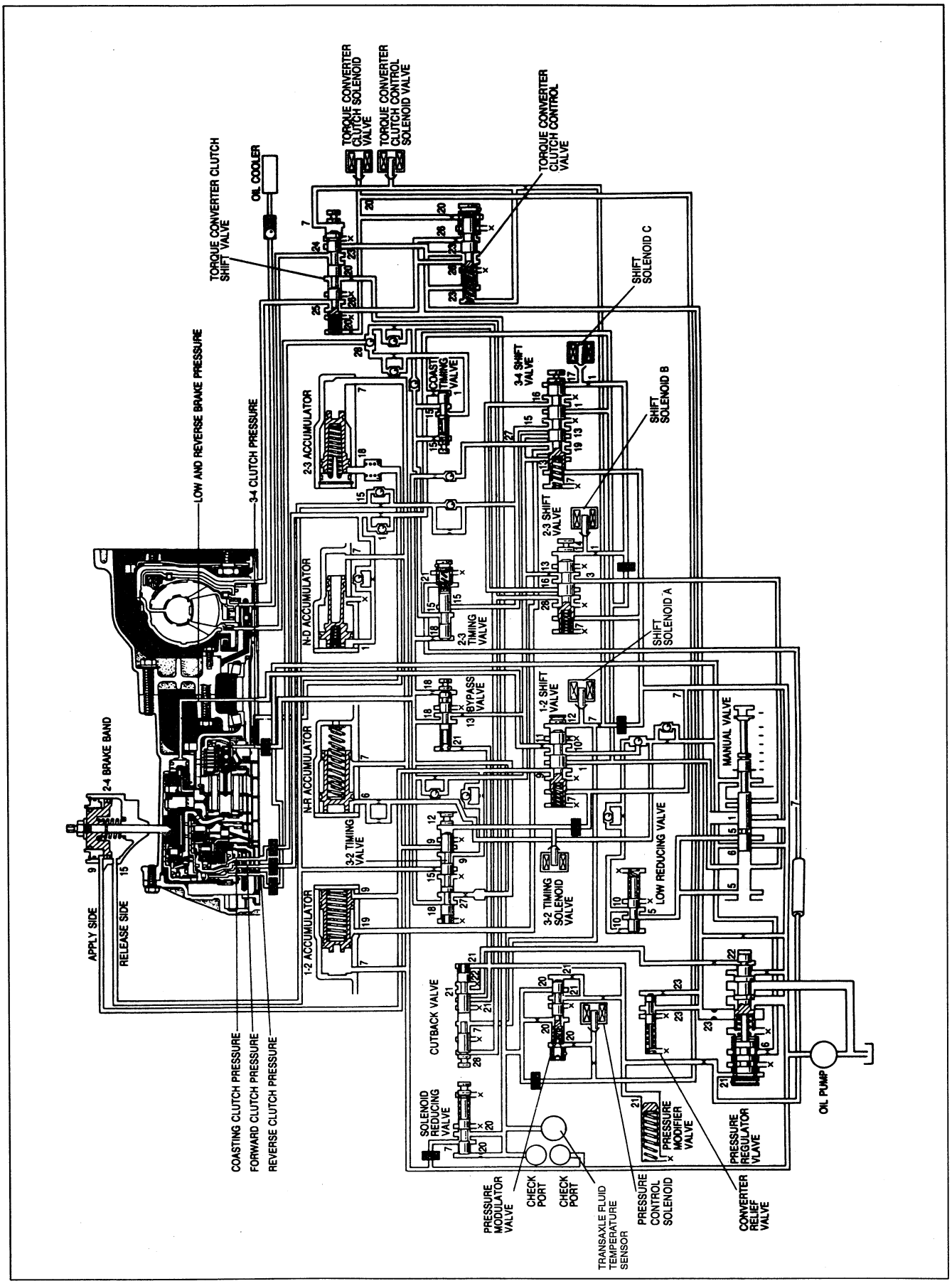
Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 4A terminal — battery	No symptom	Meter 15A fuse burns out when ignition switch is ON	NA
Powertrain control module 4C terminal — battery	No symptom Powertrain control module D, 2 range: Third gear fixed 1 range: First gear fixed	Meter 15A fuse burns out when ignition switch is ON	NA

Ground

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module 2P terminal — ground	Powertrain control module does not function D, 2 range: Third gear fixed 1 range: First gear fixed	No symptom	Shifting may be abnormal

NA: Not applicable

HYDRAULIC CIRCUIT



Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

AUTOMATIC TRANSAXLE (LA4A–EL)

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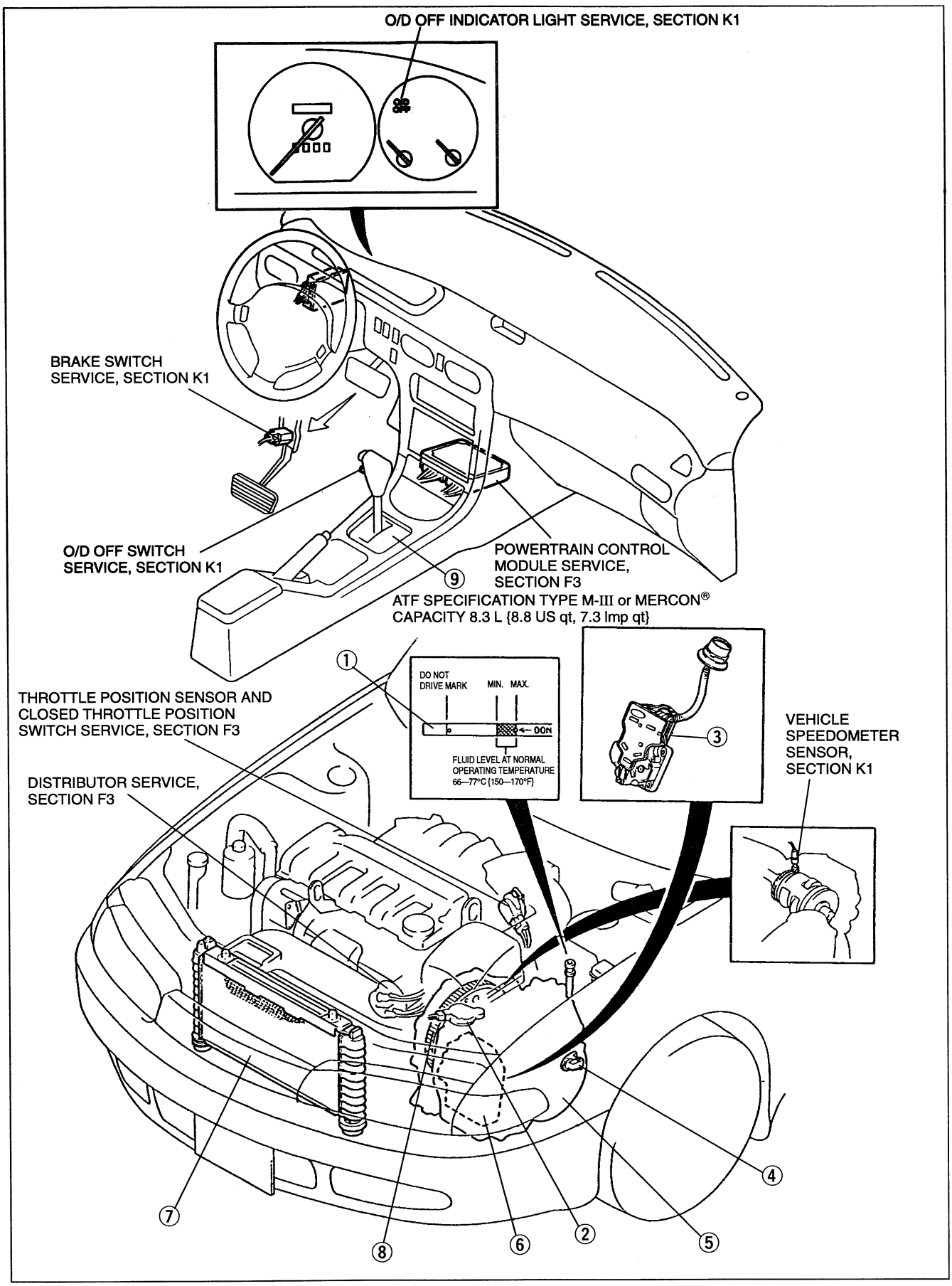
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BRAKE SWITCH SERVICE, SECTION K1
O/D OFF SWITCH SERVICE, SECTION K1
POWERTRAIN CONTROL MODULE SERVICE, SECTION F3
9
ATF SPECIFICATION TYPE M-III or MERCON®
CAPACITY 8.3 L {8.8 US qt, 7.3 Imp qt}
1
DO NOT DRIVE MARK
MIN.
MAX.
OON
FLUID LEVEL AT NORMAL OPERATING TEMPERATURE 66—77°C {150—170°F}
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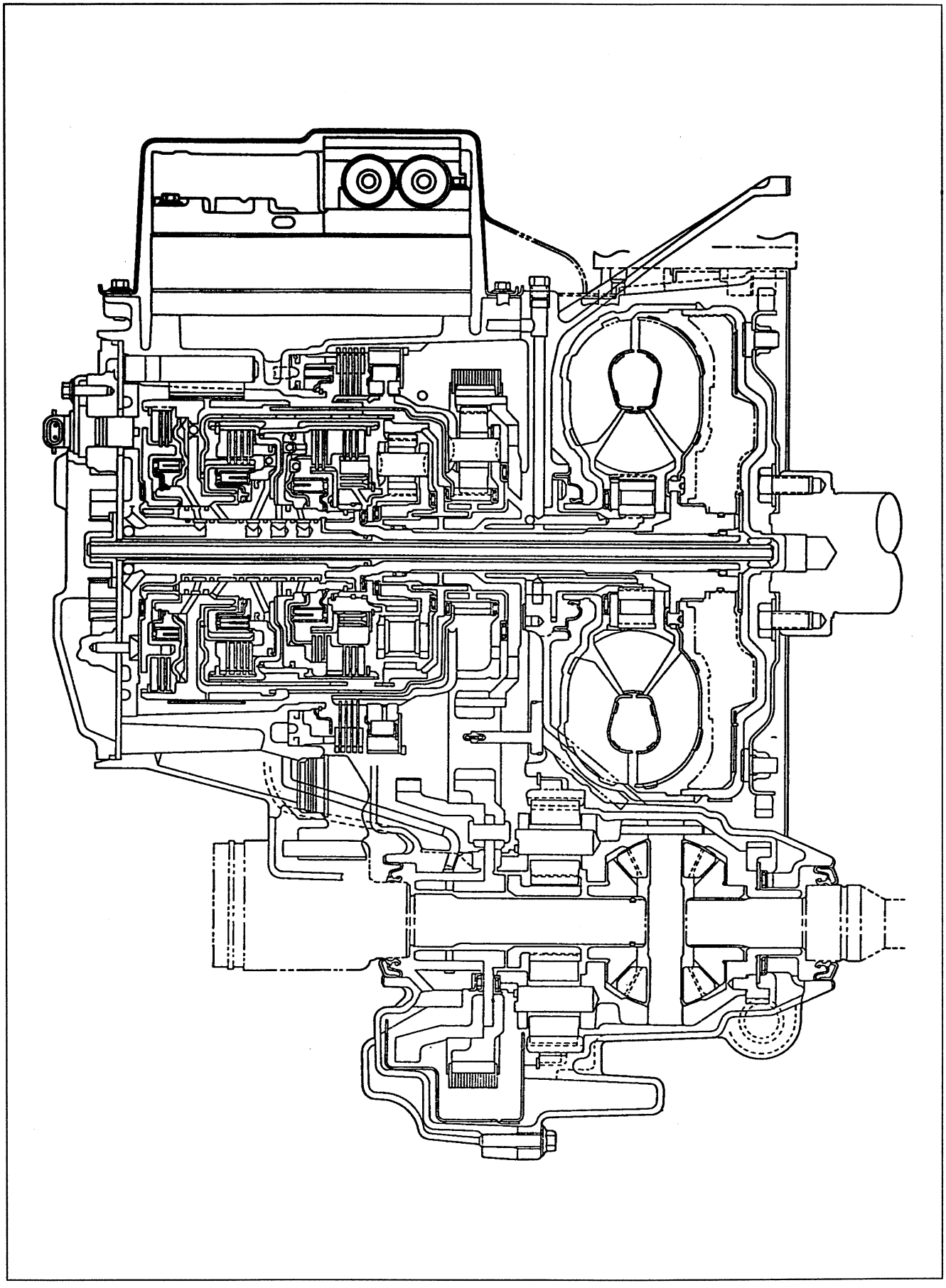
OUTLINE

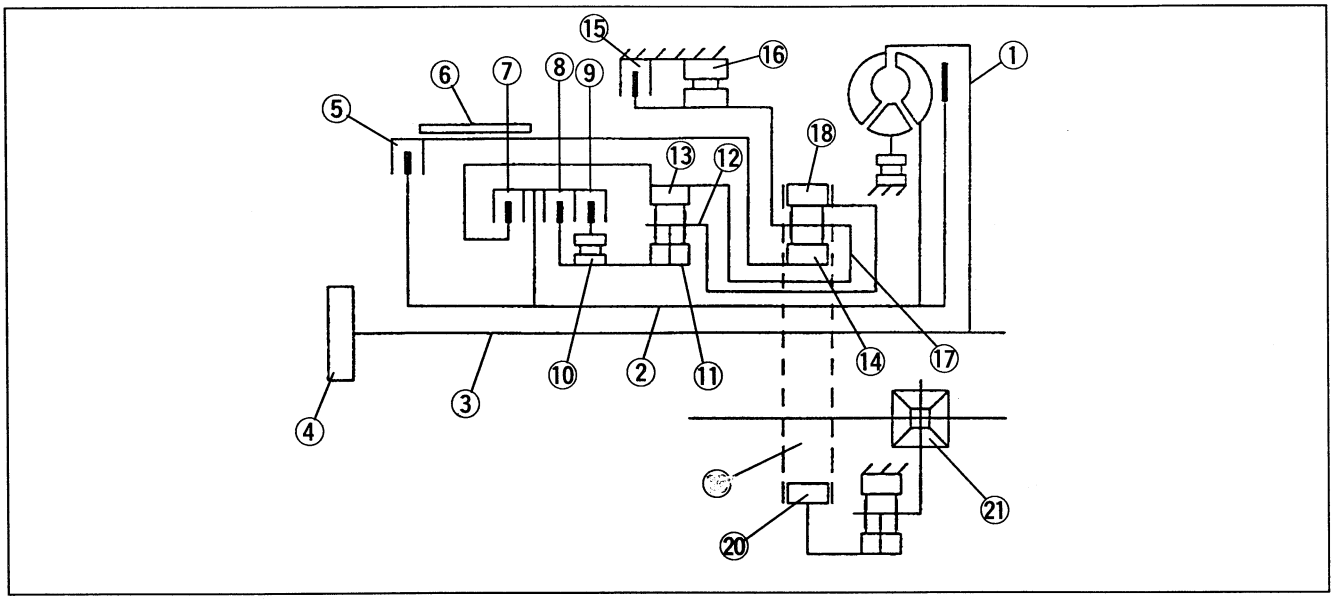
SPECIFICATIONS

Item \ Transaxle/Engine		LA4A–EL
		FS
Transaxle control		Floor shift
Torque converter clutch mechanism		Equipped
Gear ratio	First gear	2.889
	Second gear	1.571
	Third gear	1.000
	Fourth gear	0.698
	Reverse	2.310
Final gear ratio		3.770
ATF	Type	M–III or MERCON®
	Capacity L {US qt, Imp qt}	8.3 {8.8, 7.3}
Number of drive/driven plates	Forward clutch	2/3
	Coasting clutch	2/2
	Direct clutch	3/3
	Reverse clutch	2/2
	Low/rev clutch	3/3

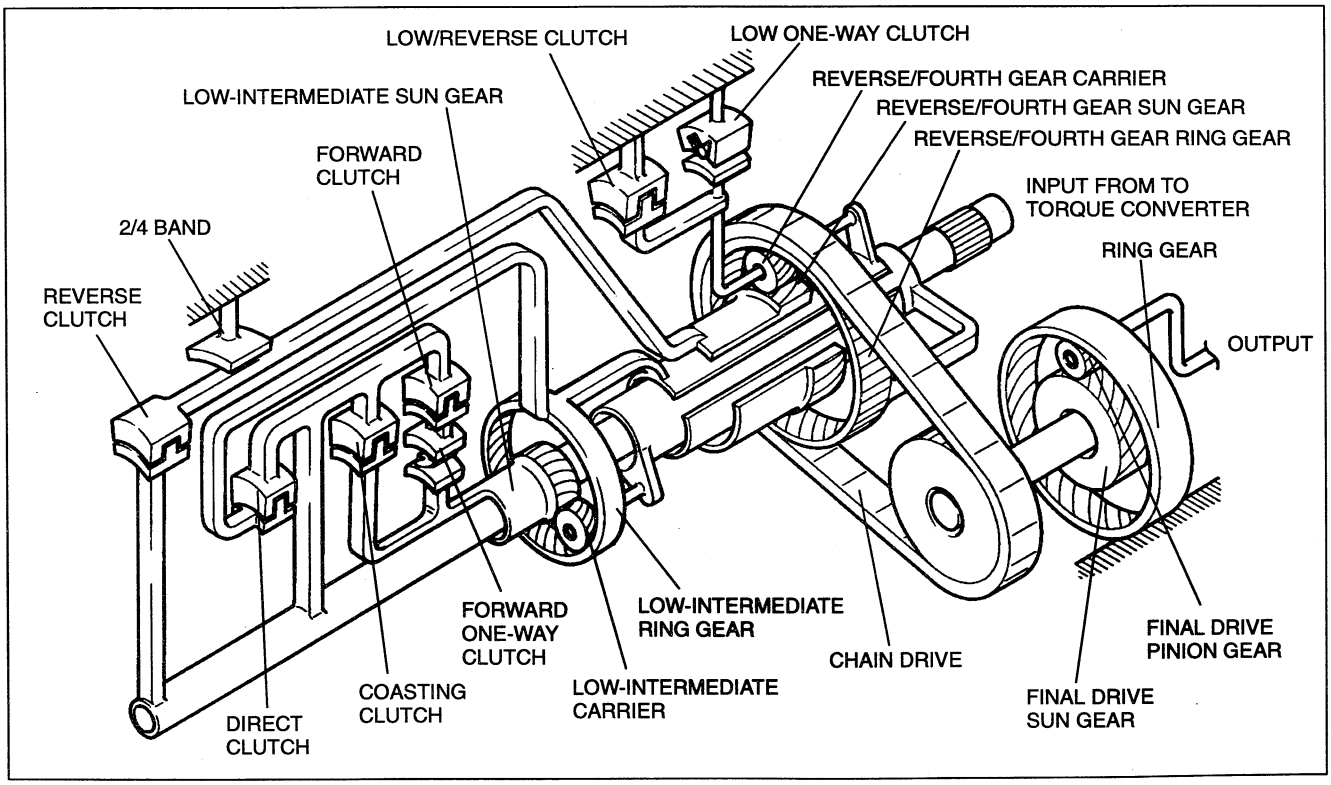
CROSS-SECTIONAL VIEW



POWER FLOW DIAGRAM



1. Torque converter
2. Turbine shaft
3. Oil pump drive shaft
4. Oil pump
5. Reverse clutch
6. 2/4 band
7. Direct clutch
8. Coasting clutch
9. Forward clutch
10. Forward one-way clutch
11. Low/intermediate sun gear
12. Low/intermediate planetary carrier
13. Low/intermediate ring gear
14. Reverse/fourth gear sun gear
15. Low/reverse clutch
16. Low one-way clutch
17. Reverse/fourth gear carrier
18. Reverse/fourth gear ring gear (Drive sprocket)
19. Chain
20. Driven sprocket
21. Differential

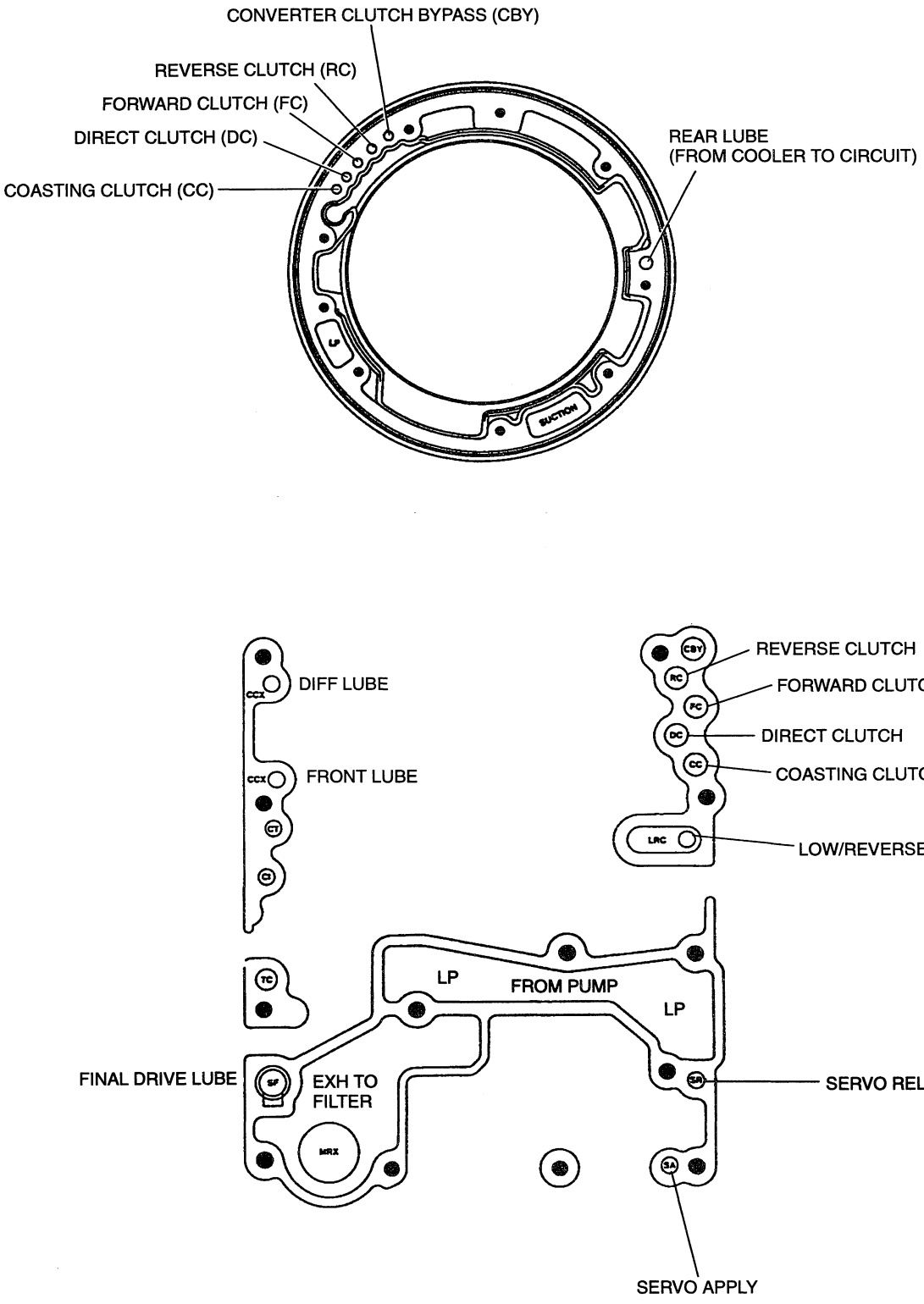


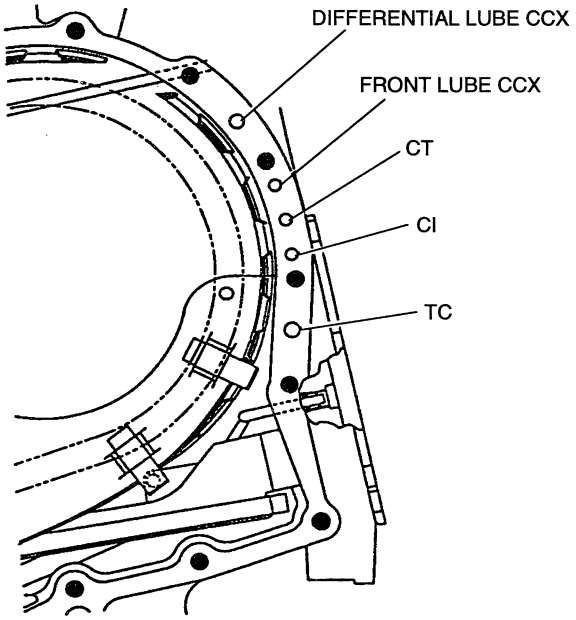
OPERATION OF COMPONENTS

Position/ Range	Mode	Gear	Engine braking effect	2/4 band	Reverse clutch	Direct clutch	Foward clutch	Forward one-way clutch		Coasting clutch	Low/reverse clutch	Low one-way clutch	
								Drive	Coast			Drive	Coasting
P	—	—	—										
R	—	Reverse gear	Yes		○						○		
N	—	—	—										
D	☆ O/D OFF SW OFF	First gear	No				○	○	⊗			○	⊗
		Second gear	No	○			○	○	⊗				
		Third gear	No			○	○	○	⊗				
		Fourth gear	Yes	○		○	◎	⊗					
	☆ O/D OFF SW ON	First gear	No				○	○	—	○		○	⊗
		Second gear	Yes	○			○	○	—	○		⊗	⊗
		Third gear	Yes			○	○	○	—	○		⊗	⊗
		*Fourth gear	Yes	○		○	◎	⊗	⊗			⊗	⊗
2	—	Second gear	Yes	○			○	○	—	○		⊗	⊗
		*Third gear	Yes			○	○	○	—	—		⊗	⊗
		*Fourth gear	Yes	○		○	◎	⊗	⊗			⊗	⊗
1	—	First gear	Yes				○	○	—	○	○	○	—
		*Second gear	Yes	○			○	○	—	○		⊗	⊗

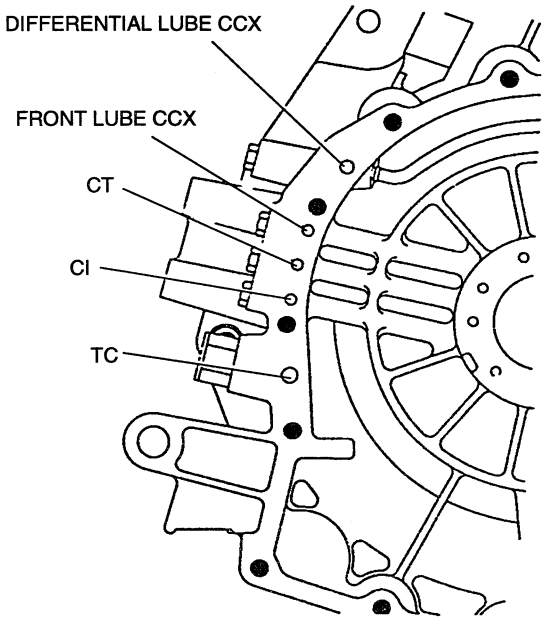
○ Operating.
⊗ Operating but not contributing to transaxle output. (OVER RUNNING)
◎ Power is not transmitted.
* Engine overspeed protection.
☆ The powertrain control module switches automatically between power and normal modes corresponding to how rapidly the accelerator pedal is depressed.

FLUID PASSAGE LOCATIONS
Transaxle Case



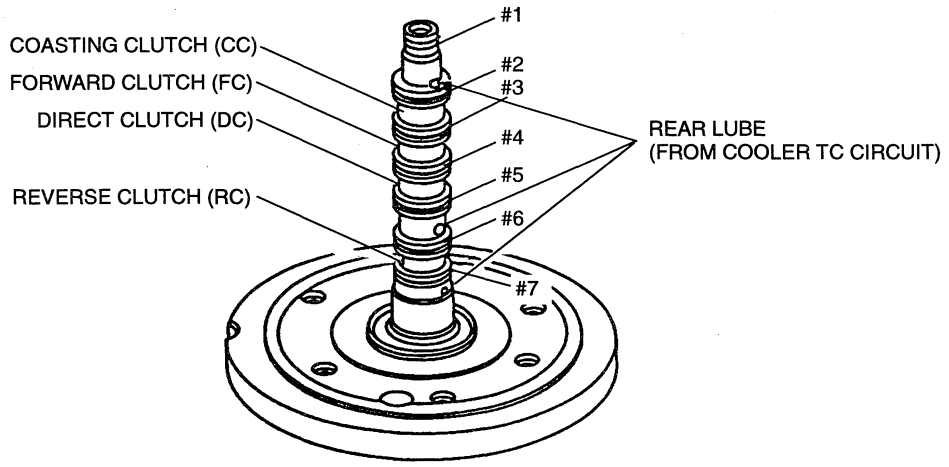


Converter Housing

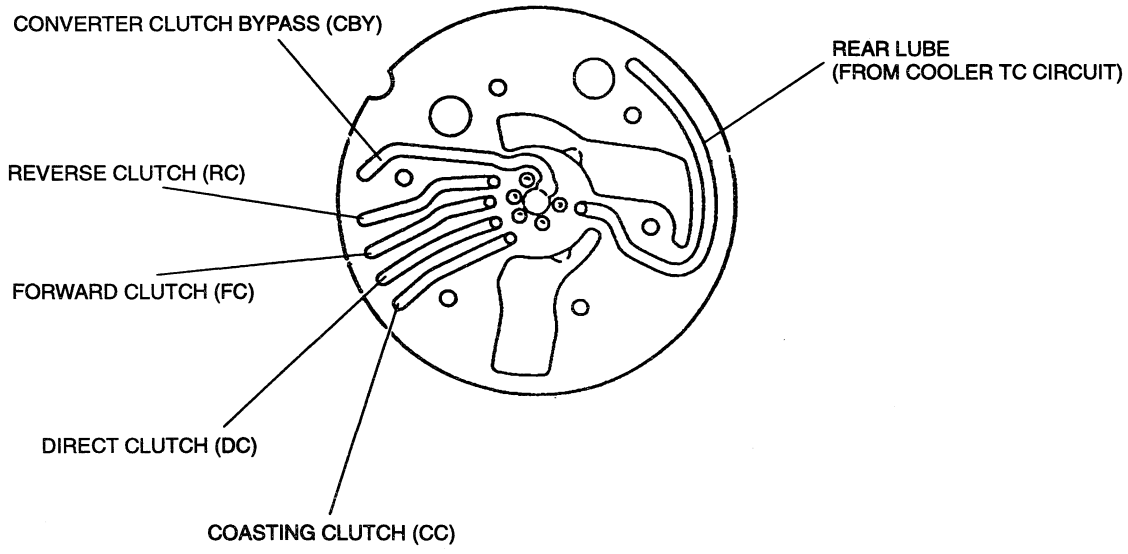


Oil Pump

SEAL RINGS

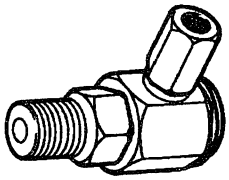
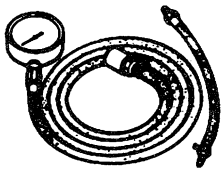
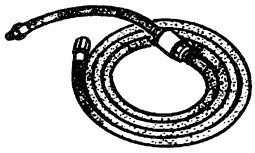


BOTTOM VIEW



MECHANICAL SYSTEM TEST

PREPARATION
SST

49 UN01 128 Adapter to mate hose 	For oil pressure test	49 0378 400A Gauge set, oil pressure 	For oil pressure test
49 B019 902 Oil pressure gauge (Part of 49 0378 400A) 	For oil pressure test	49 B019 903 Hose (Part of 49 0378 400A) 	For oil pressure test
49 B019 901 Oil pressure gauge 	For oil pressure test	—	—

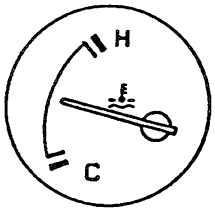
LINE PRESSURE TEST

This test measures line pressure as a means of checking the hydraulic components and inspecting for oil leakage.

Preparation

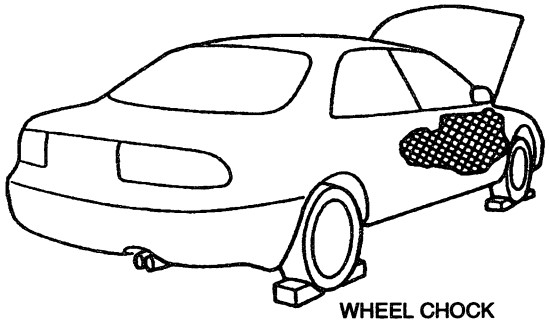
1. Engage the parking brake and use wheel chocks at the front and rear of the wheels.
2. Check, and correct as necessary, the engine coolant level.
3. Warm the engine thoroughly to raise the ATF temperature to operating level **66—77°C {150—170°C}**.
4. Check, and correct as necessary, the engine oil and ATF levels.
5. Check the idle speed and ignition timing in P position. (Service as section F3.)

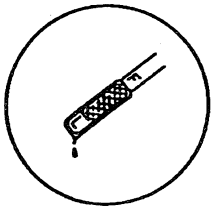

ENGAGE PARKING BRAKE

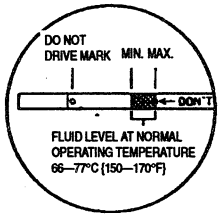


WARM UP ENGINE


ENGINE COOLANT LEVEL

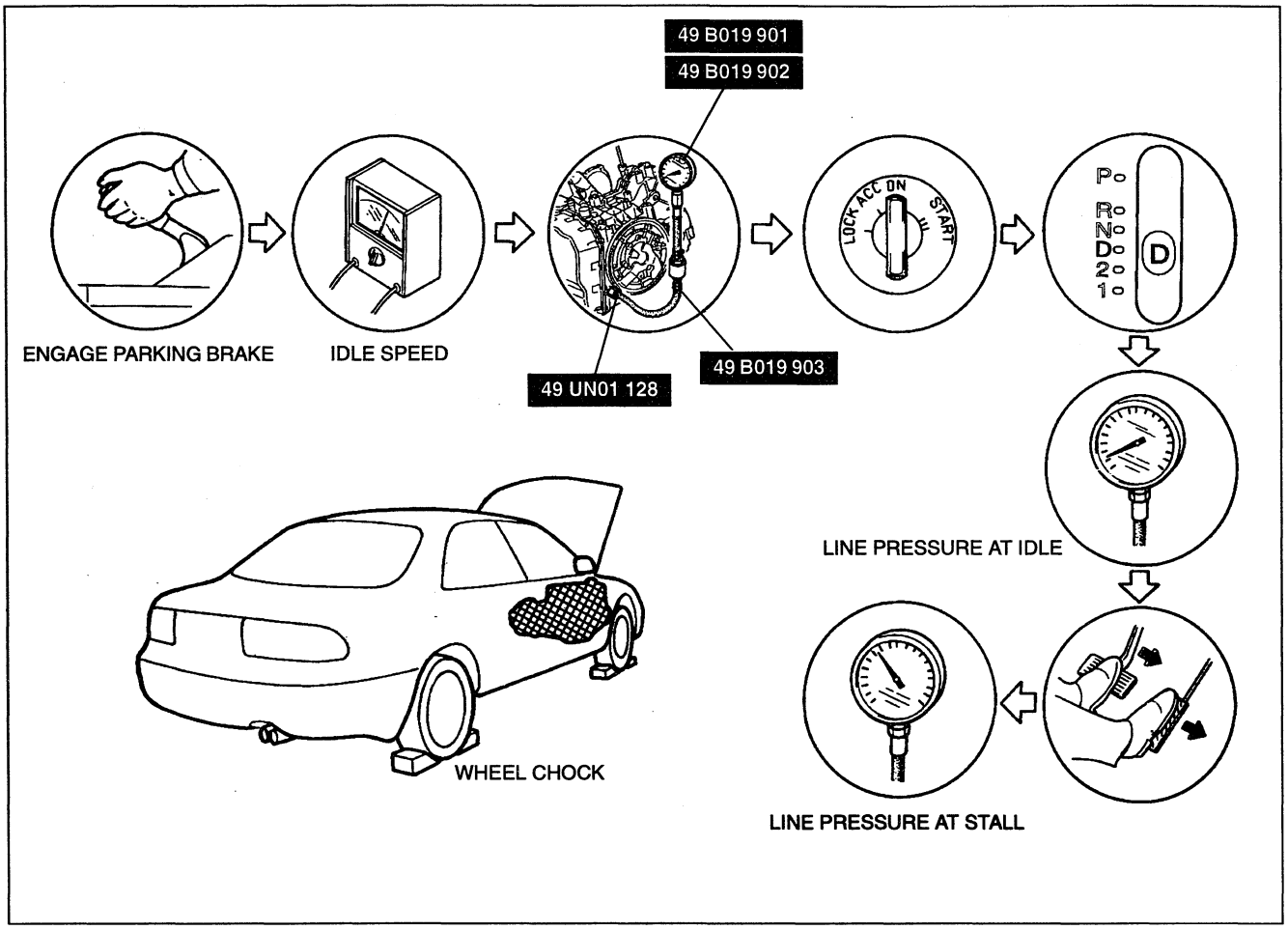

WHEEL CHOCK


ENGINE OIL LEVEL



ATF LEVEL

Procedure



Caution

- **Perform the LINE PRESSURE TEST prior to performing the STALL TEST. If line pressure is low at stall, do not perform the STALL TEST or further transaxle damage will occur. Do not keep the WOT in any gear range for more than 5 seconds.**
- **The transaxle tester must be removed from the transaxle and the vehicle harness reinstalled in order to verify the line pressure.**

1. Connect the **SST** to the line pressure inspection port.
2. Start engine.
3. Shift the selector to D range and read the line pressure at idle.
4. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
5. When the engine speed no longer increases, quickly read the line pressure and release the accelerator.
6. Shift the selector to N position and let the engine idle for 1 minute or more to cool the ATF.
7. Read the line pressure at idle and at the engine stall speed for each range in the same manner.

Specified line pressure

LINE PRESSURE SPECIFICATIONS		
	IDLE kPa {kgf·cm^2, psi}	STALL kPa {kgf·cm^2, psi}
P, N	441—524 {4.50—5.34, 64—76}	—
R	441—524 {4.50—5.34, 64—76}	1,786—2,027 {18.21—20.66, 259—294}
D	310—365 {3.16—3.72, 45—53}	1,158—1,269 {11.80—12.93, 168—184}
2	310—365 {3.16—3.72, 45—53}	1,158—1,269 {11.80—12.93, 168—184}
1	310—365 {3.16—3.72, 45—53}	1,158—1,269 {11.80—12.93, 168—184}

8. Install a new square head plug in the inspection port.

Evaluation of Line Pressure Test

Line pressure	Possible cause
Low pressure in every position	Fluid level low Restricted inlet filter Control valve body, solenoid body or accumulater body is loose Excessive leakage in pump, case, control bodies Sticking main regulator valve Damaged inlet tube seal or inlet filter Damaged gaskets, separator plate
Higher than specification	Problem with main regulator valve, solenoid body and wiring harness

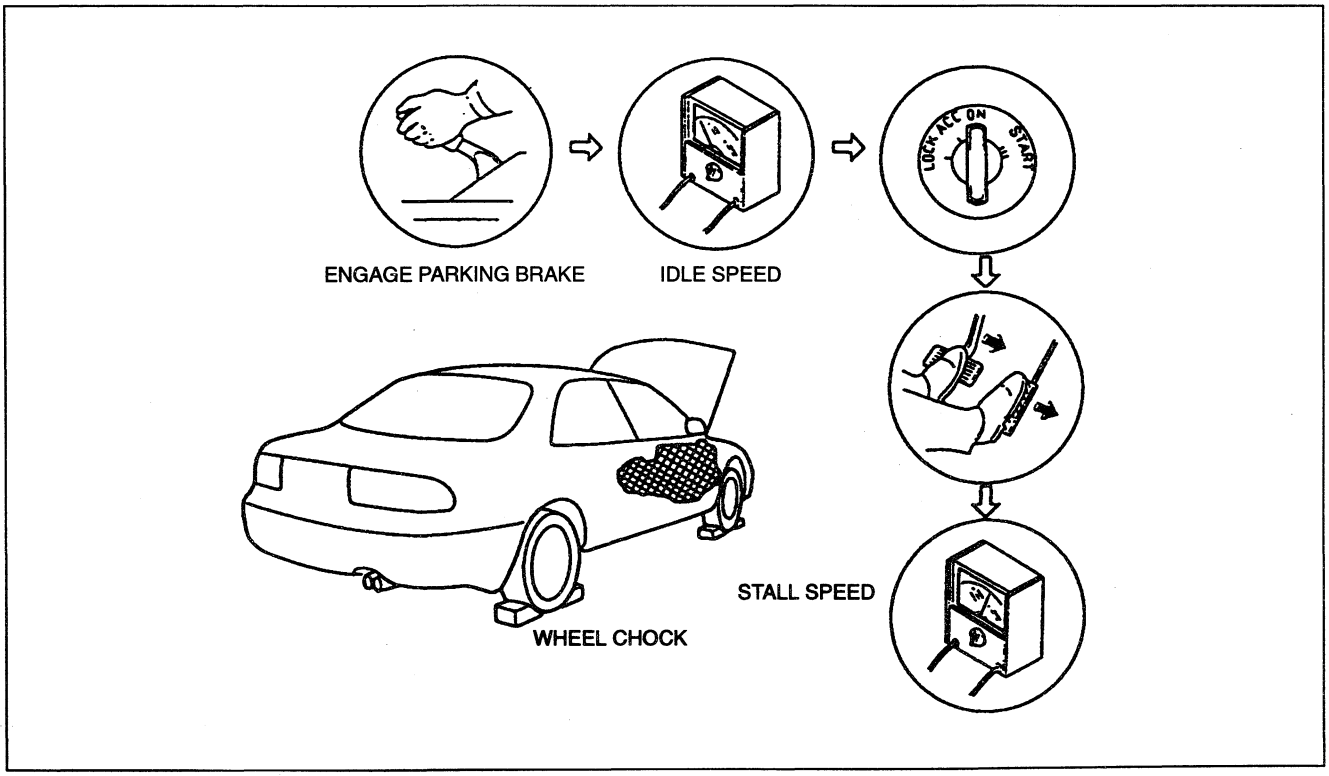
STALL TEST

This test is performed to determine if there is slippage of the friction elements or a malfunction of the hydraulic components.

Preparation

Perform the preparation procedure outlined in LINE PRESSURE TEST. (Refer to page K2–10.)

Procedure



Warning
- **Apply the service and parking brakes firmly while performing each STALL TEST. Failure to set the brakes may result in death or bodily injury.**

Caution
- **Perform the LINE PRESSURE TEST prior to performing the STALL TEST. If line pressure is low at stall, do not perform the STALL TEST or further transaxle damage will occer. Do not keep the WOT in any gear range for more than 5 seconds.**

1. Start the engine.
2. Shift the selector lever to R position.

Caution
- **If the accelerator pedal is pressed for longer than 5 seconds while the brake pedal is pressed, the transaxle could be damaged. Therefore, do steps 4 and 5 within 5 seconds of each other.**

3. Firmly depress the foot brake with the left foot, and gently depress the accelerator pedal with the right foot.
4. When the engine speed no longer increases, quickly read the engine speed and release the accelerator.
5. Shift the selector to N position and let the engine idle for 1 minute or more to cool the ATF.
6. Perform stall tests for the remaining ranges in the same manner.
   (1) D range
   (2) 2 range
   (3) 1 range

Engine stall speed: 2,200—2,500 rpm

Evalution of Stall Test

Condition		Possible cause
Above specification	in D range	Forward clutch Forward one-way clutch Low one-way clutch
	In R position	Reverse clutch Low and reverse clutch
Below specification		Engine Torque converter one-way clutch

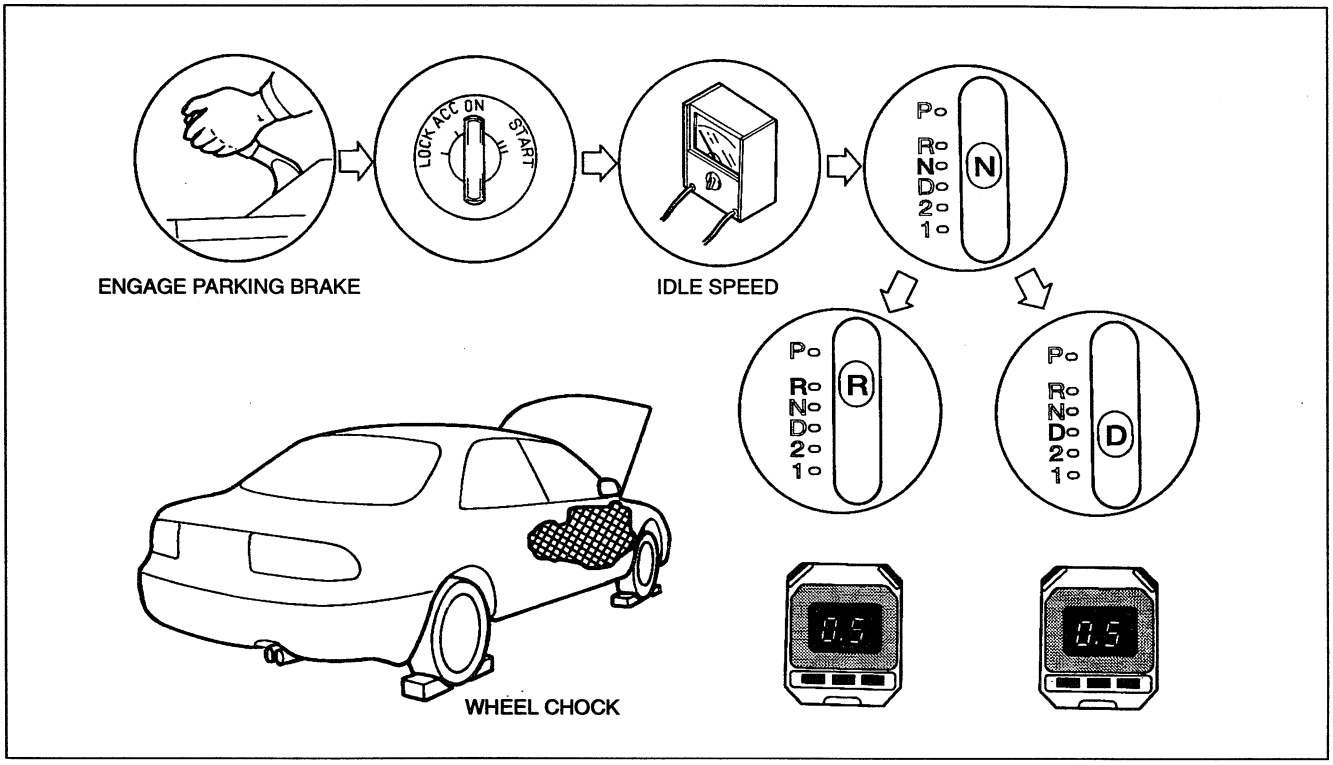
TIME LAG TEST

This test measures time lag as a means of checking the hydraulic components and the friction elements.

Preparation

Perform the preparation procedure outlined in LINE PRESSURE TEST. (Refer to page K2–10.)

Procedure



1. Start the engine.
2. Shift from N position to D range.
3. Use a stopwatch to measure the time it takes from shifting until shock is felt.
4. Shift the selector to N position and run the engine at idle speed for at least one (1) minute.
5. Do the time lag test for the following shifts in the same manner. Take three measurements for each test and average the results.
6. Perform the test for the following shifts in the same manner.
   (1) N → D range
   (2) N → R position

Time lag: N → D range ... below approx. 1.0 second
N → R position ... below approx. 1.0 second

Evaluation of Time Lag Test

Condition		Possible Cause
N → D shift	More than specification	Insufficient line pressure Forward clutch slipping Forward one-way clutch slipping Low one-way clutch slipping
	Less than specification	Forward accumulator not operating properly Excessive line pressure
N → R shift	More than specification	Insufficient line pressure Low/reverse clutch slipping Reverse clutch slipping
	Less than specification	Low/reverse accumulator not operating properly Excessive line pressure

TORQUE CONVERTER CLUTCH OPERATION TEST

This test verifies that the torque converter clutch control system and the torque converter are operating properly.

Warning

- **Doing this test by yourself can be dangerous. You could have an accident if you are looking at the manual or devices while driving, which may resulting in death or injury. Always have another person in the vehicle with you to read the manual or devices while you drive.**

Note

- Perform the OBD Test. Check for a code P0741 or P0743. Refer to the appropriate pinpoint test or procedure for diagnosis.

1. Bring the engine to normal operating temperature by driving the vehicle at highway speeds for approximately 15 minutes in D range.
2. After normal operating temperature is reached, maintain a constant vehicle speed of about 80 km/h (50 mph), and tap the brake pedal with the left foot.
3. Engine rpm should increase when the brake pedal is tapped, and decrease about 5 seconds after the brake pedal is released. If this does not occur, refer to Torque Converter Operation Concern in SYMPTOM TROUBLESHOOTING.
4. If the vehicle stalls in D range at idle with the vehicle at a stop, move the selector lever to 1 range. If the vehicle stalls, the cause may be the converter control valve in the oil pump. Service as required. If the vehicle does not stall in 1 range, refer to Pinpoint Test C1 in ON-BOARD DIAGNOSIS SYSTEM.

ROAD TEST

A road test is necessary to inspect for problems in the different gear ranges. If a range or function targeted by the road test is found to have any problem, refer to the ELECTRONIC SYSTEM COMPONENT segment or the TRANSAXLE, OIL COOLER, DRIVE PLATE, and SHIFT MECHANISM segments of this section.

Do the road test only when the ATF is 66—77°C {150—170°F}.

D RANGE TEST

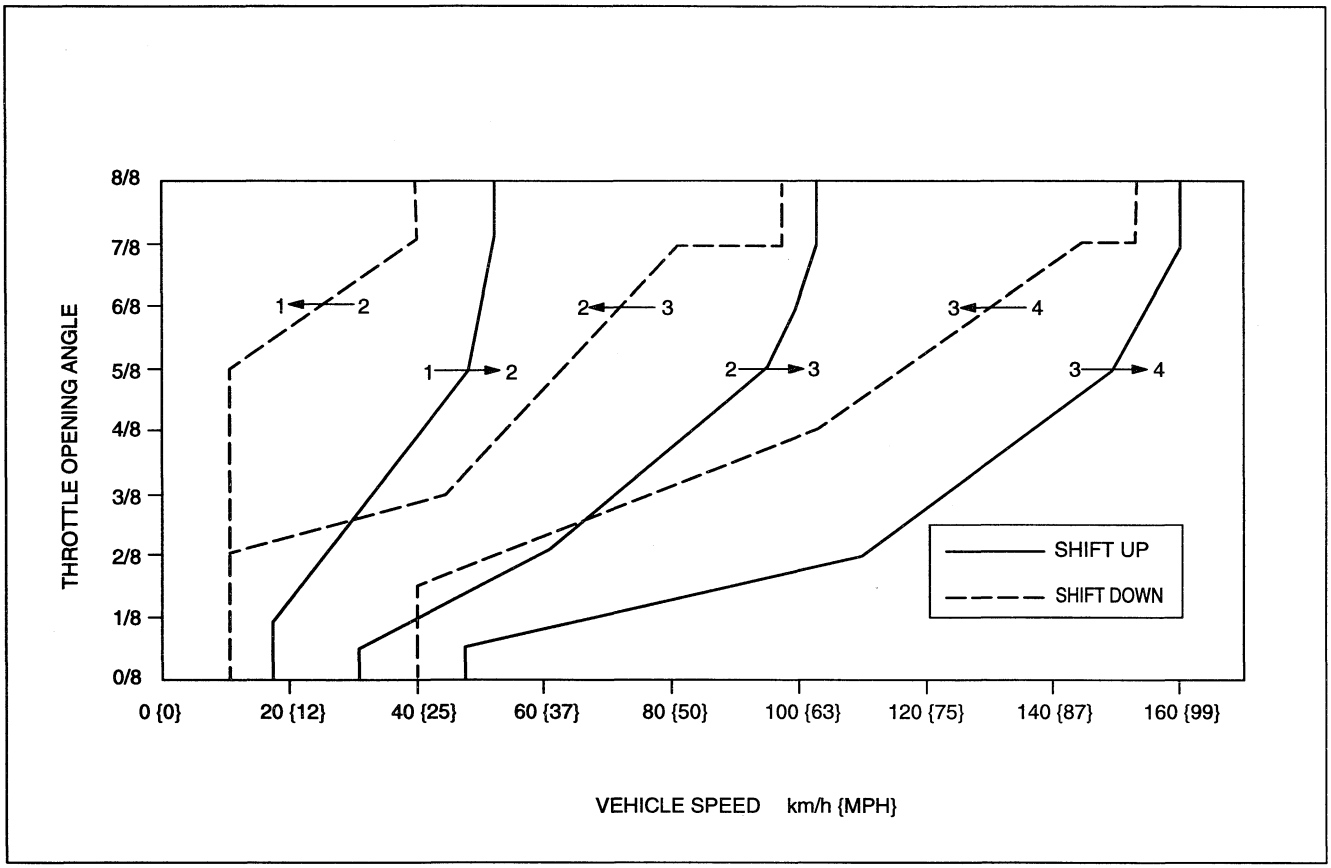
D Range (Except O/D OFF Mode)

Note

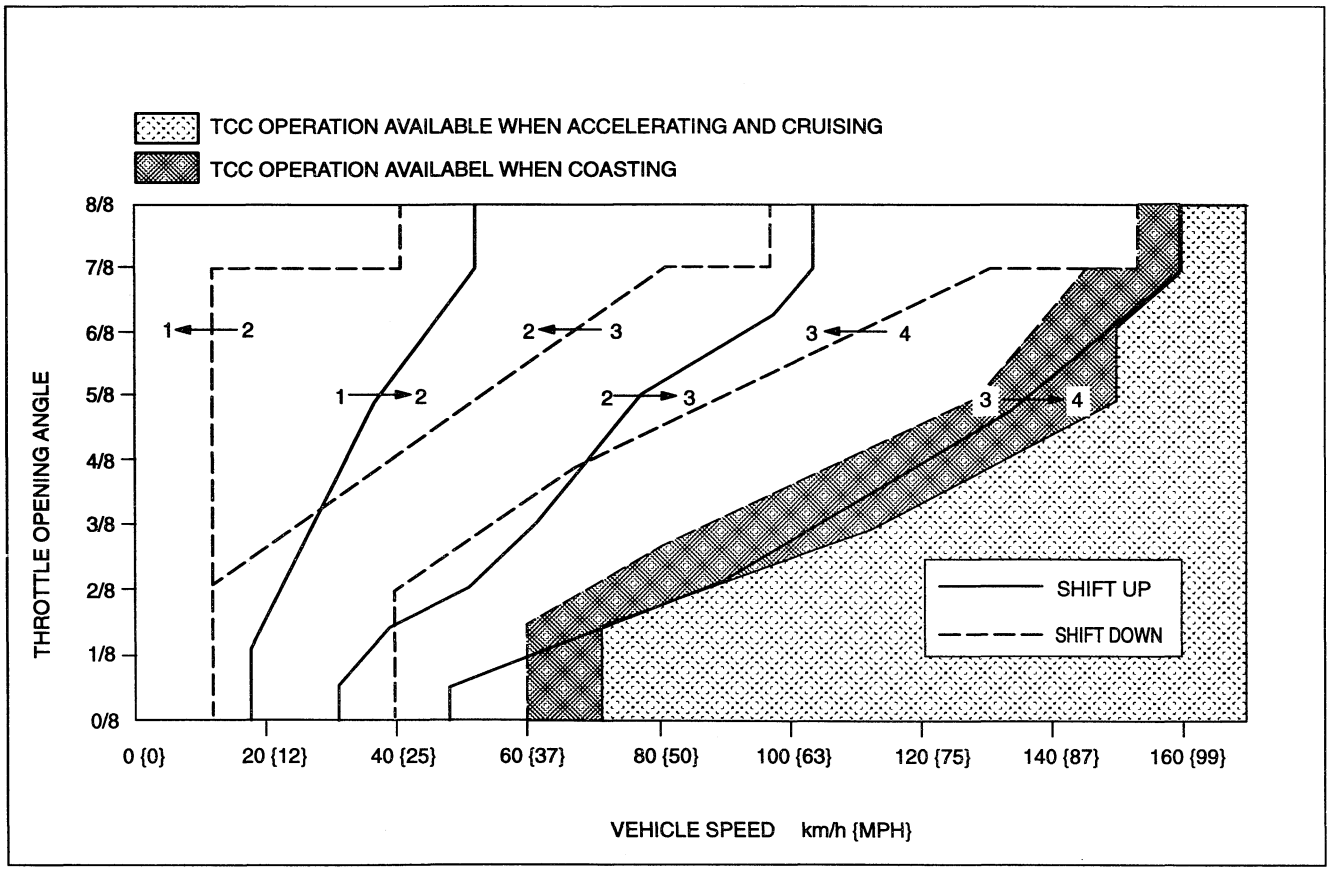
- The power mode and the normal mode are automatically selected by the Powertrain control module.

1. Shift the selector lever to D range.
2. Accelerate the vehicle with half and wide open throttle.
3. Verify that 1–2, 2–3, and 3–4 upshifts and downshifts are obtained. The shift points must be as shown in the D range shift diagram.
4. Drive the vehicle in Fourth, Third, and Second gears and verify that kickdown occurs for 4→3, 4→2, 4→1, 3→2, 3→1, 2→1, and that the shift points are as shown in the D range shift diagram.
5. Decelerate the vehicle and verify that engine braking effect is felt in Fourth and Third gears.
6. Drive the vehicle and verify that torque converter clutch operation is obtained. (only for normal mode)

D range (POWER mode) shift diagram



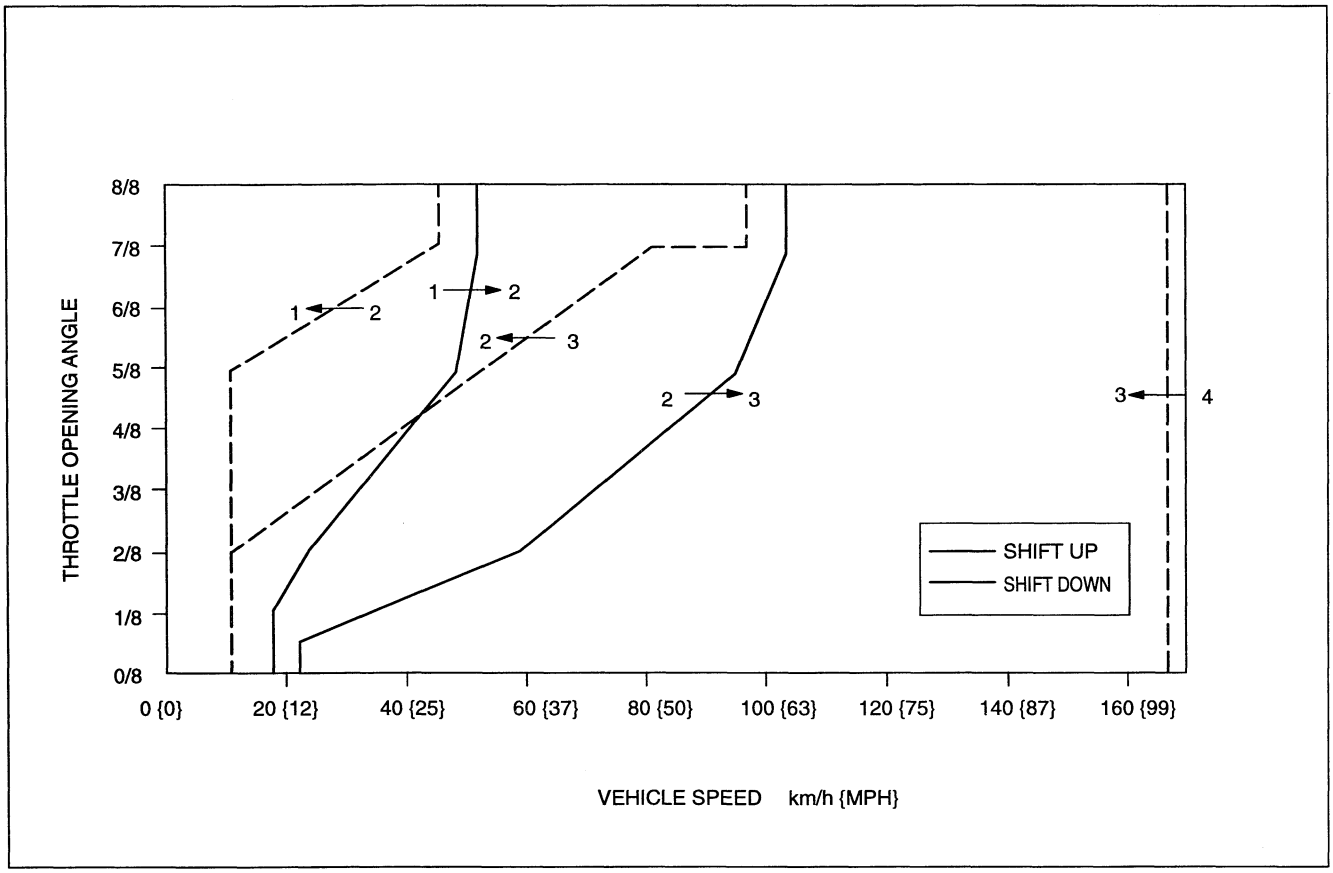
D range (NORMAL mode) shift diagram



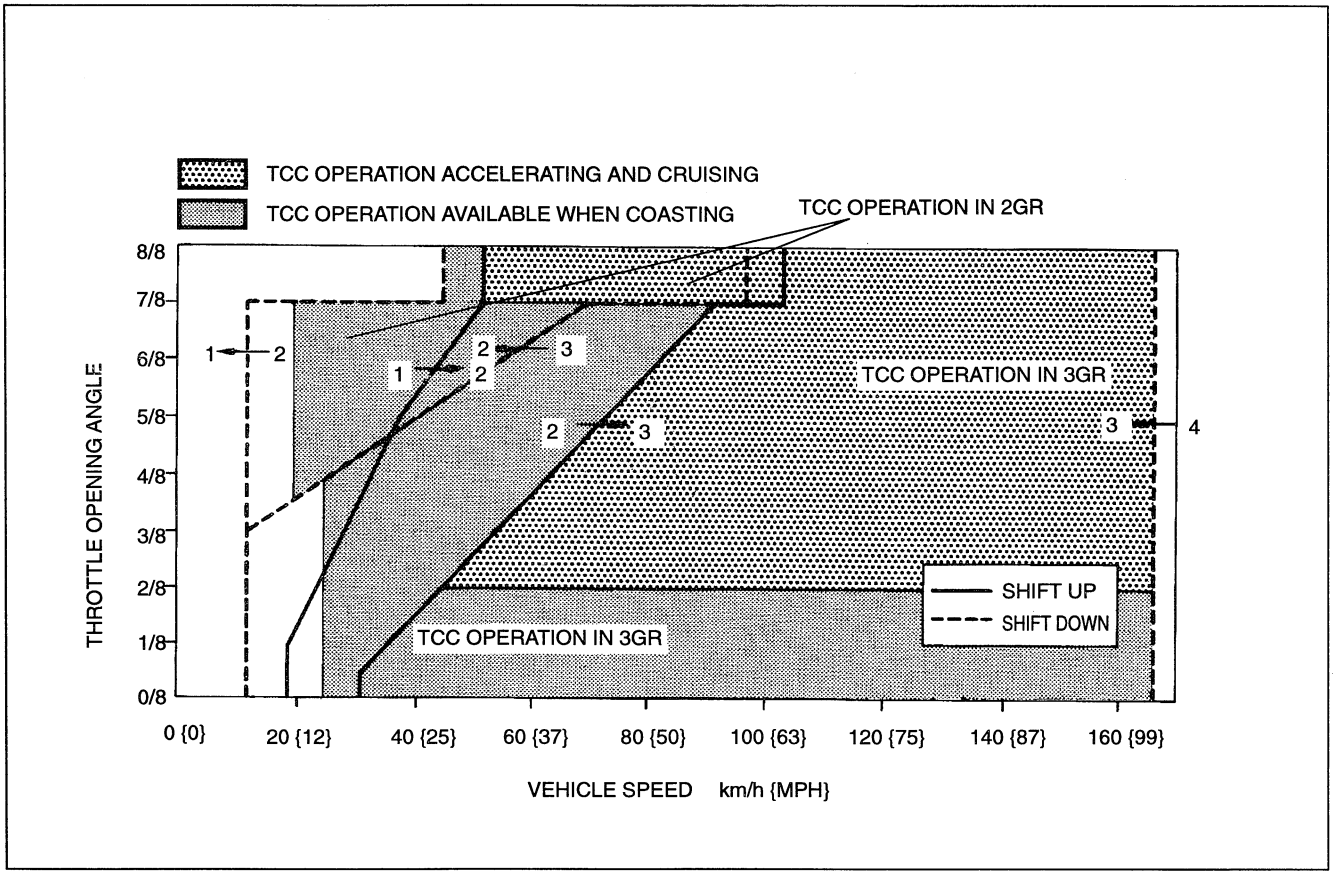
D Range (O/D OFF Mode)

1. Shift the selector lever to D range, and select the O/D OFF mode.
2. Accelerate the vehicle with half and wide open throttle.
3. Verify that 1–2 and 2–3 upshifts and downshifts are obtained. The shift points must be as shown in the D range O/D OFF shift diagram.
4. Drive the vehicle in Third and Second gears and verify that kickdown occurs for 3→2, 3→1, 2→1, and that the shift points are as shown in the D range O/D OFF shift diagram.
5. Decelerate the vehicle and verify that engine braking effect is felt in Third gear.
6. Drive the vehicle and verify that torque converter clutch operation is obtained. (only for normal mode)

D range (O/D OFF POWER mode) shift diagram



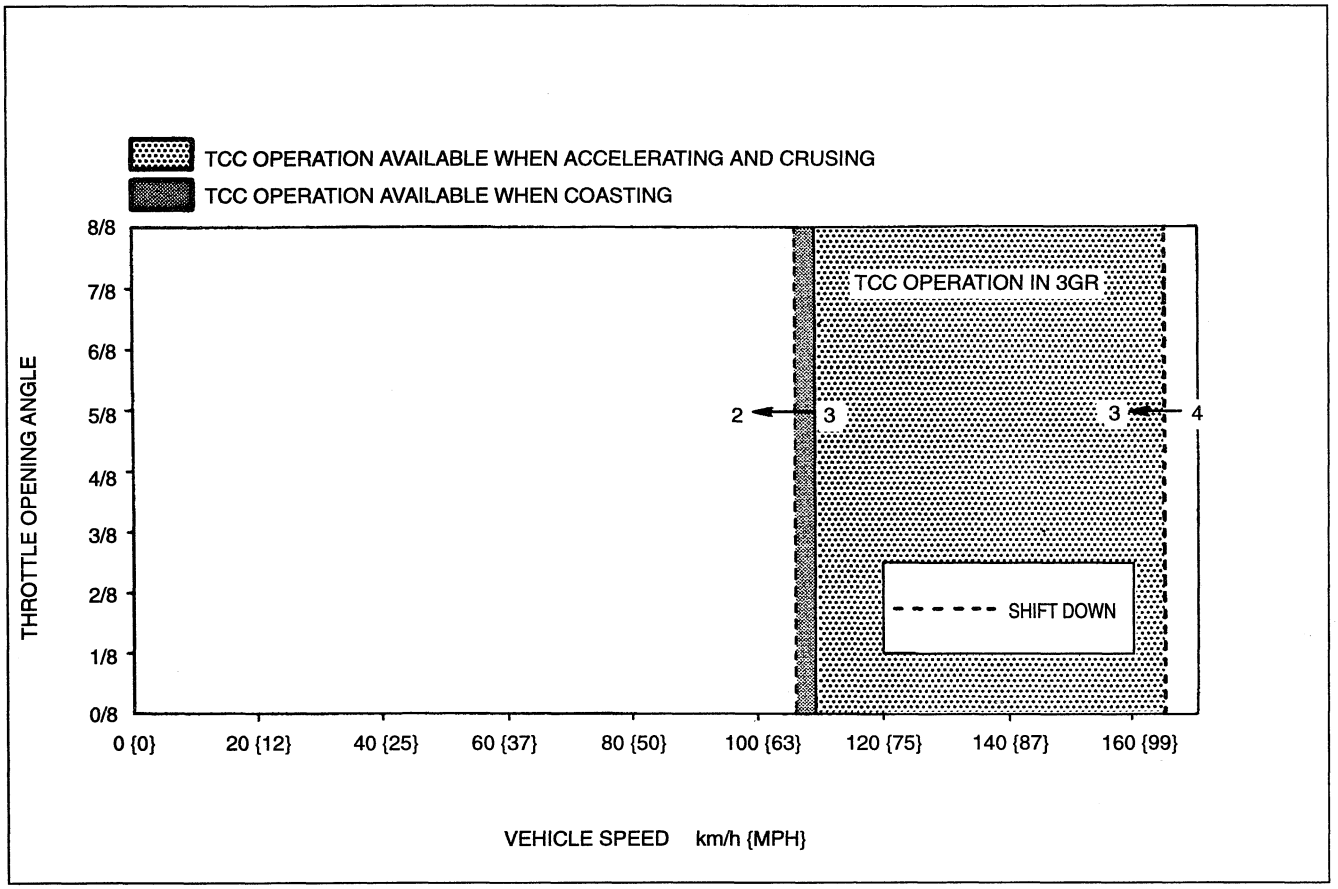
D range (O/D OFF NORMAL mode) shift diagram



2 RANGE TEST

1. Shift the selector lever to 2 range.
2. Accelerate the vehicle with half and wide open throttle, and verify that Second gear is held.
3. Decelerate the vehicle and verify that engine braking effect is felt.

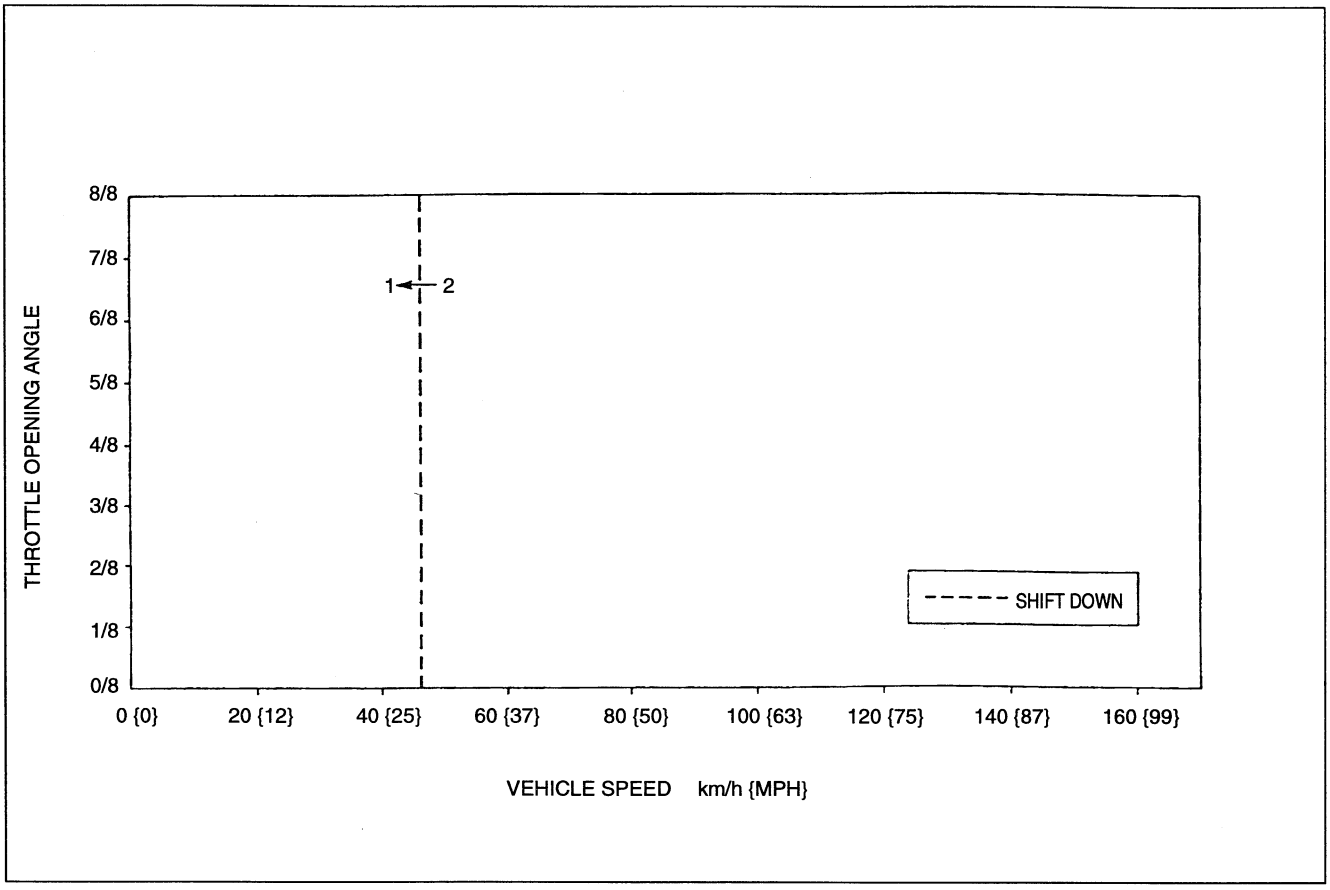
2 range shift diagram



1 RANGE TEST

1. Shift the selector lever to 1 range.
2. Accelerate the vehicle with half and wide open throttle, and verify that First gear is held.
3. Decelerate the vehicle and verify that engine braking effect is felt.

1 range shift diagram



P POSITION TEST

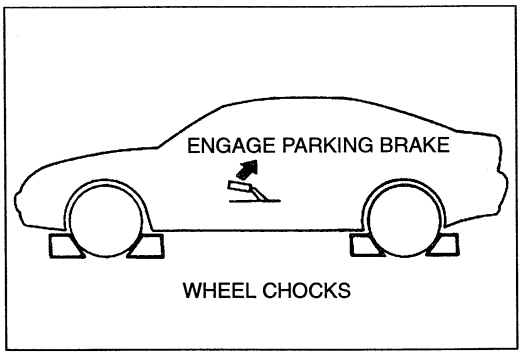
Shift into P position on a gentle slope, release the brake, and verify that the vehicle does not roll.

Vehicle Speed at Shiftpoint Table

Range Mode			Throttle condition (throttle position sensor voltage)	Shift	Vehicle speed km/h {mph}
D	O/D OFF switch OFF	POWER	Wide open throttle (3.0—4.4 V)	$D_1 \rightarrow D_2$	51—57 {32—35}
				$D_2 \rightarrow D_3$	101—109 {63—68}
				$D_3 \rightarrow D_4$	157—167 {97—104}
			Half throttle	$D_1 \rightarrow D_2$	36—45 {22—28}
				$D_2 \rightarrow D_3$	74—92 {46—57}
				$D_3 \rightarrow D_4$	124—149 {77—92}
			Closed throttle position (0.1—1.1 V)	$D_4 \rightarrow D_3$	37—43 {23—27}
				$D_3 \rightarrow D_1$	8—14 {5—9}
			Kickdown	$D_4 \rightarrow D_3$	148—158 {92—98}
				$D_3 \rightarrow D_2$	93—101 {58—63}
				$D_2 \rightarrow D_1$	37—43 {23—27}
		NORMAL	Wide open throttle (3.0—4.4 V)	$D_1 \rightarrow D_2$	51—57 {32—35}
				$D_2 \rightarrow D_3$	101—109 {63—68}
				$D_3 \rightarrow D_4$	157—167 {97—104}
				TCC ON (D_4)	147—157 {91—97}
			Half throttle	$D_1 \rightarrow D_2$	28—36 {17—22}
				$D_2 \rightarrow D_3$	61—77 {38—48}
				$D_3 \rightarrow D_4$	105—132 {65—82}
				TCC ON (D_4)	118—145 {73—90}
			Closed throttle position (0.1—1.1 V)	$D_4 \rightarrow D_3$	37—43 {23—27}
				$D_3 \rightarrow D_1$	8—14 {5—9}
			Kickdown	$D_4 \rightarrow D_3$	148—158 {92—98}
				$D_3 \rightarrow D_2$	93—101 {58—63}
				$D_2 \rightarrow D_1$	37—43 {23—27}
	O/D OFF switch ON	POWER	Wide open throttle (3.0—4.4 V)	$D_1 \rightarrow D_2$	51—57 {32—35}
				$D_2 \rightarrow D_3$	101—109 {63—68}
			Half throttle	$D_1 \rightarrow D_2$	36—45 {22—28}
				$D_2 \rightarrow D_3$	75—91 {47—56}
			Closed throttle position (0.1—1.1 V)	$D_3 \rightarrow D_1$	8—14 {5—9}
			Kickdown	$D_3 \rightarrow D_2$	93—101 {58—63}
				$D_2 \rightarrow D_1$	42—48 {26—30}
		NORMAL	Wide open throttle (3.0—4.4 V)	$D_1 \rightarrow D_2$	51—57 {32—35}
				$D_2 \rightarrow D_3$	101—109 {63—68}
				TCC ON (D_2)	51—57 {32—35}
				TCC ON (D_3)	101—109 {63—68}
			Half throttle	$D_1 \rightarrow D_2$	28—37 {17—23}
				$D_2 \rightarrow D_3$	55—72 {34—45}
				TCC ON (D_3)	55—72 {34—45}
			Closed throttle position (0.1—1.1 V)	$D_3 \rightarrow D_1$	8—14 {5—9}
			Kickdown	$D_3 \rightarrow D_2$	93—101 {58—63}
				$D_2 \rightarrow D_1$	42—48 {26—28}
2			—	TCC ON (S_3)	104—114 {64—71}
				D_4 (S_4) $\rightarrow S_3$	162—168 {100—104}
				$S_3 \rightarrow S_2$	103—109 {64—68}
1			—	$L_2 \rightarrow L_1$	43—49 {27—30}

Input the voltages displayed on the engine signal monitor into the following formula to calculate the half throttle voltage.

$$\frac{\text{Wide open throttle voltage} - \text{Closed throttle position voltage}}{2} = \text{Half throttle voltage}$$



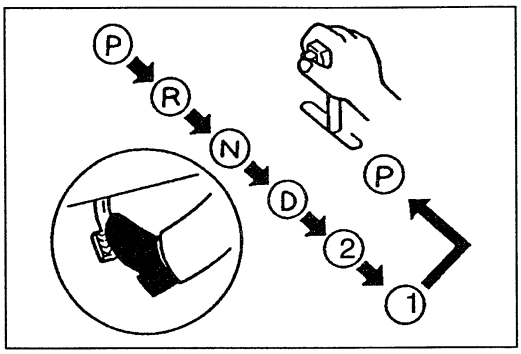
AUTOMATIC TRANSAXLE FLUID (ATF)

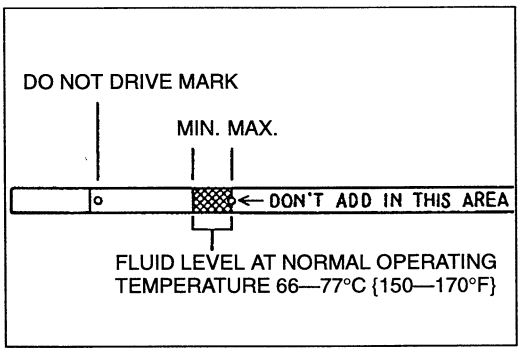
ATF
Inspection
Level

1. Park the vehicle on level ground.
2. Apply the parking brake and position wheel chocks securely to prevent the vehicle from rolling.
3. Warm up the engine until the ATF reaches **66—77°C {150—170°F}**.

Caution
- **Do not warm the transaxle by performing stalls. This will damage the torque converter.**

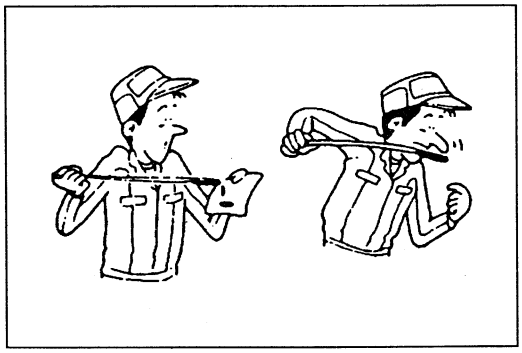
4. While depressing the brake pedal, shift the selector lever to each range (P—1), pausing momentarily in each range.
5. Shift back to P position.





6. Ensure that the ATF level is between max. and min.

ATF type: M-III or MERCON®
Total capacity: 8.3 L {8.8 US qt, 7.3 Imp qt}



Condition

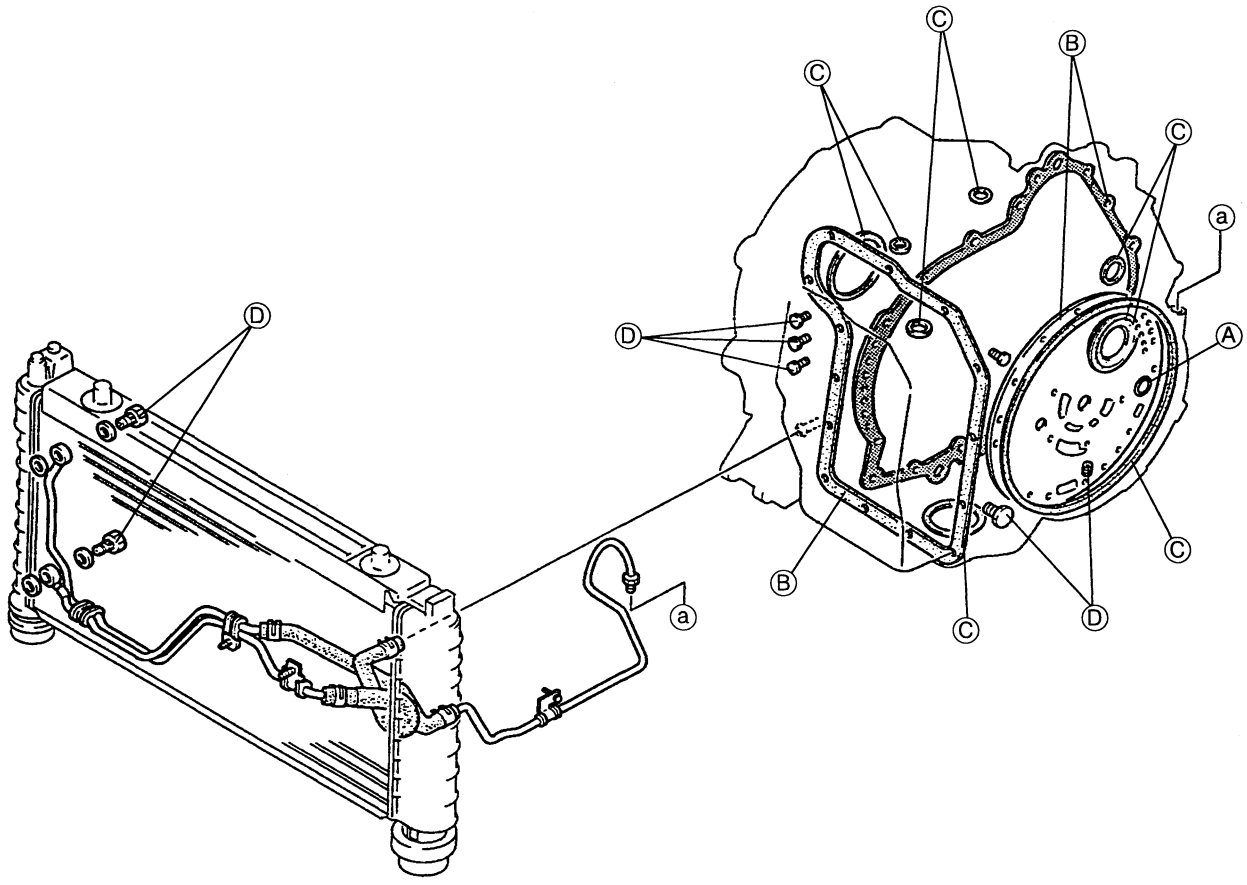
Determine whether the automatic transaxle should be disassembled by noting:

1. If the ATF is muddy or varnished.
2. If the ATF smells strange or unusual.

Fluid Leaks

Check for ATF leaks of the transaxle at the points shown below and repair or replace as necessary.

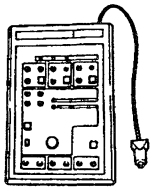
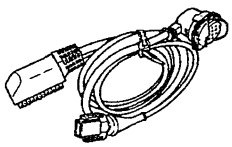
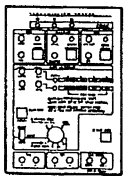
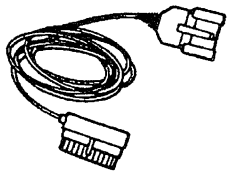
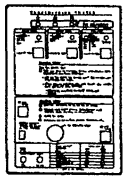
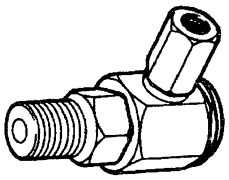
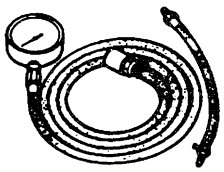
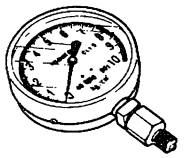
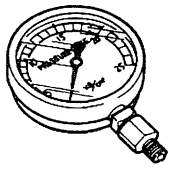
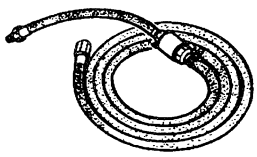
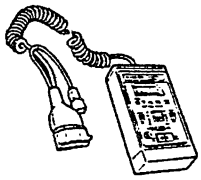
1. Gaskets, O-rings, and plugs.
2. Oil hoses, oil pipes, and connections.
3. Oil cooler.



Ⓐ = O-RING
Ⓑ = GASKET
Ⓒ = OIL SEAL
Ⓓ = PLUG

ELECTRICAL SYSTEM COMPONENTS

PREPARATION
SST

49 UN01 086 MLPS alignment tool 	For Alignment of TR switch	49 UN01 071 Transaxle tester 	For check of electrical system components
49 UN01 089 Transaxle diagnostic harness 	For check of electrical system components	49 UN01 090 Transaxle overlay 	For check of electrical system components
49 UN01 091 MLPS harness adapter 	For check of TR switch	49 UN01 092 MLPS overlay 	For check of TR switch
49 UN01 128 Adapter 	For oil pressure test	49 0378 400A Gauge set, oil pressure 	For oil pressure test
49 B019 901 Oil pressure gauge 	For oil pressure test	49 B019 902 Oil pressure gauge (Part of 49 0378 400A) 	For oil pressure test
49 B019 903 Hose (Part of 49 0378 400A) 	For oil pressure test	49 UN01 056 Super STAR II tester 	For diagnosis of malfunction

TRANSAXLE TESTER INSTRUCTION

The transaxle tester allows a technician to operate the electrical portion of the transaxle independent of the vehicle electronics. The transaxle tester usage is divided into five steps.

1. Preliminary testing and diagnosis.
2. Installing the transaxle tester.
3. Static testing-vehicle OFF.
4. Dynamic testing-vehicle running.
5. Removing the transaxle tester and clearing Diagnostic Trouble Codes (DTCs).

Preliminary Testing and Diagnosis

Before any diagnostic testing is done on a vehicle some preliminary checks must be performed, as outlined below. Be sure to write down your findings, especially any DTC, for future reference.

- Check ATF level and condition.
- Check for add-on items (phones, computers, CB radio etc).
- Visually inspect wiring harness and connectors.
- Check for vehicle modifications.
- Verify that the shift linkage is properly adjusted.
- Verify customer concern.
  - Upshift, Downshift, Coasting, Engagement, Noise/Vibration
- Vehicle must be at normal operating temperature.
- Perform vehicle On-Board Diagnostic Test. (Refer to page K2–118.)
- Record all DTCs.
- Repair all non-transaxle DTCs.

Installing The Transaxle Tester (Set Up Procedures)

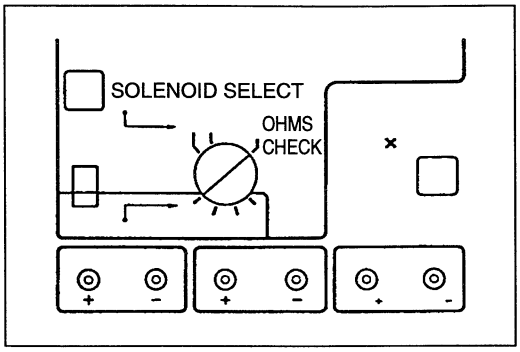
Installing the transaxle tester at the solenoid body connector allows the separation of the vehicle electronics from the transaxle electronics. Disconnecting the normal vehicle electronics will in itself set additional DTCs and cause firm shifts. (Disconnecting the solenoid body connector defaults the transaxle to maximum line pressure).

Note

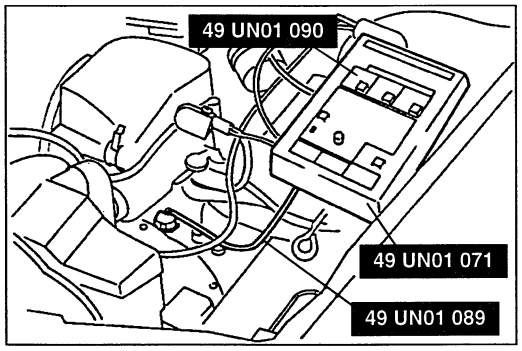
- During tester usage additional DTCs may be set.
- Therefore, it is important that all DTCs are erased after repairs have been made. To verify elimination of all DTCs, rerun the On-Board Diagnostic Test. (Refer to page K2–118.)

Caution
- **Do not attempt to pry off connectors with a screwdriver.**
  This will damage the connector and could result in a transaxle concern.

1. Disconnect the emission harness at the solenoid body connector and at the TSS connector on the oil pump body in the LH wheel arch.

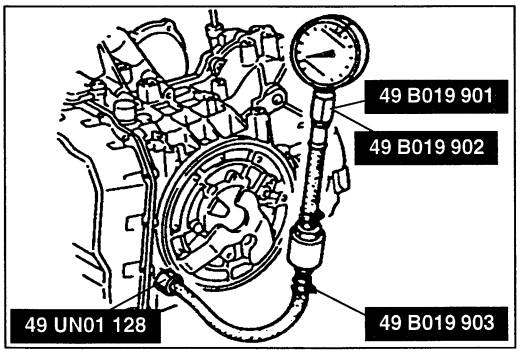


2. Turn the tester solenoid select switch to the "OHMS CHECK" position.



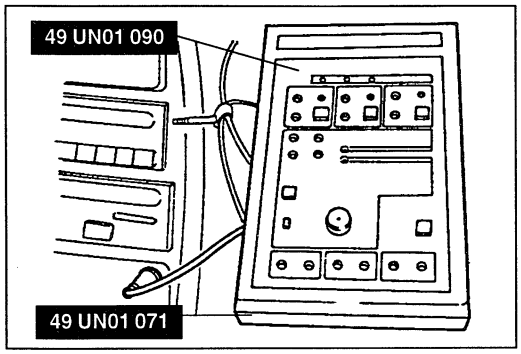
Caution
- **Route all cables away from heat sources.**

3. Install the **SST** onto tester.
   Connect the **SST** to the transaxle tester and then to the appropriate solenoid body connector and TSS connector.

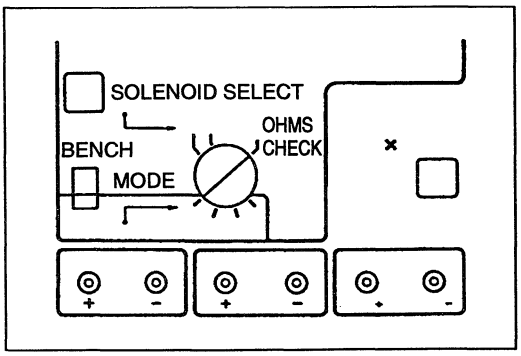


Caution
- **Route all gauge lines away from heat sources.**

4. Connect the **SST** to the line pressure inspection port.



5. Plug the transaxle tester power supply plug into the cigarette lighter receptacle. At this time, all LED's should illuminate for a short period and then turn off. This is the tester internal circuit check.



6. Set the Bench/Drive switch to "BENCH" mode.

Static Testing-Vehicle "OFF"

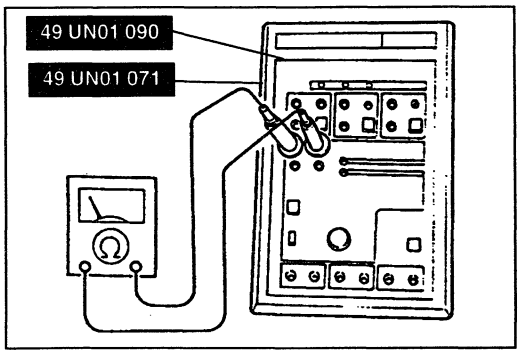
Static testing procedures allow for shop testing of the transaxle in the vehicle or on the bench. Completion of these tests prove out the transaxle electronically.

Caution

- **For resistance checks, be sure that the tester solenoid select switch is set to the "OHMS CHECK" position or damage to the ohmmeter may result.**

Resistance/Continuity Tests

- Refer to Pinpoint Test (Refer to page K2–124.) to be performed "On Board Diagnostics" based on the DTC displayed.
- Using a volt-ohmeter and the transaxle tester, perform the Pinpoint Tests as indicated in "On Board Diagnostics" (Refer to page K2–124) based on the DTC which were displayed.
- Perform repairs as indicated by the Pinpoint Tests. (Refer to page K2–124.) Always retest and road test the vehicle after a repair. (Refer to page K2–15.)

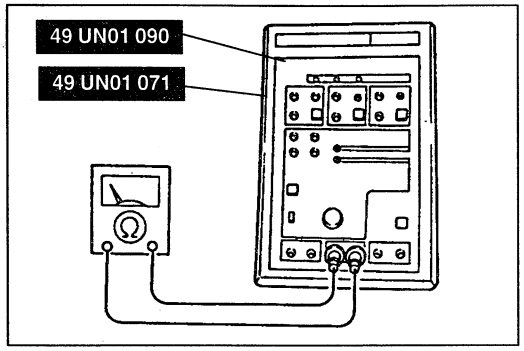


Transaxle Solenoid and Sensors Resistance Tests
Solenoids (EPC, SS1, SS2, TCC, 3–2T/CCS)

1. Set an ohmmeter to the 0—100 ohm range.
2. Connect the position lead of the ohmmeter to the appropriate VPWR jack for the solenoid being tested.
3. Connect the negative lead of the ohmmeter to the appropriate solenoid (EPC, SS1, SS2, TCC, 3–2T/CCS) jack.
4. Record the resistance.
5. Refer to the chart for the valves.

SOLENOID	SOLENOID RESISTANCE (Ω)
SS1	12—22
SS2	12—22
TCC	12.5—19.0
EPC	3.7—5.92
3–2T/CCS	3.7—5.92

6. If out of range refer to the following pinpoint tests.
   - Pinpoint test E (EPC) (Refer to page K2–133.)
   - Pinpoint test A (SS1, SS2) (Refer to page K2–124.)
   - Pinpoint test C (TCC) (Refer to page K2–128.)
   - Pinpoint test G (3–2T/CCS) (Refer to page K2–137.)

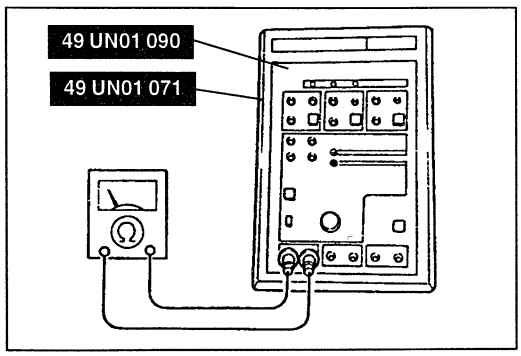


Transaxle Fluid Temperature (TFT)
1. Set an ohmmeter to the 1,000 ohm range.
2. Connect the positive lead to the + TFT jack.
3. Connect the negative lead to the – TFT jack.

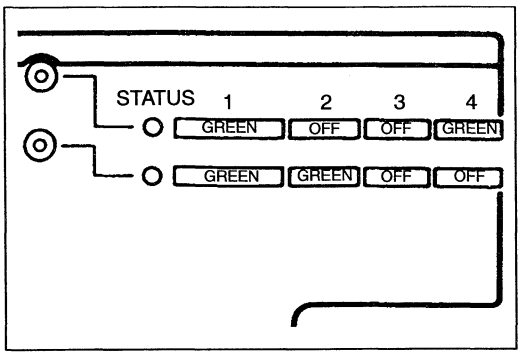
4. Record the resistace. Resistance will vary with temperature.
5. Refer to the chart for the valves.

Temperature °C {°F}	Resistance kΩ
–40—–20 {–40—–4}	967—284
–19—–1 {–3—31}	284—100
0—20 {32—58}	100—37
21—40 {59—104}	37—16
41—70 {105—158}	16—5
71—90 {159—194}	5—2.7
91—110 {195—230}	2.7—1.5
111—130 {231—266}	1.5—0.8
131—150 {267—302}	0.8—0.54

6. If out of range, refer to Pinpoint test B. (Refer to page K2–126.)



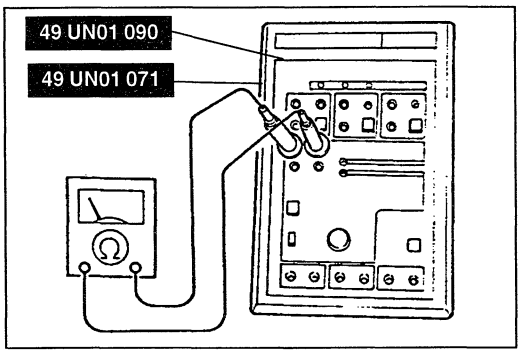
Turbine Shaft Speed (TSS) Sensor
1. Set an ohmmeter to the 1,000 ohm range.
2. Connect the postive lead to the +TSS jack.
3. Connect the negative lead to the –TSS jack.
4. Record the resistance.
5. TSS should be **140—290 ohm**.
6. If out of range, refer to Pinpoint test F. (Refer to page K2–135.)



Short to Ground and Solenoid Voltage Tests

Note

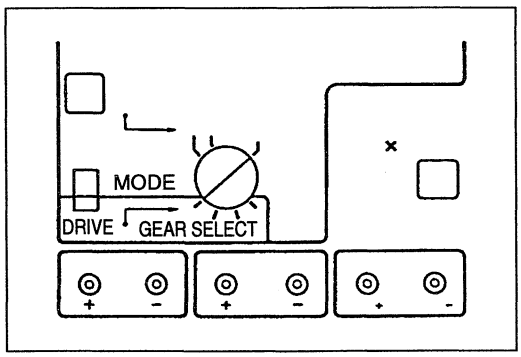
- LED will turn "GREEN" when solenoid activates and turn "OFF" when deactivated. LED will turn "RED" if an activated solenoid/harness is shorted to BAT+. LED will remain "OFF" if an activated solenoid/harness is shorted to ground or no continuity.



1. Tester Bench/Drive switch set to "BENCH" mode.
2. Set an voltmeter to the 20 volt D.C. range.
3. Connect the voltmeter positive lead to the appropriate solenoid VPWR.
4. Connect voltmeter negative lead to the appropriate solenoid.
5. Using the voltmeter, check for voltage across each solenoid by activating the solenoid switch. Select the appropriate solenoid with the rotary switch and depress the corresponding solenoid switch. The "LED" should illuminate, the voltage should change, and an audible click may be heard. If "LED" does not illuminate, a short to ground condition exists.
6. Observe and record the values.

Dynamic Testing-Vehicle Running

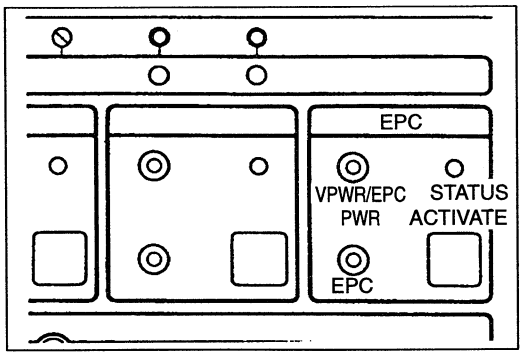
Dynamic testing is the final step in the transaxle tester usage. It allows the transaxle to be proven out electronically and hydraulically.



Transaxle Solenoid Cycling and Drive Test Procedures

Preliminary Set Up

1. Set the Bench/Drive switch to DRIVE mode.
2. Rotate the gear select switch on tester to the GEAR SELECT "1" position.
3. Set the vehicle in PARK.
4. Start the vehicle.

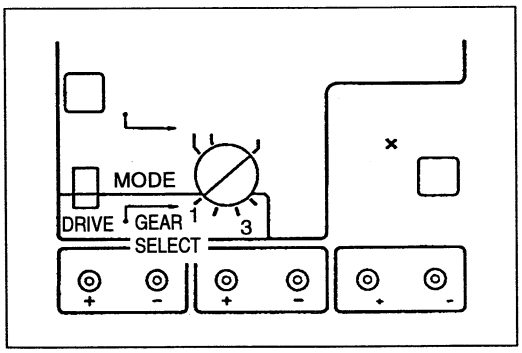


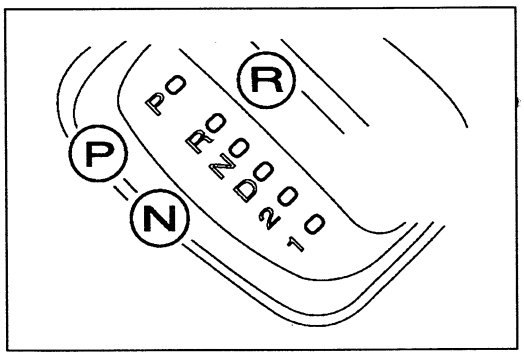
EPC Solenoid

Caution

- **Do not attempt to keep the EPC switch depressed (minimum line pressure) and stall the transaxle (holding the vehicle with the brake while depressing the throttle with the transaxle in gear). Transaxle damage will result.**

5. Observe the line pressure. Record the value. Line pressure should go to maximum. If not, refer to SYMPTOM TROUBLESHOOTING (refer to page K2–72) or Pinpoint test "E" concerning the EPC solenoid. (refer to page K2–133.)
6. Depress the EPC switch. Line pressure should drop to a minimum value. Record the value. If not, refer to SYMPTOM TROUBLESHOOTING (refer to page K2–72.) or Pinpoint Test "E". (refer to page K2–133.)





Engagement

Note

- For reverse operation, the gear select switch must be in "3/R".

7. Set the Bench/Drive switch to the "DRIVE" mode.
8. Rotate the gear select switch to GEAR SELECT "1".
9. Start the vehicle, rotate the gear select switch to GEAR SELECT "3/R". Line pressure should drop to idle pressure. While holding the EPC switch down, shift the vehicle from PARK to REVERSE.

   - Does the vehicle shift into REVERSE?

   Note

   - Engagement will be harsh and line pressure will be at maximum regardless of the EPC switch during reverse check.

   Shift the vehicle from REVERSE to PARK.

10. Rotate the gear select switch to GEAR SELECT "1". Depress the EPC switch. Line pressure should drop to idle pressure. While holding the EPC switch down, shift the vehicle from PARK to DRIVE.

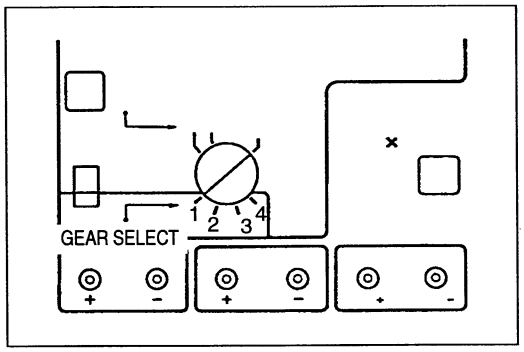
    - Does the vehicle shift into DRIVE?
    - Was the engagement smooth?

    Shift the vehicle from DRIVE to PARK.
    Release the EPC switch. Line pressure should return to maximum. Repeat steps 9 and 10 for engagements. With the EPC switch released, engagements should be firm.

Upshift/Downshift

Note
- GEAR SELECT SWITCH must be in GEAR SELECT "3/R" to get REVERSE gear.
- Upshifts and downshifts will be FIRM during this procedure.
- Pressure gauges may be removed from the vehicle during these tests.
- These tests should be performed on the road. If they are performed on the hoist, the technician may not feel all of the shifts when they are engaged.
- LED's will turn "green" when solenoids are activated and turn "off" when deactivated. Refer to the appropriate overlay for the proper status/shift sequence of the shift solenoids during upshift and downshift.

Caution
- **Selector lever must be in the D range position or internal damage could result. Do not shift to 2 or 1 range position.**



11. Verify that the gear select switch is in 1st gear position. Move the selector lever into the D range. Depress the 3–2 T/CCS button and accelerate the vehicle. If there is no vehicle movement, inspect the forward one-way clutch. If movement occurs, proceed to step 12 and continue diagnosis.
12. Verify that the gear select switch is in the "1" position. Move the selector shift lever into D range and accelerate to **5 km/h {15 mph}**. Select second gear by rotating the gear selector to "2" position.

    - Did the vehicle upshift to second gear?
    - Did the appropriate shift solenoids activate/deactivate?

13. Accelerate to **40 km/h {25 mph}** and select "3" position.

    - Did the vehicle upshift to third gear?
    - Did the appropriate shift solenoids activate/deactivate?

14. Accelerate to **56—72 km/h {35—45 mph}** and select "4" position.

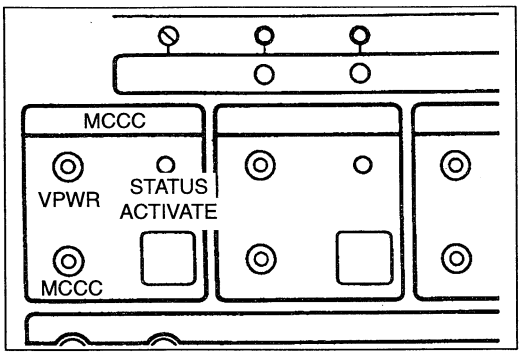
    - Did the vehicle upshift to fourth gear?
    - Did the appropriate shift solenoids activate/deactivate?

    Caution
    - **The vehicle must below 56 km/h {35 mph} before selecting gear select "1" position, or the transaxle could overrun.**

15. Reverse the order to downshift.

    Note
    - 4–3 downshift will be harsh when using the transaxle tester.

    - Does the vehicle down shift from forth gear to third gear, third gear to second gear, and second gear to 1st gear?.
    - Did the appropriate shift solenoids activate/deactivate?



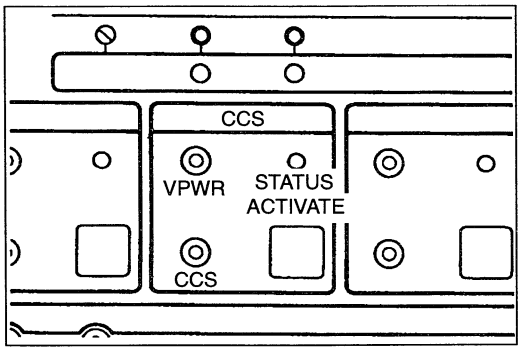
Torque Converter Clutch (TCC) Engagement

Note
- This test should be performed on the road. If it is performed on a hoist, the technician may not feel the torque converter clutch engage.

Caution
- **Do not depress the TCC switch with the transaxle in gear and the vehicle at a stop. Damage to converter clutch may result.**

16. Accelerate and shift the vehicle up into third gear. Hold the speed steady and depress the TCC switch.

    - Does the converter engage?
    - Does the engine rpm drop?
    - Did the TCC solenoid activate?



3–2 Timing/Coasting Clutch (3–2T/CCS) Engagement

Note
- This test should be performed on the road. If it is performed on the hoist, the technician may not feel the 3–2 timing/coasting clutching disengage.

17. Accelerate and upshift the vehicle into 2nd gear. Go to closed throttle. Depress the 3–2T/CCS switch.

    - Does the 3–2 timing/coasting clutch disengage?
    - Did the 3–2T/CCS solenoid deactivate (light on)?

18. Remain at closed throttle, then release the 3–2T/CCS switch.

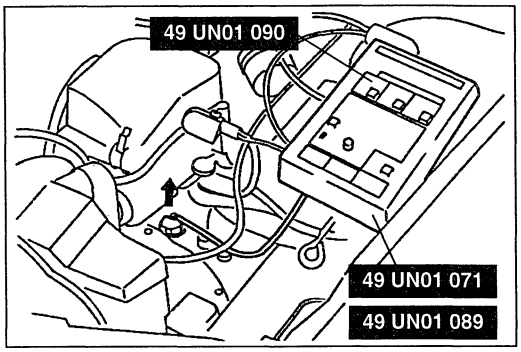
    Note
    - Coast clutch engagement at closed throttle will be harsh.

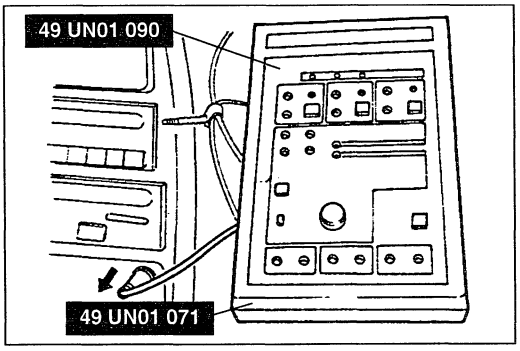
    - Does the 3–2 timing/coasting clutch engage?
    - Did the 3–2 T/CCS solenoid activate (light off)?
    - Did engine braking occur when the throttle was released?

Turbine Shaft Speed Sensor Function Check.

Note
- This test may be performed on the hoist or on the road.

19. Set a voltmeter to 20 volt A.C.
    Connect the positive lead to the (+) TSS jack.
    Connect the negative lead to the (–) TSS jack.
    Slowly accelerate the vehicle and monitor voltmeter.
    - Does the voltage increase with vehicle speed?





Removing the Transaxle Tester and Clearing DTC

Caution
- **Do not attempt to pry off connectors with a screwdriver. This will cause damage to connector and could result in a transaxle concern.**

1. Disconnect the transaxle tester from the solenoid body connector and TSS connector.
2. Reinstall the emission harnesses. Verify the connections by pulling up on the harness.
3. Disconnect the transaxle tester power lead from the vehicle.
4. Erase all DTCs from the continuous test. (Refer to page K2–118.)
5. Rerun the On-Board Diagnostic Test. (Refer to page K2–118.)
6. Based on the transaxle tester testing results, proceed to the appropriate segment of this section for transaxle or electrical/wiring service.
7. Confirm the servicing by repeating transaxle tester test.

MLP TESTER INSTRUCTION

The transaxle tester allows the technician to operate the electrical portion of the TR switch. The MLP tester usage is divided into five steps.

1. Preliminary testing and diagnosis.
2. Installing the transaxle tester.
3. Testing the TR switch.
4. Testing the Park/Neutral and backup circuits.
5. Removing the transaxle tester and clearing DTCs.

Preliminary Testing and Diagnosis

Before any diagnostic testing is done on a vehicle, some preliminary checks must be performed, as outlined below. Be sure to write down your findings, especially any DTCs found, for future reference.

- Check ATF level and condition.
- Check for add-on items (phones, computers, CB radio etc).
- Visually inspect wiring harness and connector.
- Check for vehicle modifications.
- Verify that the shift linkage is properly adjusted in "OVERDRIVE".
- Verify that TR switch is properly adjusted in "NEUTRAL".
- Verify customer concern.
  - Upshift, Downshift, Coasting, Engagement, Noise/Vibration
- Vehicle must be at normal operating temperature.
- Perform vehicele On-Board Diagnostic Test. (Refer to page K2–118.)
- Record all DTCs.
- Repair all non-transaxle DTCs.

Installing the Transaxle Tester (Set Up Procedures)

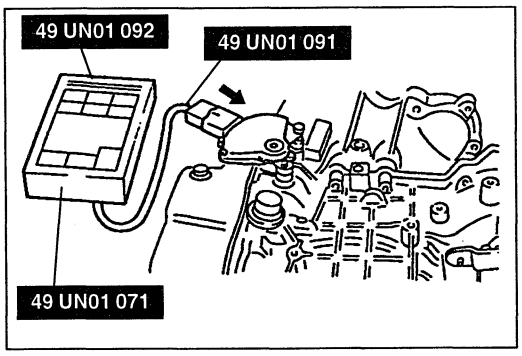
Installing the transaxle tester at the TR switch connector allows the separation of the vehicle electronics from the TR switch electronics.

Note

- During tester usage, additional DTCs may be set. Therefore, it is important that all DTCs are erased after repairs have been made. To verify the elimination of all DTCs, rerun the On-Board Diagnostic Test.

Caution
- **Do not attempt to pry off connectors with a screwdriver. This will damage the connector and could result in a transaxle concern.**

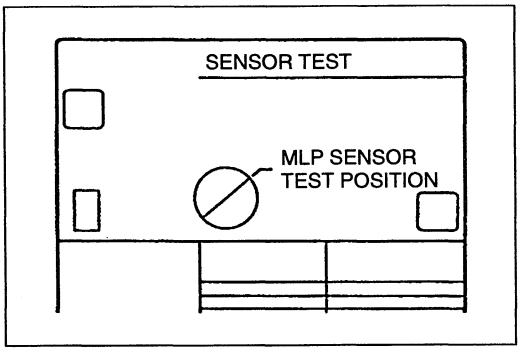
1. Disconnect the emission harness at transaxle TR switch connector.



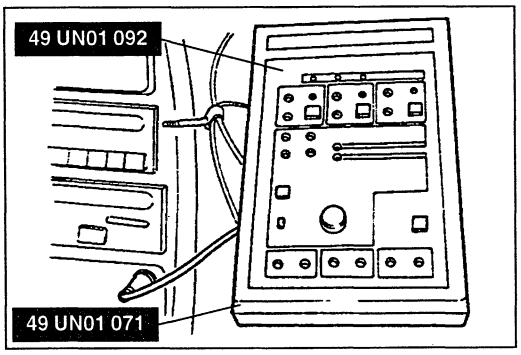
Note
- For in vehicle testing, use the **SST**.

Caution
- **Route all cables away from heat sources.**

2. Set the Bench/Drive switch to "DRIVE" mode. Install the **SST** onto the tester. Connect the interface cable (cable I.D. "D") to the transaxle tester and then to the TR switch connector.



3. Turn the test select switch to the "MLP SENSOR TEST" position.



4. Plug the transaxle tester power supply plug into the cigarette lighter receptacle.
   At this time, all LED's should illuminate for a short period and then turn off. This is the tester internal circuit check.

Testing the TR Switch

Static testing procedures allow for shop testing of the transaxle in the vehicle or on the bench. Completion of these tests prove out the TR switch electronically.

Caution

- **For resistance checks, be sure that the tester select switch is set to the "MLP SENSOR TEST" position or damage to the ohmmeter may result.**

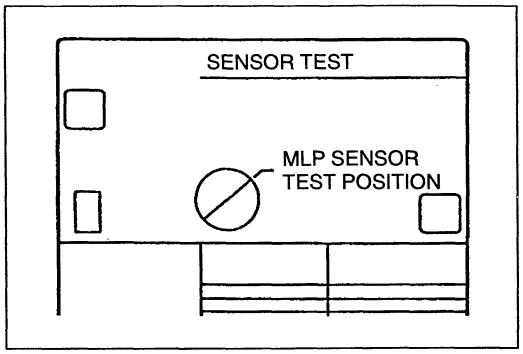
Resistance/Continuity Tests

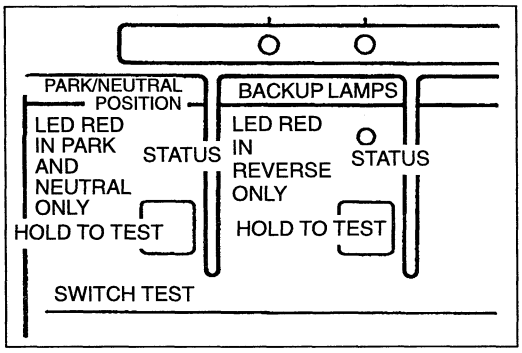
- Using a digital volt-ohmmeter and the transaxle tester, perform the pinpoint test "D" as indicated on page K2–126 based on the DTCs which were displayed.
- Perform repairs as indicated by the pinpoint test. Always retest and road test the vehicle after a repair.

TR Switch resistance tests

TR Switch – Set the ohmmeter to the 1,000 ohm range.
– Connect the positive lead of the ohmmeter to the MLP jack.
– Connect the negative lead of the ohmmeter to the SIGRTN jack.
– Move the selector lever into each range position.
– Record the resistance at each position.
– Refer to the chart for values.
– If out of range, refer to the pinpoint test "D" on page K2–130.

Selector lever position	Resistance (ohms)	
	Minimum	Maximum
P	3,770	4,607
R	1,304	1,593
N	660	807
D	361	442
2	190	232
1	78	95

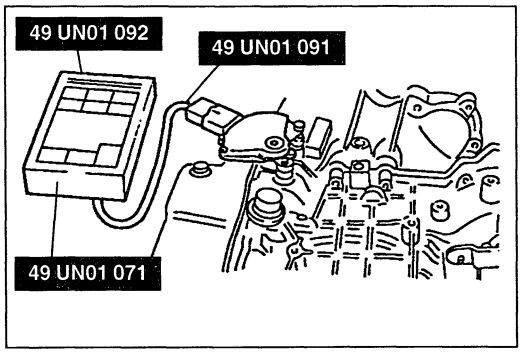


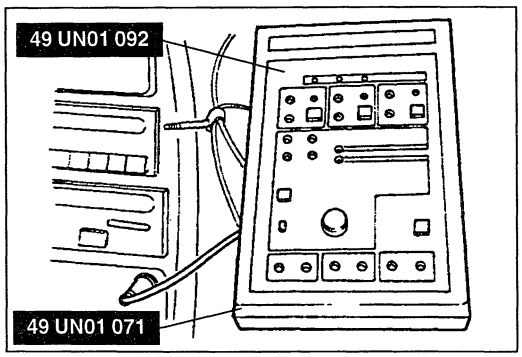


Park/Neutral backup light and optional circuit voltage tests

Note
- LED will turn "RED" when the circuit is closed and turn "OFF" when the circuit is open.

1. Set the tester select switch to the "MLP SENSOR TEST" position.
2. Press and hold each button while moving the selector lever through each range position.
3. Monitor each "LED".
4. The status "LED" should indicate "RED" only in the indicated position. Refer to the overelay.
5. If the LED does not indicate "RED" in the desired position, or indicated "RED" in another position, first verify the TR switch alignment and then retest. If the switch fails, then replace.

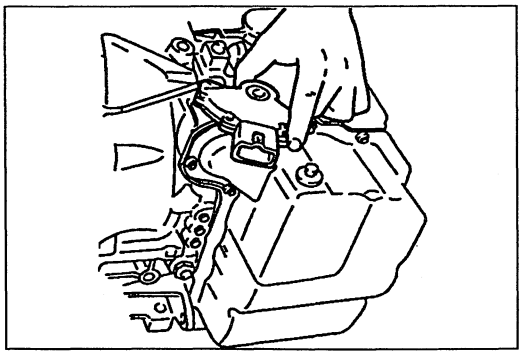




Removing the transaxle tester and clearing DTC

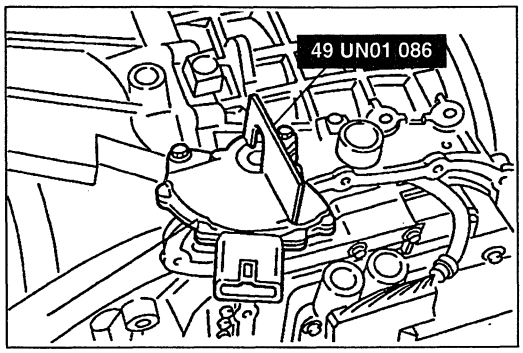
Caution
- **Do not attempt to pry off connectors with a screwdriver. This will damage the connector and could result in a transaxle concern.**

1. Disconnect the transaxle tester from the TR switch connector.
2. Reinstall the emission harness. Verify the connection by pulling up on the harness.
3. Disconnect the transaxle tester power lead from vehicle.
4. Erase all DTCs by using the procedures in Section F3. (Unlatch the center button of the star tester while the codes are being displayed on a KOEO on-board diagnostic test)
5. Return to the on-board diagnostic test.
6. Verify that the customer concern has been eliminated.



Transaxle range switch replacement

1. Disconnect the negative battery cable.
2. Remove the resonance chamber, fresh air duct, and air cleaner assembly.
3. Disconnect the TR switch connector.
4. Remove the TR switch.



5. Shift the transaxle into N position.
6. Install the TR switch on the manual lever shaft.
7. Handly tighten the two mounting bolts.
8. Use the **SST** to align the switch on the shaft and case.
9. Tighten the two mounting bolts.

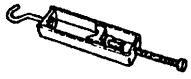
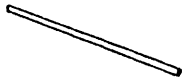
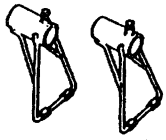
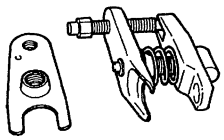
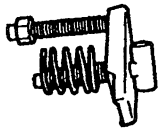
Tightening torque: 9.8 N·m {100 kgf·cm, 86.8 in·lbf}

TRANSAXLE

TRANSAXLE UNIT (REMOVAL)

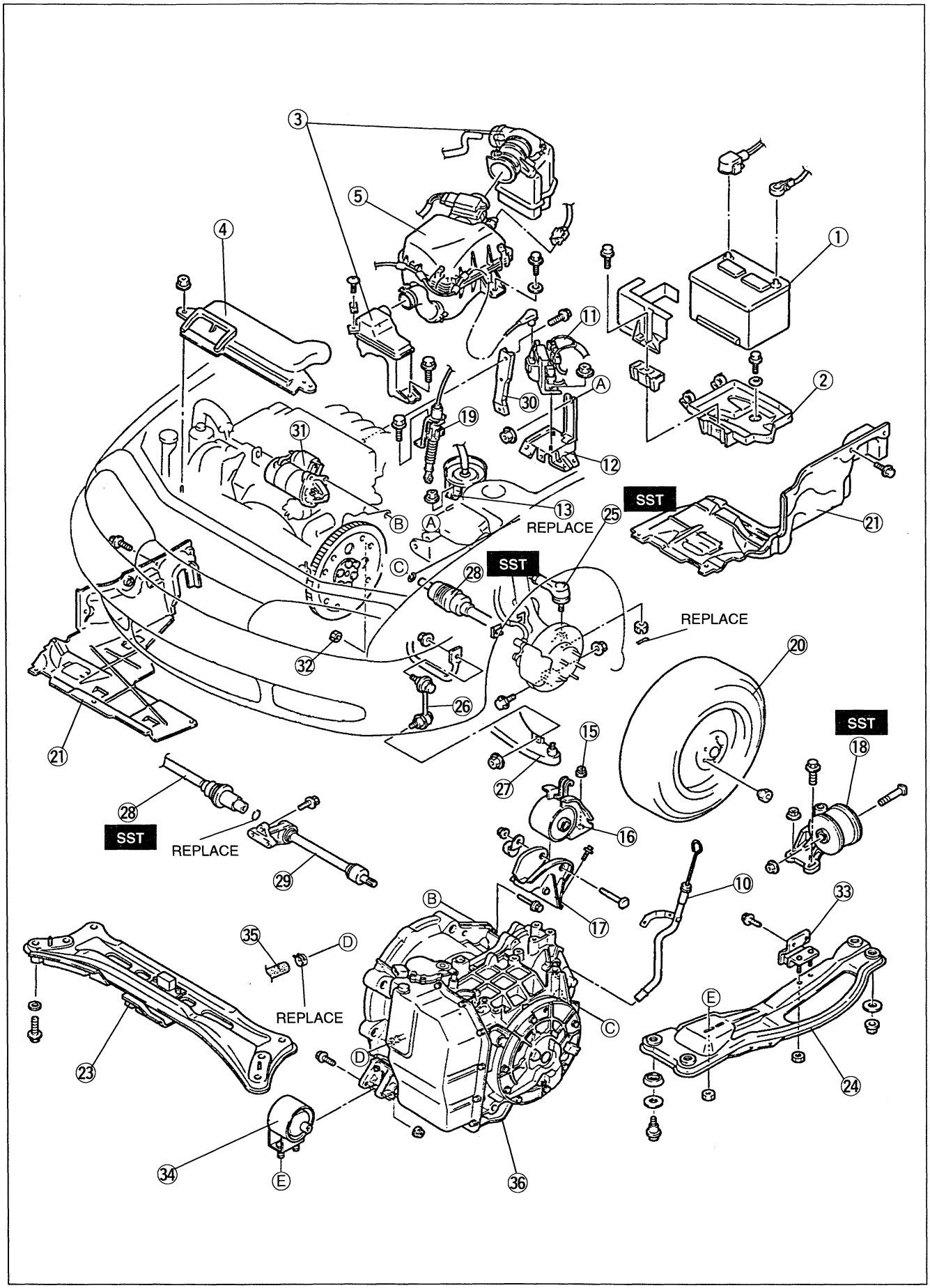
Preparation

SST

49 G017 5A0 Support, engine 	For support of engine	49 G017 503 Hook (Part of 49 G017 5A0) 	For support of engine
49 G017 501 Bar (Part of 49 G017 5A0) 	For support of engine	49 G017 502 Support (Part of 49 G017 5A0) 	For support of engine
49 T028 3A0 Puller, ball joint 	For removal of tie rod end	49 T028 303 Body (Part of 49 T028 3A0) 	For removal of tie rod end
49 T028 304 Attachment (Part of 49 T028 3A0) 	For removal of tie rod end	—	—

Removal

1. Disconnect the negative battery cable.
2. Raise the vehicle on a vehicle hoist.
3. Drain the ATF into a suitable container.
4. Remove in the order shown in the figure, referring to **Removal Note**.


SST
REPLACE
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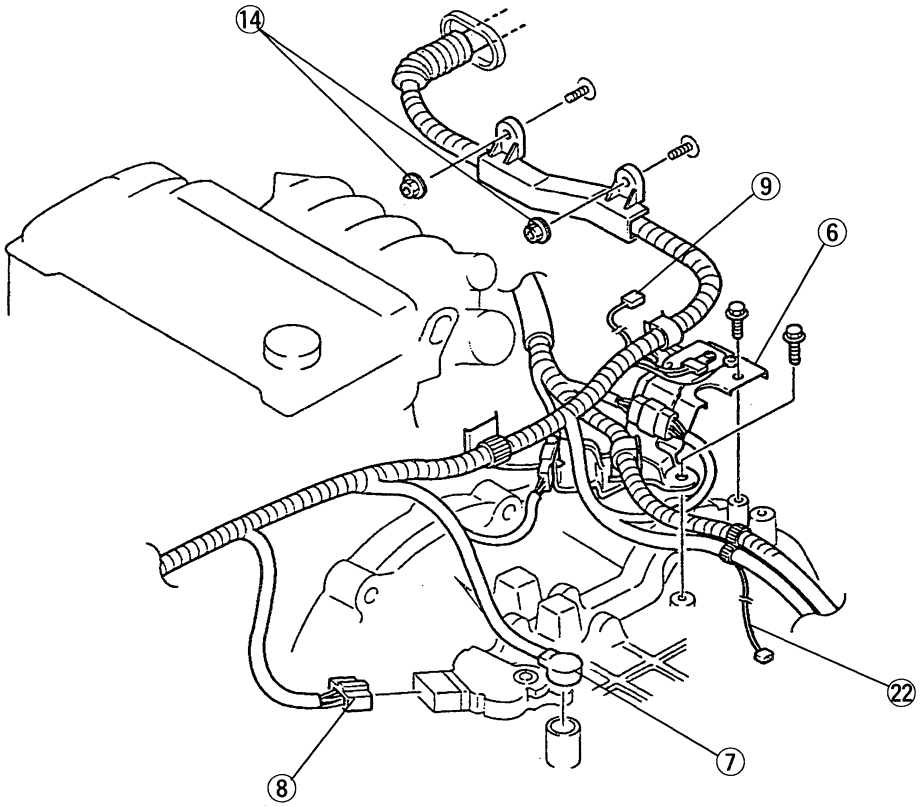
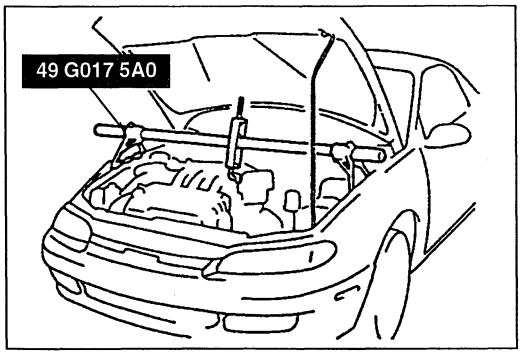
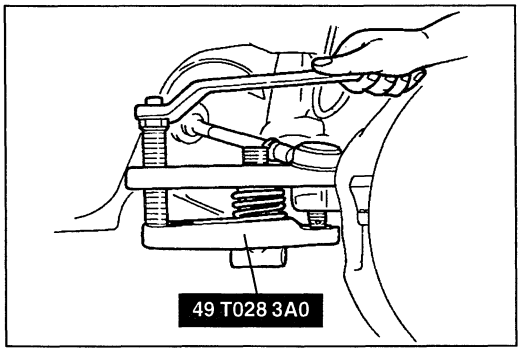
SST



1. Battery
2. Battery carrier
3. Resonance chamber
4. Fresh air duct
5. Air cleaner assembly
6. Ground and bracket
7. Solenoid body connector
8. Transaxle range switch connector
9. Vehicle speedometer sensor connector
10. Oil filler tube
11. Ignition coil
12. Ignition coil bracket
13. Fuel filter mounting nut
14. Emission harness protector nuts
15. No.1 engine mount nut
16. No.1 engine mount rubber
17. No.1 engine mount bracket
18. No.4 engine mount
    Removal Note ..... page K2–42
19. Shift control cable
20. Wheel and tire
21. Splash shield
22. Turbine speed sensor connector
23. Transverse member
24. Engine mounting member
25. Tie rod end
    Removal Note ..... page K2–42
26. Stabilizer control link
27. Lower arm
    Removal Note ..... page K2–42
28. Drive shaft
    Removal Note ..... page K2–42
29. Joint shaft
30. Intake manifold bracket
31. Starter
32. Torque converter nut
33. No.5 engine mount
34. No.2 engine mount
35. Oil hose
36. Transaxle
    Removal Note ..... page K2–43



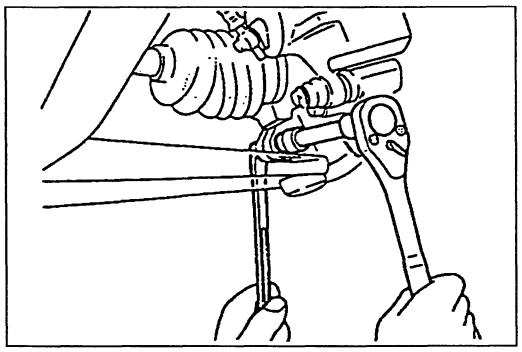
Removal Note
No.4 engine mount
1. Support the engine by using the **SST** before removing the engine mounting member.
2. Remove the No.4 engine mount.



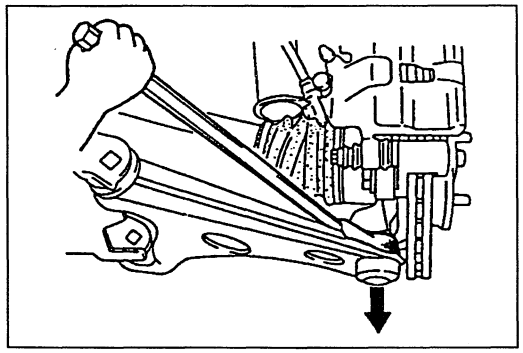
Tie rod end

Caution
- **The sharp edges of the SST can slice the tie rod end dust boot. Install the SST so that the sharp edges are between the dust boot and the tie rod.**

1. Remove the cotter pin and nut.
2. Disconnect the tie rod end from the knuckle by using the **SST**.

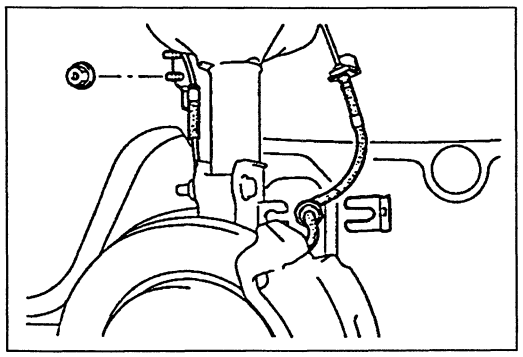


Lower arm
1. Remove the clinch bolt from the lower arm ball joint.

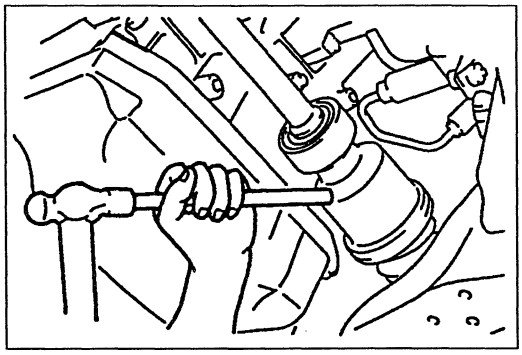


Caution
- **Wrap a rag around the ball joint dust seal to protect it from damage.**

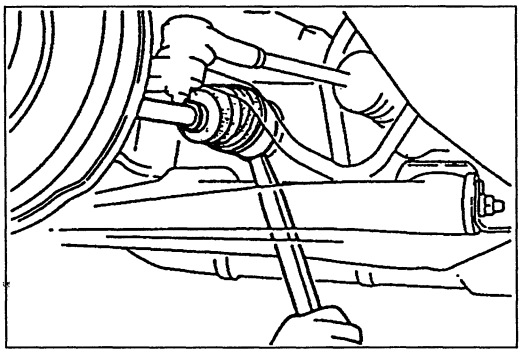
2. Wrap a rag around the ball joint dust boot.
3. Pry the lower arm out of the knuckle.



Drive shaft
1. Remove the clip.
2. Remove the ABS wheel speed sensor harness mounting nuts.



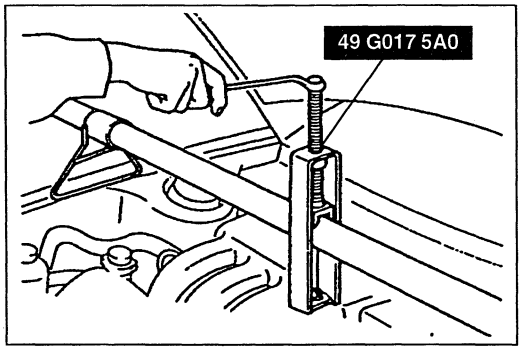
3. Separate the drive shaft (right side) from the joint shaft by using a brass bar and a hammer.



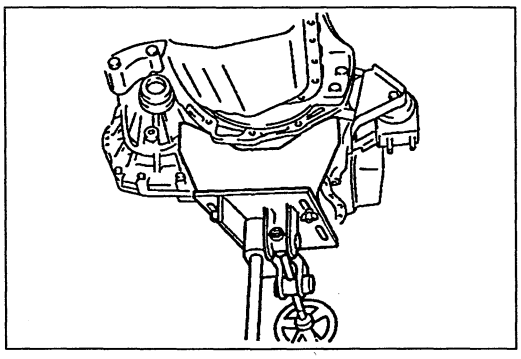
Caution
- **The sharp edges of the drive shaft snap ring can slice or puncture the oil seal. Be careful when removing the drive shaft from the transaxle.**

Note
- Do not pry on the seal surface.

4. Separate the left side drive shaft from the transaxle by prying with a bar inserted between the outer ring and the transaxle, as shown in the figure.
5. Suspend the drive shaft with a rope.



Transaxle
1. Loosen the **SST** (engine support) and lean the engine toward the transaxle.

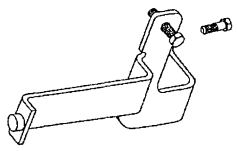
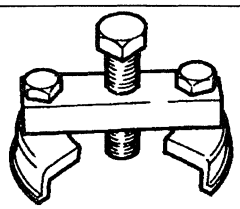


2. Support the transaxle on a jack.
3. Remove the transaxle mounting bolts.
4. Remove the transaxle.

2/4 BAND SERVO (ON-VEHICLE REMOVAL / INSPECTION / INSTALLATION)

Preparation

SST

49 UN01 104 Servo cover remover/ replacer		For installation of 2/4 servo piston	49 UN01 105 Servo piston rod selector 	For installation of 2/4 servo piston

Caution

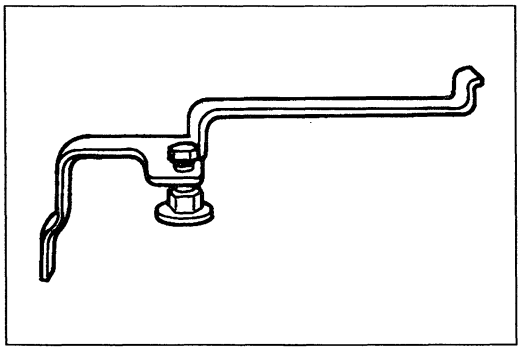
- **Servicing the 2/4 band servo in the vehicle is only recommended in the event of a leak. If servicing is required due to a servo problem, it is necessary to remove and disassemble the transaxle to inspect the 2/4 band assembly and direct clutch for damage.**

On-vehicle Removal

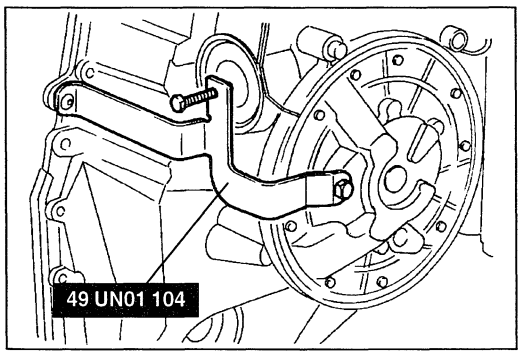
1. Raise and support the vehicle.
2. Remove the splash shield.

Warning

- **The servo cover is under high spring pressure.**



3. Install a nut with an integral washer onto the forcing bolt of the servo cover remover/replacer tool with a permanent thread sealer. This nut and washer will aid in the installation of the cover.



4. Install the **SST** and compress the servo cover assembly.
5. Remove the servo cover retaining ring and release the tension on the servo cover assembly slowly.
6. After releasing all of the tension on the servo cover assembly, remove the **SST**.
7. Remove the servo cover assembly, 2/4 servo piston and return spring.

Inspection

Inspect the 2/4 servo piston and servo cover assembly for nicks or cuts and replace if necessary.

On-vehicle Installation

1. Lubricate the 2/4 servo piston, servo cover, servo cover seal, and servo case bore using ATF or petroleum jelly to aid in the installation and prevent cutting of the seal.
2. Install the 2/4 servo piston and return spring into the transaxle case.

3. Install the **SST**.
4. Tighten the center screw to compress the 2/4 servo into the bore.

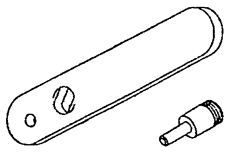
Note
- If the cover will not seat deep enough in the bore to install the servo cover retaining ring, a blunt punch may be used with a small hammer. Gently tap the cover around the outer edge with the punch until the snap ring groove is fully exposed.

5. Install the servo cover retaining ring into transaxle case.
6. Remove the **SST**.
7. Lower the vehicle. Check the fluid level prior to road testing.

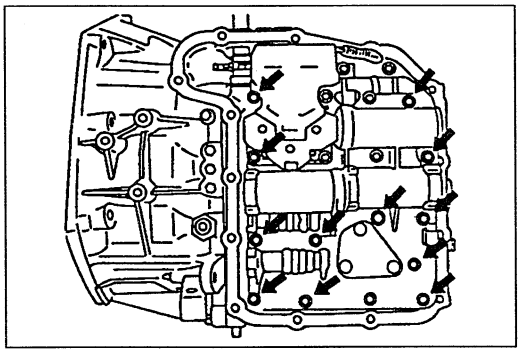
CONTROL VALVE BODY AND TERMOSTATIC OIL LEVEL CONTROL VALVE (ON-VEHICLE REMOVAL / INSTALLATION)

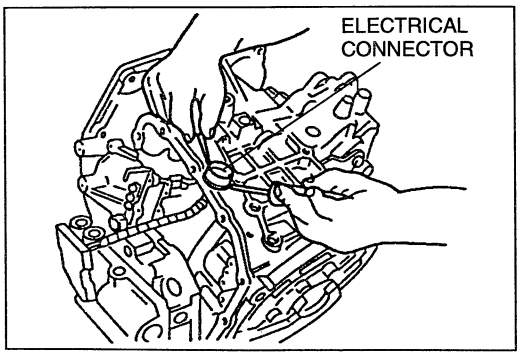
Preparation

SST

49 UN01 085 Shifter shaft alignment tool		For adjustment of shifter shaft

On-vehicle Removal



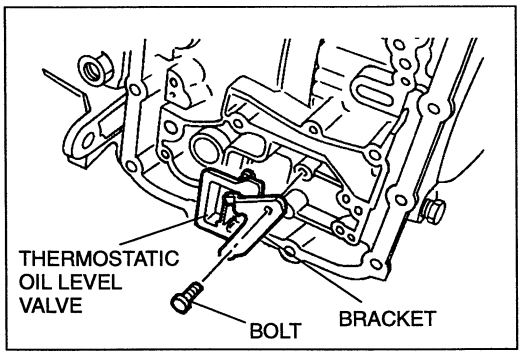


Caution
- **Clean the transaxle exterior thoroughly with a steam cleaner or cleaning solvents before removal.**

1. Remove the following items. (Refer to page K2–39.)
   - Battery
   - Battery carrier
   - Fresh air duct
   - Resonance chamber
2. Disconnect the TR switch connector.
3. Disconnect the solenoid body connector.
4. Drain the ATF.
5. Remove the splash shield.
6. Remove the oil cooler hose.
7. Remove the control valve body cover.
8. Remove the control valve body mounting bolts.

Caution
- **Do not pull on the connector wires or use a hammer on the connector.**

9. Remove the control valve body assembly.



10. If the thermostatic oil level control valve must be removed, remove the bolt and the bracket. Pull the thermostatic oil level control valve straight out of the transaxle case.

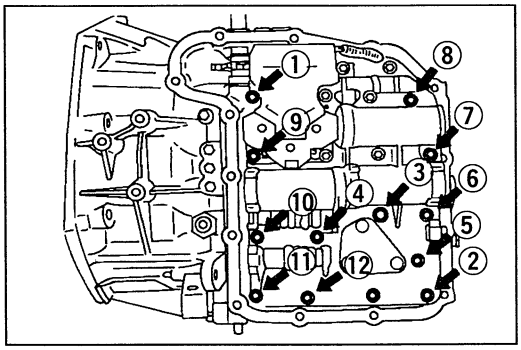
On-vehicle Installation

1. If the thermostatic oil level control valve was removed, insert it into the transaxle case and install the bracket and bolt.

   Tightening torque:
   11—13 N·m {112—133 kgf·cm, 96—117 in·lbf}

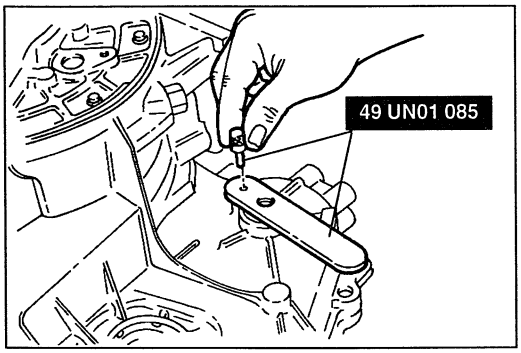
2. Install a new O-ring on the solenoid electrical connector and lightly coat the O-ring with petroleum jelly.

   Caution
   - **Do not pull wires or damage connector body.**

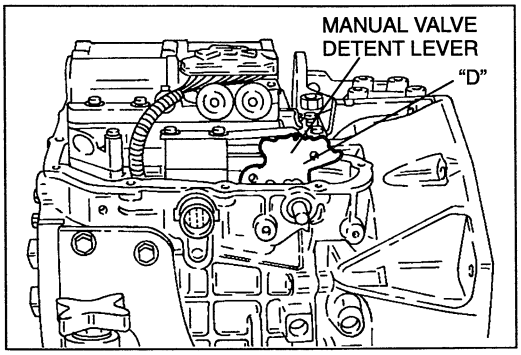


3. Place the control valve body slightly away from the transaxle case and push the solenoid body connector into its bore.
4. Align the Z-link in the manual valve.
5. Install the 12 mounting bolts. Tighten the mounting bolts in the sequence shown.

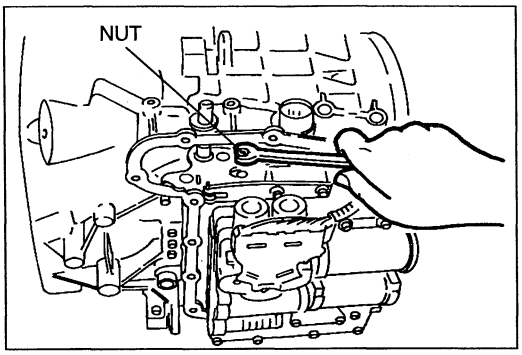
   Tightening torque:
   9—11 N·m {92—112 kgf·cm, 80—97 in·lbf}

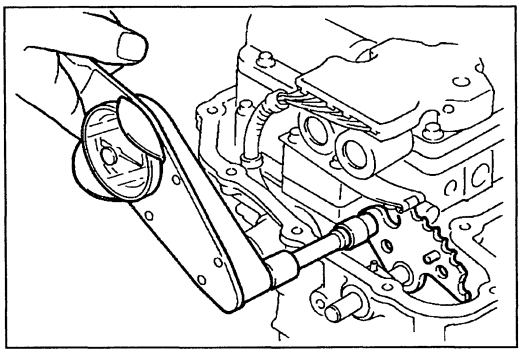


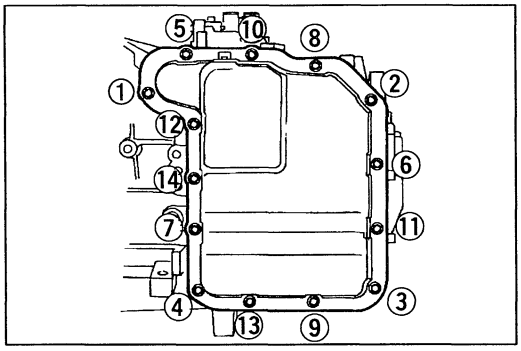
6. Loosen the nut on the ball stud for the manual valve detent actuating rod.
7. Remove the manual lever control shaft outer lever.
8. Use the **SST** to move the shaft to the D range position and install the pin to hold the tool in position.



9. Move the manual valve detent lever to the D range position.







10. Loosen the nut on the ball stud for the manual valve detent lever actuating rod assembly.
11. Initially tighten the nut on the ball.
    Remove the shifter pin.

12. Rotate the **SST** until the socket can be installed on the nut. Tighten the manual valve detent lever ball stud nut.

    Tightening torque:
    11—13 N·m {112—133 kgf·cm, 96—117 in·lbf}

13. Remove the pin and **SST**.
14. Install the manual control lever assembly and bolt.

    Tightening torque:
    24—30 N·m {2.4—3.1 kgf·m, 18—22 ft·lbf}

15. Install the control valve body cover gasket on the case. Attach the cover to the case.
16. Install the fourteen mounting bolts in the sequence shown.

    Tightening torque:
    14—18 N·m {143—184 kgf·cm, 127—138 in·lbf}

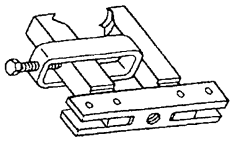
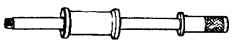
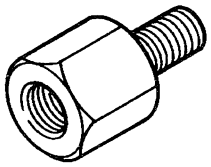
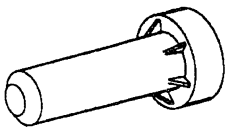
    Caution
    - **If reusing the hose clamp, position it in the original location on the hose and squeeze the clamp lightly with large pliers to ensure a tight fit.**

17. Align the marks, and slide the oil cooler hose onto the oil cooler pipe until it is fully seated.
18. Install the hose clamp onto the hose at the center of the mark and at the angle shown.
19. Verify that the hose clamp does not interfere with any other parts.
20. Slide the radiator hose onto the radiator pipe until it is fully seated.
21. Install the hose clamp on the hose.
22. Squeeze it lightly with large pliers to ensure a good fit.
23. Connect the TR switch connector.
24. Connect the solenoid body connector.
25. Install the following items. (Refer to page K2–55.)
    - Battery
    - Battery carrier
    - Fresh air duct
    - Resonance chamber
26. Fill the transaxle with the specified ATF.
    (Refer to page K2–22.)
27. Check for leakage of ATF from the oil pan or the oil hose connecting points. (Refer to page K2–22.)
28. Carry out the mechanical system test.
    (Refer to page K2–10.)
29. Carry out the road test. (Refer to page K2–15.)

DIFFERENTIAL OIL SEALS (ON-VEHICLE REMOVAL / INSTALLATION)

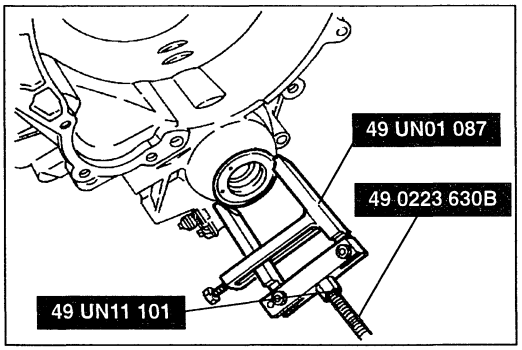
Preparation

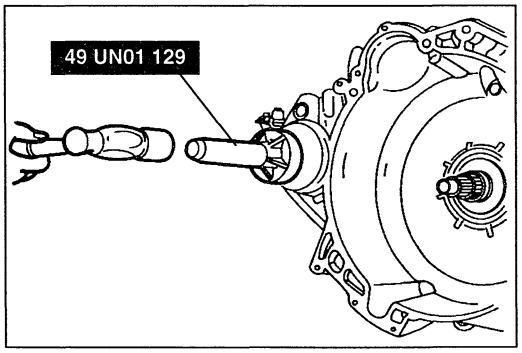
SST

49 UN01 087 Converter seal remover 	For removal of seal	49 0223 630B Axle shaft puller 	For removal of seal
49 UN11 101 Threaded adapter 	For removal of seal	49 UN01 129 Seal replacer 	For installation of seal

On-vehicle Removal

1. Raise and support the vehicle on safety stands.
2. Remove the front wheels.
3. Drain the ATF.
4. Remove the drive shaft and joint shaft. (Refer to section M.)
5. Remove the differential seals using the **SSTs** or equivalent.





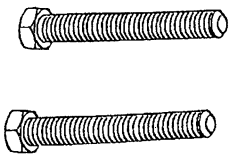
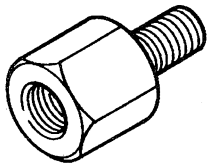
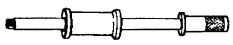
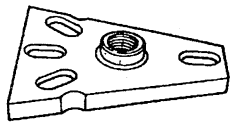
On-vehicle installation

1. Apply a thin coat of petroleum jelly on the outer diameter and the lip of the new differential seals.
2. Use the **SST** to tap in the differential seals.
3. Install the drive shaft and joint shaft. (Refer to section M.)
4. Install the front wheels.
5. Refill the ATF.

ATF LEAK FROM OIL PUMP BODY SEAL

Preparation

SST

49 UN01 100 Oil pump removal bolts 	For removal of oil pump	49 UN11 101 Threaded adapter 	For removal of oil pump
49 0223 630B Axle shaft puller 	For removal of oil pump	49 8501 631A Adapter 	For removal of oil pump

Issue

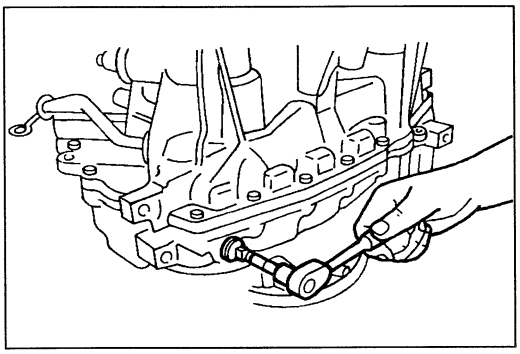
Some vehicles may leak fluid from the pump-to-case interface area of the transaxle. This may be caused by the pump body seal being rolled or pinched during installation.

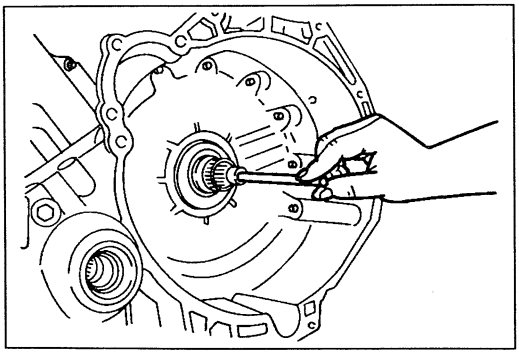
Action

If a fluid leak is detected in the pump-to-case interface area, refer to the following service procedure to replace the pump body seal.

Caution

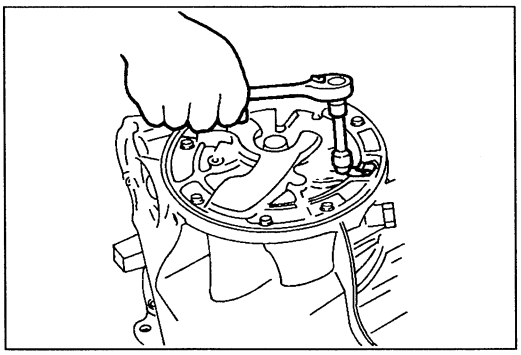
- **This procedure does not require complete teardown of the transaxle and should only be used for leak concerns. If replacement of the pump body or pump support is required, the transaxle must be disassembled and reassembled. The components will be misaligned if this repair is performed while the transaxle is still in the vehicle.**



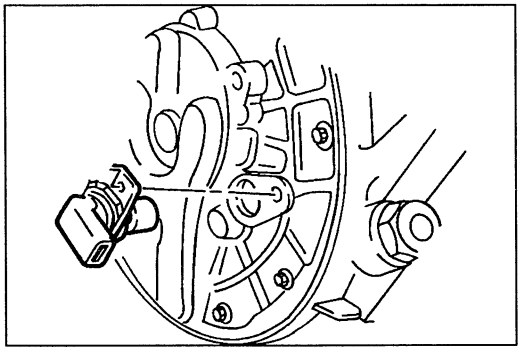


Procedure

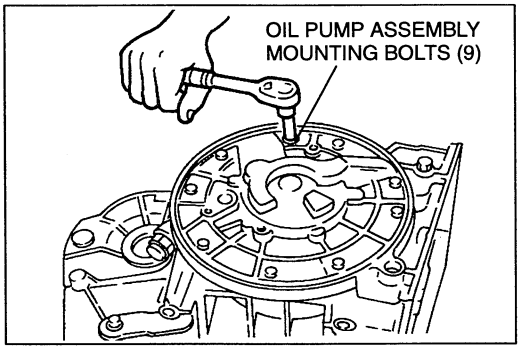
1. Remove the transaxle from the vehicle. (Refer to page K2–39.)
2. Remove the torque converter from the transaxle and drain.
3. Remove the transaxle drain plug from the transaxle case. Allow the transaxle to drain completely.
4. Remove the pump drive shaft.



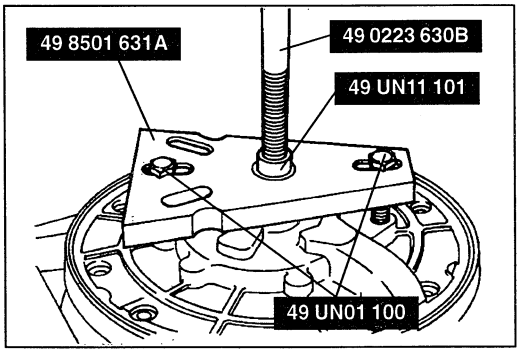
5. Position the transaxle with the pump facing up and remove the TSS sensor mounting bolt.



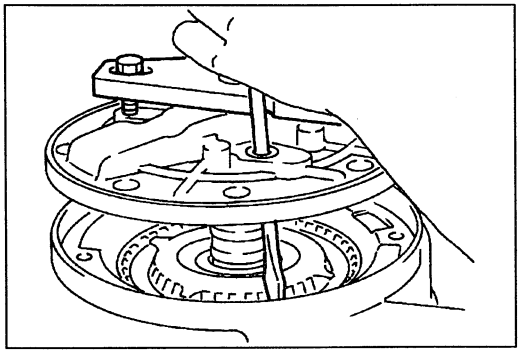
6. Separate the TSS sensor from the pump.



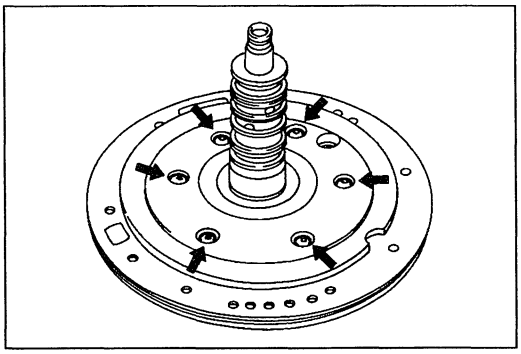
7. Remove the nine (9) pump mounting bolts.



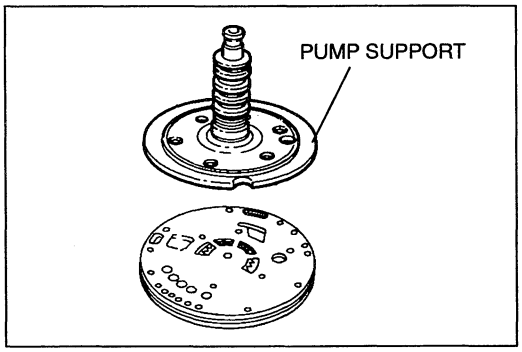
8. Install the **SSTs** on the pump.



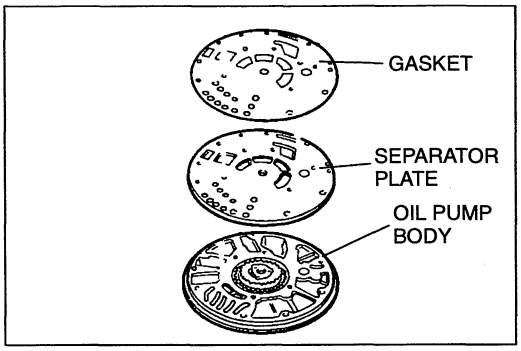
9. Install a large screwdriver through the TSS sensor hole. Do not locate the screwdriver on the reverse clutch hub tabs.
10. Remove the pump while holding the components into the case with the screwdriver. Remove the #1 thrust bearing. This bearing may be attached to the pump support or on the reverse clutch hub.



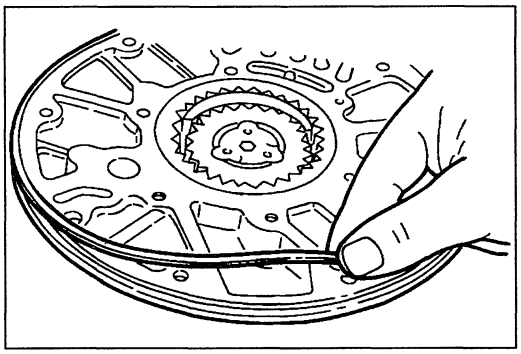
11. Remove the pump support mounting bolts.



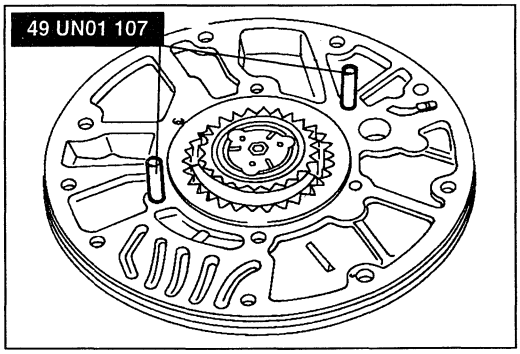
12. Remove the pump support.



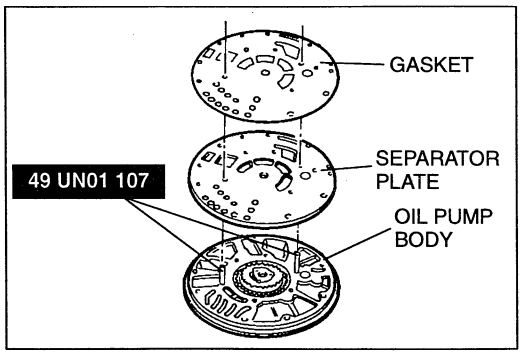
13. Remove the pump-to-case gasket and separator plate and discard the gasket.



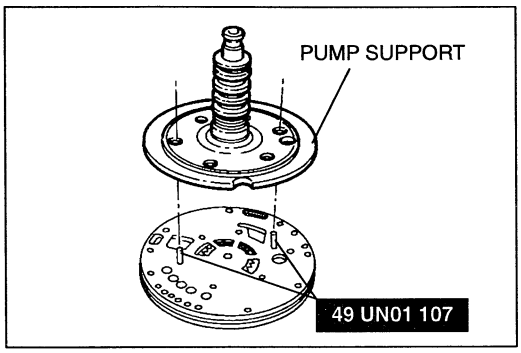
14. Remove the pump seal and discard.



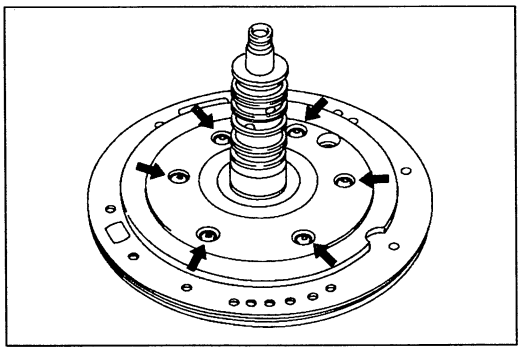
15. Install the **SST** in the holes. Use the bolt hole next to the TSS sensor hole and the bolt hole opposite it for the **SST**.



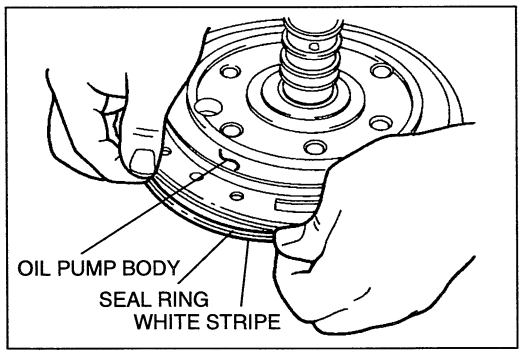
16. Install the separator plate and new gasket.



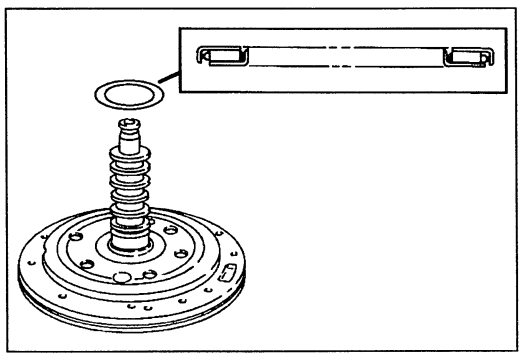
17. Install the pump support.



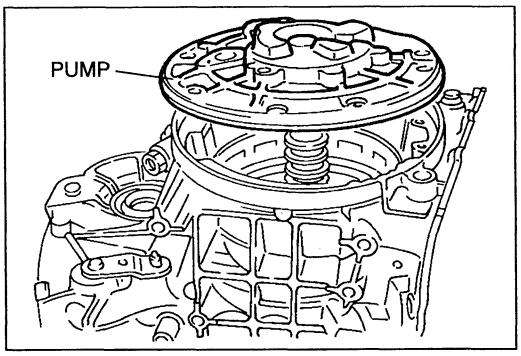
18. Install four (4) mounting bolts and tighten the bolts to 13 N·m (10 lb·ft).
19. Remove the **SST** and install and torque the remaining two (2) bolts to 13 N·m (10 lb·ft).



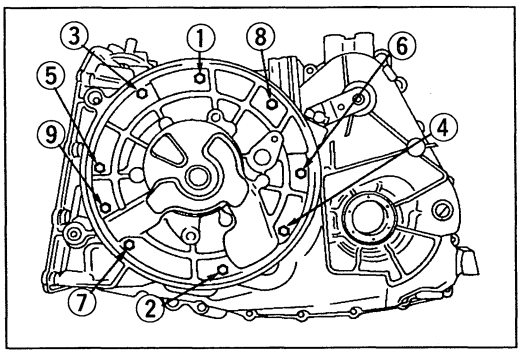
20. Install the new pump seal. Ensure that the white stripe is visible all around the pump.
21. Visually inspect the case flange for damage or burrs.



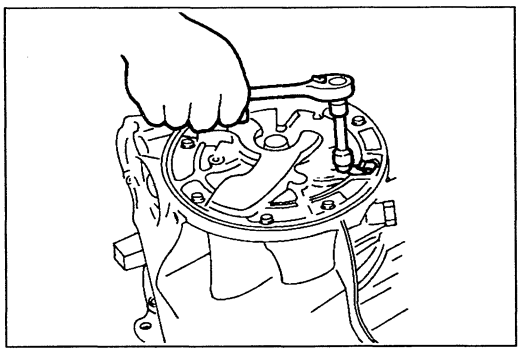
22. Lubricate the #1 thrust bearing with petroleum jelly and install on the pump support.



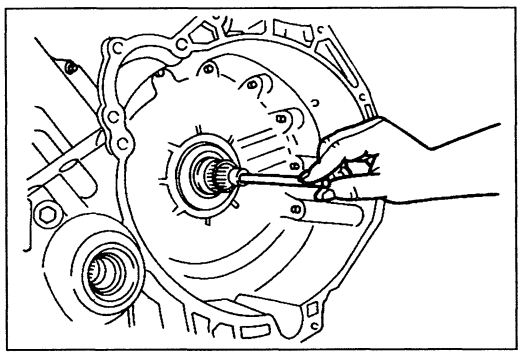
23. Lubricate the pump support seals and the pump bore in the case.
24. Lower the pump assembly into the case.



25. Install the nine (9) pump mounting bolts and torque to 13 N·m (10 lb·ft).



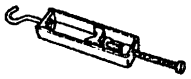
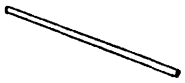
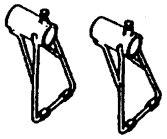
26. Install the TSS sensor and mounting bolt and tighten to 14 N·m (10 lb·ft).



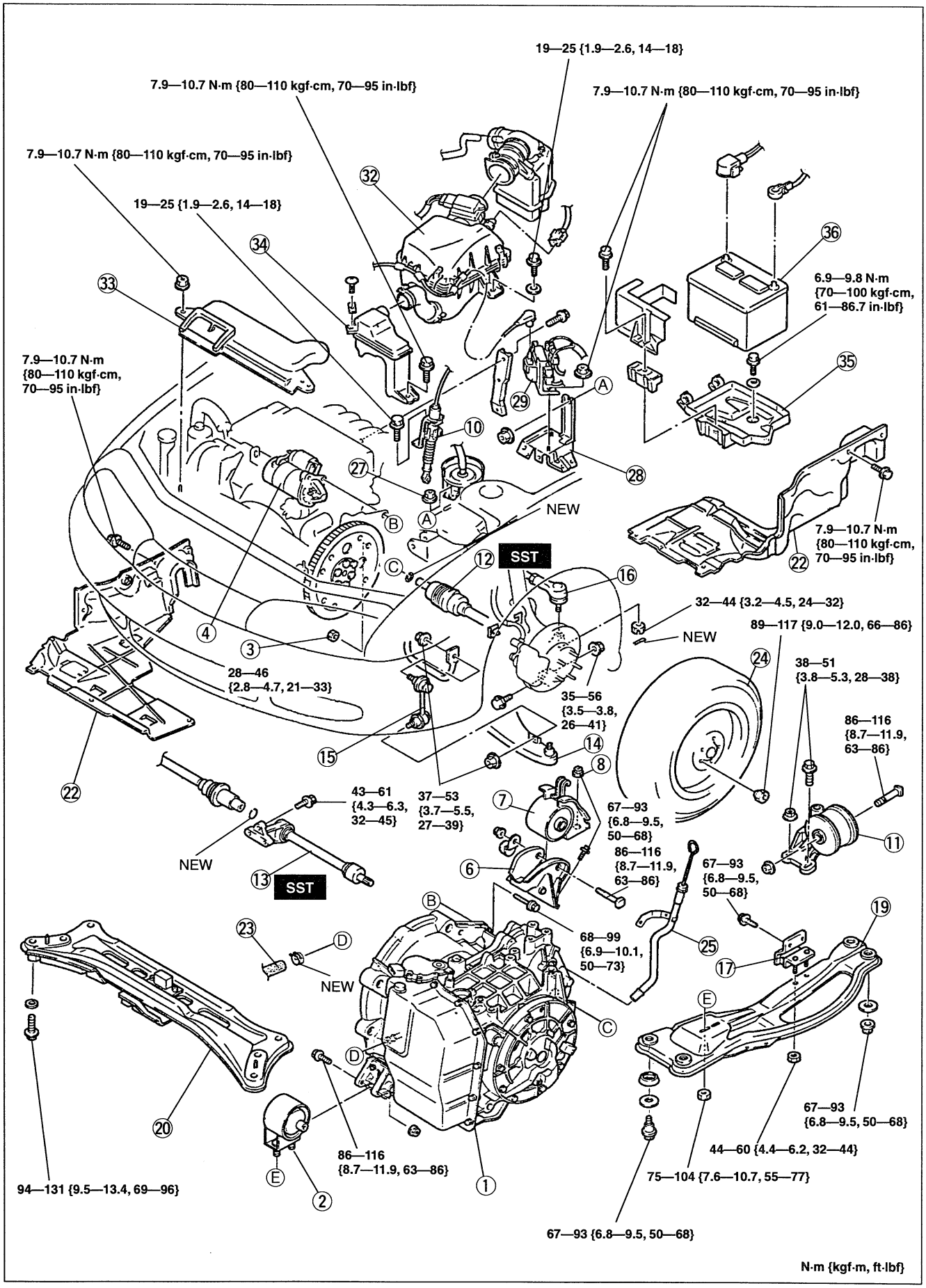
27. Install the pump drive shaft.
28. Install the torque converter into the transaxle.
29. Reinstall the transaxle into the vehicle. (Refer to page K2–55.)

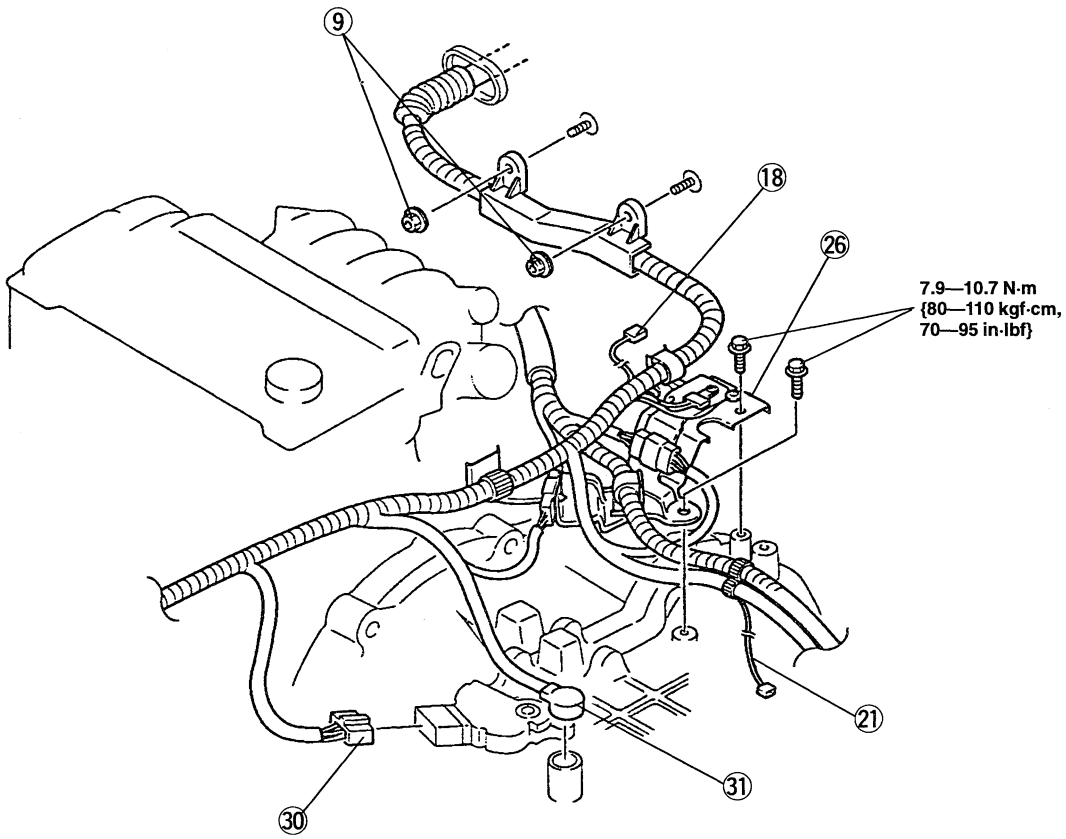
MEMO

TRANSAXLE UNIT (INSTALLATION)
Preparation
SST

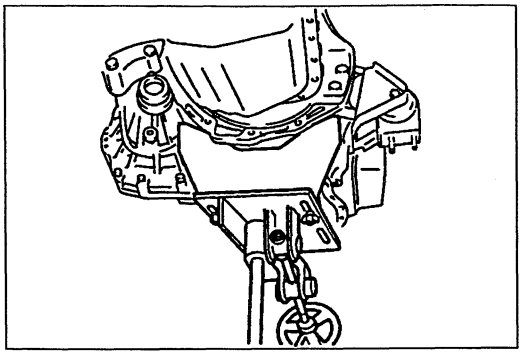
49 G017 5A0 Support, engine 	For support of engine	49 G017 503 Hook (Part of 49 G017 5A0) 	For support of engine
49 G017 501 Bar (Part of 49 G017 5A0) 	For support of engine	49 G017 502 Support (Part of 49 G017 5A0) 	For support of engine

Installation
1. Install in the order shown in the figure, referring to **Installation Note**.
2. Fill the transaxle with the specified ATF after installation. (Refer to page K2–22.)
3. Check for leakage of ATF from all connecting points. (Refer to page K2–22.)
4. Carry out the mechanical system test. (Refer to page K2–10.)
5. Carry out the road test. (Refer to page K2–15.)


19—25 {1.9—2.6, 14—18}
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}
19—25 {1.9—2.6, 14—18}
6.9—9.8 N·m {70—100 kgf·cm, 61—86.7 in·lbf}
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}
NEW
SST
32—44 {3.2—4.5, 24—32}
NEW
89—117 {9.0—12.0, 66—86}
38—51 {3.8—5.3, 28—38}
86—116 {8.7—11.9, 63—86}
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}
28—46 {2.8—4.7, 21—33}
35—56 {3.5—3.8, 26—41}
43—61 {4.3—6.3, 32—45}
37—53 {3.7—5.5, 27—39}
67—93 {6.8—9.5, 50—68}
86—116 {8.7—11.9, 63—86}
67—93 {6.8—9.5, 50—68}
NEW
SST
68—99 {6.9—10.1, 50—73}
NEW
94—131 {9.5—13.4, 69—96}
86—116 {8.7—11.9, 63—86}
44—60 {4.4—6.2, 32—44}
67—93 {6.8—9.5, 50—68}
75—104 {7.6—10.7, 55—77}
67—93 {6.8—9.5, 50—68}
N·m {kgf·m, ft·lbf}



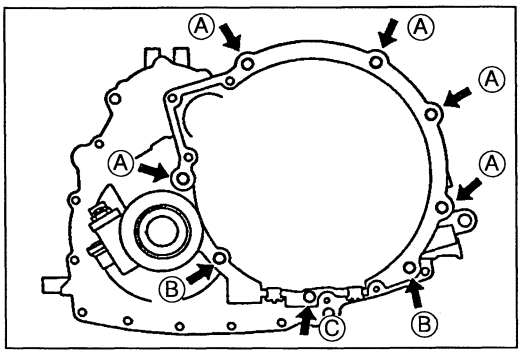
1. Transaxle
   Installation Note ..... page K2–58
2. No.2 engine mount
3. Torque converter nut
4. Starter
5. Intake manifold bracket
6. No.1 engine mount bracket
7. No.1 engine mount rubber
8. No.1 engine mount nut
9. Emission harness protector nuts
10. Shift control cable
11. No.4 engine mount
12. Drive shaft
    Service ..... section M
13. Joint shaft
    Service ..... section M
14. Lower arm
    Installation Note ..... page K2–58
15. Stabilizer control link
16. Tie rod end
    Installation Note ..... page K2–59
17. No.5 engine mount
18. Vehicle speedometer sensor connector
19. Engine mounting member
    Installation Note ..... page K2–59
20. Transverse member
21. Turbine speed sensor connector
22. Splash shield
23. Oil hose
    Installation Note ..... page K2–60
24. Wheel and tire
25. Oil filler tube
26. Ground and bracket
27. Fuel filter mounting nut
28. Ignition coil bracket
29. Ignition coil
30. Transaxle range switch connector
31. Solenoid body connector
32. Air cleaner
33. Fresh air duct
34. Resonance chamber
35. Battery carrier
36. Battery



Installation Note
Transaxle

Warning
- **Do not allow the transaxle to fall from the jack.**

1. Set the transaxle on a jack and lift it into place.



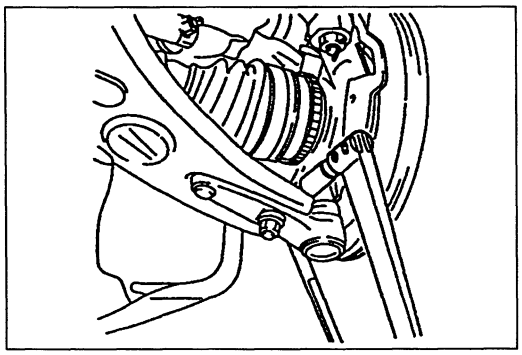
2. Install the transaxle mounting bolts.

Tightening torque
Ⓐ: 90—116 N·m {9.1—11.9 kgf·m, 66—86 ft·lbf}
Ⓑ: 38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}
Ⓒ: 19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

3. Install the torque converter nuts.

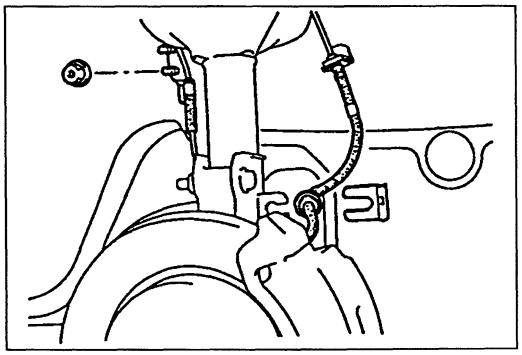
Tightening torque:
28—46 N·m {2.8—4.7 kgf·m, 21—33 ft·lbf}

4. Handly tighten the No.4 engine mount nuts.



Lower arm
1. Connect the lower arm to the knuckle and tighten the clinch bolt.

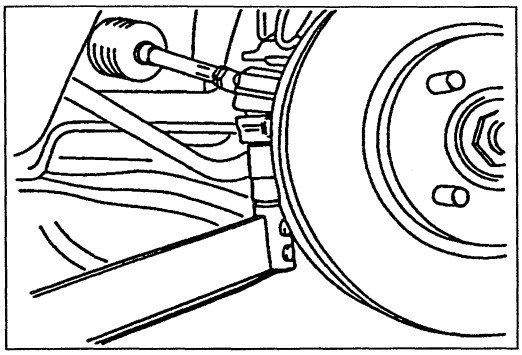
Tightening torque:
37—53 N·m {3.7—5.5 kgf·m, 27—39 ft·lbf}



2. Install the ABS wheel speed sensor harness mounting nuts.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 69.5—95.4 in·lbf}

3. Install the clip.

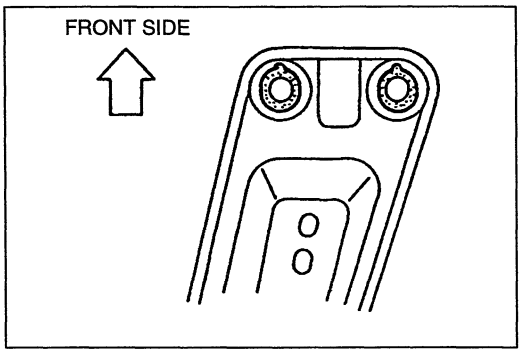


Tie rod end

1. Install the locknut.

   Tightening torque:
   32—44 N·m {3.2—4.5 kgf·m, 24—32 ft·lbf}

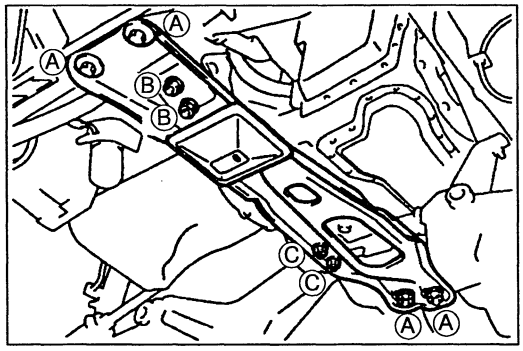
2. Secure the locknut by using a new cotter pin.



Engine mounting member

Note

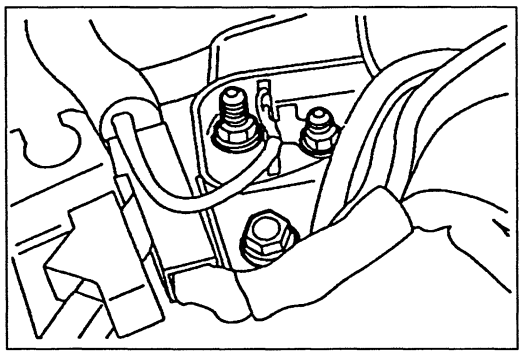
- Verify that the engine mount rubbers are installed as shown.
- Put the No.2 engine mount stud bolts in the installing holes when installing the engine mounting member.



1. Install the bolts and nuts Ⓐ as shown.

   Tightening torque
   A: 67—93 N·m {6.8—9.5 kgf·m, 50—68 ft·lbf}

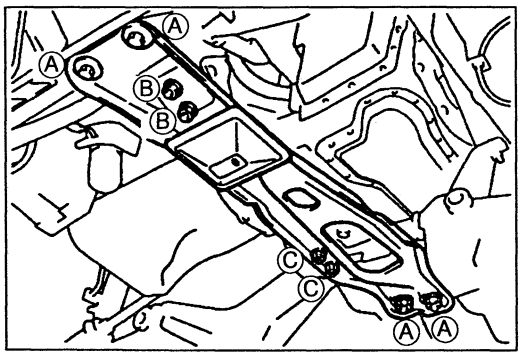
2. Handly tighten the nuts Ⓑ and Ⓒ as shown.



3. Tighten the No.4 engine mount nuts and bolts.

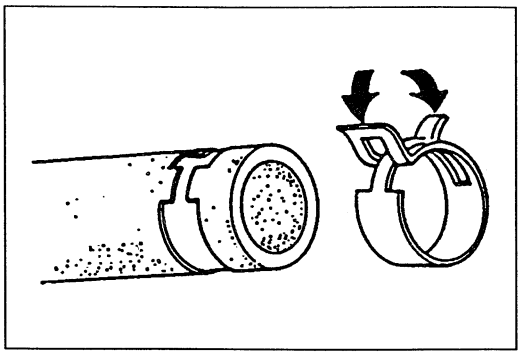
   Tightening torque:
   38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

4. Remove the **SST** (engine support).



5. Tighten the nuts Ⓑ and Ⓒ as shown.

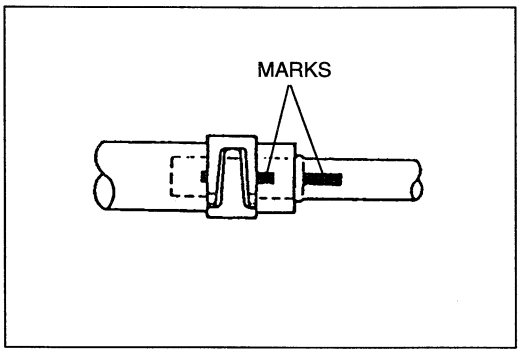
   Tightening torque
   B: 75—104 N·m {7.6—10.7 kgf·m, 55.0—77.3 ft·lbf}
   C: 44—60 N·m {4.4—6.2 kgf·m, 32—44 ft·lbf}



Oil hose

Caution

- **If reusing the hose clamp, position it in the original location on the hose and squeeze the clamp lightly with large pliers to ensure a tight fit.**



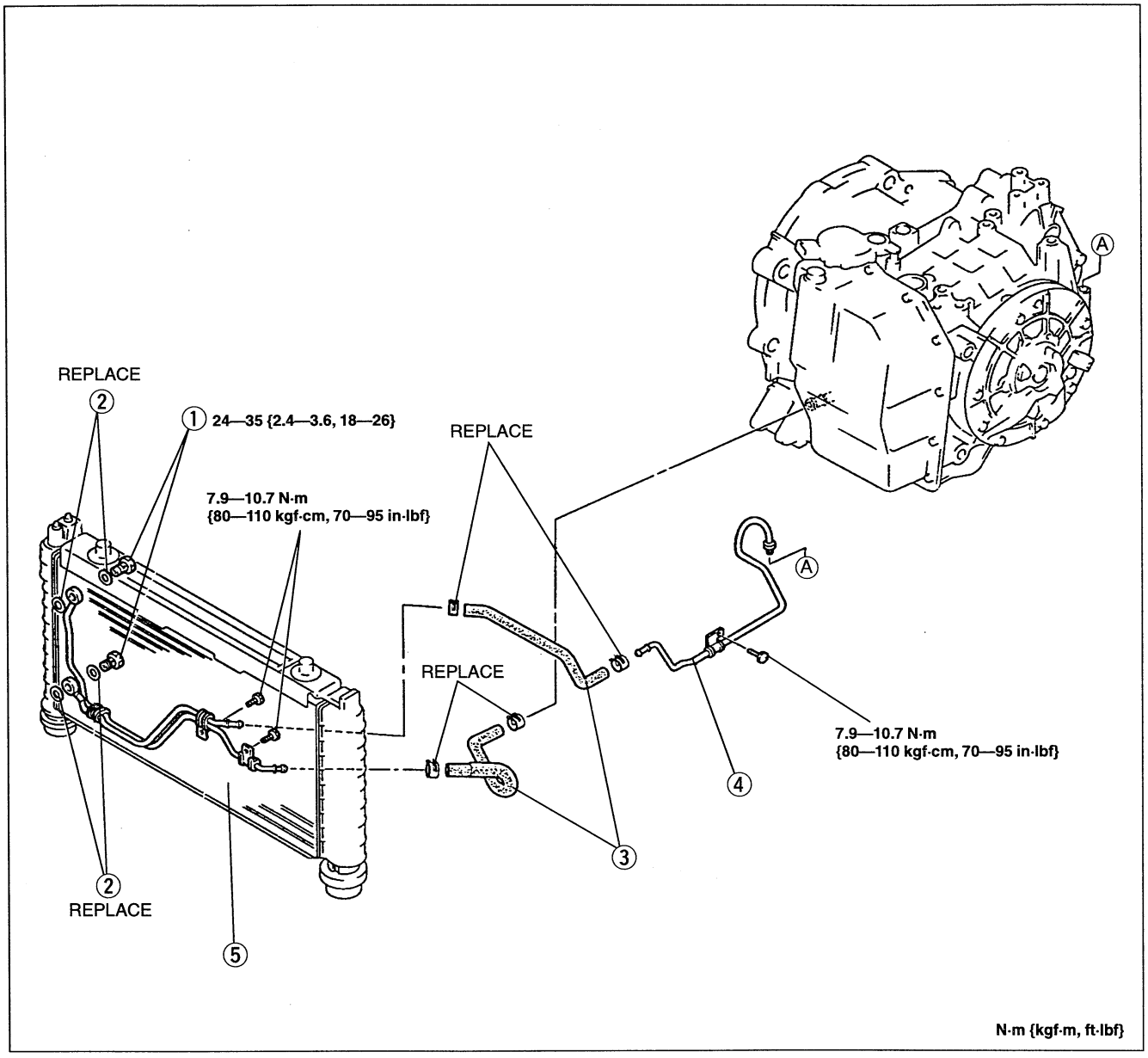
1. Align the marks, and slide the oil cooler hose onto the oil cooler pipe until it is fully seated as shown.
2. Install the hose clamp onto the hose at the center of the mark and at the angle shown.
3. Verify that the hose clamp does not interfere with any other parts.

OIL COOLER

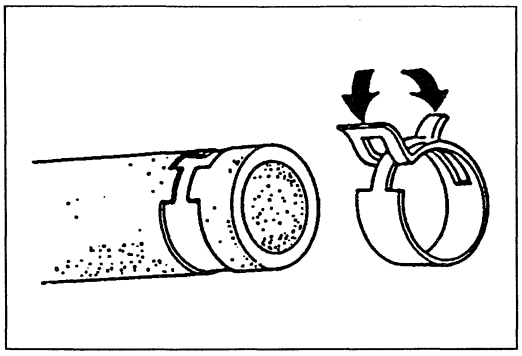
OIL COOLER

Removal / Inspection / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. Add ATF to the specified level.
5. Connect the negative battery cable.
6. Inspect for oil leakage from the oil pipes and oil hoses.
7. Inspect the ATF level and condition. (Refer to page K2–22.)

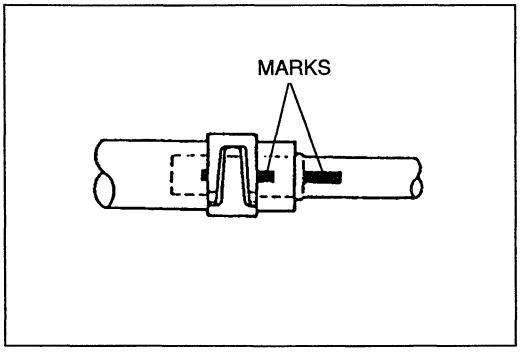


1. Connector bolts
2. Washers
3. Oil hose
   Installation Note ..... page K2–62
4. Oil pipe
5. Radiator
   Service ..... section E1



Installation Note
Oil hose

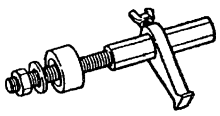
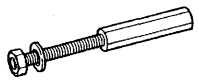
Caution
- **If reusing the hose clamp, position it in the original location on the hose, and squeeze the clamp lightly with large pliers to ensure a tight fit.**



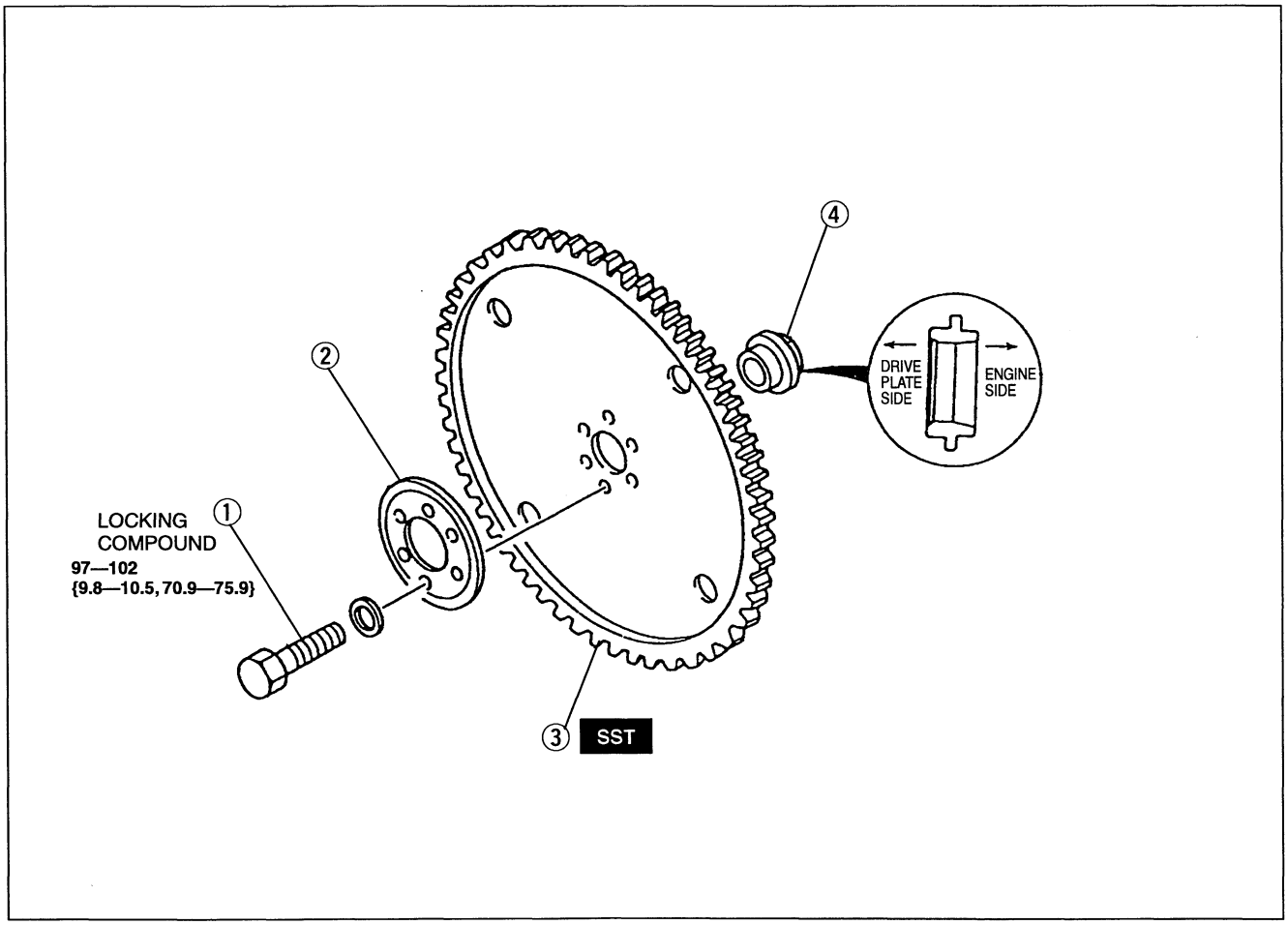
1. Align the marks, and slide the oil cooler hose onto the oil cooler pipe until it is fully seated as shown.
2. Install the hose clamp onto the hose at the center of the mark and at the angle shown.
3. Verify that the hose clamp does not interfere with any other parts.

DRIVE PLATE

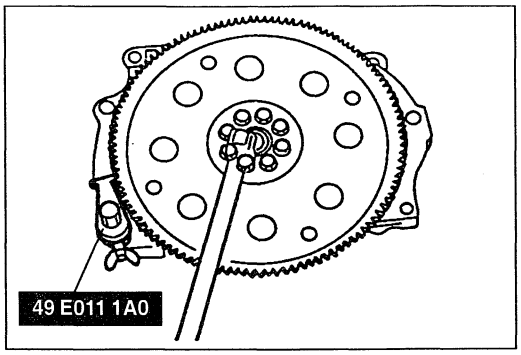
PREPARATION
SST

49 E011 1A0 Brake set, ring gear 	For holding drive plate	49 E011 103 Shaft (Part of 49 E011 1A0) 	For holding drive plate
49 E011 104 Collar (Part of 49 E011 1A0) 	For holding drive plate	49 E011 105 Stopper (Part of 49 E011 1A0) 	For holding drive plate

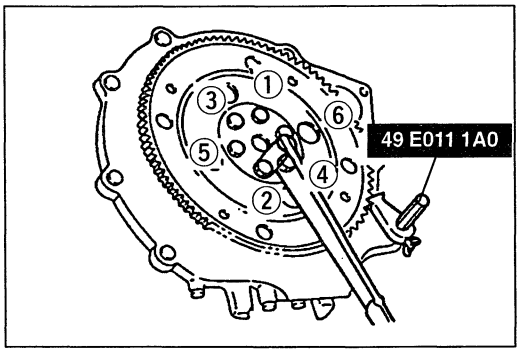
DRIVE PLATE
Removal / Installation
1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal, referring to **Installation Note**.



1. Drive plate mounting bolts
   - Removal Note ..... page K2–64
   - Installation Note ..... page K2–64
2. Backing plate
3. Drive plate
4. Adapter



Removal Note
Drive plate mounting bolts
1. Set the **SST** or equivalent against the drive plate.
2. Remove the bolts and the drive plate.



Installation Note
Drive plate mounting bolts
1. Remove any old locking compound from the bolt threads and bolt holes, and apply new locking compound to the bolt threads.
2. Set the **SST** or equivalent against the drive plate.
3. Tighten the drive plate mounting bolts in two or three steps in the order shown.

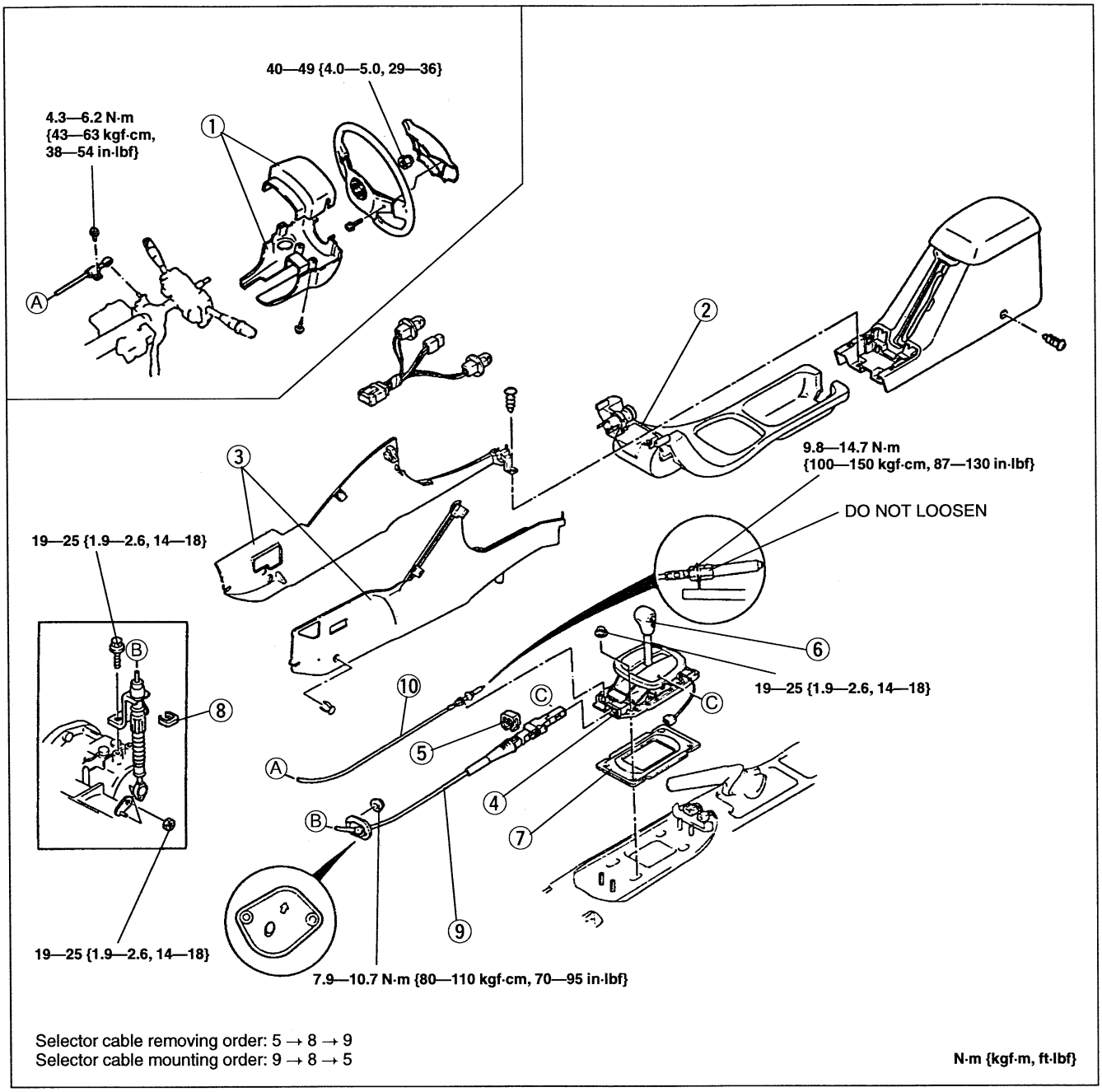
Tightening torque:
97—102 N·m {9.8—10.5 kgf·m, 70.9—75.9 ft·lbf}

SHIFT MECHANISM

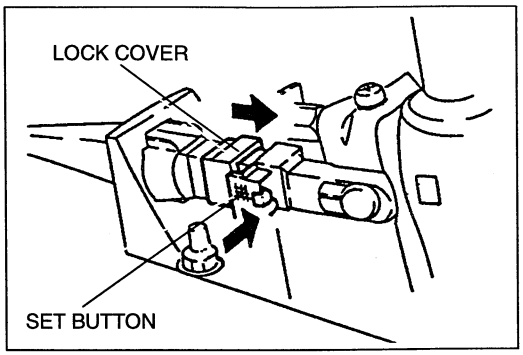
SELECTOR LEVER

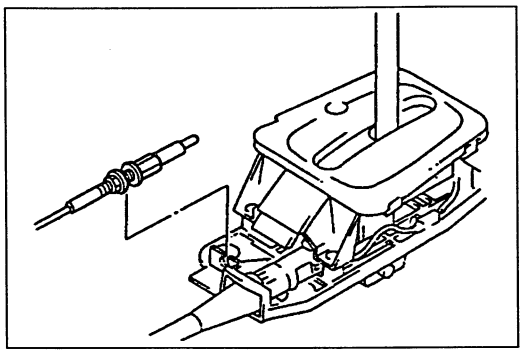
Removal / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. After installation, check the shift-lock, emergency override button, and key interlock operations.



1. Steering column cover
2. Front console
3. Side wall
4. Indicator panel
   Service ..... section K1
5. Clip
6. Selector lever
   Installation Note ..... page K2–66
7. Insulator
8. Clip
9. Selector cable
10. Interlock cable





Installation Note
Selector lever

1. Install the selector lever.

   Tightening torque:
   16—22 N·m {1.6—2.3 kgf·m, 12—16 ft·lbf}

2. Verify the transaxle is in D range.
3. Install the selector cable to the selector lever.
4. Push the selector lever into the D range.
5. Connect the set button.
6. Slide the lock cover and lock the set button.
7. Install the interlock cable to the selector lever.

   Tightening torque:
   9.8—14.7 N·m {100—150 kgf·cm, 87—130 in·lbf}

TROUBLESHOOTING GUIDE

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; therefore, when troubleshooting begin with those points which can be inspected quickly and easily. The recommended troubleshooting sequence is described below.

Caution

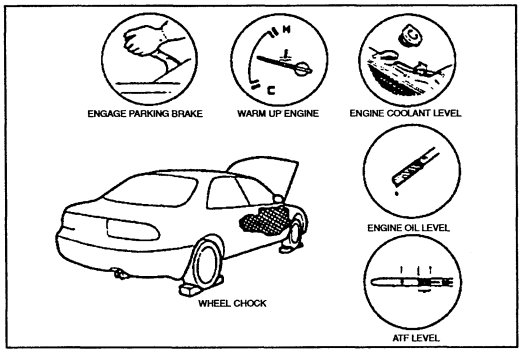
- **Be aware that this section deals with the engine control module. It is interconnected for the FS engine.**

Preliminary Inspection

- Know and understand the customer's concern.
- Verify the concern by operating the vehicle.
- Check the ATF level and condition.
- Check for NON-factory add-on items.
- Check shift linkages for proper adjustment.
- Check the Service Bulletins for the concern.

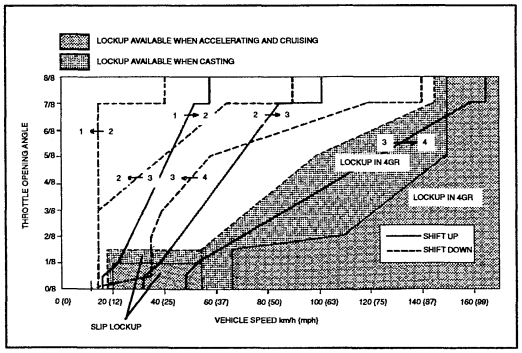
Step 1: On-Boad Diagnostic System Inspection

Check for diagnostic trouble code(s) memorized in the powertrain control module with the New Generation Star (NGS) Tester. (Refer to page K2–117.)



Step 3: Mechanical System Test

Check the engine stall speed and line pressure. (Refer to page K2–10.)



Step 4: Road Test

Check the shift point, shift schedule, and shift shock. (Refer to page K2–15.)

QUICK DIAGNOSIS CHART

OUTLINE

The QUICK DIAGNOSIS CHART shows various problems and the various components that might be the cause of the problem.

1. Components indicated in the "On-board diagnostic" line of the QUICK DIAGNOSIS CHART (I) are diagnosed by the powertrain control module on-board diagnostic function. NGS can be used for easy retrieval of the diagnostic trouble code numbers.
2. Components indicated in the "Adjustment" line of the QUICK DIAGNOSIS CHART (I) indicate that there is a possibility that the problem may be the result of an incorrect adjustment.
   Check the adjustment of each component, and readjust if necessary.
3. Input and output signals of the powertrain control module for the components indicated in the NGS line of the QUICK DIAGNOSIS CHART (I) can be easily checked by using the NGS.
4. Components indicated in the "Line Pressure Test" line of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the line pressure test.
5. Components indicated in the "Stall Test" line of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the stall test.
6. Components indicated in the "Road Test" line of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the road test.
7. QUICK DIAGNOSIS CHART (II) shows the relationship between the troubleshooting item and inspection point.

QUICK DIAGNOSIS CHART (I)

Item \ Possible parts and reference page		Preliminary					Emission control system						EC-AT control system											Hydraulic control system							
		ATF level and condition	Selector lever	Stall test	Line pressure test	Road test	Powertrain control module	Electronic ignition system	Mass air flow sensor	Throttle position sensor	Engine coolant temperature sensor	Magnetic clutch	Transaxle fluid temperature sensor	Transaxle range switch	Brake switch	Vehicle speedometer sensor	Turbine shaft speed sensor	O/D OFF switch	Shift solenoid 1	Shift solenoid 2	Electronic pressure control solenoid	Torque converter clutch solenoid	3–2 timing/coasting clutch solenoid	Oil pump	Control valve body	Thermostatic oil level control valve	Torque converter	Oil filter and seal	Oil cooler	Chain pan
On-Board Diagnostic							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○							
Adjustment		○	○											○																
Testers	NGS												○	○	○	○	○	○	○	○	○	○	○							
	Transaxle tester												○	○			○		○	○	○	○	○							
	Breakout box								○	○	○	○	○	○	○	○	○	○	○	○	○	○	○							
Stall test																								○	○		○			
Line pressure test																				○				○	○					
Road test						○			○	○	○	○	○	○	○	○	○	○	○	○	○	○	○							

QUICK DIAGNOSIS CHART (I)

Powertrain																						Exteria		Other				Possible parts and reference page / Item	
Foward clutch	Coasting clutch	Direct clutch	Reverse clutch	2/4 band and servo	Low/reverse clutch	Chain and sprocket	Forward/coasting/direct clutch cylinder	REV/4GR carrier	REV/4GR sun gear and shell	Forward one-way clutch	Low one-way clutch	Converter one-way clutch	Low-intermediate carrier	Planetaly gearsets (Differential)	Parking mechanism	Turbine shaft	Final drive and differential	Transaxle case	Converter housing	Joint shaft	Engine mount	Drive plate	Tire size						
																							○	On-Board Diagnostic	
																								Adjustment	
																								NGS	Testers
																								Transaxle tester	Testers
																								Breakout box	Testers
○			○	○	○					○	○													Stall test	
○		○	○	○	○																			Line pressure test	
○	○	○		○	○					○		○			○								○	Road test	

QUICK DIAGNOSIS CHART (II)

Item		Possible parts and reference page	Preliminary					Emission control system					Electronic system												Hydraulic control system							
			ATF level and condition	Selector lever	Stall test	Line pressure test	Road test	Powertrain control module	Electronic ignition system	Mass air flow sensor	Throttle position sensor	Engine coolant temperature sensor	Transaxle fluid temperature sensor	Transaxle range switch	Brake switch	Vehicle speedometer sensor	Turbine shaft speed sensor	O/D OFF switch	Shift solenoid 1	Shift solenoid 2	Electronic pressure control solenoid	Torque converter clutch solenoid	3-2 timing/coasting clutch solenoid	Oil pump	Control valve body	Thermostatic oil level control valve	Torque converter	Oil filter and seal	Oil cooler	Chain pan
1	No forward engagement only			○																				○	○						
2	No reverse engagement only			○		○		○						○					○					○	○						
3	Harsh engagement		○	○		○		○					○								○		○		○			○			
4	Delayed/soft engagement		○	○		○																		○	○			○			
5	No forward and no reverse engagements		○	○		○																		○	○		○	○			
6	Some or all shift missing		○	○				○			○			○		○			○	○											
7	Shift concern	Timing-early/late						○			○		○			○															
8		Erratic	○								○			○	○	○	○		○	○	○	○	○		○						
9		Feel-soft/slipping	○	○		○		○		○	○		○								○			○	○			○			
10		Feel harsh	○			○		○		○	○		○	○		○	○				○	○	○		○		○				
11		No first gear engages in higher gear ("D" range)		○				○						○				○	○	○					○						
12		No first gear in "1" range (First gear in "D" range O.K.)		○				○						○					○	○					○						
13		No 1–2 shift				○		○						○				○	○	○					○						
14		No 2–3 shift				○		○						○				○	○	○				○	○						
15		No 3–4 shift				○		○						○				○	○	○					○						
16		Soft/slipping 1–2 shift						○					○								○				○						
17		Soft/slipping 2–3 shift						○					○								○			○	○						
18		Soft/slipping 3–4 shift						○					○								○				○						
19		Soft/slipping 4–3 shift (Automatic)						○		○	○					○					○				○						
20		Soft/slipping 3–2 shift (Automatic)						○		○	○					○					○		○	○	○						
21		Soft/slipping 2–1 shift (Automatic or kickdown)						○		○	○		○								○			○							
22		Harsh 1–2 shift						○		○	○		○	○		○	○				○	○		○	○						
23		Harsh 2–3 shift						○		○			○	○		○	○				○	○		○	○						
24		Harsh 3–4 shift						○		○	○		○	○		○	○				○	○	○	○	○						
25		Harsh 4–3 shift (Automatic)						○		○	○		○	○		○	○				○	○	○	○	○						
26		Harsh 3–2 shift (Automatic)						○		○	○		○	○		○	○				○	○	○	○	○						
27	Torque converter clutch	No apply						○					○		○		○					○			○		○				
28		Always applied/may stall engine						○					○										○	○	○		○				
29	Poor vehicle acceleration/performance			○				○			○		○					○								○				
30	Engine will not crank			○				○						○																
31	No "P" position			○																										
32	Transaxle overheating		○					○					○				○					○		○	○	○	○	○		○	○
33	No engine braking in first gear ("1" range)							○															○	○	○						
34	No engine braking in "D" range (O/D OFF sw ON)			○				○															○	○	○						
35	Vehicle movement with gear selector in the "N" position			○																				○							
36	Shift efforts high			○																					○						
37	External leaks		○																												
38	Noise/vibration—forward/reverse		○	○																				○			○		○	○	

QUICK DIAGNOSIS CHART (II)

Powertrain: Forward clutch	Coasting clutch	Direct clutch	Reverse clutch	2/4 band and servo	Low/reverse clutch	Chain and sprocket	Forward/coasting/direct clutch cylinder	REV/4GR carrier assembly	REV/4GR sun gear and shell	Forward one-way clutch	Low one-way clutch	Converter one-way clutch	Low-intermediate carrier assembly	Planetaly gearsets differential	Parking mechanism	Turbine shaft	Final drive and differential	Exteria: Transaxle case	Converter housing	Other: Joint shaft	Engine mount	Drive plate	Tire size	Possible parts and reference page		Item
○	○									○	○		○											No forward engagement only		1
			○		○		○	○										○						No reverse engagement		2
○		○	○		○															○	○			Harsh engagement		3
○			○		○		○																	Delayed/soft engagement		4
						○								○	○	○	○			○				No forward and no reverse engagements		5
																								Some or all shift missing		6
																							○	Shift concern	Timing-early/late	7
																									Erratic	8
																									Feel-soft/slipping	9
																				○	○				Feel harsh	10
		○		○																					No first gear engages in higher gear ("D" range)	11
																									No first gear in "1" range (First gear in "D" range O.K.)	12
				○					○		○							○							No 1–2 shift	13
		○		○														○							No 2–3 shift	14
	○			○						○								○							No 3–4 shift	15
○				○	○					○	○							○							Soft/slipping 1–2 shift	16
		○		○						○								○							Soft/slipping 2–3 shift	17
		○																○							Soft/slipping 3–4 shift	18
○	○	○		○																					Soft/slipping 4–3 shift (Automatic)	19
		○		○														○							Soft/slipping 3–2 shift (Automatic)	20
○				○							○														Soft/slipping 2–1 shift (Automatic or kickdown)	21
○				○														○							Harsh 1–2 shift	22
		○		○														○							Harsh 2–3 shift	23
	○	○		○														○							Harsh 3–4 shift	24
	○			○														○							Harsh 4–3 shift (Automatic)	25
		○		○														○							Harsh 3–2 shift (Automatic)	26
																								Torque converter clutch	No apply	27
																		○							Always applied/may stall engine	28
												○												Poor vehicle acceleration/performance		29
																								Engine will not crank		30
															○									No "P" position		31
																		○	○					Transaxle overheating		32
	○				○																			No engine braking in first gear ("1" range)		33
	○									○														No engine braking in "D" range (O/D OFF sw ON)		34
○	○																							Vehicle movement with gear selector in the "N" position		35
															○									Shift efforts high		36
																								External leaks		37
						○				○				○			○			○	○	○		Noise/vibration—forward/reverse		38

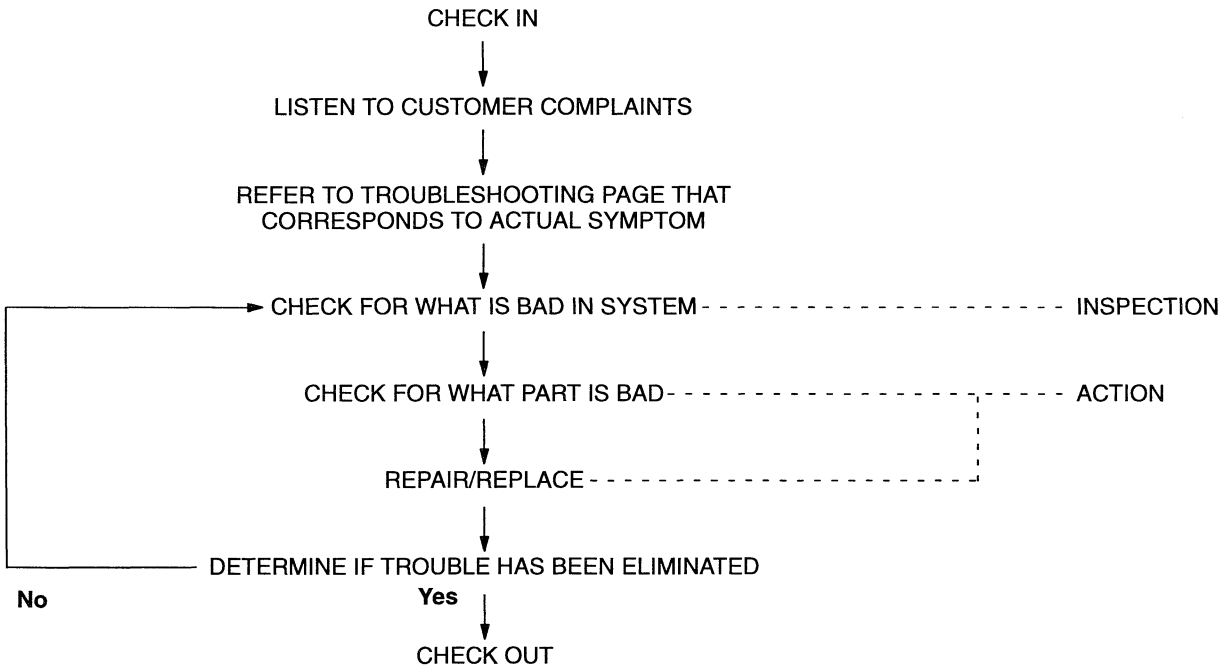
SYMPTOM TROUBLESHOOTING

USING THIS SECTION

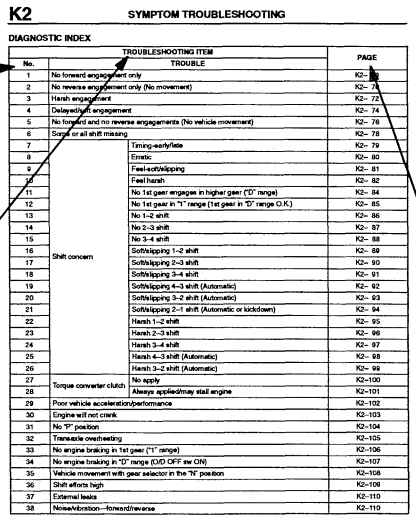
Introduction

- Most of the automatic transaxle control system is electronically controlled, often making it difficult to diagnose problems in the system, especially intermittent problems. Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability 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.
- If the problem is related to any part of the automatic transaxle unit, repair or replace the automatic transaxle unit as necessary.

