1994 Mazda RX-7 Workshop Manual

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.

Printed in the U.S.A. (8/93)
Form No. 1378-10-93H
Part No. 9999-95-018B-94

1994 Mazda RX-7 Workshop Manual

FOREWORD

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

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.

CONTENTS

*** Refer to the 1994 RX-7 Body Electrical Troubleshooting Manual (Form No. 1380-10-93H, Part No.9999-95-085F-94) for servicing of the body electrical components.**

Printed in the U.S.A. (8/93)
Form No. 1378-10-93H
Part No. 9999-95-018B-94

GENERAL INFORMATION

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

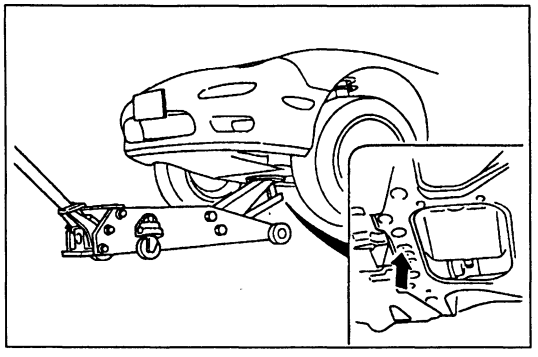
Warning

- **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.

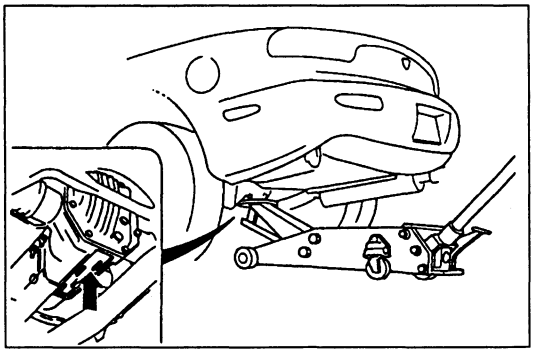
Front

At the center of the crossmember



Rear

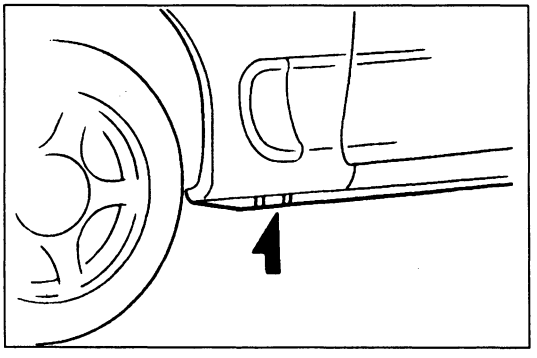
At the center of the crossmember



SAFETY STAND POSITIONS

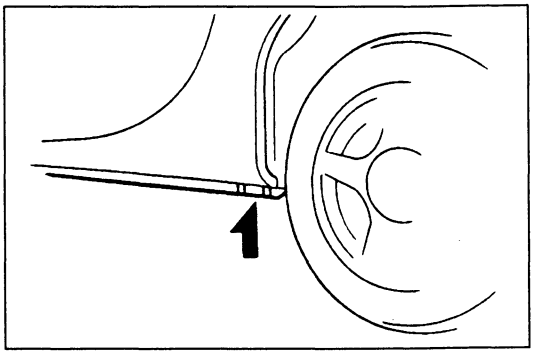
Front

Both sides of the vehicle



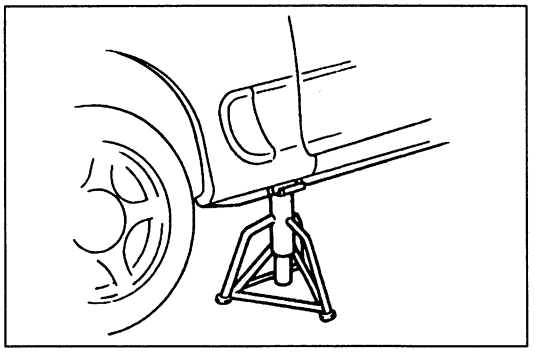
Rear

Both sides of the vehicle

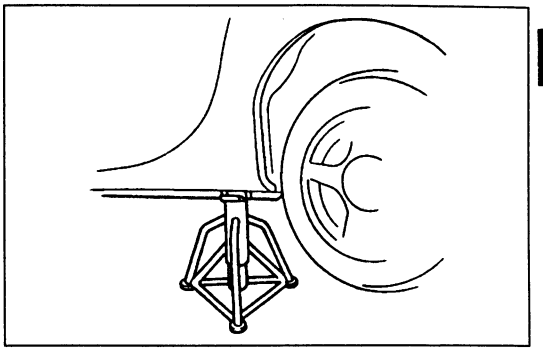


VEHICLE LIFT POSITIONS

Front



Rear



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 eyewear.
- 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.**

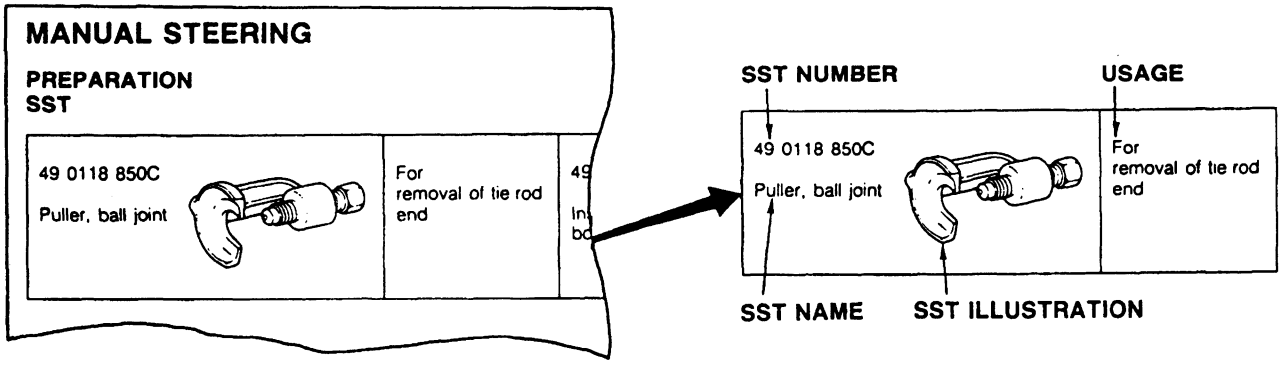
Note

- 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.

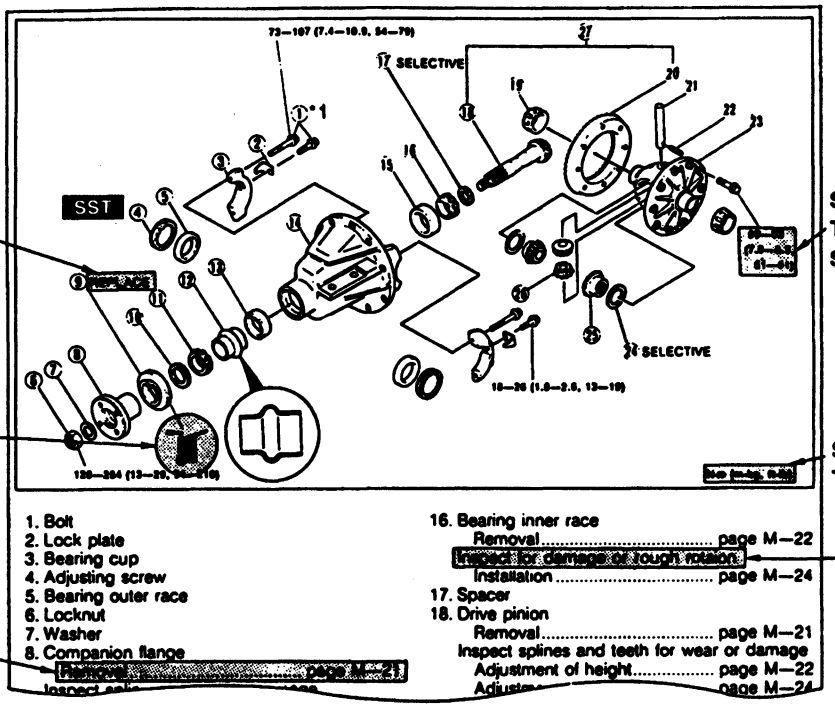
Example:



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.
* 2: Units are in N·m {kgf·m, ft·lbf} unless otherwise specified.

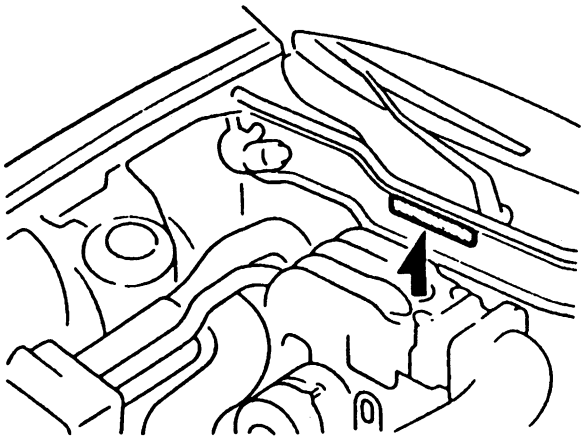
SYMBOLS

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

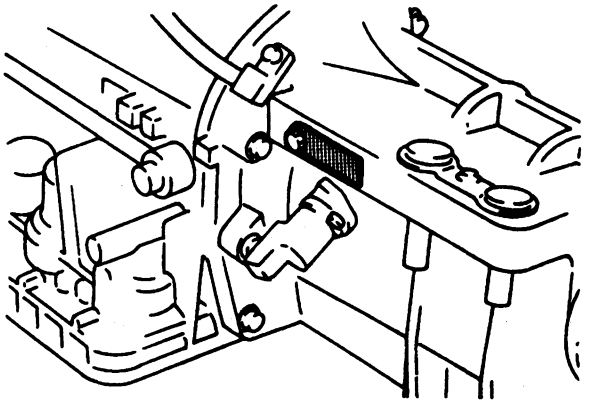
Symbol	Meaning	Kind
	Apply oil	New engine oil or gear oil as appropriate
	Apply brake fluid	FMVSS116: DOT-3
	Apply automatic transmission fluid	Dexron®II or M-III
	Apply grease	Appropriate grease
	Apply sealant	Appropriate sealant
Ⓟ	Apply petroleum jelly	Appropriate petroleum jelly

IDENTIFICATION NUMBER LOCATIONS

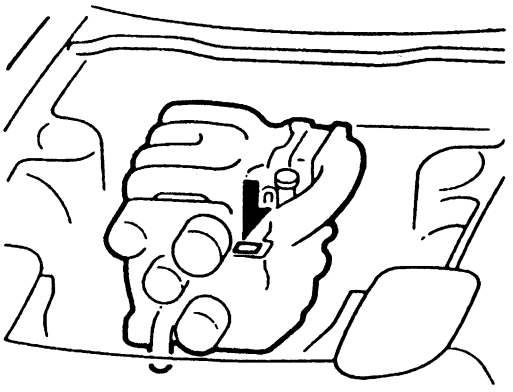
VEHICLE IDENTIFICATION NUMBER (VIN)



AUTOMATIC TRANSMISSION MODEL AND NUMBER



ENGINE MODEL AND NUMBER



UNITS

Electrical current	A (ampere)
Electric potential	V (volt)
Electric power	W (watt)
Length	mm (millimeters)
	in (inches)
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·lb (foot pounds)
	in·lb (inch pounds)
Volume	L (liter)
	US qt (U.S. quart)
	Imp qt (Imperial quart)

ABBREVIATIONS

AAS	Auto adjusting suspension
ABDC	After bottom dead center
ABS	Anti-lock braking system
ACC	Accessories
ACV	Air control valve
ASV	Air supply valve
AT	Automatic transmission
ATDC	After top dead center
ATF	Automatic transmission fluid
ATS	Ambient temperature sensor
AWS	Accelerated warm-up system
BAC	Bypass air control
BBDC	Before bottom dead center
BTDC	Before top dead center
EC-AT	Electronically controlled Automatic Transmission
ECPS	Electronically controlled power steering
ECU	Engine control unit
EGI	Electronic gasoline injection
E/L	Electrical load
ESA	Electronic spark advance
ESPS	Engine speed sensing power steering
ETS	Evaporator temperature sensor
EX	Exhaust
IC	Integrated circuit
IGN	Ignition
IN	Intake
INT	Intermittent
ISC	Idle speed control
LH	Left hand
LSD	Limited slip differential
M	Motor
MOP	Metering oil pump
MT	Manual transmission
OD	Overdrive
OFF	Switch off
ON	Switch on
PBV	Proportioning bypass valve
PCTS	Passenger compartment temperature sensor
PCV	Positive crankcase ventilation
PRC	Pressure regulator control
P/S	Power steering
P/W	Power window
RH	Right hand
RTS	Reduce torque signal
SLS	Slip lockup signal
SR	Sensor rotor
SST	Special service tool
ST	Start
SW	Switch
TDC	Top dead center
TNS	Tail number side
TRS	Torque reduced signal
VDI	Variable dynamic effect intake
VRIS	Variable resonance induction system
WSS	Wheel speed sensor
WTS	Water temperature sensor

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.

Engine and Emission Systems

Previous Standard		SAE Standard		
Abbreviation	**Name**	**Abbreviation**	**Name**	**Remark**
—	Accelerator Pedal	AP	Accelerator Pedal	
—	Air Cleaner	ACH	Air Cleaner Housing	
—	Air/Fuel (A/F) Solenoid Valve	MCS	Mixture Control Solenoid	F2 Carburetor
—	Airflow Meter	VAF	Volume Airflow Sensor	
—	Airflow Sensor	MAF	Mass Airflow Sensor	
—	Alternator	ALT	Alternator	
—	Atmospheric Pressure Sensor	BARO	Barometric Absolute Pressure Sensor	
—	Carburetor	CARB	Carburetor	
—	Catalytic Converter	OC	Oxidation Catalyst	
		TWC	Three-Way Catalyst	
		WU-TWC	Warm Up Three-Way Catalyst	#1
—	Circuit Opening Relay	FPR	Fuel Pump Relay	#2
—	Cooling Fan Control	CFC	Coolant Fan Control	
—	Crank Angle Sensor	CPS	Crankshaft Position Sensor	
—	Diagnosis Connector	DLC	Data Link Connector	
—	Direct Ignition	DLI	Distributorless Ignition	
EGI	Electronic Gasoline Injection System	CIS	Continuous Fuel injection System	
—	Electronic Spark Ignition	EI	Electronic Ignition	#3
—	EGR Modulator Solenoid	EGRC	EGR Function Control	
—	EGR Gas Sensor	EGRS	EGR Function Sensor	#4
	EGR Position Sensor			
	EGR Position Switch			
ECU	Engine Control Unit	PCM	Powertrain Control Module	#5
		PCME	Powertrain Control Module (Engine)	
—	Engine Modification	EM	Engine Modification	
—	Engine Speed	RPM	Engine Speed	
—	Evaporative Emission Control System	EVAP	Fuel Evaporative System	
—	Exhaust Gas Recirculation System	EGR	Exhaust Gas Recirculation	System name
—	Feedback System	CLS	Closed Loop System	
—	Flexible Fuel	FF	Flexible Fuel	
—	Fuel Pump	FP	Fuel Pump	
—	IC Regulator	VR	Voltage Regulator	

#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 PCME (PCM)
#4: EGR valve controller device name
#5: Device that controls engine and powertrain

Engine and Emission Systems (cont'd)

Previous Standard		SAE Standard		
Abbreviation	Name	Abbreviation	Name	Remark
—	Intake Air Thermosensor	IATS	Intake Air Temperature Sensor	
—	Intercooler	CAC	Charge Air Cooler	
—	ISC Solenoid Valve	IACV	Idle Air Control Valve	
—	Knock Sensor	KS	Knock Sensor	
—	Malfunction Indicator Light	MIL	Malfunction Indicator Light	
—	Multiport Fuel Injection	MFI	Multiport Fuel Injection	
—	Oxidizing Converter	OC	Oxidation Catalyst	
—	Oxygen Sensor	HO2S	Heated Oxygen Sensor	With heater
		O2S	Oxygen Sensor	
—	Open Loop	OL	Open Loop	
PTC	Positive Temperature Coefficient Heater	EFE	Early Fuel Evaporation	
—	Pressure Sensor	MAP	Manifold Absolute Pressure Sensor	
		MVS	Manifold Vacuum Sensor	Checks vacuum only
—	Reed Valve	SAPV	Secondary Air Pulse Valve	
—	Relief 1 Solenoid Valve	SABV	Secondary Air Bypass Valve	
—	Secondary Air Injection System	PAIR	Pulsed Secondary Air Injection	Pulsed injection
		AIR	Secondary Air Injection	#6
—	Sequential Fuel Injection	SMFI	Sequential Multipoint Fuel Injection	
—	Service Code(s)	DTC	Diagnostic Trouble Code(s)	
—	Spark Ignition	DI	Distributor Ignition	
—	Supercharger	SC	Supercharger	
—	Switching Solenoid Valve	SASV	Secondary Air Switching Valve	
—	Test Mode(s)	DTM	Diagnostic Test Mode(s)	#7
—	Three-Way Catalyst	TWC	Three-Way Catalyst	
—	Throttle Body	TB	Throttle Body	
—	Throttle Sensor	TPS	Throttle Position Sensor	
—	Turbocharger	TC	Turbocharger	
—	VAC	MDP	Manifold Differential Pressure	
—	Vacuum Switch	MVZS	Manifold Vacuum Zone Switch	
—	Water Thermosensor	ECTS	Engine Coolant Temperature Sensor	

#6: Supplies air to three-way catalytic
#7: Diagnostic trouble codes depend on the test mode

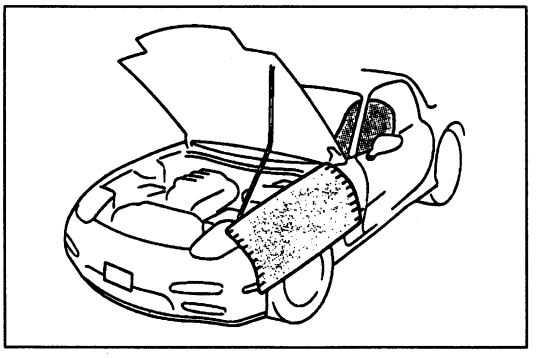
Transmission (Transaxle) and Steering System

Previous Standard		SAE Standard		
Abbreviation	**Name**	**Abbreviation**	**Name**	**Remark**
—	Clutch Position	CPP	Clutch Pedal Position	
—	EC-AT Control Unit	PCMT	Powertrain Control Module (Transaxle)	FF
			Powertrain Control Module (Transmission)	FR
—	Fully Closed	CTP	Closed Throttle Position	
—	Fully Open	WOT	Wide Open Throttle	
—	Inhibitor Switch	PNS	Park/Neutral Switch	
—	Lock-Up Position	TCC	Torque Converter Clutch	
—	Output Signal(s)	PTCS	Powertrain Control Signal(s)	
—	Overdrive	4GR	Fourth Gear	
—	Power Steering Pressure Switch	SPS	Steering Pressure Sensor	
—	Pulse Generator	VSPG	Vehicle Speed Pulse Generator	
—	Vehicle Speed Sensor	VSS	Vehicle Speed Sensor	
—	3rd Gear	3GR	Third Gear	

Body Electrical System and Heater and Air Conditioner Systems

Previous Standard		SAE standard		
Abbreviation	**Name**	**Abbreviation**	**Name**	**Remark**
—	A/C Switch	ACS	Air Conditioning Sensor	
—	Air Conditioner	A/C	Air Conditioner	
V_B	Battery Voltage	B+	Battery Positive Voltage	
—	Coolant Level Sensor	COLS	Coolant Level Sensor	
—	Ground	GND	Ground	
—	Self-Diagnosis System	OBD	On-Board Diagnosis System	#8

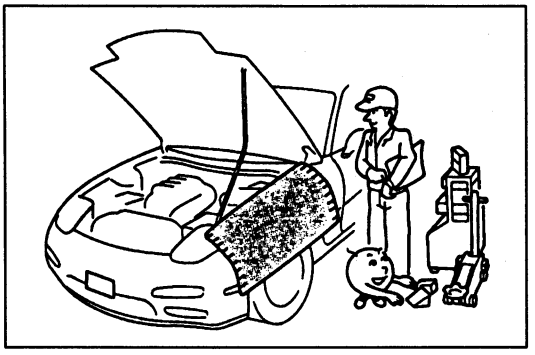
#8: System name. Other related names are unchanged.



FUNDAMENTAL PROCEDURES

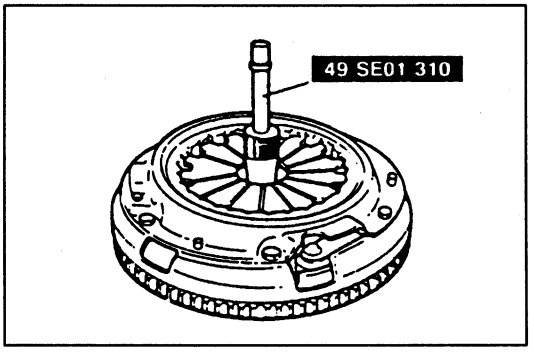
PROTECTION OF THE VEHICLE

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



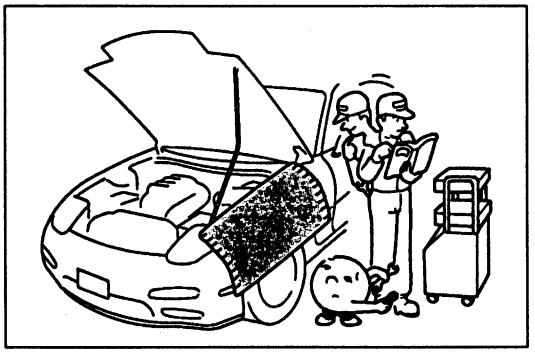
PREPARATION OF TOOLS AND MEASURING EQUIPMENT

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



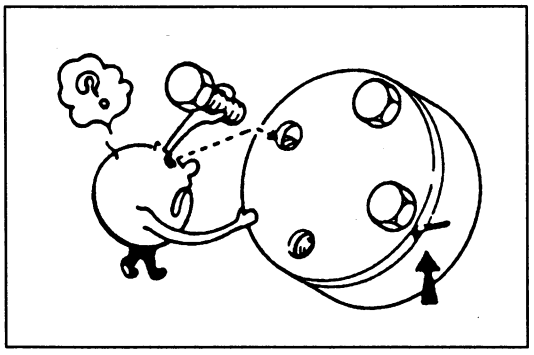
SPECIAL TOOLS

Use special tools when they are required.



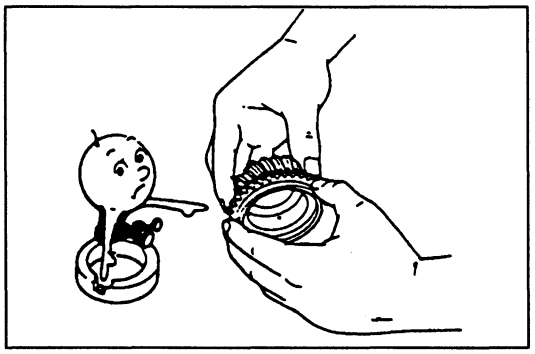
REMOVAL OF PARTS

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.

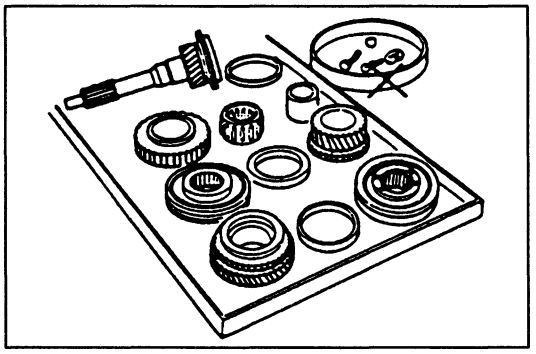


DISASSEMBLY

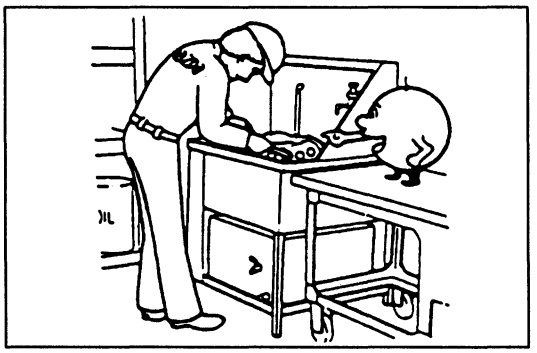
If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be disassembled in a way that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



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

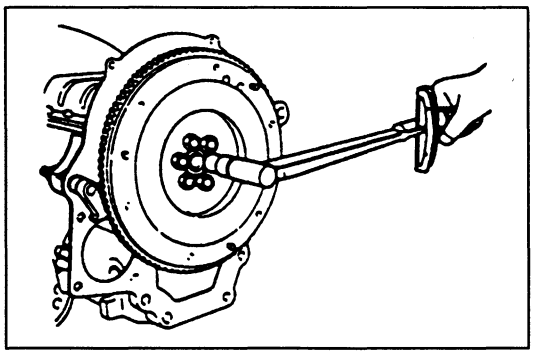


2. Arrangement of parts
All disassembled parts should be carefully arranged for reassembly.
Be sure to separate or otherwise identify the parts to be replaced from those that will be reused.



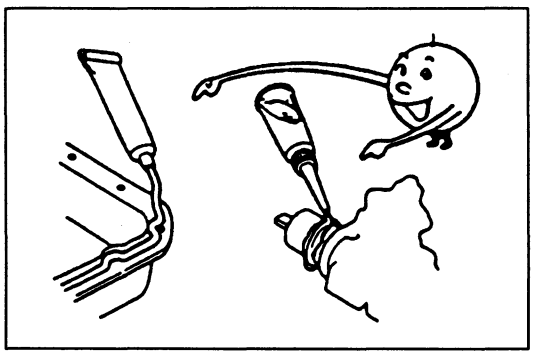
3. Cleaning parts for reuse
All parts to be reused should be carefully and thoroughly cleaned in the appropriate method.

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.**

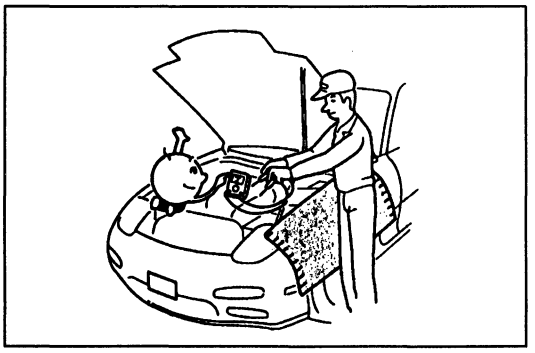


REASSEMBLY
Standard values, such as torques and certain adjustments, must be strictly observed in the reassembly of all parts. Refer to STANDARD BOLT AND NUT TIGHTENING TORQUE in section TD for tightening torques not mentioned in the main text.

If removed, these parts should be replaced with new ones:
1. Oil seals
2. O-rings
3. Cotter pins
4. Gaskets
5. Lock washers
6. Nylon nuts

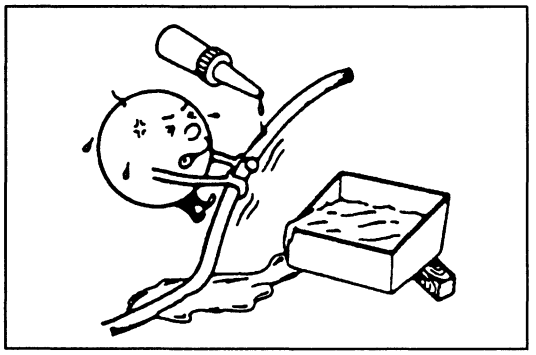


Depending on location:
1. Sealant should be applied to gaskets.
2. Oil should be applied to the moving components of parts.
3. Specified oil or grease should be applied at the prescribed locations (such as oil seals) before reassembly.



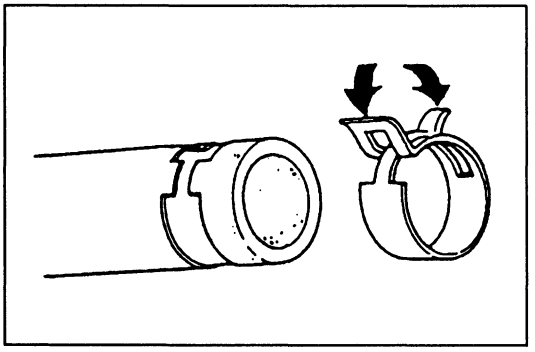
ADJUSTMENTS

Use suitable gauges and testers when making adjustments.



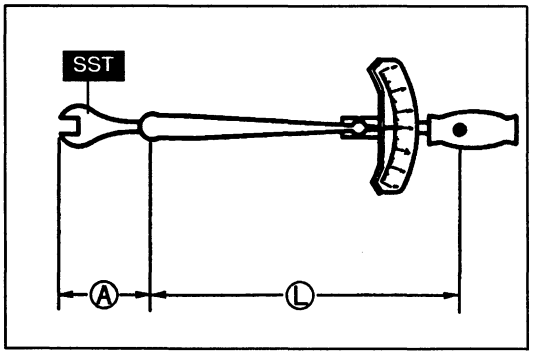
RUBBER PARTS AND TUBING

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.

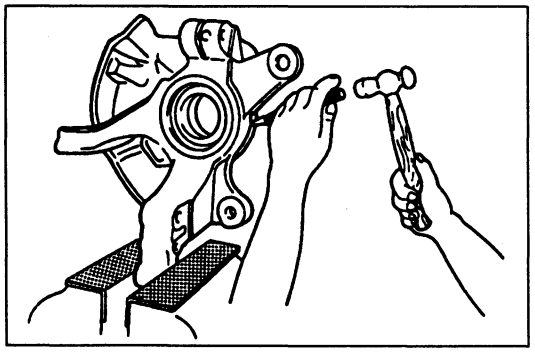


TORQUE FORMULAS

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.

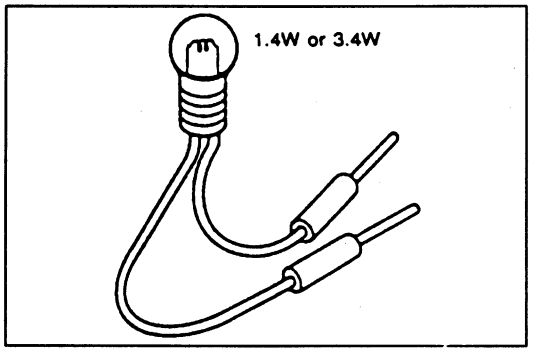
Torque Unit	Formula	L&A Unit
N·m	N·m × [L/(L+A)]	centimeter
kgf·m	kgf·m × [L/(L+A)]	centimeter
kgf·cm	kgf·cm × [L/(L+A)]	centimeter
ft·lb	ft·lb × [L/(L+A)]	inch
in·lb	in·lb × [L/(L+A)]	inch

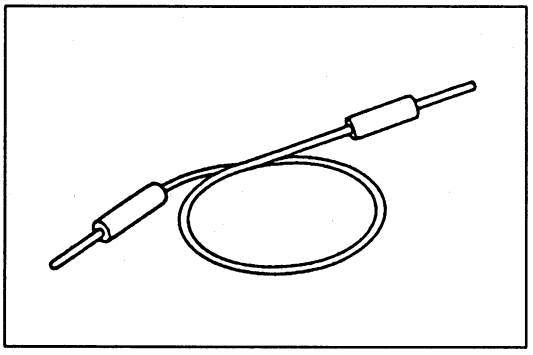
A = The length of the **SST** past the torque wrench drive.
L = The length of the torque wrench.

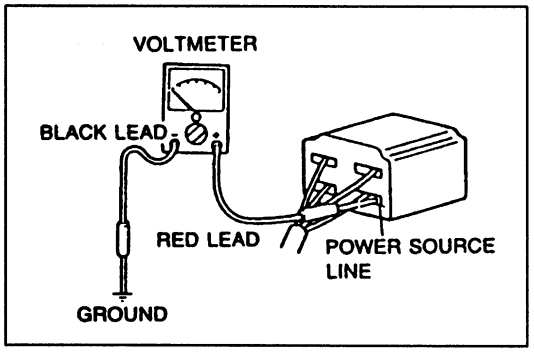


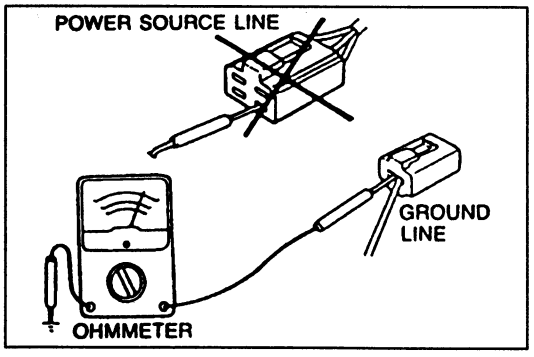
VISE

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 harnesses or electronic components.**

VOLTMETER

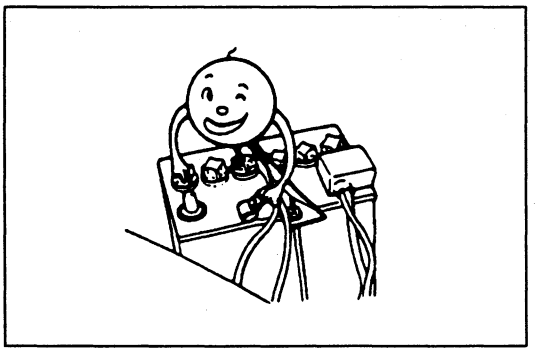
The DC voltmeter is used to measure circuit voltage. A voltmeter with a range of 15V or more is used by connecting the positive (+) probe (red lead wire) to the point where voltage is to be measured and the negative (–) probe (black lead wire) to a body ground.

OHMMETER

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

Caution

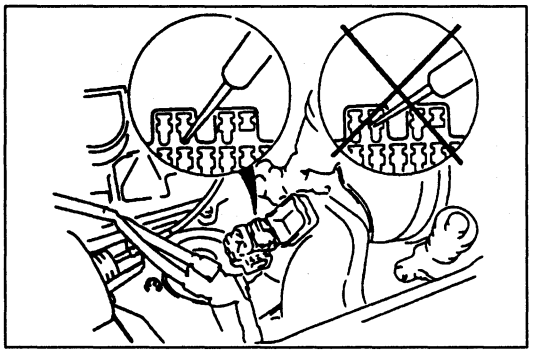
- **Do not connect the ohmmeter to any circuit to which voltage is applied; this will damage the ohmmeter.**



ELECTRICAL PARTS

BATTERY CABLE

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



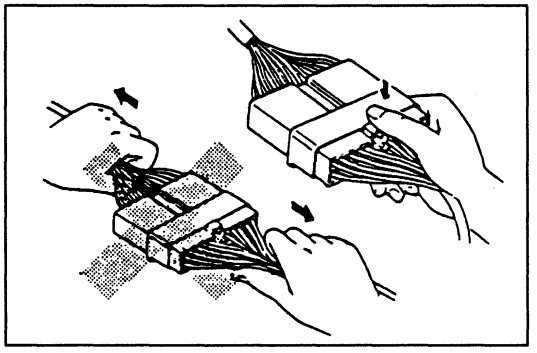
CONNECTORS

Data Link Connector

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

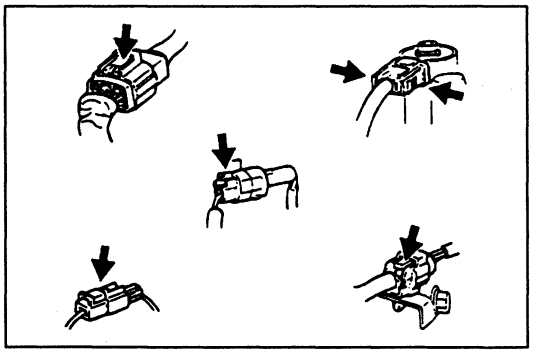
Caution

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

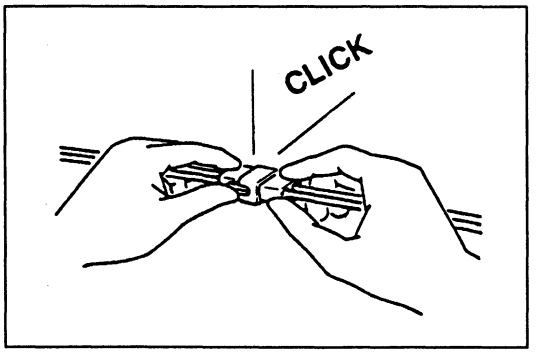


Disconnecting Connectors

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

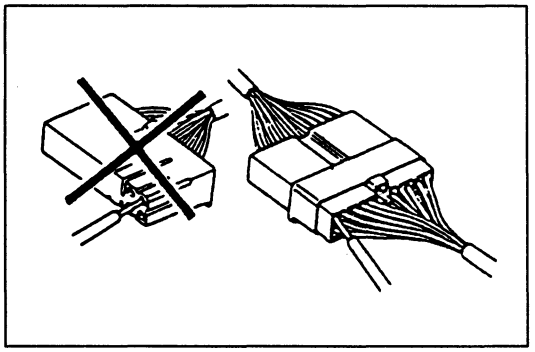


Connectors can be disconnected by pressing or pulling the lock lever as shown.



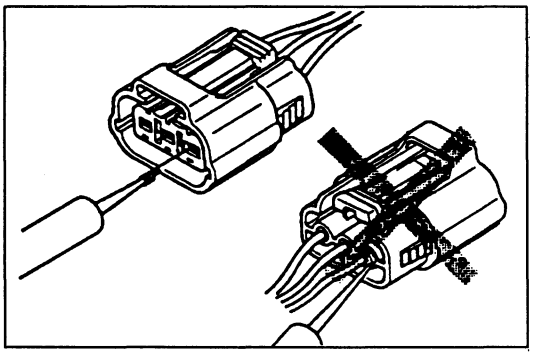
Locking Connectors

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



Inspection

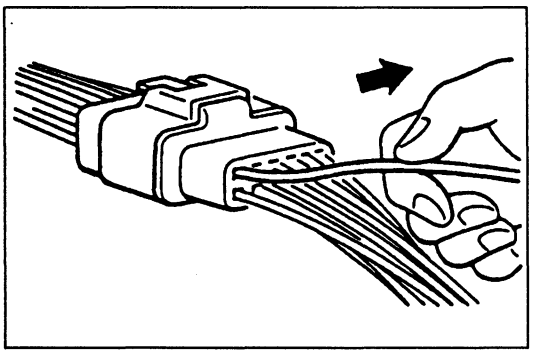
1. When a tester is used to check for continuity or to measure voltage, insert the tester probe from the wiring harness side.



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

Caution

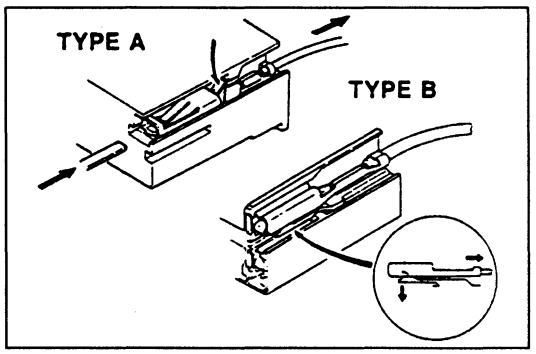
- **To prevent damage to the terminal, wrap a thin wire around the lead before inserting it into the terminal.**



TERMINALS

Inspection

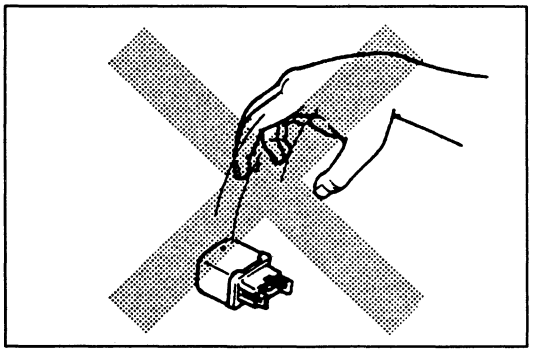
Pull lightly on individual wires to check that they are secured in the terminal.



Replacement

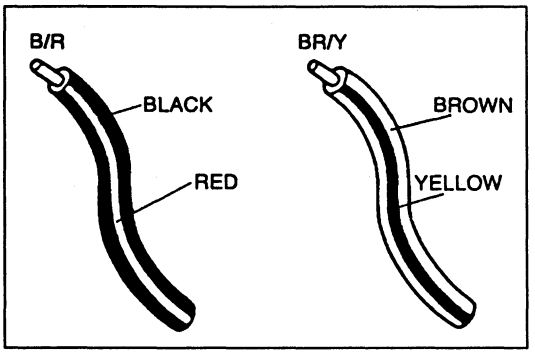
Use the appropriate tools to remove a terminal as shown. When installing a terminal, be sure to insert it until it locks securely.

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.

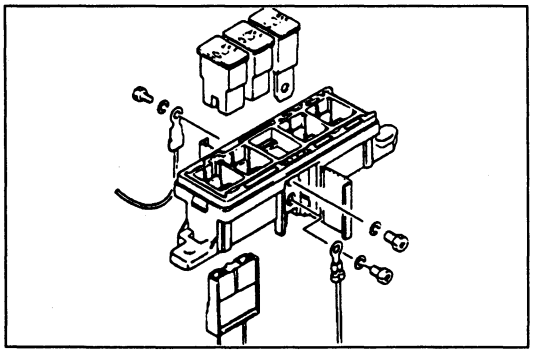


WIRING HARNESS

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.

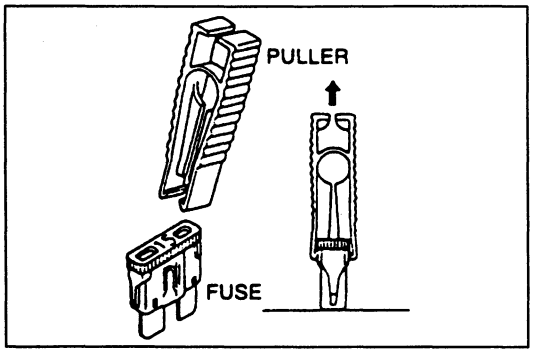
CODE	COLOR	CODE	COLOR
B	Black	O	Orange
BR	Brown	P	Pink
G	Green	R	Red
GY	Gray	V	Violet
L	Blue	W	White
LB	Light Blue	Y	Yellow
LG	Light Green	—	—



FUSE

Replacement

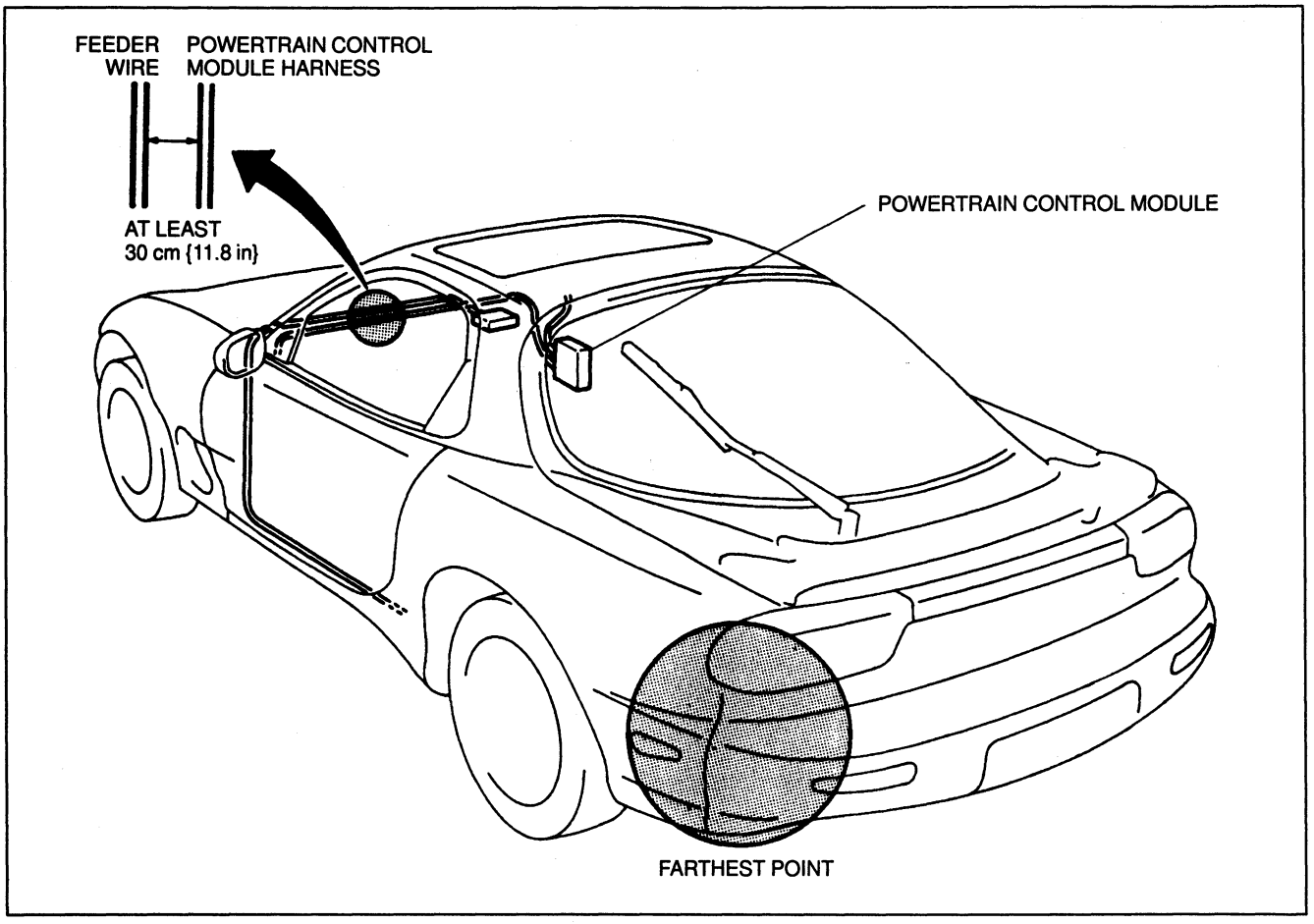
1. When replacing a fuse, be sure to replace it with one of the specified capacity.
   If a fuse again fails after it has been replaced, the circuit probably has a short and the wiring should be checked.
2. Be sure the negative battery terminal is disconnected before replacing a main fuse (80A).

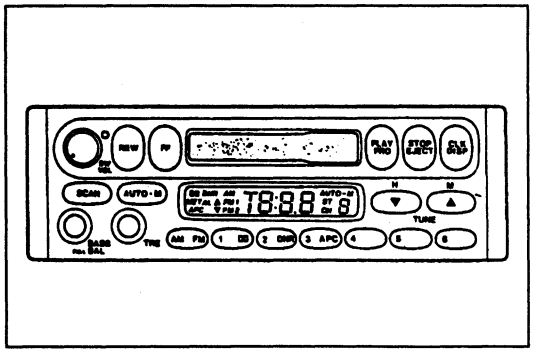


3. When replacing a pullout fuse, use the fuse puller supplied in the fuse box cover.

INSTALLATION OF MOBILE TWO-WAY RADIO SYSTEM

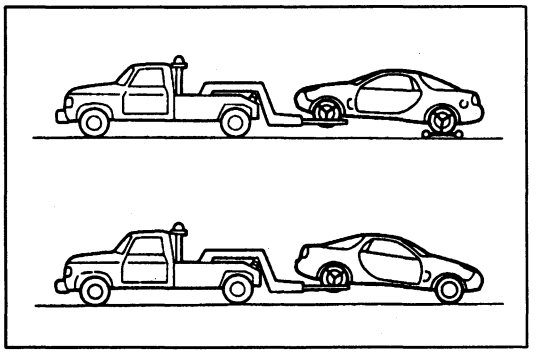
If a mobile two-way radio system is installed improperly or if a high-powered type is used, the CIS and other systems may be affected.
When the vehicle is to be equipped with a mobile two-way radio, observe the following precautions:
1. Install the antenna at the farthest point from control modules.
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 mobile two-way radio system.





AUDIO ANTITHEFT SYSTEM

An audio with an antitheft function is optionally available. Before removing the negative battery terminal or disconnecting the audio power source, obtain the code number and deactivate the audio antitheft system.
(Refer to 1994 RX-7 Body Electrical Troubleshooting Manual.)



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 transmission.
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.

With manual transmission

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

With automatic transmission

If excessive damage or other conditions prevent towing the vehicle with the driving wheels off the ground, use wheel dollies.

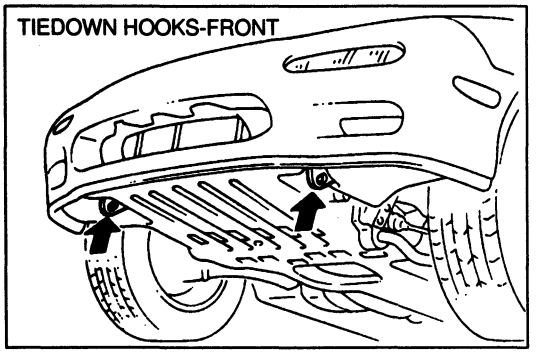
If all four wheels are on the ground, the vehicle may be towed only forward. Don't exceed 45 km/h (28 mph) and a distance of 15 km (10 miles); you could damage the transmission.

If speed must exceed 45 km/h (28 mph) or a towing distance of 15 km (10 miles), use one of these methods:

- Place the rear wheels on a dolly;
- Tow with the rear wheels off the ground;
- Disconnect the propeller shaft.

If the transmission or rear axle is inoperative, tow with the rear wheels off the ground.

Caution
- **Don't tow with sling-type equipment. This could damage your vehicle. Use wheel-lift or flatbed equipment.**



Caution
- **Don't use the hook loops under the front 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 AND SCHEDULED MAINTENANCE

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 the specifications:
- ☐ Glass, exterior bright metal, and paint for damage
- ☐ Wheel lug nuts and locks
  89–117 N·m {9.0–12.0 kgf·m, 66–86 ft·lbf}
- ☐ All weather strips for damage and detachment
- ☐ Operation of hood release and lock
- ☐ Operation of fuel lid and rear hatch opener
- ☐ Door operation and alignment
- ☐ Headlight aim

INSTALL the following parts
- ☐ Power outside mirror (s)
- ☐ Front air deflector (if equipped)

UNDER HOOD–ENGINE OFF

INSPECT and **ADJUST**, if necessary, the following items to the specifications:
- ☐ Fuel, coolant, and hydraulic lines, fittings, connections, and components for leaks
- ☐ Engine oil level
- ☐ Power steering fluid level
- ☐ Brake and clutch master cylinder fluid levels
- ☐ Windshield washer reservoir fluid level
- ☐ Radiator coolant level and specific gravity
- ☐ Tightness of battery terminals

INTERIOR

CHECK the operations of the following items:
- ☐ Seat controls (sliding and reclining)
- ☐ Door locks
- ☐ Seat belts and warning system
- ☐ Ignition switch and steering lock
- ☐ Air bag system warning light
- ☐ Shift-lock system and Park/Neutral switch (AT only)
- ☐ Starter interlock switch (clutch pedal, MT only)
- ☐ All lights including warning and indicator lights and retractable headlight mechanism
- ☐ IC audible warning system
- ☐ Horn, wipers, and washers (front and rear, if equipped)
- ☐ Radio and antenna
- ☐ Cigarette lighter and clock
- ☐ Power outside mirror
- ☐ Power windows
- ☐ Heater, defroster, and air conditioner at all mode selections (if equipped)
- ☐ Sunroof (if equipped)
- ☐ Theft-deterrent system

CHECK the following items:
- ☐ Spare fuse
- ☐ Upholstery and interior finishes

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

	Pedal height mm (in)	Pedal free play mm (in)
Clutch pedal	165.5–177.0 {6.516–6.968 in} (With carpet)	0.6–3.2 {0.02–0.13}
Brake pedal	164.5–176.0 {6.48–6.92} (With carpet)	3.0–8.0 {0.12–0.31}

- ☐ Parking brake
  7–10 notches / 200 N {20 kgf, 44 lbf}

UNDER HOOD–ENGINE RUNNING AT OPERATING TEMPERATURE

CHECK the following items:
- ☐ Bypass air control system
- ☐ Automatic transmission fluid level

ON HOIST

CHECK the following items:
- ☐ Manual transmission oil level
- ☐ Rear axle oil level
- ☐ Underside fuel, coolant, and hydraulic lines, fittings, connections, and components for leaks
- ☐ Tires for cuts and 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 meters and gauges
- ☐ Squeaks, rattles, or 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
- ☐ **REMOVE** identification color tape on directional tires

The following items must be done just before the delivery to your customer.
- ☐ Load test battery and charge if necessary
- ☐ Adjust tire pressure to the specification (Refer to section Q)
- ☐ Clean outside of vehicle
- ☐ Install fuses for accessories
- ☐ Remove seat and floor mat protective covers
- ☐ Vacuum inside of vehicle

SCHEDULED MAINTENANCE (EXCEPT CANADA)

Schedule 1 (Normal Driving Conditions)
If the vehicle is mainly operated where none of the "unique driving conditions" apply.

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 corrosives are used.
- Driving on rough or muddy roads.
- Extended periods of idling or low-speed operation.
- Driving for long periods in cold temperatures or extremely humid climates.

SCHEDULE 1 (NORMAL DRIVING CONDITIONS)

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

Remarks:
- After 48 months or 96,000 kilometers {60,000 miles}, 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 kilometers {miles}, whichever comes first								
	Months		6	12	18	24	30	36	42	48
	×1,000	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			Replace every 8,000 kilometers {5,000 miles}							
Oil Filter			Replace every 8,000 kilometers {5,000 miles}							
Drive Belts (Tension)						I				I
Air cleaner housing										
Air Cleaner Element						R				R
Ignition system										
Spark Plugs						R				R
Fuel system										
Idle Speed				I *2		I *2		I *2		I
Fuel Filter										R
Fuel Lines						I *1				I
Cooling system										
Cooling System				I		I		I		I
Engine Coolant						R				R
Chassis & body										
Brake Lines, Hoses & Connections						I				I
Disc Brakes						I				I
Steering Operation & Linkages						I				I
Front & Rear Suspension Ball Joints						I				I
Rear Suspension Uni Ball & Sliding Rubber Bushing						I				I
Manual Transmission Oil										R
Differential Oil										R
Driveshaft Dust Boots						I				I
Bolts & Nuts on Chassis & Body						I				I
Exhaust System Heat Shield						I				I
All Locks & Hinges			L	L	L	L	L	L	L	L
Air conditioner system (if equipped)										
Refrigerant Amount				I		I		I		I
Compressor Operation				I		I		I		I
Electrical system										
Engine Oil Level Warning System				I		I		I		I
Engine Coolant Level Warning System						I				I

SCHEDULE 2 (UNIQUE DRIVING CONDITIONS)

Chart symbols:

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

Remarks:

- After 48 months or 96,000 kilometers {60,000 miles}, 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)

Maintenance Interval / Maintenance item	Number of months or kilometers {miles}, whichever comes first											
Months	4	8	12	16	20	24	28	32	36	40	44	48
×1,000 **Kilometers**	8	16	24	32	40	48	56	64	72	80	88	96
×1,000 **Miles**	5	10	15	20	25	30	35	40	45	50	55	60
Engine												
Engine Oil	Replace every 5,000 kilometers {3,000 miles}											
Oil Filter	Replace every 5,000 kilometers {3,000 miles}											
Drive Belts						I						I
Air cleaner housing												
Air Cleaner Element						R						R
Ignition system												
Spark Plugs						R						R
Cooling system												
Cooling System			I			I			I			I
Engine Coolant						R						R
Fuel system												
Fuel Filter												R
Fuel Lines						I *1						I
Idle Speed			I *2			I *2			I *2			I
Chassis & body												
Brake Lines, Hoses & Connections						I						I
Brake Fluid						R						R
Disc Brakes			I			I			I			I
Steering Operation & Linkages						I						I
Front & Rear Suspension Ball Joints						I						I
Rear Suspension Uni Ball & Sliding Rubber Bushing						I						I
Manual Transmission Oil						R						R
Differential Oil						R						R
Driveshaft Dust Boots						I						I
Bolts & Nuts on Chassis & Body			I			I			I			I
Exhaust System Heat Shield						I						I
All Locks & Hinges	L	L	L	L	L	L	L	L	L	L	L	L
Air conditioner system (if equipped)												
Refrigerant Amount			I			I			I			I
Compressor Operation			I			I			I			I
Electrical system												
Engine Oil Level Warning System			I			I			I			I
Engine Coolant Level Warning System						I						I
Engine Oil (Puerto Rico)	Replace every 5,000 kilometers {3,000 miles}											

SCHEDULED MAINTENANCE (CANADA)

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

Remarks :
- After 60 months or 100,000 kilometers, continue to follow the described maintenance at the recommended intervals.

*1 This maintenance is recommended by Mazda. However, it is not necessary for emission warranty coverage or manufacturer recall liability.

Schedule (Canada)

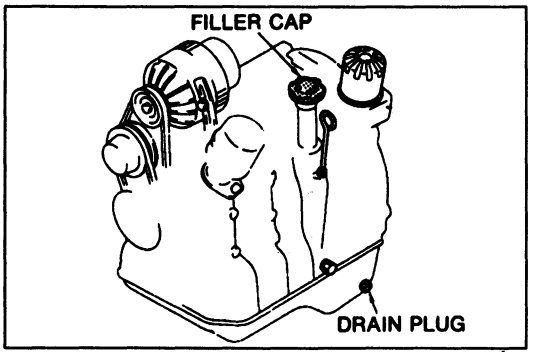
Maintenance Interval / Maintenance item		Number of months or kilometers, whichever comes first																			
Months		3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
×1,000	Kilometers	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
Engine																					
Engine Oil		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Oil Filter		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Tension of All Drive Belts		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Air cleaner housing																					
Air Cleaner Element						I					R					I					R
Ignition system																					
Spark Plugs											R										R
Cooling system																					
Engine Coolant Level & Strength		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Cooling System for Leaks						I					I					I					I
Engine Coolant											R										R
Fuel system																					
Idle Speed						I					I					I					I
Fuel Lines & Hoses											I *1										I
Fuel Filter											R										R
Emission Hoses & Tubes																					I

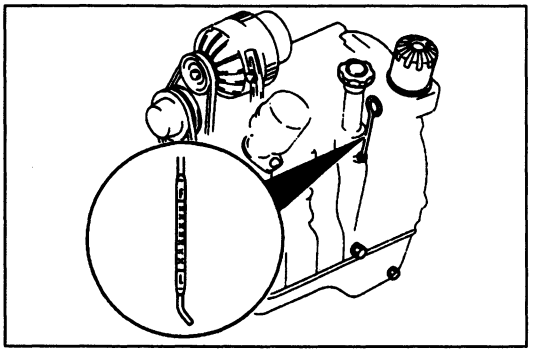
Schedule (Canada) (Cont'd)

Maintenance Interval / Maintenance item	Number of months or kilometers, whichever comes first																			
	Months		3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
	×1,000	Kilometers	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
Chassis & body																						
Manual Transmission Oil Level							I					I					I					I
Automatic Transmission Fluid Level			I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Transmission Oil MT & AT												R										R
Differential Oil Level			I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Differential Oil												R										R
Driveshaft Dust Boots												I										I
Brake Lines & Hoses												I										I
Brake & Clutch Fluid Level			I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Brake Fluid												R										R
Disc Brakes (Front & Rear)							I					I					I					I
Tire Inflation Pressure & Tire Wear			I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Rotate Tires	Rotate every 25,000 kilometers or every 15 months																					
Power Steering Fluid Level			I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Steering Operation & Linkage (Includes Four Wheel Alignment)												I										I
Suspension Components Front & Rear												I										I
Rear Suspension Uniball & Sliding Rubber Bushing												I										I
All Chassis & Body Nuts & Bolts							I					I					I					I
Exhaust System Heat Shield												I										I
All Locks & Hinges			L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Washer Fluid Level			I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Function of All Lights			I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Engine Oil Level Warning System							I					I					I					I
Engine Coolant Level Warning System												I										I

Air conditioner system (if equipped)

Refrigerant	Inspect the refrigerant amount annually
Compressor	Inspect the operation annually





REPLACEMENT OF ENGINE OIL

1. Warm up the engine if it is cold.
2. Remove the drain plug.
3. Remove the oil filler cap. This will allow the oil to drain more easily.
4. Fill engine oil to the "F" mark on the dipstick. Use oil with the proper SAE viscosity.

Oil capacity:
Total: 4.9 L {5.2 US qt, 4.3 Imp qt} .. except R1 model
5.4 L {5.7 US qt, 4.8 Imp qt} ..... R1 model
Oil replacement: 3.6L {3.8 US qt, 3.2 Imp qt}
Oil + oil filter replacement: 3.8L {4.0 US qt, 3.3 Imp qt}

Note
- After starting the engine, recheck the oil level and also check the drain plug washer for leaks.

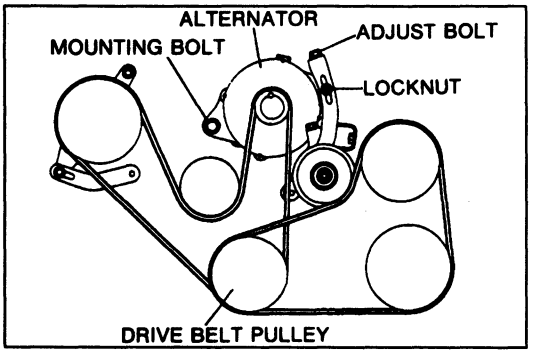
Typical specification:
API service SG, SH grade (Mineral oil only)
ILSAC

Recommended SAE viscosity numbers

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

REPLACEMENT OF ENGINE OIL FILTER

1. Remove the oil filter by using the oil filter wrench.
2. Using a clean rag, wipe the mounting surface on the engine.
3. Apply a small amount of clean engine oil to the rubber seal of the new filter.
4. Install the oil filter until the rubber seal contacts the base, and then tighten the filter an additional 1-1/6 turns by hand.
5. Start the engine and inspect for leaks around the filter seal.
6. Stop the engine and check the oil level; add oil if necessary.



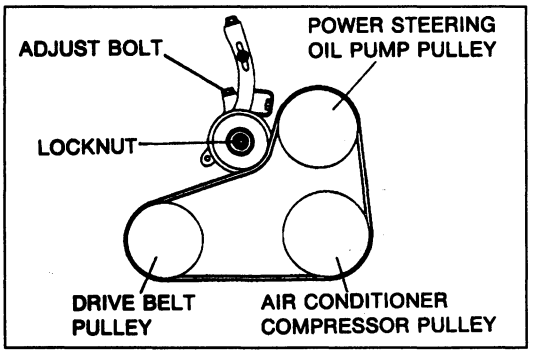
INSPECTION OF DRIVE BELTS

1. Check the belt for cracks or any other damage.
2. If necessary, adjust the drive belt tension with thumb pressure of about **98N {10 kgf, 22 lbf}**.

Alternator and air pump drive belt

1. Loosen the alternator mounting bolt and locknut.
2. Move the alternator to obtain proper belt tension.
3. Tighten the bolts and recheck the tension.

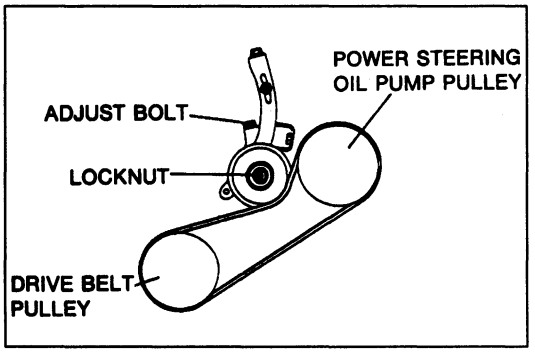
Deflection	7.0-7.5 mm {0.28-0.29 in}



Air conditioner drive belt (if equipped)

1. Loosen the lock nut on the idler pulley.
2. Turn the adjusting bolt until the correct tension is obtained.
3. Tighten the lock nut and recheck the tension.

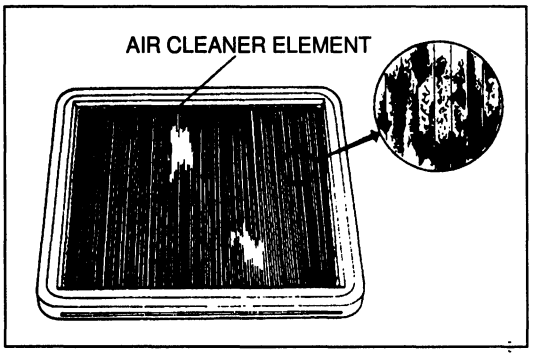
Deflection	4.5–5.0 mm {0.18–0.19 in}



Power steering oil pump drive belt

1. Loosen the lock nut on the idler pulley.
2. Turn the adjusting bolt until the correct tension is obtained.
3. Tighten the lock nut and recheck the tension.

Deflection	4.5–5.0 mm {0.18–0.19 in}



REPLACEMENT OF AIR CLEANER ELEMENT

Use only a genuine Mazda air cleaner element or one of equivalent quality.

INSPECTION OF SPARK PLUGS

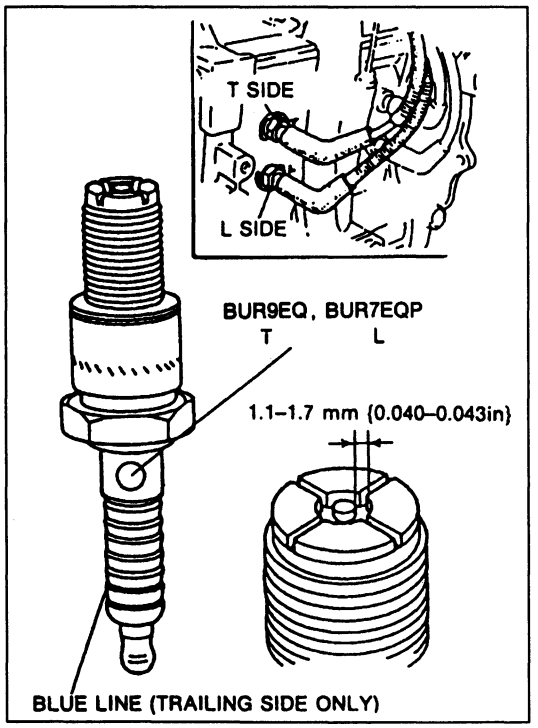
Check the following points. If a problem is found, replace the spark plug.

- Damaged insulation
- Worn electrodes
- Carbon deposits
  If cleaning is necessary, use a plug cleaner. Clean the upper insulator, also.
- Damaged gasket
- Burnt

Plug gap: 1.0–1.1 mm {0.040–0.043 in}

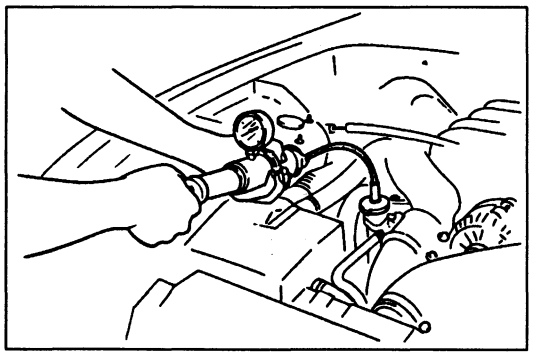
Plug position	NGK	Discrimination color
Leading side	BUR7EQP*, (BUR7EQ) (BUR6EQP) (BUR6EQ)	—
Trailing side	BUR9EQ*, (BUR9EQP) (BUR8EQP) (BUR8EQ)	Blue

* Standard plug



Caution

- **The electrode is platinum coated. The following can scratch its platinum coating and impair its performance.**
  (1) Adjusting the plug gap.
  (2) Using a wire brush to clean the electrode.
  (3) Using a plug cleaner for more than twenty (20) seconds, or at more than 588 kPa {6 kgf/cm^2 85 psi}



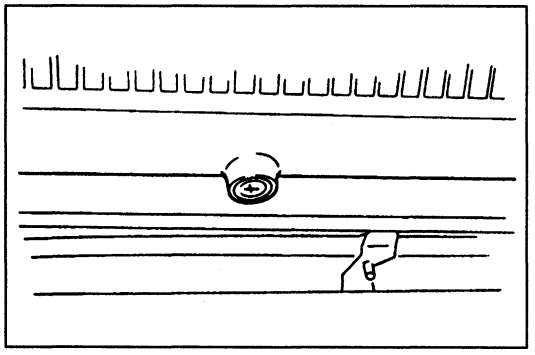
INSPECTION OF COOLING SYSTEM

1. Check the cooling system hoses (including the heater hoses) for cracks or wear.
2. Check the cooling system for leaks by applying a pressure of **142 kPa {1.45 kgf/cm^2, 20.6 psi}** with a radiator cap tester.

Note
- Do not pressurize the system to more than **142 kPa {1.45 kgf/cm^2, 20.6 psi}**.

If necessary, replace the hoses.

Warning
- **Be careful to avoid injury from escaping steam or hot water when removing the radiator cap.**



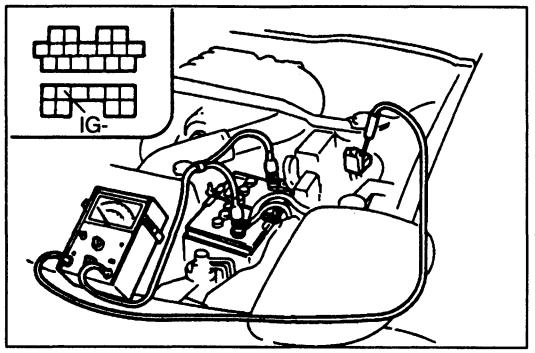
REPLACEMENT OF ENGINE COOLANT

Drain the engine coolant by removing the radiator drain plug.

Warning
- **Be careful to avoid injury when checking a hot engine.**

Fill with new coolant according to the recommended mixture ratio as follows.

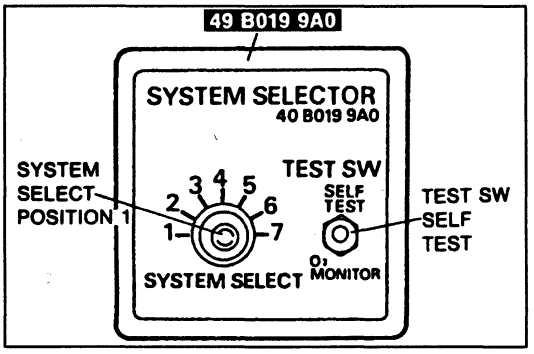
Protection	Mixture percentage (volume)	
	Anti-freeze solution	Water
Above -16°C {3°F}	35	65
Above -26°C {-15°F}	45	55
Above -40°C {-40°F}	55	45

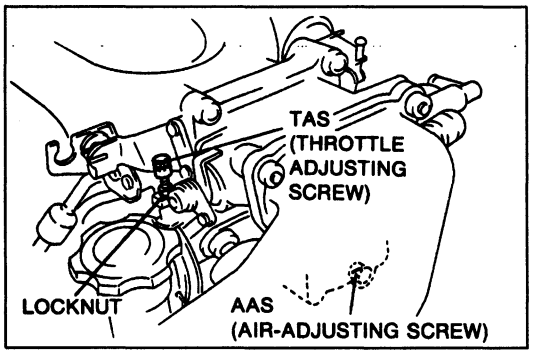


INSPECTION OF IDLE SPEED

Preparation

1. Warm up the engine to normal operating temperature.
2. Turn all electric loads OFF.
3. Connect the **SST (SYSTEM SELECTOR)** to the data link connector.
4. Connect a tachometer to the data link connector **IG-** terminal as shown.



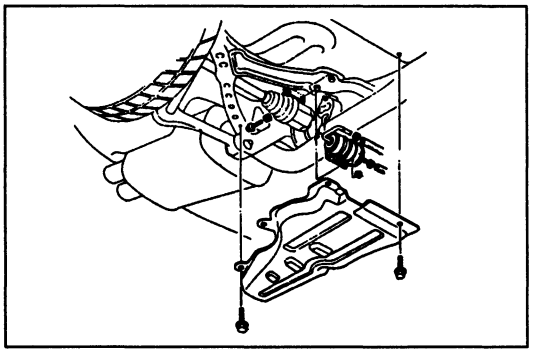


Idle Speed

1. Perform "Preparation".
2. Set SYSTEM SELECT to position 1.
3. Set TEST SW to SELF TEST.
4. With the cooling fan off, verify that the idle speed is within specification.

   Idle speed: 700–750 (720 $^{+30}_{-20}$) rpm

5. If not within the specification, adjust the idle by turning the air-adjusting screw. (AAS)
6. If not within specification when air adjusting screw fully closed, loosen the locknut and turn the throttle adjusting screw to set the idle.
7. Tighten the locknut and put a paint mark on the nut and throttle body.
8. Disconnect the **SST**.



REPLACEMENT OF FUEL FILTER

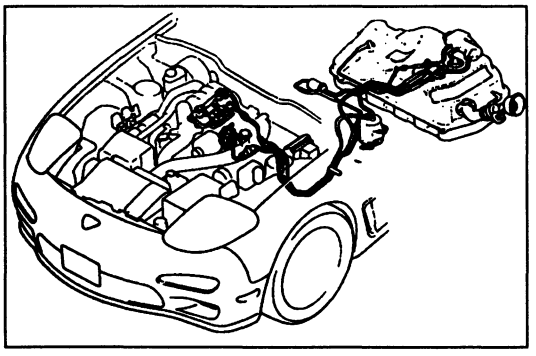
Replace the fuel filter with a new one.

Note

- Be careful of the fuel flow direction on the filter.

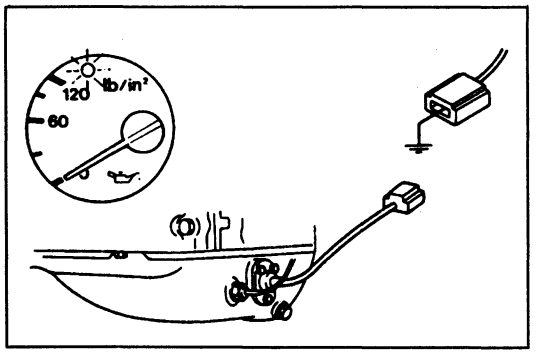
Caution

a) Cover the hoses with a rag since fuel will be splashed out when you disconnect the hoses.
b) Keep sparks and open flames away from the fuel area.



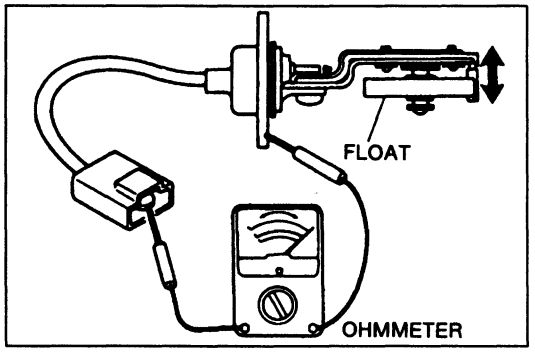
INSPECTION OF FUEL LINES

1. Check the fuel line fittings, connections and components for leaks.
2. There should be no wetness or stained areas that might indicate leaks.
3. Replace any defective hoses or clips.

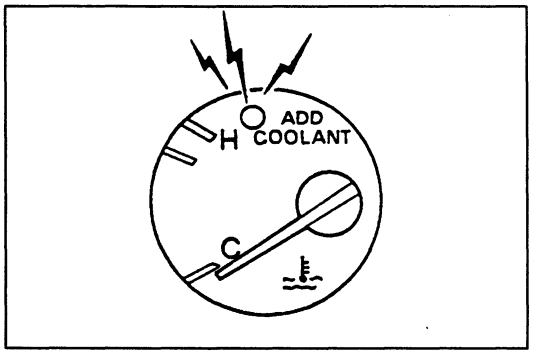


INSPECTION OF OIL-LEVEL WARNING SYSTEM

1. When you turn the ignition switch ON, the oil-level warning light comes ON.
2. Start the engine and the oil-level warning light should go OFF.
3. Disconnect the connector from the oil-level sensor and ground the terminal at idle.
   The oil-level warning light comes ON and the buzzer sounds.
4. Remove the sensor.
5. Check that the oil holes of the oil chamber are not clogged.
   If necessary, clean the oil holes with solvent.

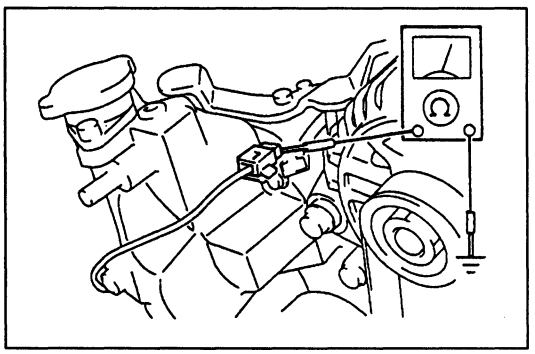


6. Connect an ohmmeter to the oil-level sensor and check the continuity by moving the float up and down. When the float is on the upper side, the ohmmeter should not show any continuity.
   When moved to the lower side, it should show a continuity of the circuit. If this is found not to be so, replace the oil-level sensor.



INSPECTION OF COOLANT LEVEL WARNING SYSTEM

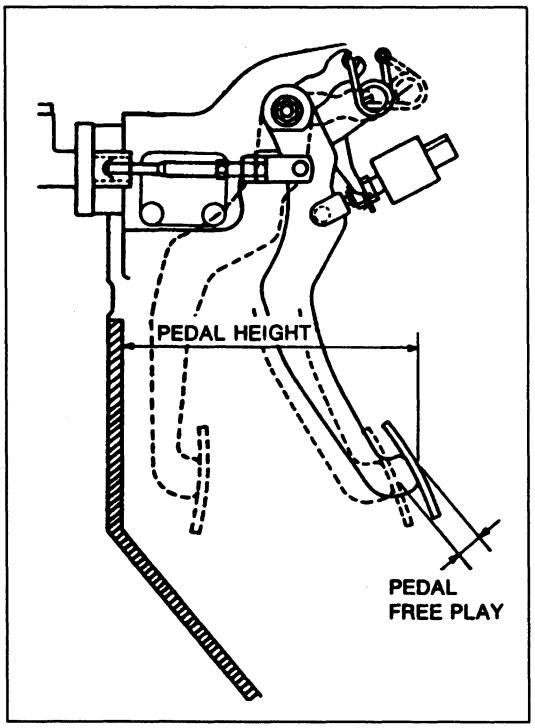
1. Turn the ignition switch ON. The coolant level warning light comes ON.
2. Start the engine and the coolant level warning light should go OFF.
3. Disconnect the connector from the coolant level sensor and make sure the coolant level warning light comes ON after 9–16 seconds and the buzzer sounds at idle.



4. Disconnect coolant level sensor connector.
5. Check continuity between the terminal of the coolant level sensor and a ground.

Coolnat level	Continuity
Below MIN	No
Above MIN	Yes

6. If not as specified, replace the coolant level sensor.



INSPECTION OF CLUTCH PEDAL

Height

Measure the distance from the upper surface of the pedal to the carpet.

Pedal height: 165.5–177.0 mm {6.516–6.968 in}
(with carpet)

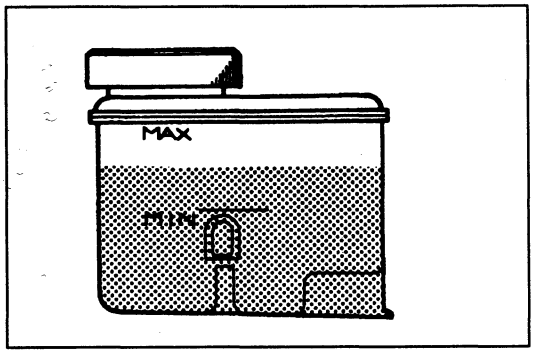
If necessary, adjust the pedal height.

Free Play

Depress the clutch pedal by hand until clutch resistance is felt.

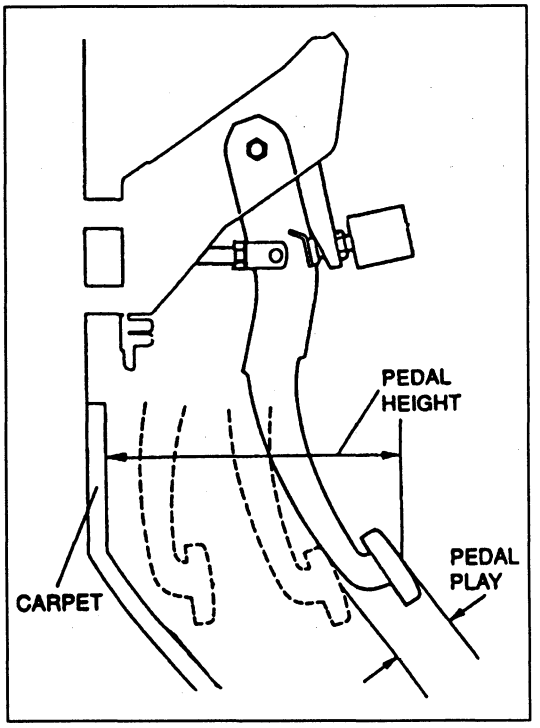
Free play: 0.6–3.2 mm {0.02–0.13 in}
Total Free play: 5.1–14 mm {0.20–0.55 in}

If necessary, adjust the pedal free play.



INSPECTION OF CLUTCH FLUID

1. Make sure that fluid level in the reservoir is between the MAX and MIN mark.
2. If the fluid level is extremely low, check the clutch and brake systems for leakage.



INSPECTION OF BRAKE PEDAL

Pedal Height Inspection

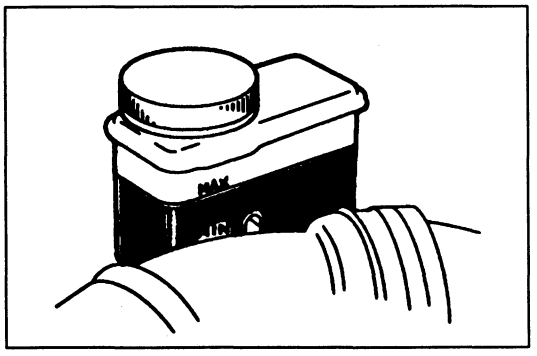
Check if the distance from the center of the upper surface of the pedal pad to the carpet is as specified.

Pedal height: 164.5–176.0 mm {6.48–6.92 in} (with carpet)

Pedal Play Inspection

1. Depress the pedal a few times to eliminate the vacuum in the system.
2. Lightly depress the pedal by hand until resistance is felt and check the free play.

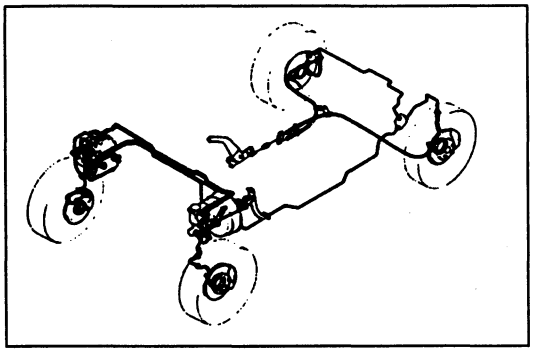
Free play: 3–8 mm {0.12–0.31 in}



INSPECTION OF BRAKE FLUID

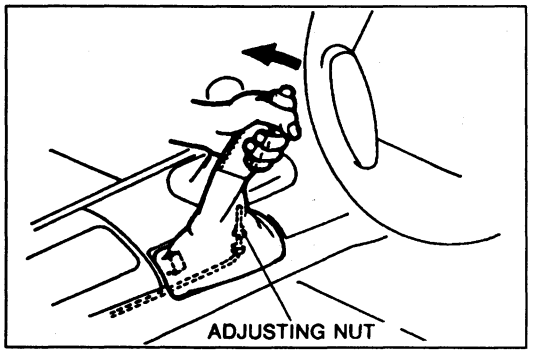
Check that the brake fluid level is near the "MAX" level line on the see-through reservoir. If necessary, add brake fluid to bring the level to the "MAX" level line.

Fluid specification:
FMVSS 116 DOT-3



INSPECTION OF BRAKE LINE, HOSES AND CONNECTIONS

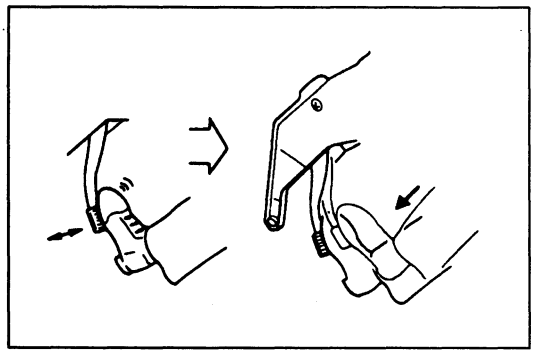
Check the brake lines and hoses for proper attachment and connections. There should not be any leaks, cracks, chafing, abrasion, deterioration, etc. on lines and connections.



INSPECTION OF PARKING BRAKE

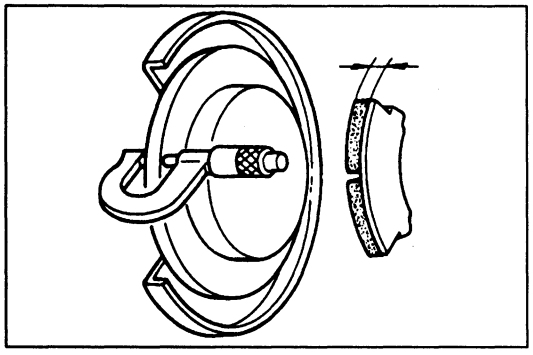
1. Pull the brake lever with 200 N {20 kgf, 44 lbf} of force and measure the lever stroke.
2. If necessary, adjust the lever stroke by turning the adjusting nut.

Lever notices: 7–10



INSPECTION OF POWER BRAKE UNIT AND HOSES

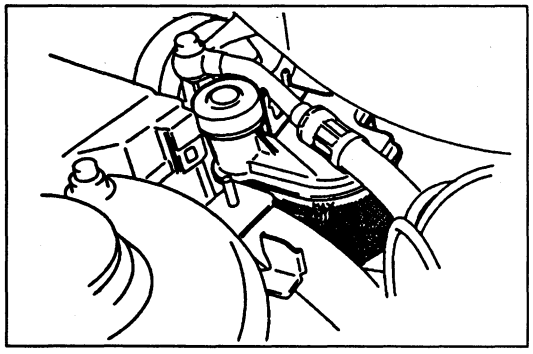
1. Check the vacuum hoses, connectors, and check the valve for cracks, chafing, deterioration, etc.
2. Check the power brake for proper operation. To check, depress the brake pedal several times to make sure the pedal play does not change. Then, while depressing the brake pedal, start the engine. At this time, the pedal should go down a little.



INSPECTION OF DISC BRAKES

Check the following conditions of disc brake components.

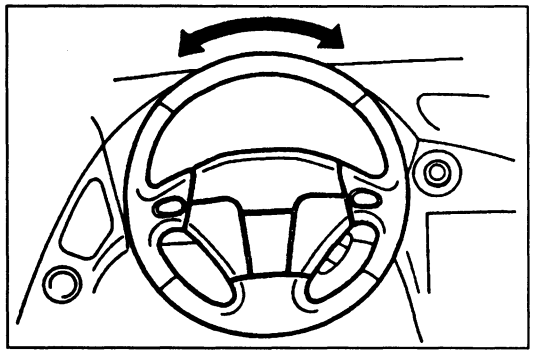
1. Check caliper operation and inspect for leaks.
2. Check pads for wear.
3. Check condition and thickness of disc plate.



INSPECTION OF POWER STEERING FLUID LEVEL

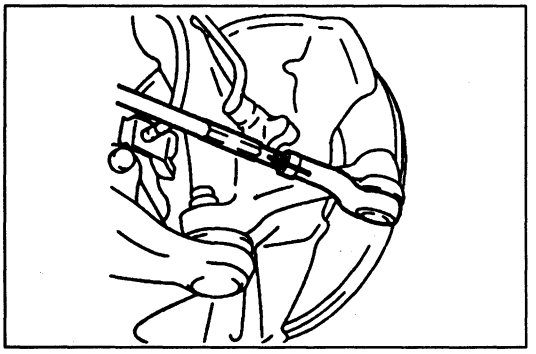
Check the power steering fluid level. Add specified power steering fluid to MAX if necessary.

Fluid specification: ATF Dexron®II or M-III



INSPECTION OF STEERING OPERATION AND LINKAGE

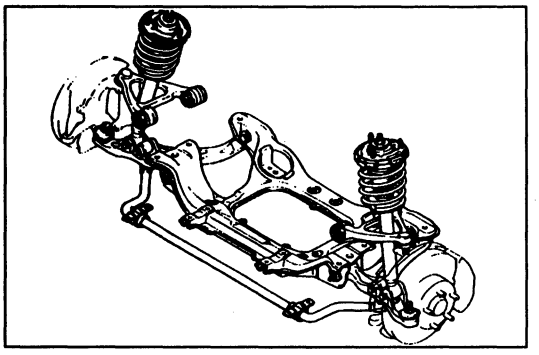
1. Check the steering wheel free play. (Refer to page N–6.)
   Free play: 0–30 mm {0–1.18 in}
2. Check the steering for proper operation and for looseness of the steering housing.
3. Check the steering gear housing for fluid leakage or see page.
4. Check for excessive play on the tie rod ends and rack guide.
5. Check for damage of the dust boots.
6. Check for looseness or grease leakage of the tie rod ends.



INSPECTION OF STEERING LINKAGES, RACK GUIDE AND TIE ROD ENDS

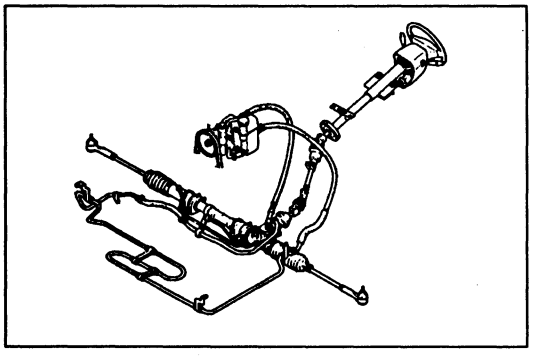
Check the steering linkage for looseness and damage. Check that there is:

1. No excessive play on tie rod ends and rack guide.
2. No looseness or grease leakage on tie rod ends.



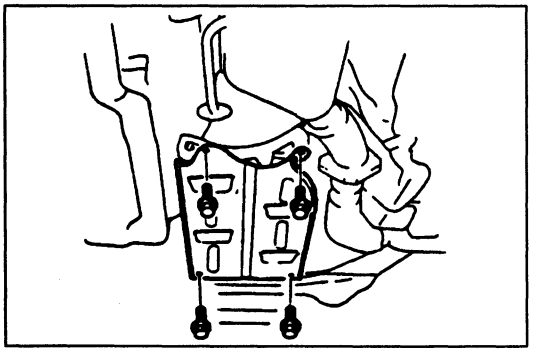
INSPECTION OF SUSPENSION BALL JOINTS

Check the ball joints for damage, looseness and grease leakage.



INSPECTION OF RACK SEAL BOOTS

Check the boot for cracking or other damage.
If a problem is found, replace the boot.



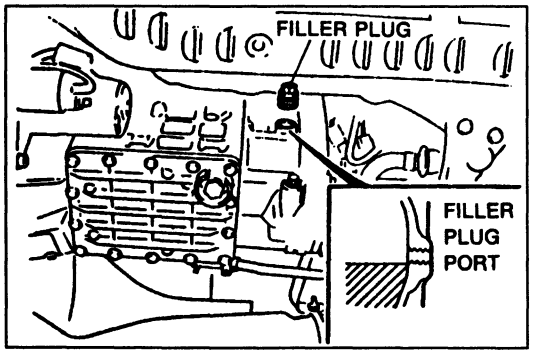
INSPECTION OF MANUAL TRANSMISSION OIL

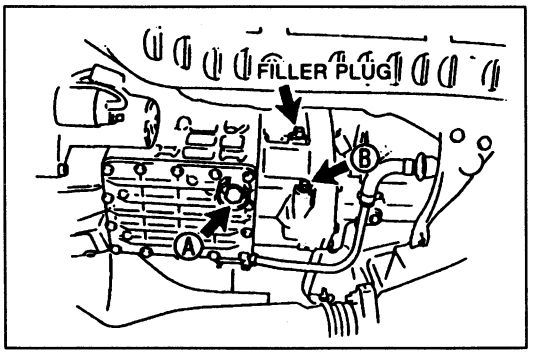
1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Remove the transmission cover.
3. Remove the filler plug.
4. Verify that the oil is up to the bottom of the check plug hole.
5. If the oil level is low, add the specified oil through the filler plug port.
6. Install a new filler plug.

Tightening torque:
25–39 N·m {2.5–4.0 kgf·m, 19–28 ft·lbf}

7. Install the transmission cover.

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

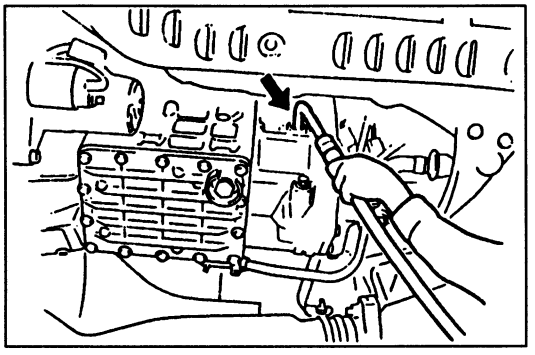




REPLACEMENT OF MANUAL TRANSMISSION OIL

1. Remove the transmission cover.
2. Remove plug A (with washer) and B, and drain the oil into a suitable container.
3. Wipe all plug clean.
4. Apply sealant to the B plug threads.
5. Install new plugs A (with new washer) and B.

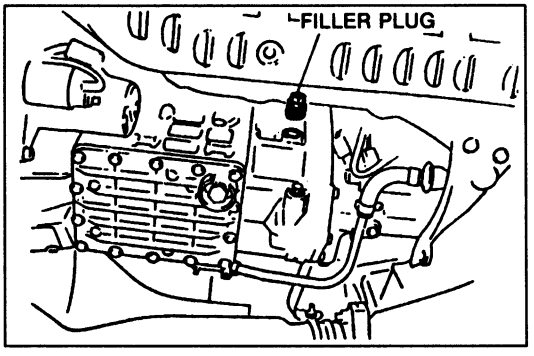
Tightening torque:
A: 40–58 N·m {4.0–6.0 kgf·m, 29–43 ft·lbf}
B: 21–31 N·m {2.1–3.2 kgf·m, 16–23 ft·lbf}



6. Remove filler plug and add the specified oil through the filler plug port until the level rises to the bottom of the port.

Specified oil:
Grade: API service GL-4 or GL-5
All-season: SAE 75W-90
Above 10°C {50°F}: SAE 80W-90

Capacity: 2.5 L {2.6 US qt, 2.2 Imp qt}

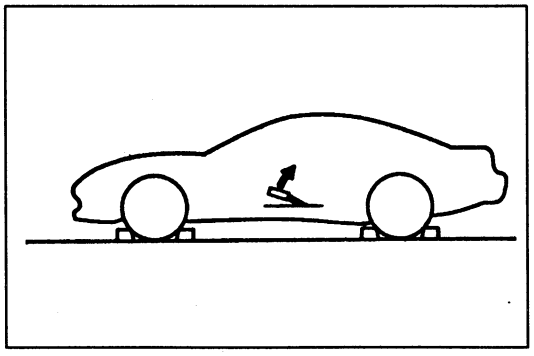


7. Install a new filler plug.

Tightening torque:
25–39 N·m {2.5–4.0 kgf·m, 19–28 ft·lbf}

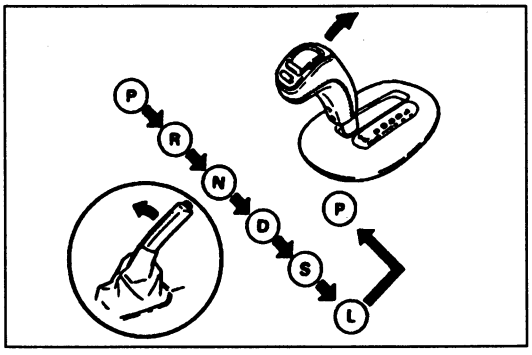
8. Install the transmission cover.

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

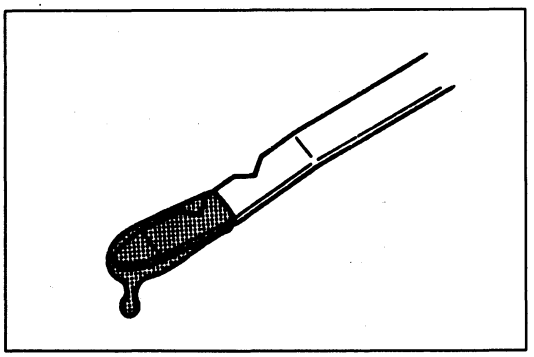


INSPECTION OF AUTOMATIC TRANSMISSION FLUID LEVEL (Except CANADA)

1. Park the vehicle on level ground.
2. Apply the parking brake and securely position wheel chocks to prevent the vehicle from rolling.
3. Warm up the engine until the ATF temperature reaches **60–70°C {140–158°F}**.

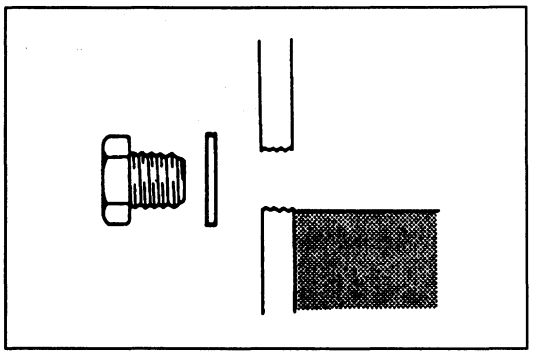


4. While depressing the brake pedal, shift the selector lever to each range (P–L). Leave it a few seconds in each range.
5. Shift back to P range.



6. Ensure that the ATF level is between the notches of the ATF dipstick. Add ATF to the specified level, if necessary.

ATF Type: Dexron®II or M-III
Capacity: 8.6 L {9.1 US qt, 7.6 Imp qt}

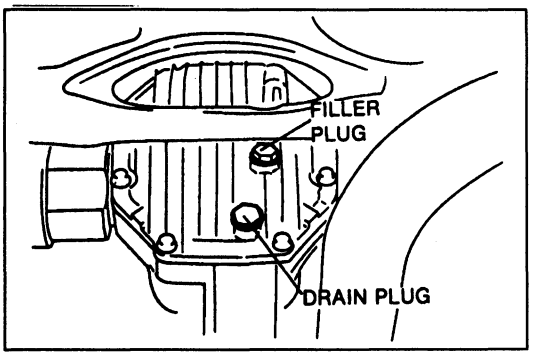


INSPECTION OF DIFFERENTIAL OIL

Note
- Park the vehicle on level ground.

1. Remove the filler plug.
2. Verify that the oil is at the bottom of the filler plug hole. If it is low, add the specified oil.
3. Install a new washer and the filler plug.

Tightening torque:
39–53 N·m {4.0–5.5 kgf·m, 29–39 ft·lbf}



REPLACEMENT OF DIFFERENTIAL OIL
1. Remove the filler and drain plugs.
2. Drain the differential oil into a suitable container.
3. Wipe the plugs clean.
4. Install a new washer and the drain plug.

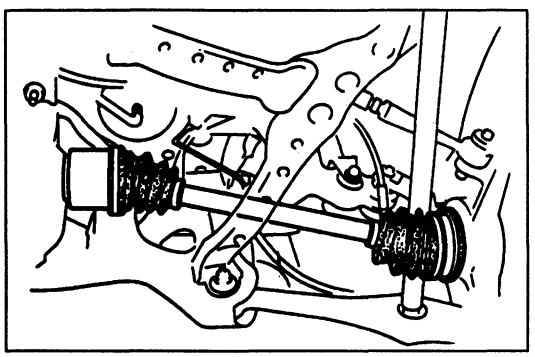
Tightening torque:
39–53 N·m {4.0–5.5 kgf·m, 29–39 ft·lbf}

5. Add the specified oil from the filler plug hole until it reaches the bottom of the hole.

Specified oil
Type
Above –18°C {0°F}:API GL-4 or 5, SAE 90
Below –18°C {0°F}:API GL-4 or 5, SAE 80
Capacity: 1.30 L {1.38 US qt, 1.14 Imp qt}

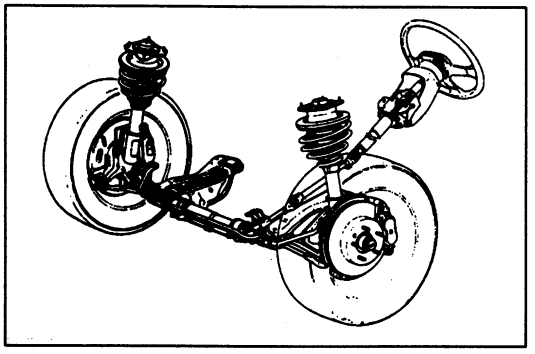
6. Install a new washer and the filler plug.

Tightening torque:
39–53 N·m {4.0–5.5 kgf·m, 29–39 ft·lbf}



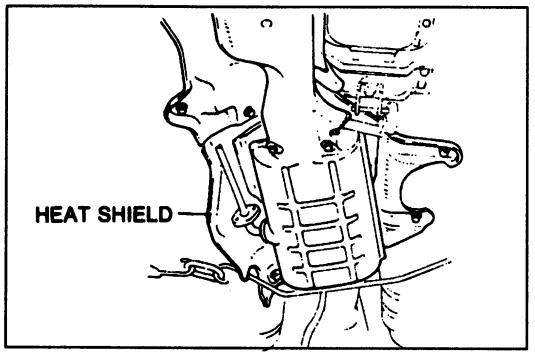
On vehicles equipped with limited-slip differential, API GL-5, SAE 90 special lubricant is required for limited-slip differentials.

INSPECTION OF DRIVE SHAFT DUST BOOTS
Check the dust boot on the drive shaft for cracks, damage, grease leakage, and a loose boot band.



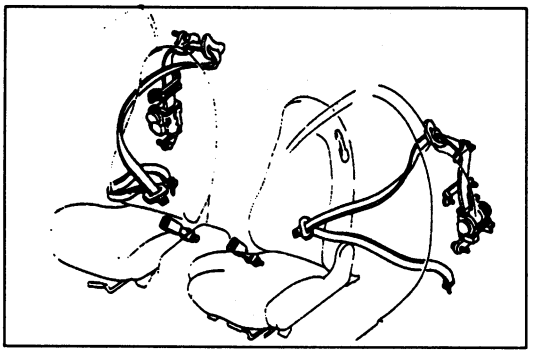
TIGHTENING BOLTS AND NUTS ON CHASSIS AND BODY

1. Tighten all seat mounting bolts.
2. Retighten all loose nuts and bolts of front and rear suspensions to the specified torque. (Refer to Section R)



INSPECTION OF EXHAUST SYSTEM HEAT SHIELDS

1. Check the clearance between insulator and body, and also between the insulator and the exhaust system.
2. Visually inspect the pipes, hangers and connections for severe corrosion, leaks or damage.



INSPECTION OF SEAT BELTS, BUCKLES, RETRACTORS AND ANCHORS

1. Pull each seat belt to be sure it moves smoothly.
2. Check for scratches, tears, or wear of the webbing, and for bent metal fittings.

Caution

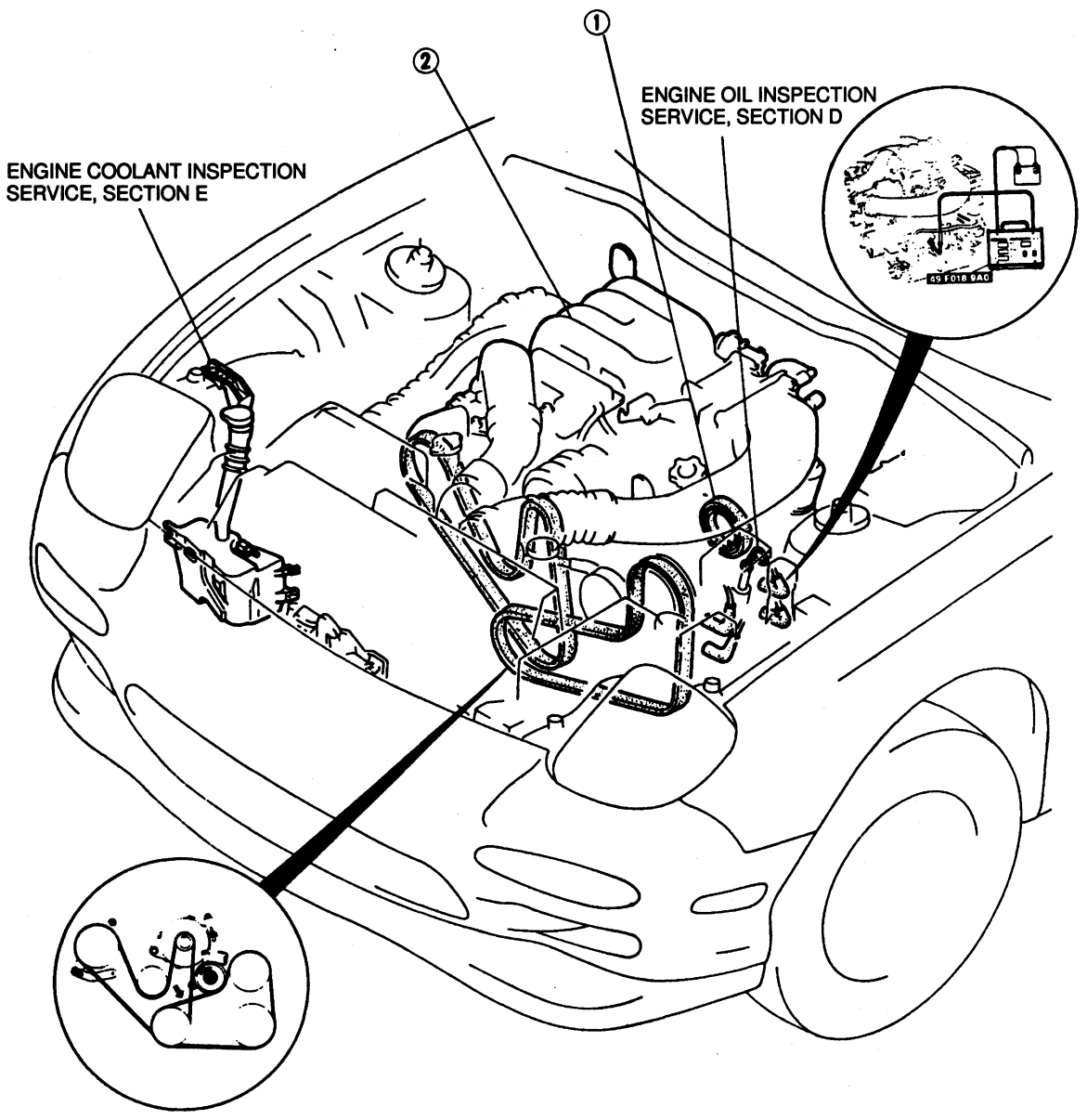
- **Do not disassemble the buckle or ELR assembly.**

3. Check operation of retractors.
4. Check tightness of belt anchor bolts.

Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

ENGINE

INDEX



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

DRIVE BELT	NEW	USED	LIMIT
ALTERNATOR	6.0-7.0 {0.24-0.27}	7.0-7.5 {0.28-0.29}	9.0 {0.35}
P/S·A/C	3.5-4.0 {0.14-0.15}	4.5-5.0 {0.18-0.19}	6.0 {0.24}

OUTLINE

SPECIFICATIONS

Item \ Engine				13B Turbo
Engine type				Rotary
Displacement ml {cc, cu in}				654 {654, 40.0} × 2
Number of Cylinders and arrangement				2 rotors, longitudinal
Combustion chamber type				Bathtub
Compression ratio				9.0 : 1
Air induction				4-port induction
Port timing	Intake	Open	Primary	45° BTDC
			Secondary	32° BTDC
		Close	Primary	50° ABDC
			Secondary	50° ABDC
	Exhaust	Open		75° BBDC
		Close		48° ATDC
Fuel supply system				CIS
Ignition timing*			Trailing	20° ATDC (–20° BTDC)
			Leading	5° ATDC (–5° BTDC)
Idle speed* rpm				700 – 750

* TEN terminal of data link connector is grounded.

TROUBLESHOOTING GUIDE

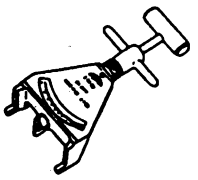
Problem	Possible cause	Action	Page
Difficult starting	**Insufficient compression**		
	Deformation or abnormal wear of side housing	Replace	C–51
	Deformation or abnormal wear of rotor housing	Replace	C–54
	Wear of rotor grooves	Replace	C–57, 58
	Deformation of or loose rotor seals	Replace	C–57, 58
	Worn or weak rotor seal springs	Replace	—
	Malfunction of metering oil pump		Section D
	Malfunction of electrical system		Section F
	Malfunction of electrical system		Section G
Poor idling	**Insufficient compression**		
	Deformation or abnormal wear of side housing	Replace	C–51
	Deformation or abnormal wear of rotor housing	Replace	C–54
	Wear of rotor grooves	Replace	C–57, 58
	Deformation or loose rotor seals	Replace	C–57, 58
	Worn or weak rotor seal springs	Replace	—
	Malfunction of fuel system		Section F
	Malfunction of ignition system		Section G

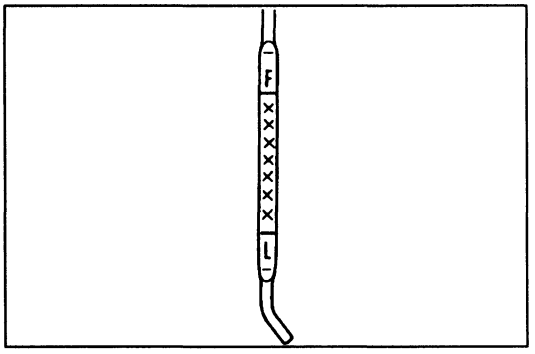
TROUBLESHOOTING GUIDE

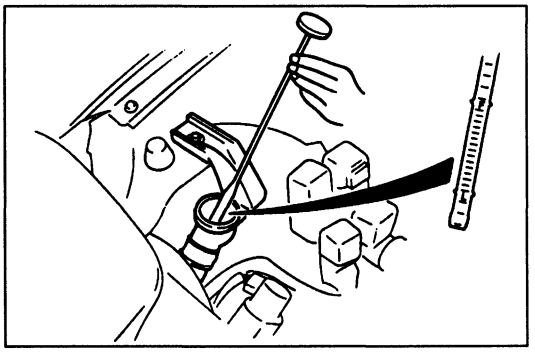
Problem	Possible cause	Action	Page
Insufficient power	**Insufficient compression**		
	Deformation or abnormal wear of side housing	Replace	C-51
	Deformation or abnormal wear of rotor housing	Replace	C-54
	Wear of rotor grooves	Replace	C-57, 58
	Deformation or loose rotor seals	Replace	C-57, 58
	Worn or weak rotor seal springs		
	Malfunction of fuel system		Section F
	Malfunction of ignition system		Section G
Abnormal combustion	**Malfunction of combustion chamber**		
	Carbon accumulation	Remove and clean	C-49
	Malfunction of fuel system		Section F
	Malfunction of ignition system		Section G
Excessive oil consumption	**Leakage into combustion chamber**		
	Deformation or abnormal wear of side housing	Replace	C-51
	Malfunction of rotor (blow holes)	Replace	C-54
	Scratched or burred rotor land	Replace	C-54
	Malfunction of oil seal (incorrect angle)	Replace	C-56
	Leakage into coolant passages		
	Deformed rotor housing	Replace	C-54
	Malfunction of sealing rubber	Replace	—
	Leakage to outside of engine		Section D
	Malfunction of lubrication system		Section D
Engine noise	**Rotor seal noise**		
	Malfunction of rotor seals	Replace	C-56, 57
	Malfunction of housing	Replace	C-51, 54
	Malfunction of seal spring	Replace	C-56, 57
	Malfunction of metering oil pump		Section D
	Knocking noise		
	Accumulation of carbon	Remove and clean	C-49
	Hitting noise		
	Malfunction of main hearing or rotor hearing	Replace	C-53, 56
	Excessive end play	Adjust	C-74
	Foreign matter in internal gear or stationary gear or malfunction of gear	Replace	C-53
	Other		
	Malfunction of water pump bearing		Section E
	Loose drive belt	Adjust	C-5
	Malfunction of alternator bearing		Section G
	Exhaust gas leakage		Section F
	Malfunction of fuel system		Section F

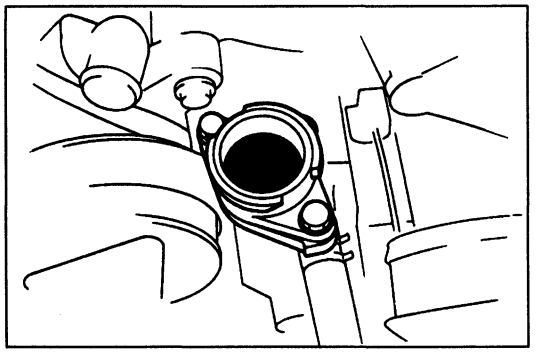
ENGINE TUNE-UP PROCEDURE

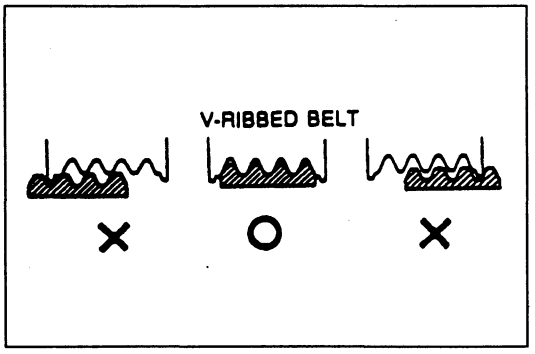
PREPARATION
SST

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









ENGINE OIL

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.**

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 1.7L {1.8 US qt, 1.5 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 near the filler port neck.
2. Remove the coolant level dipstick from the coolant reservoir and verify that the coolant level is between the F and L marks. Add coolant if necessary.

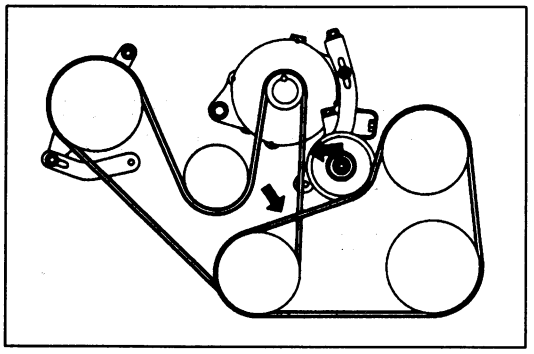
Coolant quality

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.
3. 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.

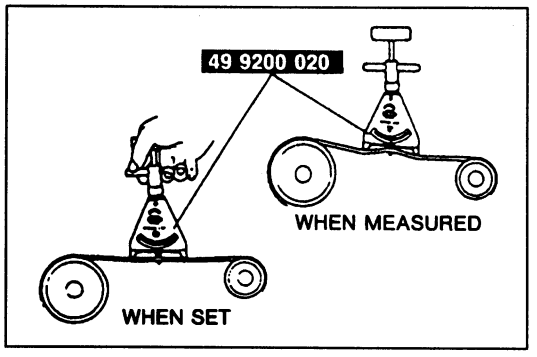
Deflection

mm {in}

Drive belt	New*	Used	Limit
Alternator	6.0–7.0 {0.24–0.27}	7.0–7.5 {0.28–0.29}	9.0 {0.35}
P/S·A/C	3.5–4.0 {0.14–0.15}	4.5–5.0 {0.18–0.19}	6.0 {0.24}

* 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

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

1. Using the **SST**, check the belt tension.

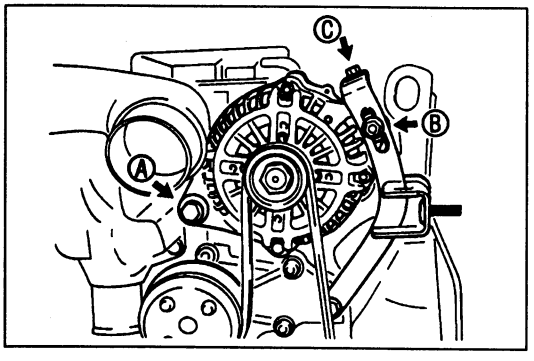
Tension

N{kgf·lbf}

Drive belt	New*	Used	Limit
Alternator	690–780 {70–80, 160–170}	590–680 {60–70, 140–150}	320 {33, 73}
P/S·A/C	740–880 {75–90, 170–190}	540–630 {55–65, 130–140}	320 {33, 73}

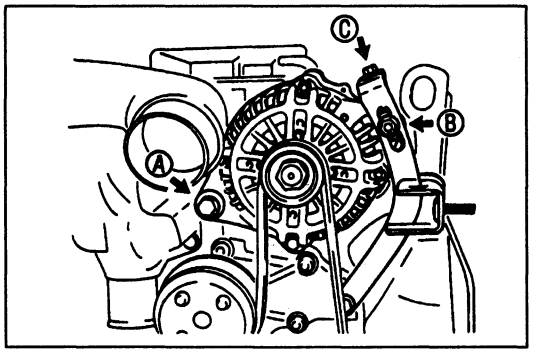
* A belt that has been on a running engine for less than five minutes.

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



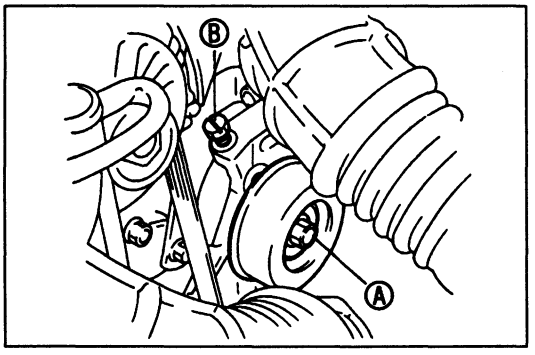
Adjustment
Alternator
1. Loosen bolt Ⓐ and nut Ⓑ.
2. Adjust the belt deflection by turning adjusting bolt Ⓒ.

Deflection
New:6.0–7.0 mm {0.24–0.27 in}
Used:7.0–7.5 mm {0.28–0.29 in}
Limit:9.0 mm {0.35 in}



3. Tighten bolt Ⓐ and nut Ⓑ.

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

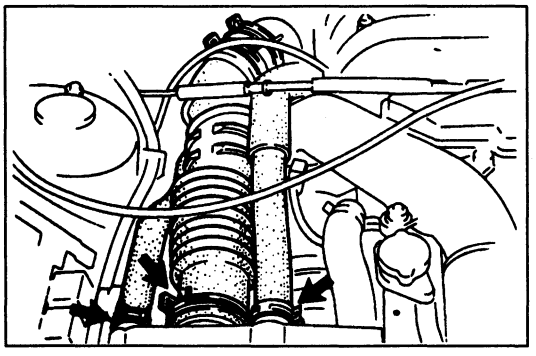


P/S, A/C
1. Loosen idler pulley locknut Ⓐ.
2. Adjust the belt deflection by turning adjusting bolt Ⓑ.

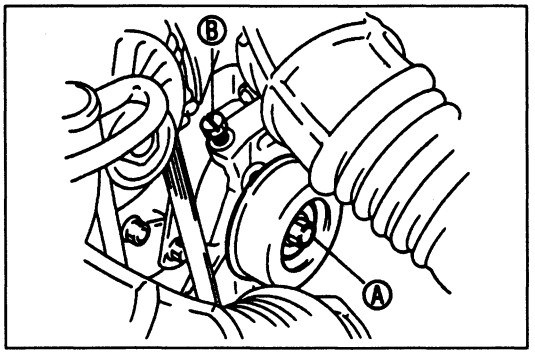
Deflection
New: 3.5–4.0 mm {0.14–0.15 in}
Used: 4.5–5.0 mm {0.18–0.19 in}
Limit: 6.0 mm {0.24 in}

3. Tighten nut Ⓐ.

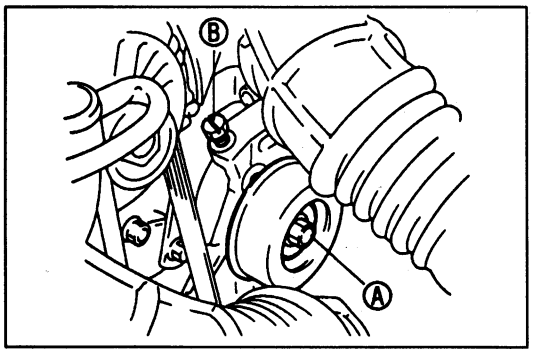
Tightening torque:
37–53 N·m {3.7–5.5 kgf·m, 27–39 ft·lbf}



Replacement
P/S, A/C
1. Disconnect the air hoses shown in the figure.



2. Loosen idler pulley locknut Ⓐ.
3. Loosen adjusting bolt Ⓑ.
4. Remove the belt.



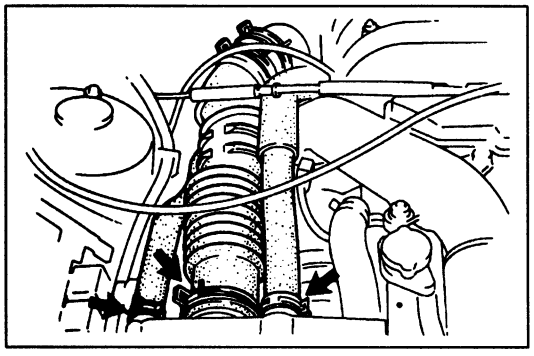
5. Install the new belt on the pulleys.
6. Adjust the belt deflection by turning adjusting bolt Ⓑ.

Deflection
3.5–4.0mm {0.14–0.15 in}

7. Tighten idler pully locknut Ⓐ.

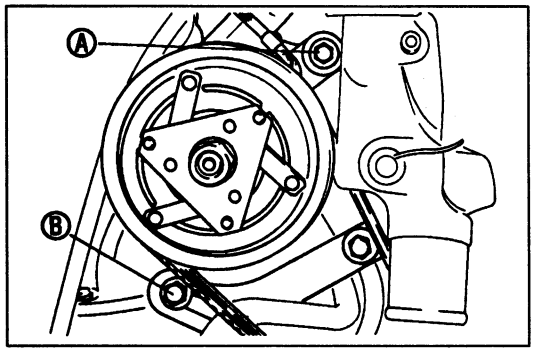
Tightening torque:
37–53 N·m {3.7–5.5 kgf·m, 27–39 ft·lbf}

8. Connect the air hoses.

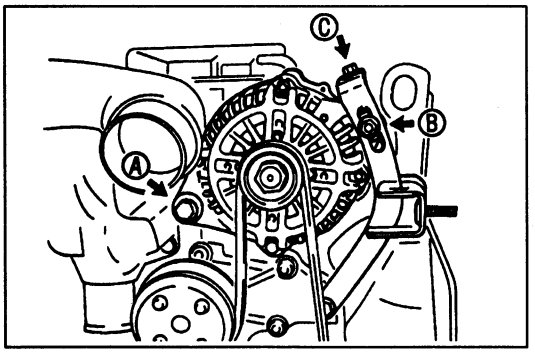


Alternator

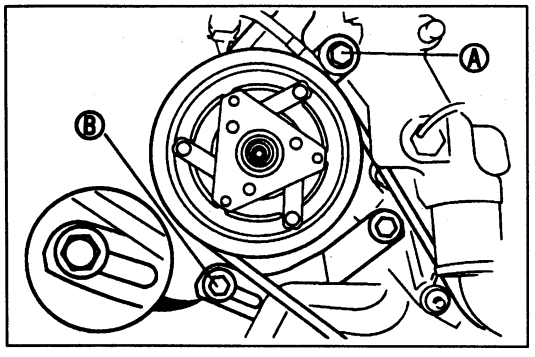
1. Disconnect the air hoses shown in the figure.



2. Loosen air pump mount bolts Ⓐ and Ⓑ.

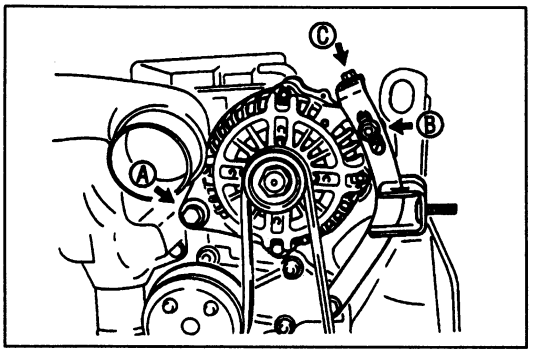


3. Loosen alternator mount bolt Ⓐ and locknut Ⓑ.
4. Loosen adjusting bolt Ⓒ.
5. Remove the drive belt.



6. Install the new drive belt on the pulleys.
7. Tighten the air pump mount bolts Ⓐ and Ⓑ while applying the pressure to the drive belt.

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



8. Adjust the belt deflection by turning adjusting bolt Ⓒ.

   Deflection
   6.0–7.0 mm {0.24–0.27 In}

9. Tighten alternator mount bolt Ⓐ and locknut Ⓑ.

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

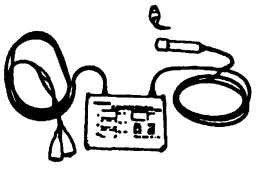
10. Connect the air hoses.

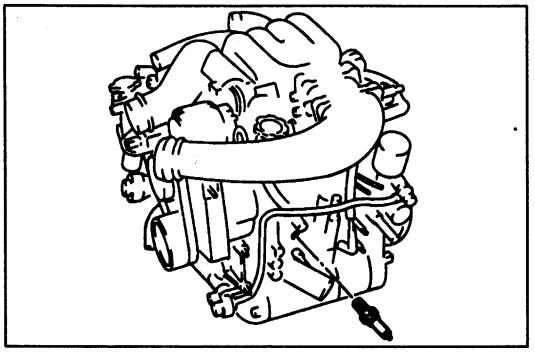
C

COMPRESSION

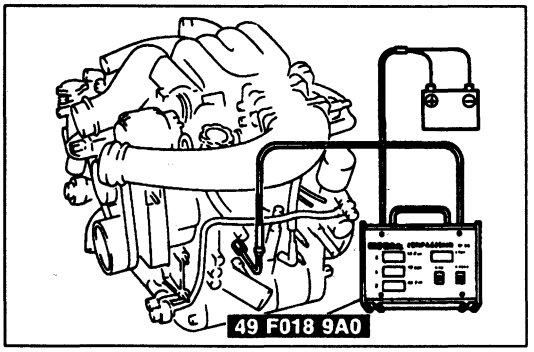
If the engine exhibits low power, poor fuel economy, or poor idle, check the following:
1. Ignition system (Refer to Section G.)
2. Compression
3. Fuel system (Refer to Section F.)

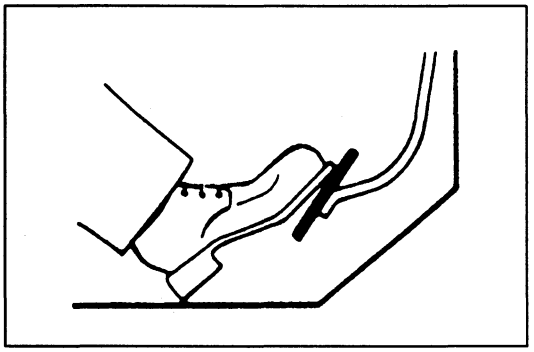
PREPARATION
SST

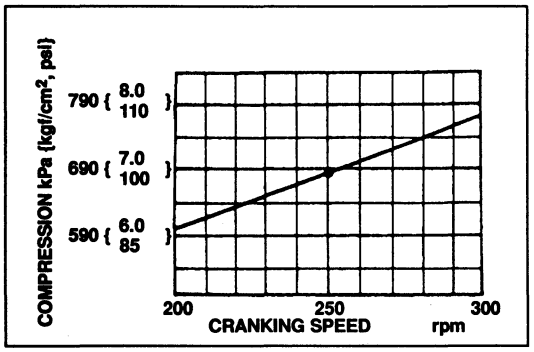
49 F018 9A0 Tester, compression		For Inspection of compression

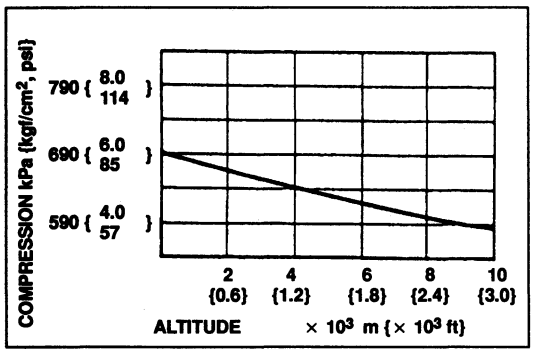


1. Check that the battery is fully charged. Recharge it if necessary.
2. Warm up the engine to the normal operating temperature, then stop it.
3. Allow about 10 minutes for the exhaust manifold to cool.
4. Remove the front and rear trailing-side spark plugs.
5. Disconnect the circuitopening relay and the igniter connector.









6. Connect the **SST** to the front rotor housing and the battery.
7. Fully depress the accelerator pedal and crank the engine for 5 to 10 seconds.
8. Record the compression of the three combustion chambers and cranking speed.

Compression:
690 kPa {7.0 kgf/cm², 100 psi}–250 rpm
Differential limit of chambers:
150 kPa {1.5 kgf/cm², 21 psi}–250 rpm

1) If pressure is below 290 kPa {3.0 kgf/cm², 43 psi} at one or two chambers of a rotor, the tester indicates one correct measurement and two 00.0 readings.
2) If pressure is below 290 kPa {3.0 kgf/cm², 43 psi} at three chambers, the tester indicates three 00.0 readings.
3) In the above cases, the cranking speed readings are all 00.0.

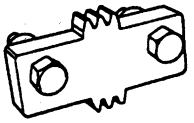
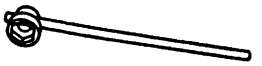
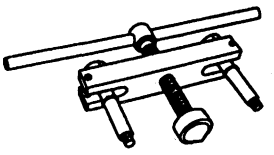
9. Check the rear chambers by using the same procedure.
10. Compensate the compression values if they are measured at cranking speeds other than standard or if they are measured at high altitude.

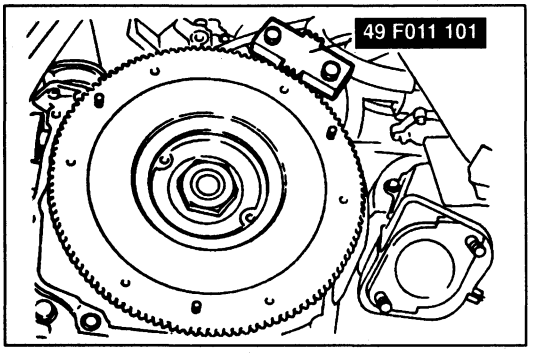
Cranking speed compensation
Compensate the compression according to the cranking speed.

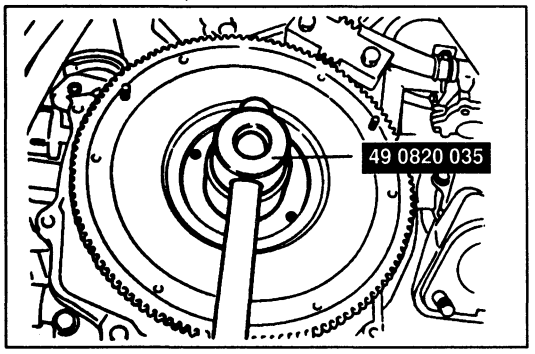
Altitude compensation
Compensate the compression according to the altitude.

ON-VEHICLE MAINTENANCE

REAR OIL SEAL
PREPARATION
SST

49 F011 101 Brake, ring gear 	For prevention of eccentric shaft rotation	49 0820 035 Box wrench, flywheel 	For removal of flywheel locknut
49 1881 055A Stopper, counterweight 	For prevention of eccentric shaft rotation	49 0839 305A Puller, counterweight 	For removal of counterweight
49 0813 225 Remover, oil seal 	For Removal of oil seal		





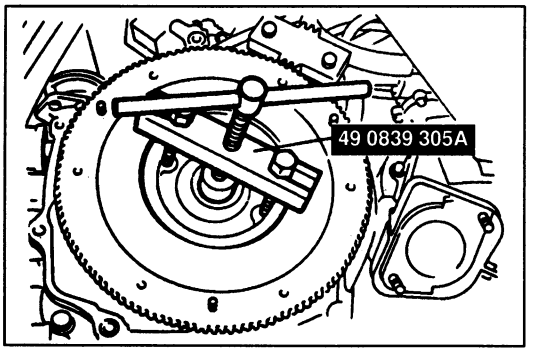
Removal Note

1. Disconnect the negative battery cable.
2. Drain the engine oil.
3. Remove the manual transmission. (Refer to Section J.)
   Remove the automatic transmission. (Refer to Section K.)

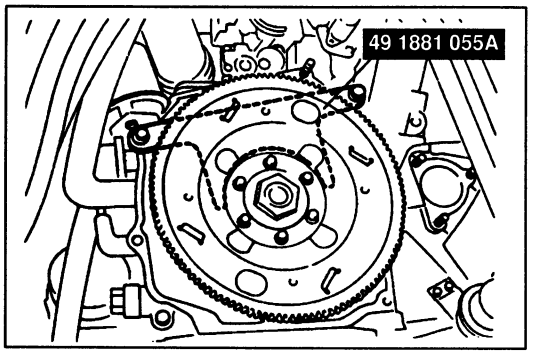
(MT)
   (1) Remove the clutch cover and clutch disc. (Refer to Section H.)
   (2) Install the **SST** against the flywheel.

Caution
- **Place a rag between the SST and the vacuum pipes to protect the pipes.**

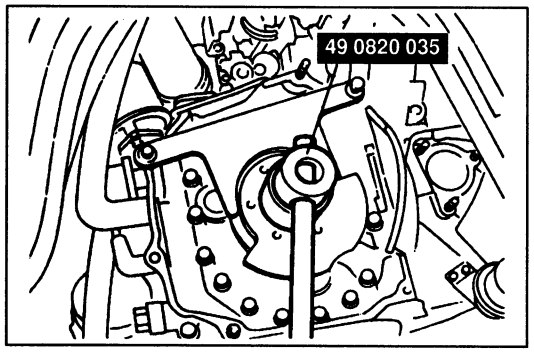
   (3) Remove the lock nut by using the **SST**.



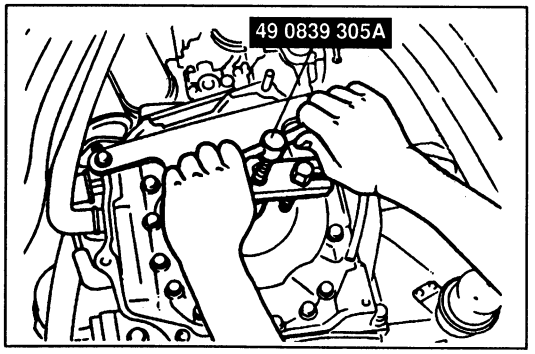
(4) Remove the flywheel by using the **SST**.
(5) Remove the key.



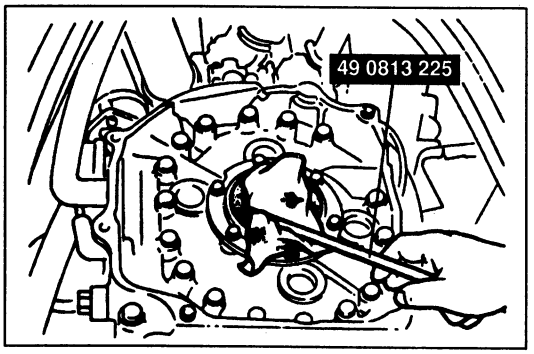
(AT)
(1) Install the **SST** against the counterweight.



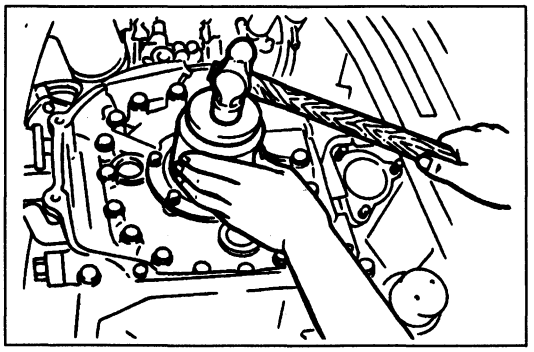
(2) Remove the back plate and drive plate.
(3) Remove the lock nut by using the **SST**.



(4) Remove the counterweight by using the **SST**.

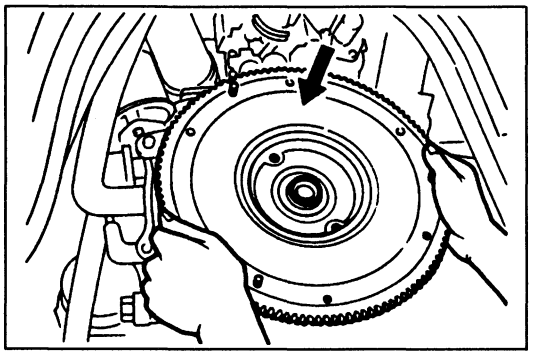


(MT and AT)
4. Remove the oil seal by using the **SST**.

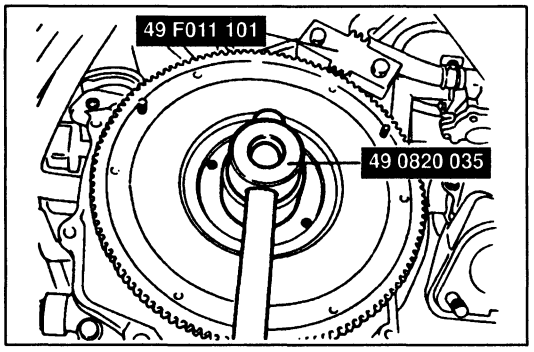


Installation Note
Rear oil seal
1. Apply engine oil to the seal lip.
2. Fit the oil seal onto the stationary gear.
3. Using a pipe and hammer, tap the oil seal in evenly until it is flush with the edge of the rear cover.

Oil seal outer diameter: 95.0 mm {3.74 in}



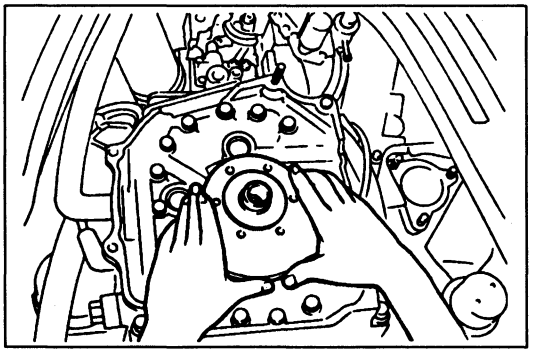
Flywheel (MT)
1. Fit the key to the eccentric shaft.
2. Install the flywheel to the eccentric shaft.
3. Apply thread-locking compound to the eccentric shaft threads.
4. Apply sealant to the contact surface of the locknut.



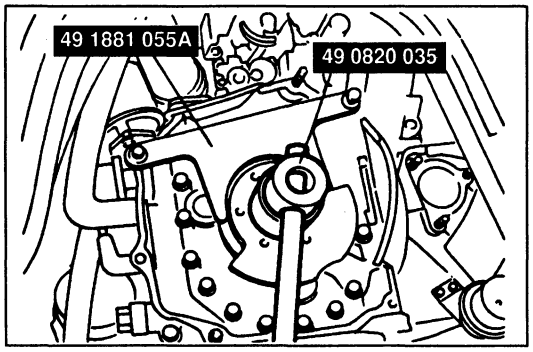
5. Install the lock nut and tighten it with the **SST**.

Tightening torque:
400–490 N·m {40–50 kgf·m, 290–360 ft·lbf}

Caution
- **Place a rag between the SST and the vacuum pipes to protect pipes.**

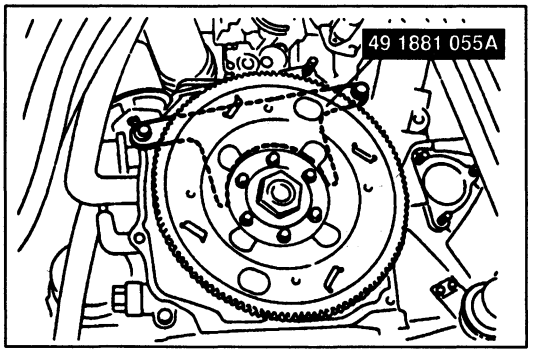


Drive plate (AT)
1. Fit the key to the eccentric shaft.
2. Install the counterweight to the eccentric shaft.
3. Apply thread-locking compound to the eccentric shaft threads.
4. Apply sealant to the contact surface of the lock nut.



5. Install the locknut and tighten it with the **SST**.

Tightening torque:
400–490 N·m {40–50 kgf·m, 290–360 ft·lbf}



6. Install the drive plate and the back plate.

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

Steps After Installation
1. Add engine oil to the specified level.
2. Connect the negative battery cable.
3. Start the engine and do the following:
   (1) Check for leakage of engine oil.
   (2) Perform engine adjustments as necessary.
   (3) Recheck the oil level.

REMOVAL

PREPARATION
SST

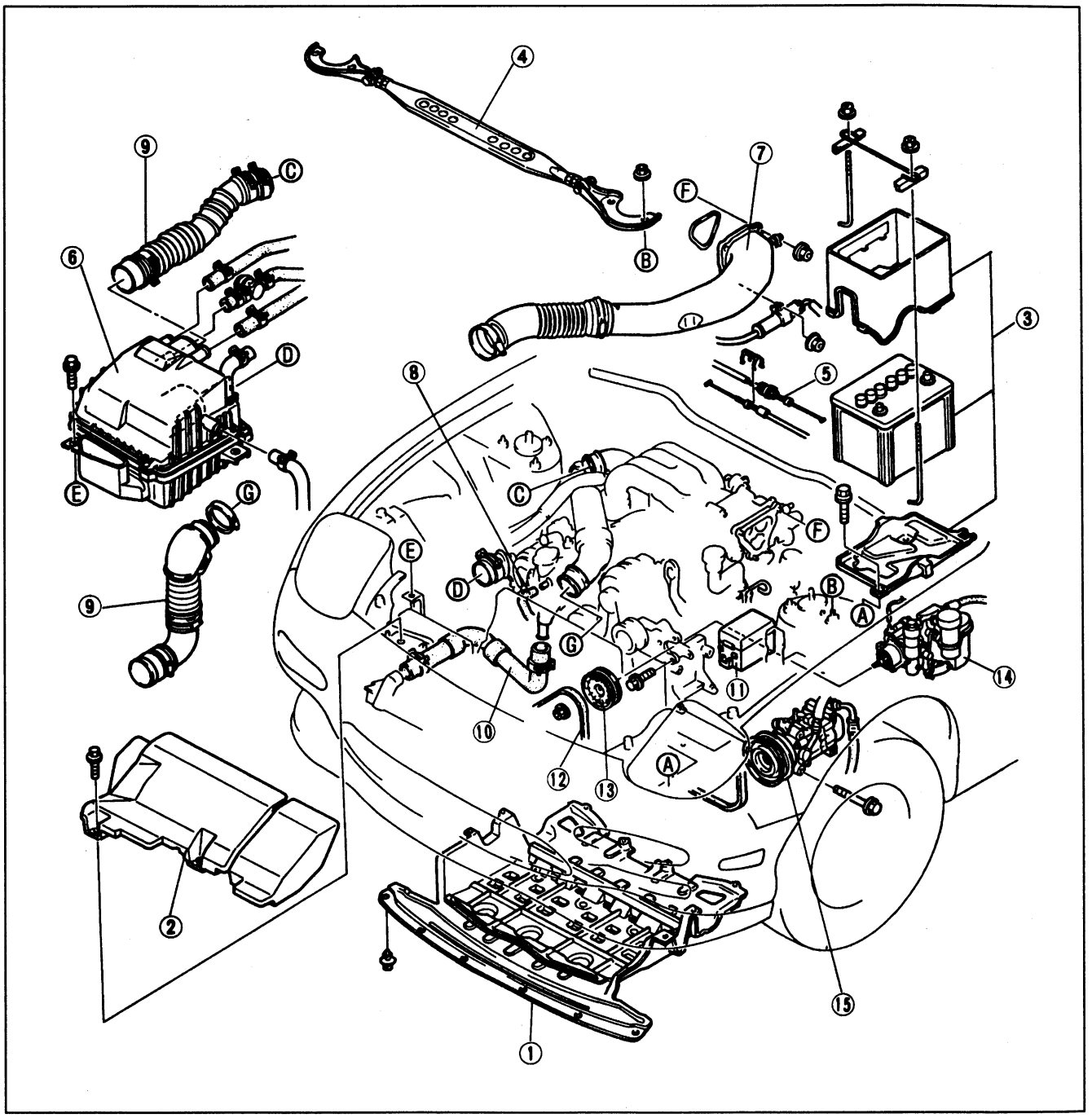
49 W023 585A Adjust wrench 	For prevention of P/S oil pump rotation

PROCEDURE

Warning
- **Release the fuel pressure. (Refer to Section F)**
- **Keep sparks and open flames away from fuel area.**

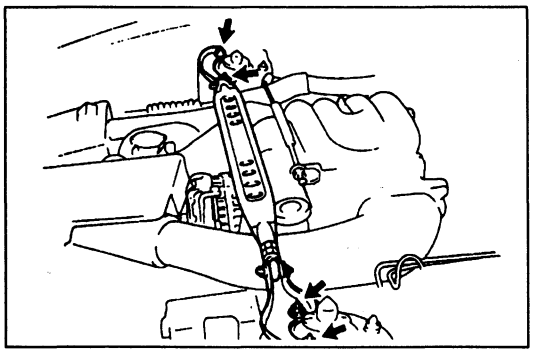
1. Disconnect the negative battery cable.
2. Drain the engine coolant and engine oil.
3. Remove the hood.
4. Remove the transmission. (Refer to Section J or K.)
5. Disconnect the powertrain control module. (Refer to Section F.)
6. Remove in the order shown in the figure, referring to **Removal Note**.

Step 1

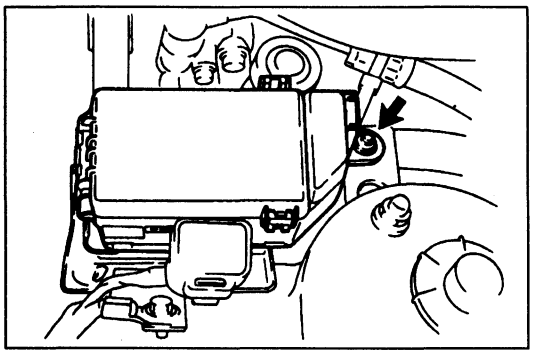


1. Undercover
2. Fresh-air duct
3. Battery and box
4. Strut bar
   Removal Note ..... page C-16
5. Accelerator cable
6. Air cleaner housing
7. Hose
8. Water hose
9. Air hose
10. Radiator hose (upper)
11. Fuse box
    Removal Note ..... page C-16
12. Drive belt
    Removal Note ..... page C- 7
13. P/S oil pump pulley
    Removal Note ..... page C-16
14. P/S oil pump
    Removal Note ..... page C-16
15. A/C compressor
    Removal Note ..... page C-16

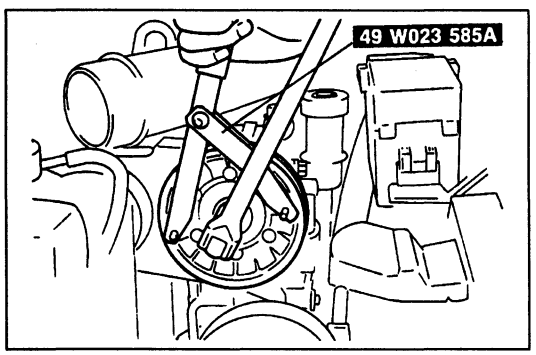
REMOVAL



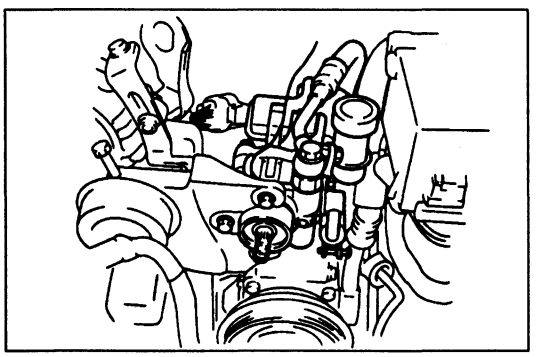
Removal Note
Strut bar
1. Remove the strut bar.
2. Temporarily tighten the lock nut to the stud bolt.



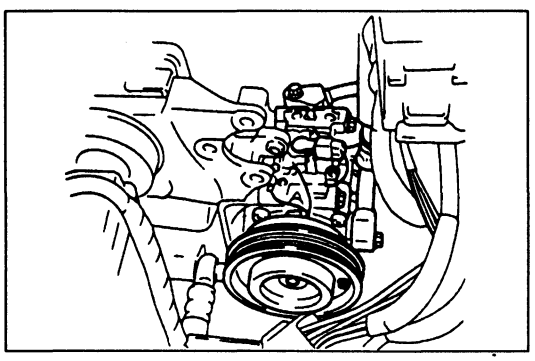
Fuse box
Remove the fuse box with the harness still connected.



P/S oil pump pulley
1. Hold the P/S oil pump pulley by using the **SST**.
2. Remove the P/S oil pump pulley nut.
3. Remove the P/S oil pump pulley.

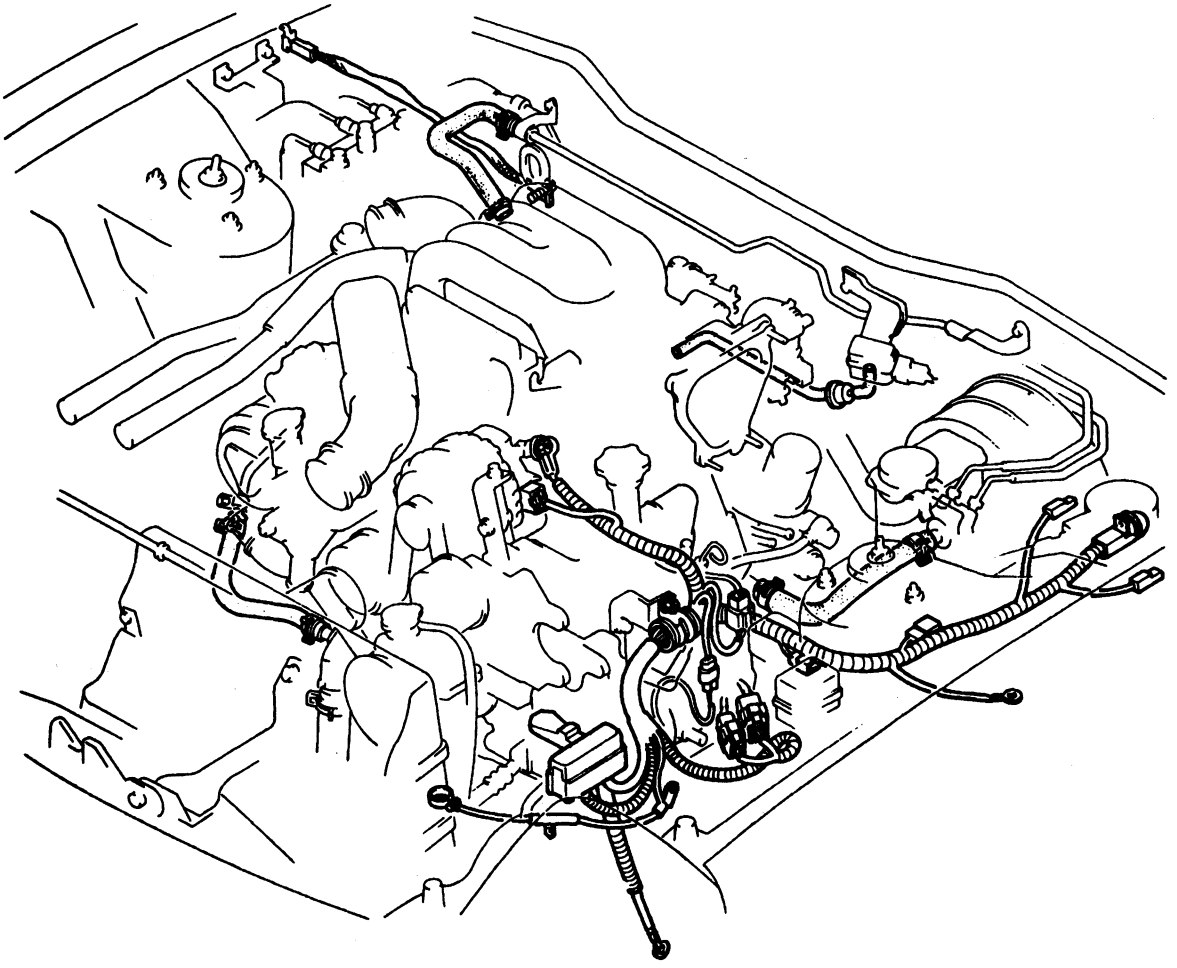


P/S oil pump
1. Remove the P/S oil pump with the hose still connected.
2 Position the pump away from the engine, and support it with wire.

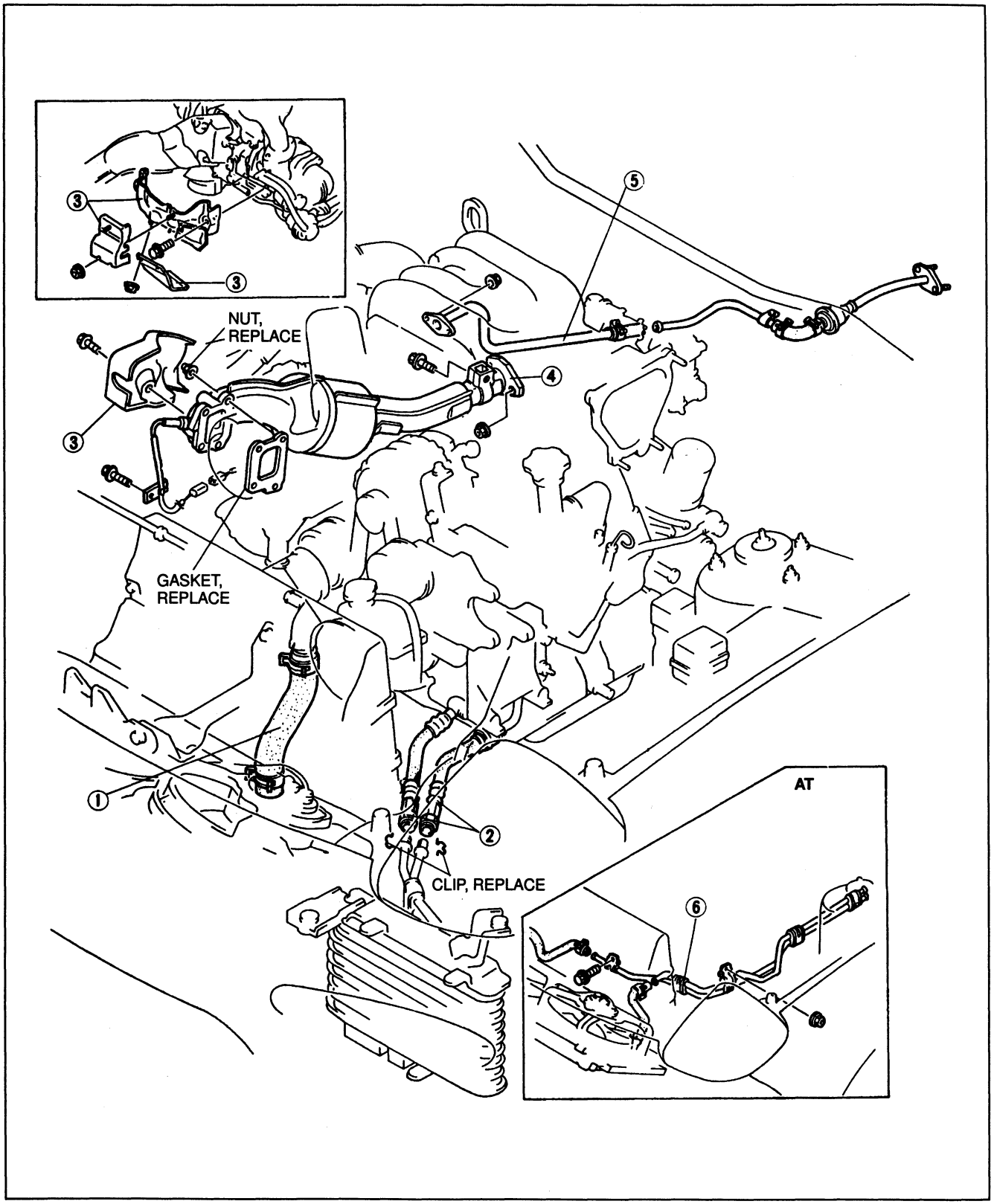


A/C Compressor
1. Remove the A/C compressor with the hoses still connected.
2. Position the compressor away from the engine, and support it with wire.

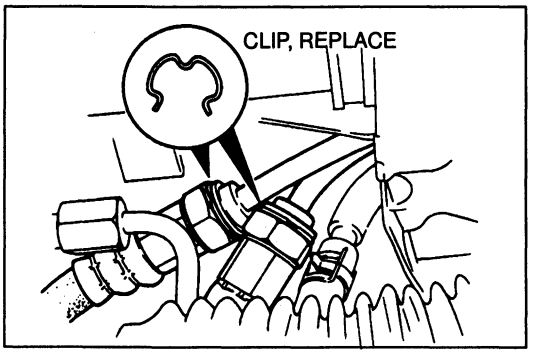
Step 2
Disconnect the harness connectors and hoses.



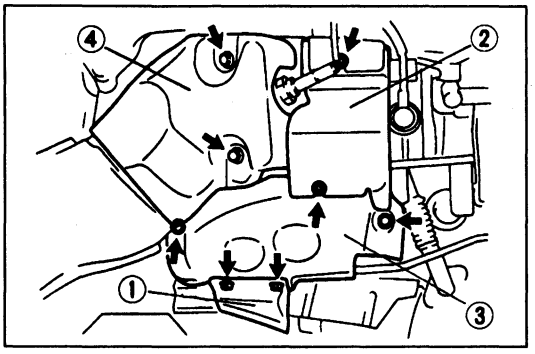
Step 3



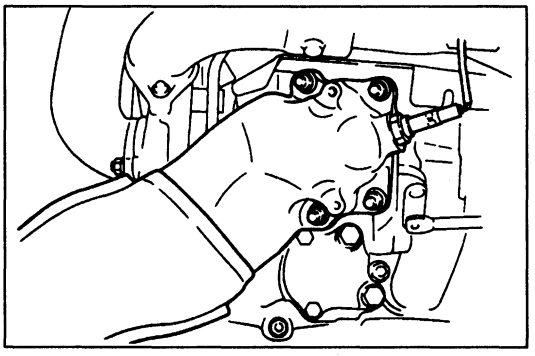
1. Radiator hose (lower)
2. Oil pipe
   Removal Note ..... page C-19
3. Insulator
   Removal Note ..... page C-19
4. Front exhaust pipe
   Removal Note ..... page C-19
5. Split air pipe
6. Oil cooler pipe (AT)
   Removal Note ..... page C-19



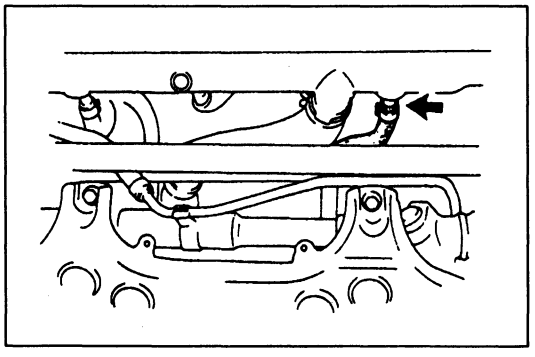
Removal Note
Oil pipe
Remove the clip and disconnect the oil pipe, using a drain pan to catch the oil.



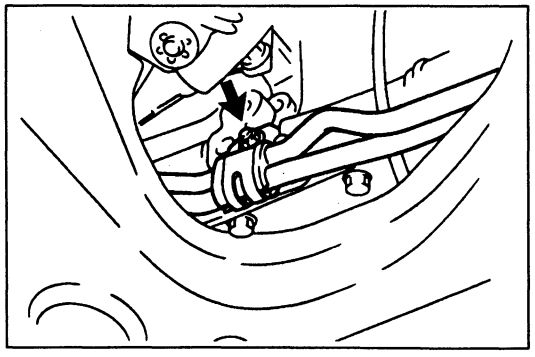
Insulator
Remove the insulators in the order shown in the figure. Keep the surface of the insulator free from oil.



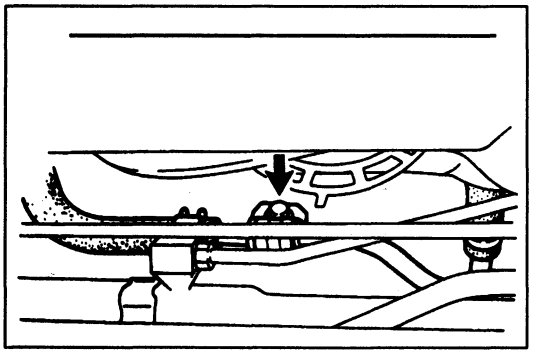
Front exhaust pipe
1. Disconnect the oxygen sensor harness.
2. Remove the front exhaust pipe.



Oil cooler pipe (AT)
1. Disconnect the oil cooler pipe.

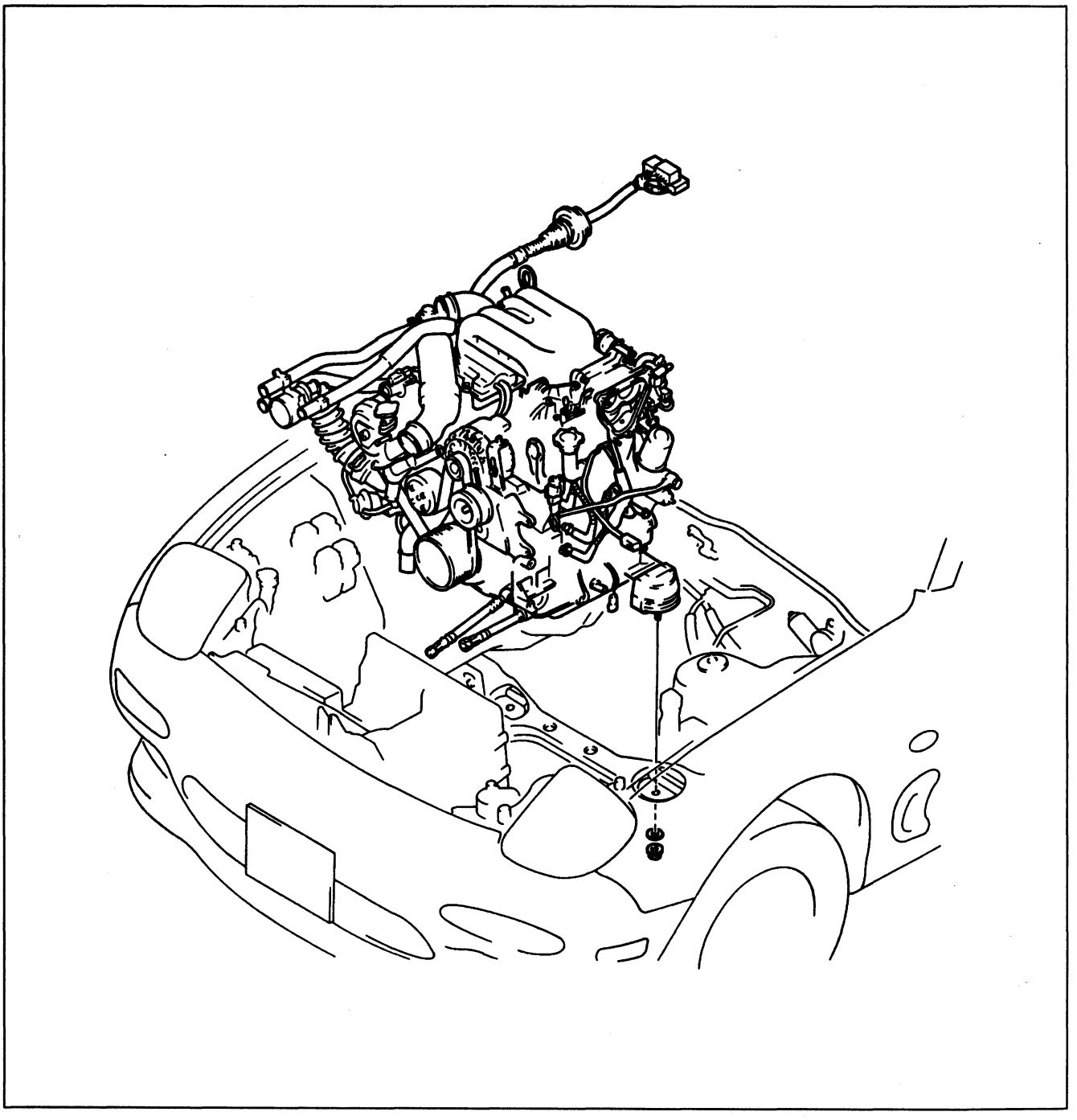


2. Remove the nut shown in the figure.



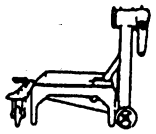
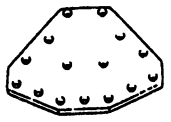
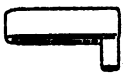
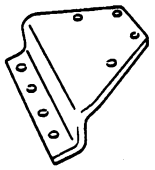
3. Remove the bolt shown in the figure and disconnect the oil cooler pipe from the engine.

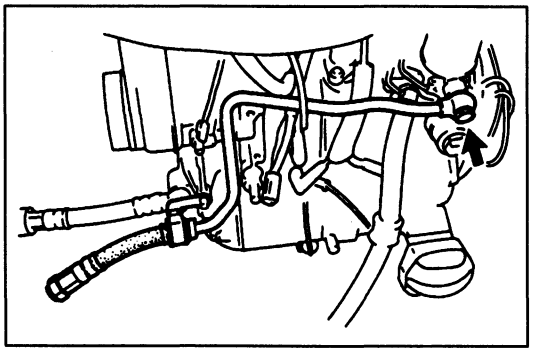
Step 4
Remove the engine assembly.



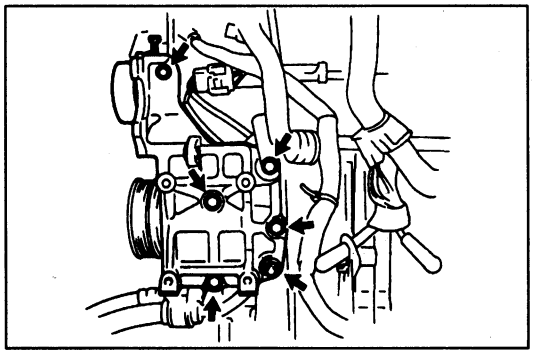
ENGINE STAND MOUNTING

PREPARATION
SST

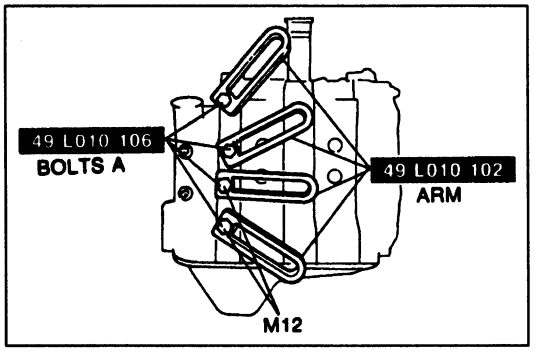
49 0107 680A Stand, engine 	For disassembly / assembly of engine	49 L010 1A0 Hanger set, engine stand 	For disassembly / assembly of engine
49 L011 101 Plate (Part of 49 L011 1A0) 	For disassembly / assembly of engine	49 L010 102 Arms (Part of 49 L010 1A0) 	For disassembly / assembly of engine
49 L010 103 Hooks (Part of 49 L011 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 1114 005 Hanger, engine 	For disassembly / assembly of engine		



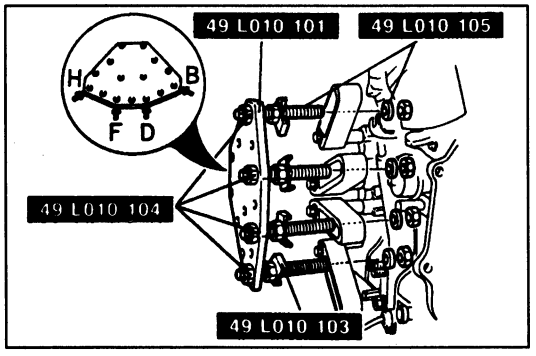
PROCEDURE
When using 49 L010 1A0
1. Remove the oil pipe.



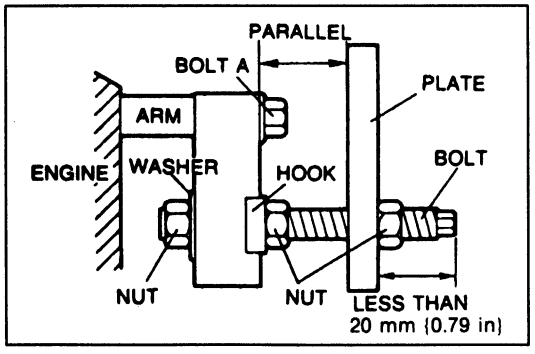
2. Remove the A/C compressor and P/S oil pump bracket.
3. Remove the stud.



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



5. Assemble the **SST** (bolts, nuts, hooks and plate).
6. Install the **SST** assembly to the respective arms while adjusting parallelism between the arms and plate by turning the bolts and nuts.

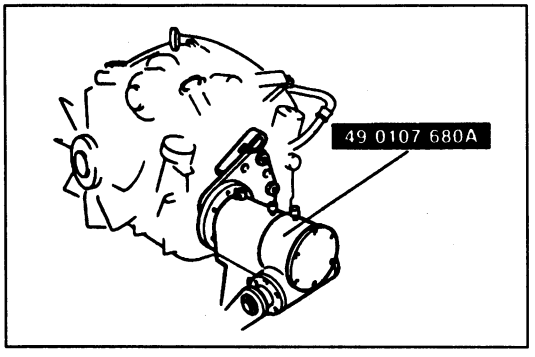


Warning

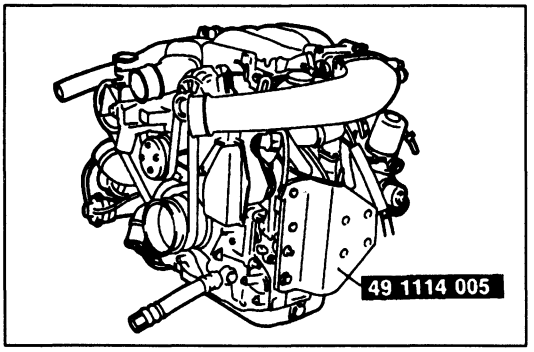
- **Although the engine stand has a self-locking brake system, there is a possibility that the brake may not be effective in the following situations:**

  1. When the engine is held in an unbalanced position.
  2. While rotating the engine, if it passes through an unbalanced position.

  Either of these situations could lead to sudden, rapid movement of the engine and mounting stand handle and cause serious injury. Never keep the engine in an unbalanced position, and always hold the rotating handle firmly when turning the engine.

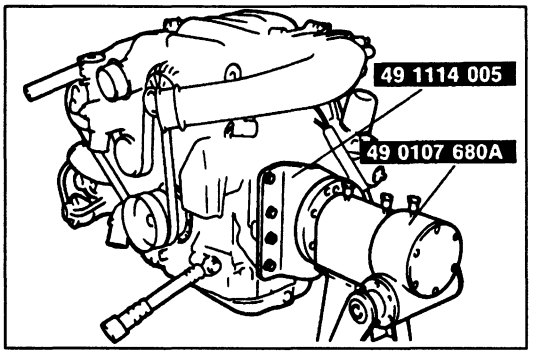


7. Tighten the bolts and nuts to affix the **SST**.
8. Install the engine on the **SST** (engine stand).



When using 49 1114 005

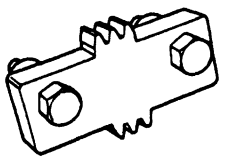
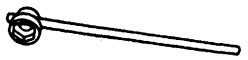
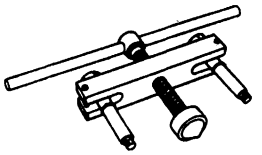
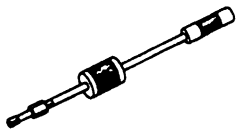
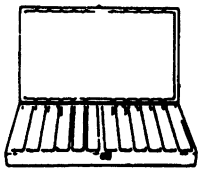
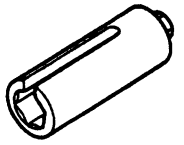
1. Remove the oil pipe, engine mounts, and P/S oil pump bracket.
2. Install the **SST** as shown in the figure.



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

DISASSEMBLY

PREPARATION
SST

49 F011 101 Brake, ring gear 	For prevention of engine rotation	49 1881 055A Stopper, counterweight 	For prevention of engine rotation
49 0820 035 Box wrench, flywheel 	For removal/ installation of locknut	49 0839 305A Puller, counterweight 	For removal of counterweight
49 0813 215A Puller, tubular dowel 	For removal of tubular dowel	49 0813 225 Remover, oil seal 	For removal of oil seal
49 0813 250 Case, seal 	For arrangement of rotor seals	49 H018 001 Wrench, knock sensor 	For removal of knock sensor

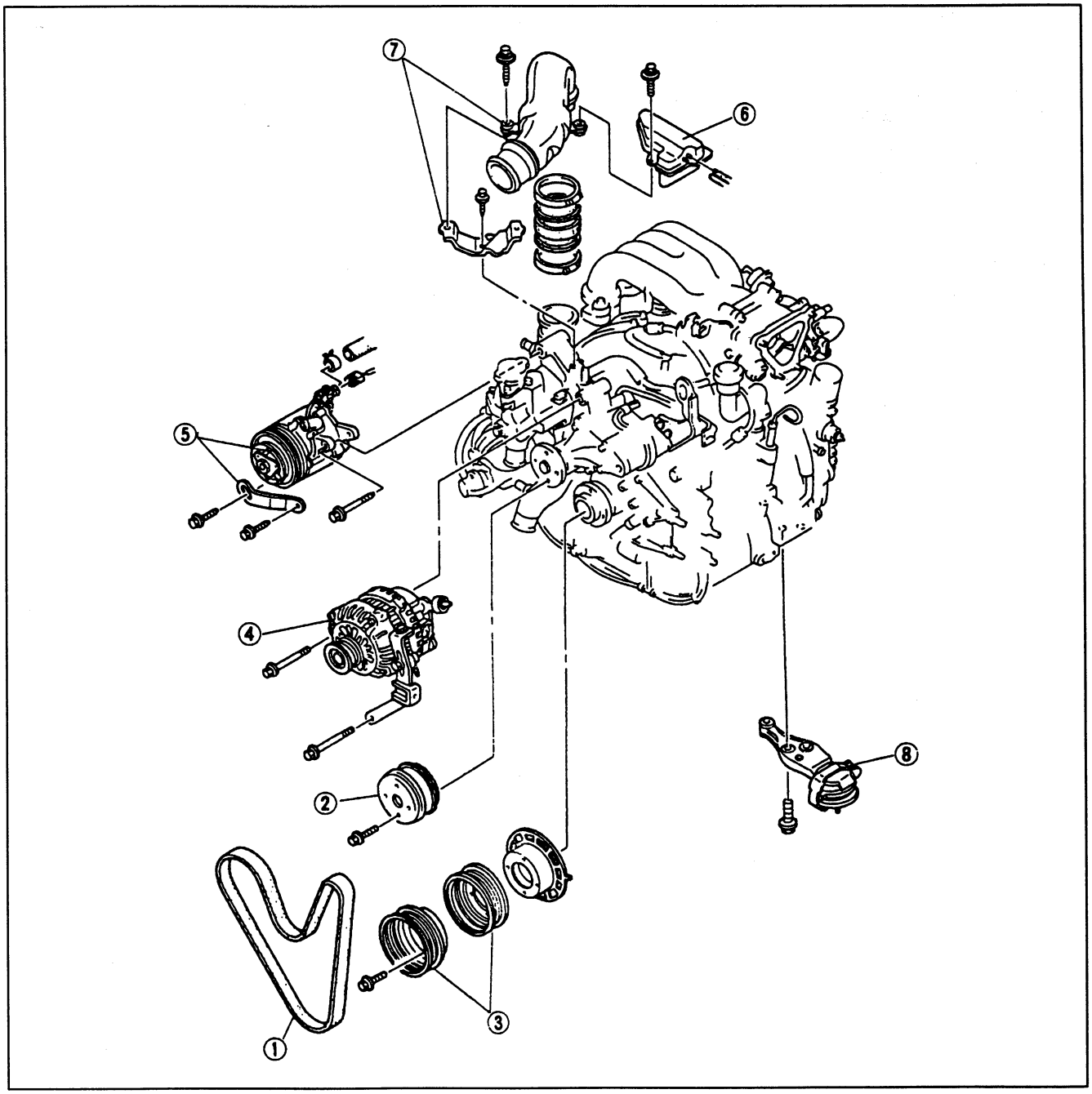
Warning

- **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. Code all identical parts (such as rotors, rotor oil seals, rotor seals, and seal springs) so that they can be reinstalled in the location from which they were removed.
2. Clean the parts with a steam cleaner; blow off any remaining water with compressed air.

AUXILIARY PARTS (I)

1. Drain the engine oil.
2. Disassemble in the order shown in the figure, referring to **Disassembly Note**.



1. Drive belt
2. Water pump pulley
3. Drive belt pulley
4. Alternator and bracket
5. Air pump and bracket
6. Pressure chamber
7. Air pipe and bracket
8. Engine mount (RH and LH)

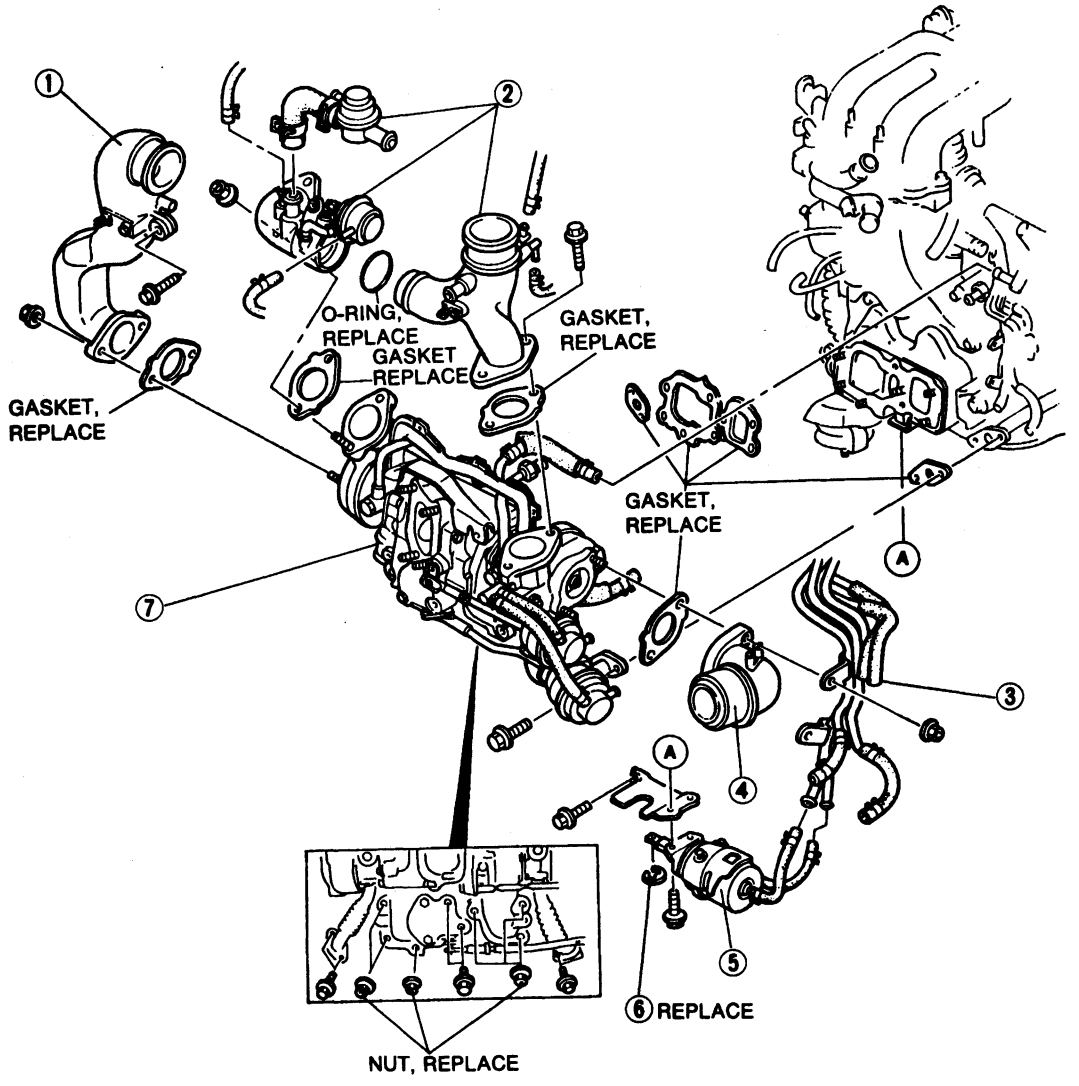
TURBOCHARGER

Turbocharger handling procedures.

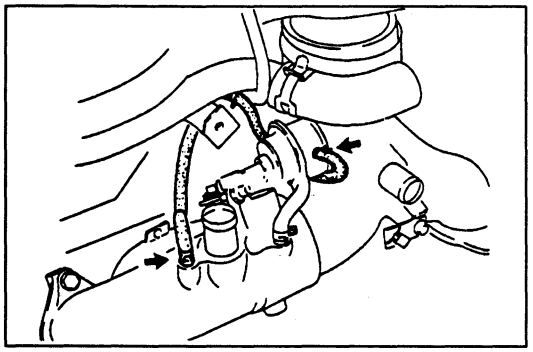
- Holding the actuator, the rod, or the actuator hose when removing and carrying the turbocharger can cause damage.
- Set the turbine down with the shaft horizontal.
- Replace damaged studs and nuts. Use only the specified studs and nuts. Using damaged or unspecified studs and nuts can cause gas leakage because of insufficient clamping.
- Protect the oil pipe from deformation. Deformation will inhibit oil flow and may damage the turbocharger due to overheating.
- Foreign material in the oil line can damage the turbocharger. Keep the oil line clean.
- Cover the turbocharger air port and exhaust port with tape to keep out foreign material. It can damage the turbocharger's internal components.
- Protect the insulators from deformation and oil. Deformed or oily insulators can lead to damage to the turbocharger due to overheating.

DISASSEMBLY

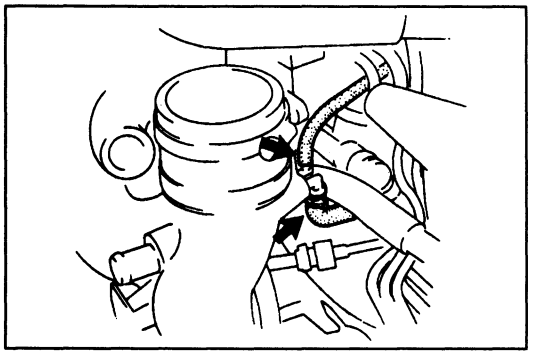
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



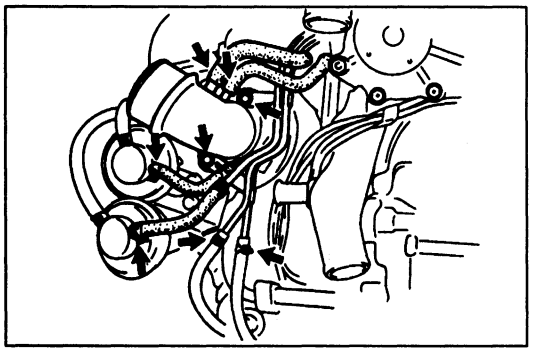
1. Air pipe
2. Air pipe and control valve
   Disassembly Note ..... page C-27
3. Vacuum pipe and hoses
   Disassembly Note ..... page C-27
4. Air intake pipe
5. Turbo control actuator
   Disassembly Note ..... page C-27
6. Clip
7. Turbocharger assembly
   Disassembly Note ..... page C-28



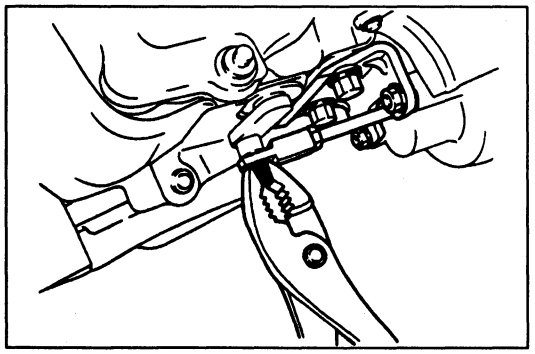
Disassembly Note
Air pipe and control valve
1. Disconnect the hoses shown in the figure.



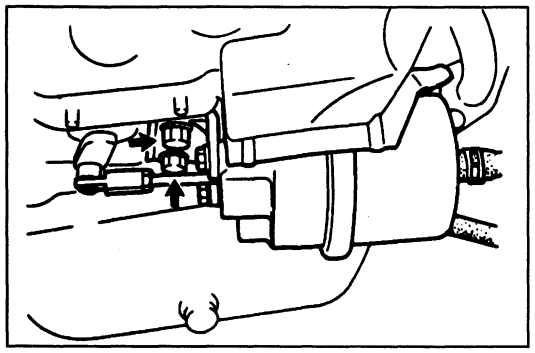
2. Disconnect the vacuum hoses shown in the figure.
3. Remove the air pipe and control valve assembly.



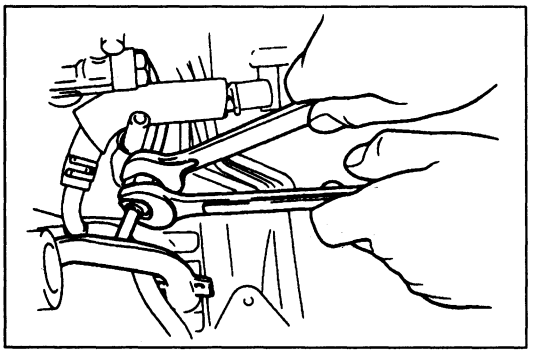
Vacuum pipe and hoses
1. Disconnect the vacuum hoses shown in the figure.
2. Remove the nuts shown in the figure.
3. Disconnect the vacuum pipe and hoses from the turbocharger.



Turbo control actuator
1. Remove the clip shown in the figure.



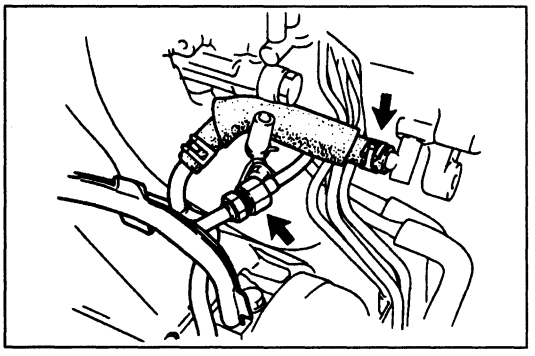
2. Remove the bolts and remove the turbo control actuator.



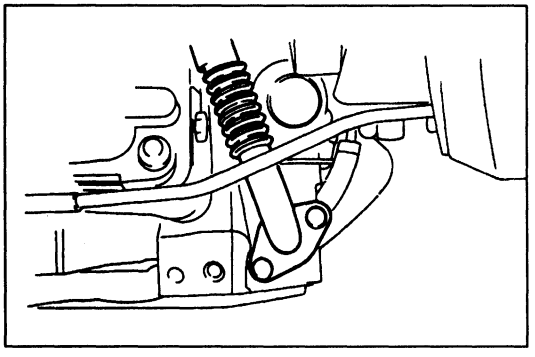
Turbocharger assembly

Caution
- **Hold the pipe by using a wrench.**

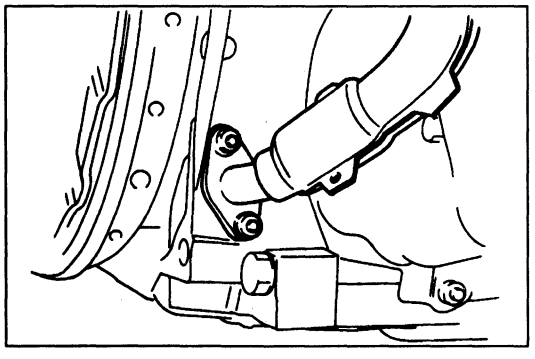
1. Use two wrenches when disconnecting the oil inlet pipe.

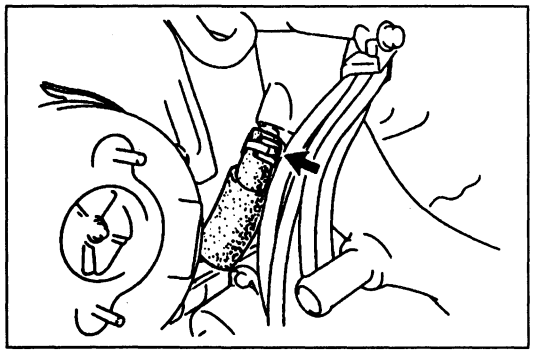


2. Disconnect the water hose and oil inlet pipe.

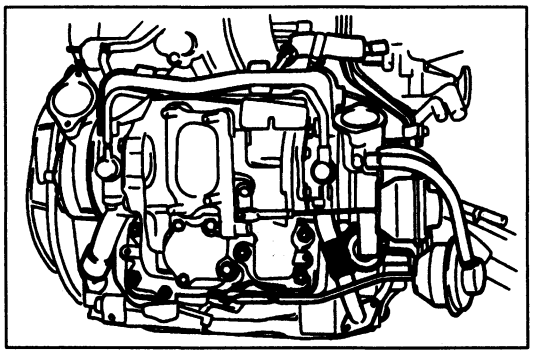


3. Disconnect the oil outlet pipes.





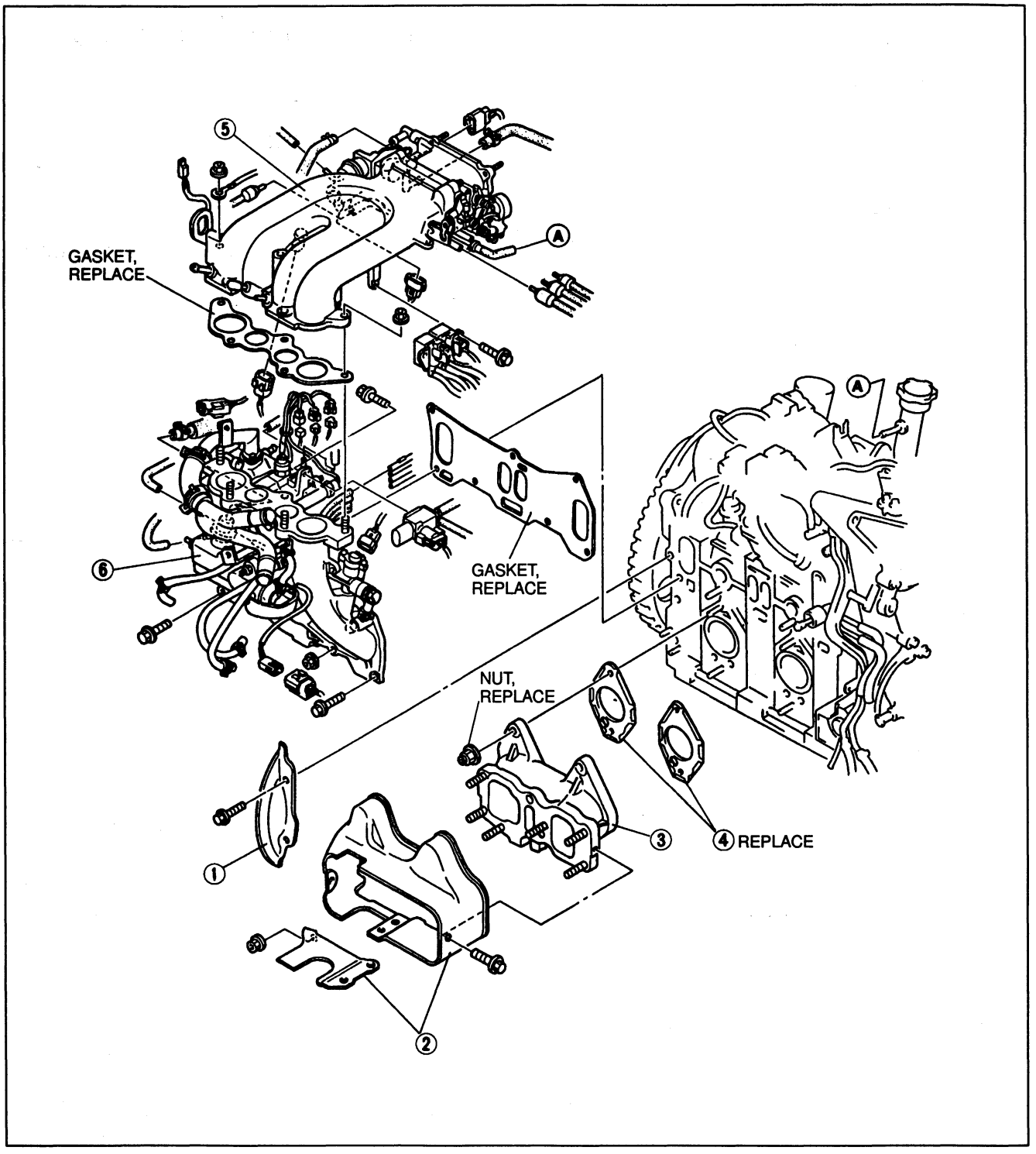
4. Disconnect the water hose.



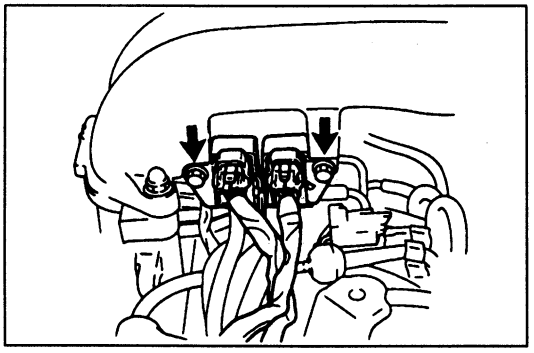
5. Remove the bolts and nuts and remove the turbocharger assembly.

AUXILIARY PARTS (II)

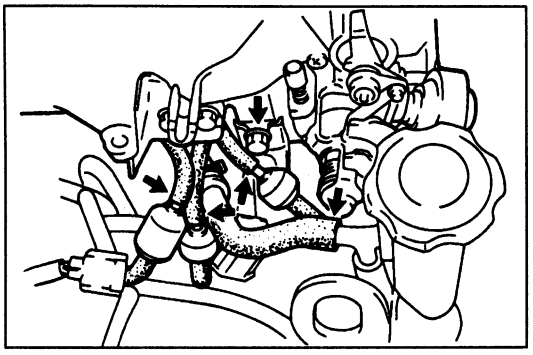
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



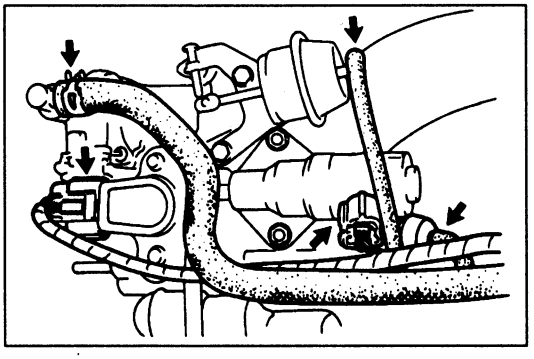
1. Seal plate
2. Exhaust manifold insulator
3. Exhaust manifold
4. Exhaust manifold gasket
5. Surge tank assembly
   Disassembly Note ..... page C-31
6. Intake manifold assembly
   Disassembly Note ..... page C-32



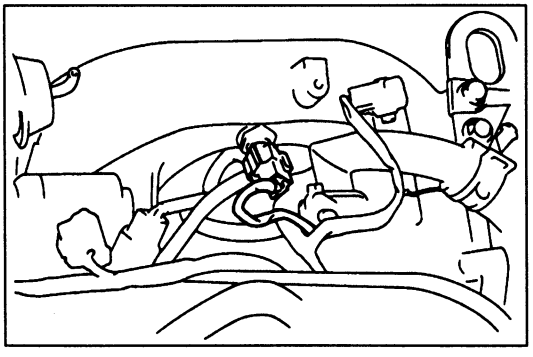
Disassembly Note
Surge tank assembly
1. Remove the bolts shown in the figure.
2. Disconnect the duty solenoid valve from the surge tank.



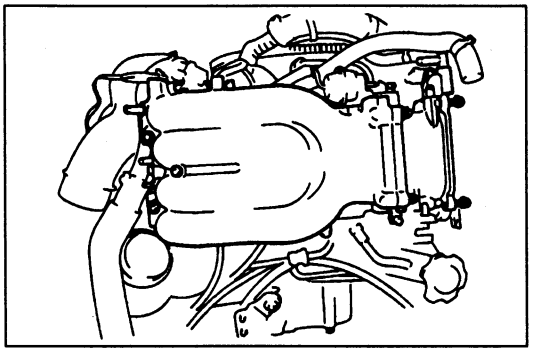
3. Disconnect the vacuum hoses and blowby hose shown in the figure.
4. Loosen the bolt shown in the figure.



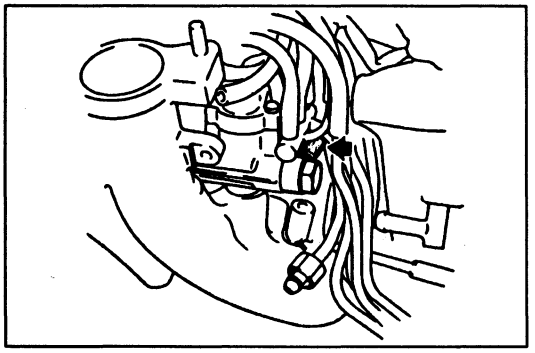
5. Disconnect the hoses and connectors shown in the figure.



6. Disconnect the connector shown in the figure.

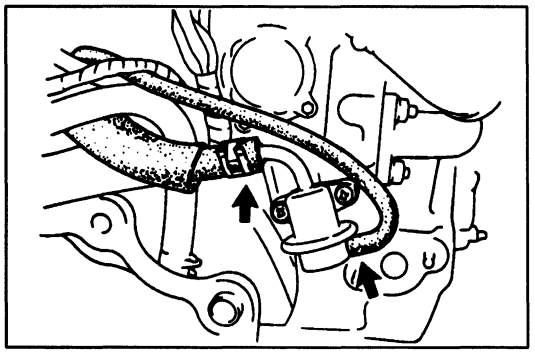


7. Remove the bolts and remove the surge tank assembly.

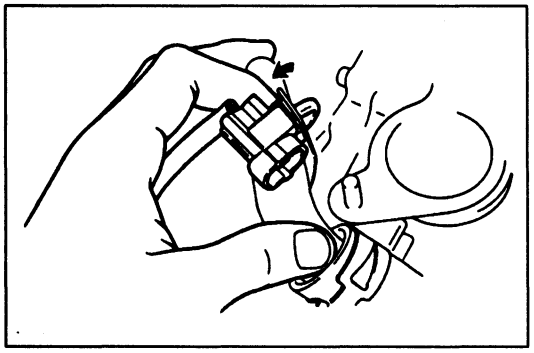


Intake manifold assembly

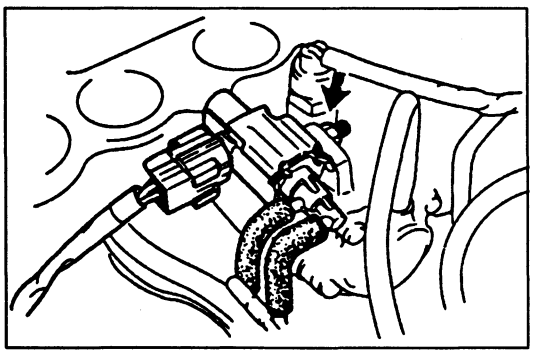
1. Disconnect the hose shown in the figure.



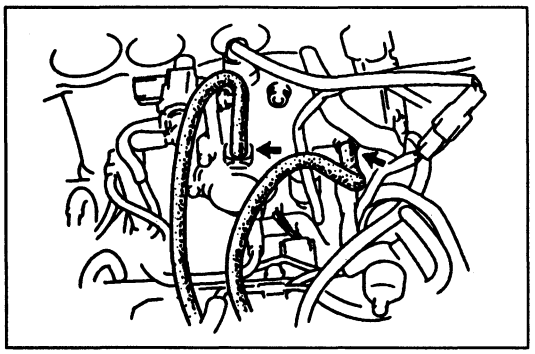
2. Disconnect the fuel hose and vacuum hose shown in the figure.



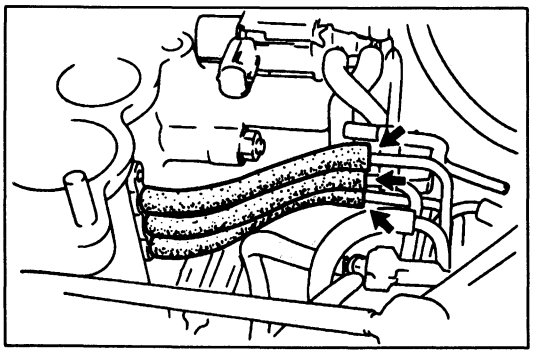
3. Remove the oxygen sensor connector.



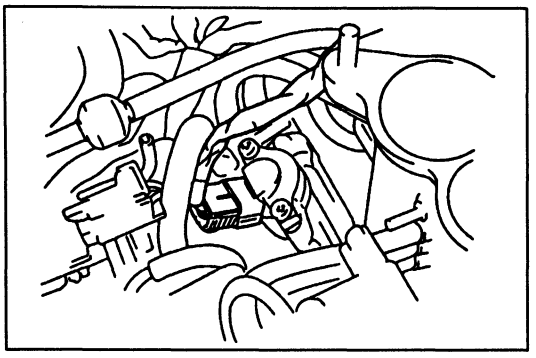
4. Remove the nut shown in the figure.
5. Remove the three-way solenoid.



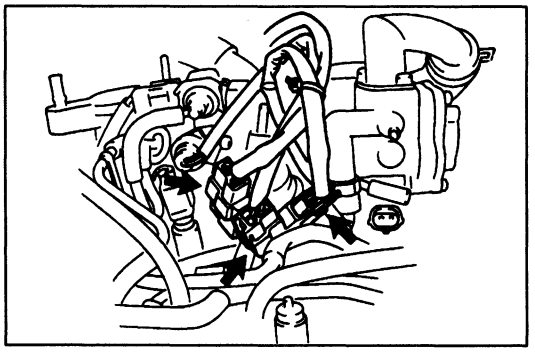
6. Disconnect the vacuum hoses shown in the figure.



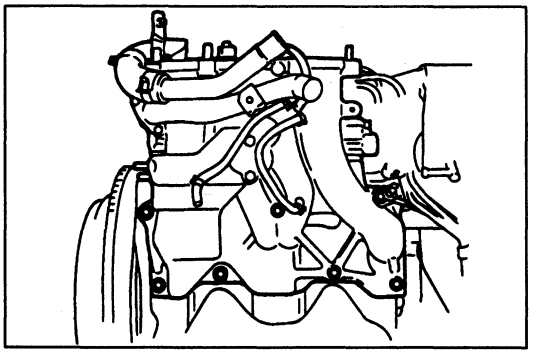
7. Disconnect the vacuum hoses shown in the figure.



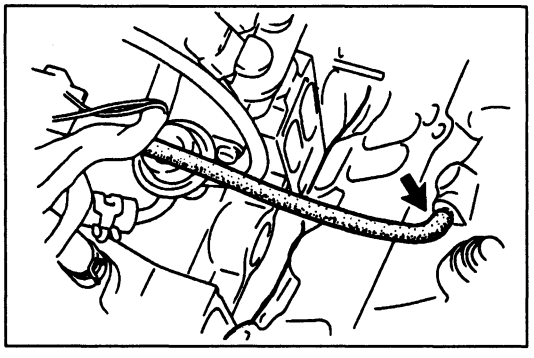
8. Disconnect the fuel injector connectors.



9. Disconnect the connectors.



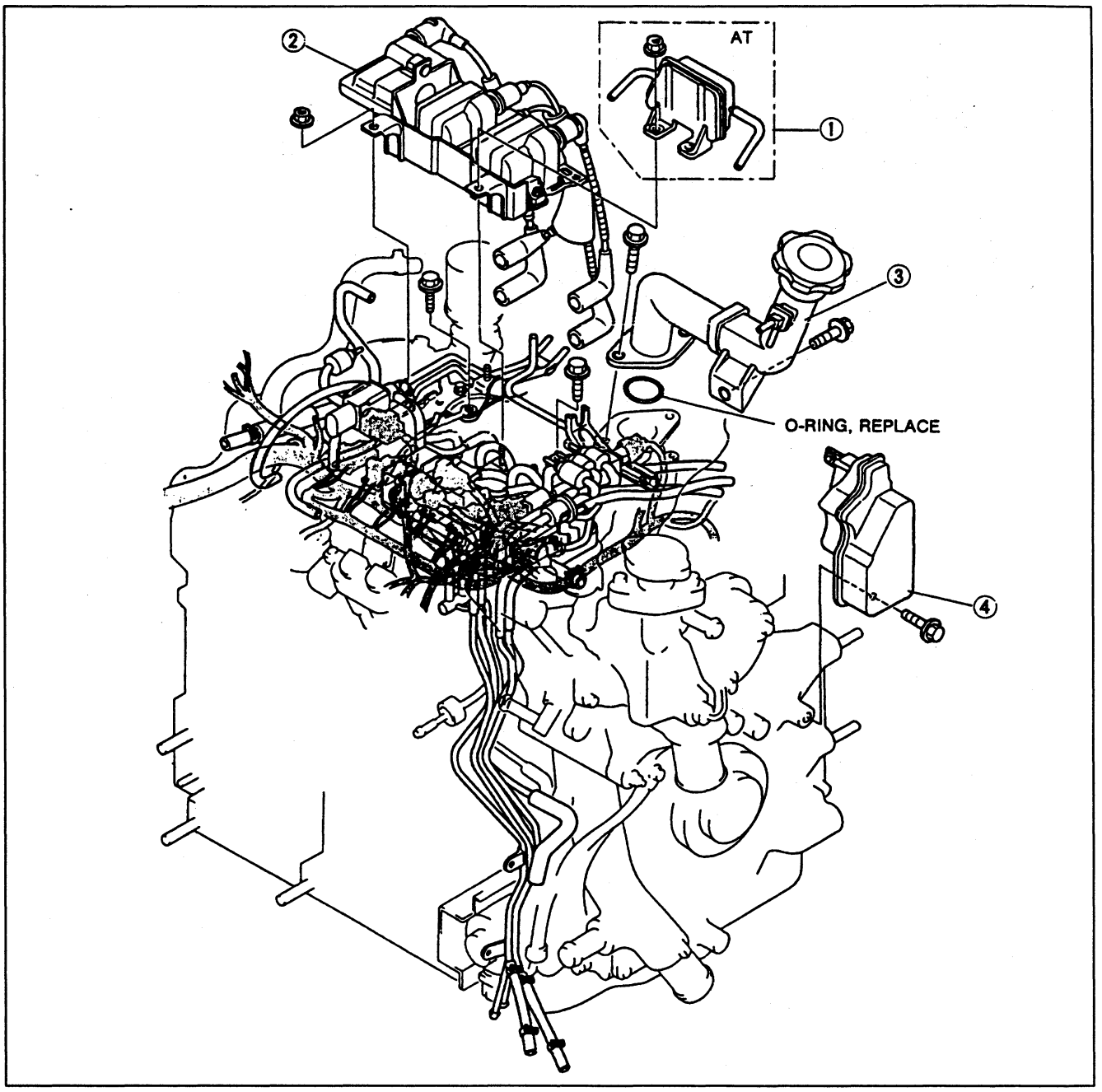
10. Remove the intake manifold assembly.



11. Disconnect the vacuum hose.

Vacuum pipe assembly

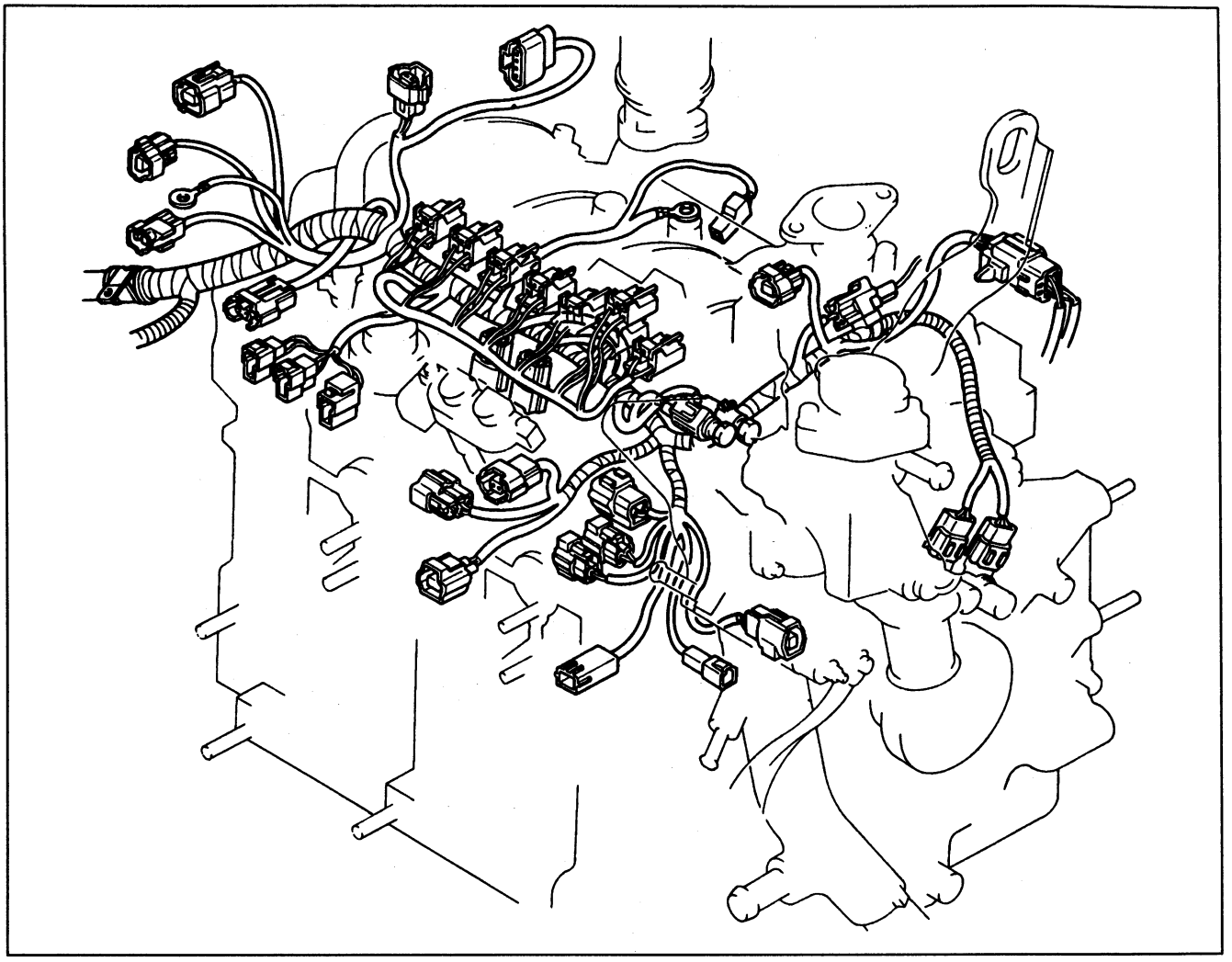
Disassemble in the order shown in the figure.



1. Vacuum chamber (AT)
2. Ignition coil assembly
3. Oil filler pipe
4. Vacuum chamber

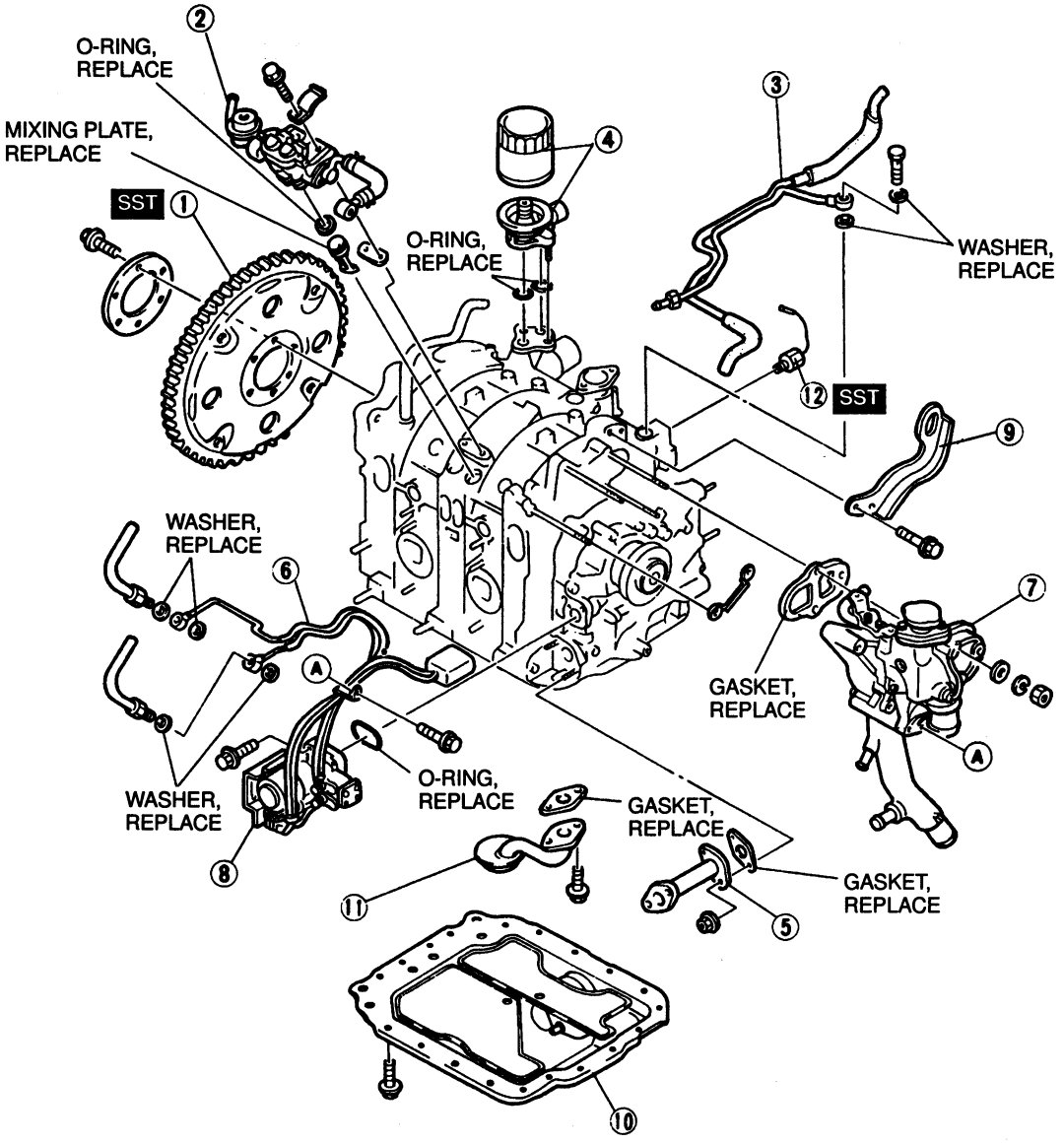
Harness

Disconnect the harness connectors shown in the figure.

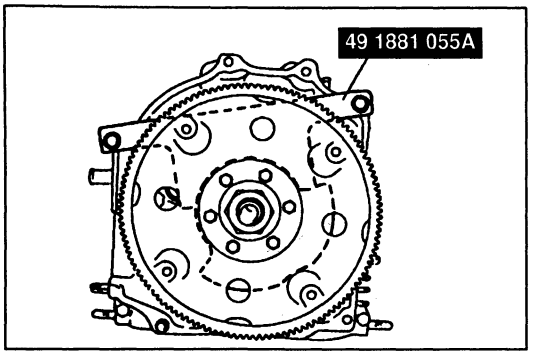


HOUSING (EXTERNAL PARTS I)

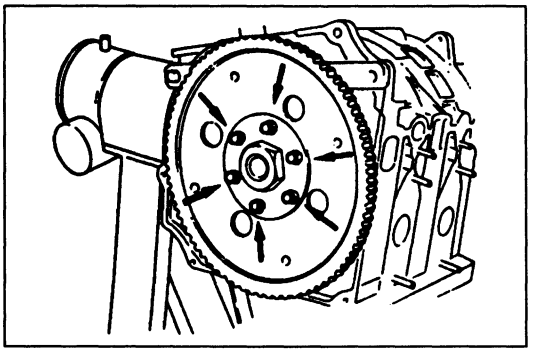
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



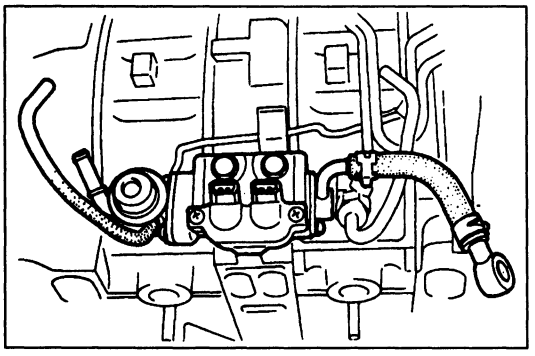
1. Drive plate (AT)
   Disassembly Note ..... page C-37
2. Fuel delivery pipe and mixing plate
   Disassembly Note ..... page C-37
   Service ..... Section F
3. Oil inlet pipe
4. Oil filter and body
5. Oil pipe
6. Metering oil nozzle
   Service ..... Section D
7. Water pump body
   Service ..... Section E
8. Metering oil pump
   Service ..... Section D
9. Engine hanger
10. Oil pan
    Disassembly Note ..... page C-38
11. Oil strainer
12. Knock sensor
    Disassembly Note ..... page C-38



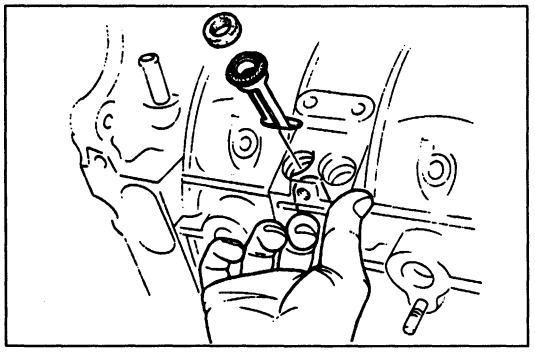
Disassembly Note
Drive plate (AT)
1. Attach the **SST** to the counterweight.



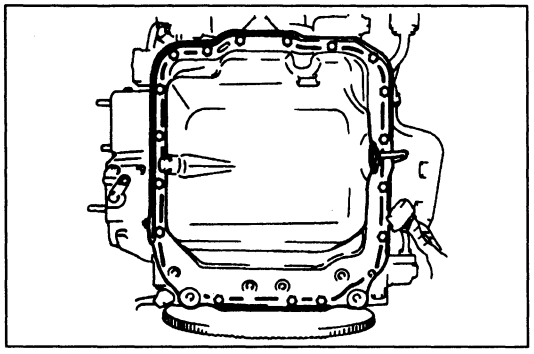
2. Remove the retainer and the drive plate.



Fuel delivery pipe and mixing plate
1. Remove the fuel delivery pipe and spacer.

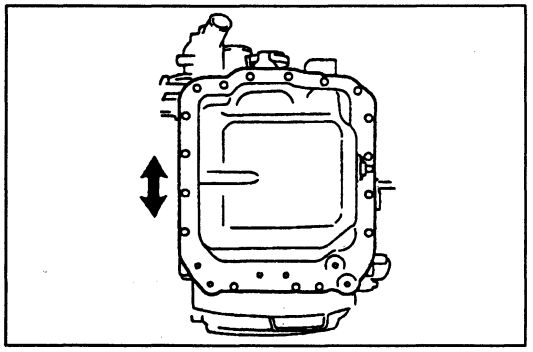


2. Reach into the intake port and push out the mixing plate by hand.

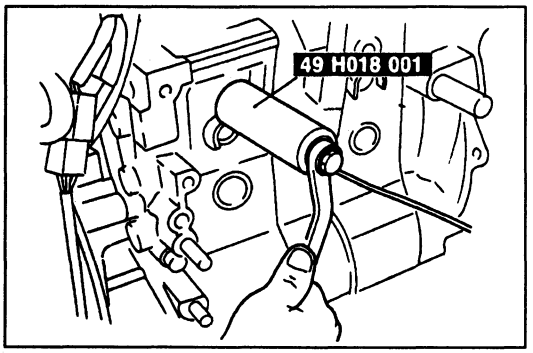


Oil pan
1. Remove the oil pan attaching bolts.

Caution
- **Pry tools can easily scratch the 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 oil pan by inserting screwdriver into only the areas shown in the figure.

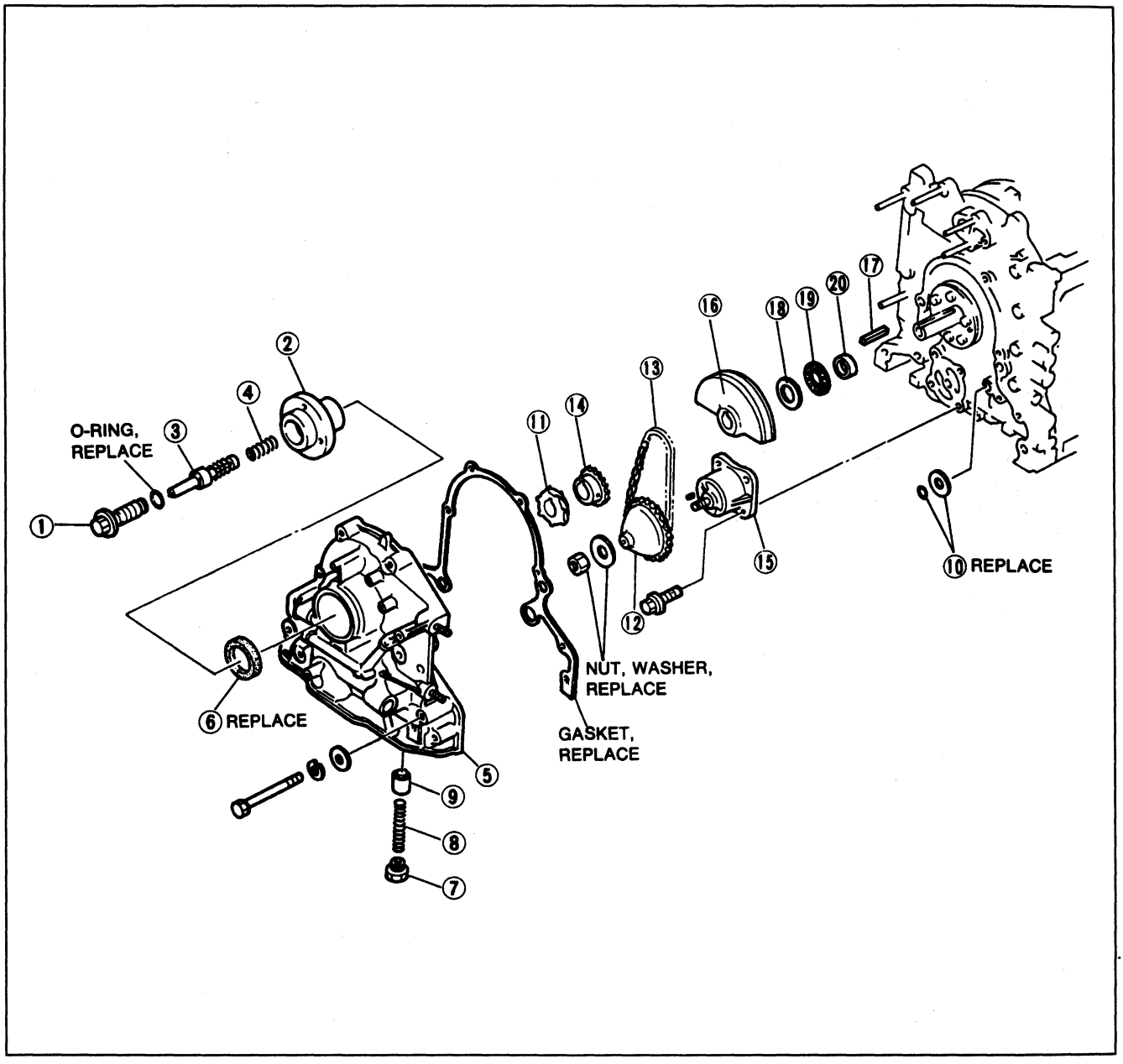


Knock sensor

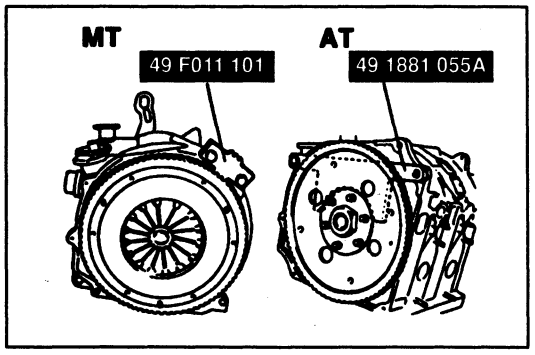
Remove the knock sensor by using the **SST**.

HOUSING (EXTERNAL PARTS II)

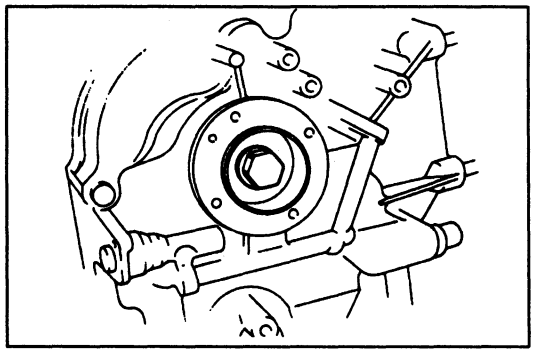
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



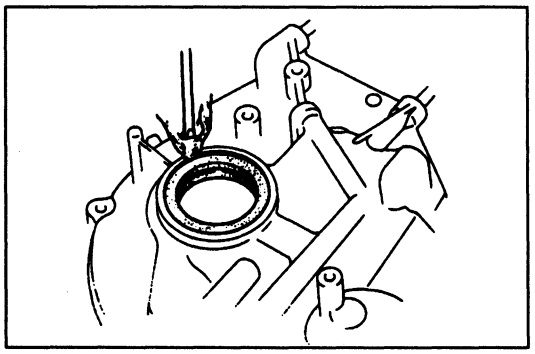
1. Eccentric shaft lock bolt
   Disassembly Note ..... page C-40
2. Pully boss
3. Eccentric shaft bypass valve
   Inspection ..... page C-59
4. Spring
5. Front cover
6. Oil seal
   Disassembly Note ..... page C-40
7. Plug
8. Control valve spring
9. Control valve
10. O-ring and backup ring
11. Drive gear
12. Oil pump sprocket wheel
    Disassembly Note ..... page C-40
13. Oil pump drive chain
    Inspection ..... page C-59
14. Oil pump drive sprocket
    Inspection ..... page C-59
15. Oil pump
    Service ..... Section D
16. Balance weight
17. Key
18. Thrust washer
    Inspection ..... page C-59
19. Needle bearing
    Inspection ..... page C-59
20. Spacer



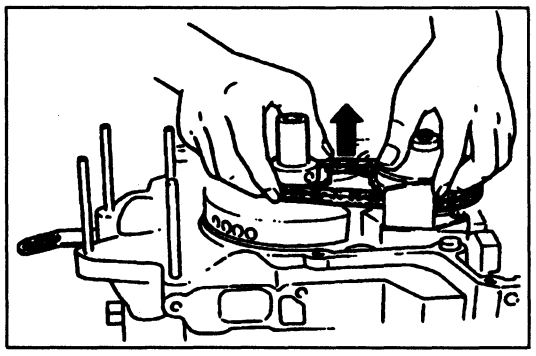
Disassembly Note
Eccentric shaft lock bolt
1. Attach the **SST** to the flywheel (MT) or counterweight (AT).



2. Remove the eccentric shaft lock bolt.



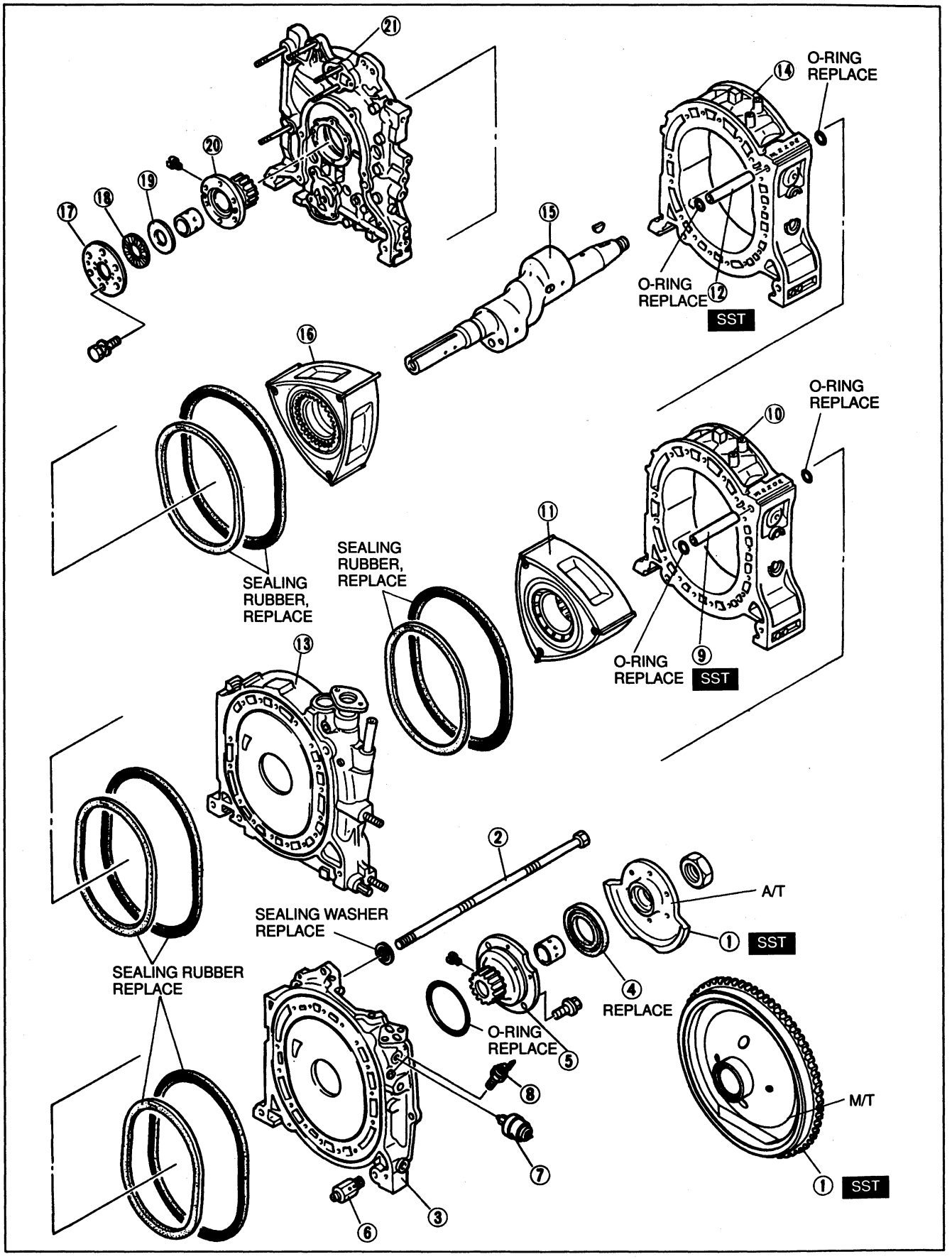
Oil seal
Remove the oil seal by using a screwdriver protected with a rag.



Oil pump sprocket wheel
1. Lift the lock washer tab and remove the sprocket lock nut.
2. Remove the oil pump drive gear, sprocket wheel, and drive chain as an assembly.

HOUSING (INTERNAL PARTS)

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

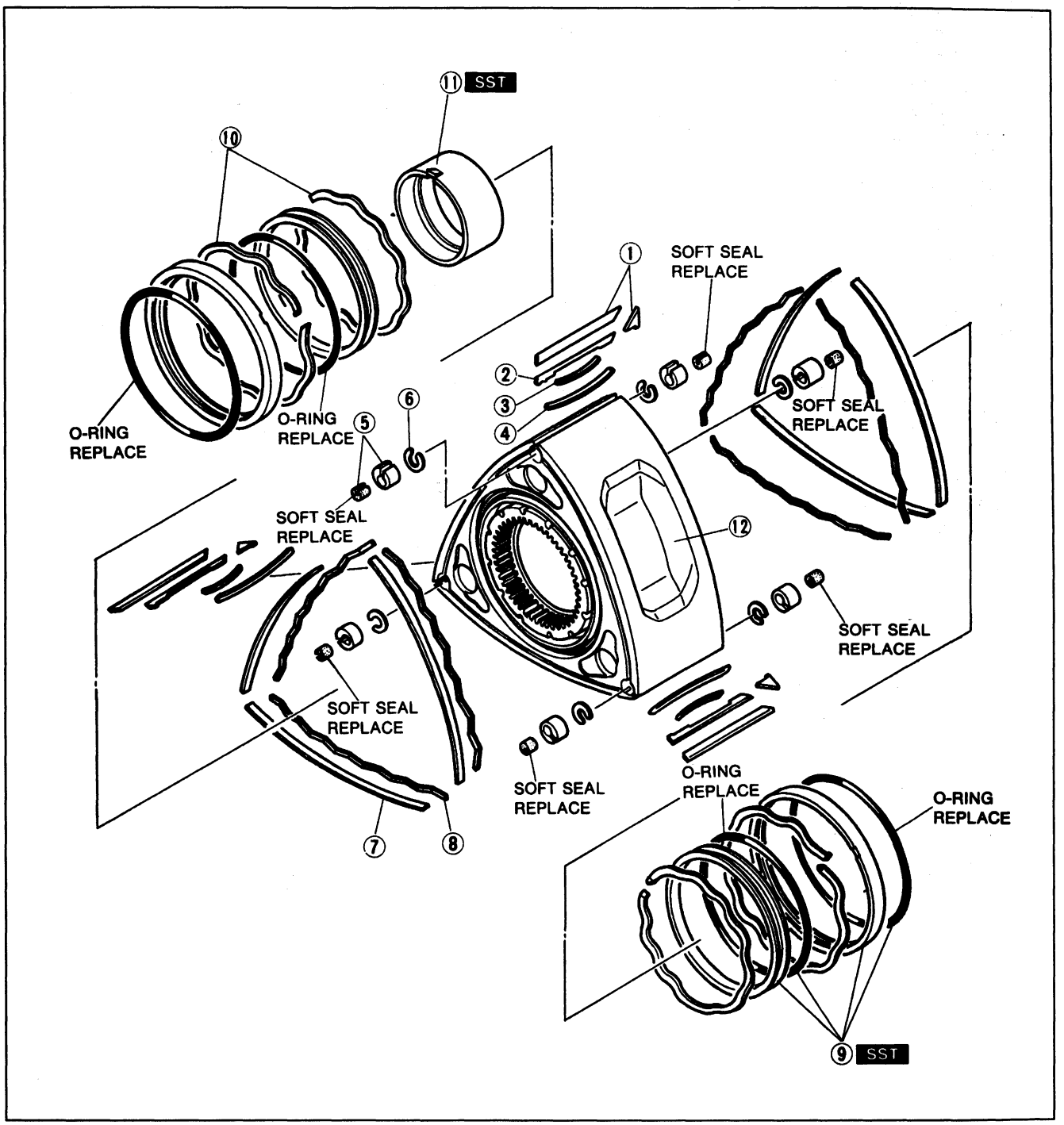


DISASSEMBLY

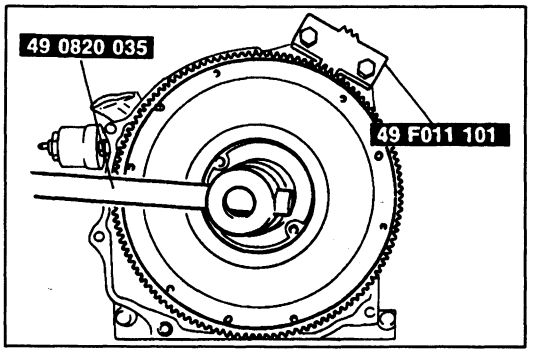
1. Flywheel (MT) / Counterweight (AT)
   - Disassembly Note ..... page C-44
2. Tension bolts
   - Disassembly Note ..... page C-45
3. Rear housing
   - Disassembly Note ..... page C-45
   - Inspection ..... page C-51
4. Rear oil seal
   - Disassembly Note ..... page C-45
5. Rear stationary gear
   - Inspection ..... page C-52
6. Oil regulator valve
   - Service ..... Section D
7. Oil pressure switch
   - Disassembly Note ..... page C-45
8. Heat gauge unit
9. Tubular dowel
   - Disassembly Note ..... page C-46
10. Rear rotor housing
    - Disassembly Note ..... page C-46
    - Inspection ..... page C-54
11. Rear rotor
    - Disassembly Note ..... page C-46
    - Inspection ..... page C-54
12. Tubular dowel
    - Disassembly Note ..... page C-47
13. Intermediate housing
    - Disassembly Note ..... page C-47
    - Inspection ..... page C-51
14. Front rotor housing
    - Disassembly Note ..... page C-47
    - Inspection ..... page C-54
15. Eccentric shaft
    - Inspection ..... page C-58
16. Front rotor
    - Disassembly Note ..... page C-47
    - Inspection ..... page C-54
17. Plate
18. Needle bearing
    - Inspection ..... page C-59
19. Thrust washer
    - Inspection ..... page C-59
20. Front stationary gear
    - Inspection ..... page C-52
21. Front housing
    - Inspection ..... page C-51

HOUSING (ROTOR)

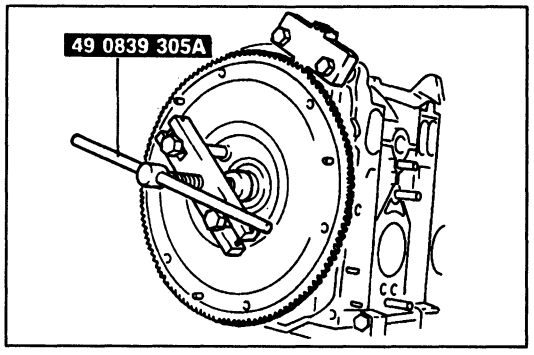
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



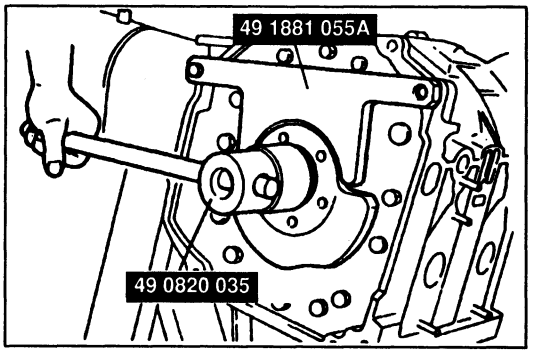
1. Apex seal and side piece
   Inspection ..... page C-57
2. Second piece
   Inspection ..... page C-57
3. Apex seal spring (short)
4. Apex seal spring (long)
5. Corner seal
   Inspection ..... page C-58
6. Corner seal spring
7. Side seal
   Inspection ..... page C-57
8. Side seal spring
9. Oil seal and O-ring
   Disassembly Note ..... page C-48
   Inspection ..... page C-56
10. Oil seal spring
11. Rotor bearing
   Inspection ..... page C-56
12. Rotor
   Inspection ..... page C-55



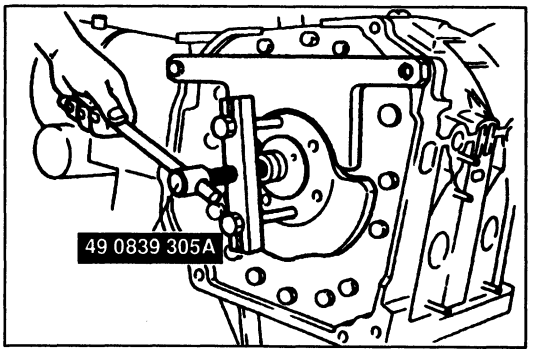
Disassembly Note
Flywheel (MT)
1. Remove the flywheel nut by using the **SST**.



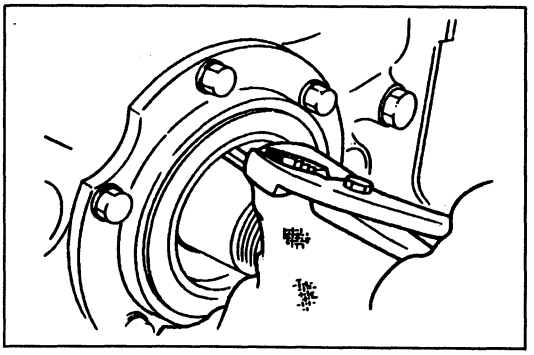
2. Remove the flywheel by using the **SST**.
3. Remove the key.
4. Remove the **SST**.



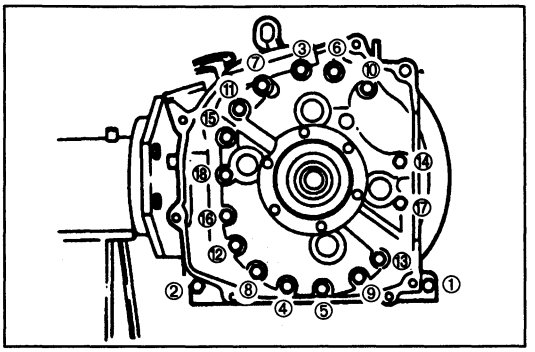
Counterweight (AT)
1. Remove the counterweight nut by using the **SST**.



2. Remove the counterweight by using the **SST**.

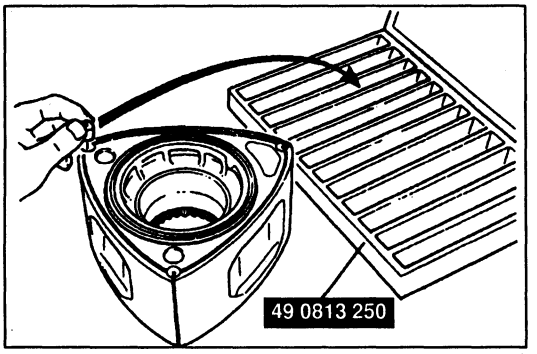


3. Remove the key by using a pryer protected with rag.
4. Remove the **SST**.

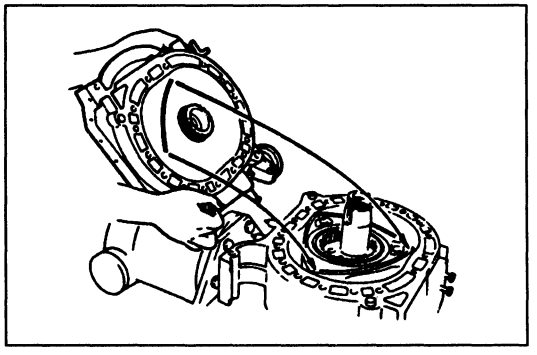


Tension bolts

1. Loosen the tension bolts gradually and in the sequence shown in the figure; then remove them.

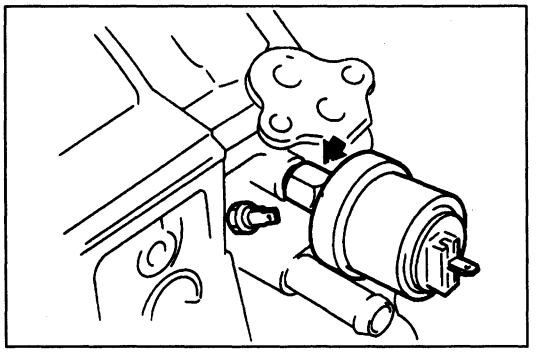


2. Rotor seals (apex, side, and corner) are identified by the numbers near each corresponding groove on the rotor face. Place them in the **SST** according to the numbers.



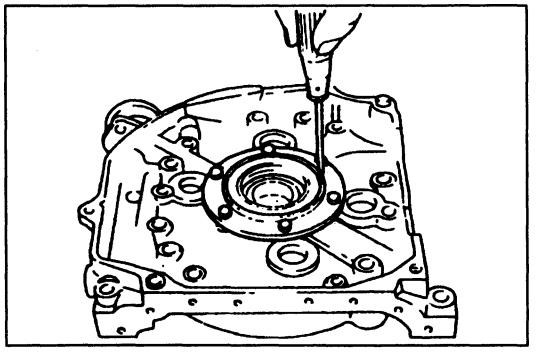
Rear housing

1. Remove the rear housing.
2. If the seals stick to the housing when it is removed, put them back into their original position.



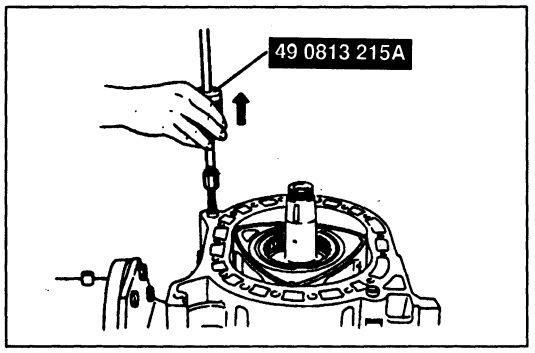
Oil pressure sensor

Remove the oil pressure sensor by using a wrench.

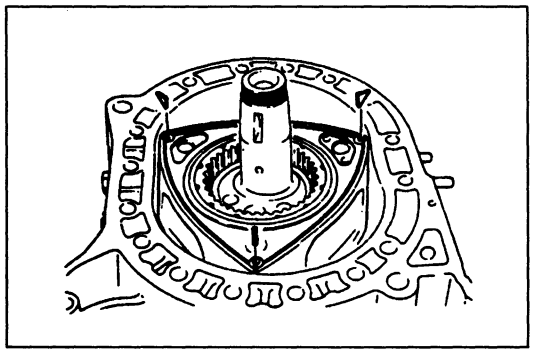


Rear oil seal

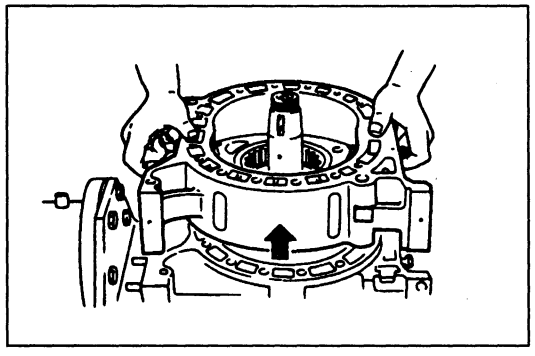
Remove the oil seal cover and the oil seal from the rear housing.



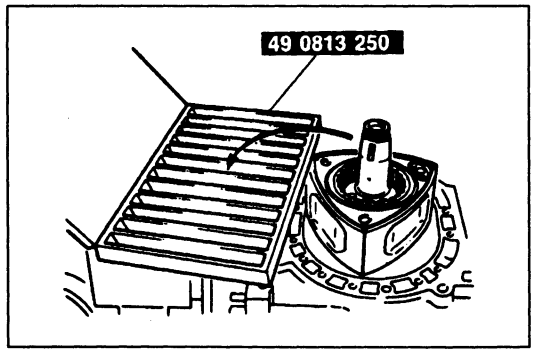
Tubular dowel
Remove the tubular dowels by using the **SST**.



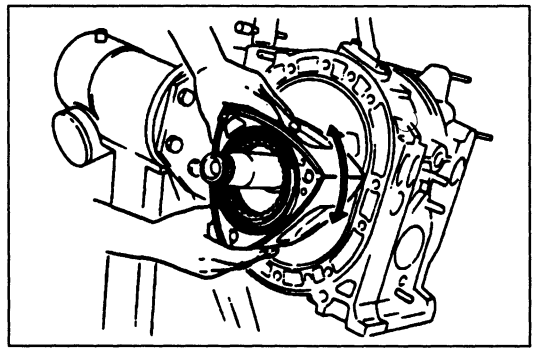
Rear rotor housing
1. Remove the side pieces and place them in the **SST**.



2. Remove the rotor housing. Be careful not to drop the apex seals.
3. Remove the O-ring from the upper dowel hole.

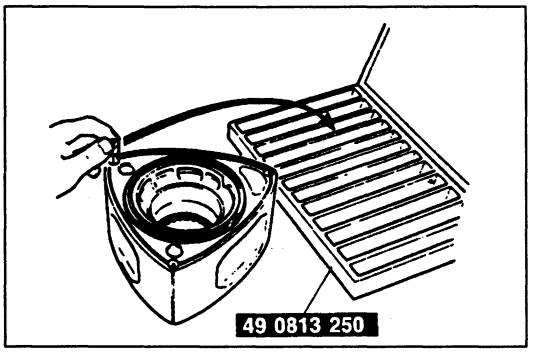


Rear rotor
1. Remove the seals and springs, and place them in position in the **SST**.

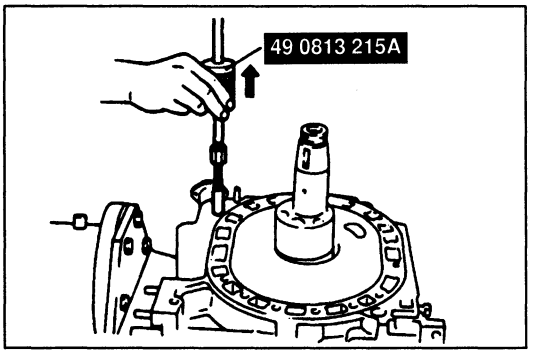


2. Remove the rotor.
If the seals stick on the intermediate housing surface, put them back into their respective position in the rotor.

Caution
- **Place the rotor on a soft surface to prevent damaging it.**

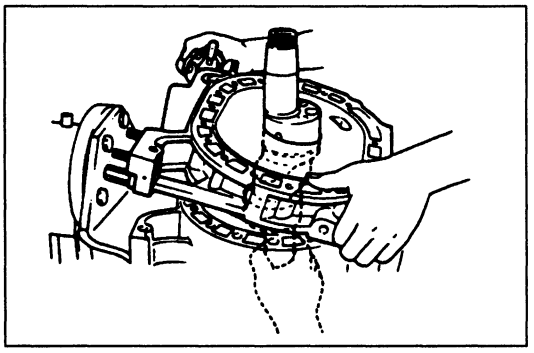


3. Remove the seals and springs, and put them in position in the **SST**.
4. Mark the rotor with an "R" for proper reassembly.



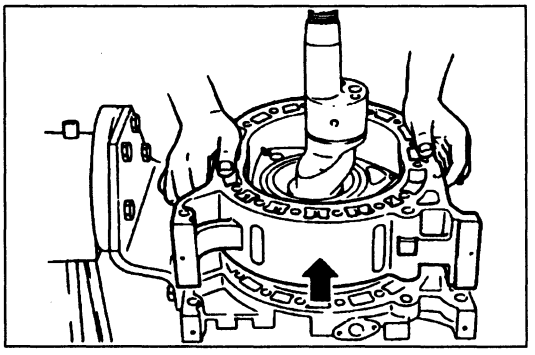
Tubular dowel

Remove the tubular dowels by using the **SST**.



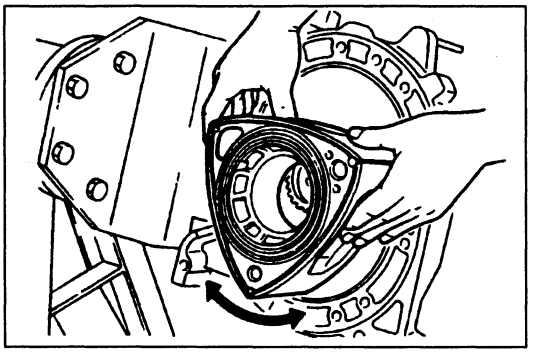
Intermediate housing

1. Turn the eccentric shaft so that the rotor journal faces in the short axial direction.
2. Remove the intermediate housing while pushing the eccentric shaft up.
3. If the seals stick to the intermediate housing surface, put them back into their respective position in the rotor.
4. Remove the sealing rubbers.



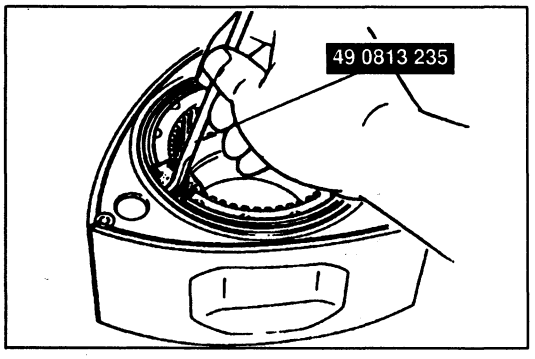
Front rotor housing

1. Remove the side pieces and place them in the **SST**.
2. Remove the rotor housing. Be careful not to drop the apex seals.
3. Remove the O-ring from the upper dowel hole.



Front rotor

Remove the front rotor in the same procedure as the removal of the rear rotor.



Rotor oil seal

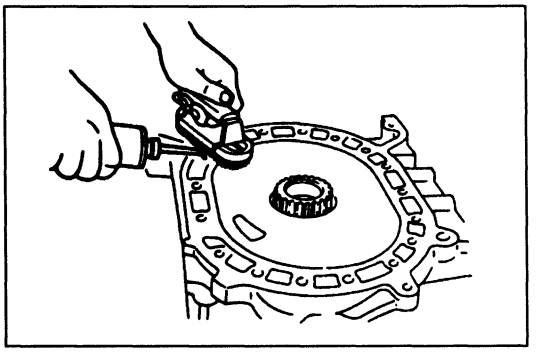
1. Remove the outer oil seal from the rotor by using the **SST**.
2. Remove the inner oil seal in the same manner.
3. Remove the oil seal springs.
4. Remove the O-ring from the oil seal.

CLEANING

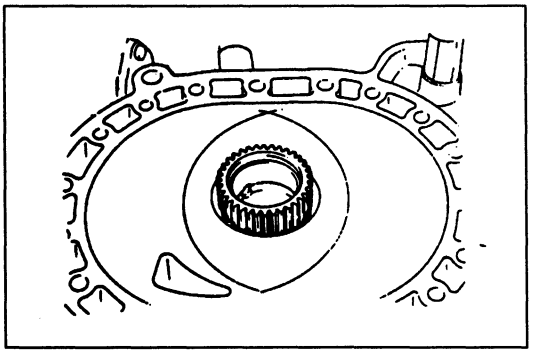
PREPARATION
SST

49 0813 225 Remover, oil seal		For cleaning of rotor

Clean all parts, making sure to remove any gasket fragments, dirt, oil, grease, carbon, and other materials.

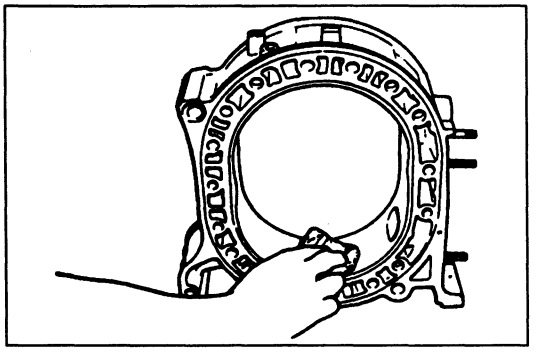


Side Housing (front, intermediate and rear housings)
1. Remove the sealing agent from the housing surface by using a cloth or a brush soaked in solvent or thinner.

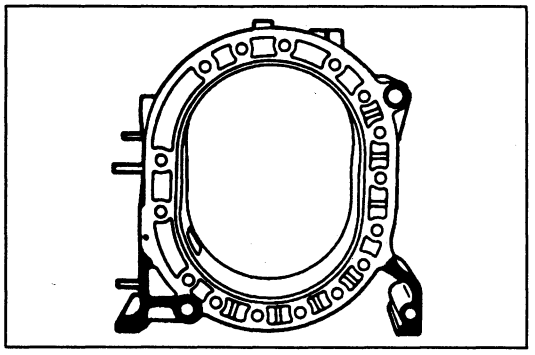


2. Remove all carbon from the rotor chamber surface by using extrafine emery paper.

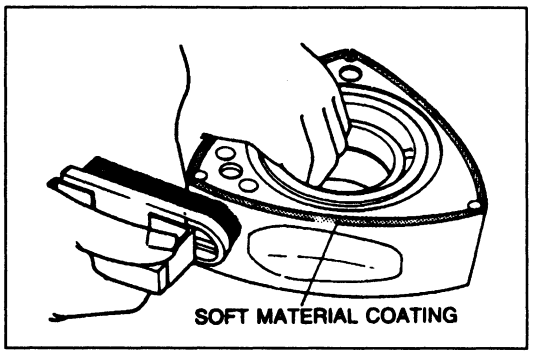
Caution
- **Carbon scrapers can damage the surface.**



Rotor Housing
1. Inspect for traces of gas or water leakage along the inner margin of the rotor housings.
2. Remove all carbon from the inner surface of the rotor housing by wiping with a cloth soaked in solvent or thinner.



3. Remove all deposits and rust from the coolant passages of the housing.
4. Remove the sealing agent from the housing by wiping with a cloth or brush soaked in solvent or thinner.



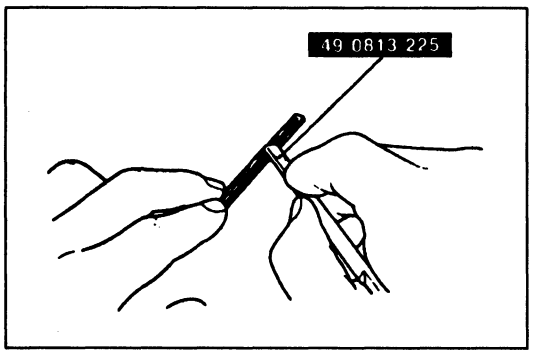
Rotor

1. Remove the carbon from the rotor by using a nonabrasive sponge and carbon cleaner.

Caution

- **Cleaning materials can damage the soft material coating on the side surfaces.**

2. Remove the carbon from each groove.
3. Wash the rotor with a cleaning solution.

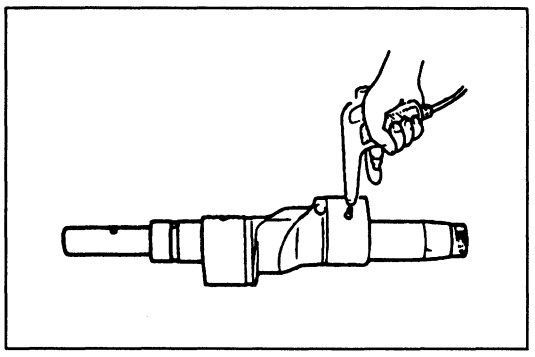


Rotor Seal (apex, side and corner seals)

1. Remove the carbon from each seal by using the **SST**.
2. Wash the seals with a cleaning solution.

Caution

- **Emery paper will damage the seals. Don't use emery paper.**

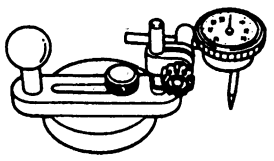
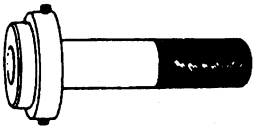
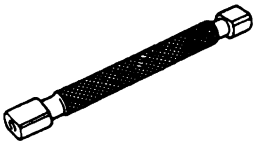
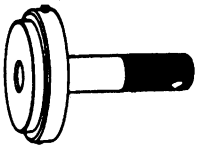


Eccentric Shaft

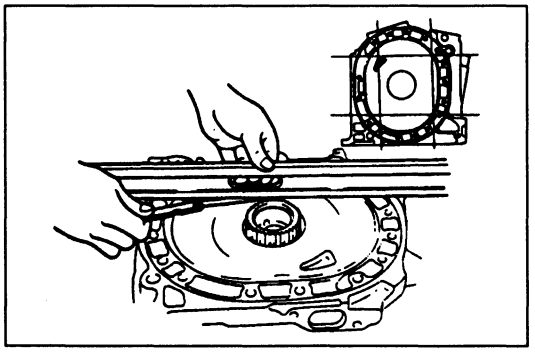
1. Wash the eccentric shaft with a cleaning solution.
2. Blow the oil passages to clean with compressed air.

INSPECTION / REPAIR

PREPARATION
SST

49 0727 570 Body, gauge		For inspection of side housing	49 0813 235 Replacer main bearing		For removal / installation of main bearing
49 0839 165 Gauge, corner seal		For inspection of corner seal	49 0813 240 Replacer rotor bush		For removal / installation of rotor hearing

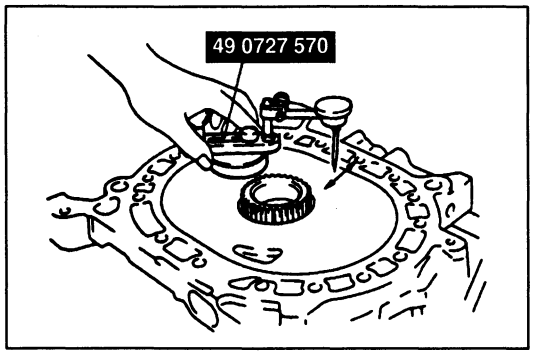
1. Clean all parts, making sure to remove any gasket fragments, dirt, oil, grease, carbon, moisture residue, and other foreign materials. (Refer to page C-50.)
2. Inspect and repair in the specified order.



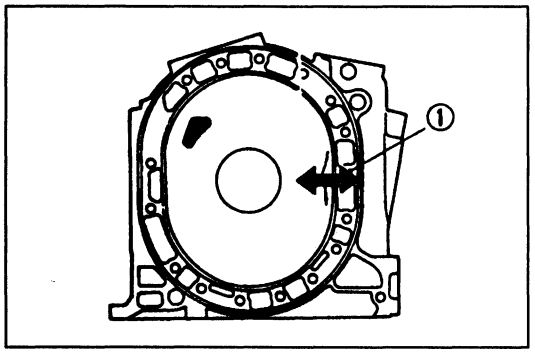
Side Housing (front, intermediate and rear housings)

1. Check the housing surface for warpage in the four directions shown in the figure. If necessary, replace the housing.

   Warpage: 0.04 mm {0.0016 in} max.

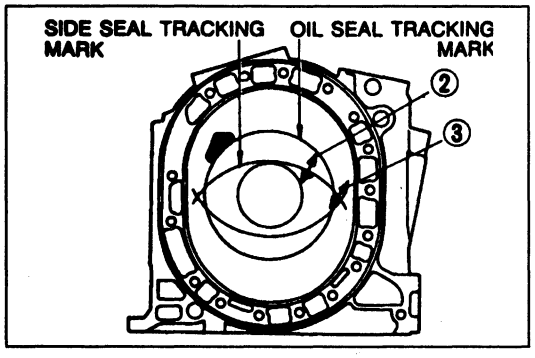


2. Check the contact surface for wear by using a dial indicator mounted on the **SST**. Slide the gauge across the area as indicated in the figure.



(1) Side seal wear

Wear: 0.10 mm {0.0039 in} max.

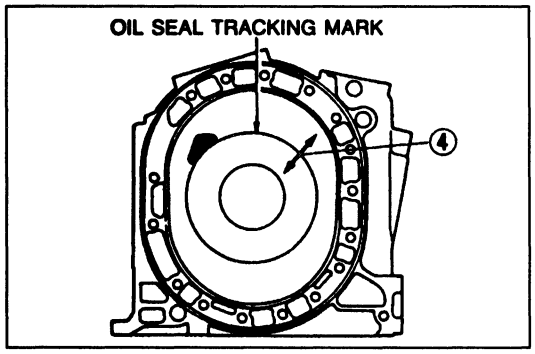


(2) Side seal wear, overlapping oil seal wear

Wear: 0.01 mm {0.0004 in} max.

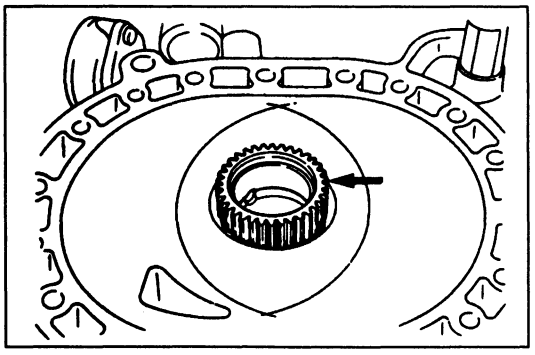
(3) Side seal wear, outside oil seal wear

Wear: 0.10 mm {0.0039 in} max.



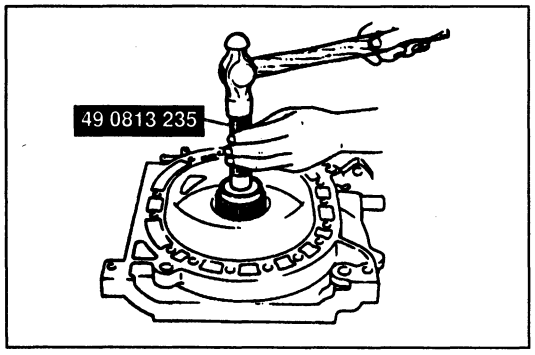
(4) Oil seal wear

Wear: 0.02 mm {0.0008 in} max.

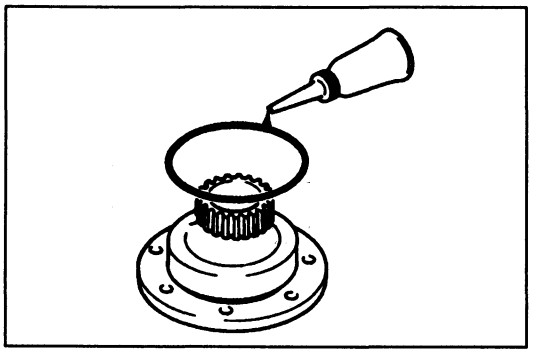


Stationary Gear

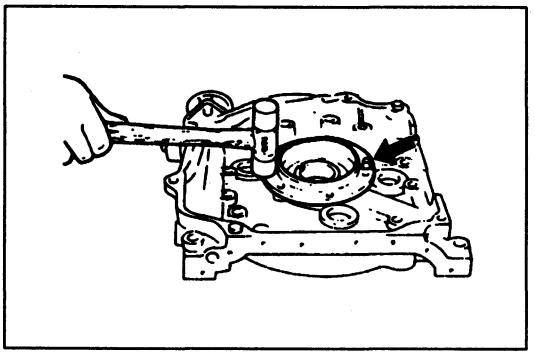
1. Check the front and rear stationary gear for cracked, scored, worn, and chipped teeth.



2. If necessary, replace the stationary gear.
   (1) (Front stationary gear)
   Remove the plate, needle bearing, and thrust plate.
   (Rear stationary gear)
   Remove the attaching bolts.
   (2) Remove the stationary gear by using the **SST**.

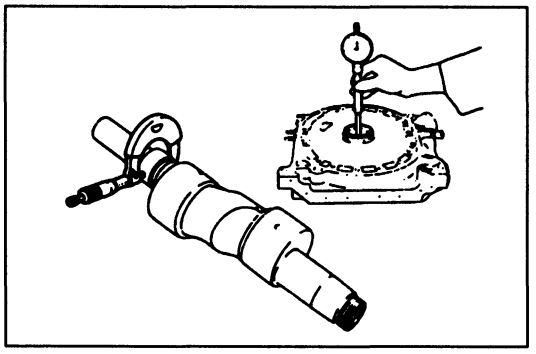


(3) (Rear stationary gear only)
Apply petroleum jelly to a new O-ring and install it on the rear stationary gear. Apply sealant to the stationary gear flange.

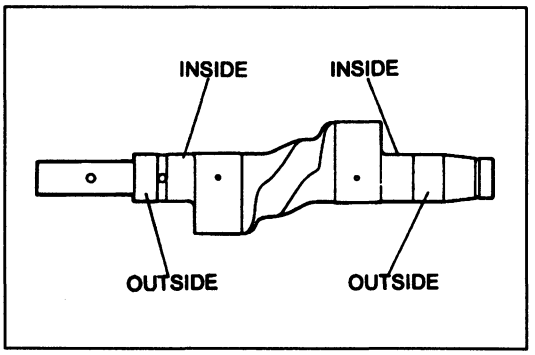


(4) Install the stationary gear to the housing so that the slot of the stationary gear is fit over the dowel on the housing.
(5) (Front stationary gear)
Install the thrust plate, needle bearing, and plate.
(Rear stationary gear)
Tighten the attaching bolts.

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

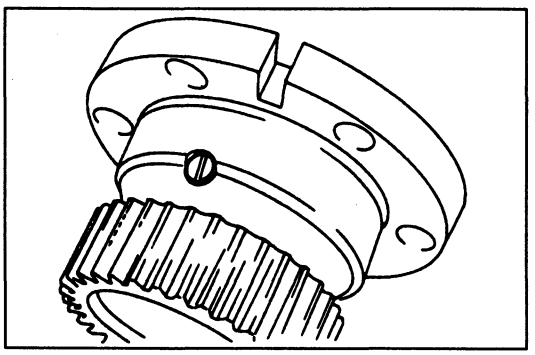


Main Bearing
1. Check the main bearing for wear, scoring, flaking, and other damage.
2. Measure the main bearing clearance. Measure the inner diameter of the main bearing and the outer diameter of the eccentric shaft main journal.

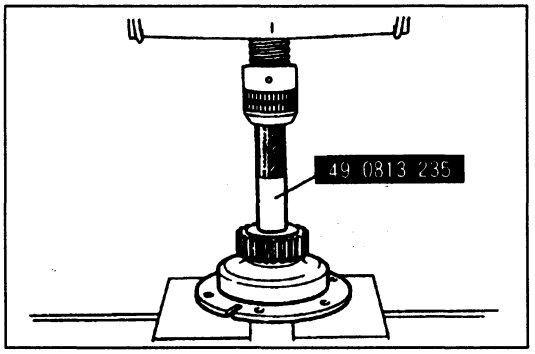


3. The inside and outside journal specifications are different.

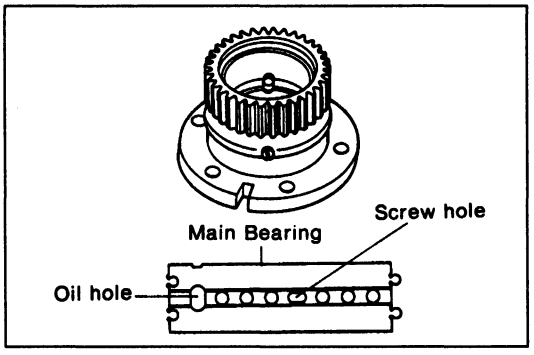
Standard clearance:
0.08–0.11 mm {0.0032–0.0043 in} outside
0.06–0.08 mm {0.0024–0.0031 in} inside
Maximum: 0.13 mm {0.0051 in} outside
0.11 mm {0.0043 in} inside



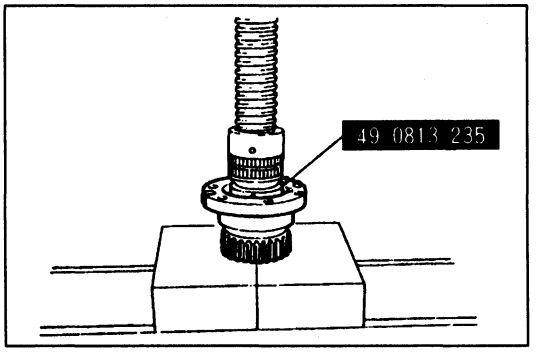
4. If necessary, replace the main bearing.
(1) Remove the stationary gear. (Refer to page C–52.)
(2) Remove the screw.



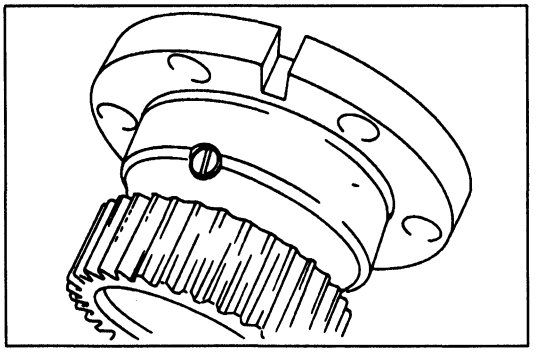
(3) Place the stationary gear on the support with the gear facing upward.
(4) Press out the main bearing by using the **SST** without the adapter ring. Discard the bearing.



(5) Place the stationary gear on the support with the gear downward.
(6) Place the new main bearing on the stationary gear so that the small hole is in line with the screw hole of the stationary gear.

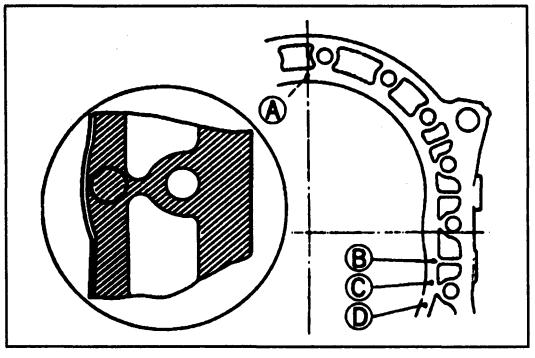


(7) Press in the main bearing by using the **SST**.

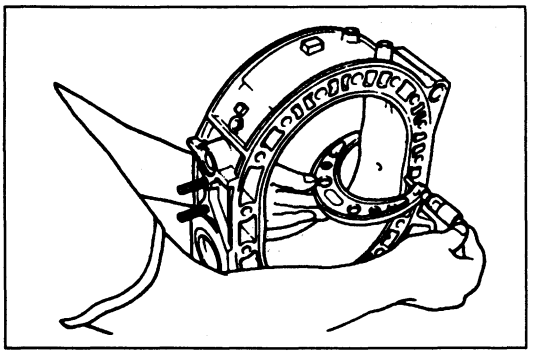


(8) Remove the thread-locking compound from the screw and screw hole threads.
(9) Apply new thread-locking compound to the screw threads and tighten the screw.

Tightening torque:
3.3–4.7 N·m {33–48 kgf·cm, 29–41 in·lbf}



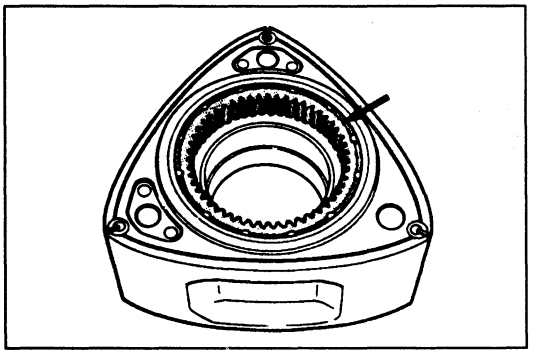
Rotor Housing
1. Check the chromium plated surface on the rotor housing for scoring, flaking, and other damage.
2. Check the width difference of the rotor housing.
   (1) Measure the rotor housing width at the points Ⓐ, Ⓑ, Ⓒ, and Ⓓ, as shown in the figure.



(2) Calculate the difference between the value of point Ⓐ and the minimum value among points Ⓑ, Ⓒ, and Ⓓ.

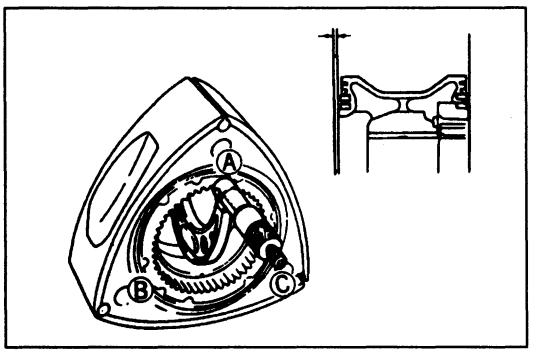
Difference: 0.06 mm {0.0024 in} max.

3. If the difference exceeds the specification, replace the rotor housing.



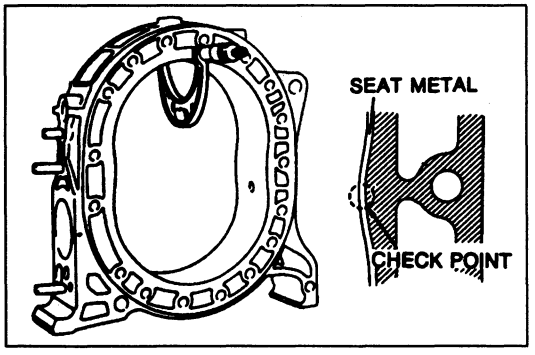
Rotor

1. Carefully inspect the rotor and replace if it is severely worn or damaged.
2. Check the internal gear for cracked, scored, worn, and chipped teeth.

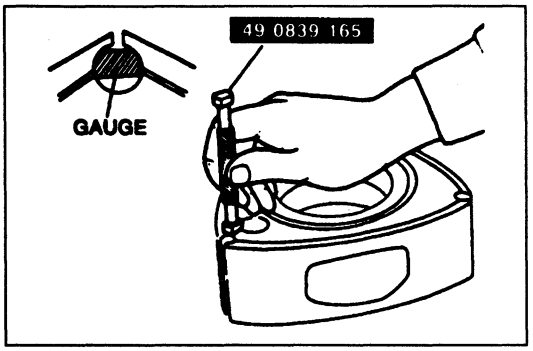


3. Check the clearance between the side housing and rotor. Measure the rotor housing width (point Ⓐ) and the maximum rotor width at the three points indicated in the figure.

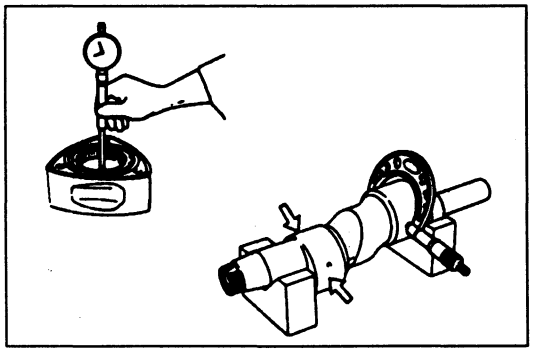
Standard: 0.12–0.21 mm {0.0048–0.0082 in}
Clearance: 0.10 mm {0.0039 in} min.



4. If the clearance is less than specified, replace the rotor assembly.



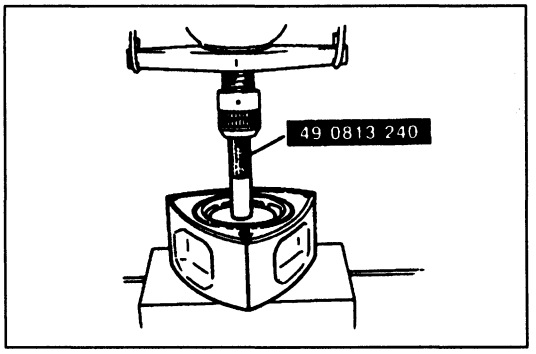
5. Check the corner seal bore for wear by using the **SST**.
   (1) If neither end of the gauge goes into the bore, use the original corner seal.
   (2) If only one end of the gauge goes into the bore, replace the corner seal.
   (3) If both ends of the gauge go into the bore, replace the rotor.



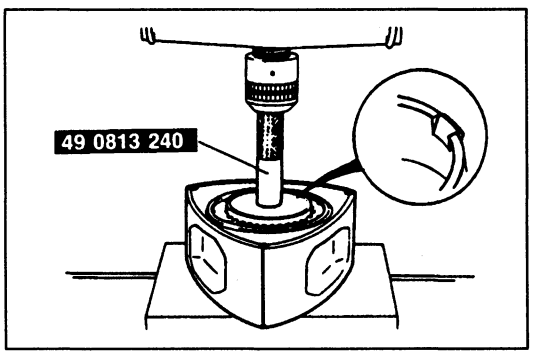
Rotor Bearing

1. Check the rotor bearing for wear, flaking, scoring, and other damage.
2. Check the rotor bearing clearance. Measure the inner diameter of the rotor bearing and the outer diameter of the eccentric shaft rotor journal.

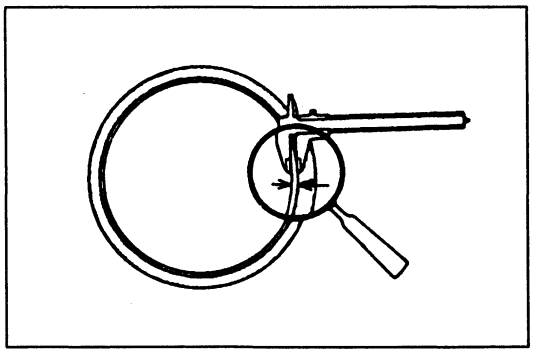
Standard clearance:
0.06–0.08 mm {0.0024–0.0031 in}
Clearance: 0.10 mm {0.0039 in} max.



3. If not within specification, replace the rotor bearing.
   (1) Place the rotor on a support with the internal gear downward.
   (2) Press the bearing out of the rotor by using the **SST** without the adapter ring.



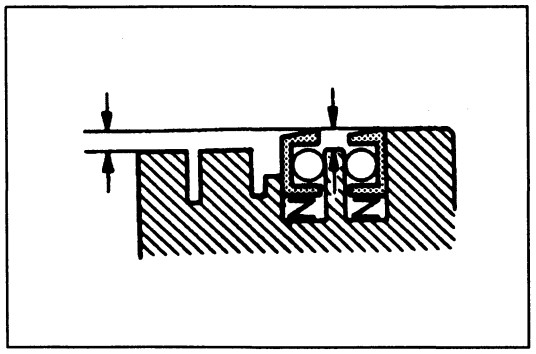
   (3) Place the rotor on the support with the internal gear facing upward.
   (4) Place the new rotor bearing on the rotor so that the bearing lug is in line with the slot of the rotor bore.
   (5) Using the **SST**, press the bearing in until it is flush with the rotor boss.



Rotor Oil Seal

1. Inspect the oil seal for wear and damage. If necessary, replace it.
2. Check the oil seal lip width.

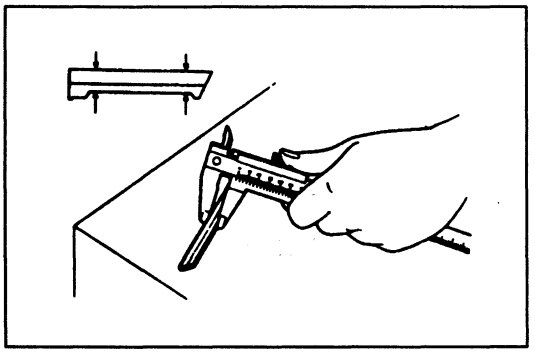
Lip width: 0.5 mm {0.020 in} max.



3. Install the oil seal springs and oil seals into their respective grooves.
4. Check the oil seals for free vertical movement.
5. Check the oil seal protrusion.

Protrusion: 0.5 mm {0.020 in} min.

6. If necessary, replace the oil seal or the spring.

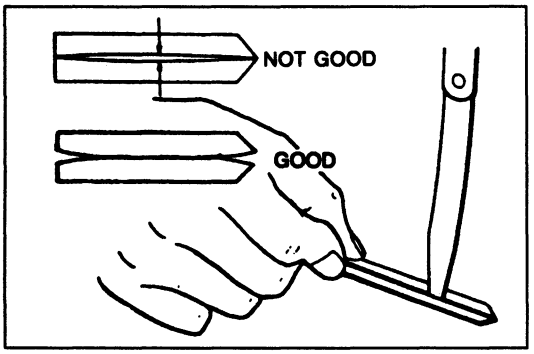


Apex Seal

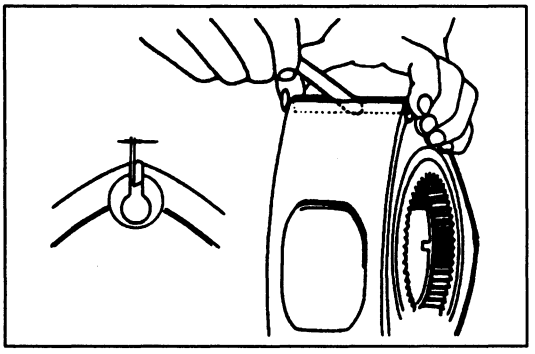
1. Check the apex seal for wear, cracks, and other damage. If necessary, replace it.
2. Measure the combined height of the upper and lower apex seals at two points.

   Standard height: 8.5 mm {0.33 in}
   Height: 6.5 mm {0.256 in} min.

3. If the apex seal height is below 6.5 mm {0.256 in}, replace the apex seals together with apex seal springs.

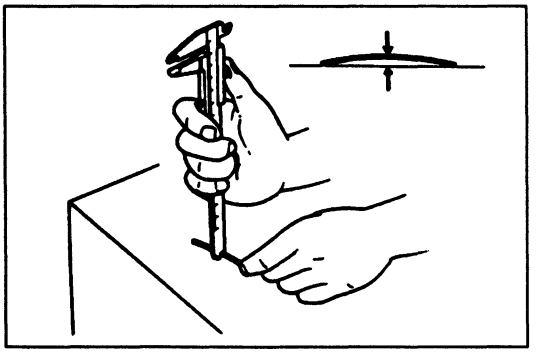


4. Check the apex seals for warpage.
   Put two apex seals together, top-to-top, and check the warpage. Do this with all three seals.
   If warpage exists in the middle of the seals, replace the apex seals.
   If the warpage exists in the ends of the seals, the seals can be reused.



5. Check the clearance between the apex seal and the groove. Place the apex seal in its respective groove in the rotor, and measure the apex seal clearance. If necessary, replace it.

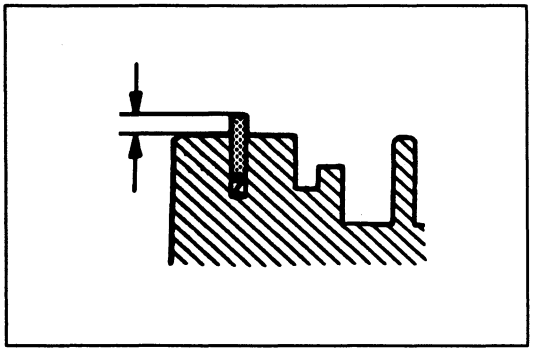
   Standard clearance
   0.051–0.101 mm {0.0020–0.0039 in}
   Maximum: 0.15 mm {0.0059 in}



6. Check the long apex seal spring free height. If necessary, replace it.

   Free height: 3.5 mm {0.138 in}

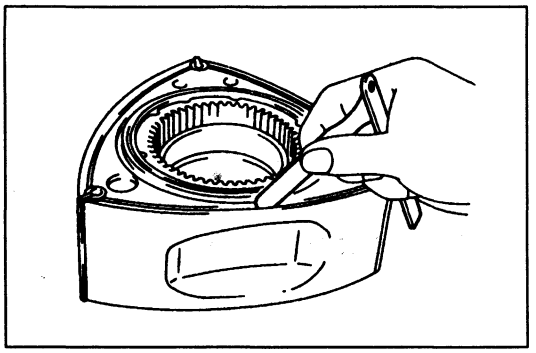
   Note
   - Replace the short apex seal spring only when the apex seals are replace in step 3.



Side Seal

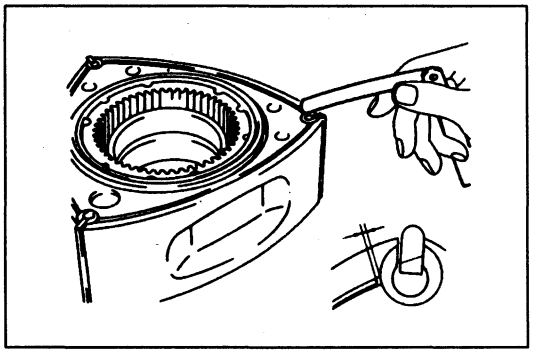
1. Inspect the side seal for wear and damage. If necessary, replace it.
2. Install the side seal spring and side seal into their respective groove.
3. Check the side seal for free vertical movement.
4. Check the side seal protrusion.

   Protrusion: 0.5 mm {0.020 in} min.



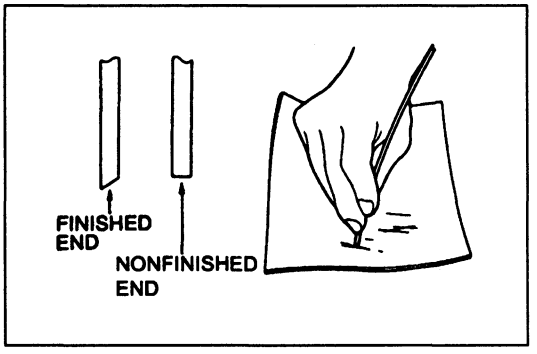
5. Check the clearance between the side seal and the groove.

Standard clearance:
0.028–0.078 mm {0.0011–0.0030 in}
Clearance: 0.10 mm {0.0039 in} max.



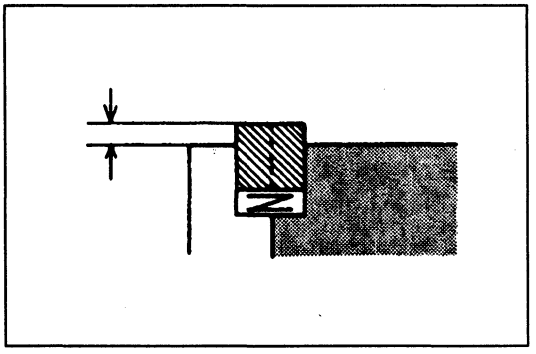
6. Check the clearance between the side seal and the corner seal.

Standard clearance:
0.05–0.15 mm {0.0020–0.0059 in}
Clearance: 0.40 mm {0.016 in} max.



7. If necessary, replace the side seal.
Adjust the clearance between the new side seal and cornerseal by carefully lapping the nonfinished end.

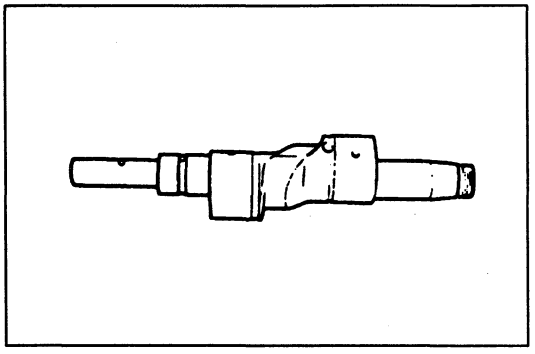
Adjusted clearance:
0.05–0.15 mm {0.002–0.0059 in}



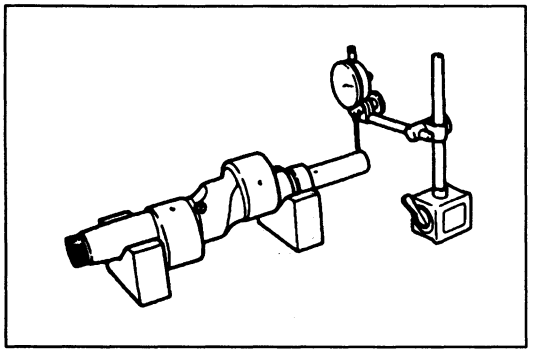
Corner Seal
1. Inspect the corner seal and soft seal for wear, cracks, and other damage. If necessary, replace them.
2. Install the corner seal spring and corner seal into its respective groove.
3. Check the corner seal for free vertical movement.
4. Check the corner seal protrusion.

Protrusion: 0.5 mm {0.020 in} min.

5. If necessary, replace the corner seal and/or the spring.

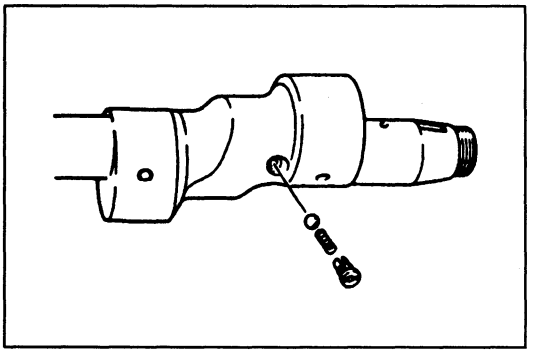


Eccentric Shaft
1. Check the eccentric shaft for cracks, scoring, wear, and other damage.
2. Verify that the oil passages are open.

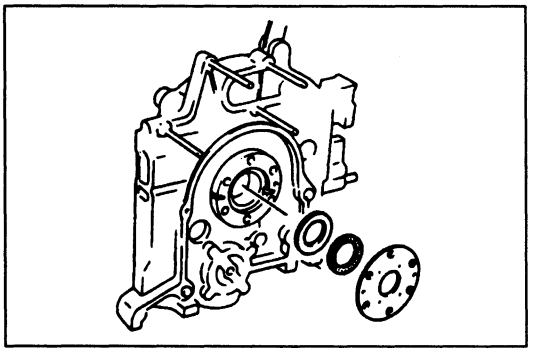


3. Check the eccentric shaft runout. Measure the runout at the end of the shaft, and replace the shaft if necessary.

Runout: 0.06 mm {0.0024 in} max.

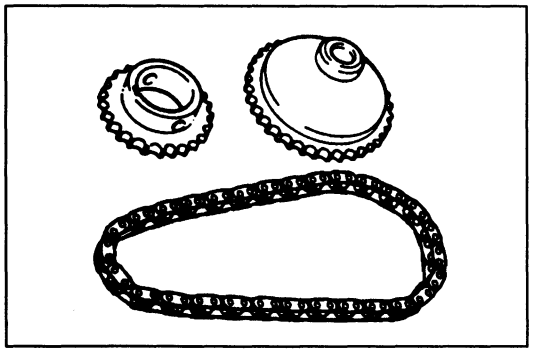


4. Check the oil jet spring for weakness, and check for sticking and damage of the steel ball.
5. Check the oil seal and pilot bearing. (Refer to section C.)



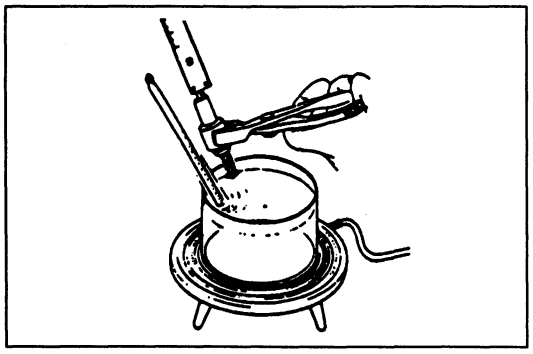
Needle Bearing and Thrust washer

1. Check the needle bearing for wear and damage.
2. Check the bearing housing and thrust plate for wear and other damage.



Oil Pump Drive Chain and Sprocket Wheel

1. Check the oil pump drive chain for broken links.
2. Check the oil pump drive sprocket and oil pump sprocket wheel for cracks and worn or damaged teeth. If necessary, replace with new parts.



Eccentric Shaft Bypass Valve

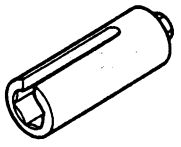
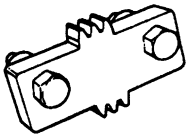
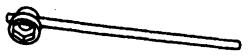
1. Place the eccentric shaft bypass valve in oil and heat up the oil gradually.
2. Check the protrusion of the valve at **60°C {140°F}**.

Protrusion: 6 mm {0.24 in} min.

3. If not as specified, replace the bypass valve.

ASSEMBLY

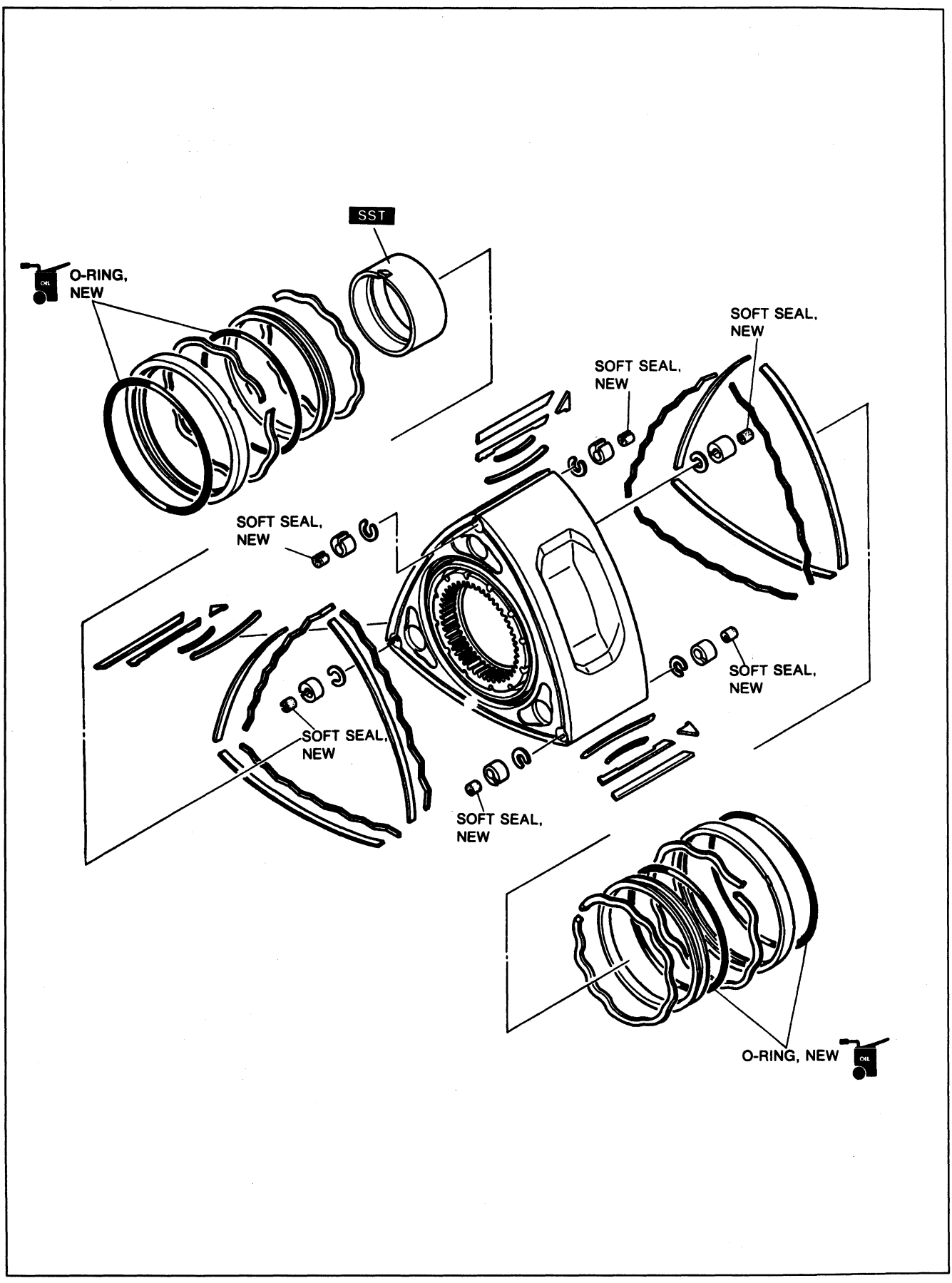
PREPARATION
SST

49 H018 001 Wrench, knock sensor 	For installation of knock sensor	49 F011 101 Brake, ring gear 	For prevention of engine rotation
49 0820 035 Box wrench, flywheel 	For removal / installation of locknut	49 1881 055A Stopper counter weight 	For prevention of engine rotation

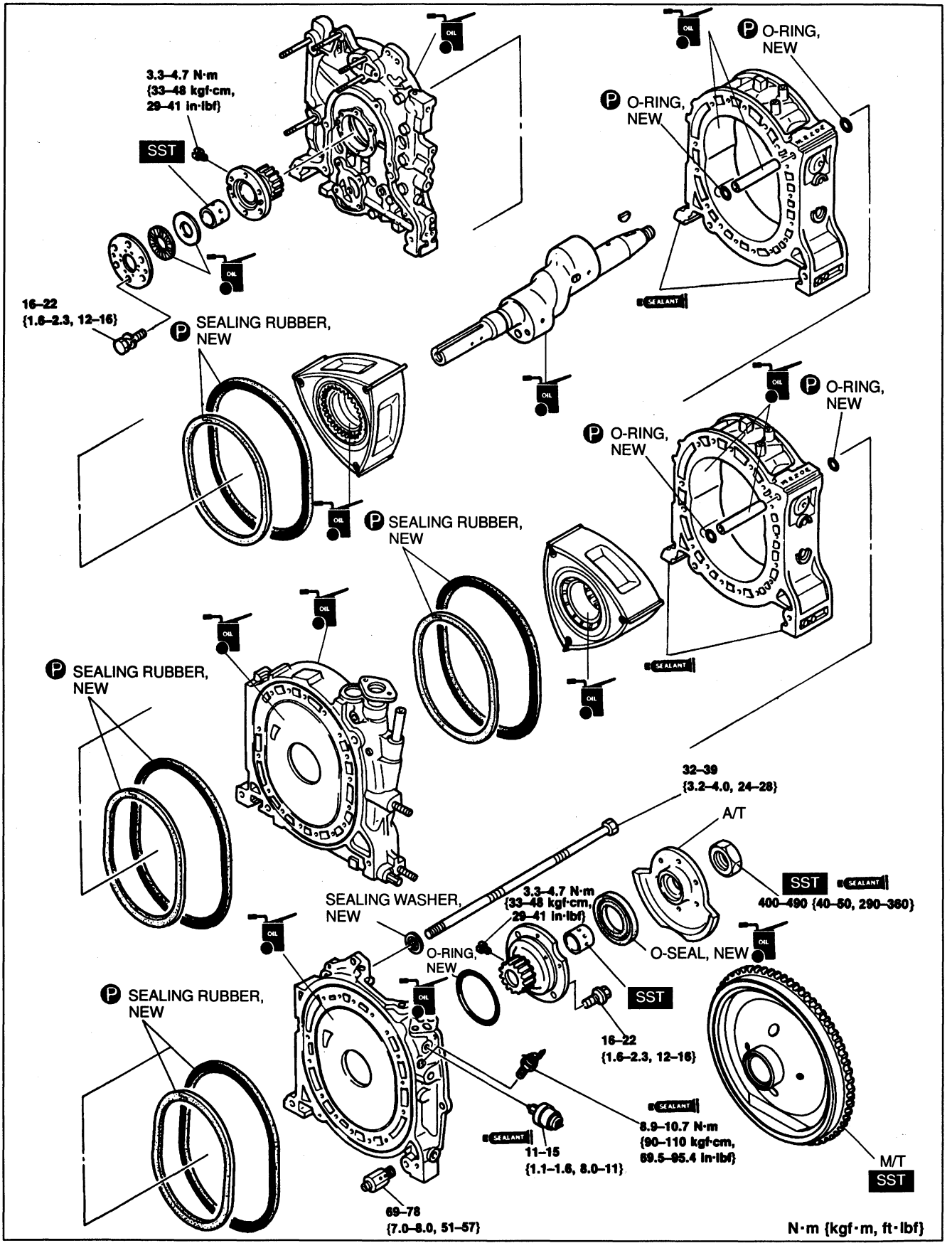
1. Do not reuse gaskets or oil seals.
2. Clean all parts before reinstallation.
3. Apply clean engine oil to all sliding and rotating parts.
4. Install identical parts (such as rotor seals, seal springs, rotor oil seals, and rotor) in the exact positions from which they were removed.
5. Replace plain bearings if they are peeling, burned, or otherwise damaged.
6. Tighten all bolts and nuts to the specified torques.

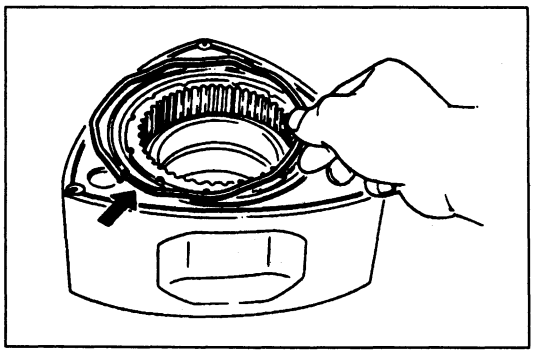
Caution
- **Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.**

HOUSING (ROTOR)



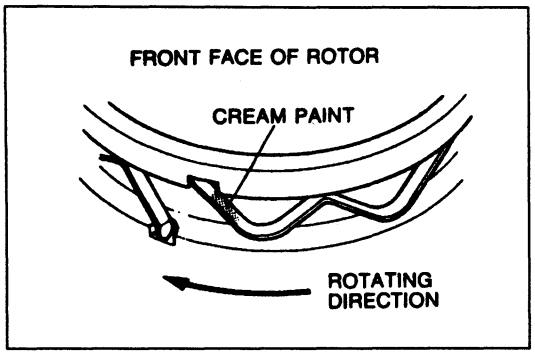
HOUSING (INTERNAL PARTS)
Torque Specifications



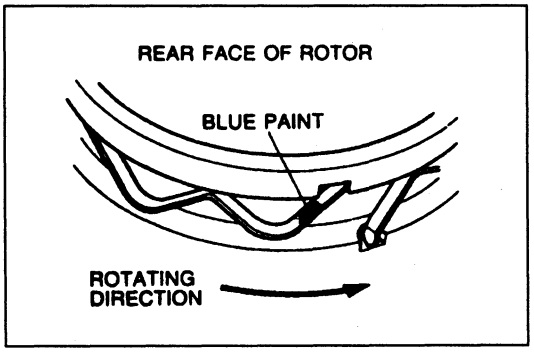


Rotor Oil Seal

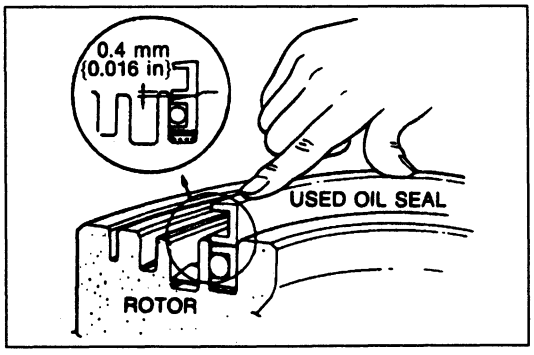
1. Verify that the oil seal moves smoothly in the groove without the O-ring in place. Do not deform the oil seal lip.
2. Install the oil seal springs in their respective grooves on the rotor with the round edge of the spring fitted in the stopper hole of the oil seal grooves.



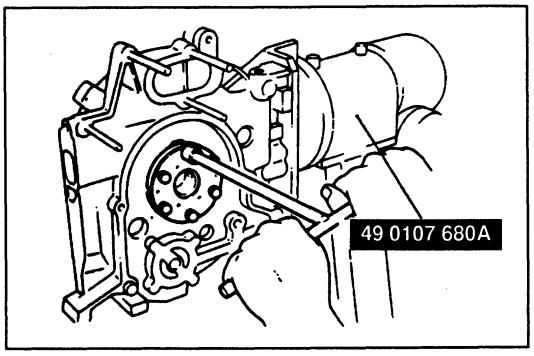
3. The oil seal springs are identified by a paint mark.
   Cream . . . for front faces of the front and rear rotors.
   Blue . . . . . for rear faces of the front and rear rotors.



4. Apply engine oil to the new O-ring.
5. Install the O-ring in the oil seal.
6. Place the inner oil seal in the oil seal groove so that the square edge of the spring fits into the notch of the oil seal.



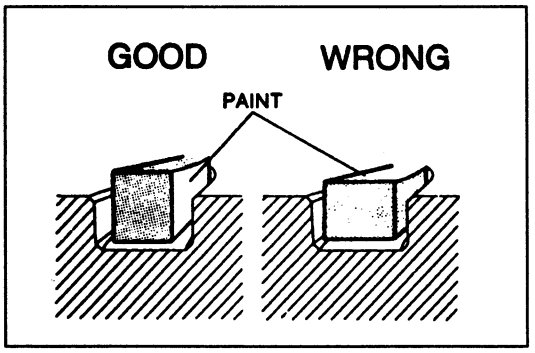
7. Press in the oil seal by using a used oil seal until the lip of the new oil seal is approximately **0.4 mm {0.016 in}** below the surface of the rotor.
8. Push the oil seal slowly by hand and make sure it moves freely.



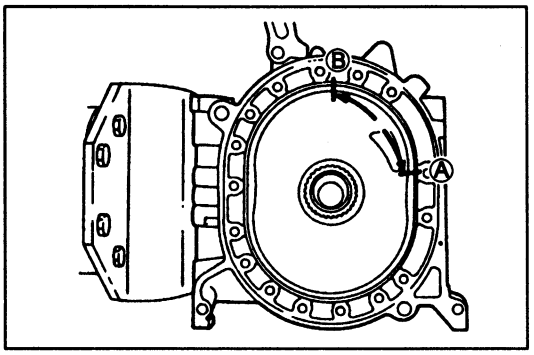
Front Housing

1. Mount the front housing to the **SST**.
2. Position the thrust plate with the chamfer facing toward the front housing. Install the needle bearing and plate.

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

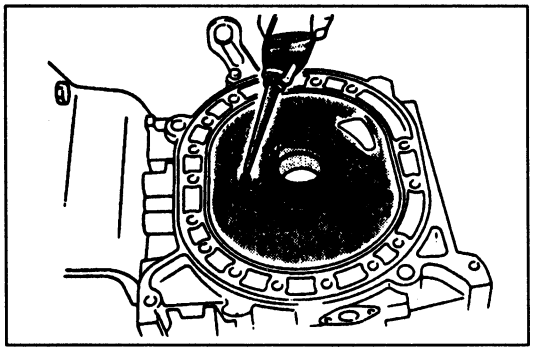


3. Apply petroleum jelly to the new outer and inner sealing rubbers.
4. Install the outer sealing rubber so that the white paint faces the side wall of the groove.



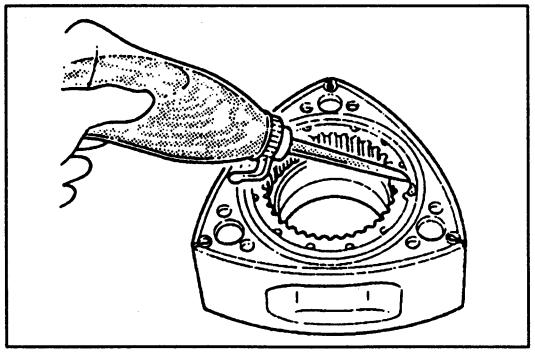
5. Install the inner sealing rubber so that the blue paint faces the outer wall of the groove and the seam is placed within the position shown in the figure.
6. Fit the sealing rubbers in the intermediate housing so that their joints are positioned between points A and B of the housing, and the painted sides fase as shown in the figure.

Caution
- **Twisting the sealing rubber and allowing oil or grease on it can damage the rubber.**

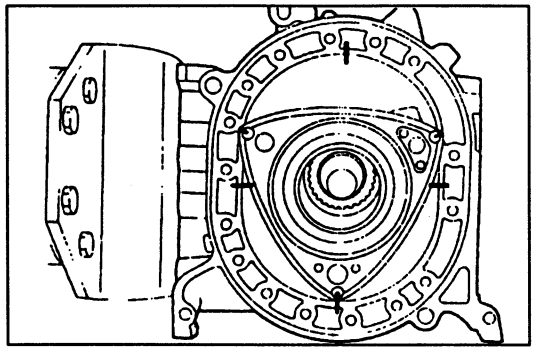


7. Apply engine oil to the contact surfaces, stationary gear, and main bearing.

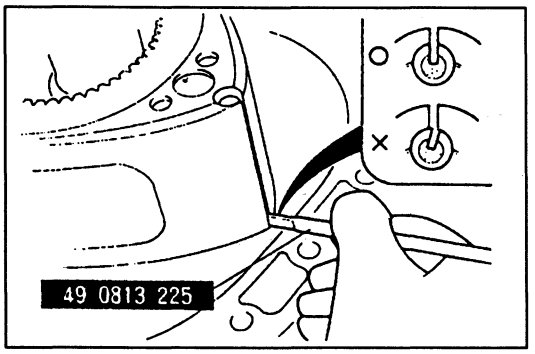
Caution
- **Do not apply engine oil to the sealing rubber. It will adversely effect the petroleum jelly previously applied.**



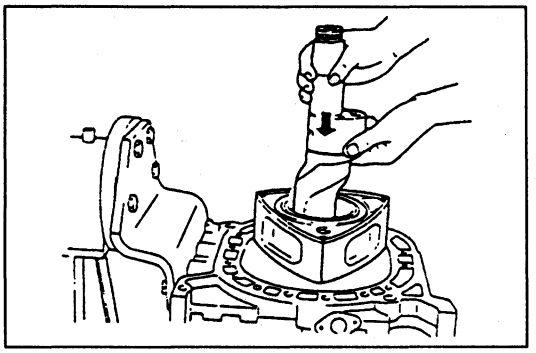
Front rotor
1. Apply engine oil to the oil seal, side seal, main bearing, and internal gear of the rotor.



2. Place the rotor on the front housing and engage the housing stationary gear and the rotor intarnal gear. Position the rotor so that one of its apexes (apex seal groove) points the bottom of the engine (intake bottom dead center).



3. Insert the **SST** into each apex seal groove and verify that the grooves in the rotor and corner seals are aligned.



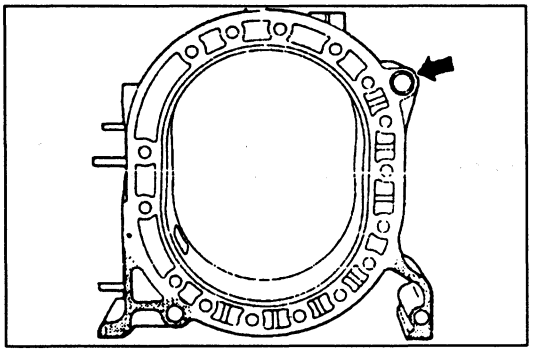
Eccentric shaft

1. Apply engine oil to the eccentric shaft journals.

Caution

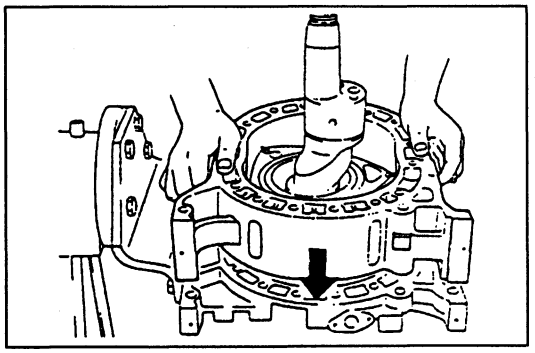
- **The eccentric shaft can scratch or damage the rotor bearing and main bearing when inserted.**

2. Align the eccentricity of the eccentric shaft and the rotor, and insert the eccentric shaft into the rotor and housing.

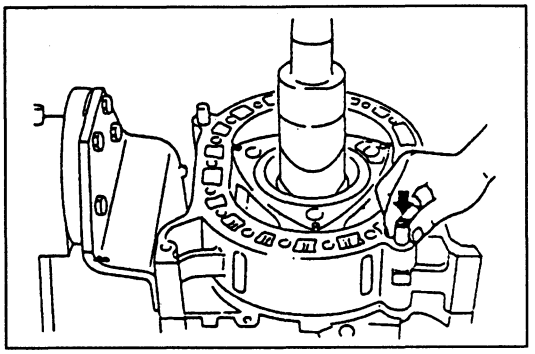


Rotor housing

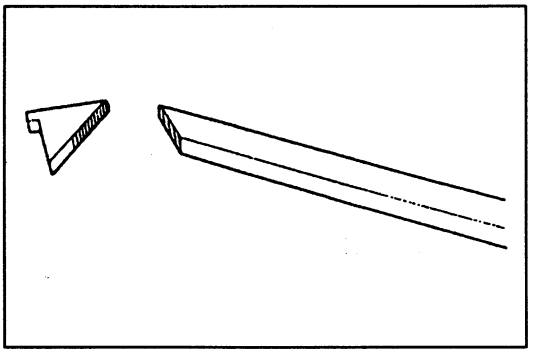
1. Coat a new O-ring with petroleum jelly and fit it in the tubular dowel hole in the rotor housing.
2. Degrease the rotor housing pedestal and apply sealant. (Shaded areas in the figure.)



3. Apply engine oil to the rotor housing inner surface and install it to the front housing.

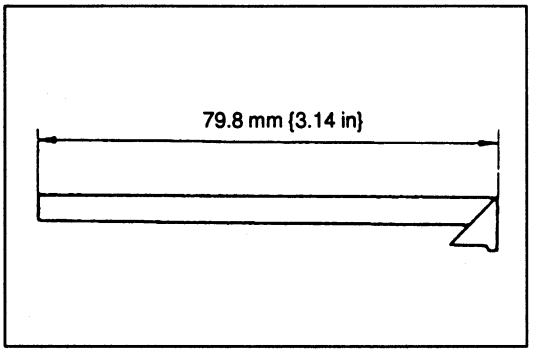


4. Coat the tubular dowel with engine oil and insert it into the tubular dowel holes in the rotor housing and front housing, making sure that the dowel is fully inserted.

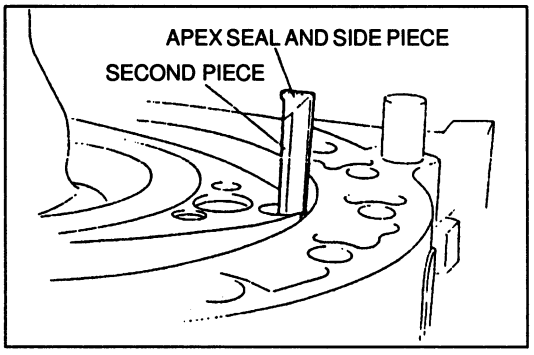


Apex seal

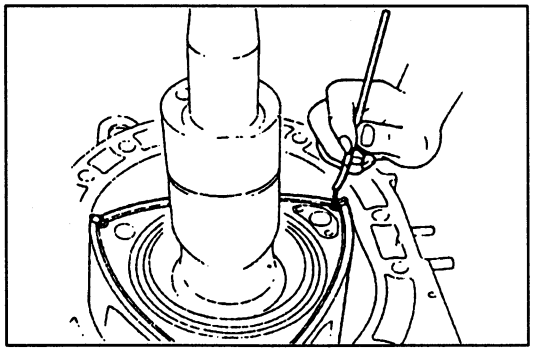
1. When apex seals are reused, assemble them in the following procedure. When new apex seals are used, go to step 2.
   (1) Remove any old bonding agent from the contact surfaces of the apex seal and side piece with a knife and degrease them with paint thinner.
   (2) Apply a drop of bonding agent to the contact surface of the apex seal and side seal.



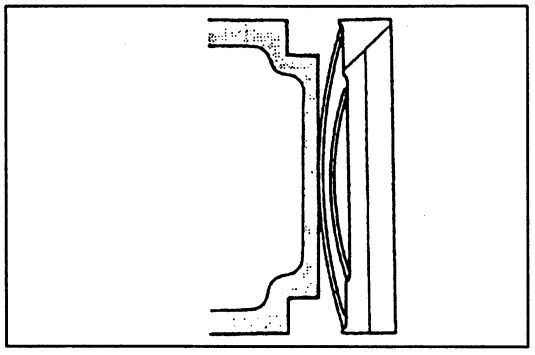
   (3) Adhere the apex seal and side piece to the specified length. The joint must be plane.
   (4) Remove excessive bonding agent with a knife.



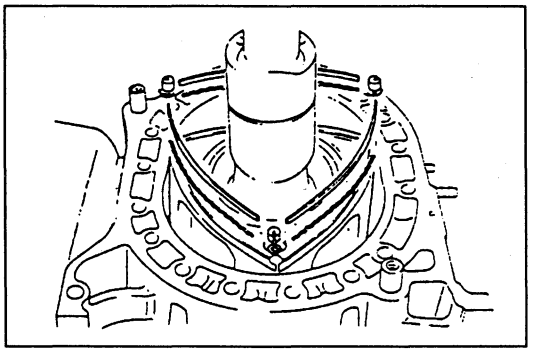
2. Install the second piece to the apex seal and side piece that is assembled in step 1. Face the side piece to the rear of the engine and insert the assembly into the apex seal groove in the rotor.



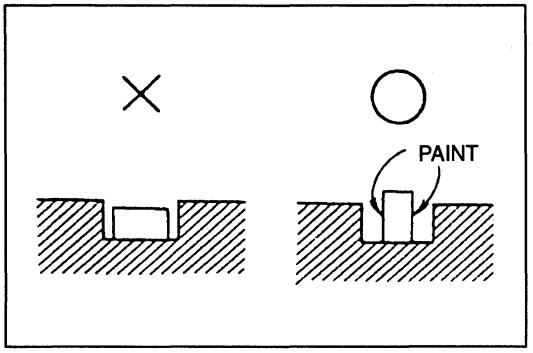
3. Install the short apex seal spring between the apex seal and apex seal groove. Face the spring toward the apex seal and press until the spring is fastened by the spring stopper on the side piece.



4. Install the long apex seal spring over the short apex seal spring. Press the spring until it is fastened by the spring stopper on the side piece.



5. Install the corner seals.
6. Install the side seals.

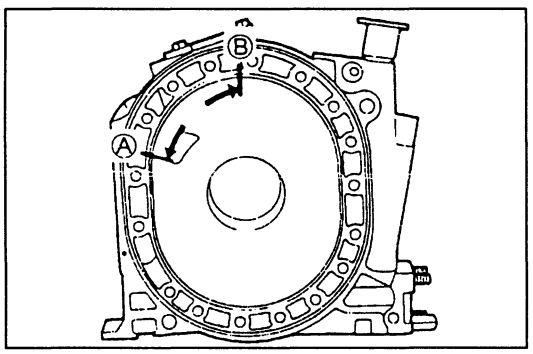


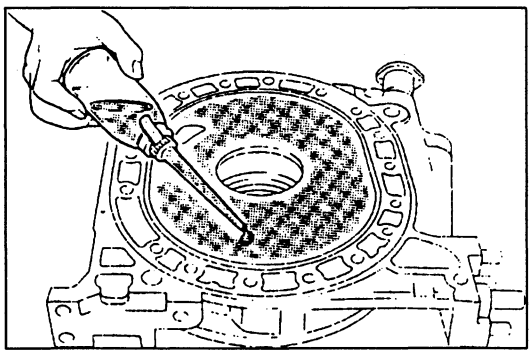
Intermediate housing

1. Apply petroleum jelly to the new sealing rubbers.
2. Fit the sealing rubbers in the intermediate housing so that their joints are positioned between points A and B of the housing, and the painted sides fase as shown in the figure.

Caution

- **Twisting the sealing rubber and allowing oil or grease on it can damage the rubber.**

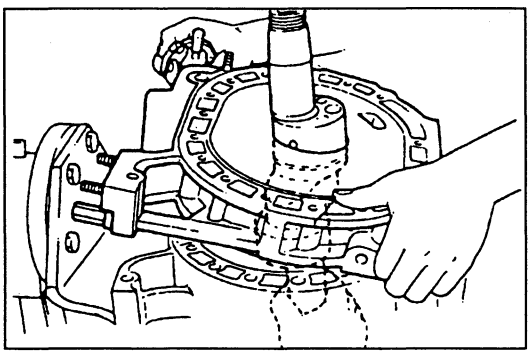




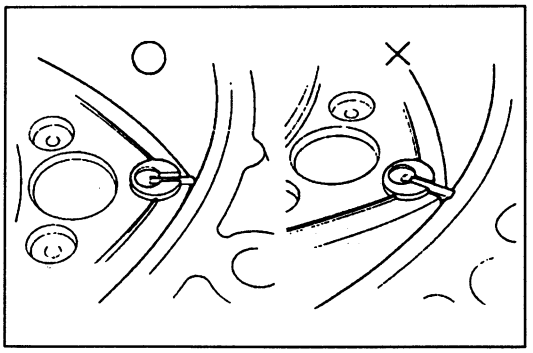
3. Apply engine oil to the seals of the front rotor.
4. Apply engine oil to the front of the contact surface of the intermediate housing.

Caution

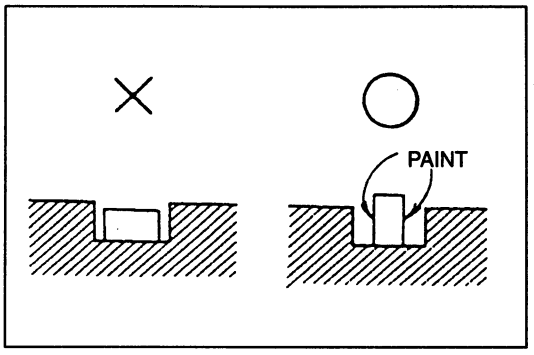
- **Do not apply engine oil to the sealing rubber. It will adversely effect the petroleum jelly previously applied.**



5. Coat new O-ring with petroleum jelly and fit it in the tubular dowel hole in the rotor housing.
6. Degrease the rotor housing pedestal and apply sealant.
7. Turn the eccentric shaft so that its rear rotor journal eccentricity is aligned with the nallower axis of the engine.

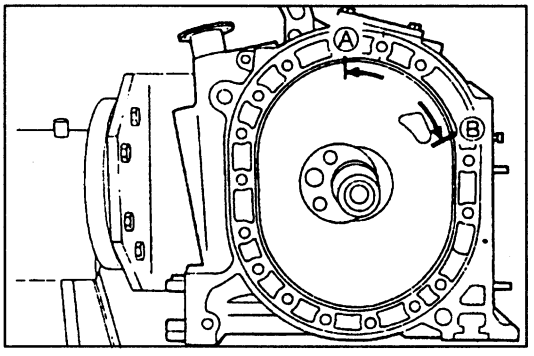


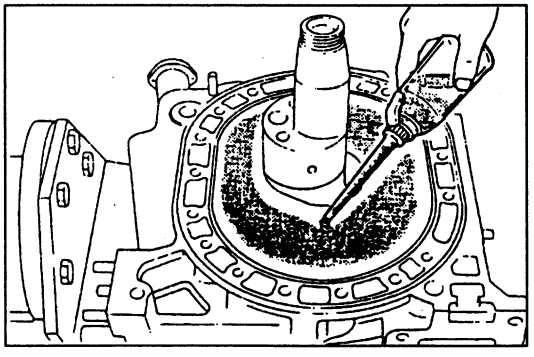
Caution
- **The side piece on the rotor can scratch or damage the intermediate housing during assembly if it is caught between the rotor housing and intermediate housing.**



8. Working with another person, hold the eccentric shaft up approx. 3cm (1.2 in) from underside and assemble the intermediate housing over the rotor housing.
9. Apply petroleum jelly to the new sealing rubbers.
10. Fit the sealing rubbers in the intermediate housing so that their joints are positioned between points A and B of the housing, and the painted sides fase as shown in the figure.

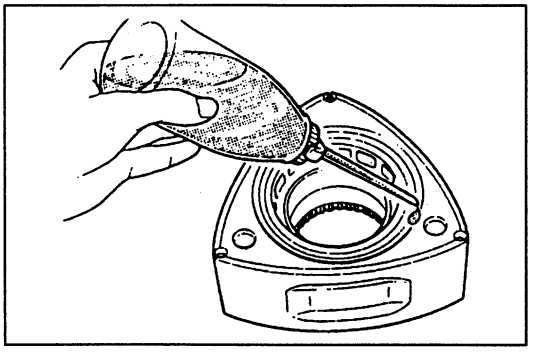
Caution
- **Twisting the sealing rubber and allowing oil or grease on it can damage the rubber.**



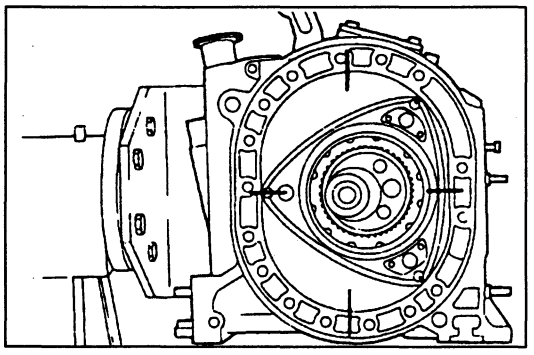


11. Apply engine oil to the seals of the front rotor.
12. Apply engine oil to the front of the sliding surface of the intermediate housing.

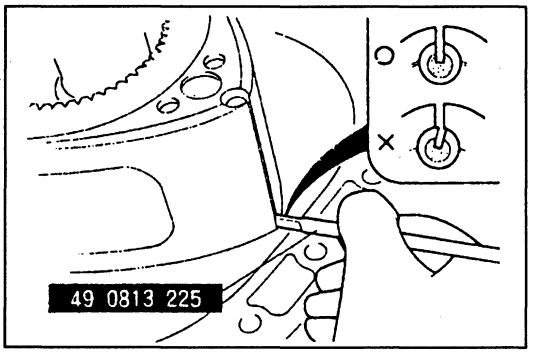
Caution
- **Do not apply engine oil to the sealing rubber. It will adversely effect the petroleum jelly previously applied.**



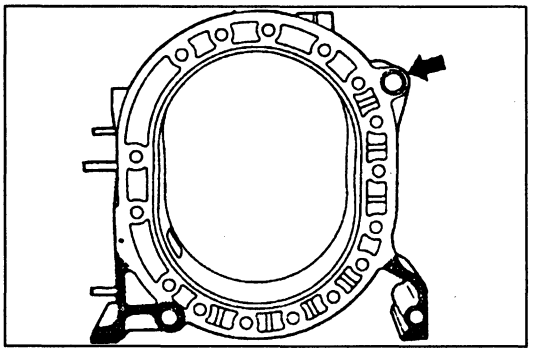
Rear rotor
1. Apply engine oil to the oil seal, side seal, and main bearing of the rotor.



2. Install the rotor on the eccentric shaft as shown in the figure.

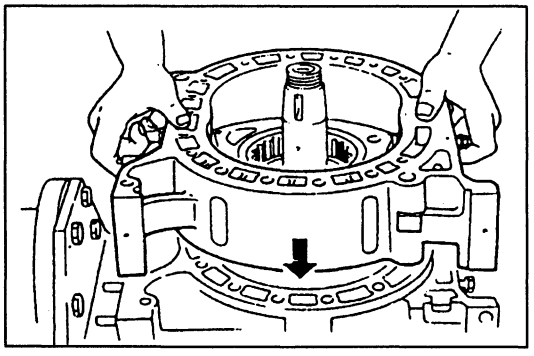


3. Insert the **SST** into each apex seal groove and verify that the grooves in the rotor and corner seals are aligned.

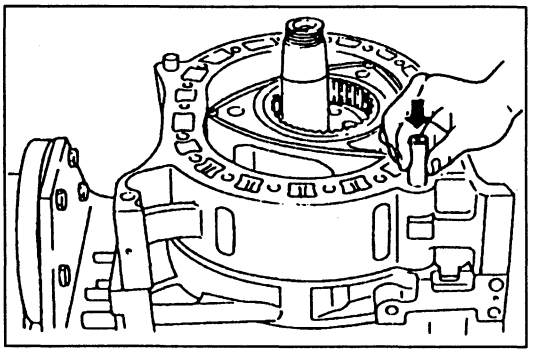


Rotor housing

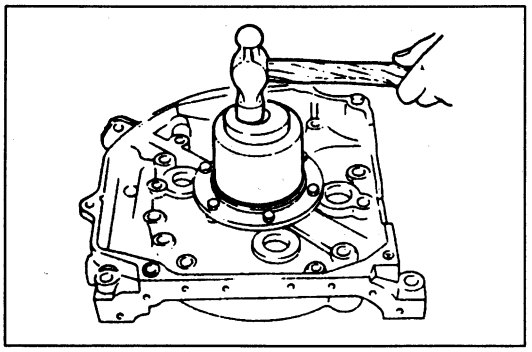
1. Coat the new O-ring with petroleum jelly and fit it in the tubular dowel hole in the rotor housing.
2. Degrease the rotor housing pedestal and apply liquid gasket. (Shaded areas in the figure.)



3. Apply engine oil to the rotor housing inner surface and install it to the intermediate housing.

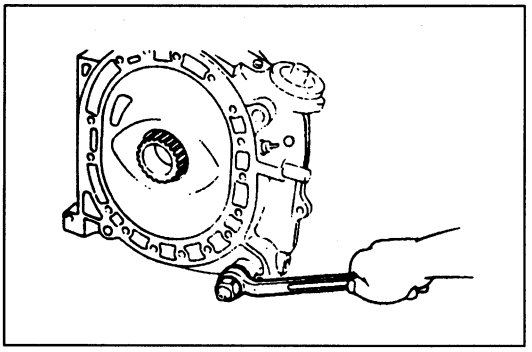


4. Coat the tubular dowel with engine oil and insert it into the tubular dowel holes in the rotor housing and intermediate housing, making sure that the dowel is fully inserted.



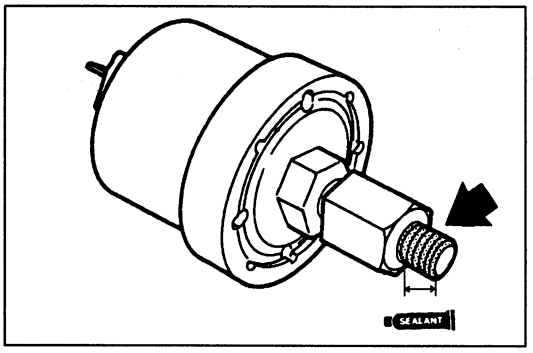
Rear Housing

1. Apply clean engine oil to a new rear oil seal and the groove of the rear stationary gear.
2. Install the oil seal into the rear stationary gear.



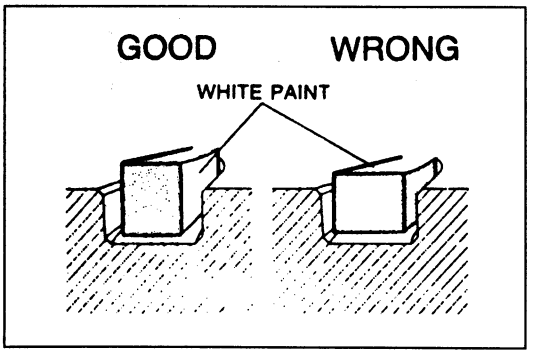
3. Install the oil regulator valve.

Tightening torque:
69–78 N·m {7.0–8.0 kgf·m, 51–57 ft·lbf}

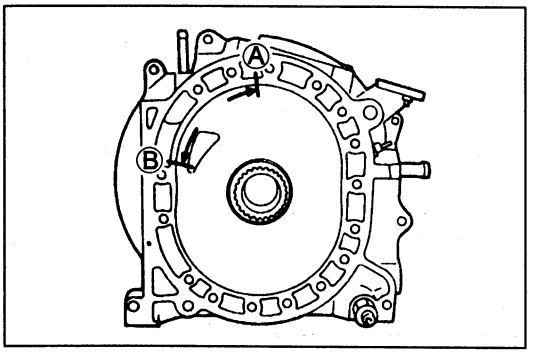


4. Apply sealant to the oil pressure switch threads. Do not allow sealant in the pressure switch hole.
5. Install the oil pressure switch.

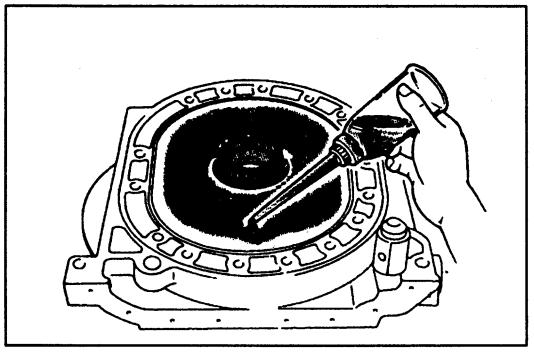
Tightening torque:
11–15 N·m {1.1–1.6 kgf·m, 8.0–11 ft·lbf}



6. Apply petroleum jelly to the new outer and inner sealing rubbers.
7. Install the outer sealing rubber so that the white paint faces the side wall of the groove.

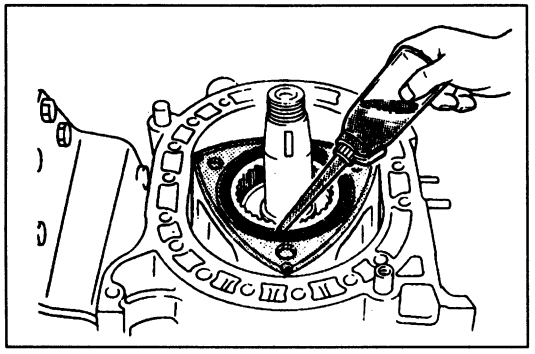


8. Install the inner sealing rubber so that the blue paint faces the outer wall of the groove and so that the seam is placed within position shown in the figure.
9. Verify that the outer and inner sealing rubbers are not twisted.

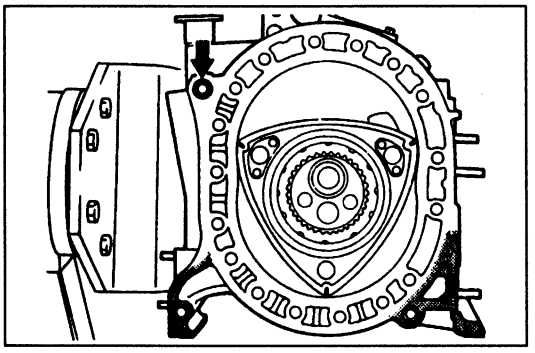


10. Apply clean engine oil to the contact surfaces, stationary gear, and main bearing.

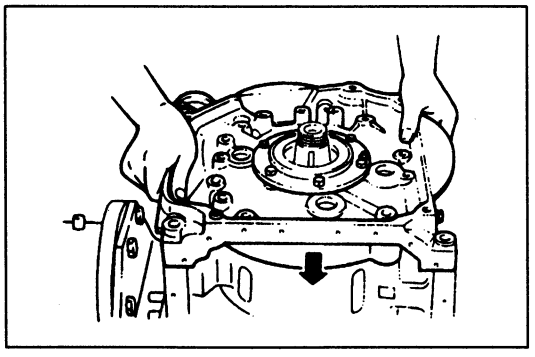
Caution
- **Do not apply engine oil to the sealing rubber. It will adversely effect the petroleum jelly previously applied.**



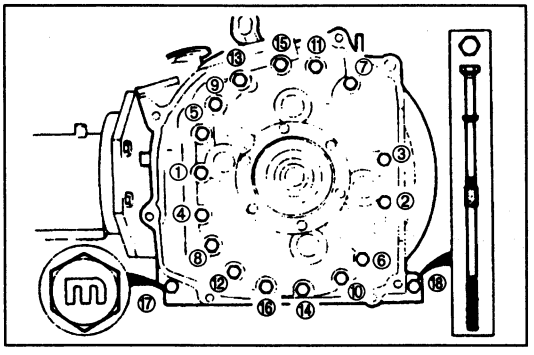
11. Apply clean engine oil to the rotor oil seal of the rear side of the rotor.



12. Apply petroleum jelly to a new O-ring and fit it into the rear rotor housing.
13. Apply sealant to the shaded areas shown in the figure.

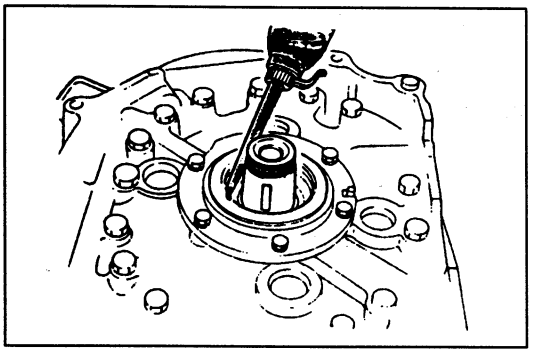


14. Install the rear housing on the rear rotor housing.
15. Verify that the side pieces of the front and rear apex seals are not wedged between the rotor housing and side housing.



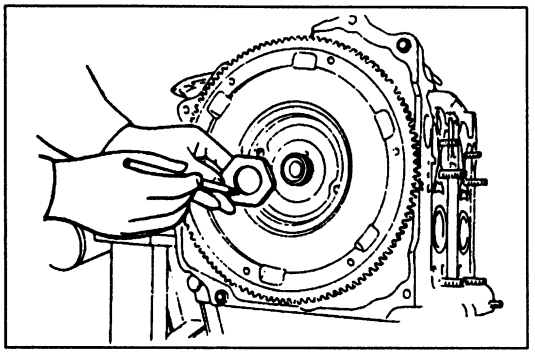
Tension Bolt
1. Apply clean engine oil to new seal washers and install them on the tension bolts.
2. Apply clean engine oil to the bolt threads.
3. Install the tension bolts and tighten them gradually in the order shown in the figure.
   The bolt with the "m" mark is for the No. 17 position.
   The bolt with the protector tube is for the No. 18 position.

Tightening torque:
32–39 N·m {3.2–4.0 kgf·m, 24–28 ft·lbf}

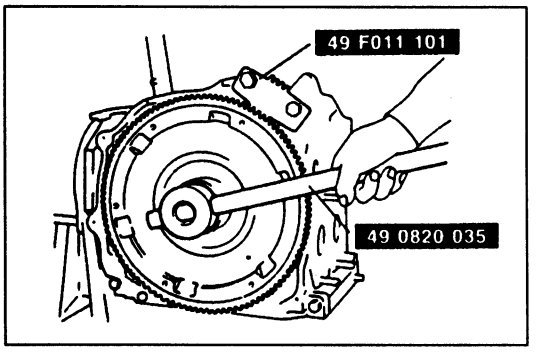


4. Turn the eccentric shaft and make sure that it rotates easily and smoothly.

Flywheel (MT)
1. Apply clean engine oil to the oil seal in the rear housing.
2. Fit the key to the eccentric shaft.
3. Install the flywheel to the eccentric shaft.

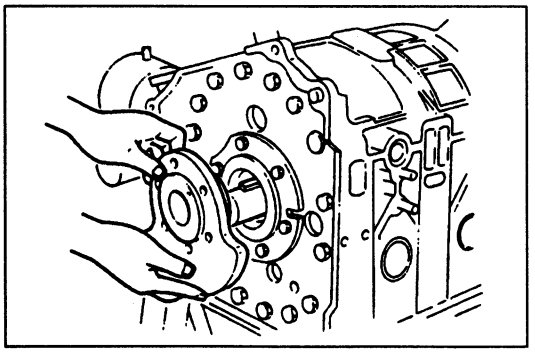


4. Apply thread-locking compound to the eccentric shaft threads.
5. Apply sealant to the contact surface of the locknut.

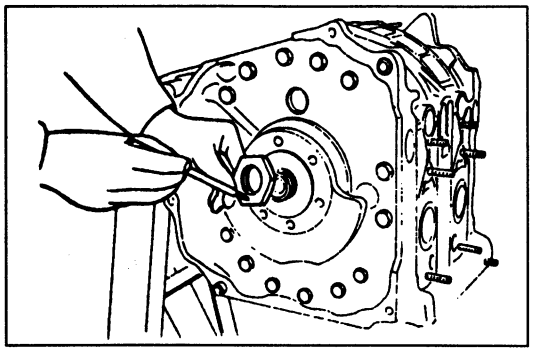


6. Install. the lock nut and tighten it by using the **SST.**

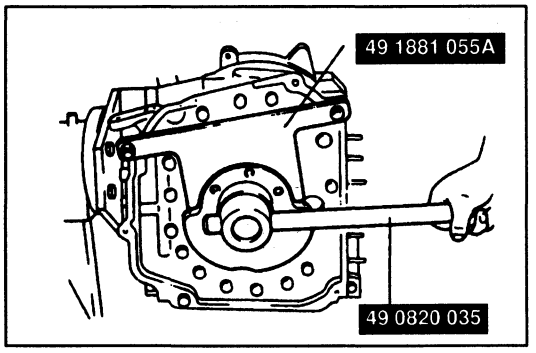
Tightening torque:
400–490 N·m {40–50 kgf·m, 290–360 ft·lbf}



Counterweight (AT)
1. Apply clean engine oil to the oil seal in the rear housing.
2. Fit the key into the eccentric shaft.
3. Install the counterweight onto the eccentric shaft.



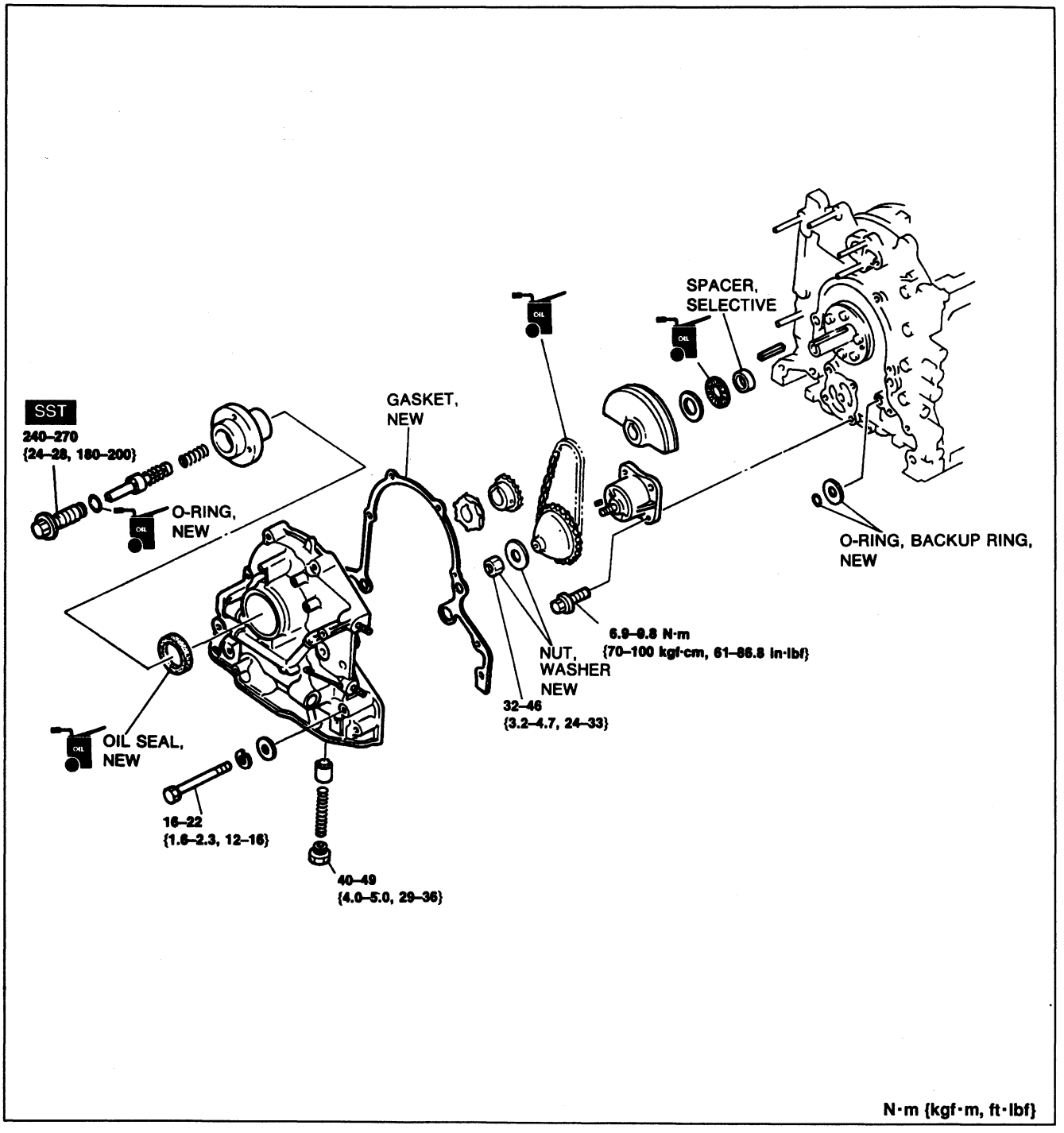
4. Apply thread-locking compound to the eccentric shaft threads.
5. Apply sealant to the contact surface of the locknut.

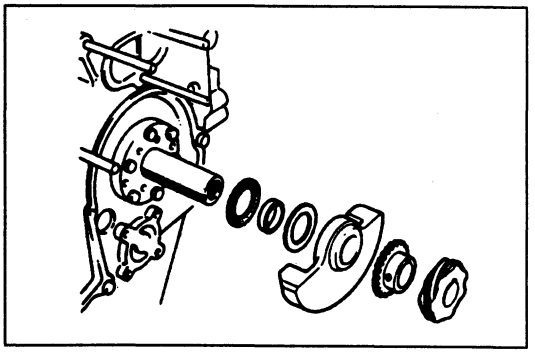


6. Install the lock nut and tighten it by using the **SST**.

Tightening torque:
400–490 N·m {40–50 kgf·m, 290–360 ft·lbf}

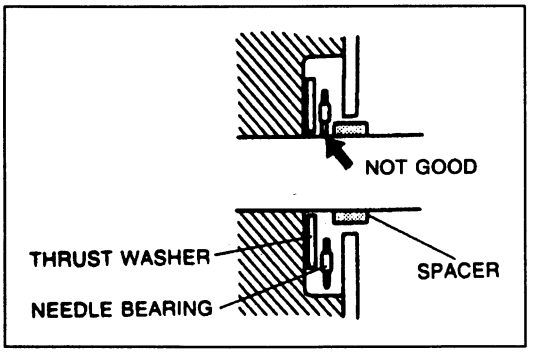
HOUSING (EXTERNAL PARTS II)
Torque Specifications



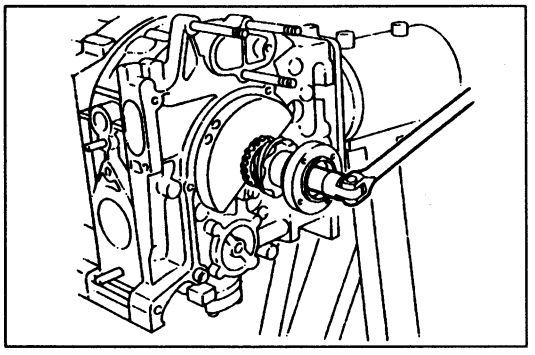


Balance Weight, Bearing, and Spacer

1. Install the following parts to the eccentric shaft:
   (1) Spacer
   (2) Thrust needle bearing
   (3) Thrust washer
   (4) Balance weight
   (5) Oil pump drive sprocket
   (6) Drive gear



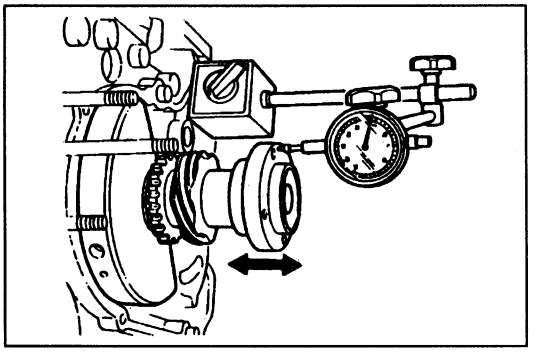
2. Verify that the needle bearing is not caught by the spacer.



3. Install the eccentric shaft pulley boss and tighten the new pulley lock bolt.

Tightening torque:
240–270 N·m {24–28 kgf·m, 180–200 ft·lbf}

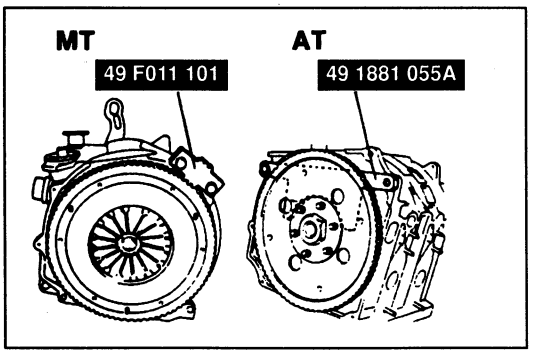
4. Remove the **SST**.



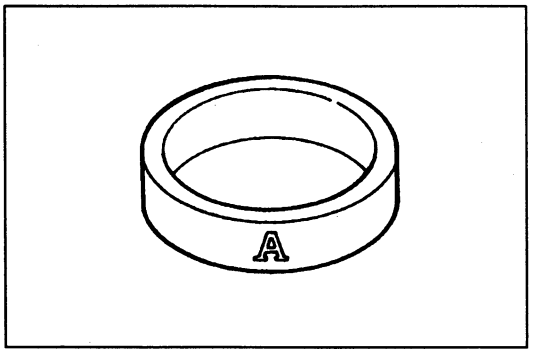
5. Measure the end play of the eccentric shaft.

Standard:
0.040–0.070 mm {0.0016–0.0027 in}
Maximum:
0.09 mm {0.0035 in} max.

If the end play is not within specification, continue from step 6 and replace the spacer.



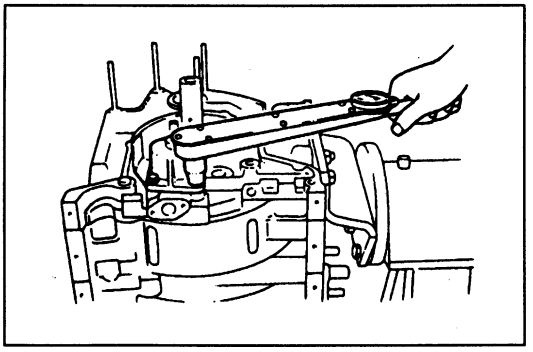
6. Attach the **SST** to the flywheel (MT) or to the counterweight (AT).
7. Remove the eccentric shaft lock bolt, drive gear, and oil pump drive sprocket.



8. If the end play is less than specified, replace the spacer with a thicker one. If the end play is more than specified, install a thinner spacer.

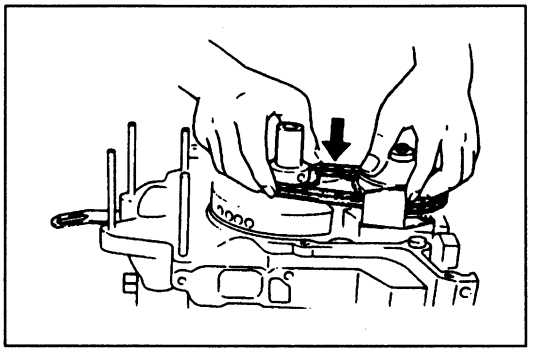
Spacer stamp and thickness

Stamp	Thickness mm {in}	Stamp	Thickness mm {in}
A	7.975–7.995 {0.3140–0.3147}	D	8.035–8.055 {0.3164–0.3171}
B	7.995–8.015 {0.3148–0.3155}	E	8.055–8.075 {0.3172–0.3179}
C	8.015–8.035 {0.3156–0.3163}		

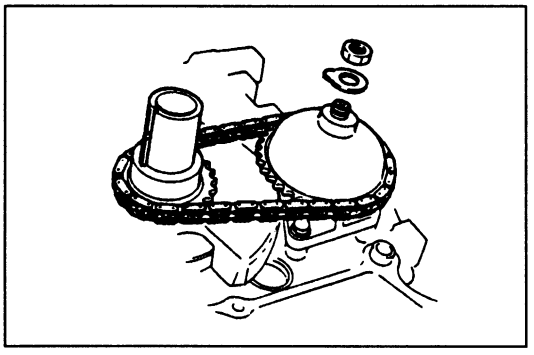


Oil pump
1. Apply clean engine oil to the oil pump shaft.
2. Install the oil pump to the front housing.

Tightening torque:
6.1–9.8 N·m {70–100 kgf·cm, 61–86.8 in·lbf}



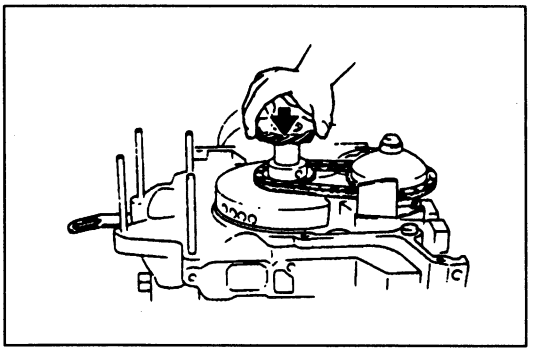
3. Install the key to the oil pump shaft.
4. Install the oil pump drive gear, oil pump sprocket wheel, and drive chain as an assembly.



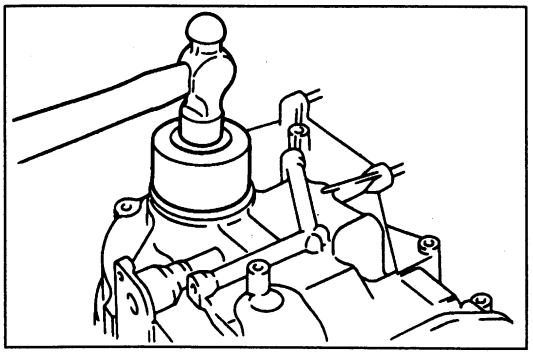
5. Install the key to the eccentric shaft.
6. Install a new washer and oil pump lock nut.

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

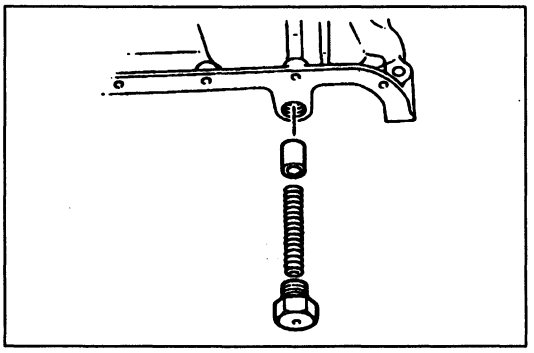
7. Bend the washer to lock the nut.



8. Install the drive gear so that the chamfered surface faces the housing.

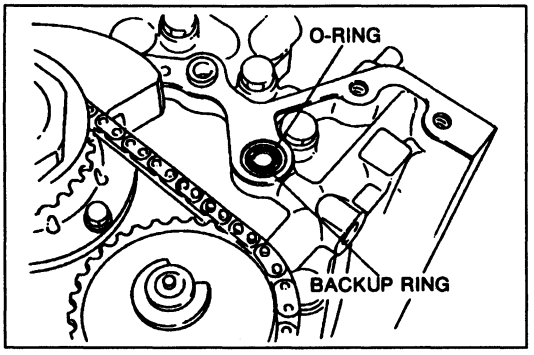


Front Cover
1. Apply clean engine oil to the new front oil seal and the groove of the front cover.
2. Install the oil seal in the front cover.

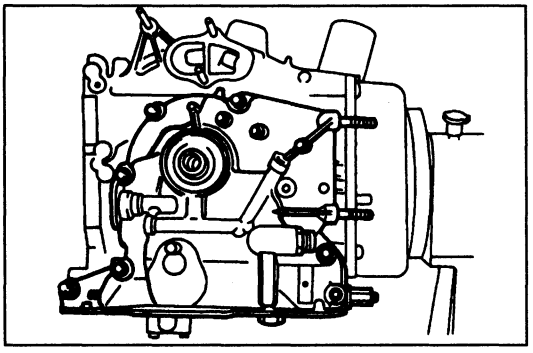


3. Install the oil pressure control valve in the front cover.

Tightening torque:
40–49 N·m {4.0–5.0 kgf·m, 29–36 ft·lbf}

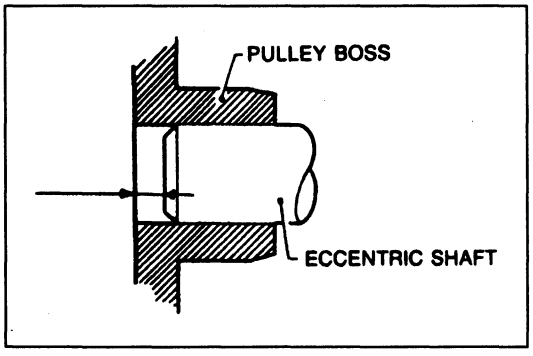


4. Apply petroleum jelly to the new O-ring and backup ring.



5. Install the front cover along with a new gasket.

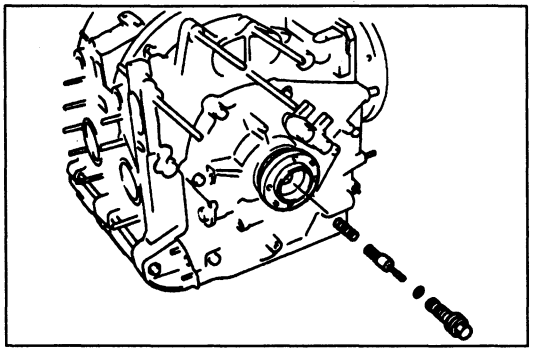
Tightening torque:
16–22 N·m {1.6–2.3 kgf·m, 12–16 ft·lbf}



Eccentric Shaft Lock Bolt and Bypass Valve

1. Install the eccentric shaft pulley boss.
2. Temporarily install the lock bolt, and tighten it by hand.
3. Remove the lock bolt, and measure the pulley boss protrusion. If it is over the limit, the needle bearing may be caught by the spacer. Remove and reinstall the needle bearing, if necessary.

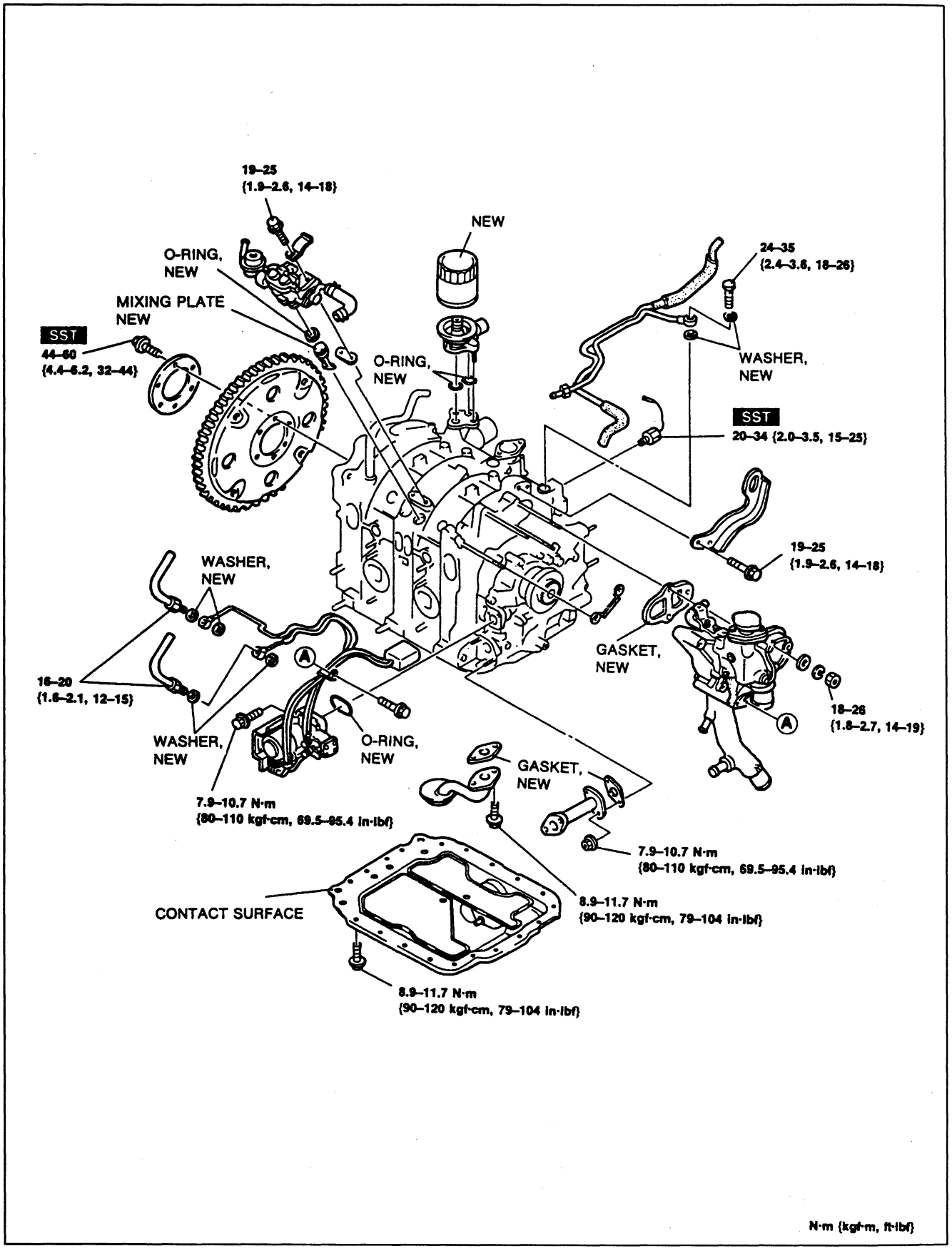
Protrusion: 2.44 mm {0.0961} max.

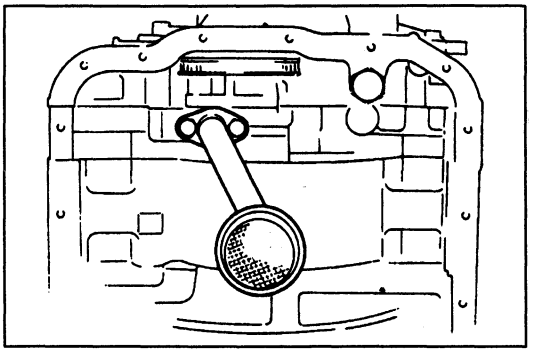


4. Install the bypass valve and spring into the eccentric shaft.
5. Apply clean engine oil to the new O-ring and install it on the lock bolt.
6. Apply sealant to the flange face of a new lock bolt.
7. Install the lock bolt.

Tightening torque:
240–270 N·m {24–28 kgf·m, 180–200 ft·lbf}

HOUSING (EXTERNAL PARTS I)
Torque Specifications

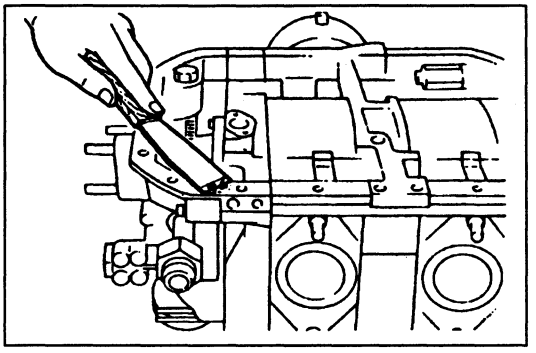




Oil Strainer

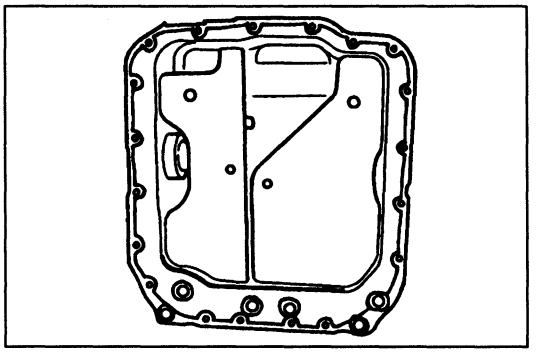
Install the oil strainer along with a new gasket.

Tightening torque:
8.9–11.7 N·m {90–120 kgf·cm, 79–104 in·lbf}



Oil Pan

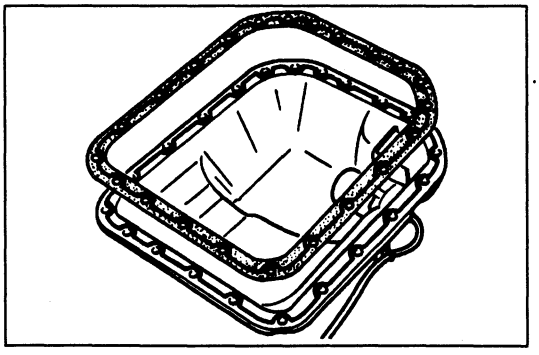
1. Cut away the part of the gasket that projects from between the front cover and the housing.



2. Clean the contact surface of the housing and oil pan with degreaser and a soft cloth.
3. Apply silicone sealant and install oil pan;

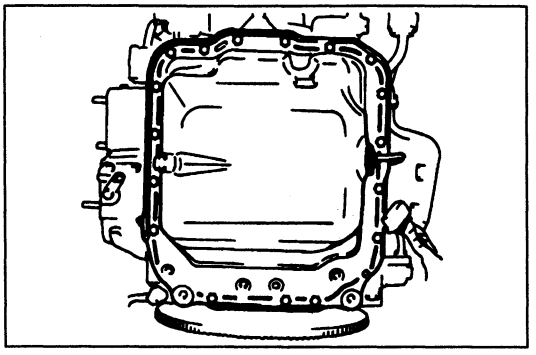
Without gasket; Apply a 4–6 mm {0.16–0.24 in} continuous bead of silicone sealant along the inside edge of the housing, inboard of the bolt holes. Overlap the ends and install the oil pan within five minutes.

With gasket; Apply a 4–6 mm {0.16–0.24 in} continuous bead of silicone sealant along the inside edge of the oil pan and the housing side of the gasket, inboard of the bolt holes. Overlap the ends and install the oil pan within five minutes.



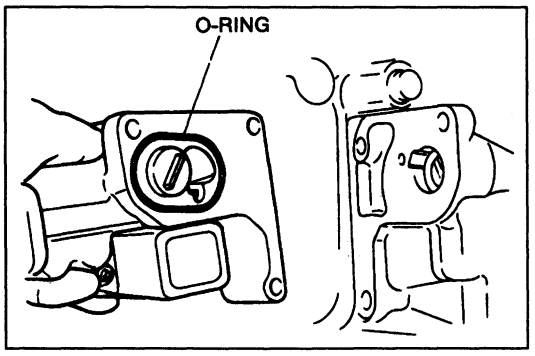
Caution

- **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.**



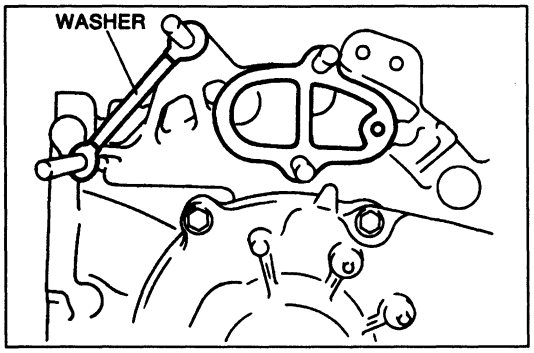
4. Install the oil pan and tighten the bolts gradually and evenly.

Tightening torque:
8.9–11.7 N·m {90–120 kgf·cm, 79–104 in·lbf}

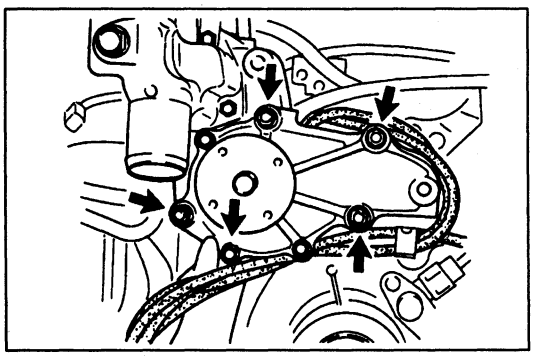


Metering oil pump
1. Apply engine oil to the new O-ring.
2. Install the metering oil pump to the front housing.

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

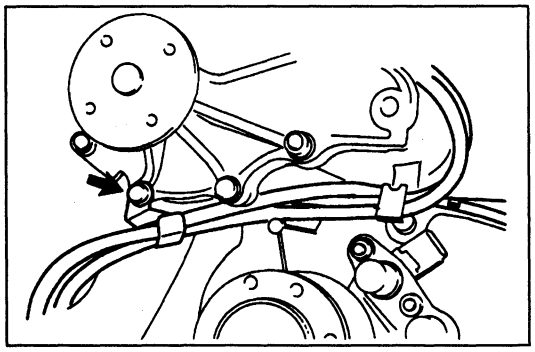


Water pump
1. Install the washer and new gasket to the front housing.



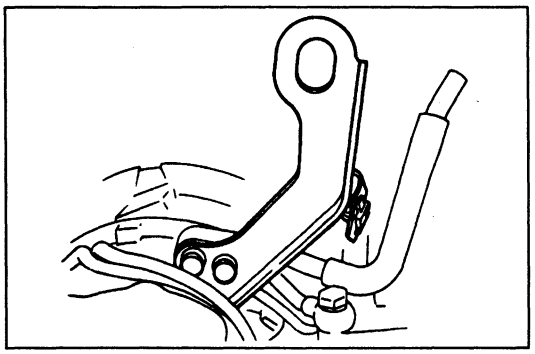
2. Install the water pump to the front housing.

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



3. Install the metering oil pump harness and the metering oil tube to the water pump housing.

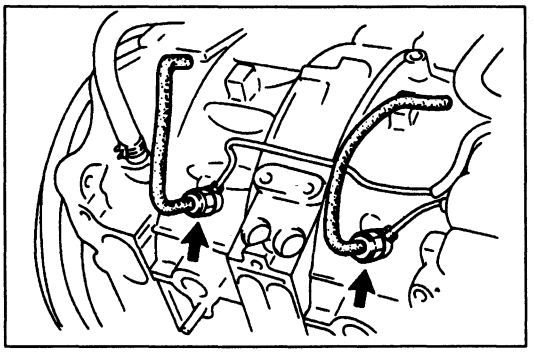
Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 69.5–95.4 in·lbf}



Engine hanger
1. Install the engine hanger to the front housing.

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

2. Mount the metering oil pump connector to the engine hanger.



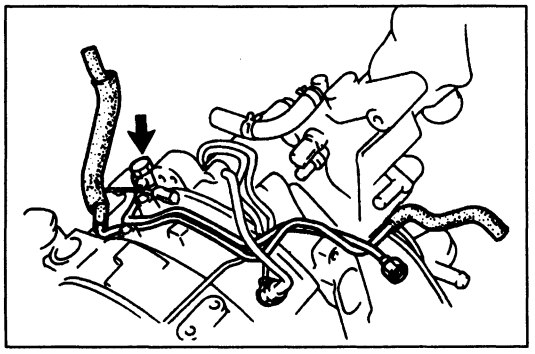
Metering oil nozzle

Install the oil nozzles and connect the metering oil tubes using new washers. The oil tube ends are colored.

White: Front rotor housing

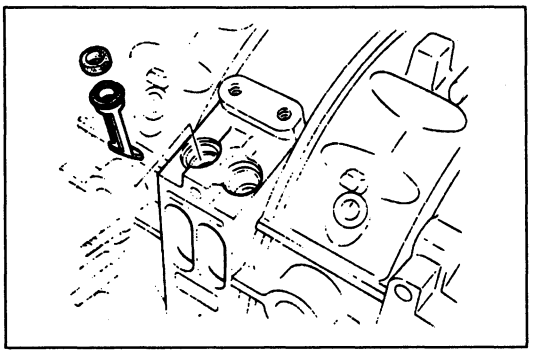
Yellow: Rear rotor housing

Tightening torque:
16–20 N·m {1.6–2.1 kgf·m, 12–15 ft·lbf}



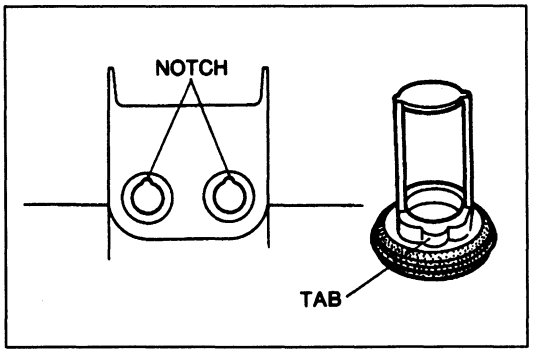
Oil inlet pipe

Install the oil inlet pipe and new washers as an assembly and hand tighten the connecting bolt.

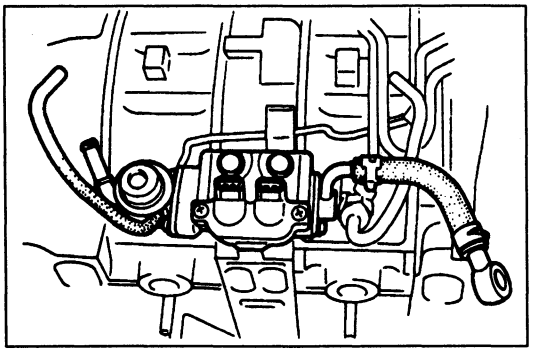


Fuel delivery pipe and mixing plate

1. Apply clean engine oil to the air bleed socket.
2. Install the air bleed socket into the engine.

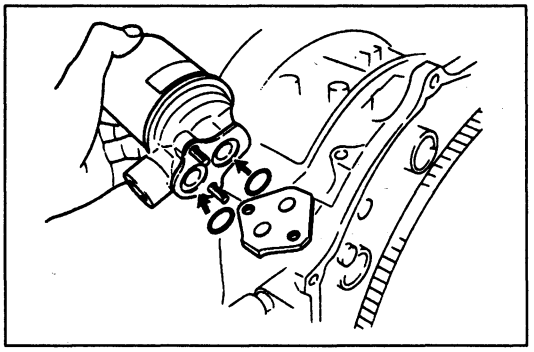


3. Install the mixing plate by aligning the mixing plate tab with the housing notch.
4. Install the fuel delivery pipe.



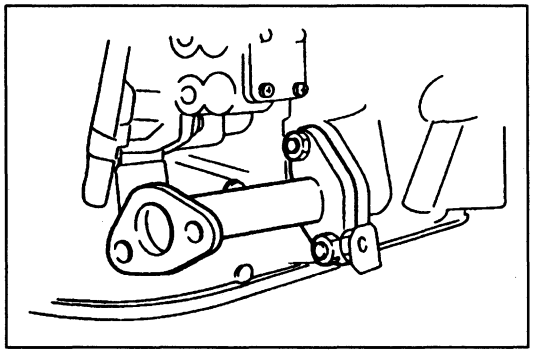
5. Install the fuel delivery pipe.

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



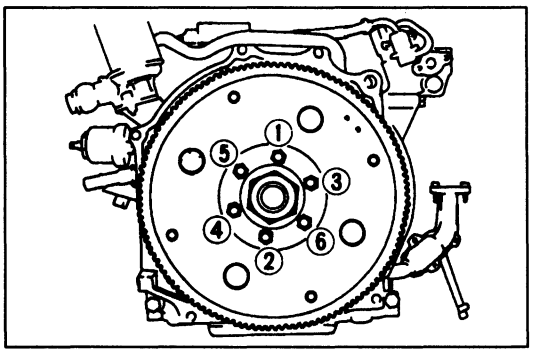
Oil filter body
Install the oil filter body along with new O-rings.

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



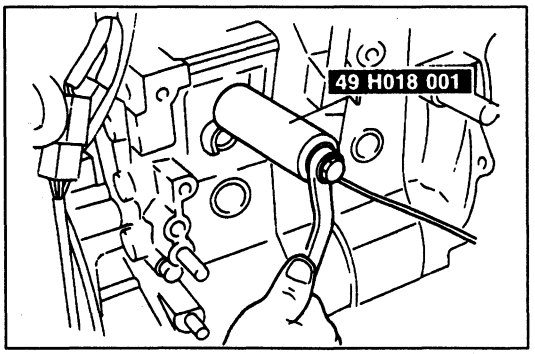
Oil pipe
Install the oil pipe along with a new gasket.

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



Drive plate (AT)
1. Attach the **SST** to the counterweight.
2. Install the drive plate and the back plate.
3. Tighten the bolts in two or three steps in the order shown in the figure.

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

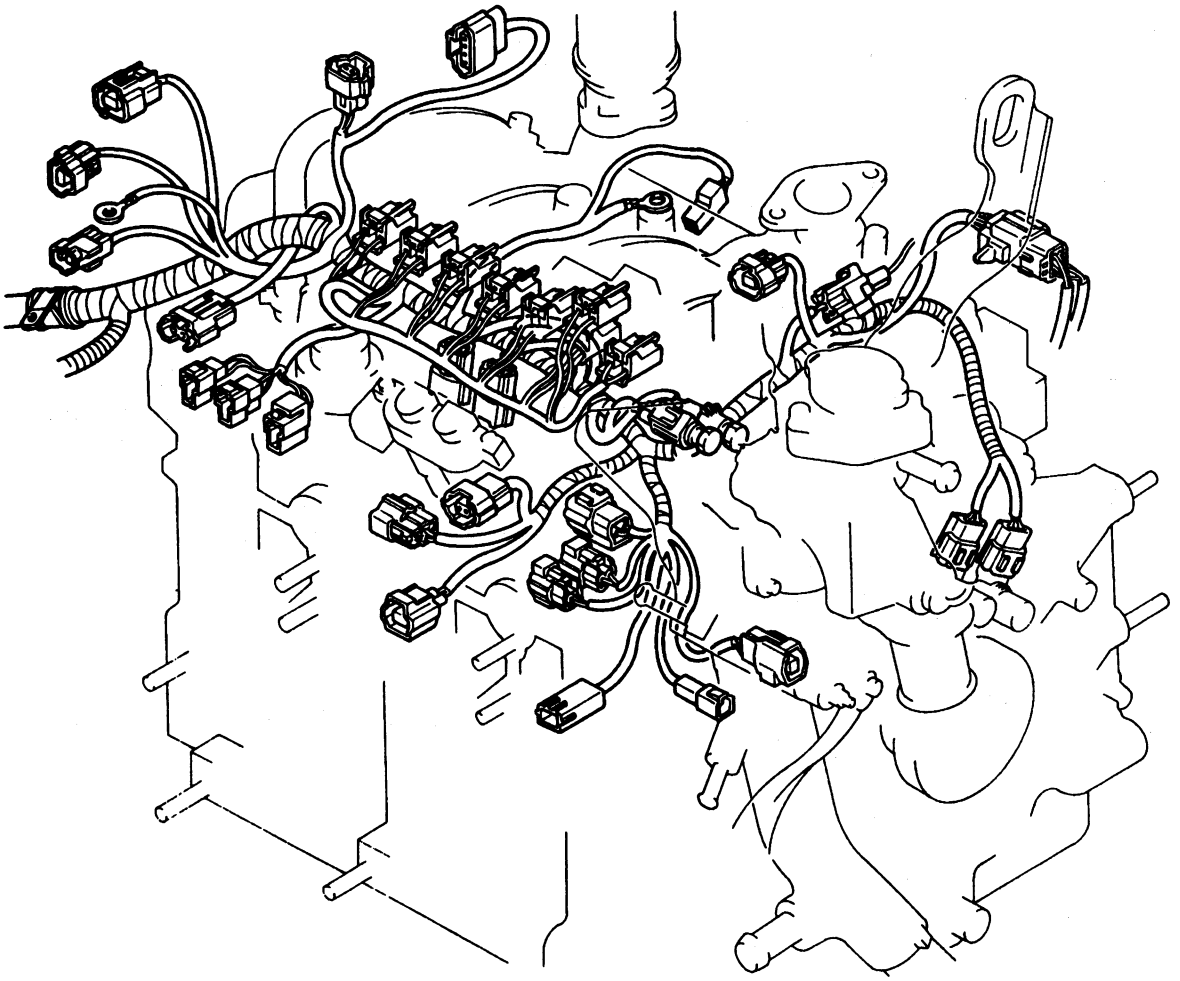


Knock sensor
Install the knock sensor and tighten it by using the **SST**.

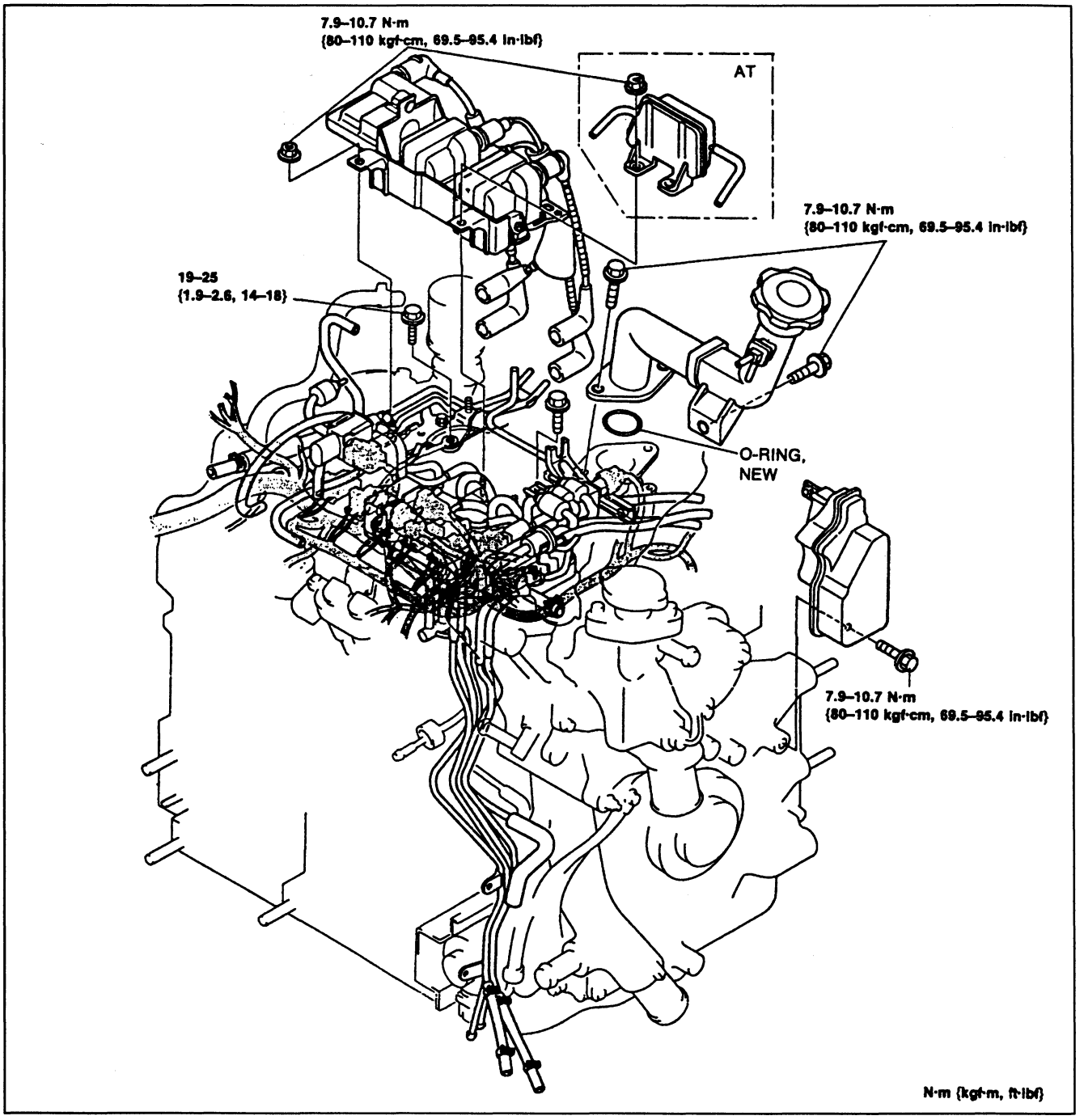
Tightening torque:
20–34 N·m {2.0–3.5 kgf·m, 15–25 ft·lbf}

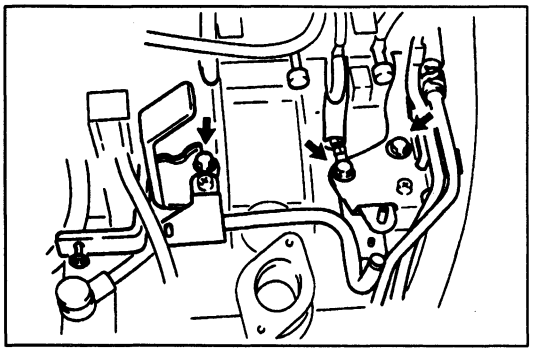
Harness

Connect the harness connectors shown in the figure.



Vacuum pipe assembly
Connect the hoses and connectors shown in the figure.
Torque Specifications

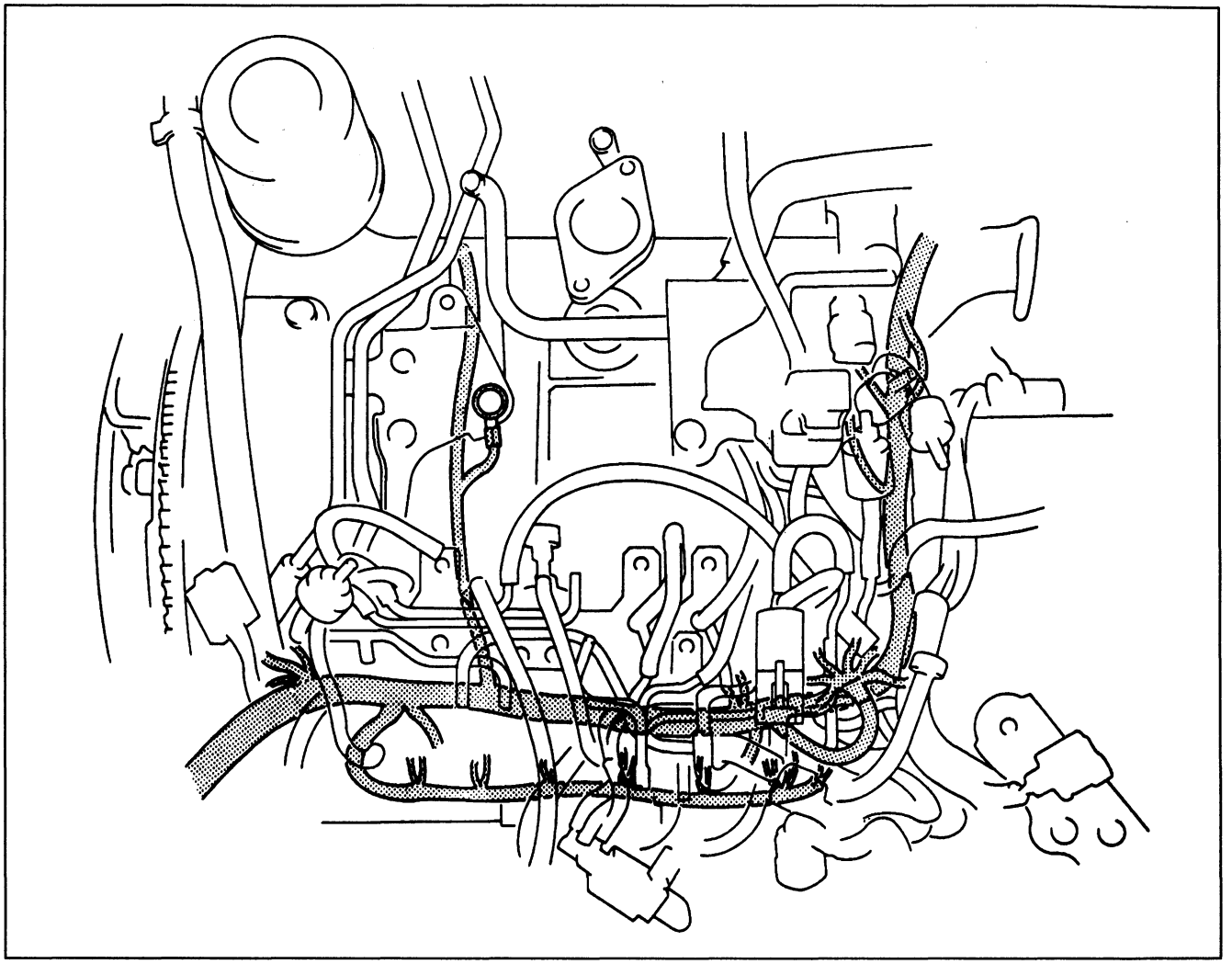


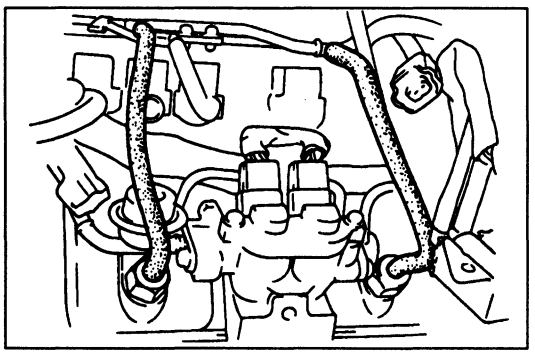


Vacuum pipe
1. Install the vacuum pipe and ground harness.

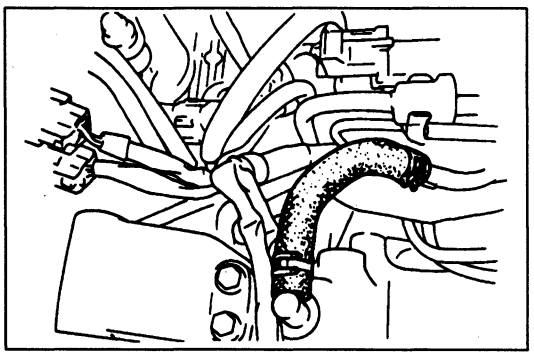
Tightening torque:
19–25 N·m {1.9–2.6 kgf·m, 14–18 ft·lbf}

2. Install the harness and hoses as shown in the figure.

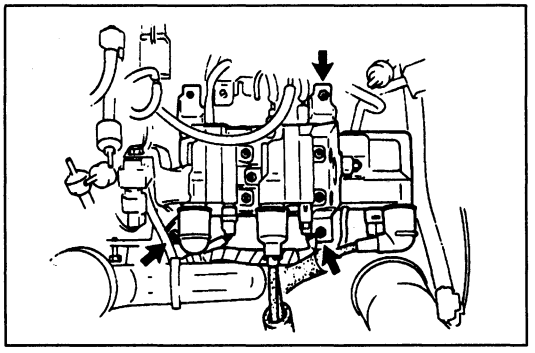




3. Connect the vacuum hoses.

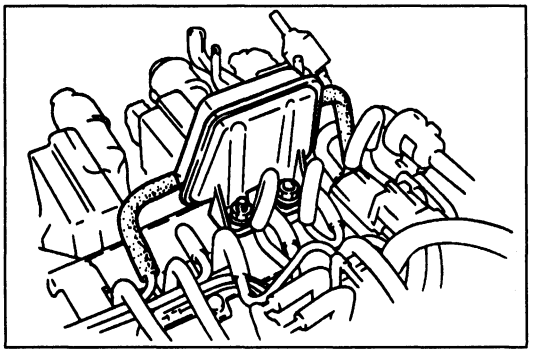


4. Connect the water hose.



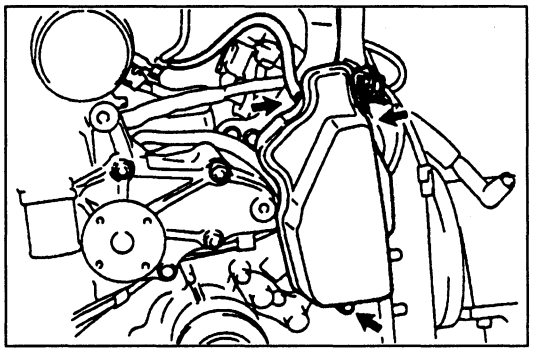
Ignition coil assembly and vacuum chamber
1. Install the ignition coil assembly

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



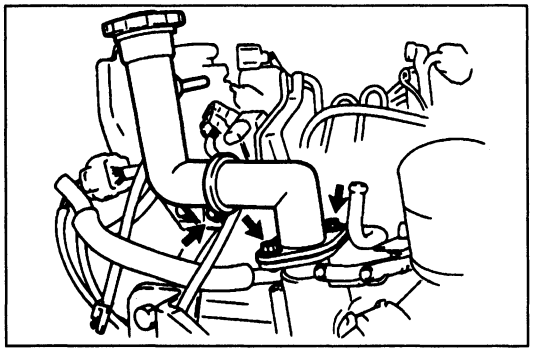
2. Install the vacuum chamber. (AT)

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



Vacuum chamber
1. Connect the vacuum hose.
2. Install the vacuum chamber.

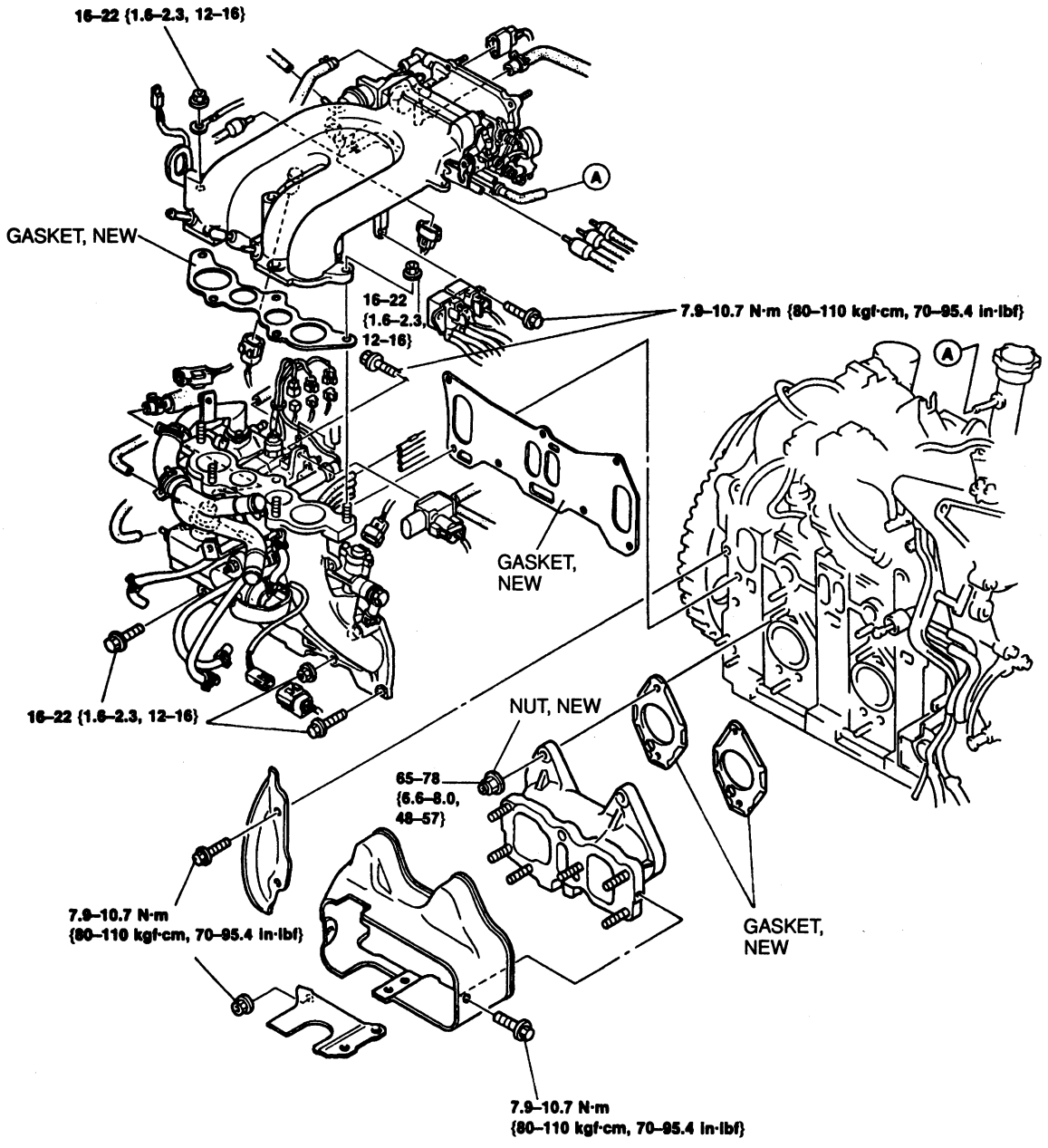
Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 70–95.4 in·lbf}



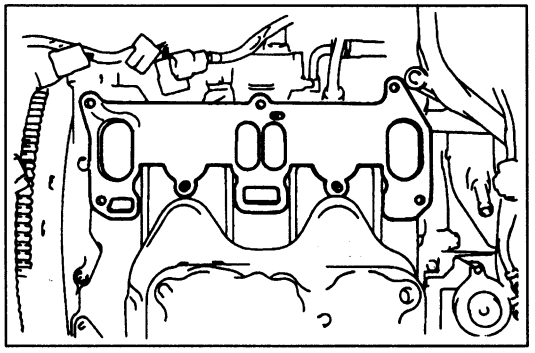
Oil filler pipe
Install the oil filler pipe along with a new O-ring.

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

AUXILIARY PARTS (II)
Torque Specifications

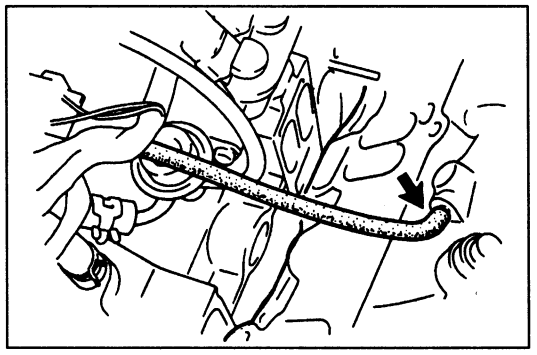


N·m {kgf·m, ft·lbf}

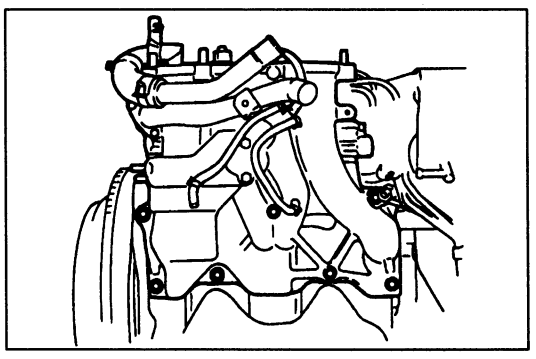


Intake manifold assembly

1. Install the new intake manifold gasket on the engine.

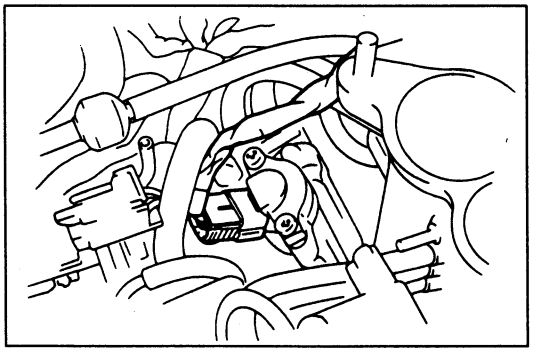


2. Connect the vacuum hose to the intake manifold.

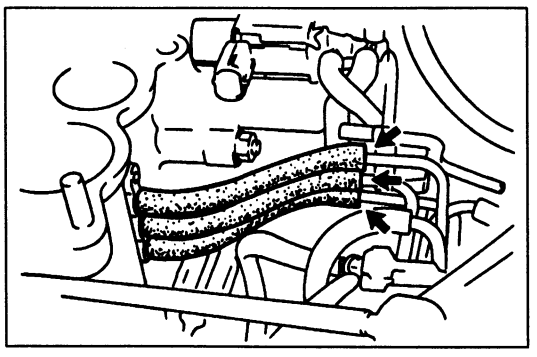


3. Install the intake manifold.

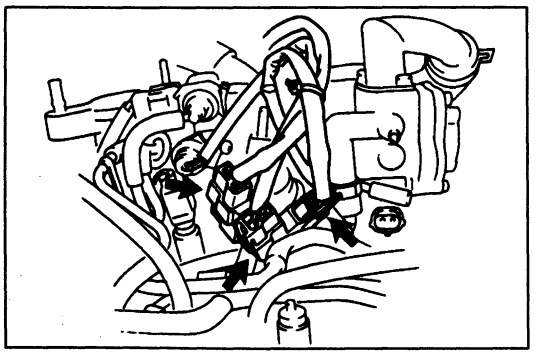
Tightening torque:
16–22 N·m {1.6–2.3 kgf·m, 12–16 ft·lbf}



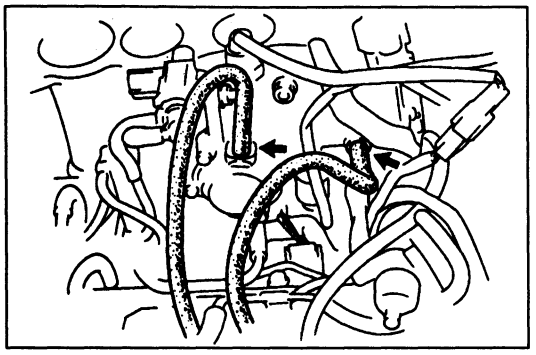
4. Connect the fuel injector connectors.



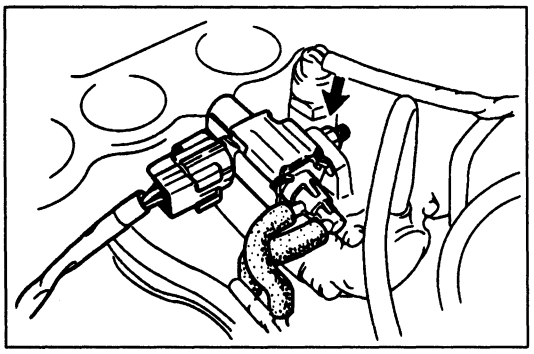
5. Connect the vacuum hoses as shown in the figure.



6. Connect the connectors shown in the figure.

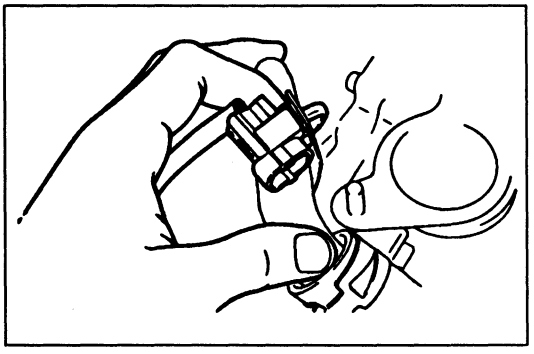


7. Connect the vacuum hoses as shown in the figure.

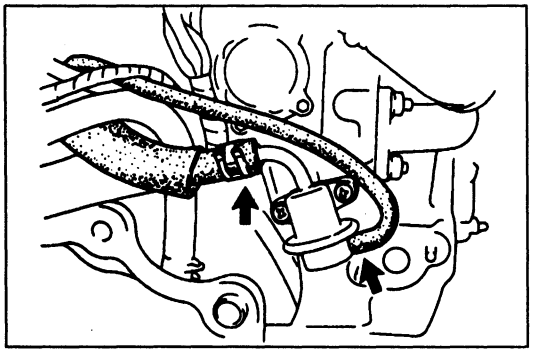


8. Install the three-way solenoid shown in the figure.

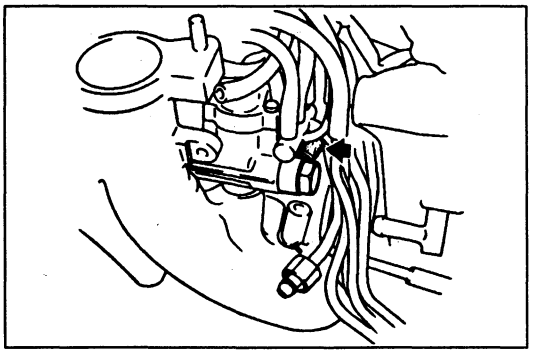
Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 69.5–95.4 in·lbf}



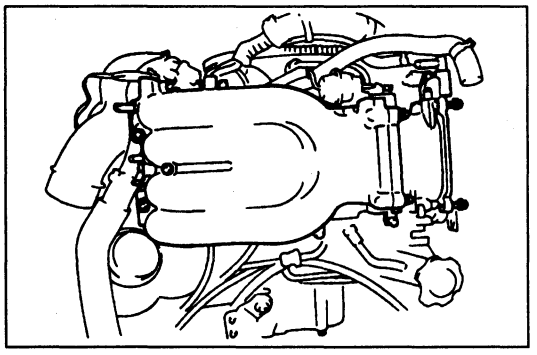
9. Mount the oxygen sensor connector.



10. Connect the fuel hose and vacuum hose.



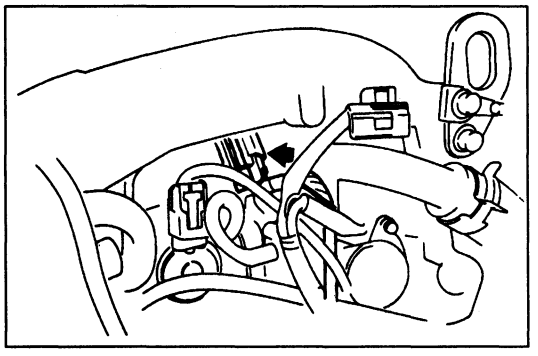
11. Connect the fuel hose shown in the figure.



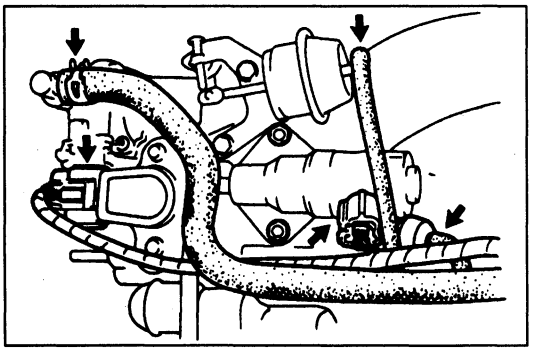
Surge tank assembly

1. Install the surge tank assembly and the ground harness.

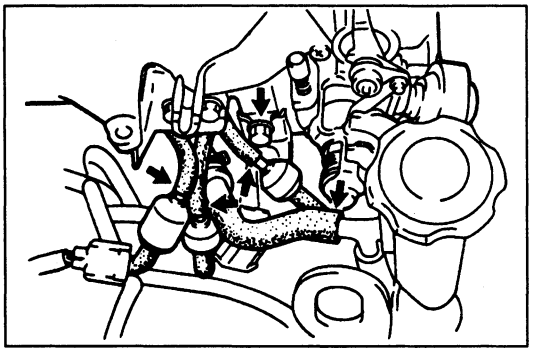
Tightening torque:
16–22 N·m {1.6–2.3 kgf·m, 12–16 ft·lbf}



2. Connect the connector shown in the figure.



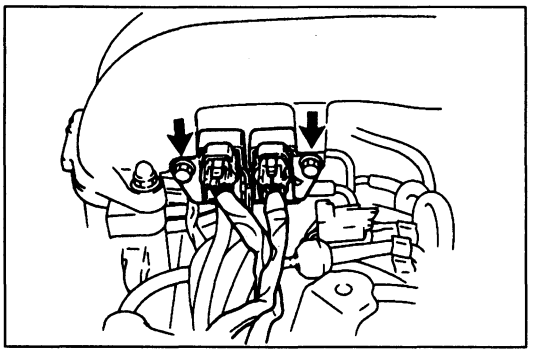
3. Connect the connector and the hoses shown in the figure.



4. Tighten the bolt.

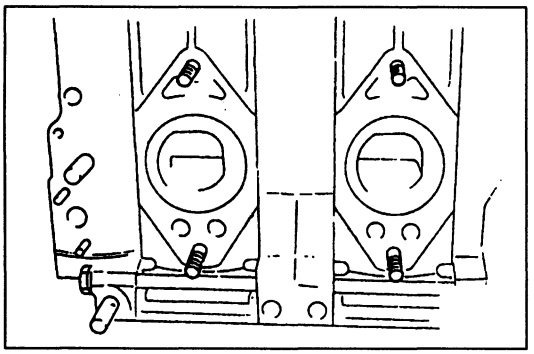
Tightening torque:
19–25 N·m {1.9–2.6 kgf·m, 14–18 ft·lbf}

5. Connect the vacuum hoses and the blowby hose as shown in the figure.



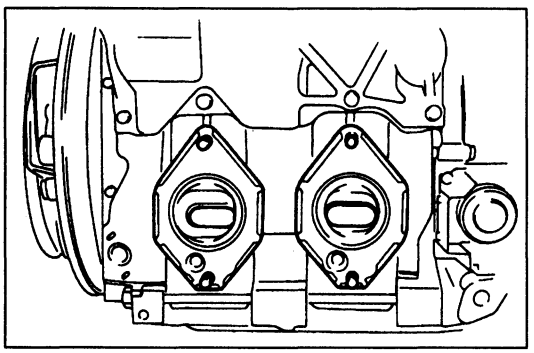
6. Connect the duty solenoid valve as shown in the figure.

Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 69.5–95.4 in·lbf}

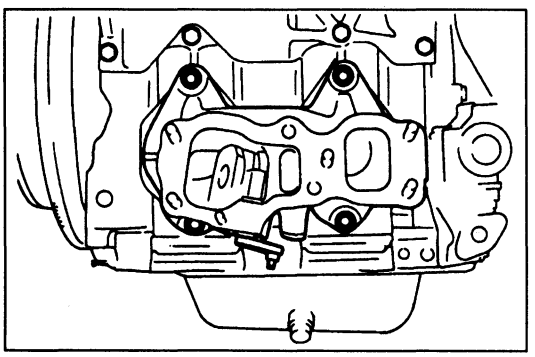


Exhaust manifold
1. Retighten the studs to the specified torque.

Tightening torque:
30–35 N·m {3.0–3.6 kgf·m, 22–26 ft·lbf}

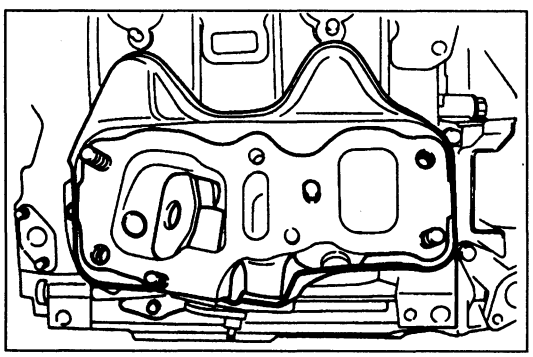


2. Install the gaskets with the crimped side facing the exhaust manifold.
3. Install the exhaust manifold.



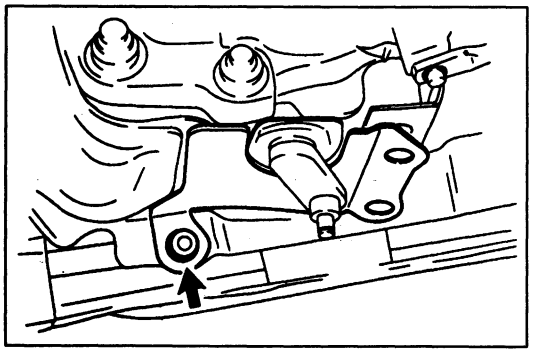
4. Install the exhaust manifold.

Tightening torque:
65–78 N·m {6.6–8.0 kgf·m, 48–57 ft·lbf}



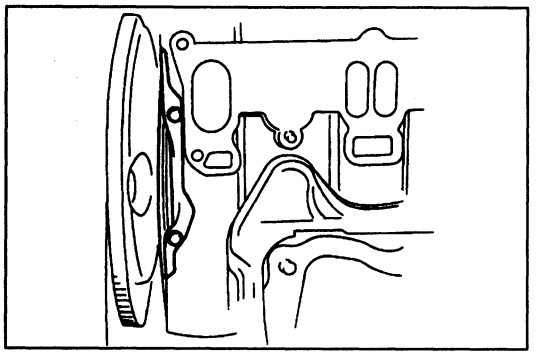
Exhaust manifold insulator
1. Install the exhaust manifold insulator.

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



2. Install the exhaust manifold insulator.

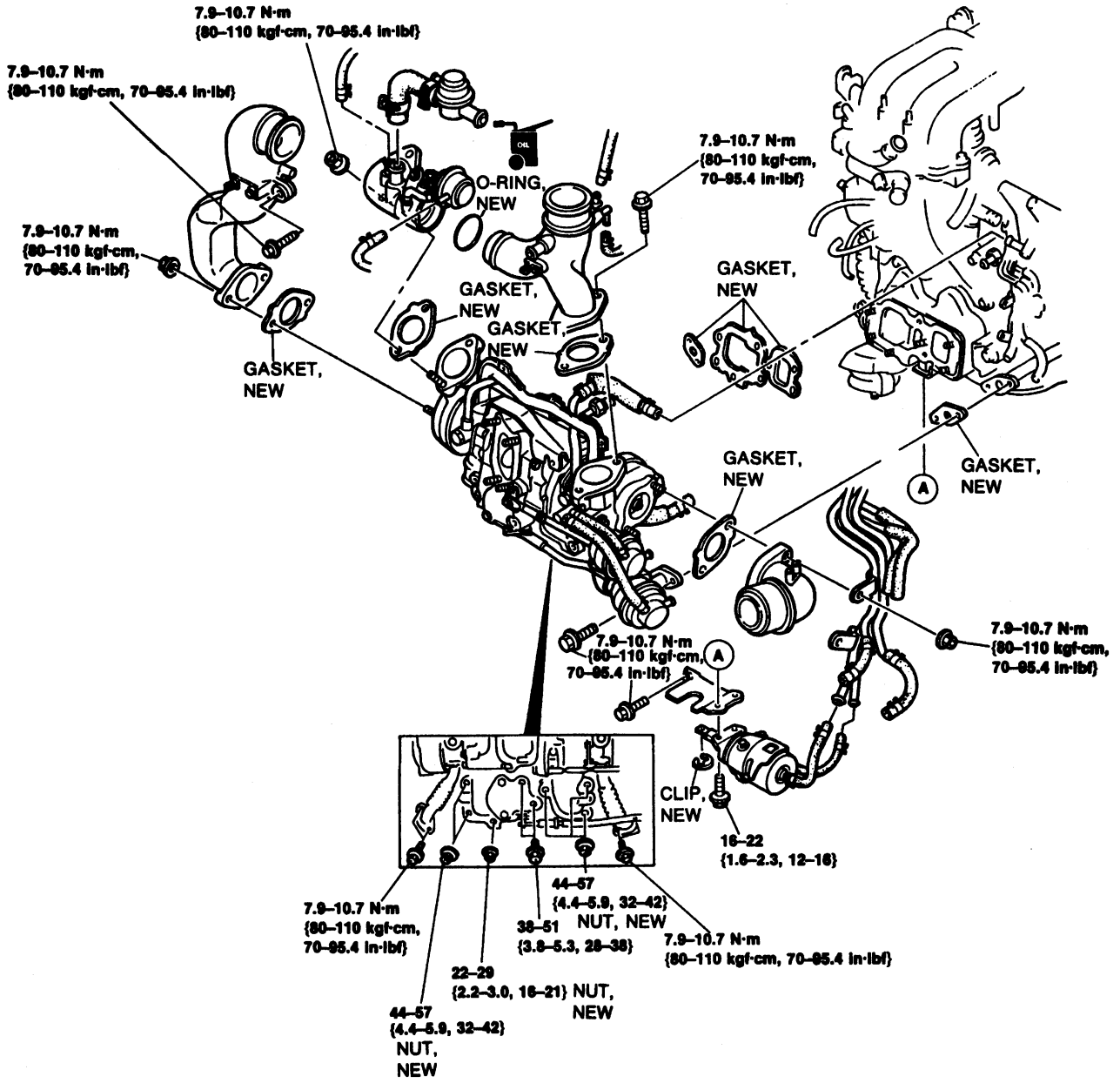
Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 69.5–95.4 in·lbf}



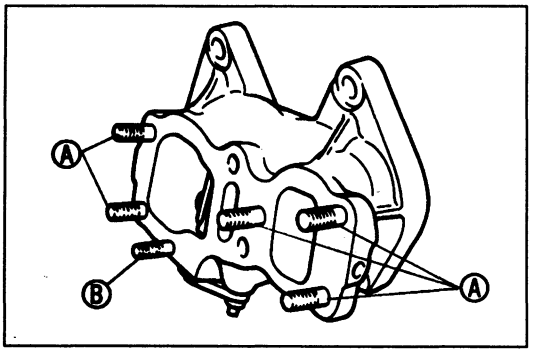
Oil seal plate
Install the oil seal plate.

Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 69.5–95.4 in·lbf}

TURBOCHARGER
Torque specifications



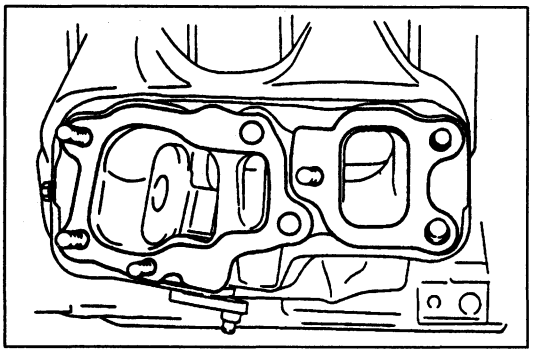
N·m {kgf·m, ft·lbf}



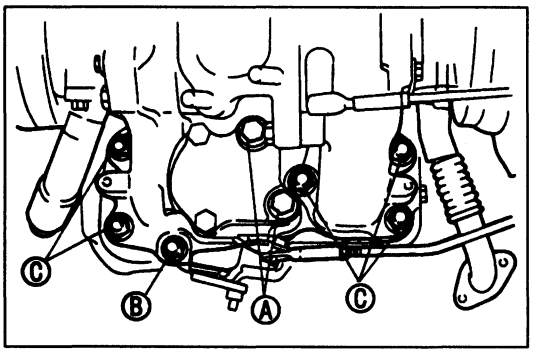
Turbocharger

1. Retighten the stud to the specified torque.

Tightening torque:
Ⓐ: 16–23 N·m {1.6–2.4 kgf·m, 12–17 ft·lbf}
Ⓑ: 7.9–11.7 N·m {80–120 kgf·cm, 70–104 in·lbf}

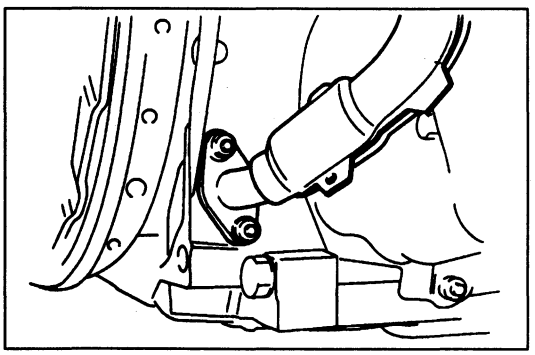


2. Install the new turbocharger gaskets.



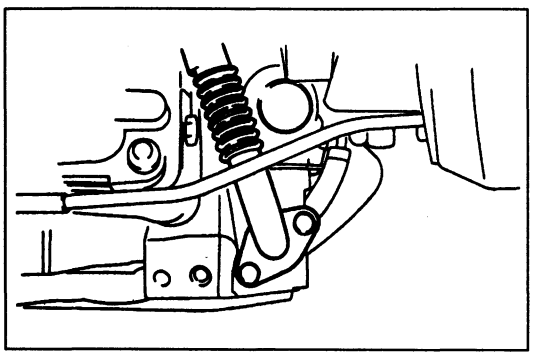
3. Install the turbocharger assembly.

Tightening torque:
Ⓐ: 38–51 N·m {3.8–5.3 kgf·m, 28–38 ft·lbf}
Ⓑ: 22–29 N·m {2.2–3.0 kgf·m, 16–21 ft·lbf}
Ⓒ: 44–57 N·m {4.4–5.9 kgf·m, 32–42 ft·lbf}



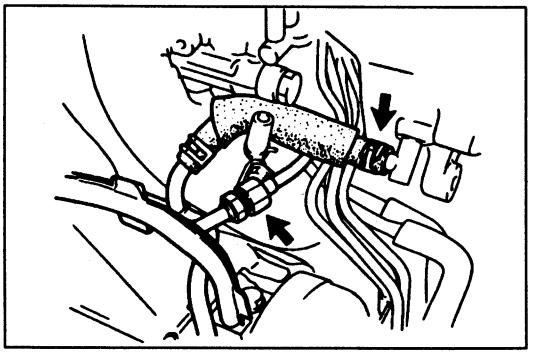
4. Connect the oil outlet pipe along with a new gasket.

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

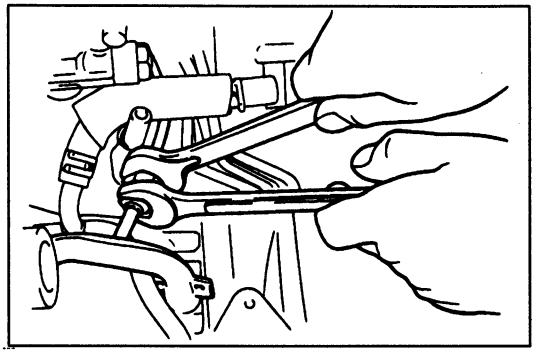


5. Connect the oil outlet pipe along with a new gasket.

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



6. Connect the oil inlet pipe and water hose.

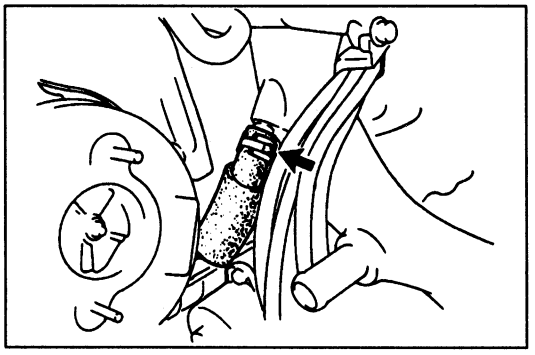


7. Use two wrenches to tighten the oil inlet pipe connector bolt.

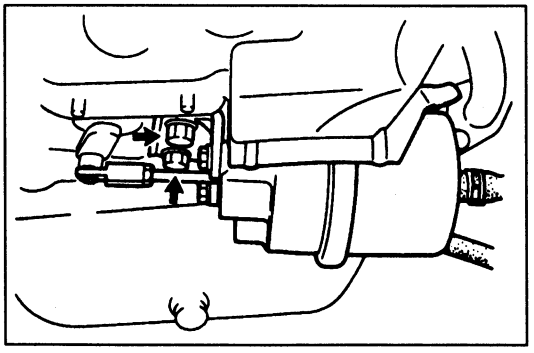
   Tightening torque:
   18–22 N·m {1.8–2.3 kgf·m, 14–16 ft·lbf}

8. Tighten the oil inlet pipe connecting bolt. (Refer to page C-80)

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



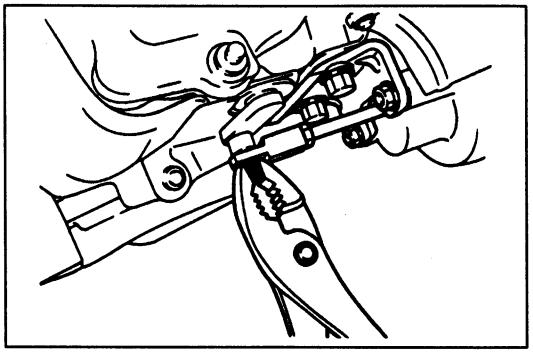
9. Connect the water hose.



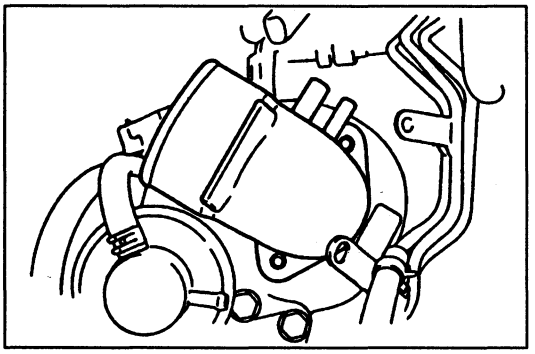
10. Install the turbo control actuator.

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

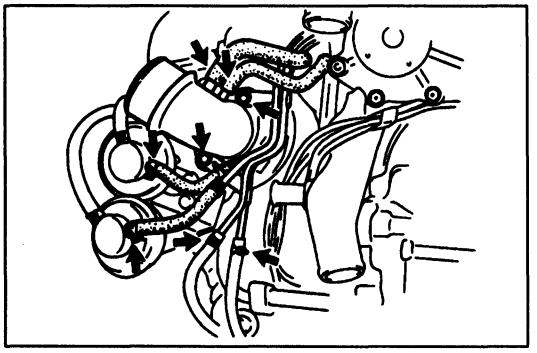
11. Connect the air hoses.



12. Install a new clip on the actuator rod.



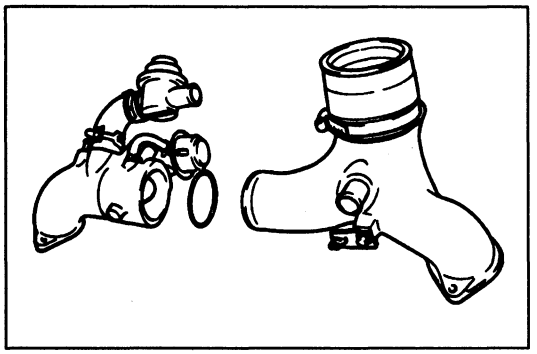
Air intake pipe
Install the air intake pipe.



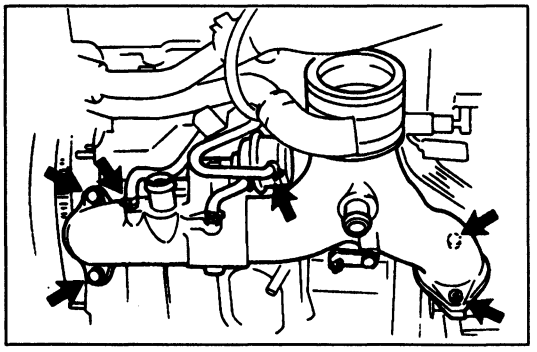
Vacuum pipe
1. Install the vacuum pipe.

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

2. Connect the vacuum hoses.

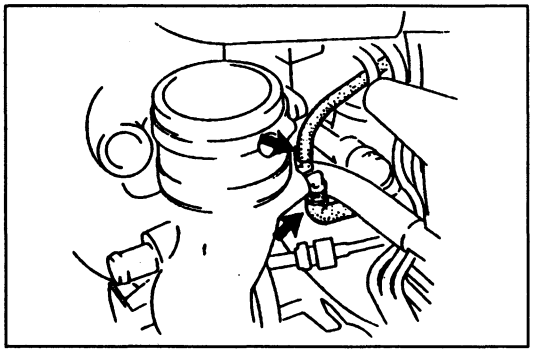


Air pipe and control valve
1. Apply clean engine oil to the new O-ring, and install it between the air pipe and control valve.

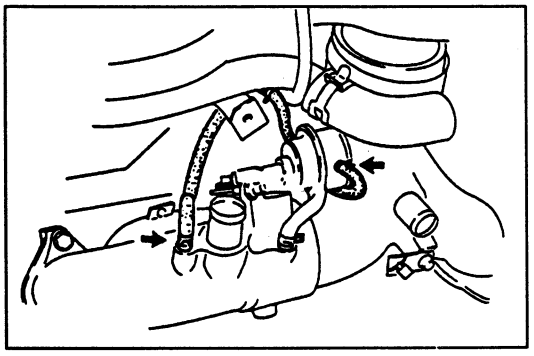


2. Install the air pipe and control valve on the turbo-charger assembly along with new gaskets.

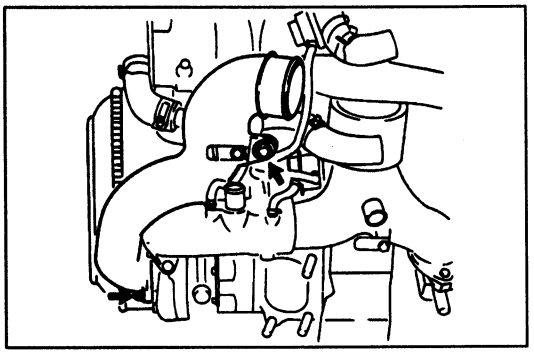
   Tightening torque:
   7.9–10.7 N·m {80–110 kgf·cm, 70–95.4 in·lbf}



3. Connect the vacuum hoses shown in the figures.



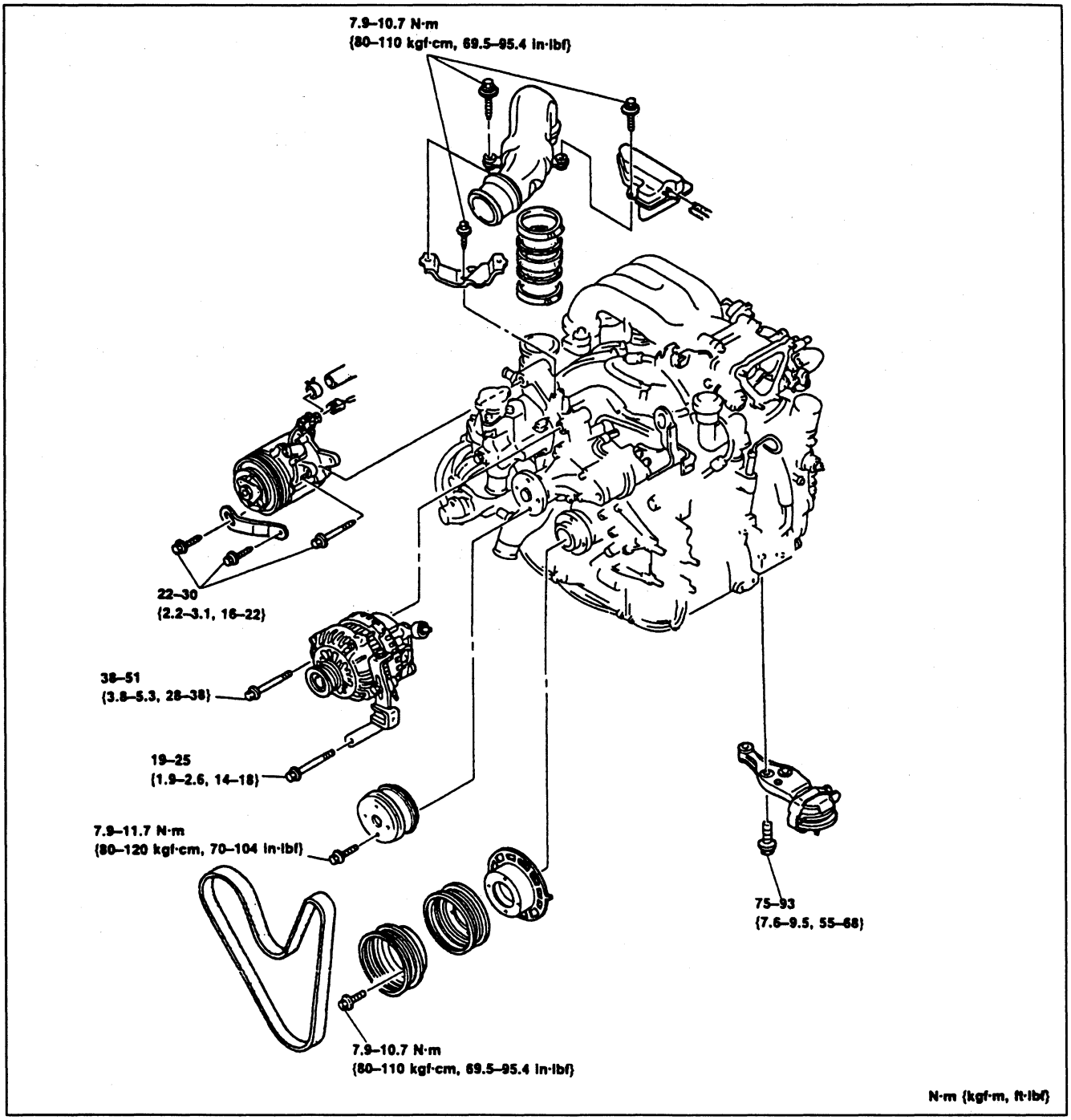
4. Connect the hoses shown in the figure.

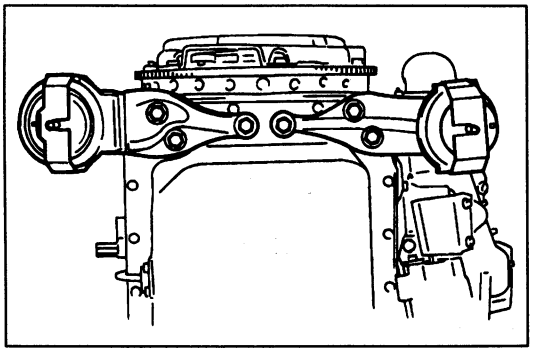


Air pipe
Install the air pipe along with a new gasket.

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

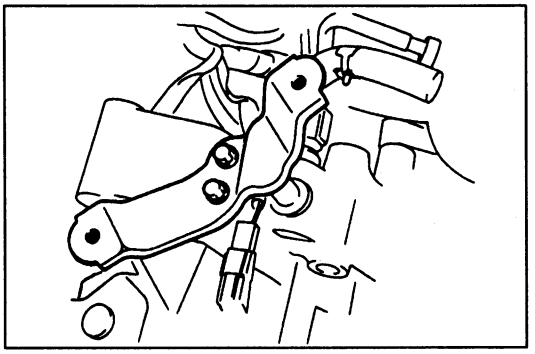
AUXILIARY PARTS (I)
Torque specifications





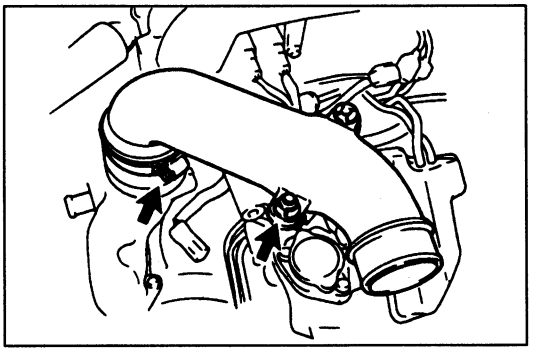
Engine mount right and left
Install the engine mount right and left.

Tightening torque:
75–93 N·m {7.6–9.5 kgf·m, 55–68 ft·lbf}



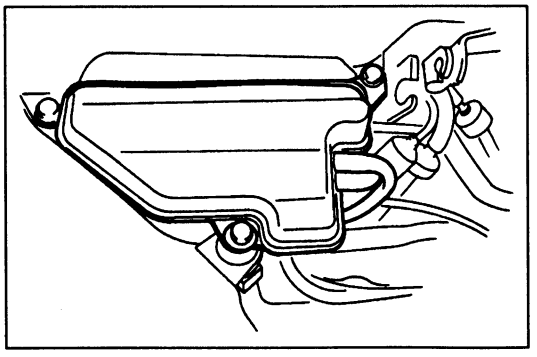
Air pipe and bracket
1. Install the air pipe bracket.

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



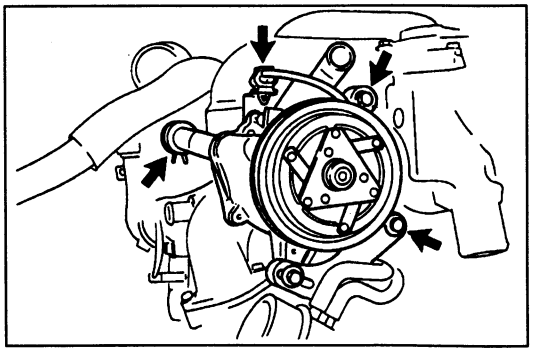
2. Install the air pipe.

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

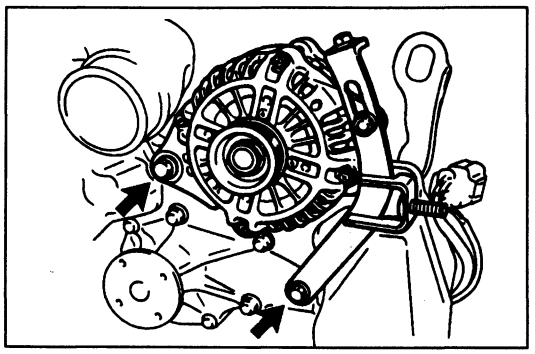


3. Install the pressure chamber.

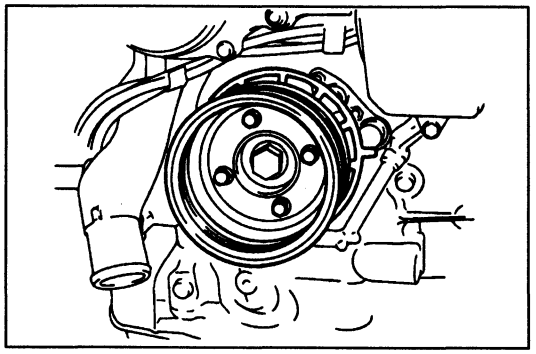
Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 70–95.4 in·lbf}



Air pump
1. Install the air pump and bracket and hand tighten the mounting bolts.
2. Connect the connector and air hose.

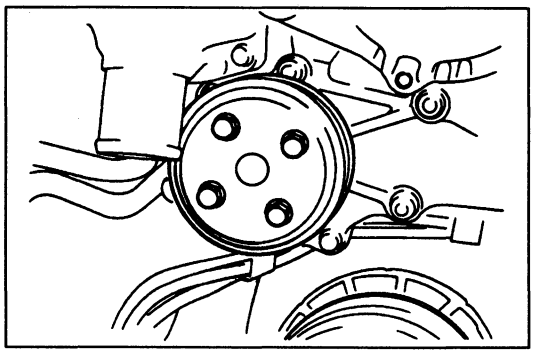


Alternator and bracket
Install the alternator and bracket and hand tighten the mounting bolts.



Drive belt pulley
Install the drive belt pulley as shown in the figure.

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



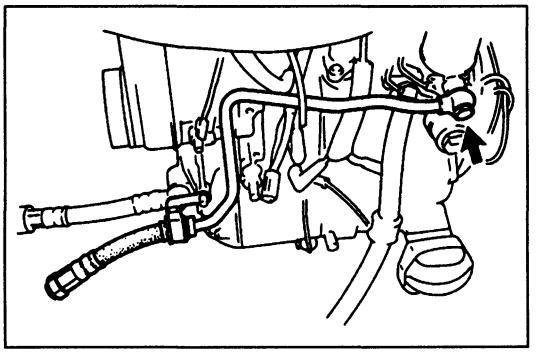
Water pump pulley
1. Install the water pump pulley and hand tighten the mounting bolts.
2. Install the drive belt. (Refer to page C–5.)
3. Tighten the water pump pulley bolts to specified torque.

Tightening torque:
7.9–11.7 N·m {80–120 kgf·cm, 70–104 in·lbf}

ENGINE STAND DISMOUNTING

PROCEDURE

1. Remove the engine from the engine stand.
2. Remove the **SST** from the engine.



3. Install the new studs into the front housing.
4. Install new washers and the oil pipe.

Tightening torque:
54–68 N·m {5.5–7.0 kgf·m, 40–50 ft·lbf}

INSTALLATION

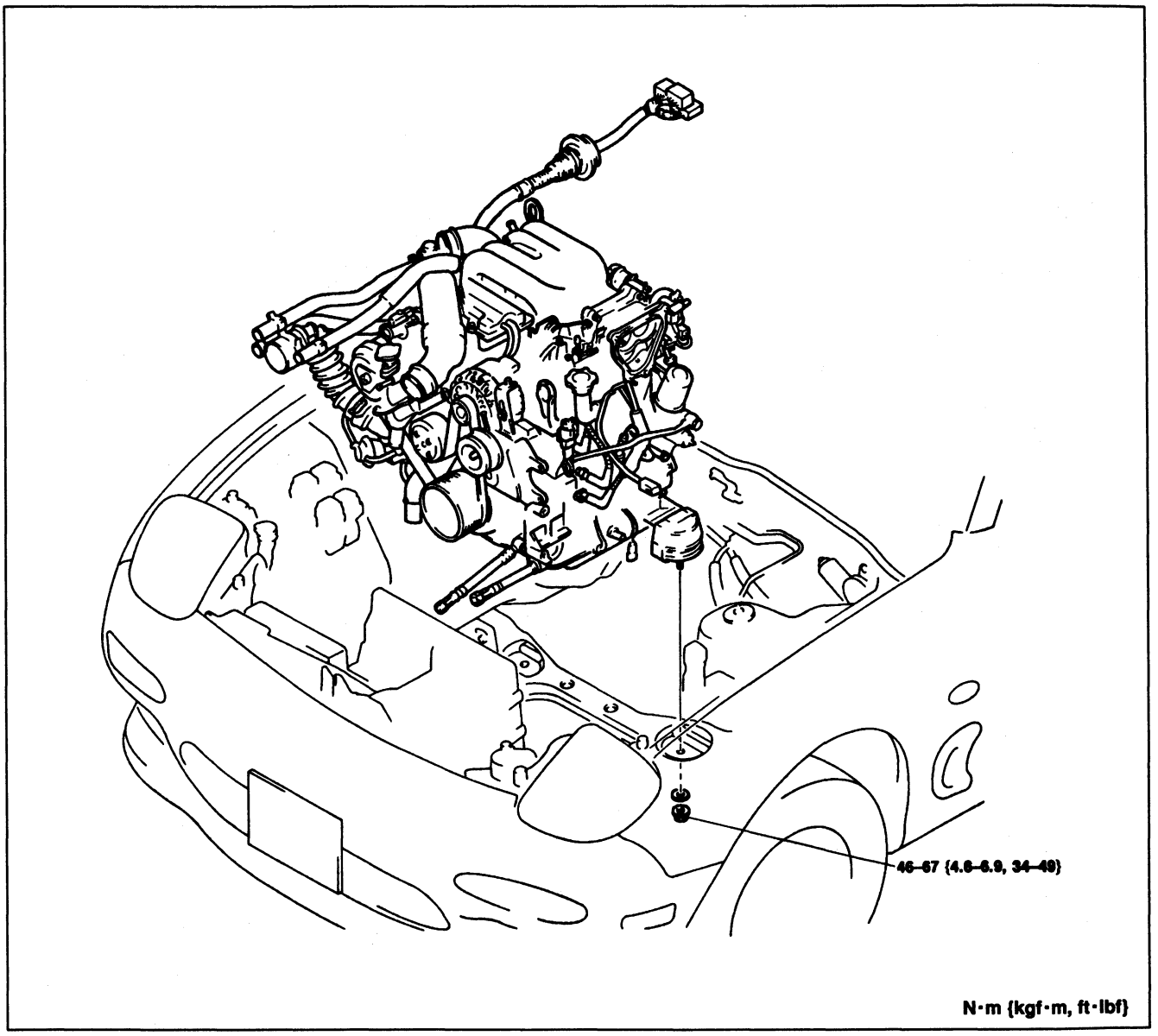
PREPARATION
SST

49 W023 585A Adjust wrench		For removal / installation of locknut

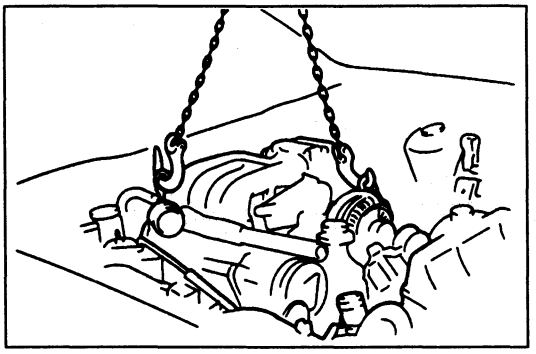
PROCEDURE
Step 1

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.**

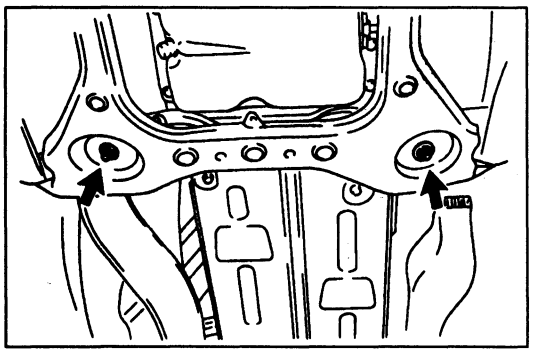
Torque specifications



N·m {kgf·m, ft·lbf}



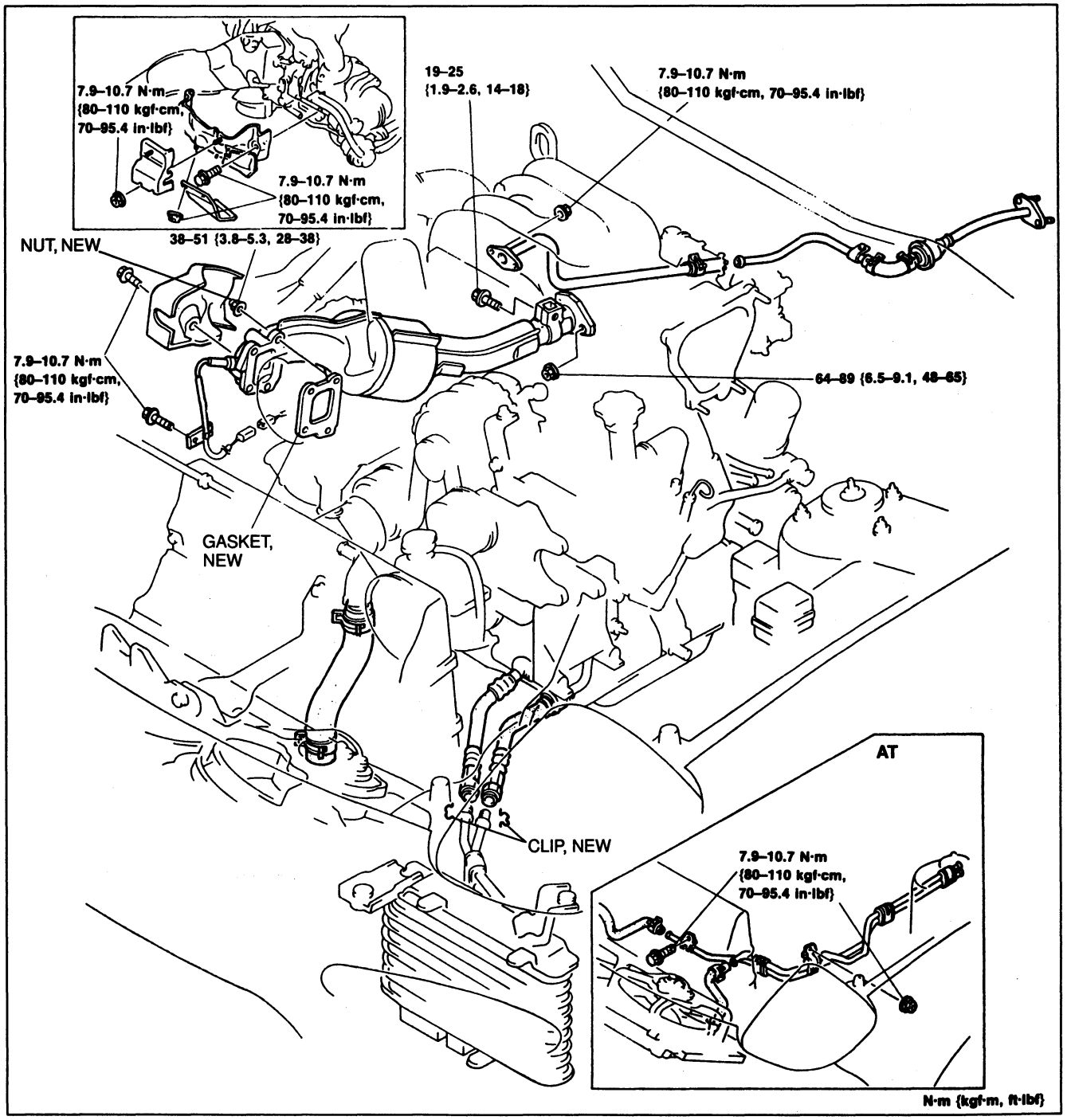
Engine
1. Suspend the engine.
2. Slowly lower the engine. Keep it from swinging or bumping into components in the engine compartment. Align the engine mounts with the cross member mounting holes.

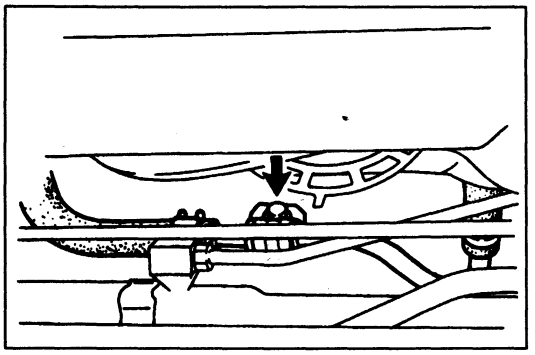


Engine mount
Install and tighten the engine mount nuts.

Tightening torque:
46–67 N·m {4.6–6.9 kgf·m, 34–49 ft·lbf}

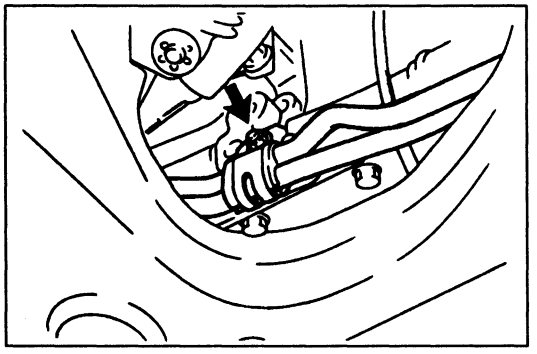
Step 2
Torque specifications





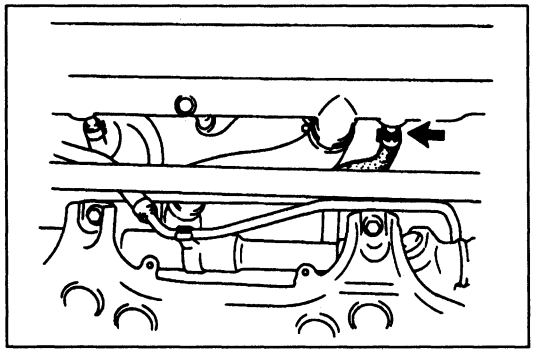
Oil Cooler Pipe (AT)
1. Install the oil cooler pipe.
2. Tighten the bolt.