Work Flow



Diagnosis Index



K2 SYMPTOM TROUBLESHOOTING

DIAGNOSTIC INDEX

No.	TROUBLESHOOTING ITEM TROUBLE		PAGE
1	No forward engagement only		K2- [illegible]
2	No reverse engagement only (No movement)		K2- 70
3	Harsh engagement		K2- 72
4	Delayed/soft engagement		K2- 74
5	No forward and no reverse engagements (No vehicle movement)		K2- 76
6	Some or all shift missing		K2- 78
7	Shift concern	Timing-early/late	K2- 79
8		Erratic	K2- 80
9		Feel-soft/slipping	K2- 81
10		Feel harsh	K2- 82
11		No 1st gear engages in higher gear ("D" range)	K2- 84
12		No 1st gear in "1" range (1st gear in "D" range O.K.)	K2- 85
13		No 1–2 shift	K2- 86
14		No 2–3 shift	K2- 87
15		No 3–4 shift	K2- 88
16		Soft/slipping 1–2 shift	K2- 89
17		Soft/slipping 2–3 shift	K2- 90
18		Soft/slipping 3–4 shift	K2- 91
19		Soft/slipping 4–3 shift (Automatic)	K2- 92
20		Soft/slipping 3–2 shift (Automatic)	K2- 93
21		Soft/slipping 2–1 shift (Automatic or kickdown)	K2- 94
22		Harsh 1–2 shift	K2- 95
23		Harsh 2–3 shift	K2- 96
24		Harsh 3–4 shift	K2- 97
25		Harsh 4–3 shift (Automatic)	K2- 98
26		Harsh 3–2 shift (Automatic)	K2- 99
27	Torque converter clutch	No apply	K2-100
28		Always applied/may stall engine	K2-101
29	Poor vehicle acceleration/performance		K2-102
30	Engine will not crank		K2-103
31	No "P" position		K2-104
32	Transaxle overheating		K2-105
33	No engine braking in 1st gear ("1" range)		K2-106
34	No engine braking in "D" range (O/D OFF sw ON)		K2-107
35	Vehicle movement with gear selector in the "N" position		K2-108
36	Shift efforts high		K2-109
37	External leaks		K2-110
38	Noise/vibration—forward/reverse		K2-110

No.:
Each troubleshooting item is assigned a number

Troubleshooting Item:
There are 38 troubleshooting items. Choose the item that most closely corresponds to the actual symptom.

Page:
Shows the reference page

Troubleshooting chart

1	NO FORWARD ENGAGEMENT ONLY		
[TROUBLESHOOTING HINTS] ① Internal or external shift linkages ② Oil pump ③ Control valve body ④ Forward clutch and coasting clutch assembly ⑤ Low one way clutch assembly ⑥ Forward one way clutch assembly ⑦ Low intermediate carrier assembly			
STEP	**INSPECTION**		**ACTION**
1	**Internal or External Shift Linkages** – Do any of the following problems exist? • Damaged • Misadjusted • Misassembled ☞ page K2–58	Yes	Service as required
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged or leaking • Pressure Tap Plate/Gasket leaking or damaged • Separator Plates damaged • Hydraulic Passages damaged • Main Regulator Valve stuck, damaged or misassembled • Forward Accumulator leaking	Yes	Service as required
		No	Go to next step
3	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to spec • Gaskets dam • Poro ing or	Yes	Service as required
		No	Go to next step

TROUBLESHOOTING HINTS:
This describes the possible point of malfunction.

STEP:
This shows the order of troubleshooting. Proceed with troubleshooting as indicated.

INSPECTION:
This describes an inspection to quickly determine the malfunction of parts. If a detailed procedure is necessary to perform the INSPECTION, refer to the page shown by the "☞" mark.

ACTION:
This recommends the appropriate action to take as a result (Yes/No) of the INSPECTION. How to perform the action is described on the reference page shown by ☞ mark.

DIAGNOSTIC INDEX

TROUBLESHOOTING ITEM			PAGE
No.	TROUBLE		
1	No forward engagement only		K2– 75
2	No reverse engagement only (No movement)		K2– 76
3	Harsh engagement		K2– 78
4	Delayed/soft engagement		K2– 80
5	No forward and no reverse engagements (No vehicle movement)		K2– 82
6	Some or all shift missing		K2– 84
7	Shift concern	Timing-early/late	K2– 85
8		Erratic	K2– 86
9		Feel-soft/slipping	K2– 87
10		Feel harsh	K2– 88
11		No first gear engages in higher gear ("D" range)	K2– 90
12		No first gear in "1" range (First gear in "D" range O.K.)	K2– 91
13		No 1–2 shift	K2– 92
14		No 2–3 shift	K2– 93
15		No 3–4 shift	K2– 94
16		Soft/slipping 1–2 shift	K2– 95
17		Soft/slipping 2–3 shift	K2– 96
18		Soft/slipping 3–4 shift	K2– 97
19		Soft/slipping 4–3 shift (Automatic)	K2– 98
20		Soft/slipping 3–2 shift (Automatic)	K2– 99
21		Soft/slipping 2–1 shift (Automatic or kickdown)	K2–100
22		Harsh 1–2 shift	K2–101
23		Harsh 2–3 shift	K2–102
24		Harsh 3–4 shift	K2–103
25		Harsh 4–3 shift (Automatic)	K2–104
26		Harsh 3–2 shift (Automatic)	K2–105
27	Torque converter clutch	No apply	K2–106
28		Always applied/may stall engine	K2–107
29	Poor vehicle acceleration/performance		K2–108
30	Engine will not crank		K2–109
31	No "P" position		K2–110
32	Transaxle overheating		K2–111
33	No engine braking in first gear ("1" range)		K2–112
34	No engine braking in "D" range (O/D OFF sw ON) or "2" range		K2–113
35	Vehicle movement with gear selector in the "N" position		K2–114
36	Shift efforts high		K2–115
37	External leaks		K2–116
38	Noise/vibration—forward/reverse		K2–116

SYMPTOM TROUBLESHOOTING CHART

1	NO FORWARD ENGAGEMENT ONLY

[TROUBLESHOOTING HINTS]
① Internal or external shift linkages
② Oil pump
③ Control valve body
④ Forward clutch and coasting clutch assembly
⑤ Low one way clutch assembly
⑥ Forward one way clutch assembly
⑦ Low intermediate carrier assembly

STEP	INSPECTION		ACTION
1	**Internal or External Shift Linkages** – Do any of the following problems exist? • Damaged • Misadjusted • Misassembled ☞ page K2–58	Yes	Service as required
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged or leaking • Pressure Tap Plate/Gasket leaking or damaged • Separator Plates damaged • Hydraulic Passages damaged • Main Regulator Valve stuck, damaged, or misassembled • Forward Accumulator leaking	Yes	Service as required
		No	Go to next step
3	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to spec • Gaskets damaged • Porosity/cross leaks and/or ball plug missing or leaking or a plugged hole • Pump support seal rings, #3 and #4 damaged	Yes	Service as required
		No	Go to next step
4	**Forward Clutch and Coasting Clutch Assembly** – Do any of the following problems exist? • Seals or Pistons damaged • Return Spring damaged • Ball Check Valve damaged • Friction Elements severely damaged or worn • F/C/D Clutch Cylinder damaged, leaking, misassembled, or binding • Welding between Cylinder and Hub broken or Splines damaged	Yes	Service as required
		No	Go to next step
5	**Low One Way Clutch Assembly** – Do any of the following problems exist? • Worn • Damaged • Misassembled	Yes	Service as required
		No	Go to next step
6	**Forward One Way Clutch Assembly** – Do any of the following problems exist? • Worn • Damaged • Misassembled	Yes	Service as required
		No	Go to next step
7	**Low Intermediate Carrier** – Do any of the following problems exist? • Damaged • Misassembled	Yes	Service as required
		No	The problem is fixed

2	NO REVERSE ENGAGEMENT (NO MOVEMENT)

[TROUBLESHOOTING HINTS]

① Powertrain control system
② Improper pressures
③ Internal or external shift linkages
④ Control valve body
⑤ Oil pump
⑥ Reverse clutch assembly
⑦ Low/reverse clutch assembly
⑧ Forward/coasting/direct clutch cylinder assembly
⑨ Transaxle case
⑩ Reverse/fourth gear carrier assembly

STEP	INSPECTION		ACTION
1	**Powertrain Control System** – Are there any problems with the following? • Electrical Input/Output • Vehicle Wiring Harness • PCM • SS1 (ON) • TR Switch ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "A and D" ☞ **page K2–124, 130**
		No	Go to next step
2	**Improper Pressures** – Is there low line pressure? ☞ **page K2–10**	Yes	Check the following possible components Control Valve Body, Oil Pump, Reverse Clutch Assembly, Low/Reverse Clutch Assembly
		No	Go to next step
3	**Internal or External Shift Linkages** – Do any of the following problems exist? • Damaged • Misadjusted ☞ **page K2–65**	Yes	Service as required
		No	Go to step 9
4	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket damaged • 1–2 Shift Valve, SS1, Main Regulator Valve, Low/Reverse Modulator Valve, Low/Reverse Accumulator Piston, Pressure Tap Plate damaged, missing, stuck, misassembled • Separator Plates damaged • Hydraulic Passages damaged	Yes	Service as required
		No	Go to next step
5	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket damaged • Porosity/cross leaks/ball plug missing or leaking, plugged hole • Pump Support Seal Rings, #6 and #7, damaged	Yes	Service as required
		No	Go to next step
6	**Reverse Clutch Assembly** – Do any of the following problems exist? • Seals-Piston damaged • Ball Check Valve damaged • Friction Elements worn, severely damaged, or misassebled • Piston Return Spring damaged • Reverse Clutch Hub to F/C/D clutch Hub Splines damaged	Yes	Service as required
		No	Go to next step
7	**Low/Reverse Clutch Assembly** – Do any of the following problems exist? • Seals or Piston damaged • Friction Elements worn or severely damaged • Piston Return Spring damaged • Wave Spring missing • Piston Bore damaged	Yes	Service as required
		No	Go to step 3
8	**Forward/Coasting/Direct Clutch Cylinder** – Are any of the reverse seal rings damaged, missing, or misassembled?	Yes	Service as required
		No	Go to next step

STEP	INSPECTION		ACTION
9	**Reverse/fourth Carrier Assembly** – Is there any damage?	Yes	Service as required
		No	Go to next step
10	**Transaxle Case** – Is there any severe cross leakage from the reverse clutch to low/reverse clutch feeds?	Yes	Service as required
		No	The problem is fixed

3	HARSH ENGAGEMENT

[TROUBLESHOOTING HINTS]

① ATF
② Powertrain control system
③ Improper pressure
④ Control valve body
⑤ Oil filter and seal
⑥ Internal and external linkages
⑦ Joint shafts
⑧ Engine mounts
⑨ Forward clutch assembly (Forward only)
⑩ Reverse clutch assembly (Reverse only)
⑪ Low/reverse clutch assembly (Reverse only)
⑫ Direct clutch assembly (Reverse only)

STEP	INSPECTION		ACTION
1	**ATF** – Are there any problems with the following? • Level • Condition ☞ **page K2–22**	Yes	Service as required
		No	Go to next step
2	**Powertrain Control System** – Are there any problems with the following? • Electrical Input/Output • Vehicle Wiring Harness • PCM • EPC Solenoid • TFT Sensor • 3–2 T/CCS (Harsh forward only) ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B and E" ☞ **page K2–126, 133**
		No	Go to next step
3	**Improper Pressure** – Is line pressure higher than normal? ☞ **page K2–10**	Yes	Verify engagements at minimum EPC using the Transaxle Tester If line remains high, check the following components: Control valve body, Oil Filter and Seal assembly
		No	Go to next step
4	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Low/Reverse Accumulator Piston and Spring (Reverse), Main Regulator Valve, Coast Clutch Valve (Forward) • Accumulator Piston and Spring misassembled, stuck or damaged • EPC Solenoid stuck or damaged	Yes	Service as required
		No	Go to next step
5	**Oil Filter and Seal Assembly** – Do any of the following problems exist? • Filter/Seal damaged, plugged • Recirculation Seal damaged, plugged, or out of position	Yes	Replace as reguired
		No	Go to next step
6	**Internal or External Shift Linkages** – Do any of the following problems exist? • Damaged • Misadjusted ☞ **page K2–65**	Yes	Service as required
		No	Go to next step
7	**Joint Shafts** – Is there spline damage? ☞ **page K2–39**	Yes	Service as required
		No	Go to next step
8	**Engine Mounts** – Do any of the following problems exist? • Loose, broken, missing or misaligned • Powertrain contacting with other vehicle components ☞ **page K2–39**	Yes	Service as required
		No	Go to next step

STEP	INSPECTION		ACTION
9	**F/C/D Clutch Assembly (Forward Only)** – Do any of the following problems exist? • F/C/D Clutch Cylinder damaged • Piston Bore damaged • Friction Elements damaged worn • Forward Clutch Return Spring damaged or missing • Ball Check damaged • Piston or Seals damaged	Yes	Service as required
		No	Go to next step
10	**Reverse Clutch Assembly (Reverse Only)** – Do any of the following problems exist? • Seals or Piston damaged • Reverse Piston damaged • Friction Elements damaged, worn, misassembled • Return Spring Assembly damaged, worn • Ball Check damaged, missing	Yes	Service as required
		No	Go to next step
11	**Low/Reverse Clutch Assembly (Reverse Only)** – Do any of the following problems exist? • Seals or Piston damaged • Wave Spring damaged • Friction Elements damaged, worn, misassembled • Return Spring Assembly damaged, worn, or misassembled • Piston Bore damaged	Yes	Service as required
		No	Go to next step
12	**Direct Clutch Assembly (Reverse Only)** – Are any of the friction elements severely damaged?	Yes	Service as required
		No	The problem is fixed

4	DELAYED/SOFT ENGAGEMENT		
[TROUBLESHOOTING HINTS] ① ATF ② Improper pressure ③ Internal or external shift linkages ④ Control valve body ⑤ Oil filter and seal assembly ⑥ Oil pump ⑦ Forward clutch assembly ⑧ Reverse clutch assembly ⑨ Low/reverse clutch assembly ⑩ Forward/coasting/direct clutch cylinder assembly			
STEP	**INSPECTION**		**ACTION**
1	**ATF** – Are there any problems with the following? • Level • Condition ☞ **page K2–22**	Yes	Service as required
		No	Go to next step
2	**Improper Pressure** – Is line pressure lower than normal? ☞ **page K2–10**	Yes	Check the following possible components; Control valve body, oil pump, oil filter and seal assembly, recirculating seal, clutch assemblies
		No	Go to next step
3	**Internal or External Shift Linkages** – Do any of the following problems exist? • Damaged • Misadjusted • Misassembled ☞ **page K2–65**	Yes	Service as required
		No	The problem is fixed
4	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Manual Valve, Main Regulator Valve, Low/Reverse Modulator Regulator Valve stuck, damaged, or misassembled • Separator Plates damaged • Pressure Tap Plate/Gasket leaks, damaged, misassembled	Yes	Service as required
		No	Go to next step
5	**Oil Filter and Seal Assembly** – Do any of the following problems exist? • Filter/Seal damaged, plugged • Recirculating Seal damaged or out of position	Yes	Service as required
		No	Go to next step
6	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Porosity/cross leaks/ball plug missing or leaking, or passage blockage • Pump Support Seal Rings, #3 and #4 (Forward), or #6 and #7 (Reverse), damaged • Pump Gear/Pocket damaged • Separator Plate damaged	Yes	Service as required
		No	Go to next step
7	**Forward Clutch Assembly (Forward Only)** – Do any of the following problems exist? • Seals or Piston damaged • Ball Check damaged, missing, or not seating properly • Friction Elements damaged, worn, or excessive end clearance	Yes	Service as required
		No	Go to next step
8	**Reverse Clutch Assembly (Reverse Only)** – Do any of the following problems exist? • Seals or Piston damaged • Check Ball damaged • Friction Elements damaged, worn • Return Spring worn, damaged • Piston Bore damaged • Excessive Clutch Pack End Clearance	Yes	Service as required
		No	Go to next step

STEP	INSPECTION		ACTION
9	**Low/Reverse Clutch Assembly (Reverse Only)** – Do any of the following problems exist? • Piston or Seals damaged • Friction Elements damaged, worn • Return Spring damaged • Piston Bore damaged • Excessive Clutch Pack End Clearance	Yes	Service as required
		No	Go to next step
10	**Forward/Coasting/Direct Clutch Cylinder Assembly** – Do any of the following problems exist? • Reverse Seal Ring damaged or missing • Cylinder damaged or leaking	Yes	Service as required
		No	Go to step 3

5	NO FORWARD AND NO REVERSE ENGAGEMENTS (NO VEHICLE MOVEMENT)

[TROUBLESHOOTING HINTS]

① ATF
② Improper pressure
③ Internal or external linkages
④ Control valve body
⑤ Oil filter and seal assembly
⑥ Oil pump
⑦ Drive plate
⑧ Turbine shaft to forward/coasting/direct clutch cylinder
⑨ Torque converter
⑩ Chain and sprocket assembly
⑪ Park mechanism
⑫ Joint shafts
⑬ Final drive and differential assembly
⑭ Planetary gearsets (Differential)

STEP	INSPECTION		ACTION
1	**ATF** – Are there any problems with the following? • Level • Condition ☞ **page K2–22**	Yes	Service as required
		No	Go to next step
2	**Improper Pressures** – Do any of the following problems exist? • Low Line Pressure • No Line Pressure ☞ **page K2–10**	Yes	If pressure is low, check the following possible components: Control Valve Body, Oil Filter and Seal Assembly, Oil Pump Go to step 4 If OK, proceed to Turbine Shaft Check Torque Converter Pump Shaft and Assembly Go to step 7
		No	Go to next step
3	**Internal or External Shift Linkages** – Do any of the following problems exist? • Damaged • Misadjusted • Misassembled ☞ **page K2–65**	Yes	Service as required
		No	Go to step 10
4	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Pressure Plate/Gasket damaged or missing • Main Regulator Valve, Manual Valve stuck, damaged, plugged, missing, "Z" Link not connected	Yes	Service as required
		No	Go to next step
5	**Oil Filter and Seal Assembly** – Do any of the following problems exist? • Filter/Seal damaged, plugged, or missing • Recirculating Seal damaged or out of position	Yes	Service as required
		No	Go to next step
6	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to spec • Gasket damaged, missing • Porosity/cross leaks or passage(s) blocked • Pump Support Seal Rings missing • Oil Pump Shaft broken, damaged	Yes	Service as required
		No	Go to step 3
7	**Drive plate** – Do any of the following problems exist? • Damaged • Broken ☞ **page K2–63**	Yes	Service as required
		No	Go to next step
8	**Turbine Shaft to Forward/Coasting/Direct Clutch Cylinder Housing** – Is there Splines damaged?	Yes	Service as required
		No	Go to next step
9	**Torque Converter Assembly** – Do any of the following problems exist? • Oil Pump Shaft Insert damaged • Studs broken or damaged • Splines damaged • Internal Blades damaged, broken	Yes	Service as required
		No	Go to step 3

STEP	INSPECTION		ACTION
10	**Chain and Sprocket Assembly** – Do any of the following problems exist? • Broken • Damaged	Yes	Service as required
		No	Go to next step
11	**Park Mechanism** – Are any of the Parking Pawl Return Spring damaged, missing, or misassembled?	Yes	Service as required
		No	Go to next step
12	**Joint shaft** – Do any of the following problems exist? • Broken • Splines damaged ☞ page K2–39	Yes	Service as required
		No	Go to next step
13	**Final Drive and Differential Assembly** – Do any of the following problems exist? • Splines damaged • Gearset damaged	Yes	Service as required
		No	Go to next step
14	**Planetary Gearsets (Differential)** – Are there any problems with the following? • Gear Teeth • Carriers • Splines	Yes	Service as required
		No	The problem is fixed

6	SOME OR ALL SHIFTS MISSING		
[TROUBLESHOOTING HINTS] ① ATF ② Powertrain control system ③ Internal and external shift linkages ④ Speed input			
STEP	**INSPECTION**		**ACTION**
1	**ATF** – Is there improper level? ☞ **page K2–22**	Yes	Adjust fluid to proper level
		No	Go to next step
2	**Powertrain Control System** – Are there any problems with the following? • Electrical Input/Output • Vehicle Wiring Harness • PCM • Shift Solenoids • TR Switch • TP Sensor • Vehicle speedometer sensor • O/D OFF switch ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "A and D" ☞ **page K2–124, 130**
		No	Go to next step
3	**Internal and External Shift Linkages** – Do any of the following problems exist? • Damaged • Misadjusted • Misassembled ☞ **page K2–65**	Yes	Service as required
		No	Go to next step
4	**Speed Input** – Is the vehicle speedometer sensor drive gear damaged?	Yes	Service as required
		No	For further diagnosis, refer to the appropriate shift routine(s): Shifts / No Shift 1–2 / 13 2–3 / 14 3–4 / 15

7	SHIFT CONCERN: TIMING — EARLY/LATE		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Tire size ③ Speed input			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Are there any problems with the following? • Electrical Input/Output • Vehicle Wiring Harness • PCM • TP Sensor • Vehicle speedometer sensor • TFT Sensor ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Test "B" ☞ **page K2–126**
		No	Go to next step
2	**Possible Components** – Do any of the following problems exist? • Tire Size change ☞ **section Q** • Vehicle speedometer sensor drive gear damaged	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section F3

8	SHIFT CONCERN: ERRATIC		
[TROUBLESHOOTING HINTS] ① ATF ② Powertrain control system ③ Vehicle speed input ④ Control valve body			
STEP	INSPECTION		ACTION
1	**ATF** – Are there any problems with the followings? • Level • Condition ☞ **page K2–22**	Yes	Service as required
		No	Go to next step
2	**Powertrain Control System** – Are there any problems with the following? • Electrical Inputs/Output • Vehicle wiring harness • PCM • SS1, SS2 • TR switch • Brake switch • TCC solenoid • Vehicle speedometer sensor • TP sensor • TSS • EPC solenoid • 3–2T/CCS ☞ **page K2–24**	Yes	Run OBD tests Perform Pinpoint Test "A, C, D, F and G" ☞ **page K2–124, 128, 130, 135, 137**
		No	Go to next step
3	**Vehicle Speed Input** – Is the vehicle speedometer sensor drive gear damaged?	Yes	Service as required
		No	Go to next step
4	**Control Valve Body** – Do any of the following problems exist? • Bolts not torque to specification • Gaskets damaged • 3–2 timing valve, Pull in valve, 2–4 accumulator valve, Servo release shuttle valve, 3–2 control valve stuck, damaged, misassembled • Solenoid screen brocked • Separator plates damaged, blocked • Pressure tap plate/gasket damaged • SS1, SS2, 3–2T/CCS solenoid malfunction, stuck, damaged	Yes	Service as required
		No	Refer to the appropriate shift for further diagnosis

Shifts	No Shift	Soft/Slip	Harsh
1–2	13	16	22
2–3	14	17	23
3–4	15	18	24
4–3	—	19	25
3–2	—	20	26
2–1	—	21	—

9	SHIFT CONCERN: FEEL — SOFT/SLIPPING

[TROUBLESHOOTING HINTS]

① ATF
② Powertrain control system
③ Internal or external shift linkages
④ Improper pressure
⑤ Control valve body
⑥ Oil pump
⑦ Oil filter and seal assembly

STEP	INSPECTION		ACTION
1	**ATF** – Are there any problems with the following? • Level • Condition ☞ **page K2–22**	Yes	Service as required
		No	Go to next step
2	**Powertrain Control System** – Are there any problems with the following? • Electrical Input/Output • Vehicle wiring harness • PCM • EPC solenoid • TFT sensor • TP sensor • MAF sensor ☞ **page K2–24**	Yes	Run OBD Tests, Perform Pinpoint Tests "B and E" ☞ **page K2–126, 133**
		No	Go to next step
3	**Internal External Shift Linkage** – Do any of the following problems exist? • Damaged • Misadjusted • Misassembled ☞ **page K2–65**	Yes	Service as required
		No	Go to next step
4	**Improper Pressure** – Is there low line pressure? ☞ **page K2–10**	Yes	Check the line pressure If pressures are low or all shifts are soft/slipping, go to step 6 If pressures are OK and a specific shift is soft/slipping, refer to the following chart: Shift / Soft/Slip 1–2 / 16 2–3 / 17 3–4 / 18 4–3 / 19 3–2 / 20 2–1 / 21
		No	Go to next step
5	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Main Regulator Valve, Line Modulator Valve stuck, damaged, or misassembled, or springs missing, tangled or damaged • EPC Solenoid stuck or damaged • Separator Plates damaged, blocked • Pressure Tap Plate/Gasket damaged or missing	Yes	Service as required
		No	Go to next step
6	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Porosity/cross leaks	Yes	Service as required
		No	Go to next step
7	**Oil Filter and Seal Assembly** – Do any of the following problems exist? • Filter/Seal damaged, plugged, or missing • Recirculating Seal damaged or out of position	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section F3

10	SHIFT CONCERN: FEEL — HARSH

[TROUBLESHOOTING HINTS]

① ATF
② Powertrain control system
③ Joint shafts
④ Engine mounts
⑤ Improper pressure
⑥ Control valve body
⑦ Torque converter assembly

STEP	INSPECTION		ACTION
1	**ATF** – Are there any problems with the following? • Level • Condition ☞ **page K2–22**	Yes	Service as required
		No	Go to next step
2	**Powertrain Control System** – Are there any problems with the following? • Electrical Input/Output • Vehicle wiring harness • PCM • EPC solenoid • TFT sensor • TSS • TP sensor • Vehicle speedometer sensor • MAF sensor • TCC solenoid • TR switch • 3–2T/CCS ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B, C, D, E, F and G" ☞ **page K2–126, 128, 130, 133, 135, 137**
		No	Go to next step
3	**Joint Shafts** – Do any of the following problems exist? • Damaged • Loose • Splines damaged ☞ **page K2–39**	Yes	Service as required
		No	Go to next step
4	**Engine Mounts** – Do any of the following problems exist? • Damaged • Loose • Missing ☞ **page K2–39**	Yes	Service as required
		No	Go to next step
5	**Improper Pressure** – Is there high line pressure? ☞ **page K2–10**	Yes	Check the line pressure Service as required If pressures are OK and a specific shift is harsh, refer to the following chart: Shift / Harsh 1–2 / 22 2–3 / 23 3–4 / 24 4–3 / 25 3–2 / 26 2–1 / —
		No	Go to next step
6	**Control Valve Bodys** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Main Regulator Valve, By-Pass Valve, Line Modulator Valve stuck, damaged, or misassembled Springs tangled, missing, damaged • EPC solenoid stuck or damaged • Hydraulic Passages damaged • Separator plate damaged, blocked	Yes	Service as required
		No	Go to next step

STEP	INSPECTION		ACTION
7	**Torque Converter Assembly** **Note** • TCC applied during shifts – Do any of the following problems exist? • Piston damaged • Pump Support Seal #1 (CBY) leaking, missing or damaged • Case leakage • Converter Assembly damaged	Yes	Service as required If heat stained, replace converter
		No	The problem is not in the automatic transaxle Go to section F3

11	SHIFT CONCERNS: NO FIRST GEAR ENGAGES IN HIGHER GEAR ("D" RANGE)		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Internal or external shift linkage ③ Control valve body ④ Seals ⑤ Direct clutch ⑥ 2/4 band and servo			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Are there any problems with the following? • Electrical Input/Output • Vehicle wiring harness • PCM • SS1, SS2 • TR switch • O/D OFF switch ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "A and D" ☞ **page K2–124, 130**
		No	Go to next step
2	**Internal or External Shift Linkages** – Do any of the following problems exist? • Damaged • Misadjusted • Misassembled ☞ **page K2–65**	Yes	Service as required After servicing linkage, verify that the TR switch is properly adjusted ☞ **page K2–35**
		No	Go to next step
3	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Pull In Valve, Solenoid Regulator Valve, Shift Valves stuck, damaged, misassembled • Solenoid Filter Gasket damaged or misassembled • Hydraulic Passages damaged • SS1, SS2 Solenoid malfunction	Yes	Service as required
		No	Go to next step
4	**Mechanical** – Do any of the following problems exist? • Seals, Clutches damaged, worn • Direct Clutch, 2/4 Band, 2/4 Servo damaged, stuck on	Yes	Service as required
		No	Refer to the appropriate shift for further diagnosis Shift / No Shift 1–2 / 13 2–3 / 14 3–4 / 15

12	SHIFT CONCERNS: NO FIRST GEAR IN "1" RANGE (FIRST GEAR IN "D" RANGE O.K.)		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Internal or external shift linkages ③ Control valve body			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Are there any problems with the following? • Electrical Input/Output • Vehicle wiring harness • PCM • SS1, SS2 • TR switch ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "A and D" ☞ **page K2–124, 130**
		No	Go to next step
2	**Internal or External Shift Linkage** – Do any of the following problems exist? • Damaged • Misadjusted • Misassembled ☞ **page K2–65**	Yes	Service as required After servicing linkage, verify that the TR sensor is properly adjusted ☞ **page K2–35**
		No	Go to next step
3	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Pull in Valve stuck, damaged • SS2 stuck "ON" • Hydraulic Passages damaged • Separator Plates damaged, blocked	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section F3

13	SHIFT CONCERNS: NO 1–2 SHIFT

[TROUBLESHOOTING HINTS]
① Powertrain control system
② Improper pressure
③ Control valve body
④ 2/4 band and servo
⑤ Low OWC assembly
⑥ Reverse/fourth gear sun gear and shell
⑦ Transaxle case

STEP	INSPECTION		ACTION
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • SS1, SS2 • TR switch • O/D OFF switch ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "A and D" ☞ **page K2–124, 130**
		No	Go to next step
2	**Improper Pressure** – Do any of the following problems exist? • High line pressure • Low line pressure ☞ **page K2–10**	Yes	Go to next step
		No	Go to step 4
3	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • 1–2 Shift Valve, 2–4 Accumulator, Main Regulator Valve stuck, damaged, or misassembled • SS1 malfunction • Pressure Tap Plate/Gasket damaged • Separator Plates damaged • Hydraulic Passages damaged	Yes	Service as required
		No	Go to next step
4	**2/4 Band and Servo Assembly** **Note** • Also no fourth gear – Do any of the following problems exist? • Seals damaged, missing • Piston damaged • Band damaged, worn • Springs damaged • Servo Rod or Rod Bore damaged	Yes	Service as required
		No	Go to next step
5	**Low OWC Assembly** – Is there damaged?	Yes	Service as required
		No	Go to next step
6	**Reverse/fourth gear Sun Gear and Shell** – Do any of the following problems exist? • Damaged, weld broken • Lugs damaged	Yes	Service as required
		No	Go to next step
7	**Transaxle Case** – Do any of the following problem exist? • Band anchor area damaged • Porosity/leakage in servo apply, servo release circuits	Yes	Service or replace case as required
		No	The problem is not in the automatic transaxle Go to section F3

14	SHIFT CONCERNS: NO 2–3 SHIFT		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Improper pressure ③ Control valve body ④ Oil pump ⑤ Direct clutch assembly ⑥ 2/4 servo ⑦ Transaxle case			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • SS1, SS2 • TR switch • O/D OFF switch ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "A and D" ☞ **page K2–124, 130**
		No	Go to next step
2	**Improper Pressure** – Do any of the following problems exist? • High line pressure • Low line pressure ☞ **page K2–10**	Yes	Go to next step
		No	Go to step 5
3	**Control Valve Body** – Do any of the following problems exist? • Bolts not torque to specification • Gasket leaks • 2–3 Shift Valve (also No fourth), Main Regulator Valve stuck, damaged, misassembled • SS2 malfunction (also No fourth) • Separator Plates damaged • Pressure Tap Plate/Gasket leaks • Hydraulic Passages damaged	Yes	Service as required
		No	Go to next step
4	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to spec • Gaskets damaged • Porosity/cross leaks • Pump Support Seal Rings, #4 and #5, damaged	Yes	Service as required
		No	Go to next step
5	**Direct Clutch Assembly** – Do any of the following problems exist? • Seals or Piston damaged • Piston Bore damaged • Friction severely damaged, worn • Ball Check not seating properly • Return Spring Assy. damaged • Cylinder Bore/Splines damaged • Shell/Hub damaged	Yes	Service as required
		No	Go to next step
6	**2/4 Servo** – Do any of the following problems exist? • Piston or Piston Bore damaged • Rod Bore or Rod damaged leaking	Yes	Service as required
		No	Go to next step
7	**Transaxle Case** – Do any of the following problems exist? • Leakage in the Servo Apply, Servo Release or Direct Clutch Circuits	Yes	Service or replace case as required
		No	The problem is not in the automatic transaxle Go to section F3

15	SHIFT CONCERNS: NO 3–4 SHIFT		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Improper pressures ③ Control valve body ④ 2/4 band and servo assembly ⑤ Coasting clutch assembly ⑥ Forward OWC assembly ⑦ Transaxle case			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • SS1, SS2 • TR switch • O/D OFF switch ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "A and D" ☞ **page K2–124, 130**
		No	Go to next step
2	**Improper Pressure** – Do any of the following problems exist? • High line pressure • Low line pressure ☞ **page K2–10**	Yes	Go to next step
		No	Go to step 4
3	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket leaks • 3–4 Shift Valve, Main Regulator Valve stuck, damaged or misassembled • SS1 malfunction (Also No first gear) • Separator Plates damaged or Orifice blocked	Yes	Service as required
		No	Go to next step
4	**2/4 Band and Servo Assembly** **Note** • Also no second gear – Do any of the following problems exist? • 2/4 Band damaged, worn • Servo Rod or Rod Bore damaged • Servo Piston or Cover damaged or leaking • Springs damaged	Yes	Service as required
		No	Go to next step
5	**Coasting Clutch Assembly** – Do any of the following problems exist? • Seals damaged, missing • Piston damaged • Friction severely damaged, worn • Check Ball severely damaged	Yes	Service as required
		No	Go to next step
6	**Forward OWC Assembly** – Is there damage?	Yes	Service as required
		No	Go to next step
7	**Transaxle Case** **Note** • Also no second gear – Do any of the following problems exist? • Band Anchor damaged • Servo Apply and Servo Release circuits leaking	Yes	Service as required
		No	Go to next step

16	SHIFT CONCERNS: SOFT/SLIPPING 1–2 SHIFT		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Control valve body ③ 2/4 Band and servo assembly ④ Forward OWC assembly ⑤ Forward clutch assembly ⑥ Low OWC assembly ⑦ Low/reverse clutch assembly ⑧ Transaxle case			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • EPC solenoid • TFT sensor ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B and E" ☞ **page K2–124, 130**
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • 2–4 Accumulator Piston Plug and Seal (also soft 3–4 shift), Main Regulator Valve, Line Modulator Valve (also soft 3–4 shift) stuck, damaged, or mis-assembled • Hydraulic Passages damaged • Pressure Tap Plate/Gasket damaged • Separator Plates damaged	Yes	Service as required
		No	Go to next step
3	**2/4 Band and Servo Assembly** – Do any of the following problems exist? • Piston, Seals or Piston Bore damaged, missing • Servo Rod or Rod Bore damaged • 2/4 Band and/or Reverse Clutch Drum Assembly worn, damaged, or misassembled • Springs damaged • Servo Cover and Seal damaged	Yes	Service as required
		No	Go to next step
4	**Forward OWC Assembly (Slips in first gear)** – Is the forward OWC assembly damaged or not holding?	Yes	Service as required
		No	Go to next step
5	**Forward Clutch Assembly (Slip in first gear)** – Do any of the following problems exist? • Seals damaged • Return Spring damaged • Friction Elements damaged • Pump Support Seals #3, #4 damaged	Yes	Service as required
		No	Go to next step
6	**Low OWC Assembly** – Is the low OWC assembly damaged or not over-running?	Yes	Service as required
		No	Go to next step
7	**Low/Reverse Clutch Assembly** – Is there severe friction damage?	Yes	Service as required
		No	Go to next step
8	**Transaxle Case** — Do any of the following problems exist? • Band Anchor damaged • Porosity/Leakage in servo Apply Servo Release circuits	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section F3

17	SHIFT CONCERNS: SOFT/SLIPPING 2–3 SHIFT		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Control valve body ③ Oil pump ④ Direct clutch assembly ⑤ 2/4 servo ⑥ Forward OWC assembly ⑦ Transaxle case			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • EPC solenoid • TFT sensor ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B and D" ☞ **page K2–124, 130**
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket leaks • Line Modulator Valve (also soft 1–2 and 3–4 shifts), Servo Release Shuttle Valve stuck, damaged or misassembled • Hydraulic Passages damaged • Separator Plates damaged • Pressure Tap Plate/Gasket leaks	Yes	Service as required
		No	Go to next step
3	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Pump Support Seals #4 and #5 damaged, missing	Yes	Service as required
		No	Go to next step
4	**Direct Clutch Assembly** – Do any of the following problems exist? • Seals or Piston damaged • Piston Bore damaged • Friction damaged, worn, or excessive end clearance • Check Ball not seating properly • Return Spring Assembly damaged	Yes	Service as required
		No	Go to next step
5	**2/4 Servo** – Do any of the following problems exist? • Piston or Piston Bore damaged • Servo Rod or Rod Bore damaged	Yes	Service as required
		No	Go to next step
6	**Forward OWC Assembly** – Is the foward OWC assembly damaged or not holding	Yes	Service as required
		No	Go to next step
7	**Transaxle Case** – Do any of the following problems exist? • Leakage in the Servo Apply, Servo Release or Direct Clutch circuits	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section F3

18	SHIFT CONCERNS: SOFT/SLIPPING 3–4 SHIFT		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Control valve body ③ 2/4 band and servo assembly ④ Direct clutch assembly ⑤ Transaxle case			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • EPC solenoid • TFT sensor ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B and E" ☞ **page K2–124, 130**
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket leaks • Line Modulator Valve, 2–4 Accumulator Valve Plug and Seal (also soft 1–2 shift), stuck, damaged, misassembled • Pressure Tap Plate/Gasket leaks • Hydraulic Passages damaged • Separator Plates damaged or Orifice blocked	Yes	Service as required
		No	Go to next step
3	**2/4 Band and Servo Assembly** – Do any of the following problems exist? • 2/4 Band and/or Reverse Clutch Drum Assembly worn, damaged, or misassembled • Piston, Seals or Piston Bore damaged, missing • Servo Cover or Seal damaged • Servo Rod or Rod Bore damaged • Springs damaged	Yes	Service as required
		No	Go to next step
4	**Direct Clutch Assembly** **Note** • May also have third gear slip – Do any of the following problems exist? • Seals damaged, missing • Piston damaged • Check Ball damaged, missing, or leaking • Return Spring damaged • Friction Elements damaged	Yes	Service as required
		No	Go to next step
5	**Transaxle Case** – Do any of the following problems exist? • Band Anchor damaged • Servo Apply and Servo Release circuits leaking	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section F3

19	SHIFT CONCERNS: SOFT/SLIPPING 4–3 SHIFT (AUTOMATIC)		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Control valve body ③ 2/4 band and servo assembly ④ Direct clutch assembly ⑤ Forward/Coasting clutch assembly ⑥ Transaxle case			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • EPC solenoid • Vehicle speedometer sensor • MAF • TP sensor ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "E" ☞ **page K2–133**
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket leaks • Servo Release Shuttle Valve, Main Regulator Valve stuck, damaged, or misassembled • Hydraulic Passages damaged • Pressure Tap Plate/Gasket leaks, or damaged • Separator Plates damaged, blocked	Yes	Service as required
		No	Go to next step
3	**2/4 Band and Servo Assembly** – Do any of the following problems exist? • 2/4 Band and/or Reverse Clutch Drum Assembly damaged/worn/misassembled • Servo Return Spring broken • Servo Rod damaged • Piston Seal damaged	Yes	Service as required
		No	Go to next step
4	**Direct Clutch Assembly** – Do any of the following problems exists? • Seals damaged, missing • Piston damaged • Check Ball damaged, missing, or leaking • Return Spring damaged • Friction Elements damaged	Yes	Service as required
		No	Go to next step
5	**Forward/Coasting Clutch Assembly** – Do any of the following problems exist? • Seals damaged, missing • Piston damaged • Friction Elements worn, damaged • Check Ball not functioning • Forward Clutch, Piston and Return Spring damaged	Yes	Service as required
		No	Go to next step
6	**Transaxle Case** – Do any of the following problems exists? • Prosity/cross leaks in Servo Apply, Servo Release, Direct Clutch circuits	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section F3

20	SHIFT CONCERNS: SOFT/SLIPPING 3–2 SHIFT (AUTOMATIC)		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Control valve body ③ Oil pump ④ 2/4 band and servo assembly ⑤ Direct clutch assembly ⑥ Transaxle case			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • EPC solenoid • TP sensor • Vehicle speedometer sensor • MAF • 3–2T/CCS ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "E and G" ☞ **page K2–133, 137**
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket damaged • 3–2 Timing Valve, Solenoid Regulator Valve, 3–2 Control Valve Stuck, damaged or misassembled • 3–2T/CCS Solenoid malfunction • Pressure Tap Plate/Gasket leaks or damaged • Separator Plates damaged, blocked	Yes	Service as required
		No	Go to next step
3	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Porosity/Cross leaks • Pump Support Seal Rings #4, 5, 6 damaged or misassembled • Forward to Direct passage leaks	Yes	Service as required
		No	Go to next step
4	**2/4 Band and Servo Assembly** – Do any of the following problems exist? • 2/4 Band and/or Reverse Clutch Drum Assembly damaged, worn, or misassembled • Servo Piston damaged • Servo Return and Cushion Springs damaged, misassembled • Springs damaged, misassembled • Servo Rod bent, damaged	Yes	Service as required
		No	Go to next step
5	**Direct Clutch Assembly** – Do any of the following problems exist? • Return Spring damaged, broken • Friction Elements damaged, worn • Ball Check not releasing • Piston or Seal damaged	Yes	Service as required
		No	Go to next step
6	**Transaxle Case** – Do any of the following problems exist? • Band Anchor damaged • Leakage in Servo Apply/Release circuits • Case Bore damaged (Servo Rod)	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section F3

21	SHIFT CONCERNS: SOFT/SLIPPING 2–1 SHIFT (AUTOMATIC OR KICKDOWN)		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Oil pump ③ 2/4 band and servo assembly ④ Forward clutch assembly ⑤ Low OWC assembly			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Do any of the followng problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • EPC solenoid • TFT sensor • TP sensor • MAF ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B and E" ☞ **page K2–126, 133**
		No	Go to next step
2	**Oil Pump** – Do any of the following problems exist? • Gaskets damaged • Porosity/cross leaks • Pump Support Seals #3 and 4 leaking, misassembled, damaged	Yes	Service as required
		No	Go to next step
3	**2/4 Band and Servo Assembly** – Do any of the following problems exist? • Piston damaged • Return Spring damaged	Yes	Service as required
		No	Go to next step
4	**Forward Clutch Assembly** – Do any of the following problems exist? • Piston or Seals damaged • Friction Elements damaged	Yes	Service as required
		No	Go to next step
5	**Low OWC Assembly** – Is there the low OWC damaged or not holding?	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section F3

22	SHIFT CONCERNS: HARSH 1–2 SHIFT		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Control valve body ③ Oil pump ④ 2/4 band and servo assembly ⑤ Forward clutch assembly ⑥ Transaxle case			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • EPC solenoid • TFT sensor • TSS • TP sensor • Vehicle speedometer sensor • MAF • TCC • TR switch ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B, C, D, E, and F" ☞ **page K2–126, 128, 130, 133, 135**
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket leaks • 2–4 Accumulator Valve, 3–2 Control Valve (also harsh 3–4 shift) stuck, damaged, or misassembled • Separator Plates damaged • Hydraulic Passages damaged	Yes	Service as required
		No	Go to next step
3	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket damaged • Pump Support Seal Rings #3 and #4 damaged • Porosity/cross leaks	Yes	Service as required
		No	Go to next step
4	**2/4 Band and Servo Assembly** – Do any of the following problems exist? • Cushion Return Springs damaged • Band damaged, worn • 2/4 Band and/or Reverse Clutch Drum Assembly worn, damaged, or misassembled	Yes	Service as required
		No	Go to next step
5	**Forward Clutch Assembly** – Do any of the following problems exist? • Seals damaged • Return Spring damaged • Friction Elements damaged	Yes	Service as required
		No	Go to next step
6	**Transaxle Case** – Is there the band anchor area damaged?	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section F3

23	SHIFT CONCERNS: HARSH 2–3 SHIFT		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Control valve body ③ Oil pump		④ Direct clutch assembly ⑤ 2/4 servo ⑥ Transaxle case	
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • EPC solenoid • TR switch • Vehicle speedometer sensor • TFT sensor • MAF • TCC solenoid • TSS ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B, C, D, E, and F" ☞ **page K2–126, 128, 130, 133, 135**
		No	Go to next step
2	**Control Valve Body** – Do any of following problems exist? • Bolts not torqued to specification • Gasket leaks • Line Modulator Valve (also 1–2 and 3–4 harsh shift), Servo Release Shuttle Valve stuck, damaged, misassembled • Separator Plates damaged • Hydraulic Passages damaged	Yes	Service as required
		No	Go to next step
3	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket damaged • Porosity/cross leaks • Pump Support Seal Rings #4 and #5 damaged	Yes	Service as required
		No	Go to next step
4	**Direct Clutch Assembly** – Do any of the following problems exist? • Piston or Piston Bore damaged • Friction Elements damaged, worn • Ball Check not seating properly • Return Spring Assembly damaged • F/C/D Clutch Cylinder Splines damaged	Yes	Service as required
		No	Go to next step
5	**2/4 Band Servo** – Do any of the following problems exist? • Piston or Piston Bore damaged • Servo Rod damaged	Yes	Service as required
		No	Go to next step
6	**Transaxle Case** – Do any of the following problems exist? • Leakage in the Servo Apply, Servo Release, or Direct Clutch circuits • Servo Rod Bore damaged	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section F3

24	SHIFT CONCERNS: HARSH 3–4 SHIFT

[TROUBLESHOOTING HINTS]
① Powertrain control system
② Control valve body
③ Oil pump
④ 2/4 band and servo assembly
⑤ Coasting clutch assembly
⑥ Direct clutch assembly
⑦ Transaxle case

STEP	INSPECTION		ACTION
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • EPC solenoid • TR switch • Vehicle speedometer sensor • 3–2T/CCS • TFT sensor • TSS • TP sensor • MAF • TCC solenoid ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B, C, D, E, F, and G" ☞ **page K2–126, 128, 130, 133, 135, 137**
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket leaks • Line Modulator Valve (also harsh 1–2 and 2–3 shifts), 3–2 Control Valve, 2–4 Accumulator Valve, Coasting Clutch Valve, stuck, damaged, or misassembled • Hydraulic Passaged damaged • Separator Plates damaged, blocked	Yes	Service as required
		No	Go to next step
3	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket damaged • Porosity/cross leaks • Coasting Clutch Teflon Seals damaged	Yes	Service as required
		No	Go to next step
4	**2/4 Band and Servo Assembly** – Do any of the following problems exist? • 2/4 Band and/or Reverse Clutch Drum Assembly damaged/worn/misassembled • Servo Piston or Cover damaged or leaking • Springs damaged	Yes	Service as required
		No	Go to next step
5	**Coasting Clutch Assembly** – Do any of the following problems exist? • Piston or Seals damaged, missing • Friction damaged, worn • Check Ball not functioning	Yes	Service as required
		No	Go to next step
6	**Direct Clutch Assembly** – Do any of the following problems exist? • Piston or Seals damaged, missing • Check Ball damaged, missing, or leaking • Return Spring damaged • Friction Elements damaged • F/C/D Clutch Cylinder Splines damaged	Yes	Service as required
		No	Go to next step
7	**Transaxle Case** – Is there the band anchor damaged?	Yes	Service as required
		No	The problems is not in the automatic transaxle Go to section F3

25	SHIFT CONCERNS: HARSH 4–3 SHIFT (AUTOMATIC)		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Control valve body ③ Oil pump		④ 2/4 band and servo assembly ⑤ Coasting clutch assembly ⑥ Transaxle case	
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** — Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • EPC solenoid • TR switch • Vehicle speedometer sensor • TP sensor • TFT sensor • MAF • TSS • 3–2T/CCS • TCC solenoid ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B, C, D, E, F and G" ☞ **page K2–126, 128, 130, 133, 135, 137**
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket leaks • Servo Release Shuttle Valve, 3–2 Timing/Coast Clutch Valve stuck, damaged, misassembled • Hydraulic Passaged damaged • Separator Plates damaged, blocked	Yes	Service as required
		No	Go to next step
3	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to specification • Porosity/cross leak, Seal Rings damaged, missing or leaking ball plug • Gasket damaged • Pump Support Seal Rings #2, 3, 4, and #5 (Coast and Direct circuits) damaged	Yes	Service as required
		No	Go to next step
4	**2/4 Band and Servo Assembly** – Do any of the following problems exist? • Servo Rod bent, damaged • Servo Return Spring broken	Yes	Service as required
		No	Go to next step
5	**Coasting Clutch Assembly** – Do any of the following problems exist? • Seals damaged, mission • Piston damaged • Friction Elements worn, damaged • Check Ball not functioning • Forward Clutch Piston and Return spring damaged	Yes	Service as required
		No	Go to next step
6	**Transaxle Case** – Do any of the following problems exist? • Porosity/cross leaks in Servo Apply, Servo Release, Direct Clutch, Coasting Clutch circuits	Yes	Service as required
		No	The problems is not in the automatic transaxle Go to section F3

26	SHIFT CONCERNS: HARSH 3–2 SHIFT (AUTOMATIC)		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Control valve body ③ Oil pump		④ Direct clutch assembly ⑤ 2/4 band and servo assembly ⑥ Transaxle case	
STEP	INSPECTION		ACTION
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • EPC solenoid • TR switch • Vehicle speedometer sensor • 3–2T/CCS • TFT sensor • MAF • TP sensor • TSS • TCC solenoid ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B, C, D, E, F, and G" ☞ **page K2–126, 128, 130, 133, 135, 137**
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gasket damaged • 3–2 Timing Valve, Solenoid Regulator Valve, 3–2 Control Valve stuck, damaged, misassembled • Hydraulic Passages damaged • Separator Plates damaged, blocked • 3–2T/CCS Solenoid malfunction	Yes	Service as required
		No	Go to next step
3	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Porosity/Cross leaks • Pump Support Seal Rings damaged or misassembled	Yes	Service as required
		No	Go to next step
4	**Direct Clutch Assembly** – Do any of the following problems exist? • Return Spring damaged, broken • Friction Elements damaged, worn • Check Ball not exhausting • Servo Rod bent or damaged	Yes	Service as required
		No	Go to next step
5	**2/4 Band and Servo Assembly** – Do any of the following problems exist? • 2/4 Band and/or Reverse Clutch Drum Assembly damaged, worn, or misassembled • Servo Piston damaged • Servo Return and Cushion Springs damaged, misassembled • Springs damaged, misassembled	Yes	Service as required
		No	Go to next step
6	**Transaxle Case** – Do any of the following problems exist? • Band Anchor damaged • Leaks • Servo Rod Bore damaged	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section F3

27	TORQUE CONVERTER CLUTCH: NO APPLY		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Control valve body ③ Torque converter assembly			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • TFT sensor • TCC solenoid • Brake switch • TSS ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B, C, and F" ☞ **page K2–126, 128, 135**
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Caskets damaged • Solenoid Pressure Regulator Valve, Bypass Clutch Control Valve and Plunger, Converter Regulator Valve stuck, damaged, or misassembled • TCC Solenoid malfunction, stuck • Hydraulic Passages damaged • Separator Plates damaged, blocked	Yes	Service as required
		No	Go to next step
3	**Torque Converter Assembly** – Do any of the following problems exist? • Leakage • Internal damage	Yes	Perform Torque converter test
		No	Replace the torque converter assembly

28	TORQUE CONVERTER CLUTCH; ALWAYS APPLIED/MAY STALL ENGINE		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Control valve body ③ Oil pump		④ Torque converter assembly ⑤ Transaxle case	
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Do any of the following problems exist? • Electrical Input/Output • Vehicle wiring harness • PCM • TFT sensor • TCC solenoid ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B and C" ☞ **page K2–126, 128**
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Bypass Clutch Control Valve and Plunger (always applied), Converter Regulator Valve stuck, damaged, misassembled • Separator Plates damaged, blacked **Note** • Converter not applied in first gear or reverse gear • TCC Solenoid malfunction • Pressure Tap Plate/Gasket damaged • Hydraulic Passages damaged	Yes	Service as required
		No	Go to next step
3	**Oil Pump** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Pump Support #1, Seal Ring damaged, missing, misassembled	Yes	Service as required
		No	Go to next step
4	**Torque Converter Assembly** – Do any of the following problems exist? • Internal Seals damaged • Piston Plate damage/stuck to Cover	Yes	Service as required
		No	Go to next step
5	**Transaxle Case** – Do any of the following problems exist? • Porositly/cross leaks from the CBY circuit	Yes	Service as required
		No	The problem is fixed

29	OTHER: POOR VEHICLE ACCELERATION/PERFORMANCE		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Internal or external shift linkages ③ Torque converter clutch ④ Converter OWC			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Are there any problems with the following? • Engine • Electrical Input/Output • Vehicle wiring harness • PCM • TFT sensor • TP sensor • O/D OFF switch ☞ **page K2–24**	Yes	Run OBD Tests If the problem is engine related, go to Section F3 If the problem is not engine related, perform Pinpoint Tests "B, C and D" ☞ **page K2–126, 128, 130**
		No	Go to next step
2	**Internal and External Shift Linkages** – Do any of the following problems exist? • Damaged • Misadjusted • Misassembled ☞ **page K2–65**	Yes	Service as required
		No	Go to next step
3	**Torque Converter Clutch** – Is the torque converter clutch always applied?	Yes	Perform Symptom Troubleshooting No.28 ☞ **page K2–107**
		No	Go to next step
4	**Converter OWC** – Is the converter OWC damaged?	Yes	Service as required
		No	Perform Road Test and verify proper shift schedule and engagements Service as required ☞ **page K2–15**

30	OTHER: ENGINE WILL NOT CRANK		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Internal or external shift linkages ③ TR switch			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Are there any problems with the following? • Engine • Electrical Input/Output • Vehicle wiring harness • PCM • TR switch ☞ **page K2–24**	Yes	Run OBD Tests If the problem is engine related, go to Section F3 If the problem is not engine related, perform Pinpoint Tests "D" ☞ **page K2–130**
		No	Go to next step
2	**Internal and External Shift Linkage or TR Switch** – Do any of the following problems exist? • Damaged • Misadjusted • Misassembled ☞ **page K2–65** ☞ **page K2–35**	Yes	Service as required
		No	Go to next step
3	**Starter/Drive plate** – Do any of the following problems exist? • Damaged • Misassembled ☞ **section G** ☞ **page K2–63**	Yes	Service as required
		No	The problem is fixed

31	OTHER: NO "P" POSITION		
[TROUBLESHOOTING HINTS] ① Internal or external shift linkages ② Park mechanism			
STEP	INSPECTION		ACTION
1	**Internal or External Shift Linkages** – Do any of the following problems exist? • Damaged, misadjusted, or misassembled ☞ **page K2–65**	Yes	Service as required
		No	Go to next step
2	**Park Mechanism** – Do any of following problems exist? • Park gear on driven sprocket assembly, Parking pawl return spring, Park pawl ratcheting springs, Park pawl shaft • Manual lever, Cam apply lever • Manual lever detent spring • TR switch, Parking pawl apply cam • Manual shaft nut damaged • Missing or misassembled	Yes	Service as required
		No	The problem is fixed

32	OTHER: TRANSAXLE OVERHEATING

[TROUBLESHOOTING HINTS]
① ATF
② Powertrain control system
③ Oil cooler
④ Control valve body
⑤ Torque converter clutch
⑥ Oil pump
⑦ Chain pan
⑧ Thermostatic oil level control valve
⑨ Transaxle case/converter housing/Starter support

STEP	INSPECTION		ACTION
1	**ATF** – Are there any problems with the following? • Level • Condition ☞ **page K2–22**	Yes	Service as required
		No	Go to next step
2	**Powertrain Control System** – Are there any problems with the following? • Electrical Input/Output • Vehicle wiring harness • PCM • TCC solenoid • TFT sensor • TSS ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "B, C and F" ☞ **page K2–126, 128, 135**
		No	Go to next step
3	**Oil cooler** – Do any of the following problems exist? • Damaged • Blocked • Reversed • Restricted • Leaking • Misassembled ☞ **page K2–61**	Yes	Service as required
		No	Go to next step
4	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Main Regulator Valve, Bypass Clutch Control Valve, Converter Regulator Valve stuck, damaged, misassembled • Hydraulic Passages damaged • Separator Plates/Gaskets damaged • TCC Solenoid malfunction (OFF)	Yes	Service as required
		No	Go to next step
5	**Torque Converter Clutch** – Does the torque converter clutch not apply?	Yes	Perform Symptom Troubleshooting No.27 ☞ **page K2–106**
		No	Go to next step
6	**Oil Pump** – Do any of the following problems exist? • Gasket damaged • Rear Lube Passage blocked	Yes	Service as required
		No	Go to next step
7	**Chain Pan** – Is it missing?	Yes	Install the chain pan
		No	Go to next step
8	**Thermostatic Oil Level Control Valve** – Do any of the following problems exist? • Stuck open or damaged • Gasket damaged or missing • Bolt or bracket damaged, missing, or improperly installed	Yes	Service as required
		No	Go to next step
9	**Transaxle Case/Converter Housing/Stater Support** – Do any of the following problems exist? • Front Lube Passage blocked or restricted • TC, CI, CT Passages blocked or restricted	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section E

33	OTHER: NO ENGINE BRAKING IN FIRST GEAR ("1" RANGE)		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Control valve body ③ Oil pump ④ Coasting clutch assembly ⑤ Low/reverse clutch assembly			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Are there any problems with the following? • Electrical Input/Output • Vehicle wiring harness • PCM • 3–2T/CCS ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "G" ☞ **page K2–137**
		No	Go to next step
2	**Control Valve Body** – Do any of the following problems exist? • Bolts not torqued to specification • Gaskets damaged • Low/Reverse Modulator Valve, Coasting Clutch Valve stuck damaged or misassembled • 3–2T/CCS stuck or damaged • Hydraulic Passages damaged • Pressure Tap Plate/Gasket damaged • Separator Plate/Gasket damaged	Yes	Service as required
		No	Go to next step
3	**Oil Pump** – Do any of the following problems exist? • Pump Support #2 and #3 Seal Rings for the Coast Clutch circuit damaged, missing	Yes	Service as required
		No	Go to next step
4	**Coasting Clutch Assembly** – Do any of the following problems exist? • Assembly misassembled, damaged • Forward Clutch Hub Seal damaged • Piston or Seals damaged • Ball Check damaged, missing	Yes	Service as required
		No	Go to next step
5	**Low/Reverse Clutch Assembly** – Do any of the following problems exist? • Misassembled • Damaged • Piston or seals damaged	Yes	Service as required
		No	The problem is fixed

34	OTHER: NO ENGINE BRAKING IN "D" RANGE (O/D OFF SW ON) OR "2" RANGE		
[TROUBLESHOOTING HINTS] ① Powertrain control system ② Internal or external shift linkages ③ Control valve body ④ Oil pump ⑤ Forward OWC assembly ⑥ Coasting clutch assembly			
STEP	**INSPECTION**		**ACTION**
1	**Powertrain Control System** – Are there any problems with the following? • Electrical Inputs/Outputs • Vehicle wiring harnesses • PCM • 3–2T/CCS ☞ **page K2–24**	Yes	Run OBD Tests Perform Pinpoint Tests "G" ☞ **page K2–137**
		No	Go to next step
2	**Internal or External Shift Linkages** – Do any of the following problems exist? • Damaged • Misadjusted • Misassembled ☞ **page K2–65**	Yes	Service as required
		No	Go to next step
3	**Control Valve Body** – Do any of the following problems exist? • 3–4 Shift Valve, 1–2 Shift Valve, Pull in Valve, Coasting Clutch Control Valve stuck, damaged • 3–2T/CCS stuck or damaged	Yes	Service as required
		No	Go to next step
4	**Oil Pump** – Do any of the following problems exist? • Pump Support #2 and #3 Seal Rings for the Coasting Clutch circuit damaged, missing	Yes	Service as required
		No	Go to next step
5	**Forward OWC Assembly** – Do any of the following problems exist? • Damaged • Misassembled	Yes	Service as required
		No	Go to next step
6	**Coasting Clutch Assembly** – Do any of the following problems exist? • Assembly misassembled, damaged • Forward Clutch Hub Seal damaged • Piston or Seals damaged • Ball Check damaged, missing	Yes	Service as required
		No	The problem is not in the automatic transaxle Go to section B1 or F3

35	OTHER: VEHICLE MOVEMENT WITH GEAR SELECTOR IN "N" POSITION		
[TROUBLESHOOTING HINTS] ① Internal or external shift linkages ② Oil pump		③ Forward/coasting clutch assembly	
STEP	**INSPECTION**		**ACTION**
1	**Internal or External Shift Linkages** – Do any of the following problems exist? • Damaged • Misadjusted • Misassembled ☞ **page K2–65**	Yes	Service as required
		No	Go to next step
2	**Oil Pump** – Do any of the following problems exists? • Gaskets Severely damaged • Pump Support Seal Ring #2, leakage from Lube Circuit into FC Circuit	Yes	Service as required
		No	Go to next step
3	**Forward/Coasting Clutch Assembly** – Do any of the following problems exist? • Friction plates severely damaged • Return Spring damaged • Ball Check damaged, missing	Yes	Service as required
		No	The problem is fixed

36	OTHER: SHIFT EFFORTS HIGH		
[TROUBLESHOOTING HINTS] ① Shift interlock ② Internal or external shift linkage ③ Transaxle case ④ Control valve body			
STEP	**INSPECTION**		**ACTION**
1	**Shift Interlock** – Is there any problem? ☞ **page K2–65**	Yes	Service as required
		No	Go to next step
2	**Internal or External Shift Linkages** – Do any of the following problems exist? • Damaged • Misadjusted • Misassembled ☞ **page K2–65**	Yes	Service as required
		No	Go to next step
3	**Transaxle Case** – Do any of the following problems exist? • Manual lever damaged • Park mechanism damaged • Shaft bent • Detent lever shaft bore (in case) damaged • Detent spring bent/damaged • Nut loose	Yes	Service as required
		No	Go to next step
4	**Control Valve Body** – Do any of the following problems exist? • Bolts are not torqued to specification • Manual valve stuck, damaged	Yes	Service as required
		No	The problem is fixed

37	OTHER: EXTERNAL LEAKS		
[TROUBLESHOOTING HINTS] ① ATF			
STEP	INSPECTION		ACTION
1	**ATF** – Is ATF improper level? ☞ **page K2–22**	Yes	Service as required
		No	Go to next step
	SEALS/GASKETS Differential seal, speedometer seal, pump, main control cover, servo cover, split frange converter inpeller hub, manual shift seal **OTHERS** • Cooler fitting, pressure tap plug, line pressure plug, case porosity, case cracked • Vent blocked or damaged **CONNECTORS/SENSORS** • Transaxle connector, TR switch, TSS sensor seal		Locate source of leak Service as required

38	OTHER: NOISE/VIBRATION — FORWARD/REVERSE		
[TROUBLESHOOTING HINTS] ① For Noises/Vibrations that Change with Engine Speed ② For Noises/Vibrations that Chenge with Vehicle speed ③ Other Noises/Vibrations			
STEP	INSPECTION		ACTION
1	**For Noises/Vibrations that Change with Engine Speed** – Are there any problems with the following? • Torque converter • ATF level (low) pump cavitation • Oil pump • Engine drive accessories • Cooler lines grounding out • Drive plate	Yes	Service as required
		No	Go to next step
2	**For Noises/Vibrations that Change with Vehicle Speed** – Are there any problems with the following? • Engine mount • Tires • Drive shaft or joint shaft • Differential (final drive/chain) • Suspension • Planetary gear sets • Chain grounding to chain pan • Forward one-way clutch • Torque converter	Yes	Service as required
		No	Go to next step
3	**Other Noise/Vibrations** – Are there any problems with the following? • Shift cable vibration grounding • Cooler lines grounding	Yes	Service as required
		No	The problem is fixed

ON-BOARD DIAGNOSTIC SYSTEM

DESCRIPTION

Quick Test Description

Quick Test is divided into three special tests: Key On Engine Off Self-Test, Key On Engine Running Self-Test and Continuous Memory DTC access. Quick Test also provides a quick check of the powertrain control system and is usually performed at the start of each diagnostic procedure and at the end of most pinpoint tests for verification of repair and to ensure no other faults exist.

Key On Engine Off Self-Test

Key On Engine Off is a functional test of the powertrain control system performed on demand. A fault has to be present at the time of testing for the Key On Engine Off Self-Test to detect the fault. When a fault is detected, a Diagnostic Trouble Code (DTC) will be output on the data link when requested by a scan tool.

Key On Engine Running Self-Test

Key On Engine Running is a functional test of the powertrain control system performed on demand with the engine running and vehicle stopped. A check of the inputs and outputs is made during operating conditions and at normal temperature. A fault has to be present at the time of testing. When a fault is detected, a Diagnostic Trouble Code (DTC) will be output on the data link when requested by a scan tool.

Continuous Memory DTC Access Self-Test

Continuous Memory DTC access is also a functional test of the powertrain control system. The Continuous Memory self-test is always active. The test consists of all the OBD II monitors and the comprehensive component monitor, and is designed to detect failures contributing to driveability and emission concerns. As part of Quick Test, the technician may perform a specific drive cycle before running Quick Test. This is necessary to detect certain faults not tested during other self-test operations. All self-tests are menu driven in the New Generation Star (NGS) scan tool.

Parameter Identification (PID) Access

The PID mode allows access to certain data values, analog and digital inputs and outputs, calculated values, and system status information.

Brake On/Off Test

On vehicles equipped with Brake On/Off (BOO) input, the brake pedal **MUST** be depressed and released after the Key On Engine Running self-test is initiated.

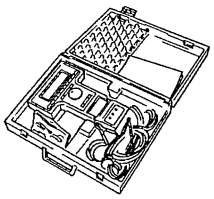
O/D OFF Switch Test

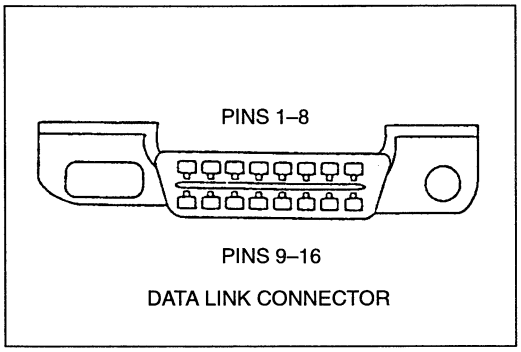
On vehicles equipped with an O/D OFF switch, the switch **MUST** be cycled after the Key On Engine Running self-test is initiated.

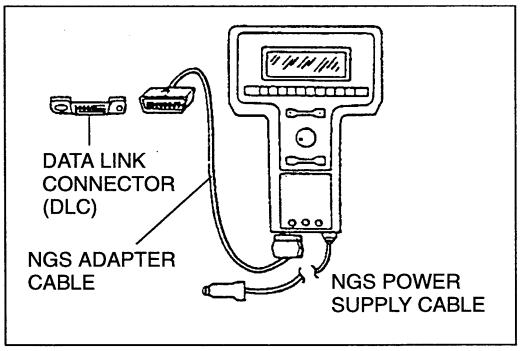
Wiggle/Tap Test

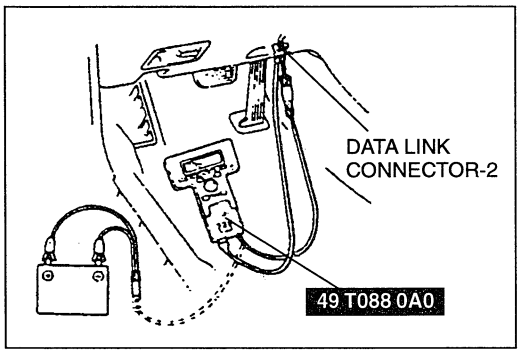
The wiggle/tap test is performed by the technician in an attempt to re-create an intermittent fault.

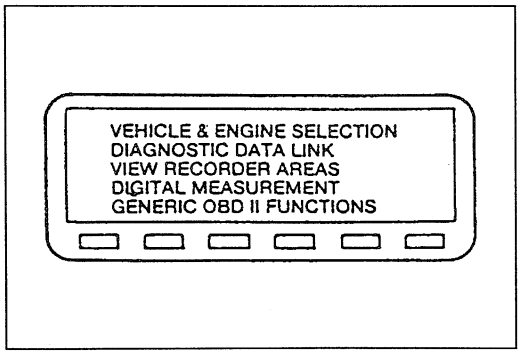
PREPARATION
SST

49 T088 0A0 NGS set		For inspection of PCM terminal voltage and input/output device









ON-BOARD DIAGNOSTIC TEST
New Generation Start (NGS) Hook-up Procedure

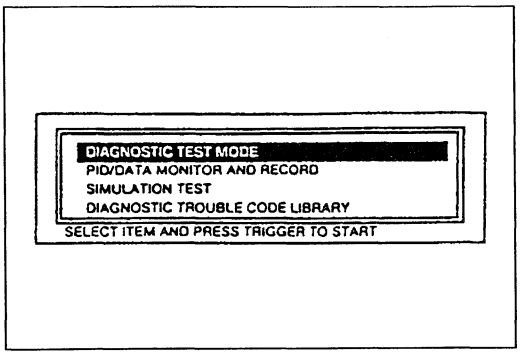
Note
- Make sure Key is Off.

1. Insert the vehicle interface module and program card into the **SST** (NGS) control unit.
2. Plug the NGS OBD II adapter into the interface module and the large 5 pin connector into the vehicle data link connector (DLC) located under the dash to left of the center console.
3. Plug the (NGS) tester power cable into the cigarette lighter or use a battery hook-up adapter.
4. Listen for a double beep. The **SST** (NGS) is now initialized. Begin the functional test of powertrain control system.

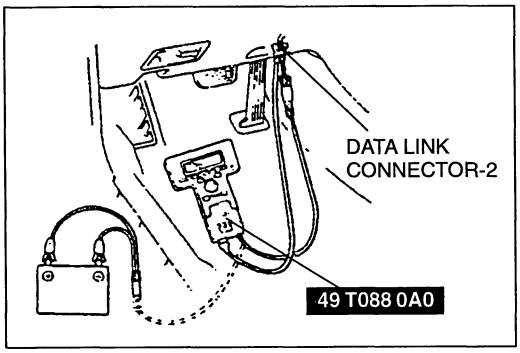
Key On Engine Off Quick-Test Procedure

Note
- Start the engine and bring up to operating temperature before running the Quick-Test.

1. Perform the necessary vehicle preparation and visual inspection (Refer to section F3). Hook-up the **SST** (NGS) to the vehicle.
2. Select vehicle and engine selections.
3. Select vehicle year and model.
4. Select diagnostic data link.
5. Select PCM.



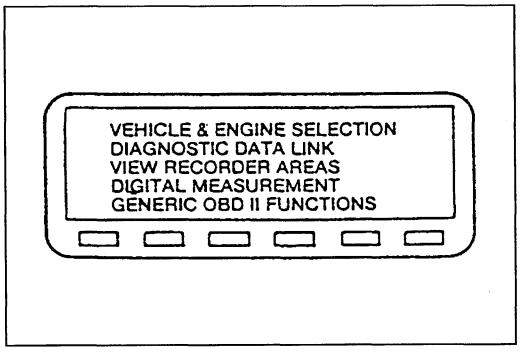
6. Select diagnostic test mode.
7. Select key ON engine off on-demand self-test.
8. Turn the key ON. Press start and trigger. Follow the operating procedures from the menu.

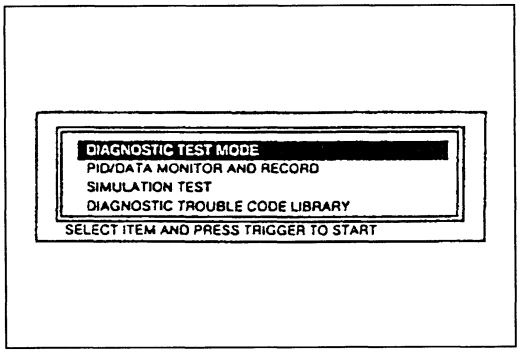


Key On Engine Running Quick-Test Procedure

Note
- Start the engine and bring up to normal operating temperature before running the Quick-Test.

1. Perform the necessary vehicle preparation and visual inspection (Refer to section F3). Hook-up the **SST** (NGS) to the vehicle.
2. Select vehicle and engine selection.
3. Select vehicle year and model.
4. Select Diagnostic data link.
5. Select PCM.

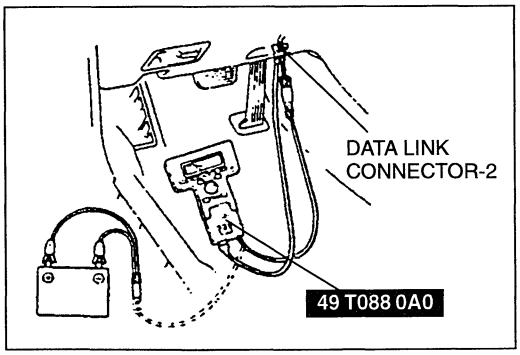




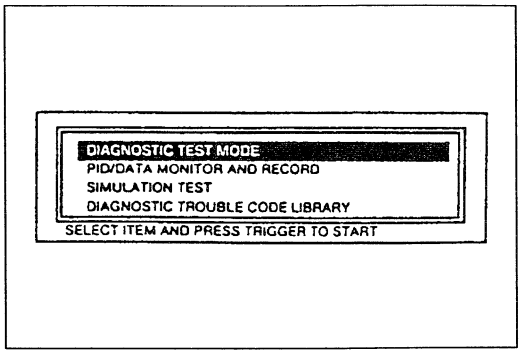
6. Select diagnostic test mode.
7. Select key ON engine running on-demand self-test.
8. Start the vehicle. Press start and trigger.
9. Follow the operating instructions from the menu and perform BOO, and O/D OFF switch cycling, if equipped.

Accessing All Continuous Memory DTC's Procedure

Note
- Start the engine and bring up to operating temperature before running the Quick-Test.



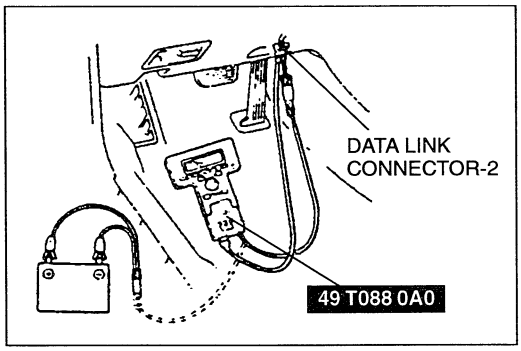
1. Perform the necessary vehicle preparation and visual inspection (Refer to section F3). Hook the **SST** (NGS) to the vehicle.
2. Select vehicle and engine selection menu.
3. Select vehicle year and model.
4. Select Diagnostic data link.
5. Select PCM.



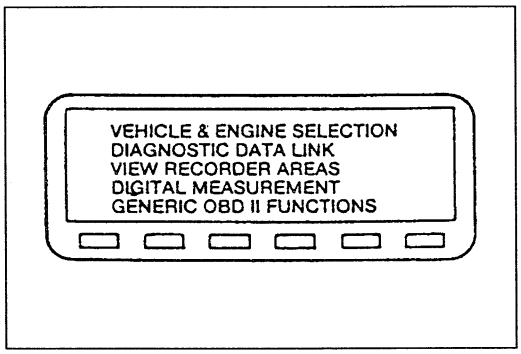
6. Select Diagnostic test mode.
7. Select Retrieve/Clear continuous DTC's.
8. Turn the key ON. Press start.
9. Follow the operating instruction from the menu.

Output Control Test
Procedure

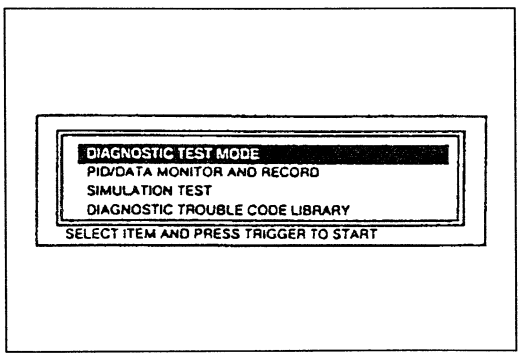
Note
- Start the engine and bring up to operating temperature before running the Output Control Test.



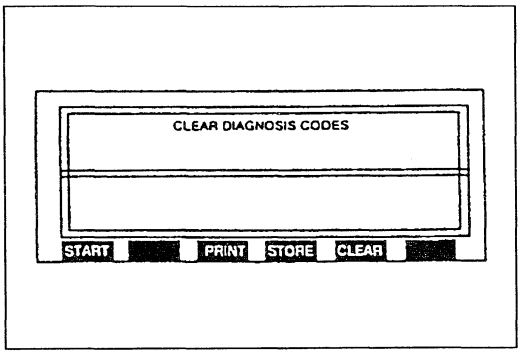
1. Perform the necessary vehicle preparation and visual inspection. (Refer to section F3). Hook up the **SST** (NGS) to the vehicle.
2. Select vehicle and engine selection.
3. Select vehicle year and model.



4. Select diagnostic data link.
5. Select PCM.



6. Select diagnostic test mode.
7. Select active tests.
8. Select output control.
9. Turn the key ON. Press start and trigger. Follow the operating instructions from the menu.



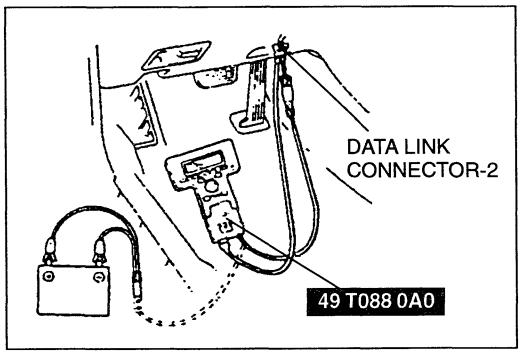
After Repair Procedure

1. Connect the **SST** (NGS) to the Data Link Connector.
2. Select Clear codes function and clear the DTC's.
3. Perform Quick-Test to ensure that the customer's concern has been resolved. If DTC P1000 is present, go to the DTC P1000 chart.

OBD II Drive Cycle

Note
- Only perform this procedure when instructed to do so.

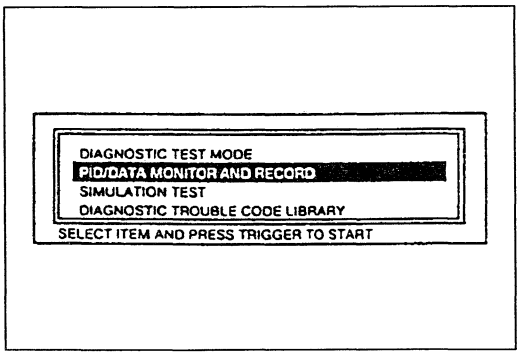
1. Start the engine.
2. Drive the vehicle in any mode for 6 minutes.
3. Monitor the ECT PID drive vehicle until the ECT PID reaches 0.6 volts (180°F [82°C]) or greater.
4. Idle for 45 seconds.
5. Accelerate to 45 mph at 1/4 throttle.
6. Drive for 4 minutes in the range of 30 to 45 mph. If stop and go conditions occur, the accumulated time must be within the 20 to 45 mph range. No wide open throttle (WOT) conditions should occur.
7. Drive at a speed between 30 and 40 mph for 1 minute at steady throttle.
8. Decelerate and idle for 1 minute.
9. Accelerate to 55 mph at 1/2 throttle.
10. Cruise at a speed between 40 and 65 mph for 80 seconds at steady throttle.
11. Decelerate and idle.
12. With the ignition key ON, (vehicle at idle or engine off) check for Continuous Memory DTCs.



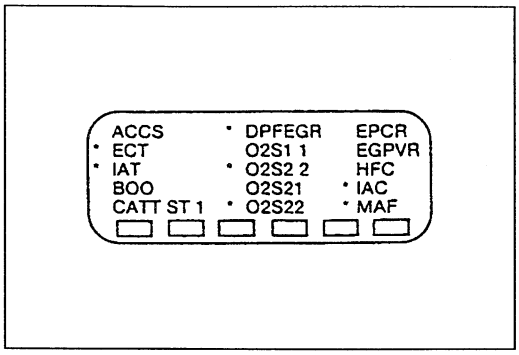
Accessing OBD II PID Mode Procedure

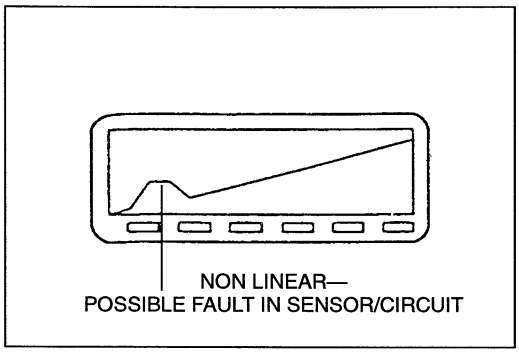
Note
- Start the engine and bring up to operating temperature before running the Quick-Test.

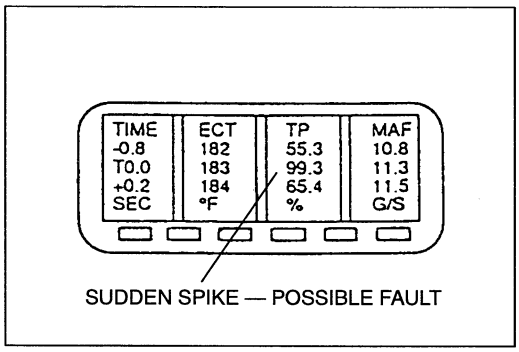
1. Hook-up the **SST** (NGS).
2. Select vehicle and engine selection menu.
3. Select vehicle year and model.
4. Select Diagnostic data link.
5. Select PCM.



6. Select PID/DATA monitor and Record.
7. Turn the key ON or start the engine.







8. Select the PID values to view and press the trigger.
9. Select start to begin.

Note

- Refer to the manufacturer provided instruction manual for other NGS diagnostic testing procedures.

DIAGNOSTIC TROUBLE CODE

Note
- If the DTC that you want to find is not in the following chart, please refer to the "Diagnostic Trouble Code Number" chart in section F3.

No.	Diagnosed Circuit	Condition	Page
P0500	Vehicle speedometer sensor	Insufficient vehicle speedometer sensor input	K2–141
P0706	TR switch	TR out of range Open circuit or sensor	K2–130
P0707		TR out of range Shorted circuit or sensor	
P0712	TFT sensor	150°C (302°F) indicated TFT sensor circuit grounded	K2–126
P0713		–40°C (–40°F) indicated TFT sensor circuit open	
P0715	TSS sensor	Insufficient input from TSS sensor	K2–135
P0731	SS1, SS2, or internal parts	Incorrect gear ratio for 1GR	K2–124
P0732		Incorrect gear ratio for 2GR	
P0733		Incorrect gear ratio for 3GR	
P0734		Incorrect gear ratio for 4GR	
P0741	TCC solenoid	TCC control engagement error	K2–128
P0743		TCC solenoid circuit failure during self-test	
P0750	SS1	SS1 circuit failure	K2–124
P0755	SS2	SS2 circuit failure	
P1500	Vehicle speedometer sensor	Insufficient vehicle speedometer sensor input	K2–141
P1705	TR switch	TR not in PARK	K2–130
P1711	TFT sensor	ATF is not at operating temperature during self-test	K2–126
P1746	EPC solenoid	Open PCM output driver	K2–133
P1747		EPC solenoid circuit failure, shorted to ground or open	
P1780	O/D OFF switch	O/D OFF switch not cycled during self-test	K2–139
P1783	TFT sensor	ATF temperature exceeded 132°C (270°F)	K2–126
P1788	3–2T/CCS	Circuit shorted during self-test	K2–137
P1789		Circuit open or PCM drive circuit failure during self-test	

Caution
- **Do not disconnect the battery to clear diagnostic trouble codes. This will erase the keep alive memory information which may cause a driveability concern.**
- **After repairing a failure, perform the After Repair Procedure to verify the fault has been corrected.**

Pinpoint Test
Pinpoint test A

DIAGNOSTIC TROUBLE CODE NO.P0750, P0755, P0731, P0732, P0733, P0734			
DESCRIPTION	This Pinpoint Test is intended to diagnose the following components: • Transaxle Wiring Harness, SS1, SS2, VPWR • Powertrain Control Module (PCM)		
[TROUBLESHOOTING HINTS] Engine: Performance, Cooling, Brakes Electrical: Battery, Input Sensors, Wiring Harnesses Transaxle: Internal Transaxle Compornents, Linkages, Cooling			
STEP	**INSPECTION**		**ACTION**
A1	**ELECTRONIC DIAGNOSTICS** • Check the solenoid body connector is fully seated, terminals are fully engaged in the connector and in good condition before preceeding. • Connect NGS tester. • Perform KOEO Test until Continuous Memory DTC have been displayed. • Perform the Drive Cycle Test mode. • Depress throttle to WOT and release. • Does vehicle enter Output State (DTM)?	Yes	Remain in Output State (DTM). Go to A2
		No	Depress thottle and release. If vehicle did not enter Output State (DTM), refer to section F3.
A2	**CHECK ELECTRICAL SIGNAL OPERATION** **Caution** • **Removing the solenoid body connector by prying with a screwdriver will damage the connector. Remove the solenoid body connector by pushing on the wire tab and pulling on the wiring harness.** • Disconnect solenoid body connector. • Using a mirror, inspect both ends of the connector for damaged or pushed out pins, corrosion, loose wires, and missing or damaged seals. • Refer to connector schematic and table of solenoid body. (Refer to page K2–143) • Connect VOM/DVOM positive test lead to VPWR circuit and negative test lead to the suspect solenoid circuit of the transaxle vehicle harness connector. • VOM/DVOM ON 20 Volt scale. • While observing DVOM, depress and release throttle to cycle solenoid output ON and OFF. • Does the suspected solenoid output voltage change at least 0.5 volt?	Yes	Go to A5
		No	Go to A3
A3	**CHECK CONTINUITY OF SOLENOID SIGNAL AND VPWR HARNESS CIRCUITS** • Key OFF. • Solenoid body connector disconnected. • Disconnect Powertrain Control Module (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as Reqd. • Install breakout box, leave PCM disconnected. • Refer to connector schematic and table of solenoid body. (Refer to page K2–143) • Measure resistance between PCM signal test pin (27 or 1) at the breakout box and signal pin at solenoid body connector. • Measure resistance between PCM Test Pin (71/97) at the breakout box and VPWR pin at solenoid body connector. • Is each resistance less than 5.0 ohms?	Yes	Go to A4
		No	Service open circuit(s). Remove breakout box. Reconnect all components. Rerun OBD Tests.

STEP	INSPECTION		ACTION
A4	**CHECK SOLENOID HARNESS FOR SHORTS TO POWER AND GROUND** • Breakout box installed, PCM disconnected. • Solenoid body connector disconnected. • Refer to connector schematic and table of solenoid body. (Refer to page K2–143) • Measure resistance between PCM signal test pin (27 or 1) and Test Pin (71/97) at the breakout box. • Measure resistance between PCM signal test pin (27 or 1) and test pins (77/103) and (91) at breakout box and chassis ground. • Is each resistance greater than 10,000 ohms?	Yes	Go to A5
		No	Service short circuit. Remove breakout box. Reconnect all components. Rerun OBD Tests.
A5	**SOLENOID FUNCTIONAL TEST** • Ensure that the harness is disconnected at the transaxle. • Install Transaxle tester at the solenoid body connecter. • Using tests outlined under Tester Instructions, Perform the SOLENOID VOLTAGE test. **Note** • LED will turn "GREEN" when solenoid activates and turn "OFF" when deactivated LED will turn "RED" if activated solenoid is shorted to BAT+. LED will remain "OFF" if an activated solenoid is shorted to ground or no continuity. • Does the solenoids activate? (LED GREEN)	Yes	Go to A6
		No	Go to A7
A6	**TRANSAXLE DRIVE TEST** • Perform the Drive test. (Refer to page K2–25.) • Does the vehicle upshift when commanded by the tester?	Yes	Replace the PCM. Reconnect all components. Return OBD Tests. If symptom still are present, refer to SYMPTOM TROUBLESHOOTING for shift concern.
		No	Go to A7
A7	**CHECK RESISTANCE OF SOLENOID** **Note** • Refer to the Transaxle Tester for terminal location. • Bench/Drive switch in BENCH mode. • Rotate gear selector switch to OHMS position. • Connect ohmmeter negative lead to the SS1 jack and the positive lead to VPWR jack on tester. This is to test SS1. • Record resistance. • Connect ohmmeter negative lead to the SS2 jack and the positive lead to VPWR jack on tester. This is to test SS2. • Are all the shift solenoids resistance between 12 and 22 ohms?	Yes	Go to A8
		No	Replace Solenoid Body assembly. Record and erase codes. Rerun OBD Tests.
A8	**CHECK SOLENOID FOR SHORT TO GROUND** • Check for continuity between BAT- (engine ground) and appropriate jack by using an ohmmeter or other low current tester (less than 200 milliamps). Solenoid / Tester Jack: SS1 / SS1/VPWR; SS2 / SS2/VPWR • Connection should show infinite resistance (no continuity). • Is there continuity?	Yes	Replace Solenoid Body assembly. Record and erase codes. Rerun OBD Tests.
		No	Refer to SYMPTOM TROUBLESHOOTING.

Pinpoint test B

DIAGNOSTIC TROUBLE CODE NO.P1711, P0712, P0713, P1783			
DESCRIPTION	This Pinpoint Test is intended to diagnose the following components: • Transaxle Wiring Harness, TFT, SIGNAL RETURN • Powertrain Control Module (PCM)		
[TROUBLESHOOTING HINTS] Engine: Cooling Electrical: Battery, Wiring Harness Transaxle: Internal Transaxle Components, Cooling, Fluid			
STEP	**INSPECTION**		**ACTION**
B1	**ELECTRONIC DIAGNOSTICS** • Check the solnoid body connector is fully seated, terminals are fully engaged in the connector and in good condition before preceeding. • Have the items been checked?	Yes	Go to B2
		No	Perform checks. Erase DTCs and rerun OBD Tests.
B2	**CHECK ELECTRICAL SIGNAL OPERATION** • Key OFF. **Caution** • **Removing the solenoid body connector by prying with a screwdriver will damage the connector. Remove the solenoid body connector by pushing on the wire tab and pulling on the wiring harness.** • Disconnect solenoid body connector. • Using a mirror, inspect both ends of the connector for damaged or pushed out pins, corrosion, loose wires, and missing or damaged seals. • Refer to connector schematic and table of solenoid body. (Refer to page K2–143) • Connect VOM/DVOM positive test lead to TFT circuit and negative test lead to SIG RTN circuit of the solenoid body connector. • VOM/DVOM ON 20 Volt scale. • Key ON. (engine OFF). • Is the voltage between 4.50 and 5.25 volts?	Yes	Go to B6
		No	Go to B3.
B3	**CHECK CONTINUITY OF TFT AND SIG RTN CIRCUITS** • Key OFF. • Solenoid body connector disconnected. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as required. • Install breakout box, leave PCM disconnected. • Refer to connector schematic and table of solenoid body. (Refer to page K2–143) • Measure resistance between PCM signal test pin (37) at the breakout box and signal pin at solenoid body connector. • Measure resistance between PCM signal test pin (91) at the breakout box and signal pin at solenoid body transaxle harness connector. • Are both resistances less than 5.0 ohms?	Yes	Go to B4
		No	Service open circuit(s). Remove breakout box. Reconnect all components. Erase DTCs and rerun OBD Tests.
B4	**CHECK TFT CIRCUIT FOR SHORT TO VPWR AND GROUND** • Key OFF. • Solenoid body connector disconnected. • Disconnect PCM, inspect for damaged or pushed out pins, corrosion, loose wires, etc. • Install breakout box, leave PCM disconnected. • Refer to connector schematic and table of solenoid body. (Refer to page K2–143) • Measure resistance between TFT test pin 37 and Pins 71/97 at breakout box. • Measure resistance between TFT test Pin 37 and Pins 77/103 and 91 at breakout box. • Is each resistance greater than 10,000 ohms?	Yes	Go to B5
		No	Service short circuit. Remove breakout box. Reconnect all components. Erase DTCs and rerun OBD Tests.

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>B5</td><td>CHECK RESISTANCE OF TFT SENSOR/ HARNESS

Note
• Refer to the Transaxle Tester for Terminal Locations.

• Ensure that the emission harness is disconnected.
• Install tester to solenoid body connector.
• Set Bench/Drive switch to BENCH mode.
• Rotate Gear selector switch to OHMS Check position.
• Connect ohmmeter negative lead to –TFT jack and positive lead to +TFT jack no tester.
• Perform Tests 1 and 2.

Note
• While performing Tests 1 and 2 observe resistances.
Code P0713 is set if resistance value exceeds 869K ohms (OPEN circuit).
Code P0712 is set if resistance value falls below 597 ohms (Short circuit).

TEST 1
• Record resistance.
• Resistance should be approximately in the following ranges:
Transaxle Fluid Temperature
<table><tr><th>Temperature °C {°F}</th><th>Resistance kΩ</th></tr><tr><td>–40—–20 {–40—–4}</td><td>967—284</td></tr><tr><td>–19—–1 {–3—31}</td><td>284—100</td></tr><tr><td>0—20 {32—58}</td><td>100—37</td></tr><tr><td>21—40 {59—104}</td><td>37—16</td></tr><tr><td>41—70 {105—158}</td><td>16—5</td></tr><tr><td>71—90 {159—194]</td><td>5—2.7</td></tr><tr><td>91—110 {195—230}</td><td>2.7—1.5</td></tr><tr><td>111—130 {231—266}</td><td>1.5—0.8</td></tr><tr><td>131—150 {267—302}</td><td>0.8—0.54</td></tr></table>
TEST 2
• Check for intermittent short or open.
• If resistance was between 0.8K and 100K ohms, perform the following test. If transaxle is cold, run transaxle to warm it up. If transaxle is warm, allow transaxle to cool. Check TFT sensor resistance again. Compart resistance with internal resistance. Resistance should decrease if transaxle was warmed and should increase if transaxle was allowed to cool. If correct change in resistance occurs, repeat OBD Tests.
• Is the resistance within range?</td><td>Yes</td><td>Go to B6</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace solenoid body assembly.
Record and erase DTCs.
Repeat OBD Tests.</td></tr>
<tr><td>B6</td><td>CHECK TFT SENSOR FOR SHORT TO GROUND
• Check for continuity between –BAT (engine ground) and appropriate jack (–TFT and +TFT) appropriate wire with ohmmeter or other low current tester (less than 200 milliamps).
• Connection should show infinite resistance (no continuity).
• Is there continuity?</td><td>Yes</td><td>Replace solenoid body assembly.
Repeat OBD Test.</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace PCM.
Erase DTCs and perform Drive Cycle Test.
Rerun OBD Tests.
If DTC are present and overtemp condition existed determine.
If fluid is burnt, teardown unit and repair as required.
Rerun OBD Test.</td></tr>
</table>

Pinpoint test C

DIAGNOSTIC TROUBLE CODE NO.P0741, P0743			
DESCRIPTION	This Pinpoint Test is intended to diagnose the following components: • Transaxle Wiring Harness, TCC, VPWR • Powertrain Control Module (PCM)		
[TROUBLESHOOTING HINTS] Engine: Performance, Cooling Electrical: Battery, Input Sensors, Wiring Harnesses, Brake Switch Transaxle: Internal Transaxle Components, Linkage, Cooling			
STEP	**INSPECTION**		**ACTION**
C1	**ELECTRONIC DIAGNOSTICS** • Check the solenoid body connector is fully seated, terminals are fully engaged in the connector and in good condition before preceeding. • Connect NGS tester. • Perform KOEO Test until Continuous Memory DTC have been displayed. • Perform the Drive Cycle Test mode. • Depress throttle to WOT and release. • Does vehicle enter Output State (DTM)?	Yes	Remain in Output State (DTM). Go to C2
		No	Depress thottle and release. If vehicle did not enter Output State (DTM), refer to section F3.
C2	**CHECK ELECTRICAL SIGNAL OPERATION** **Caution** • **Removing the solenoid body connector by prying with a screwdriver will damage the connector. Remove the solenoid body connector by pushing on the wire tab and pulling on the wiring harness.** • Disconnect solenoid body connector. • Using a mirror, inspect both ends of the connector for damaged or pushed out pins, corrosion, loose wires, and missing or damaged seals. • Refer to connector schematic and table of solenoid body. (Refer to page K2–143) • Connect VOM/DVOM positive test lead to VPWR circuit and negative test lead to solenoid circuit of the solenoid body connector. • VOM/DVOM ON 20 Volt scale. • While observing DVOM, depress and release throttle to cycle solenoid output ON and OFF. • Does the suspected solenoid output voltage change at least 0.5 volt?	Yes	Go to C5
		No	Go to C3
C3	**CHECK CONTINUITY OF SOLENOID SIGNAL AND VPWR HARNESS CIRCUITS** • Key OFF. • Solenoid body connector disconnected. • Disconnect Powertrain Control Module (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as required. • Install breakout box, leave PCM disconnected. • Refer to connector schematic and table of solenoid body. (Refer to page K2–143) • Measure resistance between PCM signal pin (54) at the breakout box and signal test pin at solenoid body connector. • Measure resistance between PCM test pin (71/97) at the breakout box and VPWR pin at solenoid body connector. • Is each resistance less than 5.0 ohms?	Yes	Go to C4
		No	Service open circuit(s). Remove breakout box. Reconnect all components. Rerun OBD Tests.

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>C4</td><td>CHECK SOLENOID HARNESS FOR SHORTS TO POWER AND GROUND
• Key OFF.
• Breakout box installed, PCM disconnected.
• Solnoid body connector disconnected.
• Refer to connector schematic and table of solenoid body. (Refer to page K2–143)
• Measure resistance between PCM signal test pin (54) and Test Pin (71/97) at the breakout box.
• Measure resistance between PCM signal test pin (54) and test pins (77/103) and (91) at breakout box and chassis ground.
• Is each resistance greater than 10,000 ohms?</td><td>Yes</td><td>Go to C5</td></tr>
<tr><td></td><td></td><td>No</td><td>Service short circuit.
Remove breakout box.
Reconnect all components.
Rerun OBD Tests.</td></tr>
<tr><td>C5</td><td>SOLENOID FUNCTIONAL TEST
• Emission harness disconnected at transaxle.
• Install Transaxle tester at the solenoid body connecter.
• Using tests outlined under Tester Instructions Perform the SOLENOID VOLTAGE test.

Note
• LED will turn “GREEN” when solenoid activates and turn “OFF” when deactivated.
LED will turn “RED” if activated solenoid is shorted to BAT+.
LED will remain “OFF” if an activated solenoid is shorted to ground or no continuity.

• Does the solenoid activate? (LED GREEN)</td><td>Yes</td><td>Go to C6</td></tr>
<tr><td></td><td></td><td>No</td><td>Go to C7</td></tr>
<tr><td>C6</td><td>TRANSAXLE DRIVE TEST
• Perform the Drive Cycle Test as outlined in Transaxle Tester manual.
• Does the TCC active when commanded by the tester?
• Does the engine RPM drop?</td><td>Yes</td><td>Replace PCM.
Erase DTCs and perform Drive Cycle Test.
Rerun OBD Tests.
If symptom are still present, refer to SYMPTOM TROUBLESHOOTING for torque converter concern.</td></tr>
<tr><td></td><td></td><td>No</td><td>Go to C7</td></tr>
<tr><td>C7</td><td>CHECK RESISTANCE OF SOLENOID

Note
• Refer to the Transaxle Tester for terminal location.

• Set Bench/Drive switch to Bench mode.
• Rotate gear select switch to Ohms Check position.
• Connect ohmmeter negative lead to TCC jack and positive lead to VPWR jack on tester.
• Record resistance.
• Is resistance between 12.5—19.0 ohms?</td><td>Yes</td><td>Go to C8</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace solenoid body assembly.</td></tr>
<tr><td>C8</td><td>CHECK SOLENOID FOR SHORT TO GROUND
• Check for continuity between BAT- (engine ground) and appropriate jack with and ohmmeter or other low current tester (less than 200 milliamps).

<table><tr><th>Solenoid</th><th>Tester Jack</th></tr><tr><td>TCC</td><td>TCC
VPWE</td></tr></table>
• Connection should show infinite resistance (no continuity).
• Is there continuity?</td><td>Yes</td><td>Replace solenoid body assembly.</td></tr>
<tr><td></td><td></td><td>No</td><td>Refer SYMPTOM TROUBLE SHOOTING to diagnose torque converter clutch diagnosis.</td></tr>
</table>

Pinpoint test D

DIAGNOSTIC TROUBLE CODE NO.P1705, P0707, P0708	
DESCRIPTION	This Pinpoint Test is intended to diagnose the following components: • Transaxle Wiring Harness, TR switch, Signal Return • Powertrain Control Module (PCM) • Starter Circuits, Backup Circuits

[TROUBLESHOOTING HINTS]
Engine: Starter, Starter Relay
Electrical: Battery, Ignition Switch, Wiring Harness
Transaxle: Internal Transaxle Components, Linkage

STEP	INSPECTION		ACTION
D1	**ELECTRONIC DIAGNOSTICS** • Check the TR switch connector is fully seated, terminals are fully engaged in the connector and in good condition before preceeding. • Verify shift linkage adjustment in D range. • Key OFF. • Apply parking brake. • Place transaxle in N position. • Verify that TR Switch Alignment Tool or equivalent fits in the appropriate slots. • Is TR switch proper adjusted?	Yes	Remove tools. Go to D2
		No	Adjust TR switch as outlined under Transaxle assembly. After adjustments place selector lever in P position. Erase DTCs and rerun OBD Tests.
D2	**CHECK ELECTRICAL SIGNAL OPERATION** • Key OFF. **Caution** • **Do not attempt to pry on TR switch connector. Depress tab and pull up on wiring harness.** • Disconnect TR switch connector. • Using a mirror, inspect both end of the connector for damaged or pushed out pins, corrosion, loose wires and missing or damaged seals. • Refer to connector schematic of TR switch. (Refer to page K2–143) • Connect a VOM/DVOM positive test lead to TR signal circuit and negative test lead to signal return (SIGRTN) circuit of TR switch connector. • Place VOM on 20 volt scale. • Key ON. (engine OFF). • Is voltage between 4.75 and 5.25 volts?	Yes	Go to D5
		No	Go to D3
D3	**CHECK CONTINUITY OF TR SWITCH HANESS CIRCUITS** • Key OFF. **Caution** • **Do not attempt to pry on TR switch connector. Depress tab and pull up on wiring harness.** • Disconnect TR switch connector. • Inspect for damaged or pushed out pins, corrosion, loose wires, etc. • Disconnect Powertrain Control Module (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as required. • Install breakout box, leave PCM disconnected. • Refer to connector of TR switch. (Refer to page K2–143) • Measure resistance between PCM test pin (91) at the breakout box and SIG RTN circuit at the TR switch connector • Measure resistance between PCM test pin (64) at the breakout box and TR signal circuit at the TR switch connector • Is each resistance less than 5.0 ohms?	Yes	Go to D4
		No	Service open circuit(s). Remove breakout box. Reconnect all components. Erase codes. Rerun OBD Tests.

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>D4</td><td>CHECK TR SWITCH CIRCUIT FOR SHORTS TO POWER AND GROUND
• Key OFF.
• Breakout box installed, PCM disconnected.
• TR switch connector disconnected.
• Refer to connector of TR switch. (Refer to page K2–143)
• Measure resistance between PCM test pin (64) and PCM test pin (71/97), (77/103), and (91) at the breakout box.
• Measure resistance between PCM test pin (64) at the breakout box and chassis ground.
• Is each resistance greater than 10,000 ohms?</td><td>Yes</td><td>Go to D5</td></tr>
<tr><td></td><td></td><td>No</td><td>Service short circuit.
Remove breakout box.
Reconnect all components.
Erase codes.
Rerun OBD Tests.</td></tr>
<tr><td>D5</td><td>CHECK TR SWITCH RESISTANCE
• Disconnect TR switch connector.
• Connect MLPS Harness Adapter to TR switch and Transaxle Tester.
• Install MLPS Overlay onto Transaxle Tester.
• Using procedure provide with tester, verify switch resistive functions in all positions.
<table><tr><th rowspan="2">Selector Lever Position</th><th colspan="2">Resistance (ohms)</th><th rowspan="2">Range Volts</th></tr><tr><th>min</th><th>max</th></tr><tr><td>P</td><td>3,770</td><td>4,607</td><td>3.97—4.85</td></tr><tr><td>R</td><td>1,304</td><td>1,593</td><td>3.24—3.96</td></tr><tr><td>N</td><td>660</td><td>807</td><td>2.55—3.11</td></tr><tr><td>D</td><td>361</td><td>442</td><td>1.88—2.30</td></tr><tr><td>2</td><td>190</td><td>232</td><td>1.23—1.51</td></tr><tr><td>1</td><td>78</td><td>95</td><td>0.61—0.75</td></tr></table>• Are the resistive value within specifications?</td><td>Yes</td><td>If you are here as a result of No VREF (D2), replace PCM, then Go to D6</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace TR swithc and adjust.
Erase DTCs and rerun OBD Tests.</td></tr>
<tr><td>D6</td><td>CHECK PARK/NEUTRAL CIRCUITS OF TR SWITCH
• Using the procedures outlined in the tester manual check the Park/Neutral circuits of TR switch in all gear positions.
• Monitor the status light on the tester for proper indications.
<table><tr><th colspan="3">Park/Neutral Circuit</th></tr><tr><th>Terminal</th><th>Selector Lever Position</th><th>A Good Switch Will Indicate</th></tr><tr><td rowspan="6">33 and 32</td><td>P</td><td>Less than 5 ohms</td></tr><tr><td>R</td><td>Greater than 100K ohms</td></tr><tr><td>N</td><td>Less than 5 ohms</td></tr><tr><td>D</td><td>Greater than 100K ohms</td></tr><tr><td>2</td><td>Greater than 100K ohms</td></tr><tr><td>1</td><td>Greater than 100K ohms</td></tr></table>• Do the Park/Neutral circuits operate properly and only in the proper gear position?</td><td>Yes</td><td>Service as required.
Go to D7</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace TR switch and adjust.
Erase DTCs and rerun OBD Tests.</td></tr>
</table>

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>D7</td><td>CHECK REVERSE/BACK-UP LIGHT CIRCUIT OF TR SWITCH
• Using the procedures outlined in the tester manual, check the Reverse/Back-up light circuits of TR switch in all gear positions.
• Monitor the status light on the tester for proper indications.
<table><tr><th colspan="3">Reverse/Back-up Light Circuit</th></tr><tr><th>Terminal</th><th>Selector Lever Position</th><th>A Good Switch Will Indicate</th></tr><tr><td rowspan="6">298 and 140</td><td>P</td><td>Greater than 100K ohms</td></tr><tr><td>R</td><td>Less than 5 Ohms</td></tr><tr><td>N</td><td>Greater than 100K ohms</td></tr><tr><td>D</td><td>Greater than 100K ohms</td></tr><tr><td>2</td><td>Greater than 100K ohms</td></tr><tr><td>1</td><td>Greater than 100K ohms</td></tr></table>• Do the Reverse/Back-up circuits operate properly and only in the proper gear positions?</td><td>Yes</td><td>Service as required.</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace TR switch and adjust.
Erase DTCs and rerun OBD Tests.</td></tr>
</table>

Pinpoint test E

DIAGNOSTIC TROUBLE CODE NO. P1747, P1746			
DESCRIPTION	This Pinpoint Test is intended to diagnose the following components: • Transaxle Wiring Harness, EPC, EPCPWR • Powertrain Control Module (PCM)		
[TROUBLESHOOTING HINTS] Engine: Performance Electrical: Battery, Input Sensors, Wiring Harness Transaxle: Internal Transaxle Components, Cooling			
STEP	**INSPECTION**		**ACTION**
E1	**ELECTRONIC DIAGNOSTICS** • Check the solenoid body connector is fully seated, terminals are fully engaged in the connector and in good condition before preceeding. • Connect NGS tester. • Perform KOEO Test until Continuous Memory DTC have been displayed. • Perform the Drive Cycle Test mode. • Depress throttle to WOT and release. • Does vehicle enter Output State (DTM)?	Yes	Remain in Output State (DTM). Go to E2
		No	Depress thottle and release. If vehicle did not enter Output State (DTM), refer to section F3.
E2	**CHECK ELECTRICAL SIGNAL OPERATION** **Caution** • **Removing the solenoid body connector by prying with a screwdriver will damage the connector. Remove the solenoid body connector by pushing on the wire tab and pulling on the wiring harness.** • Disconnect solenoid body connector. • Using a mirror, inspect both ends of the connector for damaged or pushed out pins, corrosion, loose wires, and missing or damaged seals. • Refer to connector schematic and table of solenoid body. (Refer to page K2–143) • Connect VOM/DVOM positive test lead to VPWR circuit and negative test lead to the suspect solenoid circuit of the transaxle vehicle harness connector. • VOM/DVOM ON 20 Volt scale. • While observing DVOM, depress and release throttle to cycle solenoid output ON and OFF. • Does the suspected solenoid output voltage change at least 0.5 volt?	Yes	Go to E5
		No	Go to E3
E3	**CHECK CONTINUITY OF SOLENOID SIGNAL AND VPWR HARNESS CIRCUIT** • Key OFF. • Disconnect Powertrain Control Module (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. • Install breakout box, leave PCM disconnected. • Refer to connector schematic and table of the solenoid body. (Refer to page K2–143) • Measure resistance between PCM Test Pin (71/97) at breakout box and EPC PWR circuit at the solenoid body connector. • Measure resistance between PCM Test Pin (81) at the breakout box and EPC solenoid signal pin at the solenoid body connector. • Is each resistance less than 5.0 ohms?	Yes	Go to E4
		No	Service open circuit. Remove breakout box. Reconnect all components. Erase DTCs and rerun OBD Tests.

STEP	INSPECTION		ACTION
E4	**CHECK HARNESS FOR SHORT TO POWER OR GROUND** • Key OFF. • Breakout box installed, PCM disconnected. • Solenoid body connector disconnected. • Refer to connector schematic and table of the solenoid body. (Refer to page K2–143) • Measure resistance between EPC solenoid circuit test pin (81) and test pin (71/97) at the breakout box. • Measure resistance between EPC solenoid circuit test pin (81) and test pins (77/103), (91) at the breakout box. • Is each resistance greater than 10,000 ohms?	Yes	Go to E5
		No	Service short circuit. Remove breakout box. Reconnect all components. Erase DTCs and rerun OBD Tests.
E5	**TRANSAXLE FUNCTIONAL TEST** • Solenoid body connector disconnected. • Install Transaxle Tester. • Set Bench/Drive switch to Drive mode. • Rotate Gear selector switch to 1st Gear position. • Using tests outlined in the manual perform the EPC function test. • Observe line pressure on the gauge while depressing the EPC switch. (VEHICLE MUST BE RUNNING) • Does the EPC (LED GREEN) activate and line pressure drop when the EPC switch is depressed?	Yes	Replace PCM. Rerun OBD Tests.
		No	Go to E6
E6	**CHECK RESISTANCE OF SOLENOID** **Note** • Be sure that tester power is OFF or damage to ohmmeter may result. • Connect ohmmeter negative lead to VPWR jack and positive lead to EPC jack on tester. This is to test EPC solenoid. • Record resistance. • Is the resistance between 3.75—5.92 ohms?	Yes	Go to E7
		No	Replace solenoid body assembly. Record and erase DTCs. Rerun OBD tests.
E7	**CHECK SOLENOID FOR SHORT TO GROUND** • Check for continuity between BAT- (engine ground) and appropriate jack with an ohmmeter or other low current tester (less than 200 milliamps). Solenoid: EPC — Tester jack: EPC, VPWR • Connection should show infinite resistance (no continuity). • Is there continuity?	Yes	Replace Solenoid Body Assembly. Record and erase DTCs. Rerun OBD Tests.
		No	Refer to QUICK DIAGNOSIS CHART to diagnose EPC concerns under engagement and/or Shift diagnosis.

Pinpoint test F

DIAGNOSTIC TROUBLE CODE NO.P0715			
DESCRIPTION	This Pinpoint Test is intended to diagnose the following components: • Transaxle Wiring Harness, TSS, SIGNAL RETURN • Powertrain Control Module (PCM)		
[TROUBLESHOOTING HINTS] Electrical: Battery, Input Sensors, Wiring Harness Transaxle: Internal Transaxle Components			
STEP	**INSPECTION**		**ACTION**
F1	**ELECTRONIC DIAGNOSTICS** • Check the turbine shaft speed sensor (TSS) connector is fully seated, terminal are fully engaged in the connector and in good condition before proceeding. • Have the items above been checked?	Yes	Go to F2
		No	Perform the checks. Erase DTCs and rerun OBD Tests.
F2	**CHECK CONTINUITY OF TSS HARNESS CIRCUIT** • Key OFF. **Caution** • **Do not pry on connector. Pull up on harness.** • Disconnect TSS connector. • Disconnect Powertrain Control Module (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. • Install breakout box, leave PCM disconnected. • Refer to connector schematic of TSS. (Refer to page K2–143) • Measure resistance between PCM test pin (84) at the breakout box and the TSS (+) circuit at the TSS connector. • Measure resistance between PCM test pin (91) at the breakout box and the TSS (–) circuit at the TSS connector and chassis/battery ground. • Is each resistance less than 5.0 ohms?	Yes	Go to F3
		No	Service open circuit. Remove breakout box. Reconnect all components. Rerun OBD Tests.
F3	**CHECK TSS CIRCUIT FOR SHORT TO POWER AND GROUND** • Key OFF. • Dissonnect TSS connector. • Breakout box installed, PCM disconnected. • Measure resistance between PCM test pins (84), (91) and test pins (71/97) at breakout box. • Measure resistance between PCM test pins (84), (91), (71/97) and test pins (77/103) at breakout box. • Is each resistance greater than 10,000 ohms?	Yes	Go to F4
		No	Service short circuit. Remove breakout box. Reconnect all components. Rerun OBD Tests.
F4	**TSS FUNCTIONAL TEST** **Caution** • **Do not pry on connector. Pull up on harness.** • Disconnect vehicle harness at TSS. • Install transaxle tester on to TSS. • Connect voltmeter positive lead to (+) TSS and negative lead to (–) TSS jacks. Set voltmeter to 20 volts AC. • Perform drive cycle test. Monitor voltmeter. • Does the voltage increase with an increase in vehicle speed?	Yes	Replace PCM.
		No	Go to F5

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>F5</td><td>CHECK RESISTANCE OF TSS

Note
• Refer to the LA4A-EL Transaxle Tester for Terminal Locations

• Connect ohmmeter negative lead to +TSS jack and positive lead to –TSS jack on tester. This is to test TSS.
• Record resistance.
• Is the resistance between 140—290 ohms?</td><td>Yes</td><td>Go to F6</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace TSS.
Rerun TSS functional test.</td></tr>
<tr><td>F6</td><td>CHECK SENSOR FOR SHORT TO GROUND
• Check for continuity between BAT– (engine ground) and appropriate jack with an ohmmeter or other low current tester (less than 200 milliamps).

<table><tr><th>Solenoid</th><th>Tester jack</th></tr><tr><td>TSS</td><td>+TSS
–TSS</td></tr></table>
• Connection should show infinite resistance (no continuity).
• Is there continuity?</td><td>Yes</td><td>Replace TSS.
Rerun function test.</td></tr>
<tr><td></td><td></td><td>No</td><td>Go to F7</td></tr>
<tr><td>F7</td><td>CHECK TSS MAGNETISM
• Remove TSS from transaxle.
• Place TSS against a metal surface to which a magnet would stick. The TSS should be magnetized and stick to the metal surface.
• Does the TSS stick?</td><td>Yes</td><td>Go to F8</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace TSS.
Rerun functional test.</td></tr>
<tr><td>F8</td><td>CHECK EXCITER WHEEL
• Remove TSS.
• With a remote starter, start and stop until a tooth of the exciter wheel is visible through the TSS hole. Continue until all 4 teeth have been visibly inspected.
• Were all teeth present?</td><td>Yes</td><td>Replace TSS.
Rerun functional test.</td></tr>
<tr><td></td><td></td><td>No</td><td>Service or replace as required.
Then rerun function test.</td></tr>
</table>

Pinpoint test G

DIAGNOSTIC TROUBLE CODE NO.P1788, P1789			
DESCRIPTION	This Pinpoint Test is intended to diagnose the following components: • Transaxle Wiring Harness, 3–2T/CCS, VPWR • Powertrain Control Module (PCM)		
[TROUBLESHOOTING HINTS] Engine: Performance Electrical: Battery, Input Sensors, Wiring Harness Transaxle: Internal Transaxle Components			
STEP	**INSPECTION**		**ACTION**
G1	**ELECTRONIC DIAGNOSTICS** • Check the solenoid body connector is fully seated, terminals are fully engaged in the connector and in good condition before preceeding. • Connect NGS tester. • Perform KOEO Test until Continuous Memory DTC have been displayed. • Perform the Drive Cycle Test mode. • Depress throttle to WOT and release. • Does vehicle enter Output State (DTM)?	Yes	Remain in Output State (DTM). Go to G2
		No	Depress thottle and release. If vehicle did not enter Output State (DTM), refer to section F3.
G2	**CHECK ELECTRICAL SIGNAL OPERATION** **Caution** • **Removing the solenoid body connector by prying with a screwdriver will damage the connector. Remove the solenoid body connector by pushing on the wire tab and pulling on the wiring harness.** • Disconnect solenoid body connector. • Using a mirror, inspect both ends of the connector for damaged or pushed out pins, corrosion, loose wires, and missing or damaged seals. • Refer to connector schematic and table of solenoid body. (Refer to page K2–143) • Connect VOM/DVOM positive test lead to VPWR circuit and negative test lead to the suspect solenoid circuit of the transaxle vehicle harness connector. • VOM/DVOM ON 20 Volt scale. • While observing DVOM, depress and release throttle to cycle solenoid output ON and OFF. • Does the suspected solenoid output voltage change at least 0.5 volt?	Yes	Go to G5
		No	Go to G3
G3	**CHECK CONTINUITY OF SOLENOID SIGNAL AND VPWR HARNESS CIRCUIT** • Key OFF. • Disconnect Powertrain Control Module (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. • Install breakout box, leave PCM disconnected. • Refer to connector schematic and table of solenoid body. (Refer to page K2–143) • Measure resistance between PCM Test Pin (71/97) at breakout box and SOL PWR circuit at the solenoid body connector. • Measure resistance between PCM Test Pin (102) at the breakout box and 3–2T/CCS solenoid signal pin at the solenoid body connector. • Is each resistance less than 5.0 ohms?	Yes	Go to G4
		No	Service open circuit. Remove breakout box. Reconnect all components. Erase DTCs and rerun OBD Tests.

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td rowspan="2">G4</td><td rowspan="2">CHECK HARNESS FOR SHORT TO POWER OR GROUND
• Key OFF.
• Breakout box installed, PCM disconnected.

Caution
• Removing the solenoid body connector by prying with a screwdriver will damage the connector. Remove the solenoid body connector by pushing on the wire tab and pulling on the wiring harness.

• Solenoid body connector disconnected.
• Refer to connector schematic and table of solenoid body. (Refer to page K2–143)
• Measure resistance between 3–2T/CCS solenoid circuit test pin (102) and test pin (71/97) at the breakout box.
• Measure resistance between 3–2T/CCS solenoid circuit test pin (102) and test pins (77/103), (91) at the breakout box.
• Is each resistance greater than 10,000 ohms?</td><td>Yes</td><td>Go to G5</td></tr>
<tr><td>No</td><td>Service short circuit.
Remove breakout box.
Reconnect all componets.
Rerun OBD Tests.</td></tr>
<tr><td rowspan="2">G5</td><td rowspan="2">TRANSAXLE FUNCTIONAL TEST
• Solenoid body connector disconnected.
• Install Transaxle Tester.
• Set Bench/Drive switch to Drive mode.
• Rotate Gear selector switch to 1st Gear position.
• Does the 3–2T/CCS (LED GREEN) deactivate when the 3–2T/CCS switch is depressed?
• When the 3–2T/CCS switch is released does engine braking occur and the 3–2T/CCS engage (LED OFF)?</td><td>Yes</td><td>Replace PCM.
Inspect PCM power relay, service as required.
Rerun OBD Tests.</td></tr>
<tr><td>No</td><td>Go to G6</td></tr>
<tr><td rowspan="2">G6</td><td rowspan="2">CHECK RESISTANCE OF SOLENOID

Note
• Be sure that tester power is OFF or damage to ohmmeter may result.

• Connect ohmmeter negative lead to VPWR jack and positive lead to 3–2T/CCS jack on tester. This is to test 3–2T/CCS solenoid.
• Record resistance.
• Is the resistance between 3.75—5.92 ohms?</td><td>Yes</td><td>Go to G7</td></tr>
<tr><td>No</td><td>Replace solenoid body assembly.
Record and erase DTCs.
Rerun OBD Tests.</td></tr>
<tr><td rowspan="2">G7</td><td rowspan="2">CHECK SOLENOID FOR SHORT TO GROUND
• Check for continuity between BAT– (engine ground) and appropriate jack with and ohmmeter or other low current tester (less than 200milliamps).

<table><tr><th>Solenoid</th><th>Tester Jack</th></tr><tr><td>3–2T/CCS</td><td>3–2T/CCS VPWR</td></tr></table>
• Connection should show infinite resistance (no continuity).
• Is there continuity?</td><td>Yes</td><td>Replace solenoid body assembly.
Record and erase DTCs.
Rerun OBD Tests.</td></tr>
<tr><td>No</td><td>Refer to QUICK DIAGNOSIS CHART to diagnose.
3–2T/CCS concerns under shift diagnosis.</td></tr>
</table>

Pinpoint test TB

DIAGNOSTIC TROUBLE CODE NO.P1780			
DESCRIPTION	This Pinpoint Test is intended to diagnose the following components: • Transaxle Wiring Harness, O/D OFF switch, O/D OFF indicator light • Powertrain Control Module (PCM)		
[TROUBLESHOOTING HINTS] Electrical: Battery, Input Sensors, Wiring Harness Transaxle: Linkages			
STEP	**INSPECTION**		**ACTION**
TB1	**DIAGNOSTIC TROUBLE CODE P1780** DTC P1780 indicates the O/D OFF switch was not cycled during Key On Engine Running (KOER) Self-Test. Possible Cause: – O/D OFF switch damaged or switch not cycled during self-test – Shorted harness – Damaged PCM – Open harness or fuse Did O/D OFF switch cycled during KOER Self-Test?	Yes	Go to TB2
		No	Return KOER Self-Test to cycle O/D OFF switch
TB2	**CHECK O/D OFF SWITCH CIRCUIT FOR VOLTAGE** • Key OFF • Disconnect PCM Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary • Install breakeout box, leave PCM disconnected • Key on, engine off • Measure voltage between test pin (29) and test pins (24/77) at the breakout box while cycling the O/D OFF switch several times Does the voltage cycle?	Yes	Replace PCM Remove breakout box Return OBD Tests
		No	Go to TB3
TB3	**CHECK HARNESS CIRCUIT(S) FOR SHORT TO GROUND** • Key OFF • Breakout box installed, PCM disconnected • Disconnect O/D OFF switch Inspect both ends of the connector for damaged or pushed out pins, moisture, corrosion, loose wires, etc. Service as necessary • Measure resistance between test pin (29) and test pins (24/77) at the breakout box Is the resistance greater than 10,000 ohms?	Yes	Go to TB4
		No	Service short circuit Return KOER Self-Test
TB4	**CHECK CONTINUITY OF O/D OFF SWITCH HARNESS** • Key OFF • Breakout box connected, PCM disconnected • Measure the resistance between keypower at the fuse panel and power side of O/D OFF switch vehicle harness connector (ohmmeter negative probe) Is resistance less than 5.0 ohms?	Yes	Go to TB5
		No	Service open circuit Remove breakout box Reconnect all components Return OBD Tests
TB5	**CHECK HARNESS CIRCUIT FOR SHORT TO POWER** • Key OFF • Breakout box installed, PCM disconnected • Measure resistance between test pin (29) and test pins (71/97) at the breakout box Is each resistance greater than 10,000 ohms?	Yes	Replace damaged switch Remove breakout box Reconnect all components Return OBD Tests
		No	Service short circuit Remove breakout box Reconnect all components Return OBD Tests

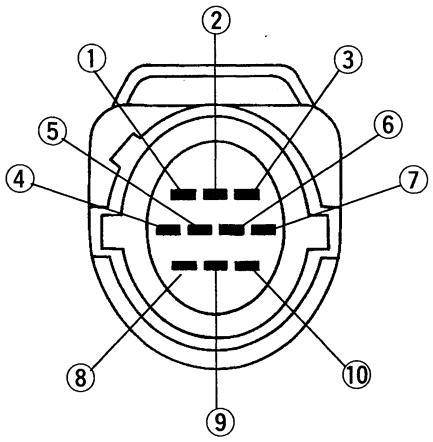
STEP	INSPECTION		ACTION
TB6	**O/D OFF INDICATOR LIGHT ALWAYS ON** • Key ON, engine off • Cycle O/D OFF switch Does O/D OFF indicator light turn on and off?	Yes	Concern may be intermittent. Go to Pinpoint Test Step Z1 (Refer to section F3)
		No	Go to TB7
TB7	**CHECK FOR SHORT TO GROUND IN O/D OFF INDICATOR LIGHT CIRCUIT** • Key OFF • Disconnect PCM Inspect both ends for damaged or pushed out pins, moisture, corrosion, loose wires, etc. Service as necessary • Key ON, engine off Does O/D OFF indicator light remain on?	Yes	Repair short to ground between bulb and test pin (79) Verify O/D OFF indicator light turns on and off
		No	O/D OFF indicator light turns off when PCM is disconnected Replace PCM
TB8	**O/D OFF INDICATOR LIGHT NEVER ON** • Run Key On Engine Running (KOER) Self-Test Is DTC P1780 present?	Yes	Service DTC P1780 Go to TB1
		No	Go to TB9
TB9	**CHECK CONTINUITY OF O/D OFF INDICATOR LIGHT CIRCUIT** • Key OFF • Breakout box installed • Key ON, engine off • Measure the voltage between test pin (79) and test pins (24/76) at the breakout box Is the voltage reading greater than 2.0 volts?	Yes	Replace PCM Cycle (O/D OFF switch) checking operation of O/D OFF indicator light
		No	Check indicator bulb and fuse If OK, open is in the wiring between the ignition switch and test pin (79) at the harness connector Repair as necessary

Pinpoint test DP

DIAGNOSTIC TROUBLE CODE NO.P0500, P1500			
DESCRIPTION	This Pinpoint Test is intended to diagnose the following components: • Transaxle Wiring Harness, Vehicle Speedometer Sensor, VPWR • Powertrain Control Module (PCM)		
[TROUBLESHOOTING HINTS] Electrical: Battery, Input Sensors, Wiring Harness Transaxle: Linkages			
STEP	INSPECTION		ACTION
DP1	**DTC P0500: CHECK CONTINUITY OF VEHICLE SPEEDOMETER SENSOR HARNESS CIRCUIT** DTC P0500 indicates the VSS input signal has been detected out of Self-Test range. **Note** • Delayed engagement or no vehicle movement may be caused by a transaxle concern. Harsh shifts and/or erratic speedometer may be caused by a failed speedometer or an open or intermittent ground within the instrument panel on vehicles with electronic readout. Possible causes: – Open in VSS (+)/VSS (–) harness circuit. – Short to GND or SIG RTN in VSS (+)/VSS (–) harness circuit – Short to PWR in VSS (+)/VSS (–) harness circuit – Damaged VSS – Damaged PCM • Key OFF. • Disconnect PCM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Install breakout box, PCM disconnected. • Disconnect VSS. • Measure resistance between test pin 58 [VSS (+)] at the breakout box and VSS (+) circuit at the VSS vehicle harness connector. • Measure resistance between test pin 33 [VSS (–)] at the breakout box and VSS (–) circuit at the VSS vehicle harness connector. Is each resistance less than 5.0 ohms?	Yes	Go to DP2
		No	Service open in harness circuit Remove breakout box Reconnect all components Complete PCM Reset to clear DTCs Run VSS Drive Cycle in DP5 to verify repair
DP2	**CHECK VEHCLE SPEEDOMETER SENSOR HARNESS CIRCUITS FOR SHORTS TO GROUND, SIG RTN AND POWER** • Key OFF • VSS disconnected. • Breakout box installed, PCM disconnected. • Measure resistance between test pin (58) [VSS (+)] and test pins (51), (103) (PWR GND), (33) [VSS (–)], (91) (SIG RTN) and (71) (VPWR) at the breakout box. • Measure resistance between test pins (33) [VSS (–)] and (71) (VPWR) at the breakout box. Is each resistance greater than 500 ohms?	Yes	Go to DP3
		No	Service short circuit Remove the breakout box Reconnect all components Complete PCM Reset to clear DTCs Run VSS Drive Cycle in DP5 to verify repair
DP3	**CHECK VEHICLE SPEEDOMETER SENSOR RESISTANCE** • Key OFF. • VSS disconnected. • Measure the resistance of the VSS. Is resistance between 190 and 250 ohms?	Yes	Remove breakout box Replace the PCM Reconnect the VSS Run VSS Drive Cycle in DP5 to verify repair
		No	Replace the VSS Remove breakout box Reconnect the PCM Run VSS Drive Cycle in DP5 to verify repair

STEP	INSPECTION		ACTION
DP4	**DTC P1500: VISUAL INSPECTION** DTC P1500 indicates the VSS input signal was intermittent. Possible causes: – Intermittent VSS connections – Intermittent open in VSS harness circuit(s) – Intermittent short in VSS harness circuit(s) – Damaged VSS – Damaged PCM • Key OFF. • Visually inspect the VSS and VSS harness circuits for any potential failures. Use the following check list for reference: – Loose VSS connector – Pushed out VSS connector pins – Damaged VSS wiring harness insulation – Incorrect harness routing – Incorrect VSS mounting Did the visual inspection reveal a potential failure?	Yes	Service fault as necessary Complete PCM Reset to clear DTCs Run VSS Drive Cycle in DP5 to verify repair
		No	Reconnect all components Unable to duplicate or identify faulf at this time Go to Pinpoint Test Step Z1 in section F3 with the following data: the VSS PID, if available, the VSS check list and list of possible concern
DP5	**VEHICLE SPEEDOMETER SENSOR DRIVE CYCLE TEST** • Warm engine to operating temperature. • Perform the VSS Drive Cycle at least three times as outlined below: **AUTOMATIC TRANSAXLE:** • Place gear selector in DRIVE range. • Obey all local traffic laws. • Accelerate heavily to 35 mph. • Coast down to an idle and stop the vehicle. • Shut the engine off. • After the drive cycle is completed, retrieve and record any Continuous Memory DTCs. Address the DTCs in Section 5, Powertrain Diagnostic Trouble Code Charts. • If no DTCs are generated, testing is complete.		

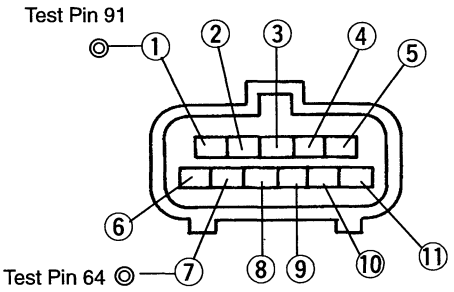
Solenoid body



VEHICLE HARNESS CONNECTOR PIN LOCATIONS

Pin	Description	PCM Test Pin
1	TCC Power	71, 97
2	Signal return	91
3	TFT Signal	37
4	SS1 Signal	27
5	Solenoid Power	71, 97
6	SS2 Signal	1
7	TCC Signal	54
8	EPC Signal	81
9	EPC Power	71, 97
10	3-2T/CCS Signal	102

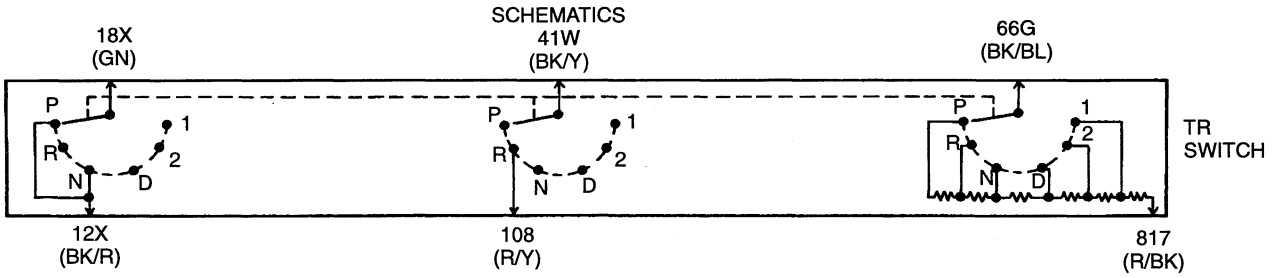
TR switch



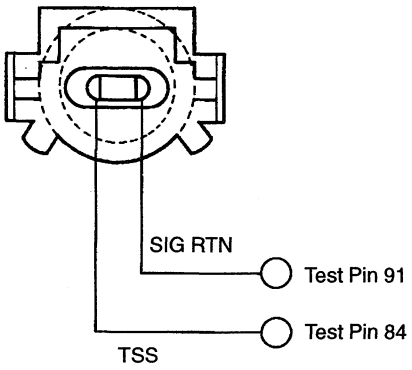
VEHICLE HARNESS CONNECTOR PIN LOCATIONS

Pin	Circuit	Circuit Function
1	66H (BK/BL)	Sensor Signal Return
2	12X (BK/R)	Starter Motor Output
3	108 (R/Y)	Backup Lamp Output
4	—	NOT USED
5	41W (BK/Y)	Power
6	—	NOT USED
7	817 (R/BK)	Transaxle Range Signal
8	18X (GN)	Starter interrupt Relay Input
9	—	NOT USED
10	—	NOT USED
11	—	NOT USED

SCHEMATICS



TSS sensor



SERVICE POINTS

OUTLINE

Transaxle Range (TR) Switch

- If a malfunction occurs in the wiring of the TR or TR switch, the powertrain control module (PCM) cannot determine the range position, and shifting may be abnormal in D, 2, and 1 ranges. There may not be a shift to fourth gear, and all shifts will be firm.

Transaxle Fluid Temperature (TFT) Sensor

- If a malfunction occurs in the TFT sensor, the problem will be the torque converter clutch operation and EPC pressure control.

Brake Switch

- If the brake switch is always ON, the torque converter clutch will not engage at less than 1/3 throttle.
- If the brake switch is always OFF, the torque converter clutch will not disengage when the brake is applied.

Turbine Shaft Speed Sensor (TSS)

- If a malfunction occurs in the TSS, the torque converter clutch will not engage, and shifting may be harsh. There may not be a shift to fourth gear and engine braking way operate in second and third gear.

Vehicle Speedometer Sensor

- If a malfunction occurs in the vehicle speedometer sensor, shifting may be abnormal, the torque converter will not engage.
- There may not be all shift to fourth gear.

Electronic Pressure Control (EPC) Solenoid

- If the EPC is always ON, at maximum current line pressure will be at minimum.
- If the EPC is always OFF, the line pressure will be maximum and there will be harsh engagements or harsh shift.

Shift Solenoid No.1 and No.2 (SS1, SS2)

- If a malfunction occurs in the SS1 or SS2, shifting may be abnormal.

3–2 Timing/Coasting Clutch Solenoid (3–2T/CCS)

- If the 3–2T/CCS is always ON, the engine braking will not operate (except in fourth gear) and will delay 3–2, 4–2 downshifts.
- If the 3–2T/CCS is always OFF, the engine braking will operate in second/third gear (D range) and abnormal 3–2 downshifts and harsh 4–3 downshift.

Torque Converter Clutch (TCC) Solenoid

- If the TCC is always ON, the torque converter clutch will not disengage.
- If the TCC is always OFF, the torque converter clutch will not engage.

Engine Coolant Temperature (ECT) Sensor

- If a malfunction occurs in the ECT, the TCC will always be OFF.

Distributor Ignition (DI) System

- If a malfunction occurs in the DI, the torque converter clutch will not engage, and shifting may be abnormal.

Magnetic Clutch

- If the magnetic clutch is always ON, the line pressure will be slightly low with the A/C OFF.
- If the magnetic clutch is always OFF, the line pressure will be slightly high with the A/C ON.

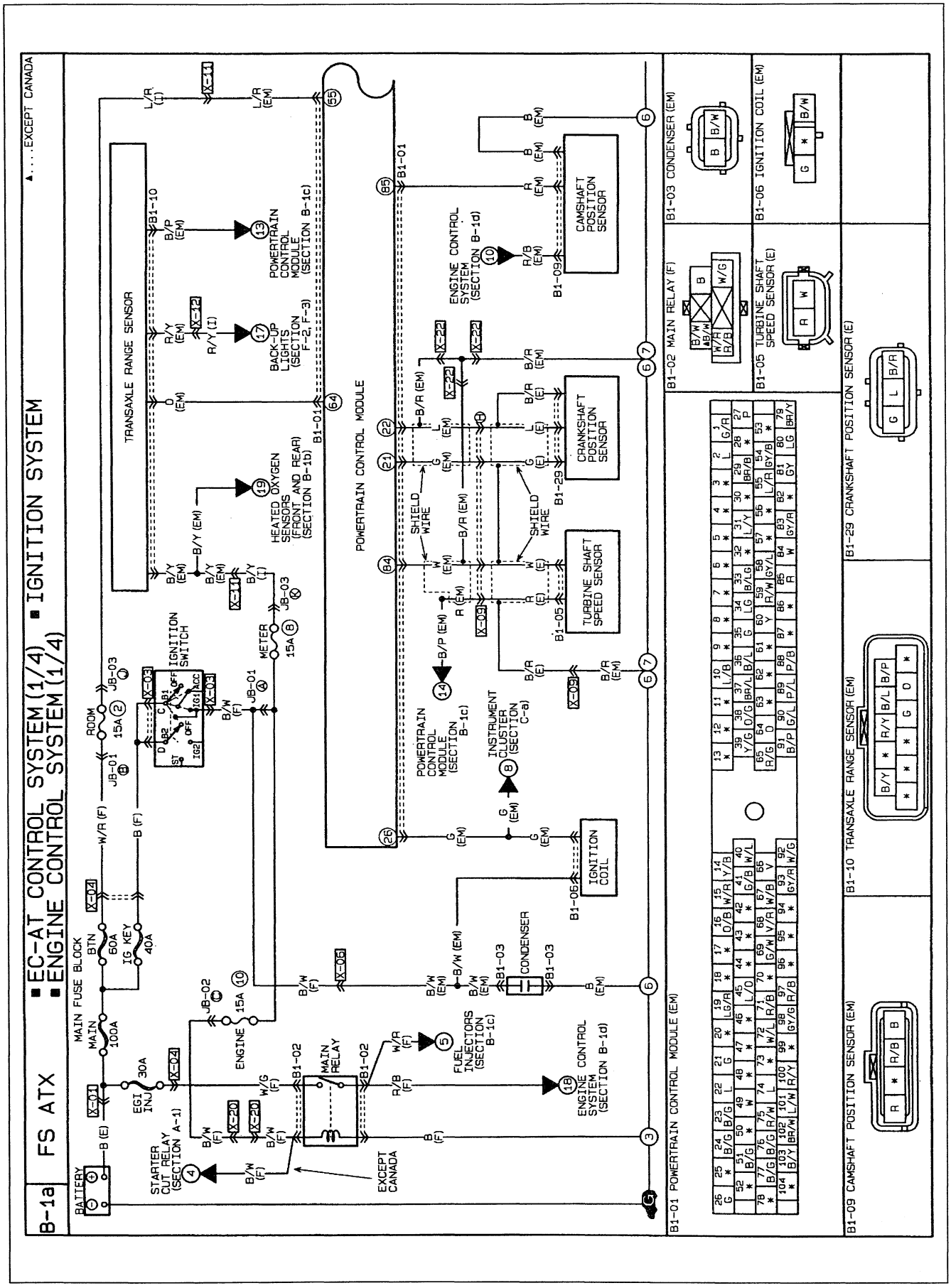
Mass Air Flow Sensor (MAF)

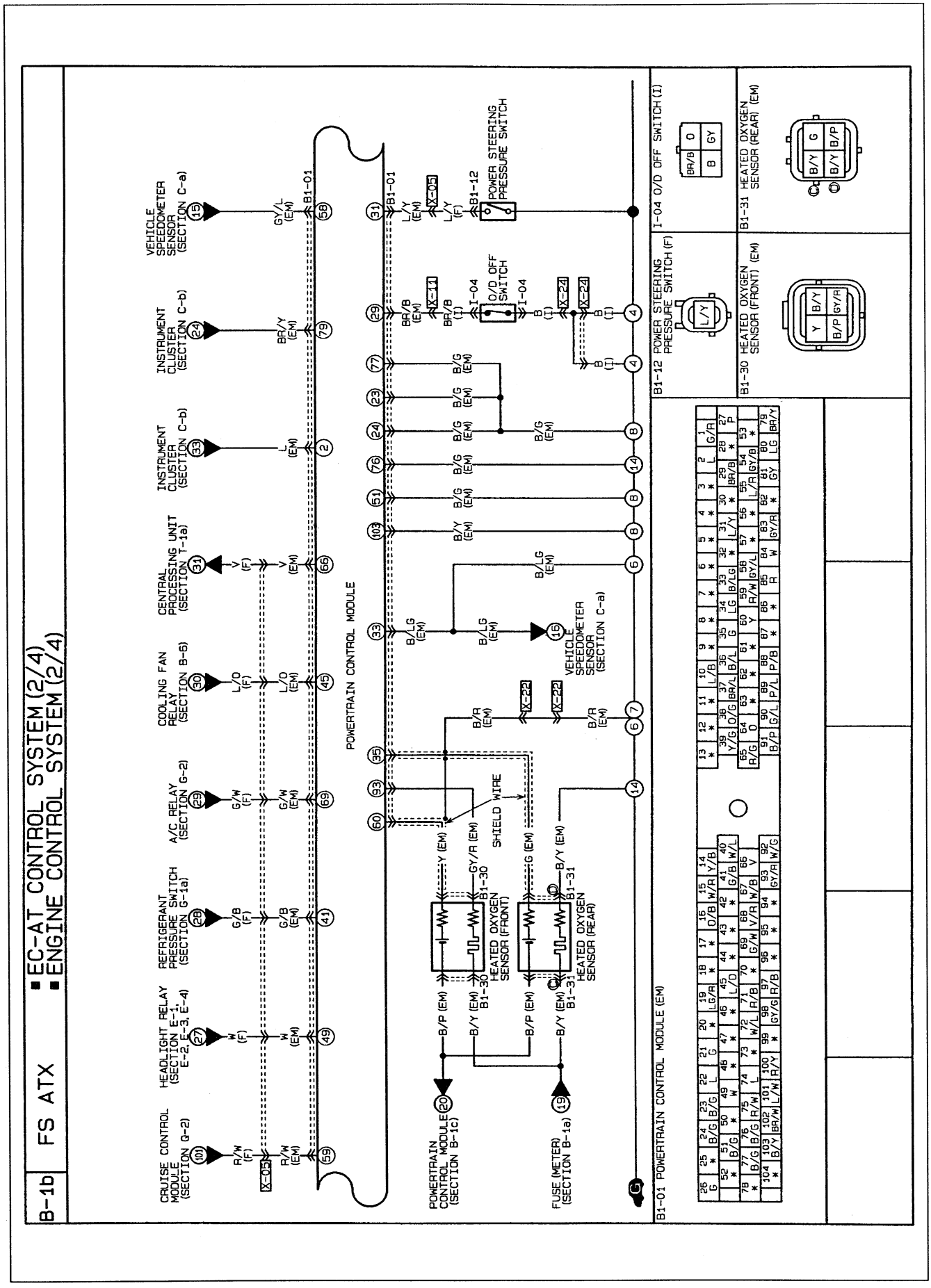
- If a malfunction occurs in the MAF, shifting and torque converter clutch operation will be abnormal.

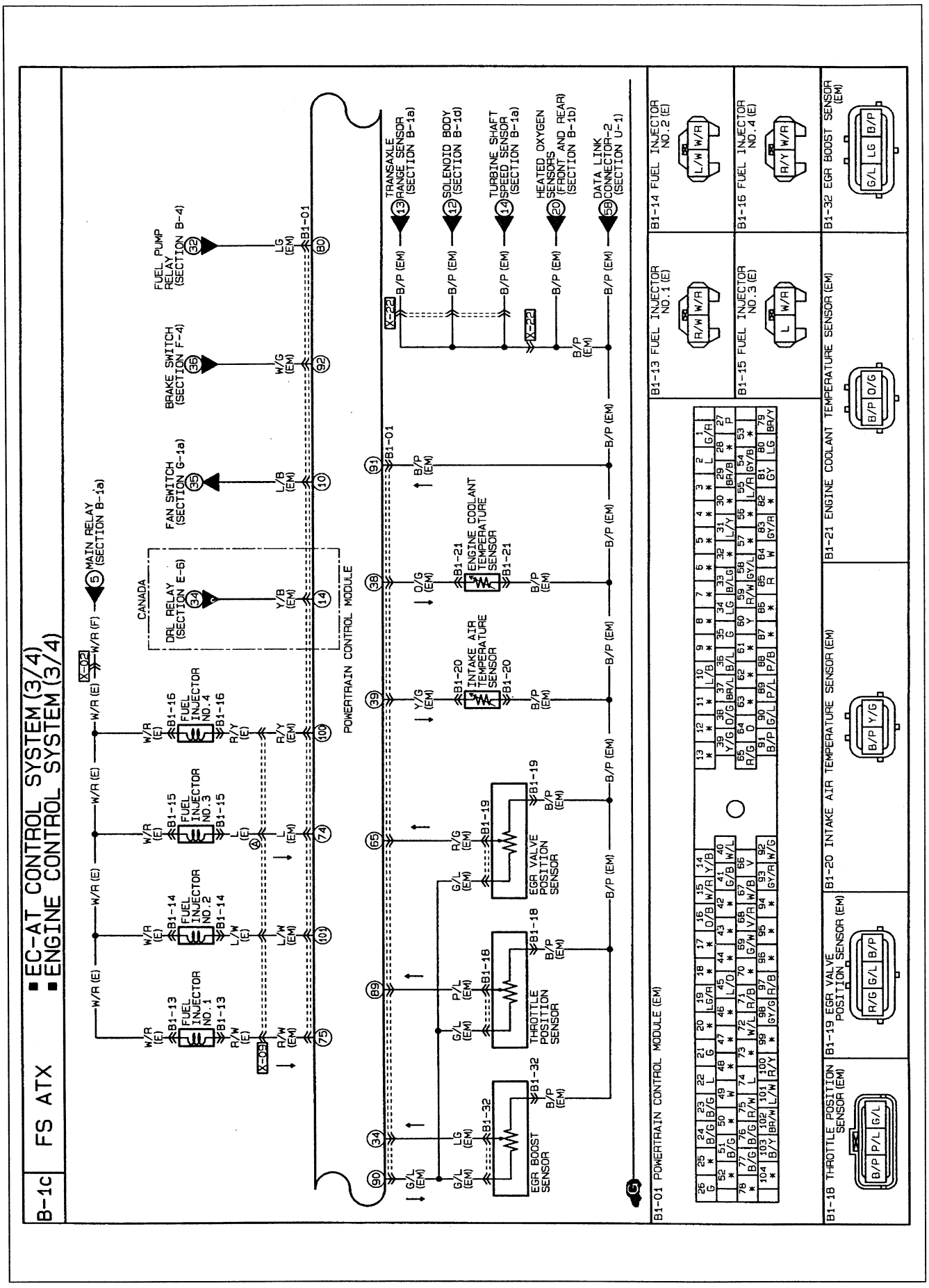
Throttle Position (TP) Sensor

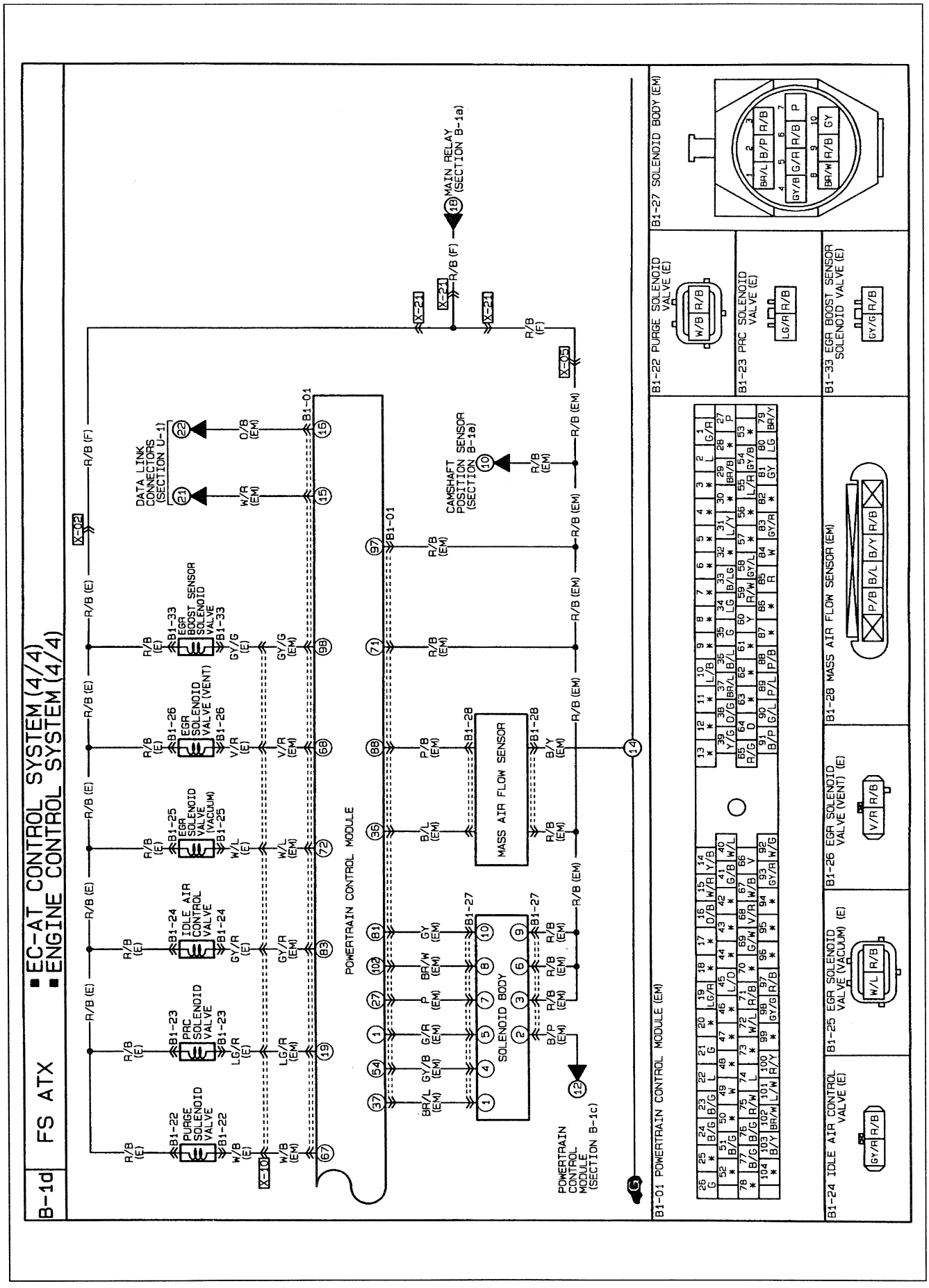
- If a malfunction occurs in the TP, shifting and torque converter clutch operation will be abnormal.

WIRING DIAGRAM

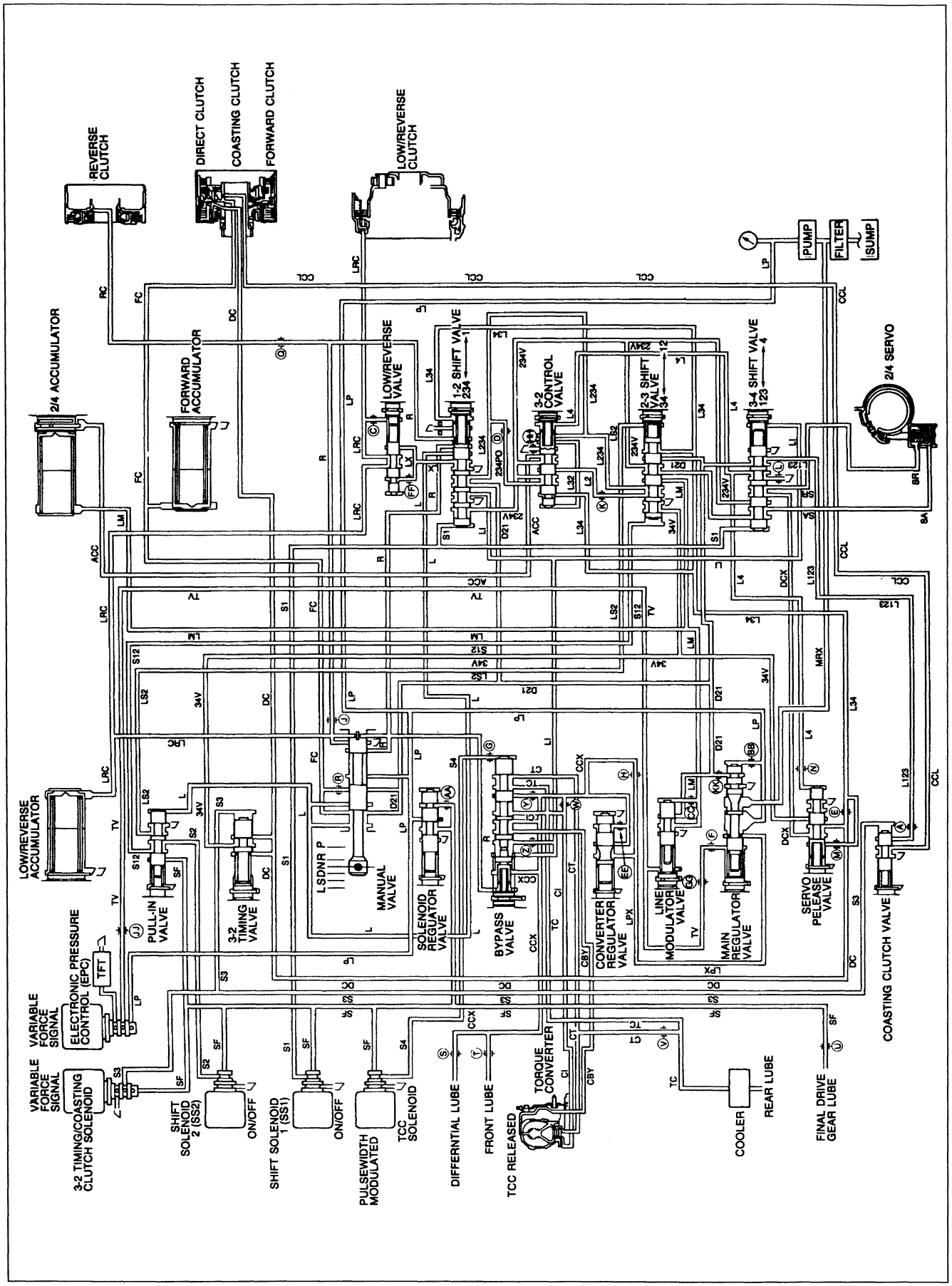



B-1b
FS ATX
■EC-AT CONTROL SYSTEM (2/4)
■ENGINE CONTROL SYSTEM (2/4)
POWERTRAIN CONTROL MODULE
B1-01 POWERTRAIN CONTROL MODULE (EM)
CRUISE CONTROL MODULE (SECTION G-2)
HEADLIGHT RELAY (SECTION E-1, E-2, E-3, E-4)
REFRIGERANT PRESSURE SWITCH (SECTION G-1a)
A/C RELAY (SECTION G-2)
COOLING FAN RELAY (SECTION B-6)
CENTRAL PROCESSING UNIT (SECTION T-1a)
INSTRUMENT CLUSTER (SECTION C-b)
INSTRUMENT CLUSTER (SECTION C-b)
VEHICLE SPEEDOMETER SENSOR (SECTION C-a)
POWERTRAIN CONTROL MODULE (SECTION B-1c)
FUSE (METER) (SECTION B-1a)
HEATED OXYGEN SENSOR (FRONT)
HEATED OXYGEN SENSOR (REAR)
SHIELD WIRE
VEHICLE SPEEDOMETER SENSOR (SECTION C-a)
POWER STEERING PRESSURE SWITCH
O/D OFF SWITCH
B1-12 POWER STEERING PRESSURE SWITCH (F)
I-04 O/D OFF SWITCH (I)
B1-30 HEATED OXYGEN SENSOR (FRONT) (EM)
B1-31 HEATED OXYGEN SENSOR (REAR) (EM)


B-1c FS ATX
EC-AT CONTROL SYSTEM (3/4)
ENGINE CONTROL SYSTEM (3/4)
MAIN RELAY (SECTION B-1a)
CANADA
DRL RELAY (SECTION E-6)
FAN SWITCH (SECTION G-1a)
BRAKE SWITCH (SECTION F-4)
FUEL PUMP RELAY (SECTION B-4)
FUEL INJECTOR NO.1
FUEL INJECTOR NO.2
FUEL INJECTOR NO.3
FUEL INJECTOR NO.4
POWERTRAIN CONTROL MODULE
TRANSAXLE RANGE SENSOR (SECTION B-1a)
SOLENOID BODY (SECTION B-1d)
TURBINE SHAFT SPEED SENSOR (SECTION B-1a)
HEATED OXYGEN SENSORS (FRONT AND REAR) (SECTION B-1b)
DATA LINK CONNECTOR-2 (SECTION U-1)
ENGINE COOLANT TEMPERATURE SENSOR
INTAKE AIR TEMPERATURE SENSOR
THROTTLE POSITION SENSOR
EGR VALVE POSITION SENSOR
EGR BOOST SENSOR
B1-01 POWERTRAIN CONTROL MODULE (EM)
B1-13 FUEL INJECTOR NO.1 (E)
B1-14 FUEL INJECTOR NO.2 (E)
B1-15 FUEL INJECTOR NO.3 (E)
B1-16 FUEL INJECTOR NO.4 (E)
B1-18 THROTTLE POSITION SENSOR (EM)
B1-19 EGR VALVE POSITION SENSOR (EM)
B1-20 INTAKE AIR TEMPERATURE SENSOR (EM)
B1-21 ENGINE COOLANT TEMPERATURE SENSOR (EM)
B1-32 EGR BOOST SENSOR (EM)


B-1d
FS ATX
■EC-AT CONTROL SYSTEM (4/4)
■ENGINE CONTROL SYSTEM (4/4)
POWERTRAIN CONTROL MODULE
SOLENOID BODY
MASS AIR FLOW SENSOR
DATA LINK CONNECTORS (SECTION U-1)
CAMSHAFT POSITION SENSOR (SECTION B-1a)
MAIN RELAY (SECTION B-1a)
POWERTRAIN CONTROL MODULE (SECTION B-1c)
B1-22 PURGE SOLENOID VALVE
B1-23 PRC SOLENOID VALVE
B1-24 IDLE AIR CONTROL VALVE
B1-25 EGR SOLENOID VALVE (VACUUM)
B1-26 EGR SOLENOID VALVE (VENT)
B1-33 EGR BOOST SENSOR SOLENOID VALVE
B1-01 POWERTRAIN CONTROL MODULE (EM)
B1-22 PURGE SOLENOID VALVE (E)
B1-23 PRC SOLENOID VALVE (E)
B1-27 SOLENOID BODY (EM)
B1-24 IDLE AIR CONTROL VALVE (E)
B1-25 EGR SOLENOID VALVE (VACUUM) (E)
B1-26 EGR SOLENOID VALVE (VENT) (E)
B1-28 MASS AIR FLOW SENSOR (EM)
B1-33 EGR BOOST SENSOR SOLENOID VALVE (E)

HYDRAULIC CIRCUIT

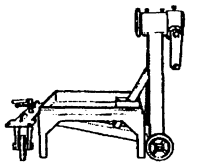
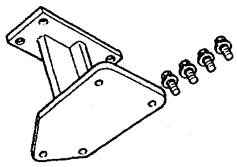
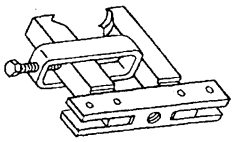
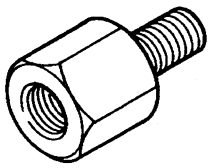
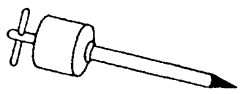
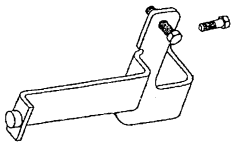
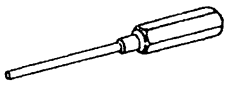
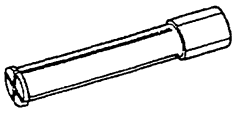
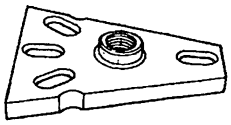
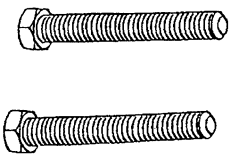
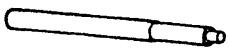
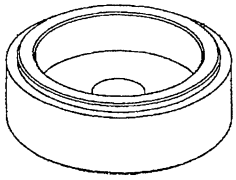
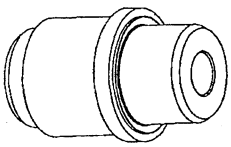
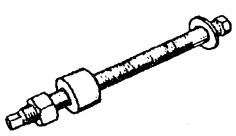


TRANSAXLE OVERHAUL

TRANSAXLE UNIT (DISASSEMBLY)

Preparation

SST

49 0107 680A Engine stand 	For disassembly of transaxle	49 G019 038 Hanger, transaxle 	For disassembly of transaxle
49 UN01 087 Converter seal remover 	For removal of converter seal	49 0223 630B Puller, axle shaft 	For removal of seal
49 UN11 101 Threaded adapter 	For removal of seal	49 UN01 101 Jet plug remover 	For removal of cap
49 UN01 104 Servo cover remover/ replacer 	For removal of servo cover	49 UN01 117 Actuator pin 	For removal of oil filter recirculation seal
49 UN01 118 Collet 	For removal of oil filter recirculation seal	49 8501 631A Attachment 	For removal of oil pump
49 UN01 100 Oil pump removal bolts 	For removal or oil pump	49 UN01 119 Lube tube seal replacer 	For removal of lube tube seal
49 UN01 099 Servo plug replacer/needle replacer 	For removal of bearing	49 UN01 098 Needle bearing remover/ replacer/ receiver 	For removal of bearing
49 UN01 122 Threaded drawber 	For removal of bearing	—	—

Precaution

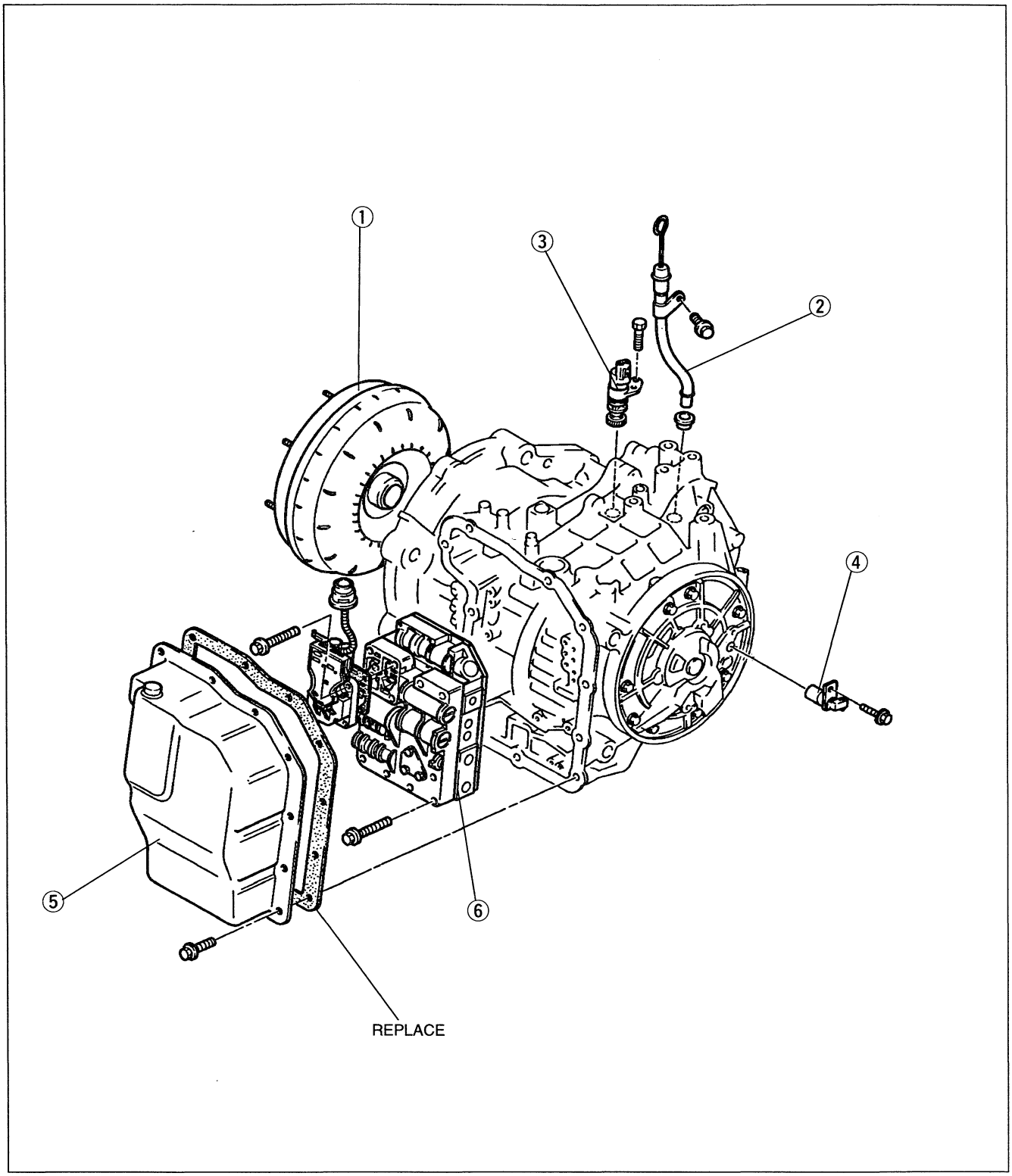
General notes:

1. Disassemble the transaxle in a clean area (dust proof work space) to prevent the entry of dust into the mechanism.
2. Inspect the individual transaxle components in accordance with the QUICK DIAGNOSIS CHART during disassembly. (Refer to page K2–68.)
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 look alike; 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 burnt or when the ATF has degenerated.

Cleaning notes:

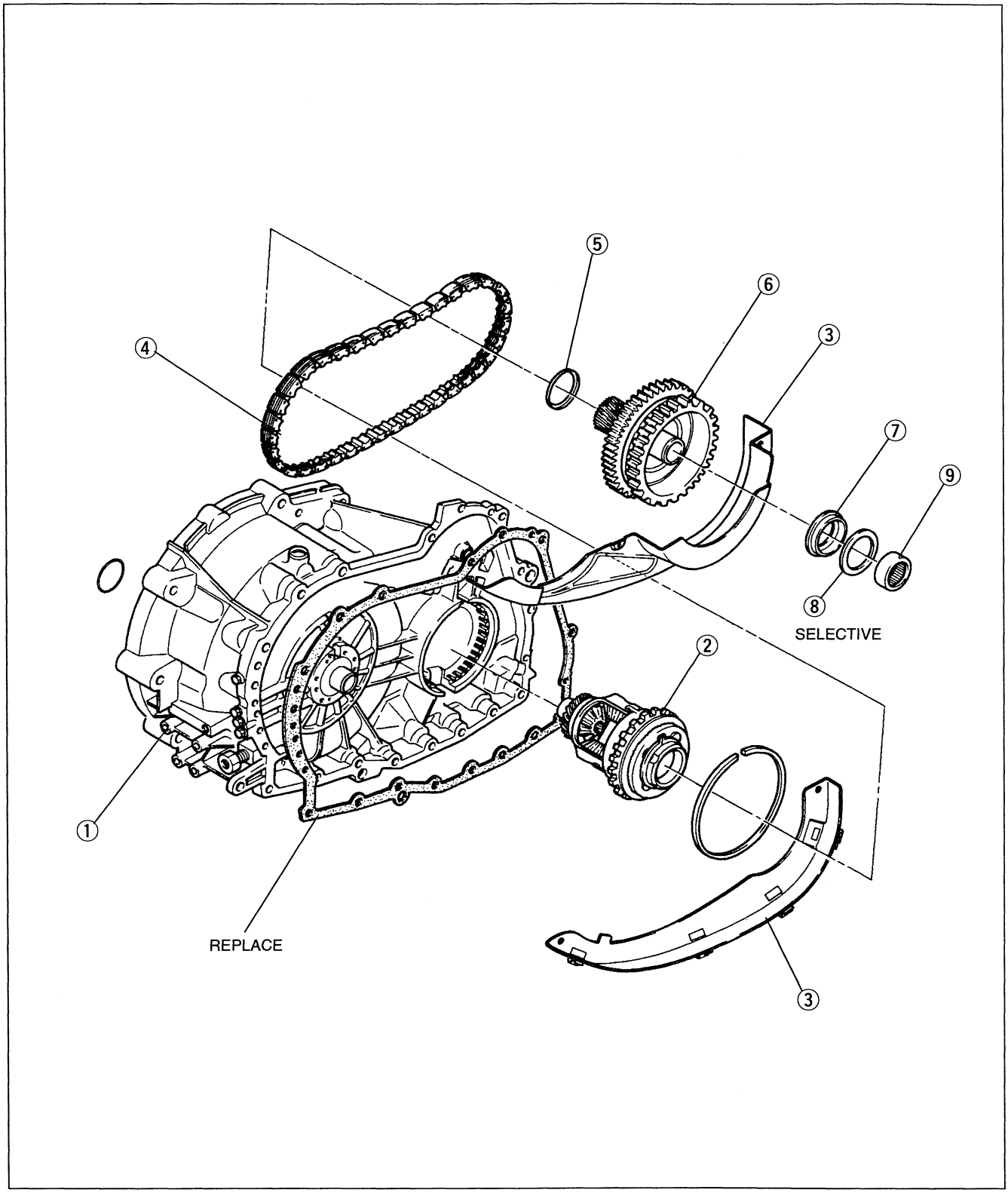
1. Clean the transaxle exterior thoroughly with a steam cleaner or cleaning solvents before disassembly.
2. Clean the removed parts with cleaning solvent, and dry with compressed air. Clean out all holes and passages with compressed air, and verify that there are no obstructions.
3. Wear eye protection when using compressed air to clean components.

Components



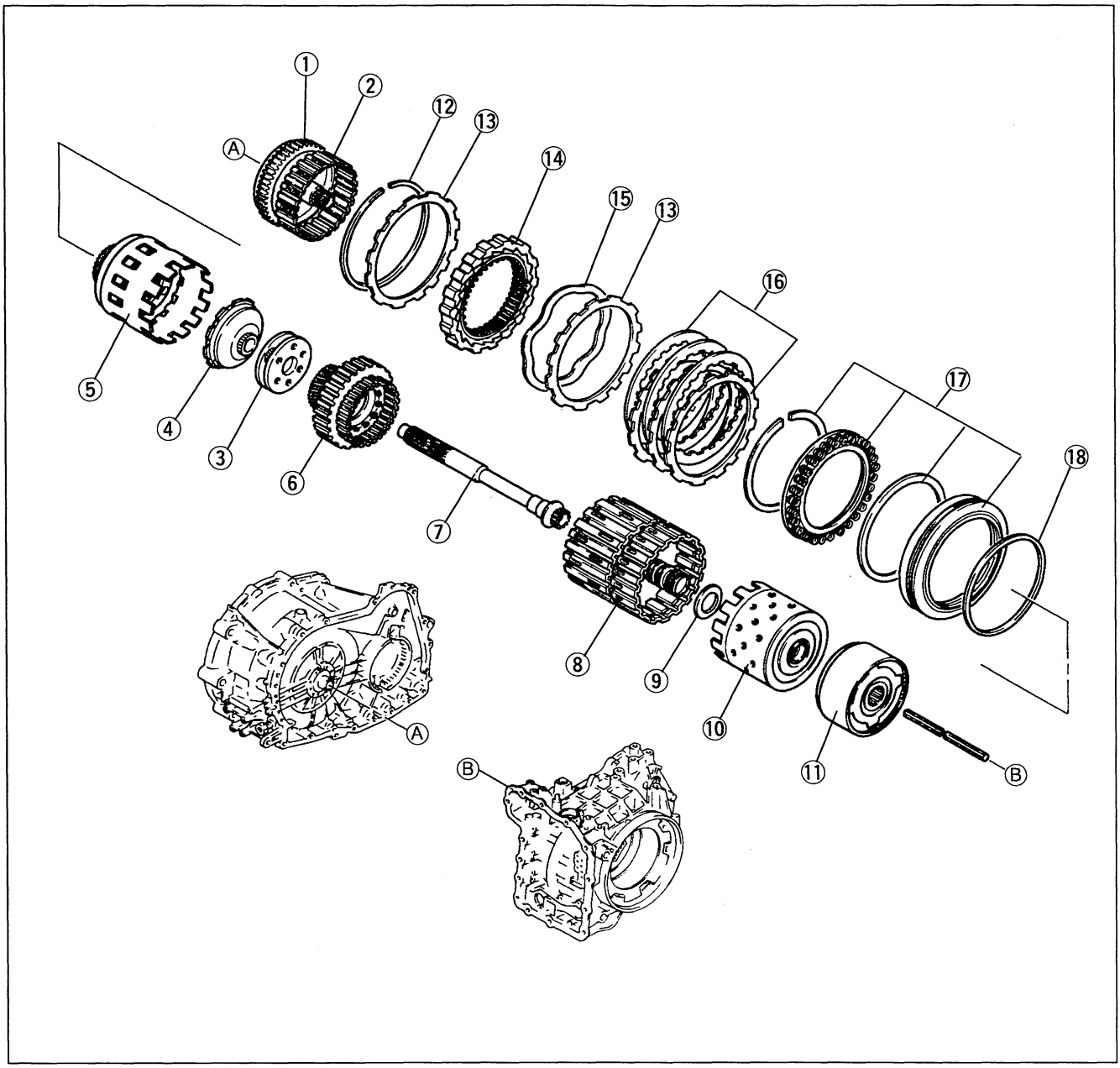
1. Torque converter
   Inspection ..... page K2–175
2. ATF dipstick and oil filler tube
3. Vehicle speedometer sensor
   Inspection ..... section K1
4. Turbine shaft speed sensor
   Inspection ..... section K1
5. Control valve body cover
6. Control valve body
   Disassembly / Inspection .... page K2–201
   Assembly ..... page K2–209
   On-vehicle
   removal / installation ..... page K2– 45

Components



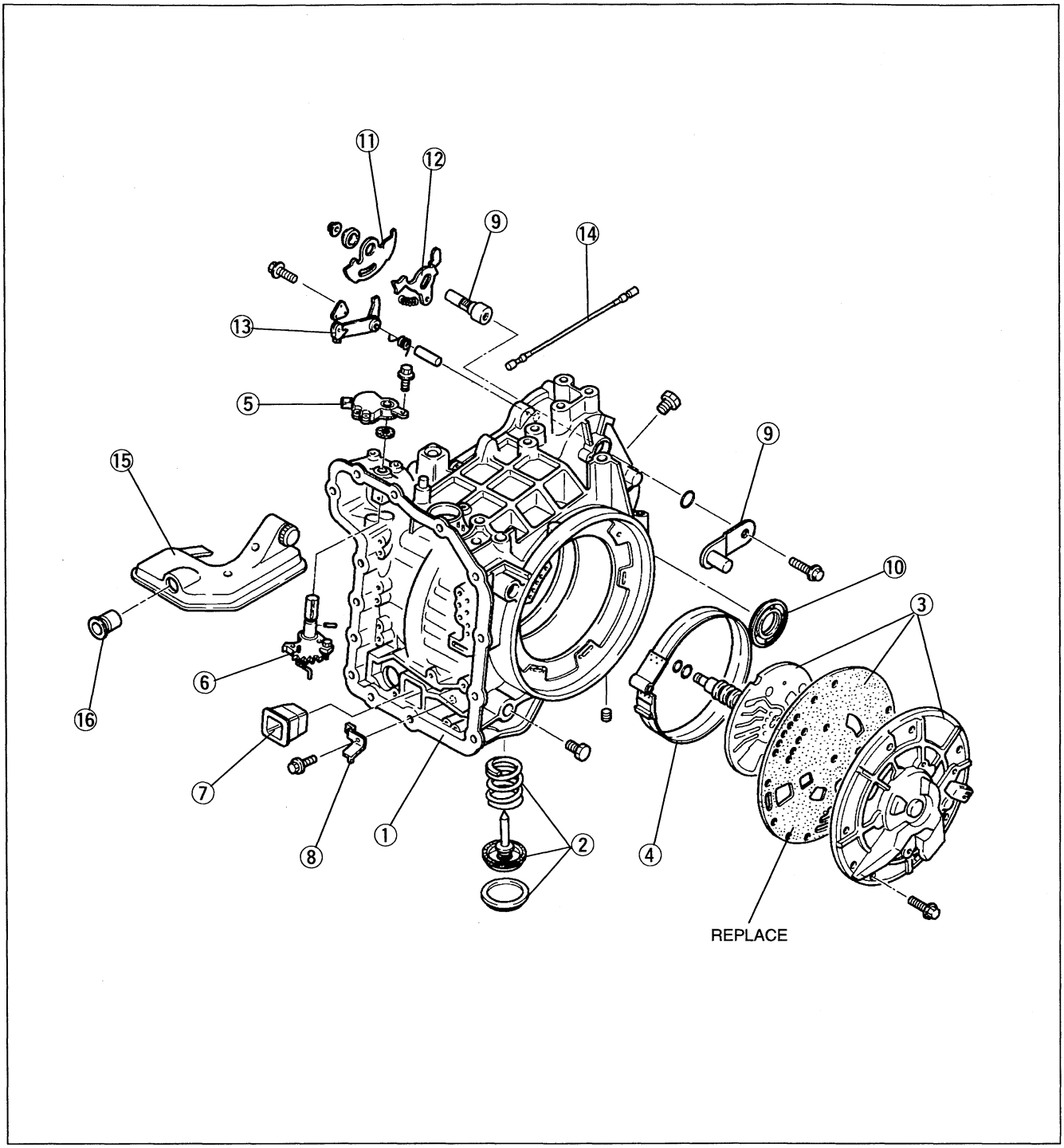
1. Converter housing
2. Final drive and differential
   Disassembly / Inspection / Assembly . . . . . page K2–212
3. Chain cover pan
4. Drive chain
5. #13 driven sprocket thrust bearing
6. Driven sprocket
7. #12 driven sprocket bearing
8. #11 driven sprocket shim
9. #18 driven sprocket bearing

Components

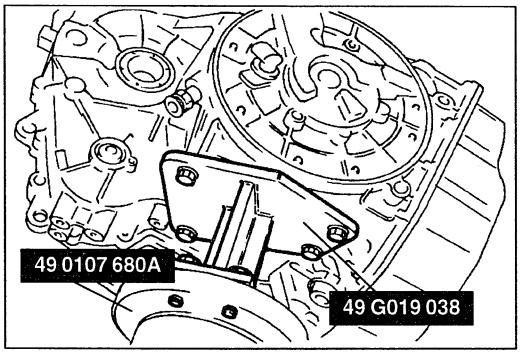


1. Reverse/fourth gear sun gear
   Disassembly / Inspection / Assembly . . . . . page K2–199
2. Reverse/fourth gear carrier assembly
   Disassembly / Inspection / Assembly . . . . . page K2–199
3. Low-intermediate ring gear
4. Low-intermediate carrier assembly
5. Reverse/fourth gear sun gear and low-intermediate carrier assembly
   Disassembly / Inspection / Assembly . . . . . page K2–180
6. Forward one way clutch and low-intermediate sun gear
   Disassembly / Inspection / Assembly . . . . . page K2–180
7. Turbine shaft
8. Forward/coasting/direct clutch cylinder
   Disassembly / Inspection / Assembly . . . . . page K2–184
9. Thrust washer
10. Direct clutch shell assembly
11. Reverse clutch drum
    Disassembly / Inspection / Assembly . . . . . page K2–184
12. Retaining ring
13. Low one way clutch plate
14. Low one way clutch
15. Wave spring
16. Low/reverse clutch
17. Low/reverse clutch piston assembly
18. Low/reverse piston seal (Inner)

Components

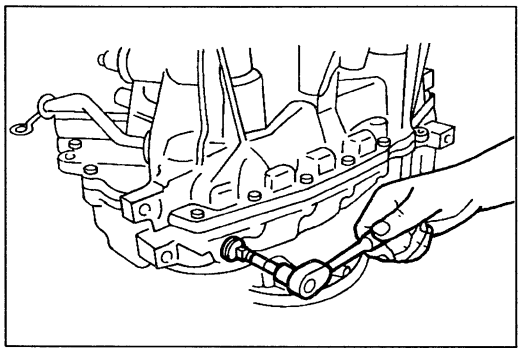


1. Transaxle case
2. 2/4 band servo piston, rod, and spring
3. Oil pump and pump support
   Disassembly / Inspection / Assembly . . . . . page K2–176
4. 2/4 band
5. Transaxle range switch
   Inspection . . . . . page K2– 24
6. Manual valve detent lever assembly
7. Thermostatic oil level valve
8. Thermal valve bracket
9. Manual control lever and shaft
10. Differential seal
11. Parking pawl acturing cam
12. Parking cam actuator lever
13. Parking pawl and shaft
14. Manual valve detent lever actuating rod
15. Oil filter and seal
16. Recirculating regulator exhaust seal

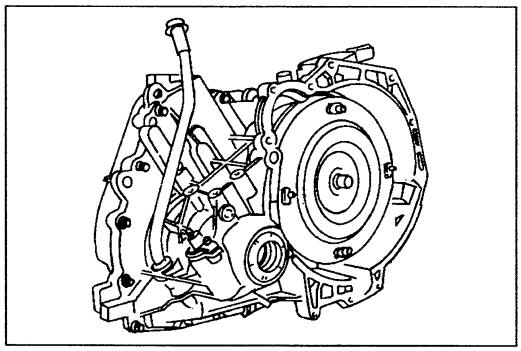


Disassembly Procedure

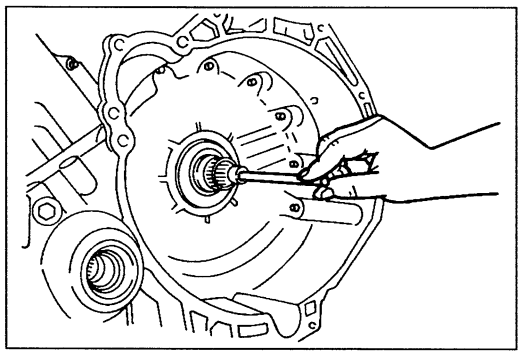
1. Install the **SSTs** or equivalent on the transaxle case. Position a drain pan under the transaxle.



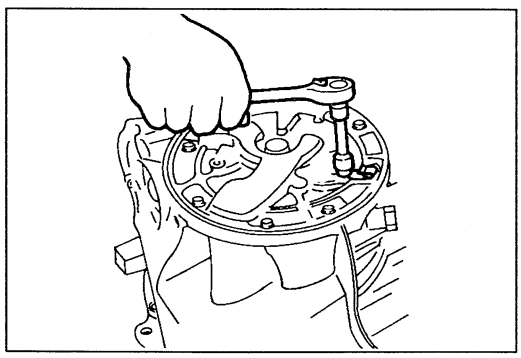
2. Remove the drain plug from the transaxle case. Allow the transaxle to drain completely.



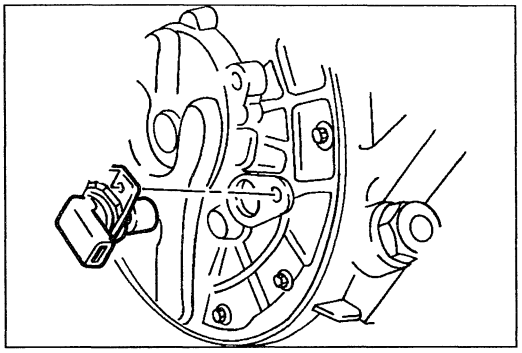
3. Remove the torque converter from the transaxle. Drain the fluid from converter.



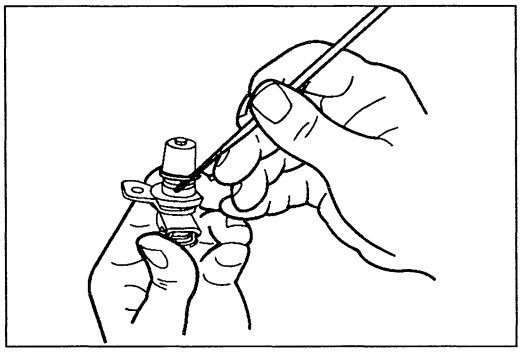
4. Remove the oil pump shaft by pulling it from the end of the turbine shaft.



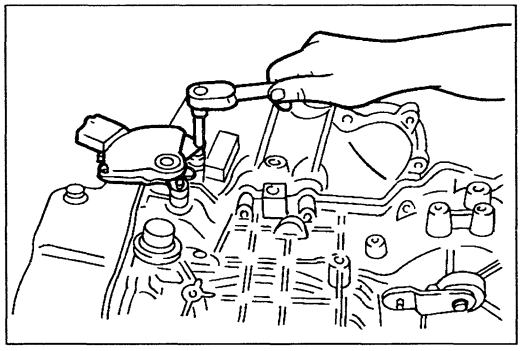
5. Remove the turbine shaft speed sensor mounting bolt.



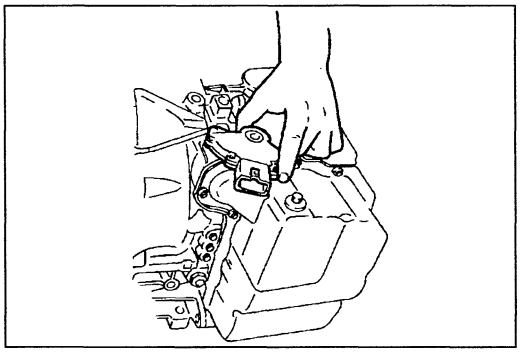
6. Pull the sensor from the bore.



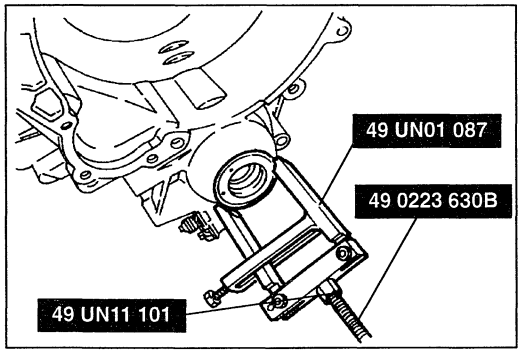
7. Remove the O-ring seal. Discard the O-ring seal.



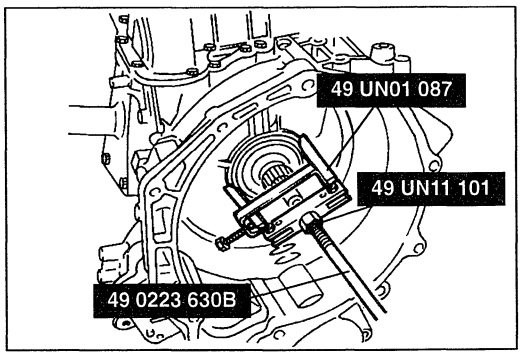
8. Remove the two transaxle range switch mounting bolts.



9. Pull the transaxle range switch from the shaft.

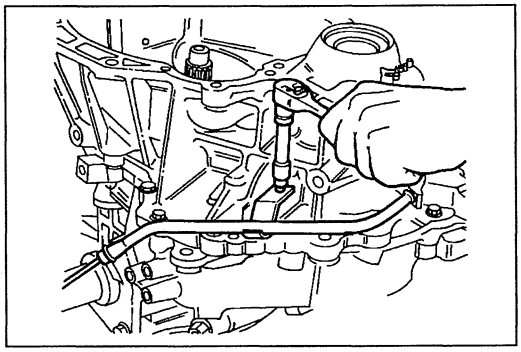


10. Use the **SSTs** or equivalent to remove the RH and LH differential seals. Check the seal contact surfaces on the LH joint shaft and the RH drive shaft for excessive wear.

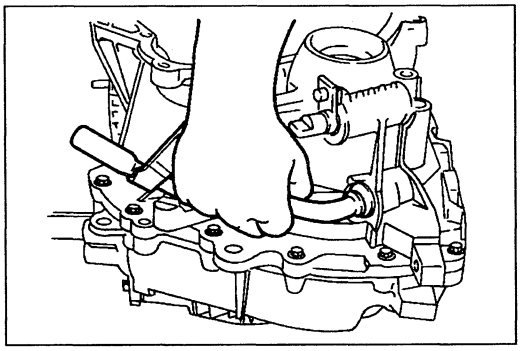


Note
- Do not remove the stator support bolts behind the impeller hub seal.

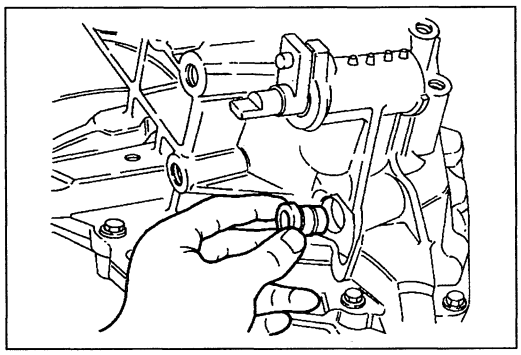
11. Use the **SSTs** or equivalent to remove the torque converter impeller hub seal. Check the seal contact surface on the torque converter impeller hub for excessive wear.



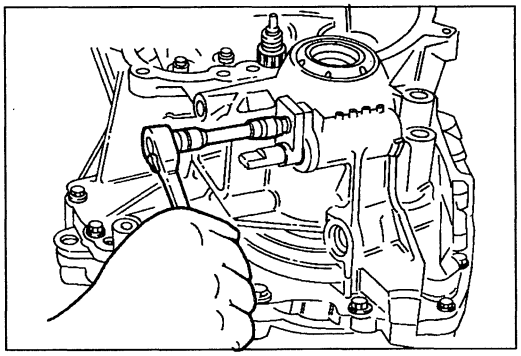
12. Remove the oil filler tube mounting bolt.



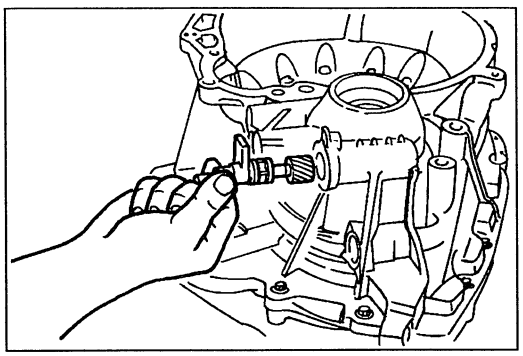
13. Pull the tube from the bore.



14. Remove the tube seal grommet.

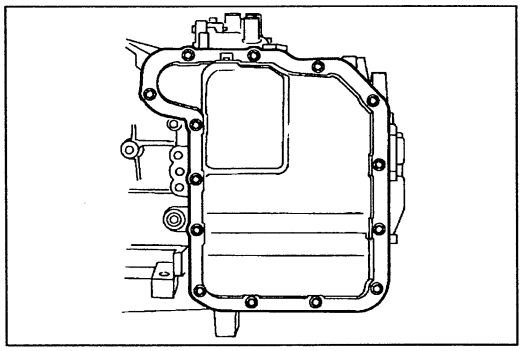


15. Remove the vehicle speedometer sensor bolt.



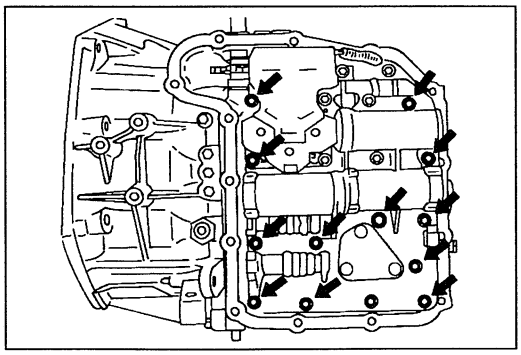
16. Remove the sensor from the bore.

17. Remove the O-ring seal from the sensor. Discard the O-ring seal.

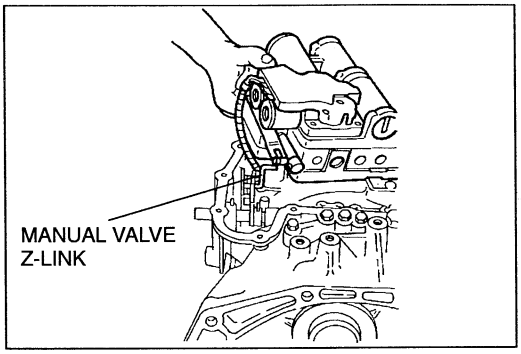


18. Remove the fourteen control valve body cover-to-transaxle case bolts.

19. Pull the cover from the transaxle case.
20. Separate the cover from the gasket. Discard the gasket.
21. Inspect the vent and grommet.

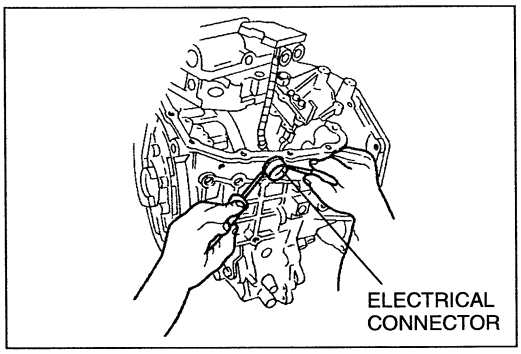


22. Remove the twelve control valve body assembly mounting bolts shown.



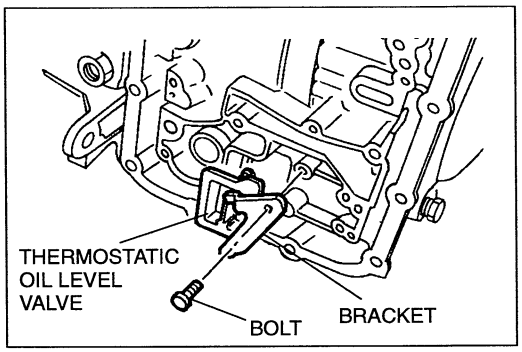
Caution
- **Do not allow the loose manual valve to become damaged.**

23. Pull the control valve body slightly away from the transaxle case. Disconnect the Z-link from the manual valve.

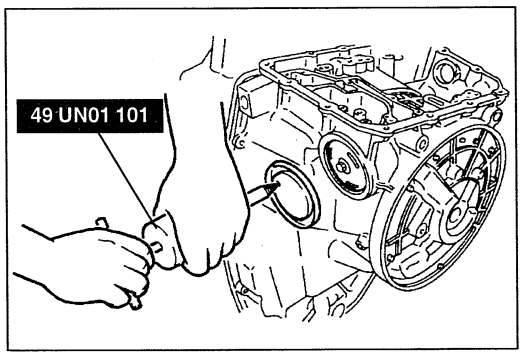


Caution
- **Do not pull on the connector wires or use a hammer on the connector.**

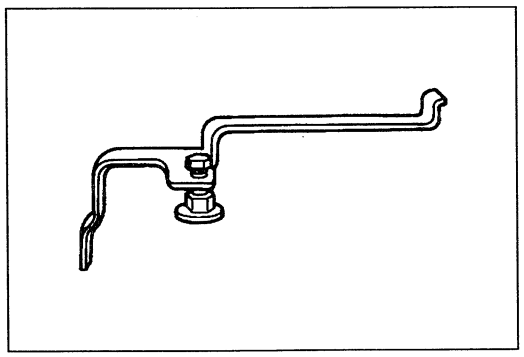
24. Squeeze the retainer tabs of the solenoid body connector and remove the connector from the bore in the case.
25. If seapage is found around the solenoid body connector area, inspect the O-ring for damage and discard it.



26. Remove the control valve body from the transaxle and store it in a clean location.
27. Remove the thermostatic oil level valve bracket bolt. Remove the bracket.Remove the filter from the forward clutch circuit.
28. Pull the thermostatic oil level valve from the transaxle case.

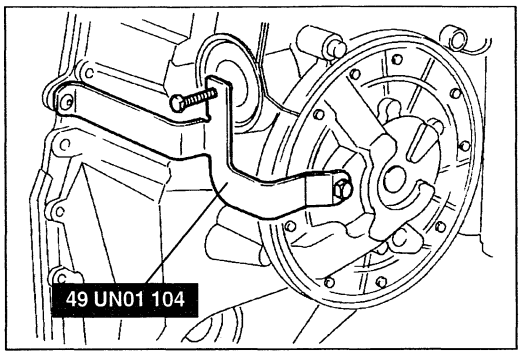


29. If equipped, remove the cap from the 2/4 servo assembly by using the **SST**. Discard the cap.

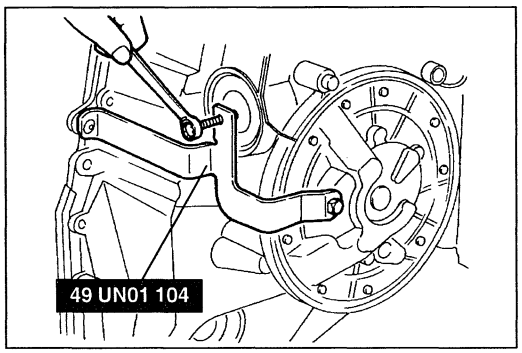


30. Install a nut with an integral washer onto the forcing bolt of the servo cover remover/replacer tool with a permanent thread sealer. This nut and washer will aid in the installation of the cover.

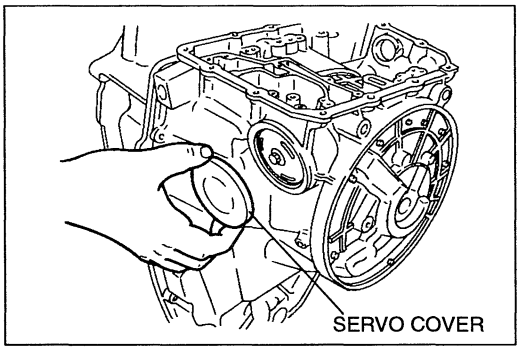
Warning
- **The servo cover is under high spring pressure.**



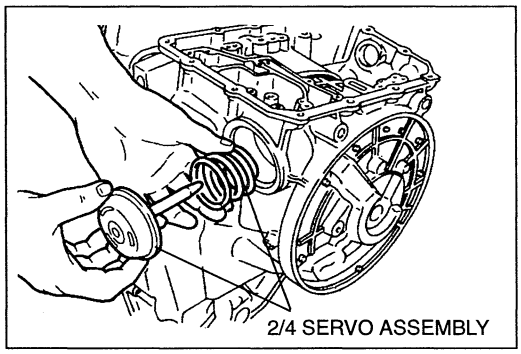
31. Attach the **SST** or equivalent to the pump.



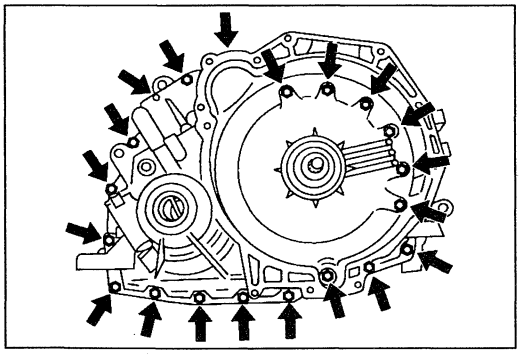
32. Screw in the bolt to compress the servo cover and remove the retaining ring.
33. Remove the **SST**.



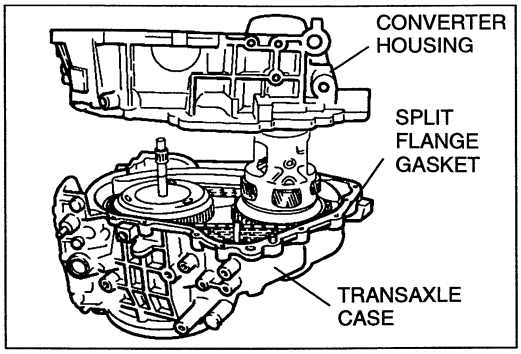
34. Remove the servo cover from the bore.



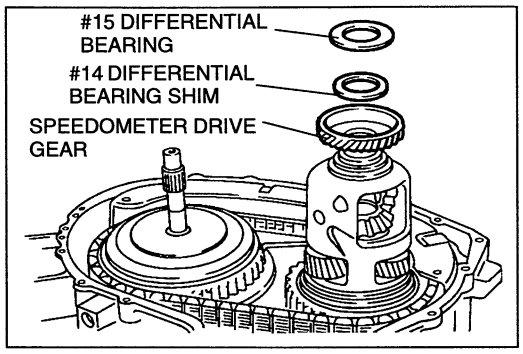
35. Remove the 2/4 servo assembly.



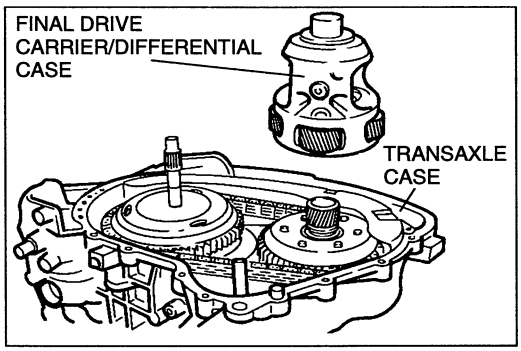
36. Position the transaxle so the converter housing faces up.
37. Remove the twenty converter housing-to-transaxle case bolts.



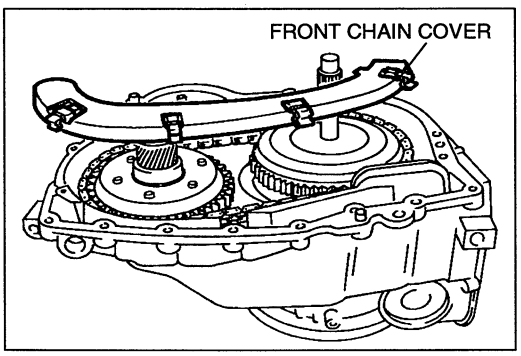
38. Separate the converter housing from the transaxle case.
39. Remove the split flange gasket from the converter housing. Discard the split flange gasket.



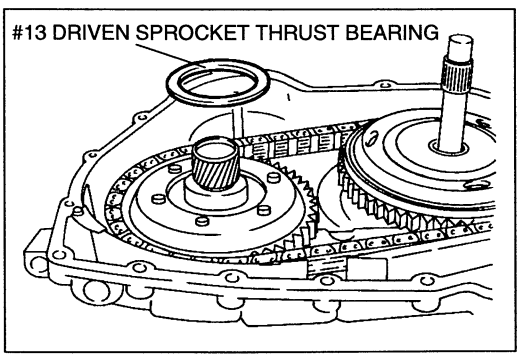
40. Remove the #15 differential bearing.
41. Remove the #14 differential bearing shim (selective fit) from the differential case.
42. Remove the speedometer drive gear from the differential case.



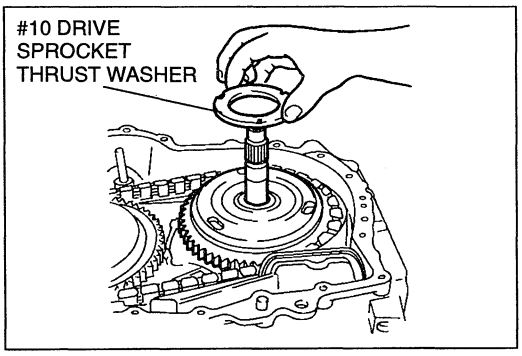
43. Remove the final drive carrier/differential case.



44. Remove the front part of the chain cover by unsnapping it from the rear part.

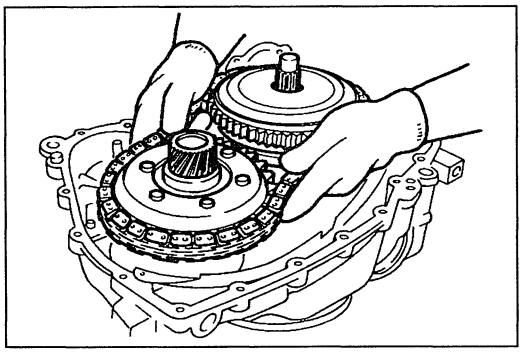


45. Remove the #13 driven sprocket thrust bearing.



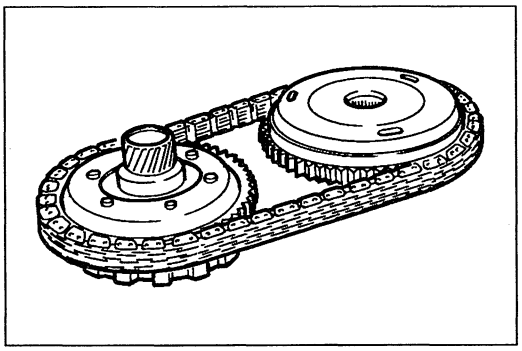
Note
- The thrust washer may be attached to the converter housing.

46. Remove the #10 drive sprocket thrust washer (selective fit) from the drive sprocket.

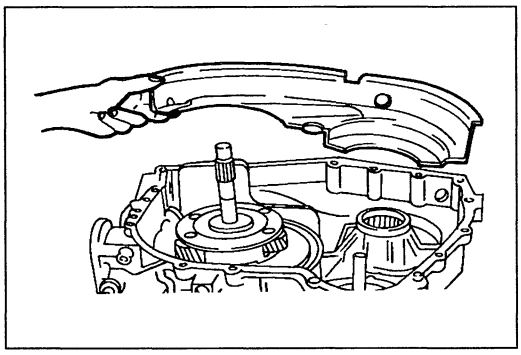


Warning
- **Wear gloves as personal protection from the sharp chain and sprocket teeth.**

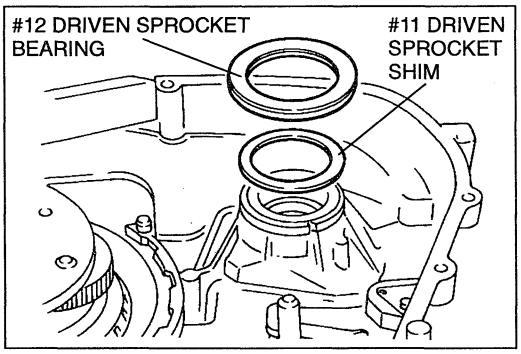
47. Lift the drive chain and both sprockets together from the transaxle case.



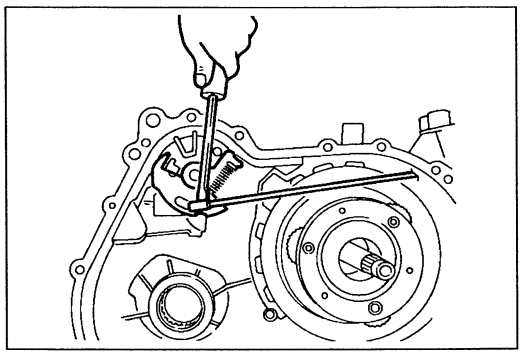
48. Separate the drive chain from the sprockets.



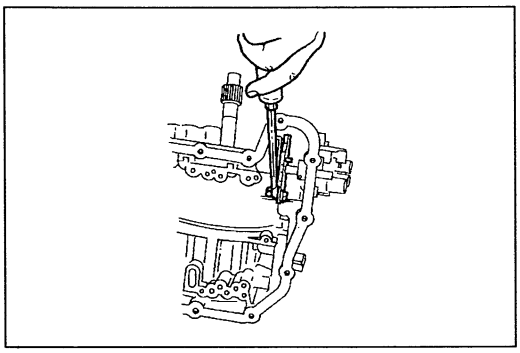
49. Remove the rear part of the chain cover (with the magnet attached) from the transaxle case.
Check the magnet for excessive metal particles.



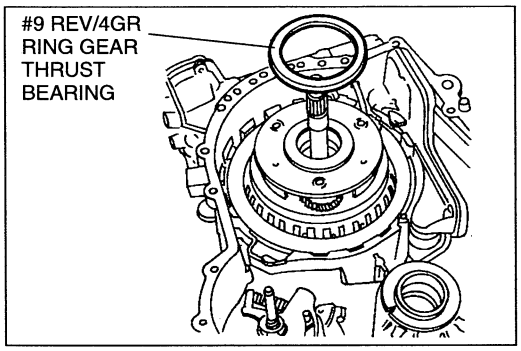
50. Remove the #12 driven sprocket bearing and the #11 driven sprocket shim (selective fit) from the transaxle case.



51. Unsnap the socket end of the manual detent lever actuating rod from the parking cam actuator.

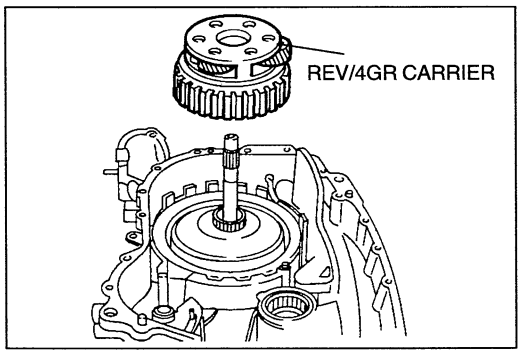


52. Unsnap the socket end of the manual detent lever actuating rod from the manual detent lever.

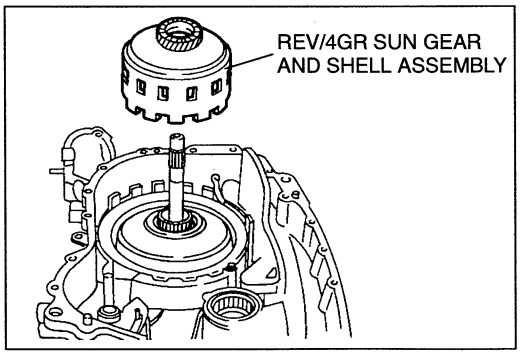


Note
- Thrust bearing may be attached to the drive sprocket.

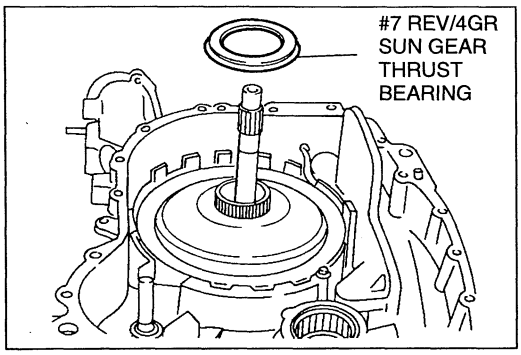
53. Remove the #9 reverse/fourth gear ring gear thrust bearing.



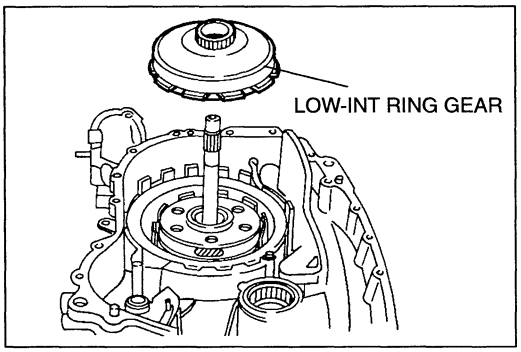
54. Remove the reverse/fourth gear carrier (with captured #8 reverse/fourth gear carrier thrust bearing).



55. Remove the reverse/fourth gear sun gear and shell assembly.

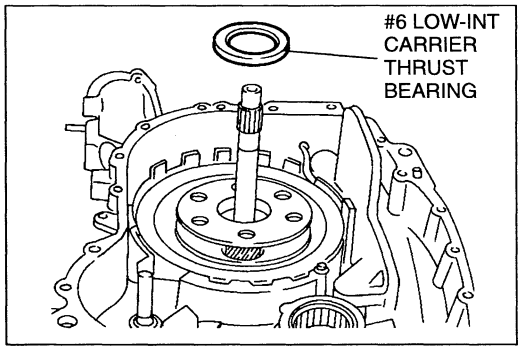


56. Remove the #7 reverse/fourth gear sun gear thrust bearing.

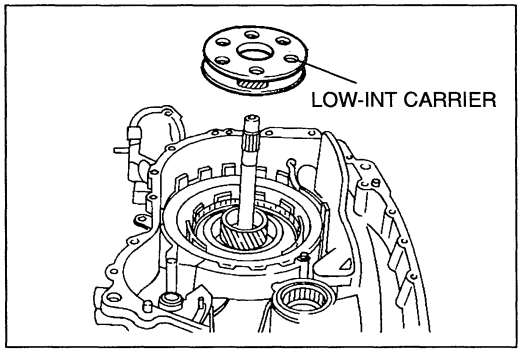


57. Remove the low-intermediate ring gear.

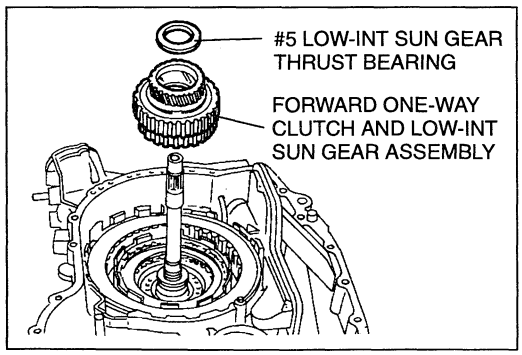
Note
- Thrust bearing may be attached to the low-intermediate ring gear.



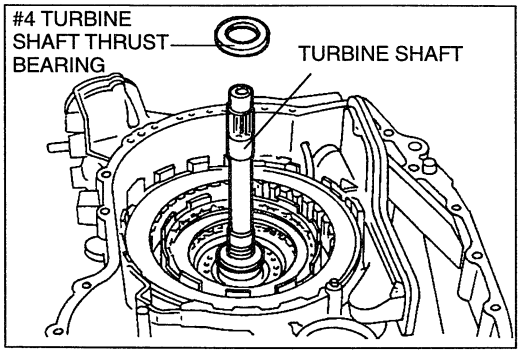
58. Remove the #6 low-intermediate carrier thrust bearing.



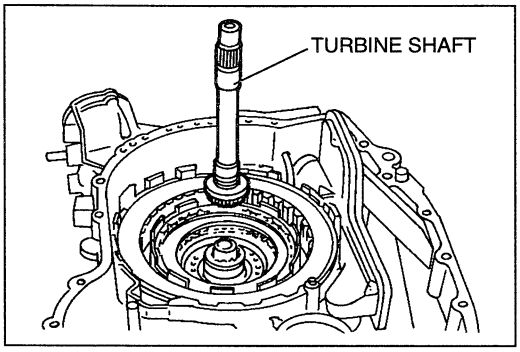
59. Remove the low-intermediate carrier.



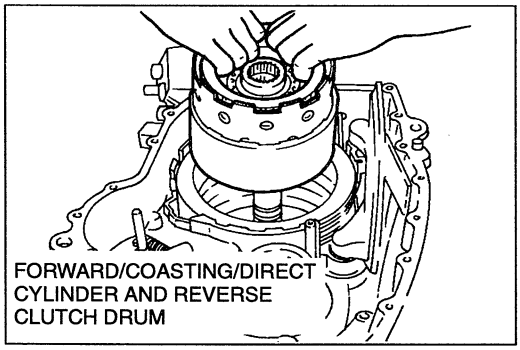
60. Remove the #5 low-intermediate sun gear thrust bearing and the forward one-way clutch and low-intermediate sun gear assembly.



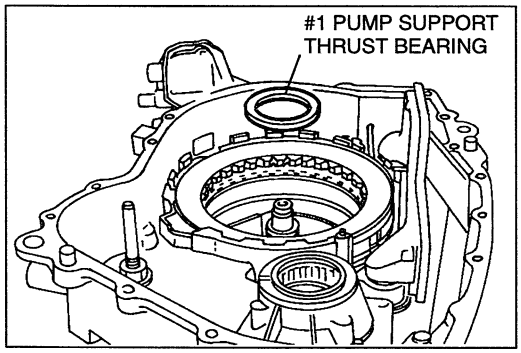
61. Remove the #4 turbine shaft thrust bearing.



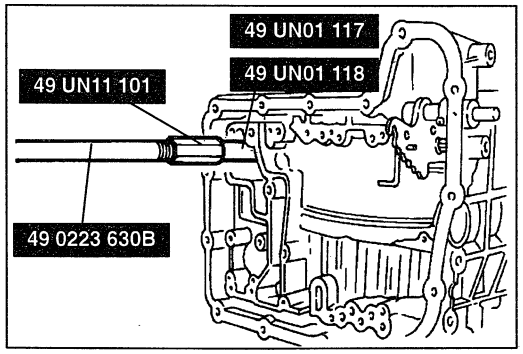
62. Remove the turbine shaft.



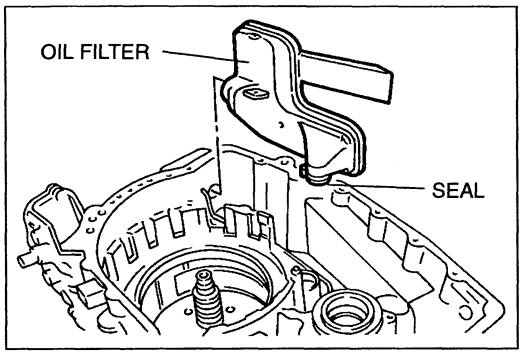
63. Remove the assembly of the forward/coasting/direct cylinder and reverse clutch drum.



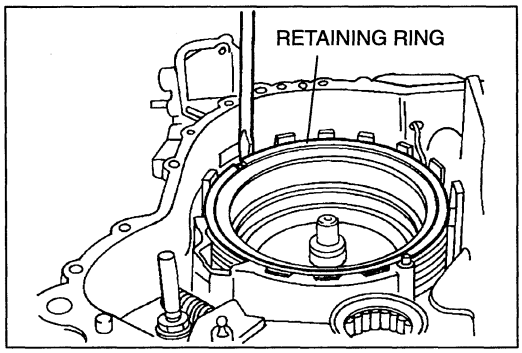
64. Remove the #1 pump support thrust bearing.



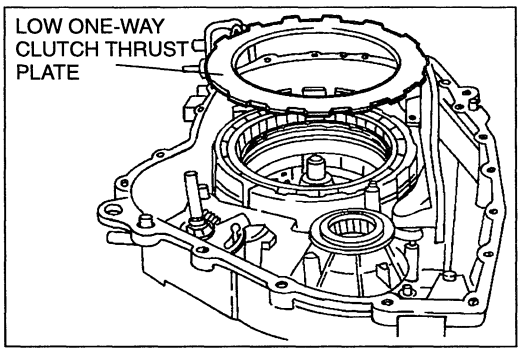
65. Use the **SSTs** or equivalent to remove the oil filter recirculation seal. Discard the recirculation seal.



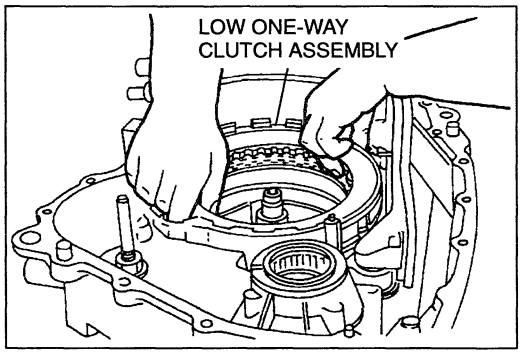
66. Remove the oil filter and seal assembly and discard.



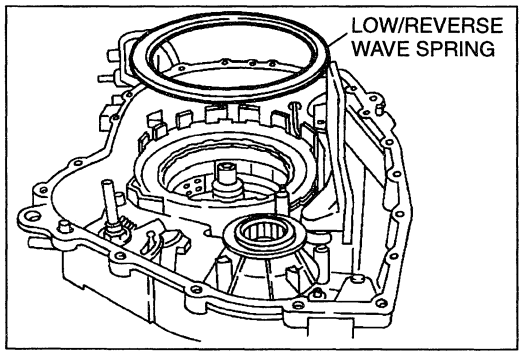
67. Remove the low one-way clutch retaining ring.



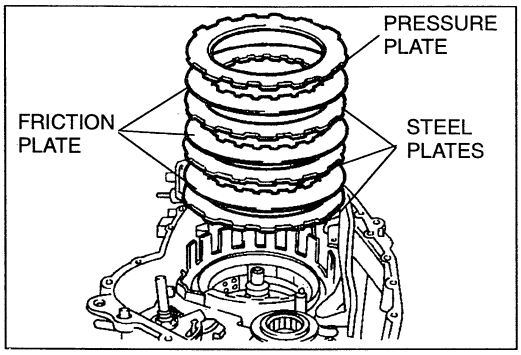
68. Remove the low one-way clutch thrust plate.



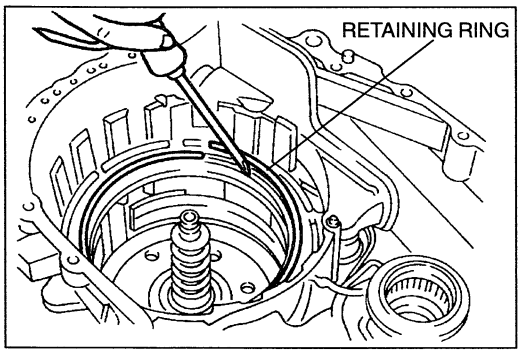
69. Remove the low one-way clutch assembly.



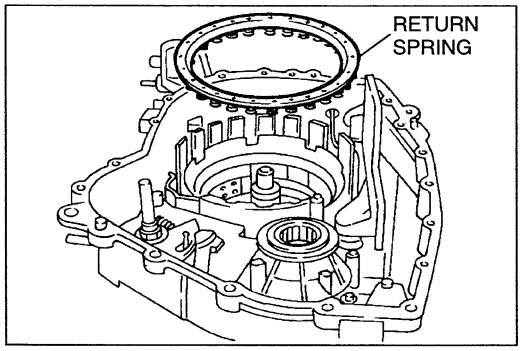
70. Remove the low/reverse wave spring.



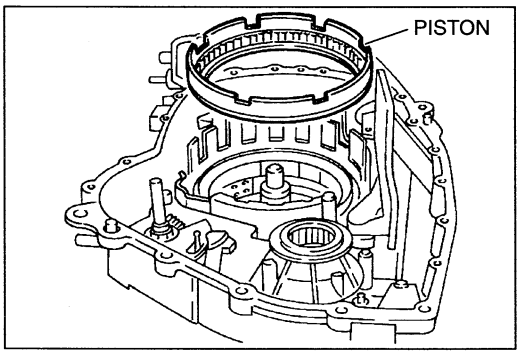
71. Remove the low/reverse clutch plates.



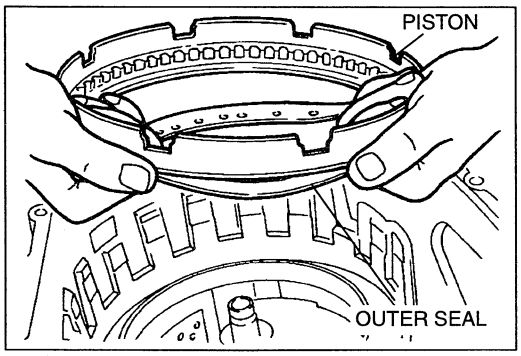
72. Use a screwdriver to remove the return spring retaining ring.



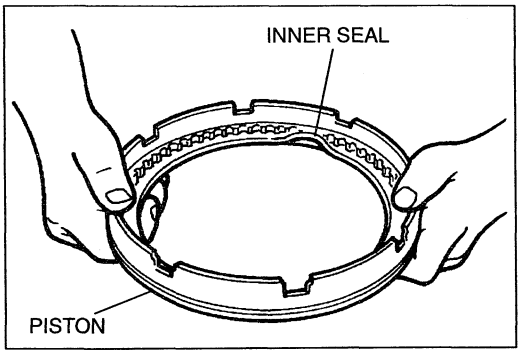
73. Remove the return spring.



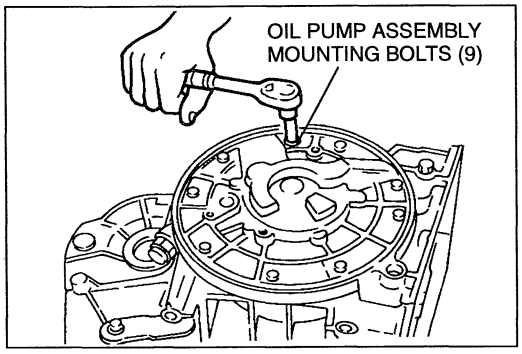
74. Pull the piston from the bore by using a rotating motion.



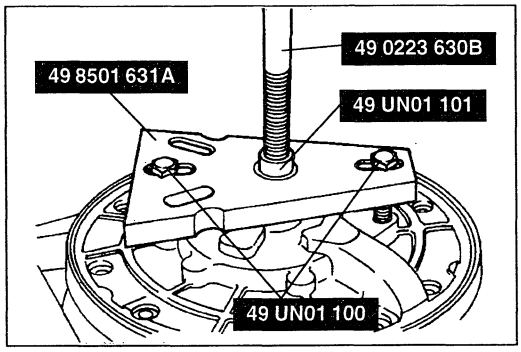
75. Remove the outer seal from the piston. Discard the outer seal.



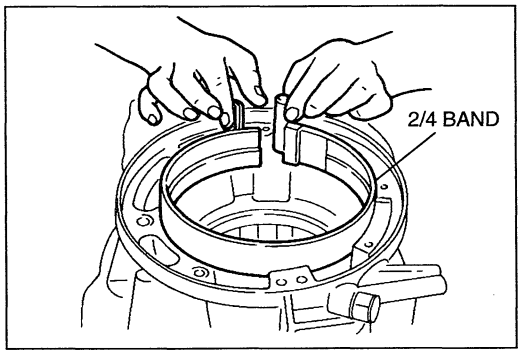
76. Remove the inner seal from the piston. Discard the inner seal.



77. Position the transaxle with the oil pump facing up. Remove the nine oil pump assembly mounting bolts.

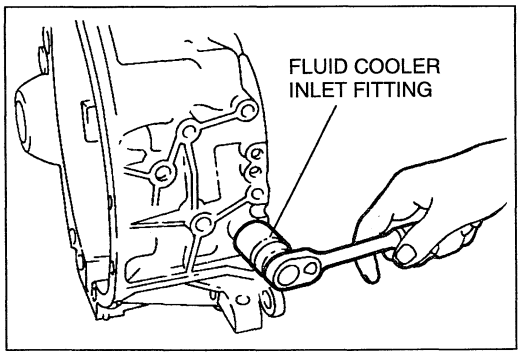


78. Install the **SSTs** or equivalent and remove the oil pump assembly from the transaxle case.

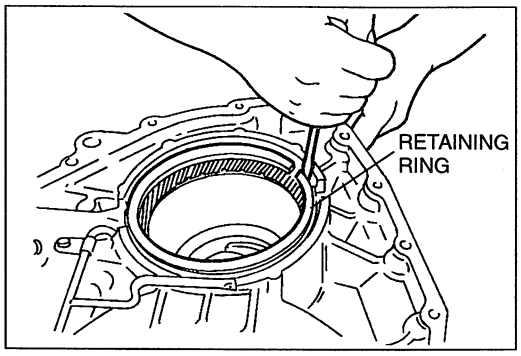


Note
- Use a piece of wire to secure the 2/4 band so that it is not damaged by being stretched.

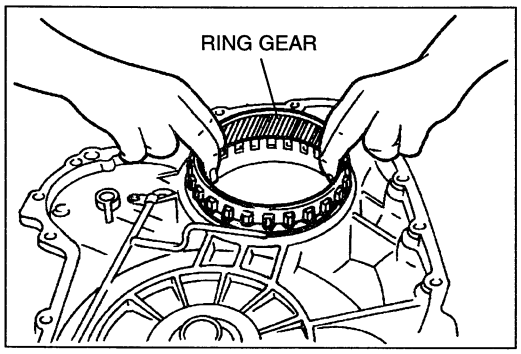
79. Slide the 2/4 band from the case.



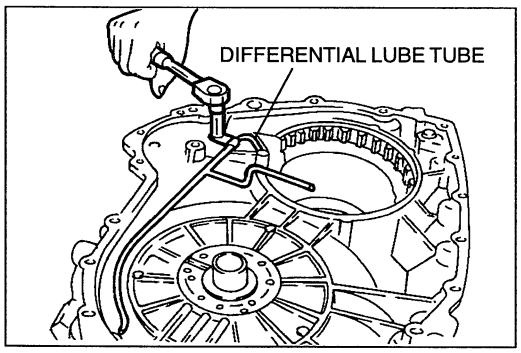
80. Remove the fluid cooler line fitting. Inspect the fluid cooler line fitting seal.



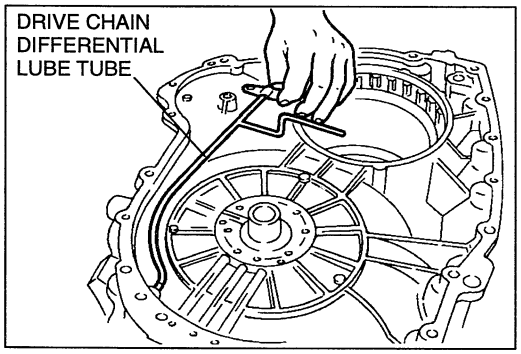
81. Remove the final drive ring gear retaining ring.



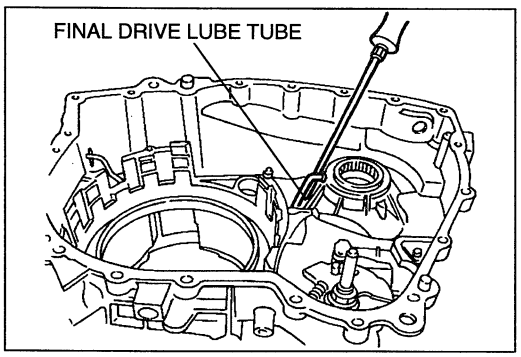
82. Lift the final drive ring gear from the housing. Inspect gear and housing lug teeth.



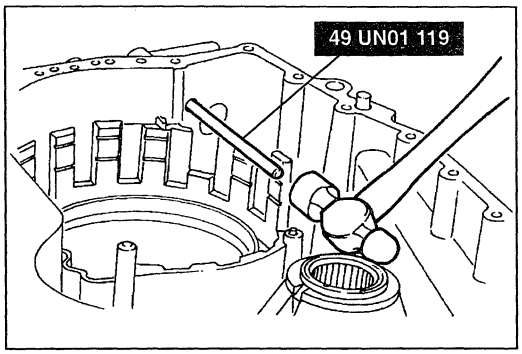
83. Remove the drive chain/differential lube tube mounting bolt.



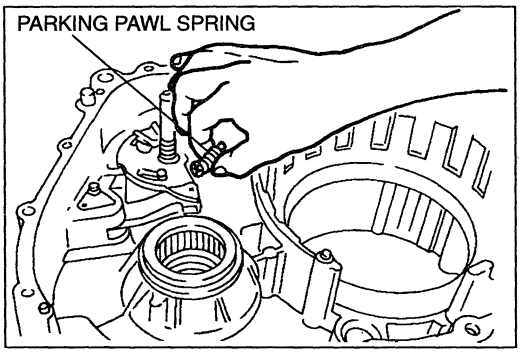
84. Wiggle and pull the drive chain/differential lube tube from the housing and discard.



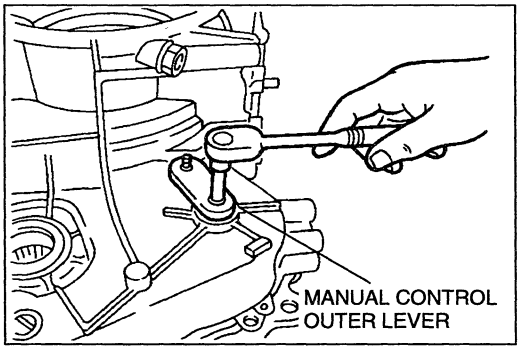
85. Use a screwdriver to remove the final drive lube tube from the case and discard.



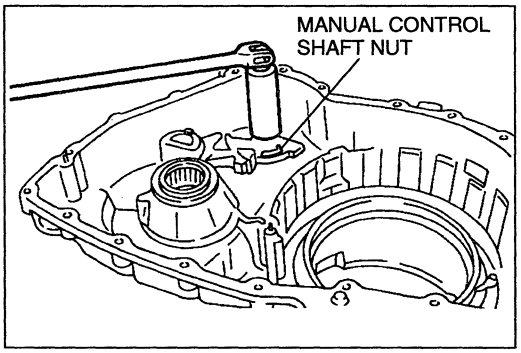
86. Use the **SST** or equivalent to remove the final drive lube tube seal from the case.



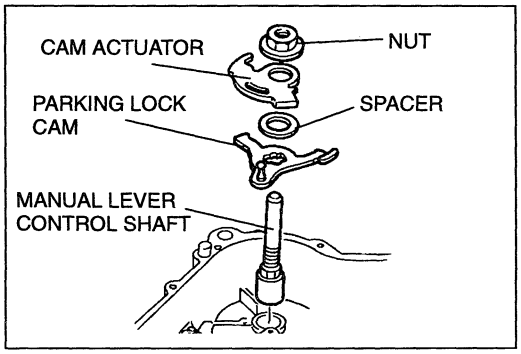
87. Remove the parking pawl spring.



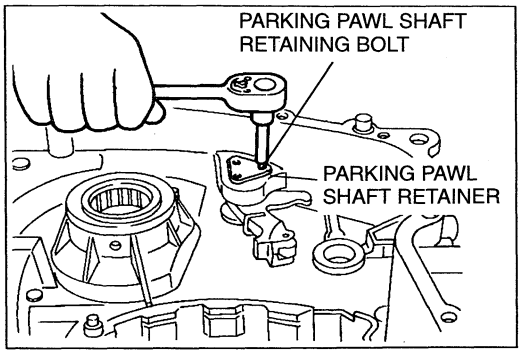
88. Remove the manual control outer lever bolt.
89. Remove the manual control outer lever.



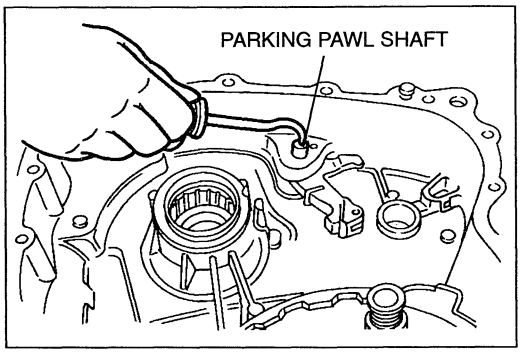
90. Remove the manual control shaft nut.



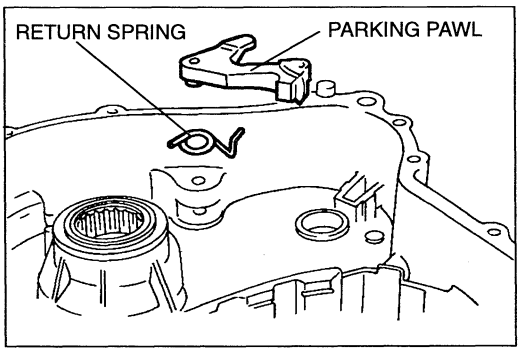
91. Remove the parking lock cam, cam actuator, spacer, and manual control lever shaft.



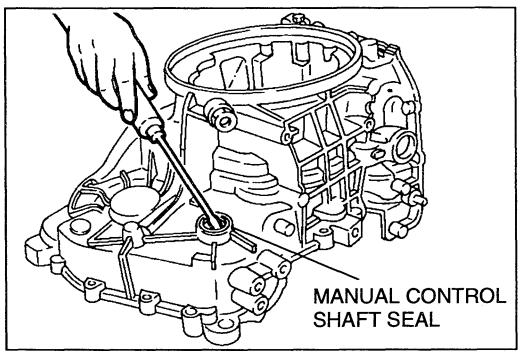
92. Remove the parking pawl shaft retainer and bolt.



93. Use an O-ring pick or magnet to remove the parking pawl shaft.

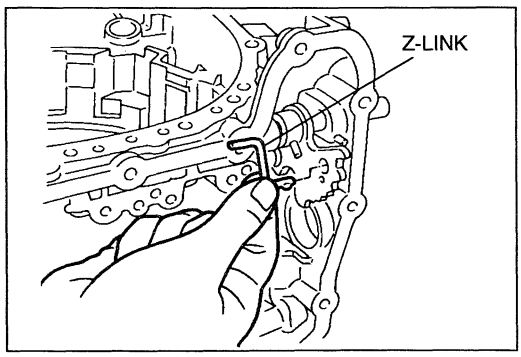


94. Remove the parking pawl and return spring.

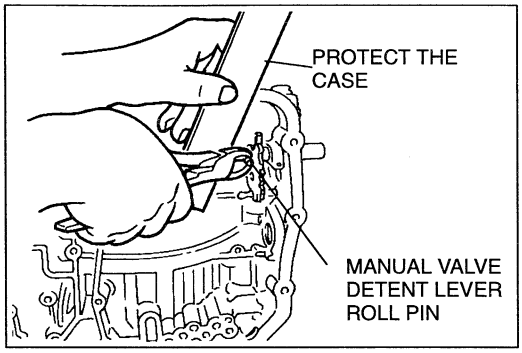


Caution
- **Do not damage the case bore during seal removal.**

95. Use a screwdriver to remove the manual control shaft seal.

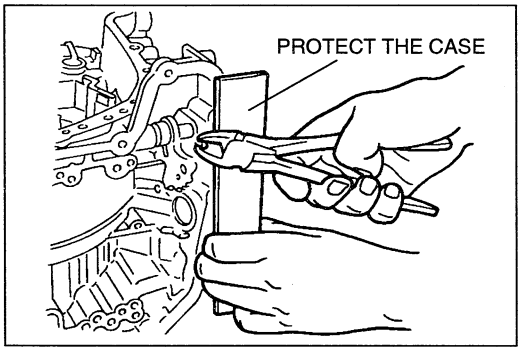


96. Remove the manual valve actuator rod (Z-link).



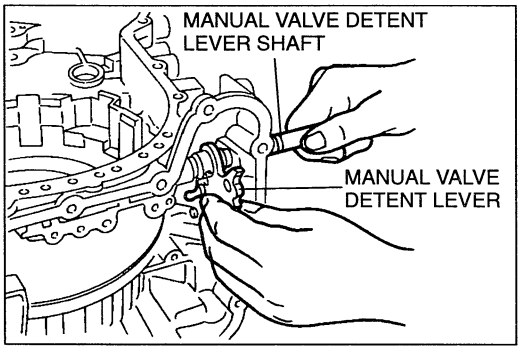
Caution
- **Do not damage the transaxle case sealing surface.**

97. Protect the case and use a pair of side cutters to remove the manual valve detent lever roll pin. Discard the roll pin.

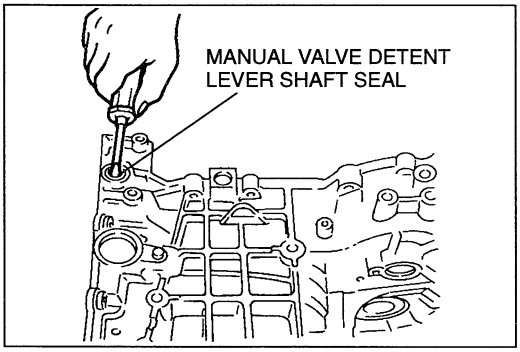


Caution
- **Do not damage the transaxle case sealing surface.**

98. Protect the case and use a pair of side cutters to remove the manual valve detent lever shaft roll pin. Discard the roll pin.

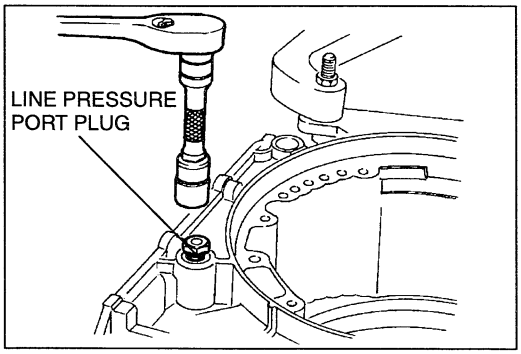


99. Remove the manual valve detent lever and shaft from the case.

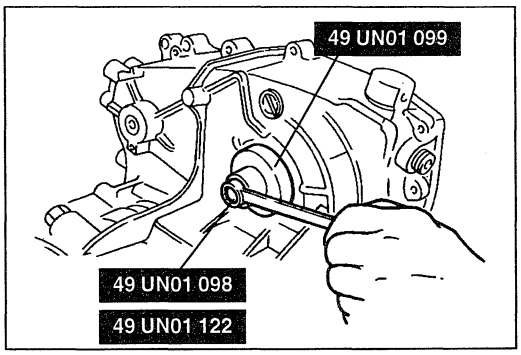


Caution
- **Do not damage the transaxle case during seal removal.**

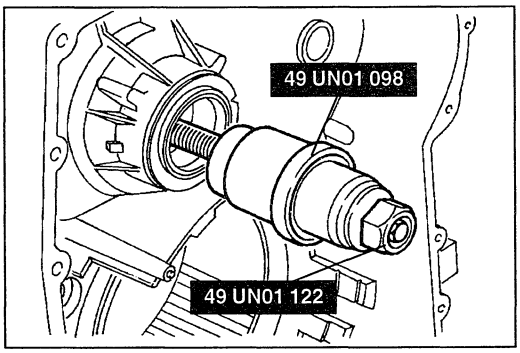
100. Use a screwdriver to remove the manual valve detent lever shaft seal from the case. Discard the seal.



101. Remove the line pressure port plug from the transaxle case.
102. Remove the fluid cooler line fitting. Inspect the fluid cooler line fitting seal.



103. If it is necessary to replace #18 driven sprocket bearing in the transaxle case, install the **SSTs**.

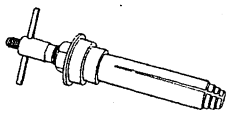
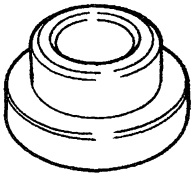


104. Remove the bearing by using the **SSTs**.

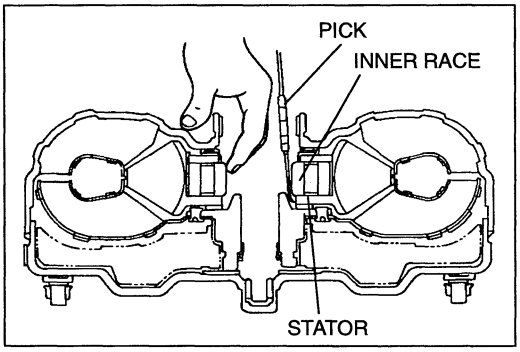
TORQUE CONVERTER

Preparation

SST

49 UN01 123 End play checking tool 	For inspection of torque converter	49 UN01 120 End play checking tool sleeve 	For inspection of torque converter

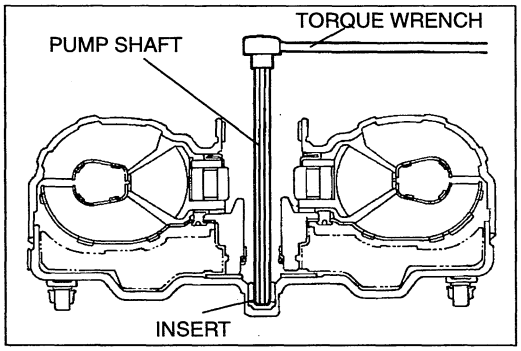
The torque converter is welded together and cannot be disassembled.



Inspection

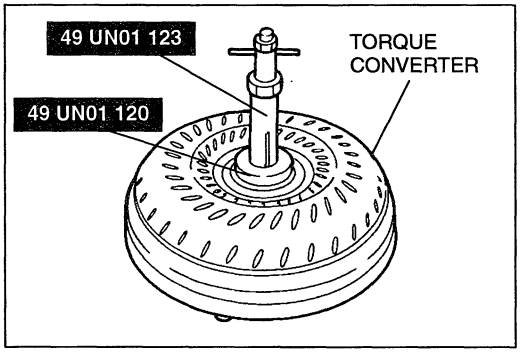
Torque converter one-way clutch check

1. Place the torque converter on a workbench with the impeller hub facing up.
2. Place a pick in a slot on the bottom of the stator.
3. While holding the bottom of the stator, rotate the inner race of the one-way clutch.
4. If the inner race rotates in both directions during this check, the stator one-way clutch is slipping.



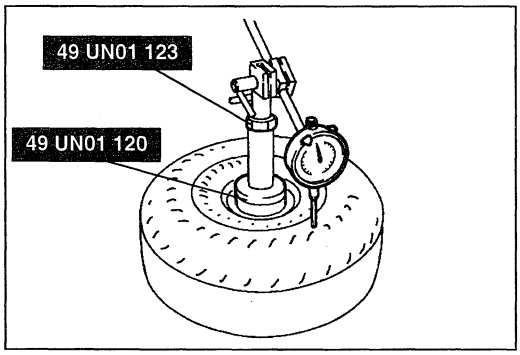
Torque converter pump insert check

1. Install the oil pump shaft into the torque converter.
2. Verify that the insert can hold 14 N·m {1.5 kgf·m, 10 ft·lbf} of torque.
3. If the insert cannot hold the specified torque, replace the torque converter.
4. Remove the oil pump shaft.



Turbine torque check

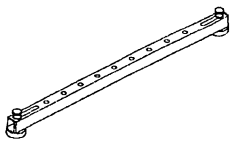
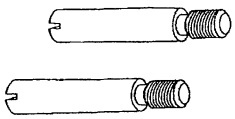
1. Install the **SSTs** into the turbine splines in the torque converter.
2. Attach a torque wrench and determine the torque required to turn the turbine.
3. If the torque exceeds 8 N·m {0.8 kgf·m, 6 ft·lbf}, replace the torque converter.



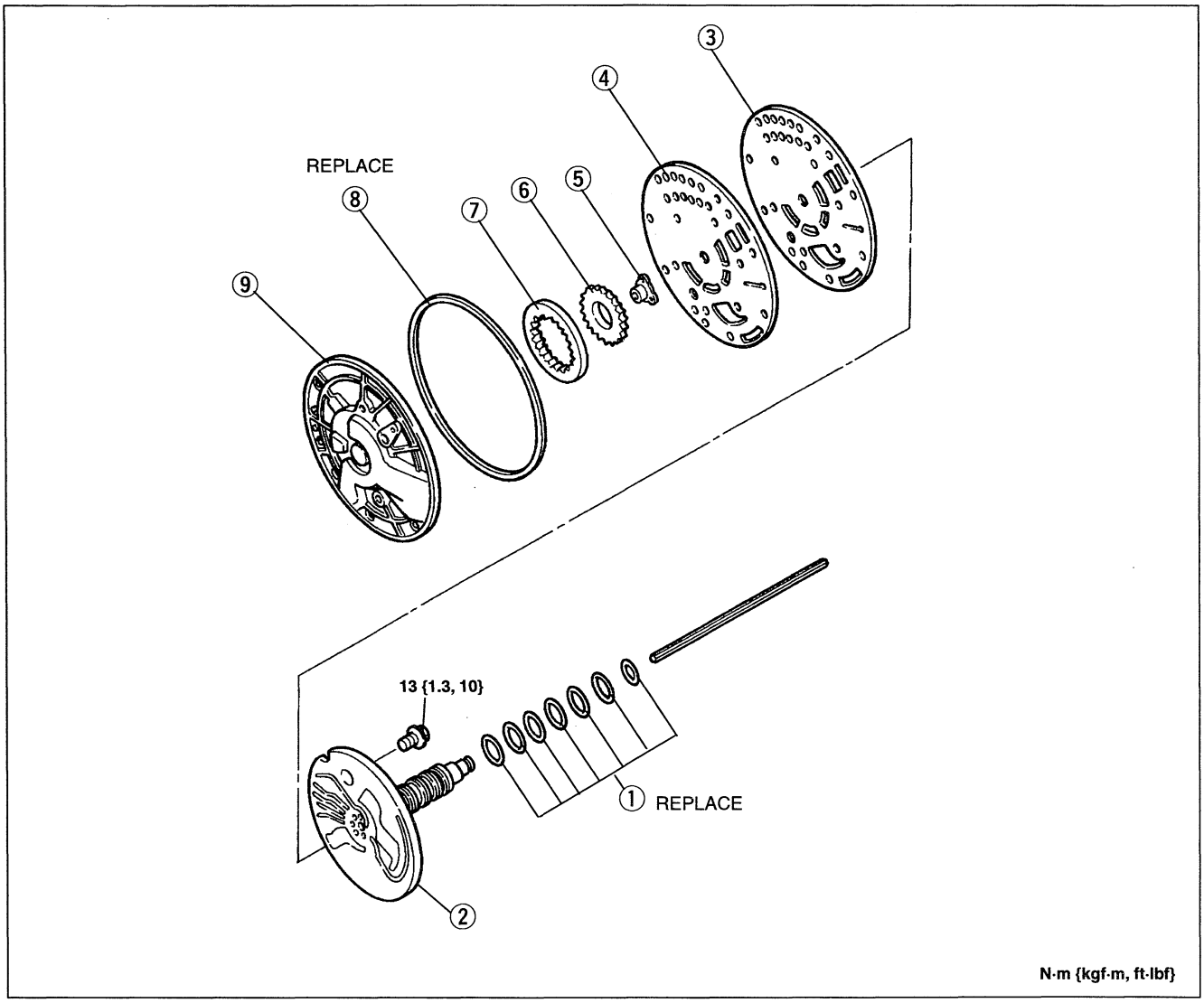
Torque converter end play check

1. Install the **SSTs** into the turbine splines in the torque converter.
2. Attach a dial indicator to the **SSTs**.
3. Zero the needle of the dial indicator.
4. Pull up on the **SSTs** and observe the dial indicator reading.
5. If the end play exceeds 1.27 mm {0.05 in}, replace the torque converter.

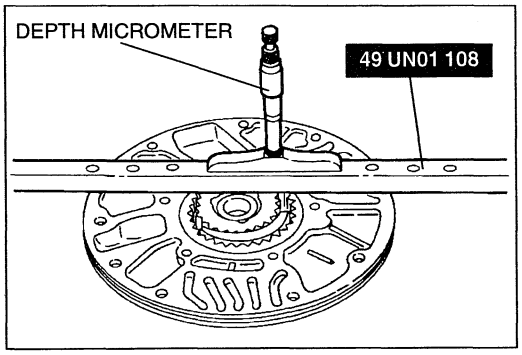
OIL PUMP
Preparation
SST

49 UN01 108 Gauge bar 	For inspection of oil pump	49 UN01 107 Pump alignment pins 	For assembly of oil pump

Disassembly / Inspection / Assembly
1. Disassemble in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.

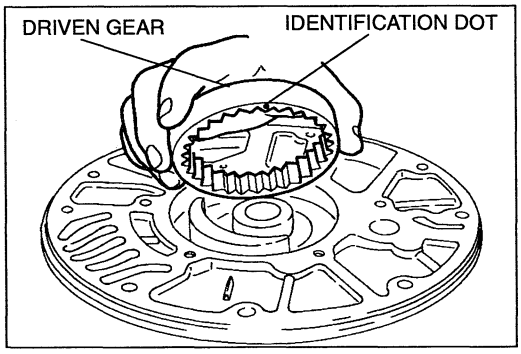


1. Seal ring
2. Pump support
3. Gasket
4. Separator plate
5. Drive gear insert
6. Drive gear
   Inspection ..... page K2–177
7. Driven gear
   Inspection ..... page K2–177
8. Oil pump seal ring
9. Oil pump body



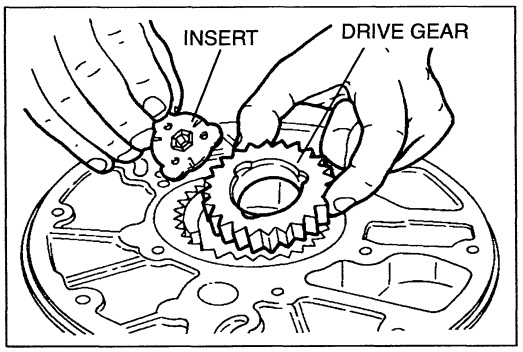
Inspection

1. Use the **SST** and a depth micrometer to measure the clearance between each gear and the pump body face.
2. The allowable clearance for each gear is **0.040—0.080 mm {0.0016—0.0031 in}**. If the clearance exceeds the specification, replace the oil pump assembly.
3. Check for oil blockage. (Refer to page K2–9.)

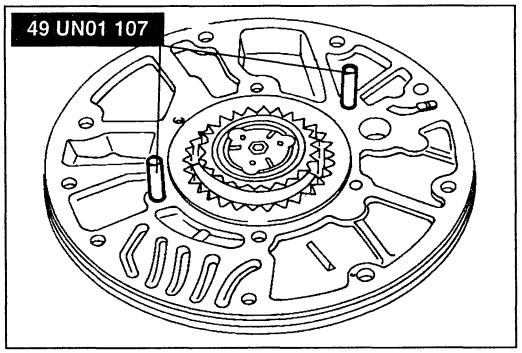


Assembly Procedure

1. Install the driven gear in the oil pump body with the identification dot facing down.



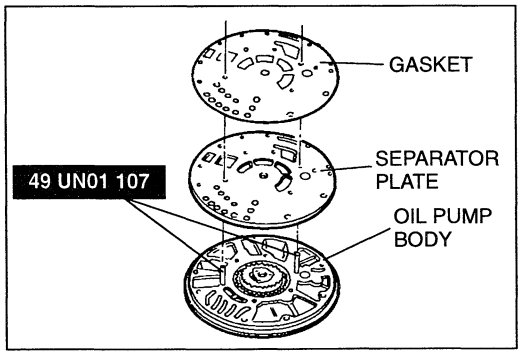
2. Install the drive gear and insert in the oil pump body.



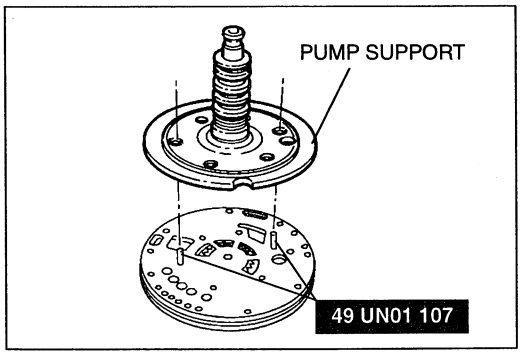
Note

- Use the bolt hole next to TSS sensor hole and the bolt hole opposite it for alignment pins.

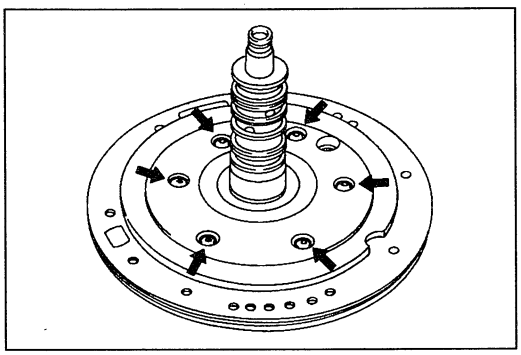
3. Install the **SST** or equivalent in the oil pump body, with the alignment pins in the holes as shown.



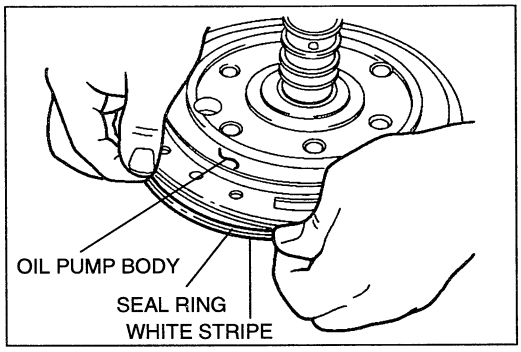
4. Install the separator plate and new gasket on the oil pump body.



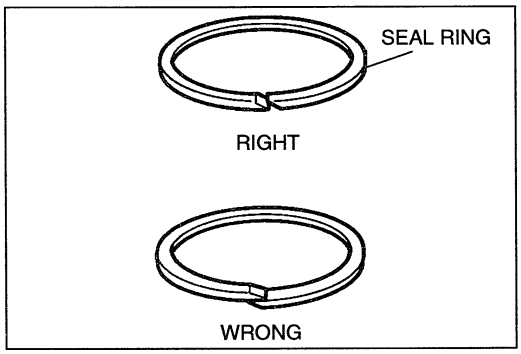
5. Install the pump support on the oil pump body.



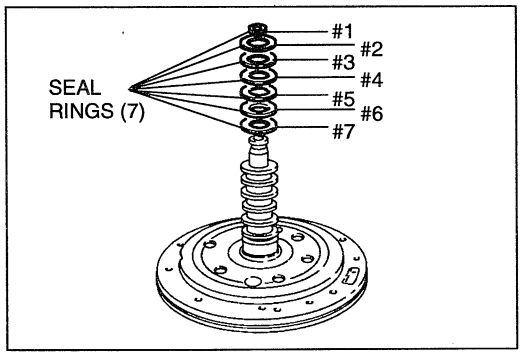
6. Install and tighten the four pump support-to-oil pump body bolts to **13 N·m {1.3 kgf·m, 10 ft·lbf}** and remove the **SST** (alignment pins). Install and tighten the two remaining mounting bolts to **13 N·m {1.3 kgf·m, 10 ft·lbf}**.



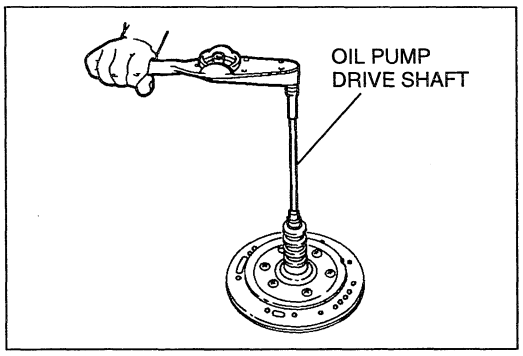
7. Install a new seal ring on the oil pump body. Ensure that the white stripe is visible all around the pump.



Note
- Ensure that the scarf cut seals are overlapped correctly.



8. Install seven new seal rings on the pump support.

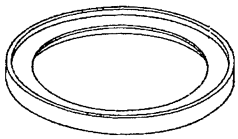


9. Install the oil pump drive shaft.
10. Use a torque wrench to rotate the oil pump. The maximum rotating torque is **0.3 N·m {3.1 kgf·m, 2 in·lbf}**.
11. Remove the torque wrench and oil pump drive shaft.
12. If the rotating torque exceeds the specification, disassemble and inspect the oil pump for contamination or improper end clearance.

FORWARD ONE-WAY CLUTCH, LOW-INTERMEDIATE SUN GEAR ASSEMBLY, AND LOW-INTERMEDIATE CARRIER ASSEMBLY

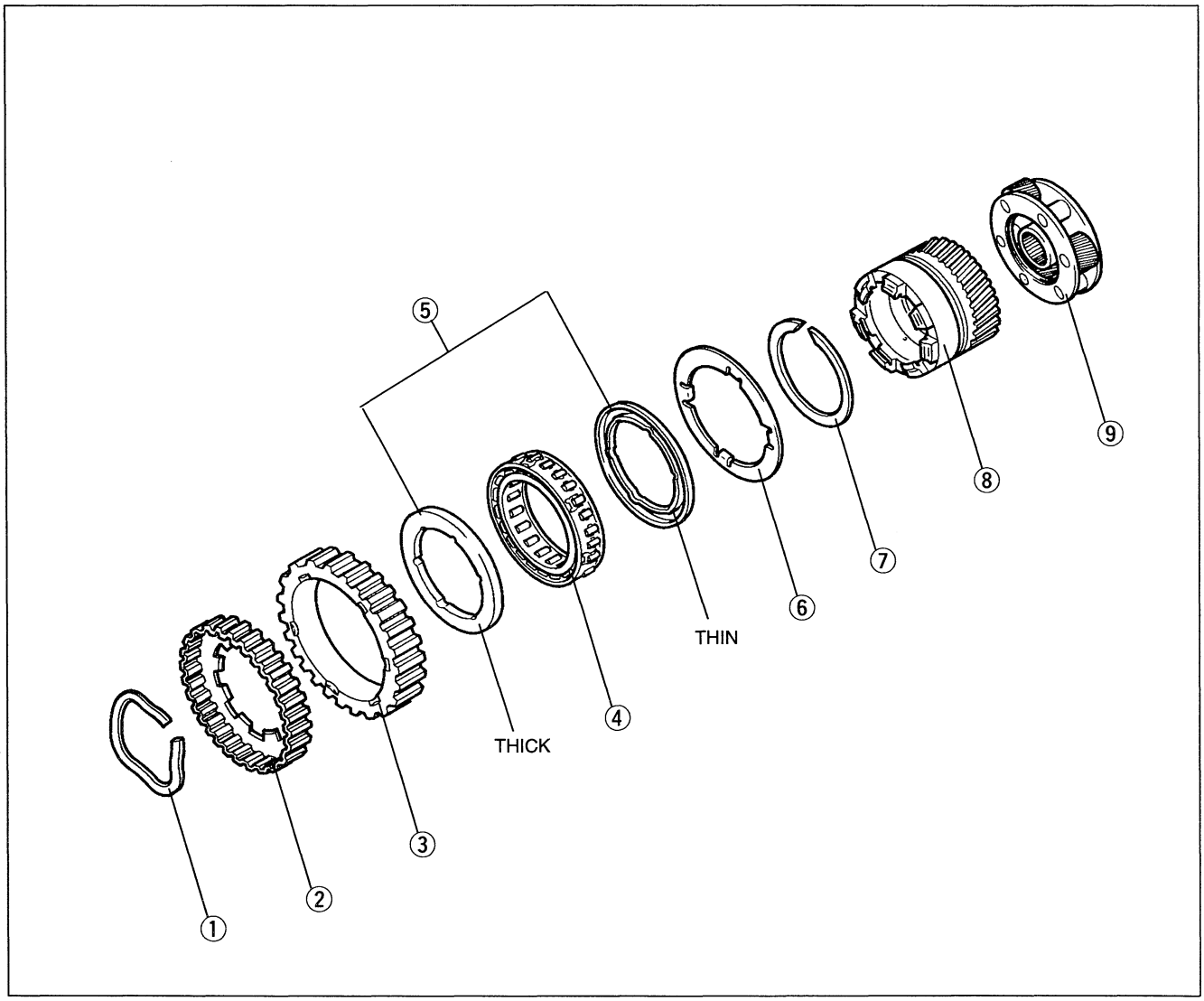
Preparation

SST

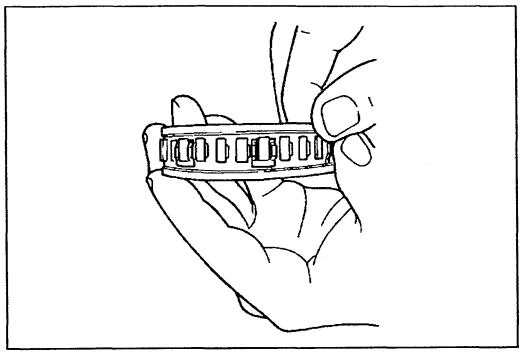
49 UN01 102 Sprag replacer		For installation of sprag assembly

Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts, and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



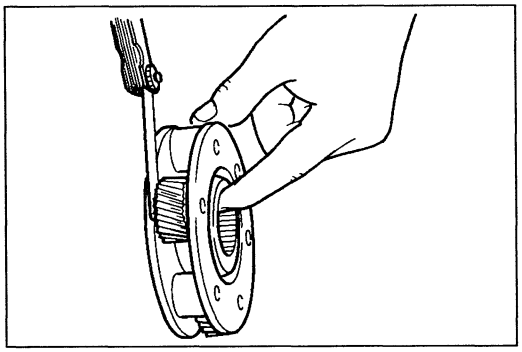
1. Retaining ring
2. Coasting clutch hub
3. One-way clutch outer race
4. Sprag assembly
5. End cap
   Disassembly note . . . . . page K2–181
6. Retaining washer
7. Retaining ring
8. Low-intermediate sun gear
9. Low-intermediate carrier
   Inspection . . . . . page K2–181



Disassembly Note
End cap

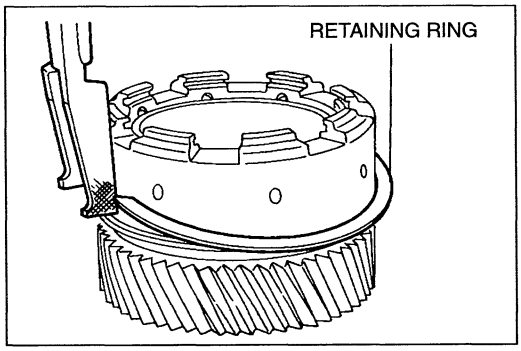
Note
- Note the position of the end caps.
  They are of different thicknesses and are not interchangeable.

Separate the sprag assembly and end caps from the outer race.



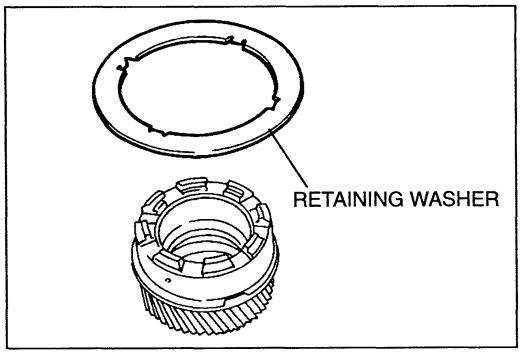
Inspection
Low-intermediate carrier assembly

Inspect the low-intermediate carrier assembly pinion gear end play. End play should be between **0.15—0.72 mm {0.006—0.028 in}**.



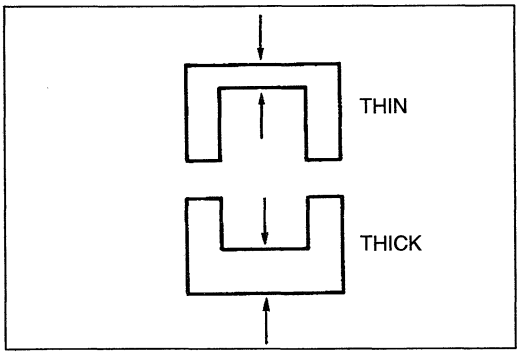
Assembly procedure

1. Install the retaining ring.

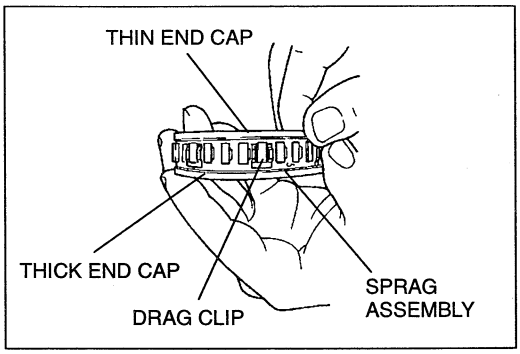


Note
- The tabs on the retaining washer should be facing down.

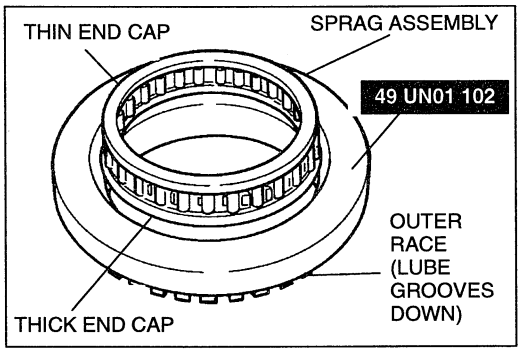
2. Install the retaining washer.



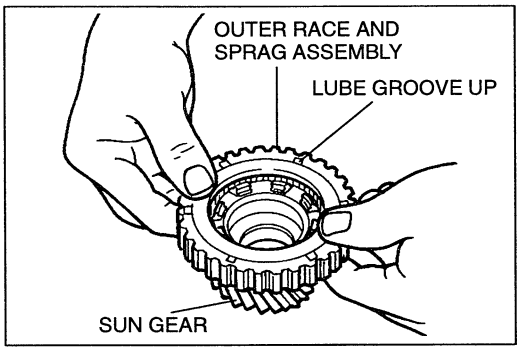
3. Identify the thick and thin end caps.



4. Assemble the one-way clutch, sprag assembly and end caps.

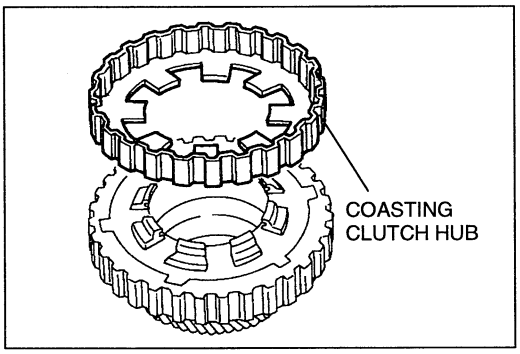


5. Use the **SST** or equivalent to install the sprag assembly and end caps in the outer race.

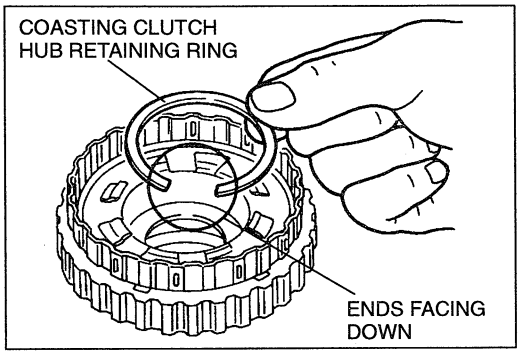


Caution
- **Lube grooves face up (away from sun gear).**

6. Flip the outer race and sprag assembly over and install on the sun gear.

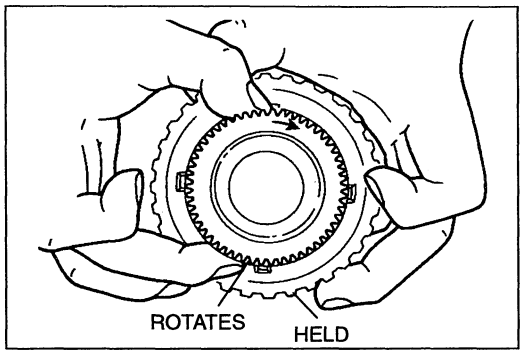


7. Install the coasting clutch hub.



Note
- The end of the retaining ring should point towards the coasting clutch hub.

8. Install the coasting clutch hub retaining ring.

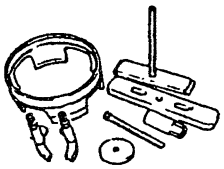
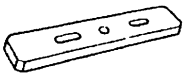
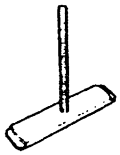
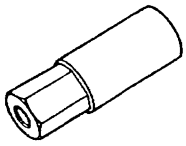
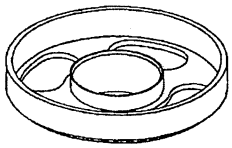
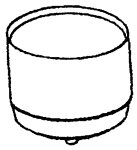
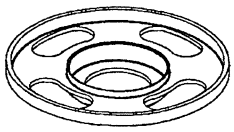
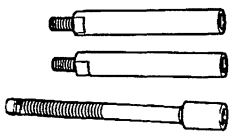


9. Check the operation of the forward one-way clutch with the sun gear facing up. It should work as follows:
   - When the sun gear is rotated in a clockwise direction, it should not rotate the outer race.
   - When the sun gear is rotated in a counterclockwise direction, it should rotate the outer race.

FORWARD/COASTING/DIRECT CLUTCH CYLINDER AND REVERSE CLUTCH DRUM

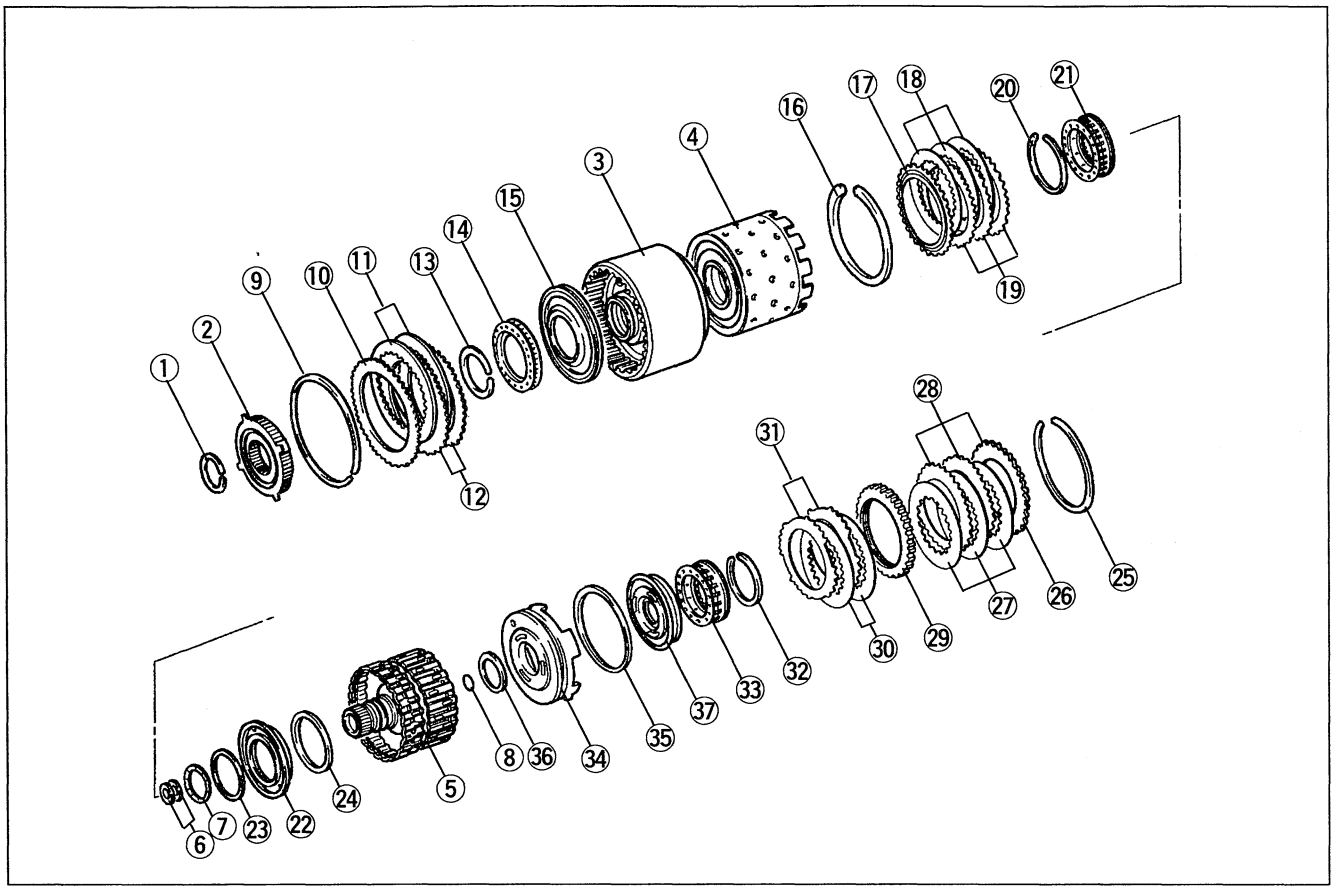
Preparation

SST

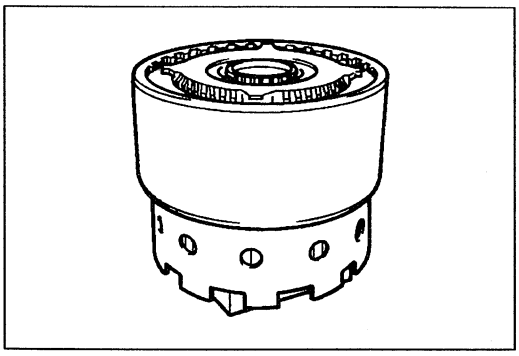
49 G019 0A7A Compressor set, return spring 	For disassembly / assembly of coasting clutch and reverse clutch	49 G019 025 Body B (Part of 49 G019 0A7A) 	For disassembly / assembly of coasting clutch
49 G019 026 Plate (Part of 49 G019 0A7A) 	For disassembly / assembly of coasting clutch and reverse clutch	49 G019 027 Attachment A (Part of 49 G019 0A7A) 	For disassembly / assembly of coasting clutch and reverse clutch
49 G019 029 Nut (Part of 49 G019 0A7A) 	For disassembly / assembly of coasting clutch and reverse clutch	49 UN01 095 Coasting clutch piston seal protector 	For installation of forward clutch piston
49 UN01 096 Seal sizer 	For installation of F/C/D clutch cylinder hub seal	49 UN01 094 Reverse clutch piston seal protector 	For installation of reverse clutch piston
49 L019 001 Bolt 	For removal / installation of snap ring	—	—

Disassembly / Inspection / Assembly

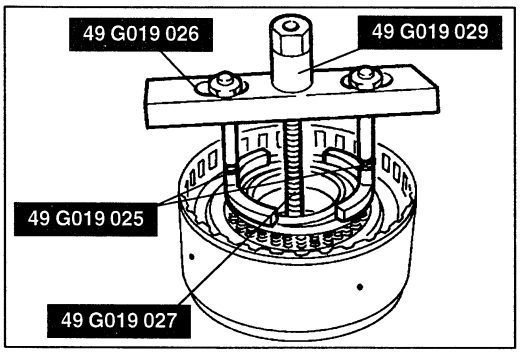
1. Disassemble as shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



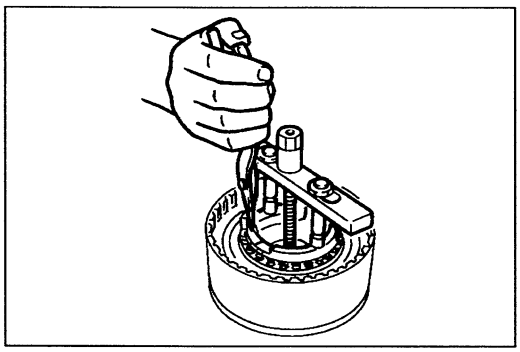
1. Retaining ring
   Disassembly note ..... page K2–186
2. Reverse clutch hub
3. Reverse clutch drum
4. Direct clutch hub/shell
5. Forward/coasting/direct clutch cylinder
6. Reverse clutch seal rings
7. Direct clutch thrust washer
8. F/C/D clutch cylinder hub seal
9. Retaining ring
10. Pressure plate
11. Friction plates
    Inspect for wear and burning
12. Steel plates
13. Retaining ring
    Disassembly note ..... page K2–186
14. Return spring assembly
    Inspection ..... page K2–187
15. Reverse clutch piston
16. Retaining ring
17. Pressure plate
18. Friction plates
    Inspect for wear and burning
19. Steel plates
20. Retaining ring
    Disassembly note ..... page K2–186
21. Return spring assembly
    Inspection ..... page K2–187
22. Direct clutch piston
    Disassembly note ..... page K2–187
23. Direct clutch piston inner seal
24. Direct clutch piston outer seal
25. Retaining ring
26. Pressure plate
27. Friction plates
    Inspect for wear and burning
28. Steel plates
29. Pressure plate
30. Friction plates
    Inspect for wear and burning
31. Steel plates
32. Retaining ring
    Disassembly note ..... page K2–187
33. Return spring assembly
    Inspection ..... page K2–187
34. Forward clutch piston
35. Forward clutch piston outer seal
36. Forward clutch piston inner seal
37. Coasting clutch piston



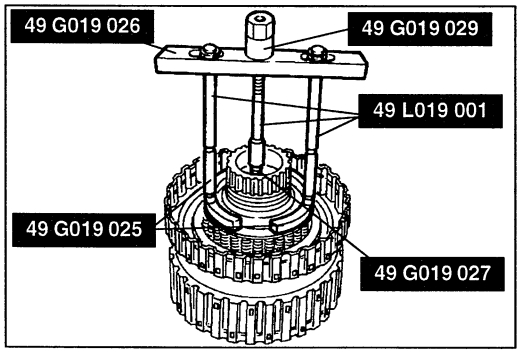
Disassembly Note
Retaining ring (Reverse clutch hub)
Support the forward/coasting/direct clutch cylinder on a block so that the reverse clutch hub is facing up and the direct clutch hub/shell is not touching the workbench.



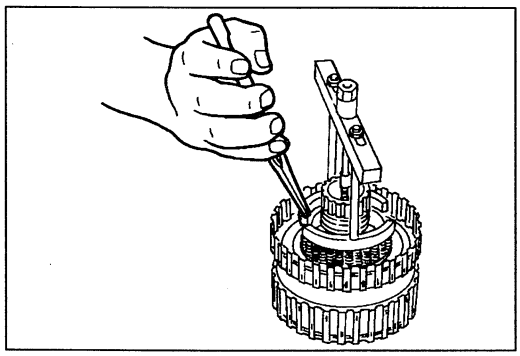
Retaining ring (Reverse clutch)
1. Use the **SSTs** or equivalent to compress the return spring assembly.



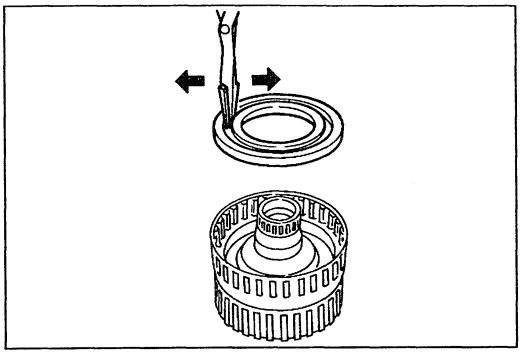
2. Remove the retaining ring.



Retaining ring (Direct clutch)
1. Use the **SST** or equivalent to compress the return spring assembly.

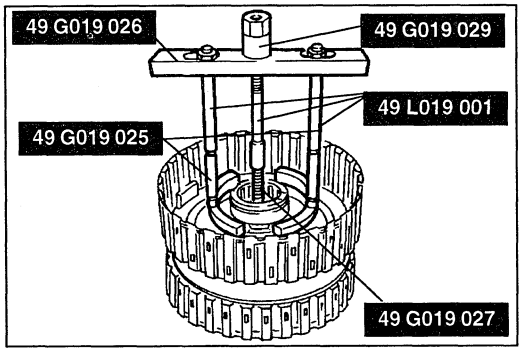


2. Remove the retaining ring.



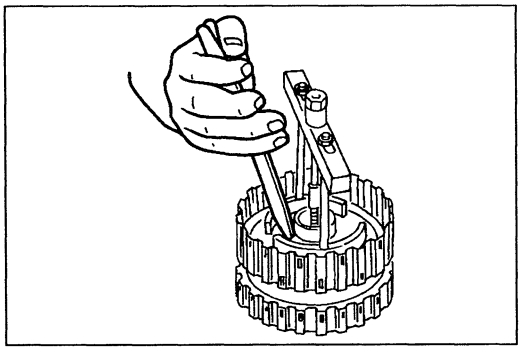
Direct clutch piston

Remove the direct clutch piston by using external snap-ring pliers as shown in the figure.



Retaining ring (Forward and coasting clutch)

1. Use the **SSTs** or equivalent to compress the return spring assembly.

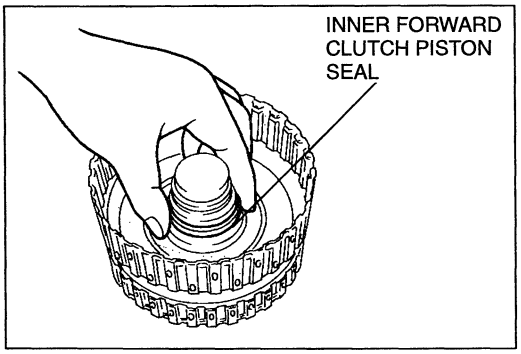


2. Remove the retaining ring.

Inspection

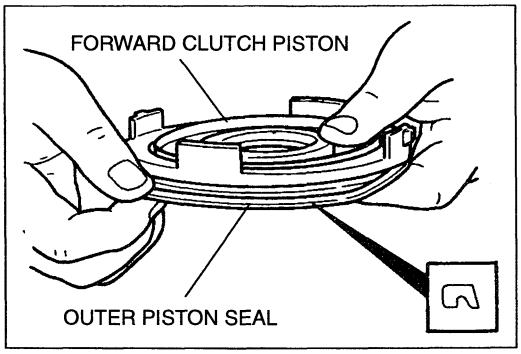
Springs

- Springs must be the same length.
- Springs must not be twisted.
- Springs must not be damaged.



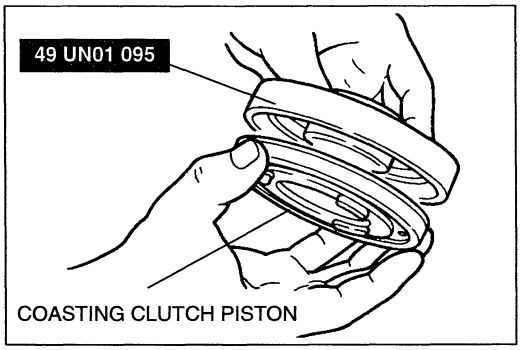
Assembly procedure

1. Install a new inner forward clutch piston seal in the forward/coasting/direct clutch cylinder.

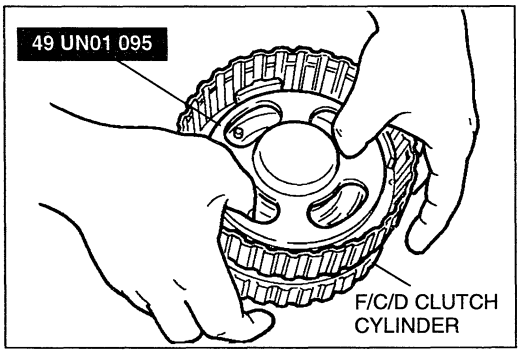


2. Install a new outer seal on the forward clutch piston.

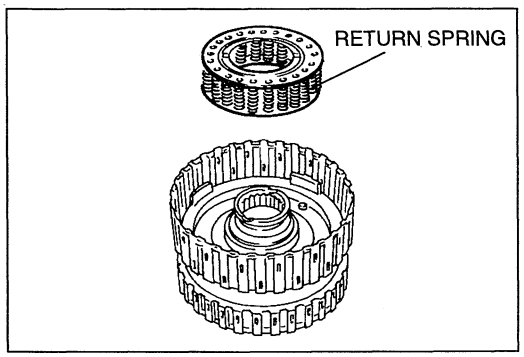
3. Install the forward clutch piston in the forward/coasting/ direct clutch cylinder.



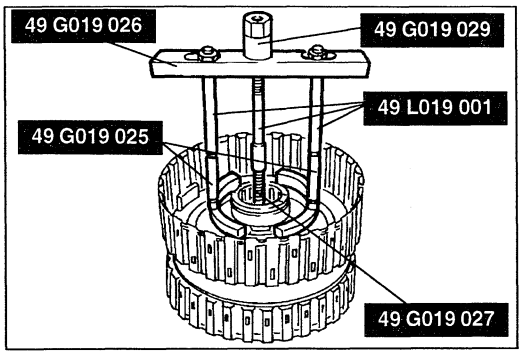
4. Lubricate and install the coasting clutch piston in the **SST**.



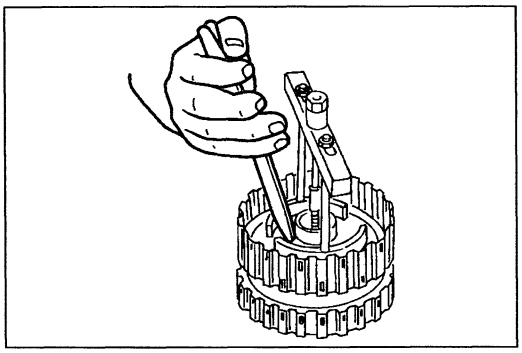
5. Use the **SST** or equivalent to install the coasting clutch piston into the forward clutch piston.



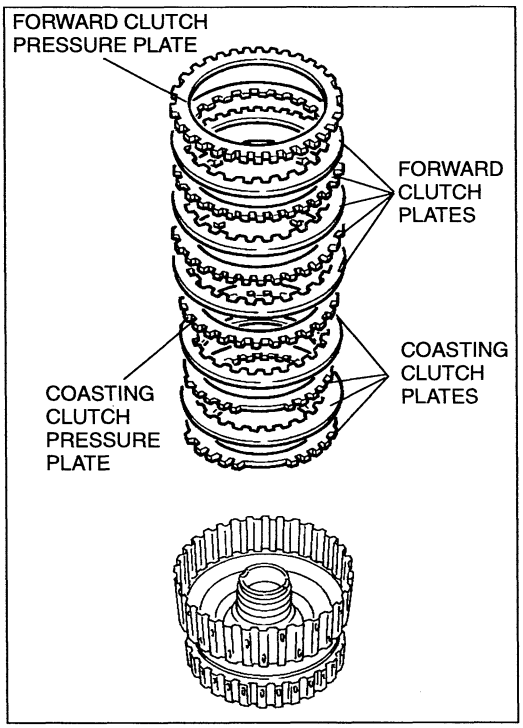
6. Install the return spring assembly.



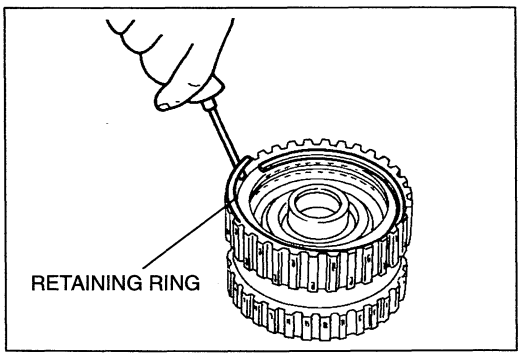
7. Use the **SST** or equivalent to compress the return spring assembly.



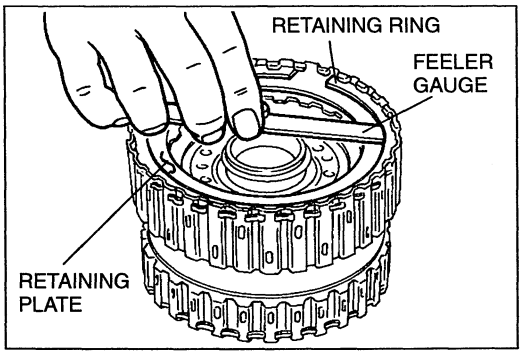
8. Install the retaining ring.
9. Remove the **SST**.



10. Install the forward and coasting clutch plates.



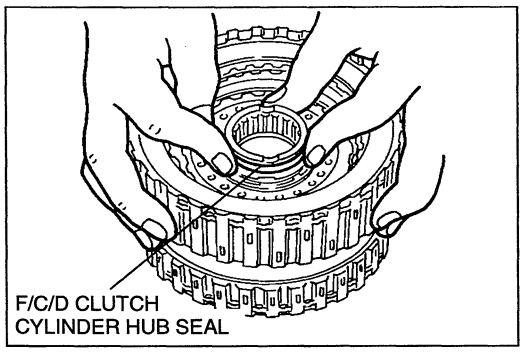
11. Install the forward clutch plate retaining ring (selective fit).



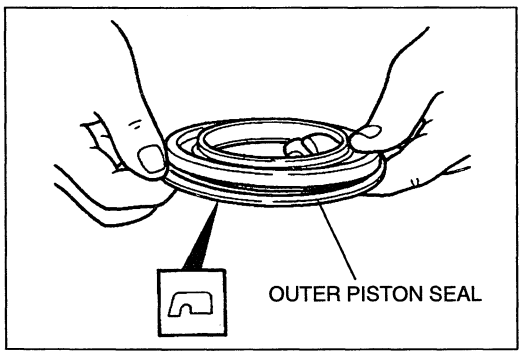
12. Use a feeler gauge to measure the clearance between the clutch plates and the forward clutch plate retaining ring. Make a second measurement on the opposite side. Average the two measurements to get the clearance.
13. The standard clearance is **0.50—1.09 mm {0.02—0.04 in}**. If the clearance is not within the specification, select and install the proper thickness retaining plate to obtain the standard clearance.

Retaining ring sizes are as follows:

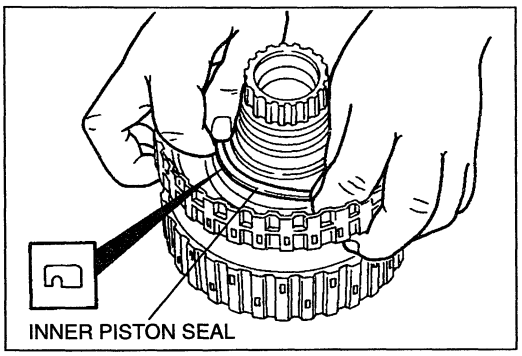
Thickness mm {in}
1.28—1.38 {0.050—0.054}
1.39—1.49 {0.055—0.059}
1.52—1.62 {0.060—0.064}
1.65—1.75 {0.065—0.069}



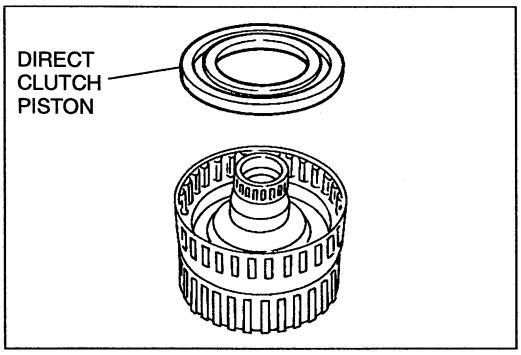
14. Install the forward/coasting/direct clutch cylinder hub seal ring on the forward/coasting/direct clutch cylinder.



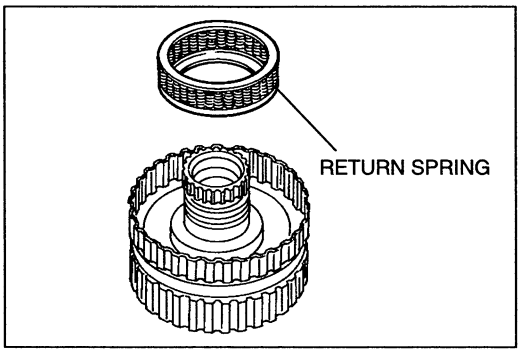
15. Install a new outer seal on the direct clutch piston.



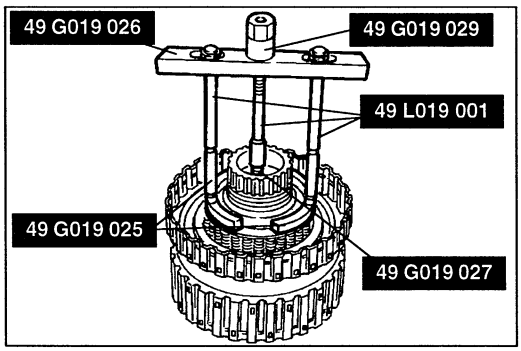
16. Install a new inner piston seal in the forward/coasting/direct clutch cylinder.



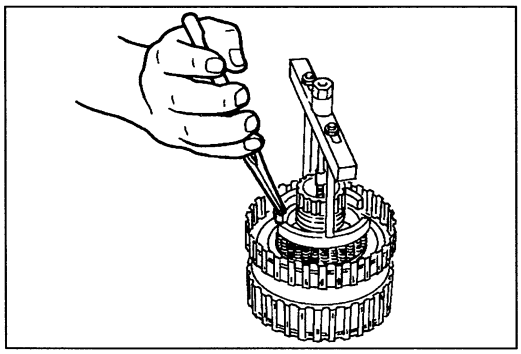
17. Lubricate the seals and install the direct piston in the forward/coasting/direct clutch cylinder.



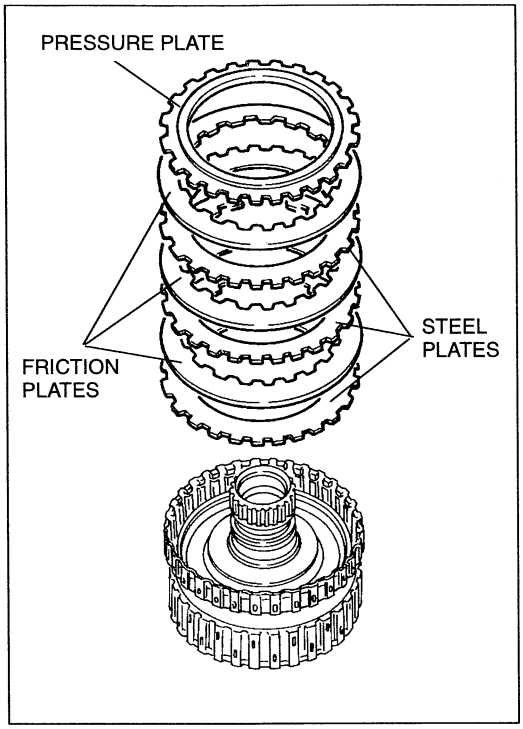
18. Install the return spring assembly.



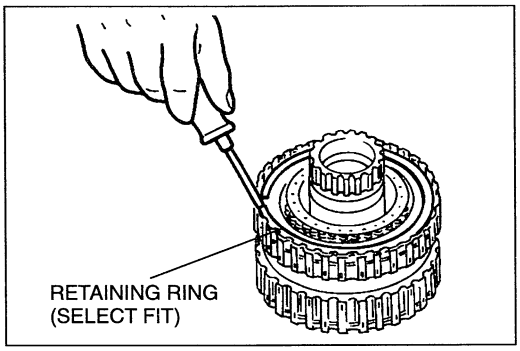
19. Use the **SSTs** or equivalent to compress the return spring assembly.



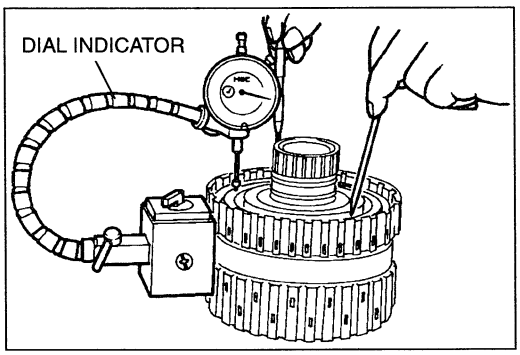
20. Use a pair of snap ring pliers to install the retaining ring.
21. Remove the **SST**.



22. Install the direct clutch plates.



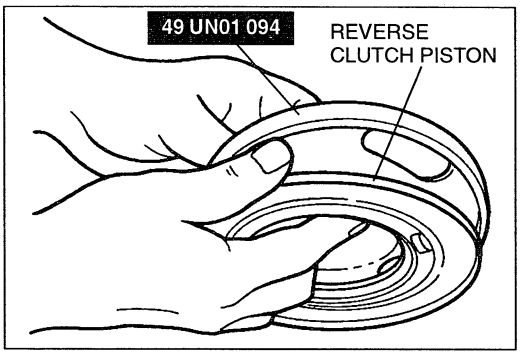
23. Install the direct clutch plate retaining ring (selective fit)



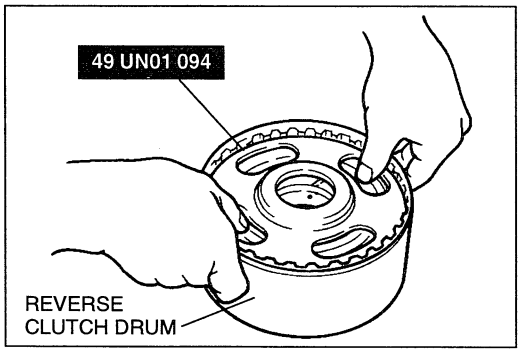
24. Measure the direct clutch clearance as follows:
    - Install a dial indicator on the side of the forward/coasting/direct clutch cylinder and zero the needle on the pressure plate.
    - Use two picks to pull the pressure plate upward. Observe the dial indicator reading.
    - Make a second measurement on the opposite side. Average the two measurements to get the clearance.
25. The standard clearance is **0.52—1.12 mm {0.02—0.04 in}**. If the clearance is not within the specification, select and install the proper thickness retaining ring to obtain the standard clearance.

Retaining ring sizes are as follows:

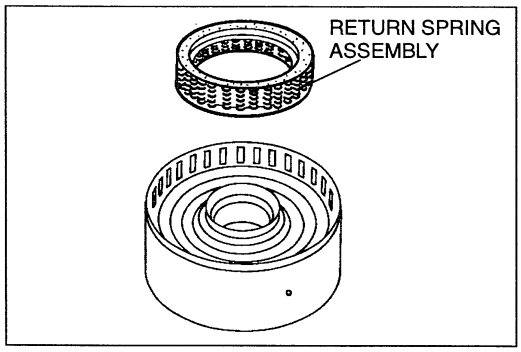
Thickness mm {in}
1.28—1.38 {0.050—0.054}
1.39—1.49 {0.054—0.06}
1.52—1.62 {0.060—0.063}
1.65—1.75 {0.064—0.068}



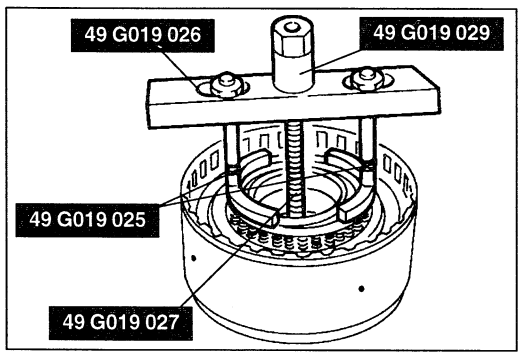
26. Lubricate and install the reverse clutch piston in the **SST** or equivalent.



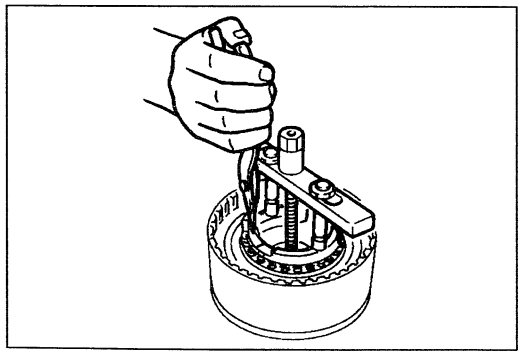
27. Use the **SST** or equivalent to install the reverse clutch piston with integral seals.



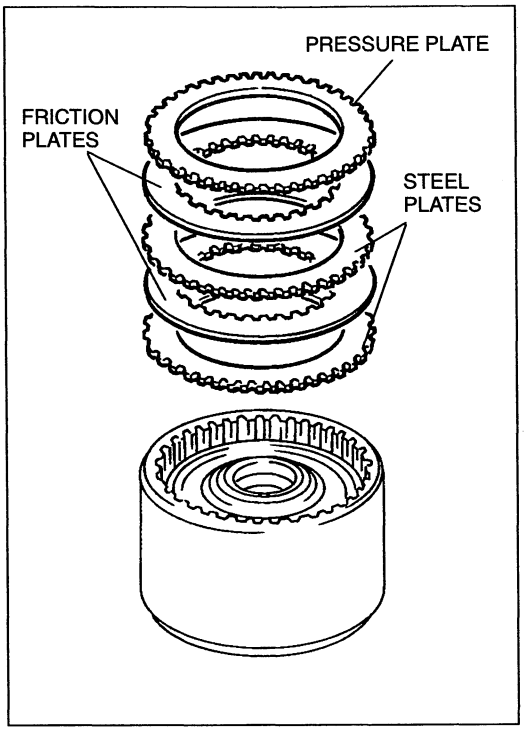
28. Install the return spring assembly.



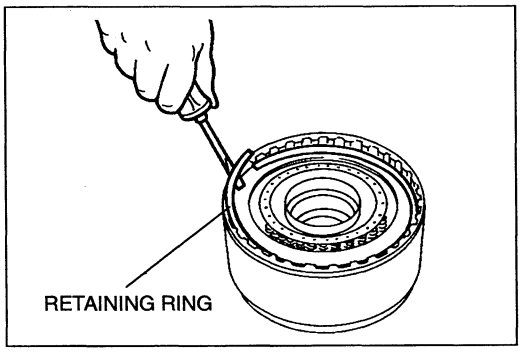
29. Use the **SSTs** or equivalent to compress the return spring assembly.



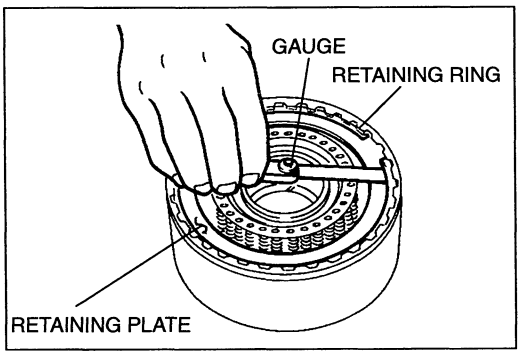
30. Use a pair of snap ring pliers to install the retaining ring.
31. Remove the **SSTs**.



32. Install the reverse clutch plates.



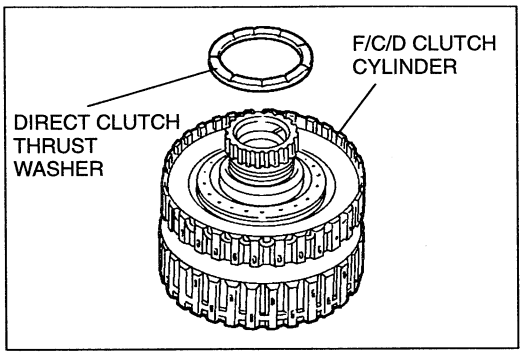
33. Install the reverse clutch plate retaining ring (selective fit).



34. Use a feeler gauge to measure the clearance between the clutch plates and the reverse clutch plate retaining ring. Make a second measurement on the opposite side. Average the two measurements to get the clearance.
35. The standard clearance is **0.33—0.89 mm {0.01—0.04 in}**. If the clearance is not within the specification, select and install the proper thickness retaining ring to obtain the standard clearance.

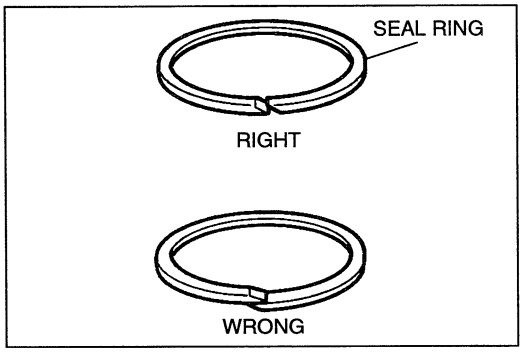
Retaining ring sizes are as follows:

Thickness mm {in}
1.39—1.49 {0.055—0.059}
1.53—1.63 {0.060—0.064}
1.68—1.78 {0.066—0.070}

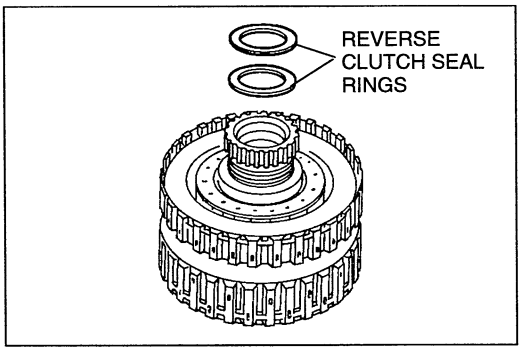


Caution
- **Tabs on direct clutch thrust washers must be seated in return spring assembly.**

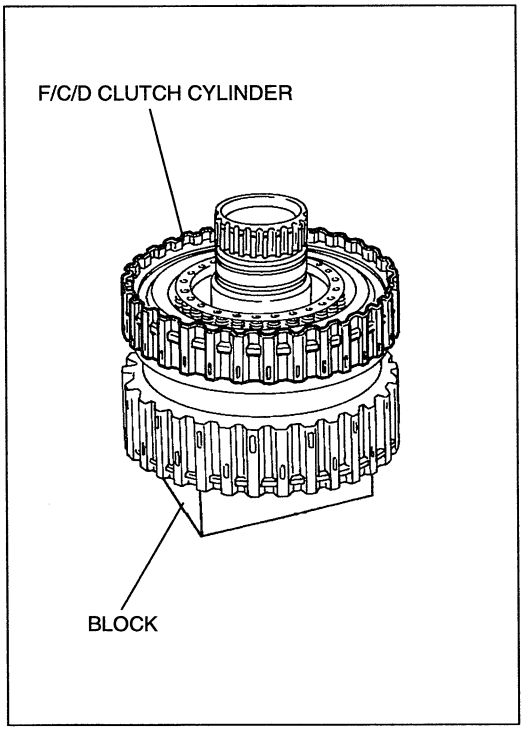
36. Install the direct clutch thrust washer on the forward/coasting/direct clutch cylinder with the tabs facing down.



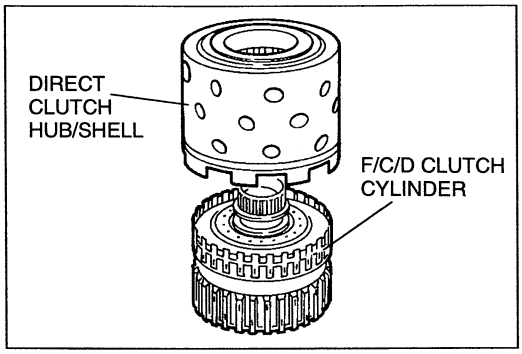
Note
- Ensure that the scarf cut seals are overlapped correctly.



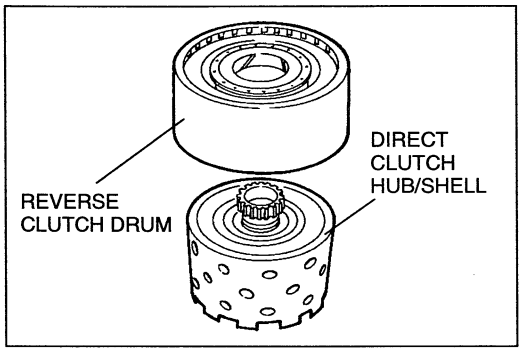
37. Install the two reverse clutch seal rings.



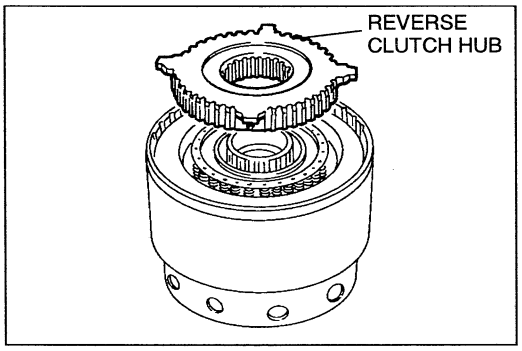
38. Support the forward/coasting/direct clutch cylinder on a block so that the direct clutch faces upward.



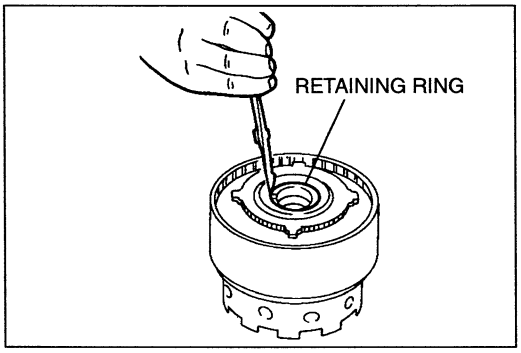
39. Install the direct clutch hub/shell on the forward/coasting/direct clutch cylinder.



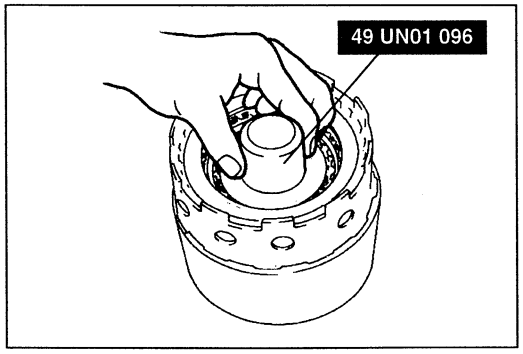
40. Install the reverse clutch drum.



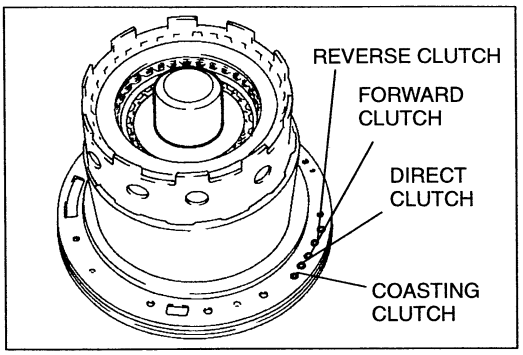
41. Install the reverse clutch hub.



42. Install the reverse clutch hub retaining ring.



43. Flip the assembly over. Use the **SST** to size the forward/coasting/direct clutch cylinder hub seal. Leave the seal sizer on until the assembly is installed in the case.



44. Lubricate the pump seal rings (#1–#7) with ATF.
45. Install the thrust bearing on a pump support.
46. Lower the forward/coasting/direct clutch cylinder and reverse clutch drum assembly on the oil pump as shown in the figure.

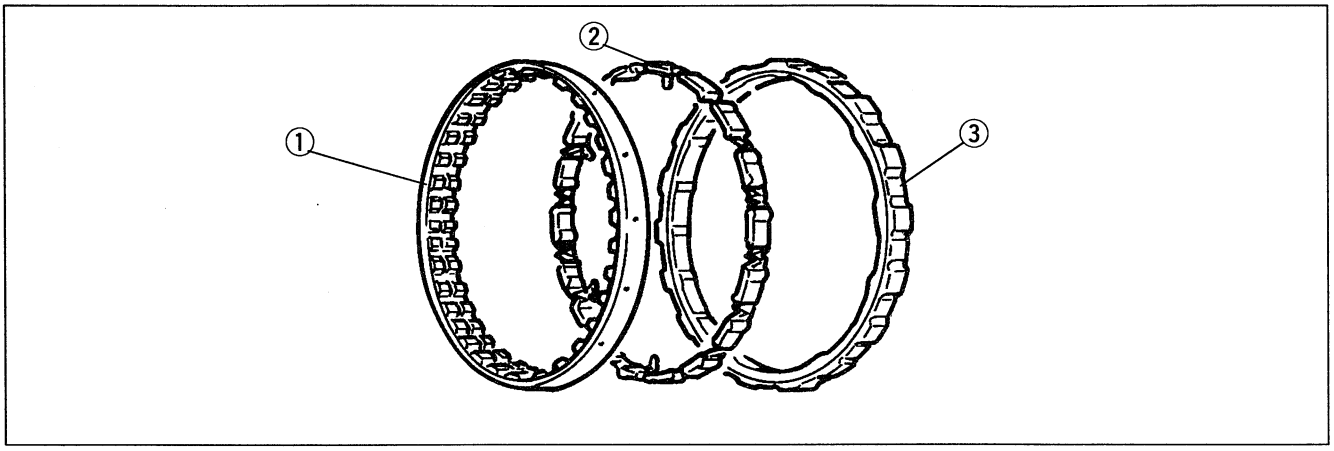
Warning
- **Wear eye protection when using compressed air.**

47. Apply compressed air 275 kPa {2.8 kgf/cm^2, 40 psi} to each clutch passage and listen for a dull thud sound when the clutch applies.
48. If a hissing sound occurs during the check, disassemble and locate the source of the leakage.
49. Lift the cylinder and drum assembly from the oil pump.

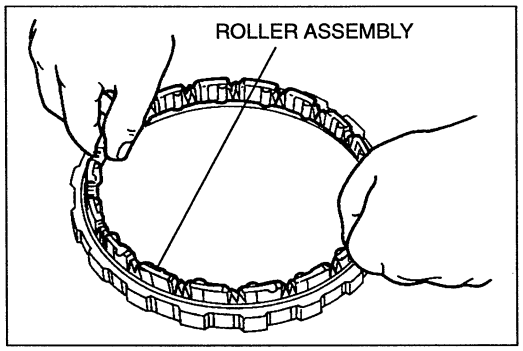
LOW ONE-WAY CLUTCH

Disassembly / Inspection / Assembly

1. Disassemble as shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



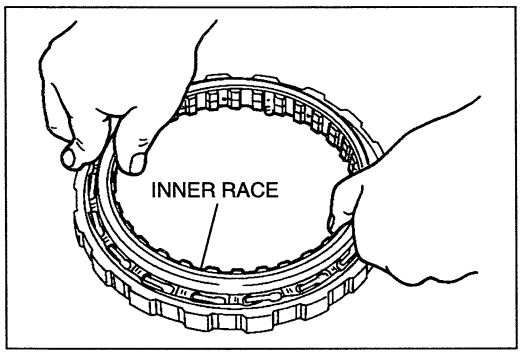
1. Low one-way clutch inner race
2. Roller assembly
3. Low one-way clutch outer race



Assembly Procedure

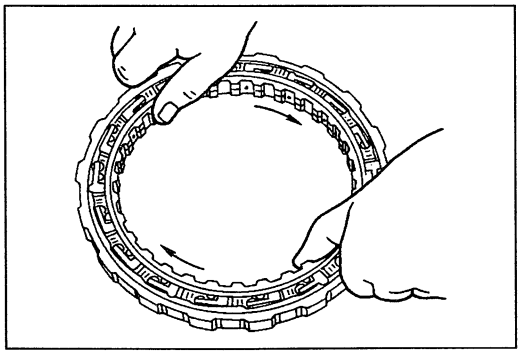
Note
- The outer tabs of the roller assembly must be facing up.

1. Install the roller assembly into the outer race.



Caution
- **Inner race groove must be face up.**

2. Install the inner race with the groove facing up, using clockwise rotating motion.

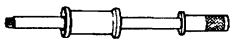
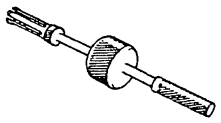
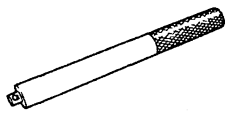


3. Check the operation of the low one-way clutch as follows:
   - When the inner race is rotated in a clockwise direction, it should move freely.
   - When the inner race is rotated in a counterclockwise direction, it should lock to the outer race.

REVERSE/FOURTH GEAR RING GEAR, REVERSE/FOURTH GEAR CARRIER ASSEMBLY, AND CHAIN DRIVE

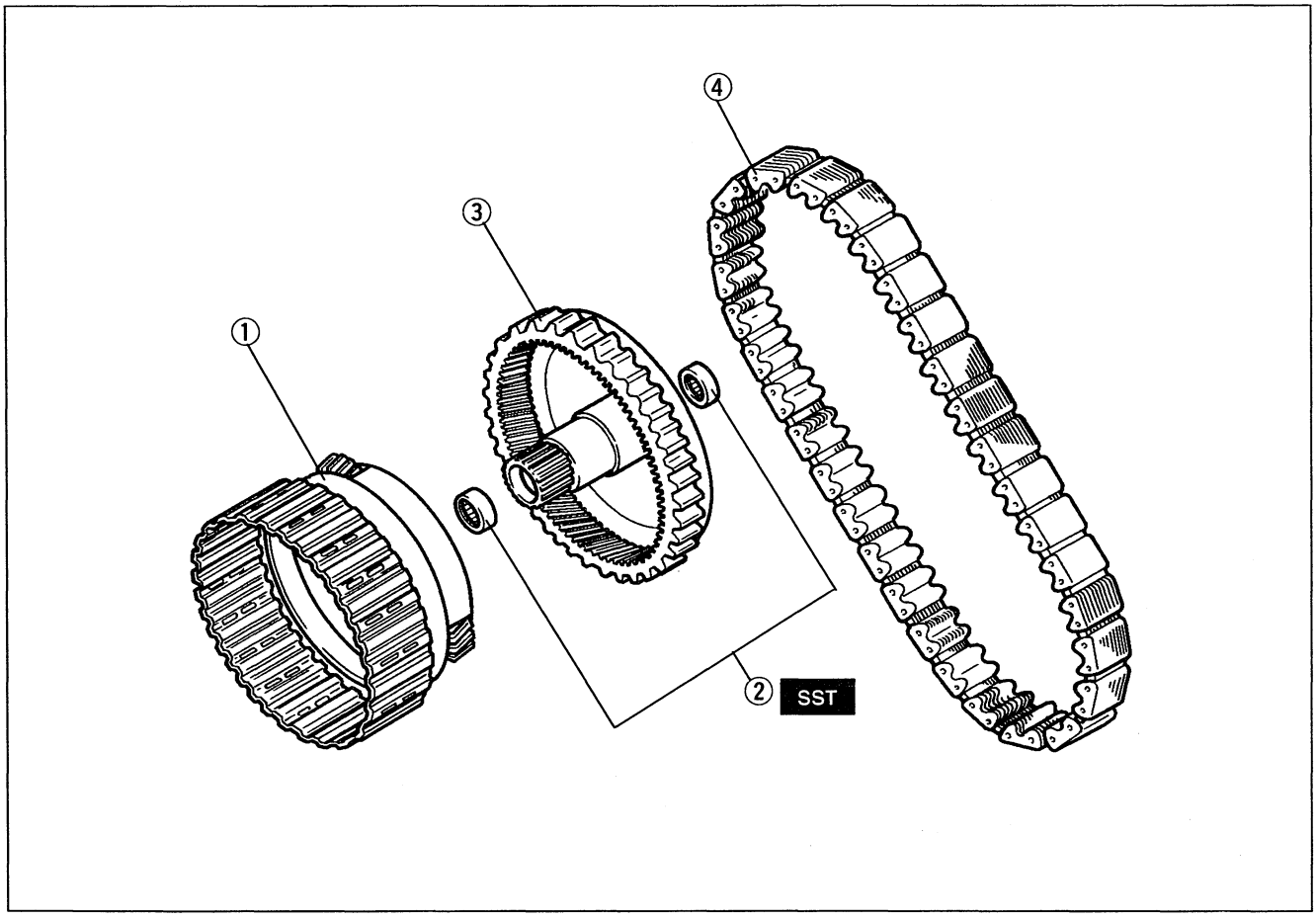
Preparation

SST

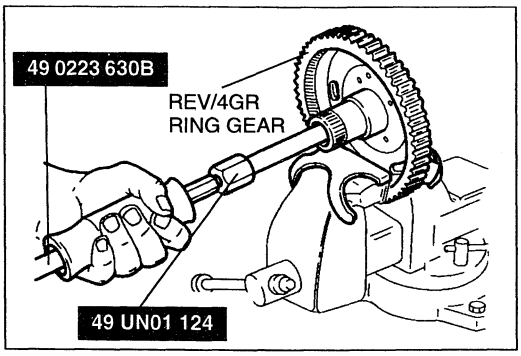
49 0223 630B Puller, axle shaft 	For removal of drive sprocket bearing/stator support bearing	49 UN01 124 Shaft bearing remover 	For removal of drive sprocket bearing
49 S231 660 Puller, needle bearing 	For removal of stator support bearing	49 F027 003 Handle (Part of 49 F028 2A0) 	For installation of drive sprocket bearing

Disassembly / Inspection / Assembly

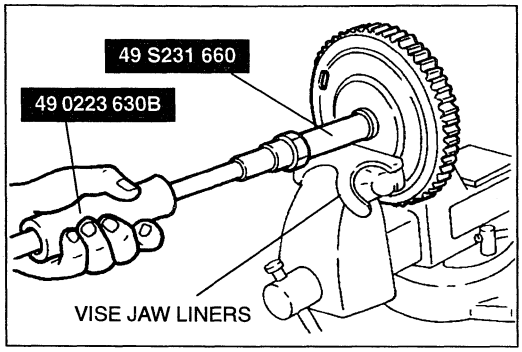
1. Disassemble in the order shown in the figure, referring to **Disassembly Note.**
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure.**



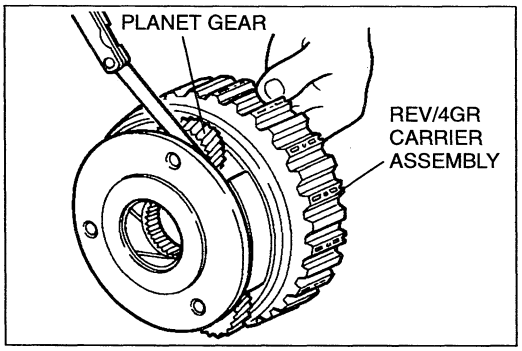
1. Reverse/fourth gear carrier assembly
   Inspection ..... page K2–200
2. Bearing
   Disassembly Note ..... page K2–200
3. Reverse/fourth gear ring gear
   Inspect for wear
4. Chain drive
   Inspect for excessive stretching, wear, or tight link(s)



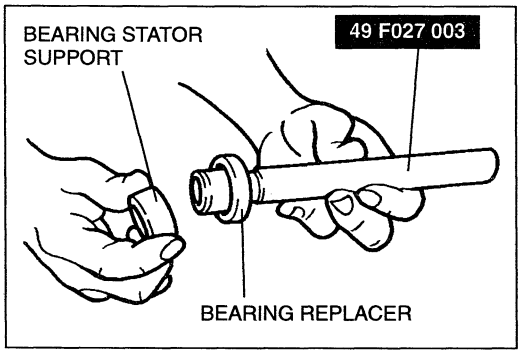
Disassembly Note
Bearing
1. If necessary, use the **SSTs** or equivalent to remove the drive sprocket bearing.



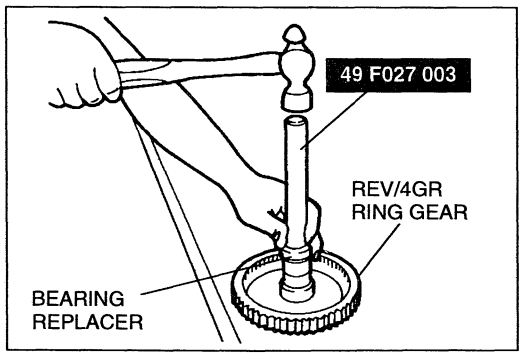
2. If necessary, use the **SSTs** or equivalent to remove the stator support bearing.



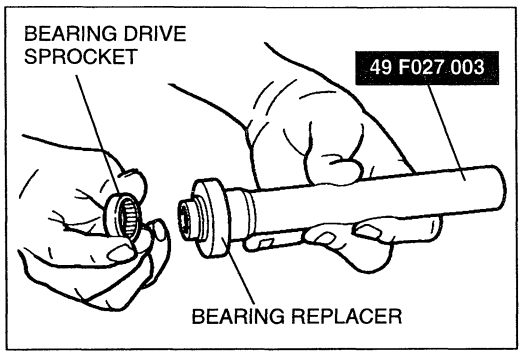
Inspection
Reverse/fourth gear carrier assembly
Inspect the Reverse/fourth gear carrier assembly pinion gear end play. End play should be between **0.15—0.72 mm {0.006—0.028 in}**.



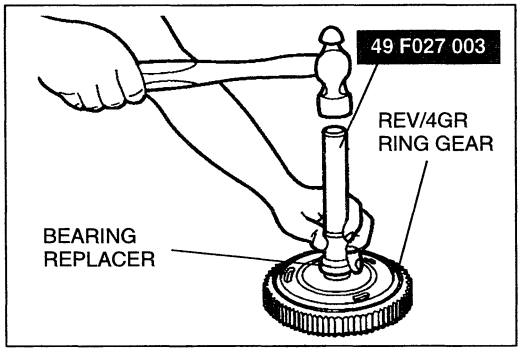
Assembly Procedure
1. If removed, install the drive sprocket bearing on the **SST**.



2. If removed, use the **SSTs** or equivalent to install the drive sprocket bearing.



3. If removed, install the stator support bearing on the **SST**.



4. If removed, use the **SSTs** or equivalent to install the stator support bearing.

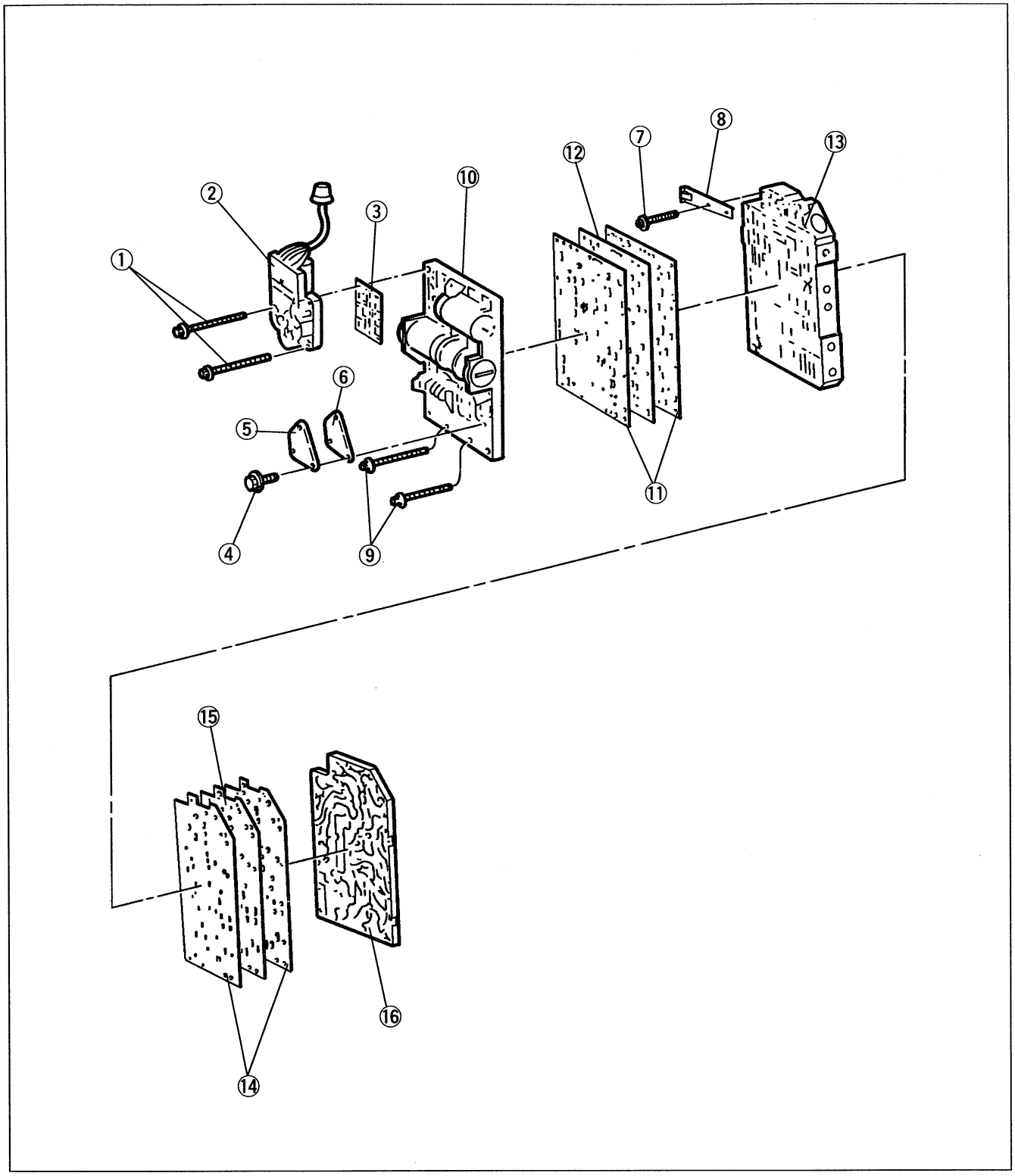
CONTROL VALVE BODY (DISASSEMBLY / INSPECTION)

Disassembly / Inspection

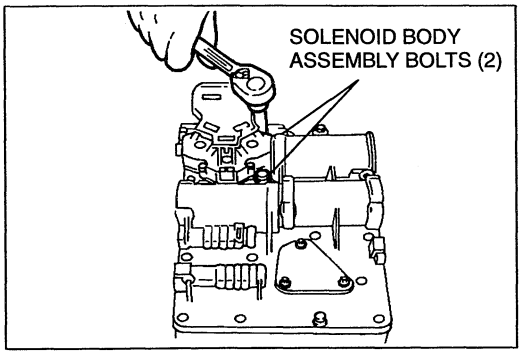
Caution

- **Be especially careful when handling the control valve because it consists of the most precise and delicate parts of the transaxle.**
- **Neatly organize the removed parts so that similar parts do not get mixed up.**
- **Clean the removed parts with cleaning solvent, and dry them with compressed air. Clean out all holes and passages with compressed air.**
- **Wear eye protection when using compressed air to clean components.**

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

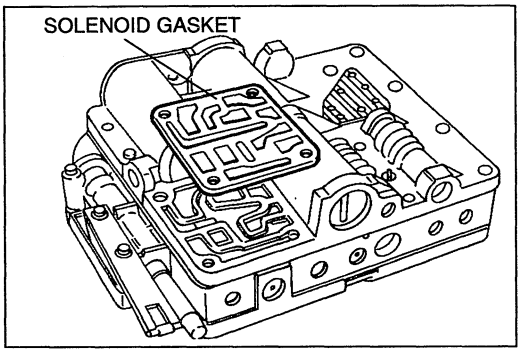


1. Bolt
2. Solenoid body assembly
3. Solenoid gasket
4. Bolt
5. Pressure tap plate
6. Pressure tap gasket
7. Bolt
8. Detent lever
9. Bolt
10. Accumulator body assembly
11. Gaskets
12. Separator plate
13. Valve body assembly
14. Gaskets
15. Separator plate
16. Transfer plate

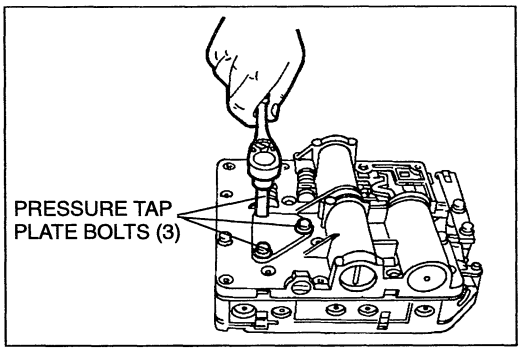


Disassembly Procedure

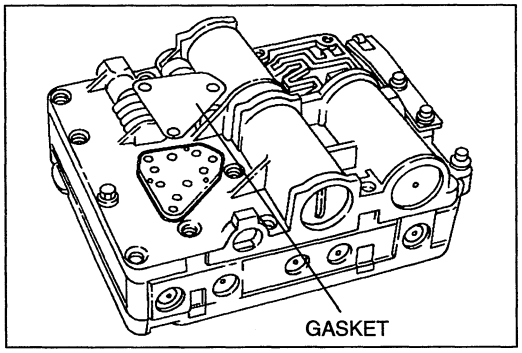
1. Remove manual control valve from the valve body. Remove the two solenoid body assembly bolts. Remove the solenoid body assembly.



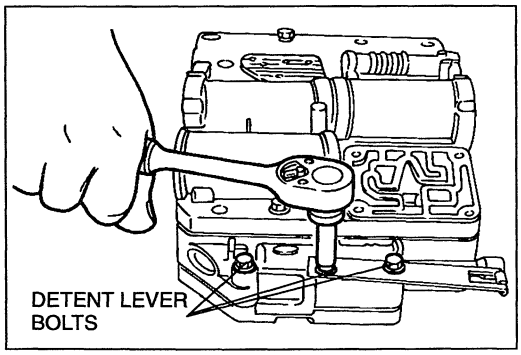
2. Remove the solenoid gasket from the accumulator body. Discard the solenoid gasket.



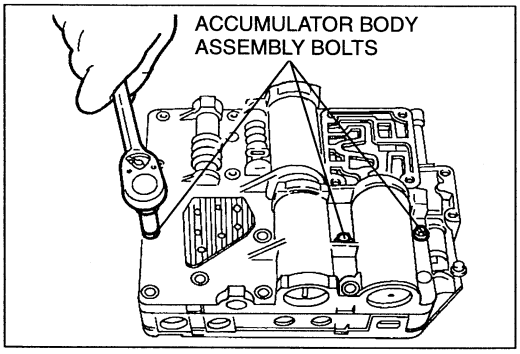
3. Remove the three pressure tap plate bolts. Remove the pressure tap plate.



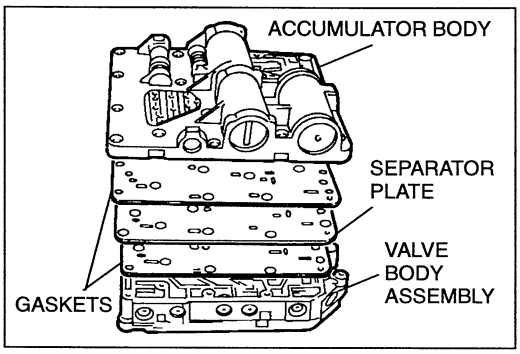
4. Remove the gasket from the accumulator body assembly. Discard the gasket.



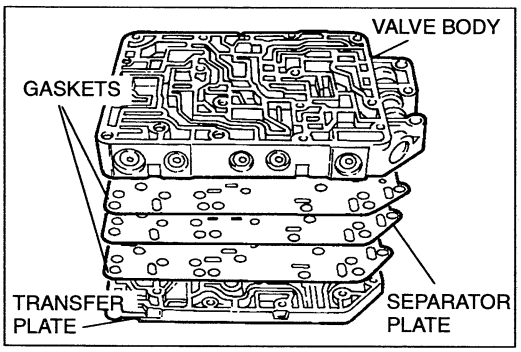
5. Remove the three valve body-to-transfer plate bolts. Remove the detent lever.



6. Remove the three accumulator body assembly bolts.



7. Remove the accumulator body, separator plate, and gaskets from the valve body assembly. Discard the gaskets.

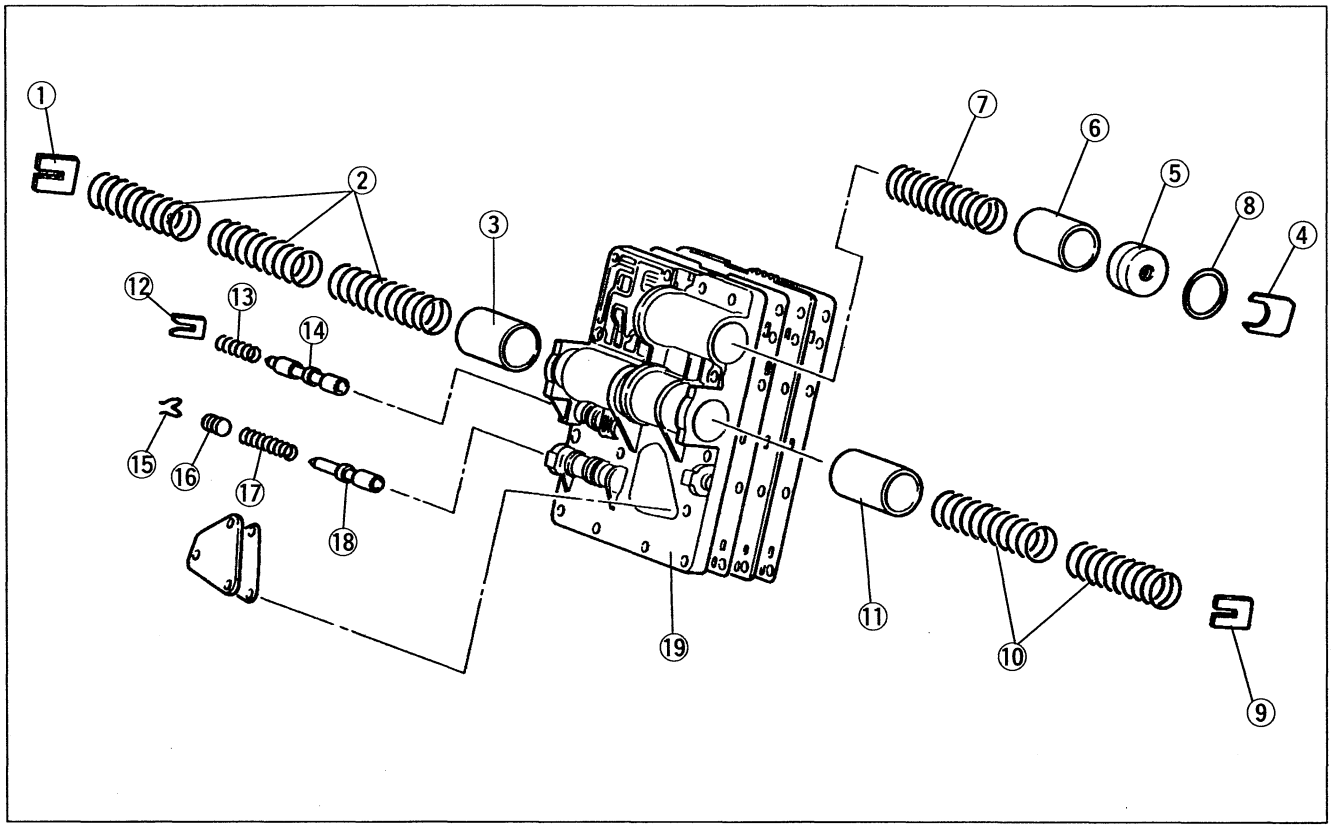


8. Remove the valve body, separator plate and gaskets from the transfer plate. Discard the gaskets.

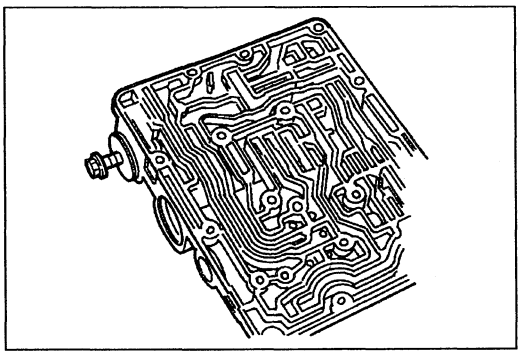
ACCUMULATOR BODY
Disassembly / Inspection / Assembly

Caution
- **Each valve should slide out/in under its own weight.**
- **When a valve will not slide out under 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 plastic hammer. Never scratch or otherwise damage a valve surface or bore.**
- **Do not drop or lose the valves or internal parts.**
- **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 part that has been dropped.**
- **Wrap a screwdriver or rod with tape before using it to insert a valve.**

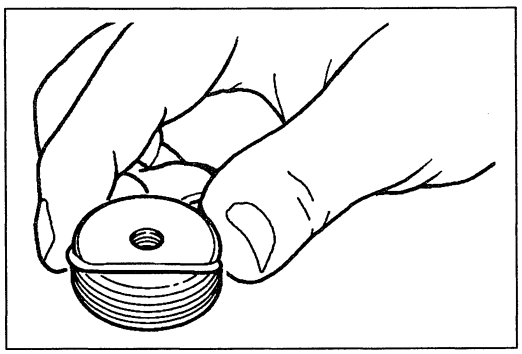
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly.



1. Retaining plate
2. Low/reverse accumulator springs
   Inspection ..... page K2–206
3. Low/reverse accumulator piston
4. Retaining plate
5. 2/4 accumulator plug
   Disassembly note ..... page K2–206
6. 2/4 accumulator piston
7. 2/4 accumulator spring
   Inspection ..... page K2–206
8. 2/4 accumulator plug seal
   Assembly note ..... page K2–206
9. Retaining plate
10. Forward accumulator spring
    Inspection ..... page K2–206
11. Forward accumulator piston
12. Spring retaining plate
13. Pull-in control valve spring
    Inspection ..... page K2–206
14. Pull-in control valve
15. Valve plug retainer
16. Valve retainer plug
17. 3–2 timing valve spring
    Inspection ..... page K2–206
18. 3–2 timing valve
19. Accumulator body assembly

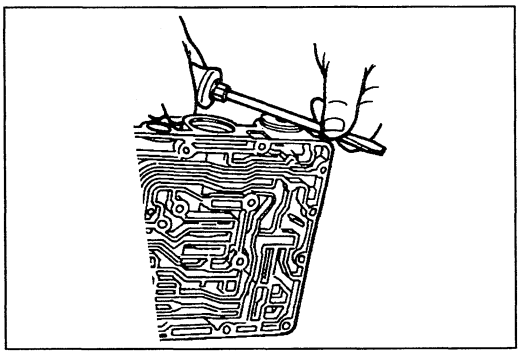


Disassembly note
2/4 accumulator plug
1. Remove the 2/4 accumulator plug by using a bolt.



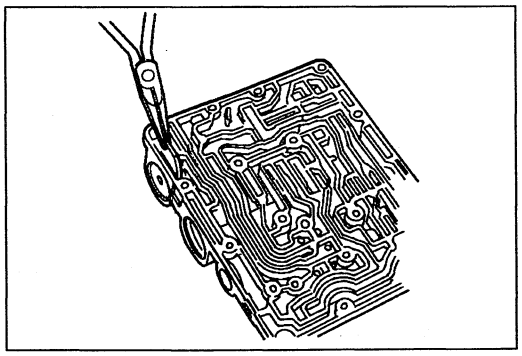
2. Remove the 2/4 accumulator plug seal. Discard the seal.

Inspection
Springs
- Springs must not be twisted.
- Springs must not be damaged.



Assembly note
2/4 accumulator plug seal
1. Install a new seal on the 2/4 accumulator plug.
2. Lubricate the plug and install.

Caution
- **Do not push the plug into the bore beyond flush or damage to the seal will occur.**

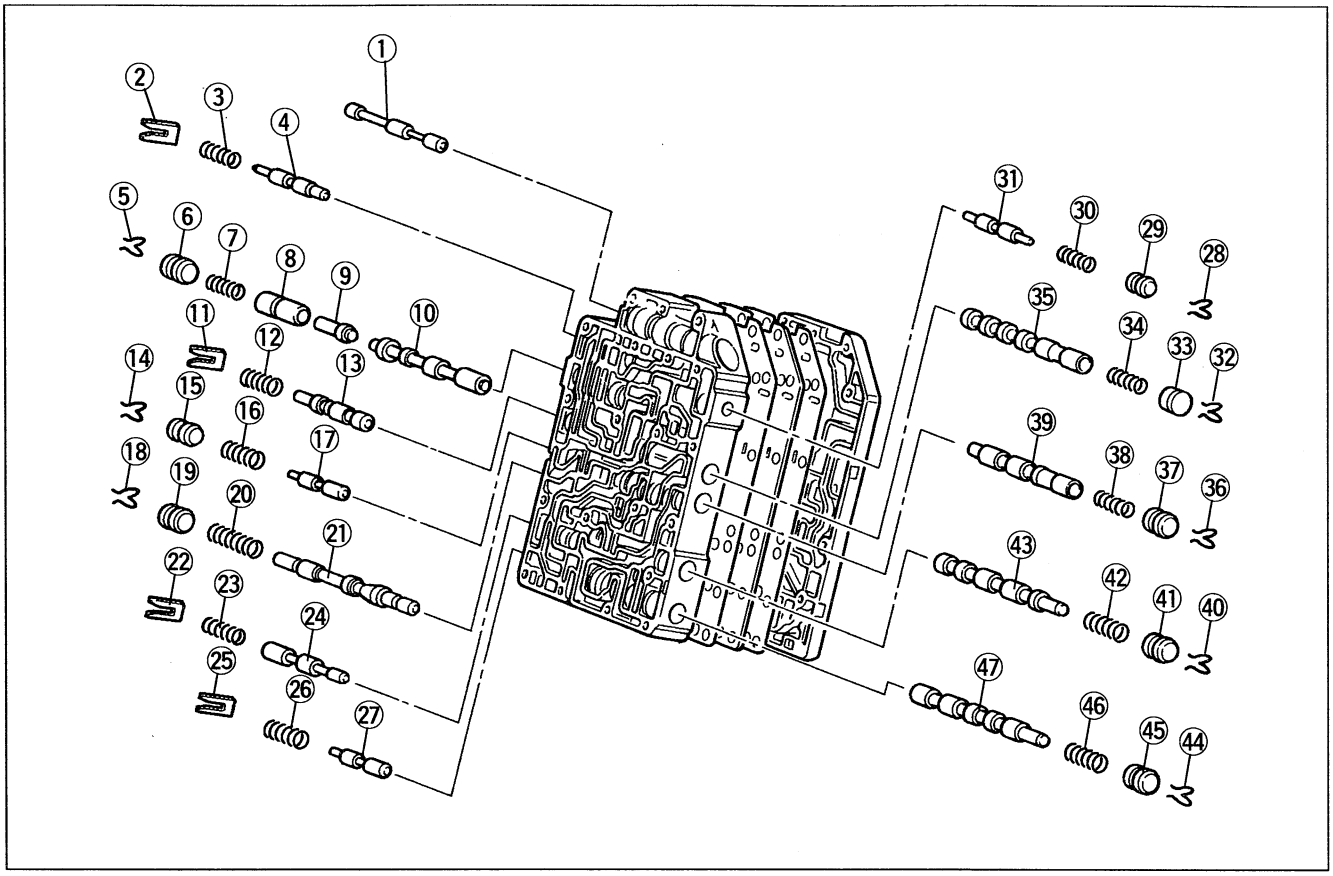


3. Install the retaining plate by using needle-nosed pliers.

VALVE BODY ASSEMBLY
Disassembly / Inspection / Assembly

Caution
- **Each valve should slide out/in under its own weight.**
- **When a valve will not slide out under 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 plastic hammer. Never scratch or otherwise damage a valve or bore.**
- **Do not drop or lose the valves or internal parts.**
- **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 part that has been dropped.**
- **Wrap a screwdriver or rod with tape before using it to insert a valve.**

1. Disassemble in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly.

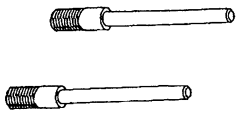


1. Manual control valve
2. Spring retaining plate
3. Solenoid regulator valve spring
   Inspection . . . . . page K2–209
4. Solenoid regulator valve
5. Valve plug retainer
6. Valve retainer plug
7. Bypass clutch control valve spring
   Inspection . . . . . page K2–209
8. Bypass clutch control sleeve
9. Clutch control valve plunger
10. Bypass clutch control valve
11. Spring retaining plate
12. Converter regulator valve spring
    Inspection . . . . . page K2–209
13. Converter regulator valve
14. Valve plug retainer
15. Valve retainer plug
16. Line modulator spring
    Inspection . . . . . page K2–209
17. Line modulator valve
18. Valve plug retainer
19. Valve retainer plug
20. Main regulator valve spring
    Inspection . . . . . page K2–209
21. Main regulator valve
22. Spring retaining plate
23. Servo release shuttle valve spring
    Inspection . . . . . page K2–209
24. Servo release shuttle valve
25. Spring retaining plate
26. Coasting clutch shift valve spring
    Inspection . . . . . page K2–209
27. Coasting clutch shift valve
28. Valve plug retainer
29. Valve retainer plug
30. Low/reverse modulator spring
    Inspection . . . . . page K2–209
31. Low/reverse modulator valve
32. Valve plug retainer
33. Valve retainer plug
34. 1–2 shift valve spring
    Inspection . . . . . page K2–209
35. 1–2 shift valve
36. Valve plug retainer
37. Valve retainer plug
38. 3–2 control valve spring
    Inspection . . . . . page K2–209
39. 3–2 control valve
40. Valve plug retainer
41. Valve retainer plug
42. 2–3 shift valve spring
    Inspection . . . . . page K2–209
43. 2–3 shift valve
44. Valve plug retainer
45. Valve retainer plug
46. 3–4 shift valve spring
    Inspection . . . . . page K2–209
47. 3–4 shift valve

Inspection
Springs
- Springs must not be twisted.
- Springs must not be damaged.

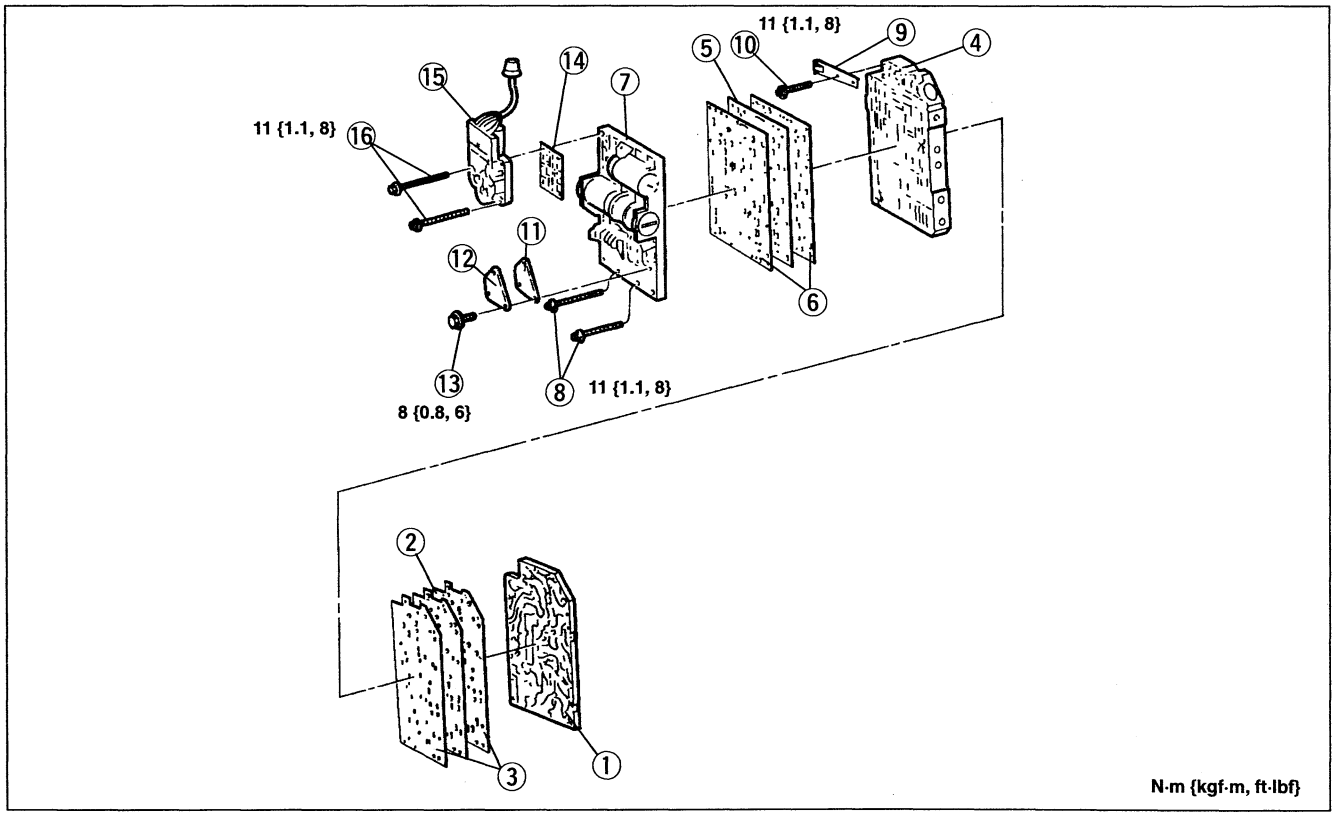
CONTROL VALVE BODY (ASSEMBLY)

Preparation
SST

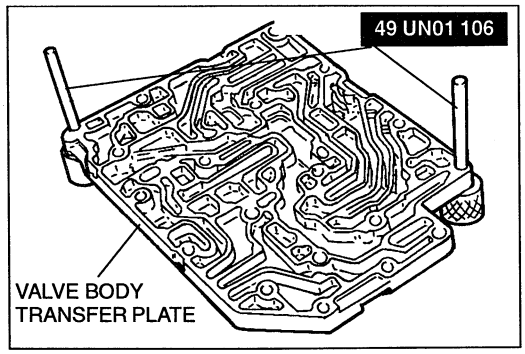
49 UN01 106 Valve body guide pin		For assemble of control valve body

Caution
- **Before assembly, make sure all parts are perfectly clean.**
- **Apply ATF to all parts.**
- **Do not reuse the gaskets or O-rings.**

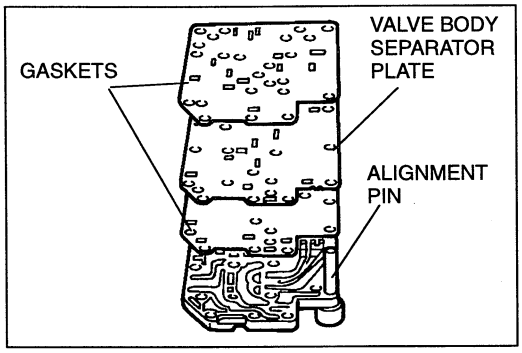
Assemble as shown in the figure, referring to **Assembly Procedure**.



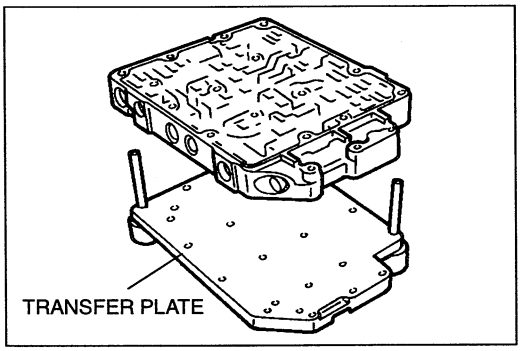
1. Transfer plate
2. Separator plate
3. Gaskets
4. Valve body assembly
5. Separator plate
6. Gaskets
7. Accumulator body assembly
8. Bolt
9. Detent lever
10. Bolt
11. Pressure tap gasket
12. Pressure tap plate
13. Bolt
14. Solenoid gasket
15. Solenoid body assembly
16. Bolt



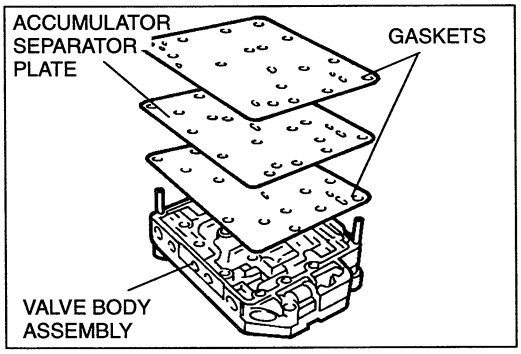
1. Install the **SST** or equivalent in the valve body transfer plate.



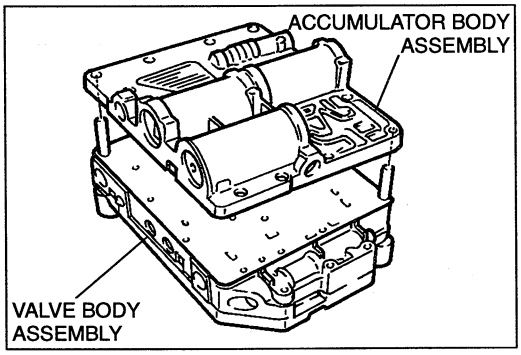
2. Install the valve body separator plate and new gaskets on the transfer plate.



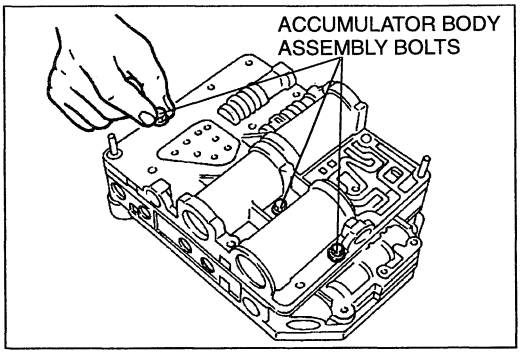
3. Install the valve body assembly on the transfer plate.



4. Install the accumulator body separator plate and new gaskets on the valve body assembly.

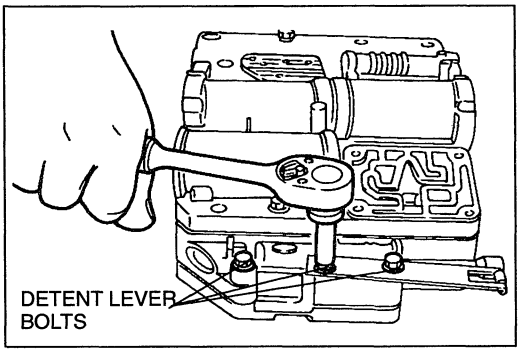


5. Install the accumulator body assembly on the valve body assembly.



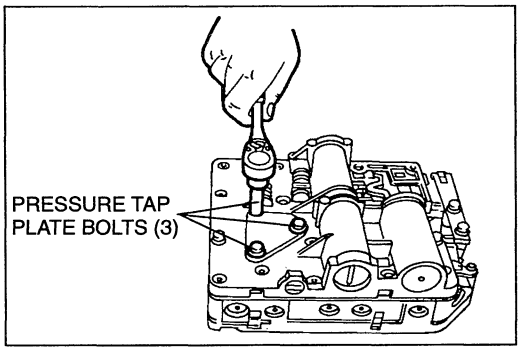
6. Install and tighten the three accumulator body assembly-to-transfer plate bolts.

Tightening torque: 10 N·m {1.1 kgf·m, 7 ft·lbf}



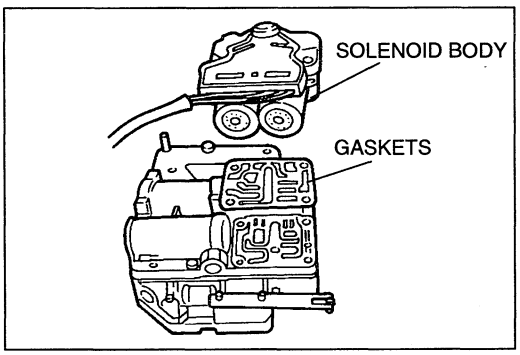
7. Install the three valve body-to-transfer plate bolts and detent lever.

Tightening torque: 10 N·m {1.1 kgf·m, 7 ft·lbf}



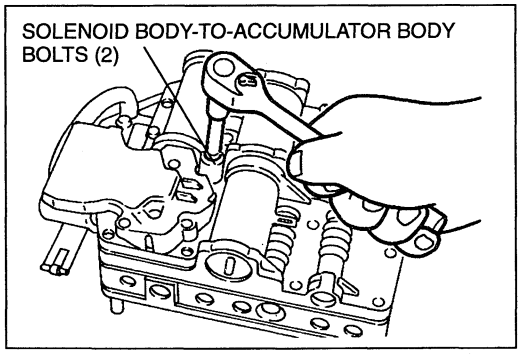
8. Install the pressure tap plate, gasket, and three bolts on the accumulator body assembly.

Tightening torque: 8 N·m {0.8 kgf·m, 6 ft·lbf}



Note
- Match the solenoid body gasket to the passages.

9. Install the solenoid body and a new gasket on the accumulator body.



10. Install the two solenoid body-to-accumulator body bolts.

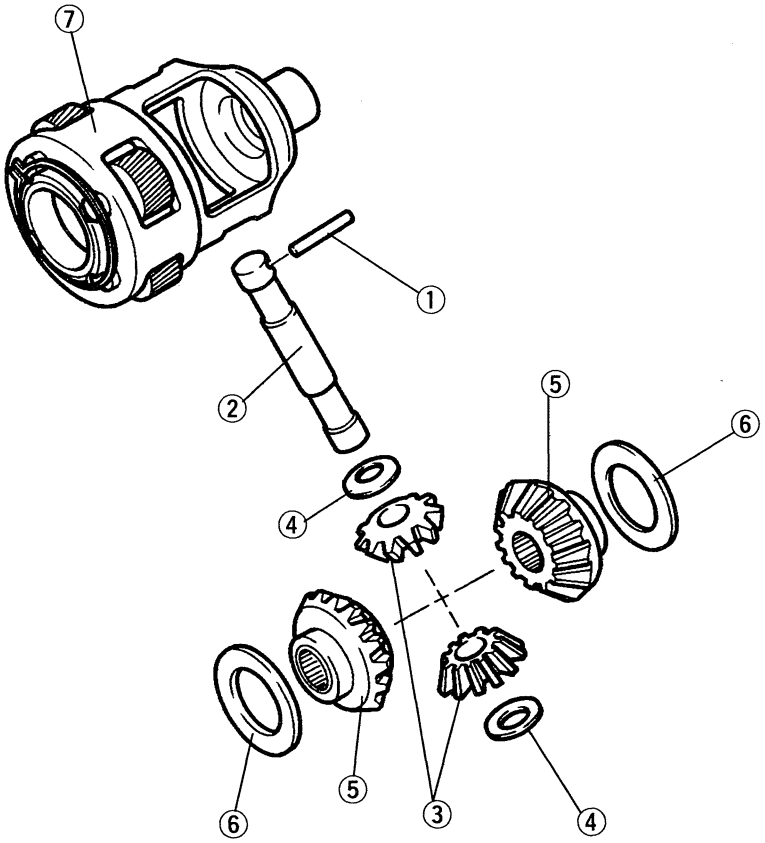
Tightening torque: 10 N·m {1.1 kgf·m, 7 ft·lbf}

11. Remove the valve body alignment pins.
12. Install the manual control valve.

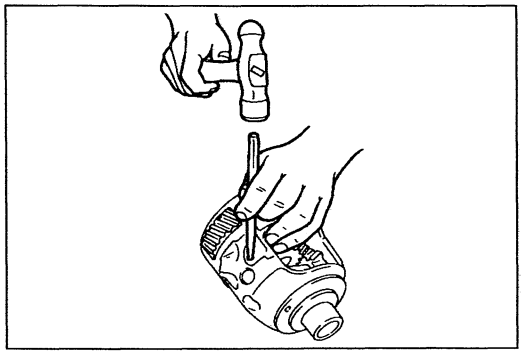
DIFFERENTIAL

Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



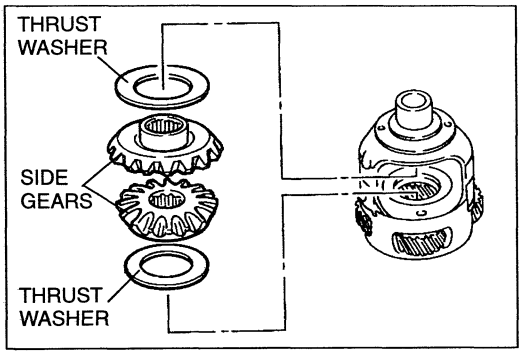
1. Roll pin
   Disassembly Note ..... below
2. Pinion shaft
3. Pinion gears
4. Thrust washer
5. Side gears
6. Thrust washer
7. Differential case



Disassembly Note

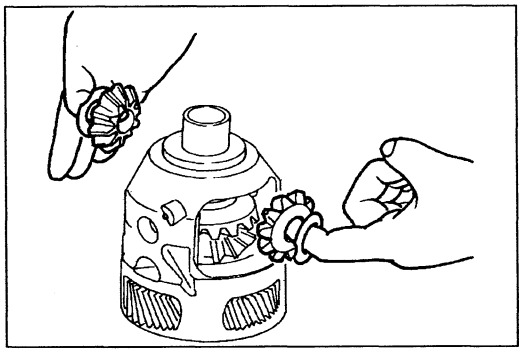
Roll pin

Use a punch to remove the pinion shaft roll pin.

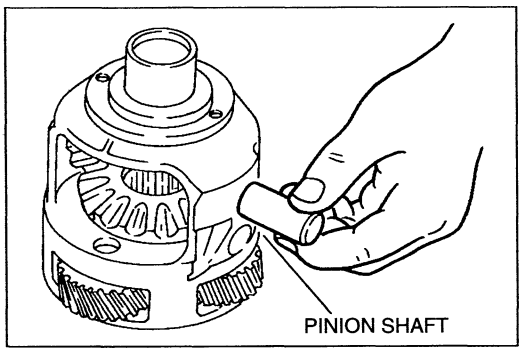


Assembly Procedure

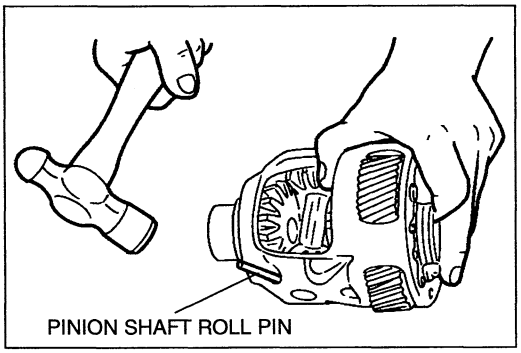
1. Install the side gears and thrust washers.



2. Install the pinion gears and thrust washers.

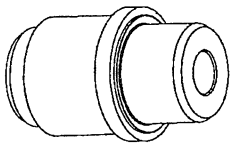
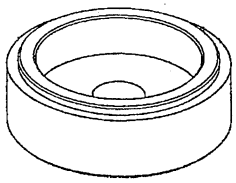
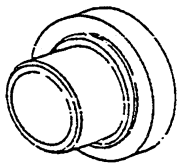
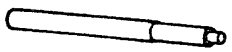
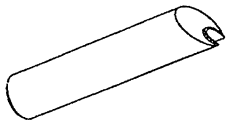
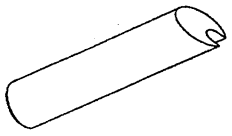
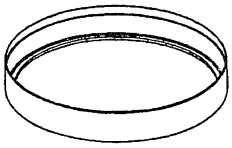
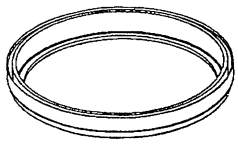
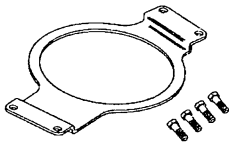
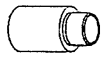
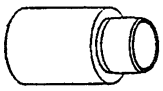
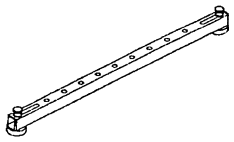
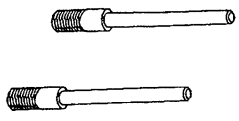
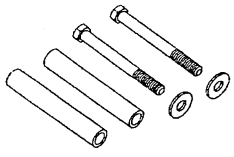


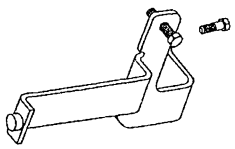
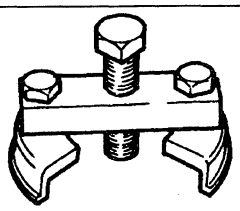
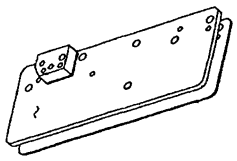
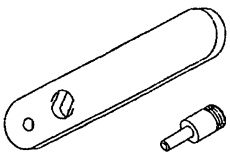
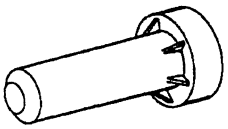
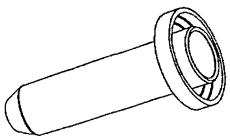
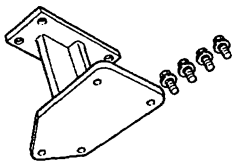
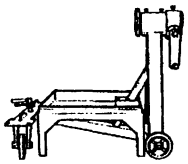
3. Install the pinion shaft.



4. Install the pinion shaft roll pin.

TRANSAXLE UNIT (ASSEMBLY)
Preparation
SST

49 UN01 098 Needle bearing remover/ replacer/ receiver 	For installation of #18 bearing	49 UN01 099 Servo plug replacer 	For installation of #18 bearing
49 UN01 024 Throttle shaft seal replacer 	For installation of manual control shaft seal	49 UN01 119 Lube tube seal replacer 	For installation of lube tube seal
49 UN01 116 Lube tube replacer 	For installation of lube tube	49 UN01 115 Lube tube replacer 	For installation of lube tube
49 UN01 093 Low/reverse clutch piston seal protector 	For installation of low/reverse clutch piston	49 UN01 097 Low/reverse clutch piston seal protector 	For installation of low/reverse clutch piston
49 UN01 109 Preload tool 	For adjustment of preload	49 UN01 110 Preload tool adaptor 	For adjustment of preload
49 UN01 111 Preload tool aligner 	For adjustment of preload	49 UN01 108 Gauge bar 	For adjustment of preload
49 UN01 112 Preload tool aligner adaptor 	For adjustment of preload	49 UN01 106 Valve body guide pins 	For installation of oil filter recirculation seal
49 UN01 126 Filter replacer 	For installation of oil filter recirculation seal	49 UN01 114 Gauge bar spacer set 	For adjustment of preload

49 UN01 104 Servo cover remover/ replacer 	For installation of 2/4 servo piston	49 UN01 105 Servo piston rod selector 	For installation of 2/4 servo piston
49 UN01 113 Transmission test plate with valve body 	For checking clutch hydraulic circuit	49 UN01 085 Shifter shaft alignment tool 	For adjustment of shifter shaft
49 UN01 086 MLPS alignment tool 	For adjustment of TR sensor	49 UN01 129 Seal replacer 	For installation of differential seal
49 UN01 088 Converter seal replacer 	For installation of torque converter impeller hub seal	49 G019 038 Transaxle hanger 	For assembly of transaxle
49 0107 680A Engine stand 	For assembly of transaxle	—	—

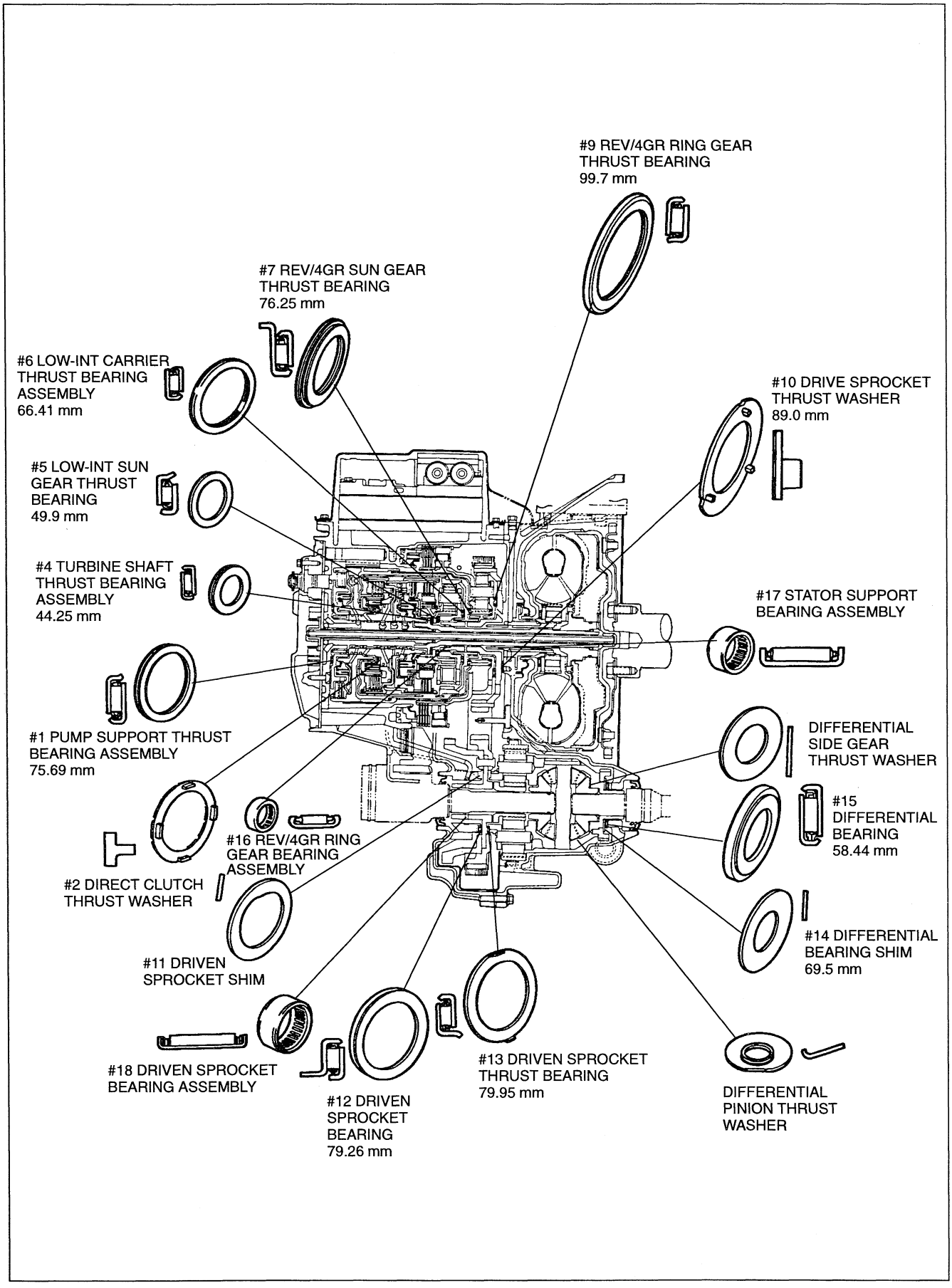
Precaution

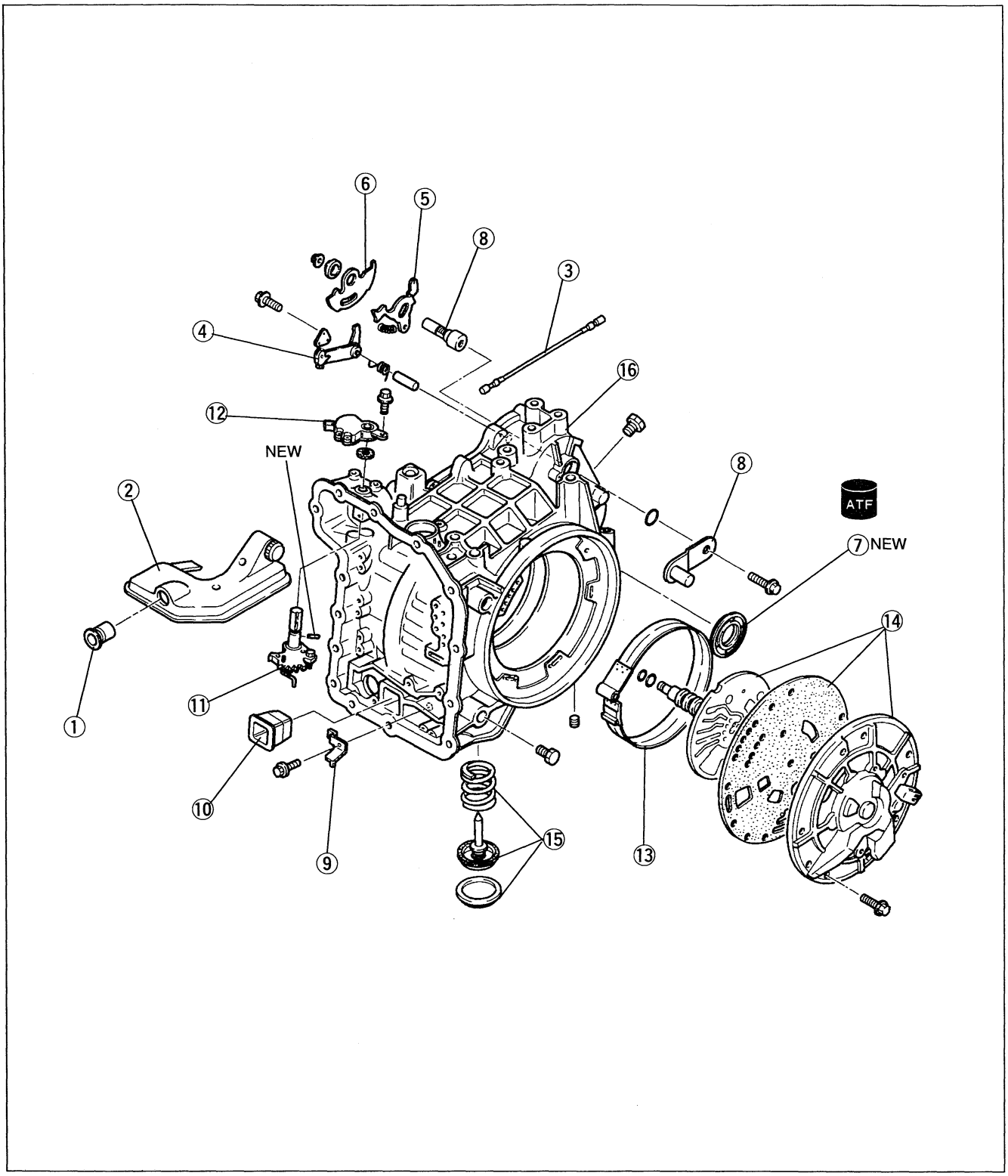
1. If the drive plates or 2/4 band are replaced with new ones, soak the new part in ATF for at least 15 minutes before installation.
2. Before assembly, apply ATF to all seal rings, rotating parts, O-rings, and sliding parts.
3. All O-rings, seals, and gaskets must be replaced with the new ones included 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.

Bearing assembly location
Outer diameter of bearing assembly

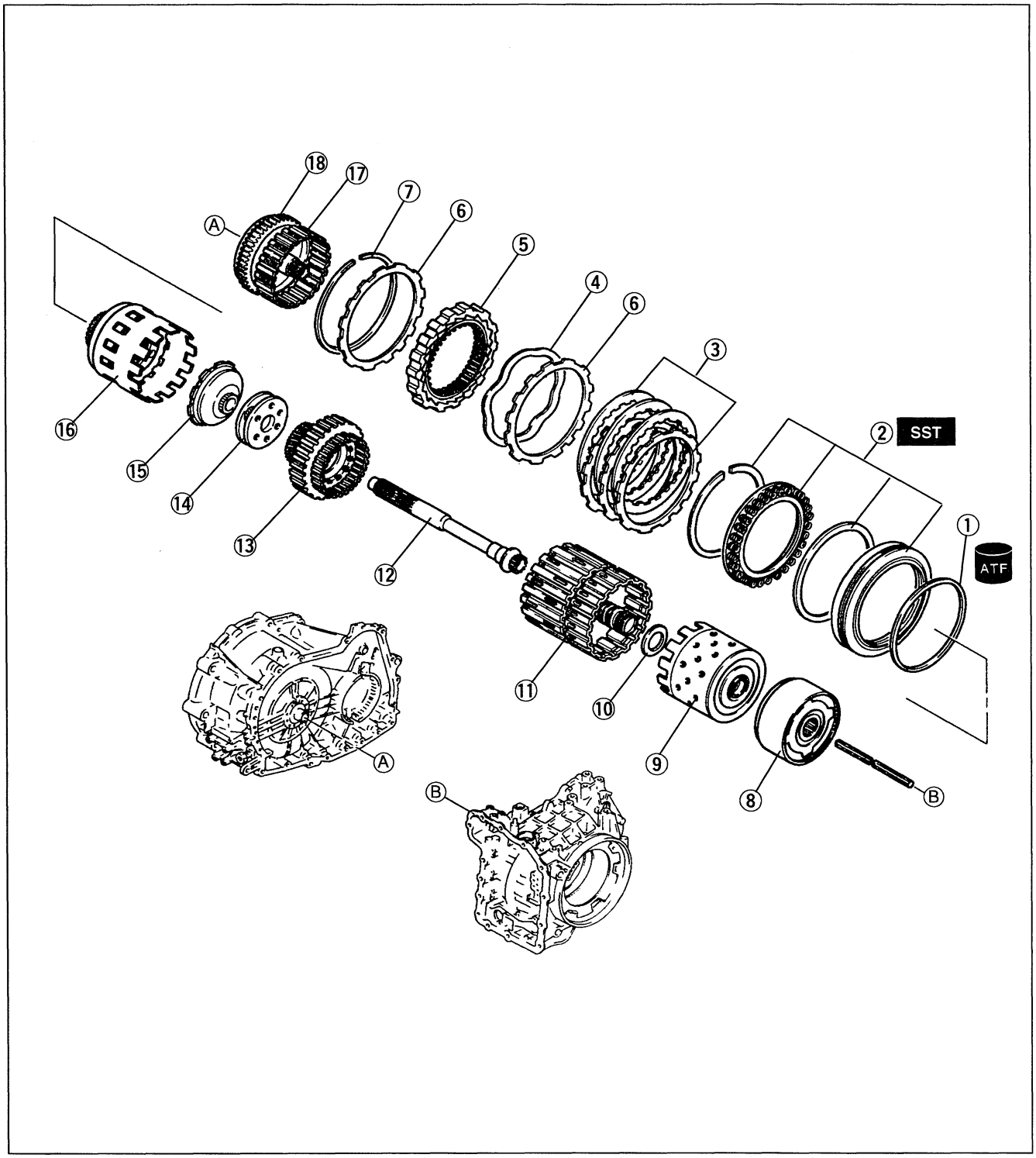
No.	Name	Outer diameter mm {in}
#1	Pump support thrust bearing	75.09 {2.956}
#4	Turbine shaft thrust bearing	44.25 {1.742}
#5	Low-int sun gear thrust bearing	49.90 {1.965}
#6	Low-int carrier thrust bearing	66.41 {2.615}
#7	Rev/4gr sun gear thrust bearing	76.75 {3.022}
#8	Rev/4gr carrier thrust bearing	72.87 {2.869}
#9	Rev/4gr ring gear thrust bearing	99.70 {3.925}
#12	Driven sprocket thrust bearing	79.26 {3.120}
#13	Driven sprocket thrust bearing	79.95 {3.148}
#15	Differential bearing	58.44 {2.301}

Bearing and race locations

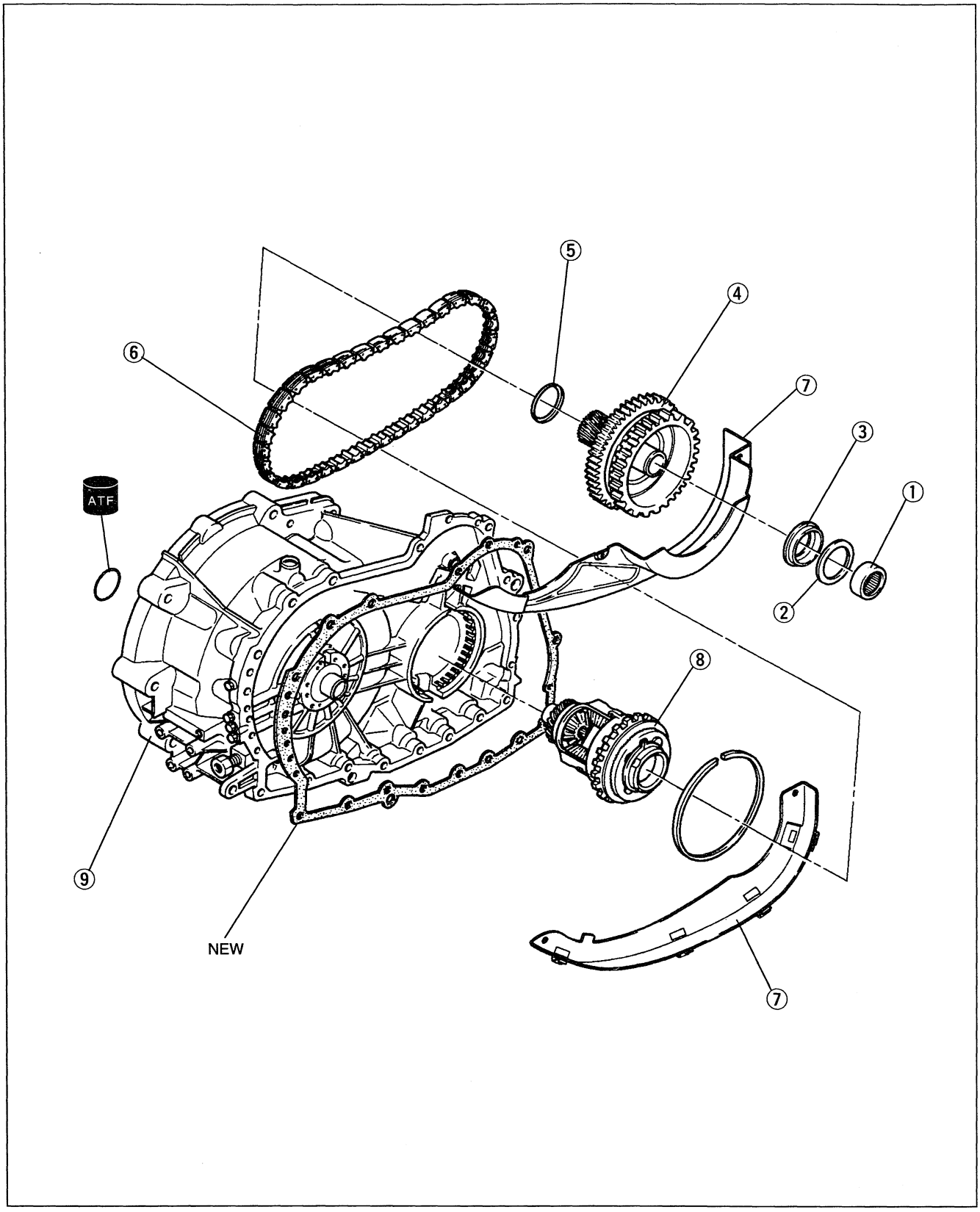




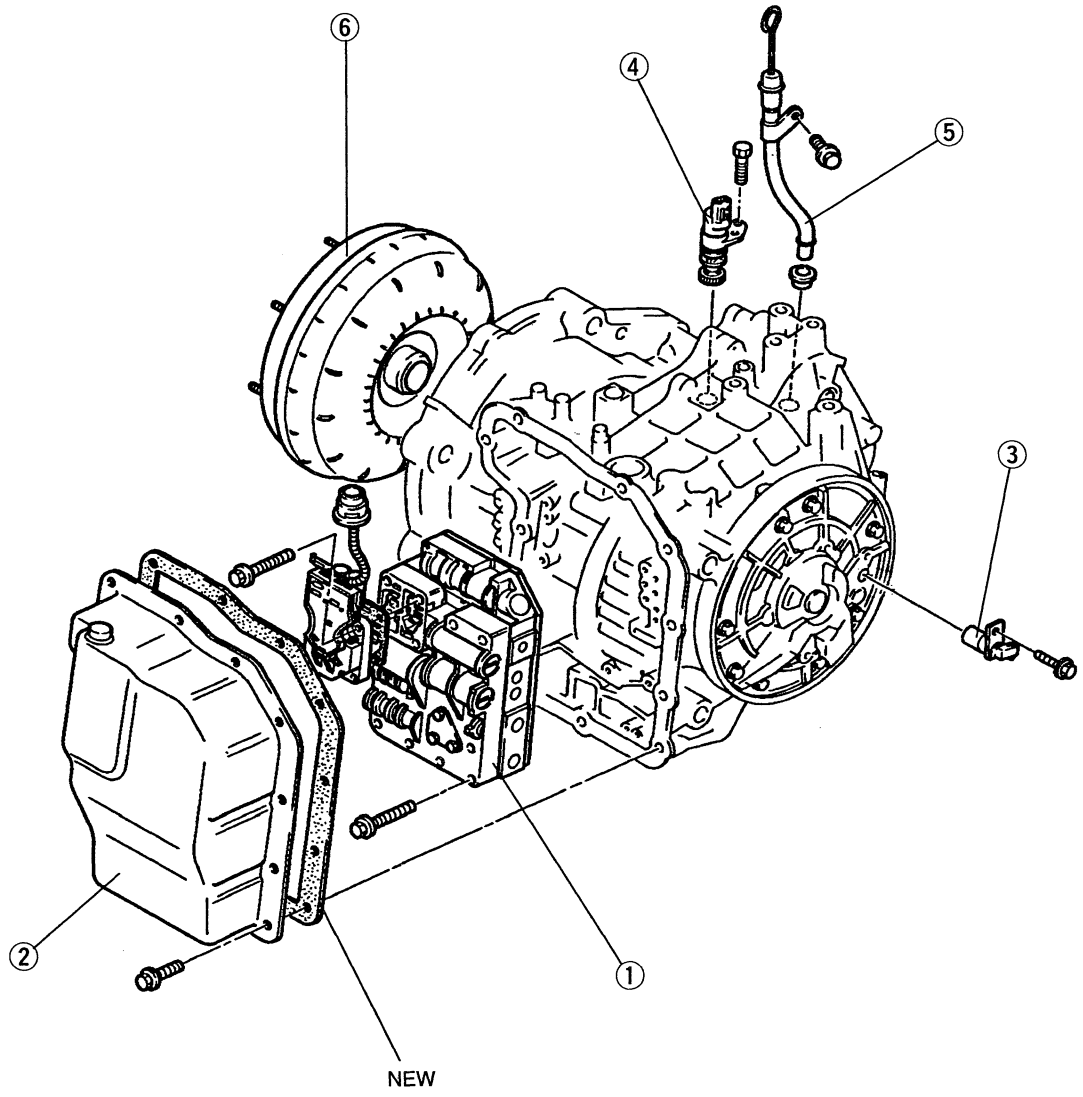
1. Recirculating regulator exhaust seal
2. Oil filter and seal
3. Manual valve detent lever actuating rod
4. Parking pawl and shaft
5. Parking cam actuator lever
6. Parking pawl actuating cam
7. Differential seal
8. Manual control lever and shaft
9. Thermal valve bracket
10. Thermostatic oil level valve
11. Manual valve detent lever assembly
12. Transaxle range switch
13. 2/4 band
14. Oil pump and pump support
15. 2/4 band servo piston, rod, and spring
16. Transaxle case



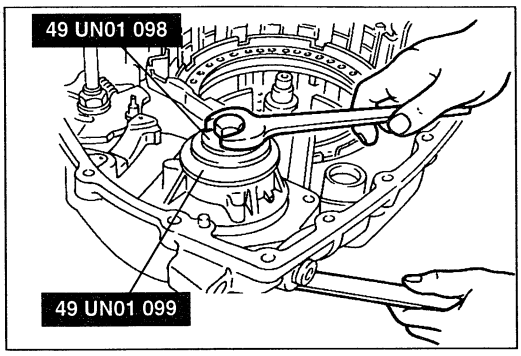
1. Low/reverse piston seal (Inner)
2. Low/reverse clutch piston assembly
3. Low/reverse clutch
4. Wave spring
5. Low one-way clutch
6. Low one-way clutch plate
7. Retaining ring
8. Reverse clutch drum
9. Direct clutch shell assembly
10. Thrust washer
11. Forward/coasting/direct clutch cylinder
12. Turbine shaft
13. Forward one-way clutch and low-intermediate sun gear
14. Low-intermediate carrier assembly
15. Low-intermediate ring gear
16. Reverse/fourth gear sun gear and low-intermediate carrier assembly
17. Reverse/fourth gear carrier assembly
18. Reverse/fourth gear sun gear



1. #18 driven sprocket bearing
2. #11 driven sprocket shim
3. #12 driven sprocket bearing
4. Driven sprocket
5. #13 driven sprocket thrust bearing
6. Drive chain
7. Chain cover pen
8. Final drive and differential
9. Converter housing

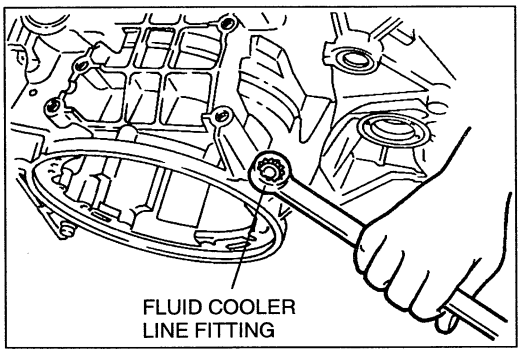


1. Control valve body
2. Control valve body cover
3. Turbine shaft speed sensor
4. Vehicle speedometer sensor
5. ATF dipstick and oil filler tube
6. Torque converter



Assembly Procedure

1. If necessary, use the **SSTs** or equivalent to install the #18 driven sprocket bearing in the transaxle case.

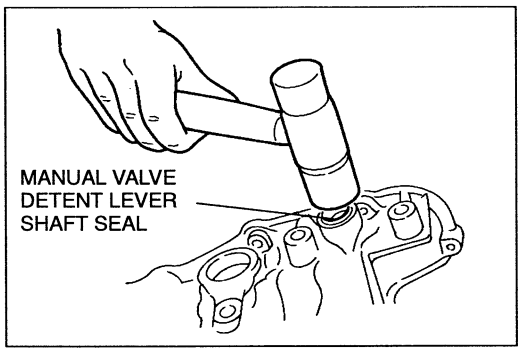


2. Apply thread sealant to the fitting. Install the fluid cooler line fitting on the transaxle case.

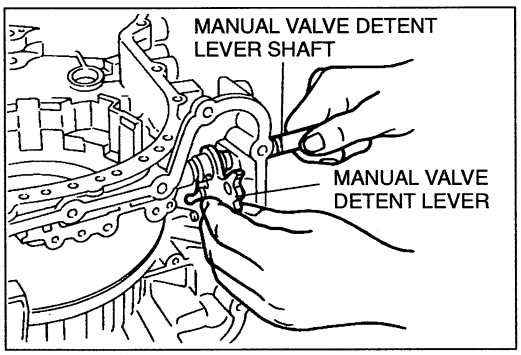
   Tightening torque: 40 N·m {4.1 kgf·m, 30 ft·lbf}

3. Apply thread sealant to the port plug. Install the line pressure port plug on the transaxle case.

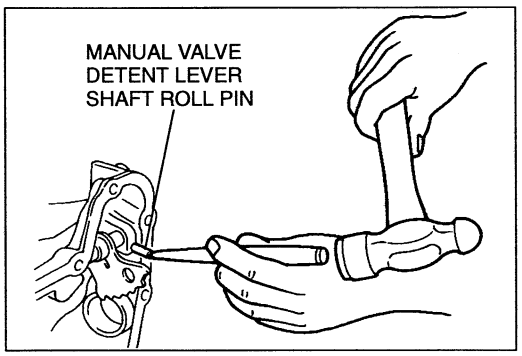
   Tightening torque: 8 N·m {0.8 kgf·m, 6 ft·lbf}



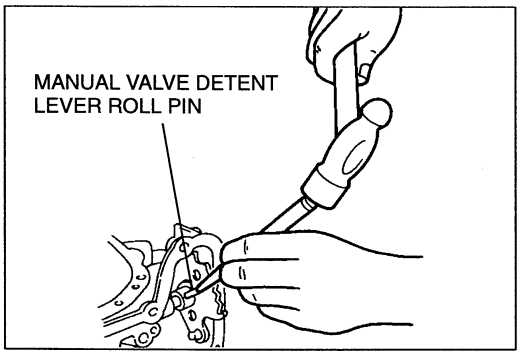
4. Use a small rubber mallet to install the manual valve detent lever shaft seal in the case.



5. Install the manual valve detent lever and shaft into the case.

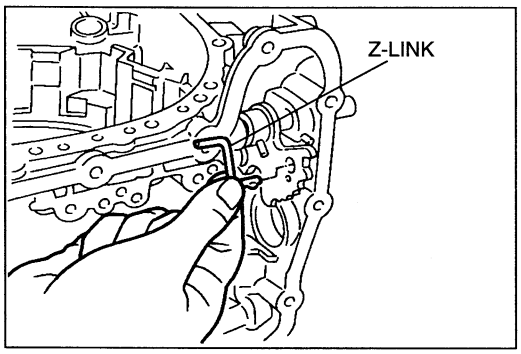


6. Use a hammer and a punch to install a new manual valve detent lever shaft roll pin.

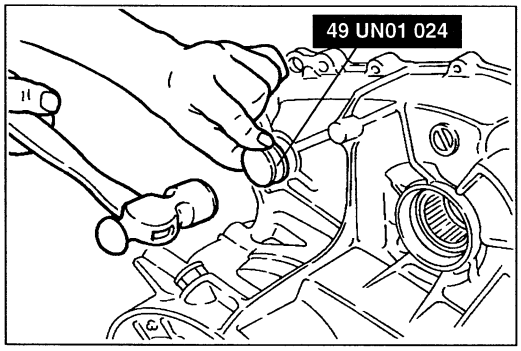


Caution
- **Do not allow the manual valve detent lever roll pin to make contact with the case.**

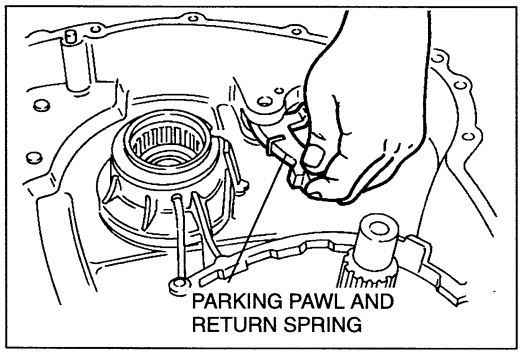
7. Use a hammer and a punch to install a new manual valve detent lever roll pin.



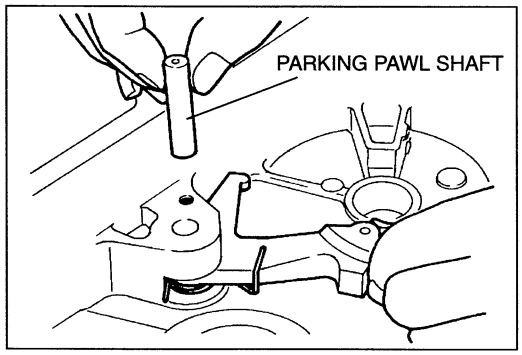
8. Verify that the manual valve detent lever rotates freely. Install the manual valve actuator rod (Z-link).



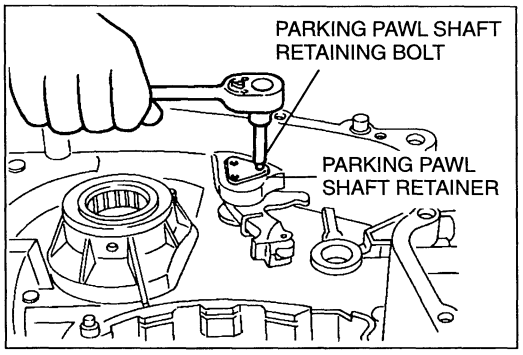
9. Use the **SST** or equivalent to install the manual control shaft seal.



10. Install the parking pawl and return spring.

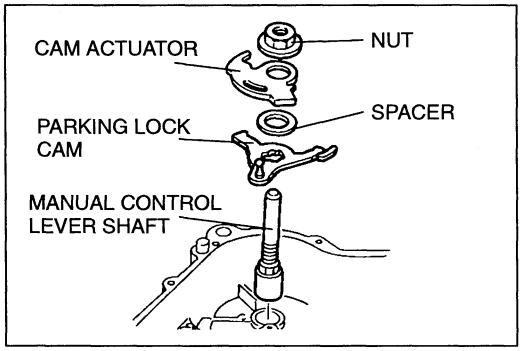


11. Install the parking pawl shaft.

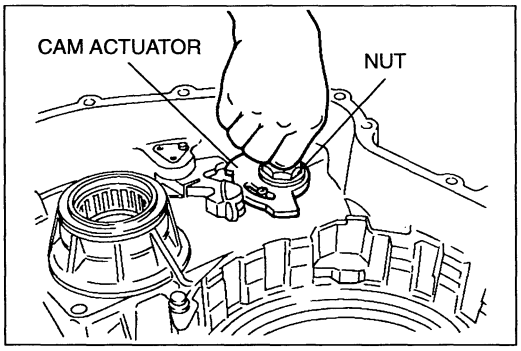


12. Install the parking pawl shaft retainer and bolt.

Tightening torque: 8 N·m {0.8 kgf·m, 6 ft·lbf}

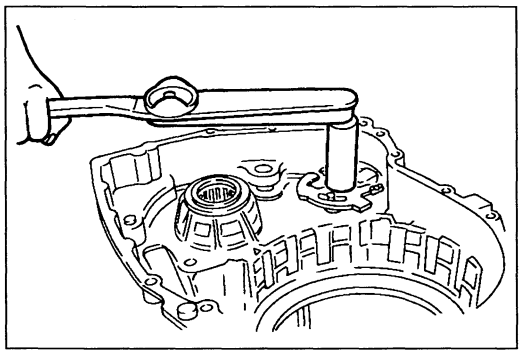


13. Assemble the parking lock cam, cam actuator, spring, and spacer on the manual lever control shaft.



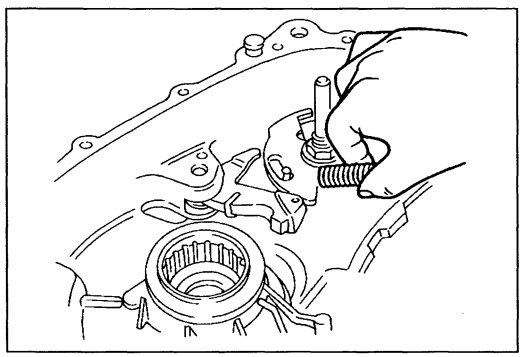
Note
- Verify that the manual lever control shaft assembly can move freely.

14. Install the manual lever control shaft assembly into the case.

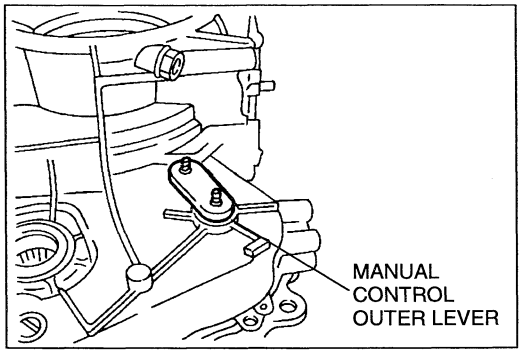


15. Install the manual control shaft nut.

Tightening torque: 74 N·m {7.5 kgf·m, 55 ft·lbf}

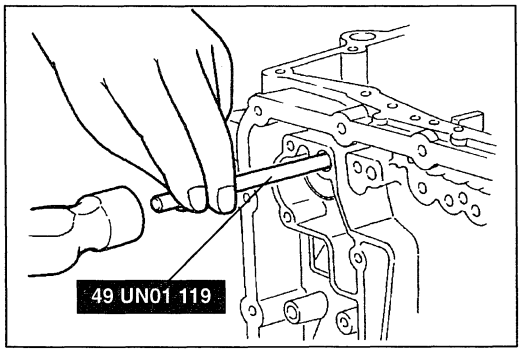


16. Install the parking pawl spring.

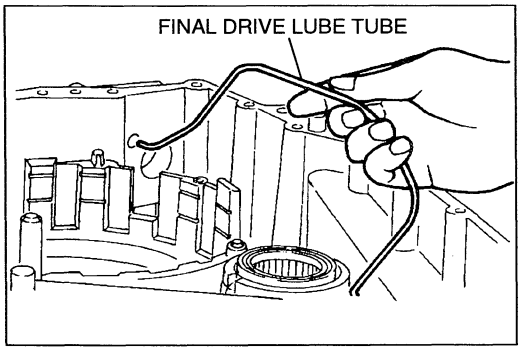


Note
- Bolt will be torqued after linkage adjustment.

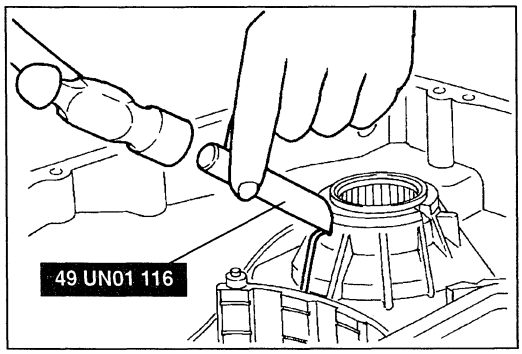
17. Install the manual control outer lever and bolt by hand.



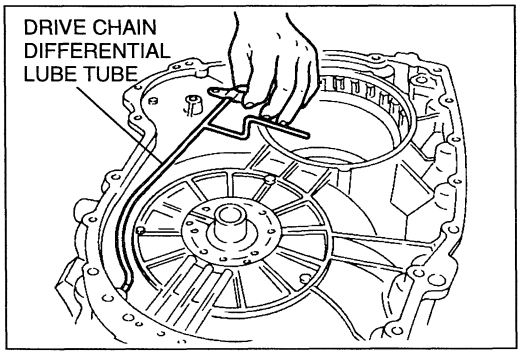
18. Use the **SST** or equivalent to install a new final drive lube tube seal into the case.



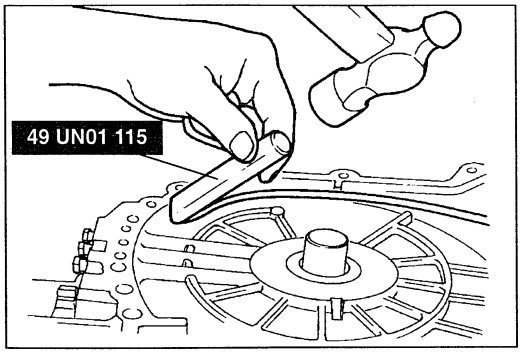
19. Lubricate the end of a new final drive lube tube and push it into the seal.



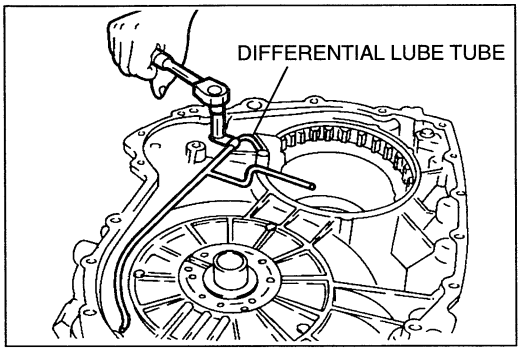
20. Push the final drive lube tube into the bearing of the case and seat it with the **SST.**



21. Push a new drive chain/differential lube tube into the housing.

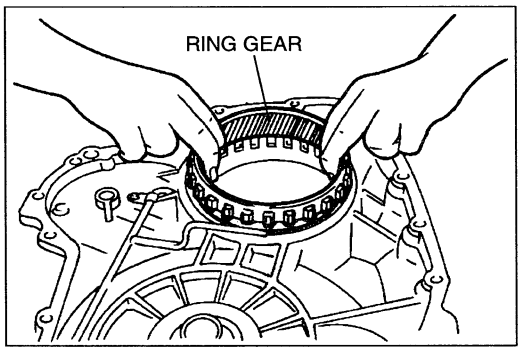


22. Seat the end of the drive chain/differential lube tube with the **SST**.



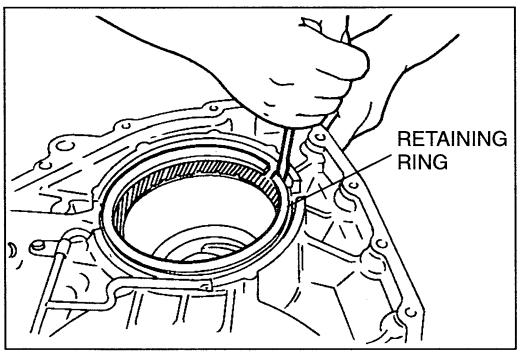
23. Install the mounting bolt.

Tightening torque: 15 N·m {1.5 kgf·m, 11 ft·lbf}

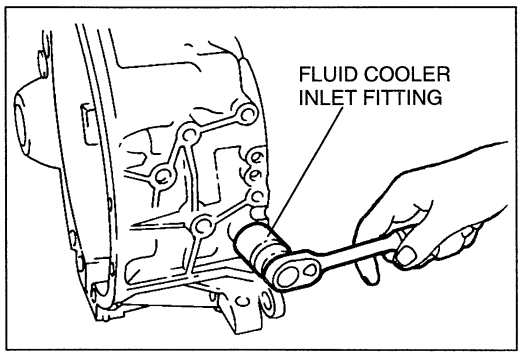


Note
- The gear is installed with the lug end up away from the housing.

24. Lower the final drive ring gear into the housing.

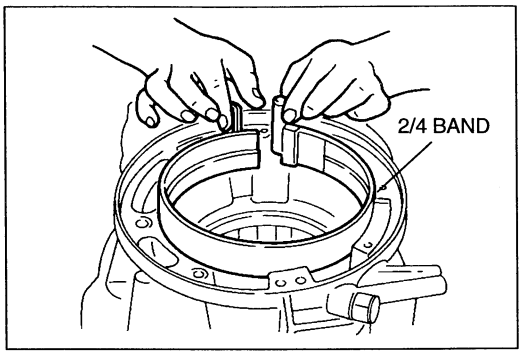


25. Install the final drive gear retaining ring.

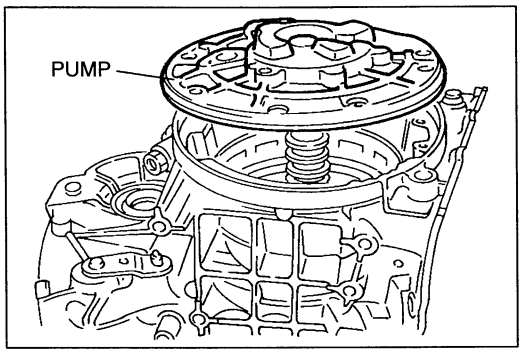


26. Install the fitting to the converter housing.

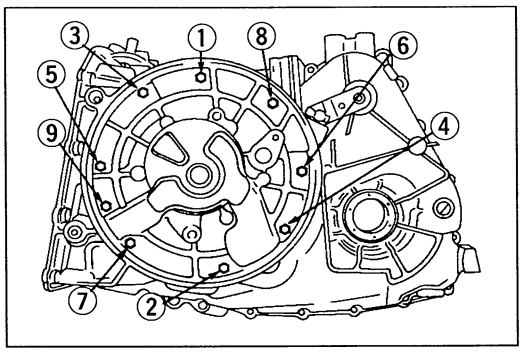
Tightening torque: 40 N·m {4.1 kgf·m, 30 ft·lbf}



27. Slide the 2/4 band into the case.

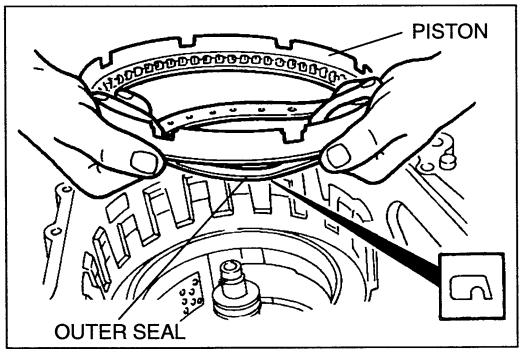


28. Lubricate the seal and bore in the case.
29. Lower the pump into the transaxle case.

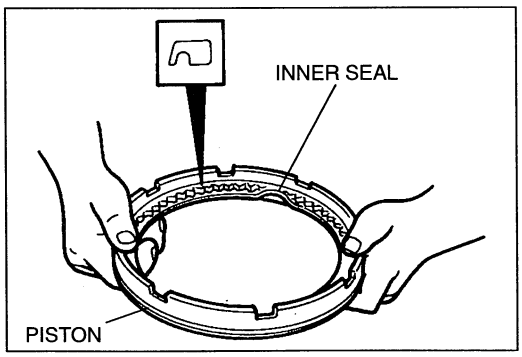


30. Install the nine oil pump assembly-to-transaxle case bolts.

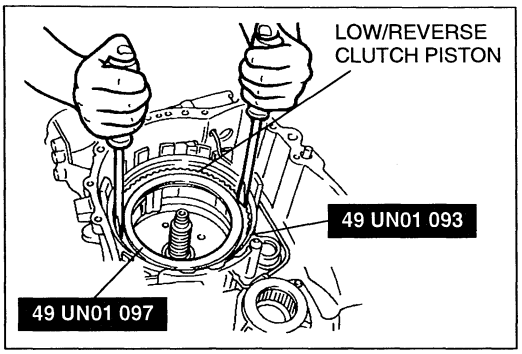
Tightening torque:
12—14 N·m {122—146 kgf·cm, 104—127 in·lbf}



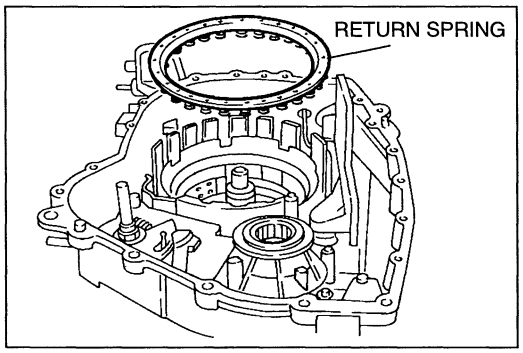
31. Install a new outer seal on the low/reverse piston.



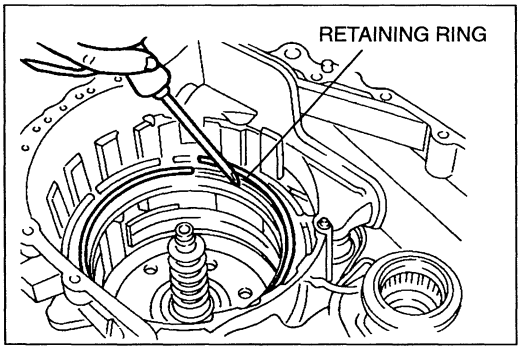
32. Install a new inner seal on the piston.



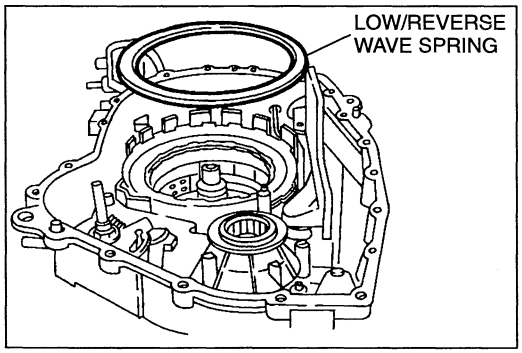
33. Install the low/reverse clutch piston into **SST** (49 UN01 093) and **SST** (49 UN01 097).
Install the low/reverse clutch piston into the case. Remove the **SSTs**.



34. Install the return spring assembly.

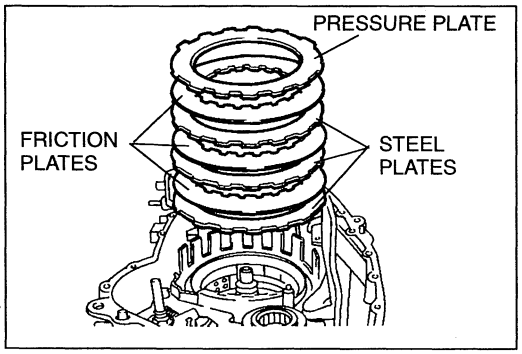


35. Use a screwdriver to install the retaining ring. Verify that the ring is seated all around.

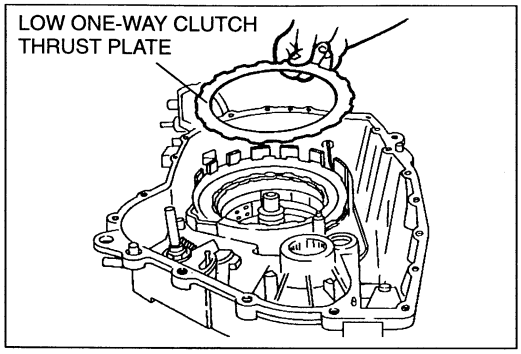


Caution
- **The wave spring is installed in this position for measurement purposes only.**

36. Install the low/reverse wave spring.

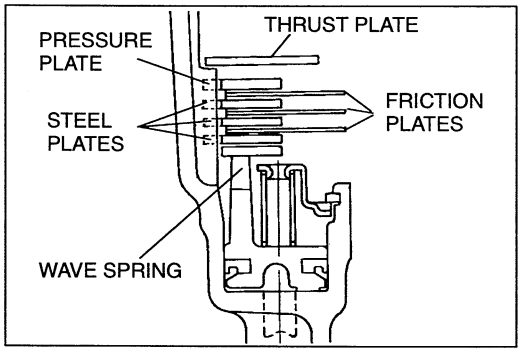


37. Install the low/reverse steel and friction plates, and the pressure plate.



Note
- The thrust plate is installed in this position for measurement purposes only.

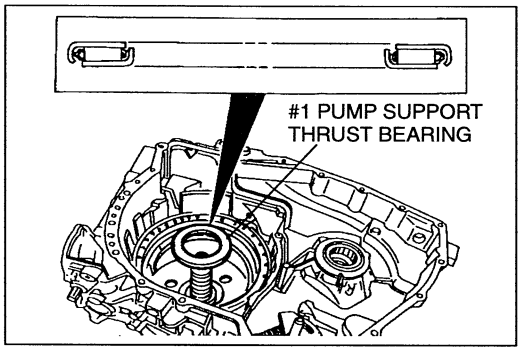
38. Install the low one-way clutch thrust plate.
39. Use a feeler gauge to measure the clearance between the pressure plate and the thrust plate. Make a second measurement on the opposite side. Average the two measurements to obtain the clearance.
40. The standard clearance is **0.54—1.17 mm {0.02—0.05 in}**. If the clearance is not within the specification, select the proper thickness pressure plate to obtain the standard clearance.



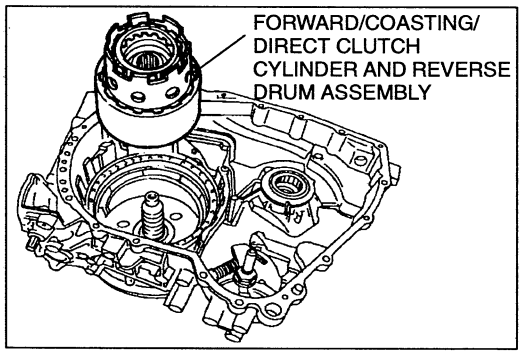
Pressure plate sizes are as follows:

Thickness mm {in}	Number of notches
2.57—2.47 {0.1—0.097}	1
2.36—2.26 {0.092—0.088}	2
2.16—2.06 {0.085—0.081}	3

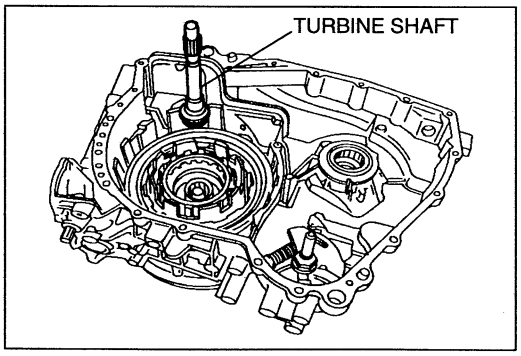
41. Remove the thrust plate, pressure plate, steel and friction plates, and the wave spring for installation later.



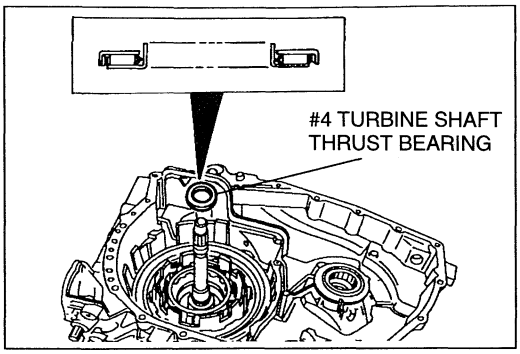
42. Install the #1 pump support thrust bearing.



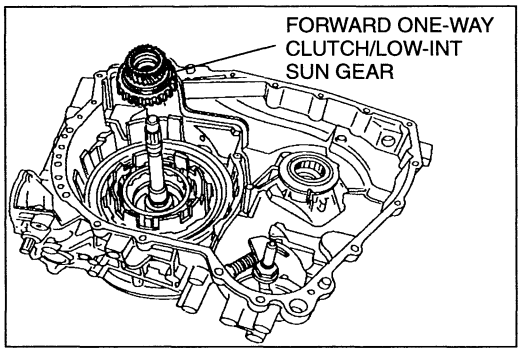
43. Remove the **SST** (seal sizer) from the forward/coasting/direct clutch cylinder.
44. Install the assembly of the forward/coasting/direct clutch cylinder and reverse drum assembly.



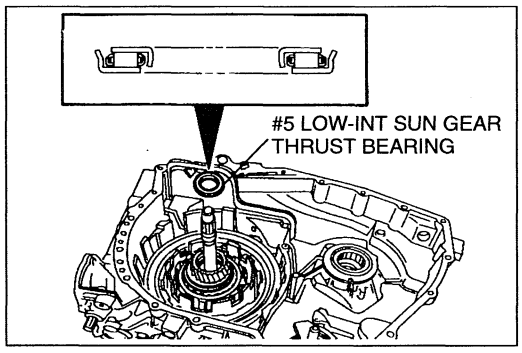
45. Install the turbine shaft.



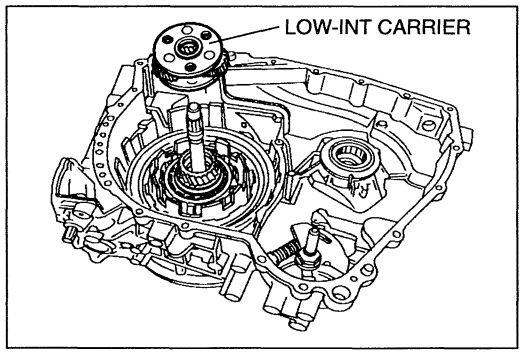
46. Install the #4 turbine shaft thrust bearing.