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

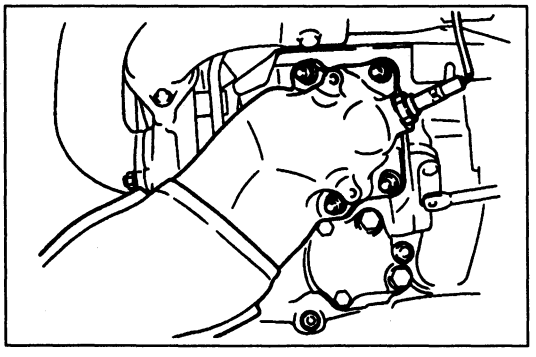


3. Tighten the nut shown in the figure.

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



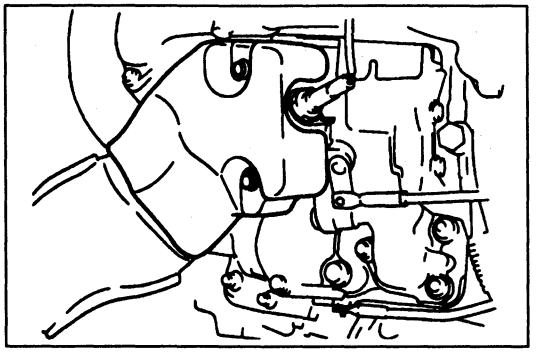
4. Connect the oil cooler hose.



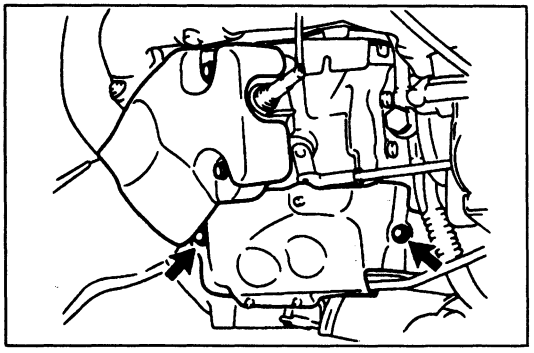
Front Exhaust Pipe
1. Connect the front exhaust pipe along with a new gasket.

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

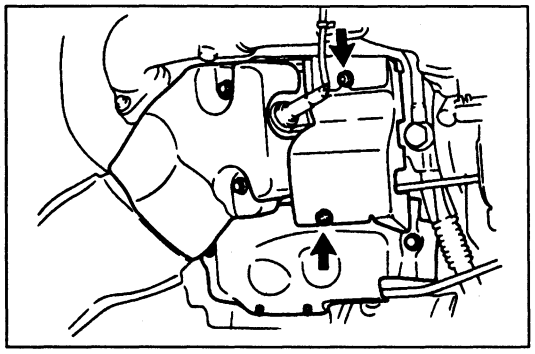
2. Install the oxygen sensor harness.



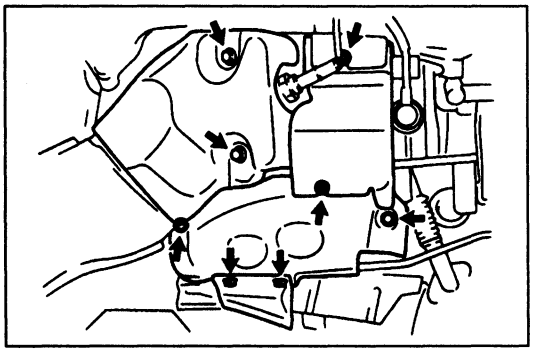
Insulator
1. Install the front exhaust pipe insulator and hand tighten the bolts.



2. Install the turbo insulator and hand tighten the bolts.

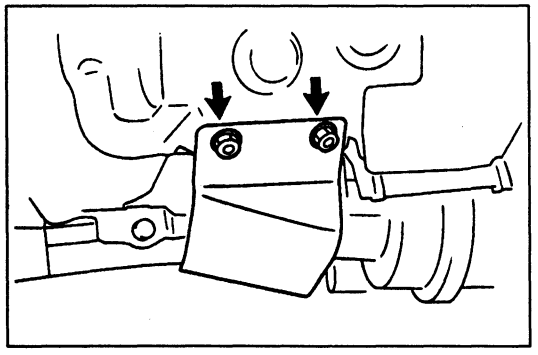


3. Install the center insulator and hand tighten the bolts.



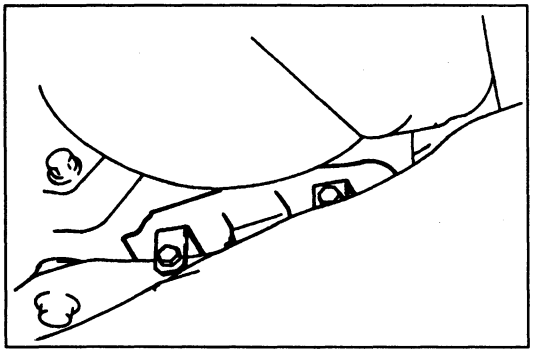
4. Tighten the insulator bolt.

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



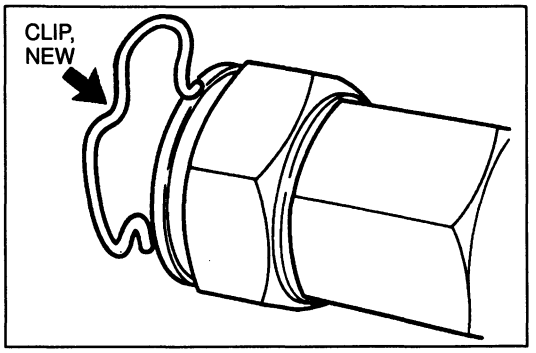
5. Install the insulator.

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



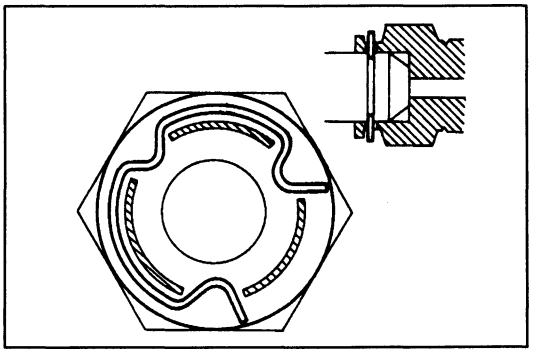
6. Install the engine mount insulator.

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

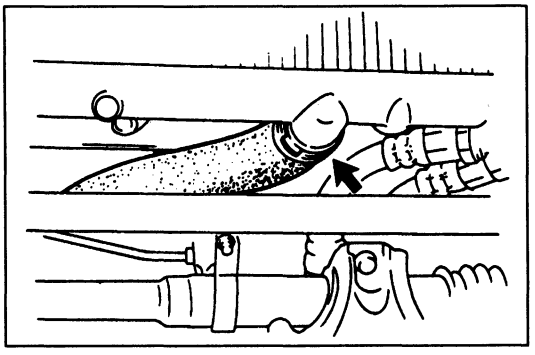


Oil Pipe

1. Connect the oil pipe and install the retaining clip.



2. Verify that the oil pipe is securely locked.

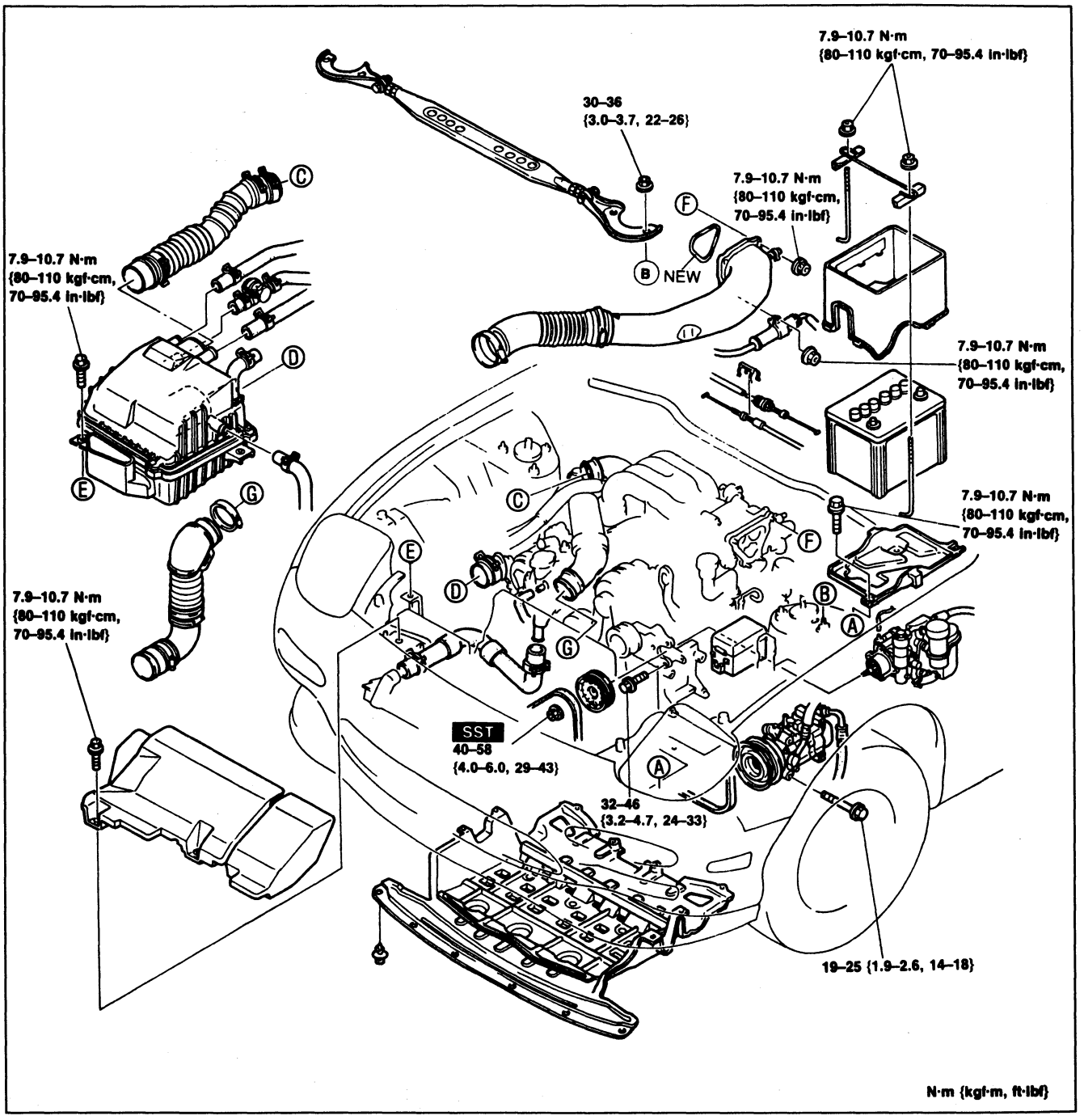


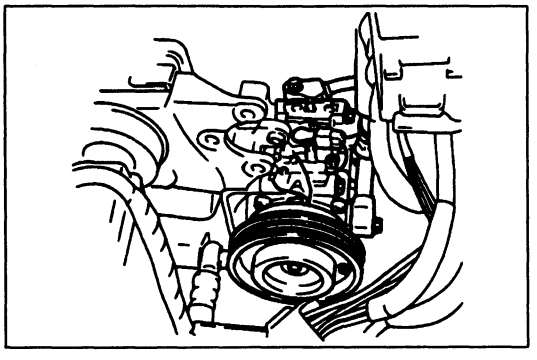
Radiator hose (lower)

Connect the lower radiator hose.

Step 3
Connect the harness connectors and the hoses shown in the figure.

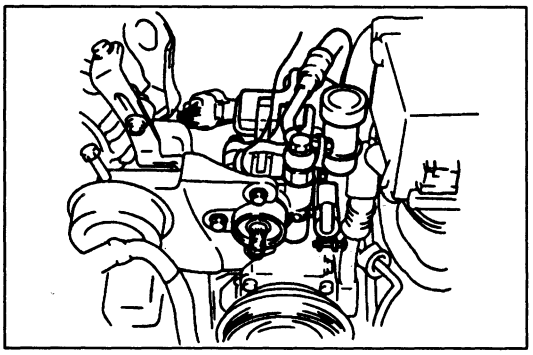
Step 4
Torque specifications





A/C compressor
Install the A/C compressor to the bracket.

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

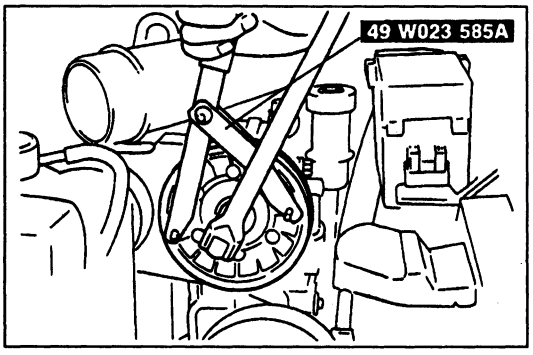


P/S oil pump

1. Install the P/S oil pump to the bracket.

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

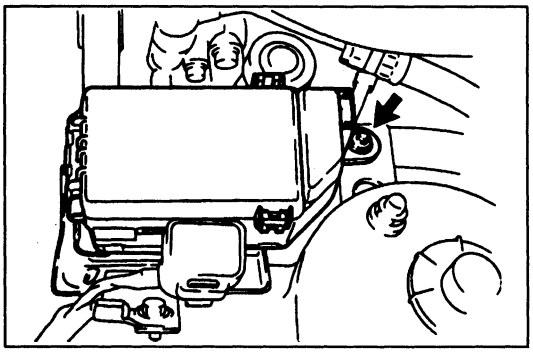
2. Connect the connector.



P/S oil pump pulley

1. Install the P/S oil pump pulley to the pump body and hand tighten the nut.
2. Tighten the pulley nut while holding the pulley with the **SST**.

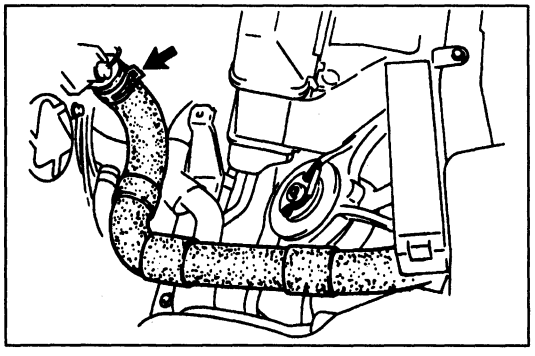
   Tightening torque:
   40–58 N·m {4.0–6.0 kgf·m, 29–43 ft·lbf}



Fuse box

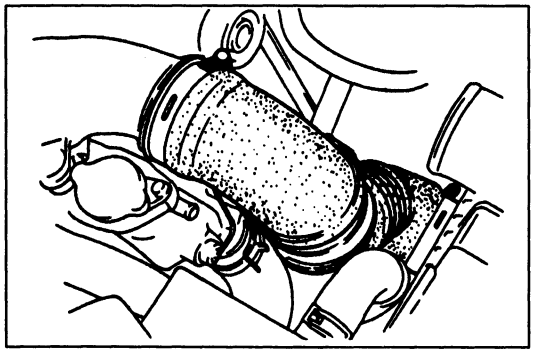
Install the fuse box.

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



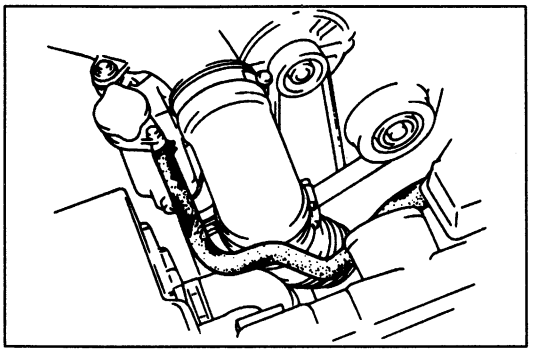
Radiator hose (upper)

Connect the upper radiator hose.

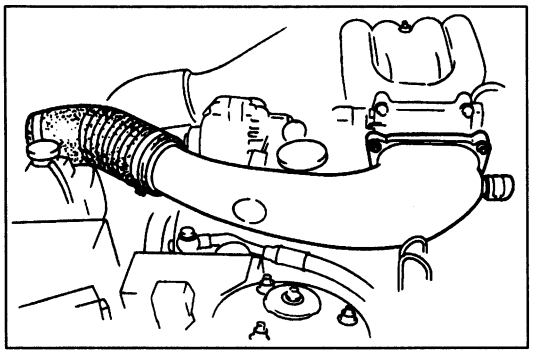


Air hose

Connect the air hose.

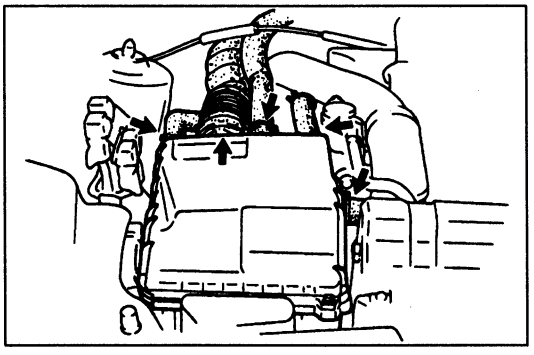


Water hose
Connect the water hose.



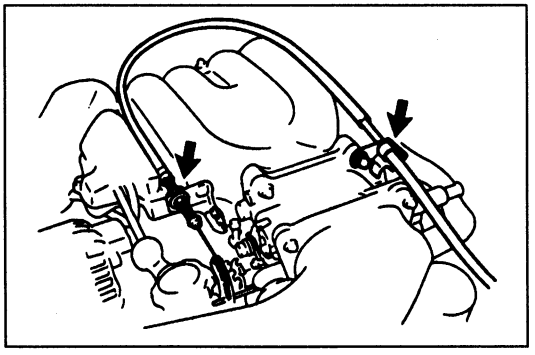
Hose
Install the hose.

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



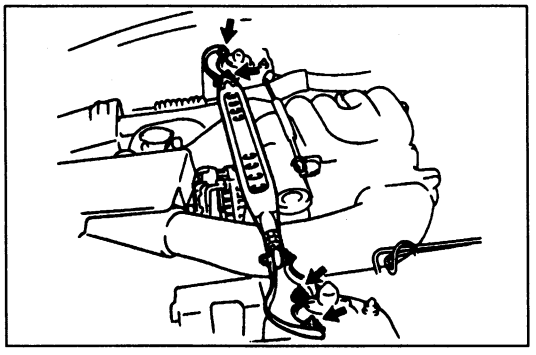
Air cleaner housing
1. Connect the air hose.
2. Install the air cleaner housing.

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



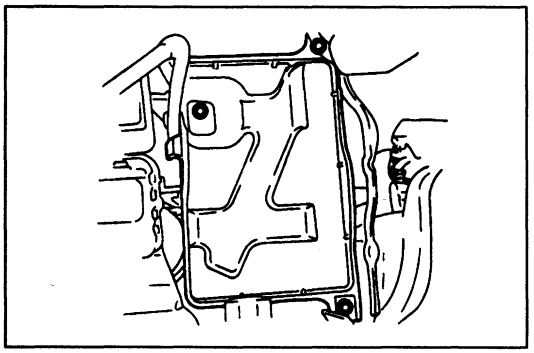
Accelerator cable
1. Install the accelerator cable.
2. Adjust the cable deflection.

Deflection:
1–3 mm {0.04–0.12 in}



Strut bar
1. Remove the upper nuts.
2. Install the strut bar.

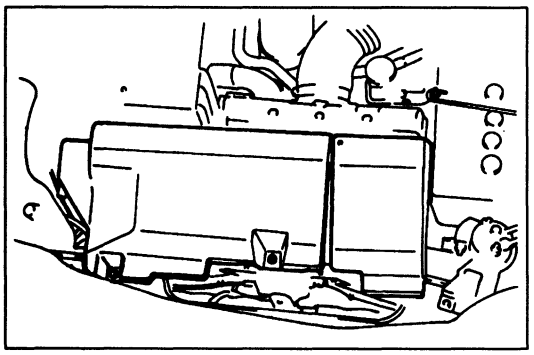
Tightening torque:
30–36 N·m {3.0–3.7 kgf·m, 22–26 ft·lbf}



Battery and carrier
1. Install the battery carrier.

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

2. Install the battery.
3. Connect the positive battery cable.



Fresh-air duct
Install the fresh-air duct.

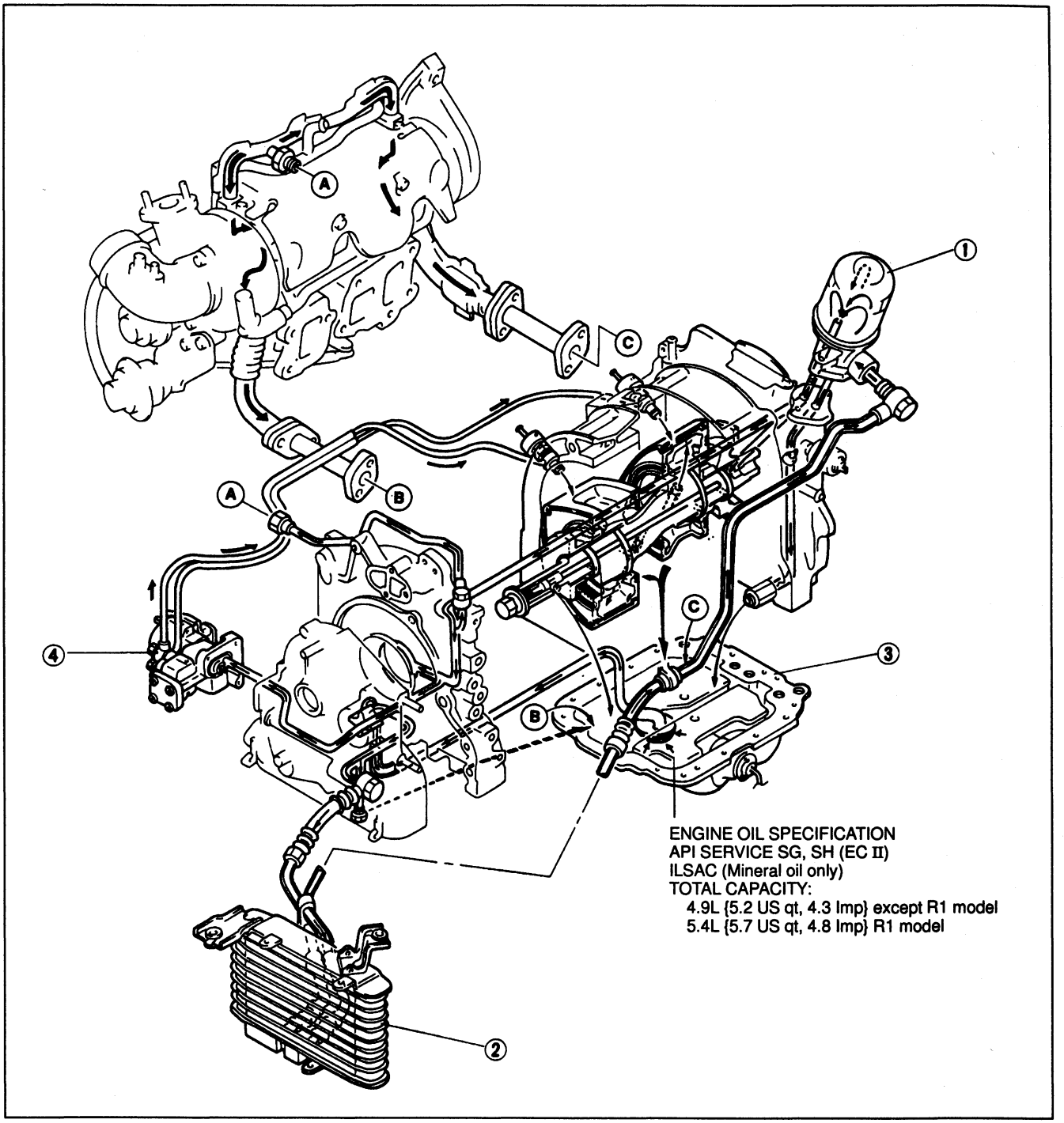
Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 70–95.4 in·lbf}

Steps After Installation
1. Connect the powertrain control module. (Refer to section F.)
2. Fill the radiator with the specified amount and type of engine coolant. (Refer to section E.)
3. Fill the engine with the specified amount and type of engine oil. (Refer to section D.)
4. Fill the transmission with the specified amount and type of transmission oil.
   (MT: Refer to section J, AT: Refer to section K)
5. Install the hood.
6. Start the engine and check the following.
   (1) check for engine oil, transmission oil, and engine coolant leakage.
   (2) check the ignition timing and idle speed. (refer to section F)
   (3) check the operation of the emission control system.
7. Turn off the engine and check drive belt deflection. (refer to page C–6)
8. Perform a road test.
9. Recheck the oil and coolant levels.

Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

LUBRICATION SYSTEM

INDEX

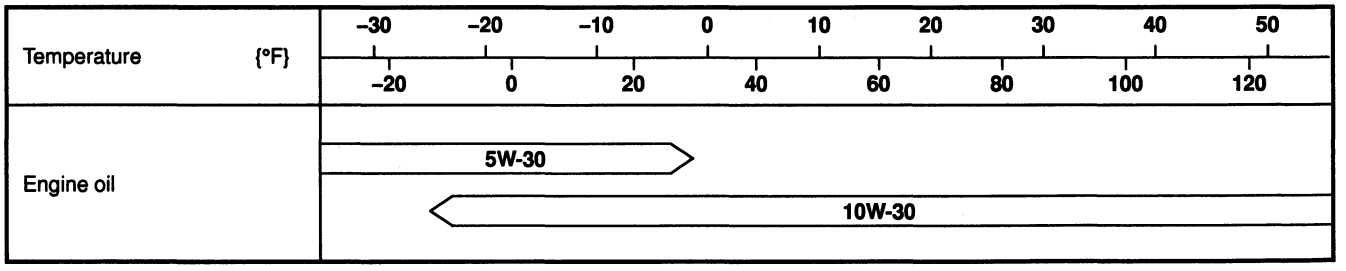


OUTLINE

SPECIFICATIONS

Item \ Engine model			13B Turbo
Lubrication system			Force-fed
Oil pump	Type		Trochoid
	Number of rotors		2
	Diameter × width of rotor mm {in}		50 × 17.5 {1.97 × 0.69}
Control valve relief pressure kPa{kgf·cm², psi}			1080 {11.0, 156}
Oil cooler	Type		Air-cooled, with bypass valve
	Relief temperature °C {°F}		60–65 {140–149} or below
	Relief pressure differential kPa{kgf·cm², psi}		349 {3.56, 50} at 60°C {149°F}
Regulator valve relief pressure kPa{kgf·cm², psi}			780 {8.0, 110}
Oil filter	Type		Full-flow, paper element
	Relief pressure differential kPa{kgf·cm², psi}		98 {1.0, 14}
Eccentric shaft bypass valve relief temperature °C {°F}			60 {140} or below
Engine oil	Total (dry engine) L {US qt, Imp qt}		4.9 {5.2, 4.3} ... except R1 model 5.4 {5.7, 4.8} ... R1 model
	Oil replacement L {US qt, Imp qt}		3.6 {3.8, 3.2}
	Oil replacement (with oil filter) L {US qt, Imp qt}		3.8 {4.0, 3.3}
	Oil ileter L {US qt, Imp qt}	Factoryinstalled	0.19 {0.20, 0.17}
		Service part	0.17 {0.18, 0.15}
	Grade		API Service SG, SH (ECII) ILSAC (Mineral oil only)

Recommended SAE Viscosit



Anticipated ambient temperature range before the succeeding oil change, °C {°F}

TROUBLESHOOTING GUIDE

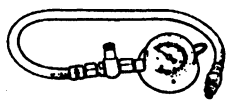
Problem	Possible Cause	Action	Page
Engine hard starting	Improper oil Insufficient oil	Replace Add oil	D-6 D-6
Excessive oil consumption	Malfunction of metering oil pump mechanical component Faulty oil nozzle Oil leakage	Inspect Inspect Repair	D-14 D-17 —
Oil leakage	Loose drain plug or damaged washer Faulty seal at oil pan Damaged front cover Loose front cover bolt or oil pan bolt Damaged sealing rubber, O-ring, or front cover gasket Malfunction of oil seal Loose oil filter Loose or damaged oil level sensor or oil pressure gauge Damaged oil cooler or oil cooler hose Damaged oil tube	Tighten or replace Repair Replace Tighten Replace Replace Tighten Tighten or replace Replace Replace	D-9 D-9 — — — — D-7 — D-8 —
Oil pressure drop*	Oil leakage Insufficient oil Worn or damaged oil pump gear Clogged oil strainer Malfunction of oil pressure control valve Malfunction of oil pressure regulator valve Clogged oil filter Malfunction of eccentric shaft bypass valve Excessive oil clearance between eccentric shaft and main bearing	Repair Add oil Refer to Section C Clean Replace Replace Replace Refer to Section C Refer to Section C	— D-6 — — D-13 D-9 D-7 — —
Oil pressure gauge does not work	Oil pressure drop Malfunction of oil pressure gauge unit Malfunction of electrical system	As described above Refer to Section T Refer to Section T	D-5 — —
Oil level warning indicator illuminates when engine is running	Insufficient oil Malfunction of oil level sensor Malfunction of electrical system	Add oil Refer to Section T Refer to Section T	D-6 — —
Poor acceleration	Malfunction of metering oil pump electrical component	Inspect	D-14
Rough idle	Malfunction of metering oil pump electrical component	Inspect	D-14

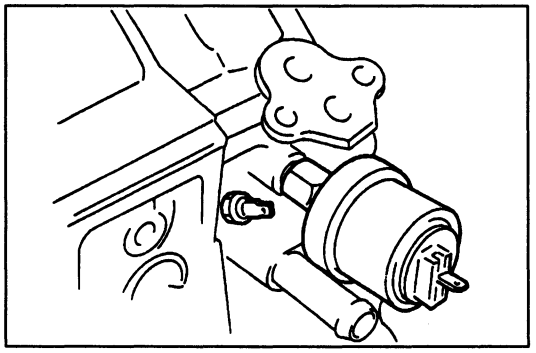
* Oil pressure becomes low when the engine is cold because the eccentric shaft bypass valve operates.

OIL PRESSURE

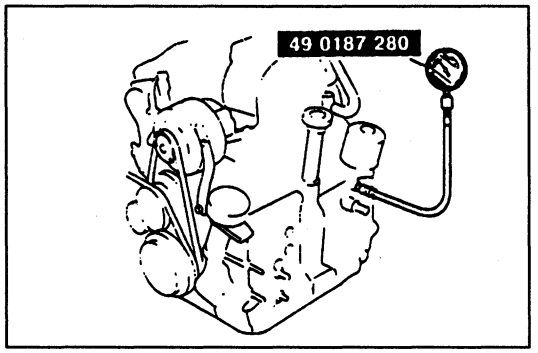
Warning
- **Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.**

PREPARATION
SST

49 0187 280 Gauge, oil-pressure		For inspection of oil pressure



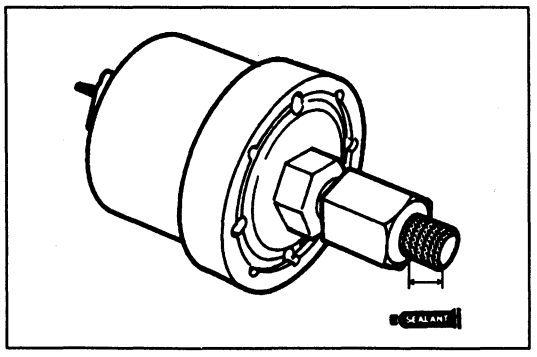
INSPECTION
1. Disconnect the connector and remove the oil pressure sensor.



2. Install the **SST**.
3. Start the engine and let it warm up to operating temperature.
4. Run the engine at 3,000 rpm and note the gauge reading.

   Oil pressure: 340 kPa {3.5 kgf·cm^2, 50 psi} min

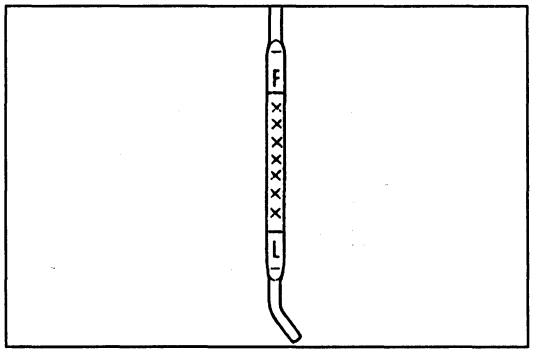
5. If the pressure is not as specified, check for the cause and repair. (Refer to Troubleshooting Guide.)
6. Remove the **SST**.



7. Apply sealant to the oil pressure sensor threads. Do not allow sealant in the pressure sensor hole.
8. Install the oil pressure sensor.

   Tightening torque:
   11–15 N·m {1.1–1.6 kgf·m, 8–11 ft·lbf}

9. Connect the sensor connecter.



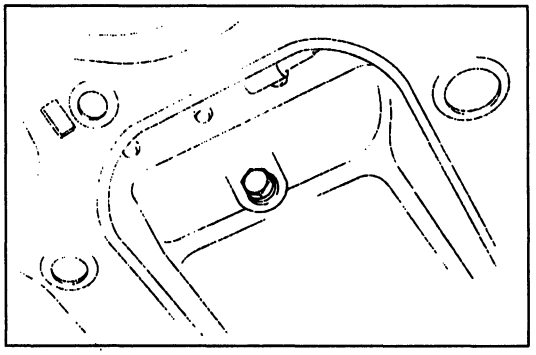
ENGINE OIL

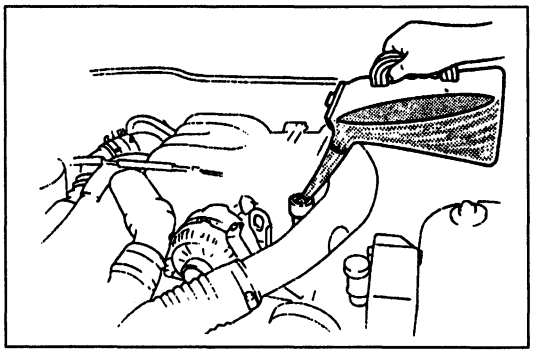
INSPECTION

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 1.7 L {1.8 US qt, 1.5 Imp qt}.





REPLACEMENT

Warning

- **When the engine and the oil are hot, they can badly burn. Don't burn yourself with either.**

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

Tightening torque:
30–41 N·m {3.0–4.2 kgf·m, 22–30 ft·lbf}

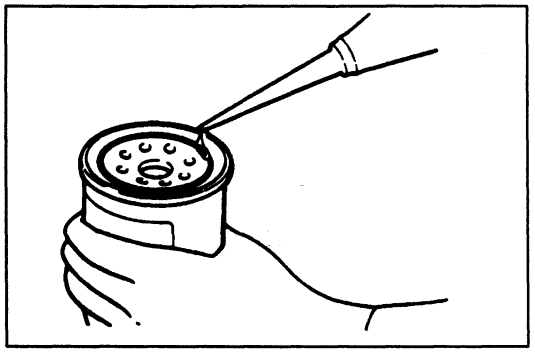
5. Refill the engine with the specified type and amount of engine oil.

Oil capacity:

L {US qt, Imp qt}

Total (dry engine)	4.9 {5.2, 4.3}...except R1 model 5.4 {5.7, 4.8}...R1 model
Engine oil replacement	3.6 {3.8, 3.2}
Engine oil replacement (with oil filter)	3.8 {4.0, 3.3}

6. Refit the oil filler cap.
7. Run the engine a few minutes and stop it.
8. Recheck the oil level and add oil if necessary.



OIL FILTER

REPLACEMENT

1. Remove the oil filter by using the oil filter wrench.
2. Using a clean rag, wipe the mounting surface of the engine.
3. Apply a small amount of clean engine oil to the rubber seal of the new filter.
4. Install the oil filter and tighten it until the rubber seal contacts the base, and then tighten the filter an additional 1-1/6 turns by hand.
5. Start the engine and inspect for leaks around the filter seal.
6. Stop the engine and check the oil level; add oil if necessary.

Note

- The factory installed oil filter and the service part filter are different.

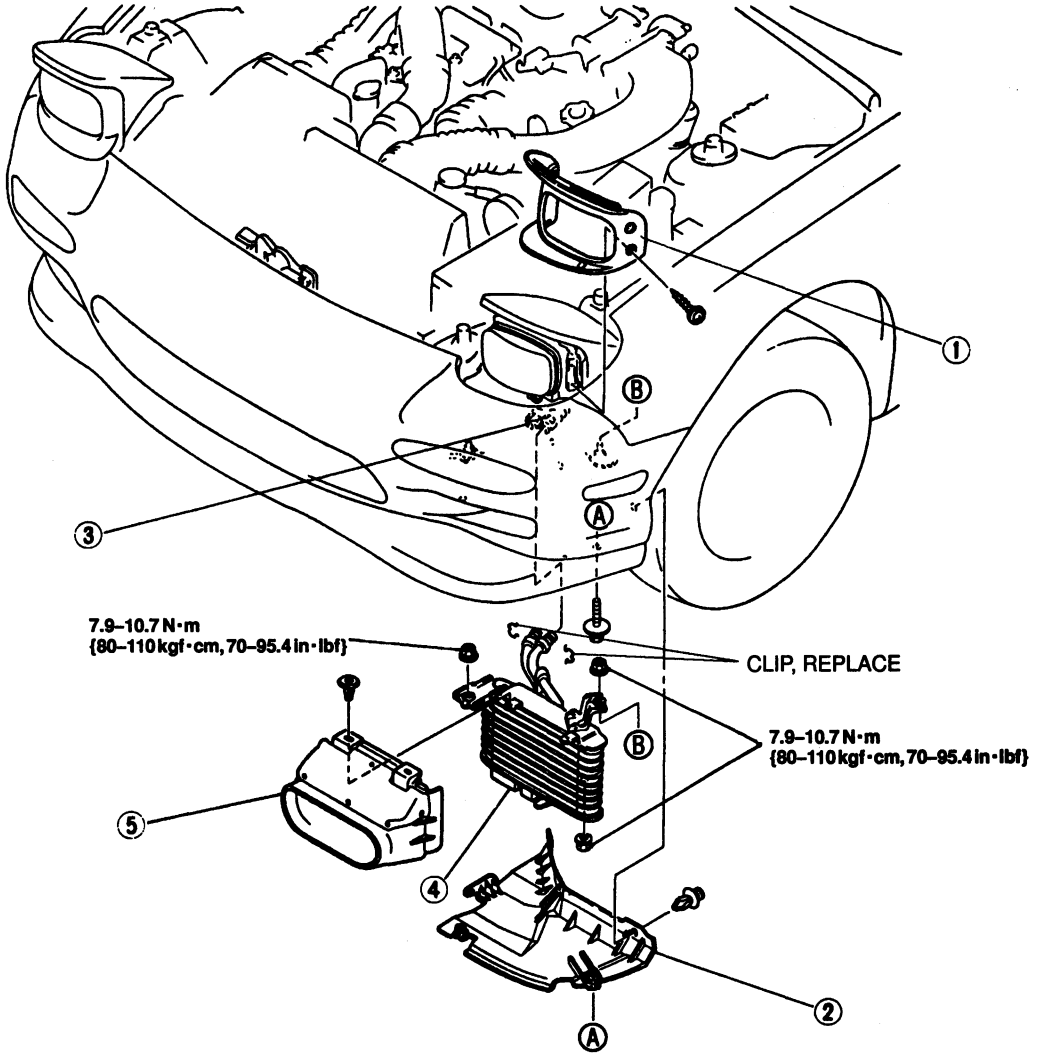
Service oil filter capacity:
0.17 L {0.18 US qt, 0.15 Imp qt}

OIL COOLER

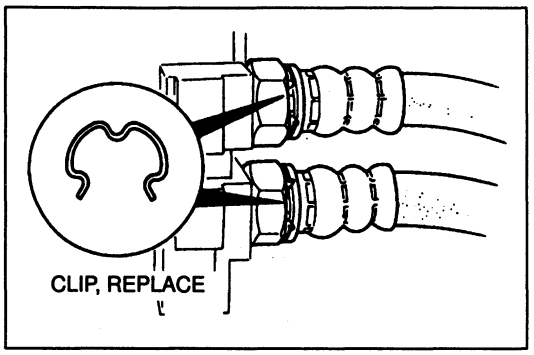
REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.

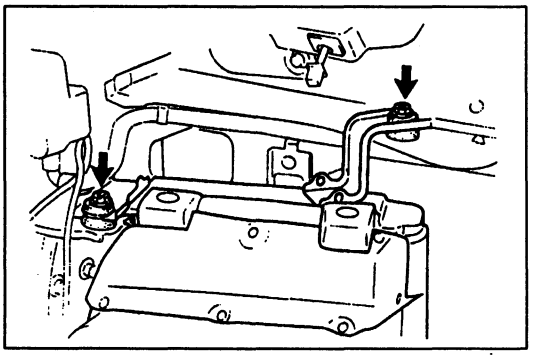
Note
(In case of two oil cooler are equipped)
- LH oil cooler is shown.
  Remove / install RH oil cooler in same procedure.



1. Light bezel
2. Brake pipe air duct
3. Oil cooler hoses
   Removal Note ..... page D–9
4. Oil cooler
   Removal Note ..... page D–9
5. Air duct (oil cooler)



Removal Note
Oil cooler hose
Remove the clip and disconnect the oil cooler hose, using a drain pan to catch the oil.

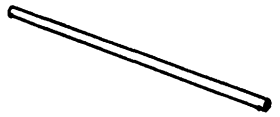
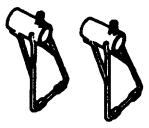
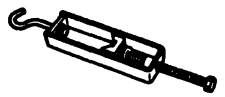


Oil cooler
1. Remove the light bezel.
2. Remove the mounting bracket nuts.
3. Remove the oil cooler.

Steps After Installation
Fill the engine with the specified amount and type of engine oil. (Refer to page D–6.)

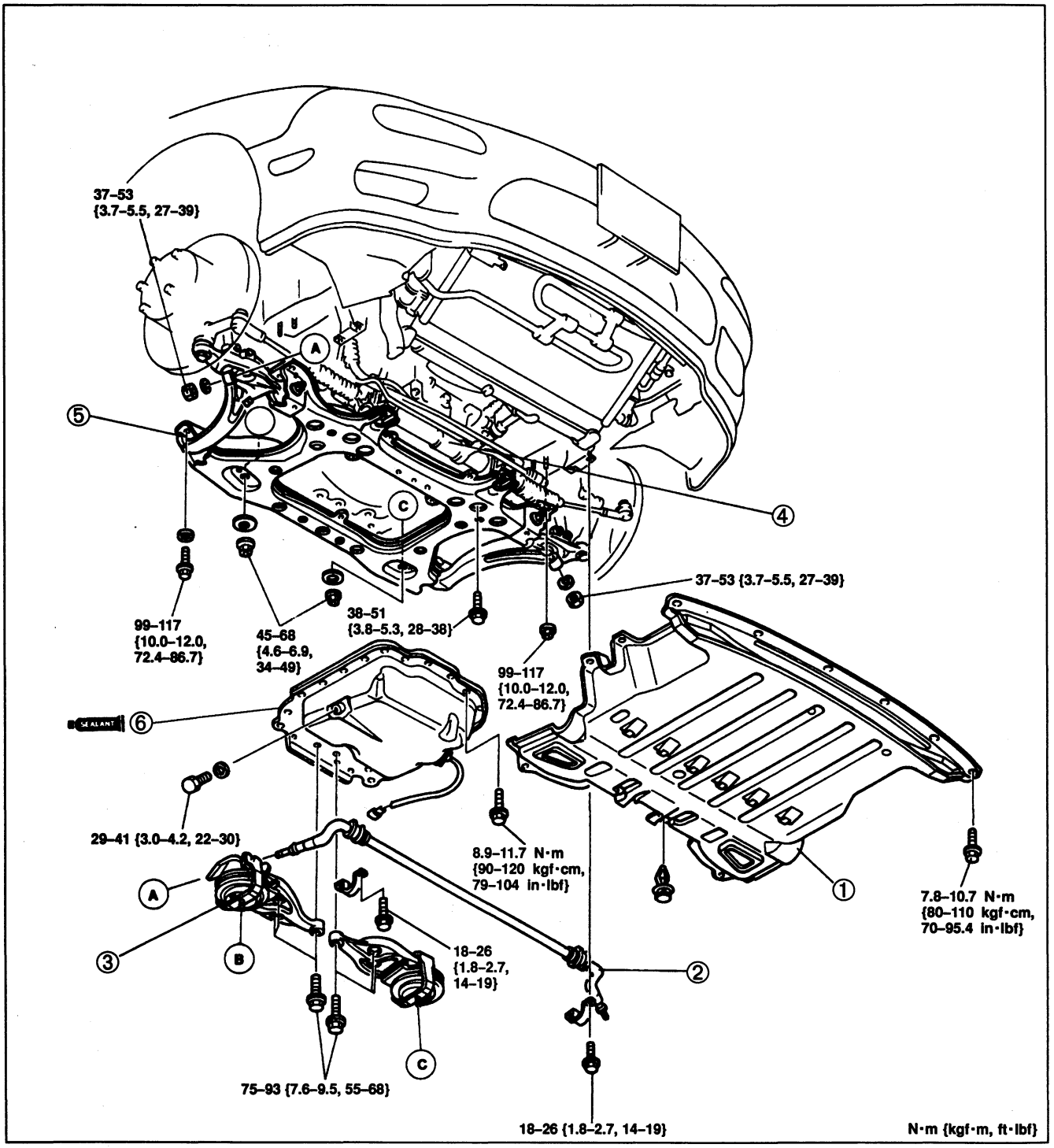
OIL PAN

PREPARATION
SST

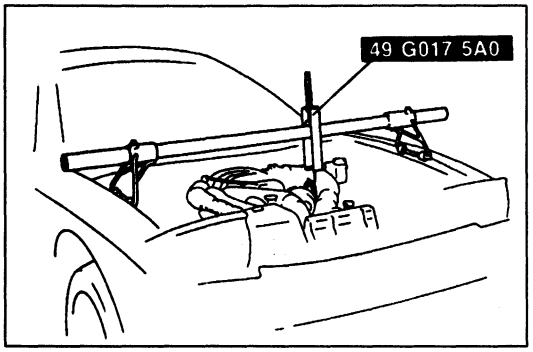
49 G017 5A0 Support, engine 	For support of engine	49 G017 501 Bar (Part of 49 G017 5A0) 	For support of engine
49 G017 502 Support (Part of 49 G017 5A0) 	For support of engine	49 G017 503 Hook (Part of 49 G017 5A0) 	For support of engine

REMOVAL / INSTALLATION

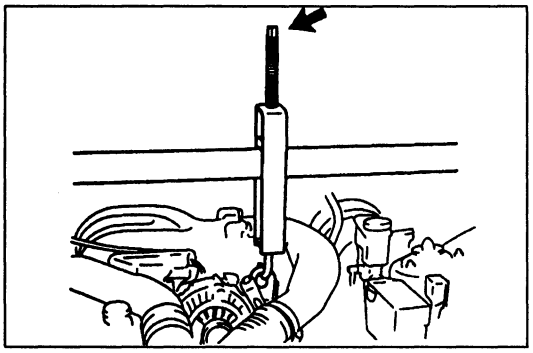
1. Disconnect the negative battery cable.
2. Remove the undercover.
3. Drain the engine oil.
4. Remove in the order shown in the figure, referring to **Removal Note**.
5. Install in the reverse order of removal, referring to **Installation Note**.



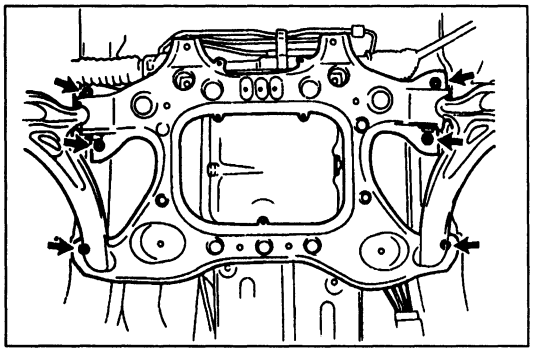
1. Undercover
2. Stabilizer
3. Engine mount bracket
   Removal Note ..... page D–11
4. Steering gear box
5. Crossmember
   Removal Note ..... page D–11
6. Oil pan
   Removal Note ..... page D–11
   Installation Note ..... page D–12



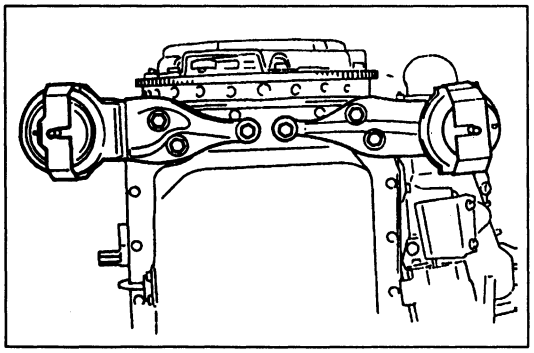
Removal Note
Engine mount bracket
1. Assemble the **SST** and connect the hook to the front engine hanger.



2. Remove the engine mounting nuts.
3. Turn the bolt of the **SST** clockwise to lift the engine.

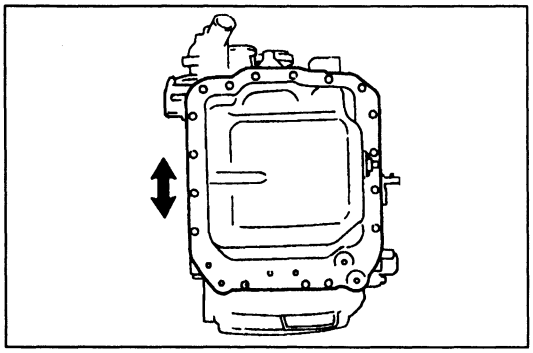


Crossmember
1. Remove the power steering oil hose bracket from the crossmember.
2. Remove the bolts and nuts (arrows) and the crossmember.

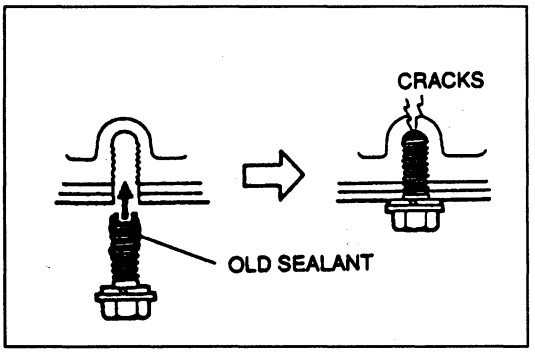


Oil pan
1. Remove the engine mount brackets from the engine.
2. Disconnect the oil level sensor connector and remove it from the harness bracket.
3. Remove the oil pan mounting bolts.

Caution
- **Pry tools can easily scratch the 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.**



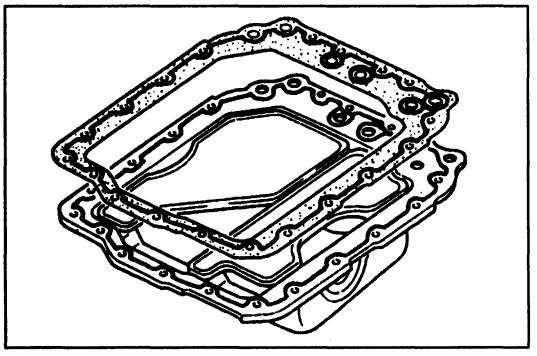
4. Insert a screwdriver only between the points shown in the figure to pry the oil pan loose.



Installation Note
Oil pan

1. Remove all foreign material from the oil pan contact surfaces.

Caution
- **If the bolts are reused, remove the old sealant from the bolt threads. Tightening bolts with old sealant on them may cause cracking inside the bolt holes.**

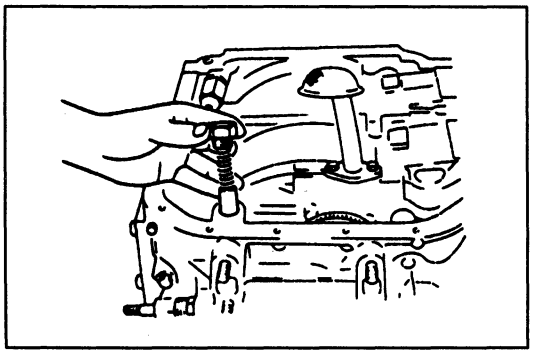


2. Apply silicone sealant to the contact surfaces of the oil pan and the engine side of the new gasket.
3. Install the oil pan within five minutes of applying the sealant.

Tightening torque:
8.9–11.7 N·m {90–120 kgf·cm, 79–104 in·lbf}

Steps After Installation

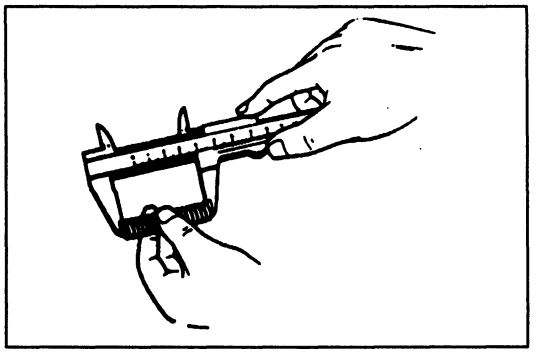
Fill the engine with the specified amount and type of engine oil. (Refer to page D–6.)



OIL PRESSURE CONTROL VALVE

REMOVAL / INSTALLATION

1. Remove the parts in the following order.
   (1) Oil pan (Refer to page D-9.)
   (2) Cap bolt and spring
   (3) Control plunger
2. Install in the reverse order.
3. Check the engine for oil leakage and check the oil level.



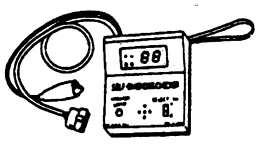
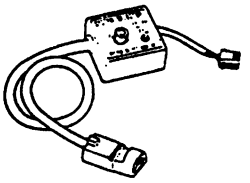
INSPECTION

1. Check each part for damage and scoring. Replace if necessary.
2. Measure the free length of the spring, and if necessary, replace it.

   Free length: 73.0 mm {2.87 in}

METERING OIL PUMP

PREPARATION
SST

49 H018 9A1 Self-Diagnosis Checker		For diagnosis of metering oil pump system	49 B019 9A0 System Selector		For diagnosis of metering oil pump system

Malfunctions related to the metering oil pump may be described as electrical component problems and mechanical component problems.

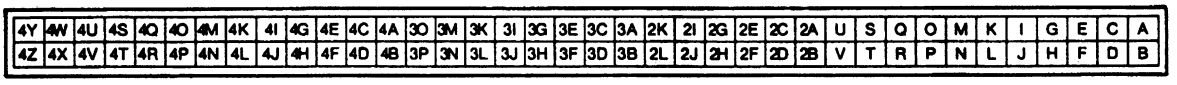
Electrical Component Related Problem

1. Check for service codes by using the **SST**. (Refer to section F.)
2. If service code No. 20, 26, 27 or 37 appears, check the metering oil pump following the diagnosis chart below.

Diagnosis Chart

Service Code No.	Possible Cause	Action
20 (Metering oil pump position sensor)	• Open or short circuit in position sensor wiring • Open or short circuit in wiring between powertrain control module and position sensor • Loose connection of position sensor or powertrain control module	Perform Inspection 2 (page D-16)
26 (Metering oil pump control system)	• Open or short circuit in wiring between powertrain control module and stepping motor • Loose connection of metering oil pump or powertrain control module • Damaged stepping motor • Insufficient powertrain control module voltage	Perform Inspection 1 (page D-15)
27 (Metering oil pump control system)	• Open or short circuit in wiring between powertrain control module and stepping motor • Loose connection of metering oil pump or powertrain control module • Damaged stepping motor • Position sensor inaccurate • Insufficient powertrain control module voltage	Perform Inspection 1 (page D-15)
37 (Battery positive voltage drop)	• Malfunction of charging system	Refer to Section G

Control Module Terminal



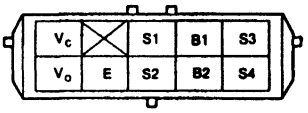
INSPECTION

1. Metering oil pump control system

Stepping motor resistance

Measure the resistance at the following terminals Is voltage as shown?
(Beading must be A or B)

Reading / Terminals	A	B
+ B1 to S1 - S3	Open	16–31 Ω
+ B2 to S2 - S4	Open	16–31 Ω
+ B1 to S2 - S4	16–31 Ω	Open
+ B2 to S1 - S3	16–31 Ω	Open



NO → Replace metering oil pump

YES ↓

Harness terminal voltage

Turn ignition switch ON; is battery positive voltage indicated at terminals +B1 and +B2 of harness with connector disconnected?

NO → Repair or replace wiring harness

YES ↓

Harness and connector continuity

Is there continuity between stepping motor and powertrain control module as shown?

Stepping motor	Powertrain control module
S1 (B/O)	4I
S2 (B/L)	4J
S3 (B/LG)	4K
S4 (B/Y)	4L

NO → Repair or replace wiring harness

YES ↓

Powertrain control module terminal voltage (stepping motor)

Turn ignition switch ON; is battery positive voltage indicated at terminals 4I, 4J, 4K, and 4L?

Note
This test must be done with connector connected.

NO → Replace powertrain control module

YES ↓

Powertrain control module terminal voltage (position sensor)

Turn ignition switch ON: is approx. 1–4.2V indicated at terminal 3A?

NO →

YES ↓

Is approx. 1.1V indicated at idle?

NO →

YES ↓

Does voltage increase from approx. 1.1V then return to approx. 1.1V when accelerating and decelerating engine?

NO →

Replace metering oil pump

YES ↓

Position sensor operation

Cancel memory of malfunctions by disconnecting negative battery cable for 20 seconds; then reconnect it
Warm up engine until coolant temperature reaches 80°C (176°F) and let it idle for 15 minutes
Does service code No. 26 or 27 appear?

YES → Replace metering oil pump

NO ↓

Metering oil pump control system OK

2. Metering oil pump position sensor

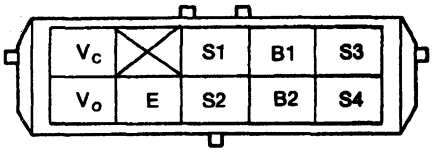
Position sensor resistance

Is resistance between terminals V_C and E as specified?

Resistance: 1–2 kΩ

Is resistance of terminal (V_O–E) and (V_O–V_C) as specified?

Resistance: 0.4–12 kΩ



NO → Replace metering oil pump

YES

Harness and connector continuity

Is there continuity between position sensor and powertrain control module as shown?

Position sensor	Powertrain control module
V_C (BR/W)	3I
V_O (G/B)	3A
E (BR/B)	4D

NO → Repair or replace wiring harness

YES

Harness short circuit

Is there short or ground between V_O and 3A of wiring harness?

YES → Repair or replace wiring harness

NO

Control unit terminal voltage

Turn ignition switch ON; is there approx. 1–4.2V indicated at terminal 3A?

NO → Replace metering oil pump

YES

Cancel memory of malfunctions by disconnecting negative battery cable for 20 seconds; then reconnect it.
Does service code No. 20 appear?

YES → Replace powertrain control module

NO

Position sensor operation

Cancel memory of malfunctions by disconnecting negative battery cable for 20 seconds; then reconnect it
Warm up engine until coolant temperature reaches 80°C (176°F) and let it idle 15 minutes
Does service code No. 20 appear?

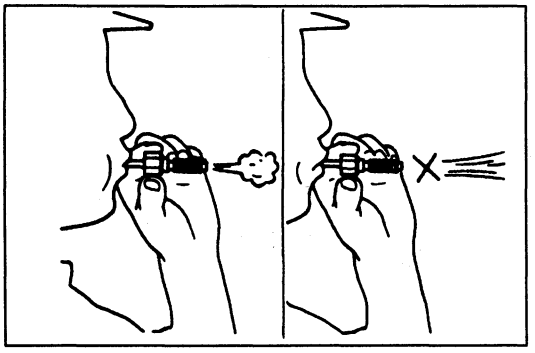
YES → Replace metering oil pump

NO

Metering oil pump control system OK

Mechanical Component Related Problem

Excessive oil consumption may be caused by a metering oil pump malfunction.
Before replacing the metering oil pump, refer to "Oil leakage" in the Troubleshooting Guide (page D–4) and perform the electrical component inspection (pages D–15 and D–16).



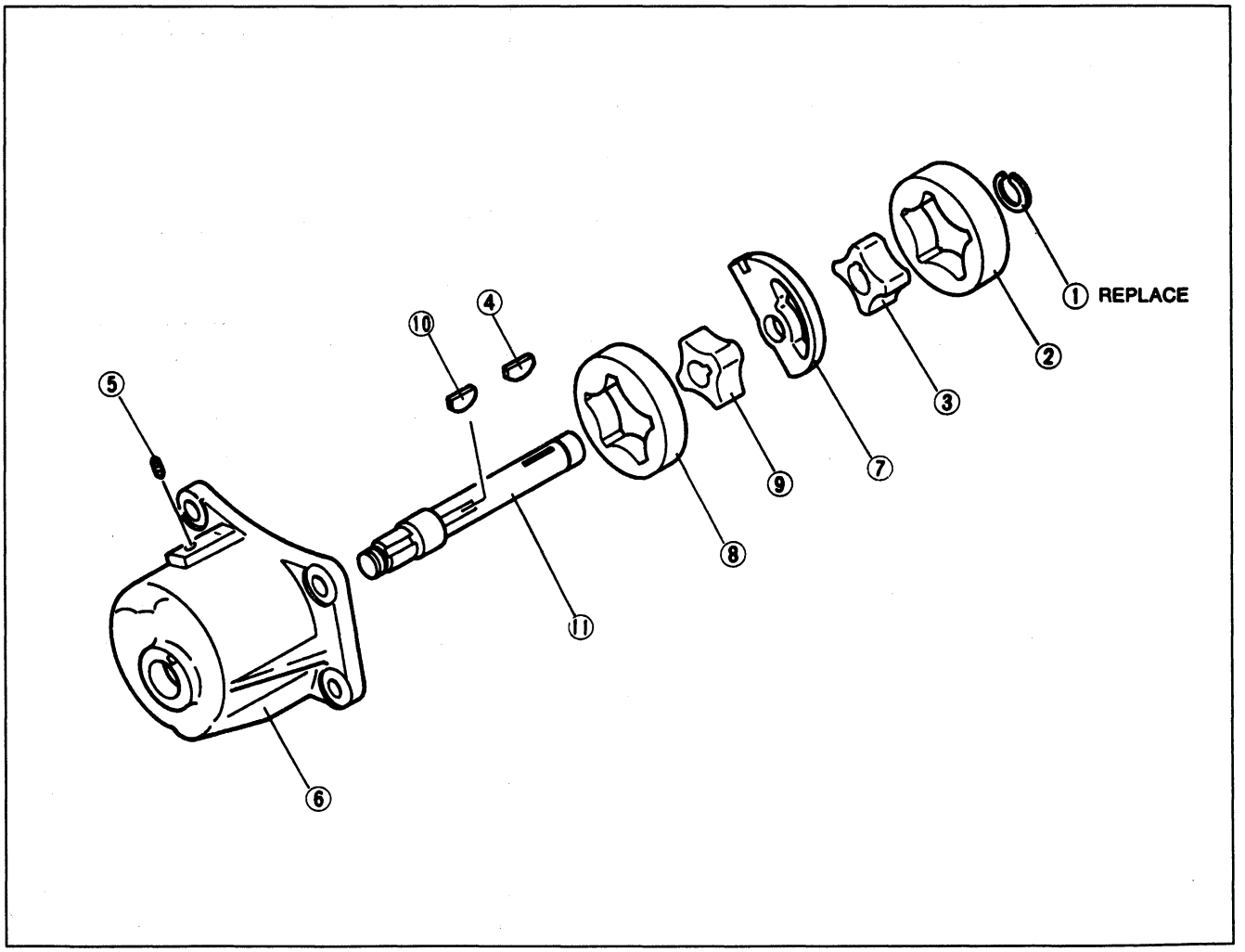
Oil nozzle

1. Remove the oil nozzles from the rotor housing and the intake manifold.
2. Verify that air passes in only one direction as shown. If not so, replace the oil nozzle.

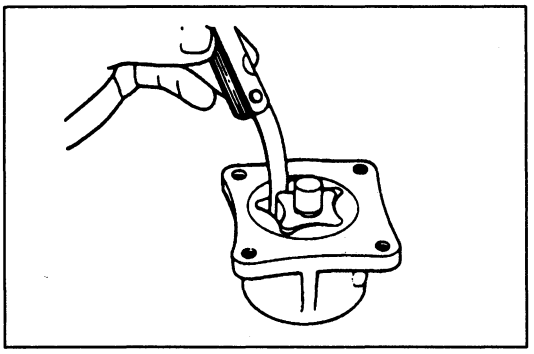
OIL PUMP

DISASSEMBLY / ASSEMBLY

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



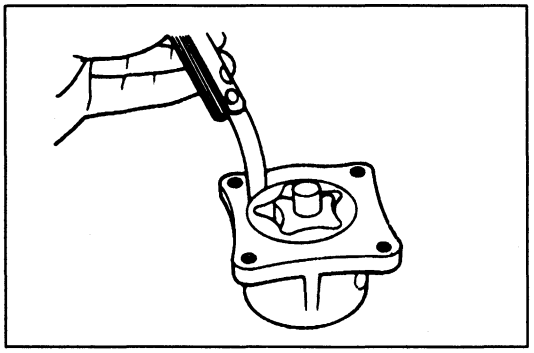
1. Snap ring
2. Rear outer rotor
   Assembly Note
   ..... page D-18
3. Rear inner rotor
   Assembly Note
   ..... page D-18
4. Key
5. Screw
   Assembly Note
   ..... page D-19
6. Body
7. Center plate
8. Front outer rotor
   Assembly Note
   ..... page D-18
9. Front inner rotor
   Assembly Note
   ..... page D-18
10. Key
11. Shaft



INSPECTION

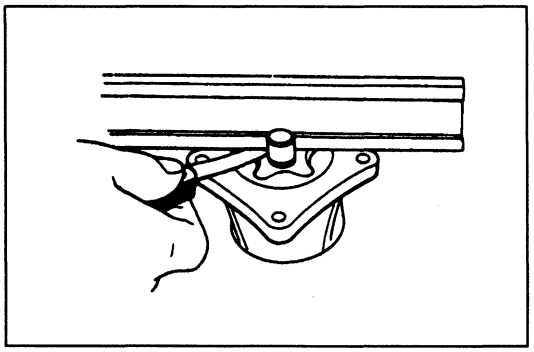
1. Inspect the oil pump parts for wear and damage. Replace as necessary.
2. Measure the clearance between the lobes of rotors by using a feeler gauge.

Standard clearance:
0.03–0.12 mm {0.0012–0.0047 in}
Maximum: 0.15 mm {0.0059 in}

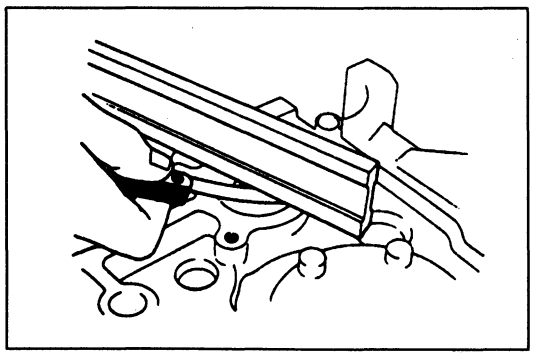


3. Measure the clearance between the outer rotor and the pump body.

Standard clearance:
0.20–0.25 mm {0.0079–0.098 in}
Maximum: 0.30 mm {0.0118 in}

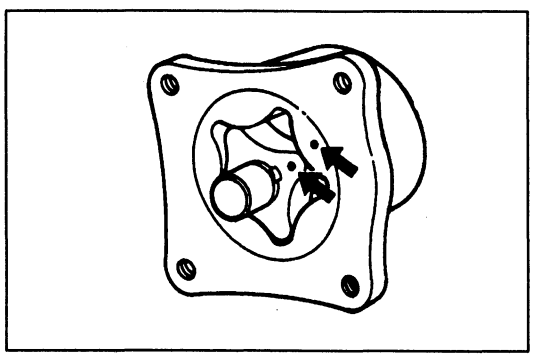


4. Inspect the side clearance of the rotors.
   (1) Using a straightedge and a feeler gauge, measure the depth of the rotor in the pump body.

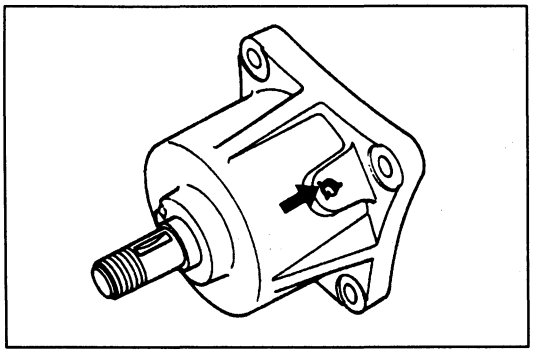


   (2) Measure the depth of the rotor sliding surface from the pump mounting surface.
   (3) Add these two depth to obtain the side clearance.
   (4) If not as specified, grind or replace the pump body.

Standard end clearance:
0.03–0.125 mm {0.0012–0.0049 in}
Maximum: 0.15 mm {0.0059 in}



Assembly Note
Outer rotor and inner rotor
Install the front and rear outer and inner rotors so that the tally marks on the rotors face the front housing.



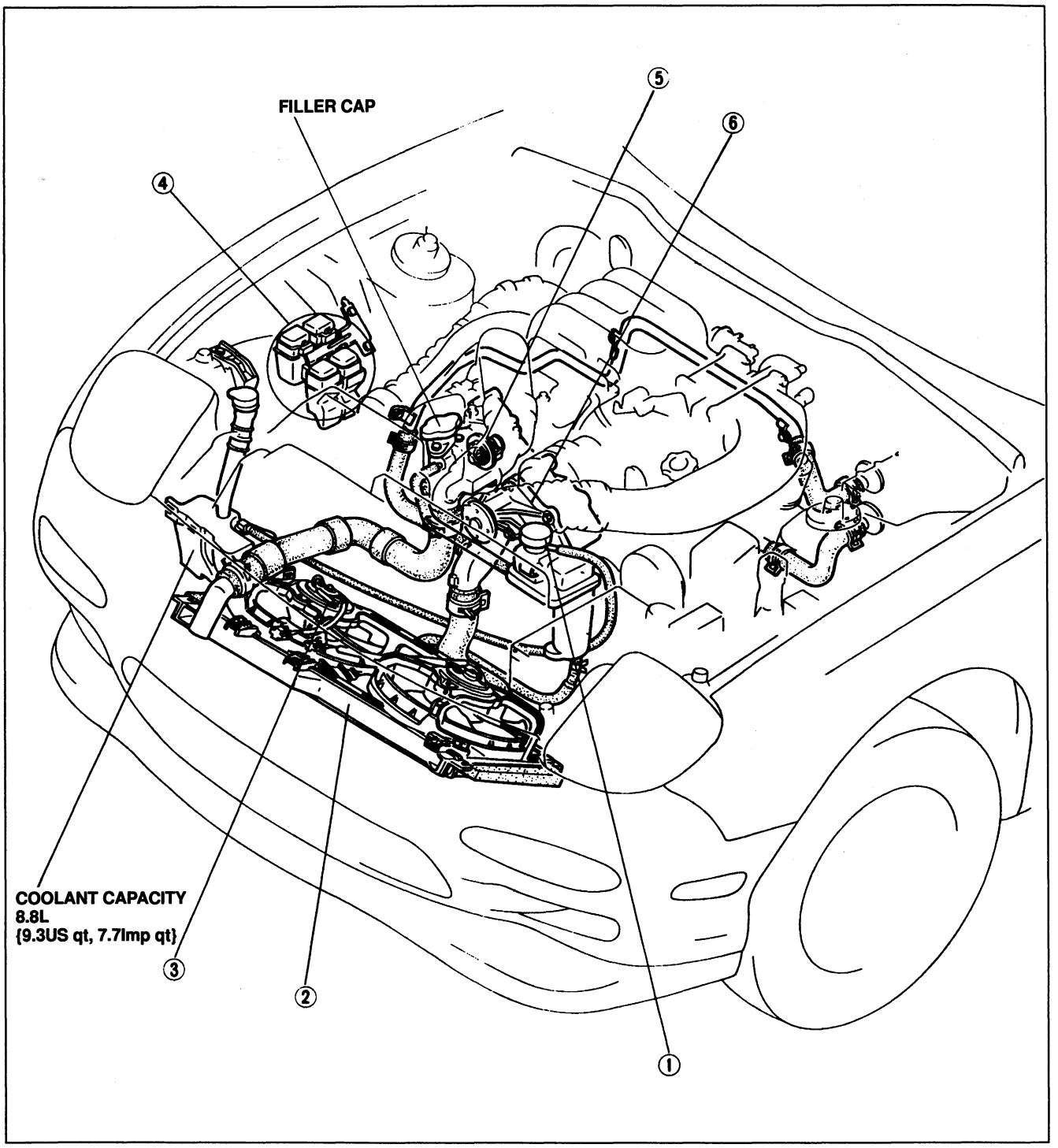
Screw

To prevent the screw from loosening, stake it after installation.

Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

COOLING SYSTEM

INDEX



OUTLINE

SPECIFICATIONS

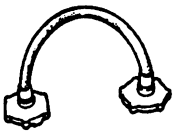
Item \ Engine model			13B Turbo
Cooling system			Water-cooled, forced circulation
Coolant capacity		L {US qt, Imp qt}	8.8 {9.3, 7.7}
Water pump	Type		Centrifugal
	Water seal		Unified mechanical seal
Thermostat	Type		Wax, bottom-bypass
	Opening temperature	°C {°F}	80.5–83.5 {177–182}
	Full-open temperature	°C {°F}	95 {203}
	Full-open lift	mm {in}	8–10 {0.31–0.39}
Radiator	Type		Corrugated fin
	Cap valve opening pressure	kPa {kgf/cm^2, psi}	113–142 {1.15–1.45, 16.4–20.6}
Coolant fan	Motor current	A	High: 10.6–16.6, Med: 6.5–12.5, Low: 5.8–11.8
	Number of blades		No.1: 5, No.2: 4
	Outer diameter of blades	mm {in}	No.1, No.2: 300 {11.8}

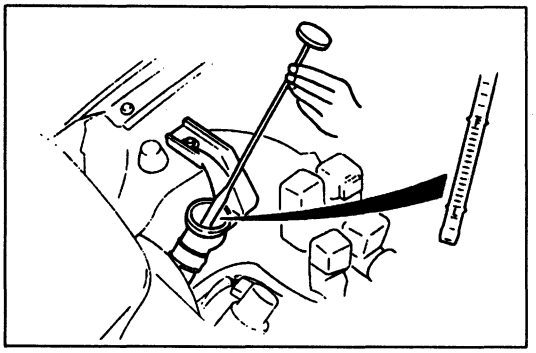
TROUBLESHOOTING GUIDE

Problem	Possible cause	Action	Page
Overheating	Coolant level insufficient	Add	E–5
	Coolant leakage	Repair	—
	Radiator fins clogged	Clean	E–10
	Radiator cap malfunction	Replace	E–7
	Coolant fan malfunction	Replace	E–11
	Thermostat malfunction	Replace	E–15
	Water passage clogged	Clean	E–5
	Water pump malfunction	Replace	E–16
Corrosion	Impurities in coolant	Replace	E–5

ENGINE COOLANT

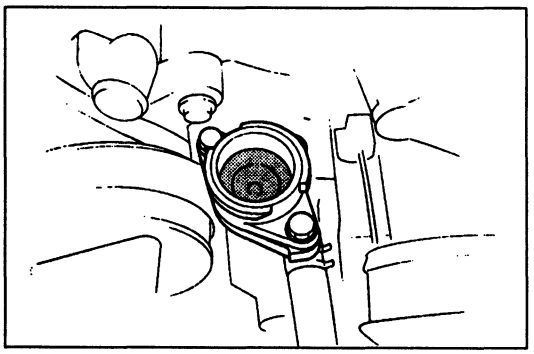
PREPARATION
SST

49 9200 145 Adapter set, radiator cap tester		For inspection of cooling system pressure	49 9200 146 Adapter A (Part of 49 9200 145)		For inspection of cooling system pressure



INSPECTION
Coolant Level (Engine cold)
1. Verify that the coolant level is near the filler neck.
2. Verify that the coolant level on the dipstick is between the F and L.
3. Add coolant if necessary.

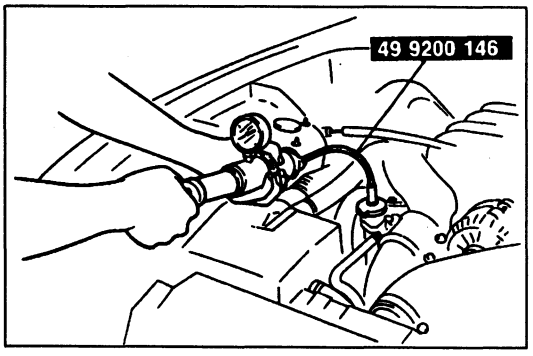
Note
- The distance between the L and F marks on the dipstick represents 1.0 Liter {1.1 US qt, 0.9 Imp qt}.



Coolant Quality

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.

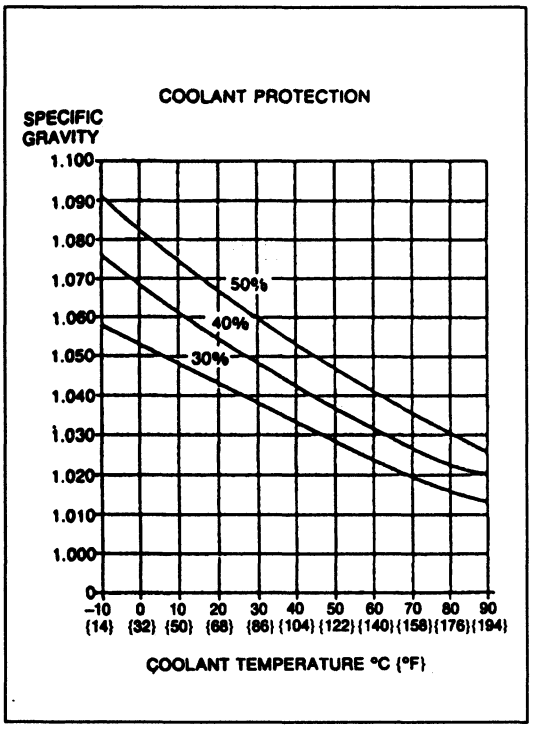
1. Verify that there is no buildup of rust or scale around the radiator cap or filler neck.
2. Verify that coolant is free of oil. Replace the coolant if necessary.



Coolant Leakage
1. Connect a radiator tester (commercially available) and the **SST** to the radiator filler neck.

Caution
- **Applying more than 142 kPa {1.45 kgf/cm^2, 20.6 psi} can damage the hoses, fittings, and other components, and cause leaks.**

2. Apply **142 kPa {1.45 kgf/cm^2, 20.6 psi}** of pressure to the system.
3. Verify that the pressure is held.
4. If not as specifed, check for coolant leakage.



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.**

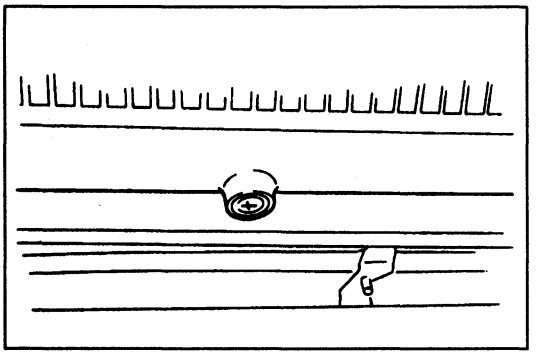
Caution

- **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 the 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.

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 radiator cap.
2. Loosen the radiator drain plug.
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. Install and tighten the drain plug.

Refilling

Use the proper amount and mixture of ethylene-glycol based coolant. (Refer to Coolant Protection, page E-5)

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

   Filling pace:
   1.0 L {1.1 US qt, 0.9 Imp qt}/min. max

   Coolant capacity:
   8.8 L {9.3 US qt, 7.7 Imp qt}/min. max

2. Fill the coolant reservoir up to the F mark.
3. Securely install the radiator cap and the coolant filler cap.
4. Start the engine and let it idle about 10 minutes until it warms up.
5. If the coolant level warning light comes on while warming up, turn the engine off and inspect the drain plug and water hoses for leaks.
6. Stop the engine and allow it to cool.

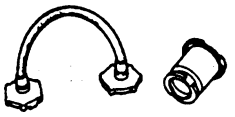
   Warning

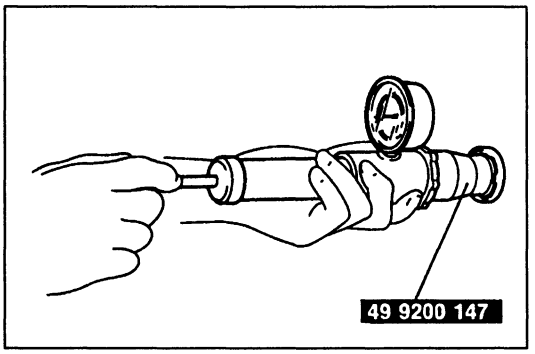
   - **Removing the radiator cap or the coolant filler cap while the engine is running, or when the engine and radiator are hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system. Turn off the engine and wait until it is cool. 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.

7. Check the coolant level. If it's low, repeat the procedure from step 1.
8. Fill the reservoir to the F mark.

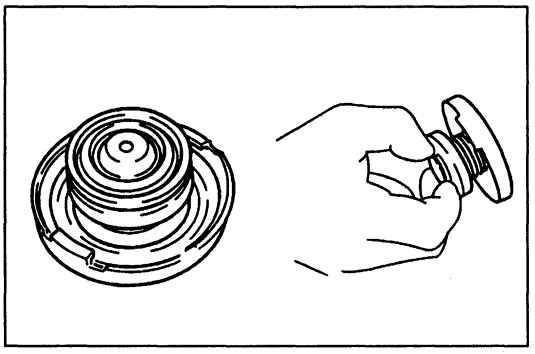
RADIATOR CAP

PREPARATION
SST

49 9200 145 Adapter set, radiator cap tester 	For inspection of radiator cap valve	49 9200 147 Adapter B (Part of 49 9200 145) 	For inspection of radiator cap valve



INSPECTION
Radiator Cap Valve
1. Remove foreign material (such as water residue) from between the radiator cap valve and the valve seat.
2. Attach the radiator cap to a radiator cap tester (commercially available) by using the **SST**. Apply pressure gradually to **113–142 kPa {1.15–1.45 kgf/cm^2, 16.4–20.6 psi}**.
3. Wait about **10 seconds**. Verify that the pressure has not decreased.
4. If not as specified, replace the radiator cap.



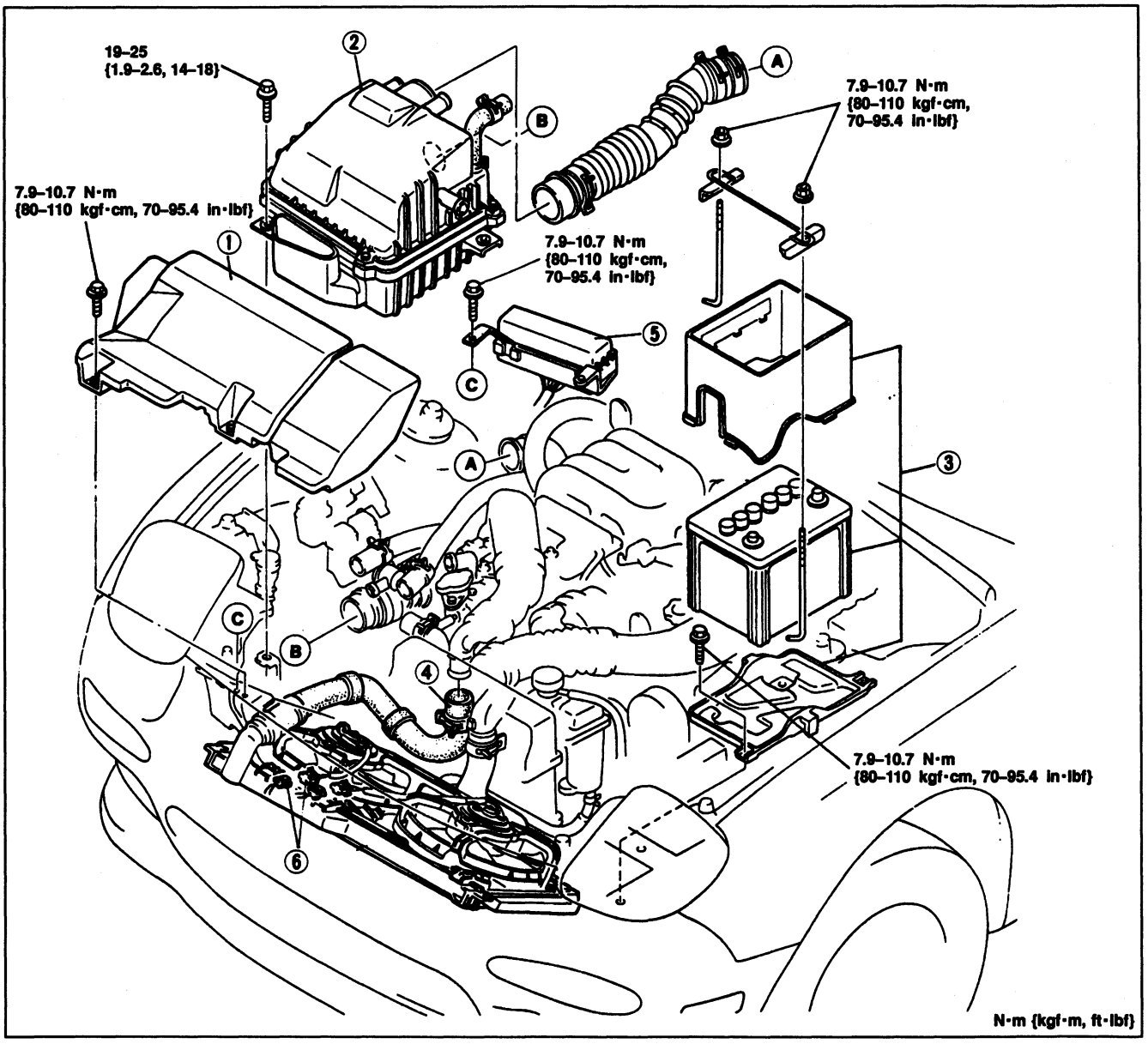
Negative Pressure Valve
1. Pull the negative pressure valve to open it. Verify that it closes completely when released.
2. Check for damage on the contact surfaces and for cracked or deformed seal packing.
3. Replace the radiator cap if a problem is found.

RADIATOR AND COOLANT FAN

REMOVAL / INSTALLATION

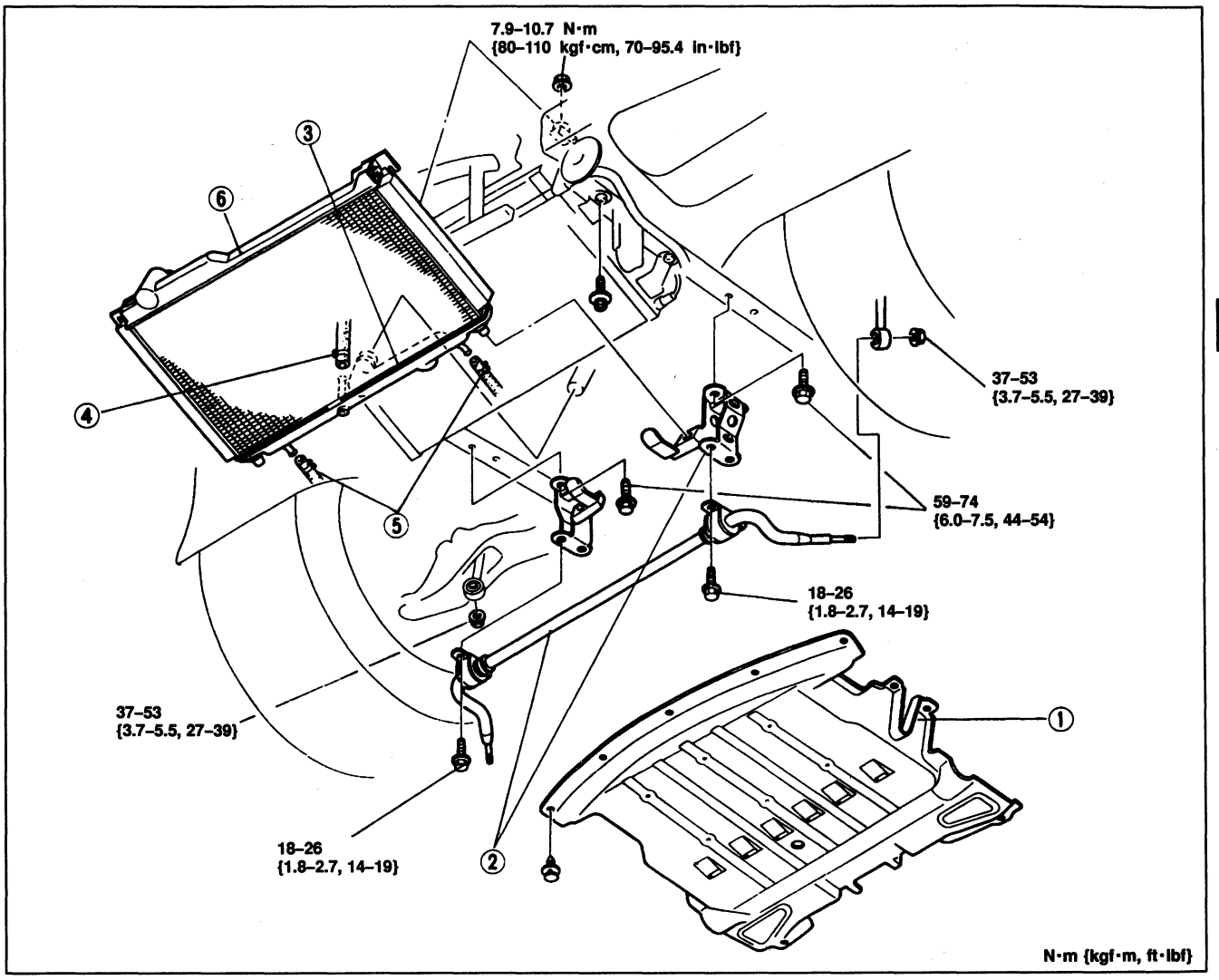
1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to page E-5)
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal.

STEP 1

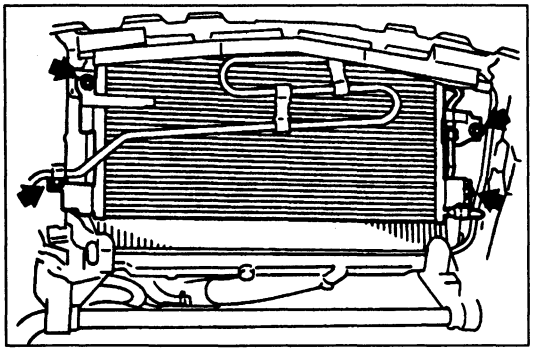


1. Fresh-air duct
2. Air cleaner housing
3. Battery and carrier
4. Radiator hose (upper)
5. Relay box
6. Coolant fan motor connector

STEP 2



1. Undercover
2. Stabilizer and bracket
   Removal/Inspection ..... Section R
3. Radiator hose (lower)
4. Air separation hose
5. Oil cooler hose (AT)
6. Radiator and coolant fan
   Removal Note ..... below
   Inspection ..... page E–10

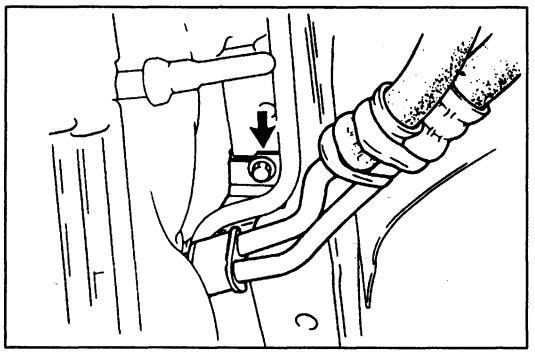


Removal Note

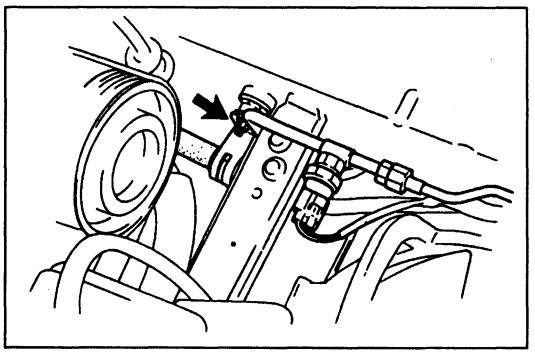
Radiator and coolant fan

While removing the radiator and cooling fan, do not disconnect the A/C piping.

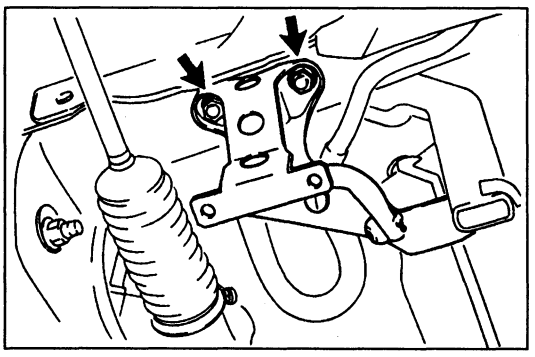
1. Remove the bolts shown in the figure.
2. Position the A/C condenser away from the radiator and secure it with wire.



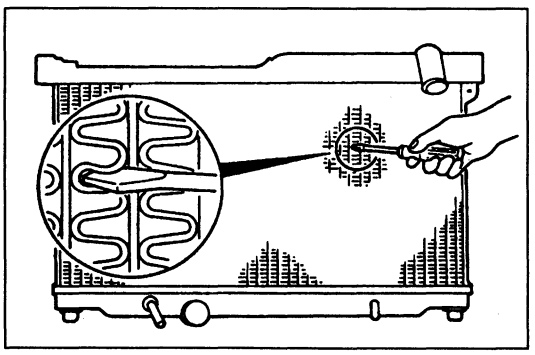
3. Remove the P/S oil pump pipe bracket shown in the figure.



4. Remove the A/C compressor high-pressure pipe bracket as shown in the figure.



5. Remove the radiator bracket.
6. Remove the radiator and coolant fan.

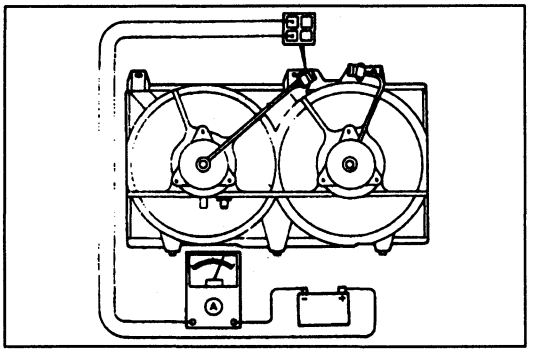


INSPECTION

Radiator

Check for the following and repair or replace the radiator as necessary.

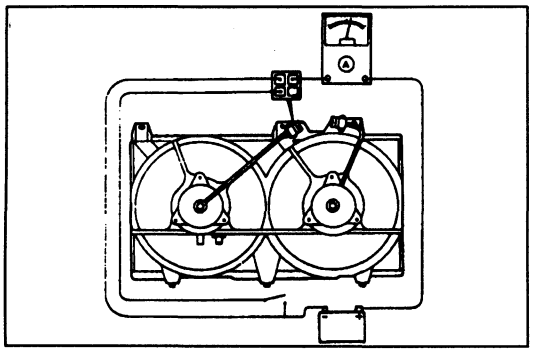
1. Cracks, damage and water leakage
2. Bent fins (repair with a screwdriver)
3. Damaged radiator inlet, outlet, and hose connectors



Coolant fan motor

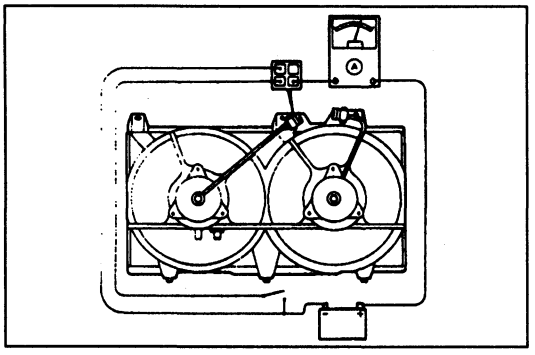
1. Verify that the battery is fully charged.
2. Disconnect the fan motor connectors.
3. Connect battery positive voltage and an ammeter as shown to the fan motor connector for low-speed inspection.
4. Verify that the fan motor operates smoothly at the standard current.

Current: 5.8–11.8A



5. Connect battery positive voltage, an ammeter, and a switch to the fan motor connector as shown for medium-speed inspection.
6. Verify that the fan motor operates smoothly at the standard current or less with the switch ON.

Current: 6.5–12.5A



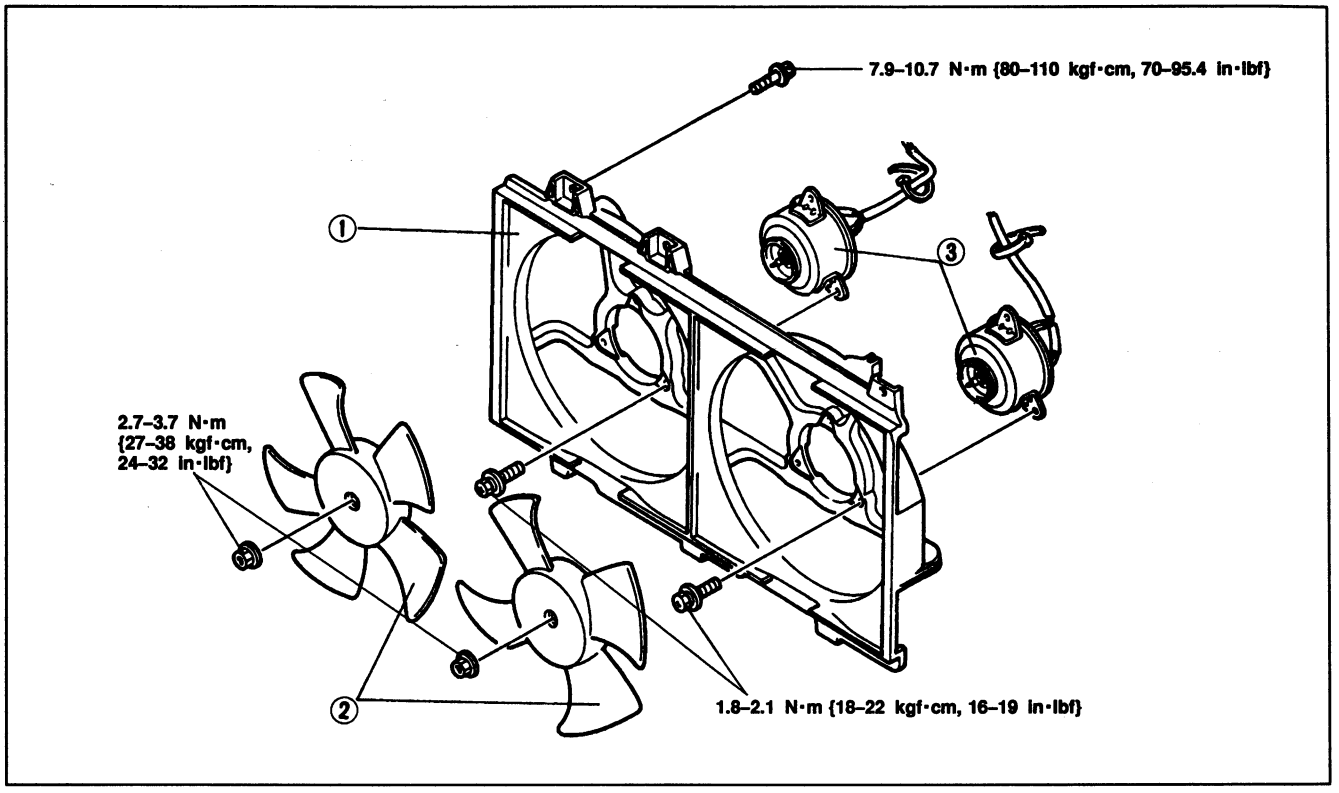
7. Connect battery positive voltage, an ammeter, and a switch to the fan motor connector as shown for high-speed inspection.
8. Verify that the fan motor operates smoothly at the standard current or less with the switch ON.

Current: 10.6–16.6A

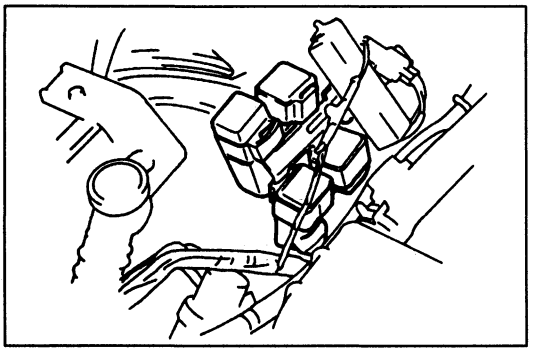
9. Check the other fan motor as described above.
10. If a fan motor does not operate as specified, replace it.

REPLACEMENT

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



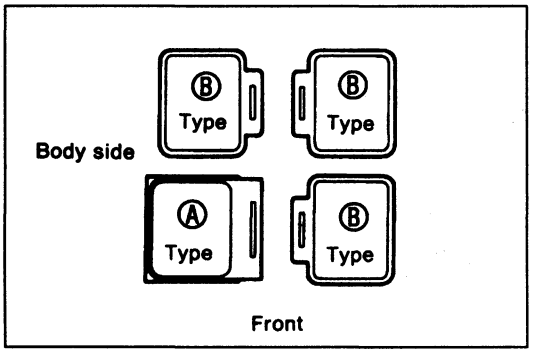
1. Radiator cowling
2. Coolant fan
3. Coolant fan motor



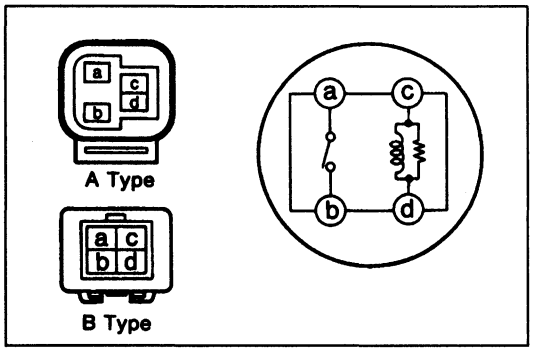
COOLANT FAN RELAY

REMOVAL / INSTALLATION

Slide the coolant fan relays off the bracket.



The relay positions are shown in the figure.



INSPECTION

1. Check continuity of the relaly as shown.

Terminal	Continuity
a–b	No
c–d	Yes

2. Apply 12V between terminals c and d.
   Check for continuity between terminals a and b.
3. If not as specified, replace the fan relay.

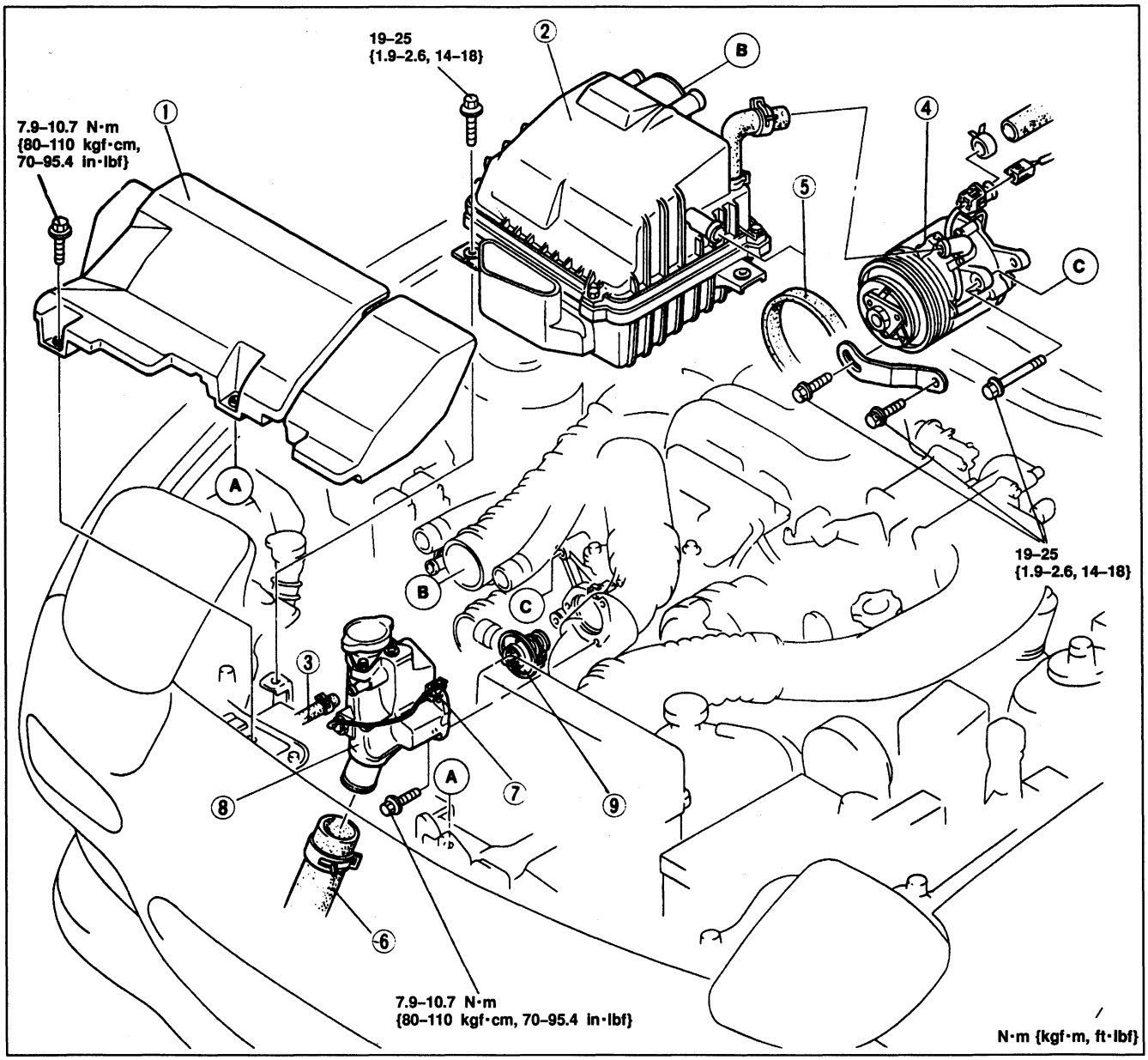
Steps After Installation

1. Fill the rediator with the specified amount and type of engine coolant. (Refer to page E-5.)
2. Start the engine and check for leaks.

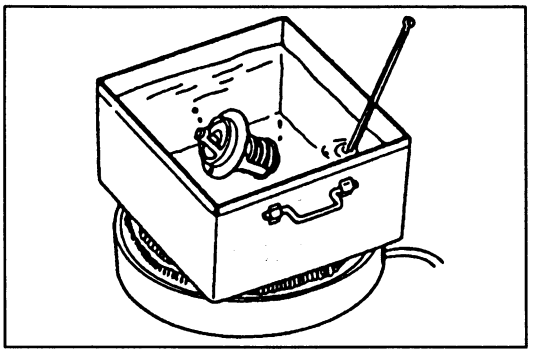
THERMOSTAT

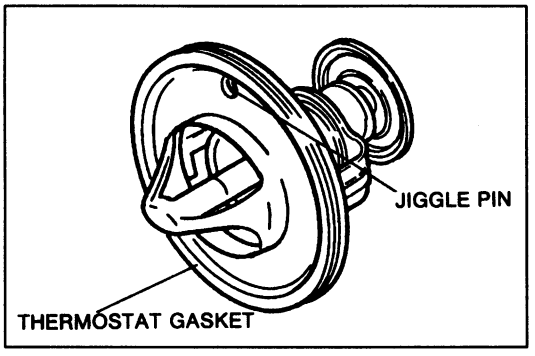
REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to page E-5)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal, referring to **Installation Note**.



1. Fresh-air duct
2. Air cleaner housing
3. Water hose
4. Air pump
5. Drive belt
   Removal/Installation ..... Section C
6. Radiator hose (upper)
7. Coolant level sensor connector
8. Thermostat cover
9. Thermostat and gasket
   Inspection ..... page E-15
   Installation Note ..... page E-15





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:
   80.5–83.5°C {177–182°F}
   Full-open temperature: 95°C {203°F}
   Full-open lift: 8.0–10 mm {0.31–0.39 in} min.

4. Check the thermostat gasket; if damaged, replace the thermostat assembly.

Installation Note

Thermostat

Install the thermostat into the thermostat case with the jiggle pin at the top.

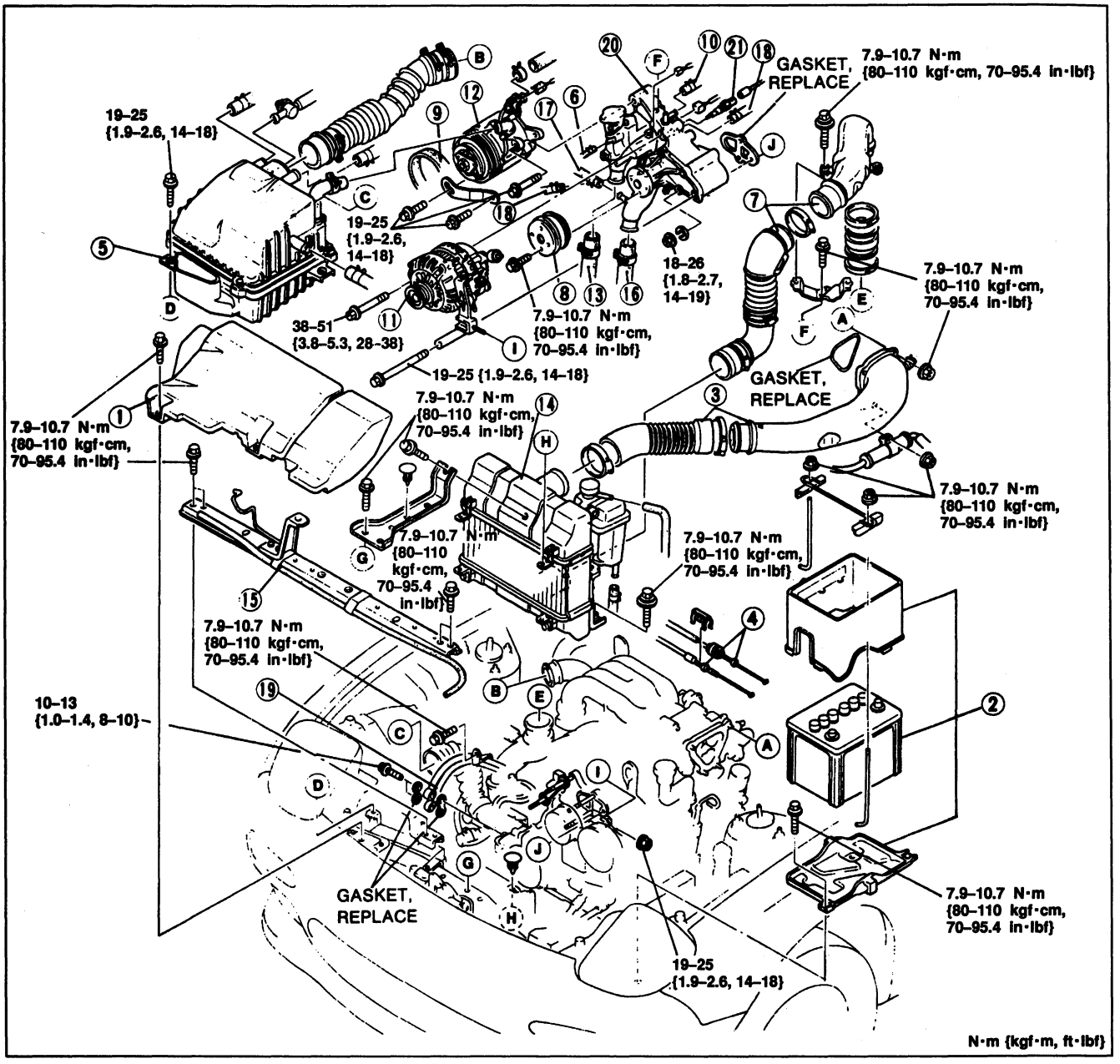
Steps After Installation

1. Fill the radiator with the specified amount and type of engine coolant. (Refer to page E-5,6.)
2. Connect the negative battery cable.
3. Start the engine and check for leaks.
4. Bleed the cooling system. (Refer to page E-6.)

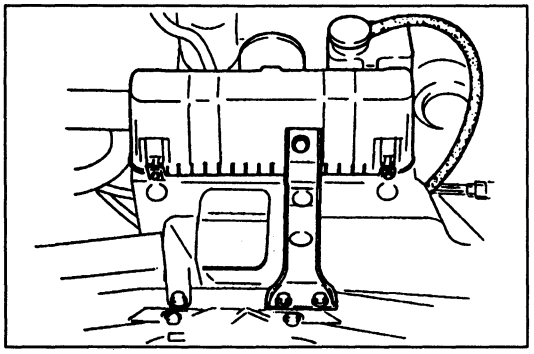
WATER PUMP AND WATER THERMOSENSOR

REMOVAL / INSTALLATION

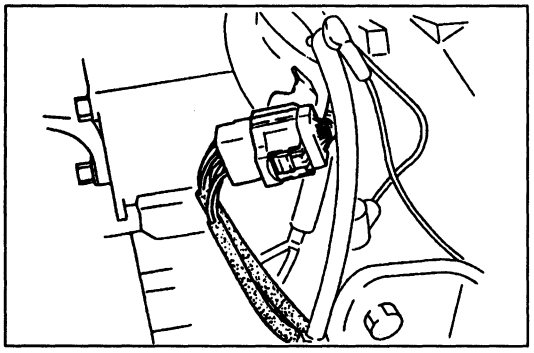
1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to page E-5)
3. Remove in the order shown in the figure (page E-16), referring to **Removal Note.**
4. Install in the reverse order of removal.



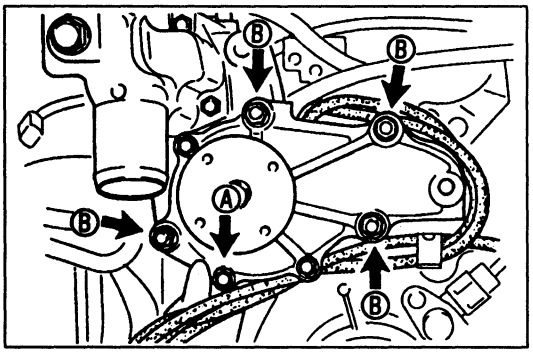
1. Fresh-air duct
2. Battery and carrier
3. Air funnel and air hose
4. Accelerator cable
   Service ..... Section F
5. Air cleaner housing
6. Water hose (filler port)
7. Air pipe and air hose
8. Water pump pulley
9. Drive belt
   Removal/Installation ..... Section C
10. Water hose (water pump body)
11. Alternator and strap
12. Air pump and strap
13. Radiator hose (upper)
14. Charge air cooler and air separation tank
    Removal Note ..... page E–17
15. Subframe
16. Radiator hose (lower)
17. Heater hose
18. Water hose (water pump body)
19. Metering oil tube
20. Water pump and pump body
    Removal Note ..... page E–17
21. Water thermosensor
    Inspection ..... page E–17
    Installation Note ..... page E–17



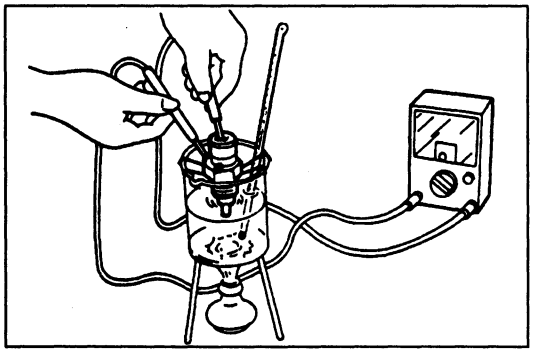
Removal Note
Charge air cooler and air separation tank
Do not remove the air duct from the body.



Water pump and pump body
1. Remove the metering oil pump connector from the engine hanger.



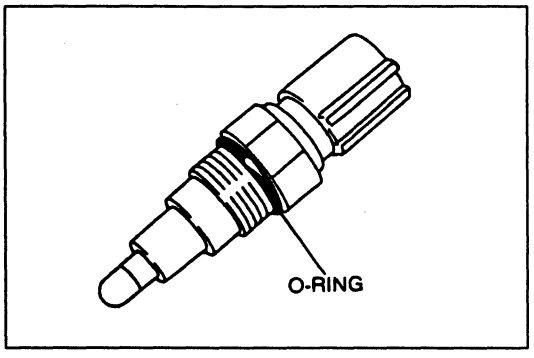
2. Remove the bolt Ⓐ shown in the figure.
3. Position the metering oil tube and metering oil pump harness under the lower radiator hose.
4. Remove the nuts Ⓑ shown in the figure.
5. Remove the water pump and pump body.



INSPECTION
Water Thermosensor
1. Place the switch and a thermometer in water.
2. Heat the water gradually and check resistance of the switch.

Coolant	Resistance
101°C {214°F}	0.5 Ω max.
108°C {236°F}	1 MΩ min

3. If not as specified, replace the water thermosensor.



Installation Note
Water thermosensor
1. Apply a small amount of engine coolant to the new O-ring.
2. Install the water thermosensor.

Tightening torque:
5.9–8.8 Nm {60–90 kgf·cm, 52–78 in·lbf}

Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

FUEL AND EMISSION CONTROL SYSTEMS

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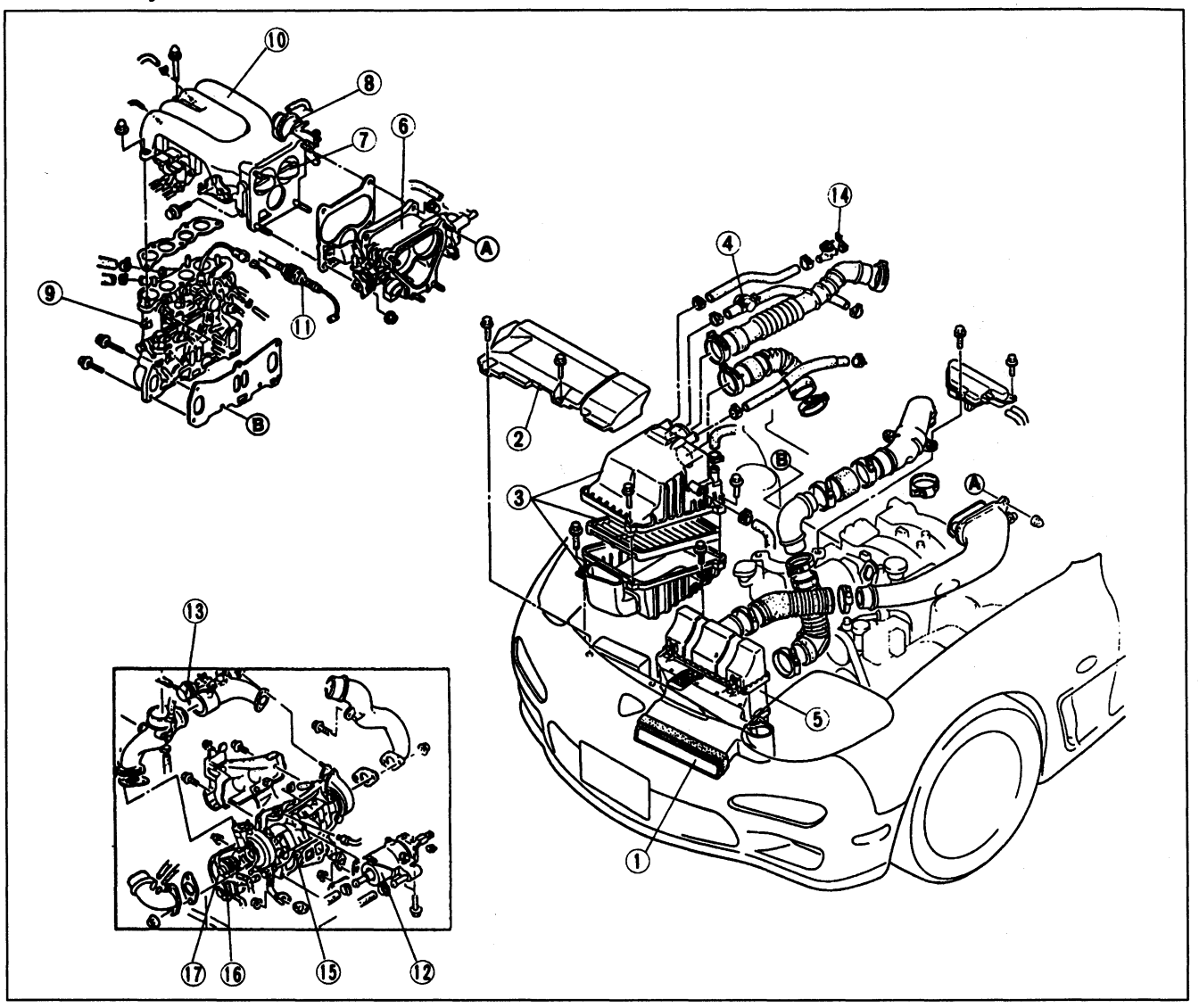
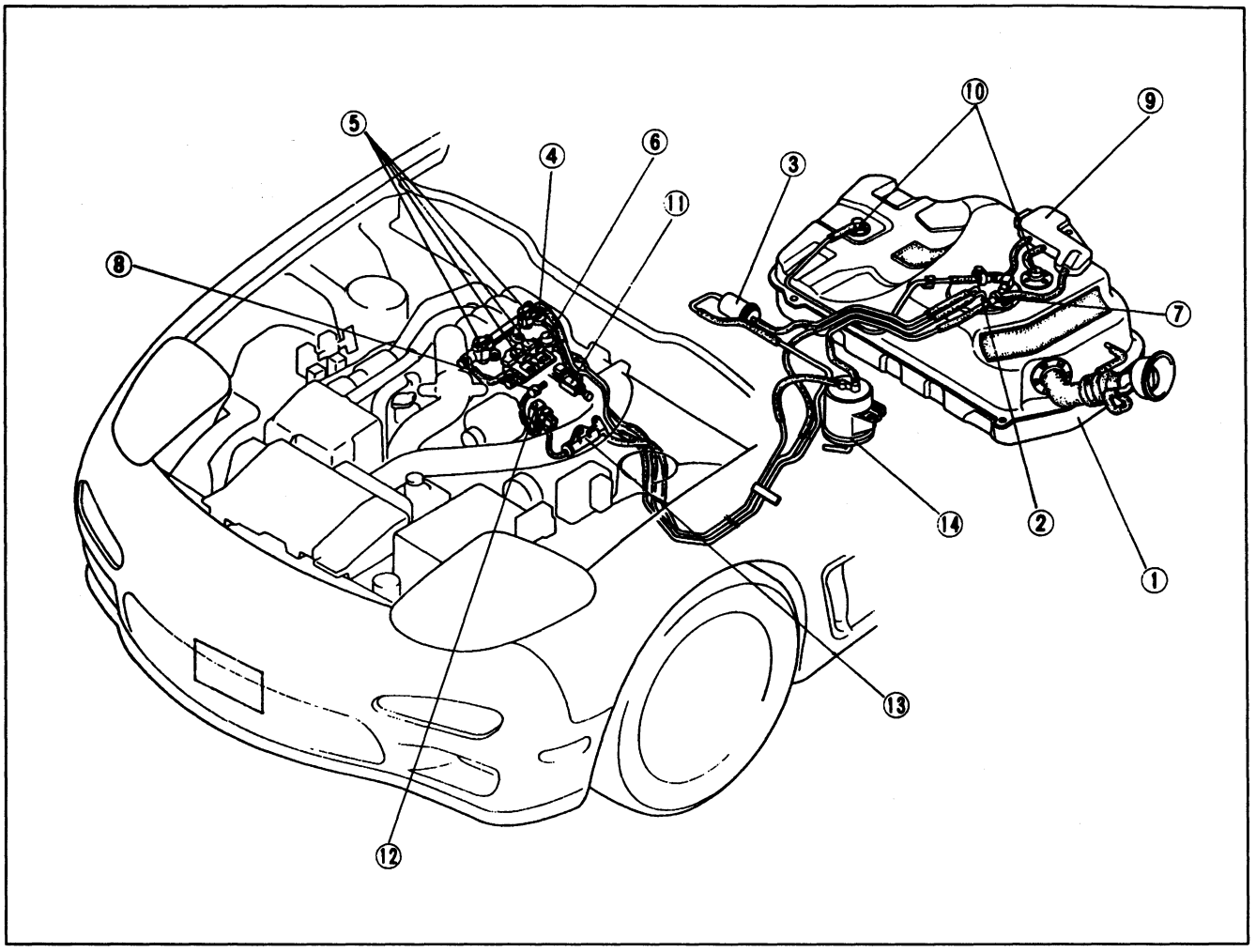
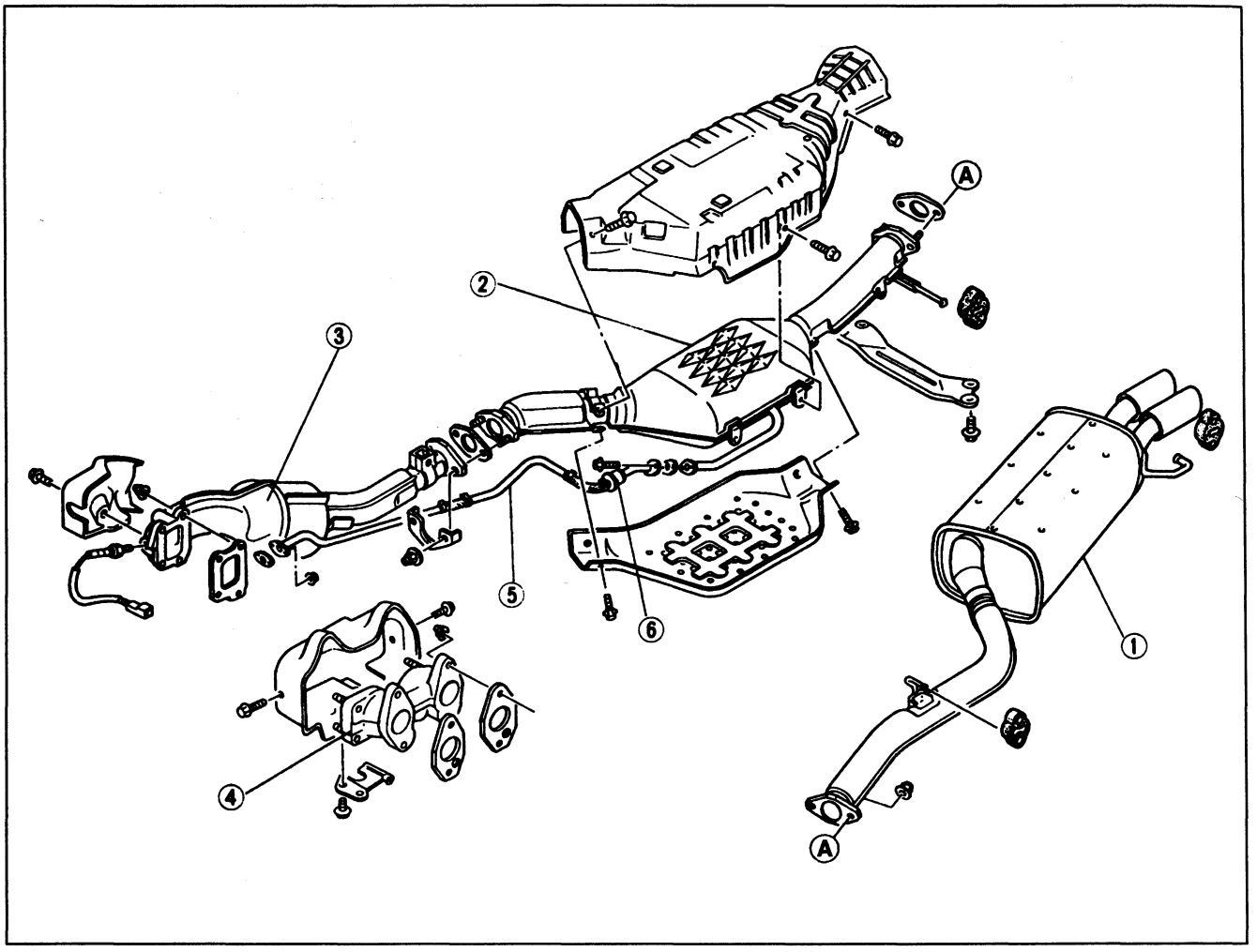
Intake Air System



Fuel System and Evapolative Emission Control System



Exhaust System



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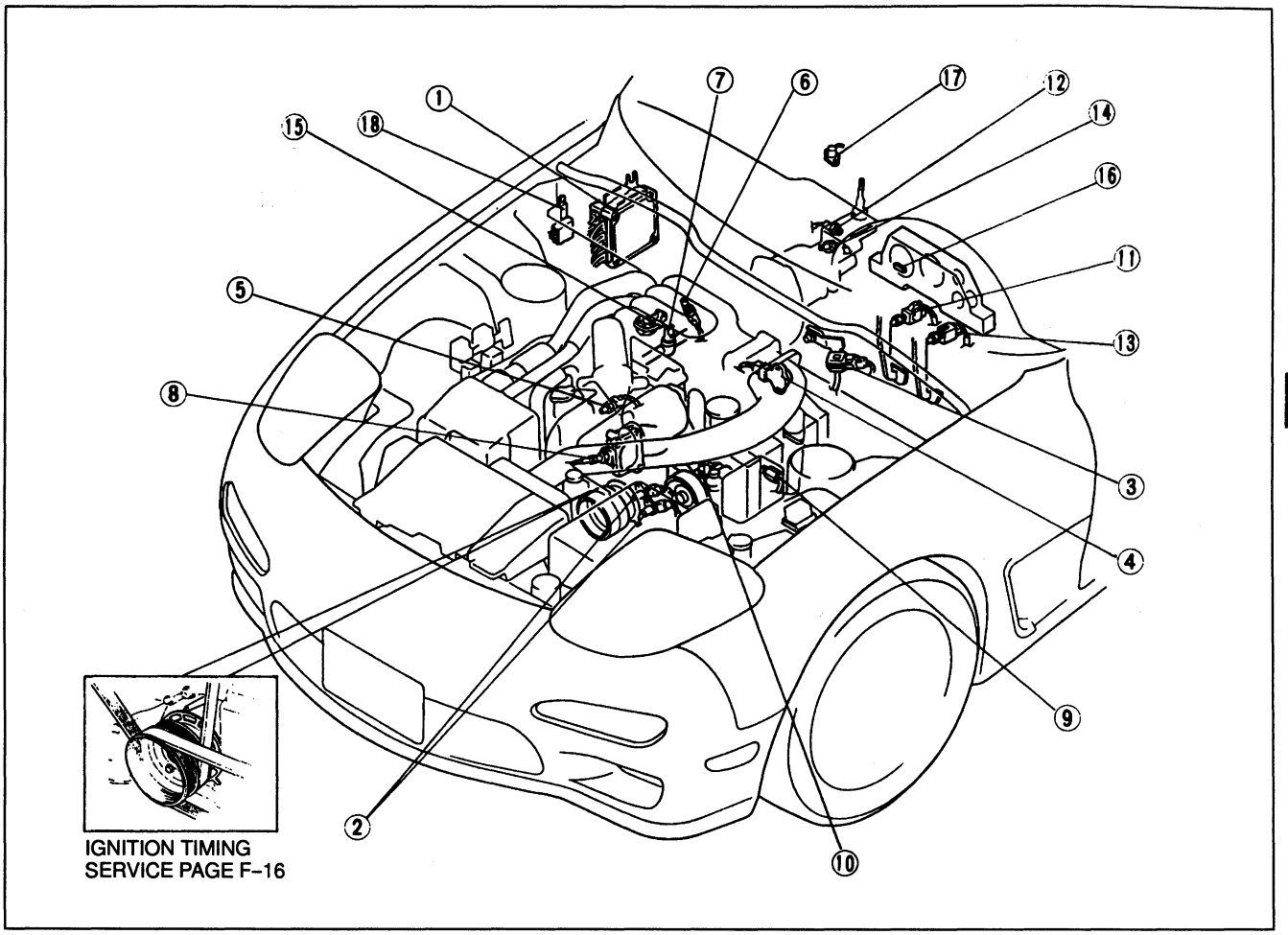
Control System (Input Devices)



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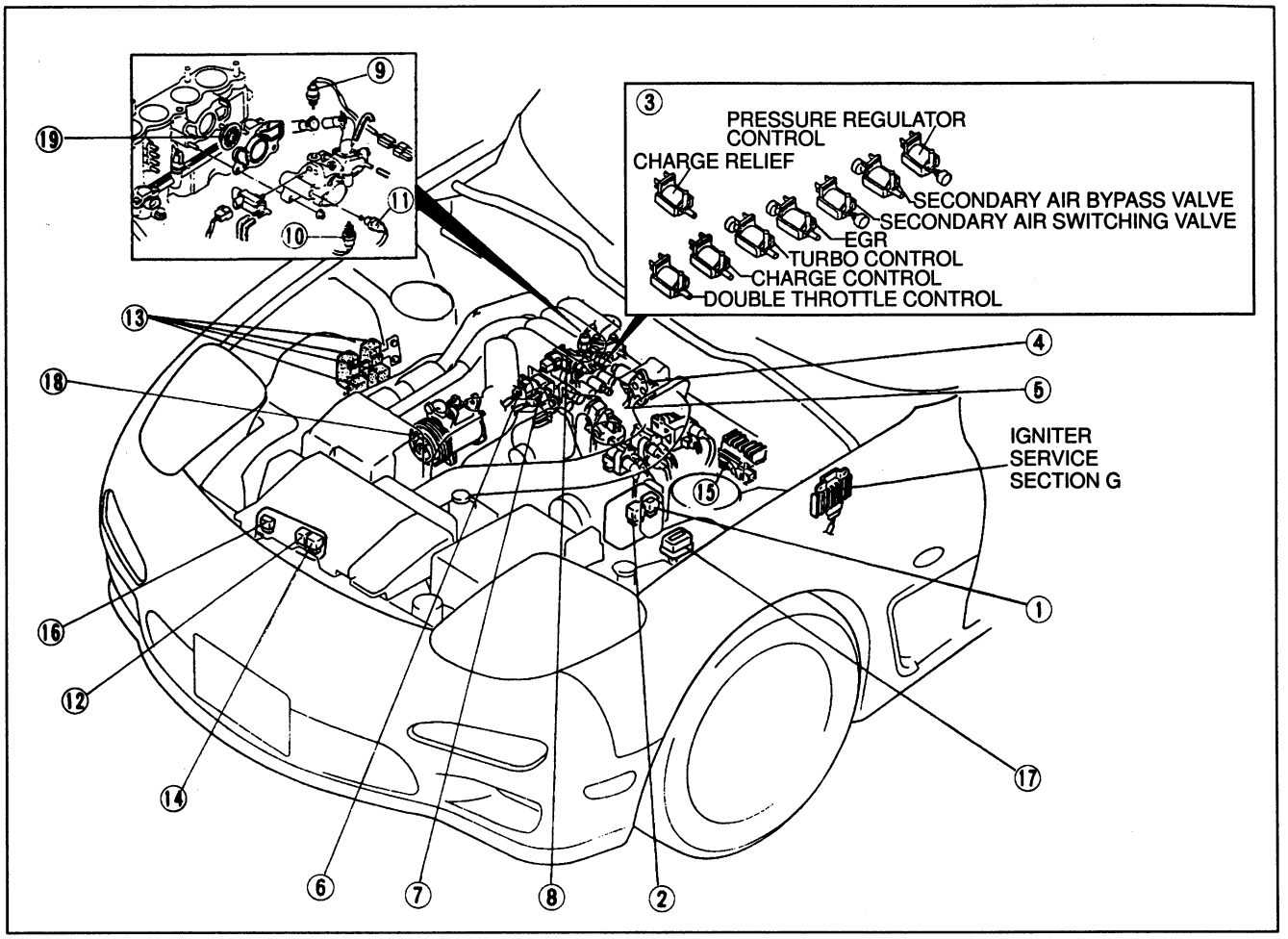

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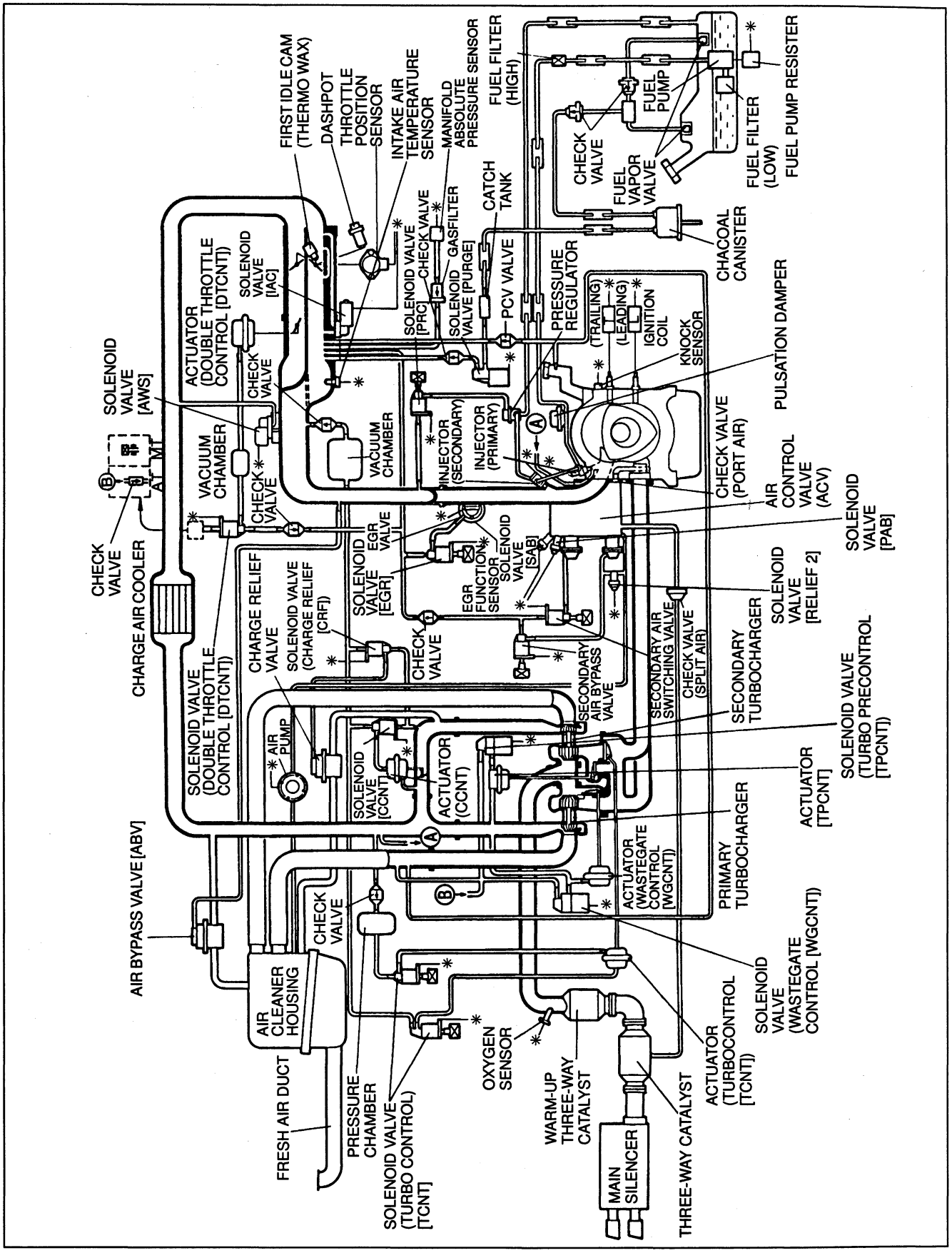
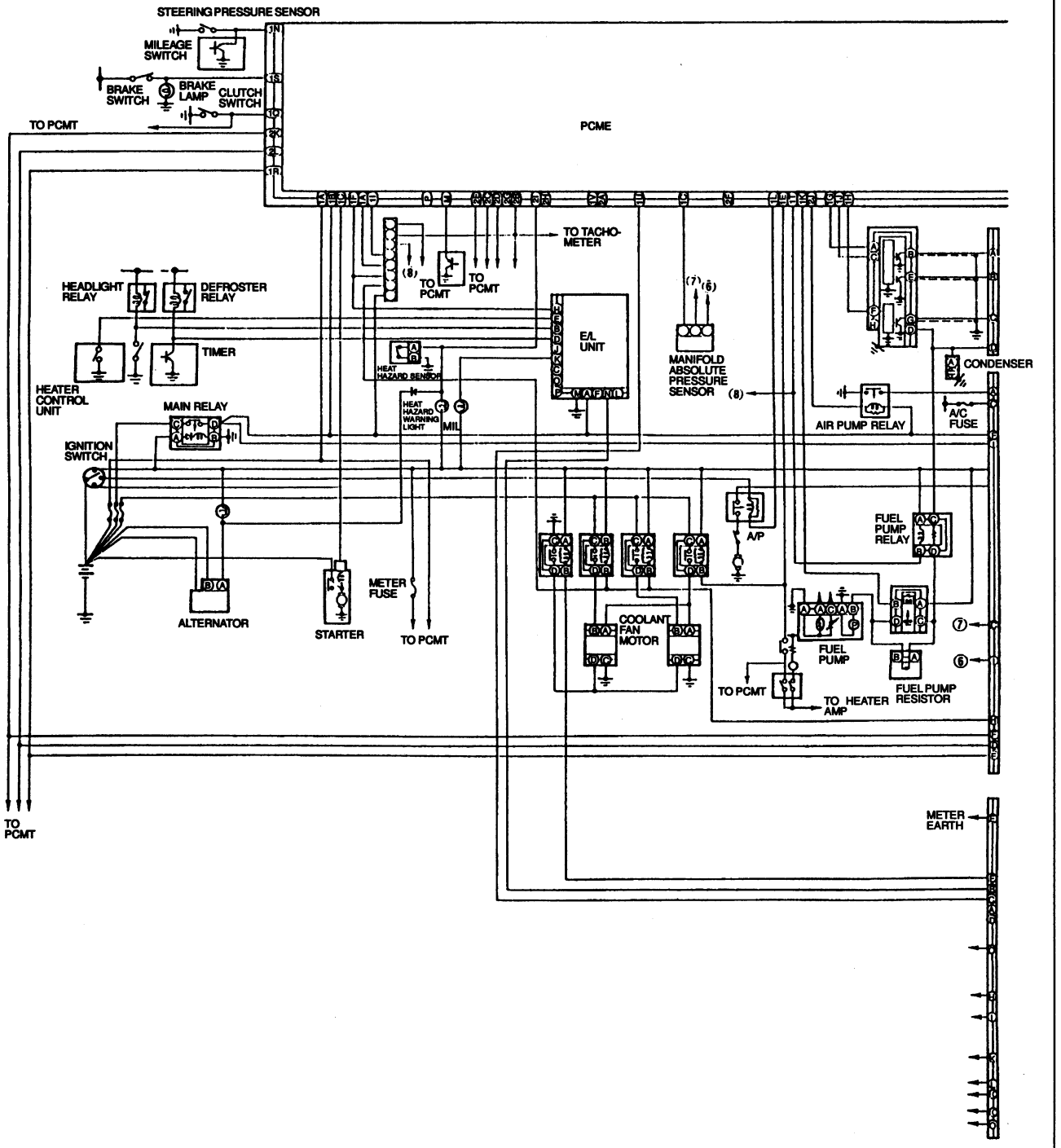
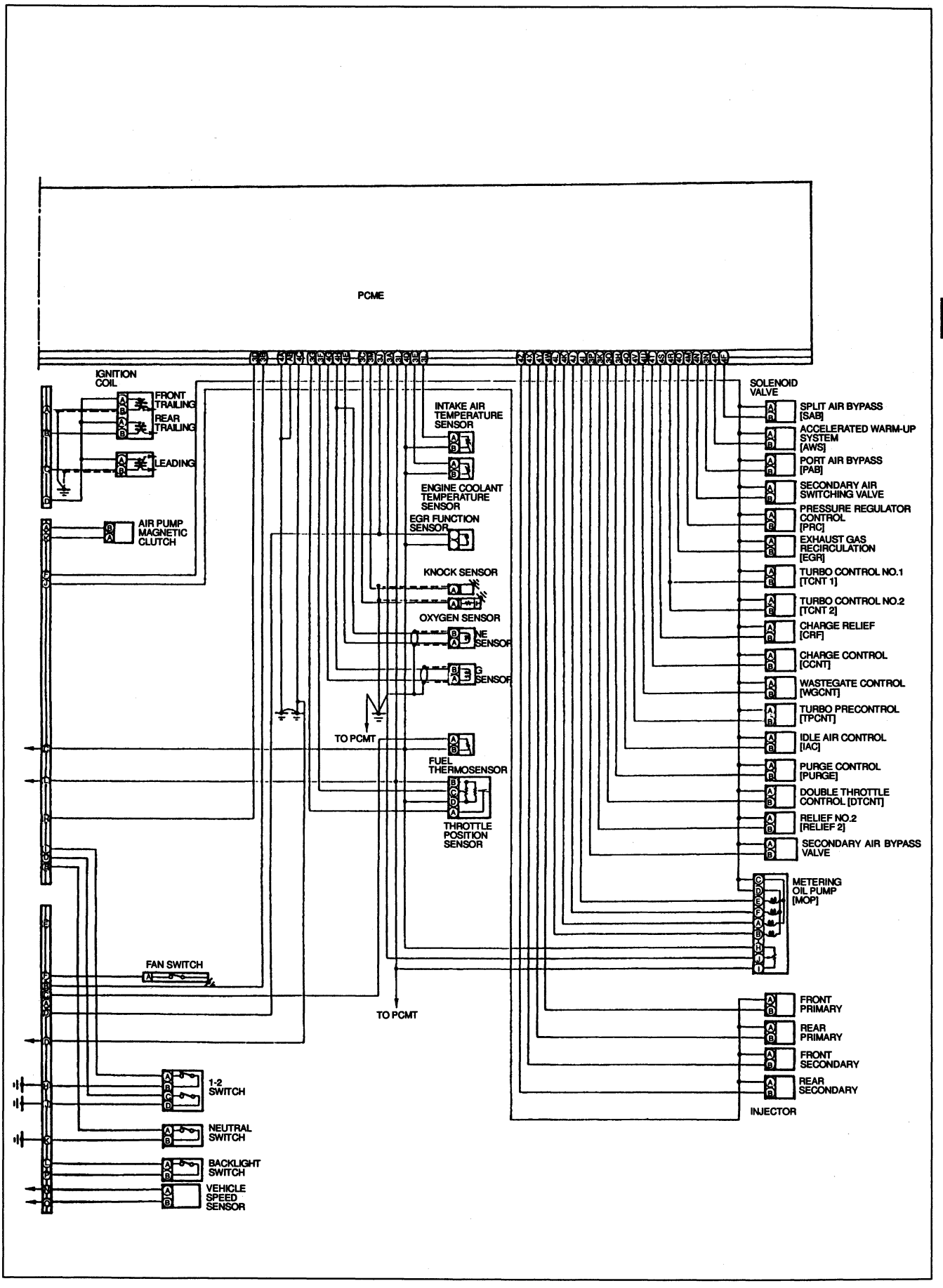
OUTLINE

SYSTEM DIAGRAM



WIRING DIAGRAM




PCME
IGNITION COIL
FRONT TRAILING
REAR TRAILING
LEADING
AIR PUMP MAGNETIC CLUTCH
INTAKE AIR TEMPERATURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
EGR FUNCTION SENSOR
KNOCK SENSOR
OXYGEN SENSOR
NE SENSOR
G SENSOR
TO PCMT
FUEL THERMOSENSOR
THROTTLE POSITION SENSOR
FAN SWITCH
TO PCMT
1-2 SWITCH
NEUTRAL SWITCH
BACKLIGHT SWITCH
VEHICLE SPEED SENSOR
SOLENOID VALVE
SPLIT AIR BYPASS [SAB]
ACCELERATED WARM-UP SYSTEM [AWS]
PORT AIR BYPASS [PAB]
SECONDARY AIR SWITCHING VALVE
PRESSURE REGULATOR CONTROL [PRC]
EXHAUST GAS RECIRCULATION [EGR]
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CHARGE RELIEF [CRF]
CHARGE CONTROL [CCNT]
WASTEGATE CONTROL [WGCNT]
TURBO PRECONTROL [TPCNT]
IDLE AIR CONTROL [IAC]
PURGE CONTROL [PURGE]
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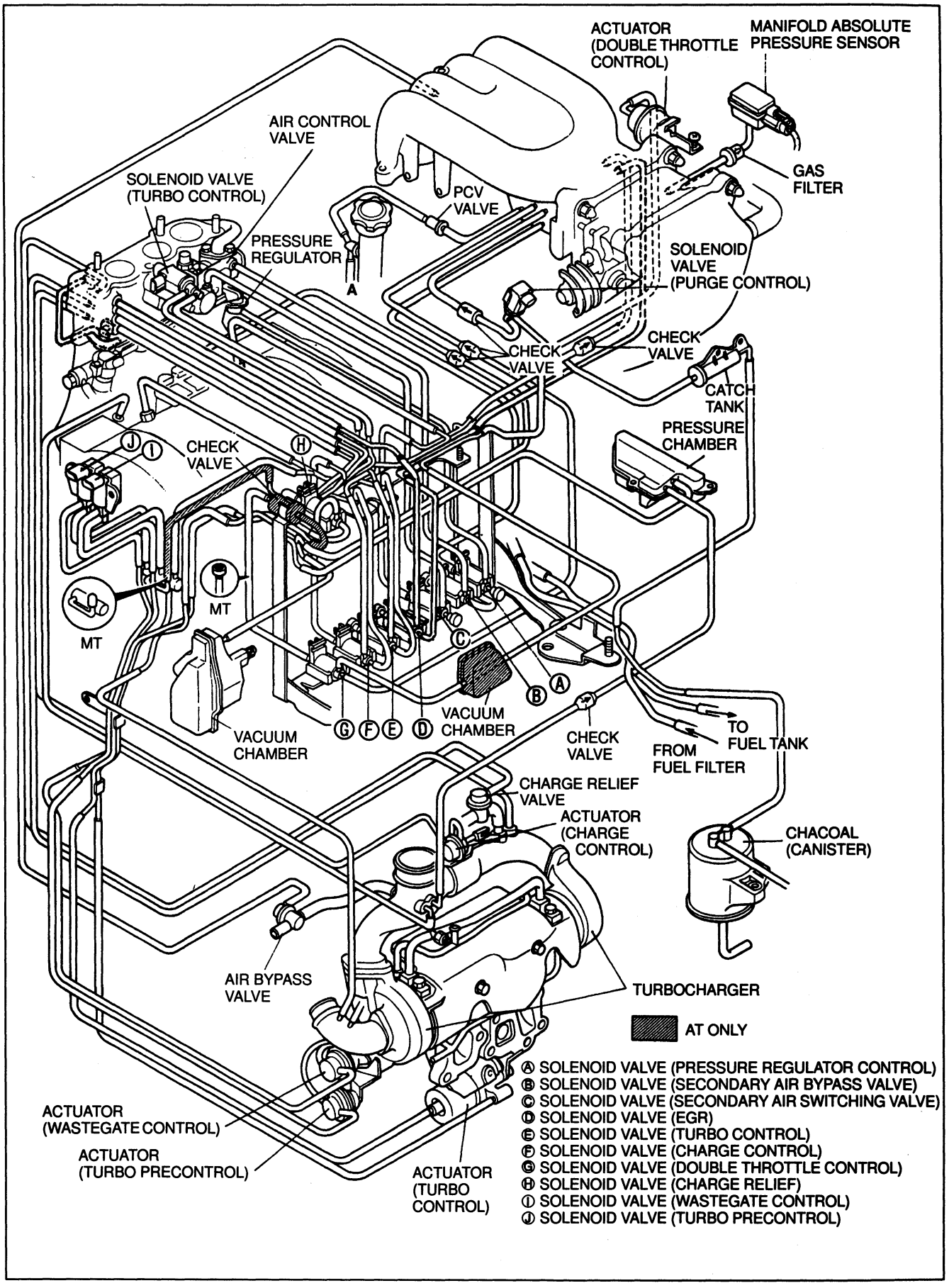
RELIEF NO.2 [RELIEF 2]
SECONDARY AIR BYPASS VALVE
METERING OIL PUMP [MOP]
FRONT PRIMARY
REAR PRIMARY
FRONT SECONDARY
REAR SECONDARY
INJECTOR

VACCUM HOSE ROUTING DIAGRAM



SPECIFICATIONS

Item			Specification
Idle speed*		rpm	700–750 (720 $^{+30}_{-20}$)
Ignition timing*	Leading	ATDC	5°
	Trailing	ATDC	20°
Air cleaner housing			
Element type			Oil permeated
Throttle body			
Type			Horizontal draft {2 stage–3 barrel}
Throat diameter	Primary	mm {in}	45 {1.772}
	Secondary	mm {in}	50 {1.969} × 2
Dashpot touch angle		°	8
Water thermovalve Operation (full open) temperature		°C {°F}	55–65 {131–149} or more
Charge air cooler			
Type			Air cooled
Core size {w × h × t}		mm {in}	294 × 114 × 65 {11.575 × 4.4882 × 2.5591}
Turbocharger			
System type			Sequential twin turbo charged
Cooling method			water + engine oil
Boost control actuator			turbo pre-control + wastegate control
Boost control method			Solenoid valve (duty-controled) × 2
Fuel filter			
Type	Low-pressure		Nylon element
	High-pressure		paper element
Pressure regulator			
Type			Diaphragm
Regulated pressure		kPa {kgf/cm^2, psi}	250–260 {2.5–2.6, 35.6–37.0}
Fuel pump			
Type			Impeller (In tank)
Output pressure		kPa {kgf/cm^2, psi}	490–740 {50–7.5, 71.1–106.7}
Injector			
Type			Side-feeding
Injection volume	Primary	ml {cc, fl oz}/min	550 {550, 16.5}
	Secondary	ml {cc, fl oz}/min	850 {850, 25.5}
Three-way catalyst			
Type	Warm-up three-way catalyst		Metal
	Three-way catalyst		Monolithic
Air pump			
Capacity		cm^3 {cc}/rev	375 {375}
Output		L/min	MT 130–200, AT 160–200
Fuel			
Specification			Unleaded premium (RON95 or higher)

* TEN terminal of data link connector is grounded.

COMPONENT DESCRIPTIONS

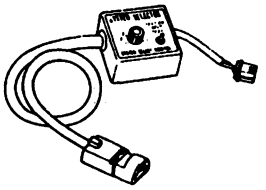
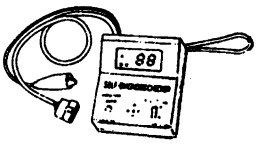
Component	Function	Remark
1-2 switch	Detects gear position (1st, 2nd)	MT only
Actuator (charge control)	Controls charge control valve	—
Actuator (Double throttle control)	Controls double throttle valve	Installed on extension manifold
Actuator (Turbo control)	Controls turbo control valve	Controlled by two solenoid valves
Actuator (Turbo precontrol)	Controls turbo precontrol valve	Part of turbocharger assembly
Actuator (Wastegate control)	Controls wastegate control valve	Part of turbocharger assembly
Air Bypass Valve	Reduces sound of intake air entering air cleaner housing from turbocharger deceleration	
Air Cleaner Element	Filters air entering throttle chamber	Oil permeated type
Air Control Valve	Directs air to one of three locations: exhaust port, three-way catalyst, or relief air silencer	Consists of two valves: Secondary air bypass valve Secondary air switching valve
Air pump	Supplies secondary air to air control valve	With electromagnetic clutch
Barometric Absolute Pressure Sensor	Detects atmospheric pressure; sends signal to PCME	Built in PCME
Charcoal Canister	Stores fuel tank fumes when engine is stopped	Vented to atmosphere through charcoal and air filter
Clutch switch	Detects clutch condition (engaged / disengaged)	MT only
Crankshaft position Sensor	Detects eccentric shaft angle at 30° intervals and front rotor position; sends signal to PCME	—
Dashpot	Prevents sudden throttle valve closing during deceleration	—
Data link connector	**Service connector terminals:** 1. CIS self-diagnosis 2. PCMT on-board diagnosis [AT] 3. Initial set 4. Fuel pump check 5. Engine speed output 6. Switch and oxygen sensor monitor 7. Supply battery positive voltage 8. Ground 9. A/C self-diagnosis 10. Cruise control self-diagnosis 11. Electrical coolant fan self-diagnosis	**25-pin (located near fuse box)** 1. FEN terminal 2. TAT and FAT terminal 3. TEN terminal 4. F/P terminal 5. IG- terminal 6. MEN terminal 7. +B terminal 8. GND terminal 9. TAC and FAC terminal 10. TSC and FSC terminal 11. TFA terminal
Engine coolant temperature sensor	Detect coolant temperature; send signals to PCME	• Installed in engine
Fuel filter	Filters particles from fuel	
Fuel pump	Provides fuel to injectors	• Operates while engine running • In fuel tank
Fuel pump relay	Voltage for fuel pump while engine running	—
Igniter	Receives spark signal from PCME and generates high voltage in ignition coil	
Ignition switch (START position)	Sends engine cranking signal to PCME	—
Injector	Injects fuel into intake port	• Controlled by signal from PCME (side-feed type)
Intake air temperature sensor	Detects intake air temperature; sends signal to PCME	• Installed in extension manifold
Knock sensor	Detects engine knocking; sends signal to PCME	—
Main relay	Supplies current to output devices and PCME	—
Manifold absolute pressure sensor	Detects intake manifold pressure; sends signal to PCME	—
Neutral/Clutch switches (MT)	Detects in-gear condition; sends signal to PCME	• Switch is ON in neutral
Oxygen sensor	Detects oxygen concentration; sends signal to PCME	• Zirconic and platinum coat

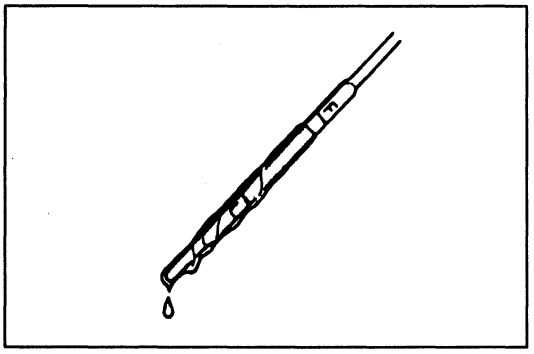
Component	Function	Remark
Park/neutral switch (AT)	Detects load condition; sends signal to PCME	—
PCV valve	Controls blowby gas introduced into engine	—
Powertrain control module (engine) (PCME)	**Detects the following:** 1. Engine speed 2. Knocking signal 3. Vehicle speed 4. Engine coolant temperature 5. Intake air temperature 6. Throttle valve opening angle (full range) 7. Intake manifold pressure 8. Atmospheric pressure 9. Oxygen concentration 10. Air/Fuel ratio 11. Throttle valve opening angle (narrow range) 12. Metering oil pump (MOP) position signal 13. Fuel temperature 14. Gear position 15. Clutch condition 16. In-gear condition 17. Power steering operation 18. Braking signal 19. Starter signal 20. Electrical Load (E/L) condition 21. EGR condition	 1. Crankshaft position sensor 2. Knock sensor 3. Vehicle speed sensor 4. Engine coolant temperature sensor 5. Intake air temperature sensor 6. Throttle position sensor (full range) 7. Manifold absolute pressure sensor 8. Barometric absolute pressure sensor 9. Oxygen sensor 10. Oxygen sensor 11. Throttle position sensor (narrow range) 12. MOP position sensor 13. Fuel thermosensor 14. 1-2 switch (MT) 15. Clutch switch (MT) 16. Neutral switch (MT) 17. Steering pressure sensor 18. Stoplight switch 19. Ignition switch 20. E/L unit 21. EGR function sensor
	Control operation of the following 1. Fuel injection system 2. Ignition control system 3. Idle speed control system 4. Pressure negulaton control system 5. Secondary air injection 6. Accelerated warm-up System 7. Sequential twin turbocharger control system 8. Exhaust Gas Recirculation control system 9. Double throttle control system 10. A/C control system 11. Electric coolant fan control system 12. Lock-up control system 13. Slip control system 14. On-board diagnosis function 15. Monitor function 16. Back up function	 Injector Igniter Solenoid valve (Idle air control [IAC]) Solenoid valve (Pressure Regulator control [PRC]) Solenoid valve (Split air bypass [SAB]) Solenoid valve (Port air bypass [PAB]) Secondary air switching valve Solenoid valve (Relief No.2 [RELIEF2]) Secondary air bypass valve Solenoid valve (AWS) Solenoid valve (Turbo control No.1 [TCNT1]) Solenoid valve (Turbo control No.2 [TCNT2]) Solenoid valve (Wastegate control [WGCNT]) Solenoid valve (Turbo precontrol [TPCNT]) Solenoid valve (Change control [CCNT]) Solenoid valve (Change relief [CRF]) Solenoid valve (EGR) Solenoid valve (DTCNT) A/C relay Fan relay PCMT PCMT Self-diagnosis checker Self-diagnosis checker
Pressure regulator	Adjusts fuel pressure supply to injectors	—
Pulsation dumper	Absorbs fuel pulsations	—
Secondary air bypass valve	Controls relief valve	• Installed below extension manifold
Secondary air switching valve	Controls switching valve of air control valve	• Installed below extension manifold
Solenoid valve (IAC)	Supplies bypass air into intake manifold	• Controlled by duty signal from PCME
Solenoid valve (PRC)	Controls vacuum to pressure regulator	• Installed below extension manifold
Solenoid valve (SAB)	Controls split air volume	• Installed in ACV
Solenoid valve (RELIEF2)	Controls relief valve	• Installed in ACV
Solenoid valve (PAB)	Controls port air volume	• Installed in ACV
Solenoid valve (AWS)	Controls accelerated warm-up system	• Installed in extension manifold
Solenoid valve (TCNT1)	Controls turbo control valve	• Installed in ACV (pressure applied)
Solenoid valve (TCNT2)	Controls turbo control valve	• Installed below extension manifold (vacuum applied)

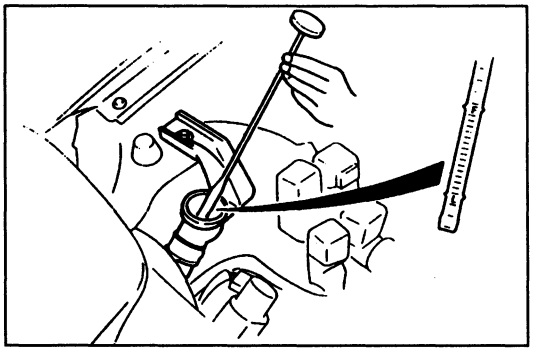
Component	Function	Remark
Solenoid valve (WGCNT)	Controls wastegate valve	• Controlled by duty signal from PCME
Solenoid valve (TPCNT)	Controls turbo precontrol valve	• Controlled by duty signal from PCME
Solenoid valve (CCNT)	Controls charge control valve	• Installed below extension manifold
Solenoid valve (CRF)	Controls charge relief valve	• Installed below extension manifold
Solenoid valve (EGR)	Controls EGR valve	• Installed below extension manifold
Solenoid valve (DTCNT)	Controls double throttle valve	• Installed below extension manifold
Solenoid valve (PURGE)	Controls evapolative fumes from chacoal canister to intake manifold	• Controlled by duty signal from PCME
Steering pressure sensor	Detects P/S operation	• Steering pressure sensor ON when steering wheel turned
Stoplight switch	Detects braking; sends signal to PCME	—
Three-Way Catalyst	Reduces HO, CO and NOx	—
Throttle body	Controls intake air amount	—
Throttle position sensor	Detects throttle valve opening angle	• Installed on throttle body
Vehicle speed sensor	Detects vehicle speed; sends signal to PCME	• Installed in instrument cluster

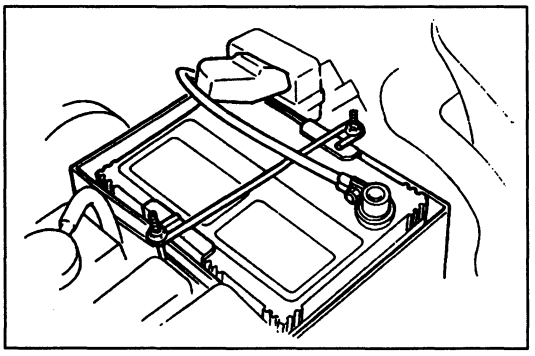
ENGINE TUNE-UP

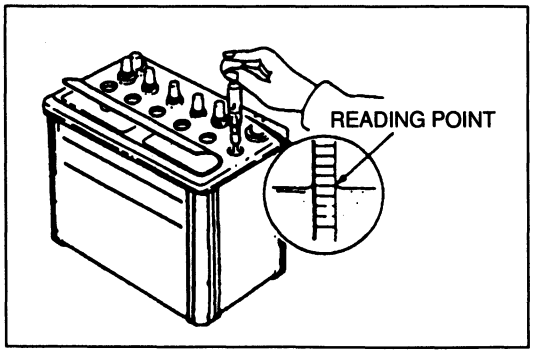
PREPARATION
SST

498 B019 9A0 System Selector 	For inspection of ignition timing and idle speed and diagnosis	49 H018 9A1 Self-Diagnosis Checker 	For diagnosis









BASIC INSPECTION
Engine Oil
1. Remove the dipstick and check the engine oil level and condition.
2. Add or change oil as necessary.

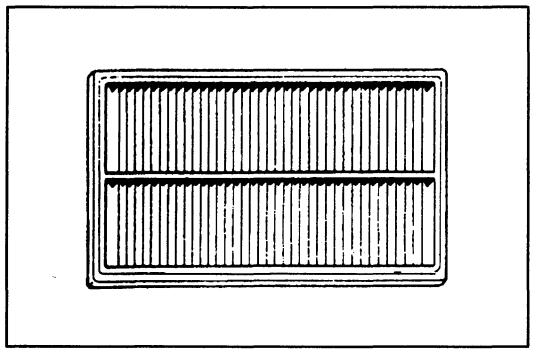
Coolant (engine cold)
Warning
- **Removing the radiator cap or the coolant filler cap while the engine is running, or when the engine and radiator are hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.**
- **Turn off 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 counter-clockwise 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 coolant level gauge from the coolant recervir.
2. Verify that the coolant level is between the and marks of the gauge.
3. Add coolant if necessary.

Battery
Terminal and cable
1. Remove any corrosion on the clamps or battery posts and coat them with grease.
2. Verify that the battery top is clean. If necessary, clean with baking soda and water.
3. Verify that cables are not frayed or corroded. Repair or replace if necessary.
4. Verify that cable clamps are tight.
5. Verify that the rubber protector completely covers the positive terminal and clamp.

Electrolyte level and specific gravity
1. Verify that the electrolyte level is between the "Upper" and "Lower" level marks.
2. Add distilled water if necessary. Do not over fill.
3. Check the specific gravity with a hydrometer.

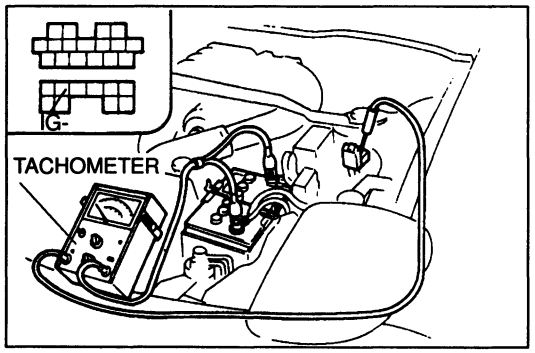
Specific Gravity: 1.27–1.29 {at 20°C [68°F]}



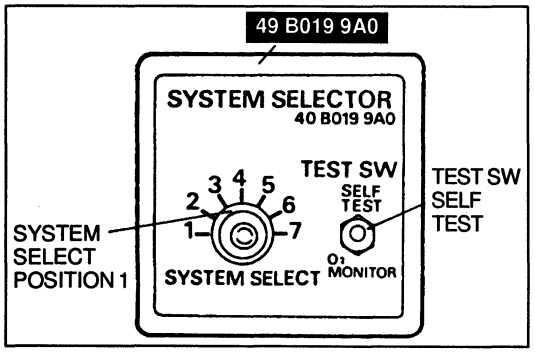
Air Cleaner Element
Inspection
1. Check the air cleaner element for excessive dirt and for oil and damage.

Caution
- **Cleaning the element with compressed air will reduce the element's ability to filter the air. Don't use compressed air to clean the element.**

2. Replace the element if necessary.

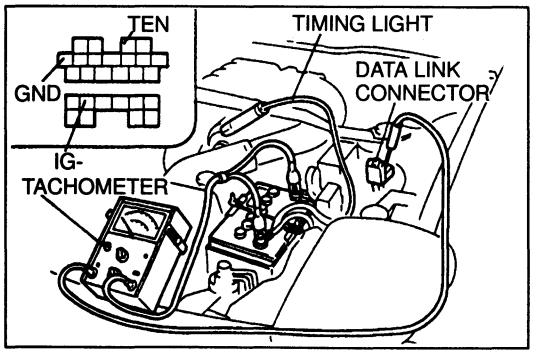


ADJUSTMENT
Preparation
1. Warm up the engine to normal operating temperature.
2. Turn all electric loads OFF.
3. Connect the **SST** to the data link connector.
4. Connect a tachometer to the data link connector **IG-** terminal as shown.

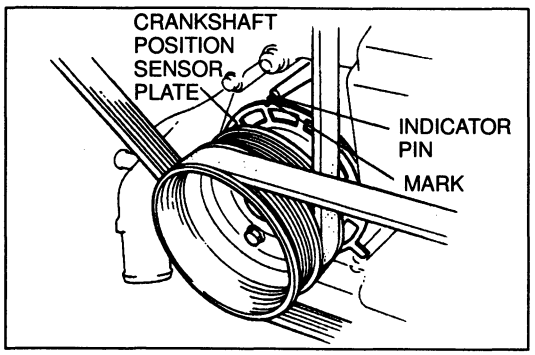


Ignition Timing
The ignition timing is set at the factory and must not be adjusted. Any adjustment will negatively effect the engine performance.

1. Perform preparation (refer to above.)
2. Verify that the electric coolant fan does not operate.
3. Remove the fuel filler cap.
4. Set SYSTEM SELECT to position 1.
5. Set TEST SW to SELF-TEST.
6. If the **SST** is not used, connect a jumper wire between the TEN terminal and the GND terminal of the data link connector.
7. Make sure the idle speed is within specification; if not, adjust the idle speed.
8. Connect a timing light to the high-tension lead of the front trailing-side.

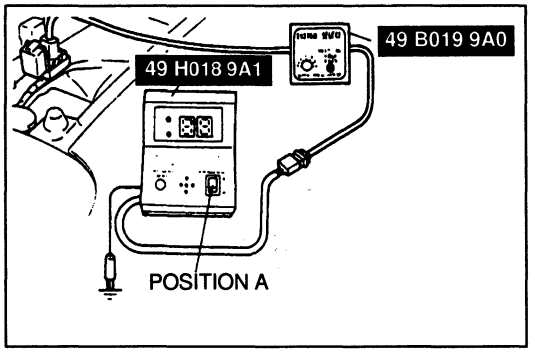


Note
- Some timing lights will not illuminate even if the ignition is working properly.



9. Verify that the timing mark (white) on the crankshaft position sensor plate is aligned with the indicator pin.

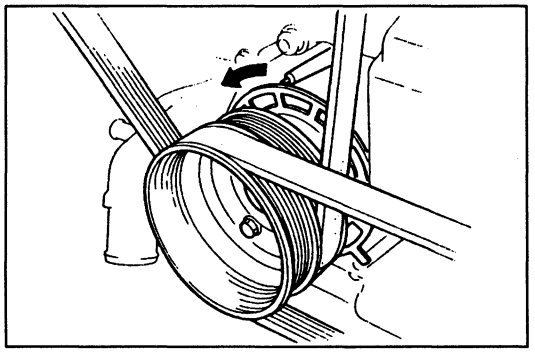
Ignition timing: Trailing side: 20° ATDC (–20° BTDC)
Leading side: 5° ATDC (–5° BTDC)
Idle speed (Neutral or P range): 550–950 rpm



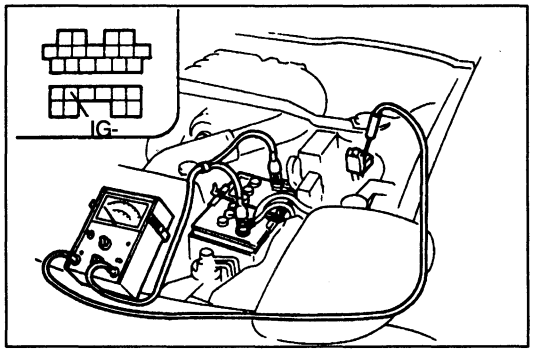
10. If the timing is incorrect, check the following procedure.
    - Verify that no trouble code number is present. If trouble code number present, check for cause by referring to the specified check sequence. (Refer to page F-20)
    - 05-knock sensor
    - 13-Manifold absolute pressure sensor

Input devices
- E/L, P/S, A/C, Coolant fan
- Crankshaft position sensor (NE, signal)
- Manifold absolute pressure sensor
- Throttle position sensor
- Neutral SW / Clutch SW (MT)
- Park / Neutral signal (AT)

Others
PCME terminal 3I (Refer to page F-152)

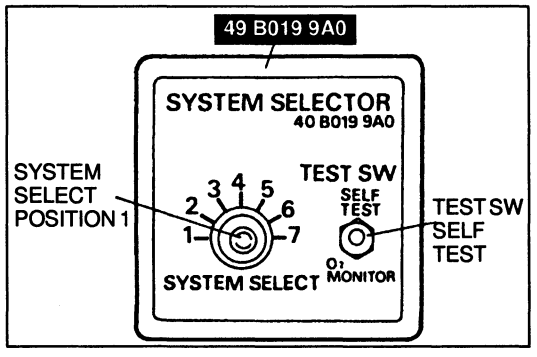


11. Disconnect the **SST**.
12. Verify that the ignition timing advances when the engine is above 1,500 RPM.



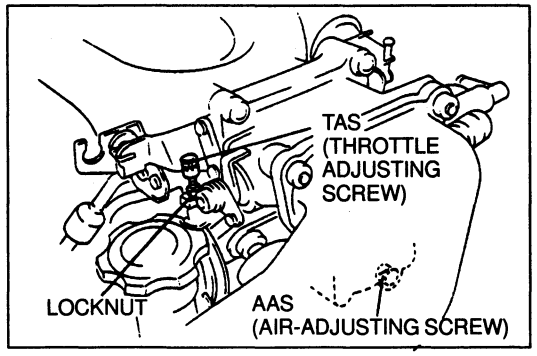
Idle Speed
Because the idle speed is controlled automatically by the PCME, it is usually not necessary to check and adjust the idle speed control valve. However, if the engine is idling roughly, use the following procedure to make adjustments.

1. Perform "Preparation". (Refer to page F-16)



2. Set SYSTEM SELECT to position 1
3. Set TEST SW to SELF TEST
4. With the coolant fan off, verify that the idle speed is within specification.

Idle speed: 700-750 (720 $^{+30}_{-20}$ rpm)



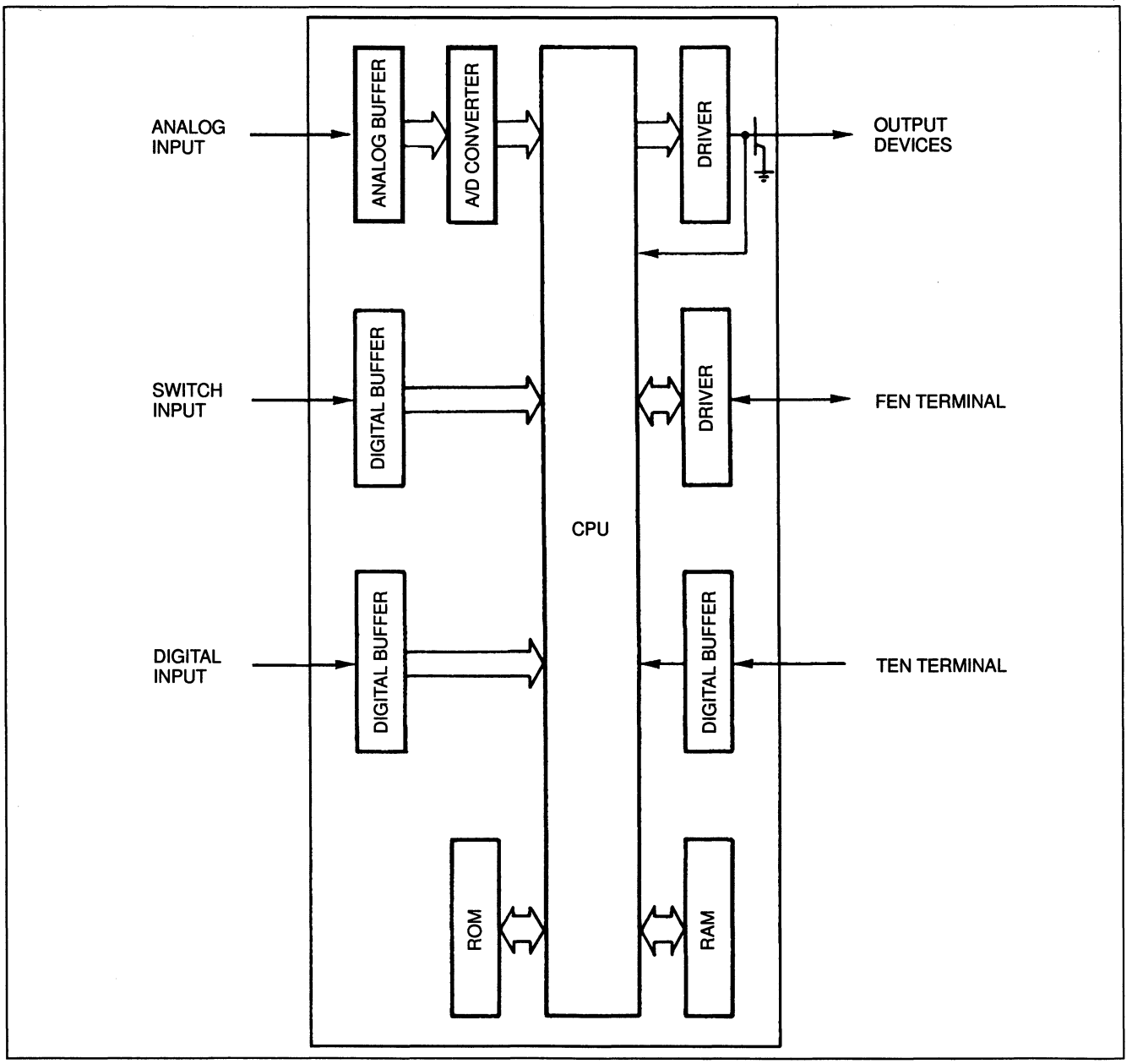
5. If not within the specification, adjust the idle by turning the air-adjusting screw (AAS).
6. If not within the specification when air adjusting screw fully closed, loosen the locknut and turn the throttle adjusting screw to set the idle.
7. Tighten the locknut and put a paint mark on the nut and throttle body.
8. Disconnect the **SST**.

ON-BOARD DIAGNOSIS FUNCTION

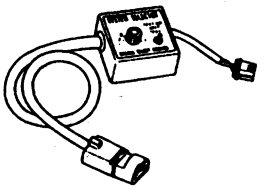
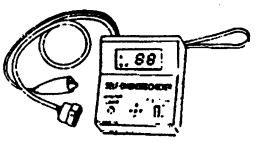
DESCRIPTION

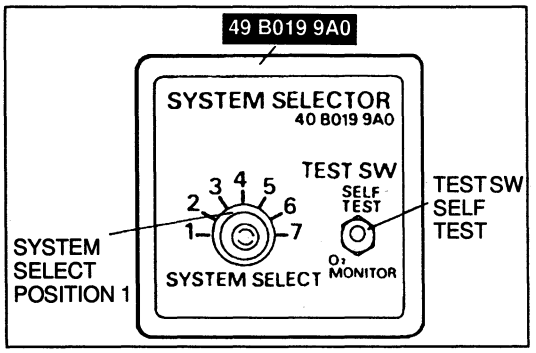
When trouble occurs in the main input or output devices, check for the cause by using the **SST**. Failure of input and output devices is indicated and retrieved from the powertrain control module (engine) (PCME) as diagnostic trouble code numbers.

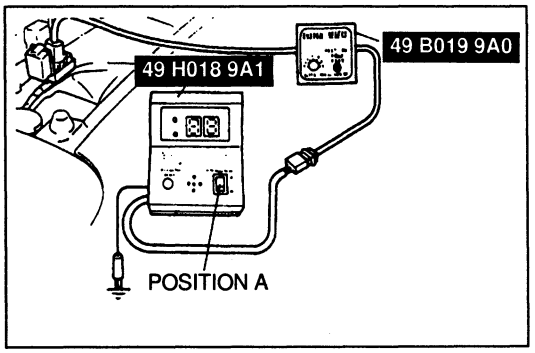
For input devices, the PCME continuously checks for malfunctions. For output devices, it checks for malfunctions only in a three-second period after the ignition switch is turned to ON, or the TEN terminal of the data link connector is grounded.

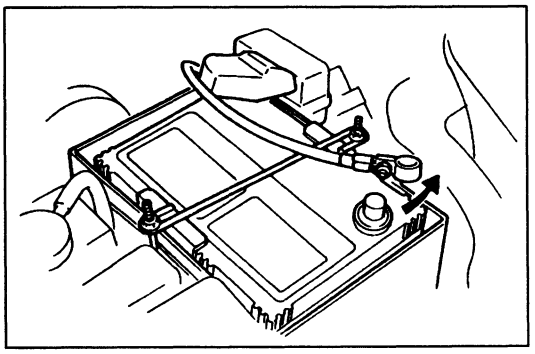


PREPARATION
SST

49 B019 9A0 System Selector 	For diagnosis	49 H018 9A1 Self-Diagnosis Checker 	For diagnosis







DIAGNOSTIC TROUBLE CODE NUMBER
Inspection Procedure

1. Connect the **SST** to the Self-Diagnosis Checker to the data link connector.
2. Set system select to position 1.
3. Set the test switch to SELF TEST.
4. Connect the **SST** to the System Selector and a ground.
5. Set the select switch to position A.
6. Turn the ignition switch ON.
7. Verify the "88" flashes on the digital display and the buzzer sounds for **3 sec.** after turning the ignition switch ON.
8. If "88" does not flash, check the main relay (refer to page F-174), power supply circuit, and data link connector wiring.
9. If "88" flashes and the buzzer sounds continuously for more than **20 sec.**, check for a short circuit between the PCME terminal 1 F and the data link connector. Replace the PCME if necessary, perform Steps 3 and 7 again.
10. Note any code numbers and check for the causes by referring to the check sequences shown on pages **F-26 through F-65**. Repair as necessary.
11. After repairs, cancel the code numbers by performing the "After-repair procedure". (Refer to page F-66.)

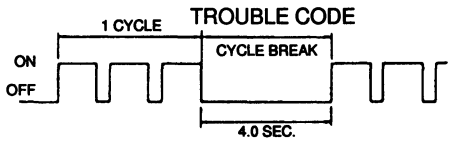
Principle of Code Cycle

Trouble codes are determined as shown below.

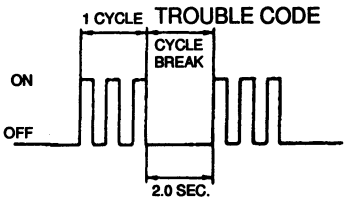
1. Code cycle break

The time between trouble code cycles is 4.0 seconds (the time the buzzer is off).

SELF-DIAGNOSIS CHECKER



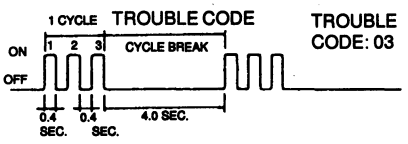
DIGTAL CODE CHECKER WITH SIGNAL ADAPTER



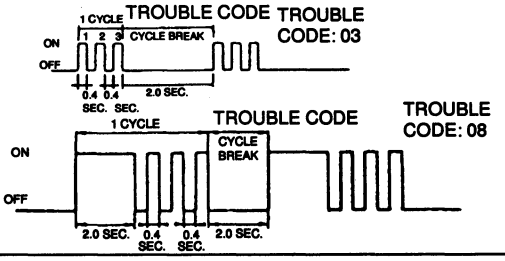
2. Second digit of trouble code (ones position)

The digit in the ones position of the trouble code represents the number of times the buzzer sounds 0.4 second during one cycle.

SELF-DIAGNOSIS CHECKER



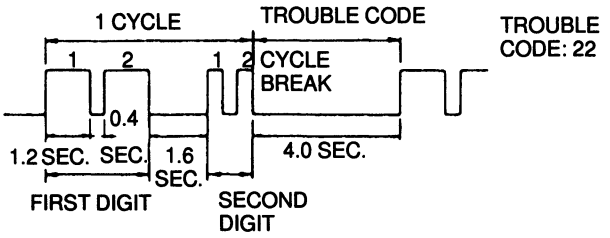
DIGITAL CODE CHECKER WITH SIGNAL ADAPTER



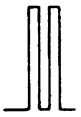
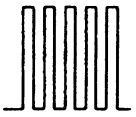
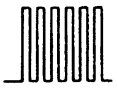
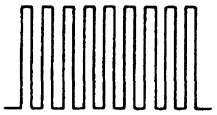
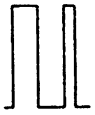
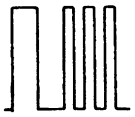
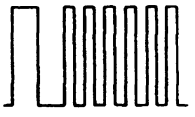
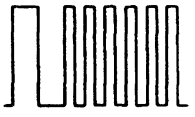
3. First digit of trouble code (tens position)

The digit in the tens position of the trouble code represents the number of times the buzzer is on 1.2 seconds during one cycle.

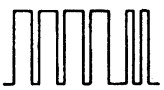
The buzzer is off for 1.6 seconds between the long and short pulses.

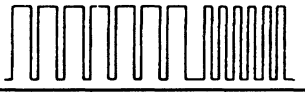


Diagnostic Trouble Code Numbers

No.	Indicator flashing pattern	Diagnosed circuit	Condition	Point	Memorized	Page
02	ON / OFF 	Crankshaft position sensor (NE signal)	No NE signal	• Crankshaft position sensor connector • Wiring from crankshaft position sensor to PCME • Crankshaft position sensor	Yes	F-26
03	ON / OFF 	Crankshaft position sensor (G signal)	No G signal	• Crankshaft position sensor connector • Wiring from crankshaft position sensor to PCME • Crankshaft position sensor	Yes	F-27
05	ON / OFF 	Knock sensor	Open or shout circuit	• Knock sensor connector • Wiring from knock sensor to PCME • Knock sensor	Yes	F-28
06	ON / OFF 	Vehicle speed Sensor	No vehicle speed sensor signal	• Vehicle speed sensor connector • Wiring from vehicle speed sensor to PCME	Yes	F-29
09	ON / OFF 	Engine coolant temprature sensor	Open or short circuit	• Engine coolant temperature sensor connector • Wiring from engine coolant temperature sensor to PCME • Engine coolant temperature sensor resistance	Yes	F-30
11	ON / OFF 	Intake air temprature sensor		• Intake air temperature sensor connector • Wiring from intake air temperature sensor to PCME • Intake air temperature sensor resistance	Yes	F-31
12	ON / OFF 	Throttle position sensor (Full range)		• Throttle position sensor connector • Wiring from throttle position sensor to PCME	Yes	F-32
13	ON / OFF 	Manifold absolute pressure sensor		• Manifold absolute pressure sensor connector • Wiring from manifold absolute pressure sensor to PCME • Manifold absolute pressure sensor resistance	Yes	F-33
14	ON / OFF 	Barometric absolute pressure sensor (in PCME)		• PCME	Yes	F-34
15	ON / OFF 	Oxygen sensor (Inactivation)	Sensor output continues less than 0.55V 25 sec. in closed loop zone	• Oxygen sensor connector • Wiring from oxygen sensor to PCME • Oxygen sensor	Yes	F-34
16	ON / OFF 	EGR function sensor	Open or short circuit	• EGR function sensor connector • Wiring from EGR function sensor to PCME • EGR function sensor	Yes	F-35
17	ON / OFF 	Oxygen sensor (Inversion)	Sensor output not changed 120 sec. in closed loop zone	• Fuel pressure • Injection fuel leakage • Ignition system • Air leakage • PCME	Yes	F-36
18	ON / OFF 	Throttle position sensor (Narrow range)	Open or short circuit	• Throttle position sensor connector • Wiring from throttle position sensor to PCME	Yes	F-38

No.	Indicator flashing pattern	Diagnosed circuit	Condition	Point	Memorized	Page
20	ON OFF 	Metering oil pump position sensor	Open or Short circuit	• MOP connector • Wiring from MOP position sensor to PCME • MOP position sensor continuity	Yes	F-39
23	ON OFF 	Fuel thermosensor		• Fuel thermosensor connector • Wiring from Fuel thermosensor to PCME • Fuel thermosensor resistance	Yes	F-40
25	ON OFF 	Solenoid valve (pressure regulator control)		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	No	F-41
26	ON OFF 	Metering oil pump (stepping moter)		• MOP connector • Wiring from MOP to PCME • MOP continuity	Yes	F-42
27	ON OFF 	Metering oil pump	Open or short circuit or Sticking of MOP sensor	• MOP connector • Wiring from MOP to PCME • Mop continuity	Yes	F-43
28	ON OFF 	Solenoid valve (EGR)	Open or short circuit	• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	No	F-44
30	ON OFF 	Solenoid valve (Split air bypass)		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	No	F-45
31	ON OFF 	Secondary air bypass valve		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	No	F-46
32	ON OFF 	Secondary air switching valve		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	Yes	F-47
33	ON OFF 	Solenoid valve (Port air bypass)		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	No	F-48
34	ON OFF 	Solenoid valve (Idle air control)		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	No	F-49
37	ON OFF 	Metering Oil Pump	Low battery positive voltage	• Charging system • MOP connector • Wiring from MOP to PCME	Yes	F-50

No.	Indicator flashing pattern	Diagnosed circuit	Condition	Point	Memorized	Page
38	ON / OFF 	Solenoid valve (Accelerated warm-up system)	Open or Short Circuit	• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	No	F-51
39	ON / OFF 	Solenoid valve (Relief 2)		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	No	F-52
40	ON / OFF 	Solenoid valve (Purge control)		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	No	F-53
42	ON / OFF 	Solenoid valve (Turbo precontrol)		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	No	F-54
43	ON / OFF 	Solenoid valve (Wastegate control)		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	No	F-55
44	ON / OFF 	Solenoid valve (Turbo control)		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	Yes	F-56
45	ON / OFF 	Solenoid valve (Charge control)		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	Yes	F-57
46	ON / OFF 	Solenoid valve (Charge relief)		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	No	F-58
50	ON / OFF 	Solenoid valve (Double throttle control)		• Solenoid valve connector • Wiring from solenoid valve to PCME • Solenoid valve continuity	No	F-59
51	ON / OFF 	Fuel pump relay (speed)		• Fuel pump relay connector • Wiring from relay to PCME • Relay continuity	Yes	F-60
54	ON / OFF 	Air pump relay		• Air pump relay connector • Wiring from relay to PCME • Relay continuity	No	F-61

No.	Indicator flashing pattern	Diagnosed circuit	Condition	Point	Memorized	Page
71	ON / OFF 	Injector (Front secondary)	Open circuit	• Injector connector • Wiring from Injector to PCME • Injector resistance	Yes	F-62
73	ON / OFF 	Injector (Rear secondary)		• Injector connector • Wiring from injector to PCME • Injector resistance	Yes	F-63
76	ON / OFF 	Slip lock up off signal (PCMT)	Open or Short circuit	• PCMT connector • Wiring from PCMT to PCME	No	F-64
77	ON / OFF 	Torque reduced signal (PCMT)		• PCMT connector • Wiring from PCMT to PCME	No	F-65

Note

- If more than one failure is present, the code numbers will be indicated in numerical order.

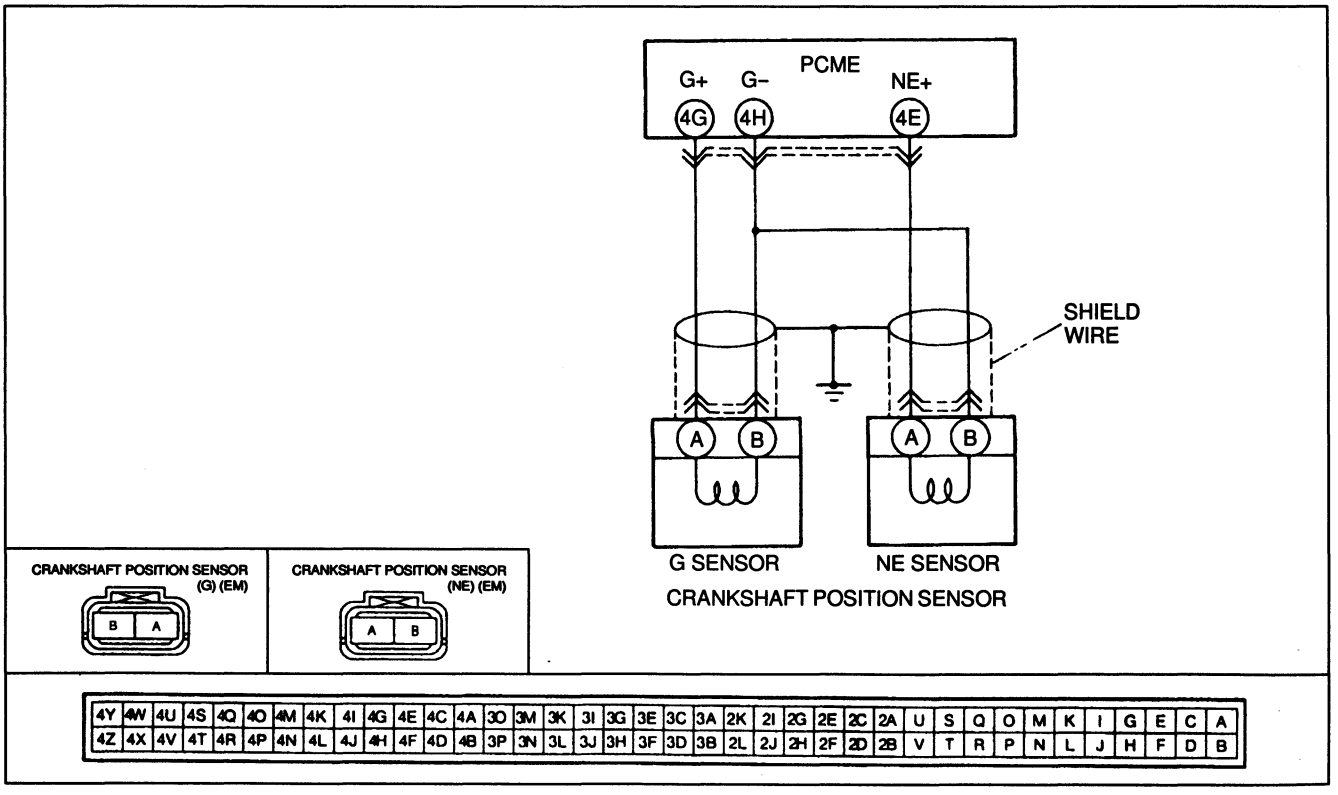
After repairs, cancel the code numbers by performing the "After-repair procedure".
(Refer to page F-66.)

Troubleshooting

If a trouble code number is shown on the SST, check for the cause by referring to the related chart.

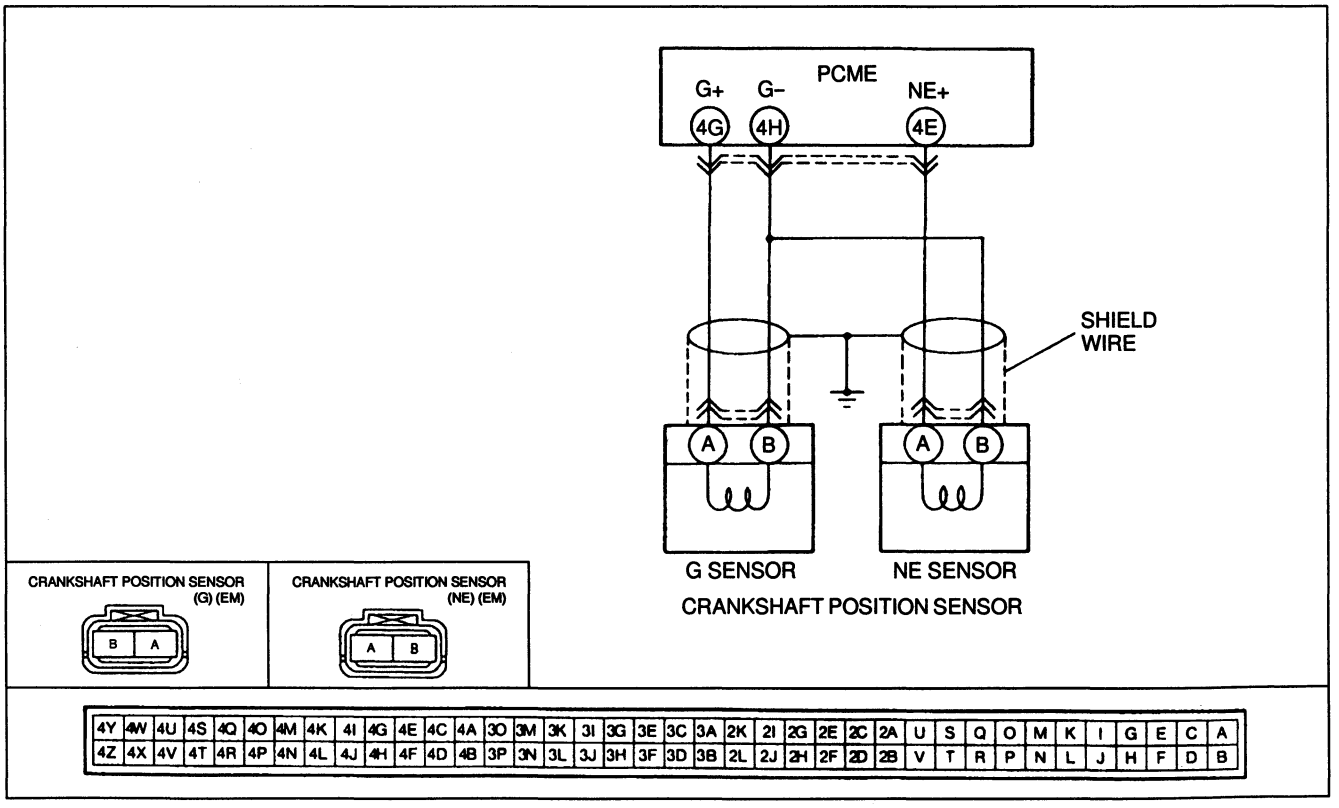
CODE No.	02 (CRANKSHAFT POSITION SENSOR [NE SENSOR])		
STEP	INSPECTION		ACTION
1	Is Code No.03 also present?	Yes	Go to next step
		No	Go to step 5
2	Does crankshaft position sensor circuit have poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
3	Is resistance of crankshaft position sensor [NE SENSOR] OK? **Resistance: 0.95–1 .25 kΩ (20°F [68°F])**	Yes	Go to next step
		No	Replace crankshaft position sensor [NE SENSOR] **☞page F-166**
4	Is clearance of crankshaft position sensor [NE signal] OK? **Clearance: 1.0–2.0 mm (0.039–0.078 in)**	Yes	Go to next step
		No	Adjust clearance **☞page F-166**
5	Is there continuity between ground and 4E or ground and 4H terminal? (at harness side)	Yes	Check for short circuit in wiring (Crankshaft position sensor–4H or 4E terminal)
		No	Go to next step
6	Disconnect connector from PCME; is resistance between 4E and 4H terminals OK? **Resistance: 0.95–1.25 KΩ (20°C [68°F])**	Yes	Replace PCME **☞page F-150**
		No	Check for open circuit in wiring (Crankshaft position sensor–4H or 4E terminal)

Circuit Diagram



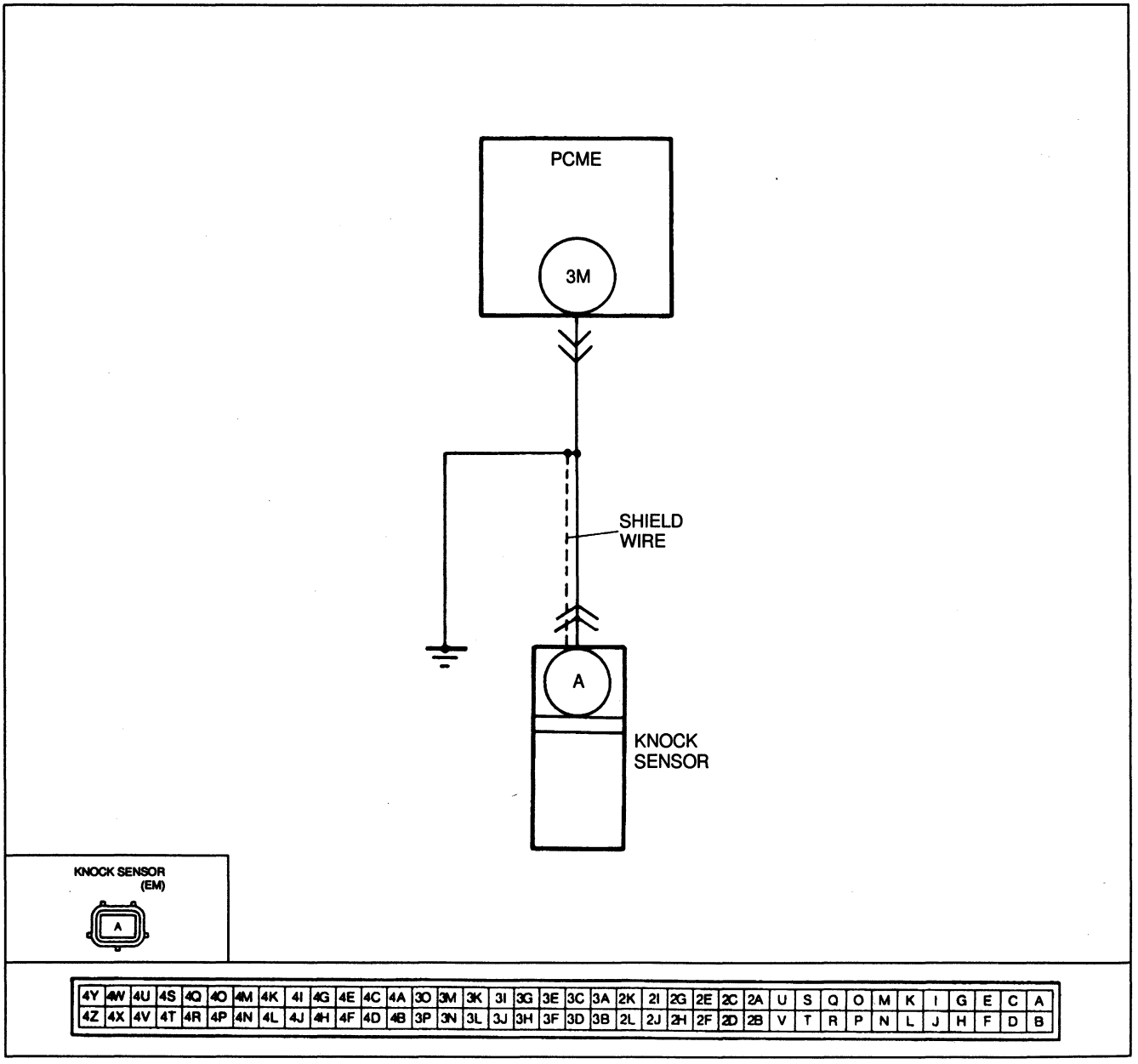
CODE No.	03 (CRANKSHAFT POSITION SENSOR [G SENSOR])		
STEP	INSPECTION		ACTION
1	Is Code No.02 also present?	Yes	Go to next step
		No	Go to step 5
2	Does crankshaft position sensor circuit have poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
3	Is resistance of crankshaft position sensor [G SENSOR] OK? **Resistance: 0.95–1.25 KΩ (20°F [68°F])**	Yes	Go to next step
		No	Replace crankshaft position sensor [G SENSOR] **☞page F–166**
4	Is clearance of crankshaft position sensor [G signal] OK? **Clearance: 1.0–2.0 mm (0.039–0.0178 in)**	Yes	Go to step
		No	Adjust clearance **☞page F–166**
5	Is there continuity between ground and 4G or ground and 4H terminal? (at harness side)	Yes	Check for short circuit in wiring (Crankshaft position sensor-4H or 4G terminal)
		No	Go to next step
6	Disconnect connector from PCME; is resistance between 4G and 4H terminals OK? **Resistance: 0.95–1.25 KΩ (20°C [68°F])**	Yes	Replace PCME **☞page F–150**
		No	check for open circuit in wiring (Crankshaft position sensor–4G or 4H terminal)

Circuit Diagram



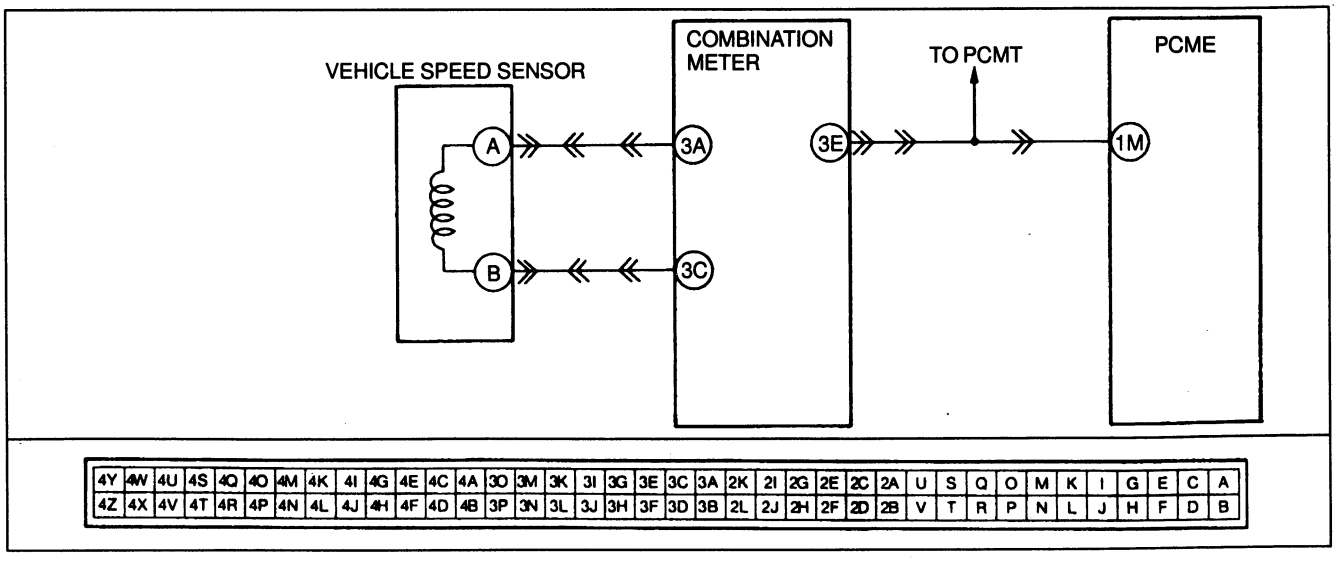
CODE No.	05 (KNOCK SENSOR)		
STEP	INSPECTION		ACTION
1	Does knock sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is there continuity between knock sensor and PCME terminal 3M?	Yes	Check continuity between PCME terminal 3M and ground ➪ If continuity, repair or replace wiring ➪ If no continuity, go to next step
		No	Repair wiring harness
3	Try known good knock sensor, is same code No. present?	Yes	Replace PCME ☞page F-166
		No	Replace knock sensor ☞page F-171

Circuit Diagram



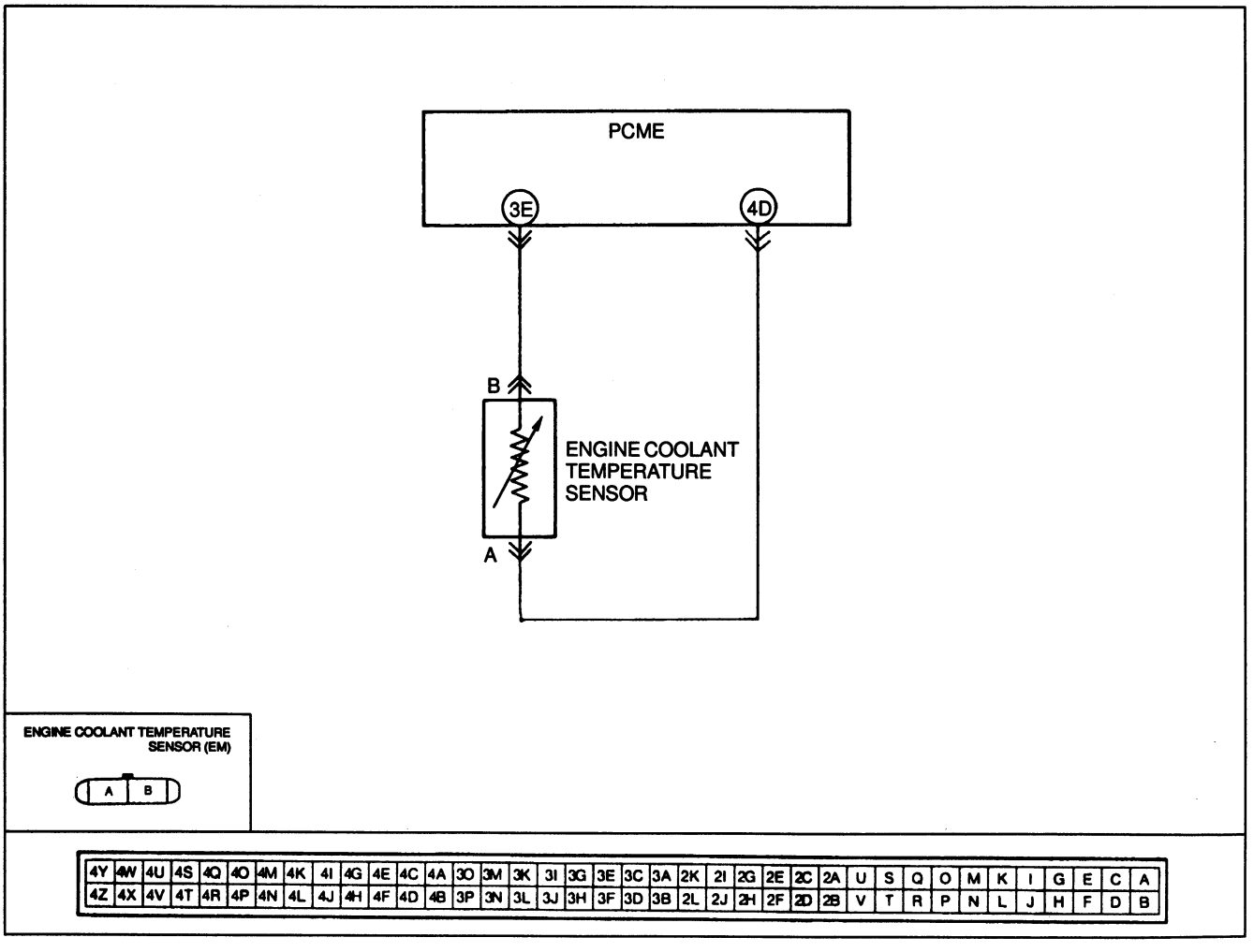
CODE No.	06 (VEHICLE SPEED SENSOR)		
STEP	INSPECTION		ACTION
1	Is speedometer working correctry	Yes	Go to next step
		No	Go to step 5
2	Check for PCMT trouble code. Is code No.07 also present?	Yes	Go to step 5
		No	Go to next step
3	Does vehicle speed sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
4	Is there vehicle speed sensor terminal 1M voltage OK? **Condition / Voltage** While driving: 2–2.5V Idle: 0V or 4–5V	Yes	Check for open or short circuit wiring harness (Vehicle speed sensor terminal 3E-PCME terminal 1M) ⇨ If OK go to step 8 ⇨ If not OK, repair wiring harness
		No	Go to next step
5	Remove vehicle speed sensor Is resistance felt when turning sensor driven gear by hand?	Yes	Go to next step
		No	Replace vehicle speed sensor
6	Disconnect vehicle speed sensor connector and connect circuit tester Does pointer of circuit fester move slightly when driven gear is slowly turned?	Yes	Go to next step
		No	Replace vehicle speed sensor
7	Disconnect vehicle speed sensor connector Is resistance of sensor OK? **Resistance: Approx. 290 Ω (20°C [68°F]); (reference)**	Yes	Check wiring and connectors from vehicle speed sensor to speedometer ⇨ If OK, go to next step ⇨ It not OK, repair wiring and/or connector
		No	Replace vehicle speed sensor
8	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for trouble code Is trouble code displayed?	Yes	Replace PCME ☞page F–150
		No	Intermittent poor connection Check for cause

Circuit Diagram



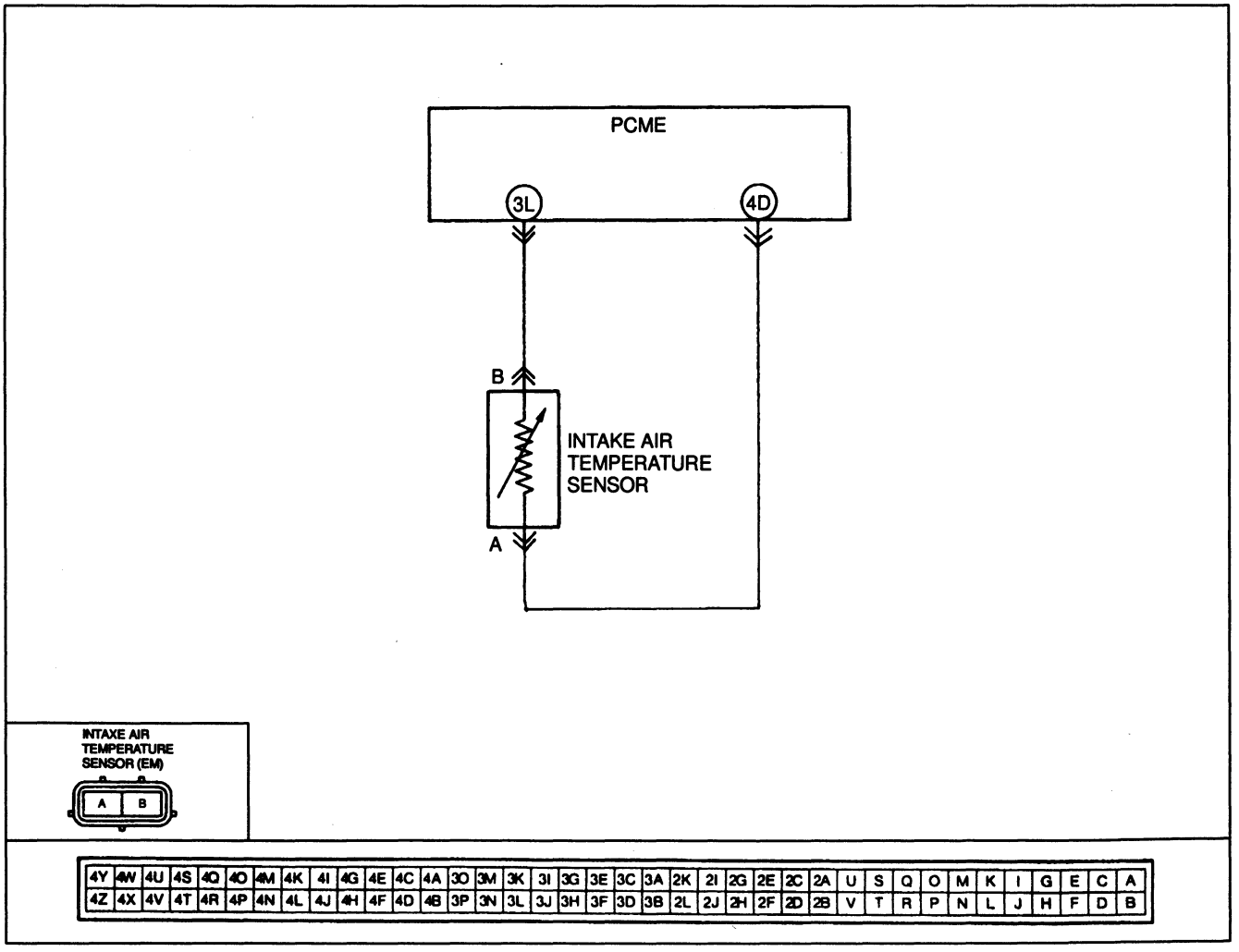
CODE No.	09 (ENGINE COOLANT TEMPERATURE SENSOR)		
STEP	INSPECTION		ACTION
1	Does the engine coolant temperature sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is engine coolant temperature sensor B terminal voltage OK with engine coolant temperature sensor connector disconnected? Condition: Ignition switch ON — Voltage: Approx. 5.0V	Yes	Go to next step
		No	Check for short or open circuit in wiring harness (Engine coolant temperature sensor B terminal-PCME terminal 3E) ⇨ If OK, replace PCME ⇨ If not OK, repair wiring harness
3	Is there continuity between engine coolant temperature sensor A terminal and a ground	Yes	Go to next step
		No	Repair wiring harness
4	Is resistance of engine coolant temperature sensor OK? Coolant temp. / Resistance {kΩ}: -20°C {-4°F} — 14.6–17.8 20°C {68°F} — 2.2–2.7 80°C {176°F} — 0.29–0.35	Yes	Replace PCME ☞page F-150
		No	Replace engine coolant temperature sensor ☞page F-169

Circuit Diagram



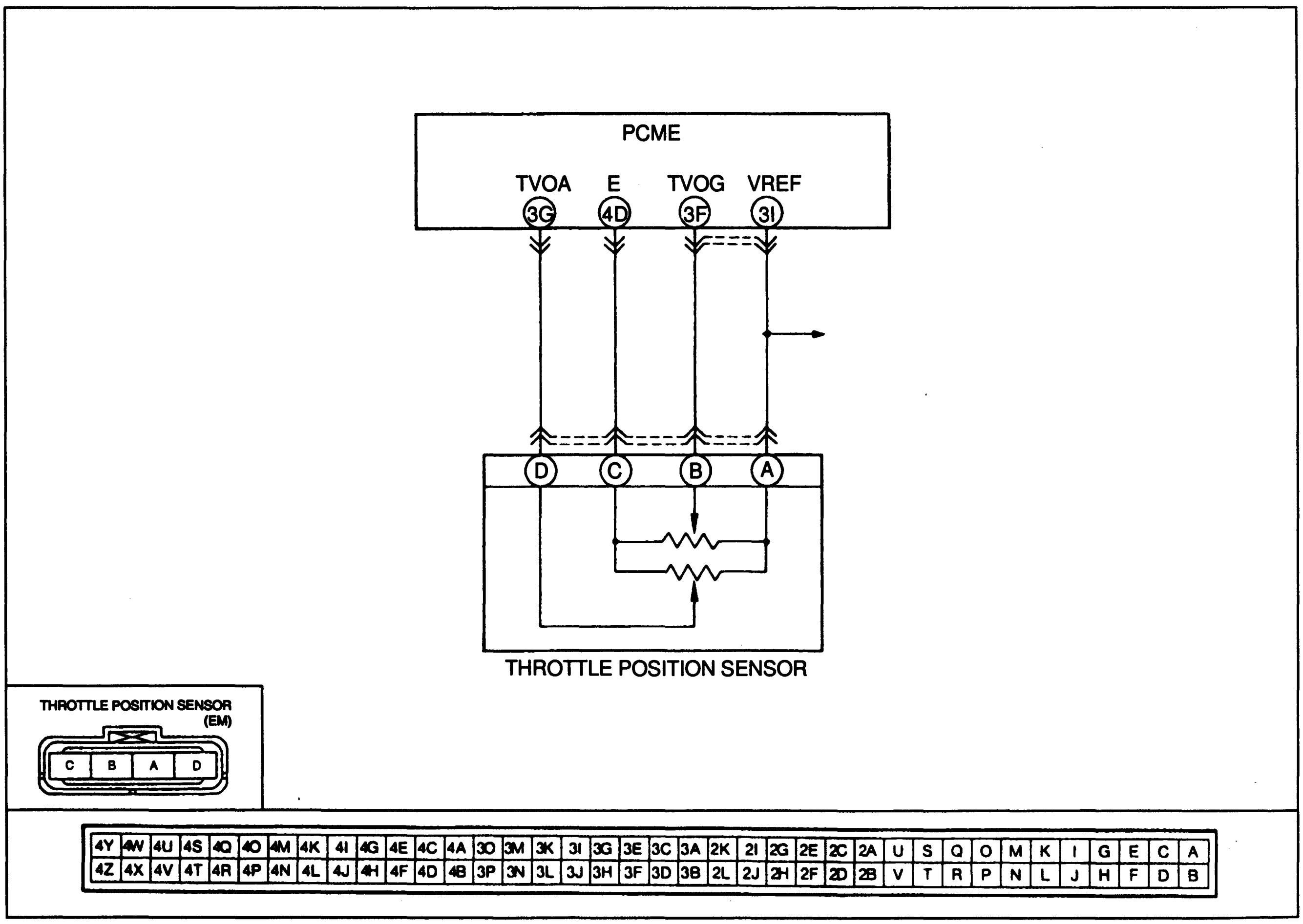
CODE No.	11 (INTAKE AIR TEMPERATURE SENSOR)		
STEP	INSPECTION		ACTION
1	Does the engine coolant temperature sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is Intake air temperature sensor B terminal voltage OK with intake air temperature sensor connector disconnected? Condition: Ignition switch ON — Voltage: Approx. 5.0V	Yes	Go to next step
		No	Check for short or open circuit in wiring harness (Intake air temperature sensor B terminal-PCME terminal 3L) ⇨ If OK, replace PCME ⇨ If not OK, repair wiring harness
3	Is there continuity between intake air temperature sensor A terminal and a ground	Yes	Go to next step
		No	Repair wiring harness
4	Is resistance of intake air temperature sensor OK? 20°C {68°F}: 2.2–2.7 kΩ 85°C {185°F}: 0.29–0.35	Yes	Replace PCME ☞page F–150
		No	Replace intake air temperature sensor ☞page F–169

Circuit Diagram



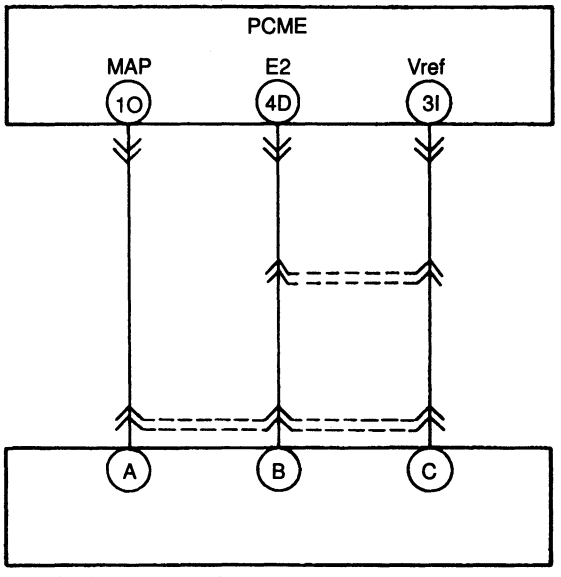
CODE No.	12 (THROTTLE POSITION SENSOR [FULL RANGE])		
STEP	**INSPECTION**		**ACTION**
1	Does throttle position sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is throttle position sensor A terminal voltage OK with throttle position sensor disconnected? **Condition** / **Voltage** Ignition switch ON / Approx. 5.0V	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Throttle position sensor A terminal-PCME terminal 3I) ⇨ If OK, replace PCME ⇨ If not OK, repair wiring harness
3	Is there continuity between throttle position sensor and PCME? **Throttle position sensor terminal** / **PCME** D / 3G C / 4D	Yes	Check for short circuit in wiring harness (Throttle position sensor D terminal-PCME terminal 3G) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is there continuity between terminals A and D with throttle valve closed throttle position to fully opened OK?	Yes	Replace PCME ☞page F–150
		No	Replace throttle position sensor ☞page F–168

Circuit Diagram

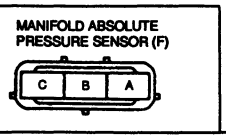


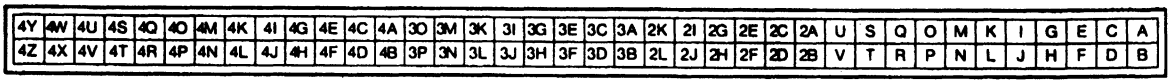
CODE No.	13 (MANIFOLD ABSOLUTE PRESSURE SENSOR)		
STEP	**INSPECTION**		**ACTION**
1	Does manifold absolute pressure sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector C terminal voltage OK with manifold absolute pressure sensor connector disconnected? **Condition** / **Voltage**: Ignition switch ON / Approx. 5.0V	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (manifold absolute pressure sensor C terminal-PCME terminal 3I
3	Is there continuity between manifold absolute pressure sensor B terminal and PCME terminal 4D	Yes	Go to next step
		No	Repair wiring harness
4	Is output A terminal voltage of manifold absolute pressure sensor OK? **Pressure or Vaccum** / **Voltage**: 66 kPa {500 mmHg, 19.7 inHg} (Vaccum) / 1.3–1.6V; 0 kPa {0 mmHg, 0 inHg} / 2.3–2.8V; 98.7 kPa {740 mmHg, 29.1 inHg} (Pressure) / 4.3–4.6V	Yes	Replace PCME ☞page F–150
		No	Replace manifold absolute pressure sensor ☞page F–167

Circuit Diagram



MANIFOLD ABSOLUTE PRESSURE SENSOR

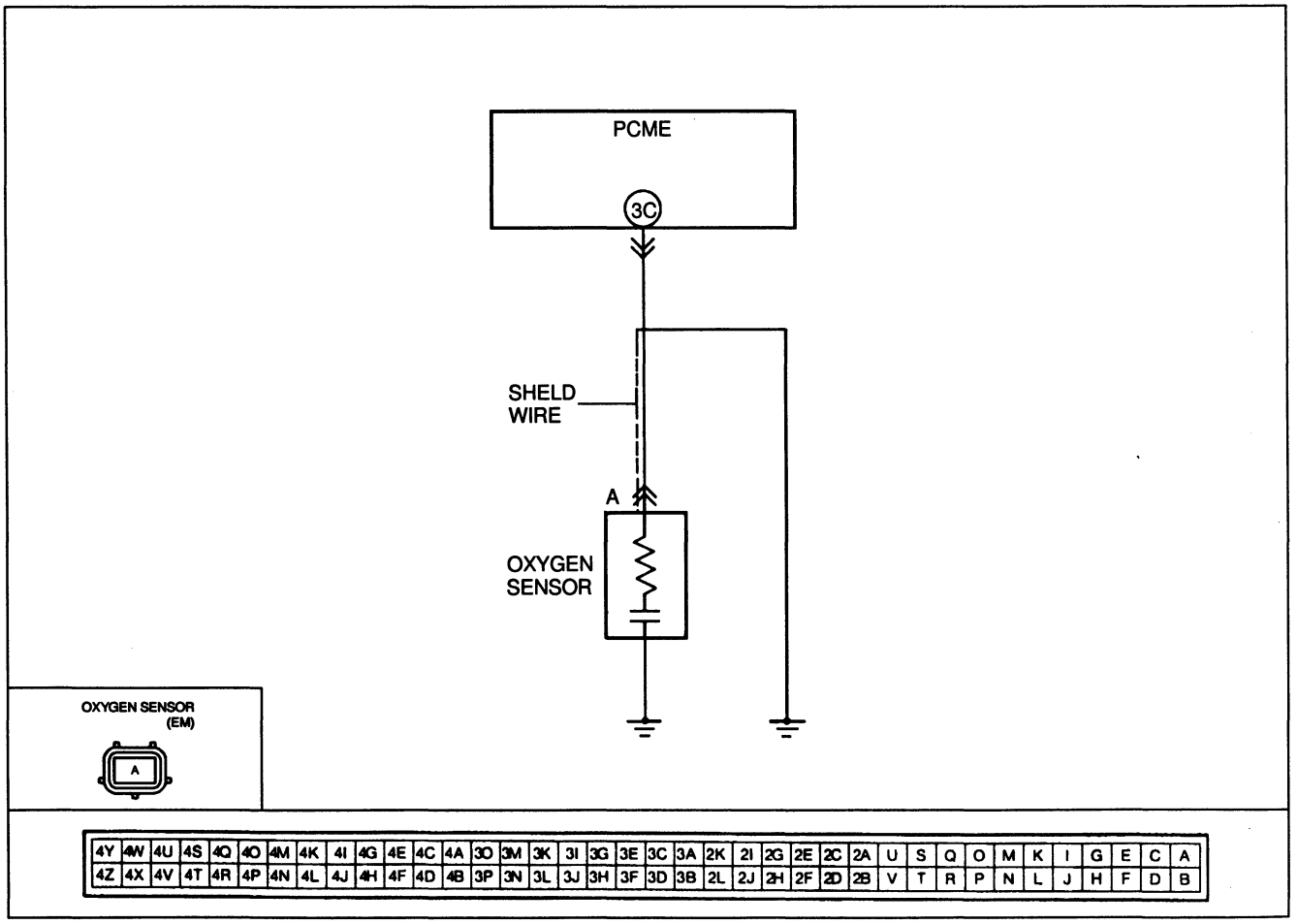




CODE No.	14 (BAROMETRIC ABSOLUTE PRESSURE SENSOR-IN PCME)
STEP	ACTION
1	Replace PCME ☞page F–150

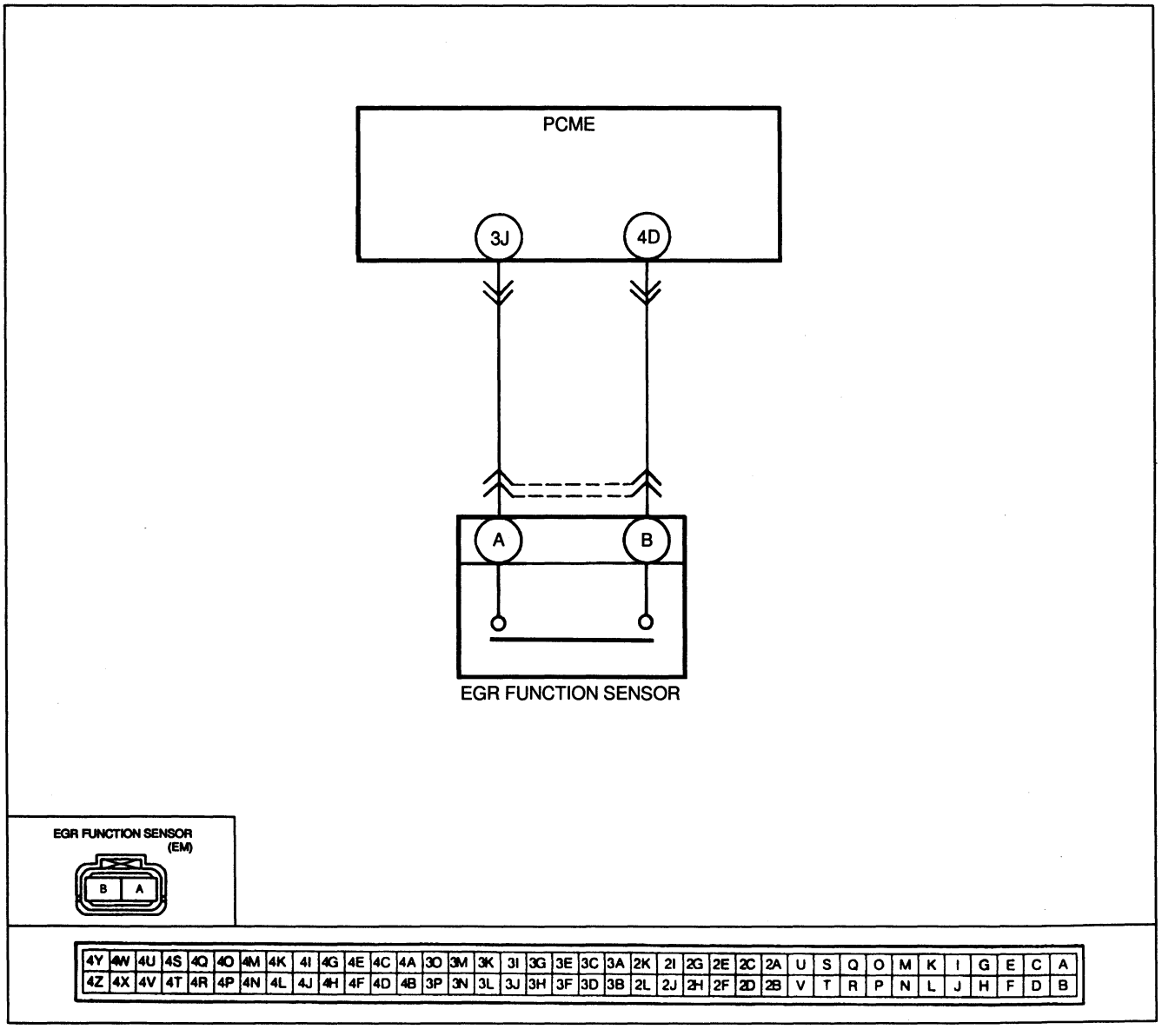
CODE No.	15 (OXYGEN SENSOR-INACTIVATION)		
If Code No.15 and 17 are both present, first perform the checking procedure for Code No.17.			
STEP	INSPECTION		ACTION
1	Does oxygen sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is oxygen sensor output voltage OK?	Yes	Go to next step
		No	Replace oxygen sensor ☞page F–113
3	Is there continuity between oxygen sensor and PCME terminal 3C?	Yes	Check for short circuit in wiring ☞page F–150 ⇨ If OK, replace PCME ⇨ If not OK, repair wire harness
		No	Repair wiring harness

Circuit Diagram



CODE No.	16 (EGR FUNCTION SENSOR)		
STEP	INSPECTION		ACTION
1	Does EGR function sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector A terminal voltage OK with EGR function sensor connector disconnected.	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (EGR function sensor A terminal-PCME terminal 3J)
3	Is there continuity between EGR function sensor B terminal and PCME terminal 4D?	Yes	Go to next step
		No	Repair wiring harness
4	Is EGR function sensor OK? ☞page F-127	Yes	Replace PCME ☞page F-150
		No	Replace EGR valve

Circuit Diagram

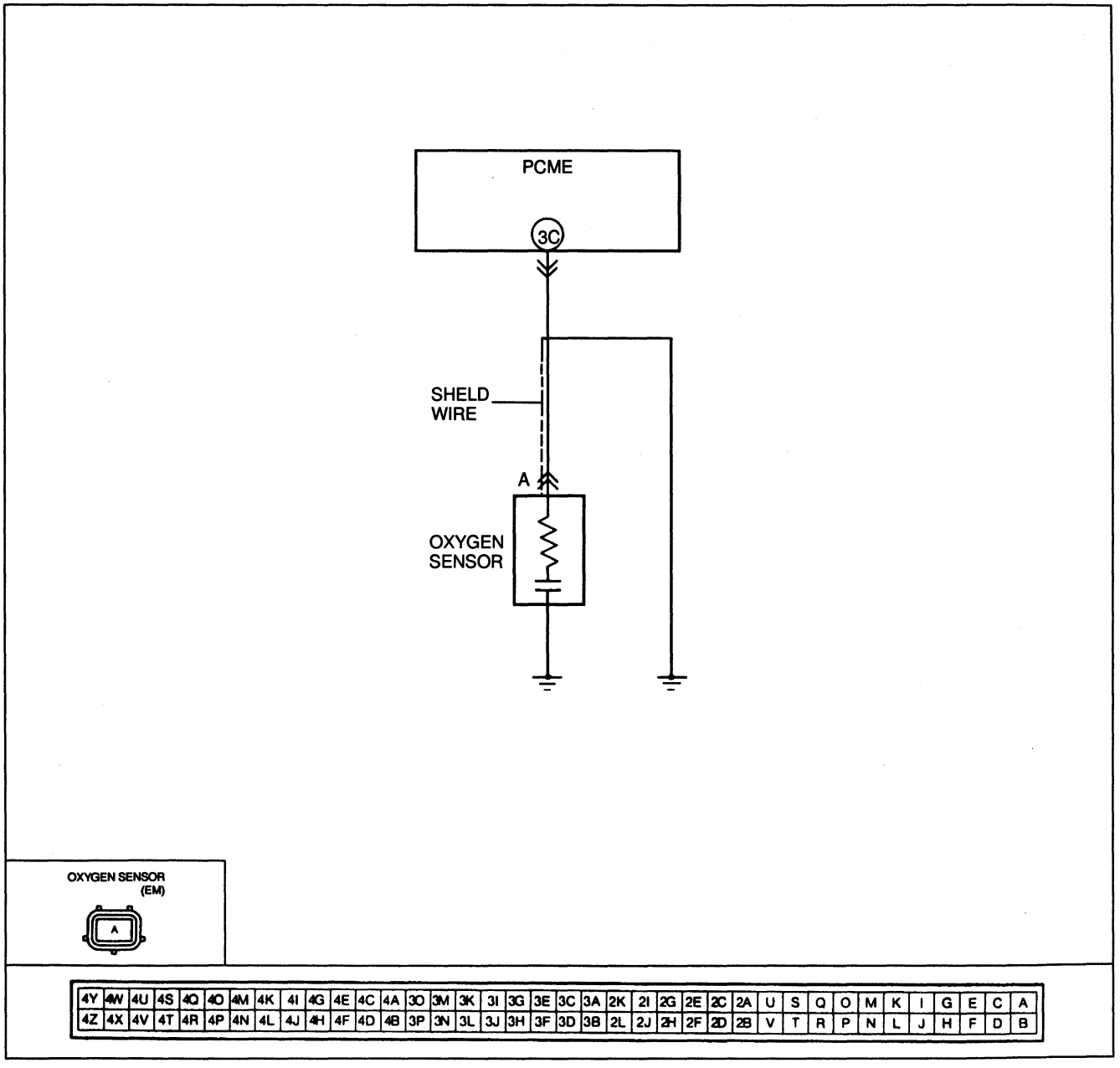


CODE No.	17 (OXYGEN SENSOR (INVERSION))		
STEP	INSPECTION		ACTION
1	Is the same Code No. present following after repair procedure? ☞page F–66	Yes	Go to next step
		No	Check oxygen sensor circuit for a poor connection ➪ If OK, perform troubleshooting Code No.15
2	Does monitor lamp of Self-Diagnosis Checker illuminate at idle after the engine has been warmed up and run at **2500–3000 rpm** for **3 min**?	Yes	Go to next step A/F mixture rich
		No	Go to Step 6 A/F mixture is lean or misfire is occurring
3	Is there air leakage in intake air system components?	Yes	Go to next step
		No	Repair or replace ☞page F–76
4	Is fuel line pressure correct at idle? ☞page F–104 **Fuel line pressure:** **190–220 kPa {1.9–2.3 kgf/cm ^{2}, 28–32 psi}**	Yes	Go to next step
		No	**High pressure** ☞page F–104 Check if fuel return hose is clogged or restricted ➪ If OK, replace pressure regulator
5	Is there fuel leakage at injector? ☞page F–107	Yes	Replace injector ☞page F–105
		No	Check engine coolant temperature sensor? ☞page F–169 ➪ If it is OK, replace oxygen sensor ➪ If it is not OK, replace it
6	Disconnect each high tension lead at idle; does engine speed decrease equally at each rotor?	Yes	Go to next step
		No	Go to Step 8
7	Is fuel line pressure correct at idle? ☞page F–97 **Fuel line pressure:** **190–220 kPa {1 .9–2.3 kgf/cm^2, 28–32 psi}**	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose ➪ If it **quickly** increases, check pressure regulator ☞page F–104 ➪ If it **gradually** increases, check for clogging between fuel pump and pressure regulator ➪ If hose is not clogged, check fuel pump maximum pressure ☞page F–101
8	Is there a misfire of a dead rotor from step 6 inspection?	Yes	Repair or replace ignition system component(s)
		No	Go to next step

B+: Battery positive voltage

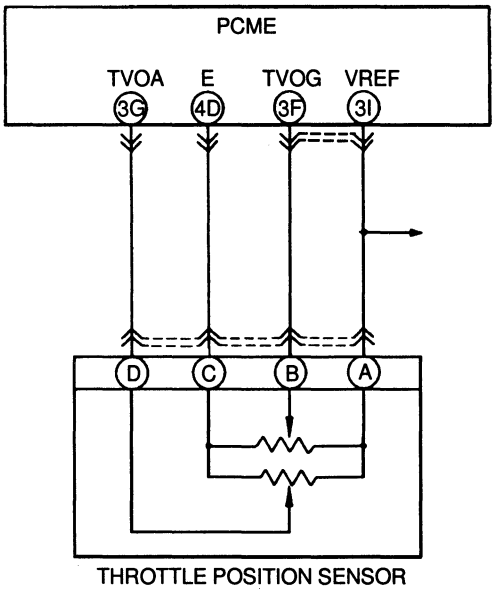
STEP	INSPECTION		ACTION
9	Is there an injector operating sound at idle of dead rotor from step 6 inspection?	Yes	Go to next step
		No	Check for approx. B+ at injector terminal wire ⇨ If there is, replace injector ☞page F–105 ⇨ If there is not, check for a short or open circuit in wire harness
10	Replace injector at dead rotor from step 6 inspection ☞page F–105 Is the same Code No. present following afterrepair procedure?	Yes	Try known good oxygen sensor ⇨ If it is OK, replace oxygen sensor ⇨ If it is not OK, replace PCME
		No	System OK

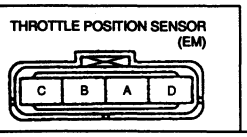
Circuit Diagram

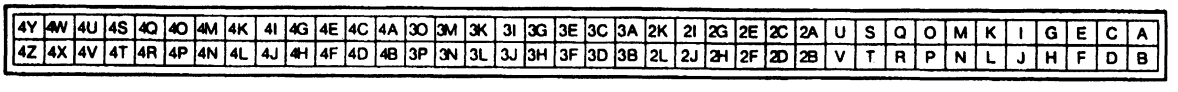


CODE No.	18 (THROTTLE POSITION SENSOR [NARROW RANGE])		
STEP	INSPECTION		ACTION
1	Does throttle position sensor circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is throttle position sensor A terminal voltage OK with throttle position sensor disconnected? Condition: Ignition switch ON — Voltage: Approx. 5.0V	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Throttle position sensor A terminal -PCME terminal 3I) ⇨ If OK, replace PCME ⇨ If not OK, repair wiring harness
3	Is there continuity between throttle position sensor and PCME? Throttle position sensor terminal: B — PCME: 3F Throttle position sensor terminal: C — PCME: 4D	Yes	Check for short circuit in wiring harness (Throttle position sensor B terminal-PCME terminal 3F) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is there continuity between terminals A and B with throttle valve closed to fully opened OK?	Yes	Replace PCME ☞page F-150
		No	Replace throttle position sensor ☞page F-168

Circuit Diagram

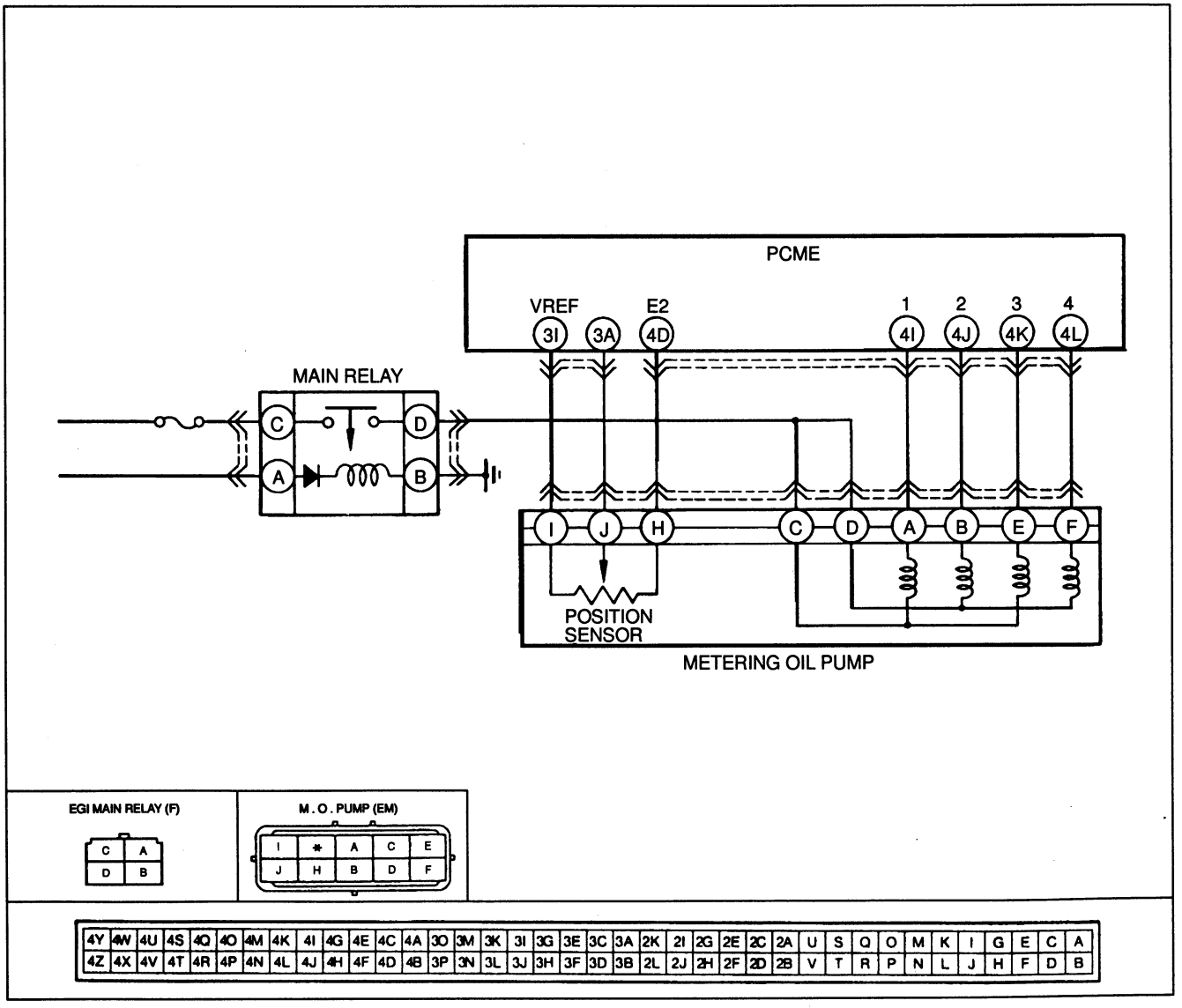






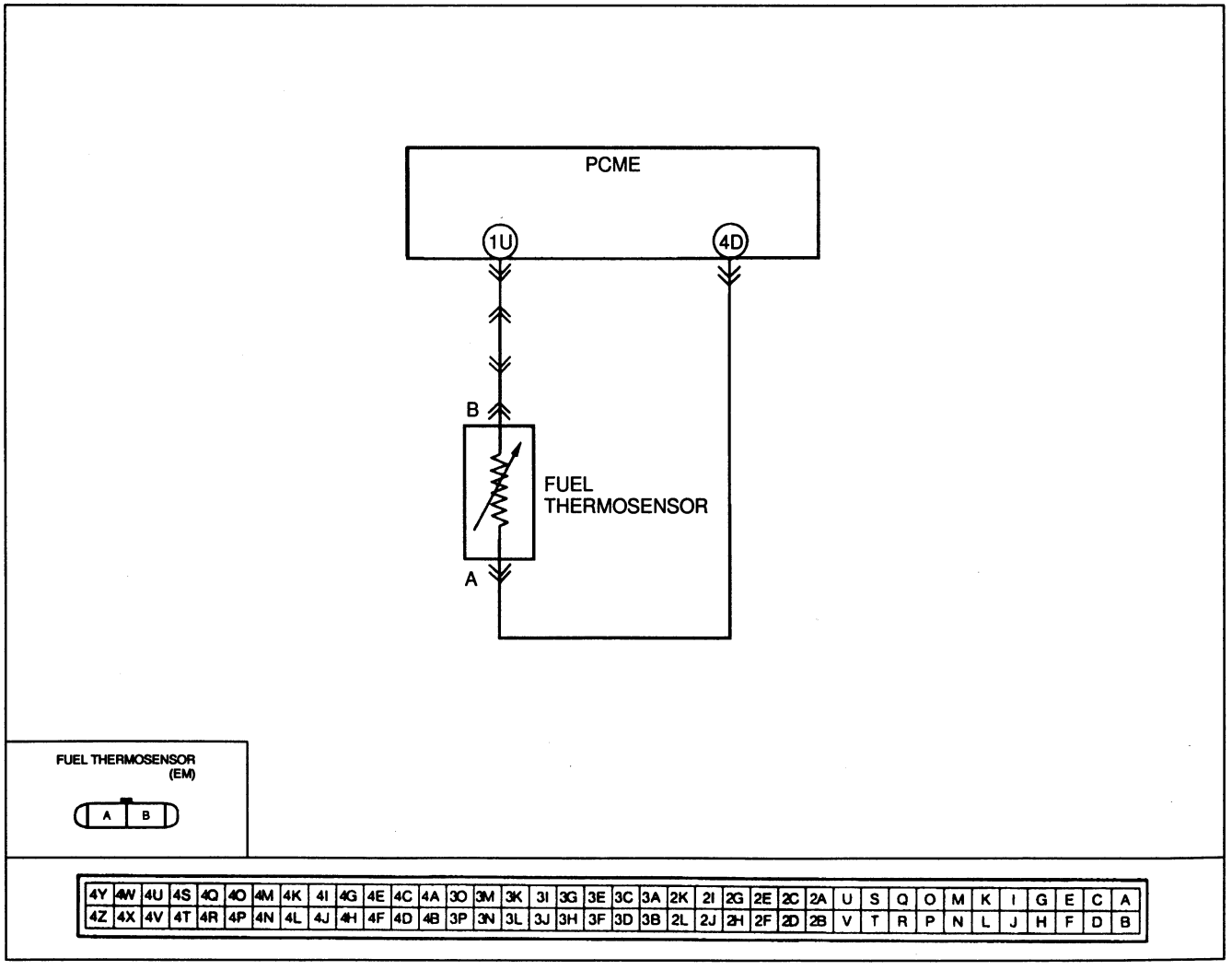
CODE No.	20 (METERING OIL PUMP POSITION SENSOR)		
STEP	INSPECTION		ACTION
1	Are there any poor connections at metering oil pump and PCME connectors?	Yes	Repair or replace connector
		No	Go to next step
2	Is PCME terminal 3A voltage OK? Condition: Idle — Voltage: 1.1V Condition: Acceleration — Voltage: 1.1V–4.2V	Yes	Go to step 4
		No	Go to next step
3	Is resistance of MOP position sensor OK? Resistance: J–H 0.4–12 kΩ J–I 1.0–2 kΩ H–I 9.4–12 kΩ	Yes	Repair wiring harness (Mop position sensor-PCME terminal 3A)
		No	Replace MOP
4	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for trouble code Is trouble code displayed?	Yes	Replace PCME
		No	Intermittent poor connection check for cause.