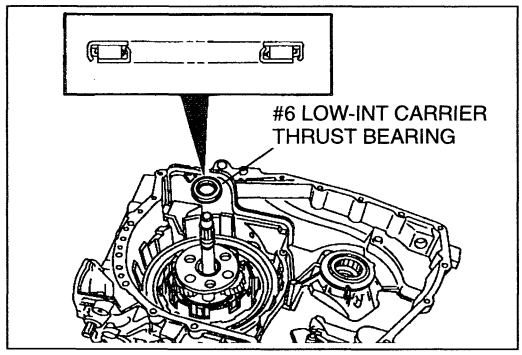
47. Install the forward one-way clutch/low-intermediate sun gear.
48. Be sure that the assembly is fully installed in all clutch plates and is resting on the #4 turbine shaft thrust bearing.



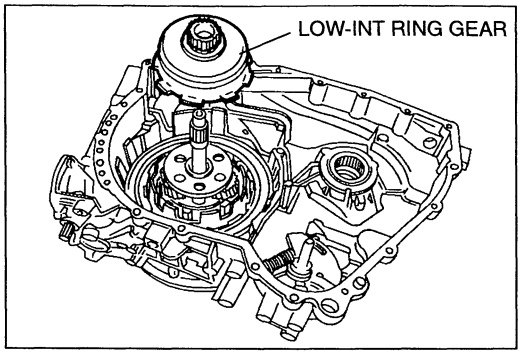
49. Install the #5 low-intermediate sun gear thrust bearing.



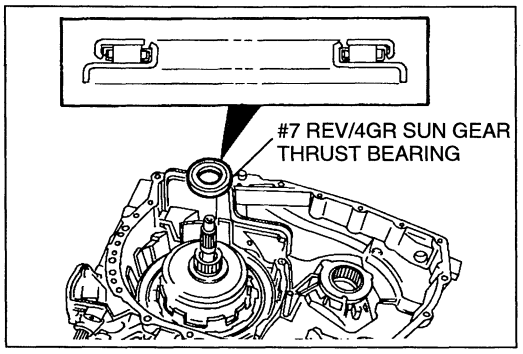
50. Install the low-intermediate carrier.



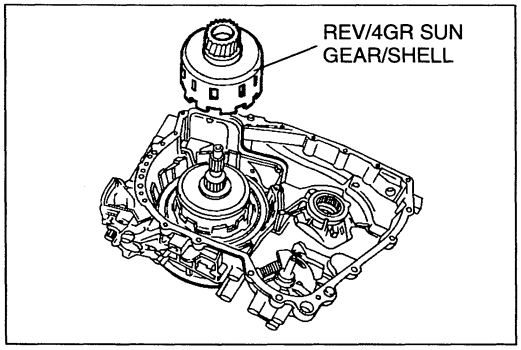
51. Install the #6 low-intermediate carrier thrust bearing.



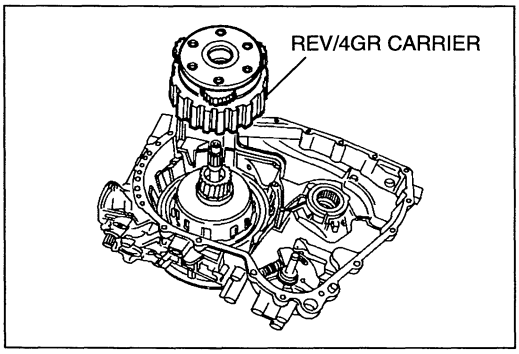
52. Install the low-intermediate ring gear.



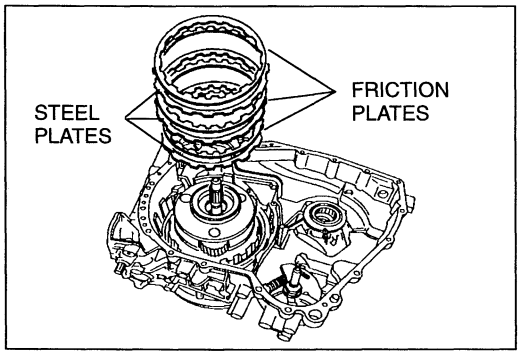
53. Install the #7 reverse/fourth gear sun gear thrust bearing.



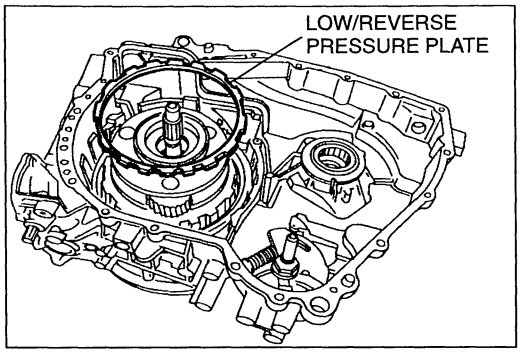
54. Install the reverse/fourth gear sun gear/shell.



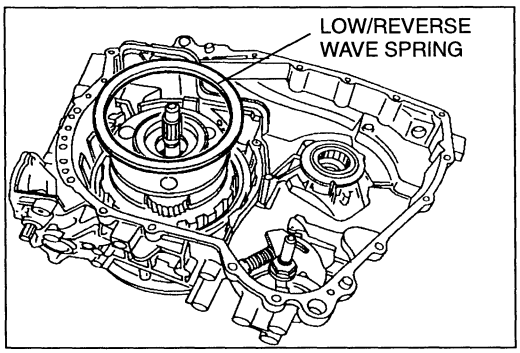
55. Install the reverse/fourth gear carrier with the captured #8 reverse/fourth gear carrier thrust bearing.



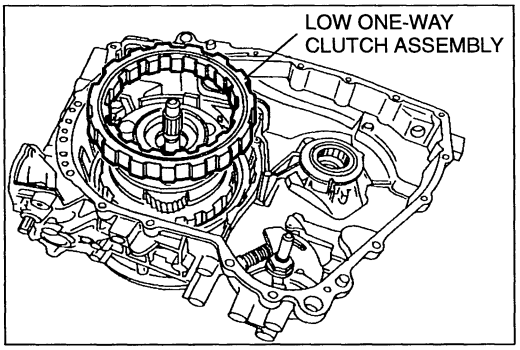
56. Install the low/reverse clutch plates.



57. Install the low/reverse pressure plate previously selected.

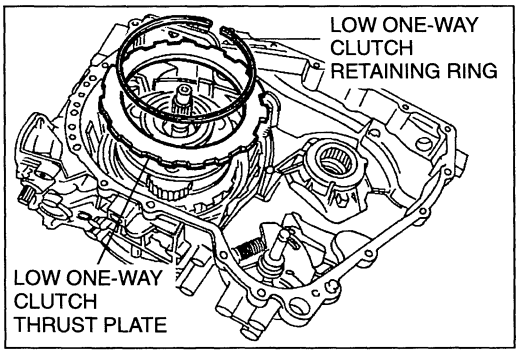


58. Install the low/reverse wave spring.

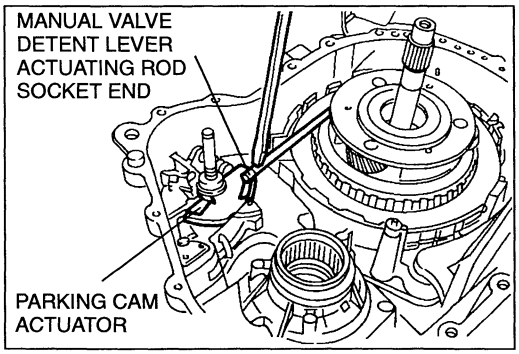


Note
- Be sure the grooves in the inner and outer races face up.

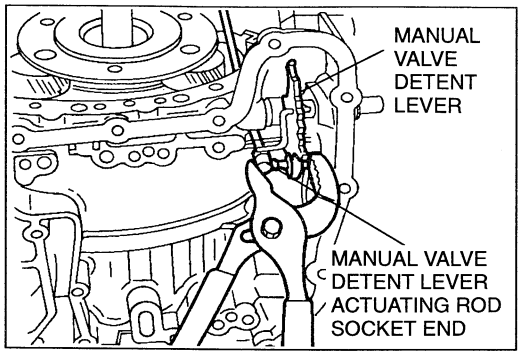
59. Install the low one-way clutch assembly with the I.D. groove on the inner ring facing up.



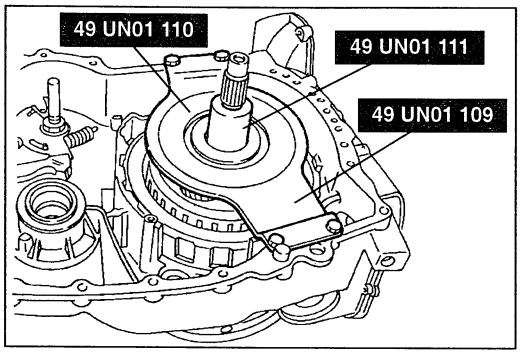
60. Install the low one-way clutch thrust plate.
61. Install the low one-way clutch retaining ring. Position the retaining ring ends in an area near the case lugs.



62. Snap the socket end of the manual valve detent lever actuating rod on the parking cam actuator.

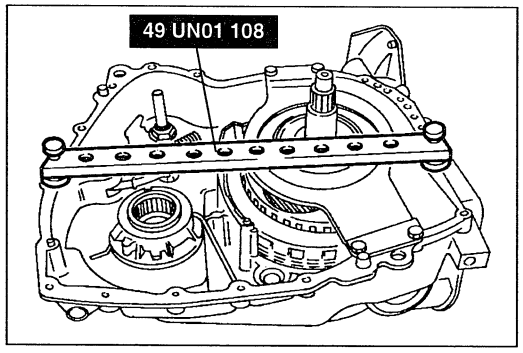


63. Snap the opposite socket end of the manual valve detent lever actuating rod on the manual valve detent lever.

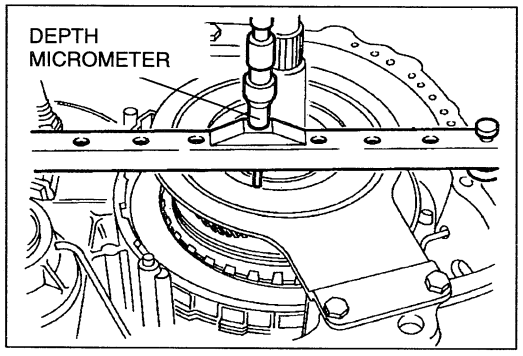


64. Install the **SSTs** on the reverse/fourth gear carrier.

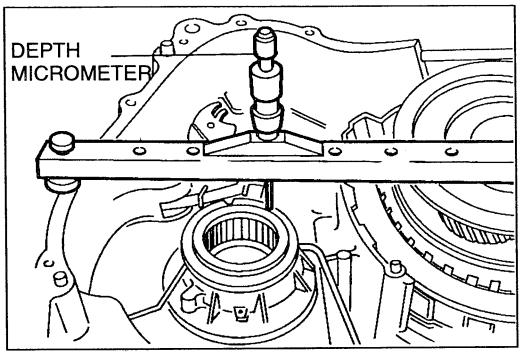
    Tightening torque: 13.5 N·m {1.4 kgf·m, 10 ft·lbf}



65. Install the **SST** across the case.



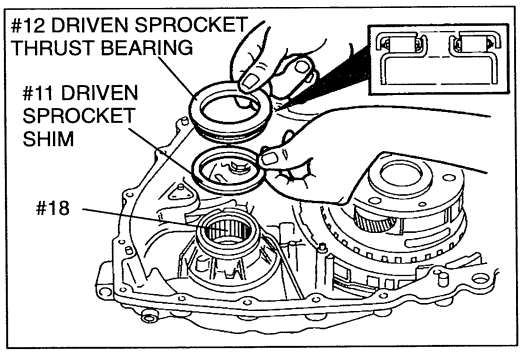
66. Use a depth micrometer to measure the distance from the top of the gauge bar to the bearing surface on the reverse/fourth gear carrier. Repeat this measurement on the other side of the turbine shaft. Average the two measurements. This is dimension A.



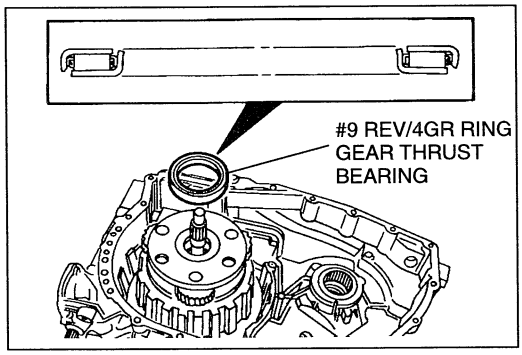
67. Measure the distance from the top of the **SST** to the #12 driven sprocket bearing surface area of the case. This is dimension B.
68. Subtract dimension A from dimension B to get dimension C.
69. Use dimension C to select the proper #11 driven sprocket shim from the following chart.

Dimension C mm {in}	Shim Thickness mm {in}
14.34—14.17 {0.565—0.558}	2.20—2.10 {0.087—0.083}
14.16—14.00 {0.557—0.551}	2.02—1.92 {0.080—0.076}
13.99—13.83 {0.550—0.544}	1.85—1.75 {0.073—0.069}
13.82—13.66 {0.543—0.538}	1.67—1.57 {0.066—0.062}
13.65—13.49 {0.537—0.531}	1.50—1.40 {0.059—0.055}
13.48—13.32 {0.530—0.524}	1.32—1.22 {0.052—0.048}

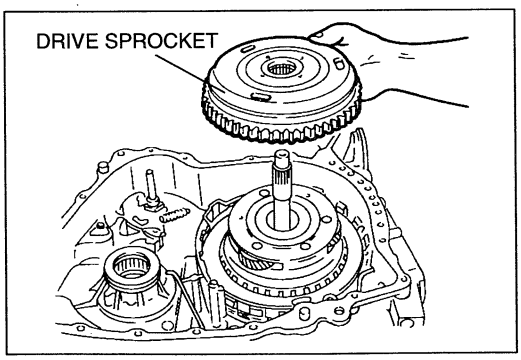
70. Remove the **SSTs**.



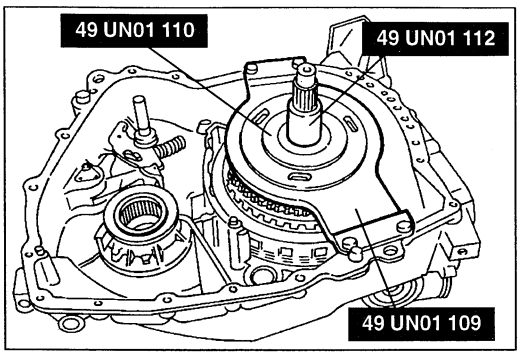
71. Lubricate the needles and seals of #18 bearing in the case.
72. Install the selected #11 driven sprocket shim on the case.
73. Install the #12 driven sprocket thrust bearing.



74. Install the #9 reverse/fourth gear thrust bearing.

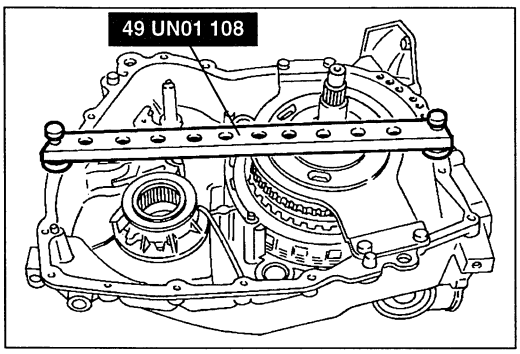


75. Install the drive sprocket, for gauging only.

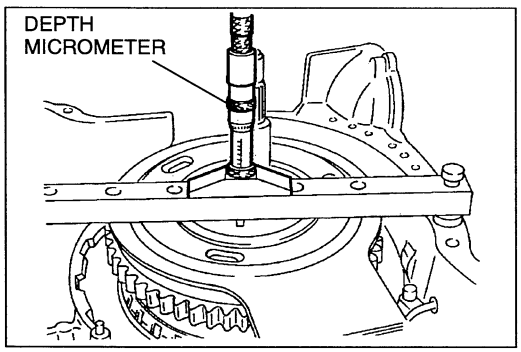


76. Install the **SSTs** on the drive sprocket.

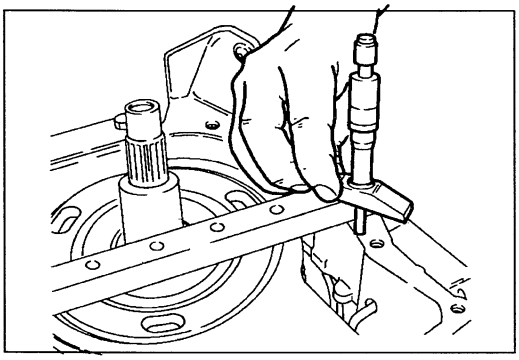
    Tightening torque: 13.5 N·m {1.4 kgf·m, 10 ft·lbf}



77. Install the **SST** on the case.



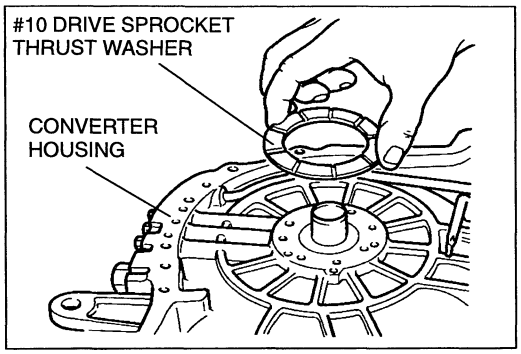
78. Use a depth micrometer to measure the distance from the top of the gauge bar to the face of the drive sprocket. Repeat on other side of the turbine shaft. Average these two numbers. This is dimension A.



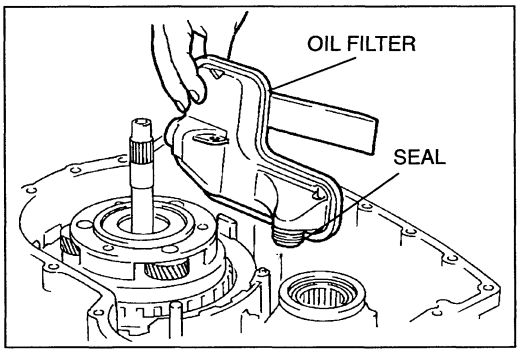
79. Use the combined thickness 25.4 mm {1.00 in} of the gauge bar and short spacers as distance B.
80. Subtract dimension A from dimension B to get dimension C.
81. Use dimension C to select the proper #10 drive sprocket thrust washer from the following chart.

Dimension C mm {in}	#10 Washer Thickness mm {in}
1.12—0.86 {0.044—0.034}	1.51—1.41 {0.059—0.056}
0.85—0.60 {0.033—0.024}	1.77—1.67 {0.070—0.066}
0.59—0.34 {0.023—0.013}	2.03—1.93 {0.080—0.076}
0.33—0.08 {0.013—0.003}	2.29—2.19 {0.090—0.086}

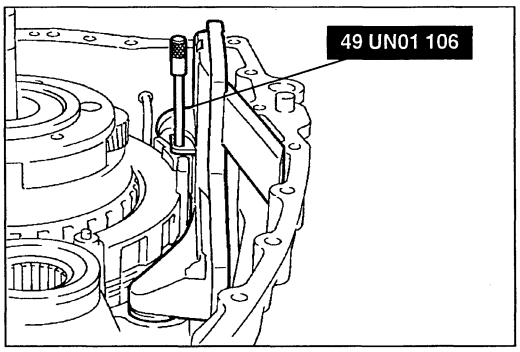
82. Remove the drive sprocket.



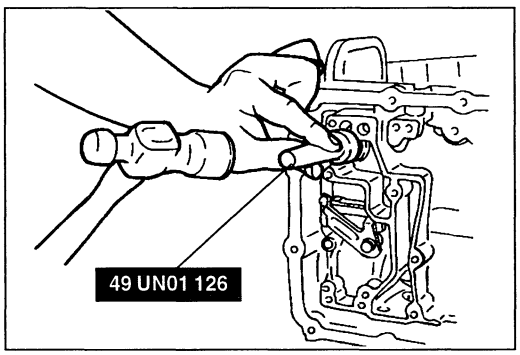
83. Remove the gauge bar and preload tool.
Apply petroleum jelly to the selected #10 drive sprocket thrust washer and install on the converter housing.
Remove the drive sprocket.



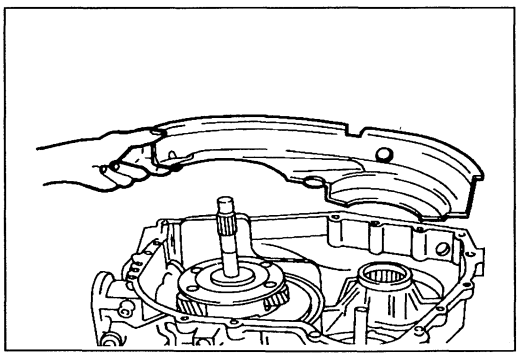
84. Install the oil filter and seal assembly.



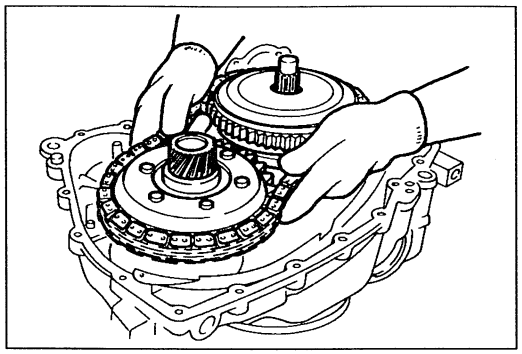
85. Temporarily install the **SST** or equivalent.



86. Use the **SST** to install a new oil filter recirculation seal and then remove the **SST** from the filter.

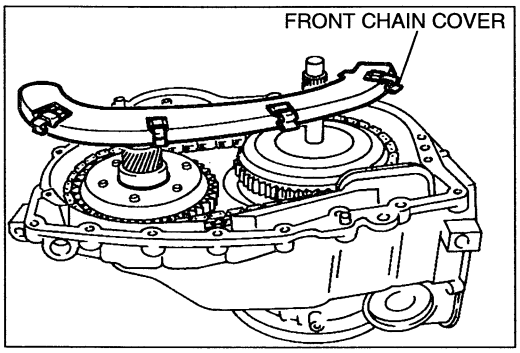


87. Install the rear part of the chain cover in the transaxle case.

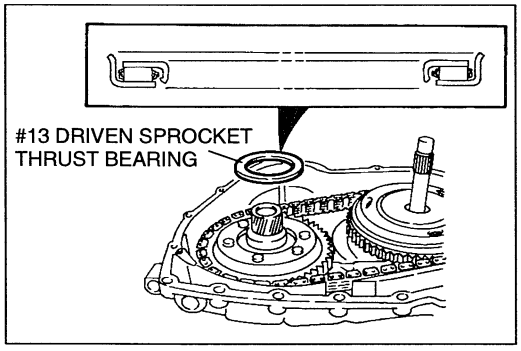


Warning
- **Wear gloves as personal protection from the sharp chain and sprocket teeth.**

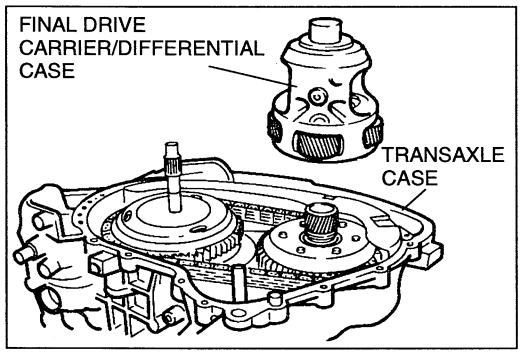
88. Lower the chain drive and its sprockets together in the transaxle case. Verify that both sprockets are seated.



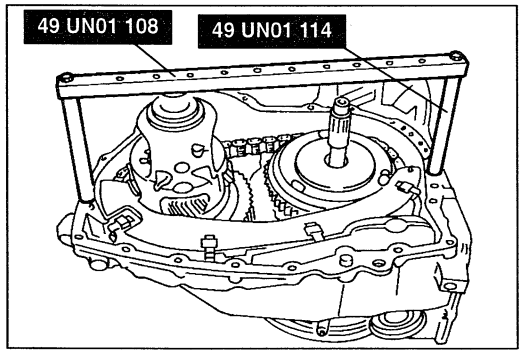
89. Install the front part of the chain cover by snapping it into place.



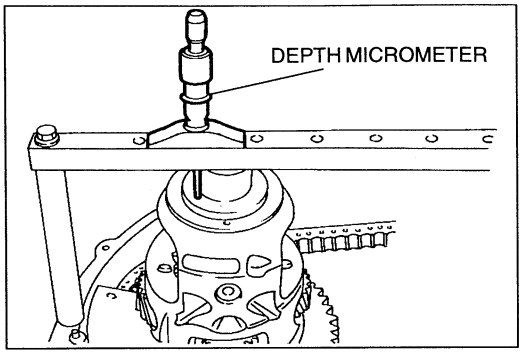
90. Install the #13 driven sprocket thrust bearing.



91. Install the final drive carrier/differential case.



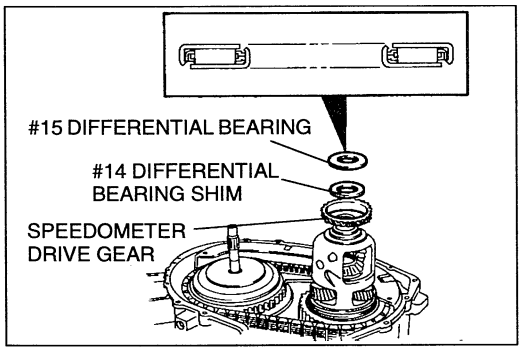
92. Install the **SSTs** on the case. Secure them with the two bolts.



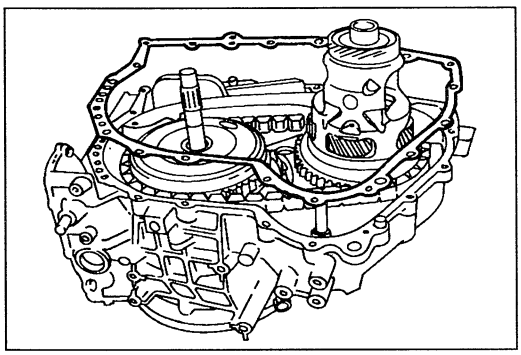
93. Use a depth micrometer to measure the distance from the top of the gauge bar to the shim surface area of the final drive carrier and differential assembly. Make two measurements then average them. This is dimension A.
94. Use the combined thickness of the gauge bar with long spacers 177.8 mm {7.00 in} as distance B.
95. Subtract dimension A from dimension B to get dimension C.
96. Use dimension C to select the proper #14 differential bearing shim from the following chart.

Dimension C mm {in}	#14 Shim Thickness mm {in}
130.76—130.46 {5.148—5.136}	1.08—0.98 {0.043—0.039}
130.45—130.16 {5.136—5.124}	1.38—1.28 {0.054—0.050}
130.15—129.87 {5.123—5.113}	1.67—1.57 {0.066—0.062}
129.86—129.57 {5.113—5.101}	1.97—1.87 {0.078—0.074}
129.56—129.27 {5.100—5.089}	2.27—2.17 {0.089—0.085}

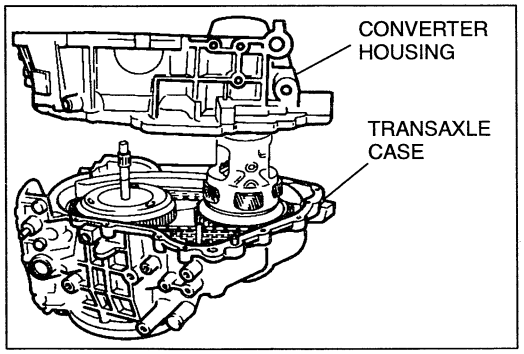
97. Remove the gauge bar and long spacers.



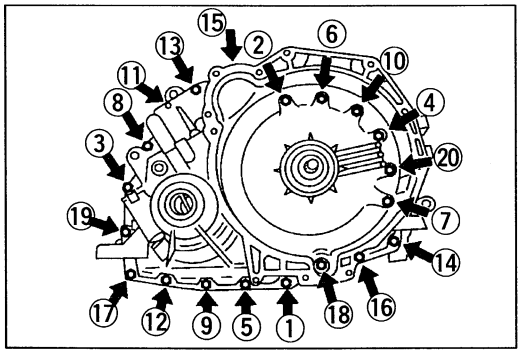
98. Install a new speedometer drive gear.
99. Install the selected #14 differential bearing shim.
100. Install the #15 differential bearing.



101. Attach a new gasket to the transaxle case split flange.

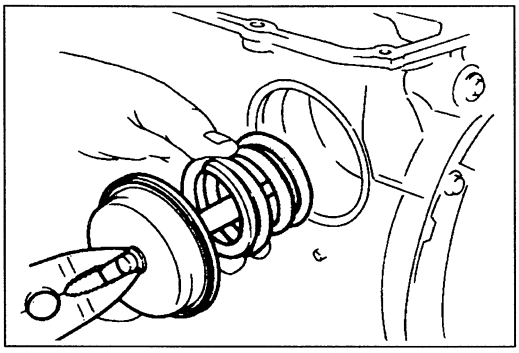


102. Lower the converter housing onto the transaxle case.



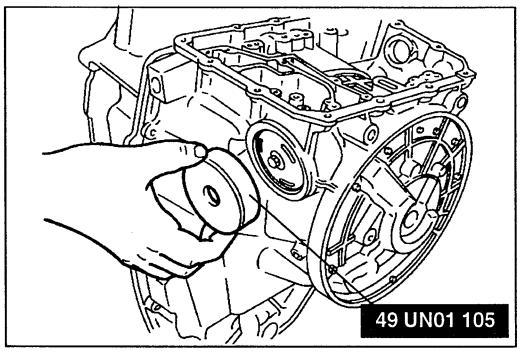
103. Install the twenty converter housing-to-transaxle case bolts or replace bolts. Tighten the bolts in the sequence shown.

Tightening torque:
20—25 N·m {2.0—2.5 kgf·m, 15—18 ft·lbf}

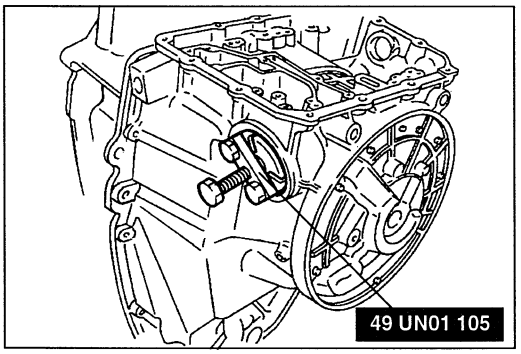


Note
- Note the number of grooves on the piston rod.

104. Install the 2/4 servo piston and return spring assembly.

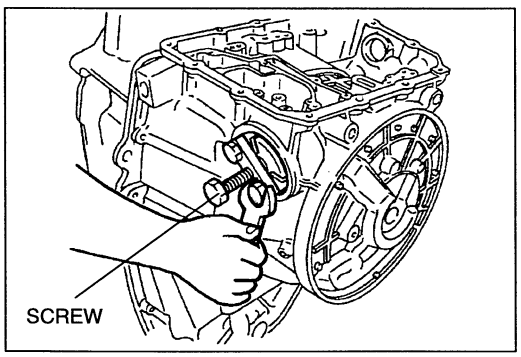


105. Install the **SST** on the piston.



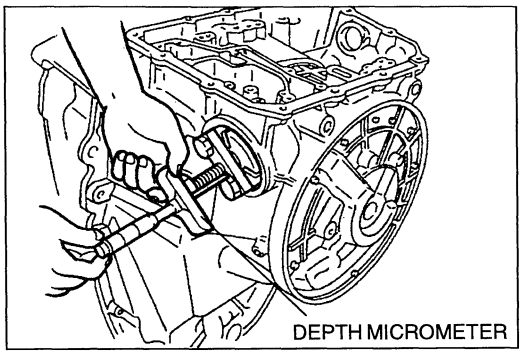
Note
- Legs of the **SST** fit into the servo piston cover retaining ring groove.

106. Install the **SST** in the case bore. The **SST** bolts should be loosely assembled for easy installation.



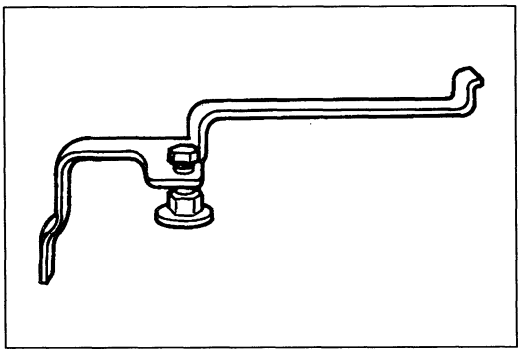
107. Tighten the bolts on the **SST** as shown.
108. Tighten the screw.

Tightening torque: 4 N·m {40 kgf·m, 36 ft·lbf}

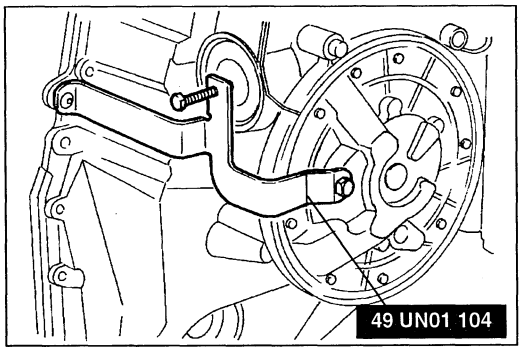


109. Install a depth micrometer on the head of the **SST**. Measure and record the distance from the depth micrometer to the bar of the **SST**. (distance A).
110. Unscrew until the servo piston movement stops. Measure and record the distance to the bar of the **SST**. (distance B).
111. Subtract A from B to obtain travel C.

Number of Grooves	Travel Specification mm {in}	Rod Length mm {in}
0	2.43—4.82 {0.096—0.190}	108.1 {4.26}
1		107.1 {4.22}
2		105.7 {4.16}



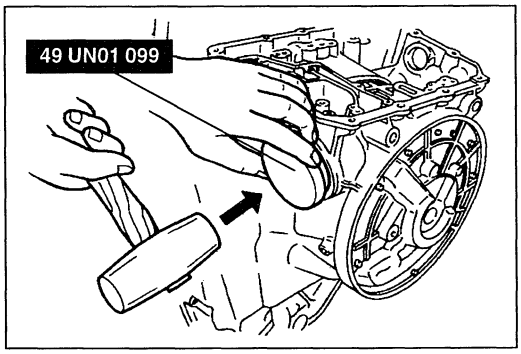
112. If the depth micrometer reading is not within the travel specification, replace the 2/4 servo piston rod and recheck.
113. Remove the **SST**.
114. Install a nut with an integral washer onto the forcing bolt of the servo cover remover/replacer tool with a permanent thread sealer. This nut and washer will aid in the installation of the cover.



115. Lubricate the 2/4 servo piston, servo cover, servo cover seal and servo case bore, using ATF or petroleum jelly to aid in the installation and prevent cutting of the seal.
116. Install the servo cover in the case.
117. Install the **SST**.

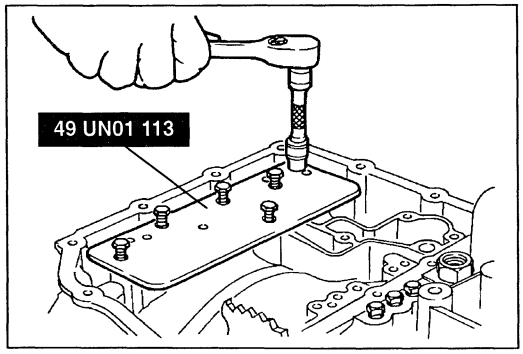
Warning
- **Servo return spring force is very high.**

118. Compress the servo cover and install the retaining ring.
119. Remove the **SST**.



Note
- If the cover will not seat deep enough in the bore to install the servo cover retaining ring, a blunt punch may be used with a small hammer. Gently tap the cover around the outer edge with the punch until the snap ring groove is fully exposed.

120. Install the servo cover cap by using the **SST**, if equipped originally.



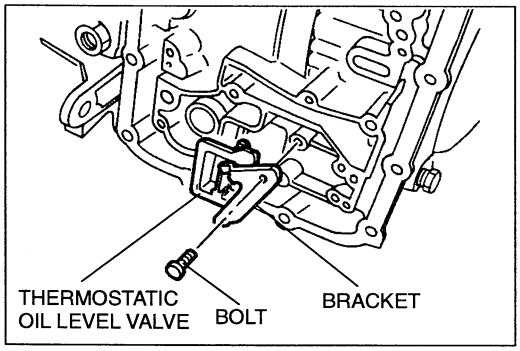
Warning
- **Use safety glasses when using compressed air.**

Caution
- **The coasting clutch circuit should not be applied. Failure to do so may result in the coasting clutch piston coming out of the forward clutch piston.**

121. Install the **SST** by using six mounting bolts.
Use a rubber tipped blow gun and compressed air **275 kPa {2.8 kgf/cm^2, 40 psi}** to check the following clutch hydraulic circuits for function and leakage.
- REVERSE CLUTCH
- FORWARD CLUTCH
- DIRECT CLUTCH
- LOW/REVERSE CLUTCH
- SERVO RELEASE
- SERVO APPLY

Warning
- **Wear eye protection when using compressed air.**

122. If leakage is heard in any circuit, the transaxle must be disassembled and the source of leakage corrected.
Remove the **SST**.



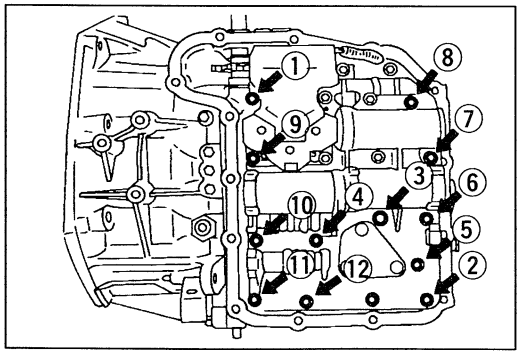
123. Install the filter in the forward clutch circuit. Place the thermostatic oil level control valve in the transaxle case.
124. Install the bracket and the bolt.

Tightening torque:
11—13 N·m {112—133 kgf·cm, 96—117 in·lbf}

125. If necessary, install the O-ring on the solenoid body connector.

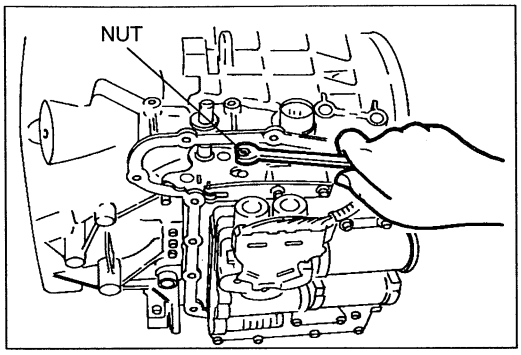
Caution
- **Do not pull on the wires or damage the connector body.**

126. Place the control valve body slightly away from the transaxle case and push the solenoid body connector into its bore.
127. Align the Z-link in the manual valve.

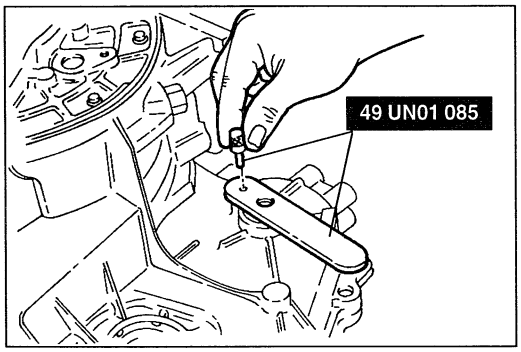


128. Install the 12 mounting bolts. Tighten the mounting bolts in the sequence shown.

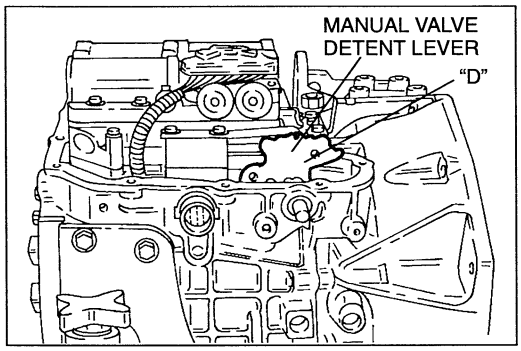
Tightening torque:
9—11 N·m {92—112 kgf·cm, 80—97 in·lbf}



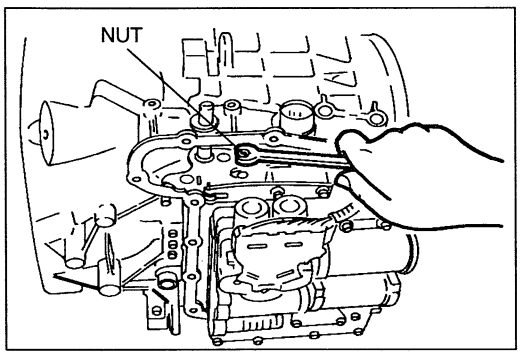
129. Loosen the nut on the ball stud for the manual valve detent actuating rod.
130. Remove the manual lever control shaft outer lever.



131. Use the **SST** to move the shaft to the D range position and install the pin to hold the tool in position.

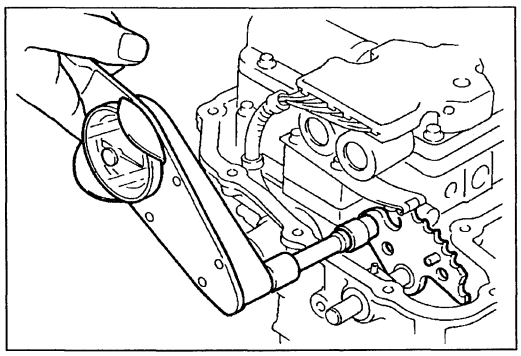


132. Move the manual valve detent lever to the D range position.



133. Loosen the nut on the ball stud for the manual valve detent lever actuating rod assembly.

134. Initially tighten the nut on the ball. Remove the shifter pin.

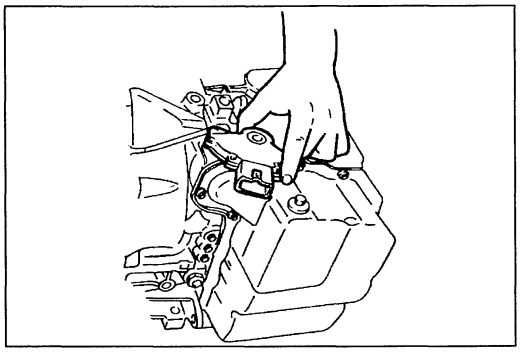


135. Rotate the **SST** until the socket can be installed on the nut. Tighten the manual valve detent lever ball stud nut.

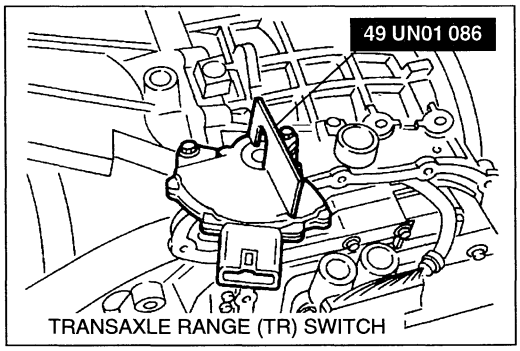
Tightening torque:
11—13 N·m {112—133 kgf·cm, 96—117 in·lbf}

136. Remove the pin and **SST**.
137. Install the manual control lever assembly and bolt.

Tightening torque:
24—30 N·m {2.4—3.1 kgf·m, 18—22 ft·lbf}



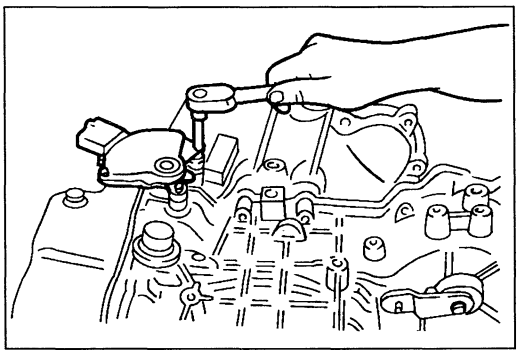
138. Install the transaxle range switch on the manual lever shaft. Hand-tighten the two mounting bolts.



TRANSAXLE RANGE (TR) SWITCH

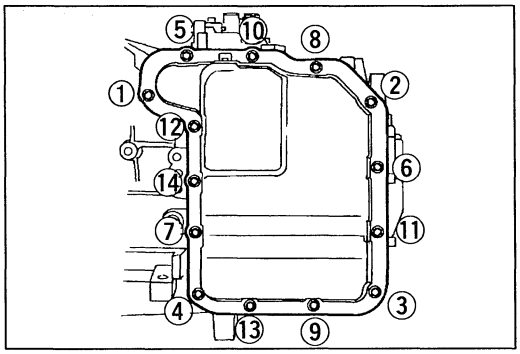
Note
- The outer lever must be in the N position.

139. Use the **SST** to align the switch on the shaft and case.

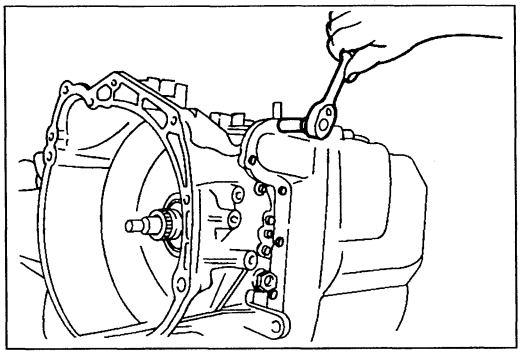


140. Tighten the transaxle range switch bolts.
Remove the **SST**.

Tightening torque:
11—13 N·m {112—133 kgf·cm, 96—117 in·lbf}

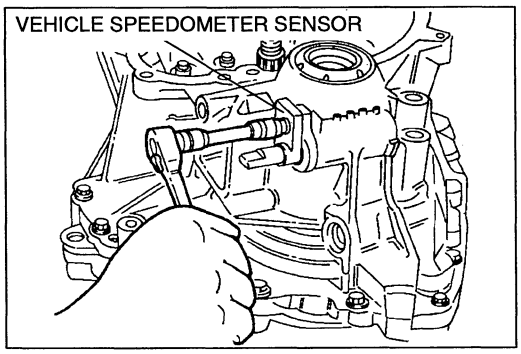


141. Install the control valve body cover gasket on the case. Attach the cover to the case.
142. Install the fourteen mounting bolts in the sequence shown.



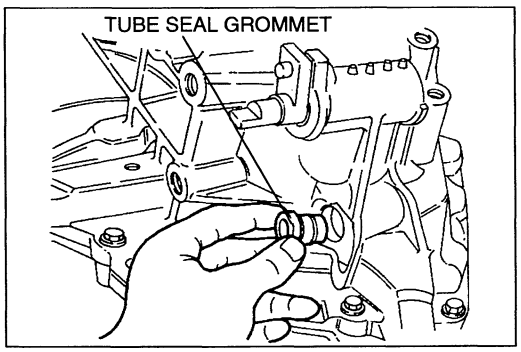
143. Install and tighten the control valve body cover-to-transaxle case bolts.

Tightening torque: 12 N·m {1.2 kgf·m, 9 ft·lbf} (galvinized cover)
Tightening torque: 20 N·m {2.0 kgf·m, 15 ft·lbf} (black cover)

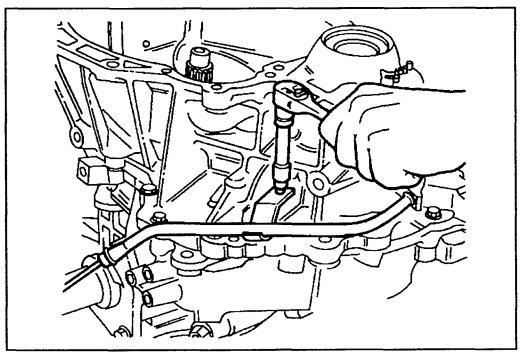


144. Install the O-ring seal on the vehicle speedometer sensor.
145. Push the vehicle speedometer sensor into the bore.
146. Install the bolt.
147. Tighten the bolt.

Tightening torque:
5—6 N·m {50—61 kgf·cm, 44—53 in·lbf}



148. Install the oil filler tube seal grommet into the case.



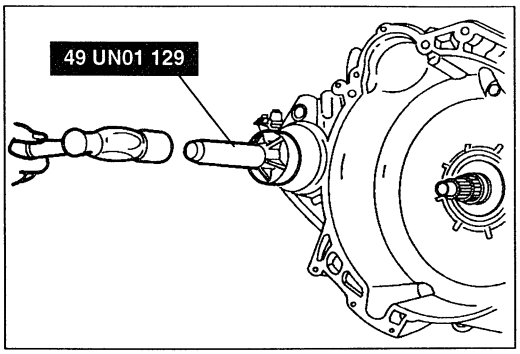
149. Install the oil filler tube.
150. Install the mounting bolt. Tighten the mounting bolt.

Tightening torque:
7—9 N·m {71—92 kgf·cm, 62—80 in·lbf}

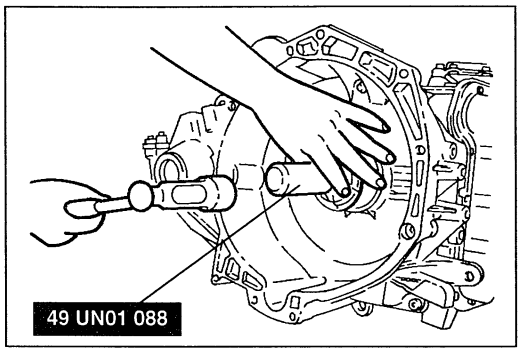
151. Install the oil level indicator in the tube.

152. Install the turbine shaft speed sensor O-ring seal.
153. Push the turbine shaft speed sensor into the bore.
154. Install the mounting bolt.
155. Tighten the bolt.

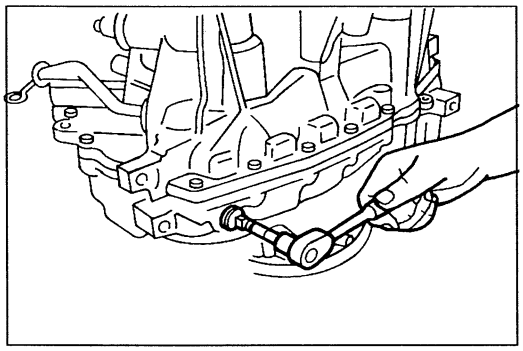
Tightening torque:
12—14 N·m {120—146 kgf·cm, 104—127 in·lbf}



156. Use the **SST** or equivalent and a hammer to install the RH and LH differential seals.

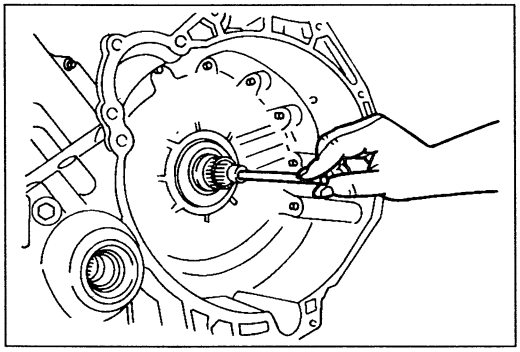


157. Use the **SST** or equivalent and a hammer to install the torque converter impeller hub seal spring, then verify that the seal spring has not been dislodged.

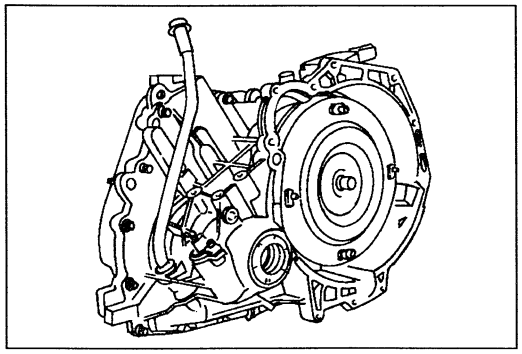


158. Apply sealant to the drain plug. Install the drain plug. Tighten the drain plug.

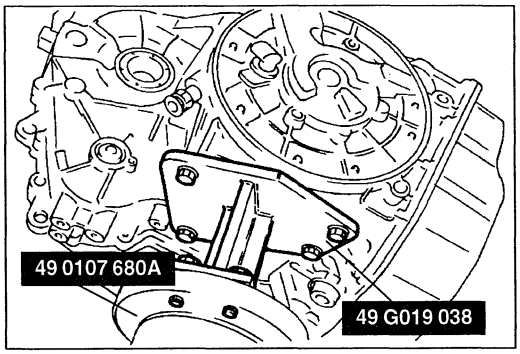
Tightening torque:
15—35 N·m {1.5—3.6 kgf·m, 11—26 ft·lbf}



159. Install the oil pump drive shaft into the end of the turbine shaft.



160. Install the torque converter in the transaxle.



161. Remove the transaxle from the **SST**.
162. Dry the transaxle exterior and prepare it for installation.

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

FRONT AND REAR AXLES

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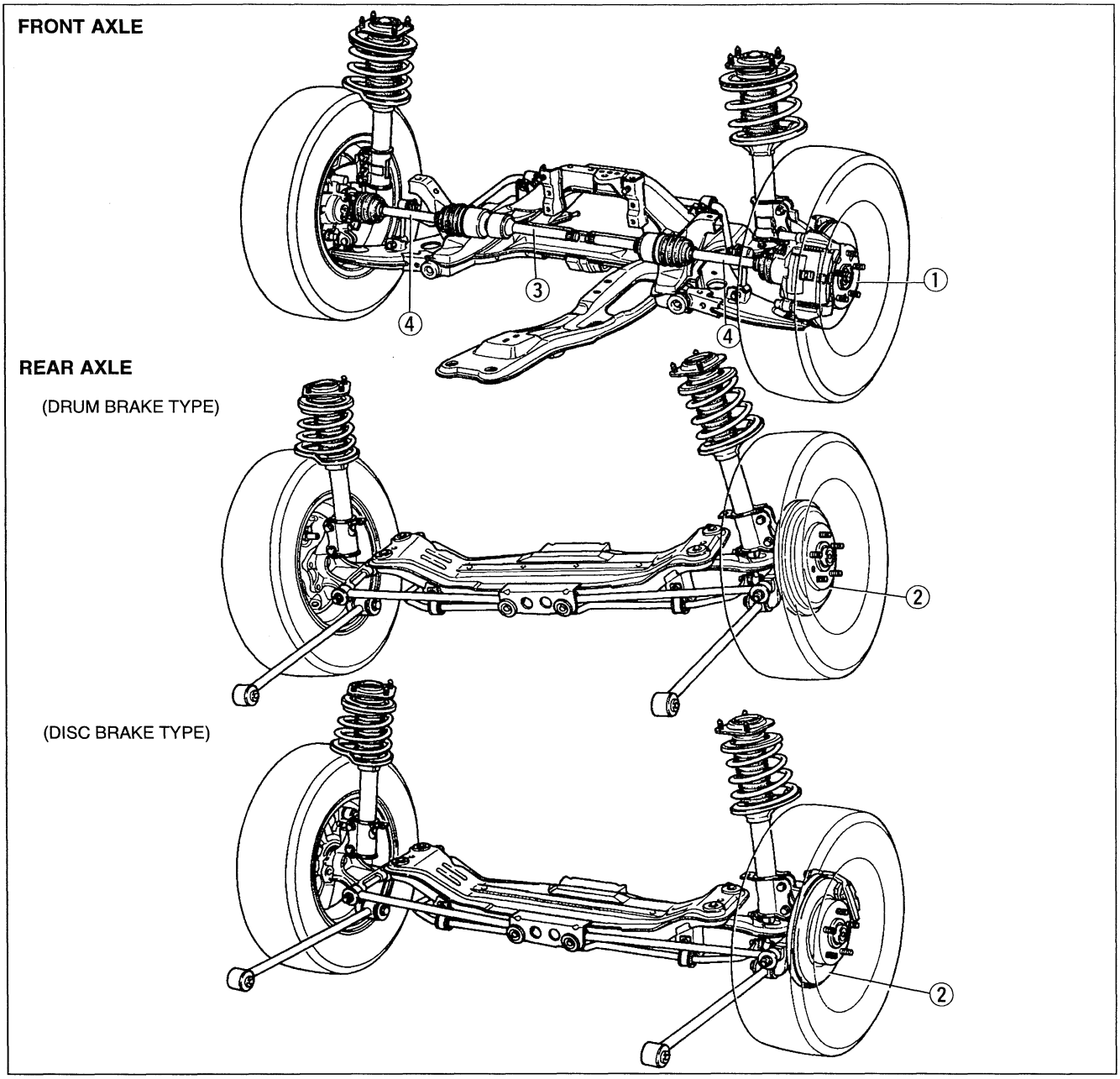

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2. Rear axle
(Drum brake type)
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3. Joint shaft
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(Tripod type) ..... page M–33

OUTLINE

SPECIFICATIONS

Item \ Engine / Transaxle		FS		KL	
		MTX	ATX	MTX	ATX
Front axle					
Maximum wheel bearing play mm {in}		0.05 {0.002}			
Rear axle					
Maximum wheel bearing play mm {in}		0.05 {0.002}			
Drive shaft					
Joint type	Wheel side	Birfield joint (BJ)			
	Differential side	DOJ*	TJ*	DOJ	TJ
Length of joint (between center of joint) mm {in}	Right side	387.0 {15.24}	380.0 {14.96}	382.0 {15.04}	380.0 {14.96}
	Left side	387.0 {15.24}	357 {14.06}	382.0 {15.04}	380.0 {14.96}
Shaft diameter rmm {in}	Right side	24.0 {0.94}	24.3 {0.96}	26.0 {1.02}	26.3 {1.03}
	Left side	24.0 {0.94}	24.3 {0.96}	26.0 {1.02}	26.3 {1.03}
Length of joint shaft mm {in}		376.0 {14.80}			
Joint shaft diameter mm {in}		26.0 {1.02}			

* TJ: Tripod joint
DOJ: Double offset joint

TROUBLESHOOTING GUIDE

M

Front Axle

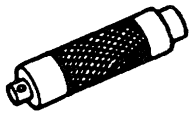
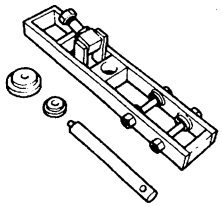
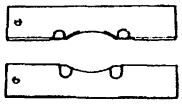
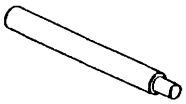
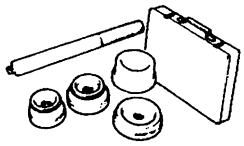
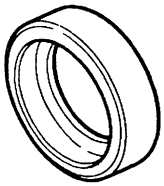
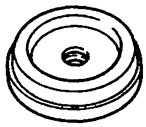
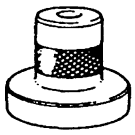
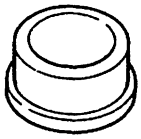
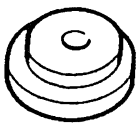
Problem	Possible Cause	Remedy	Page
Steering wheel vibration	Excessive wheel bearing play Worn or damaged wheel bearing	Tighten or replace Replace	M– 5 M– 7
Steering wheel pulls or one-sided braking	Excessive wheel bearing play Worn or damaged wheel bearing	Tighten or replace Replace	M– 5 M– 7
Excessive steering wheel play	Excessive wheel bearing play	Tighten or replace	M– 5
Abnormal noise	Worn or damaged wheel bearing Insufficient grease in joint or splines of joint shaft Bent drive shaft or joint shaft Worn drive shaft or joint shaft splines Insufficient grease in joint or on splines of drive shaft Worn drive shaft	Replace Add or replace Replace Replace Replenish or replace Replace	M– 7 M–19 M–19, 23 M–19, 23 M–23, 28 M–24
Grease leakage from boot	Damaged or broken boot Faulty boot band Excessive grease	Replace Replace Repair	M–28, 33 M–28, 33 M–28, 33

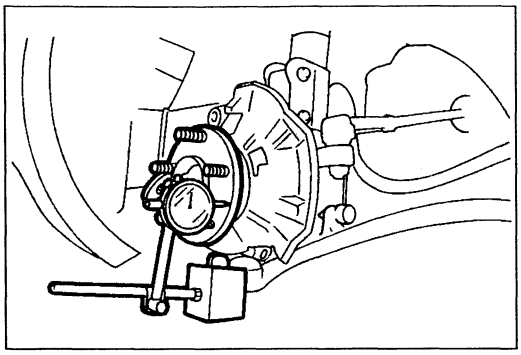
Rear Axle

Problem	Possible Cause	Remedy	Page
Steering wheel vibration	Worn or damaged wheel bearing Excessive wheel bearing play	Replace Tighten or replace	M–12, 15 M–12, 15
Steering wheel pulls or one-sided braking	Worn or damaged wheel bearing Excessive wheel bearing play	Replace Tighten or replace	M–12, 15 M–12, 15
Excessive steering wheel play	Excessive wheel bearing play	Tighten or replace	M–12, 15
Abnormal noise	Worn or damaged wheel bearing	Replace	M–12, 15

FRONT AXLE

PREPARATION
SST

49 G030 797 Handle (Part of 49 G030 795) 	For installation of wheel bearing	49 G033 1A1 Puller, wheel hub 	For disassembly and assembly of wheel hub
49 F026 103 Puller, wheel hub 	For disassembly of wheel bearing	49 G033 105 Attachment (Part of 49 G033 1A1) 	For installation of front wheel hub
49 G033 102 Handle (Part of 49 G033 1A1) 	For removal of front wheel hub	49 F027 0A1 Installer set, bearing 	For installation of bearing
49 G033 107 Installer, dust cover 	For installation of dust cover	49 F027 004 Attachment 80 (Part of 49 F027 0A1) 	For removal of wheel bearing
49 V001 795 Installer, oil seal 	For installation of oil seal	49 F027 009 Attachment 68 & 77 (Part of 49 F027 0A1) 	For instalation of dust cover
49 G033 106 Attachment (Part of 49 G033 1A1) 	For removal of front wheel hub	49 G030 795 Installer, oil seal 	For installation of wheel bearing



WHEEL HUB, STEERING KNUCKLE

Preinspection

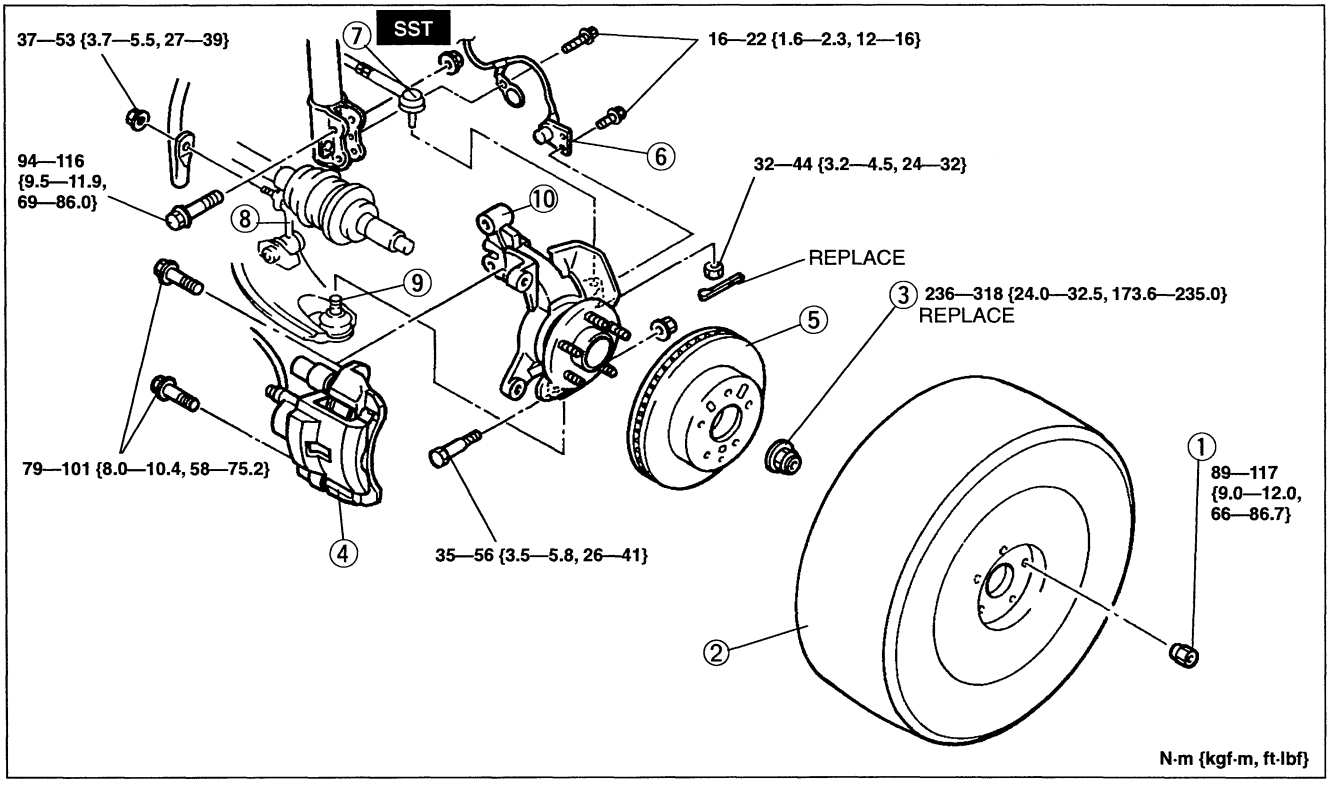
Wheel bearing play

1. Remove the wheel and tire.
2. Remove the brake caliper assembly and disc plate.
3. Position a dial indicator against the wheel hub. Push and pull the wheel hub by hand in the axial direction and measure the wheel bearing play.
4. If the bearing play exceeds the specification, check and adjust the locknut torque or replace the wheel bearing if necessary.

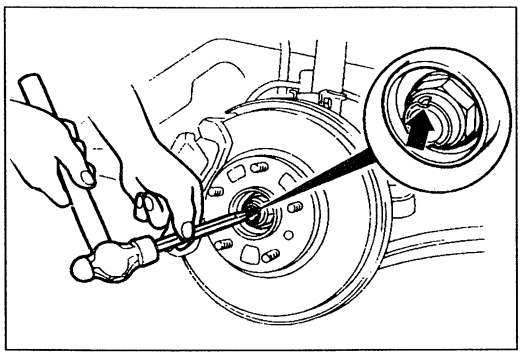
Maximum wheel bearing play: 0.05 mm {0.002 in}

Removal / Installation

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. Tighten the stabilizer and shock absorber bolts and nuts to just under the specified torque. Lower the vehicle and tighten all bolts and nuts to the specified torque with the vehicle unladen.
5. After installation, check the wheel alignment. (Refer to section R.)

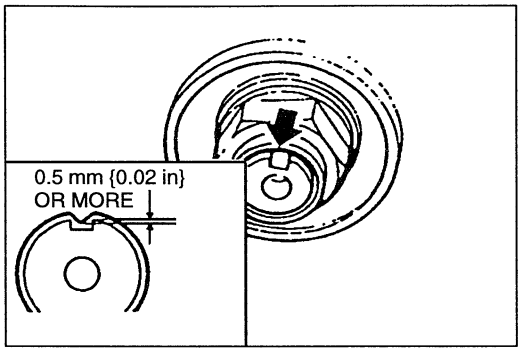


1. Wheel nut
2. Wheel and tire
3. Locknut
   - Removal Note ..... page M–6
   - Installation Note ..... page M–6
4. Brake caliper assembly
   - Service ..... section P
5. Disc plate
   - Service ..... section P
6. ABS wheel-speed sensor
   - Service ..... section P
7. Tie-rod end
   - Service ..... section N
8. Stabilizer control link
9. Lower arm ball joint
10. Steering knuckle, wheel hub and dust cover
    - Inspect dust cover for damage and distortion
    - Disassembly / Inspection / Assembly ..... page M–7



Removal Note
Locknut

1. Knock the crimped portion of the locknut outward by using a small chisel and a hammer.
2. Lock the hub by applying the brakes.
3. Remove the locknut.



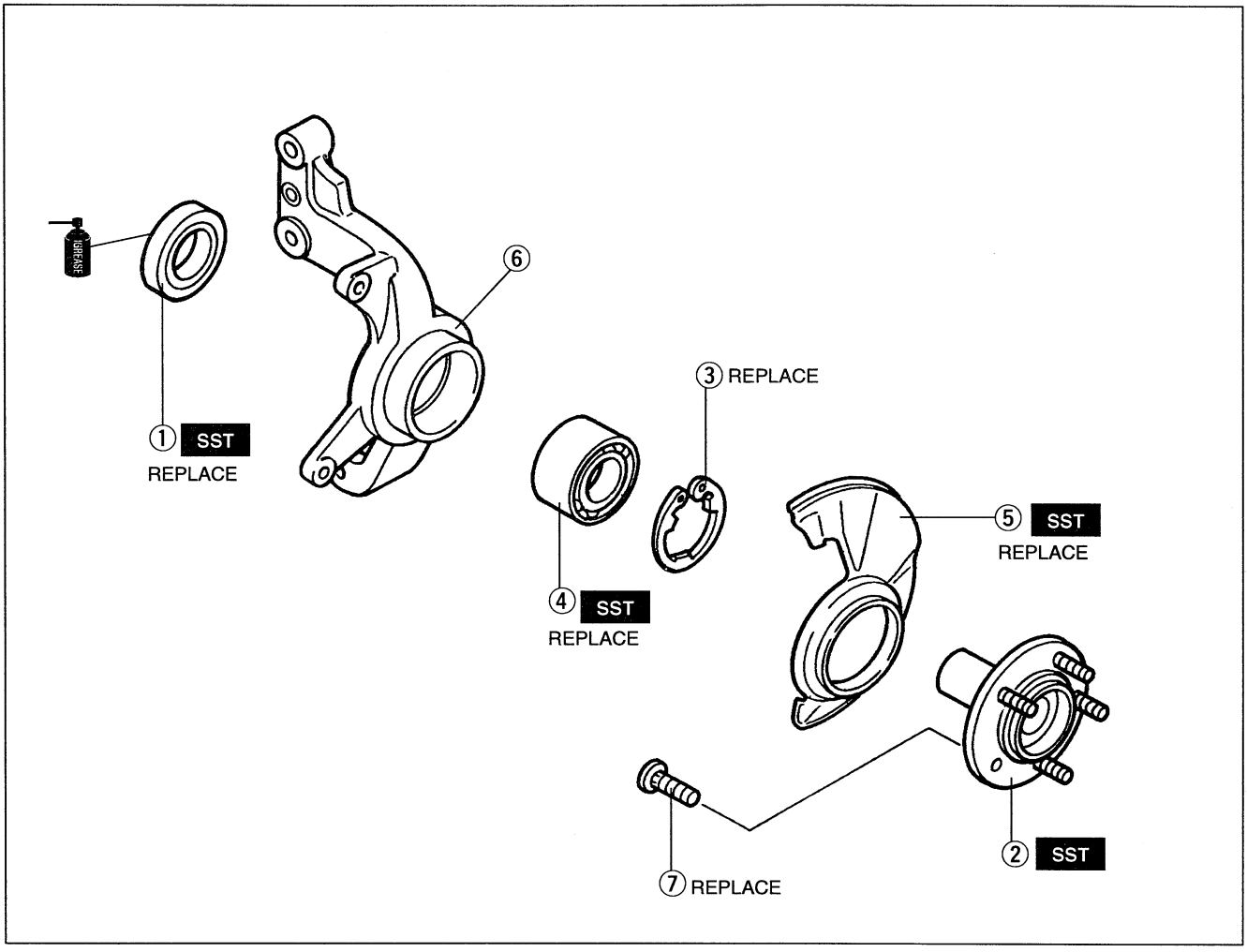
Installation Note
Locknut

Install a new locknut and stake it as shown.

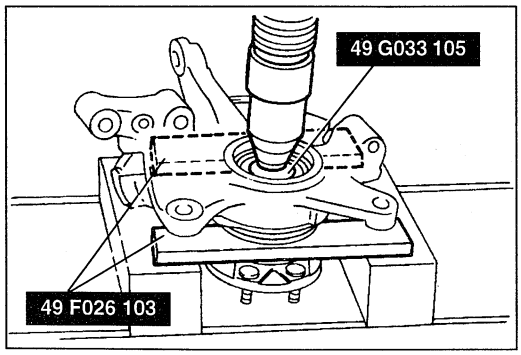
Tightening torque: 236—318 N·m {24.0—32.5 kgf·m, 173.6—235.0 ft·lbf}

Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



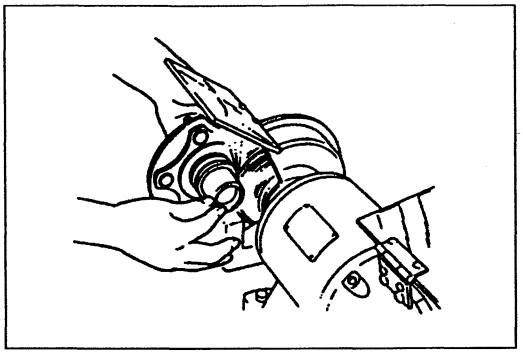
1. Oil seal
   Assembly Note ..... page M–10
2. Front wheel hub assembly
   Disassembly Note ..... below
   Assembly Note ..... page M– 9
3. Retaining ring
4. Wheel bearing
   Disassembly Note ..... page M– 8
   Assembly Note ..... page M– 9
5. Dust cover
   Disassembly Note ..... page M–8
   Assembly Note ..... page M–9
6. Steering knuckle
7. Hub bolt
   Disassembly Note ..... page M–8
   Assembly Note ..... page M–9



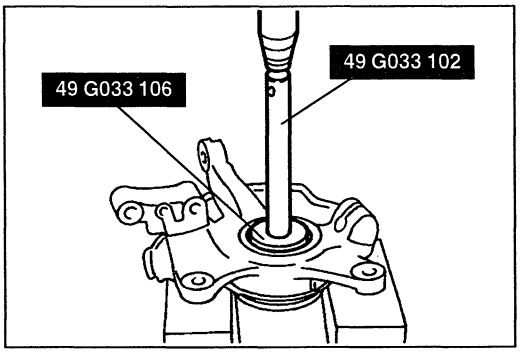
Disassembly Note

Front wheel hub assembly

1. Remove the front wheel hub assembly by using the **SSTs**.

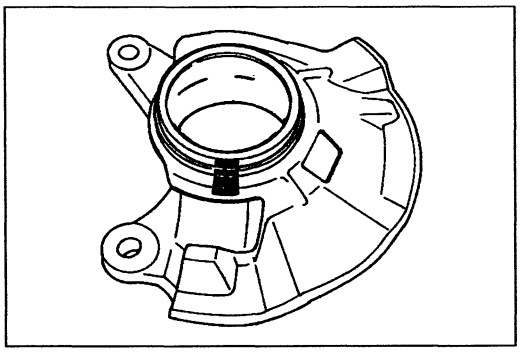


2. If the bearing inner race remains on the front wheel hub assembly, grind a section of the bearing inner race until approx. 0.5 mm {0.020 in} remains. Then remove it with a chisel.



Wheel bearing

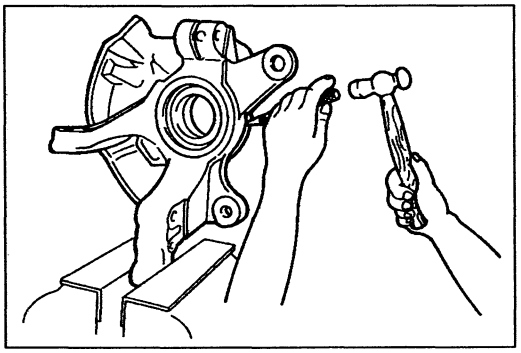
Using the **SSTs**, remove the wheel bearing.



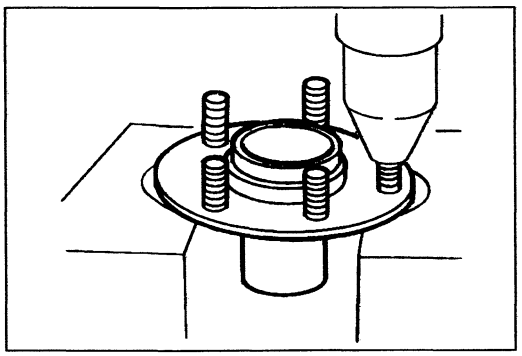
Dust cover

Note
- The dust cover does not need to be removed unless you are replacing it.

1. Mark the dust cover and steering knuckle for proper reassembly.



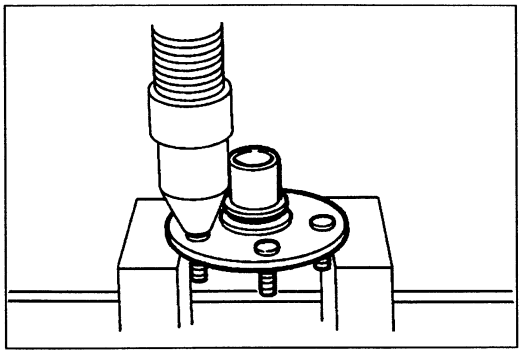
2. Remove the dust cover by using a chisel.



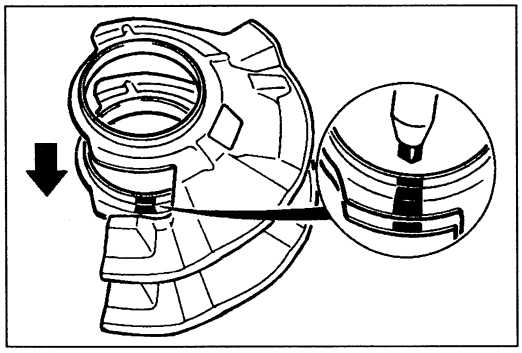
Hub bolt

Note
- The hub bolts do not need to be removed unless you are replacing them.

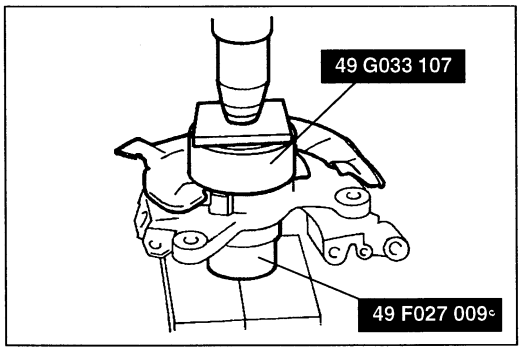
Remove the hub bolts by using a press.



Assembly Note
Hub bolt
Press in new hub bolts.

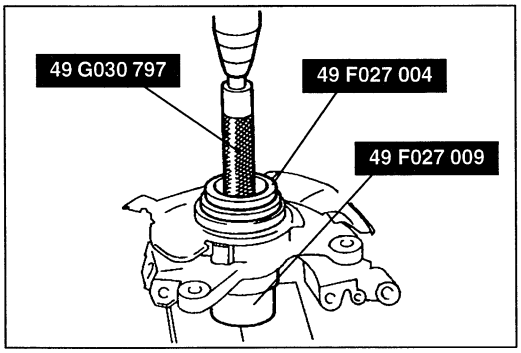


Dust cover
1. Mark the new dust cover as the one removed.

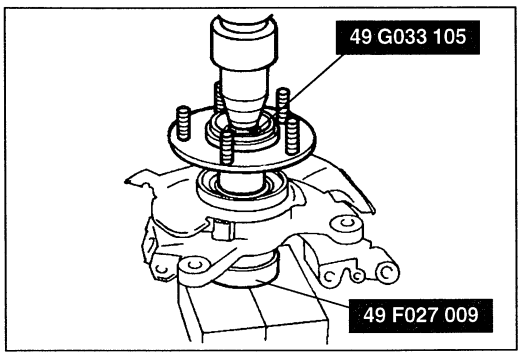


2. Align the marks of the new dust cover and the steering knuckle.
3. Using a steel plate and the **SSTs**, install the dust cover.

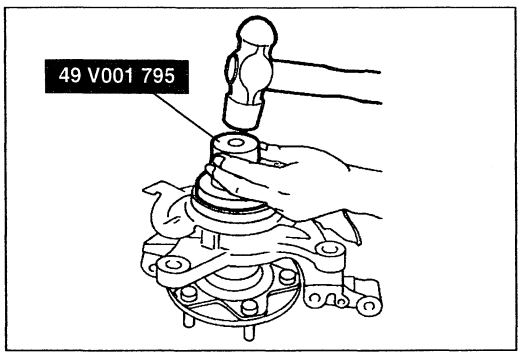
M



Wheel bearing
Using the **SSTs**, install the new wheel bearing.



Front wheel hub assembly
Using the **SSTs**, install the front wheel hub assembly.

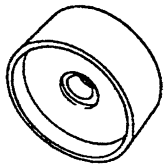


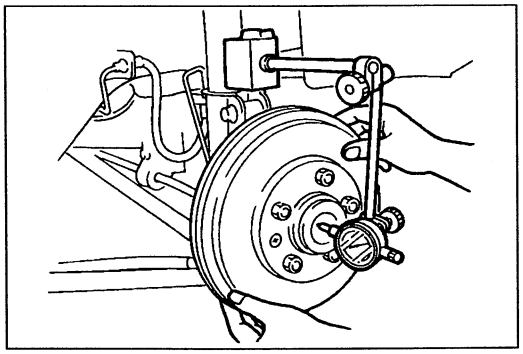
Oil seal

1. Using the **SST** and a hammer, tap a new oil seal in evenly until the **SST** contacts the steering knuckle.
2. Coat the lip of the oil seal with grease.

REAR AXLE

PREPARATION
SST

49 H028 204 Attachment		For installation of sensor rotor



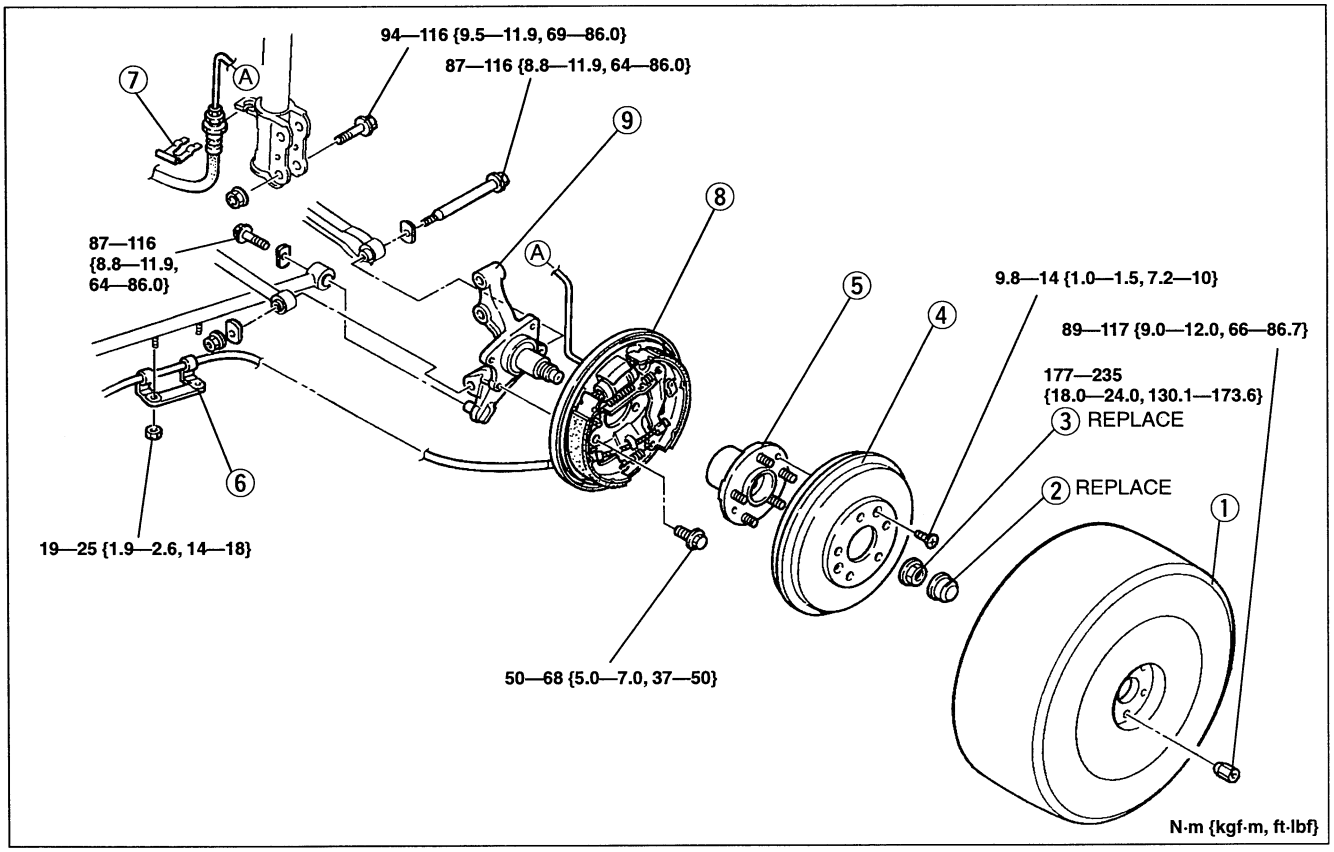
DRUM BRAKE TYPE
Wheel Hub, Hub Spindle
Preinspection
Wheel bearing play

1. Remove the wheel and tire.
2. Position a dial indicator against the brake drum. Push and pull the rear brake assembly by hand in the axial direction and measure the wheel bearing play.
3. If the bearing play exceeds specification, check and adjust the locknut torque or replace the hub bearing assembly if necessary.

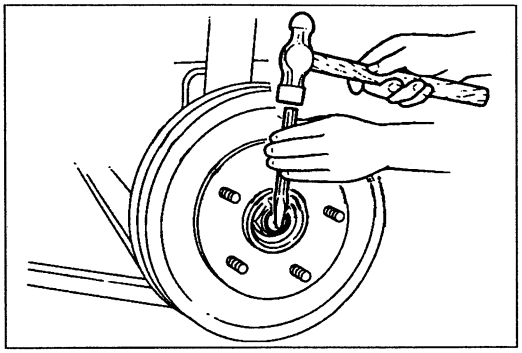
Maximum wheel bearing play: 0.05 mm {0.002 in}

Removal / Inspection / Installation

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. Tighten the lateral link, trailing link and shock absorber bolts and nuts to just under the specified torque. Lower the vehicle and tighten all bolts and nuts to the specified torques with the vehicle unladen.
5. After installation, check the rear wheel alignment. (Refer to section R.)

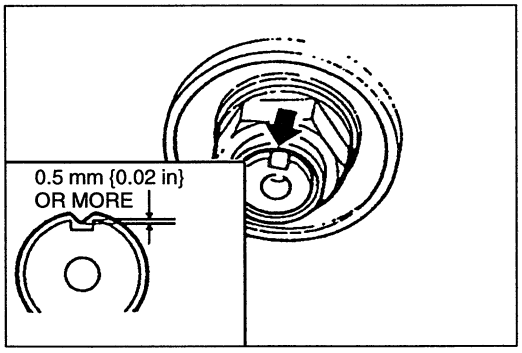


1. Wheel and tire
2. Hub cap
3. Locknut
   - Removal Note ..... page M–13
   - Installation Note ..... page M–13
4. Brake drum
5. Hub bearing assembly
   - Inspect for cracks and damage
   - Disassembly / Assembly ..... page M–14
6. Parking brake cable bracket
7. Clip
8. Rear brake assembly
   - Service ..... section P
9. Rear hub spindle
   - Inspect for cracks and damage



Removal Note
Locknut

1. Raise the staked portion of the locknut using a small cape chisel and a hammer.
2. Lock the hub by applying the brakes.
3. Remove the locknut.



Installation Note
Locknut

Install a new locknut and stake it as shown.

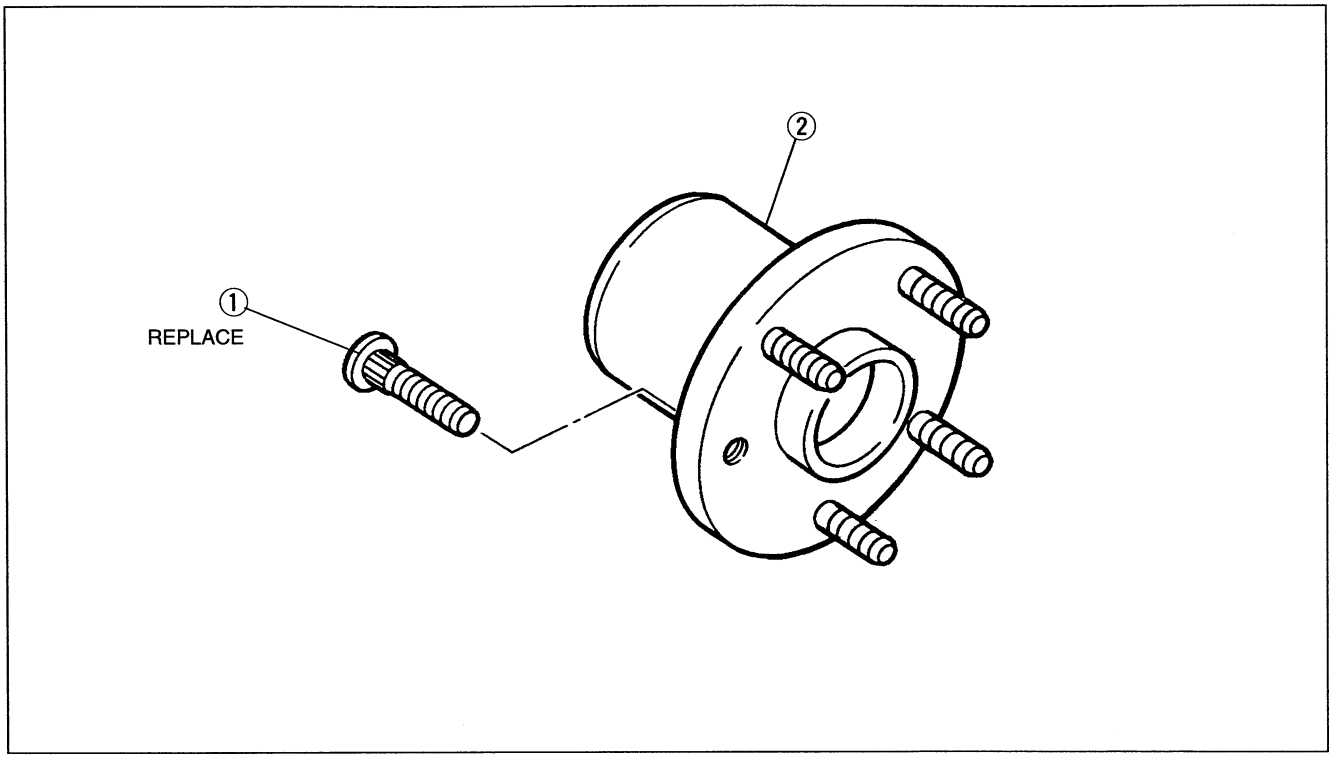
Tightening torque: 177—235 N·m {18.0—24.0 kgf·m, 130.1—173.6 ft·lbf}

Disassembly / Assembly

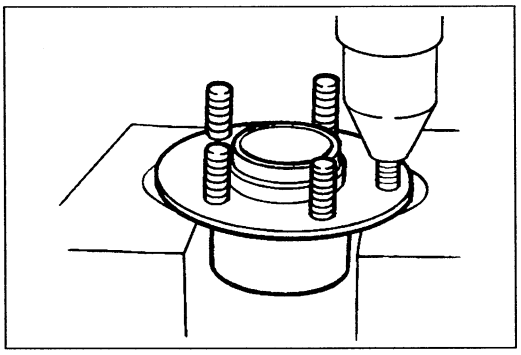
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.

Caution

- **The wheel hub and bearing are one assembly and do not need to be disassembled.**



1. Hub bolt
   Disassembly Note ..... page M–14
   Assembly Note ..... page M–14
2. Hub bearing assembly

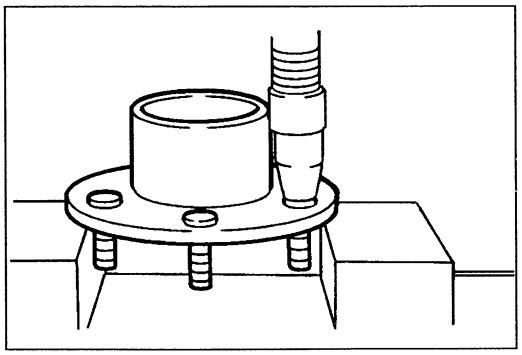


Disassembly Note
Hub bolt

Note

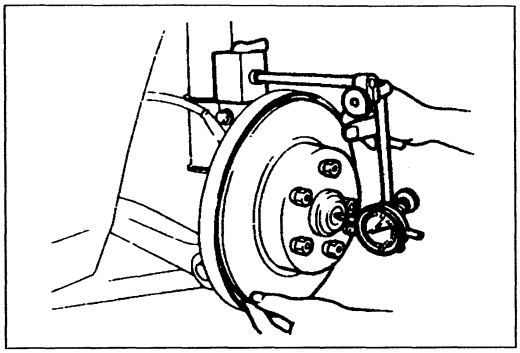
- The hub bolts do not need to be removed unless you are replacing them.

Remove the hub bolts with a press.



Assembly Note
Hub bolt

Press in new hub bolts.



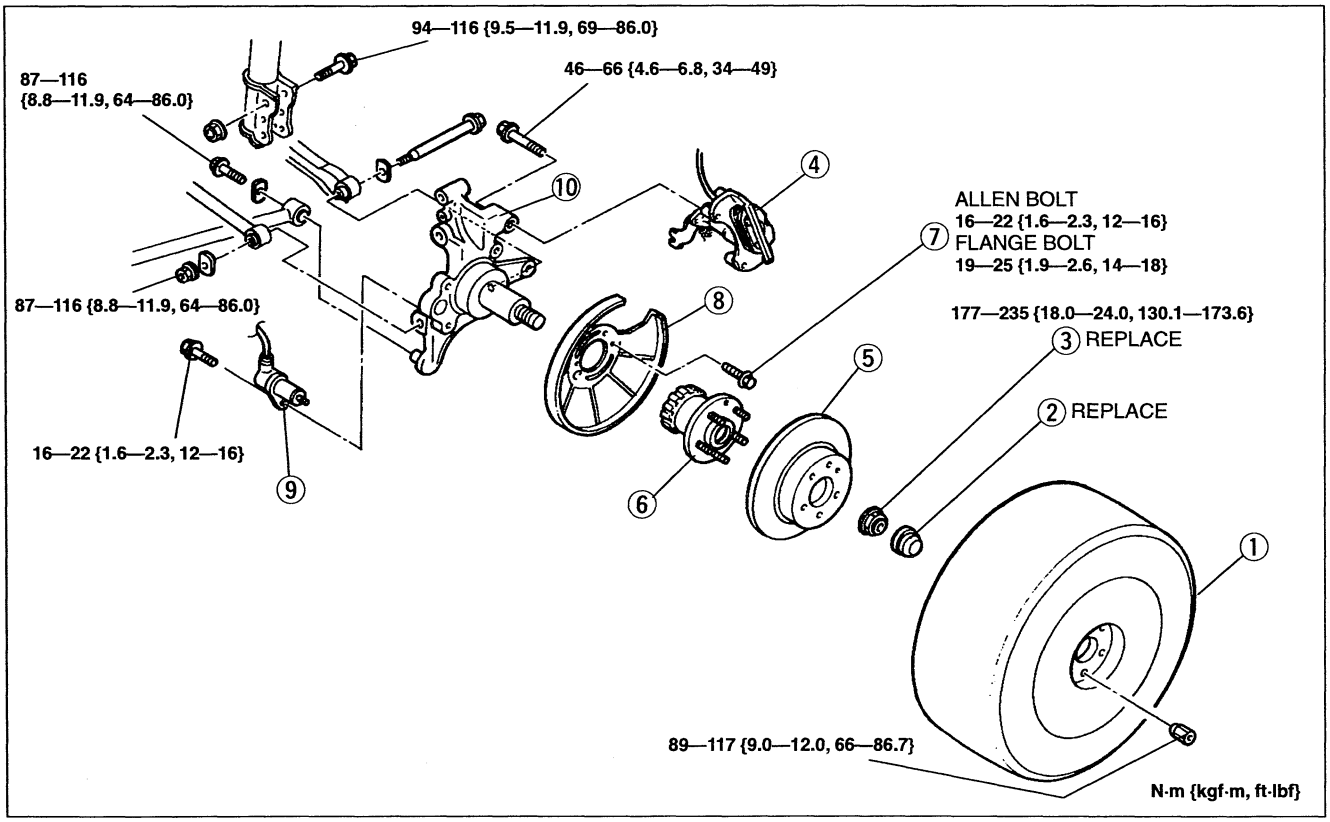
DISC BRAKE TYPE
Wheel Hub, Hub Spindle
Preinspection
Wheel bearing play

1. Remove the wheel and tire.
2. Remove the brake caliper assembly.
3. Position a dial indicator against the wheel hub. Push and pull the wheel hub by hand in the axial direction and measure the wheel bearing play.
4. If the bearing play exceeds the specification, check and adjust the locknut torque or replace the hub bearing assembly if necessary.

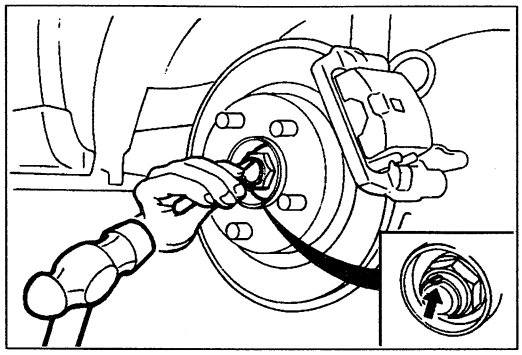
Maximum wheel bearing play: 0.05 mm {0.002 in}

Removal / Inspection / Installation

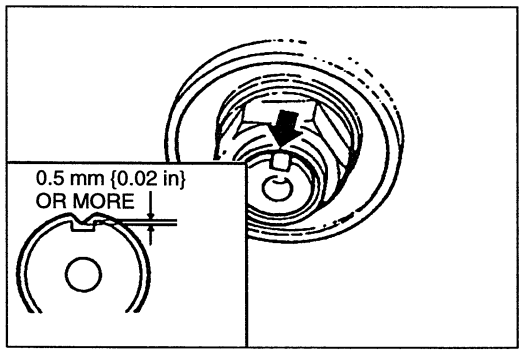
1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. Tighten the lateral link, trailing link and shock absorber bolts and nuts to just under the specified torque. Lower the vehicle and tighten all bolts and nuts to the specified torques with the vehicle unladen.
5. After installation, check the rear wheel alignment. (Refer to section R.)



1. Wheel and tire
2. Hub cap
3. Locknut
   - Removal Note ..... page M–16
   - Installation Note ..... page M–16
4. Brake caliper assembly
   - Service ..... section P
5. Disc plate
   - Inspection ..... section P
6. Hub bearing assembly
   - Inspect for cracks and damage
   - Disassembly / Assembly ..... page M–16
7. Allen bolt or flange bolt
8. Dust cover
   - Inspect for damage and distortion
9. ABS wheel-speed sensor
10. Hub spindle
    - Inspect for cracks and damage



Removal Note
Locknut
1. Knock the crimped portion of the locknut outward by using a small chisel and a hammer.
2. Lock the hub by applying the brakes.
3. Remove the locknut.

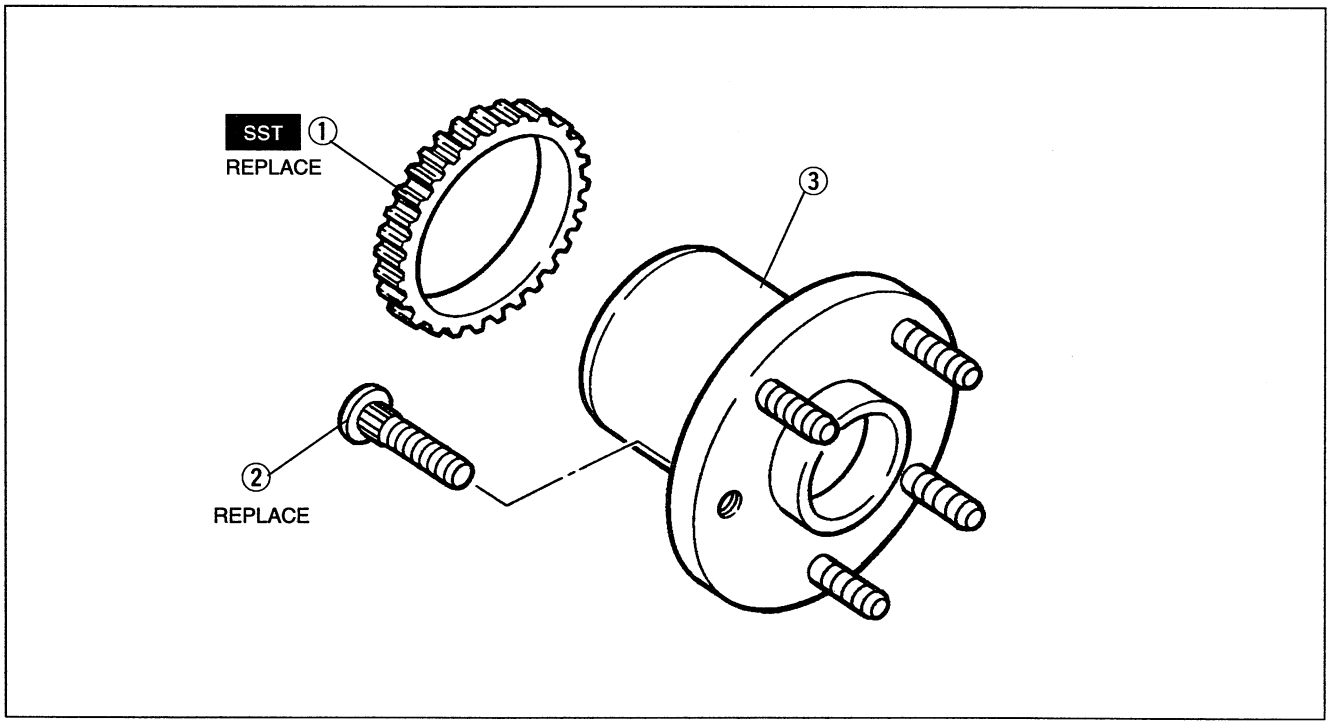


Installation Note
Locknut
Install a new locknut and stake it as shown.

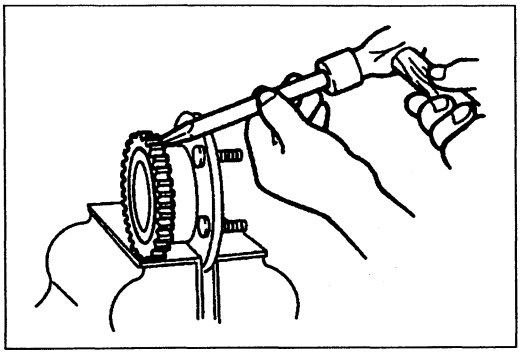
Tightening torque: 177—235 N·m {18.0—24.0 kgf·m, 130.1—173.6 ft·lbf}

Disassembly / 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**.

Caution
- **The wheel hub and bearing are one assembly and do not need to be disassembled.**



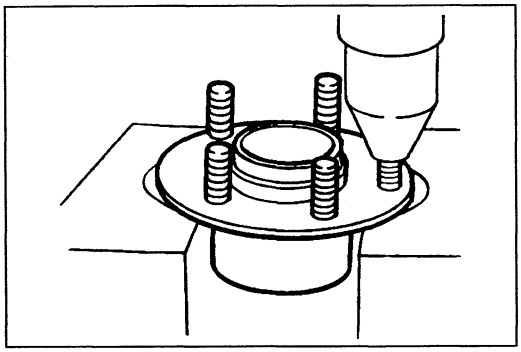
1. ABS sensor rotor
   Disassembly Note ..... page M–17
   Assembly Note ..... page M–17
2. Hub bolt
   Disassembly Note ..... page M–17
   Assembly Note ..... page M–17
3. Hub bearing assembly



Disassembly Note
ABS sensor rotor

Note
- The ABS sensor rotor does not have to be removed unless you are replacing it.

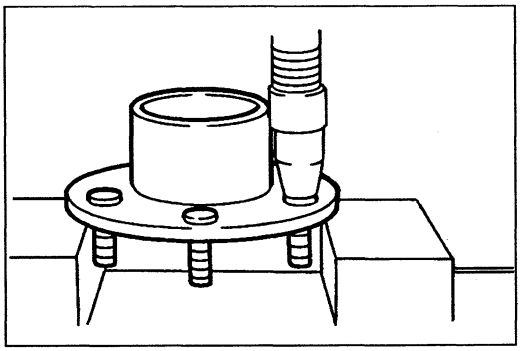
Remove the ABS sensor rotor by using a chisel.



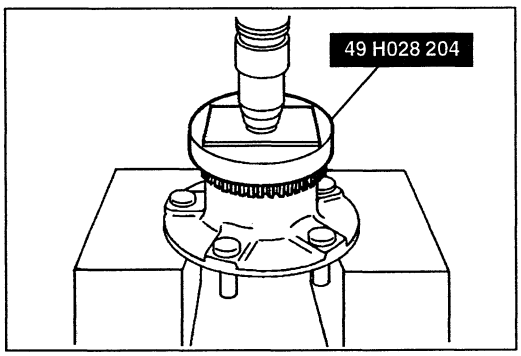
Hub bolt

Note
- The wheel hub and bearing are one assembly and do not to be disassembled.

Remove the hub bolts by using a press.



Assembly Note
Hub bolt
Press in new hub bolts.

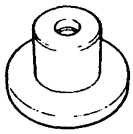
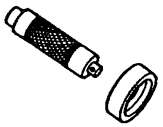
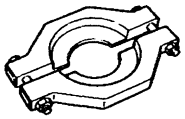
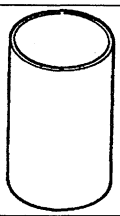
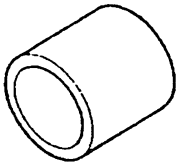
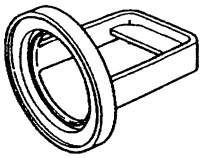
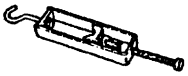
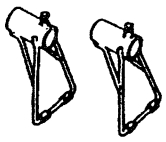
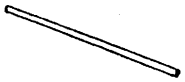
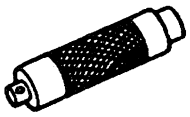
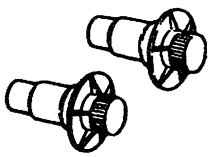


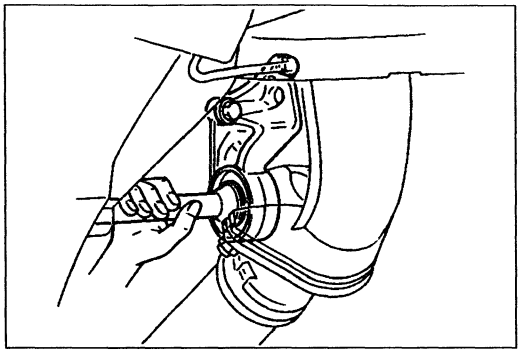
ABS sensor rotor
1. Install a new rear ABS sensor rotor on to the wheel hub.
2. Using a steel plate and the **SST**, press the rotor until it is flush with the wheel hub.

Note
- The ABS sensor rotor can be installed in either direction.

DRIVE SHAFT

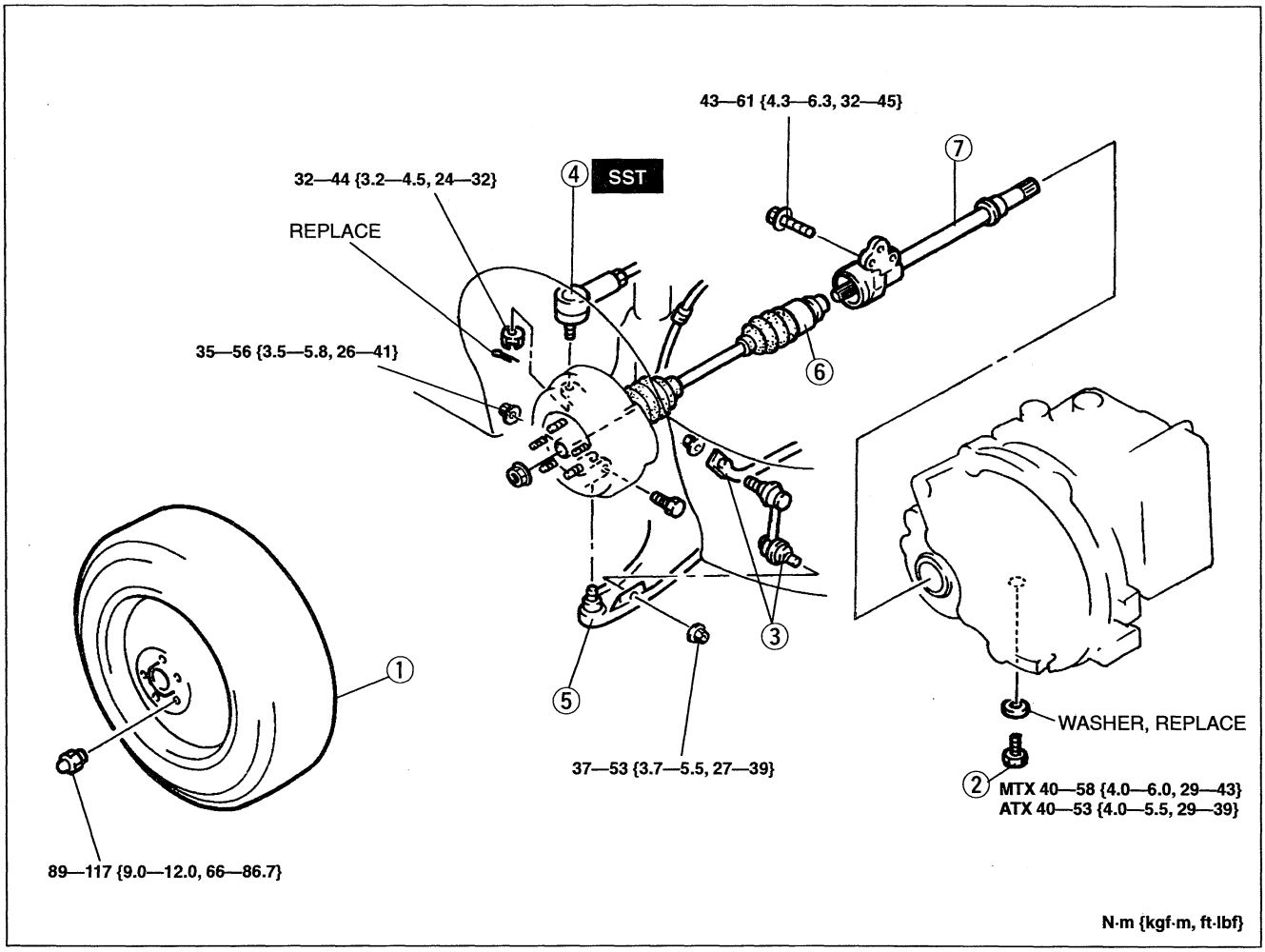
PREPARATION
SST

49 H034 2A0 Lower arm bushing puller & installer 	For support of bracket	49 H034 201 Support block (Part of 49 H034 2A0) 	For support of bracket
49 F026 102 Installer, bearing 	For removal of bearing and left side dust seal	49 G030 795 Installer, oil seal 	For installation of right side dust seal and bearing
49 H027 002 Remover, bering 	For removal of dust cover	49 B025 005 Installer, dust cover 	For installation of dust cover
49 W027 003 Installer, oil seal 	For installation of left side dust seal	49 G025 001 Installer, sensor rotor 	For installation of sensor rotor
49 G017 503 Hook (Part of 49 G017 5A0) 	For support of engine	49 G017 5A0 Support, engine 	For support of engine
49 G017 502 Support (Part of 49 G017 5A0) 	For support of engine	49 G017 501 Bar (Part of 49 G017 5A0) 	For support of engine
49 G030 797 Handle (Part of 49 G030 795) 	For installation of right side dust seal and bearing	49 G030 796 Body (Part of 49 G030 795) 	For installation of right side dust seal and bearing
49 G030 455 Holder, diff. side gear 	For holding side gears	—	—

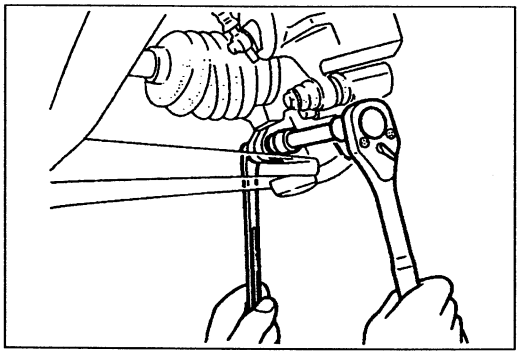


JOINT SHAFT
Preinspection
Joint shaft
1. Verify that the joint shaft is not twisted or cracked. Replace it if necessary.
2. Turn the joint shaft by hand and verify that the bearing rotates smoothly and freely. Replace it if necessary.

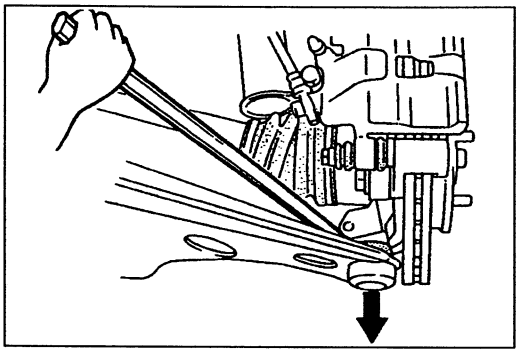
Removal / Installation
1. Drain the transaxle oil.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. After installation, fill the transaxle with the specified amount of the specified transaxle oil or ATF and inspect for oil leakage.



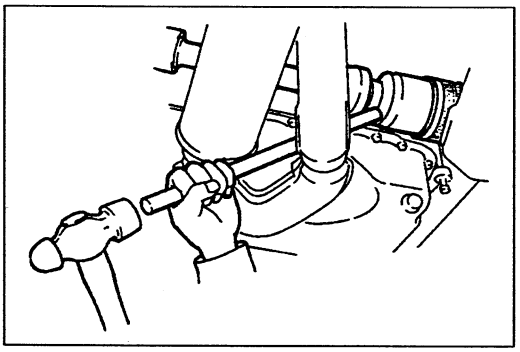
1. Wheel and tire
2. Drain plug
3. Stabilizer control link
4. Tie-rod end
   Service ..... section N
5. Lower arm ball joint
6. Right drive shaft and axle
   Removal Note ..... page M–20
   Installation Note ..... page M–21
7. Joint shaft
   Removal Note ..... page M–20
   Installation Note ..... page M–20
   Overhaul ..... page M–21



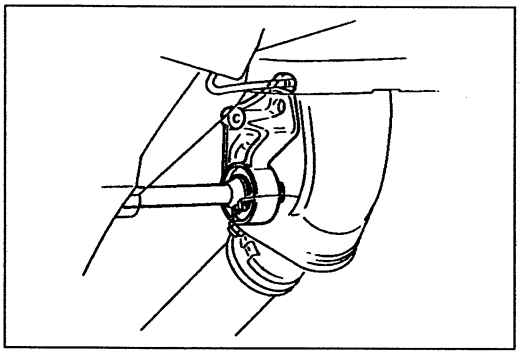
Removal Note
Right drive shaft and axle
1. Remove the clinch bolt and nut.



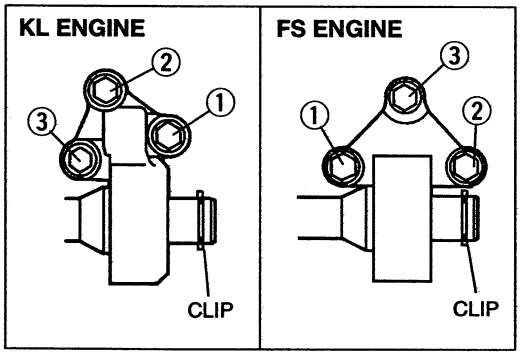
2. Wrap a rag around the ball joint dust boot.
3. Pry the lower arm out of the knuckle.



4. As shown in the figure, insert a pry bar between the right drive shaft and the joint shaft and tap on the bar to uncouple them.

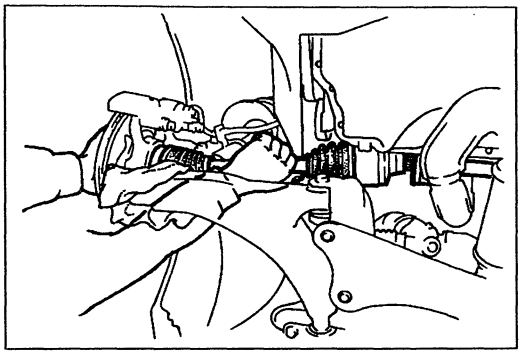


Joint shaft
Pull the joint shaft straight out.



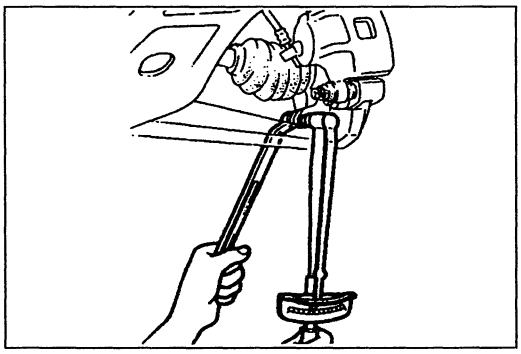
Installation Note
Joint shaft
1. Install the joint shaft with the end-gap of a new clip facing upward.
2. Tighten the bolts in the order shown.

Tightening torque:
43—61 N·m {4.3—6.3 kgf·m, 32—45 ft·lbf}



Right drive shaft and axle

1. Push the drive shaft into the joint shaft.
2. After installation, pull the front hub outward to verify that the drive shaft is securely held by the clip.

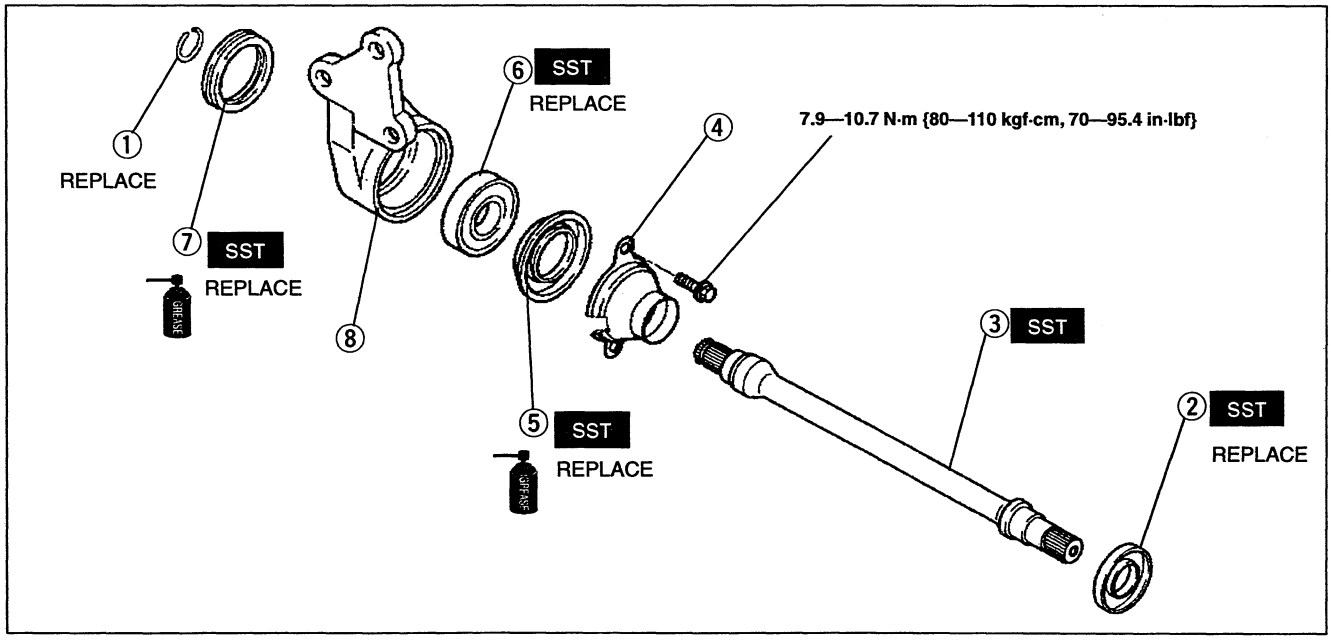


3. Install the lower arm ball joint to the knuckle and tighten the through bolt.

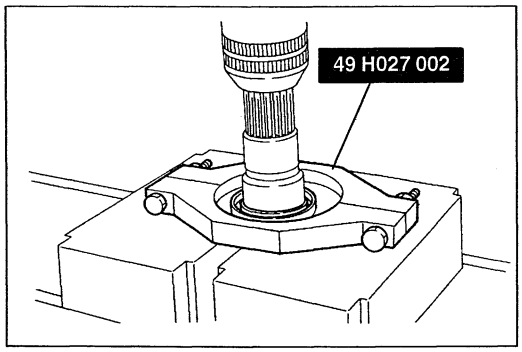
Tightening torque:
35—56 N·m {3.5—5.8 kgf·m, 26—41 ft·lbf}

Overhaul

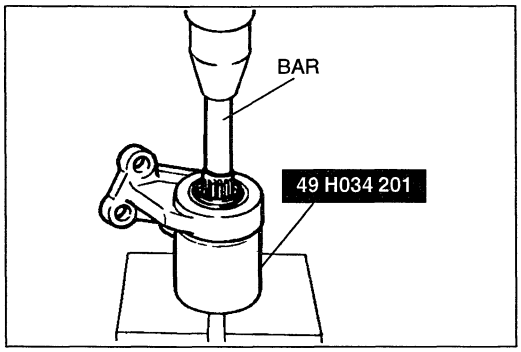
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



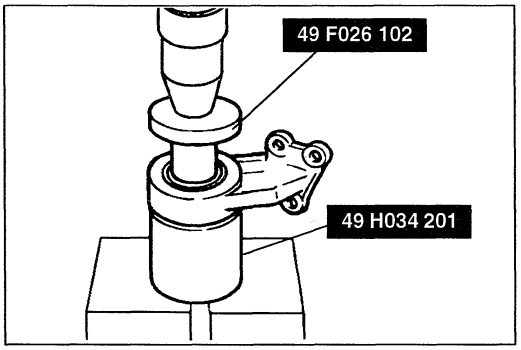
1. Clip
2. Dust cover (KL engine)
   - Disassembly Note ..... page M–22
   - Assembly Note ..... page M–23
3. Joint shaft
   - Inspect splines for damage and wear
   - Disassembly Note ..... page M–22
   - Assembly Note ..... page M–23
4. Dust cover (KL engine)
5. Dust seal (left)
   - Disassembly Note ..... page M–22
   - Assembly Note ..... page M–23
6. Bearing
   - Disassembly Note ..... page M–22
   - Assembly Note ..... page M–22
7. Dust seal (right)
   - Assembly Note ..... page M–22
8. Bracket



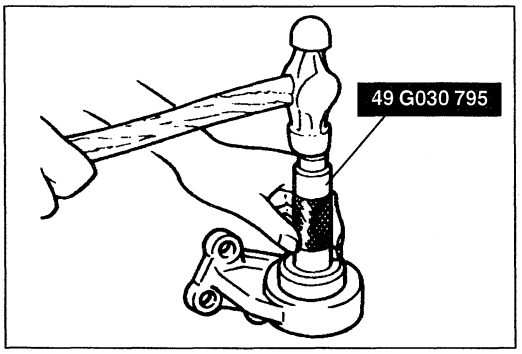
Disassembly Note
Dust cover (KL engine)
While holding the joint shaft, press out the dust cover by using the **SST**.



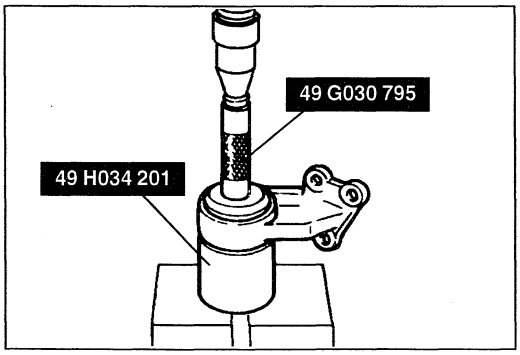
Joint shaft
Remove the joint shaft by using the **SST**.



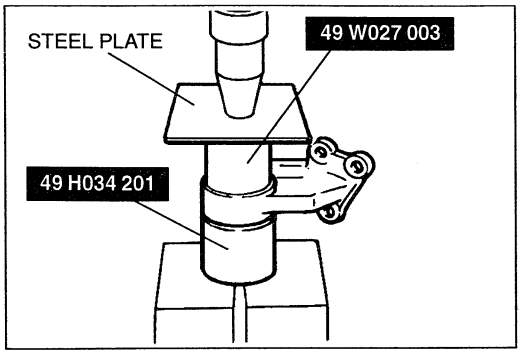
Dust seal (left)/Bearing
Remove the left side dust seal and bearing by using the **SSTs**.



Assembly Note
Dust seal (right)
Using the **SST**, install the new right side dust seal.

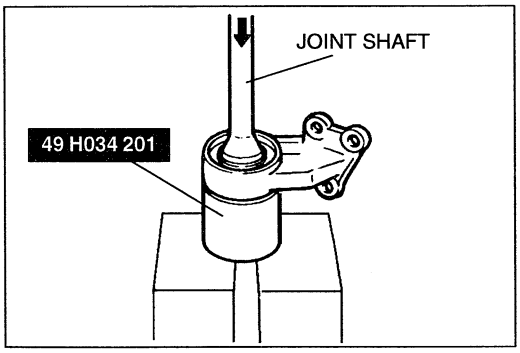


Bearing
Using the **SSTs**, install the new bearing.



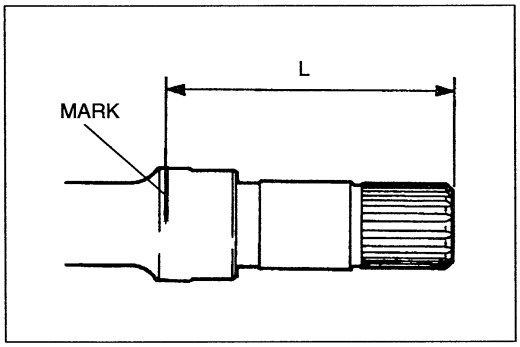
Dust seal (left)

Using a steel plate and the **SSTs**, install the new left side dust seal.



Joint shaft

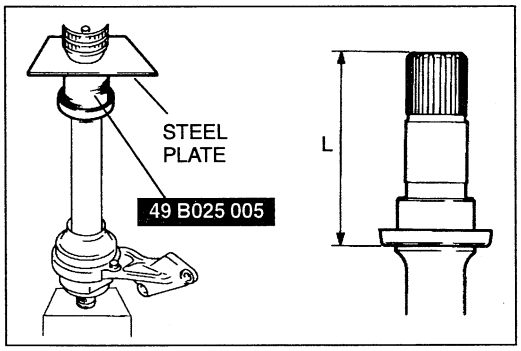
Using a press and the **SST**, install the joint shaft.



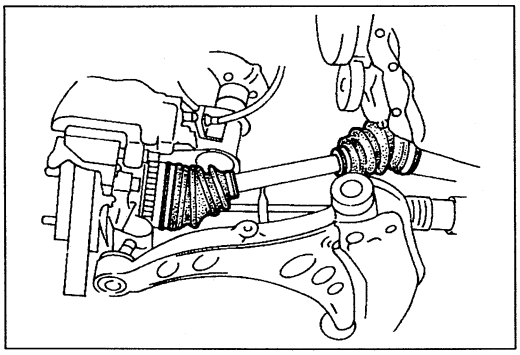
Dust cover (KL engine)

1. Mark the shaft as shown in the figure.

   Length L: 89.0 ± 0.5 mm {3.50 ± 0.02 in}



2. Press in the dust cover to the marked position by using a steel plate and the **SST**.
3. Verify that length L is within specification.

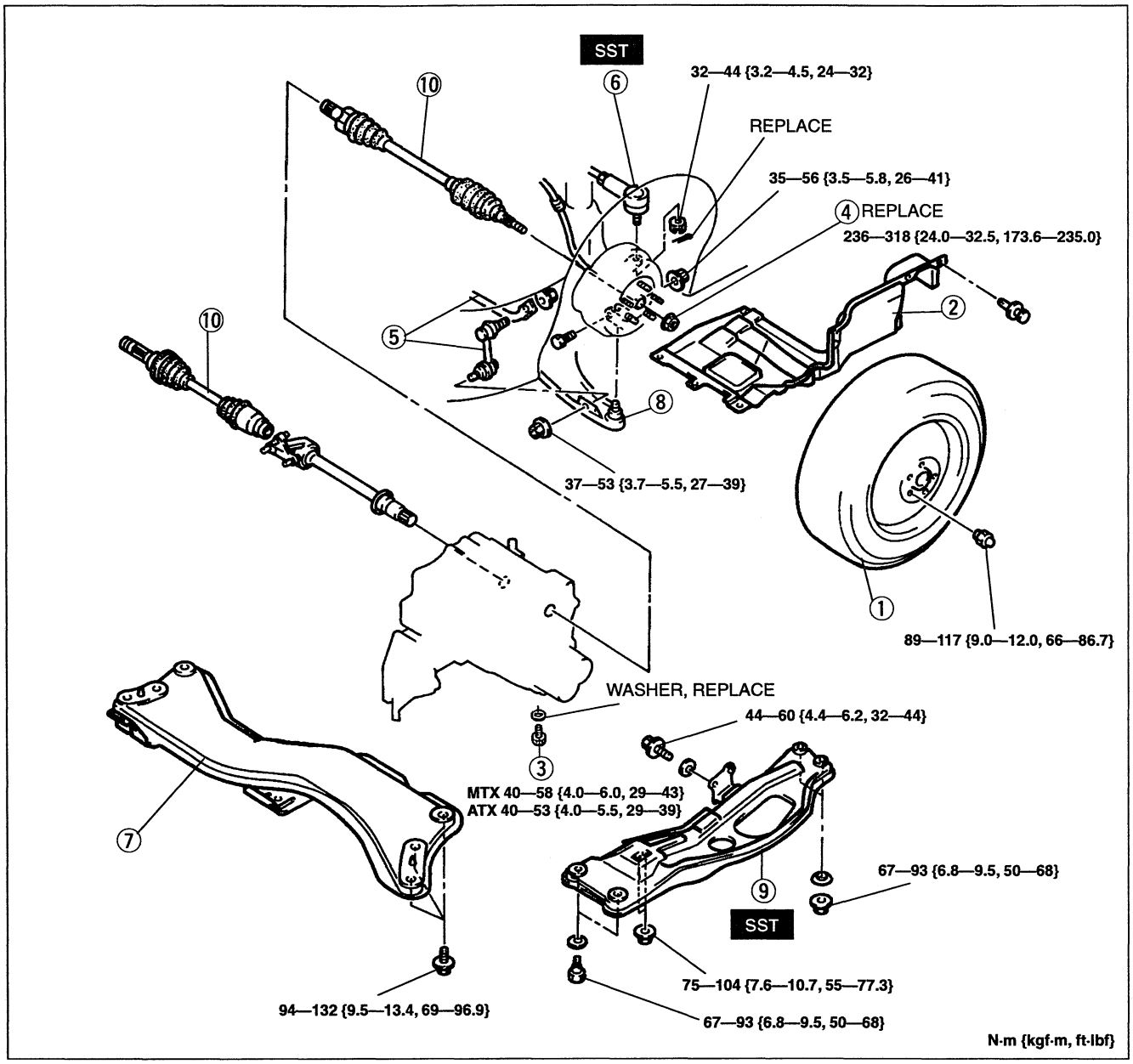


DRIVE SHAFT
Preinspection
Drive shaft

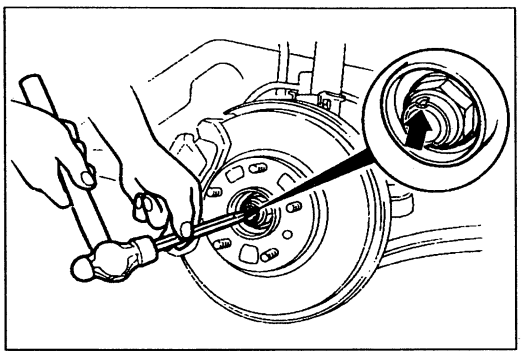
1. Check the dust boot on the drive shaft for cracks, damage, leaking grease, and a loose boot band.
2. Check the drive shaft for bending, cracks, and wear of joints or splines.
3. Repair or replace the drive shaft if necessary.

Removal / Installation

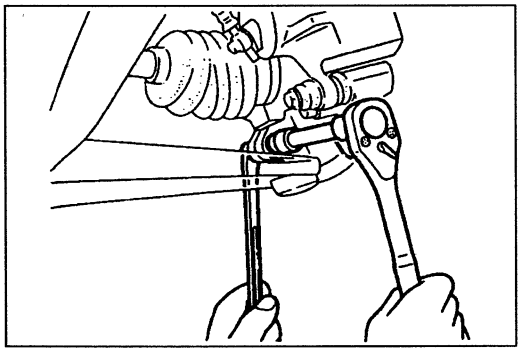
1. Drain the transaxle oil.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. After installation, fill the transaxle with the specified amount of the specified transaxle oil or ATF and inspect for oil leakage.
5. Check the front wheel alignment. (Refer to section R.)



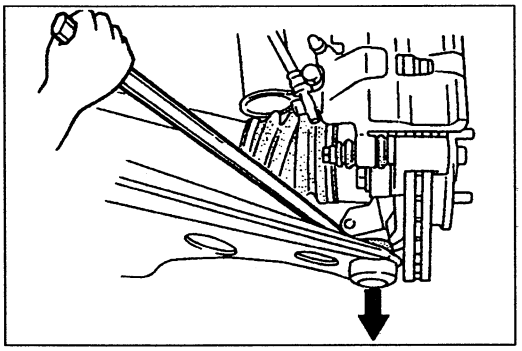
1. Wheel and tire
2. Splash shield
3. Drain plug
4. Locknut
   - Removal Note ..... page M–25
   - Installation Note ..... page M–27
5. Stabilizer and control link
6. Tie-rod end
   - Service ..... section N
7. Transverse member
8. Lower arm ball joint
   - Removal Note ..... page M–25
9. Engine mount member
   (Only for ATX at left side drive shaft)
   - Removal Note ..... page M–25
10. Drive shaft
    - Removal Note ..... page M–25
    - Installation Note ..... page M–26
    - Overhaul ..... pages M–28, 33



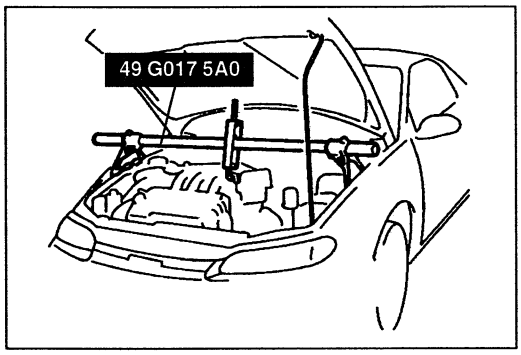
Removal Note
Locknut
1. Knock the crimped portion of the locknut outward by using a chisel and a hammer.
2. Lock the hub by applying the brakes.
3. Remove the locknut.



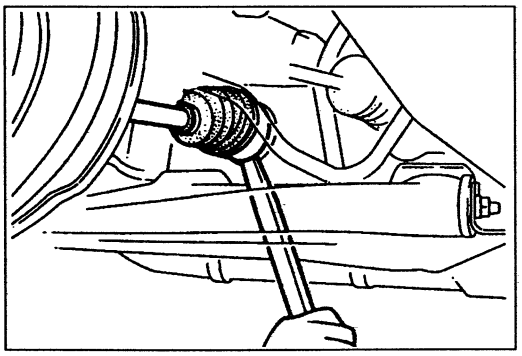
Lower arm ball joint
1. Remove the clinch bolt and nut.



2. Wrap a rag around the ball joint dust boot.
3. Pry the lower arm out of the knuckle.



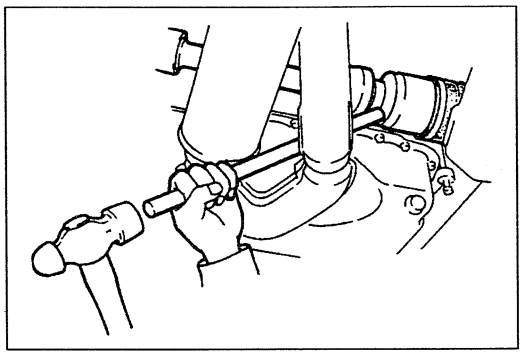
Engine mount member
Suspend the engine by using the **SST** and remove the engine mount member.



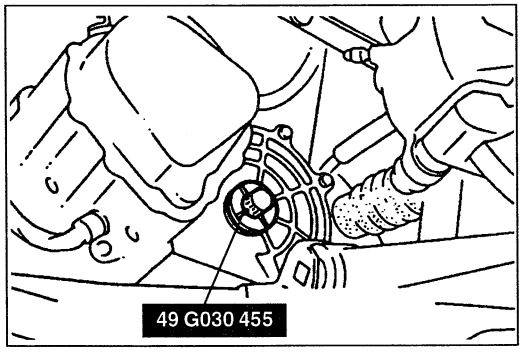
Drive shaft

Caution
- **The sharp edges of the drive shaft can slice or puncture the oil seal. Be careful when removing the drive shaft from the transaxle.**

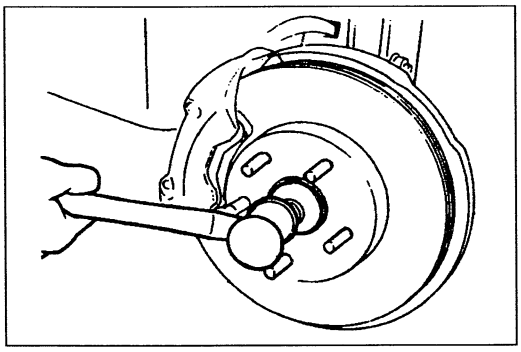
1. Separate the left-side drive shaft from the transaxle by prying with a bar inserted between the outer ring and the transaxle, as shown in the figure.



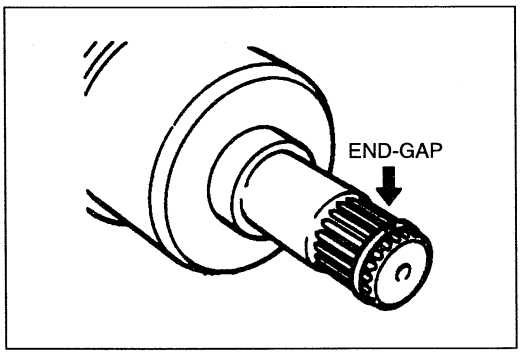
2. Separate the right-side drive shaft from the joint shaft by hammering on a bar inserted between them.



3. Install the **SST** into the transaxle to hold the side gears.



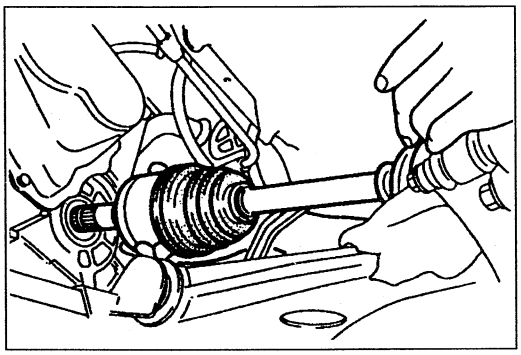
Note
- If the drive shaft will not come out of the front wheel hub easily, install an already discarded nut onto the drive shaft so that the nut is flush with the end of the drive shaft. Tap the nut with a copper hammer to loosen the drive shaft from the front wheel hub.



Installation Note
Drive shaft

Caution
- **The sharp edges of the drive shaft can slice or puncture the oil seal. Be careful when installing the drive shaft to the transaxle.**

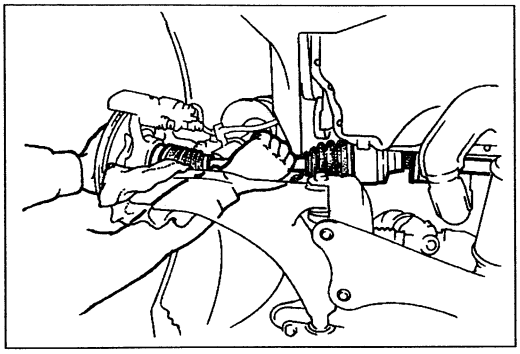
1. Turn the clip with the opening facing upward.



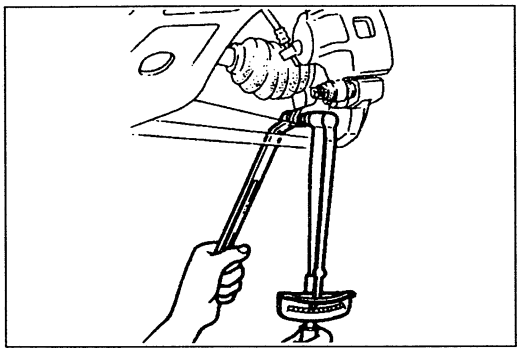
2. Apply grease to the ends of the drive shafts.

Caution
- **The oil seals are damaged easily if this procedure is not done correctly.**

3. Push the drive shaft into the transaxle (left side) or joint shaft (right side).

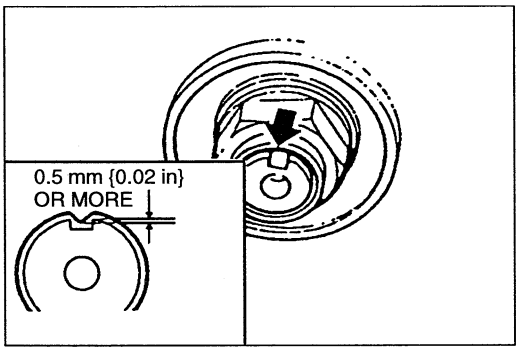


4. After installation, pull the front hub outward to confirm that the drive shaft is securely held by the clip.



5. Install the lower arm ball joint to the knuckle and tighten the through bolt.

Tightening torque:
35—56 N·m {3.5—5.8 kgf·m, 26—41 ft·lbf}



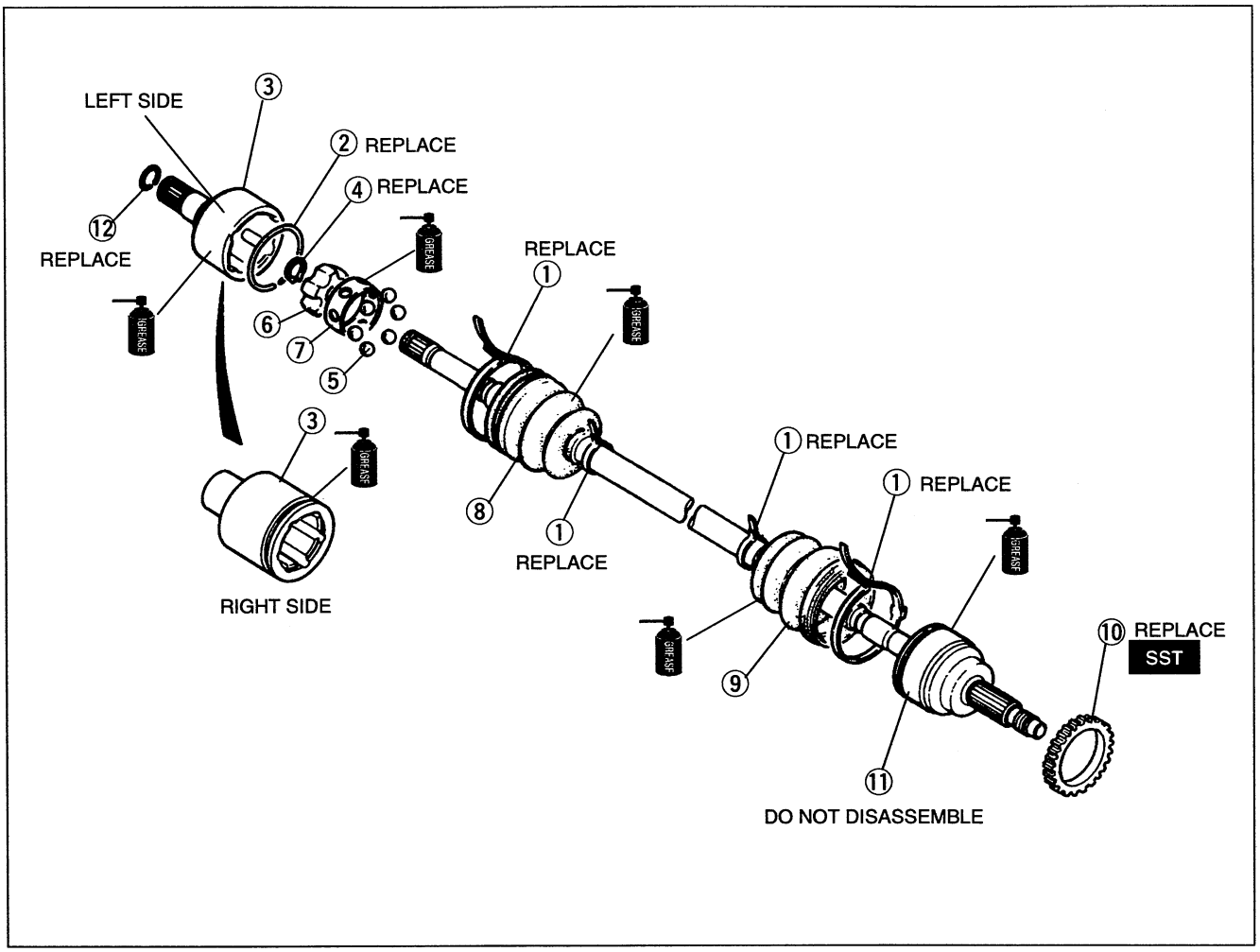
Locknut
Install a new locknut and stake it as shown.

Tightening torque: 236—318 N·m
{24.0—32.5 kgf·m, 173.6—235.0 ft·lbf}

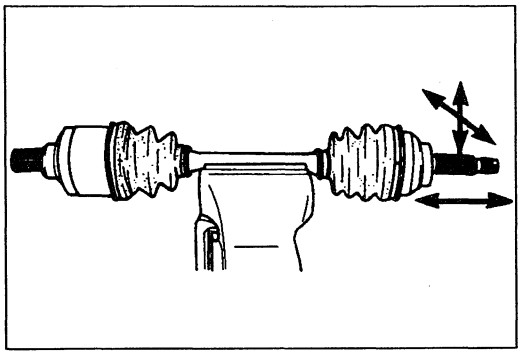
DOUBLE OFFSET TYPE (MTX)

Overhaul

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Verify that all parts are free of dust, dirt and other foreign material immediately before reassembly.
4. Assemble in the reverse order of disassembly, referring to **Assembly Note**.

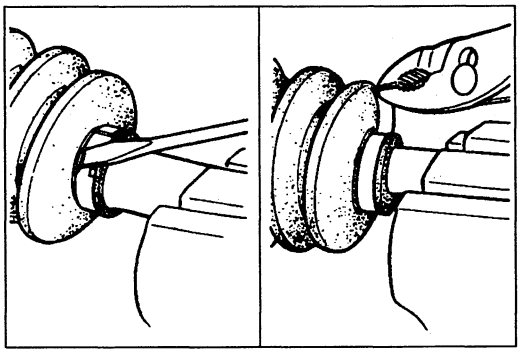


1. Boot band
   - Disassembly Note ..... page M–29
   - Assembly Note ..... page M–32
2. Clip
   - Disassembly Note ..... page M–29
   - Assembly Note ..... page M–31
3. Outer ring
   - Inspect inside bore for wear, corrosion, and scoring
   - Assembly Note ..... page M–31
4. Snap ring
   - Disassembly Note ..... page M–29
   - Assembly Note ..... page M–31
5. Balls
   - Disassembly Note ..... page M–29
   - Assembly Note ..... page M–31
6. Inner ring
   - Disassembly Note ..... page M–29
   - Assembly Note ..... page M–31
7. Cage
   - Disassembly Note ..... page M–29
   - Assembly Note ..... page M–31
8. Boot (transaxle side)
   - Disassembly Note ..... page M–30
   - Inspect for cracks and damage
   - Assembly Note ..... pages M–30, 31
9. Boot (wheel side)
   - Disassembly ..... page M–30
   - Inspect for cracks and damage
   - Assembly Note ..... page M–31
10. ABS sensor rotor
    - Disassembly Note ..... page M–30
    - Assembly Note ..... page M–30
11. Shaft and ball joint assembly
    - Inspect splines for damage and wear
    - Inspect wheel side joint for excessive play and rough rotation
12. Clip



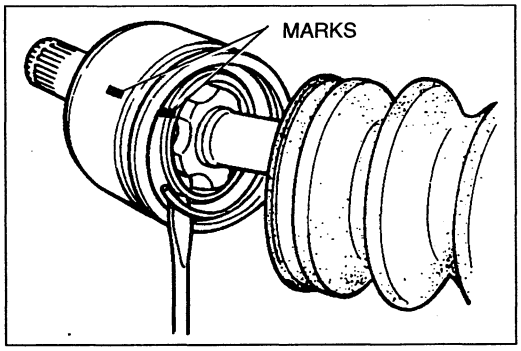
Disassembly Note

Rotate the joint by hands as shown. If the joint does not move smoothly or if a problem is found, repair the necessary parts or replace the drive shaft.



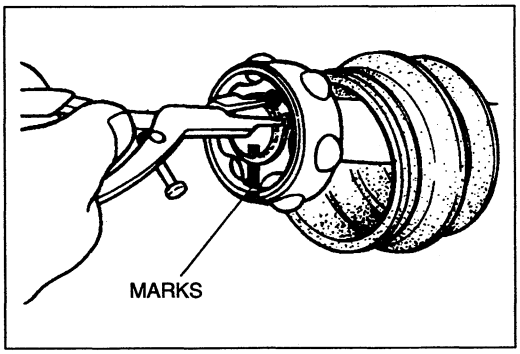
Boot band

1. Pry up the locking clips by using a screwdriver.
2. Pull back the end of the band.



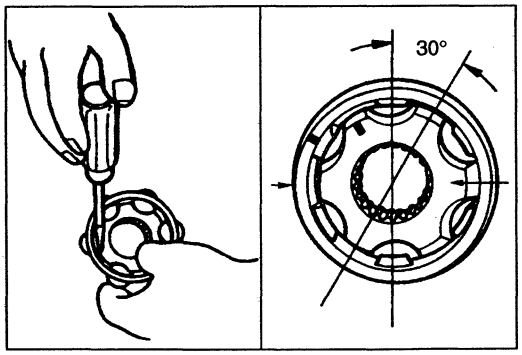
Clip

1. Use paint to mark the drive shaft and outer ring for proper reassembly.
2. Remove the clip.



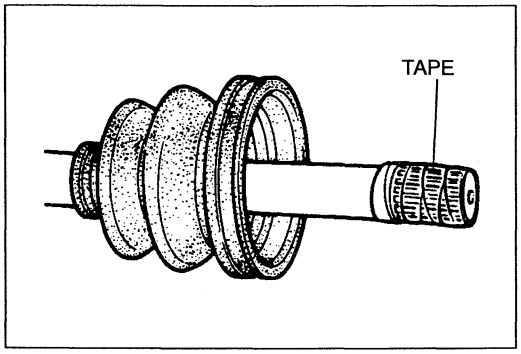
Snap ring

1. Use paint to mark the drive shaft and inner ring for proper reassembly.
2. Remove the snap ring by using snap ring pliers.

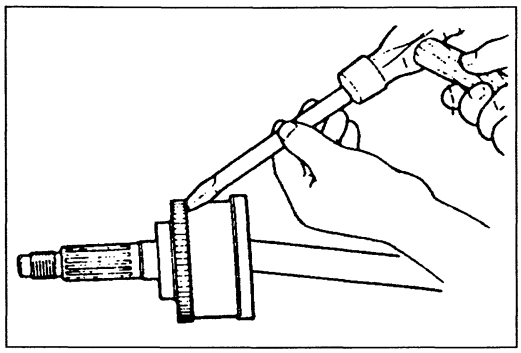


Cage, inner ring, and balls

1. Use paint to mark the inner ring and cage for proper reassembly.
2. Turn the cage approximately 30 degrees and pull the cage and balls away from the inner ring.



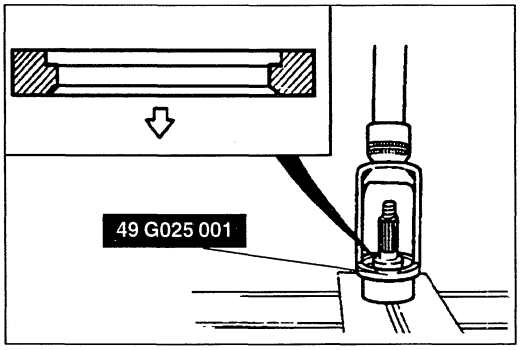
Boot
1. Wrap the shaft splines with tape to protect the boot.
2. Remove the boot.



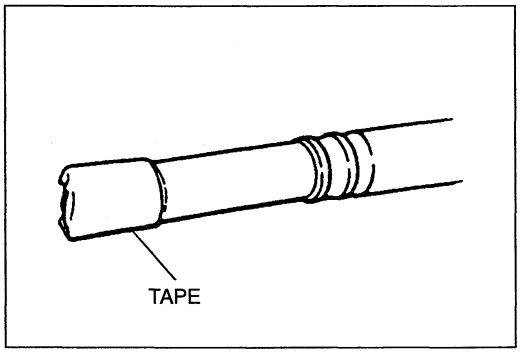
ABS sensor rotor

Note
- The sensor rotor does not need to be removed unless you are replacing it.

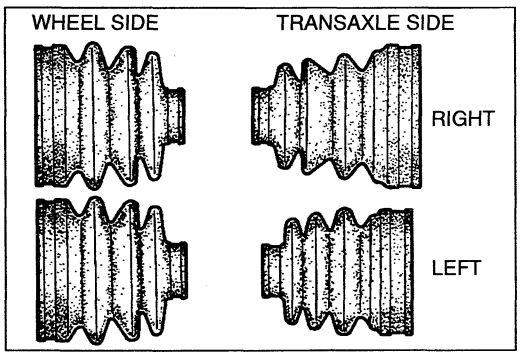
Tap the ABS sensor rotor off the drive shaft with a chisel.



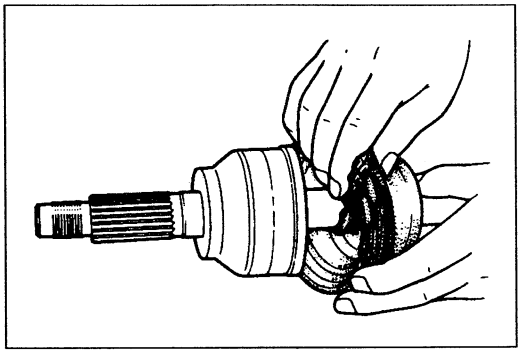
Assembly Note
ABS sensor rotor
Set a new ABS sensor rotor on the drive shaft in the direction as shown, and press it onto the shaft assembly by using the **SST**.



Boot
1. Wrap the shaft splines with tape.



2. Install the wheel-side and transaxle-side boots, noting the shape and size of each one in the figure.

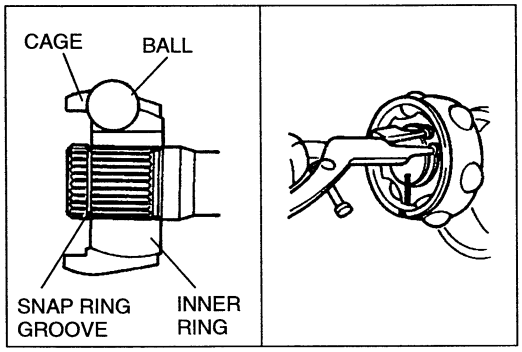


Boot (wheel side)

1. Fill the boot with the grease supplied in the boot kit.

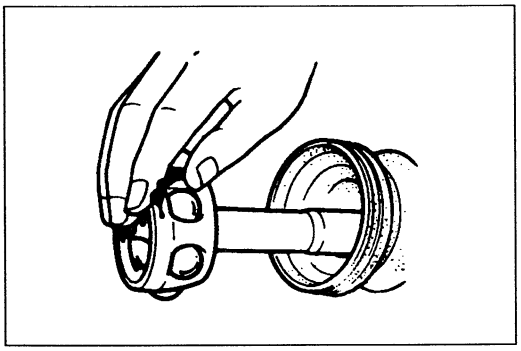
   Grease amount
   FS engine: 90—110 g {3.18—3.88 oz}
   KL engine: 130—150 g {4.59—5.29 oz}

2. Slide the boot onto the shaft.



Cage, inner ring and balls/Snap ring

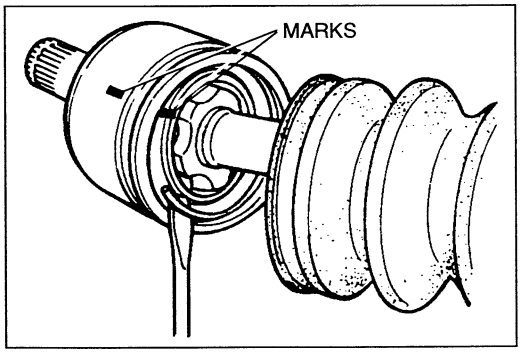
1. Align the marks and install the balls and cage to the inner ring in the direction shown in the figure.
2. Install a new snap ring.



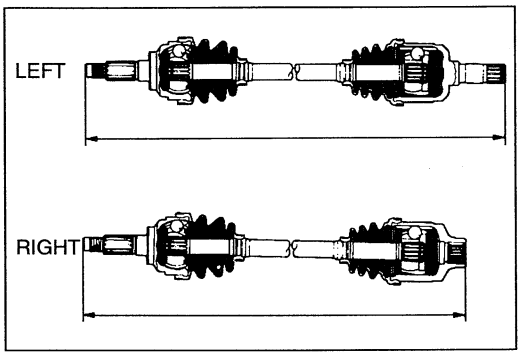
Boot (differential side), outer ring, clip

1. Fill the boot and outer ring with the grease supplied in the boot kit and joint kit.

   Grease amount
   FS engine: 120—140 g {4.24—4.94 oz}
   KL engine: 140—160 g {4.94—5.64 oz}



2. Align the marks, and install the outer ring onto the shaft.
3. Install a new clip.
4. Install the boot.

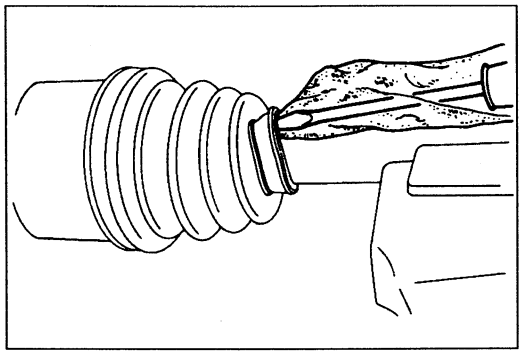


5. Set the drive shaft to the standard length.

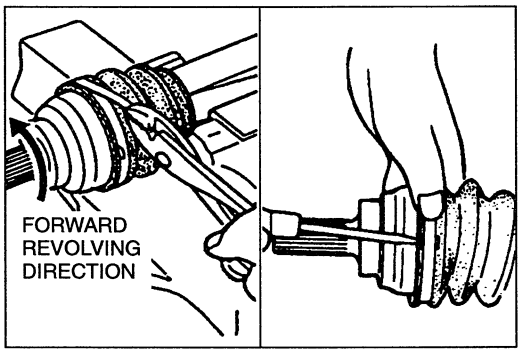
Standard length

mm {in}

Engine	Left side	Right side
FS	649.2—659.2 {25.56—25.95}	600.2—610.2 {23.63—24.02}
KL	650.7—660.7 {25.62—26.01}	600.7—610.7 {23.65—24.04}



6. Release trapped air from inside the boot (differential side) by using a screwdriver covered with a rag.
7. Verify the drive shaft length.
8. If not within specification, return to Step 5.



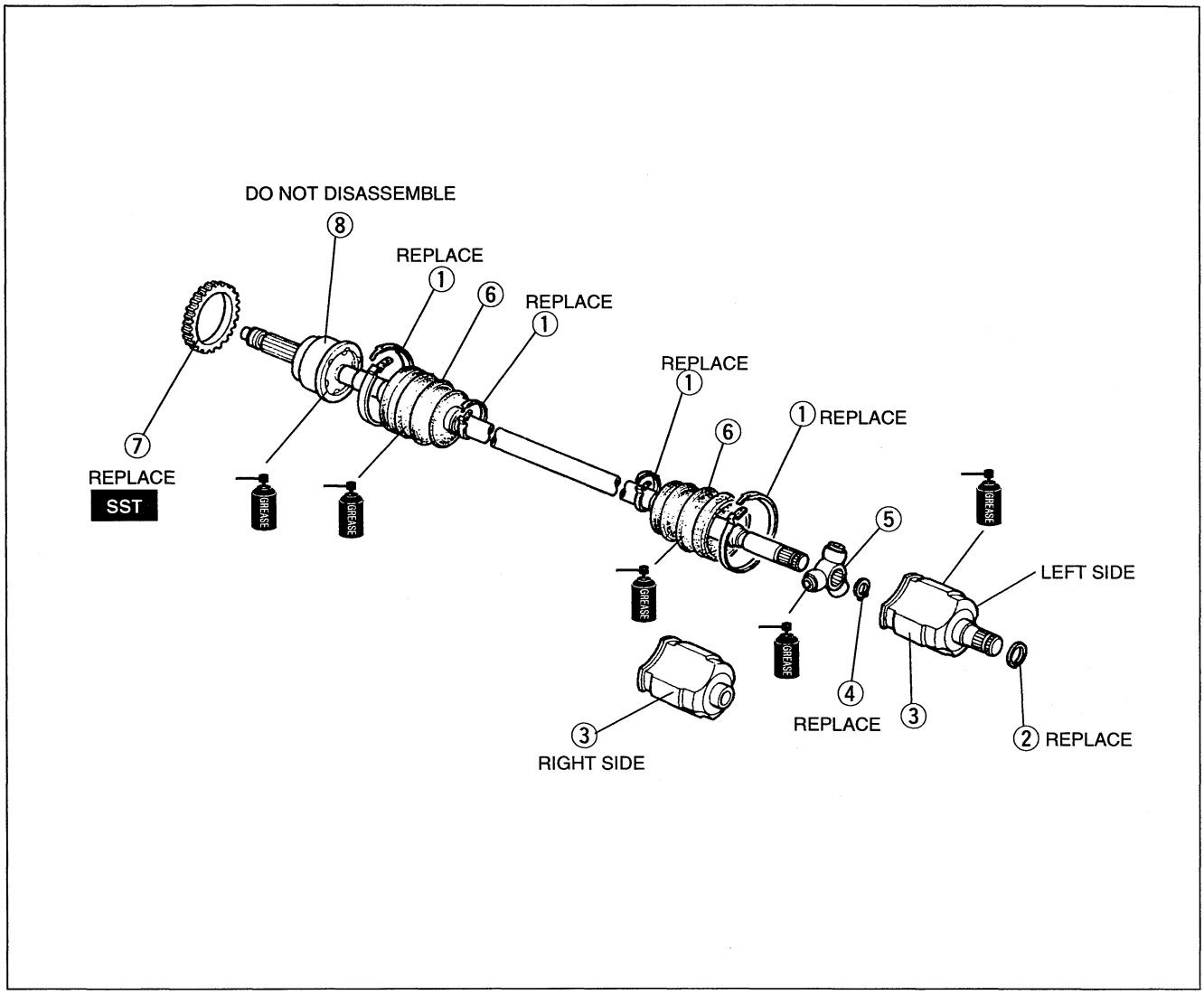
Boot band

1. Fold the band back in the direction opposite the forward revolving direction of the drive shaft and use pliers to pull it tight.
2. Lock the end of the band by bending the locking clips.

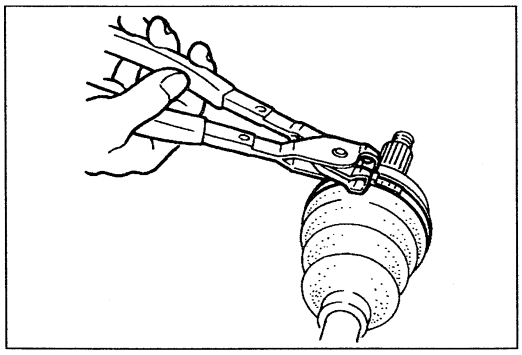
TRIPOD TYPE (ATX)

Overhaul

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Verify that all parts are free of dust, dirt, and other foreign material immediately before reassembly.
4. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



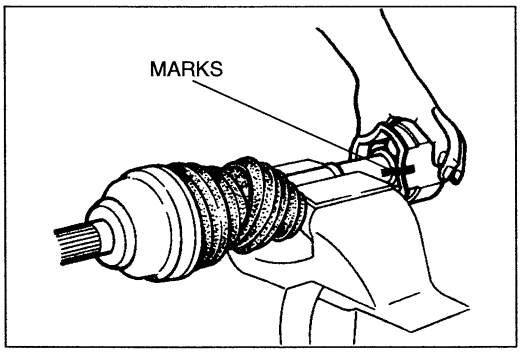
1. Boot band
   - Disassembly Note ..... page M–34
   - Assembly Note ..... page M–36
2. Clip
3. Outer ring
   - Disassembly Note ..... page M–34
   - Inspect inside bore for wear, corrosion, and scoring
   - Assembly Note ..... page M–35
4. Snap ring
   - Disassembly Note ..... page M–34
   - Assembly Note ..... page M–35
5. Tripod joint
   - Disassembly Note ..... page M–34
   - Inspect for damage and wear
   - Assembly Note ..... page M–35
6. Boot
   - Inspect for damage
   - Assembly Note ..... page M–35
7. ABS sensor rotor
   - Disassembly Note ..... page M–34
   - Assembly Note ..... page M–35
8. Shaft and ball joint assembly
   - Inspect splines for damage and wear
   - Inspect wheel-side joint for excessive play and rough rotation



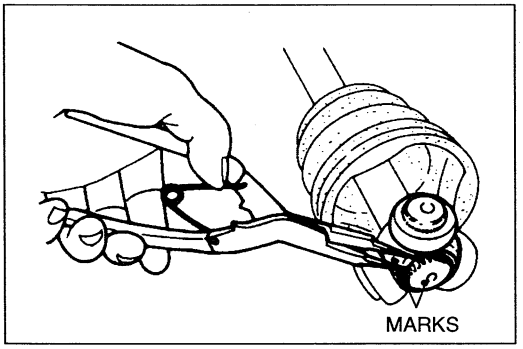
Disassembly Note
Boot band

Note
- The boot band does not need to be removed unless you are replacing it.

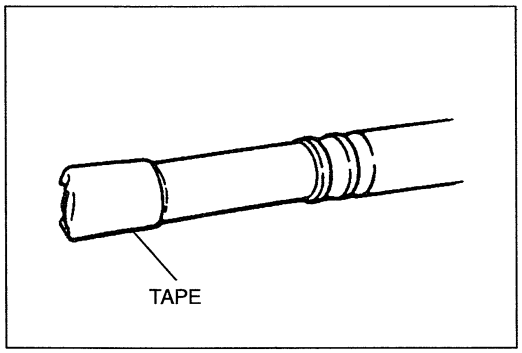
Remove the boot clamp with end clamp pliers as shown and discard the clamp.



Outer ring
Mark the outer ring and the shaft for proper reassembly.

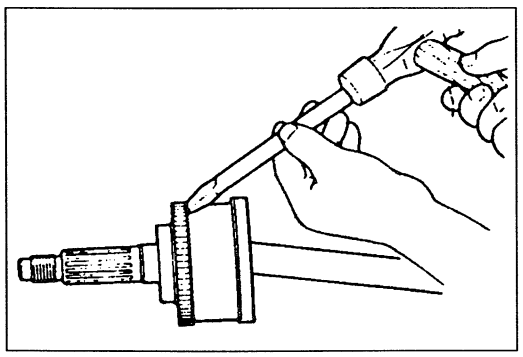


Snap ring/tripod joint
1. Mark the shaft and tripod joint for proper reassembly.
2. Remove the snap ring with snap ring pliers.
3. Remove the tripod joint from the shaft with a bar and a hammer.



Note
- The wheel-side boot does not need to be removed unless you are replacing it.

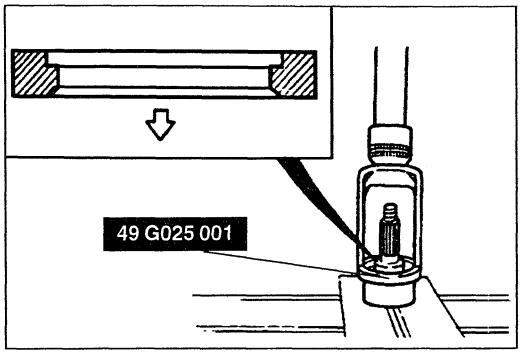
Wrap the splines of the shaft with tape to prevent damaging the boot.



ABS sensor rotor

Note
- The sensor rotor does not need to be removed unless you are replacing it.

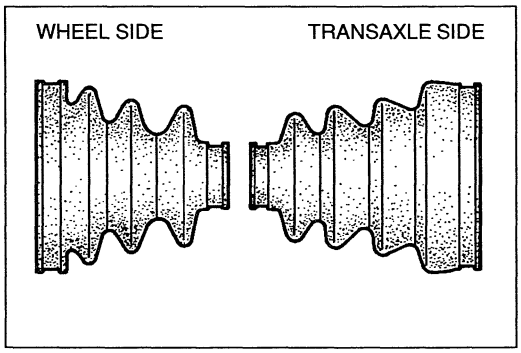
Tap the ABS sensor rotor off the drive shaft by using a chisel.



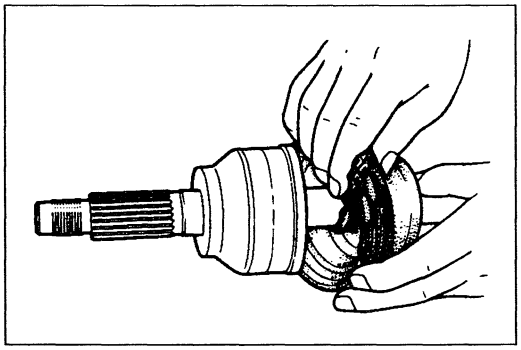
Assembly Note
ABS sensor rotor

Caution
- **Verify the direction of the sensor rotor.**

Set a new ABS sensor rotor on the drive shaft in the direction shown, and press it onto the shaft assembly by using the **SST**.

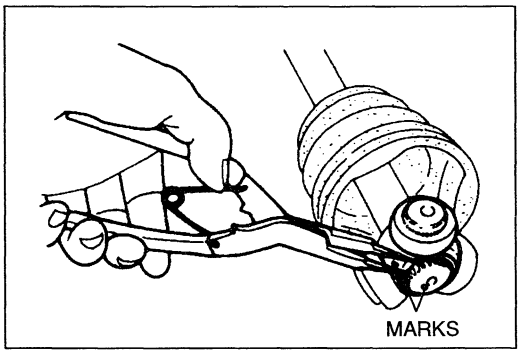


Boot
1. Wrap the splines of the transaxle side shaft, and install the wheel-side and transaxle side boots, noting the shape and size of each one in the figure.

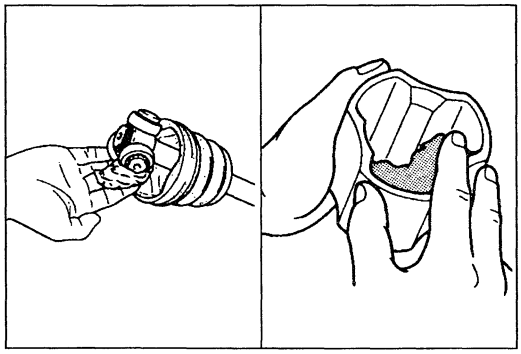


2. Fill the wheel side boot with the grease supplied in the boot kit.

Grease amount: 125—145 g {4.41—5.11 oz}

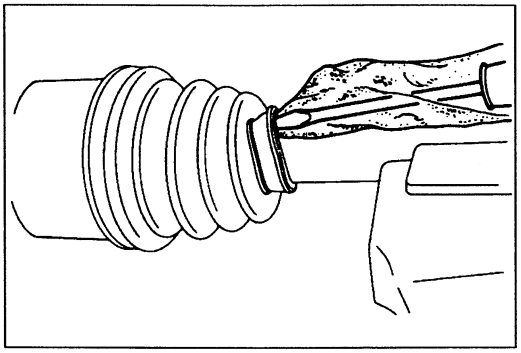


Snap ring/tripod joint
1. Align the marks and install the tripod joint.
2. Install the new snap ring with snap-ring pliers.



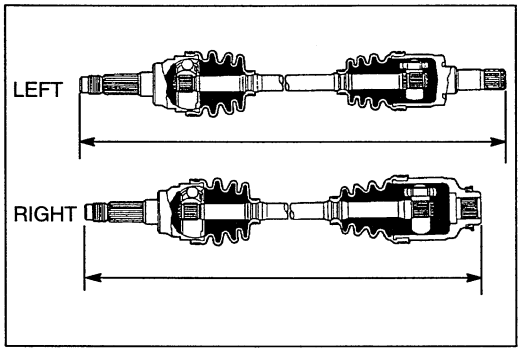
Outer ring
Fill the outer ring and transaxle-side boot with the grease supplied in the boot kit.

Grease amount: 185—215 g {6.52—7.58 oz}



Boot band

1. Verify that the boots are not dented or twisted.

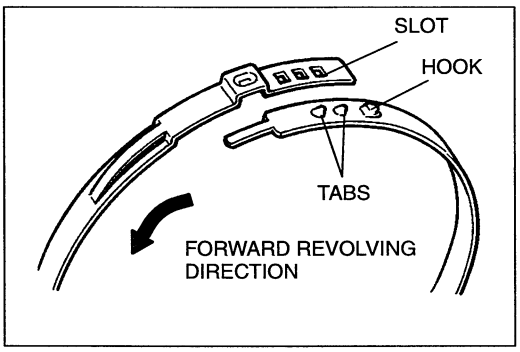


2. Set the drive shaft to the standard length.

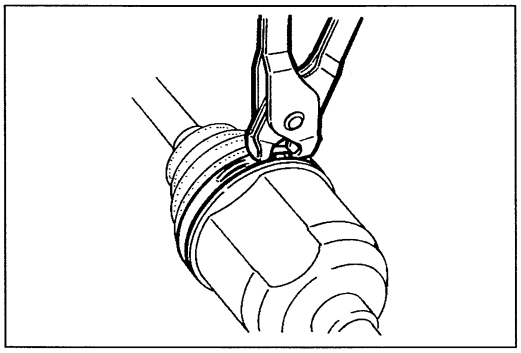
Standard length

mm {in}

	FS engine	KL engine
Left side	695.5—705.5 {27.39—27.77}	653.6—663.6 {25.74—26.12}
Right side	603.1—613.1 {23.75—24.13}	603.1—613.1 {23.75—24.13}



3. Release any trapped air from inside the boot by using a rag-covered screwdriver.
4. Verify that the drive shaft length is within the standard.
5. If the drive shaft length is not within the standard, return to step 1.
6. Install a new boot band on the boot so that the end of the boot band with solts is pointing opposite the forward revolving direction of the drive shaft.
7. Slide the hook into the end slot, and fit the tabs into the remaining two slots.



8. Crimp the clamp securely by using clamp pliers.

Caution

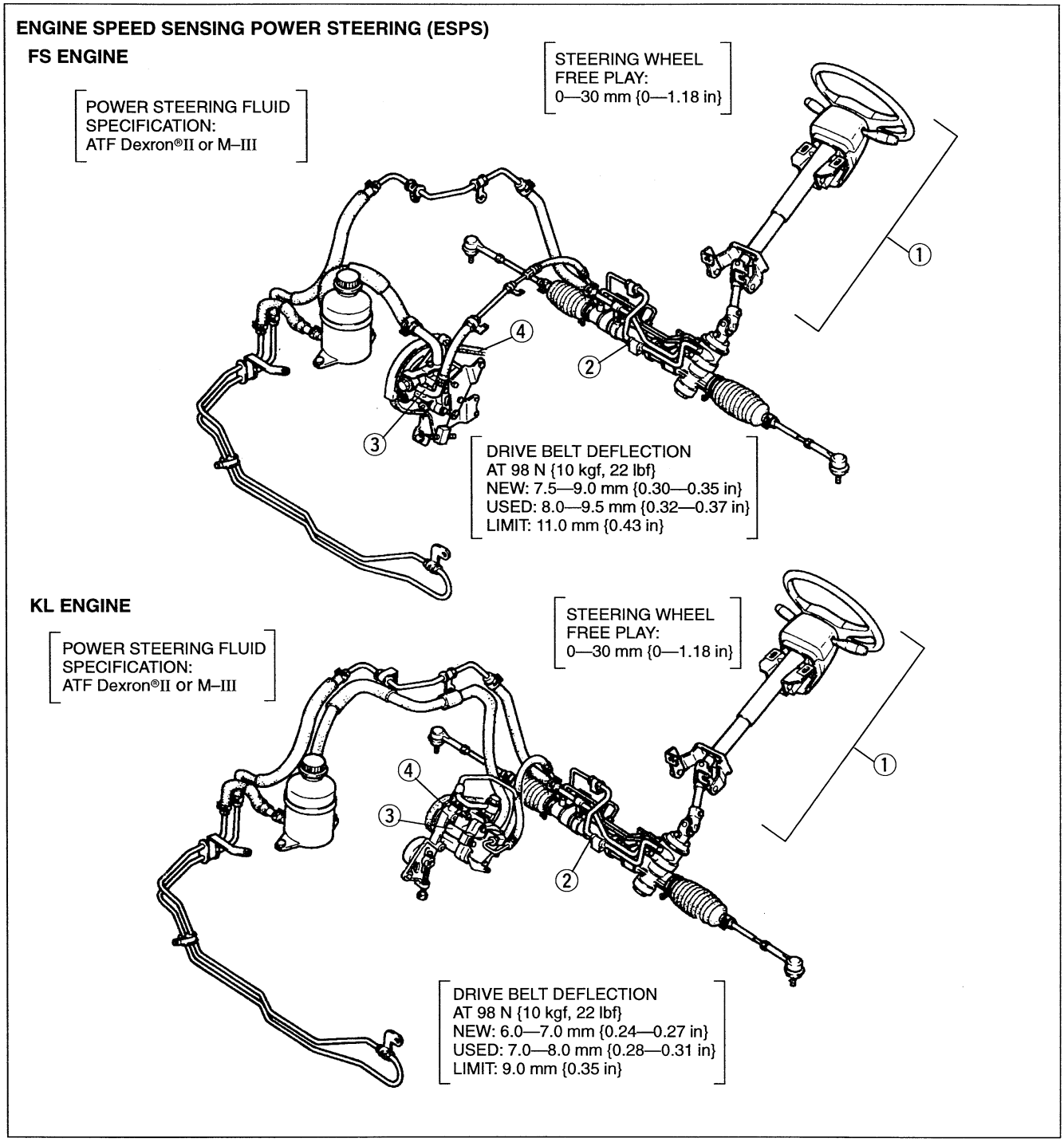
- **Do not overcrimp the boot band clamp. Overcrimping could damage the clamp bridge.**

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

STEERING SYSTEM

INDEX ..... **N– 2**
OUTLINE ..... **N– 3**
SPECIFICATIONS ..... **N– 3**
ENGINE SPEED SENSING POWER STEERING .. **N– 3**
PREPARATION ..... **N– 3**
TROUBLESHOOTING GUIDE ..... **N– 4**
AIR BLEEDING ..... **N– 5**
POWER STEERING FLUID ..... **N– 6**
STEERING WHEEL AND COLUMN ..... **N– 9**
STEERING GEAR AND LINKAGE **N–14**
POWER STEERING OIL PUMP **N–18**
DRIVE BELT **N–22**

INDEX



1. Steering wheel and column
   - On-vehicle inspection ..... page N– 9
   - Removal / Installation ..... page N–10
   - Disassembly / Inspection / Assembly ..... page N–12

2. Steering gear and linkage
   - Removal / Installation ..... page N–14
   - Disassembly / Inspection / Assembly ..... page N–16
   - Air bleeding ..... page N– 5

3. Power steering oil pump
   - Removal / Installation ..... page N–18
   - Disassembly / Inspection / Assembly ..... page N–20
   - Air bleeding ..... page N– 5
   - Power steering fluid ..... page N– 6

4. Drive belt
   - Inspection ..... page N–22
   - Adjustment ..... page N–23
   - Replacement ..... page N–23

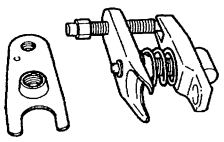
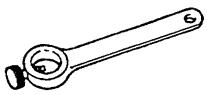
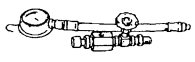
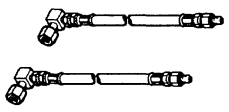
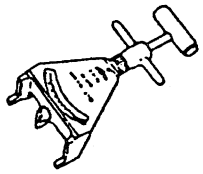
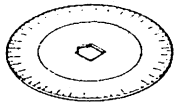
OUTLINE

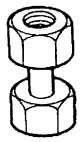
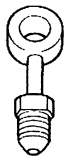
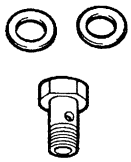
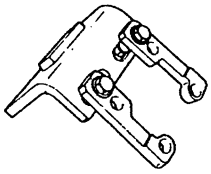
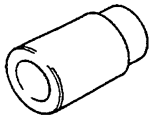
SPECIFICATIONS

Item		Specifications
Steering wheel	Outer diameter mm {in}	380 {15.0}
	Lock-to-lock turns	3.1
Steering gear	Type	Rack-and-pinion
	Total gear ratio	17.0
	Rack stroke mm {in}	137 {5.39}
Steering column and shaft	Shaft type	Collapsible
Power assist system		Engine speed sensing
Power steering fluid	Type	ATF Dexron®II or M-III
	Capacity L {US qt, Imp qt}	1.25 {1.32, 1.10}

ENGINE SPEED SENSING POWER STEERING

PREPARATION
SST

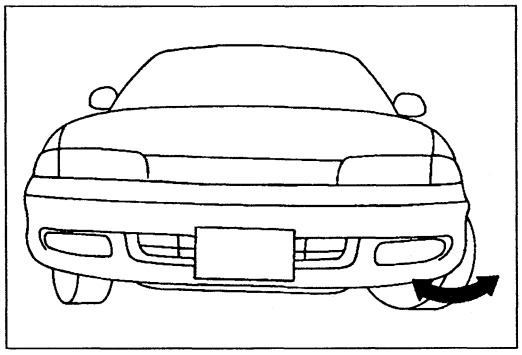
49 T028 3A0 Puller set, ball joint 	For removal of tie-rod end ball joint	49 0180 510B Attachment, preload 	For inspection of pinion preload
49 1232 670A Gauge set, power steering 	For inspection of power steering fluid pressure	49 1232 672 Gauge (Part of 49 1232 670A) 	For inspection of power steering fluid pressure
49 1232 673 Body, valve (Part of 49 1232 670A) 	For inspection of power steering fluid pressure	49 H002 671 Adapter, power steering gauge 	For inspection of power steering fluid pressure
49 G017 5A0 Support, engine 	For support of engine	49 9200 020 Tension gauge, V-ribbed belt 	For inspection of drive belt tension
49 H032 321A Wrench, hexagon 	For removal / installation of adjusting cover	49 D032 316 Protractor 	For installation of adjusting cover

49 G032 3A4 Adapter, power steering gauge 	For inspection of power steering fluid pressure	49 G032 351 Adapter (Part of 49 G032 3A4) 	For inspection of power steering pressure
49 G032 352 Adapter (Part of 49 G032 3A4) 	For inspection of power steering fluid pressure	49 G032 353 Bolt (Part of 49 G032 3A4) 	For inspection of power steering fluid pressure
49 F032 301 Hanger, power steering pump 	For disassembly / assembly of power steering oil pump	49 F032 320 Installer A 	For assembly of power steering oil pump

TROUBLESHOOTING GUIDE

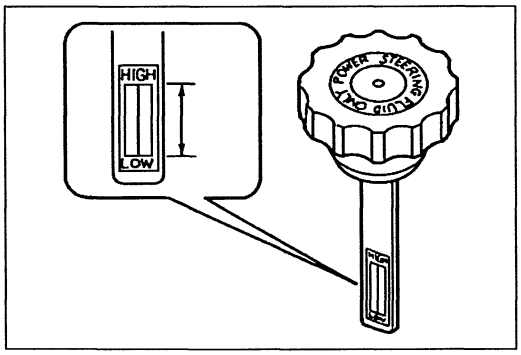
Problem	Possible Cause	Action	Page/Section
Steering feels heavy	Poor lubrication or abnormal wear of steering assembly ball joint	Replace	N–16
	Stuck or damaged lower arm ball joints	Replace	section R
	Improper steering pinion preload	Adjust	N–17
	Damaged steering gear	Replace gear	N–14
	Malfunctioning steering shaft joint	Replace	N–10
	Improperly adjusted wheel alignment	Adjust	section R
	Incorrect tire pressure	Adjust	section Q
	Loose or damaged oil pump drive belt	Adjust or replace	N–23
	Low fluid level or air in fluid	Add fluid or bleed air	N–5, 6
	Leakage of fluid	Repair or replace	—
	Insufficient P/S oil pump pressure	Replace	N–18
Steering wheel pulls to one side	Incorrect tire pressure	Adjust	section Q
	Unevenly worn tires	Replace	section Q
	Weak front spring	Replace	section R
	Worn or damaged stabilizer and/or lower arm bushing	Replace	section R
	Dragging brake	Repair	section P
	Loose lower arm	Tighten or replace	section R
	Improperly adjusted wheel alignment	Adjust	section R
General instability while driving	Incorrect tire pressure	Adjust	section Q
	Damaged or unbalanced wheel	Adjust or replace	section Q
	Worn or damaged steering shaft joint(s)	Replace	N–10
	Improper steering pinion preload	Adjust	N–17
	Weak front coil spring	Replace	section R
	Worn or damaged stabilizer and/or lower arm bushing	Replace	section R
	Damaged shock absorber	Replace	section R
	Improperly adjusted wheel alignment	Adjust	section R
Shake (steering wheel vibrates up/down)	Excessive tire and/or wheel runout	Replace	section Q
	Loose lug nuts	Tighten	section Q
	Unbalanced wheel(s)	Adjust or replace	section Q
	Cracked or worn engine mount rubber	Replace	sections B1, B2
	Cracked or worn transaxle mount rubber	Replace	sections J, K1, K2

Problem	Possible Cause	Action	Page/Section
Shimmy (steering wheel vibrates circumferentially)	Cracked or worn steering gear mount rubber	Replace	N–16
	Loose steering gear mounting bolts	Tighten	N–14
	Stuck or damaged steering ball joint	Replace	N–16
	Excessive tire and/or wheel runout	Replace	section Q
	Loose lug nuts	Tighten	section Q
	Unbalanced wheel(s)	Adjust or replace	section Q
	Incorrect tire pressure	Adjust	section Q
	Unevenly worn tires	Replace	section Q
	Damaged shock absorber	Replace	section R
	Loose shock absorber mounting bolts	Tighten	section R
	Stuck or damaged lower arm ball joint	Replace	section R
	Cracked or worn suspension bushing	Replace	section R
	Damaged or worn front wheel bearing	Replace	section M
	Improperly adjusted front wheel alignment	Adjust	section R
Excessive steering wheel play	Worn steering gear	Replace gear	N–14
	Worn or damaged steering shaft joints	Replace	N–10
	Worn or damaged lower arm bushing	Replace	section R
	Loose steering gear mounting bolts	Tighten	N–14
	Worn linkage or tie rod ball joint	Replace	N–16
Poor steering wheel return	Incorrect tire pressure	Adjust	section Q
	Stuck or damaged steering shaft joints	Replace	N–10
	Improperly adjusted front wheel alignment	Adjust	section R
	Improperly adjusted steering pinion preload	Adjust	N–17
	Ball joint sticking	Replace	N–16
	Obstruction near steering shaft	Repair	N–10
Abnormal noise from steering system	Loose P/S oil pump or bracket	Tighten	N–18
	Loose steering gear	Tighten	N–14
	Drive belt too loose/tight	Adjust	N–23
	Air in system	Bleed air	N– 5
	Malfunctioning steering gear	Replace gear	N–14
	Malfunctioning P/S oil pump	Replace	N–18
	Obstruction near steering shaft or pressure pipe	Repair or replace	N–10
	Loose steering linkage	Tighten or replace	N–14
	Worn steering shaft joints	Replace	N–10

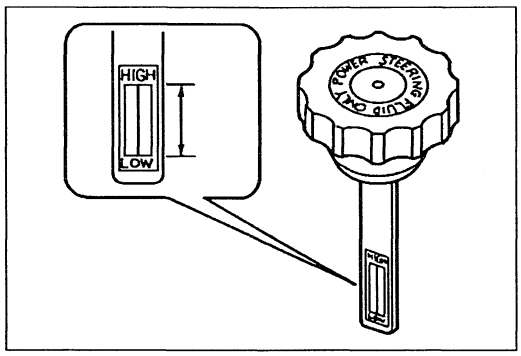


AIR BLEEDING

1. Check the fluid level. (Refer to page N–6.)
2. Turn the steering wheel fully left and right several times with the engine not running.
3. Recheck the fluid level. If it has dropped, add fluid.
4. Repeat steps 2 and 3 until the fluid level stabilizes.
5. Start the engine and let it idle.
6. Turn the steering wheel fully left and right several times.



7. Verify that the fluid is not foamy and that the fluid level has not dropped.
8. Add fluid if necessary and repeat steps 6 and 7.



POWER STEERING FLUID
Inspection
Fluid level

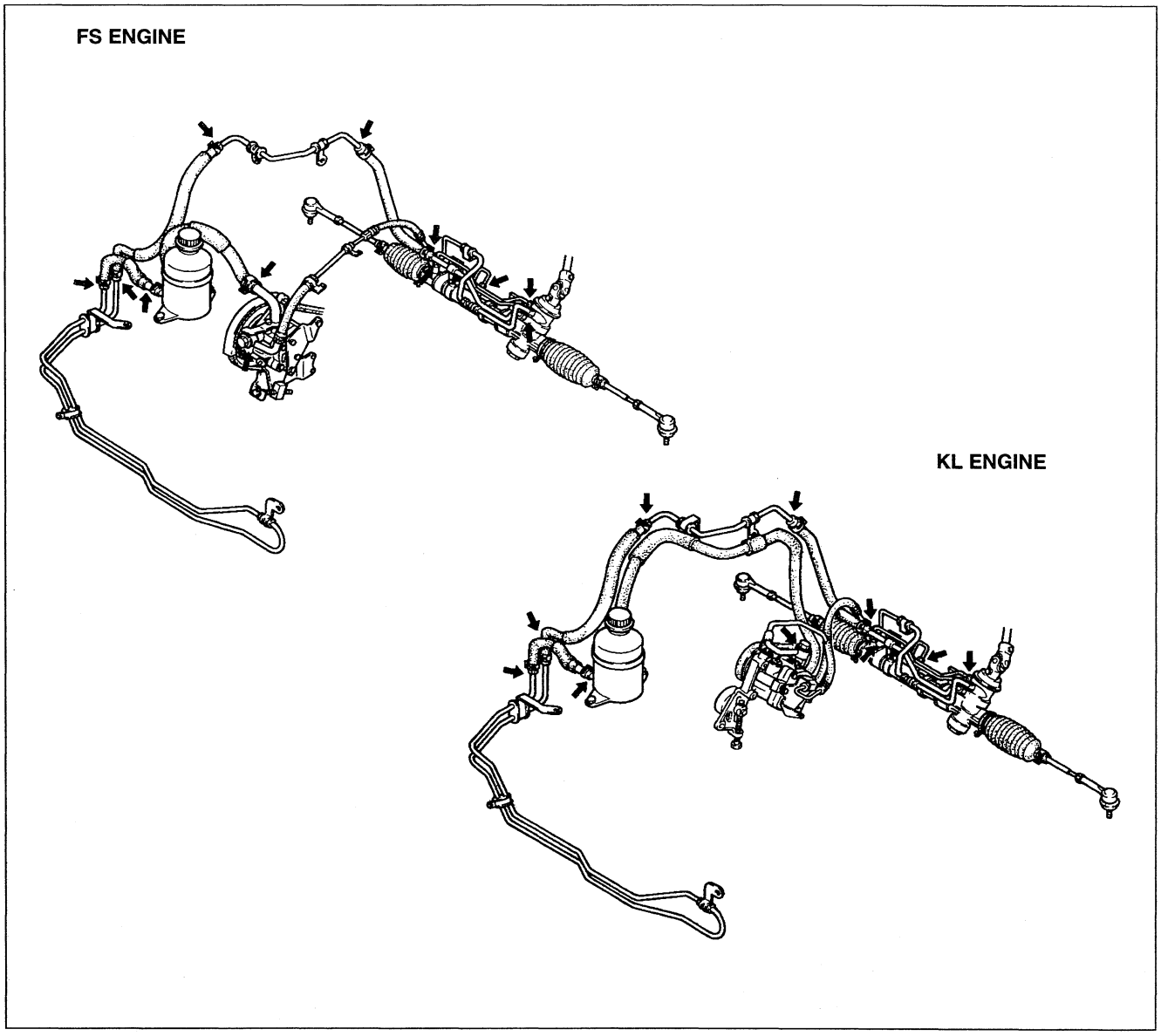
Check the power steering fluid level. Add the specified power steering fluid if necessary.

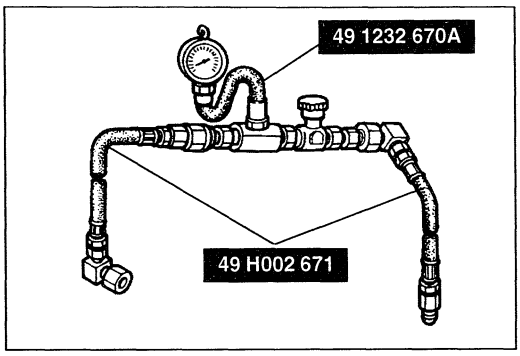
Fluid specification:
ATF Dexron®II or M–III

Fluid leakage

Caution
- **Never hold the steering wheel to the exreme left or right for more than five seconds with the engine running. This could damage the power steering pump.**

Start the engine and let it idle. Turn the steering wheel fully left and right to apply fluid pressure. Inspect the points shown in the figure for fluid leakage.

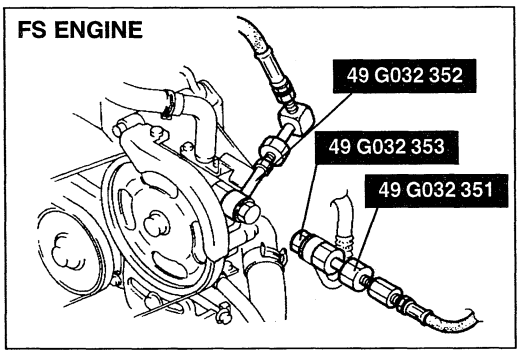




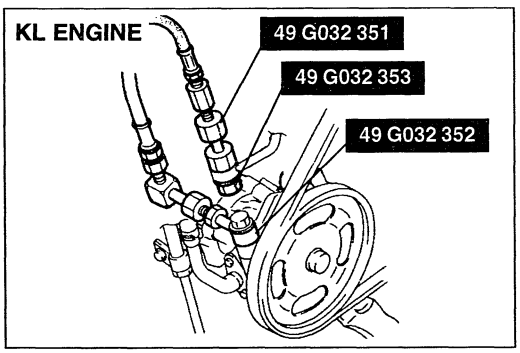
Fluid pressure

1. Assemble the **SST** as shown in the figure. Remove the transverse member. (KL engine) (Refer to section R.)

   Tightening torque:
   40—49 N·m {4.0—5.0 kgf·m, 29—36 ft·lbf}

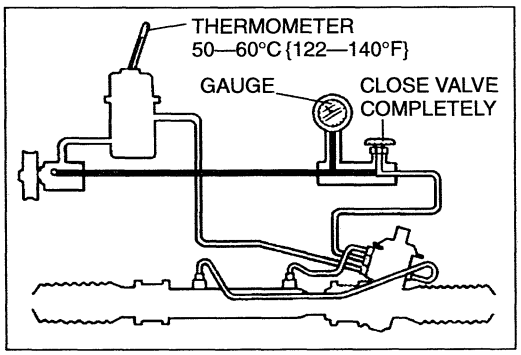


2. Mark both hose connections to ensure that the hose is reinstalled in its original position.
3. Disconnect the pressure hose from the oil pump. Attach the **SST** (adapters).
4. Connect the **SST** (gauge set) to the **SST** (adapters).
5. Bleed the air from the system. (Refer to page N–5.)



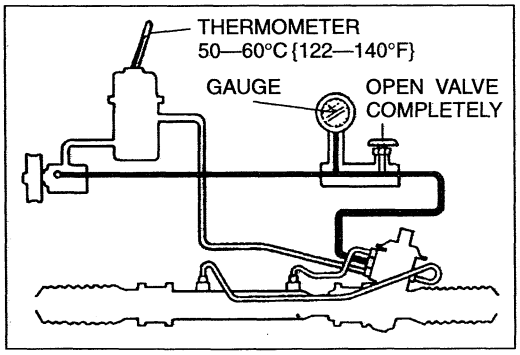
6. Open the gauge valve fully. Start the engine and turn the steering wheel fully left and right to raise the fluid temperature to **50—60°C {122—140°F}**.

   Caution
   - **Do not let the valve stay closed for more than five seconds. The increase in fluid temperature will damage the oil pump.**

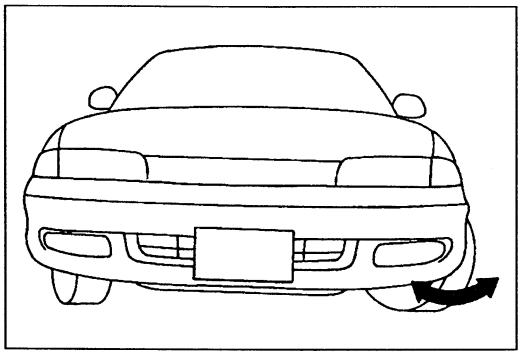


7. Close the gauge valve completely. Increase the engine speed to **1,000—1,500 rpm** and measure the fluid pressure generated by the oil pump. If the pressure is not within specification, replace the oil pump assembly. (Refer to page N–18.)

   Oil pump fluid pressure: 8,340—8,820 kPa {85.0—90.0 kgf/cm^2, 1,210—1,270 psi}



8. Open the gauge valve fully and increase the engine speed to **1,000—1,500 rpm**.



Caution
- **Do not let the valve stay closed for more than five seconds. The increase in fluid temperature will damage the oil pump.**

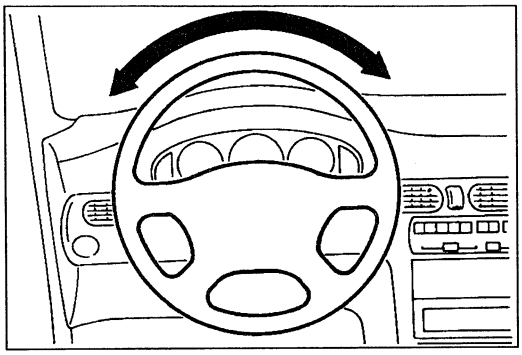
9. Turn the steering wheel fully left and right and measure the fluid pressure generated within the gear housing. If the pressure is not within specification, repair or replace the steering gear assembly.

   Gear housing fluid pressure: 8,340—8,820 kPa {85.0—90.0 kgf/cm^2, 1,210—1,270 psi}

10. Remove the gauge set. Install and tighten the pressure hose to the specified torque.

    Tightening torque:
    24—35 N·m {2.4—3.6 kgf·m, 18—26 ft·lbf}

11. Install the transverse member. (Refer to section R.)
12. Bleed the air from the system. (Refer to page N–5.)



STEERING WHEEL AND COLUMN

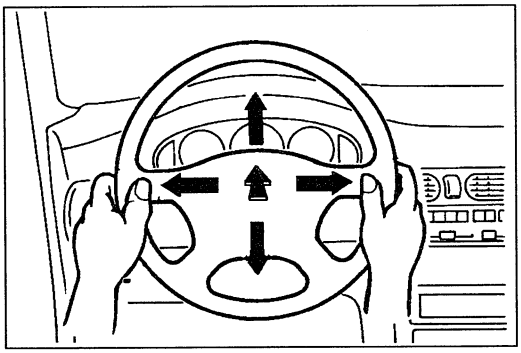
On-vehicle Inspection

Steering wheel play

With the wheels in the straight-ahead position, gently turn the steering wheel left and right and verify that the play is within specification.

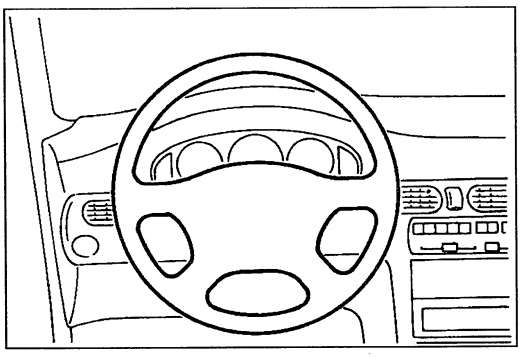
Play: 0—30 mm {0—1.18 in}

If the play exceeds specification, either the steering joints are worn or the backlash of the steering gear is excessive.



Looseness or play of steering wheel

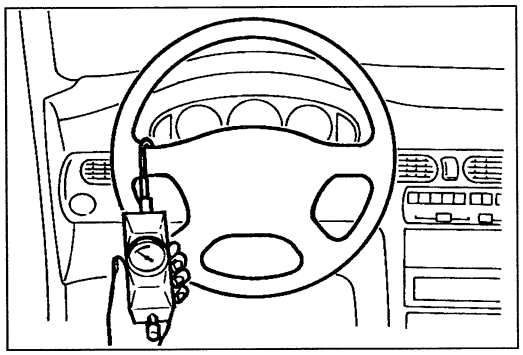
Move the steering wheel in the directions shown to check for column bearing and bushing wear, steering shaft joint play, steering wheel looseness, and column looseness.



Steering wheel effort

1. With the vehicle on a hard, level surface, 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}**.

N



3. With the engine running at idle, attach a pull scale to the outermost point of the steering wheel spoke.Then, starting with the wheels in the straight-ahead position, measure the effort required to turn the steering wheel to the left and to the right.

   Steering wheel effort:
   28—29 N {2.8—3.0 kgf, 6.2—6.6 lbf}
   [during one turn of the steering wheel]

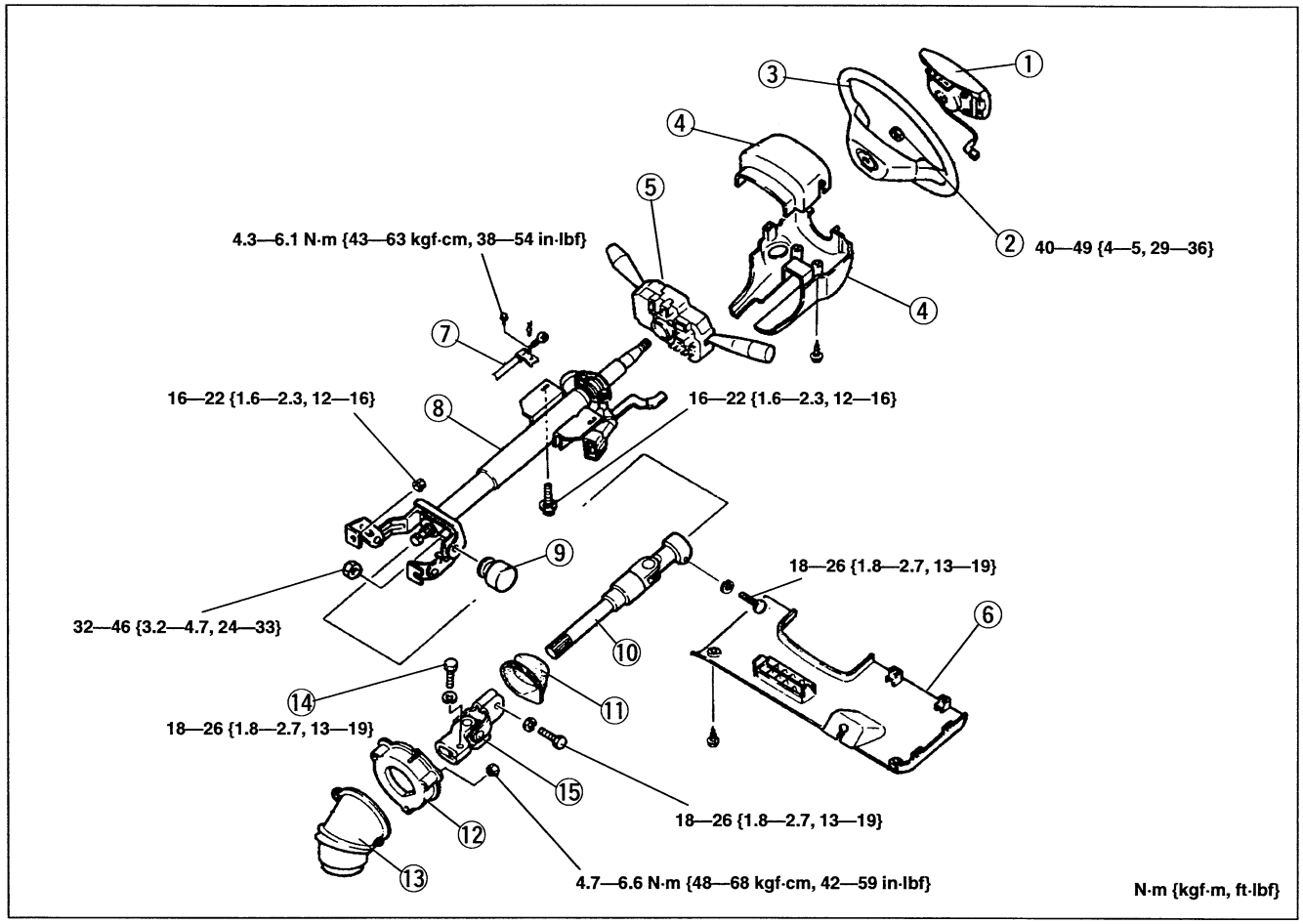
4. If not within specification, check the following: fluid level, air in system, fluid leakage at hose or connections, function of oil pump and steering gear, and tire pressure.

Removal / Installation

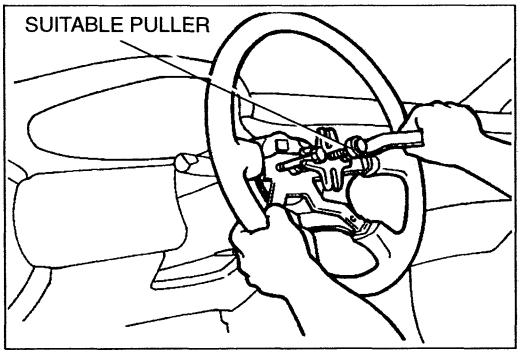
Warning

- **Refer to the 1996 626/MX–6 Body Electrical Troubleshooting Manual for removal and installation of the air bag module.**

1. Disconnect the negative battery cable.
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. Tighten all necessary nuts and bolts to the specified torque.



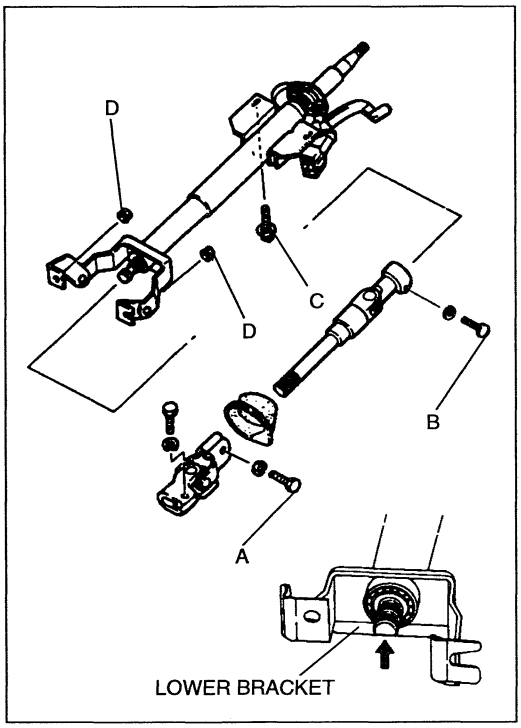
1. Air bag module
   Service ... 1996 626/MX–6 Body Electrical Troubleshooting Manual
2. Locknut
3. Steering wheel
   Removal Note ..... page N–11
   Installation Note ..... page N–11
4. Column cover
5. Combination switch
   Service ... 1996 626/MX–6 Body Electrical Troubleshooting Manual
6. Lower panel
7. Key interlock cable (ATX)
8. Steering shaft assembly
   Installation Note ..... page N–11
   Disassembly / Inspection / Assembly ..... page N–12
9. Dynamic damper (FS engine MX–6 with ATX)
10. Intermediate shaft
    Installation Note ..... page N–11
    Inspect for damage
    Inspect universal joint for looseness, abnormal noise, and sticking
11. Shaft seal
    Inspect for damage and cracks
12. Set plate
13. Dust cover
14. Bolt (intermediate shaft)
    Installation Note ..... page N–15
15. Universal joint
    Inspect for looseness, abnormal noise, and sticking



Removal note
Steering wheel

Caution
- **Do not try to remove the steering wheel by hitting the shaft with a hammer. The column will collapse.**

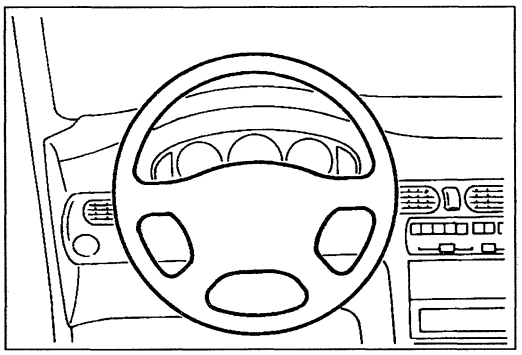
Remove the steering wheel by using a suitable puller.



Installation note
Intermediate shaft and steering shaft assembly
1. Tighten bolt A after tightening bolt B.
2. Tighten bolt C with the steering shaft at its uppermost tilt position.
3. After installation, lightly tap the lower bracket at the point shown by using a hammer to verify correct installation.

Caution
- **Do not apply the shock in the axial direction of the shaft.**

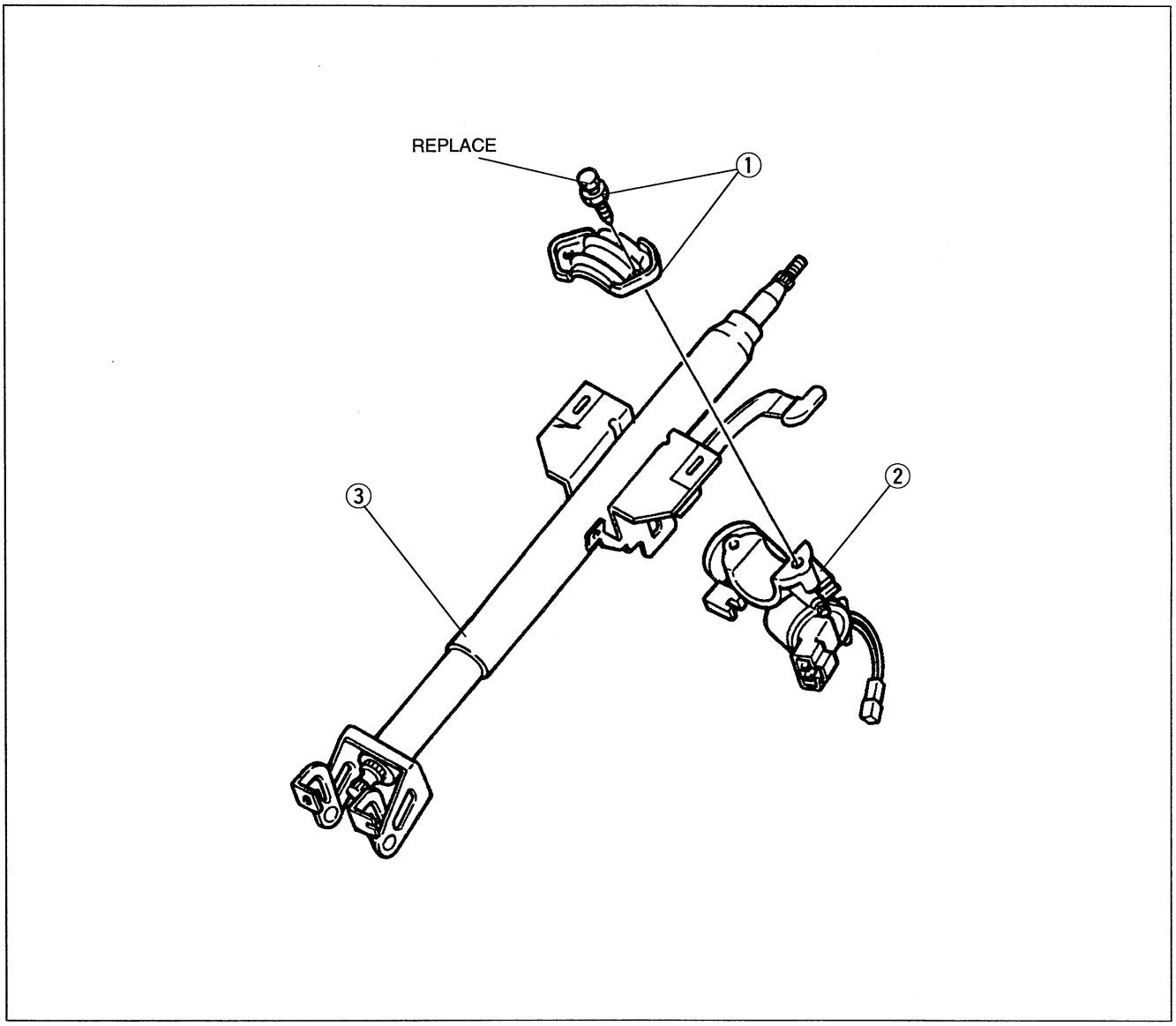
Note
- If the tilt lever does not move easily, loosen nuts D, tap the lower bracket at the point shown and retighten.