Circuit Diagram



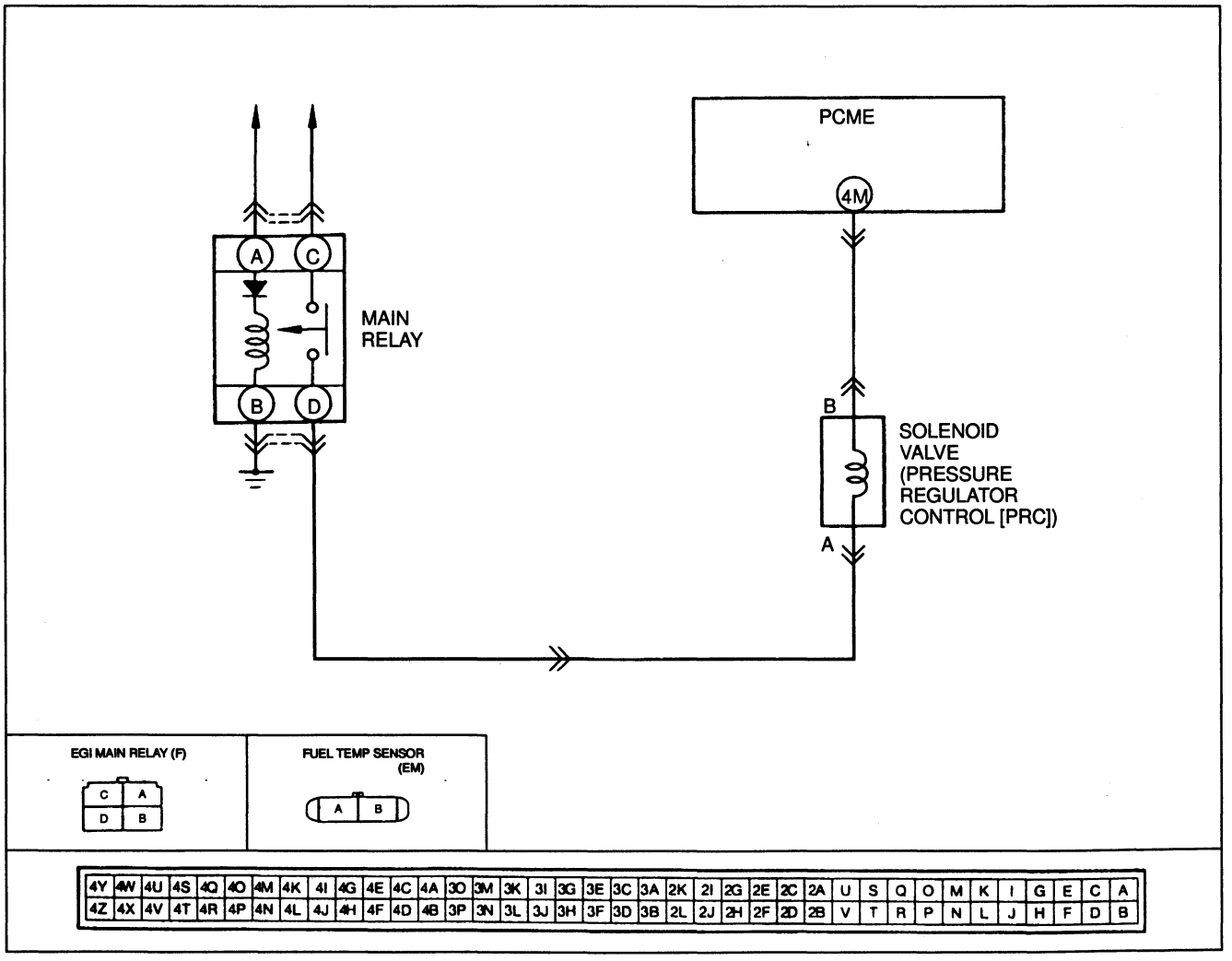
CODE No.	23 (FUEL THERMOSENSOR)		
STEP	INSPECTION		ACTION
1	Does the fuel thermosensor circuit have a poor connection?	Yes	Repair connector and/or harness
		No	Go to next step
2	Is fuel thermosensor B terminal voltage OK with fuel thermosensor connector disconnected? Condition: Ignition switch ON — Voltage: Approx. 5.0V	Yes	Go to next step
		No	Check for short or open circuit in wiring harness (Fuel thermosensor B terminal -PCME terminal 1U) ⇨ If OK, replace PCME ⇨ If not OK, repair wiring harness
3	Is there continuity between fuel thermosensor A terminal and a ground?	Yes	Go to next step
		No	Repair wiring harness
4	Is resistance of fuel thermosensor OK? Fuel temp: −20°C {−4°F} — Resistance {kΩ}: 14.6–17.8 Fuel temp: 20°C {68°F} — Resistance {kΩ}: 2.2–2.7 Fuel temp: 80°C {176°F} — Resistance {kΩ}: 0.29–0.35	Yes	Replace PCME ☞page F–150
		No	Replace fuel thermosensor ☞page F–170

Circuit Diagram



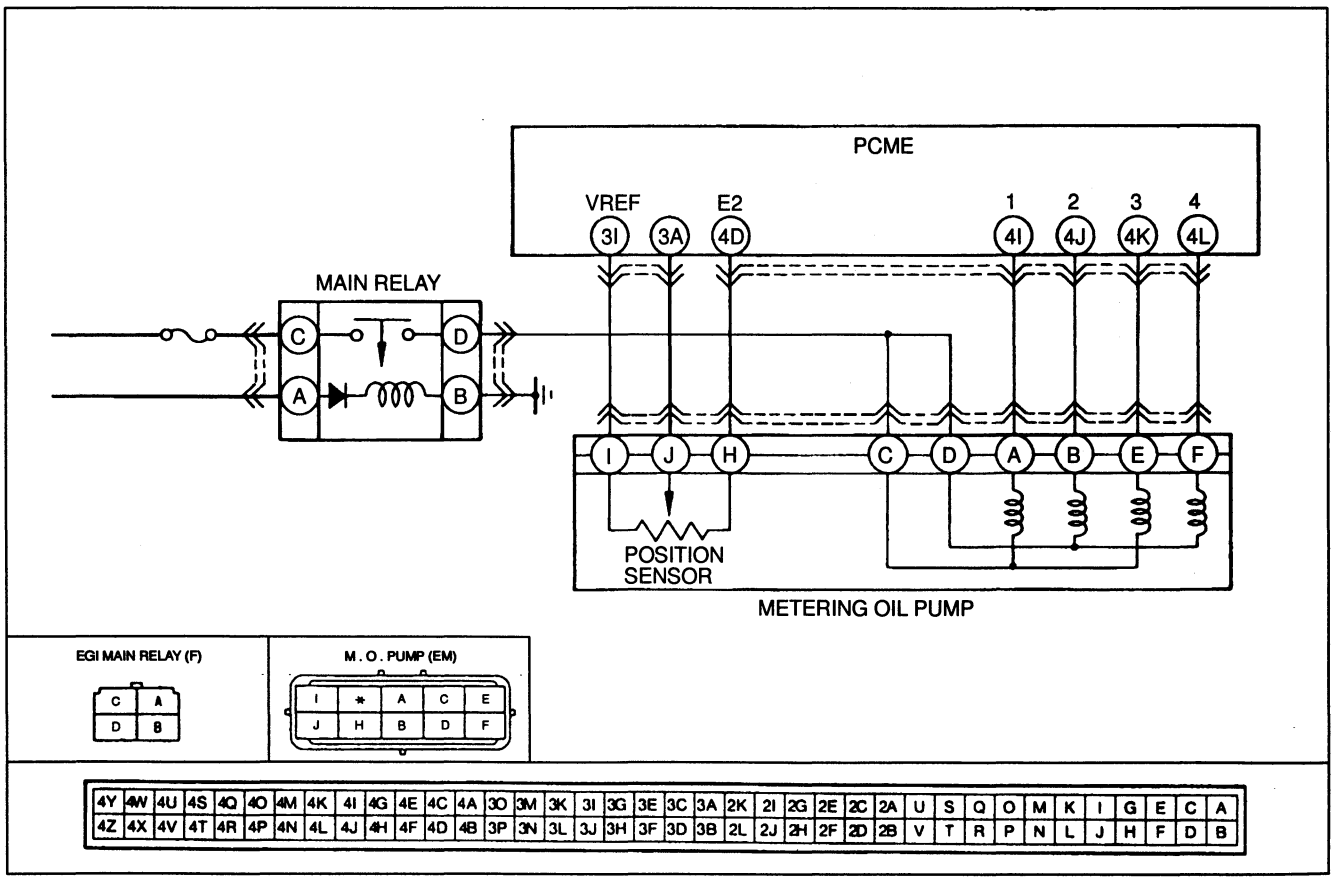
CODE No.	25 (SOLENOID VALVE–PRESSURE REGULATOR CONTROL [PRC])		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector A terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve A terminal–Main relay D terminal)
3	Is there continuity between solenoid valve B terminal and PCME terminal 4M?	Yes	Check for short circuit in wiring harness (Solenoid valve B terminal–PCME terminal 4M) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–176	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



CODE No.	26 (METERING OIL PUMP STEPPING MOTOR)		
STEP	**INSPECTION**		**ACTION**
1	Are there any poor connections at metering oil pump and PCME connector?	Yes	Repair or replace connector
		No	Go to next step
2	Is resistance of MOP stepping motor OK? terminal: C – SM A, C – SM E, D – SM B, D – SM F Resistance {kΩ}: 16–31	Yes	Go to next step
		No	Replace MOP
3	Is continuity between MOP stepping motor and PCME terminals OK?	Yes	Repair wiring harness (MOP-Main relay)
	MOP terminal / PCME terminal: SM A – 41; SM B – 4J; SM E – 4K; SM F – 4L	No	Repair wiring harness (MOP-PCME terminals)
4	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for trouble code Is trouble code displayed?	Yes	Replace PCME
		No	Intermittent poor connection check for cause

Circuit Diagram



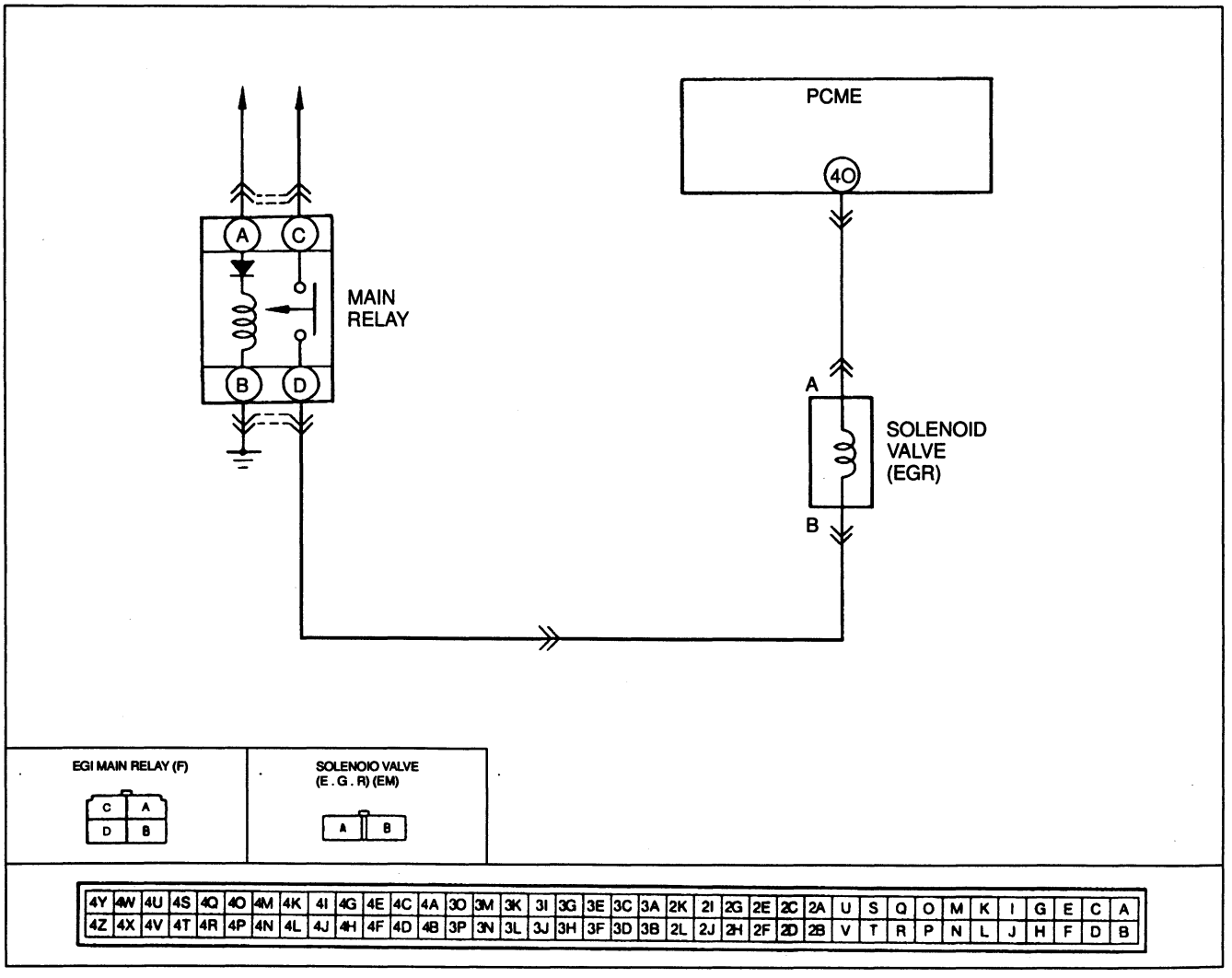
B+: Battery positive voltage

<table>
<tr><th>CODE No.</th><th colspan="3">27 (METERING OIL PUMP)</th></tr>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>1</td><td>Are there any poor connections at metering oil pump and PCME connector?</td><td>Yes</td><td>Repair or replace connector</td></tr>
<tr><td></td><td></td><td>No</td><td>Go to next step</td></tr>
<tr><td>2</td><td>Is PCME terminal 3A voltage OK?
<table><tr><th>Condition</th><th>Voltage</th></tr><tr><td>Idle</td><td>1.1V</td></tr><tr><td>Acceleration</td><td>1.0V–4.2V</td></tr></table></td><td>Yes</td><td>Go to step 4</td></tr>
<tr><td></td><td></td><td>No</td><td>Go to next step</td></tr>
<tr><td>3</td><td>Is resistance of MOP position sensor OK?
Resistance: J–H 0.4–12 kΩ
J–I 10–2 kΩ
H–I 0.4–12 kΩ</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace MOP</td></tr>
<tr><td>4</td><td>Is PCME terminals voltage OK?
Specification: (Idle)
<table><tr><th>Stepping Motor</th><th>PCME terminal</th><th>Output voltage</th></tr><tr><td>SM A</td><td>4I</td><td rowspan="4">One terminal: B+
Three terminals: 5–9 V</td></tr><tr><td>SM B</td><td>4J</td></tr><tr><td>SM E</td><td>4K</td></tr><tr><td>SM F</td><td>4L</td></tr></table></td><td>Yes</td><td>Go to step 7</td></tr>
<tr><td></td><td></td><td>No</td><td>Go to next step</td></tr>
<tr><td>5</td><td>Is resistance of MOP stepping motor OK?
<table><tr><th>terminal</th><th>Resistance { kΩ}</th></tr><tr><td>C – SM A</td><td rowspan="4">16–31</td></tr><tr><td>C – SM E</td></tr><tr><td>D – SM B</td></tr><tr><td>D – SM F</td></tr></table></td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace MOP</td></tr>
<tr><td>6</td><td>Is continuity between MOP stepping motor and PCME terminals OK?
<table><tr><th>MOP terminal</th><th>PCME terminal</th></tr><tr><td>SM A</td><td>4I</td></tr><tr><td>SM B</td><td>4J</td></tr><tr><td>SM E</td><td>4K</td></tr><tr><td>SM F</td><td>4L</td></tr></table></td><td>Yes</td><td>Repair wiring harness (MOP-Main relay)</td></tr>
<tr><td></td><td></td><td>No</td><td>Repair wiring harness (MOP-PCME terminals)</td></tr>
<tr><td>7</td><td>Disconnect negative battery cable for at least 20 seconds
Connect battery cable and recheck for trouble code
Is trouble code displayed?</td><td>Yes</td><td>Replace PCME</td></tr>
<tr><td></td><td></td><td>No</td><td>Intermittent poor connection check for cause</td></tr>
</table>

Circuit Diagram
(Refer to page F–42)

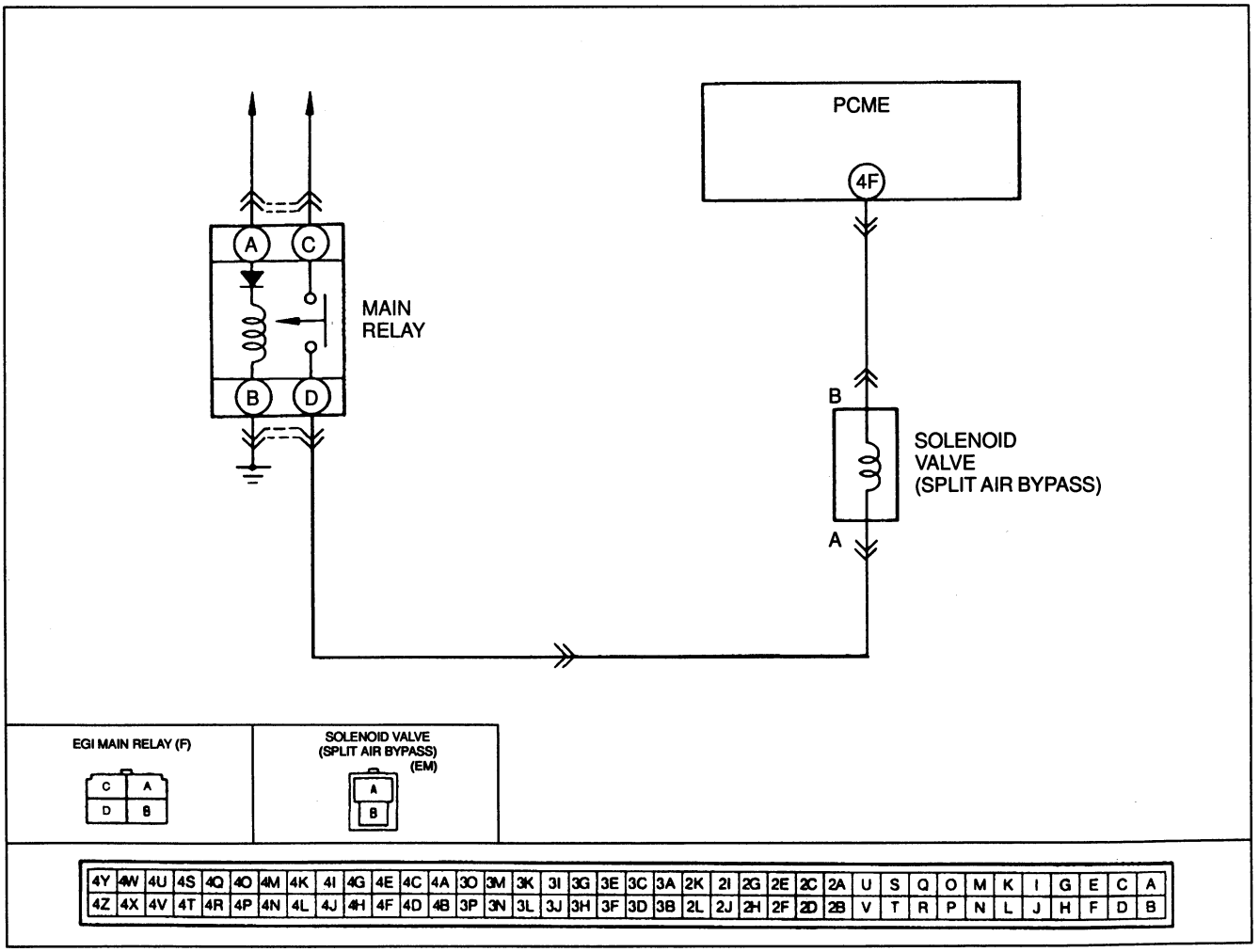
CODE No.	28 (SOLENOID VALVE–EGR)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector B terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve B terminal–Main relay D terminal)
3	Is there Continuity between solenoid valve A terminal and PCME terminal 4O?	Yes	Check for short circuit in wiring harness (Solenoid valve A terminal–PCME terminal 4O) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–176	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



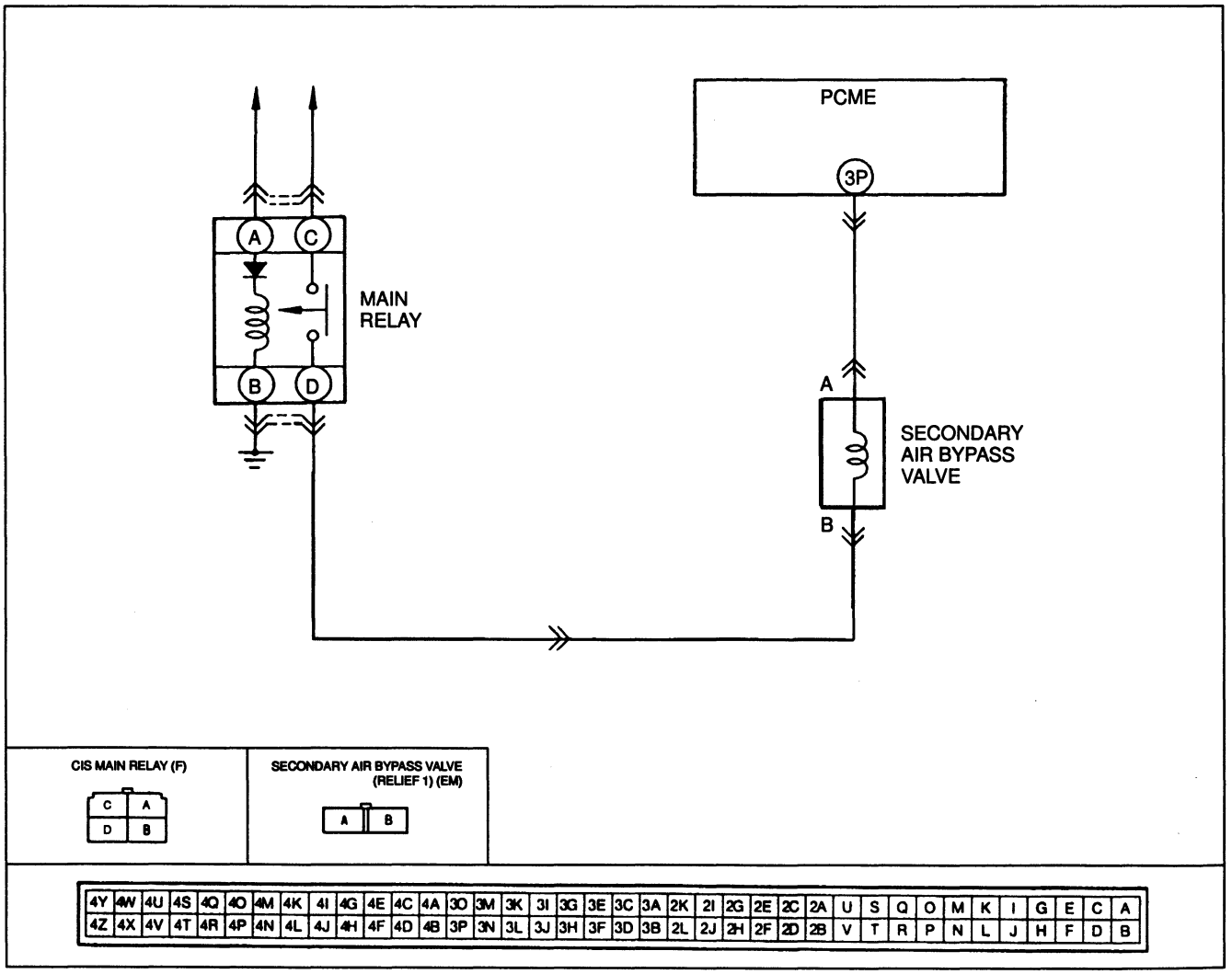
CODE No.	30 (SOLENOID VALVE–SPLIT AIR BYPASS)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector A terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve A terminal–Main relay D terminal)
3	Is there continuity between solenoid valve B terminal and PCME terminal 4F?	Yes	Check for short circuit in wiring harness (Solenoid valve B terminal–PCME terminal 4F) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–120	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



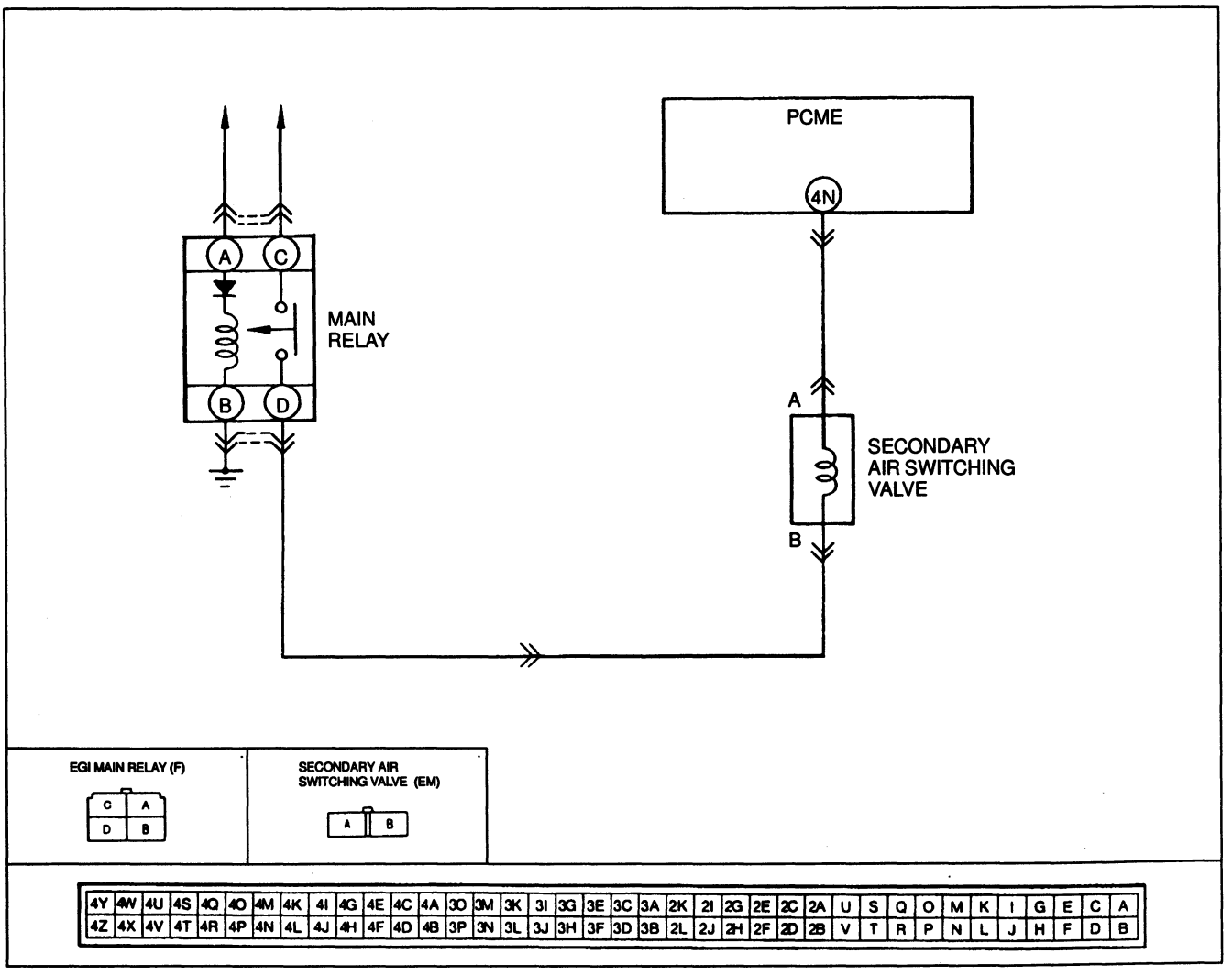
CODE No.	31 (SECONDARY AIR BYPASS VALVE)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector B terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve B terminal–Main relay D terminal)
3	Is there continuity between solenoid valve A terminal and PCME terminal 3P?	Yes	Check for short circuit in wiring harness (Solenoid valve A terminal–PCME terminal 3P) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–123	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



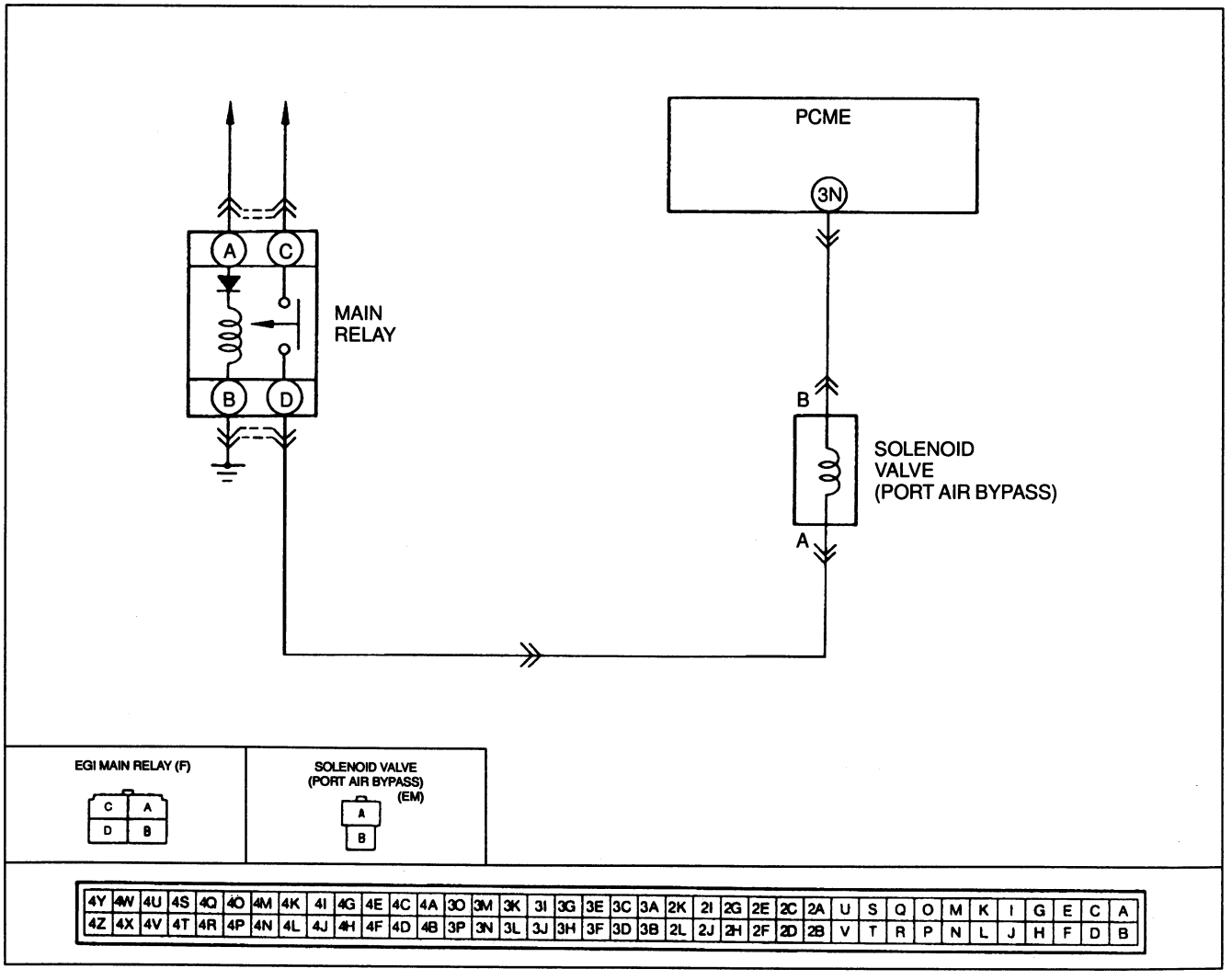
CODE No.	32 (SECONDARY AIR SWITCHING VALVE)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector B terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve B terminal–Main relay D terminal)
3	Is there continuity between solenoid valve A terminal and PCME terminal 4N?	Yes	Check for short circuit in wiring harness (Solenoid valve A terminal–PCME terminal 4N) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–176	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



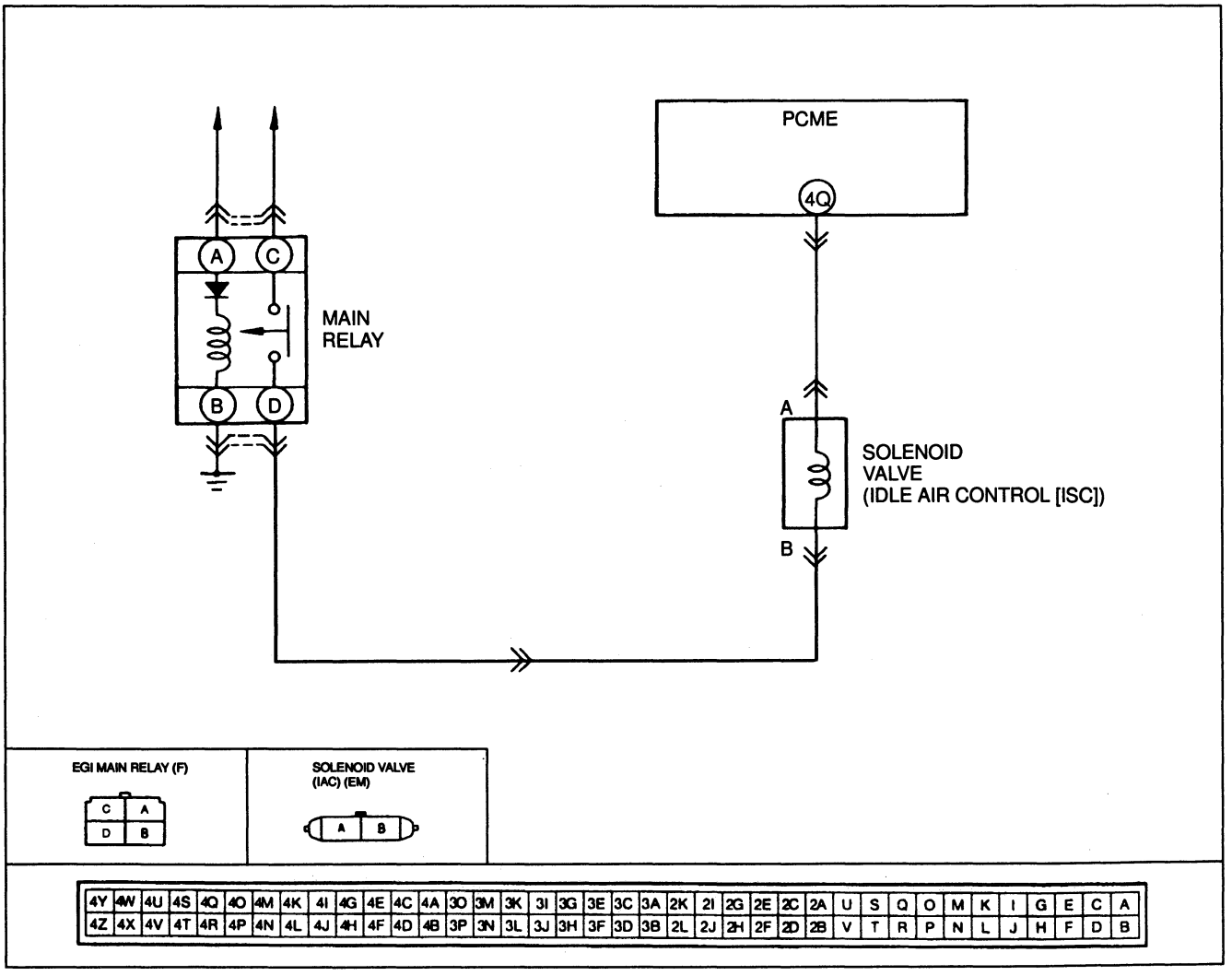
CODE No.	33 (SOLENOID VALVE–PORT AIR BYPASS)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector A terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve A terminal–Main relay D terminal)
3	Is there continuity between solenoid valve B terminal and PCME terminal 3N?	Yes	Check for short circuit in wiring harness (Solenoid valve B terminal–PCME terminal 3N) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–119	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



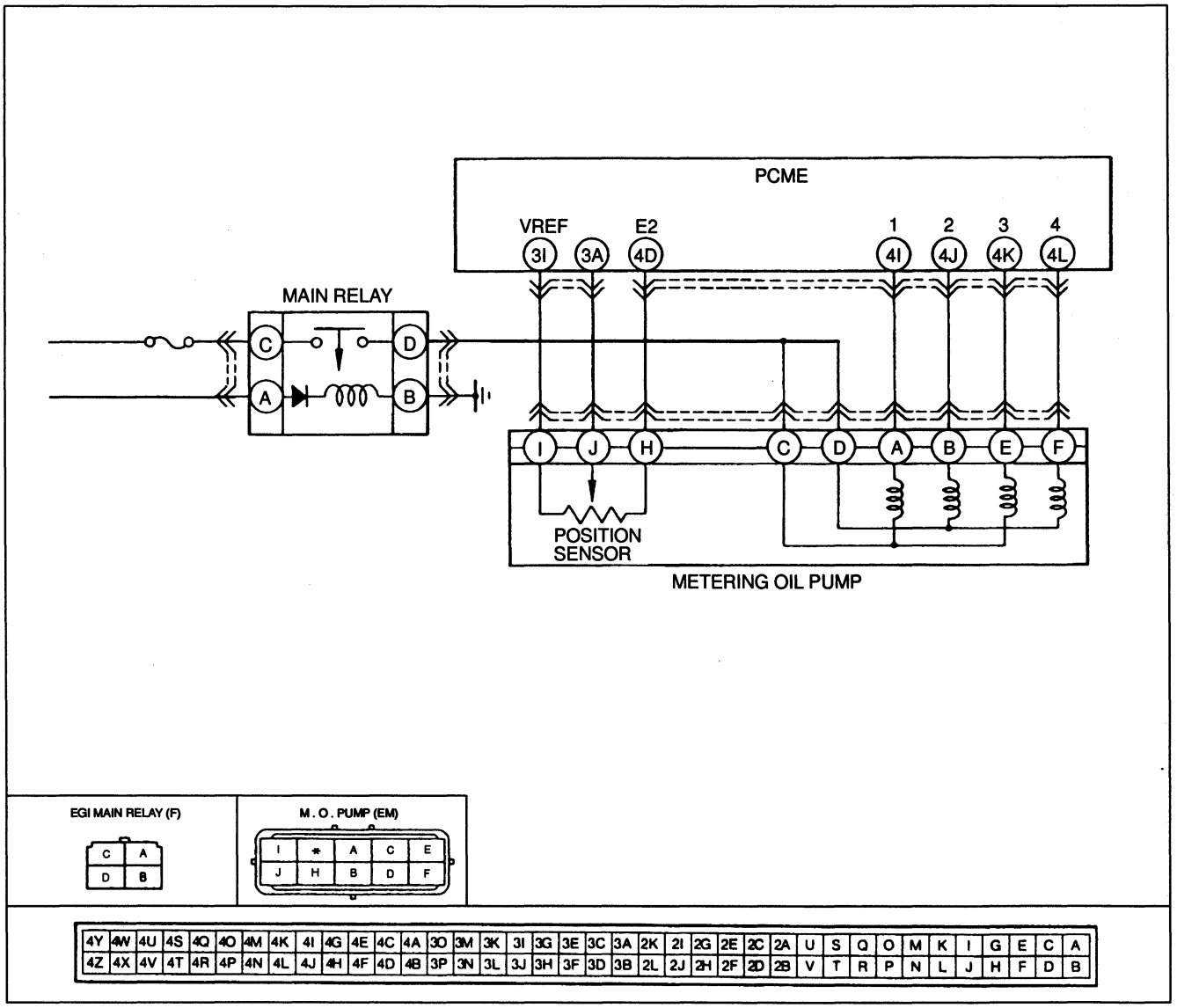
CODE No.	34 (SOLENOID VALVE–IDLE AIR CONTROL)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector B terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve B terminal–Main relay D terminal)
3	Is there continuity between solenoid valve A terminal and PCME terminal 4Q?	Yes	Check for short circuit in wiring harness (Solenoid valve A terminal–PCME terminal 4Q) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–83	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



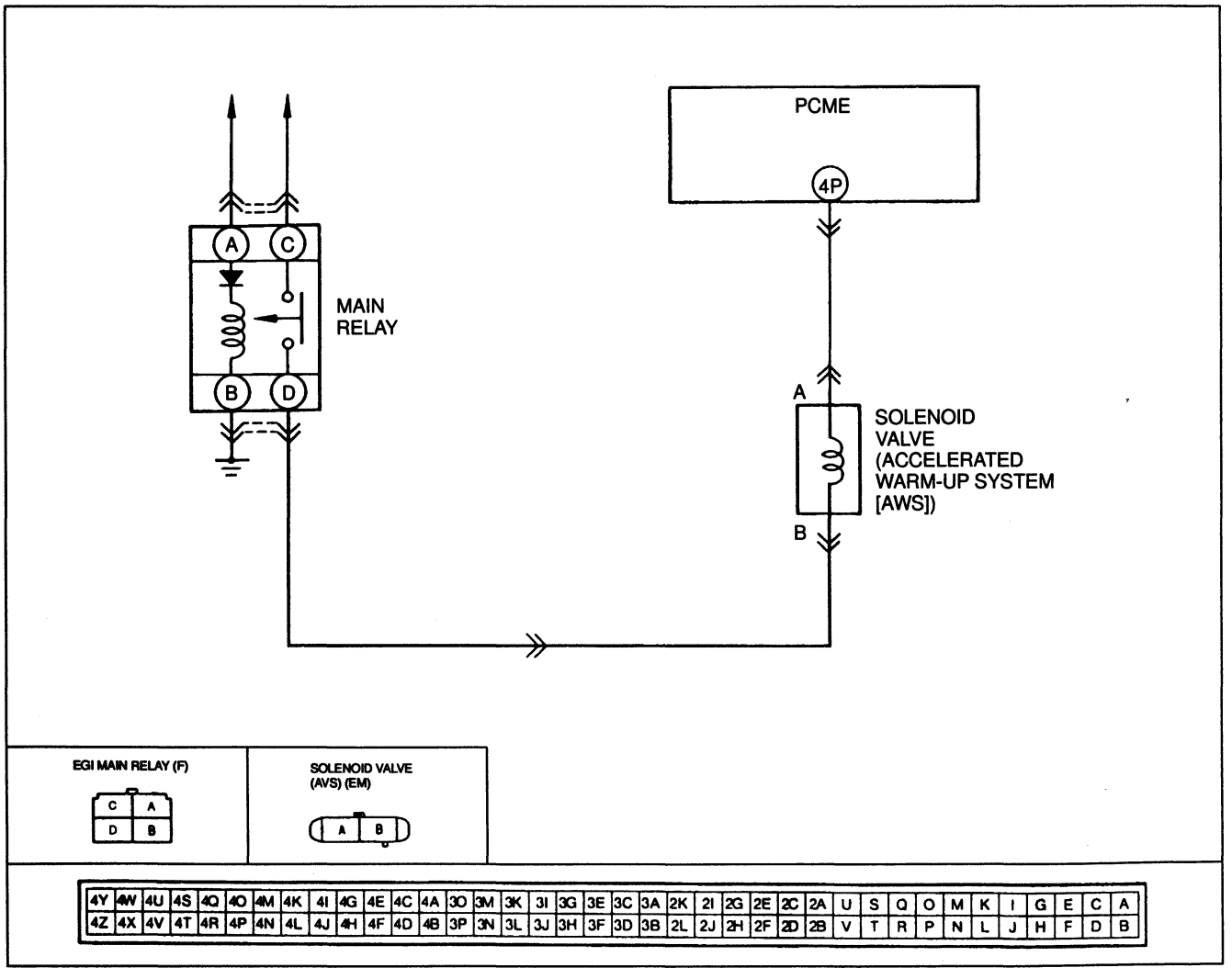
CODE No.	37 (METERING OIL PUMP)		
STEP	INSPECTION		ACTION
1	Is battery positive voltage OK? **Specification: 12–14V (at idle)**	Yes	Go to next step
		No	Repair charging system and/or Battery
2	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for trouble code Is trouble code displayed?	Yes	Replace PCME ☞page F–150
		No	Intermittent poor connection Check for cause

Circuit Diagram



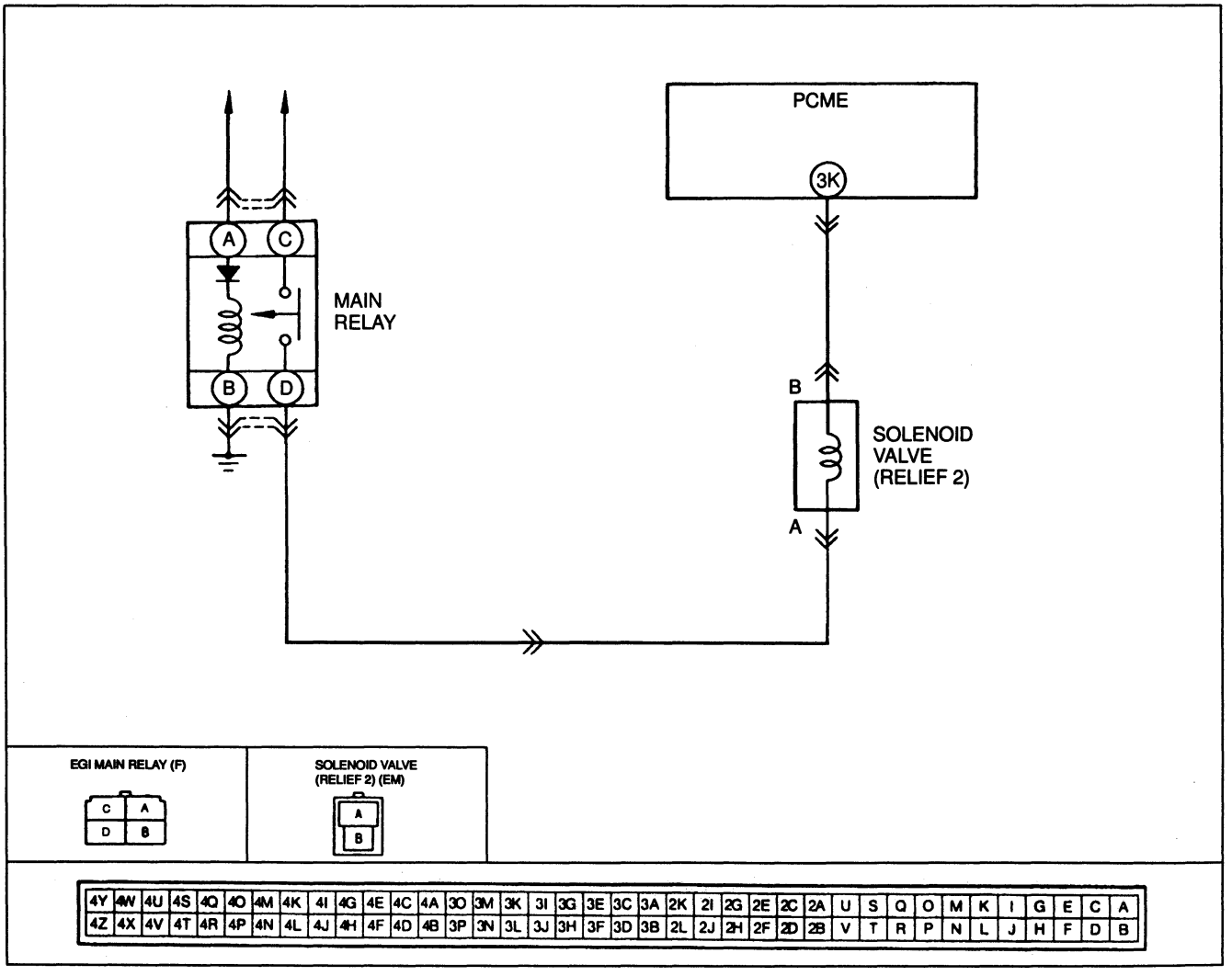
CODE No.	38 (SOLENOID VALVE–ACCELERATED WARM-UP SYSTEM [AWS])		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector B terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve B terminal–Main relay D terminal)
3	Is there continuity between solenoid valve A terminal and PCME terminal 4P?	Yes	Check for short circuit in wiring harness (Solenoid valve A terminal–PCME terminal 4P) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–83	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



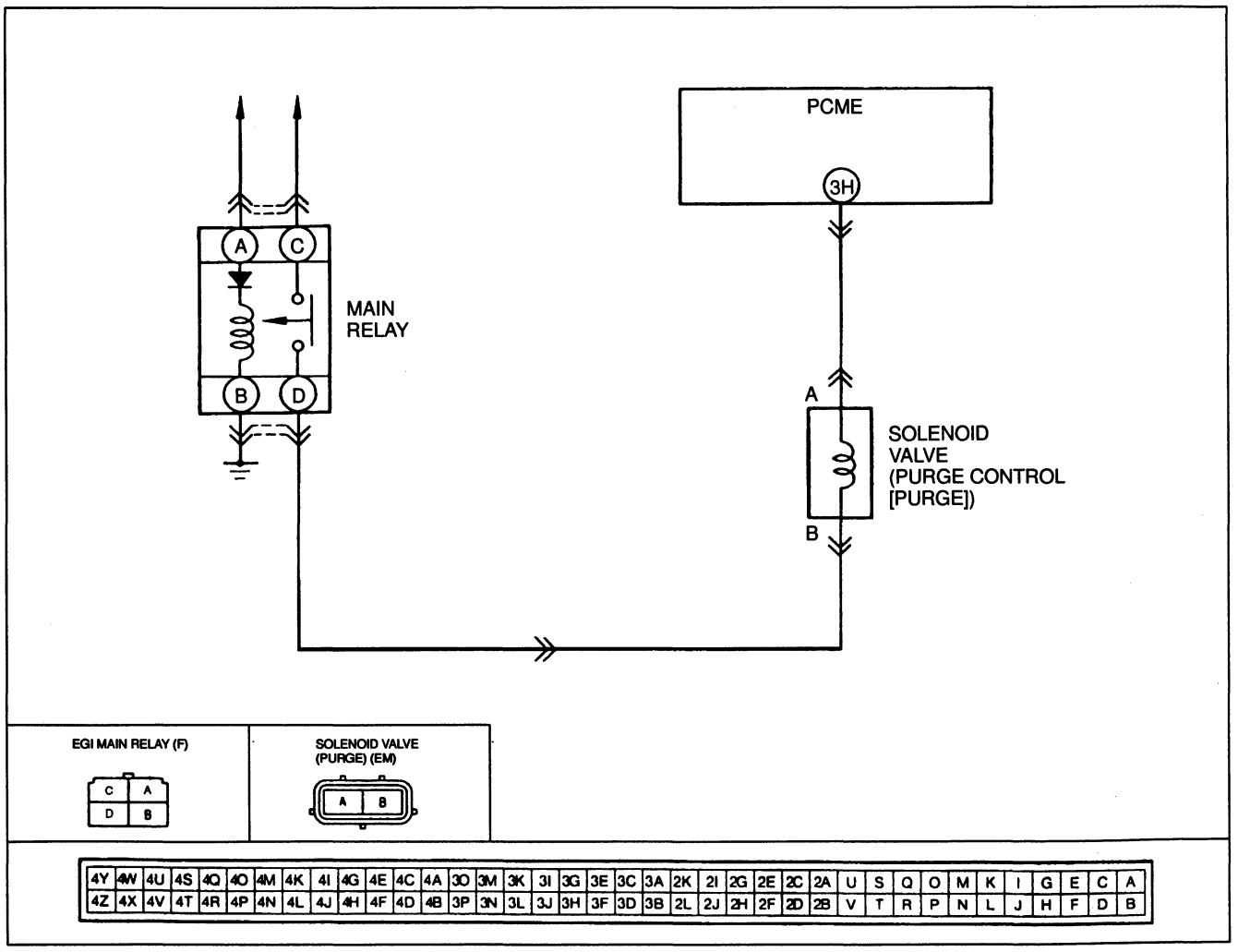
CODE No.	39 (SOLENOID VALVE-RELIEF 2)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector A terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve A terminal–Main relay D terminal)
3	Is there continuity between solenoid valve B terminal and PCME terminal 3K?	Yes	Check for short circuit in wiring harness (Solenoid valve B terminal–PCME terminal 3K) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F-123	Yes	Replace PCME ☞page F-150
		No	Replace solenoid valve

Circuit Diagram



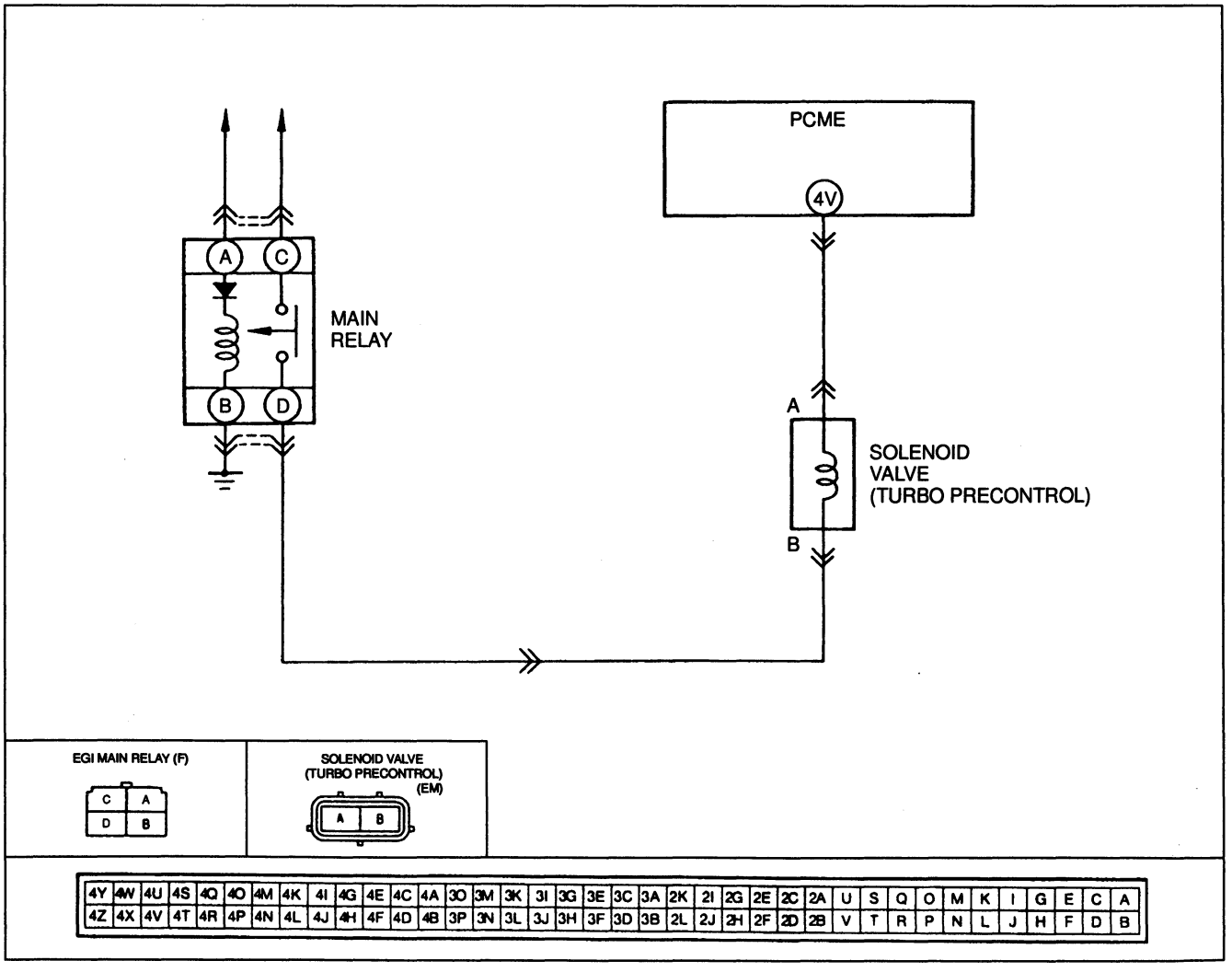
CODE No.	40 (SOLENOID VALVE–PURGE CONTROL [PURGE])		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector B terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve B terminal–Main relay D terminal)
3	Is there continuity between solenoid valve A terminal and PCME terminal 3H?	Yes	Check for short circuit in wiring harness (Solenoid valve A terminal–PCME terminal 3H) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–131	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



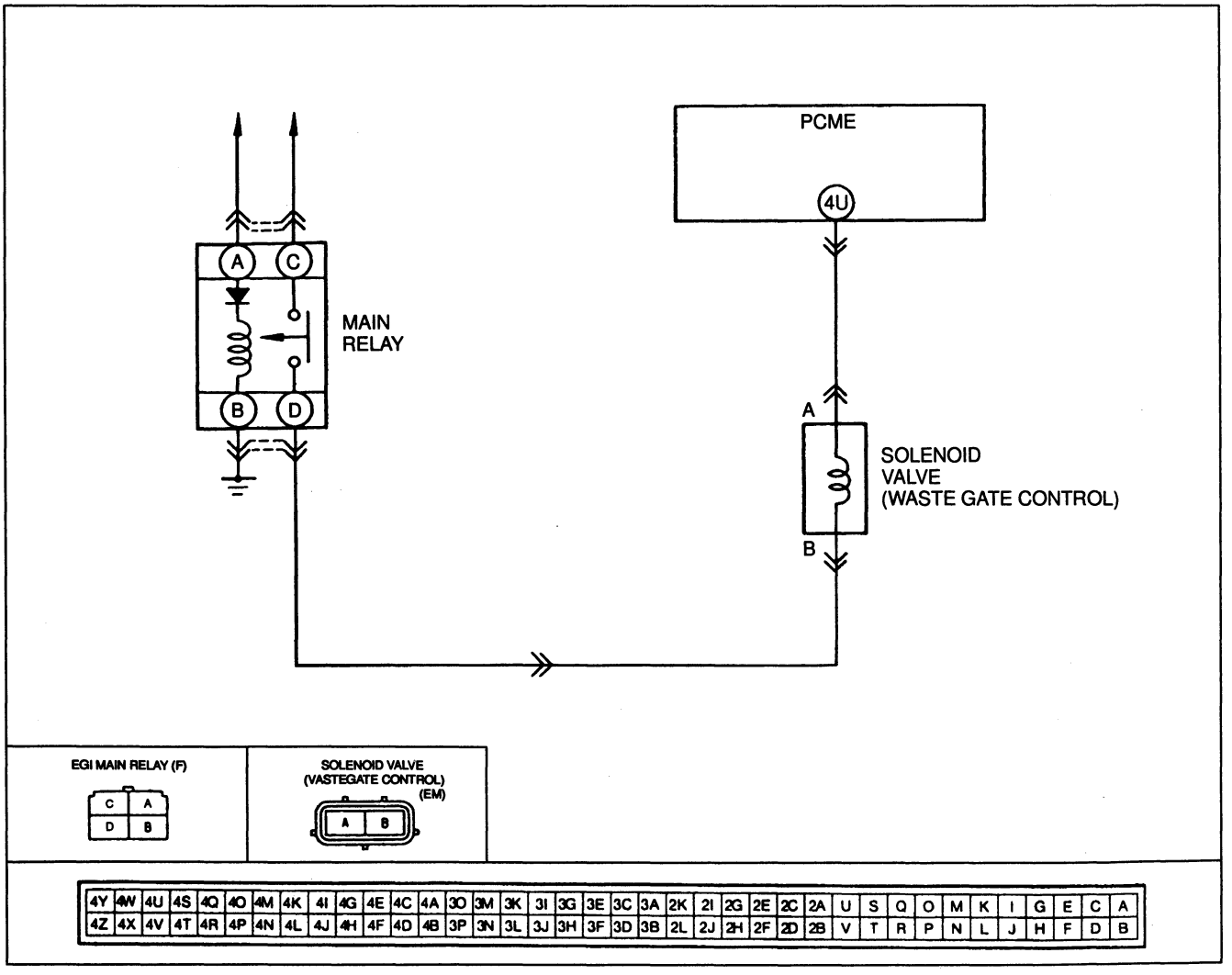
CODE No.	42 (SOLENOID VALVE–TURBO PRECONTROL)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector B terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve B terminal–Main relay D terminal)
3	Is there continuity between solenoid valve A terminal and PCME terminal 4V?	Yes	Check for short circuit in wiring harness (Solenoid valve A terminal–PCME terminal 4V) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–93	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



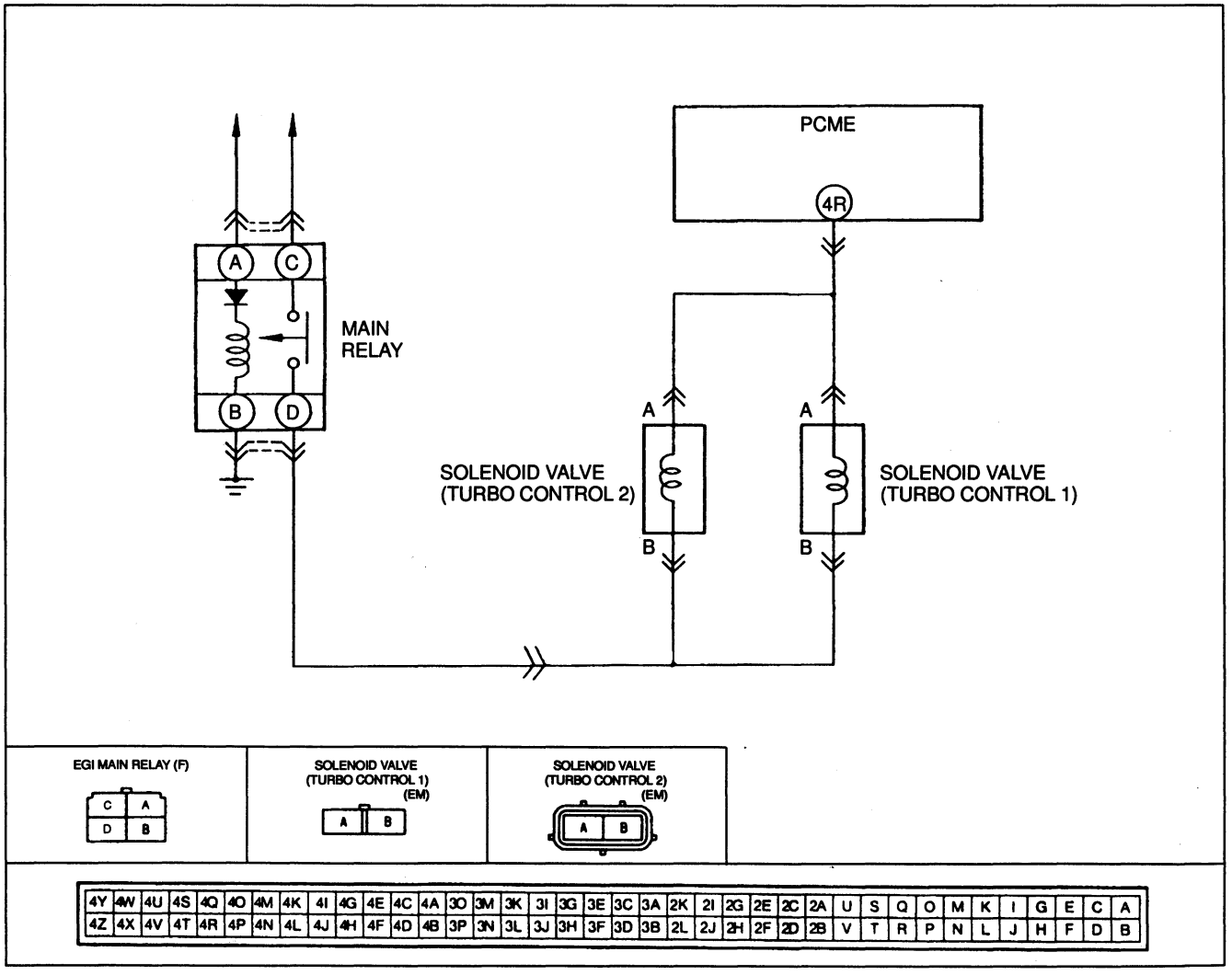
CODE No.	43 (SOLENOID VALVE–WASTEGATE CONTROL)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector B terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve B terminal–Main relay D terminal)
3	Is there continuity between solenoid valve A terminal and PCME terminal 4U?	Yes	Check for short circuit in wiring harness (Solenoid valve A terminal–PCME terminal 4U) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–93	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



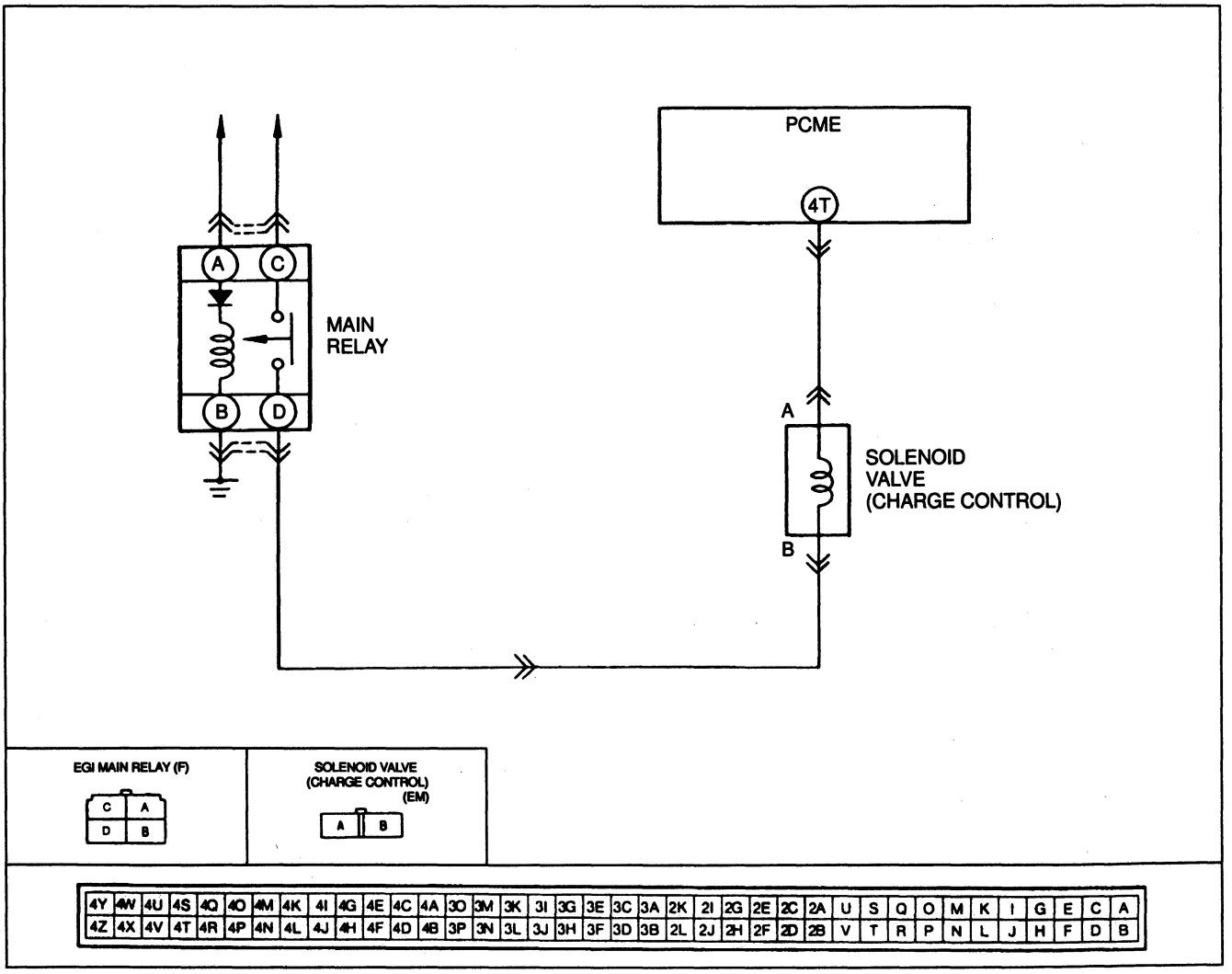
CODE No.	44 (SOLENOID VALVE–TURBO CONTROL)		
STEP	INSPECTION		ACTION
1	Does solenoid valves circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector B terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valves B terminal–Main relay D terminal)
3	Is there continuity between solenoid valves A terminal and PCME terminal 4R?	Yes	Check for short circuit in wiring harness (Solenoid valves A terminal–PCME terminal 4R) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–93	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



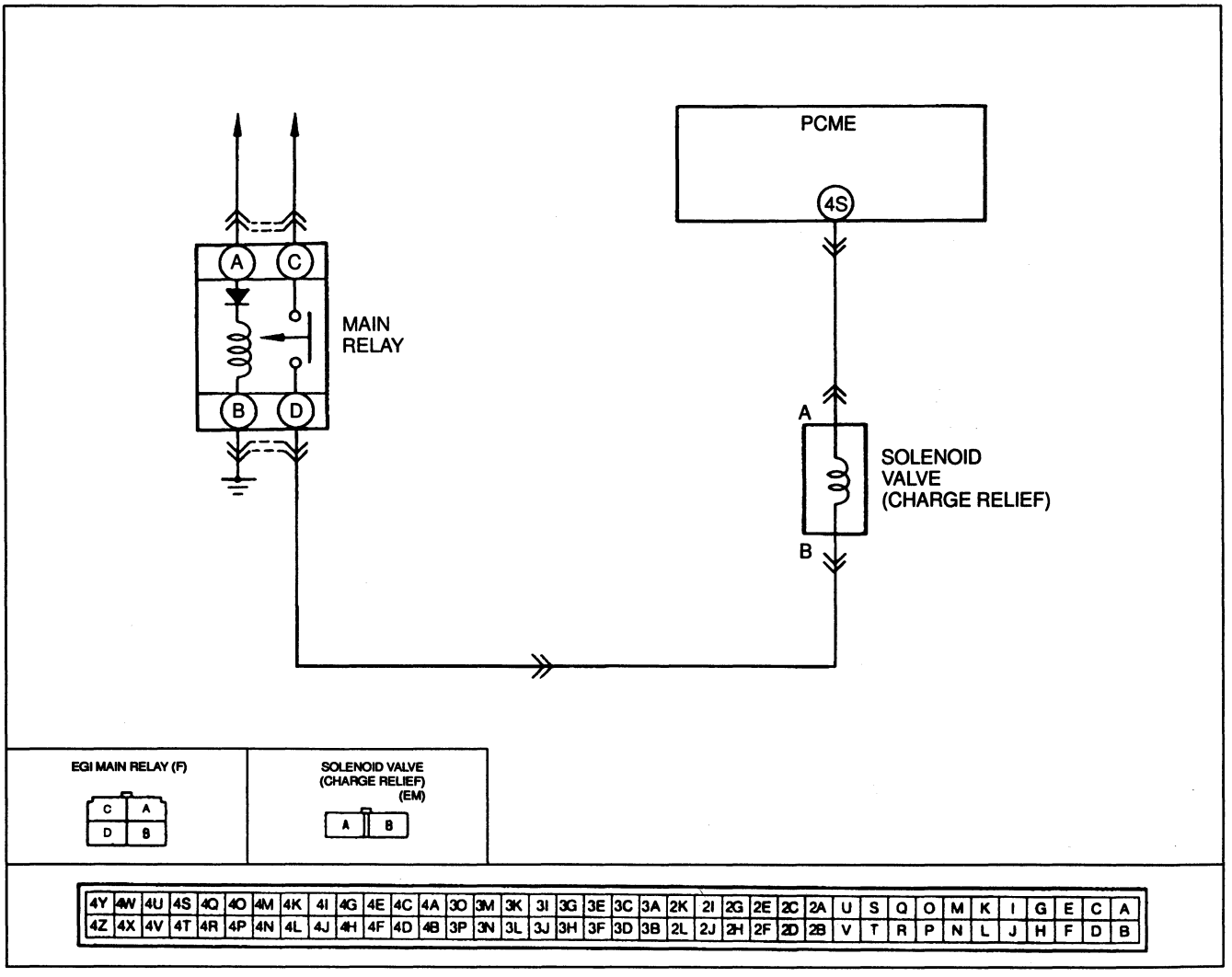
CODE No.	45 (SOLENOID VALVE–CHARGE CONTROL)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector B terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve B terminal–Main relay D terminal)
3	Is there continuity between solenoid valve A terminal and PCME terminal 4T?	Yes	Check for short circuit in wiring harness (Solenoid valve A terminal–PCME terminal 4T) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–176	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



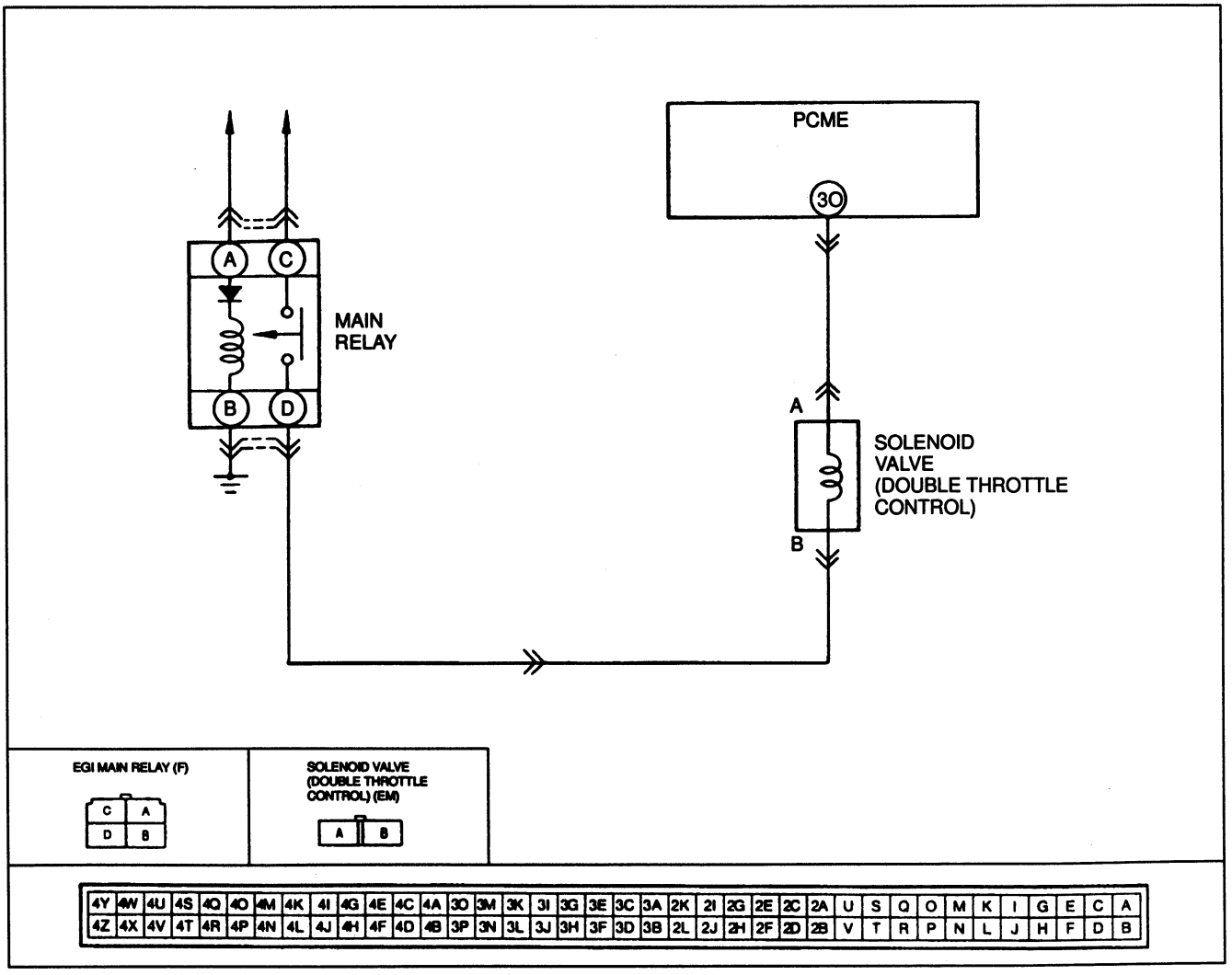
CODE No.	46 (SOLENOID VALVE–CHARGE RELIEF)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector B terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve B terminal–Main relay D terminal)
3	Is there continuity between solenoid valve A terminal and PCME terminal 4S?	Yes	Check for short circuit In wiring harness (Solenoid valve A terminal–PCME terminal 4S) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–176	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



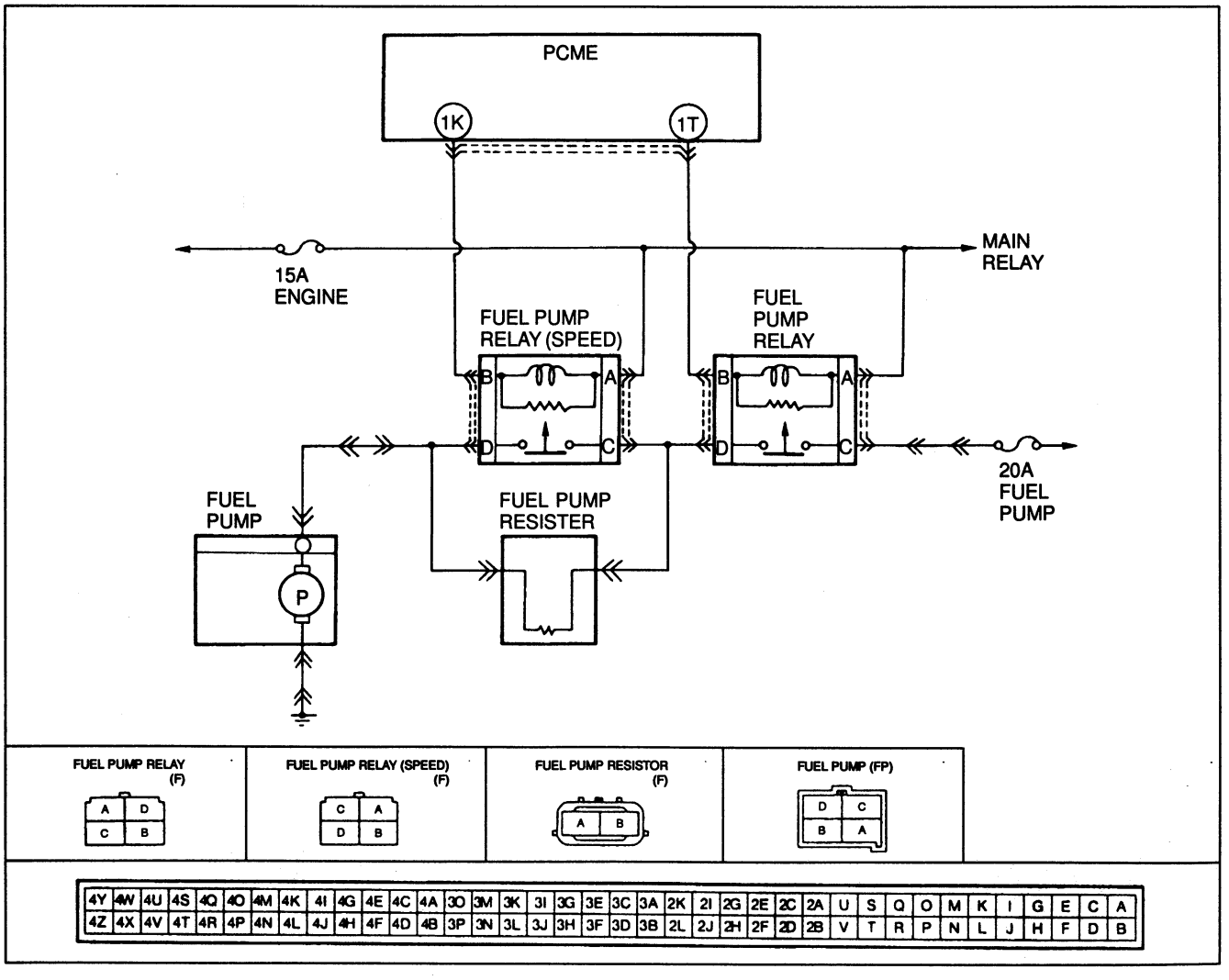
CODE No.	50 (SOLENOID VALVE–DOUBLE THROTTLE CONTROL)		
STEP	INSPECTION		ACTION
1	Does solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector B terminal voltage OK with solenoid valve connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Solenoid valve B terminal–Main relay D terminal)
3	Is there continuity between solenoid valve A terminal and PCME terminal 3O?	Yes	Check for short circuit in wiring harness (Solenoid valve A terminal–PCME terminal 3O) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is solenoid valve OK? ☞page F–176	Yes	Replace PCME ☞page F–150
		No	Replace solenoid valve

Circuit Diagram



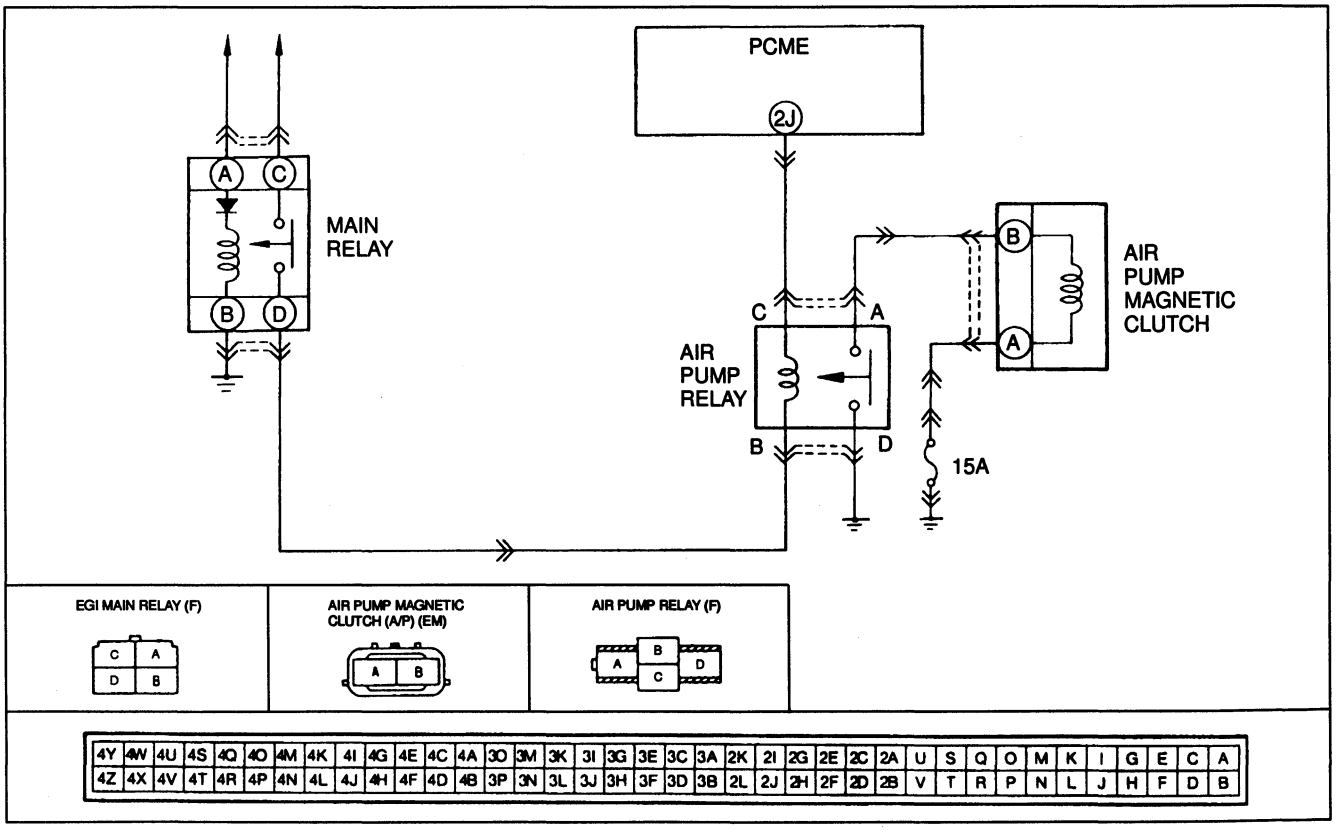
CODE No.	51 (FUEL PUMP RELAY [SPEED])		
STEP	**INSPECTION**		**ACTION**
1	Does fuel pump relay (speed) circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector A terminal voltage OK with fuel pump relay (speed) connector disconnected? **Condition**: Ignition switch ON — **Voltage**: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Fuel pump relay A terminal–Main relay D terminal)
3	Is there Continuity between fuel pump relay (speed) B terminal and PCME terminal 1K?	Yes	Check for short circuit in wiring harness (Fuel pump relay (speed) B terminal–PCME terminal 1K) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is fuel pump relay (speed) OK? ☞page F–110	Yes	Replace PCME ☞page F–150
		No	Replace fuel pump relay (speed)

Circuit Diagram



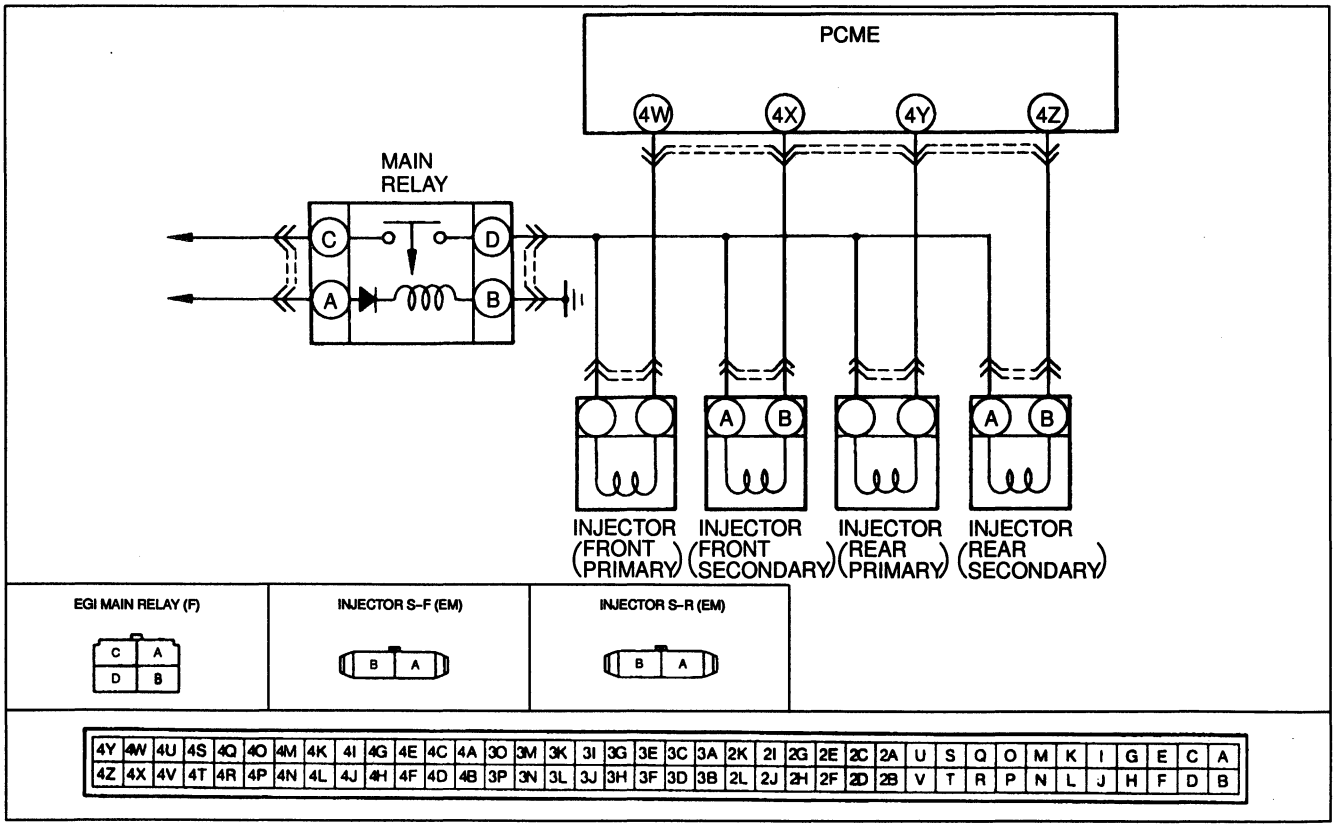
CODE No.	54 (AIR PUMP RELAY)		
STEP	INSPECTION		ACTION
1	Does air pump relay circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector B terminal voltage OK with air pump relay connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Air pump relay B terminal–Main relay D terminal)
3	Is there continuity between air pump relay C terminal and PCME terminal 2J?	Yes	Check for short circuit in wiring harness (Air pump relay C terminal–PCME terminal 2J) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is air pump relay OK? ☞page F-123	Yes	Replace PCME ☞page F-150
		No	Replace air pump relay

Circuit Diagram



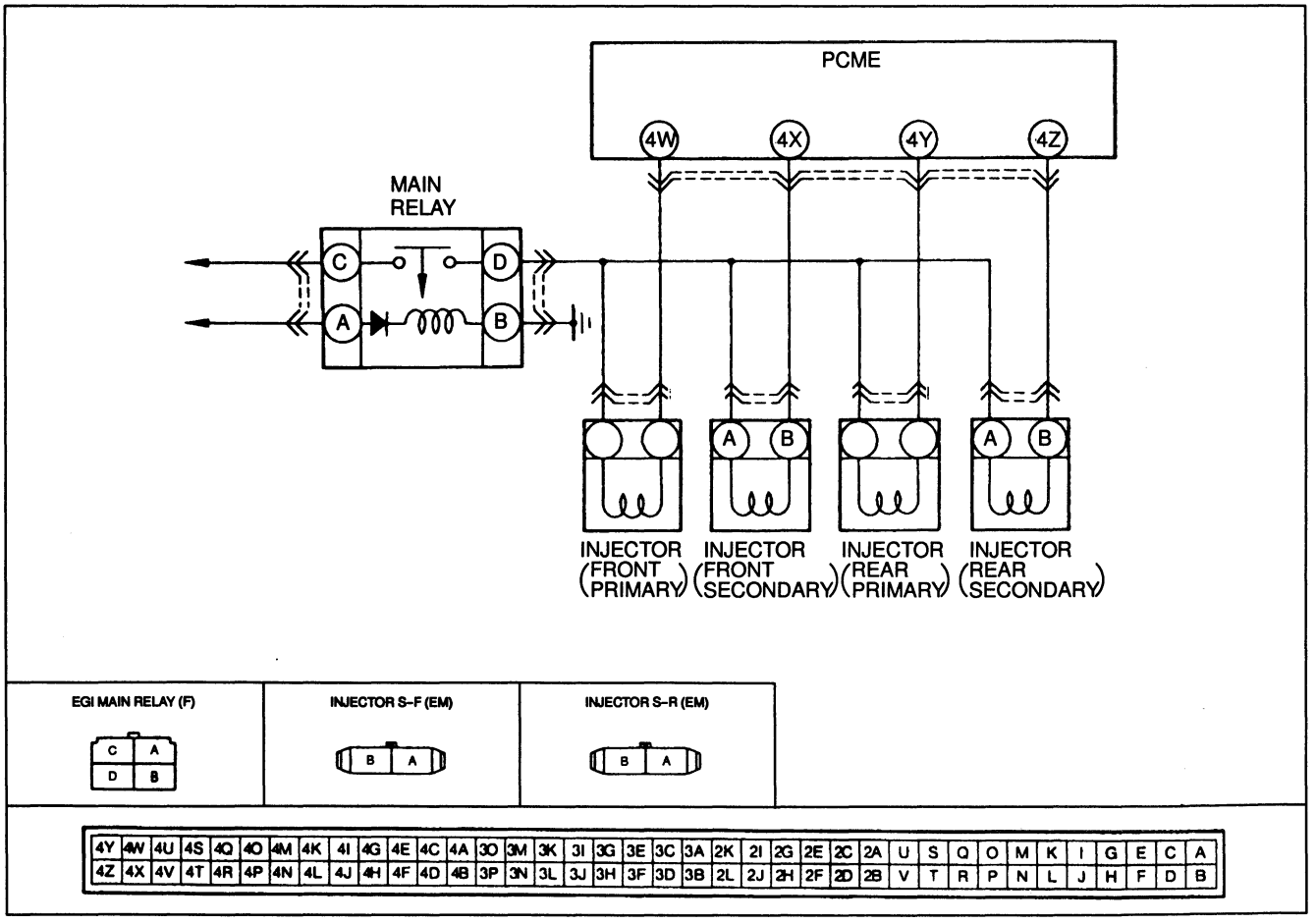
CODE No.	71 (INJECTOR [FRONT SECONDARY])		
STEP	INSPECTION		ACTION
1	Does injector circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector A terminal voltage OK with injector connector disconnected? Condition: Ignition switch ON — Voltage: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Injector A terminal–Main relay D terminal)
3	Is injector resistance OK? **Resistance: 13.5 Ω (20°C [68°F])**	Yes	Go to next step
		No	Replace injector
4	Is there continuity between injector terminal and PCME terminal? Injector terminal: B — PCME: 4X	Yes	Check for short circuit in wiring harness (Injector-PCME) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
5	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for trouble code Is trouble code displayed?	Yes	Replace PCME ☞page F–150
		No	Intermittent poor connection Check for cause

Circuit Diagram



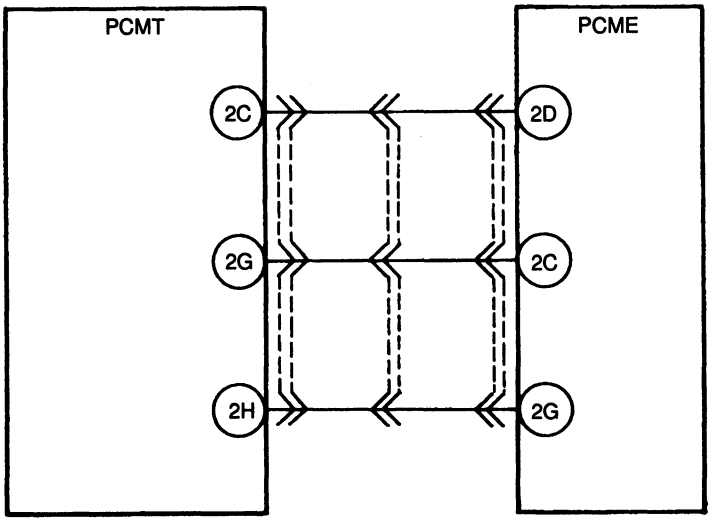
CODE No.	73 (INJECTOR [REAR SECONDARY])		
STEP	**INSPECTION**		**ACTION**
1	Does injector circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector A terminal voltage OK with injector connector disconnected? **Condition**: Ignition switch ON; **Voltage**: Battery positive voltage	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (Injector A terminal-Main relay D terminal)
3	Is injector resistance OK? **Resistance: 13.8 Ω (20°C [68°F])**	Yes	Go to next step
		No	Replace injector
4	Is there continuity between injector terminal and PCME terminal? **Injector terminal**: B; **PCME**: 4Z	Yes	Check for short circuit in wiring harness (Injector-PCME) ⇨ If OK, go to next step ⇨ If not OK, repair wiring harness
		No	Repair wiring harness
5	Disconnect negative battery cable for at least 20 seconds Connect battery cable and recheck for trouble code Is trouble code displayed?	Yes	Replace PCME ☞page F-150
		No	Intermittent poor connection Check for cause

Circuit Diagram



CODE No.	76 (SLIP LOCKUP OFF SIGNAL)		
STEP	INSPECTION		ACTION
1	Is there poor connection in Lockup off signal circuit between PCME and PCMT?	Yes	Repair or replace connector
		No	Go to next step
2	Is there continuity between PCME terminal 2G and PCMT terminal 2H	Yes	Go to next step
		No	Check for open circuit in wiring harness (PCMT-PCME)
3	Is PCMT terminal 2H voltage OK?	Yes	Go to next step
		No	Check for cause ☞page F-156
4	Is PCME terminal 2G voltage OK?	Yes	Replace PCME ☞page F-150
		No	Check for short circuit in wiring harness (PCMT-PCME)

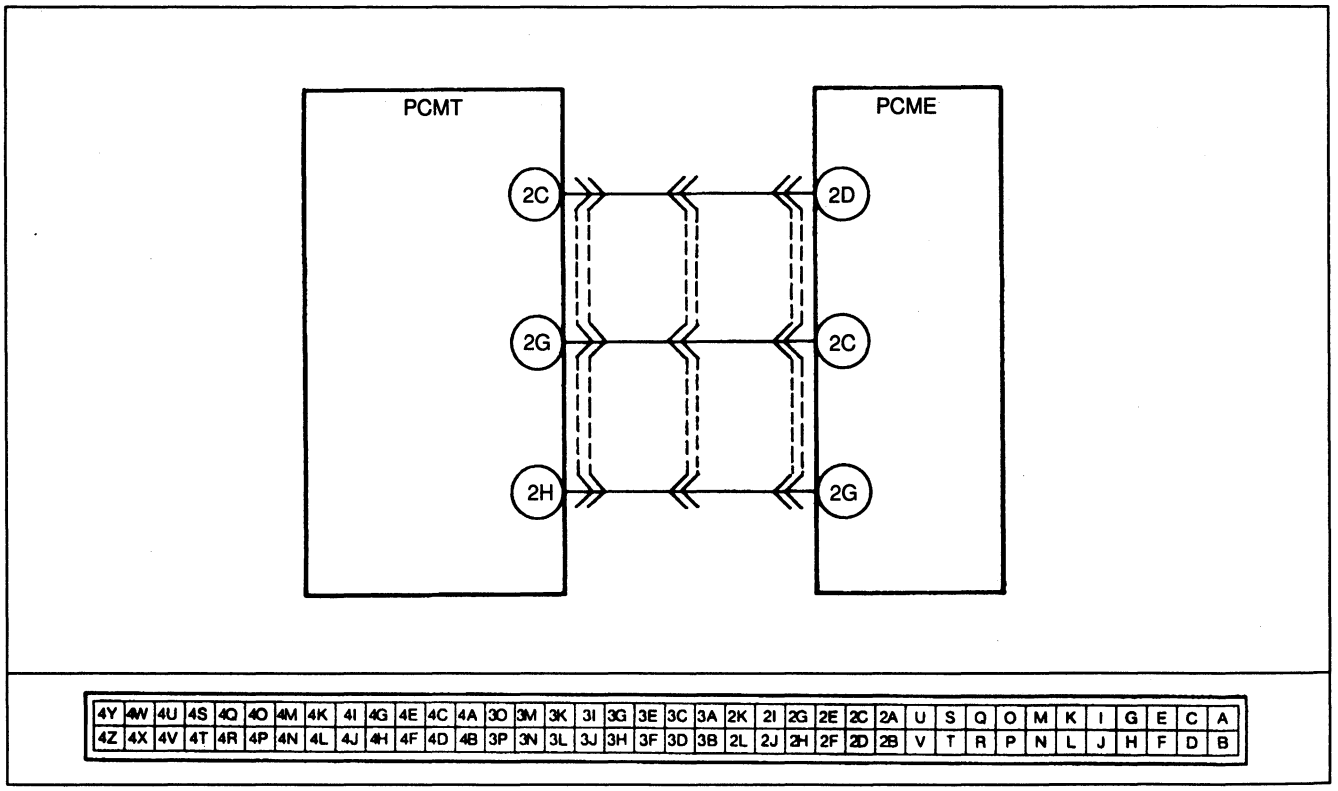
Circuit Diagram

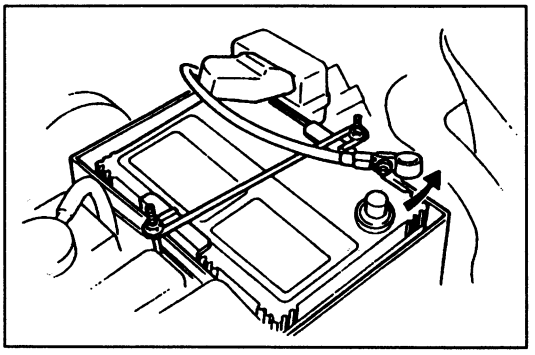


4Y	4W	4U	4S	4Q	4O	4M	4K	4I	4G	4E	4C	4A	3O	3M	3K	3I	3G	3E	3C	3A	2K	2I	2G	2E	2C	2A	U	S	Q	O	M	K	I	G	E	C	A
4Z	4X	4V	4T	4R	4P	4N	4L	4J	4H	4F	4D	4B	3P	3N	3L	3J	3H	3F	3D	3B	2L	2J	2H	2F	2D	2B	V	T	R	P	N	L	J	H	F	D	B

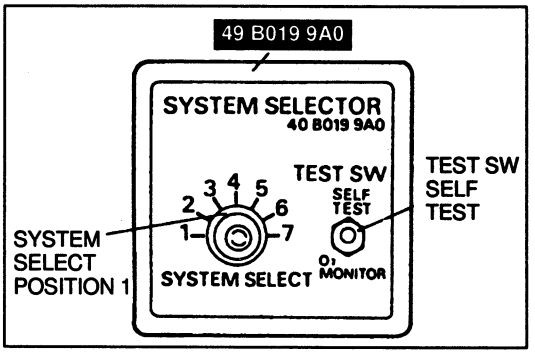
CODE No.	77 (TORQUE REDUCED SIGNAL)		
STEP	INSPECTION		ACTION
1	Is there poor connection in torque reduced signal circuit between PCME and PCMT?	Yes	Repair or replace connector
		No	Go to next step
2	Is there continuity between PCME terminal 2D and PCMT terminal 2C	Yes	Go to next step
		No	Check for open circuit in wiring harness (PCMT-PCME)
3	Is PCMT terminal 2C voltage OK?	Yes	Go to next step
		No	Check for cause ☞page F-156
4	Is PCME terminal 2D voltage OK?	Yes	Replace PCME ☞page F-150
		No	Check for short circuit in wiring harness (PCMT-PCME)

Circuit Diagram

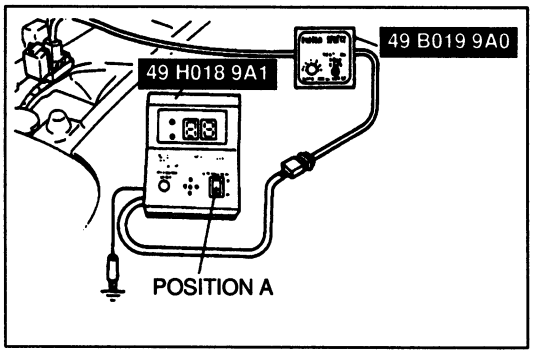




After-repair Procedure
Cancel the memory of trouble code number by disconnecting the negative battery cable for **20 sec** and depress the brake pedal. Reconnect the negative battery cable.



Self-Diagnosis Checker
1. Connect the **SST** (System Selector) to the data link connector.
2. Set system select to position 1.
3. Set the test switch to SELF TEST.



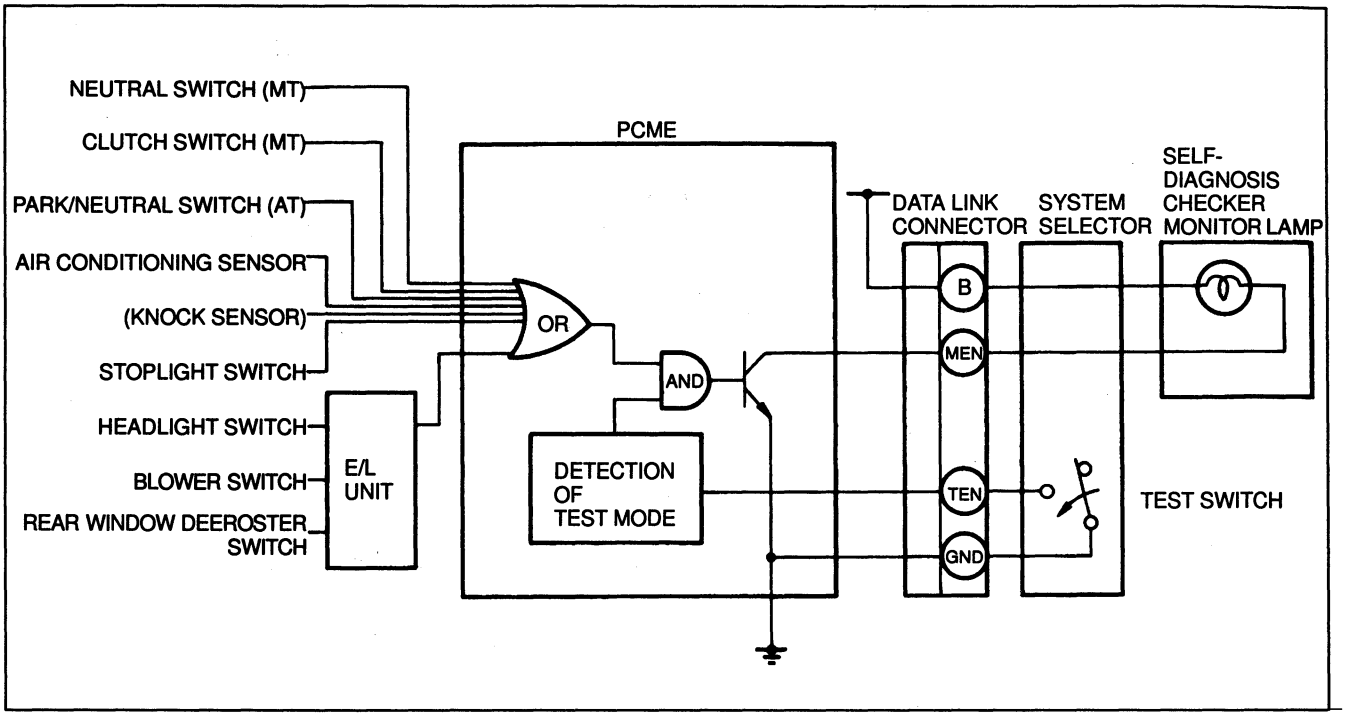
4. Connect the **SST** (Self-Diagnosis Checker) to the System Selector and a ground.
5. Set the select switch of the Self-Diagnosis Checker to position A.
6. Turn the ignition switch ON.
7. Verify that no trouble code numbers are displayed.

SWITCH MONITOR FUNCTION

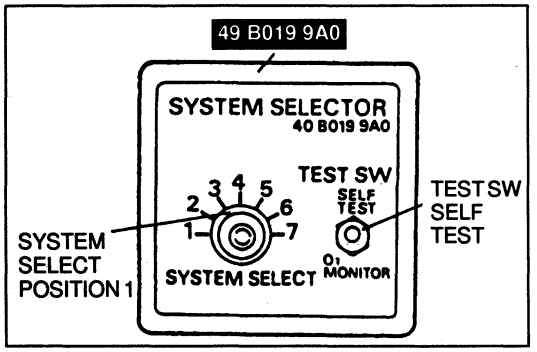
Individual switches can be inspected by the **SST** (Self-Diagnosis Checker)

Preparation

The TEN terminal of the data link connector must be grounded and the ignition switch turned to ON (engine off). If any switch remains activated, the monitor lamp will be illuminated.

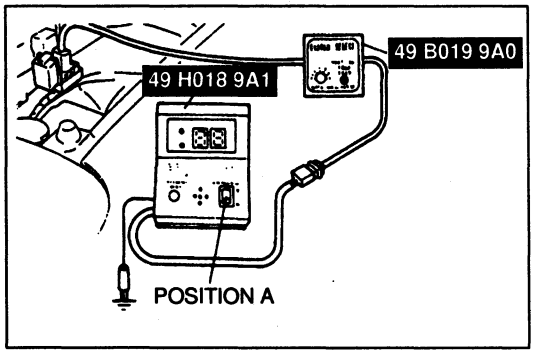


Switch	Self-Diagnosis Checker (Monitor lamp)		Remarks
	Lamp ON	Lamp OFF	
Clutch switch (MT)	Pedal depressed	Pedal released	In neutral
Neutral switch (MT)	In gear	Neutral	Clutch pedal released
Park/neutral switch (AT)	L, S, D or R range	N or P range	—
Headlight switch	ON	OFF	Headlight switch I or II position
Blower switch	ON	OFF	At 3rd or 4th position
Rear window defroster switch	ON	OFF	—
Air conditioning sensor	ON	OFF	Blower switch at 1st or 2nd position
Stoplight switch	Pedal depressed	Pedal released	—



Inspection Procedure
Self-Diagnosis Checker

1. Connect the **SST** (System Selector) to the data link connector.
2. Set system select to position 1.
3. Set TEST SW to SELF-TEST.



4. Connect the **SST** (Self-Diagnosis Checker) to the System Selector and a ground.
5. Set the select switch of the Self-Diagnosis Checker to position A.
6. Turn the ignition switch ON.
7. Check if the Monitor Lamp illuminates when each switch is made to function as described.

Caution

- **If either switch remains activated, the monitor lamp will be illuminated.**
- **Do not start the engine.**

Procedure

Set conditions to deactivate each switch
- All accessories OFF
- Transmission in neutral
- All pedals released

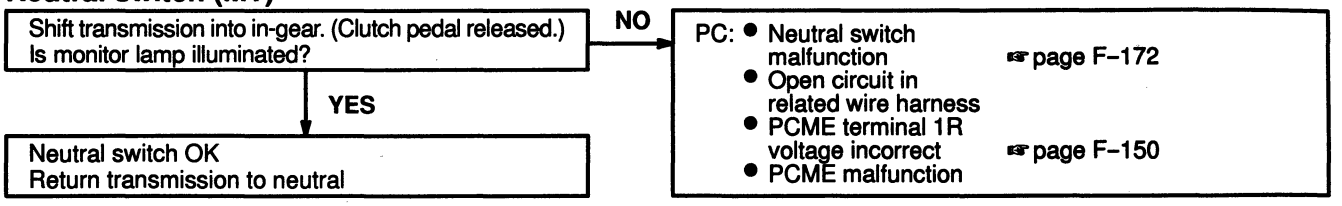
Is monitor lamp illuminated?

YES → Check each switch and related wire harness

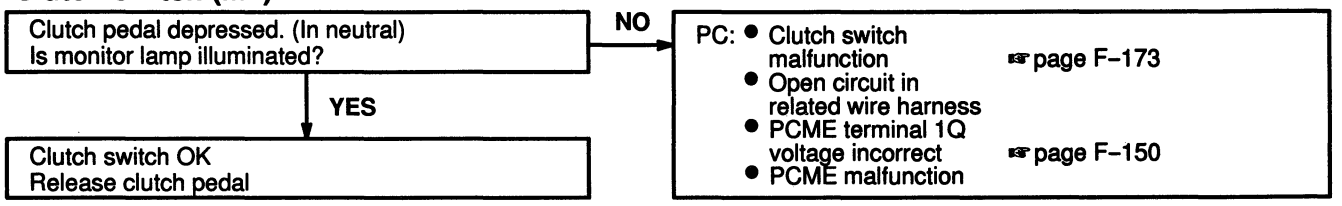
- Clutch switch ☞page F-173
- Neutral switch ☞page F-172
- Headlight switch ☞1994 RX-7 Body electrical troubleshooting manual
- Rear window defroster switch ☞1994 RX-7 Body electrical troubleshooting manual
- Blower switch ☞1994 RX-7 Body electrical troubleshooting manual
- Air conditioning sensor ☞1994 RX-7 Body electrical troubleshooting manual
- Position switch ☞1994 RX-7 Body electrical troubleshooting manual

NO → Check each switch as described

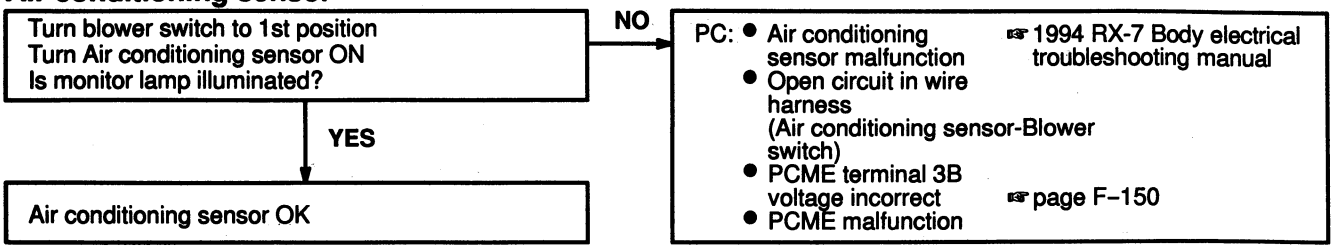
Neutral switch (MT)



Clutch switch (MT)



Air conditioning sensor



Rear window defroster switch

Turn rear window defroster switch ON
Is monitor lamp illuminated?

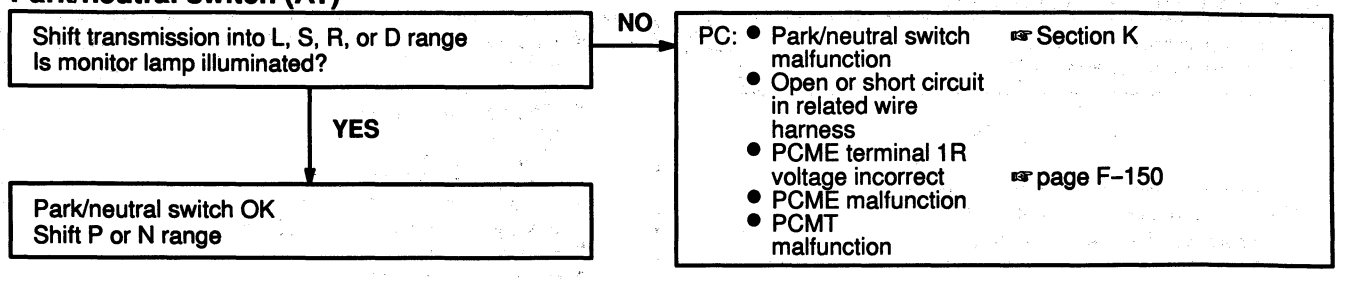
NO →

PC:
- Rear window defroster switch malfunction — ☞ 1994 RX-7 Body electrical troubleshooting manual
- Open circuit in wire harness (Rear window defroster switch-PCME)
- PCME terminal 3B voltage incorrect — ☞ page F-150
- PCME malfunction
- E/L unit malfunction

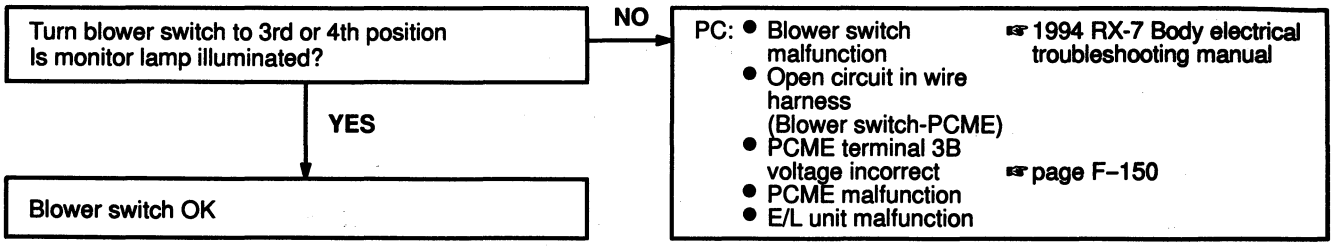
YES ↓

Rear window defroster switch OK
Turn rear window defroster switch OFF

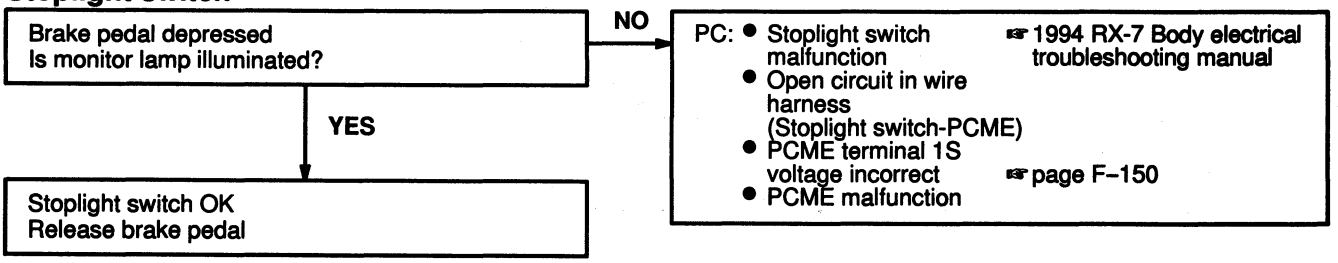
Park/neutral switch (AT)



Blower switch



Stoplight switch



OXYGEN SENSOR MONITOR FUNCTION

Engine Signal Monitor

With the **SST** see to O_2 Monitor, the oxygen sensor is monitored by the Self-Diagnosis Checker as described.

Condition		Item monitored	Function
Engine	System selector switch		
Vehicle running	O_2 monitor	Oxygen sensor output signal	Oxygen sensor output more than 0.45 V Monitor lamp: Flashes

KNOCK SENSOR MONITOR FUNCTION

With the System selector set to Engine Signal Monitor. SELF-TEST the knock sensor is monitored by the Self-Diagnosis Checker as described below.

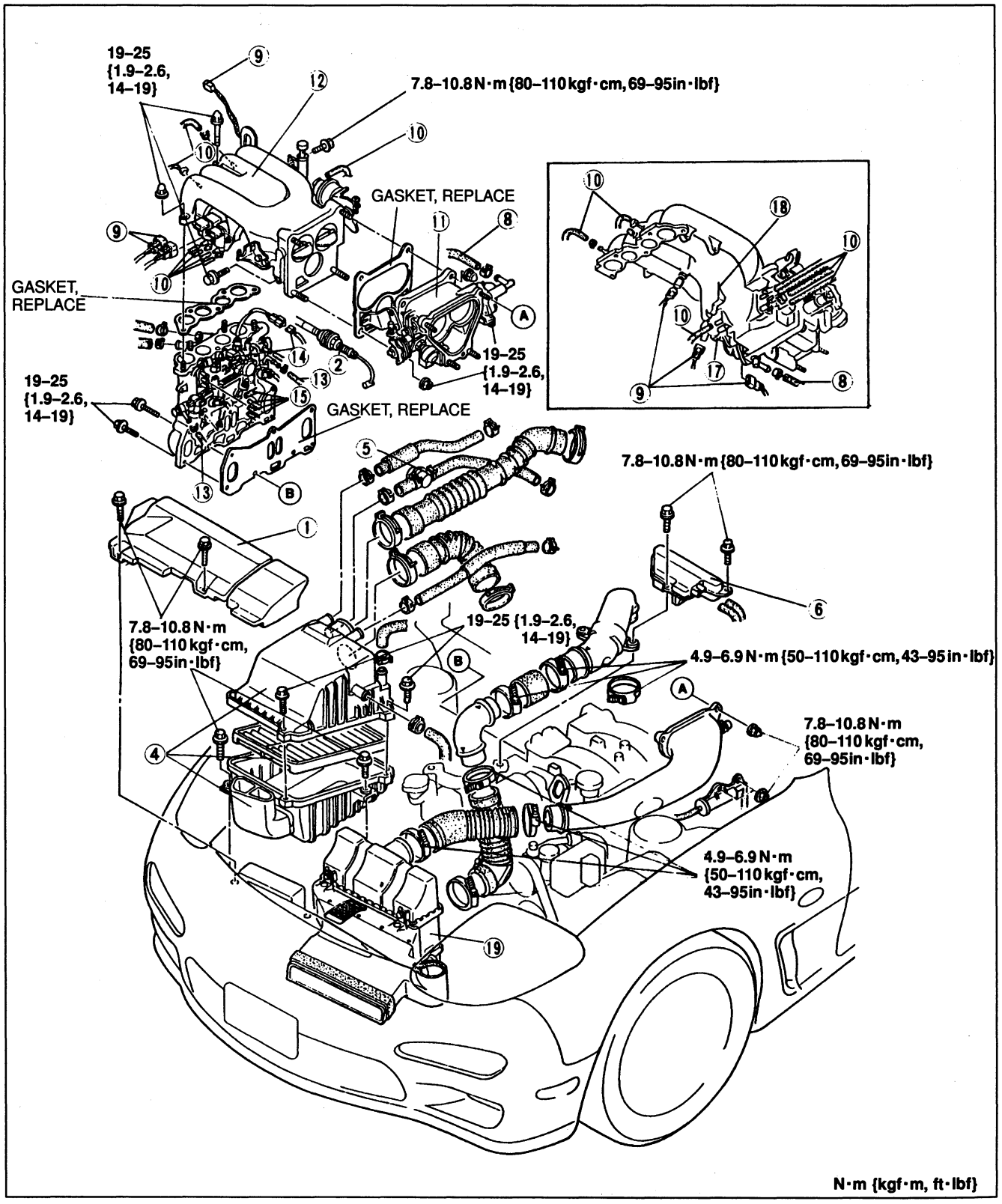
Item monitored	Condition			Function
	Test	Ignition switch	System selector switch	
Knock sensor output signal	Tap the engine hanger lightly with hammer	ON	SELF-TEST	Monitor lamp: Flashes

INTAKE AIR SYSTEM

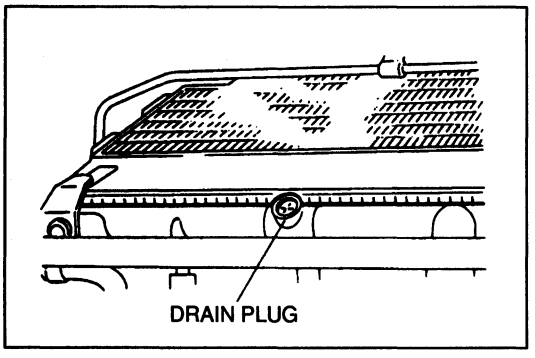
COMPONENT PARTS

Removal / Inspection / Installation

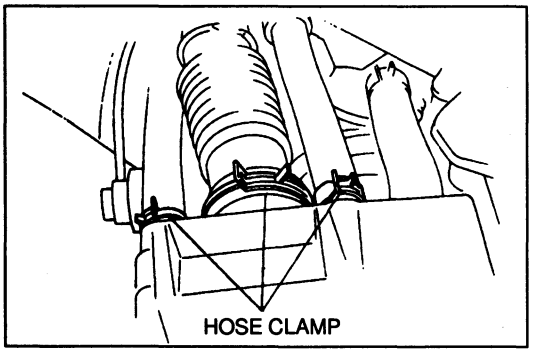
1. Remove in the order shown in the figure, reffering to **Removal Note**. (Refer to page F-77.)
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, reffering to **Installation Note**. (Refer to page F-77.)



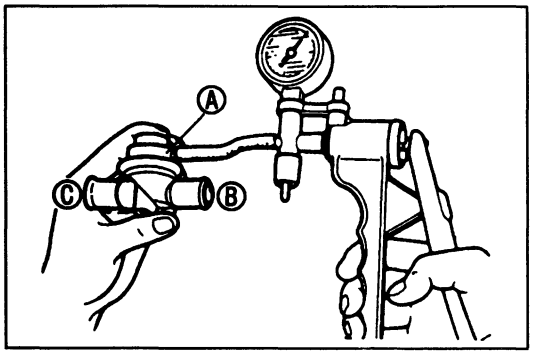
1. Fresh air duct
   Inspect for damage and cracks
2. Accelerator cable
3. Air intake hose
   Inspect for damage
4. Air cleaner housing
   Inspection ..... page F-16
5. Air bypass valve
   Inspection ..... page F-77
6. Pressure chamber
7. Air intake pipe
   Inspect for damage and cracks
8. Water hose
9. Connector
10. Vacuum hose
11. Throttle body
    Inspection ..... page F-79
12. Extension manifold
    Inspection ..... page F-79
13. Fuel hose
14. Connector
15. Vacuum hose
16. Intake manifold
    Inspection ..... page F-79
17. Idle air control valve
    Inspection ..... page F-83
18. Solenoid valve (AWS)
    Inspection ..... page F-83
19. Charge air cooler
    Removal / Inspection / Installation ..... page F-78



Removal Note
1. Loosen the drain plug and radiator cap and drain the coolant from radiator.
2. Remove the water hose from the throtlle body.
3. After installation of the throttle body, refill the radiator. (Refer to section E.)



Installation Note
Install the air intake hose clamp and hose same place as shown in the figure.



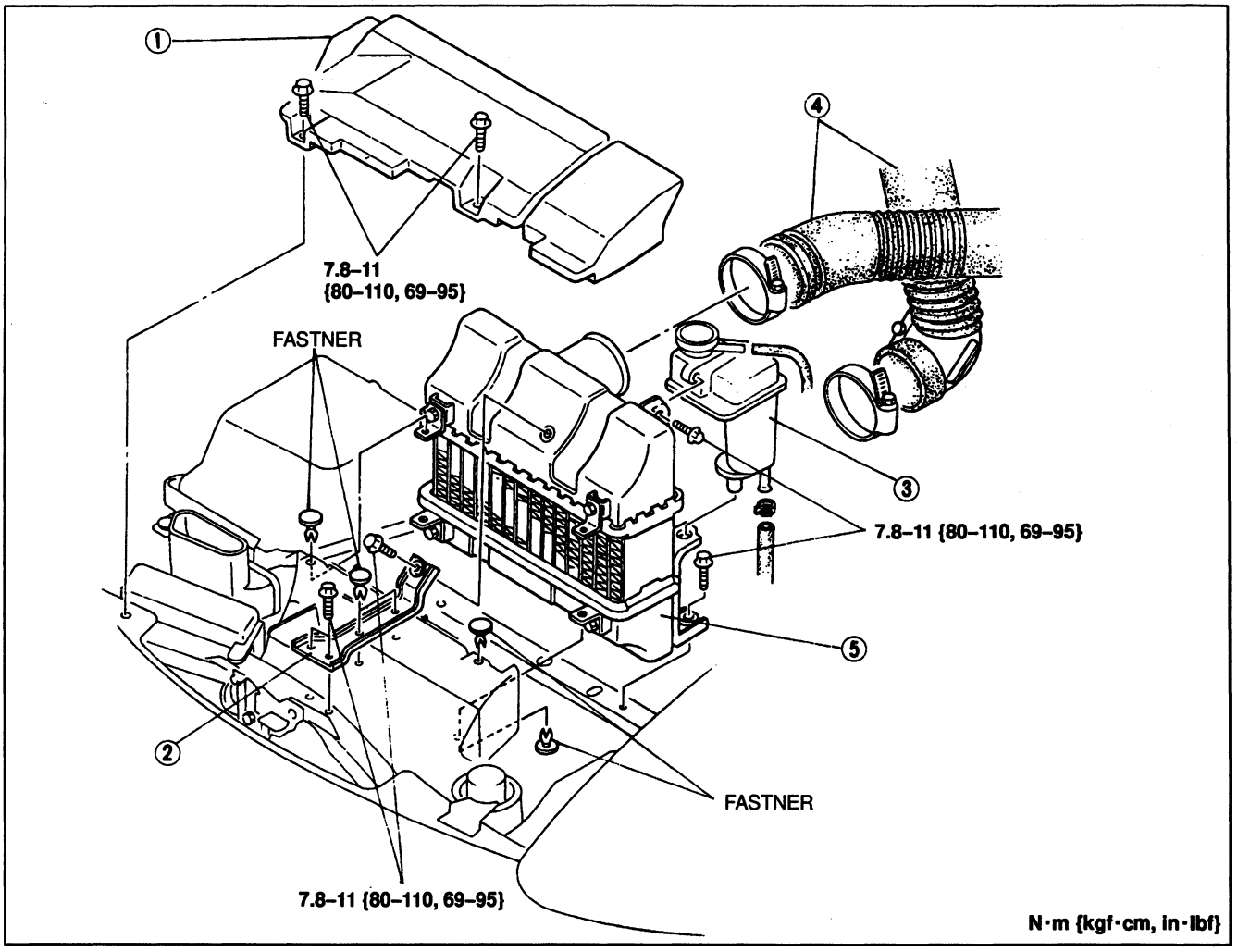
AIR BYPASS VALVE
Inspection
1. Remove the air bypass valve.
2. Connect a vaccum pump to the air bypass valve port A.
3. Check the operation of the air bypass valve.

Apply approx. 14–22 kPa {100–170 mmHg, 3.9–6.7 inHg}	Air flow
Apply approx. 31.3 kPa {235 mmHg, 9.2 inHg}	Fully open

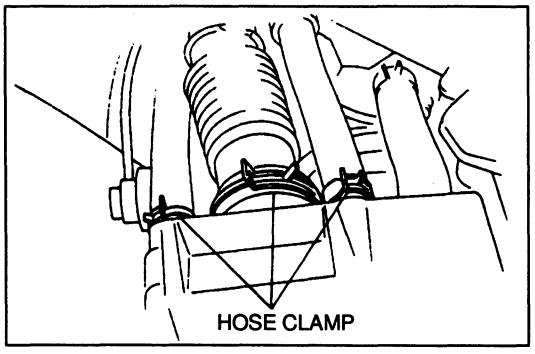
CHARGE AIR COOLER

Removal / Inspection / Installation

1. Remove in the order shown in the figure.
2. Inspect the charge air cooler visually and repair or replace if necessary.
3. Install in the reverse order of removal, reffering to **Installation Note**.

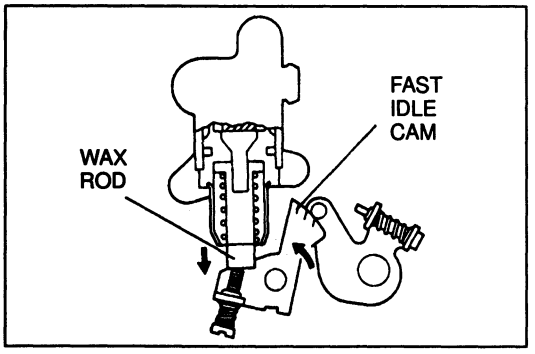


1. Fresh air duct
2. Charge air cooler braket
3. Air separation tank
4. Air hose
5. Charge air cooler



Installation Note

Install the air intake hose and hose clamp same place as shown in the figure.

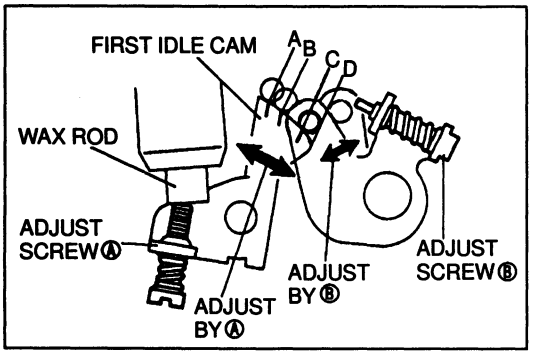


THROTTLE BODY

Inspection

Fast idle cam

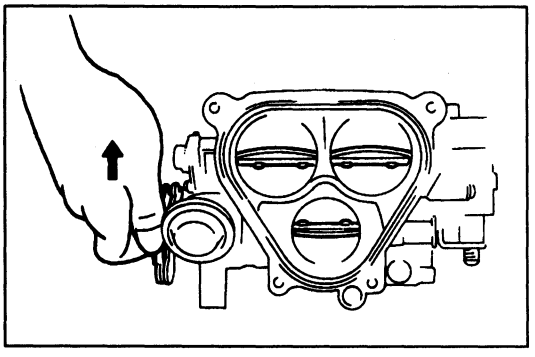
1. Verify that the indicated mark on the fast idle cam is aligned with the center of the cam.
2. Warm up the engine to operating temperature and verify that the waxrod extends outuard fully and the idle cam separates from the roller at 55–65°C {131–149°F}.
3. Adjust the adjust screws if necessary.



Adjustment

1. To adjust the first idle cam separates point D turn adjust screw B.
2. To adjust the first idle cam opening temperature turn adjust screw A.

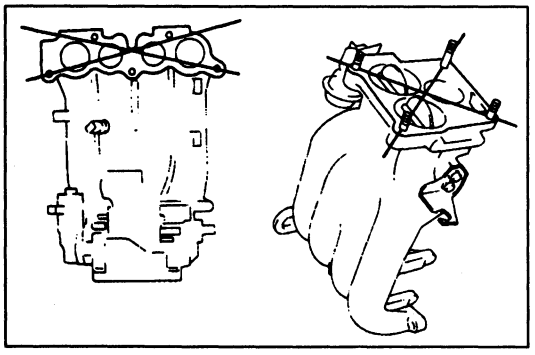
Temperature	Position
-20°C {-4°F}	A
0°C {32°F}	B
25°C {77°F}	C
60°C {140°F}	D



Double throttle valve

Inspection

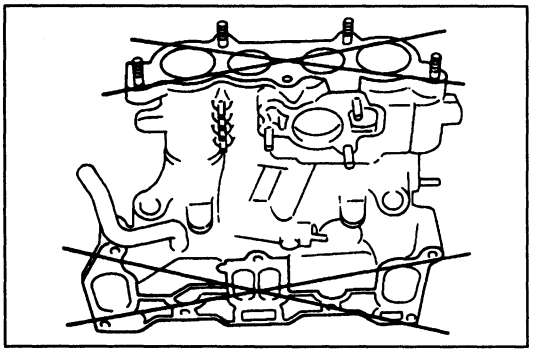
1. Verify that the No.2 secondary throttle valve and linkage move smoothly when primary throttle valve is fully opened.
2. Replace throttle body if necessary.



EXTENSION MANIFOLD

Inspection

1. Visually check for cracks or damage and replace it if necessary.
2. Check for distortion of extension manifold and replace if necessary.



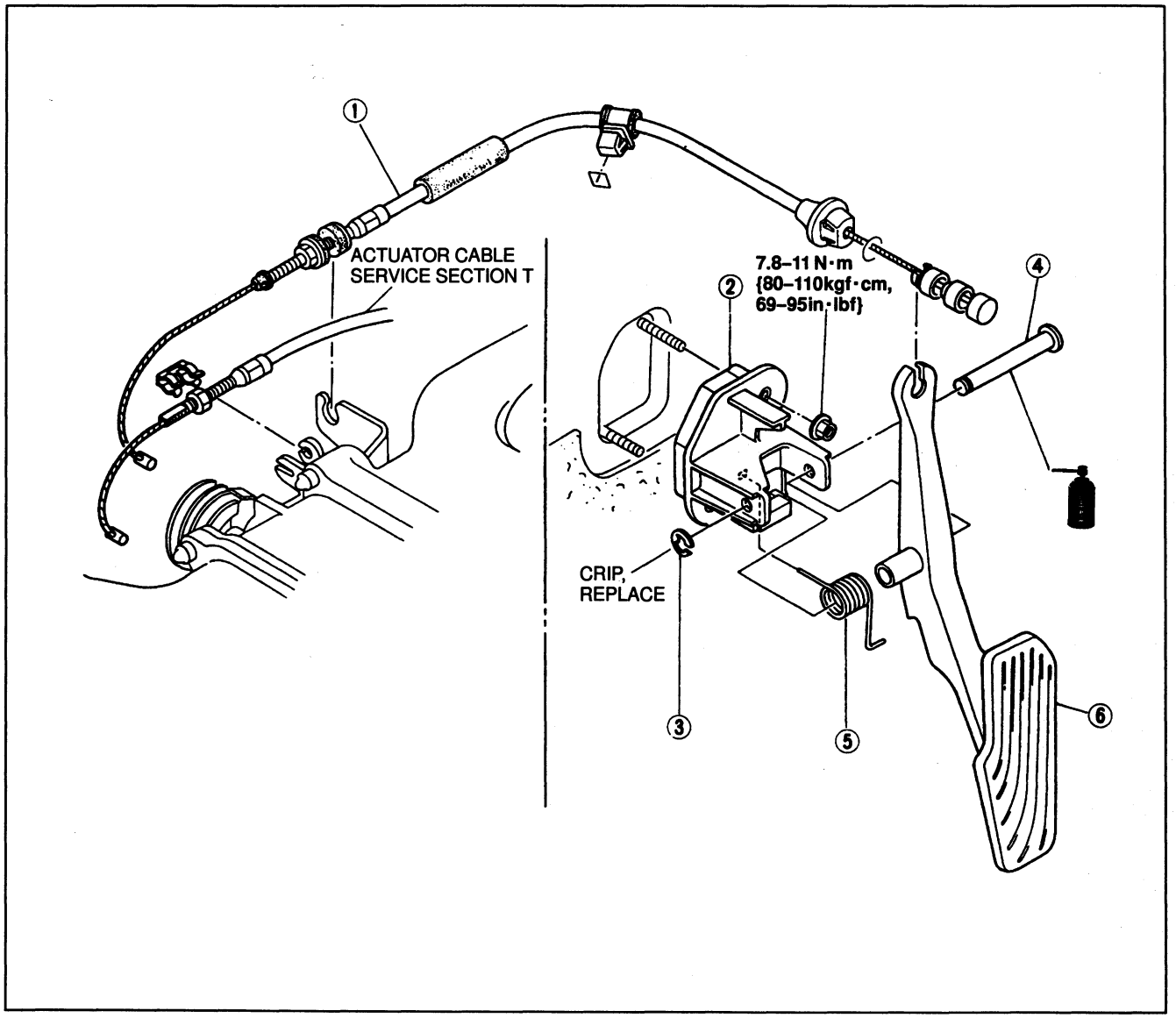
INTAKE MANIFOLD

1. Visually check for cracks or damage and replace if necessary.
2. Check for distortion of the intake manifold and replace it if necessary.

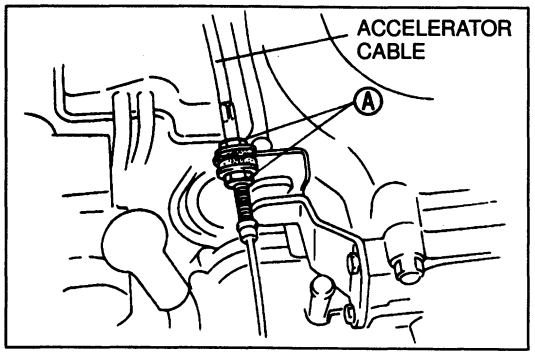
ACCELERATOR PEDAL

Removal / Inspection / Installation

1. Remove in the order shown in the figure.
2. Visually check the accelerator pedal and retainer for cracks or damage.
3. Install in the reverse order of removal.



1. Accelerator cable
   Inspection / Adjustment ..... below
2. Retainer
3. Clip
4. Shaft
5. Return spring
6. Accelerator pedal



ACCELERATOR CABLE

Inspection / Adjustment

1. Warm up the engine at normal operating temperature.
2. Depress the accelerator pedal to the floor and check that the throttle valve is fully opened.
3. Inspect the play of the accelerator cable.

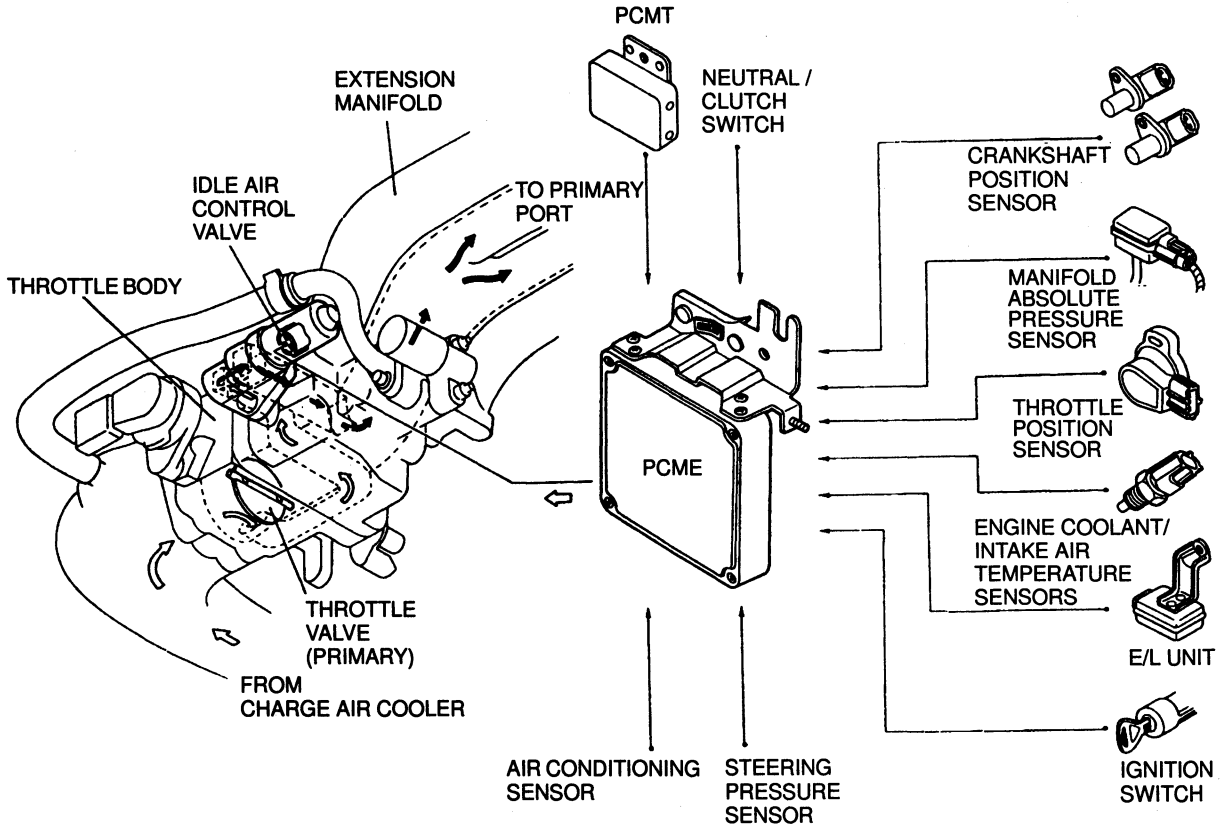
   Play: 1–3 mm {0.04–0.12 in}

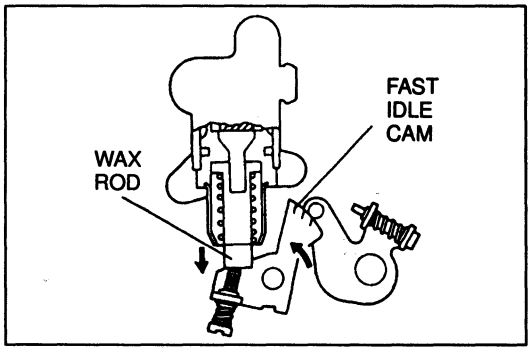
4. Loosen nuts A to adjust the play if necessary.

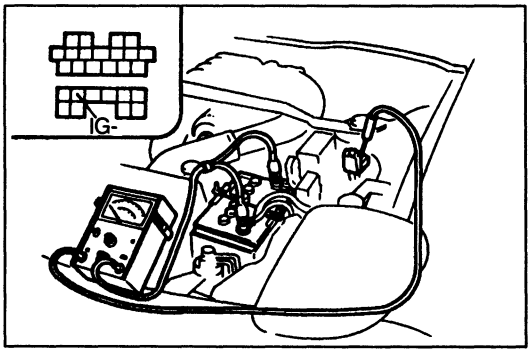
IDLE-SPEED CONTROL SYSTEM

DESCRIPTION

Idle-speed control system controls the bypass air amount that passes through the throttle valve, the idle-speed control system performs closed loop control so that engine idle smoothly and at the target speed. The system also performs the function of the AAV (anti-afterburns valve), there by eliminating the AAV and simplifying deceleration control system.







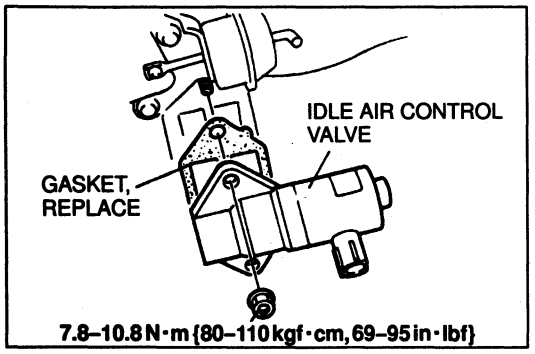
SYSTEM OPERATION

1. Warm up the engine and let it idle.
2. Verify that the fast idle cam separates.
3. Turn all electrical loads OFF.
4. Connect a tachometer to the data link connector terminal IG-.
5. With the coolant fan off, verify that the idle speed is within specification.

   Idle speed (Neutral or P range): 700–750 (720^{+30}_{-20}) rpm

6. Verify that the idle speed is within specification under the condition below.

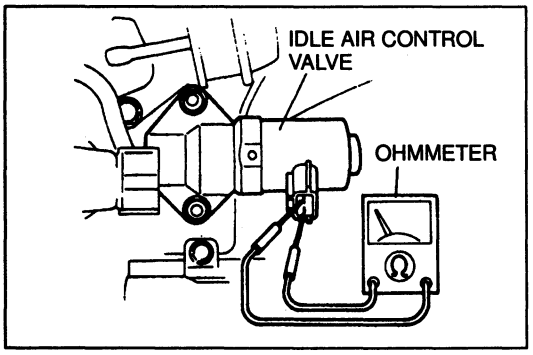
Condition	Idle speed (rpm)	
	MT	AT
No load	700–750 (720^{+30}_{-20})	
Electrical load ON	775–825	
Air conditioner ON	875–925	775–825



IDLE AIR CONTROL VALVE

Removal / Installation

1. Disconnect negative battery cable.
2. Remove the extension manifold. (Refer to page F–76.)
3. Disconnect the solenoid valve connector.
4. Remove the idle air control valve as shown in figure.
5. Install in the reverse order of removal.

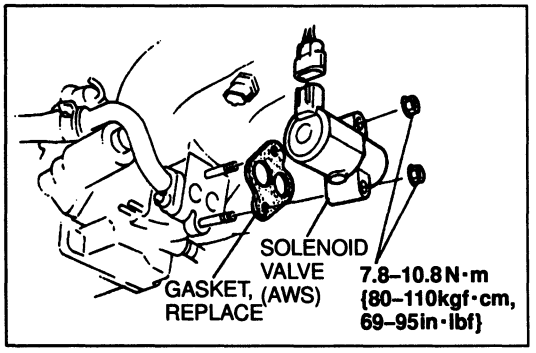


Inspection

1. Remove the solenoid valve. (Refer to above.)
2. Measure the solenoid valve resistance with an ohmmeter.

Resistance: 10.7–12.3 Ω (20°C {68°F})

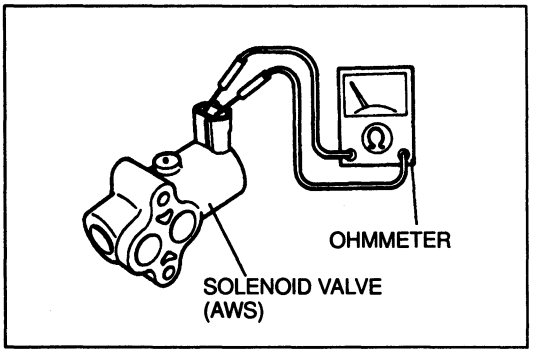
3. If not as specified, replace solenoid valve.



SOLENOID VALVE (ACCELERATED WARM-UP SYSTEM [AWS])

Removal / Installation

1. Disconnect negative battery cable.
2. Remove the extension manifold. (Refer to page F–76.)
3. Disconnect the solenoid valve connector.
4. Remove the solenoid valve (AWS) as shown in the figure.
5. Install in the reverse order of removal.



Inspection

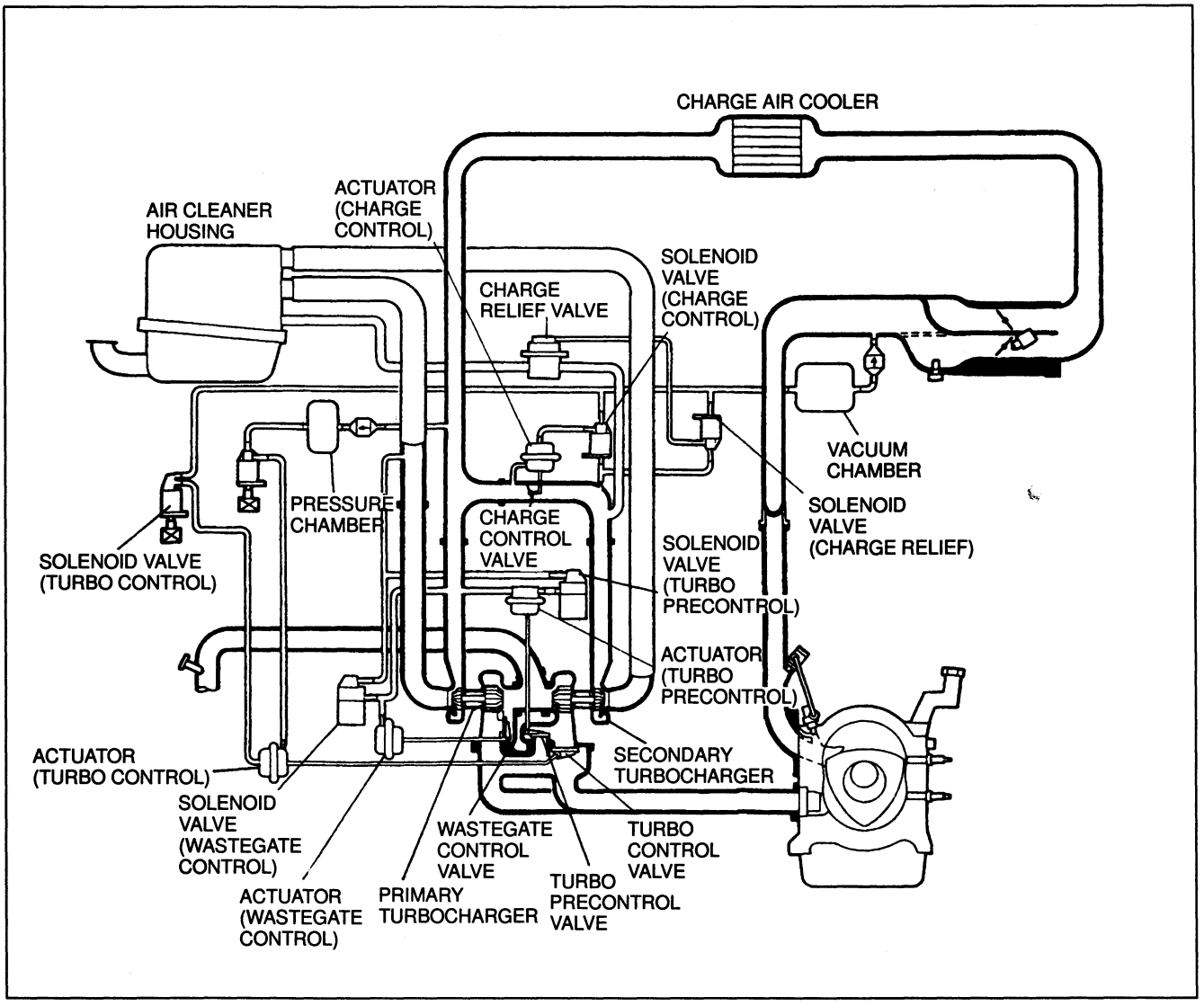
1. Remove the solenoid valve. (Refer to page F–76.)
2. Measure the solenoid valve resistance with an ohmmeter.

Resistance: 9.3–11.3 Ω (20°C {68°F})

3. If not as specified, replace solenoid valve.

SEQUENTIAL TWIN TURBOCHARGER SYSTEM

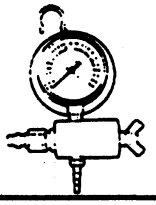
- The sequential twin turbocharger system consists of two turbochargers (primary and secondary) fitted in line with each other. In the low-speed, light-load range, turbocharging is done only by the primary turbocharger; in the high-speed, heavy-load range, turbocharging is done by the primary and secondary turbochargers in union.
- To prevent a drop of boost pressure when the secondary turbocharger begins to operate, the secondary turbocharger is made to spin prior to its operation.
- The sequential twin turbocharger system consists of the primary and secondary turbochargers and the actuators and solenoid valves (turbo precontrol, turbo control, wastegate control, charge control, charge relief).

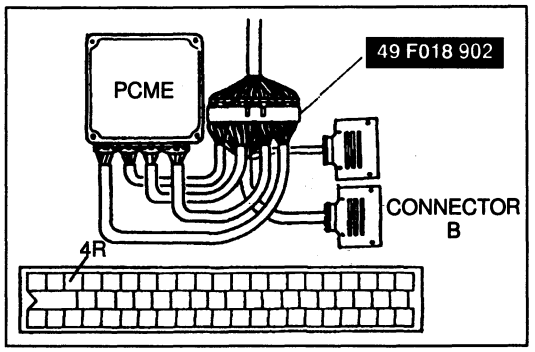


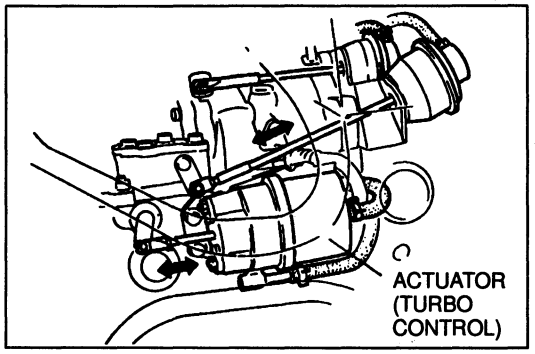
Operation

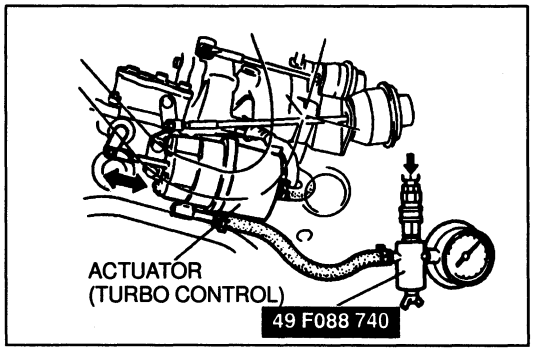
Devices \ Engine speed		Low-speed → High-speed / light-load → Heavy-load		
Turbocharger	Primary	Boost pressure		
	Secondary	Stop	Preliminary rotation	Boost
Solenoid valve	Turbo precontrol	Duty control		Duty 5% (Fully open)
	Wastegate control	Duty 95% (Fully closed)		Duty control
	Charge relief	OFF		ON
	Charge control	ON		OFF
	Turbo control	OFF		ON

PREPARATION
SST

49 F088 740 Pressure tester 	For inspection of turbocharger	49 F018 902 Adapter harness 	For inspection of solenoid valve







ACTUATOR (TURBO CONTROL [TCNT])

System Operation

1. Connect the **SST** (Engine signal Monitor Adaptor Harness) to the PCME as shown.
2. Start the engine and verify that the actuator rod is moved once.
3. Run it idle.
4. Short the PCME terminal 4R and verify that the actuator rod is pulled into the actuator.
5. If the actuator rod is not moved, check the following condition below.

- Vaccum tube
  Inspect vaccum line fitting, connections and components for leaks. (Refer to page F-10.)
- Vaccum and pressure chamber
  Visually check for clogging damage or crack.
- Solenoid valve (Turbo control)
  Inspection (Refer to page F-176.)
- Actuator (Turbo control)
  Inspection (Refer to below.)

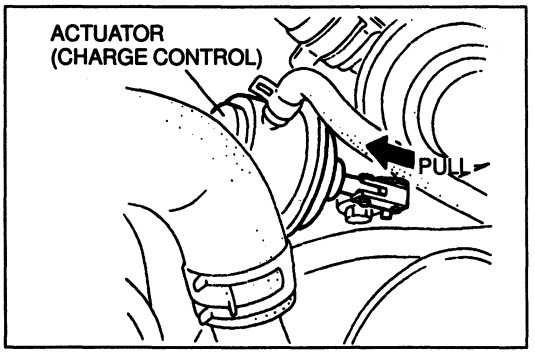
Inspection

1. Disconnect the air hose and attached it to the **SST** as shown.
2. Adjust the compressioned air pressure to **49 kPa. {0.5 kg·f/cm^2,7.1 psi}**
3. Verify that the actuator rod is move when appying and releasing air pressure.

Caution

- **Applying more than 79.4 kPa {0.81 kgf/cm^2, 11.5 psi} of compressed can damage the actuator.**

4. If not as specified, replace the actuator.
   (Refer to page F-91.)

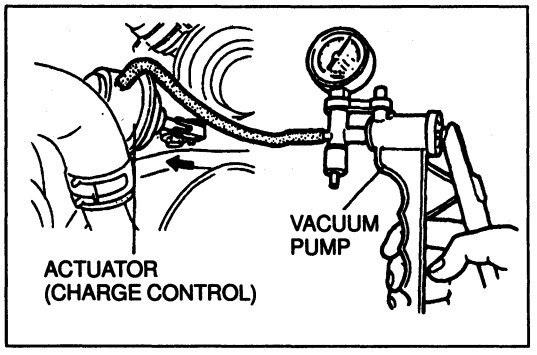


ACTUATOR (CHARGE CONTROL)

System Operation

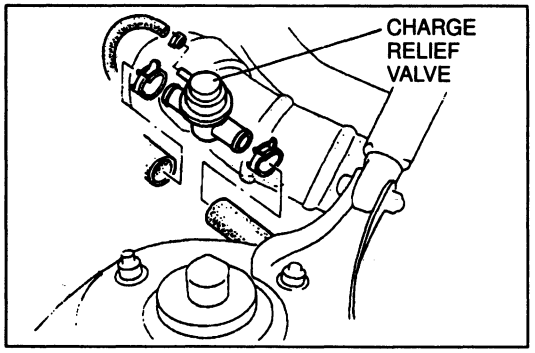
1. Start the engine and verify that the actuator rod is pulled into the actuator.
2. If the actuator rod is not pulled, check the following condition below.

- Vacuum tube
  Inspect vaccum line fitting, connections and components for leak. (Refer to page F-10.)
- Vacuum chamber
  Inspect the damage or crack.
- Solenoid valve (Charge control)
  Inspection (Refer to page F-176.)
- Actuator (Charge control)
  Inspection (Refer to below.)
- Shutter valve
  Inspection (Refer to below.)



Inspection

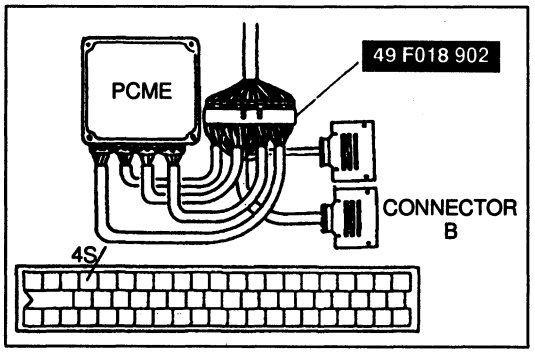
1. Disconnect the vacuum hose from the actuator.
2. Connect a vacuum pump.
3. Verify that the actuator rod is pulled when applying vacuum more than **6.7 kPa {50 mmHg, 1.9 inHg}**
4. If not as specified, replace the actuator. (Refer to page F-91.)



CHARGE RELIEF VALVE

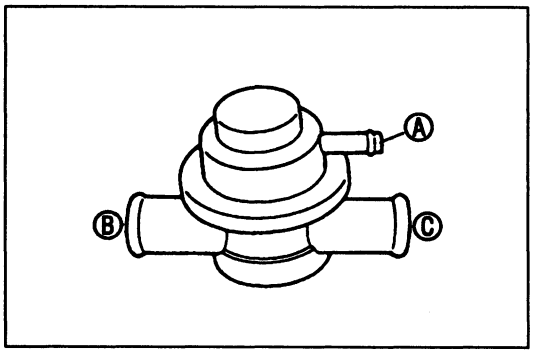
Removal / Installation

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



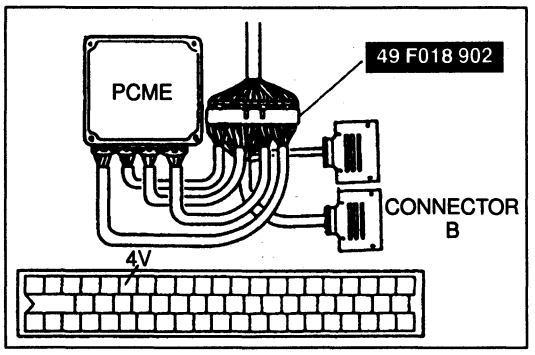
System operation

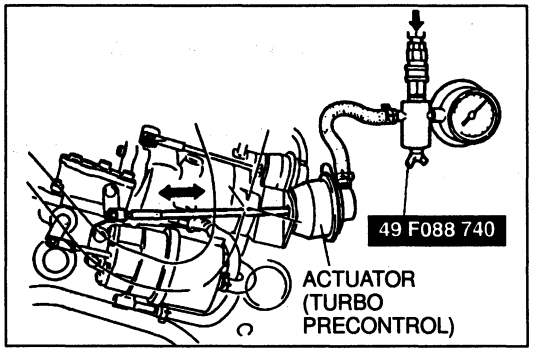
1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the PCME as shown.
2. Turn ignition switch to ON.
3. Short the PCME terminal 4S and verify that the operating sound is heard when the solenoid valve ON.
4. If no sound is heard, check the solenoid valve. (Refer to page F-176.)



Inspection

1. Remove the charge relief valve.
2. Connect a vacuum pump to port A.
3. Apply approx. **26.7 kPa {200 mmHg, 7.87 inHg}** to port A and verify that air flows between B and C.
4. Replace if necessary.





TURBOCHARGER

Actuator (Turbo precontrol)

System operation

1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the PCME.
2. Turn ignition switch to ON.
3. Short the PCME terminal 4V and verify that the operating sound is heard.
4. If no sound is heard, check the solenoid valve. (Refer to page F-93.)

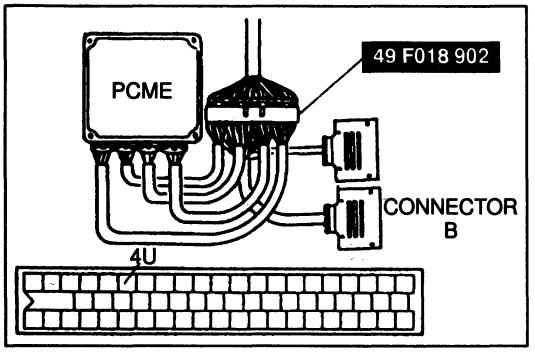
Inspection

1. Disconnect the air hoses and attached one to the **SST** and plug the other pipe as shown.
2. Verify that the actuator rod is moved when applying compressed air pressure to **69–98 kPa {0.7–1.0 kgf/cm^2, 10–14 psi}**

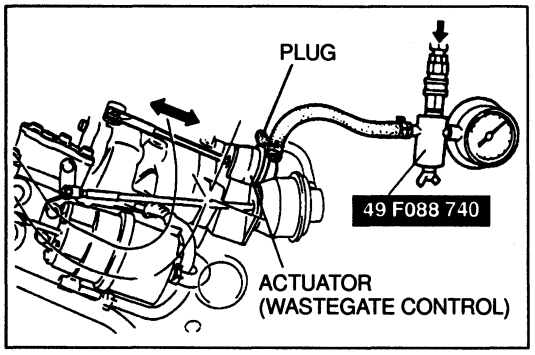
Caution

- **Applying more than 98 kPa {1.0 kgf/cm^2, 14 psi} of compressed can damage the actuator.**

3. Replace turbocharger, if necessary. (Refer to page F-91.)



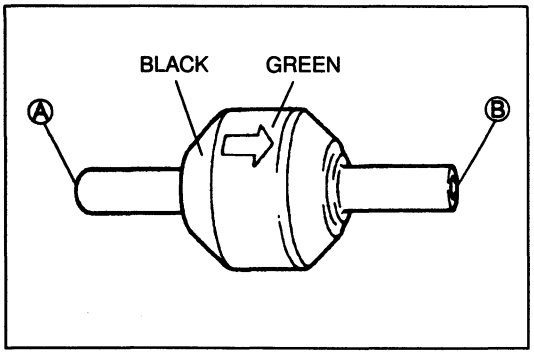
Actuator (wastegate control)
System Operation
1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the PCME.
2. Turn ignition switch to ON.
3. Short the PCME terminal 4U and verify that the operating sound is heard.
4. If no sound is heard, check the solenoid valve (Refer to page F-93.)



Inspection
1. Disconnect the air hoses and attached one to the **SST** and plug the other pipe as shown.
2. Verify that the actuator rod is moved when applying pressed air pressure to **69–98 kPa {0.7–1.0 kgf/cm^2 10–14 psi}**

Caution
- **Applying more than 98 kPa {1.0 kgf/cm^2, 14 psi} of compressed can damage the actuator.**

3. Replace turbocharger, if necessary. (Refer to page F-91.)



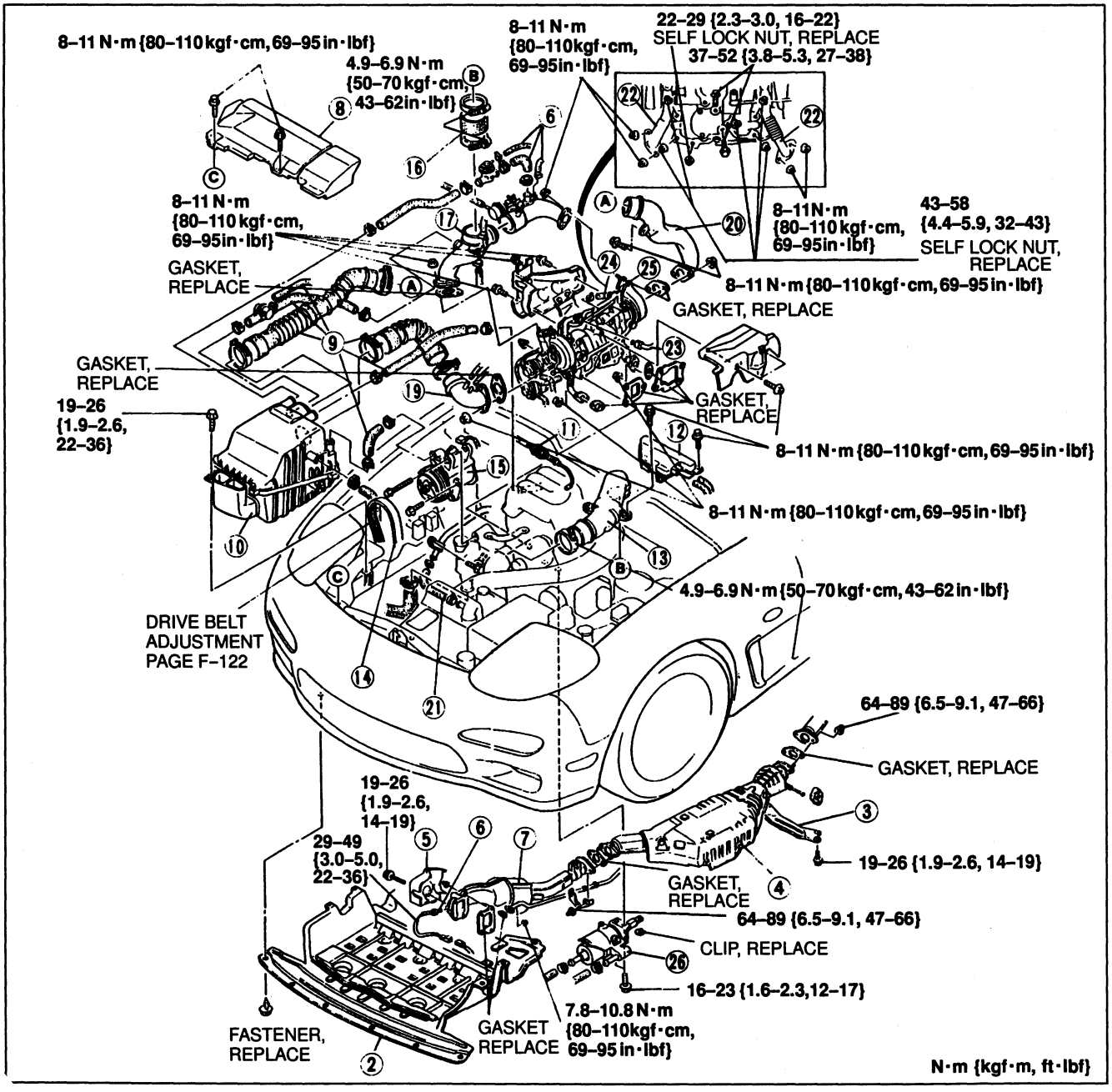
CHECK VALVE
Inspection
1. Remove the check velve.
2. Blow through A and verify that air flows from B.
3. Blow through B and verify that air does not flow from A.

Removal / Installation

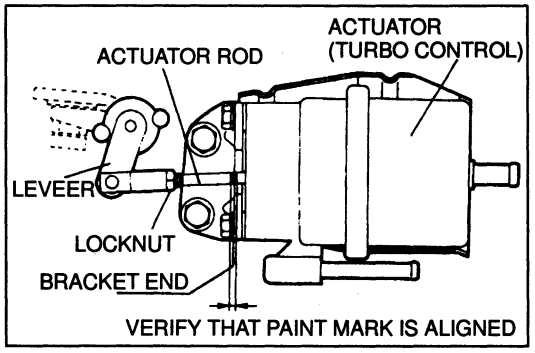
Turbocharger handling procedures.

- Holding the actuator, the rod, or the actuator hose when removing and carrying the turbocharger can cause damage.
- Set the turbine down with the shaft horizontal.
- Replace damaged studs and nuts. Use only the specified studs and nuts. Using damaged or unspecified studs and nuts can cause gas leakage because of insufficient clamping.
- Cover the turbocharger air port and exhaust port with tape to keep out foreign material. Foreign material may damage the turbocharger's internal components.

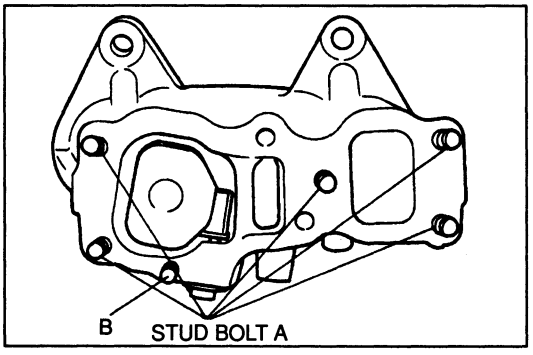
1. Disconnect the negative battery cable.
2. Lift up the vehicle.
3. Drain the engine coolant.
4. Remove in the order shown in the figure.
5. Install in the reverse order of removal, reffering to **Installation Note**.



1. Negative battery cable
2. Under cover
3. Braket
4. Three-way catalyst assembly
5. Insulator
6. Oxygen sensor
7. Warm-up three-way catalyst
8. Fresh air duct
9. Air hoses
10. Air cleaner housing
11. Accelerater cable
    Removal / Installation ..... page F-80
    Inspection / Adjustment ..... page F-80
12. Pressure chamber
13. Air pipe
14. Drive belt
15. Air pump
16. Air hose
17. Air pipe
18. Charge control valve assembly
    Inspection ..... page F-87
19. Air intake pipe (Secondary)
20. Air intake pipe (Primary)
21. Water hose
22. Oil return pipes
23. Oil pipe
24. Water hose
25. Turbocharger
    Inspection ..... below
26. Actuator (Turbo control)
    Inspection ..... page F-86

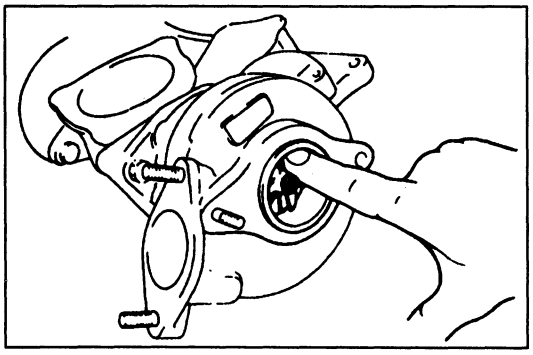


Installation Note
1. Verify that the paint mark on the actuator rod is aligned with actuator braket end.
2. If the mark is not aligned, adjust the actuator rod length



3. Check the stud bolt tighting torque before installing turbocharger.

Tighting torque
A: 16–24 N·m {1.6–2.4 kgf·m, 12–17 ft·lbf}
B: 8–12 N·m {0.8–1.2 kgf·m, 5.8–8.7 ft·lbf}

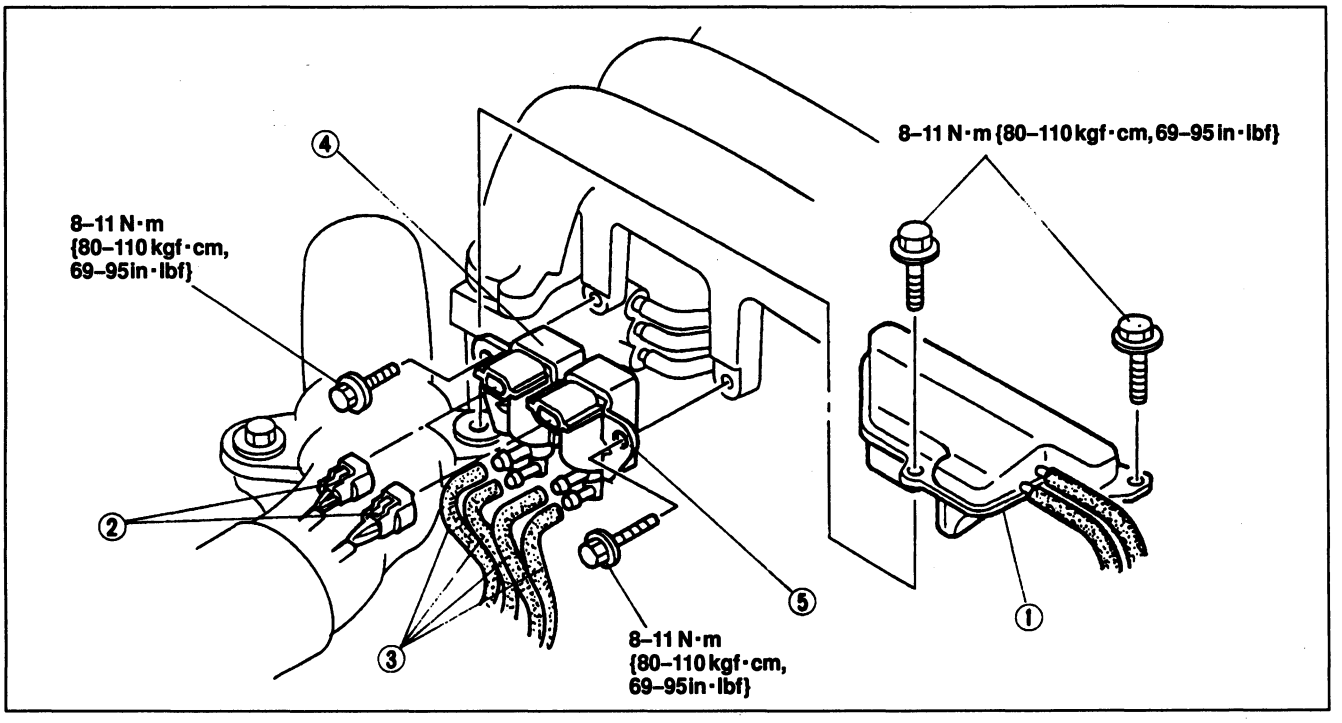


Inspection
1. Be sure the engine is cool.
2. Remove the turbocharger.
3. Check that the compressor wheel assembly turns smoothly.
4. If there is excessive drag or noise, replace the turbocharger.

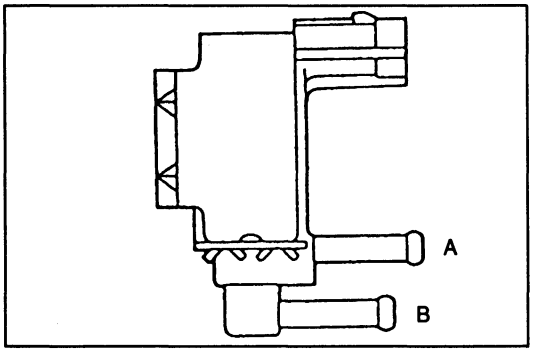
SOLENOID VALVE (TURBO PRECONTROL, WASTEGATE CONTROL)

Removal / Installation

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

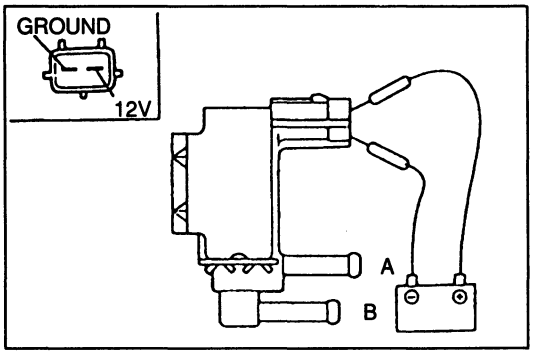


1. Pressure chamber
2. Connectors
3. Vaccum hoses
4. Solenoid valve. (Turbo precontrol)
   Inspection ..... below
5. Solenoid valve. (Wastegate control)
   Inspection ..... below



Inspection

1. Remove the solenoid valve.
2. Blow through the solenoid valve from hose A and check that air does not flow from B to A.



3. Apply battery positive voltage to solenoid valve and check that air does flow the solenoid valve from A to B.
4. If not as specified, measure the resistance.

Resistance: 29–33 Ω {20°C [68°F]}

FUEL SYSTEM

DESCRIPTION

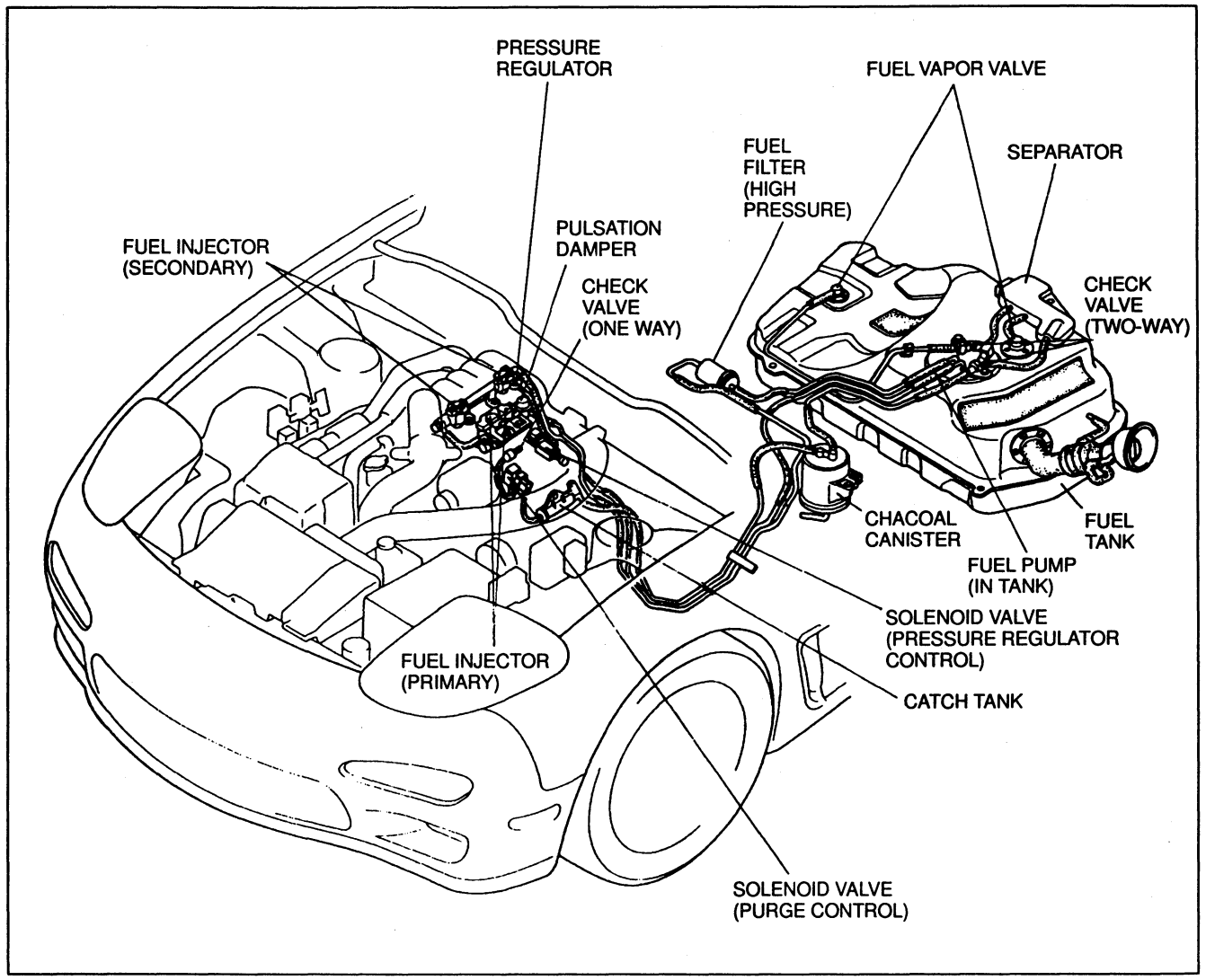
This system supplies the necessary fuel at constant pressure to the injectors.
Fuel is metered and injected into intake manifold and intake port according to the injection control signals from the PCME (Powertrain Control Module (Engine)).
This system consists of fuel pump, fuel filters, pressure regulator, pulsation dumper, solenoid valve (Pressure regulator control), and injectors.

SECONDARY INJECTOR - OPERATING RANGE

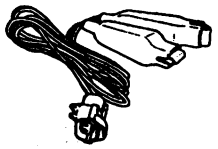
When the engine speed is above 2750 RPM and the total fuel injection amount is above the present amount (pre-programmed in the ECU), the secondary fuel injector operates.

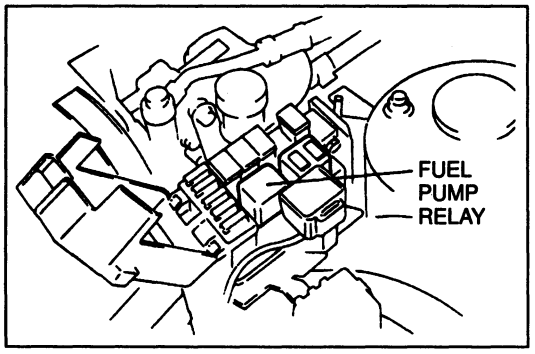
The total fuel injection amount is determined by engine speed, intake manifold pressure, intake air temperature and atmospheric pressure.

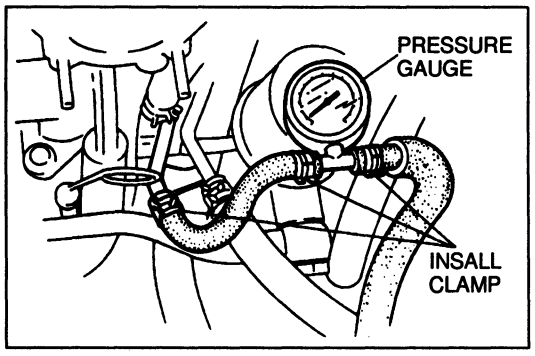
> For troubleshooting the secondary fuel injector, please refer to the self-diagnosis function-service code No. 71 and 73.



PREPARATION
SST

49 L018 901 Injector checker 	For inspection of injector	49 F013 102 Hose injector checker 	For inspection of injector





PRECAUTION

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

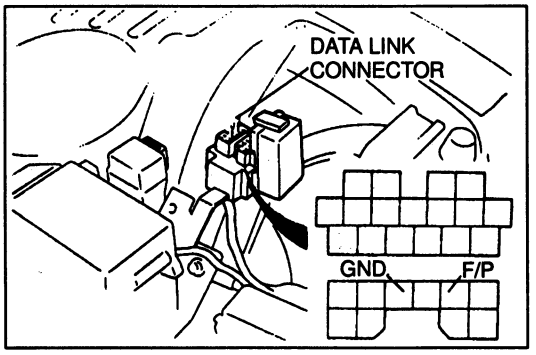
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the following "Fuel Line Safety Procedures".**

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 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.

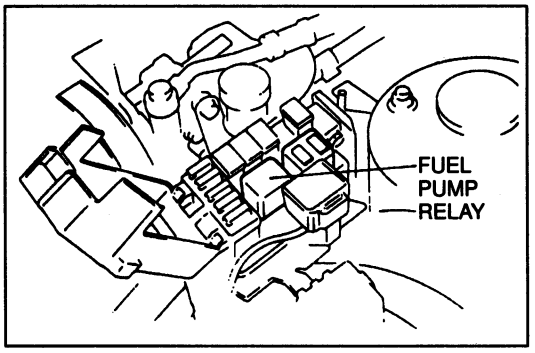
C. Install hose clamps to secure the fuel pressure gauge connections.



Priming Fuel System

After releasing the fuel pressure for repairs or inspection, the system must be primed to avoid excessive cranking when first starting the engine. Follow the steps below.

1. Connect the data link connector terminals **F/P** and **GND** with a jumper wire.
2. Turn the ignition switch ON for **Approximately 10 seconds** and check for fuel leaks.
3. Turn the ignition switch OFF and remove the jumper wire.

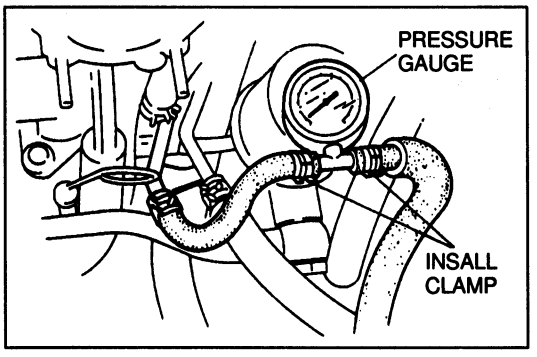


SYSTEM OPERATION

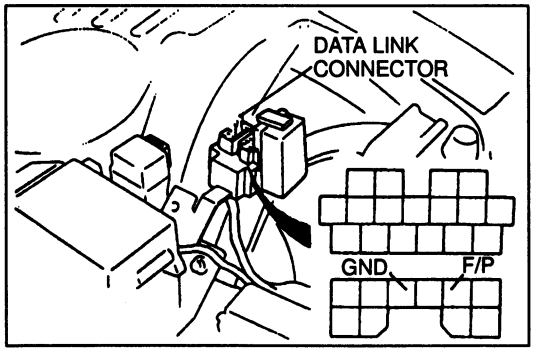
Fuel Pressure Hold Inspection

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" on page F-95.**



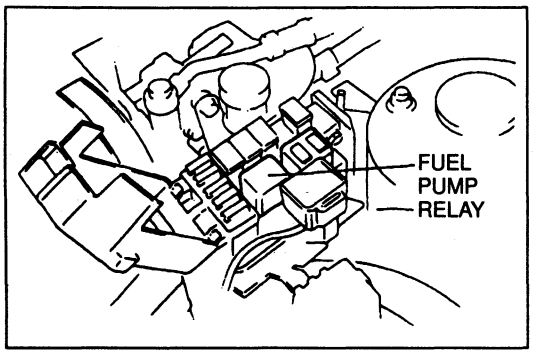
1. Disconnect the negative battery terminal.
2. Install a fuel pressure gauge as shown.
3. Connect the negative battery terminal.



4. Connect the data link connector terminals **F/P** and **GND** with a jumper wire.
5. Turn the ignition switch ON for **10 seconds** to operate the fuel pump.
6. Turn the ignition switch OFF and disconnect the jumper wire.
7. Observe the fuel pressure **5 minutes**.

   Fuel pressure:
   More than 150 kPa {1.5 kgf/cm^2, 21 psi}

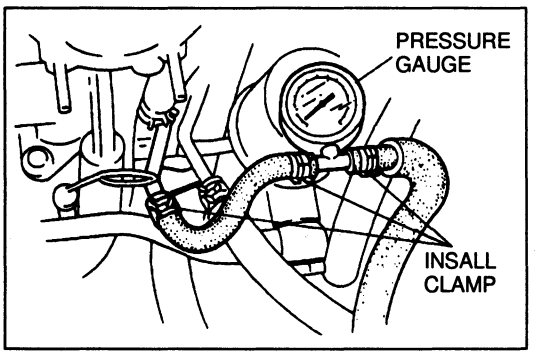
8. If not as specified, perform the following inspections.
   - Fuel pump hold pressure. (Refer to page F-100.)
   - Pressure regulator fuel line pressure. (Refer to page F-104.)
   - Injector fuel leakage. (Refer to page F-107.)



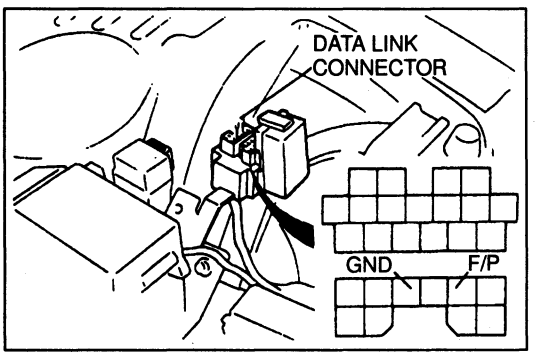
Fuel Line Pressure Inspection

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 F–95.**



1. Disconnect the negative battery cable.
2. Install a fuel pressure gauge as shown in the figure.
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 ON.
6. Measure the fuel line pressure.

Fuel line pressure:
250–260 kPa {2.5–2.7 kg/cm^2, 36–38 psi}

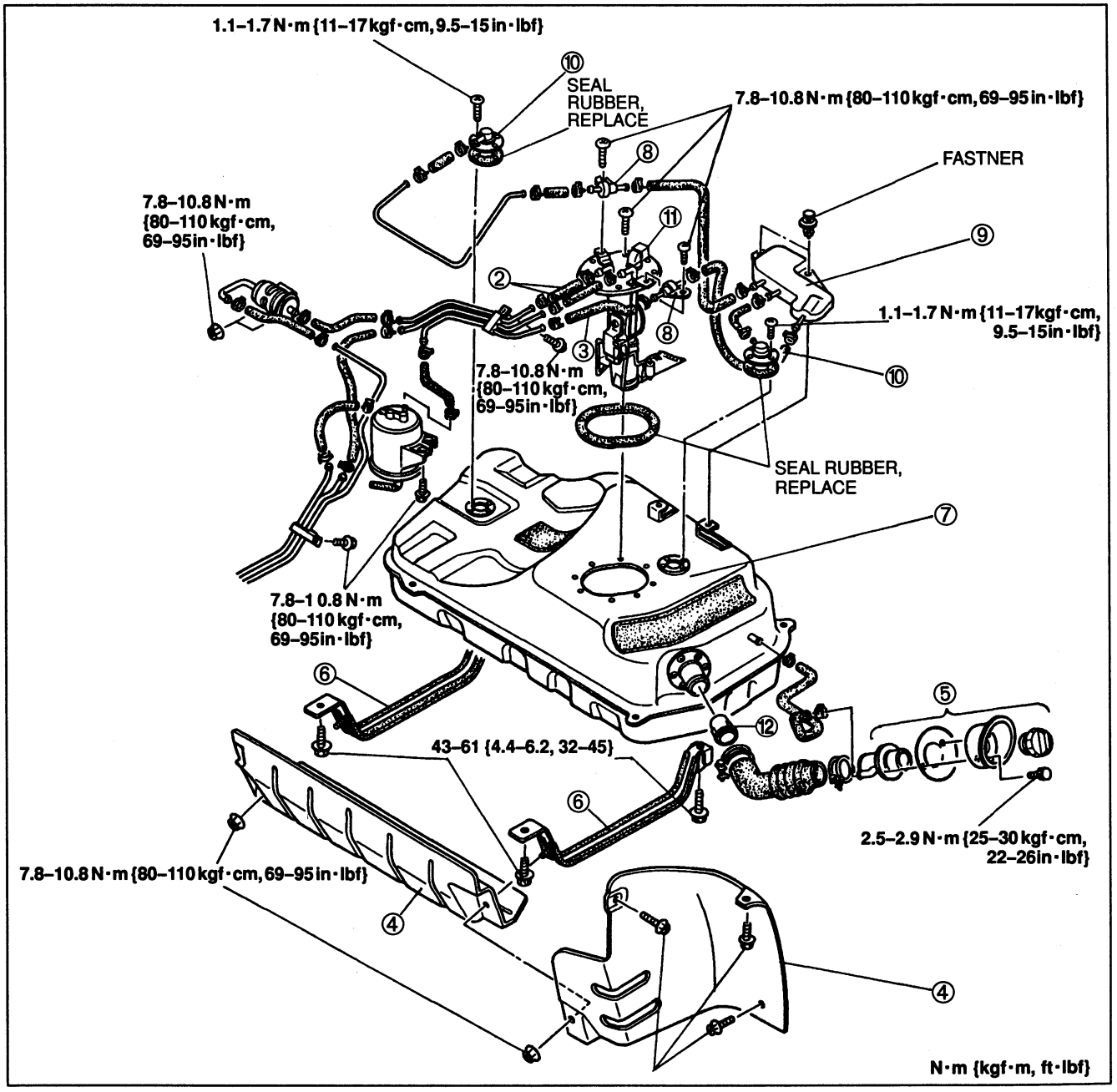
Pressure low – Measure fuel pump maximum pressure. (Refer to page F–101.) If as specified, the fuel line or fuel filter might be clogged or restricted.

Pressure high – Replace the pressure regulator. (Refer to page F–105.)

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 F-95.**
- **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.**

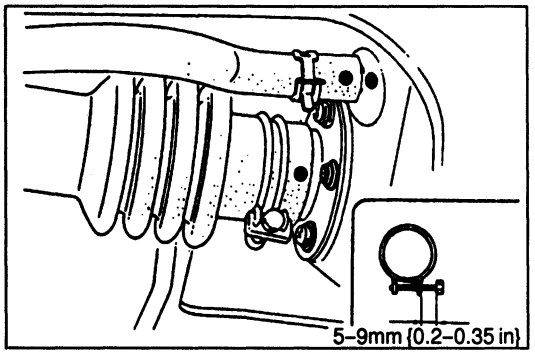
1. Drain the fuel from the fuel tank.
2. Remove in the order shown in the figure.
3. Inspect the fuel tank components visually and repair or replace if necessary.
4. Install in the reverse order of removal, referring to **Installation Note**.



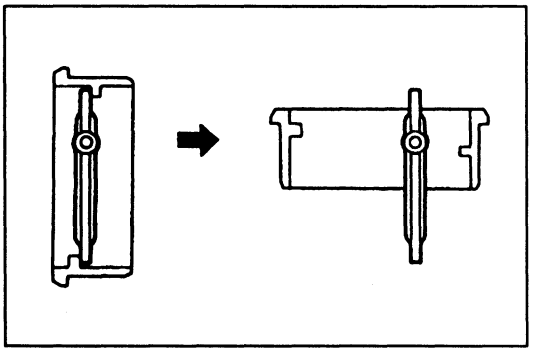
1. Battery cable
2. Fuel hoses
   Installation Note ..... page F-99
3. Evapolative hoses
   Installation Note ..... page F-99
4. Under cover
5. Fuel filler pipe
6. Fuel tank strap
7. Fuel tank
   Inspect for cracks and corrosion
8. Check valve
   Inspection ..... page F-132
9. Separator
   Inspect for cracks and corrosion
10. Fuel vapor valve
    Inspection ..... page F-132
11. Fuel pump
    Inspection ..... page F-101
    Removal / Installation ..... page F- 98
    Assembly / Disassembly ..... page F-102
12. Nonreturn valve

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 filter hose onto the fuel tank pipe and filter pipe **at least 35 mm {1.4 in}**.
3. Push the evaporative hoses onto the fuel vapor valve **at least 20 mm {0.8 in}**.
4. Push the evaporative hoses onto the check valve **at least 17 mm {0.7 in}**.

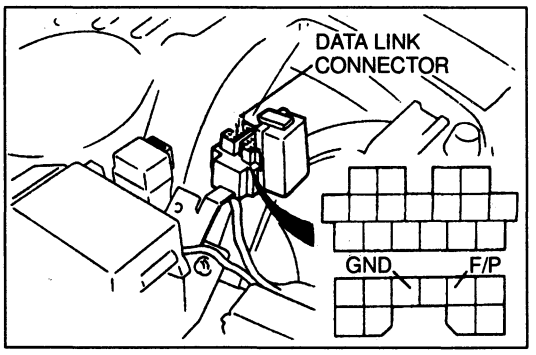


5. Connect the fuel filler hose and breather hose onto the fuel tank as shown in the figure.

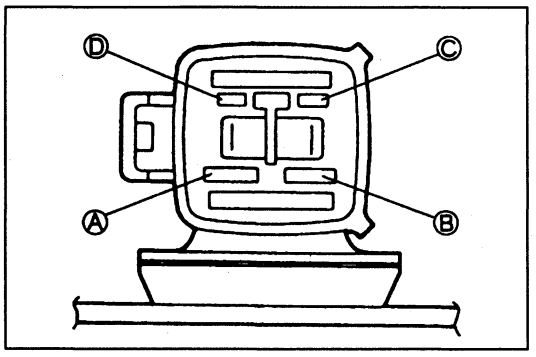


Nonreturn Valve

Verify that the nonreturn valve operates under its own weight as shown in the figure.



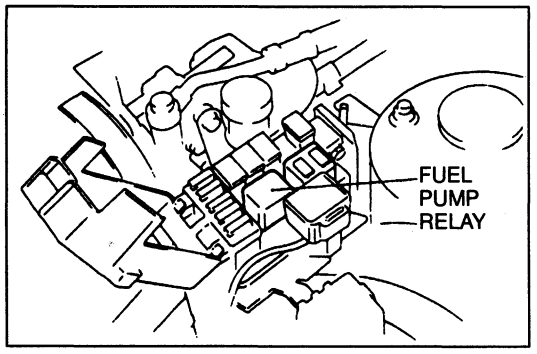
FUEL PUMP
Inspection
Fuel pump operation
1. Connect the data link connector terminals **F/P** and **GND** with a jumper wire.
2. Remove the fuel filler cap.
3. Turn the ignition switch ON.
4. Listen for operational sound of the fuel pump at the filler inlet.
5. Install the fuel filler cap.



6. If no sound was heard, measure the voltage the fuel pump connector wire W/R.

   Voltage: Battery positive voltage

7. If not correct, check the fuel pump relay and its circuits. (Refer to page F-110.)
8. If the voltage is normal, check for continuity between fuel pump connector A and B.
9. If there is no continuity, replace the fuel pump.

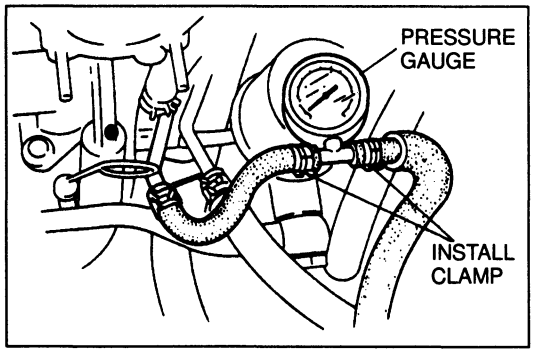


Hold pressure

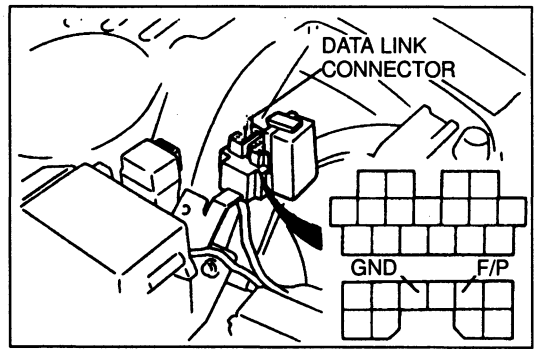
Perform the inspection if the fuel pressure hold inspection is not as specified.

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 F-95.**



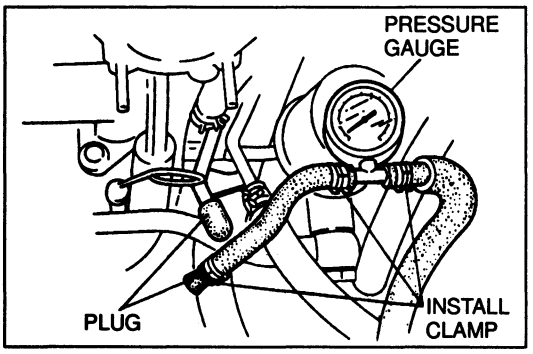
1. Disconnect the negative battery terminal.
2. Connect a fuel pressure gauge to the fuel main pipe and plug the outlet of the fuel pressure gauge as shown. (Install clamps as shown.)
3. Connect the negative battery terminal.

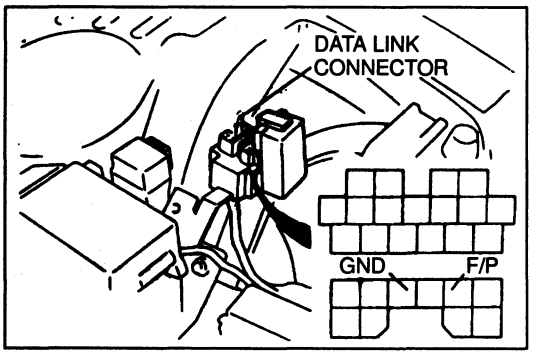


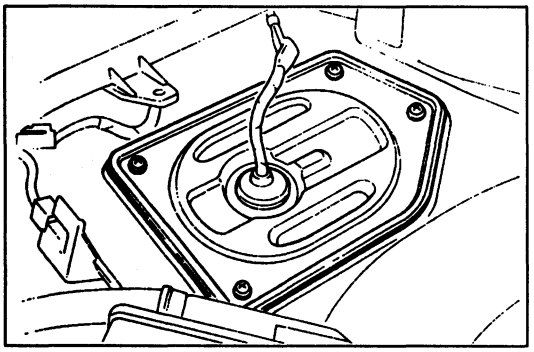
4. Connect data link connector terminals **F/P** and **GND** with a jumper wire.
5. Turn the ignition switch ON and measure the fuel pressure.

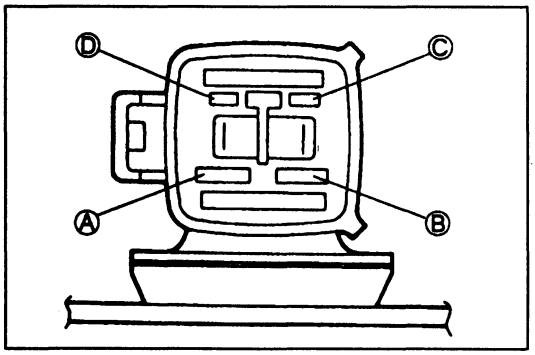
   Fuel pressure:
   490–740 kPa {5.0–7.5 kgf/cm^2, 71–106 psi}

6. Turn the ignition switch OFF and disconnect the jumper wire.
7. 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 F-95.**

1. Disconnect the negative battery terminal.
2. Connect a fuel pressure gauge to the fuel main pipe and plug the outlet of the gauge as shown. (Install clamps as shown.)
3. Connect the negative battery terminal.
4. Connect data link connector terminals **F/P** and **GND** with a jumper wire.
5. Turn the ignition switch ON to operate the fuel pump.
6. Measure the pump maximum pressure.

Fuel pump maximum pressure:
490–740 kPa {5.0–7.5 kgf/cm^2, 71–107 psi}

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

Continuity Inspection
1. Remove the luggage room carpet.
2. Remove the acoustic wave guide assembly. (if equipped)
3. Disconnect the fuel pump connector.

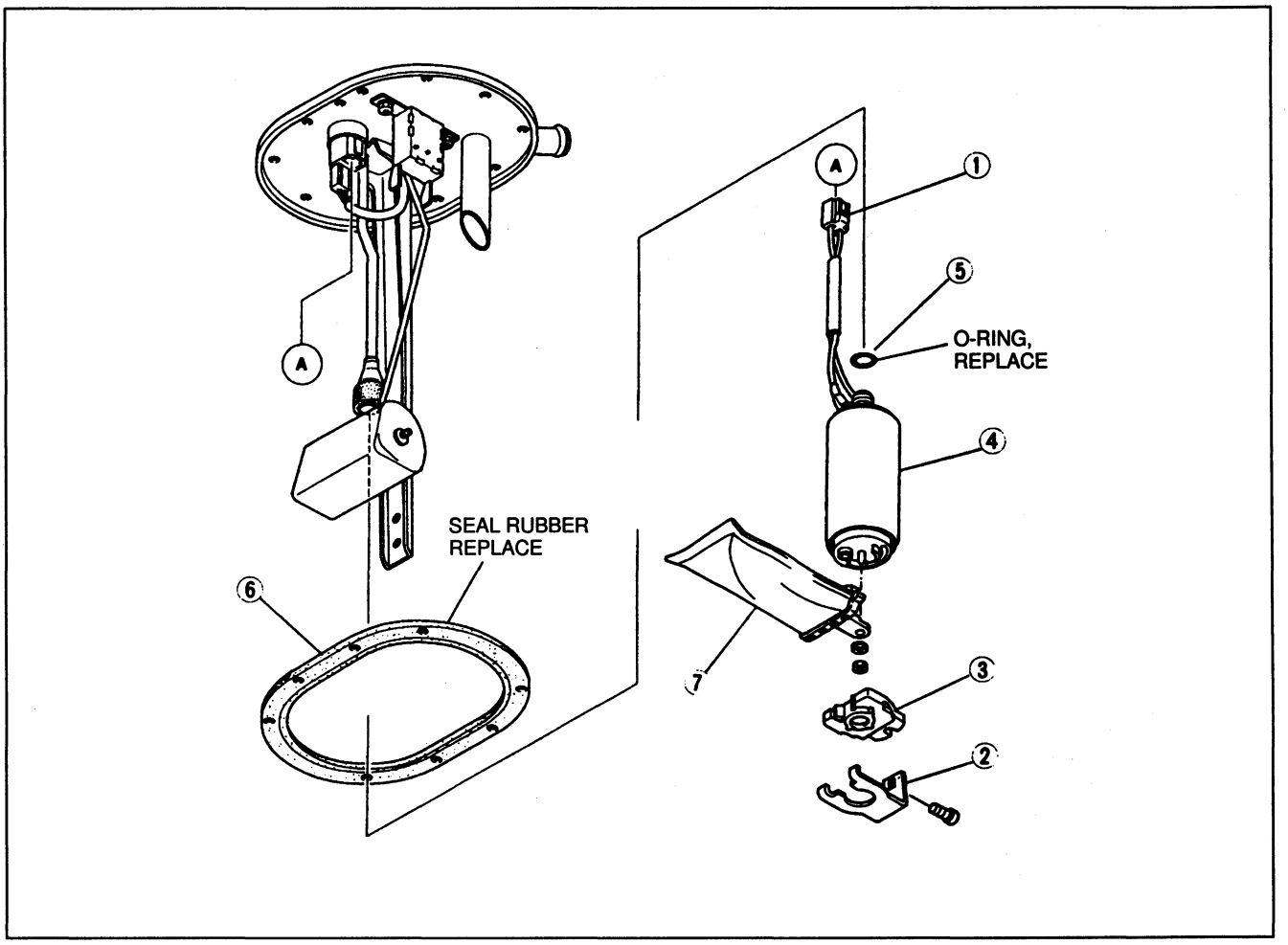
4. Check for continuity between the fuel pump connector A and B.
5. If there is none, replace the fuel pump. (Refer to page F-98.)

Disassembly / Assembly

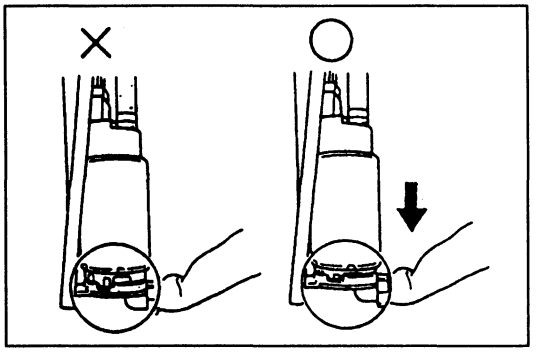
Warning

- **When replacing the fuel system parts, keep sparks, cigarettes, and open flames away from the 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 F-95.**

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



1. Fuel pump connector
2. Bracket
3. Mounting rubber
4. Fuel pump
5. O-ring
6. Seal rubber
7. Fuel filter (Low pressure side)



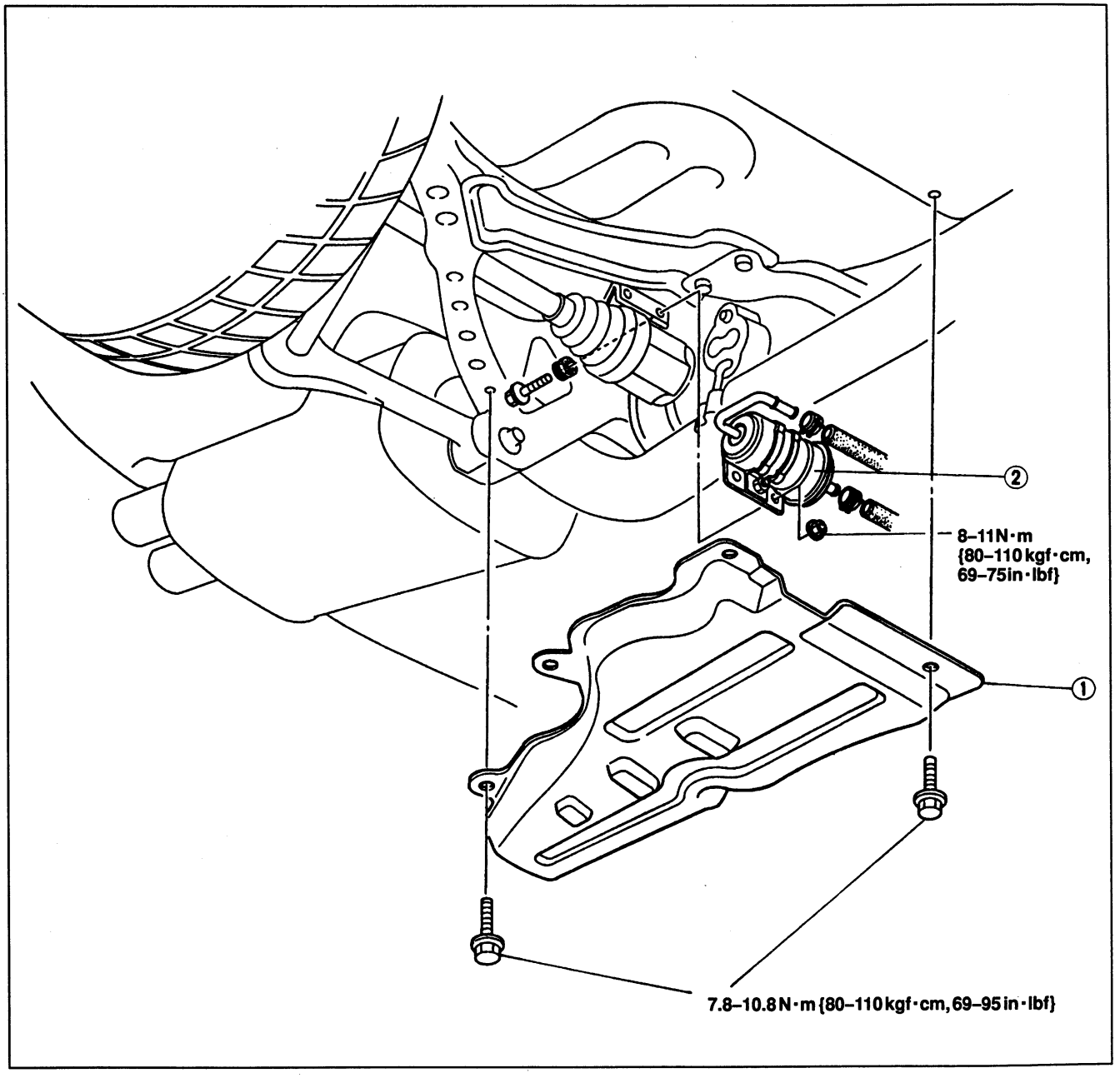
Assembly Note

After installing the fuel pump to the braket, pull the pump down so that it is tight against the braket.

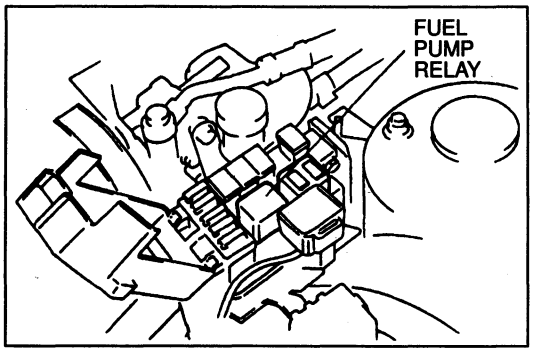
FUEL FILTER
Replacement

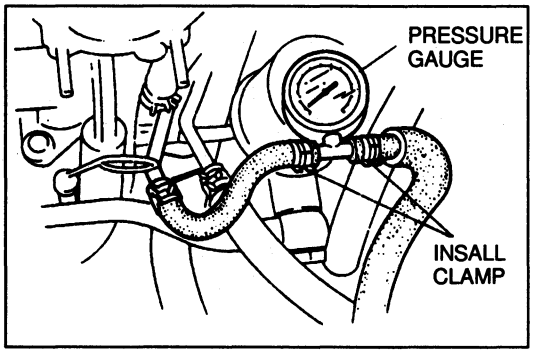
Warning
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

High-pressure side
The fuel filter must be replaced at the intervals outlined in the maintenance schedule.
1. Before removing the fuel filter, release the fuel pressure from the fuel system.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.
4. Verify that the fuel hoses are pushed fully onto the fuel filter nipple.



1. Under cover
2. Fuel filter (High-pressure side)





PRESSURE REGULATOR

Inspection

Fuel line pressure

Warning

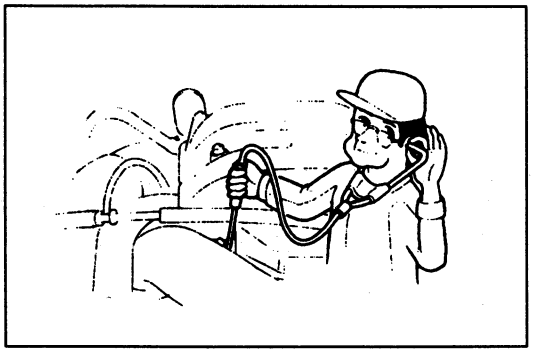
- **Fuel line spills and leaks can be dangerous. Fuel can ignite and cause serious injuries or death and can damage the vehicle. Fuel can also irritate skin and eyes. To prevent this from happening, release the fuel pressure according to "Fuel Line Safety Procedures" on page F-95.**

1. Disconnect the negative battery terminal.
2. Connect a fuel pressure gauge between the fuel filter and the fuel main hose. (Install clamps as shown.)
3. Connect the negative battery terminal.
4. Start the engine and run it at idle.
5. Measure the fuel line pressure.

Fuel line pressure:
190–220 kPa {1.9–2.3 kgf/cm^2, 28–32 psi}

Removal / Installation

(Refer to page F-105)



INJECTOR

Inspection (On-vehicle)

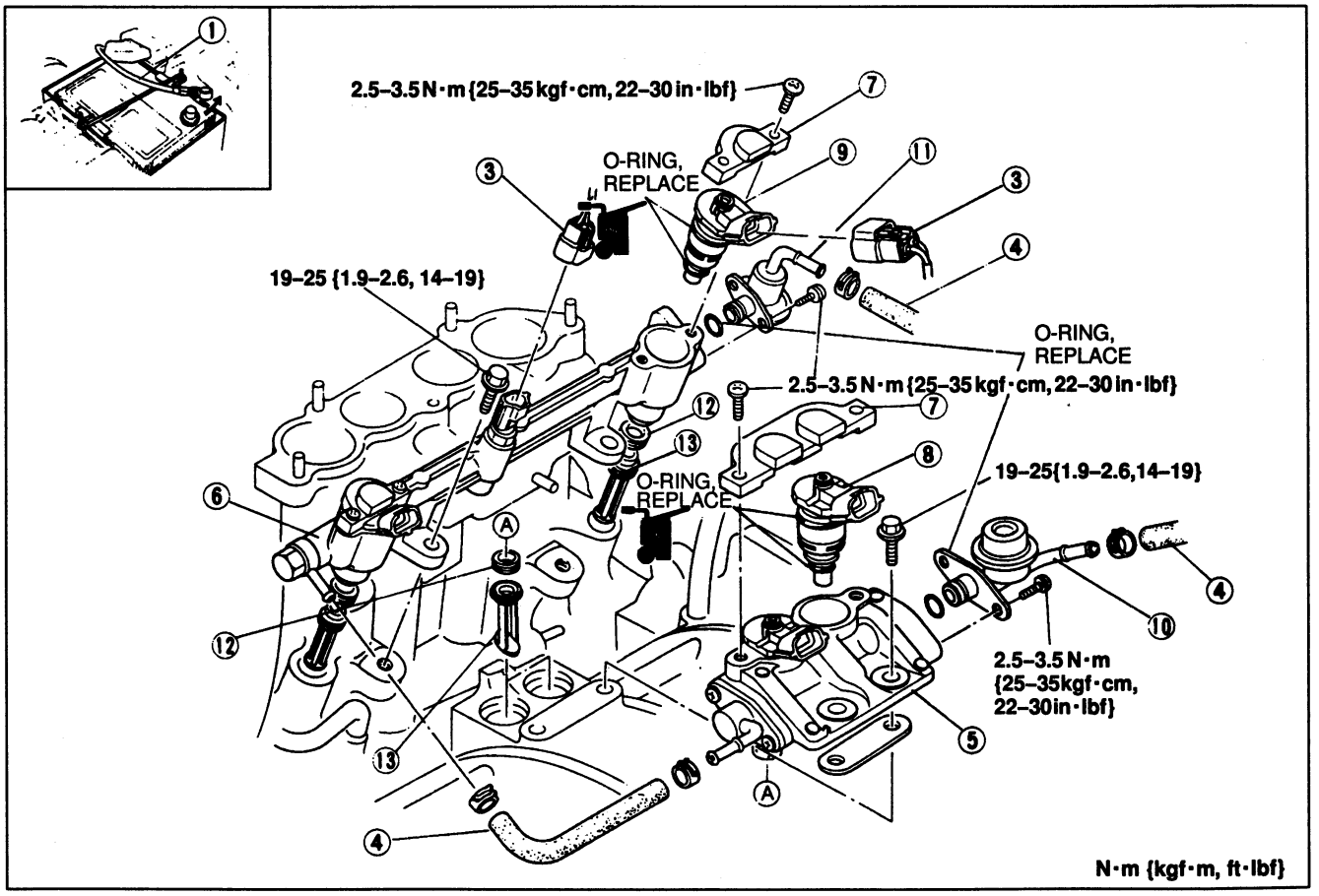
1. Warm up the engine and run it idle.
2. Listen for the operational sound of primary injector with a screwdriver or a sound scope.

Removal / Installation

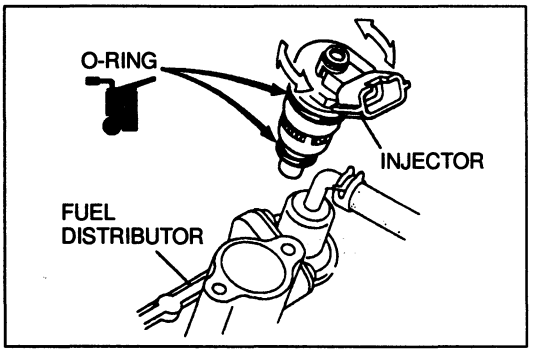
Warning

- **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 F–95.**

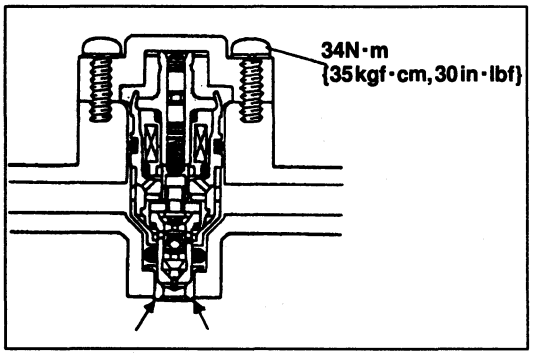
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal, referring to **Installation Note**.



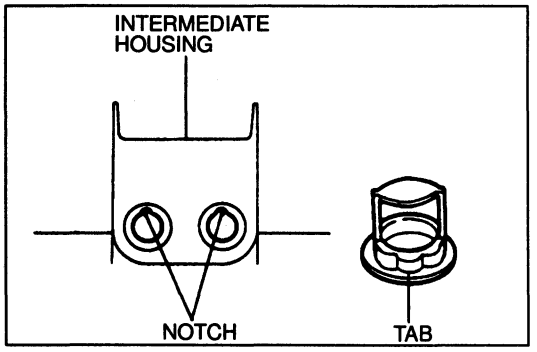
1. Negative battery cable
2. Extension manifold (Refer to page F–76)
3. Connector
4. Fuel hoses
5. Fuel distributor assembly (Primary)
6. Fuel distributor assembly (Secondary)
7. Cover
8. Injector (Primary) Inspection ..... page F–107
9. Injector (Secondary) Inspection ..... page F–107
10. Pulsation damper
11. Pressure regulator Inspection ..... page F–104
12. Insulator
13. Air bleed socket



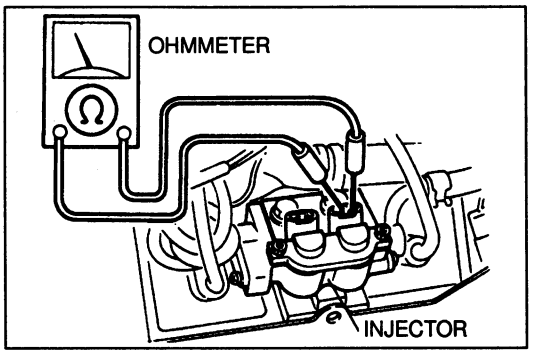
Installation Note
Injector installation
1. Use new O-rings.
2. Apply a small amount of clean engine oil to the O-rings before installing them.
3. Install the injector squarely into fuel distributor and gradually twist it.
4. Verify that the deposit is not to the holder inside of fuel distributor.
5. If there is, clean the holder inside by used to gasoline.



Fuel leakage test
1. Install the fuel hose.
2. Connect the data link connector terminals F/P and GND with a jumper wire.
3. Turn the ignition switch ON and check for fuel leaks from the fuel distributor.
4. If fuel leaks, check the injector O-ring and fuel distributor.



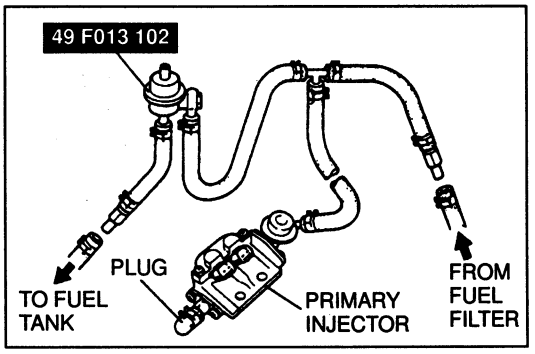
Air bleed socket installation
Align the tab of the air bleed socket with the notches in the intermediate housing.



Inspection
Injector resistance
1. Disconnect injector connector as shown in figure.
2. Measure the resistance of the injection with an ohmmeter.

Resistance: Approx. 13.8 Ω {20°C [68°F]}

3. If not as specified, replace the injector.

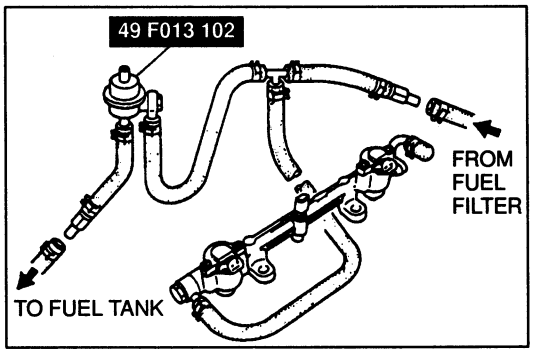


Fuel leakage test

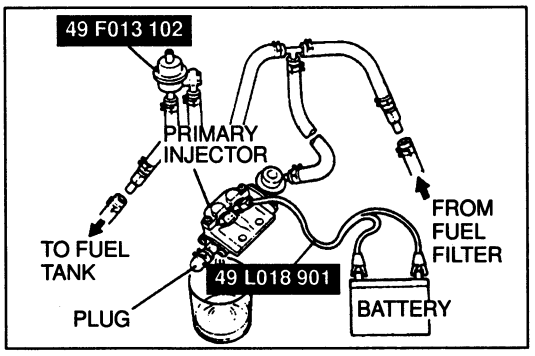
Warning
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

1. Remove the injector together with fuel distributor.
2. Connect the **SST** as shown in figure.
3. Connect the data link connector terminals F/P and GND with a jumper wire.
4. Turn the ignition switch ON and check for fuel leaks from the injector.

Fuel leakage: Less than 1 drop / 5 min.



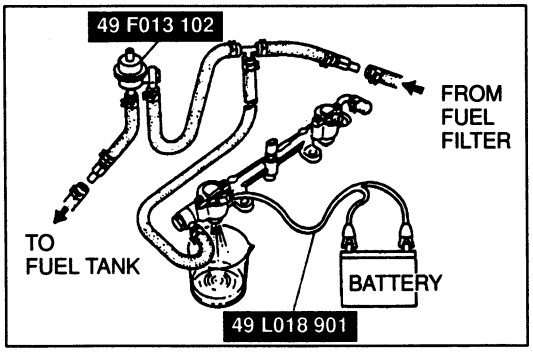
5. If not as specified, check the injector O-ring and fuel distributor contact face.
6. Install the injector.
7. Turn the ignition switch ON and check for fuel leaks from injector.
8. If not as specified, replace the injector.



Volume Test
1. Remove the injectors together with the fuel distributor.
2. Connect the **SST** as shown in 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. Check the injection volume with a graduated container.



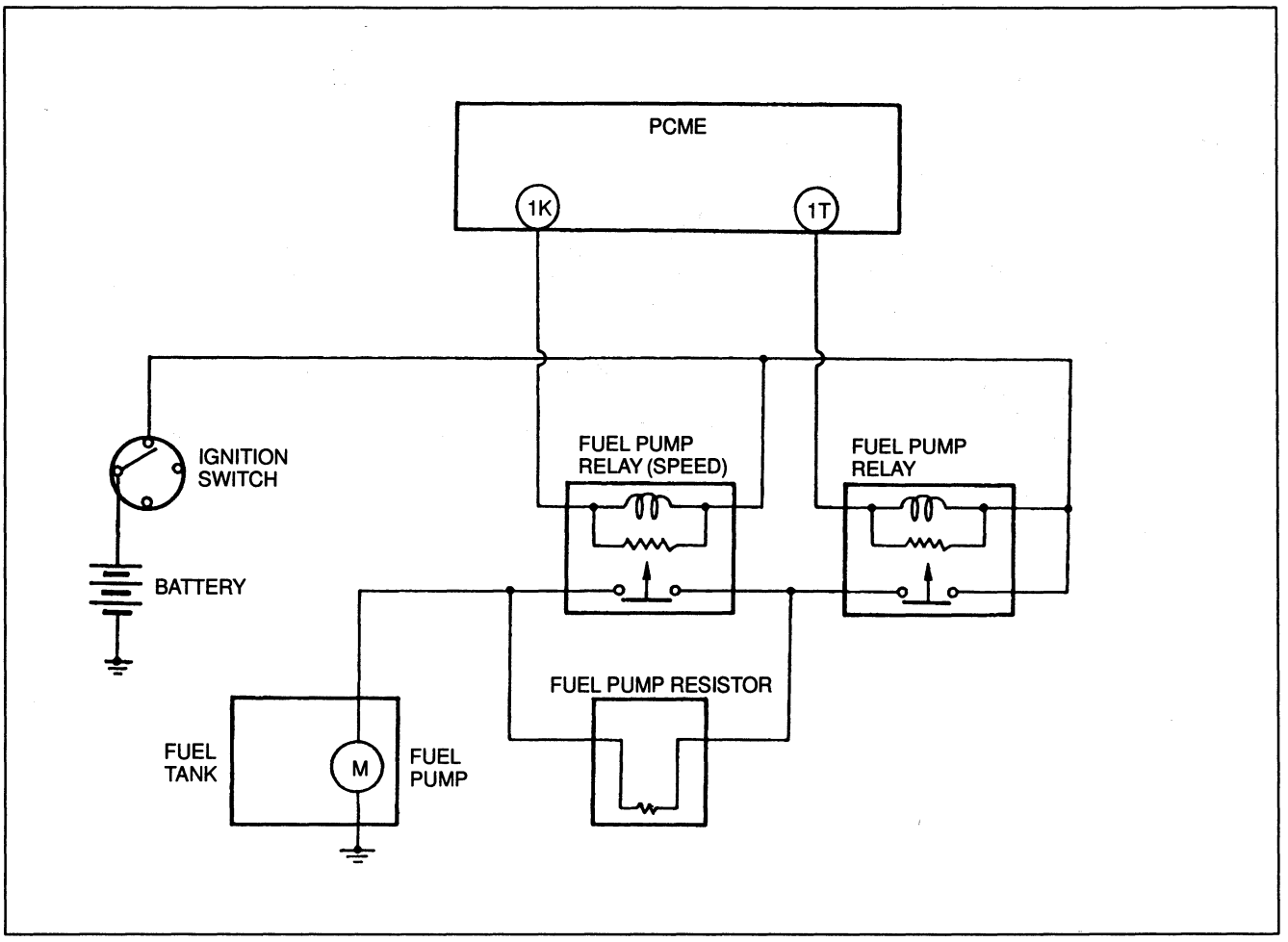
Injection volume
Primary injector:
128–147 ml {128–147 cc, 3.84–4.41 fl oz} / 15 sec.
Secondary injector:
198–227 ml {198–227 cc, 5.94–6.81 fl oz} / 15 sec.

4. If not as specified, replace the injector.

FUEL PUMP CONTROL SYSTEM

Description

- The PCME turns the fuel pump ON/OFF via the fuel pump relay. By controlling the fuel pump relay (speed), the PCME also controls fuel pump operation in two phases to improve fuel pump reliability and ensure the necessary fuel amount.



Fuel pump relay

- The fuel pump relay is controlled by the PCME and turns the fuel pump ON/OFF.

Fuel pump relay (speed)

- The fuel pump relay (speed) is controlled by the PCME and controls fuel pump operation voltage via the fuel pump resistor.

Fuel pump resister

- The fuel pump resister controls fuel pump operation voltage. During low-speed engine operation, fuel pump voltage is supplied via the fuel pump resistor.

Operation

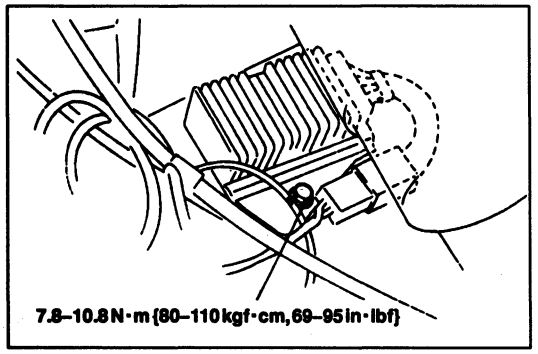
(1) In low-speed range (1K terminal of PCME is battery positive voltage)
  - The fuel pump is driven by voltage from the fuel pump resister.

(2) In high-speed range (1K terminal of is 0V)
  - The fuel pump is driven by battery positive voltage.

Operating conditions

The system operates when either of the following conditions is met.

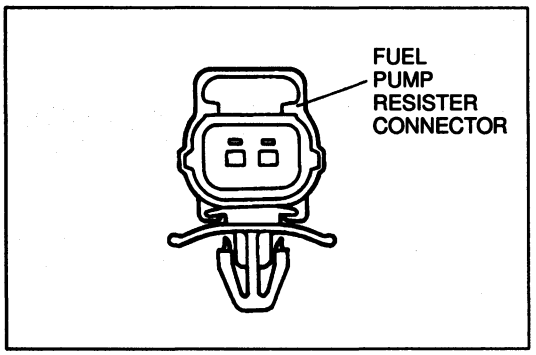
- During engine start-up
- Solenoid valve (pressure regulator control) operating
- High speed and heavy load



FUEL PUMP RESISTOR

Removal / Installation

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

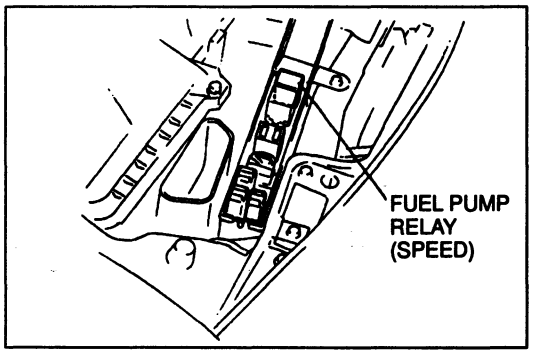


Inspection

1. Disconnect fuel pump resistor connector.
2. Measure resistance of the fuel pump resistor with an ohmmeter.

   Resistance 0.57–0.70 Ω {at 20°C [68°F]}

3. Replace the fuel pump resistor if necessary.

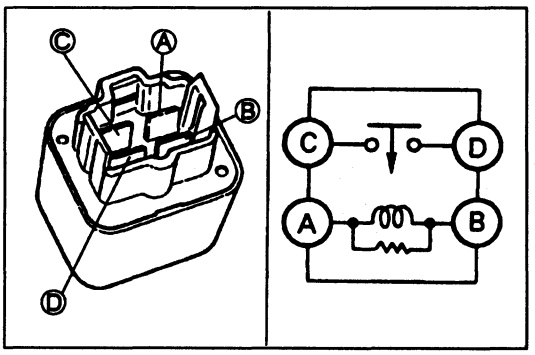


FUEL PUMP RELAY (SPEED)

Inspection

Operation check

Listen for operational sound of the fuel pump relay (speed) when ignition switch ON.



Continuity inspection

Check continuity between the terminals with ohmmeter.

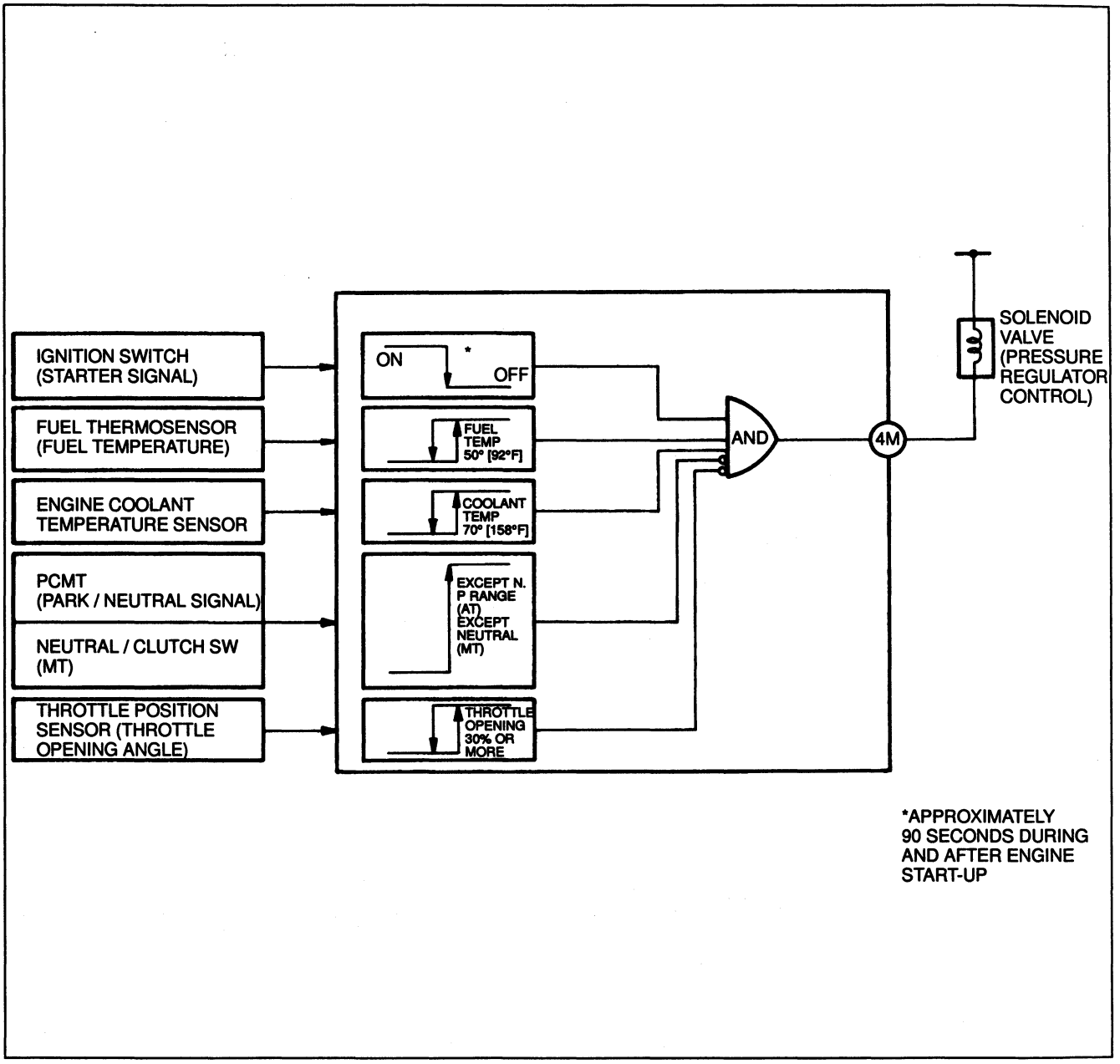
B+: Battery positive voltage

Terminal A–B	Terminal C–D
Apply B+	Yes
Not apply B+	No

PRESSURE REGULATOR CONTROL (PRC) SYSTEM

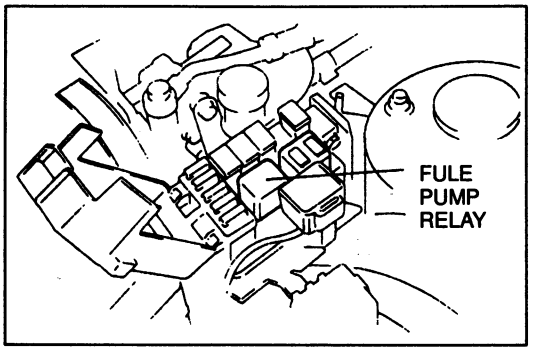
DESCRIPTION

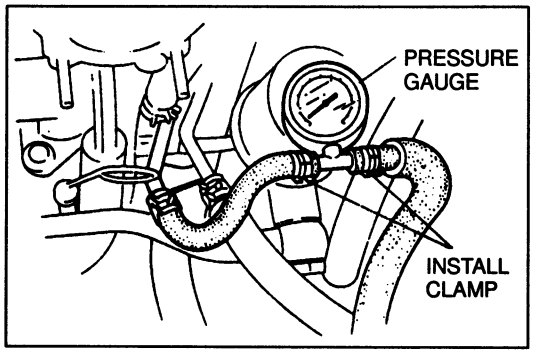
- This system cancels the vacuum applied to the pressure regulator and increases the fuel pressure during hot engine start-up and for a period immediately following engine start-up. This improves hot stanting as well as providing smooth idle.



Operation

To prevent vapor-lock during hot restart idle, vacuum to the pressure regulator is momentarily cut, and fuel injection pressure is increased.





SYSTEM OPERATION

Warning

- **Fuel line spills and leaks can be dangerous. Fuel can ignite and cause serious injuries or death and can damage the vehicle. Fuel can also irritate skin and eyes. To prevent this from happening, release the fuel pressure according to "Fuel Line Safety Procedures" on page F–95.**

1. Remove the fuel pump relay.
2. Connect a fuel pressure gauge to the main hose.
3. Connect the fuel pump relay.
4. Start the engine and run it idle.
5. Verify the fuel pressure.

Fuel line pressure
190–220 kPa {1.9–2.3 kgf/cm^2, 28–32 psi}

6. Short the PCME Terminal 4M and verify that fuel pressure.

Fuel line pressure
250–260 kPa {2.5–2.7 kgf/cm^2, 36–38 psi}

7. If not as specified, check the pressure regulator and solenoid valve.

EXHAUST SYSTEM

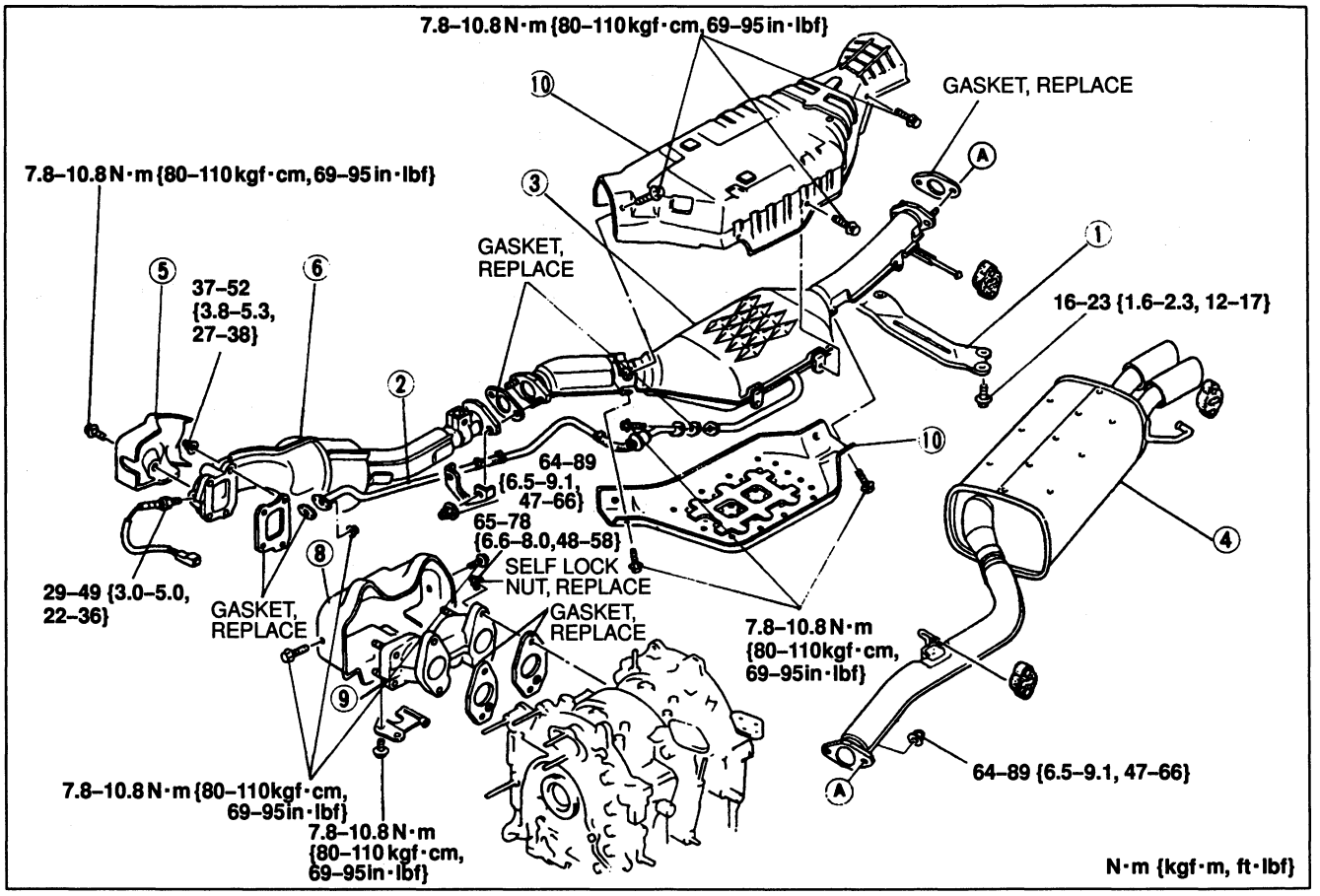
COMPONENT PARTS

Inspection (On-vehicle)

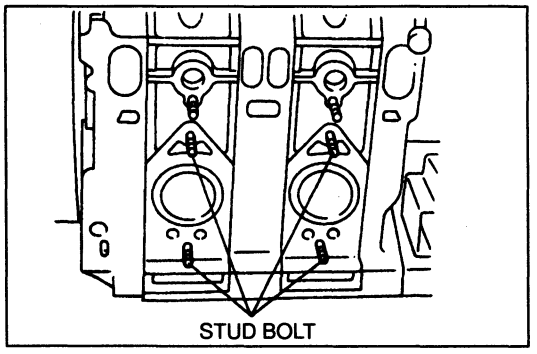
Start the engine and verify that there is no exhaust gas leakage from the exhaust system components.

Removal / Inspection / Installation

1. Remove in the order shown in the figure.
2. Check all parts and repair or replace if necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.



1. Braket
2. Secondary air pipe.
   Inspect for deterioration and restriction.
3. Three-way catalyst
   Inspect for deterioration and restriction.
4. Main silencer
   Inspect for deterioration and restriction.
5. Insulator
6. Warm-up three-way catalyst
   Inspect for deterioration and restriction.
7. Turbocharger
   Removal ..... Refer to page F–89
8. Insulator
9. Exhaust manifold
   Inspect for deterioration and restriction.
10. Insulatior



Installation Note

Check the stud bolt tighting torque before installing exhaust manifold.

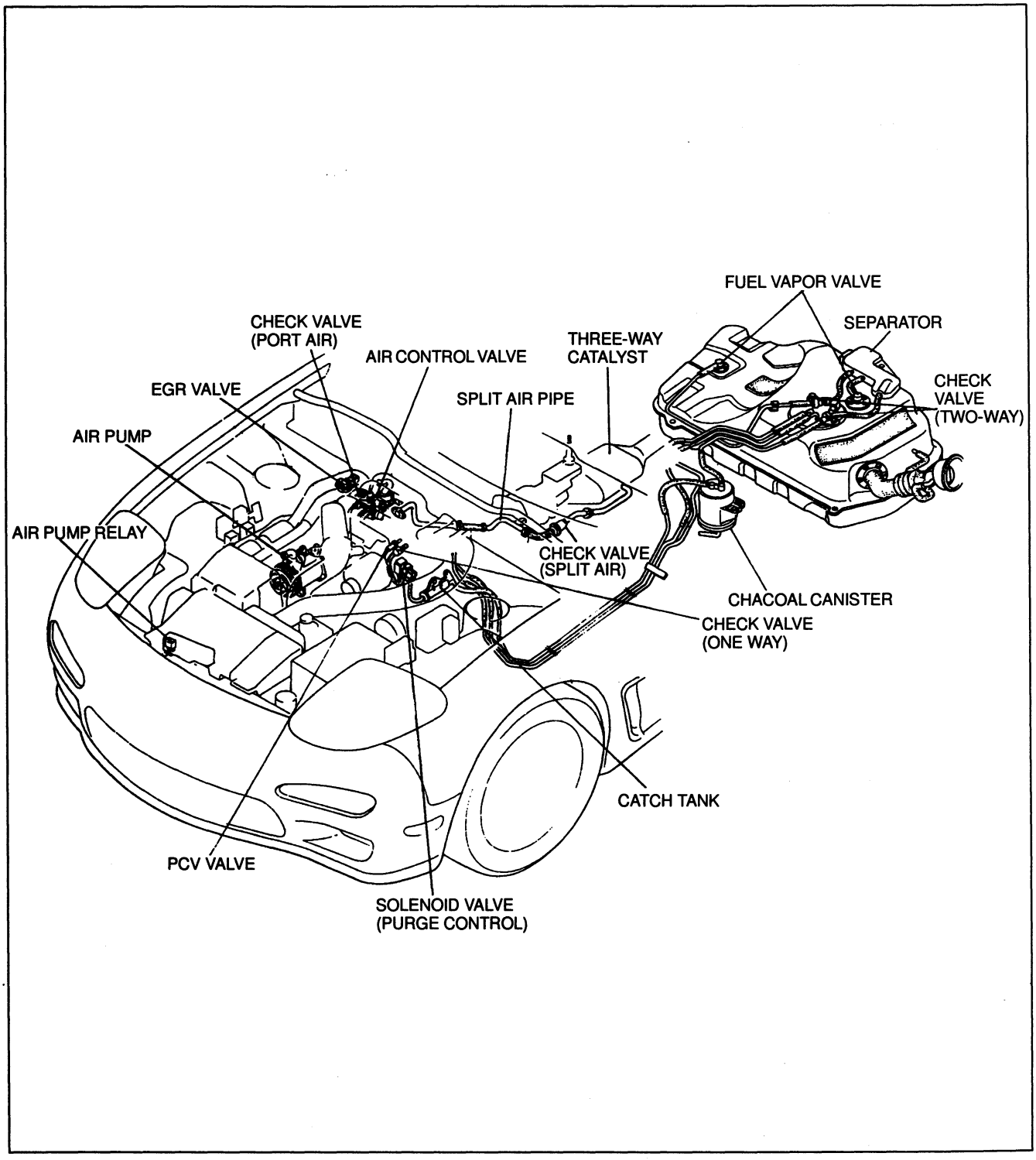
Tighting torque:
30–35 N·m {3.0–3.6 kgf·m, 22–26 ft·lbf}

OUTLINE OF EMISSION SYSTEM

STRUCTURAL VIEW

The following systems are employed to reduce CO, HC, and NOx emissions.

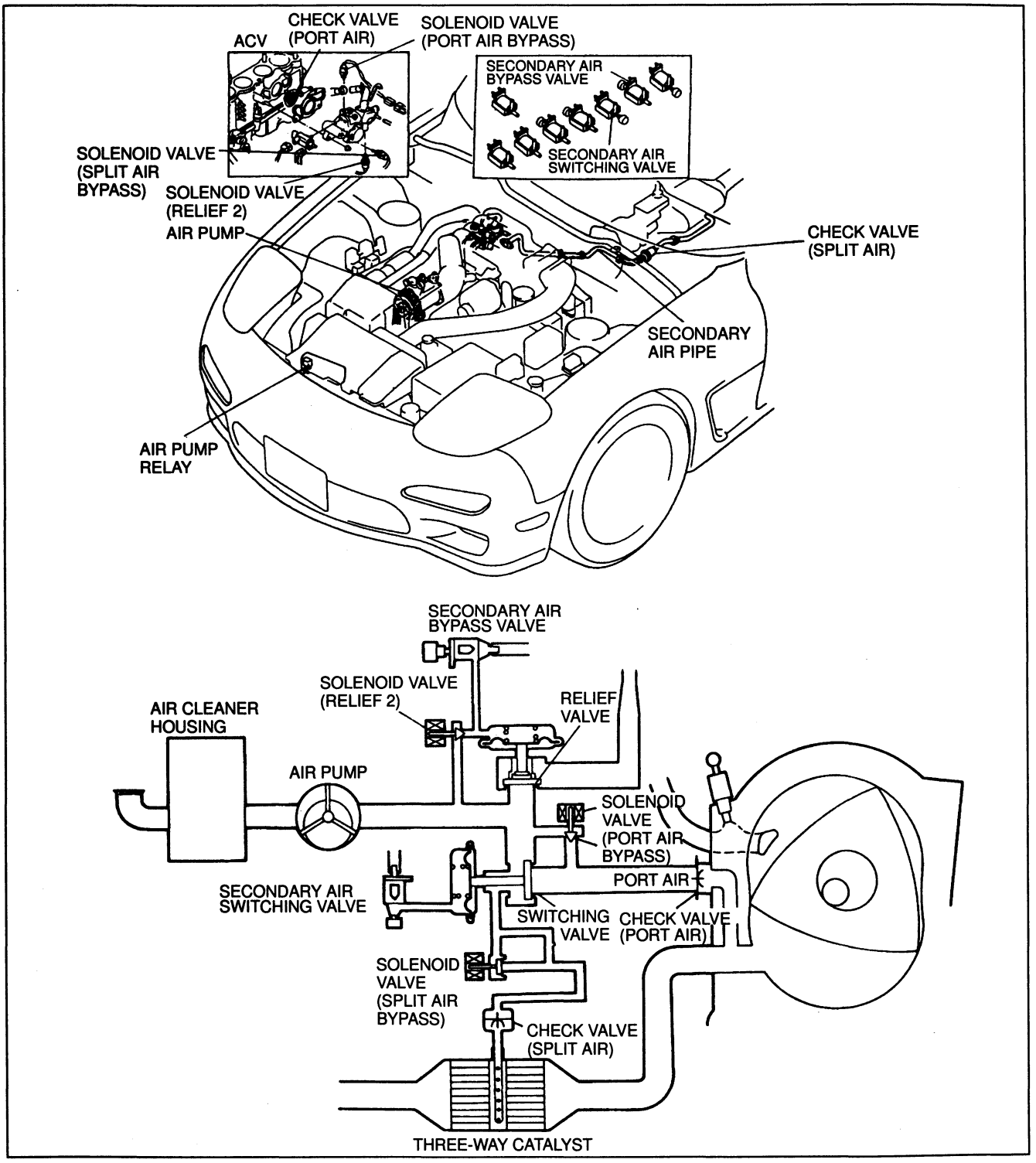
1. Secondary air injection
2. Positive crankcase ventilation system
3. Fuel evaporative system
4. Three-way catalyst
5. Deceleration control system
6. Exhaust gas recirculation



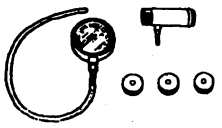
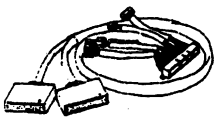
SECONDARY AIR INJECTION

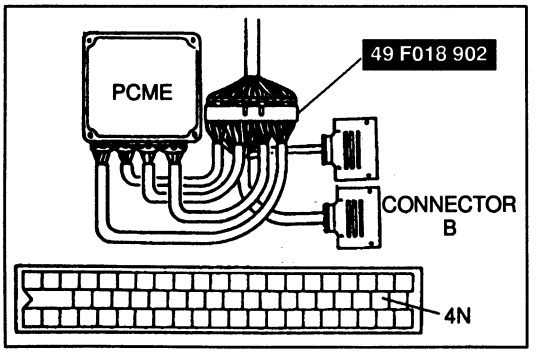
DESCRIPTION

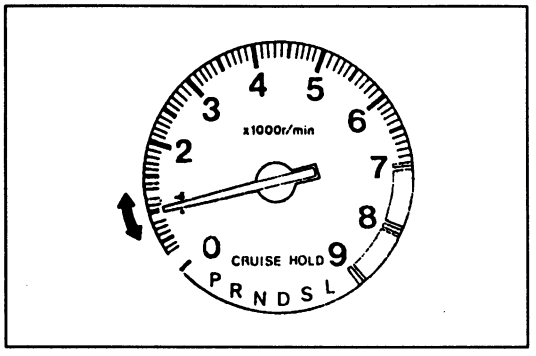
The secondary air injection helps to clean the exhaust gas by introducing fresh air into the exhaust port or three-way catalyst in relation to the during condition.
The PCME controls secondary air by actuating the solenoid valves (secondary air switching, secondary air bypass, relief 2, port air bypass, split air bypass) and the air pump relay.
This system consist of an air control valve (ACV), three way solenoid valves, air pump relay and powertrain control module (engine).

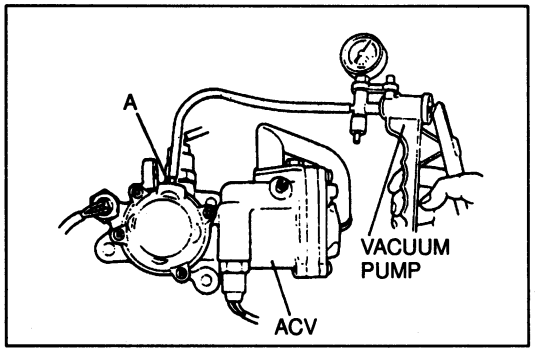


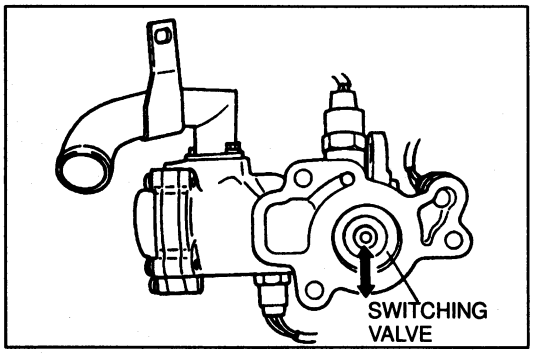
PREPARATION
SST

49 2113 011B Air pump gauge set 	For inspection of air pump	49 F018 902 Adapter harness 	For inspection of solenoid valve









AIR CONTROL VALVE (ACV)

Switching Valve

System operation

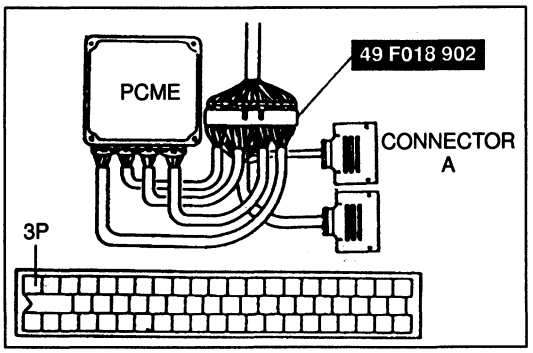
1. Connect the **SST** (Engine Signal Monitor Adapter Harness) to the PCME as shown.
2. Start the engine and run it idle.
3. Short the PCME terminal 4N and verify that the engine condition change (idle roughing).
4. If the engine condition does not change, check the following below.
   - Vacuum tube
     Inspect the vacuum line fitting, connections and components for leaks. (Refer to page F-10)
   - Secondary air switching valve
     Inspection (Refer to page F-176)
   - Air relief valve
     Inspection (Refer to page F-118)
   - Air pump
     Inspection (Refer to page F-121)
   - Air pump relay
     Inspection (Refer to page F-123)

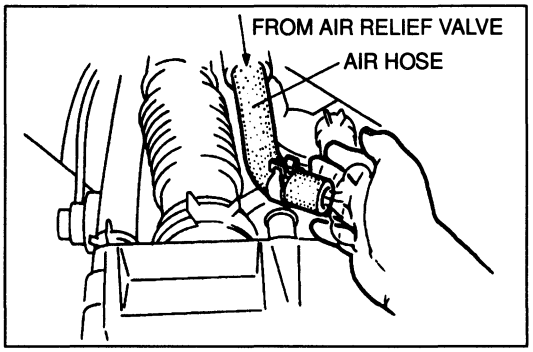
Inspection

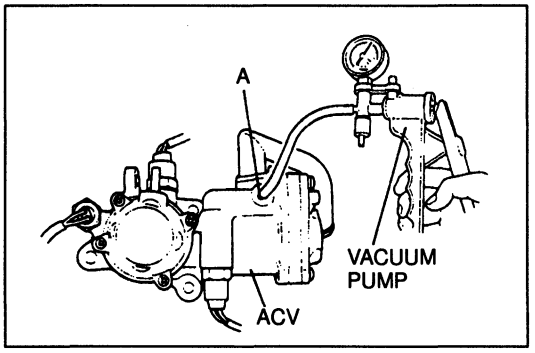
1. Remove the air control valve. (Refer to page F-119.)
2. Connect a vacuum pump to port A.
3. Verify that the switching valve opens at a vacuum **14.7 kPa {110 mmHg, 4.3 inHg}.**

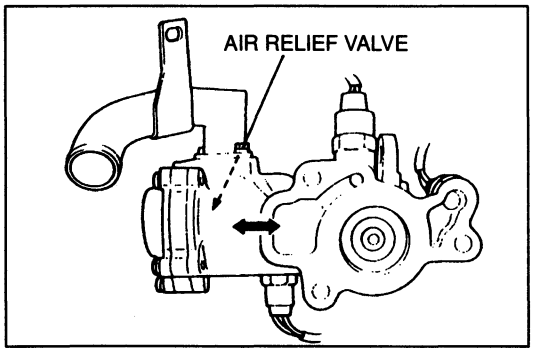
   Caution
   - **Applying vacuum greater than 66.7 kPa {500 mmHg, 19.7 inHg} can damage the air control valve.**

4. If not as specified, replace air control valve.
   (Refer to page F-119.)









Air Relief Valve
System operation
Engine Signal Monitor

1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the PCME as shown.
2. Start the engine and run it idle.
3. Verify that air does not flows from air relief Valve.
4. Short the PCME terminal 3P and verify that the air flows from air relief valve.
5. If the air does not flow, check the following condition below.
   - Vacuum tube
     Inspect the vacuum line fitting, connections and components for leaks. (Refer to page F-10)
   - Secondary air bypass valve
     Inspection (Refer to page F-176)
   - Air pump
     Inspection (Refer to page F-121)
   - Air pump relay.
     Inspection (Refer to page F-123)

Inspection

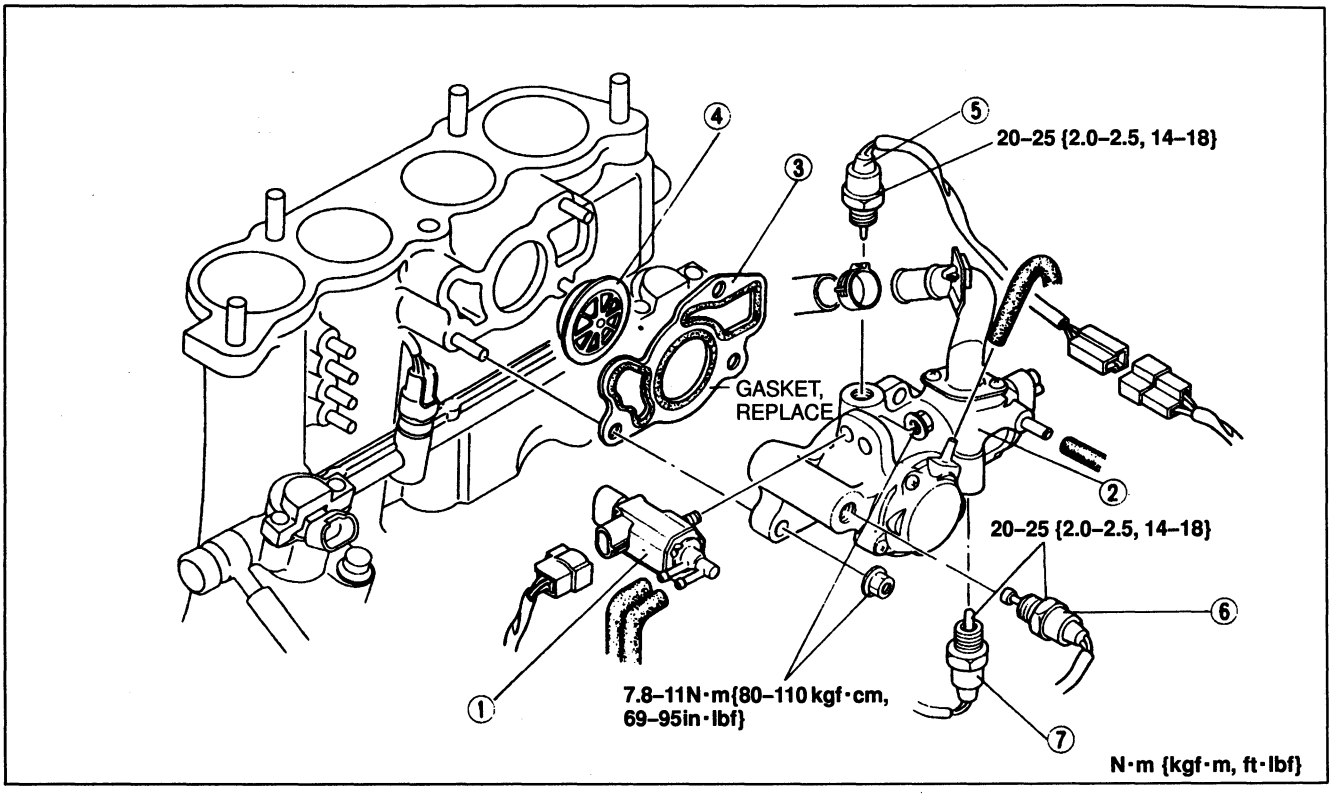
1. Remove the air control valve. (Refer to page F-119.)
2. Connect a vacuum pump to port A.
3. Verify that the air relief valve opens at a vacuum **19.3 kPa {145 mmHg, 5.7 inHg}**.

   Caution
   - **Applying vacuum greater than 66.7 kPa {500 mmHg, 19.7 inHg} can damage the air control valve.**

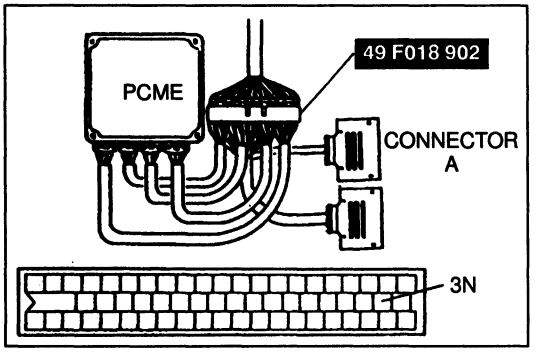
4. If not as specified, replace air control valve.

Removal / Installation

1. Remove the extension manifold. (Refer to page F-76.)
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.



1. Solenoid valve (Turbo control)
   Inspection ..... page F-176
2. Air control valve
3. Gasket
4. Check valve (Port air)
   Inspection ..... page F-120
5. Solenoid valve (Port air bypass)
   Inspection ..... below
6. Solenoid valve (Split air bypass)
   Inspection ..... page F-120
7. Solenoid valve (Relief2)
   Inspection ..... page F-123



SOLENOID VALVE (PORT AIR BYPASS)

System Operation

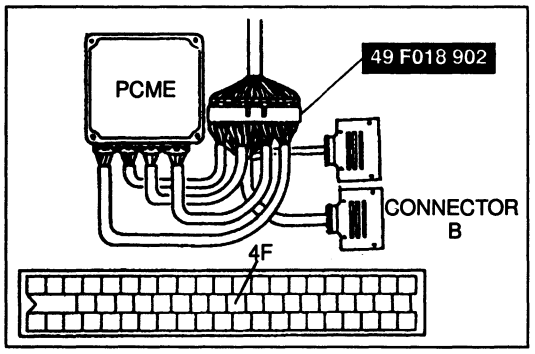
1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the PCME.
2. Turn ignition switch ON.
3. Short the PCME terminal 3N and verify that the operational sound is heard.

Inspection

1. Disconnect the solenoid valve (Port air bypass) connector.
2. Measure the solenoid valve resistance with an ohmmeter.

   Resistance: 26.6–32.6 Ω (20°C [68°F])

3. If not as specified, replace solenoid valve. (Above)



SOLENOID VALVE (SPLIT AIR BYPASS)

System Operation

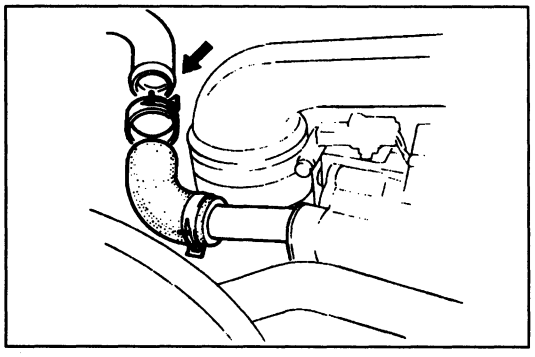
1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the PCME.
2. Turn ignition switch ON.
3. Short the PCME terminal 4F and verify that the operational sound is heard.

Inspection

1. Disconnect the solenoid valve.
2. Measure the solenoid valve resistance with an ohmmeter.

   Resistance: 27–32 Ω {20°C [68°F]}

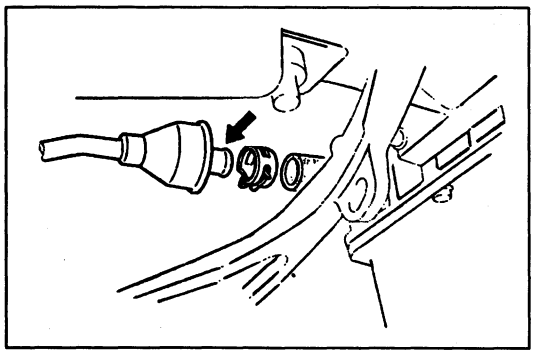
3. If not as specified, replace solenoid valve. (Refer to page F–119.)



CHECK VALVE (PORT AIR)

Inspection

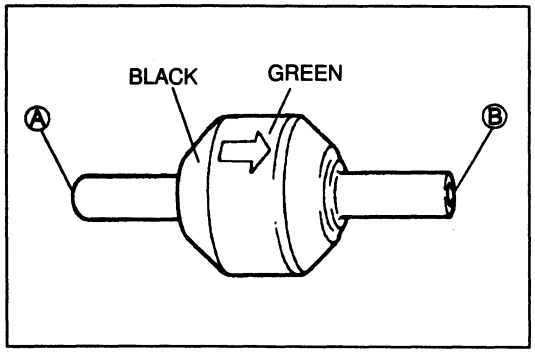
1. Disconnect the air hose (From air pump to air control valve) at the air control valve.
2. Start the engine and run it idle.
3. Verify that the exhaust gas does not flow from air control valve.
4. If the exhaust gas flows from air control valve, replace the check valve (port air). (Refer to page F–119.)



CHECK VALVE (SPLIT AIR)

Inspection

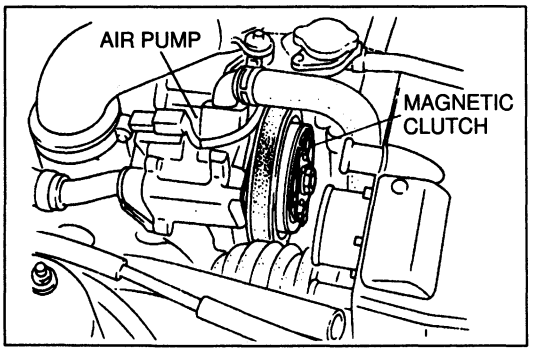
1. Disconnect the air hose (From air control valve to air pipe) at the air pipe.
2. Start the engine.
3. Increase the engine speed to 2,000 rpm and verify that the exhaust gas does not flow from split air pipe.
4. If not as specified, replace the check valve (Spilit air).



CHECK VALVE

Inspection

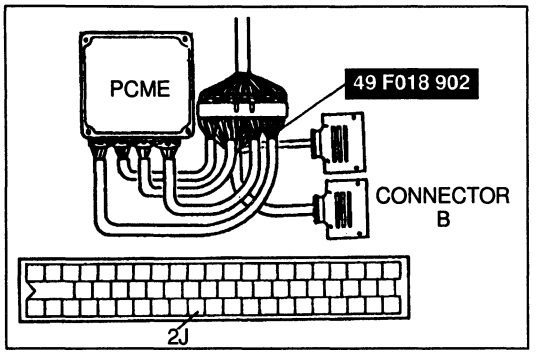
1. Remove the check valve.
2. Blow through A and verify that air flows from B.
3. Blow through B and verify that air does not flow from A.



AIR PUMP

System Operation

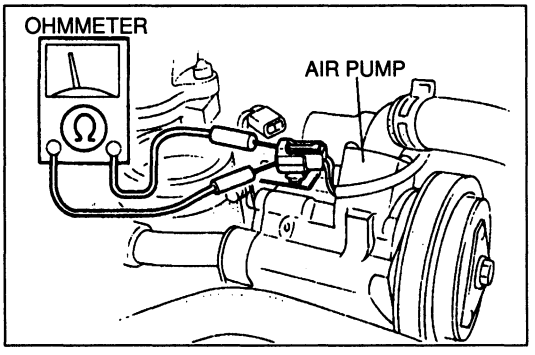
1. Start the engine.
2. Increase the engine speed to above 3250 rpm and verify that the air pump magnetic clutch OFF.



Inspection

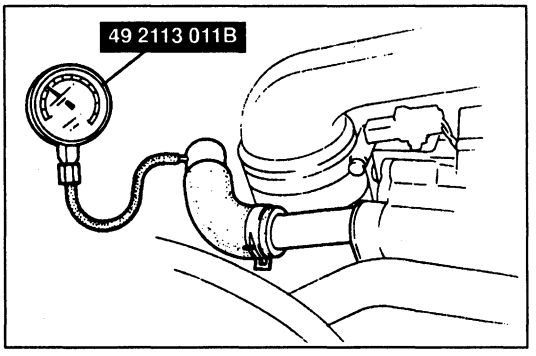
Magnetic clutch

1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the PCME.
2. Turn ignition switch ON.
3. Short the PCME terminal 2J and verify that the magnetic clutch OFF.
4. If the magnetic clutch does not OFF, check the air pump relay. (Refer to page F-123.)
5. If the relay is OK, disconnect the air pump connector and check the continuity.
6. If not as specified, replace the air pump.



Continuity

1. Disconnect the air pump connector.
2. Check for continuity between terminals.
3. If no continuity, replace the air pump.



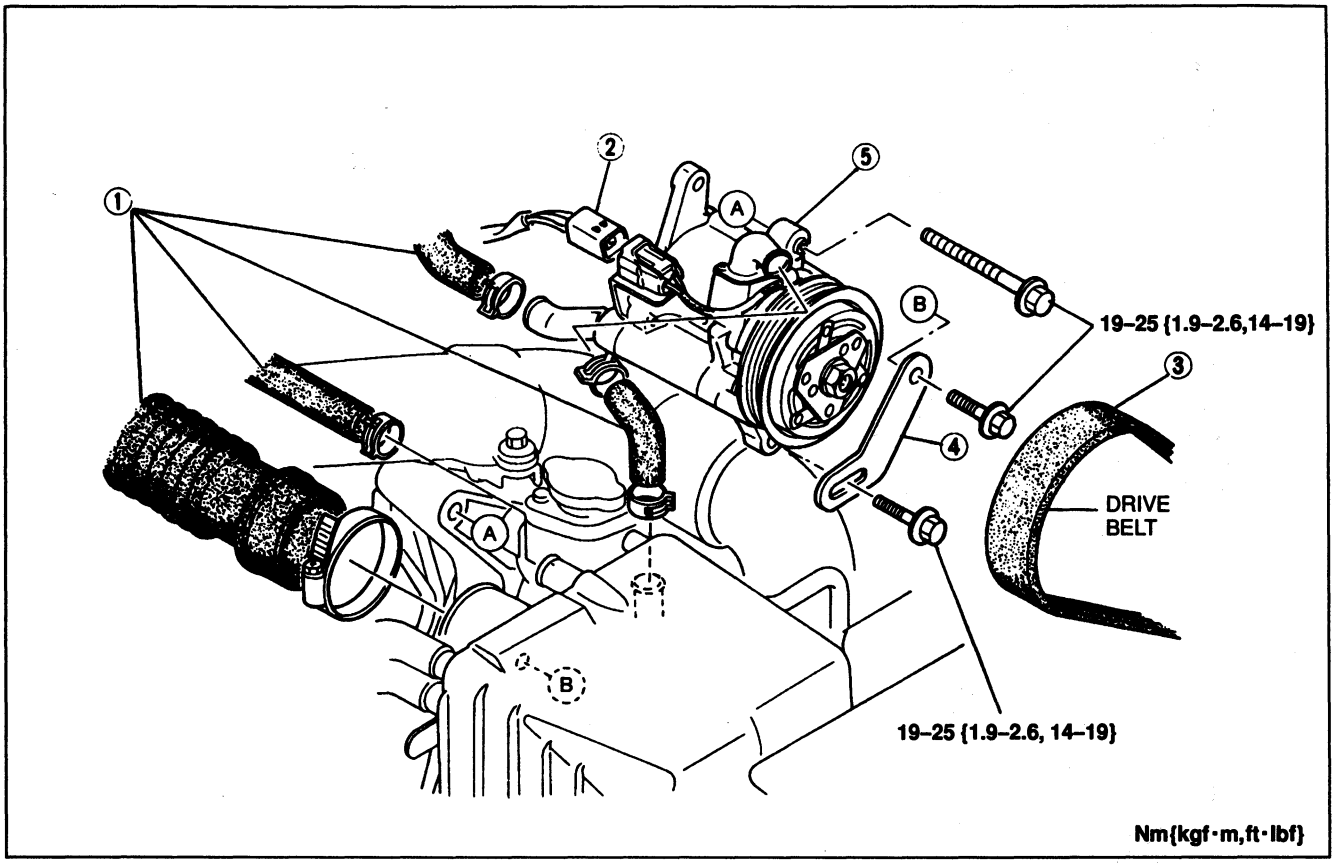
Pressure

1. Disconnect air hose (from air control valve to air pump) at the air control valve.
2. Connect the **SST** to the air hose.
3. Start the engine and run it idle.
4. Measure the pressure.

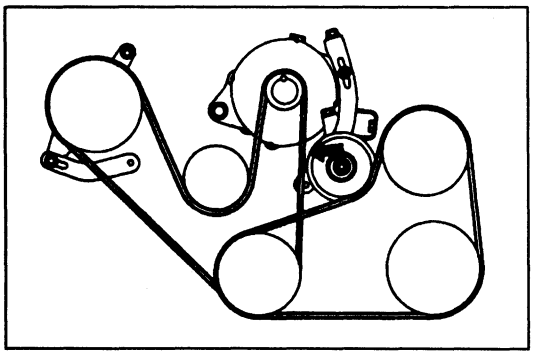
Pressure
More than 4.9 kPa {0.05 kgf/cm^2, 0.7 psi}

5. If not as specified, replace the air pump.

Removal / Installation
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.

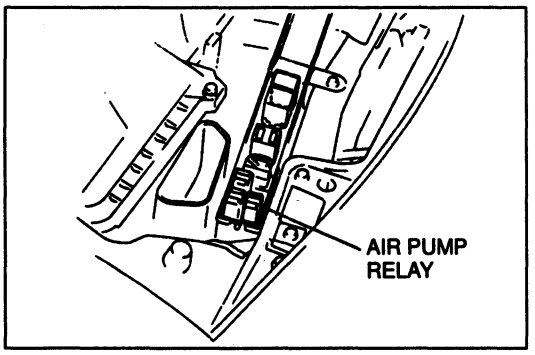


1. Air hoses
2. Connector
3. Drive belt
   Inspection ..... below
4. Braket
5. Air pump
   Inspection ..... page F–121



AIR PUMP DRIVE BELT
Inspection
1. Check the drive belt for cracks deterioration or oil contamination.
2. Replace if necessary.
3. If the belt is noisy, check for loose or misaligned pulleys.

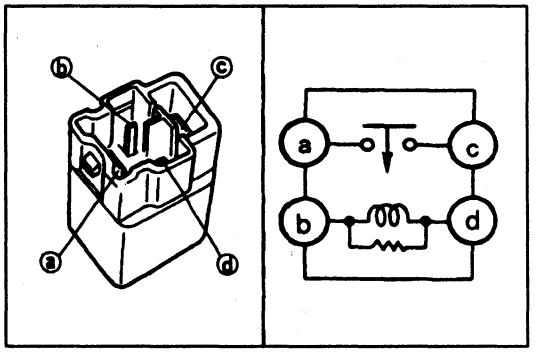
Adjustment
Refer to section C.



AIR PUMP RELAY

Inspection (On-vehicle)

Check that a "clicking" sound is heard at the Air pump relay when turning the ignition switch ON and OFF.

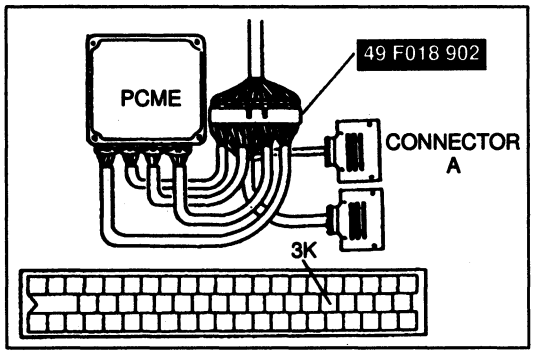


Inspection

1. Disconnect the air pump relay.
2. Apply Battery positive voltage and ground to terminals B and D of the relay.
3. Check continuity of the relay.

B+: Battery positive voltage

Operation	A–C terminals
B+ Applied	Continuity
B+ Not applied	No continuity



SOLENOID VALVE (RELIEF2)

System Operation

Engine Signal Monitor

1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the PCME.
2. Turn ignition switch ON.
3. Short the PCME terminal 3K and verify that the operation sound is heard.

Inspection

1. Disconnect the solenoid valve. (Refer to page F–119.)
2. Measure the solenoid valve resistance with an ohmmeter.

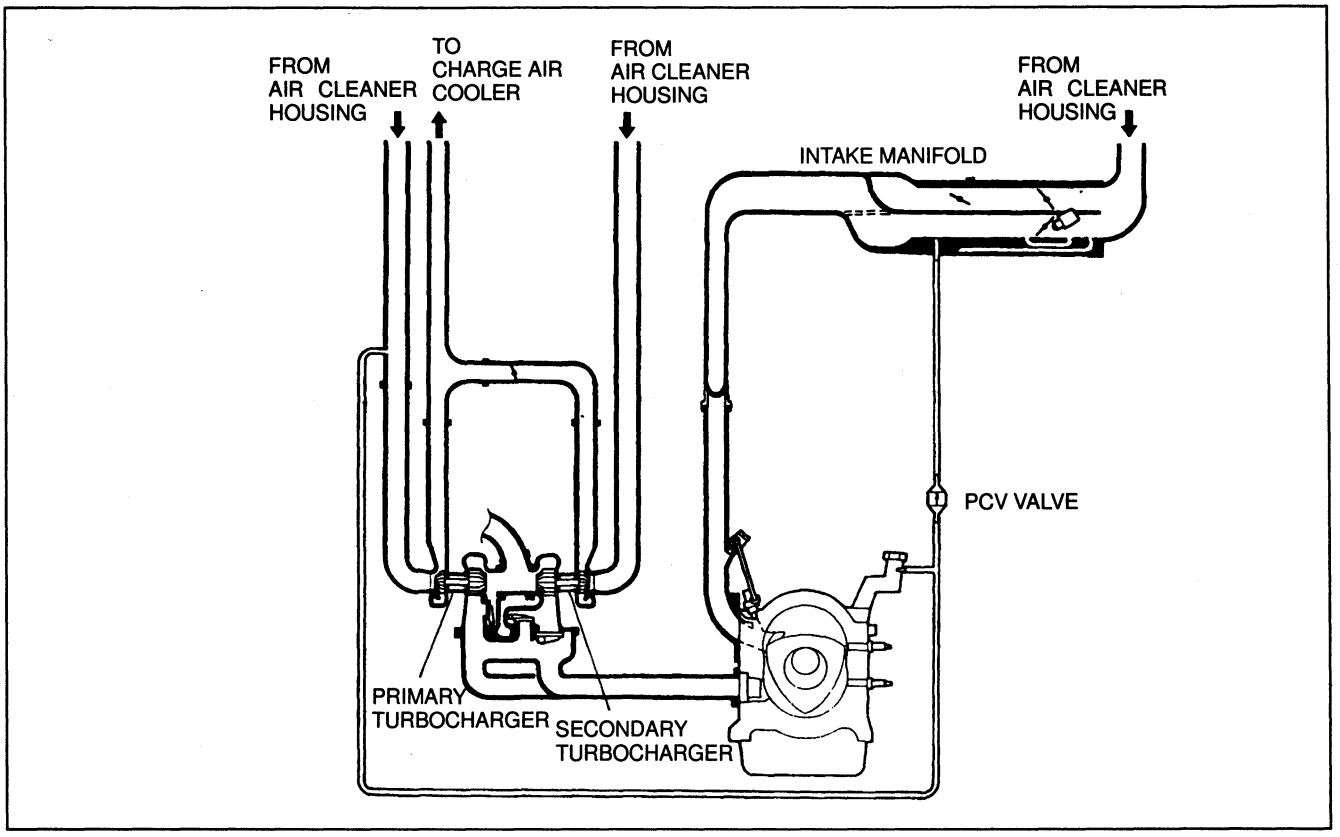
Resistance 27–32 Ω {20°C [68°F]}

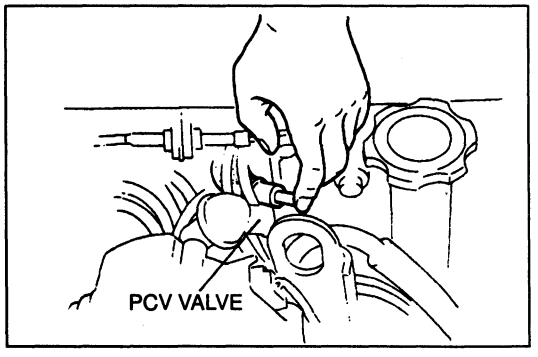
3. If not as specified, replace solenoid valve. (Refer to page F–119.)

POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

DESCRIPTION

The PCV valve is operated by the intake manifold vacuum.
When the engine is running at idle, the PCV valve is opened slightly and a small amount of blow by 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 blow by gas to be drawn into the intake manifold.

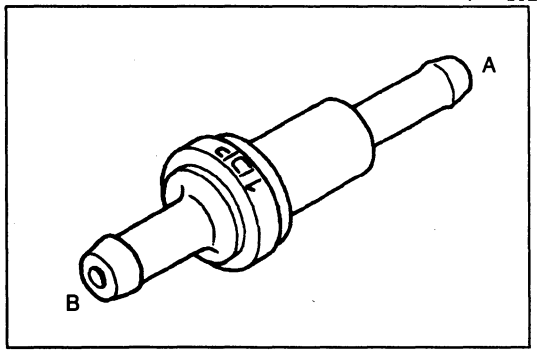




PCV VALVE

Inspection

1. Warm up the engine to the normal operating temperature and run it at idle.
2. Disconnect the PCV valve with the ventilation hose.
3. Block the PCV valve opening.
4. Verify that vacuum is felt.

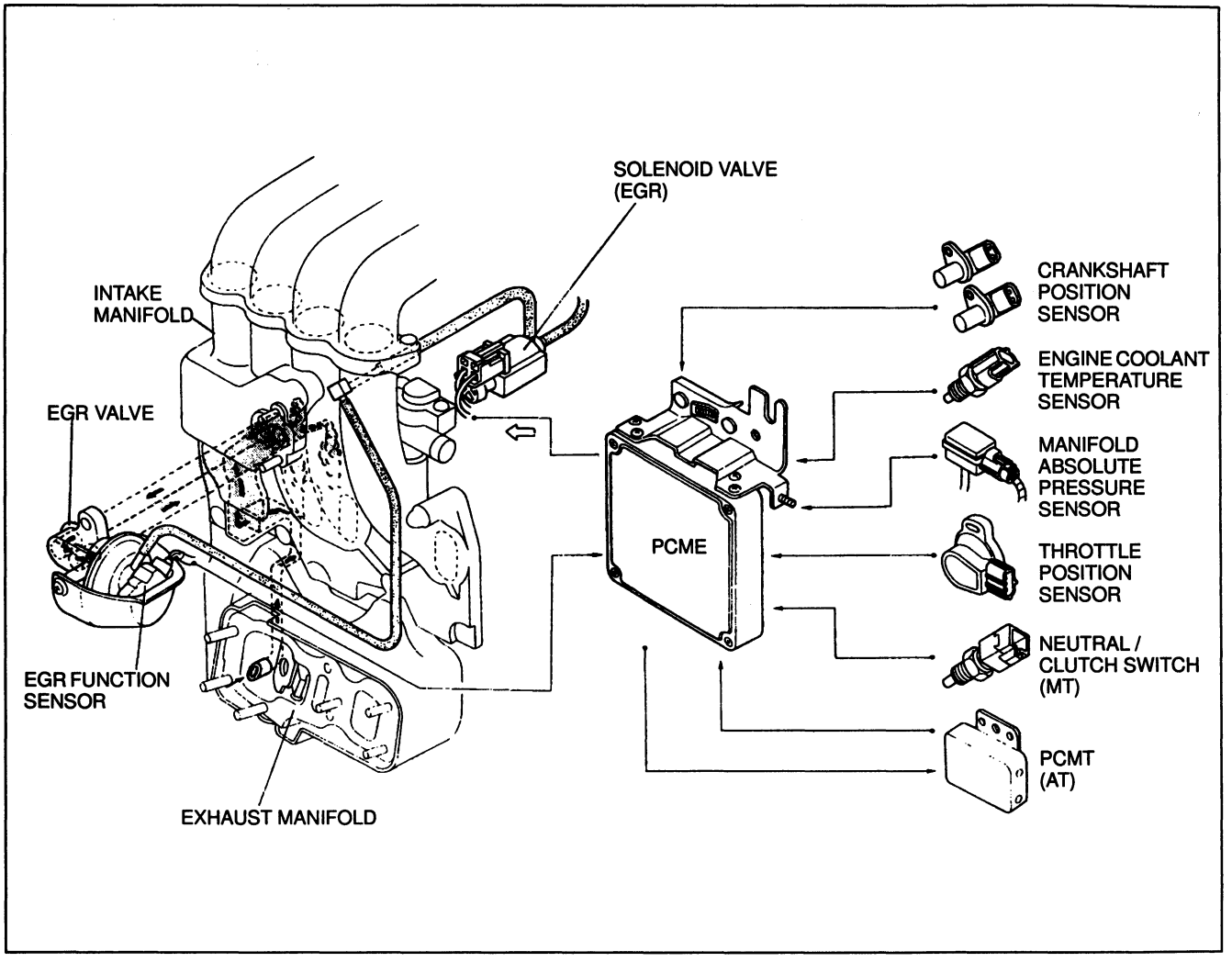


5. Remove the PCV valve.
6. Blow through the valve from port A and verify that air comes out of port B.
7. Blow through the valve from port B and verify that no air comes out of port A.
8. Replace the PCV valve if necessary.

EXHAUST GAS RECIRCULATION (EGR)

DESCRIPTION

This system recirculates a small amount of exhaust gas into the intake manifold to reduce the combustion temperature, and reduce NOx emissions.
This system consists of the EGR valve, EGR function sensor, solenoid valve, PCME and input devices.



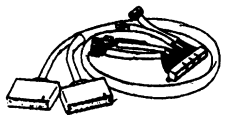
Operation

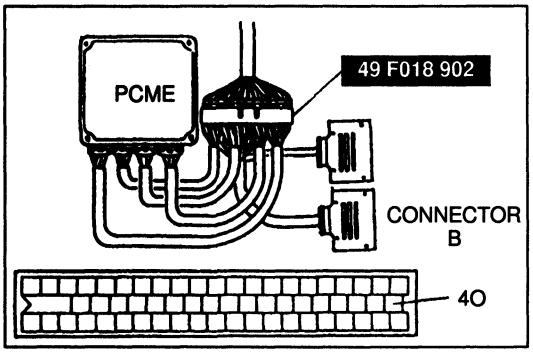
Cold engine (Engine coolant temperature: below 70°C [158°F])
EGR operation is stopped to improve drivabilty when the engine is cold.

Warm engine
The PCME controls the solenoid valve to supply EGR gases as described below.

Operating condition	EGR operation	Remark
Idle	Stopped	—
Deceleration		
High engine speed		Above 3850 rpm
Heavy load		—
Others	Supplied EGR gas	• MT 5th gear, AT OD position • Engine speed above 1700 rpm

PREPARATION
SST

49 F018 902 Adapter harness		For inspection of solenoid valve

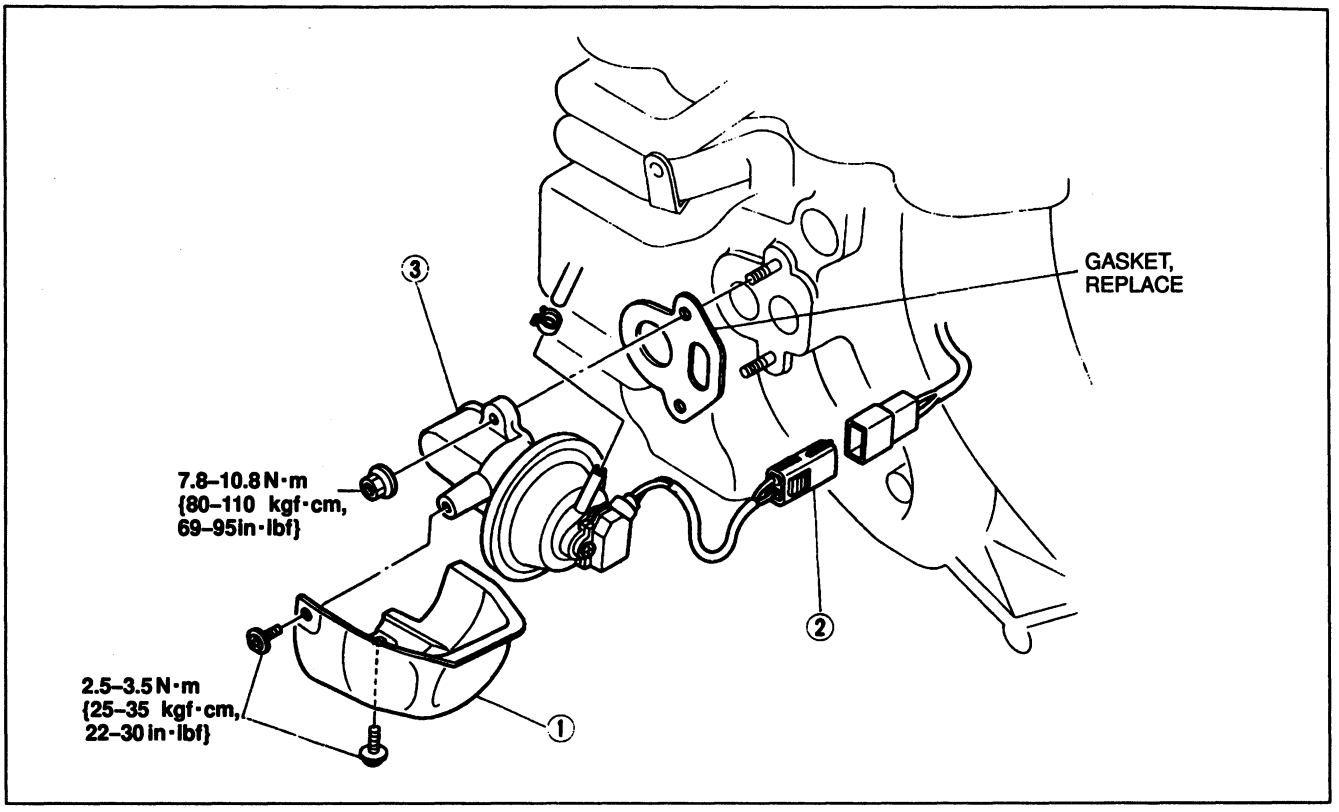


SYSTEM OPERATION
1. Connect the **SST** (Engine Signal Monitor Adaptor Harness) to the PCME as shown.
2. Start the engine.
3. Accelerates the engine and verify that PCME terminal 4O voltage B+ while the engine is still cold.
4. Warm up the engine to normal operating temperature and run it at idle.
5. Short the PCME terminal 4O and verify that the engine runs roughly or stalls at idle.

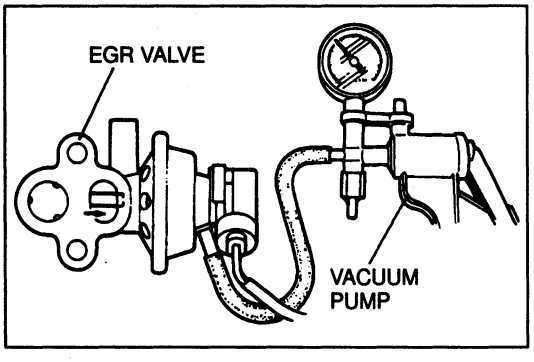
EGR VALVE

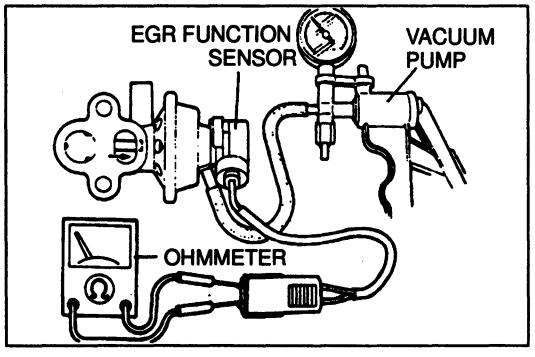
Removal / Installation

1. Remove the intake air system component parts. (Refer to page F-76.)
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.



1. Insulator
2. Connector
3. EGR valve
   Inspection ..... below





Inspection

1. Connect a vacuum pump as shown and apply vacuum.
2. Verify that the EGR valve moves at more than the specified vacuum.

   Specification:
   11–15.3 kPa {85–115 mmHg, 3.3–4.5 inHg}

3. If not as specified, replace EGR valve.

EGR FUNCTION SENSOR

Inspection

1. Remove the EGR valve. (Refer to above)
2. Connect a ohmmeter between the terminals.
3. Connect a vacuum pump as shown and apply vacuum.
4. Verify that the EGR function sensor ON (continue) at more than the specified vacuum.

   Specification:
   11–15.3 kPa {85–115 mmHg, 3.3–4.5 inHg}

5. If not as specified, replace EGR valve.

SOLENOID VALVE (EGR)

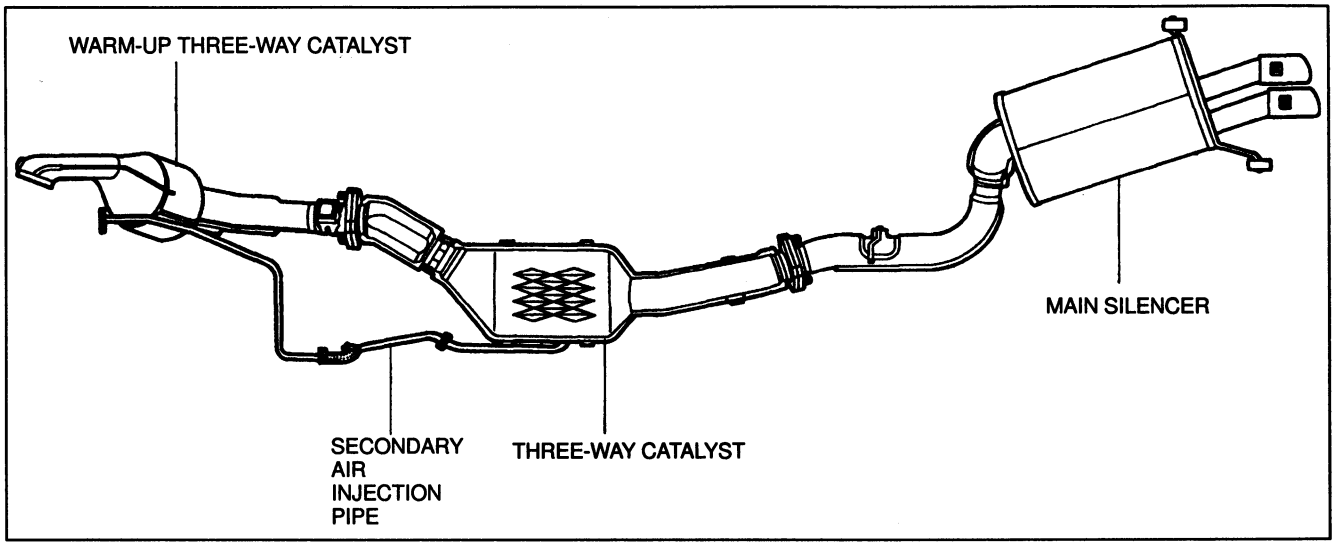
Inspection

(Refer to page F-176)

THREE-WAY CATALYST SYSTEM

DESCRIPTION

Two bets three-way catalysts are used to reduce CO, HC, and NOx emissions. For efficient operation, the warm-up three-way catalyst is placed close to the exhaust manifold so that it will heat up quickly and purify exhaust gas efficiently when engine runs at idle.



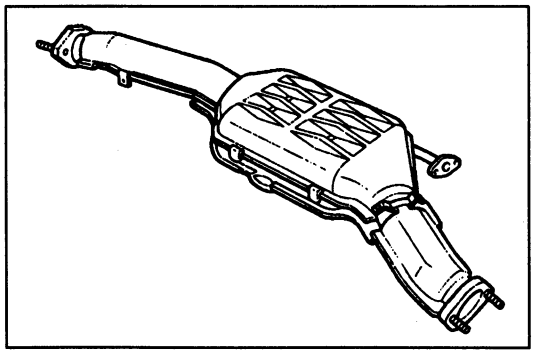
The three-way catalysts reduce CO and HC, emissions through oxidization and NOx emissions by chemical reaction.

Three-way catalyst	Type
Warm-up three-way catalyst	Metal
Three-way catalyst	Monotythic

Operation

(1) Before the engine is warmed up, when large amounts of CO and HC are ceated, the three-way catalyst is supplied port air and uses both the first and second stages as the oxidization catalyst.
(2) In the normal driving range, the three-way catalyst is supplied split air and uses the first stage as the ternary catalyst and second stage as the oxidization catalyst.
(3) During high-speed driving, an additional air to the three-way catalyst is cut off, and the first and second stages are used the ternary catalyst.

	First stage	Second stage	Remark
Port air	Oxidation	Oxidation	Low-speed range, Deceleration range
Split air	Ternary	Oxidation	Cruising range
Air cut	Ternary	Ternary	High-speed range



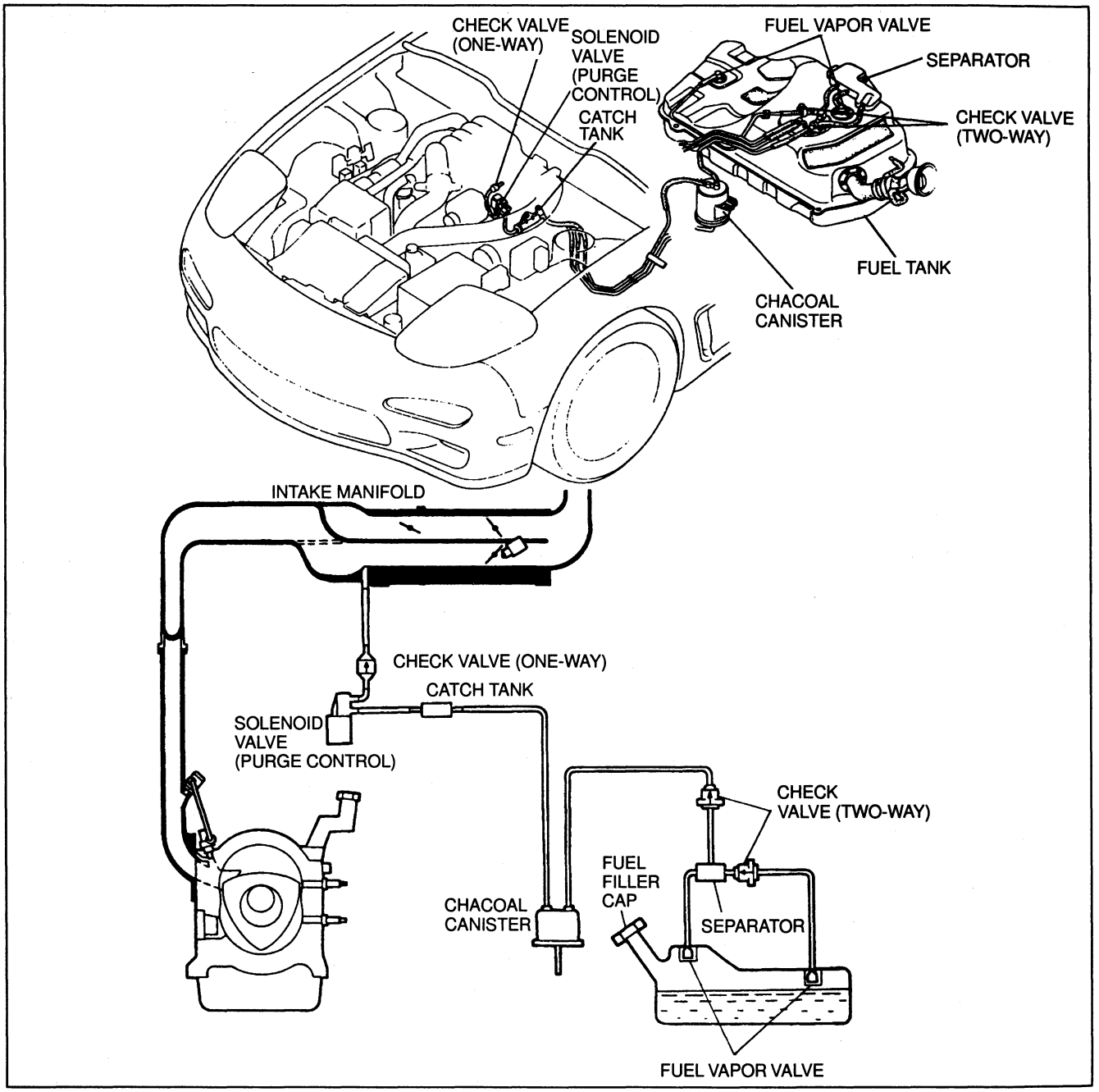
THREE-WAY CATALYST (WARM-UP THREE-WAY CATALYST AND THREE-WAY CATALYST)

Inspection

1. Check the three-way catalyst for deterioration or clogging.
2. Check the insulation covers welded onto the three-way catalyst for damage.
3. Excessive heat will occur at the floor if the insulation cover is touching the three-way catalyst.

FUEL EVAPORATIVE SYSTEM

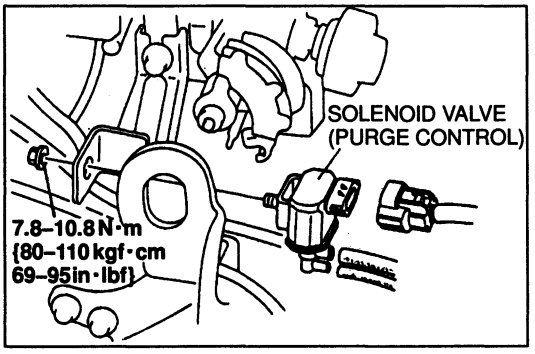
DESCRIPTION



The fuel evaporative system temporarily stores in the canister the evaporative fumes generated in the fuel tank. The stored gas is then passed into the air intake system for combustion when the engine is running. This operation prevents evaporative fumes from flowing out to the atmosphere.
Sending a large volume of evaporative fumes at one time into the air intake system deteriorates the air fuel ratio; thus, the PCME uses the solenoid valve (purge control) to regulate this volume.

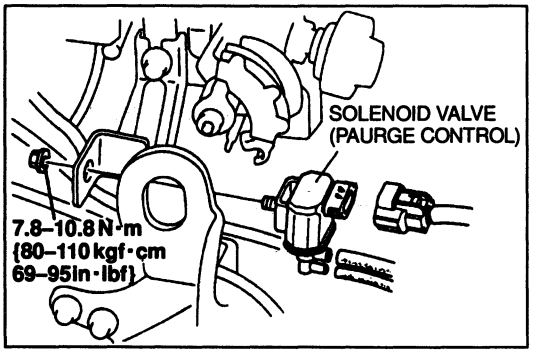
Operation

With engine stopped and no load applied
The evaporative fumes from the fuel tank are absorbed by the charcoal canister.
With engine running and load applied
The evaporative fumes absorbed by the charcoal canister are drawn into the engine via the solenoid valve (purge control). The volume of fumes drawn depends on engine conditions.



SYSTEM OPERATION

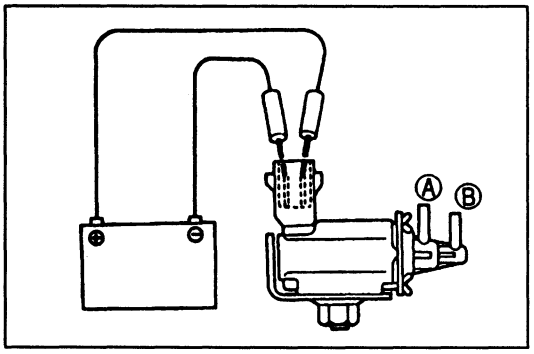
1. Warm up the engine to normal operating temperature and run it at idle.
2. Disconnect the vacuum hose from the solenoid valve (purge control) as shown in the figure, and verify that no vacuum is felt at the solenoid valve.
3. If not as specified, check the solenoid valve.



SOLENOID VALVE (PURGE CONTROL)

Removal / Installation

1. Disconnect the vacuum hoses and connector from solenoid valve.
2. Remove the mounting nuts and solenoid valve.
3. Install in the reverse order of removal.

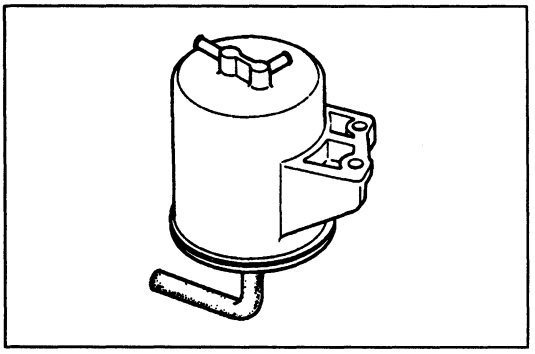


Inspection

1. Disconnect the vacuum hoses and connector from the solenoid valve.
2. Blow into the valve and verify that no air flows through it.
3. Apply battery positive voltage as shown in the figure.
4. Blow into the valve and verify that air flows through it.
5. If not as specified, measure the solenoid valve resistance with an ohmmeter.

   Resistance: 30–34 Ω (20°C [68°F])

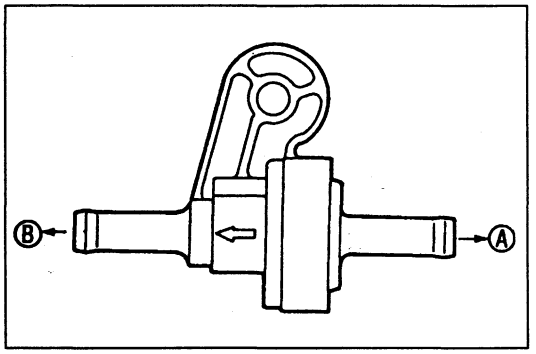
6. If not as specified, replace the solenoid valve.



CHARCOAL CANISTER

Inspection

Visually check for damage and replace the charcoal canister if necessary.

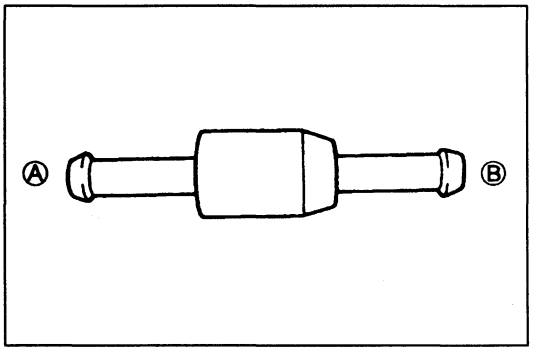


CHECK VALVE (TWO-WAY)

Inspection

1. Remove the check valve.
2. Check the operation of the check valve by using a vacuum pump.

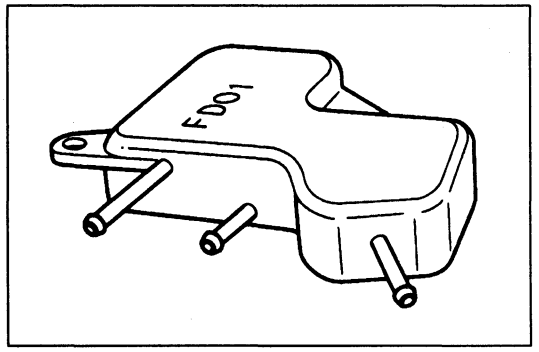
Apply approx. 5 kPa {37 mmHg, 1.46 inHg} vacuum at port A	Air flow
Apply approx. 6 kPa {44 mmHg, 1.73 inHg} vacuum at port B	Air flow



CHECK VALVE (ONE-WAY)

Inspection

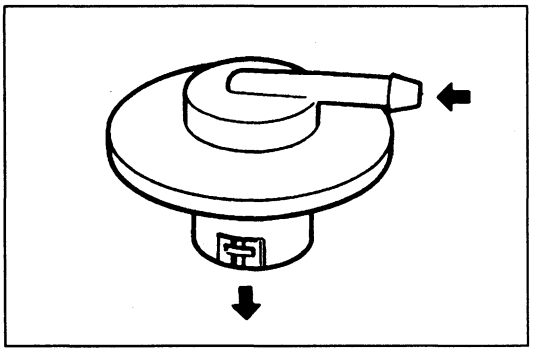
1. Remove the check valve.
2. Blow through the check valve from port A, and check that the air flows from port B.
3. Blow through the check valve from port B, and check there is no flow.



SEPARATOR

Inspection

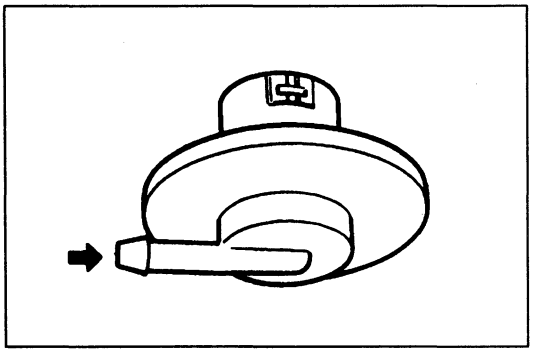
Visually check for damage and replace the separator if necessary.



FUEL VAPOR VALVE

Inspection

1. Remove the valve.
2. Blow through the valve and verify that air flows in the direction shown.

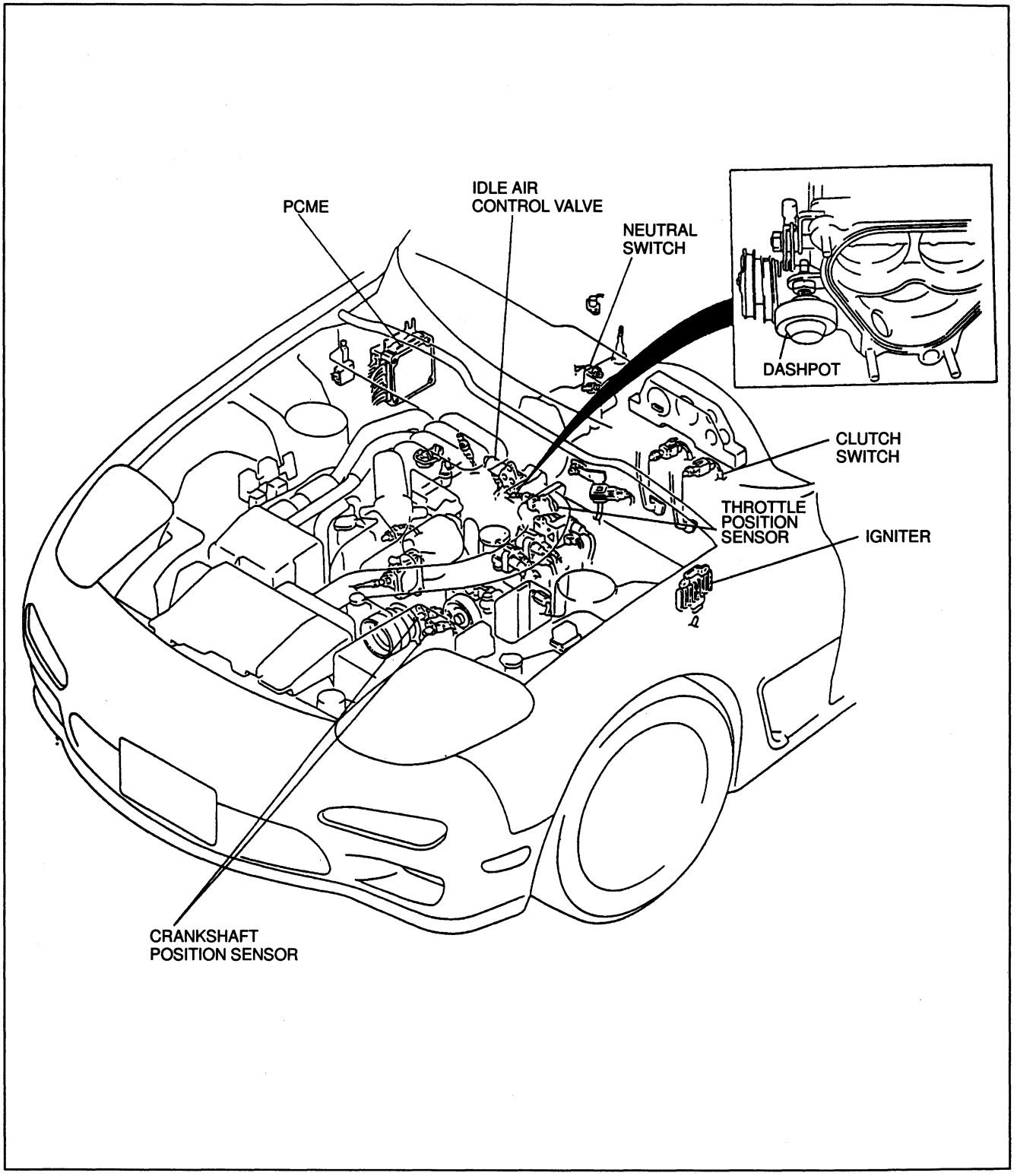


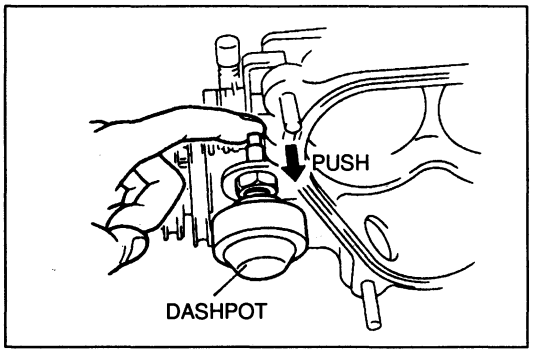
3. Turn the valve over and blow through the valve. Verify that no air flows.
4. Replace the valve if necessary.

DECELERATION CONTROL SYSTEM

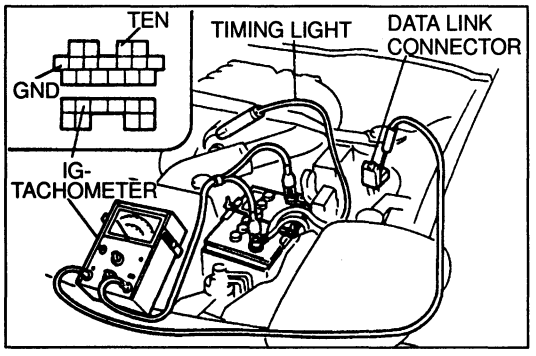
DESCRIPTION

- Dashpot : To prevent the throttle valves from closing suddenly.
- Idle air control valve : To prevent afterburn, air is supplied to intake manifold during deceleration.
- Fuel cut control : To improve the fuel economy and to prevent engine bucking during deceleration.
- Air bypass valve : Bypasses compressed air from after the turbocharger to air cleaner housing during deceleration to prevent noise.

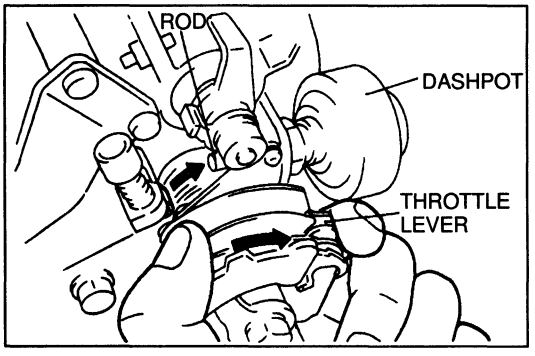




DASHPOT
Inspection
1. Open the throttle valve fully, then push the dashpot rod with a finger and verify that the rod goes in slowly.
2. Release the rod and verify that it comes out quickly.
3. Replace it, if necessary.

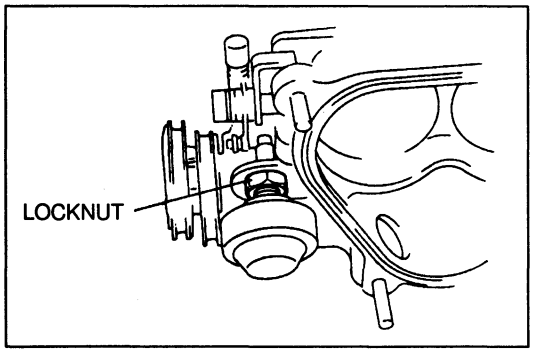


Adjustment
1. Warm up the engine to the normal operating temperature and run it idle.
2. Verify that the fast idle cam separates.
3. Turn all electrical loads OFF.
4. Connect a tachometer to the data link connector terminal **IG-**.

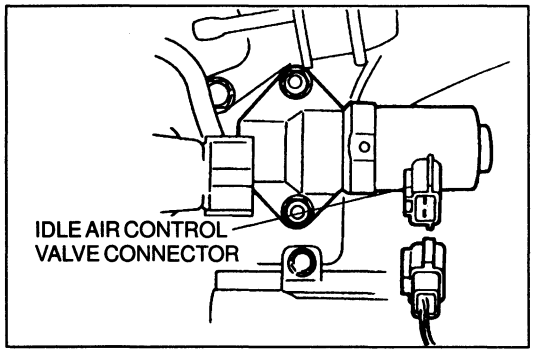


5. Open the throttle valve until the dashpot rod separates from the lever.
6. Check the engine speed when the dashpot rod touches to the lever.

Engine speed: 2600–3000 {2800 ± 200} rpm



7. Loosen the locknut and adjust by turning the dashpot, if necessary.



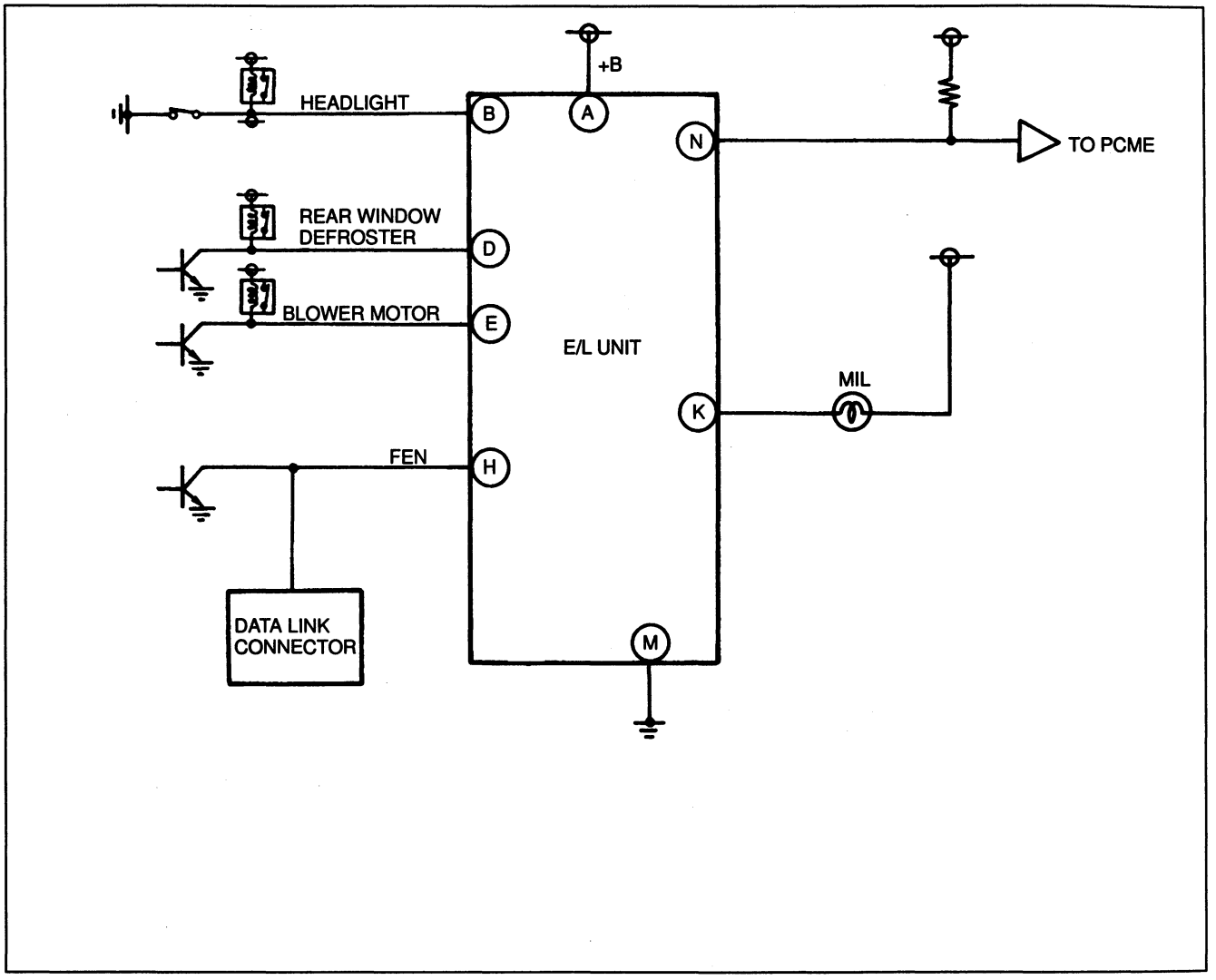
ANTI AFTERBURN CONTROL
System operation
1. Start the engine and run it at idle.
2. Disconnect the idle air control valve connector.
3. Increase the engine speed to over 4,000 rpm then decrease the engine speed rapidly.
4. Verify that the engine speed decrease roughly at 1500–1000 rpm.

ELECTRICAL LOAD (E/L) CONTROL SYSTEM

DESCRIPTION

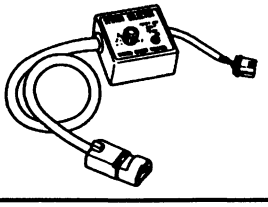
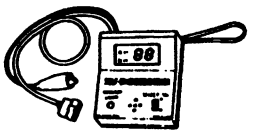
The engine speed increases when any of the following switches are ON.

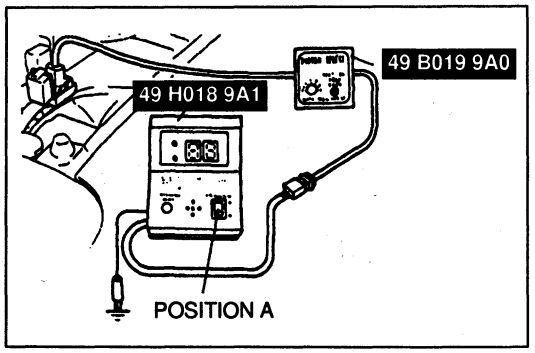
- Rear window defroster switch
- Headlight switch
- Blower switch 3rd or 4th position.



PREPARATION

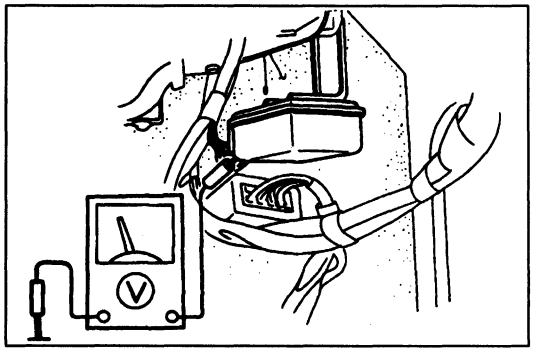
SST

49 B019 9A0 System Selector		For diagnosis	49 H018 9A1 Self-Diagnosis Checker		For diagnosis



SYSTEM OPERATION

1. Connect the **SST** (System selector) to the data link connector.
2. Set switch A to position 1 and TEST SW to SELF-TEST.
3. Connect the **SST** (Self-Diagnosis Checker) to the System Selector and a ground.
4. Set the select switch to position A.
5. Turn ignition switch ON.
6. Check if the monitor lamp illuminates when E/L unit relative switch is made to function. (Refer to page F-67.)



Inspection

1. Remove the E/L unit. (Refer to page F-150.)
2. Connect the E/L unit connector.
3. Measure the voltage at each terminal by using a voltmeter.
4. If any E/L unit terminal voltage is incorrect, check the input or output device and related wiring harness. If they are normal, replace the E/L unit.

Terminal voltage

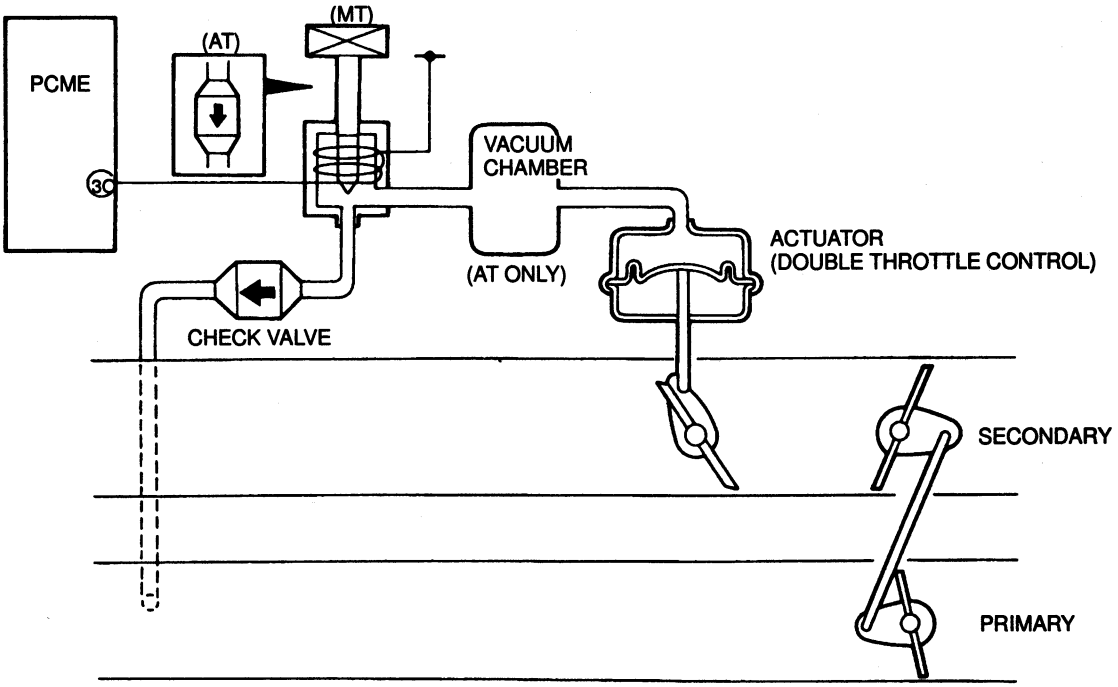
B+: Battery positive voltage

Terminal	Input	Output	Connected to	Test condition	Correct voltage	Remark
A	—	—	Main relay	Ignition switch ON	B+	—
B	O		TNS relay	Position light ON	Below 1.0V	—
				Position light OFF	B+	
C	—	—	—	—	—	—
D	O		Rear window defroster ready	Rear window defroster OFF	B+	Ignition switch ON
				Rear window defroster ON	Below 1.0V	
E	O		Blower motor relay	Blower switch 3rd or 4th position	Below 1.0V	Ignition switch ON
				Blower switch 1st or 2nd position	B+	
F	—	—	—	—	—	—
G	—	—	—	—	—	—
H		O	Self-Diagnosis checker Data link connector (FEN)	Buzzer sounded for 3 sec, after ignition switch OFF → ON	Below 2.5V	• With Self-Diagnosis Checker and System Selector • With System Selector test switch at SELF TEST
				Buzzer not sounded for after 3 sec.	B+	
				Buzzer sounded	Below 2.5V	
				Buzzer not sounded	B+	
I	—	—	—	—	—	—
J	—	—	—	—	—	—
K		O	Malfunction indicator lamp (MIL)	Lamp illuminated for 3 sec. after ignition switch ON	Below 2.5V	With system selector test switch at SELF TEST
				Lamp not illuminated after 3 sec.	B+	
				Lamp illuminated	Below 2.5V	
				Lamp not illuminated	B+	
L	—	—	—	—	—	—
M	—	—	Ground	Constant	0V	—
N		O	PCME	Electrical load ON	Below 4.0V	Ignition switch ON
				Electrical load OFF	4.5-5.5V	
O	—	—	—	—	—	—
P	—	—	—	—	—	—

DOUBLE THROTTLE CONTROL SYSTEM

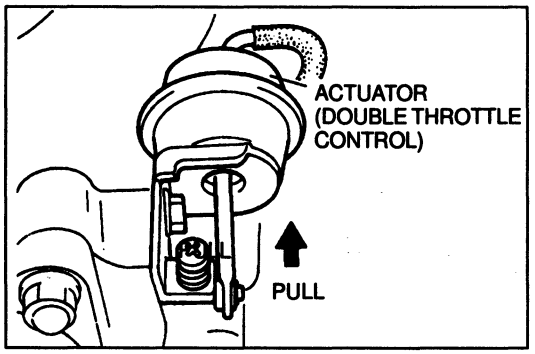
DESCRIPTION

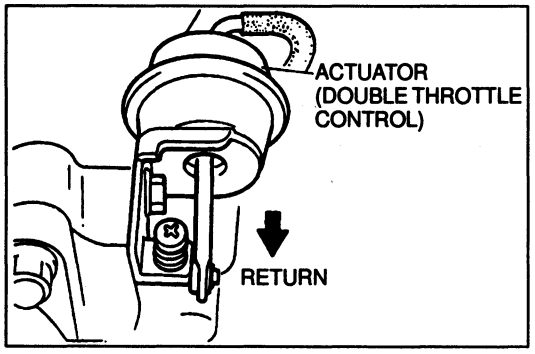
The response delay of the manifold absolute pressure sensor followed mounted by rapid acceleration temporarily causes a lean fuel mixture. The double throttle control system prevents hesitation caused by this lean fuel mixture by slightly delaying the opening of the double throttle valve after the secondary throttle valve.
The double throttle valve is controlled by the PCME through the solenoid valve.



OPERATION

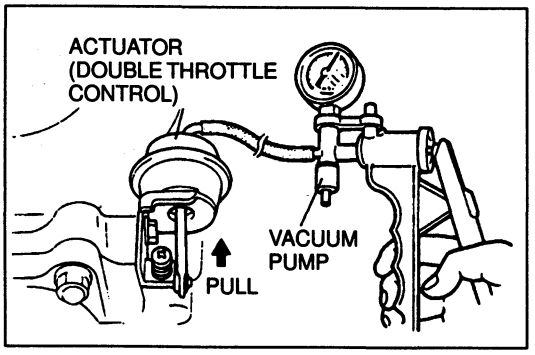
When the engine coolant temperature below 80°C {176°F} the PCME turns the solenoid valve ON, applies vacuum to the actuator (double throttle control), and closes the double throttle valve.





SYSTEM OPERATION

1. Start the engine and verify that the actuator (Double throttle control) rod is pulled into actuator while engine is cold.
2. If the actuator rod is not pulled, check the following condition below.
   - Vacuum tube
     Inspect vacuum line fitting, connections and components for leaks. (Refer to page F-10.)
   - Vacuum chamber
     Visually check for dogging damage or crack.
   - Actuator
     Inspection (Refer to below.)
   - Solenoid valve (Double throttle control)
     Inspection (Refer to page F-176.)
   - Engine coolant temperature sensor
     Inspection (Refer to page F-169.)
3. Verify that the actuator rod is returned, when warm up the engine to normal operating temperature.
4. If the actuator rod is not return, check the following condition below.
   - Solenoid valve (Double throttle control)
     Inspection (Refer to page F-176.)
   - Engine coolant temperature sensor
     Inspection (Refer to page F-169.)



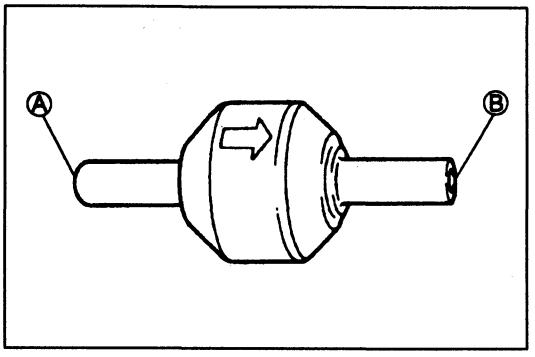
ACTUATOR (DOUBLE THROTTLE CONTROL)

Inspection

1. Disconnect vacuum hose.
2. Connect a vacuum pump and verify that actuator rod is pulled into actuator when apply the vacuum more than **22.0–28.7 kPa {165–215 mmHg, 6.5–8.5 inHg}**
3. If not as specified, replace the actuator.

Removal / Installation

(Refer to page F–76.)



CHECK VALVE

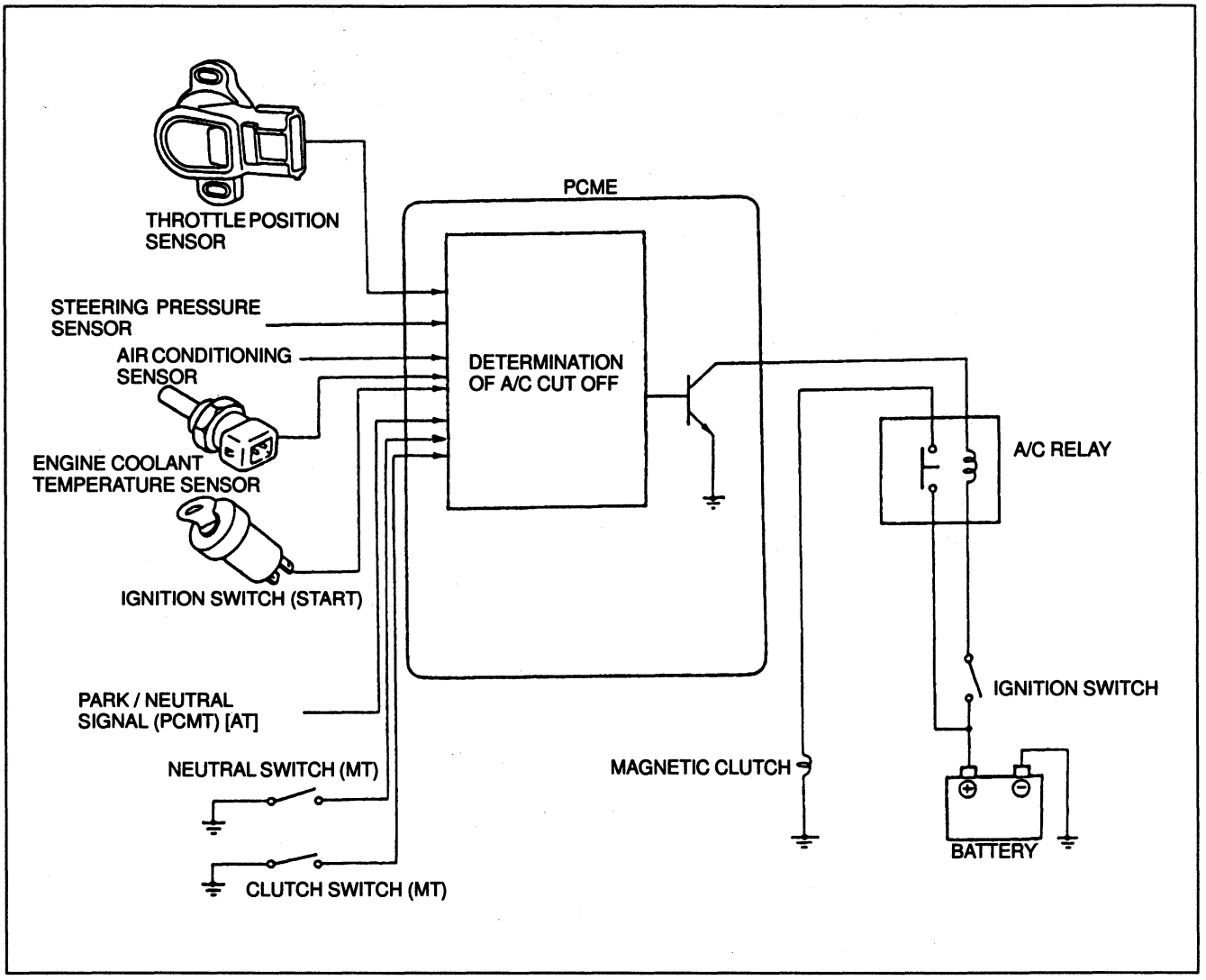
Inspection

1. Remove the check valve.
2. Blow through A and check that air flows from B.
3. Blow through B and check that air does not flow from A.

A/C CUT-OFF SYSTEM

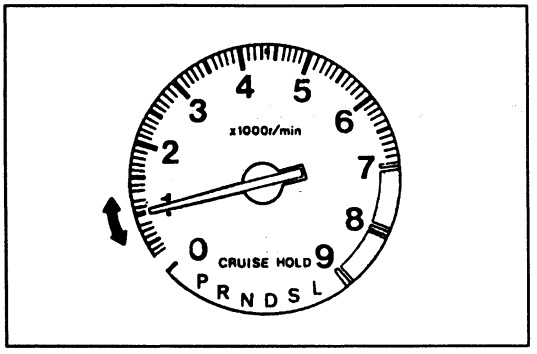
DESCRIPTION

An A/C cut-off system in used to improve idle smoothness immediately after starting the engine and to improve acceleration performance.



Operation

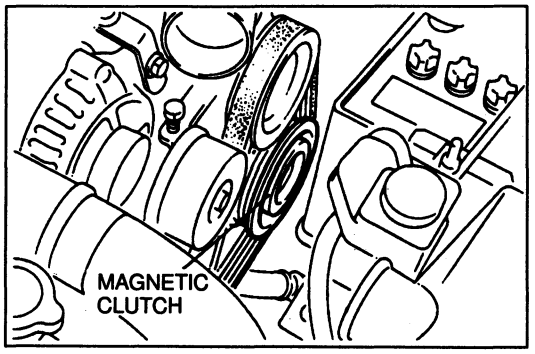
Engine condition	Purpose	Cut off period
After engine started	Improved idle	Approx. 8 sec.
Throttle valve wide open throttle	Improved drivability	Approx. 7 sec.
Engine coolant temperature over 117°C {243°F}	Prevent engine from over heating	Engine coolant temperature under 115°C {239°F}



SYSTEM OPERATION

1. Start the engine and let it idle.
2. Turn the A/C sensor and blower switch ON, and verify that no engine speed decrease.
3. Turn the blower switch OFF and verify that no engine speed increase.
4. If not as specified, check for cause.

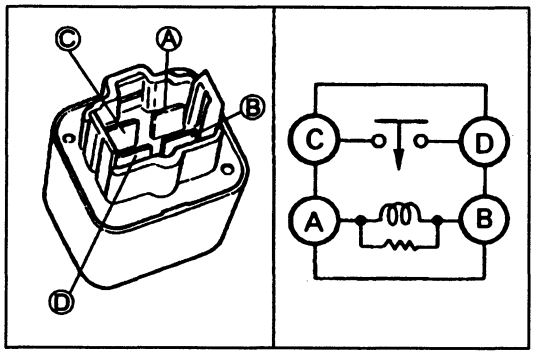
- Idle air control valve
  Inspection (Refer to page F-82.)
- A/C signal (PCME terminal 1E)
  Inspection (Refer to page F-152.)



Inspection

Acceleration cut-off

1. Turn ignition switch ON.
2. Shift transmission into gear (MT) on shift into D range (AT).
3. Turn the A/C sensor and blower switch ON.
4. Open the throttle valve fully and verify that the magnetic clutch disengage (click is heard) then renganges after **approx. 5 seconds**.



A/C RELAY

Continuity inspection

Check continuity between the terminals with ohmmeter.

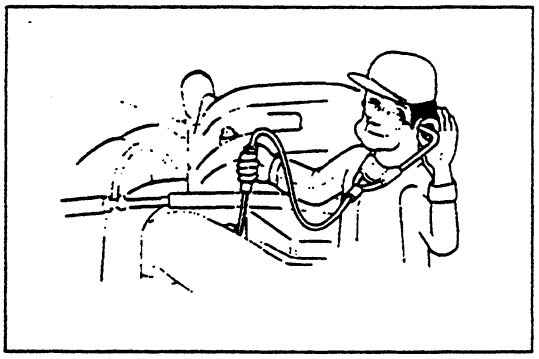
B+: Battery positive voltage

Terminal A–B	Terminal C–D
Apply B+	Yes
Not Apply B+	No

DECHOKE CONTROL SYSTEM

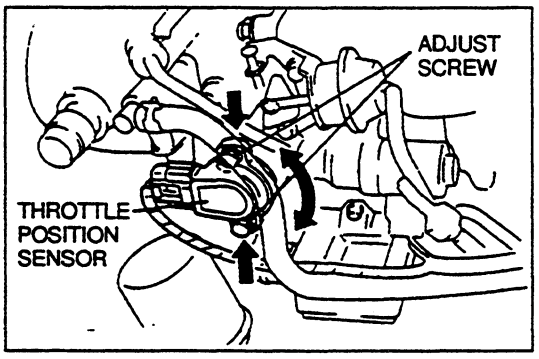
DESCRIPTION

To facilitate starting the engine if the spark plugs become fouled, such as when the engine is flooded, fuel injection is cut if the throttle valve is held wide open throttle while cranking the engine. This allows the spark plugs to dry and purges excess fuel from the cylinders.



SYSTEM OPERATION

1. Verify that the engine will not start and no operational sound of primary injector with a screwdriver or a soundscope when cranked at normal speed with the throttle wide open throttle.

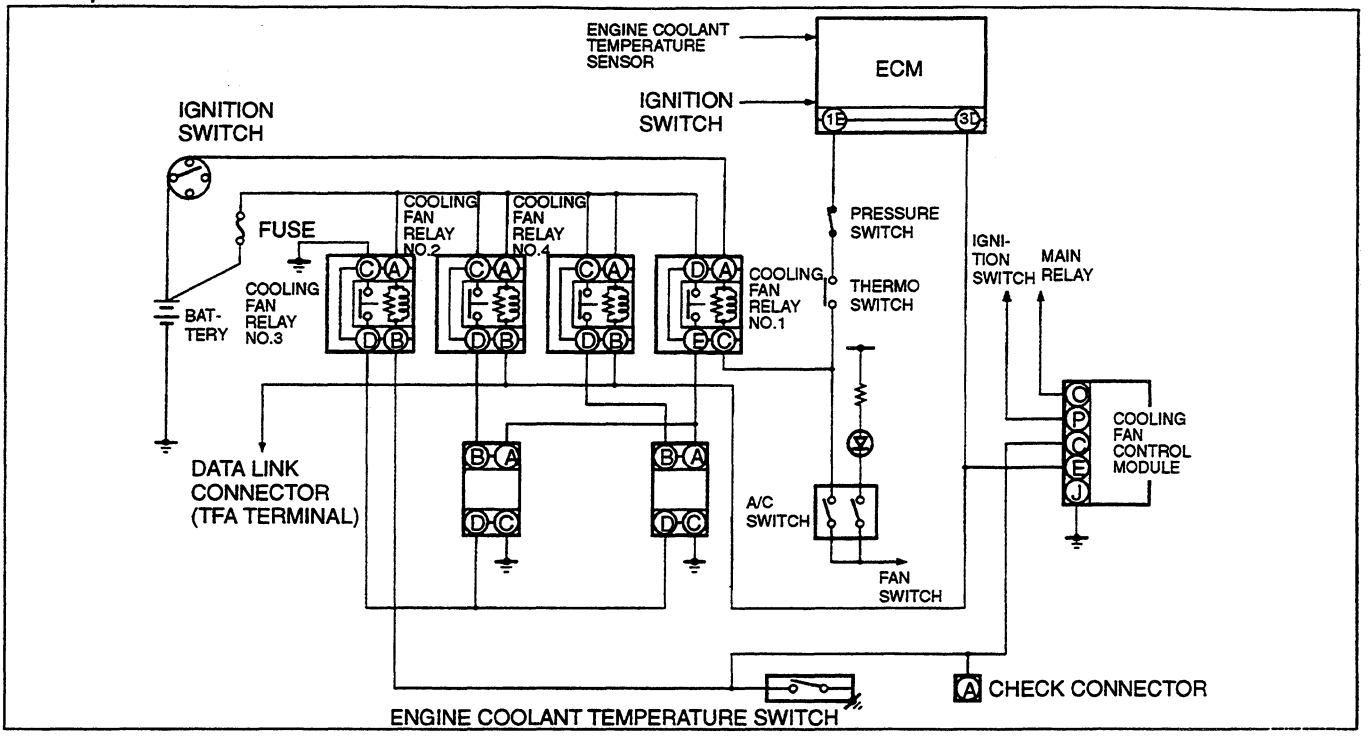


2. If the engine starts, and operational sound of primary injector is heard, inspect the throttle position sensor (Refer to page F–182) and the PCME terminal 1 C voltage. (Refer to page F–152.)

COOLING FAN CONTROL SYSTEM

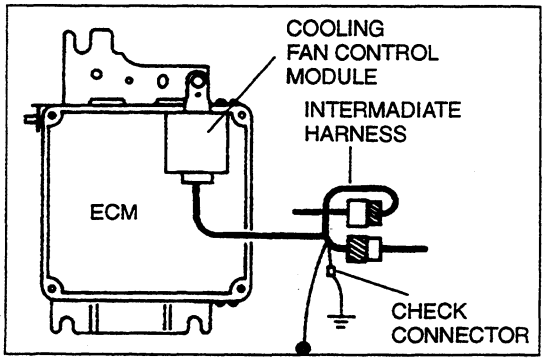
DESCRIPTION

To improve idle smoothness and engine reliability, the cooling fan control system controls the electrical fan speed by ECM. This system consists of the cooling fan, cooling fan relays, cooling fan control module, ECM, and input devices.



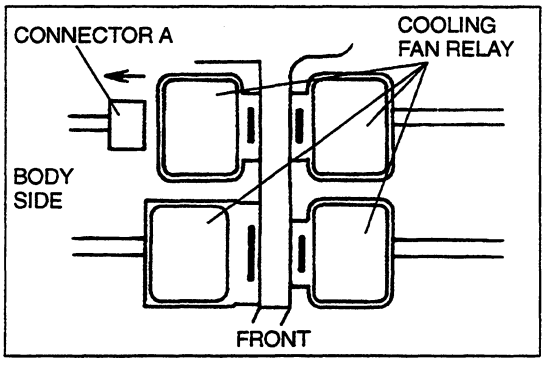
Operation

Engine condition (No electrical load)		A/C operation	Cooling fan relay No.1	Cooling fan relay No.2	Cooling fan relay No.3	Cooling fan relay No.4	Cooling fan operation
Engine coolant temperature below 105 °C {221 °F}		OFF	OFF	OFF	OFF	OFF	OFF
		ON	ON	OFF	OFF	OFF	LOW
Engine coolant temperature 105—108 °C {221—226 °F}		OFF	OFF	ON	OFF	ON	LOW
		ON	ON	ON	OFF	ON	MIDDLE
Engine coolant temperature above 108 °C {226 °F} (Engine coolant temperature switch ON)		OFF	OFF	ON	ON	ON	MIDDLE
		ON	ON	ON	ON	ON	HIGH
In 10 min. after ignition switch is turned OFF. Engine coolant temperature above 108 °C {226 °F} for more than 2 min. before ignition switch is turned OFF.	Engine coolant temperature over 108 °C {226 °F} after ignition switch is turned OFF	—	OFF	ON	ON	ON	MIDDLE
	Engine coolant temperature becomes lower than 108 °C {226 °F} after ignition switch is turned OFF	—	OFF	ON	OFF	ON	LOW
Engine coolant temperature sensor malfunction		—	OFF	ON	OFF	ON	LOW
TFA terminal ground		—	OFF	ON	OFF	ON	LOW

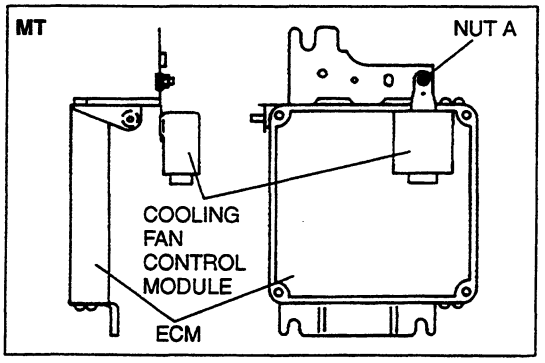


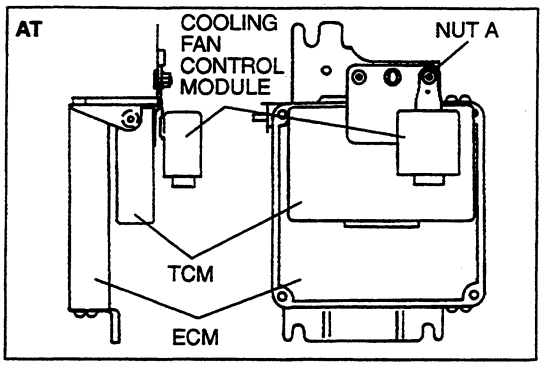
SYSTEM INSPECTION

1. Verify that the engine coolant temperature is below 80 °C {176 °F }
2. Turn the ignition switch to ON for 15 sec. or longer.
3. Turn the ignition switch to OFF.
4. Ground the check connector by using a jumper wire.
5. Turn the ignition switch to ON and verify that the cooling fan operates approx. 100—150sec. after the ignition switch is turned to ON.
6. If the cooling fan will not operate, inspect the following. Cooling fan control module terminal voltage (Refer to page F–146.)
   - Battery positive voltage
   - Fan control signal
   - Engine coolant temperature signal
   - Ground



7. Turn the ignition switch to OFF.
8. Verify that the cooling fan keep operating after the ignition switch is turned to OFF.
9. If not, replace the cooling fan control module. (Refer to page F–146.)
10. Wait for approx. 20 sec.
11. Disconnect cooling fan relay connector A. Verify that the cooling fan operates at low speed.
12. If not, inspect the cooling fan relay. (Refer to page F–146–1.)
13. Connect cooling fan relay connector A. Verify that the cooling fan operates at the speed before connector A is disconnected.
14. Disconnect the jumper wire from the check connector. Verify that the cooling fan operates at low speed.
15. Turn the ignition switch to ON.
16. Verify that the cooling fan stops 8—12 sec. after the ignition switch is turned to ON.
17. If not as specified, replace the cooling fan control module. (Refer to page F–146.)





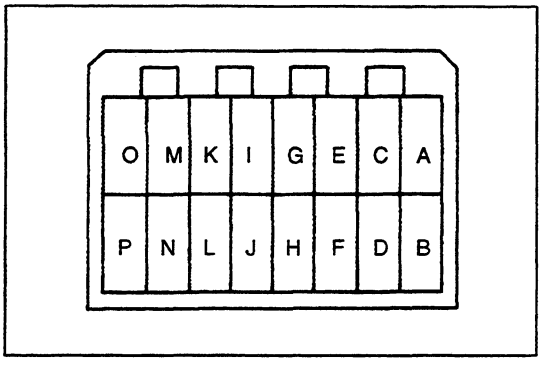
COOLING FAN CONTROL MODULE

Removal / Installation

1. Remove the ECM. (Refer to page F–150.)
2. Disconnect the cooling fan control module connector.
3. Loosen nut A as shown.
4. Remove the cooling fan control module.
5. Install in the reverse order of removal.

Tightening torque

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



Inspection

1. With the cooling fan control module connector connected, measure the voltage at each terminal of the connector. Using a voltmeter, ground the negative lead to the body and insert the positive lead in each terminal of the connector.
2. If there is any incorrect output voltage while all input voltages are correct, inspect related systems. When the systems are normal, replace the cooling fan control module.

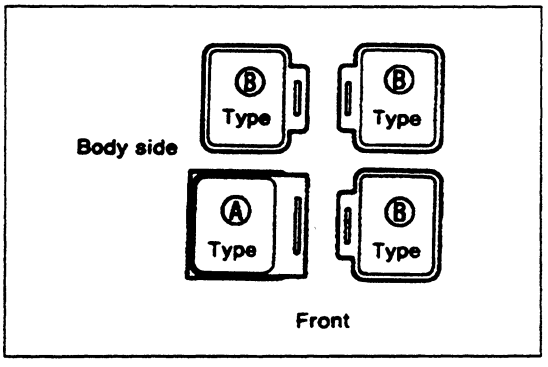
Terminal voltage

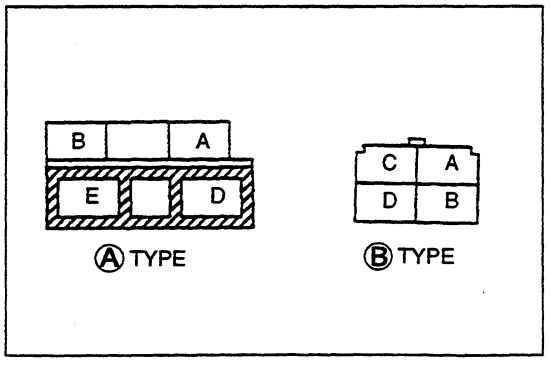
B+: Battery positive voltage

Terminal	Signal	Connected to	Test condition	Voltage (V)	Possible malfunction
A	—	—	—	—	—
B	—	—	—	—	—
C	Engine coolant temperature (for cooling fan)	Engine coolant temperature switch	Engine coolant temperature below 108 °C {226 °F }	B+	• Engine coolant temperature switch • Cooling fan relay (Refer to F–146–1)
			Engine coolant temperature above 108 °C {226 °F }	Below 1.0	
D	—	—	—	—	—
E	Cooling fan relay No.2, 4	Cooling fan relay No.2, 4	Cooling fan not operating	B+	• Cooling fan relay (Refer to F–146–1)
			During cooling fan operating	Below 1.0	
			TFA terminal of data link connector is grounded	Below 1.0	
F	—	—	—	—	—
G	—	—	—	—	—
H	—	—	—	—	—
I	—	—	—	—	—
J	Ground	Ground	Constant	Below 1.0	• Cooling fan control module terminal J –Ground

B+: Battery positive voltage

Terminal	Signal	Connected to	Test condition	Voltage (V)	Possible malfunction
K	—	—	—	—	—
L	—	—	—	—	—
M	—	—	—	—	—
N	—	—	—	—	—
O	Power supply	Main relay	Ignition switch OFF	Below 1.0	• Main relay
			Ignition switch ON	B+	
P	Power supply (Condenser fan)	Battery	Constant	B+	• A/C fuse





COOLING FAN RELAY (No.1, 2, 3, 4)

Inspection

1. Disconnect the cooling fan relay.
2. Apply battery positive voltage and ground to terminals A and B of the cooling fan relay.
3. Check continuity of the relay.

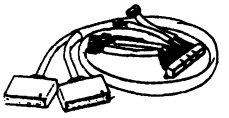
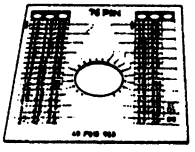
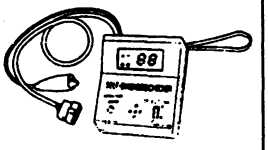
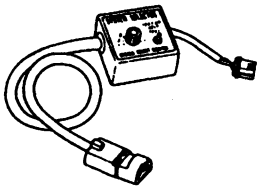
B+: Battery positive voltage

Operation	Ⓐ Type—Terminals D—E Ⓑ Type—Terminals C—D
B+ applied	Continuity
B+ not applied	No continuity

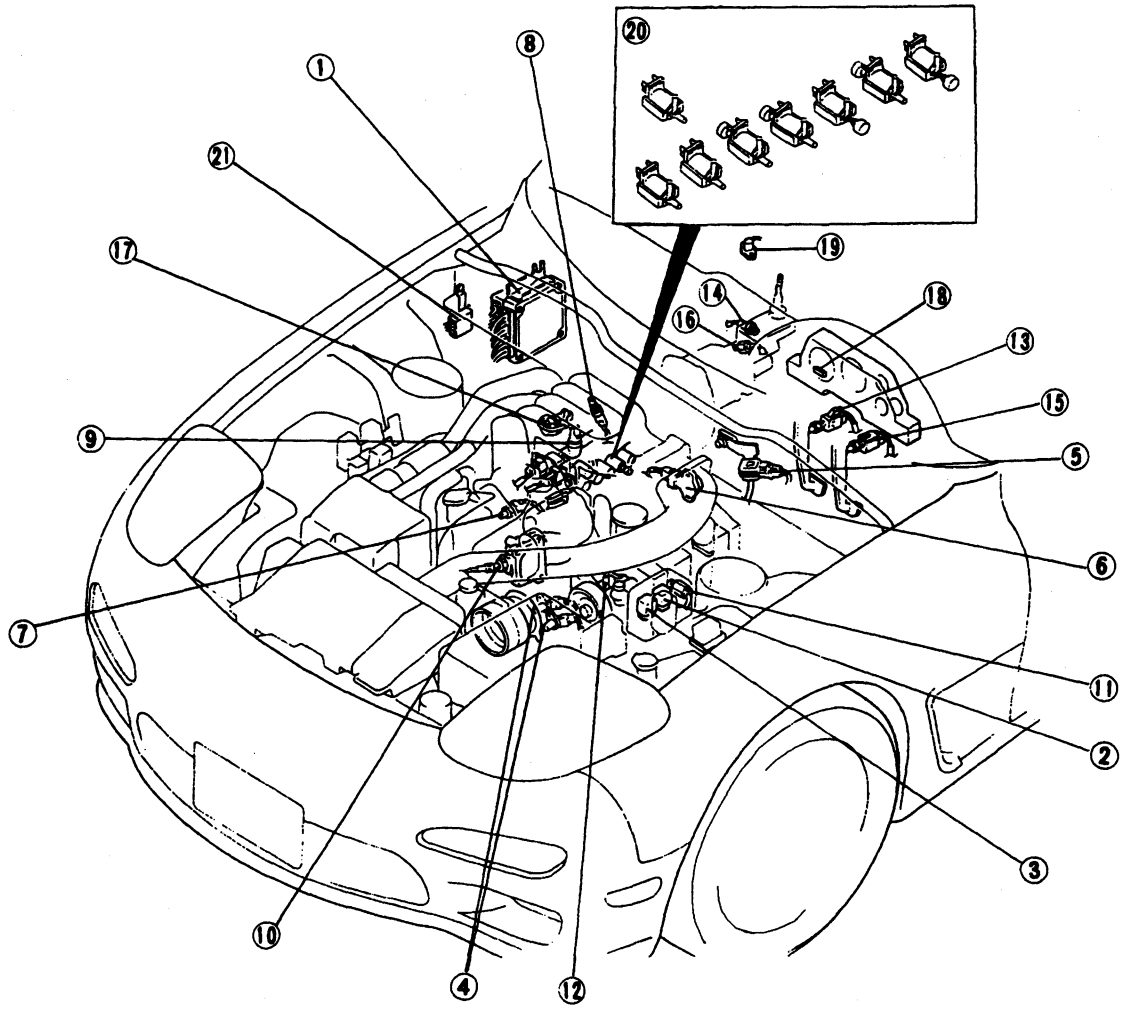
4. If not as specified, replace the cooling fan relay.

CONTROL SYSTEM

PREPARATION
SST

49 9200 162 Engine Signal Monitor 	For inspection of PCME terminal voltage.	49 F018 902 Adaptor harness 	For inspection of PCME terminal voltage
49 F018 903 Sheet 	For inspection of PCME terminal voltage.	49 H018 9A1 Self-Diagnosis Checker 	For inspection of oxygen sensor and knock sensor
49 B019 9A0 System Selector 	For inspection of oxygen sensor and knock sensor.		

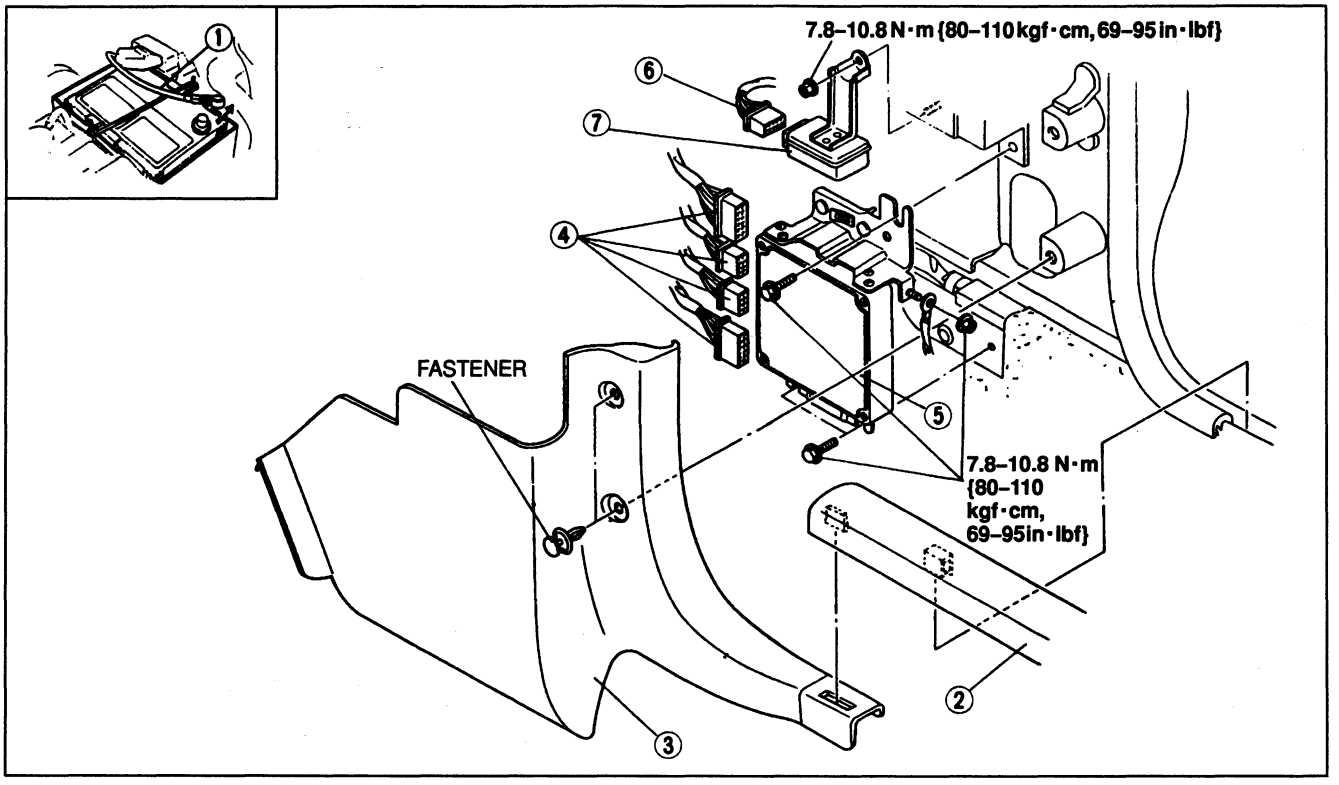
STRUCTUAL VIEW



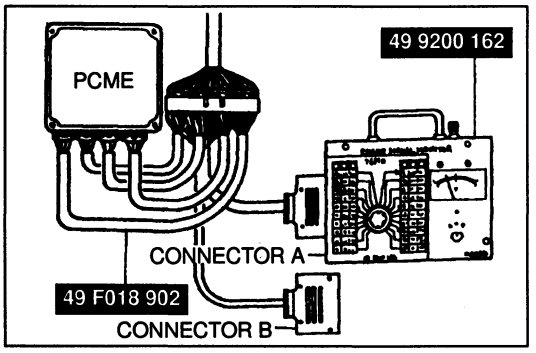
POWERTRAIN CONTROL MODULE (ENGINE) (PCME)

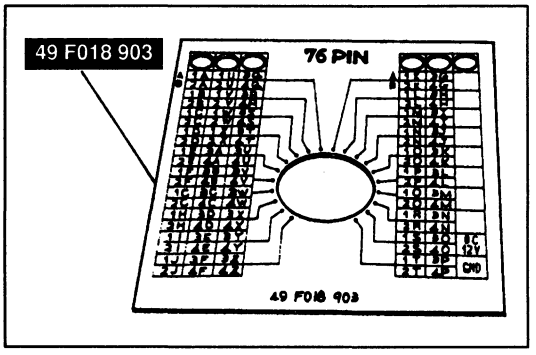
Removal / Installation

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



1. Battery cable
2. Scuff plate
3. Front side trim
4. Connectors
5. PCME
   Inspection
   (Engine Signal Monitor) ..... page F–151
6. Connector
7. E/L unit
   Inspection ..... page F–136





Inspection
Engine signal Monitor

1. Connect the **SSTs** to the PCME as shown.

   Use connector A of the adapter to measure voltage at terminals 1A through 1V and 3A through 3P, and use connector B to measure voltage at the terminals 2A through 2L and 4A through 4Z.

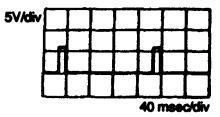
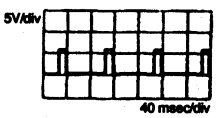
2. Place the **SST** (Sheet: 76-pin type) on the **SST** (Engine Signal Monitor).
3. Measure the voltage at each terminal.
4. If any PCME terminal voltage is incorrect, check the input or output device and related wiring. If they are normal, replace the PCME.

Caution

- **Applying voltage to SST terminals A or B will damage the SST.**

Terminal voltage
1. Using the engine signal monitor

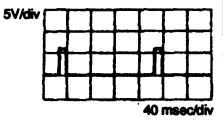
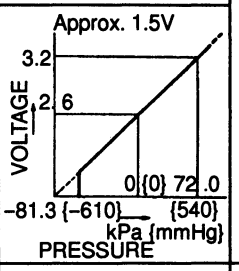
B+: Battery positive voltage

Terminal	Input	Output	Connected to	Test condition		Correct voltage	Remark
1A	—	—	Battery	Constant		B+	For backup
1B	O		Main relay (FUEL INJ relay)	Ignition switch	OFF	0V	—
					ON	B+	
1C	O		Ignition switch (START)	While cranking		B+	—
				Ignition switch ON		Below 1.0V	
1D		O	Self-Diagnosis checker (monitor lamp)	Test switch at SELF TEST Lamp illuminated for 3 sec. after ignition switch OFF → ON		4.5–5.5V	With Self-Diagnosis checker and System Selector
				Lamp not illuminated after 3 sec.		B+	
				Test switch at O_2 MONITOR Lamp illuminated		4.5–5.5V	
				Test switch at O_2 MONITOR Lamp not illuminated		B+	
1E	O		Air conditioning sensor	Air conditioning sensor ON		Below 3.0V	• With Blower SW ON • Ignition switch ON
				Air conditioning sensor OFF		B+	
1F		O	Self-Diagnosis checker (code number)	Buzzer sounded for 3 sec. after ignition switch OFF → ON		Below 2.5V	• With Self-Diagnosis checker and System Selector • With System Selector test switch at SELF TEST
				Buzzer not sounded for after 3 sec.		B+	
				Buzzer sounded		Below 2.5V	
				Buzzer not sounded		B+	
1G		O	Igniter (Trailing) Front rotor	Ignition switch ON		0V	—
				Idle Oscilloscope		0.2–0.5V (Reference) 	
				Engine speed: above 2,500 rpm		0.5–0.8V (Reference)	Initial acceleration
1H		O	Igniter (Leading)	Ignition switch ON		0V	—
				Idle Oscilloscope		0.2–0.5V (Reference) 	
				Engine speed: above 2,500 rpm		0.8–1.2V (Reference)	Initial acceleration

B+: Battery positive voltage

Incorrect voltage		Possible cause
Always 0V		• ROOM 10A fuse burnt • Open circuit in wiring from ROOM 10A fuse to PCME terminal 1A
Always 0V		• Main relay malfunction (Refer to page F-174) • Open or short circuit in wiring from main relay to PCME terminal 1B
Always 0V (starter turns)		• Open or short circuit in wiring from ignition switch to PCME terminal 1C • Ignition switch malfunction (Refer to section T)
Always 0V		• Main relay (FUEL INJ relay) malfunction (Refer to page F-174) • Open circuit in wiring from ignition switch to data link connector terminal +B • Open or short circuit in wiring from data link connector terminal MEN to PCME terminal 1D
Always B+		• Poor connection at PCME connector • PCME malfunction
Always approx. 5V		PCME malfunction
Always below 1.0V		• Short circuit in wiring from air conditioning sensor to PCME terminal 1E • Air conditioning sensor malfunction (Refer to section T)
Always B+		• Open circuit in wiring from air conditioning sensor to PCME terminal 1E • Air conditioning sensor malfunction (Refer to section T)
Always below 2.5V	No display on Self-Diagnosis Checker	• Main relay (FUEL INJ relay) malfunction (Refer to page F-174) • Open circuit in wiring from ignition switch to data link connector terminal + B
	"88" displayed and buzzer sounds continuously	Open or short circuit in wiring from data link connector terminal FEN to PCME terminal 1F
Always B+		• Poor connection at PCME connector • PCME malfunction
Always 0V		Refer to page F-16 (Ignition timing adjustment)
Always 0V		Refer to page F-16 (Ignition timing adjustment)

B+: Battery positive voltage

Terminal	Input	Output	Connected to	Test condition		Correct voltage	Remark
1I	○		Data link connector (TEN terminal)	System Selector test switch at O_2 MONITOR		B+	• With System Selector • Ignition switch ON
				System Selector test switch at SELF TEST		0V	
1J		○	Igniter (Trailing) Rear rotor	Ignition switch ON		0V	—
				Idle Oscilloscope		0.2–0.5V (Reference) 	
				Engine speed: above 2500 rpm		0.5–0.8V (Reference)	Initial acceleration
1K		○	Fuel pump relay (Speed)	Ignition switch ON		Below 1.0V	—
				While cranking		Below 1.0V	
				Idle	Solenoid valve (PRC) does not operate	B+	
					Solenoid valve (PRC) operates	Below 1.0V	
1L		○	A/C relay	While cranking		B+	Air conditioning sensor, Blower switch ON
				Idle		Below 1.0V	
				During acceleration (Running)		B+	
1M	○		Vehicle speed sensor	Ignition switch ON		0V or 4.0–5.0V	—
				Driving		2.0–2.5V	
1N	○		Steering pressure sensor	P/S OFF at idle		B+	—
				P/S ON at idle		Below 1.0V	
			Mileage switch	Over 20,000 miles {34,000 km}		Below 1.5V	Ignition switch ON after 2 seconds
				Under 20,000 miles {34,000 km}		B+	
1O	○		Manifold absolute pressure sensor	Ignition switch ON		Approx. 2.6V	—
				Idle		Approx. 1.5V 	
1P	—	—	—	—		—	—

B+: Battery positive voltage

Incorrect condition	Possible cause
Always below 1.0V	Short circuit in wiring from data link connector terminal TEN to PCME terminal 1I
Always B+	• Open circuit in wiring from data link connector terminal TEN to PCME terminal 1I • Open circuit in wiring from data link connector terminal GND to ground
Always 0V	Refer to page F-16 (Ignition timing adjustment)
Always below 1.0V	Refer to Code No.51 Troubleshooting (Refer to page F-60)
Always B+	• Poor connection at PCME connector • Fuel pump relay (speed) malfunction (Refer to page F-110) • PCME malfunction
Always B+	• A/C relay malfunction (Refer to page F-142) • Open circuit in wiring from ignition switch to A/C relay • Open circuit in wiring from A/C relay to PCME terminal 1L
Always below 1.0V	• Short circuit in wiring from A/C relay to PCME terminal 1L • A/C relay malfunction (Refer to page F-142)
Always 0V	• Open or short circuit in wiring from vehicle speed sensor to PCME terminal 1M • Vehicle speed sensor malfunction (Refer to section T)
Always below 1.0V	• Steering pressure sensor malfunction (Refer to page F-172) • Short circuit in wiring from steering pressure sensor to PCME terminal 1N • PCME malfunction
Always B+	• Steering pressure sensor malfunction (Refer to page F-172) • Open circuit in wiring from steering pressure sensor to PCME terminal 1N • Open circuit in wiring from steering pressure sensor to ground
Always B+ under 20,000 miles	• Mileage switch malfunction (Refer to page F-175) • PCME malfunction
Always below 1.5V over 20,000 miles	• Mileage switch malfunction (Refer to page F-175) • PCME malfunction
Always 0V or 5V	Refer to Code No.13 Troubleshooting (Refer to page F-33)
—	—

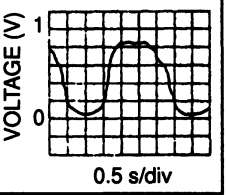
B+: Battery positive voltage

Terminal	Input	Output	Connected to	Test condition	Correct voltage	Remark
1Q	○		Clutch switch (MT)	Clutch pedal: released	B+	Ignition switch ON
				Clutch pedal: depressed	Below 1.0V	
			Powertrain control module (Transmission) (AT)	Idle	B+	Reduce torque signal
				When shifting from 1st to 2nd or from 2nd to 3rd with the throttle opening above 1.5/8	Below 1.0V	
				Idle	B+	Slip lock up signal
				When slip lockup with the throttle opening below 0.5/8	Below 1.0V	
1R	○		Neutral switch (MT)	Neutral	Below 1.0V	Ignition switch ON
				In gear	B+	
			Powertrain control module (Transmission) (AT)	Por N range	Below 1.0V	• Park/Neutral signal • Ignition switch ON
				Other	B+	
1S	○		Stoplight switch	Brake pedal released	Below 1.0V	Ignition switch ON
				Brake pedal depressed	B+	
1T		○	Fuel pump relay	Ignition switch ON	B+	—
				Idle	Below 1.0V	
1U	○		Fuel thermosensor	Idle (after warm up)	1.5–3.0V	—
1V	—	—	—	—	—	—
2A	—	—	—	—	—	—
2B		○	Data link connector (IG-terminal)	Ignition switch ON	0V	—
				Idle	0.3–0.8 (Reference)	
				Engine speed: 3,000 rpm	1.8–2.2V (Reference)	Initial acceleration
2C		○	Powertrain control module (Transmission) (AT)	Idle	B+	Slip lock up OFF signal
				Engine speed: hold 3,000 rpm (after 8 seconds)	Below 1.0V	Initial acceleration
2D		○	Powertrain control module (Transmission) (AT)	Ignition switch ON	2–4.5V	Barometric absolute pressure signal
2E		○	Powertrain control module (Transmission) (AT)	Idle	Below 1.0V	Idle signal
				Other	Approx 5V	
2F	—	—	—	—	—	—
2G		○	Powertrain control module (Transmission) (AT)	Idle	B+	Torque reduced signal
				Throttle opening above 1/8 (Engine coolant temp. below 40°C {104°F})	Below 1.0V	
2H	—	—	—	—	—	—
2I	○		Heat Hazard Sensor	Ignition switch ON	Below 2.0V	—
				Idle (Temp.: Below 100°C {212°F})	B+	
				Idle (Temp.: Above 100°C {212°F})	Below 1.0V	
2J		○	A/P relay	Engine speed Idle-Below 3,250 rpm	Below 1.0V	—
				Engine speed above 3,250 rpm	B+	

B+: Battery positive voltage

Incorrect voltage	Possible cause
Always B+	• Clutch switch malfunction (Refer to page F-173) • Open circuit in wiring from clutch switch to PCME terminal 1Q
Always below 1.0V	• Clutch switch malfunction (Refer to page F-173) • Short circuit in wiring from clutch switch to PCME terminal 1Q
Always B+	• Open circuit in wiring from PCME terminal 1Q to PCMT terminal 2P
Always below 1.0V	• Short circuit in wiring from PCME terminal 1Q to PCMT terminal 2P
Always below 1.0V	• Neutral switch malfunction (Refer to page F-172) • Short circuit in wiring from neutral switch to PCME terminal 1R
Always B+	• Neutral switch malfunction (Refer to page F-172) • Open circuit in wiring from neutral switch to PCME terminal 1R
Always below 1.0V	• Park/neutral switch malfunction (Refer to section K) • Short circuit in wiring from PCMT terminal 1C to PCME terminal 1R
Always B+	• Park/neutral switch malfunction (Refer to section K) • Open circuit in wiring from PCMT terminal 1C to PCME terminal 1R
Always below 1.0V (Stoplight OK)	Open circuit in wiring from stoplight switch to PCME terminal 1S
Always below 1.0V or B+	• Open or short circuit in wiring from fuel pump relay to PCME terminal 1T • Fuel pump relay malfunction (Refer to page F-174)
Always Approx. 0V or approx 5V	Refer to Code No.23 Troubleshooting (Refer to page F-40)
—	—
—	—
Always 0V	• Open circuit in wiring from data link connector IG-terminal to PCME terminal 2B • Crankshaft position sensor malfunction (Refer to page F-166) • PCME malfunction
Always B+	Open circuit in wiring from PCMT terminal 2G to PCME terminal 2C
Always below 1.0V	Short circuit in wiring from PCMT terminal 2G to PCME terminal 2C
Always 0V or 4V	• Refer to Code No.14 Troubleshooting (Refer to page F-34) • Open or short circuit in wiring from PCMT terminal 2C to PCME terminal 2D
Always below 1.0V	Short circuit in wiring from PCMT terminal 2M to PCME terminal 2E
Always B+	Open circuit in wiring from PCMT terminal 2M to PCME terminal 2E
—	—
Always below 1.0V	Short circuit in wiring from PCMT terminal 2P to PCME terminal 2G
Always B+	Open circuit in wiring from PCMT terminal 2P to PCME terminal 2G
—	—
Always below 1.0V	• Short circuit in wiring from heat hazard sensor to PCME terminal 2I • Heat hazard sensor malfunction (Refer to page F-175)
Always B+	• Open circuit in wiring from heat hazard sensor to PCME terminal 2I • Heat hazard sensor malfunction (Refer to page F-175)
Always below 1.0V or B+	Refer to Code No.54 Troubleshooting (Refer to page F-61)

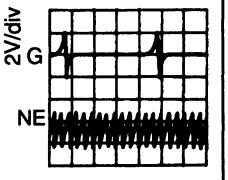
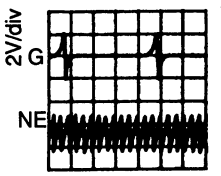
B+: Battery positive voltage

Terminal	Input	Output	Connected to	Test condition		Correct voltage	Remark
2K	O		1–2 switch (MT)	1st and 2nd position		B+	Ignition switch ON
				Other		Below 1.0V	
			PCMT	2nd or 3rd position		Below 1.0V	While running
				Other		B+	
2L	O		1–2 switch (MT)	2nd position		Below 1.0V	Ignition switch ON
				Other		B+	
			PCMT	3rd or O/D position		Below 1.0V	While running
				Other		B+	
3A	O		Metering oil pump position sensor	Ignition switch ON		1.0–4.2V	Voltage increase when accelerating
				Idle		Approx. 1.1V	
				Accelerator pedal depressed		1.1–4.2V	
3B	O		E/L unit	Headlight switch position I, II,		Below 4.0V	—
				Blower motor position III, IV,			
				Rear defroster switch ON			
				Headlight switch, Blower motor, rear defroster switch are OFF		4.5–5.5V	
3C	O		Oxygen sensor	Driving	Cold engine	Approx 0V	—
					After warm up Oscilloscope	0.0–1.0V  	
				Acceleration (after warm up)		0.5–1.0V	
				Deceleration (after warm up)		0.0–0.4V	
3D		O	Coolant fan relay	Idle	Electrical coolant fan does not operating	B+	—
					During electrical coolant fan operating	Below 1.0V	
				TFA terminal of data link connector is grounded		Below 1.0V	Ignition switch ON
3E	O		Engine coolant temperature sensor	Engine coolant temperature 20°C {68°F}		Approx. 2.5V	Ignition switch ON
				After warm up		Below 0.5V	
3F	O		Throttle position sensor (Narrow range)	Accelerator pedal released		0.75–1.25	• Ignition switch ON • After warm-up
				Accelerator pedal fully depressed		4.8–5.0	
3G	O		Throttle position sensor (Full range)	Accelerator pedal released		0.1–0.7	• Ignition switch ON • After warm-up
				Accelerator pedal fully depressed		4.2–4.6	
3H		O	Solenoid valve (purge control)	Ignition switch ON		B+	—
				Idle			
				Engine speed: 1,500–3,300 rpm		4–10V	While running

B+: Battery positive voltage

Incorrect voltage	Possible cause
Always below 1.0V	• Short circuit in wiring from 1-2 switch to PCME terminal 2K • 1-2 switch malfunction (Refer to page F-173)
Always B+	• Open circuit in wiring from 1-2 switch to PCME terminal 2K • 1-2 switch malfunction (Refer to page F-173)
Always below 1.0V	Short circuit in wiring from PCMT terminal 1D to PCME terminal 2K
Always B+	Open circuit in wiring from PCMT terminal 1D to PCME terminal 2K
Always below 1.0V	• Short circuit in wiring from 1-2 switch to PCME terminal 2L • 1-2 switch malfunction (Refer to page F-173)
Always B+	• Open circuit in wiring from 1-2 switch to PCME terminal 2L • 1-2 switch malfunction (Refer to page F-173)
Always below 1.0V	• Short circuit in wiring from PCMT terminal 1B to PCME terminal 2L
Always B+	• Open circuit in wiring from PCMT tarminal 1B to PCME terminal 2L
Always approx 0V or approx 5V	Refer to Code No.27 Troubleshooting (Refer to page F-43)
Always below 1.0V	• Short circuit in wiring from switches ~ E/L unit ~ PCME terminal 3B • Switches malfunction (Refer to section T)
Always B+	• Open circuit in wiring from switches ~ E/L unit ~ PCME terminal 3B • Switches malfunction (Refer to section T)
0V after warm-up	Refer to Code No.15 Troubleshooting (Refer to page F-34)
Always approx. 1V after warm-up	Refer to Code No.17 Troubleshooting (Refer to page F-36)
Always below 1.0V or Always B+	• Open or short circuit in wiring from coolant fan relay to PCME terminals 3D • Fan relay malfunction (Refer to page F-146) • PCME malfunction
Always approx. 0V or approx. 5V	Refer to Code No.09 Troubleshooting (Refer to page F-30)
Always approx. 0V	Refer to Code No.12 Troubleshooting (Refer to page F-32)
Always approx. 5V	
Always approx. 0V	Refer to Code No.18 Troubleshooting (Refer to page F-38)
Always approx. 5V	
Always 0V or B+	Refer to Code No.40 Troubleshooting (Refer to page F-53)

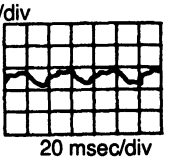
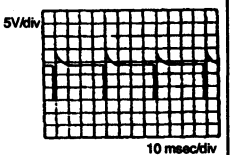
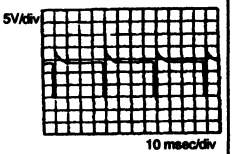
B+: Battery positive voltage

Terminal	Input	Output	Connected to	Test condition		Correct voltage	Remark
3I	O		Throttle position sensor	Constant		Approx. 5.0V	Ignition switch ON
3J	O		EGR function sensor	EGR valve operates		B+	—
				EGR valve does not operate		Below 1.0V	
3K		O	Solenoid valve (Relief2)	Ignition switch ON		B+	—
				Idle	Before warm up approx. 40°C {104°F}	Below 1.0V	
					After warm up	B+	
3L	O		Intake air temperature sensor	Ambient air temperature 20°C {68°F}		Approx. 2.5V	Ignition switch ON
				After warm up		Approx. 0.6V	
3M	O		Knock sensor	Ignition switch ON		Approx. 2.5V	—
				Knocking occur (Tap the engine hanger with hammer)		2.6–2.8V (Reference)	Ignition switch ON (Measure the terminal voltage by using the digital type voltmeter)
3N		O	Solenoid valve (Port air by-pass)	Ignition switch ON		B+	—
				After warm up Engine speed: 1,500–3,000 rpm		Below 1.0V	While running
3O		O	Solenoid valve (Double throttle control)	Engine coolant temperature below 80°C {176°F}		Below 1.0V	Ignition switch ON
				After warm up		B+	
3P		O	Secondary air bypass valve	Idle		B+	• After warm up
				Engine speed: 3,250–3,750 rpm for 0.5 sec.		Below 1.0V	
4A	—	—	Ground (Output)	Constant		0V	—
4B	—	—	Ground (Output)	Constant		0V	—
4C	—	—	Ground (CPU)	Constant		0V	—
4D	—	—	Ground (Input)	Constant		0V	—
4E	O		Crankshaft position sensor [NE + signal]	Ignition switch ON		Below 1.0V	Engine signal monitor: Red lamp flash
				Idle	Oscilloscope		
					Voltmeter	0.1–0.4V (Reference)	
4F		O	Solenoid valve (Split air by-pass)	Idle		B+	
				5th position (MT) / OD (AT)		Below 1.0V	• After warm up • While running
4G	O		Crankshaft position sensor [G signal]	Ignition switch ON		Below 1.0V	—
				Idle	Oscilloscope		
					Voltmeter	0.1–0.4V (Reference)	

B+: Battery positive voltage

Incorrect voltage	Possible cause
Always 0V	• Short circuit in wiring from main relay to PCME terminal 3I • Main relay malfunction (Refer to page F-174)
Always 0V or B+	• EGR function sensor malfunction (Refer to page F-127) • Open or short circuit in wiring from EGR function sensor to PCME terminal 3J
Always below 1.0V or B+	Refer to Code No.39 Troubleshooting (Refer to page F-52)
Always 0V or approx. 5V	Refer to Code No.11Troubeshooting (Refer to page F-31)
Always 0V	Refer to Code No.05 Troubleshooting (Refer to page F-28)
Always below 1.0V or B+	Refer to Code No.33 Troubleshooting (Refer to page F-48)
Always below 1.0V or B+	Refer to Code No.50 Troubleshooting (Refer to page F-59)
Always below 1.0V or B+	Refer to Code No.31 Troubleshooting (Refer to page F-46)
Above 0V	• Poor connection at ground terminal • Open circuit in wiring from PCME
Always approx. 0V or approx. 5V	Refer to Code No.03 Troubleshooting (Refer to page F-27)
Always below 1.0V or B+	Refer to Code No.30 Troubleshooting (Refer to page F-45)
Always approx 0V or approx. 5V	Refer to Code No.02 Troubleshooting (Refer to page F-26)

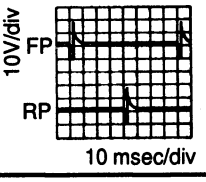
B+: Battery positive voltage

Terminal	Input	Output	Connected to	Test condition	Correct voltage	Remark
4H	O		Crankshaft position sensor	Constant	Below 1.0V	—
4I		O	Stepping motor (Metering oil pump)	Ignition switch ON	B+	
4J				Idle	3 terminals / 4 terminals B+ Other terminal 5–9V	
4K						
4L						
4M		O	Solenoid valve (Pressure regulator control)	Idle	B+	
				Idle after hot start	Below 1.0V	approx. 90 seconds
4N		O	Secondary air switching valve	Ignition switch ON/Idle	B+	
				Engine speed: above 3,200 rpm (After warm up)	Below 1.0V	Initial acceleration
4O		O	Solenoid valve (EGR)	Idle	B+	
				5th position (MT)/OD (AT)	Below 1.0V	While running
4P		O	Solenoid valve (AWS)	Before warm up approx. 40°C {104°F}	Below 1.0V	Idle
				After warm up	B+	
4Q		O	Idle air control valve (ISC)	Ignition switch ON	8.0–11.0V	Reference value ● Cranking 99% ● Idle 32–65% ● Initial set 38%
				Idle Oscilloscope	5.0–11.0 (Reference) 5V/div  20 msec/div	
4R		O	Solenoid valve (Turbo control)	Idle	B+	
				Engine speed: above 5,500 rpm (MT)	Below 1.0V	Initial acceleration
				Engine speed: above 5,250 rpm (AT)		
4S		O	Solenoid valve (Charge relief)	Idle	B+	
				Engine speed: 4,000–5,500 rpm (MT) for 4–8 sec. 3,500–5,000 (AT) for 4–8 sec.	Below 1.0V	Initial acceleration
				Engine speed: above 5,500 rpm (MT) above 5,250 rpm (AT)		
4T		O	Solenoid valve (Charge control)	Idle	Below 1.0V	
				Engine speed: above 5,500 rpm (MT)	B+	Initial acceleration
				Engine speed: above 5,250 rpm (AT)		
4U		O	Solenoid valve (Wastegate control)	Ignition switch ON	B+	Reference value ● Idle 5% ● Solenoid valve (Turbo control) before operates 95%
				Idle Oscilloscope	B+  	
				Initial acceleration	5.0–11.0 V	
4V		O	Solenoid valve (Turbo precontrol)	Ignition switch ON	B+	Reference value ● Idle 5% ● Solenoid valve (Turbo control) after operates 5%
				Idle Oscilloscope	B+  	
				Engine speed: above 3,000 rpm	4.0–10.0V (Reference)	Initial acceleration

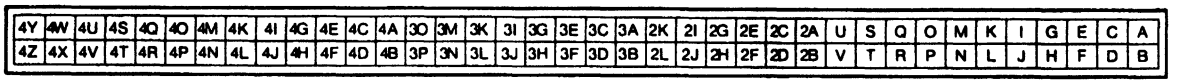
B+: Battery positive voltage

Incorrect voltage	Possible cause
Always above 1.0V	Refer to Code No.02 Troubleshooting (Refer to page F-26)
Always 0V or B+	Refer to Code No.26 Troubleshooting (Refer to page F-42)
Always below 1.0V or B+	Refer to Code No.25 Troubleshooting (Refer to page F-41)
Always below 1.0V or B+	Refer to Code No.32 Troubleshooting (Refer to page F-47)
Always below 1.0V or B+	Refer to Code No.28 Troubleshooting (Refer to page P-44)
Always below 1.0V or B+	Refer to Code No.38 Troubleshooting (Refer to page F-51)
Always below 1.0V or B+	Refer to Code No. 34 Troubleshooting (Refer to page F-49)
Always below 1.0V or B+	Refer to Code No.44 Troubleshooting (Refer to page F-56)
Always below 1.0V or B+	Refer to Code No.46 Troubleshooting (Refer to page F-58)
Always below 1.0V or B+	Refer to Code No.45 Troubleshooting (Refer to page F-57)
Always below 1.0V or B+	Refer to Code No.43 Troubleshooting (Refer to page F-55)
Always below 1.0V or B+	Refer to Code No.42 Troubleshooting (Refer to page F-54)

B+: Battery positive voltage

Terminal	Input	Output	Connected to	Test condition	Correct voltage	Remark
4W		○	Injector (Front primary)	Ignition switch ON	B+	● Secondary injector not working at no load condition * Engine Signal Monitor: Green lamp flash
4X		○	Injector (Front secondary)	idle*	12–14V	
4Y		○	Injector (Rear primary)	Oscilloscope		
4Z		○	Injector (Rear secondary)			

PCME Connector (PCME Side)

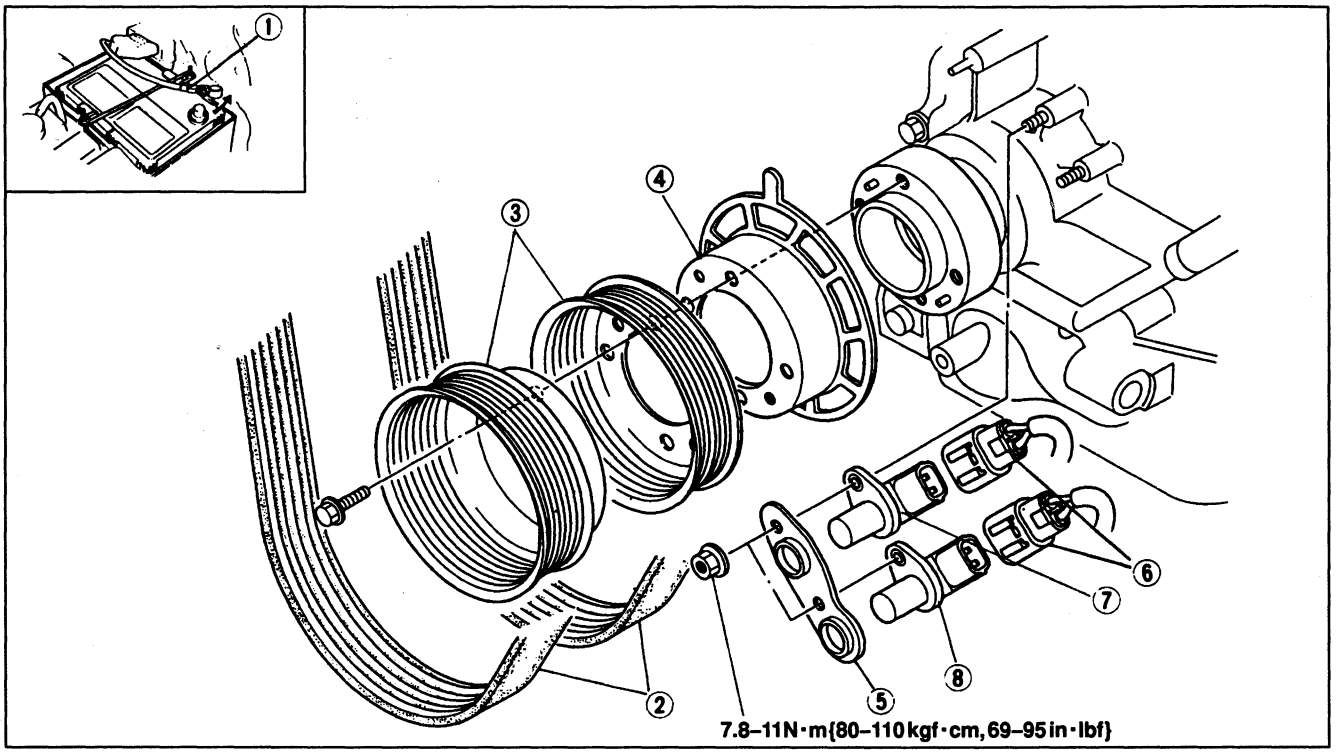


Incorrect voltage	Possible cause
Always 0V	● Open or short circuit in wiring from injector to PCME terminal 4W, 4X, 4Y, or 4Z ● Main relay malfunction (Refer to page F-174) ● Refer to Code No.71, 73 (Refer to page F-62, 63) troubleshooting

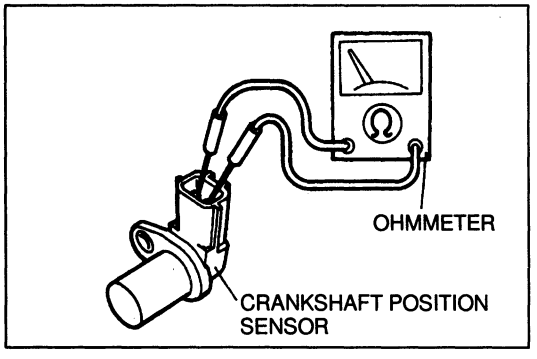
CRANKSHAFT POSITION SENSOR

Removal / Installation

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal, referring to **Installation Note**.



1. Battery cable
2. Drive belt
3. Eccentric shaft pulley
4. Crankshaft position sensor plate
5. Bracket
6. Connectors
7. Crankshaft position sensor (NE-signal)
   Inspection ..... below
8. Crankshaft position sensor (G-signal)
   Inspection ..... below

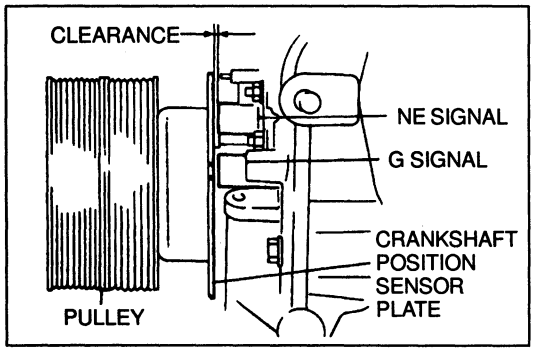


Inspection

1. Remove the crankshaft position sensor.
2. Measure the resistance of the sensor.

Resistance: 0.95–1.25 kΩ (20°C [68°F])

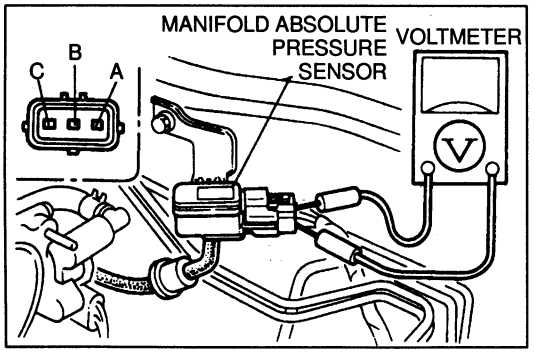
3. If not as specified, replace the crankshaft position sensor.

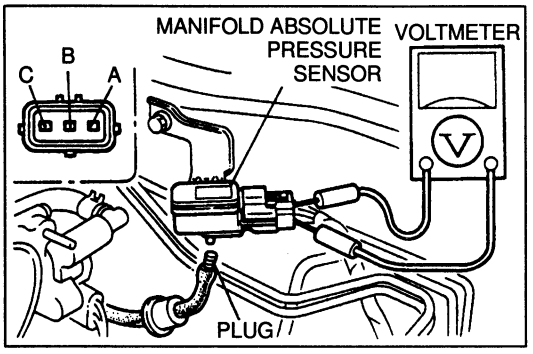


Installation Note

Measure the crankshaft position sensor to crankshaft position sensor plate clearance by using feeler gauge.

Clearance: 1.0–2.0 mm {0.039–0.078 in)





MANIFOLD ABSOLUTE PRESSURE SENSOR

Inspection

1. Warm up the engine to normal operating temperature and run it at idle.
2. Turn all electrical load off.
3. Connect a voltmeter between the manifold absolute pressure sensor terminal A and B and verify that the voltage is within specification.

   Voltage: 1.3–1.6V

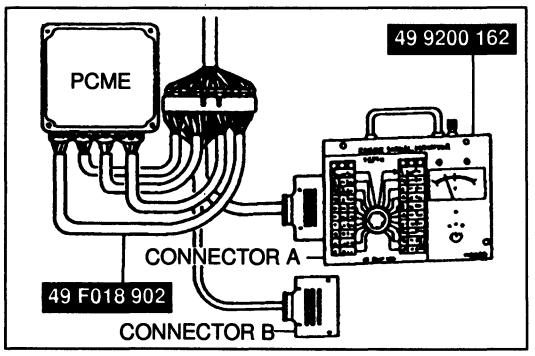
4. Disconnect vacuum tube and plug the vacuum tube and verify that the voltage is within specification.

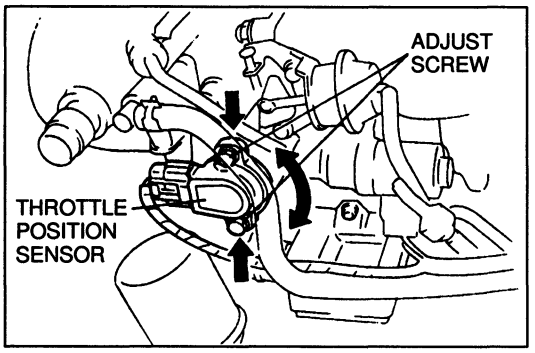
   Voltage: 2.38–2.78V

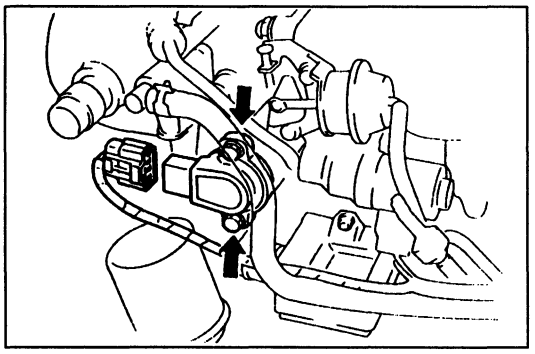
5. Connect a vacuum pump to the manifold absolute pressure sensor.
6. Apply vacuum and measure the voltage of the manifold absolute pressure sensor.

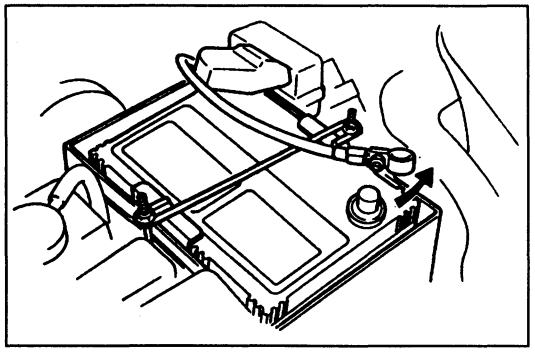
Vacuum	Voltage
-66 kPa {-500 mmHg-19.7 inHg} (Vacuum)	1.25–1.55V
0 kPa {0 mmHg, 0 inHg}	2.38–2.78V
98.7 kPa {740 mmHg, 29.1 inHg} (Pressure)	4.35–4.65V

7. If not as specified, replace the manifold absolute pressure sensor.
8. Cancel the memory of malfunctions by disconnecting the negative battery cable for at least 20 seconds and depress brake pedal.
9. Reconnect the negative battery cable.









THROTTLE POSITION SENSOR

Inspection

1. Warm up the engine to normal operating temperature and run it at idle.
2. Verify the first idle cam separates.
3. Stop the engine.
4. Connect the **SSTs** (Engine Signal Monitor and Adaptor Harness) to PCME.
5. Turn the ignition switch to ON.
6. Rotate the throttle link by hand verify that the voltage is within specification.

Specification

PCME Terminal	Throttle valve condition		
	Closed throttle position	closed to open	Wide open throttle
3F (Narrow range)	0.75–1.25V	1.0–5.0V	4.8–5.0V
3G (Full range)	0.1–0.7V	0.4–4.3V	4.2–4.6V

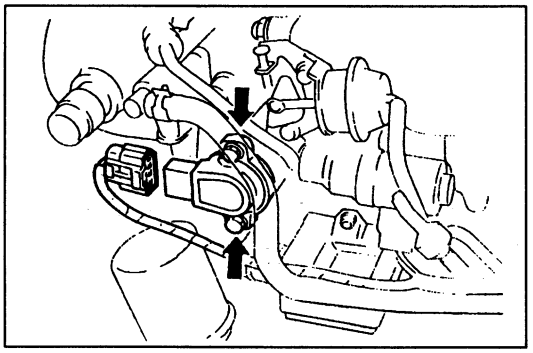
7. If not as specified, adjust or replace the throttle position sensor.

Adjustment

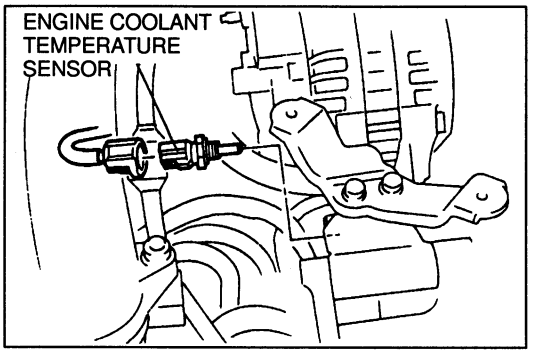
1. Warm up the engine to normal operating temperature and run it idle.
2. Verify that the first idle cam separates.
3. Stop the engine.
4. Connect the **SSTs** (Engine Signal Monitor and Adaptor Harness) to PCME.
5. Turn the ignition switch to ON.
6. Loosen the screws and rotate the throttle position sensor to set the correct closed position voltage.
   (Refer to "Specification" above)
7. Check the correct open position voltage and close to open voltage.
   (Refer to "Specification" above)
9. Tighten the screws.

Tightening Torque
1.6–2.4 N·m {16–24 kgf·cm, 140–210 in·lbf}

10. Cancel the memory of malfunctions by disconnecting the negative battery cable for at least 20 seconds and depress the brake pedal.
11. Reconnect the negative battery cable.



Removal / Installation
1. Turn ignition switch to OFF.
2. Disconnect the throttle position sensor connector.
3. Remove the throttle position sensor.
4. Install the throttle position sensor.
5. Adjust the throttle position sensor. (Refer to page F-168.)

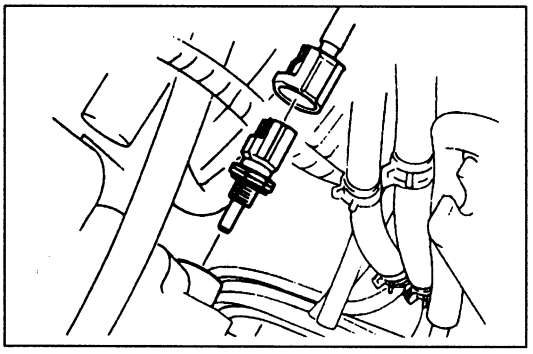


ENGINE COOLANT TEMPERATURE SENSOR
Removal / Installation

Warning
- **Removing the engine coolant temperature sensor while the engine hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. Turn off the engine and wait until it is cool. Even then, be very careful when removing the engine coolant temperature sensor.**

1. Remove the extension manifold. (Refer to page F-76.)
2. Disconnect engine coolant temperature sensor connector.
3. Remove the engine coolant temperature sensor.
4. Install a new gasket and install in the reverse order of removal.

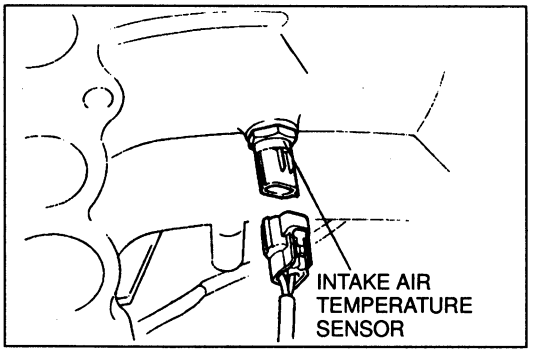
Tightening torque:
20–24 N·m {2.0–2.5 kgf·m, 15–18 ft·lbf}



Inspection
1. Place the engine coolant temperature sensor in water with a thermometer and heat the water gradually.
2. Measure the resistance of the sensor with an ohmmeter.

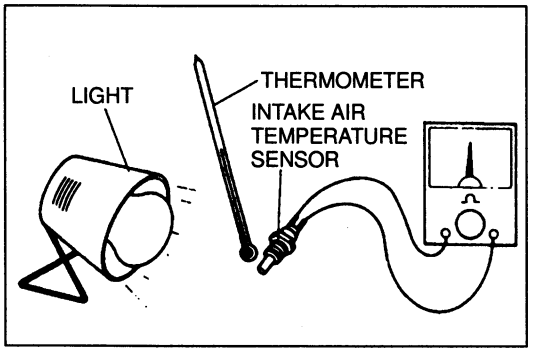
Water temperature	Resistance
20°C {68°F}	2.2–2.7 kΩ
80°C {176°F}	0.29–0.35 kΩ

3. Replace the sensor, if necessary.



INTAKE AIR TEMPERATURE SENSOR
Removal / Installation
1. Remove the extension manifold. (Refer to page F-76.)
2. Remove the intake air temperature sensor from extension manifold.
3. Install the intake air temperature sensor.

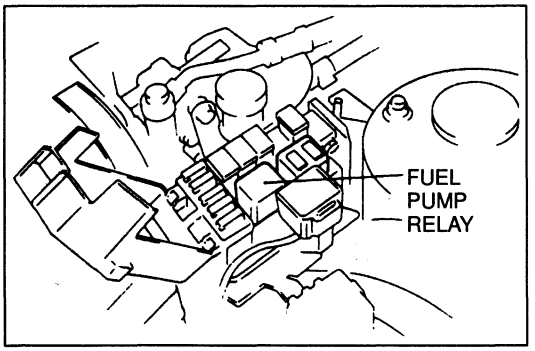
Tightening torque:
7.9–11.7 N·m {80–120 kgf·cm, 70–104 in·lbf}



Inspection
1. Remove the intake air temperature sensor and heat the sensor as shown in the figure.
2. Measure the resistance of the sensor with an ohmmeter.

Temperature	Resistance
20°C {68°F}	2.2–2.7 kΩ
80°C {176°F}	0.29–0.35 kΩ

3. Replace the sensor, if necessary.

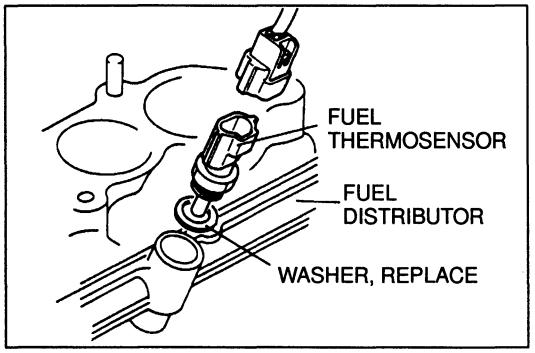


FUEL THERMOSENSOR
Removal / Installation

Warning
- **Fuel line spills and leaks can be dangerous. Fuel can ignite and cause serious injuries or death and can damage the vehicle. Fuel can also irritate skin and eyes. To prevent this from happening, release the fuel pressure according to "Fuel Line Safety Procedures" on page F–95.**

1. Remove the intake air system component parts. (Refer to page F–76.)
2. Disconnect the fuel thermosensor connector.
3. Remove the fuel thermosensor.
4. Install in the reverse order of removal.

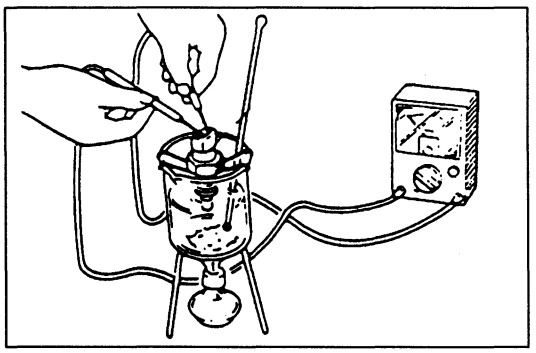
Tightening torque:
20–24 N·m {2.0–2.5 kgf·m, 15–18 ft·lbf}



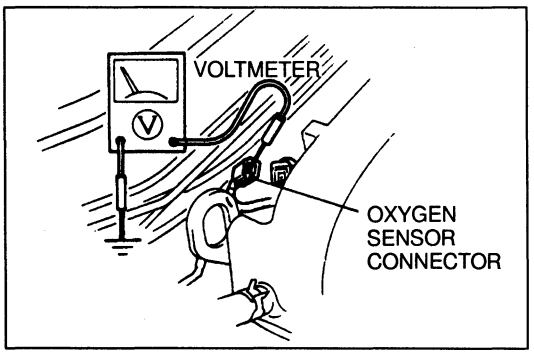
Inspection
1. Place the fuel thermosensor in water with a thermometer and heat the water gradually.
2. Measure the resistance of the sensor with an ohmmeter.

Water temperature	Resistance
20°C {68°F}	2.2–2.7 kΩ
80°C {176°F}	0.29–0.35 kΩ

3. Replace the sensor, if necessary.

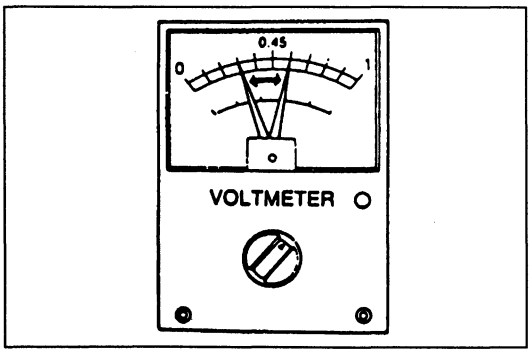


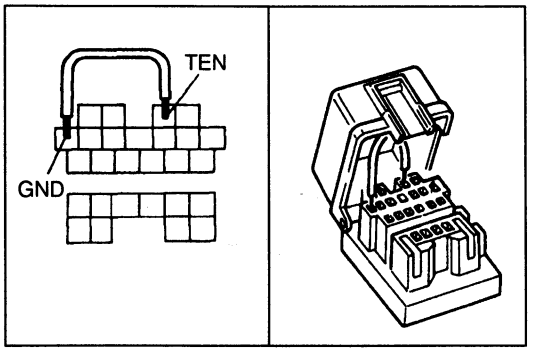
OXYGEN SENSOR
Inspection of Terminal Voltage.
1. Warm up the engine to normal operating temperature and run it at idle.
2. Disconnect the oxygen sensor connector.
3. Connect a high internal resistance voltmeter (more than 40 kΩ) between the oxygen sensor terminal and ground.
4. Measure the voltage while increasing and decreasing the engine speed suddenly several times.



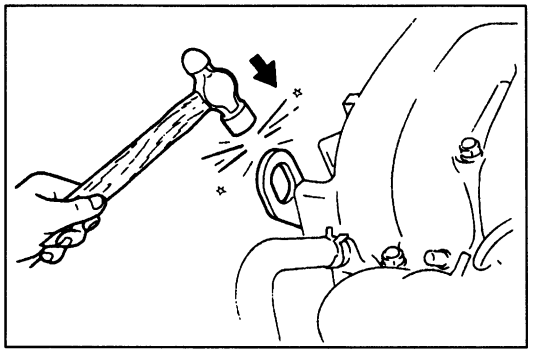
Specification

Engine condition	Voltage
While decelerating	0.0–0.4V
While accelerating	0.5–1.0V

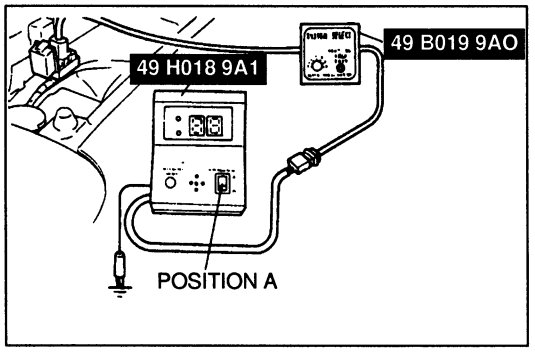




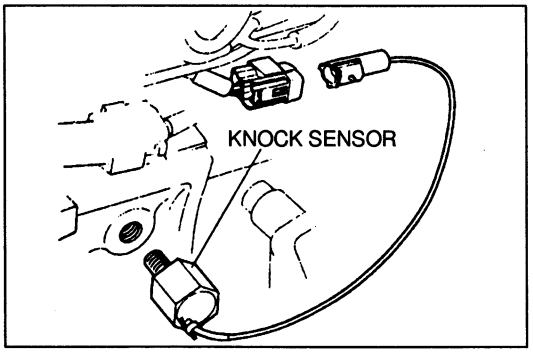
KNOCK SENSOR
Inspection (On vehicle)
1. Connect a voltmeter ⊖terminal to the MEN terminal of the data link connector
2. Connect the data link connector terminals TEN and GND by using a jumper wire.
3. Turn the ignition switch to ON.



4. Lightly tap the engine hanger with a hammer.
5. Verify that the voltmeter indicator moves.
6. Turn the ignition switch to OFF.

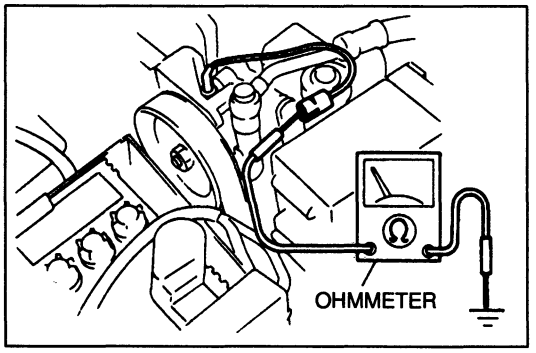


Self-Diagnosis Checker
1. Connect the **SSTs** (System Selector and Self-Diagnosis Checker) to data link connector.
2. Set switch A to position of Self-Diagnosis Checker.
3. Set SYSTEM SELECT position 1and TEST SW to SELF-TEST of System Selector.
4. Turn the ignition switch to ON.
5. Lightly tap the engine hanger with a hammer.
6. Verify that the monitor lamp illuminates for approx. 0.5 seconds.
7. Turn the ignition switch to OFF.



Removal / Installation
1. Disconnect knock sensor connector.
2. Remove the knock sensor.
3. Install in the reverse order of removal.

Tightning Torque:
20–34 N·m {2.0–3.5 kgf·m, 14–25 ft·lbf}

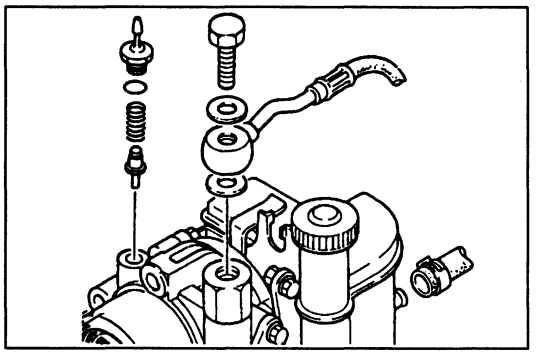


STEERING PRESSURE SENSOR

Inspection (On the vehicle)

1. Disconnect the steering pressure sensor connector.
2. Start the engine, and check continuity of the switch.

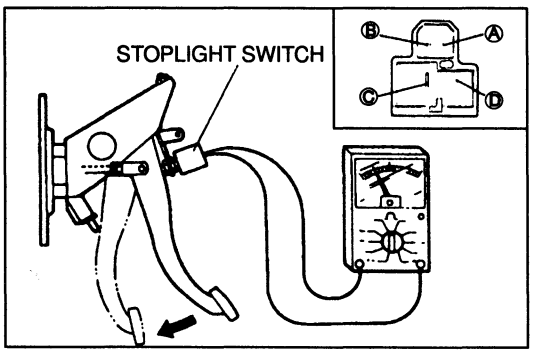
Steering wheel	Continuity
Turned	Yes
Straight ahead	No



3. Replace the steering pressure sensor if not as specified.

Removal / Installation

Refer to section N.

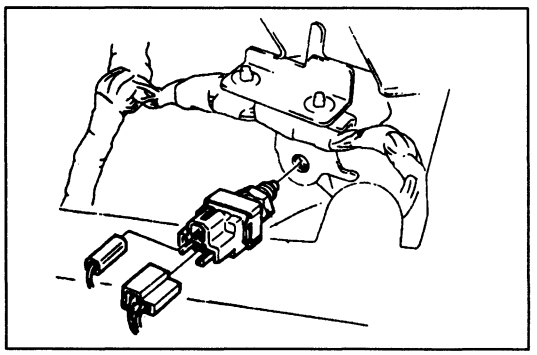


STOPLIGHT SWITCH

Inspection

1. Disconnect the stoplight switch connector.
2. Connect a circuit tester between the stoplight switch terminals C and D.
3. Check the continuity of the switch.

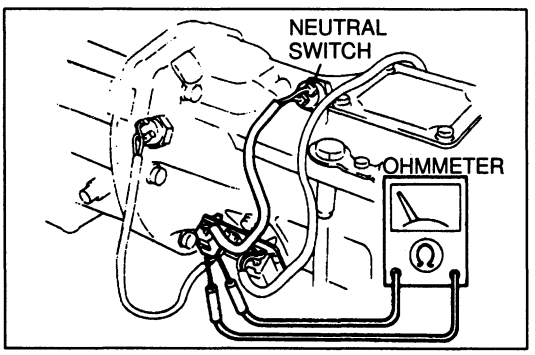
Pedal	Continuity
Depressed	Yes
Released	No



Removal / Installation

1. Disconnect the stoplight switch connector.
2. Remove the stoplight switch.
3. Install the stoplight switch.
4. Connect a circuit tester between the stoplight switch terminals C and D, and verify that the continuity when the brake pedal depressed and no continuity when the brake pedal released.
5. Tighten the adjust nut.

Tightening Torque:
14–18 N·m {1.4–1.8 kgf·m, 10–13 ft·lbf}

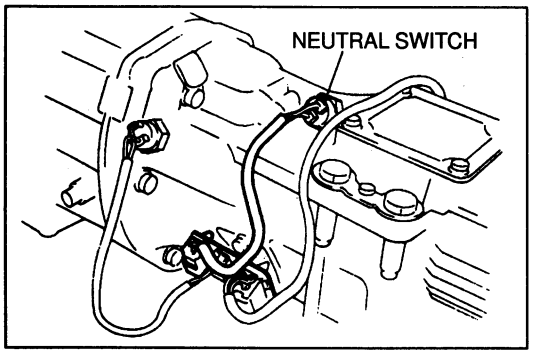


NEUTRAL SWITCH (MT)

Inspection

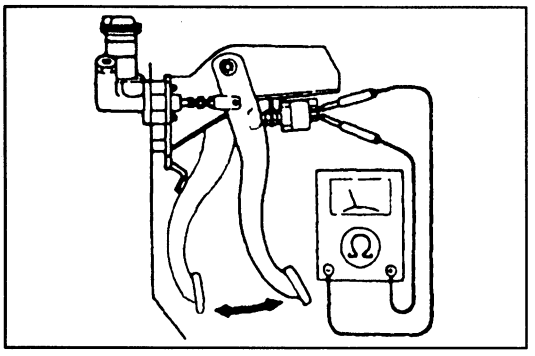
1. Disconnect the neutral switch connector.
2. Connect a circuit tester to the switch.
3. Check the continuity.

Transmission	Continuity
In neutral	Yes
In other ranges	No



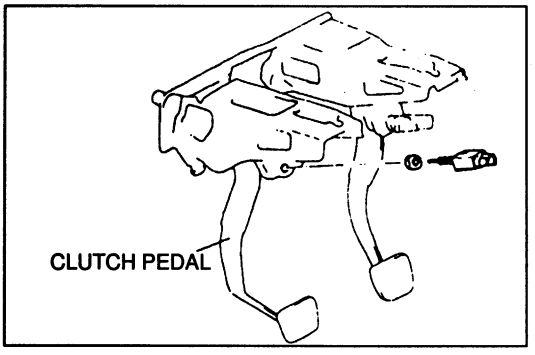
Removal / Installation
1. Remove the power plant frame (Refer to section J-MT Refer to section K-AT)
2. Disconnect the neutral switch connector.
3. Remove the neutral switch.
4. Install in the reverse order of removal.

Tightening Torque:
25–34 N·m {2.5–3.5 kgf·m, 18–25 ft·lbf}



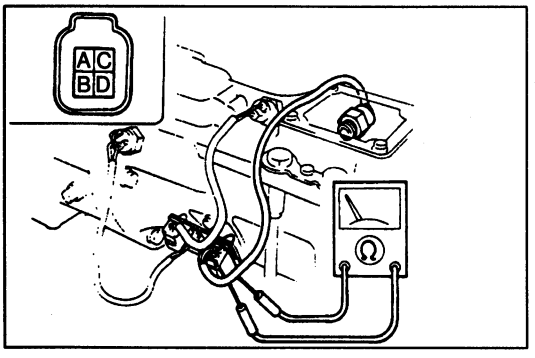
CLUTCH SWITCH (MT)
Inspection
1. Disconnect the clutch switch connector.
2. Connect a circuit tester to the switch.
3. Check the continuity.

Pedal	Continuity
Depressed	Yes
Released	No



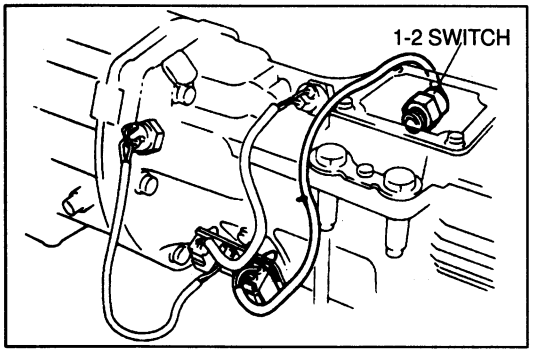
Removal / Installation
1. Remove the power plant frame (Refer to section J-MT Refer to section K-AT)
2. Remove the clutch switch.
3. Install the clutch switch.
4. Connect a circuit tester to the switch and verify that the continuity when the clutch pedal depressed and no continuity when the clutch pedal released.
5. Tighten the adjust nut.

Tightening torque:
14–18 N·m {1.4–1.8 kgf·m 10–13 ft·lbf}



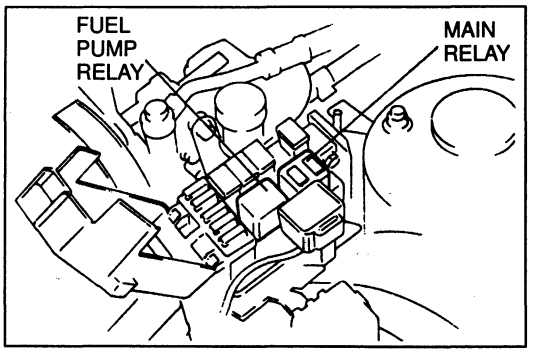
1-2 SWITCH (MT)
Inspection
1. Disconnect 1-2 switch.
2. Connect a circuit tester to the switch.
3. Check the continuity.

Terminal	Transmission	Continuity
A–B	In 1st and 2nd range	No
	In other range	Yes
C–D	In 2nd	Yes
	In other range	No



Removal / Installation
1. Remove the extension housing. (Refer to section J.)
2. Remove the 1-2 switch.
3. Install in the reverse order of removal.

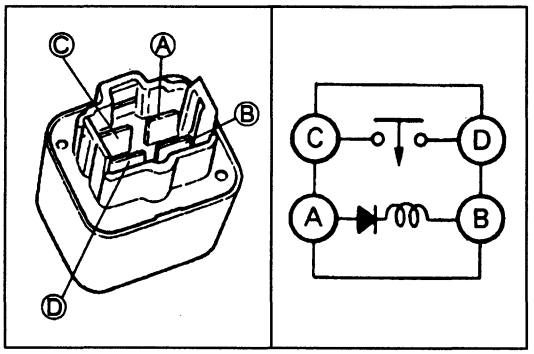
Tightening torque:
25–34 N·m {2.5–3.5 kgf·m, 18–25 ft·lbf}



MAIN RELAY (EGI RELAY)

Inspection (On vehicle)

Check that a "clicking" sound is heard at the main relay when turning the ignition switch OFF and ON.

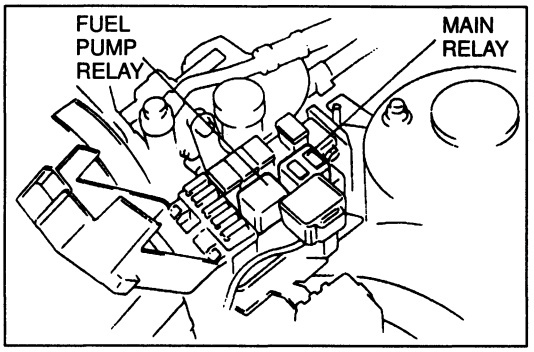


Inspection

1. Disconnect the main relay.
2. Apply battery positive voltage and ground to terminals A and B of the main relay.
3. Check continuity of the relay.