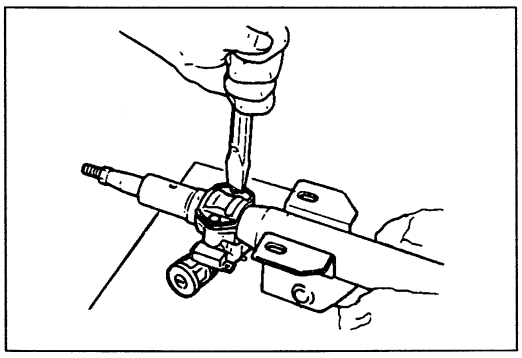
Steering wheel
Set the wheels in the straight-ahead position, and install the steering wheel.

Disassembly / Inspection / 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**.



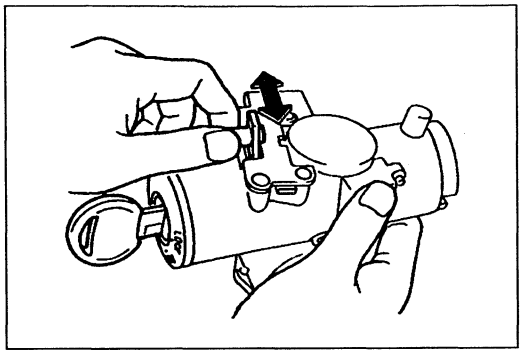
1. Steering lock mounting bolts and bracket
   Disassembly Note ..... below
   Assembly Note ..... page N–13
2. Steering lock assembly
   Inspection ..... page N–13
3. Steering shaft assembly
   Inspection ..... page N–13



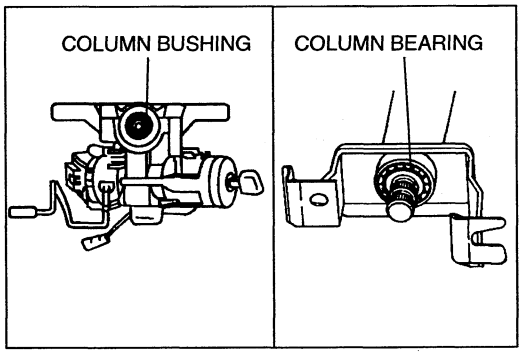
Disassembly note

Steering lock mounting bolts and bracket

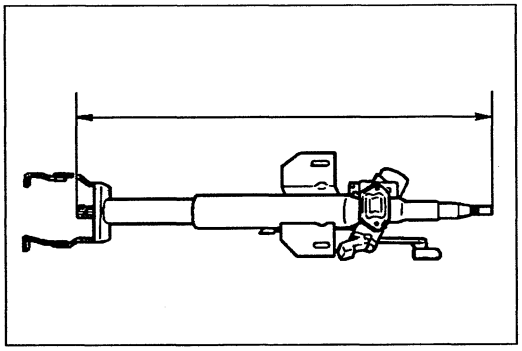
1. Use a chisel and a hammer to make a groove in the heads of the steering lock mounting bolts.
2. Remove the bolts by using a screwdriver.
3. Remove the steering lock assembly.



Inspection
Steering lock assembly (Automatic transaxle only)
Verify that the cable connector does not move when the key is in the LOCK position and that it moves freely with the key in other positions.

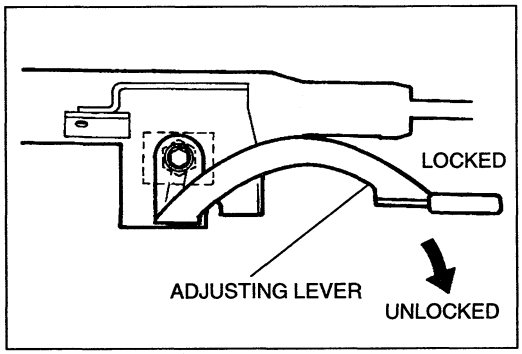


Steering shaft assembly
Check for the following and replace the steering shaft assembly if necessary.
1. Column bushing damage
2. Column bearing damage

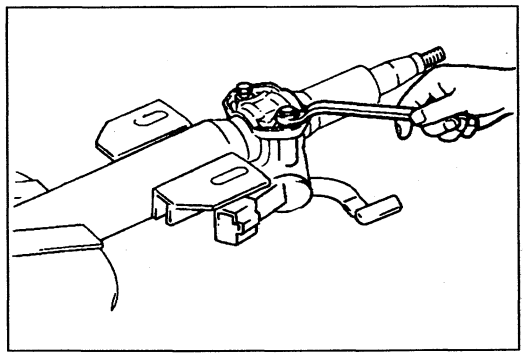


3. Steering shaft length

Length: 567.6—569.6 mm {22.35—22.42 in}



4. Tilt operation
   (1) Verify that the adjusting lever moves smoothly from unlock position to lock position.
   (2) Verify that the steering shaft is fixed firmly when the adjusting lever is locked.



Assembly note
Steering lock mounting bolts and bracket
1. Install the steering lock assembly on the jacket.
2. Verify that the lock operates correctly.
3. Install new steering lock mounting bolts.
4. Tighten the bolts until the heads break off.

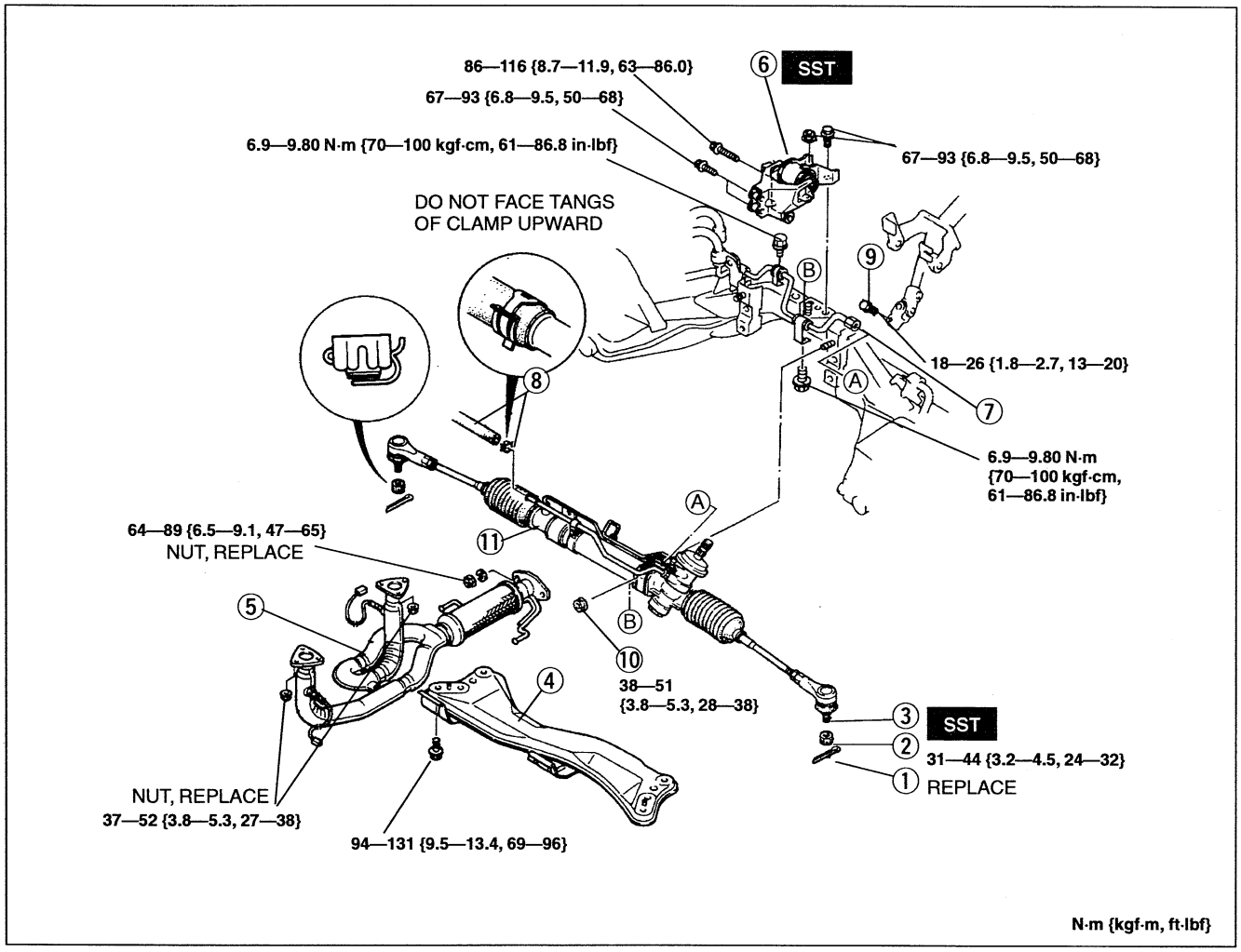
STEERING GEAR AND LINKAGE

Removal / Installation

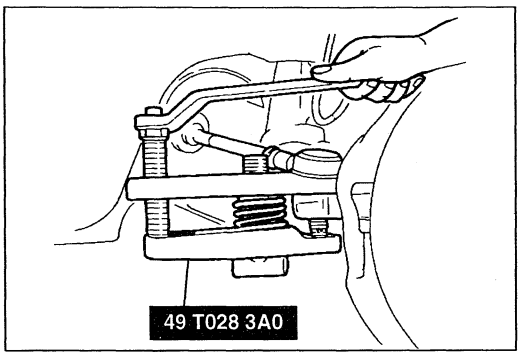
1. Remove the wheels.
2. Jack up the front of the vehicle and support it on safety stands.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Install the wheels.

Tightening torque: 89—117 N·m {9—12 kgf·m, 65—86 ft·lbf}

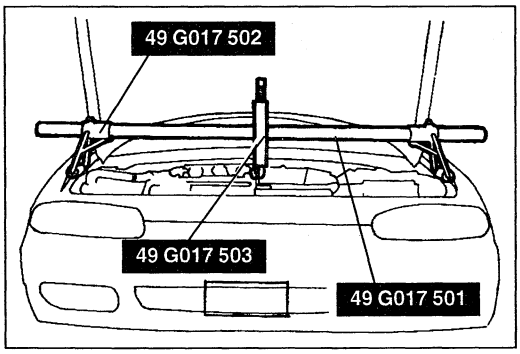
6. After Installation:
   (1) Check for fluid leakage. (Refer to page N–6.)
   (2) Bleed air from the system. (Refer to page N–5.)
   (3) Check the steering angle and toe-in, and adjust if necessary. (Refer to section R.)



1. Cotter pin
2. Nut
3. Tie-rod end ball joint
   Removal Note ..... page N–15
4. Transverse member (KL engine)
   Service ..... section R
5. Front exhaust pipe and catalytic converter (KL engine)
   Service ..... section F2
6. Engine mount
   Removal Note ..... page N–15
7. Pressure pipe
   Installation Note ..... page N–15
8. Return hose and clamp
9. Bolt (Intermediate shaft)
   Installation Note ..... page N–15
10. Mounting bracket nut and bolt
    Installation Note ..... page N–15
11. Steering gear and linkage
    Removal Note ..... page N–15
    Disassembly / Inspection / Assembly ..... page N–16

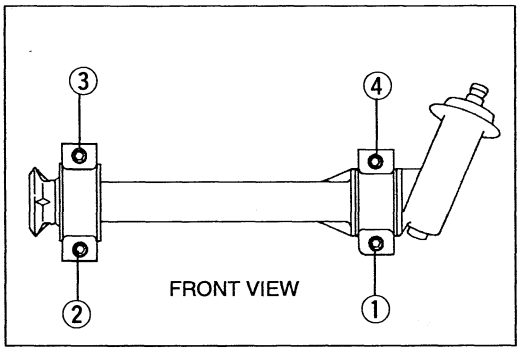


Removal note
Tie-rod end ball joint
1. Remove the tie rod nut.
2. Separate the tie-rod end from the steering knuckle by using the **SST**.



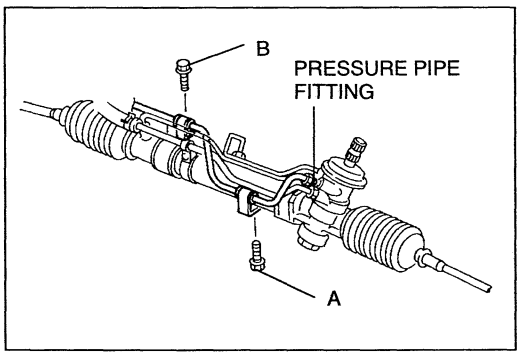
Engine mount
1. Use the **SST** as shown.
2. Remove the engine mount.

Steering gear and linkage
Pull the steering gear from the right side to remove it.

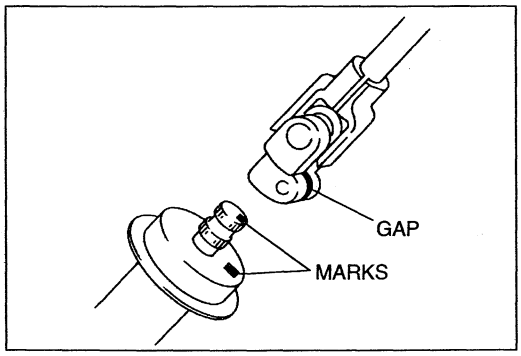


Installation note
Mounting bracket nut and bolt
1. Loosely tighten nuts 4 and 3.
2. Tighten the mounting bracket nuts and bolts to the specified torque in the order shown.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



Pressure pipe
1. Hand-tighten the pressure pipe fitting to the gear housing, being careful not to damage the O-ring.
2. Hand-tighten bolt A.
3. Tighten bolt B to the specified torque.
4. Tighten bolt A and the pressure pipe fitting to the specified torque.

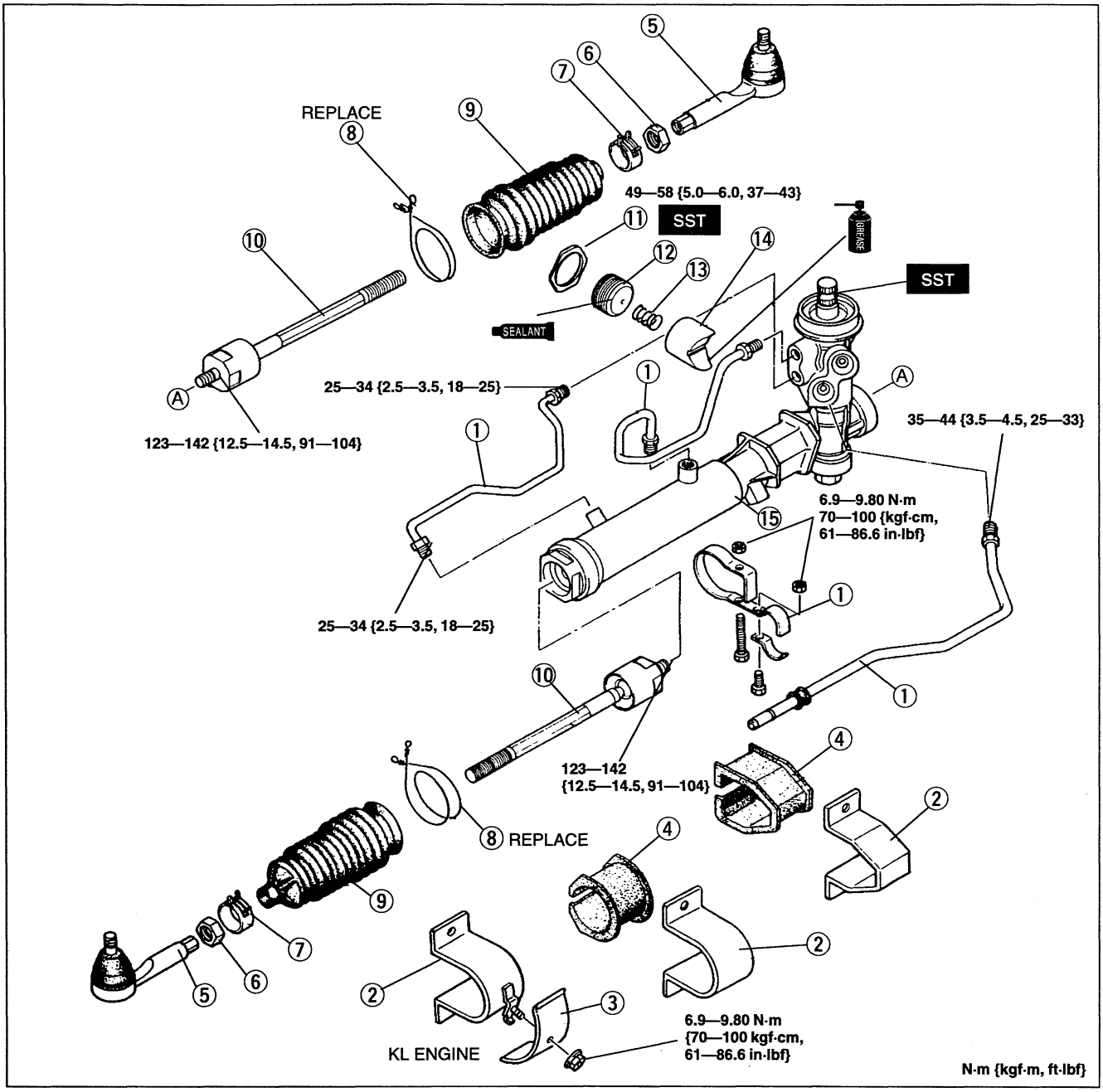


Bolt (intermediate shaft)
1. Align the marks as shown.
2. Install the intermediate shaft so that the universal joint gap is aligned with the marks.
3. Tighten the bolt.

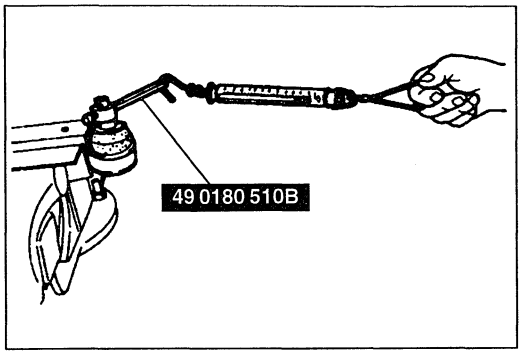
Tightening torque:
18—26 N·m {1.8—2.7 kgf·m, 13—20 ft·lbf}

Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and replace as necessary.
3. Assemble in the reverse order of removal, referring to **Assembly Note**.



1. Oil pipe and pipe clip
2. Mounting bracket
3. Heat insulator (KL engine)
4. Mounting rubber
5. Tie-rod end
   Inspection ..... page N–17
6. Locknut (tie-rod end)
7. Clamp
8. Boot wire
9. Boot
10. Tie rod
    Inspection ..... page N–17
11. Locknut (adjusting cover)
12. Adjusting cover
    Assembly Note ..... page N–17
13. Spring
    Inspect for damage
14. Pressure pad
    Inspect for damage
15. Steering gear assembly
    Inspect for damage and poor operation (Not repairable; replace steering gear assembly)

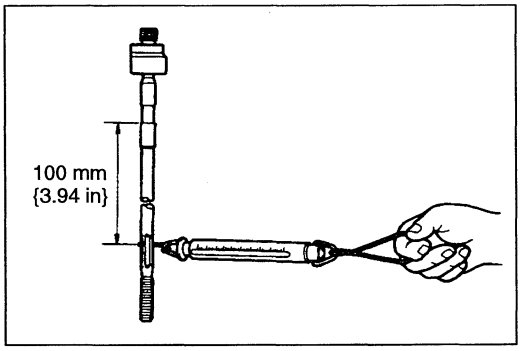


Inspection
Tie-rod end
1. Inspect the tie-rod end for damage and boot cracks. Replace it as necessary.
2. Inspect the ball joint for looseness. Replace the tie-rod end as necessary.
3. Rotate the ball joint five times.
4. Measure the rotation torque of the ball joint by using the **SST** and a pull scale.

   Rotation torque:
   0.3—2.9 N·m {3—30 kgf·cm, 2.6—26 in·lbf}
   Pull scale reading: 3—29 N {0.3—3 kgf, 0.7—6.6 lbf}

5. If not within specification, replace the tie-rod end.

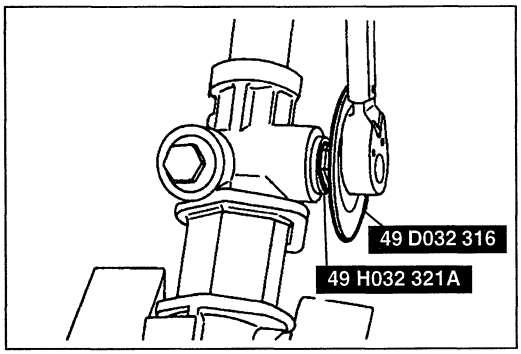
Tie rod
1. Inspect the tie rod for bending and damage. Replace it if necessary.
2. Inspect the ball joint for looseness. Replace the tie rod as necessary.
3. Swing the tie rod five times.
4. Measure the swinging torque by using a pull scale.



   Swinging torque:
   0.1—3.4 N·m {1—35 kgf·cm, 0.9—30 in·lbf}
   Pull scale reading:
   0.7—21 N {0.07—2.2 kgf, 0.16—4.8 lbf}

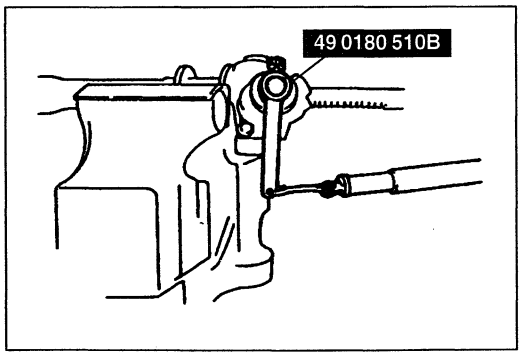
5. If not within specification, replace the tie rod.

Assembly note
Adjusting cover
1. Set the rack in the center position.
2. Tighten the adjusting cover to **9.8 N·m {100 kgf·cm, 87 in·lbf}**, then loosen it.
3. Tighten again to **4.4—5.4 N·m {45—55 kgf·cm, 39—48 in·lbf}**, and then return it **20 degrees**.
4. Apply thread-locking compound to the exposed threads of the adjusting cover.
5. Attach the **SST** and a pull scale to the pinion shaft.
6. Measure the pinion preload.



   Rack position: Center ±90°
   Pinion preload:
   1.2—1.5 N·m {12—16 kgf·cm, 11—13 in·lbf}
   Pull scale reading:
   12—15 N {1.2—1.6 kgf, 2.8—3.3 lbf}

7. If not within specification, repeat steps 2—6.
8. Tighten the locknut while holding the adjusting cover by using the **SST**.

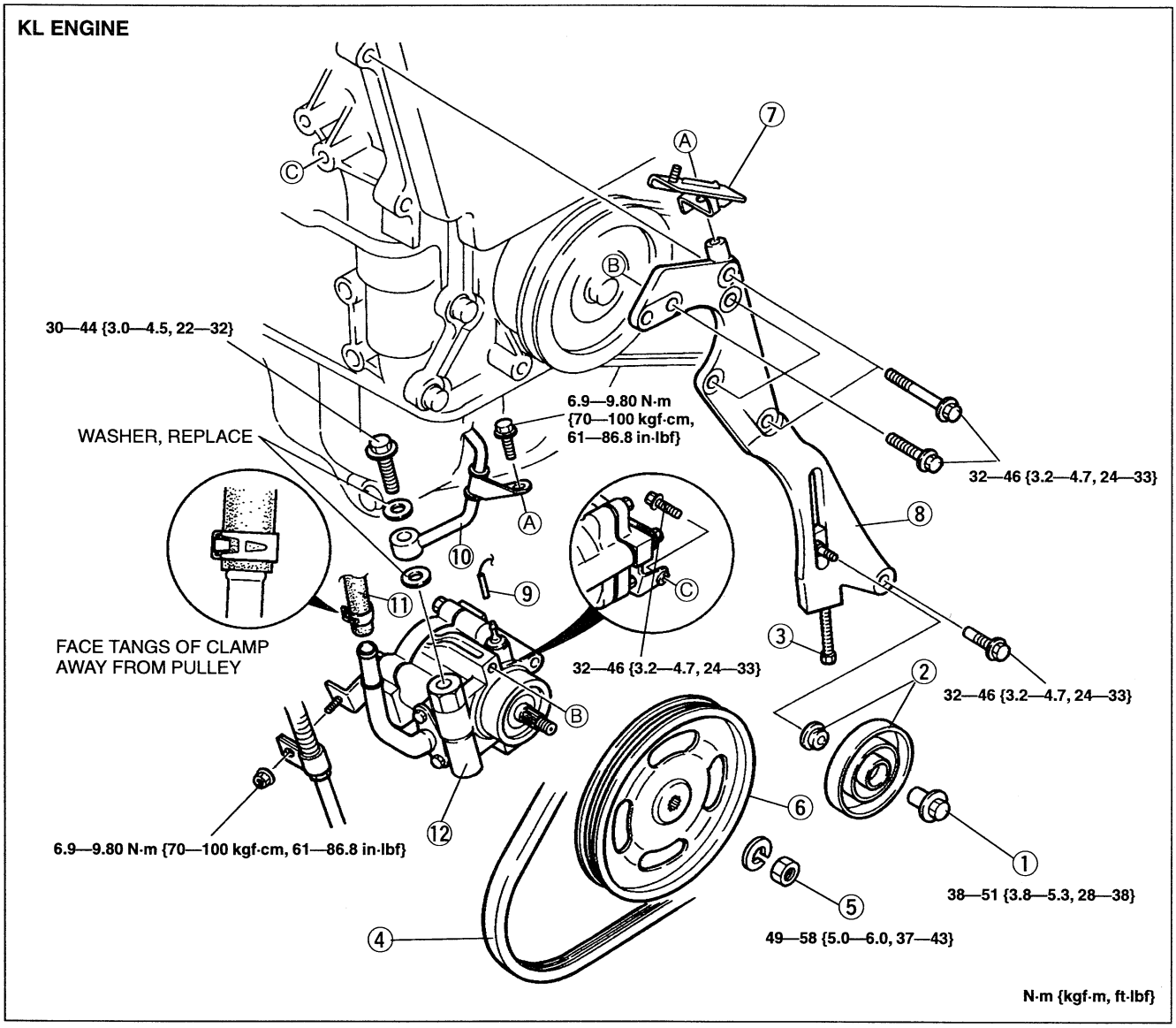


   Tightening torque:
   49—58 N·m {5.0—6.0 kgf·m, 37—43 ft·lbf}

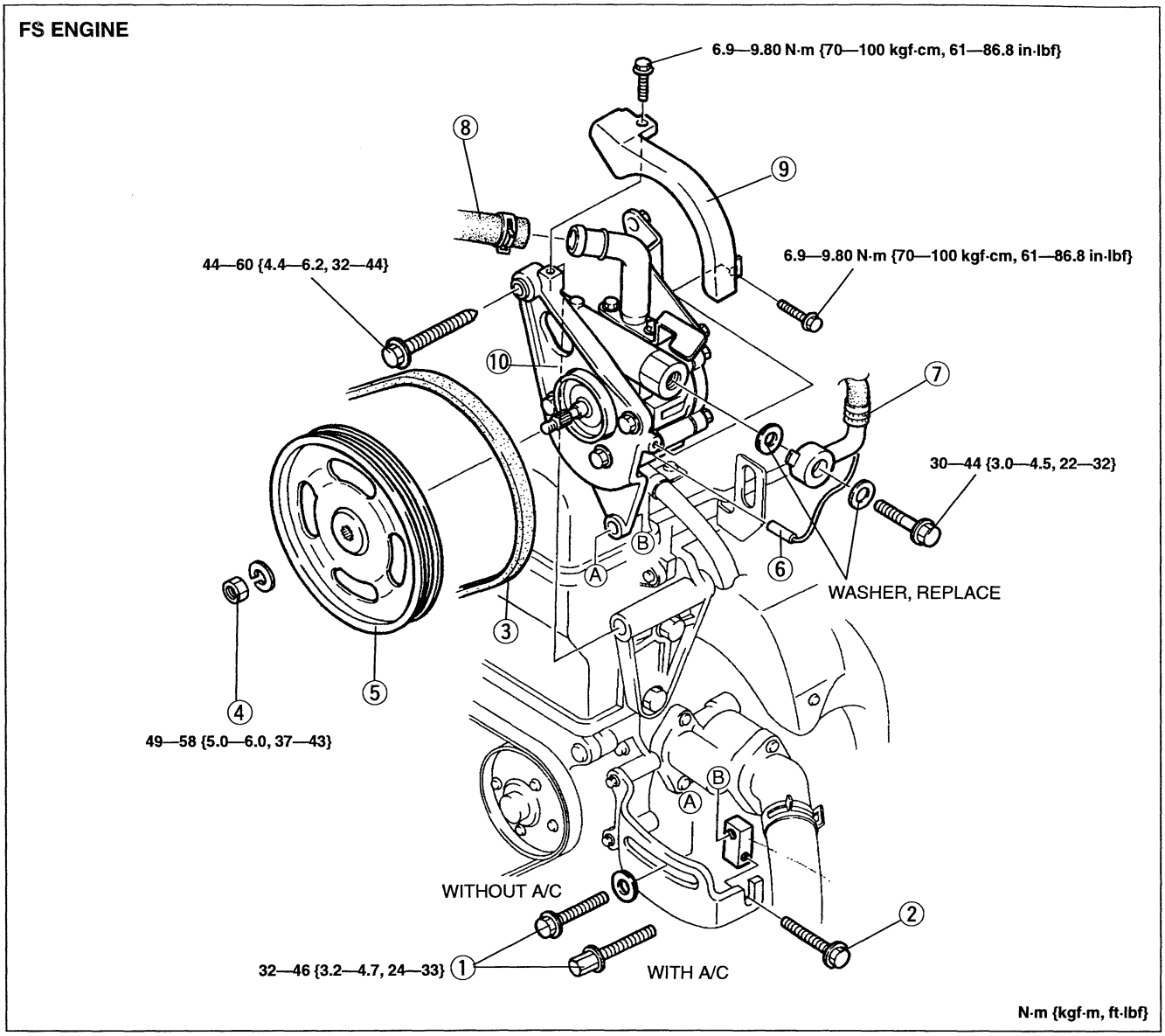
POWER STEERING OIL PUMP

Removal / Installation

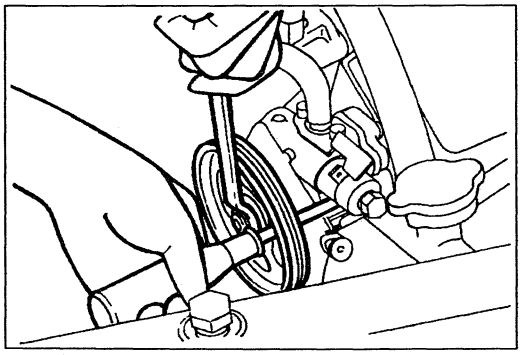
1. Remove the transverse member. (Refer to section R.)
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Inspect all parts and repair or replace as necessary.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Install the transverse member. (Refer to section R.)
6. After installation:
   (1) Adjust the belt deflection. (Refer to page N–23.)
   (2) Bleed air from the system. (Refer to page N–5.)
   (3) Check all connections for fluid leakage. (Refer to page N–6.)



1. Locknut
2. Idler pulley and bearing
3. Adjusting bolt
4. Drive belt
   - Inspection ..... page N–22
   - Adjustment ..... page N–23
   - Replacement ..... page N–23
5. Nut
   - Removal / Installation Note .... page N–19
6. Pulley
7. Hose bracket
8. Pump bracket
9. PSP switch connector
10. Pressure pipe
11. Return hose
12. Power steering oil pump
    - Disassembly / Inspection / Assembly ..... page N–20



1. Lock bolt
2. Adjusting bolt
3. Drive belt
   - Inspection ..... page N–22
   - Adjustment ..... page N–23
   - Replacement ..... page N–23
4. Nut
   - Removal / Installation Note ..... below
5. Pulley
6. PSP switch connector
7. Pressure pipe
8. Return hose
9. Pulley cover
10. Power steering oil pump and bracket
    - Disassembly / Inspection / Assembly ..... page N–20



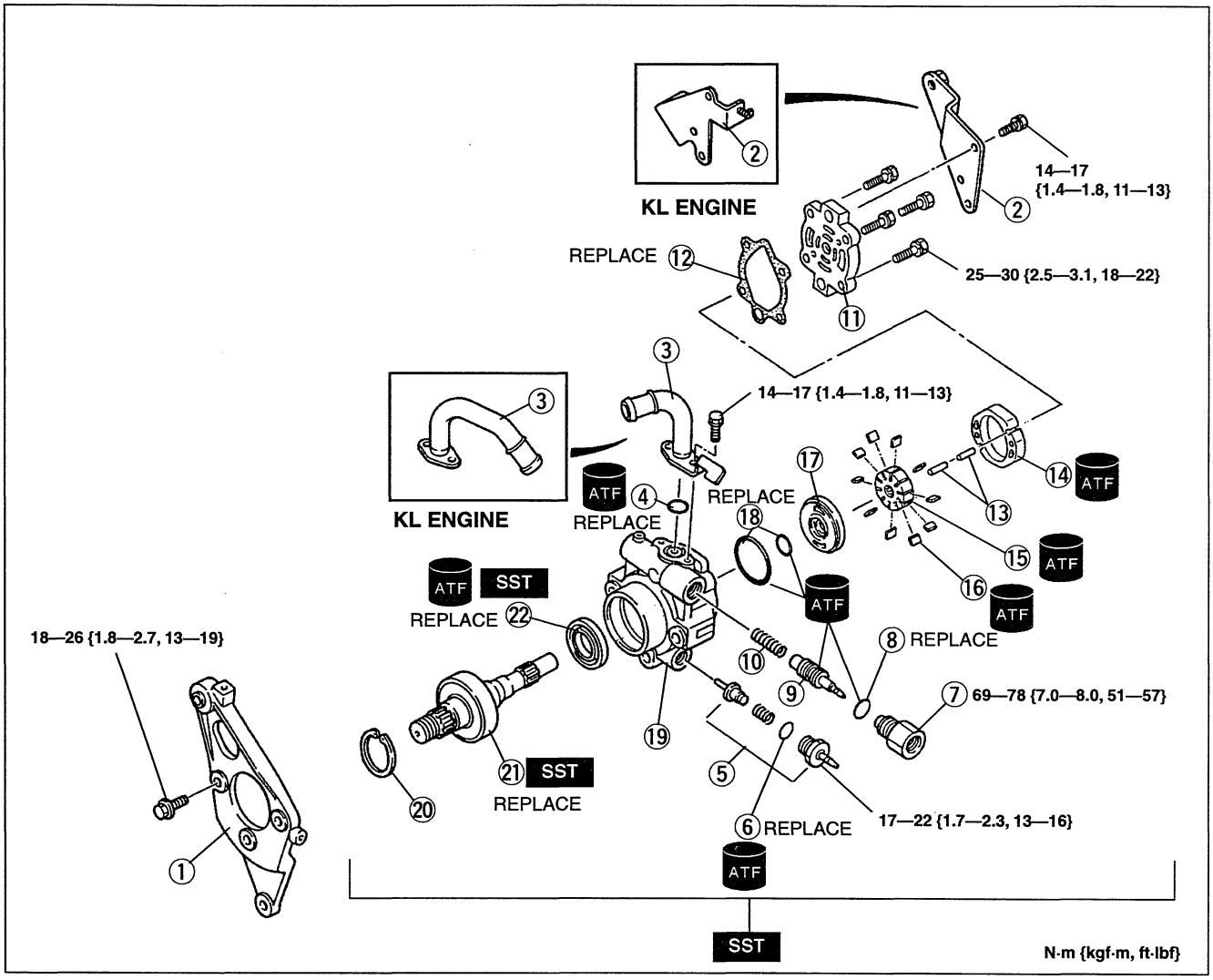
Removal / Installation note

Nut

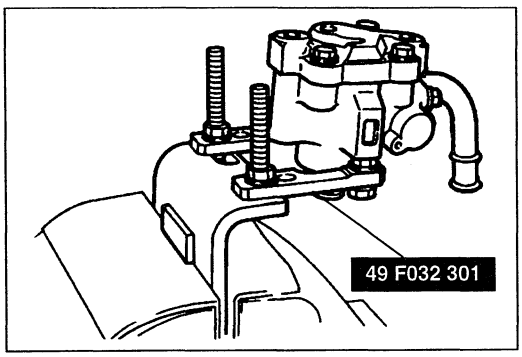
Insert a screwdriver through a hole of the pulley, and while holding the pulley, loosen/tighten the nut.

Disassembly / Inspection / Assembly

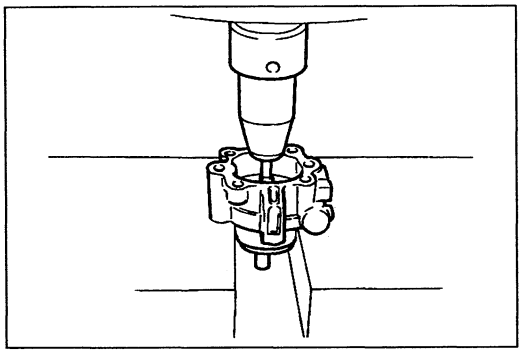
1. The following procedure is for replacement of the O-rings, the shaft, and the pump body (front) only. Replace the oil pump assembly if other repairs are necessary.
2. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



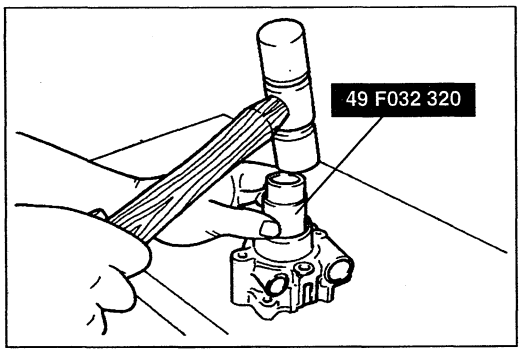
1. Bracket (FS engine)
2. Bracket
3. Suction pipe
4. O-ring
5. PSP switch assembly
6. O-ring
7. Connector
8. O-ring
9. Control valve
   Inspect for clogging, cracks, and damage
10. Spring
    Inspect for weakness
11. Pump body (Rear)
    Assembly Note ..... page N–22
    Inspect for cracks, wear, and damage
12. Gasket
13. Pin
14. Cam ring
    Assembly Note ..... page N–22
    Inspect for wear and damage
15. Rotor
    Inspect for wear and damage
16. Blade
    Assembly Note ..... page N–22
    Inspect for wear and damage
17. Side plate
    Inspect for wear and damage
18. O-ring
19. Pump body (Front)
    Inspect for cracks, wear, and damage
20. Snap ring
21. Shaft and bearing
    Disassembly Note ..... page N–21
    Assembly Note ..... page N–21
22. Oil seal
    Assembly Note ..... page N–21



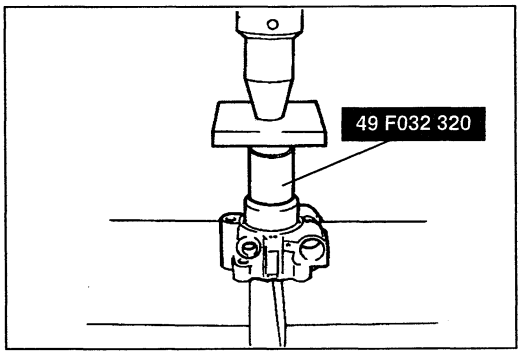
Disassembly note
Oil pump
Install the pump to the **SST** and hold the pump and **SST** in a vise.



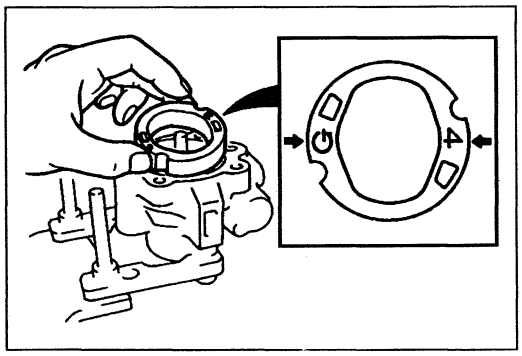
Shaft and bearing
Remove the shaft and bearing by using a press.



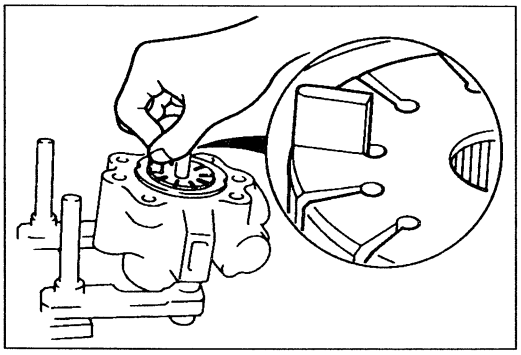
Assembly note
Oil seal
Tap the oil seal into the pump body (front) by using the **SST**.



Shaft and bearing
Press the shaft and bearing into the pump body (front) by using the **SST**.



Cam ring
Install the cam ring in the pump body (front) with the mark facing upward.

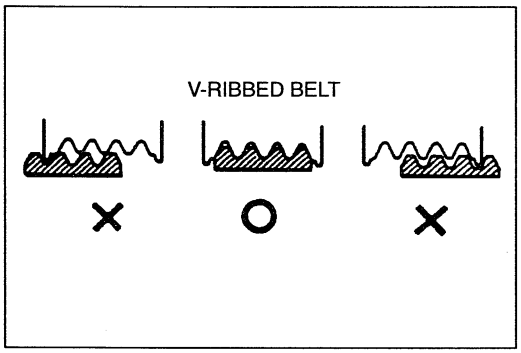


Blade

Place the blades in the rotor with the rounded edges contacting the cam.

Pump body (Rear)

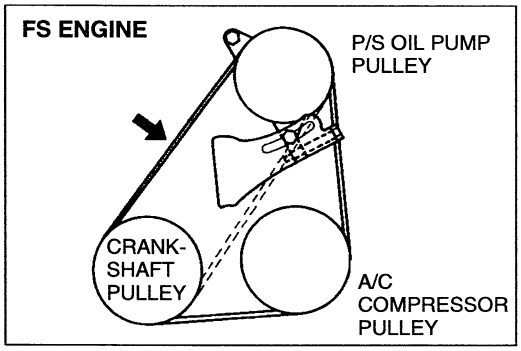
After installing the pump body (rear), manually turn the shaft to verify that it rotates smoothly.



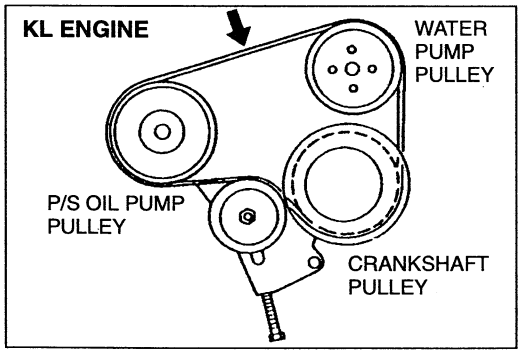
DRIVE BELT

Inspection

1. Check the drive belt for wear, cracks, and fraying. Replace if necessary.
2. Verify that the drive belt is correctly mounted on the pulleys.



3. Check the belt deflection when the engine is cold, or at least 30 minutes after the engine has stopped. Apply moderate pressure **98 N {10 kgf, 22 lbf}** midway between the specified pulleys.



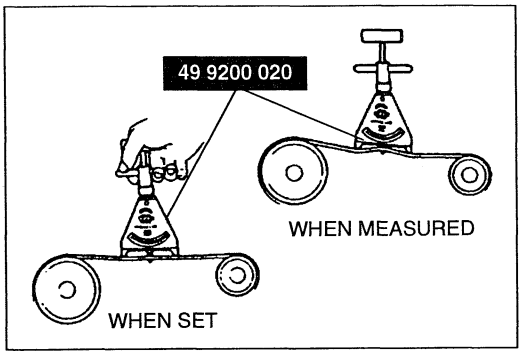
Deflection

mm {in}

	New*	Used	Limit
KL engine	6.0—7.0 {0.24—0.27}	7.0—8.0 {0.28—0.31}	9.0 {0.35}
FS engine	7.5—9.0 {0.30—0.35}	8.0—9.5 {0.32—0.37}	11.0 {0.43}

* A belt that has been on a running engine for less than five minutes.

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



Drive belt tension check

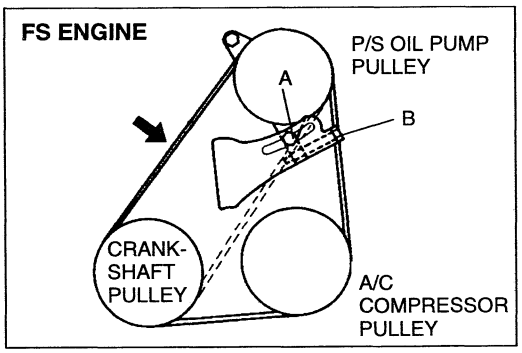
Belt tension can be checked in place of belt deflection. Check the drive belt tension when the engine is cold, or at least 30 minutes after the engine has stopped. Using the **SST**, check the belt tension between any two pulleys.

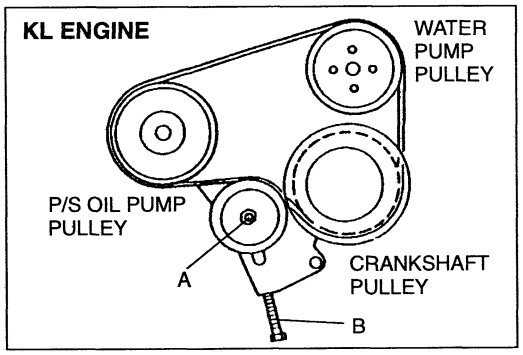
Tension

N {kgf, lbf}

	New*	Used	Limit
KL engine	540—680 {55—70, 130—150}	400—530 {40—55, 10—150}	340 {35, 77}
FS engine	590—780 {60—80, 140—170}	500—680 {50—70, 110—150}	390 {40, 88}

* A belt that has been on a running engine for less than five minutes.





Adjustment

Loosen idler pulley locknut (bolt) A, and adjust the belt deflection by turning adjusting bolt B.

Tightening torque

A: 38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

Replacement

1. Remove the alternator A/C drive belt. (KL engine) (Refer to 1996 626/MX–6 Body Electrical Troubleshooting Manual.)
2. Loosen locknut (bolt) A and adjusting bolt B.
3. Remove and replace the drive belt.
4. Adjust the deflection (tension). (Refer to above.)
5. Install the alternator A/C drive belt. (KL engine) (Refer to 1996 626/MX–6 Body Electrical Troubleshooting Manual.)

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

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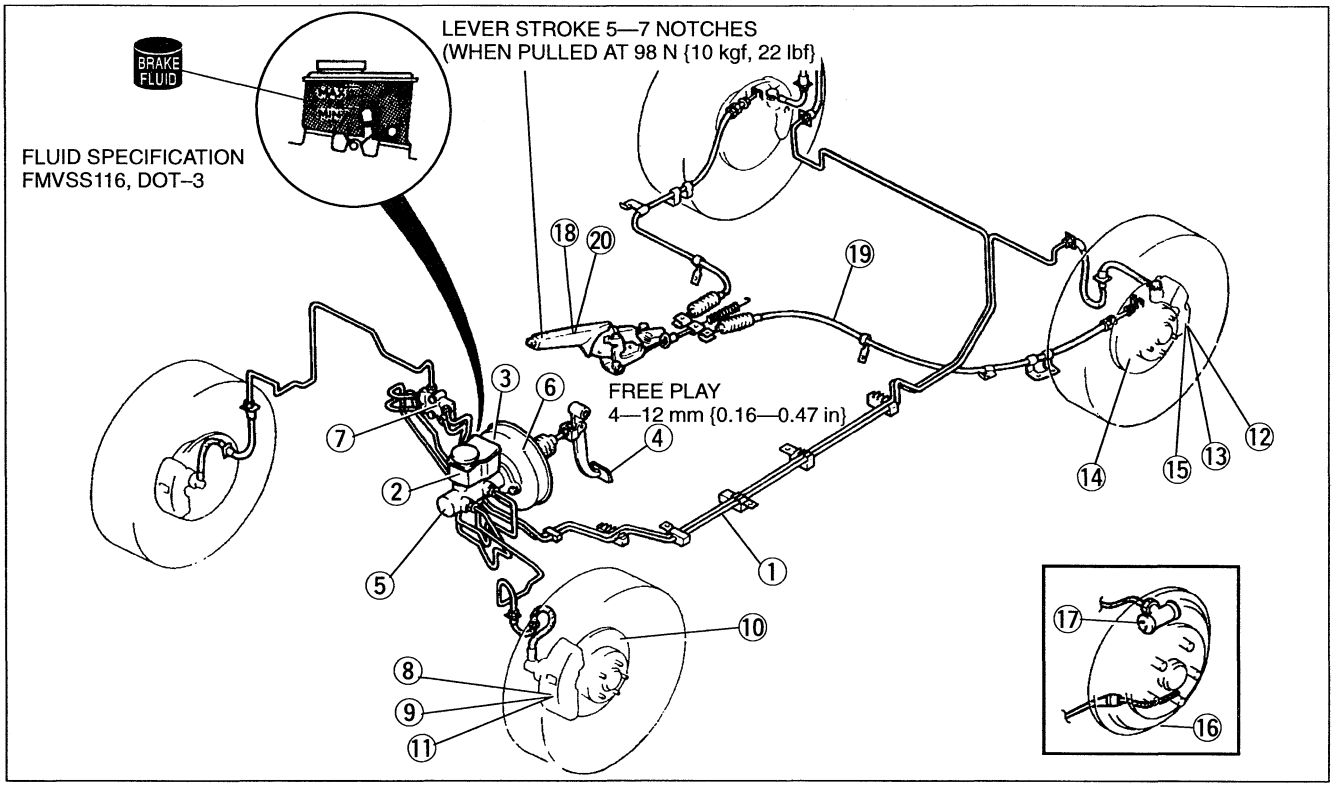

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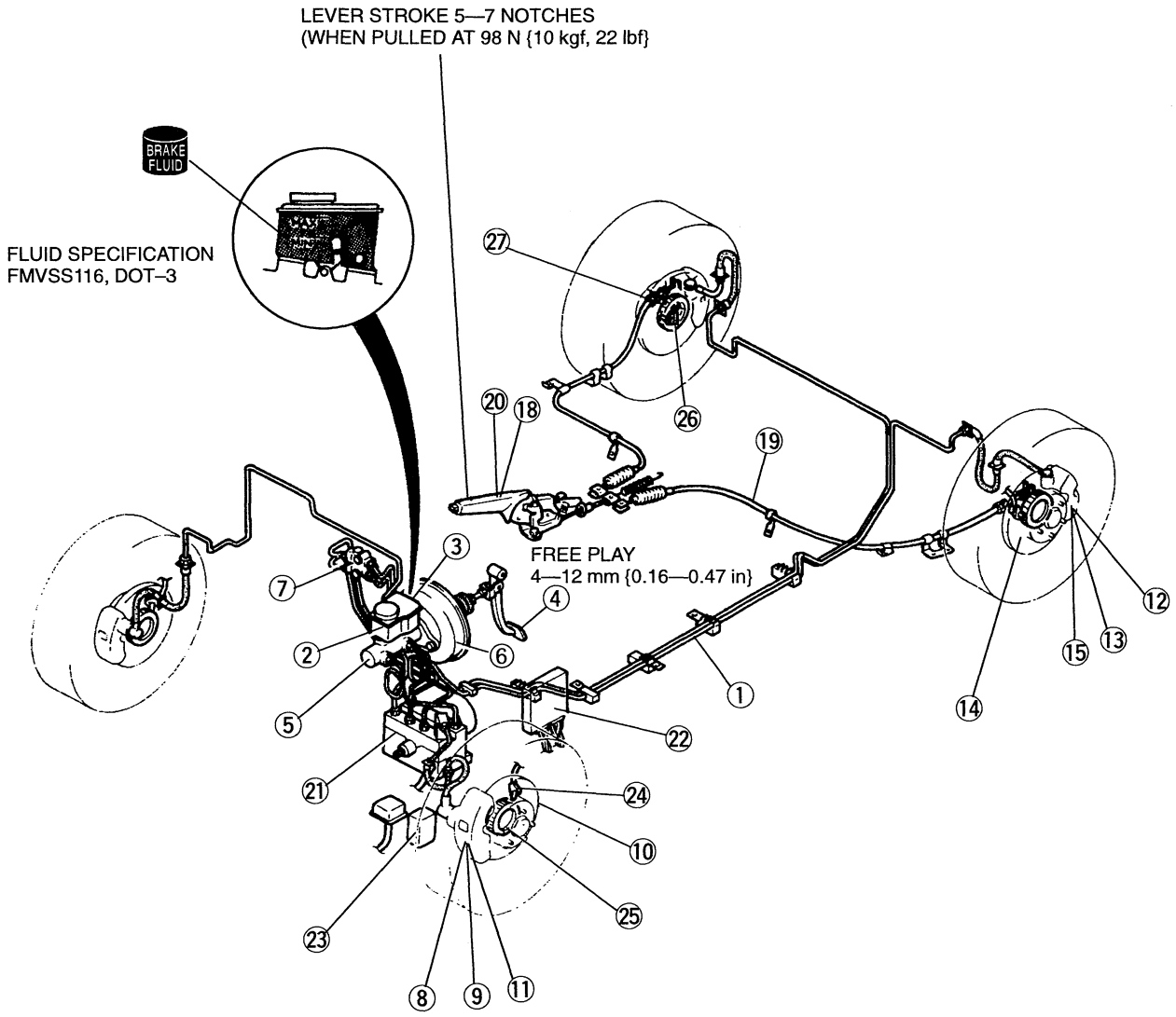
ANTILOCK BRAKE SYSTEM (ABS)



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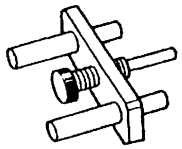
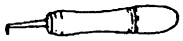
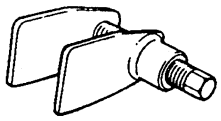
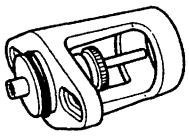
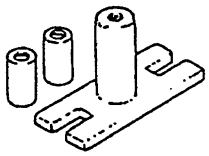
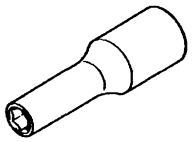
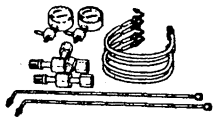
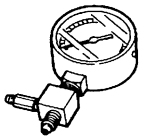
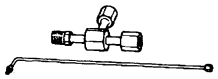
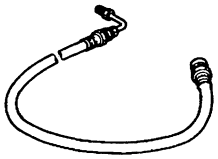
OUTLINE

SPECIFICATIONS

Item \ Engine		FS		KL	
		non ABS	ABS	non ABS	ABS
Brake pedal	Type	Suspended			
	Pedal lever ratio	4.1			
	Max. stroke mm {in}	125 {4.92}			
Master cylinder	Type	Tandem (with level sensor)			
		Conventional	Port-less	Conventional	Port-less
	Cylinder inner diameter mm {in}	23.81 {0.937}			
Front disc brake	Type	Ventilated disc			
	Cylinder bore mm {in}	57.15 {2.250}			
	Pad dimensions (area × thickness) mm^2 {in^2} × mm {in}	4800 {7.44} × 10 {0.39}			
	Disc plate dimensions (outer diameter × thickness) mm {in}	258 × 24 {10.16 × 0.94}			
Rear disc brake	Type	—	Solid disc		
	Cylinder bore mm {in}	—	30.16 {1.187}		
	Pad dimensions (area × thickness) mm^2 {in^2} × mm {in}	—	2900 × 8.0 {4.49 × 0.31}		
	Disc plate dimensions (outer diameter × thickness) mm {in}	—	261 × 10.0 {9.88 × 0.39}		
Rear drum brake	Type	Leading-trailing	—		
	Wheel cylinder inner diameter mm {in}	17.46 {0.687}	—		
	Lining dimensions (width × length × thickness) mm {in}	30 × 219.3 × 4.5 {1.18 × 8.63 × 0.18}	—		
	Drum inner diameter mm {in}	228.6 {9.000}	—		
	Shoe clearance adjustment	Automatic adjuster	—		
Power brake unit	Type	Vacuum multiplier			
		Single diaphragm		Tandem diaphragm	
	Diameter mm {in}	239 {9.4}		188+215 {7.4+8.5}	
Braking force control device	Type	Dual proportioning valve			
Brake fluid		FMVSS116, DOT–3			
Parking brake	Type	Mechanical two-rear-wheel control			
	Operation system	Center lever			

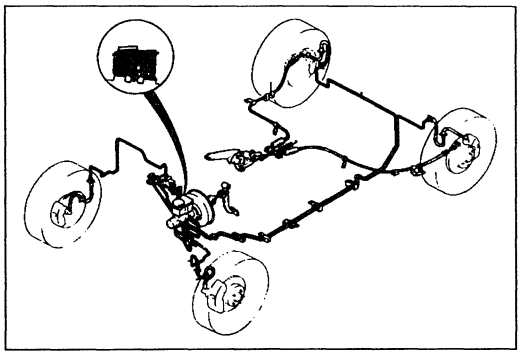
CONVENTIONAL BRAKE SYSTEM

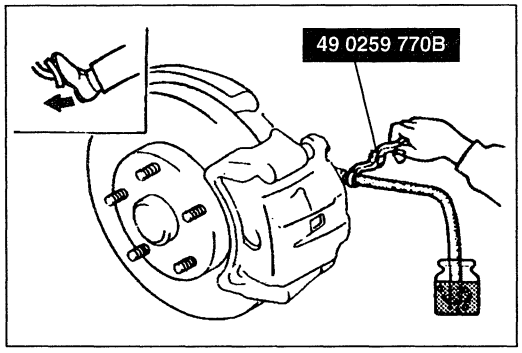
PREPARATION
SST

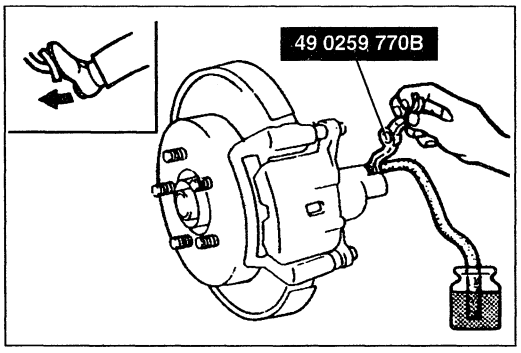
49 0259 770B Wrench, flare nut 	For removal of brake pipe	49 F043 001 Adjust gauge 	For adjustment of push rod clearance
49 0208 701A Air-out tool, boot 	For removal of piston seal	49 0221 600C Espand tool, disc brake 	For installation of brake pads (Front disc brake)
49 B043 001 Adjust gauge 	For adjustment of push rod clearance	49 E043 003A Lock tool, turning 	For adjustment of push rod clearance
49 B043 004 Socket wrench 	For adjustment of push rod clearance	49 U043 0A0 Gauge set, oil pressure 	For inspection of brake fluid pressure
49 U043 004 Gauge, oil pressure (Part of 49 U043 0A0) 	For inspection of brake fluid pressure	49 U043 005 Joint (Part of 49 U043 0A0) 	For inspection of brake fluid pressure
49 U043 006 Hose (Part of 49 U043 0A0) 	For inspection of brake fluid pressure	—	—

TROUBLESHOOTING GUIDE

Problem	Possible cause	Action	Page
Poor braking	Leakage of brake fluid	Repair	—
	Air in system	Bleed air	P– 7
	Worn disc pad or brake shoe	Replace	P–25, 29, 33
	Brake fluid, grease, oil or water on disc pad or brake shoe	Clean or replace	P–25, 29, 33
	Hardening of disc pad or brake shoe surface or poor contact	Grind or replace	P–25, 29, 33
	Malfunction of caliper piston or wheel cylinder	Replace	P–26, 31, 33
	Malfunction of master cylinder or wheel cylinder	Repair or replace	P–12, 16, 33
	Malfunction of power brake unit	Replace	P–20
	Malfunction of check valve (vacuum hose)	Replace	P– 9
	Damaged vacuum hose	Replace	P– 9
	Deterioration of flexible hose	Replace	P– 8
	Malfunction of dual proportioning valve	Replace	P–22
Brakes pull to one side	Worn disc pad or brake shoe	Replace	P–25, 29, 33
	Brake fluid, grease, oil or water on disc pad or brake shoe	Clean or replace	P–25, 29, 33
	Hardening of disc pad brake shoe surface or poor contract	Grind or replace	P–25, 29, 33
	Abnormal wear, distortion of disc plate or drum	Repair or replace	P–24, 28, 33
	Malfunction of automatic adjuster	Repair or replace	P–31, 33
	Loose or damaged dust cover/backing plate mounting bolt	Tighten or replace	section M
	Malfunction of caliper piston or wheel cylinder	Replace	P–26, 31, 33
	Worn or improperly adjusted wheel bearing preload	Adjust or replace	section M
	Improper adjustment of wheel alignment	Adjust	section R
	Unequal tire air pressure	Adjust	section Q
Brakes do not release	No brake pedal play	Adjust	P–10
	Improper adjustment of push rod clearance	Adjust	P–13
	Clogged master cylinder return port	Clean	—
	Brake pad not returning properly	Repair	—
	Improper return or malfunction of caliper piston or wheel cylinder piston	Repair or replace	P–26, 31, 35
	Excessive runout of disc plate	Repair or replace	P–24, 28
	Improper adjustment of wheel bearing preload	Adjust or replace	section M
Pedal goes too far (Excessive pedal stroke)	Air in system, insufficient brake fluid	Add fluid and bleed air	P–7, 9
	Improper adjustment of pedal play	Adjust	P–10
	Worn disc pad or brake shoe	Replace	P–25, 29, 33
Abnormal noise or vibration during braking	Worn disc pad or brake shoe	Replace	P–25, 29, 33
	Damaged pad or brake shoe	Grind or replace	P–25, 29, 33
	Brakes do not release	Repair	—
	Foreign material or scratches on disc plate or drum contact surface	Clean	—
	Loose backing plate/dust cover or caliper mounting bolt	Tighten	P–24, 28, 33
	Damaged disc plate or drum contact surface	Replace	P–24, 28, 33
	Poor contact of pad or brake shoe	Repair or replace	P–25, 29, 33
	Insufficient grease on sliding parts	Apply grease	—







AIR BLEEDING

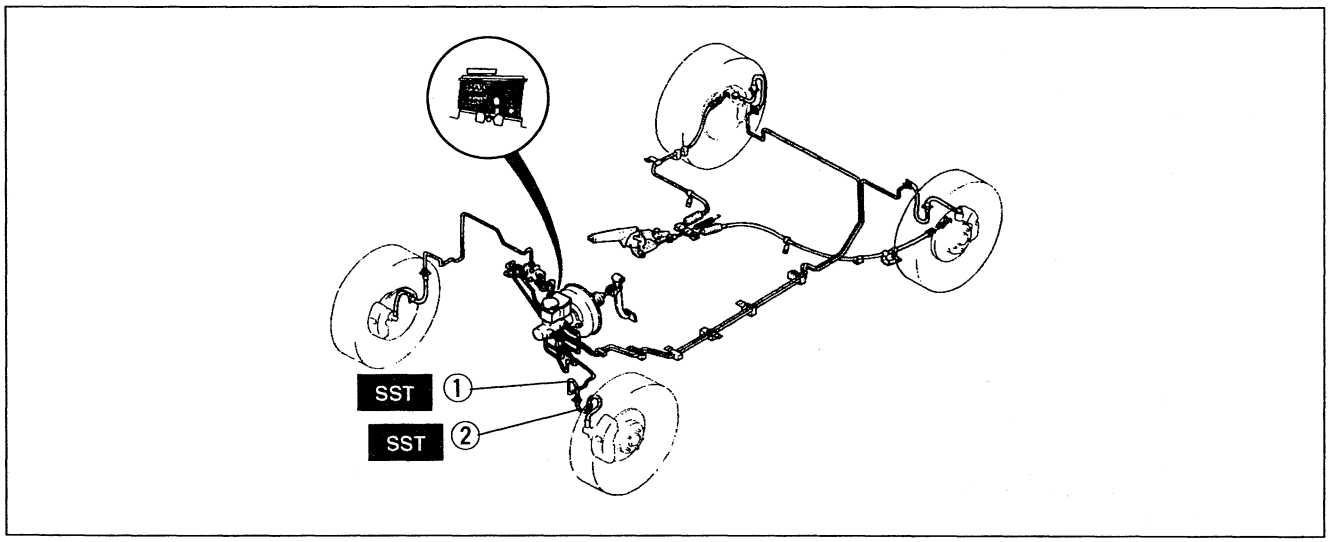
Note

- The brakes should be bled whenever a brake line is disconnected. If a hydraulic line is disconnected at the master cylinder, start at the slave cylinder farthest from the brake master cylinder, and move to the next closest slave cylinder until all four cylinders have been bled. If the disconnection point is anywherer except the master cylinder, start at the point closest to the disconnection, and move to the next farthest slave cylinder until all four cylinders have been bled.

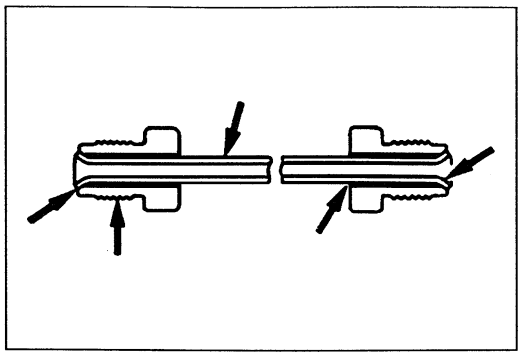
1. Jack up the vehicle and support it with safety stands.
2. Remove the bleeder cap and attach a vinyl hose to the bleeder plug.
3. Place the other end of the vinyl tube in a clear container.
4. One person should depress the brake pedal a few times, and then hold it in the depressed position.
5. A second person should loosen the bleeder screw, drain out the fluid, and retighten the screw by using the **SST**.
6. Repeat steps 4 and 5 until no air bubbles are seen. The reservoir should be kept about 3/4 full during bleeding to prevent air from reentering the lines.
7. Check for correct brake operation.
8. Verify that there is no fluid leakage. Wipe off any spilled fluid immediately.
9. After bleeding the air, add brake fluid to the reservoir up to the specified level.

Tightening torque
Front: 7—9 N·m {72—91 kgf·cm, 63—78 in·lbf}
Rear: 5.9—8.8 N·m {60—90 kgf·cm, 53—78 in·lbf}

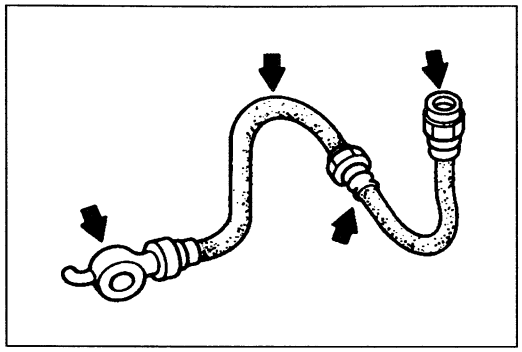
BRAKE HYDRAULIC LINE



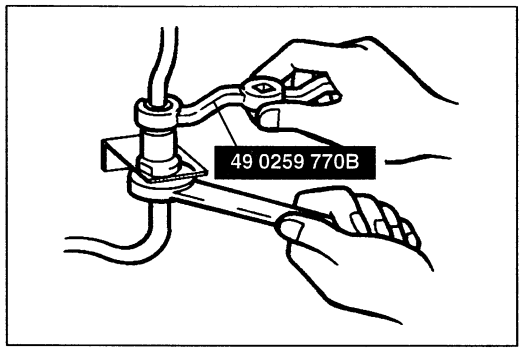
1. Brake pipe
   Inspection / Removal / Installation ..... page P–8
2. Flexible hose
   Inspection / Removal / Installation ..... page P–8



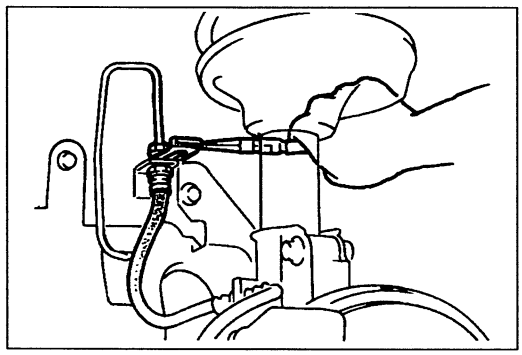
Inspection (on-vehicle)
Brake pipe
Check for cracks, damage, and corrosion of the brake pipe. Replace the pipe or flare nut(s) if necessary.



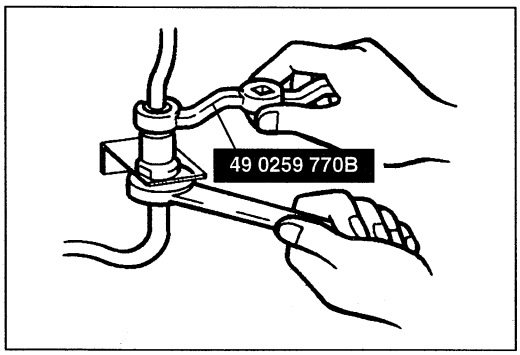
Flexible hose
Check for scars, cracks, and swelling of the flexible hose. Replace the hose if necessary.



Removal
1. Remove the brake pipe by using the **SST**.
2. Disconnect the clip and remove the flexible hose from the bracket.

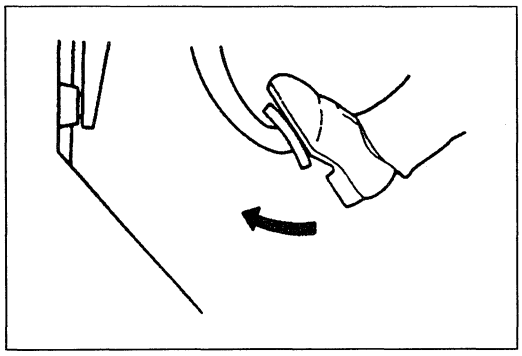


Installation
1. Secure the flexible hose in the bracket and connect the clip to it.



2. Connect the flexible hose to the brake pipe. Verify that the hose is not twisted.
3. Tighten the flare nut by using the **SST**. Verify that the hose can not come in contact with any other parts of vehicle.

Tightening torque:
12.9—21.5 N·m {130—220 kgf·cm, 113—190 in·lbf}



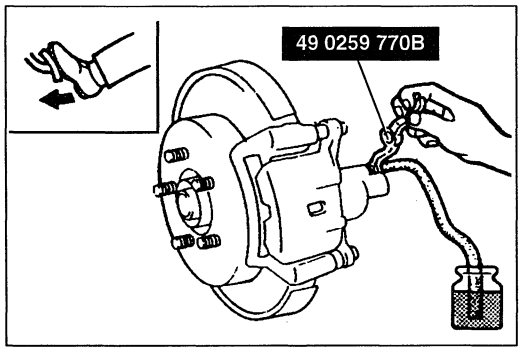
BRAKE FLUID

Inspection

1. Depress the brake pedal several times, and inspect for leakage of the brake line system.

2. Verify that the fluid level in the reservoir is between the MAX and MIN lines on the reservoir.
3. If the fluid level is extremely low, check the brake system for leakage.

Fluid specification: FMVSS116, DOT–3

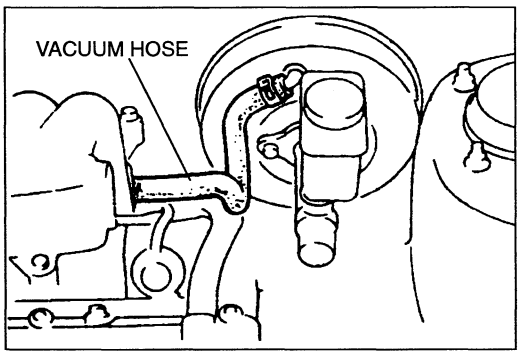


Replacement

Caution

- **Brake fluid will damage painted surfaces. If brake fluid does get on a painted surface, wipe it off immediately.**

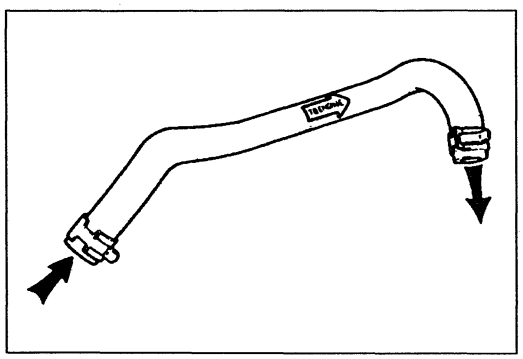
1. Remove the brake fluid from the reservoir by using a suction pump.
2. Fill the reservoir with clean brake fluid.
3. Attach a vinyl tube to the farthest bleeder screw and place the other end of the tube in a clear container.
4. Remove all old brake fluid from the brake lines by loosening the bleeder screw and pumping the brake pedal until only clean fluid is seen. The reservoir should be kept about 3/4 full during bleeding to prevent air from reentering the lines.
5. Perform the above for all bleeder screws.
6. Fill the reservoir to the specified levels.



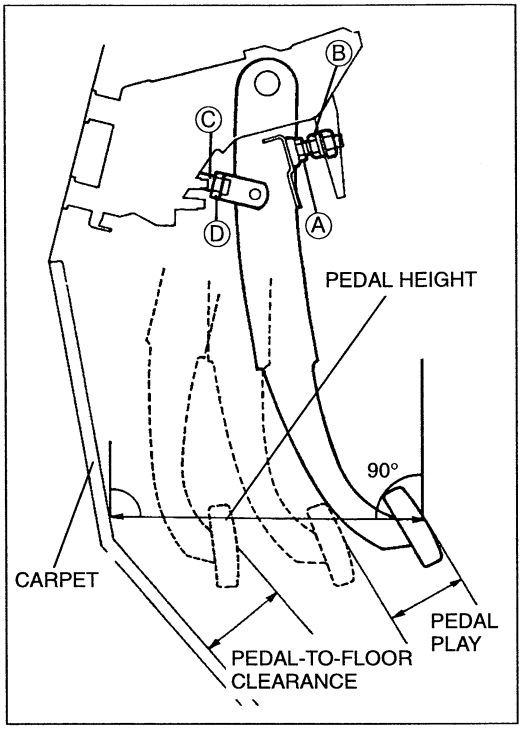
VACUUM LINE

Inspection

1. Remove the clamps and the hose.



2. Apply both suction and pressure to the engine-side of the hose, and verify that air flows only toward that side. If air flows in both directions or not at all, replace the vacuum hose.



BRAKE PEDAL
Inspection (on-vehicle)
Brake pedal height
Inspection

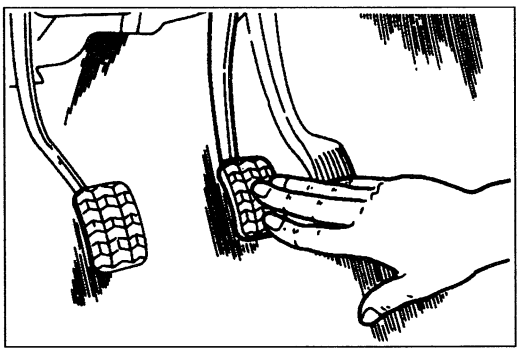
Verify that the distance from the center on the pedal pad to the carpet is as specified.

Specification: 191.5—196.5 mm {7.54—7.74 in}

Adjustment

1. Loosen locknut Ⓑ and turn bolt Ⓐ until it does not contact the pedal.
2. Loosen locknut Ⓓ and turn rod Ⓒ to adjust the height.
3. Adjust the pedal free play and tighten locknut Ⓓ.
4. Turn bolt Ⓐ until it contacts the pedal; then turn an additional 1/2 turn.
5. Tighten locknut Ⓑ.

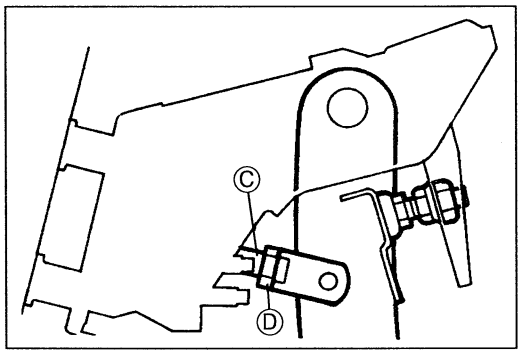
Tightening torque:
9.81—14.7 N·m {100—150 kgf·cm, 86.9—130 in·lbf}



Pedal Play
Inspection

1. Depress the pedal a few times to eliminate the vacuum in the system.
2. Remove the snap pin, verify that the holes in the fork and in the pedal are aligned, then reinstall the pin.
3. Gently depress the pedal by hand and check the free play (until resistance is felt).

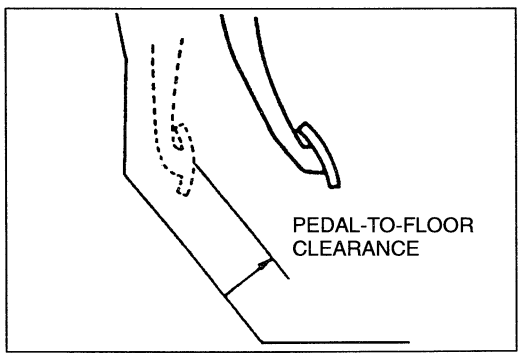
Pedal play: 4—12 mm {0.16—0.47 in}



Adjustment

1. Remove the spring pin and the clevis pin.
2. Loosen locknut Ⓓ and turn rod Ⓒ to align the holes in the fork and in the pedal.
3. Install the clevis pin and a new spring pin.
4. Verify the pedal height and the brake light operation.

Tightening torque:
24—34 N·m {2.4—3.5 kgf·m, 17—25 ft·lbf}



Pedal-To-Floor Clearance
Inspection

Verify that the distance from the floor panel to the pedal pad center is as specified when the pedal is depressed with a force of **589 N {60 kgf, 132 lbf}**.

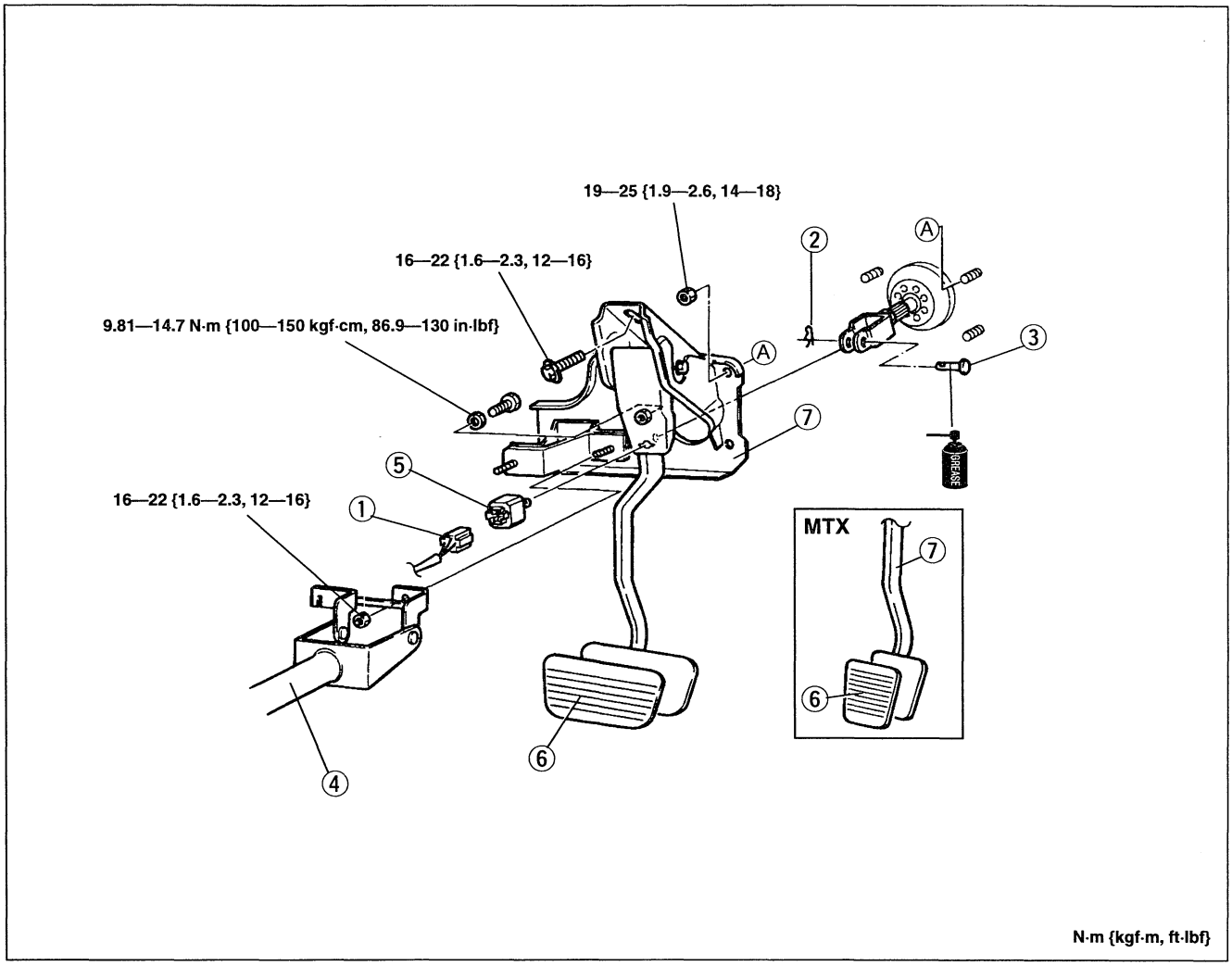
Pedal-to-floor clearance: 85 mm {3.35 in} min.

If the distance is less than specified, check for the following problems:

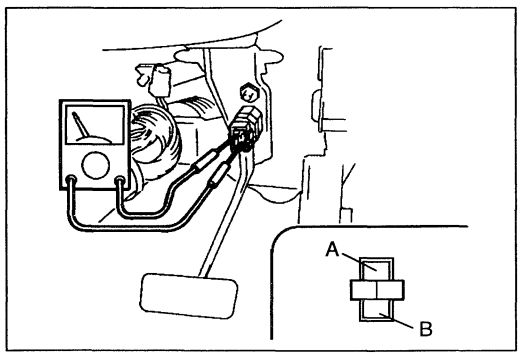
1. Air in brake system
2. Malfunction of automatic adjuster
3. Worn pads

Removal / Inspection / Installation

1. Remove in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal.
4. After installation, check and if necessary adjust the pedal height and free play.



1. Brake switch connector
2. Spring pin
3. Clevis pin
4. Steering shaft
   Service ..... section N
5. Brake switch
   Inspection ..... below
6. Pedal pad
   Inspect for wear and damage
7. Brake pedal
   Inspect for bending and damage



Inspection

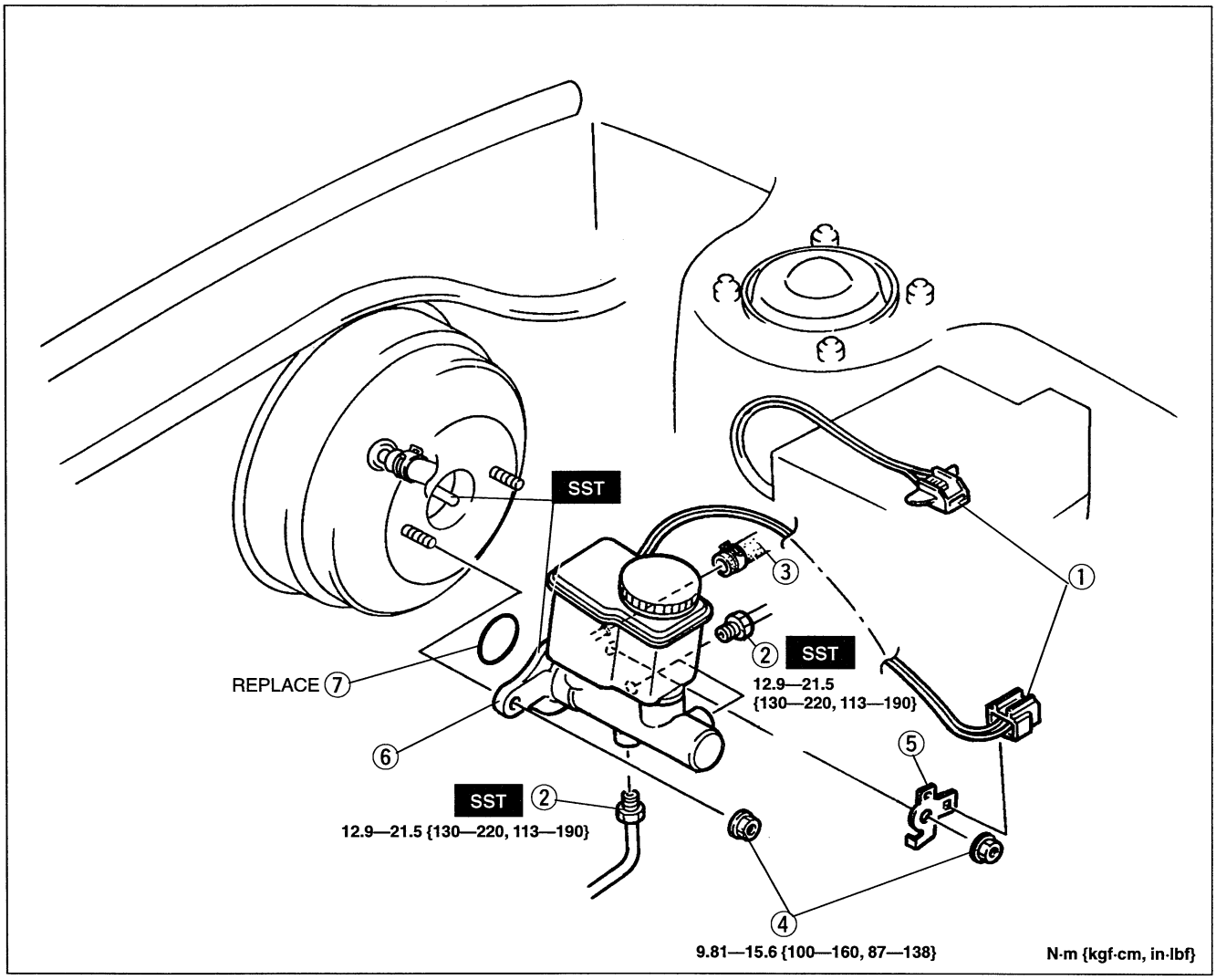
Brake switch

1. Disconnect the brake switch connector.
2. Connect an ohmmeter between the terminals of the brake switch.
3. Confirm continuity between the terminals when the brake pedal is depressed.

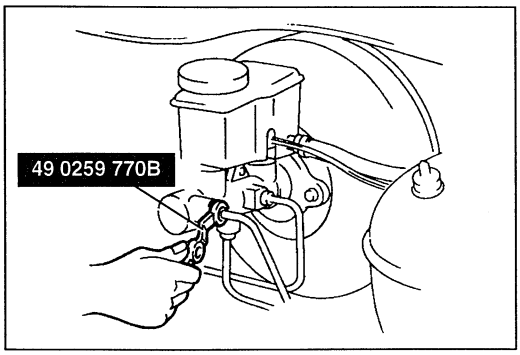
MASTER CYLINDER

Removal / Installation

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**.
3. After installation, add brake fluid, bleed air, and check for fluid leakage.



1. Brake fluid level sensor connector
2. Brake pipe
   - Removal Note ..... below
   - Installation Note ..... page P–15
3. Hose (MTX)
4. Nut
5. Bracket
6. Master cylinder
   - Disassembly / Inspection / Assembly ..... page P–16
   - Installation Note ..... page P–13
7. O-ring (Except MTX without ABS)

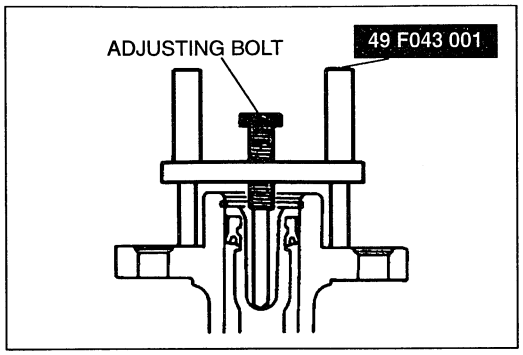


Removal note
Brake pipe

Caution

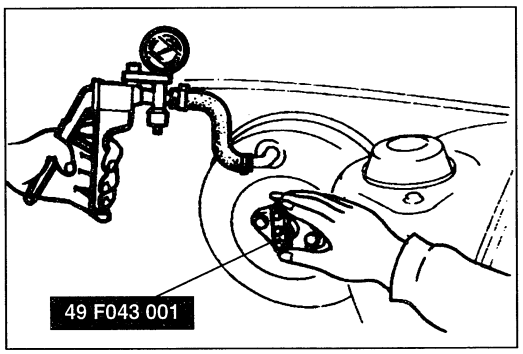
- **Brake fluid will damage painted surfaces. If brake fluid does get on a painted surface, wipe it off immediately.**

Disconnect the brake pipe from the master cylinder by using the **SST**.

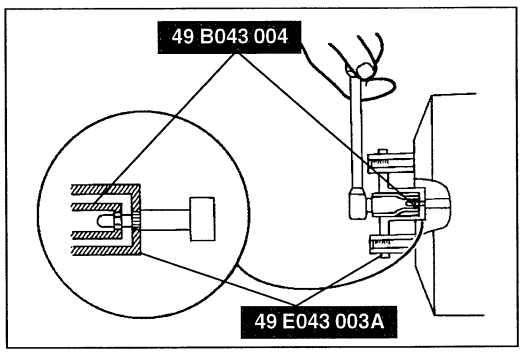


Installation note
Master cylinder (MTX without ABS)
Piston to push rod clearance

1. Place the **SST** atop the master cylinder. Turn the adjusting bolt until it touches the bottom of the push rod hole in the piston.

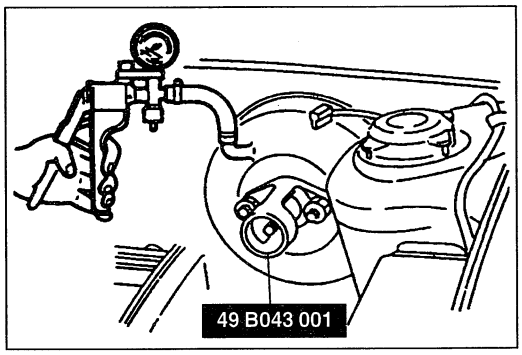


2. Apply **66.7 kPa {500 mmHg, 19 inHg}** vacuum to the power brake unit by using a vacuum pump.
3. Invert the adjustment gauge used in step 1 and place it on the power brake unit.
4. Measure the clearance between the end of the **SST** and the push rod of the power brake unit. If it is not **0 mm {0 in}**, loosen the push rod locknut and turn the push rod to make the adjustment by using the **SSTs**.



Note
- This adjustment produces the following clearance.

Vacuum applied to unit	Push rod to piston clearance
Approx. 66.7 kPa {500 mmHg, 19.7 inHg}	0.1—0.4 mm {0.004—0.016 in}

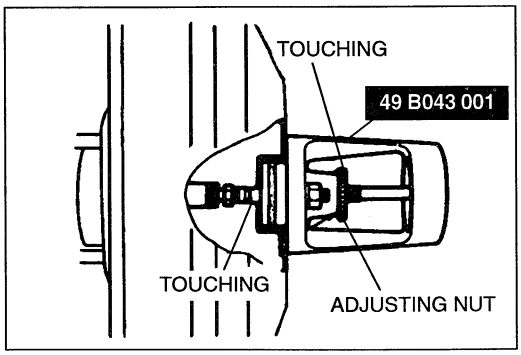


Master cylinder (except MTX without ABS)
Piston to push rod clearance

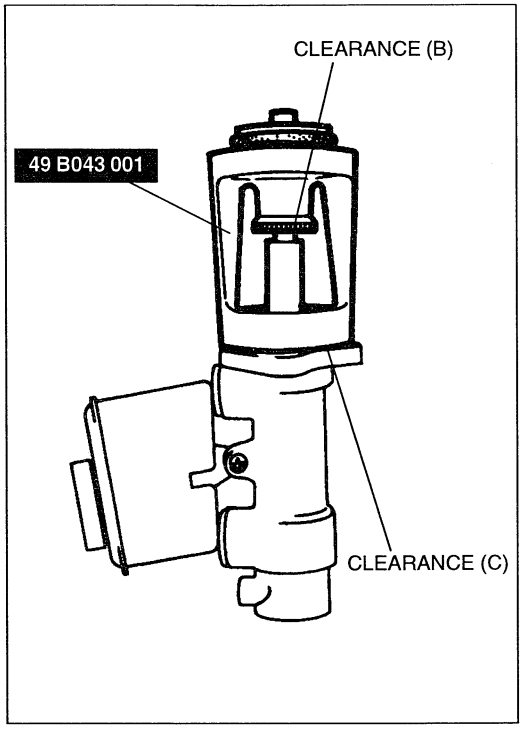
1. Turn the nut of the **SST** clockwise to fully retract the **SST** gauge rod. Attach the **SST** to the power brake unit.

   Tightening torque:
   9.81—15.6 N·m {100—160 kgf·cm, 87—138 in·lbf}

2. Apply **66.7 kPa {500 mmHg, 19.7 inHg}** vacuum to the power brake unit by using a vacuum pump.

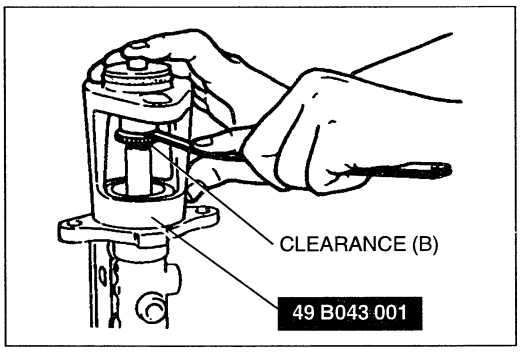


3. Turn the adjusting nut of the **SST** counterclockwise until the gauge rod just contacts the push rod end of the power brake unit.
   Push lightly on the end of the gauge rod to be sure it is seated. Verify that there is no gap between the adjusting nut and **SST** body.



4. Remove the **SST** from the power brake unit without disturbing the adjusting nut. Set the **SST** onto the master cylinder as shown in the figure.
5. Push lightly on the end of the **SST** gauge rod to be sure it is bottomed in the master cylinder piston, but do not push so hard that the piston moves. Note any clearance between the **SST** body and the adjusting nut (clearance B) or between the body and the master cylinder (clearance C). Adjust the push rod as necessary as outlined in "Adjustment" below.

Measurement	Push rod
Clearance at (B)	Too short
Clearance at (C)	Too long
No clearance at (B) or (C)	OK

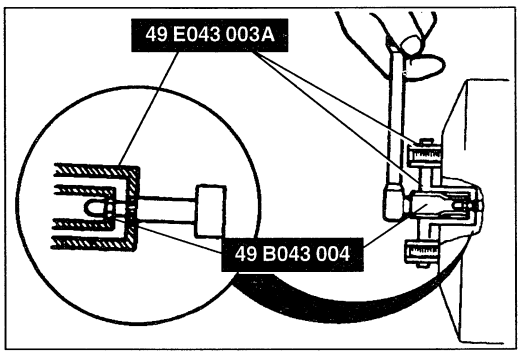


Adjustment

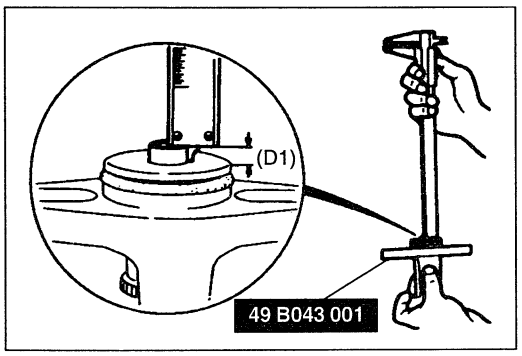
The threads of the push rod are specially designed so that the bolt becomes harder to turn past a certain point. This is to prevent the bolt from coming loose. Turn the bolt only within this range when adjusting.

Clearance at (B)

1. Push lightly on the end of the **SST** gauge rod, and measure the clearance between the adjusting nut and the **SST** body.

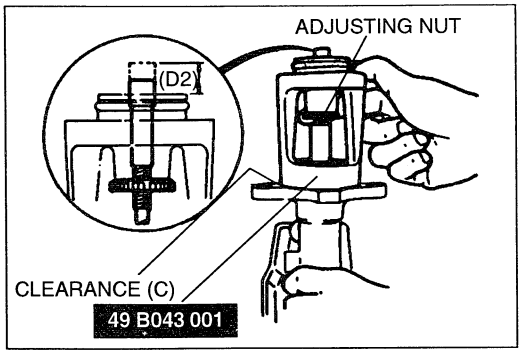


2. Using the **SSTs**, turn the nut to lengthen the power brake unit push rod to an amount equal to the clearance measured at (B).

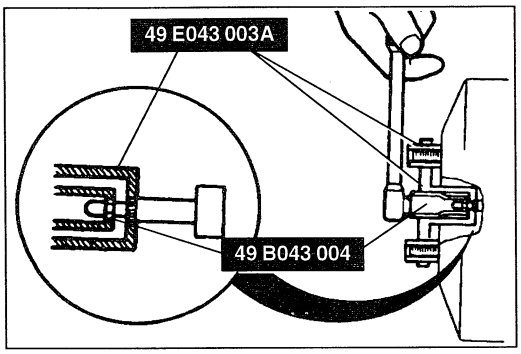


Clearance at (C)

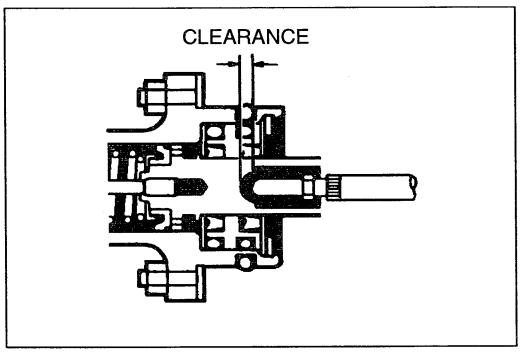
1. Measure and record height (D1) of the gauge rod.



2. Turn the adjusting nut until the **SST** body sets squarely on the master cylinder. (Turn only enough for the body to touch.)
3. Measure and record height D2 of the gauge rod.

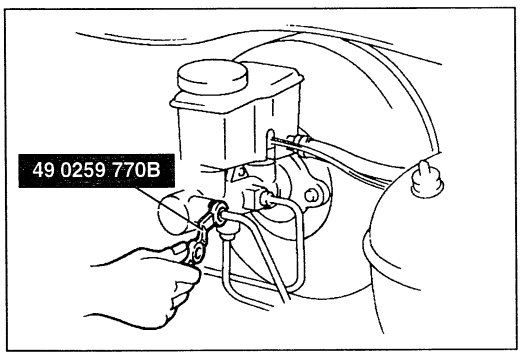


4. Subtract D1 from D2 and using the **SSTs**, turn the nut to shorten the power brake unit push rod an amount equal to the sum.



Note
- This adjustment produces the follwing clearance.

Vacuum applied to unit	Push rod to piston clearance
Approx. 66.7 kPa {500 mmHg, 19.7 inHg}	0.1—0.4 mm {0.004—0.016 in}



Brake pipe

Tighten the brake pipe flare nut by using the **SST**.

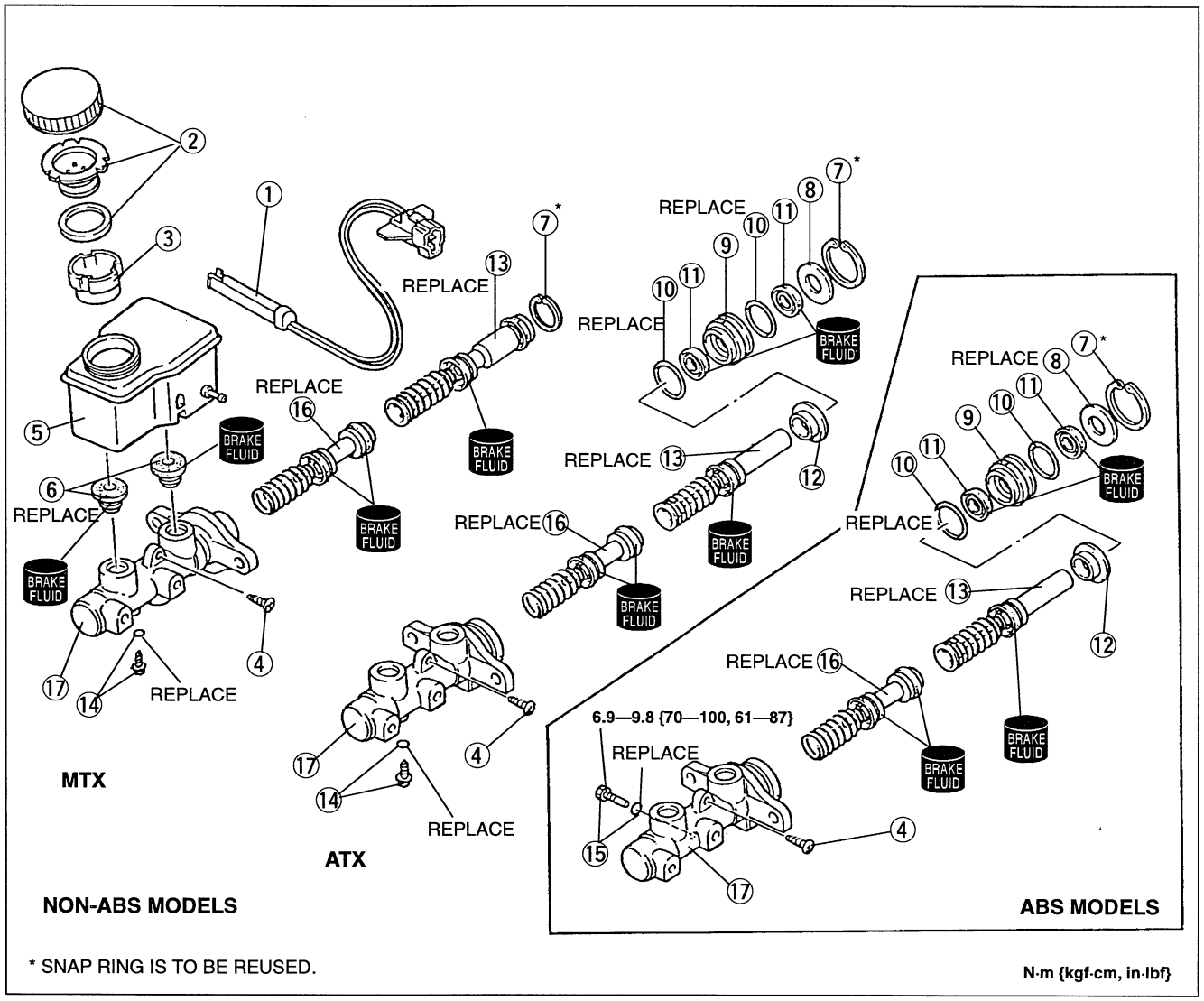
Tightening torque:
12.9—21.5 N·m {130—220 kgf·cm, 113—190 in·lbf}

Disassembly / Inspection / Assembly

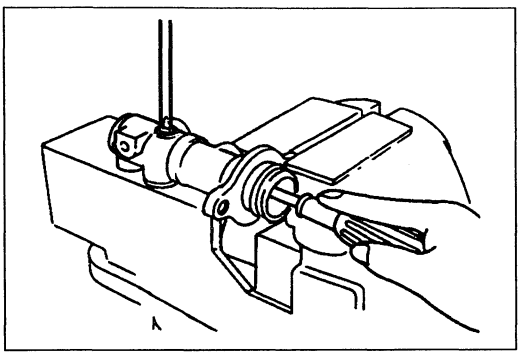
1. After removing the brake fluid, disassemble in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary. If the master cylinder body is damaged, replace the unit as an assembly.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.

Caution

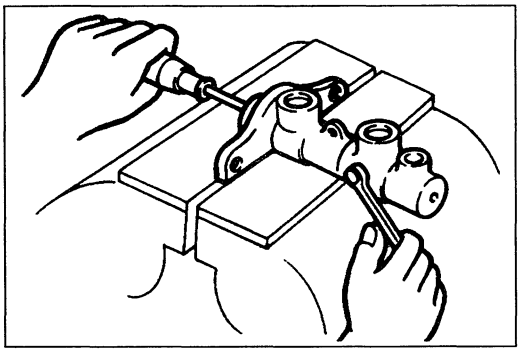
- **The brake master cylinder is made of aluminum, and can be easily damaged by tightening in a vise. When securing the master cylinder in a vise, tighten only the flange of the master cylinder.**



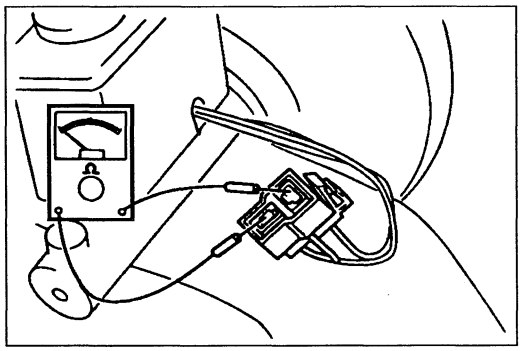
1. Brake fluid level sensor
   Inspection ..... page P–17
2. Cap set
3. Filter
4. Screw
5. Reservoir
   Inspect for damage and deformation
6. Bushings
7. Snap ring
8. Spacer
9. Piston guide
10. O-ring
11. Cup
12. Stopper
13. Primary piston assembly
    Inspect for abnormal wear, rust, and damage
14. Stop screw and O-ring (Non-ABS model)
    Assembly Note ..... page P–17
15. Stop pin and O-ring (ABS model)
    Assembly Note ..... page P–17
16. Secondary piston assembly
    Inspect for abnormal wear, rust, and damage
17. Master cylinder body
    Inspect inside of body for corrosion



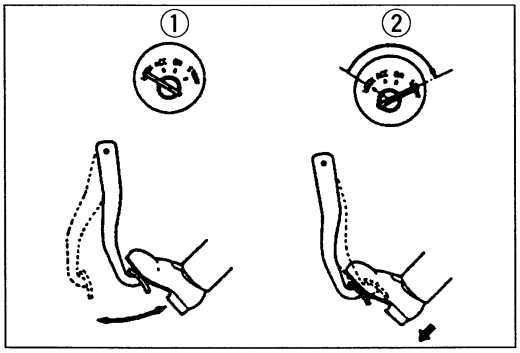
Assembly note
Stop screw and O-ring (non-ABS model)
1. Push the secondary piston assembly in fully.
2. Install and tighten a new O-ring and stop screw.
3. Push and release the piston to verify that it is held by the stop screw.



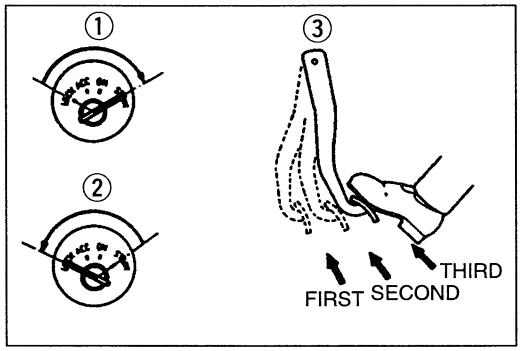
Stop pin and O-ring (ABS model)
1. Install the secondary piston assembly with the piston hole facing the stop pin.
2. Install and tighten the new O-ring and stop pin.
3. Push and release the piston to verify that it is held by the stop pin.



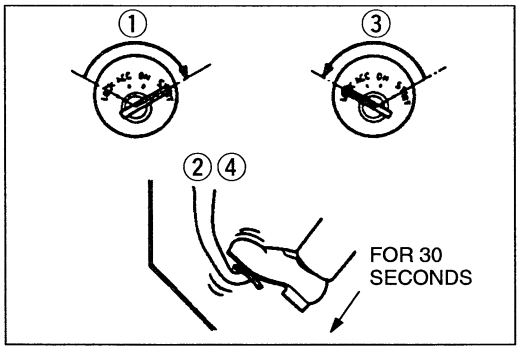
Inspection
Fluid level sensor
1. Disconnect the sensor connector.
2. Connect an ohmmeter to the connector.
3. Starting with the fluid level above the MIN mark on the reservoir, verify that there is no continuity.
4. Remove the brake fluid and verify continuity when the level is below the MIN mark.
5. Replace the sensor if necessary.



POWER BRAKE UNIT
Quick Inspection (on-vehicle)
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 the pedal moves down slightly immediately after the engine starts, the unit is operating.

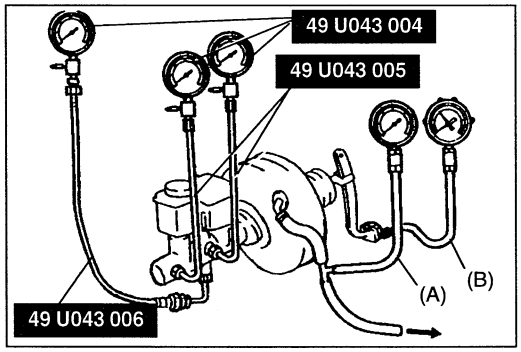


Step 2
1. Start the engine.
2. Stop the engine after it has run for **1 or 2 minutes**.
3. Depress the pedal with the usual force.
4. If the first pedal stroke is long and becomes shorter with subsequent strokes, the unit is operating.
5. If a problem is found, inspect the check valve and vacuum hose for damage and examine the installation. Repair if necessary, and inspect it again.

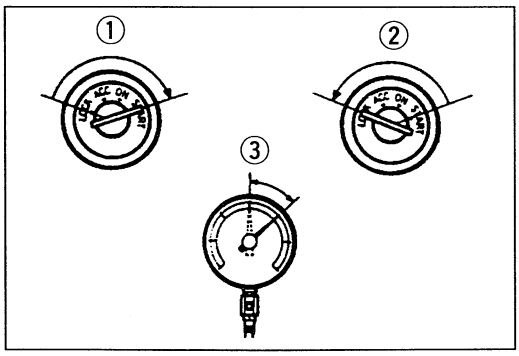


Step 3
1. Start the engine.
2. Depress the pedal with the usual force.
3. Stop the engine with the pedal depressed.
4. Hold the pedal down for **about 30 seconds**.
5. If the pedal height does not change, the unit is operating.
6. If there is a problem, check the check valve and vacuum hose for damage, and check the connection. Repair if necessary and check again.

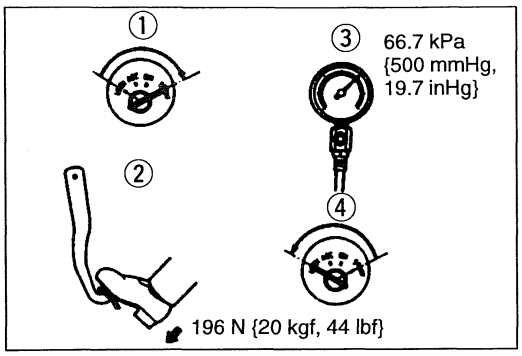
   If the nature of the problem is still not clear after the 3 steps above, follow the more detailed check described in "Inspection using gauges" below.



(Inspection using gauges)
Connect the **SSTs** gauges, vacuum gauge (A), and pedal depression force gauge (B) as shown. Bleed the air from the **SSTs** gauges before performing the following tests.

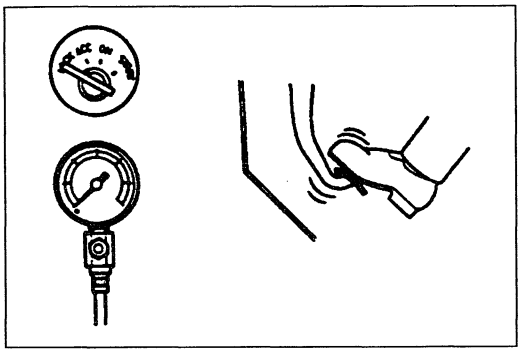


a) Checking for vacuum loss
Unloaded condition
1. Start the engine.
2. Stop the engine when the vacuum gauge reading reaches **66.7 kPa {500 mmHg, 19.7 inHg}**.
3. Observe the vacuum gauge for **15 seconds**. If the gauge shows **63.3—66.7 kPa {475—500 mmHg, 18.7—19.7 inHg}**, the unit is operating.



Loaded condition

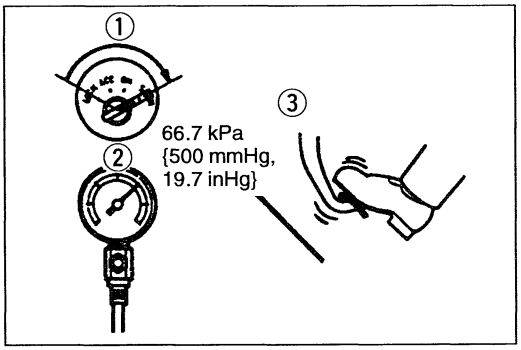
1. Start the engine.
2. Depress the brake pedal with a force of **196 N {20 kgf, 44 lbf}**.
3. With the brake pedal depressed, stop the engine when the vacuum gauge reading reaches **66.7 kPa {500 mmHg, 19.7 inHg}**.
4. Observe the vacuum gauge for **15 seconds**. If the gauge shows **63.3—66.7 kPa {475—500 mmHg, 18.7—19.7 inHg}**, the unit is operating.



b) Checking for hydraulic pressure

1. If the fluid pressure is within the specification when the engine is stopped (vacuum **0 kPa {0 mmHg, 0 inHg}**), the unit is operating.

Pedal force N {kgf, lbf}	Fluid pressure kPa {kgf/cm^2, psi}
196 {20, 44}	883 {9, 128} min.

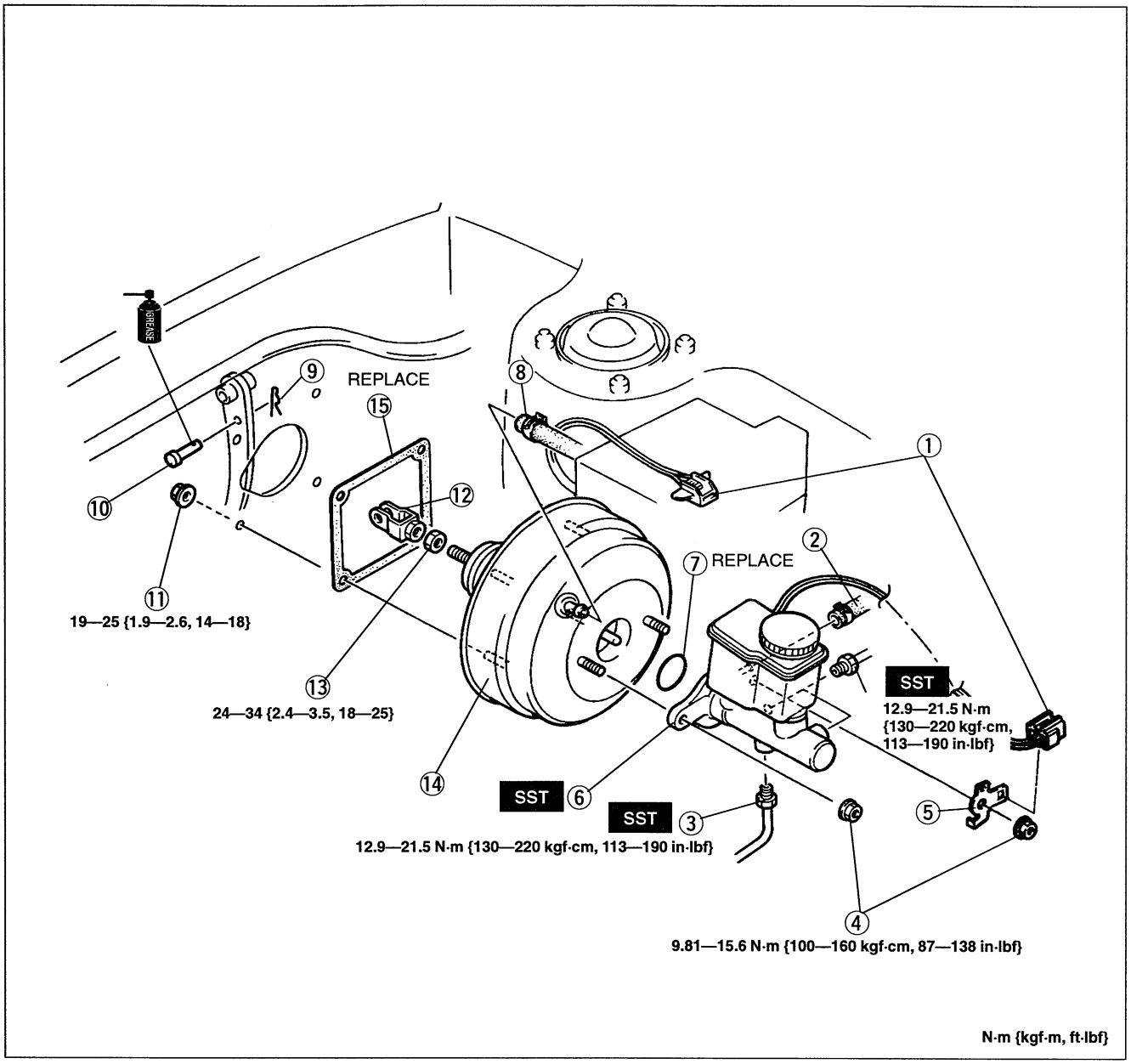


2. Start the engine. Depress the brake pedal when the vacuum reaches **66.7 kPa {500 mmHg, 19.7 inHg}**. If the fluid pressure is within the specification, the unit is operating.

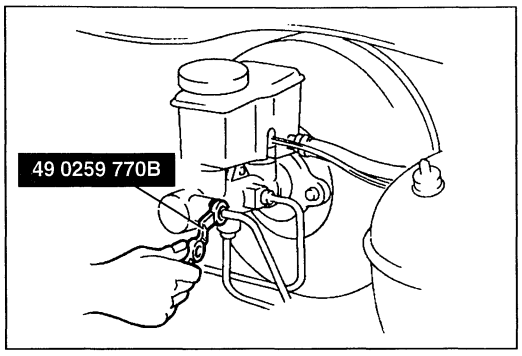
Pedal force N {kgf, lbf}	Fluid pressure kPa {kgf/cm^2, psi}
196 {20, 44}	MTX: 7061 {72, 1024} min.
	ATX: 8826 {90, 1280} min.

Removal / Installation

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**.
3. After installation, perform the following.
   (1) Add fluid and bleed the air. (Refer to page P–7.)
   (2) Check and adjust the brake pedal height. (Refer to page P–10.)
   (3) Check for fluid leakage. (Refer to page P–9.)



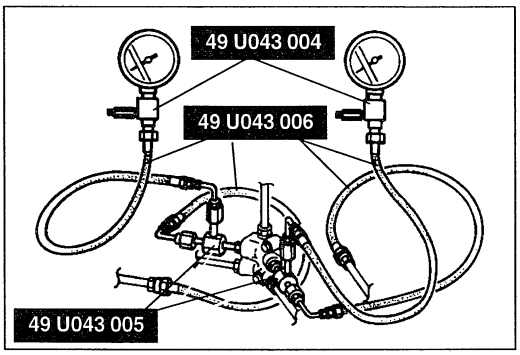
1. Brake fluid level sensor connector
2. Hose (MTX)
3. Brake pipe
   Removal / Installation Note .... page P–21
4. Nut
5. Bracket
6. Master cylinder
   Removal / Installation ..... page P–12
   Disassembly / Inspection / Assembly ..... page P–16
7. O-ring (Except MTX without ABS)
8. Vacuum hose
9. Spring pin
10. Clevis pin
11. Nut
12. Fork
13. Nut
14. Power brake unit
15. Gasket

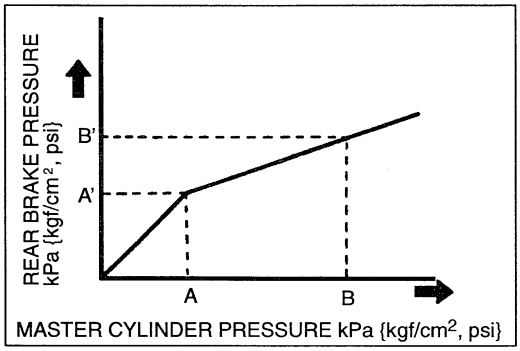


Removal / Installation note
Brake pipes

Caution
- **Brake fluid will damage painted surfaces. If it does get on a painted surface, wipe it off immediately.**

Loosen and tighten the brake pipes by using the **SST**.





DUAL PROPORTIONING VALVE

Inspection

1. Connect the **SSTs** to the brake pipes with adapters as shown in the figure.

   Adapter and flare nut tightening torque:
   12.9—21.5 N·m {130—220 kgf·m, 113—190 ft·lbf}

   Note
   - Connect the brake pipes by using the **SST** (49 0259 770B).

2. Bleed the air from the brake system. (Refer to page P–7.)
3. Depress the brake pedal until the master cylinder pressure equals A; then record rear brake pressure A'.
4. Depress the brake pedal again, apply additional pressure until the pressure equals B; then record pressure B'.

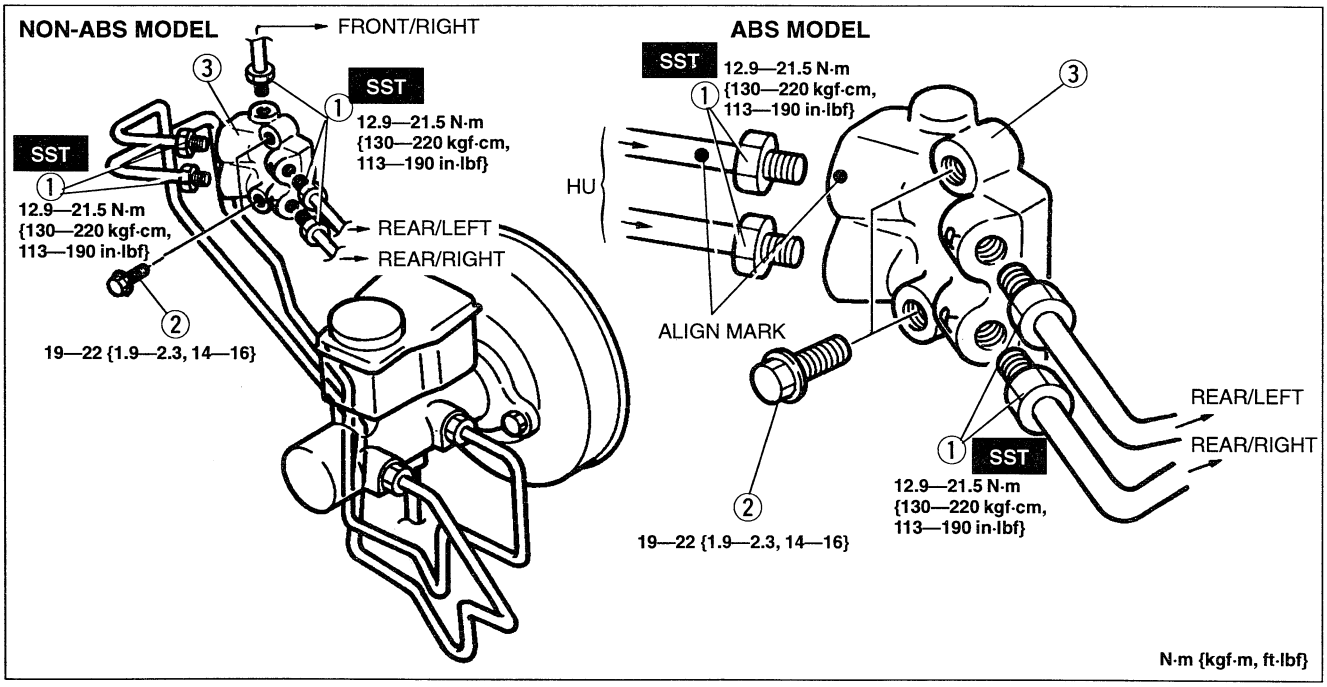
Fluid pressure

kPa {kgf/cm², psi}

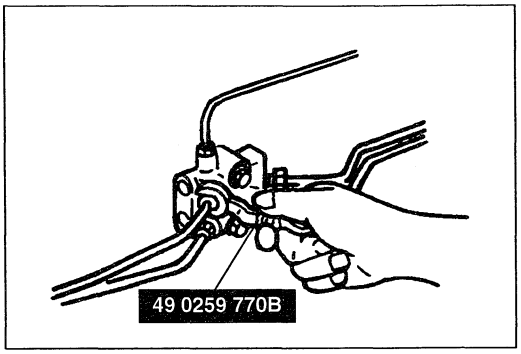
	A	A'	B	B'
Non-ABS MODEL	3400 {35,500}	3400 {35,500} ±200 {2,30}	5880 {60,850}	4170 {42.5,600} ±294 {3,43}
ABS MODEL	3400 {35,500}	3400 {35,500} ±200 {2,30}	5880 {60,850}	4410 {45,640} ±294 {3,43}

Replacement

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**.
3. After installation, add brake fluid, bleed air, and check for fluid leakage.



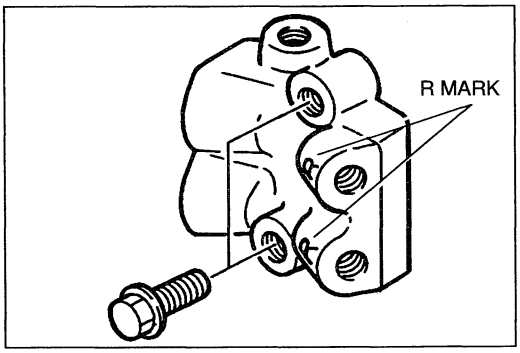
1. Brake pipe
   Removal / Installation Note .... page P–23
2. Bolts
3. Dual proportioning valve
   Installation Note ..... page P–23



Removal / Installation note
Brake pipe

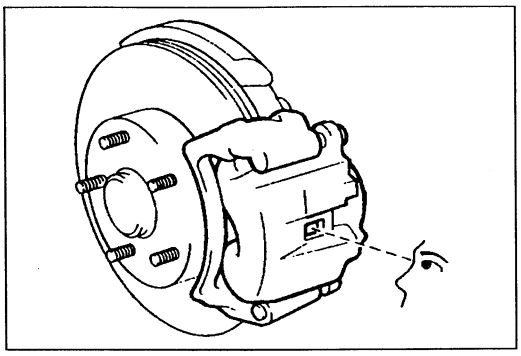
Loosen and tighten the brake pipe by using the **SST**.

Tightening torque:
12.9—21.5 N·m {130—220 kgf·cm, 113—190 in·lbf}



Installation note
Dual proportioning valve

Install the dual proportioning valve with the R marks facing the right side.



FRONT BRAKE (DISC)

Inspection (on-vehicle)

Disc pad

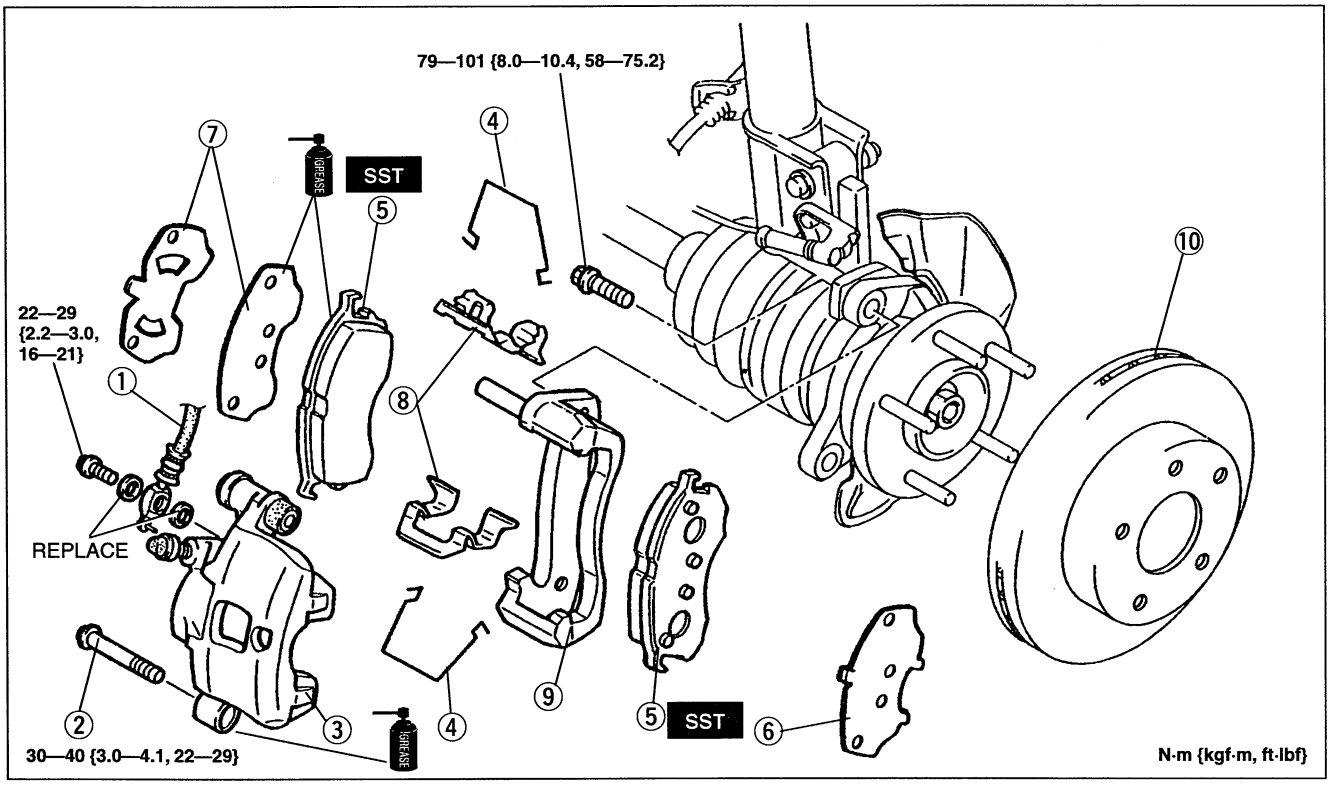
1. Jack up the front of the vehicle and support it with safety stands.
2. Remove the wheels and tires.
3. Look through the caliper inspection hole and inspect the remaining thickness of the pads.

   Thickness: 2.0 mm {0.08 in} min.

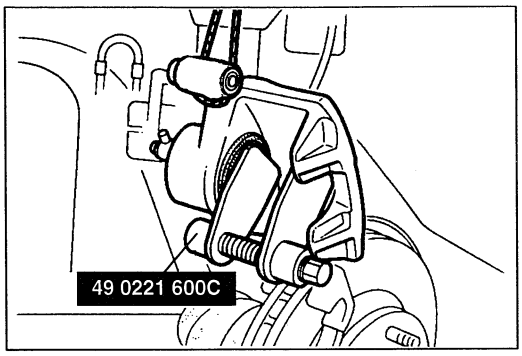
4. Replace the pads as a set (right and left wheels) if either is at or less than the minimum thickness.

Removal / Inspection / Installation

1. Remove in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. After installation, perform the following.
   (1) Add fluid and bleed the air. (Refer to page P–7.)
   (2) Check for fluid leakage. (Refer to page P–9.)
   (3) Depress the pedal a few times, then verify that the brakes do not drag while rotating the wheel by hand.

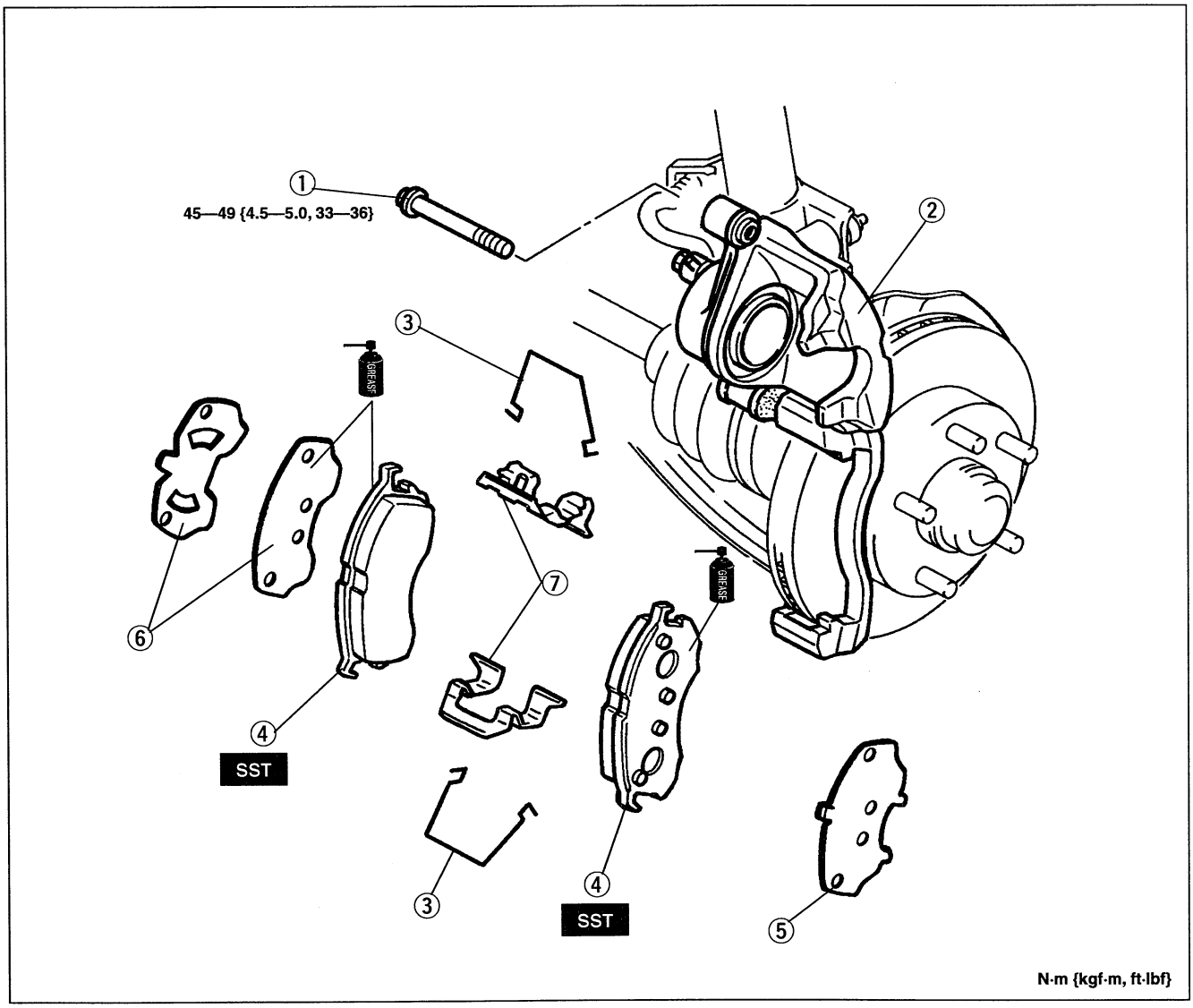


1. Flexible hose
2. Bolt
3. Caliper
   Disassembly / Inspection / Assembly ..... page P–26
4. V-spring
5. Disc pad
   Inspection ..... above
   Installation Note ..... page P–25
6. Outer shim
7. Inner shim
8. Guide plate
9. Mounting support
10. Disc plate
    Inspection ..... page P–26

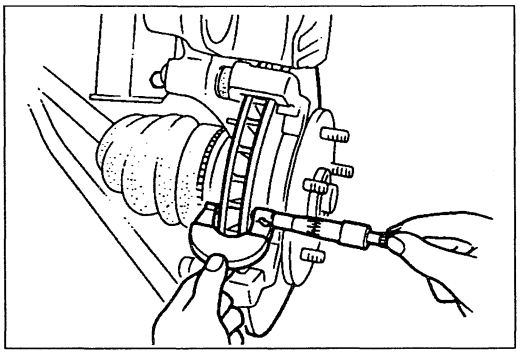


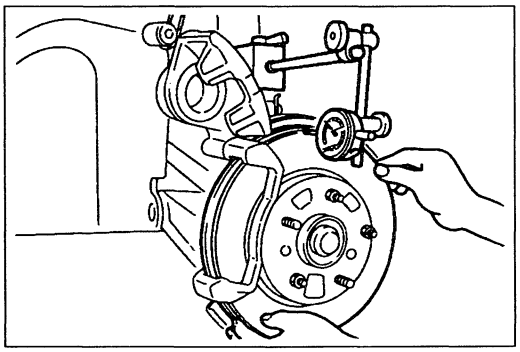
Installation note
Disc pad
Before installing the disc pads, push the piston fully inward by using the **SST**.

DISC PAD
Replacement
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal, referring to **Installation Note**.



1. Bolt
2. Caliper
3. V-spring
4. Disc pad
   Installation Note ..... above
5. Outer shim
6. Inner shim
7. Guide plate





DISC PLATE
Inspection
Disc plate thickness
1. Measure the thickness of the disc plate.

Caution
- **When it is necessary to machine the disc plate, if the disc plate is removed from the vehicle then machined, excessive runout may result. Machine the disc plate with it installed on the vehicle.**

Standard: 24 mm {0.94 in}
Minimum: 22 mm {0.87 in}
Minimum thickness after machining by using a brake lathe on-vehicle: 22.8 mm {0.90 in}

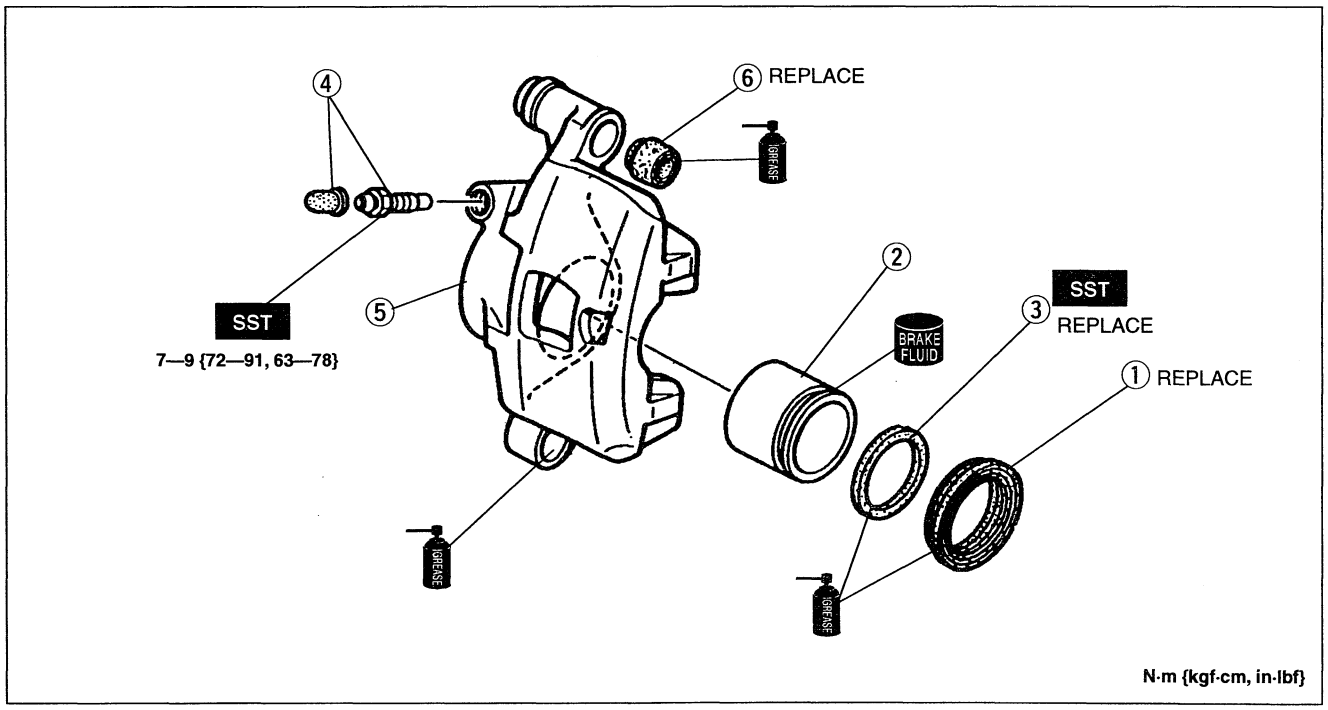
2. If the thickness is not within the specifications, replace the disc plate.

Disc plate runout
1. Verify that there is no wheel bearing looseness.
2. Measure the runout at the outer edge of the contact surface of the disc pad.

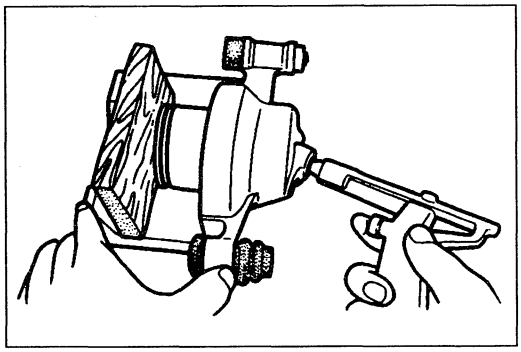
Runout: 0.05 mm {0.002 in} max.

3. If the runout is not within the specification, repair or replace the disc plate.

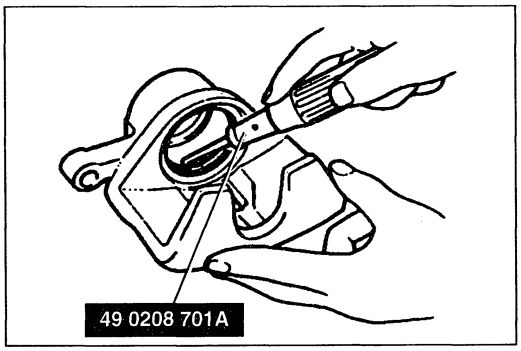
CALIPER
Disassembly / Inspection / Assembly
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



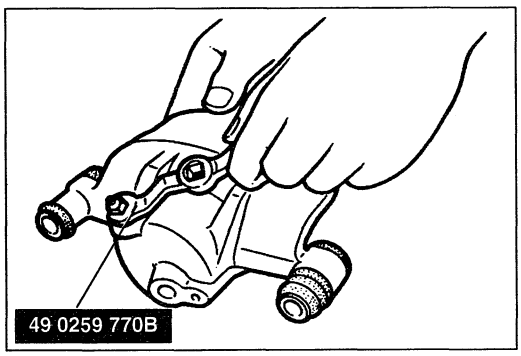
1. Dust seal
   Inspect for damage and poor sealing
2. Piston
   Disassembly Note ..... page P–27
   Inspect for wear and rust
3. Piston seal
   Disassembly Note ..... page P–27
4. Bleeder cap, bleeder screw
   Disassembly Note ..... page P–27
   Assembly Note ..... page P–27
5. Caliper body
   Inspect for damage, wear and rust
6. Boot



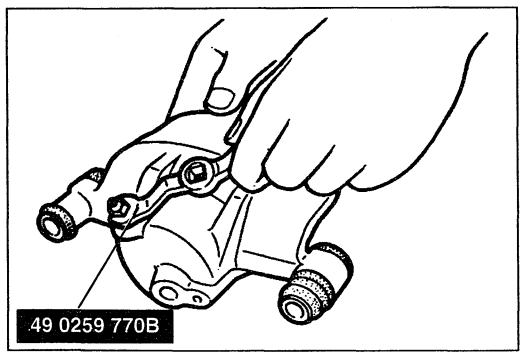
Disassembly note
Piston
1. Place a piece of wood in the caliper.
2. Gently blow compressed air through the pipe hole to force the piston out of the caliper.



Piston seal
Remove the piston seal from the caliper by using the **SST**.

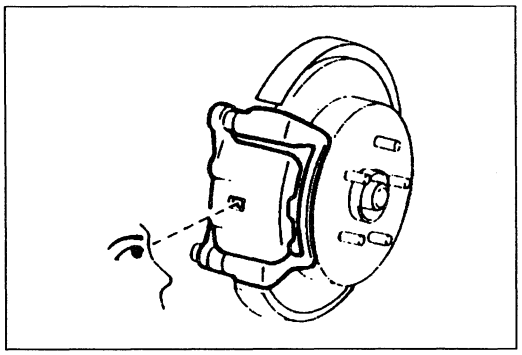


Bleeder screw
Loosen the bleeder screw by using the **SST**.



Assembly note
Bleeder screw
Tighten the bleeder screw by using the **SST**.

Tightening torque:
7—9 N·m {72—91 kgf·cm, 63—78 in·lbf}



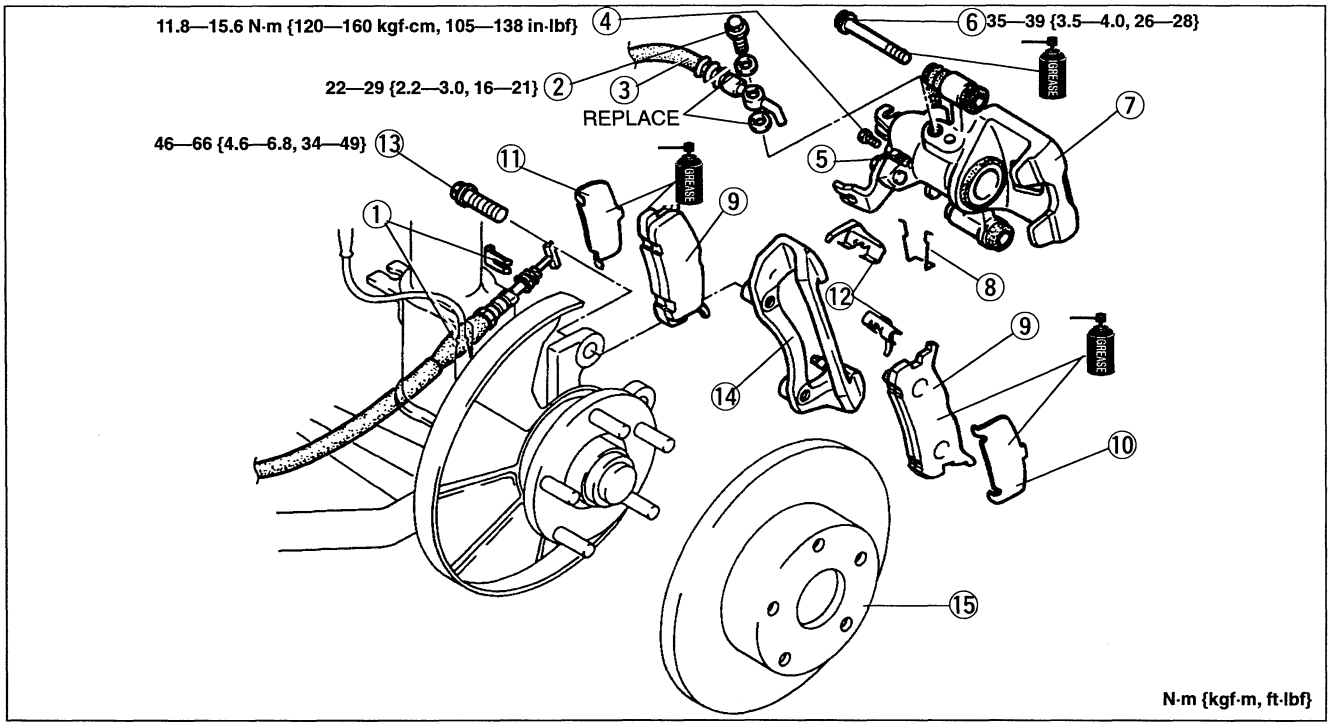
REAR BRAKE (DISC)
Inspection (on-vehicle)
Disc pad

1. Jack up the rear of the vehicle and support it with safety stands.
2. Remove the wheels and tires.
3. Verify the remaining thickness of the pads.

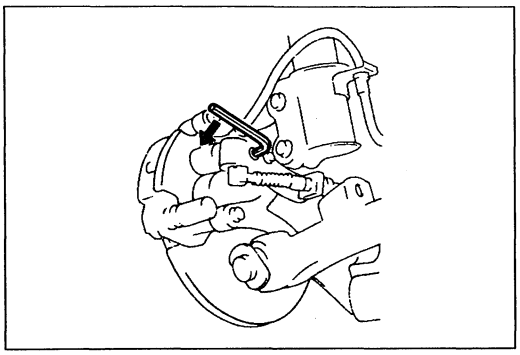
Thickness: 1.0 mm {0.04 in} min.

Removal / Inspection / Installation

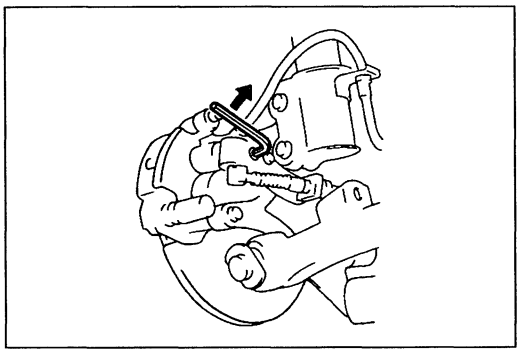
1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. After installation, check the following.
   (1) Add fluid and bleed the air. (Refer to page P–7.)
   (2) Check for fluid leakage. (Refer to page P–9.)
   (3) Depress the pedal a few times, then verify that the brakes do not drag while rotating the wheel by hand.



1. Parking brake cable, clip
   Removal / Inspection / Installation ..... page P–37
2. Connecting bolt
3. Brake hose
4. Screw plug
5. Manual adjustment gear
   Removal Note ..... page P–29
   Installation Note ..... page P–29
6. Lock bolt
7. Caliper
   Disassembly / Inspection / Assembly ..... page P–31
8. M-spring
9. Disc pad
   Inspection ..... above
10. Outer shim
11. Inner shim
12. Guide plate
13. Bolt
14. Mounting support
15. Disc plate
    Inspection ..... page P–30

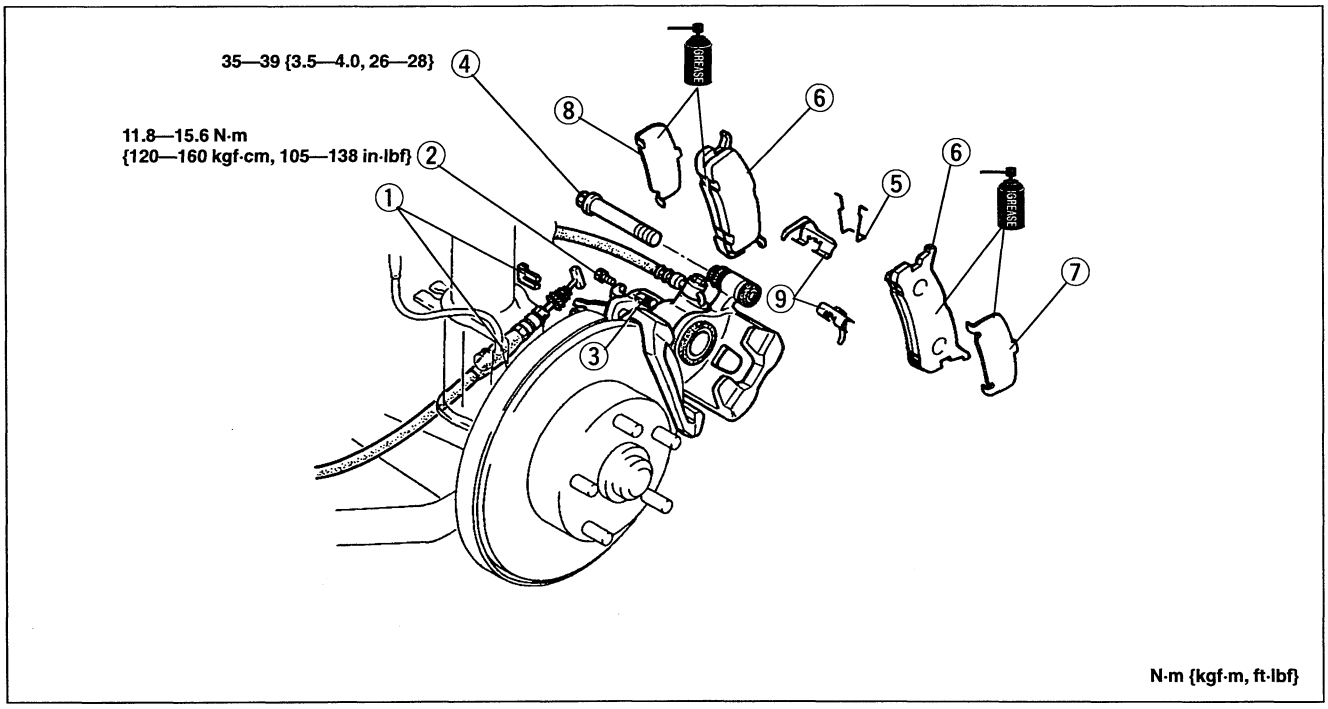


Removal note
Manual adjustment gear
Turn the manual adjustment gear counterclockwise with an Allen wrench to pull the brake caliper piston inward. (Turn until it stops.)

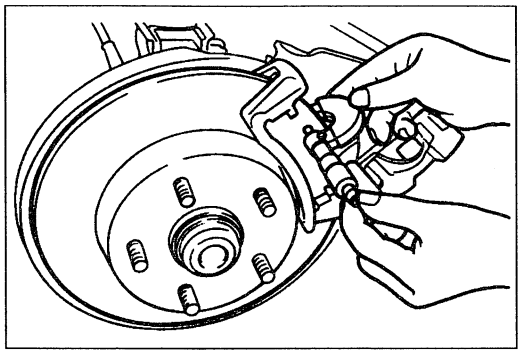


Installation note
Manual adjustment gear
1. Turn the manual adjustment gear clockwise until the brake pads just touch the disc plate.
2. Return the manual adjustment gear 1/3-turn.

DISC PAD
Replacement
1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.



1. Parking brake cable, clip
2. Screw plug
3. Manual adjustment gear
   - Removal Note ..... above
   - Installation Note ..... above
4. Lock bolt
5. M-spring
6. Disc pad
7. Outer shim
8. Inner shim
9. Guide plate

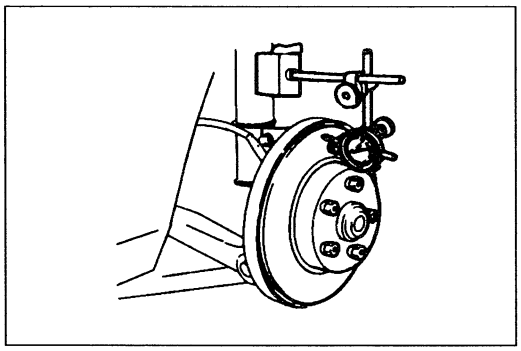


DISC PLATE
Inspection
Disc plate thickness
1. Measure the thickness of the disc plate.

   Caution
   - **When it is necessary to machine the disc plate, if the disc plate is removed from the vehicle then machined, excessive runout may result. Machine the disc plate with it installed on the vehicle.**

   Standard: 10 mm {0.39 in}
   Minimum: 8 mm {0.31 in}
   Minimum thickness after machining by using a brake lathe: 8.8 mm {0.35 in}

2. If the thickness is not within the specifications, replace the disc plate.



Disc plate runout
1. Verify that there is no looseness in the wheel bearing.
2. Measure the runout at the outer edge of the contact surface of the disc pad.

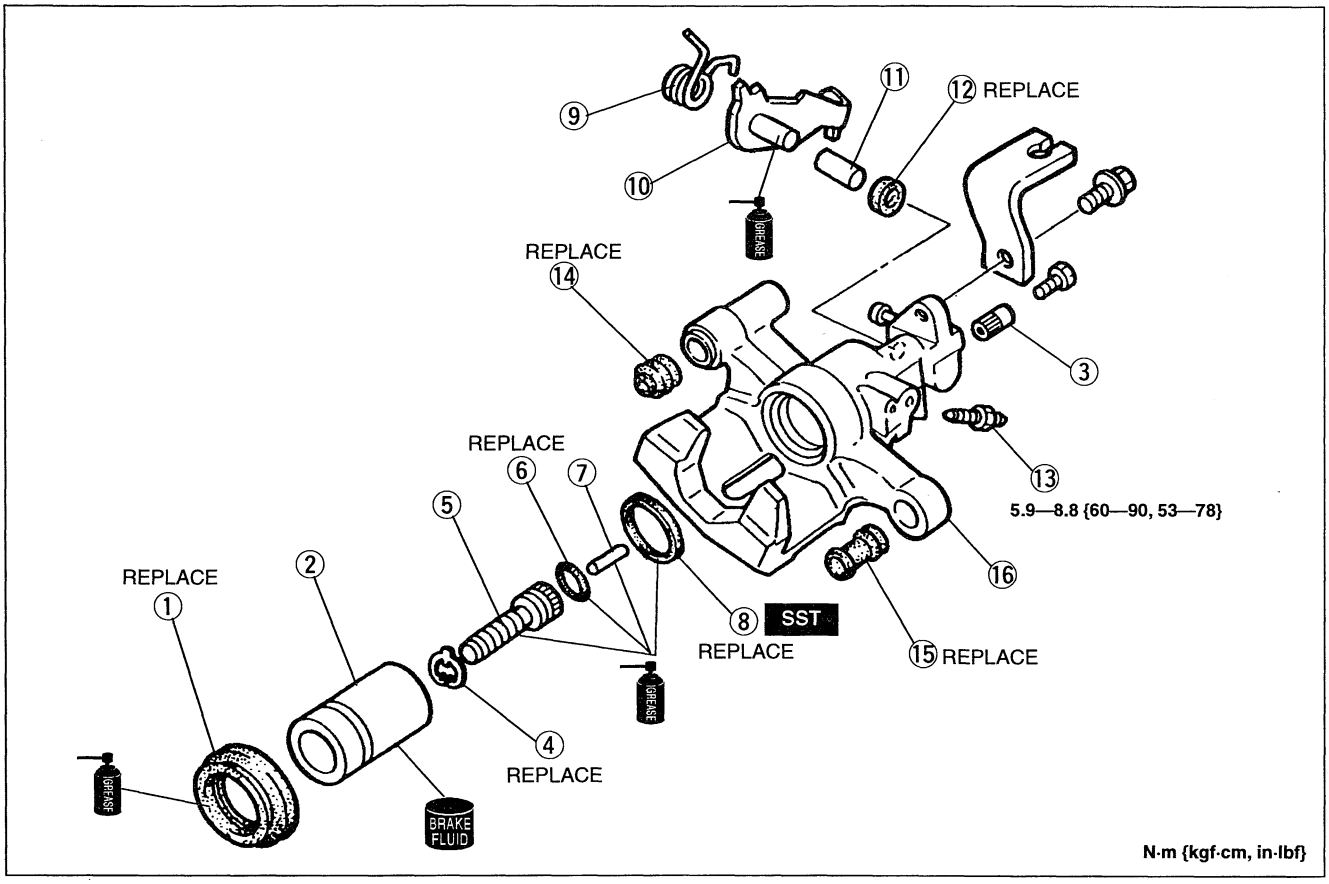
   Runout: 0.05 mm {0.002 in} max.

3. If the runout is not within the specification, repair or replace the disc plate.

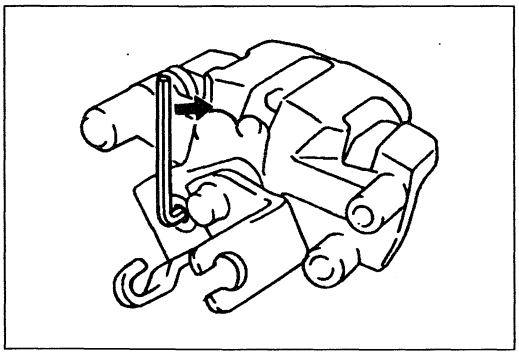
CALIPER

Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



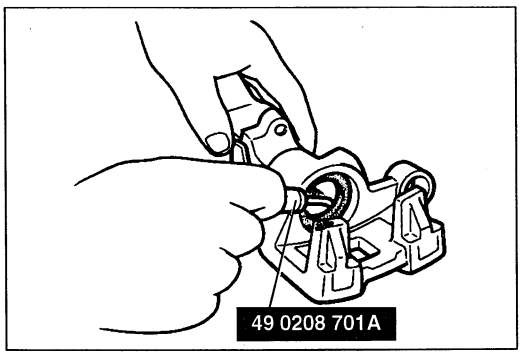
1. Dust seal
2. Piston
   - Disassembly Note ..... below
   - Assembly Note ..... page P–32
   - Inspect for wear and rust
3. Manual adjustment gear
4. Snap ring
5. Adjusting bolt
6. O-ring
7. Connecting link
8. Piston seal
   - Disassembly Note ..... page P–32
9. Spring
10. Operating lever
11. Sleeve
12. Boot
13. Bleeder cap and bleeder screw
    - Disassembly Note ..... page P–32
    - Assembly Note ..... page P–32
14. Boot
15. Boot
16. Caliper body
    - Inspect for damage and cracks



Disassembly note

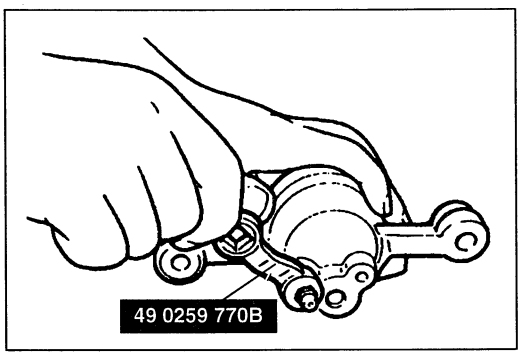
Piston

Turn the adjustment gear clockwise with an Allen wrench to remove the piston from the adjustment gear.
(Turn the adjustment gear until it becomes easy to turn.)



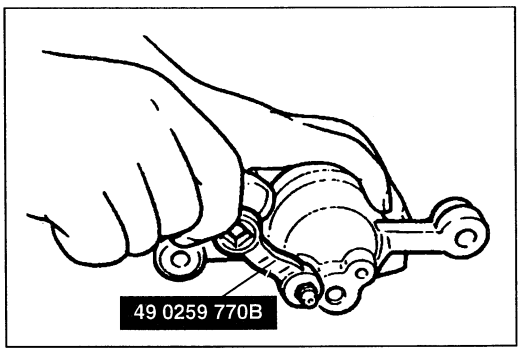
Piston seal

Remove the piston seal from the caliper by using the **SST**.



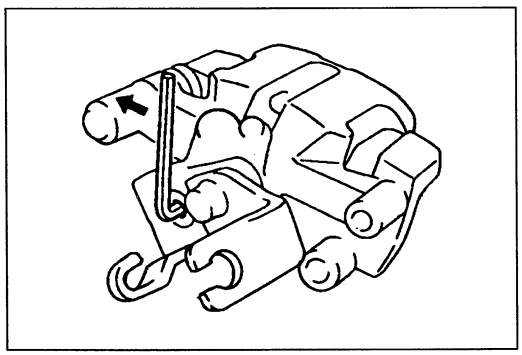
Bleeder screw

Loosen the bleeder screw by using the **SST**.



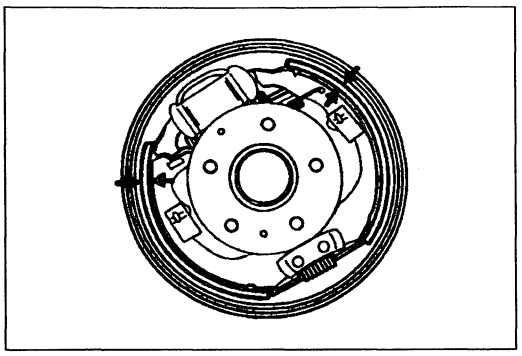
Assembly note
Bleeder screw

Tighten the bleeder screw by using the **SST**.



Piston

Insert the piston into the caliper and turn the adjustment gear counterclockwise with an Allen wrench to pull the piston inward. (Turn until it stops.)



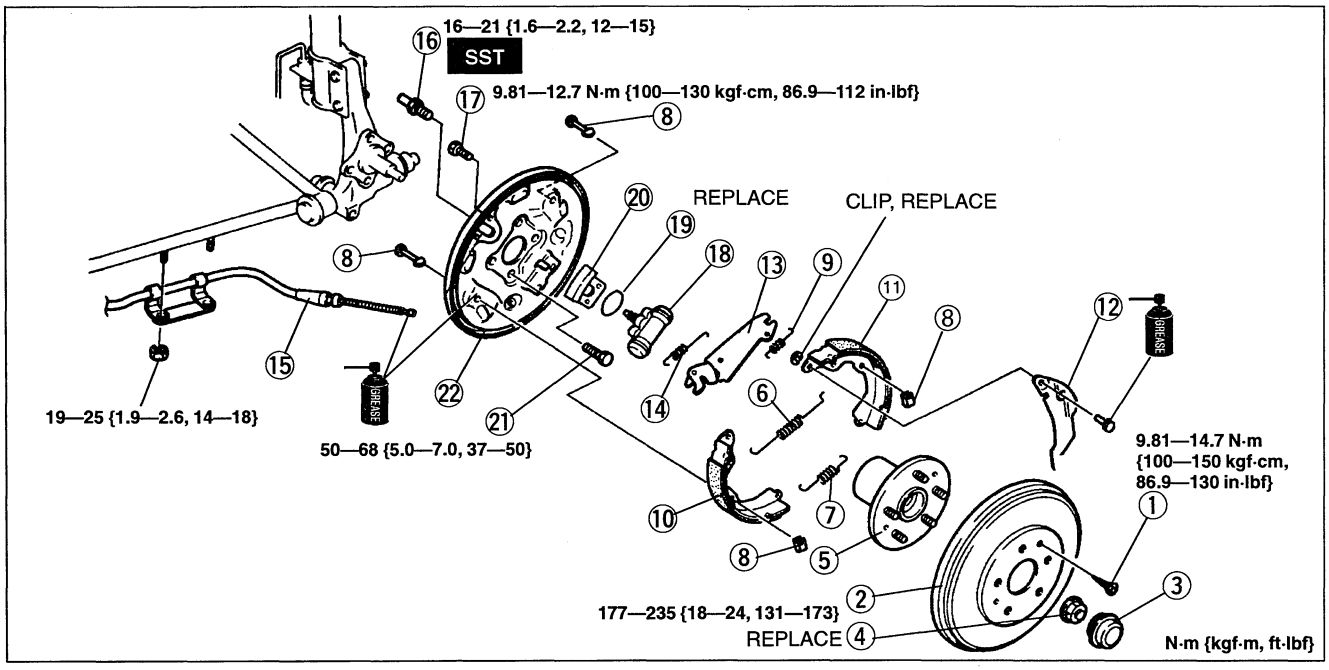
REAR BRAKE (DRUM)
Inspection (on-vehicle)
Brake shoe (lining)

1. Jack up the rear of the vehicle and support it with safety stands.
2. Remove the wheels and tires.
3. Remove the brake drum. (See below)
4. Verify the remaining thickness of the lining.

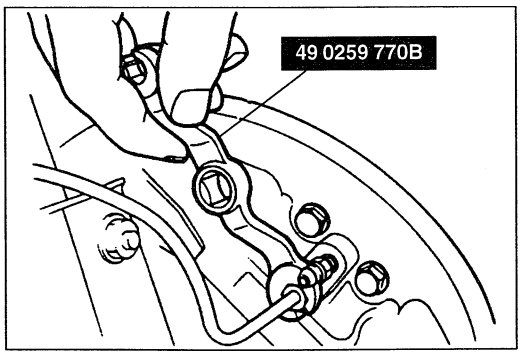
Thickness: 1.0 mm {0.04 in} min.

Removal / Inspection / Installation

1. Remove the lining 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**.
4. After installation, check the following.
   (1) Add fluid and bleed the air. (Refer to page P–7.)
   (2) Check for fluid leakage. (Refer to page P–9.)
   (3) Depress the pedal a few times, then verify that the brakes do not drag while rotating the wheel by hand.

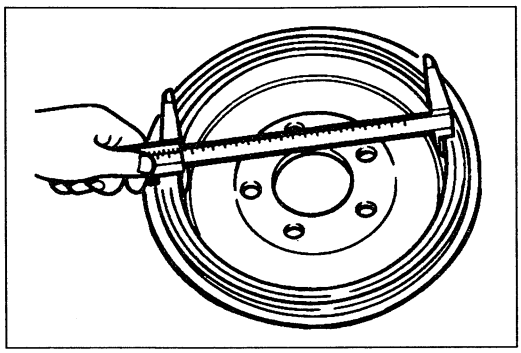


1. Screw
2. Brake drum
   Inspection ..... page P–34
   Installation Note ..... page P–34
3. Hub cap
4. Locknut
5. Wheel hub assembly
6. Return spring (upper)
7. Return spring (lower)
8. Hold pin and spring
9. Anti-rattle spring
10. Brake shoe (leading side)
    Inspection ..... above
11. Brake shoe (trailing side)
    Inspection ..... above
12. Operating lever
13. Quadrant
14. Quadrant spring
15. Parking brake cable
16. Brake pipe
    Removal Note ..... page P–34
17. Bolt
18. Wheel cylinder
    Disassembly / Inspection / Assembly ..... page P–35
19. Wheel cylinder gasket
20. Insulator
21. Bolt
22. Backing plate
    Inspect for damage and cracks



Removal note
Brake pipe
Disconnect or connect the brake pipe from/to the wheel cylinder with the **SST**.

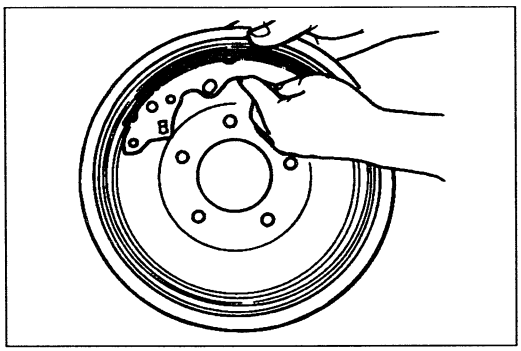
Tightening torque:
16—21 N·m {1.6—2.2 kgf·m, 12—15 ft·lbf}



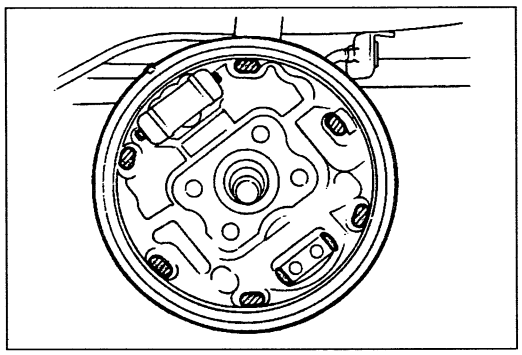
Inspection
Check for the following and repair or replace the parts as necessary.

Brake drum
1. Measure the inner diameter of the drum.

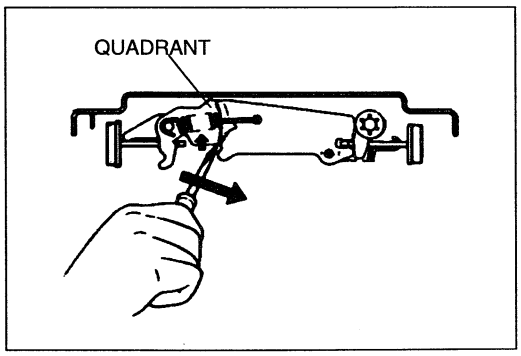
Standard diameter: 228.6 mm {9.000 in}
Diameter limit: 230.1 mm {9.059 in}



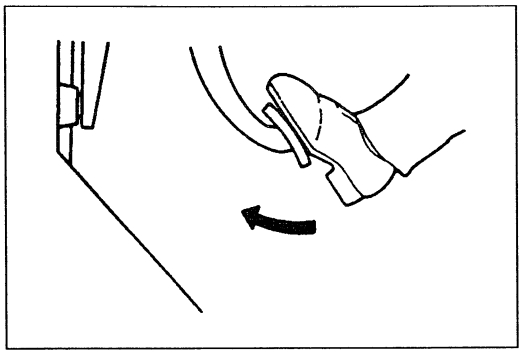
2. Check for scratches, and uneven or abnormal wear inside the drum.



Grease points
(1) Shoe and cylinder contact points
(2) Shoe anchor points
(3) Projections of backing plate



Installation note
Brake drum
1. Before installing the brake drum, depress the brake pedal to verify operation of the automatic adjuster.

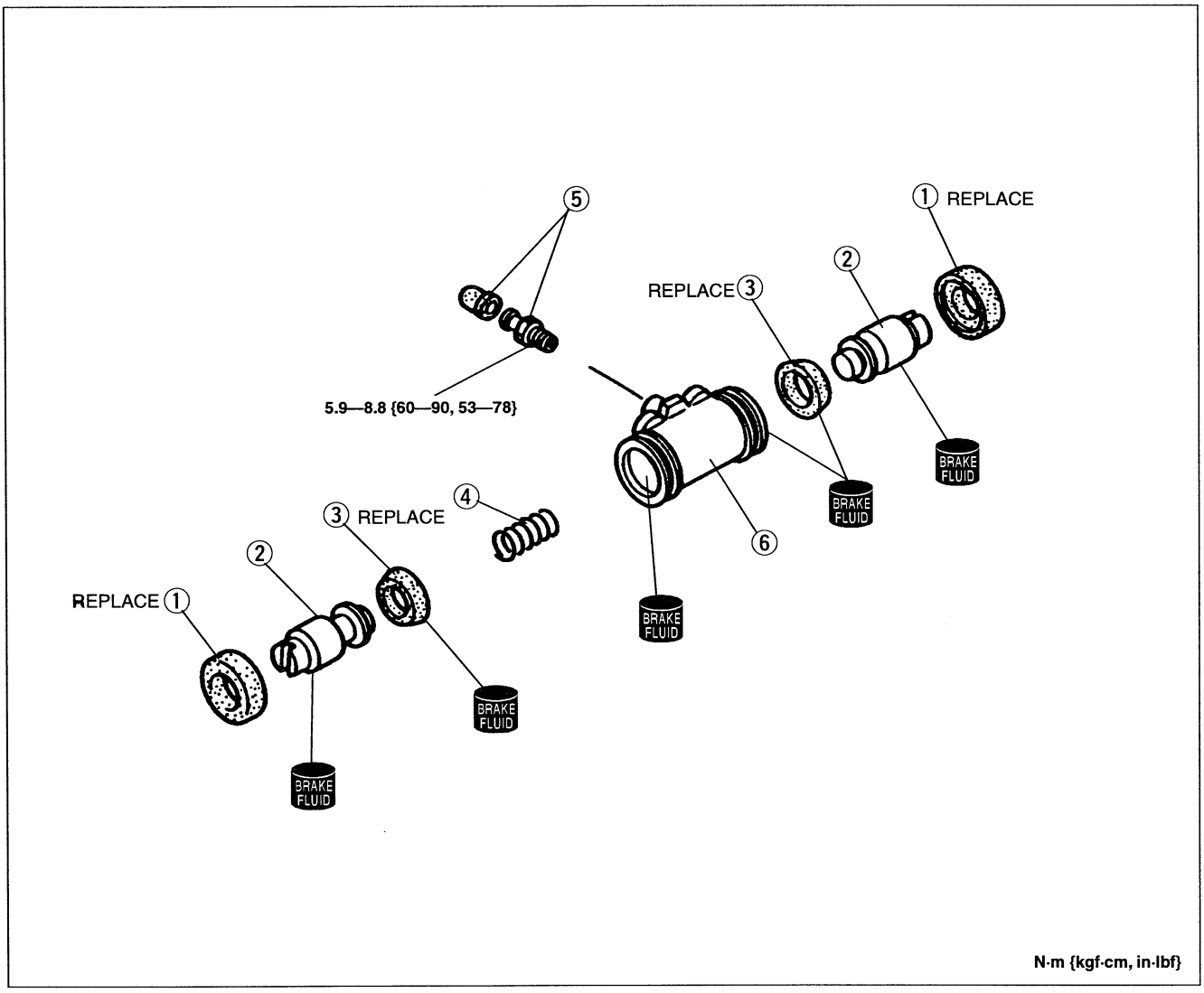


2. After installation:
   (1) Add fluid and bleed the air. (Refer to page P–7.)
   (2) Check for fluid leakage. (Refer to page P–8.)
   (3) Depress the brake pedal a few times and check that the rear brakes do not drag while rotating the wheel.
   (4) Check the parking brake lever stroke. (Refer to page P–36.)

WHEEL CYLINDER

Disassembly / Inspection / Assembly

1. Disassemble the wheel cylinder in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary. If any of the metal parts are damaged, replace the wheel cylinder as an assembly.
3. Assemble in the reverse order of disassembly.



1. Dust boot
2. Piston
   Inspect for corrosion and damage
3. Piston cup
4. Spring
5. Bleeder cap and bleeder screw
6. Wheel cylinder body
   Inspect for corrosion and damage

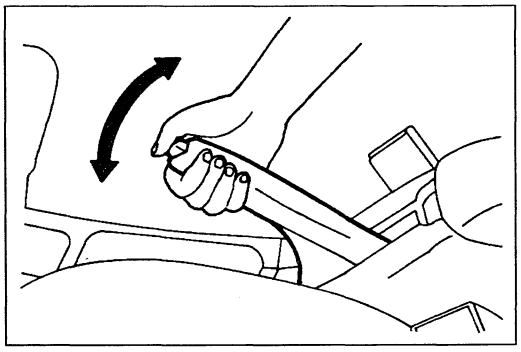
PARKING BRAKE SYSTEM

TROUBLESHOOTING GUIDE

Problem	Possible cause	Action	Page
Brakes do not release	Improper return of parking brake cable or improper adjustment	Repair or adjust	P–36, 37
Parking brake does not hold well	Excessive lever stroke	Adjust	P–36
	Brake cable stuck or damaged	Repair or replace	P–37
	Brake fluid or oil on pad or brake shoe	Clean or replace	—
	Hardening of pad or brake shoe surface or poor contact	Grind or replace	P–29, 33

PARKING BRAKE SHOE
Removal / Inspection / Installation
Drum brake

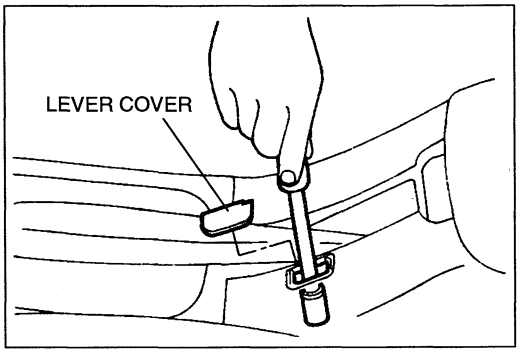
Removal and Installation. (Refer to page P–33.)
Inspection. (Refer to page P–33.)



PARKING BRAKE (LEVER TYPE)
Inspection (on-vehicle)

Verify whether or not the stroke is within the specification when the parking brake lever is pulled with a force of **98 N {10 kgf, 22 lbf}**.

Stroke: 5—7 notches



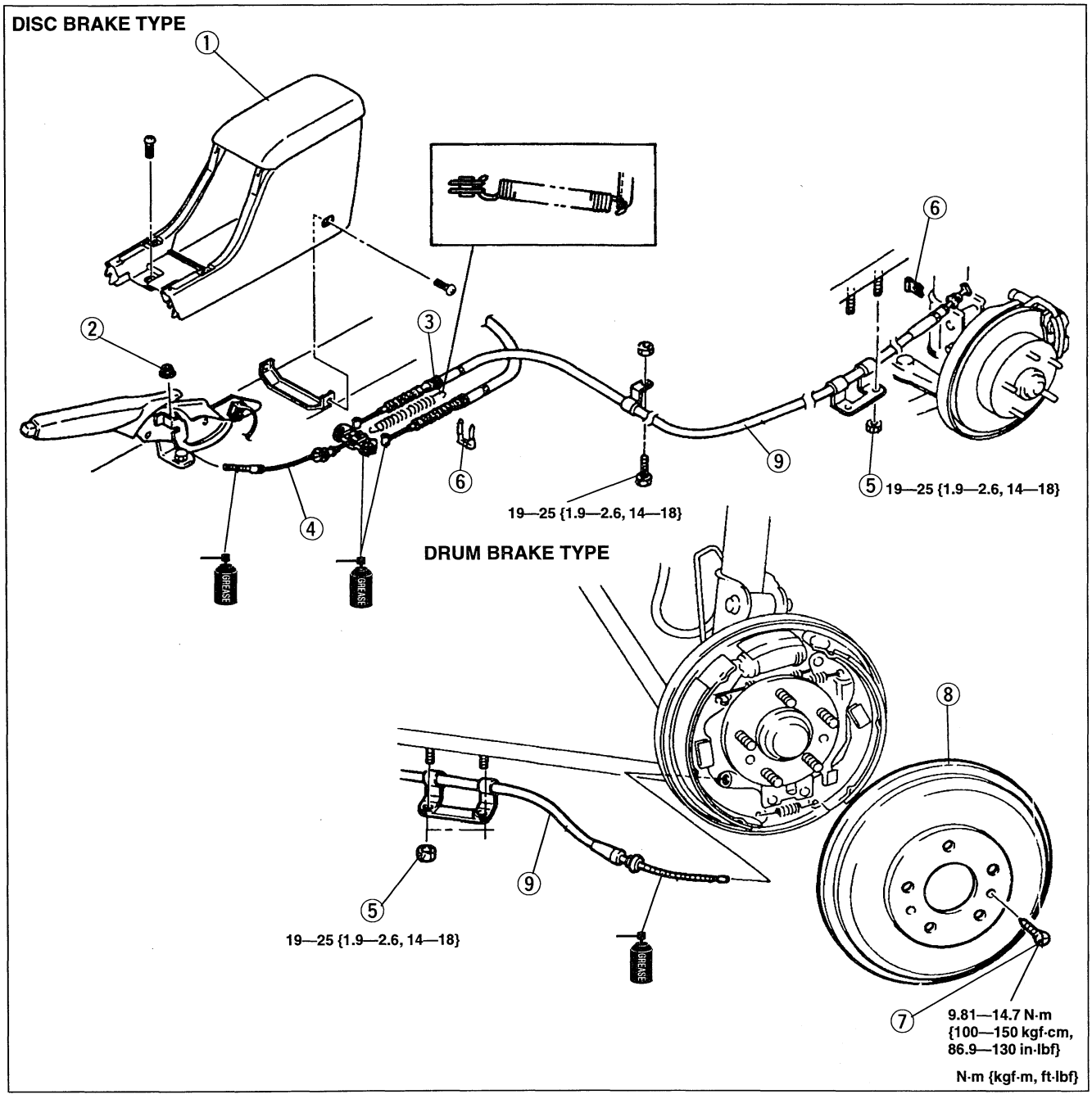
Adjustment

1. Before adjustment, start the engine and depress the brake pedal several times.
2. Stop the engine.
3. Remove the parking brake lever cover.
4. Turn the adjusting nut at the front of the parking cable.
5. After adjustment, check the following points:
   (1) Turn the ignition switch ON, pull the parking brake lever one notch, and check that the parking brake warning light illuminates.
   (2) Verify that the rear brakes do not drag.

PARKING BRAKE CABLE

Removal / Inspection / Installation

1. Remove the cable in the order shown in the figure.
2. Visually check each part, and replace it if necessary.
3. Install in the reverse order of removal.
4. Depress the brake pedal a few times and check that the rear brakes do not drag while rotating the wheels.
5. Adjust the parking brake lever stroke.

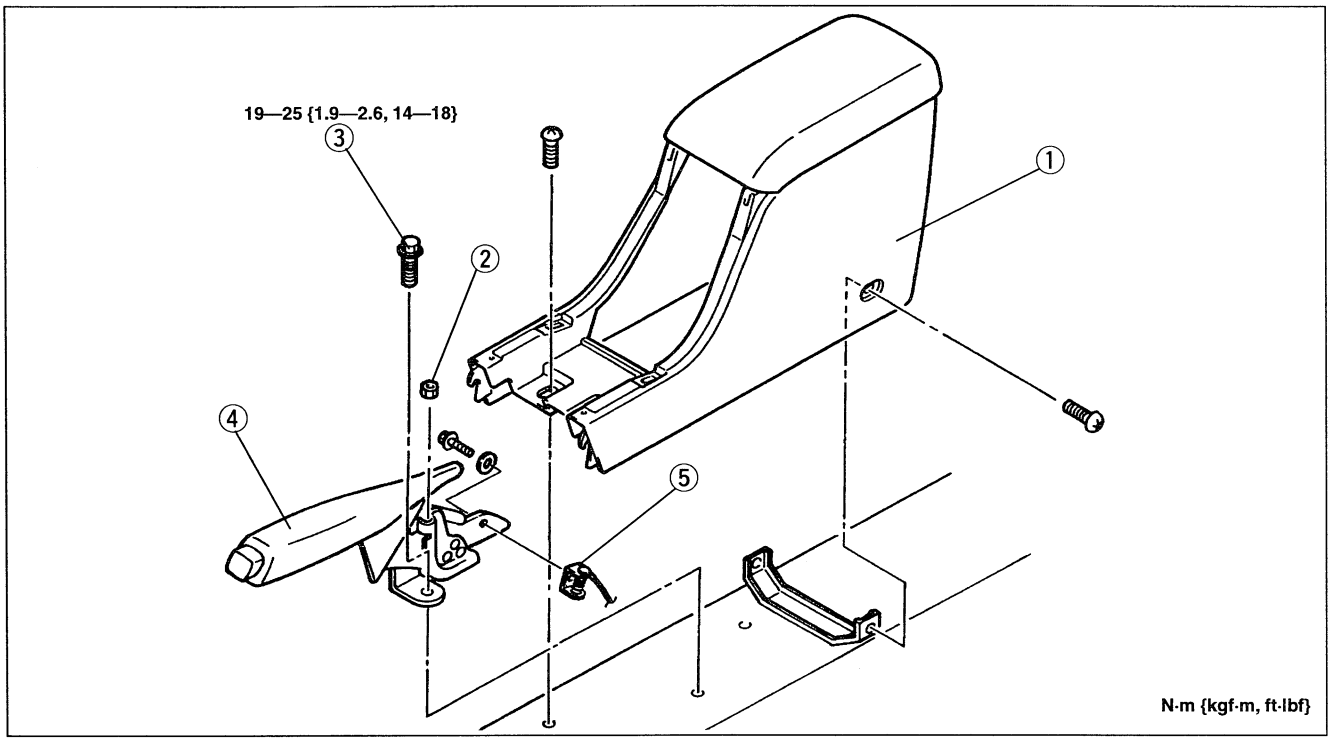


1. Rear console
   Removal / Installation ..... section S
2. Adjusting nut
3. Return spring
4. Front parking cable
   Inspect for damage and wear
5. Nut
6. Clip
7. Screw
8. Brake drum
9. Rear parking cable

PARKING BRAKE LEVER

Removal / Inspection / Installation

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 any parts if necessary.
5. Install in the reverse order of removal. Install the parking brake switch so that it contacts the parking brake lever when the lever is fully released.
6. Adjust the parking lever stroke. (Refer to page P–37.)
7. Turn the ignition switch to ON, and verify that the parking brake warning light comes on when the lever is pulled up one notch.

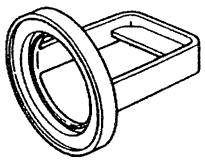
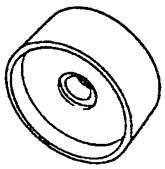
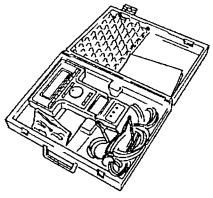


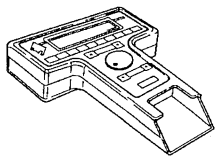
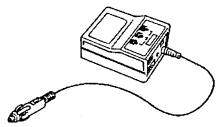
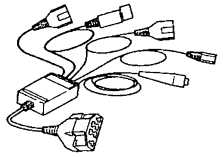
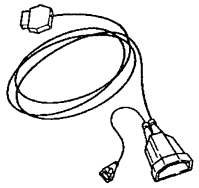
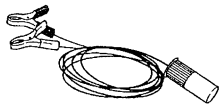
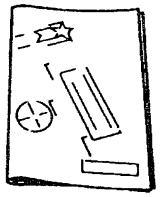
1. Rear console
   Removal / Installation ..... section S
2. Adjusting nut
3. Bolt
4. Parking brake lever assembly
   Inspect for damage and wear
5. Parking brake switch
   Inspection ..... section T

ANTILOCK BRAKE SYSTEM (ABS)

PREPARATION

SST

49 G025 001 Sensor rotor installer 	For installation of sensor rotor (Front)	49 0259 770B Wrench, flare nut 	For removal and installation of brake pipe
49 H028 204 Attachment 	For installation of sensor rotor (Rear)	49 T088 0A0 NGS set 	For diagnosis

49 T088 001 Control Unit (Part of 49 T088 0A0) 	For diagnosis	49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0) 	For diagnosis
49 T088 003 Super MECS Adapter (Part of 49 T088 0A0) 	For diagnosis	49 T088 005 STAR/DCL Adapter (Part of 49 T088 0A0) 	For diagnosis
49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0) 	For diagnosis	49 T088 008A Instruction Manual 	For diagnosis
49 T088 010B Program Card 	For diagnosis	—	—

TROUBLESHOOTING GUIDE

Precaution

Conditions that are not malfunctions

1. Vibration can sometimes be felt in the steering wheel, body, and/or brake pedal when the ABS is functioning; such vibration is simply an indication that the system is functioning.
2. The ABS warning light may illuminate under any of the following conditions:
   - When the vehicle is travelling on snow or ice with the parking brake activated or a brake dragging at one wheel.
   - When different size tires are used.
   - When tires of different gripping performance are used.
   - When (while the vehicle is jacked up or stuck) the front wheels only are spun for 20 seconds or more.
   - When there is insufficient battery voltage.

Note

- Under the above conditions, the warning light will not illuminate a second time when the ignition is switched OFF then back ON, and there will be no problem entry made to the control module memory.

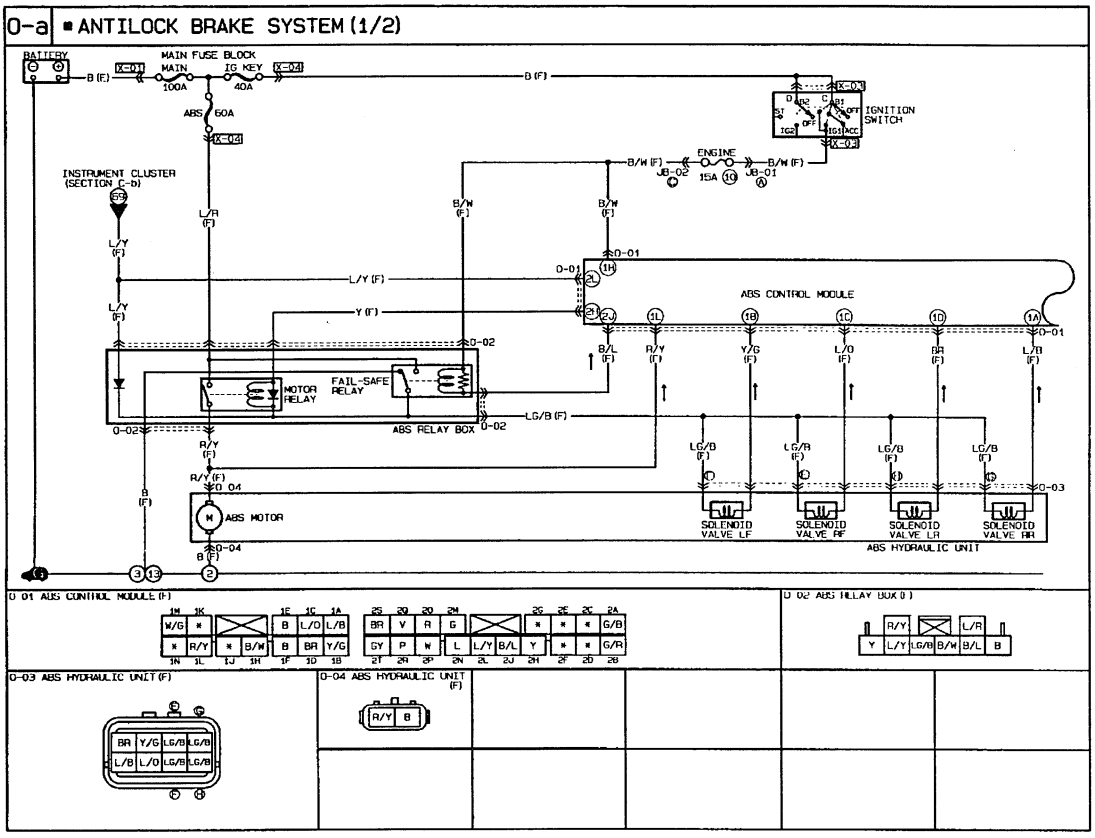
Troubleshooting notes

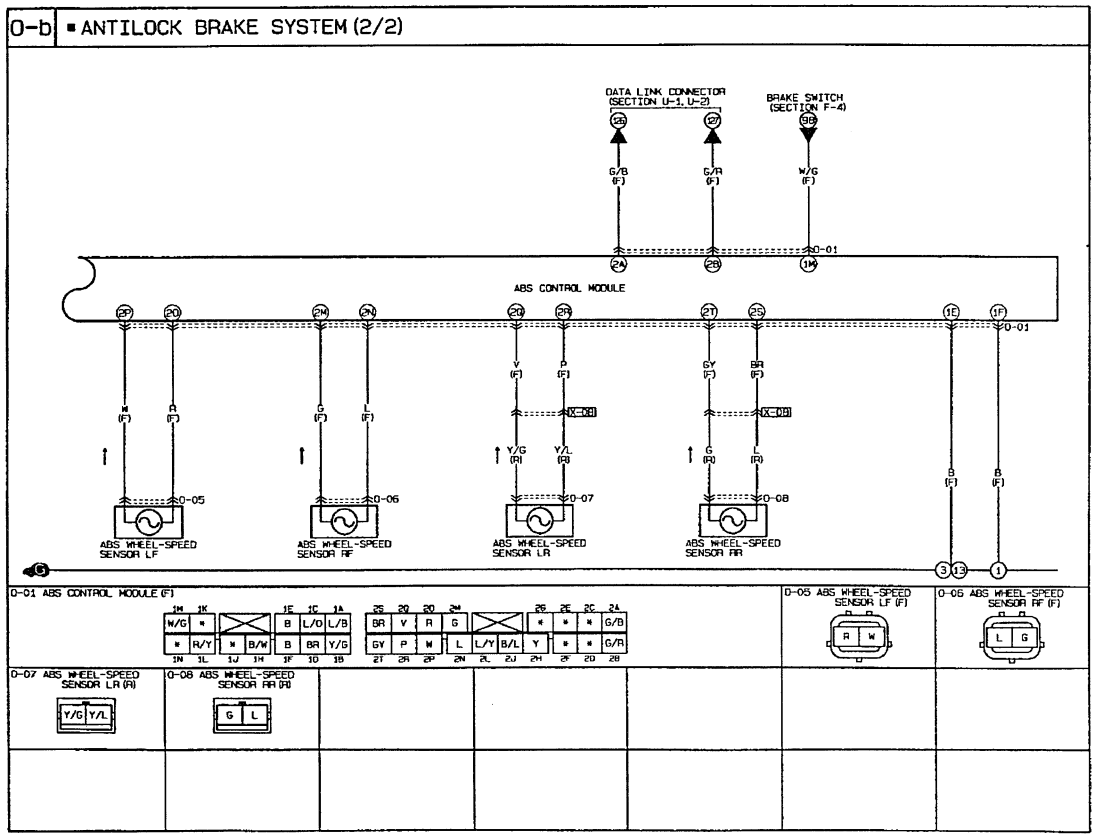
The ABS is composed of electrical components, mechanical components (ABS hydraulic unit), and the components of the standard brake system.

Fundamentally, malfunctions of the ABS electrical or mechanical components are judged by the on-board diagnosis function within the ABS control module. The malfunctions are indicated by the warning light in the instrument panel. The location of a malfunction is indicated by the technician switching the system to the diagnostic test mode.

The on-board diagnostic system must be used when diagnosing malfunctions of the ABS.

WIRING DIAGRAM





RELATIONSHIP CHART

Input \ Output	ABS hydraulic unit		ABS warning light	Data link connector
	Solenoid valve	ABS motor		
ABS wheel-speed sensor	○	○	○	○
Brake switch	○	○		
Fail-safe relay	○		○	○
Motor relay		○	○	○

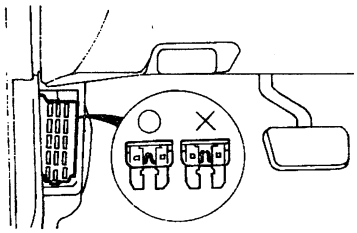
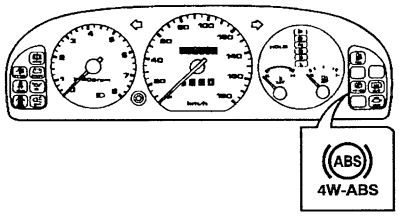
QUICK DIAGNOSIS CHART

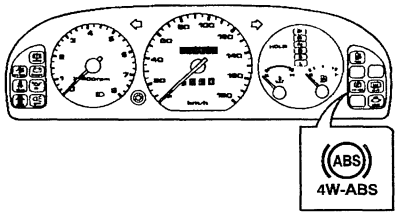
Symptom \ Cause		Input				Output				
		ABS wheel-speed sensor	Brake switch	ABS relay		ABS hydraulic unit		ABS warning light	Data link connector	ABS control module
				Fail-safe relay	Motor relay	Solenoid valve	ABS motor			
1	ABS warning light not illuminated when ignition switch turned ON							○		
2	ABS warning light remains ON	○	○	○		○	○	○		○
3	ABS warning light flashes								○	

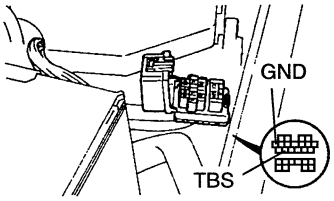
DIAGNOSTIC INDEX

No.	Troubleshooting Items	Remarks	Page
1	ABS warning light not illuminated when ignition switch turned ON	—	P–42
2	Warning light remains ON	Warning light remains ON and ABS does not operate	P–43
3	ABS warning light flashes	—	P–44

SYMPTOM TROUBLESHOOTING

1	WARNING LIGHT NOT ILLUMINATED WHEN IGNITION SWITCH TURNED ON		
DETAILED DESCRIPTION	—		
Possible cause: • If other warning indicators do not illuminate, METER 15 A fuse may be burnt. • Failed indicator light or open in related wiring harness.			
Step	**Inspection**		**Action**
1	Is METER 15 A fuse OK? ☞ **page P–54** 	Yes	Go to next step
		No	Repair METER 15 A fuse
2	Is harness of ABS warning light normal? ☞ **page P–51** 	Yes	Inspect ABS warning light ☞ **page P–51**
		No	• Inspect harness between ABS CM and ABS relay • Inspect harness between instrument panel and ABS CM • Inspect harness between instrument panel and ABS relay • Inspect ABS warning light bulb

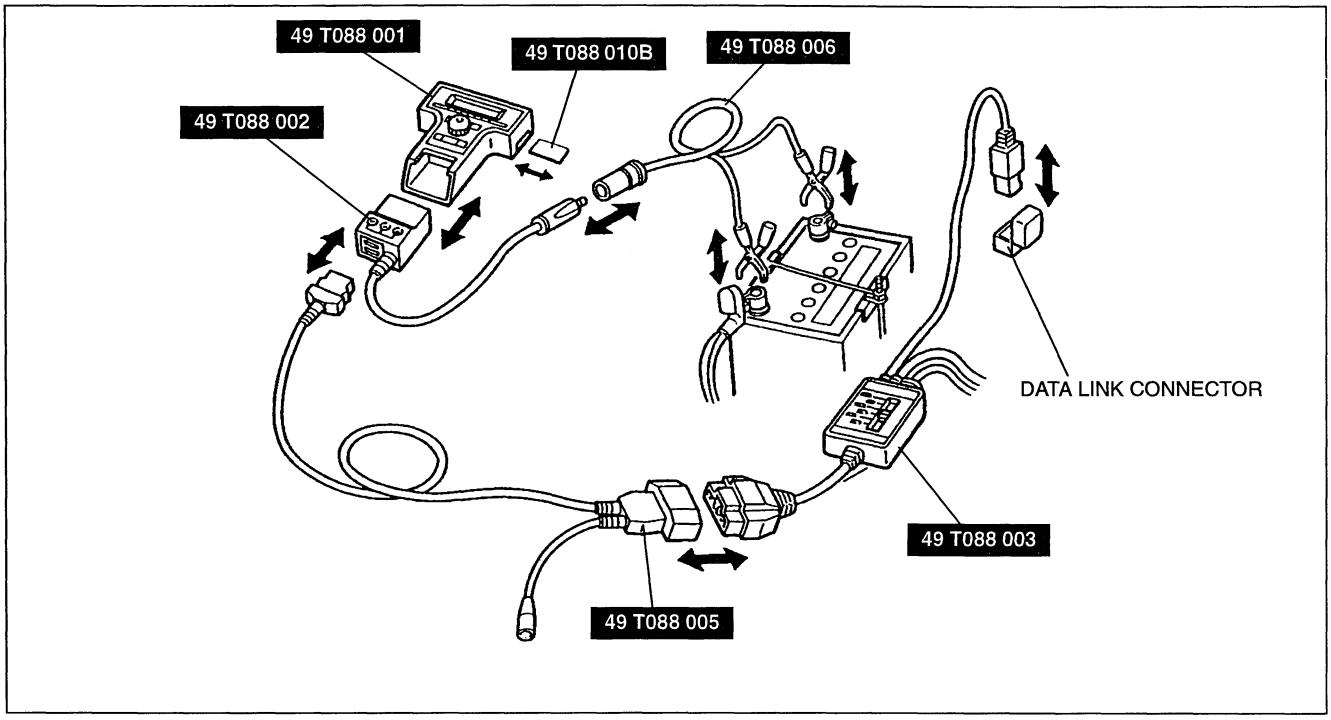
2	WARNING LIGHT REMAINS ON		
DETAILED DESCRIPTION	**Warning light remains ON and ABS does not operate**		
Possible cause: • If ABS warning light only illuminates, activate diagnostic mode and check for diagnostic trouble code • Malfunction of battery • Malfunction of ABS warning light harness (fail-safe relay) • Malfunction of ABS CM			
Step	**Inspection**		**Action**
1	With the **SSTs** (self diagnosis checker, system selecter), verify that diagnostic trouble code is indicated. (Connect the **SSTs** to the data link connector) ☞ **page P–45**	Yes	Read diagnostic trouble code ➪ Inspect as indicated ☞ **page P–47**
		No	Go to next step
2	Is battery voltage OK? ☞ **page P–51**	Yes	Go to next step
		No	Charge or replace battery
3	Is ABS warning light harness normal? ☞ **page P–51** 	Yes	Go to next step
		No	• Inspect harness between ABS CM and ABS relay • Inspect harness between instrument panel and ABS CM • Inspect harness between instrument panel and ABS relay
4	Connect terminal 2J of ABS CM connector (18 pin) to a ground and check the following points (IG ON) • Operation sound of relay is heard • ABS warning light is not illuminated • 1D terminal of ABS CM connector indicates 12V	Yes	Go to next step
		No	• Inspect ABS relay (fail-safe relay) • Inspect harness between ABS relay (fail-safe relay) and ABS CM, battery • Inspect harness between ABS relay (fail-safe relay) and ABS hydraulic unit
5	Is voltage at terminals 1E, 1F and 1H of ABS CM connector (12 pin) and terminals 2B and 2L of ABS CM connector (18 pin) as specified? ☞ **page P–56**	Yes	Replace ABS CM
		No	• Inspect harness between ABS CM and ground • Inspect harness between ignition switch and ABS CM • Inspect harness between data link connector and ABS CM • Inspect harness between ABS warning light and ABS CM

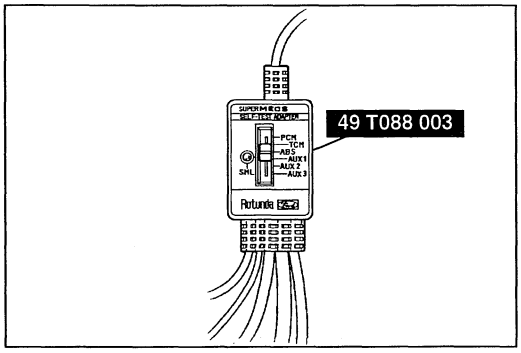
3	ABS WARNING LIGHT FLASHES		
DETAILED DESCRIPTION	—		
Possible cause: • Data link connector terminal TBS grounded			
Step	**Inspection**		**Action**
1	Verify that there is no continuity between terminal TBS and GND  	Yes	Inspect ABS CM
		No	Repair short between terminal TBS and ground

ON-BOARD DIAGNOSTIC SYSTEM
Inspection by diagnostic test mode
Outline

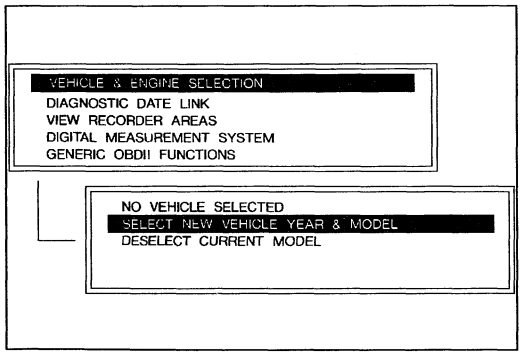
- The ABS control module contains an on-board diagnostic and memory functions to detect and indicate present and past failures.
  Read and note the diagnostic indications by using the **SST**, and take action according to the Diagnostic Trouble Code Table. (Refer to page P–47.)
- The ABS CM has a nonvolatile memory. Diagnostic trouble codes are not erased if the battery is disconnected. The memory should be cleared when servicing is finished. (Refer to page P–47.)

Inspection using NGS

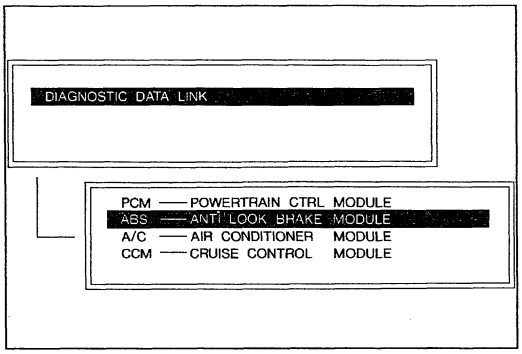




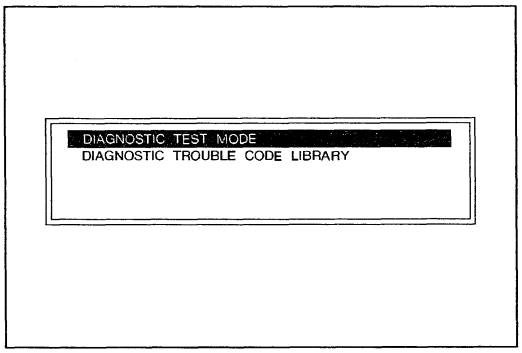
1. Connect the **SST** (NGS) to the data link connector and battery.
2. Set the **SST** (Super MECS Adapter) to ABS.



3. Select "VEHICLE & ENGINE SELECTION" on the **SST** (Control Unit) display, and then select the vehicle model, engine type, and model year.



4. Select "DIAGNOSTIC DATA LINK" on the **SST**, (Control Unit) display.
5. Select "ANTI LOCK BRAKE MODULE" on the **SST** (Control Unit) display.



6. Select "DIAGNOSTIC TEST MODE" on the **SST** (Control Unit) display.
7. (1) If a trouble code is displayed, refer to the Diagnostic trouble code table (Refer to page P–47.) and inspect the appropriate system area.
   (2) If "No codes received" is displayed, the system areas shown in the Diagnostic trouble code table are okay. Inspect another system area.

Memory Cancel

Diagnostic trouble codes memorized in the ABS control module are canceled by performing the following steps.

1. Connect the TBS terminal to GND at the data link connector.
2. Turn the ignition switch ON.
3. Output all memorized codes.
4. After verifying that the first code is repeated, depress the brake pedal 10 times at intervals of less than one second (1 sec.).

Note

Diagnostic trouble codes will not be canceled if:

- Intervals of depressing the brake pedal exceed one second (1 sec.).
- Brake switch has failed.
- While performing the memory cancel operation, the ABS warning light will not illuminate.
- When the memory cancel operation is completed, the ABS warning light comes on for 2—3 seconds, then goes off.
- After the memory is canceled, the ABS control module performs on-board diagnosis.

Diagnostic Trouble Code Table

Note

- If the ignition switch is turned OFF and ON again, and the vehicle is then accelerated to higher than 10 km/h {6.2 MPH}, diagnostic trouble code 15 will be replaced by a code from 11 through 14.

DTC	Display on the NGS	Possible cause	Diagnosis chart No.
11	WSS, SR (RH-FFRONT) — OPEN OR SHORT, DEFECT	Right front wheel-speed sensor Right front sensor rotor	ABS–1
12	WSS, SR (LH-FRONT) — OPEN OR SHORT, DEFECT	Left front wheel-speed sensor Left front sensor rotor	
13	WSS, SR (RH-REAR) — OPEN OR SHORT, DEFECT	Right rear wheel-speed sensor Right rear sensor rotor	
14	WSS, SR (LH-REAR) — OPEN OR SHORT, DEFECT	Left rear wheel-speed sensor Left rear sensor rotor	
15	WSS — OPEN OR SHORT	ABS wheel-speed sensor	ABS–2
22	SOLV (RH-FRONT) — OPEN OR SHORT	Right front solenoid valve	ABS–3
24	SOLV (LH-FRONT) — OPEN OR SHORT	Left front solenoid valve	ABS–3
26	SOLV (RH-REAR) — OPEN OR SHORT	Right rear solenoid valve	
28	SOLV (LH-REAR) — OPEN OR SHORT	Left rear solenoid valve	
51	FAIL-SAFE RELAY — OPEN OR SHORT, DEFECT	Fail-safe relay	ABS–4
53	MOTOR, MOTOR RELAY, OPEN OR SHORT, DEFECT	ABS motor Motor relay	ABS–5
61	ABS CONTROL UNIT — DEFECT	ABS control module	ABS–6

Diagnosis Chart

ABS–1	Diagnostic trouble code: 11—14		
Possible failure: ABS wheel-speed sensor, harness, ABS sensor rotor, hydraulic pressure 11: Right front 12: Left front 13: Right rear 14: Left rear			
Step	**Check item**	**Remark**	**Refer to**
1	Check control module connector	Check for poor connection	—
2	Check wiring harness between control module and ABS wheel-speed sensor	Check for open or short to ground	—
3	Check ABS wheel-speed sensor	—	P–59
4	Check ABS sensor rotor	—	P–59
5	Check brake switch	—	P–52
6	Check hydraulic system	If a problem is found, replace ABS hydraulic unit or repair hydraulic system piping as necessary	P–60
7	If all above are OK after diagnostic trouble code(s) is erased, recheck for diagnostic trouble code after driving from when vehicle is stopped to over 10 km/h {6 mph}	If code of 11—14 is obtained, replace ABS control module	P–63
8	If all above are OK, there was temporarily poor contact in wiring and now ABS system is functioning		

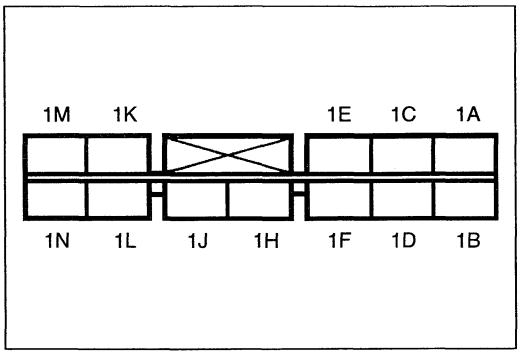
ABS–2	Diagnostic trouble code: 15		
Possible failure: ABS wheel-speed sensor, harness			
Step	**Check item**	**Remark**	**Refer to**
1	If all the malfunctions are OK after diagnostic trouble code is erased, recheck for diagnostic trouble code after driving from when vehicle is stopped to over 10 km/h {6 mph}	If code of 11—14 is obtained, go to ABS–1	Above
		If code 15 is obtained, replace ABS control module	P–63
		If nothing is displayed, there was temporarily poor contact in wiring and now ABS is OK	—

ABS–3	Diagnostic trouble code: 22—28		
Possible failure: Solenoid valve, harness 22: Right front, 24: Left front, 26: Right rear, 28: Left rear			
Step	**Check item**	**Remark**	**Refer to**
1	Check control module connector	Check for poor connection	—
2	Check wiring harness between ABS hydraulic unit and control module	Check for open or short to ground	—
3	Check ABS hydraulic unit solenoid valve	Check for open circuit	P–54
4	Check ABS warning light operation	If warning light remains illuminated after turning ignition switch ON, replace ABS control module	—
		If warning light does not illuminate after turning ignition switch ON, there was temporarily poor contact in wiring and now ABS system is functioning	

ABS–4	Diagnostic trouble code: 51		
Possible failure: Fail-safe relay			
Step	**Check item**	**Remark**	**Refer to**
1	Check pump fuse	Check pump fuse condition	P–54
		Check short to ground	—
2	Check ABS relay	Check for open circuit	P–64
3	Check wiring harness between ABS relay and ABS hydraulic unit or ABS control module	Check for open or short to ground	—
4	Check ABS warning light operation	If warning light remains illuminated after turning ignition switch ON, replace ABS control module	—
		If warning light does not illuminate after turning ignition switch ON, there was temporarily poor contact in wiring and now ABS system is functioning	

ABS–5	Diagnostic trouble code: 53		
Possible failure: ABS motor, motor relay			
Step	**Check item**	**Remark**	**Refer to**
1	Check motor relay	If pump motor continues operating after turning ignition switch OFF, motor relay may be faulty	P–65
2	Check ABS pump fuse	Check ABS pump fuse condition	P–54
		Check short to ground	—
3	Check wiring harness between ABS relay and ABS hydraulic unit and ABS control module	Check for open or short to ground	—
4	Check voltage at ABS control module terminal	Turn ignition switch ON and check motor relay terminal voltage	P–56
5	Check ABS motor	Check for open circuit	P–53
6	Check wiring harness between ABS motor and ground	Check for open circuit	—
7	Check wiring harness between ABS motor and ABS control module	Check for open or short to ground	—
8	Check ABS warning light operation	If warning light remains illuminated after turning ignition switch ON, replace ABS control module	—
		If warning light does not illuminate after turning ignition switch ON, there was temporarily poor contact in wiring and now ABS system is functioning	

ABS–6	Diagnostic trouble code: 61		
Possible failure: ABS control module			
Step	**Check item**	**Remark**	**Refer to**
1	—	Replace ABS control module	P–63



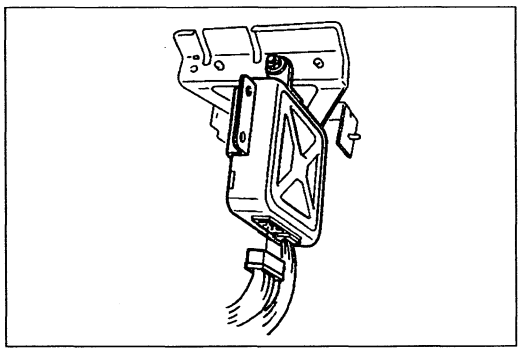
Inspection of ABS system
Check battery

Note
- If the battery voltage is low, the ABS warning light may illuminate.