B+: Battery positive voltage

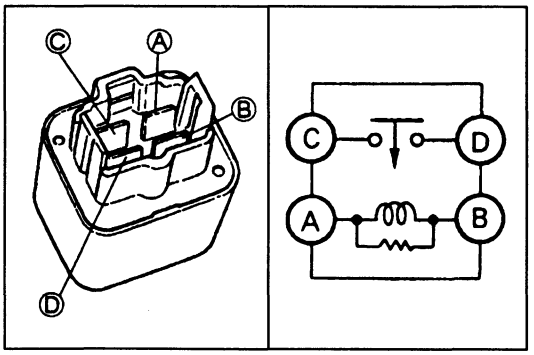
Operation	C-D terminals
B+ Applied	Continuity
B+ Not applied	No continuity



FUEL PUMP RELAY

Inspection (On vehicle)

Check that a "clicking" sound is heard at the fuel pump relay, when turning the ignition switch OFF and ON.

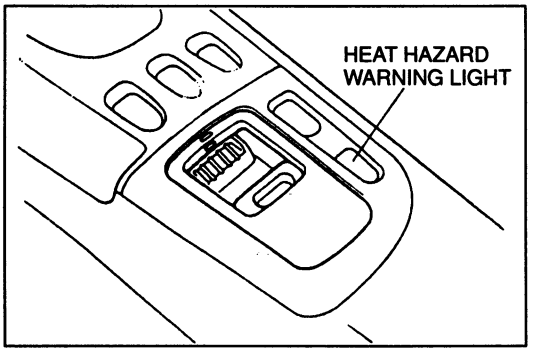


Inspection

1. Disconnect the fuel pump relay.
2. Apply battery positive voltage and ground to terminals A and B of the fuel pump relay.
3. Check continuity of the relay.

B+: Battery positive voltage

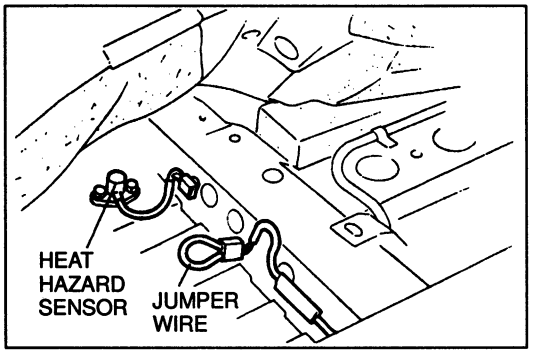
Operation	C-D terminals
B+ applied	Continuity
B+ Not applied	No continuity



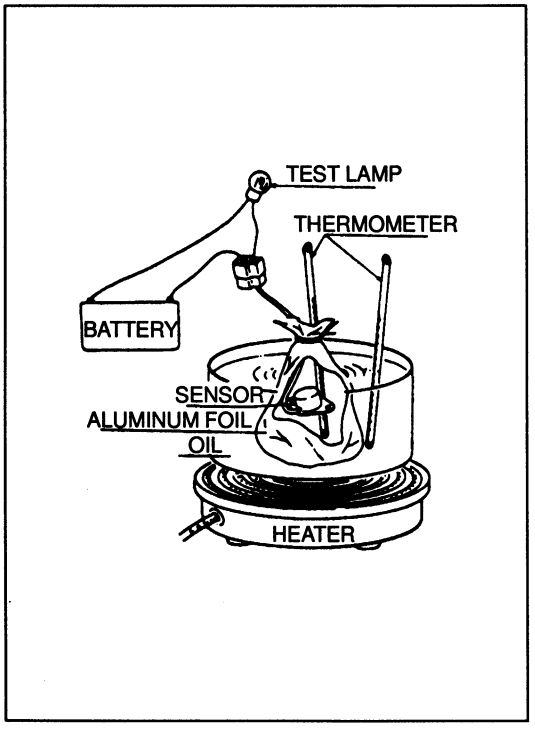
HEAT HAZARD SENSOR

Inspection (Warning system)

1. Turn the ignition switch to ON and verify that the heat hazard warning light illuminates.
2. Start the engine and verify that the warning lamp goes out.



3. Disconnect the heat hazard sensor connector.
4. Check that the heat hazard warning light illuminates on when a jumper wire is connected to the terminals of the sensor connector (harness side).



Removal

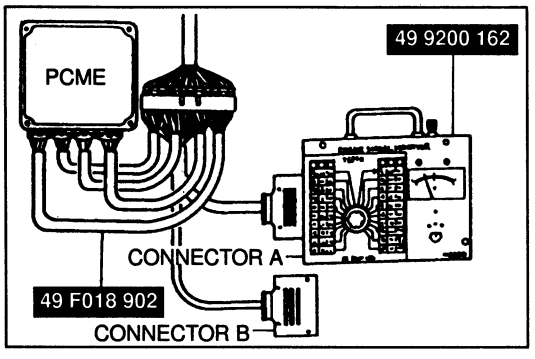
1. Remove the right front seat.
2. Lift up the floor mat.
3. Disconnect the heat hazard sensor connector and remove the sensor.

Installation

Install in the reverse order of removal.

Inspection

1. Wrap the sensor and a thermometer in aluminum foil and place them in a container of oil.
2. Connect a test lamp and battery positive voltage to the terminals of the sensor connector.
3. Gradually heat the oil.
4. Verify that the test lamp comes on when the temperature in the aluminum foil reaches 95–105°C {203–221°F}.
5. Replace the sensor if necessary.



MILEAGE SWITCH

Inspection

1. Connect the **SST** (Engine Signal Monitor) to the PCME.
2. Turn the ignition switch to ON.
3. Measure the voltage at PCME terminal 1N within the first two seconds after the ignition switch is turned to ON.

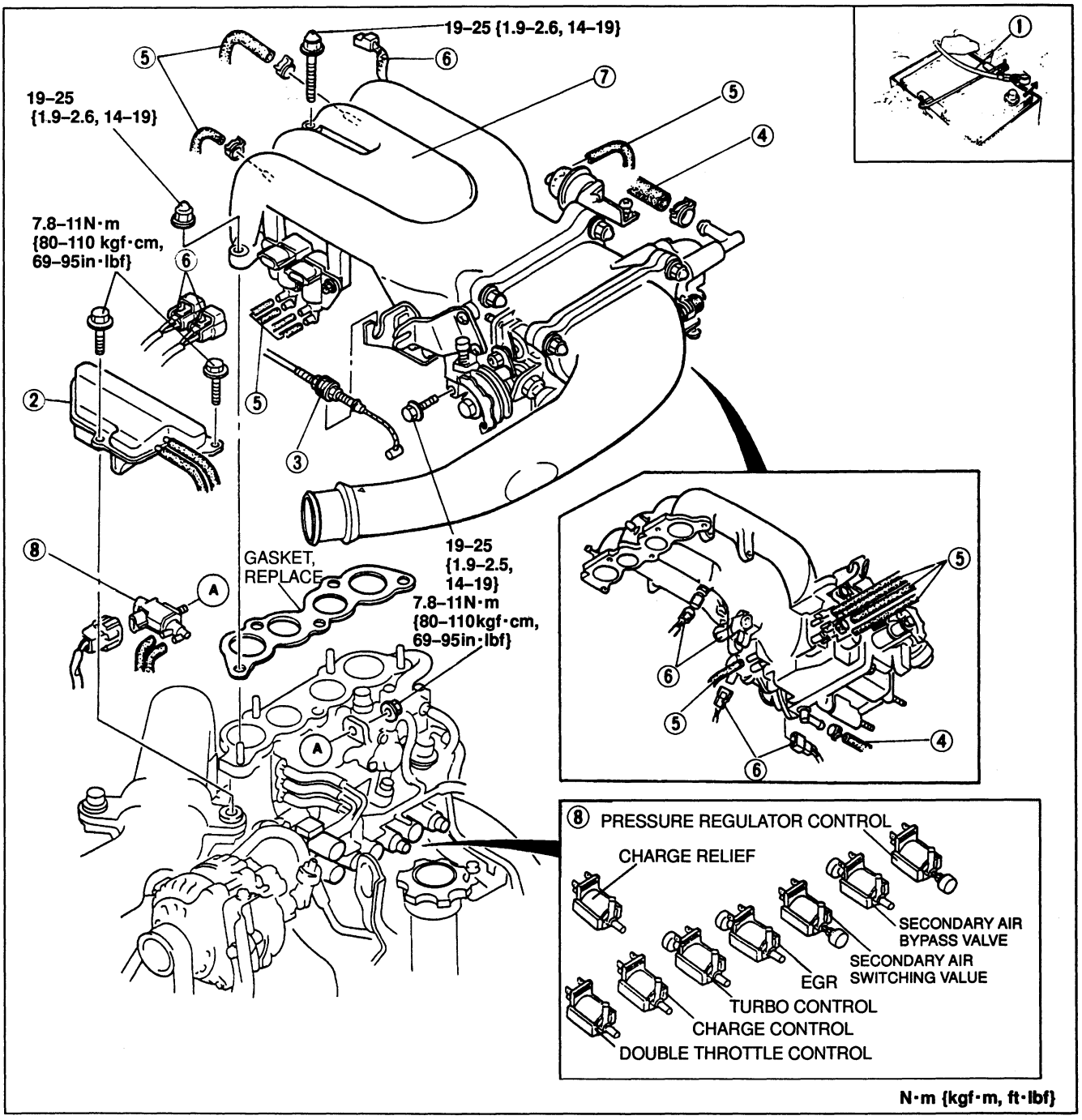
B+: Battery positive voltage

Under 20,000 miles	B+
Over 20,000 miles	Below 1.5V

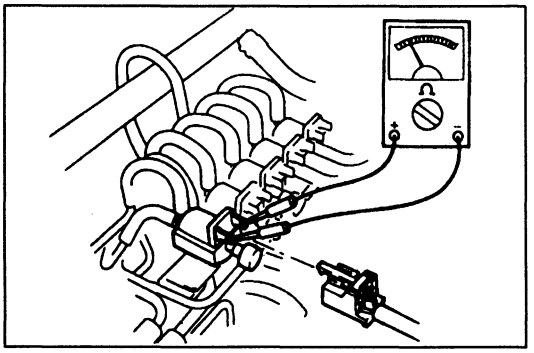
SOLENOID VALVES

Removal / Installation

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

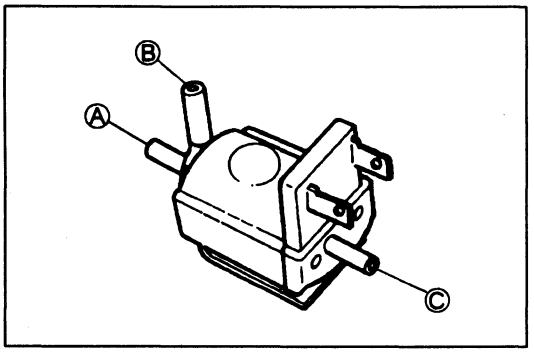


1. Battery cable
2. Pressure chamber
3. Accelerator cable
   removal / installation ..... page F–80
   Inspection / adjustment ..... page F–80
4. Water hose
5. Vacuum hoses
6. Connector
7. Extension manifold
8. Solenoid valves
   Inspection ..... page F–177



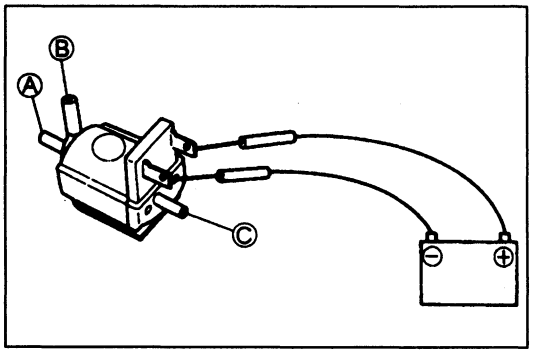
Inspection

1. Disconnect the connector.
2. Connect a circuit tester to the solenoid valve.
3. Check the continuity at the terminals.



4. Verify that air flows between each ports as below.

Port	Air flow
A–B	No
A–C	No
B–C	Yes



5. Connect battery positive voltage and a ground to the terminals of the solenoid valve.
6. Verify that air flows between each ports as below.

Port	Air flow
A–B	Yes
A–C	No
B–C	No

7. Replace the solenoid valve, if necessary.

TROUBLESHOOTING GUIDE

QUICK DIAGNOSIS CHART

This Quick Diagnosis Chart shows the relationship between troubleshooting items and inspection points.

Item		Possible parts and reference pag	Intake air system						Fuel system								Ignition system				Turbo charger system					Secondary air Injection system						Emis-sion system			
			F-16	F-83	F-83	F-137	F-79	F-76	F-105	F-105	F-103	F-100	F-110	F-109	F-110	F-104	F-112	Secion G	Secion G	Secion G	F-16	F-93	F-93	F-93	F-93	F-93	F-123	F-119	F-119	F-119	F-123	F-121	F-123	F-128	F-131	F-131	F-127
			Air cleaner element	Idle air control valve	Solenoid valve (AWS)	Solenoid valve (Double throttle)	Fast idle cam	Intake air leakage	Injector (Primary)	Injector (Secondary)	Fuel filter	Fuel pump	Fuel pump relay (speed)	Fuel pump resistor	Fuel pump relay	Pressure regulator	Solenoid valve (PRC)	Igniter	Ignition coil	Spark plug	Ignition timing	Turbo precontrol	Wastegate control	Turbo precontrol	Charge control	Charge relief	Secondary air bypass valve	Secondary air switching valve	Split air bypass	Port air bypass	Relief 2	Air pump	Air pump relay	Three-way catalyst	Charcoal canister	Solenoid valve (Purge control)	Solenoid valve (EGR)
																					Solenoid valve					Solenoid valve										
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			○	○		○	○	○							○	○																		

DECEL-ERA-TION system	CONTROL SYSTEM (INPUT SIGNAL)																													OTHERS				Possible parts and reference page / Item		
F-134	F-77	F-166	F-166	F-169	F-169	F-170	F-167	F-168	F-168	F-170	F-171	Secton T	Secton D	F-172	Secton U	Secton E	F-172	F-175	F-173	F-152	F-134	F-173	F-172	F-173	Secton K	Secton K	Secton K	Secton K	Secton K	Secton E	Secton D	F-143	Secton C	F-150			
Dashpot	Air bypass valve	Crankshaft position sensor (NE)	Crankshaft position sensor (G)	Engine coolant temperature sensor	Intake air temperature sensor	Fuel thermosensor	Manifold absolute pressure sensor	Narrow range / Throttle position sensor	Full range / Throttle position sensor	Oxygen sensor	Knock sensor	Vehicle speed sensor	Metering oil pump position sensor	P/S manifold absolute pressure sensor	Air conditioning sensor	Water thermoswitch	Stoplight switch	Mileage switch	Heat hazard sensor	Starter signal	E/L unit	1-2 switch (MT)	Neutral switch (MT)	Clutch switch (MT)	Solenoid valve (Shift A) (AT)	Solenoid valve (Shift B) (AT)	Reduce torque signal (AT)	Slip lock-up signal (AT)	Park / neutral signal (AT)	Electrical coolant fan	Metering oil pump	A/C relay	Compression down	PCME			
																																			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

Item	Possible parts and reference pag	Intake air system						Fuel system									Ignition system				Turbo charger system					Secondary air Injection system							Emis-sion system			
		F-16	F-83	F-83	F-137	F-79	F-76	F-105	F-105	F-103	F-100	F-110	F-109	F-110	F-104	F-112	Secion G	Secion G	Secion G	F-16	F-93	F-93	F-93	F-93	F-93	F-123	F-119	F-119	F-119	F-123	F-121	F-123	F-128	F-131	F-131	F-127
		Air cleaner element	Idle air control valve	Solenoid valve (AWS)	Solenoid valve (Double throttle)	Fast idle cam	Intake air leakage	Injector (Primary)	Injector (Secondary)	Fuel filter	Fuel pump	Fuel pump relay (speed)	Fuel pump resistor	Fuel pump relay	Pressure regulator	Solenoid valve (PRC)	Igniter	Ignition coil	Spark plug	Ignition timing	Turbo precontrol	Wastegate control	Turbo precontrol	Charge control	Charge relief	Secondary air bypass valve	Secondary air switching valve	Split air bypass	Port air bypass	Relief 2	Air pump	Air pump relay	Three-way catalyst	Charcoal canister	Solenoid valve (Purge control)	Solenoid valve (EGR)
																					Solenoid valve					Solenoid valve									
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	Self-Diagnosis Checker flashes 88																																			
39	Self-Diagnosis Checker will not work																																			

DECEL-ERA-TION system	CONTROL SYSTEM (INPUT SIGNAL)																															OTHERS			Possible parts and reference page / Item	
F-134	Dashpot																															Secton D			Idle fluctuates / idle hunts	28
F-77	Air bypass valve																															F-143			Hesitates / Stumbles on acceleration	29
F-166	Crankshaft position sensor (NE)																															Secton C			Surges while cruising	30
F-166	Crankshaft position sensor (G)																															F-150			Lack of power	31
F-169	Engine coolant temperature sensor																																		Poor fuel economy	32
F-169	Intake air temperature sensor																																		A/C does not work	33
F-170	Fuel thermosensor																																		Knocking / Pinging	34
F-167	Manifold absolute pressure sensor																																		Fuel odor	35
F-168	Narrow range / Throttle position sensor																																		Exhaust sulfur smell	36
F-168	Full range																																		High oil consumption	37
F-170	Oxygen sensor																																		Self-Diagnosis Checker flashes 88	38
F-171	Knock sensor																																		Self-Diagnosis Checker will not work	39
Secton T	Vehicle speed sensor																																			
Secton D	Metering oil pump position sensor																																			
F-172	P/S manifold absolute pressure sensor																																			
Secton U	Air conditioning sensor																																			
Secton E	Water thermoswitch																																			
F-172	Stoplight switch																																			
F-175	Mileage switch																																			
F-173	Heat hazard sensor																																			
F-152	Starter signal																																			
F-134	E/L unit																																			
F-173	1-2 switch (MT)																																			
F-172	Neutral switch (MT)																																			
F-173	Clutch switch (MT)																																			
Secton K	Solenoid valve (Shift A) (AT)																																			
Secton K	Solenoid valve (Shift B) (AT)																																			
Secton K	Reduce torque signal (AT)																																			
Secton K	Slip lock-up signal (AT)																																			
Secton K	Park / neutral signal (AT)																																			
Secton E	Electrical coolant fan																																			
Secton D	Metering oil pump																																			
F-143	A/C relay																																			
Secton C	Compression down																																			
F-150	PCME																																			

RELATIONSHIP CHART

INPUT DEVICE \ OUTPUT DEVICE		INJECTOR					SOLENOID VALVE																					
		FUEL INJECTION AMOUNT	FUEL INJECTION TIMING	FUEL PUMP RELAY	FUEL PUMP RELAY (SPEED)	IGNITER	IDLE AIR CONTROL	ACCELEATED WARM-UP	DOUBLE THROTTLE CONTROL	PRESSURE REGULATOR CONTROL	TURBO PRECONTROL	WASTEGATE CONTROL	TURBO CONTROL	CHARGE CONTROL	CHARGE RELIEF	SECONDARY AIR BYPASS	SECONDARY AIR SWITCHING	SPLIT AIR BYPASS	PORT AIR BYPASS	RELIEF2	PURGE CONTROL	EGR	POWERTRAIN CONTROL MODULE (TRANSMISSION)	METERING OIL PUMP	A/C RELAY	AIR PUMP RELAY	TROUBLE CODE	MONITOR LAMP
CRANKSHAFT POSITION SENSOR	NE SIGNAL	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	G SIGNAL		○			○																					○	
THROTTLE POSITION SENSOR	NARROW RANGE	○				○	○		○	○						○	○	○	○	○	○	○	○	○		○	○	○	
	FULL RANGE	○	○			○	○				○	○	○	○	○							○			○	○	○	○
ENGINE COOLANT TEMPERATURE SENSOR		○				○	○	○	○		○	○				○	○	○	○	○	○	○			○	○	○	
INTAKE AIR TEMPERATURE SENSOR		○				○	○																				○	
FUEL THERMOSENSOR		○			○	○	○			○											○						○	
MANIFOLD ABSOLUTE PRESSURE SENSOR		○			○	○	○				○	○	○	○	○	○	○	○	○	○	○	○		○		○	○	
OXYGEN SENSOR		○														○		○	○		○						○	○
KNOCK SENSOR						○																					○	○
VEHICLE SPEED SENSOR							○																				○	
MOP POSITION SENSOR																								○			○	
E/L UNIT						○	○																					○
AIR CONDITIONING SENSOR		○				○	○																					○
STEERING PRESSURE SENSOR		○				○	○																					○
IGNITION SWITCH (ST SIGNAL)		○		○	○	○	○	○		○			○				○								○	○		○
STOPLIGHT SWITCH							○																					○
NEUTRAL SWITCH (MT)		○				○	○	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○			○	○		○
CLUTCH SWITCH (MT)		○				○	○	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○			○	○		○
1-2 SWITCH (MT)											○	○	○	○	○												○		
EGR FUNCTION SENSOR																						○					○	
MILEAGE SWITCH																○		○	○	○								
HEAT HAZARD SENSOR																											○	
SOLENOID VALVE SIGNAL (AT)	SHIFT A					○			○		○	○	○	○	○		○	○					○				○		
	SHIFT B					○			○		○	○	○	○	○		○	○					○				○		
REDUCE TORQUE SIGNAL (AT)						○																	○					
SLIP LOCK-UP SIGNAL (AT)						○																	○					
PARK / NEUTRAL SIGNAL (AT)		○				○	○	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○			○	○		○
DATA LINK CONNECTOR (TEN-TERMINAL)		○					○																				○	○
BAROMETRIC ABSOLUTE PRESSURE SENSOR (IN PCME)		○				○	○			○		○	○	○	○	○		○			○		○				○	

Output devices and Engine condition

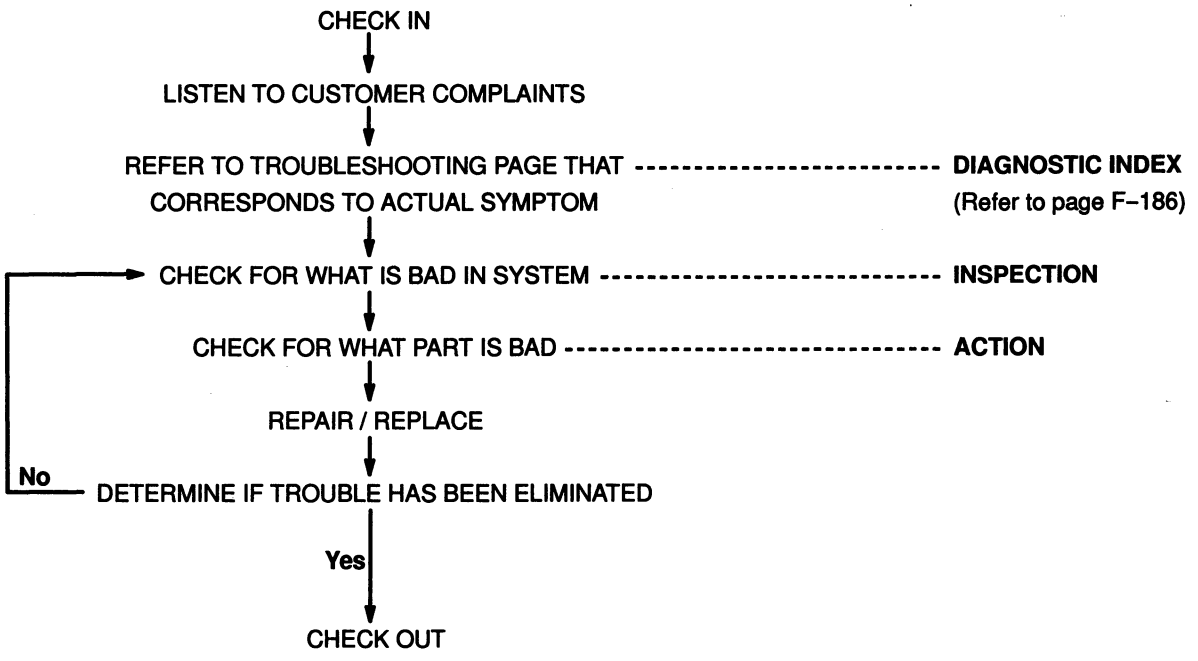
OUTPUT DEVICE \ ENGINE CONDITION		CRANKING (COLD ENGINE)	WARMING UP (DURING IDLE)	MEDIUM LOAD		ACCELERATION	HEVY LOAD	DECELERATION	IDLE	IG: ON (ENGINE NOT RUNNING)	REMARK
				COLD	WARM						
INJECTOR	FUEL INJECTION AMOUNT	Rich			Normal	Rich		FUEL CUT	Rich	No Injection	
	Primary	Operate						Not operate	Operate		
	Secondary	Not operate				Operate		Not operate			
FUEL PUMP RELAY		ON								OFF	
FUEL PUMP REAY (SPEED)		OFF (Low speed)				ON (High speed)		OFF (Low speed)			
IGNITER		Fixed at BTDC 5°	Advanced: depends on engine condition						Fixed at ATDC 5° (L) ATDC 20° (T)	—	
SOLENOID VALVE	ACELERATED WARM-UP (AWS)	ON	OFF								
	IDLE AIR CONTROL (IAC)	ON (Feedback duty)	ON (Fixed duty)						ON (Feedback duty)		
	DOUBLE THROTTLE CONTROL	ON (Closed)		OFF (Open)		ON (AT onry)	OFF (Open)				
	TURBO PRE-CONTROL	OFF (Closed)	Depends on engine condition					OFF (Closed)			
	WASTEGATE CONTROL	OFF (Closed)				Depends on engine condition		OFF (Closed)			
	TURBO CONTOROL	OFF (Closed)				ON (Open)		OFF (Closed)			
	CHARGE CONTROL	ON (Closed)				OFF (Open)		ON (Closed)			
	CHARGE RELIEF CONTROL	OFF (Open)				ON (Closed)		OFF (Closed)			
	SECONDARY AIR BYPASS	OFF (Closed)		ON (Open)		OFF (Closed)					
	SECONDARY AIR SWITCHING	OFF (Port)		ON (Split)				OFF (Port)			
	SPLIT AIR BYPASS	OFF (Closed)		ON (Open)				OFF (Closed)			
	PORT AIR BYPASS	OFF (Closed)	ON (Open)			OFF (Closed)					
	RELIEF 2	ON (Open)	OFF (Closed)								
	PRESSURE REGULATOR CONTROL (PRC)	OFF (Vacuum to pressure regulator)							ON*	OFF	* During hot start only
	PURGE CONTROL (PURGE)	OFF		ON (Purge)		OFF					
	EXHAUST GAS RECIRCULATION (EGR)	OFF (EGR Cut)		ON* (EGR)		OFF (EGR Cut)					* Engine speed: 1,700–3,850 rpm
A/C RELAY		OFF (A/C cut)	ON			OFF (A/C cut)	ON				
COOLANT FAN RELAY		OFF		Depends on engine coolant temperature							
METERING OIL PUMP (MOP)		OFF	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 drivabilitiy 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 58 troubleshooting items. Choose the item that most closely corresponds to the actual symptom.

F TROUBLESHOOTING GUIDE

DIAGNOSTIC INDEX

No.	TROUBLESHOOTING ITEM: TROUBLE		DESCRIPTION	PAGE
1	Melts main or other fuse		-	F-204
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	F-205
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	F-205
5		Partial combustion – when 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 IG position	F-207
6	Will start in other than P and N ranges		Engine starts in P, N and other ranges	Section K
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	F-208
		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	
		After	cranks engine at normal speed but engine requires long time before starting after warm-up	
10	Engine stalls		steadily at any engine temp.	
11			operation	

Troubleshooting chart

7, 8, 9	CRANKS NORMALLY BUT HARD TO START	• ANY ENGINE TEMPERATURE • WHEN ENGINE COLD • AFTER WARM-UP
DESCRIP-TION	• 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 rough" [Nos. 19, 20, 21, 22, or 23])	

[TROUBLESHOOTING HINTS]
① Injector
- Fuel leakage from injector(s)

② Fuel pump
- Poor connection of pump connector
- Poor connection of fuel pump relay connector

③ Pressure regulator
- Malfunction of pressure regulator

④ Fast idle cam
- Malfunction of fast idle cam (when engine cold)

⑤ Spark plug
- Dirty or worn spark plug(s)

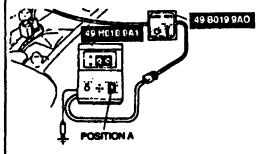
⑥ Intake air system
- Air leakage

⑦ Engine coolant temperature sensor
- Poor connection of engine coolant temperature sensor
- Malfunction of engine coolant temperature sensor

⑧ Solenoid valve (Purge control)
- Air leakage

⑨ Metering oil pump
- Malfunction of pump

⑩ Crankshaft position sensor
- Ground circuit open

STEP	INSPECTION		ACTION
1	Is "00" displayed on SST with ignition switch ON? ☞page F-20 	Yes	"00" displayed Go to next step
		No	Trouble Code No. displayed Check for cause (Refer to specified check sequence)
2	Is air leakage felt or heard at intake air system components at idle?	Yes	Repair or replace
3			

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 actions is described on the reference page specified by the "☞" mark.

DIAGNOSTIC INDEX

TROUBLESHOOTING ITEM No.	TROUBLE		DESCRIPTION	PAGE
1	Melts main or other fuse		—	F-190
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	F-191
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	F-191
5		Partial combustion – when 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 IG position	F-193
6	Will start in other than P and N ranges		Engine starts in P, N and other ranges	Section K
7	Cranks normally but hard to start	Any engine temperature	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	F-194
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 temperature	Engine stops unexpectedly at any engine temperature	F-196
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 is turned ON at idle	F-198 Section K
*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	F-199
16		On acceleration	Engine stops unexpectedly at beginning of acceleration or during acceleration	F-201
17		While cruising	Engine stops unexpectedly while cruising	
*18		On deceleration	Engine stops unexpectedly at beginning of deceleration or recovery from deceleration Exhaust afterburn	F-202 Section K
19	Engine rough	Idle at any engine temperature	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at any engine temperature Idle speed too slow and excessive engine shake at any engine temperature	F-203
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	

* Refer to section F before referring to section K.

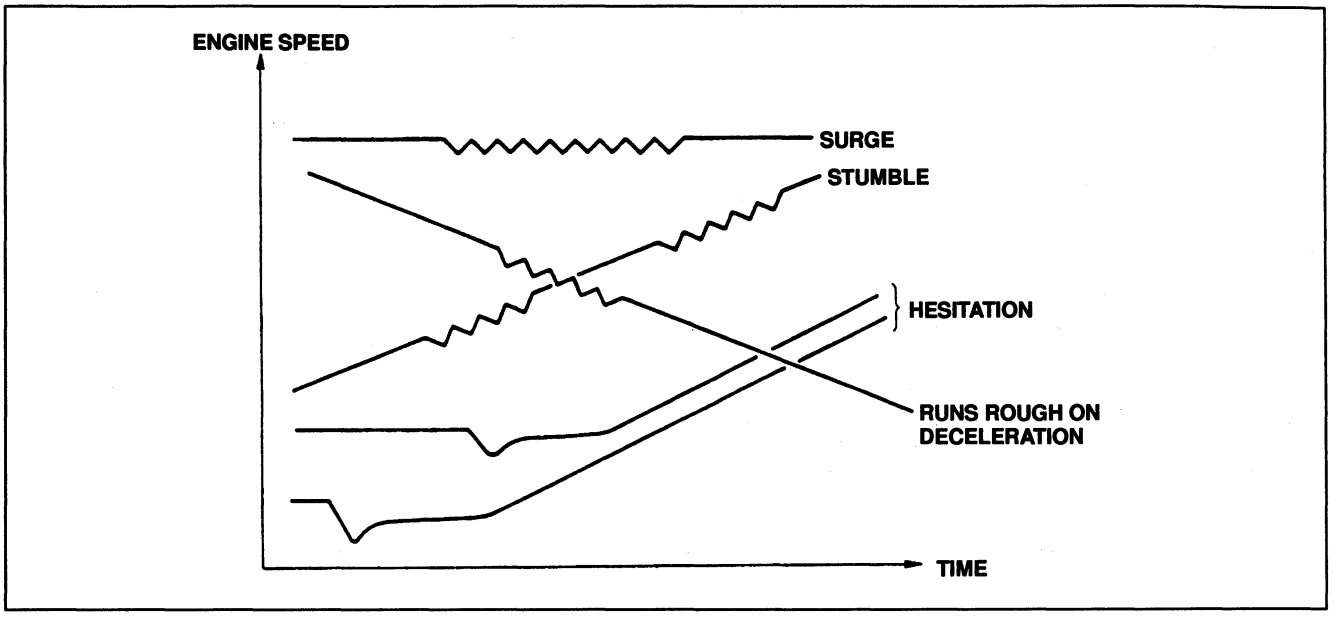
TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
22	Engine rough	Idle with A/C, P/S, and/or E/L ON	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when A/C, P/S, and/or E/L ON	F-205
23		Idle when shifted from N or P to other range	Engine speed 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 beginning of deceleration, during deceleration, or recovery from deceleration Exhaust afterburn	F-206 Section K
25*	Poor acceleration	Driveaway	Engine speed increases normally but vehicle speed slowly increases during driveaway	F-207 Section K
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	F-209
28	Idle fluctuates / Idle hunts		Engine speed hunts between specified idle speed and higher speed	F-211
29	Hesitates / Stumbles on acceleration		Momentary pause at beginning of acceleration or during acceleration	F-212
30*	Surges while cruising		Momentary minor irregularity in engine power at steady vehicle speed	F-214 Section K
31*	Lack of power		Performance poor under load (i.e., power down when climbing hills)	F-215 Section K
32*	Poor fuel economy		Fuel economy unsatisfactory	F-215 Section K
33	A/C does not work		A/C compressor magnetic clutch does not engage when Air conditioning sensor ON	F-215
34	Knocking / Pinging		Sound produced as air/fuel mixture is ignited by some-thing other than spark plug (i.e., hot spot in combustion chamber)	F-216
35	Fuel odor		Gasoline fuel smell or visible leaks	F-216
36	Exhaust sulfur smell		Rotten egg (sulfur) smell from exhaust	F-216
37	High oil consumption		Oil consumption excessive	F-216
38	Self-Diagnosis Checker flashes 88		Checker flashes 88 with test connector grounded	F-217
39	MIL never ON		Self-Diagnosis Checker indicates Trouble Code No. of input device but MIL never ON	F-217
40	Vehicle does not move in D, S, L and/or R ranges		No creep at all Vehicle does not move when accelerator pedal is depressed after shifted to D, S, L and/or R ranges	Section K
41	Vehicle moves in N range		Vehicle creeps in N ranges Vehicle moves with accelerator pedal not depressed	Section K
42	Vehicle moves in P range		Vehicle rolls in P range	Section K
43	Excessive creep		Vehicle moves quickly in D, S, L and R range (with accelerator pedal not depressed) Excessive N to R range and N to D range shift shock felt.	Section K

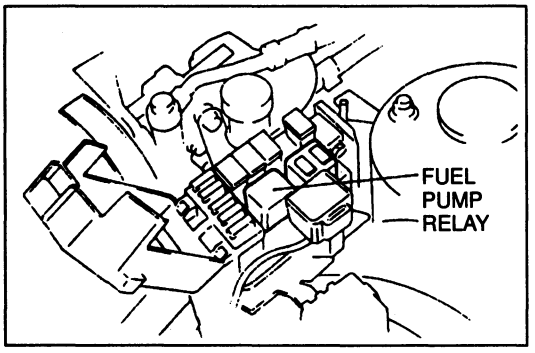
* Refer to section F before referring to section K.

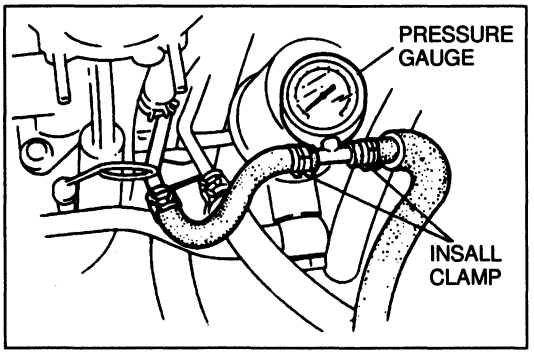
TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
44	No shift		Single range shift (1st → 2nd, 2nd → 3rd or 3rd → O/D) only Sometimes shifts correctly Gear position held in hold mode	Section K
45	Abnormal shift		Shifts incorrectly (incorrect shift pattern) (ex) Vehicle shifts 1st → O/D directly when accelerating with accelerator pedal depressed slightly	Section K
46	Frequent shifting		Downshift occurs when accelerated slightly in D, S and L ranges (except hold mode)	Section K
47	Shift point high or low		Shift points do not match shift diagram Shift delayed when accelerating Shift occur too fast when accelerating and engine speed does not increase	Section K
48	No lockup		No lockup when vehicle speed reaches lockup range	Section K
49	No kickdown		Does not downshift when accelerator pedal depressed more than 7/8 within kickdown range	Section K
50	Engine speed flares up	When accelerating	Engine speed flares up on acceleration	Section K
51		When upshifting and/or downshifting	Engine flares up when accelerator pedal depressed before upshifting Engine flares up suddenly when accelerator pedal depressed before downshifting	Section K
52	Excessive shift shock	P, N to R and/or N to D	Strong shift shock felt at id e when shifting from N to D or R range	Section K
53		When upshitting and/or downshifting	Excessive shift shock felt when accelerating at upshitting Excessive shift shock felt when accelerator pedal depressed at downshifting during cruising	Section K
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 K
55	No mode change		Mode does not change to/from normal mode in D range Hold mode not engaged or not cancelled	Section K
56	Transmission noise	All ranges	Transmission noisy in all ranges when vehicle is idling	Section K
57		D, S, L, R ranges	Abnormal noise from transmission in D, S, L, R	Section K
58	Transmission overheats		ATF smells burnt and/or is discolored	Section K

Description of Drivability Problems

STUMBLE : Mild jerking during acceleration.
HESITATION : Flat spot occurring just after the accelerator pedal is depressed.
SURGE : Continuous soft jerking while cruising.







PRECAUTION

Fuel Pressure Release and Servicing Fuel System

a) Fuel in the fuel system remains under high pressure when the engine is not running.
Before disconnecting any fuel line, release the fuel pressure from the fuel system as described to reduce the possibility of injury or fire.
1. Start the engine.
2. Remove the fuel pump relay.
3. After the engine stalls, turn OFF the Ignition switch.
4. Install the fuel pump relay.

b) Use a rag as protection from fuel spray when disconnecting the hoses.
Plug the hoses after removal.

c) When inspecting the fuel system, use a suitable fuel pressure gauge.

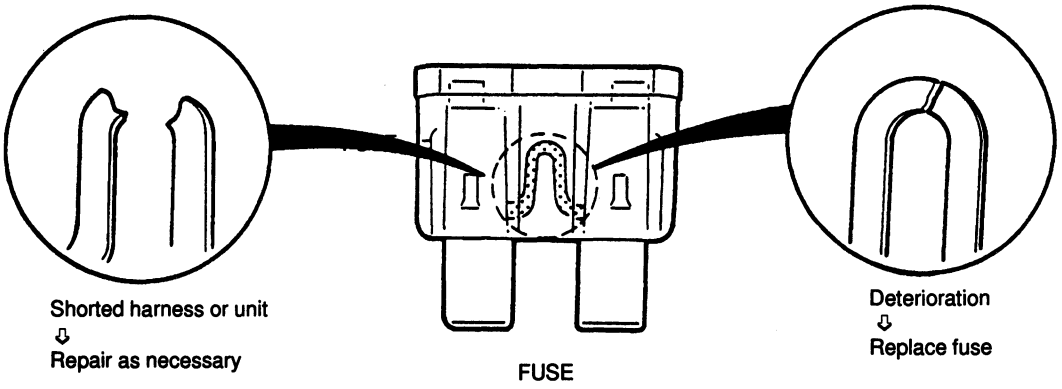
Caution

- **Install hose clamps to secure the fuel pressure gauge to prevent fuel leakage.**

SYMPTOM TROUBLESHOOTING

1	MELTS MAIN OR OTHER FUSE	

[TROUBLESHOOTING HINTS]
Check the condition of the fuse



Damaged Fuse	Related Wiring Harness	
MAIN (120A)	Main fuse	Alternator
BTN (60A)	BTN fuse	ROOM fuse
ROOM (10A)	ROOM fuse	PCME terminal 1A
EGI INJ (30A)	Main relay	Injectors PCME terminal 1B Oxygen sensor Solenoid valves E/L unit Air pump relay
ENGINE (15A)	ENGINE fuse	Main relay
METER (15A)	METER fuse	Data link connector terminal + B
FUEL PUMP (20A)	FUEL PUMP fuse Fuel pump relay	Fuel pump relay Fuel pump

3	CRANK NORMALLY BUT WILL NOT START	• NO COMBUSTION
DESCRIPTION	• Starter cranks engine at normal speed but engine shows no indication of firing	

[TROUBLESHOOTING HINTS]
① Crankshaft position sensor
- Poor connection of connector

② Main relay
- Poor connection of connector
- Malfunction of relay

③ Fuel pump
- No fuel in tank
- Poor connection of fuel pump connector

④ PCME
- Poor connection of connector (Especially 1H, 1O, 1T, 3I, 4D, 4E, 4G, 4H)

⑤ Igniter
- Poor connection of connector

⑥ Injector
- Poor connection of connector

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 IG position • Refer to "ENGINE STALLS" if this symptom initially appears after engine stalls • Fuel in tank • Battery in normal condition	

[TROUBLESHOOTING HINTS]
① Igniter
- Poor connection of connector

② Ignition coil
- Poor connection of connector

③ Spark plug
- Dirty or worn spark plug(s)

④ Injector (primary)
- Poor connection of connector
- Fuel leakage from injector(s)

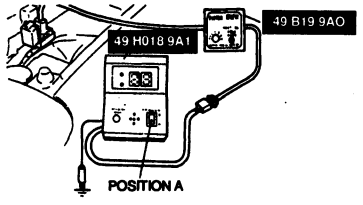
⑤ Intake air system
- Air leakage

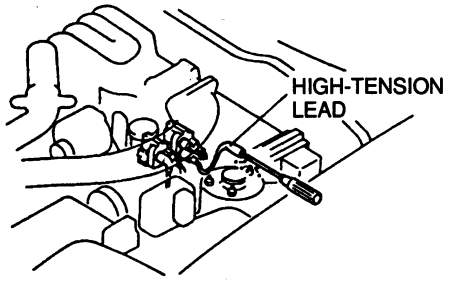
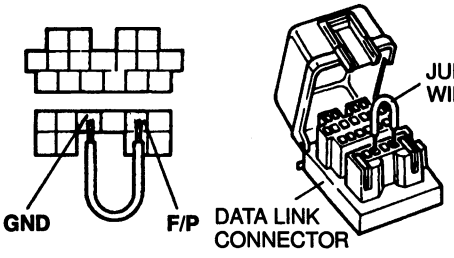
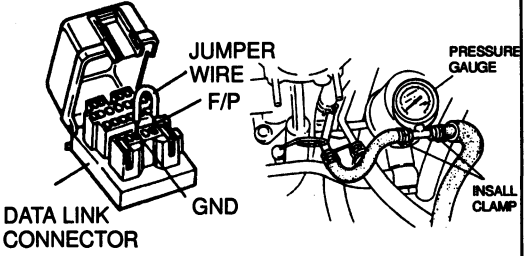
⑦ Engine coolant temperature sensor
- Poor connection of connector

⑧ Engine compression

⑨ PCME
- Poor connection of connector (Especially 1B, 1G, 1H, 1J, 1N, 1O, 1T, 3E, 4E, 4G, 4H)

⑩ Solenoid valve (Purge control)
- Short circuit (Solenoid valve fully opened)

STEP	INSPECTION		ACTION
1	Is "00" displayed on **SST** with ignition switch ON? ☞ **page F-20**  	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence)

STEP	INSPECTION		ACTION
2	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Go to next step
		No	Check ignition system ☞**Section G**
3	Are spark plugs OK? ☞**Page G**	Yes	Go to next step
		No	Clean or replace
4	Connect jumper wire between F/P and GND terminals of data link connector; will engine start? 	Yes	Check as follows: • 1T terminal voltage at PCME ☞**page F-156** • Continuity between 1T terminal and fuel pump relay connector terminal • Condition of PCME 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 F-100**
5	Are PCME terminal voltages OK? ☞**page F-152** Terminal: 1B, 1G, 1H, 1J, 1N, 1O, 1T, 3E, 4E, 4G, 4H	Yes	Go to next step
		No	Check for cause ☞**page F-153**
6	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞**page F-98** **Fuel line pressure:** **250–260 kPa {2.5–2.7 kgf/cm ^{2}, 36–38 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 F-104** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞**page F-101**

STEP	INSPECTION		ACTION
7	Are injectors OK? ☞ **Page F-107** ● Fuel leakage ● Primary injector(s) clogged	Yes	Go to next step
		No	Replace injector(s) ☞ **Page F-105**
8	Is engine compression OK? ☞ **Section C** **Compression** **690 kPa {7.0 kgf/cm², 100 psi} – 250 rpm** **Differential limit of chambers** **150 kPa {1.5 kgf/cm², 21psi} – 250 rpm**	Yes	Go to next step
		No	Check for cause ☞ **Section C**
9	Try known good PCME; does condition improve? ☞ **page F-150**		

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 Solenoid valve (PRC)
- Poor connection of solenoid valve connector or PCME 4M terminal

② Fuel
- High RVP (winter) fuel used in warm weather

③ Engine coolant temperature sensor
- Malfunction of engine coolant temperature sensor

④ Evaporative emission control
- Malfunction of check valve (two-way)

⑤ Fuel pump
- Malfunction of fuel pump relay

7, 8, 9	CRANKS NORMALLY BUT HARD TO START	• ANY ENGINE TEMPERATURE • 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 rough" [Nos. 19, 20, 21, 22, or 23])	

[TROUBLESHOOTING HINTS]

① Injector
- Fuel leakage from injector(s)

② Fuel pump
- Poor connection of pump connector
- Poor connection of fuel pump relay connector

③ Pressure regulator
- Malfunction of pressure regulator

④ Fast idle cam
- Malfunction of fast idle cam (when engine cold)

⑤ Spark plug
- Dirty or worn spark plug(s)

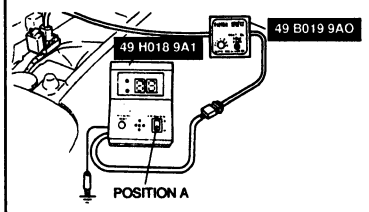
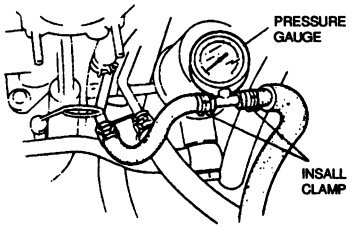
⑥ Intake air system
- Air leakage

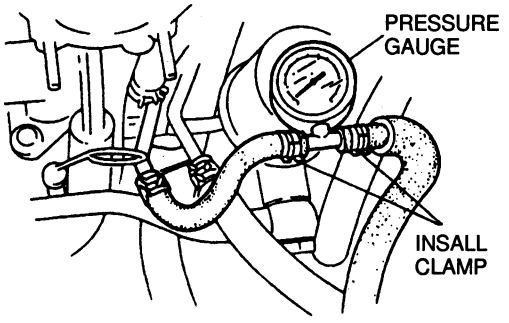
⑦ Engine coolant temperature sensor
- Poor connection of engine coolant temperature sensor
- Malfunction of engine coolant temperature sensor

⑧ Solenoid valve (Purge control)
- Air leakage

⑨ Metering oil pump
- Malfunction of pump

⑩ Crankshaft position sensor
- Ground circuit open

STEP	INSPECTION		ACTION
1	Is "00" displayed on **SST** with ignition switch ON? **☞page F–20** 	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence)
2	Is air leakage felt or heard at intake air system components at idle?	Yes	Repair or replace
		No	Go to next step
3	Is fast idle cam OK? **☞page F–79**	Yes	Go to next step
		No	Adjust **☞page F–79**
4	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? **☞page F–98** **Fuel line pressure:** **250–260 kPa {2.5–2.7 kgf/cm², 36–38 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 F–104** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure **☞page F–101**

STEP	INSPECTION		ACTION
5	Is fuel line pressure held after ignition switch is turned OFF? ☞page F-97 **Fuel pressure:** **More than 150 kPa {1.5 kgf/cm², 21 psi}**  	Yes	Go to next step
		No	Plug outlet of pressure regulator, Is fuel line pressure held after ignition switch is turned OFF? ☞page F-100 ● If yes, replace pressure regulator ☞page F-104 ● If no, check fuel pump hold pressure ☞page F-101 If fuel pump OK, check injectors for fuel leakage ☞page F-106
6	Are spark plugs OK? ☞Section G	Yes	Go to next step
		No	Repair or replace
7	Is EGR control system OK? ☞page F-126	Yes	Go to next step
		No	Check as follows: ● Solenoid valve (EGR) for sticking ● Condition of solenoid valve connector female terminal(s)
8	Try known good PCME; does condition improve? ☞page F-150		

10,11,12	ENGINE STALLS	• IDLE AT ANY ENGINE TEMP • DURING FAST IDLE • IDLE AFTER WARM-UP
DESCRIP-TION	• Engine stops unexpectedly at idle and/or during fast idle operation	

[TROUBLESHOOTING HINTS]

① Injector
- Fuel leakage from injector(s)
- Injector(s) clogged

② Fuel pump
- Poor connection of connector

③ Fuel pump relay
- Poor connection of connector

④ Spark plug
- Dirty or worn spark plug(s)

⑤ Manifold absolute pressure sensor
- Poor connection of manifold absolute pressure sensor connector

⑥ EGR control valve
- EGR control valve stuck

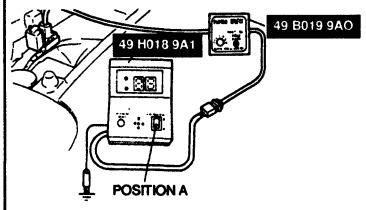
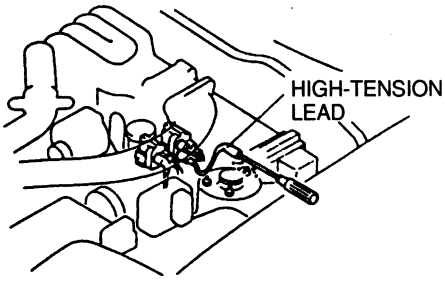
⑦ Idle air control valve
- Poor connection of connector

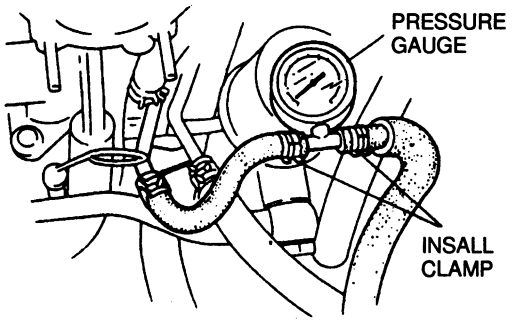
⑧ Crankshaft position sensor
- Poor connection of connector

⑨ PCME
- Poor connection of connector

⑩ Igniter
- Poor connection of connector

⑪ Metering oil pump
- Malfunction of oil pump

STEP	INSPECTION		ACTION
1	Is "00" displayed on **SST** with ignition switch ON? **☞page F-20** 	Yes	**"00" displayed** • If symptom occurs at idle at any engine temp., go to next step • If symptom occurs during fast idle operation, go to next step • If symptom occurs at idle after warm-up, go to Step 6
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence)
2	Is tast idle cam OK? **☞page F-79**	Yes	Go to next step
		No	Adjust **☞page F-79**
3	Is strong blue spark visible at each disconnected high-tension lead while cranking engine? 	Yes	Go to next step
		No	Check ignition system **☞Section G**

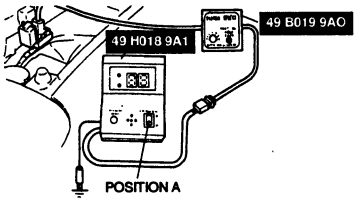
STEP	INSPECTION		ACTION
4	Are following PCME terminal voltages OK? ☞**page F-152** ● 1B (PCME power) ● 1G, 1H, 1J (Igniter) ● 1O (Manifold absolute pressure sensor) ● 1T (Fuel pump relay) ● 3E (Engine coolant temperature sensor) ● 3F (Throttle position sensor narrow range) ● 4E, 4G, 4H (Crankshaft position sensor) ● 4O (Solenoid valve (EGR)) ● 4P (Solenoid valve (AWS)) ● 4Q (Idle air control valve) ● 4W, 4Y (Primary fuel injector)	Yes	Go to next step
		No	Check for cause ☞**page F-153**
5	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞**page F-98** **Fuel line pressure:** **250–260 kPa {2.5–2.7 kgf/cm², 36–38 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 F-104** ● If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞**page F-101**
6	Is engine compression correct? ☞**Section C** **Compression** **690 kPa {7.0 kgf/cm², 100 psi} – 250 rpm** **Differential limit of chambers** **150 kPa {1.5 kgf/cm², 21 psi} – 250 rpm**	Yes	Go to next step
		No	Check for cause
7	Are spark plugs OK? ☞**Section G**	Yes	Go to next step
		No	Check for cause
8	Try known good PCME; does condition improved? ☞**page F-150**		

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)
- Air conditioning sensor
- Headlight switch
- Rear window defroster switch
- Blower switch

② Idle air control valve
- Solenoid valve stuck

③ Air control valve
- Malfunction of air control valve

STEP	INSPECTION		ACTION
1	Are switches correct when checked by using **SST** monitor switch function while ignition switch ON? ☞**page F-44** • Blower switch • Headlight switch • Rear window defroster switch • Electric coolant fan • Electrical load unit • Air conditioning sensor	Yes	Go to next step
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞**page F-45**
2	Is "00" displayed on **SST** with ignition switch ON? ☞**page F-20**  	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞**page F-22**
3	Is terminal voltage at PCME correct at idle? ☞**page F-150** **4Q terminal: Approx. 5-11V (at idle)**	Yes	Check idle air control valve and replace it if necessary ☞**page F-83** If OK, go to "ENGINE STALLS-IDLE WHEN SHIFTED FROM N or P TO OTHER RANGES" in Section K of this manual
		No	Try known good PCME and check if condition improves ☞**page F-150**

15	ENGINE STALLS	• DRIVEAWAY
DESCRIPTION	• Engine stops unexpectedly upon driveaway • Idle condition normal	

[TROUBLESHOOTING HINTS]

① Injector
- Fuel leakage from injector(s)
- Injector(s) clogged

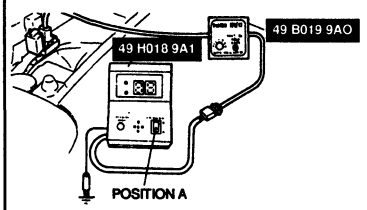
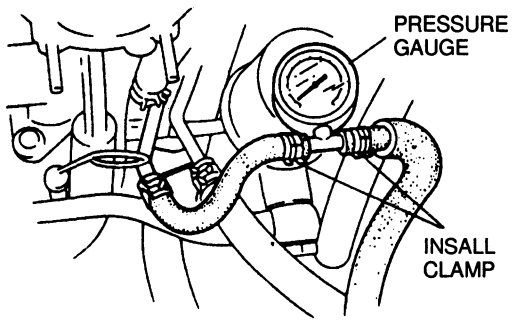
② Pressure regulator
- diaphragm damaged

③ Fuel filter
- Fuel filter clogged

④ Metering oil pump
- Poor connection of connector

⑤ Engine coolant temperature sensor
- Poor connection of connector

⑥ Crankshaft position sensor
- Malfunction of sensor

STEP	INSPECTION		ACTION
1	Is "00" displayed on **SST** with ignition switch ON? ☞**page F-20** 	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞**page F-22**
2	Using Engine Signal Monitor, do voltage reading and lamp operation change as follows upon driveaway? Terminal: 1O — Condition: Voltage gradually increase Terminal: 4E, 4G — Condition: Voltage not suddenly change Terminal: 4W, 4Y — Condition: Flashing of green and red lamps becomes quicker	Yes	Go to next step
		No	Check as follows: • Condition of female terminals in related connector • Continuity between injector connector and PCME 4W or 4Y terminal
3	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? ☞**page F-98** **Fuel line pressure:** **250–260 kPa {2.5–2.7 kgf/cm², 36–38 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 F-104** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞**page F-101**
4	Are injectors OK? • No fuel leakage ☞**page F-106** • Injectors not clogged (Perform volume test) ☞**page F-67**	Yes	Go to next step
		No	Replace injector ☞**page F-105**

STEP	INSPECTION		ACTION
5	Is engine compression OK? ☞Section G **Compression** **690 kPa {7.0 kgf/cm², 100 psi} – 250 rpm** **Differential limit of chambers** **150 kPa {1.5 kgf/cm², 21 psi} – 250 rpm**	Yes	Go to next step
		No	Check for cause
6	Are spark plugs OK? ☞Section G	Yes	Go to next step
		No	Clean or replace
7	Try known good PCME; does condition improved? ☞page F–150		

16, 17	ENGINE STALLS	• ON ACCELERATION / WHILE CRUISING
DESCRIP-TION	• Engine stops unexpectedly at beginning of acceleration or during acceleration • Engine stops unexpectedly while cruising	

[TROUBLESHOOTING HINTS]

① Fuel pump
- Poor connection

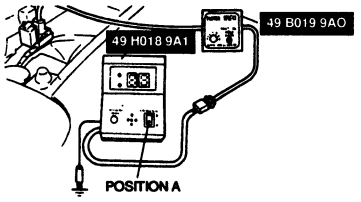
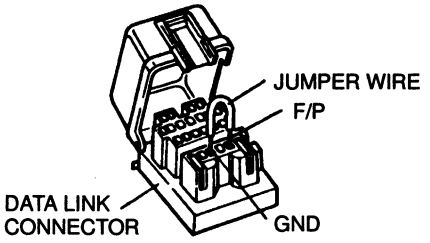
② Pressure regulator
- Diaphragm damaged

③ Crankshaft position sensor
- Poor connection of connector

④ Manifold absolute pressure sensor
- Poor connection of connector

⑤ Spark plug
- Misfire

⑥ Main relay
- Poor connection of connector

STEP	INSPECTION		ACTION
1	Is "00" displayed on **SST** with ignition switch ON? ☞**page F–20** 	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence)
2	Ground terminal F/P of data link connector within ignition switch ON; does condition improve? 	Yes	Check as follows; • Poor connection of fuel pump relay • Poor connection of PCME 1T terminal
		No	Go to next step
3	Is pressure regulator OK? ☞**page F–104**	Yes	Go to next step
		No	Replace
4	Try known good PCME; does condition improved? ☞**page F–150**		

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 of connector

② Idle speed
- Idle speed too low

③ Crankshaft position sensor
- Poor connection of connector

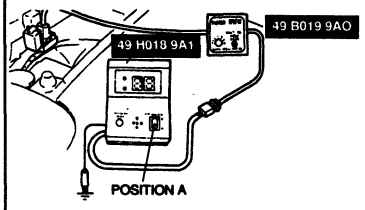
④ Manifold absolute pressure sensor
- Malfunction of manifold absolute pressure sensor

⑤ Idle air control valve
- Solenoid valve stuck

⑥ EGR control valve
- Solenoid valve stuck open

⑦ PCME
- Poor connection of connector

⑧ Fuel cut control

STEP	INSPECTION		ACTION
1	Is "00" displayed on **SST** with ignition switch ON ☞**page F-20** 	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence)
2	Are following PCME terminal voltage correct? When checking voltages, tap, move, and wiggle the harness and the connector. • 1B (Main relay) • 1G, 1H, 1J (Igniter) • 1T (Fuel pump relay) • 4D (Ground) • 4W, 4Y (Primary injector)	Yes	**MT** Check neutral switch and clutch switch ☞**page F-173** **AT** Go to "ENGINE STALLS ON DECELERATION" in Section K of this manual
		No	Check for cause

19, 20, 21	ENGINE 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 temperature • Idle speed too low and excessive engine shake at any engine temperature • Fast idle speed too low 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 Injector
- Fuel leakage from injector(s)
- Injector(s) clogged

② Air pump
- Malfunction of air pump

③ Fuel pump relay
- Poor connection of connector

④ Spark plug
- Misfire

⑤ Engine
- Compression low

⑥ Fast idle cam
- Malfunction of fast idle cam

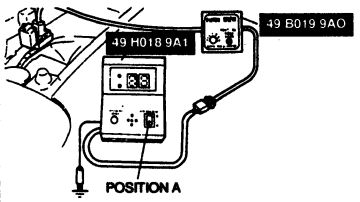
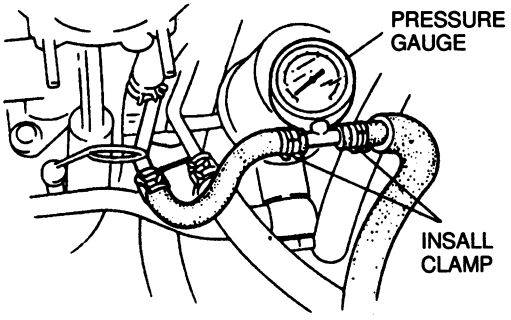
⑦ Manifold absolute pressure sensor
- Malfunction of manifold absolute pressure sensor

⑧ Engine coolant temperature sensor
- Poor connection of connector

⑨ EGR control valve
- EGR control valve stuck

⑩ Idle air control valve
- Poor connection of connector

⑪ Fuel thermosensor

STEP	INSPECTION		ACTION
1	Is "00" displayed on **SST** with ignition switch ON ? **☞page F–20** 	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence) **☞page F–22**
2	Are spark plugs OK?	Yes	Go to next step
		No	Clean or replace
3	Is strong blue spark visible at each disconnected high-tension lead at idle?	Yes	Go to next step
		No	Check ignition system **☞Section G**
4	Connect data link connector terminals F/P and GND with a jumper wire; is fuel line pressure correct with ignition switch ON? **☞page F–98** 	Yes	• If symptom occurs at idle at any engine temperature, 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 10
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose • If pressure **quickly** increases, check pressure regulator **☞page F–104** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure **☞page F–101**
5	Is air pump OK? **☞page F–121**	Yes	Go to next step
		No	Repair or replace

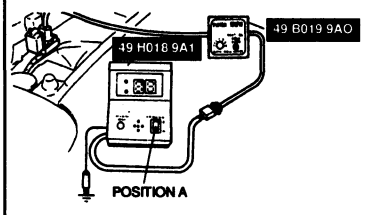
STEP	INSPECTION		ACTION
6	Is idle air control valve OK? ☞page F-83	Yes	Go to next step
		No	Repair or replace
7	Is fast idle cam OK? ☞page F-79	Yes	Go to next step
		No	Adjust
8	Is accelerated warm-up system OK? ☞page F-83	Yes	Go to next step
		No	Repair or replace
9	Is engine compression correct? ☞Section C **Compression** **690 kPa {7.0 kgf/cm², 100 psi} – 250 rpm** **Differential limit of chambers** **150 kPa {1.5 kgf/cm², 21psi} – 250 rpm**	Yes	Go to next step
		No	Check for cause ☞Section G
10	Are following PCME terminal voltages correct? ☞page F-152 • 1O (Manifold absolute pressure sensor) • 3E (Engine coolant temperature sensor) • 3L (Intake air temperature sensor) • 4I, 4J, 4K, 4L (Metering oil pump) • 4Y (Rear primary injector) • 4W (Front primary injector)	Yes	Go to next step
		No	Check for cause
11	Is EGR control system OK? ☞page F-126	Yes	Try known good PCME; does condition improve? ☞page F-150
		No	Repair or replace

22, 23	ENGINE 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 Monitor switch function (SST)
- Air conditioning sensor
- Headlight switch
- Rear window defroster switch
- Blower switch

③ Idle air control valve
- Solenoid valve stuck

STEP	INSPECTION		ACTION
1	Is idle speed correct? ☞page F-16	Yes	Go to next step
		No	Adjust ☞page F-16
2	Is "00" displayed on **SST** with ignition switch ON? ☞page F-20 	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞page F-22
3	Are following terminal voltage at PCME correct? ☞page F-1 • 1E (Air conditioning sensor) • 1N (Steering pressure sensor) • 1R (PCMT) [AT] • 3B (Electrical load unit) • 3D (Electrical coolant fan)	Yes	Go to next step
		No	Check for cause
5	Warm-up engine Does idle speed decrease when idle air control valve connector disconnected?	Yes	• If symptom occurs at idle with A/C ON, check A/C system in section U of this manual • If symptom occurs at idle with E/L ON, check E/L unit ☞page F-135 • If symptom occurs at idle with P/S ON, check P/S pump in section N of this manual • If symptom occurs at idle when shifted from N or P to other range, go to "ENGINE ROUGH-IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGE" in Section K of this manual (AT)
		No	Check fast idle cam ☞page F-79

24	ENGINE ROUGH	• ON DECELERATION
DESCRIPTION	• Engine shakes at beginning of deceleration, or recovery from deceleration • Exhaust afterburn.	

[TROUBLESHOOTING HINTS]

① Fuel pump
- Poor connection of connector

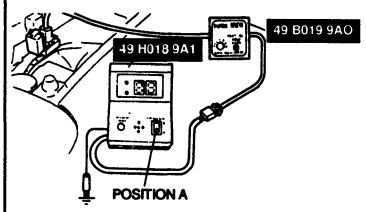
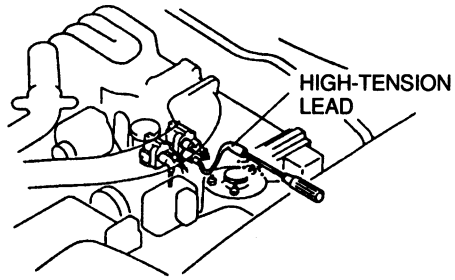
② Injector
- Fuel leakage from injector(s)

③ Dashpot
- Dashpot misadjusted

④ Throttle position sensor
- Poor connection of connector

⑤ Secondary air injection

⑥ Idle air control valve
- Solenoid valve stuck

STEP	INSPECTION		ACTION
1	Is "00" displayed on **SST** with ignition switch ON? **☞page F-20** 	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence) **☞page F-22**
2	Is strong blue spark visible at each disconnected high-tension lead.? 	Yes	Check spark plugs If OK, go to next step If not OK, clean or replace spark plug
		No	Check ignition system **☞Section G**
3	Is dashpot OK? **☞page F-134**	Yes	Go to next step
		No	Adjust
4	Is intake manifold vacuum correct at idle? **Vacuum:** **More then 60.0 kPa {450 mmHg, 17.7 inHg}**	Yes	Go to next step
		No	Check as follows: • Intake air system components for proper installation • Vacuum hoses for disconnection and damage • Engine compression **☞Section C**
5	Are injectors OK? **☞page F-106**	Yes	Go to next step
		No	Replace
6	Is engine compression OK? **☞Section C** **Compression** **690 kPa {7.0 kgf/cm³, 100 psi} – 250 rpm** **Differential limit of chambers** **150 kPa {1.5 kgf/cm², 21 psi} – 250 rpm**	Yes	Go to next step
		No	Check for cause **☞Section C**
7	Try known good PCME; does condition improved? **☞page F-150**		

25, 26	POOR ACCELERATION	• DRIVEAWAY • ON ACCELERATION
DESCRIPTION	• Engine speed increases normally but vehicle speed slowly increases during driveaway or acceleration	

[TROUBLESHOOTING HINTS]

① Injector
- Fuel leakage from injector(s)
- Injector nozzle clogged

② Pressure regulator
- Pressure regulator malfunction

③ Fuel filter
- Filter clogged

④ Spark plug
- Misfire

⑤ Igniter
- Poor connection of connector

⑥ Air leakage in intake air system

⑦ Manifold absolute pressure sensor
- Manifold absolute pressure sensor filter or hose clogged
- Poor connection of connector

⑧ Crankshaft position sensor
- Poor connection of connector

⑨ Metering oil pump
- Malfunction of oil pump
  (Fuel injection amount and ignition timing fixed)

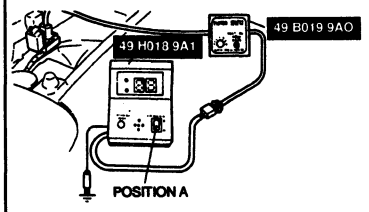
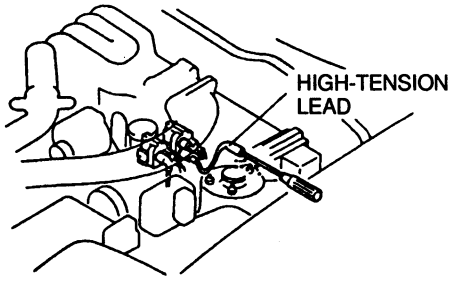
⑩ Solenoid valve (Turbo control, Charge control)
- Malfunction of solenoid valve
  (Fuel injection amount and ignition timing fixed)

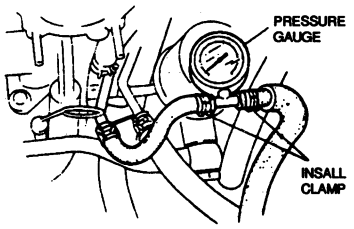
⑪ EGR control system
- FOR control valve stuck (open)

⑫ Engine coolant temperature sensor
- Malfunction of thermosensor

⑬ Double throttle control system

⑭ Check valve (Turbo control, Charge control, Charge relief)

STEP	INSPECTION		ACTION
1	Is "00" displayed on **SST** with ignition switch ON? **☞page F-20** 	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence) **☞page F-22**
2	Is a 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 ignition system **☞Section G**
3	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 • Engine compression **☞Section C**
4	Is air leakage felt or heard at intake air system components?	Yes	Repair or replace
		No	Go to next step

STEP	INSPECTION		ACTION
5	Is fuel line pressure correct at idle? ☞**page F-98** **Fuel line pressure:** **190–220 kPa {1.9–2.3 kgf/cm², 28–32 psi}**  	Yes	Go to next step
		No	**Low pressure** Check as follows: ● Fuel filter for clogging ● Operation of pressure regulator
6	Are injectors OK? ☞**page F-106**	Yes	**MT** Go to next step **AT** Go to "POOR ACCELERATION – DRIVEAWAY / ON ACCELERATION" in section K of this manual
		No	Replace
7	Try known good PCME; does condition improved? ☞**page F-150**		

27	HIGH IDLE SPEED AFTER WARM-UP
DESCRIPTION	• Idle sped continues at fast idle after warm-up • Engine returns slowly to idle after accelerator is released

[TROUBLESHOOTING HINTS]

① Fast idle cam
- Malfunction of fast idle cam

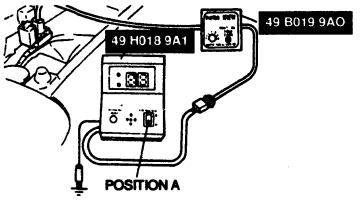
② Accelerated warm-up system
- Solenoid valve (AWS) open

③ Engine coolant temperature sensor
- Malfunction of engine coolant temperature sensor

④ Idle air control valve
- Idle air control valve stuck (open)
- A/C, P/S, or E/L signal always ON

⑤ Throttle valve
- Valve not closed throttle position

⑥ Dashpot

STEP	INSPECTION		ACTION
1	Is "00" displayed on **SST** with ignition switch ON? ☞**page F-20**  	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞**page F-22**
2	Connect data link connector terminals TEN and GND with a jumper wire; does idle speed decrease?	Yes	Check following terminal voltage at PCME ☞**page F-152** • 1E (Air conditioning sensor) • 1N (Steering pressure sensor) • 3B (Electrical load unit)
		No	Go to next step
3	Are following terminal voltage at PCME correct? ☞**page F-152** • 1E (Air conditioning sensor) • 1O (Manifold absolute pressure sensor) • 3B (Electric load unit) • 3E (Engine coolant temperature sensor) • 3F (Throttle position sensor-Narrow range) • 3L (Intake air temperature sensor) • 4P (Solenoid valve (AWS)) • 4Q (Idle air control valve)	Yes	Go to next step
		No	Check for cause ☞**page F-153**
4	Is throttle valve closed throttle position?	Yes	Go to next step
		No	Check following devices • Accelerator cable linkage • Throttle lever • Accelerator pedal • Fast idle cam

STEP	INSPECTION		ACTION
5	Is solenoid valve (AWS) OK? ☞page F-83	Yes	Go to next step
		No	Repair
6	Is engine coolant temperature sensor OK? ☞page F-183	Yes	Go to next step
		No	Replace
7	Try known good PCME; does condition improved? ☞page F-150		

28	• IDLE FLUCTUATES • IDLE HUNTS
DESCRIPTION	• Engine speed changes back and forth between specified idle speed and higher speed

[TROUBLESHOOTING HINTS]

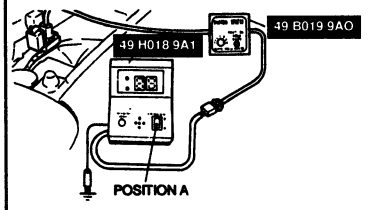
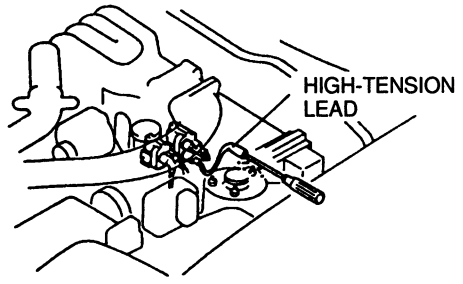
① PCV valve
- PCV valve stuck

② Spark plug
- Dirty or worn spark plug(s)

③ Throttle position sensor
- Incorrect adjustment

④ Idle air control valve
- Solenoid valve stuck

⑤ Intake air system
- Air leakage

STEP	INSPECTION		ACTION
1	Is "00" displayed on **SST** with ignition switch ON? ☞ **page F–20** 	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–22**
2	Is a 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 clean or, replace spark plug(s)
		No	Check as follows: • Ignition coils • Igniter • High-tension leads • PCME 1G, 1H, 1J terminal voltage ☞ **Section G**
3	Is air leakage felt or heard at intake air system components?	Yes	Repair or replace
		No	Go to next step
4	Is PCV valve stuck? ☞ **page F–124**	Yes	Replace PCV valve
		No	Go to next step
5	Is idle air control valve OK? ☞ **page F–83**	Yes	Go to next step
		No	Replace
6	Is fuel line pressure correct at idle? ☞ **page F–98** **Fuel line pressure:** **190–220 kPa {1.9–2.3 kgf/cm ^{2}, 28–32 psi}**	Yes	Go to next step
		No	**Low pressure** Check as follows: • Fuel filter for clogging • Operation of pressure regulator
7	Try known good PCME; does condition improved? ☞ **page F–150**		

29	• HESITATES • STUMBLES ON ACCELERATION
DESCRIPTION	• Momentary pause at beginning of acceleration or during acceleration

[TROUBLESHOOTING HINTS]

① Injector
- Fuel leakage from injector(s)

② Pressure regulator
- Pressure regulator stuck

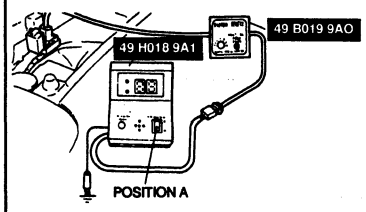
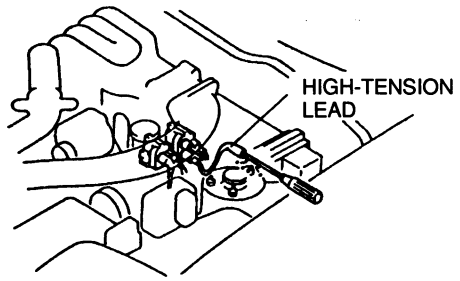
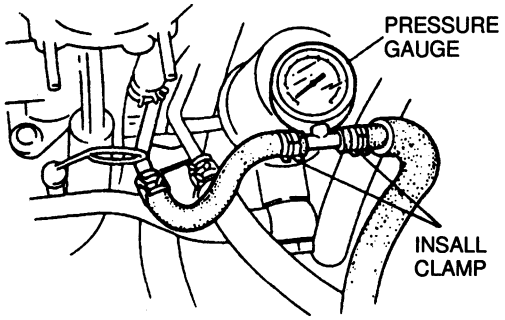
③ High-tension lead
- Lead damaged

④ Spark plug
- Dirty or worn spark plug(s)

⑤ Manifold absolute pressure sensor
- Malfunction of manifold absolute pressure sensor

⑥ EGR control valve
- EGR control valve stuck

⑦ Double throttle control
- Double throttle valve stuck

STEP	INSPECTION		ACTION
1	Is "00" displayed on **SST** with ignition switch ON? ☞**page F-20** 	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence) ☞**page F-22**
2	Is strong blue spark visible at each disconnected high-tension lead at idle? 	Yes	Check spark plug(s) If OK, go to next step If not OK, clean or replace spark plug(s)
		No	Check ignition system ☞**Section G**
3	Is fuel line pressure correct at idle? ☞**page F-104** **Fuel line pressure** **190–220 kPa {1.9–2.3 kgf/cm², 28–32 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 F-104** • If pressure **gradually** increases, check for clogging between fuel pump and pressure regulator If hose not clogged, check fuel pump maximum pressure ☞**page F-101**

STEP	INSPECTION		ACTION
4	Does fuel pressure increase when throttle valve opened? (engine running)	Yes	Go to next step
		No	Check pressure regulator ☞page F-104
5	Are following terminal voltage at PCME correct? ☞page F-154 1O (Manifold absolute pressure sensor) 3F (Throttle position sensor-Full range) 3G (Throttle position sensor-Narrow range) 3K (Solenoid valve (Relief 2)) 30 (Solenoid valve (Double throttle)) 3P (Secondary air bypass valve) 4E (Crankshaft position sensor (NE)) 4I, 4J, 4K, 4L (Metering oil pump) 4O (Solenoid valve (EGR)) 4R (Solenoid valve (Turbo control)) 4S (Solenoid valve (Charge relief)) 4T (Solenoid valve (Charge control)) 4V (Solenoid valve (Turbo precontrol)) 4W, 4X, 4Y, 4Z (Fuel injector)	Yes	Go to next step
		No	Check for cause ☞page F-155
6	Are injectors OK? ☞page F-106	Yes	Go to next step
		No	Repair or replace
7	Is EGR control system OK? ☞page F-126		
8	Try known good PCME; does condition improved? ☞page F-150		

30	SURGES WHILE CRUISING
DESCRIPTION	• Momentary minor irregularity in engine power at steady vehicle speed.

[TROUBLESHOOTING HINTS]

① Injector
- Poor connection of connector

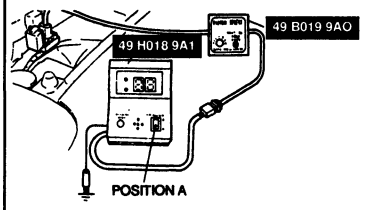
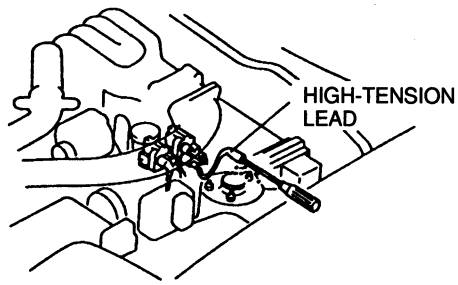
② Spark plug
- Dirty or worn spark plug(s)

③ Manifold absolute pressure sensor
- Poor connection of connector

④ Igniter
- Poor connection of connector

⑤ Ignition coil
- Malfunction of ignition coil

⑥ Throttle position sensor

STEP	INSPECTION		ACTION
1	Is "00" displayed on **SST** with ignition switch ON? **☞page F-20** 	Yes	**"00" displayed** Go to next step
		No	**Trouble Code No. displayed** Check for cause (Refer to specified check sequence) **☞page F-22**
2	Is 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 ignition system **☞Section G**
3	Does idle become rough when shaking connector of following devices? • Injector • Igniter • Ignition coil • Crankshaft position sensor	Yes	Check condition of connector
		No	Go to next step
4	Are following terminal voltage at PCME correct? **☞page F-158** • 1G, 1H, 1J (Igniter) • 3G (Throttle position sensor-Full range) • 4O (Solenoid valve (EGR)) • 4R (Solenoid valve (Turbo control)) • 4S (Solenoid valve (Charge relief)) • 4V (Solenoid valve (Turbo precontrol)) • 4W, 4X, 4Y, 4Z (Injector)	Yes	Go to next step
		No	Check for cause **☞page F-159**
5	Try known good PCME; does condition improved? **☞page F-150**		

31	LACK OF POWER
DESCRIPTION	• Performance poor under load (i.e., power down when climbing hills)

[TROUBLESHOOTING HINTS]

① Manifold absolute pressure sensor
- Malfunction of manifold absolute pressure sensor

② Secondary injector
- Poor connection of connector
- Nozzle clogged

③ Air leakage
- Turbo boost leakage

④ Spark plug
- Dirty or worn spark plug(s)

⑤ Throttle position sensor (Full range)
- Malfunction of throttle position sensor

⑥ Fuel filter
- Filter clogged

⑦ Pressure regulator
- Malfunction of pressure regulator

⑧ Double throttle control system
- Double throttle valve not open

⑨ Sequential twin turbo control system
- Secondary port not open
- Malfunction of check valve(s)

⑩ EGR control system
- EGR control valve stuck (open)

⑪ Air cleaner housing
- Clogged element

⑫ Three-way catalyst
- Clogged three-way catalyst

⑬ Fuel
- Low octane fuel used

⑭ Metering oil pump
- Poor connection of connector

32	POOR FUEL ECONOMY
DESCRIPTION	• Fuel economy unsatisfactory

[TROUBLESHOOTING HINTS]

① Engine compression
- Compression low

② Spark plug(s)
- Dirty or worn spark plug(s)

③ Ignition coil
- Malfunction of ignition coil

④ Pressure regulator
- Malfunction of pressure regulator

⑤ Intake air leakage
- Air hose damaged or disconnected

33	A/C DOES NOT WORK
DESCRIPTION	• A/C compressor magnetic clutch does not engage when Air conditioning sensor ON

[TROUBLESHOOTING HINTS]

① A/C relay
- Poor connection of connector
- Relay malfunction — ☞Section U

② Air conditioning sensor
- Does not send signal to PCME terminal 1E — ☞page F-152

③ PCME
- PCME 1L terminal circuit open — ☞page F-154

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.05 output)	☞page F-171

35	FUEL ODOR
DESCRIPTION	• Gasoline smell or visible leaks
[TROUBLESHOOTING HINTS] ① Solenoid valve (purge control) • Open harness (Code No.26 output) ② Charcoal canister • Canister full of fuel and leaking	☞page F-131

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] ① Metering oil pump • Malfunction of metering oil pump • Open or short in wiring harness ② PCV valve • PCV valve stuck open	☞ Section D ☞page F-124

38	SELF-DIAGNOSIS CHECKER FLASHES 88
DESCRIP-TION	• Checker flashes 88 with test connector (TEN) grounded
[TROUBLESHOOTING HINTS] ① Short circuit in wiring between data link connector terminal FEN and PCME terminal 1F ② PCME malfunction	

39	MIL NEVER ON
DESCRIP-TION	• Self-Diagnosis Checker indicates Trouble Code No. of input device but MIL never ON
[TROUBLESHOOTING HINTS] ① Bulb burnt ② Electrical load unit 1K terminal circuit open	☞page F-135

SERVICE POINTS

OUTLINE
[Power and Ground]
Main relay (Battery power)
- If the circuit is shorted, the EGI INJ fuse (30A) will burn out.

PCME ground (Injector)
- An open circuit will not produce any symptom.
- If the PCME ground (Output devices) circuit also has an open, the engine will not start.

PCME ground (Output devices)
- An open circuit will not produce any symptom.
- If PCME ground (Injector) circuit also has an open, the engine will not start.

PCME ground (System)
- An open circuit will not produce any symptom.

PCME ground (Analogue)
- If the circuit has an open, engine hard starting and rough idle will be caused and Trouble Code Nos. 09,11,12,13, 20 and 23 will be output.

Room fuse (PCME memory power)
- If the circuit is open, the PCME memory function will not operate, and trouble codes for intermittent malfunctions will not be indicated. Also, the learning control will be canceled, but will not produce any particular symptom.
- If the circuit is shorted, the ROOM fuse (15A) will burn out.

[Input Device]
1–2 switch (MT)
- If the circuit has an open or short, no symptom will be noticed.

Air conditioning sensor
- The switch monitor function can confirm the presence of an open or short circuit.
- If the circuit is open, the air conditioner (the magnetic clutch) will not operate.
- If the circuit is shorted, the air conditioner will constantly operate when the blower is ON.

Barometric absolute pressure sensor
- The sensor is contained in the PCME.
- If the sensor has an open or short circuit, Trouble Code No. 14 is output, and the PCME will use a preprogrammed pressure of sea level.
- A malfunction in the sensor causes engine roughness at high elevation.

Clutch switch (MT)
☞Refer to "Neutral / clutch switches" on page F–173.

Crankshaft position sensor (NE, G signal)
- If the NE signal circuit has an open or short, Trouble Code No. 02 is output.
- If the G signal circuit has an open or short, Trouble Code No. 03 is output.
- If the NE or G signal circuit has an open or short, the engine will not start (No fuel injection and no ignition).

E/L unit
- If the circuit has an open, the switch monitor function can confirm that the blower fan, headlight, rear window defroster, signals are not input to the PCME.
- If the circuit is short, the Idle speed will be increased slightly.

EGR function sensor
- If the EGR function sensor or circuit has an open or short, Trouble Code No. 16 is output.

Engine coolant temperature sensor
- If the thermosensor or circuit has an open or short, Trouble Code No. 09 is output, and PCME uses a preprogrammed temperature value of 82°C {180°F}.
- A malfunction in the engine coolant temperature sensor or its circuit will cause hard starting or engine stall when engine is cold.
- In the above condition, the electric coolant fan will constantly operate when the ignition switch is ON.

Fuel thermosensor
- If the thermosensor circuit has an open or short, Trouble Code No. 23 is output.
- In the above conditions, the PCME will use a preprogrammed temperature value of 50°C {122°F} and no symptom will be noticed.

Heat hazard sensor
- If the circuit has open, no sympotm will be noticed.
- If the sensor or circuit has a short, the heat hazard warning light will illuminate and the air pump will not operate, causing rough idle.

Intake air temperature sensor
- If the thermosensor or circuit has an open or short, Trouble Code No. 11 is output.
- In the above conditions, no symptom will be noticed.

Knock sensor
- If the knock sensor or circuit has an open or short, Trouble Code No. 05 is output.
- In the above conditions, ignition timing is retarded.

Manifold absolute pressure sensor
- If the sensor or circuit has an open or short, Trouble Code No. 13 is output.
- In the above condition, the PCME uses a preprogrammed fuel injection amount, causing rough idle and poor acceleration with afterburn.

Metering oil pump position sensor
- If the sensor or circuit has an open or short, Trouble Code 20 is output.
- In the above conditions, the fuel injection amount is fixed, causing poor acceleration and hesitation.

Mileage switch / Steering pressure sensor
- If the sensor circuit has an open circuit, no particular symptom will be noticed.
- If the sensor circuit has a short circuit, idle speed will be increased.

Neutral switches (MT)
- The switch monitor function of the Self-Diagnosis Checker can confirm the presence of an open or short circuit.
- If the circuit is open, the idle speed drops when the A/C, P/S, or electrical load is ON.

Oxygen sensor
- If the sensor output voltage continues below 0.55V for 100 sec. after the engine exceeds 1,500 rpm because of an open or short circuit, Trouble Code No. 15 is output.
- If the sensor output voltage continues unchanged 50 Sec, after the engine exceeds 1,500 rpm, Trouble Code No. 17 is output.
- In the above conditions, no fuel injection closed loop control will be present and no symptom will be noticed.

Park / Neutral signal (AT; Refer to section K)
- If the circuit is open or shorted, the idle speed will be slightly low in R, D, S, and L ranges.

Reduce torque signal (AT; Refer to section K)
- If a malfunction occurs in the reduce torque signal, the torque reduction control system is inhibited and line pressure will be high at shifting. Shift shock may be slightly increased.

Slip lock-up signal (AT; Refer to section K)
- If a malfunction occurs in the slip lock-up signal, line pressure will be high at shifting and shift shock may be slightly increased.

Solenoid valve (Shift A) (AT)
- Refer to section K.

Solenoid valve (Shift B) (AT)
- Refer to section K.

Start signal
- A lack of engine cranking signal will cause hard starting when engine is cold.

Steering pressure sensor
- Refer to "Mileage switch".

Stoplight switch
- The switch monitor function can confirm the presence of an open or short circuit.
- An open or short circuit will produce no symptom.
- A short circuit will cause the STOP fuse (20A) burn out.

TEN terminal (Data link connector)
- If the circuit is open, the Self-Diagnosis Checker can not perform trouble code checks.
- If the circuit is shorted, the opening amount of the idle air control valve will not change, causing hard starting and rough idle. The Self-Diagnosis Checker cannot perform sensor monitoring checks.

Throttle position sensor (Narrow range)
- If the sensor or circuit has an open or short, Trouble Code No. 18 is output.
- In the above condition, rough idle, and engine stall on deceleration will be caused.

Throttle position sensor (Full range)
- If the sensor or circuit has an open or short, Trouble Code No. 12 is output.
- In the above condition, poor acceleration will be caused.

Vehicle speed sensor
- If the vehicle speed signal circuit has an open or short, Trouble Code No. 06 is output.
- If the circuit has open or short, hold mode will not operate.

[Output Device]

A/C relay
- If the circuit is open, the air conditioner (Magnetic clutch) will not operate.
- If the circuit is shorted, the air conditioner will constantly operate when blower is ON, causing rough idle.

Air pump relay
- If the relay or circuit has an open or short, Trouble Code No. 54 is output.
- If the circuit is short, air pump will always operate, causing three-way catalyst melted.
- If the circuit is open, the air pump will never operate, causing rough idle.

Fan relay
- If the. circuit is shorted, the coolant fan will always operate while the ignition switch ON.
- If the circuit is open, the coolant fan will not operate until the engine temperature exceeds 108°C {226°F}.

FEN terminal (Data link connector)
- If the circuit between the data link connector and E/L unit is open, the Self-Diagnosis Checker buzzer will not sound during the trouble code check.
- If the circuit between PCME 1F terminal and E/L unit is open, the Self-Diagnosis Checker buzzer will constantly sound during the trouble code check.
- If the circuit is shorted, code "88" will keep flashing and the buzzer will continue sounding (Self-Diagnosis Checker), preventing a trouble code check.

Fuel injector
- If a secondary injector or circuit has an open or short, Trouble Code No. 71 (Front) or 73 (Rear) is output, causing poor acceleration and lack of engine power.
- If a primary injector or circuit has an open, engine will stall and will not start.

Fuel pump relay
- If the circuit is open, the engine will not start.
- If the circuit is shorted, the fuel pump will operate whenever the ignition switch is ON.

Fuel pump relay (speed)
- If the relay or circuit has an open or short, Trouble Code No. 51 is output.
- If the circuit is open, engine will hesitate or engine power will lack.

Idle air control valve
- If the solenoid valve or circuit has an open or short, Trouble Code No. 34 is output.
- If the circuit is open, the valve will always closed throttle position, causing rough idle and hard starting.
- If the circuit is shorted, the valve will always wide open throttle, causing high idle speed. (After warm-up, engine hunts at approx. 1500 rpm.)

Igniter
- If a trailing igniter or circuit has an open or short, idle speed will be slightly decreased and poor acceleration will be cased
- If the leading igniter or circuit has an open or short, hard starting and rough idle will be caused.

MEN Terminal (Data Link Connector)
- If the circuit is open, the monitor lamp will not illuminate.
- If the circuit is shorted, the monitor lamp will stay on.

Metering oil pump
- If the pump or circuit has an open or short, Trouble Code No. 26 and 27 are output.
- In the above conditions, PCME fixes ignition timing and fuel injection amount, causing engine poor acceleration.

PCMT (AT)
- Refer to section K.

Secondary air bypass valve
- If the solenoid valve or circuit has an open or short, Trouble Code No. 31 is output.
- If the circuit is open, no symptom will be noticed.
- If the circuit is shorted, solenoid / valve will be always open and CO and HC will be increased.

Secondary air switching valve
- If the solenoid valve or circuit has an open or short, Trouble Code No. 32 is output.
- If the circuit is open, no symptom will be noticed.
- If the circuit is shorted, rough idle will result.

Solenoid valve (Accelerated warm-up system)
- If the solenoid valve or circuit has an open or short, Trouble Code No. 38 is output.
- If the circuit is open, the fast idle speed just after engine starting will not exceed 2,000 rpm.
- If the circuit is shorted, the idle speed will be increased and then hunted at the specified speed (approx. 1500 rpm after warm-up).

Solenoid valve (Charge control)
- If the solenoid valve or circuit has an open or short, Trouble Code No. 45 is output.
- In the above conditions, the PCME fixes the ignition timing and fuel injection amount, causing poor acceleration and lack of power.

Solenoid valve (Charge relief)
- If the solenoid valve or circuit has an open or short, Trouble Code No. 46 is output.
- If the circuit is open, the charge relief valve will always open, causing poor acceleration.
- If the circuit is shorted, the charge relief valve will always closed, causing momentarily intake air noise on acceleration.

Solenoid valve (Double throttle control)
- If the solenoid valve or circuit has an open or short, Trouble Code No. 50 is output.
- If the circuit is open, the double throttle valve will always closed, causing poor acceleration and lack of power.
- If the circuit is shorted, the double throttle valve will always open, causing hesitation when the engine is cold.

Solenoid valve (EGR)
- If the solenoid valve or circuit has an open or short, Trouble Code No. 28 is output.
- If the circuit is open, no symptom will be noticed.
- If the circuit is shorted, the EGR valve will always open, causing engine stalling and hard starting.

Solenoid valve (Port air bypass)
- If the solenoid valve or circuit has an open or short, Trouble Code No. 33 is output.
- In the above conditions, no symptom will be noticed.

Solenoid valve (Pressure regulator control)
- If the solenoid valve or circuit has an open or short, Trouble Code No. 25 is output.
- If the circuit is open, hard starting may result when the engine is hot.
- If the circuit is shorted, fuel pressure will always be approx. 280 kPa {2.9 kgf/cm^2, 41 psi} and no symptom will be noticed.

Solenoid valve (Purge control)
- If the solenoid valve or circuit has an open or short, Trouble Code No. 40 is output.
- If the circuit is open, no symptom will be noticed.
- If the circuit is shorted, the engine stalls at low speed.

Solenoid valve (Relief 2)
- If the solenoid valve or circuit has an open or short, Trouble Code No. 39 is output.
- If the circuit is open, no symptom will be noticed.
- If the circuit is shorted, secondary air noise will be heard while the air pump operates.

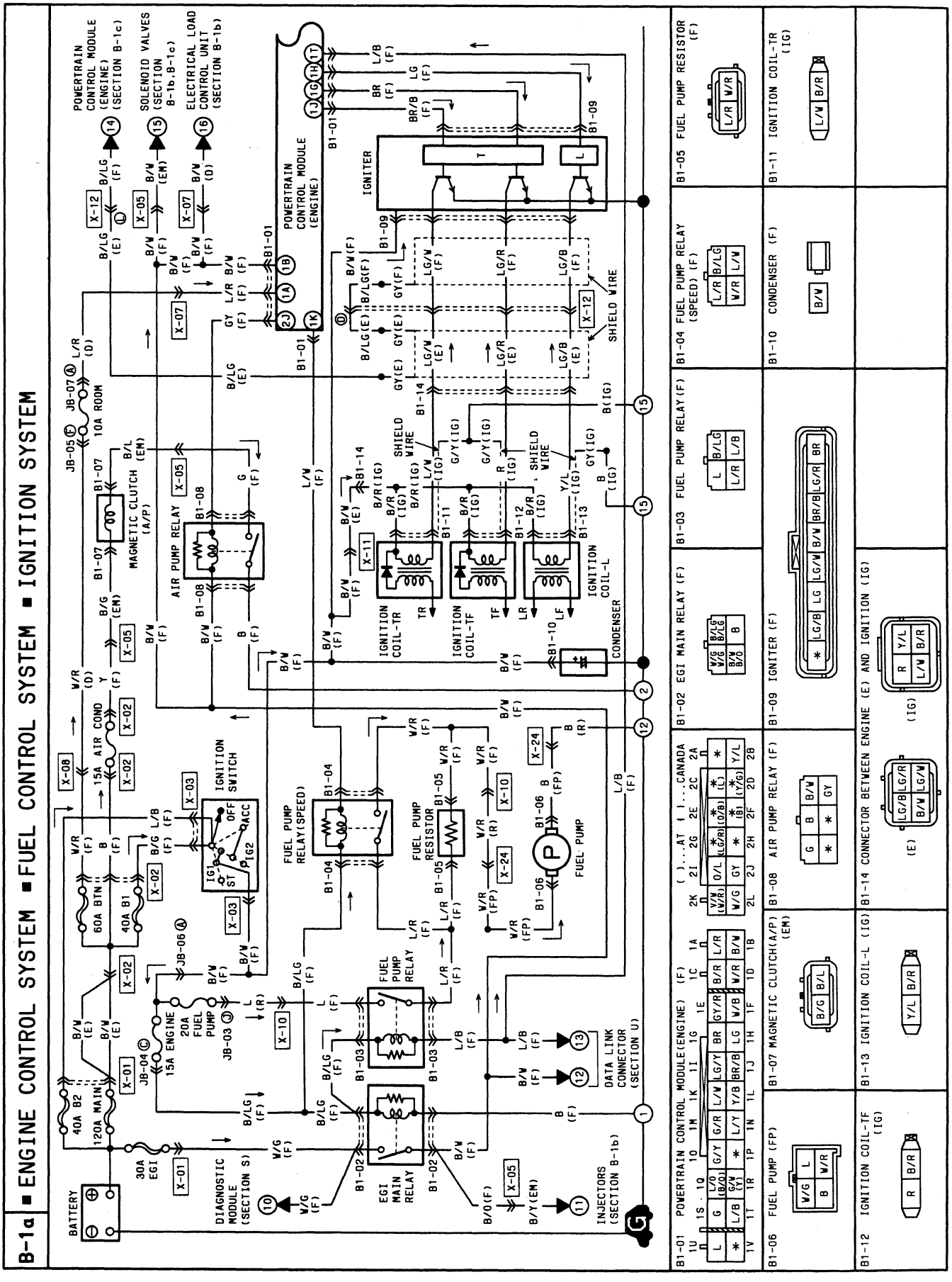
Solenoid valve (Split air bypass)
- If the solenoid valve or circuit has an open or short, Trouble Code No. 30 is output.
- In the above conditions, no symptom will be produced.

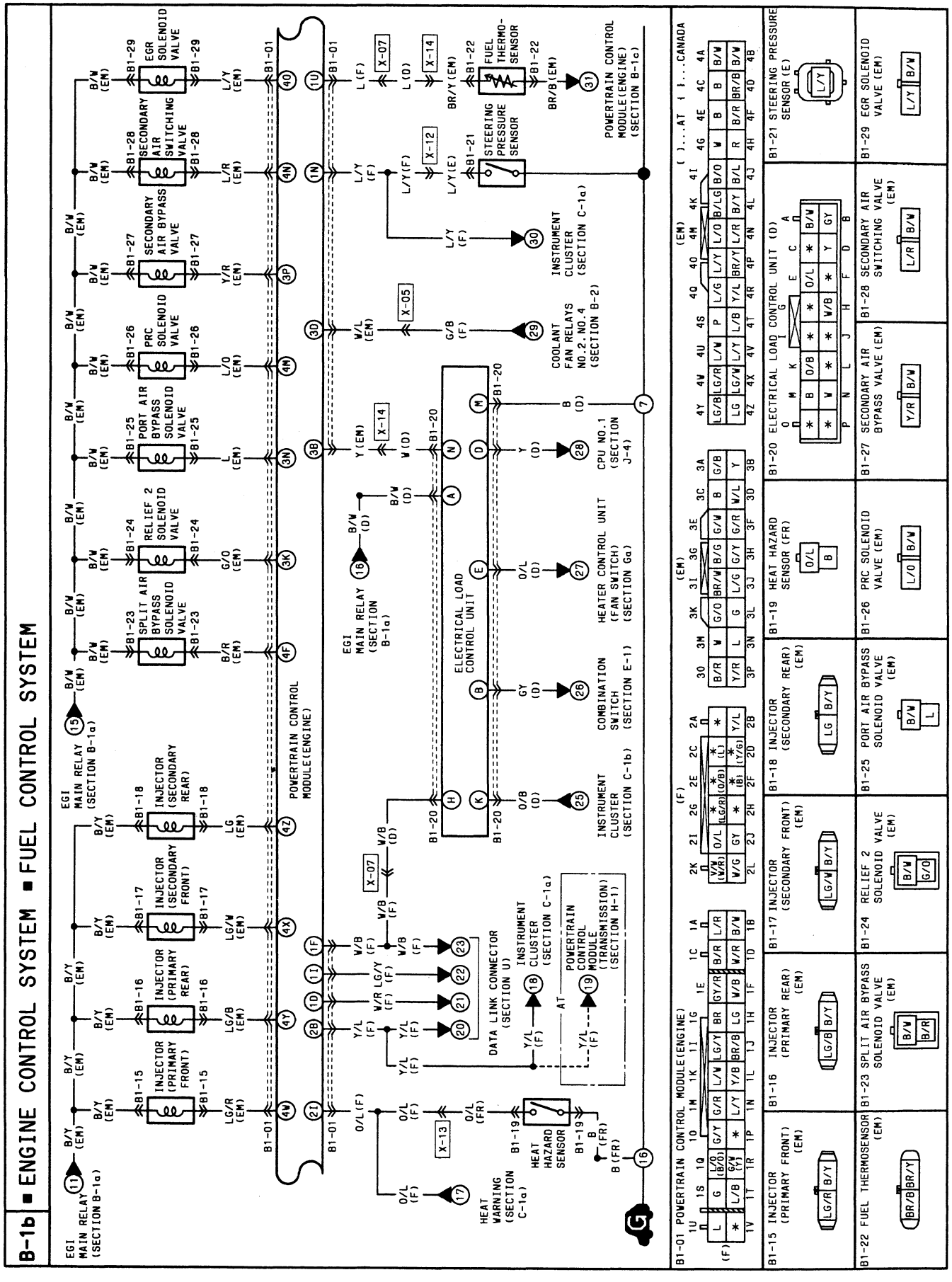
Solenoid valve (Turbo control 1, Turbo control 2)
- If the solenoid valve or circuit has an open or short, Trouble Code No. 44 is output.
- If the circuit is open, the turbo control valve will not open, causing poor acceleration and lack of power.
- If the circuit is shorted, turbo control valve will open earlier on acceleration, causing poor acceleration.

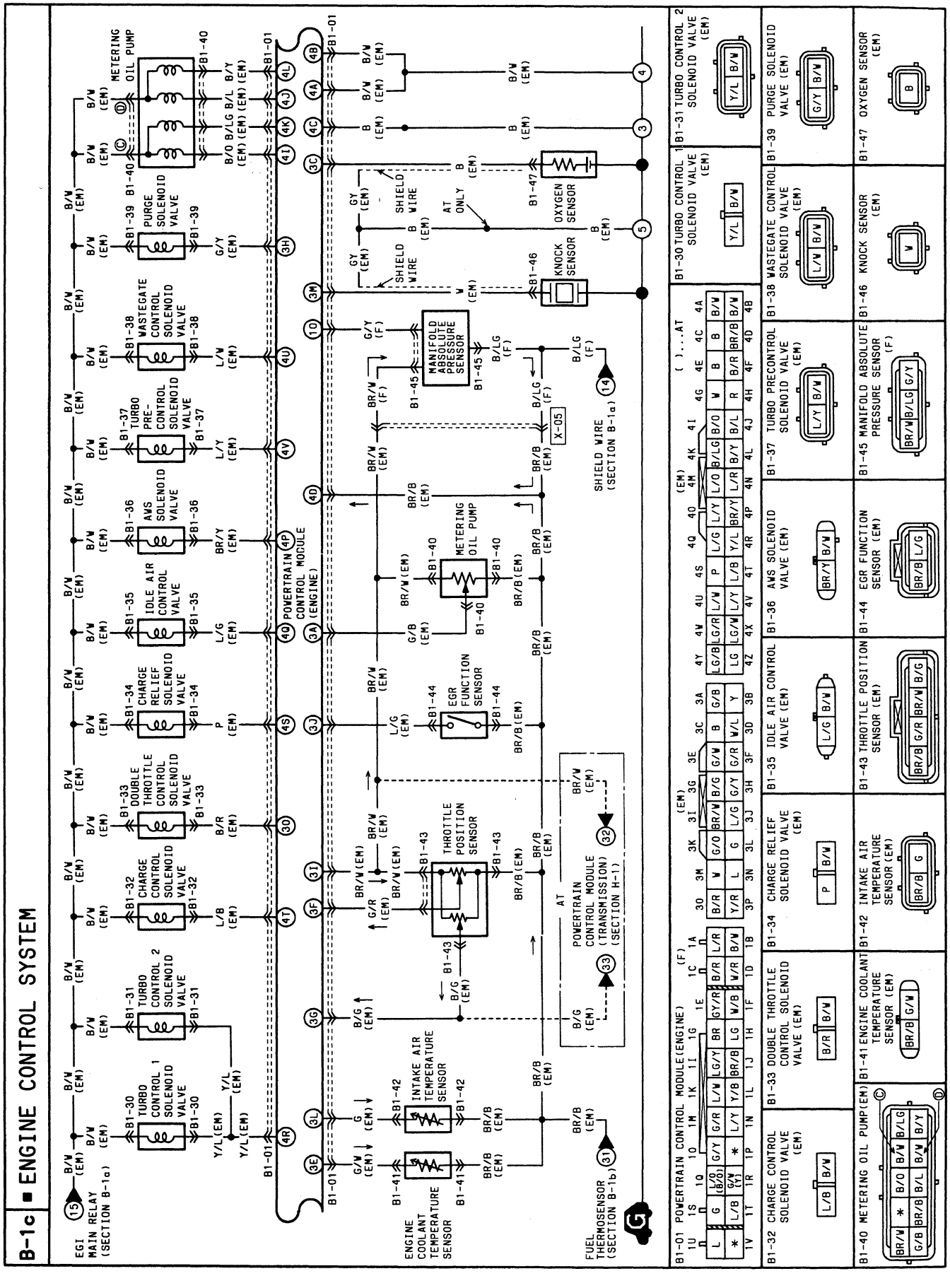
Solenoid valve (Turbo precontrol)
- If the solenoid valve or circuit has an open or short, Trouble Code No. 42 is output.
- If the circuit is open, the precontrol valve will open earlier, causing slightly hesitation and poor acceleration.
- If the circuit is short, precontrol valve will never open, causing hesitation and poor acceleration.

Solenoid valve (Wastegate control)
- If the solenoid valve or circuit has an open or short, Trouble Code No. 43 is output.
- If the circuit is open, wastegate valve will open earlier, causing poor acceleration and lack of power.
- If the circuit is shorted, wastegate valve will not open easily and no symptom will be noticed. (To prevent engine damage, the overboost fuel cut will be operated.)

WIRING DIAGRAM




B-1b ■ ENGINE CONTROL SYSTEM ■ FUEL CONTROL SYSTEM
EGI MAIN RELAY (SECTION B-1a)
POWERTRAIN CONTROL MODULE(ENGINE)
INJECTOR (PRIMARY FRONT)
INJECTOR (PRIMARY REAR)
INJECTOR (SECONDARY FRONT)
INJECTOR (SECONDARY REAR)
SPLIT AIR BYPASS SOLENOID VALVE
RELIEF 2 SOLENOID VALVE
PORT AIR BYPASS SOLENOID VALVE
PRC SOLENOID VALVE
SECONDARY AIR BYPASS VALVE
SECONDARY AIR SWITCHING VALVE
EGR SOLENOID VALVE
ELECTRICAL LOAD CONTROL UNIT
DATA LINK CONNECTOR (SECTION U)
INSTRUMENT CLUSTER (SECTION C-1a)
POWERTRAIN CONTROL MODULE (TRANSMISSION) (SECTION H-1)
HEAT WARNING (SECTION C-1a)
HEAT HAZARD SENSOR
COMBINATION SWITCH (SECTION E-1)
HEATER CONTROL UNIT (FAN SWITCH) (SECTION Ga)
INSTRUMENT CLUSTER (SECTION C-1a)
COOLANT FAN RELAYS NO.2, NO.4 (SECTION B-2)
CPU NO.1 (SECTION J-4)
STEERING PRESSURE SENSOR
FUEL THERMO-SENSOR
POWERTRAIN CONTROL MODULE(ENGINE) (SECTION B-1c)
B1-01 POWERTRAIN CONTROL MODULE(ENGINE)
B1-15 INJECTOR (PRIMARY FRONT) (EM)
B1-16 INJECTOR (PRIMARY REAR) (EM)
B1-17 INJECTOR (SECONDARY FRONT) (EM)
B1-18 INJECTOR (SECONDARY REAR) (EM)
B1-19 HEAT HAZARD SENSOR (FR)
B1-20 ELECTRICAL LOAD CONTROL UNIT (D)
B1-21 STEERING PRESSURE SENSOR (E)
B1-22 FUEL THERMOSENSOR (EM)
B1-23 SPLIT AIR BYPASS SOLENOID VALVE (EM)
B1-24 RELIEF 2 SOLENOID VALVE (EM)
B1-25 PORT AIR BYPASS SOLENOID VALVE (EM)
B1-26 PRC SOLENOID VALVE (EM)
B1-27 SECONDARY AIR BYPASS VALVE (EM)
B1-28 SECONDARY AIR SWITCHING VALVE (EM)
B1-29 EGR SOLENOID VALVE (EM)
(F)
(EM)
(...AT ...CANADA)


B-1c ■ ENGINE CONTROL SYSTEM
EGI MAIN RELAY (SECTION B-1a)
TURBO CONTROL 1 SOLENOID VALVE
TURBO CONTROL 2 SOLENOID VALVE
CHARGE CONTROL SOLENOID VALVE
DOUBLE THROTTLE CONTROL SOLENOID VALVE
CHARGE RELIEF SOLENOID VALVE
IDLE AIR CONTROL VALVE
AWS SOLENOID VALVE
TURBO PRE-CONTROL SOLENOID VALVE
WASTEGATE CONTROL SOLENOID VALVE
PURGE SOLENOID VALVE
METERING OIL PUMP
POWERTRAIN CONTROL MODULE (ENGINE)
MANIFOLD ABSOLUTE PRESSURE SENSOR
KNOCK SENSOR
OXYGEN SENSOR
SHIELD WIRE
AT ONLY
INTAKE AIR TEMPERATURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
THROTTLE POSITION SENSOR
EGR FUNCTION SENSOR
FUEL THERMOSENSOR (SECTION B-1b)
POWERTRAIN CONTROL MODULE (TRANSMISSION) (SECTION H-1)
SHIELD WIRE (SECTION B-1a)
X-05
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B1-32 CHARGE CONTROL SOLENOID VALVE (EM)
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B1-34 CHARGE RELIEF SOLENOID VALVE (EM)
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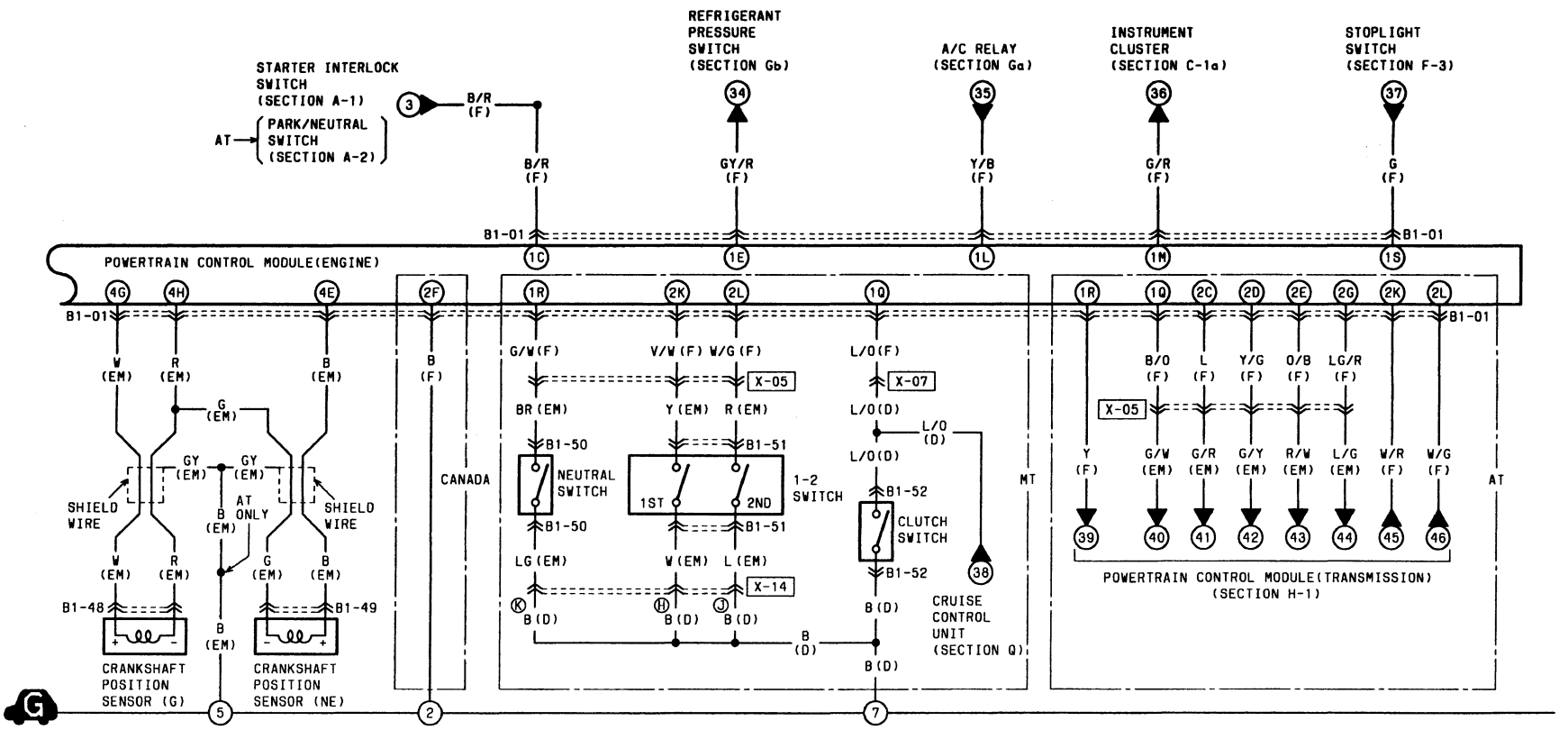
B1-42 INTAKE AIR TEMPERATURE SENSOR (EM)
B1-43 THROTTLE POSITION SENSOR (EM)
B1-44 EGR FUNCTION SENSOR (EM)
B1-45 MANIFOLD ABSOLUTE PRESSURE SENSOR (F)
B1-46 KNOCK SENSOR (EM)
B1-47 OXYGEN SENSOR (EM)

B-1d ■ ENGINE CONTROL SYSTEM



B1-01 POWERTRAIN CONTROL MODULE(ENGINE)

1U	1S	1Q	1O	1M	1K	1I	1G	1E	1C	1A
L	G	L/O (B/O)	G/Y	G/R	L/W	LG/Y	BR	GY/R	B/R	L/R
*	L/B	G/W (Y)	*	L/Y	Y/B	BR/B	LG	W/B	W/R	B/W
1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B

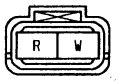
(F)

2K	2I	2G	2E	2C	2A
V/W (W/R)	O/L	* (LG/R)	* (O/B)	* (L)	*
W/G	GY	*	* (B)	* (Y/G)	Y/L
2L	2J	2H	2F	2D	2B

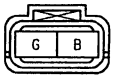
(EM) ( )...AT [ ]...CANADA

4Y	4W	4U	4S	4Q	4O	4M	4K	4I	4G	4E	4C	4A
LG/B	LG/R	L/W	P	L/G	L/Y	L/O	B/LG	B/O	W	B	B	B/W
LG	LG/W	L/Y	L/B	Y/L	BR/Y	L/R	B/Y	B/L	R	B/R	BR/B	B/W
4Z	4X	4V	4T	4R	4P	4N	4L	4J	4H	4F	4D	4B

B1-48 CRANKSHAFT POSITION SENSOR (G) (EM)

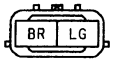


B1-49 CRANKSHAFT POSITION SENSOR (NE) (EM)

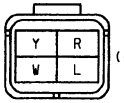


B1-50 NEUTRAL SWITCH (EM)

(MT ONLY)



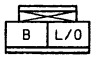
B1-51 1-2 SWITCH (EM)



(MT ONLY)

B1-52 CLUTCH SWITCH(D)

(MT ONLY)



ELECTRICAL DIAGNOSIS SUPPORT
[Power and Ground]
Main relay (Battery power)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1B)–Main relay	Engine hard starting	EGI INJ fuse (30A) burns out when ignition switch ON	NA

Room fuse (Memory power)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1A)–Room fuse	No symptom	ROOM fuse (15A) burns out	NA

PCME ground (Output device, Injector, System, Analogue)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4A)–Ground (Output device)	(One side open circuit) No symptom (Both sides open circuit) Engine will not start	NA	(One side poor ground) No symptom (Both sides poor ground) Engine will not start
PCME (4B)–Ground (Injector)			
PCME (4C)–Ground (System)	No symptom		No symptom
PCME (4D)–Ground (Analogue)	Code Nos. 09, 11, 12, 13, 20, and 23 Engine hard starting Rough idle		Code Nos. 09, 11, 12, 13, 20, and 23 Engine hard starting Rough idle

[Input Device]
Air conditioning sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME(1E)–A/C amplifier	Air conditioner (magnetic clutch) will not operate	Air conditioner will constantly operate with blower ON	NA

Clutch switch (MT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1Q)–Clutch switch	No symptom	No symptom	NA

Crankshaft position sensor (NE, G signal)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4E)–Crankshaft position sensor (NE)	Code No. 02 output Engine will not start	Code No. 02 output Engine will not start	NA
PCME (4G)–Crankshaft position sensor (G)	Code No. 03 output Engine will not start	Code No. 03 output Engine will not start	
PCME (4H)–Crankshaft position sensor (Ground)	Code Nos. 02 and 03 output Engine will not start	NA	Engine will not start Engine suddenly stalls

NA: Not applicable

E/L unit

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1F)–E/L unit (H)	MIL will never ON	MIL will always ON Self-Diagnosis Checker buzzer sounds constantly	NA
PCME (3B)–E/L unit (N)	Idle speed will be low when E/L ON*1	Idle speed will be high	
Main relay–E/L unit (A)	Idle speed will be low when E/L ON*1	EGI INJ fuse (30A) burns out when ignition switch ON	
Headlight switch–E/L unit (B)	Idle speed may be low when headlight switch ON	Parking lights will always ON	
Rear window defroster switch–E/L unit (D)	Idle speed may be low when defroster switch ON	Rear window defroster always ON when ignition switch ON	
Heater control unit–E/L unit (E)	Idle speed may be low when blower fan operate high speed	High idle speed when blower fan not operate	
MIL–E/L unit (K)	MIL will never ON	MIL will always ON	
Ground–E/L unit (M)	Idle speed drops when E/L ON*1 MIL will never ON	NA	Idle speed hunts or drops when E/L ON*1 MIL will never ON

*1 E/L ON: Headlight switch ON, rear window defroster switch ON, or blower switch at 3rd or 4th position.

EGR function sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (3J)–EGR function sensor	Code No. 16 output No symptom	Code No. 16 output No symptom	NA
PCME (4D)–EGR function sensor		No symptom	

Fuel thermosensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1U)–Fuel thermosensor	Code No. 23 output No symptom	Code No. 23 output No symptom	NA
PCME (4D)–Fuel thermosensor		No symptom	

Heat hazard sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (2I)–Heat hazard sensor	No symptom	Heat hazard warning light illuminates Rough idle	NA
Ground–Heat hazard sensor		No symptom	No symptom

NA: Not applicable

Park / Neutral signal (AT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1R)–PCMT (1C)	Idle speed drops when shifted to L, S, D or R range		NA

Intake air temperature sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (3L)–Thermosensor	Code No. 11 output No symptom	Code No. 11 output No symptom	NA
PCME (4D)–Thermosensor		No symptom	

Knock sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (3M)–Knock sensor	Code No. 05 output Lack of power Knocking	Code No. 05 output Lack of power Knocking	NA

Metering oil pump position sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (3A)–Metering oil pump (J)	Code No. 20 output Poor acceleration Hesitation	Code No. 20 output Poor acceleration Hesitation	NA
PCME (4D)–Metering oil pump (H)		No symptom	
PCME (3I)–Metering oil pump (I)		Code No. 20 output Poor acceleration Hesitation	

Mileage switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1N)–Mileage switch	No symptom	Idle speed slightly high	NA

Neutral switch (MT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1R)–Neutral switch	Idle speed slightly high	Idle speed drops when A/C, P/S, or E/L ON	NA

1-2 switch (MT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (2K)–1-2 switch	No symptom	No symptom	NA
PCME (2L)–1-2 switch			
Ground–1-2 switch			No symptom

NA: Not applicable

Oxygen sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (3C)–Oxygen sensor	Code No. 15 output No symptom	Code No. 15 output No symptom	NA

Manifold absolute pressure sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1O)–Manifold absolute pressure sensor	Code No. 13 output Poor acceleration Rough idle	Code No. 13 output Poor acceleration Rough idle	NA
PCME (3I)–Manifold absolute pressure sensor			
PCME (4D)–Manifold absolute pressure sensor		No symptom	

Steering pressure sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1N)–Steering pressure sensor	No symptom	Idle speed slightly high	NA

Reduced torque signal, slip lock-up signal (AT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1Q)–PCMT (2P)	Shift shock slightly increased		NA

Solenoid valve (Shift A) (AT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (2K)–PCMT (1D)	Shift shock slightly increased		NA

Solenoid valve (Shift B) (AT)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (2L)–PCMT (1B)	Shift shock slightly increased		NA

Stoplight signal (Stoplight switch)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1S)–Stoplight switch	No symptom	STOP fuse (20A) burns out	NA

Throttle position sensor (Narrow range, Full range)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (3F)–Throttle position sensor (Narrow range)	Code No. 18 output Rough idle Strong shift shock (AT)	Code No. 18 output Rough idle Strong shift shock (AT)	NA
PCME (3G)–Throttle position sensor (Full range)	Code No. 12 output Poor acceleration Strong shift shock (AT)	Code No. 12 output Poor acceleration Strong shift shock (AT)	
PCME (3I)–Throttle position sensor	Code Nos. 12,18 output Rough idle	Code Nos. 12 and 18 output Rough idle	
PCME (4D)–Throttle position sensor	Code No. 12 output Rough idle	No sympton	

NA: Not applicable

TEN terminal (Data link connector)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1I)–Data link connector	Cannot perform trouble code checks and switch monitor checks	Hard starting Rough idle	NA

Engine coolant temperature sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (3E)–Engine coolant temperature sensor	Code No. 09 output Rough idle and hard starting when engine cold	Code No. 09 output Rough idle and hard starting when engine cold	NA
PCME (4D)–Engine coolant temperature sensor		No symptom	

Vehicle speed sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1M)–Vehicle speed sensor	Code No. 06 output Hold mode will not operate (AT)		NA

[Output Device]
A/C relay

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1L)–A/C relay	A/C will not operate	A/C constantly operate when blower ON Rough idle	NA

Air pump relay

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (2J)–Air pump relay	Code No. 54 output Rough idle	Code No. 54 output Three-way catalyst melted	NA

Fan relay

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (3D)–fan relay	Coolant fan will not operate until coolant temperature exceeds 108°C {226°F}	Coolant fan always operate when ignition switch ON	NA

Fuel injector

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4X, 4Z)–Secondary injector	Code No. 71 or 73 output Lack of power	Code No. 71 or 73 output Engine will not start	NA
PCME (4W, 4X)–Primary injector	Engine stall Engine will not start	Engine stalls Engine will not start	

NA: Not applicable

Fuel pump relay (speed)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1K)–Fuel pump relay (speed)	Code No. 51 output Hesitation Lack of power	Code No. 51 output No symptom	NA

FEN terminal (Data link connector)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1F)–Data link connector	Self-Diagnosis Checker buzzer will not sound during trouble code check	Code "88" will keep flashing and buzzer will continue sounding during trouble code check	NA

Idle air control valve

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4Q)–Solenoid valve	Code No. 34 output Rough idle Hard start	Code No. 34 output Idle speed stays or fluctuates at approx. 1,500 rpm after warm-up	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Igniter

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1G)–Igniter (Trailing Front) PCME (1J)–Igniter (Trailing Rear)	Poor acceleration Hard starting when engine cold		NA
PCME (1H)–Igniter (Leading)	Rough idle Poor acceleration Hard starting when engine cold		

Metering oil pump

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4I, 4J, 4K, 4L)–Metering oil pump	Code No. 26 and 27 output Poor acceleration		NA

MEN terminal (Data link connector)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (1D)–MEN terminal	Monitor lamp will not illuminate	Monitor lamp stays on	NA

Secondary air bypass valve

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (3P)–Solenoid valve	Code No. 31 output No symptom	Code No. 31 output CO and HC increased	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

NA: Not applicable

Secondary air switchig valve

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4N)–Solenoid valve	Code No. 32 output No symptom	Code No. 32 output Rough idle	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Accelerated warm-up system)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4P)–Solenoid valve	Code No. 38 output Fast idle speed just after engine starting will not exceed 2,000 rpm	Code No. 38 output Idle speed stays stays or fluctuates at approx. 1,500 rpm after warm-up	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Charge control)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4T)–Solenoid valve	Code No. 45 output Lack of power Poor acceleration	Code No. 45 output Lack of power Poor acceleration	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Charge relief)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4S)–Solenoid valve	Code No. 46 output Poor acceleration	Code No. 46 output Momentarily Intake air noise on acceleration	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Double throttle control)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (3O)–Solenoid valve	Code No. 50 output Poor acceleration Lack of power	Code No. 50 output Hesitation when engine cold	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (EGR)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4O)–Solenoid valve	Code No. 28 output No symptom	Code No. 28 output Engine stall Hard starting	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

NA: Not applicable

Solenoid valve (Port air bypass)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (3N)–Solenoid valve	Code No. 33 output No symptom	Code No. 33 output No symptom	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Pressure regulator control)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4M)–Solenoid valve	Code No. 25 output Hard starting when engine warm-up	Code No. 25 output No symptom	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Purge control)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (3H)–Solenoid valve	Code No. 40 output No symptom	Code No. 40 output Hard starting Engine stalls at low speed	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Relief 2)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (3K)–Solenoid valve	Code No. 39 output No symptom	Code No. 39 output Secondary air noise heard while air pump operates	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Split air bypass)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4F)–Solenoid valve	Code No. 30 output No symptom	Code No. 30 output No symptom	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Turbo control 1, Turbo control 2)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4R)–Solenoid valve (s)	Code No. 44 output Poor acceleration	Code No. 44 output Poor acceleration	NA
Solenoid valve (s)–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

NA: Not applicable

Solenoid valve (Turbo precontrol)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4V)–Solenoid valve	Code No. 42 output Hesitation Poor acceleration	Code No. 42 output Hesitation Poor acceleration	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

Solenoid valve (Wastegate control)

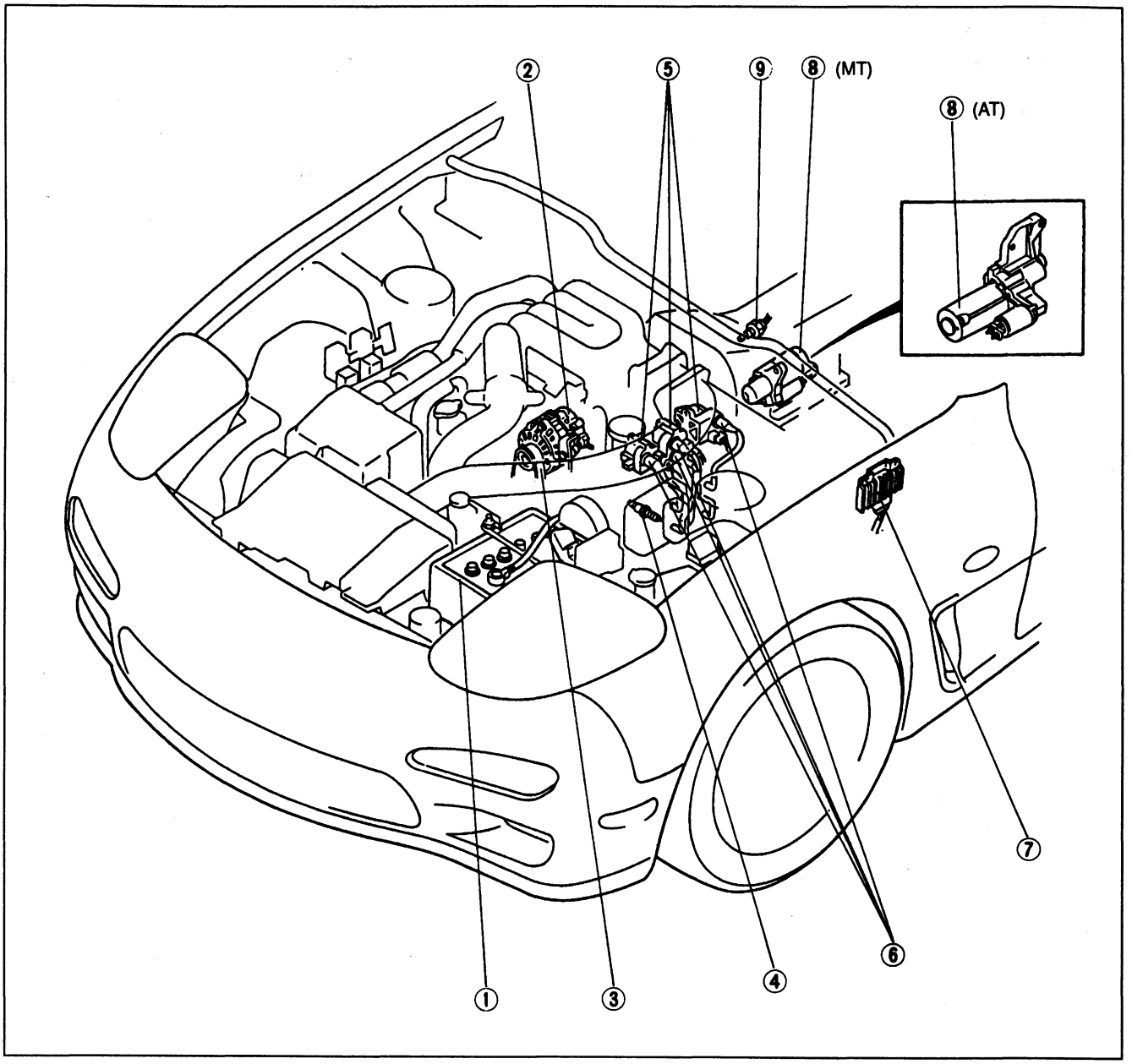
Circuit	Condition		
	Open circuit	Short circuit	Poor ground
PCME (4U)–Solenoid valve	Code No. 43 output Lack of power Poor acceleration	Code No. 43 output No symptom	NA
Solenoid valve–Main relay		EGI INJ fuse (30A) burns out when ignition switch ON	

NA: Not applicable

Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

ENGINE ELECTRICAL SYSTEM

INDEX



OUTLINE

SPECIFICATIONS

Item \ Transmission				MT	AT
Battery	Voltage		V	12, negative ground	
	Type and Capacity (5-hour rate)			65D23L (43Ah)	75D26L (52Ah)
Dark current*1			mA	20 or less	
Ignition system	Spark timing (TEN terminal grounded)			Leading : ATDC 5° (BTDC –5°) Trailing : ATDC 20° (BTDC –20°) at idle (AT: P range)	
	Spark advance			Electronic spark advance (ESA)	
	Spark plug	Type	Leading	NGK : BUR7EQP*2, BUR6EQP, BUR7EQ, BUR6EQ	
			Trailing	NGK : BUR9EQ*2, BUR8EQP, BUR9EQP, BUR8EQ	
		Plug gap	mm {in}	1.1–1.7 {0.044–0.066}	
Alternator	Output		V-A	12–100	
	Regulated voltage		V	14.1–14.7 (with temperature gradient characteristics)	
	Brush length	Standard	mm {in}	21.5 {0.846}	
		Minimum	mm {in}	8.0 {0.32}	
Stater	Type			Direct	Reduction
	Output		V-KW	12–1.2	12–2.0
	Output (no load)	Voltage	V	11	
		Current	A	Max 90	
		Speed	rpm	Min 3000	Min 2200
	Brush length	Standard	mm {in}	17.5 {0.689}	18 {0.71}
		Minimum	mm {in}	12 {0.47}	11{0.43}

*1 Dark current is the constant flow of current while the ignition is OFF (i.e., audio unit, clock, etc)
*2 Standard plug

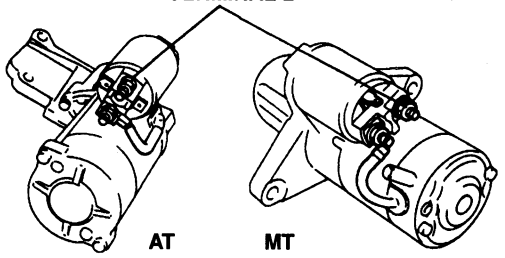
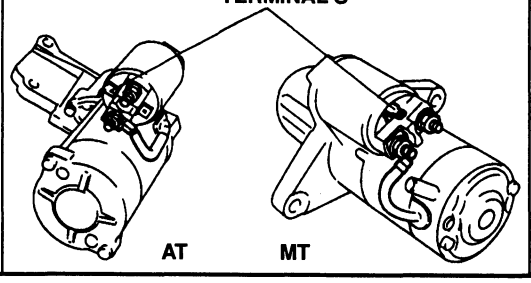
TROUBLESHOOTING GUIDE

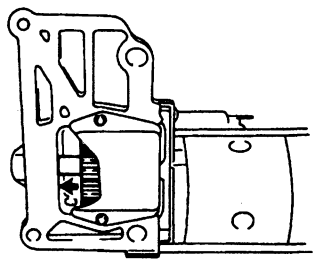
DIAGNOSTIC INDEX

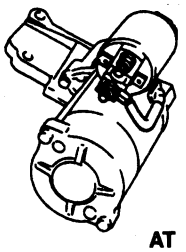
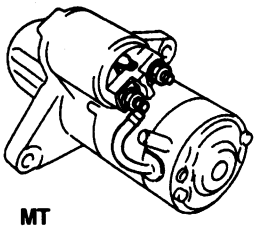
No.	Troubleshooting items	Page
1	Will not crank-starter motor does not operate	Below
2	Will not crank-starter motor spins	Below
3	Cranks slowly	G-5
4	Alternator warning light illuminates while engine running	G-5
5	Discharged battery	G-5
6	Misfire	G-6

SYMPTOM TROUBLESHOOTING

B+: Battery positive voltage

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 B+ present at terminal B? TERMINAL B  AT MT	Yes	Go to next step
		No	Check wiring harness
3	Is B+ present at terminal S with ignition switch in START position? TERMINAL S  AT MT	Yes	• Check magnetic switch ☞page G-30 • Check armature ☞page G-30
		No	• Check park/neutral switch ☞Section K • Check ignition switch ☞1994 RX-7 Body Electrical Troubleshooting Manual Section Z4 • Check wiring harness

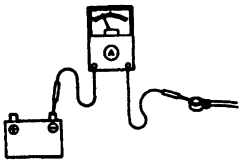
2	Will not crank-starter motor spins		
STEP	INSPECTION		ACTION
1	Is drive pinion pushed out when energized? (Is click heard?) 	Yes	Remove starter and check ring gear teeth and starter drive pinion teeth
		No	Check magnetic switch ☞page G-30

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?  AT  MT	Yes	Repair connection
		No	Check starter for binding (brush, armature, etc.) ☞page G-30

G

B+: Battery Positive Voltage

4	Alternator warning light illuminates while engine running		
STEP	**INSPECTION**		**ACTION**
1	Is B+ correct at idle? **Specification: 14.1–14.7V**	Yes	Check wiring harness (Alternator terminal L–Alternator warning light)
		No	Check charging system ☞page G-8

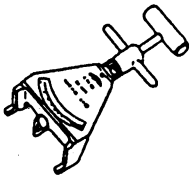
5	Discharged battery		
STEP	**INSPECTION**		**ACTION**
1	Is charging system OK? ☞page G-8	Yes	Turn ignition switch OFF and measure dark current as shown  Dark current: 20 mA max
		No	Repair or replace parts as necessary

B+: Battery positive voltage

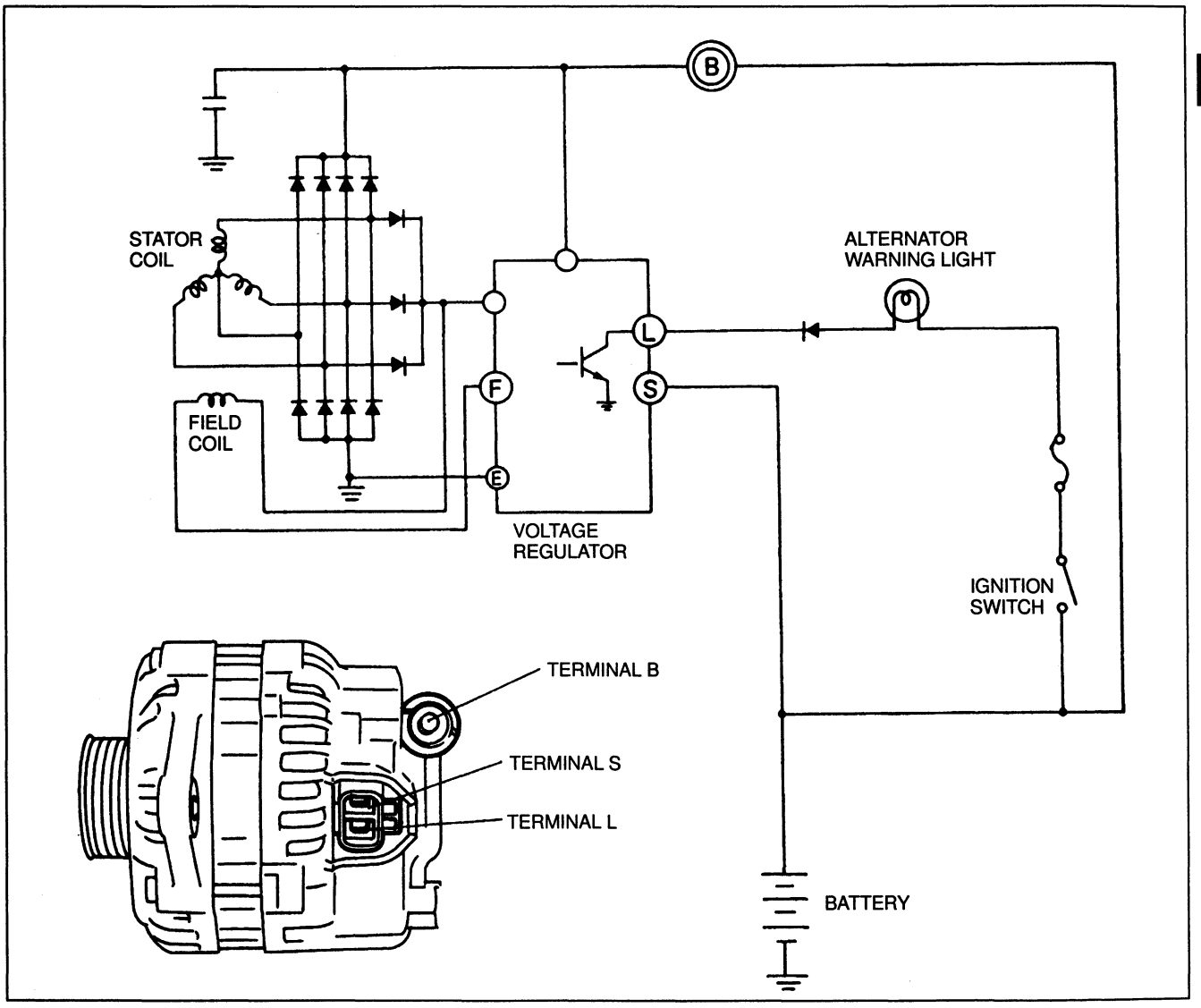
6	Misfire		
STEP	**INSPECTION**		**ACTION**
1	Are "02" or "03" displayed on **SST** while ignition switch ON?	Yes	Check for cause ☞**Section F**
		No	Go to next step
2	Are connector and wiring harness connections OK? (High-tension leads, igniter, ignition coils, PCME)	Yes	Go to next step
		No	Repair connection
3	Remove each High-tension lead; is there strong blue spark while engine is cranking?	Yes	Go to step 10
		No	Go to next step
4	Is resistance of High-tension leads OK? **Specification: 16 kΩ per 1m {3.28 ft} (at 20°C [68°F])**	Yes	Go to next step
		No	Replace High-tension lead(s)
5	Is there B+ at ignition coils terminal A and igniter terminal D with ignition switch in ON position? (Disconnect each connection) ☞**page G-16**	Yes	Go to next step
		No	Check wiring harness ☞**Page G-16** (Ignition coils terminal A, Igniter terminal D-Ignition switch)
6	Are ignition coils OK? ☞**page G-21**	Yes	Go to next step
		No	Replace ignition coil ☞**page G-20**
7	Is wiring harness from ignition coils to igniter OK? ☞**page G-16**	Yes	Go to next step
		No	Repair or replace
8	Is igniter OK? ☞**page G-23**	Yes	Go to next step
		No	Replace igniter ☞**page G-22**
9	Is wiring harness from igniter to PCME terminals OK? ☞**page G-16**	Yes	Go to next step
		No	Repair or replace
10	Is input sensor OK? • Crankshaft position sensor • Manifold absolute pressure sensor ☞**Section F**	Yes	Replace PCME ☞**page F-150**
		No	Check input sensor

CHARGING SYSTEM

PREPARATION
SST

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

CIRCUIT DIAGRAM

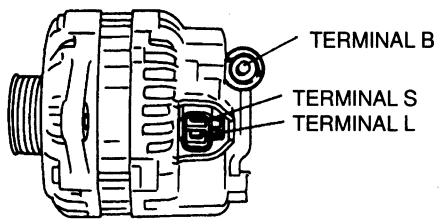
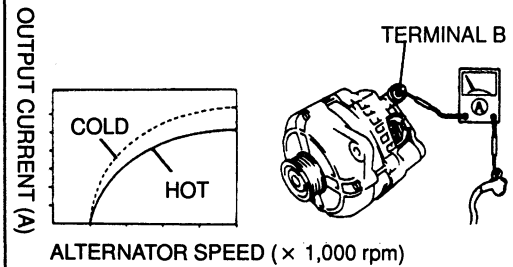


The alternator has a self-diagnosis function to warn of the following problems in the charging system. If a problem arises, the alternator warning light illuminates.

1. Terminal S circuit open
2. No voltage output
3. Field coil circuit open
4. Terminal B circuit open
5. Voltage output too high (above 16.2V)

TROUBLESHOOTING

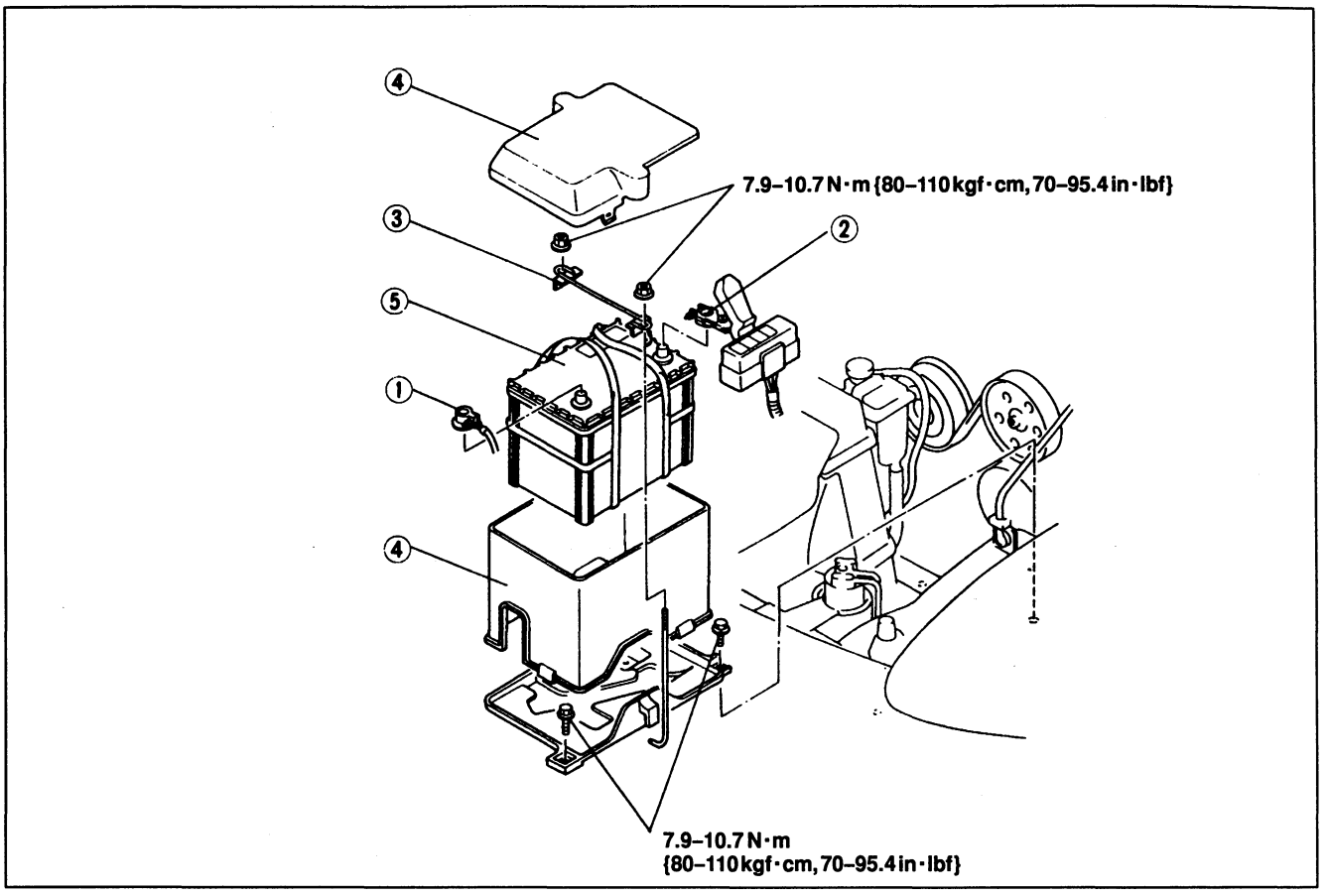
B+: Battery positive voltage

STEP	INSPECTION		ACTION
1	Check battery positive voltage, is it correct? **Specification: Above 12.4V**	Yes	Go to next step
		No	Check battery ☞**page G-9**
2	Does alternator warning light illuminate with ignition switch ON?	Yes	Go to next step
		No	Check warning light bulb and wiring harness (Alternator warning light–Terminal L)
3	Does alternator warning light go out after engine started?	Yes	Go to step 5
		No	Go to next step
4	Is voltage at alternator terminals correct? **Specification:** Terminal / Ign: ON (V) / Idle (V) B / B+ / 14.1–14.7 L / Approx. 1 / 12.9–13.5 S / B+ / 14.1–14.7 	Yes	Check wiring harness (Battery–Terminal L)
		No	• Check and repair wiring harness as necessary ☞**page G-12** • Replace or repair alternator
5	1. Connect ammeter (100A min.) between terminal B and harness 2. Start engine 3. Turn all electrical loads ON and depress brake pedal 4. Is output current 100A or more at 2,500–3,000 rpm? **Caution** • **Do not ground terminal B** 	Yes	Charging system normal
		No	Go to next step
6	Is drive belt tension OK? ☞**page G-15**	Yes	Replace or repair alternator ☞**page G-12**
		No	• Adjust drive belt tension ☞**page G-15** • Replace drive belt

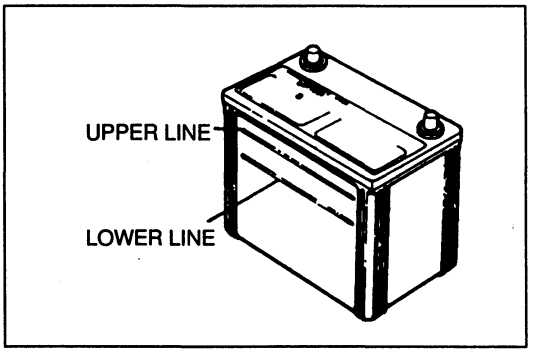
BATTERY

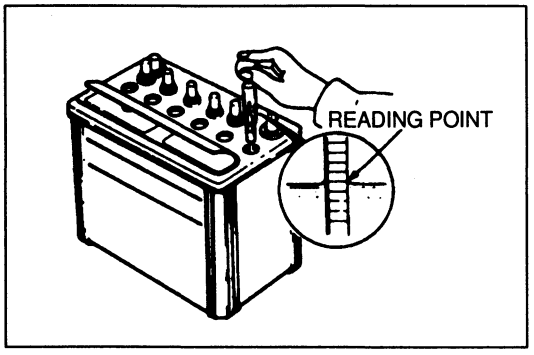
Removal / Installation

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



1. Battery negative cable
2. Battery positive cable
3. Battery clamp
4. Battery box
5. Battery
   Inspection .... page G- 9
   Recharging ... page G-10





Inspection

Electrolyte level

Warning

- **Hydrogen gas is produced during normal battery operation. A battery-related explosion can cause serious injury. Keep all flames (including cigarettes), heat, and sparks away from the top and surrounding area of open battery cells.**

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.**

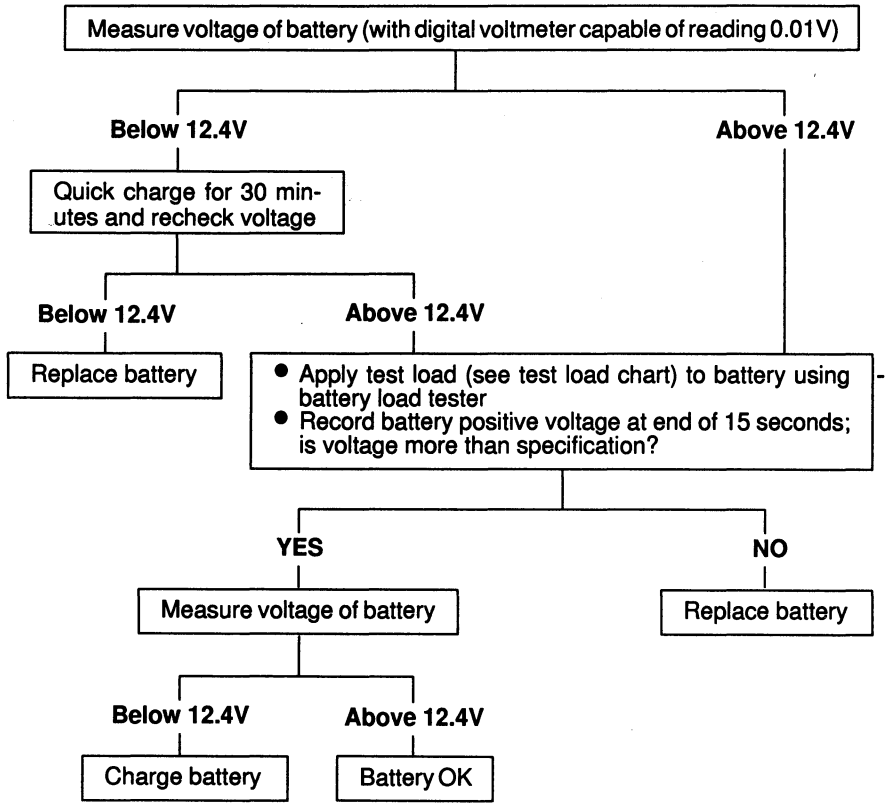
Caution

- **When disconnecting the battery, remove the negative cable first and install it last to prevent damage to electrical components or the battery.**

Electrolyte level and specific gravity

1. Verify that the electrolyte level is between the "Upper" and "Lower" level marks.
2. Add distilled water if necessary, but do not over fill.
3. Check the specific gravity with a hydrometer.
   Specific Gravity: 1.27–1.29 (at 20°C {68°F})

Battery Discharge Test

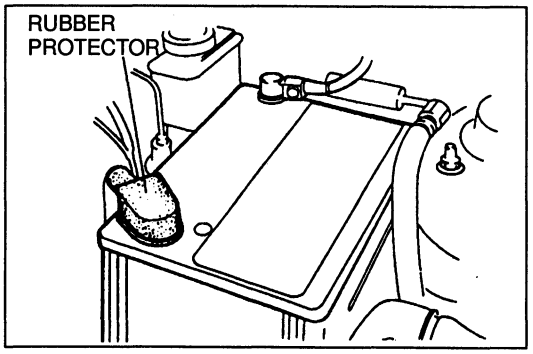


Test load

Battery	Load (A)
65D23L	165
75D26L	195

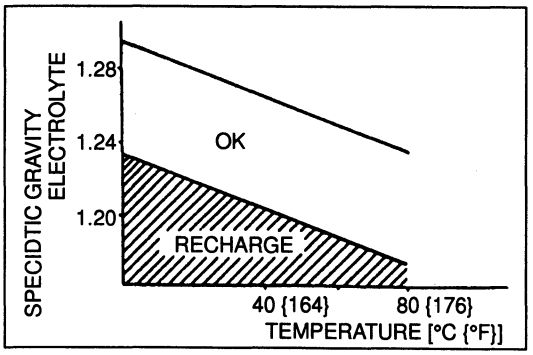
Battery positive voltage with load

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

1. Remove any corrosion on the clamps or battery posts, and coat them with grease.
2. Verify that the battery top is clean. If necessary, clean with baking soda and water.
3. Verify that cables are not frayed or corroded. Repair or replace if necessary.
4. Verify that cable clamps are tight.
5. Verify that the rubber protector completely covers the positive terminal and clamp.

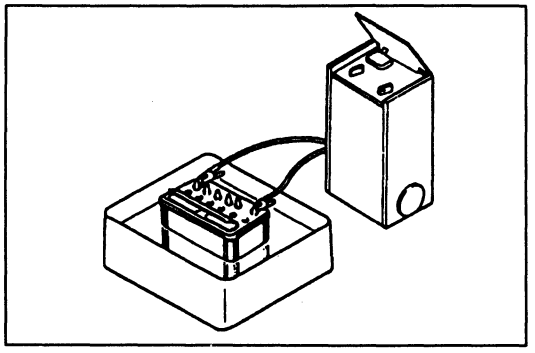


Recharging

Battery	Slow charge (A)	Quick charge (A)
65D23L	Under 5	Max. 25
75D26L	Under 8	Max. 30

Slow charging

It is not necessary to remove the vent caps to perform a slow charge.



Quick charging

1. Remove the battery from the vehicle and remove the vent caps to perform a quick charge.

   Caution
   - **Obtain the code number and deactivate the audio anti-theft system before disconnecting the battery. (Refer to the 1994 RX-7 Body Electrical Troubleshooting Manual section J1)**

   Caution
   - **To avoid damaging the battery, do not quick charge for over 30 minutes.**

2. Place the battery in a pan of water to prevent it from over heating, but keep water away from the top of the battery.

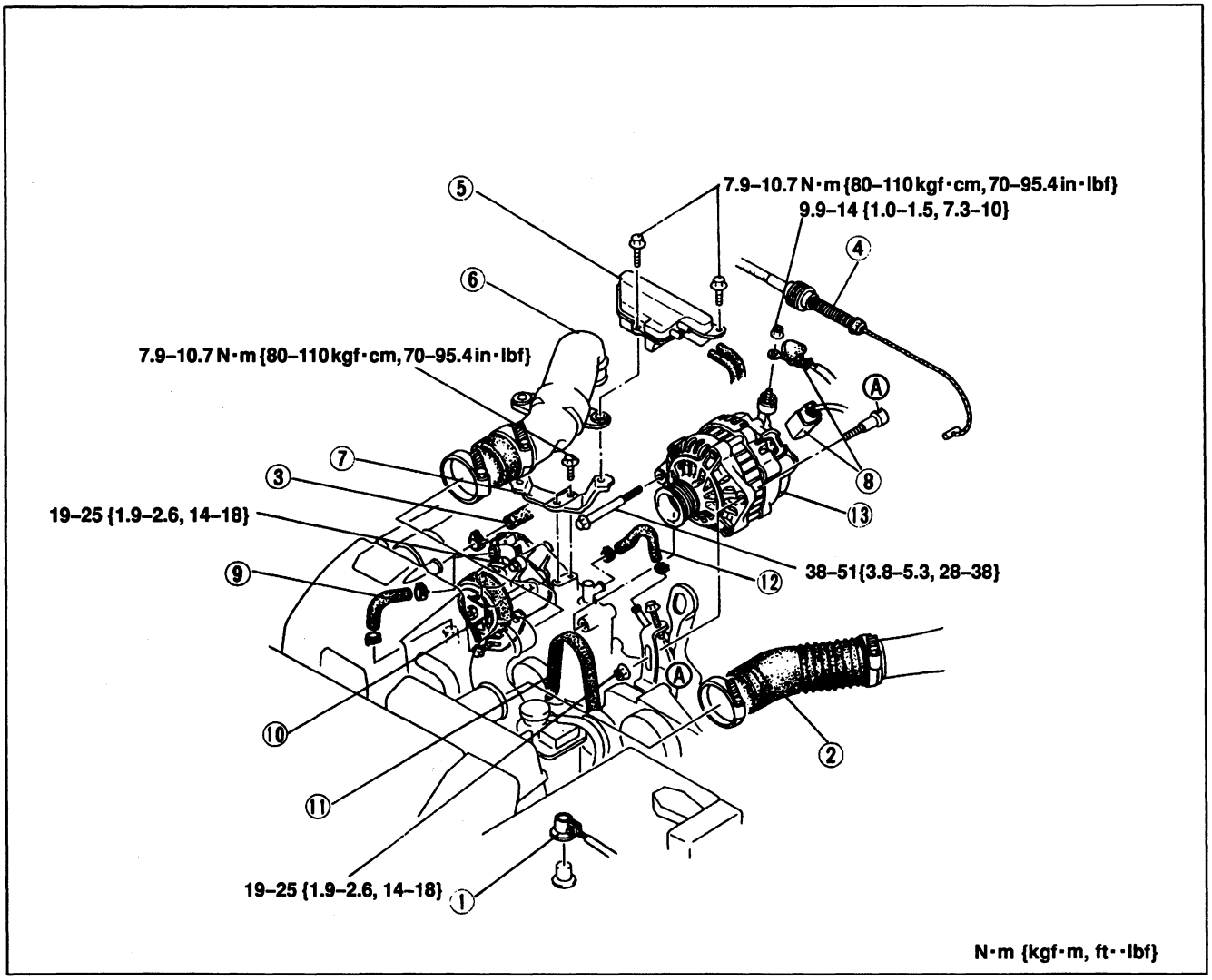
ALTERNATOR

Caution
- **Reversing the battery connections or using high-voltage testers will damage the rectifier.**

Caution
- **Do not start the engine while the connector is disconnected from terminals L and S. It can damage the alternator.**

Note
- Positive voltage is always present at alternator terminal B.

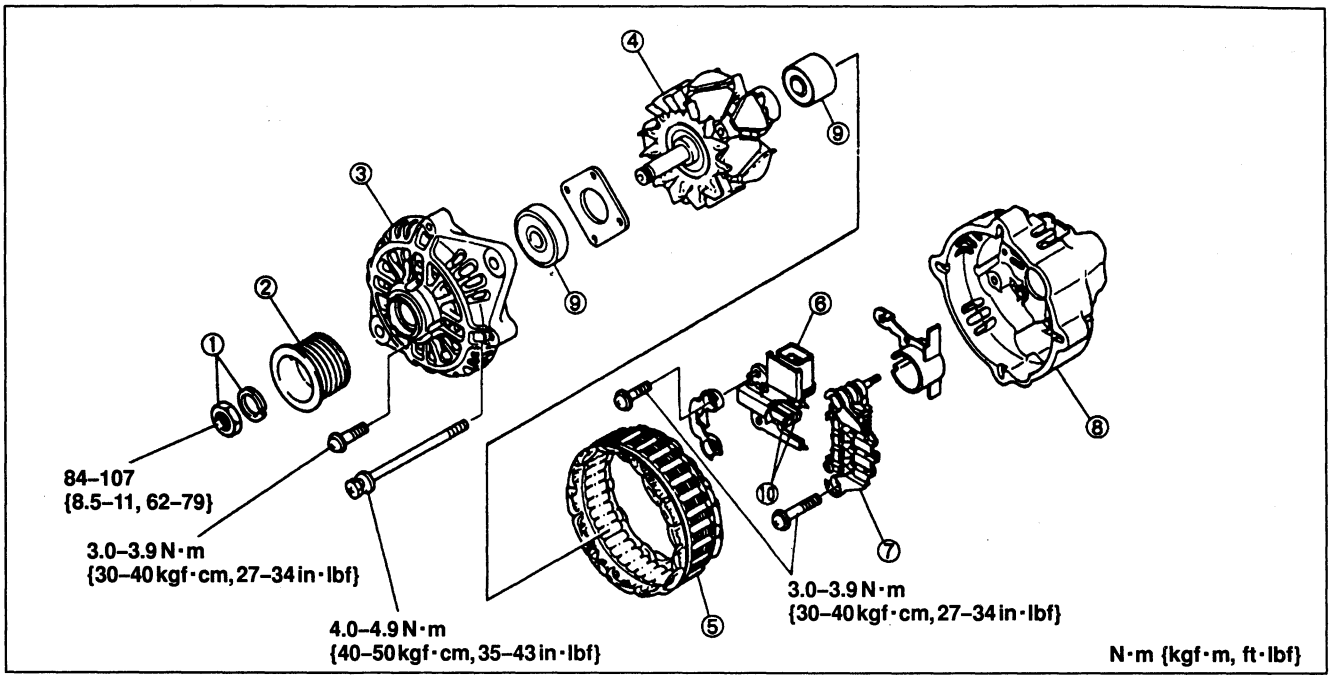
Removal / Installation
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.



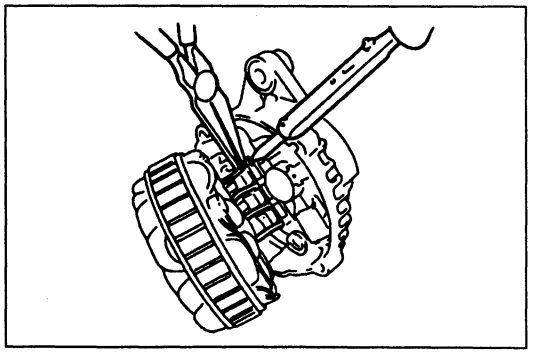
1. Battery negative cable
2. Air-intake hose
3. Air-relief hose
4. Accelerator cable
5. Pressure chamber
6. Air pipe
7. Bracket
8. Terminal B and connector
9. Air pump hose
10. Air pump
11. Drive belt
    Inspection .... page G–15
    Adjustment ... page G–15
12. Water hose
13. Alternator
    Disassembly / Assembly
    ..... page G–13
    Inspection .... page G–14

Disassembly / 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. Assembly in the reverse order of disassembly, referring to **Assembly Note.**



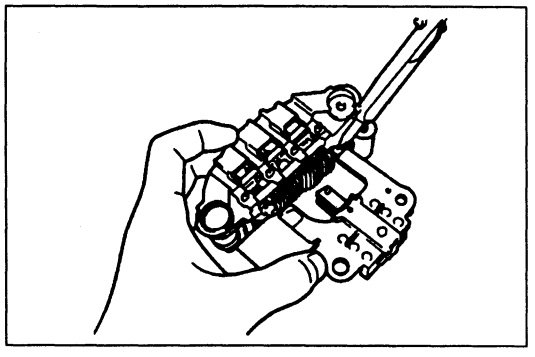
1. Nut, washer
2. Pulley
3. Front bracket
4. Rotor
   Inspection .... page G–14
5. Stator
   Disassembly / Assembly
   Note ..... page G–13
   Inspection .... page G–14
6. Regulator
   Disassembly / Assembly
   Note ..... page G–13
7. Rectifier
   Disassembly / Assembly
   Note ..... page G–13
   Inspection .... page G–14
8. Rear bracket
   Disassembly / Assembly
   Note ..... page G–13
9. Bearing
   Inspection .... page G–14
10. Brush
    Inspection .... page G–14



Disassembly / Assembly Note

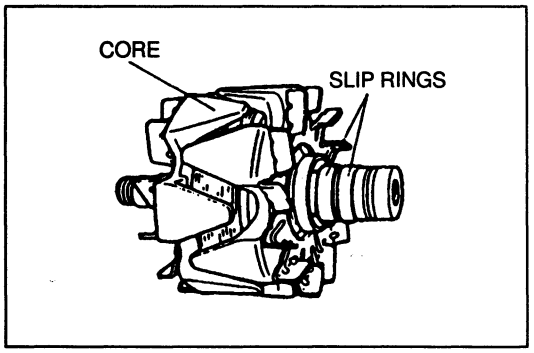
Rear bracket, stator wire

Melt the solder quickly, the diodes (rectifier) and regulator will be damaged by excessive heat.



Brush holder, regulator assembly and rectifier

Melt the solder quickly, the diodes (rectifier) and regulator will be damaged by excessive heat.

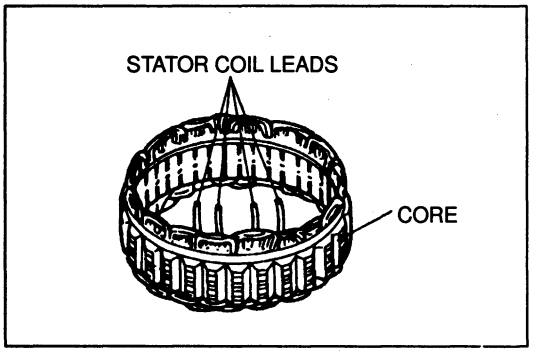


Inspection

Rotor

Check the continuity as shown.

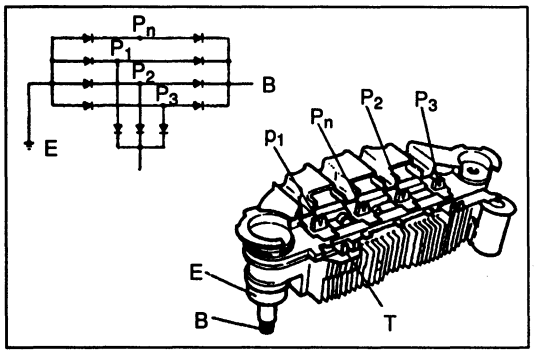
Inspection point	Continuity
Core–Slip ring	No
Slip ring–Slip ring	Yes



Stator

Check the continuity as shown.

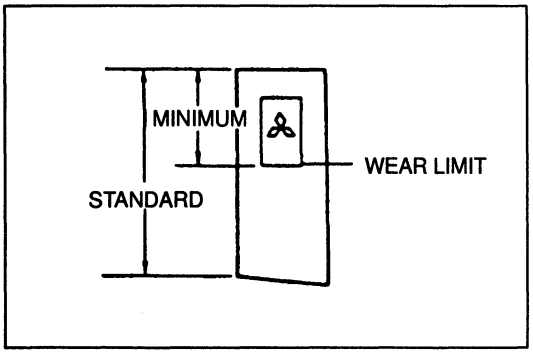
Inspection point	Continuity
Core–Stator coil leads	No
Between leads	Yes



Rectifier

Check the continuity as shown.

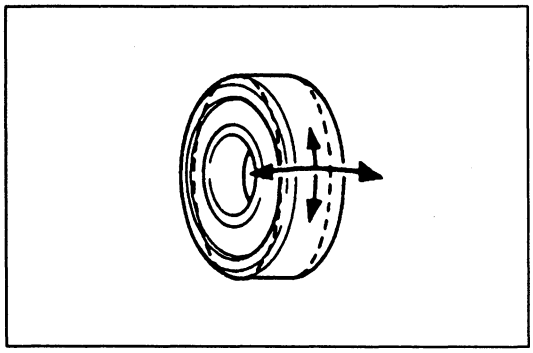
Negative	Positive	Continuity
E	P_n, P_1, P_2, P_3	Yes
B		No
T		No
P_n, P_1, P_2, P_3	E	No
	B	Yes
P_1, P_2, P_3	T	Yes
Pn		No



Brush

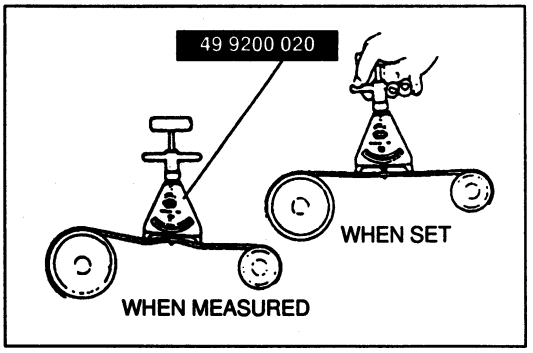
If a brush is worn almost to or beyond the limit, replace the brushes.

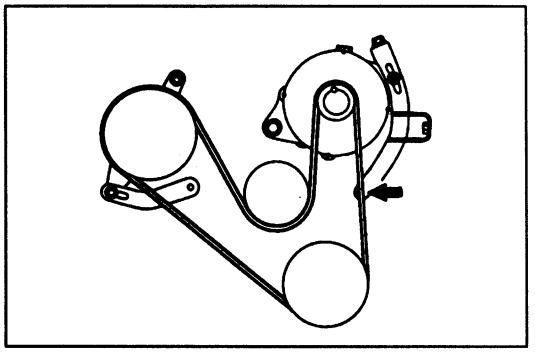
Standard : 21.5 mm {0.846 in}
Minimum : 8.0 mm {0.32in}

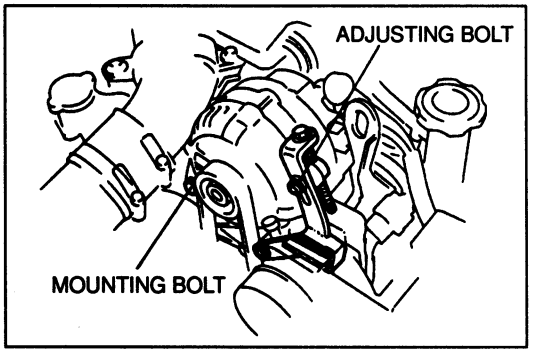


Bearing

1. Check for abnormal noise, looseness, and sticking.
2. Replace the bearing(s) as necessary.







DRIVE BELT

Inspection

1. Check the drive belts and pulleys for wear, cracks and fraying. Replace as necessary.
2. Measure the drive belt tension by using a tension gauge, and measure the deflection by applying moderate pressure midway between the pulleys. Adjust the belt if necessary.

Specification

Tension

N {kgf, lbf}

Drive belt	New	Used	Limit
Alternator	690–780 {70–80, 160–170}	590–680 {60–70, 140–150}	320 {33–73}

Deflection

mm {in}

Drive belt	New	Used	Limit
Alternator	6.0–7.0 {0.24–0.27}	7.0–7.5 {0.28–0.29}	9.0 {0.35}

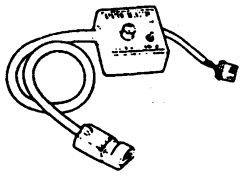
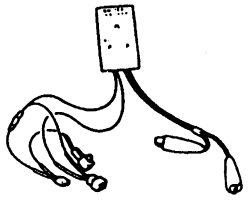
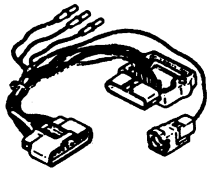
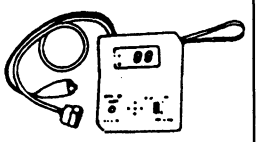
Adjustment

1. Loosen the alternator mounting bolts and turn the adjusting bolt.
2. Move the alternator to set the specified deflection.
3. Tighten all bolts and recheck the tension.

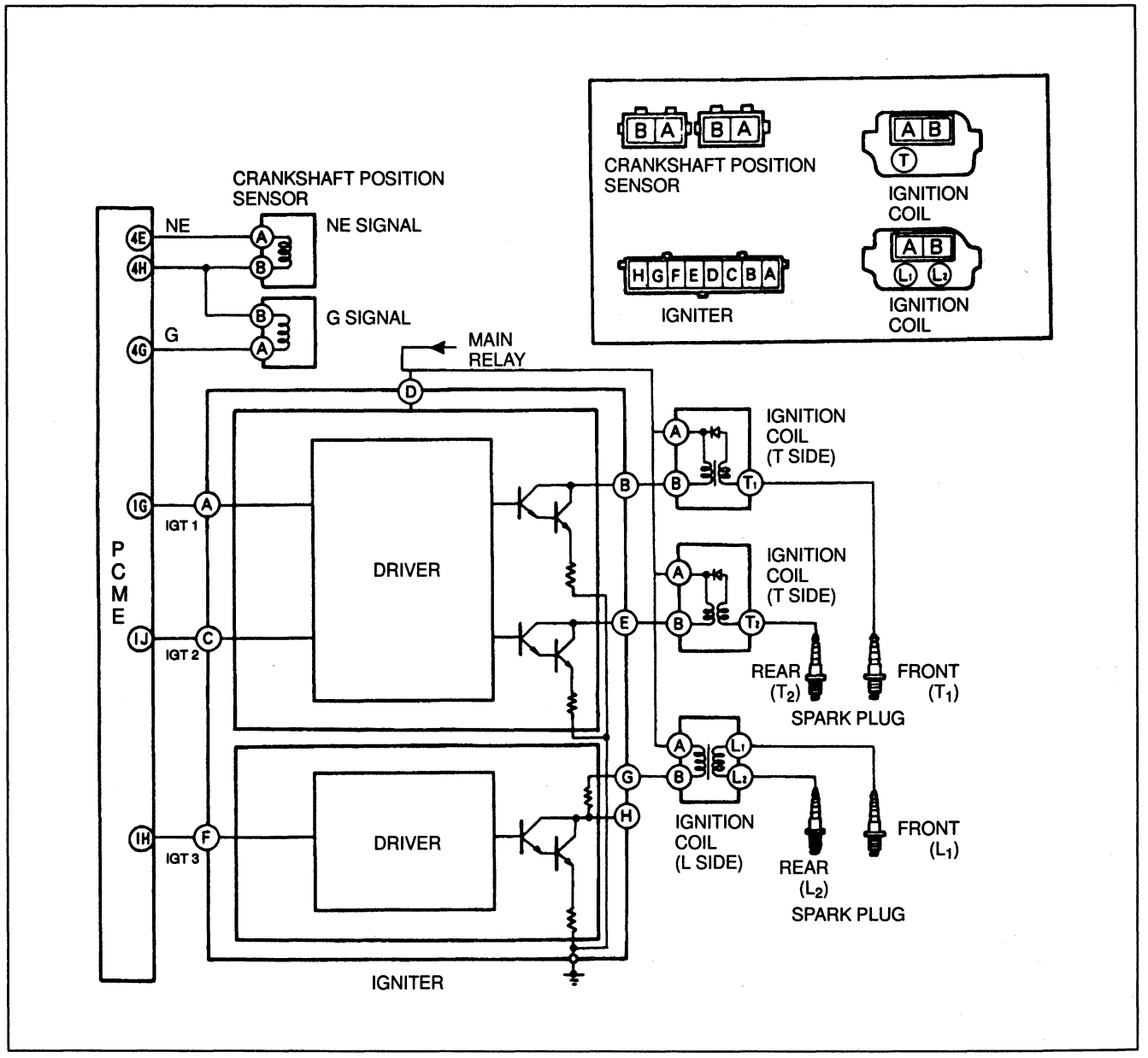
Tightening torque:
Mounting bolt:
38–51 N·m {3.8–5.3 kgf·m, 28–38 ft·lbf}
Adjusting bolt:
19–25 N·m {1.9–2.6 kgf·m, 14–18 ft·lbf}

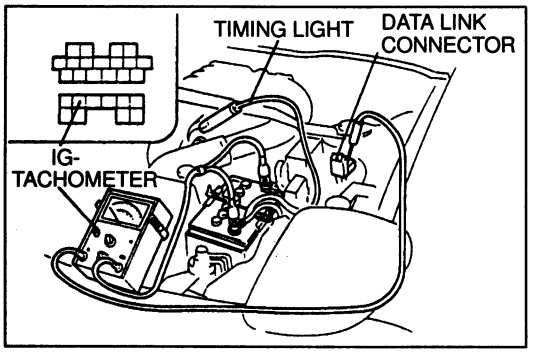
IGNITION SYSTEM

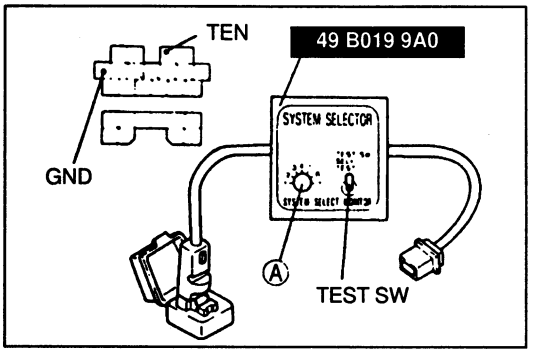
PREPARATION
SST

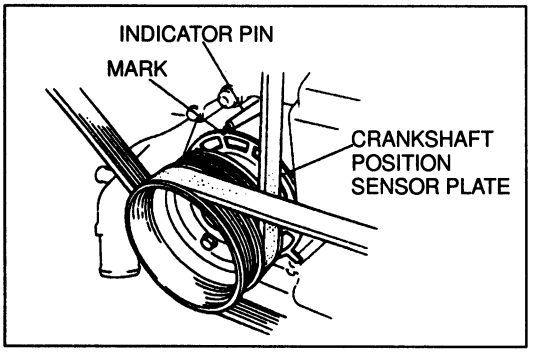
49 B019 9A0 System selector 	For self-diagnosis and inspection of ignition timing	49 F018 002 Igniter Checker 	For inspection of igniter
49 F018 003 Adapter Harness 	For inspection of igniter	49 H018 9A1 Self-Diagnosis Checker 	For self-diagnosis inspection

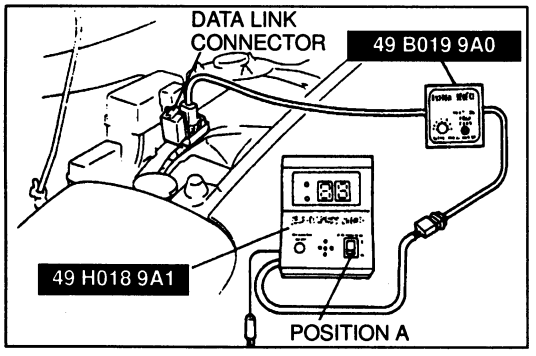
CIRCUIT DIAGRAM

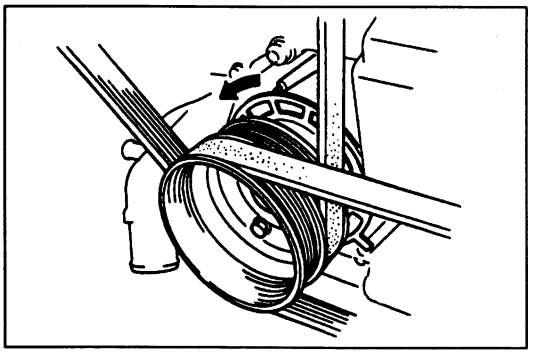












IGNITION TIMING

The ignition timing is set at the factory and must not be adjusted. Any adjustment will negatively effect the engine performance.

Preperation

1. Warm up the engine to normal operating temperature.
2. Run the engine at idle and verify the following.
   - Shift selector lever to P range (AT) / Neutral (MT).
   - Set steering wheel straight ahead.
   - Turn all electrical loads OFF.
   - Wait for electric coolant fan to stop.

Inspection

1. Connect a timing light to the high-tension lead of the front trailing side.
2. Connect a tachometer.

Note
- Some timing lights will not illuminate even if the ignition is working properly.

3. Connect the **SST** to the data link connector.
4. Set switch A to position 1.
5. Set TEST SW to SELF-TEST.
6. Verify that the idle speed is within specification.

Idle speed: 550–950 rpm

7. Verify that the timing mark (white) on the crankshaft position sensor plate is aligned with the indicator pin.

Ignition timing: Trailing side: 20°ATDC (–20°BTDC)
Leading side: 5°ATDC (–5°BTDC)

8. If the timing is incorrect, check the following.
   - Verify that no diagnostic trouble code number is present. If present, check for the cause referring to the specified check sequence. (Refer to Section F)
   - 05 Knock sensor
   - 13 Manifold absolute pressure sensor

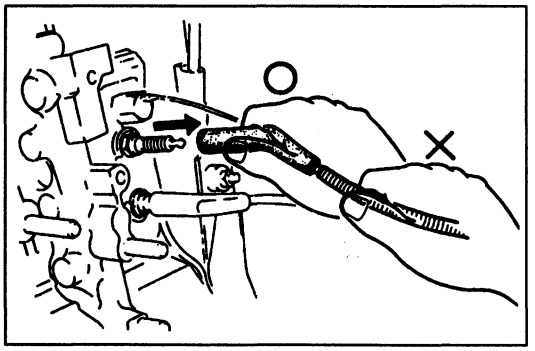
Input devices

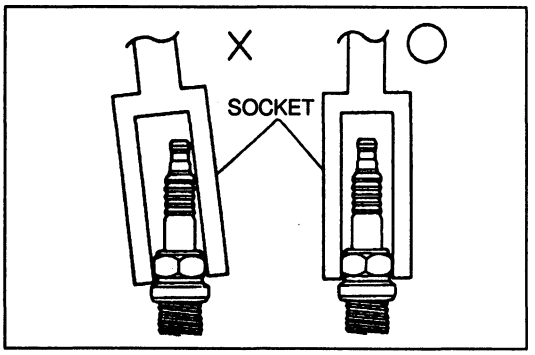
- E/L, P/S, A/C, electric coolant fan
- Crankshaft position sensor (NE, G-Signal)
- Manifold absolute pressure sensor
- Throttle position sensor
- Neutral SW / Clutch SW (MT)
- Park/neutral signal (AT)

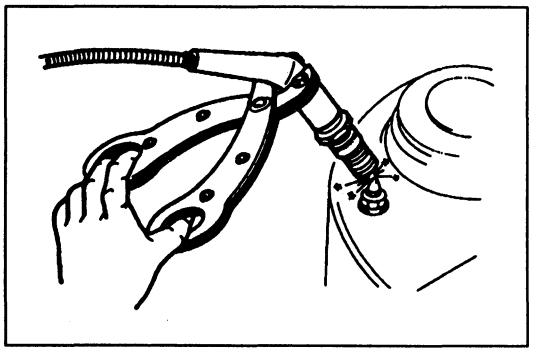
Others

- PCME terminal 3I voltage

8. Disconnect the **SST**.
9. Verify that the ignition timing advances when the engine is above 1,500 rpm.







SPARK PLUGS

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 plugs by using a plug socket.

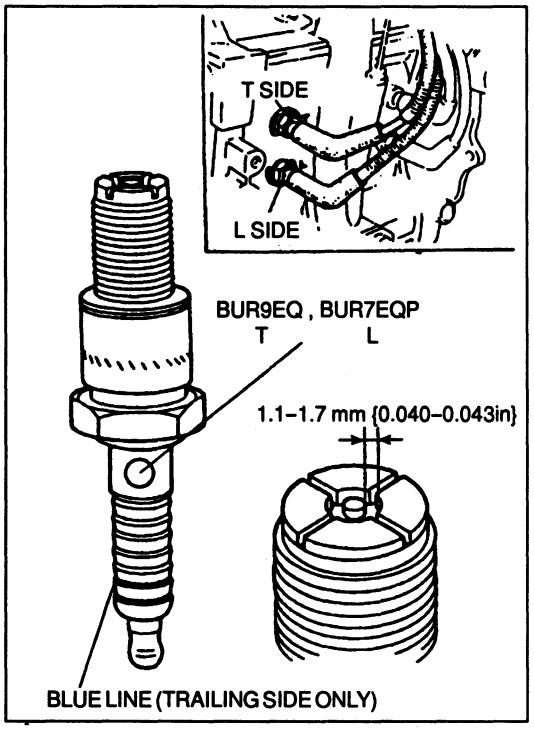
Caution
- **To avoid breaking the spark plug, be sure to fit the socket squarely over it.**

3. Apply anti-seize compound or molybdenum-based lubricant to the spark plug threads before installing.
4. Tighten the spark plugs to the specified torque.

Tightening torque:
13–17 N·m {1.3–1.8 kgf·m, 9.5–13 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. Check the engine and verify that there is a strong blue spark.
5. Replace the spark plug or high tension lead as necessary if not as specified.



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. Clean the upper insulator, also.
- Damaged gasket
- Burnt

Plug gap: 1.1–1.7 mm {0.044–0.066 in}

Plug position	NGK	Color
Leading side	BUR7EQP*, (BUR7EQ) (BUR6EQP) (BUR6EQ)	—
Trailing side	BUR9EQ*, (BUR9EQP) (BUR8EQP) (BUR8EQ)	Blue

* Standard plug

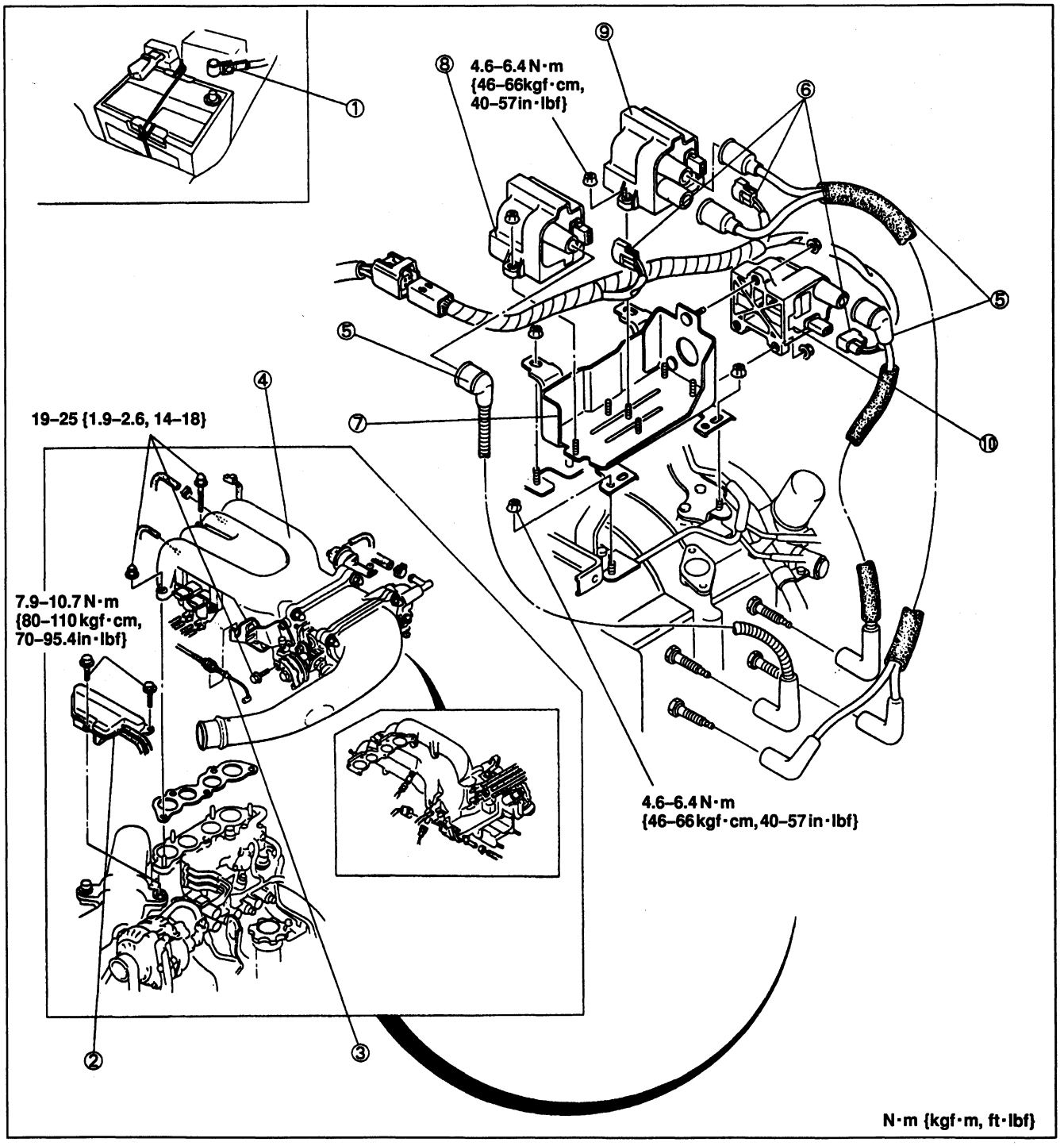
Caution

- **The electrode is platinum coated. The following can scratch its platinum coating and impair its performance.**
  (1) Adjusting the plug gap.
  (2) Using a wire brush to clean the electrode.
  (3) Using a plug cleaner for more than twenty (20) seconds, or at more than 588 kPa {6 kgf/cm^2, 85 psi}

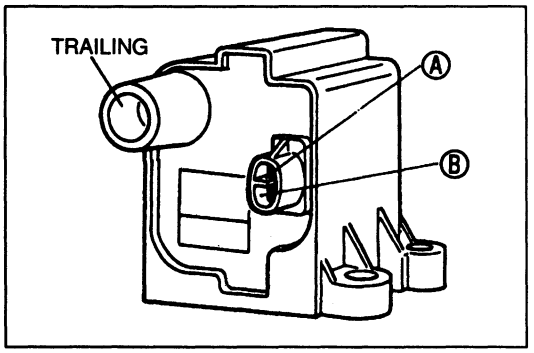
IGNITION COIL

Removal / Installation

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



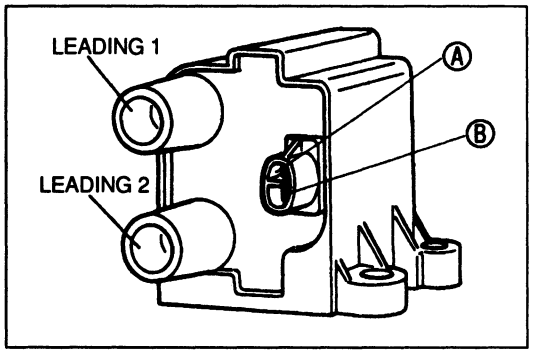
1. Battery negative cable
2. Pressure chamber
3. Accelerator cable
4. Extension manihold
5. high-tension lead
   Inspection .... page G–21
6. Connector
7. Ignition coil bracket
8. Ignition coil (Trailing No.1)
   Inspection .... page G–21
9. Ignition coil (Leading)
   Inspection .... page G–21
10. Ignition coil (Trailing No.2)
    Inspection .... page G–21



Inspection
T (Trailing) side
1. Measure resistance of the coil.

Inspection point	Resistance
A–B (primary coil winding)	below 1.0 Ω
A–T (secondary coil winding)	∞ (infinity)

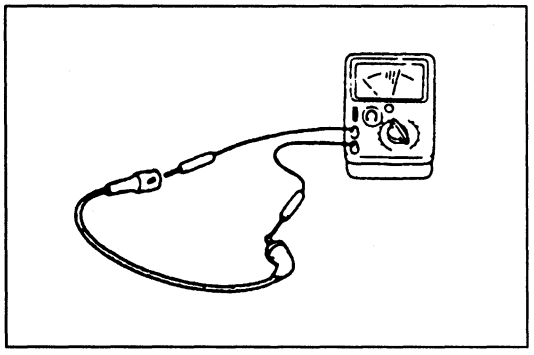
2. If not within specification, replace the ignition coil.



L (Leading) side
1. Measure resistance of the coil.

Inspection point	Resistance
A–B (primary coil winding)	below 1.0 Ω
L_1–L_2 (secondary coil winding)	9.6–16.0 kΩ

2. If not within specification, replace the ignition coil.



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 resistance of the high-tension leads.

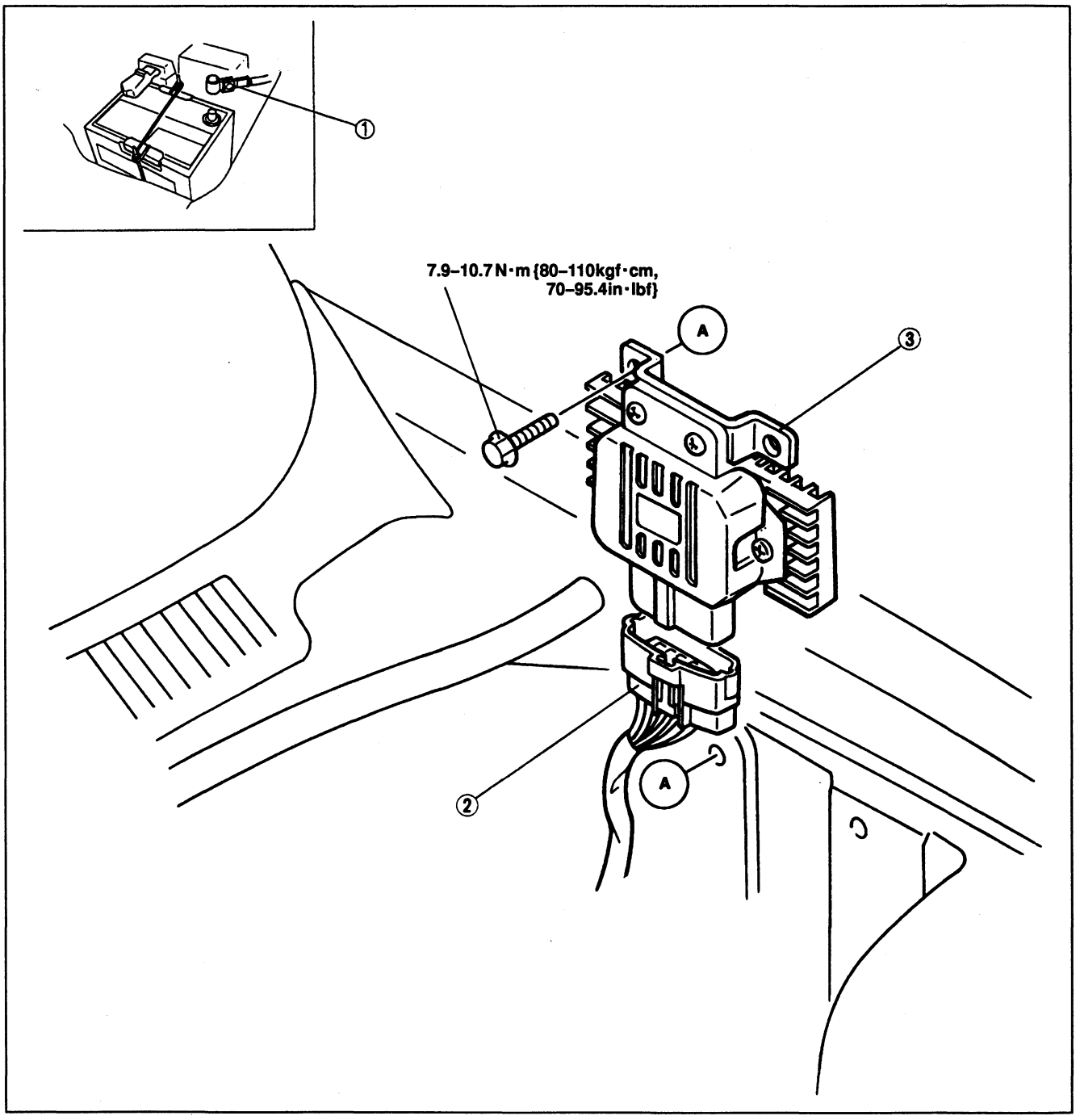
Specification: 16 kΩ per 1m {3.28 ft}

2. If not as specified, replace the high-tension leads.

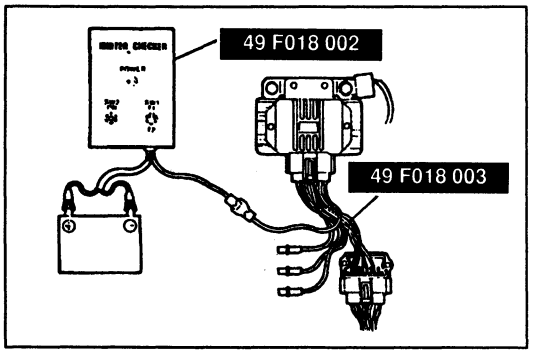
IGNITER

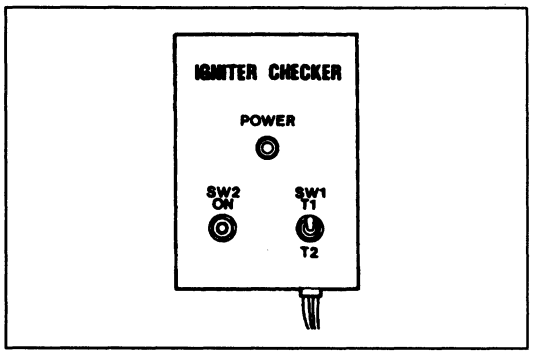
Removal / Installation

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



1. Battery negative cable
2. Connector
3. Igniter
   Inspection ..... page G–23



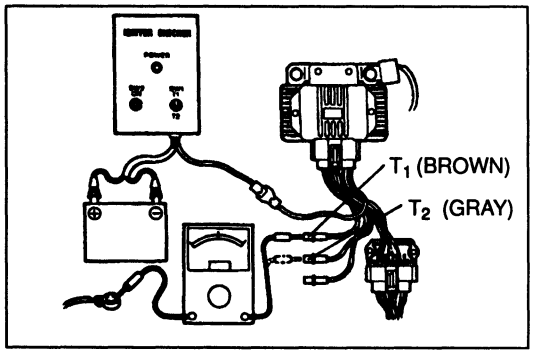


Inspection

Before this inspection, check the specific gravity of the battery, and that it is at or near full charge.

1. Disconnect the negative battery cable.
2. Disconnect the igniter connector.
3. Connect the **SST**.
4. Reconnect the negative battery cable.
5. Turn the ON ignition switch.

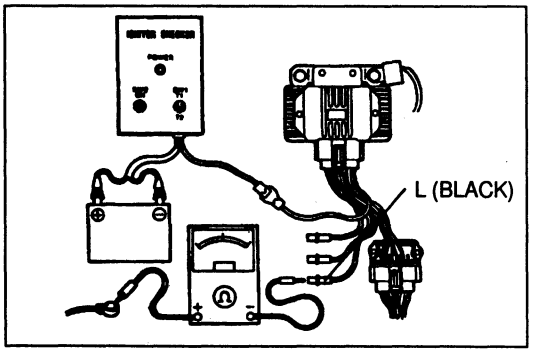
Note
- Switch 1 may be in either position.



Trailing side
1. Insert the voltmeter probe into the brown (Front rotor trailing) or gray (Rear rotor trailing) lead of the **SST** (adapter harness) and verify that the voltage is as specified.

   Voltage: Battery positive voltage

2. Press switch 2 to ON when certify to shake a hand of voltmeter.
3. Replace the igniter, if necessary.



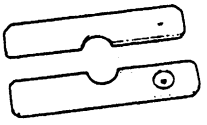
Leading side
1. Insert the voltmeter probe into the black lead of the **SST** (adapter harness) and verify that the voltage is as specified.

   Voltage: Battery positive voltage

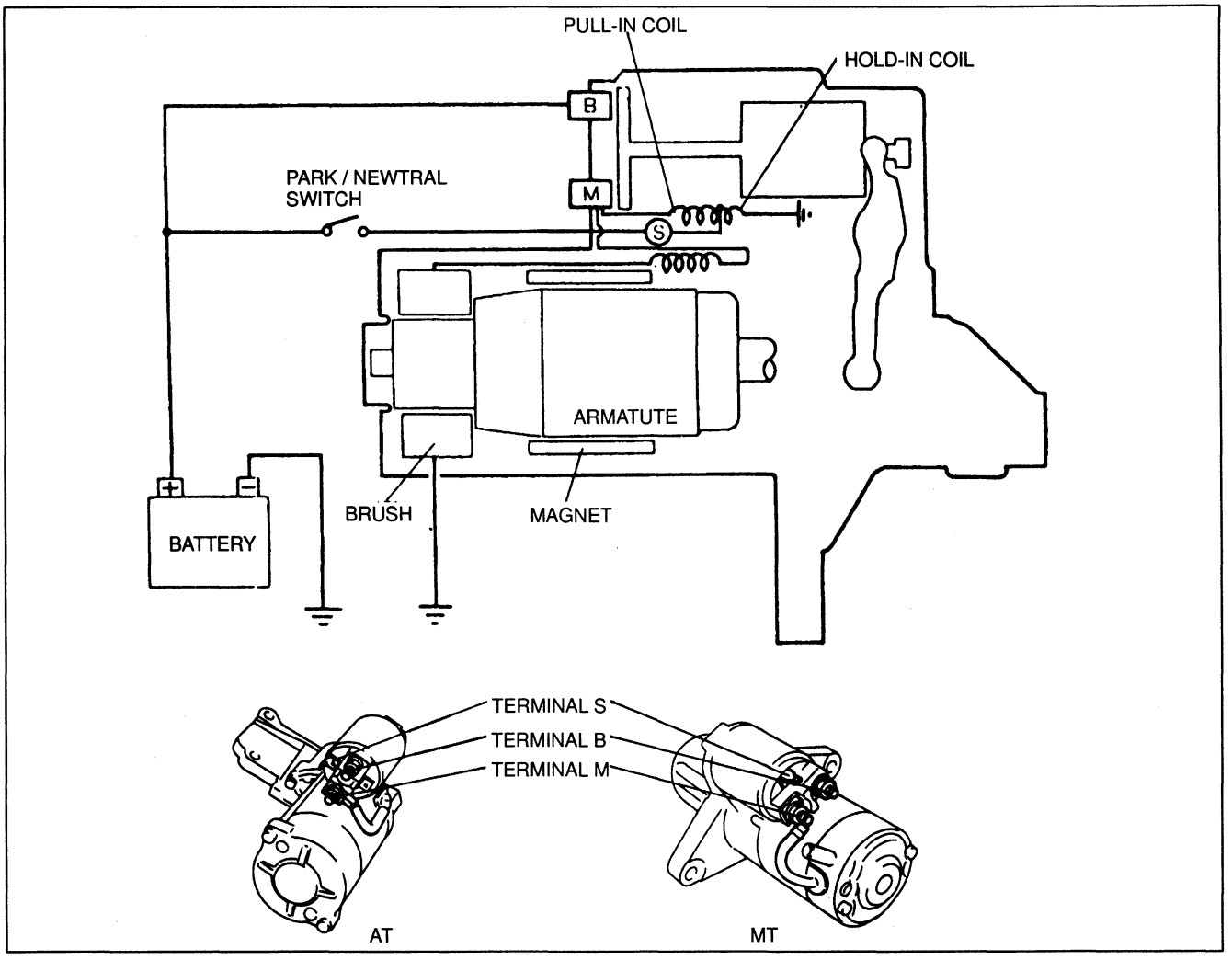
2. Press switch 2 to ON when certify to shake a hand of voltmeter.
3. Replace the igniter, if necessary.

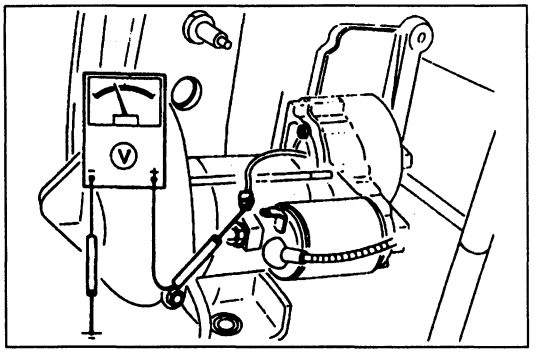
STARTING SYSTEM

PREPARATION
SST

49 E301 144 Plate, removing		For installation of overrunning clutch

CIRCUIT DIAGRAM





STARTER
Inspection (on-vehicle)

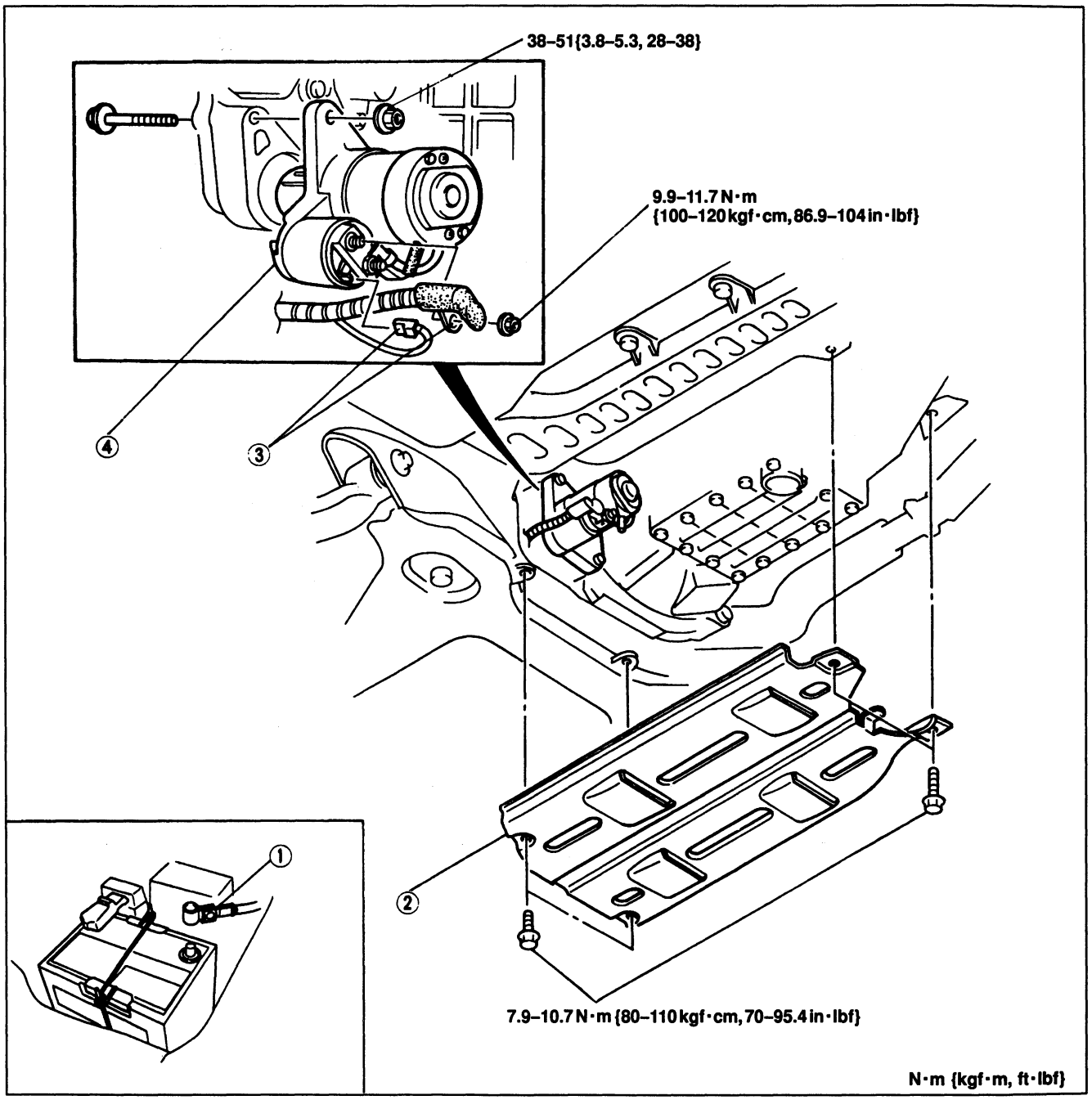
1. Measure the battery positive voltage.

   Specification: Above 12.4V
2. Crank the engine, and verify that the starter turns smoothly.
3. If the starter does not turn, measure 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, and park/neutral switch (AT).

Removal / Installation

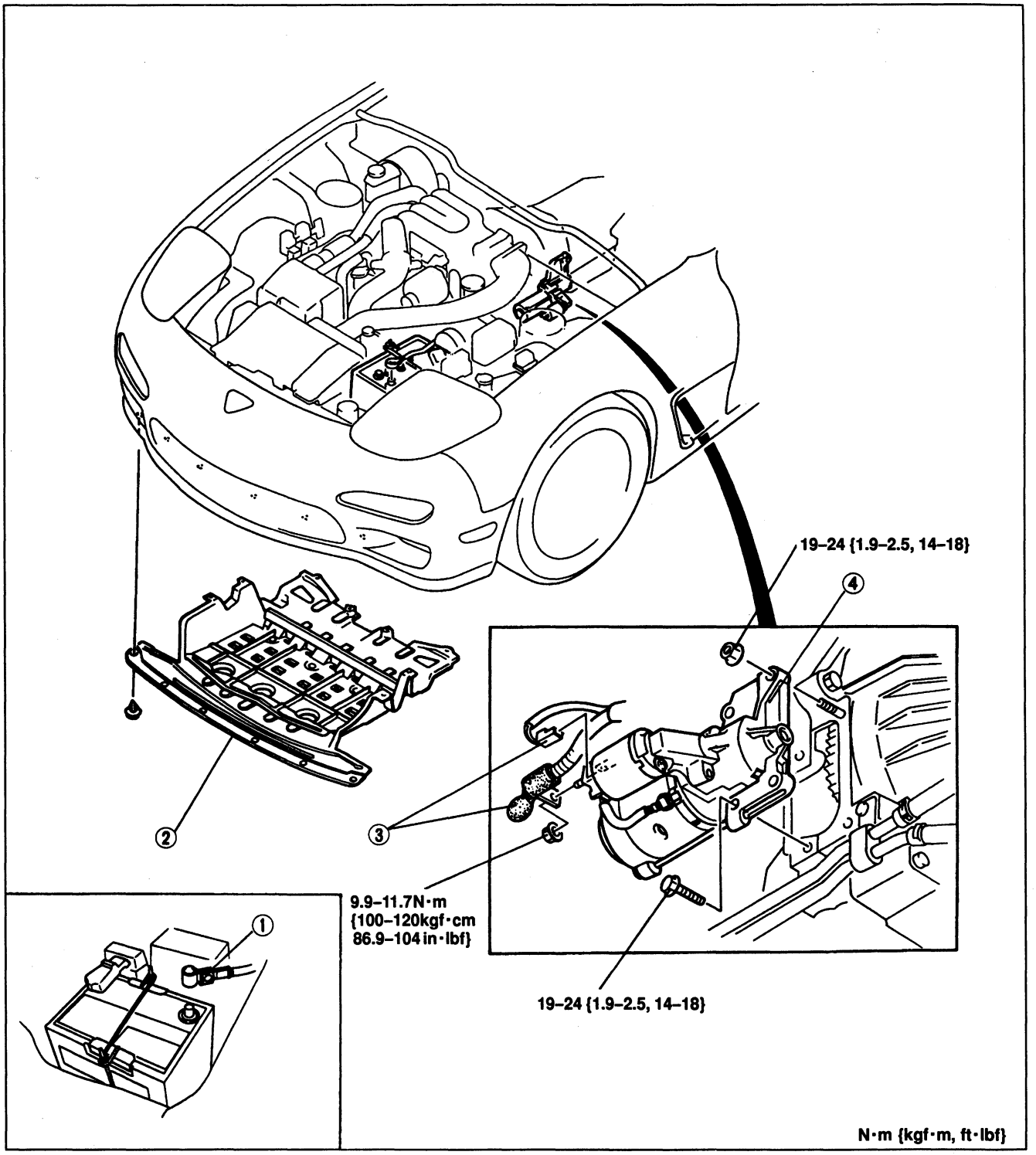
1. Remove in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal.

MT

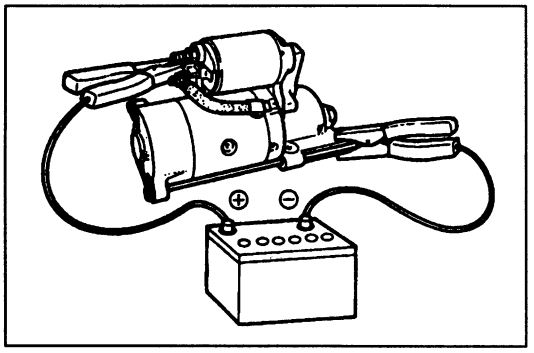


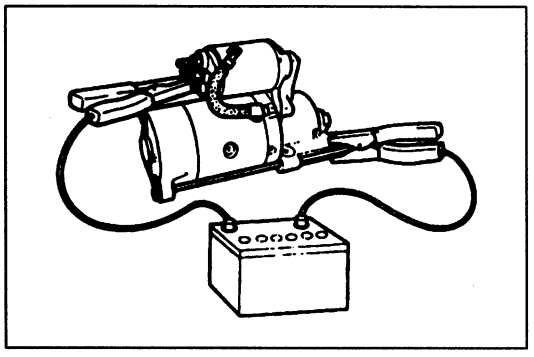
1. Battery negative cable
2. Under cover
3. Terminal S and B wire
4. Stater
   - Performance inspection ..... page G–27
   - Disassembly / Assembly ..... page G–28
   - Inspection ..... page G–30

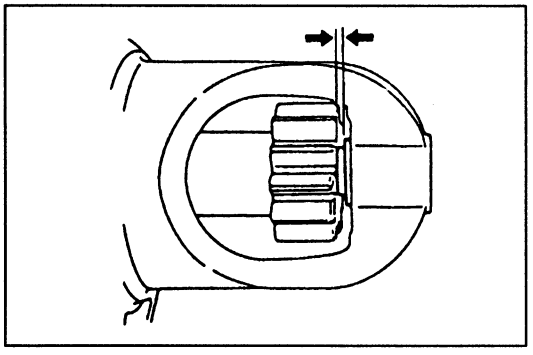
AT

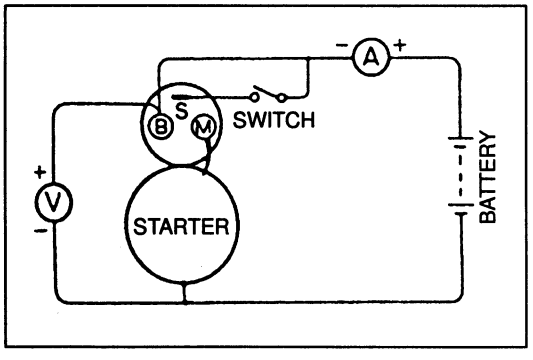


1. Battery negative cable
2. Under cover
3. Terminal S and B wire
4. Stater
   - Performance inspection ..... page G–27
   - Disassembly / Assembly ..... page G–29
   - Inspection ..... page G–30









Performance Inspection

Magnetic switch

Disconnect terminal M 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 for more than 10 seconds can 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 for more than 10 seconds can damage the starter.**

Pinion gap: 0.5–2.0 mm {0.020–0.078 in}

4. If the pinion gap is not within 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

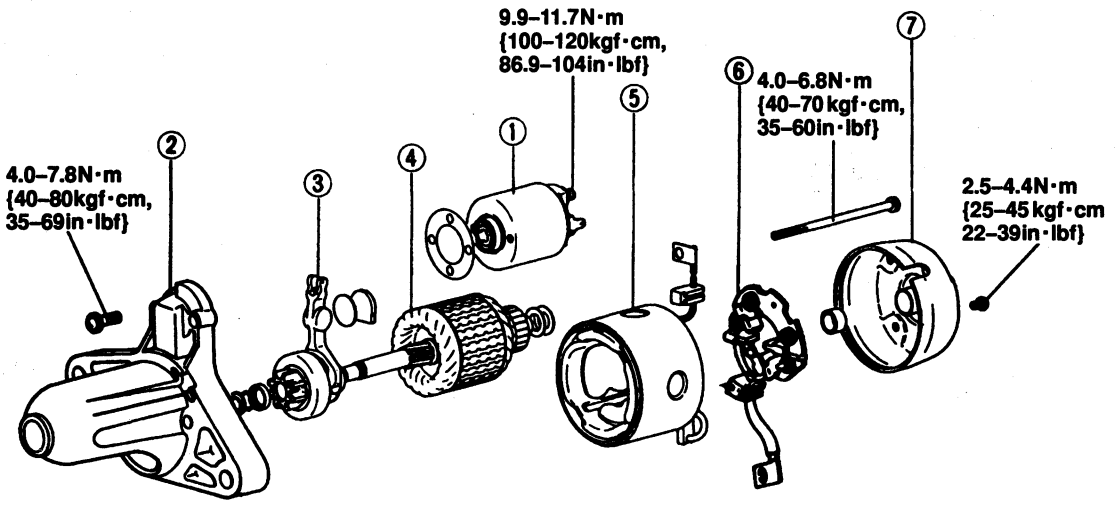
1. Connect a circuit as shown.
2. Measure voltage, current, and speed as shown below.

Voltage	(V)	11.0
Current	(A)	Max 90
Speed	(rpm)	Min 2,200 (AT), Min 3,000 (MT)

Disassembly / Assembly

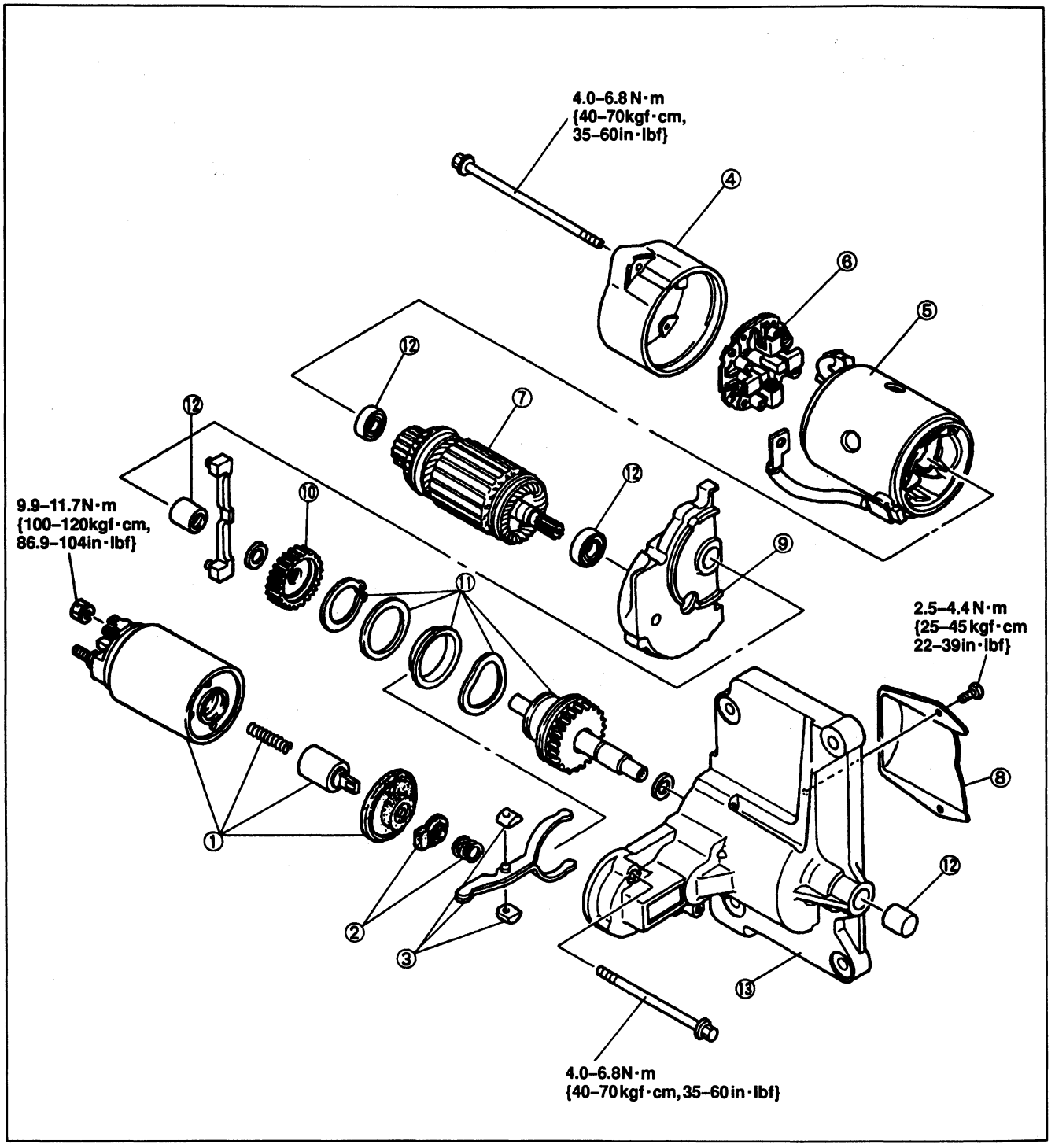
1. Disassemble in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly.

MT

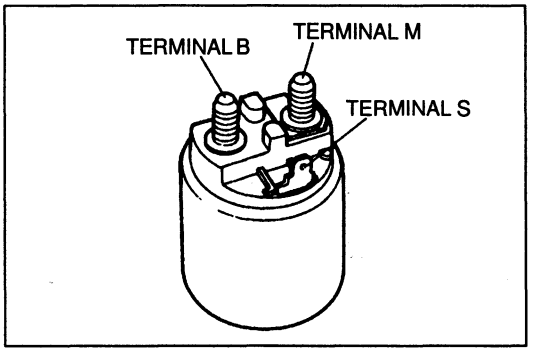


1. Magnetic switch
   Performance inspection ..... page G-27
   Inspection ..... page G-30
2. Front bracket
3. Drive pinion
   Inspection ..... page G-31
4. Armature
   Inspection ..... page G-30
5. Field coil
   Inspection ..... page G-30
6. Brush and Brush holder
   Inspection ..... page G-31
7. Rear bracket

AT



1. Magnetic switch
   Performance Inspection .... page G-27
   Inspection .... page G-30
2. Spring set
3. Lever set
4. Rear bracket
5. Field coil
   Inspection .... page G-30
6. Brush and Brush holder
   Inspection .... page G-31
7. Armature
   Inspection .... page G-30
8. Cover
9. Center bracket
10. Reduction gear
11. Pinion shaft assembly (Overrunning clutch)
    Inspection .... page G-31
12. Bearing
13. Front bracket

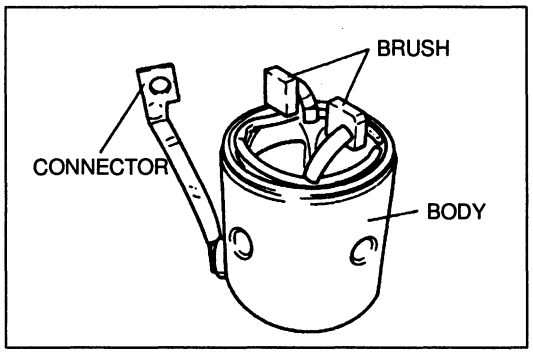


Inspection

Magnetic switch

Check the continuity as shown.

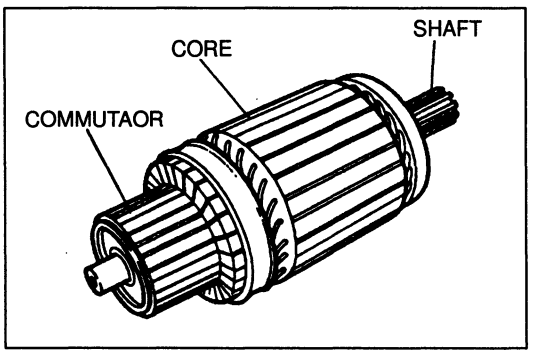
Inspection point	Continuity
Terminal S–M	Yes
Terminal M–B	No
Terminal S–Body	Yes



Field coil

Check the continuity as shown.

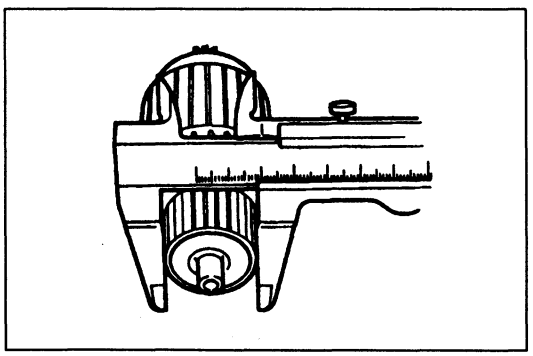
Inspection point	Continuity
Brush – Connector	Yes
Body – Connector	No



Armature

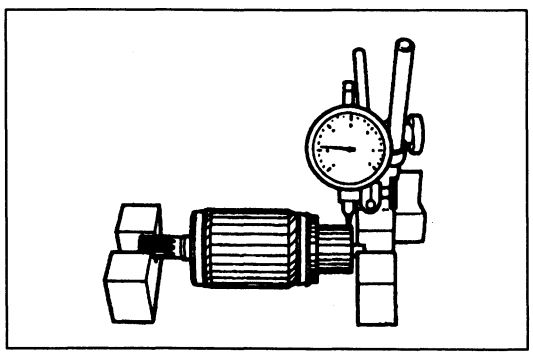
1. Check the continuity as shown.

Inspection point	Continuity
Commutator – Core	Yes
Commutator – Shaft	No
Core – Shaft	No



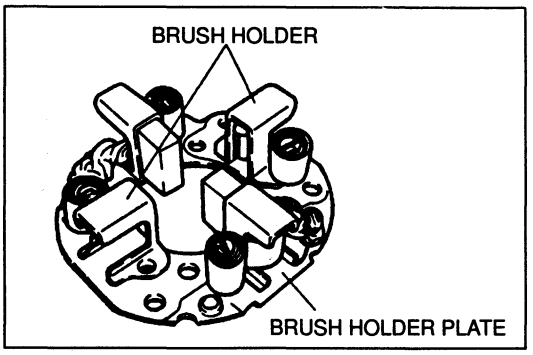
2. Replace the armature if the outer diameter of the commutator is almost at or less than the minimum.
3. If the commutator surface is dirty, wipe it with a cloth; if it is rough, repair it with a lathe or fine sandpaper.

Minimum diameter
32.0 mm {1.26 in}



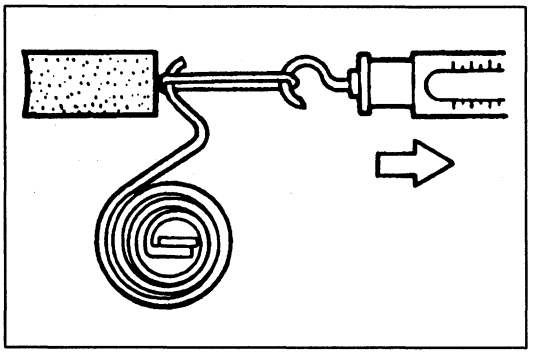
4. Place the armature on V-blocks, and measure the runout by using a dial indicator.
5. If the runout is not within specification, repair the armature by using a lathe or replace it.