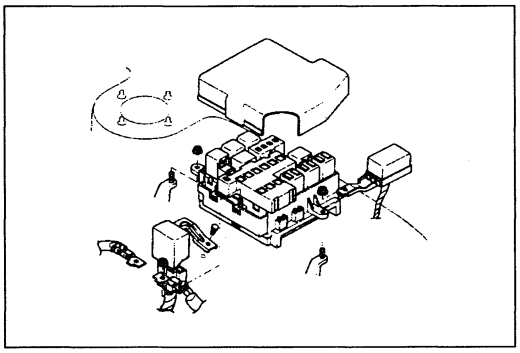
1. Start the engine.
2. Check the voltage at the battery and at the ABS control module terminal 1H.

Voltage: 10 V min.

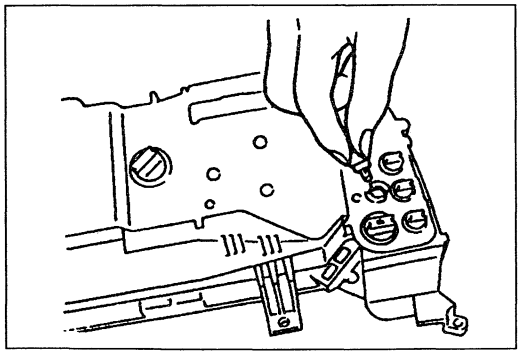
3. If the battery voltage is below the specification, charge or replace the battery as necessary.
4. If the battery voltage is within the specification and terminal 1H voltage is below the specification, check the wiring harness between the battery and the ABS control module terminal 1H.



Check ABS warning light harness
1. Turn the ignition switch OFF, and disconnect the ABS control module connector (18 pin).
2. Turn the ignition switch ON. If the warning light is ON, go to the next step. If the warning light is OFF, check the ABS relay and the harness. (Warning light — ABS relay, ABS relay — Ground)



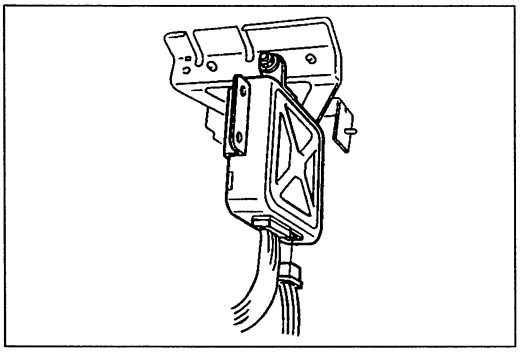
3. Disconnect the ABS relay connector.
4. If the warning light remains illuminated, check the warning light harness for a short to ground.



Check ABS warning light bulb
1. Remove the meter assembly.
2. Remove the warning light bulb from the rear of the cluster.
3. Check the condition of the bulb.
4. Replace the bulb if necessary.

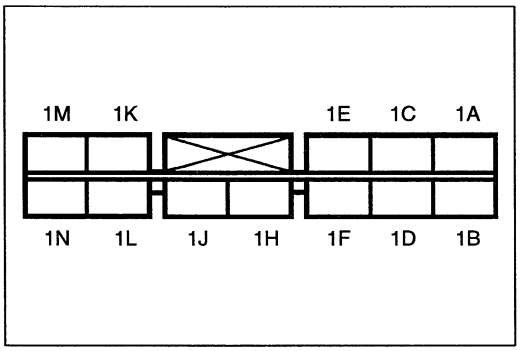
Check brake switch

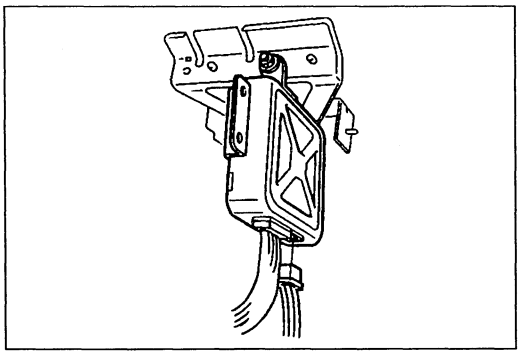
1. Depress the brake pedal.
2. Verify that the brake lights illuminate.
3. If they do not illuminate, check the following:
   - Brake light bulb
   - Brake light fuse
   - Brake switch
   - Brake light harness
4. Repair of replace any parts as necessary.

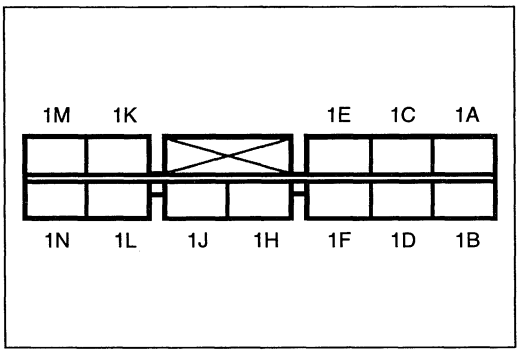


Check brake switch harness at ABS control module

1. Turn the ignition switch OFF.
2. Disconnect the ABS control module connector (12 pins).
3. Turn the ignition switch ON.
4. Check for voltage between terminal 1M at the vehicle side harness and ground. (Refer to page P–55.)
5. If not as specified, check the wiring harness between the brake switch and the ABS control module.





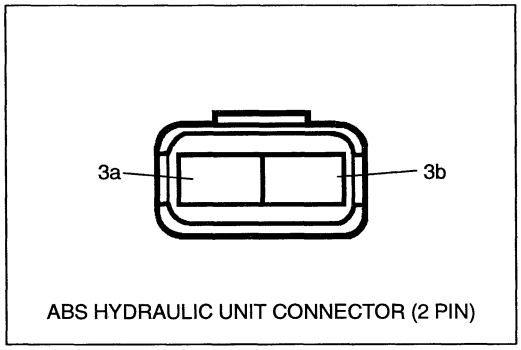


Check motor harness at ABS control module

1. Turn the ignition switch OFF, and disconnect the ABS control module connector (12 pin).
2. Measure the resistance between 1L terminal of the control module connector and ground.

   Resistance: 1 Ω max.

3. If not as specified, check the wiring harness between the ABS motor and the control module and check the ABS motor.



ABS HYDRAULIC UNIT CONNECTOR (2 PIN)

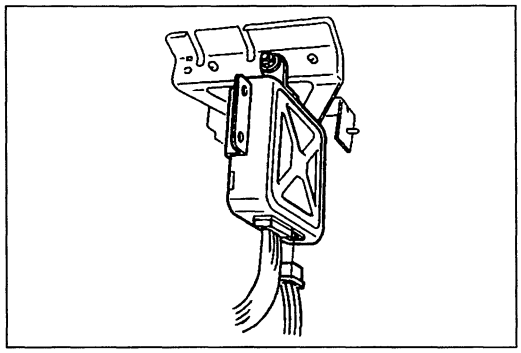
Check ABS motor at ABS hydraulic unit

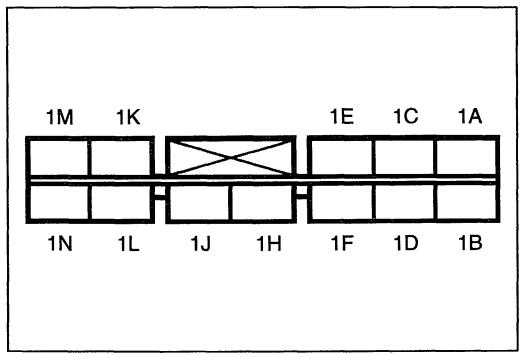
1. Turn the ignition switch OFF.
2. Disconnect the ABS hydraulic unit connector (2 pin).
3. Measure the resistance between the connector terminals.

   Resistance: 1 Ω max.

   Warning
   - **Allowing the ABS motor to operate for more than two seconds will cause it to overheat and become damaged. When checking the ABS motor and its related equipment, do not allow the ABS motor to operate for more than two seconds.**

4. Verify that the ABS motor operates when applying 12 V to the connector (2 pin).
5. If not as specified, replace the ABS hydraulic unit.



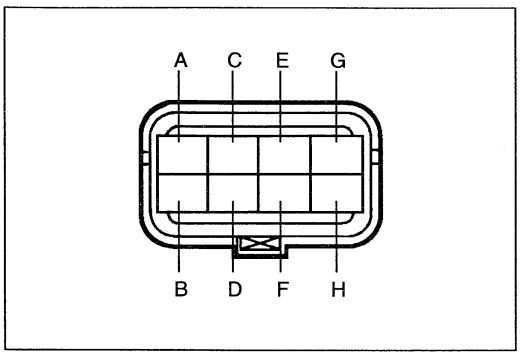


Check solenoid valve harness of ABS control module

1. Turn the ignition switch OFF.
2. Measure the resistance between a ground and the following terminals at the ABS control module connector (12 pin).
   Terminal: 1A, Right rear
   1B, Left front
   1C, Right front
   1D, Left rear

   Resistance: Approx. 3 Ω

3. If not as specified, check the wiring harness between the ABS hydraulic unit connector (8 pin) and the ABS control module.



Check solenoid valve at ABS hydraulic unit

1. Disconnect the ABS hydraulic unit connector (8 pin).
2. Measure the resistance between the following terminals.

Terminal
A—H
B—G
C—F
D—E

Resistance: approx. 3 Ω

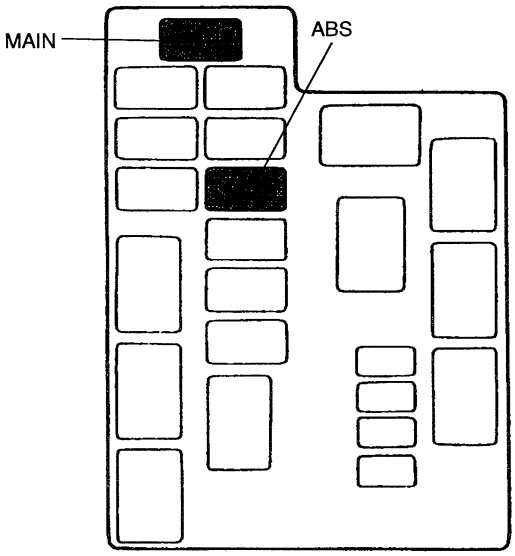
3. If not as specified, check the ABS hydraulic unit wiring harness or replace the ABS hydraulic unit if necessary.

Check fuse

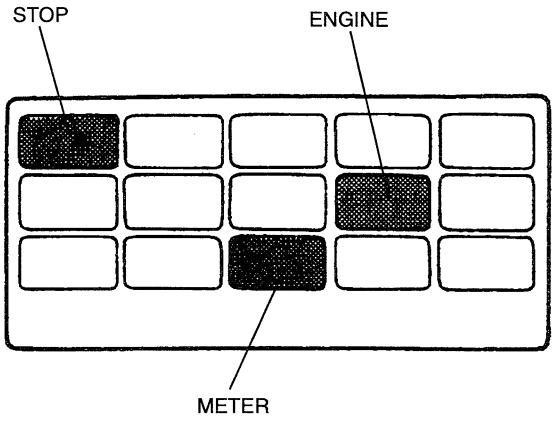
Check the fuses according to the following table. If a fuse is burnt, replace it.

Fuse name	Rating (Amp)	Location	Failure condition	Refer to
ABS	60	Main fuse block	• ABS warning light illuminates (Malfunction code 51 or 53) • ABS motor and solenoid valves do not operate	P–49, 50
MAIN	100		• Engine does not start	—
ENGINE	15	Fuse block (at driver's side)	• ABS warning light illuminates after engine started • ABS control module not activated	—
STOP	20		• Brake light does not illuminate	—
METER	15		• No ABS warning lights in instrument cluster illuminate	—

MAIN FUSE BLOCK

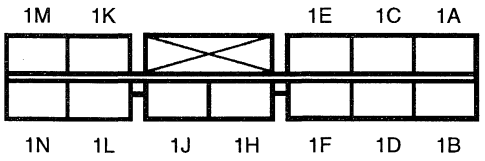


FUSE BLOCK

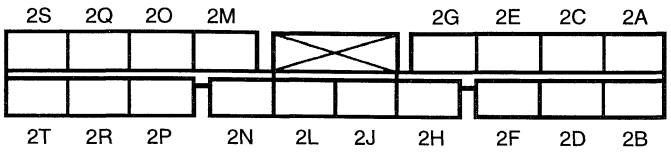


Check ABS control module

ABS CONTROL MODULE CONNECTOR



12 PIN



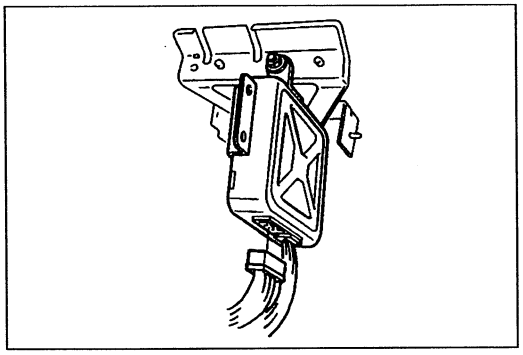
18 PIN

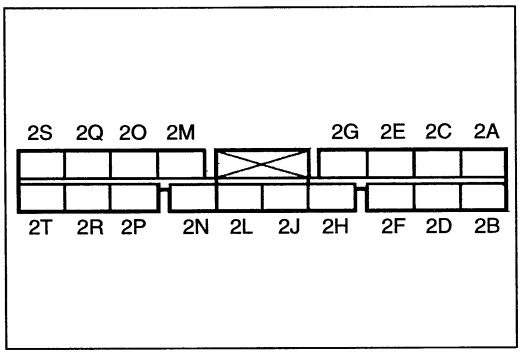
B+: Battery positive voltage

Connector	Terminal	Connected to	Condition	Voltage	Remark
12 pin	1A	Right rear wheel solenoid	Solenoid ON*	0—2	* Solenoid is ON only when ABS system is functioning. Voltage when solenoid is ON can be measured following "Hydraulic System Test" (Refer to P–60.)
			Ignition switch ON	B+	
	1B	Left front wheel solenoid	Solenoid ON*	0—2	
			Ignition switch ON	B+	
	1C	Right front wheel solenoid	Solenoid ON*	0—2	
			Ignition switch ON	B+	
	1D	Left rear wheel solenoid	Solenoid ON*	0—2	
			Ignition switch ON	B+	
	1E	Ground	Constant	0	
	1F	Ground	Constant	0	
	1H	Battery	Ignition switch ON	B+	
			Ignition switch OFF	0	
	1J	Not used	—	—	
	1K	Not used	—	—	
	1L	ABS motor	Motor running	B+	
			Motor stopped	0—1	
	1M	Brake switch	Brake pedal depressed	B+	
			Brake pedal released	0—2	
	1N	Not used	—	—	

B+: Battery positive voltage

Connector	Terminal	Connected to		Condition	Voltage	Remark
18 pin	2A	FBS check terminal		Ignition switch ON	0	
	2B	TBS check terminal		Normal mode	B+	
				Diagnostic test mode	0	
	2C	Not used		—	—	
	2D	Not used		—	—	
	2E	Not used		—	—	
	2F	Not used		—	—	
	2G	Not used		—	—	
	2H	Motor relay		Motor relay ON	0—2	
				Motor relay OFF	B+	
	2J	Fail-safe relay		Normal	0—2	
				If malfunction present	B+	
	2L	Warning light		Illuminated	0—3	
				Not illuminated	B+	
	2M	ABS wheel-speed sensor	Right front	Vehicle stopped	0	• Turn wheel at specified speed to prevent incorrect diagnosis • Check following terminals of ABS wheel-speed sensor in AC range: 2N–2M (right front) 2O–2P (left front) 2R–2Q (left rear) 2S–2T (right rear) • In DC range, ABS wheel-speed sensor voltage will be approx. 1.0V (with ignition switch ON)
	2N			Wheel turned 1 revolution per second	0.25—3.0	
	2O		Left front	Vehicle stopped	0	
	2P			Wheel turned 1 revolution per second	0.25—3.0	
	2Q		Left rear	Vehicle stopped	0	
	2R			Wheel turned 1 revolution per second	0.25—3.0	
	2S		Right rear	Vehicle stopped	0	
	2T			Wheel turned 1 revolution per second	0.25—3.0	

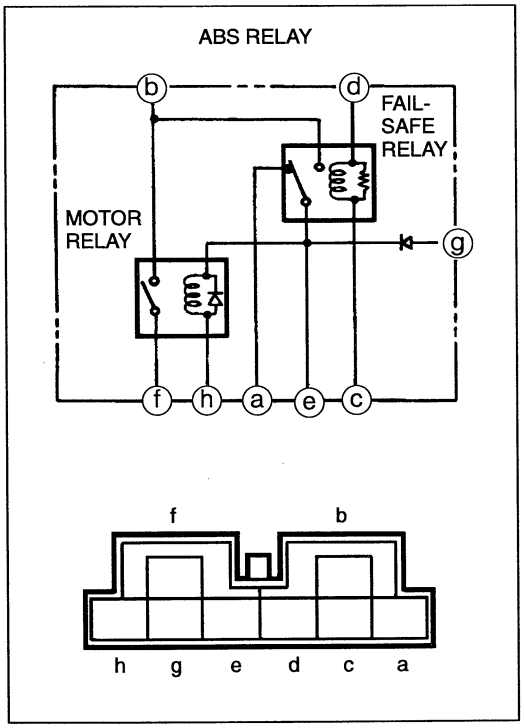




Check ABS relay harness (fail-safe relay)

1. Turn the ignition switch OFF and disconnect the ABS control module connector (18 pin).
2. Turn the ignition switch ON.
3. Connect terminal 2J of the control module connector (18 pin) to a ground.
4. Check the following points.

Condition	Action
Fail-safe relay in ABS relay does not click when 2J terminal grounded	• Check fail-safe relay • Check harness between fail safe relay and ABS control module
Warning light illuminates after grounding 2J terminal	• Check fail-safe relay
1D terminal of ABS control module connector does not indicate 12V	• Check fail-safe relay • Check harness between fail safe relay and ABS hydraulic unit



Check ABS relay (fail-safe relay)

1. Measure the resistance between terminals c and d of the ABS relay connector.

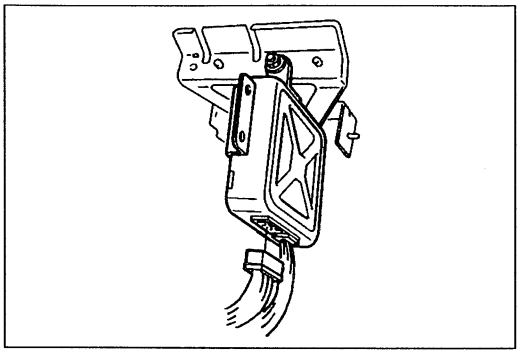
   Resistance: 60—100 Ω

2. Check for continuity between terminals a and e and between b and e.

Terminal	Continuity
a—e	Yes
b—e	No

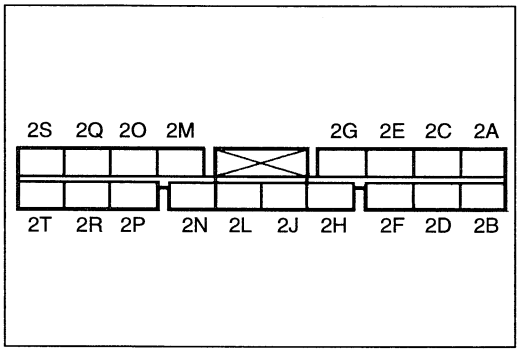
3. Apply 12 V between terminals d and c. Check for continuity between terminals a and e and between b and e.

Terminal	Continuity
b—e	Yes
a—e	No



Check ABS relay harness (motor relay)

1. Inspect the fail-safe relay.
2. Turn the ignition switch OFF and disconnect the ABS control module connector (18 pin).
3. Turn the ignition switch ON.
4. Connect terminal 2J to a ground.
5. Connect terminal 2H to a ground.
6. Check the following points.

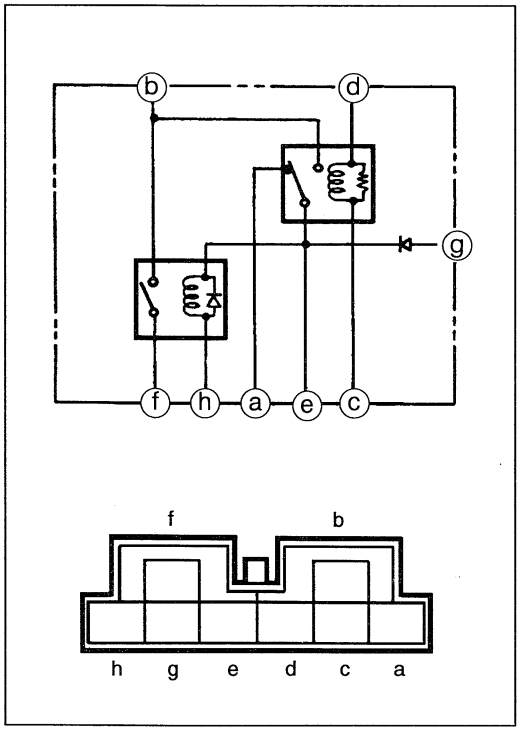


Caution

- **Allowing the ABS motor to operate for more than two seconds will cause it to overheat and become damaged. When checking the ABS motor and its related equipment, do not allow the ABS motor to operate for more than two seconds.**

Condition	Action
Motor relay in ABS relay does not click when terminals are grounded	• Check harness between motor relay and ABS control module • Check motor relay
ABS motor does not operate	• Check motor relay • Check harness between motor relay and ABS motor • Check fuse

7. If not as specified, replace the ABS relay.



Check ABS relay (motor relay)

1. Measure the resistance between terminals e and h, or between a and h of ABS relay connector.

   Resistance: 50—90 Ω

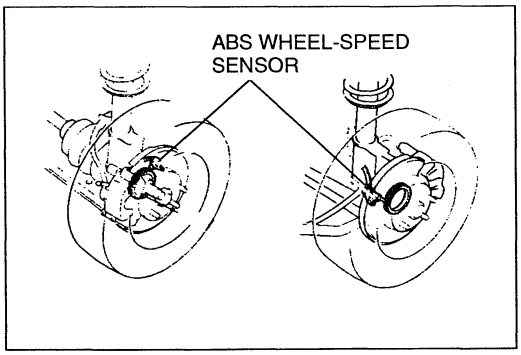
2. Check for continuity between terminals b and f.

Terminal	Continuity
b—f	No

3. Apply 12 V to terminals g (+) and h (–). Check for continuity between terminals b and f.

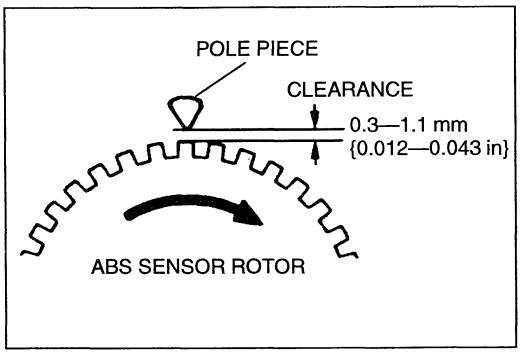
Terminal	Continuity
b—f	Yes

4. If not as specified, replace the ABS relay.



Check ABS wheel-speed sensor

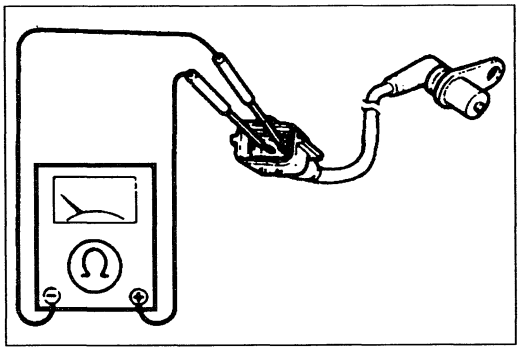
1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Remove the wheel and tire assembly.
3. Check for looseness and damage.



4. Check the clearance between the ABS wheel-speed sensor and the ABS sensor rotor at each wheel.

   Clearance: 0.3—1.1 mm {0.012—0.043 in}

5. If not as specified, replace the ABS wheel-speed sensor or ABS sensor rotor as necessary.



Check resistance of ABS wheel-speed sensor

1. Disconnect the ABS wheel-speed sensor connector.
2. Check the resistance at the ABS wheel-speed sensor.

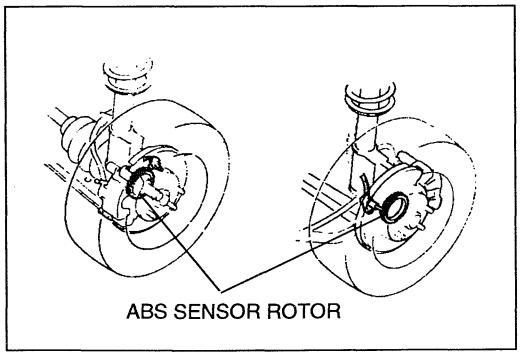
   Resistance: 1.6—2.0 kΩ

Check voltage of ABS wheel-speed sensor

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Disconnect the ABS wheel-speed sensor connector.
3. Check each wheel by rotating it at one revolution per second.

   Voltage: 0.25—3.0 V (AC)

4. If not as specified, replace the ABS wheel-speed sensor or ABS sensor rotor as necessary.
5. Cancel the ABS control module memory.

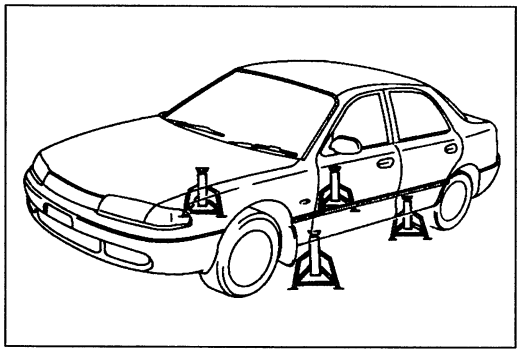


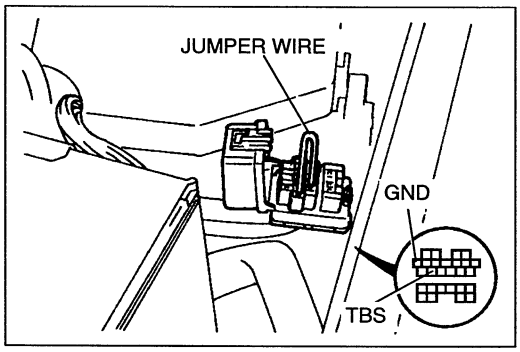
Check ABS sensor rotor

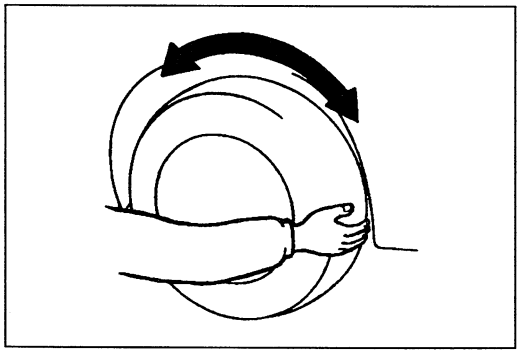
1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Remove the wheel and tire assembly.
3. Inspect the rotor for missing and damaged teeth.
4. Replace the ABS sensor rotor as necessary.

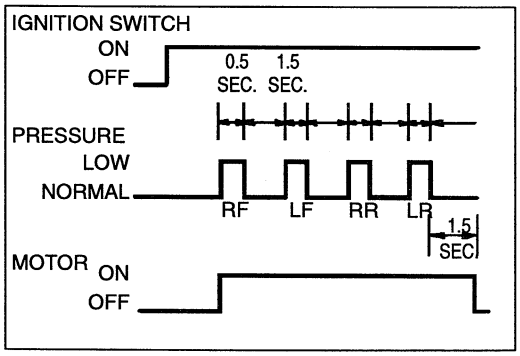
ABS HYDRAULIC UNIT

The ABS control module contains an on-board diagnostic function to check the hydraulic system operation. During the diagnostic test mode, the ABS control module activates the ABS hydraulic unit to reduce the hydraulic pressure of the right front, left front, right rear, left rear in sequence for 0.5 second each at intervals of 1.5 seconds.









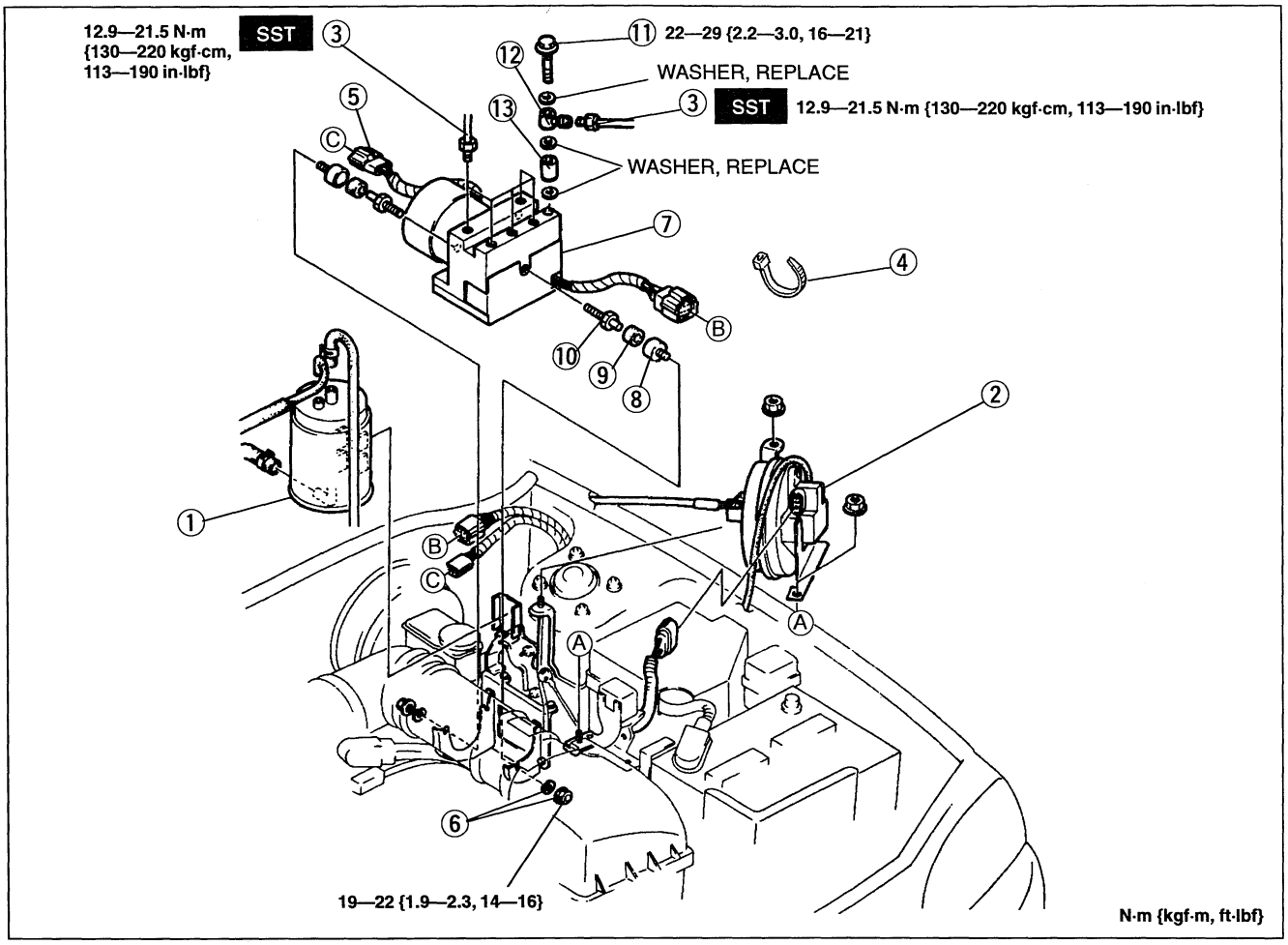
Inspection

1. Verify that the battery is fully charged.
   Verify that the ABS warning light goes out after the engine is started.
2. If the light stays ON after the engine has started, the ABS control module detects a failure and will not activate the ABS hydraulic unit.
3. Turn off the engine.
4. On level ground, jack up the vehicle and support it evenly on safety stands. Shift the transaxle to neutral or N range.
5. Release the parking brake.
6. Rotate the wheels by hand, and inspect for brake drag.
7. Using a jumper wire, connect the TBS and GND terminals of the data link connector.
8. Depress the brake pedal, and have an assistant verify that the right front wheel will not turn.
9. With the brake pedal still depressed, turn the ignition switch ON and verify that the brake is released momentarily (approx. **0.5 sec.**) and that the wheel turns when pressure reduction operates.
10. Check operation of the remaining wheels in order: left front, right rear, left rear.
11. If steps 9 and 10 show correct operation, the following systems are OK:
    - Brake piping to the ABS hydraulic unit
    - Braking system, including the ABS hydraulic unit
    - Electrical system in the ABS hydraulic unit (solenoid, ABS motor, etc.)
    - ABS control module, its output system (solenoid, relay, etc.) and harness

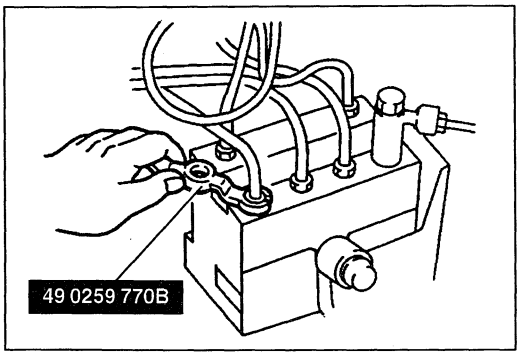
    The following are not checked with the above steps.
    - Input system and harness of the ABS control module
    - Intermittent failure
    - Fluid leakage
12. Replace the ABS hydraulic unit if necessary.

Removal / Installation

1. Remove the nuts mounting the fuel filter and igniter to the bracket, and move them toward the engine.
2. Remove the ABS hydraulic unit in the order shown in the figure, referring to **Removal Note**.
3. The ABS hydraulic unit is not serviceable. If there is a malfunction, replace the ABS hydraulic unit assembly. Install in the reverse order of removal, referring to **Installation Note**.
4. Add brake fluid, bleed the air, and check for fluid leakage.
5. Verify that the diagnostic trouble codes have been canceled. (Refer to page P–47.)



1. Charcoal canister
2. Cruise control actuator
3. Brake pipe
   Removal Note ..... below
   Installation Note ..... page P–62
4. Band
5. Connector
6. Nut and washer
7. ABS hydraulic unit
   Installation Note ..... page P–62
8. Casing
9. Mount rubber
10. Hex stud
11. Connector bolt
12. Connector
13. Spacer

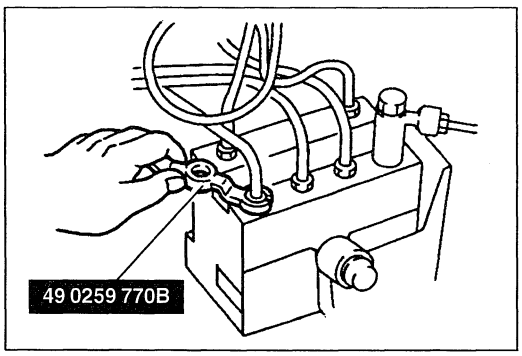


Removal note
Brake pipe

Caution

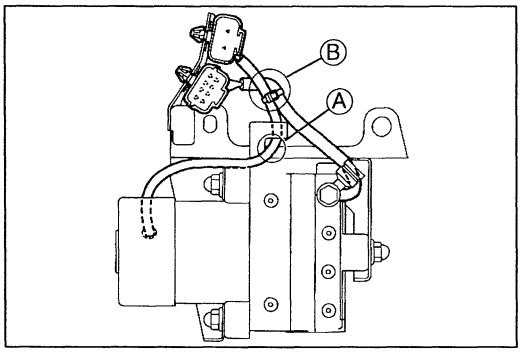
- **Brake fluid will damage painted surfaces. If brake fluid does get on a painted surface, wipe it off immediately.**

Loosen the brake pipes by using the **SST**.



Installation note
Brake pipe
Tighten the brake pipe by using the **SST**.

Tightening torque:
12.9—21.5 N·m {130—220 kgf·cm, 113—190 in·lbf}

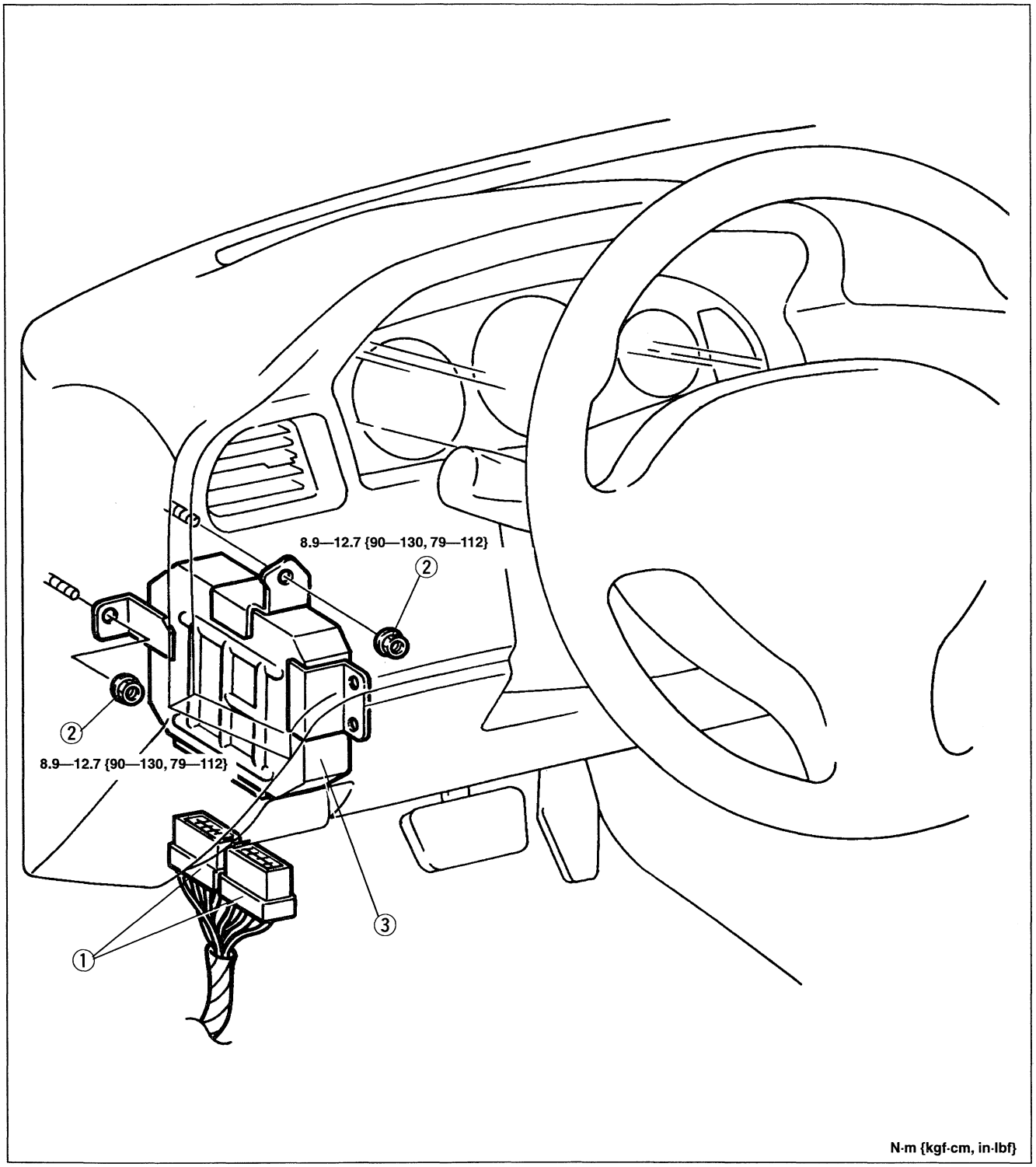


ABS hydraulic unit
1. Fix the ABS motor-harness to the clip as shown in Ⓐ.
2. Tie the solenoid harness and the ABS motor-harness together by using a band as shown in Ⓑ.
3. Fix the connector to the bracket.
4. Cut off **1—10 mm {0.04—0.39 in}** of the band from the tied part.

ABS CONTROL MODULE

Removal / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.
4. Connect the negative battery cable and verify that the diagnostic trouble codes have been canceled. (Refer to page P–47.)

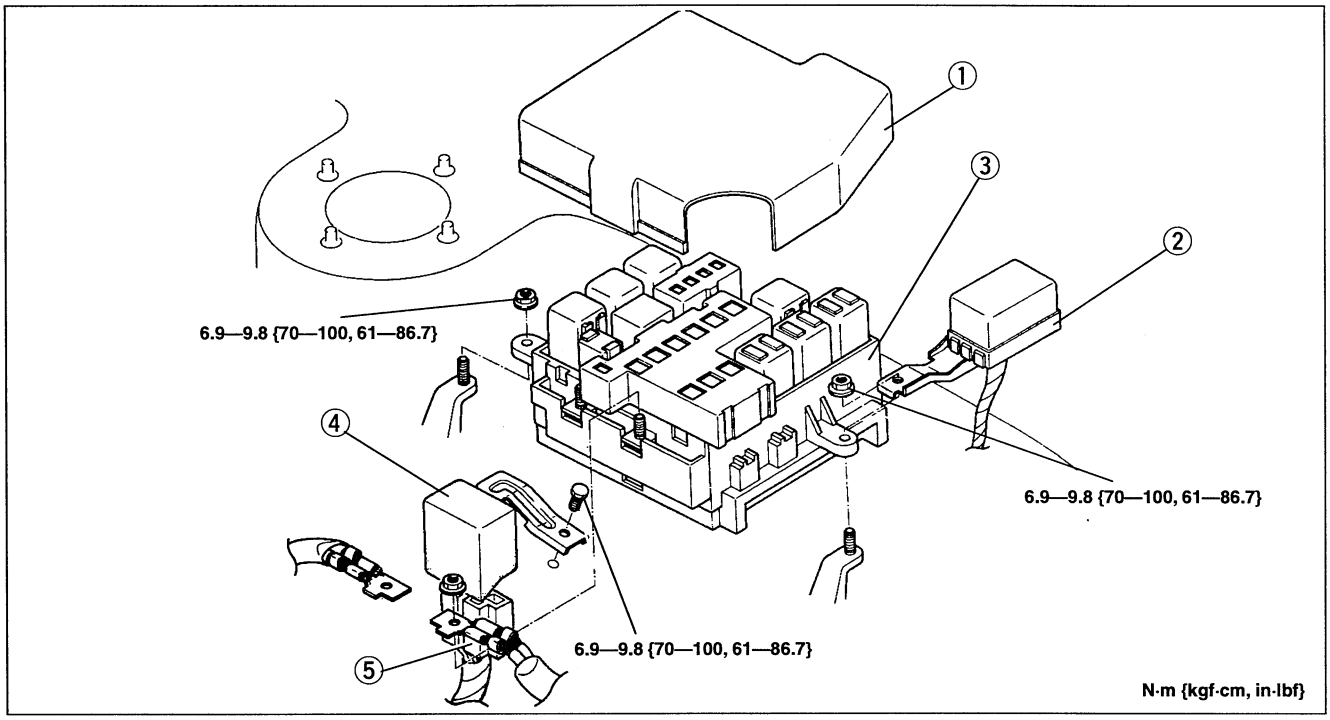


1. Connector
2. Nut
3. ABS control module

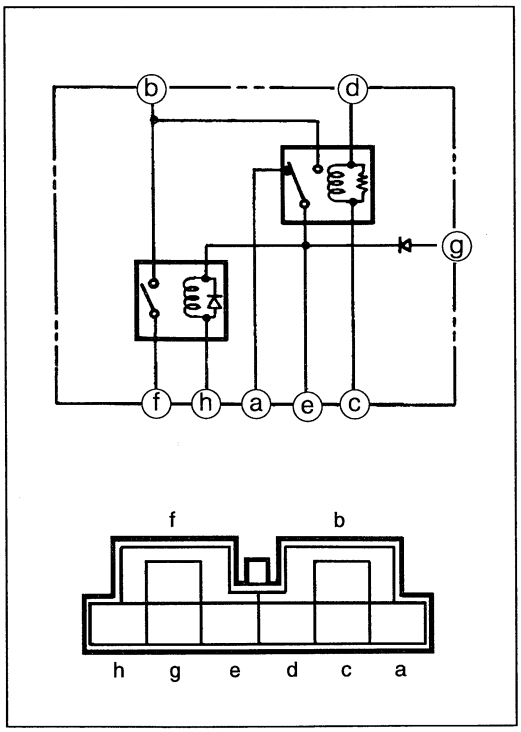
ABS RELAY

Removal / Inspection / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.
4. Connect the negative battery cable and verify that the diagnostic trouble codes have been canceled. (Refer to page P–47.)



1. Fuse block cover
2. Data link connector
3. Fuse block
4. ABS relay
   Inspection ..... below
5. Connector



Inspection

ABS relay (fail-safe relay)

1. Measure resistance between terminals e and d of the ABS relay box connector.

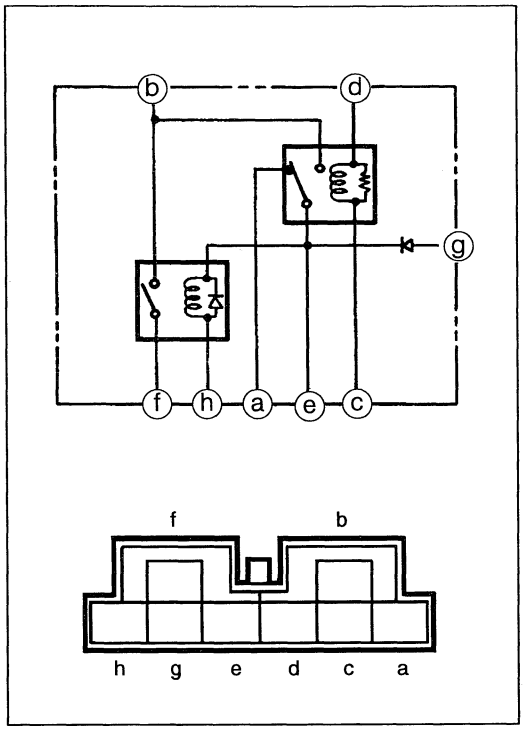
   Resistance: 60—100 Ω

2. Check for continuity between terminals a and e and between b and e.

Terminal	Continuity
a—e	Yes
b—e	No

3. Apply 12 V between terminals d and c. Check for continuity between terminals b and e and between a and e.

Terminal	Continuity
b—e	Yes
a—e	No



4. If not as specified, replace the ABS relay.

ABS relay (motor relay)

1. Measure the resistance between terminals e and h or between a and h of the ABS relay connector.

   Resistance: 50—90 Ω

2. Check for continuity between terminals b and f.

Terminal	Continuity
b—f	No

3. Apply 12 V to terminals g (+) and h (–). Check for continuity between terminals b and f.

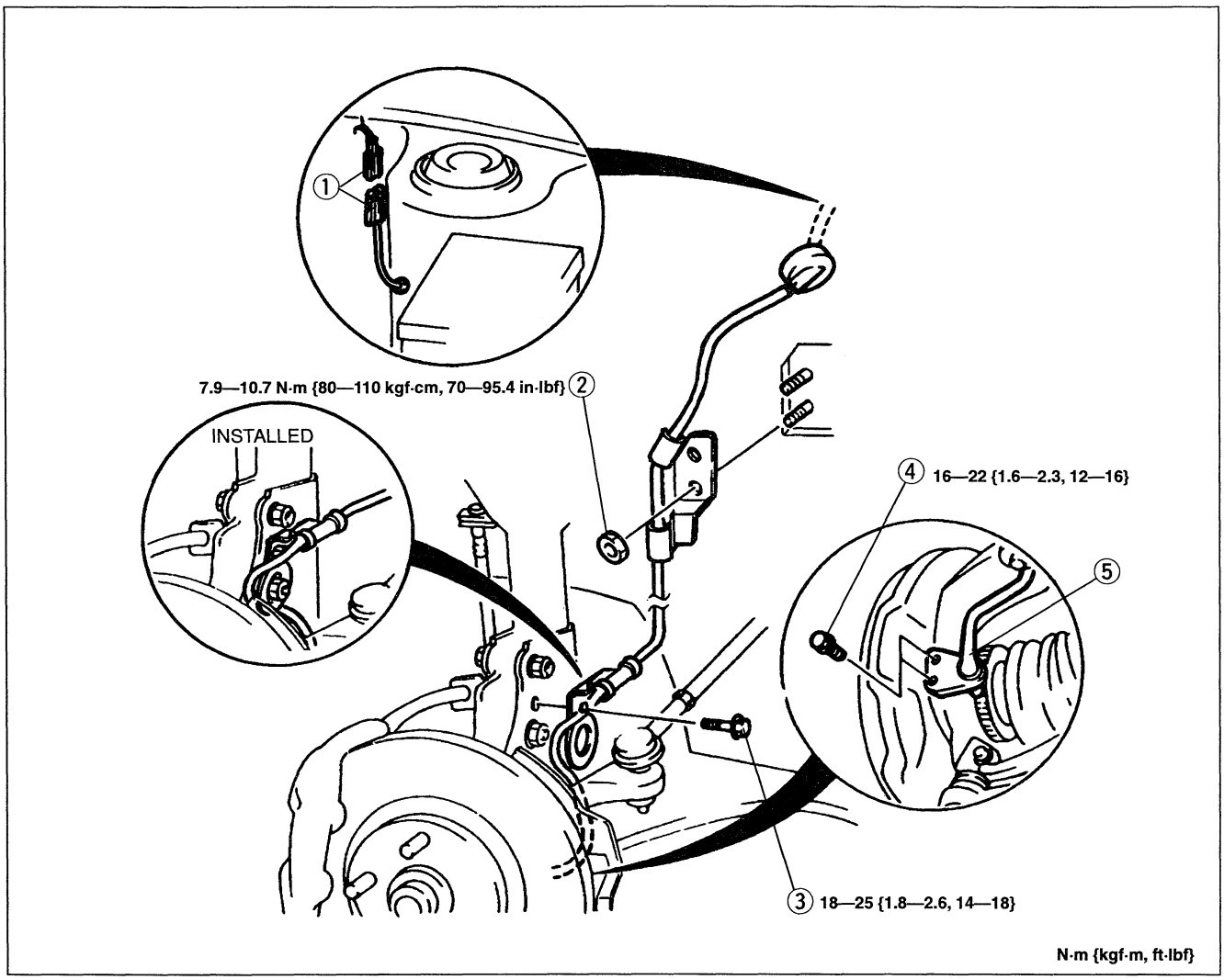
Terminal	Continuity
b—f	Yes

4. If not as specified, replace the ABS relay.

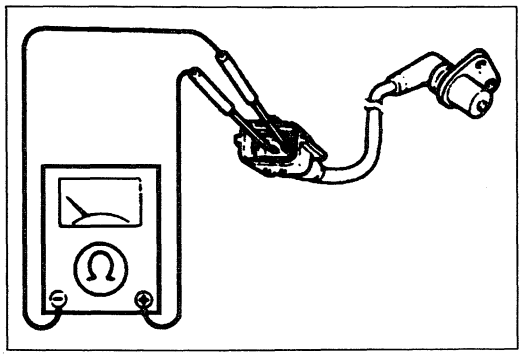
ABS WHEEL-SPEED SENSOR (FRONT)

Removal / Inspection / Installation

1. Jack up the vehicle and support it on safety stands.
2. Remove the wheel and tire assembly.
3. Remove in the order shown in the figure.
4. Install in the reverse order of the removal.
5. Install the wheel and tire assembly.
6. Verify that the diagnostic trouble codes have been cancelled. (Refer to page P–47.)



1. Connector
2. Nut
3. Bolt
4. Bolt
5. ABS wheel-speed sensor
   Inspection ..... below



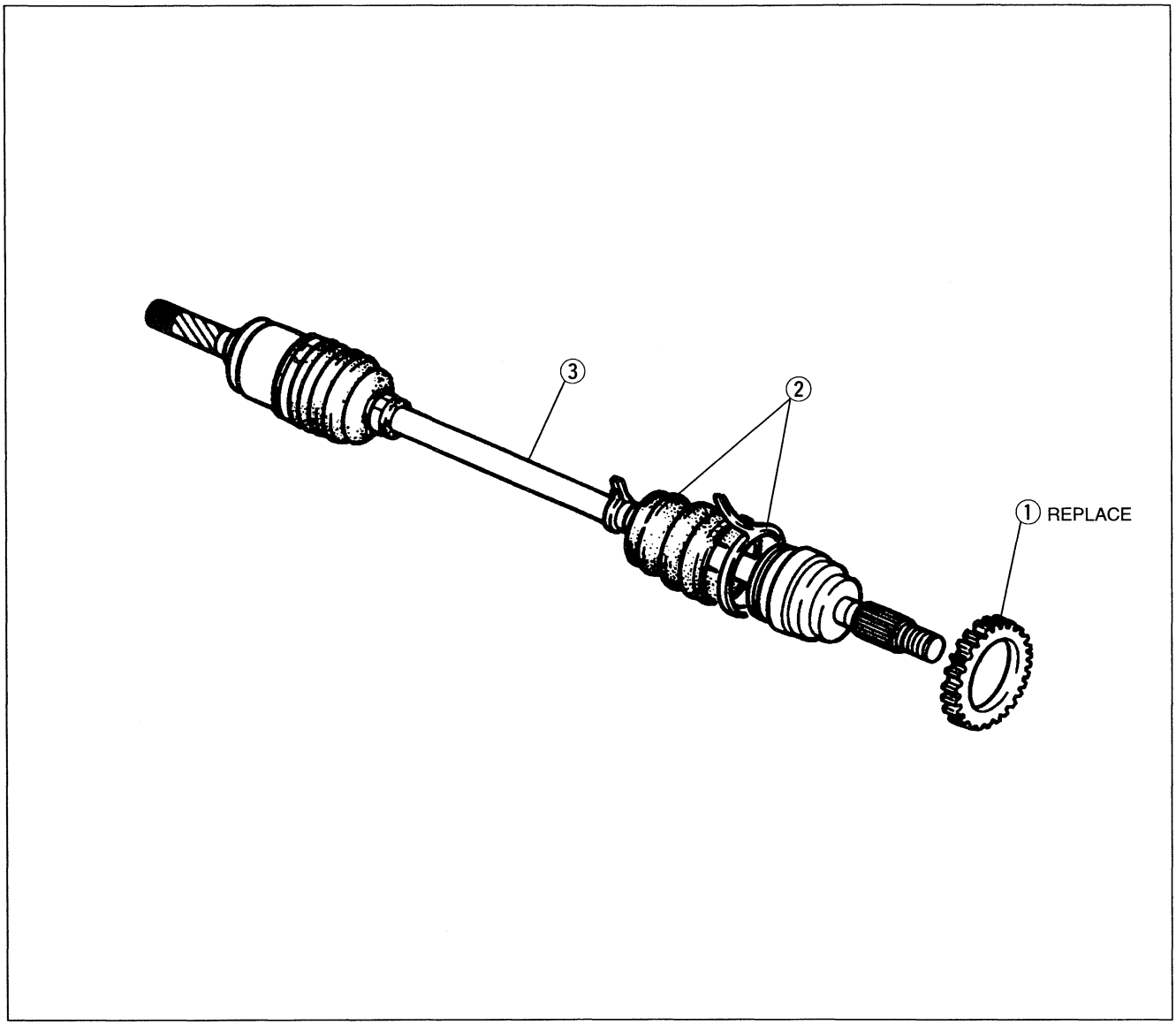
Inspection

1. Check the resistance at the ABS wheel-speed sensor terminals.

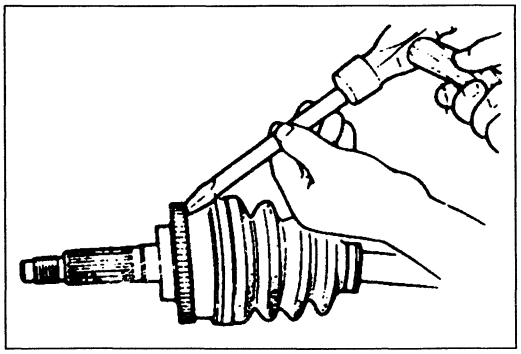
   Resistance: 1.6—2.0 kΩ

2. If not as specified, replace the ABS wheel-speed sensor.

ABS SENSOR ROTOR (FRONT)
Removal / Inspection
1. Inspect the ABS sensor rotor for missing and damaged teeth.
2. Remove the drive shaft assembly from the vehicle. (Refer to section M.)
3. Remove in the order shown in the figure, referring to **Removal Note**.



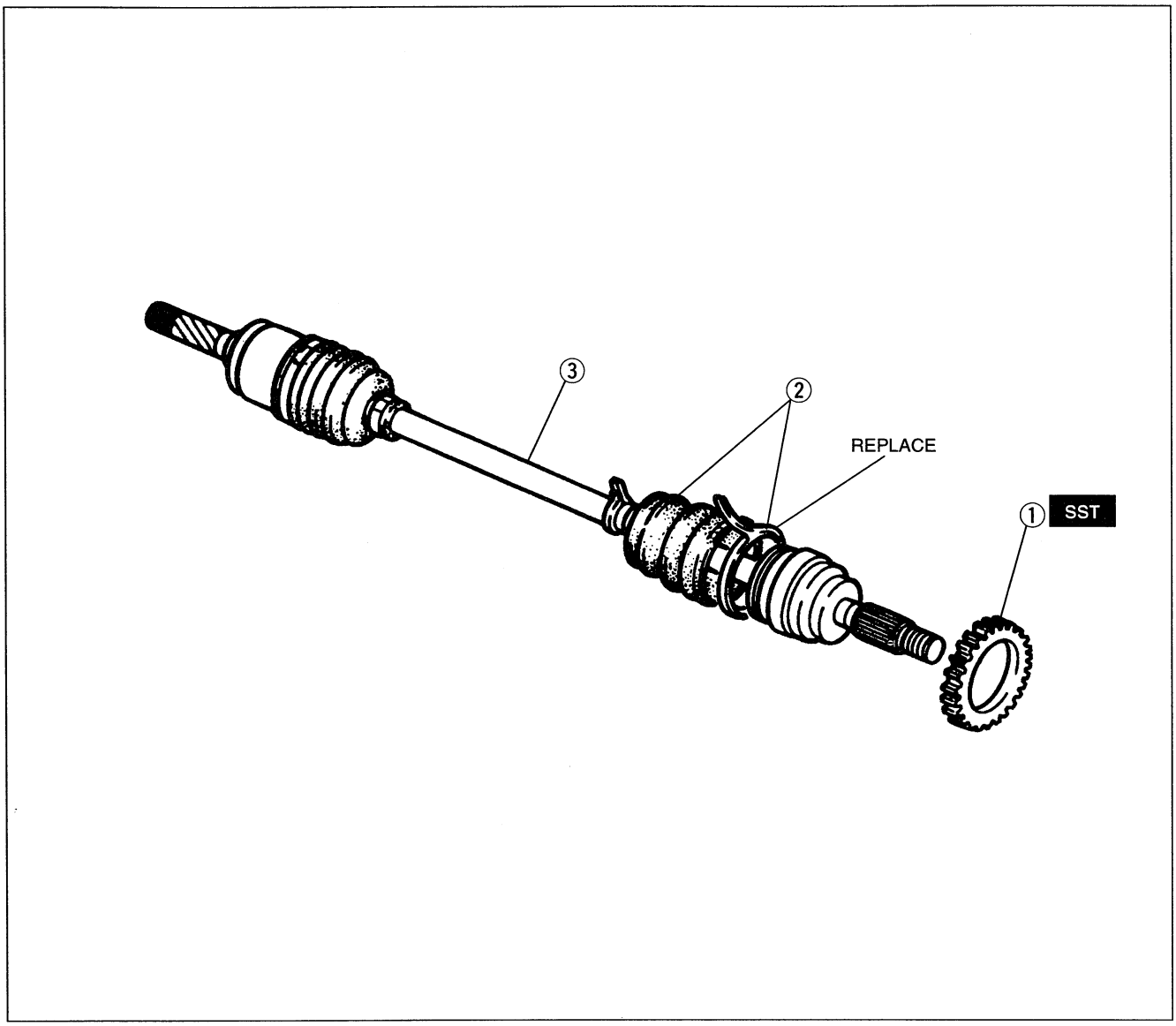
1. ABS sensor rotor
   Removal Note ..... below
2. Boot band and boot
3. Drive shaft
   Removal ..... section M



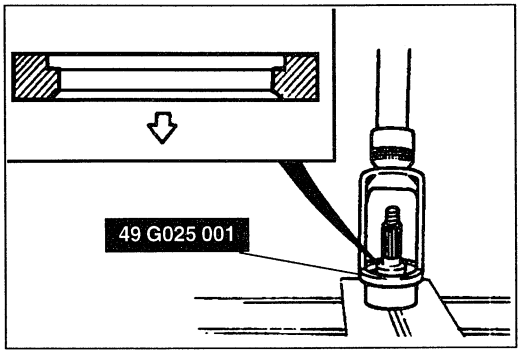
Removal note
ABS sensor rotor
Tap the ABS sensor rotor off the drive shaft by using a chisel.

Installation

1. Install in the order shown in the figure, referring to **Installation Note**.
2. Install the drive shaft assembly onto the vehicle. (Refer to section M.)



1. ABS sensor rotor
   Installation Note ..... below
2. Boot and boot band
3. Drive shaft
   Installation ..... section M



Installation note

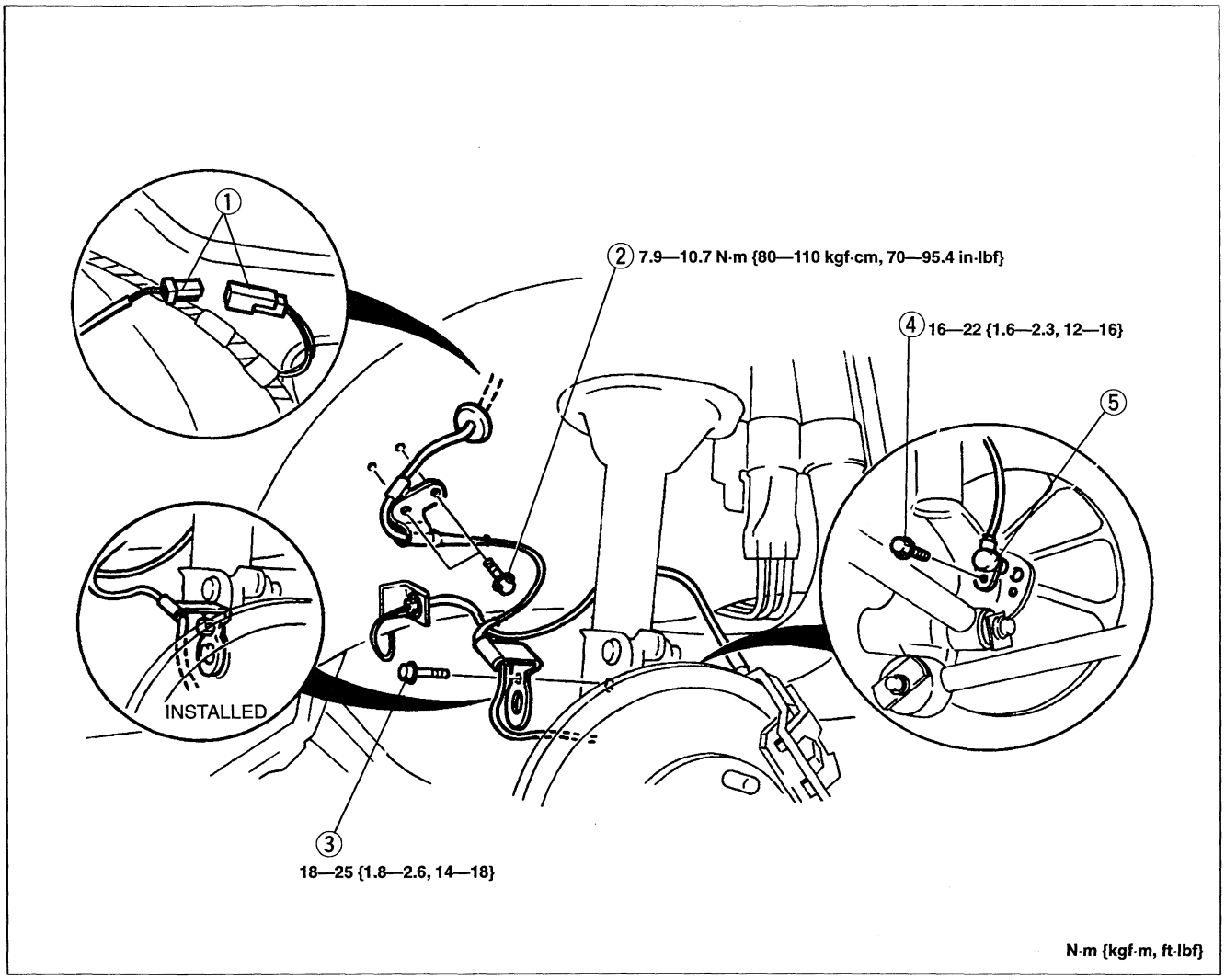
ABS sensor rotor

Set a new ABS sensor rotor on the drive shaft in the direction shown and press it onto the shaft assembly by using the **SST**.

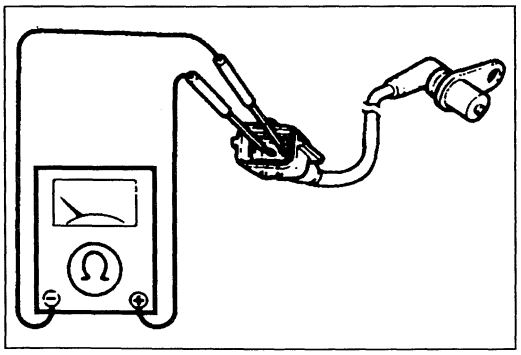
ABS WHEEL-SPEED SENSOR (REAR)

Removal / Inspection / Installation

1. Jack up the vehicle and support it on safety stands.
2. Remove the wheel and tire assembly.
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.
5. Install the wheel and tire assembly.
6. Verify that the diagnostic trouble codes have been canceled. (Refer to page P–47.)



1. Connector
2. Bolt
3. Bolt
4. Bolt
5. ABS wheel-speed sensor
   Inspection ..... below



Inspection

1. Check resistance at the ABS wheel-speed sensor terminals.

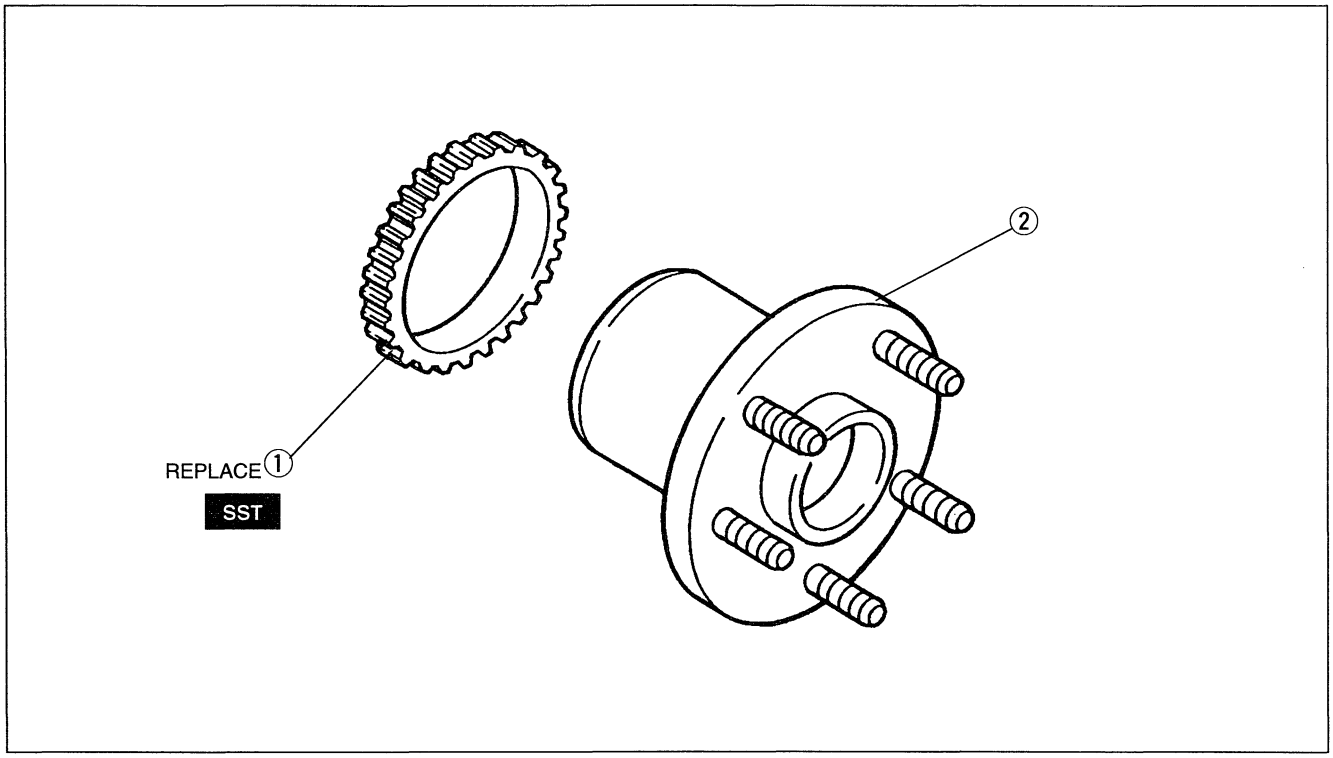
   Resistance: 1.6—2.0 Ω

2. If not as specified, replace the ABS wheel-speed sensor.

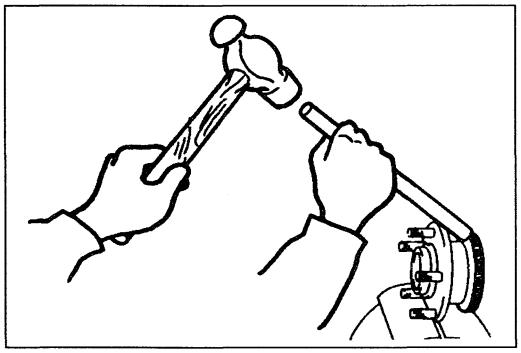
ABS SENSOR ROTOR (REAR)

Removal / Installation

1. Remove the rear wheel hub assembly from the vehicle. (Refer to section M.)
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the order shown in the figure, referring to **Installation Note**.
4. Install the rear wheel hub assembly onto the vehicle. (Refer to section M.)



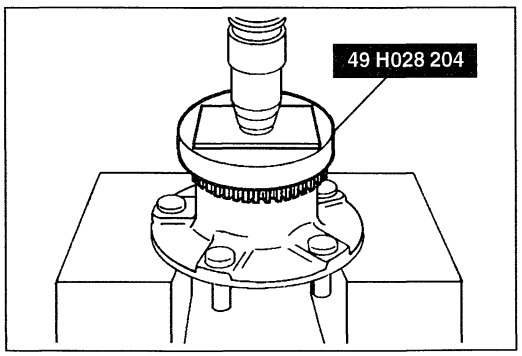
1. ABS sensor rotor
   - Removal Note ..... below
   - Installation Note ..... below
2. Wheel hub



Removal note

ABS sensor rotor

Tap the ABS sensor rotor off the wheel hub by using a chisel.



Installation note

ABS sensor rotor

1. Install a new rear ABS sensor rotor onto the wheel hub.
2. Using a steel plate and the **SST**, press the rotor until it is flush with the wheel hub.

Note

- The ABS sensor rotor can be installed in either direction.

WHEELS AND TIRES

OUTLINE **Q–2**
SPECIFICATIONS **Q–2**
TROUBLESHOOTING GUIDE **Q–3**
WHEELS AND TIRES **Q–4**
SPECIAL NOTES ABOUT WHEELS AND TIRES **Q–4**
NOTES REGARDING TIRE REPLACEMENT **Q–4**
INSPECTION / ADJUSTMENT **Q–4**
REMOVAL / INSTALLATION **Q–6**
TIRE ROTATION **Q–6**
WHEEL BALANCE ADJUSTMENT **Q–6**

OUTLINE

SPECIFICATIONS

Standard Tires

Item \ Engine/Model			FS			KL	
			626		MX–6	MX–6	626
Wheels	Size		14×6–JJ	14×5 1/2–JJ	15×6 1/2–JJ		15×6–JJ
	Offset	mm {in}	45 {1.77}				
	Pitch circle diameter	mm {in}	114.3 {4.50}				
	Material		Aluminum alloy	Steel	Aluminum alloy		
Tires	Size		P195/65R14 88S		P205/55R15 87V		P205/55R15 87H
	Air pressure kPa {kgf/cm^2, psi}	Front	220 {2.2, 32}				
		Rear	180 {1.8, 26}				

Temporary spare tire

Item			Specifications
Wheel	Size		15×4T
	Offset	mm {in}	45 {1.77}
	Pitch circle diameter	mm {in}	114.3 {4.50}
	Material		Steel
Tire	Size		T125/70D15
	Air pressure	kPa {kgf/cm^2, psi}	415 {4.2, 60}

TROUBLESHOOTING GUIDE

Problem	Possible cause	Action	Page
Excessive or irregular tire wear	Refer to page Q–5 for details.		
Premature tire wear	Incorrect tire pressure	Adjust	Q–2
Tire squeal	Incorrect tire pressure	Adjust	Q–2
	Tire deterioration	Replace	—
Road noise or body vibration	Insufficient tire pressure	Adjust	Q–2
	Unbalanced wheel	Adjust	Q–6
	Deformed wheel or tire	Repair or replace	—
	Irregular tire wear	—	Q–5
"Shake" occurs (steering wheel vibrates up/down)	Excessive tire and wheel runout	Replace	—
	Loose lug nuts	Tighten	Q–5
	Unbalanced wheel	Adjust	Q–6
	Cracked or worn engine mount rubber	Replace	sections B1, B2
	Cracked or worn transaxle mount rubber	Replace	sections J, K1, K2
"Shimmy" occurs (steering wheel vibrates circumferentially)	Excessive tire and wheel runout	Replace	—
	Loose lug nuts	Tighten	Q–5
	Unbalanced wheel	Adjust	Q–6
	Irregular tire wear	—	Q–5
	Insufficient tire pressure	Adjust	Q–2
	Damaged or worn front wheel bearing	Replace	section M
	Malfunction of steering system	—	section N
	Malfunction of suspension	—	section R
Steering wheel pulls to one side	Incorrect tire pressure	Adjust	Q–2
	Excessive or irregular tire wear	—	Q–5
	Malfunction of steering system	—	section N
	Malfunction of braking system	—	section P
	Malfunction of suspension	—	section R
General driving instability	Unequal tire air pressures	Adjust	Q–2
	Deformed wheel or tire	Repair or replace	—
	Loose lug nuts	Tighten	Q–5
	Malfunction of steering system	—	section N
	Malfunction of suspension	—	section R
Uneven (one-sided) braking	Unequal tire air pressures	Adjust	Q–2
	Malfunction of braking system	—	section P
Heavy handling	Insufficient tire pressure	Adjust	Q–2
	Malfunction of steering system	—	section N
	Malfunction of suspension	—	section R
Steering wheel doesn't return properly	Insufficient tire pressure	Adjust	Q–2
	Malfunction of steering system	—	section N
	Malfunction of suspension	—	section R

WHEELS AND TIRES

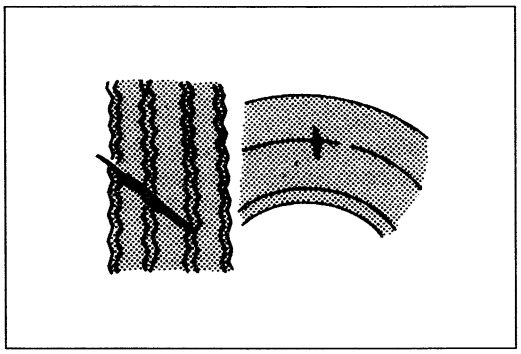
SPECIAL NOTES ABOUT WHEELS AND TIRES

1. Do not use wheels or tires other than the specified types.
2. Aluminum wheels are easily scratched. When washing them, use a soft cloth, never a wire brush.If the vehicle is steam cleaned, do not allow boiling water to contact the wheels.
3. If alkaline compounds (such as salt water or road salts) get on aluminum wheels, wash them as soon as possible to prevent damage. Use only a neutral detergent.

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. Use a wire brush, sandpaper, or cloth to clean and remove all rust and dirt from the rim edge and the rim bead.
3. When cleaning aluminum wheels, use a soft cloth, never a wire brush or sandpaper.
4. Remove pebbles, glass, nails, and other foreign items embedded in the tire tread.
5. Be sure the air valve is installed correctly.
6. Apply a soapy solution to the tire bead and the edge of the rim before mounting.
7. After mounting a tire onto a wheel, inflate the tire to **250—300 kPa {2.55—3.06 kgf/cm^2, 36—42 psi}**. Verify that the bead is seated correctly onto the rim and that there are no air leaks. Then reduce the pressure to the specified level.
8. If a tire iron is used to change a tire on an aluminum wheel, be sure to use a piece of rubber between the iron lever and the wheel to avoid damage to the wheel. Work should be done on a rubber mat, not on a hard or rough surface.

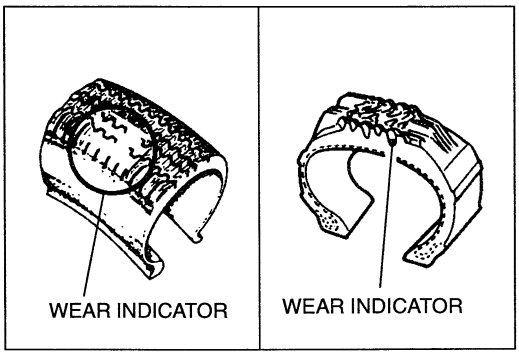


INSPECTION / ADJUSTMENT

Visual Inspection

Inspection (Tire and Wheel)

A wheel or tire should be replaced if any cracks, damages, deformation, or other problems are found.

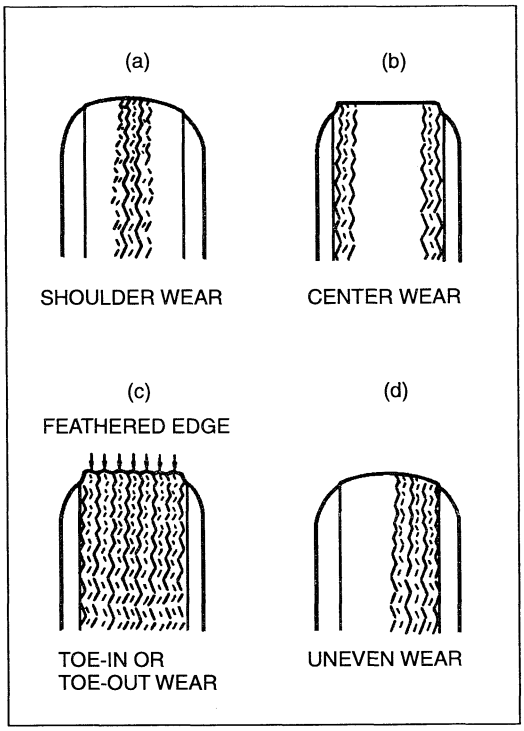


Tire Wear

1. Check the remaining tread.

   Remaining tread
   Standard tires: 1.6 mm {0.063 in} min.
   Snow tires: 50% of tread

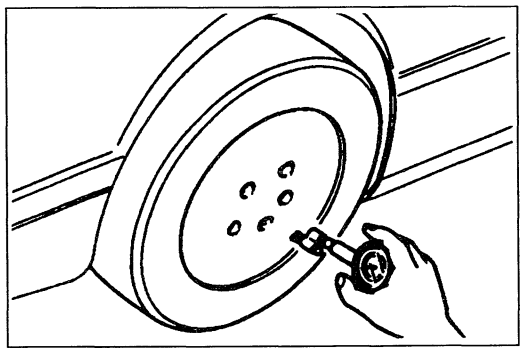
2. A tire should be replaced if the wear indicators are exposed.



Abnormal tire wear

Abnormal tire wear patterns shown in the illustration can occur. Refer to the chart for the possible causes and actions.

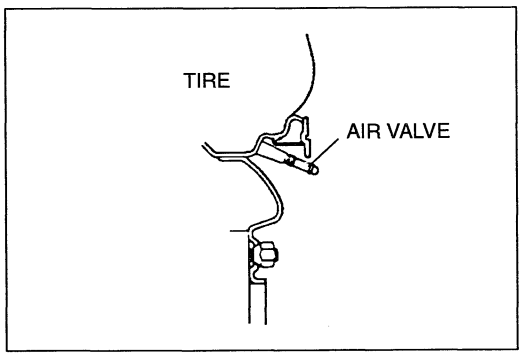
	Possible cause	Action
(a)	• Underinflation (both sides worn) • Incorrect camber (one side worn) • Hard cornering • Lack of rotation	• Measure and adjust pressure • Repair or replace suspension parts • Reduce speed • Rotate tires
(b)	• Overinflation • Lack of rotation	• Measure and adjust pressure • Rotate 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 problem • Lack of rotation	• Repair or replace axle and suspension parts • Repair or replace • Balance or replace • Correct or replace • Correct or replace • Rotate tires



Air Pressure

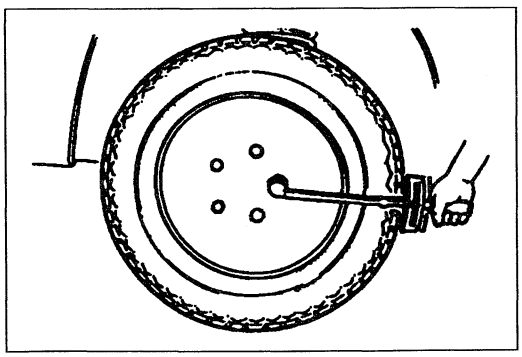
Check the air pressure of all tires, including the spare tire, with an air pressure gauge. If necessary, adjust the air pressure.

Air pressure: Refer to page Q–2



Air Leakage

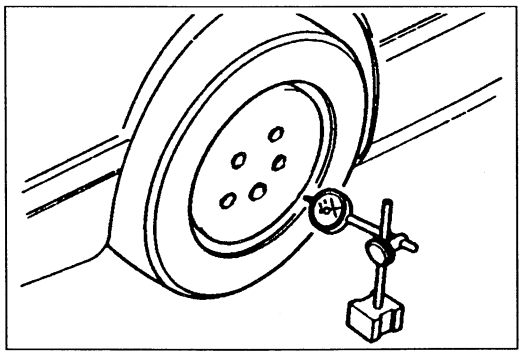
Verify that there is no air leakage from the air valve.



Loose Lug Nuts

Verify that the lug nuts are tightened to the specified torque.

Tightening torque:
89—117 N·m {9—12 kgf·m, 65—86 ft·lbf}



Wheel and Tire Runout

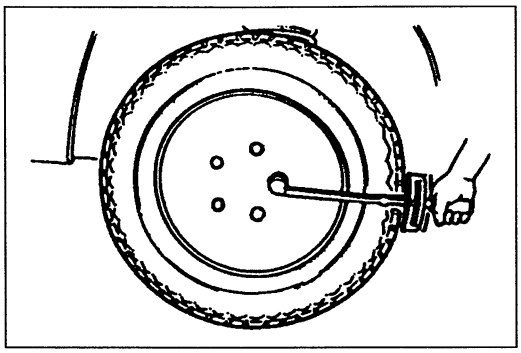
1. Jack up the vehicle and support it on safety stands.
2. Set the probe of a dial indicator against the wheel, and measure the runout through one full revolution.

Runout limit

mm {in}

Radial direction	1.5 {0.06}	
Lateral direction	2.5 {0.10} 2.0 {0.08}	Steel Aluminum

3. Replace the wheel if necessary.



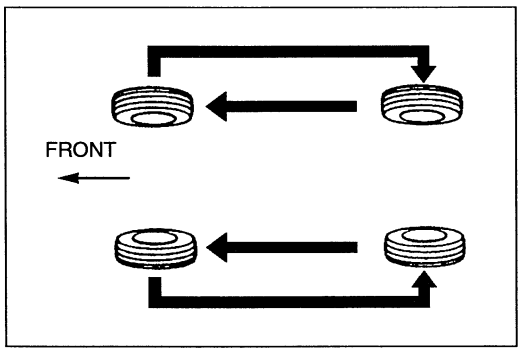
REMOVAL / INSTALLATION

Installation

1. The wheel-to-hub contact surfaces must be clean.
2. Tighten the lug nuts to the specified torque.

Tightening torque:
89—117 N·m {9—12 kgf·m, 65—86 ft·lbf}

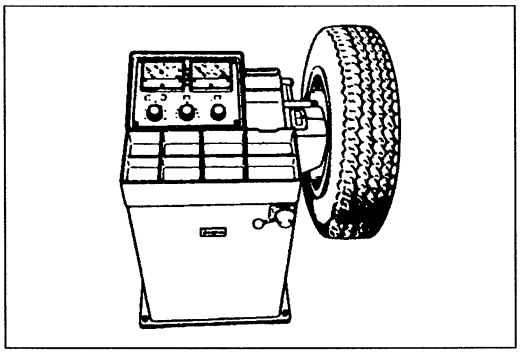
Caution
- **Retighten the lug nuts to the specified torque after about 1000 km {620 miles} of driving.**



TIRE ROTATION

To prolong tire life and assure uniform tire wear, rotate the tires as specified below. After rotating the tires, adjust each tire to the specified air pressure.
(Refer to page Q–2.)

U.S.A. : Every 6000 km {3750 miles}
Canada : Every 24000 km {15000 miles} or 15 months (whichever comes first)

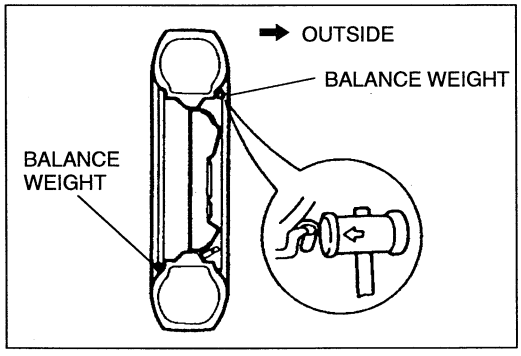


WHEEL BALANCE ADJUSTMENT

If a wheel becomes unbalanced or if a tire is replaced or repaired, the wheel must be rebalanced to within the specification.

Maximum unbalance (at rim edge)
14-inch wheel: 10 g {0.35 oz}
15-inch wheel: 9 g {0.32 oz}

Caution
- **Do not use more than two balance weights on the inner or outer side of the wheel.**
- **One balance weight; max. 60 g {2.1 oz}.**
- **If the total weight exceeds 100 g {3.5 oz} on one side, rebalance after moving the tire around on the rim.**
- **Attach the balance weights tightly to the wheel.**
- **Select suitable balance weights for steel or aluminum alloy wheels.**
- **Do not use an on-car balancer on automatic transaxle models; it may cause transaxle damage.**



Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

SUSPENSION

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FRONT WHEEL ALIGNMENT ..... **R– 7**
REAR WHEEL ALIGNMENT ..... **R– 9**
FRONT SUSPENSION (STRUT) **R–11**
PREPARATION **R–11**
FRONT SHOCK ABSORBER AND SPRING **R–13**
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FRONT STABILIZER **R–24**
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REAR SHOCK ABSORBER AND SPRING **R–31**
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LATERAL LINK AND TRAILING LINK **R–40**
REAR CROSSMEMBER **R–42**

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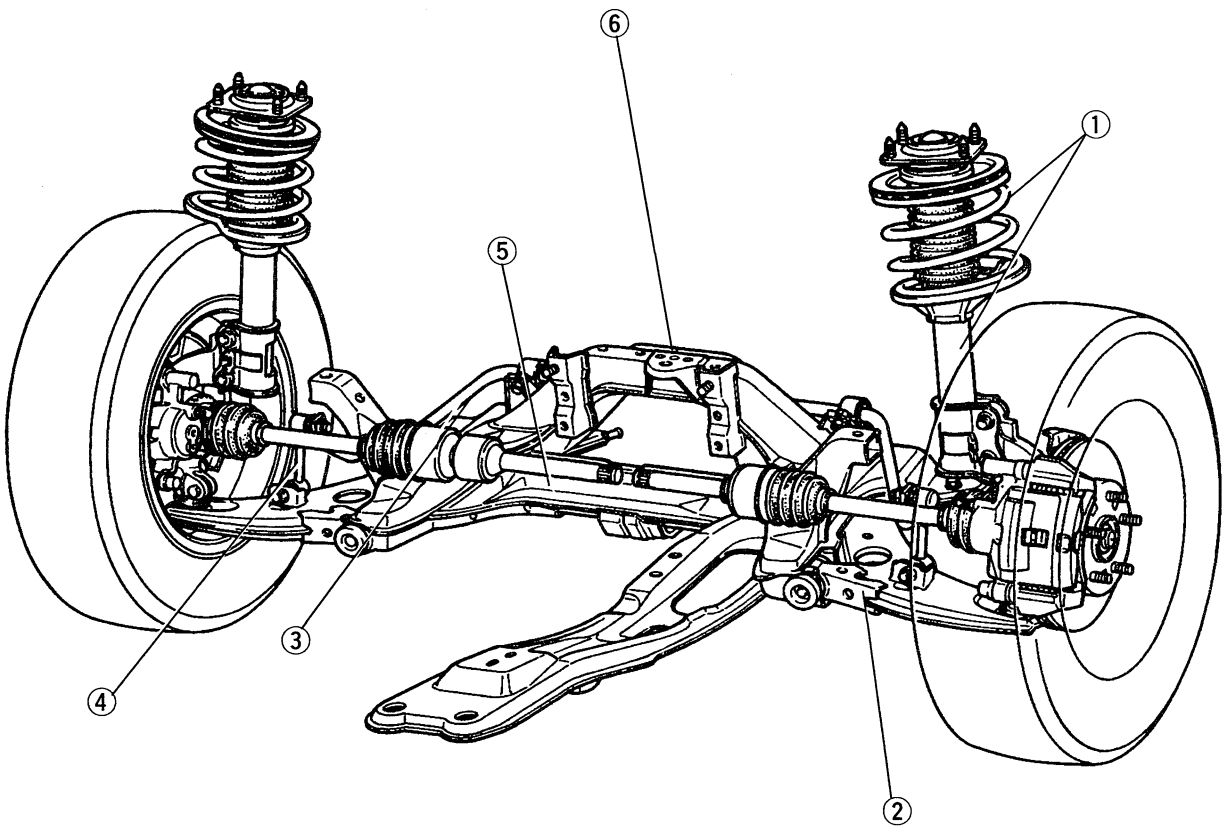
FRONT SUSPENSION



1. Front shock absorber and spring
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Disassembly / Inspection ..... page R–15
Assembly
When using SST
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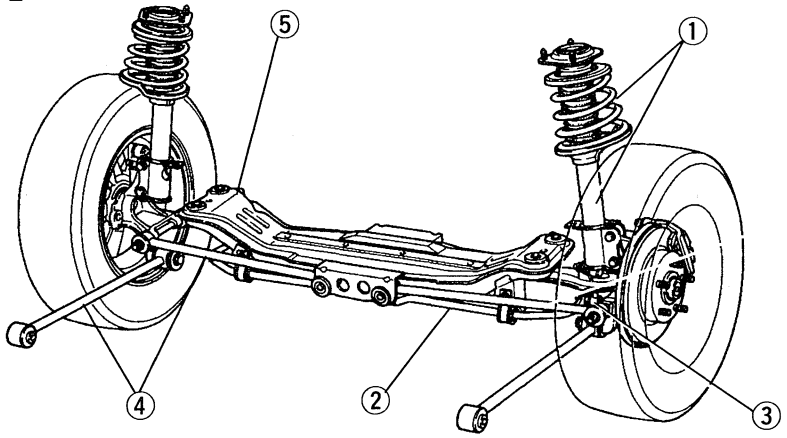
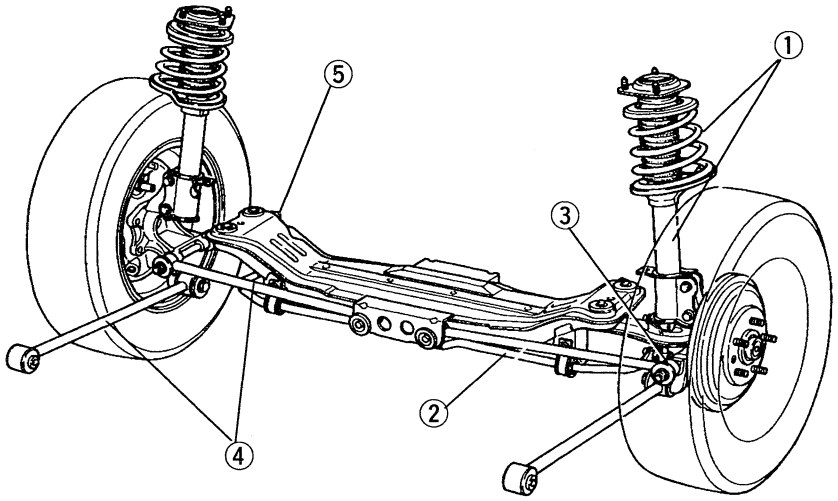
49 G034 1A0 ..... page R–19
2. Lower arm
Removal / Inspection / Installation ..... page R–22
3. Front stabilizer
Removal / Inspection / Installation ..... page R–24
4. Stabilizer control link
Removal / Inspection / Installation ..... page R–26
5. Transverse member
Removal / Inspection / Installation ..... page R–27
6. Front crossmember
Removal / Inspection / Installation ..... page R–28

REAR SUSPENSION

DISC BRAKE TYPE



DRUM BRAKE TYPE



1. Rear shock absorber and spring
   - Removal / Installation ..... page R–31
   - Disassembly / Inspection ..... page R–32
   - Assembly
   - When using SST
     - 49 T034 1A0 ..... page R–32
     - 49 G034 1A0 ..... page R–36
2. Rear stabilizer
   - Removal / Inspection / Installation ..... page R–38
3. Stabilizer control link
   - Removal / Inspection / Installation ..... page R–39
4. Lateral link and trailing link
   - Removal / Inspection / Installation ..... page R–40
5. Rear crossmember
   - Removal / Inspection / Installation ..... page R–42

OUTLINE

SPECIFICATIONS

Item \ Model				MX-6	626
Suspension type				Strut	
Shock absorber type			Front	Cylindrical, double-acting (oil-filled)	Cylindrical, double-acting, low-pressure gas charged
			Rear	Cylindrical, double-acting, low-pressure gas charged	
Coil spring	Type		Front	Straight wound	
			Rear	Taper wound	
	Dimension			See coil spring specification	
Stabilizer	Type			Torsion bar	
	Diameter mm {in}		Front	25.4 {1.00}	
			Rear	12 {0.47}	
Wheel alignment (Unladen)*1					
Front	Maximum steering angle		Inner	37° ± 2°	
			Outer	32° ± 2°	
	Total toe-in		mm {in}	3 ± 4 {0.12 ± 0.16}	3 ± 4 {0.12 ± 0.16}
			Degree	0°17' ± 0°23'	0°17' ± 0°23'
	Camber angle (Difference between left and right)		Degree	–0°43' ± 1° (1°30' max)	–0°36' ± 1° (1°30' max)
	Caster angle (Difference between left and right)		Degree	3°01' ± 1° (1°30' max)	2°37' ± 1° (1°30' max)
	SAI*2		Degree	15°25'	15°04'
Rear	Total toe-in		mm {in}	3 ± 4 {0.12 ± 0.16}	3 ± 4 {0.12 ± 0.16}
			Degree	0°17' ± 0°23'	0°17' ± 0°23'
	Camber angle (Difference between left and right)		Degree	–0°54' ± 1° (1°30' max)	–0°09' ± 1° (1°30' max)
	Thrust angle		Degree	0° ± 0°48'	0° ± 0°48'

*1 • Fuel tank full; radiator coolant and engine oil at specified level, and spare tire, jack and tools in designated position
• Adjust to the median when carrying out wheel alignment
*2 SAI: Steering Axis Inclination

Coil Spring Specifications

Item		Identification mark color		Wire diameter mm {in}	Coil outer diameter mm {in}	Free length mm {in}	No. of active coil
		M*1	A*2				
Front	A	Purple	—	13 {0.51}	175 {6.9}	293 {11.5}	2.74
	B	Light blue	—	13 {0.51}		301 {11.8}	2.94
	C	Orange	—	14 {0.55}		309 {12.2}	3.11
	D	Purple	White	13 {0.51}		345 {13.6}	3.52
	E	Light green	White	13 {0.51}		353 {13.9}	3.62
	F	Orange	White	14 {0.55}		355 {14.0}	3.69
	G	Yellow	White	14 {0.55}		349 {13.7}	3.63
	H	Pink	—	14 {0.55}		317 {12.5}	3.20
Rear	I	Blue	—	12 {0.47}	122—152 {4.8—6.0}	332 {13.1}	4.92
	J	Red	—	12 {0.47}		338 {13.3}	5.24
	K	Yellow	—	12 {0.47}		275 {10.8}	3.94
	L	Pink	—	12 {0.47}		279 {11.0}	4.08

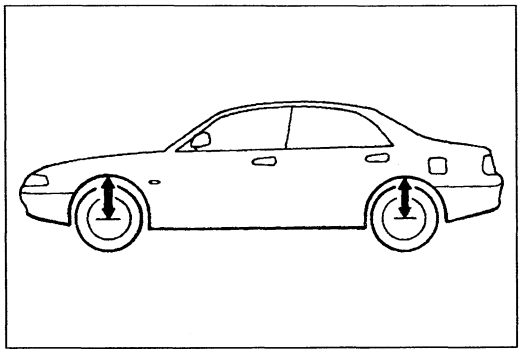
*1 Main identification mark color: lower side paint
*2 Auxiliary identification mark color: upper side paint

Coil Spring Applications

Model	Engine	Transaxle	Front	Rear right	Rear left
626	FS	MTX	D	I	J
	FS	ATX	E	I	J
	KL	MTX	F	I	J
	KL	ATX	G	I	J
MX-6	FS	MTX	A	K	L
	FS	ATX	B	K	L
	KL	MTX	C	K	L
	KL	ATX	H	K	L

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Body "rolls"	Weak stabillizer	Replace	R–24
	Damaged or worn stabilizer bushing or control link	Replace	R–24, 26
	Worn or deteriorated lower arm bushing	Replace	R–21
	Malfunction of shock absorber	Replace	R–13, 31
Poor riding comfort	Weakened coil spring	Replace	R–15, 32
	Malfunction of shock absorber	Replace	R–13, 31
Body leans	Weakened coil spring	Replace	R–15, 32
	Damaged or worn stabilizer bushing or control link	Replace	R–24, 26
	Worn or deteriorated lower arm bushing	Replace	—
Abnormal noise from suspension system	Poor lubrication or wear of thrust bearing	Replace	R–13
	Poor lubrication or wear of lower arm ball joint	Lubricate or replace	R–21
	Looseness of peripheral connections	Tighten	—
	Malfunction of shock absorber	Replace	R–13, 31
	Damaged or worn stabilizer, control link or stabilizer bracket	Replace	R–24, 26
	Worn or deteriorated lower arm bushing	Replace	R–21
General driving instability	Weakened coil spring	Replace	R–15, 32
	Malfunction of shock absorber	Replace	R–13, 31
	Worn or deteriorated lower arm bushing	Replace	R–21
	Damaged or worn stabilizer bushing or control link	Replace	R–24, 26
	Improperly adjusted wheel alignment	Adjust	R– 7
	Damaged lower arm ball joint	Replace	R–21
	Malfunction of steering system	—	section N
	Damaged or unbalanced wheel(s)	—	section Q
Heavy steering	Poor lubrication or wear of lower arm ball joint	Lubricate or replace	R–21
	Improperly adjusted wheel alignment	Adjust	R– 7
	Malfunction of steering system	—	section N
	Damaged or unbalanced wheel(s)	—	section Q
Steering wheel pulls to one side	Weakened coil spring	Replace	R–15, 32
	Damaged or worn stabilizer bushing or control link	Replace	R–24, 26
	Worn or deteriorated lower arm bushing	Replace	R–21
	Damaged lower arm ball joint	Replace	R–21
	Improperly adjusted wheel alignment	Adjust	R– 7
	Malfunction of steering system	—	section N
	Malfunction of braking system	—	section P
	Damaged or unbalanced wheel(s)	—	section Q
"Shimmy" occurs (steering wheel vibrates circumferentially)	Damaged lower arm ball joint	Replace	R–21
	Malfunction of shock absorber	Replace	R–13, 31
	Loose shock absorber mounting	Tighten	R–13, 31
	Worn or deteriorated lower arm bushing	Replace	R–21
	Damaged or worn stabilizer bushing or control link	Replace	R–24, 26
	Damaged or leaking lower arm bushing (rear)	Replace	R–21
	Improperly adjusted wheel alignment	Adjust	R– 7
	Damaged or worn wheel bearing	Replace	section M
	Malfunction of steering system	—	section N
	Damaged or unbalanced wheel(s)	—	section Q
Steering wheel doesn't return properly	Stuck or damaged lower arm ball joint	Replace	R–21
	Improperly adjusted wheel alignment	Adjust	R– 7
	Malfunction of steering system	—	section N
	Damaged or unbalanced wheel(s)	—	section Q



WHEEL ALIGNMENT

PREINSPECTION

1. Check the tire inflations and set to the recommended pressure if necessary.
2. Inspect the front wheel bearing play. Replace the bearing if necessary.
3. Inspect the wheel and tire runout.
4. Inspect the ball joints and steering linkage for excessive looseness.
5. Position the vehicle on level ground and with 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 10 mm {0.39 in}.
7. Shake the vehicle to check operation of the shock absorbers.

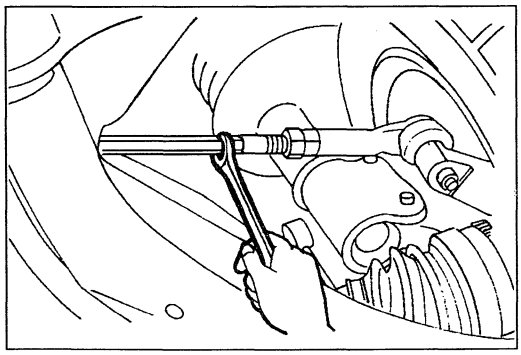
FRONT WHEEL ALIGNMENT
Specifications (Unladen)*1
626

Fuel gauge indication		Empty	1/4	1/2	3/4	Full
Maximum steering angle	Inner	37° ± 2°				
	Outer	32° ± 2°				
Total toe-in	mm {in}	4 ± 4 {0.16 ± 0.16}			3 ± 4 {0.12 ± 0.16}	
	Degree	0°23' ± 0°23'			0°17' ± 0°23'	
Camber angle*2		–0°35' ± 1°			–0°36' ± 1°	
Caster angle*2		FS: 2°25' ± 1° KL: 2°26' ± 1°	FS: 2°27' ± 1° KL: 2°28' ± 1°	FS: 2°31' ± 1° KL: 2°32' ± 1°	2°34' ± 1°	2°37' ± 1°
SAI*3		15°04'				

MX-6

Fuel gauge indication		Empty	1/4	1/2	3/4	Full
Maximum steering angle	Inner	37° ± 2°				
	Outer	32° ± 2°				
Total toe-in	mm {in}	4 ± 4 {0.16 ± 0.16}		3 ± 4 {0.12 ± 0.16}		
	Degree	0°23' ± 0°23'		0°17' ± 0°23'		
Camber angle*2		–0°42' ± 1°			–0°43' ± 1°	
Caster angle		2°52' ± 1°	2°54' ± 1°	2°56' ± 1°	2°59' ± 1°	3°01' ± 1°
SAI*3		15°25'				

*1 Radiator coolant and engine oil at specified levels; spare tire, jack, and tools in designated positions. Adjust to the median when carrying out wheel alignment.
*2 Difference between left and right must not exceed 1.5°.
*3 SAI: Steering axis inclination

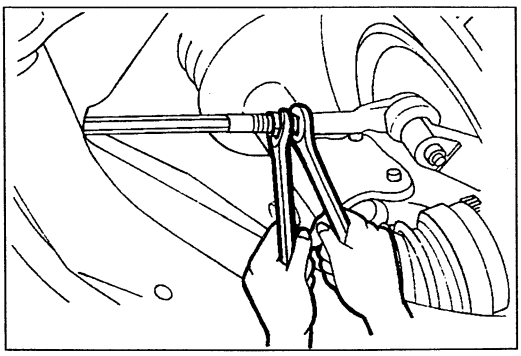


Adjustment
Total toe-in

1. Remove the steering gear boot clamps.
2. Loosen the left and right tie rod locknuts, and turn the tie rods equally. Both tie rods are right threaded, so turning the right tie rod toward the front of the vehicle and the left toward the rear increases toe-in.

Note

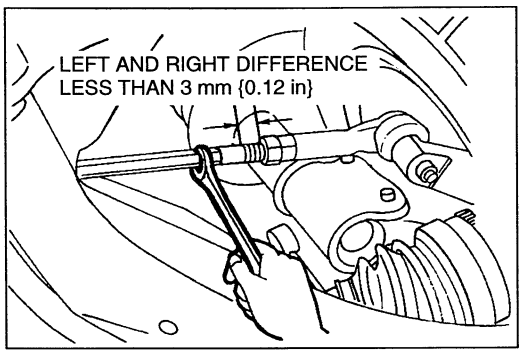
- Turning both tie rods one complete turn changes toe-in by about 6 mm {0.24 in}.



3. Tighten the tie rod locknuts.

Tightening torque:
69—98 N·m {7.0—10.0 kgf·m, 51—72.3 ft·lbf}

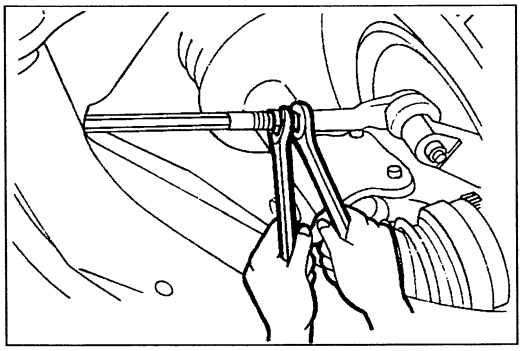
4. Verify that the boots are not twisted and install the boot clamps.



Maximum steering angle

1. Remove the steering gear boot clamps.
2. Loosen the left and right tie rod locknuts, and turn the tie rods equally to provide the correct maximum steering angle.

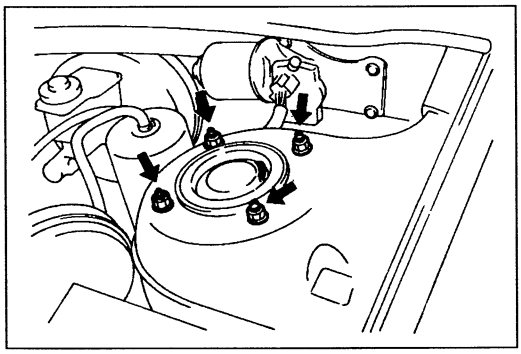
Maximum left/right difference: 3 mm {0.12 in}



3. Tighten the tie rod locknuts.

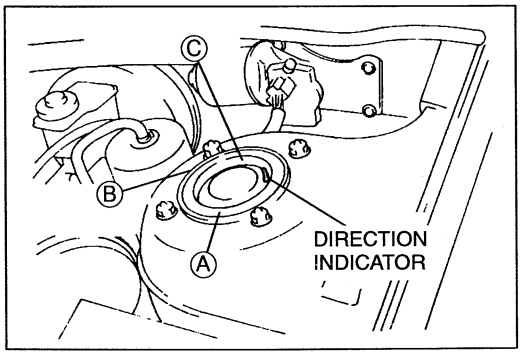
Tightening torque:
69—98 N·m {7.0—10.0 kgf·m, 51—72.3 ft·lbf}

4. Verify that the boots are not twisted and install the boot clamps.
5. Inspect and adjust the toe-in after adjusting the turning angle.

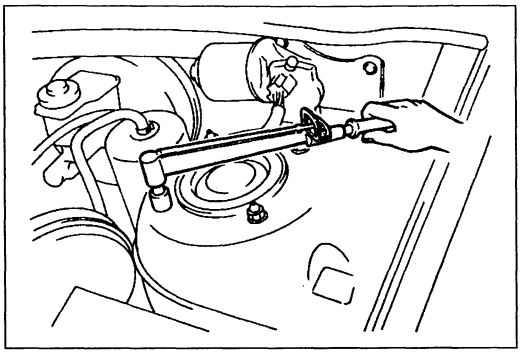


Camber and caster

1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the mounting block nuts.
3. Push the mounting block downward, and turn it to the desired position.



Mark	Difference from standard position	
	Camber angle	Caster angle
A	0°	+30'
B	+30'	+30'
C	+30'	0°



4. Install and tighten the mounting nuts to the specified torque.

Tightening torque:
47—62 N·m {4.7—6.4 kgf·m, 33—46 ft·lbf}

REAR WHEEL ALIGNMENT
Specifications (Unladen)*1
626

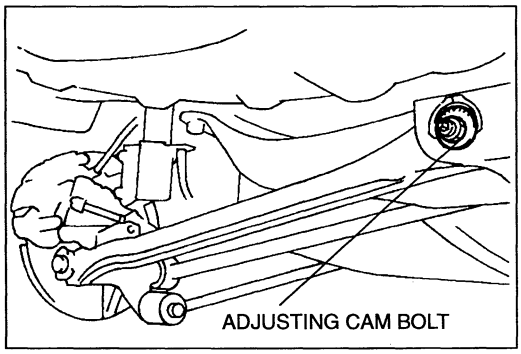
Fuel gauge indication		Empty	1/4	1/2	3/4	Full
Total toe-in	mm {in}	2 ± 4 {0.08 ± 0.16}		3 ± 4 {0.12 ± 0.16}		
	Degree	0°12' ± 0°23'		0°17' ± 0°23'		
Camber angle*2		–0°02' ± 1°	–0°04' ± 1°	–0°06' ± 1°	–0°07' ± 1°	–0°09' ± 1°
Thrust angle		0° ± 0°48'				

MX-6

Fuel gauge indication		Empty	1/4	1/2	3/4	Full
Total toe-in	mm {in}	2 ± 4 {0.08 ± 0.16}	3 ± 4 {0.12 ± 0.16}			
	Degree	0°12' ± 0°23'	0°17' ± 0°23'			
Camber angle*2		–0°51' ± 1°		–0°53' ± 1°		–0°54' ± 1°
Thrust angle		0° ± 0°48'				

*1 Radiator coolant and engine oil at specified levels; spare tire, jack, and tools in designated positions. Adjust to the median when carrying out wheel alignment.
*2 Difference between left and right must not exceed 1.5°.

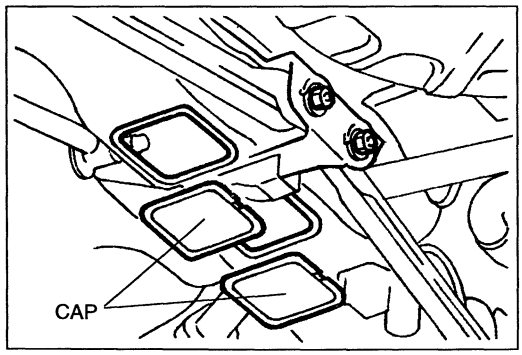
R



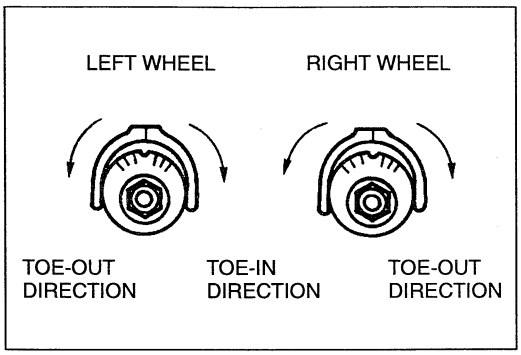
Adjustment
Total toe-in

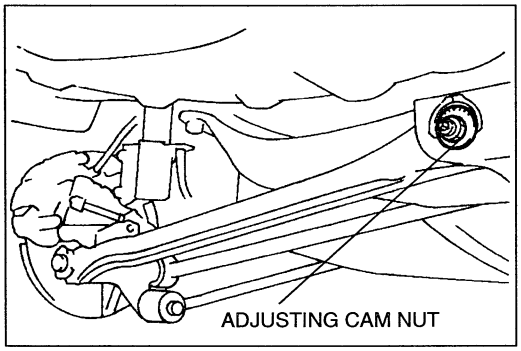
The thrust angle can only be measured with 4-wheel alignment tester. If the thrust angle is not within specification, check the body dimensions.
(Refer to the 626/MX–6 Bodyshop Manual)

Thrust angle: 0° ± 0°48'



1. Remove the access hole caps.





2. Loosen the cam nut on the lateral link.
3. Turn the adjusting cam bolt as indicated to adjust the toe-in.

	Left wheel	Right wheel
Toe-out direction	Counterclockwise	Clockwise
Toe-in direction	Clockwise	Counterclockwise

Note
- Turning the adjusting cam bolt one graduation changes the toe-in about 3.2 mm {0.13 in} (0°18').

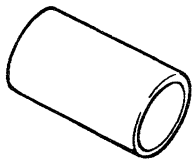
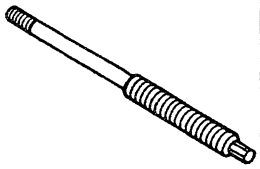
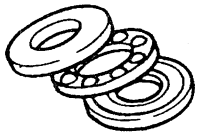
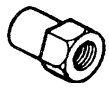
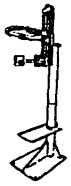
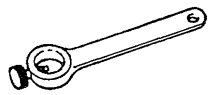
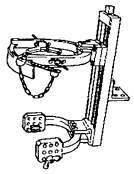
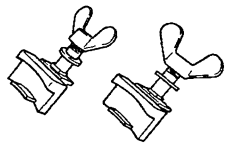
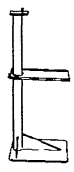
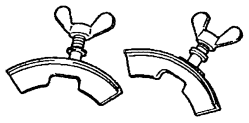
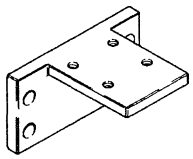
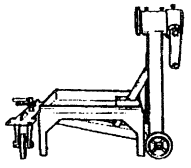
4. Tighten the cam nut.

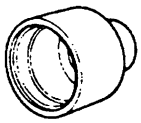
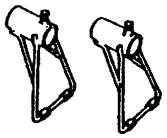
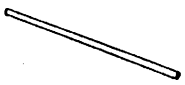
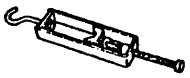
Tightening torque:
79—116 N·m {8.0—11.9 kgf·m, 58—86.0 ft·lbf}

5. Install the caps.

FRONT SUSPENSION (STRUT)

PREPARATION
SST

49 B034 2A0A Replacer, rubber bushing 	For removal / installation of lower arm bushing	49 B034 202 Support block (Part of 49 B034 2A0A) 	For removal of lower arm bushing
49 B034 203 Guide (Part of 49 B034 2A0A) 	For installation of lower arm bushing	49 B034 204A Attachment (Part of 49 B034 2A0A) 	For removal / installation of lower arm bushing
49 B034 205A Replacer (Part of 49 B034 2A0A) 	For installation of lower arm bushing	49 B034 206 Shaft (Part of 49 B034 2A0A) 	For removal / installation of lower arm bushing
49 G034 205 Bearing (Part of 49 B034 2A0A) 	For removal / installation of lower arm	49 W038 002 Nut (Part of 49 B034 2A0A) 	For removal / installation of lower arm
49 T034 1A0 Coil spring compressor set 	For removal / installation of coil spring	49 0180 510B Attachment, steering worm bearing preload measuring 	For measurement of ball joint preload
49 T034 101 Spring compressor (Part of 49 T034 1A0) 	For removal / installation of coil spring	49 T034 103 Hook (Part of 49 T034 1A0) 	For removal / installation of coil spring
49 T034 102 Stand (Part of 49 T034 1A0) 	For removal / installation of coil spring	49 T034 104 Support (Part of 49 T034 1A0) 	For removal / installation of coil spring
49 T034 105 Attachment (with engine stand) 	For removal / installation of coil spring	49 0107 680A Engine stand 	For removal / installation of coil spring

49 G034 1A0 Coil spring compressor 	For removal / installation of coil spring	49 G034 101 Body (Part of 49 G034 1A0) 	For removal / installation of coil spring
49 G034 102 Screw (Part of 49 G034 1A0) 	For removal / installation of coil spring	49 G034 103 Arm (Part of 49 G034 1A0) 	For removal / installation of coil spring
49 8038 785 Installer, boot 	For installation of ball joint dust boot	49 G017 5A0 Support, engine 	For support of engine
49 G017 502 Support (Part of 49 G017 5A0) 	For support of engine	49 G017 501 Bar (Part of 49 G017 5A0) 	For support of engine
49 G017 503 Hook (Part of 49 G017 5A0) 	For support of engine	—	—

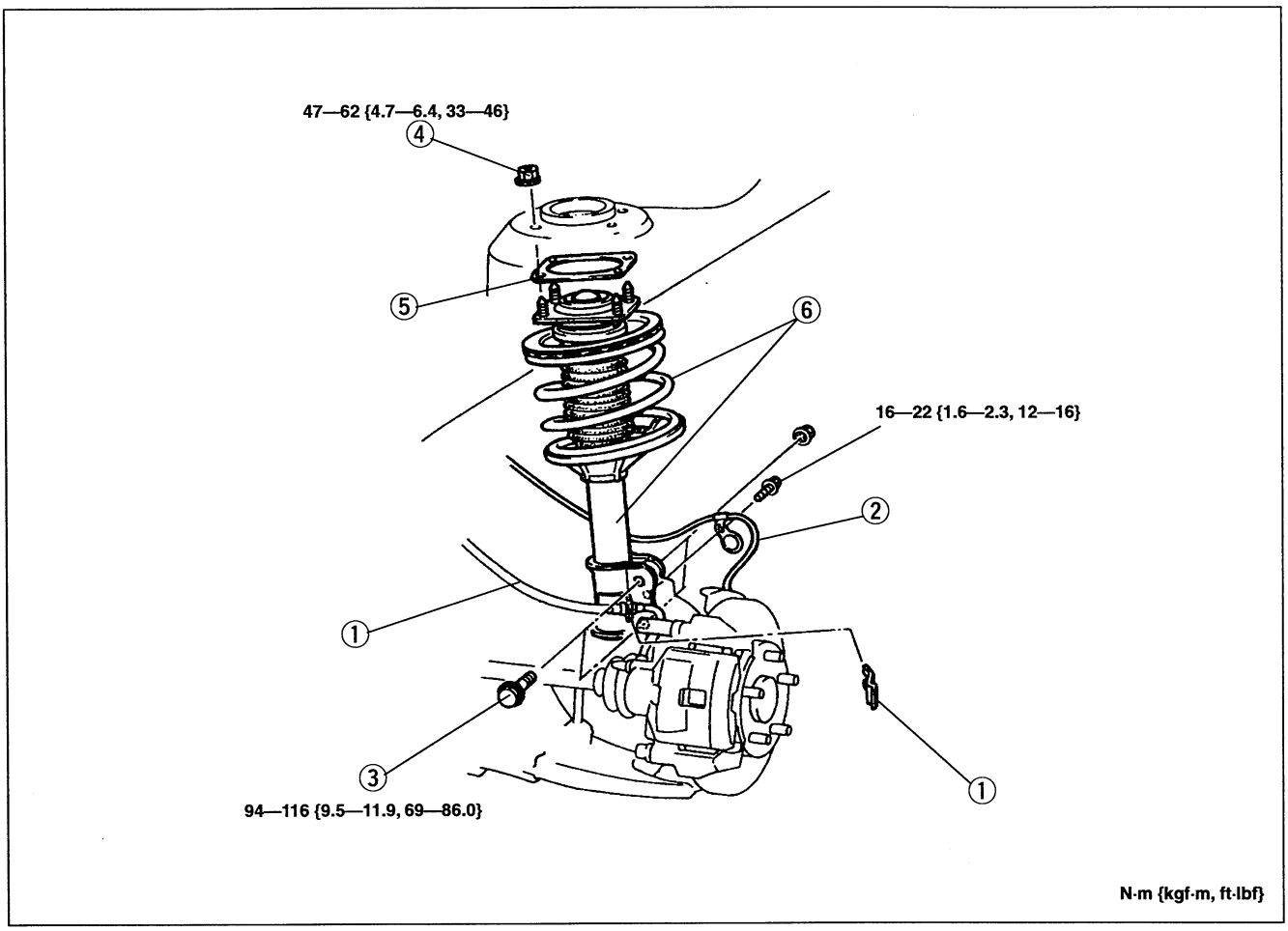
FRONT SHOCK ABSORBER AND SPRING

Removal / Installation

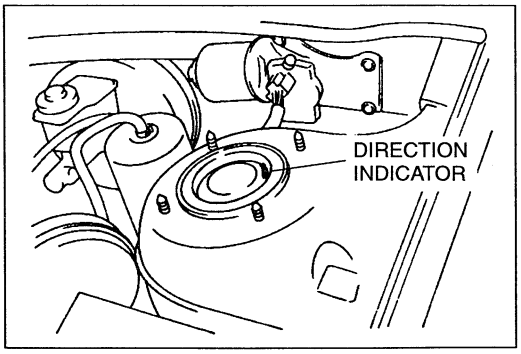
1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the wheels.
3. Remove in the order shown in the figure.
4. Inspect all parts and repair or replace as necessary.
5. Install in the reverse order of removal, referring to **Installation Note**.
6. Tighten all nuts and bolts to the specified torques, referring to the figure.
7. Install the wheels.

Tightening torque: 89—117 N·m {9.0—12.0 kgf·m, 66—86.7 ft·lbf}

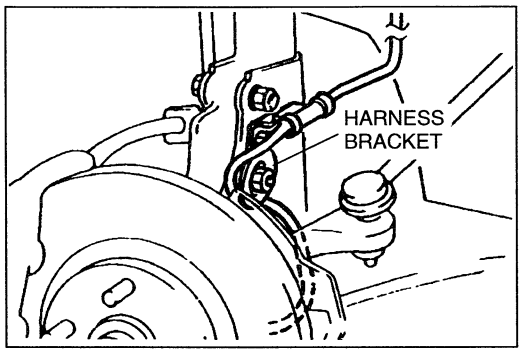
8. Adjust the front wheel alignment. (Refer to page R–7.)



1. Hose clip and flexible hose
2. ABS wheel-speed sensor harness
   Installation Note ..... page R–14
3. Shock absorber bolt
4. Nut
5. Sheet
6. Front shock absorber and spring
   Installation Note ..... page R–14
   Disassembly / Inspection ..... page R–15
   Assembly ..... page R–16 or R–19



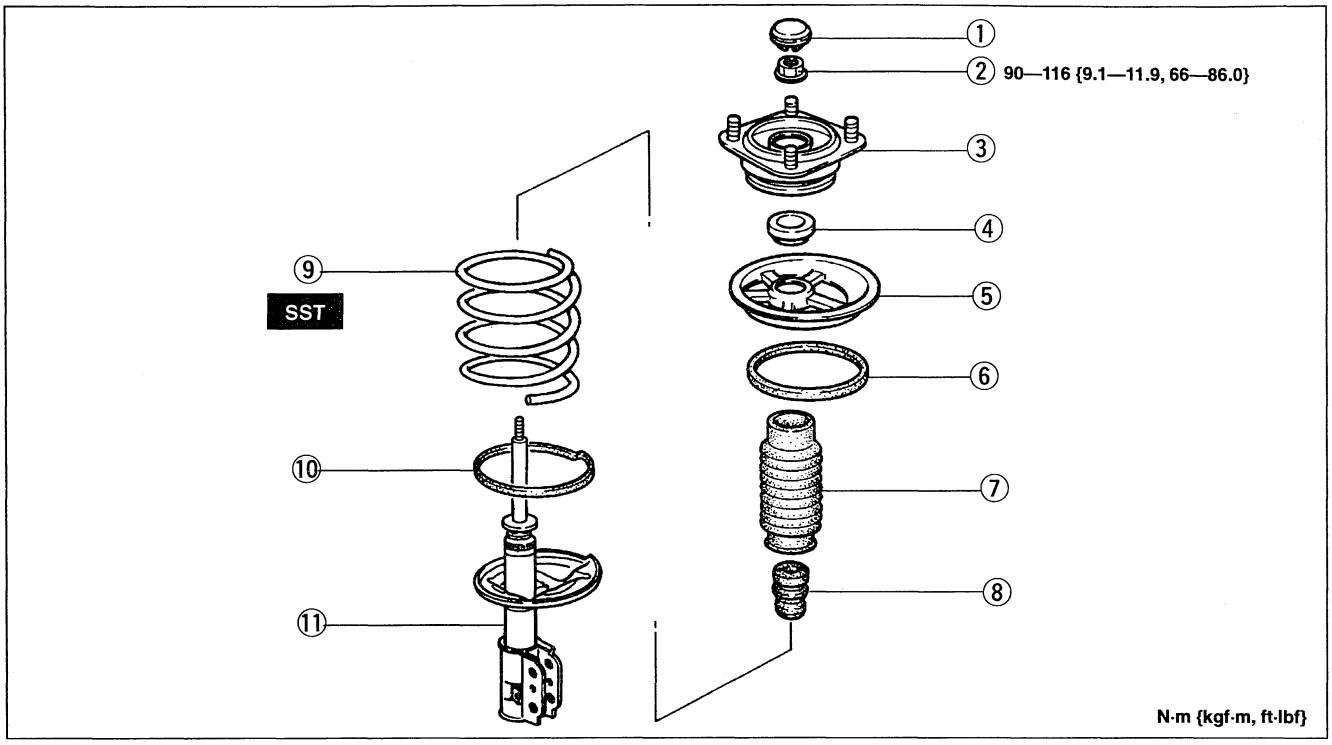
Installation note
Front shock absorber and spring
Face the mounting block direction indicator toward the rear outboard position, and install the shock absorber.



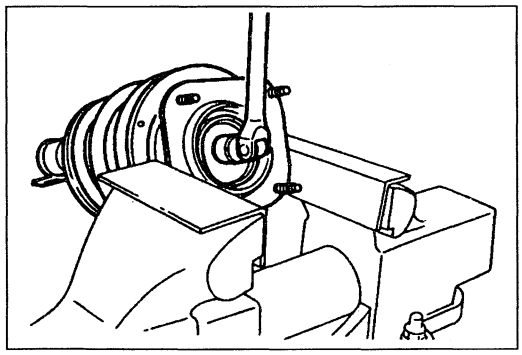
ABS wheel-speed sensor harness
Install the sensor harness bracket in the direction shown.

Disassembly / Inspection

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and replace as necessary.



1. Cap
2. Piston rod nut
   Disassembly Note
   When using SST
   49 T034 1A0 ..... below
   49 G034 1A0 ..... page R–19
3. Mounting rubber
   Inspect for damage, deterioration, and weakness
4. Thrust bearing
   Inspect for damage, wear, and poor lubrication
5. Upper spring seat
6. Upper rubber spring seat
   Inspect for damage and deterioration
7. Dust cover
   Inspect for damage and deterioration
8. Bound stopper
   Inspect for damage and cracks
9. Coil spring
   Inspect for damage, deterioration, and weakness
10. Lower rubber spring seat
    Inspect for damage and cracks
11. Shock absorber
    Inspection ..... page R–16



When using SST 49 T034 1A0
Disassembly note
Piston rod nut

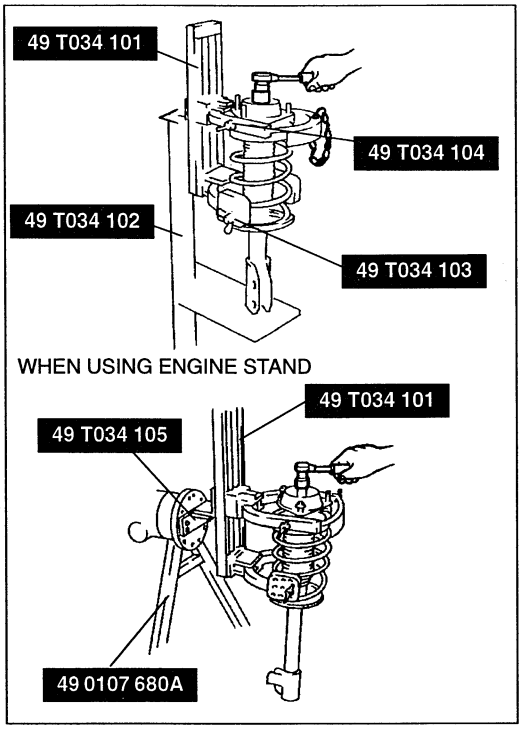
Warning

- **Removing the piston rod nut is dangerous. The shock absorber and spring could fly off under tremendous pressure and cause serious injury or death. Secure the shock absorber in the SST before removing the piston rod nut.**

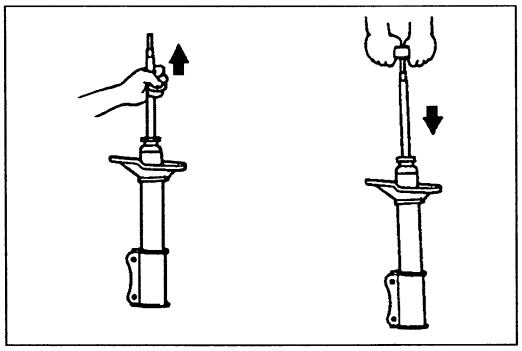
Caution

- **To prevent damage to the mounting rubber, use protective plates in the vise jaws.**

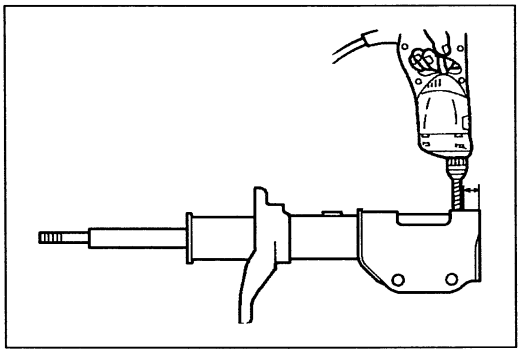
1. Secure the mounting rubber in a vise.
2. Loosen the nut several turns, but do not remove it.



3. Assemble the **SST**.
4. Secure the shock absorber in the **SST**.
5. Compress the coil spring by using the **SST** and remove the nut.



Inspection
Shock absorber
Check the following and replace if necessary.
1. Inspect for damage and oil leakage.
2. Secure a handle to the piston rod, and compress and expand the shock piston at least three times. Verify that the operational force does not change and that there is no unusual noise.

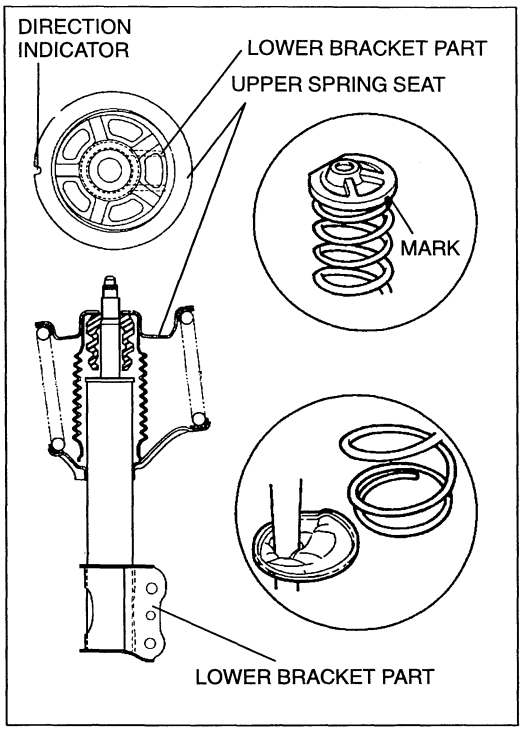


Disposal of shock absorber (626)

Warning
- **The gas in the shock absorber is pressurized, and could spray metal chips into the eyes and face when drilling. Whenever drilling into a shock absorber, wear protective eye wear.**

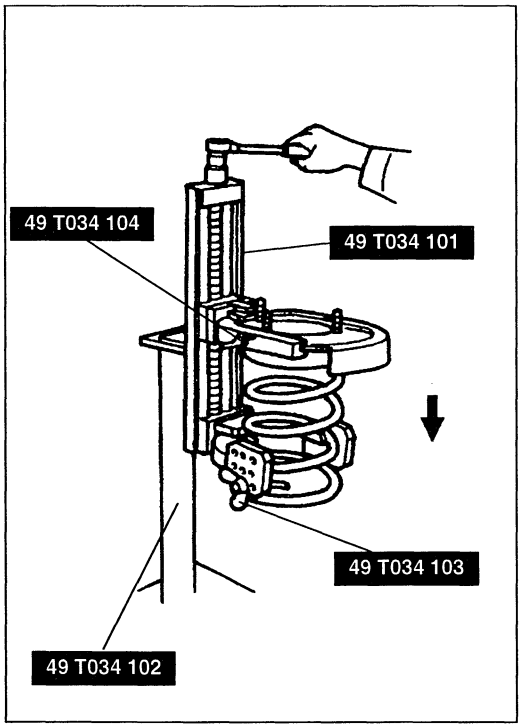
1. Clamp a shock absorber flat or with the piston downwards.
2. Drill the 2—3 mm {0.08—0.12 in} hole at a point of 20—30 mm {0.08—0.12 in} from the bottom of the tube, so that the gas can escape.
3. Turn the hole downwards.
4. The oil can be collected by moving the piston rod several times up and down and cutting the tube at the end.
5. Dispose of waste oil according to the waste disposal law.

Note
- Shock absorber gas is nitrogen gas.
- Shock absorber oil is mineral oil.

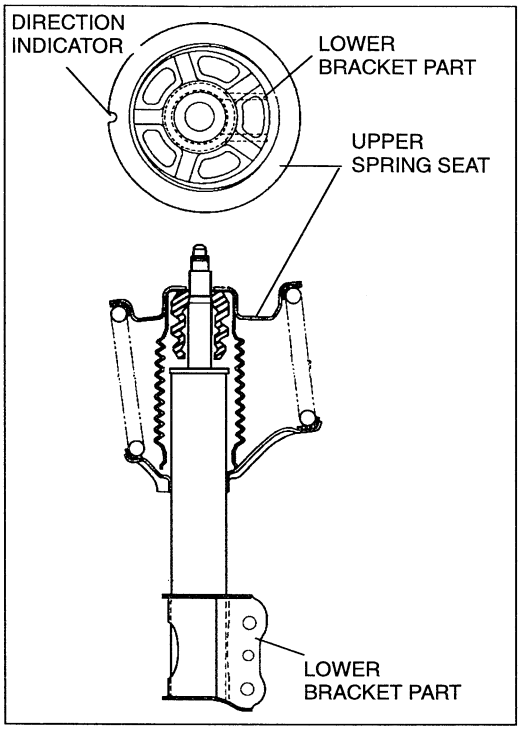


Assembly

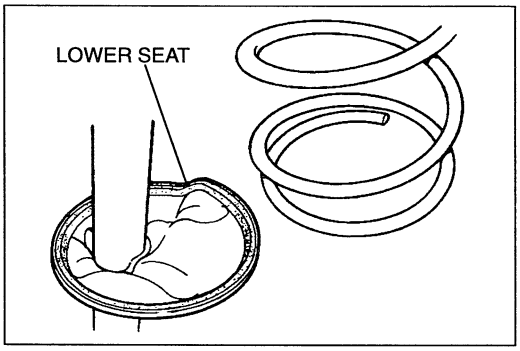
1. Temporarily assemble the upper rubber spring seat, the upper spring seat and coil spring to the shock absorber, as shown.
2. Mark the upper rubber spring seat, the upper spring seat and coil spring for proper reassembly.



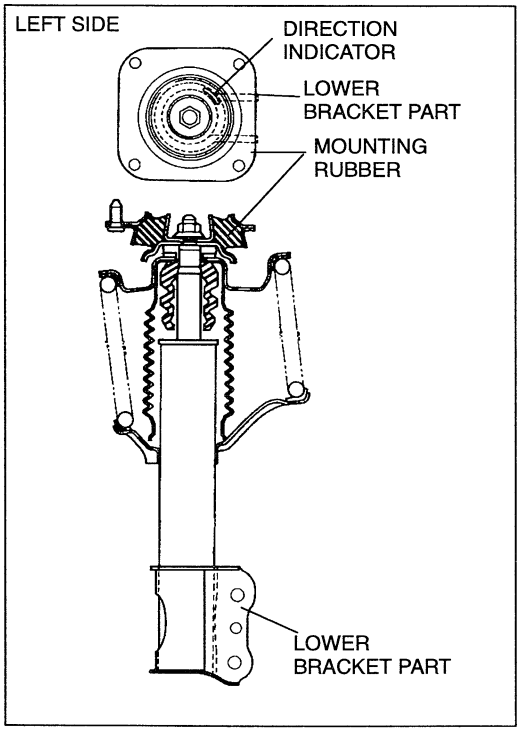
3. Align the marks of the upper spring seat and coil spring. Protect the upper spring seat and the coil spring with a piece of cloth; then assemble the **SST**.
4. Use the **SST** to compress the spring.



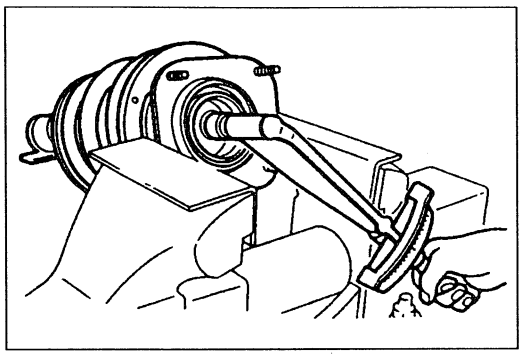
5. Install the bound stopper.
6. Install the dust cover.
7. Install the lower rubber spring seat.



8. Install the shock absorber, fitting the end of the coil into the step of the lower seat.



9. Install the thrust bearing.
10. Install the mounting rubber, facing the direction indicator as shown.
11. Tighten the nut several turns.
12. Remove the **SST**.
13. Verify that the lower coil of the spring is seated on the step of the lower seat.

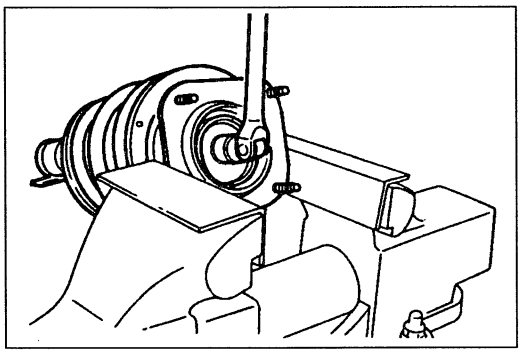


Caution
- **To prevent damage to the mounting rubber, use protective plates in the jaws of the vise.**

14. Secure the mounting rubber in a vise.
15. Tighten the nut.

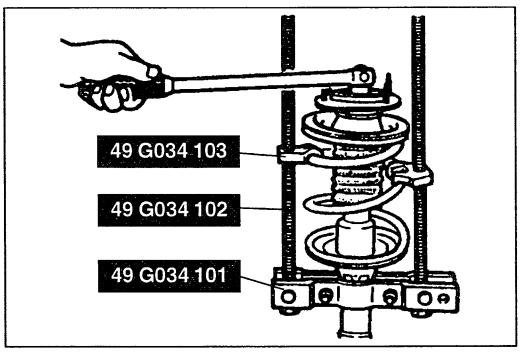
Tightening torque:
90—116 N·m {9.1—11.9 kgf·m, 66—86.0 ft·lbf}

16. Install the cap.



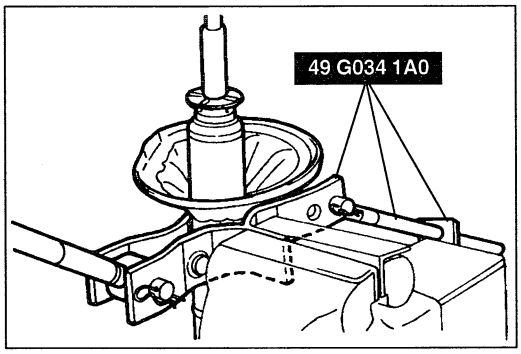
When using SST 49 G034 1A0
Disassembly note
Piston rod nut

Warning
- **Removing the piston rod nut is dangerous. The shock absorber and spring could fly off under tremendous pressure and cause serious injury or death.**
  Secure the shock absorber in the SST before removing the piston rod nut.

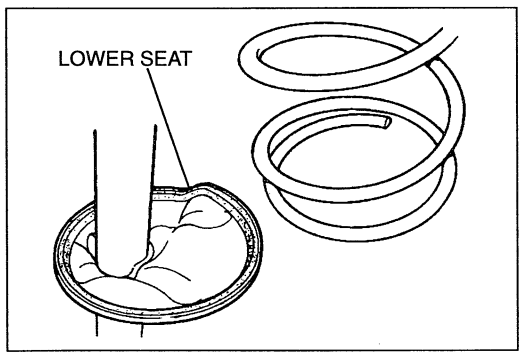


Caution
- **Do not remove the nut.**
- **To prevent damage to the mounting rubber, use protective plates in the vise jaws.**

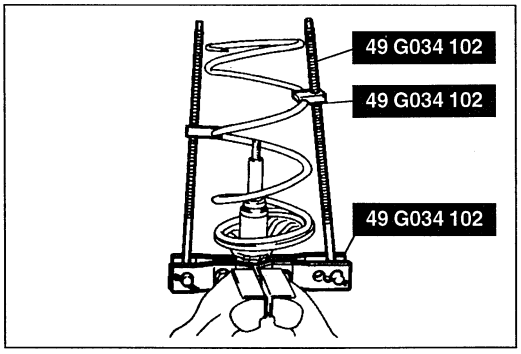
1. Secure the mounting rubber in a vise.
2. Loosen the nut several turns, but do not remove it.
3. Assemble the **SST**.
4. Secure the shock absorber in the **SST**.
5. Compress the coil spring by using the **SST** and remove the nut.



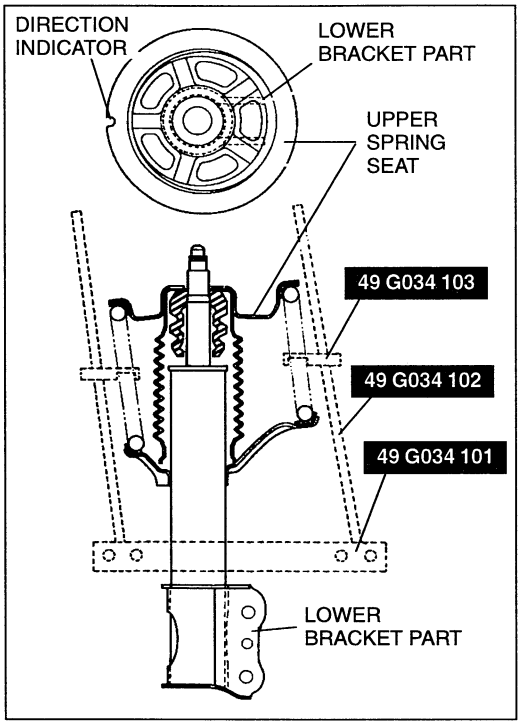
Assembly
1. Assemble the **SST**, and secure the **SST** in a vise.
2. Install the lower rubber spring seat.



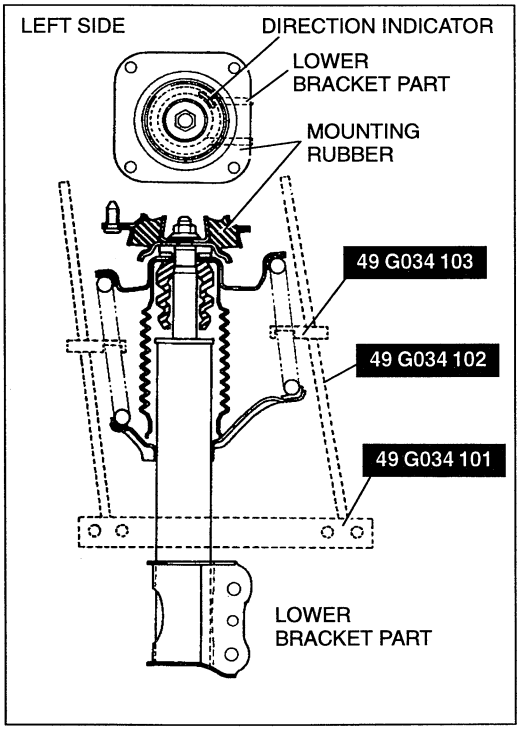
3. Install the coil spring, fitting the end of the coil into the step of the lower seat.



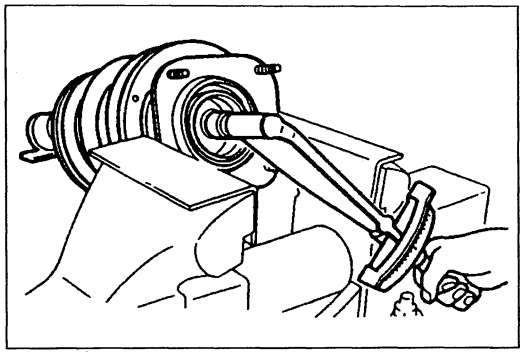
4. Compress the coil spring by using the **SST**.
5. Install the spring so that the lower coil is seated on the step of the lower seat.



6. Install the bound stopper.
7. Install the dust cover.
8. Install the upper rubber spring seat.
9. Install the upper spring seat, facing the direction indicator as shown.



10. Install the thrust bearing.
11. Install the mounting rubber, facing the direction indicator as shown.
12. Tighten the nut several turns.
13. Remove the **SST**.
14. Verify that the lower coil of the spring is seated on the step of the lower seat.



Caution
- **To prevent damage to the mounting rubber, use protective plates in the jaws of the vise.**

15. Secure the mounting rubber in a vise.
16. Tighten the nut.

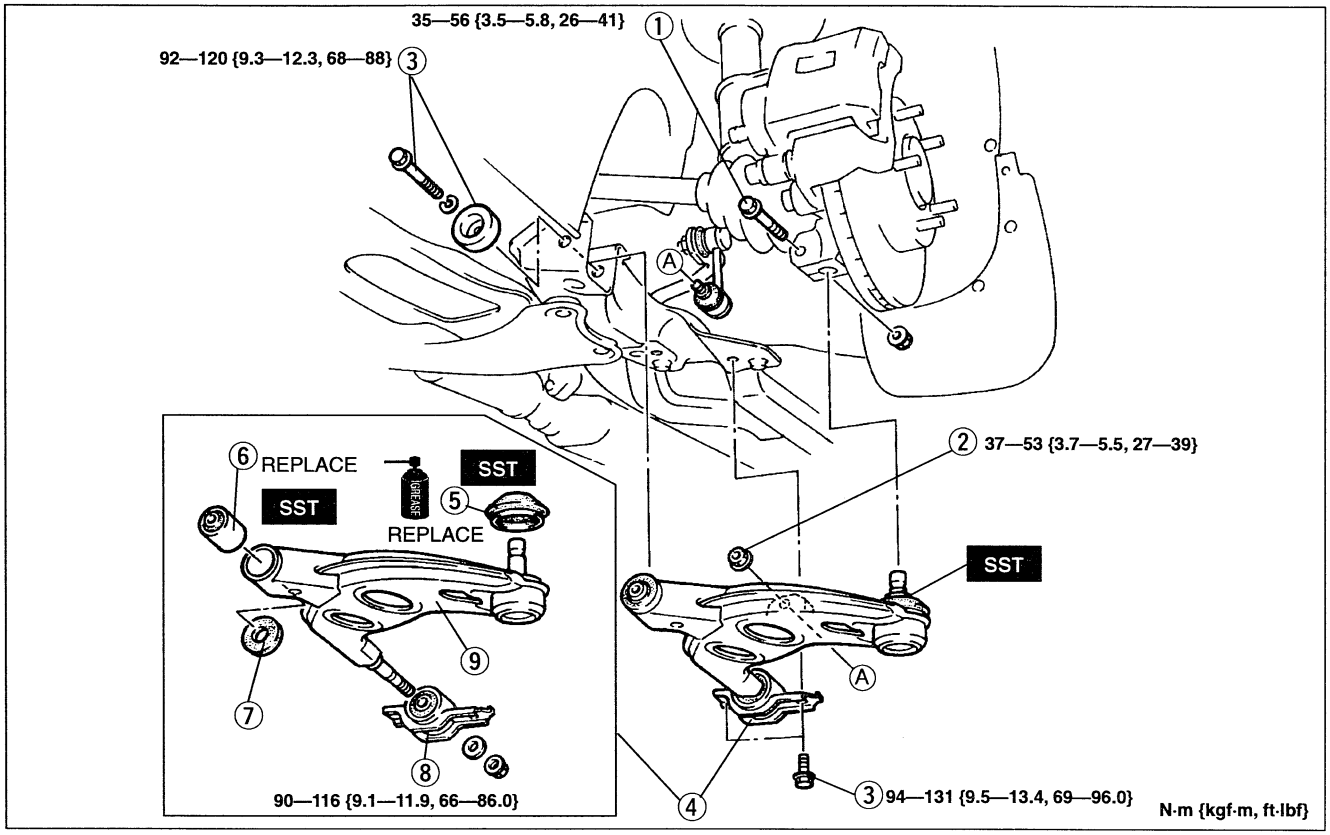
    Tightening torque:
    90—116 N·m {9.1—11.9 kgf·m, 66—86.0 ft·lbf}

17. Install the cap.

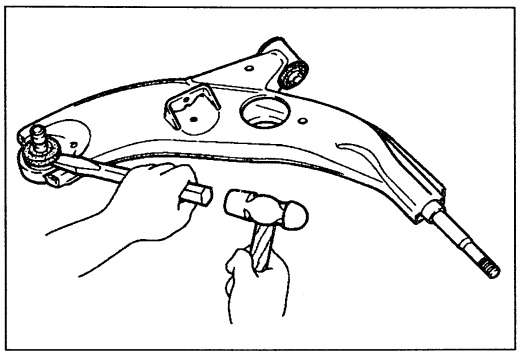
LOWER ARM

Removal / Inspection / Installation

1. Jack up the front of the vehicle and support it on safety stands.
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**.
5. Tighten the lower arm bolts to just under the specified torque. Tighten all other nuts and bolts to the specified torque.
6. Lower the vehicle.
7. With the vehicle unloaded, tighten the lower arm bolts.



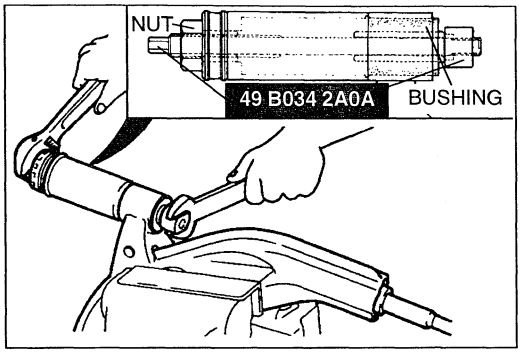
1. Bolt (Lower arm ball joint)
2. Nut (Stabilizer control link)
3. Bolt, and dynamic damper
4. Lower arm assembly
   Inspection ..... page R–23
5. Dust boot
   Removal Note ..... below
   Installation Note ..... page R–23
6. Lower arm bushing (front)
   Removal Note ..... page R–23
   Installation Note ..... page R–23
7. Stopper
   Inspect for damage and deterioration
8. Lower arm bushing (rear)
   Inspect for damage, oil leakage, and deterioration
9. Lower arm



Removal note

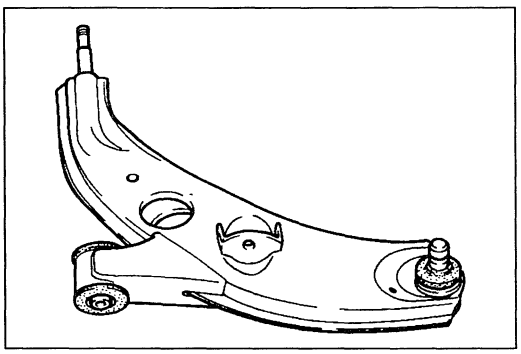
Dust boot

Carefully remove the dust boot with a chisel.



Lower arm bushing (front)

1. Cut away the projecting rubber of the lower arm bushing.
2. Set the **SST** onto the lower arm, and remove the bushing.

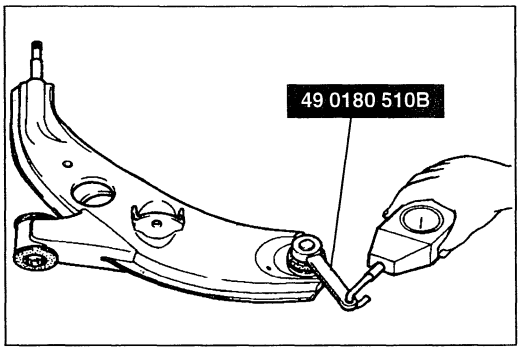


Inspection

Lower arm assembly

Inspect all parts and repair or replace as necessary.

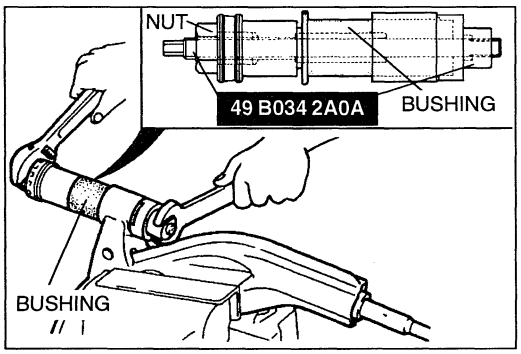
1. Lower arm for damage and cracks
2. Bushings for deterioration and wear
3. Dust boot for damage
4. Ball joint for looseness and damage
   If the ball joint needs to be replaced, replace the lower arm.



5. Ball joint preload
   Move the ball joint back and forth 5 or 6 times, then attach the **SST** to the ball stud, and measure the preload with a pull scale.

   Ball joint preload:
   1.0—4.9 N·m {10—50 kgf·cm, 8.6—43 in·lbf}

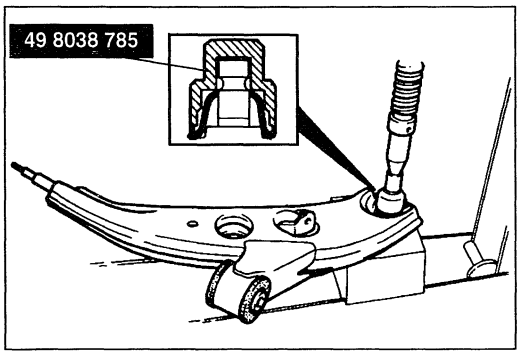
   Pull scale reading:
   9.8—49 N {1.0—5.0 kgf, 2.2—11.0 lbf}



Installation note

Lower arm bushing (front)

Install the new bushing, and pull it into the lower arm by using the **SST**.



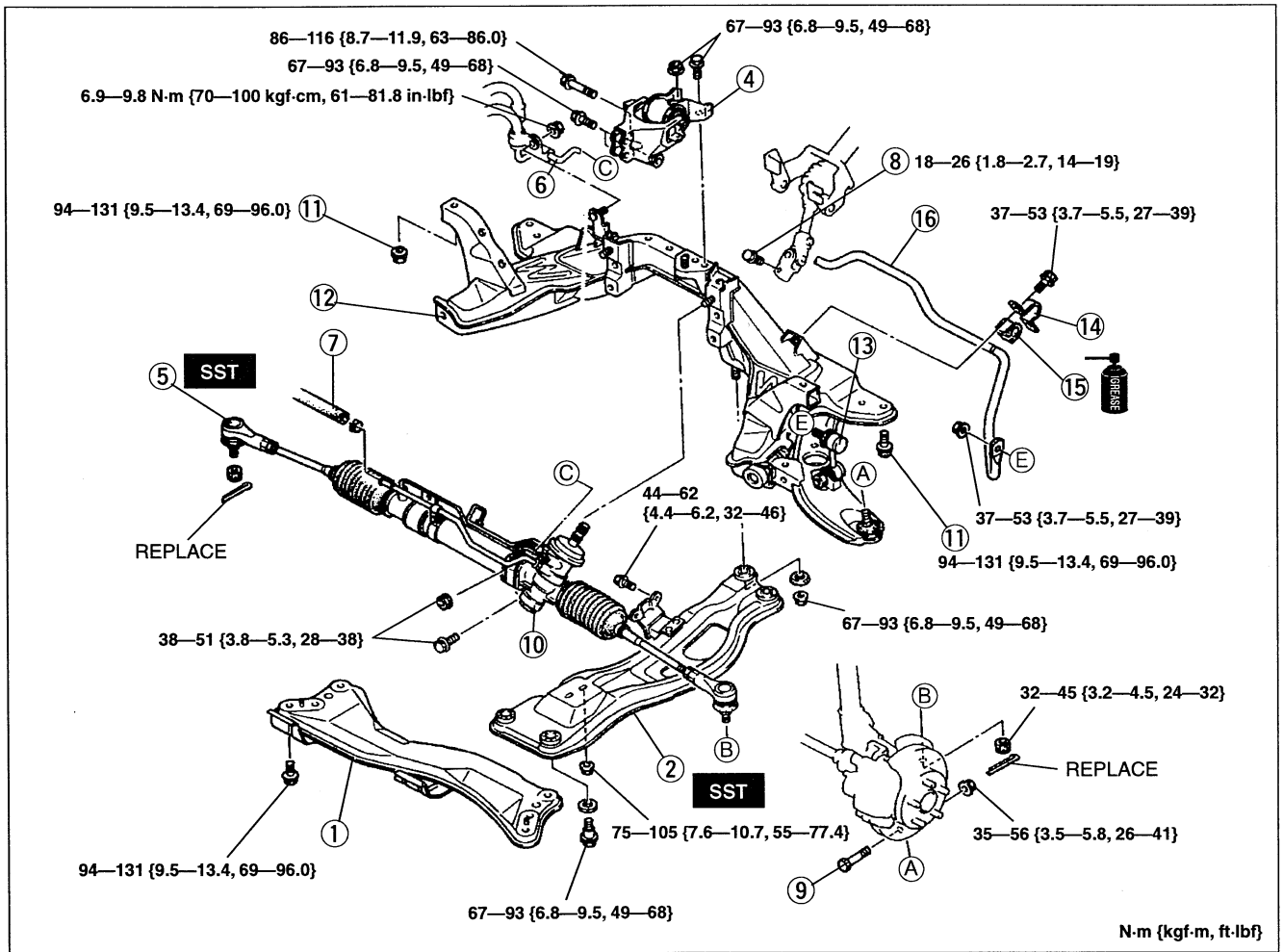
Dust boot

1. Wipe the grease off the ball stud.
2. Fill the inside of the new dust boot with grease.
3. Press the boot onto the ball joint by using the **SST**.
4. Wipe away the excess grease.

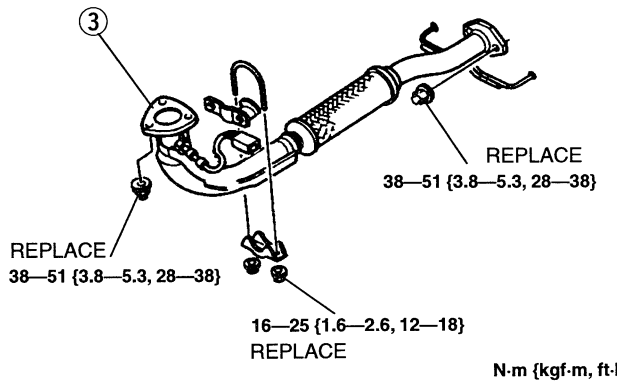
FRONT STABILIZER

Removal / Inspection / Installation

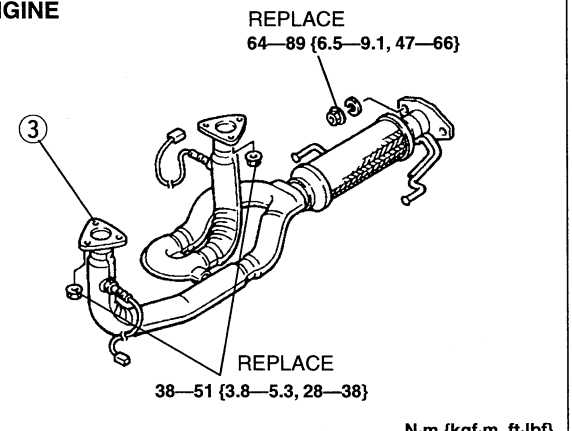
1. Jack up the front of the vehicle and support it on safety stands.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Inspect all parts and repair or replace as necessary.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Tighten the stabilizer bracket bolts to just under the specified torque. Tighten all other nuts and bolts to the specified torque.
6. Lower the vehicle.
7. With the vehicle unloaded, tighten the stabilizer bracket bolts.
8. Adjust the front wheel alignment. (Refer to page R–7.)
9. Bleed the air from the power steering system. (Refer to section N.)



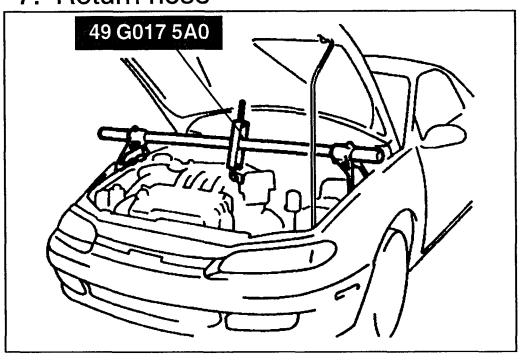
FS ENGINE



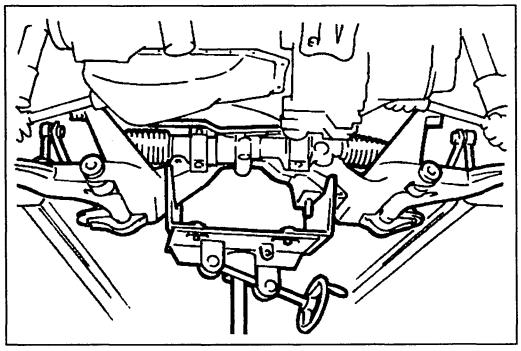
KL ENGINE



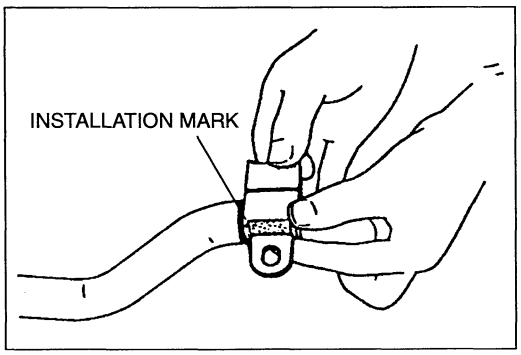
1. Transverse member
   Removal / Inspection / Installation ..... page R–27
2. Engine mount member
   Removal Note ..... below
3. Front exhaust pipe
   Removal / Installation ..... sections F1, F2
4. No.1 engine mount
5. Tie-rod end ball joint
   Removal / Installation ..... section N
6. Pressure pipe
   Service ..... section N
7. Return hose
8. Bolt (intermediate shaft)
9. Bolt (lower arm ball joint)
10. Steering gear and linkage
11. Nut and bolt
12. Crossmember and lower arm
13. Stabilizer control link
14. Stabilizer bracket
    Installation Note ..... below
15. Stabilizer bushing
    Inspect to damage and weakness
    Installation Note ..... below
16. Front stabilizer bar
    Removal Note ..... below



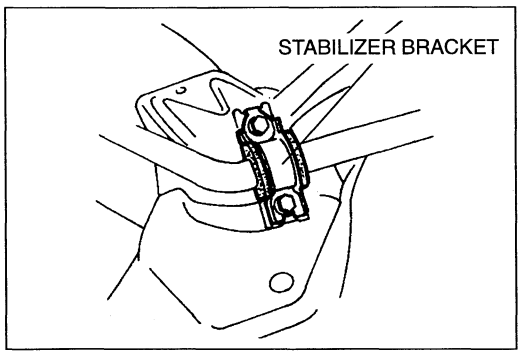
Removal note
Engine mount member
1. Support the engine by using the **SST**.
2. Remove the engine mount member.



Front stabilizer bar
1. Support the crossmember by using a jack, and remove the bolts and nuts.
2. Remove the stabilizer bracket.
3. Lower the crossmember slowly and remove the stabilizer bar from the crossmember.



Installation note
Stabilizer bushing and bracket
1. Apply rubber grease to the inside surface of the stabilizer bushing.
2. Align the bushing with the installation mark on the stabilizer bar.



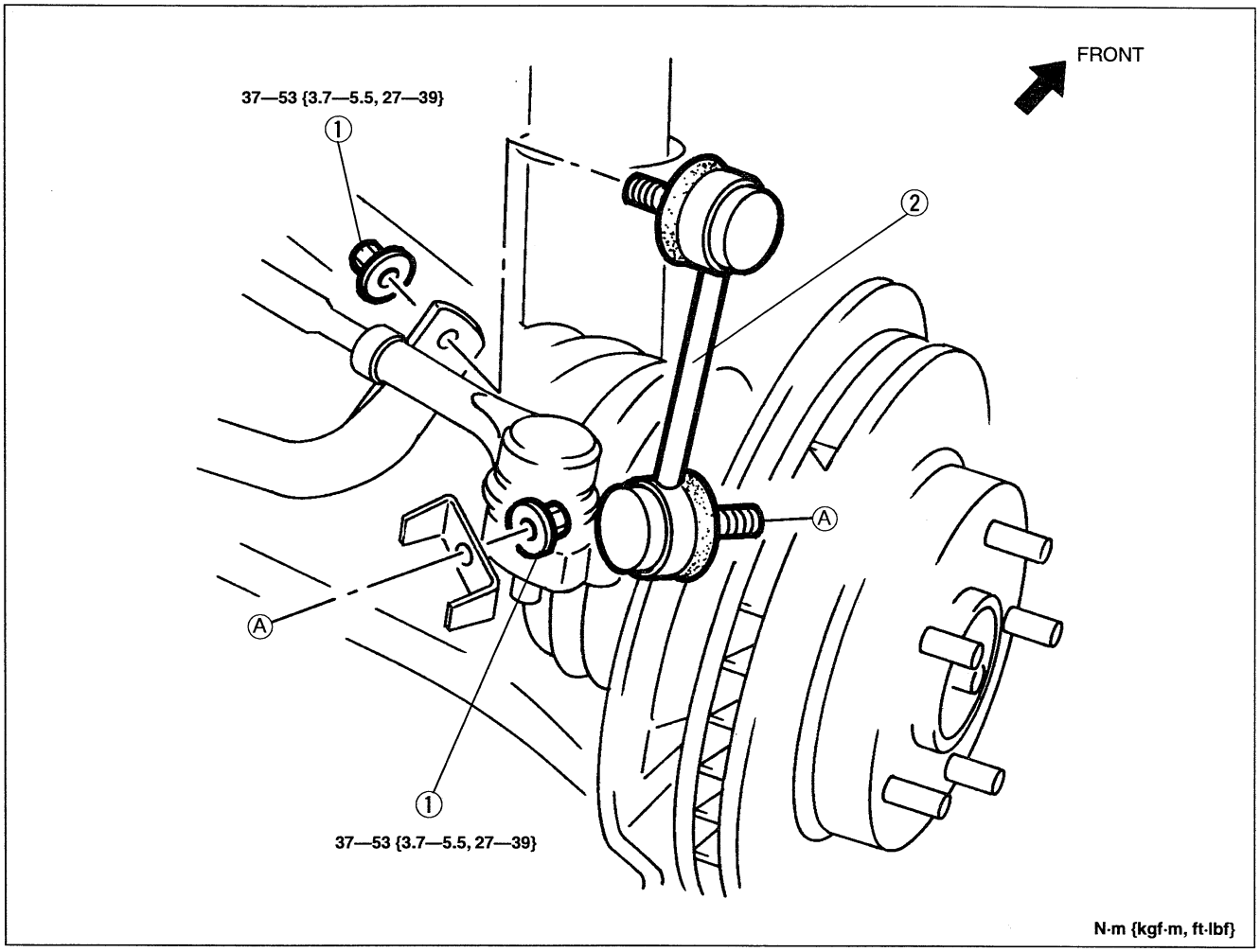
3. Install the stabilizer bracket in the direction shown.

STABILIZER CONTROL LINK

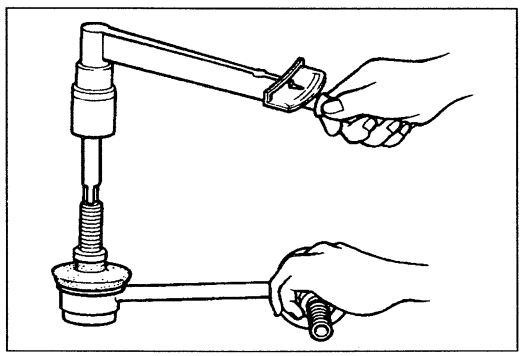
Removal / Inspection / Installation

1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the wheels.
3. Remove in the order as shown in the figure.
4. Inspect all parts and replace as necessary.
5. Install in the reverse order of removal.
6. Install the wheels.

Tightening torque: 89—117 N·m {9—12 kgf·m, 66—86.7 ft·lbf}



1. Nuts
2. Stabilizer control link
   Inspection ..... below



Inspection

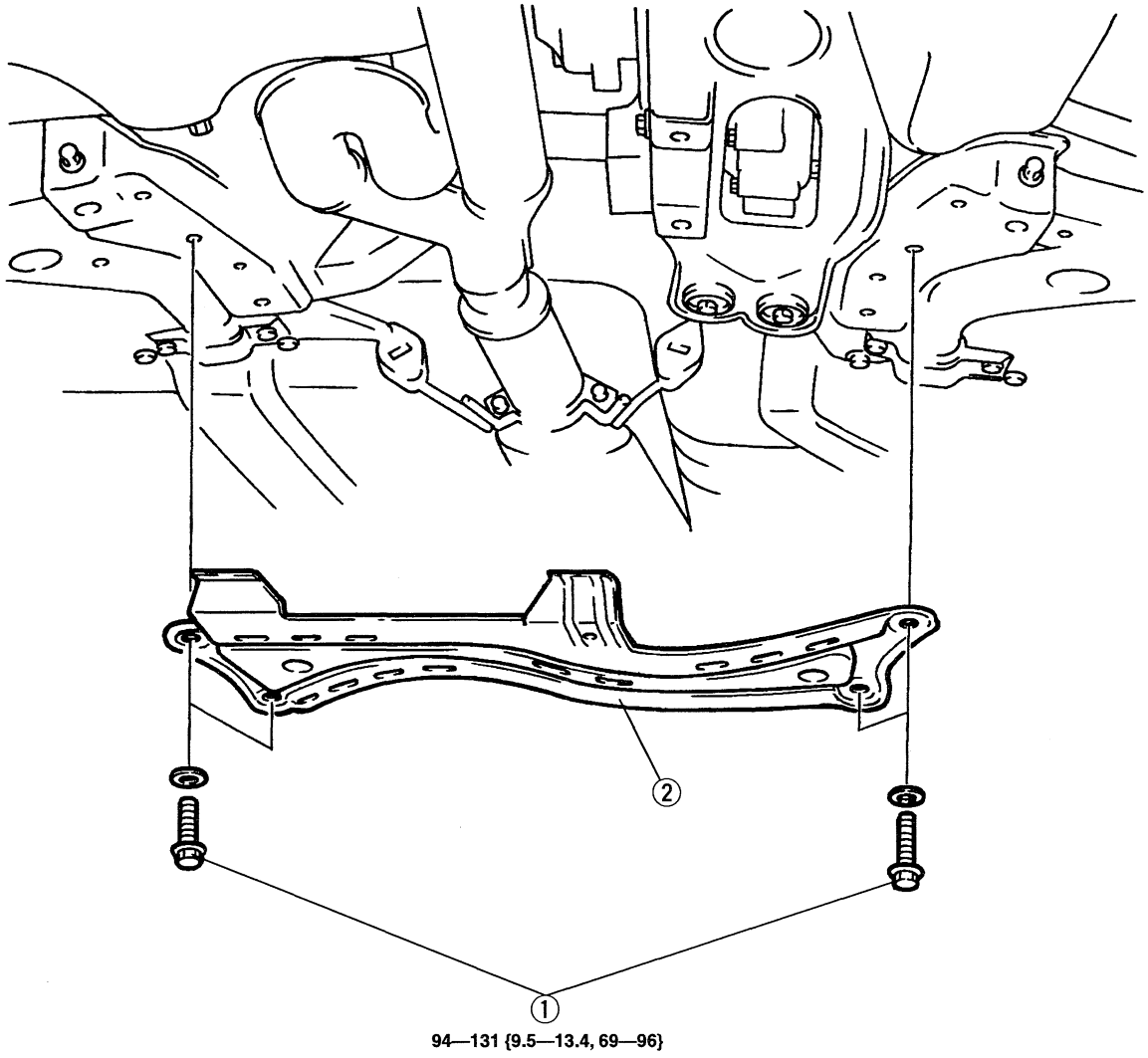
Check the following and replace if necessary.

Stabilizer control link

1. Inspect for bending and damage.
2. Measure the ball joint starting torque.(a) Rock the ball joint stud side to side 10 times.(b) Rotate the ball joint stud 10 times.(c) Measure the starting torque by using a suitable Allen socket and a torque wrench.

Starting torque:
0.2—1.5 N·m {2.0—15.0 kgf·cm, 1.7—13 in·lbf}

TRANSVERSE MEMBER
Removal / Inspection / Installation
1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the undercover.
3. Remove in the order shown in the figure.
4. Inspect all parts and repair or replace as necessary.
5. Install in the reverse order of removal.



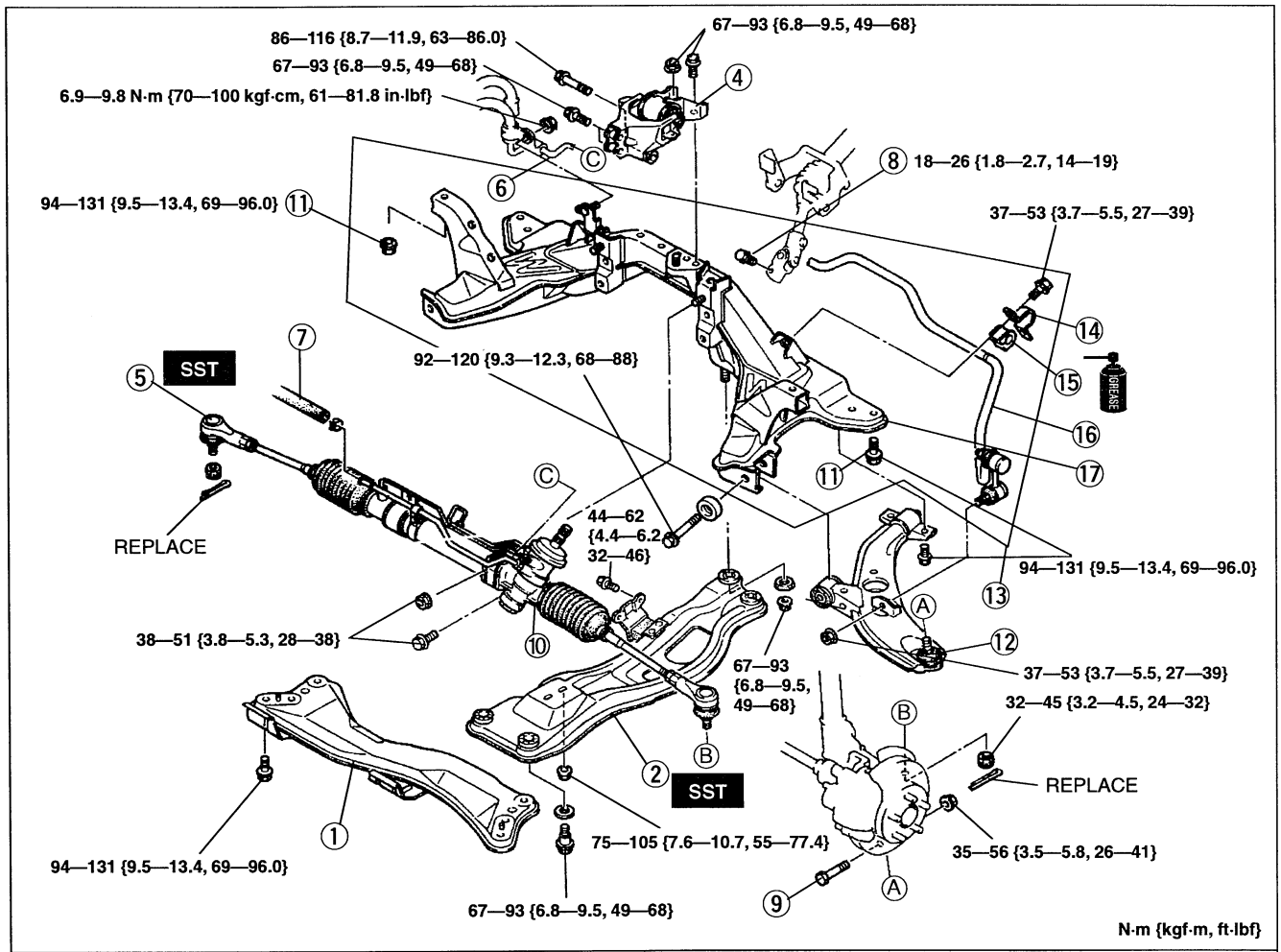
N·m {kgf·m, ft·lbf}

1. Bolt
2. Transverse member
   Inspect for cracks and damage

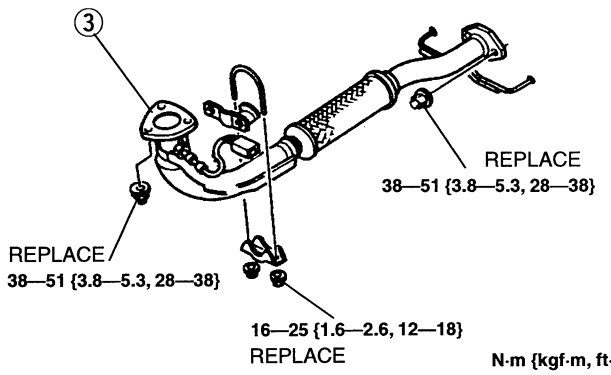
FRONT CROSSMEMBER

Removal / Inspection / Installation

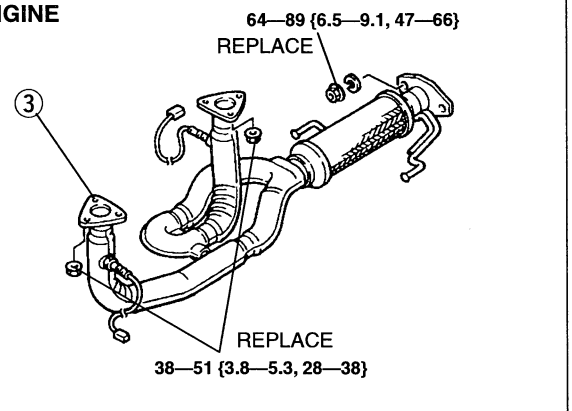
1. Jack up the front of the vehicle and support it on safety stands.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Inspect all parts and repair or replace as necessary.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Tighten the lower arm and the stabilizer bracket bolts to just under the specified torque. Tighten all other nuts and bolts to the specified torque.
6. Lower the vehicle.
7. With the vehicle unloaded, tighten the lower arm and stabilizer bracket bolts.
8. Adjust the front wheel alignment. (Refer to page R–7.)
9. Bleed the air from the power steering system. (Refer to section N.)



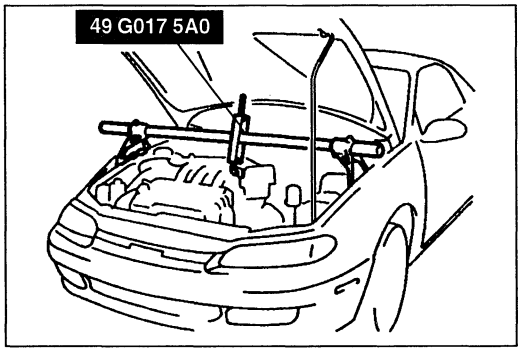
FS ENGINE



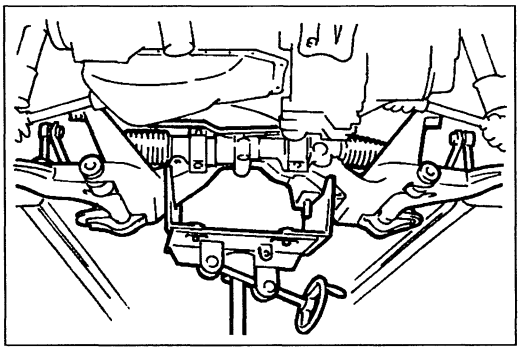
KL ENGINE



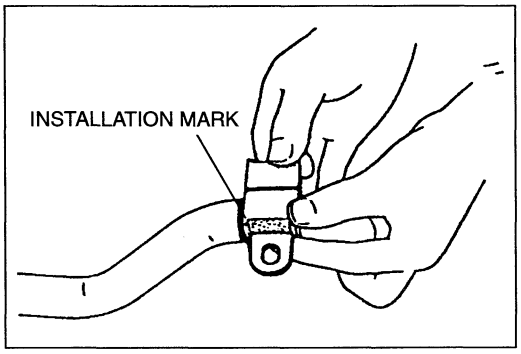
1. Transverse member
2. Engine mount member
   Removal Note ..... below
3. Front exhaust pipe
   Removal / Installation ..... sections F1, F2
4. Engine mount No.1
5. Tie rod end ball joint
   Removal / Installation ..... section N
6. Pressure pipe
   Service ..... section N
7. Return hose
8. Bolts (intermediate shaft)
9. Bolt (lower arm ball joint)
10. Steering gear and linkage
11. Nut and bolt
12. Lower arm
13. Front crossmember and stabilizer
    Removal Note ..... below
14. Stabilizer bracket
    Installation Note ..... below
15. Stabilizer bushing
    Installation Note ..... below
16. Front stabilizer
17. Front crossmember



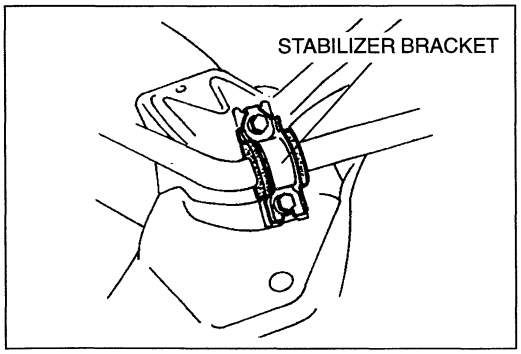
Removal note
Engine mount member
1. Support the engine by using the **SST**.
2. Remove the engine mount member nuts.



Front crossmember and stabilizer
1. Support the crossmember by using a jack and remove the bolts and nuts.
2. Remove the crossmember and steering assembly.



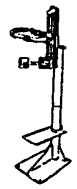
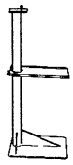
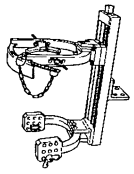
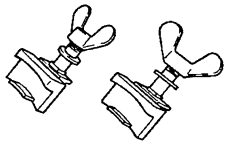
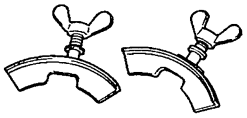
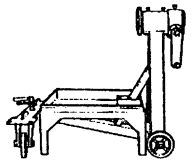
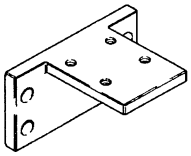
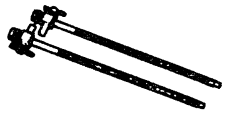
Installation note
Stabilizer bushing and bracket
1. Apply rubber grease to the inside surface of the stabilizer bushing.
2. Align the bushing with the installation mark on the stabilizer bar.



3. Install the stabilizer bracket in the direction shown.

REAR SUSPENSION (STRUT)

PREPARATION
SST

49 T034 1A0 Coil spring compressor set 	For removal / installation of coil spring	49 T034 102 Stand (Part of 49 T034 1A0) 	For removal / installation of coil spring
49 T034 101 Spring compressor (Part of 49 T034 1A0) 	For removal / installation of coil spring	49 T034 103 Hook (Part of 49 T034 1A0) 	For removal / installation of coil spring
49 T034 104 Support (Part of 49 T034 1A0) 	For removal / installation of coil spring	49 0107 680A Engine stand 	For removal / installation of coil spring
49 T034 105 Attachment (with engine stand) 	For removal / installation of coil spring	49 G034 1A0 Coil spring compressor 	For removal / installation of coil spring
49 G034 101 Body (Part of 49 G034 1A0) 	For removal / installation of coil spring	49 G034 102 Screw (Part of 49 G034 1A0) 	For removal / installation of coil spring
49 G034 103 Arm (Part of 49 G034 1A0) 	For removal / installation of coil spring	—	—

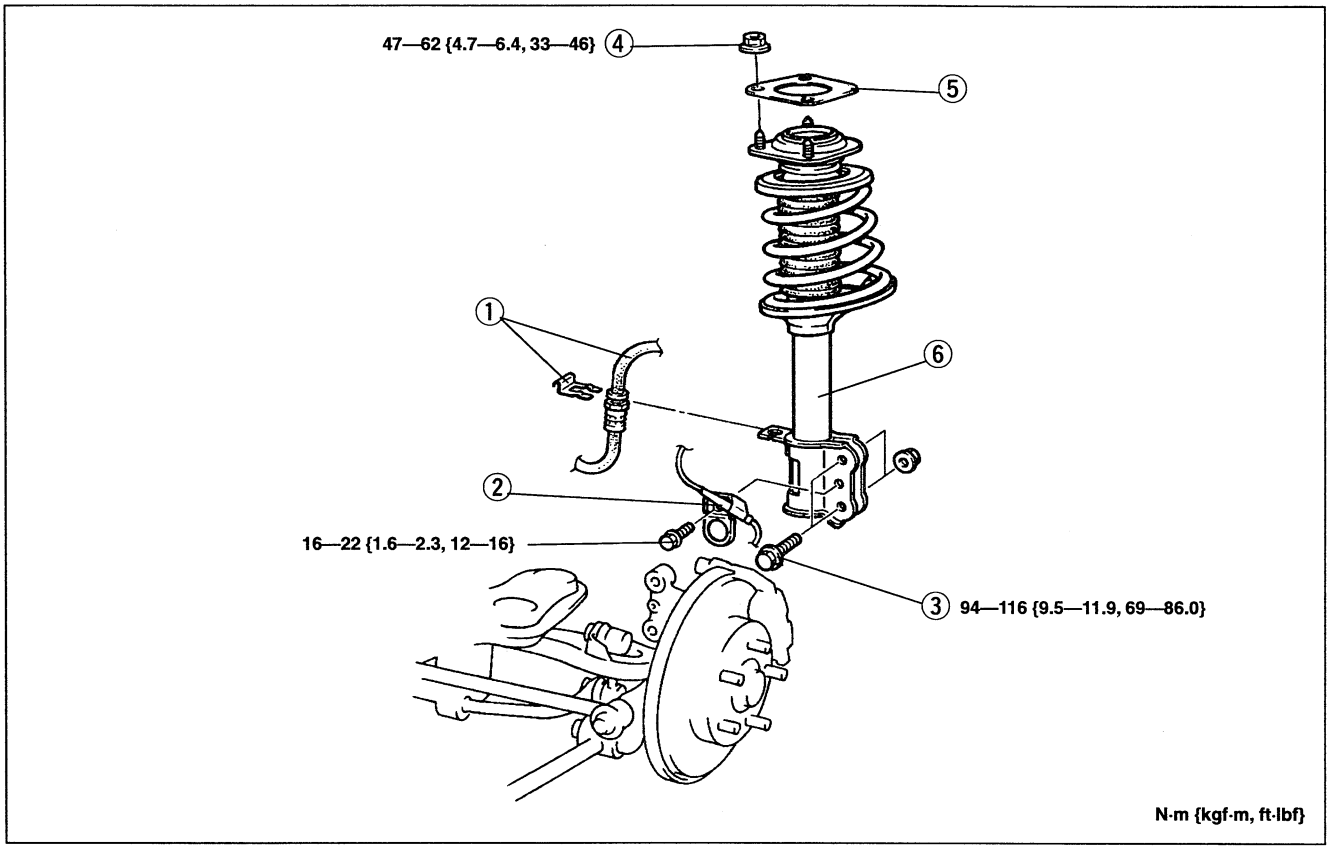
REAR SHOCK ABSORBER AND SPRING

Removal / Installation

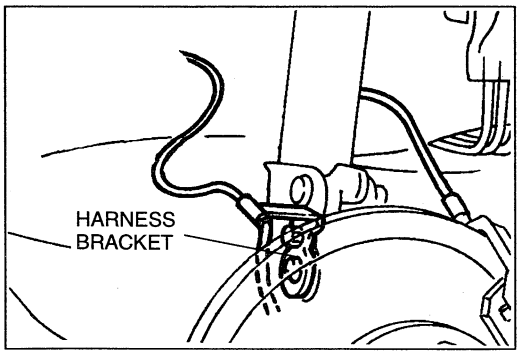
1. Jack up the rear of the vehicle and support it on safety stands.
2. Remove the wheels.
3. Remove the trunk side trim. (Refer to section S.)
4. Remove in the order as shown in the figure.
5. Install in the reverse order of removal, referring to **Installation Note**.
6. Install the trunk side trim. (Refer to section S.)
7. Install the wheels.

Tightening torque: 89—117 N·m {9—12 kgf·m, 66—86.7 ft·lbf}

8. After installation, measure the rear wheel alignment and adjust it if necessary. (Refer to page R–9.)



1. Hose clip and flexible hose
2. ABS wheel-speed sensor harness
   Installation Note ..... below
3. Shock absorber bolt
4. Nut
5. Sheet
6. Rear shock absorber and spring
   Disassembly / Inspection ..... page R–32
   Assembly ..... page R–34 or 36



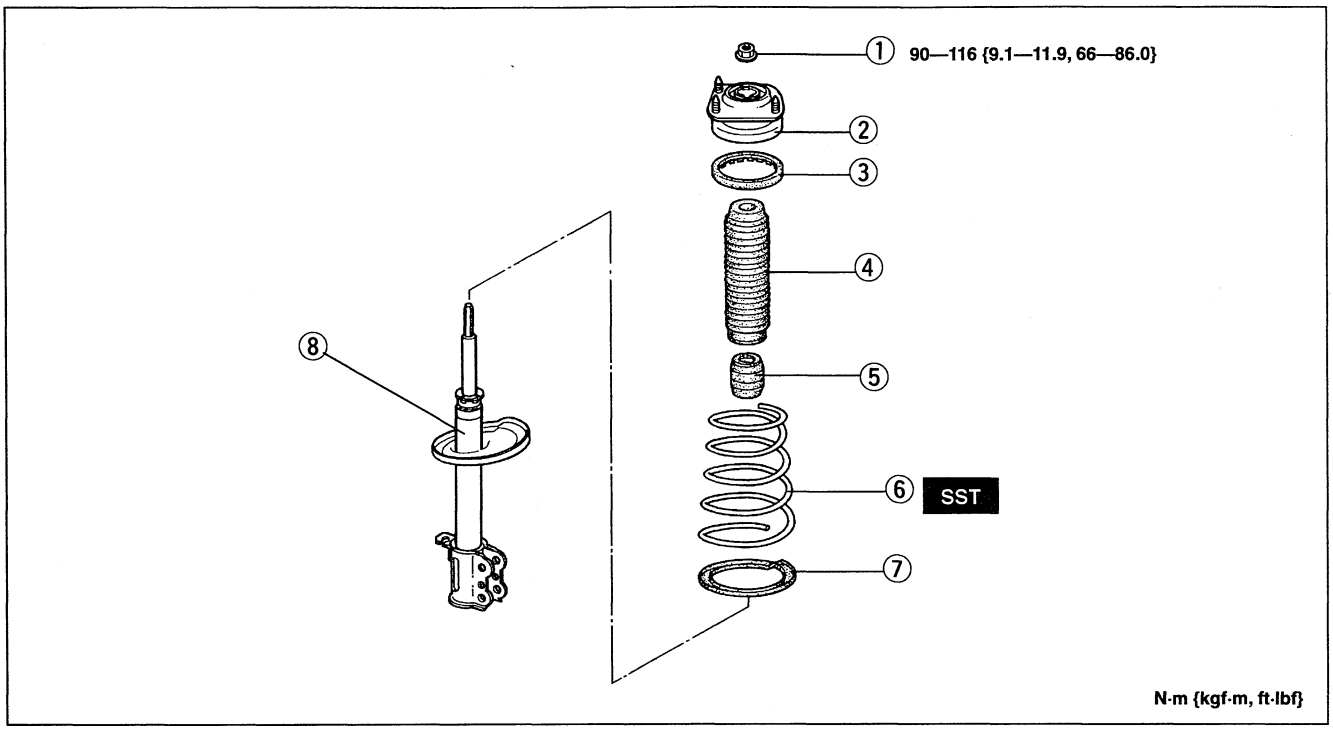
Installation note

ABS wheel-speed sensor harness

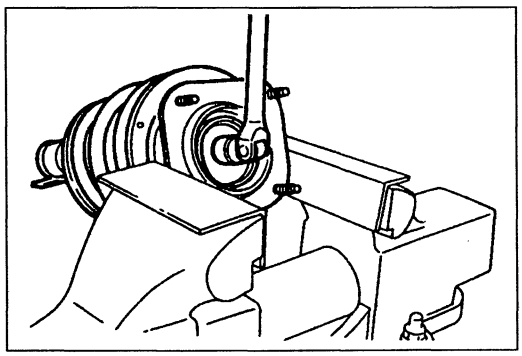
Install the sensor harness bracket in the direction shown.

Disassembly / Inspection

1. Disassemble in the order shown in the figure, referring to **Disassembly Note.**
2. Inspect all parts and replace as necessary.



1. Nut
   Disassembly Note
   When using SST
   49 T034 1A0 ..... below
   49 G034 1A0 ..... page R–36
2. Mounting rubber
   Inspect for damage and weakness
3. Upper spring seat
   Inspect for damage and cracks
4. Dust cover
   Inspect for damage and deterioration
5. Bound stopper
   Inspect for damage and cracks
6. Coil spring
   Inspect for damage and weakness
7. Lower spring seat
   Inspect for damage and cracks
8. Shock absorber
   Inspection ..... page R–33



When using SST 49 T034 1A0
Disassembly note
Nut

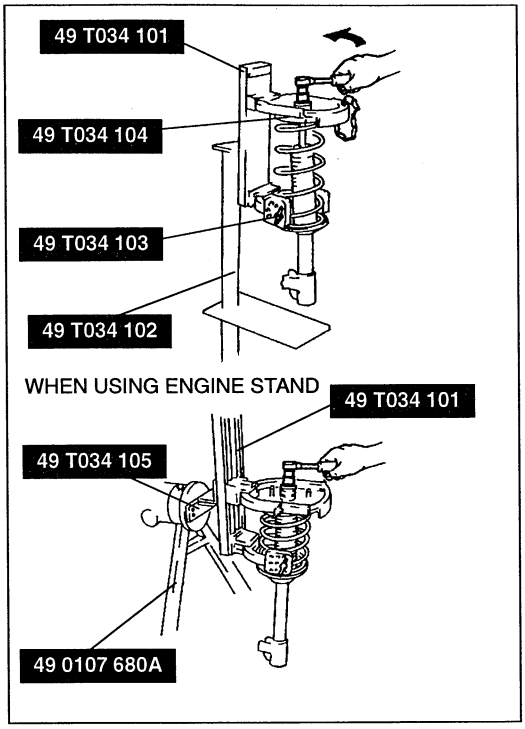
Warning

- **Removing the piston rod nut is dangerous. The shock absorber and spring could fly off under tremendous pressure and cause serious injury or death. Secure the shock absorber in the SST before removing the piston rod nut.**

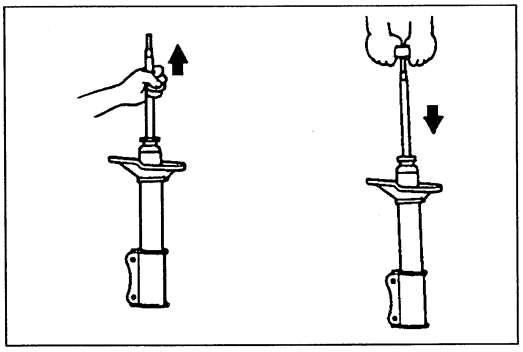
Caution

- **To prevent damage to the mounting rubber, use protective plates in the vise jaws.**

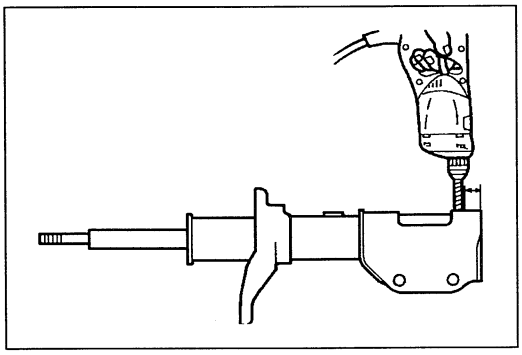
1. Secure the mounting rubber in a vise.
2. Loosen the nut several turns, but do not remove it.



3. Assemble the **SST**.
4. Secure the shock absorber in the **SST**.
5. Compress the coil spring by using the **SST** and remove the nut.



Inspection
Shock absorber
Check for the following and replace the shock absorber, if necessary.
1. Inspect for damage and oil leakage.
2. Secure a handle to the piston rod, and compress and expand the shock piston at least three times. Verify that the operational force does not change and that there is no unusual noise.

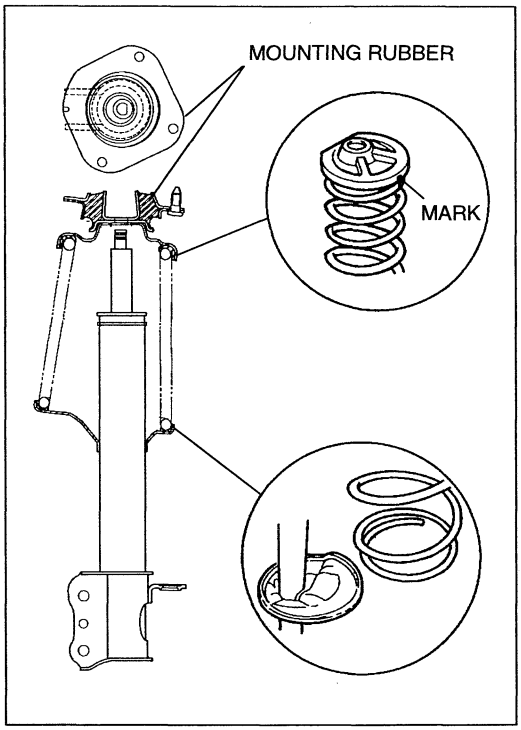


Disposal of shock absorber

Warning
- **The gas in the shock absorber is pressurized, and could spray metal chips into the eyes and face when drilling. Whenever drilling into a shock absorber, wear protective eye wear.**

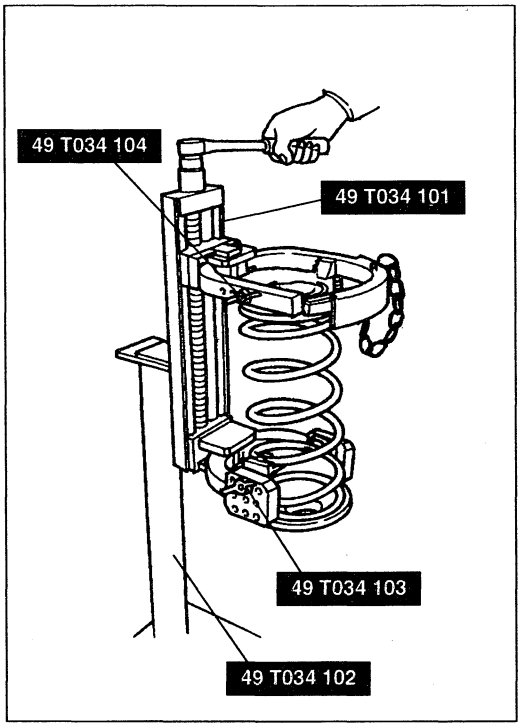
1. Clamp a shock absorber flat or with the piston downwards.
2. Drill the 2—3 mm {0.08—0.12 in} hole at a point of 20—30 mm {0.08—0.12 in} from the bottom of the tube, so that the gas can escape.
3. Turn the hole downwards.
4. The oil can be collected by moving the piston rod several times up and down and cutting the tube at the end.
5. Dispose of waste oil according to the waste disposal law.

Note
- Shock absorber gas is nitrogen gas.
- Shock absorber oil is mineral oil.

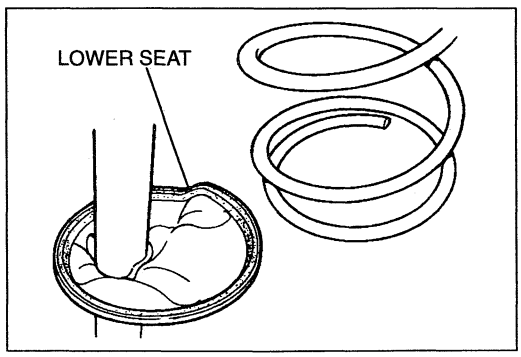


Assembly

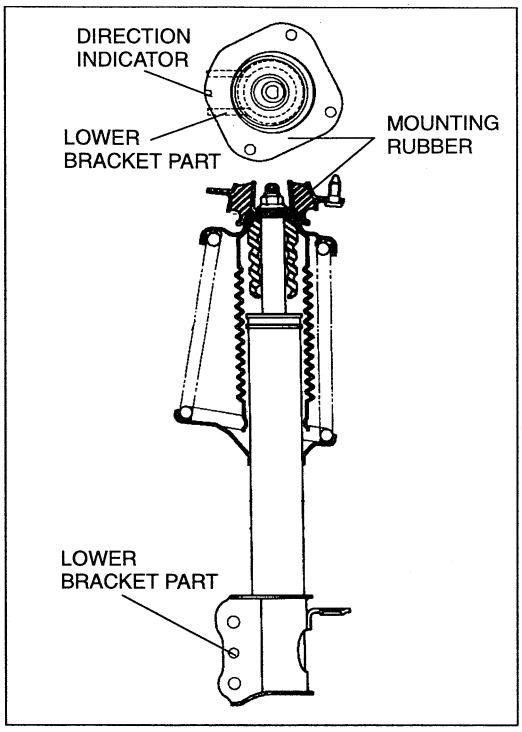
1. Temporarily assemble the upper spring seat, the mounting rubber and coil spring to the shock absorber, as shown.
2. Mark the upper spring seat and coil spring for proper reassembly.



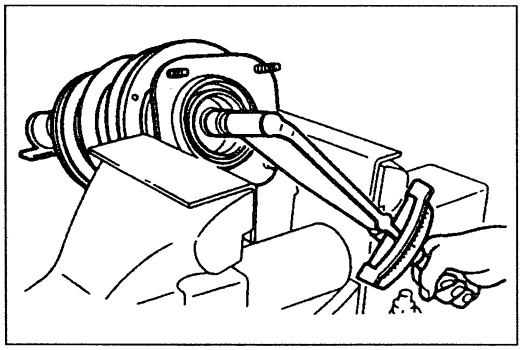
3. Align the marks of the upper spring seat and coil spring. Protect the upper spring seat and the coil spring with a piece of cloth, then assemble the **SST**.
4. Use the **SST** to compress the spring.



5. Install the lower spring seat.
6. Install the bound stopper.
7. Install the dust cover.
8. Install the shock absorber, fitting the end of the coil into the step of the lower seat.



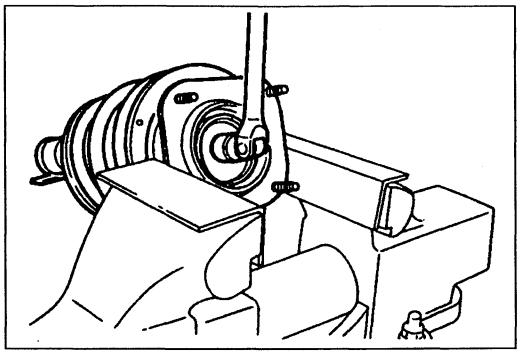
9. Tighten the nut several turns.
10. Remove the **SST**.
11. Verify that the lower coil of the spring is properly seated on the step of the lower seat.



Caution
- **Use protective plates in the jaws of the vise.**

12. Secure the mounting rubber in a vise.
13. Tighten the nut.

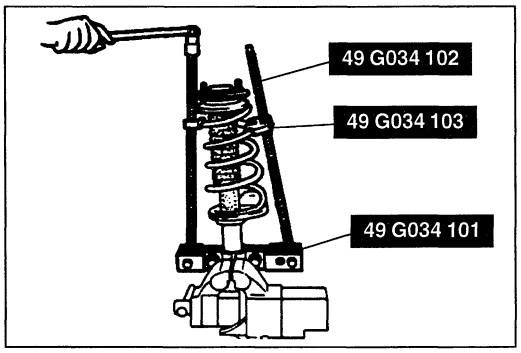
Tightening torque:
90—116 N·m {9.1—11.9 kgf·m, 66—86.0 ft·lbf}



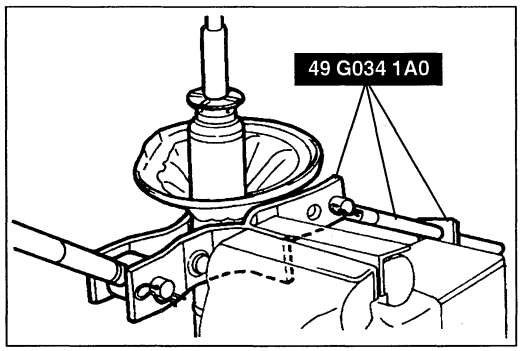
When using SST 49 G034 1A0
Disassembly note
Nut

Warning
- **Removing the piston rod nut is dangerous. The shock absorber and spring could fly off under tremendous pressure and cause serious injury or death. Secure the shock absorber in the SST before removing the piston rod nut.**

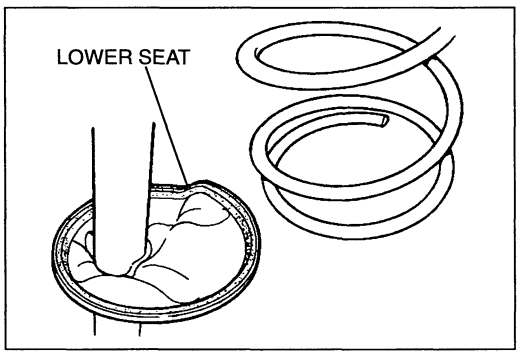
Caution
- **To prevent damage to the mounting rubber, use protective plates in the vise jaws.**



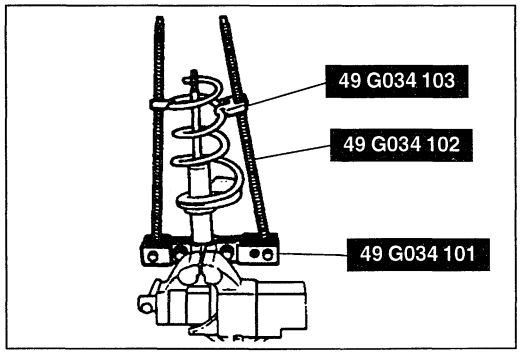
1. Secure the mounting rubber in a vise.
2. Loosen the nut several turns, but do not remove it.
3. Assemble the **SST**.
4. Secure the shock absorber in the **SST**.
5. Compress the coil spring by using the **SST** and remove the nut.



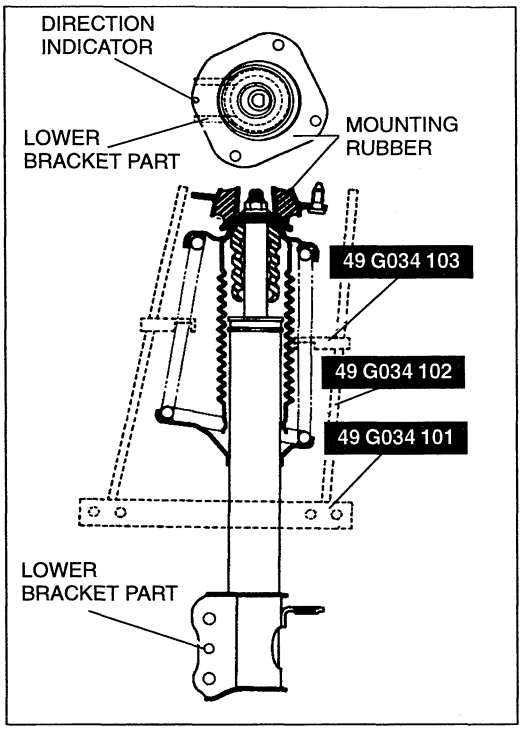
Assembly
1. Assemble the **SST**, and secure the **SST** in a vise.



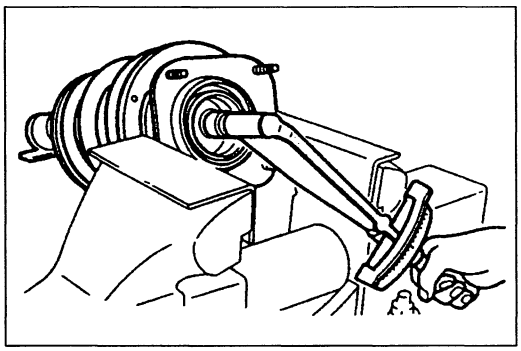
2. Install the lower rubber spring seat.
3. Install the coil spring, fitting the end of the coil into the step of the lower seat.



4. Compress the coil spring by using the **SST**.



5. Install the stopper.
6. Install the dust cover.
7. Install the upper spring seat.
8. Install the mounting rubber, facing the direction indicator as shown in the figure.
9. Tighten the nut several turns.
10. Remove the **SST**.
11. Verify that the lower coil of the spring is properly seated on the step of the lower seat.



Caution
- **Use protective plates in the jaws of the vise.**

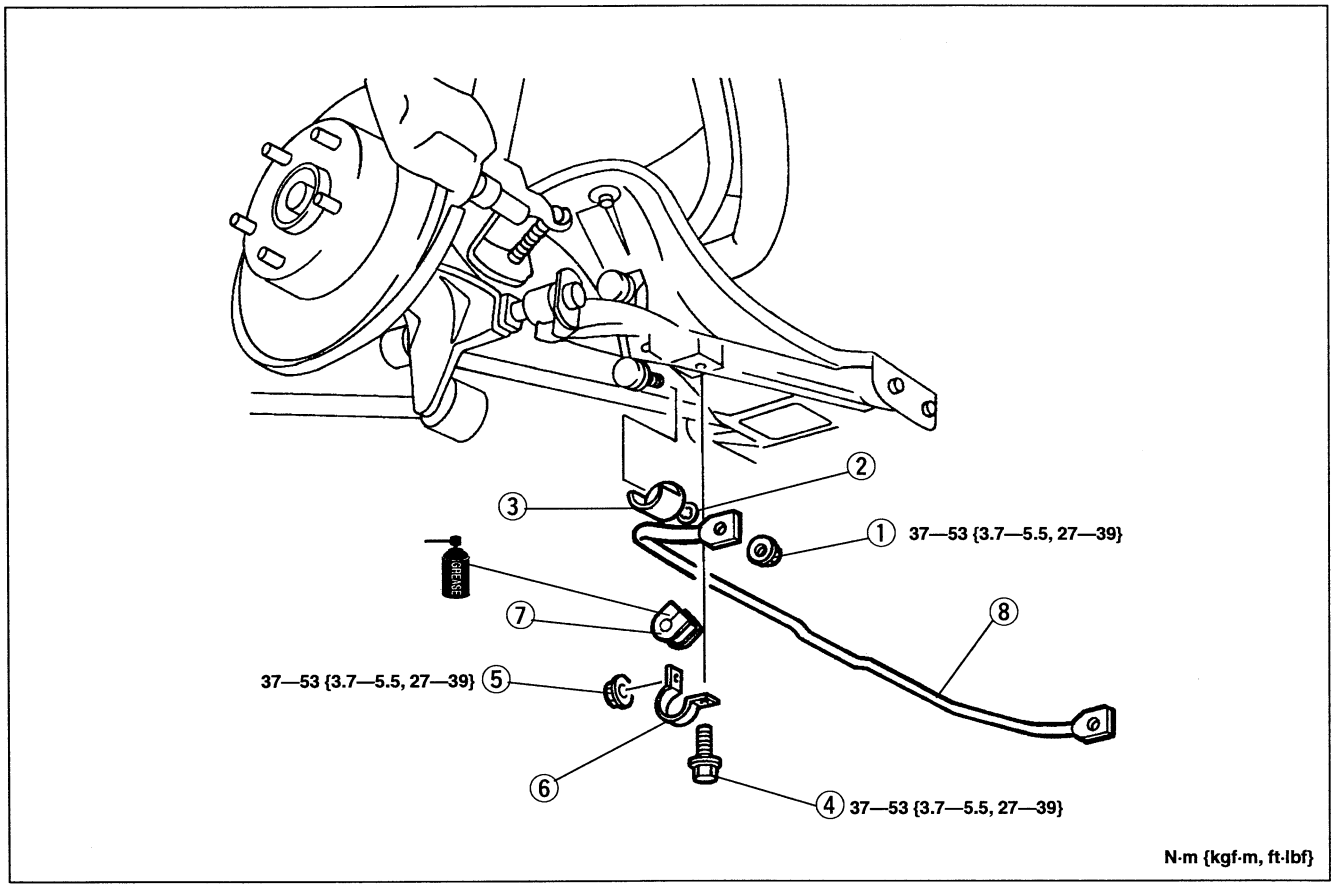
12. Secure the mounting rubber in a vise.
13. Tighten the nut.