Runout: 0.05 mm {0.002 in}



Brush and Brush holder

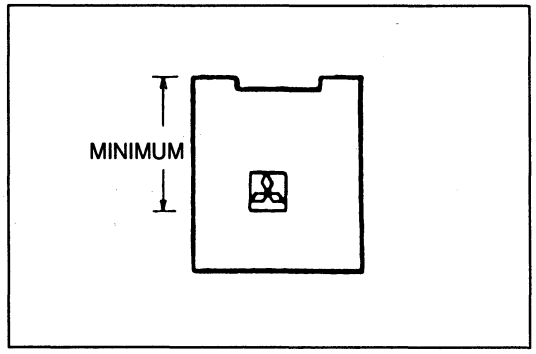
1. Check for continuity between the insulated brush and the plate. Repair or replace if there is continuity. Also check that the brush slides smoothly inside the brush holder.



2. Measure the force of the brush spring by using a spring balance.

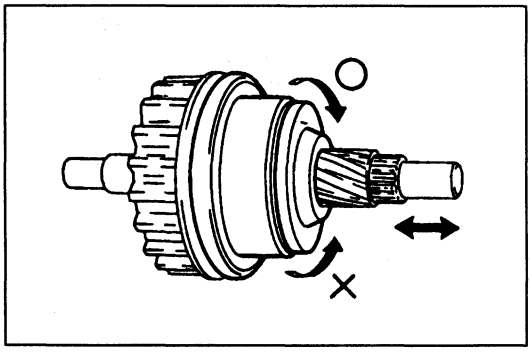
   Standard: 18.6–22.6 N {1.89–2.31 kgf, 4.16–5.08 lbf}
   Maximum: 6.9 N {0.7 kgf, 1.5 lbf}

3. Replace the spring if not as specified.



4. If a brush is worn almost to or beyond the wear limit, replace all of the brushes.

Specification		MT	AT
Standard	mm {in}	17 {0.67}	18 {0.71}
Minimum	mm {in}	11 {0.43}	11 {0.43}



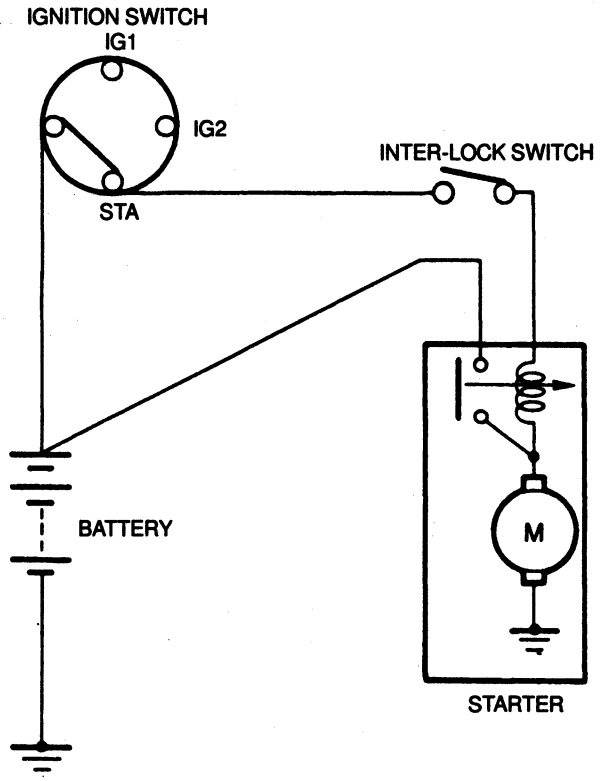
Overrunning Clutch

1. Turn the pinion shaft by hand while holding the overrunning clutch.
2. Replace the overrunning clutch if the pinion turns in both or in neither direction.

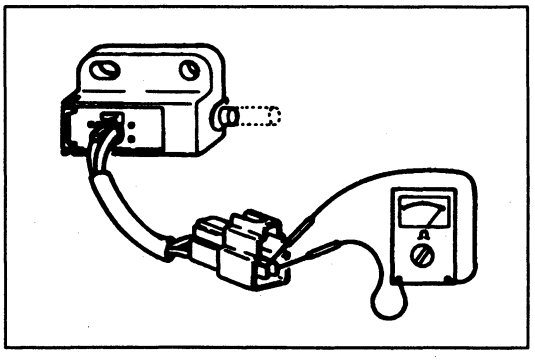
Caution

- **Using cleaning fluids or a steam cleaner to clean the overrunning clutch can dissolve the grease inside it.**

INTERLOCK SWITCH



This system is similar to that of the park/neutral switch on at AT vehicle.
If the clutch pedal is not depressed during starting, battery power will not be supplied to the starter and the starter will not operate.



Inspection

1. Disconnect the interlock switch connector.
2. Connect a circuit tester to the switch.
3. Check the continuity.

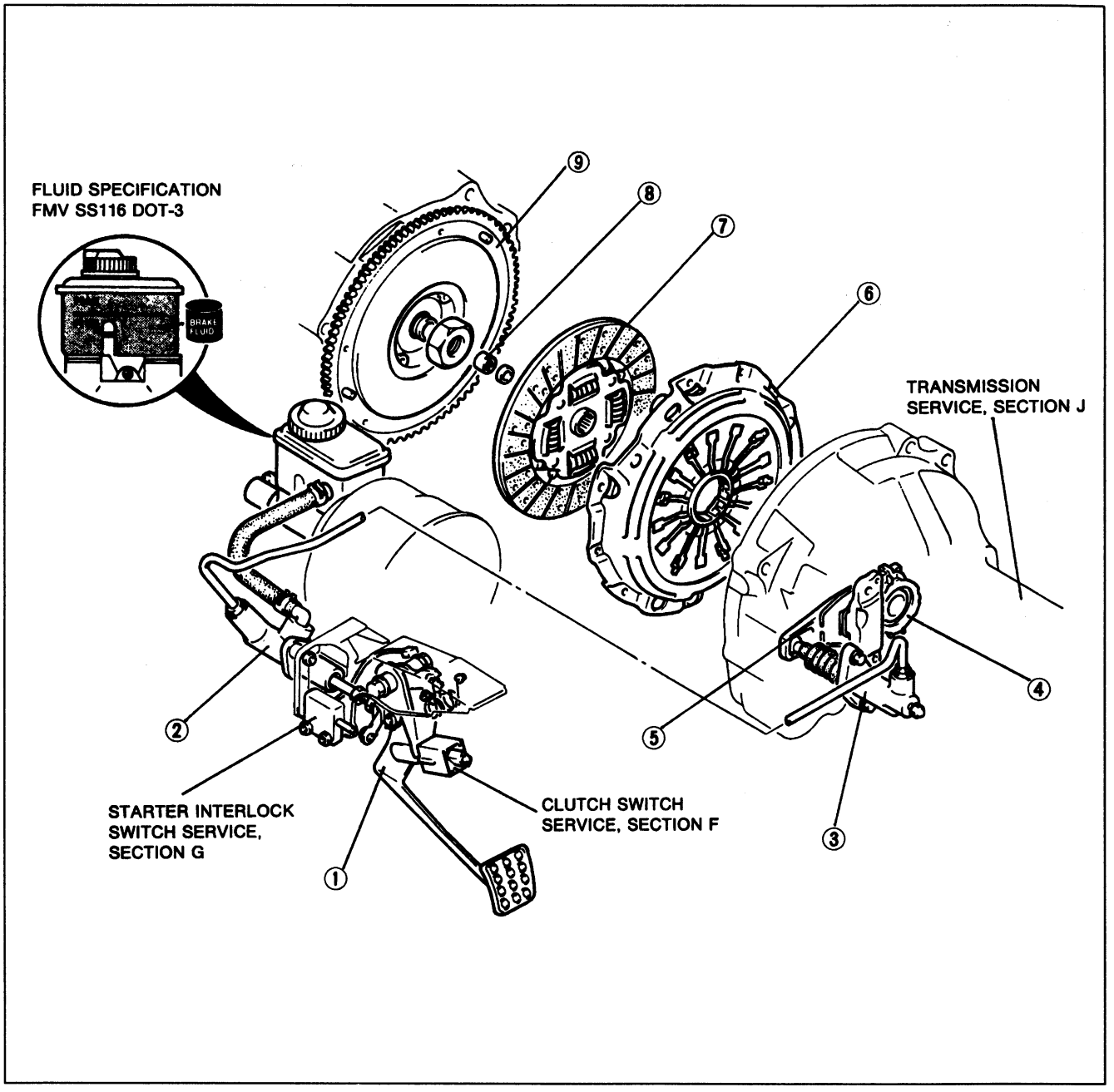
Pedal	Continuity
Depressed	Yes
Released	No

4. If not as specified, replace the switch.

Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

CLUTCH

INDEX



OUTLINE

SPECIFICATIONS

Item \ Transmission model			R15M-D (R5M-D)
Clutch control			Hydraulic
Clutch pedal	Type		Suspended
	Pedal ratio		6.35
	Full stroke mm {in}		135 {5.32}
	Height (with carpet) mm {in}		165.5–177.0 {6.516–6.968}
Clutch disc	Outer diameter mm {in}		236 {9.29}
	Inner diameter mm {in}		160 {6.30}
	Facing thickness	Flywheel side mm {in}	3.5 {0.14}
		Pressure plate side mm {in}	3.5 {0.14}
Clutch cover	Type		Diaphragm spring
	Set load N {kgf, lbf}		7,220 {736,1619}
Clutch master cylinder	Inner diameter mm {in}		15.87 {0.625}
Clutch release cylinder	Inner diameter mm {in}		19.05 {0.750}
Clutch fluid			FMVSS116 DOT-3

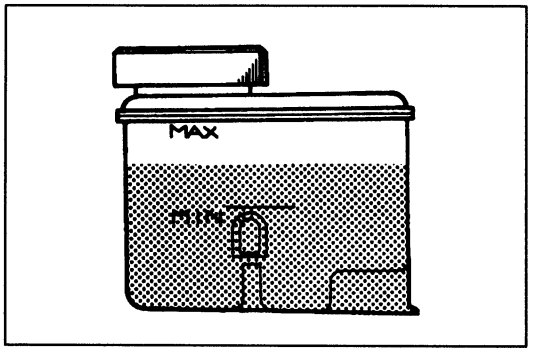
TROUBLESHOOTING GUIDE

Problem	Possible Cause	Action	Page
Slipping	Clutch disc facing worn excessively	Replace	H–17
	Clutch disc facing surface hardened or oil soaked	Repair or replace	H–17
	Pressure plate damaged	Replace	H–17
	Flywheel damaged	Replace	H–17
	Diaphragm spring damaged or weak	Replace	H–17
	Insufficient clutch pedal play	Adjust	H–6
	Clutch pedal sticking	Repair or replace	H–7, 8
Faulty disengagement	Clutch disc damaged or excessive runout	Replace	H–17
	Clutch disc splices rusted or worn	Repair or replace	H–17
	Oil on clutch disc facing	Repair or replace	H–17
	Diaphragm spring damaged or weak	Replace	H–17
	Excessive clutch pedal play	Adjust	H–6
	Leakage of clutch fluid	Locate and repair or replace	—
Clutch vibrates when accelerating	Oil on clutch disc facing	Repair or replace	H–17
	Clutch disc facing hardened or damaged	Repair or replace	H–17
	Diaphragm spring weak	Replace	H–17
	Clutch disc facing rivets loose	Replace	H–17
	Pressure plate damaged or excessive runout	Replace	H–17
	Flywheel surface hardened or damaged	Repair or replace	H–17
	Loose or worn engine mount	Tighten or replace	—
Clutch pedal sticks	Pedal shaft not properly lubricated	Lubricate or replace	H–8
Abnormal noise	Clutch release collar damaged	Replace	H–17
	Release collar not properly lubricated	Lubricate or replace	H–17
	Torsion spring weak	Replace	H–17
	Pilot bearing worn or damaged	Replace	H–17
	Worn pivot points of release fork	Repair or replace	H–17
	Release fork contact points not properly lubricated	Lubricate or replace	H–17
Clutch pedal vibrates when engine running	Improper installation of or damage to wedge collar and wire ring assembly	Replace	H–17

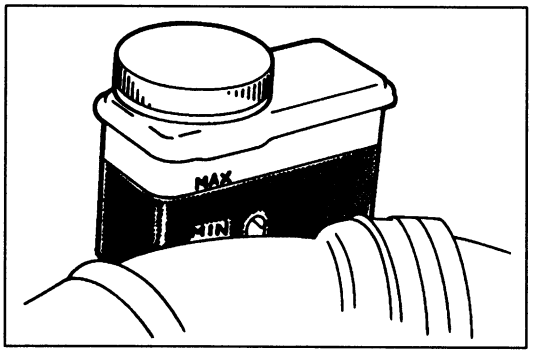
CLUTCH FLUID

PREPARATION
SST

49 0259 770B Wrench flare nut		For air bleeding



INSPECTION
1. Make sure that the fluid level in the reservoir is between the MAX and MIN mark.
2. If the fluid level is extremely low, check the clutch and brake systems for leakage.



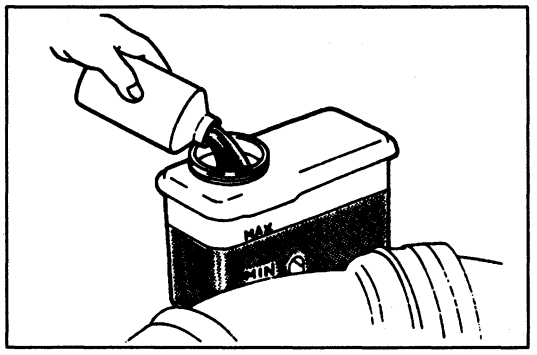
REPLACEMENT

Note
- A common reservoir is used for the clutch and brake system fluids.

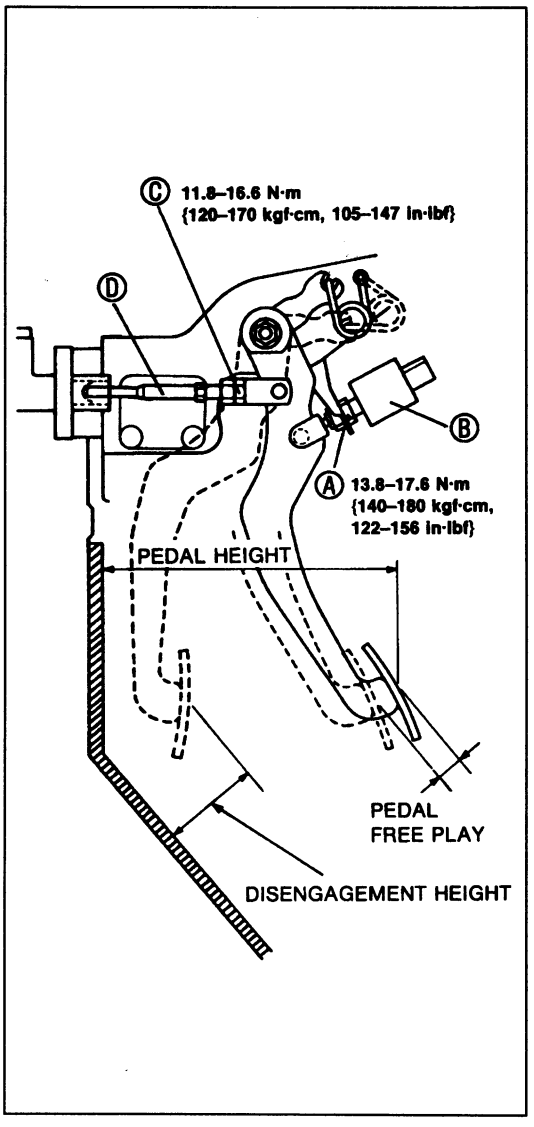
Caution
- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

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. Repert 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 operation of the clutch system.
12. Check operation of the brake system.



CLUTCH PEDAL

ADJUSTMENT

Height

Inspection

1. Measure the distance from the upper surface of the pedal to the carpet.

   Pedal height: 165.5–177.0 mm {6.516–6.968 in} (with carpet)

2. If necessary, adjust the pedal height.

Adjustment

1. Disconnect the clutch switch connector.
2. Loosen locknut A and turn clutch switch B until the pedal height is correct.
3. Tighten locknut A.

   Tightening torque:
   13.8–17.6 N·m{140–180 kgf·cm122–156 in·lbf}

4. After adjustment, measure the pedal free play.

Free Play

Inspection

1. Depress the clutch pedal by hand until clutch resistance is felt.

   Free play: 0.6–3.2 mm {0.02–0.13 in}
   Total free play: 5.1–14 mm {0.20–0.55 in}

2. If necessary, adjust the pedal free play.

Adjustment

1. Loosen locknut C and turn push rod D until pedal free play is correct.
2. Verify that the disengagement height (from the upper surface of the pedal to the carpet) is correct when the pedal is fully depressed.

   Minimum disengagement height: 48 mm {1.9 in} (with carpet)

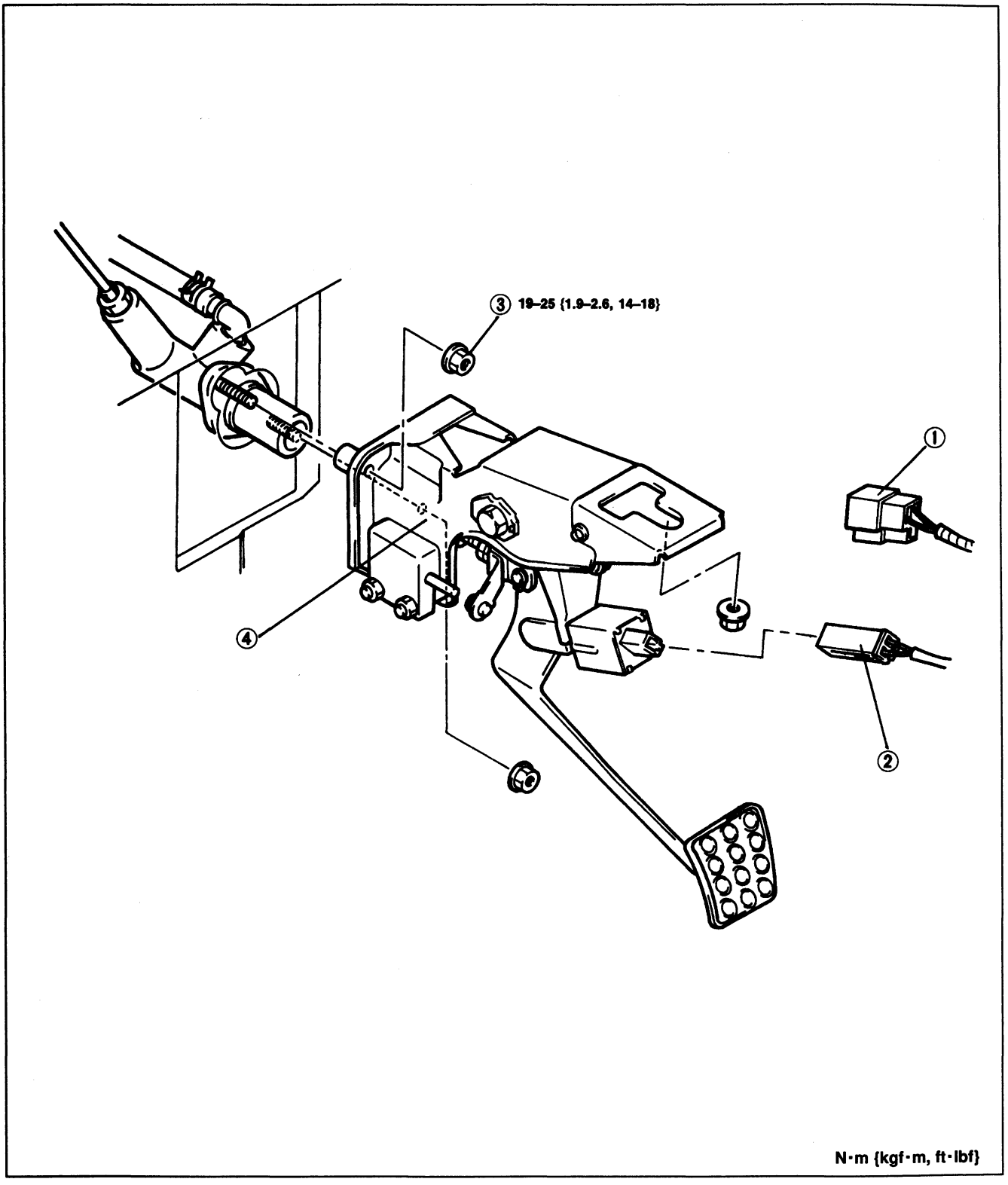
3. Tighten locknut C.

   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

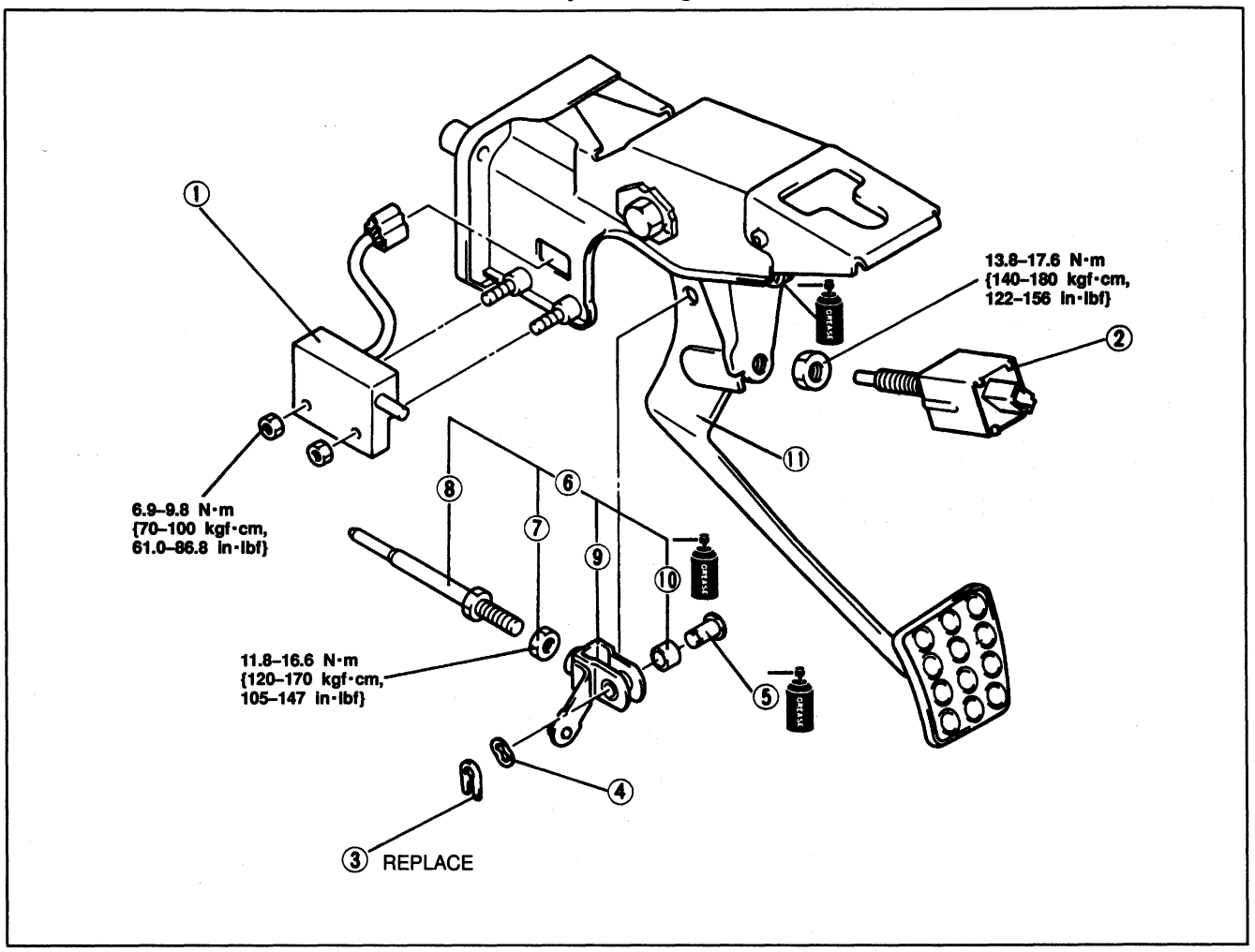
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.



1. Starter interlock switch connector
2. Clutch switch connector
3. Nut
4. Clutch pedal assembly
   Adjustment .... page H–6
   Overhaul ..... page H–8

OVERHAUL

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 Note**.



1. Starter interlock switch
2. Clutch switch
3. Retaining ring
4. Wave washer
5. Pin
6. Push rod assembly
   Inspect for damage and bending.
7. Nut
8. Push rod
9. Fork
10. Spacer
11. Clutch pedal assembly

CLUTCH MASTER CYLINDER

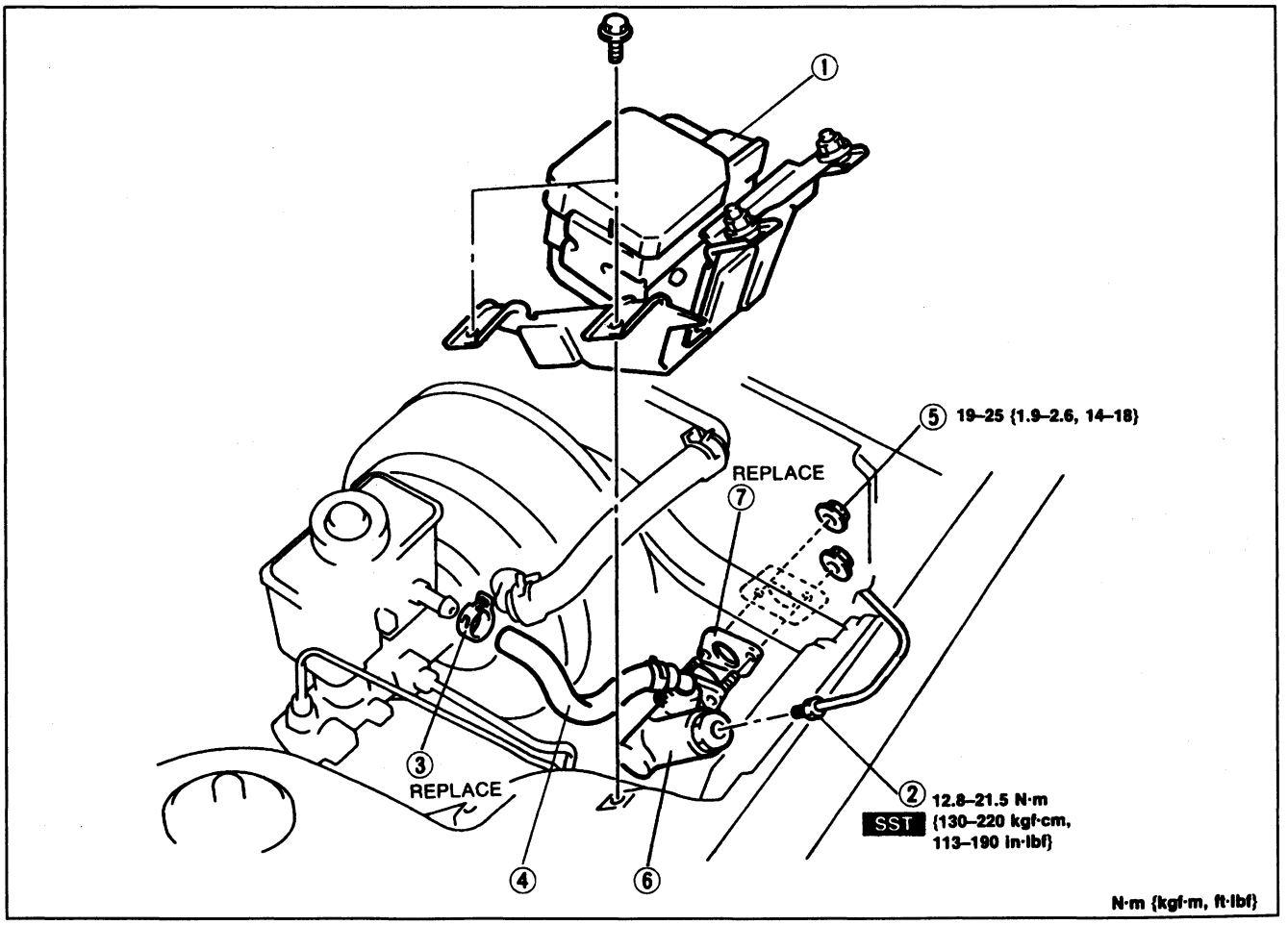
PREPARATION
SST

49 0259 770B Wrench, flare nut		For disconnecting and connecting clutch pipe

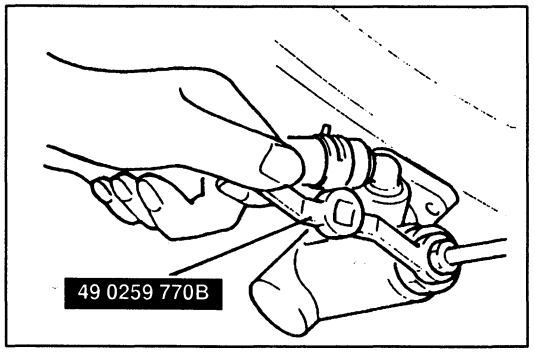
REMOVAL / INSTALLATION

Caution
- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

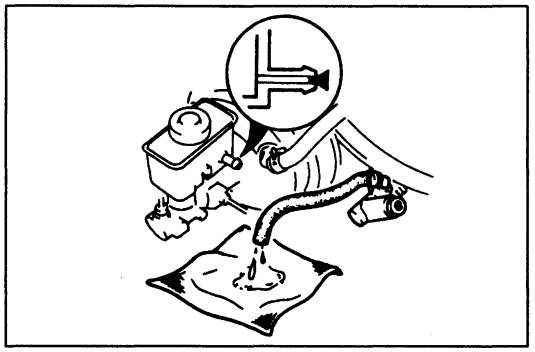
1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal, referring to **Installation Note**.
3. After installation, bleed the clutch system. (Refer to page H-11.)
4. Inspect and adjust the clutch pedal height and free play. (Refer to page H-6.)



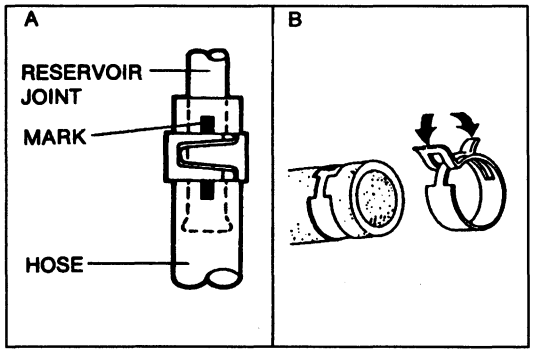
1. Cruise control actuator assembly
2. Clutch pipe
   Removal Note ..... page H-10
   Installation Note ..... page H-10
3. Clamp
4. Clutch hose
   Installation Note ..... page H-10
5. Nut
6. Clutch master cylinder
   Overhaul ..... page H-12
   Inspect for fluid leakage from the cylinder bore
   Air bleeding ... page H-11
7. Gasket



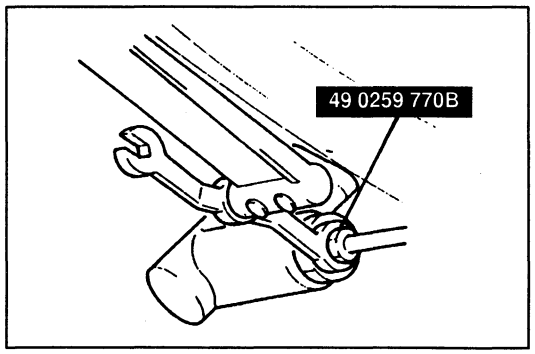
Removal Note
Clutch pipe
1. Disconnect the clutch pipe by using the **SST**.



2. Disconnect the clutch hose from the reservoir.
3. Plug the outlet of the reservoir.

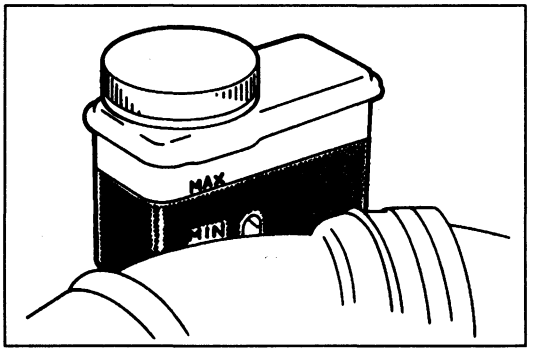


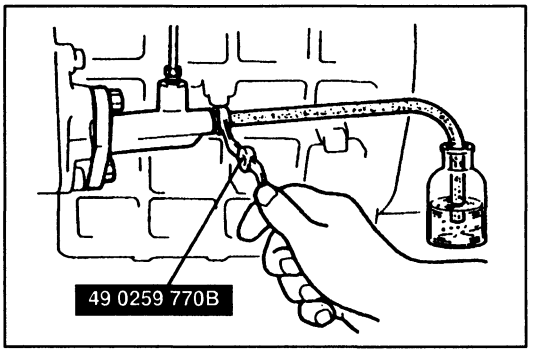
Installation Note
Clutch hose
Install the clutch hose with the mark facing upward, as shown in figure A. If reusing the clutch hose, install the new hose clamp exactly into the mark left by the previous hose clamp, as shown in figure B.

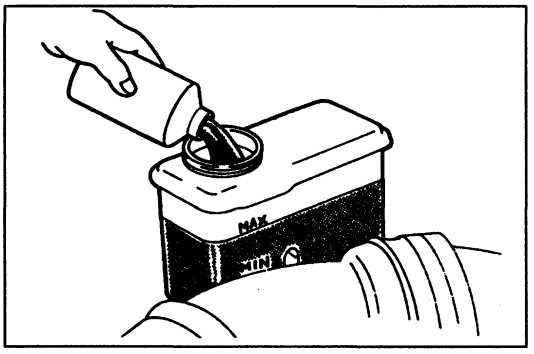


Clutch pipe
1. Modify the clutch pipe tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
2. Tighten the clutch pipe by using the **SST**.

Tightening torque:
12.8–21.5 N·m{130–220 kgf·cm,113–190 in·lbf}







AIR BLEEDING

The clutch hydraulic system must be bled to remove air introduced 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 fluid-filled 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.
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 use of 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 operation of the clutch system.
11. Check operation of the brake system.

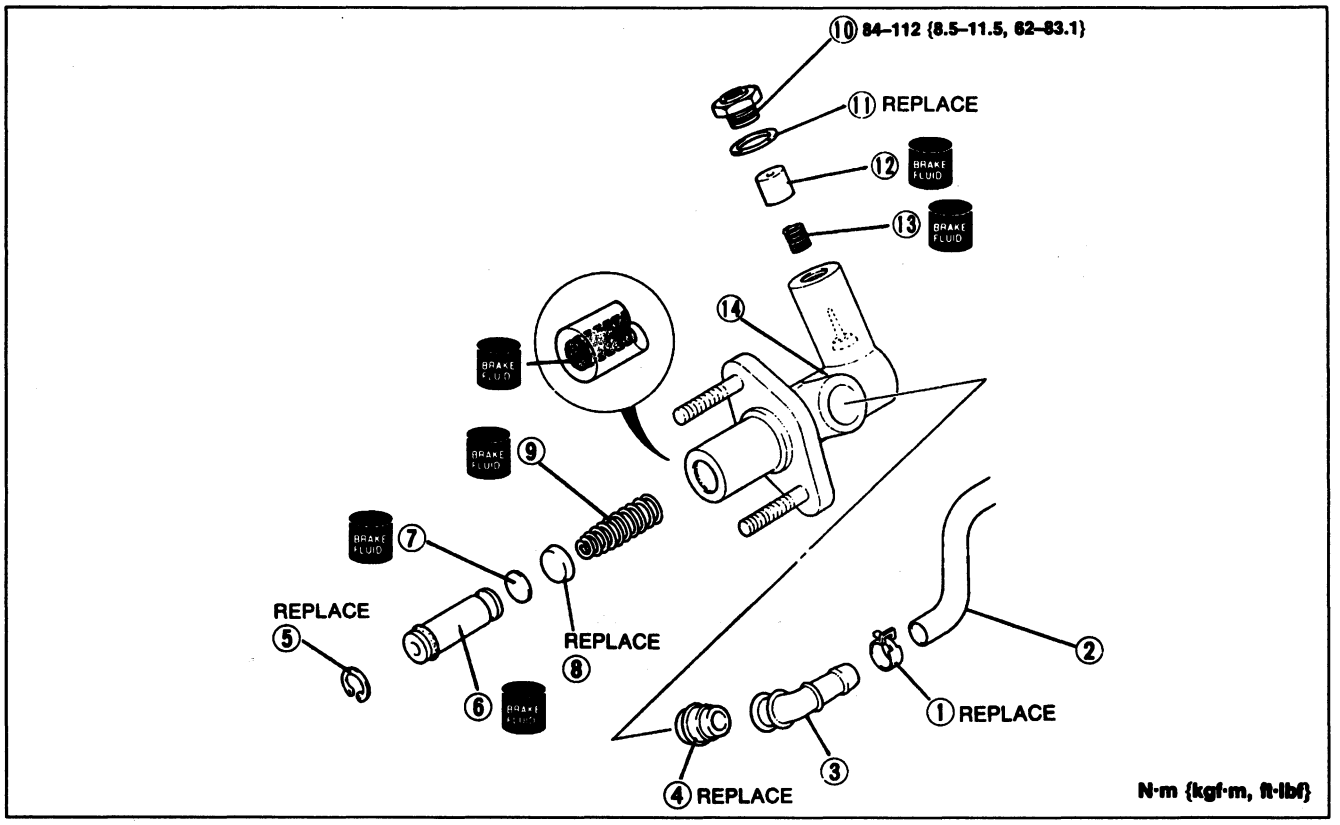
OVERHAUL

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

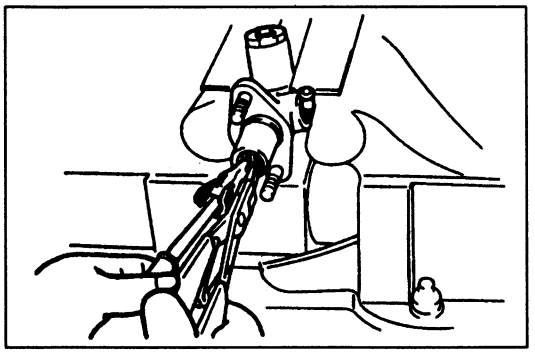
Warning

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

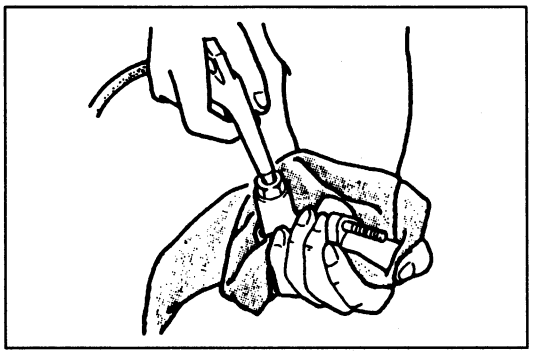
3. Wipe all parts, and clean all ports, passages, and inner parts with compressed air.
4. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



1. Hose clamp
2. Clutch hose
3. Joint
4. Bushing
5. Snap ring
   Disassembly Note ..... below
   Assembly Note ..... page H–13
6. Piston and secondary cup assembly
   Disassembly Note ..... page H–13
   Inspect for wear, scoring, and cracks
   Assembly Note ..... page H–13
7. Spacer
8. Primary cup
   Inspect for wear and cracks
9. Return spring
10. Joint bolt
11. Packing
12. One-way valve piston
    Disassembly Note ..... page H–13
13. Return spring
14. Master cylinder body
    Inspect for scoring and corrosion.
    Replace master cylinder assembly if any scoring or corrosion is found.



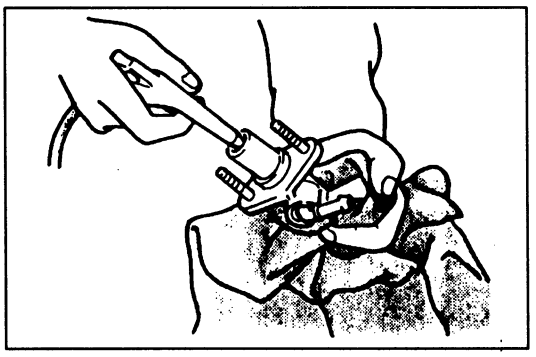
Disassembly Note
Snap ring
While holding the piston down with a cloth-wrapped pin punch, remove the snap ring.



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.**

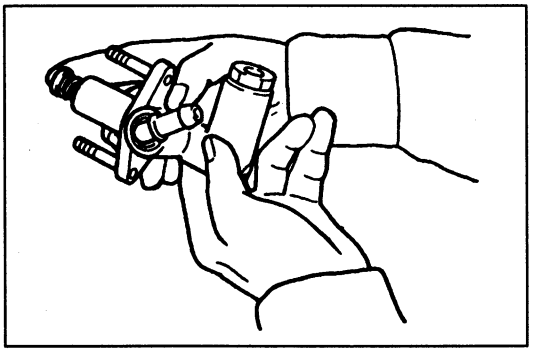
Remove the piston-and-secondary-cup assembly, spacer, primary cup, and the return spring by applying compressed air through the clutch pipe installation hole.



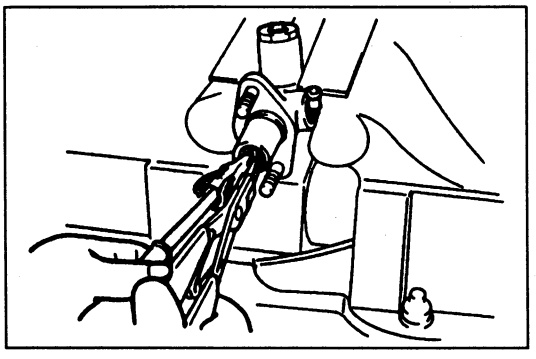
One-way valve piston

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 by applying compressed air through the cylinder bore.



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

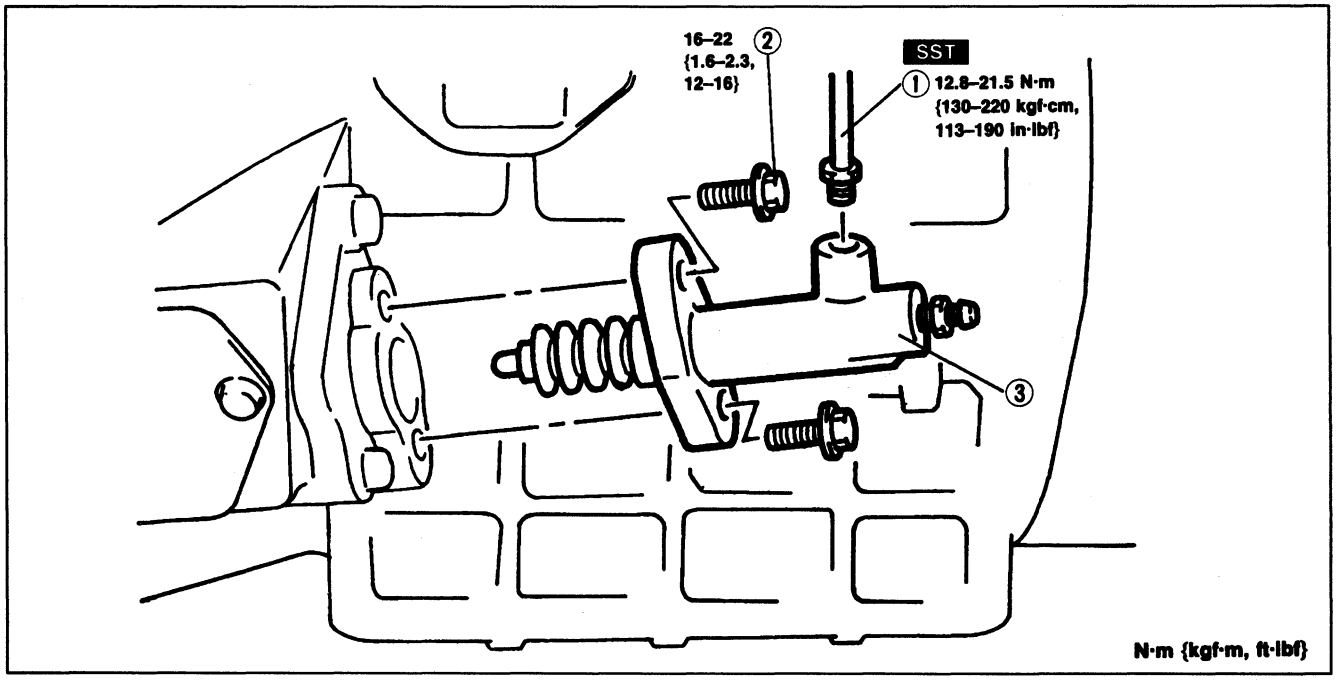
PREPARATION
SST

49 0259 770B Wrench, flare nut		For disconnecting and connecting clutch pipe

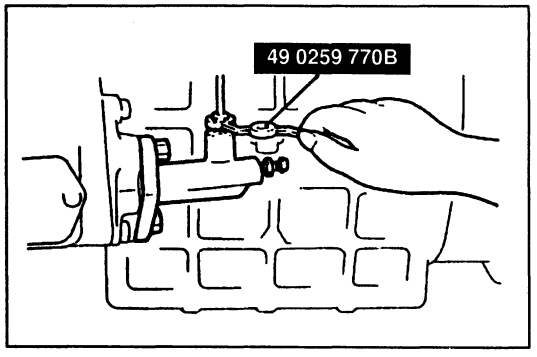
REMOVAL / INSTALLATION

Caution
- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

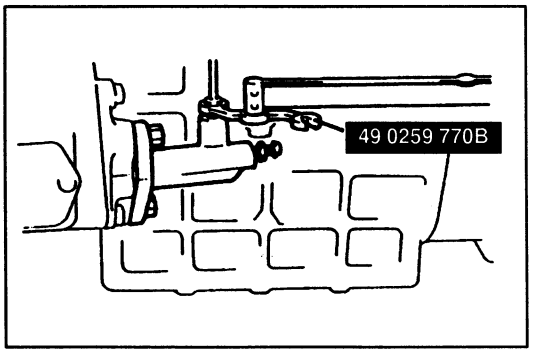
1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal, referring to **Installation Note**.
3. After installation, bleed the clutch system. (Refer to page H-11.)



1. Clutch pipe
   Removal Note ..... below
   Installation Note ..... page H-15
2. Bolt
3. Clutch release cylinder
   Remove boot and check for fluid leakage
   Overhaul ..... page H-15



Removal Note
Clutch pipe
Disconnect the clutch pipe by using the **SST**, and plug the clutch pipe immediately.



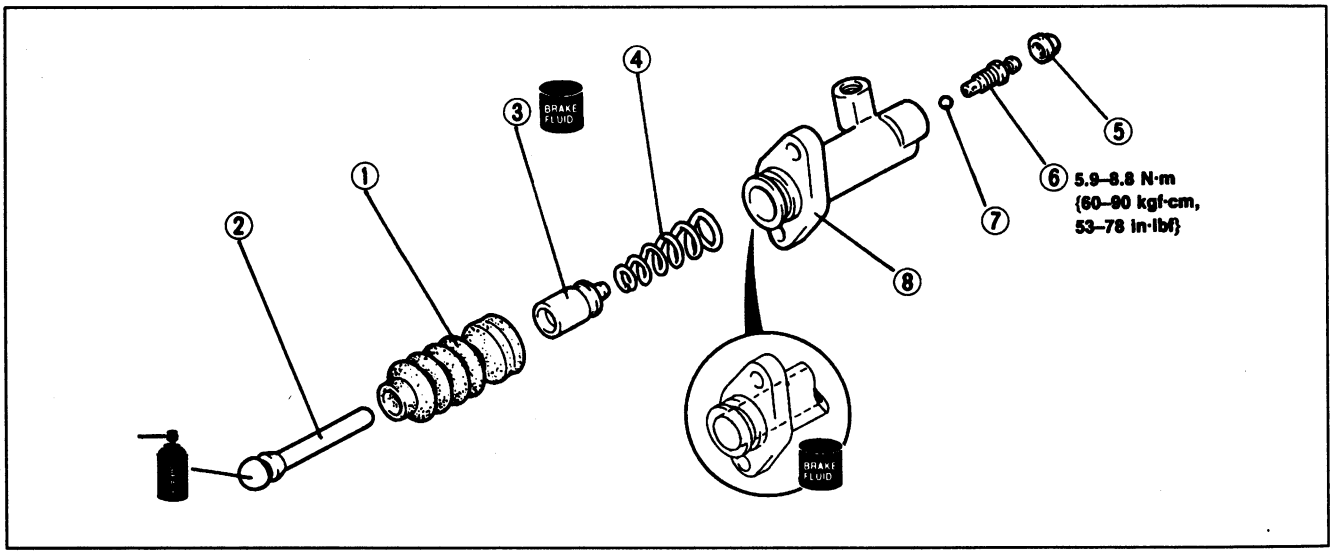
Installation Note
Clutch pipe
1. Modify the clutch pipe tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
2. Tighten the clutch pipe onto the clutch release cylinder by using the **SST**.

Tightening torque:
12.8–21.5 N·m{130–220 kgf·cm,113–190 in·lbf}

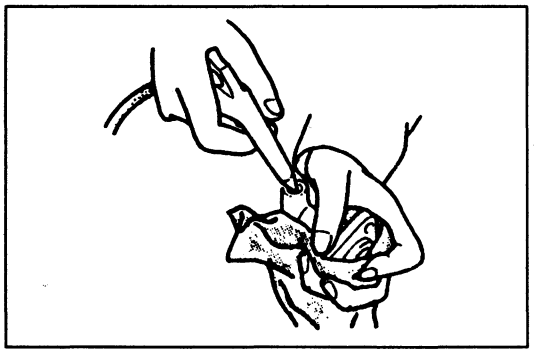
OVERHAUL
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.

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.**

3. Wipe all parts, and clean all ports, passages, and inner parts with compressed air.
4. Assemble in the reverse order of disassembly.



1. Boot
2. Push rod
3. Piston and cup assembly
   Disassembly Not ..... page H–16
   Inspect for wear, scoring and cracks
4. Return spring
5. Bleeder cap
6. Bleeder screw
7. Steel ball
8. Release cylinder body
   Inspect cylinder bore for scoring and corrosion
   Replace cylinder assembly if any is found



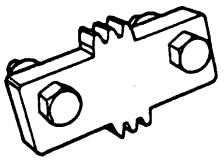
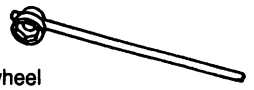
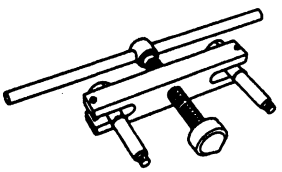
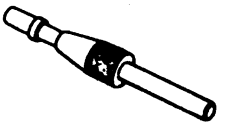
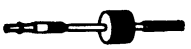
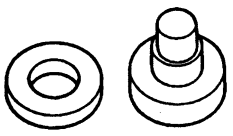
Disassembly Note
Piston and cup assembly

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

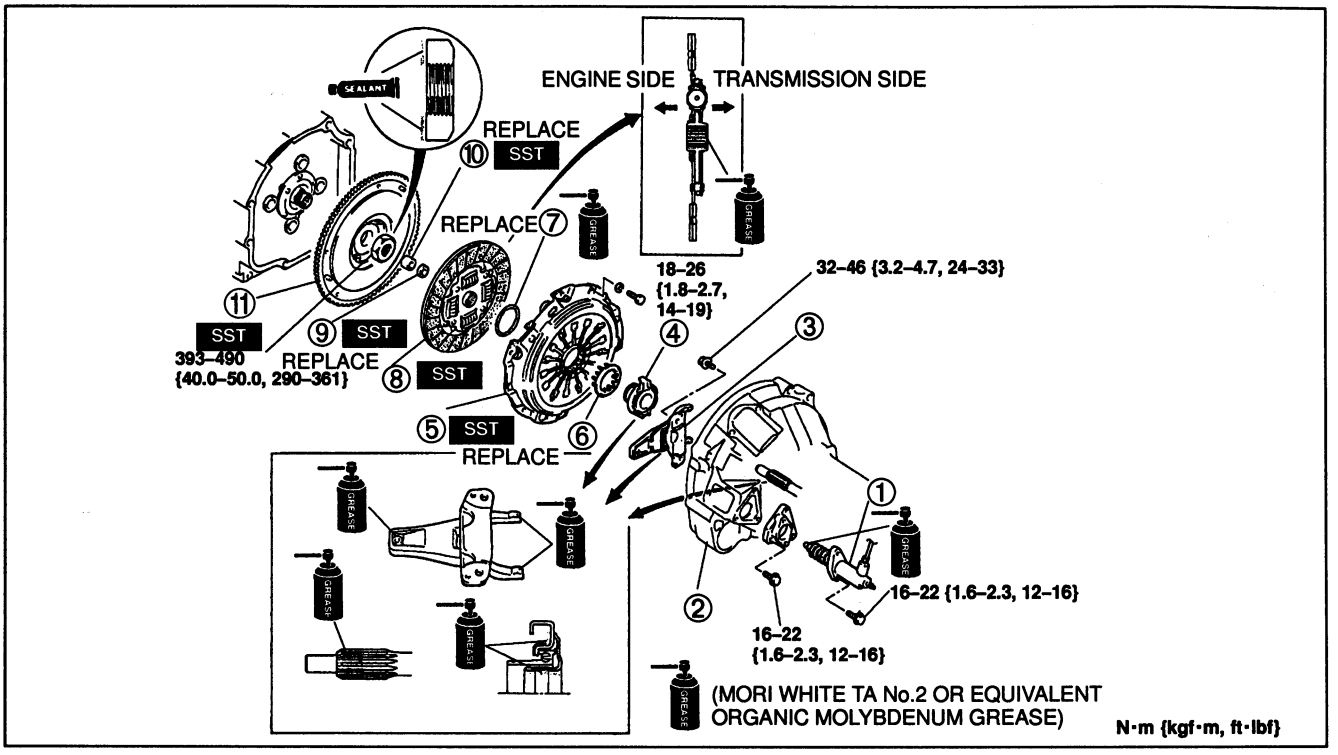
49 F011 101 Brake, ring gear 	For prevention of engine rotation	49 0820 035 Box wrench, flywheel 	For removal and installation of flywheel
49 0839 305A Puller, counterweight 	For removal of flywheel	49 SE01 310A Clutch disc centering tool 	For support of clutch disc
49 1285 071 Puller, bearing 	For removal of pilot bearing and oil seal	49 1285 073 Chuck (Part of 49 1285 071) 	For removal of pilot bearing and oil seal
49 F011 1A1 Installer set, bearing 	For installation of pilot bearing and oil seal	49 G030 795 Installer, oil seal 	For installation of pilot bearing and oil seal
49 G030 797 Handle (Part of 49 G030 795) 	For installation of pilot bearing and oil seal		

REMOVAL / INSTALLATION

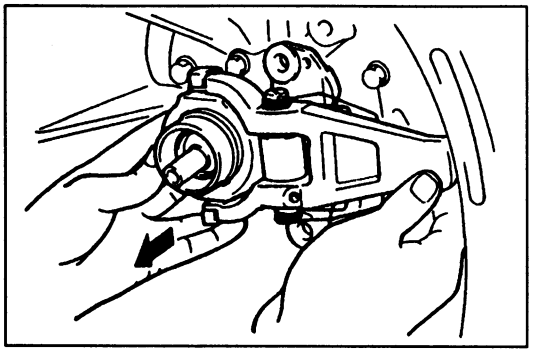
Note

- The clutch release cylinder can be removed from the trans 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**.



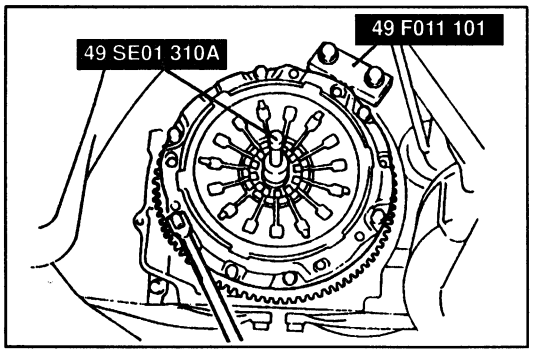
1. Clutch release cylinder
2. Transmission
   Service ..... section J
3. Clutch release fork assembly
   Removal Note ..... below
   Inspection .... page H-21
   Overhaul ..... page H-22
4. Clutch release collar
   Removal Note ..... below
   Inspection .... page H-23
5. Clutch cover
   Removal Note
   ..... page H-18
   Inspection .... page H-20
   Installation Note
   ..... page H-20
6. Wedge collar
   Removal Note
   ..... page H-18
   Installation Note
   ..... page H-19
7. Wire ring
8. Clutch disc
   Removal Note
   ..... page H-18
   Inspection .... page H-21
   Installation Note
   ..... page H-20
9. Oil seal
   Removal Note
   ..... page H-18
   Installation Note
   ..... page H-19
10. Pilot bearing
    Removal Note
    ..... page H-18
    Inspection .... page H-23
    Installation Note
    ..... page H-19
11. Flywheel
    Removal Note
    ..... page H-18
    Inspection .... page H-23
    Installation Note
    ..... page H-19



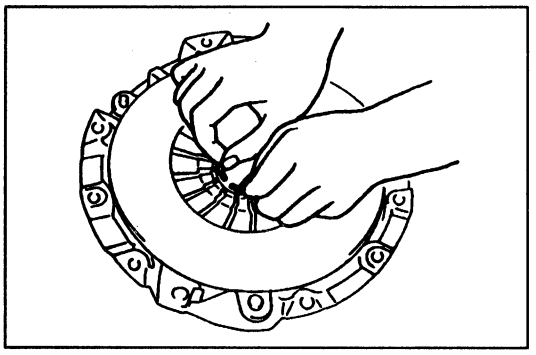
Removal Note

Clutch release fork assembly and clutch release collar

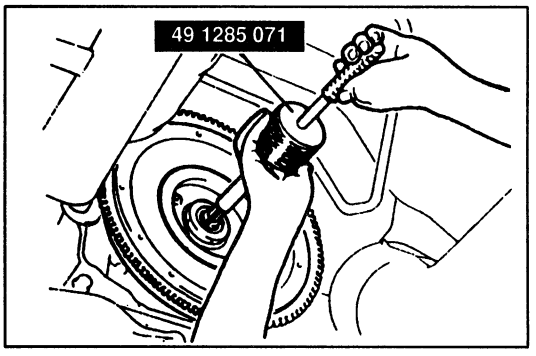
1. Remove the release fork assembly bolts.
2. Remove the release fork assembly and release collar together as shown in the figure.



Clutch cover and clutch disc
1. Install the **SSTs**.
2. Loosen each bolt one turn at a time in a crisscross pattern until spring tension is released.
3. Remove the clutch cover and disc.



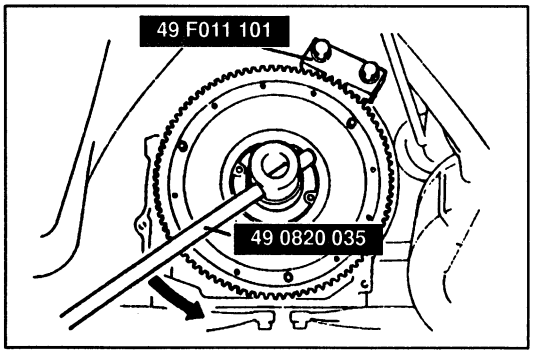
Wedge collar
1. Remove the wire ring from the wedge collar.
2. Remove the wedge collar from the clutch cover.



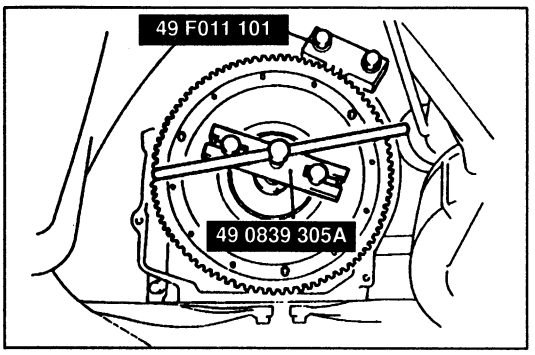
Oil seal and pilot bearing

Note
- The pilot bearing and oil seal do not need to be removed unless you are replacing them.

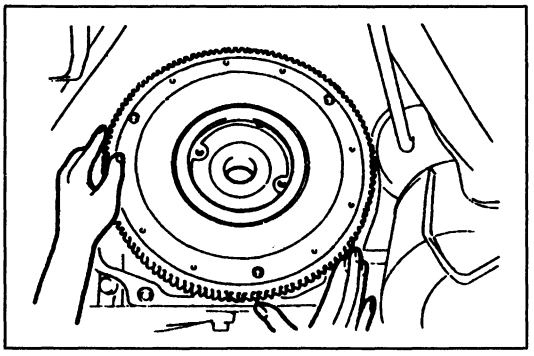
Remove the pilot bearing together with the oil seal by using the **SST**.



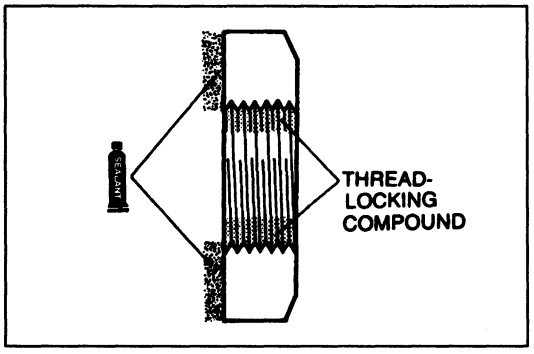
Flywheel
1. Hold the flywheel by using the **SST** or equivalent.
2. Using the **SST** (box wrench), loosen the looknut to he end of the eccentric shaft.



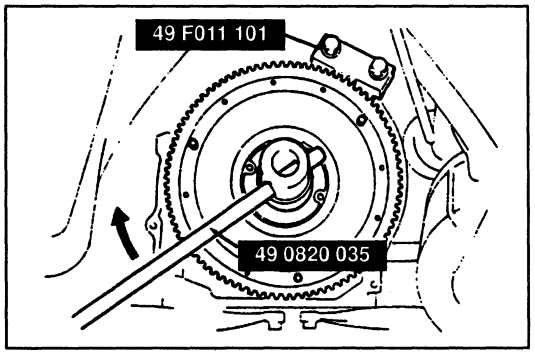
3. Loosen the flywheel from the eccentric shaft by using the **SST** (pulles).
4. Remove the locknut and Flywheel.
5. Remove the key from the eccentric shaft.
6. Inspect for oil leakage past the crankshaft rear oil seal. If there is any such leakage or if the oil seal is damaged, refer to section C and replace the crankshaft rear oil seal.



Installation Note
Flywheel
1. Set the key in the eccentric shaft.
2. Align the groove with the eccentric shaft key and slide the flywheel into place.

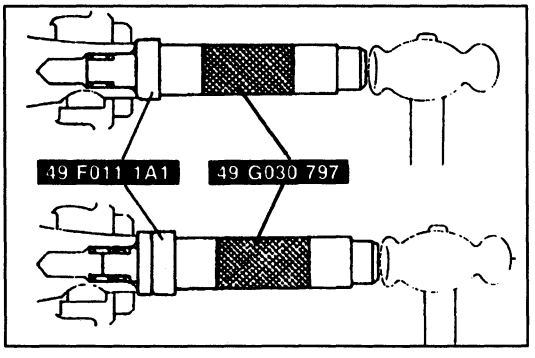


3. Apply a small amount of sealant and thread-locking compound to the flywheel locknut as shown.



4. Install the **SST** to the flywheel.
5. Tighten the locknut by using the **SST** (box wrench).

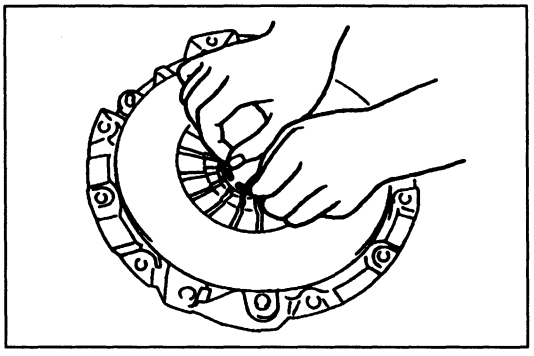
Tightening torque:
393–490 N·m{40.0–50.0 kgf·m,290–361 ft·lbf}



Pilot bearing and oil seal
1. Install the new bearing by using the **SST**.

Bearing outer diameter: 20 mm {0.79 in}
Insertion depth: 11.5–12.3 mm {0.453–0.482 in}

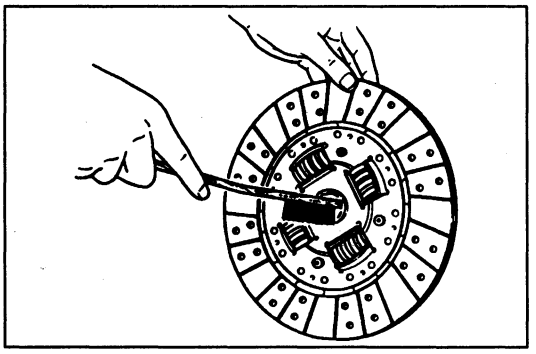
2. Install the new oil seal by using the **SST**.



Wedge collar

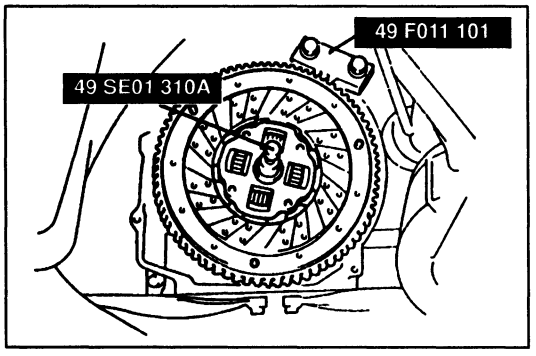
Caution
- **If the wire ring or wedge collar is bent, it can separate from the release collar, disconnecting the clutch. When installing the wire ring and wedge collar, fit them onto the clutch cover without bending them.**

1. Install a new wedge collar to the clutch cover.
2. Apply a small amount of grease to a new wire ring and install into exact position.

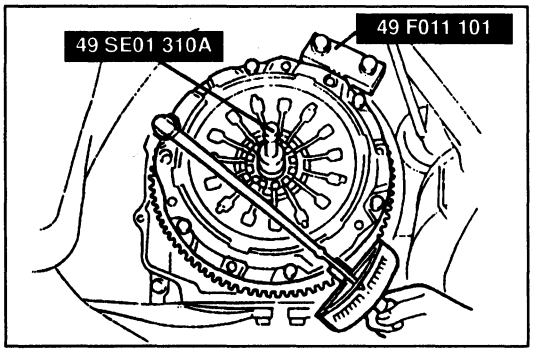


Clutch disc

1. Clean the clutch disc splines and main drive gear splines. Apply molybdenum sulfide grease to the splines.



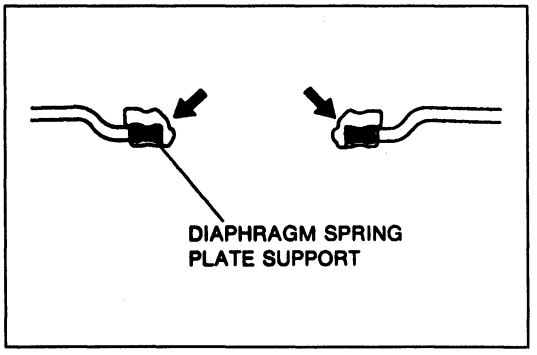
2. Hold the flywheel by using the **SST** or equivalent.
3. Hold the clutch disc in position by using the **SSTs**.



Clutch cover

1. Align the dowel holes with the flywheel dowels and set the clutch cover in place, being careful not to dent or scratch the wedge collar and wire ring.
2. Tighten the bolts evenly and gradually in a crisscross pattern, while securing the flywheel by using the **SST**.

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

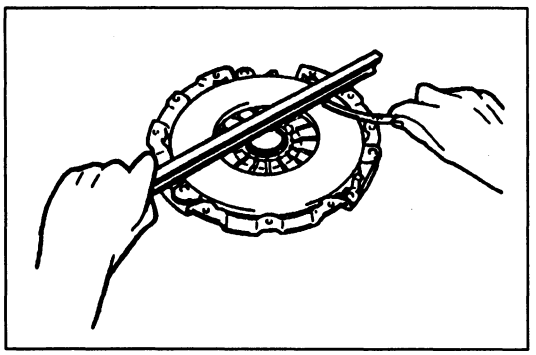


CLUTCH COVER

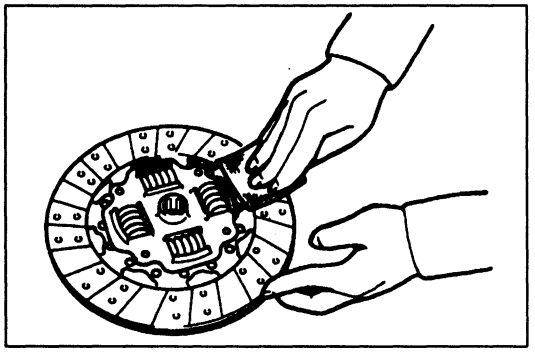
INSPECTION

1. Inspect for wear or damage to the wire ring contact surface of the diaphragm spring plate.
2. Inspect for loosening of the diaphragm spring plate support.
3. If the diaphragm spring plate is loose or damaged, replace the clutch coves.
4. Measure the flatness of the pressure plate/clutch disc contact surface in a crisscross pattern with a straightedge and a feeler gauge.

Maximum: 0.20 mm {0.008 in}



5. Check for discoloration of the pressure plate/clutch disc contact surface.
6. Remove minor discoloration with emery paper. Replace if discoloration is major.

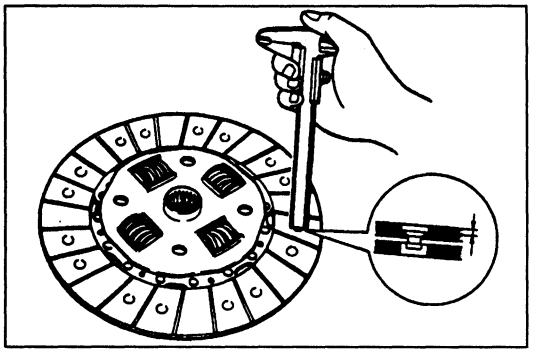


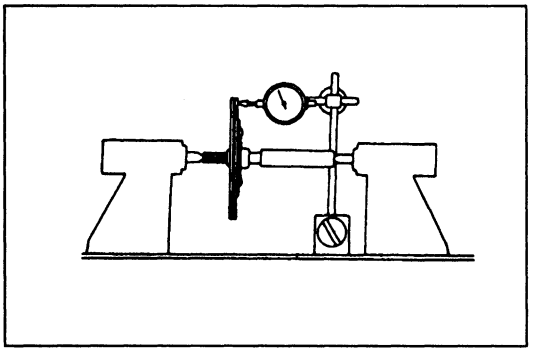
CLUTCH DISC

INSPECTION

1. Inspect the lining surface for burning or oil contamination. Remove minor scratches or discoloration with sandpaper.
2. Inspect for loose facing rivets and torsion springs. Replace the clutch disc if any are loose.
3. Measure the thickness of the lining at a rivet head on both sides with vernier calipers. Replace if thickness is less than minimum.

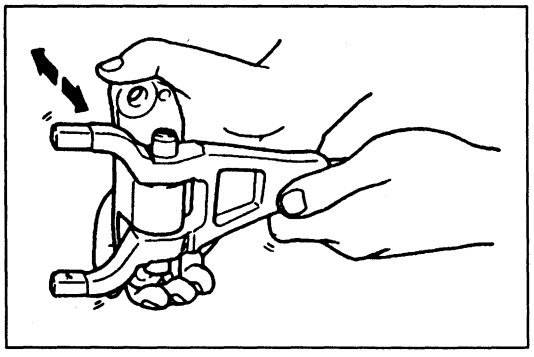
Thickness: 0.3 mm {0.012 in} min.





4. Measure the clutch disc runout with a dial indicator. Replace the clutch disc if runout is excessive.

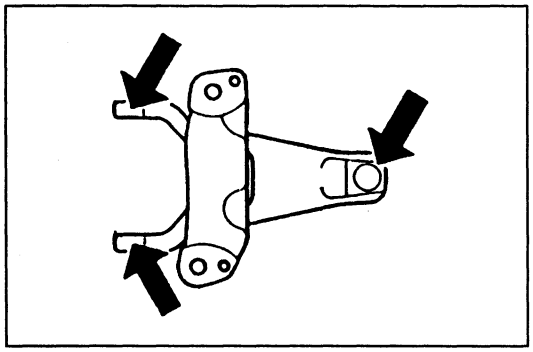
Runout: 0.6 mm {0.024 in} max.



CLUTCH RELEASE FORK ASSEMBLY

INSPECTION

1. Remove the return spring.
2. Swing the release fork back and forth, and make sure it moves smoothly.

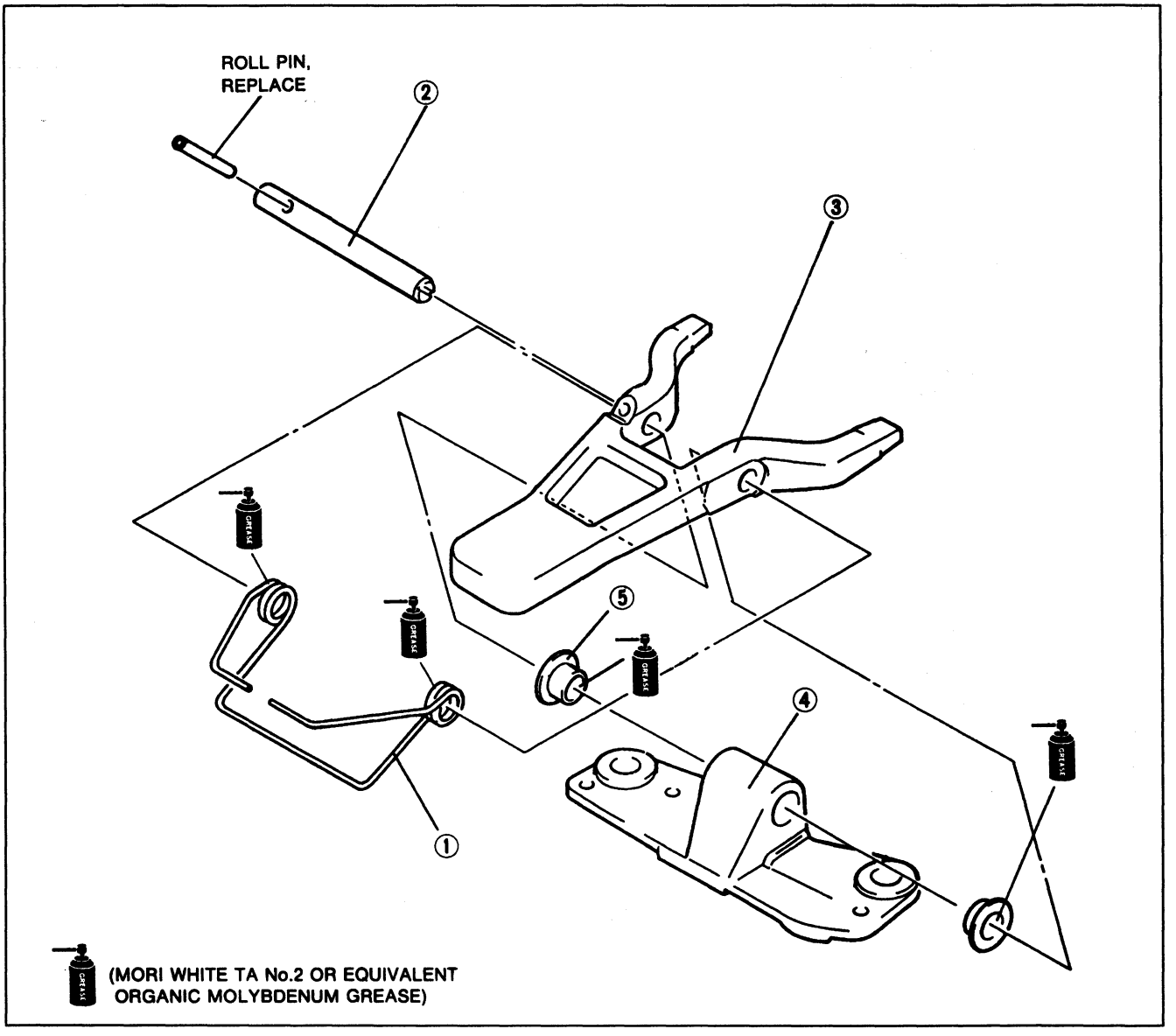


3. Inspect for wear and damage to the push rod contact surface.
4. Inspect for wear and damage to the release collar contact surfaces.
5. Replace parts as necessary.

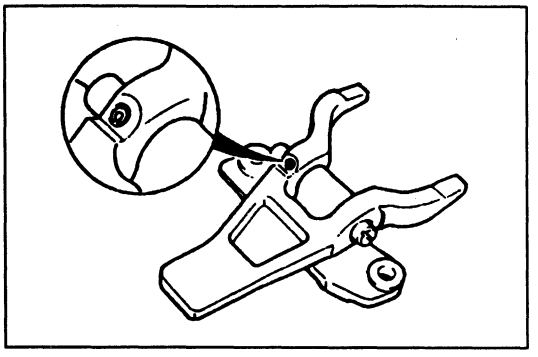
CLUTCH RELEASE FORK ASSEMBLY

OVERHAUL

1. Disassemble in the order shown.
2. Inspect all parts and replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.

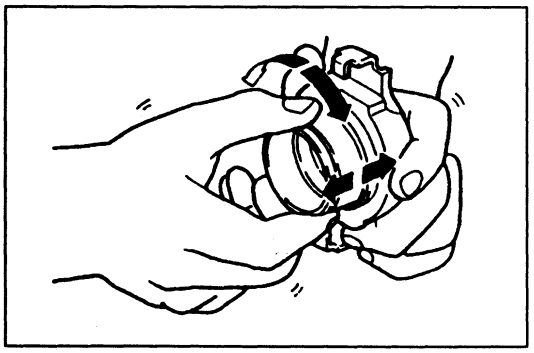


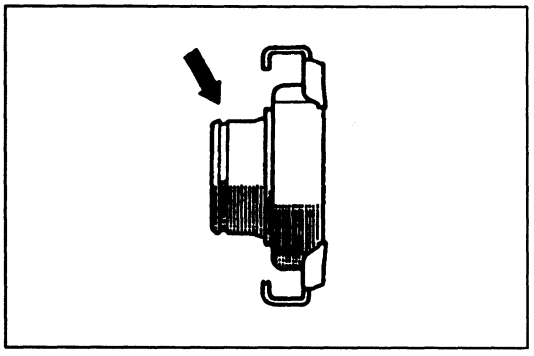
1. Return spring
   Inspect for damage and bending
2. Fork shaft
   Assembly Note . . . . . below
3. Clutch release fork
   Inspect for wear and damage
4. Release fork support
5. Bushing
   Inspect bushing bore for wear and damage



Assembly Note
Fork shaft

1. Install the roll pin with the split facing as shown.
2. Make sure the roll pin is installed flush with the release fork surface.



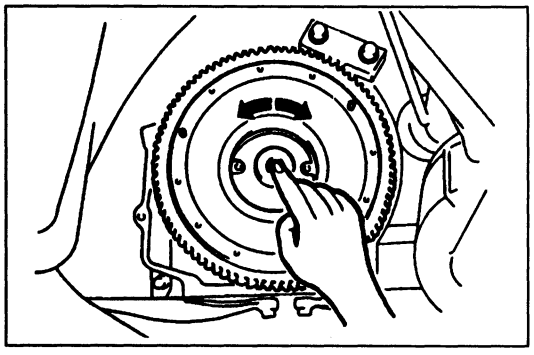


CLUTCH RELEASE COLLAR

INSPECTION

Caution
- **Cleaning the clutch release collar with cleaning fluids or a steam cleaner can wash the grease out of the sealed bearing.**

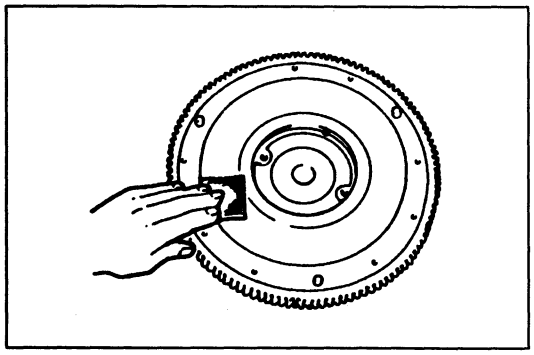
1. Turn the collar while applying force in the axial direction. If the collar sticks or has excessive resistance, replace it.
2. Inspect for wear and damage to the release collar groove. Replace if worn or damaged.

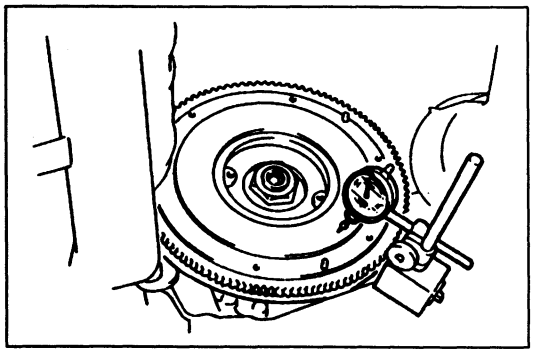


PILOT BEARING

INSPECTION

Without removing the pilot bearing from the flywheel, inspect the pilot bearing for wear and damage, and check the rotating condition. Replace the pilot bearing if worn or damaged, or if roating condition is poor.





FLYWHEEL

INSPECTION

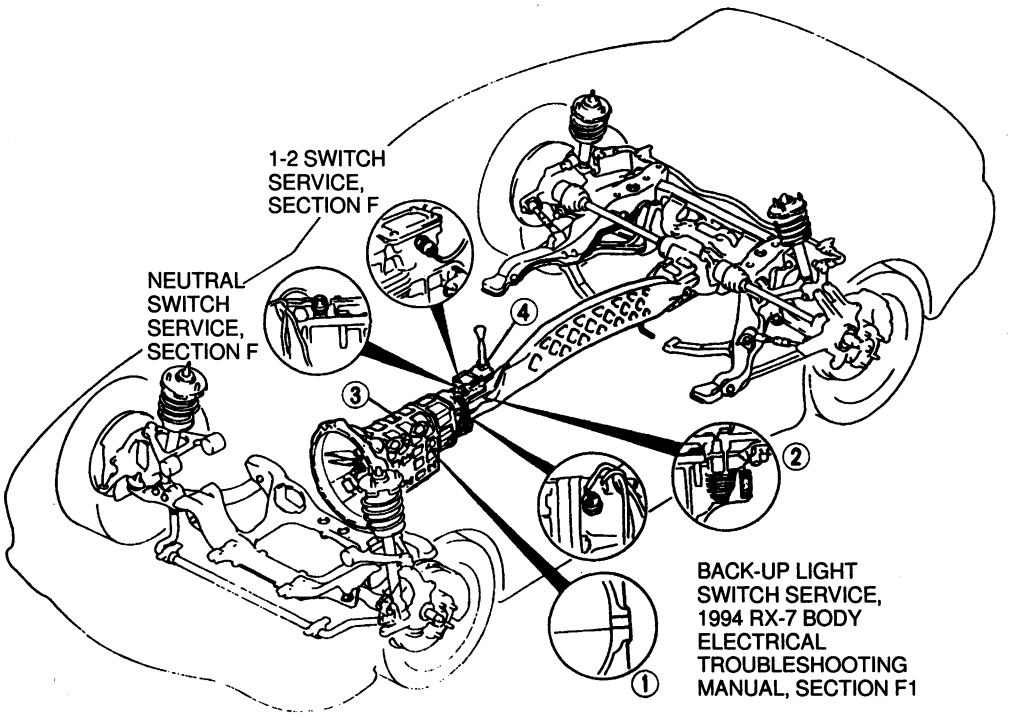
1. Inspect the contact surface for scoring, cracks, and burning.
2. Remove minor scoring and burning with emery paper. Replace if scoring or burning is major, or if flywheel is cracked.
3. Inspect the ring gear teeth for wear and damage.
4. Measure the flywheel runout with a dial indicator. Replace the flywheel if runout is excessive.

Runout: 0.2 mm {0.008 in} max.

Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

MANUAL TRANSMISSION (R15M-D)

INDEX

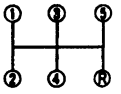


OIL SPECIFICATION

GRADE	: API SERVICE GL-4 OR GL-5
ALL SEASON	: SAE 75W-90
ABOVE 10°C {50°F}	: SAE 80W-90
CAPACITY	: 2.5 L {2.6 US qt, 2.2 Imp qt}

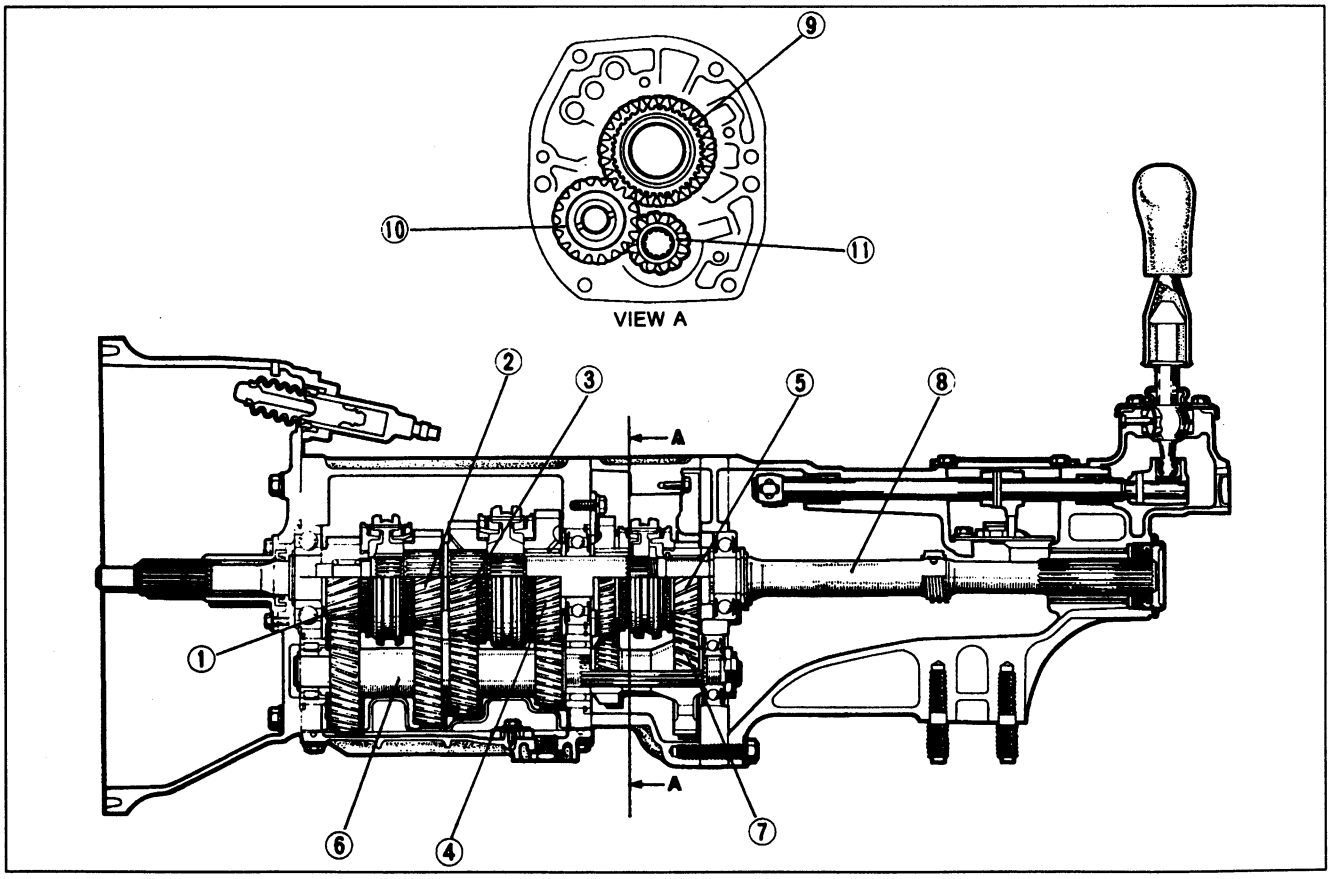
OUTLINE

SPECIFICATIONS

Item \ Model			R15M-D
Synchronization mechanism			Forward: Synchromesh Reverse: Synchromesh
Shift type			5-speed, floor shift
Shift pattern			
Gear ratio	1st		3.483
	2nd		2.015
	3rd		1.391
	4th		1.000
	5th		0.719
	Reverse		3.288
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}	2.5 {2.6, 2.2}

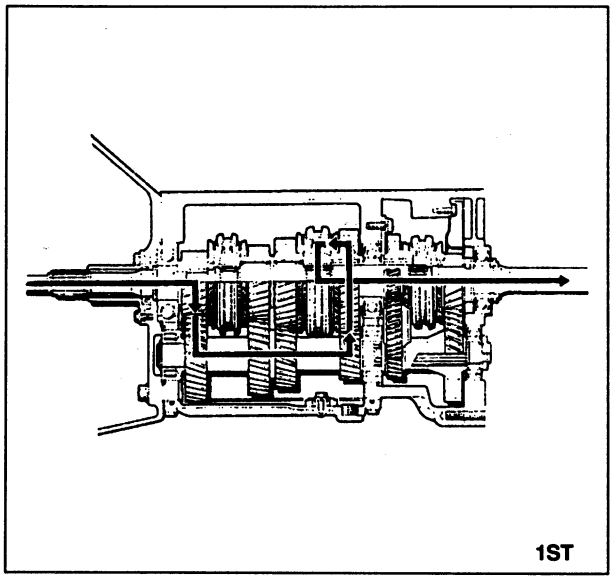
J

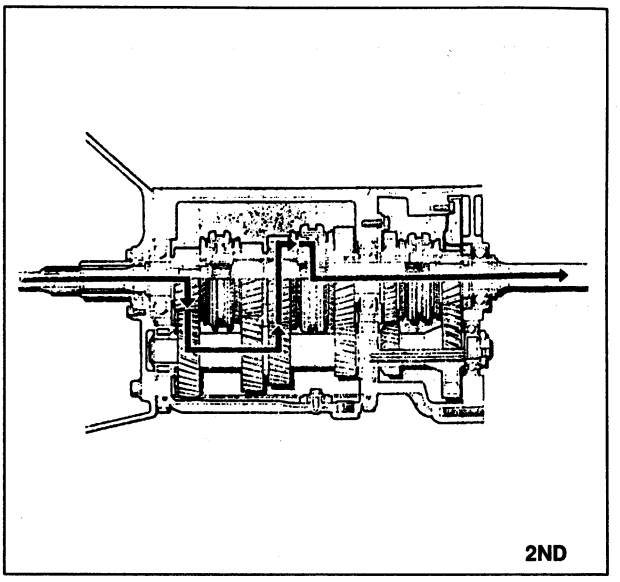
STRUCTURAL VIEW

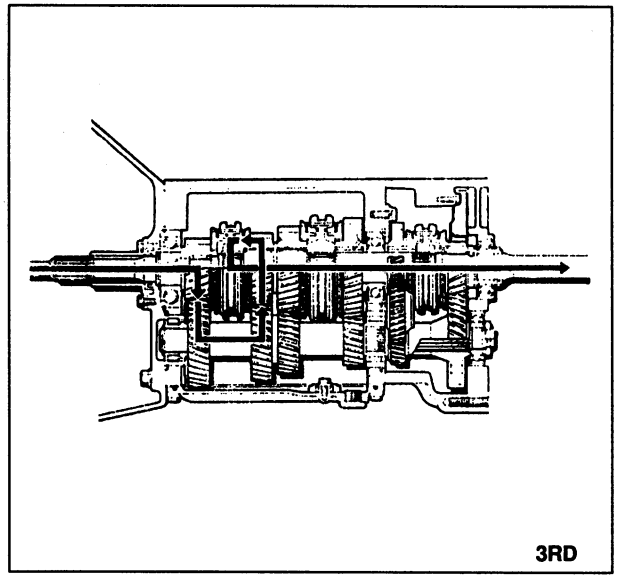


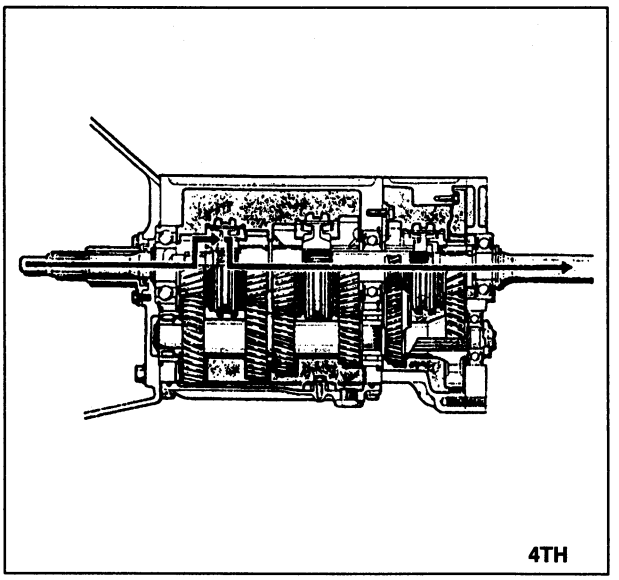
1. Main drive gear (4th gear)
2. 3rd gear
3. 2nd gear
4. 1st gear
5. 5th gear
6. Countershaft
7. Counter 5th gear
8. Mainshaft
9. Reverse gear
10. Reverse idler gear
11. Counter reverse gear

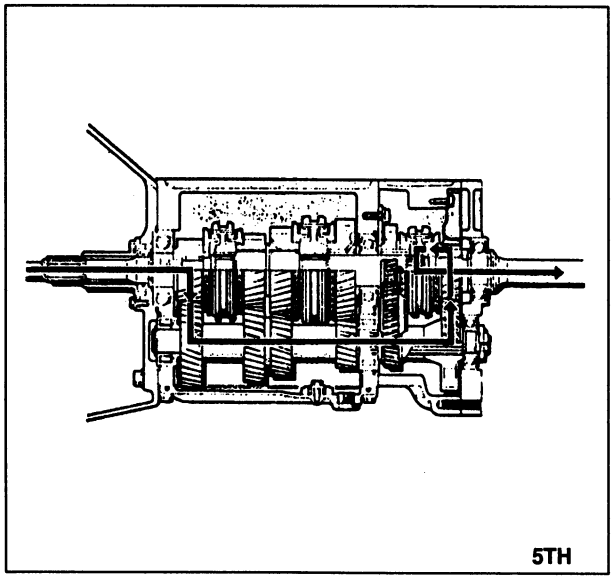
POWERFLOW

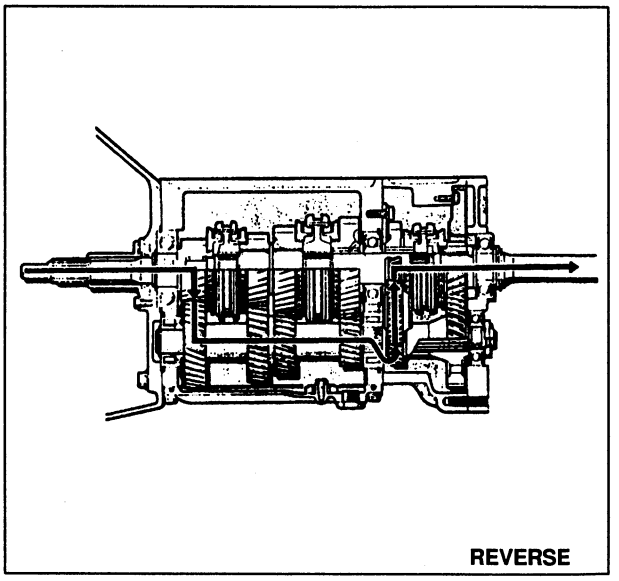

1ST


2ND


3RD

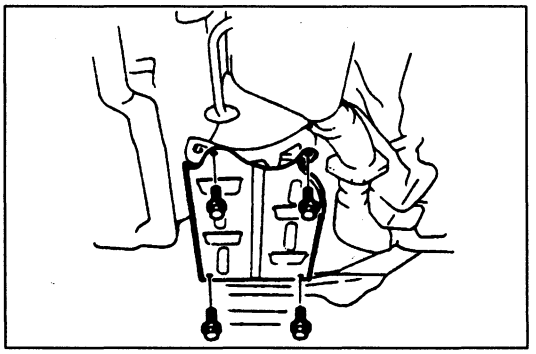

4TH


5TH


REVERSE

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Action	Page
Abnormal noise	Insufficient oil	Add oil	J-6
	Deterioration of oil quality	Replace with specified oil	J-6
	Worn bearing	Replace	—
	Worn contact surface of countershaft gear	Replace	J-24
	Worn contact surface of gears	Replace	J-16, 20, 24
	Excessive gear backlash	Replace	J-16, 20, 24
	Damaged gear teeth	Replace	J-16, 20, 24
	Object caught in gears	Repair or replace	J-16, 20, 24
Difficult to shift	Bent shift rod	Replace	J-16
	Insufficient oil	Add oil	J-6
	Deterioration of oil quality	Replace with specified oil	J-6
	Wear or play of shift fork or shift rod	Replace	J-16, 20
	Worn or damaged synchronizer ring (1st, 4th, 5th, Reverse)	Replace	J-16, 24
	Worn or damaged synchronizer assembly (2nd and 3rd)	Replace	J-24
	Worn synchronizer gear cone	Replace	J-16, 20, 24
	Poor contact of synchronizer ring and gear cone	Replace	J-16, 20, 24
	Excessive longitudinal play of gears	Replace	J-16, 20, 24
	Worn bearing	Replace	—
	Improper disengagement of clutch	Refer to section H	—
	Weak synchronizer key spring	Replace	J-16, 24
Jumps out of gear	Weak detent ball spring	Replace	J-16
	Worn shift fork	Replace	J-16, 20
	Worn clutch hub	Replace	J-16, 24
	Worn clutch hub sleeve	Replace	J-16, 24
	Worn gears	Replace	J-16, 20, 24
	Excessive gear backlash	Replace	J-16, 20, 24
	Worn bearing	Replace	—
	Loose engine mounts or transmission mounts	Tighten	—

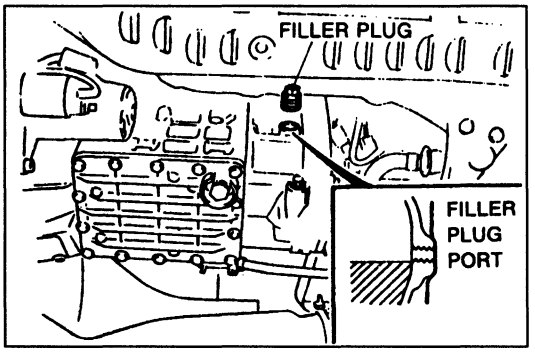


TRANSMISSION OIL

INSPECTION

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Remove the transmission cover.
3. Remove the filler plug.
4. Verify that the oil is up to the bottom of the filler plug hole.
5. If the oil level is low, add the specified oil through the filler plug port.
6. Install a new filler plug.

Tightening torque:
25–39 N·m{2.5–4.0 kgf·m,19–28 ft·lbf}

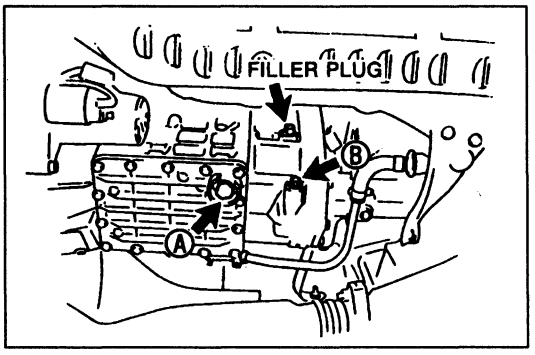


7. Install the transmission cover.

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

REPLACEMENT

1. Remove the transmission cover.
2. Remove plug A (with washer) and B, and drain the oil into a suitable container.
3. Wipe both plugs clean.
4. Apply sealant to the B plug threads.
5. Install plug A (with new washer) and B.

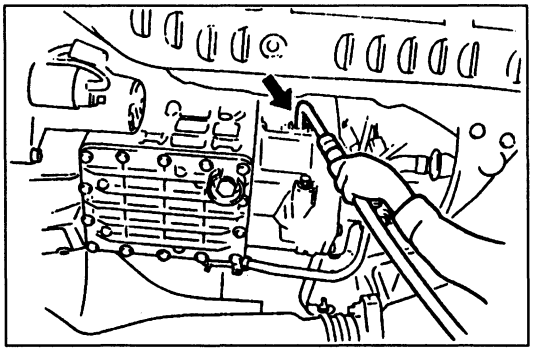


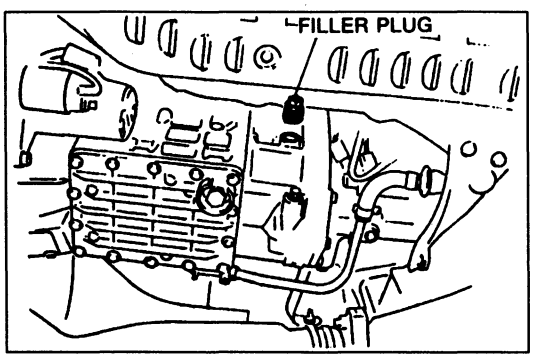
Tightening torque:
A: 40–58 N·m{4.0–6.0 kgf·m,29–43 ft·lbf}
B: 21–31 N·m{2.1–3.2 kgf·m,16–23 ft·lbf}

6. Remove the filler plug and add the specified oil through the filler plug port until the level rises to the bottom of the port.

Specified oil:
Grade: API service GL-4 or GL-5
All-season: SAE 75W-90
Above 10°C {50°F}: SAE 80W-90

Capacity: 2.5 L {2.6 US qts, 2.2 Imp qts}





7. Install a new filler plug.

Tightening torque:
25–39 N·m{2.5–4.0 kgf·m,19–28 ft·lbf}

8. Install the transmission cover.

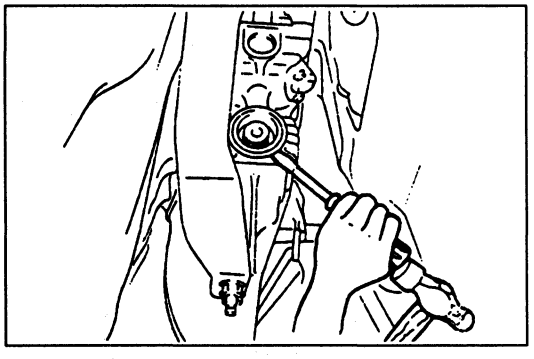
Tightening torque:
7.9–10.7 N·m{80–110 kgf·cm,70–95.4 in·lbf}

OIL SEAL (EXTENSION HOUSING)

PREPARATION
SST

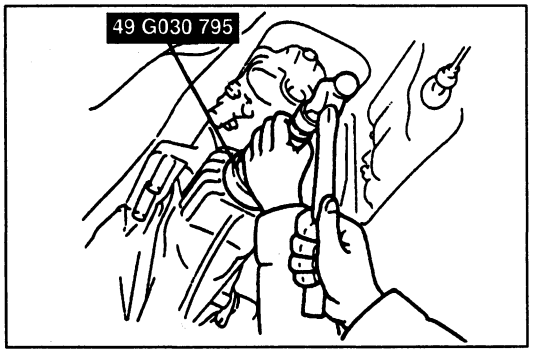
49 G030 795 Installer, oil seal 	For installation of oil seal	49 G030 796 Body (Part of 49 G030 795) 	For installation of oil seal
49 G030 797 Handle (Part of 49 G030 795) 	For installation of oil seal		

J



ON-VEHICLE REPLACEMENT

1. Remove the transmission cover.
2. Remove the propeller shaft. (Refer to section L.)
3. Remove the oil seal.

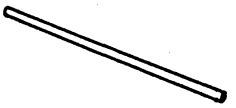
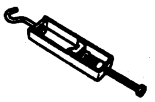
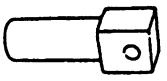
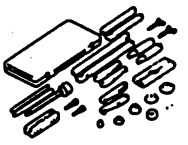
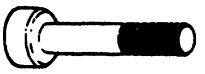
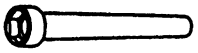
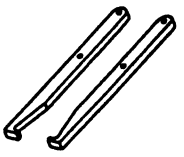
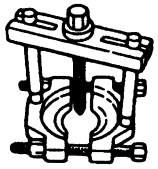
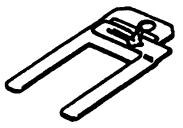


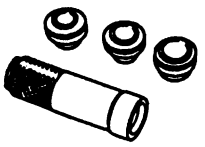
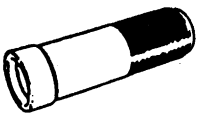
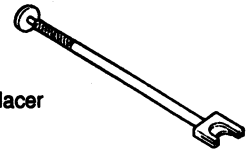
4. Apply the specified oil to the new oil seal.
5. Install the oil seal by using the **SST**.
6. Install the propeller shaft. (Refer to section L.)
7. Inspect the oil level. (Refer to page J-6)
8. Install the transmission cover.

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

TRANSMISSION

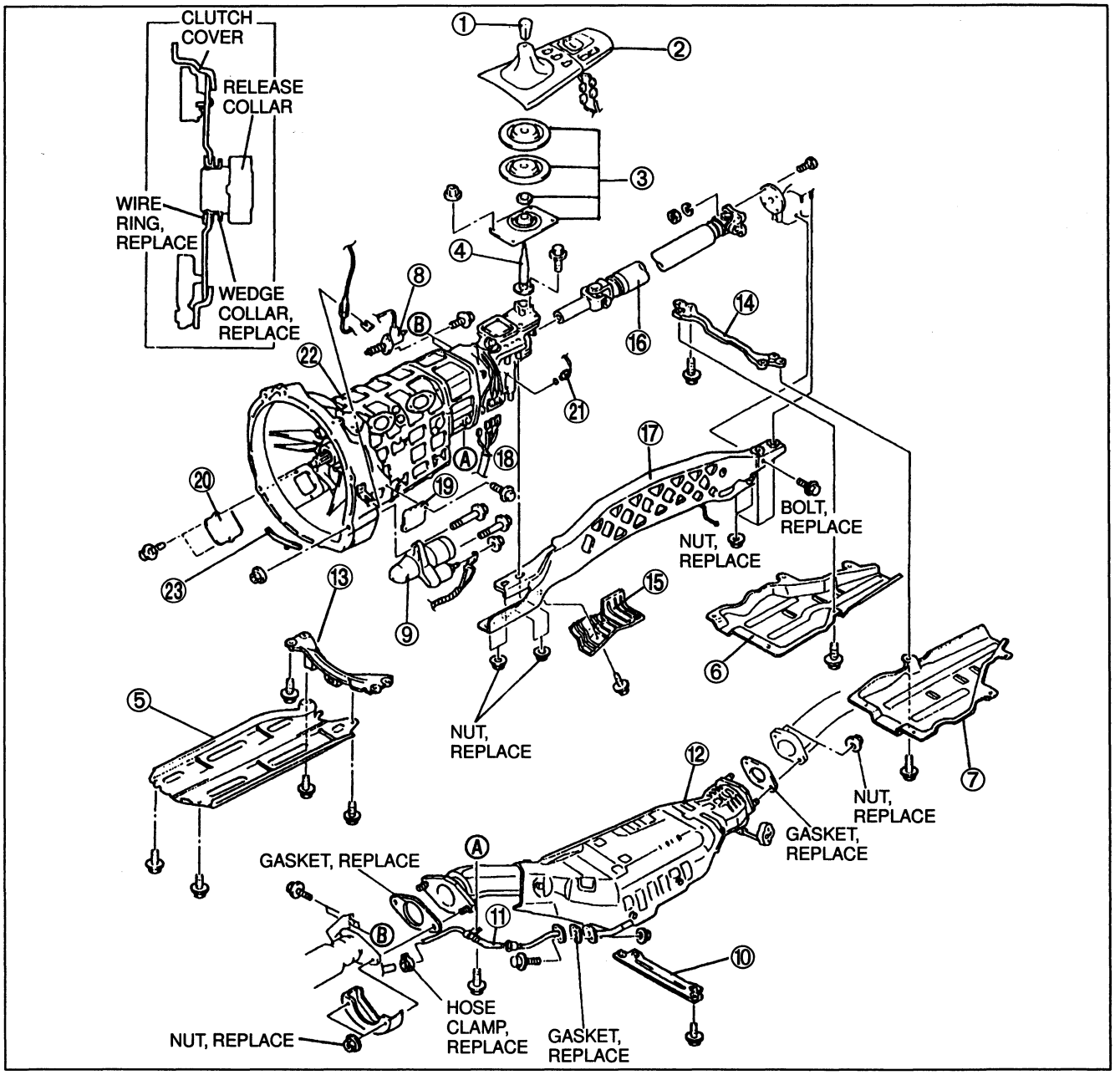
PREPARATION
SST

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 S120 440 Holder, mainshaft 	For holding mainshaft	49 0839 425C Puller set, bearing 	For removal of bearing
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	49 0500 330 Installer. transmission bearing 	For installation of bearing
49 0636 145 Puller, fan pulley boss 	For removal of clutch hub assembly	49 0862 350 Guide, shift fork	For installation of interlock pin
49 1243 465A Wrench, mainshaft locknut 	For removal of locknut	49 H017 101 Hook 	For removal of bearing
49 0710 520 Puller, bearing 	For removal of bearing	49 F017 101 Holder, synchronizer ring 	For installation of bearing

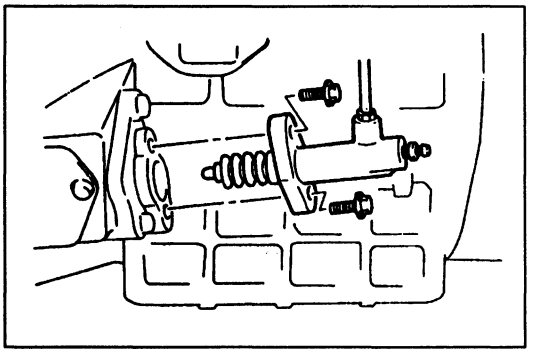
49 F401 330B Installer set, bearing 	For installation of bearing	49 F401 331 Body (Part of 49 F401 330B) 	For Installation of clutch hub assembly
49 F401 335A Attachment A (Part of 49 F401 330B) 	For installation of bearing race	49 0813 235 Replacer, main bearing 	For installation of main bearing
49 S017 401 Retaining ring replacer 	For removal/installation of retaining ring		

REMOVAL

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal Note**.



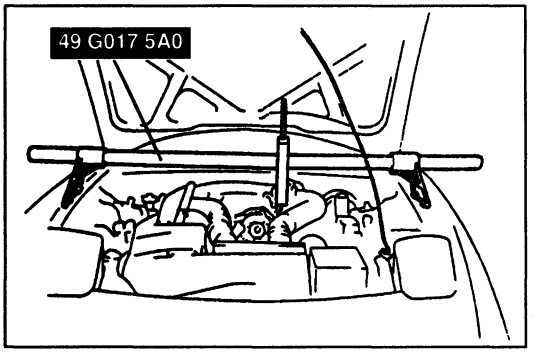
1. Shift lever knob
2. Console panel assembly
3. Insulator assembly
4. Shift lever assembly
5. Transmission cover
6. Right undercover
7. Left undercover
8. Clutch release cylinder
   Removal Note
   ..... page J-11
9. Starter
10. Tunnel reinforcement (center)
11. Secondary air injection pipe
12. Catalyic converter assembly
13. Tunnel reinforcement (front)
14. Tunnel reinforcement (rear)
15. Cover
16. Propeller shaft
    Removal ..... section L
17. Power Plant Frame (PPF)
    Removal Note
    ..... page J-11
18. Connectors
19. Service hole A cover
20. Service hole B cover
21. Back-up light switch
22. Transmission
    Removal Note
    ..... page J-11
23. Dust cover



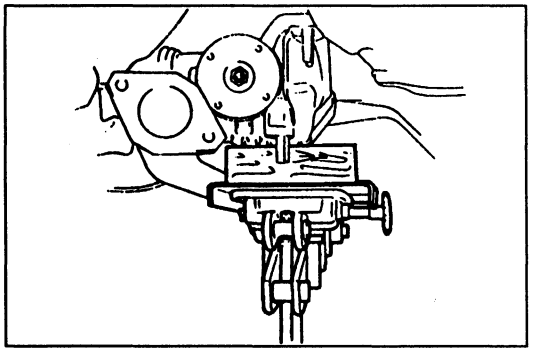
Removal Note
Clutch release cylinder

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

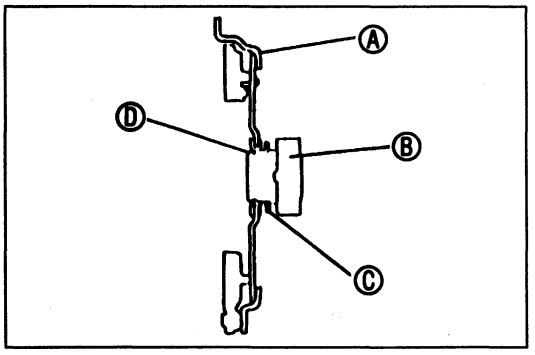
1. Loosen the clutch release cylinder installation bolts.
2. Loosen the clutch pipe bracket bolt.
3. Secure the clutch release cylinder/clutch pipe assembly in a place where it will not interfere with transmission removal.



Power plant frame (PPF)
1. Hold the engine by using the **SST** (engine supports).

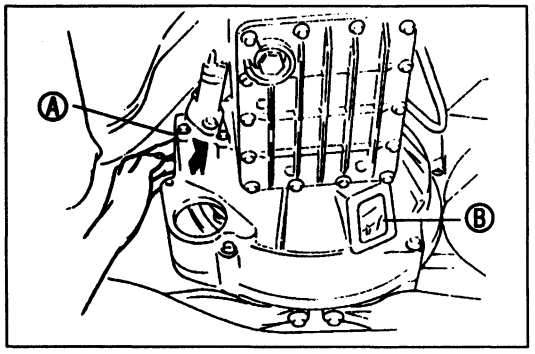


2. Hold the differential with a transmission jack.
3. Remove the PPF.
4. Remove the back-up light switch from the transmission.

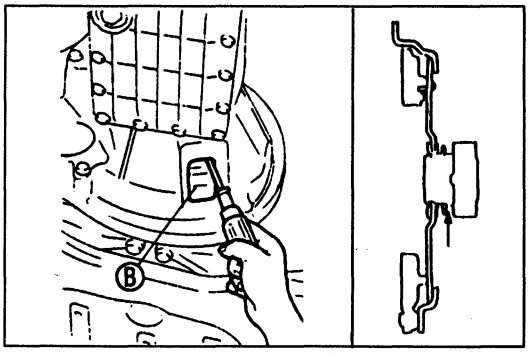


Transmission
1. The clutch cover and clutch release collar are joined as shown in the figure.

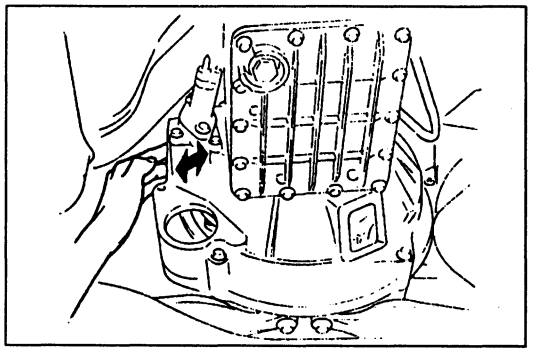
   A: Clutch cover
   B: Clutch release collar
   C: Wedge collar
   D: Wire ring



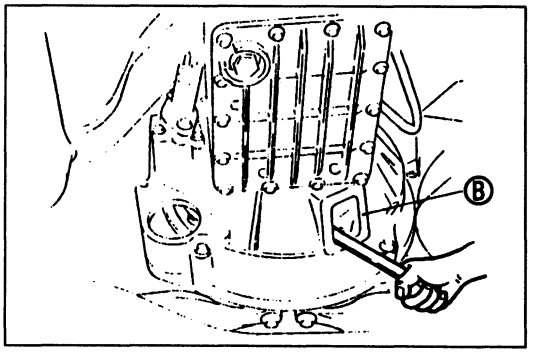
2. Remove the covers from service holes A and B.
3. Through service hole A, swing the release fork so that the release collar is pushed and held toward the clutch cover (engine side).



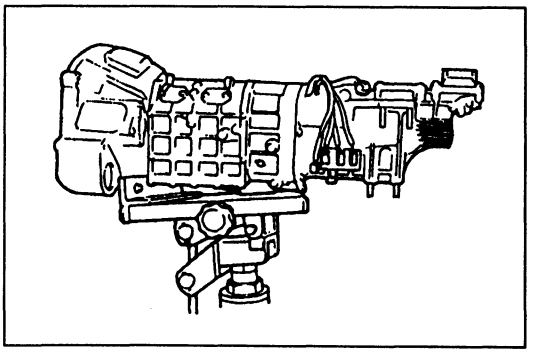
4. Insert a screwdriver through service hole B, into the space between the wedge collar and the release collar. Pry and separate the release collar from the clutch cover.



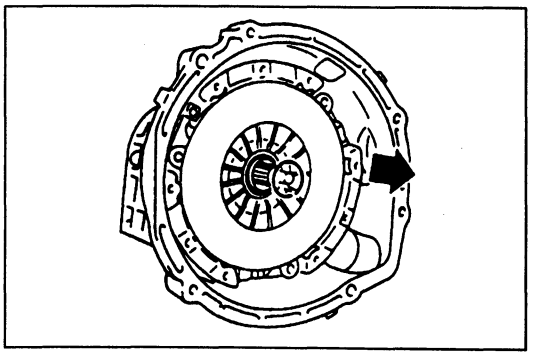
5. Swing the release fork back and forth to make sure that the release collar and clutch cover are separated.



6. If the above procedure does not work, then separate the clutch cover from the flywheel, following the procedure below.
   (1) Through service hole B, gradually loosen the 6 clutch cover installation bolts in a crisscross pattern.
   (2) Remove the clutch cover installation bolts, and separate the clutch cover from the flywheel.



7. Support the transmission with a transmission jack.
8. Loosen the transmission installation bolts.
9. Remove the transmission.



10. Remove the clutch cover.
    (1) Remove the clutch cover from the flywheel. (Refer to section H.)
    (2) If the transmission was removed by following step 6, remove the wire ring from the release collar and separate the release collar from the clutch cover.

DISASSEMBLY

Precaution

1. Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvents 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.**

Caution

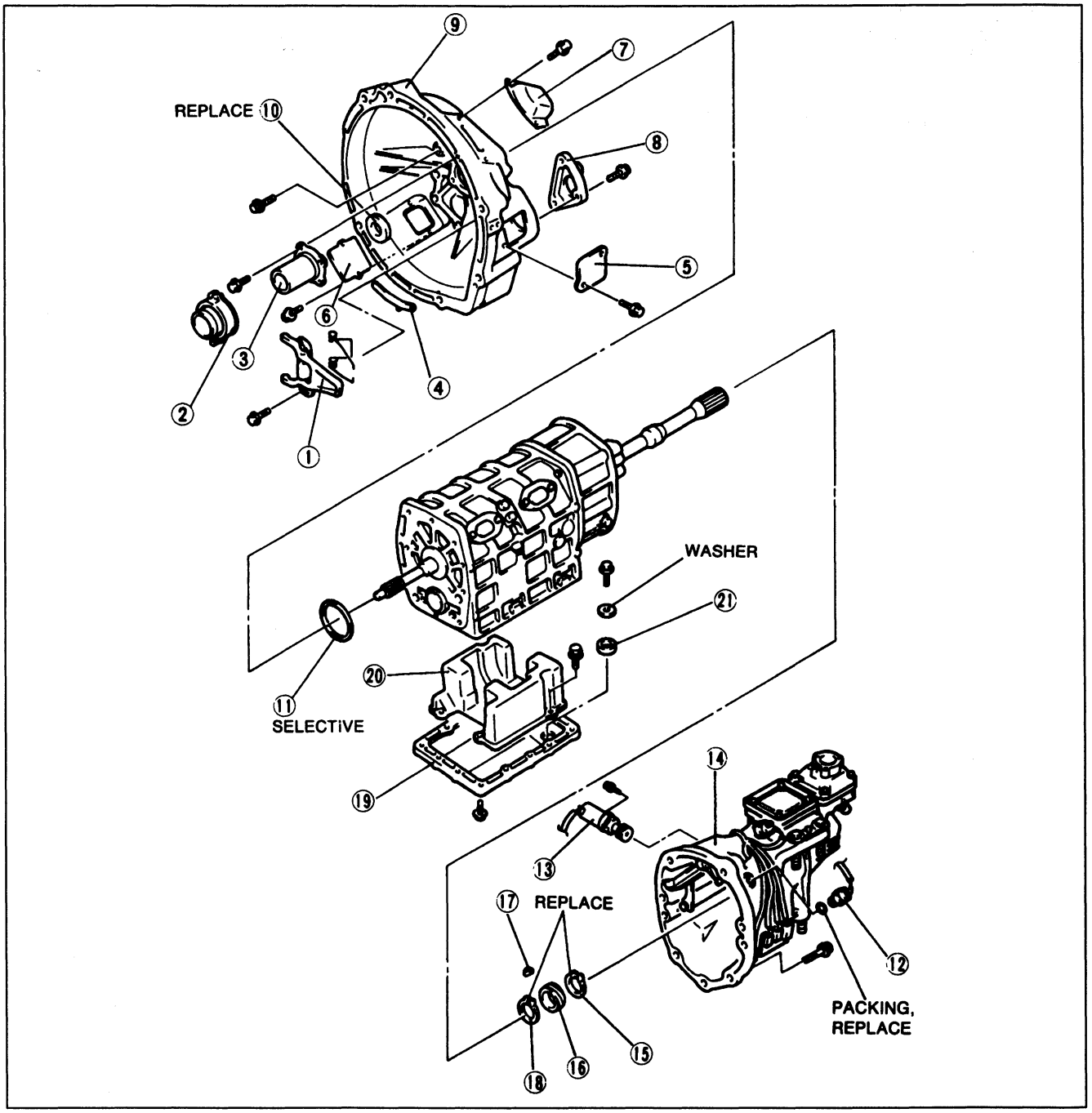
- **Cleaning sealed bearings with cleaning fluids or a steam cleaner can wash the grease out of the bearing.**

2. Clean the removed parts (except sealed bearings) with cleaning solvent, and dry with compressed air. Clean out all holes and passages with compressed air, and check that there are no obstructions.
3. Use a plastic hammer when disassembling the transmission case and other light alloy metal parts.

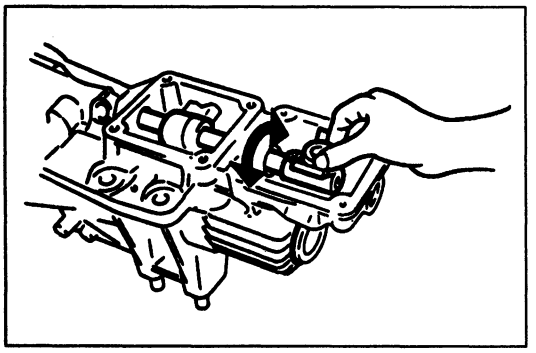
Clutch Housing and Extension Housing Components

Note
- The front and rear 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. Release fork assembly
2. Release collar
3. Front cover
4. Dust cover
5. Service hole A cover
6. Service hole B cover
7. Vent cover
8. Release cylinder support
9. Clutch housing
10. Oil seal (clutch housing)
11. Adjustment shim
12. Back-up light switch
13. Speedometer sensor (Speedometer driven gear)
14. Extension housing
    Disassembly Note
    ..... page J-15
15. Snap ring
16. Speedometer drive gear
17. Key
18. Snap ring
19. Undercover
20. Oil baffle
21. Magnet



Disassembly note
Extension Housing

1. Temporarily reinstall the shifter lever, and move the control rod end to the neutral position.
2. Remove the shift lever.
3. Remove the extension housing installation bolts.

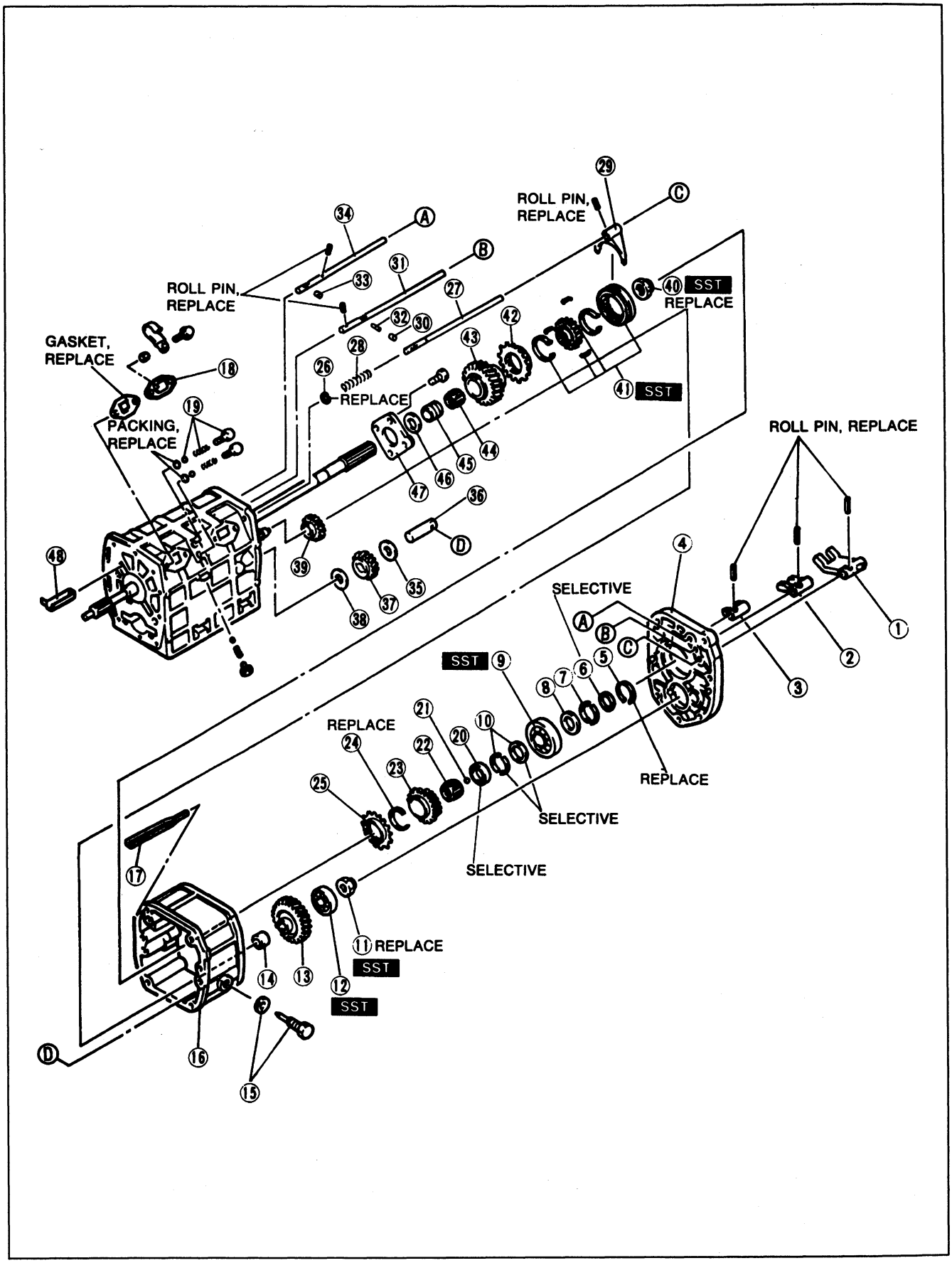
Caution

- **When removing the extension housing, be careful that the control lever is not pulled into or pushed against the shift rod gates.**

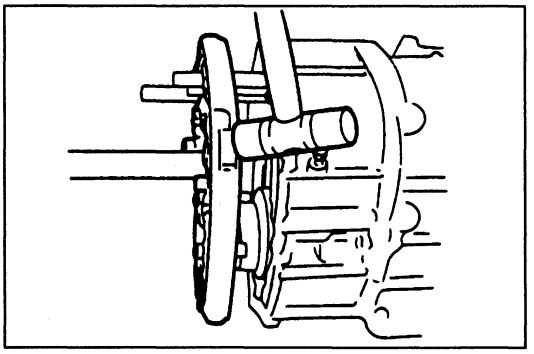
4. Lift up on and remove the extension housing from the center housing.

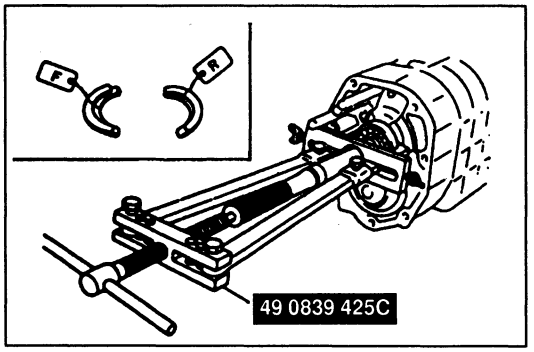
5th/Reverse Gear and Housing Components

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



1. 5th/Reverse shift rod end
   Inspection .... page J-30
2. 3rd/4th shift rod end
   Inspection .... page J-30
3. 1st/2nd shift rod end
   Inspection .... page J-30
4. Bearing housing
   Disassembly Note
   ..... below
5. Snap ring
6. Thrust washer
7. C-washers
8. Retaining ring
9. Mainshaft rear bearing
   Disassembly Note
   ..... below
   Inspect for damage
10. C-washers and retaining ring
11. Locknut
    Disassembly Note
    ..... page J-18
12. Countershaft rear bearing
    Disassembly Note
    ..... page J-18
    Inspect for damage
13. Counter 5th gear
    Inspection .... page J-29
14. Spacer
15. Set bolt and washer
16. Center housing
    Disassembly Note
    ..... page J-18
17. Oil guide
18. Blind cover
19. Cap plug, spring, and detent ball
20. Thrust lock washer
21. Steel ball
22. Bearing
    Inspect for damage
23. 5th gear
    Inspection .... page J-29
24. Retaining ring
25. 5th synchronizer ring
    Inspection .... page J-30
26. Retaining ring
27. 5th/Reverse shift rod
    Disassembly Note
    ..... page J-18
28. Spring
    Inspection .... page J-31
29. 5th/Reverse shift fork
30. Interlock pin (large)
31. 3rd/4th shift rod
    Disassembly Note
    ..... page J-19
32. Interlock pin (small)
33. Interlock pin (large)
34. 1st/2nd shift rod
    Disassembly Note
    ..... page J-19
35. Thrust washer
36. Reverse idler gear shaft
    Inspection .... page J-31
37. Reverse idler gear
    Inspection .... page J-31
38. Thrust washer
39. Counter reverse gear
    Inspection .... page J-29
40. Locknut
    Disassembly Note
    ..... page J-19
41. 5th/Reverse clutch hub assembly
    Disassembly Note
    ..... page J-19
    Inspection .... page J-30
42. Reverse synchronizer ring
    Inspection .... page J-30
43. Reverse gear
    Inspection .... page J-29
44. Bearing
    Inspect for damage
45. Bearing race
46. Thrust washer
47. Bearing cover
48. Oil guide



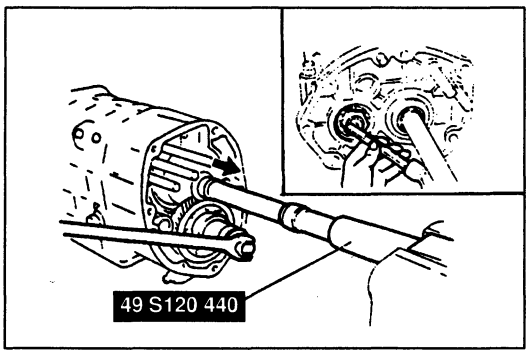


Disassembly note
Bearing housing

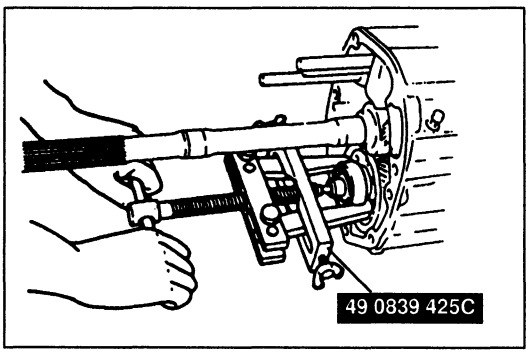
Caution
- **The bearing housing is made of aluminum, and is therefore easily dented and scratched by metal tools. When removing the bearing housing, do not use metal tools.**

Hit down and outward on the bearing housing with a plastic hammer to remove.

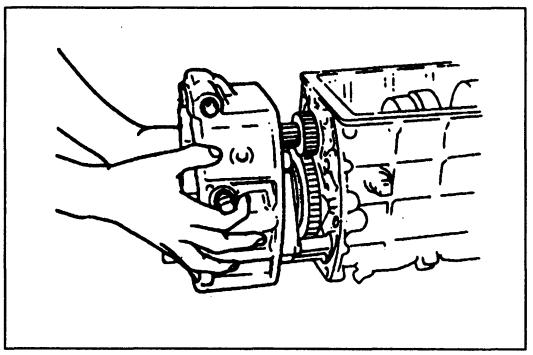
Mainshaft rear bearing
1. Remove the snap ring, washer, retaining ring, and rear C-washers. Keep the rear C-washers together for correct reassembly.
2. Remove the mainshaft rear bearing by using the **SST**.
3. Remove the retaining ring and the front C-washers. Keep the front C-washers together for correct reassembly.



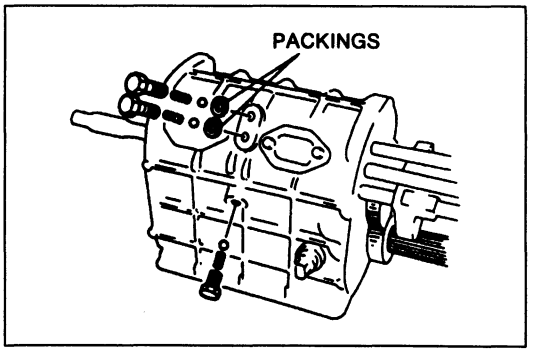
Locknut and countershaft rear bearing
1. Shift the 1st/2nd shift rod to 1St gear.
2. Uncrimp the tab of the locknut.
3. Hold the mainshaft by using the **SST** and a vise.
4. Remove the locknut.



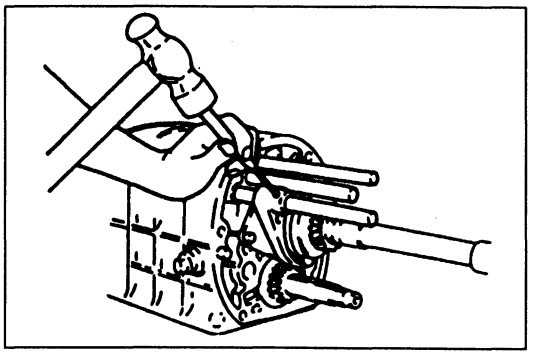
5. Remove the countershaft rear bearing by using the **SST**.



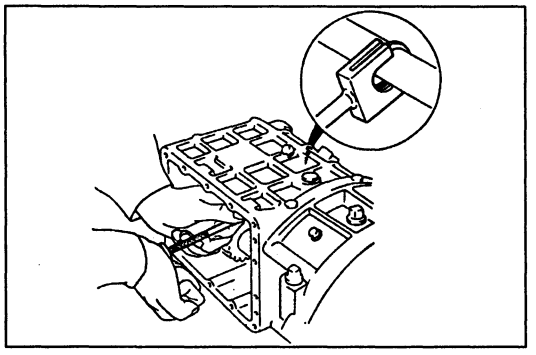
Center housing
1. Remove the set bolt and washer from the center housing.
2. Remove the center housing by tapping around its edge with a plastic hammer.



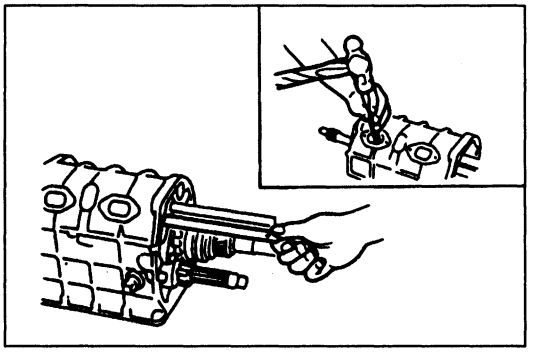
5th/Reverse shift rod
1. Remove the three cap plugs, packings, detent balls, and springs.



2. Drive the roll pin from the 5th/Reverse shift fork.

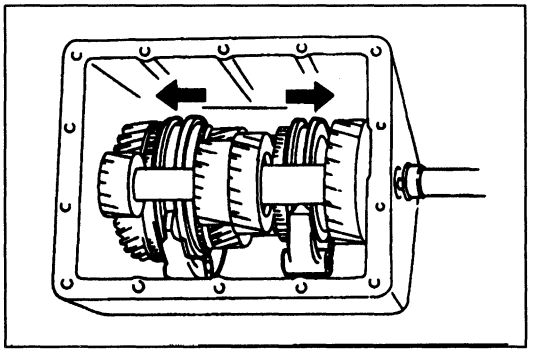


3. Remove the retaining ring from the 5th/Reverse shift rod by using the **SST**.
4. Slide the 5th/Reverse shift rod out of the transmission case, and remove the spring.



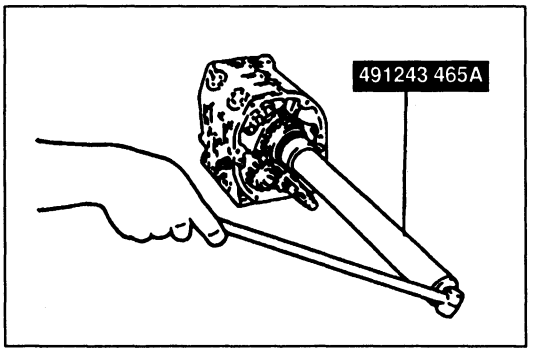
1st/2nd and 3rd/4th shift rods

1. Shift the transmission into 4th gear to gain access to the roll pin. Drive the roll pin from the 3rd/4th shift fork.
2. Slide the 3rd/4th shift rod and interlock pin (small) out from the rear of the transmission case.
3. Drive the roll pin from the 1st/2nd shift fork. Slide the 1st/2nd shift rod out from the rear of the transmission case, and remove the interlock pin (large).

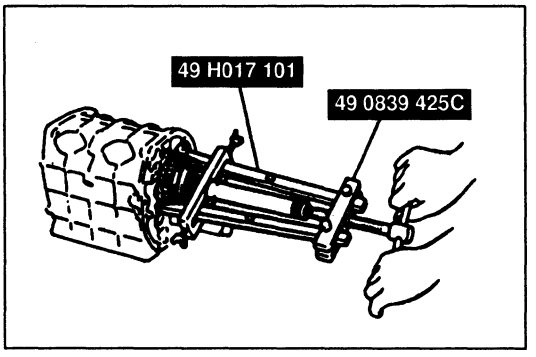


Locknut

1. Uncrimp the tab of the locknut.
2. Shift into 1st and 4th gears to lock the rotation of the mainshaft.



3. Remove the locknut by using the **SST**.

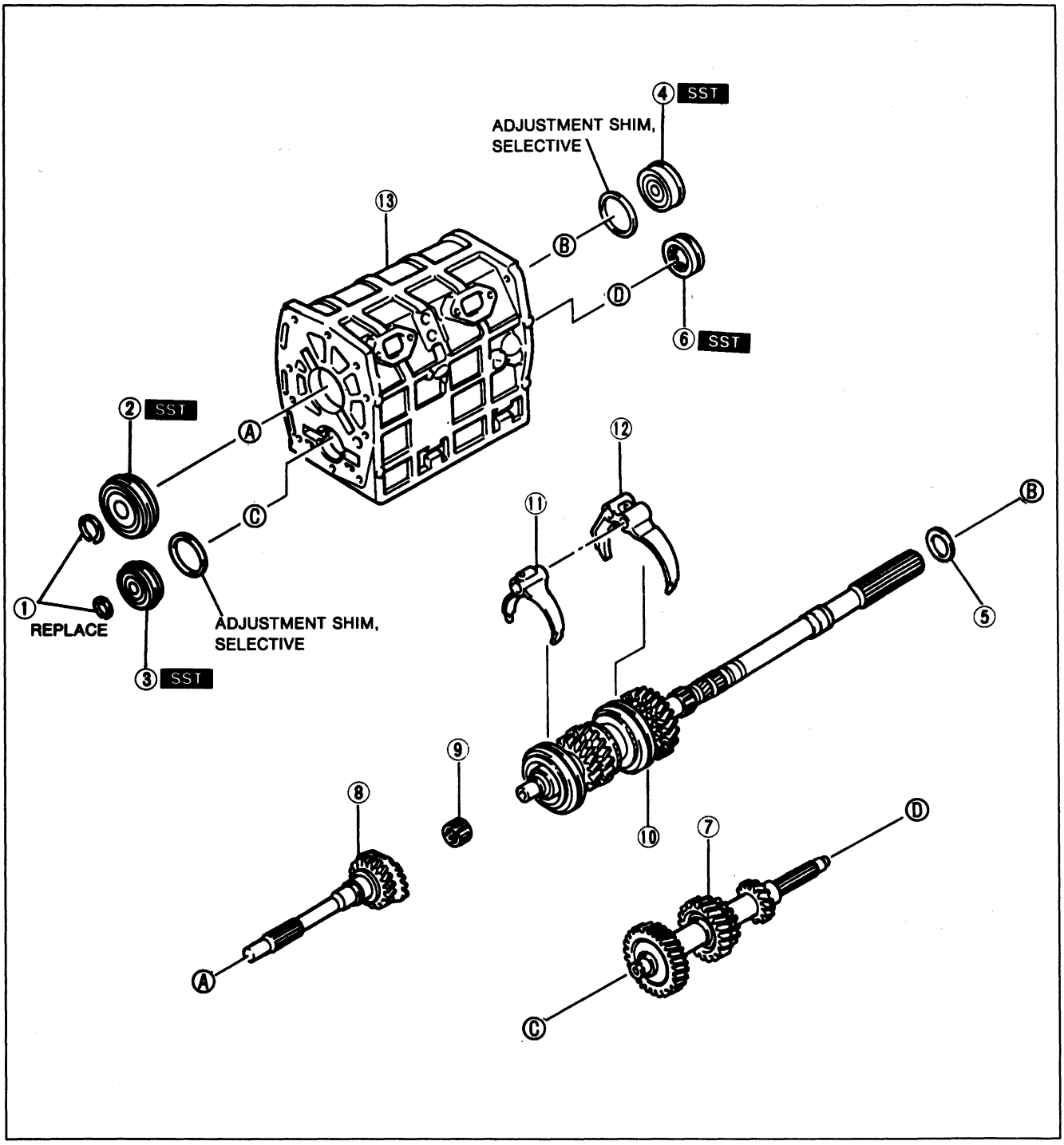


5th/Reverse clutch hub assembly

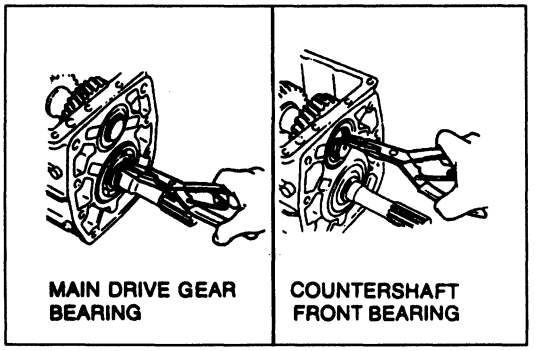
1. Remove the bearing cover installation bolts.
2. Attach the **SST** to the bearing cover and remove the assembly, which consists of the following parts:
   - 5th/Reverse clutch hub assembly
   - Synchronizer ring
   - Needle bearing
   - Bearing race
   - Reverse gear
   - Thrust washer

Transmission Case Components

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

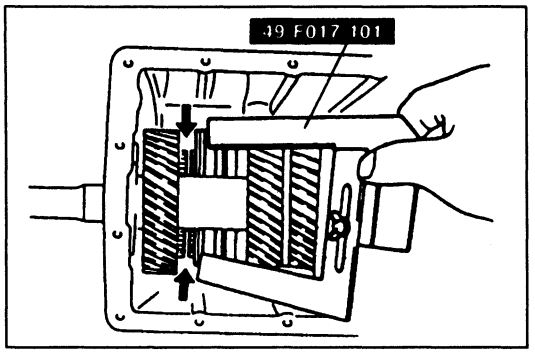


1. Snap rings
   Disassembly Note ..... page J-21
2. Main drive gear bearing
   Disassembly Note ..... page J-21
   Inspect for damage
3. Countershaft front bearing
   Disassembly Note ..... page J-21
   Inspect for damage
4. Mainshaft front bearing
   Disassembly Note ..... page J-22
   Inspect for damage
5. Thrust washer
6. Countershaft center bearing
   Disassembly Note ..... page J-22
   Inspect for damage
7. Countershaft assembly
8. Main drive gear
   Inspection .... page J-29
9. Bearing
10. Mainshaft gear assembly
    Disassembly Note ..... page J-22
11. 3rd/4th shift fork
12. 1st/2nd shift fork
13. Transmission case



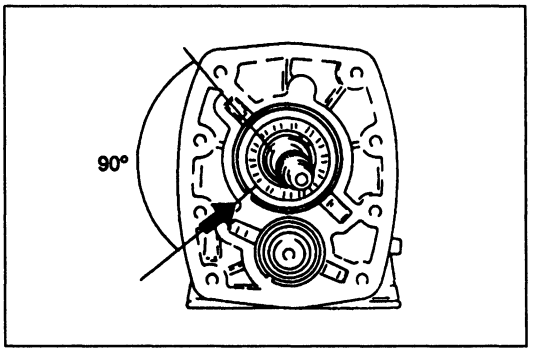
Disassembly note
Snap rings

Remove the snap rings from the mainshaft and the countershaft by using snap ring pliers.

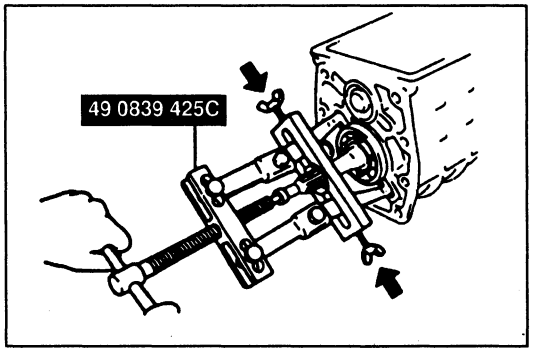


Main drive gear bearing

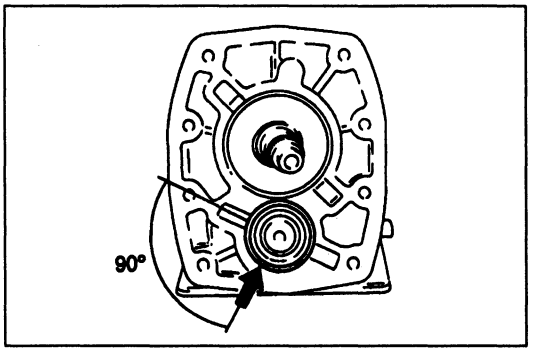
1. Install the **SST** between the 4th gear synchronizer ring and main drive synchromesh gear.



2. Turn the bearing snap rings so that the ends are 90° to the transmission case grooves.

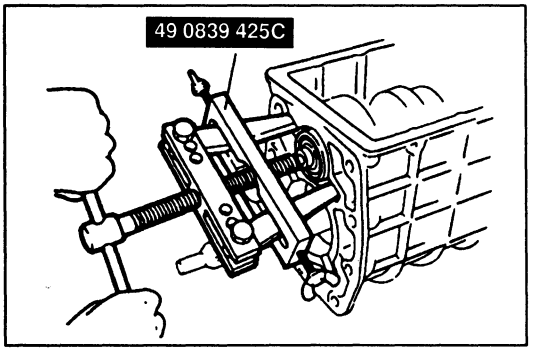


3. Install the **SST**, making sure to hand tighten the side screws as tightly as possible, and remove the main drive gear bearing.

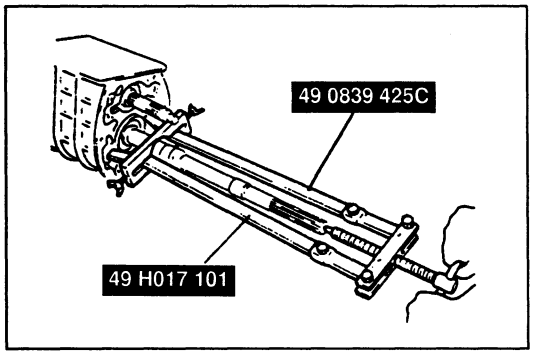


Countershaft front bearing

1. Turn the bearing snap rings so that the ends are 90° to the transmission case grooves.

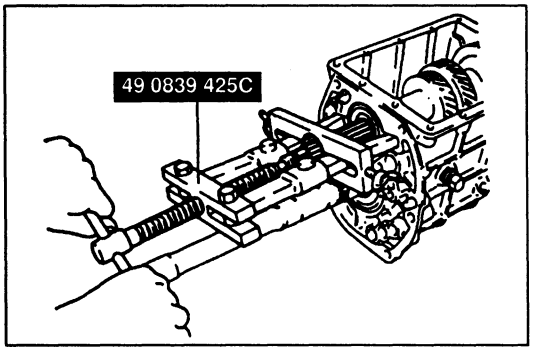


2. Remove the countershaft front bearing by using the **SST**.



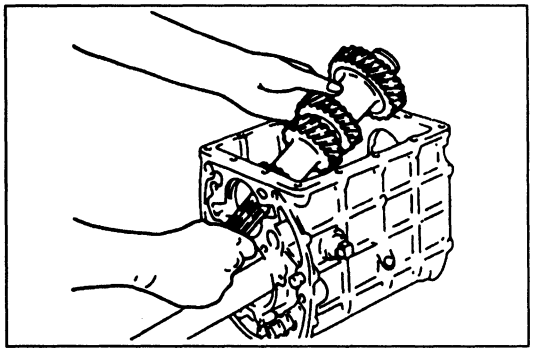
Mainshaft front bearing

Remove the mainshaft front bearing by using the **SST**.

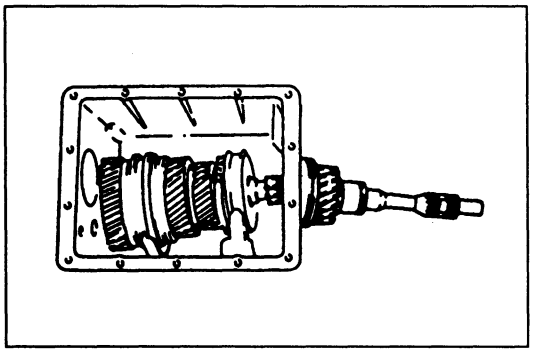


Countershaft center bearing

1. Remove the countershaft center bearing by using the **SST**.

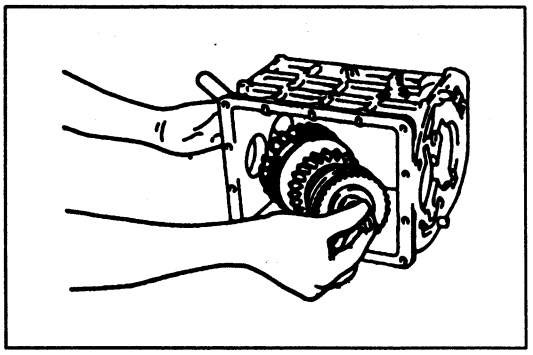


2. Remove the countershaft.



Mainshaft gear assembly

1. Remove the main drive gear from the transmission case.
2. Remove the needle bearing from the mainshaft joint of the main drive gear.

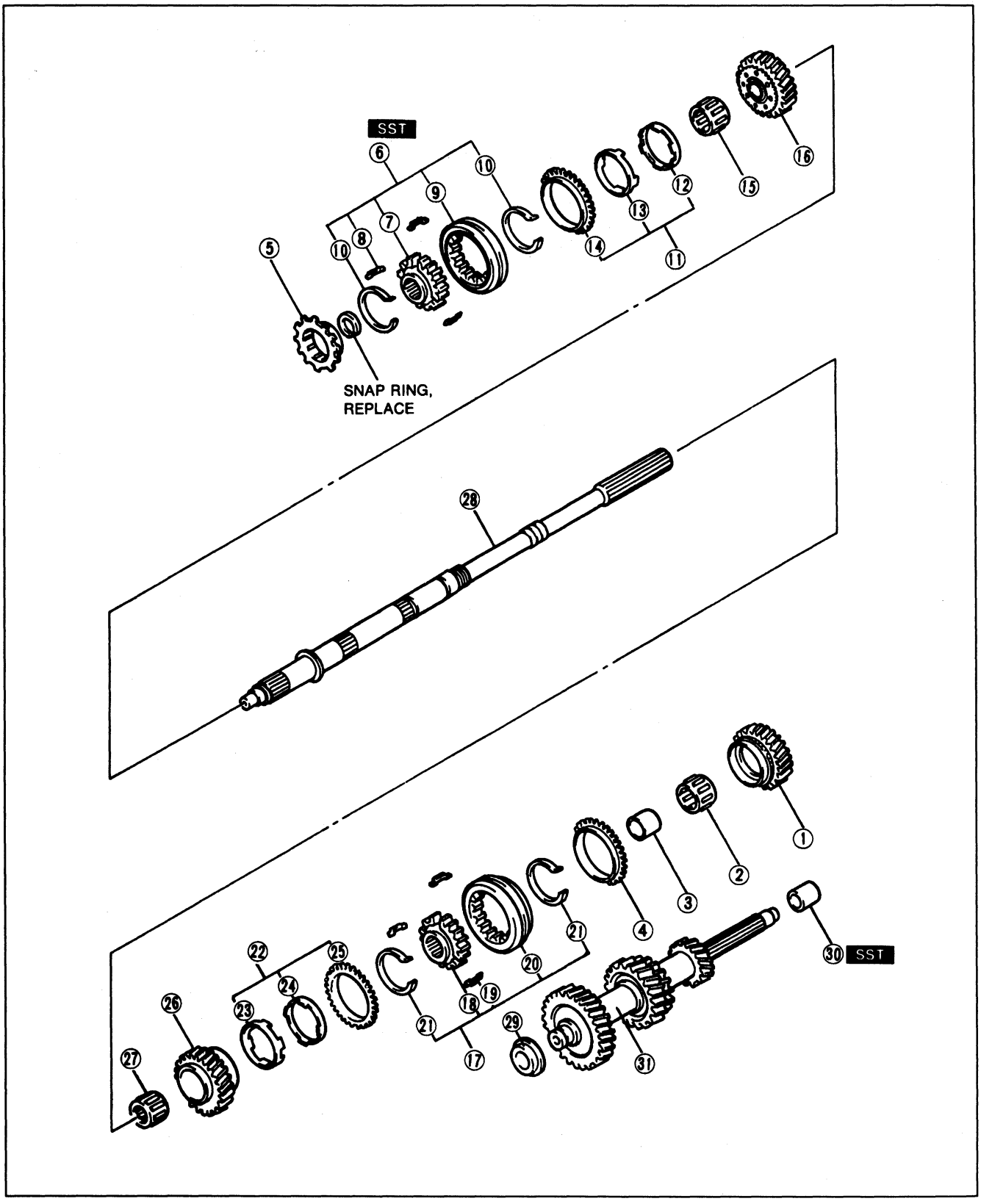


3. Remove the mainshaft gear assembly from the transmission case.

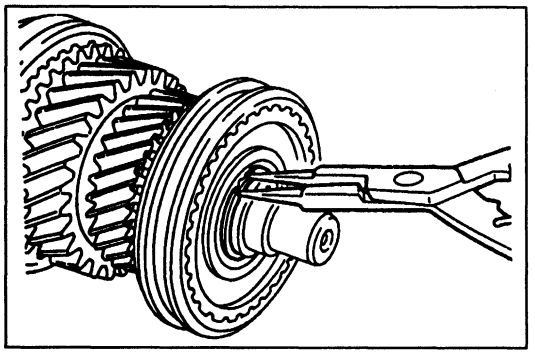
Mainshaft and Countershaft Components

Note
- The countershaft center bearing race does not need to be removed unless you are replacing it.

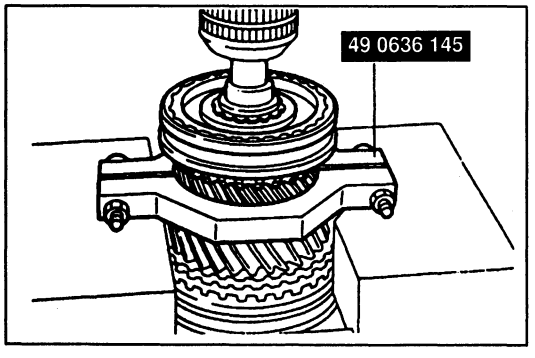
Disassemble in the order shown, referring to **Disassembly Note**.



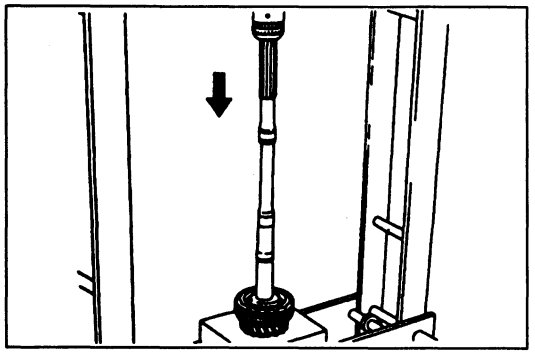
1. 1st gear
   Inspection .... page J-29
2. Bearing
   Inspect for damage
3. Bearing race
4. 1st synchronizer ring
   Inspection .... page J-30
5. 4th synchronizer ring
   Inspection .... page J-30
6. 3rd/4th clutch hub assembly
   Disassembly Note
   ..... below
   Inspection .... page J-30
7. 3rd/4th clutch hub
8. Synchronizer key
9. Clutch hub sleeve
10. Synchronizer key spring
11. 3rd synchronizer assembly
    Inspection .... page J-31
12. Inner cone
13. Double cone
14. Synchronizer ring
15. Bearing
    Inspect for damage
16. 3rd gear
    Inspection .... page J-29
17. 1st/2nd clutch hub assembly
    Disassembly Note
    ..... below
    Inspection .... page J-30
18. 1st/2nd clutch hub
19. Synchronizer key
20. Clutch hub sleeve
21. Synchronizer key springs
22. 2nd synchronizer assembly
    Inspection .... page J-31
23. Inner cone
24. Double cone
25. Synchronizer ring
26. 2nd gear
    Inspection .... page J-29
27. Bearing
    Inspect for damage
28. Mainshaft
    Inspection .... page J-29
29. Countershaft front bearing spacer
30. Countershaft center bearing race
    Disassembly Note
    ..... page J-26
31. Countershaft
    Inspection .... page J-29



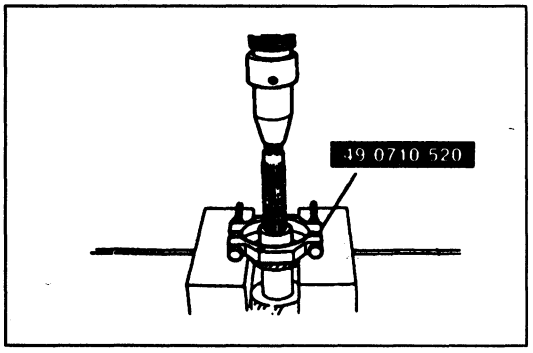
Disassembly note
3rd/4th clutch hub assembly
1. Remove the snap ring from the front of the mainshaft.



2. Position the **SST** between 2nd and 3rd gears, and hold the mainshaft from underneath.
3. Press the mainshaft out from the 3rd gear, 3rd synchronizer ring assembly, and the 3rd/4th clutch hub assembly.



1st/2nd clutch hub assembly
Hold the mainshaft, and press the 1st/2nd clutch hub assembly, 2nd synchronizer ring assembly, and 2nd gear from the mainshaft.



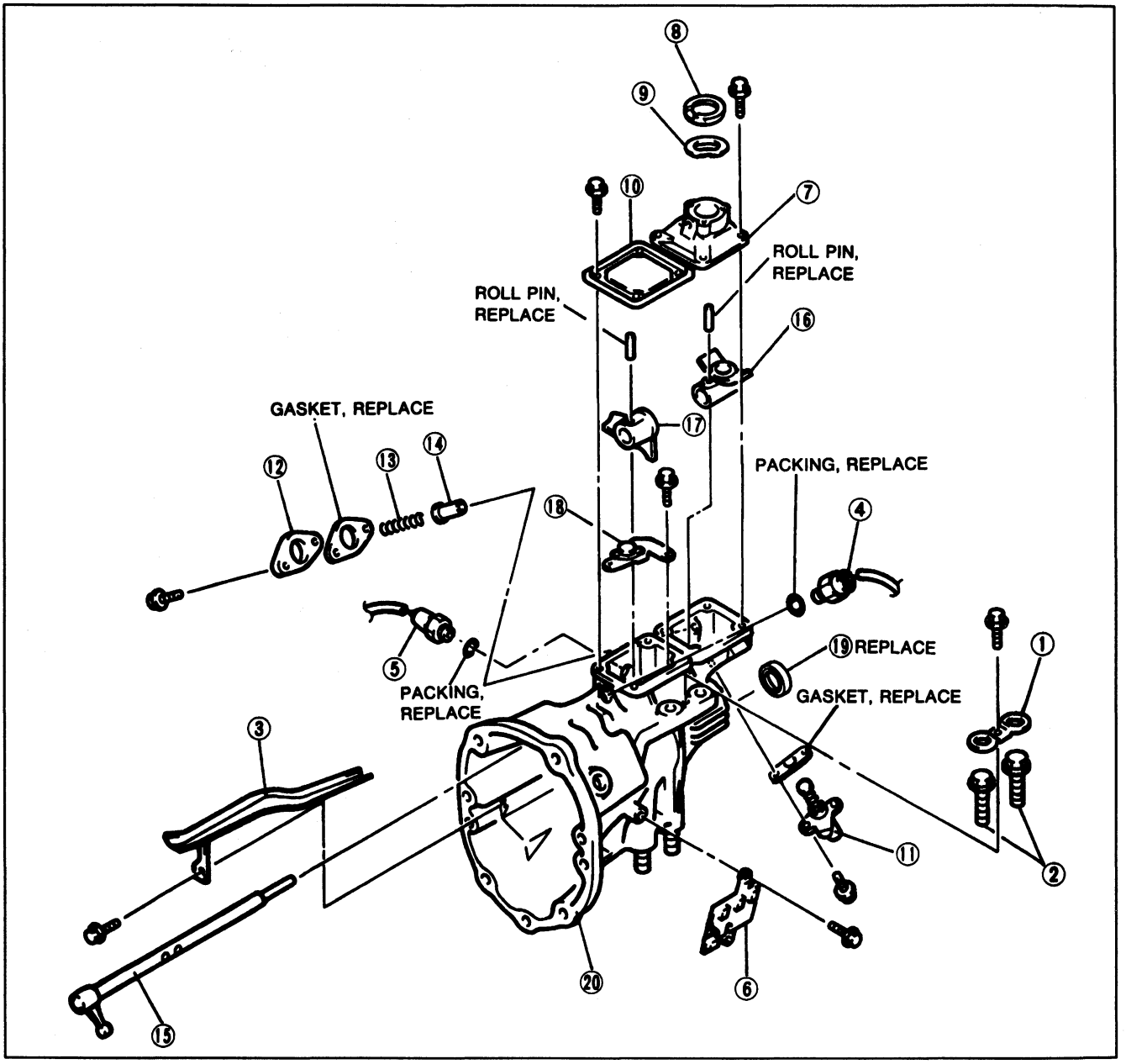
Countershaft center bearing race

Hold the countershaft from underneath, and remove the countershaft bearing race by using the **SST**.

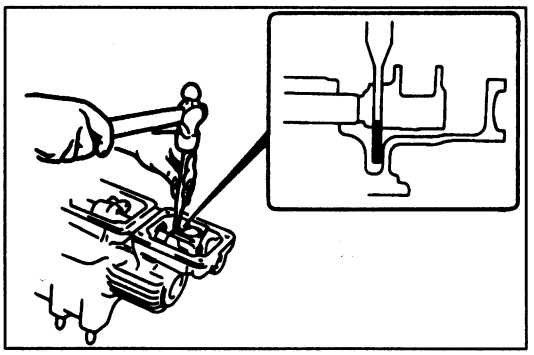
Extension Housing Components

Note
- The extension housing oil seal does not need to be removed unless you are replacing it.

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

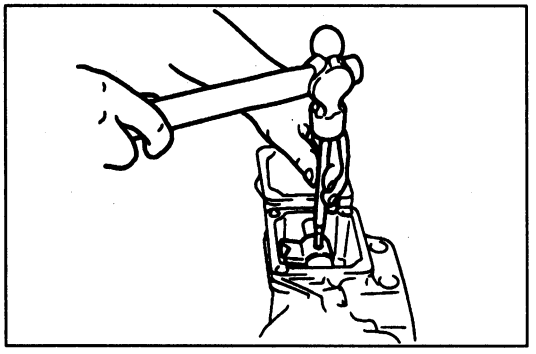


1. Stopper
2. Power plant frame installation bolts
3. Oil guide
4. Neutral switch
5. 1-2 switch
6. Bracket
7. Control case
8. Bushing
   Inspect for wear and damage
9. Wave washer
   Inspect for wear and damage
10. Blind cover
11. Select spindle assembly
12. Spring cap
13. Select lock spindle spring
    Inspection .... page J-31
14. Select lock spindle
15. Control rod
    Disassembly Note ..... page J-28
    Inspectio ..... page J-30
16. Control rod end
17. Selector
18. Shift guide assembly
19. Oil seal
    Disassembly Note ..... page J-28
20. Extension housing
    Inspection .... page J-32

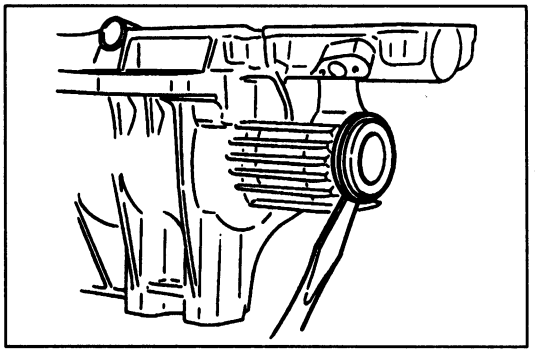


Disassembly note
Control rod

1. Slide the control rod end to the point where the roll pin is directly above the recess in the extension housing.
2. Remove the roll pin from the control rod end by using a pin punch and hammer.



3. Remove the roll pin from the selector by using a pin punch and hammer.
4. Slide the control rod from the extension housing, and remove the control rod end and selector.

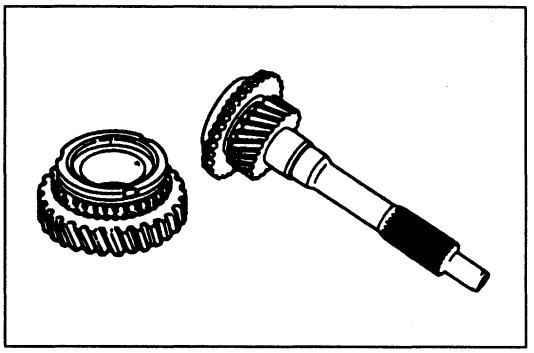


Oil seal (extension housing)

Remove the oil seal from the extension housing by using a screwdriver.

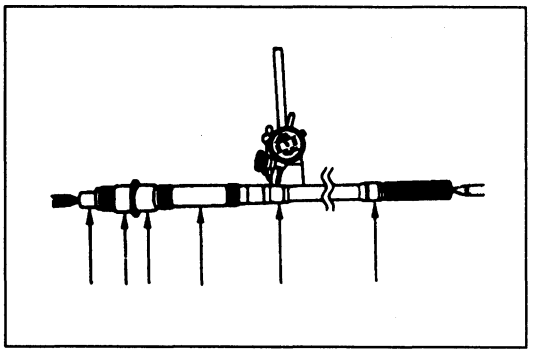
INSPECTION

Inspect all parts, and repair or replace as necessary.



Each Gear and Main Drive Gear

1. Inspect synchronizer cones for wear.
2. Inspect individual gear teeth for damage, wear, and cracks.
3. Inspect synchronizer ring matching teeth for damage and wear.
4. Inspect main drive gear splines for damage and wear.

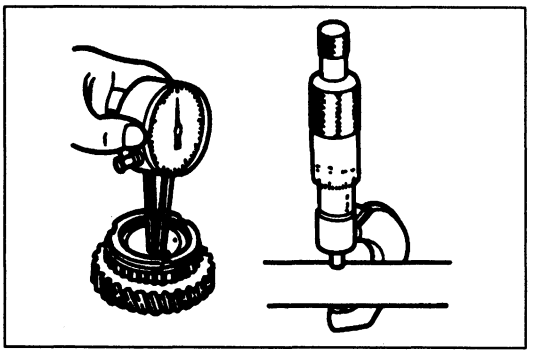


Mainshaft

1. Measure the mainshaft runout.

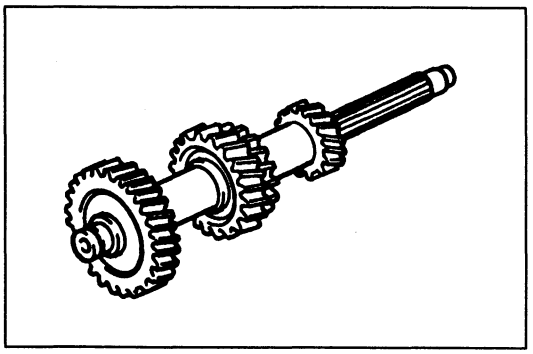
   Runout: 0.03 mm {0.0012 in} max.

2. Inspect splines for damage and wear.



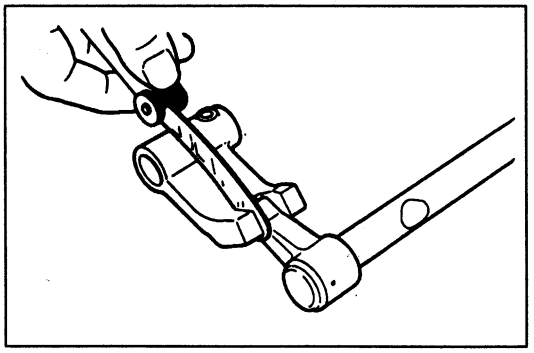
3. Measure the clearance between mainshaft and gear (or bushing).

   Clearance: 0.15 mm {0.006 in} max.



Countershaft

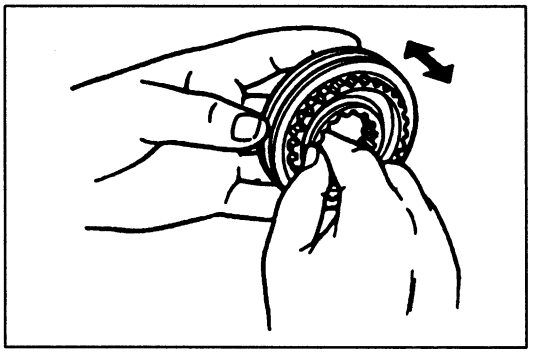
1. Inspect gear teeth for damage, wear, and cracks.
2. Inspect splines for damage and wear.



Control Rod Lever and Shift Rod

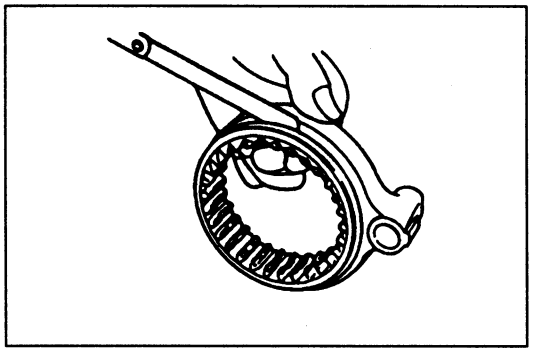
Measure the clearance between the control rod lever and the shift rod gate.

Clearance: 0.8 mm {0.031 in} max.



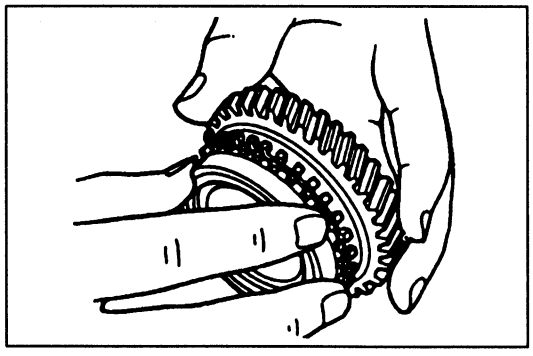
Each Clutch Hub Assembly

1. Inspect clutch hub sleeve and hub operation.
2. Inspect individual gear teeth for damage, wear, and cracks.
3. Inspect synchronizer keys for damage, wear, and cracks.



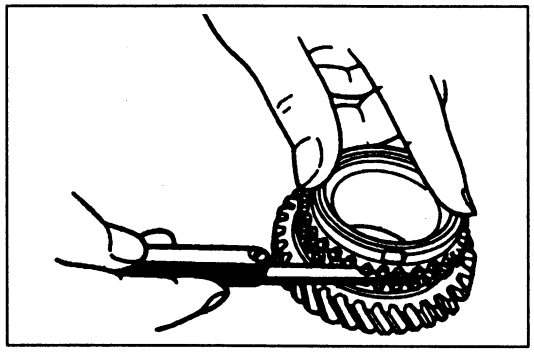
4. Measure the clearance between the hub sleeve groove and shift fork.

Clearance:
0.2–0.3 mm {0.008–0.012 in}
Maximum: 0.5 mm {0.020 in}



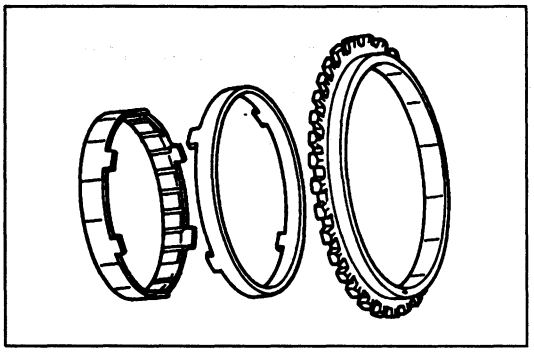
1st, 4th, 5th, Reverse Synchronizer Rings

1. Inspect individual synchronizer ring teeth for damage, wear, and cracks.
2. Inspect taper surface for wear and cracks.



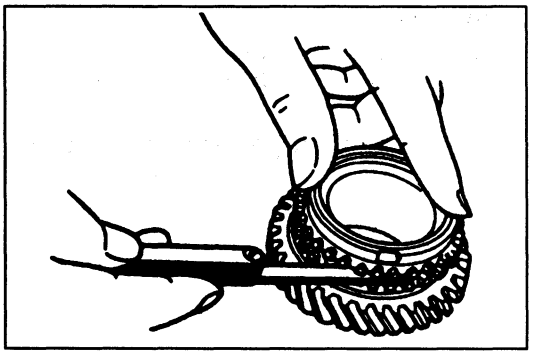
3. Set the synchronizer ring squarely in the gear.
4. Measure the clearance between the synchronizer ring and flank surface of gear all around the circumference.

Clearance: 1.5 mm {0.059 in}
Minimum: 0.8 mm {0.031 in}



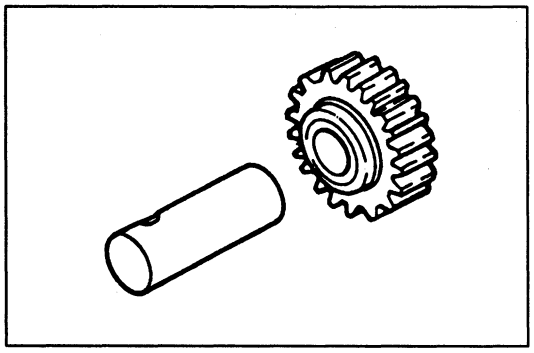
2nd/3rd Synchronizer Assembly

1. Inspect individual synchronizer ring gear teeth for damage, wear, and cracks. Replace the synchronizer assembly if any such damage is found.
2. Inspect for wear and damage to the tapered surfaces of the inner cone, double cone, and synchronizer ring. Replace the synchronizer assembly if any such damage is found.



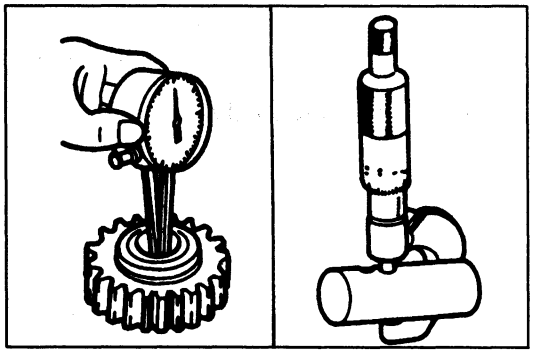
3. Set the synchronizer assembly squarely in the gear.
4. Measure the clearance between the synchronizer ring and flank surface of gear.

Clearance: 1.5 mm {0.059 in}
Minimum: 0.8 mm {0.031 in}



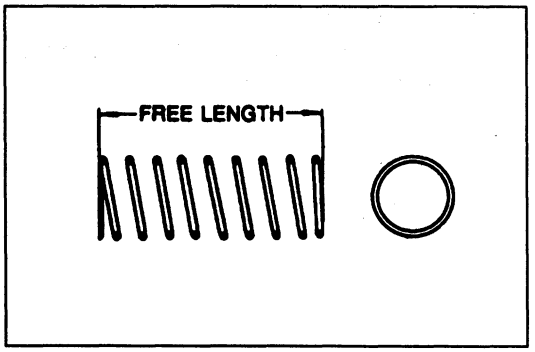
Reverse Idler Gear and Shaft

1. Inspect gear teeth for damage, wear, and cracks.



2. Measure the clearance between the reverse idler gear bushing and shaft.

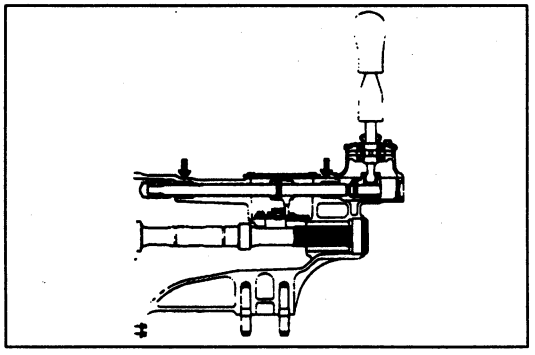
Clearance:
0.02–0.05 mm {0.0008–0.0020 in}
Maximum: 0.15 mm {0.006 in}



Spring

Measure the free length of the spring.

Standard free length
Detent ball spring: 22.5 mm {0.886 in}
5th/Reverse retaining spring: 73.00 mm {2.874 in}
Select lock spindle spring: 43.25 mm {1.703 in}



Extension Housing

1. Inspect the indicated bearings for damage.
2. Replace the extension housing if necessary.

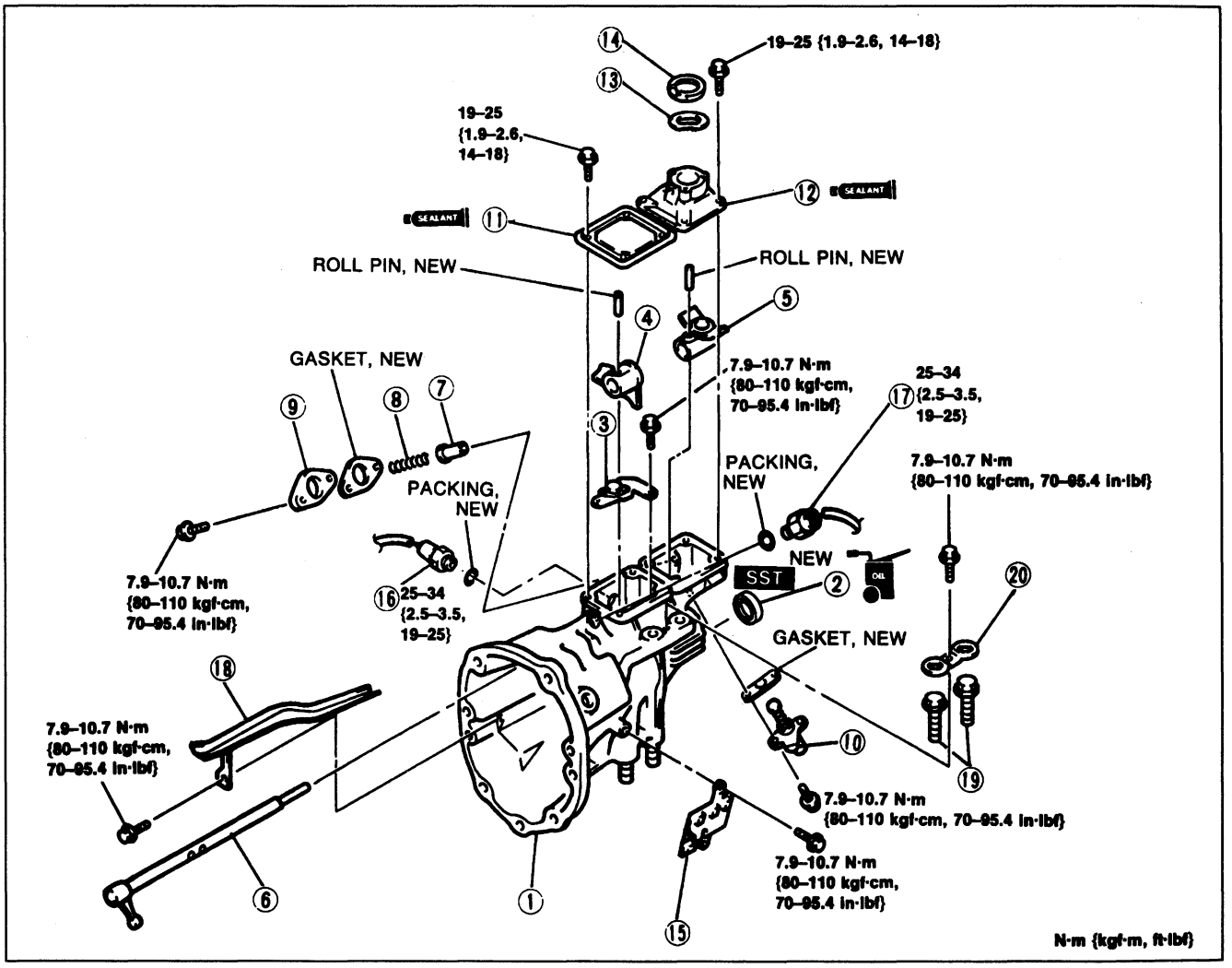
ASSEMBLY

Precaution

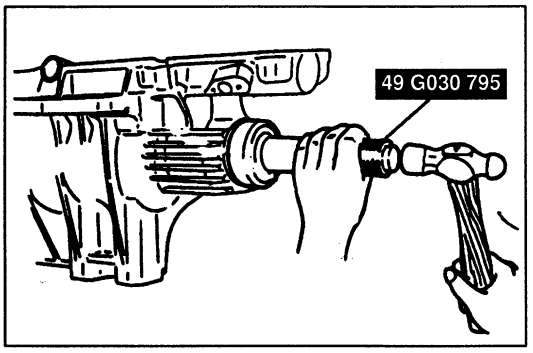
1. Make sure each part is cleaned before assembling.
2. Coat all movable parts with the specified oil.
3. Replace parts wherever required.
4. Remove old sealant from contact surfaces before applying new sealant.
5. Assemble the parts within 10 minutes after applying sealant. Allow all sealant to cure at least 30 minutes after assembly before filling the transmission with transmission oil.

Extension Housing Components

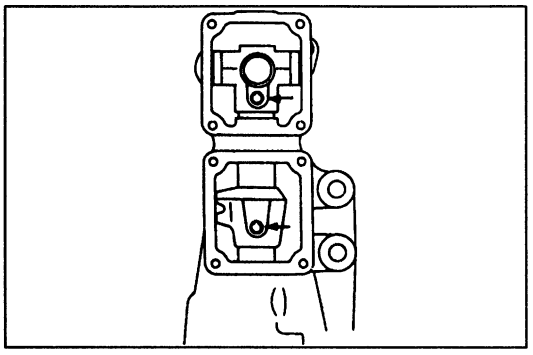
Assemble in the order shown, referring to **Assembly Note**.



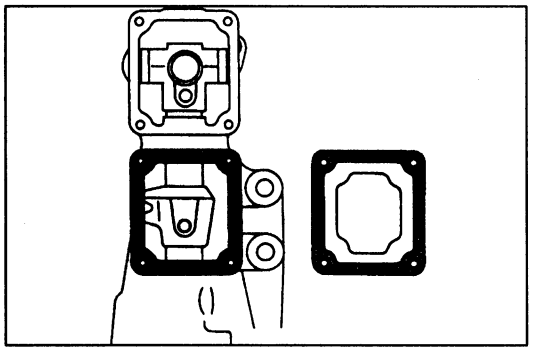
1. Extension housing
2. Oil seal (extension housing) Assembly Note ..... page J-34
3. Shift guide assembly
4. Selector
5. Control rod end
6. Control rod Assembly Note ..... page J-34
7. Select lock spindle
8. Select lock spindle spring
9. Spring cap
10. Select spindle assembly
11. Blind cover Assembly Note ..... page J-34
12. Control case Assembly Note ..... page J-34
13. Wave washer
14. Bushing
15. Bracket
16. 1-2 switch
17. Neutral switch
18. Oil guide
19. Power plant frame installation bolts
20. Stopper



Assembly note
Oil seal (extension housing)
1. Apply clean oil to the lip and outer edge of a new oil seal.
2. Install the oil seal evenly and gradually by using the **SST**.

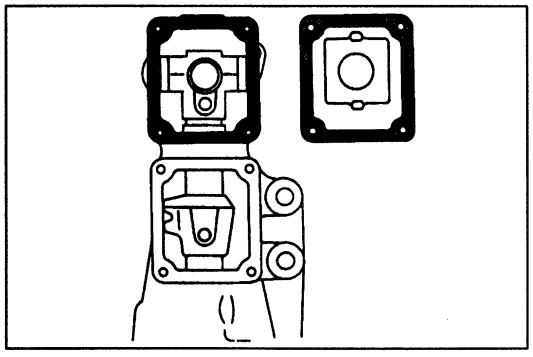


Control rod
1. Install the control rod through the selector and the control rod end, into the extension housing.
2. Install new roll pins into the selector and control rod ends as shown in the figure.



Blind cover
1. Apply sealant to the contact surfaces of the blind cover and extension housing.
2. Install the blind cover.

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



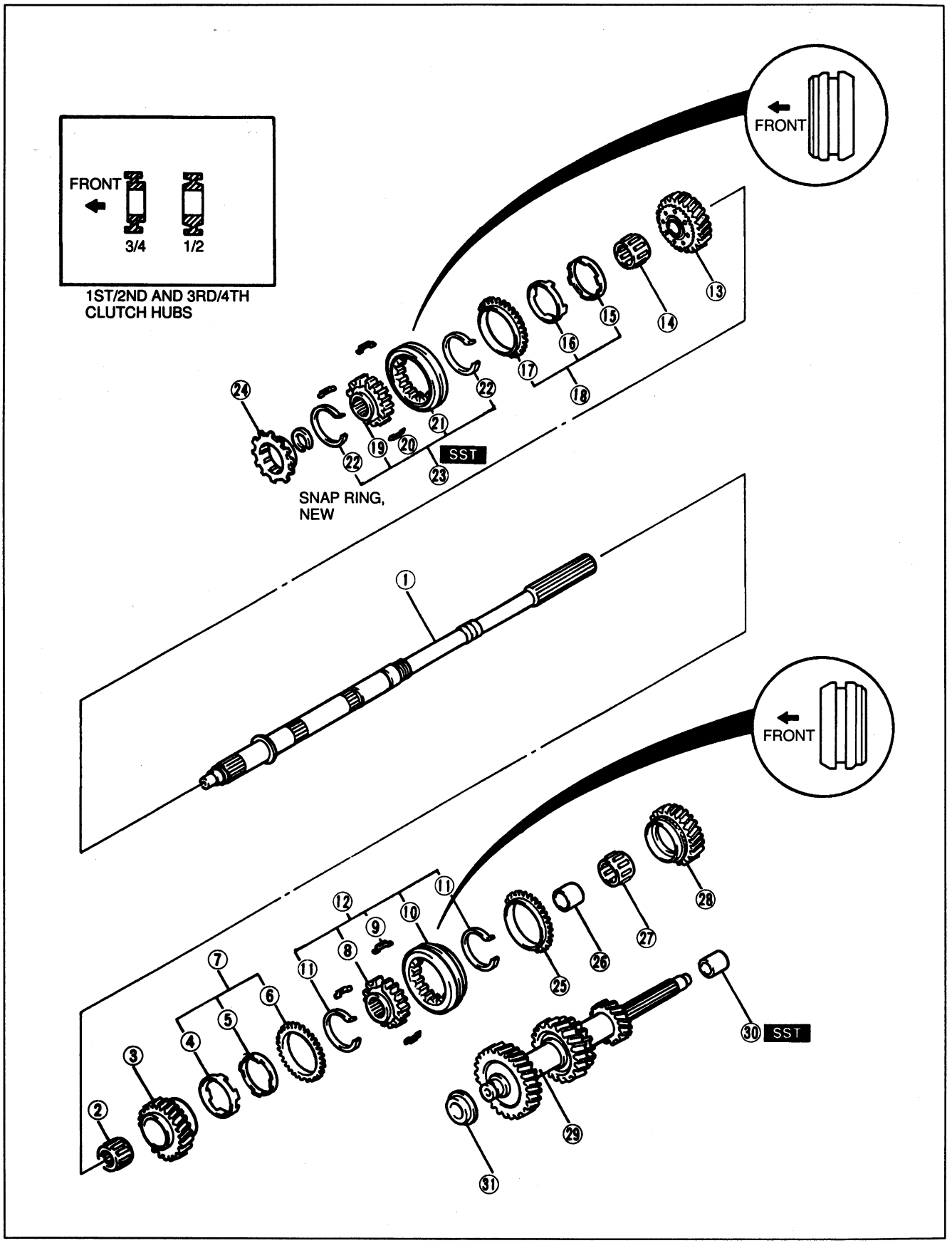
Control case
1. Apply sealant to the contact surfaces of the extension housing and control case.
2. Install the control case to the extension housing.

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

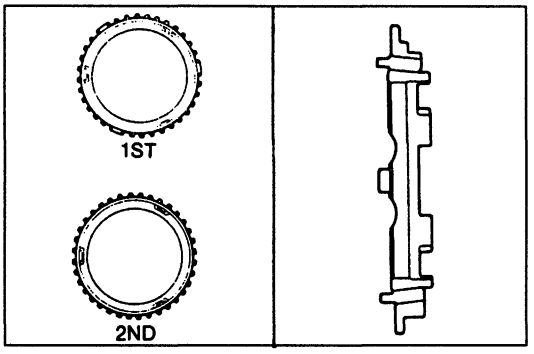
MEMO

Mainshaft and Countershaft Components

Assemble in the order shown, referring to **Assembly Note.**



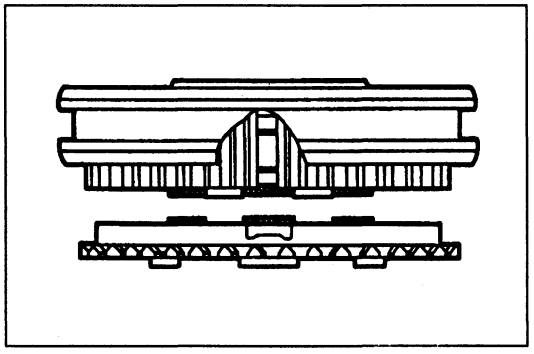
1. Mainshaft
2. Bearing
3. 2nd gear
4. Inner cone
5. Double cone
6. Synchronizer ring
7. 2nd synchronizer assembly
   Assembly Note ..... below
8. 1st/2nd clutch hub
9. Synchronizer key
10. Clutch hub sleeve
11. Synchronizer key springs
12. 1st/2nd clutch hub assembly
    Assembly Note ..... below
13. 3rd gear
14. Bearing
15. Inner cone
16. Double cone
17. Synchronizer ring
18. 3rd synchronizer assembly
    Assembly Note ..... below
19. 3rd/4th clutch hub
20. Synchronizer key
21. Clutch hub sleeve
22. Synchronizer key springs
23. 3rd/4th clutch hub assembly
    Assembly Note ..... below
24. 4th synchronizer ring
25. 1st synchronizer ring
26. Bearing race
27. Bearing
28. 1st gear
29. Countershaft
30. Countershaft center bearing race
    Assembly Note
    ..... page J-39
31. Countershaft front bearing spacer
    Assembly Note
    ..... page J-39



Assembly note

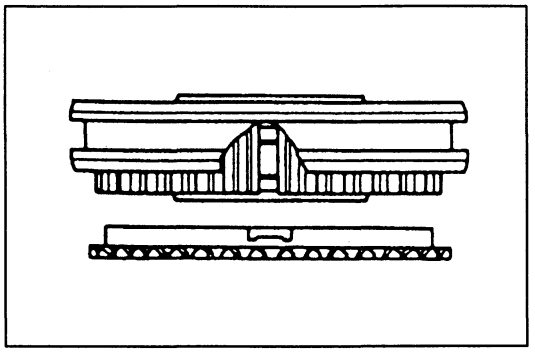
2nd, 3rd synchronizer assemblies

Install the inner cone, double cone, and synchronizer ring as shown in the figure. The 1st synchronizer ring has two teeth fused together at three places around its outer edge.

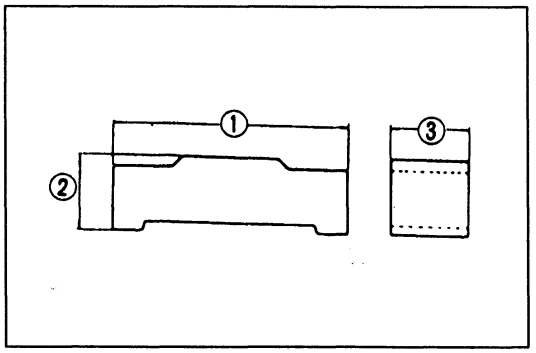


1st/2nd, 3rd/4th clutch hub assemblies

1. For the 2nd and 3rd synchronizer assemblies, align the synchronizer ring grooves and keys, and fit the inner cone tabs into the clutch hub slots.



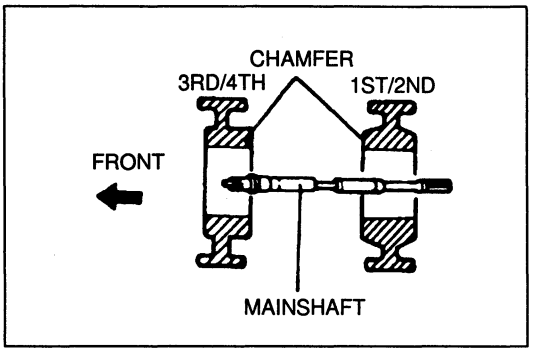
2. For the 1st and 4th synchronizer rings, align the synchronizer ring grooves and synchronizer keys.



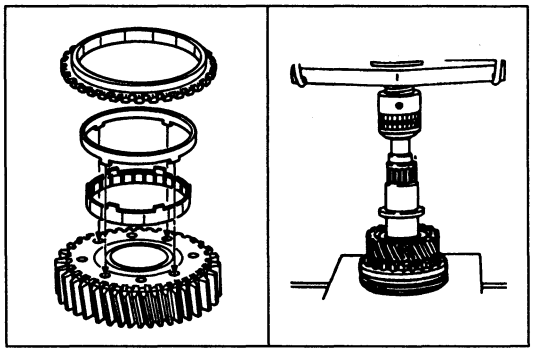
Standard key dimensions

mm {in}

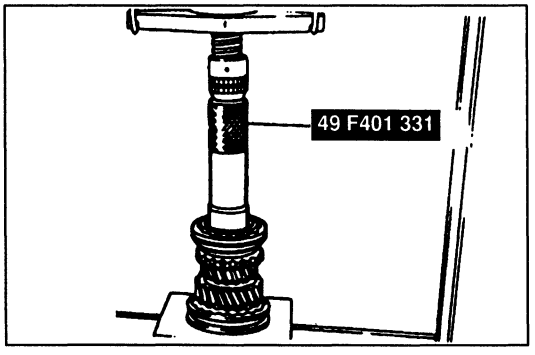
	1	2	3
1st and 2nd	18.00 {0.709}	5.45 {0.215}	6.00 {0.236}
3rd and 4th	17.00 {0.669}	4.25 {0.167}	5.00 {0.197}



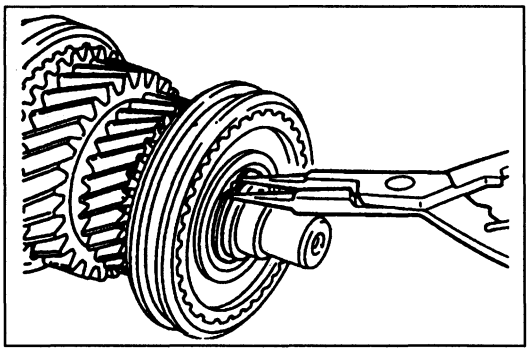
3. When installing the gears and clutch hub assemblies in the following procedure, make sure that they are installed in the direction shown in the figure.



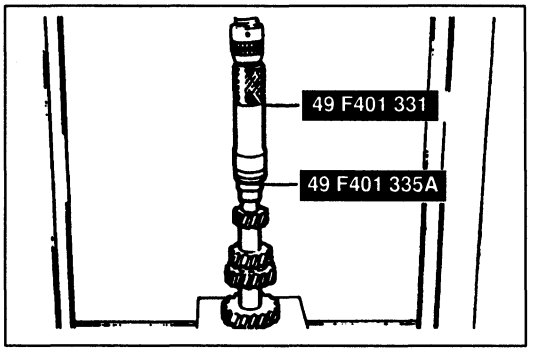
4. Set the needle bearing, 2nd gear, 2nd synchronizer assembly, and the 1st/2nd clutch hub assembly on the mainshaft. Press the parts onto the mainshaft while keeping the parts from becoming crooked or misaligned.



5. Set the needle bearing, 3rd gear, 3rd synchronizer assembly, and 3rd/4th clutch hub assembly on the mainshaft. Press the parts onto the mainshaft by using the **SST**, while keeping the parts from becoming crooked or misaligned.

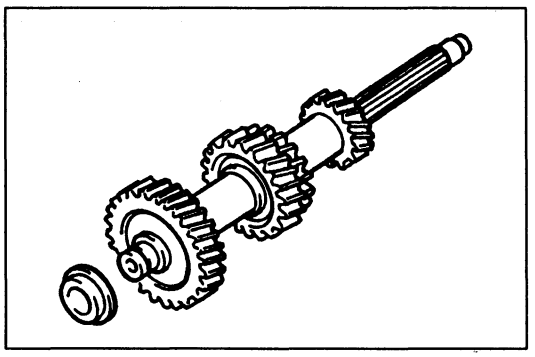


6. Install a new snap ring on the front of the mainshaft.



Countershaft center bearing race

Press the countershaft center bearing race onto the countershaft by using the **SST**.

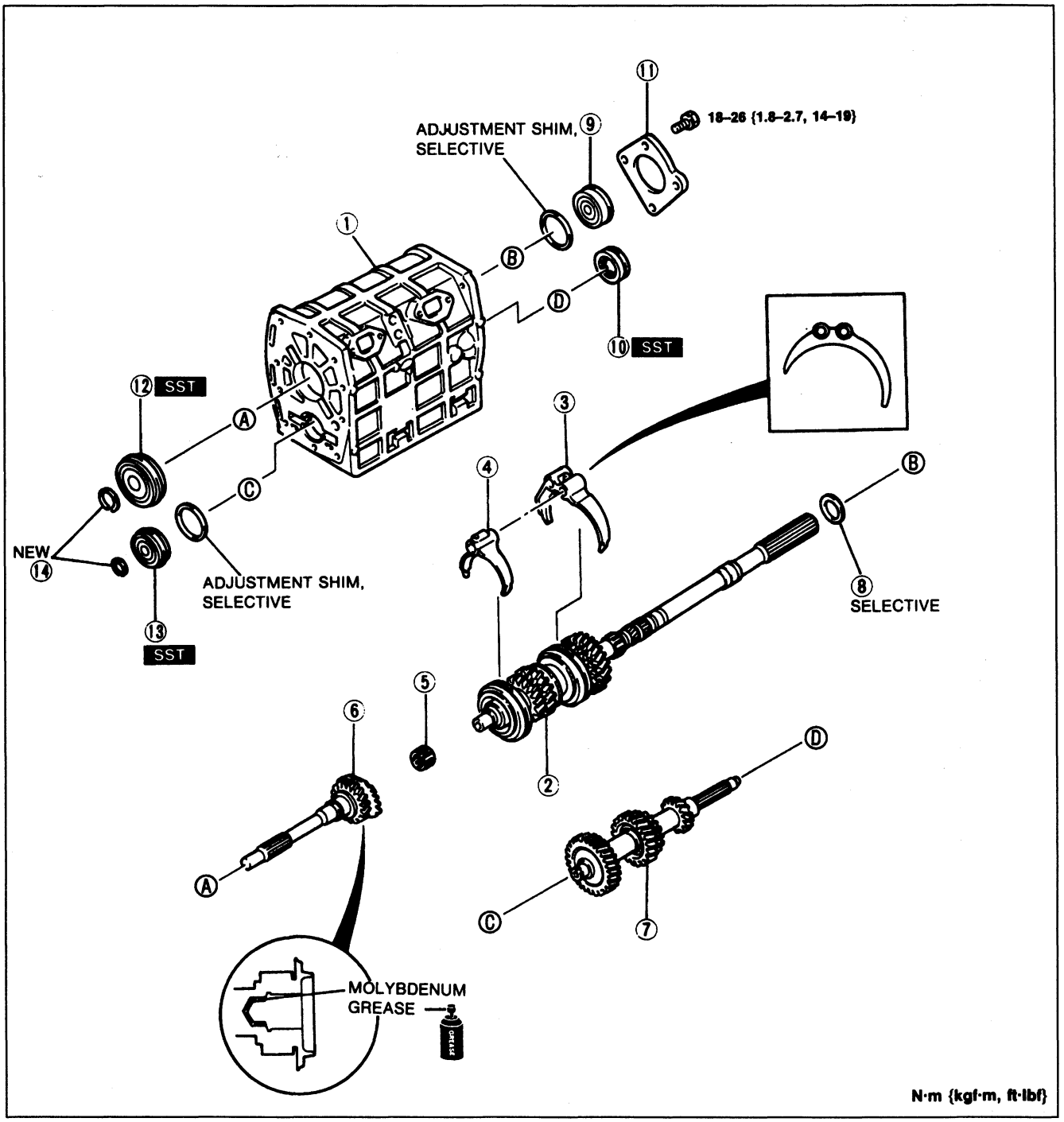


Countershaft front bearing spacer

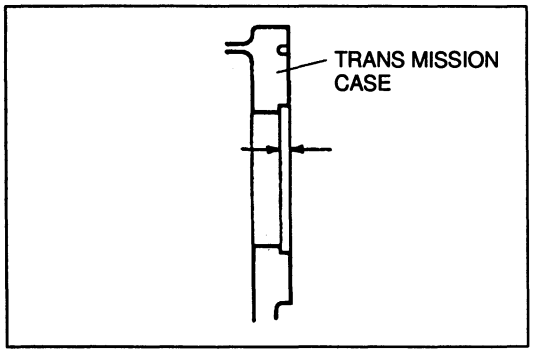
Install the countershaft front bearing spacer. If the countershaft front bearing or countershaft front bearing spacer is being replaced, replace them as an assembly.

Transmission Case Components

Assemble in the order shown, referring to **Assembly Note**.

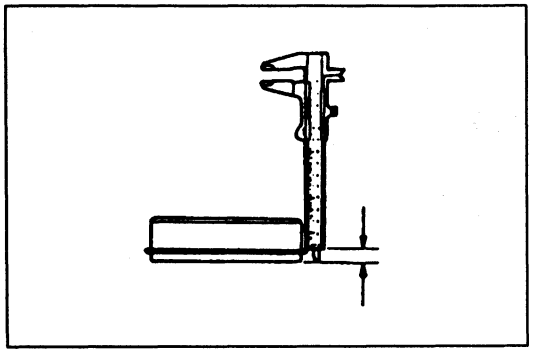


1. Transmission case
   Assembly Note
   ..... page J–41
2. Mainshaft gear assembly
3. 1st/2nd shift fork
4. 3rd/4th shift fork
5. Bearing
6. Main drive gear
7. Countershaft assembly
8. Thrust washer
9. Mainshaft front bearing
   Assembly Note
   ..... page J–42
10. Countershaft center bearing
    Assembly Note
    ..... page J–42
11. Bearing cover
12. Main drive gear bearing
    Assembly Note
    ..... page J–42
13. Countershaft front bearing
    Assembly Note
    ..... page J–43
14. Snap rings



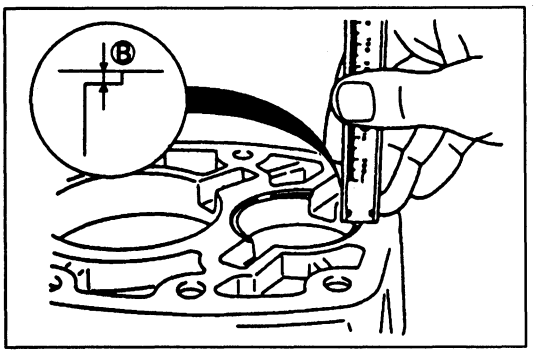
Assembly note
Transmission case

1. Measure the mainshaft front bearing thrust play as follows.
   (1) Measure the depth of the mainshaft front bearing bore in the rear of the transmission case.

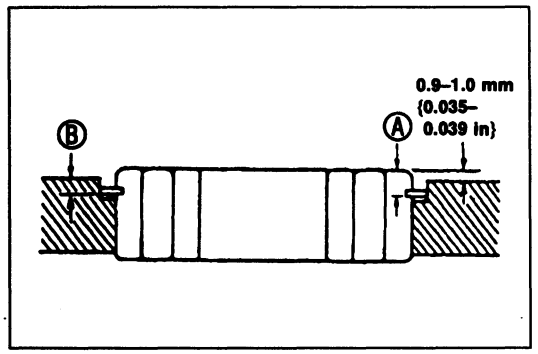


   (2) Measure the mainshaft front bearing height.
   The difference between the two measurements indicates the required thickness of the adjustment shim.

Standard thrust play:
0–0.05 mm {0–0.002 in}
Adjustment shim thicknesses:
0.1mm {0.004 in}, 0.3 mm {0.012 in}

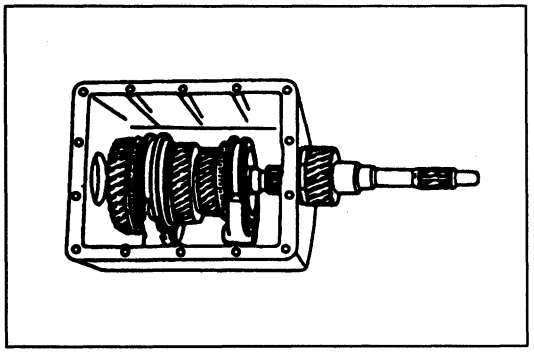


2. Measure the countershaft front bearing thrust play as follows.
   (1) Measure depth B of the countershaft front bearing bore in the transmission case.



   (2) Measure the countershaft front bearing snap ring height A.
   (3) Choose an adjustment shim that will allow the difference between the two measurements to be equal to the standard bearing height.

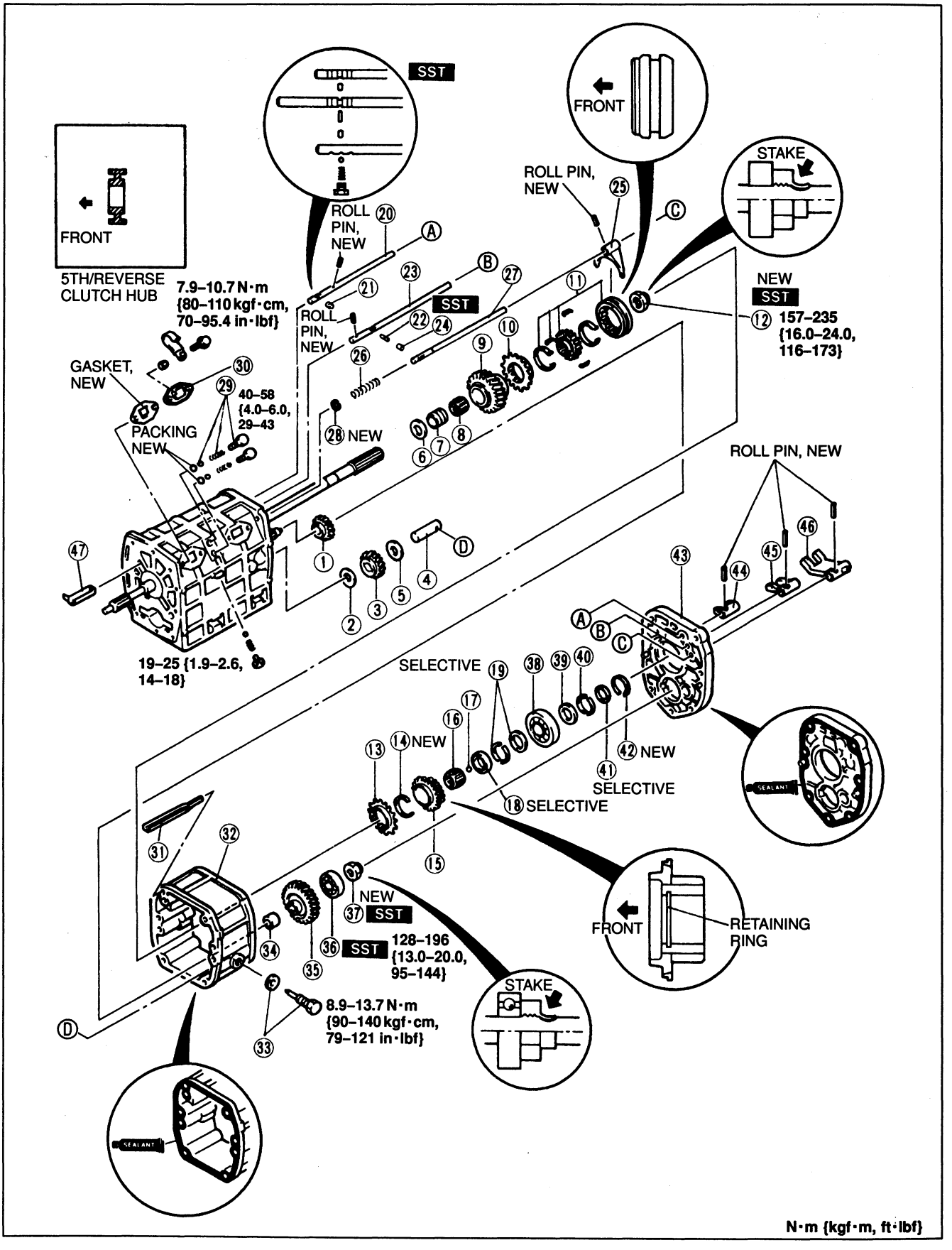
A-B + Adjustment shim(s) = 0.9–1.0 mm
{0.035–0.039 in}
Standard bearing height on installing:
0.9–1.0 mm {0.035–0.039 in}
Adjustment shim thicknesses:
0.1mm {0.004 in}, 0.3 mm {0.012 in}



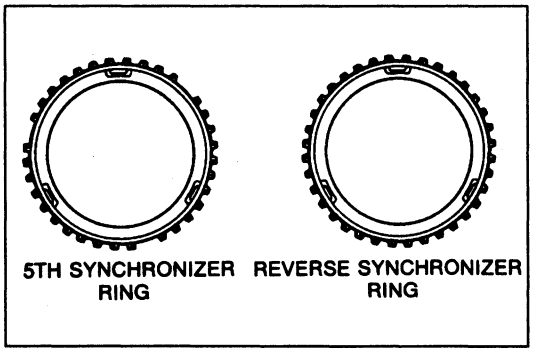
3. Position the 1st/2nd and 3rd/4th shift forks into the grooves of the clutch hub and sleeve assemblies.
4. Apply molybdenum grease to the needle bearing and install it in the main drive gear.
5. Install the main drive gear onto the front of the mainshaft.

5th/Reverse Gear and Housing Components

Assemble in the order shown, referring to **Assembly Note**.



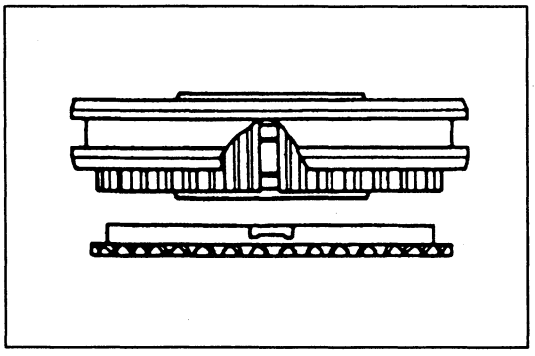
1. Counter reverse gear
2. Thrust washer
3. Reverse idler gear
4. Reverse idler gear shaft
5. Thrust washer
6. Thrust washer
7. Bearing race
8. Bearing
9. Reverse gear
10. Reverse synchronizer ring
    Assembly Note ..... below
11. 5th/Reverse clutch hub assembly
    Assembly Note ..... below
12. Locknut
    Assembly Note ..... below
13. 5th synchroniser ring
    Assembly Note ..... below
14. Retaining ring
15. 5th gear
    Assembly Note
    ..... page J-46
16. Bearing
17. Steel ball
18. Thrust lock washer
19. C-washers and retaining ring
20. 1st/2nd shift rod
    Assembly Note
    ..... page J-47
21. Interlock pin (large)
22. Interlock pin (small)
23. 3rd/4th shift rod
    Assembly Note
    ..... page J-47
24. Interlock pin (large)
25. 5th/Reverse shift fork
    Assembly Note
    ..... page J-47
26. Spring
27. 5th/Reverse shift rod
    Assembly Note
    ..... page J-47
28. Retaining ring
29. Cap plug, spring, and detent ball
30. Blind cover
31. Oil guide
32. Center housing
    Assembly Note
    ..... page J-48
33. Set bolt and washer
34. Spacer
35. Counter 5th gear
36. Countershaft rear bearing
    Assembly Note
    ..... page J-49
37. Locknut
38. Mainshaft rear bearing
    Assembly Note
    ..... page J-49
39. Retaining ring
40. C-washers
41. Thrust washer
42. Snap ring
43. Bearing housing
    Assembly Note
    ..... page J-50
44. 1st/2nd shift rod end
    Assembly Note
    ..... page J-50
45. 3rd/4th shift rod end
    Assembly Note
    ..... page J-50
46. 5th/Reverse shift rod end
    Assembly Note
    ..... page J-50
47. Oil guide



Assembly note
Synchronizer ring (5th/Reverse)

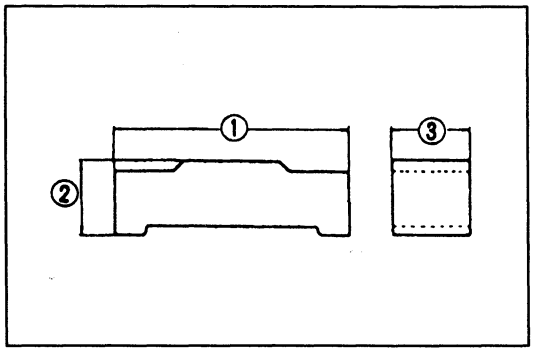
The 5th and Reverse synchronizer rings are differentiated as follows.

(1) The 5th synchronizer ring has 3 places on its circumference with one tooth missing in each place.
(2) The Reverse synchronizer ring has no distinguishing marks.



5th/Reverse clutch hub assembly and locknut

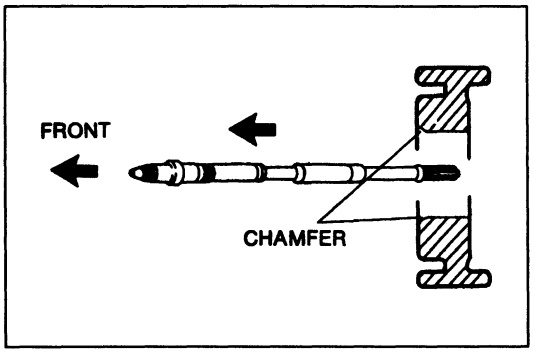
1. Align the 5th/Reverse synchronizer grooves and the synchronizer keys.



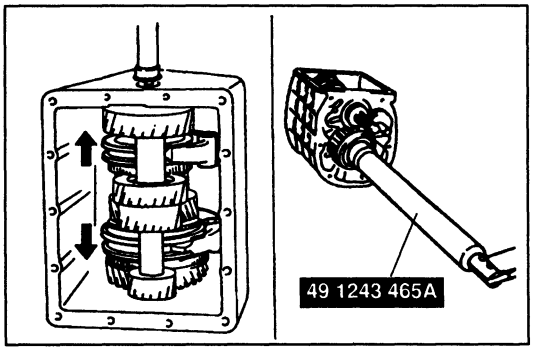
Standard key dimensions

mm {in}

	1	2	3
5th/Reverse	17.00 {0.669}	4.250 {0.167}	5.00 {0.197}

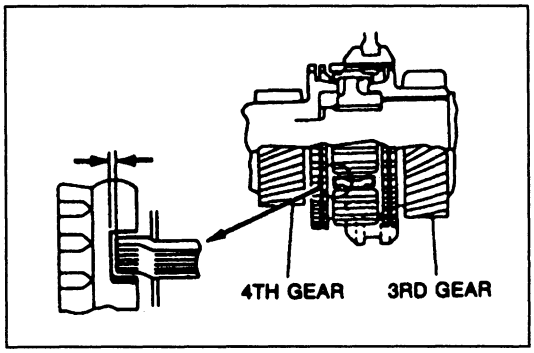


2. Install the 5th/Reverse clutch hub assembly onto the mainshaft in the direction shown.



3. Shift the clutch hubs into 1st and 4th gears to lock the rotation of the mainshaft.
4. Install a new locknut and tighten it with the **SST**.

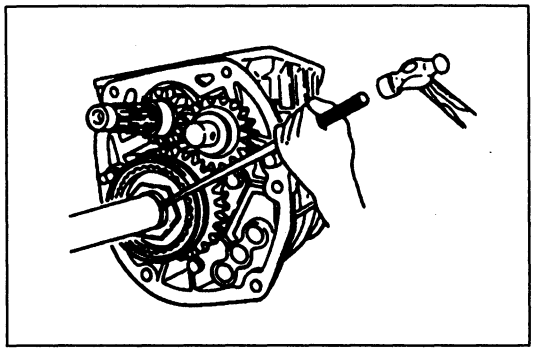
Tightening torque:
157–235 N·m{16.0–24.0 kgf·m,116–173 ft·lbf}



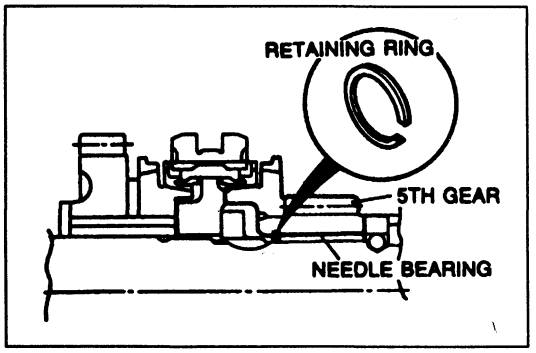
5. Check the clearance between the synchronizer key and the exposed edge of the synchronizer ring.
If the clearance is not as specified, adjust it by changing the thrust washers on the front and rear of the mainshaft front bearing. The total combined thickness of the front and rear thrust washers must equal 6.0 mm {0.236 in}

Clearance: 0.66–2.00 mm {0.026–0.079 in}

Available thrust washer thicknesses:
2.5 mm {0.098 in}, 3.0 mm {0.118 in}
3.5 mm {0.138 in}

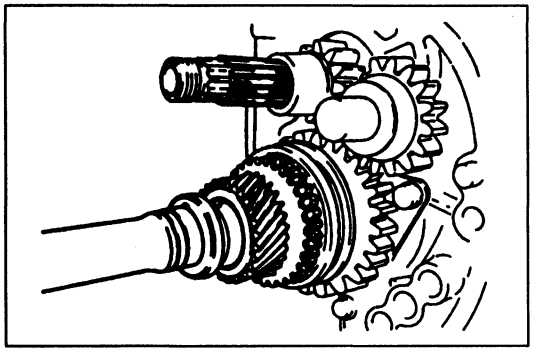


6. Stake the locknut into the mainshaft groove.

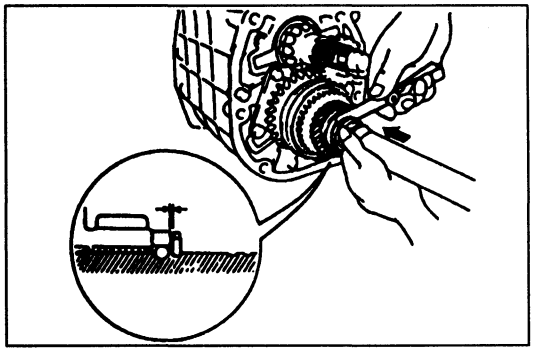


5th gear

1. Install a new retaining ring to the 5th gear.



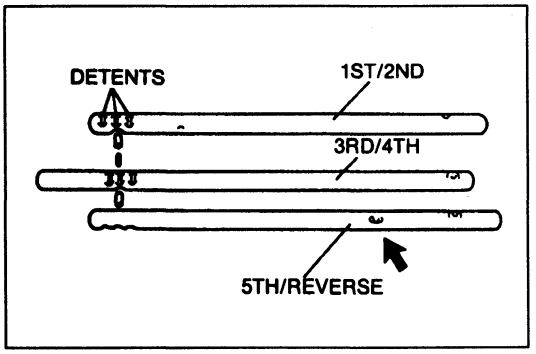
2. Install the synchronizer ring, 5th gear, and needle bearing.
3. Install the steel ball and thrust lock washer.
4. Install the 3.0 mm {0.118 in} C-washers and hold them with a retaining ring.



5. Push the C-washers toward 5th gear and measure the clearance between the C-washers and thrust lock washer. If the clearance is not as specified, select the proper thrust lock washer.

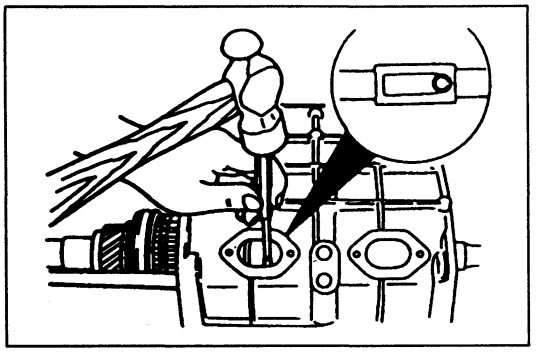
   Standard: 0.1–0.2 mm {0.004–0.008 in}

   Available thrust lock washer thicknesses:
   6.2 mm {0.244 in}, 6.3 mm {0.248 in}
   6.4 mm {0.252 in}, 6.5 mm {0.256 in}
   6.6 mm {0.260 in}, 6.7 mm {0.264 in}

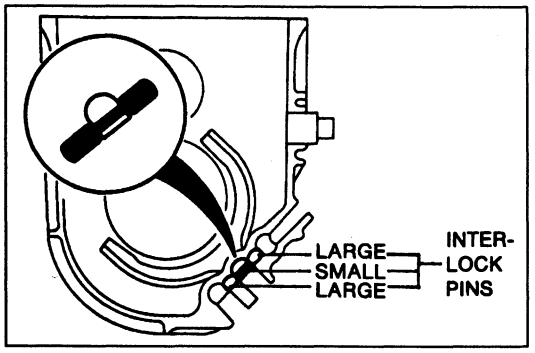


Shift forks and rods

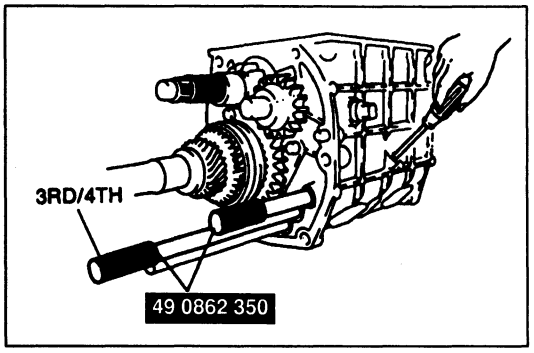
1. Refer to the figure to identify each shift rod. When installing the shift rods in the following procedure, install them so that the detent grooves are facing the detent balls.



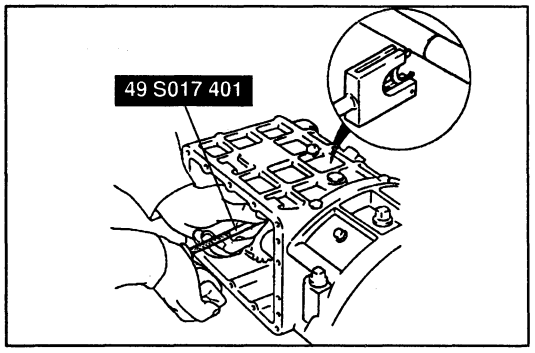
2. Slide the 1st/2nd shift rod into the case.
3. Secure the 1st/2nd shift fork to the rod with a new roll pin. The split in the roll pin must be facing in the direction shown in the figure.



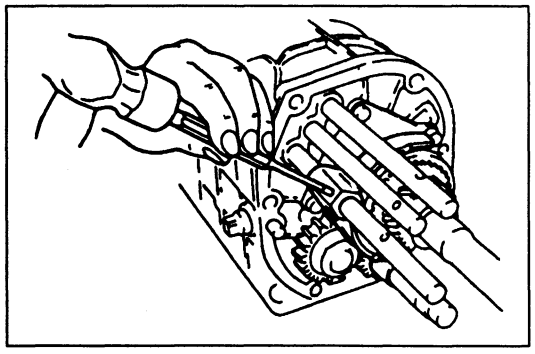
4. Install the interlock pins as shown in the figure when doing steps 4 through 8.