Tightening torque:
90—116 N·m {9.1—11.9 kgf·m, 66—86.0 ft·lbf}

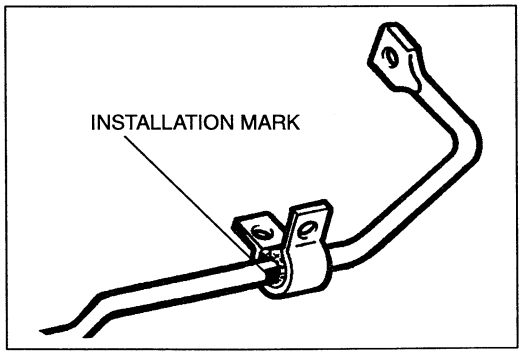
REAR STABILIZER

Removal / Inspection / Installation

1. Jack up the rear of the vehicle and support it on safety stands.
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, referring to **Installation Note**.
5. Tighten the stabilizer bracket bolts to just under the specified torque. Tighten all other nuts to the specified torque.
6. Lower the vehicle.
7. With the vehicle unloaded, tighten the stabilizer bracket bolts.



1. Nut
2. Set washer
3. Protector
4. Bolt
5. Nut
6. Stabilizer bracket
   Installation Note ..... below
7. Stabilizer bushing
   Inspect for damage and weakness
   Installation Note ..... below
8. Rear stabilizer bar
   Inspect for damage and deformation



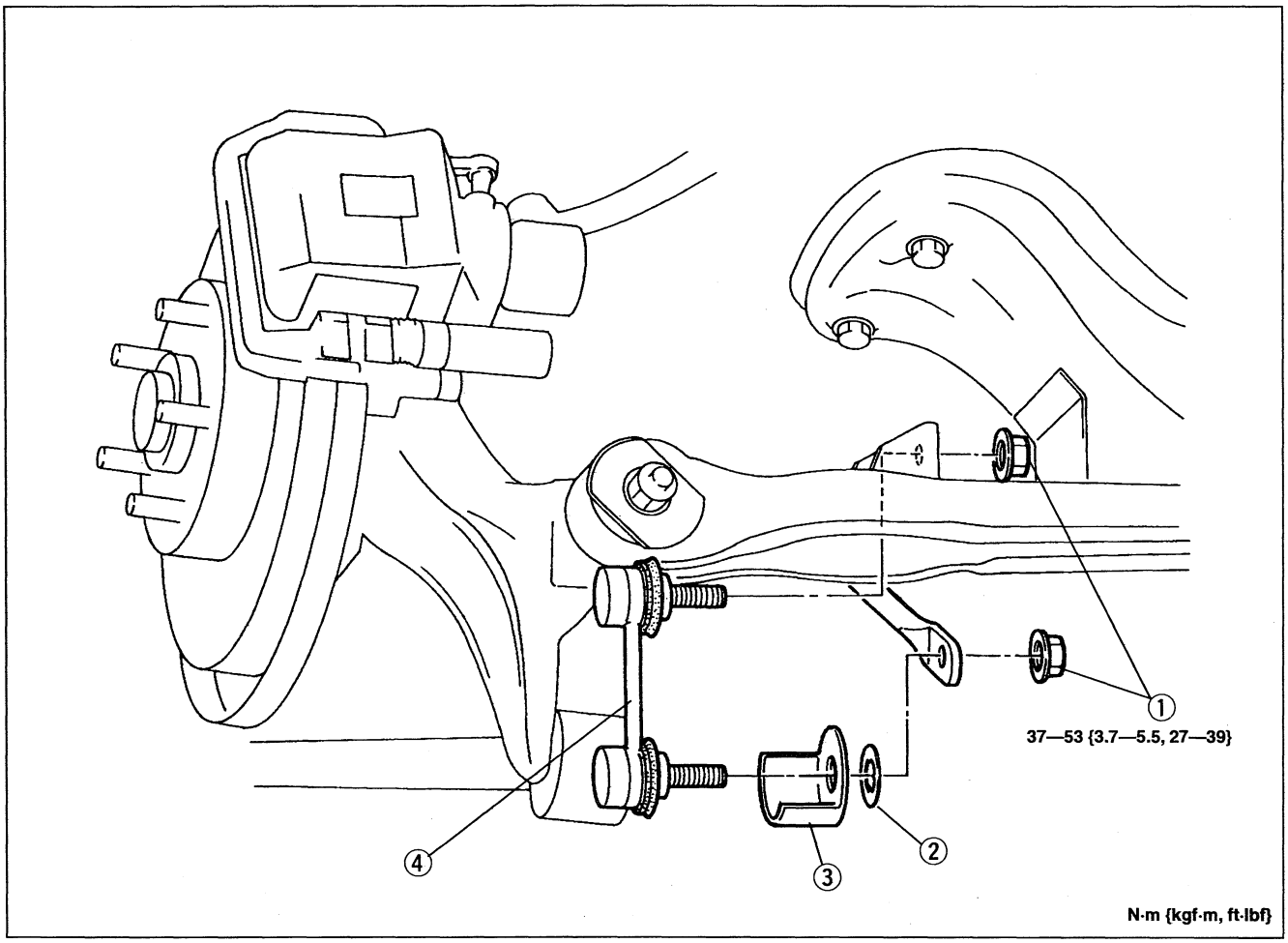
Installation note

Stabilizer bushing and bracket

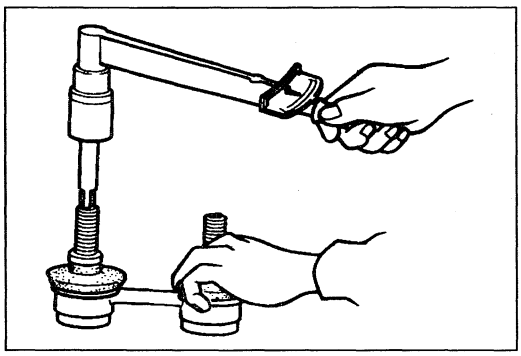
1. Apply rubber grease to the inside surface of the stabilizer bushing.
2. Align the bushing with the installation mark on the stabilizer bar.

STABILIZER CONTROL LINK
Removal / Inspection / Installation
1. Jack up the rear of the vehicle and support it on safety stands.
2. Remove the wheels.
3. Remove in the order shown in the figure.
4. Inspect all parts and repair or replace as necessary.
5. Install in the reverse order of removal.
6. Install the wheels.

Tightening torque: 89—117 N·m {9—12 kgf·m, 66—86.7 ft·lbf}



1. Nuts
2. Set washer
3. Protector
4. Stabilizer control link
   Inspection ..... below



Inspection
Check the following and replace if necessary

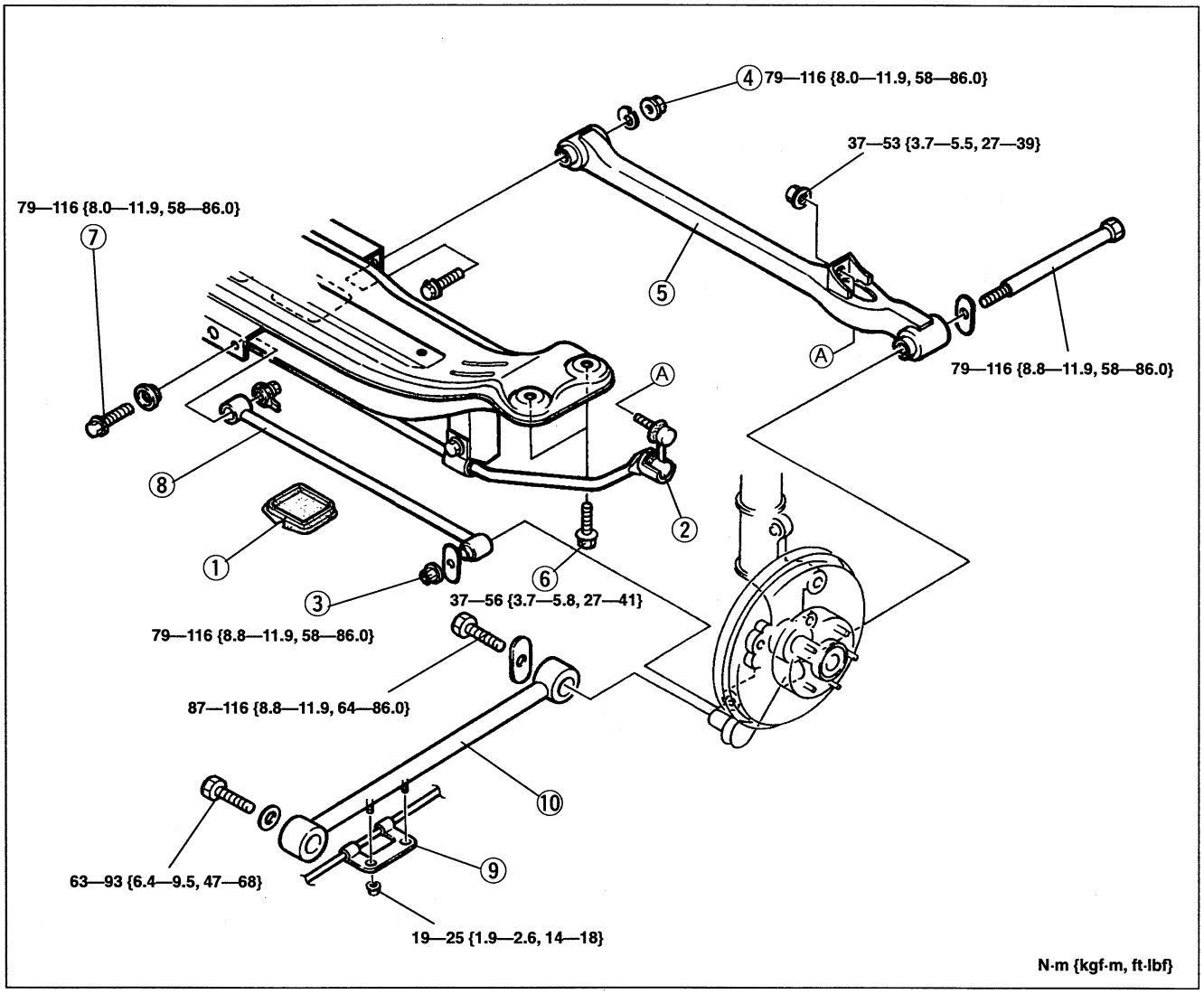
Stabilizer control link
1. Inspect for bending and damage.
2. Measure the ball joint starting torque.
   (1) Rock the ball joint stud side to side 10 times.
   (2) Rotate the ball joint stud 10 times.
   (3) Measure the starting torque by using a suitable Allen socket and a torque wrench.

Starting torque:
0.2—1.5 N·m {2.0—15.0 kgf·cm, 1.7—13 in·lbf}

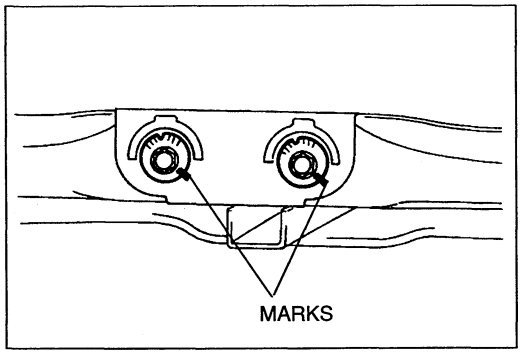
LATERAL LINK AND TRAILING LINK

Removal / Inspection / Installation

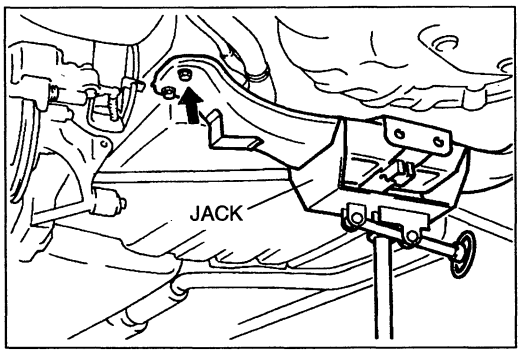
1. Jack up the rear of the vehicle and support it on safety stands.
2. Remove in the order as shown in the figure, referring to **Removal Note**.
3. Inspect all parts and repair or replace as necessary.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Tighten the lateral link and trailing link mounting bolts and nuts to just under the specified torque. Tighten brake cable nuts to the specified torque.
6. Lower the vehicle.
7. With the vehicle unloaded, tighten the lateral link and the trailing link mounting bolts.
8. After installation, measure the rear wheel alignment and adjust it if necessary. (Refer to page R–9.)



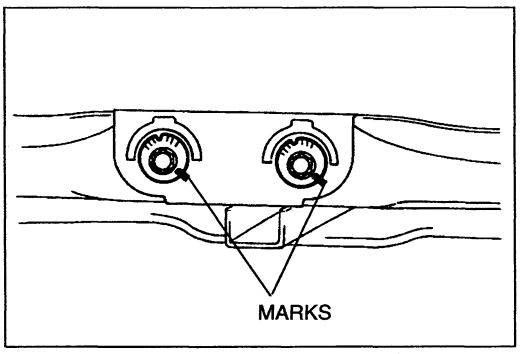
1. Cap
2. Stabilizer control link
3. Bolt, washers and nut
4. Nut, cam plate, and adjusting cam bolt
   - Removal Note ..... page R–41
   - Installation Note ..... page R–41
5. Lateral link (rear)
   - Inspect for deformation
   - Inspect bushing for damage
6. Bolt (Crossmember)
   - Removal Note ..... page R–41
7. Bolt, washer, and nut
8. Lateral link (front)
   - Inspect for deformation
   - Inspect bushing for damage
9. Brake cable bracket
10. Trailing link
    - Inspect for deformation
    - Inspect bushing for damage



Removal note
Nut, cam plate, and adjusting cam bolt
Before loosening the nut, make a mark on the cam plate and the crossmember for reference during installation.



Bolt (Crossmember)
Support the crossmember by using a jack and remove the bolts.



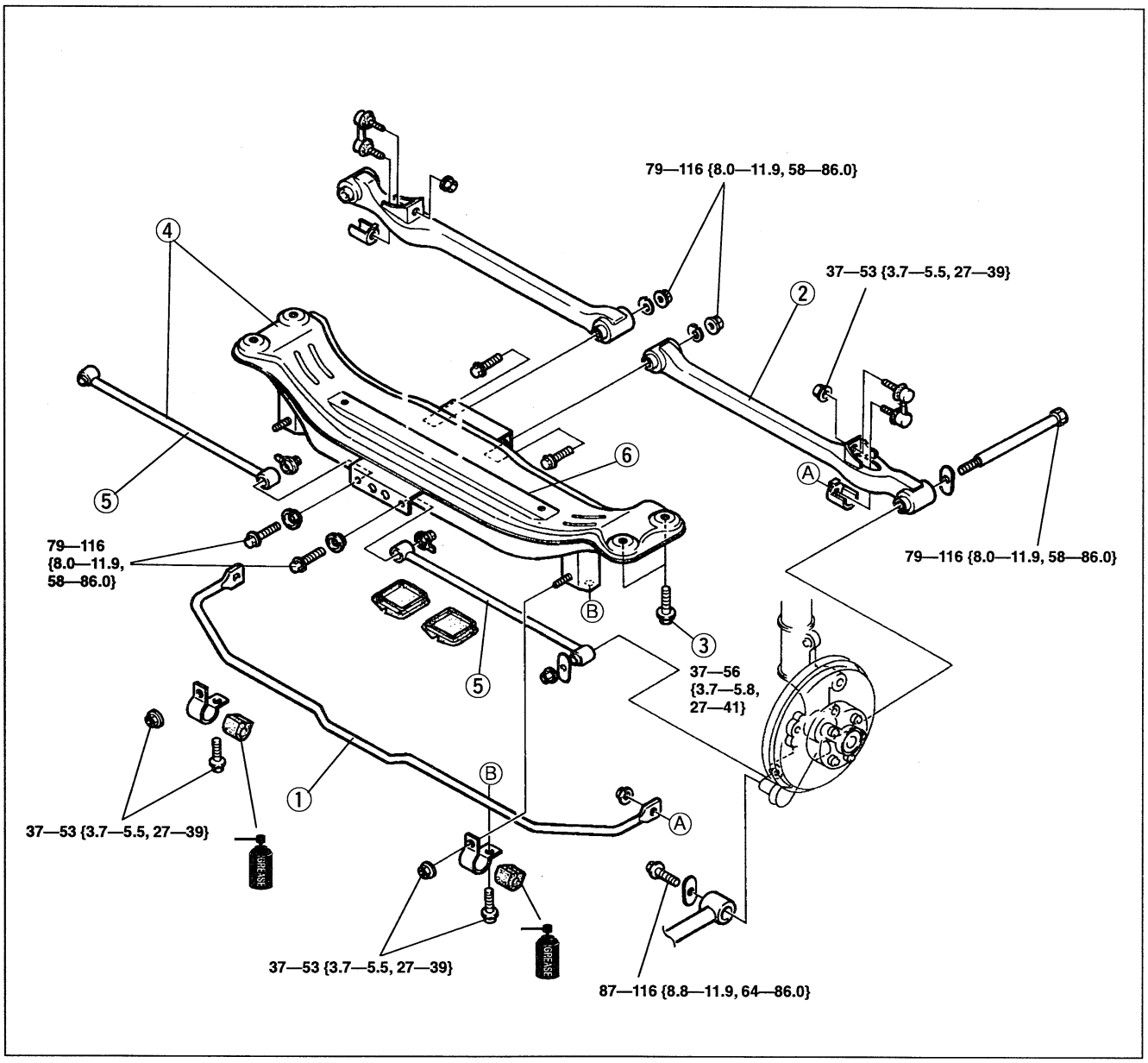
Installation Note
Nut, cam plate, and adjusting cam bolt
1. Install the cam plate so that the notch faces the same direction as the adjusting cam bolt.
2. Align to the mark made before removing the adjusting cam bolt. Tighten the nut.

Tightening torque:
79—116 N·m {8.0—11.9 kgf·m, 58—86.0 ft·lbf}

REAR CROSSMEMBER

Removal / Inspection / Installation

1. Jack up the rear of the vehicle and support it on safety stands.
2. Remove in the order shown in the figure.
3. Inspect all parts and replace as necessary.
4. Install in the reverse order of removal.
5. Tighten the stabilizer bracket, lateral link and trailing link mounting bolts to just under the specified torque. Tighten all other bolts and nuts to the specified torque.
6. Lower the vehicle.
7. With the vehicle unladen, tighten the stabilizer bracket lateral link and trailing link mounting bolts.
8. After installation, measure the rear wheel alignment and adjust it if necessary. (Refer to page R–9.)



1. Rear stabilizer
   Removal / Inspection / Installation . . . . . page R–38
2. Lateral link (rear)
   Removal / Inspection / Installation . . . . . page R–40
3. Bolts
4. Rear crossmember and lateral link
5. Lateral link (front)
   Removal / Inspection / Installation . . . . . page R–40
6. Rear crossmember
   Inspect for damage and cracks

Before beginning any service procedure, refer to section S of the 1996 626/MX-6 Body Electrical Troubleshooting Manual for air bag system service warnings.

BODY

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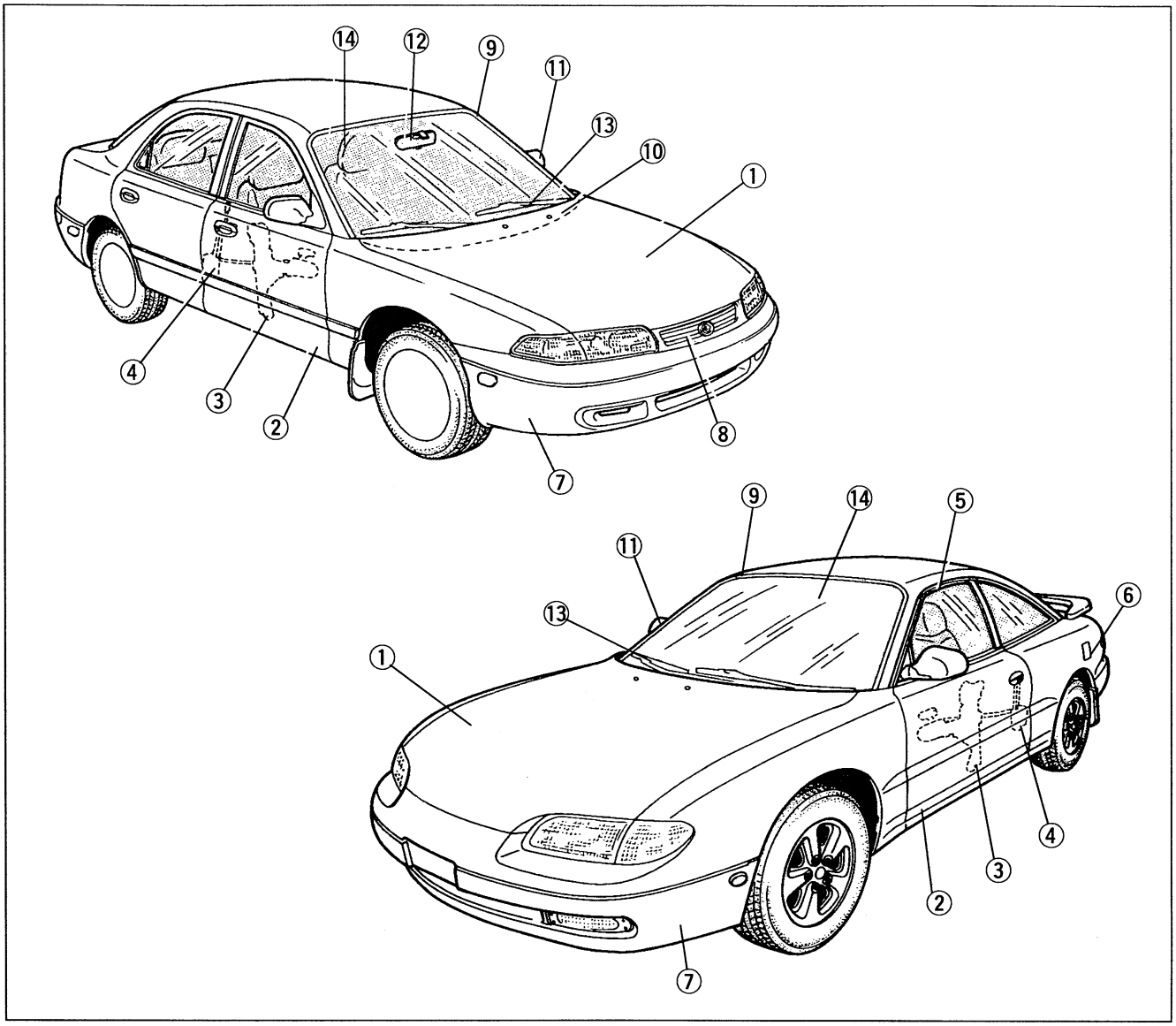

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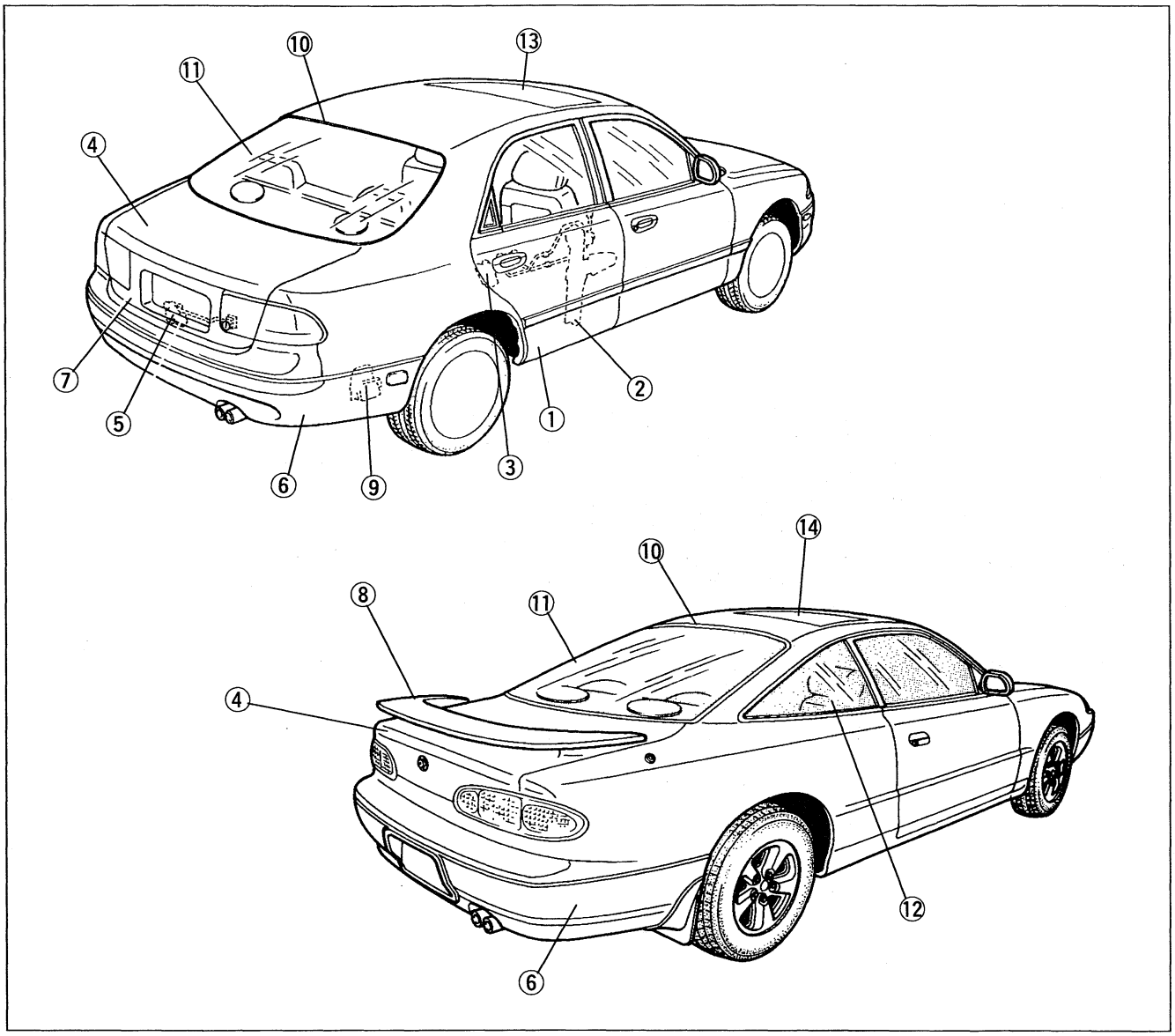

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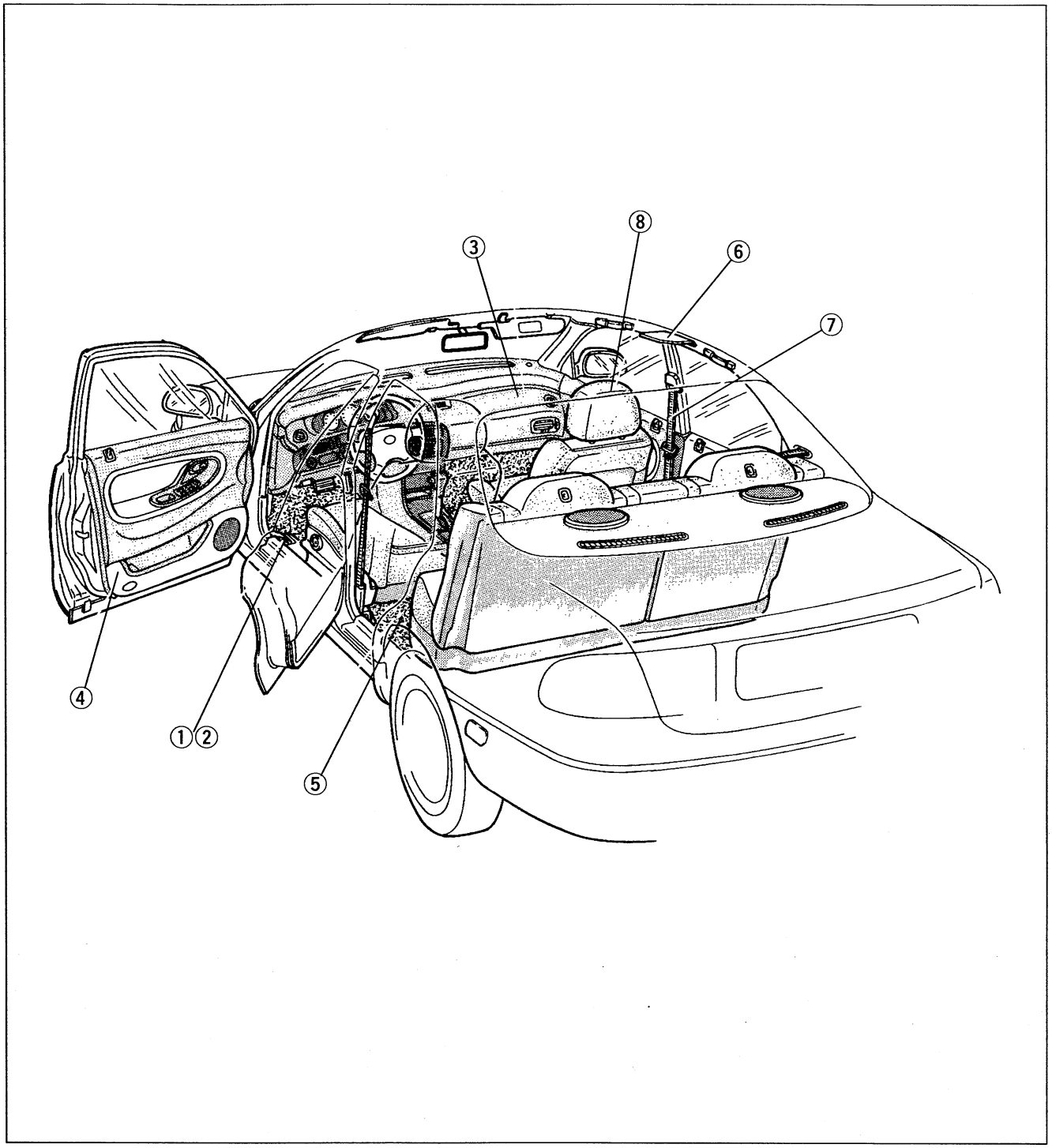

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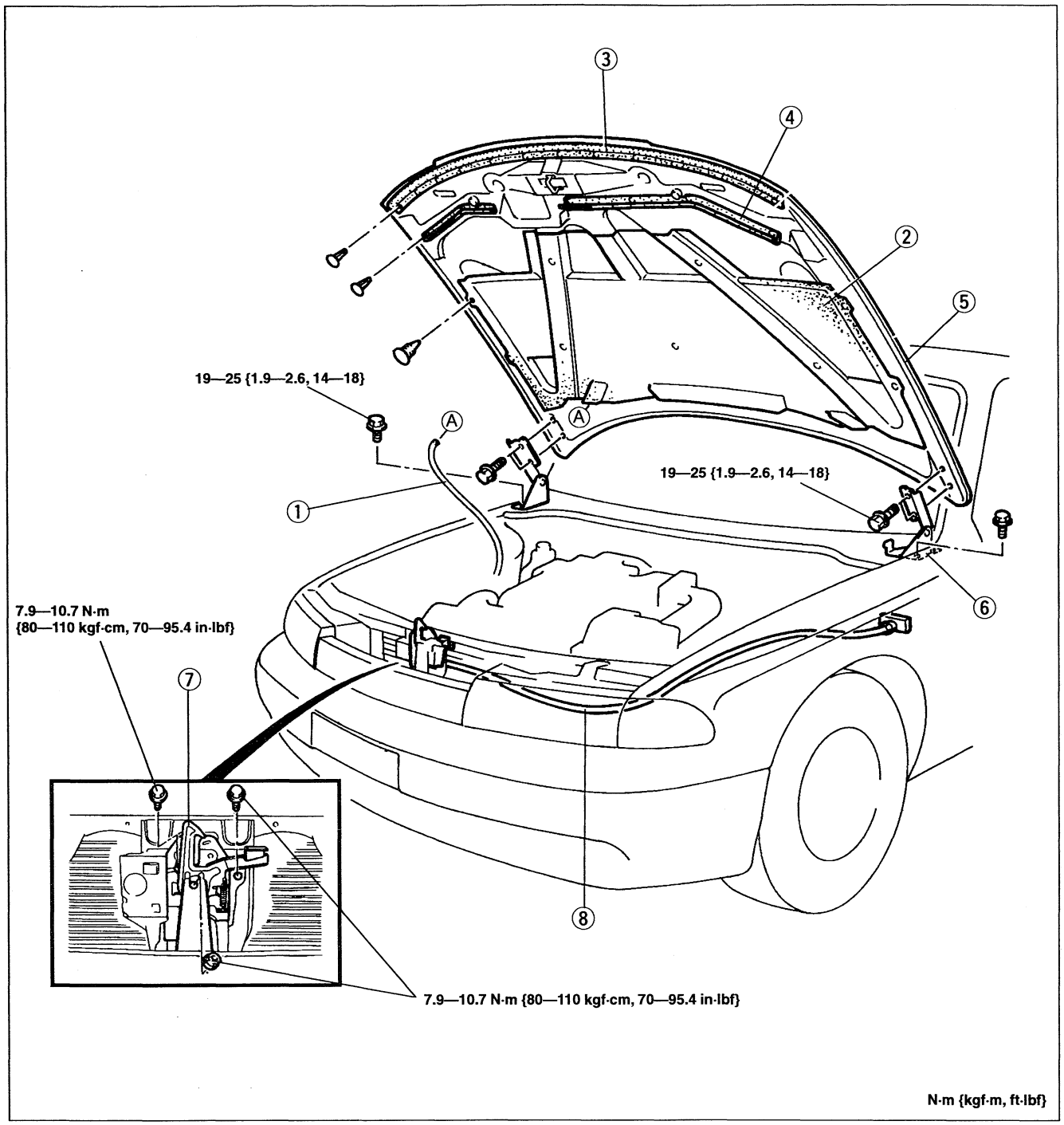
HOOD

COMPONENTS

Removal / Installation

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



1. Windshield washer pipe
2. Hood insulator
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5. Hood
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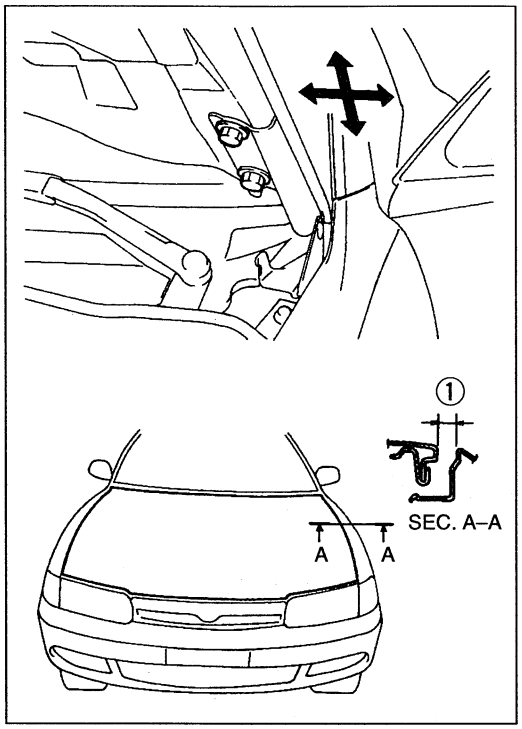


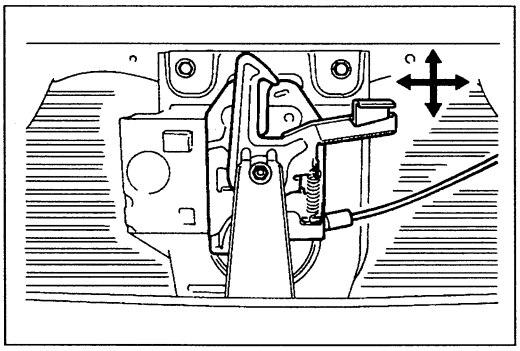
Adjustment
Hood

1. Verify that the hood can be closed easily and that there is no looseness.

   Clearance ①: 4.0 ± 1.0 mm {0.16 ± 0.04 in}

2. If not as specified, loosen the hood-to-hinge mounting bolts and reposition the hood.

   Tightening torque:
   19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



Hood lock

1. Adjust the hood lock after the hood has been aligned.
2. Loosen the hood lock mounting bolts and nut and align the lock with the striker on the hood.

   Tightening torque
   Bolts:
   7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}
   Nut:
   7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

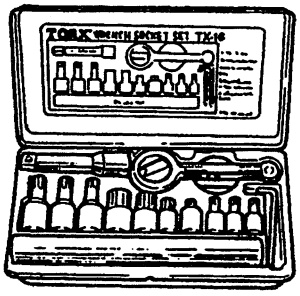
FRONT DOOR

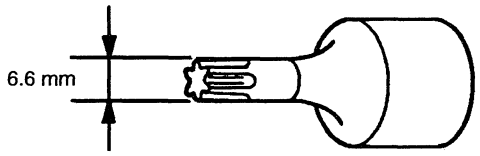
PREPARATION

TORX tool (T40)	For installation / removal of door lock striker

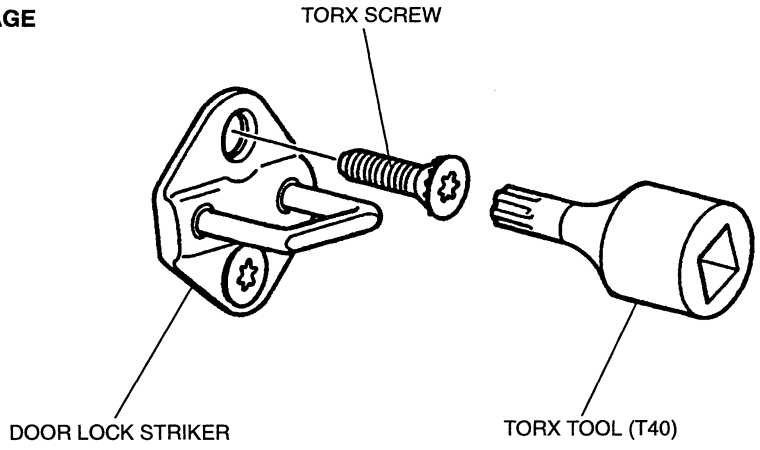
TORX TOOL (T40)

1. ILLUSTRATION





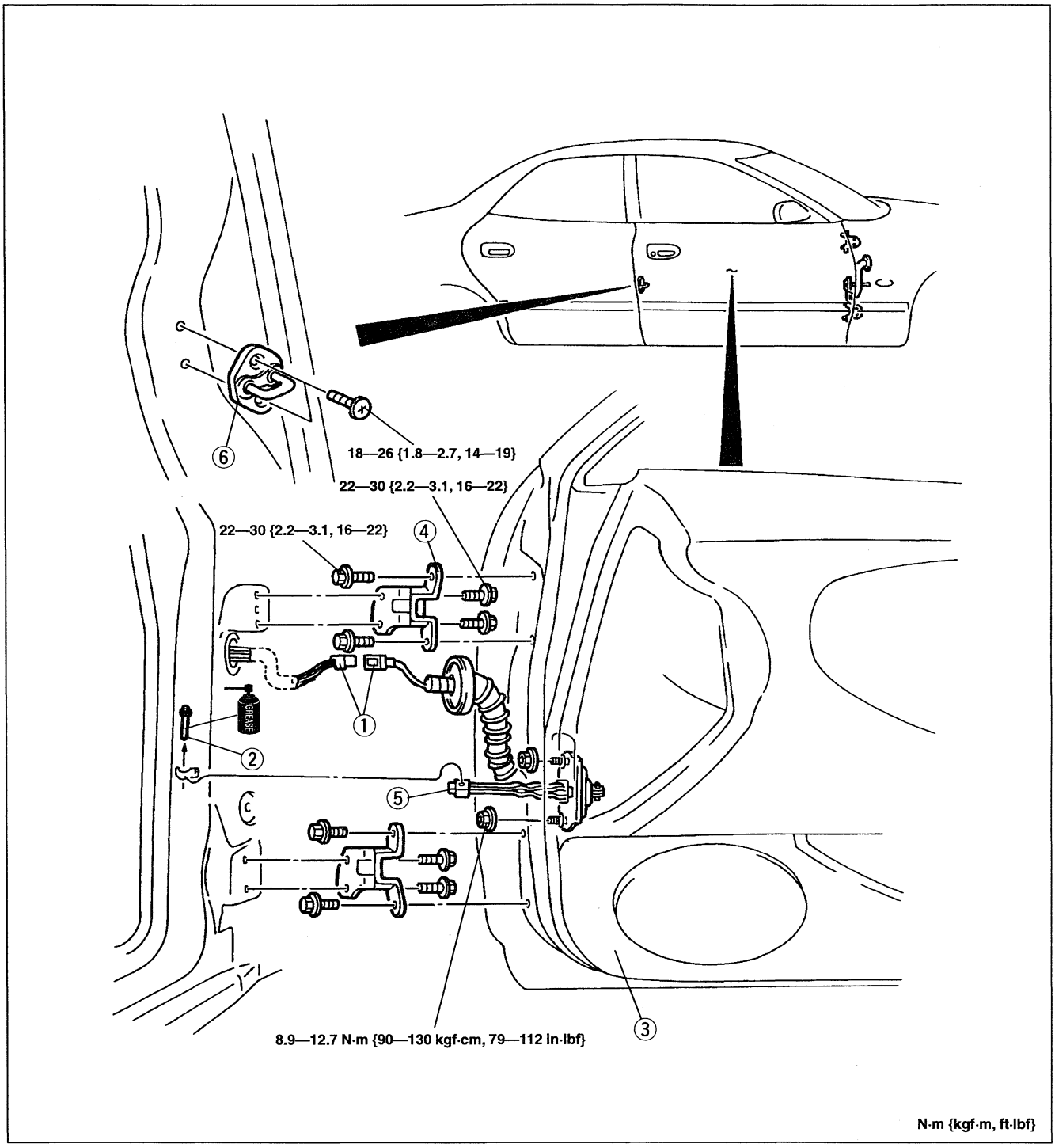
2. USAGE



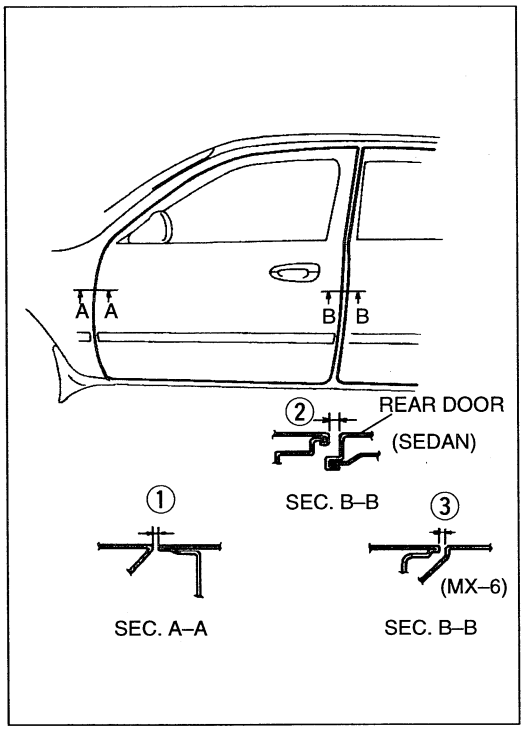
COMPONENTS

Removal / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure. To remove the checker, remove the door trim and door screen. (Refer to page S–10 or S–12.)
3. Install in the reverse order of removal.



1. Harness connector
2. Checker pin
3. Front door
   Adjustment ..... page S–9
4. Door hinge
5. Checker
6. Door lock striker
   Adjustment ..... page S–9



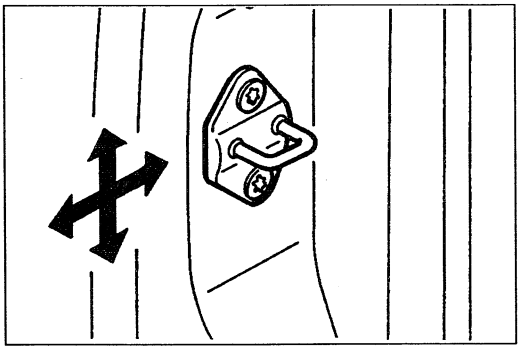
Adjustment
Front door

1. Verify that the front door can be closed easily and that there is no looseness or excessive clearance.

   Clearance ①: 4.0 ± 1.0 mm {0.16 ± 0.04 in}
   ②: 4.0 $^{+1.0}_{-0.5}$ mm {0.16 $^{+0.04}_{-0.02}$ in}
   ③: 4.0 ± 1.0 mm {0.16 ± 0.04 in}

2. If not as specified, loosen the door-hinge-to-body mounting bolts and reposition the front door.

   Tightening torque:
   22—30 N·m {2.2—3.1 kgf·m, 16—22 ft·lbf}



Door lock striker

1. Verify that the door can be closed easily and that there is no looseness.
2. If not correct, loosen the striker mounting screws and move the striker horizontally or vertically.

   Tightening torque:
   18—26 N·m {1.8—2.7 kgf·m, 14—19 ft·lbf}

FRONT WINDOW REGULATOR, GLASS AND GUIDE

COMPONENTS

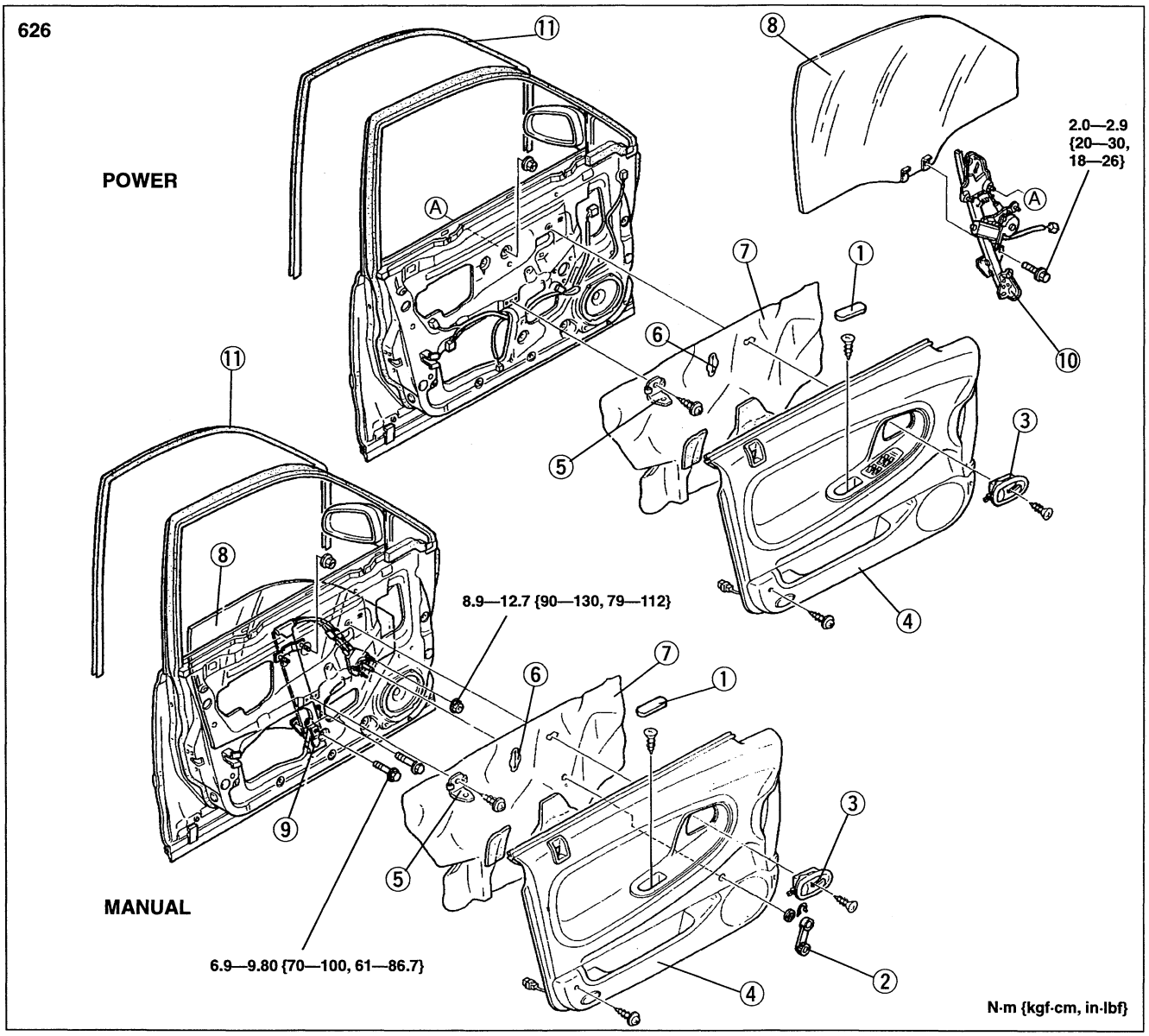
Removal / Installation

1. Raise the rear of the front door glass about **80 mm {3.2 in}** from the fully lowered position.
2. Disconnect the negative battery cable.

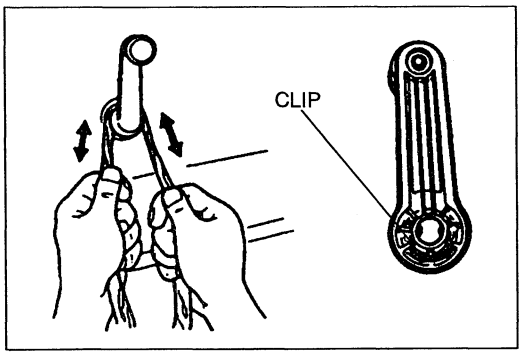
Note

- Remove the door screen carefully so that it may be reused.

3. Remove in the order shown in the figure, referring to **Removal note**.
4. Install in the reverse order of removal, referring to **Installation note**.

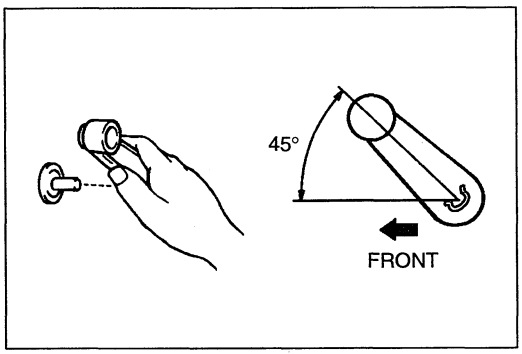


1. Recess cover
2. Regulator handle
   - Removal note ..... page S–11
   - Installation note ..... page S–11
3. Inner handle
4. Front door trim
   - Removal / Installation ..... page S–91
5. Bracket
6. Sealing pad
7. Door screen
8. Front door glass
9. Manual window regulator
10. Power window regulator
11. Glass run channel



Removal note
Regulator handle

Remove the regulator handle clip by using a rag as shown.



Installation note
Regulator handle

1. Raise the door glass fully.
2. Install the clip in the handle and push the regulator handle into position as shown.

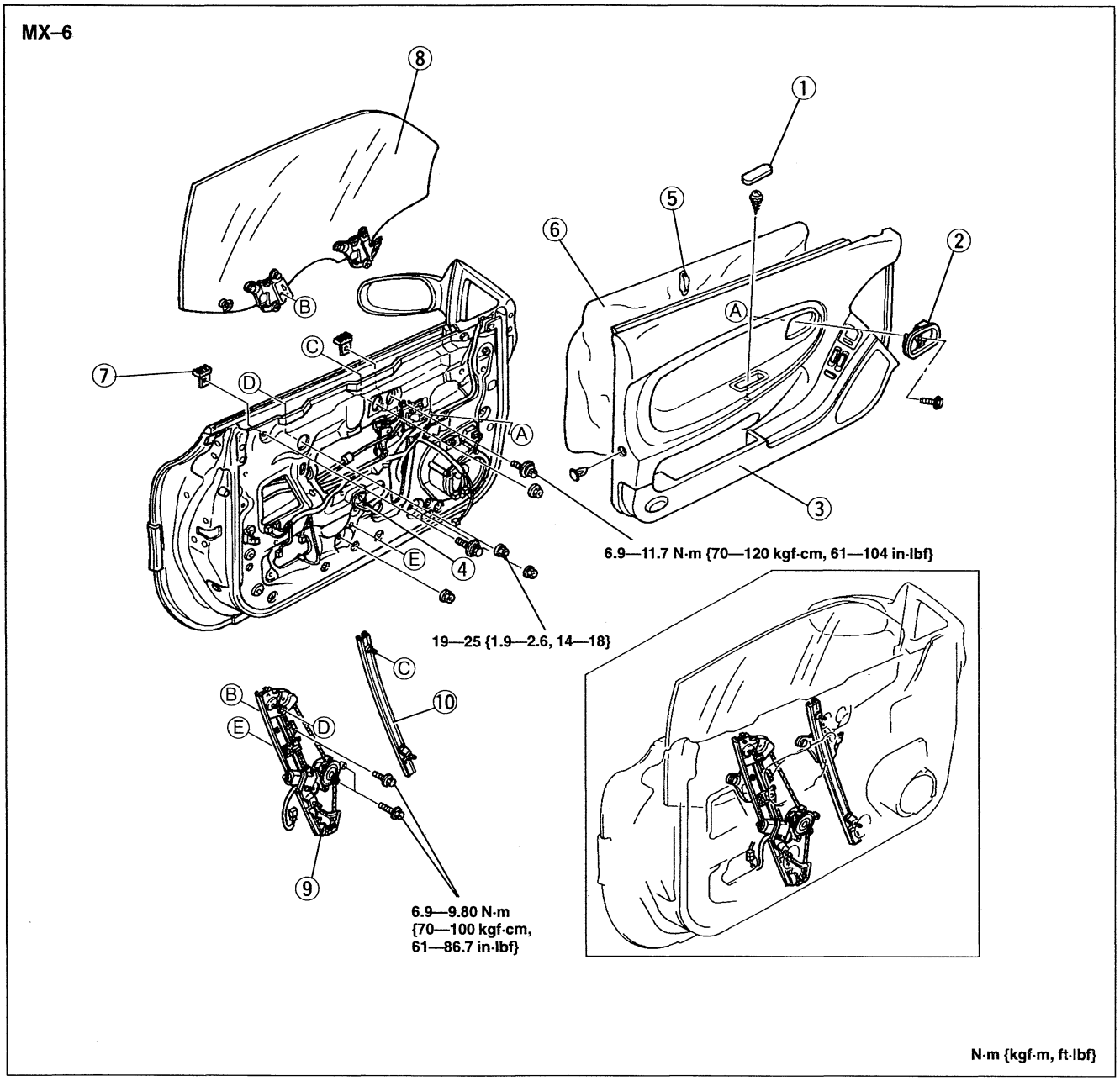
Removal / Installation

1. Raise the rear of the front door glass about **100 mm {3.9 in}** from the fully lowered position.
2. Disconnect the negative battery cable.

Note

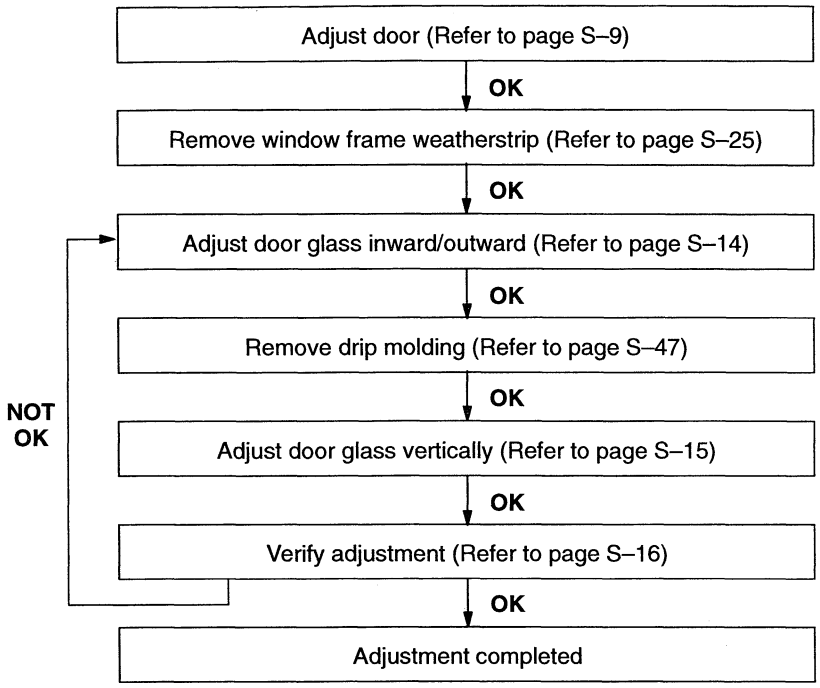
- Remove the door screen carefully so that it may be reused.
- Mark around the upper glass stopper mounting bolts with paint before removing them.

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



1. Recess cover
2. Inner handle cover
3. Door trim
   Removal / Installation ..... page S–93
4. Bracket
5. Sealing pad
6. Door screen
7. Upper glass stopper
8. Door glass
   Adjustment ..... page S–13
9. Power window regulator
10. Glass guide

Adjustment
Door glass (MX–6)
Adjust the door glass on the MX–6 as follows.

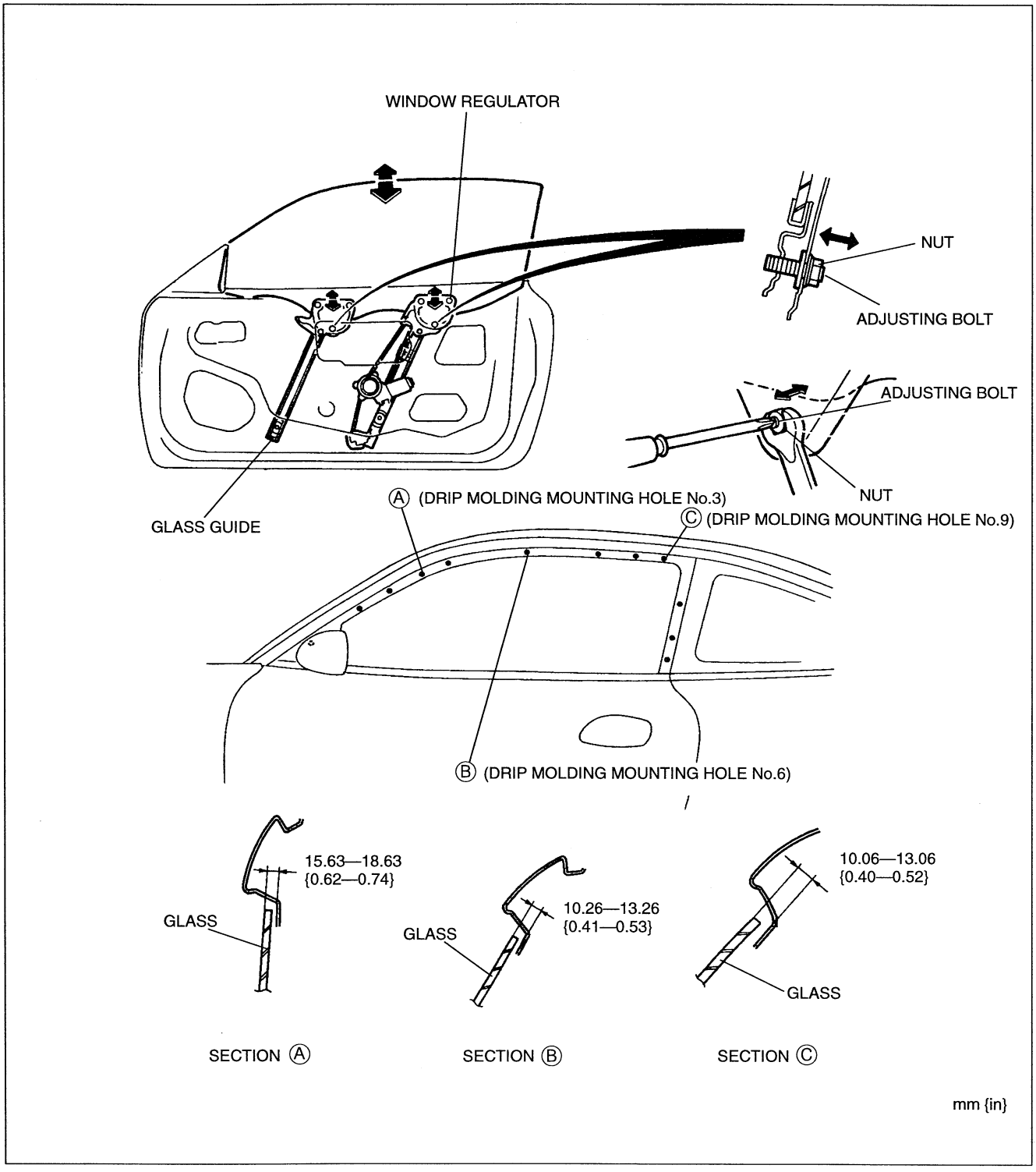


Inward/outward adjustment of door glass

Note
- The door glass moves outward about **1.5 mm {0.06 in}** with one clockwise turn of the adjusting bolt.

1. Loosen the front and rear bracket installation nuts.
2. Move the adjusting bolts inward or outward by using a screwdriver until the upper and side edges of the door glass are in the correct positions.
3. Tighten the installation nuts while holding the adjusting bolt with a screwdriver.

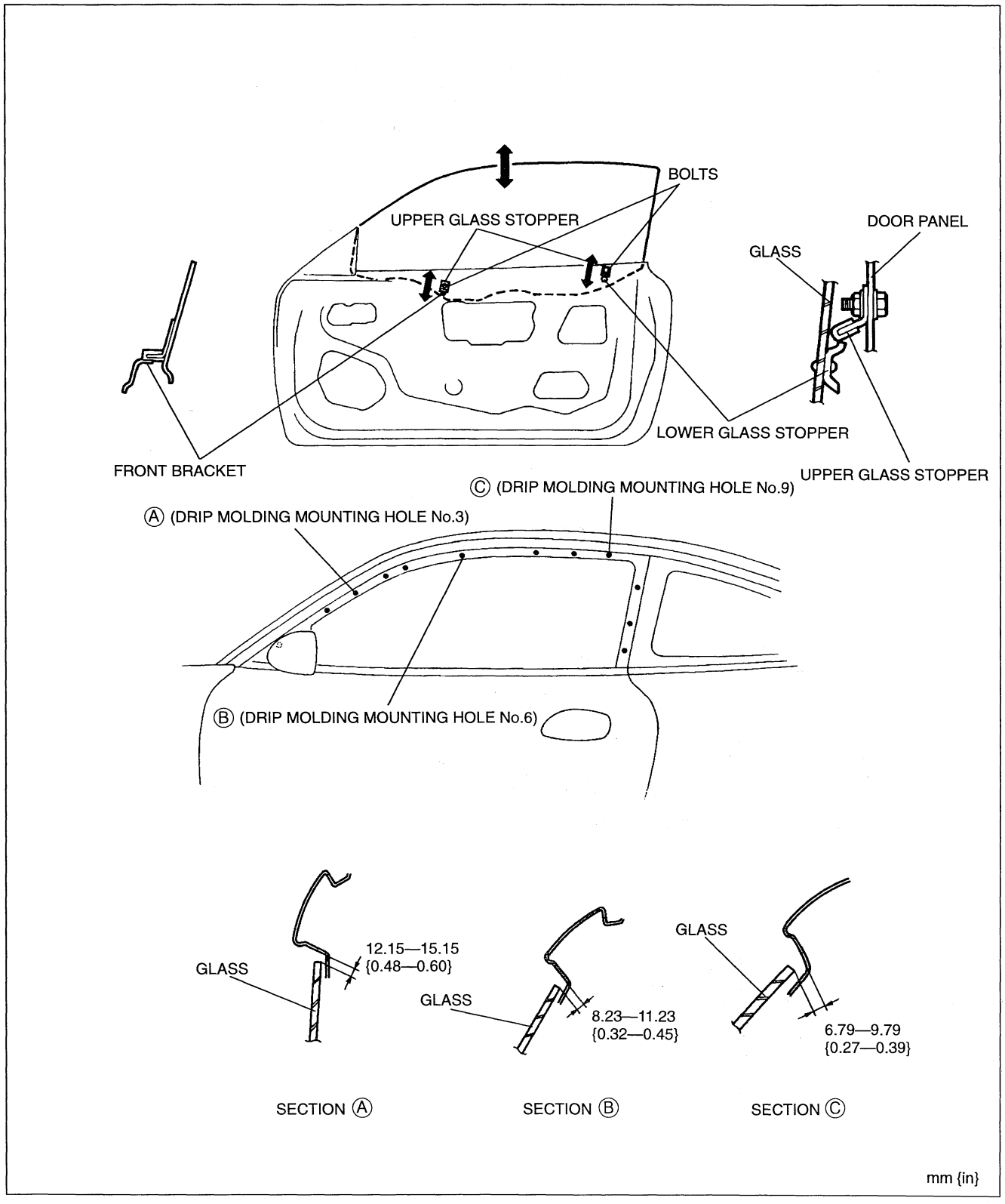
Tightening torque: 5.9—8.8 N·m {60—90 kgf·cm, 53—78 in·lbf}



Vertical adjustment of door glass

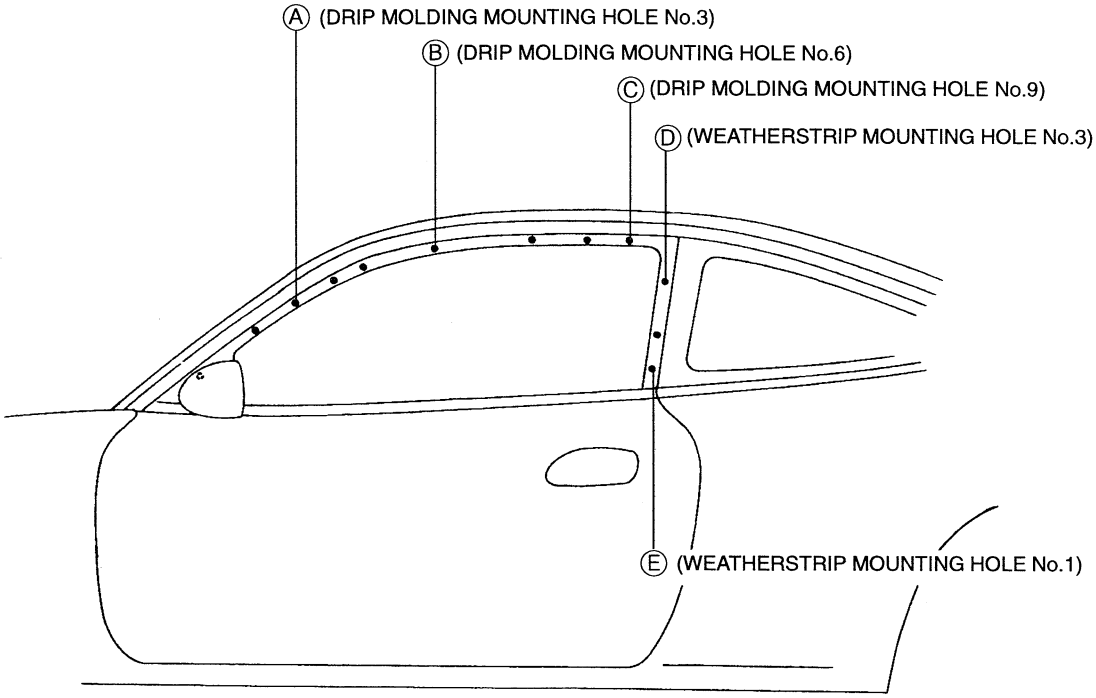
1. Loosen the upper glass stopper installation bolts.
2. Lower the door glass slightly.
3. Move the upper glass stoppers up or down so that the upper edge of the door glass is in the correct position.
4. Tighten the installation bolts.

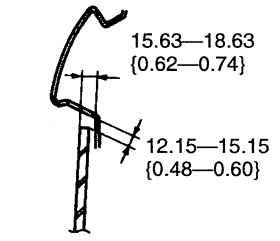
Tightening torque: 6.9—11.7 N·m {70—120 kgf·cm, 61—104 in·lbf}



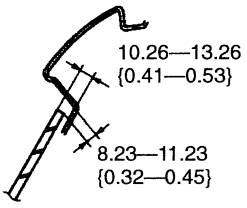
After completion of adjustment

1. Verify the following with the weatherstrip and drip molding removed:
   (1) The door glass is in the correct position when fully closed.
   (2) When the door glass is raised, the lower glass stoppers contact the upper glass stoppers at the same time.
2. Verify the following with the weatherstrip installed:
   (1) The weatherstrip mounting is correct.
   (2) The door glass raises and lowers smoothly with the door closed.

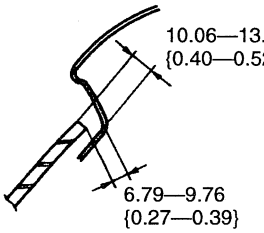




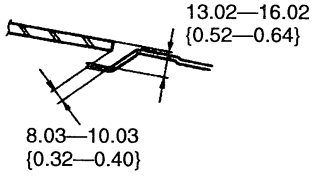
SECTION Ⓐ



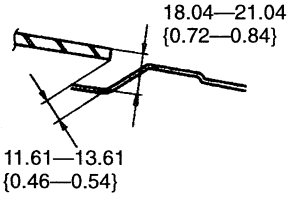
SECTION Ⓑ



SECTION Ⓒ



SECTION Ⓓ



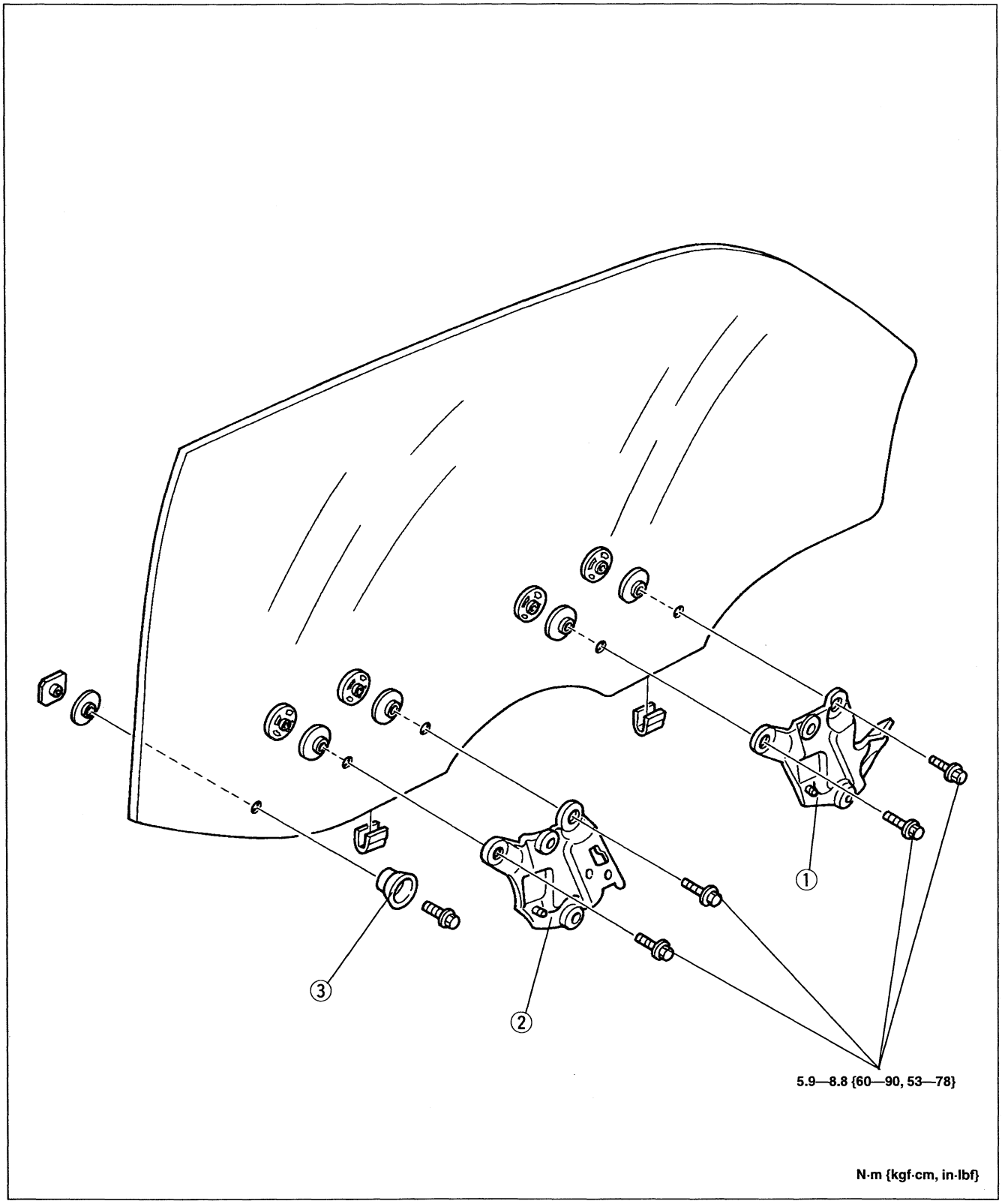
SECTION Ⓔ

mm {in}

FRONT DOOR GLASS

Disassembly / Assembly

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.



1. Front bracket
2. Rear bracket
3. Lower glass stopper

FRONT DOOR LOCK AND OPENER

COMPONENTS

Removal / Installation

1. Raise the front door glass fully.
2. Disconnect the negative battery cable.

Note

- Remove the door screen carefully so that it may reused.

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

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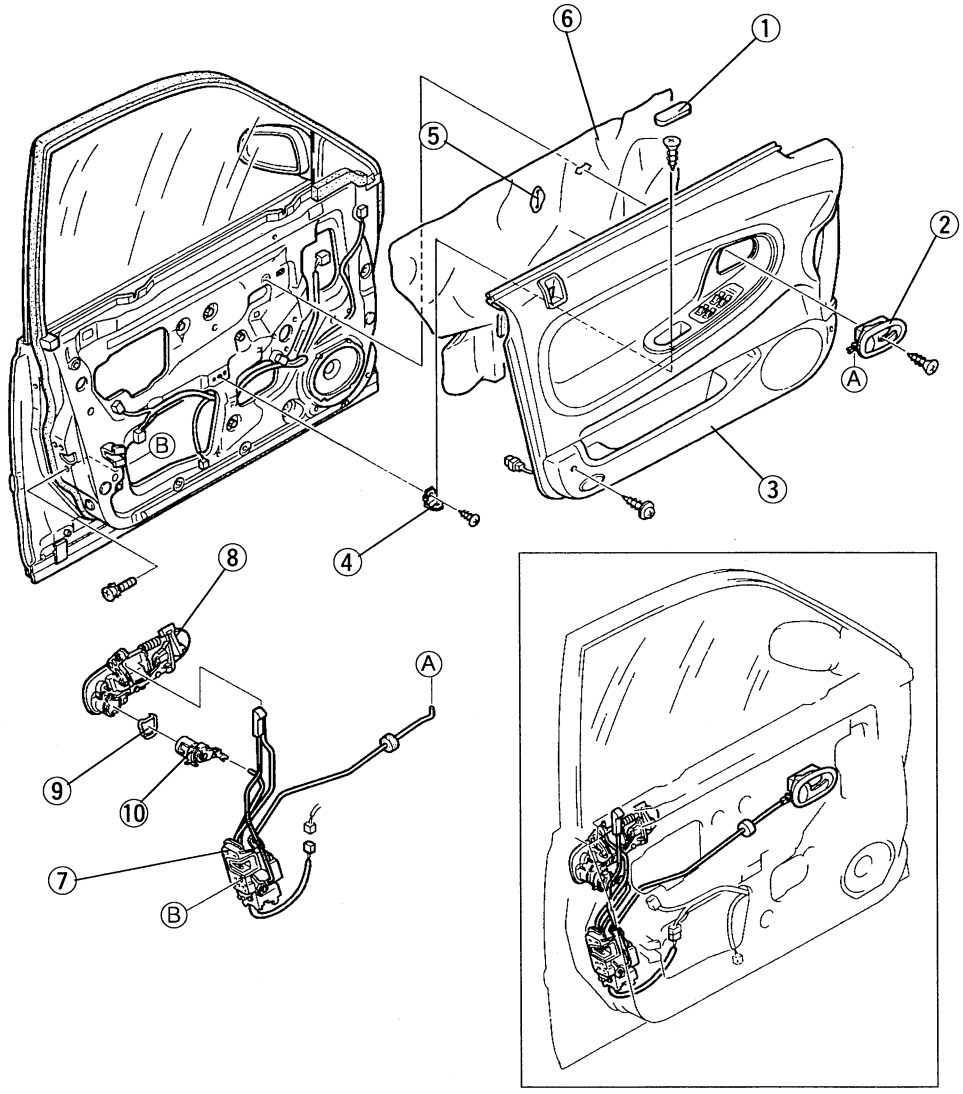
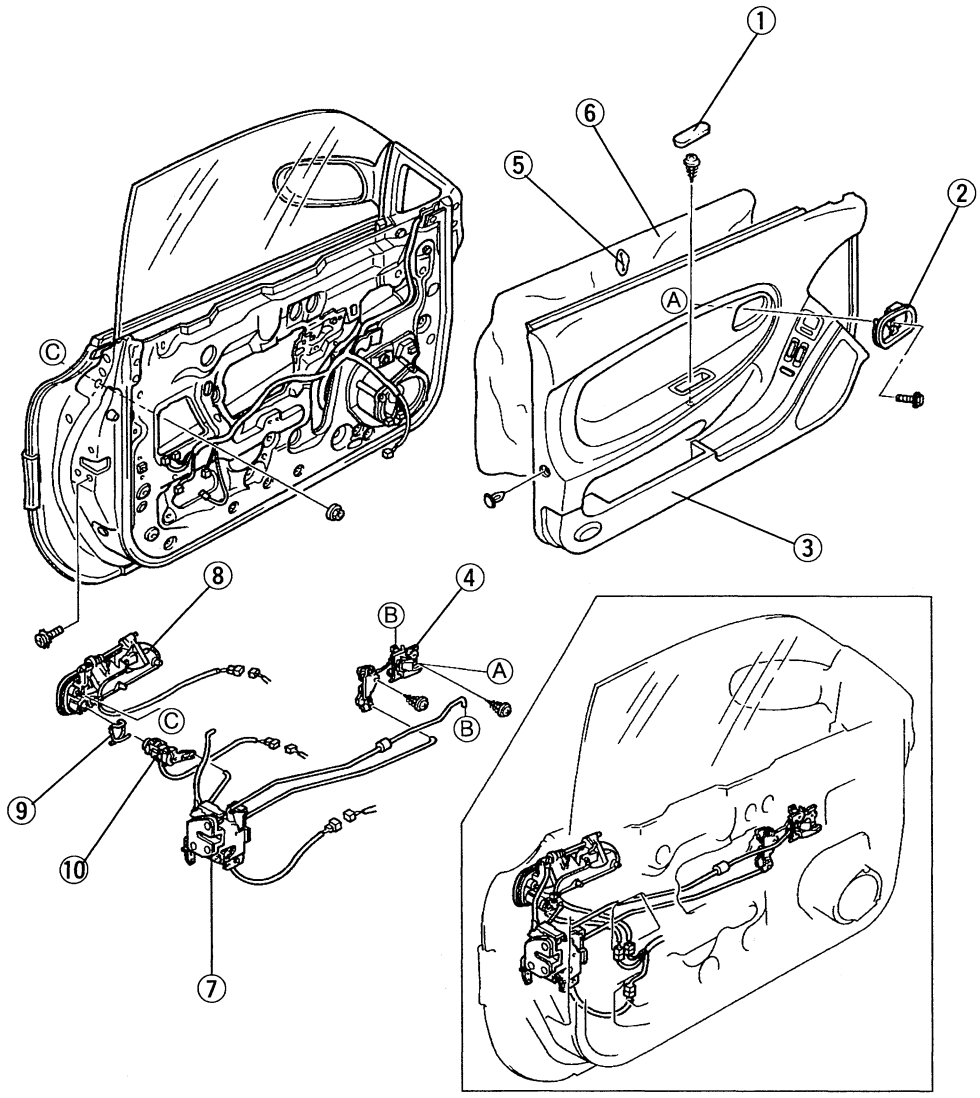


1. Recess cover
2. Inner handle
3. Front door trim
   Removal / Installation . . . . . page S–91
4. Bracket
5. Sealing pad
6. Door screen
7. Front door lock
8. Outer handle
9. Lock cylinder retainer
10. Lock cylinder

MX–6



1. Recess cover
2. Inner handle cover
3. Door trim
   Removal / Installation . . . . . page S–93
4. Inner handle
5. Sealing pad
6. Door screen
7. Door lock
8. Outer handle
9. Lock cylinder retainer
10. Lock cylinder

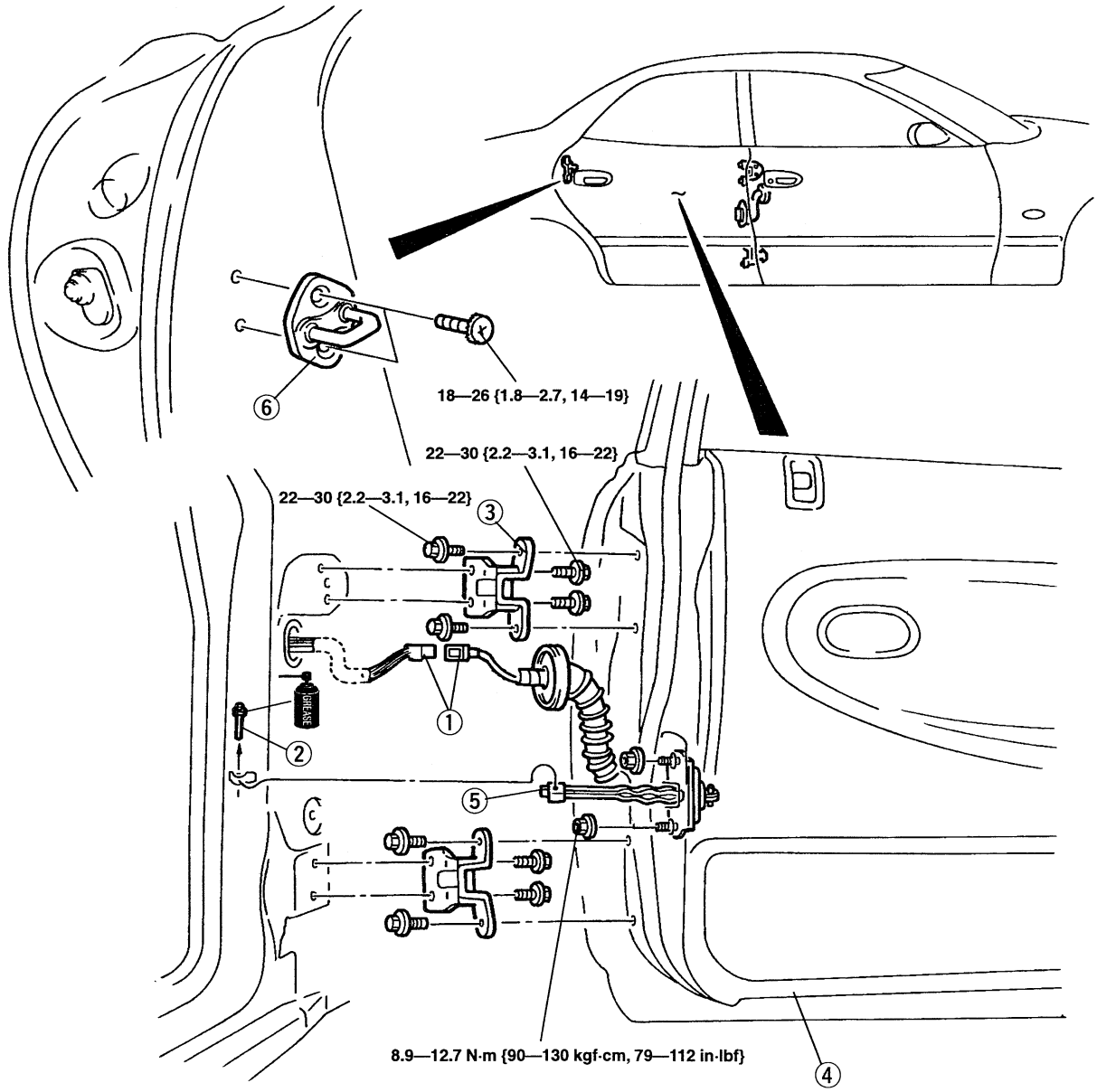
REAR DOOR

COMPONENTS

Removal / Installation

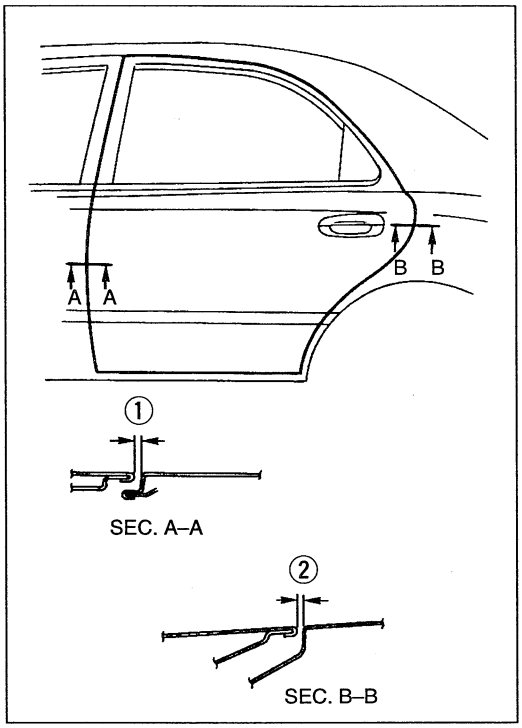
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure. To remove the checker, remove the door trim and door screen. (Refer to page S–22 or S–24.)
3. Install in the reverse order of removal.

626



N·m {kgf·m, ft·lbf}

1. Harness connector
2. Checker pin
3. Door hinge
4. Rear door
   Adjustment ..... page S–21
5. Checker
6. Door lock striker
   Adjustment ..... page S–21



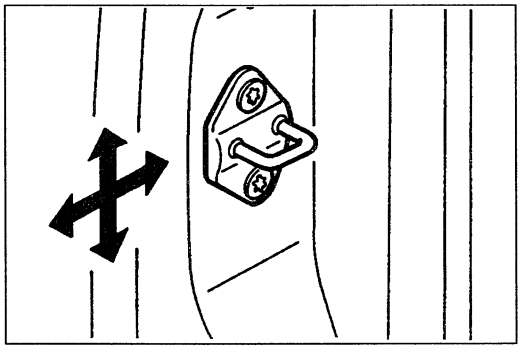
Adjustment
Rear door

1. Verify that the rear door can be closed easily and that there is no looseness or excessive clearance.

   Clearance ①: 4.0 $^{+1.0}_{-0.5}$ mm {0.16 $^{+0.04}_{-0.02}$ in}
   ②: 4.0 ± 1.0 mm {0.16 ± 0.04 in}

2. If not as specified, loosen the door-hinge-to-body mounting bolts and reposition the door.

   Tightening torque:
   22—30 N·m {2.2—3.1 kgf·m, 16—22 ft·lbf}



Door lock striker

1. Verify that the door can be closed easily and that there is no looseness.
2. If necessary, loosen the striker mounting screws and move the striker horizontally or vertically.

   Tightening torque:
   18—26 N·m {1.8—2.7 kgf·m, 14—19 ft·lbf}

REAR WINDOW REGULATOR, GLASS AND GUIDE

COMPONENTS

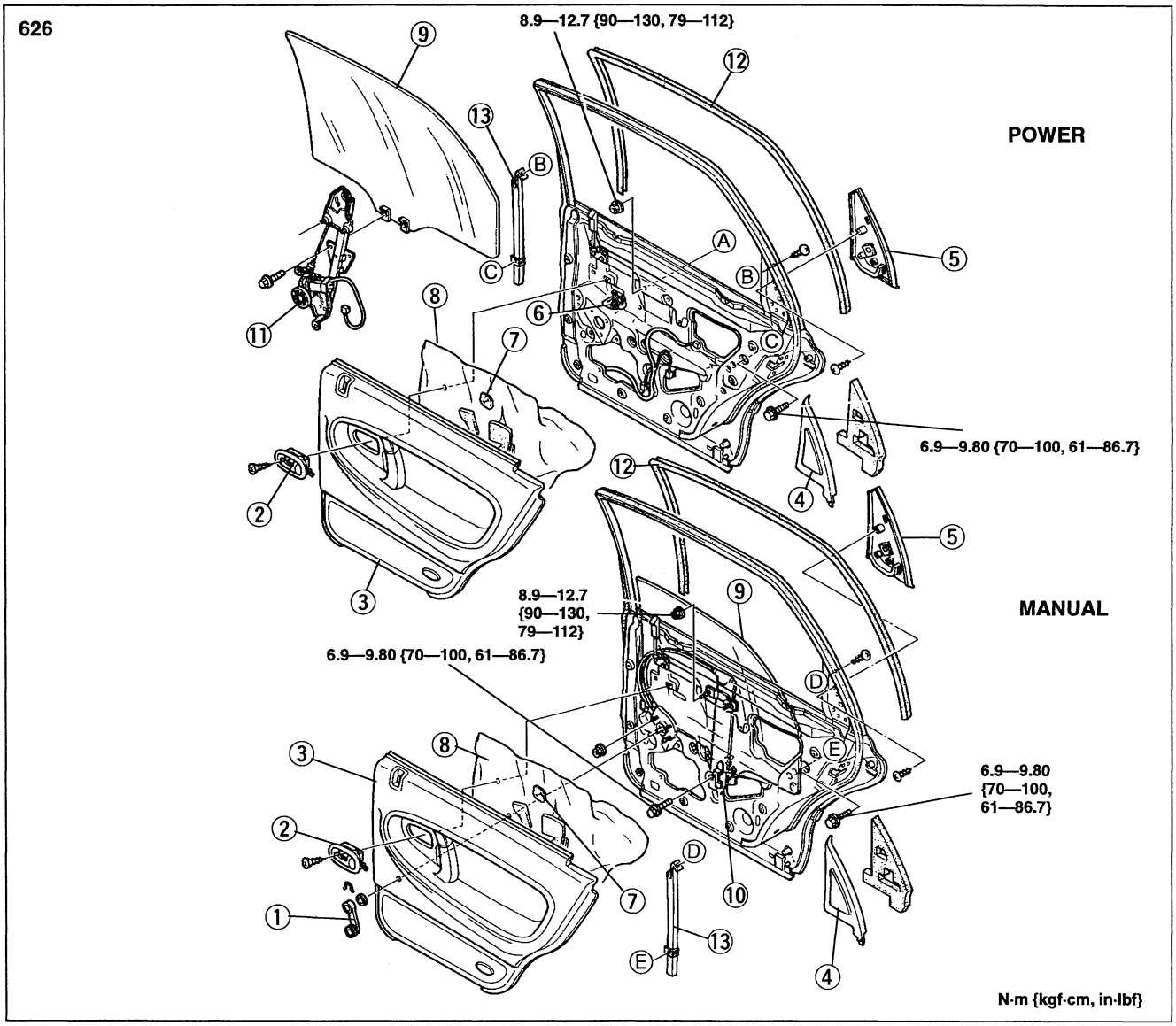
Removal / Installation

1. Raise the front of the rear door glass about **50 mm {2.0 in}** from the fully lowered position.
2. Disconnect the negative battery cable.

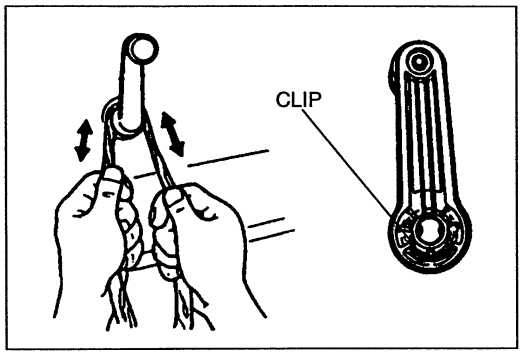
Note

- Remove the door screen carefully so that it may be reused.

3. Remove in the order shown in the figure, referring to **Removal note**.
4. Install in the reverse order of removal, referring to **Installation note**.

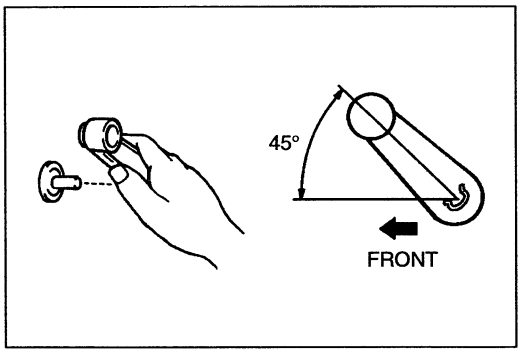


1. Regulator handle
   - Removal note ..... page S–23
   - Installation note ..... page S–23
2. Inner handle
3. Rear door trim
   - Removal / Installation ..... page S–91
4. Inner garnish
5. Outer garnish
6. Bracket
7. Sealing pad
8. Door screen
9. Rear door glass
10. Manual window regulator
11. Power window regulator
12. Glass run channel
13. Glass guide



Removal note
Regulator handle

Remove the regulator handle clip by using a rag as shown.



Installation note
Regulator handle

1. Raise the door glass fully.
2. Install the clip in the handle and push the regulator handle into position as shown.

REAR DOOR LOCK AND OPENER

COMPONENTS

Removal / Installation

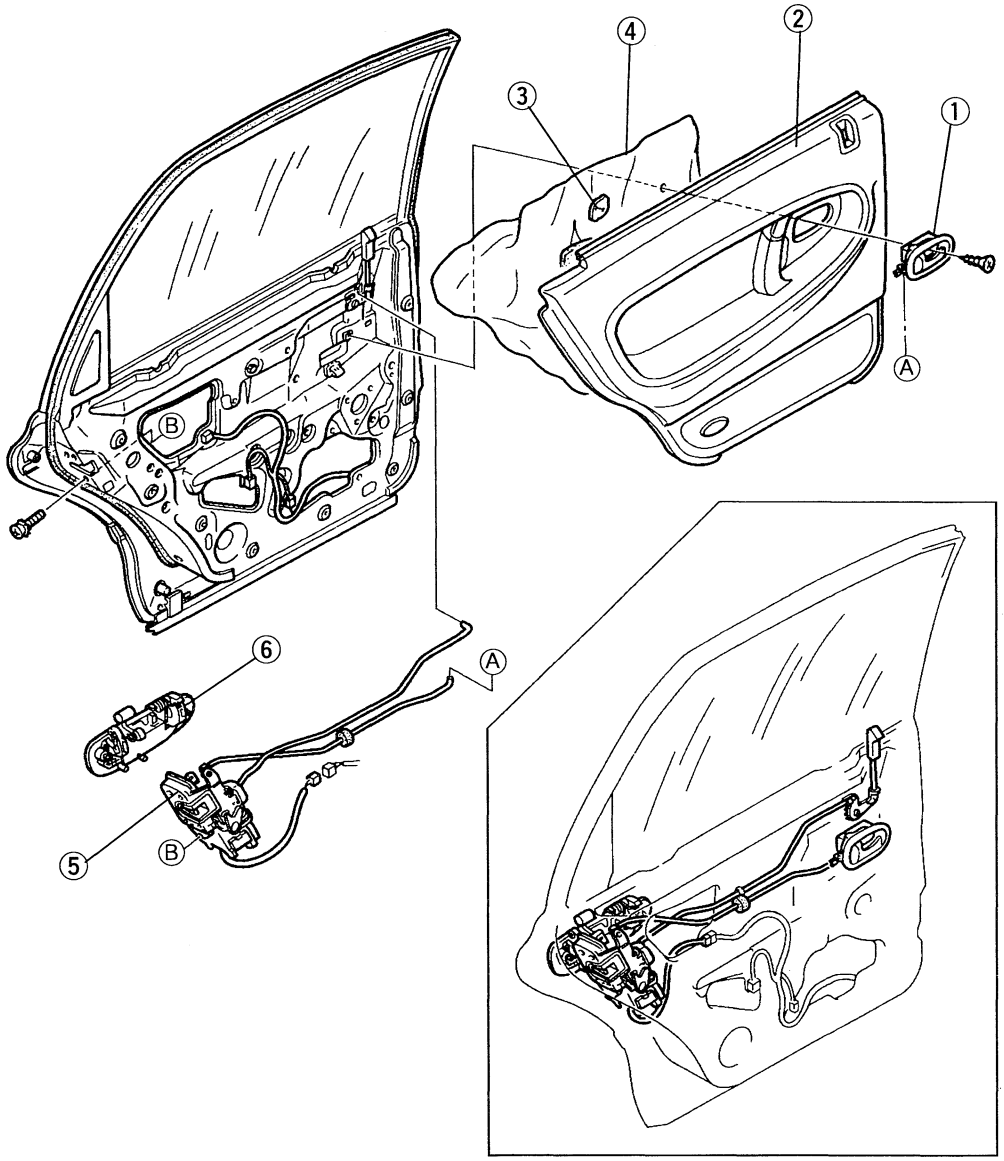
1. Raise the rear door glass fully.
2. Disconnect the negative battery cable.

Note

- Remove the door screen carefully so that it may be reused.

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

626



1. Inner handle
2. Rear door trim
   Removal / Installation . . . . . page S–91
3. Sealing pad
4. Door screen
5. Rear door lock
6. Outer handle

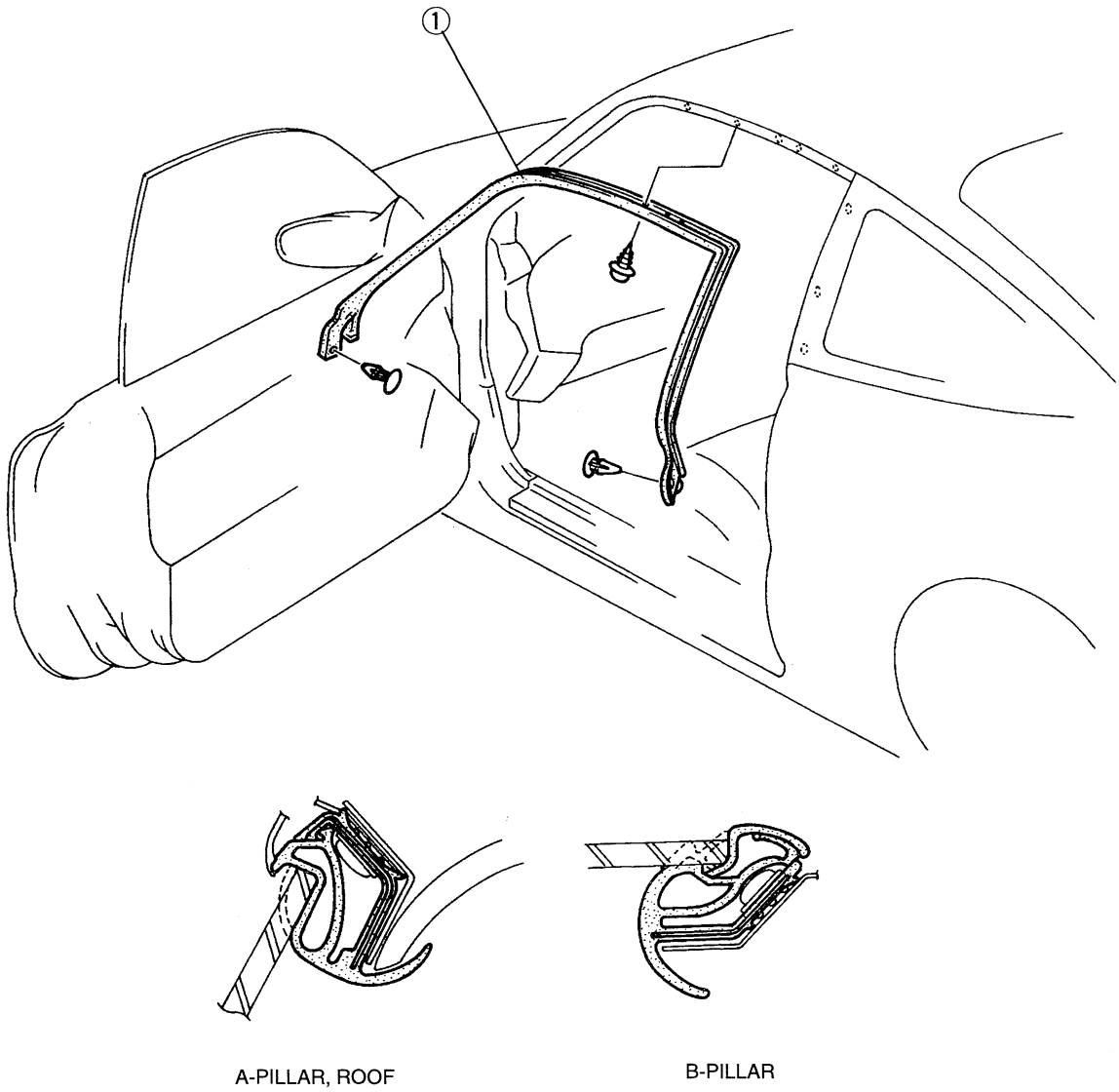
WINDOW FRAME WEATHERSTRIP

COMPONENTS

Removal / Installation

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

MX–6



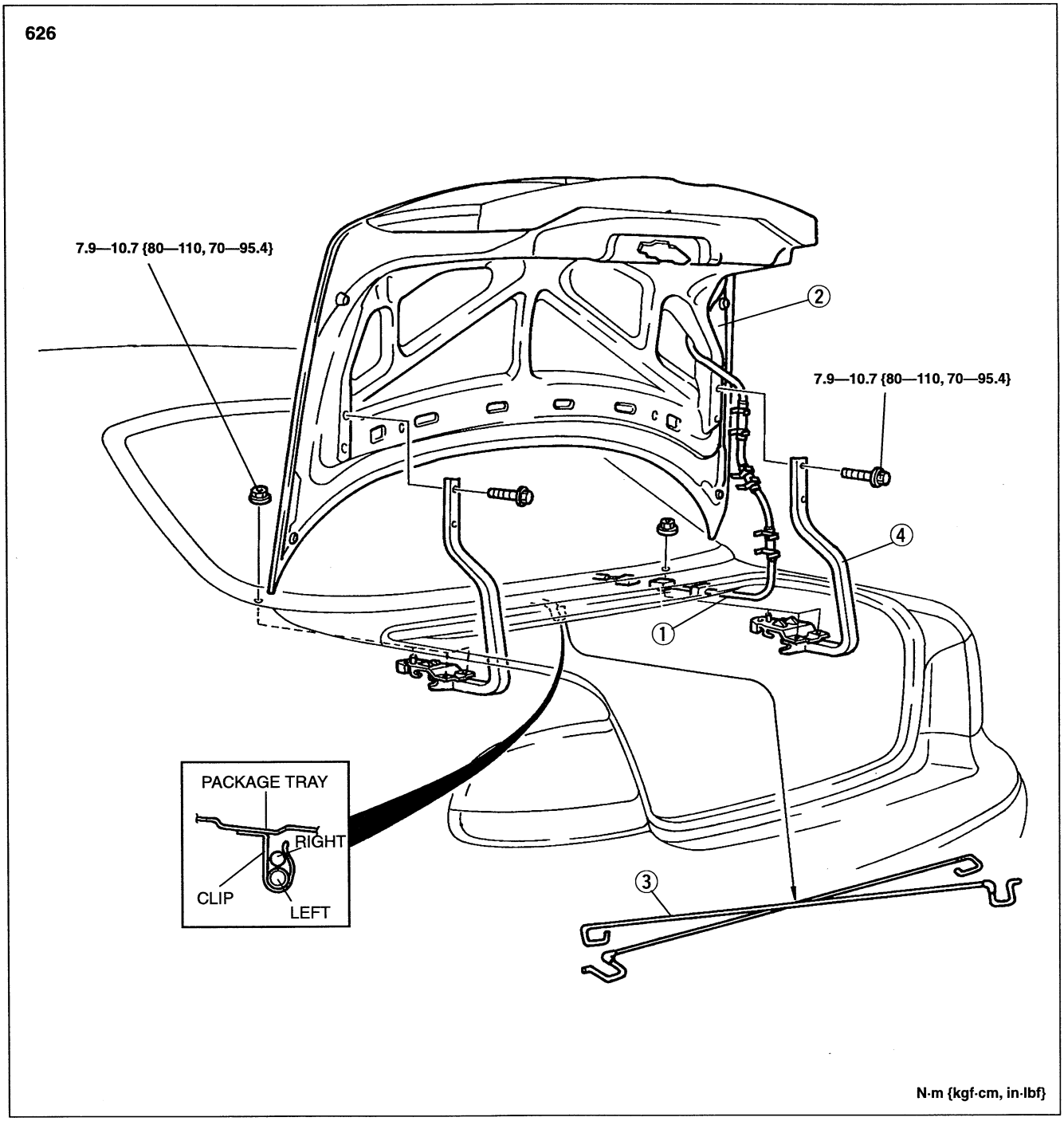
1. Window frame weatherstrip

TRUNK LID

COMPONENTS

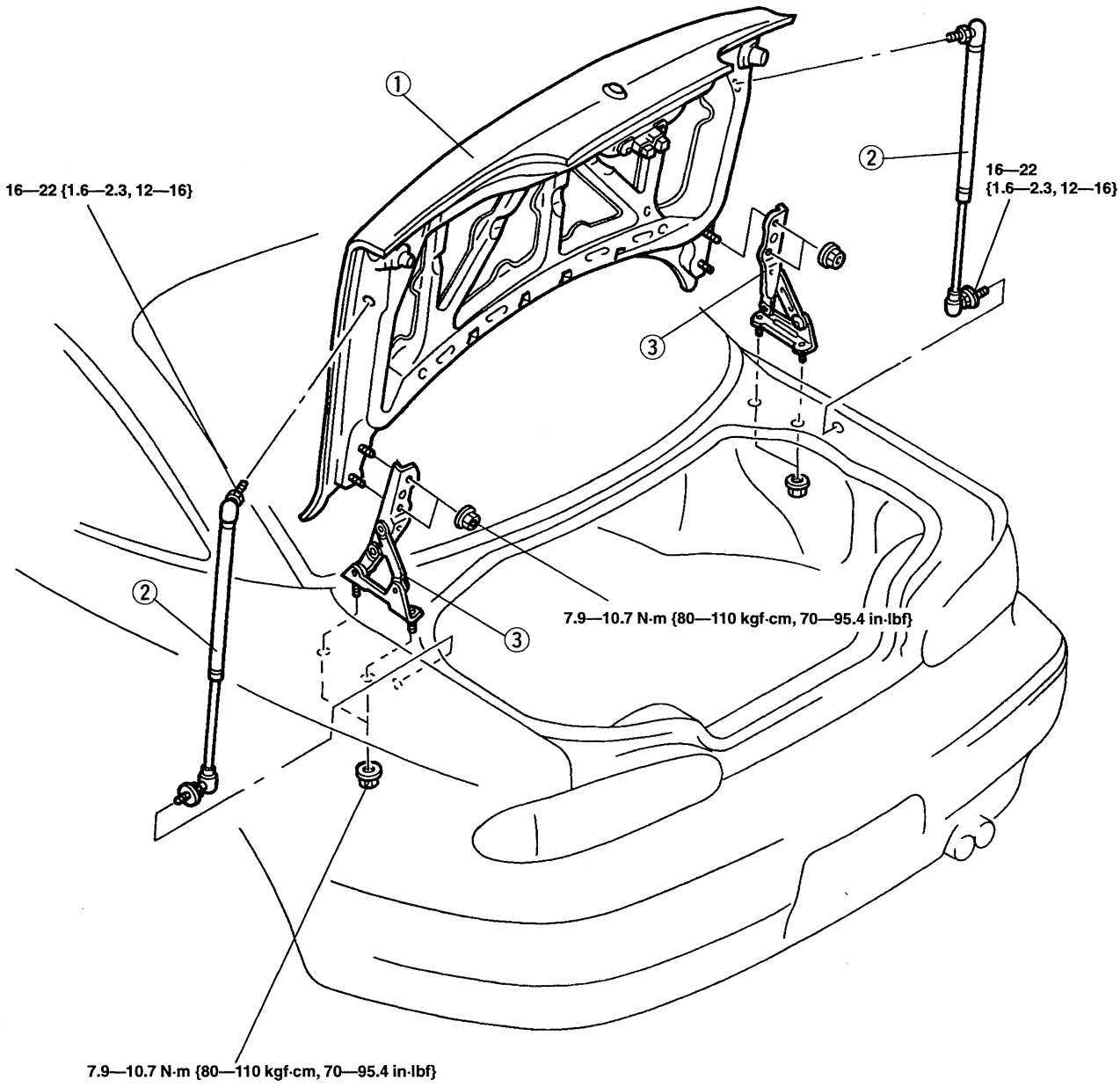
Removal / Installation

1. Disconnect the negative battery cable.
2. Remove the trunk lid trim. (Refer to page S–91.)
3. Remove in the order shown in the figure, referring to **Removal note**.
4. Install in the reverse order of removal.

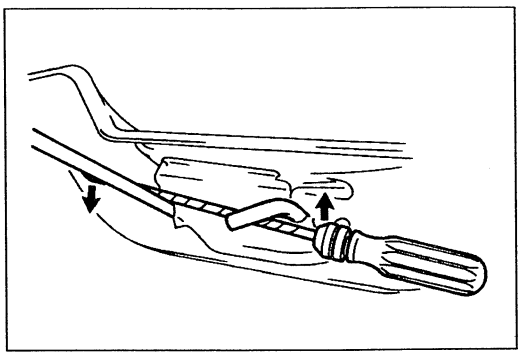


1. Harness
2. Trunk lid
   Adjustment ..... page S–28
3. Balance spring
   Removal note ..... page S–28
   Adjustment ..... page S–28
4. Trunk lid hinge

MX–6



1. Trunk lid
   Adjustment ..... page S–28
2. Stay damper
3. Trunk lid hinge



Removal note
Balance spring

Warning
- **Removing the balance spring without securing the trunk lid can be dangerous. The trunk lid may fall and injure you. Open the trunk lid fully and secure it before removing the balance spring.**

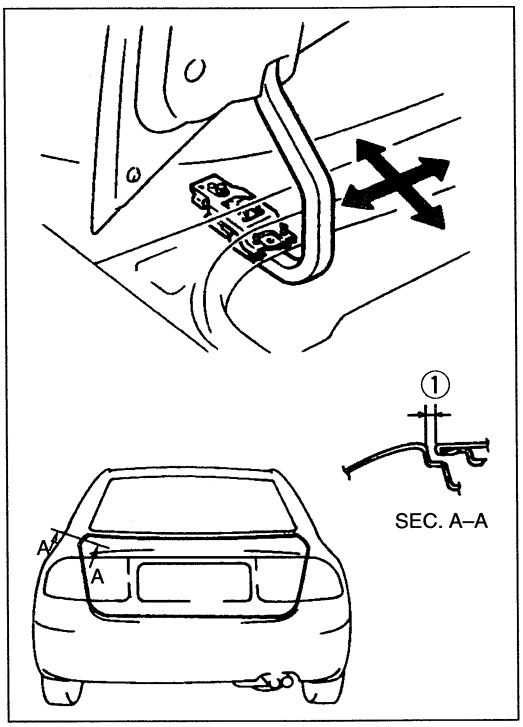
1. Lift the balance spring by using a screwdriver which has been wrapped in tape.
2. Remove the balance spring.

Adjustment
Trunk lid
1. Verify that the trunk lid can be closed easily and that there is no looseness or excessive clearance.

   Clearance ①: 4.0 ± 0.8 mm {0.16 ± 0.03 in}

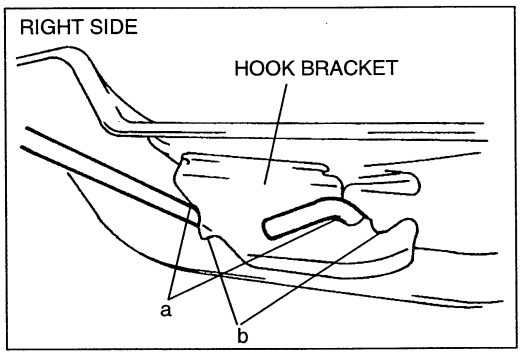
2. If not as specified, loosen the trunk-lid-to-hinge mounting nuts and reposition the trunk lid.

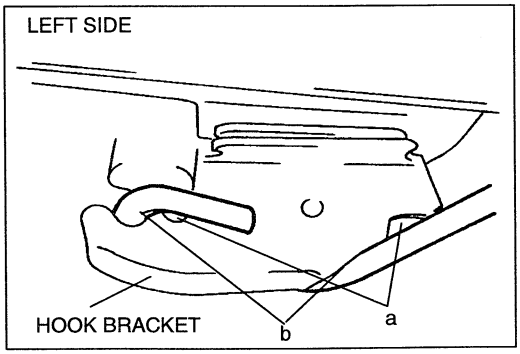
   Tightening torque:
   7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



Balance spring

Slide the balance spring to the desired position by using a screwdriver which has been wrapped in tape.





Tension \ Set position	Hook bracket	a	b
Standard	Left side		○
	Right side	○	
Increase	Left side		○
	Right side		○
Decrease	Left side	○	
	Right side	○	

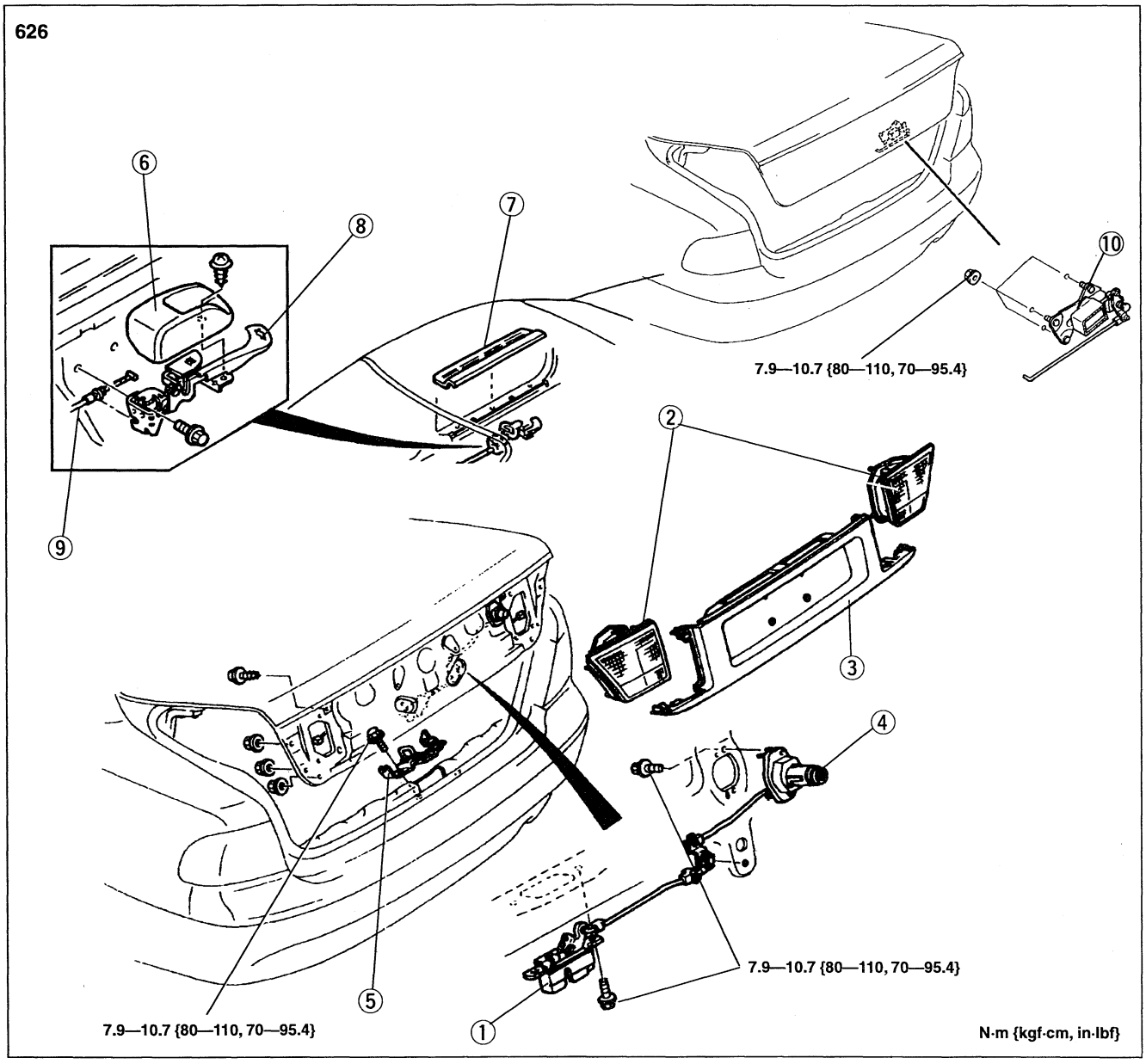
○: Position

TRUNK LID LOCK AND OPENER

COMPONENTS

Removal / Installation

1. Remove the trunk lid trim. (Refer to page S–91.)
2. Disconnect the negative battery cable.
3. Remove in the order shown in the figure. To remove the trunk lid striker, remove the trunk end trim. (Refer to page S–91.)
4. Install in the reverse order of removal.

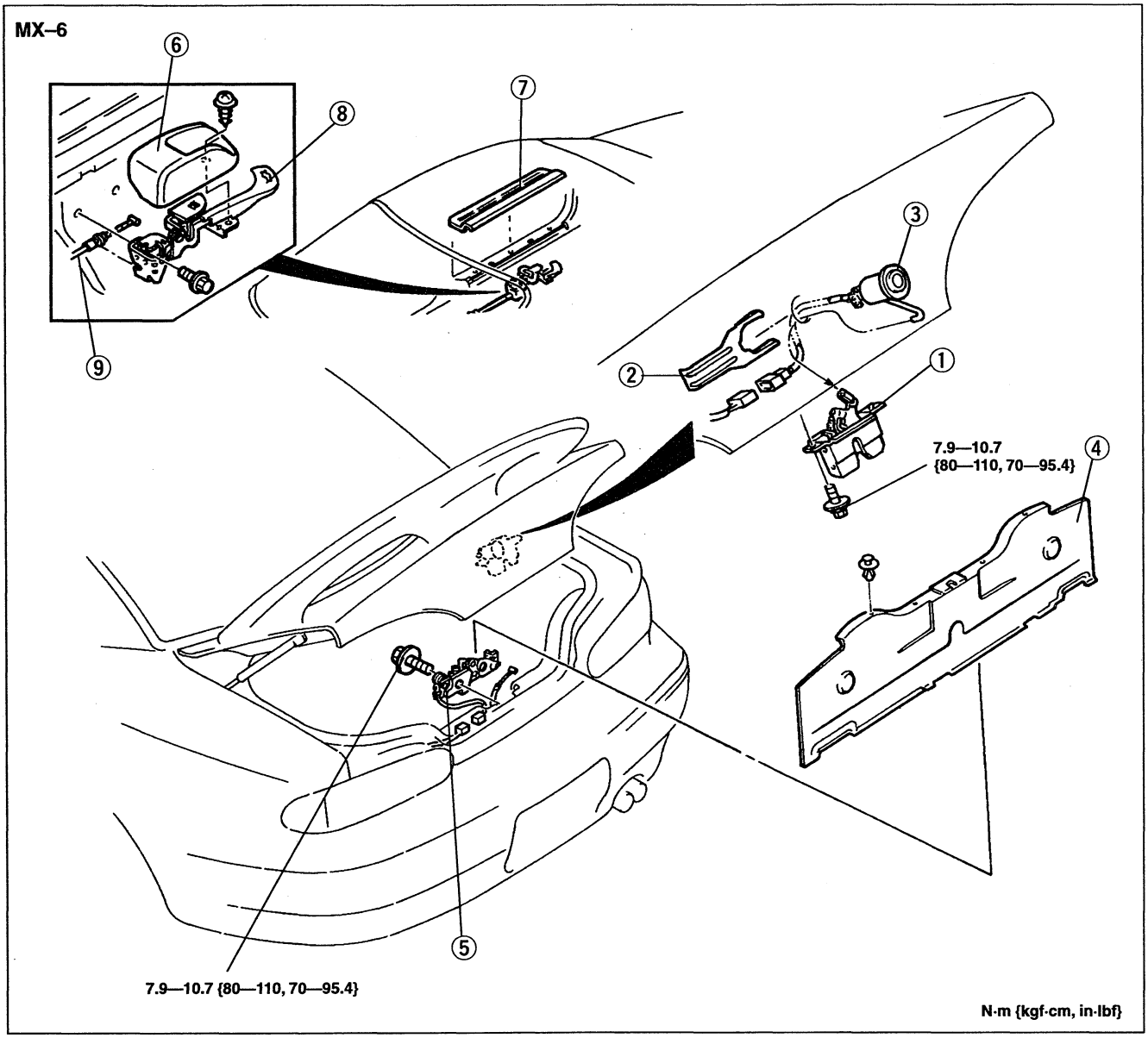


Without keyless entry system

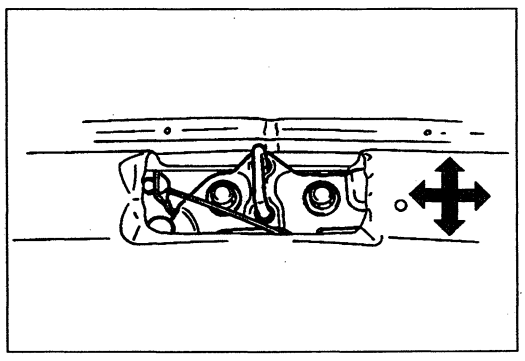
1. Trunk lid lock
2. Inboard combination light
3. Rear finisher
   Removal / Installation ..... page S–41
4. Lock cylinder
5. Trunk lid striker
   Adjustment ..... page S–30
6. Trunk lid opener cover
7. Front scuff plate
   Removal / Installation ..... page S–91
8. Trunk lid opener lever
9. Trunk lid opener cable

With keyless entry system

1. Trunk lid lock
2. Trunk lid striker
   Adjustment ..... page S–30
3. Trunk lid actuator



1. Trunk lid lock
2. Lock cylinder retainer
3. Lock cylinder
4. Trunk end trim
   Removal / Installation ..... page S–93
5. Trunk lid striker
   Adjustment ..... below
6. Trunk lid opener cover
7. Scuff plate
8. Trunk lid opener lever
9. Trunk lid opener cable



Adjustment

Trunk lid striker

Loosen the trunk lid striker mounting bolts and align the striker with the lock assembly.

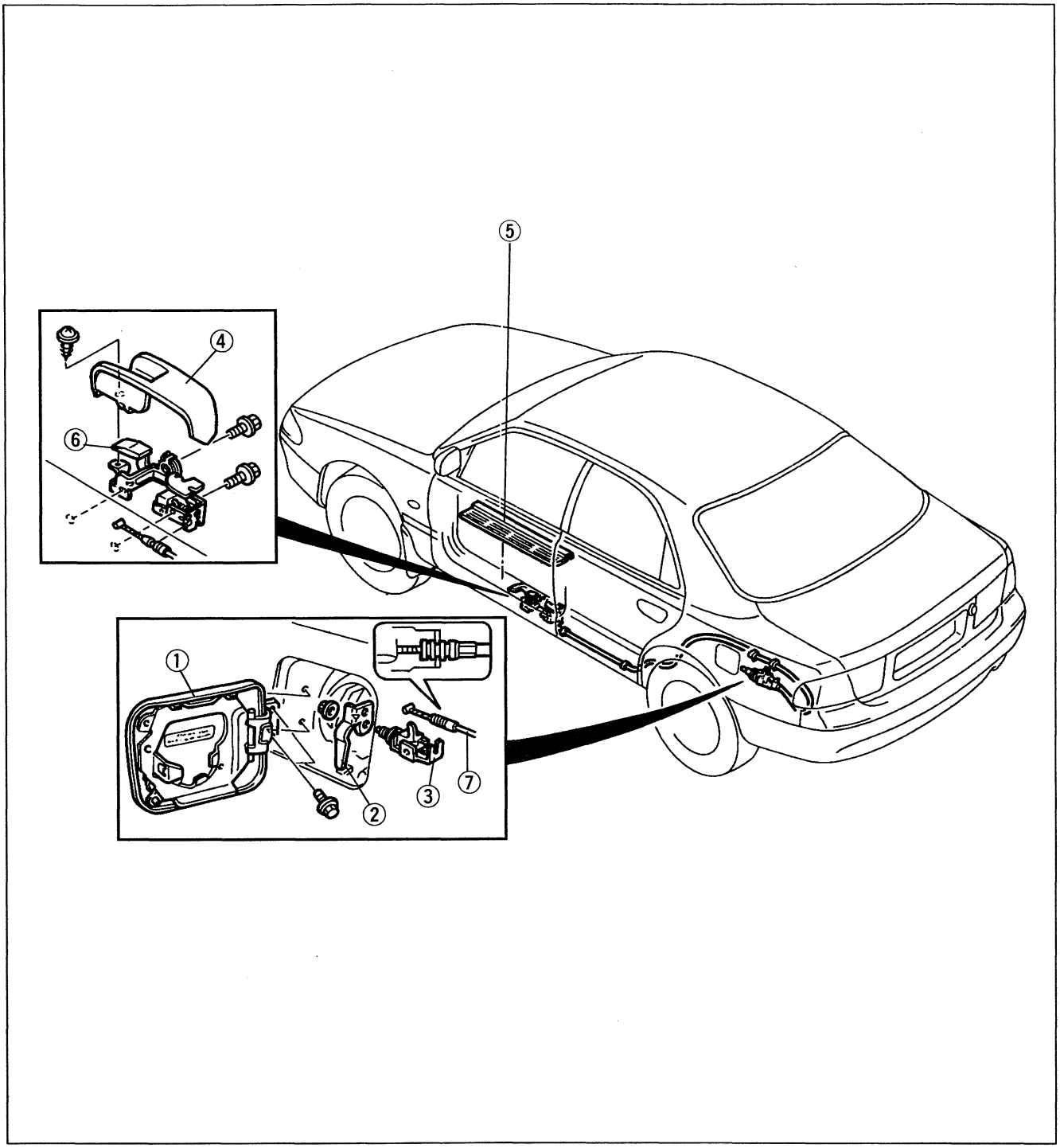
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

FUEL-FILLER LID AND OPENER

COMPONENTS

Removal / Installation

1. Remove in the order shown in the figure. To remove the fuel-filler lid opener, remove the trunk side trim. (Refer to page S–91 or S–93.)
2. Install in the reverse order of removal.



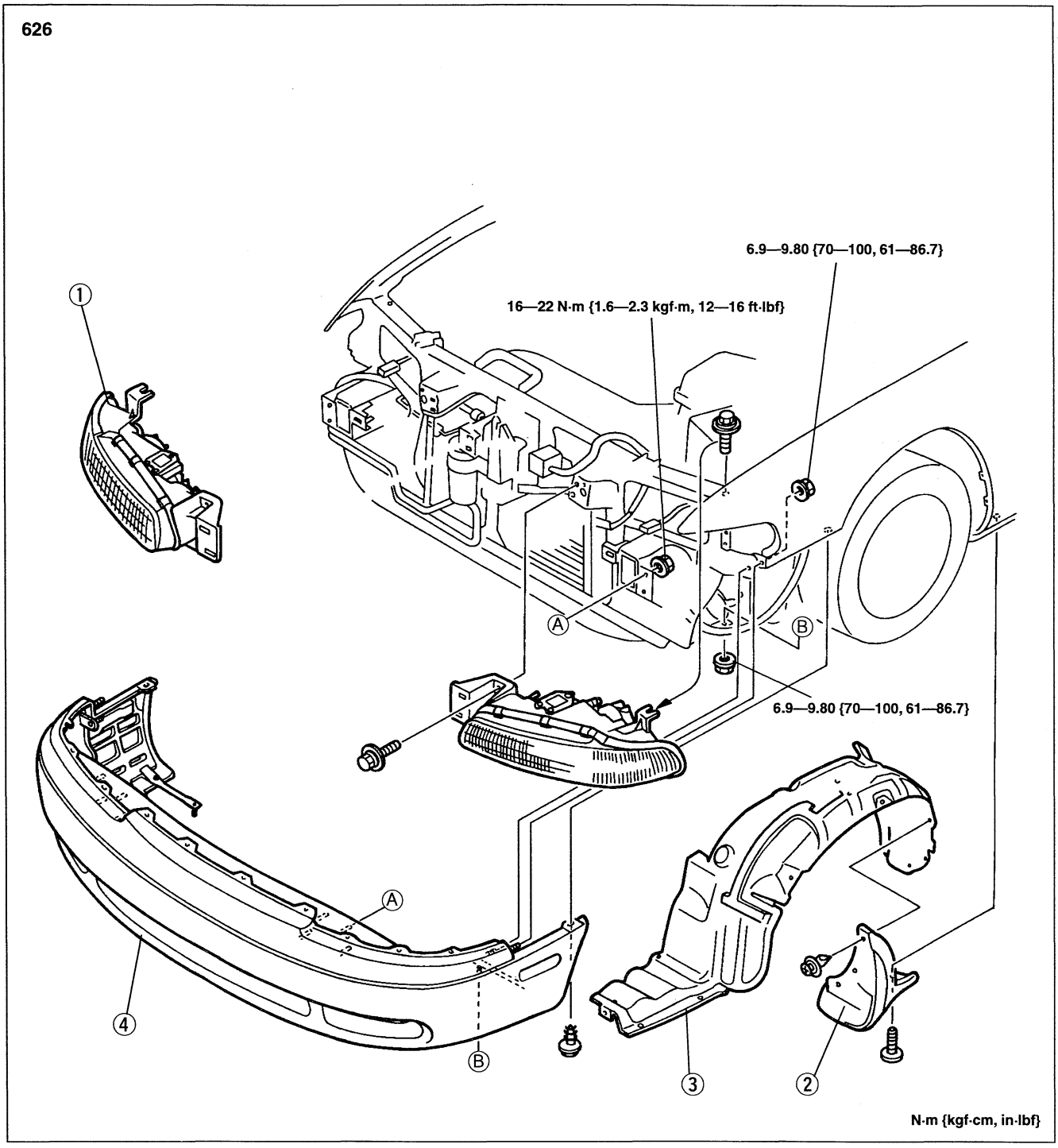
1. Fuel-filler lid
2. Lift spring
3. Fuel-filler lid opener
4. Opener cover
5. Front scuff plate
   Removal / Installation . . . . . page S–91
6. Opener lever
7. Opener cable

FRONT BUMPER

COMPONENTS

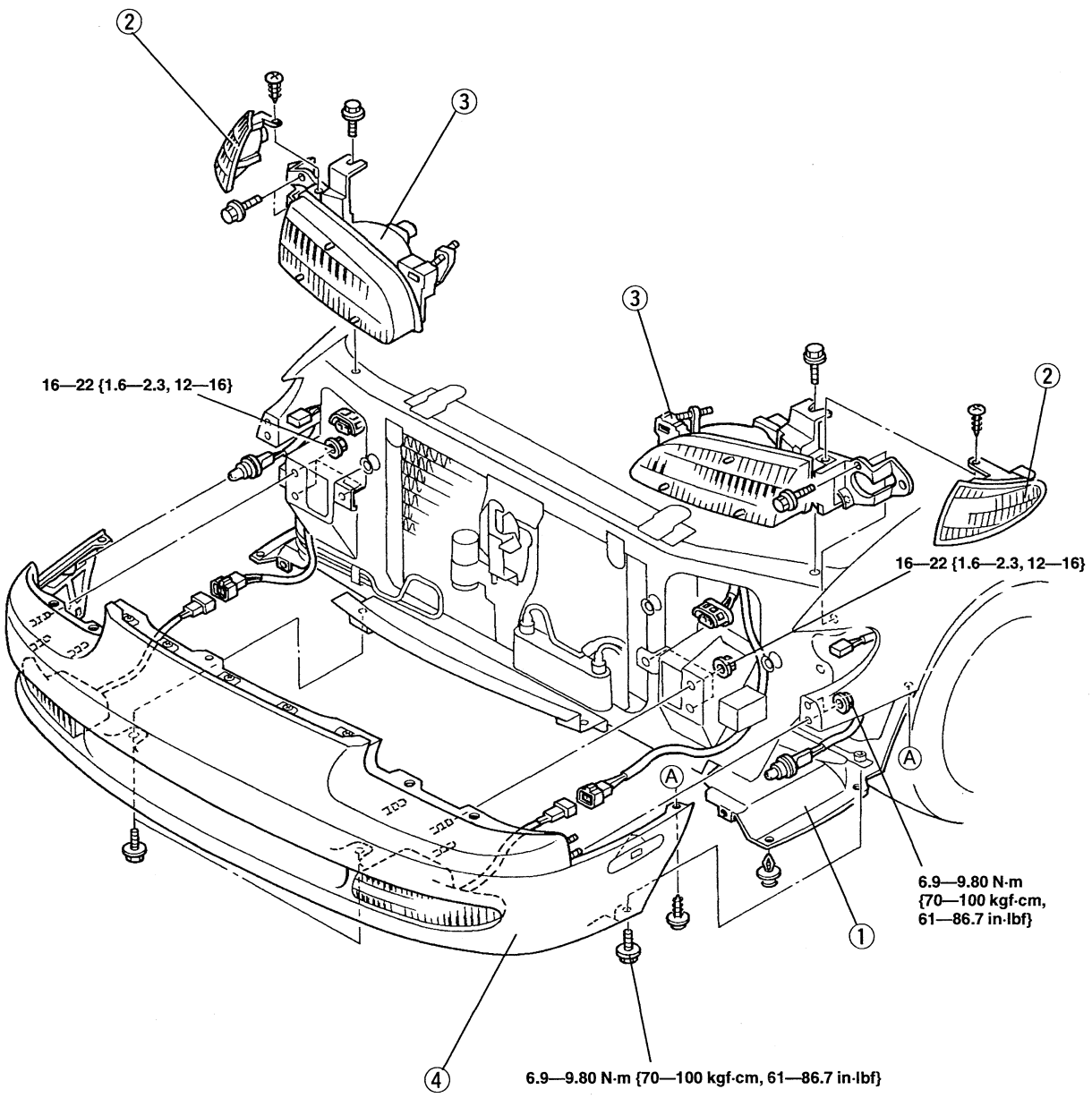
Removal / Installation

1. Disconnect the negative battery cable.
2. Remove the radiator grille. (Refer to page S–40.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.



1. Headlight
2. Front flap
3. Mud guard
4. Front bumper
   Disassembly / Assembly . . . . . page S–34

MX–6

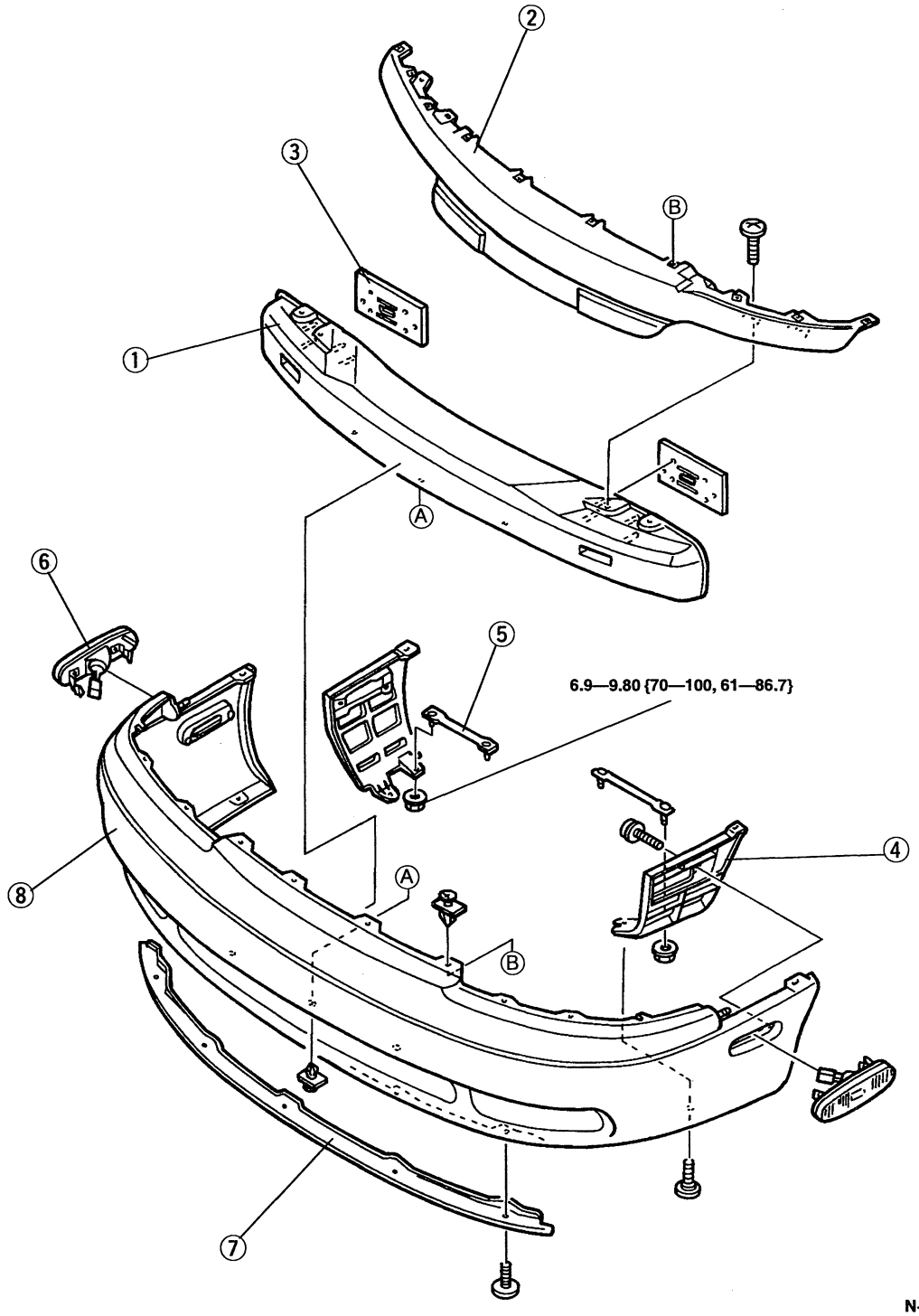


1. Mud guard
2. Front combination light
3. Headlight
4. Front bumper
   Disassembly / Assembly ..... page S–35

Disassembly / Assembly

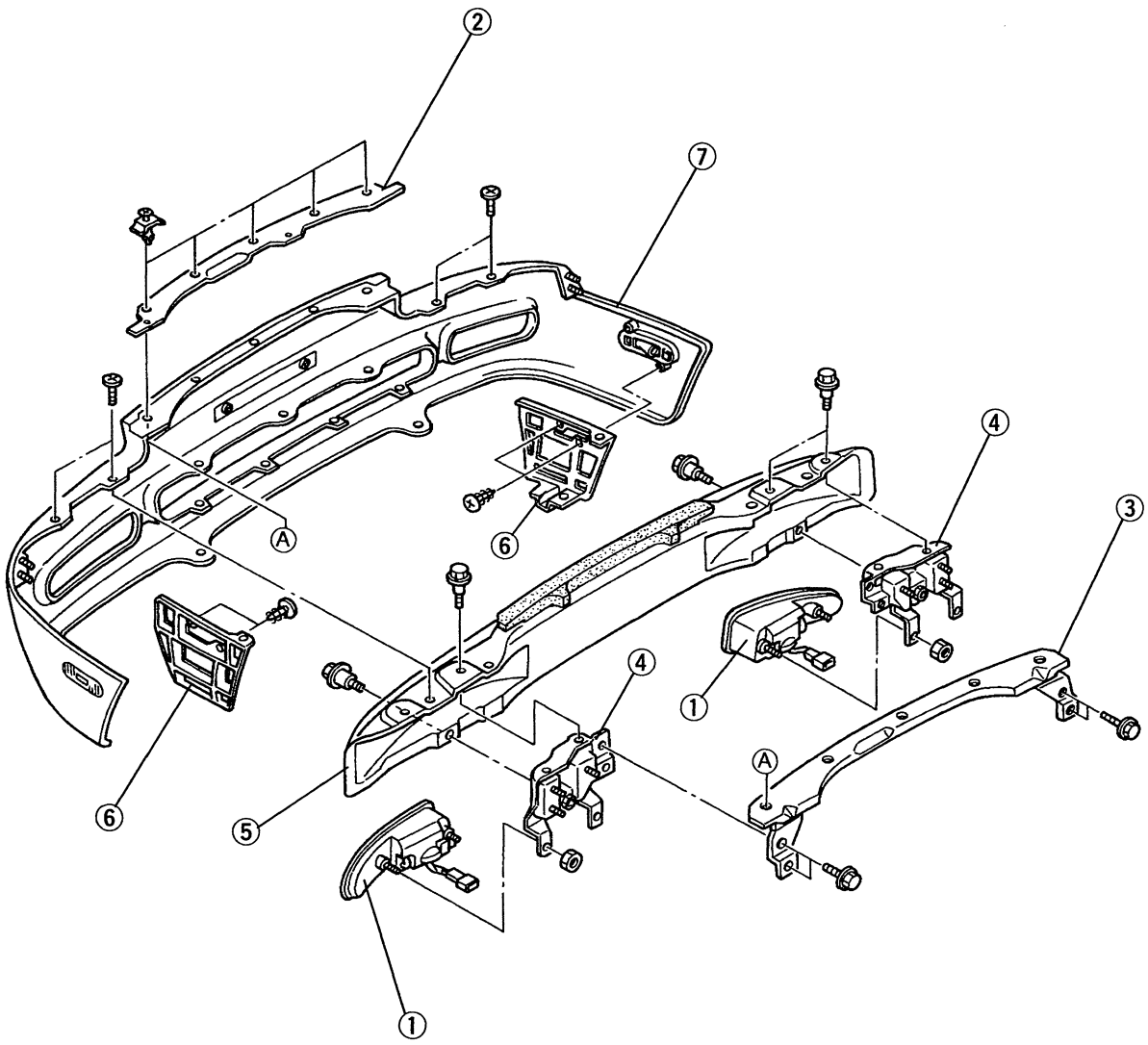
1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.

626



1. Front bumper reinforcement
2. Set plate
3. Junction plate
4. Front bumper retainer
5. Front side bracket
6. Side marker
7. Front air dam
8. Front bumper fascia

MX–6



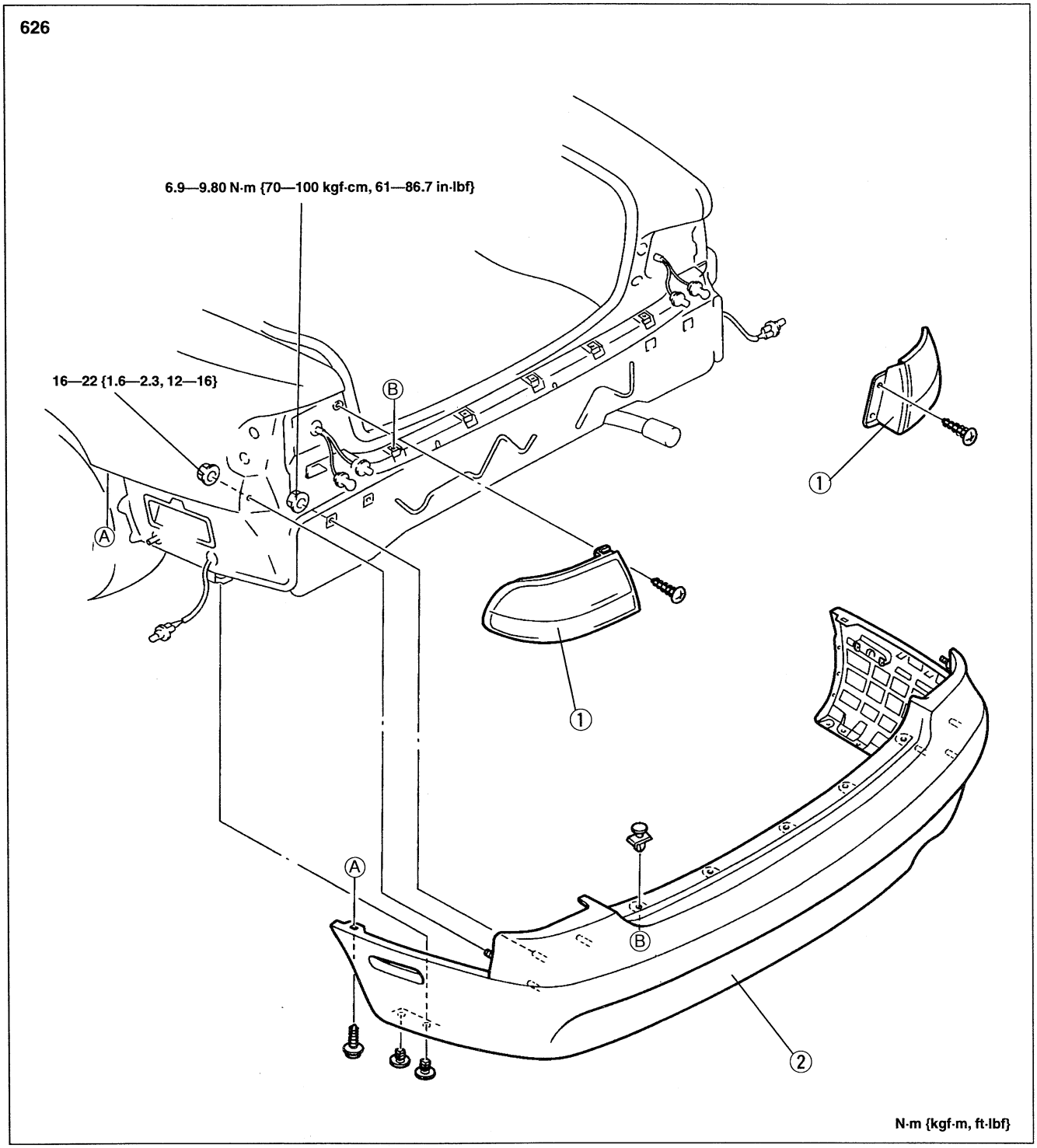
1. Fog light
2. Set plate
3. Bracket
4. Stay
5. Front bumper reinforcement
6. Front bumper retainer
7. Front bumper fascia

REAR BUMPER

COMPONENTS

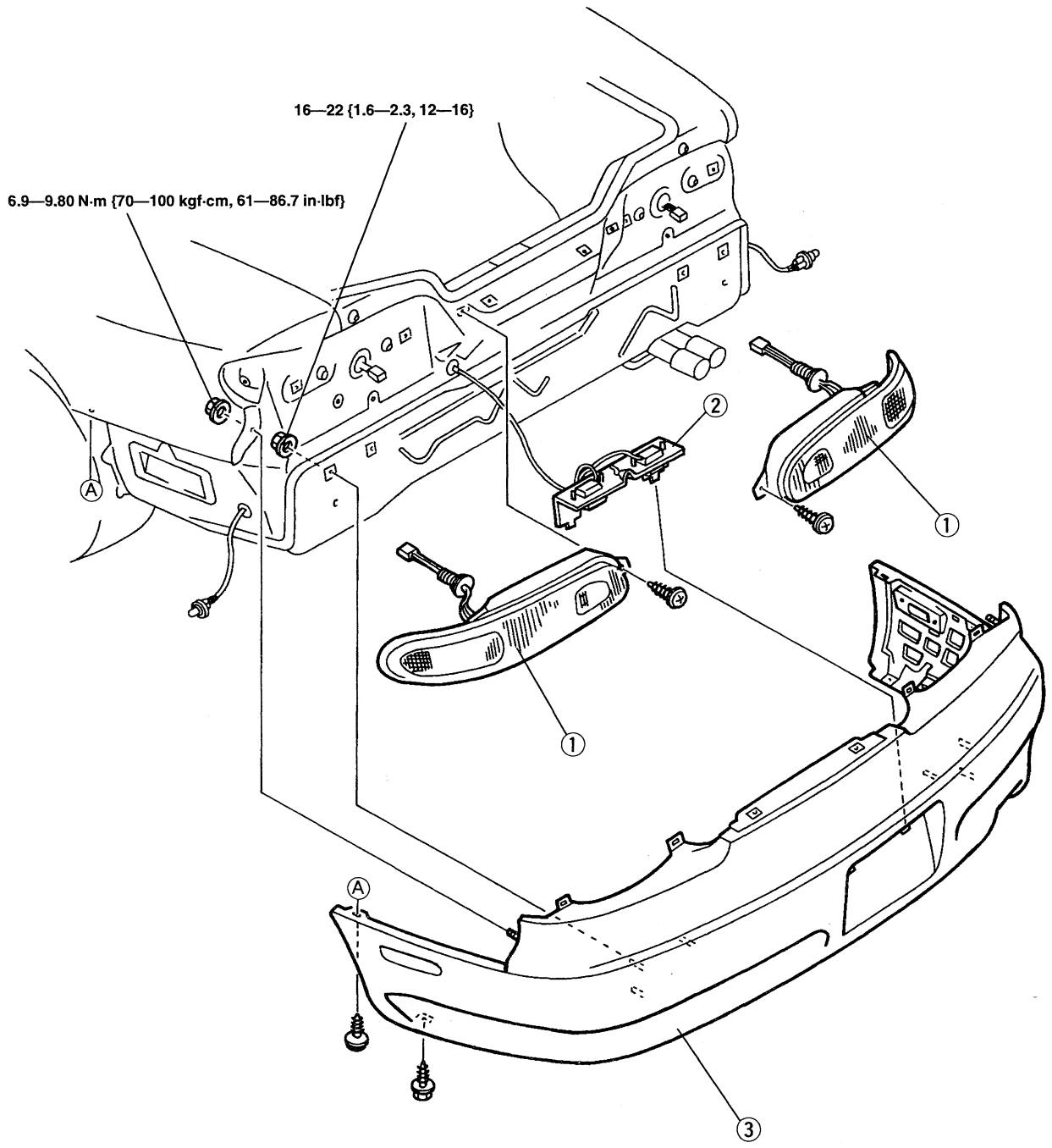
Removal / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure. To remove the rear bumper, remove the trunk end trim and trunk side trim. (Refer to page S–91 or S–93.)
3. Install in the reverse order of removal.



1. Rear combination light
2. Rear bumper
   Disassembly / Assembly ..... page S–38

MX–6

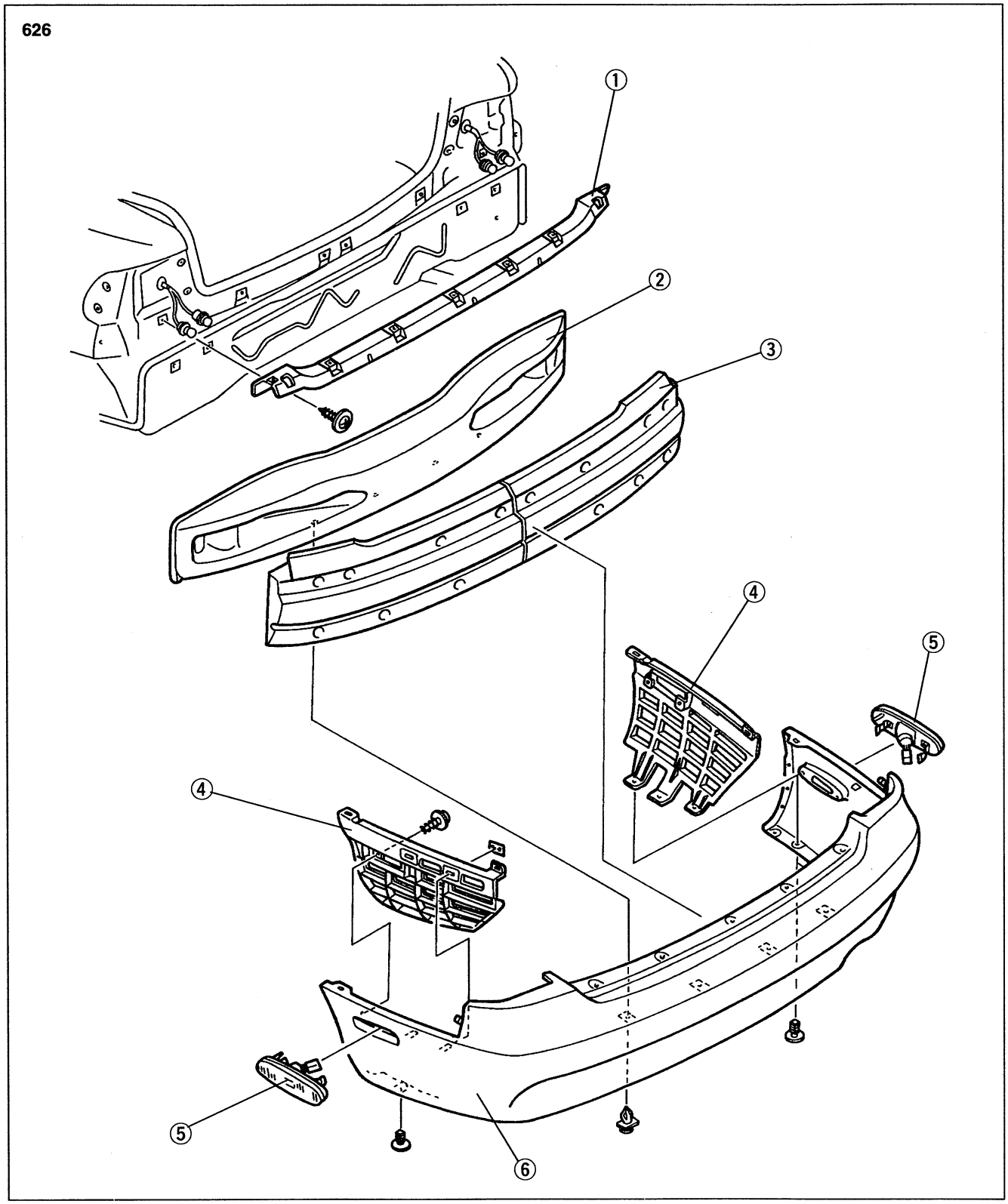


1. Rear combination light
2. License plate light
3. Rear bumper
   Disassembly / Assembly ..... page S–39

Disassembly / Assembly

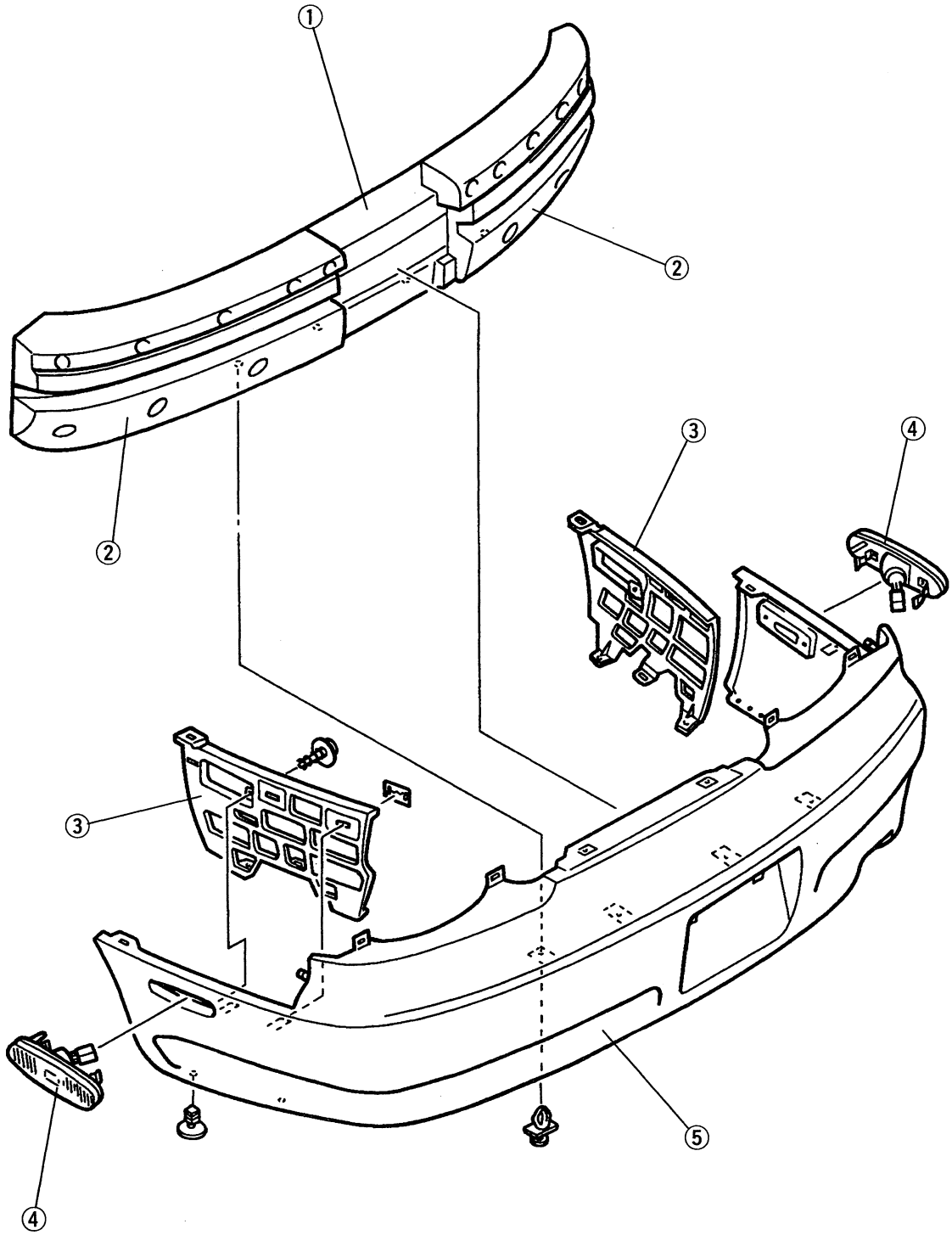
1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.

626



1. Set plate
2. Rear bumper reinforcement
3. Energy-absorbing foam
4. Rear bumper retainer
5. Rear side marker
6. Rear bumper fascia

MX–6



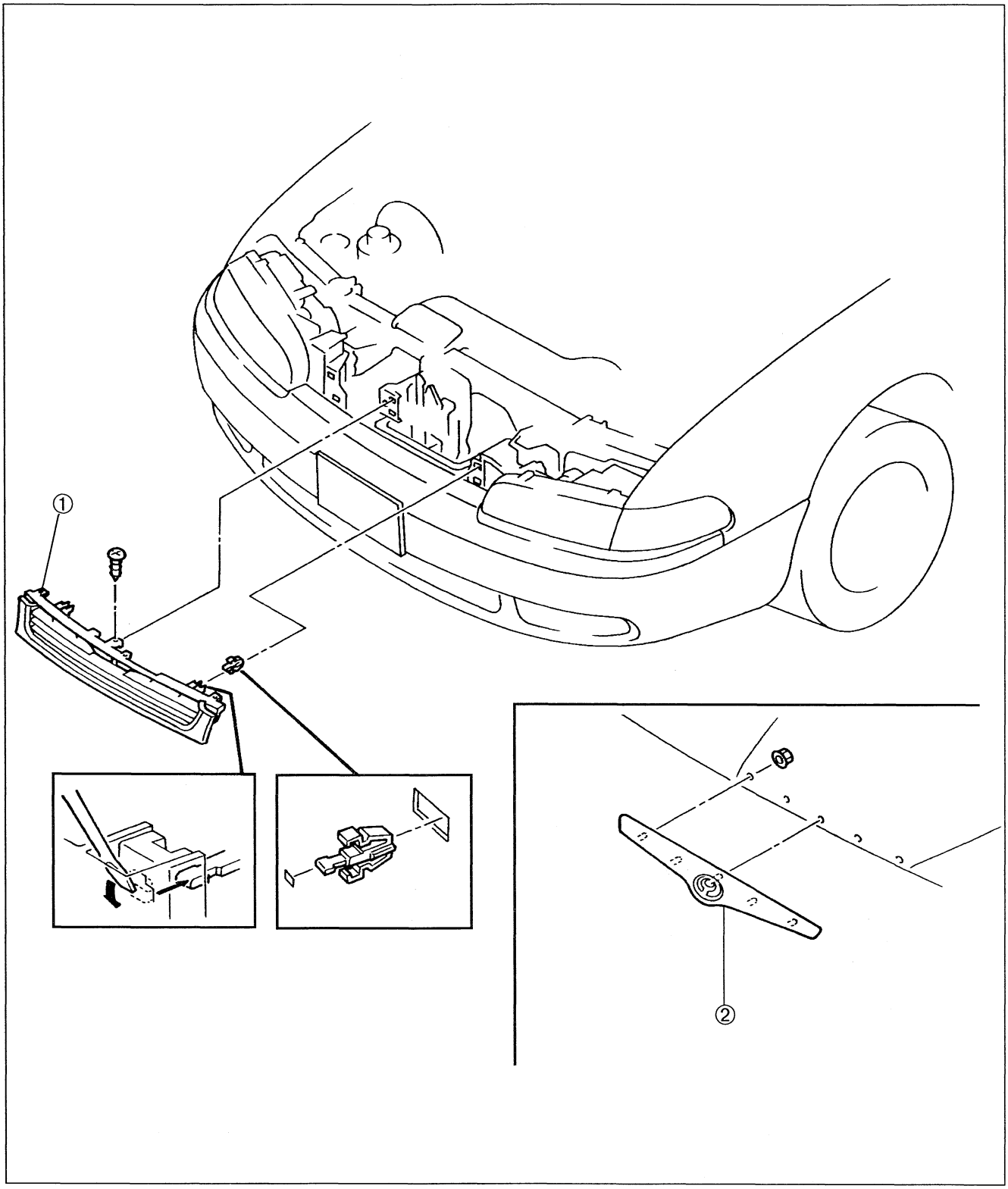
1. Rear bumper reinforcement
2. Energy-absorbing foam
3. Rear bumper retainer
4. Rear side marker
5. Rear bumper fascia

RADIATOR GRILLE

COMPONENTS

Removal / Installation

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



1. Radiator grille
2. Hood molding

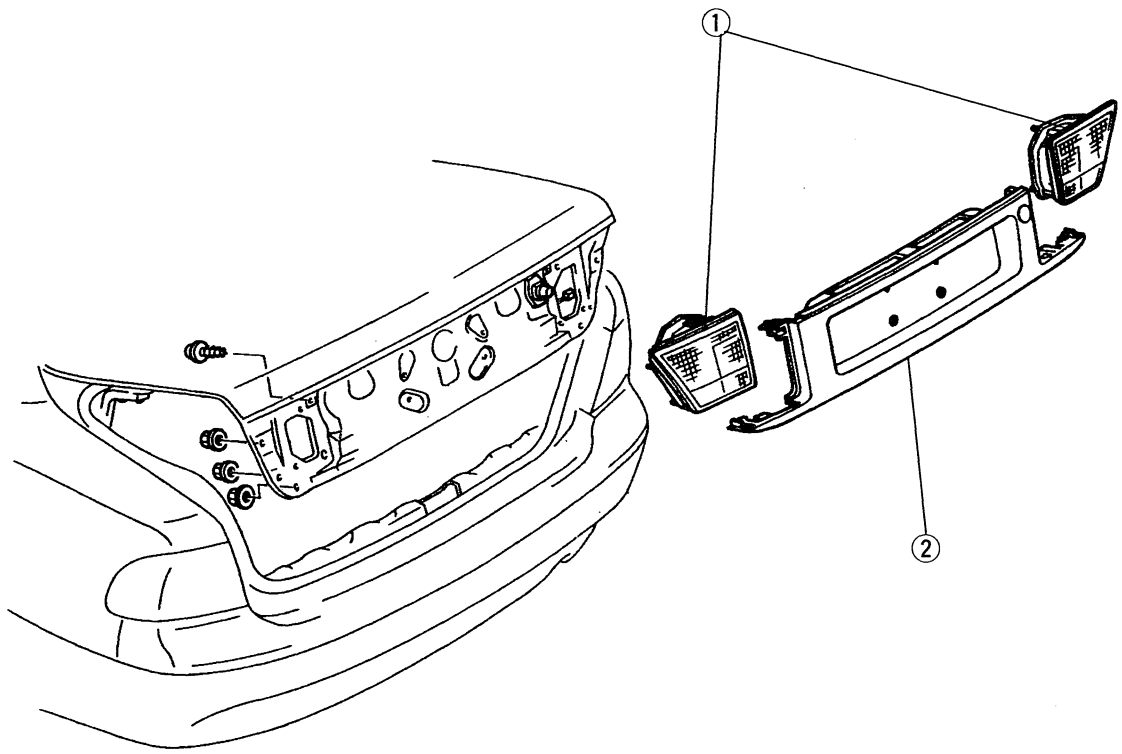
REAR FINISHER

COMPONENTS

Removal / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.

626



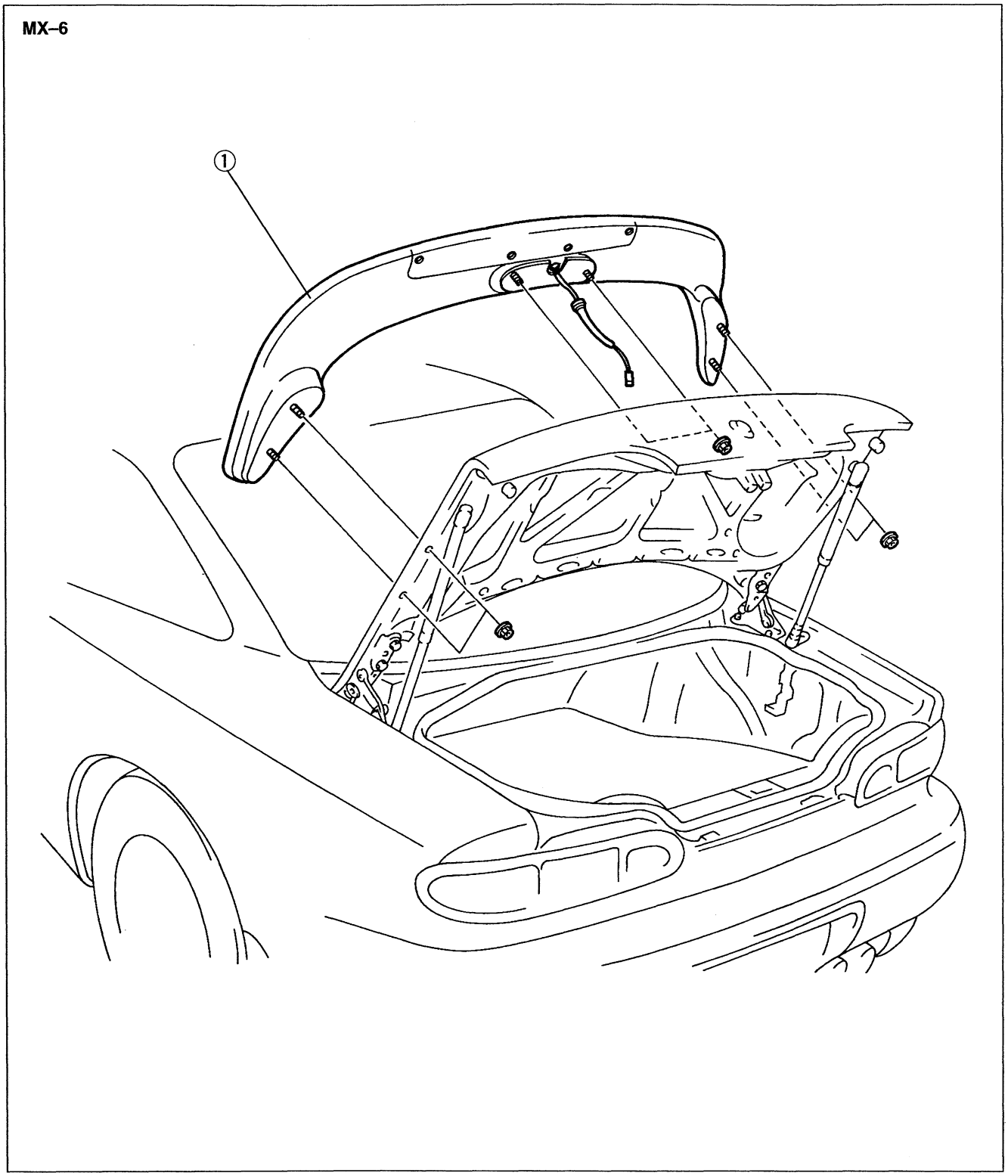
1. Inboard combination light
2. Rear finisher

REAR SPOILER

COMPONENTS

Removal / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.



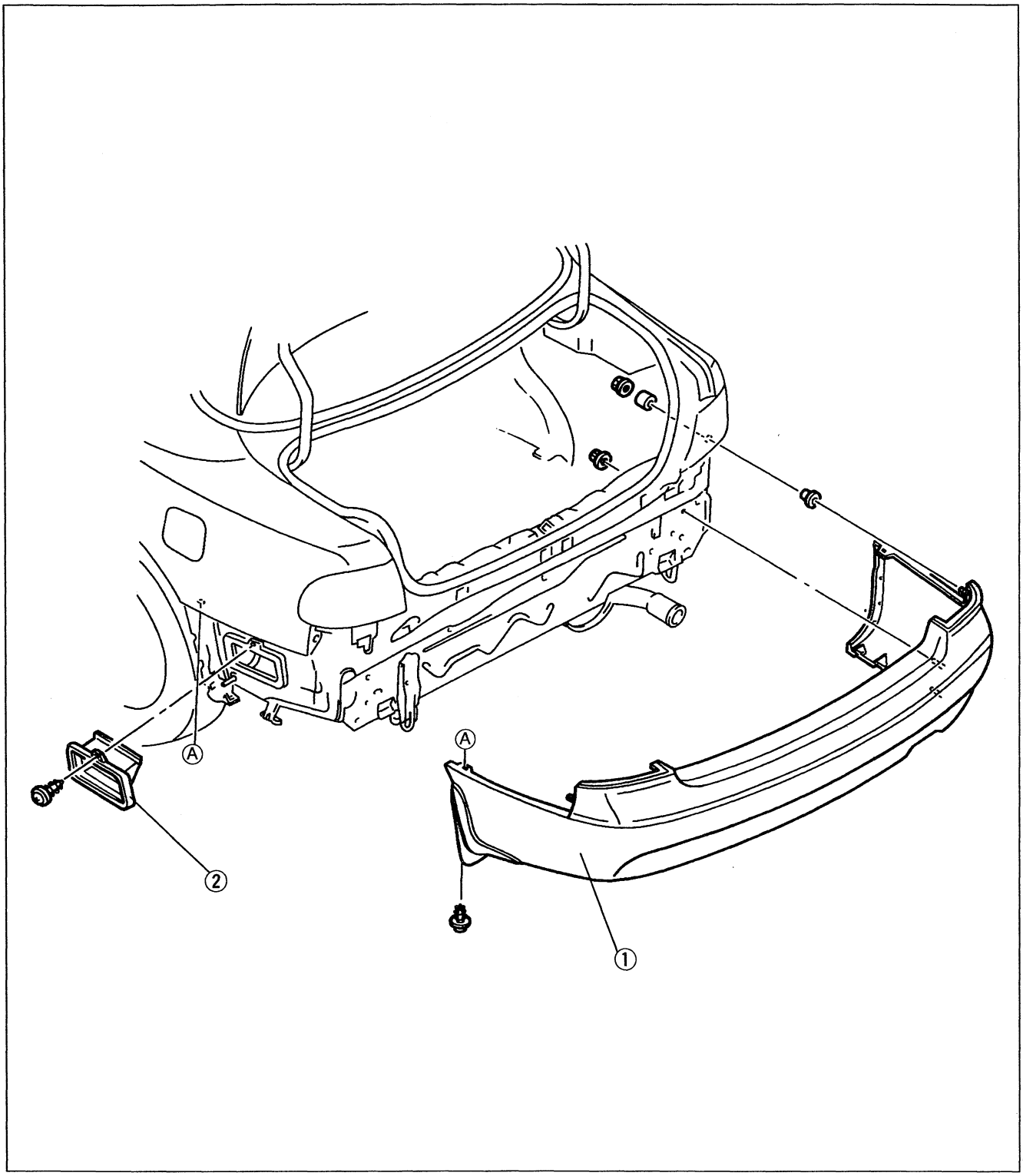
1. Rear spoiler

EXTRACTOR CHAMBER

COMPONENTS

Removal / Installation

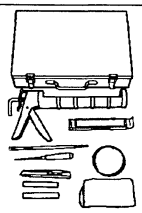
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.



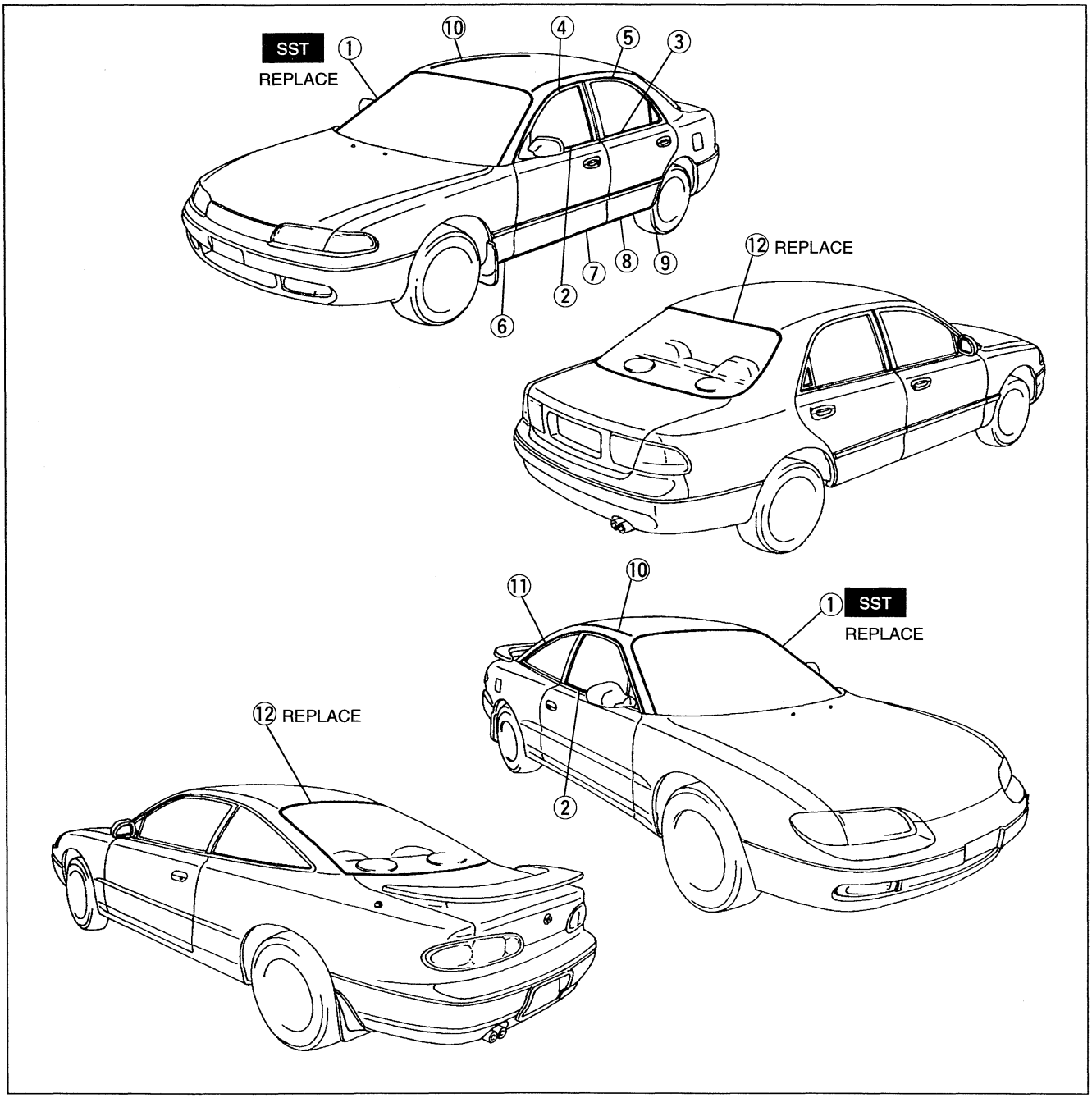
1. Rear bumper
   Removal / Installation . . . . . page S–36
2. Extractor chamber

MOLDING

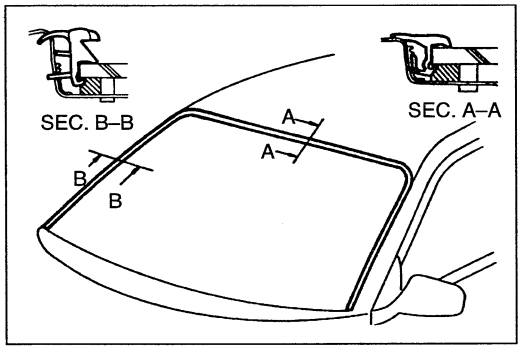
PREPARATION
SST

49 0305 870A Tool set, window		For installation of windshield molding	49 G050 1A0 Remover, sealant 	For removal of sealant

COMPONENTS
Removal / Installation
1. Remove in the order shown in the figure, referring to **Removal note**.
2. Install in the reverse order of removal, referring to **Installation note**.

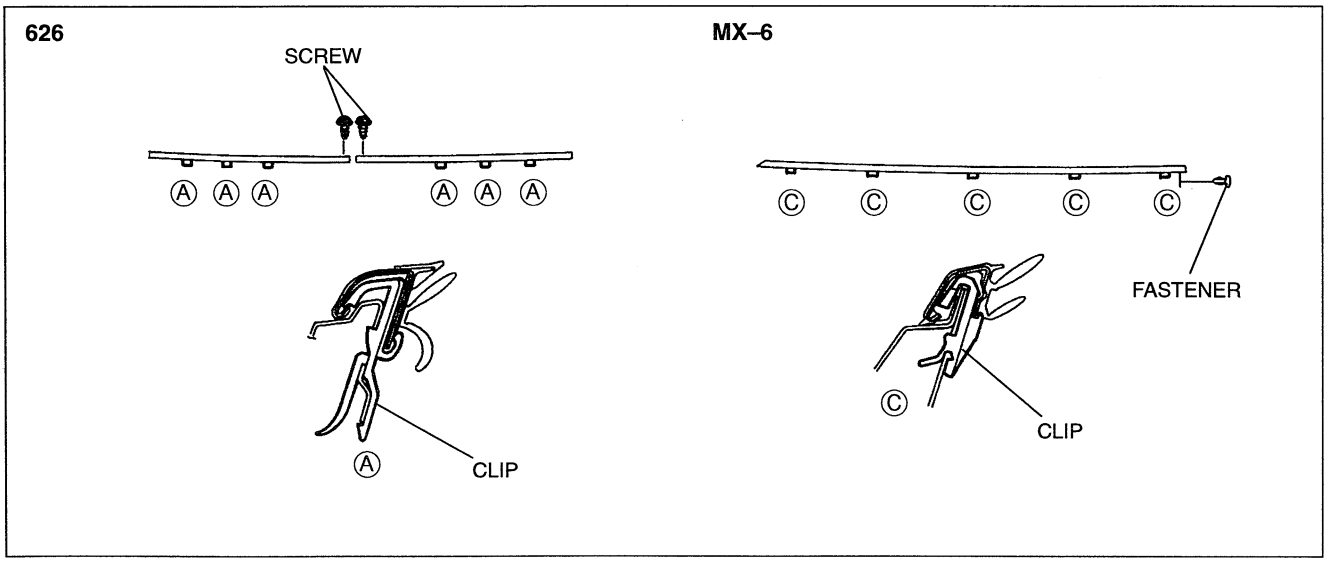


1. Windshield molding
Removal note ..... page S–45
Installation note ..... page S–48
2. Front beltline molding
Removal note ..... page S–45
3. Rear beltline molding (626)
Removal note ..... page S–45
4. Front sash molding (626)
Removal note ..... page S–46
Installation note ..... page S–51
5. Rear sash molding (626)
Removal note ..... page S–46
Installation note ..... page S–51
6. Lower molding No.1 (626)
Removal note ..... page S–46
7. Lower molding No.2 (626)
Removal note ..... page S–46
Installation note ..... page S–51
8. Lower molding No.3 (626)
Removal note ..... page S–46
Installation note ..... page S–51
9. Lower molding No.4 (626)
Removal note ..... page S–47
10. Roof molding
Removal note ..... page S–47
Installation Note ..... page S–51
11. Drip molding (MX–6)
Removal note ..... page S–47
12. Rear window molding
Removal note ..... page S–48
Installation note ..... page S–50



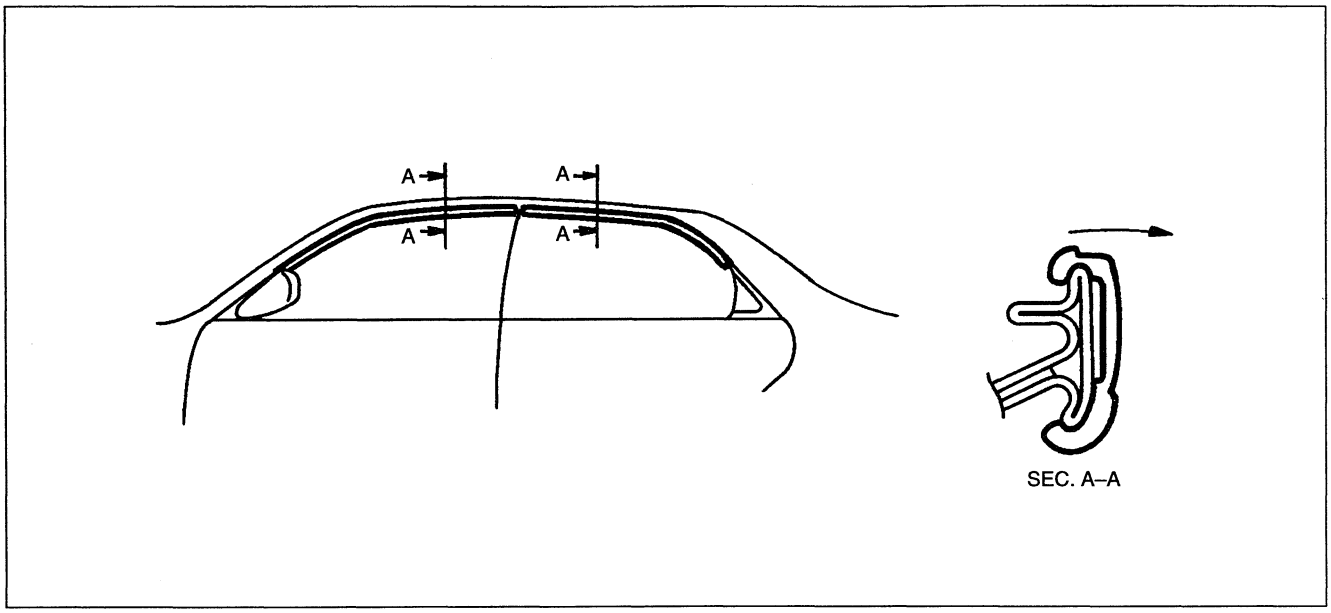
Removal note
Windshield molding
1. Remove the cowl grille. (Refer to page S–52.)
2. Pull the molding from one end to separate it. Do not re-use the windshield molding.

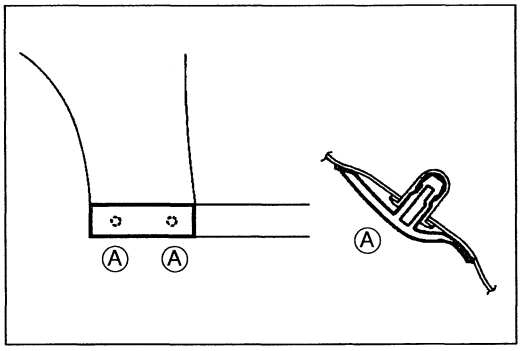
Front and rear beltline moldings
1. Open the door glass fully.
2. Remove the outside mirror (Front beltline molding). (Refer to pages S–53, 54.)
3. Remove the beltline molding mounting screw (626) or fastener (MX–6).
4. Pull the beltline molding upward to disengage the clips from the body.



Front and rear sash moldings

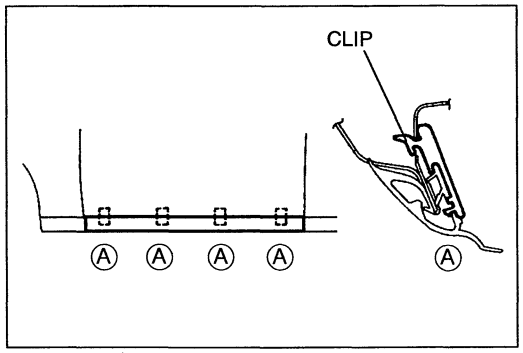
1. Peel the top of the sash molding forward to disengage it from the sash.
2. Remove the sash molding from the door garnish.





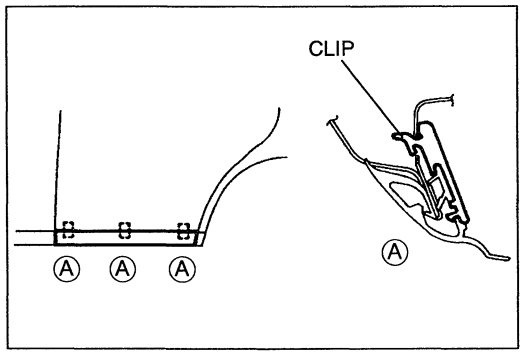
Lower molding No.1

Pull the lower molding No.1 forward to disengage the clips from the body.



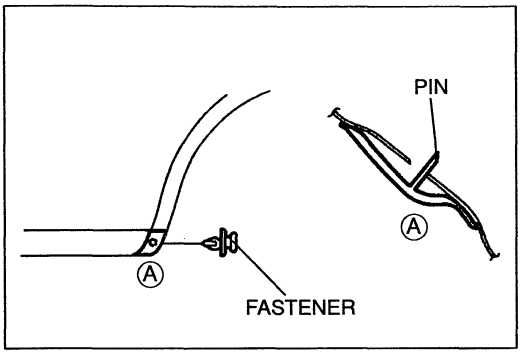
Lower molding No.2

Pull the lower molding No.2 downward to disengage the clips from the body.

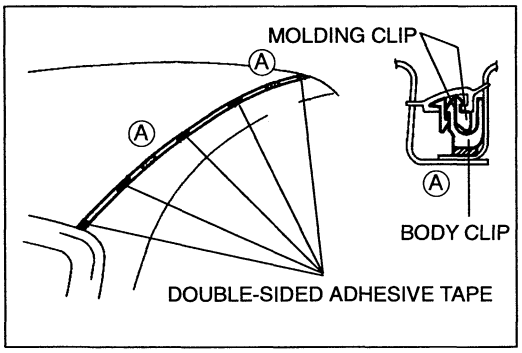


Lower molding No.3

Pull the lower molding No.3 downward to disengage the clips from the body.



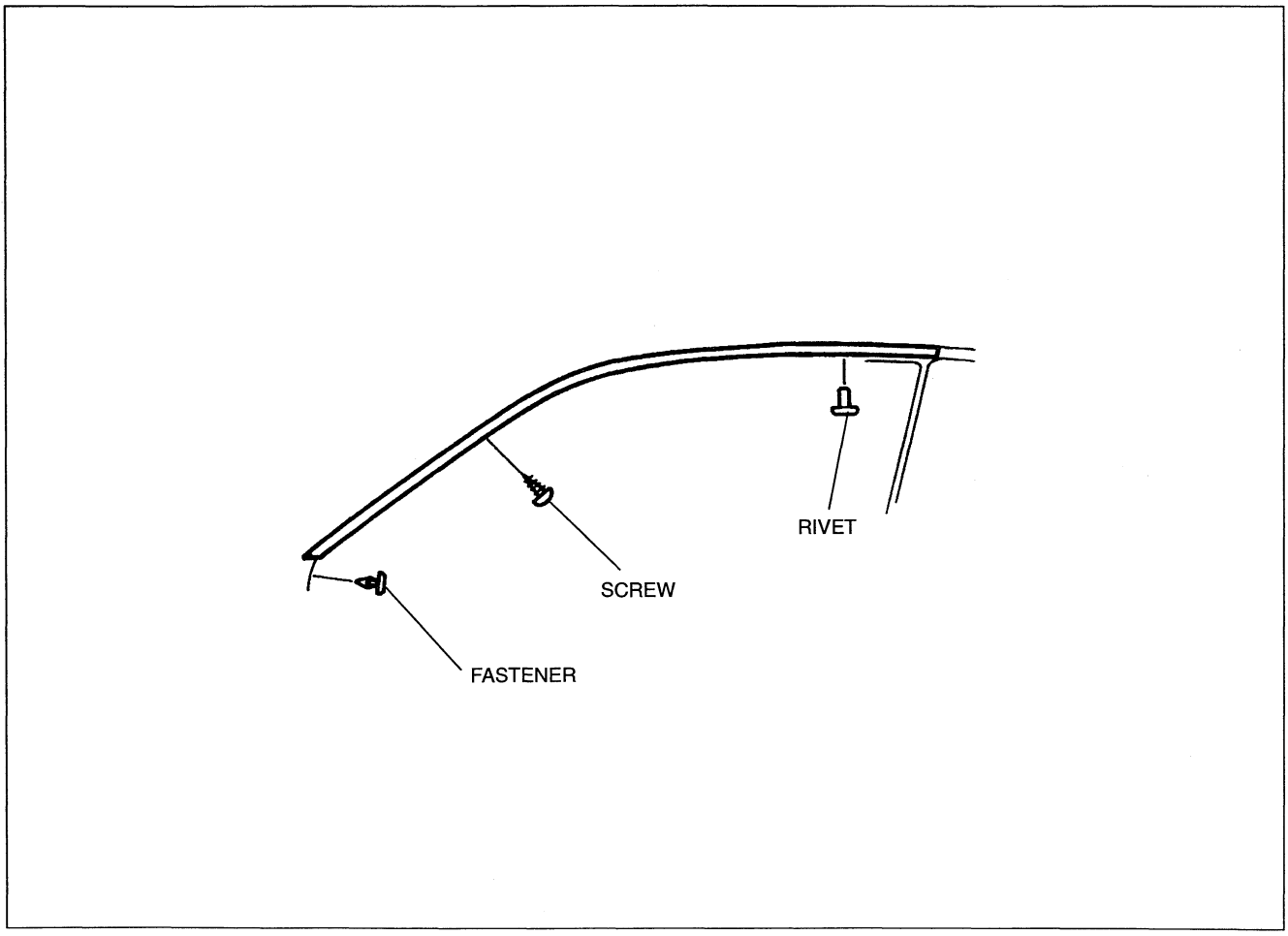
Lower molding No.4
1. Remove the lower molding mounting fastener.
2. Pull the lower molding forward to disengage the pin from the body.



Roof molding

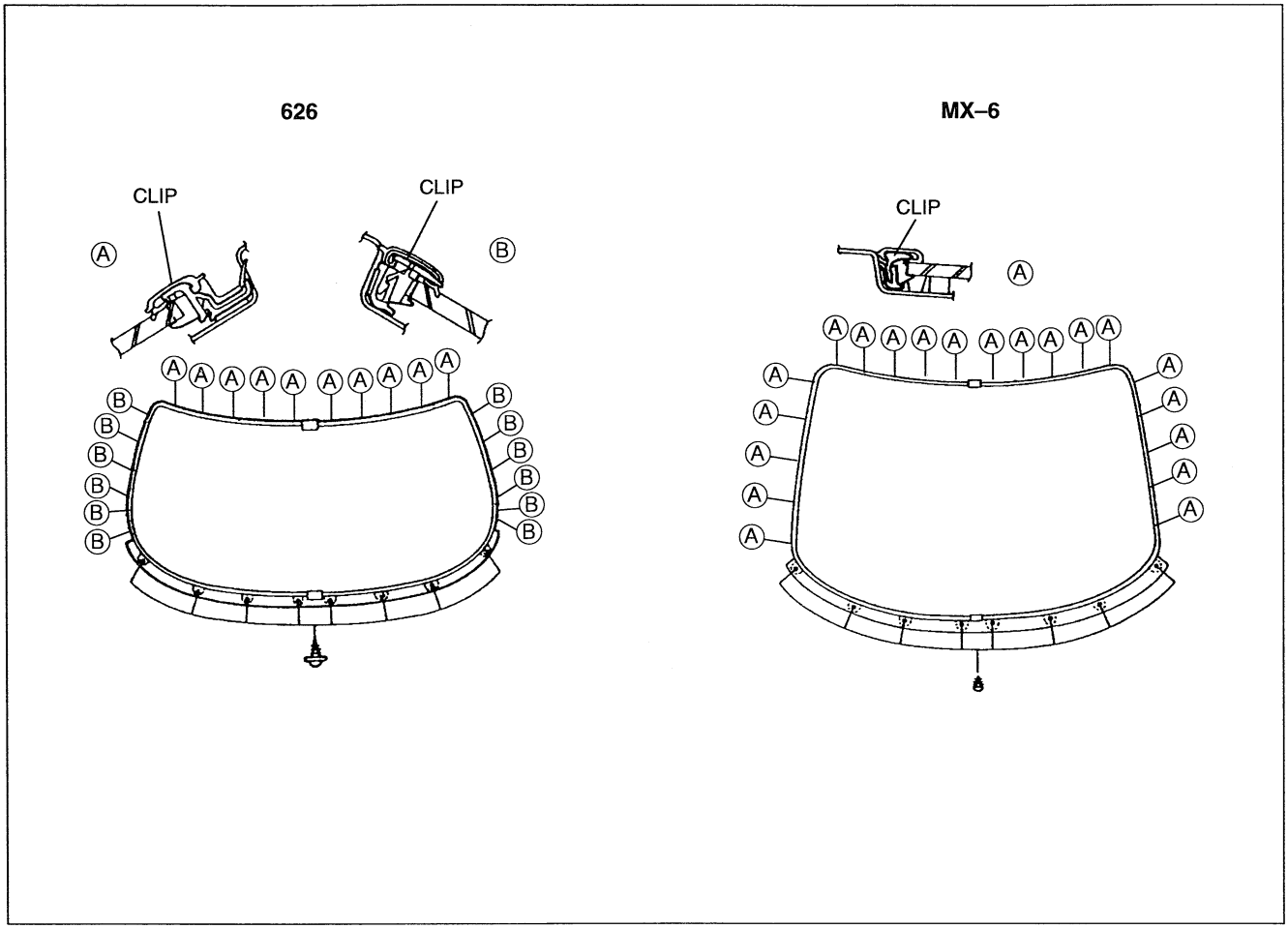
Pull the rear edge of the roof molding upward to disengage the molding clips from the body clips.

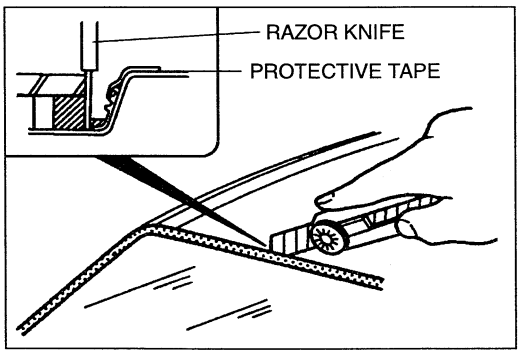
Drip molding (MX–6)
1. Remove the window frame weatherstrip. (Refer to page S–25.)
2. Remove the molding mounting rivet, fastener, and screw.
3. Remove the drip molding from the quarter window molding.



Rear window molding

1. Remove the molding mounting screws from the lower section.
2. Remove the molding mounting clips by using a molding remover and remove the side and upper sections of the molding.

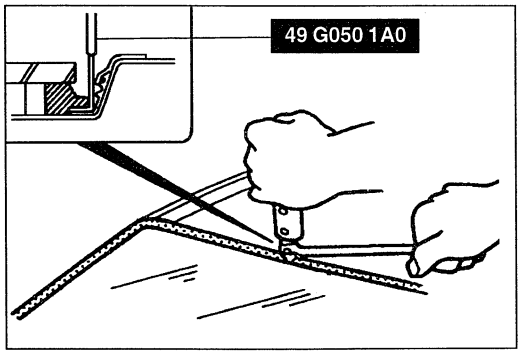




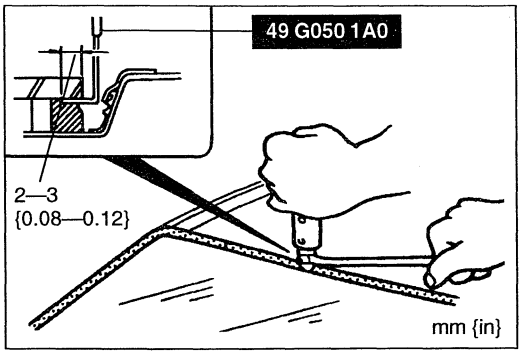
Installation note

Windshield molding

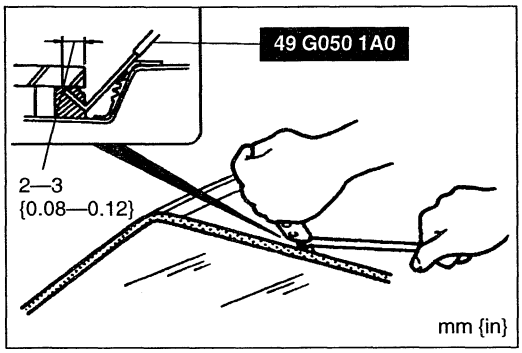
1. Apply protective tape along the edge of the body to protect it from damage.
2. Cut the sealant by using a razor knife as shown.



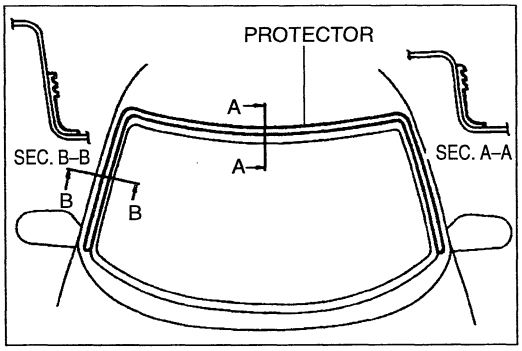
3. Cut the sealant near the body by using the **SST** as shown.



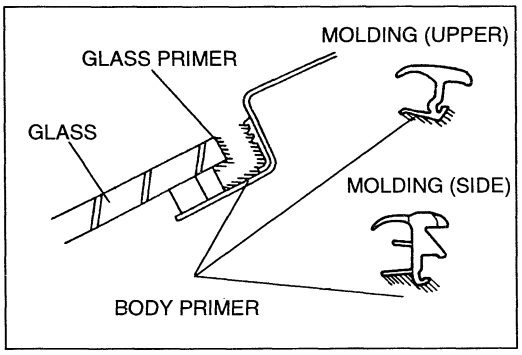
4. Cut the sealant under the glass by using the **SST** as shown.



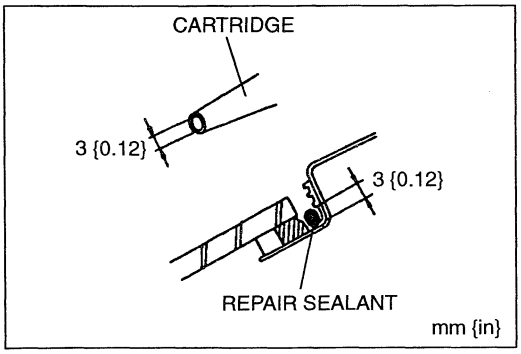
5. Cut the sealant near the glass by using the **SST** as shown.
6. Remove as much sealant as possible from between the body and the glass.
7. Carefully clean around the edge of the glass and the adhesion surface on the body.



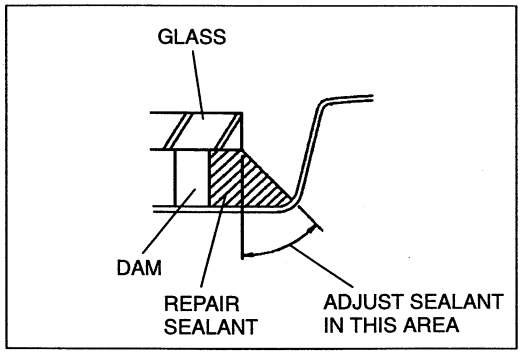
8. If the protector is damaged, replace it with a new one.



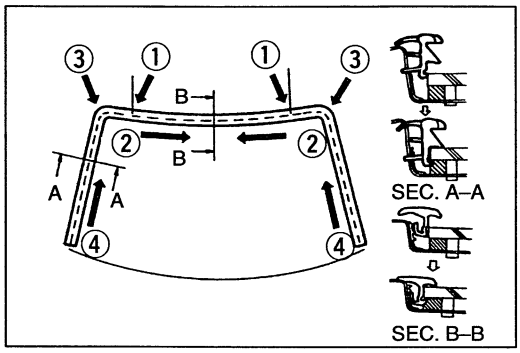
9. Apply primer onto the bonding area of the glass, body, and new windshield molding by using a brush. Use only glass primer on the glass and body primer on the body and molding. Keep the area free of dirt and grease, and do not touch the surface. Allow the primer to dry for approximately **30 minutes**.



10. Apply a **3 mm {0.12 in}** bead of repair sealant between the glass and the body.



11. Reshape the repair sealant as shown if necessary.

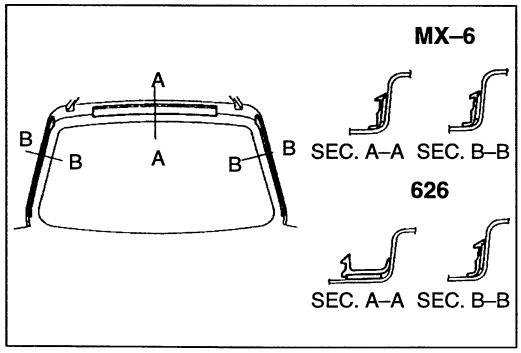


12. Install the molding before the sealant has hardened.
    ① Align the marks on the molding with the roof inner line.
    ② Push on the upper portion of the molding.
    ③ Push on the corner portion of the molding.
    ④ Push on the side portion of the molding, starting from the bottom and then toward the top.

Hardening time of repair sealant

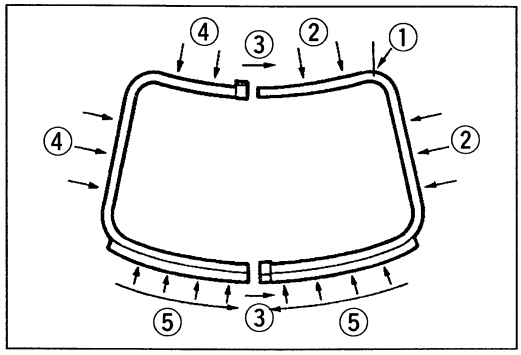
Temperature	Surface hardening time	Time required until car can be put into service
5°C {41°F}	Approx. 1.5 hr	12 hr
20°C {68°F}	Approx. 1 hr	4 hr
35°C {95°F}	Approx. 10 min	2 hr

13. Check for water leaks. If a leak is found, wipe the water off well and repeat the installation procedure with a new windshield molding.



Rear window molding

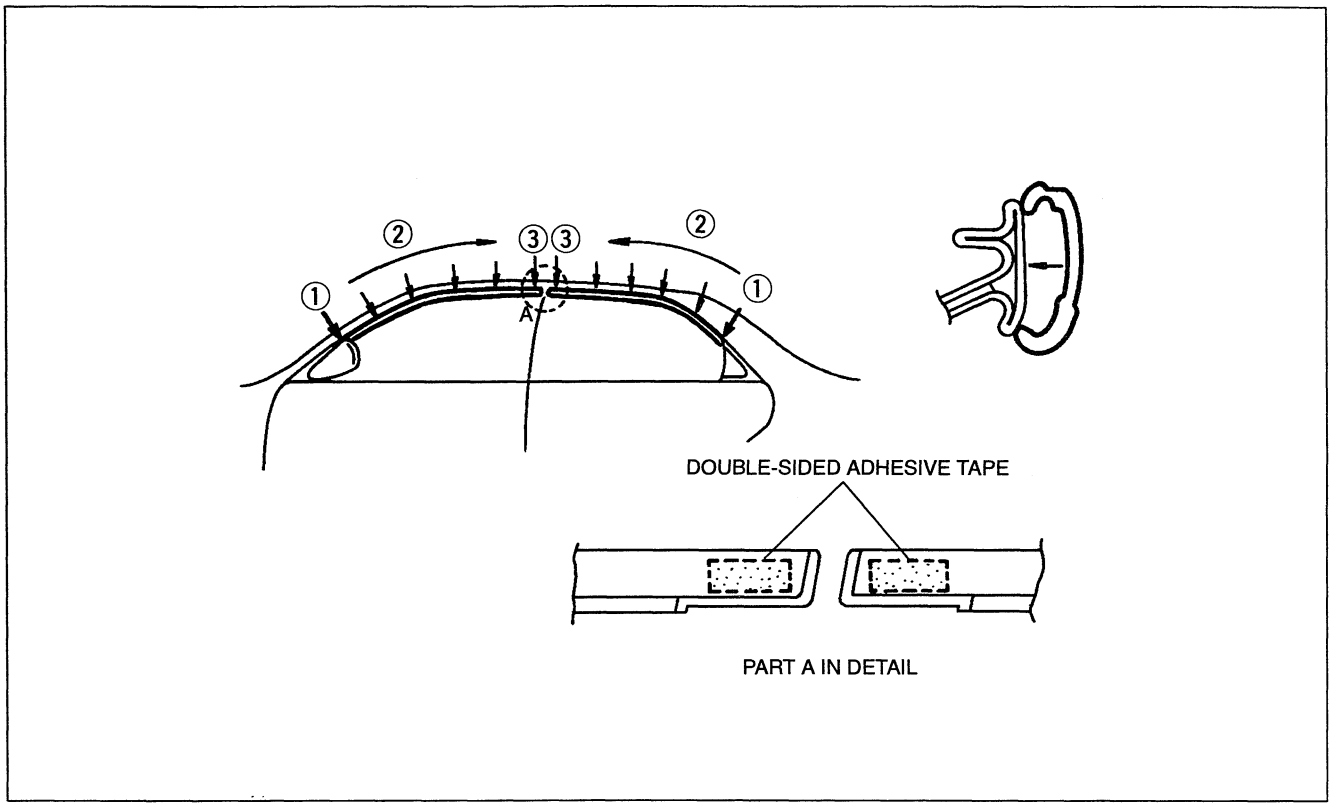
1. If one of the protectors is damaged, replace it with a new one.

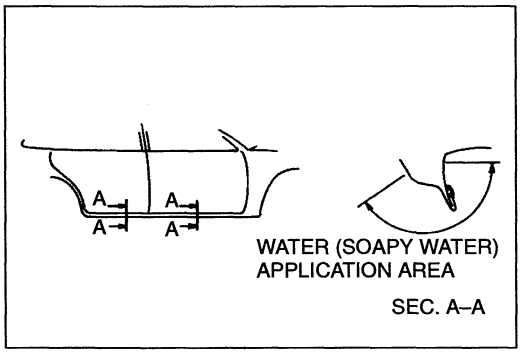


2. Install the molding.
    ① Align the mark on the right molding with the roof outer line.
    ② Push on the upper and side portions of the right molding.
    ③ Insert the left molding into the joint.
    ④ Align the upper portion of the left molding with the body and push on the upper and side portions of the molding.
    ⑤ Fasten the lower portion with the screws, working from outside to inside.

Front and rear sash moldings

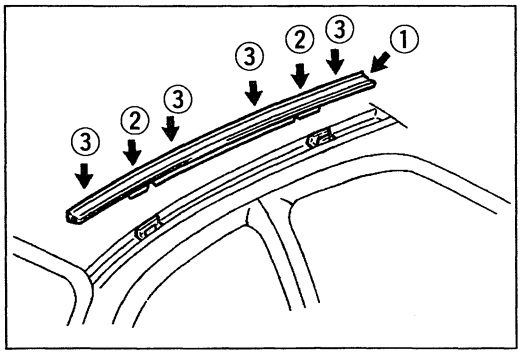
1. If the sash molding is being reused,
   a) Clean and degrease the bonding area of the sash corner and sash molding.
   b) Apply primer by using a brush to the bonding area of the sash molding and allow it to dry for approximately **30 minutes**.
   c) Attach double-sided adhesive tape to the sash molding.
2. Insert one end of the sash molding into the door garnish.
3. Remove the wax paper from the double-sided adhesive tape and fit the sash molding onto the door sash.
4. Press the adhesive tape firmly to fix the sash molding.





Lower moldings No.2 and No.3

Apply plain or soapy water to the lower molding installation part of the door. Then fit the lower molding onto the door.



Roof molding

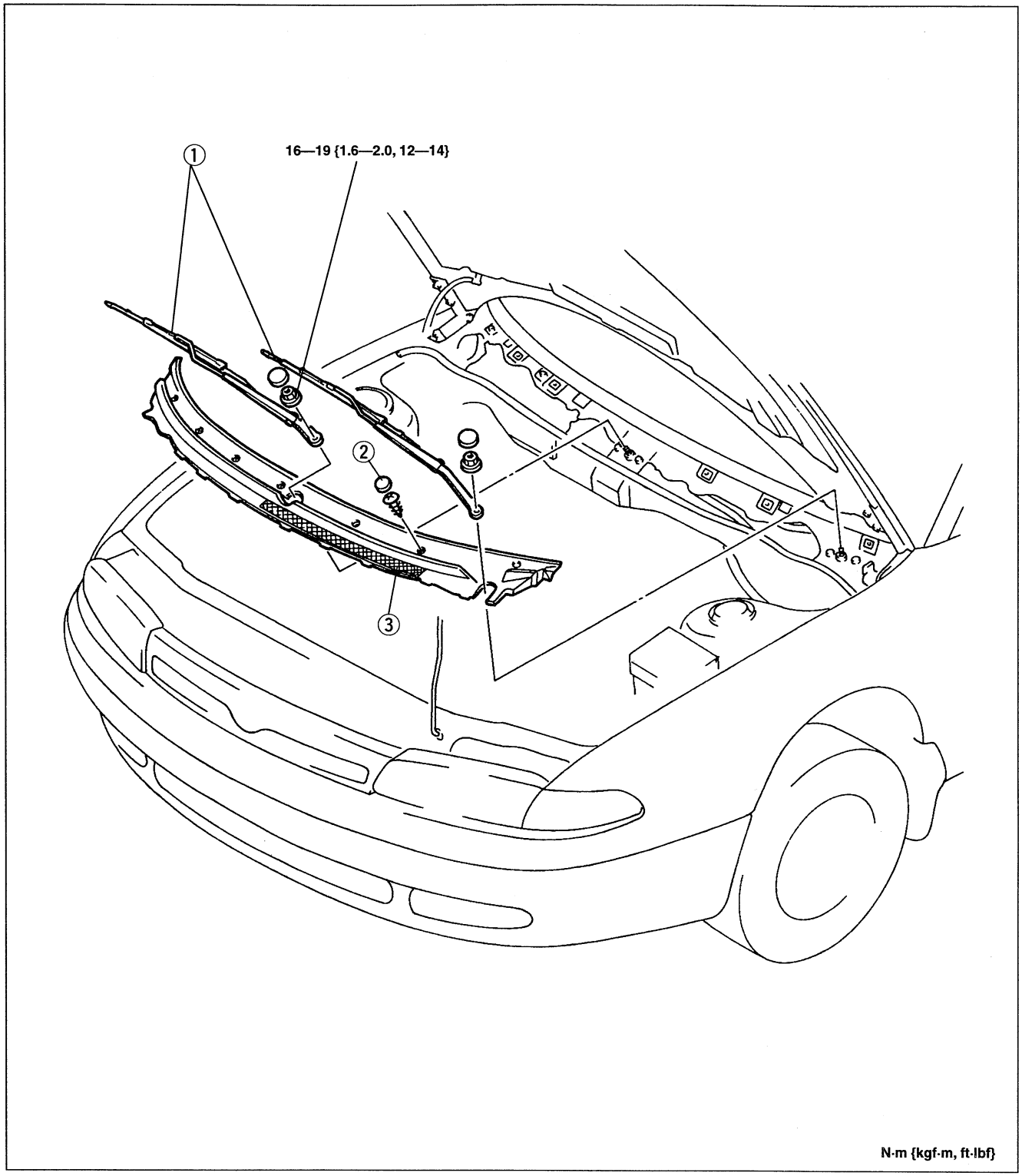
1. If the clips are damaged, replace them.
2. Install the molding.
   ① Align the rear end of the molding with the body.
   ② Press the molding down firmly.

COWL GRILLE

COMPONENTS

Removal / Installation

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



1. Windshield wiper arm and blade
   Adjustment ..... page S–58
2. Cowl cap
3. Cowl grille

OUTSIDE MIRROR

COMPONENTS

Removal / Installation

1. Disconnect the negative battery cable if a power outside mirror is installed.
2. Remove in the order shown in the figure. To remove the power outside mirror and rear window defroster switches, remove the switch panel. (Refer to page S–84 or S–86.)
3. Install in the reverse order of removal.

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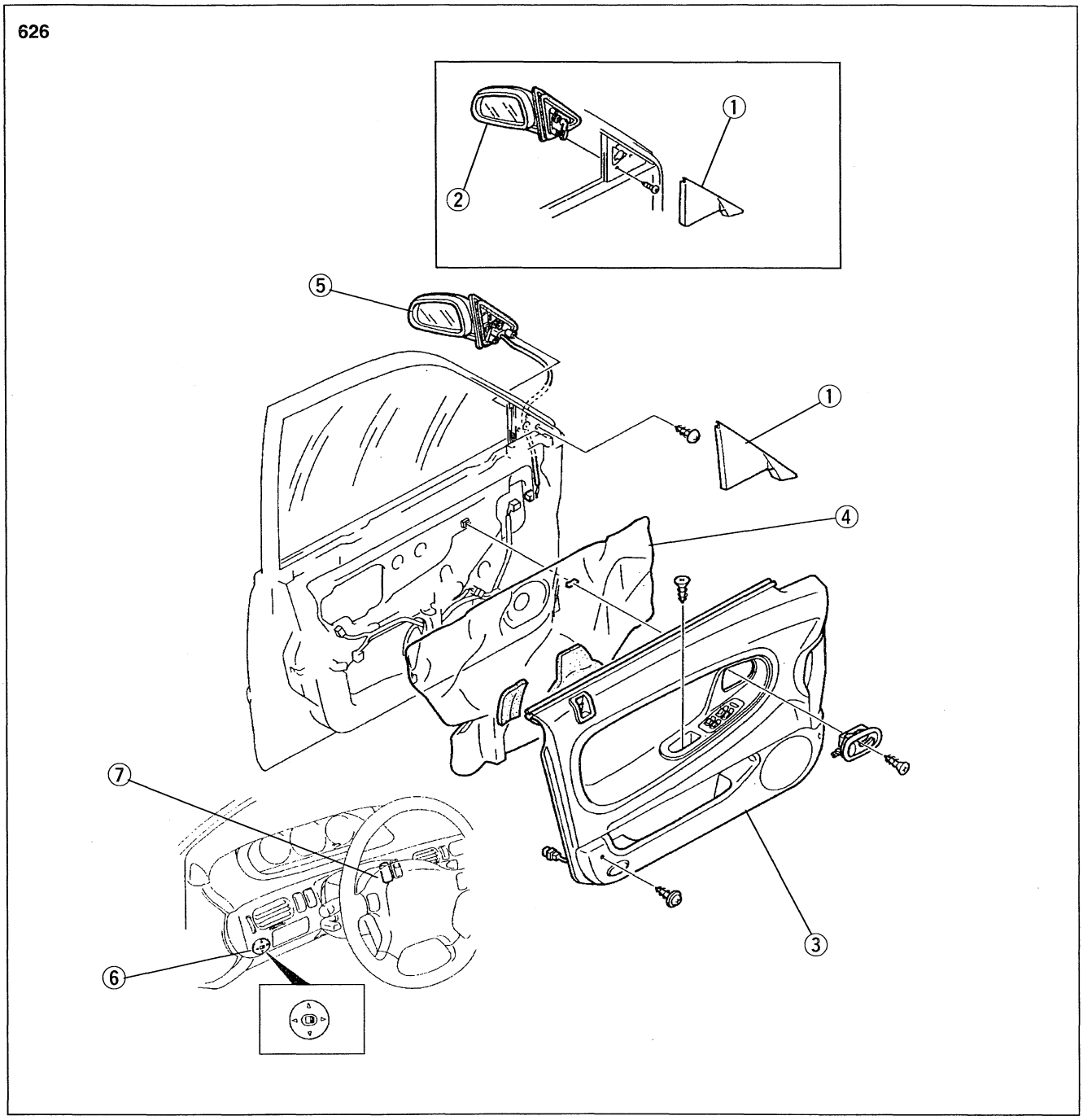
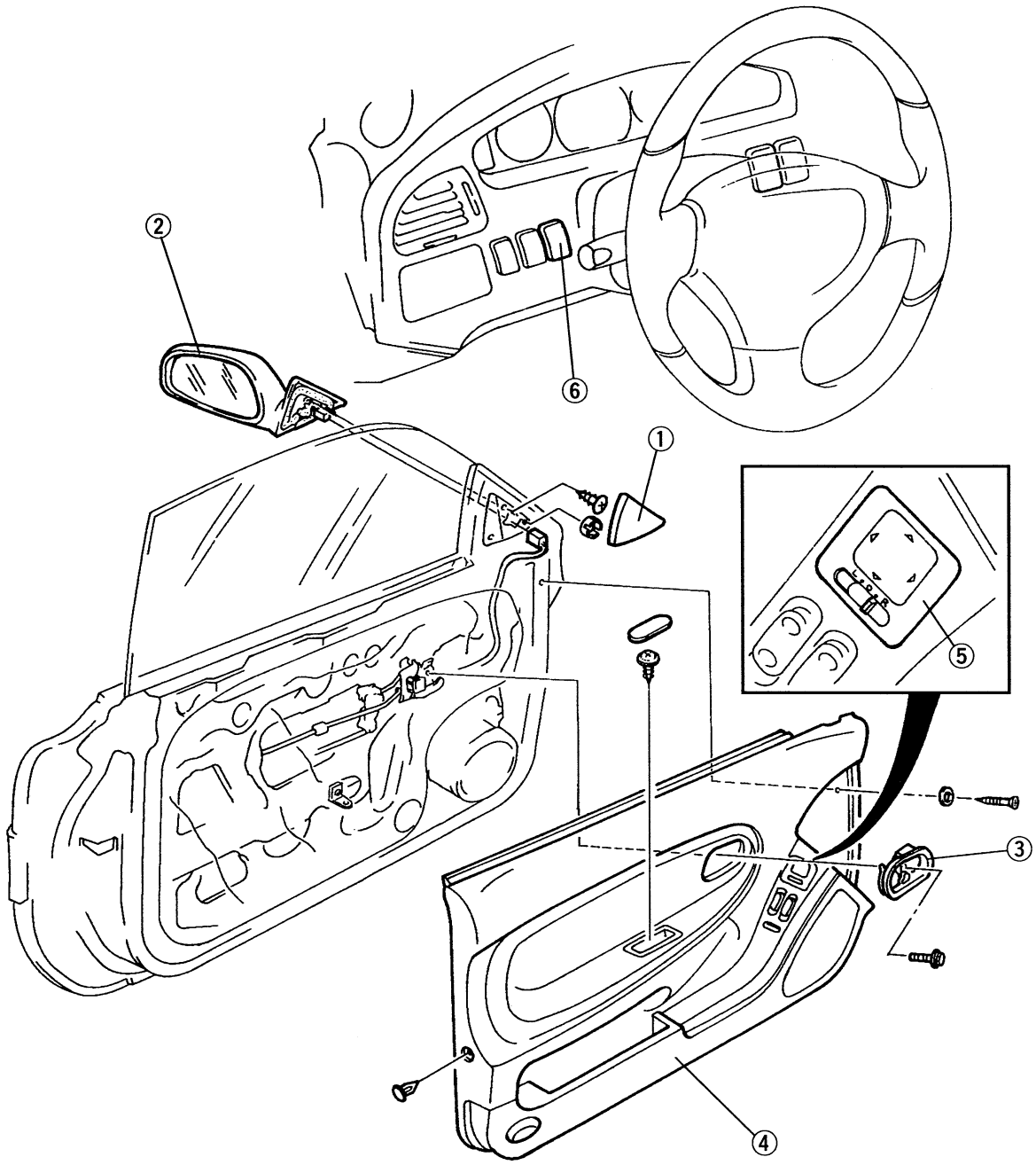
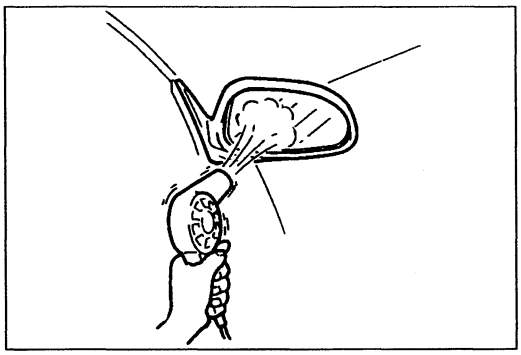


1. Inner garnish
2. Remote control mirror
   Replacement of mirror glass ... page S–55
3. Front door trim
   Removal / Installation ..... page S–91
4. Door screen
5. Power outside mirror
   Replacement of mirror glass ... page S–55
6. Power outside mirror switch
7. Rear window defroster switch

MX–6

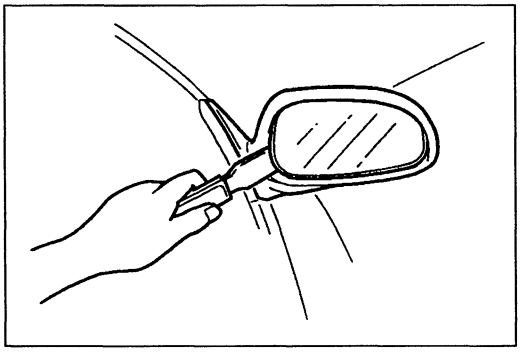


1. Inner garnish
2. Power outside mirror
   Replacement of mirror glass . . . page S–55
3. Inner handle cover
4. Door trim
   Removal / Installation . . . . . page S–93
5. Power outside mirror switch
6. Rear window defroster switch

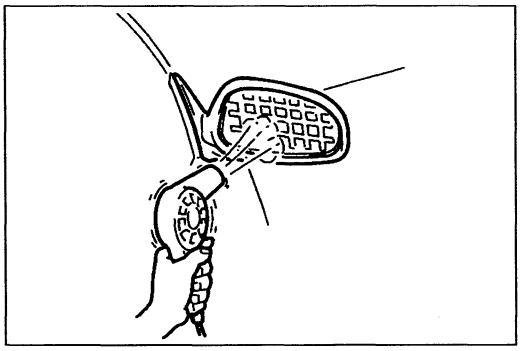


Replacement of Mirror Glass
(Except heated outside mirror)

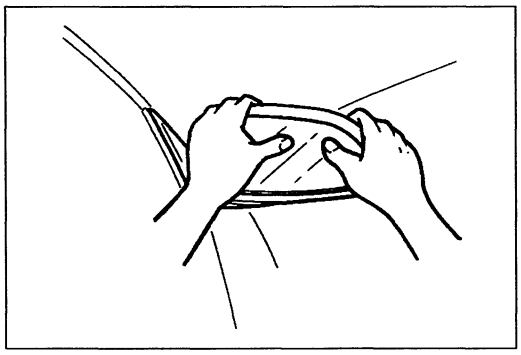
1. Warm the frame and the mirror glass by using a hot-air blower.



2. Insert a scraper between the mirror glass and the frame, and pry the glass loose.
3. Remove the remaining adhesive.



4. Warm the adhesive surface of the frame and the mirror by using a hot-air blower.



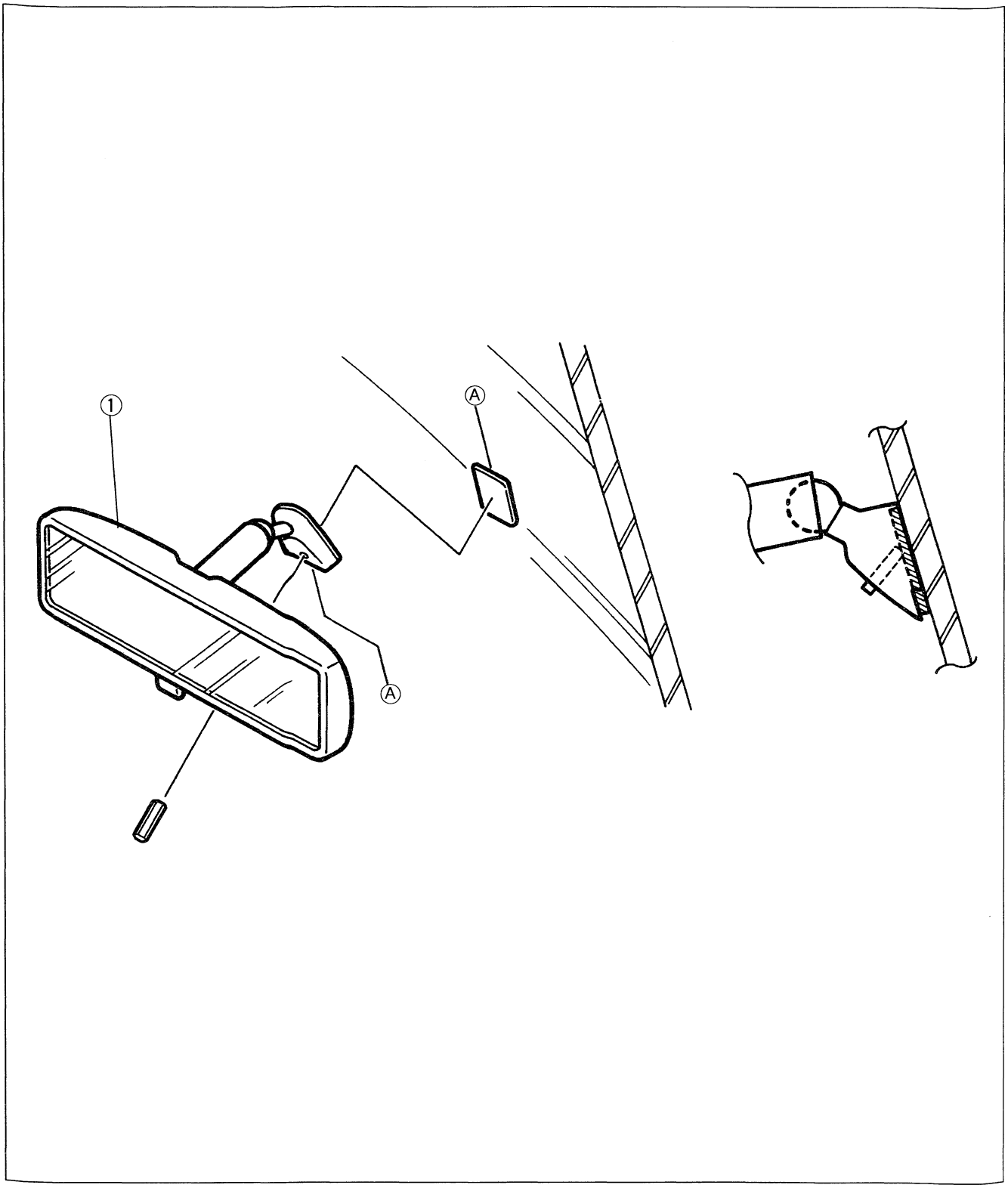
5. Install the glass in the mirror frame and gently press on the glass to secure it.

REARVIEW MIRROR

COMPONENTS

Removal / Installation

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



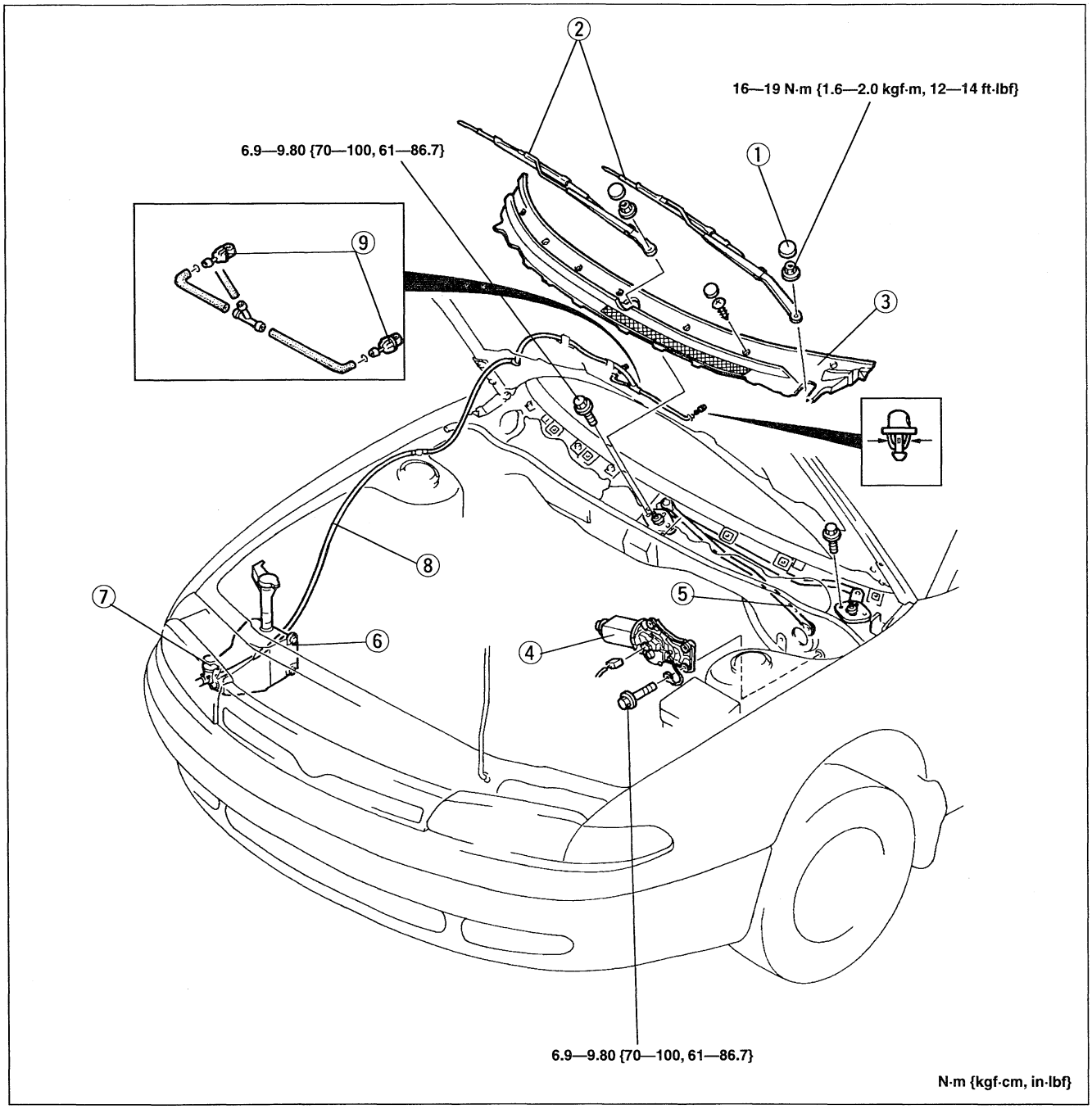
1. Rearview mirror

WINDSHIELD WIPER AND WASHER

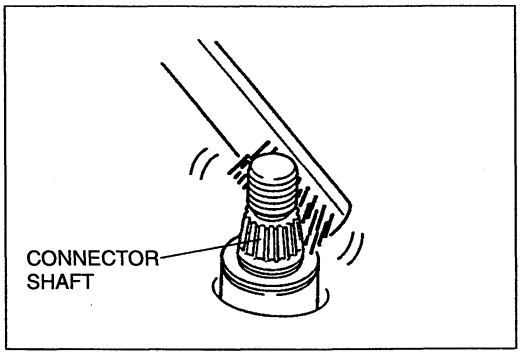
COMPONENTS

Removal / Installation

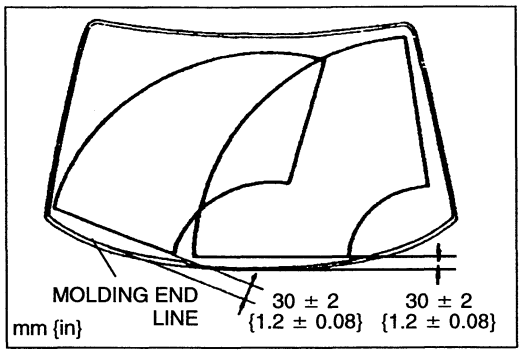
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal, referring to **Installation note**.



1. Windshield wiper arm cover
2. Windshield wiper arm and blade
   - Installation note ..... page S–58
   - Adjustment ..... page S–58
3. Cowl grille
4. Windshield wiper motor
   - Assembly / Disassembly ..... page S–59
5. Windshield wiper link
6. Windshield washer tank
7. Windshield washer motor
8. Windshield washer pipe
9. Windshield washer nozzle
   - Adjustment ..... page S–58

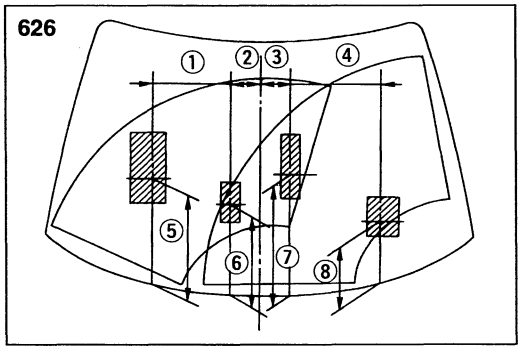


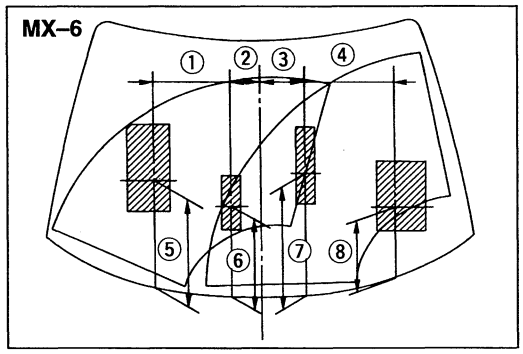
Installation note
Windshield wiper arm and blade
Clean the windshield wiper arm connector shafts with a wire brush before installing the windshield wiper arms.



Adjustment
Windshield wiper arm and blade
1. Operate the wipers once to set them in the park position.
2. Set the height of the windshield wiper arms as shown.

Tightening torque:
16—19 N·m {1.6—2.0 kgf·m, 12—14 ft·lbf}





Adjustment
Windshield washer nozzle
Insert a needle or similar object into the nozzle hole and move the nozzle to adjust the spray direction.

626

mm {in}

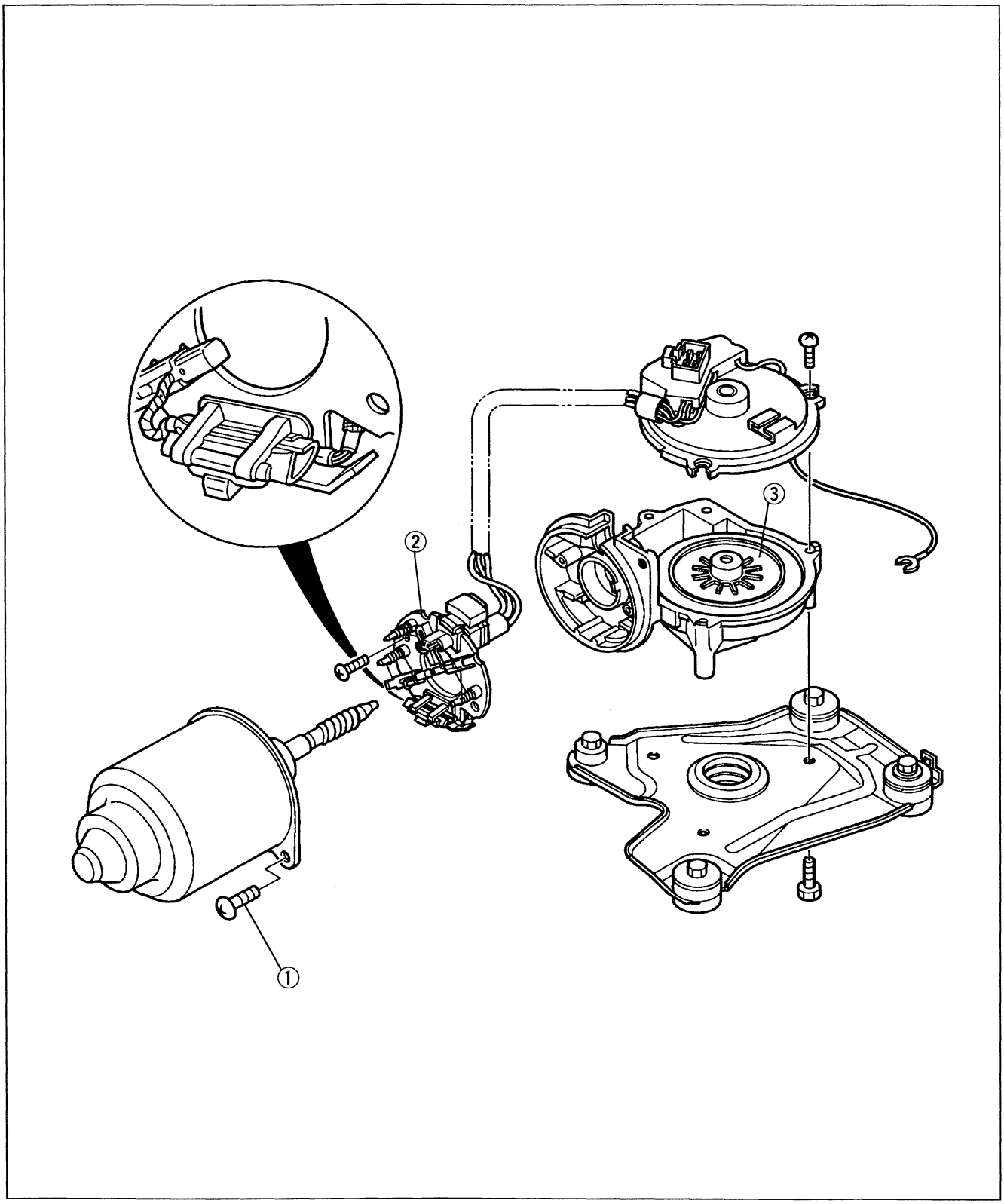
Clearance	
① 350 {13.8}	⑤ 350 {13.8}
② 100 { 3.9}	⑥ 300 {11.8}
③ 100 { 3.9}	⑦ 400 {15.7}
④ 400 {15.7}	⑧ 200 { 7.9}

MX-6

mm {in}

Clearance	
① 350 {13.8}	⑤ 350 {13.8}
② 100 { 3.9}	⑥ 300 {11.8}
③ 150 { 5.9}	⑦ 400 {15.7}
④ 400 {15.7}	⑧ 200 { 7.9}

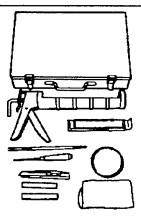
WINDSHIELD WIPER MOTOR
Disassembly / Assembly
1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.



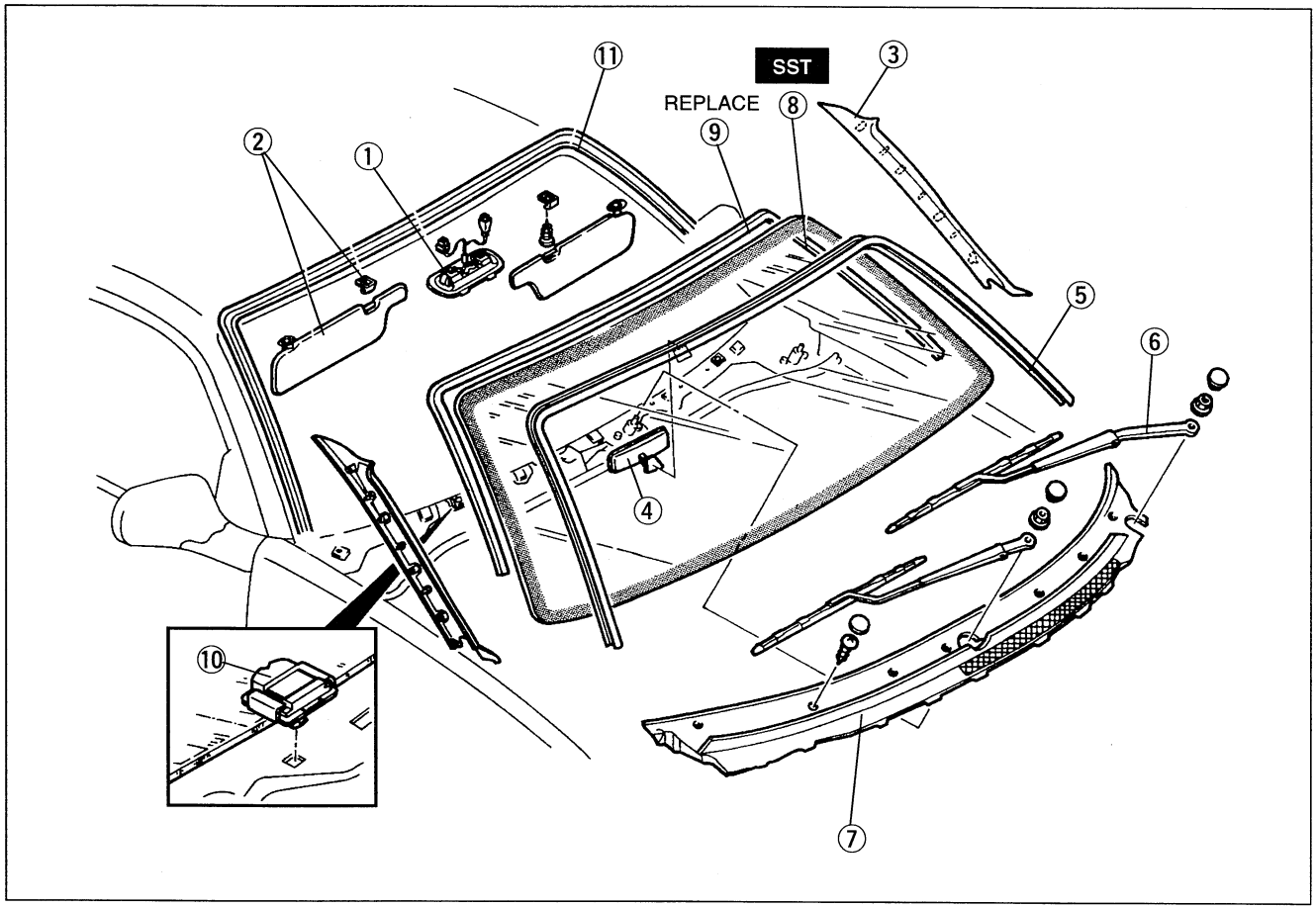
1. Screw
2. Brush plate holder
3. Motor gear assembly

WINDSHIELD

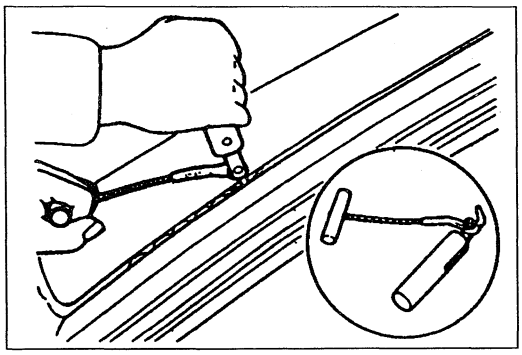
PREPARATION
SST

49 0305 870A Tool set, window		For removal / installation of glass

COMPONENTS
Removal / Installation
1. Disconnect the negative battery cable.
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**.



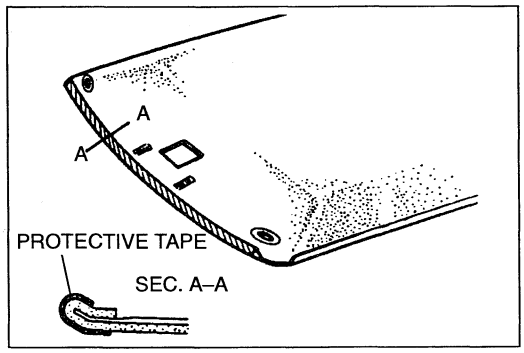
1. Overhead console
   Removal / Installation .. pages S–100, 101
2. Sunvisor and adaptor
3. A-pillar trim
   Removal / Installation .. pages S– 91, 93
4. Rearview mirror
   Removal / Installation .. page S– 56
5. Windshield molding
   Removal / Installation .. page S– 44
6. Wiper arm and blade
   Adjustment ..... page S– 58
7. Cowl grille
   Removal / Installation ..... page S–52
8. Windshield
   Removal note ..... page S–61
   Installation note ..... page S–61
9. Dam
10. Spacer
11. Protector



Removal note
Windshield

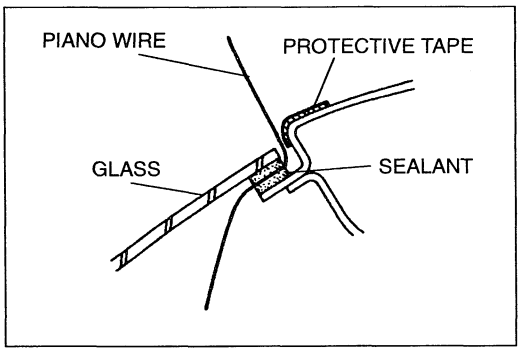
If the glass will not be reused

1. Use a tool like that shown in the figure and insert the blade into the sealant.
2. Pull through the sealant around the edge of the glass.
3. If the protector is damaged, remove it.
4. Remove the glass.

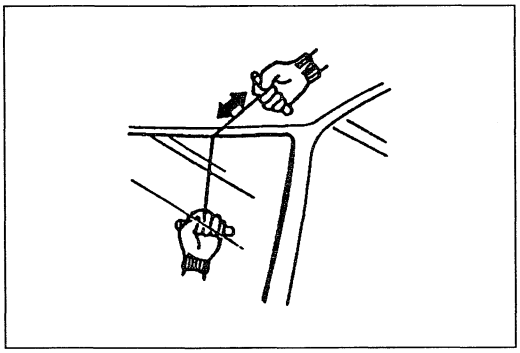


If the glass will be reused

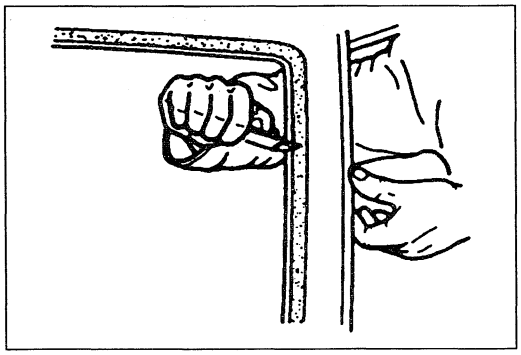
1. Apply protective tape along the front edge of the headliner to protect it from damage.



2. Apply protective tape along the edge of the body to protect it from damage.
3. Make a hole through the sealant from the inside of the vehicle by using an awl.
4. Pass piano wire through the hole.

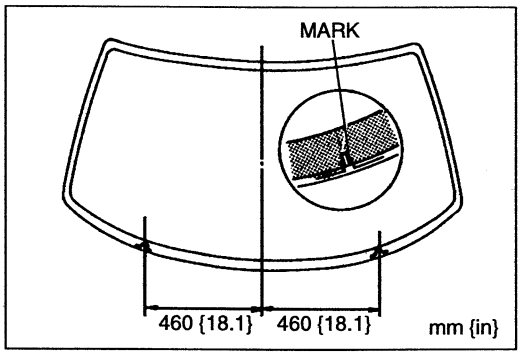


5. Wind each end of the wire around a bar.
6. Working with another person, saw through the sealant around the edge of the glass. Use a long sawing action to spread the work over the whole length of wire to prevent it from breaking. Make sure the wire does not rub on the body or the dashboard.
7. Remove the glass.

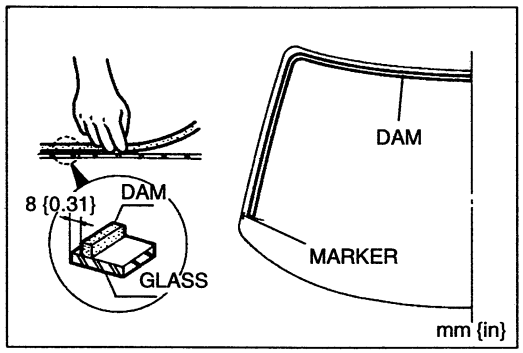


Installation note
Windshield

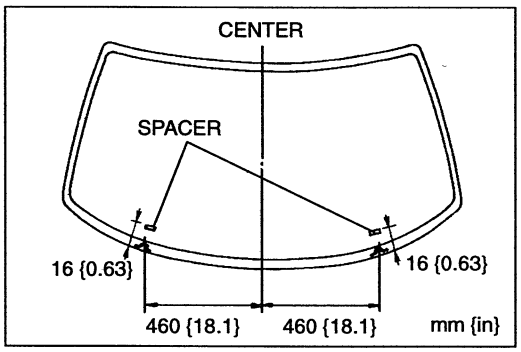
1. Cut away the old sealant by using a razor knife so that **1 to 2 mm {0.04 to 0.08 in}** of sealant remains around the circumference of the frame. If all the sealant has come off in any one place, apply some primer after degreasing, and allow it **30 minutes** to dry. Then apply new sealant to create a **2 mm {0.08 in}** layer.
2. Carefully clean an area **50 mm {2.0 in}** wide around the circumference of the glass and clean the bonding area on the body.



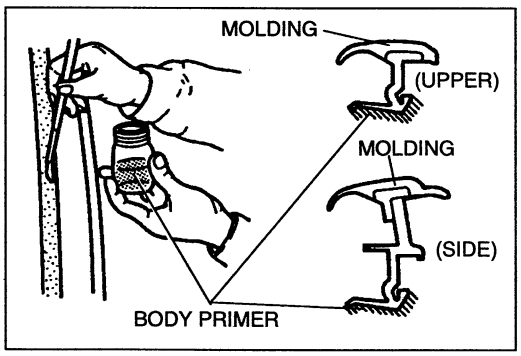
3. Mark the outer edge of the glass with a marking pen to ensure proper reinstallation.



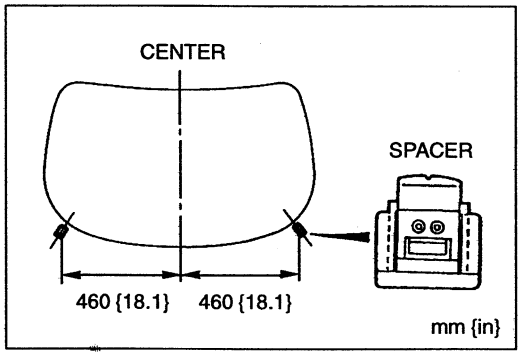
4. Securely bond a new dam along the top and sides **8 mm {0.31 in}** from the edge of the glass as shown. Allow it to dry completely.



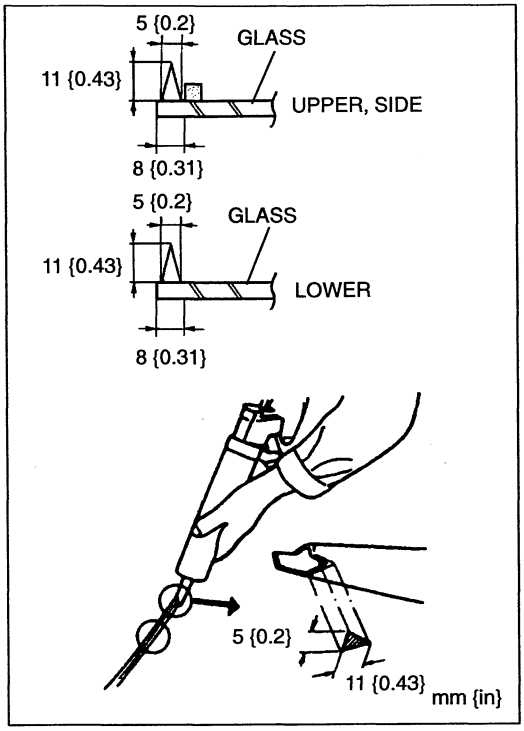
5. Align the spacers with the markers and bond the spacers to the glass as shown.



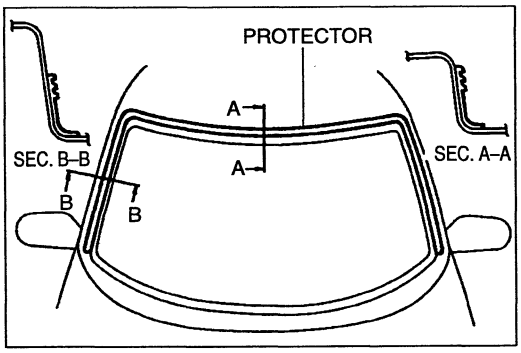
6. Apply primer to the bonding area of the glass, new windshield molding, and body by using a brush. Keep the area free of dirt and grease, and do not touch the surface. Allow it to dry for approximately **30 minutes**.



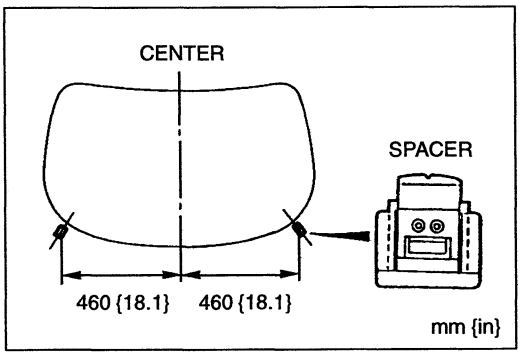
7. Install the spacers onto the body as shown. If a spacer is damaged, replace it.
8. Set the glass onto the body and adjust the clearance between the top of the glass and the body to **8 mm {0.31 in}** by moving the spacers up or down.
9. Remove the glass from the body.



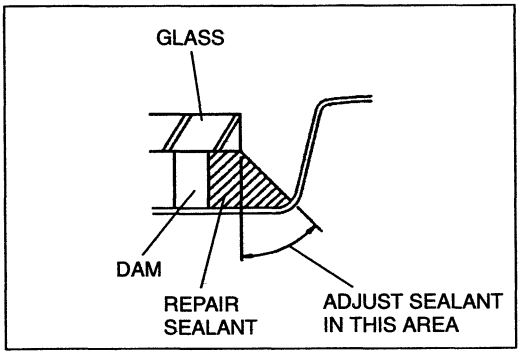
10. After the primer has dried, apply an **11 mm {0.43 in}** high bead of repair sealant around the entire circumference of the glass as shown. Keep the bead of sealant smooth and even, reshaping it with a spatula where necessary. If the windshield is being reused, apply new repair sealant over the original.



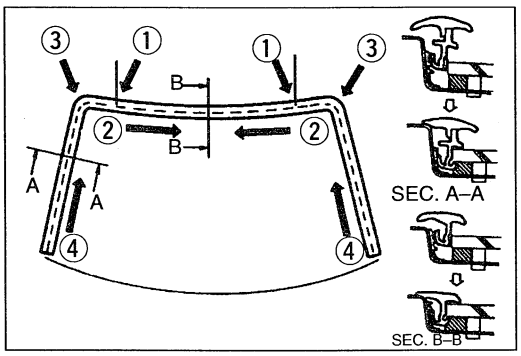
11. If the protector was removed, securely bond a new protector onto the body as shown. Allow it to dry completely.



12. Align the glass marks with the notches in the spacers and install the glass onto the body.
13. Press firmly on the glass to compress the sealant. Verify that the clearance between the top and sides of the glass and the body is **8 mm {0.31 in}**.



14. Use a scraper to smooth away any sealant that oozes out. Add more sealant to any points of poor contact. Reshape the repair sealant on the upper and side areas as shown, if necessary.



15. Install the windshield molding before the sealant has hardened.
    (1) Align the marks on the molding with the roof inner line.
    (2) Install the upper part of the molding.
    (3) Install the corner part of the molding.
    (4) Install the side parts of the molding, starting from the bottom and then toward the top.

16. To prevent the glass from being pushed out by air pressure if a door is closed, open all of the windows until the repair sealant has hardened.

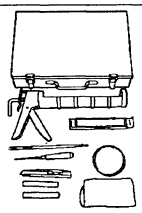
Hardening time of repair sealant

Temperature	Surface hardening time	Time required until car can be put into service
5°C {41°F}	Approx. 1.5 hr	12 hr
20°C {68°F}	Approx. 1 hr	4 hr
35°C {95°F}	Approx. 10 min	2 hr

17. Check for water leaks. If a leak is found, wipe the water off well and reinstall the windshield.

REAR WINDOW GLASS

PREPARATION
SST

49 0305 870A Tool set, window		For removal / installation of glass

COMPONENTS
Removal / Installation
1. Disconnect the negative battery cable.
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**.

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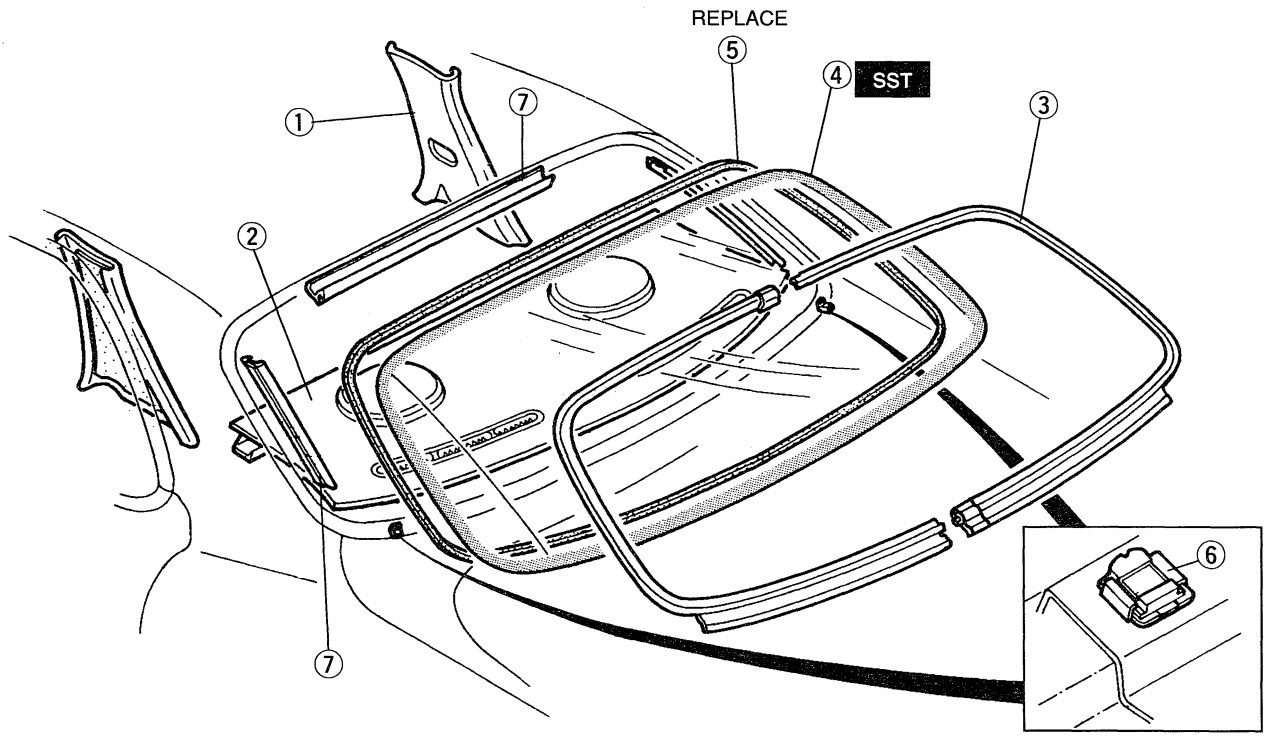
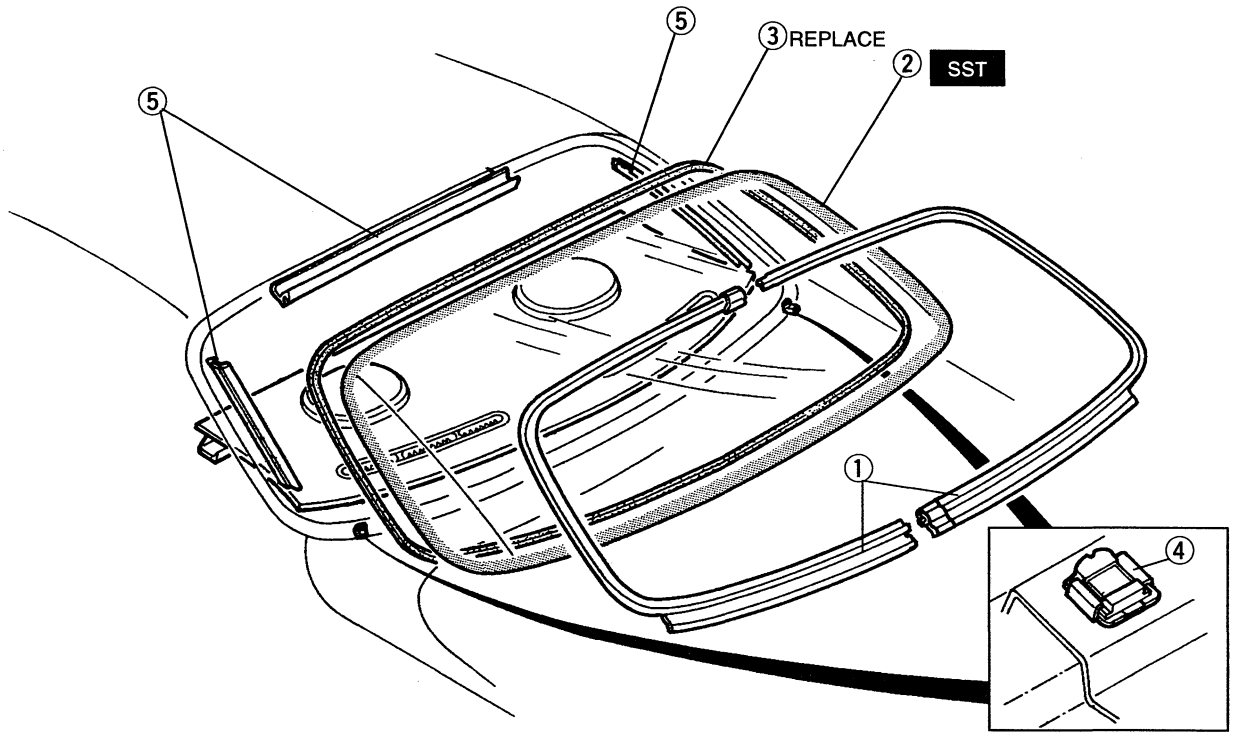
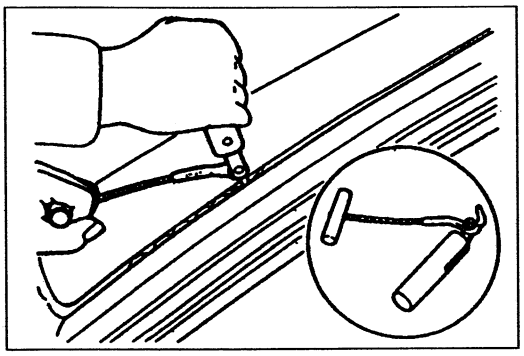


1. C-pillar trim
   Removal / Installation ..... page S–91
2. Rear package trim
   Removal / Installation ..... page S–91
3. Rear window molding
   Removal / Installation ..... page S–44
4. Rear window glass
   Removal note ..... page S–67
   Installation note ..... page S–68
5. Dam
6. Spacer
7. Protector

MX–6



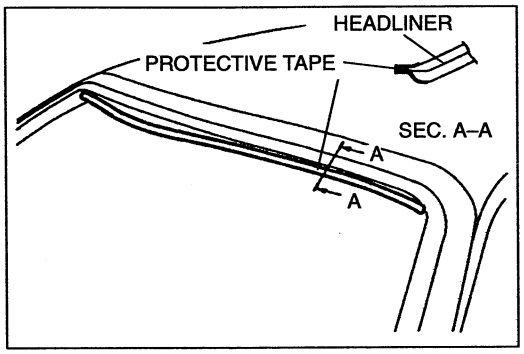
1. Rear window molding
   Removal / Installation ..... page S–44
2. Rear window glass
   Removal note ..... page S–67
   Installation note ..... page S–68
3. Dam
4. Spacer
5. Protector



Removal note
Rear window glass

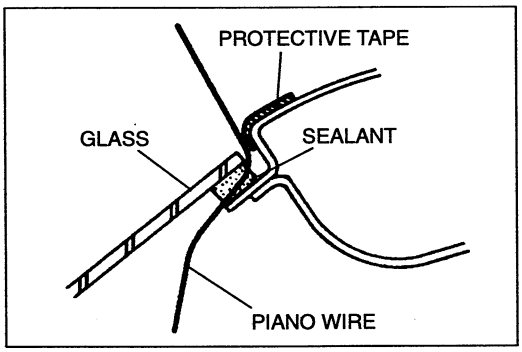
If the glass will not be reused

1. Use a tool like that shown in the figure and insert the blade into the sealant.
2. Pull through the sealant around the edge of the glass.
3. If a protector is damaged, remove it.
4. Remove the glass.

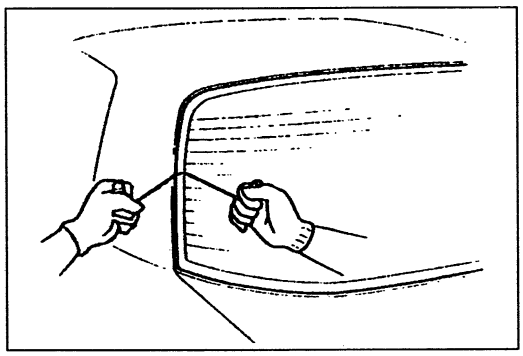


If the glass will be reused

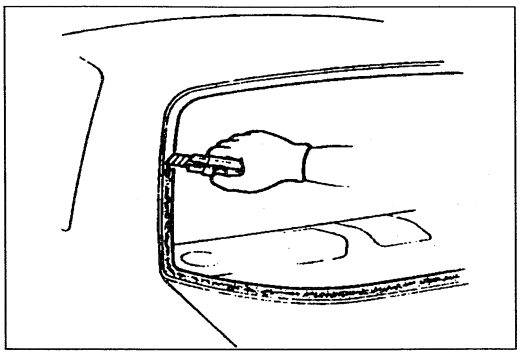
1. Apply protective tape along the rear edge of the headliner to protect it from damage.



2. Apply protective tape along the edge of the body to protect it from damage.
3. Make a hole through the sealant from the inside of the vehicle by using an awl.
4. Pass piano wire through the hole.

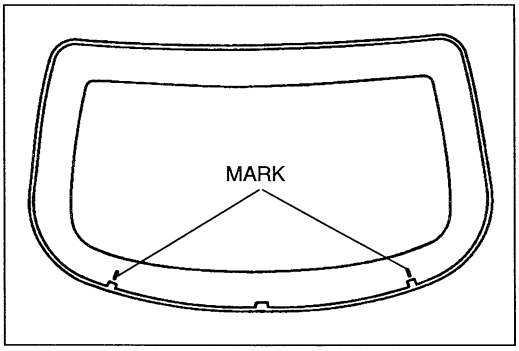


5. Wind each end of the wire around a bar.
6. Working with another person, saw through the sealant around the edge of the glass. Use a long sawing action to spread the work over the whole length of wire to prevent it from breaking. Make sure the wire does not rub on the body.
7. Remove the glass.

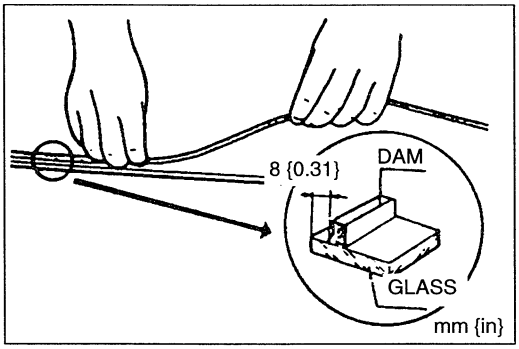


Installation note
Rear window glass

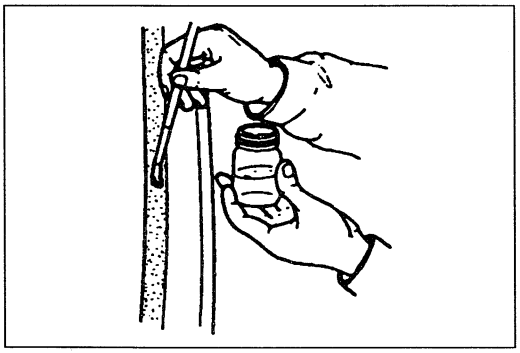
1. Cut away the old sealant by using a razor knife so that **1 to 2 mm {0.04 to 0.08 in}** of sealant remains around the circumference of the frame. If all the sealant has come off in any one place, apply some primer after degreasing, and allow it **30 minutes** to dry. Then put on new sealant to create a **2 mm {0.08 in}** layer.
2. Carefully clean an area **50 mm {2.0 in}** wide around the circumference of the glass and clean the bonding area on the body.



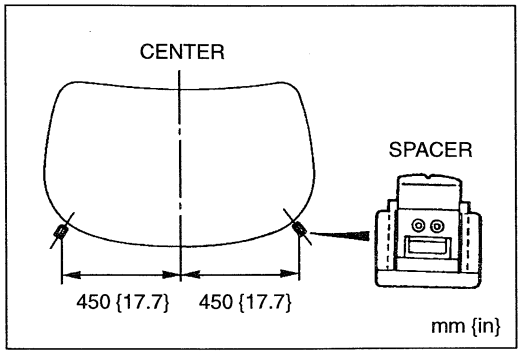
3. Mark the outer edge of the glass with a marking pen to ensure proper reinstallation.



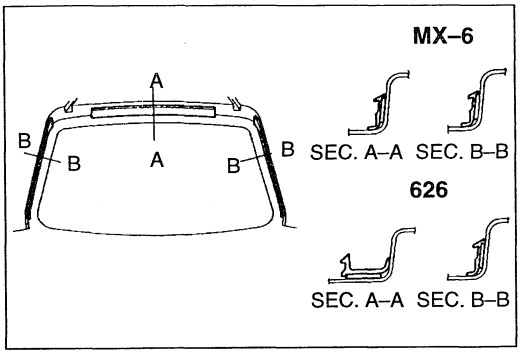
4. Securely bond a new dam along the circumference of the glass **8 mm {0.31 in}** from the edge. Allow it to dry completely.



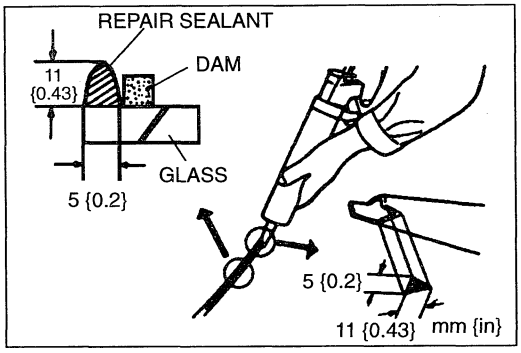
5. Apply primer to the bonding area of the glass and body by using a brush. Use only glass primer on the glass and body primer on the body. Keep the area free of dirt and grease, and do not touch the surface. Allow it to dry for approximately **30 minutes**.



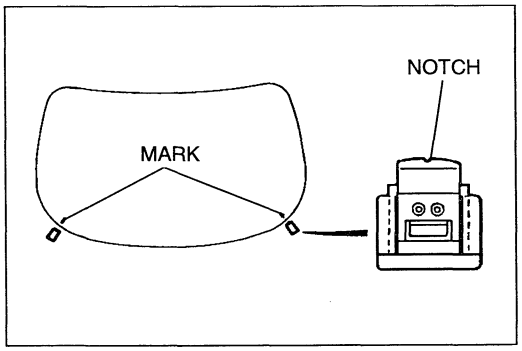
6. Install the spacers onto the body.



7. If the protectors are removed, securely bond new protecters onto the body as shown. Allow them to dry completely.



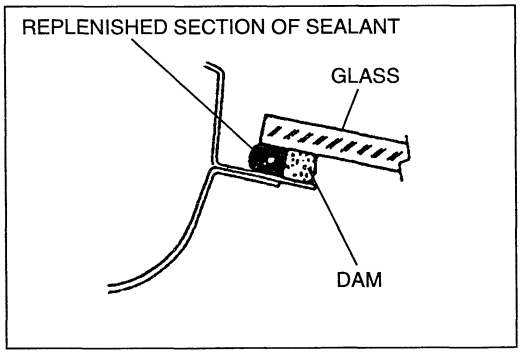
8. Prepare the nozzle of the sealant tube so that it has a flange that can run along the edge of the glass and a V notch from which the sealant can flow. Once the primer is dry, apply repair sealant around the entire circumference to fill the gap between the dam and the edge of the glass with a ridge of sealant **11 mm {0.43 in}** high. Keep the bead of sealant smooth and even, reshaping it with a spatula where necessary.



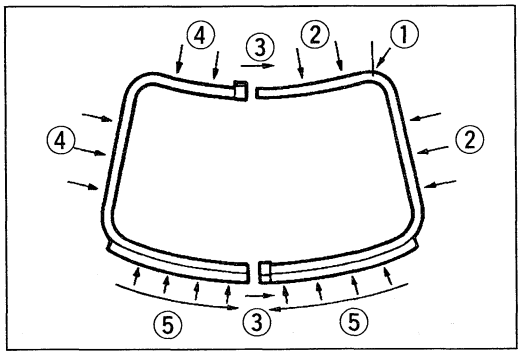
9. Align the glass marks with the V notches in the spacers and install the glass to the body.
10. Press firmly on the glass to compress the sealant.
11. To prevent the glass from being pushed out by air pressure if a door is closed, open all of the windows until the repair sealant has hardened.

Hardening time of repair sealant

Temperature	Surface hardening time	Time required until car can be put into service
5°C {41°F}	Approx. 1.5 hr	12 hr
20°C {68°F}	Approx. 1 hr	4 hr
35°C {95°F}	Approx. 10 min	2 hr



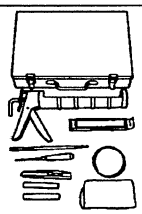
12. Check for water leaks. If a leak is found, wipe the water off well and add sealant where needed.



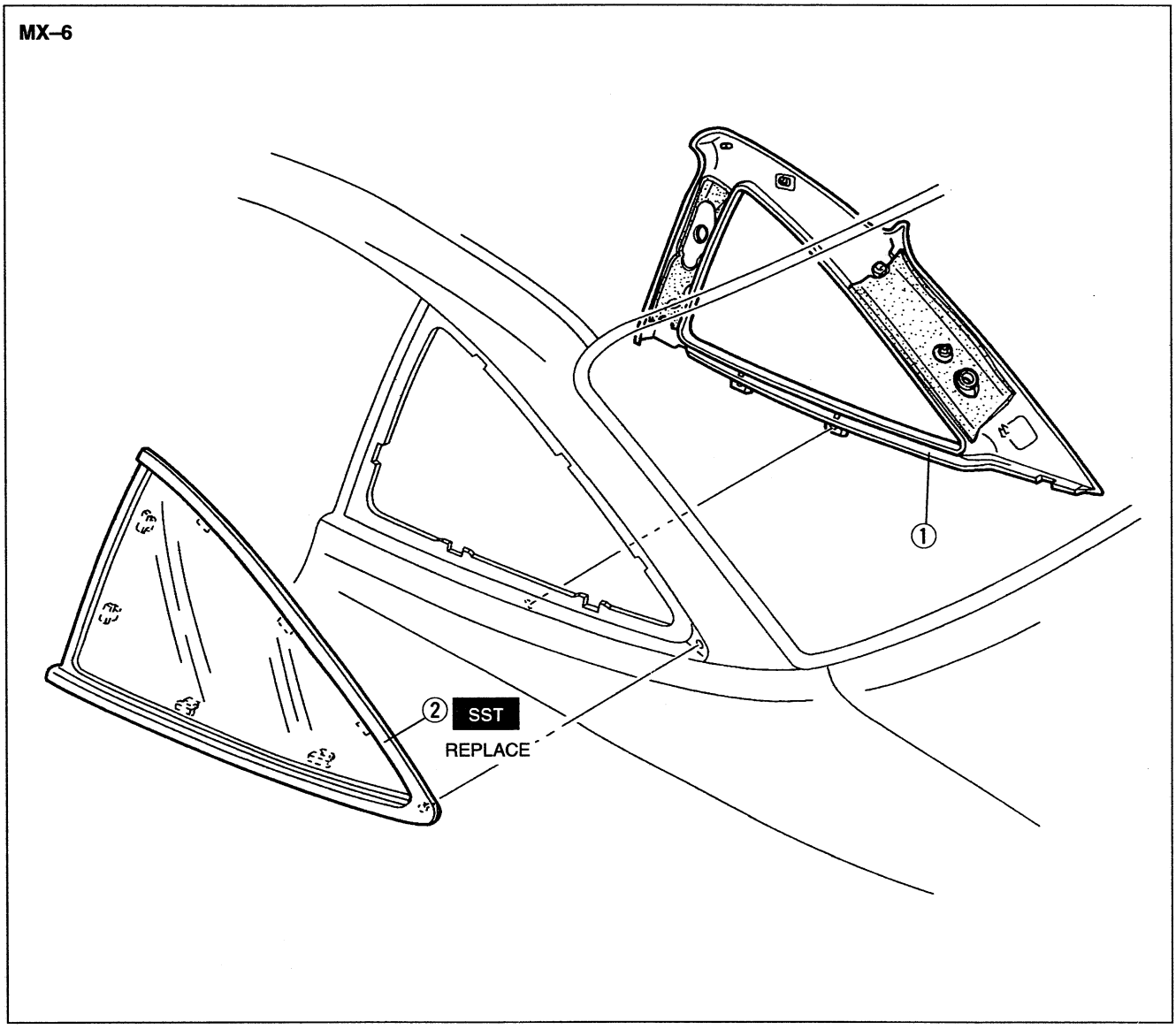
13. Install the rear window molding.
    - ① Align the mark on the right molding with the roof outer line.
    - ② Push on the upper and side portions of the right molding.
    - ③ Insert the left molding into the joint molding.
    - ④ Align the upper portion of the left molding with the body and push on the upper and side portions of the molding.
    - ⑤ Fasten the lower portion with screws, working from outside to inside.

QUARTER WINDOW GLASS

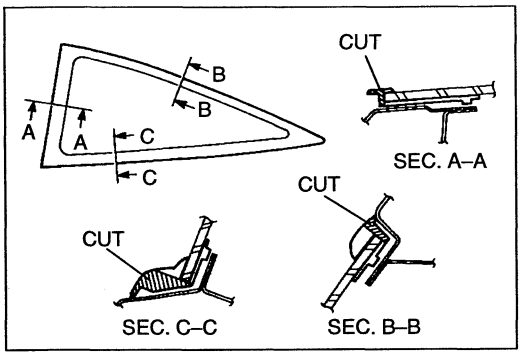
PREPARATION
SST

49 0305 870A Tool set, window		For removal / installation of glass

COMPONENTS
Removal / Installation
1. Disconnect the negative battery cable.
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**.

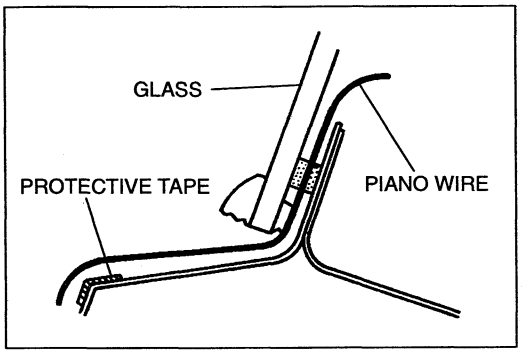


1. C-pillar trim
   Removal / Installation ..... page S–93
2. Quarter window glass
   Removal note ..... page S–71
   Installation note ..... page S–72

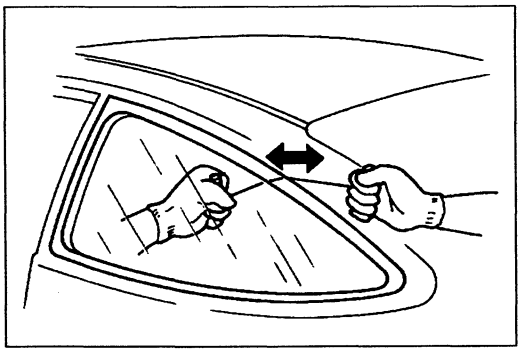


Removal note
Quarter window glass

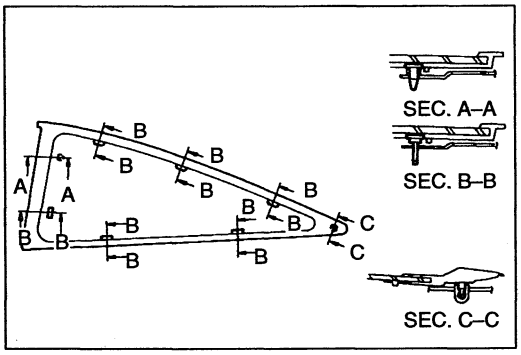
1. Apply protective tape along the edge of the body to protect it from damage.
2. Cut the quarter window molding as shown by using a razor knife.



3. Using an awl, make a hole through the sealant from the inside of the vehicle.
4. Pass piano wire through the hole.

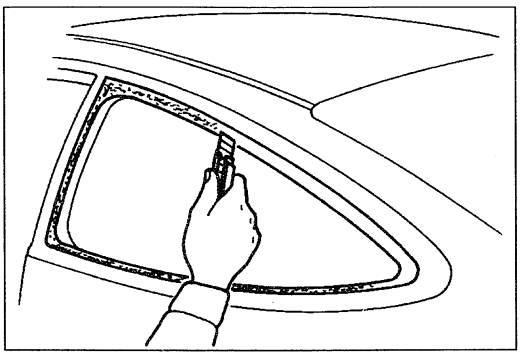


5. Wind each end of the wire around a bar.
6. Working with another person, saw through the sealant around the edge of the glass. Use a long sawing action to spread the work over the whole length of wire to prevent it from breaking. Make sure the wire does not rub on the body.
7. Remove the glass.



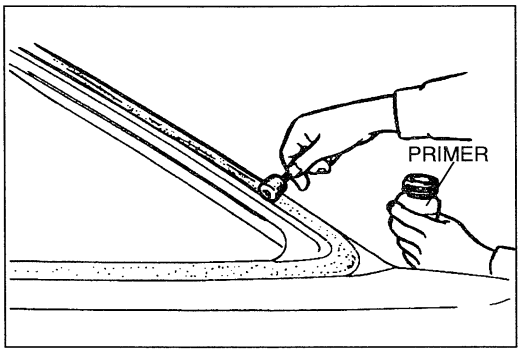
Note

- The quarter window glass has locating clips as shown. If it is difficult to cut the sealant with the piano wire, cut it by using a razor knife.

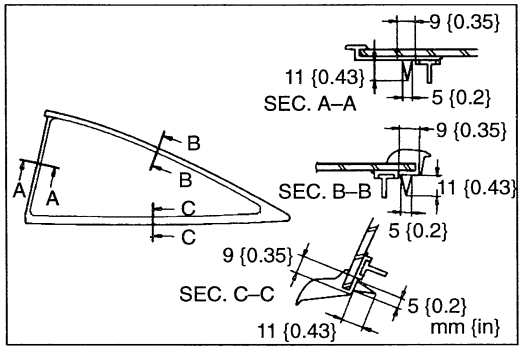


Installation note
Quarter window glass

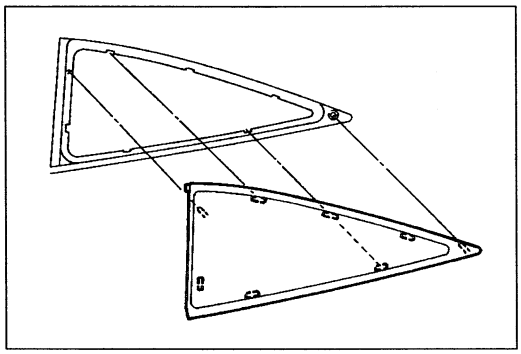
1. Cut away the old sealant by using a razor knife so that **1 to 2 mm {0.04 to 0.08 in}** of sealant remains around the circumference of the frame. If all the sealant has come off in any one place, apply some primer after degreasing, and allow it **30 minutes** to dry. Then put on new sealant to create a **2 mm {0.08 in}** layer.
2. Carefully clean an area **50 mm {2.0 in}** wide around the circumference of the glass and clean the bonding area on the body.



3. Apply primer to the bonding area of the glass and body by using a brush. Use only glass primer on the glass and body primer on the body. Keep the area free of dirt and grease. Do not touch the surface. Allow it to dry for approximately **30 minutes**.



4. Prepare the nozzle of the sealant tube 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 repair sealant around the entire circumference to fill the gap between the dam and the edge of the glass with a ridge of sealant **11 mm {0.43 in}** high. Keep the bead of sealant smooth and even, reshaping it where necessary with a spatula.



5. Align the glass via the stud pins and install it onto the body.
6. Press firmly on the glass to compress the sealant.
7. To prevent the glass from being pushed out by air pressure if a door is closed, open all of the windows until the repair sealant has hardened.

Hardening time of repair sealant

Temperature	Surface hardening time	Time required until car can be put into service
5°C {41°F}	Approx. 1.5 hr	12 hr
20°C {68°F}	Approx. 1 hr	4 hr
35°C {95°F}	Approx. 10 min	2 hr

8. Check for water leaks. If a leak is found, wipe the water off well and remove the quarter window glass. Install a new quarter window glass.

INNER SLIDING SUNROOF

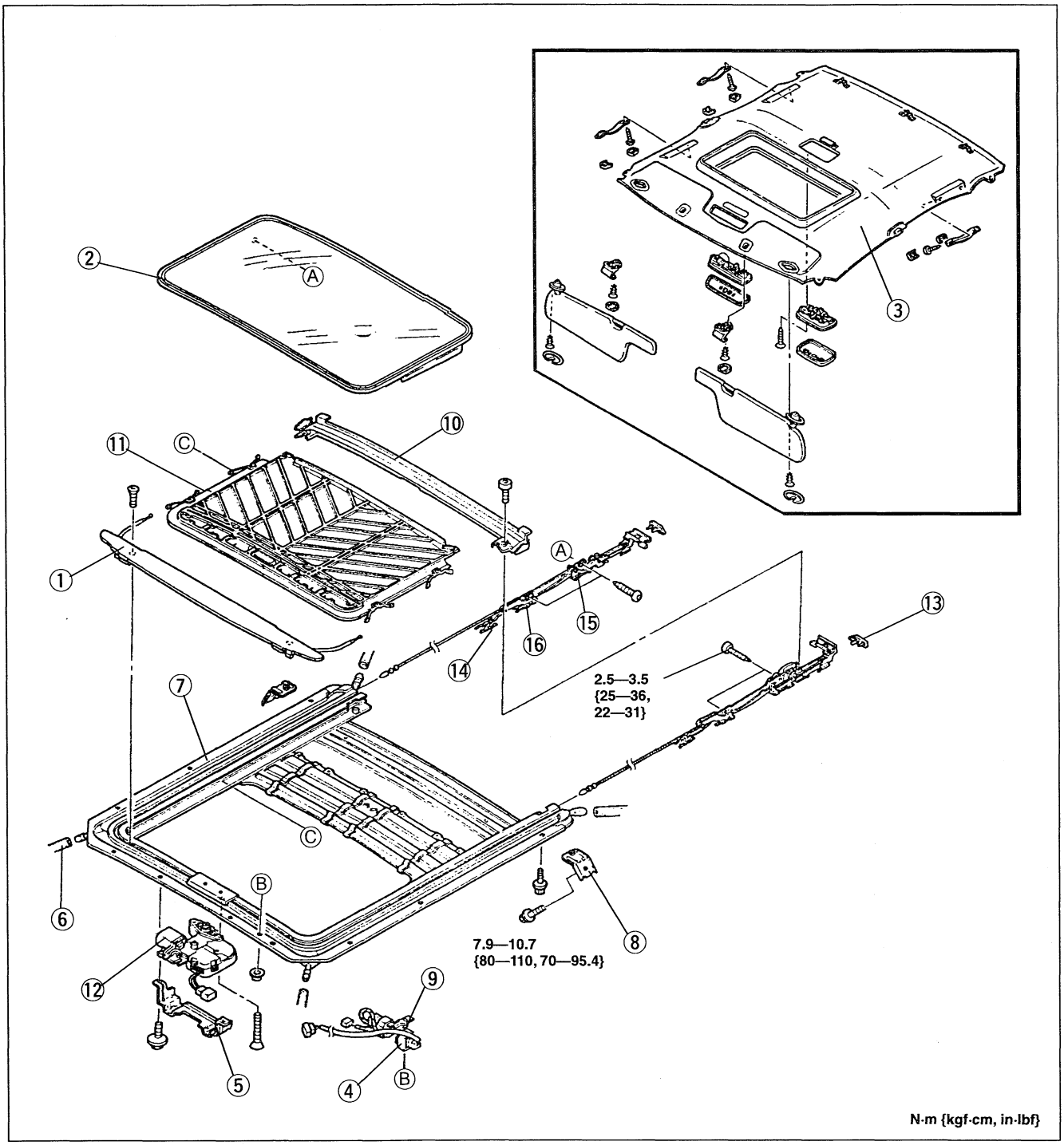
PREPARATION

TORX tool (T25)	For installation / removal of glass panel

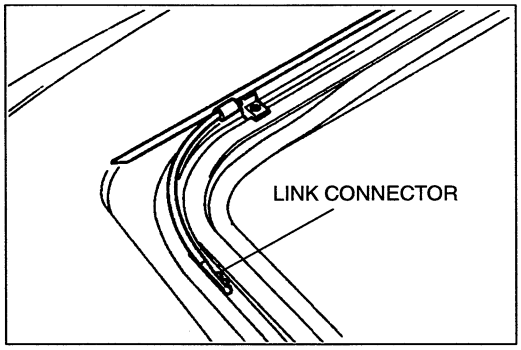
COMPONENTS

Removal / Installation

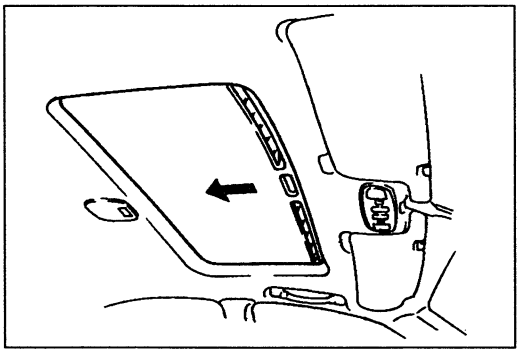
1. Remove in the order shown in the figure, referring to **Removal note**. Disconnect the negative battery cable before removing the headliner.
2. Install in the reverse order of removal, referring to **Installation note**.



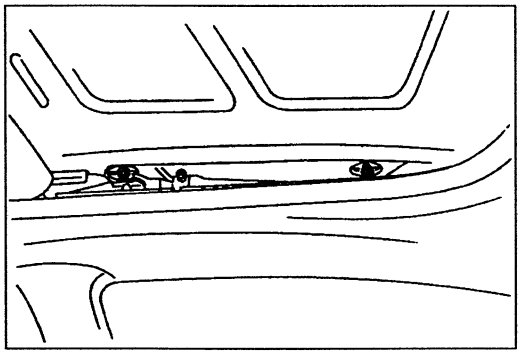
1. Deflector
   Removal note ..... below
2. Glass panel
   Removal note ..... below
   Adjustment ..... page S– 77
3. Headliner
   Removal note ..... page S–102
4. Sunroof relay
5. Motor bracket
6. Drain hose
7. Frame
8. Set bracket
9. Relay bracket
10. Drip rail
    Removal note ..... page S– 75
11. Sunshade
    Removal note ..... page S–75
12. Sunroof motor
    Installation note ..... page S–76
    Inspection ..... page S–77
13. Guide rail cover
14. Front guide
    Removal note ..... page S–75
    Installation note ..... page S–75
15. Rear guide
    Removal note ..... page S–75
    Installation note ..... page S–75
16. Position plate
    Removal note ..... page S–75
    Installation note ..... page S–75



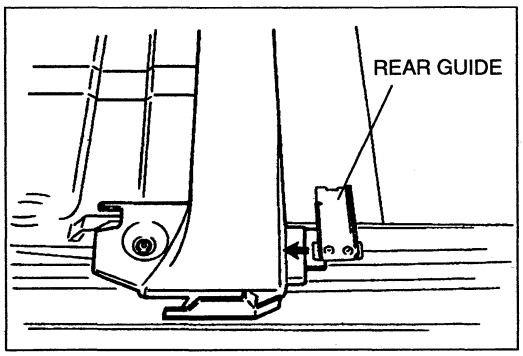
Removal note
Deflector
1. Operate the switch to fully open the panel.
2. Remove the link from the link connector by using a screwdriver.
3. Remove the mounting screws and remove the deflector from the frame.



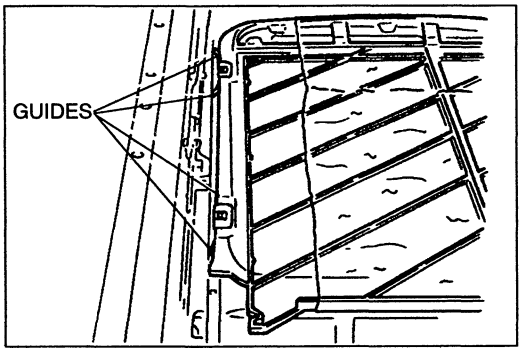
Glass panel
1. Firmly push the sunshade to slide it to the rear.
2. Remove the link cover.



3. Tilt the glass panel up by using the tilt switch.
4. Remove the panel mounting screws by using a TORX tool (T25) and remove the glass panel from the position plate.

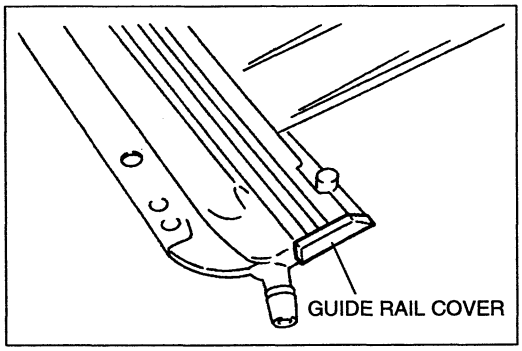


Drip rail
1. Remove the drip rail mounting screws.
2. Pull the drip rail to remove it from the position plate.

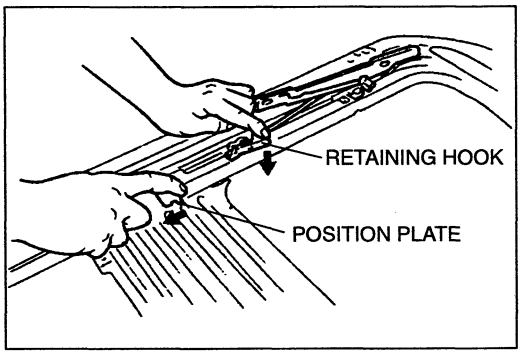


Sunshade

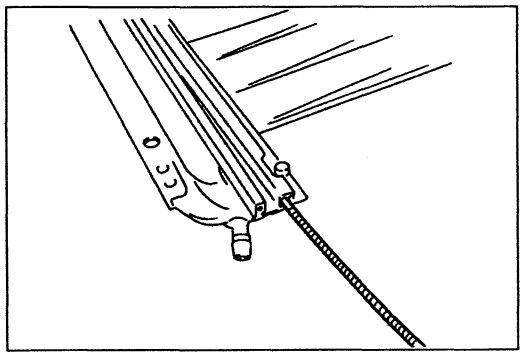
Free the guides from the frame groove by using a screwdriver, and remove the sunshade.



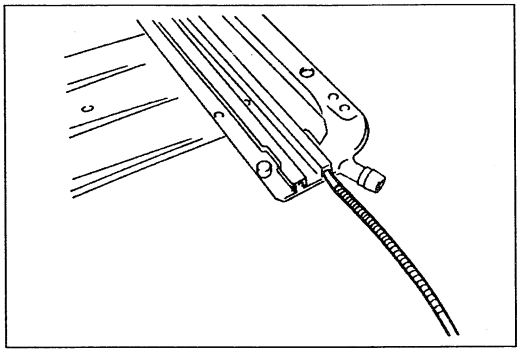
Front and rear guides, position plate
1. Remove the motor bracket mounting bolts and remove the bracket from the frame.
2. Remove the motor mounting screws and remove the motor from the frame.
3. Remove the guide rail cover from the rear end of the frame.

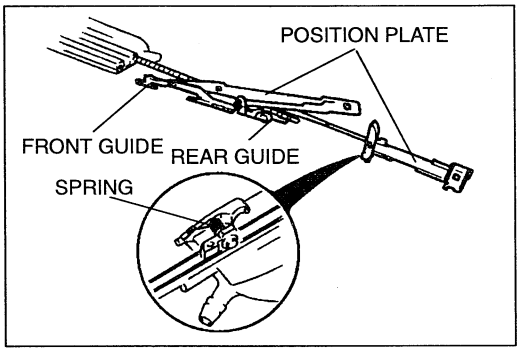


4. Push the front of the retaining hook to disengage it from the frame. Pull the position plate to remove the front guide, rear guide, and position plate from the guide rail.

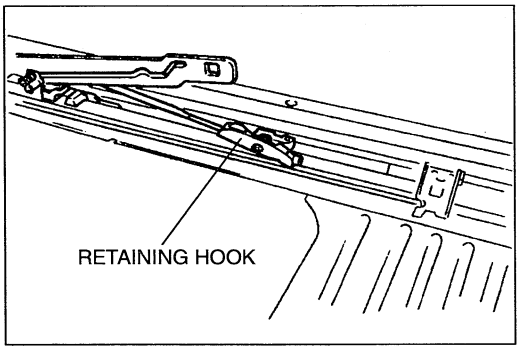


Installation note
Front and rear guides, position plate
1. Grease the contact surfaces of the cable and rear guide position plate.
2. Insert the rear guide cable into the channel of the guide rail.

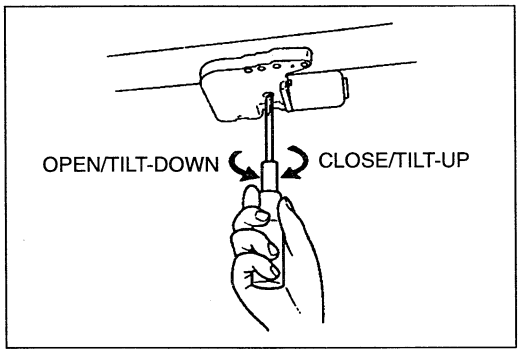




3. Insert the front guide, rear guide, and position plate into the guide rail.
4. Tilt the position plate upward. Verify that the spring hooks onto the retaining hook when the position plate is inserted into the guide rail.

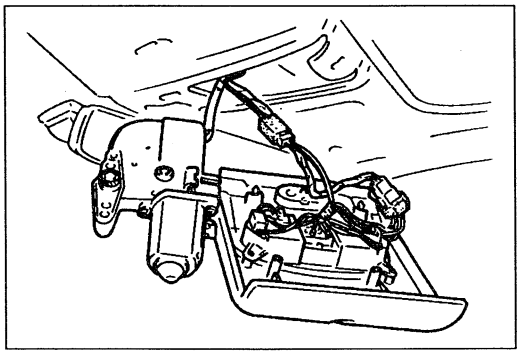


5. Push the rear guide forward until the retaining hook engages with the notch of the guide rail.

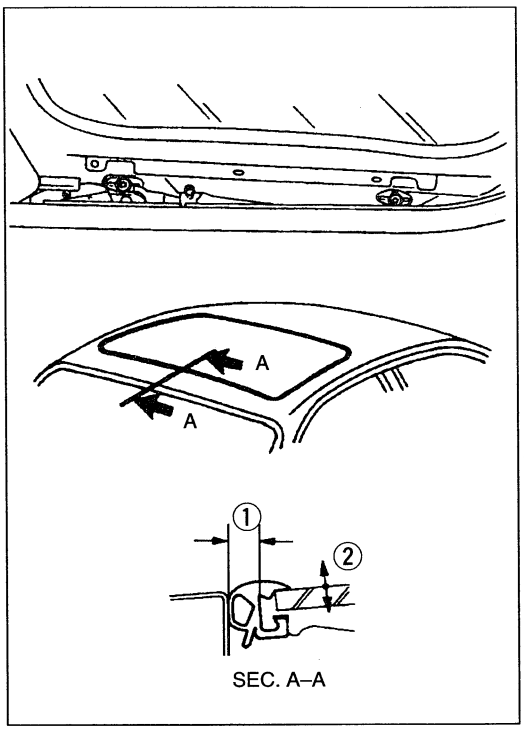


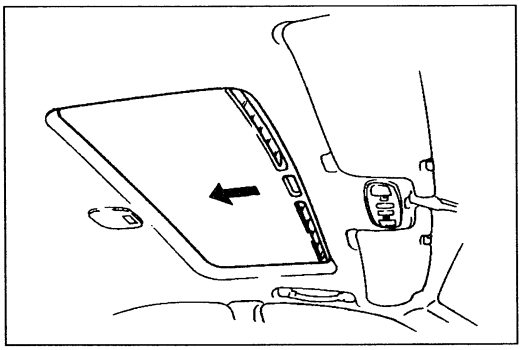
Sunroof motor

1. Install the motor to the frame. Close the panel by turning the mechanism with a screwdriver.
2. Install the frame to the body.



3. Remove the motor from the frame and install the harness connector to the overhead console.
4. Set the limit switches.
   (1) Press the back of either the TILT switch or SLIDE switch and operate the motor until it stops.
   (2) Press the front of the same switch until the motor stops.
5. Install the motor to the frame.
6. After installing the motor, use the sliding sunroof switches to verify that the panel operates normally.





Adjustment
Glass panel
Gap

1. Open the glass panel about **100 mm {3.9 in}** from the fully closed position.
2. Pull up on the weatherstrip surrounding the section which is to be measured.
3. Fully close the glass panel.
4. Remove the link cover.
5. Loosen the panel mounting screws by using a TORX tool (T25) to adjust the gap vertically, horizontally, inward, or outward.

Clearance mm {in}

	Glass panel	
	Straight	**Corner**
①	6.92 ± 0.22 {0.272 ± 0.09}	6.92 ± 0.25 {0.272 ± 0.1}
②	$0\ ^{+0.5}_{-1.5}$ $\{0\ ^{+0.02}_{-0.06}\}$	$0\ ^{+0.5}_{-1.5}$ $\{0\ ^{+0.02}_{-0.06}\}$

6. Tighten the panel mounting screws.
7. Open the glass panel and install the weatherstrip.

Tightening torque:
2.5—3.5 N·m {25—36 kgf·cm, 22—31 in·lbf}

Inspection
Sunroof motor

1. Measure the operation time of the slide panel from fully opened to fully closed and vice versa.

Specified time: 4—7 sec.

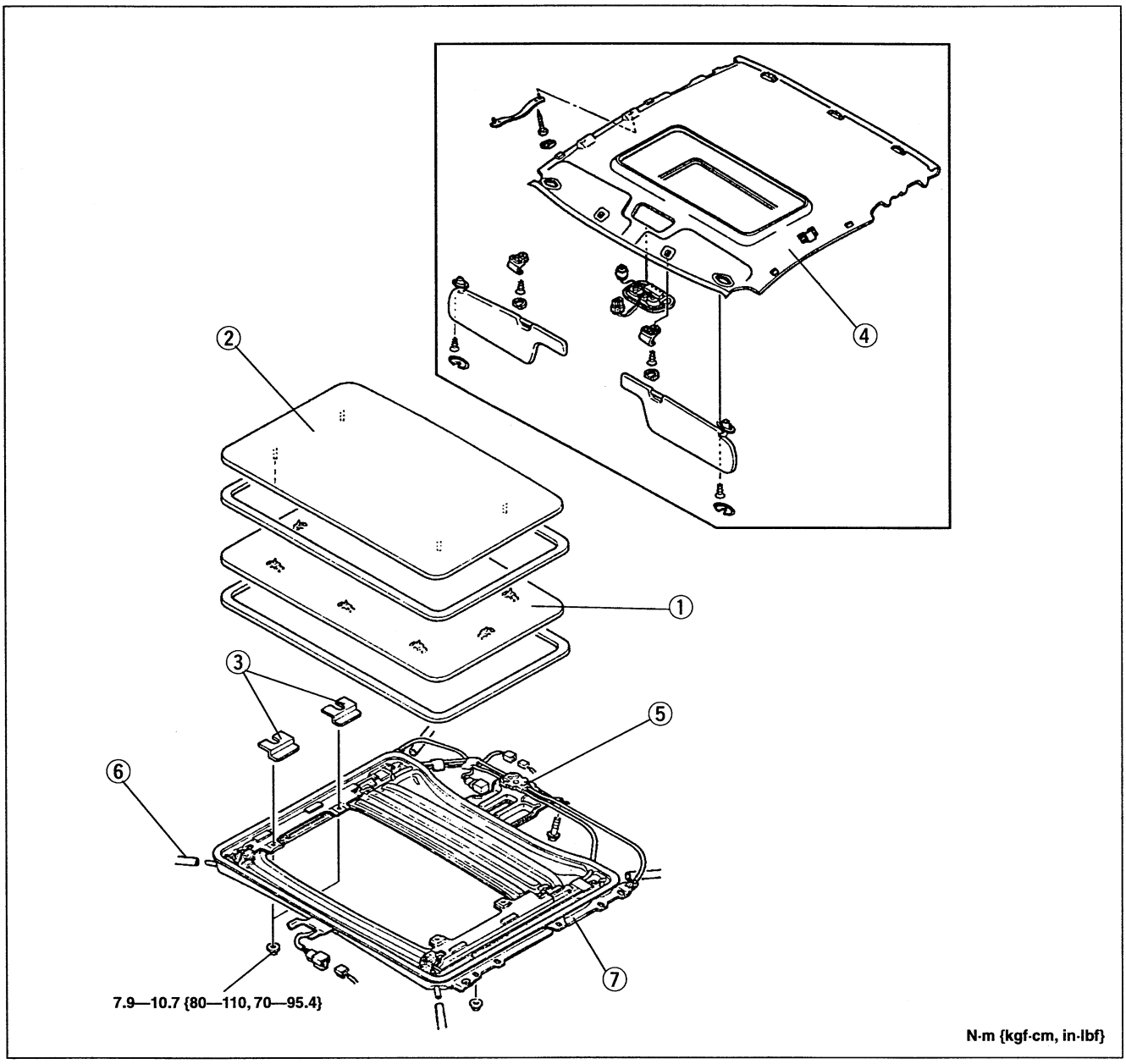
2. If not as specified, replace the sunroof motor.

OUTER SLIDING SUNROOF

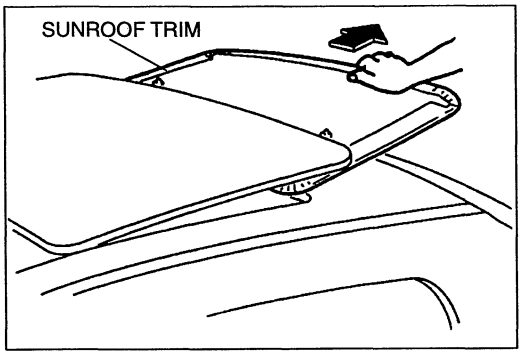
COMPONENTS

Removal / Installation

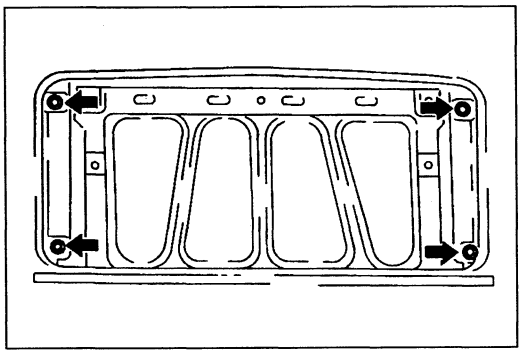
1. Open the slide panel **100 mm {3.9 in}** from the fully closed position.
2. Disconnect the negative battery cable.
3. Remove in the order shown in the figure, referring to **Removal note**.
4. Install in the reverse order of removal, referring to **Installation note**.



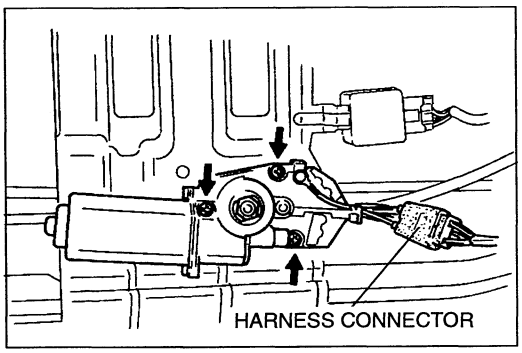
1. Sunroof trim
   - Removal note ..... page S– 79
   - Installation note ..... page S– 81
2. Slide panel
   - Removal note ..... page S– 79
   - Adjustment ..... page S– 83
3. Sunroof shim
4. Headliner
   - Removal note ..... page S–102
5. Sunroof motor
   - Removal note ..... page S–79
   - Installation note ..... page S–80
6. Drain hose
   - Installation note ..... page S–81
7. Sunroof drive unit
   - Removal note ..... page S–79
   - Installation note ..... page S–79
   - Disassembly / Assembly ..... page S–82



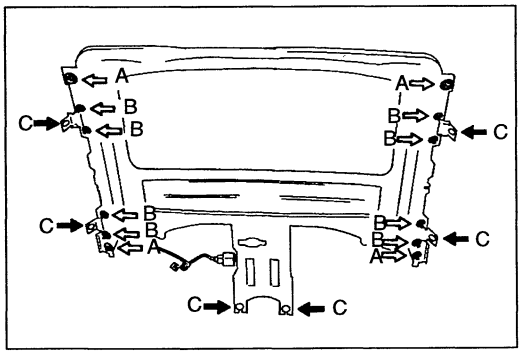
Removal note
Sunroof trim
1. Tilt up the slide panel.
2. Remove the fasteners on the front side of the sunroof trim.
3. Pull down the trim and remove it from the sunroof panel.
4. Pull out the sunroof trim from between the slide panel and the roof.



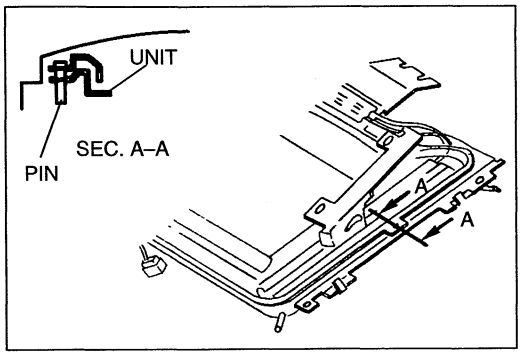
Slide panel
1. Fully close the slide panel by using an allen wrench.
2. Remove the slide panel mounting nuts.
3. Push up the slide panel from inside and remove it from the lower panel.



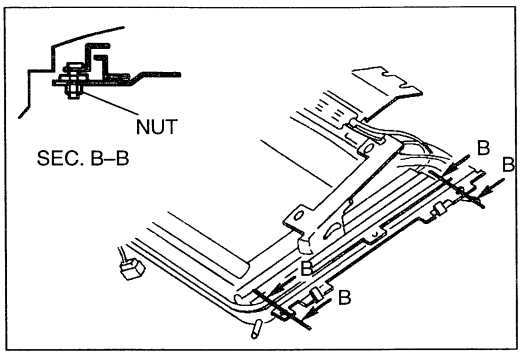
Sunroof motor
1. Tilt up the lower panel **80 mm {3.1 in}** from the fully closed position by using an allen wrench.
2. Remove the screws and remove the sliding sunroof motor from the sunroof frame.
3. Disconnect the motor harness connector.



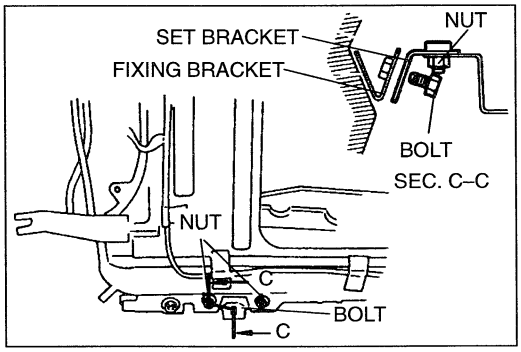
Sunroof drive unit
1. Remove bolts C.
2. Loosen nuts B.
3. Loosen height adjusting nuts A and remove the sunroof drive unit from the body.



Installation note
Sunroof drive unit
1. Set the sunroof drive unit into the roof panel and align the locator pins.

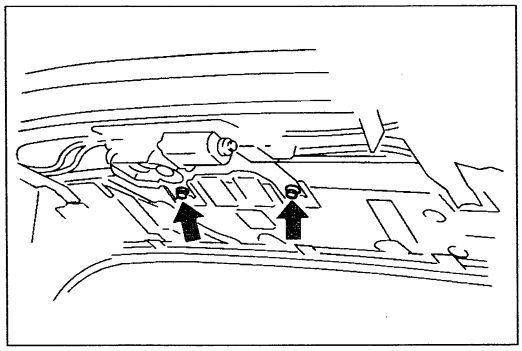


2. Loosely install the sunroof drive unit to the roof panel by using the height adjusting nuts.



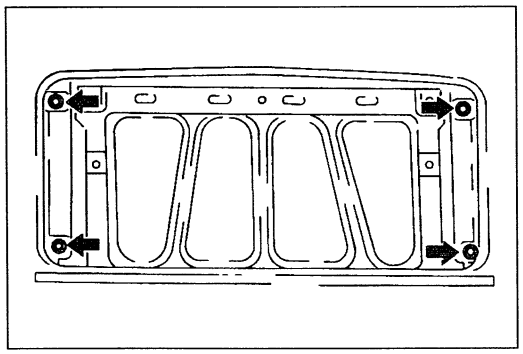
3. Loosen the set bracket attaching nuts. Position the set bracket so that it touches the roof panel fixing bracket. Tighten the bolts, and then tighten the nuts.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



4. Affix the rear of the sunroof frame to the roof panel.

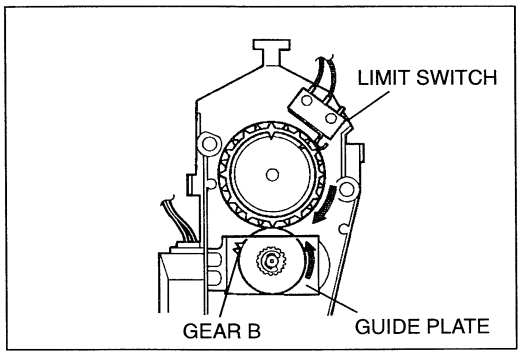
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}



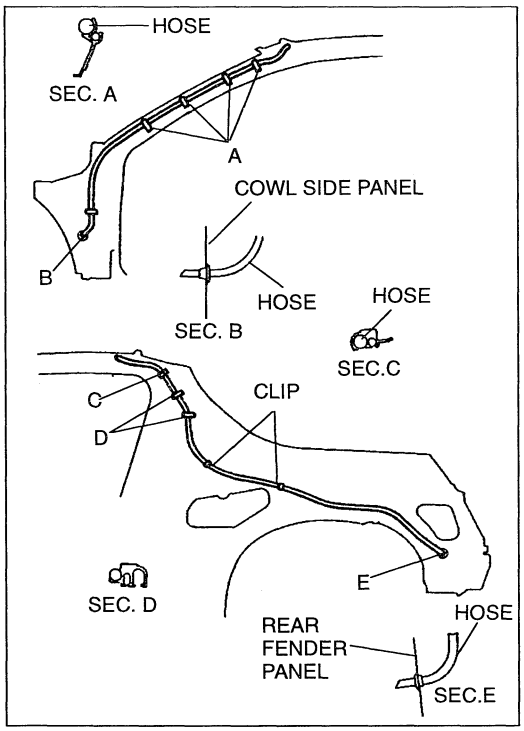
5. Install the slide panel to the lower panel.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

6. If the height difference between the slide panel and the roof panel is greater than **2 mm {0.08 in}**, loosen the slide panel attaching nuts and insert shims between the panels.



Sunroof motor
1. Move the lower panel fully forward by hand.
2. Turn the limit switch off by using an allen wrench.
3. Turn the limit switch on by using an allen wrench.
4. Set gear B inside the guide plate.
5. Install the motor to the sunroof frame with screws.
6. Connect the motor harness connector.



Drain hose

Note

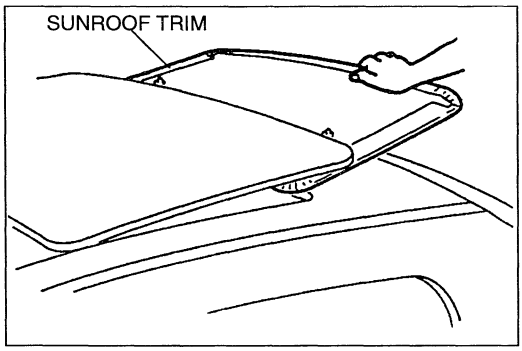
- Apply soapy water to the drain hoses and insert them fully into the sunroof frame.

(front)

Insert one end of the hose into the sunroof frame, affix the hose along the A-pillar, and insert the other end into the cowl side panel.

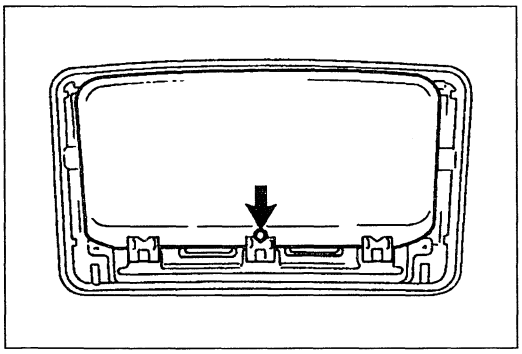
(rear)

Insert one end of the hose into the sunroof frame, affix the hose along the B-pillar, and insert the other end into the rear fender panel hole via the hole in the upper part of the B-pillar.



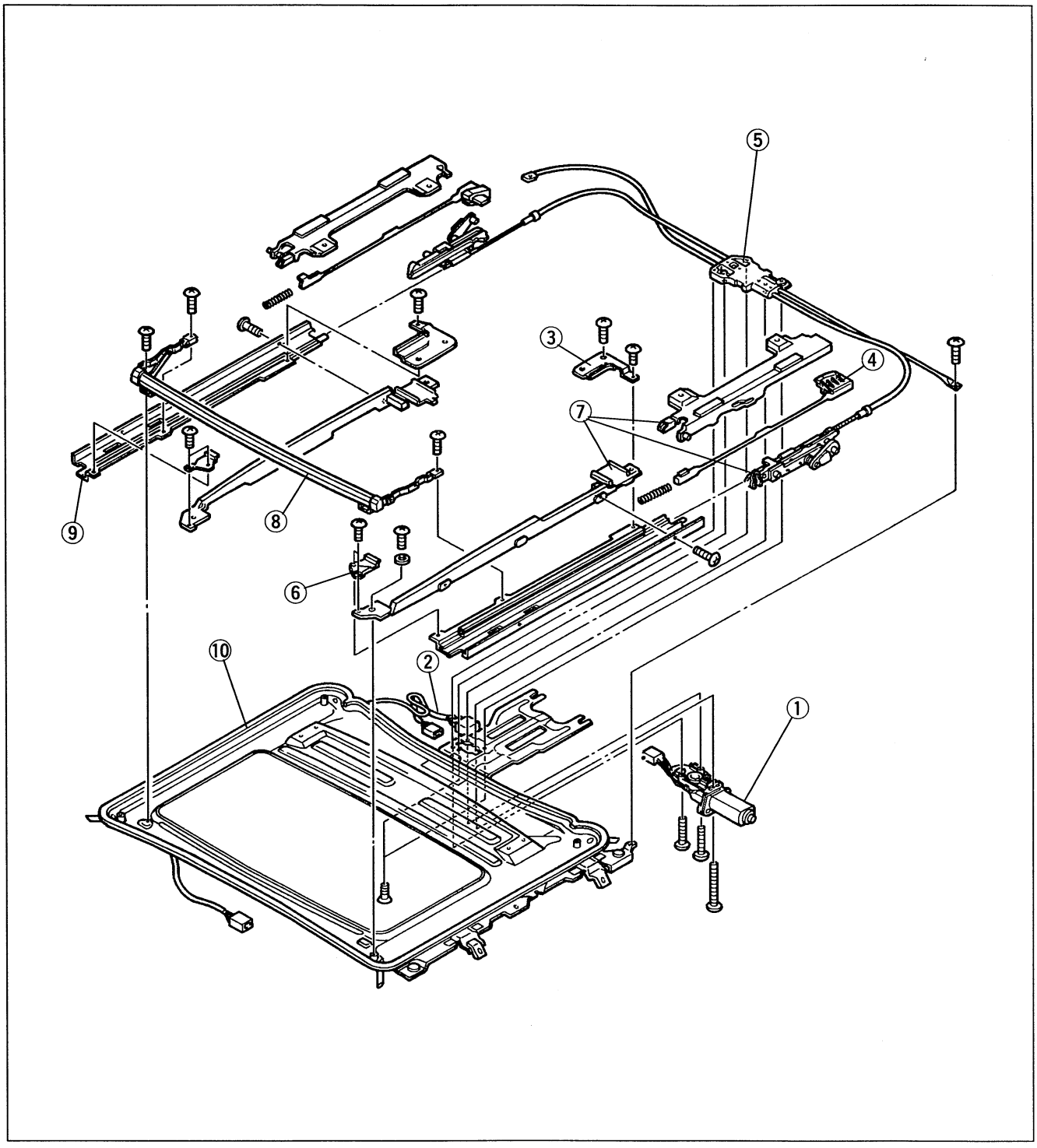
Sunroof trim

1. Tilt up the slide panel. Insert the sunroof trim between the slide panel and the roof panel from the rear of the vehicle.

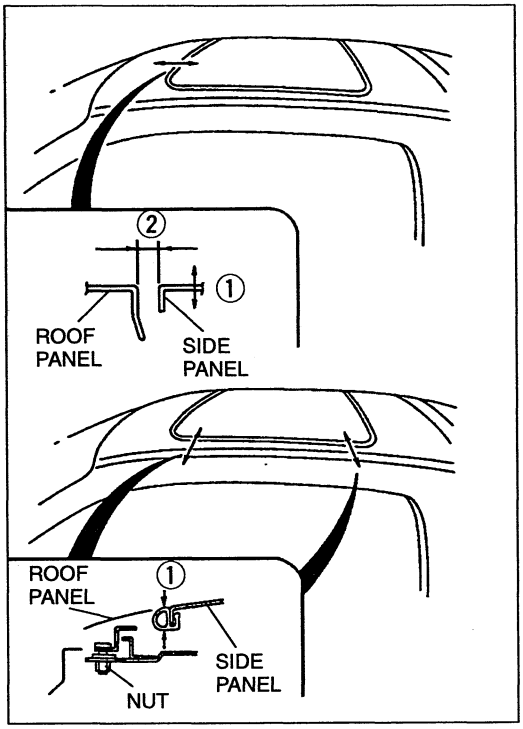


2. Match the sunroof trim guide pin with the notch in the slide panel trim bracket to locate the trim.
3. Install the sunroof trim fasteners to the slide panel.

SUNROOF DRIVE UNIT
Disassembly / Assembly
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.



1. Sunroof motor
   Inspection ..... page S–83
2. Sunroof relay
3. Closing guide plate
4. Closing assembly
5. Drive unit
6. Position plate
7. Guide assembly
8. Wind deflector
9. Guide rail
10. Sunroof frame



Adjustment
Slide panel
Height

1. Remove the headliner. (Refer to page S–101.)
2. Loosen the set bracket mounting nuts.
3. Turn the height adjusting nuts to adjust the sunroof frame height.

   Clearance (1): 0 $^{0}_{-2.0}$ mm {0 $^{0}_{-0.08}$ in}

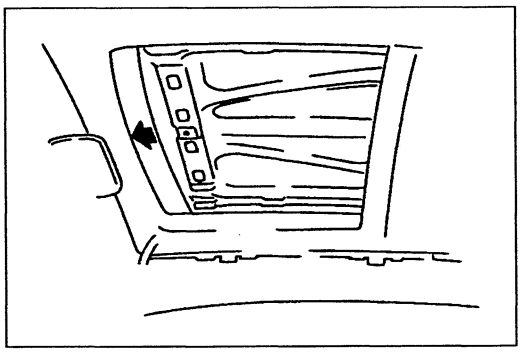
4. After adjustment, securely install the sunroof to the roof panel.

Gap

1. Loosen the slide panel mounting nuts and move the panel to adjust the clearance between the slide panel and roof panel.

   Clearance (2): 7.05 ± 0.35 mm {0.28 ± 0.014 in}

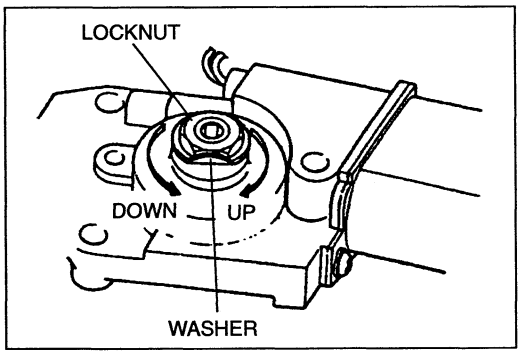
2. If the above adjustment is not enough, loosen the attaching screws and bolts of the sunroof frame and set bracket and adjust again. (Refer to Installation note for the sunroof drive unit, page S–79.)



Inspection
Sunroof motor

1. Measure the operation time of the slide panel from fully open to fully closed and vice versa.

   Specified time: 4—6 sec.



2. If not as specified, adjust it by increasing or decreasing the sliding sunroof motor driving torque.
   (1) Remove the housing cover attaching screws, E-ring, and gear. Remove the housing cover from the motor.
   (2) Unfold the locking washers.
   (3) Hold the motor shaft with an allen wrench and turn the locknut to adjust the torque.
   (4) Fold the locking washer against the locknut.

DASHBOARD AND CONSOLE

DASHBOARD AND CONSOLE

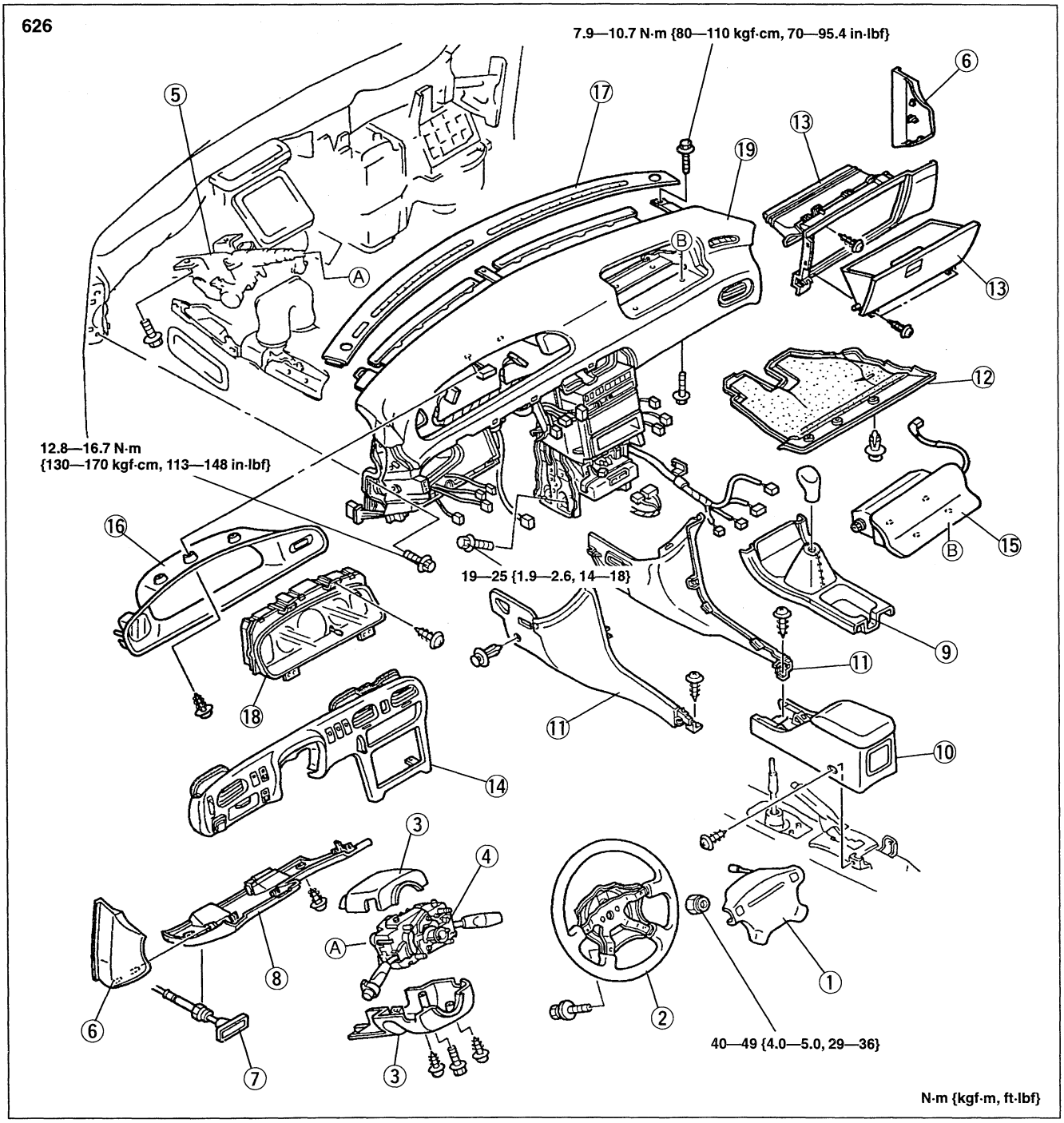
Removal / Installation

1. Disconnect the negative battery cable.

Warning

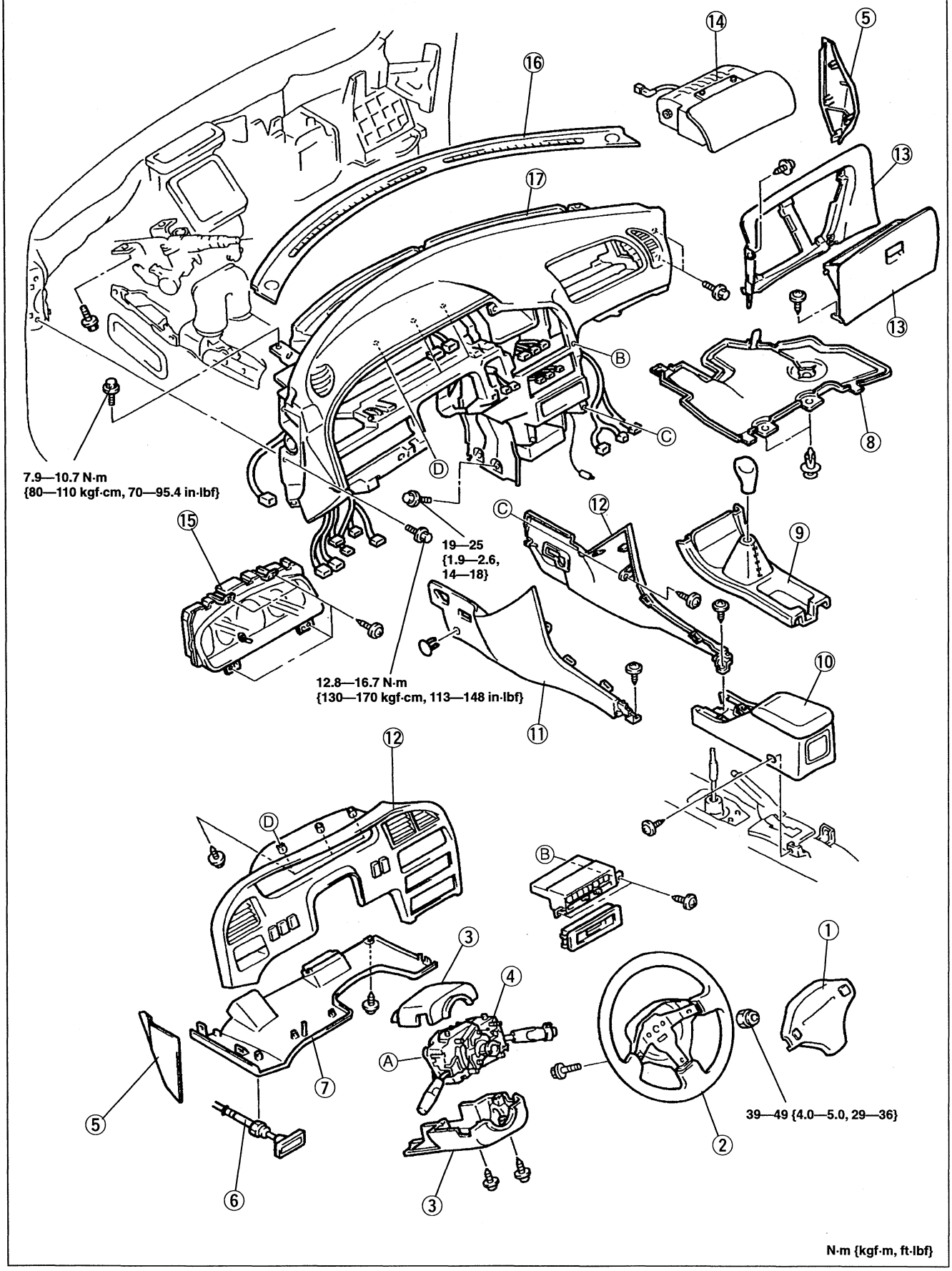
- **Handling the air bag module improperly can accidently deploy the air bag, which may seriously injure you. Read SERVICE WARNINGS, section T, before handling the air bag module.**

2. Remove the A-pillar trim. (Refer to page S–91.)
3. Remove the front side trim. (Refer to page S–91.)
4. Remove in the order shown in the figure, referring to **Removal note**.
5. Install in the reverse order of removal.

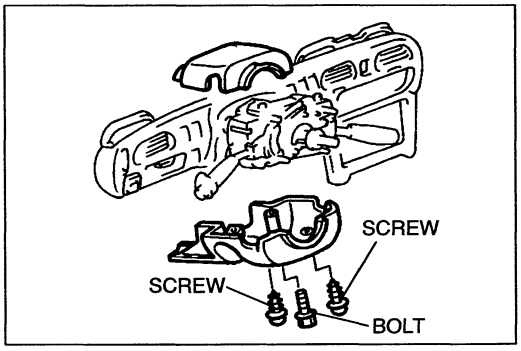


1. Driver-side air bag module
   1996 626/MX–6 Body Electrical Trouble-shooting Manual section S
2. Steering wheel
   Removal / Installation ..... section N
3. Column cover
   Removal note ..... page S–87
4. Combination switch
5. Steering shaft
6. Side panel
   Removal note ..... page S–87
7. Hood release knob
8. Lower panel
   Removal note ..... page S–89
9. Front console
   Removal note ..... page S–89
10. Rear console
    Removal note ..... page S–89
11. Side wall
    Removal note ..... page S–88
12. Undercover
    Removal note ..... page S–88
13. Glove compartment
    Removal note ..... page S–88
14. Switch panel
    Removal note ..... page S–89
15. Passenger-side air bag module
    1996 626/MX–6 Body Electrical Trouble-shooting Manual section S
16. Meter hood
    Removal note ..... page S–90
17. Upper garnish
    Removal note ..... page S–90
18. Instrument cluster
19. Dashboard

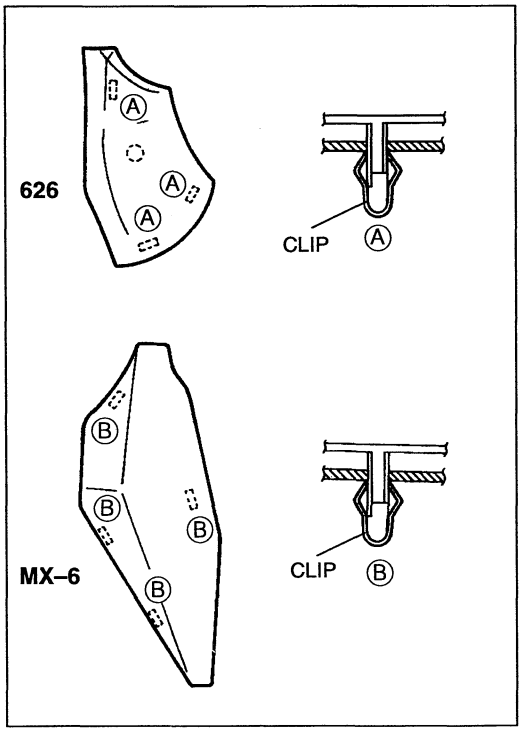
MX–6


7.9—10.7 N·m
{80—110 kgf·cm, 70—95.4 in·lbf}
19—25
{1.9—2.6,
14—18}
12.8—16.7 N·m
{130—170 kgf·cm, 113—148 in·lbf}
39—49 {4.0—5.0, 29—36}
N·m {kgf·m, ft·lbf}

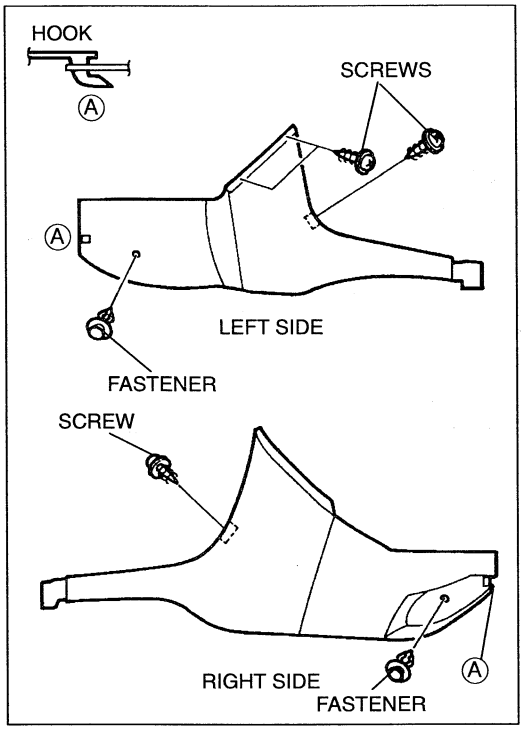
1. Driver-side air bag module
   1996 626/MX–6 Body Electrical Troubleshooting Manual, section S
2. Steering wheel
   Removal / Installation ..... section N
3. Column cover
   Removal note ..... below
4. Combination switch
5. Side panel
   Removal note ..... below
6. Hood release knob
7. Lower panel
   Removal note ..... page S–89
8. Undercover
   Removal note ..... page S–88
9. Front console
   Removal note ..... page S–89
10. Rear console
    Removal note ..... page S–89
11. Side wall
    Removal note ..... page S–88
12. Meter hood
    Removal note ..... page S–90
13. Glove comparment
    Removal note ..... page S–89
14. Passenger-side air bag module
    1996 626/MX–6 Body Electrical Troubleshooting Manual, section S
15. Instrument cluster
16. Upper garnish
    Removal note ..... page S–90
17. Dashboard



Removal note
Column cover
Remove the column cover mounting screws and bolt.

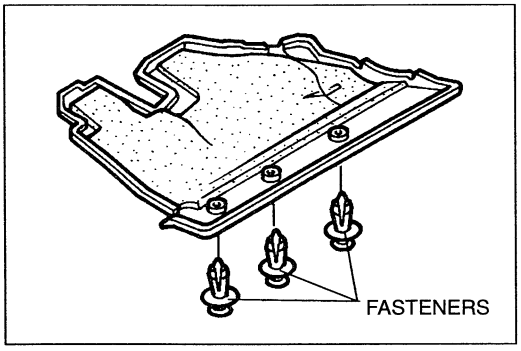


Side panel
Pull the side panel forward to disengage the clips.



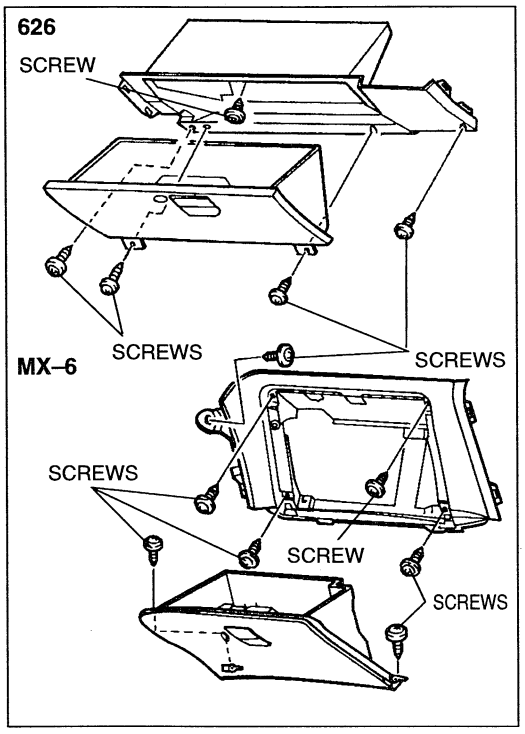
Side wall

Remove the side wall mounting screws and fasteners.



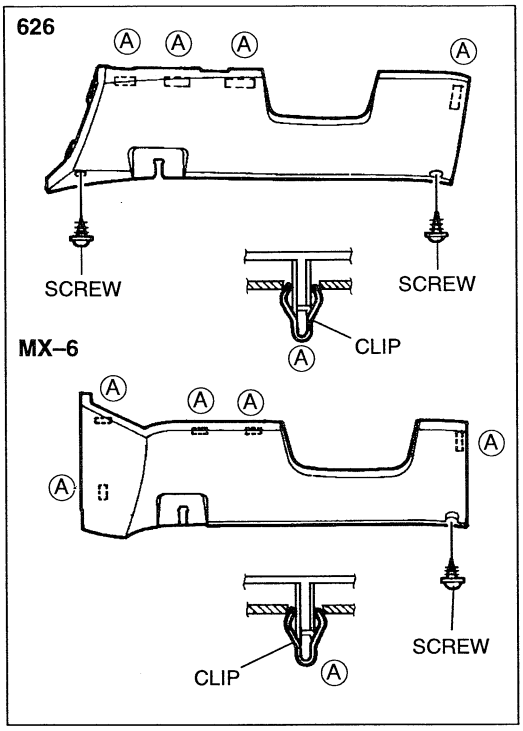
Undercover

Remove the undercover mounting fasteners.



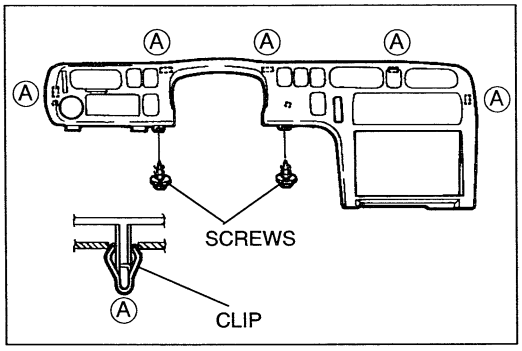
Glove compartment

Remove the glove compartment mounting screws.



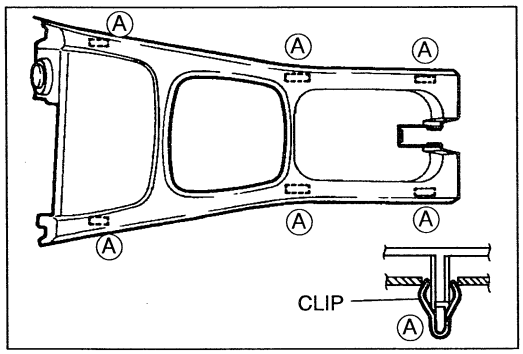
Lower panel

1. Pull the lap duct from the rear of the lower panel.
2. Remove the mounting screws from the lower panel.
3. Pull the lower panel to disengage the clips.



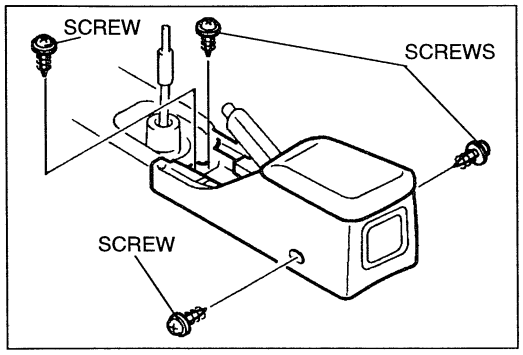
Switch panel

1. Remove the switch panel mounting screws.
2. Pull the switch panel forward to disengage the clips.



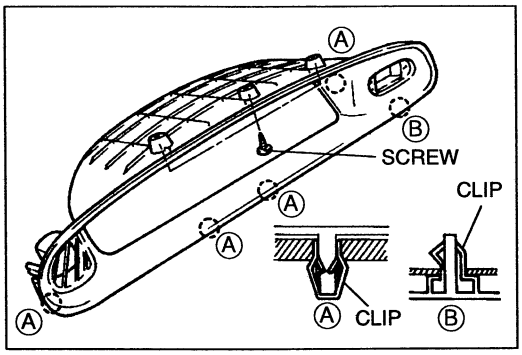
Front console

Pull the front console forward to disengage the clips.

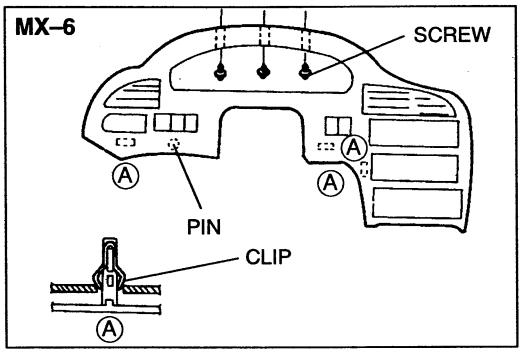


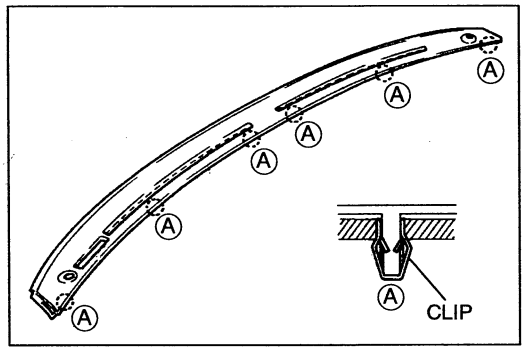
Rear console

Remove the rear console mounting screws.

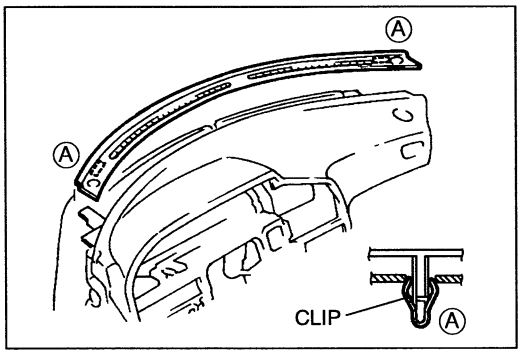


Meter hood (626)
1. Remove the meter hood mounting screws.
2. Pull the meter hood forward to disengage the clips.





Upper garnish (626)
Pull the upper garnish upward to disengage the clips.



Upper garnish (MX–6)
1. Remove the upper garnish mounting screw.
2. Pull the upper garnish upward to disengage the clips.

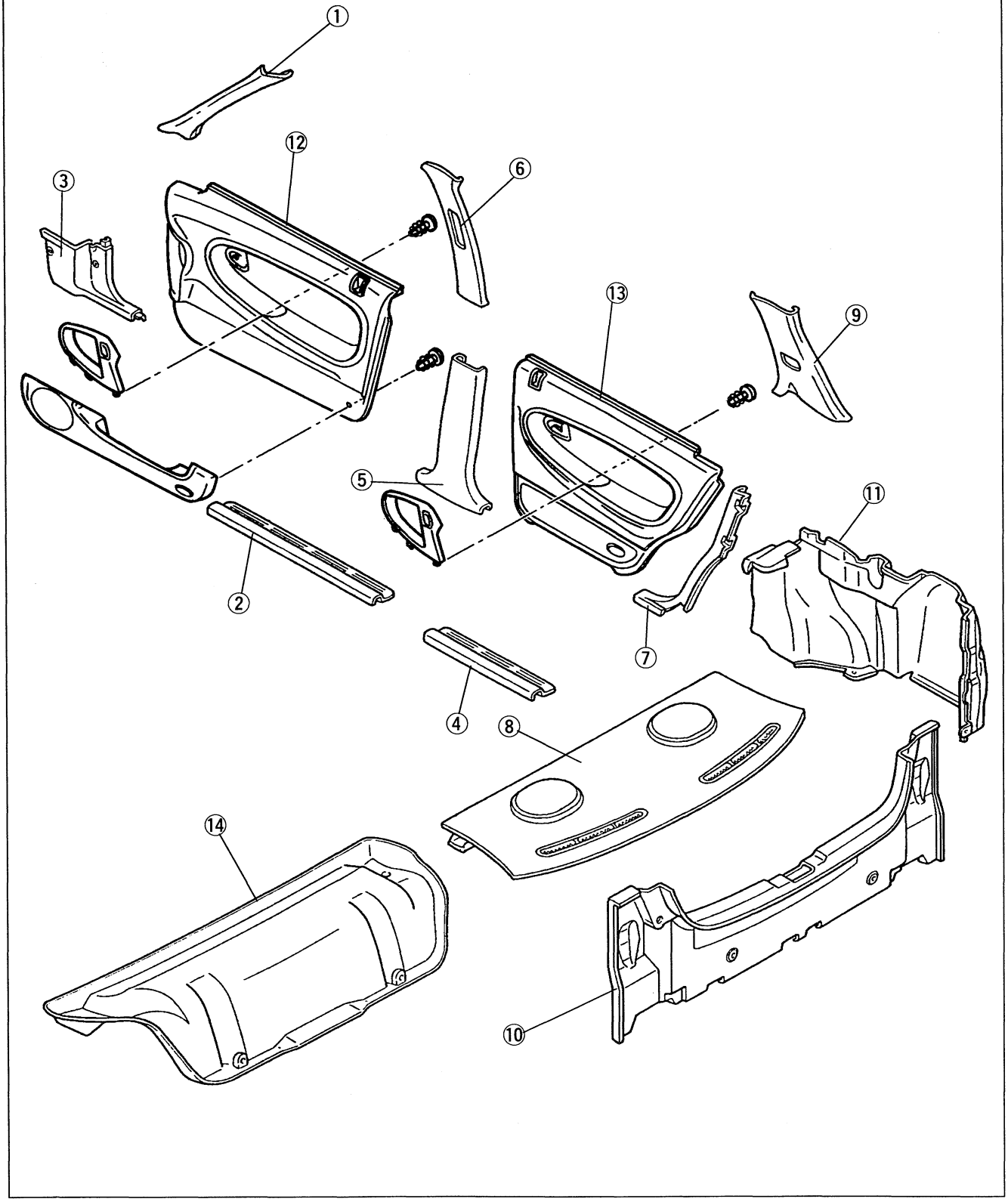
TRIM

COMPONENTS

Removal / Installation

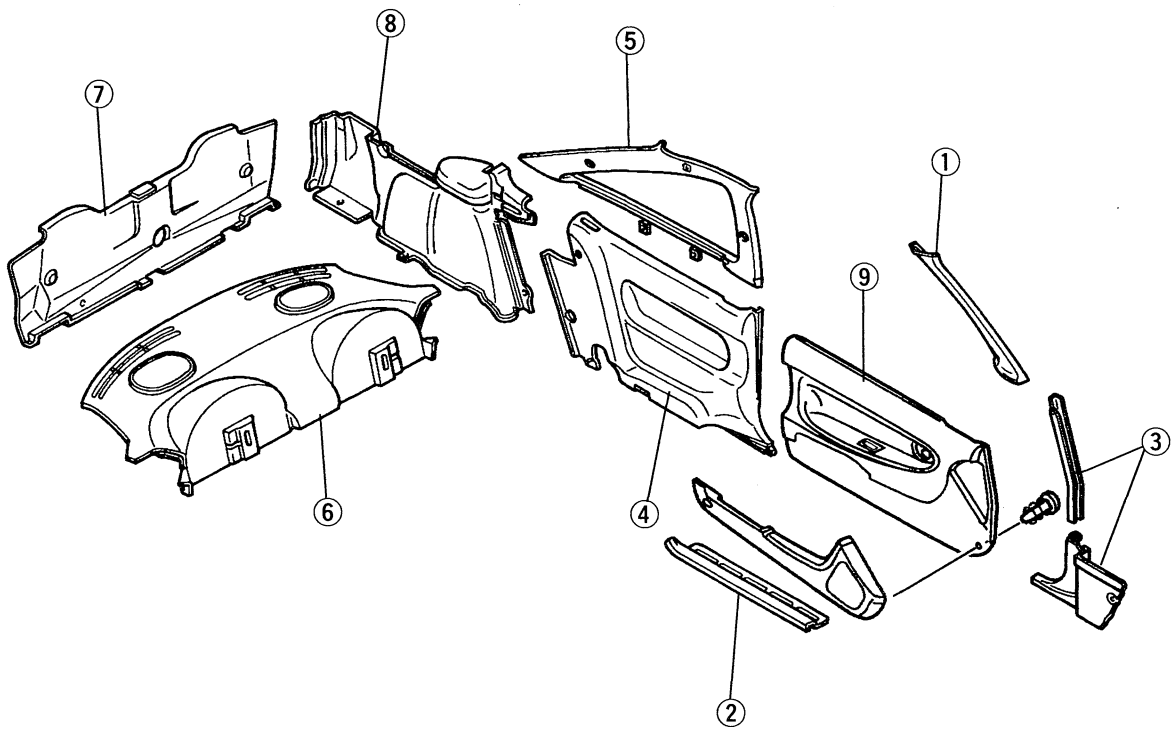
1. Remove in the order shown in the figure, referring to **Removal note**.
2. Install in the reverse order of removal.

626

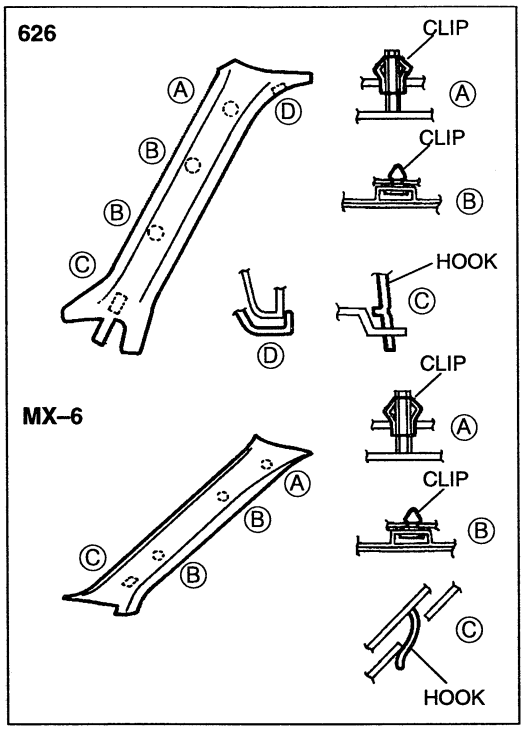


1. A-pillar trim
   Removal note ..... page S–94
2. Front scuff plate
   Removal note ..... page S–94
3. Front side trim
4. Rear scuff plate
   Removal note ..... page S–94
5. B-pillar lower trim
   Removal note ..... page S–95
6. B-pillar upper trim
   Removal note ..... page S–95
7. Tire house trim
   Removal note ..... page S–95
8. Rear package trim
   Removal note ..... page S–95
9. C-pillar trim
   Removal note ..... page S–96
10. Trunk end trim
   Removal note ..... page S–96
11. Trunk side trim
12. Front door trim
   Removal note ..... page S–97
13. Rear door trim
   Removal note ..... page S–97
14. Trunk lid trim

MX–6

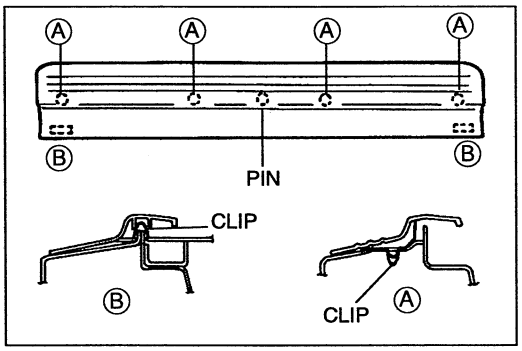


1. A-pillar trim
   Removal note ..... page S–94
2. Scuff plate
   Removal note ..... page S–94
3. Front side trim
4. Quarter trim
   Removal note ..... page S–95
5. C-pillar trim
   Removal note ..... page S–96
6. Rear package trim
   Removal note ..... page S–95
7. Trunk end trim
   Removal note ..... page S–96
8. Trunk side trim
9. Door trim
   Removal note ..... page S–97



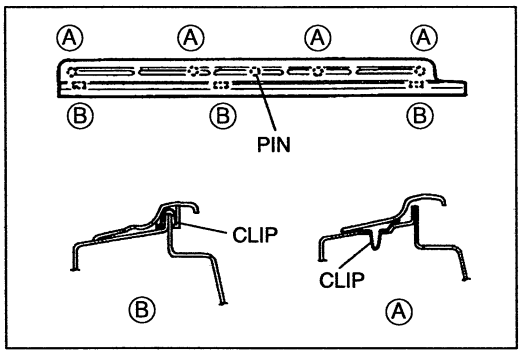
Removal note
A-pillar trim

1. Pull the A-pillar trim forward to disengage the clips from the body.
2. Pull the A-pillar trim upward to disengage the hook from the body.



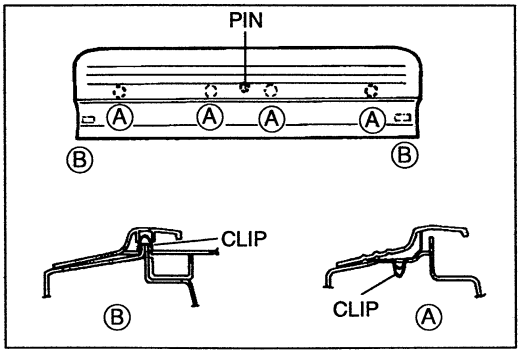
Front scuff plate (626)

Pull the front scuff plate upward to disengage the clips from the body.



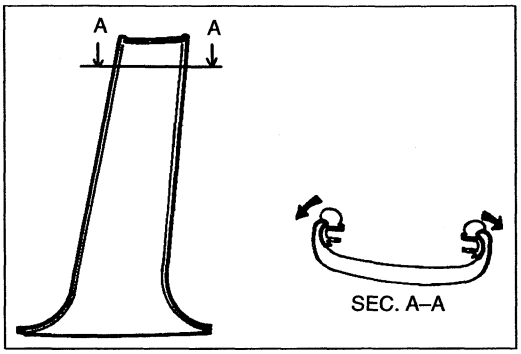
Scuff plate (MX–6)

Pull the scuff plate upward to disengage the clips from the body.

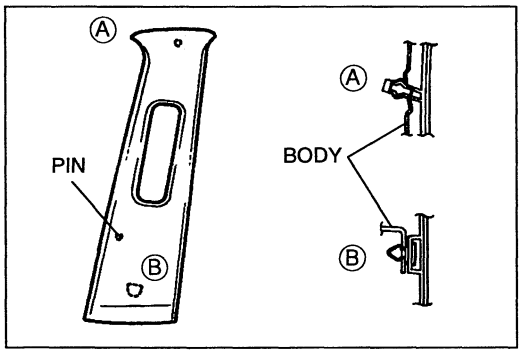


Rear scuff plate (626)

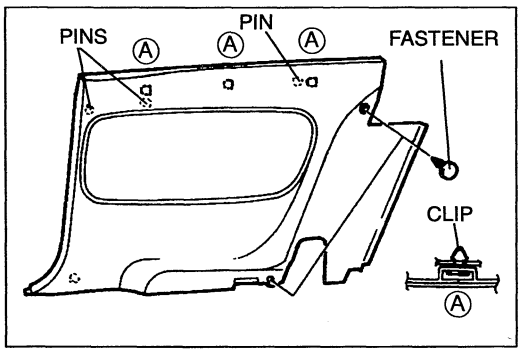
Pull the rear scuff plate upward to disengage the clips from the body.



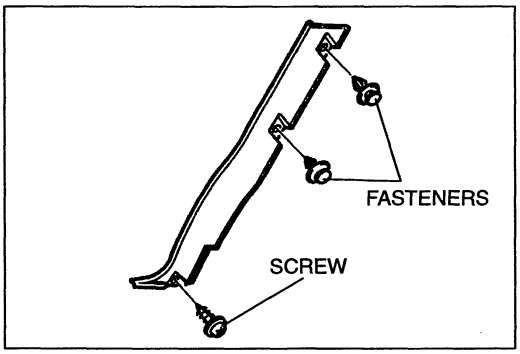
B-pillar lower trim (626)
1. Remove the front and rear scuff plates. (Refer to page S–94.)
2. Slide the B-pillar lower trim upward, and then pull the trim forward as shown to disengage it from the body.



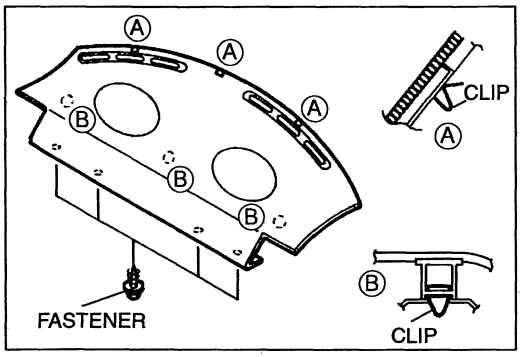
B-pillar upper trim (626)
1. Remove the front seat belt shoulder anchor. (Refer to page S–103.)
2. Pull the B-pillar upper trim to disengage the clips from the body.



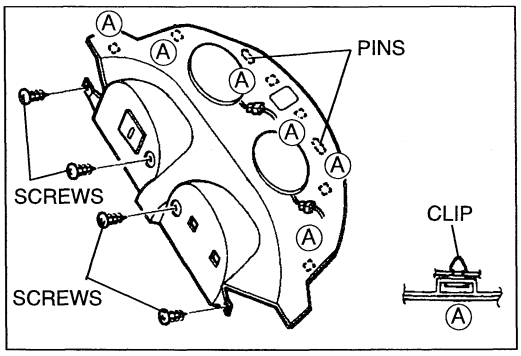
Quarter trim (MX–6)
1. Remove the rear seat cushion and rear seat back. (Refer to page S–108.)
2. Remove the scuff plate. (Refer to page S–94.)
3. Remove the quarter trim mounting fasteners.
4. Pull the quarter trim forward to disengage the clips from the body.



Tire house trim (626)
1. Remove the rear seat cushion, rear seat sides, and rear seat back. (Refer to page S–107.)
2. Remove the rear scuff plate. (Refer to page S–94.)
3. Remove the tire house trim mounting fasteners and screws.
4. Pull the tire house trim forward to disengage the clips from the body.

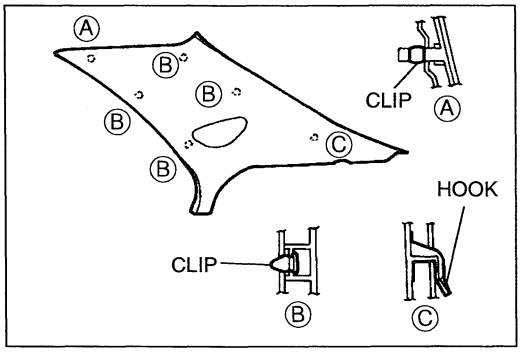


Rear package trim (626)
1. Remove the rear seat cushion, rear seat sides, and rear seat back. (Refer to page S–107.)
2. Remove the tire house trim. (Refer above.)
3. Remove the rear package trim mounting fasteners.
4. Pull the rear package trim upward to disengage clips B from the body.
5. Pull the rear package trim forward to disengage clips A from the body.



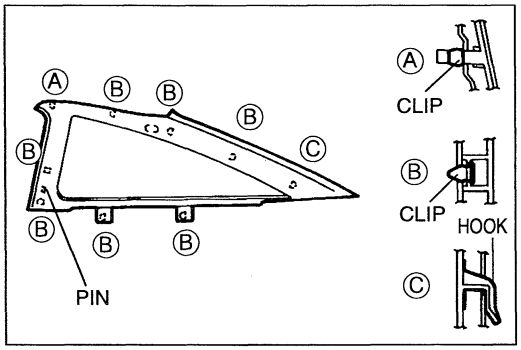
(MX–6)

1. Remove the rear seat cushion and rear seat back. (Refer to page S–108.)
2. Remove the C-pillar trim. (Refer below.)
3. Remove the rear package trim mounting screws.
4. Pull the rear package trim upward to disengage the clips from the body.



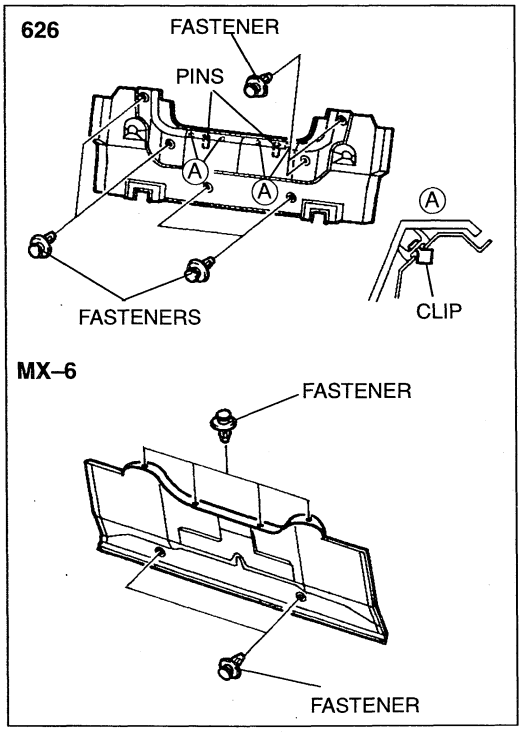
C-pillar trim
(626)

1. Remove the tire house trim. (Refer to page S–95.)
2. Remove the rear package trim. (Refer to page S–95.)
3. Pull the C-pillar trim forward to disengage the clips from the body.
4. Pull the C-pillar trim upward to disengage the hook from the body.



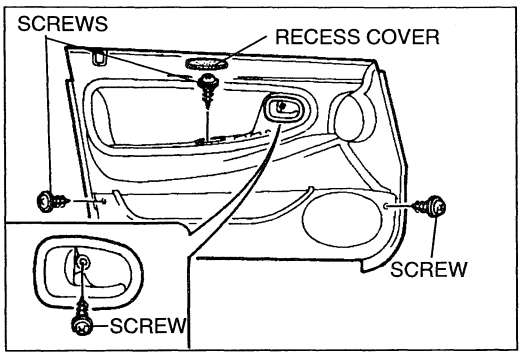
(MX–6)

1. Remove the quarter trim. (Refer to page S–95.)
2. Remove the C-pillar trim mounting screws.
3. Pull the C-pillar trim forward to disengage the clips from the body.

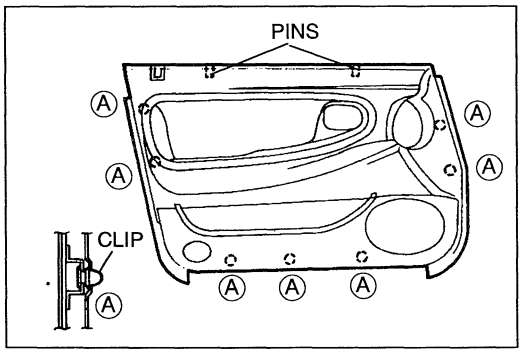


Trunk end trim

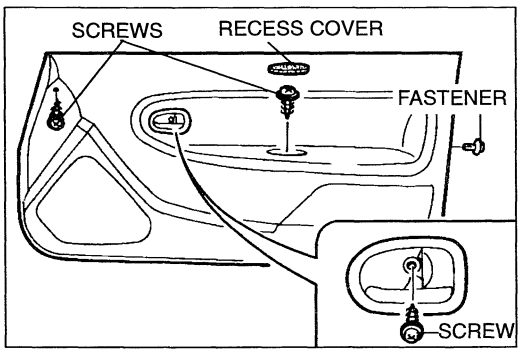
1. Remove the trunk end trim mounting fasteners.
2. Pull the trunk end trim upward to disengage the clips from the body.



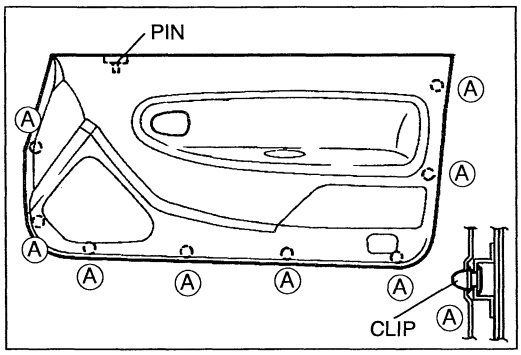
Front door trim (626)
1. Disconnect the negative battery cable.
2. Remove the recess cover and the mounting screw.
3. Remove the inner handle mounting screw and remove the inner handle.
4. Remove the door trim mounting screws.



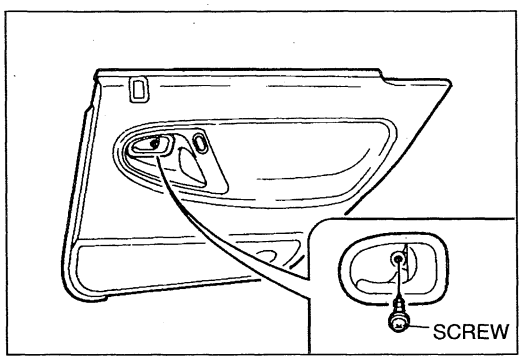
5. Pull the front door trim to disengage the clips from the body.
6. Lift the front door trim to remove the pins from the body.
7. Disconnect the harness connectors.



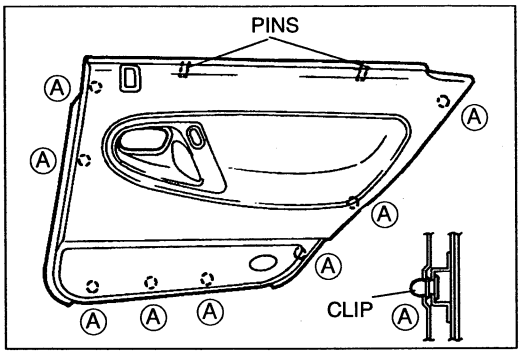
Door trim (MX–6)
1. Disconnect the negative battery cable.
2. Remove the recess cover and the mounting screw.
3. Remove the inner handle mounting screw and remove the inner handle.
4. Remove the door trim mounting screws and fastener.



5. Pull the door trim to disengage the clips from the body.
6. Lift the door trim to remove the pin from the body.
7. Disconnect the harness connectors.



Rear door trim (626)
1. Disconnect the negative battery cable.
2. Remove the inner handle mounting screw and remove the inner handle.



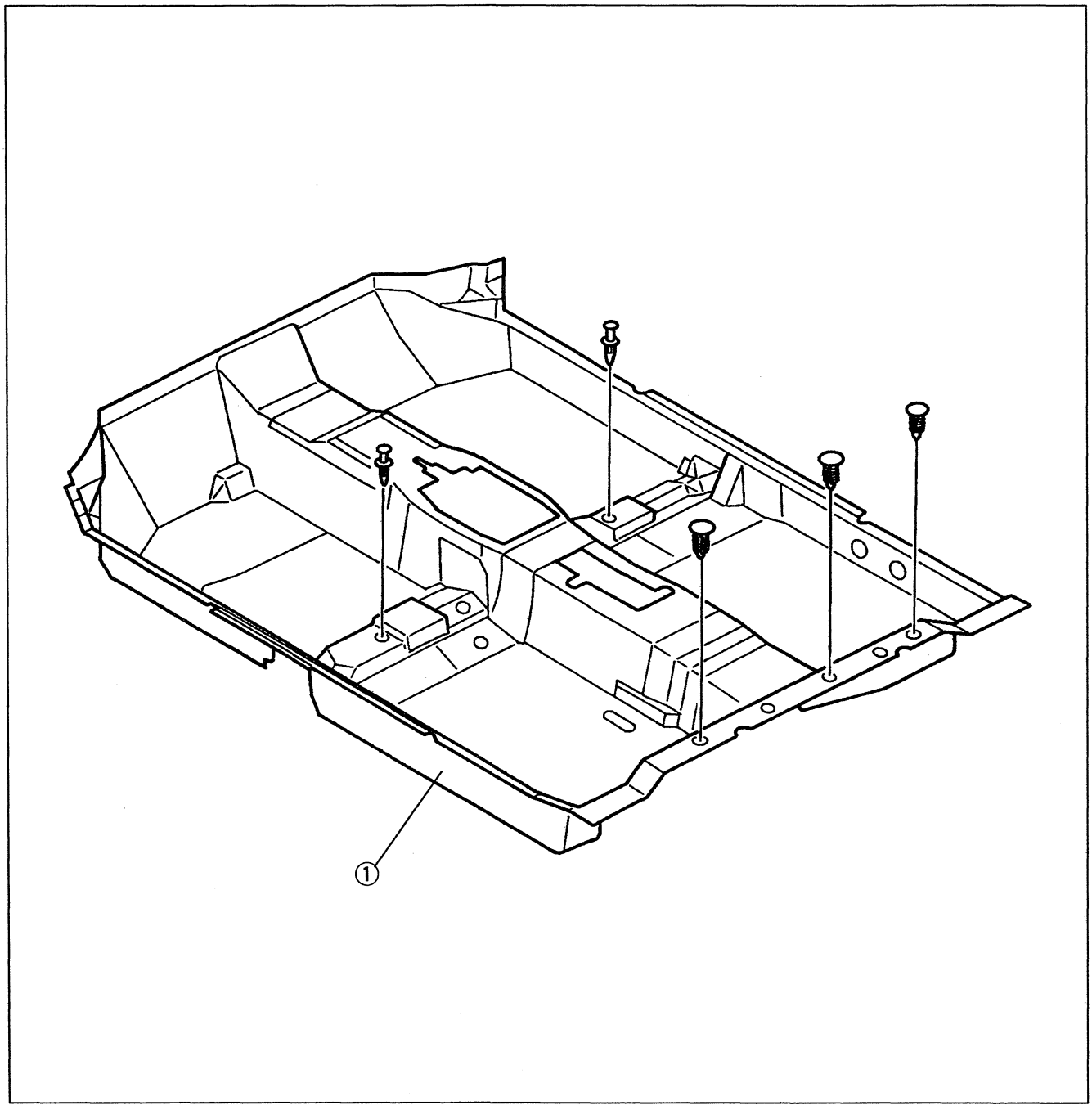
3. Pull the rear door trim to disengage the clips from the body.
4. Lift the rear door trim to remove the pins from the body.
5. Disconnect the harness connectors.

FLOOR COVERING

COMPONENTS

Removal / Installation

1. Disconnect the negative battery cable.
2. Remove the following:
   a. Front seats (Refer to page S–106.)
   b. Rear seat cushion (Refer to pages S–107, 108.)
   c. Dashboard and console (Refer to pages S–84, 86.)
   d. Front side trim, scuff plates, B-pillar lower trim, and tire house trim (Refer to pages S–91, 93.)
   e. Front seat belt lower anchor (Refer to page S–103.) or slide bar (Refer to page S–104.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.



1. Cabin carpet

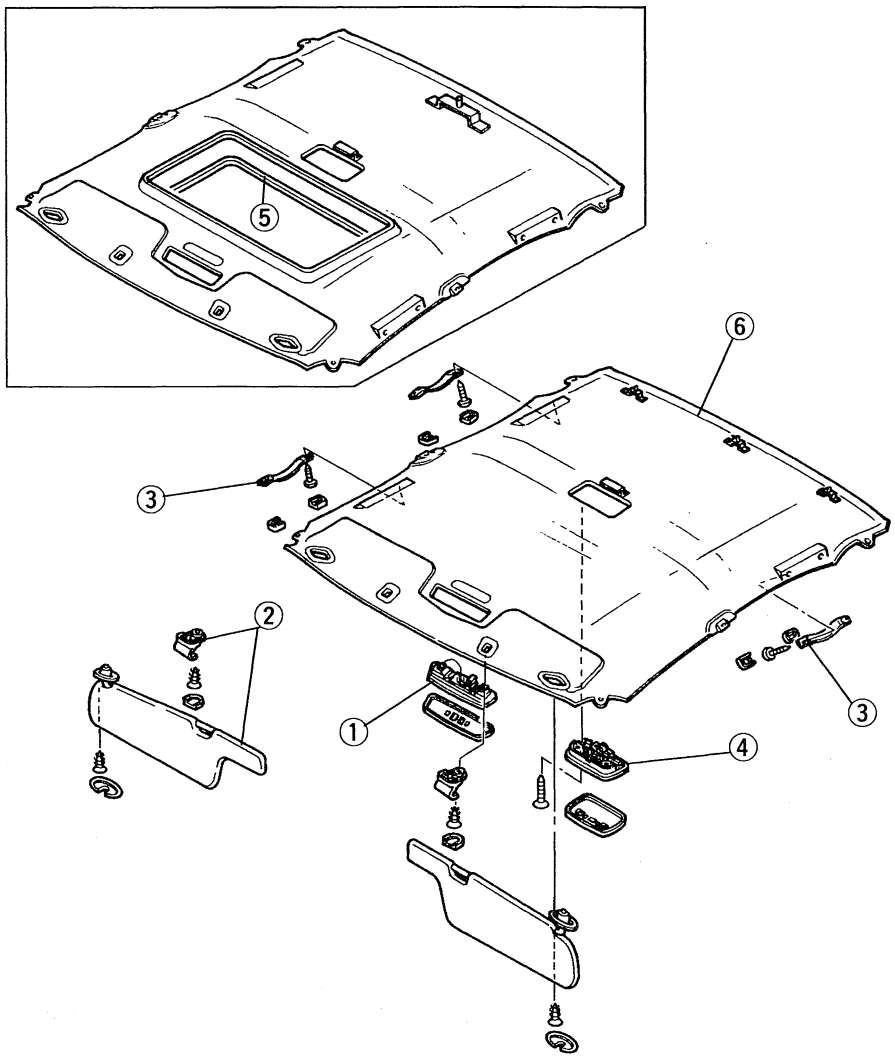
HEADLINER

COMPONENTS

Removal / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal note**.
3. Install in the reverse order of removal.

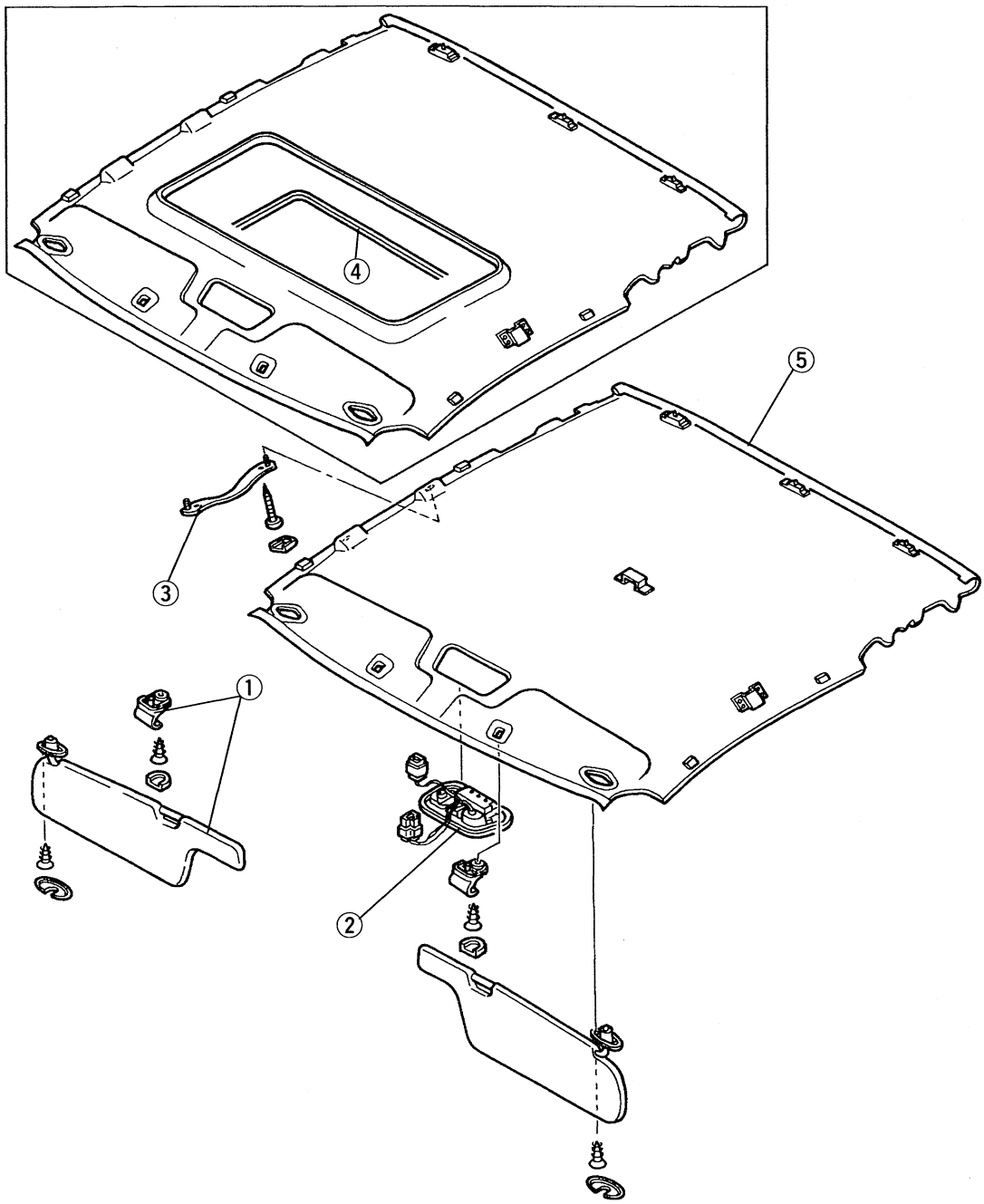
626



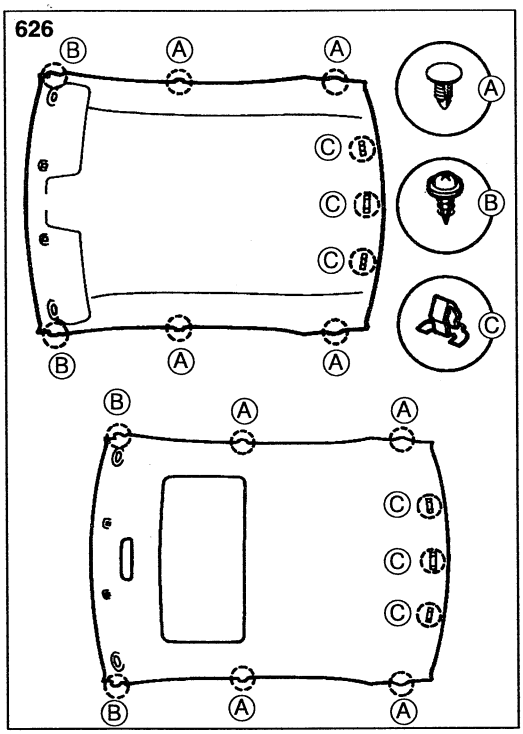
1. Overhead console
2. Sunvisor and adapter
3. Assist handle
4. Interior lamp
5. Seaming welt (with sunroof)
6. Headliner

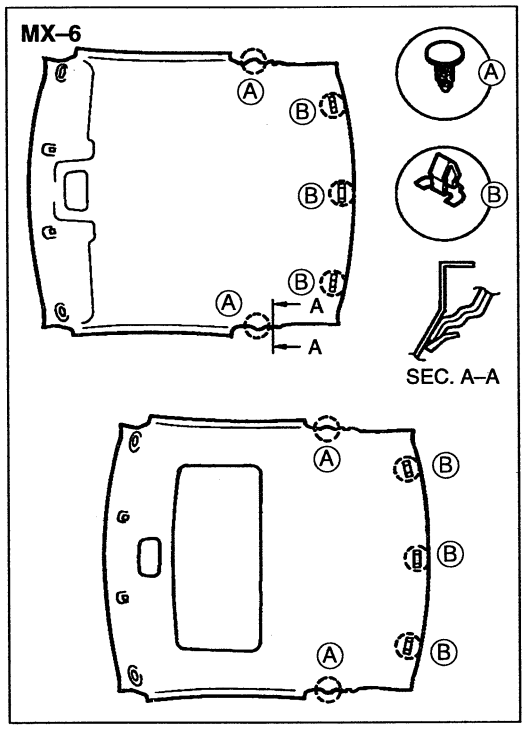
Removal note . . . . . page S–102

MX–6



1. Sunvisor and adapter
2. Overhead console
3. Assist handle
4. Seaming welt (with sunroof)
5. Headliner
   Removal note . . . . . page S–102





Removal note

Headliner

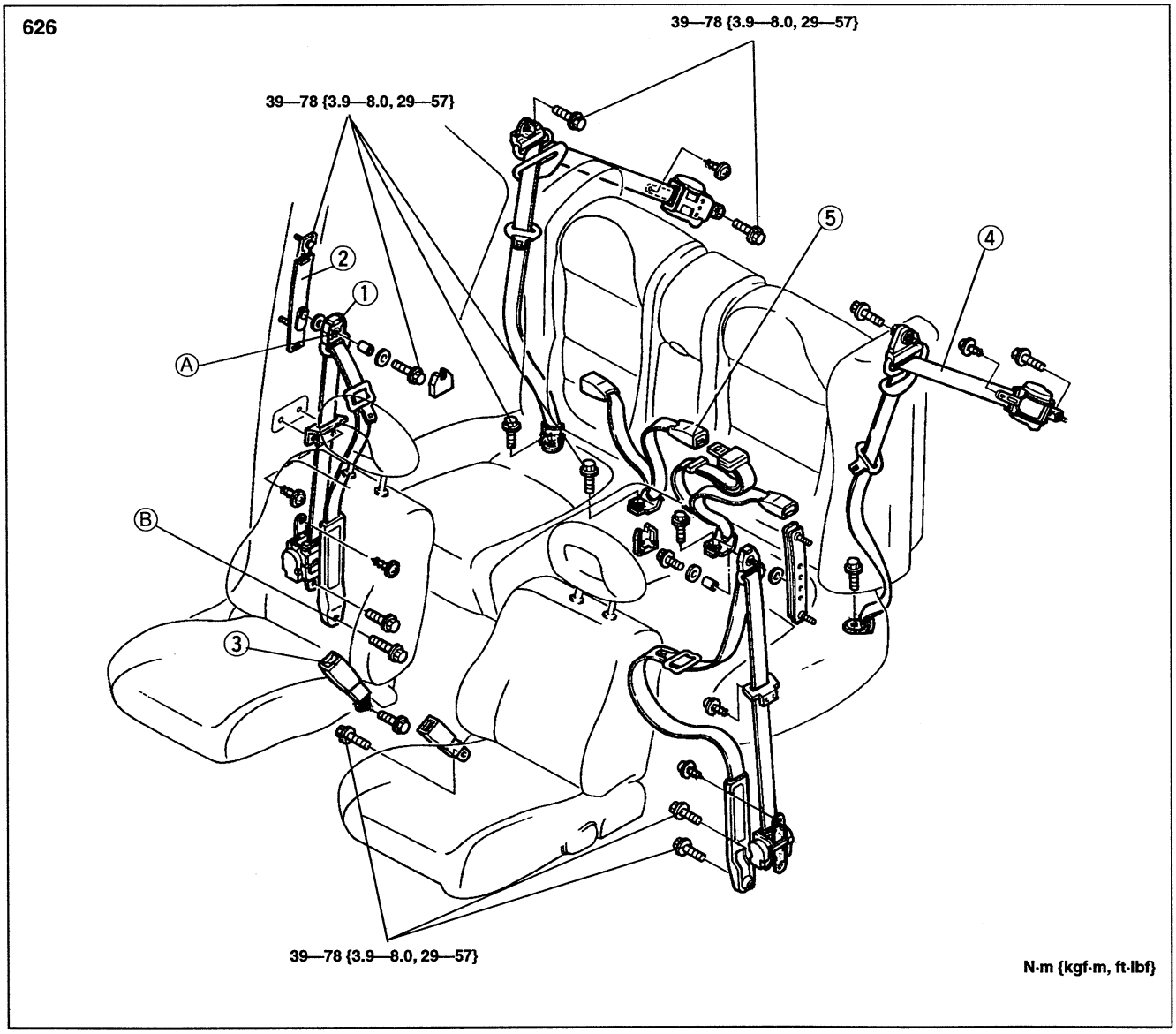
1. Remove the A-pillar trim, C-pillar trim, and either the B-pillar trim (626) or the quarter trim (MX–6). (Refer to page S–91 or S–93.)
2. Remove the mounting clips.
3. Remove the sides of the headliner from the weatherstrip.
4. Slide the headliner forward to remove it.

SEAT BELT

COMPONENTS
Removal / Installation

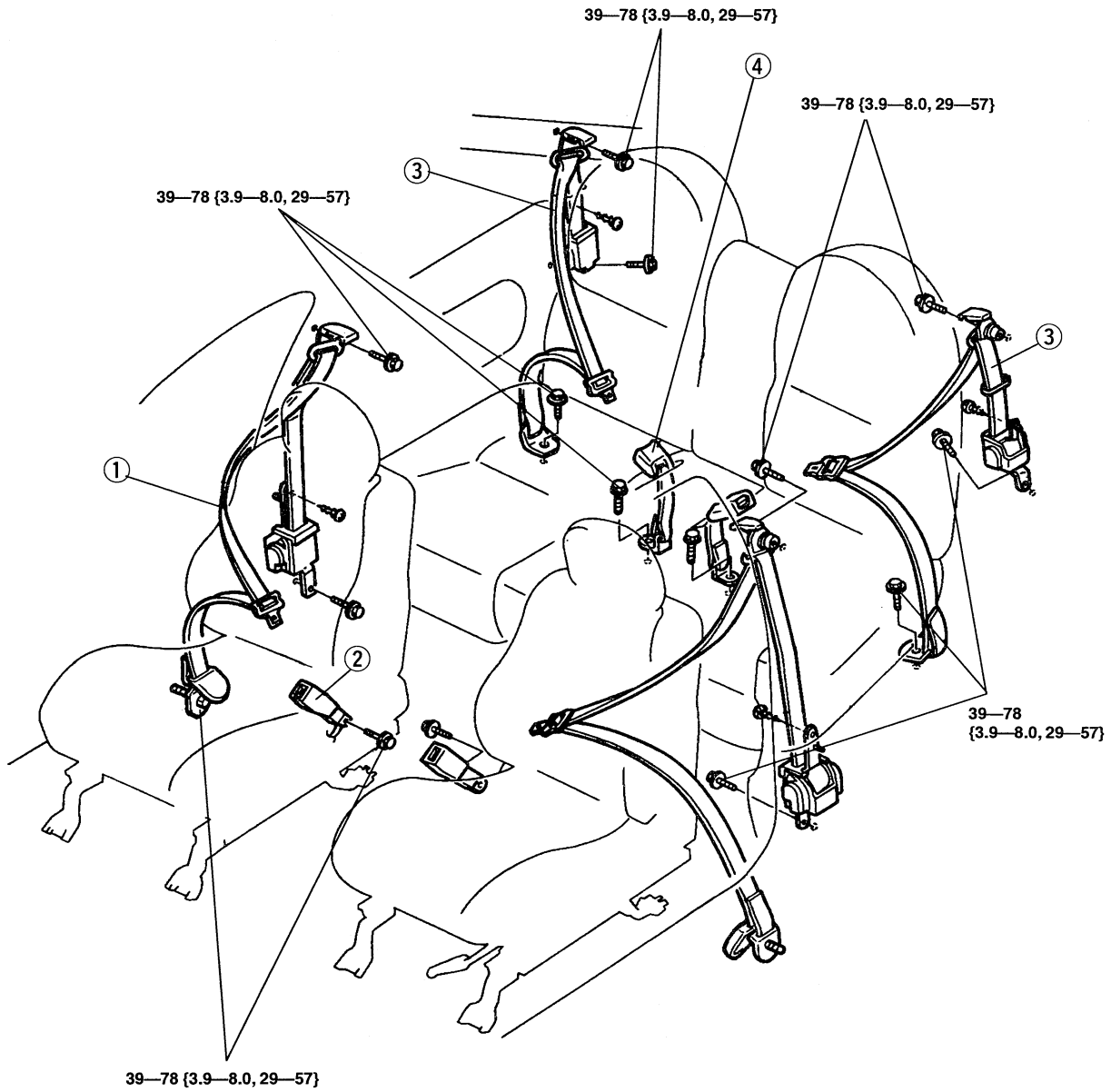
Caution
- **The ELR (emergency locking retractor) has a spring that will unwind if the retractor's cover is removed. The spring cannot be rewound by hand. If this occurs, the ELR will not work properly. Therefore, do not disassemble the buckle or retractor assembly.**

1. Remove in the order shown in the figure. To remove the front seat belt on the 626, remove the B-pillar lower trim. (Refer to page S–91.) To remove the rear seat belts, remove the C-pillar trim (Refer to page S–91 or S–93.) and the rear seat cushion. (Refer to page S–107 or S–108)
2. Install in the reverse order of removal.



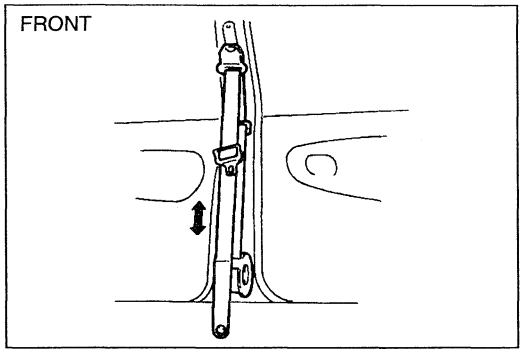
1. Front seat belt
   Inspection . . . . . page S–105
   a) Upper anchor
   b) Lower anchor
2. Anchor adjuster
3. Front buckle
   Inspection (driver) . . . 1996 Body Electrical Troubleshooting Manual, section C2
4. Rear seat belt
   Inspection . . . . . page S–105
5. Rear buckle

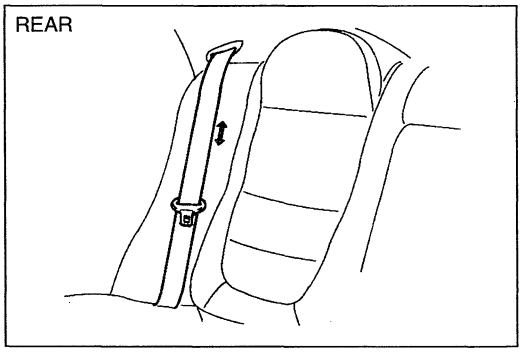
MX–6



N·m {kgf·m, ft·lbf}

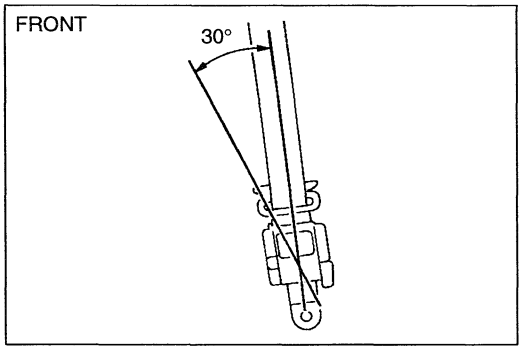
1. Front seat belt
   Inspection . . . . . page S–105
2. Front buckle
   Inspection (driver) . . . 1996 Body Electrical Troubleshooting Manual, section C2
3. Rear seat belt
   Inspection . . . . . page S–105
4. Rear buckle

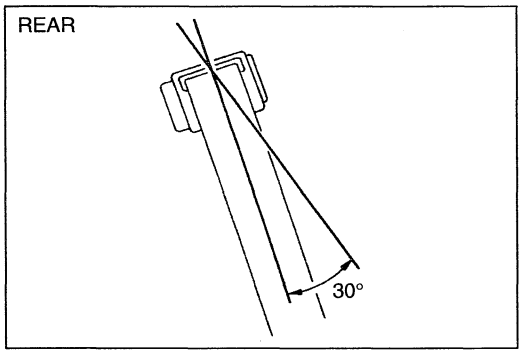




Inspection
Front and rear seat belts
Webbing and fittings
1. Inspect the webbing for scars, tears, and wear.
2. Inspect the fittings for deformation and damage.
3. If any problem is found, replace the seat belt.

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 the belt is quickly pulled.





3. Remove the retractor.
4. Hold the retractor as it would be installed.
5. Slowly incline the retractor while pulling out the belt.
6. Verify that the retractor locks at approximately **30°** inclination.
7. If not as specified, replace the seat belt.

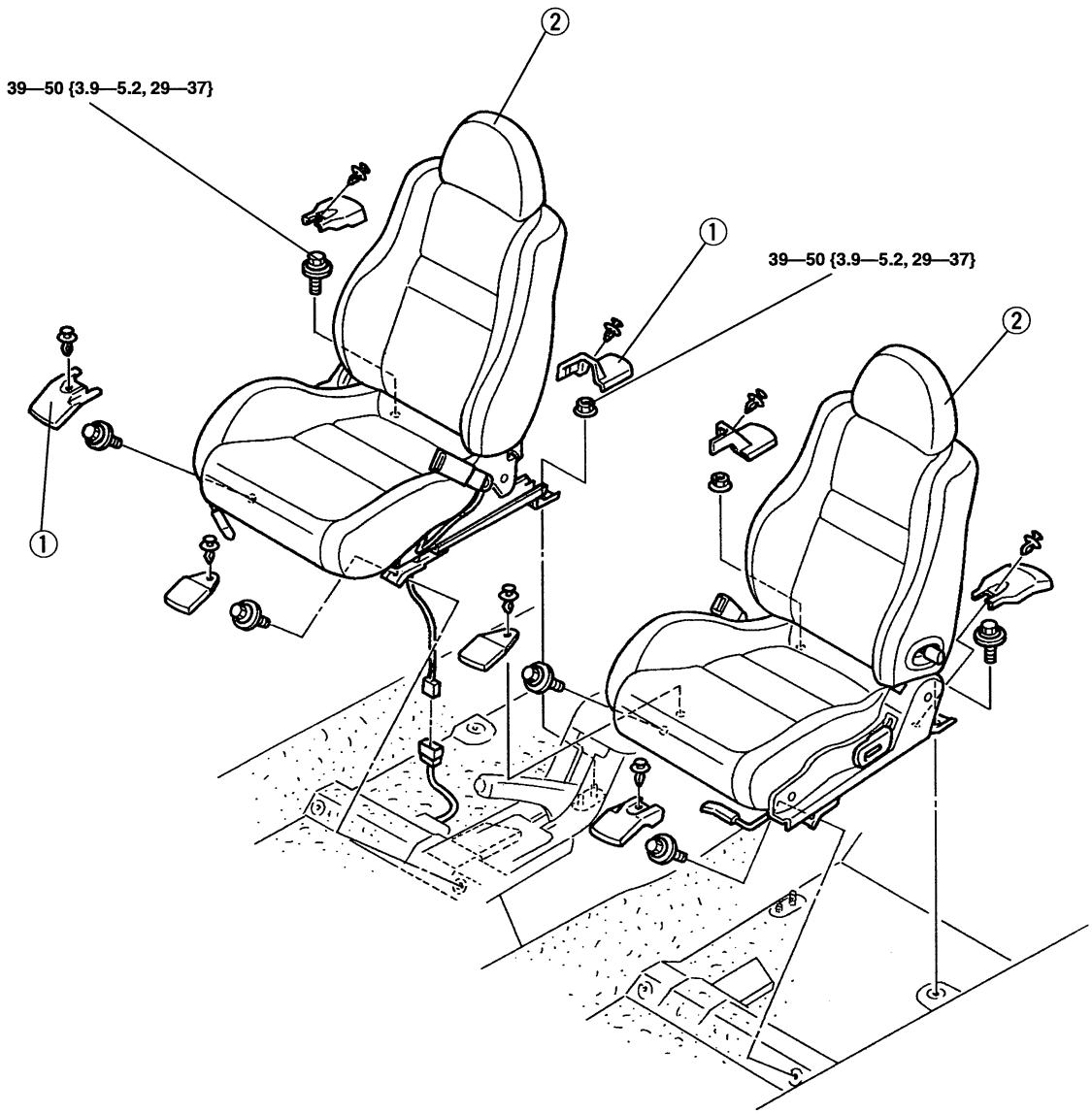
SEAT

COMPONENTS

Removal / Installation

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

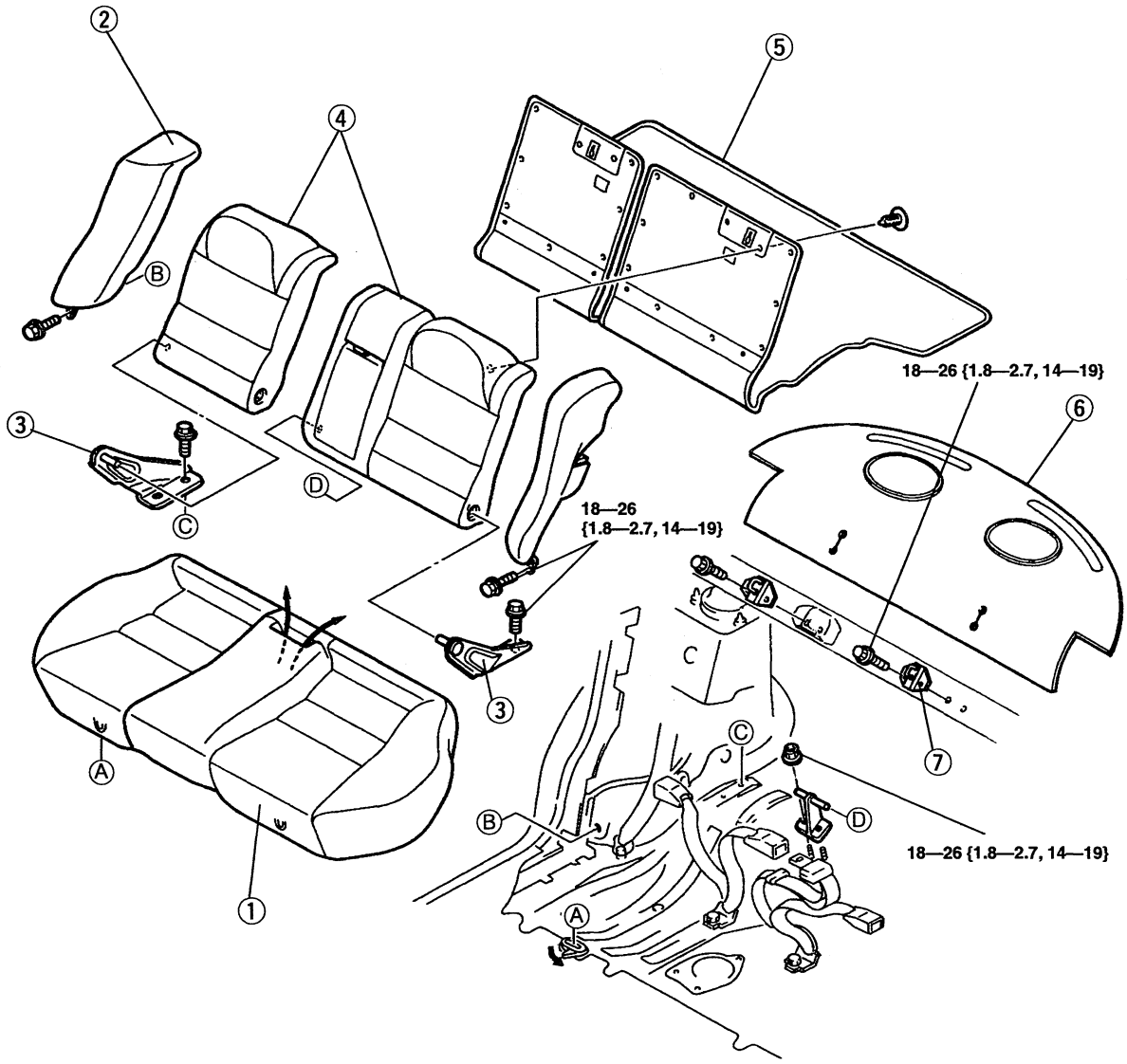
FRONT SEAT



N·m {kgf·m, ft·lbf}

1. Cover
2. Front seat
   Disassembly / Assembly . . . . . page S–109

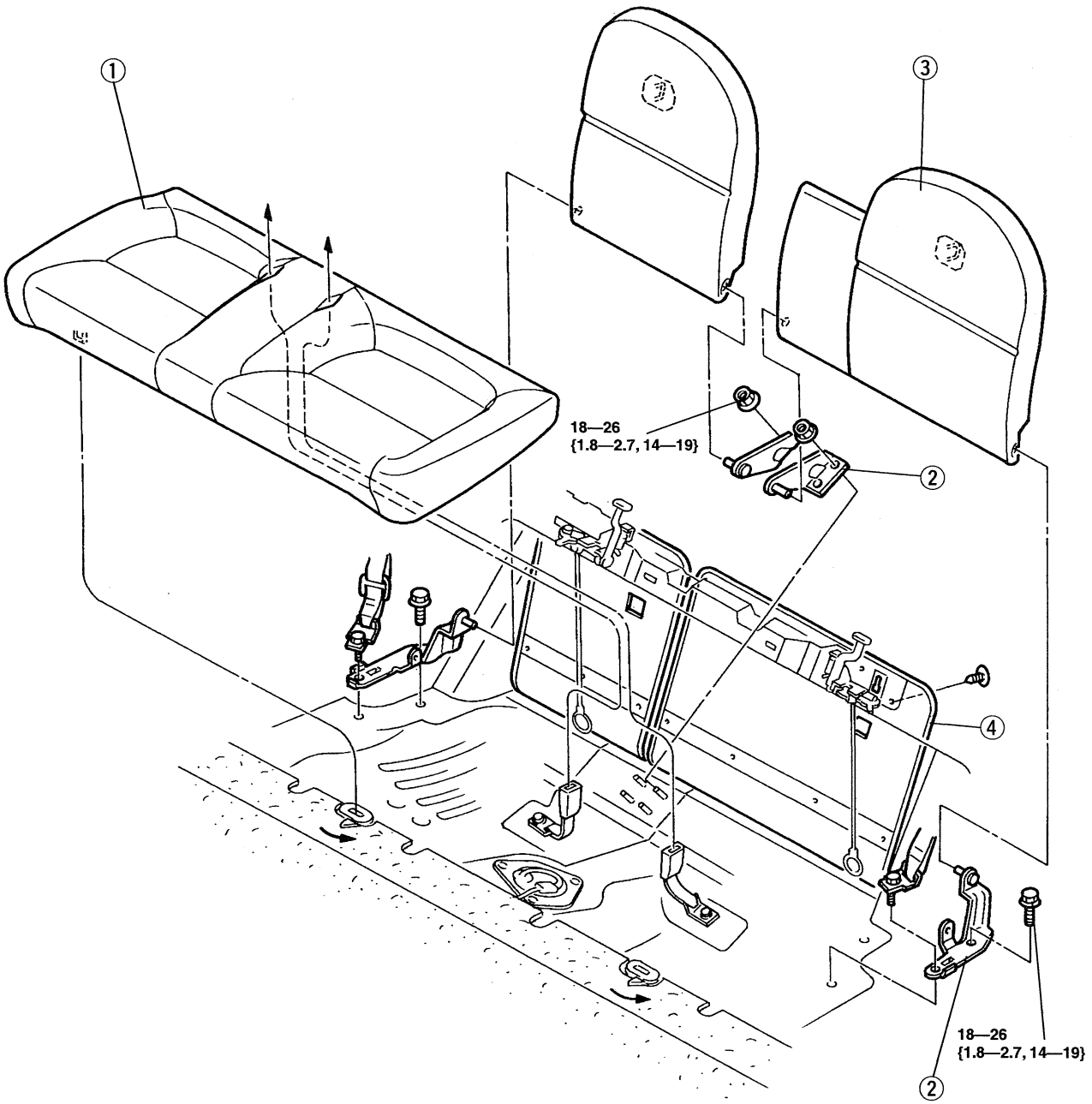
REAR SEAT (626)



N·m {kgf·m, ft·lbf}

1. Rear seat cushion
2. Rear seat side
3. Rear seat back hinge
4. Rear seat back
5. Trunk carpet
6. Rear package trim
   Removal / Installation ..... page S–91
7. Seat back striker

REAR SEAT (MX–6)

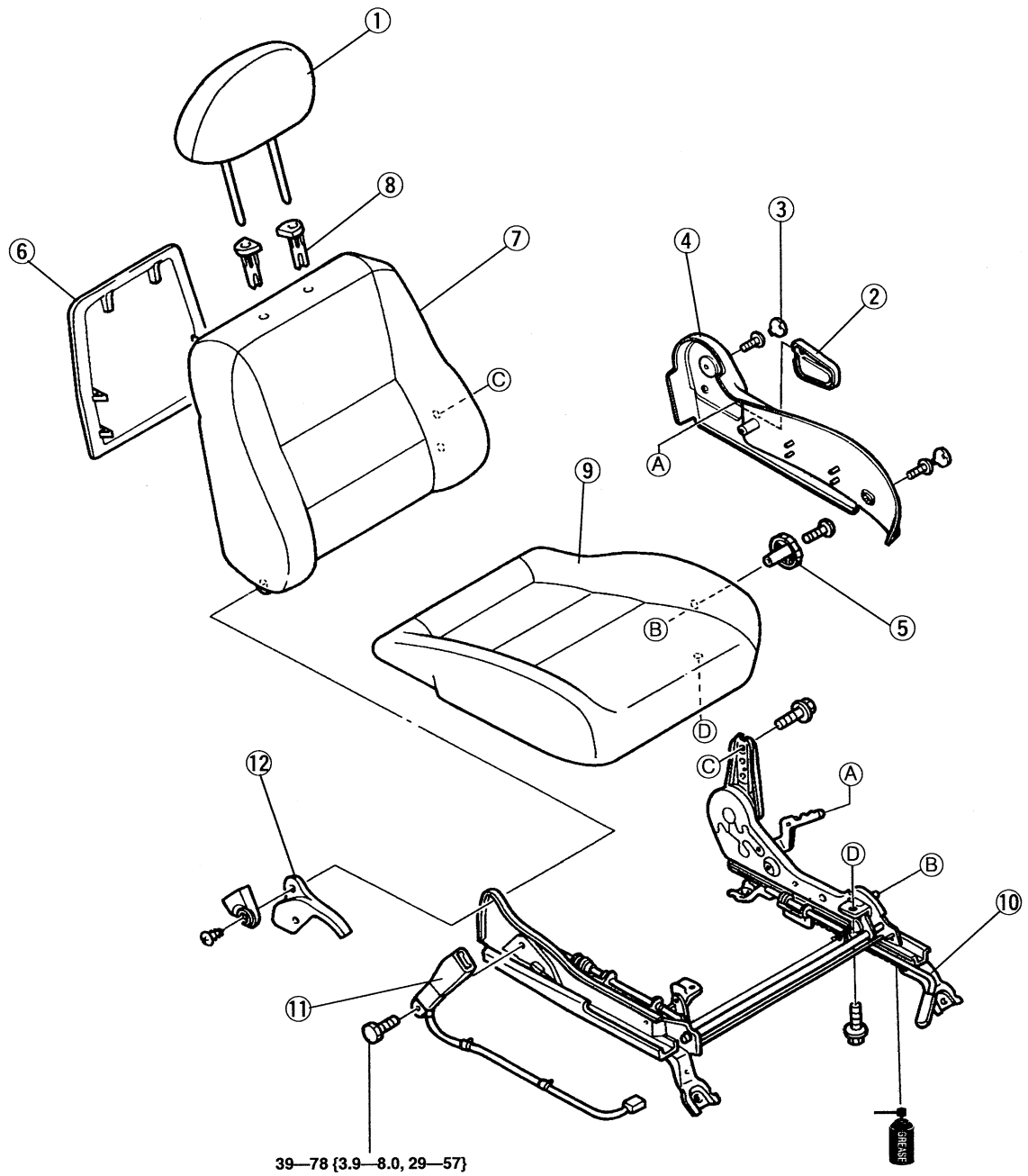


1. Rear seat cushion
2. Rear seat back hinge
3. Rear seat back
4. Trunk carpet

Disassembly / Assembly

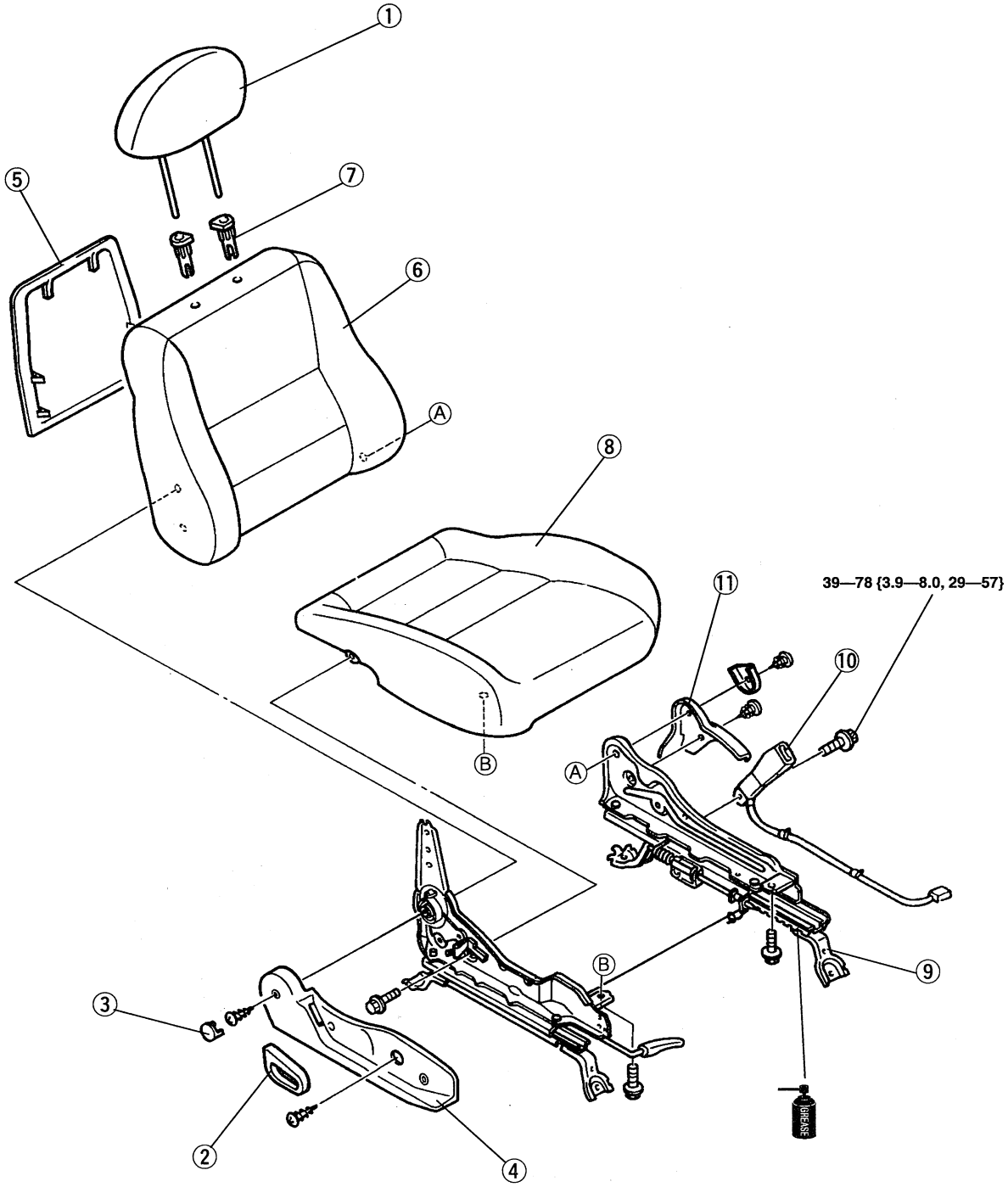
1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.

MANUAL SEAT (DRIVER)



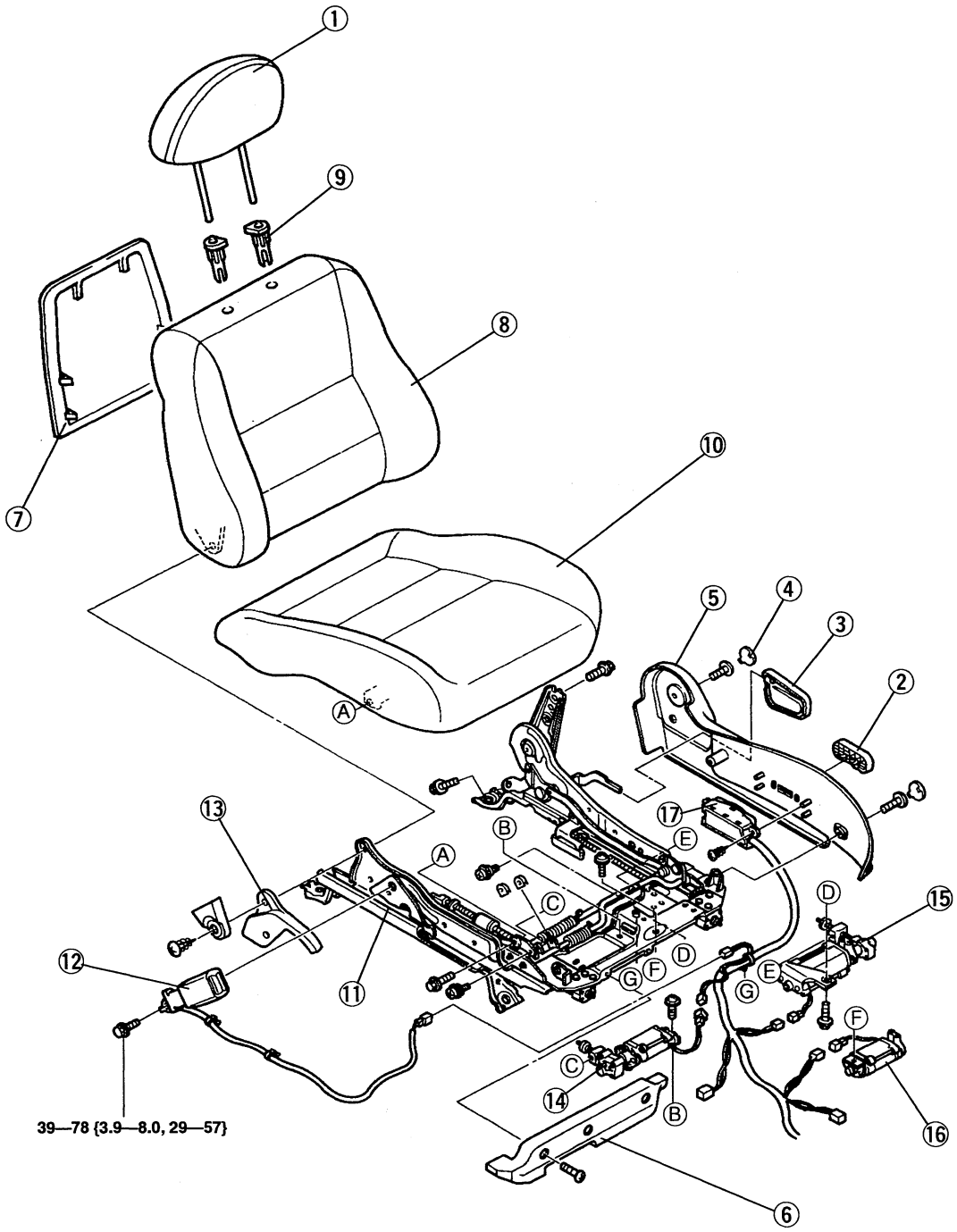
1. Headrest
2. Recliner lever
3. Cap
4. Side cover
5. Tilt knob
6. Seat back cover
7. Seat back
8. Pole guide
9. Seat cushion
10. Slide adjuster
11. Buckle
12. Cover

MANUAL SEAT (PASSENGER)



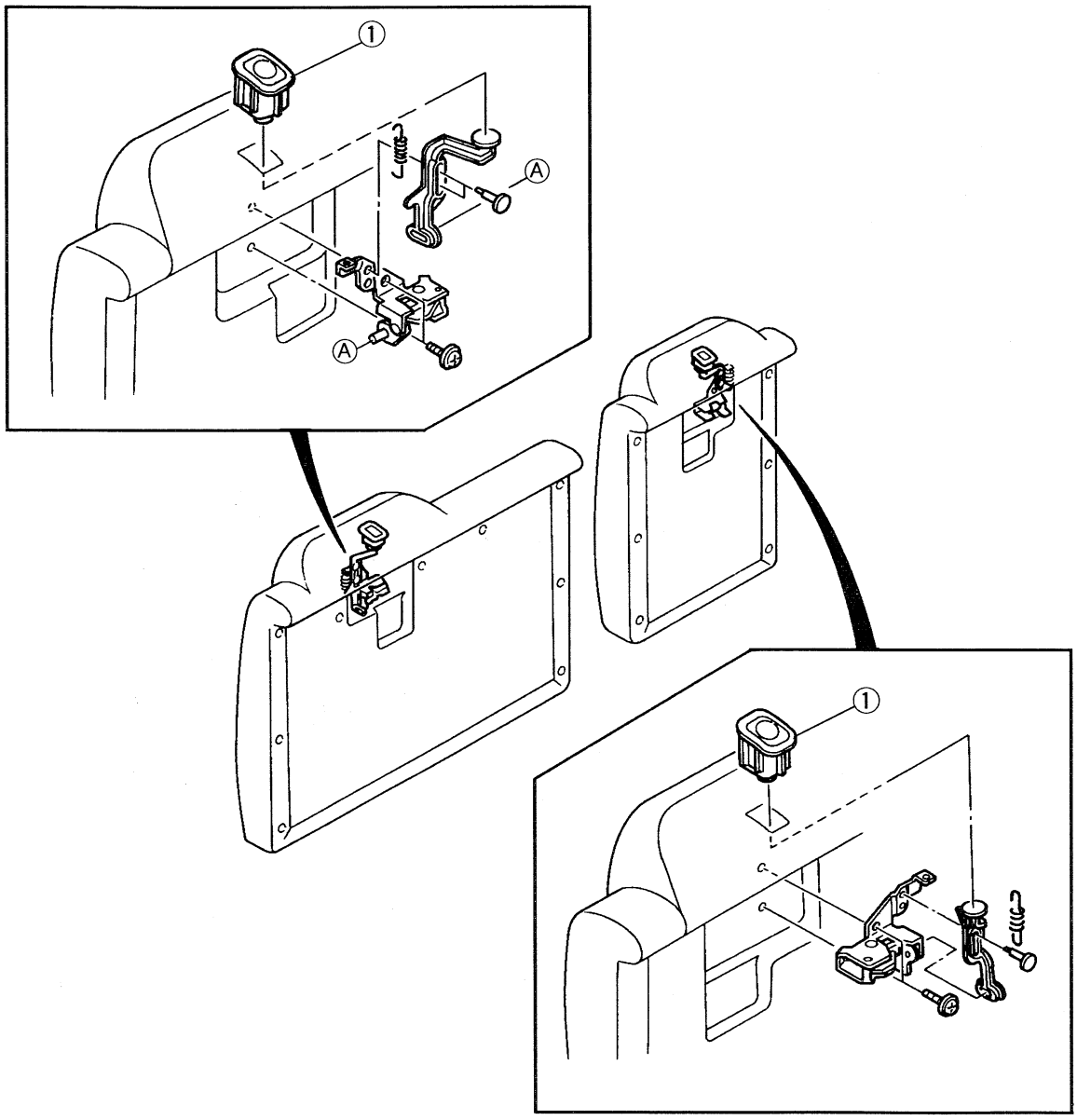
1. Headrest
2. Recliner lever
3. Cap
4. Side cover
5. Seat back cover
6. Seat back
7. Pole guide
8. Seat cushion
9. Slide adjuster
10. Buckle
11. Cover

POWER SEAT (DRIVER)



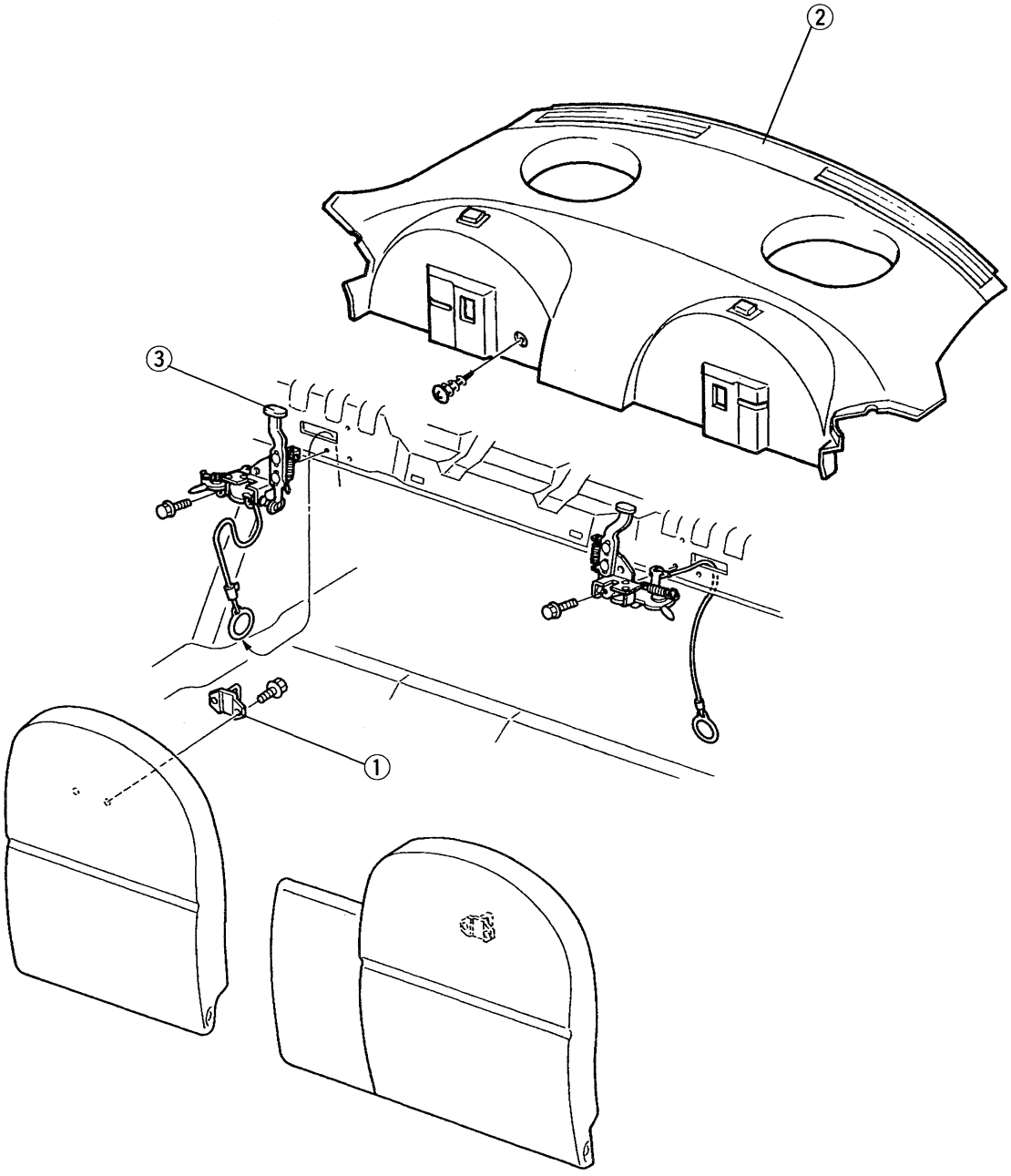
1. Headrest
2. Power seat switch knob
3. Recliner lever
4. Cap
5. Knuckle cover
6. Front cover
7. Seat back cover
8. Seat back
9. Pole guide
10. Seat cushion
11. Slide adjuster
12. Buckle
13. Cover
14. Front-lift motor
15. Rear-lift motor
16. Slide motor
17. Power seat switch

REAR SEAT (626)



1. Rear seat catch knob

REAR SEAT (MX–6)



1. Seat back striker
2. Rear package trim
   Removal / Installation ..... page S–93
3. Rear seat catch lock