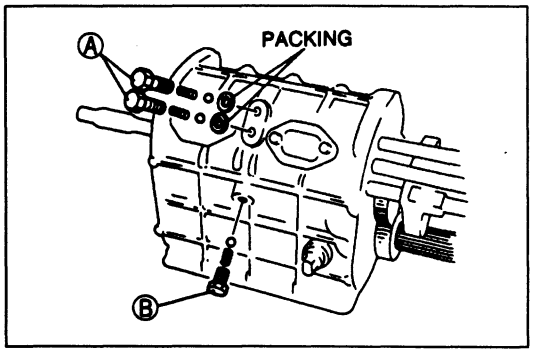
5. Slide the two **SST** into the transmission case to guide the interlock pins, and insert the first pin.
6. Remove the 3rd/4th shift fork guide from the case.
7. Slide the 3rd/4th shift rod containing the interlock pin (small) into the case.
8. Secure the 3rd/4th shift rod onto the fork with the new roll pin.
9. Insert the remaining interlock pin and remove the **SST**.



10. Install the 5th/Reverse shift fork onto the clutch hub.
11. Install the 5th/Reverse shift rod in the transmission case through the spring.
12. Push back the spring, and install a new clip to the 5th/Reverse shift rod by using the **SST**.



13. Install a new roll pin into the 5th/Reverse shift fork.

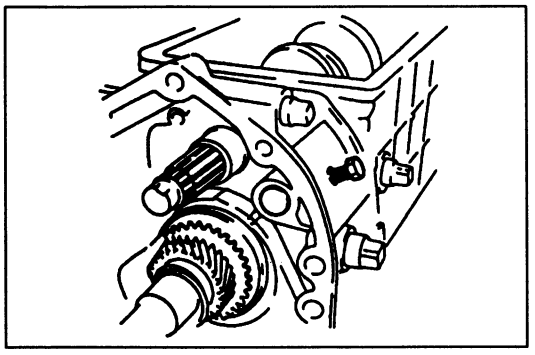


14. Install the two blind covers and two new gaskets.

Tightening torque:
7.9–10.7 N·m{80–110 kgf·cm,70.0–95.4 in·lbf}

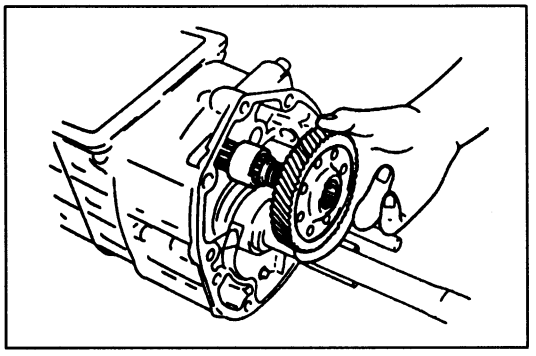
15. Install the packings, detent balls, springs, and cap bolts.

Tightening torque:
A: 40–58 N·m{4.0–6.0 kgf·m,29–43 ft·lbf}
B: 19–25 N·m{1.9–2.6 kgf·m,14–18 ft·lbf}

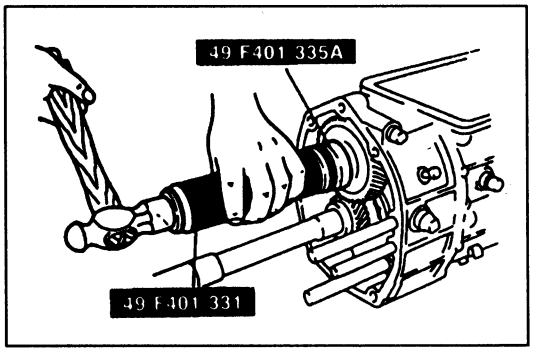


Center housing
1. Apply sealant to the contact surfaces of the transmission case and center housing.
2. Install the oil guide.
3. Install the center housing.
4. Align the reverse idler gear shaft with the set bolt hole, and install the set bolt and washer.

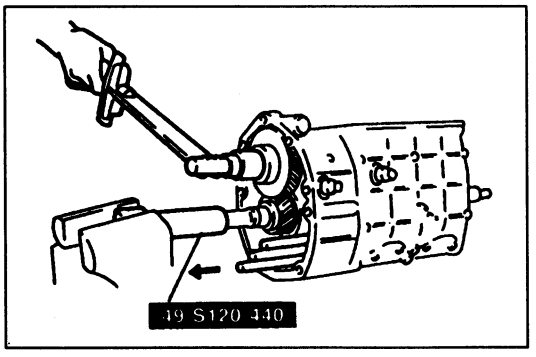
Tightening torque:
8.9–13.7 N·m{90–140 kgf·cm,79–121 in·lbf}



5. Install the spacer and counter 5th gear.

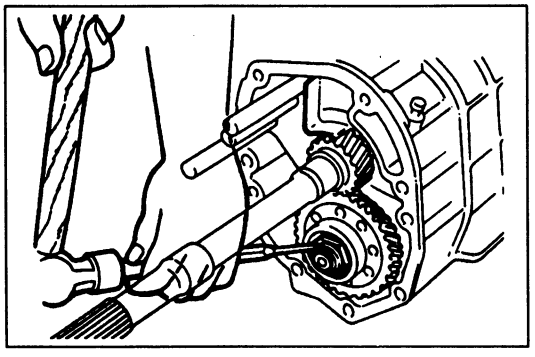


Countershaft rear bearing
1. Install the countershaft rear bearing by using the **SST**.

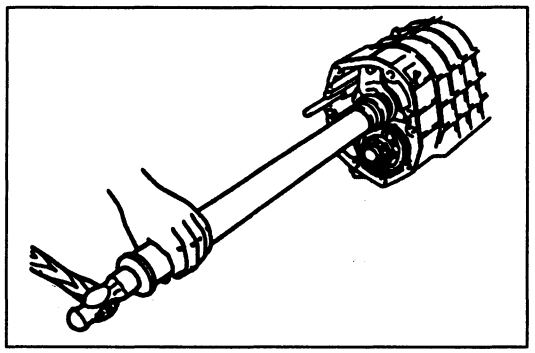


2. Connect the **SST** to the mainshaft and mount it securely in a vise.
3. Shift into 1st gear to lock the countershaft.
4. Install the new countershaft locknut.

Tightening torque:
128–196 N·m{13.0–20.0 kgf·m,95–144 ft·lbf}



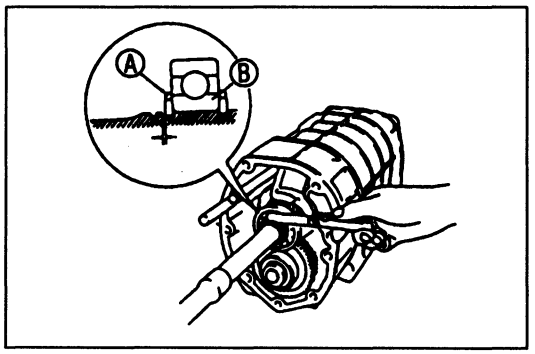
5. Stake the locknut into the countershaft groove.



Mainshaft rear bearing

1. Drive on the mainshaft rear bearing with a suitable pipe.

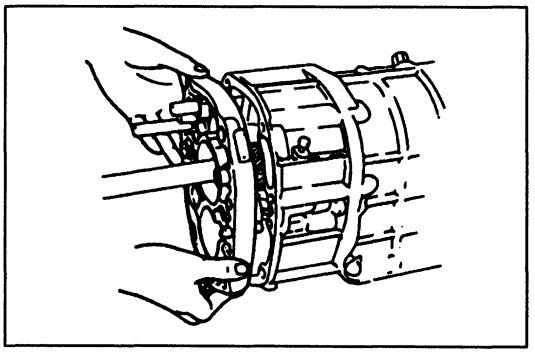
Bearing diameter (inner): 22 mm {0.87 in}
Bearing diameter (outer): 56 mm {2.2 in}



2. Install the C-washers and hold them in place with a new retaining ring.
3. With points A and B pressed tightly together, measure the clearance between the C-washers and the groove. If the clearance is not as specified, select the proper C-washers.

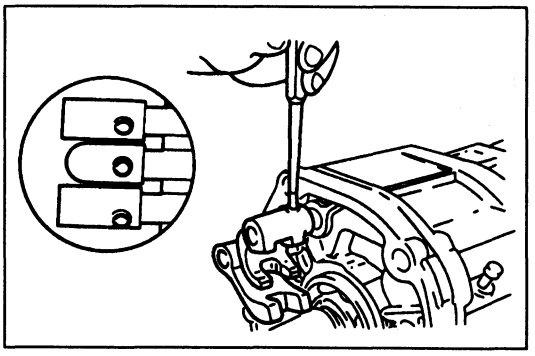
Standard: 0–0.1 mm {0–0.004 in}

Available C-washer thicknesses:
2.9 mm {0.114 in}, 3.0 mm {0.118 in}
3.1 mm {0.122 in}, 3.2 mm {0.126 in}



Bearing housing

1. Apply sealant to the contact surfaces of the center housing and bearing housing.
2. Install the bearing housing onto the center housing.

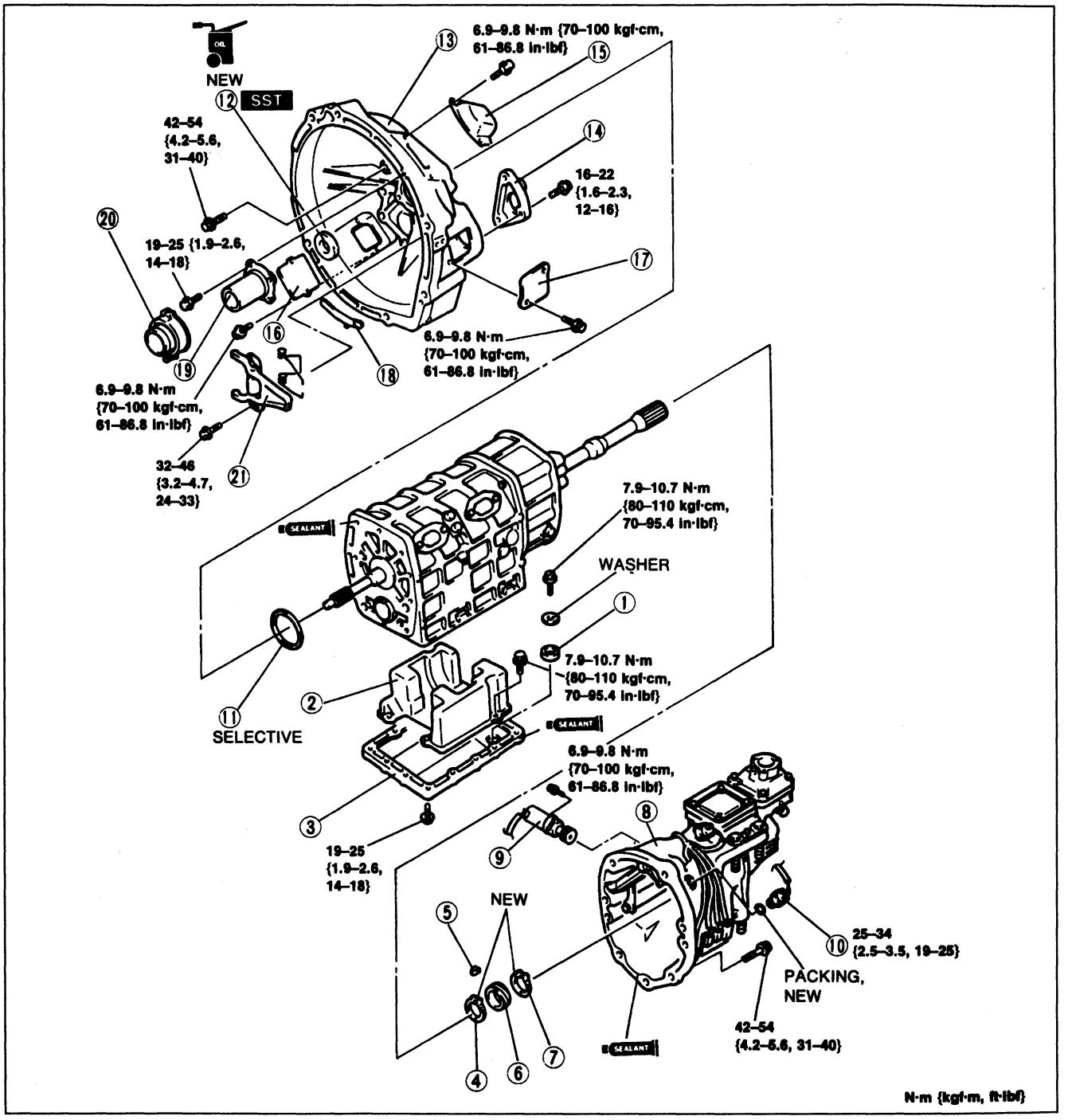


Shift rod ends

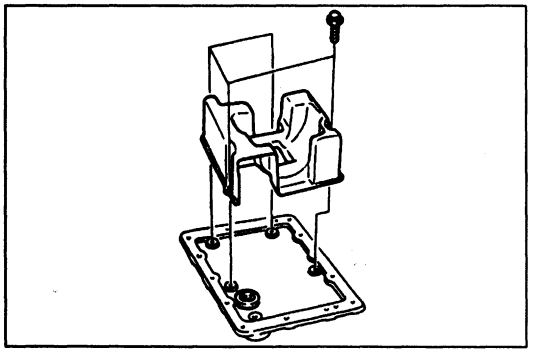
Install the shift rod ends onto the proper shift rods, and secure them with new roll pins facing as shown in the figure.

Clutch Housing and Extension Housing Components

Assemble in the order shown, referring to **Assembly Note**.



1. Magnet
2. Oil baffle
3. Undercover
   Assembly Note
   ..... page J–52
4. Snap ring
5. Key
6. Speedometer drive gear
7. Snap ring
8. Extension housing
   Assembly Note
   ..... page J–52
9. Speedometer sensor
   (Speedometer driven gear)
10. Back-up light switch
11. Assist shim
12. Oil seal (clutch housing)
    Assembly Note
    ..... page J–52
13. Clutch housing
    Assembly Note
    ..... page J–52
14. Release cylinder support
15. Vent cover
16. Service hole B cover
17. Service hole A cover
18. Dust cover
19. Front cover
20. Release collar
    Assembly Note
    ..... page J–53
21. Release fork assembly
    Assembly Note
    ..... page J–53

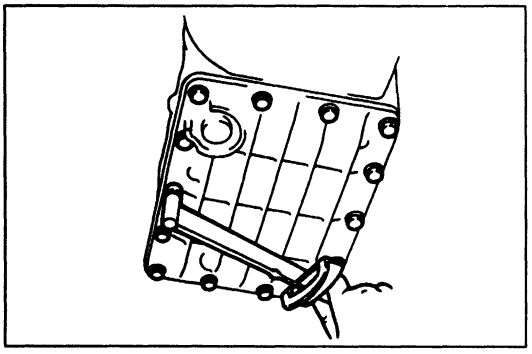


Assembly note
Undercover
1. Install the magnet to the undercover.

Tightening torque:
7.9–10.7 N·m{80–110 kgf·cm,70.0–95.4 in·lbf}

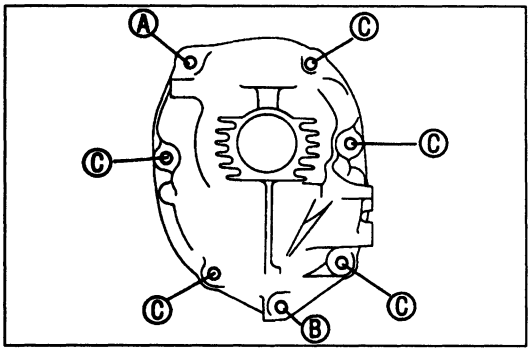
2. Install the oil baffle to the undercover.

Tightening torque:
7.9–10.7 N·m{80–110 kgf·cm,70.0–95.4 in·lbf}



3. Apply sealant to the contact surfaces of the undercover and the transmission case.
4. Install the undercover.

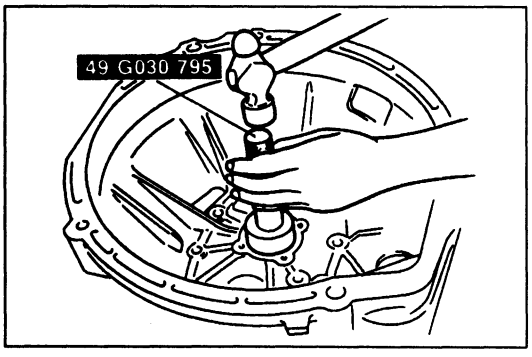
Tightening torque:
19–25 N·m{1.9–2.6 kgf·m,14–18 ft·lbf}



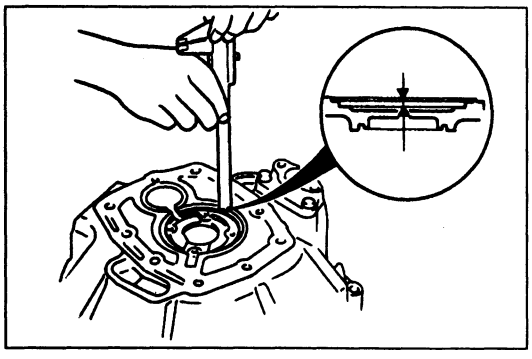
Extension housing
1. Apply sealant to the contact surfaces of the extension housing and bearing housing.
2. Install the extension housing.

Bolt length (measured from below the head):
A: 135 mm {5.31in}
B: 48 mm {1.89 in}
C: 165 mm {6.50 in}

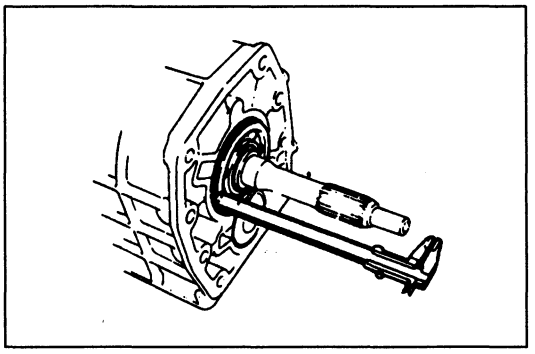
Tightening torque:
42–54 N·m{4.2–5.6 kgf·m,31–40 ft·lbf}



Oil seal (clutch housing)
1. Apply the specified oil to the lip of a new oil seal.
2. Install the oil seal evenly by using the **SST**.

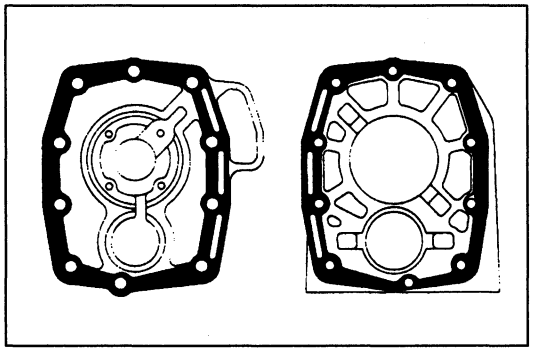


Clutch housing
1. Measure the depth of the main drive gear bearing bore in the clutch housing by using vernier calipers.

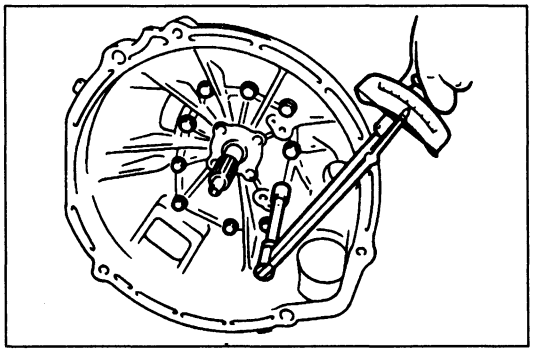


2. Measure the main drive gear bearing height.
3. The difference between the measurements in steps 1 and 2 indicates the required thickness of the adjustment shim.

Standard thrust play: 0–0.1 mm {0–0.004 in}
Adjustment shim thicknesses:
0.3 mm {0.012 in}, 0.4 mm {0.016 in}
0.5 mm {0.020 in}, 0.6 mm {0.024 in}
0.7 mm {0.028 in}

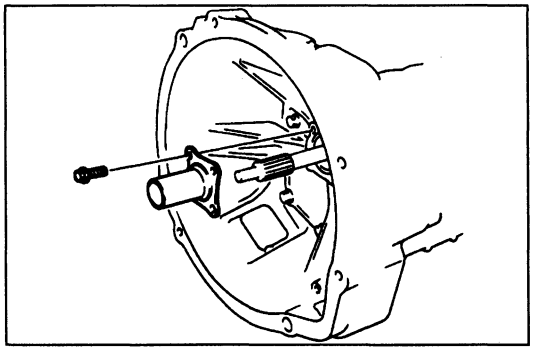


4. Apply sealant to the contact surfaces of the clutch housing and transmission case.
5. Install the correct adjustment shim on the main drive gear bearing as determined in steps 1and 2.



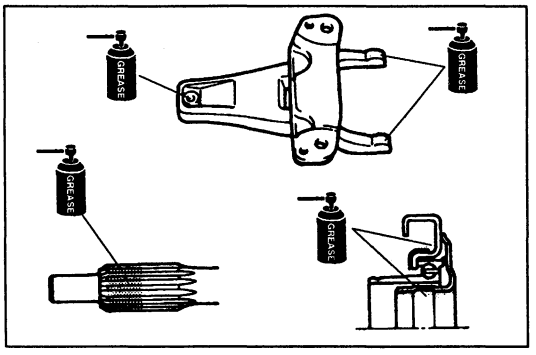
6. Install the clutch housing.

Tightening torque:
42–54 N·m{4.2–5.6 kgf·m,31–40 ft·lbf}

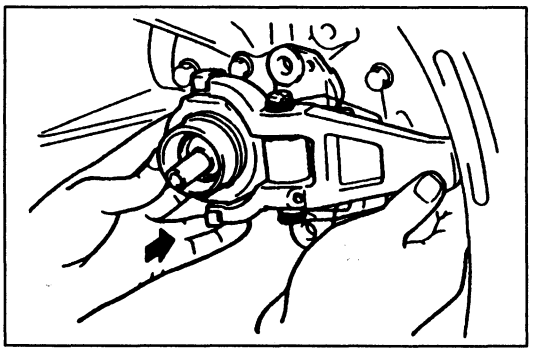


7. Install the front cover to the clutch housing.

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



Release collar and release fork assembly
1. Apply molybdenum grease to the shaded areas of the release bearing and release fork.

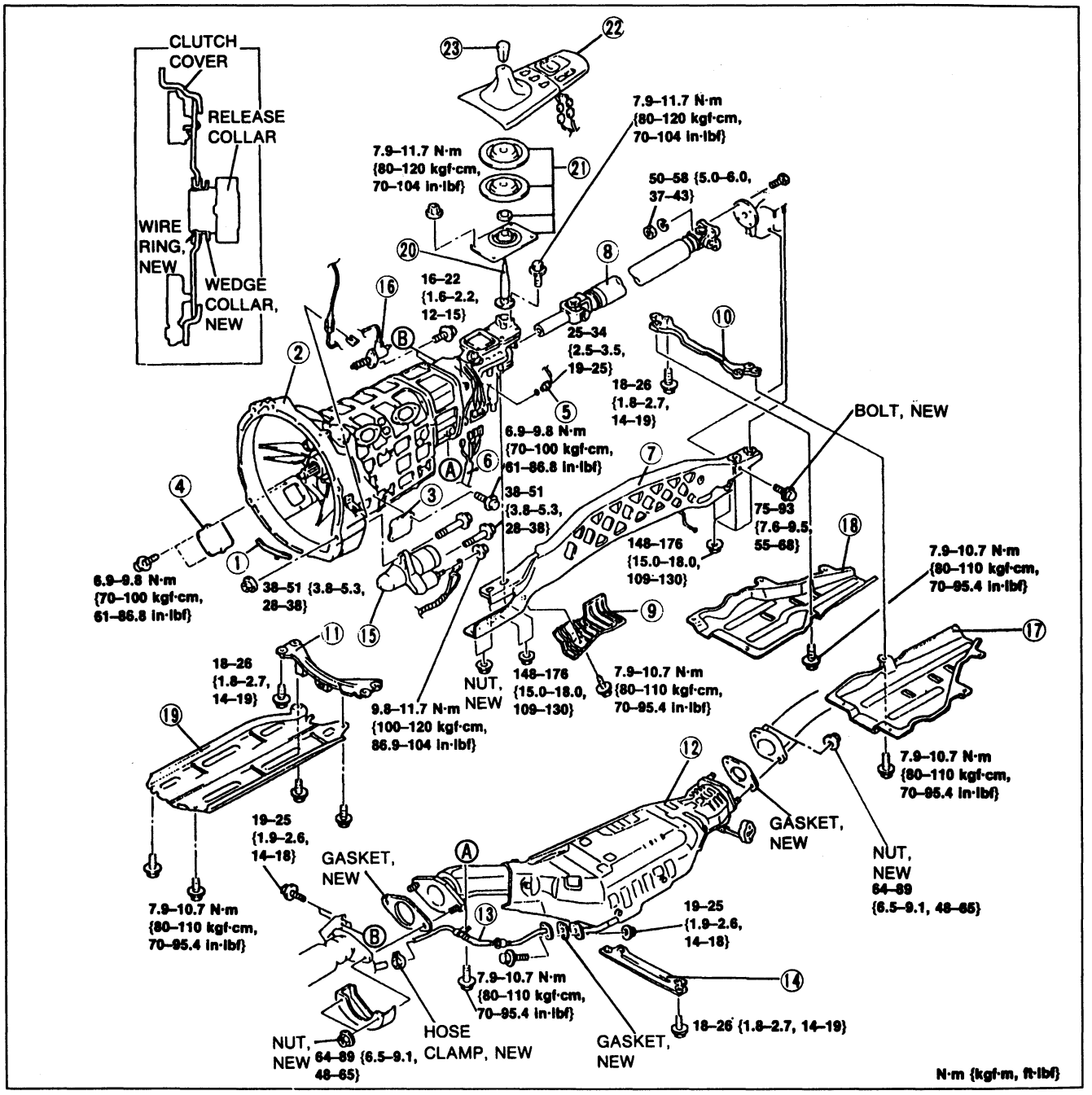


2. Install the release bearing and release fork assembly.

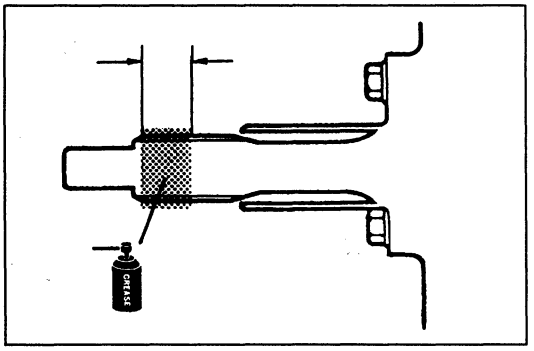
Tightening torque:
32–46 N·m {3.2–4.7 kgf·m, 24–33 ft·lbf}

INSTALLATION

1. Install in the order shown, referring to **Installation Note**.
2. After installation, fill the transmission with the specified oil and do a road test.

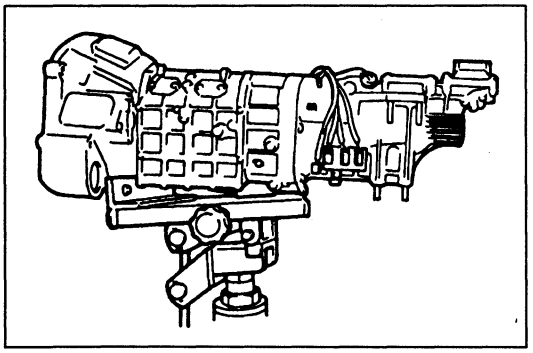


1. Dust cover
2. Transmission
   Installation Note
   ..... page J-56
3. Service hole A cover
4. Service hole B cover
5. Back-up light switch
6. Connectors
7. Power Plant Frame (PPF)
   Installation Note
   ..... page J-57
8. Propeller shaft
   Installation ..... section L
9. Cover
10. Tunnel reinforcement (rear)
11. Tunnel reinforcement (front)
12. Catalytic converter assembly
13. Secondary air injection pipe
14. Tunnel reinforcement (center)
15. Starter
16. Clutch release cylinder
17. Left undercover
18. Right undercover
19. Transmission cover
20. Shift lever assembly
21. Insulator assembly
22. Console panel assembly
23. Shift lever knob

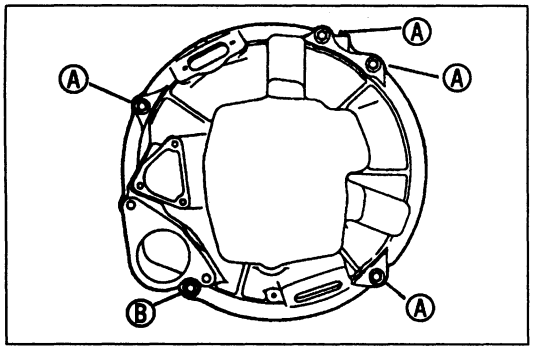


Installation Note
Transmission

1. Coat the main drive gear splines with grease as shown in the figure.



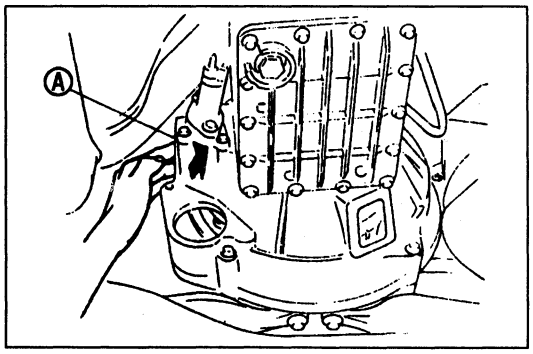
2. Set the transmission on a transmission jack.



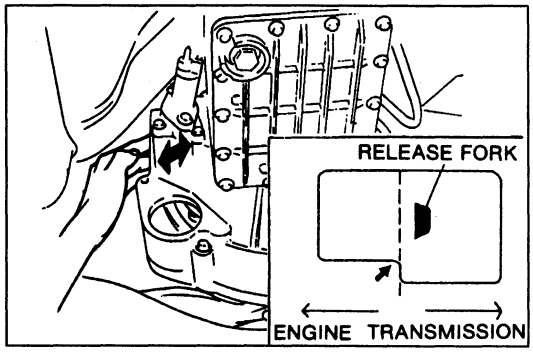
3. Raise the transmission into place and install it to the engine, being careful not to dent or scratch the wedge collar and wirering.
4. Tighten the installation bolts.

Bolt length:
A: 55 mm {2.2 in}
B: 90 mm {3.5 in}

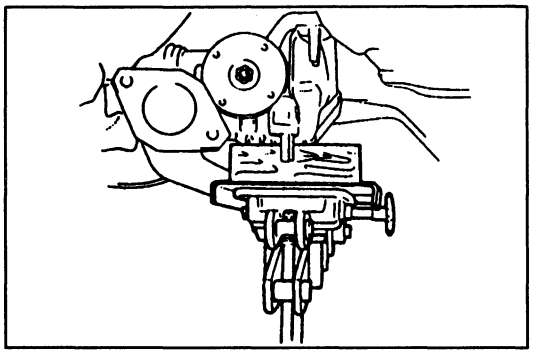
Tightening torque:
38–51 N·m{3.8–5.3 kgf·m,28–38 ft·lbf}



5. Through service hole A, push the release-cylinder end of the clutch release fork toward the transmission, and connect the clutch release collar to the clutch cover. The clutch release collar should snap into the clutch cover when installed properly.

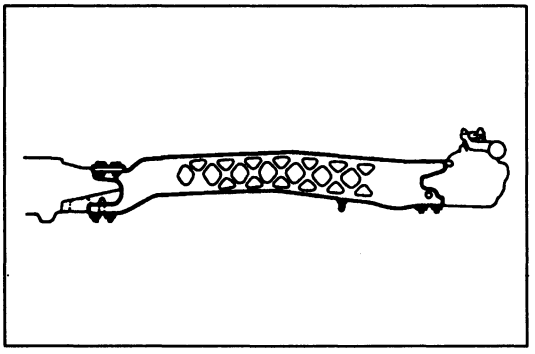


6. Swing the clutch release fork back and forth to verify that the clutch release collar is connected to the clutch cover.
7. Push the release-cylinder end of the clutch release fork toward the engine, and verify that it does not move past the dotted line.

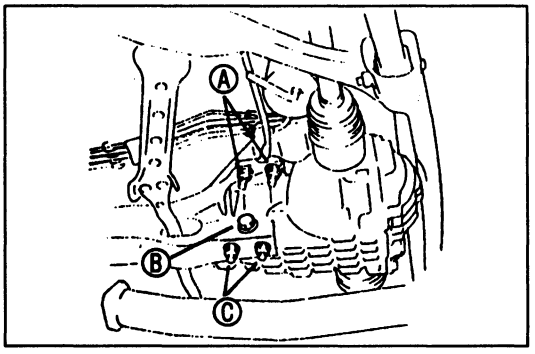


Power plant frame (PPF)

1. Hold the differential at a 0° angle by using the transmission jack.

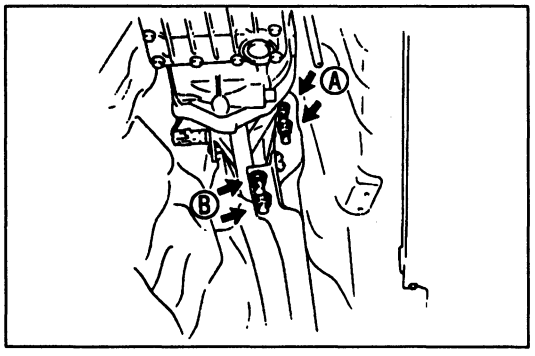


2. Hold the PPF in place with a new bolt and 8 new nuts.



3. Tighten the differential-side PPF installation bolt and nuts in the order shown.

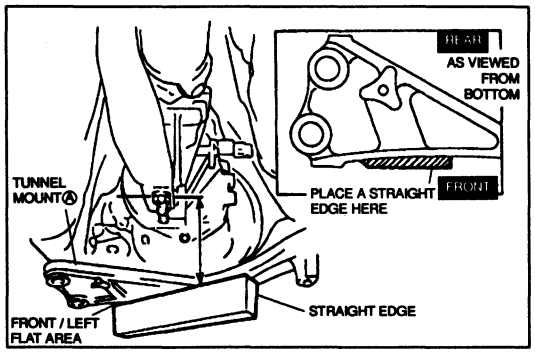
Tightening torque:
A, C: 148–176 N·m
{15.0–18.0 kgf·m,109–130 ft·lbf}
B: 75–93 N·m{7.6–9.5 kgf·m,55–68 ft·lbf}



4. Tighten the transmission-side PPF installation nuts in the order shown.

Tightening torque:
148–176 N·m{15.0–18.0 kgf·m,109–130 ft·lbf}

5. Remove the transmission jack.
6. Lower the vehicle to the ground, and remove the **SST** (engine supports).



7. Place a straightedge on the flat area on the front/left edge of the tunnel mount (A) so that it passes under the PPF install ation bolts. Measure from the top of the straightedge to the PPF.

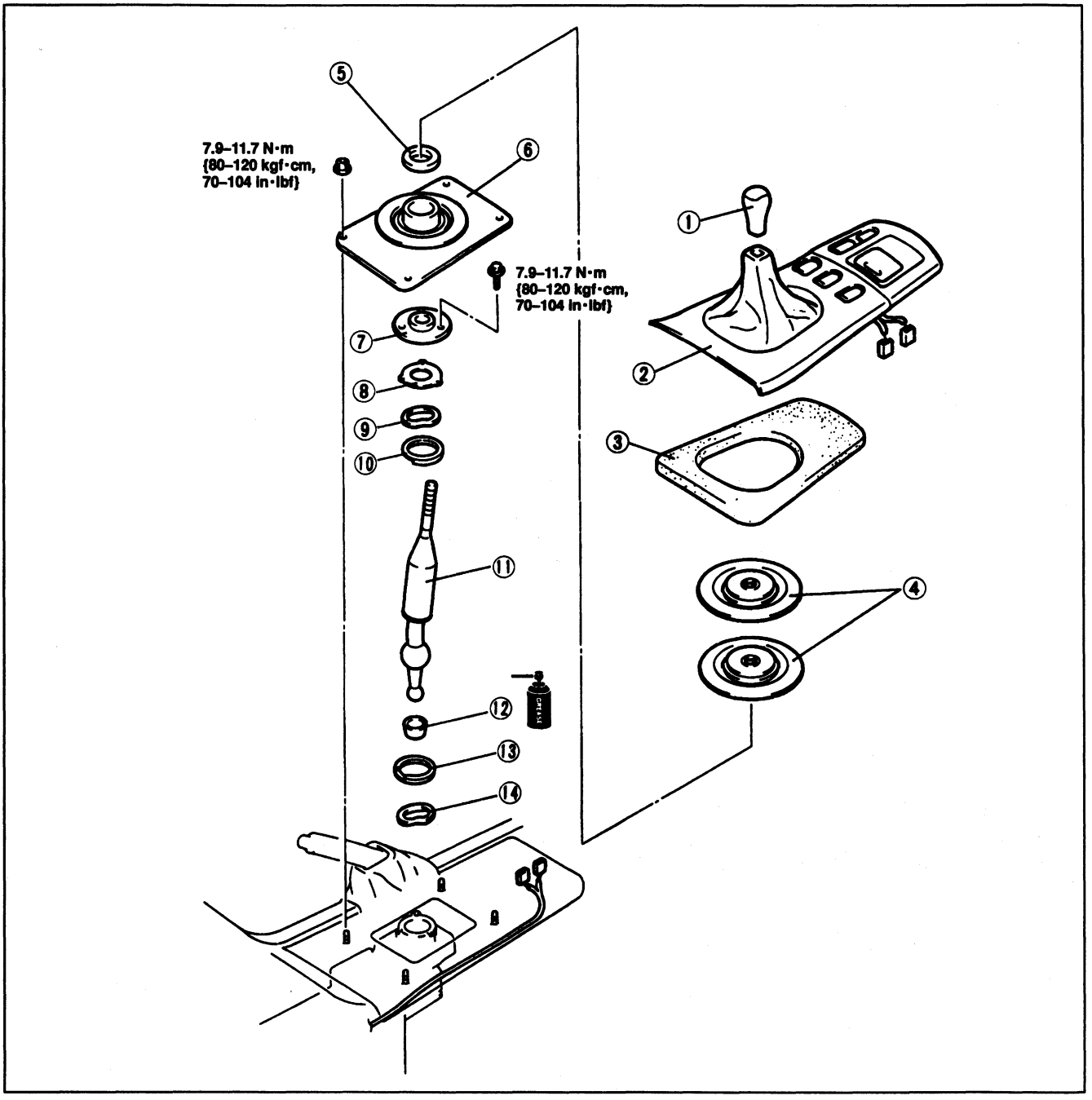
Standard: 75.1 mm {2.96 in}
Acceptable range: 70–77 mm {2.76–3.03 in}

8. If the clearance is not with in specification, read just the PPF.

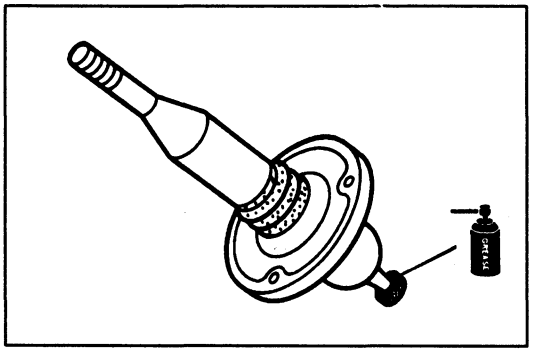
SHIFT MECHANISM

OVERHAUL

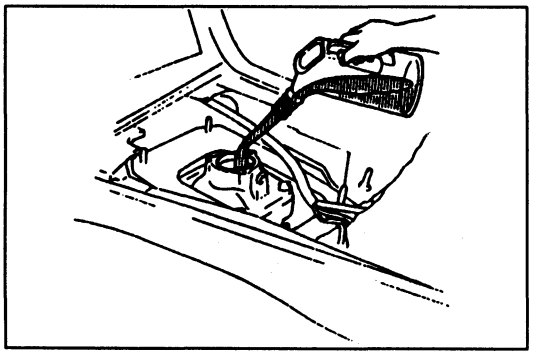
1. Disassemble as shown in the figure.
2. Inspect each part, and replace if necessary.
3. Assemble in the reverse order of disassembly.
4. After assembly, pump the clutch pedal and verify that the shift lever moves smoothly.



1. Shift lever knob
2. Console panel assembly
3. Bushing pad
4. Insulator boot pads
5. Insulator boot ring
6. Insulator boot
7. Dust boot
8. Gasket
9. Wave washer
10. Bushing
11. Shift lever
    Assembly Note
    ..... page J–59
12. Shift seat
    Assembly Note
    ..... page J–59
13. Bushing
14. Wave washer



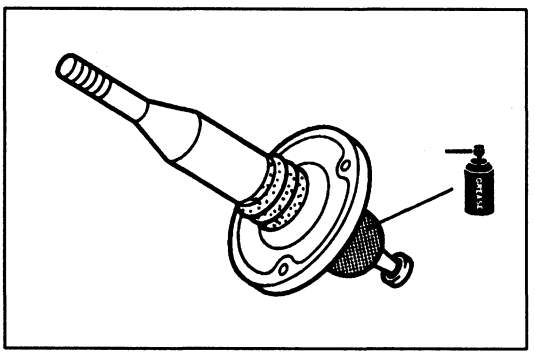
Assembly Note
Shift seat
Apply grease to both the inside and outside of the shift seat.



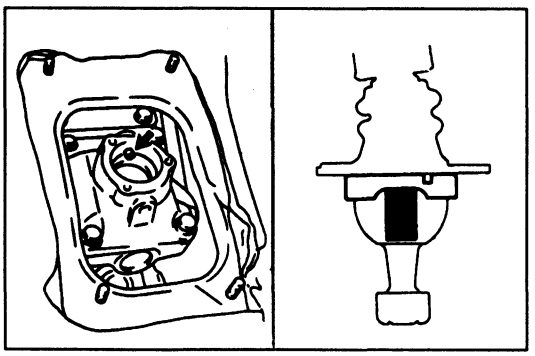
Shift lever
The change control case must be filled with oil after the transmission has been reassembled and installed.

1. Fill the change control case with the specified oil.

   Capacity: 80–95 cm^3 {4.9–5.8 cu in}



2. Apply grease to the shift lever ball joint.

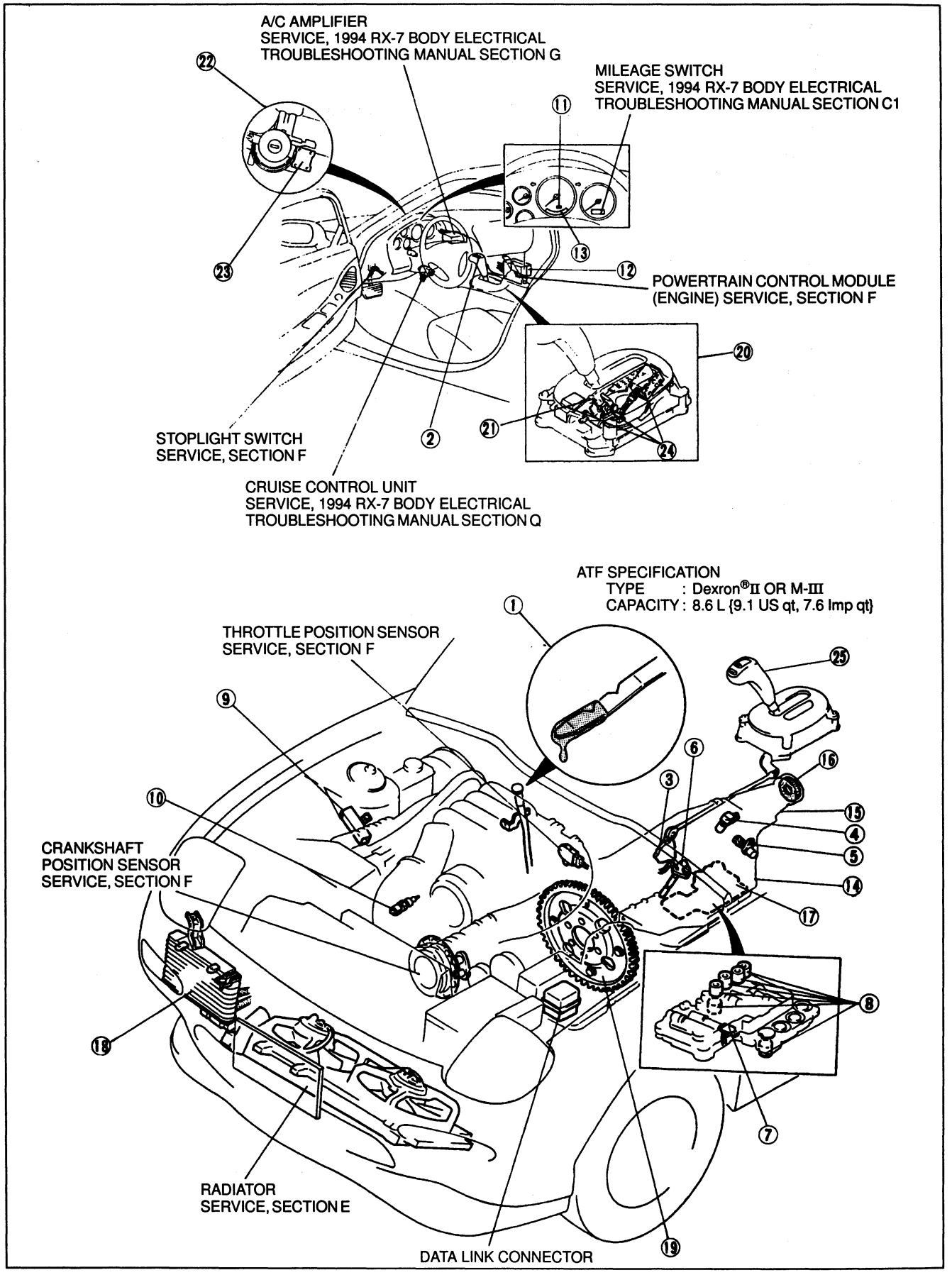


3. Align the control case pin with the slots in the change bushings and the shift lever, and install.

Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

AUTOMATIC TRANSMISSION (Electronically Controlled)

INDEX

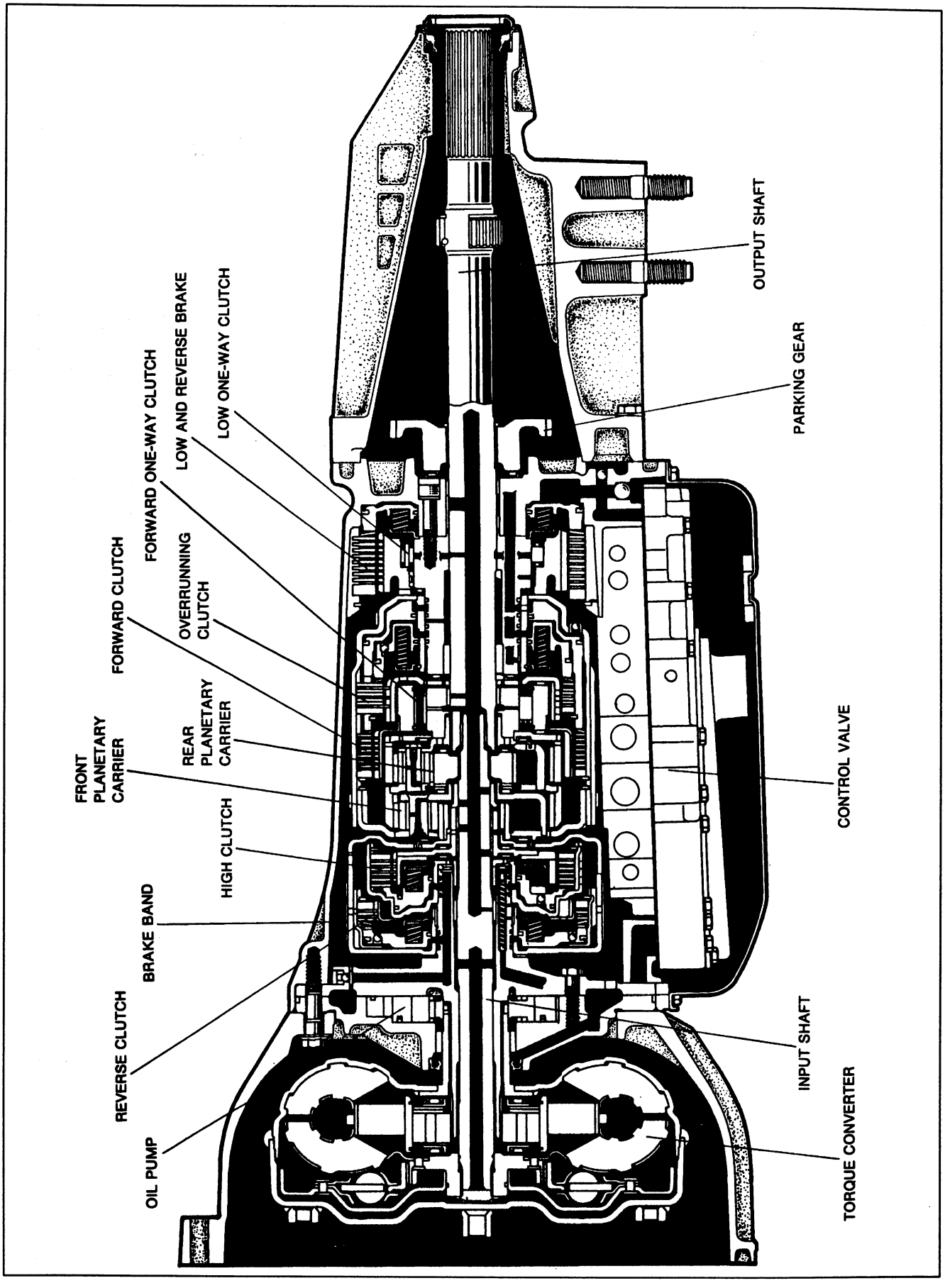

A/C AMPLIFIER
SERVICE, 1994 RX-7 BODY ELECTRICAL
TROUBLESHOOTING MANUAL SECTION G
MILEAGE SWITCH
SERVICE, 1994 RX-7 BODY ELECTRICAL
TROUBLESHOOTING MANUAL SECTION C1
POWERTRAIN CONTROL MODULE
(ENGINE) SERVICE, SECTION F
STOPLIGHT SWITCH
SERVICE, SECTION F
CRUISE CONTROL UNIT
SERVICE, 1994 RX-7 BODY ELECTRICAL
TROUBLESHOOTING MANUAL SECTION Q
ATF SPECIFICATION
TYPE : Dexron®II OR M-III
CAPACITY : 8.6 L {9.1 US qt, 7.6 Imp qt}
THROTTLE POSITION SENSOR
SERVICE, SECTION F
CRANKSHAFT
POSITION SENSOR
SERVICE, SECTION F
RADIATOR
SERVICE, SECTION E
DATA LINK CONNECTOR

OUTLINE

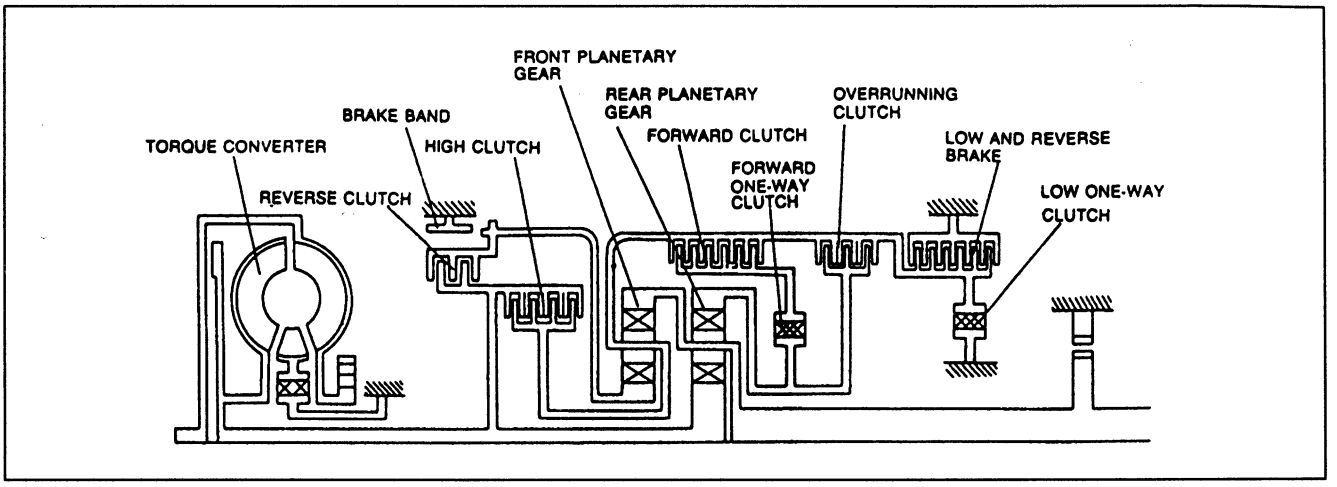
SPECIFICATIONS

Item \ Model			RB4A-EL
Gear ratio	1st gear		3.027
	2nd gear		1.619
	Third gear		1.000
	Fourth gear		0.694
	Reverse		2.272
Final gear ratio			3.909
Automatic transmission fluid (ATF)	Type		Dexron®II or M-III
	Capacity L {US qt, Imp qt}	Total	8.6 {9.1, 7.6}
		Oil pan	4.0 {4.2, 3.5}
Torque converter stall torque ratio			2.200
Number of drive / driven plates	Reverse clutch		2/2
	High clutch		4/7
	Forward clutch		6/6
	Overrunning clutch		3/5
	Low and reverse brake		7/7
Band servo mm {in}	Servo piston outer / inner diameter		80.0/50.0 {3.15/1.97}
	4GR servo piston outer diameter		72.0 {2.83}
Number of teeth on front planetary gear unit	Sun gear		33
	Pinion gear		21
	Internal gear		75
Number of teeth on front planetary gear unit	Sun gear		37
	Pinion gear		19
	Internal gear		75

CROSS-SECTIONAL VIEW



POWERFLOW DIAGRAM

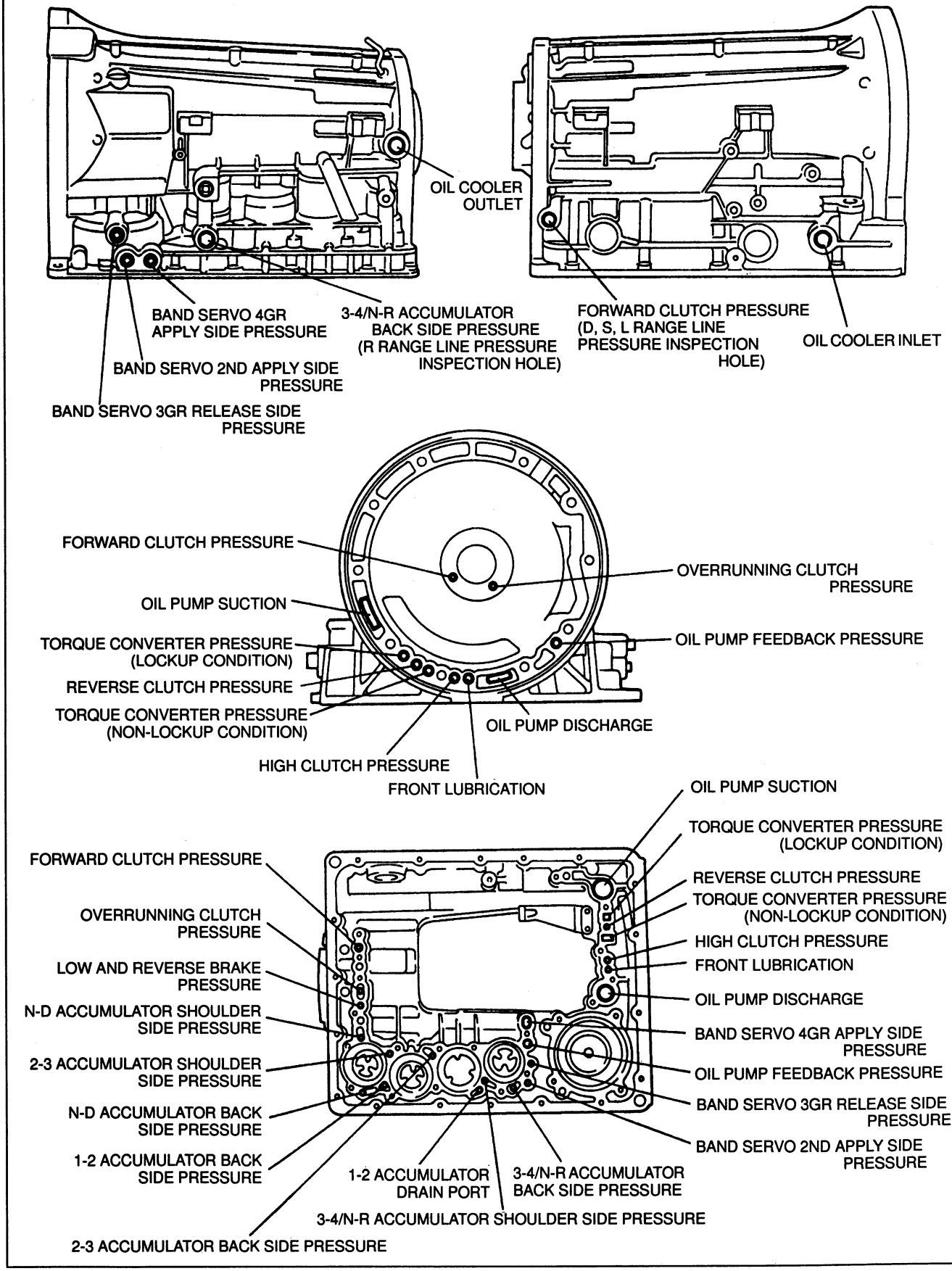


OPERATION OF COMPONENTS

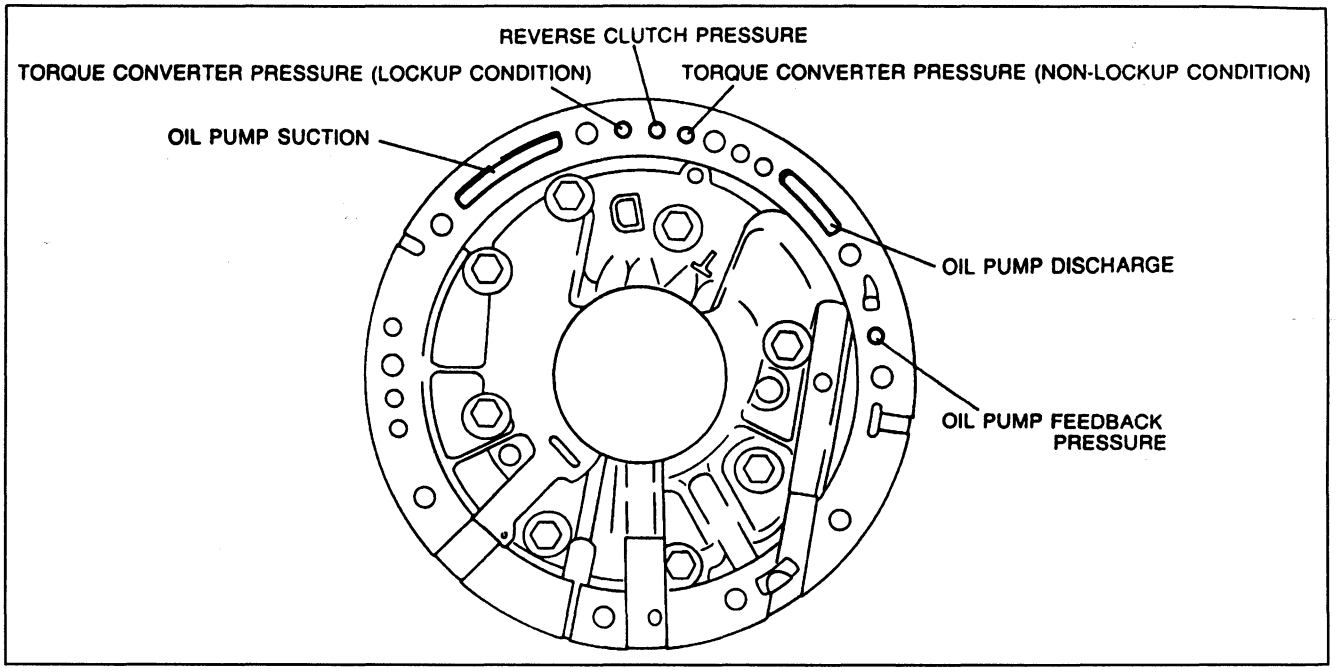
Range	Mode	Gear	Shift	Reverse clutch	High clutch	Forward clutch	Overrunning clutch	Band servo piston			Forward OWC	Low OWC	Low and reverse brake
								2nd applied	3GR released	4GR applied			
P	—	—	—										
R	—	Reverse	—	○									○
N	—	—	—										
D	Except hold	1	↕			○	■				●	●	
		2	↕			○	*3 ■	○			●		
		3	↕		○	○	*3 ■	*1 ⊗	⊗		●		
		4	↓		○	⊗		*2 ⊗	⊗	○			
	hold	2	↕			○	*3 ◎	○			●		
		3	↕		○	○	*3 ◎	*1 ⊗	⊗		●		
		*4 4	↑		○	⊗		*2 ⊗	⊗	○			
S	Except hold	1	↕			○	△				●	●	
		2	↕			○	*3 △	○			●		
		3	↓		○	○	*3 △	*1 ⊗	⊗		●		
	hold	2	↑			○	*3 △	○			●		
		*4 3	↑		○	○	*3 △	*1 ⊗	⊗		●		
L	Except hold	1	↕			○	*3 ○				●	●	○
		2	↓			○	*3 ○	○			●		
	hold	1	↑			○	*3 ○				●	●	○
		*4 2	↑			○	*3 ○	○			●		

OWC: one-way clutch
*1 : Hydraulic pressure is applied to both 2nd gear applied side and Third gear released side of band servo piston. However, because area of Third gear released side is larger than 2nd gear applied side, the brake band does not engage.
*2 : Hydraulic pressure is applied to Fourth gear applied side in the above conditions (*1) and brake band engages.
*3 : Indicates that engine braking is available as a result of operation of overrunning clutch.
*4 : Prevents engine overspeed.
○ : Constantly engaged.
● : Operates when accelerated.
△ : Engaged when throttle opening is below approximately 1.3/8.
◎ : Engaged when vehicle speed is above approximately 10 km/h {6.2 MPH} and throttle opening is below approximately 1.3/8.
■ : Engaged when vehicle speed is above approximately 10 km/h {6.2 MPH} and throttle opening is below approximately 1.3/8 (NORMAL A/C OFF mode)
⊗ : Engaged, but does not transmit power.

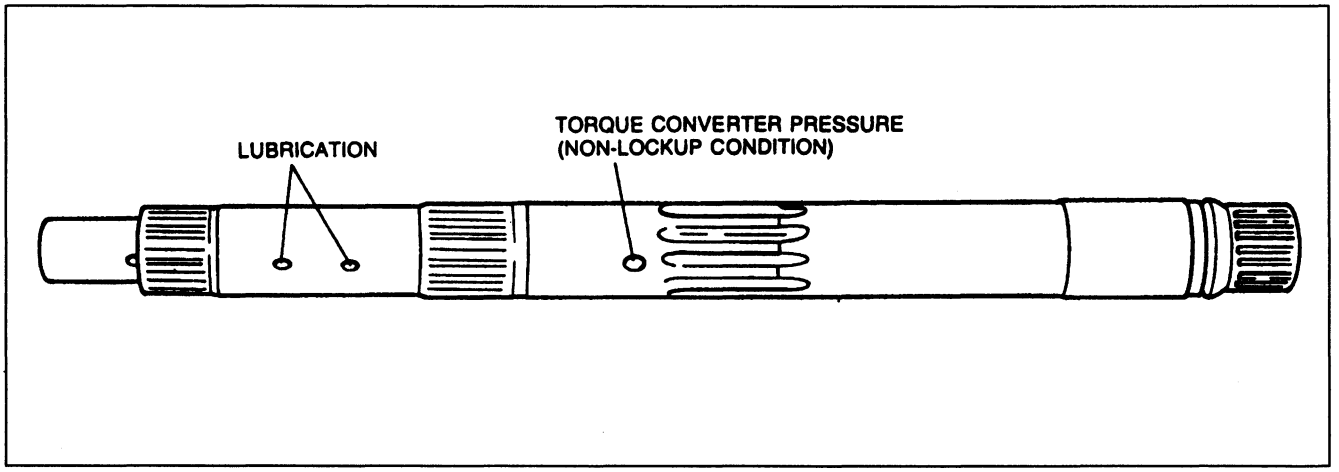
FLUID PASSAGE LOCATION
Transmission Case



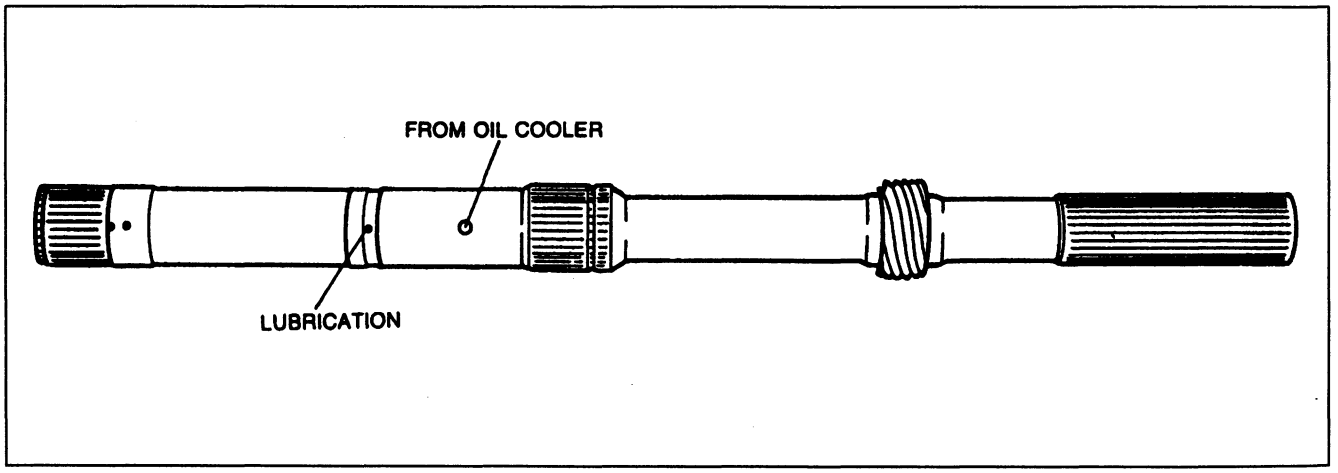
Oil Pump



Input Shaft

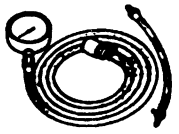
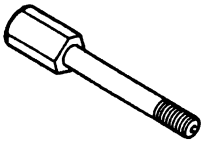


Output Shaft



MECHANICAL SYSTEM TEST

PREPARATION
SST

49 0378 400A Gauge set, oil pressure 	For oil pressure test	49 B019 901 Gauge, oil pressure 	For oil pressure test
49 F019 0A0 Adapter set 	For oil pressure test	49 F019 002 Adapter A (Part of 49 F019 0A0) 	For oil pressure test
49 F019 003 Adapter B (Part of 49 F019 0A0) 	For oil pressure test	49 F019 004 Screw (Part of 49 F019 0A0) 	For oil pressure test

K

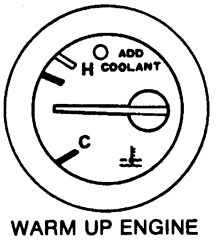
STALL TEST

This test is performed to determine if there is slippage of the friction elements or malfunction of the hydraulic components.

Preparation

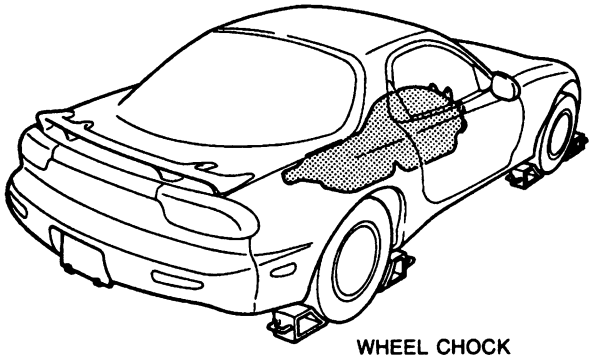
1. Engage the parking brake and use wheel chocks at the front and rear of the wheels.
2. Warm the engine thoroughly to raise the ATF temperature to operating level **60–70°C {140–158°F}**.
3. Check, and correct as necessary, the engine coolant, engine oil, and ATF levels before testing.


PARKING BRAKE

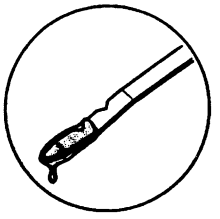


WARM UP ENGINE

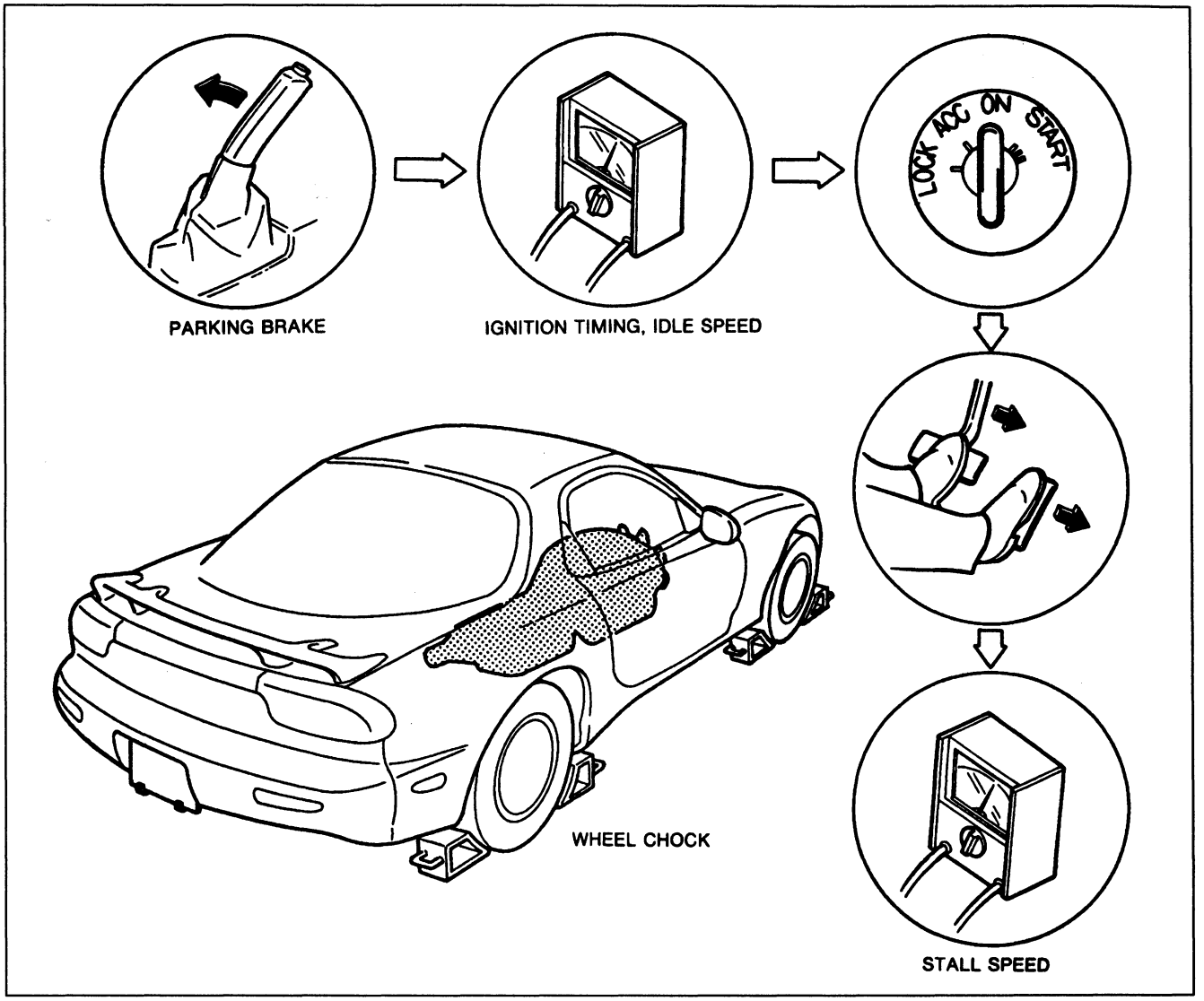

COOLANT LEVEL


WHEEL CHOCK


ENGINE OIL LEVEL


ATF LEVEL

Procedure



1. Check the idle speed and ignition timing in P range. (Refer to section F.)

Caution
- **If the accelerator pedal is pressed for longer than 5 seconds while the brake pedal is pressed, the transmission could be damaged. Therefore, do steps 2 and 3 within 5 seconds of other.**

2. Firmly depress the brake pedal with the left foot, shift the selector lever to D range (except hold mode), and gradually depress the accelerator pedal with the right foot until the throttle valve is at wide opened throttle.
3. When the engine speed no longer increases, quickly read the speed and release the accelerator.
4. Shift the selector to N and let the engine idle for 1 minute or more to cool the ATF.

5. Perform a stall test for the following ranges in the same manner. Check the high clutch and brake band for slipping even if the engine speed is within specification.
   (1) D range (hold mode)
   (2) S range (except hold mode)
   (3) S range (hold mode)
   (4) L range (except hold mode)
   (5) L range (hold mode)
   (6) R range

Engine stall speed: 3,000–3,300 rpm

Evaluation of Stall Test

<table>
<tr><th colspan="2">Condition</th><th colspan="2">Possible Cause</th></tr>
<tr><td rowspan="5">Above specification</td><td rowspan="3">In all ranges</td><td rowspan="3">Insufficient line pressure</td><td>Worn oil pump</td></tr>
<tr><td>Oil leakage from oil pump, control valve, and/ or transmission case</td></tr>
<tr><td>Stuck pressure regulator valve</td></tr>
<tr><td>In D and S ranges (except hold mode)</td><td colspan="2">Forward clutch slipping
Forward one-way clutch slipping
Low one-way clutch slipping</td></tr>
<tr><td>In R range</td><td colspan="2">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 braking applied in L range 1st
...Reverse clutch slipping
b) Engine braking not applied in L range 1st
...Low and reverse brake slipping</td></tr>
<tr><td colspan="2" rowspan="2">Below specification</td><td colspan="2">Engine out of tune</td></tr>
<tr><td colspan="2">One-way clutch slipping within torque converter</td></tr>
</table>

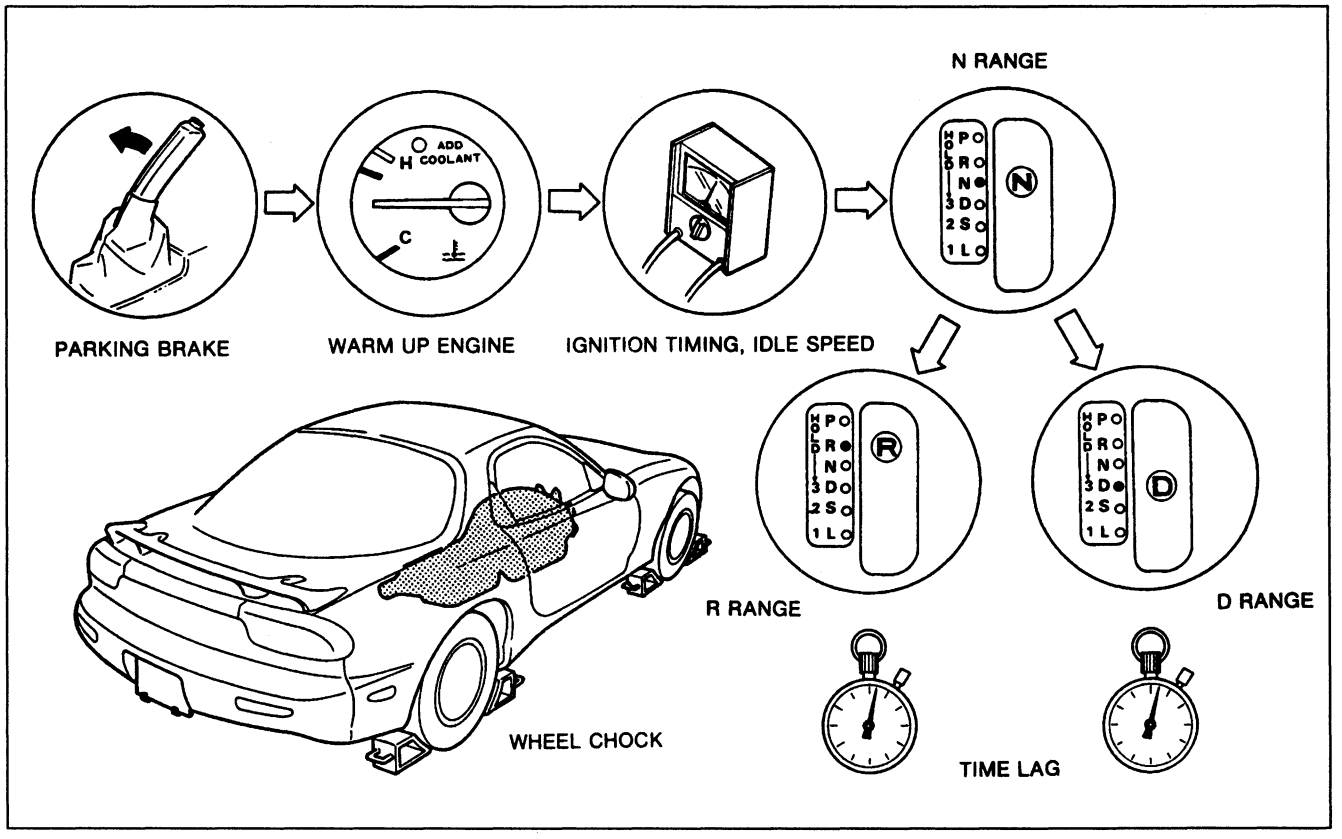
..E LAG TEST

the selector lever is shifted while the engine is idling, there will be a certain time lapse, or time lag, before shift shock is felt. This step measures this time lag in order to check conditions of the N-D, 1-2, and 3-4/N-R accumulators; forward, reverse, and one-way clutches; brake band; and low and reverse brake.

Preparation

Perform the preparation procedure outlined in STALL TEST. (Refer to page K-9.)

Procedure



1. Check the idle speed and ignition timing in P range. (Refer to section F.)
2. Shift from N range to D range (except hold mode).
3. Use a stopwatch to measure the time taken from shifting until shock is felt.
4. Do the time lag test for the following shifts in the same manner.
   Make three measurements for each test and average the results.
   (1) N → D range (hold mode)
   (2) N → R range

Time lag: N → D range ..... Below 1.0 sec.
N → R range ..... Below 1.2 sec.

If the time lag test result is above specification, check for the following possible causes.

Evaluation of Time Lag Test

Condition		Possible Cause
Above specification	N → D shift (except hold mode)	Insufficient line pressure Forward clutch slipping Low one-way clutch slipping N-D accumulator not operating properly
	N → D shift (hold mode)	Insufficient line pressure Brake band slipping 1-2 accumulator not operating properly
	N → R shift	Insufficient line pressure Reverse clutch slipping Low and reverse brake slipping 3-4/N-R accumulator not operating properly

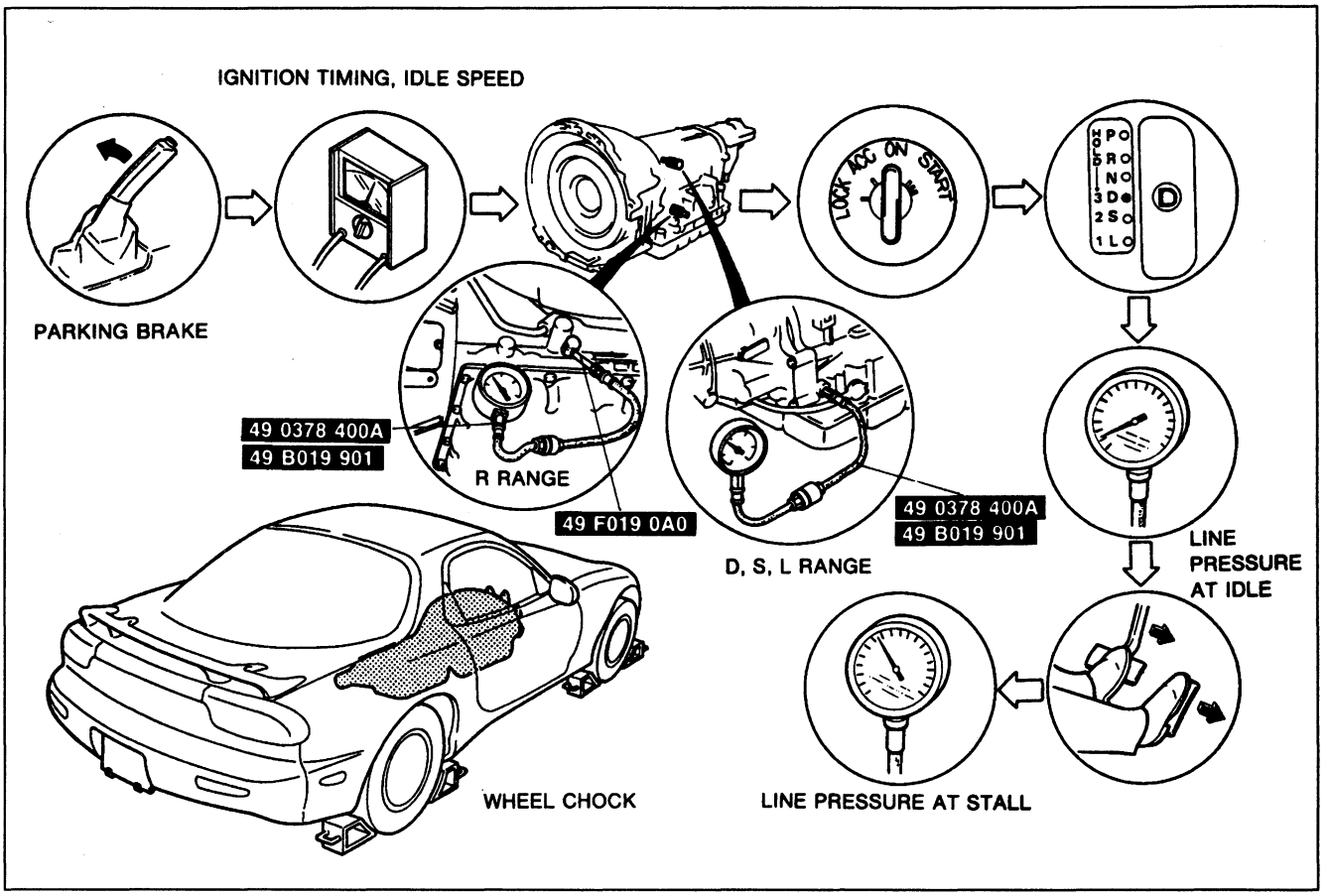
LINE PRESSURE TEST

This test measures line pressures as a means of checking the hydraulic components and inspecting for oil leakage.

Preparation

Perform the preparation procedure outlined in STALL TEST. (Refer to page K-9.)

Procedure



1. Check the idle speed and ignition timing in P range. (Refer to section F.)
2. Remove the front tunnel member and the exhaust pipe bracket.
3. Remove the line pressure inspection bolt, and connect the **SST** (49 F019 0A0).
4. Replace the gauge of **SST** (49 0378 400A) with the other **SST** (49 B019 901).
5. Shift the selector lever to D range and read the line pressure at idle.
   Warning
   - **Removing the square-head plug when the ATF is hot can be dangerous. Hot ATF can come out of the opening and badly burn. Before removing the square-head plug, allow the ATF to cool.**
6. Remove the **SST** (49 B019 901) and replace the gauge of it with the other **SST** (49 0378 400A).
7. Connect the **SST** (49 0378 400A) 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 transmission could be damaged. Therefore, do steps 8 and 9 within 5 seconds of other.**
8. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot until the throttle valve is at wide opened throttle.
9. Read the line pressure as soon as the engine speed becomes constant, then release the accelerator pedal.
10. Shift the selector to N and let the engine idle for 1 minute or more to cool the ATF.
11. Read the line pressure at idle and at the engine stall speed for each range in the same manner.

Specified line pressure:

Range	Line pressure kPa {kgf/cm², psi}	
	Idle	Stall
D, S, L	500–520 {5.0–54, 72–76}	1,200–1,270 {12.2–13.0, 174–184}
R	620–650 {6.3–6.7, 90–95}	1,510–1,570 {15.3–16.1, 218–228}

Warning
- **Removing the square-head plug when the ATF is hot can be dangerous. Hot ATF can come out of the opening and badly burn. Before removing the square-head plug, allow the ATF to cool.**

12. Remove the **SST** and install a new square head plug in the inspection port.

Tightening torque: 5.0–9.8 N·m {50–100 kgf·cm, 44–86 in·lbf}

13. Install the exhaust pipe bracket.

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

14. Install the front tunnel member.

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

If the line pressure test result is out of the specification, check for the following possible causes.

Evaluation of Line Pressure Test

Condition		Possible Cause
At idle	Low pressure in every range	Worn oil pump Damaged control piston (in oil pump) Pressure regulator valve or plug sticking Damaged pressure regulator valve spring Fluid leaking between oil strainer, oil pump, and pressure regulator valve
	Low pressure in forward ranges	Fluid leaking from hydraulic circuit of forward clutch
	Low pressure in D and S ranges (hold mode)	Fluid leaking from hydraulic circuit of band servo 2nd apply side
	Low pressure in R range	Fluid leaking from hydraulic circuit of reverse clutch
	Low pressure in R and L ranges	Fluid leaking from hydraulic circuit of low and reverse brake
	Higher than specification	Throttle position sensor out of adjustment Damaged ATF thermosensor Line pressure solenoid valve sticking Short circuit of line pressure solenoid valve circuit Pressure modifier valve sticking Pressure regulator valve or plug sticking
At stall speed	Low pressure	Throttle position sensor out of adjustment Line pressure solenoid valve sticking Short circuit of line pressure solenoid valve circuit Pressure regulator valve or plug sticking Pressure modifier valve sticking Pilot valve sticking Damaged control piston (in oil pump)

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 TRANSMISSION, OIL COOLER, DRIVE PLATE, and SHIFT MECHANISM segments of this section.
Do the road test only when the ATF is 60–70°C (140–158°F).
Verify the shift points by using only vehicle speeds shown by the speedometer.

D RANGE TEST
Shift Point, Shift Pattern, and Shift Shock

The power mode and the normal mode are automatically selected by the Powertrain Control Module (Transmission). Once the power mode is selected, the Powertrain Control Module (Transmission) does not switch to normal mode until the ignition switch is turned OFF.
When the ATF temperature is less than 40°C {104°F} in the period shortly after the engine is started, the Powertrain Control Module (Transmission) selects the low ATF temperature mode.
The shift points during the low ATF temperature mode are higher than in the power mode, and lockup is inhibited.

1. Shift the selector lever to D range.

Note
- There is no shift to fourth gear in any of the following conditions.
  1. The ATF temperature is below 10°C {50°F}.
  2. The ATF temperature is below 38°C {100°F} and vehicle speed is less than 63 Km/h {39 MPH}.
  3. The cruise control is operating and there is an 8 km/h {5 MPH} difference between the preset cruise speed and the vehicle speed, or the RESUME/ACCEL switch is ON.

2. Accelerate the vehicle with half- and full-throttle opening.
3. Verify that 1-2, 2-3, and 3-4 upshifts are obtained. The shift points must be as shown in the D range shift diagram.
4. Drive the vehicle in Fourth, Third, and 2nd 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 Third and 2nd gears when normal A/C OFF mode is selected, vehicle speed is more than 10 km/h {6.2 MPH}, and the throttle opening is less than 1.3/8.

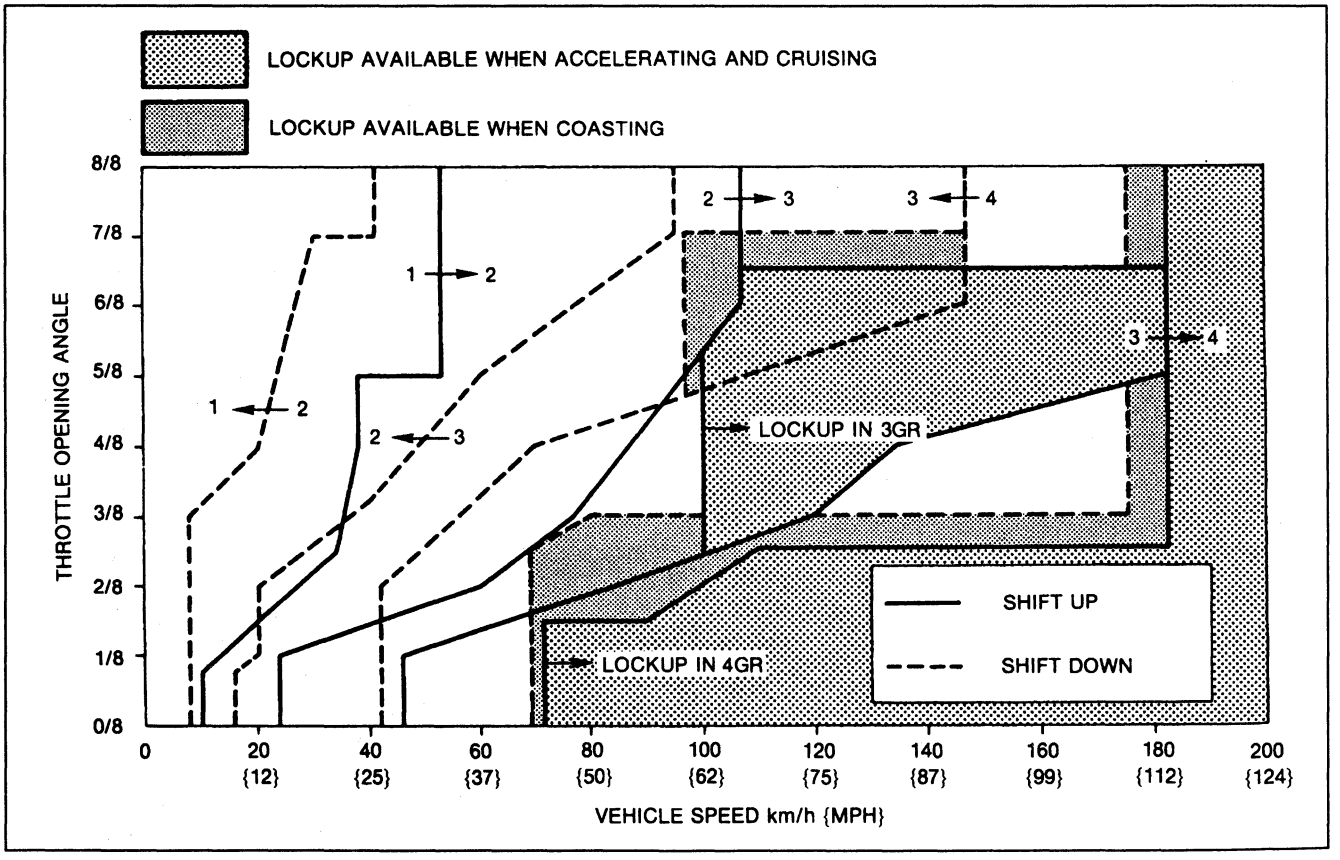
Note
- When the engine coolant temperature is above 115°C {239°F}, the lockup points are lowered.
- There is no lockup in the following conditions.
  1. The transmission is in Fourth gear position and the ATF temperature is below 20°C {68°F}.
  2. The transmission is in Third gear position and ATF temperature is below 38°C {100°F}.
- There is no slip lockup in the following conditions.
  1. There is no slip lockup when the ATF temperature is below 50°C {122°F}.
  2. There is no slip lockup when the ATF temperature is above 100°C {212°F}.
  3. There is no slip lockup when the slip lockup OFF signal is ON.
  4. There is no slip lockup when the transmission is in Fourth gear position and the idle signal is ON.
  5. There is no slip lockup when the transmission is in Third gear position, the idle signal is ON, and vehicle speed is less than 140 km/h {87 MPH}.
  6. There is no slip lockup when the accelerator pedal is depressed rapidly.

7. Drive the vehicle and verify that lockup is obtained.
8. Select hold mode.
9. Accelerate the vehicle with half-and full-throttle opening, and verify that Third gear is held after 2-3 upshift is obtained. The shift points must be as shown in the D range (hold mode) shift diagram.
10. Drive the vehicle in Third and 2nd gears and verify that kickdown does not occur.
11. Decelerate the vehicle and verify that engine braking effect is felt in Third and 2nd gears when vehicle speed is more than 10 km/h {6.2 MPH} and the throttle opening is less than 1.3/8.

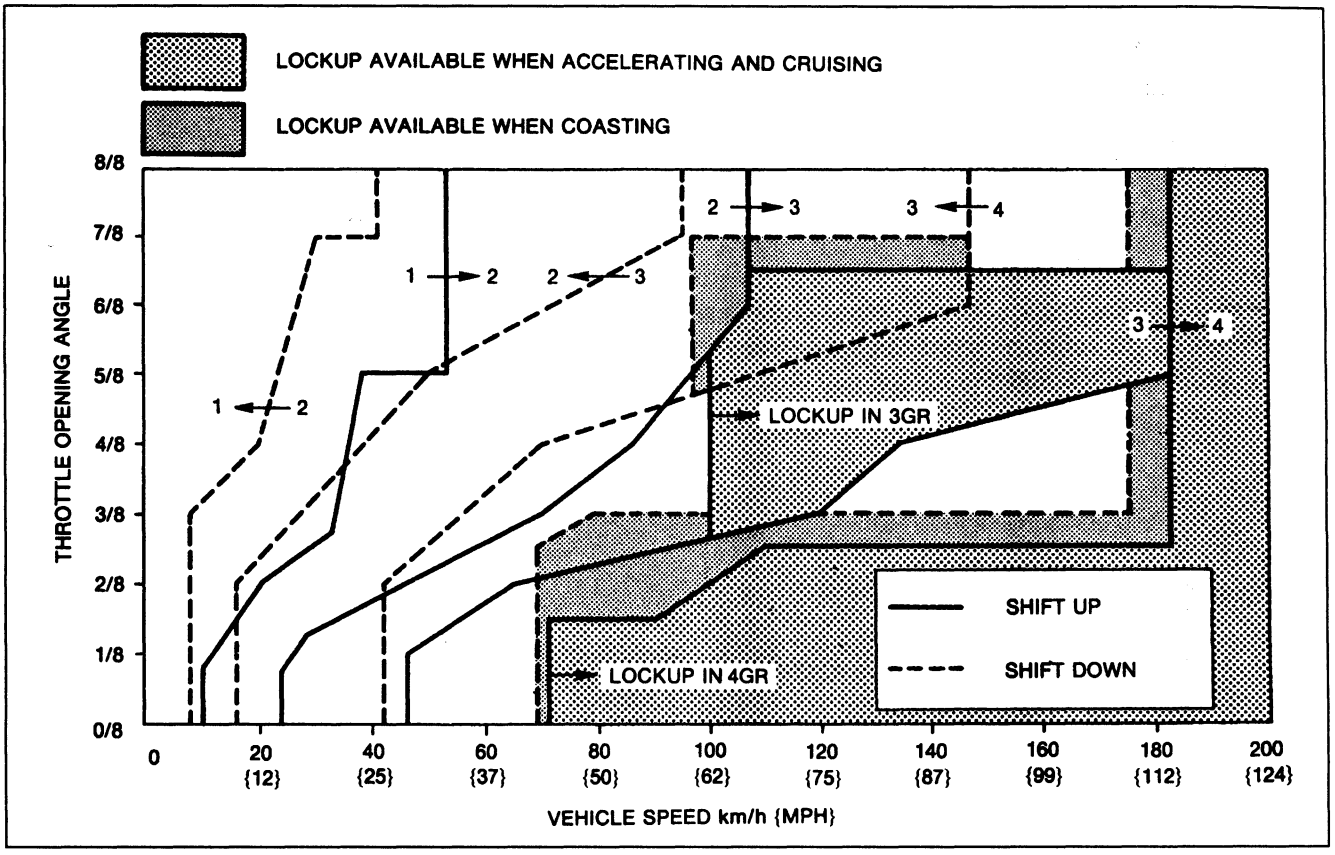
Note
- When the engine coolant temperature is above 115°C {239°F}, the lockup points are lowered.
- There is no lockup when the transmission is in Third gear position and the ATF temperature is below 38°C {100°F}.

12. Drive the vehicle and verify that lockup is obtained.

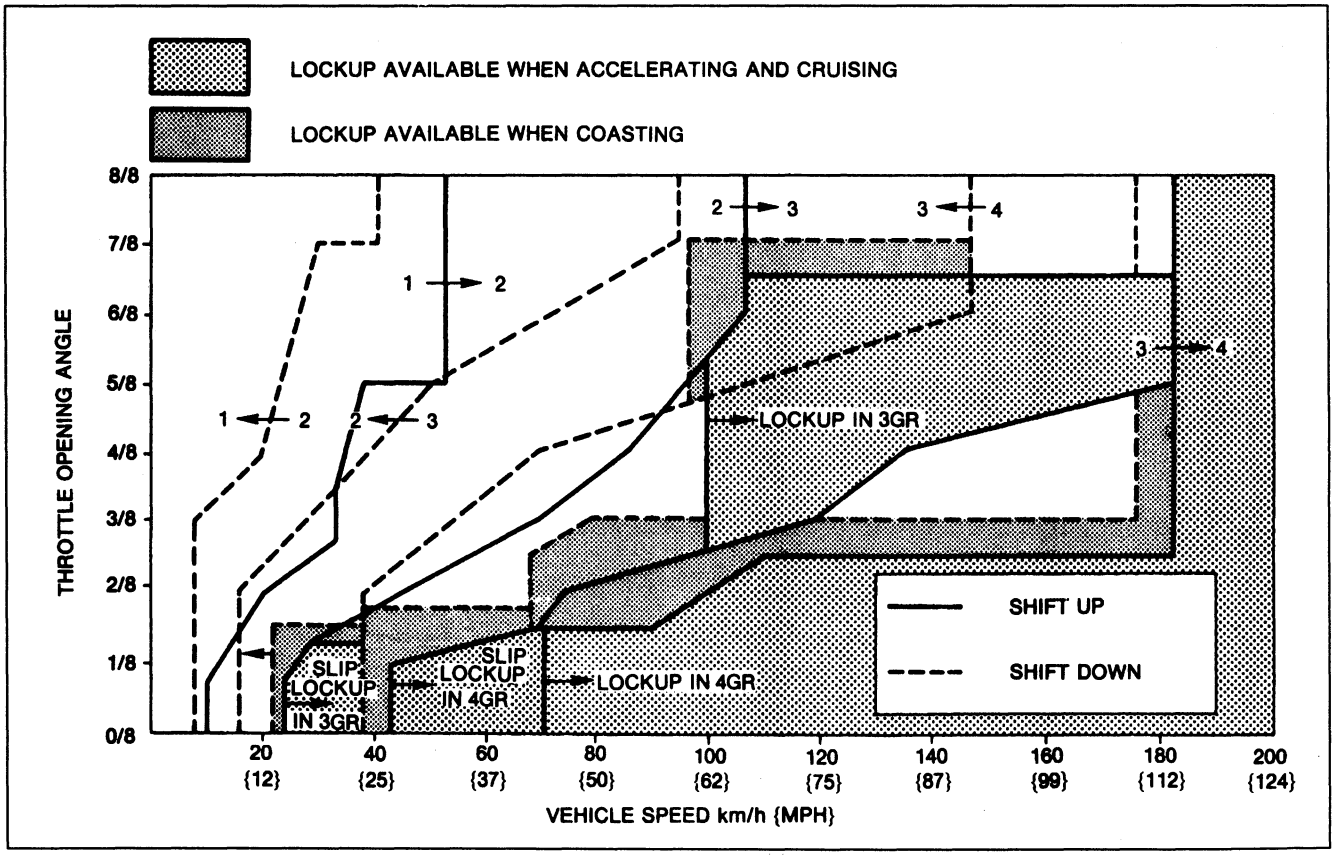
D range (power mode) shift diagram



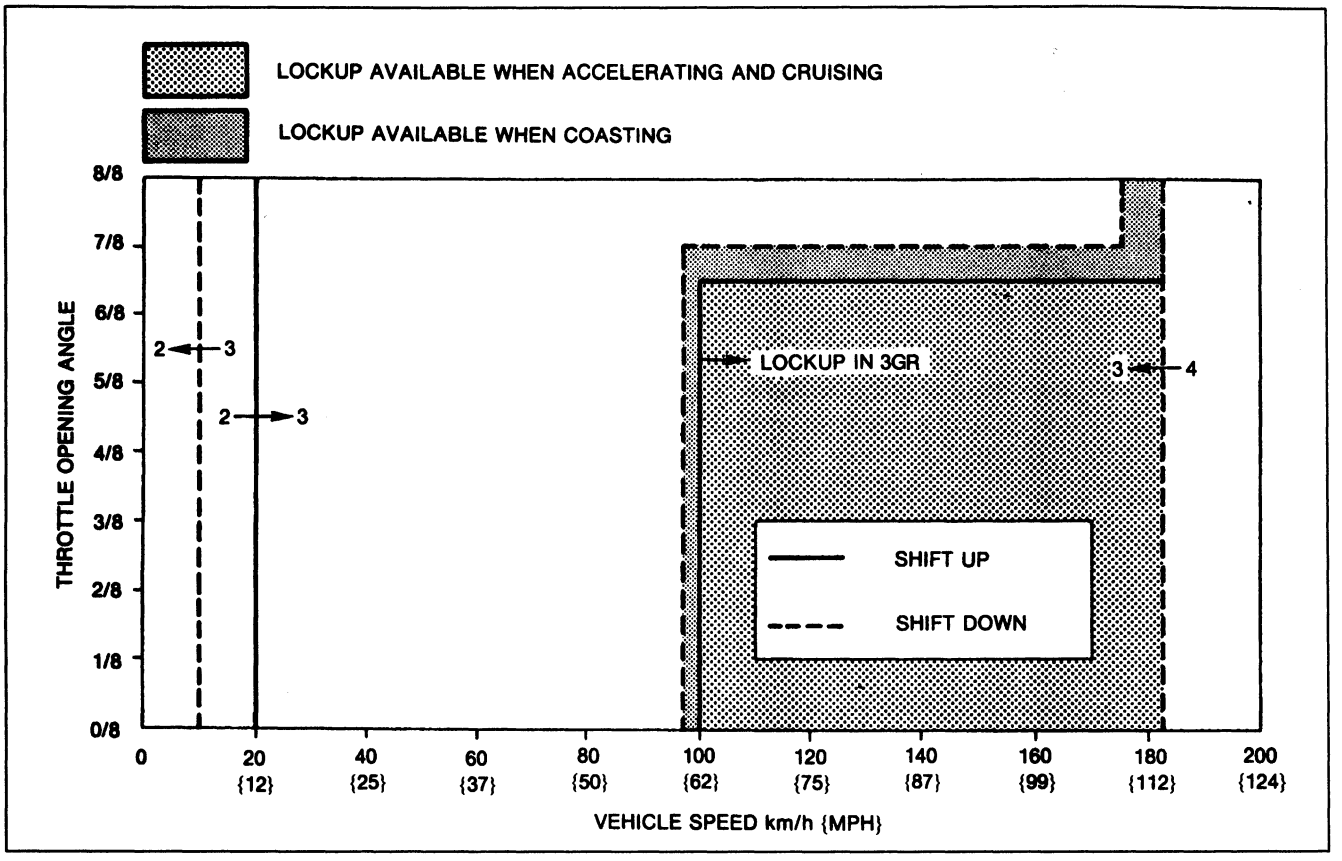
D range (normal A/C ON mode) shift diagram



D range (normal A/C OFF mode) shift diagram



D range (hold mode) shift diagram



Noise and Vibration

Drive the vehicle in Fourth gear (lockup), Fourth gear (no lockup), and Third gear (Hold) and listen closely for any out of the ordinary noise or vibration. The torque converter, propeller 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.

S RANGE TEST

Shift Point, Shift Pattern, and Shift Shock

1. Shift the selector lever to S range.
2. Accelerate the vehicle with half- and full-throttle opening.
3. Verify that 1-2 and 2-3 upshifts are obtained. The shift points must be as shown in the S range shift diagram.
4. Drive the vehicle in Third and 2rd gears and verify that kickdown occurs for 3 → 2, 3 → 1, 2 → 1, and that the shift points are as shown in the S range shift diagram.
5. Decelerate the vehicle and verify that engine braking effect is felt in Third and 2nd gears when the throttle opening is less than 1.3/8.

Note

- When the engine coolant temperature is above 115°C {239°F}, the lockup points are lowered.
- There is no lockup when the transmission is in Third gear position and the ATF temperature is below 38°C {100°F}.

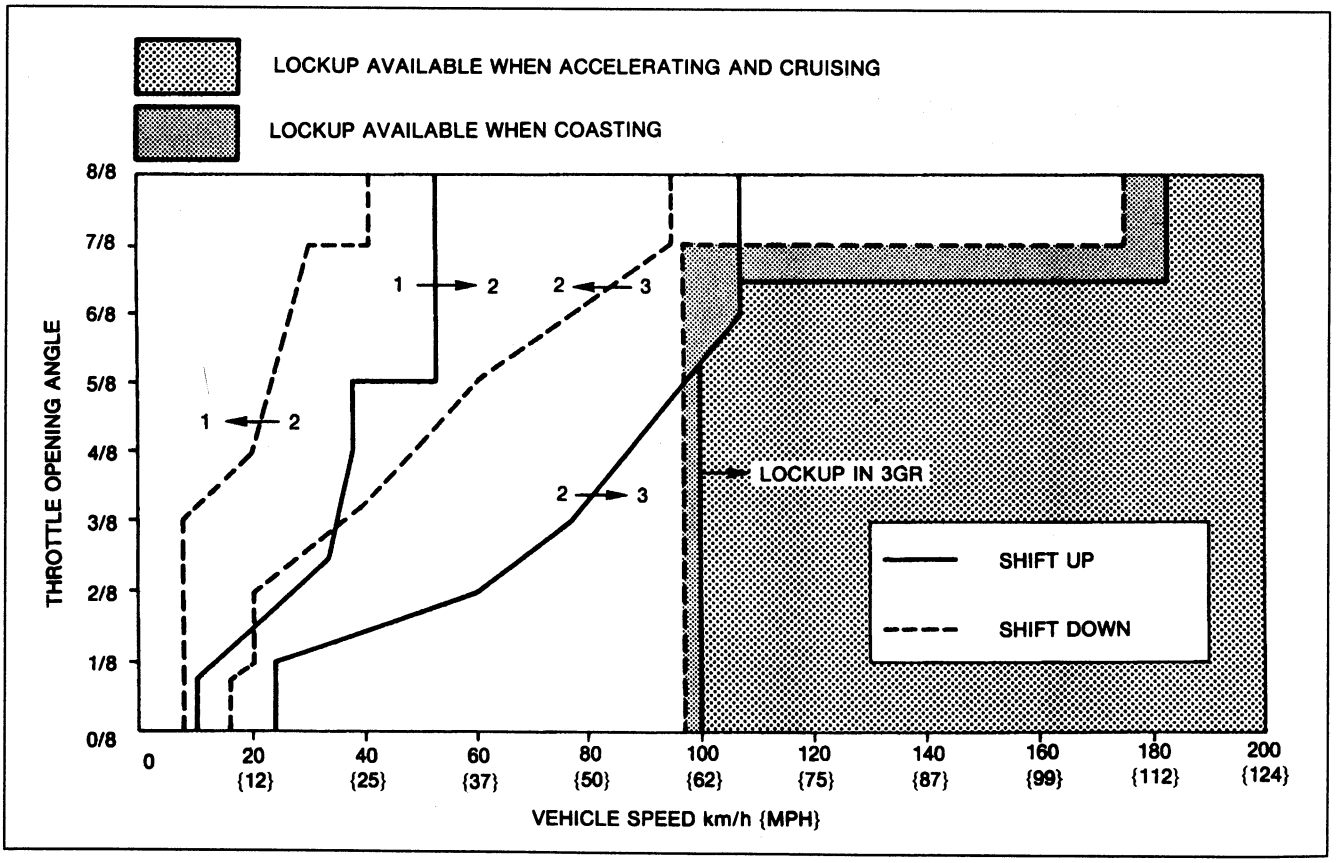
6. Drive the vehicle and verify that lockup is obtained.
7. Select hold mode.
8. Accelerate the vehicle with half- and full-throttle opening, and verify that 2nd gear is held.
9. Decelerate the vehicle and verify that engine braking effect is felt when the throttle opening is less than 1.3/8.

Note

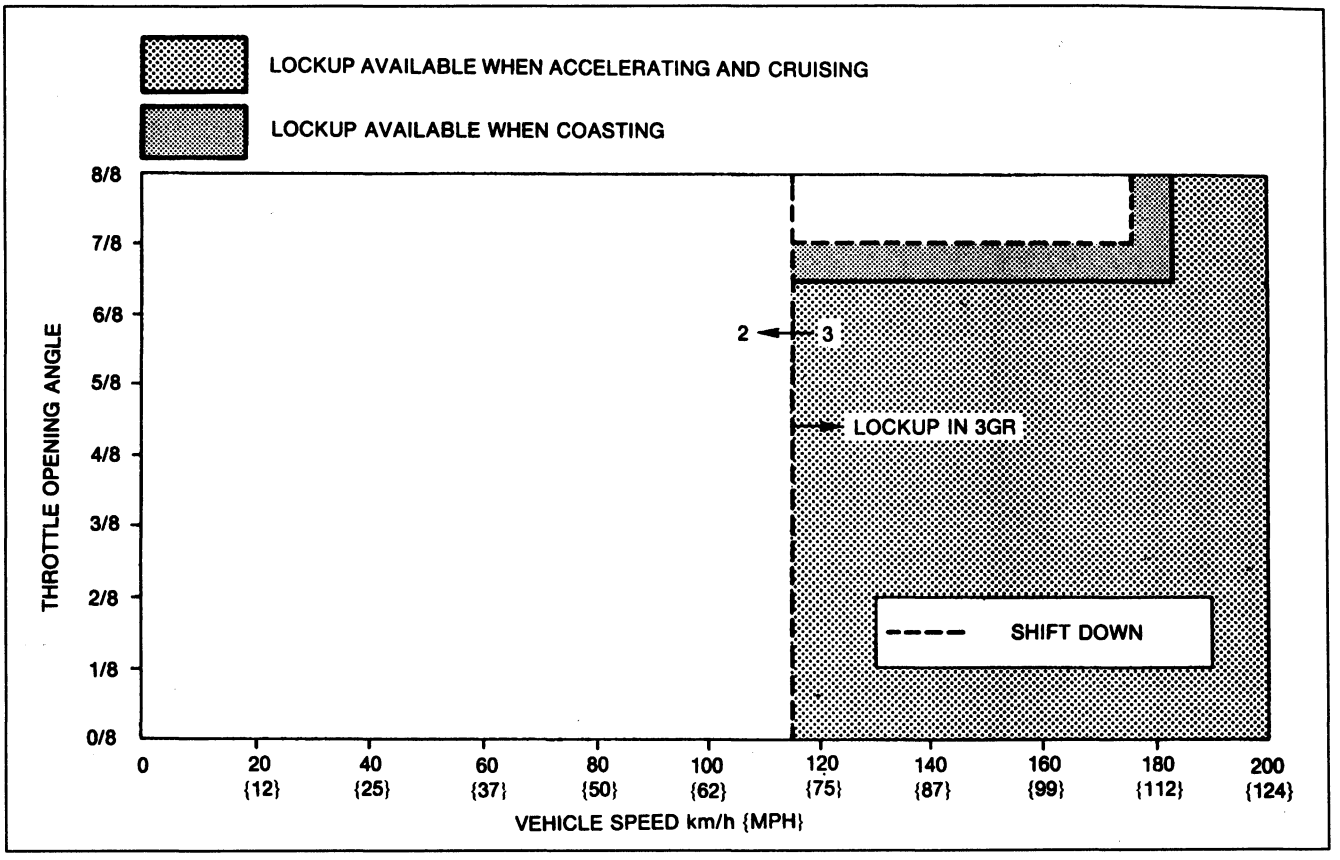
- When the engine coolant temperature is above 115°C {239°F}, the lockup points are lowered.

10. Drive the vehicle and verify that lockup is obtained.

S range (normal mode) shift diagram



S range (hold mode) shift diagram



Noise and Vibration

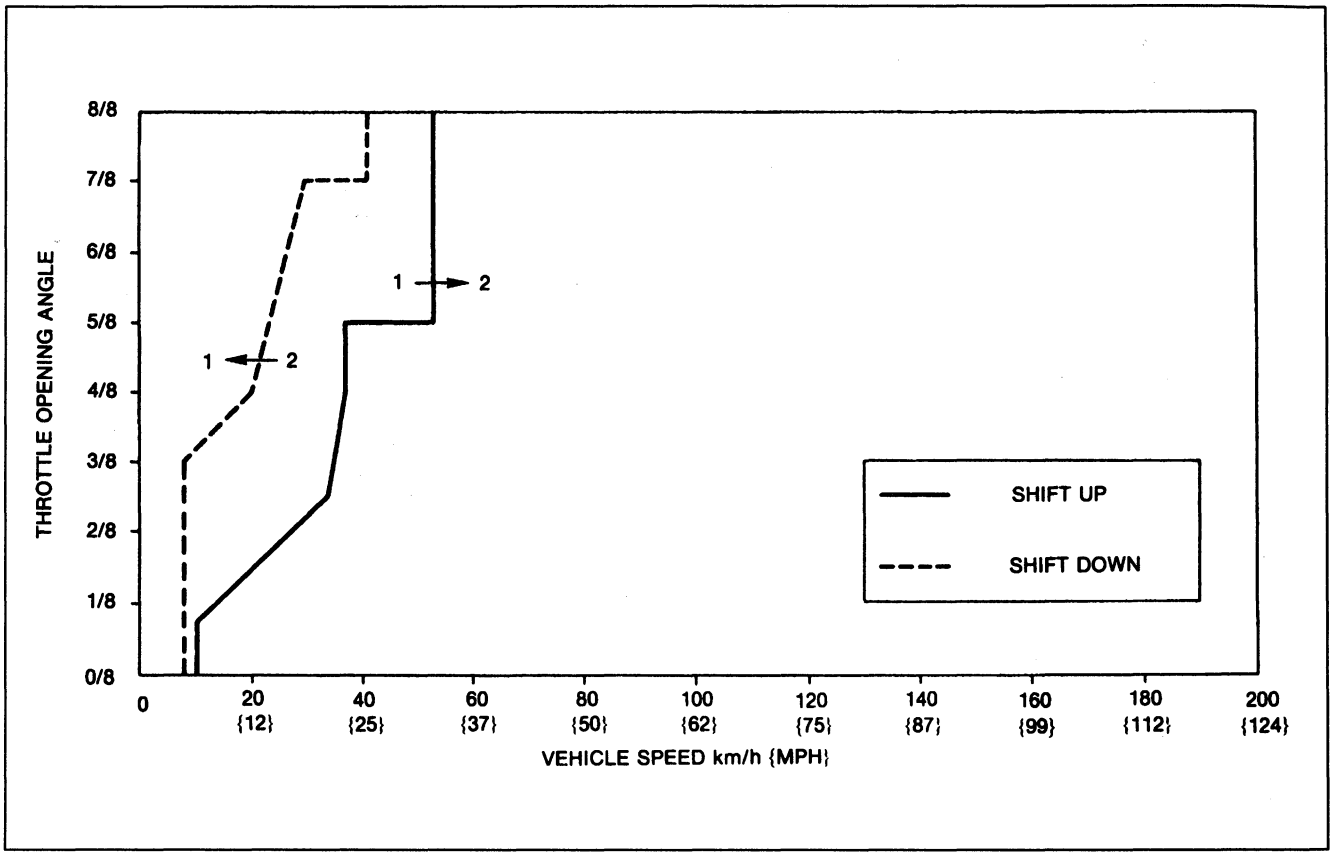
Drive the vehicle in 2nd gear (Hold) and listen closely for any out of the ordinary noise or vibration. The torque converter, propeller shaft, and differential can be sources of abnormal noise and vibration is they are not functioning properly. Check these when searching for sources of noise and vibration.

L RANGE TEST

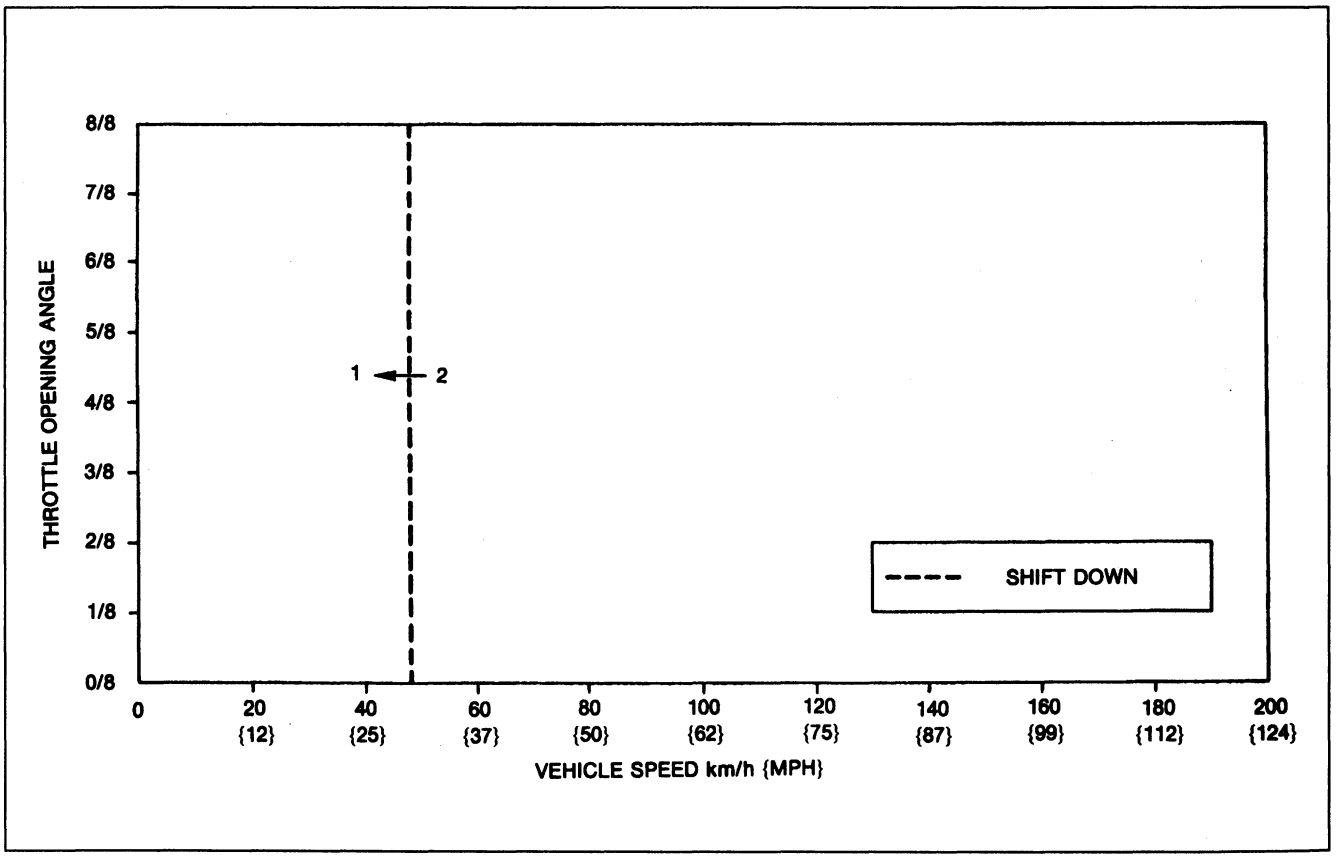
Shift Point, Shift Pattern, and Shift Shock

1. Shift the selector lever to L range.
2. Accelerate the vehicle with half- and full-throttle opening.
3. Verify that 1-2 upshift is obtained. The shift points must be as shown in the L range shift diagram.
4. Drive the vehicle in 2nd gear and verify that kickdown occurs for 2 → 1, and that the shift point is as shown in the L range shift diagram.
5. Decelerate the vehicle and verify that engine braking effect is felt in 2nd and 1st gears.
6. Select hold mode.
7. Accelerate the vehicle with half- and full-throttle opening, and verify that 1st gear is held.
8. Decelerate the vehicle and verify that engine braking effect is felt.

L range (normal mode) shift diagram



L range (hold mode) shift diagram



Noise and Vibration

Drive the vehicle in 1st gear (Hold) and listen closely for any out of the ordinary noise or vibration. The torque converter, propeller 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.

P RANGE TEST

Shift into P range on a gentle slope. Release the brake and verify that the vehicle does not roll.

Vehicle Speed at Shift Point Table

Range	Mode	Throttle condition (throttle position sensor voltage)	Shift	Vehicle speed km/h {MPH}
D	POWER	Wide open throttle (4.0–4.5V)	$D_1 \rightarrow D_2$	50–56 {31–35}
			$D_2 \rightarrow D_3$	103–111 {64–69}
			$D_3 \rightarrow D_4$	178–188 {111–117}
		Half throttle	$D_1 \rightarrow D_2$	35–41 {22–25}
			$D_2 \rightarrow D_3$	81–93 {50–58}
			$D_3 \rightarrow D_4$	126–144 {78–89}
			*Lockup ON (D_3)	94–106 {58–66} (81–93 {50–58})
			*Lockup ON (D_4)	174–192 {108–119} (126–144 {78–89})
		Closed throttle position (0.1–1.1V)	$D_4 \rightarrow D_3$	39–45 {24–28}
			$D_3 \rightarrow D_2$	13–19 {8–12}
			$D_2 \rightarrow D_1$	5–11 {3–7}
		Kickdown	$D_4 \rightarrow D_3$	142–152 {88–94}
			$D_3 \rightarrow D_2$	91–99 {57–62}
			$D_2 \rightarrow D_1$	38–44 {24–27}
	NORMAL A/C ON	Wide open throttle (4.0–4 5V)	$D_1 \rightarrow D_2$	50–56 {31–35}
			$D_2 \rightarrow D_3$	103–111 {64–69}
			$D_3 \rightarrow D_4$	178–188 {111–117}
		Half throttle	$D_1 \rightarrow D_2$	32–38 {20–24}
			$D_2 \rightarrow D_3$	80–92 {50–57}
			$D_3 \rightarrow D_4$	126–144 {78–89}
			*Lockup ON (D_3)	94–106 {58–66} (80–92 {50–57})
			*Lockup ON (D_4)	174–192 {108–119} (126–144 {78–89})
		Closed throttle position (0.1–1.1V)	$D_4 \rightarrow D_3$	39–45 {24–28}
			$D_3 \rightarrow D_2$	13–19 {8–12}
			$D_2 \rightarrow D_1$	5–11 {3–7}
		Kickdown	$D_4 \rightarrow D_3$	142–152 {88–94}
			$D_3 \rightarrow D_2$	91–99 {57–62}
			$D_2 \rightarrow D_1$	38–44 {24–27}
	NORMAL A/C OFF	Wide open throttle (4.0–4.5V)	$D_1 \rightarrow D_2$	50–56 {31–35}
			$D_2 \rightarrow D_3$	103–111 {64–69}
			$D_3 \rightarrow D_4$	178–188 {111–117}
		Half throttle	$D_1 \rightarrow D_2$	32–38 {20–24}
			$D_2 \rightarrow D_3$	80–92 {50–57}
			$D_3 \rightarrow D_4$	126–144 {78–89}
			*Lockup ON (D_3)	94–106 {58–66} (80–92 {50–57})
			*Lockup ON (D_4)	174–192 {108–119} (126–144 {78–89})
		Closed throttle position (0.1–1.1V)	$D_4 \rightarrow D_3$	32–38 {20–24}
			$D_3 \rightarrow D_2$	13–19 {8–12}
			$D_2 \rightarrow D_1$	5–11 {3–7}
		Kickdown	$D_4 \rightarrow D_3$	142–152 {88–94}
			$D_3 \rightarrow D_2$	91–99 {57–62}
			$D_2 \rightarrow D_1$	38–44 {24–27}

* complete lockup

( ) indicates lockup points when the engine coolant temperature is above 115°C {239°F}.

Range	Mode	Throttle condition (throttle position sensor voltage)	Shift	Vehicle speed km/h {MPH}
D	HOLD	—	$D_4 \rightarrow D_3$	180–186 {112–116}
			$D_3 \rightarrow D_2$	7–13 {4–8}
			$D_2 \rightarrow D_3$	15–25 {9–16}
			*Lockup ON (D_3)	94–106 {58–66} (39–51 {24–32})
S	EXCEPT HOLD	Wide open throttle (4.0–4.5V)	$S_1 \rightarrow S_2$	50–56 {31–35}
			$S_2 \rightarrow S_3$	103–111 {64–69}
		Half throttle	$S_1 \rightarrow S_2$	35–41 {22–25}
			$S_2 \rightarrow S_3$	81–93 {50–58}
			*Lockup ON (S_3)	94–106 {58–66} (81–93 {50–58})
		Closed throttle position (0.1–1.1V)	$S_3 \rightarrow S_2$	13–19 {8–12}
			$S_2 \rightarrow S_1$	5–11 {3–7}
		Kickdown	$S_3 \rightarrow S_2$	91–99 {57–62}
			$S_2 \rightarrow S_1$	38–44 {24–27}
	HOLD	—	$S_3 \rightarrow S_2$	112–118 {70–73}
L	EXCEPT HOLD	Wide open throttle (4.0–4.5V)	$L_1 \rightarrow L_2$	50–56 {31–35}
		Half throttle	$L_1 \rightarrow L_2$	35–41 {22–25}
		Closed throttle position (0.1–1.1V)	$L_2 \rightarrow L_1$	5–11 {3–7}
		Kickdown	$L_2 \rightarrow L_1$	38–44 {24–27}
	HOLD	—	$L_2 \rightarrow L_1$	45–51 {28–32}

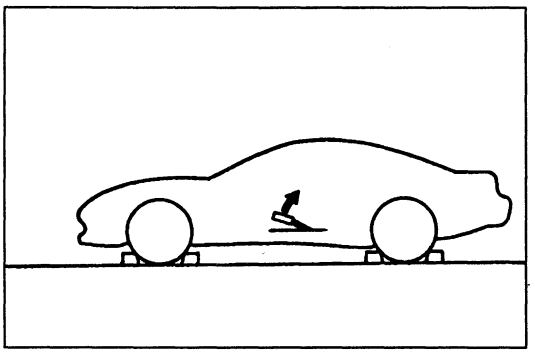
* complete lockup

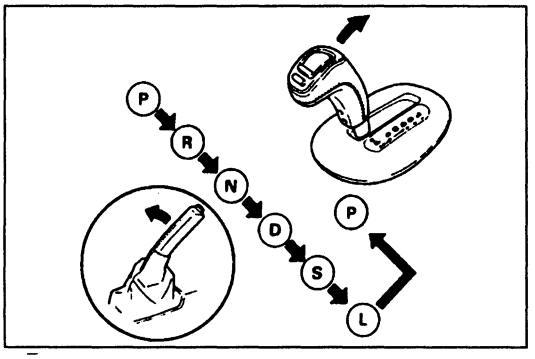
( ) indicates lockup points when the engine coolant temperature is above 115° {239°F}.

Input the voltages displayed on the EC-AT Tester into the following formula to calculate the halfthrottle voltage.

$$\frac{\text{wide open throttle voltage} - \text{closed throttle position voltage}}{2} = \text{Half throttle voltage}$$

Condition		Possible cause
Shifting	Starts in 2nd gear or shifts directly from 1st gear to Fourth gear	Stuck shift A solenoid valve Stuck shift valve A
	Starts in fourth gear	Stuck shift B solenoid valve Stuck shift valve B
	No shift	Stuck shift A and B solenoid valve Stuck shift valve A and/or B
	Incorrect shift points	Throttle position sensor out of adjustment Vehicle speed sensor (revolution sensor) not operating properly
Shift shock felt or slipping exists		Stuck line pressure solenoid valve Accumulators not operating properly Throttle position sensor out of adjustment Vehicle speed sensor (revolution sensor) not operating properly ATF thermosensor not operating properly Worn clutches, one-way clutches, and/or brakes
No engine braking		Stuck overrunning clutch solenoid valve Worn clutches and/or brakes
No lockup shift		Stock lockup solenoid valve Stuck lockup control valve

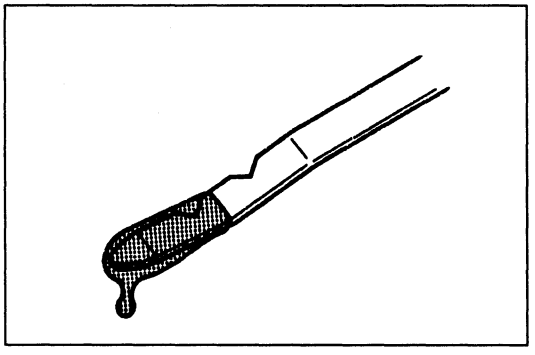




AUTOMATIC TRANSMISSION FLUID (ATF)

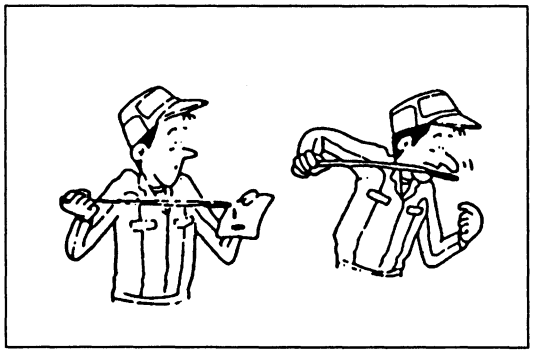
ATF
Inspection
Level

1. Park the vehicle on level ground.
2. Apply the parking brake and securely position wheel chocks to prevent the vehicle from rolling.
3. Warm up the engine until the ATF temperature reaches **60–70°C {140–158°F}**.
4. While depressing the brake pedal, shift the selector lever to each range (P–L). Leave it a few seconds in each range.
5. Shift back to P range.



6. Ensure that the ATF level is between the notches of the ATF dipstick. Add ATF to specification, if necessary.

ATF Type: Dexron®II or M-III
Capacity: 8.6 L {9.1US qt, 7.6 Imp qt}



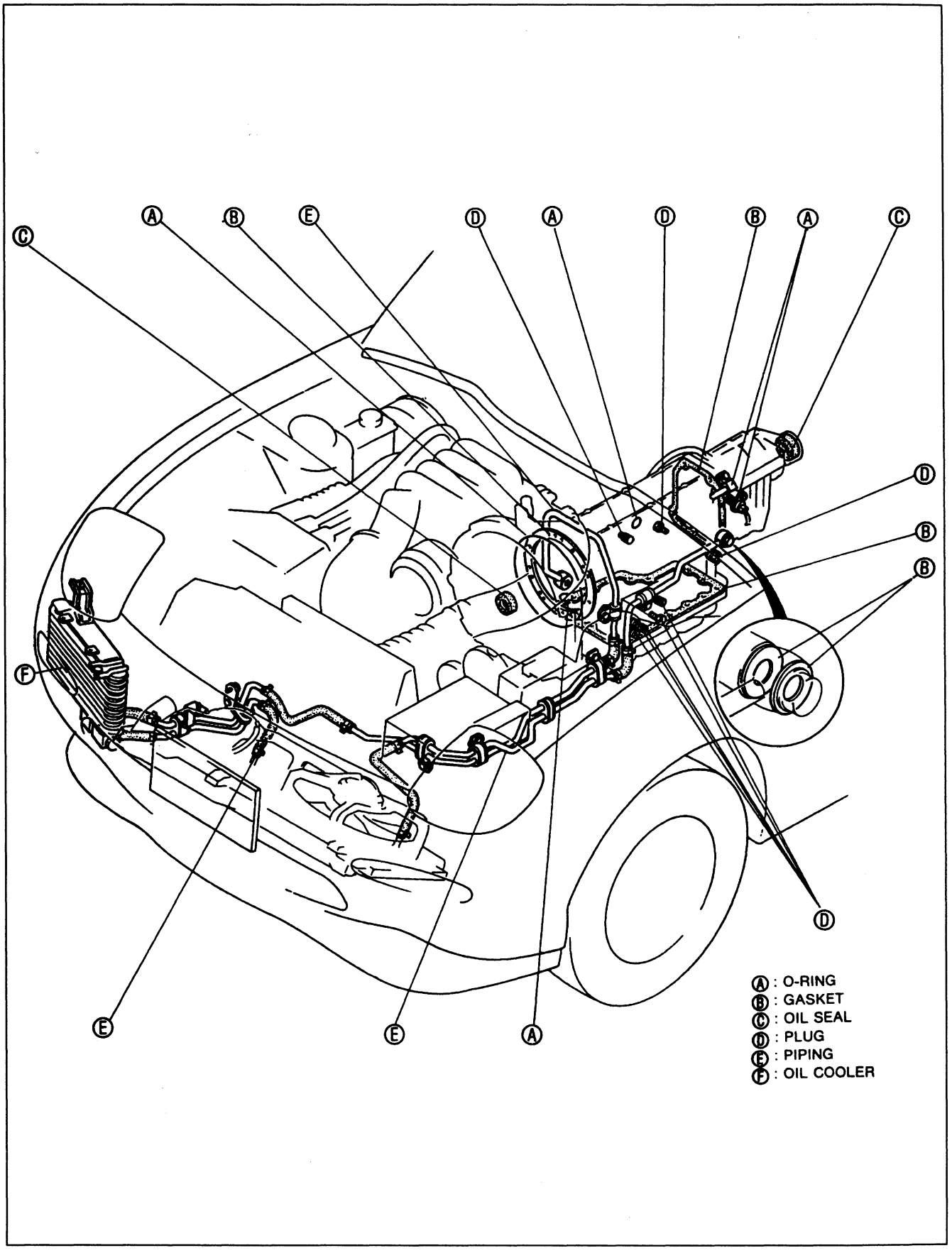
Condition

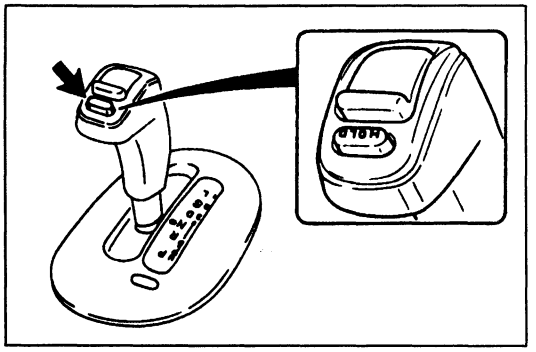
Determine whether the transmission should be disassembled by noting the following.

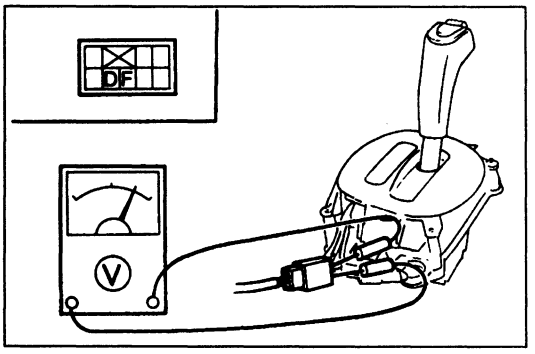
1. Is the ATF muddy or varnished?
2. Does the ATF smell strange or unusual?

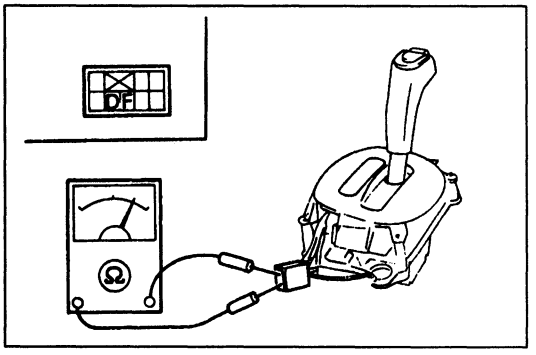
Fluid leakage

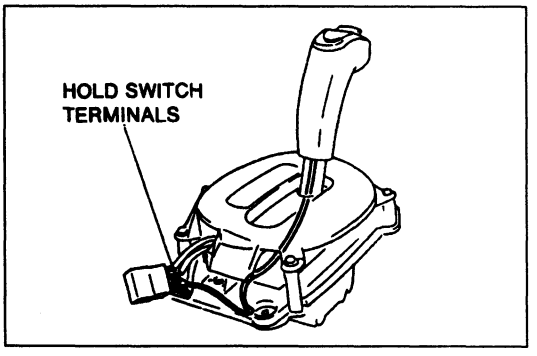
Check for ATF leakage at the points shown below and repair or replace as necessary.

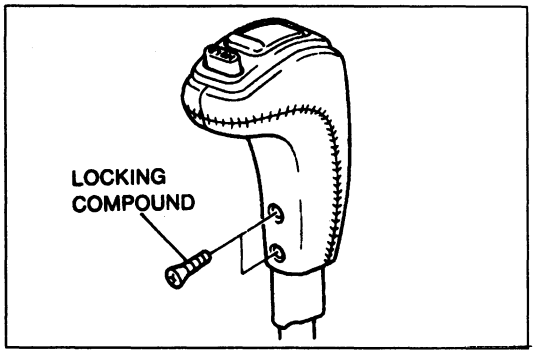












ELECTRONIC SYSTEM COMPONENTS

HOLD SWITCH

Inspection

Operation

1. Turn the ignition switch ON.
2. Press the hold switch ON/OFF and verify that the hold indicator illuminates when the hold mode is selected.
3. If not as specified, measure the hold switch terminal voltage.

Terminal voltage

1. Remove the console panel.
2. Turn the ignition switch ON.
3. Press the hold switch ON/OFF, and measure the voltage between terminals D and F.

B+: Battery positive voltage

Switch condition \ Terminal	Terminal voltage (V)	
	D	F
Released	0	0
Depressed	B+	0

4. If not correct, check the hold switch continuity.

Continuity

1. Disconnect the negative battery cable and the shift-lock control unit connector.
2. Press the hold switch ON/OFF, and check continuity between terminals D and F.

Switch condition	Continuity
Released	Yes
Depressed	No

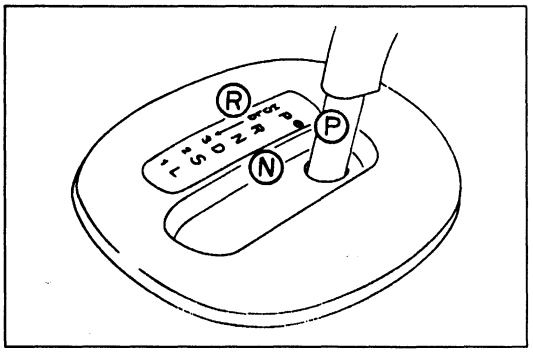
3. If not correct, replace the selector lever knob.
4. Connect the shift-lock control unit connector.
5. Install the console panel.
6. Connect the negative battery cable.

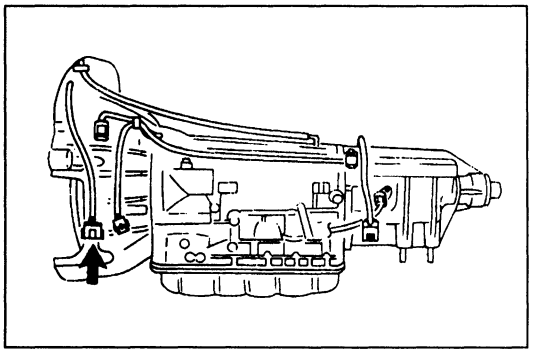
Replacement

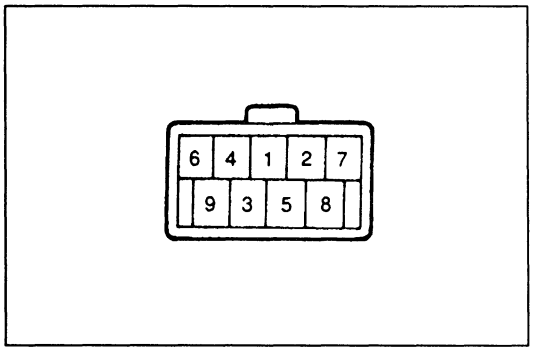
1. Remove the console panel.
2. Remove the indicator panel screws.
3. Disconnect the shift-lock control unit connector and pull the hold switch terminals out of the connector.
4. Remove the selector lever knob.
5. Install the new selector lever knob.
6. Insert the hold switch terminals into the connector and connect the shift-lock control unit connector.
7. Apply a small amount of locking compound to the screws, and tighten.

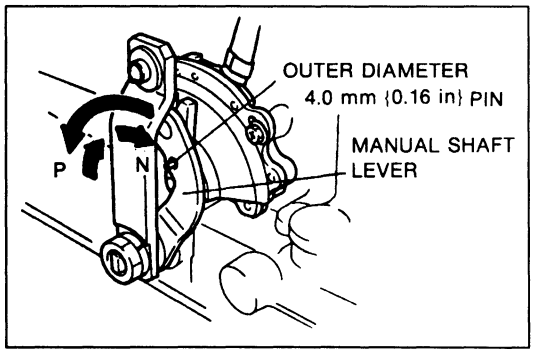
Tightening torque:
1.5–2.9 N·m {15–30 kgf·cm, 14–26 in·lbf}

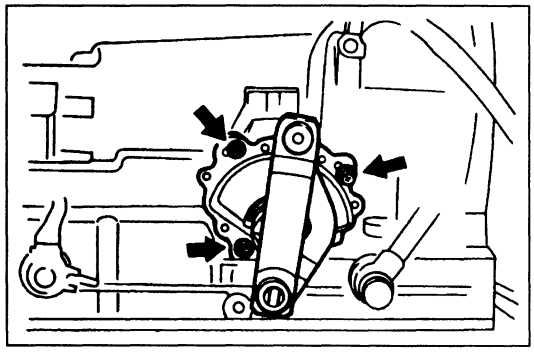
8. Install and adjust the indicator panel. (Refer to page K–165.)
9. Install the console panel.











PARK/NEUTRAL SWITCH

Inspection

Operation

1. Turn the ignition switch to ON.
2. Shift the selector lever and verify that the selected range and selector indicator light (built into combination meter) positions are aligned.
3. Apply the parking brake and securely position wheel chocks to prevent the vehicle from rolling.
4. Verify that the starter operates with the ignition switch at START position and with the selector lever in P and N ranges only.
5. Verify that the back-up lights illuminate when the selector lever is shifted to R range with the ignition switch at the ON position.
6. If not as specified, check the park/neutral switch continuity.

Continuity

1. Disconnect the negative battery cable and the park/neutral switch connector.
2. Remove the park/neutral switch connector from the bracket.
3. Check continuity of the park/neutral switch terminals.

Position	1	2	3	4	5	6	7	8	9
P	○						○	○	○
R		○					○		
N			○				○	○	○
D				○			○		
S					○		○		
L						○	○		

○—○ : Indicates continuity

4. If not correct, adjust or replace the park/neutral switch.
5. Install the park/neutral switch connector to the bracket.
6. Connect the park/neutral switch connector and the negative battery cable.

Adjustment

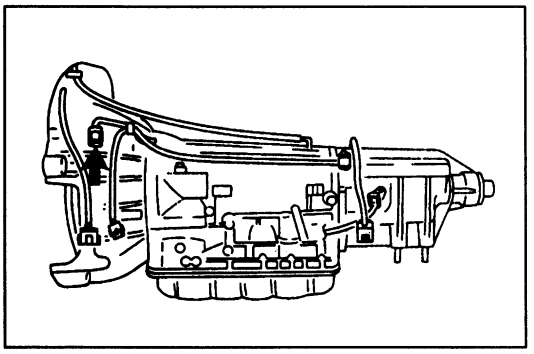
1. Remove the selector rod the from the manual shaft lever.
2. Move the manual shaft to N range position.
3. Loosen the park/neutral switch mounting bolts.
4. Align the holes of the park/neutral switch and the manual shaft by inserting a **4.0 mm {0.16 in}** outer diameter pin.
5. Tighten the park/neutral switch mounting bolts and remove the pin.

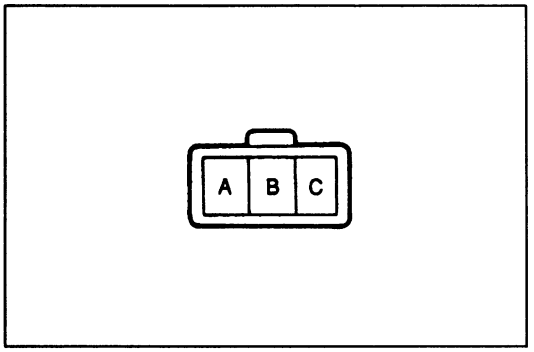
Tightening torque:
2.5–3.9 N·m {25–40 kgf·cm, 22–34 in·lbf}

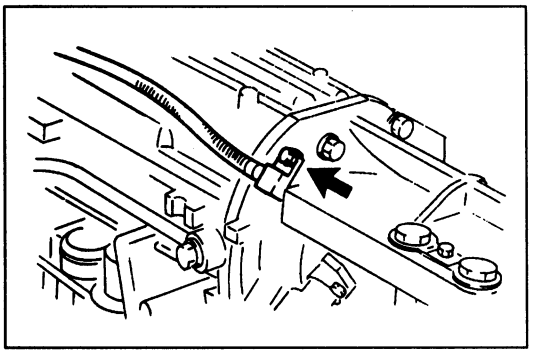
6. Recheck the continuity of the park/neutral switch.
7. If not correct, readjust or replace the park/neutral switch.
8. Install the selector rod to the manual shaft lever.

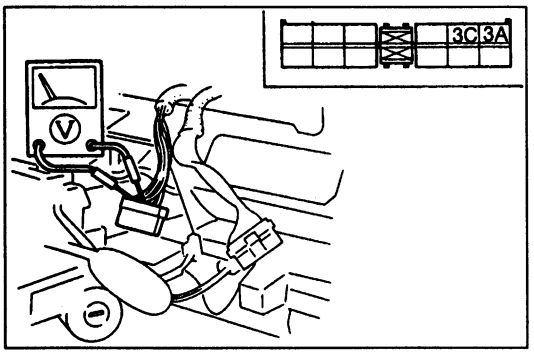
Replacement

Refer to "Adjustment" above for replacement of the park/neutral switch.









VEHICLE SPEED SENSOR (REVOLUTION SENSOR)

Inspection

1. Disconnect the negative battery cable.
2. Disconnect vehicle speed sensor connector.
3. Measure the resistance between the terminals of the vehicle speed sensor.

ATF temperature: 20–80°C {68–176°F}

Terminal	Resistance (Ω)
A and B	500–1,000
B and C	∞
A and C	∞

4. If not correct, replace the vehicle speed sensor.
5. Connect the vehicle speed sensor connector.
6. Connect the negative battery cable.

Replacement

1. Disconnect the negative battery cable.
2. Disconnect the vehicle speed sensor connector.
3. Remove the vehicle speed sensor from the extension housing.
4. Apply ATF to a new O-ring and install it on the speed sensor 1.
5. Install the new vehicle speed sensor.

Tightening torque:
5.0–6.8 N·m {50–70 kgf·cm, 44–60 in·lbf}

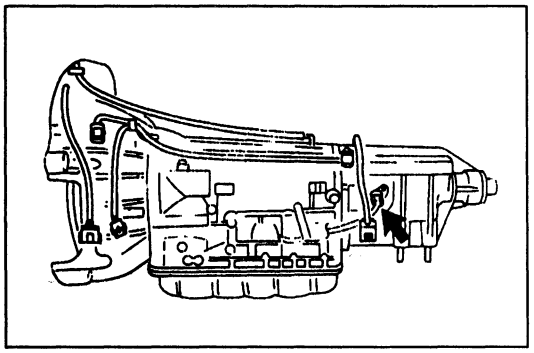
6. Connect the vehicle speed sensor connector.
7. Connect the negative battery cable.

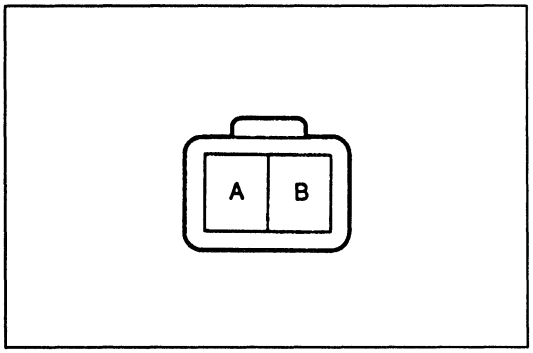
VEHICLE SPEEDOMETER SENSOR

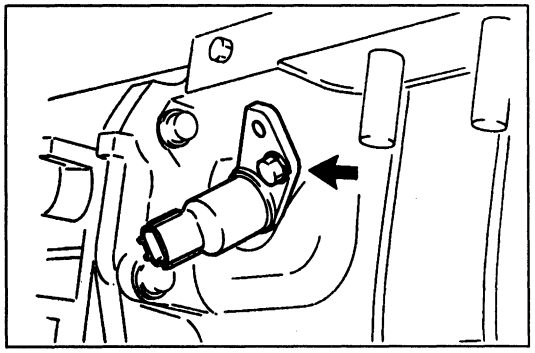
Speedmeter

Inspection

1. Remove the combination meter. (Refer to 1994 RX-7 Body Electrical Troubleshooting Manual, section C1.)
2. Disconnect the speedometer connector.
3. Set the voltmeter to the 5V range.
4. Turn the ignition switch to the LOCK position.
5. Measure the voltage between terminals 3A and 3C of the speedometer connector (harness side) while the rear wheels are turning slowly.
6. When the voltmeter pointer moves slightly, replace the speedometer. If the pointer does not move, check the vehicle speedometer sensor and/or wiring.
7. Connect the speedometer connector.
8. Install the combination meter. (Refer to 1994 RX-7 Body Electrical Troubleshooting Manual, section C1.)







Vehicle Speedometer Sensor
Inspection
1. Disconnect the negative battery cable.
2. Remove the vehicle speedometer sensor.
3. Verify that magnetic resistance is felt when turning the vehicle speedometer sensor driven gear by hand.
4. Disconnect the vehicle speedometer sensor connector.
5. Set the voltmeter to the 5V range.
6. Measure the voltage between terminals A and B while the rear wheels are turning slowly.
7. If the pointer does not move, check the vehicle speedometer sensor continuity.
8. Measure the resistance between terminals A and B.

Resistance:
Approx. 290 Ω (at 20–80°C {68–176°F})

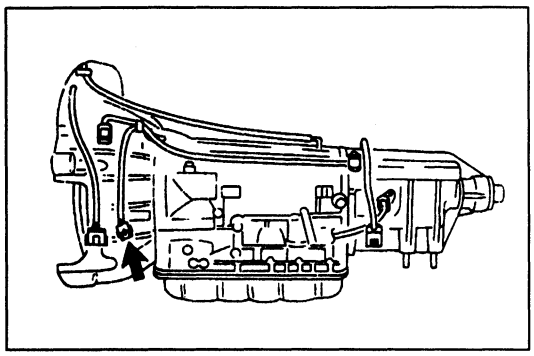
9. If not correct, replace the vehicle speedometer sensor.
10. Apply ATF to a new O-ring and install it on the vehicle speedometer sensor.
11. Install the vehicle speedometer sensor.

Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 70–95 in·lbf}

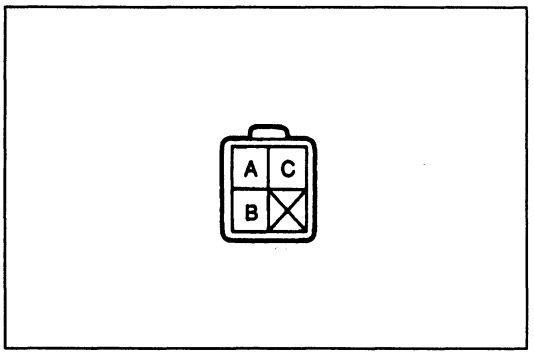
12. Connect the vehicle speedometer sensor connector.
13. Connect the negative battery cable.

Replacement
1. Disconnect the negative battery cable.
2. Disconnect the vehicle speedometer sensor connector.
3. Remove the vehicle speedometer sensor from the extension housing.
4. Apply ATF to a new O-ring and install it on the vehicle speedometer sensor.
5. Install the new vehicle speedometer sensor.

Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 70–95 in·lbf}
6. Connect the vehicle speedometer sensor connector.
7. Connect the negative battery cable.



VEHICLE SPEED PULSE GENERATOR
Inspection
1. Disconnect the negative battery cable.
2. Disconnect the vehicle speed pulse generator connector.

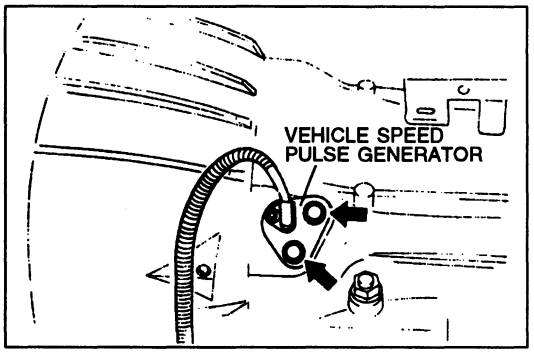


3. Measure the resistance between the terminals of the vehicle speed pulse generator.

ATF temperature: 20–80°C {68–176°F}

Terminal	Resistance (kΩ)
A and B	2.2–3.5
B and C	∞
A and C	∞

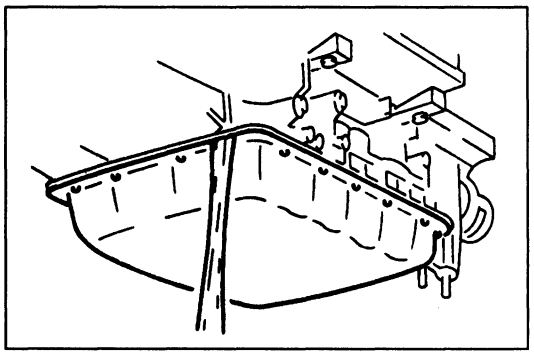
4. If not correct, replace the vehicle speed pulse generator.
5. Connect the vehicle speed pulse generator connector.
6. Connect the negative battery cable.



Replacement

1. Remove the transmission assembly. (Refer to page K–42.)
2. Remove the vehicle speed pulse generator from the transmission case.
3. Apply ATF to a new O-ring and install it on the new vehicle speed pulse generator.
4. Install the new gasket and new vehicle speed pulse generator.
5. Install new bolts and tighten.

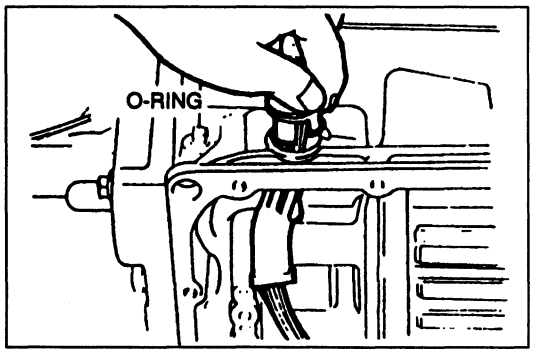
Tightening torque:
5.0–6.8 N·m {50–70 kgf·cm, 44–60 in·lbf}



6. Install the transmission assembly. (Refer to page K–149.)

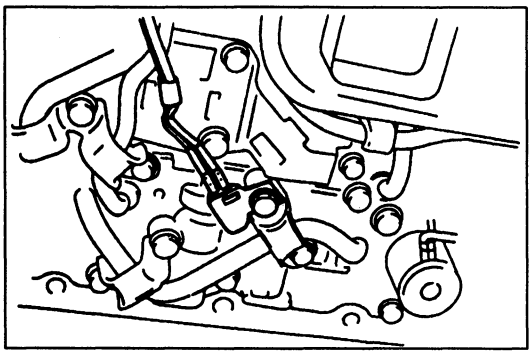
ATF THERMOSENSOR
Replacement

Warning
- **Be careful when draining; the AFT is hot.**



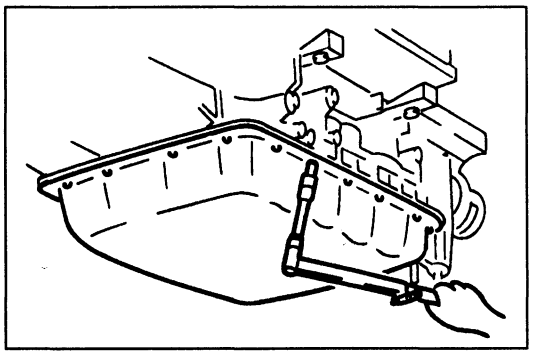
1. Disconnect the negative battery cable.
2. Disconnect the solenoid valve connector.
3. Loosen the oil pan mounting bolts and drain the ATF into a suitable container.
4. Remove the oil pan.
5. Remove the ATF thermosensor from the control valve body.
6. Remove the control valve body. (Refer to page K–128.)

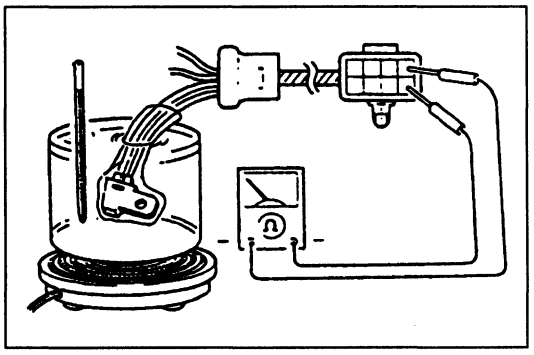
Note
- The ATF thermosensor is part of the solenoid valve harness.



7. Remove the solenoid valve harness from the transmission case.
8. Apply ATF to a new O-ring and install it on the solenoid valve harness.
9. Install the new solenoid valve harness into the transmission case.
10. Install the control valve body. (Refer to page K–130.)
11. Install the ATF thermosensor onto the control valve body.

Tightening torque:
6.9–6.8 N·m {70–90 kgf·cm, 61–78 in·lbf}





12. Clean the oil pan and the magnet, and set the magnet into the oil pan.
13. Remove any old locking compound from the bolt holes.
14. Install a new gasket and the oil pan.

Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}

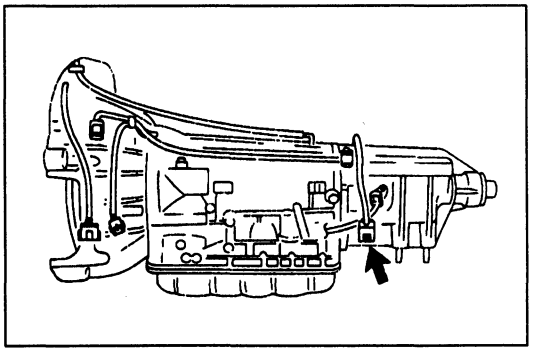
15. Tighten the new bolts evenly and quickly.
16. Connect the solenoid valve connector.
17. Fill the transmission with the specified amount and type of ATF. (Refer to page K–25.)
18. Connect the negative battery cable.

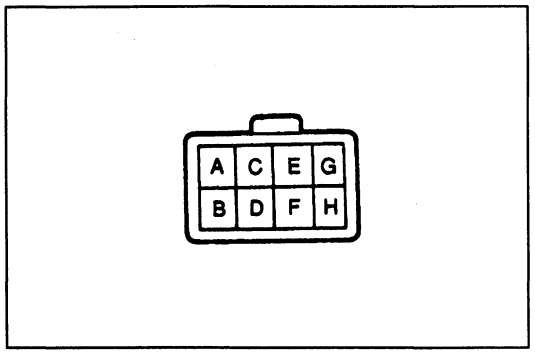
Inspection

1. Refer to "Replacement" on the previous page for removal of the ATF thermosensor.
2. Wrap the ATF thermosensor, place it in water with a thermometer as shown, and heat the water gradually.
3. Measure the resistance between the terminals of the thermosensor.

Water temperature	Resistance (kΩ)
10°C {50°F}	2.5
40°C {104°F}	0.6
80°C {176°F}	0.3

4. If not correct, replace the ATF thermosensor.
5. Refer to "Replacement" for installation of the ATF thermosensor.





SOLENOID VALVES

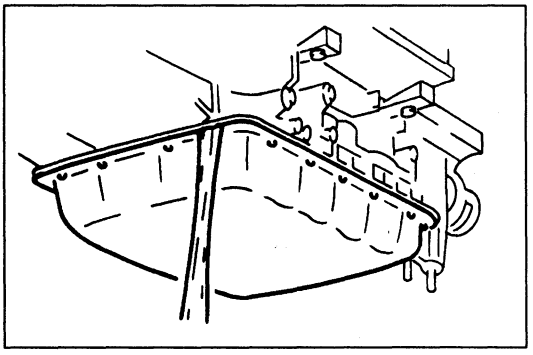
Inspection

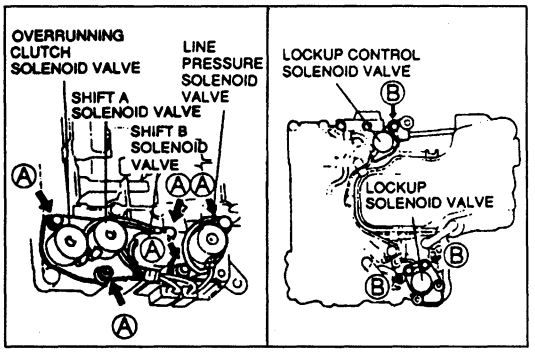
1. Disconnect the negative battery cable.
2. Disconnect the solenoid valve connector.
3. Measure the resistance between terminals A through F and a ground.

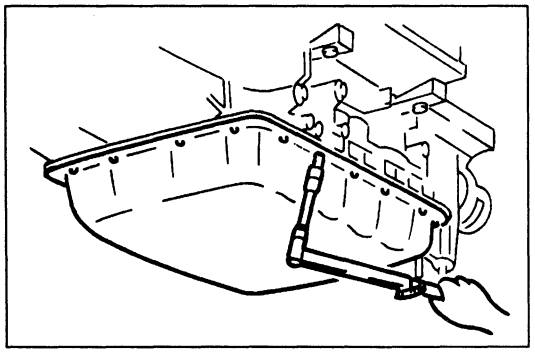
ATF temperature: 20–80°C {68–176°F}

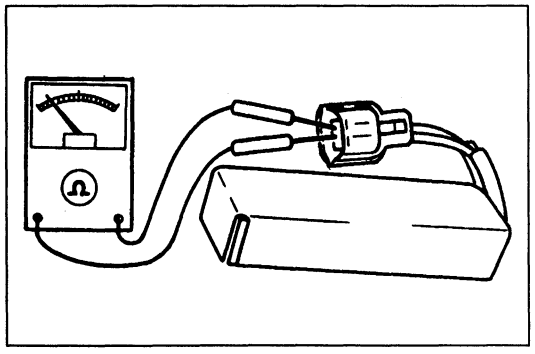
Terminal	Solenoid valve	Resistance (Ω)
A	Lockup control	20–40
B	Shift A	20–40
C	Shift B	20–40
D	Overrunning clutch	20–40
E	Line pressure	2.5–5.0
F	Lockup	10–20

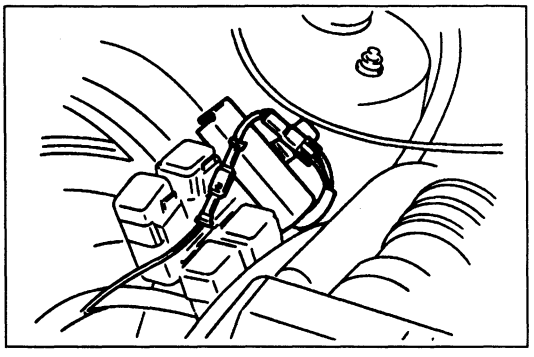
4. If not correct, replace the solenoid valves.
5. Connect the solenoid valve connector.
6. Connect the negative battery cable.











Replacement

If the shift A, shift B, overrunning clutch, and line pressure solenoid valves are not correct, replace the solenoids as an assembly.

1. Disconnect the negative battery cable.
2. Loosen the oil pan mounting bolts and drain the ATF into a suitable container.
3. Remove the oil pan.
4. Remove the control valve body. (Refer to page K-128.)
5. Remove the solenoid valve(s).
6. Apply ATF to a new O-ring(s) and install it on the new solenoid valve(s).
7. Install the new solenoid valve(s) to the control valve body.

Tightening torque
A: 6.9–9.8 N·m {70–100 kgf·cm, 61–86 in·lbf}
B: 9.9–12.7 N·m {100–130 kgf·cm, 86.9–112 in·lbf}

8. Install the control valve body. (Refer to page K-130.)
9. Clean the oil pan and the magnet, and set the magnet into the oil pan.
10. Remove any old locking compound from the bolt holes.
11. Install a new gasket and the oil pan.
12. Tighten the new bolts evenly and quickly.

Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}

13. Fill the transmission with the specified amount and type of ATF. (Refer to page K-25.)
14. Connect the negative battery cable.

DROPPING RESISTOR

Inspection

1. Disconnect the negative battery cable.
2. Disconnect the dropping resistor connector.
3. Measure the resistance between the terminals of the resistor.

Resistance: 10–14 Ω

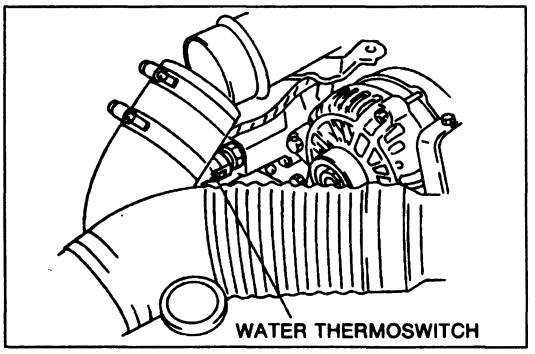
4. If not correct, replace the dropping resistor.
5. Connect the dropping resistor connector.
6. Connect the negative battery cable.

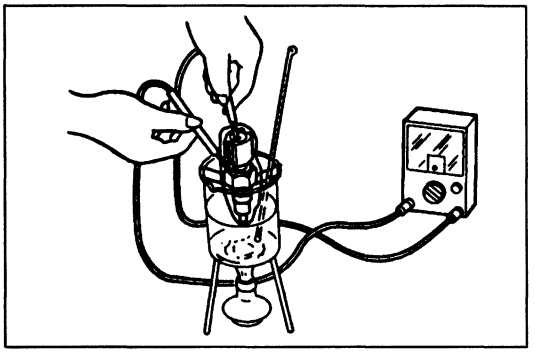
Replacement

1. Disconnect the negative battery cable.
2. Disconnect the dropping resistor connector.
3. Remove the dropping resistor.
4. Install the new dropping resistor.

Tightening torque:
7.9–11.7 N·m {80–120 kgf·cm, 70–104 in·lbf}

5. Connect the dropping resistor connector.
6. Connect the negative battery cable.





WATER THERMOSWITCH

Replacement

1. Disconnect the negative battery cable.
2. Disconnect the water thermoswitch connector.
3. Drain the engine coolant.
4. Remove the water thermoswitch.
5. Install the new water thermoswitch.

Tightening torque:
5.9–6.8 N·m {60–90 kgf·cm, 53–78 in·lbf}

6. Connect the water thermoswitch connector.
7. Fill the engine with the specified amount and type of engine coolant.
8. Connect the negative battery cable.

Inspection

1. Refer to "Replacement" above for removal of water thermoswitch.
2. Wrap the water thermoswitch in wrapping vinyl, place it in the ATF with a thermometer as shown, and heat the ATF gradually.
3. Measure the resistance between the terminals of the water thermoswitch.

ATF temperature	Continuity
Above 115°C {239°F}	Yes
Below 110°C {230°F}	No

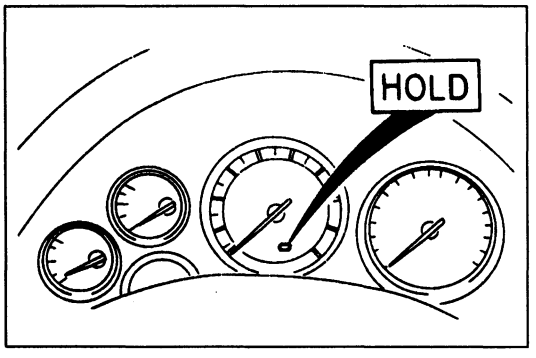
4. If not correct, replace the water thermoswitch.
5. Refer to "Replacement" above for installation of the water thermoswitch.

HOLD INDICATOR

Inspection

Operation

1. Turn the ignition switch ON.



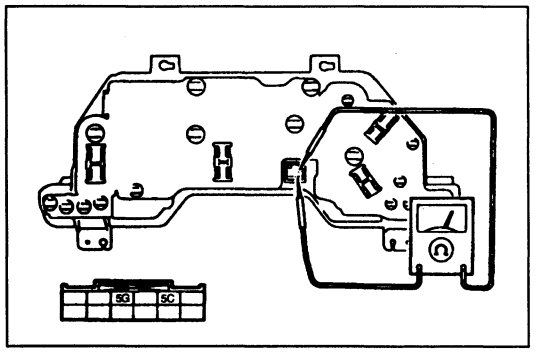
Note

- The hold indicator will flash if a malfunction exists in any of the PCMT system components.

2. Press the hold switch ON/OFF and verify that the hold indicator illuminates when the hold mode is selected.
3. If not as specified, inspect the combination meter and/or hold switch.

Continuity

1. Disconnect the negative battery cable.
2. Remove the combination meter. (Refer to 1994 RX-7 Body Electrical Troubleshooting Manual, section C1.)
3. Check for continuity between terminals 5C and 5G of the combination meter.



Terminal	5C	5G
Continuity	○	○

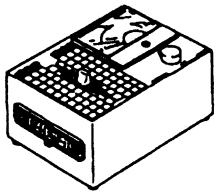
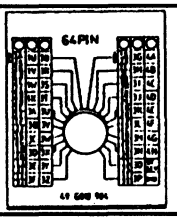
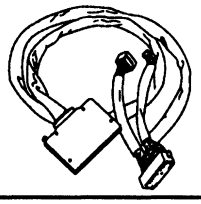
○ ○ : Indicates continuity

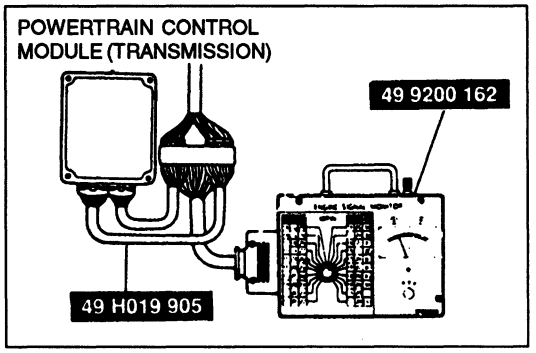
4. If not correct, replace the bulb or the combination meter.
5. Install the combination meter. (Refer to 1994 RX-7 Body Electrical Troubleshooting Manual, section C1.)
6. Connect the negative battery cable.

POWERTRAIN CONTROL MODULE (TRANSMISSION)

Preparation

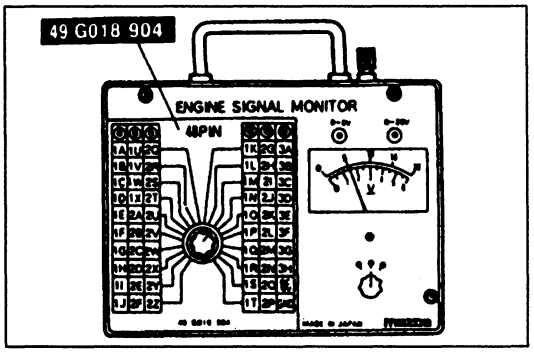
SST

49 9200 162 Monitor, Engine Signal		For inspection of Powertrain Control Module (Transmission) terminal voltage	49 G018 904 Sheet		For inspection of Powertrain Control Module (Transmission) terminal voltage
49 H019 905 Adapter Harness		For inspection of Powertrain Control Module (Transmission) terminal voltage			

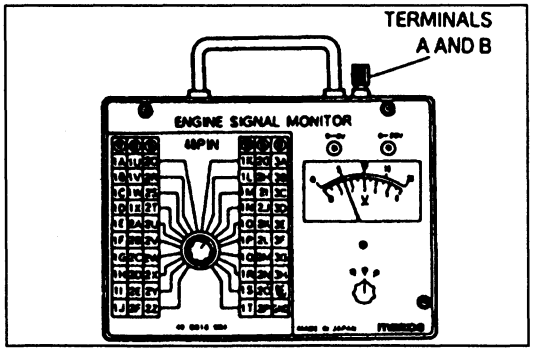


Inspection

1. Lift out the Powertrain Control Module (Transmission) by referring to the Powertrain Control Module (Transmission) replacement procedure.
   (Refer to page K-41.)
2. Disconnect the Powertrain Control Module (Transmission) connectors.
3. Connect the **SSTs (Engine Signal Monitor** and **Adapter Harness)** to the Powertrain Control Module (Transmission) as shown.



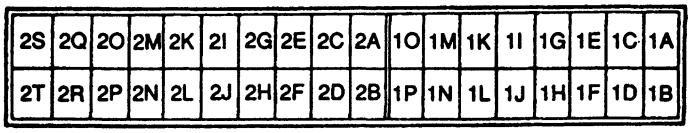
4. Place the **SST (Sheet)** on the **Engine Signal Monitor.**
5. Turn the ignition switch to ON.
6. Measure the terminal voltage at each terminal.
7. If any Powertrain Control Module (Transmission) terminal voltage is incorrect, check the related input or output devices and wiring. If no problem is found, replace the Powertrain Control Module (Transmission).



Caution

- **Applying voltage to terminals A and B of this SST will damage the SST.**

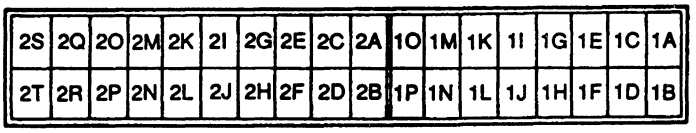
Terminal Voltage Chart (Reference Data)



B+: Battery positive voltage

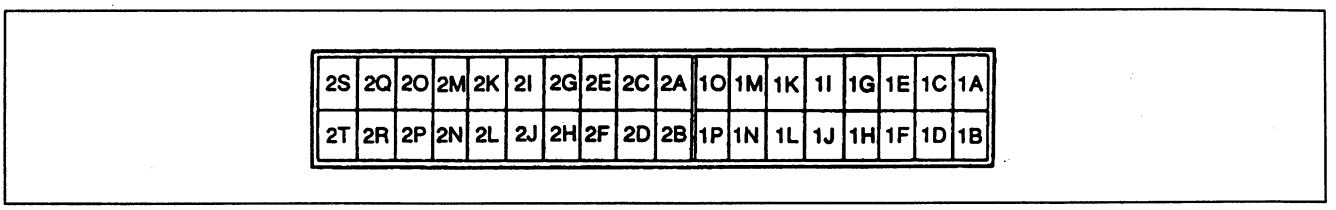
Terminal	Color	Component	Connected to	Voltmeter (+) terminal	Voltmeter (-) terminal	Correct voltage	Condition	Check area
1A	L/R	Battery (backup)	Battery	1A	Ground	B+	Constant	• Wiring and/or connector from terminal 1A to battery
1B (Output)	W/G	Shift B solenoid valve	Solenoid valve	1B		B+	P, R, and N ranges or 1st and 2nd gear positions	• Shift B solenoid valve • Wiring and/or connector from 1B terminal to shift B solenoid valve
						Below 1.0V	Third and Fourth gear positions	
1C (Output)	Y	Inhibitor signal	Engine control unit	1C		Below 1.0V	P and N ranges	• Park/Neutral switch, vehicle speed pulse generator, and/or powertrain control module (engine) • Wiring and/or connector from terminal 1C to powertrain control module (engine) terminal 1R
						B+	Except P and N ranges	
1D (Output)	W/R	Shift A solenoid valve	Solenoid valve	1D		B+	P, R, and N ranges or 1st and Fourth gear positions	• Shift A solenoid valve • Wiring and/or connector from terminal 1D to shift A solenoid valve
						Below 1.0V	2nd and Third gear positions	
1E (Input)	R	Park/Neutral switch (R range)	Park/Neutral switch	1E		B+	R range	• Park/Neutral switch • Wiring and/or connector from terminal 1E to park/neutral switch
						0V	Excect R range	
1F (Output)	W/L	Line pressure solenoid valve	Solenoid valve	1F		Above 1.5V	Throttle valve closed throttle position	• Line pressure solenoid valve • Wiring and/or connector from terminal 1F to line pressure solenoid valve
						Below 1.0V	Throttle valve wide opened throttle	
1G (Input)	Y/L	Engine rpm signal	Engine control unit	1G		0.3–0.8V	Engine running at idle	• Wiring and/or connector from terminal 1G to powertrain control module (engine) terminal 2B • Powertrain control module (engine)
						0V	Engine stopped	
						1.8–2.2V	Engine running at 3,000 rpm (no load)	
1H (Output)	B/LG	Dropping resistor	Dropping resistor	1H		B+	Throttle valve closed throttle position	• Dropping resistor and/or solenoid valve (line pressure) • Wiring and/or connector between terminal 1H, dropping resistor, and solenoid valve.
						Below 1.0V	Throttle valve wide opened throttle	

Terminal 1D voltage [shift A solenoid valve] is below 1.0V when in HOLD mode in P, R, and N ranges.



B+: Battery positive voltage

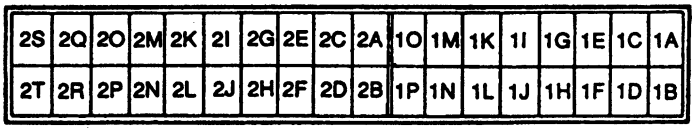
Terminal	Color	Component	Connected to	Voltmeter (+) terminal	Voltmeter (−) terminal	Correct voltage	Condition	Check area
1I (Input)	G/R	Vehicle speedometer sensor	Speedometer	1I	Ground	2–3V	Vehicle moving	• Vehicle speedometer sensor and/or speedometer • Wiring and/or connector between terminal 1I speedometer, and vehicle speedometer sensor.
						0V or 4.5–5.5V	Vehicle stopped	
1J (Ground)	B/L	Ground (Powertrain control module (Transmission))	—	1J		0V	Constant	• Wiring condition.
1K (Output)	Y	Hold indicator / FAT terminal (data link connector)	Combination meter (hold indicator light) and FAT terminal (data link connector)	1K		Below 1.0V	Hold mode	• Wiring and/or connector from terminal 1K to hold indicator light (combination meter) • Hold indicator light
						B+	Except hold mode	
1L (Input)	V/P	A/C signal	A/C relay	1L		Below 3.0V	A/C ON	• Powertrain control module (engine) and/or Air conditioning sensor • Wiring and/or connector from terminal 1L to Air conditioning sensor
						B+	A/C OFF	
1M (Output)	W	Lockup solenoid valve	Solenoid valve	1M		B+	Lockup	• Lockup solenoid valve • Wiring and/or connector from terminal 1M to lockup solenoid valve
						Below 1.0V	No lockup	
1N	B/Y	Battery (main)	Ignition switch	1N		B+	Ignition switch ON	• Meter fuse and/or ignition switch • Wiring and/or connector from terminal 1N to ignition switch (IG1)
						0V	Ignition switch OFF	
1O (Output)	W/Y	Overrunning clutch solenoid valve	Solenoid valve	1O		Below 1.0V	Throttle valve wide opened throttle (D range)	• Overrunning clutch solenoid valve • Wiring and/or connector from terminal 1O to overrunning clutch solenoid valve
						B+	Throttle valve closed (D range)	
1P	B/Y	Battery (main)	Ignition switch	1P		B+	Ignition switch ON	• Meter fuse and/or ignition switch • Wiring and/or connector from terminal 1P to ignition switch (IG1)
						0V	Ignition switch OFF	
2A (Input)	BR/W	Throttle sensor (V_{REF})	Throttle position sensor	2A		4.5–5.5V	Ignition switch ON	• Wiring and/or connector from terminal 2A to powertrain control module (engine) terminal 3I • Throttle position sensor
						0V	Ignition switch OFF	



B+: Battery positive voltage

Terminal	Color	Component	Connected to	Voltmeter (+) terminal	Voltmeter (-) terminal	Correct voltage	Condition	Check area
2B (Input)	Y/G	Park/Neutral switch (D range)	Park/Neutral switch	2B	Ground	B+	D range	• Park/Neutral switch • Wiring and/or connector from terminal 2B to park/neutral switch
						0V	Excect D range	
2C (Input)	G/Y	Barometric absolute pressure sensor	Powertrain control module (engine)	2C		2.0–4.5V	Ignition switch ON	• Wiring and/or connector from terminal 2C to powertrain control module (engine) erminal 2D
						0V	Ignition switch OFF	
2D (Input)	L/Y	Park/Neutral switch (P and N ranges)	Park/Neutral switch	2D	Ground	0V	P and N ranges	• Park/Neutral switch and/or ignition switch • Wiring and/or connector between terminal 2D park/neutral switch, and ignition switch (STA)
						B+	Except P and N ranges	
2E (Input)	O	Vehicle speed pulse generator	Vehicle speed vehicle speed pulse generator	2E*1	2L	Approx. above 0.5V AC	Vehicle speed above 25 km/h {16 MPH}	• Vehicle speed pulse generator • Wiring and/or connector from terminal 2E to vehicle speed pulse generator
						Approx. 0V (AC)	Vehicle stopped (Ignition switch ON)	
2P (Output)	G/W	Lockup control solenoid valve	Solenoid valve	2F	Ground	B+	lockup	• Lockup control solenoid valve • Wiring and/or connector from terminal 2F to lockup control solenoid valve
						Below 1.0V	No lockup	
2G (Input)	G/R	Slip lockup OFF signal	Powertrain control module (engine)	2G		Below 1.0V	Engine running at 3.000 rpm	• Wiring and/or connector from terminal 2G to powertrain control module (engine) terminal 2C • Powertrain control module (engine)
						B+	Engine running at idle	
2H (Input)	L/G	Torque reduced signal	Powertrain control module (engine)	2H*2		B+	Engine running at idle	• Wiring and/or connector from terminal 2H to powertrain control module (engine) terminal 2G • Throttle position sensor, vehicle speed sensor vehicle speed pulse generator, and/or powertrain control module (engine)
						Below 1.0V	Throttle opening above 1/8 (Engine coolant temp below 40°C {104°F})	
2I (Input)	W/Y	Hold switch	Hold switch	2I		B+	Switch depressed	• Hold switch • Wiring and/or connector from terminal 2I to hold switch
						0V	Switch released	

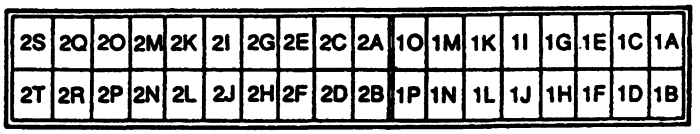
*1 Check terminal 2E (vehicle speed pulse generator) voltage by using the AC range.
*2 2H (Torque reduced signal) : Some kinds of testers may give incorrect values. This is because the voltage output period is very short.



B+: Battery positive voltage

Terminal	Color	Component	Connected to	Voltmeter (+) terminal	Voltmeter (−) terminal	Correct voltage	Condition	Check area
2J (Input)	Y/G	Vehicle speed sensor (revolution sensor)	Vehicle speed sensor (revolution sensor)	2J*	2L	Approx. above 1.0V (AC)	Vehicle speed above 25 km/h {16 MPH}	• Vehicle speed sensor (revolution sensor) • Wiring and/or connector from terminal 2J to vehicle speed sensor
						Approx. 0V (AC)	Vehicle stopped	
2K	L/W	TAT terminal(data link connector) / 4GR inhibit signal (auto speed control signal)	TAT terminal (data link connector) and cruise control unit	2K	Ground	4.5–5.5	Ignition switch ON	• Terminal 1N and 1P voltage • Wiring and/or connector from terminal 2K to data link connector TAT terminal • Wiring and/or connector from terminal 2K to cruise control unit terminal G
						0V	TAT terminal grounded	
2L (Ground)	W	Ground (input signals)	—	2L		0V	Constant	• Wiring condition
2M (Input)	R/W	Idle signal	Powertrain control module (engine)	2M	Ground	4.5–5.5V	Throttle valve opened	• Throttle position sensor and/or powertrain control module (engine) • Wiring and/or connector from terminal 2M to powertrain control module (engine) terminal 2E
						Below 1.0V	Throttle valve closed throttle position	
2N (Input)	B	Water thermo-switch / mileage switch	Water thermo-switch and mileage switch	2N		0V	Engine coolant temp. above 115°C {239°F} or vehicle total mileage above 625 km {388 miles} and vehicle stopped	• Water thermo-switch and/or mileage switch • Wiring and/or connector from terminal 2N to water thermo-switch
						B+	Engine coolant temp. below 110°C {230°F} or vehicle total mileage below 625 km {388 miles} and vehicle stopped	
2O (Input)	LG/R	Stoplight switch	Stoplight switch	2O		B+	Brake pedal depressed	• Stoplight switch • Wiring and/or connector from terminal 2O to stoplight switch
						0V	Brake pedal released	

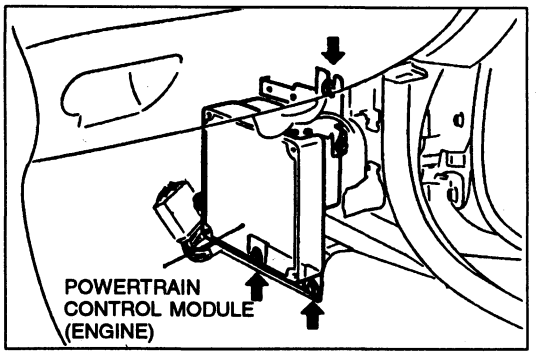
* Check terminal 2J (speed sensor 1) voltage by using the AC range.

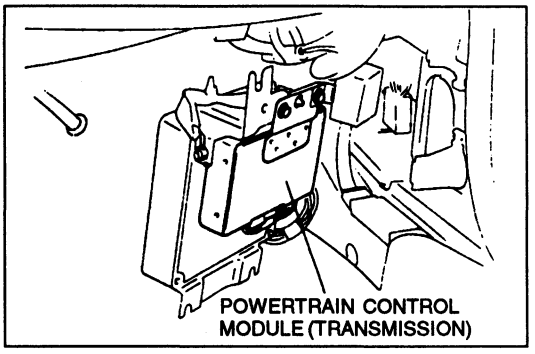


B+: Battery positive voltage

Terminal	Color	Component	Connected to	Voltmeter (+) terminal	Voltmeter (−) terminal	Correct voltage	Condition	Check area
2P (Output)	G/W	Reduce torque signal / slip lockup signal	Powertrain control module (engine)	2P*	Ground	Below 1.0V	When shifting from 1st to 2nd or from 2nd to Third with the throttle opening above 1.5/8. When slip lockup with the throttle opening below 0.5/8.	• Wiring and/or connector from terminal 2P to powertrain control module (engine) terminal 1Q • Throttle position sensor, vehicle speed sensor, vehicle speed pulse generator, lockup, lockup control solenoid valve, and/or powertrain control module (engine)
						B+	Engine running at idle	
2Q (Input)	BR/W	Park/Neutral switch (L range)	Park/Neutral switch	2Q		B+	L range	• Park/Neutral switch • Wiring and/or connector from terminal 2Q to park/neutral switch
						0V	Except L range	
2R (Input)	R	ATF thermosensor	ATF thermosensor	2R	2L	Approx. 2.4–0.4V	While warming up ATF Note • Approx. 1.8V: ATF temperature 10°C {50°F} • Approx. 1.1V: ATF temperature 40°C {104°F}	• ATF thermosensor • Wiring and/or connector from terminal 2R to ATF thermosensor
2S (Input)	L/R	Park/Neutral switch (S range)	Park/Neutral switch	2S	Ground	B+	S range	• Park/Neutral switch • Wiring and/or connector from terminal 2S to park/neutral switch
						0V	Except S range	
2T (Input)	B/G	Throttle position sensor (TVO)	Throttle position sensor	2T		0.1–1.1V	Throttle valve closed throttle position	• Throttle position sensor • Wiring and/or connector from terminal 2T to throttle position sensor
						4.0–4.5V	Throttle valve wide opened throttle	

* 2P (Reduce torque signal/ lockup signal): Some kinds of testers may give incorrect values. This is because the voltage output period is very short.





Replacement

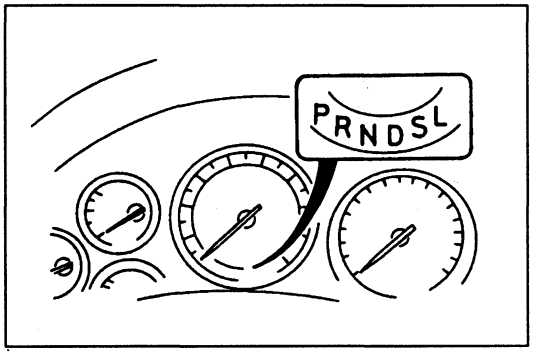
1. Disconnect the negative battery cable.
2. Remove the front side trim (passenger side).
3. Remove the Powertrain Control Module (Engine). (Refer to section F.)
4. Remove the nuts shown in the figure and disconnect the Powertrain Control Module (Transmission) connectors.
5. Install the new Powertrain Control Module (Transmission).

Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 70–95 in·lbf}

6. Connect the Powertrain Control Module (Transmission) connectors.
7. Install the Powertrain Control Module (Engine). (Refer to section F.)

Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 70–95 in·lbf}

8. Install the front side trim (passenger side).
9. Connect the negative battery cable.

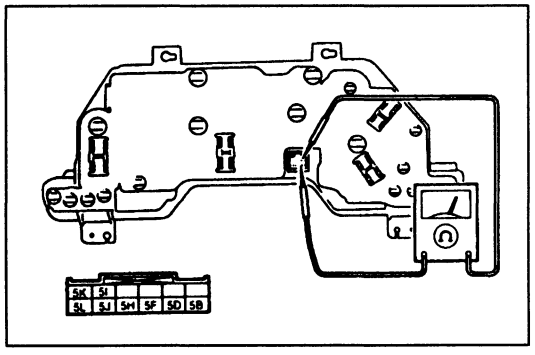


SELECTOR INDICATOR LIGHT

Inspection

Operation

1. Verify that the selected range and selector indicator light (built into combination meter) positions are aligned.
2. If not as specified, check the park/neutral switch and/or selector indicator light.



Continuity

1. Disconnect the negative battery cable.
2. Remove the combination meter. (Refer to 1994 RX-7 Body Electrical Troubleshooting Manual, section C1.)
3. Check for continuity between the terminals.

Terminal / Position	5K	5I	5L	5J	5H	5F	5D	5B
P	○		○					
R	○			○				
N		○			○			
D		○				○		
S		○					○	
L		○						○

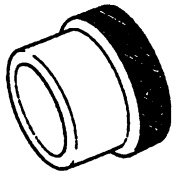
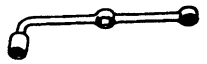
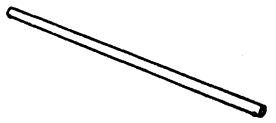
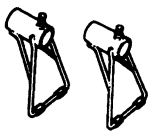
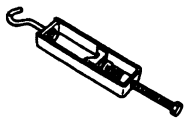
○—○ : Indicates Continuity

4. If not correct, replace the bulb or combination meter.
5. Install the combination meter. (Refer to 1994 RX-7 Body Electrical Troubleshooting Manual, section C1.)
6. Connect the negative battery cable.

TRANSMISSION

TRANSMISSION UNIT (REMOVAL)

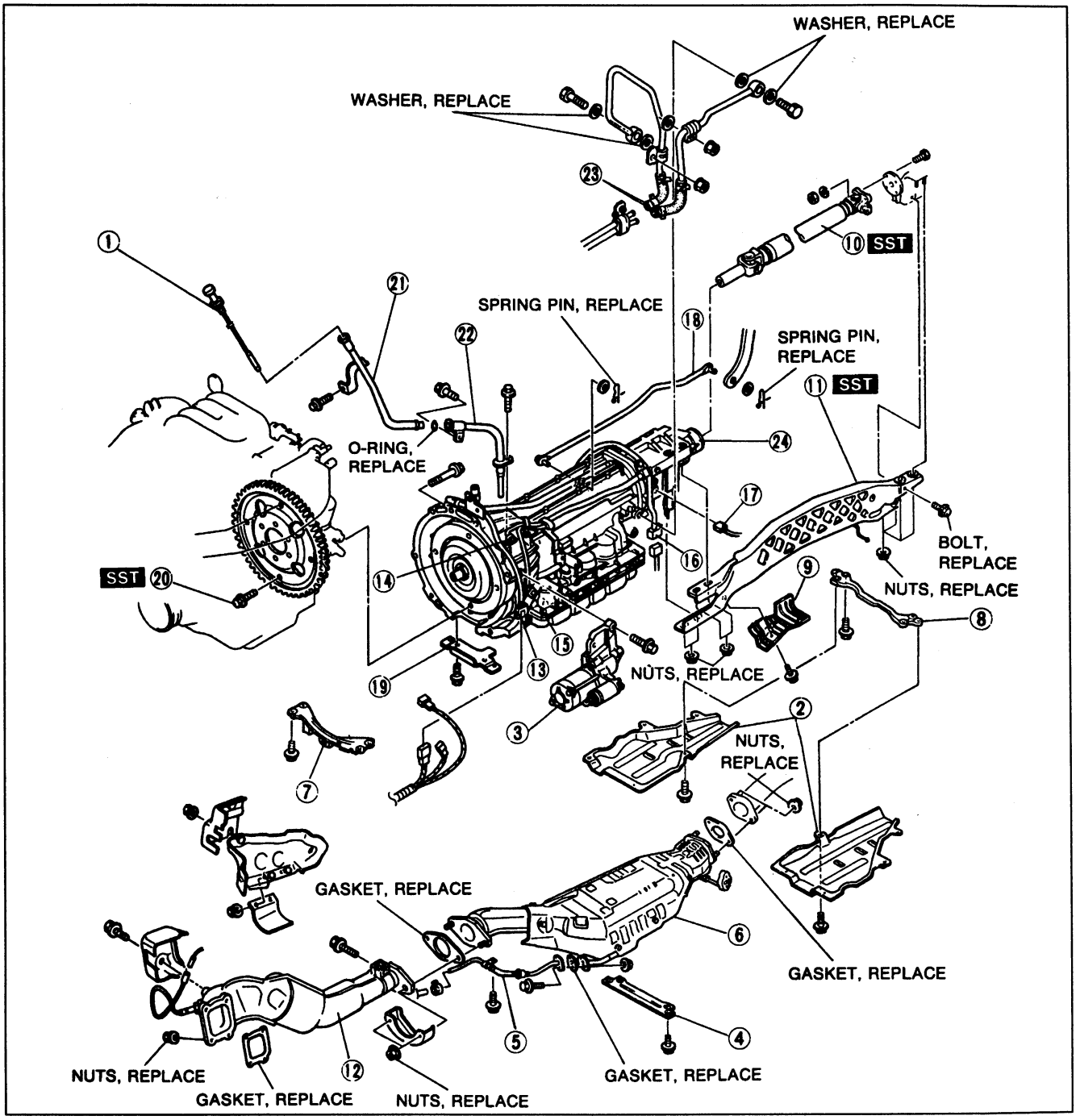
Preparation
SST

49 J019 002 Cap 	For prevention of ATF leakage	49 0877 435 Special wrench 	For loosening of torque converter installation bolts
49 G017 5A0 Support, engine 	For support of engine	49 G017 50 1 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

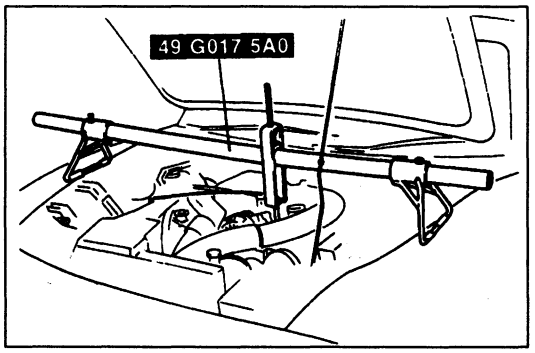
Removal

The oil pan could contain small chips, shavings, and other particles helpful in checking the condition of the transmission and diagnosing certain problems. To ensure that all foreign particles stay in the oil pan, make sure that the transmission is never tipped completely over while the oil pan is still installed.

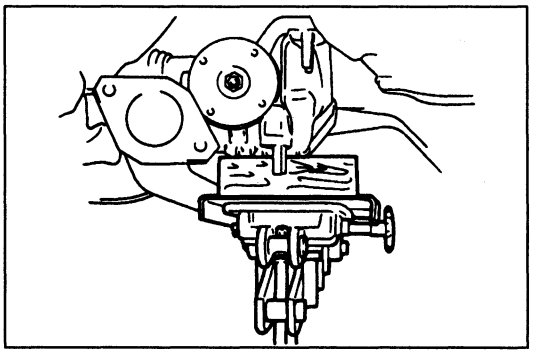
1. Disconnect the negative battery cable.
2. On level ground, jack up the vehicle and support it evenly on safety stands.
3. Remove in the order shown in the figure, referring to **Removal Note**.



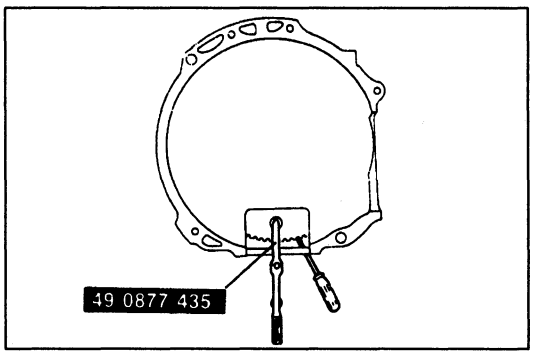
1. ATF dipstick
2. Undercover (right and left)
3. Starter
4. Tunnel member (center)
5. Secondary air injection pipe
6. Three-way catalyst assembly
7. Front tunnel member
8. Rear tunnel member
9. Cover
10. Propeller shaft
    Removal ..... section L
11. Power plant frame (PPF)
    Removal Note ..... page K-44
12. Front exhaust pipe
13. Park/neutral switch connector
14. Vehicle speed sensor connector
15. Vehicle speed pulse generator connector
16. Solenoid valve connector
17 Vehicle speedometer sensor connector
18. Selector rod (selector lever side)
19. Service hole cover
20. Torque converter bolts
    Removal Note ..... page K-44
21. Oil filler tube (upper)
22. Oil filler tube (lower)
23. Oil cooler hose
24. Transmission
    Removal Note ..... page K-45



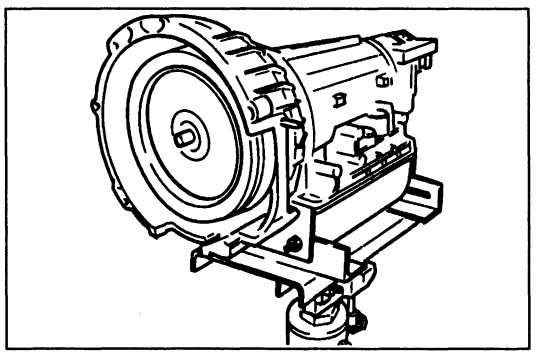
Removal note
Power plant frame (PPF)
1. Hold the engine by using the **SST**.



2. Hold the differential with a transmission jack.
3. Remove the PPF.



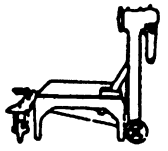
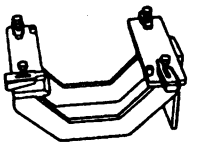
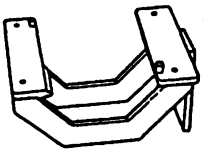
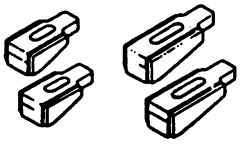
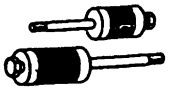
Torque converter bolts
1. Lock the drive plate by using a screwdriver.
2. Remove the torque converter bolts by using the **SST**.



Transmission
Set the transmission onto the transmission jack, paying special attention not to damage the oil pipes. Make sure that the torque converter side of the transmission is tilted slightly upward during removal. Carefully lower the transmission from the vehicle.

TRANSMISSION UNIT (DISASSEMBLY)

Preparation
SST

49 0107 680A Engine stand		For disassembly of transmission	49 U019 0A0A Hanger set, transmission		For disassembly of transmission
49 H075 495B Body (Part of 49 U019 0A0A)		For disassembly of transmission	49 U019 003 Holder (Part of 49 U019 0A0A)		For disassembly of transmission
49 0378 390 Puller, oil pump		For disassembly of transmission			

Precaution
General Notes:

1. Disassemble the transmission in a clean area (clean work space) to prevent contaminants from entering into the mechanisms.
2. Inspect the individual transmission components in accordance with the QUICK DIAGNOSIS CHART during disassembly.
3. Use only plastic hammers when applying force to separate the light alloy case joints.
4. Never use rags during disassembly; they may leave particles that can clog fluid passages.
5. Several parts resemble one another; organize them so that they do not get mixed up.
6. Disassemble the control valve assembly and thoroughly clean it when the clutch or brake band has burned out or when the ATF has degenerated.

Cleaning Notes:

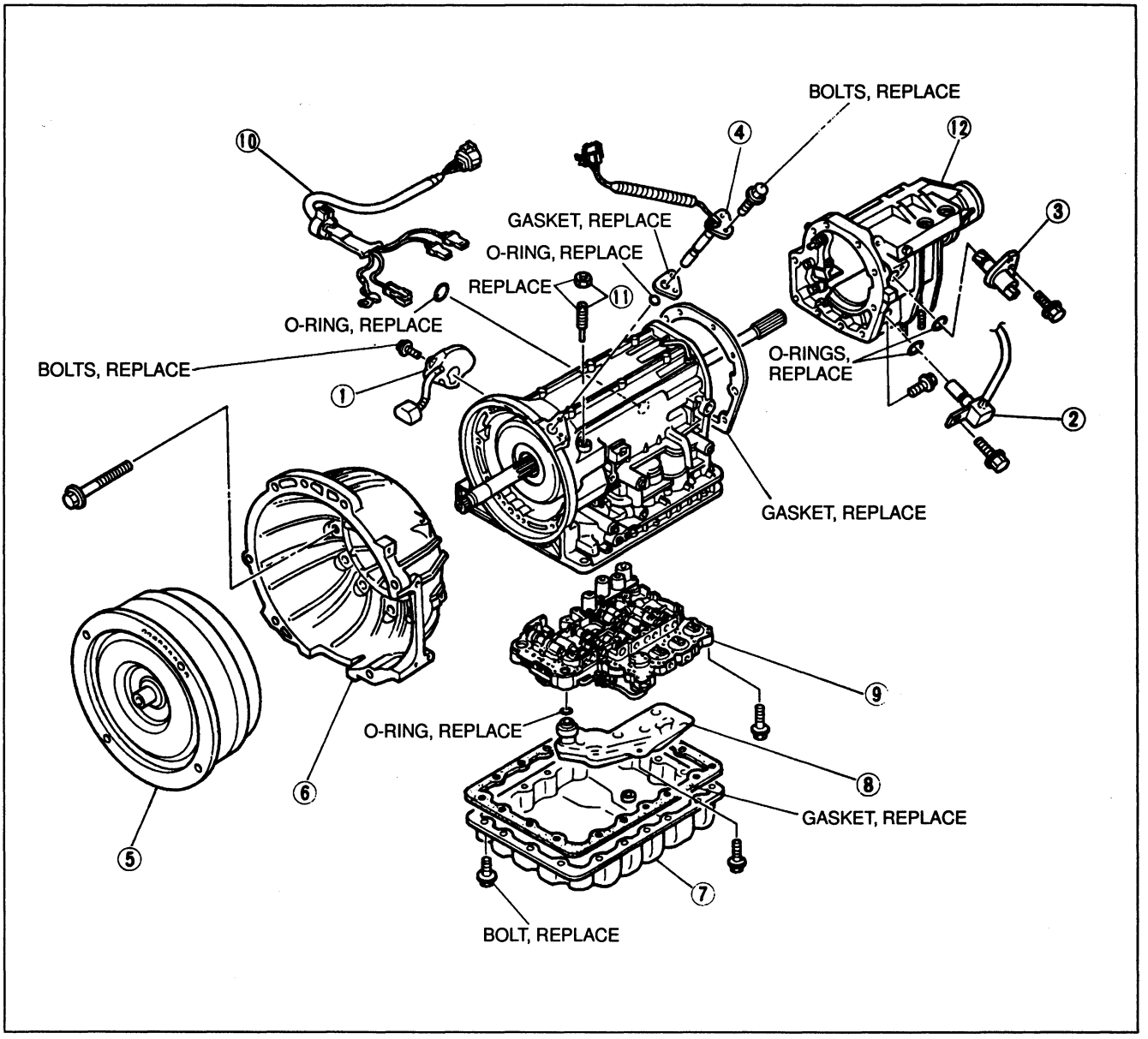
1. Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvents, or both, before disassembly.

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

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.

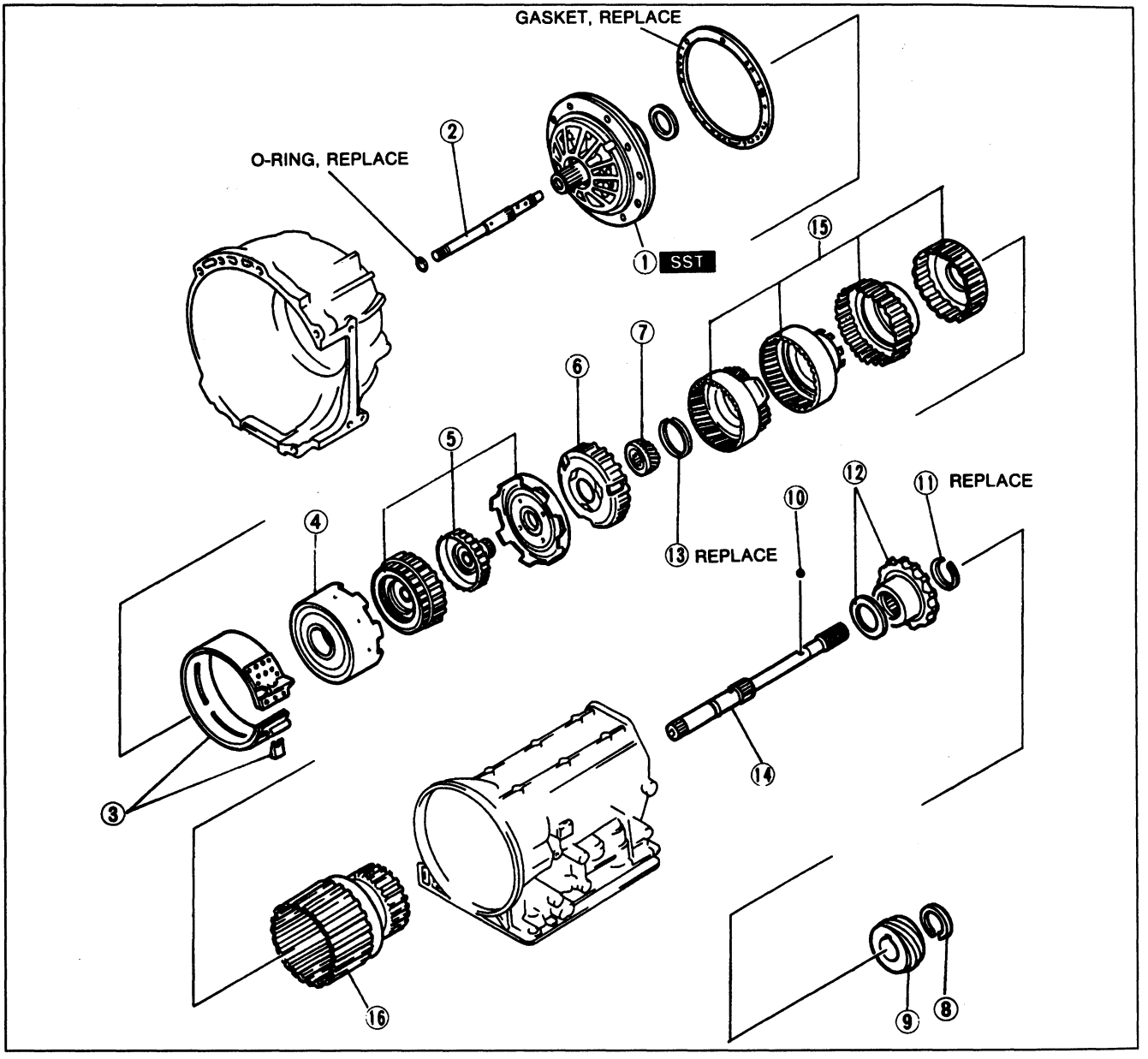
Disassembly
Disassemble in the order shown in the figure, referring to **Disassembly Procedure.**

Components 1



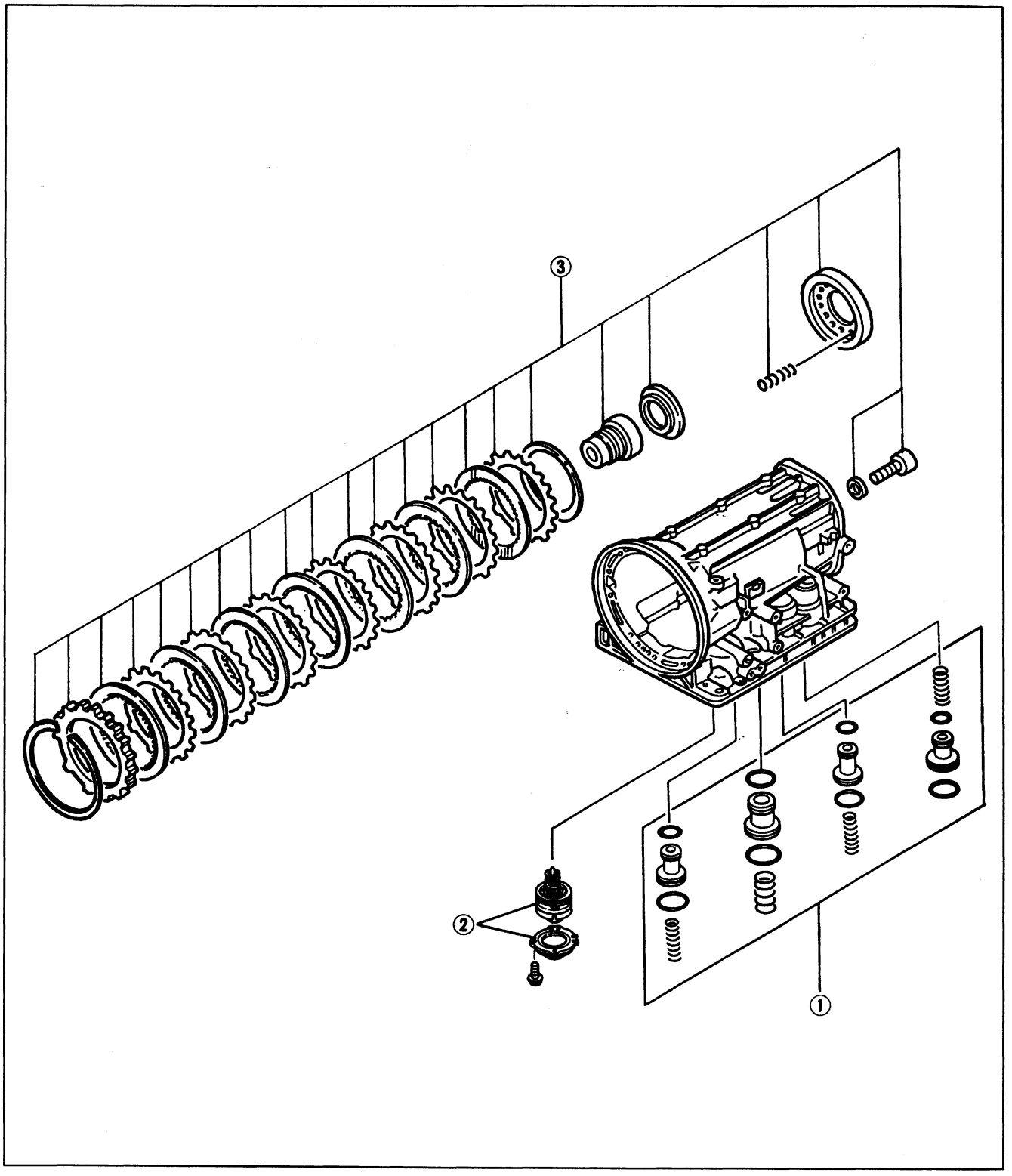
1. Park/neutral switch
   - Inspection ..... page K- 28
   - Adjustment ..... page K- 28
   - Replacement ..... page K- 28
2. Vehicle speed sensor
   - Inspection ..... page K- 29
   - Replacement ..... page K- 29
3. Vehicle speedometer sensor
   - Inspection ..... page K- 30
   - Replacement ..... page K- 30
4. Vehicle speed pulse generator
   - Inspection ..... page K- 30
   - Replacement ..... page K- 31
5. Torque converter
   - Inspection ..... page K- 57
6. Converter housing
7. Oil pan
8. Oil strainer
9. Control valve body
   - Disassembly / Inspection ..... page K-108
   - Assembly ..... page K-125
   - On-Vehicle Removal ..... page K-128
   - On-Vehicle Installation ..... page K-130
10. Solenoid valve harness
11. Anchorend bolt and nut
12. Extension housing / Parking mechanism
    - Disassembly / Inspection / Assembly ..... page K- 97
    - On-Vehicle Removal / Installation ..... page K-101

Components 2

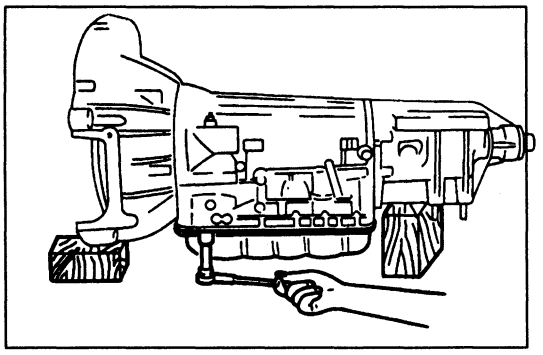


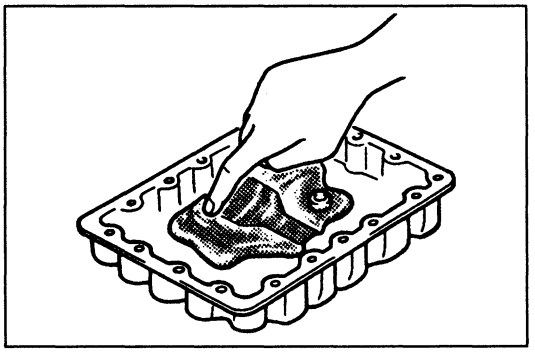
1. Oil pump
   Disassembly / Inspection / Assembly ..... page K-60
2. Input shaft
3. Brake band and strut
4. Reverse clutch
   Preinspection ..... page K-64
   Disassembly / Inspection / Assembly ..... page K-65
5. High clutch and front sun gear
   Preinspection ..... page K-70
   Disassembly / Inspection / Assembly ..... page K-71
6. Front planetary carrier
7. Rear sun gear
8. Snap ring
9. Speedometer drive gear
10. Steel ball
11. Snap ring
12. Parking gear and bearing
13. Snap ring
14. Output shaft
15. Front internal gear, rear internal gear, forward clutch hub, overrunning clutch hub
    Preinspection ..... page K-80
    Disassembly / Inspection / Assembly ..... page K-80
16. Forward clutch drum (forward clutch, overrunning clutch, low one-way clutch)
    Preinspection ..... page K-83
    Disassembly / Inspection / Assembly ..... page K-84

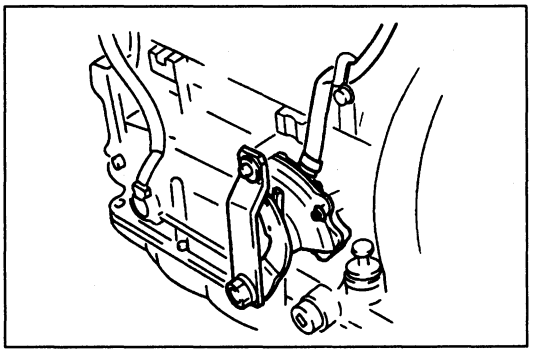
Components 3



1. Accumulators
   Disassembly / Inspection / Assembly ..... page K-58
2. Band servo
   Preinspection ..... page K-76
   Disassembly / Inspection / Assembl ..... page K-76
3. Low and reverse brake
   Preinspection ..... page K-91
   Disassembly / Inspection / Assembly ..... page K-92

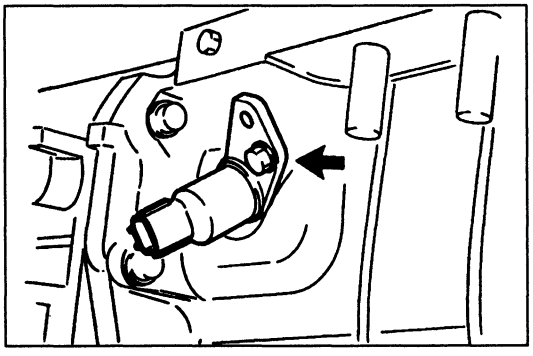




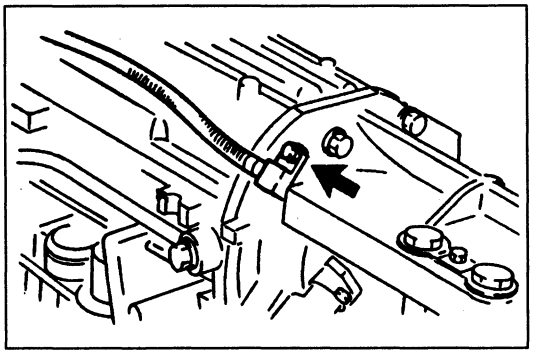


Disassembly procedure

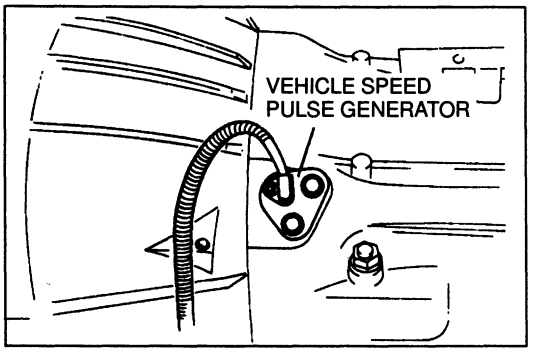
1. Support the transmission by placing wooden blocks under the converter housing and the extension housing.
2. Remove the oil pan and gasket.
   If large amounts of material are found in the oil pan, replace the torque converter and inspect the transmission for the cause.
3. Examine any material found in the pan or on the magnet to determine the condition of the transmission.
   Clutch facing material ..... Drive plate and brake band wear
   Steel (magnetic) ..... Bearing gear, and driven plate wear
   Aluminum (non-magnetic) ... Bushings or cast aluminum parts wear
4. Install the oil pan with a few bolts to protect the control valve body.
5. Remove the harness from the connector bracket.
6. Remove the park/neutral switch.



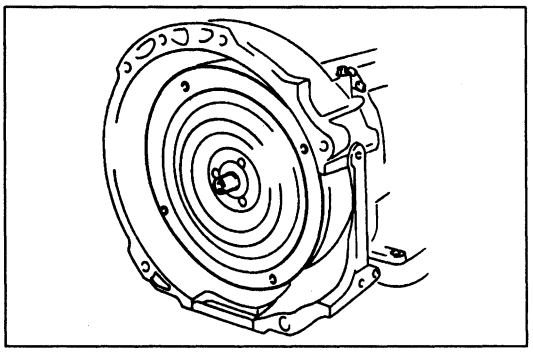
7. Remove the harness from the connector bracket.
8. Remove the connector bracket from the converter housing.
9. Remove the vehicle speedometer sensor.
10. Remove the O-ring from the vehicle speedometer sensor.



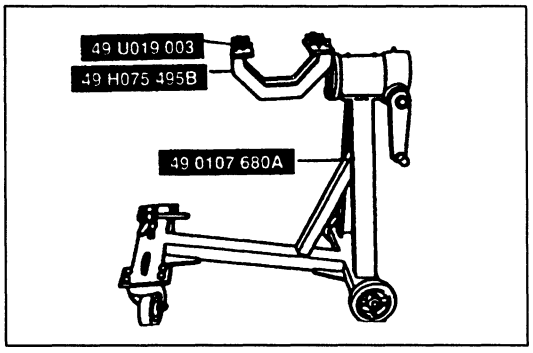
11. Remove the vehicle speed sensor.
12. Remove the O-ring from the vehicle speed sensor.



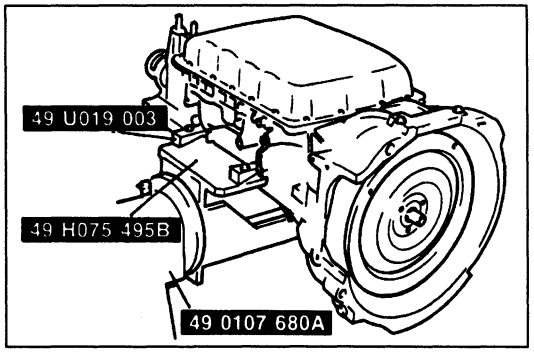
13. Remove the vehicle speed pulse generator and gasket from the transmission case.
14. Remove the O-ring from the vehicle speed pulse generator.



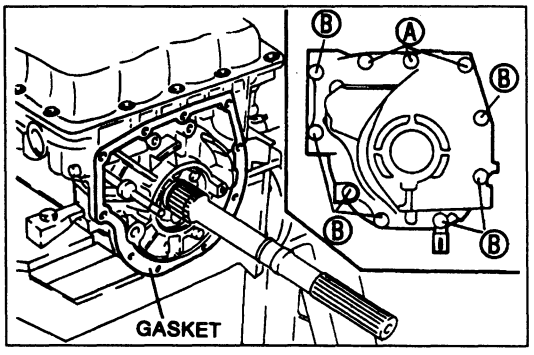
15. Remove the torque converter, and immediately turn it so that the hole faces upward. This will help to keep any remaining fluid from spilling.



16. Assemble the **SSTs** as shown.

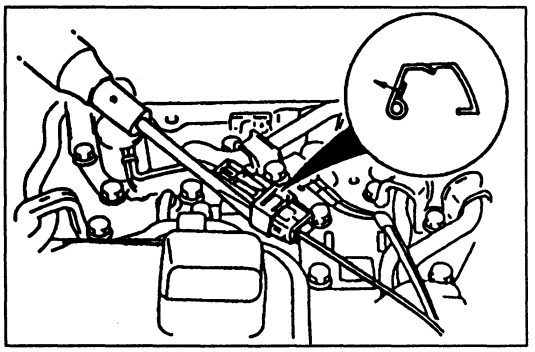


17. Mount the transmission to the **SSTs**.
18. Remove the oil pan, gasket, and magnet.

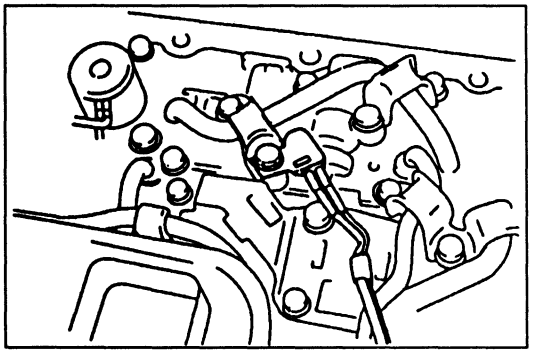


19. Remove the extension housing and gasket.

Bolt length (measured from below bolt head)
A: 30 mm {1.181 in}
B: 45 mm {1.772 in}

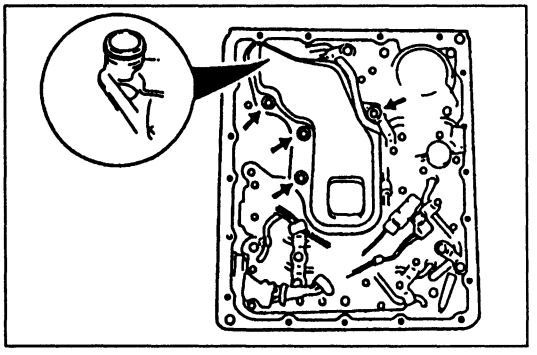


20. Remove the clip by carefully prying with a small flathead screwdriver.
21. Remove the lockup solenoid valve connector.



22. Remove the ATF thermosensor.

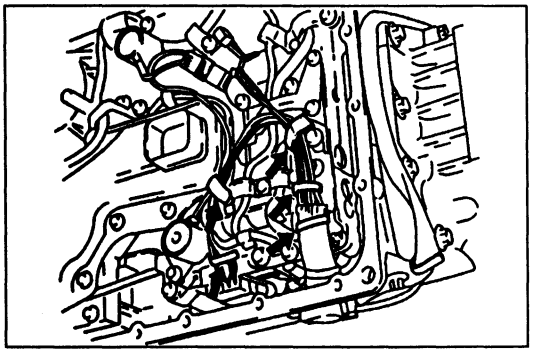
    Bolt length (measured from below bolt head): 45 mm {1.772 in}



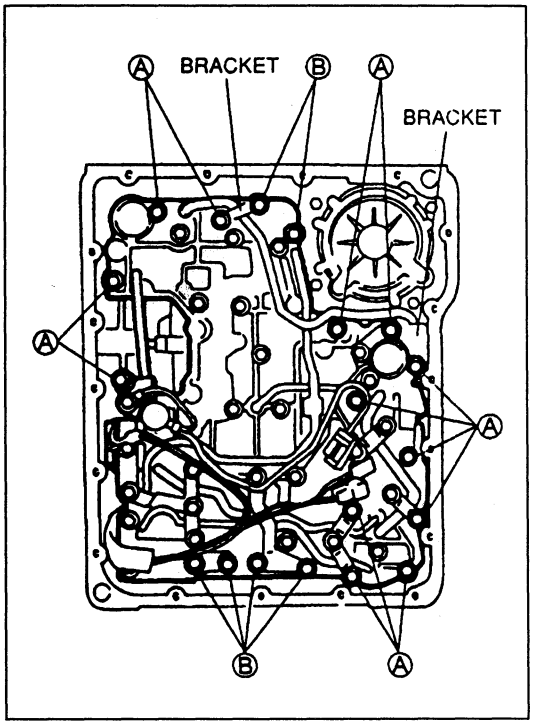
23. Remove the oil strainer.

    Bolt length (measured from below bolt head): 50 mm {1.969 in}

24. Remove the O-ring from the oil strainer.

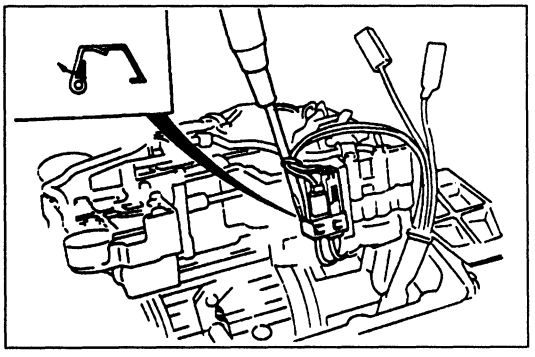


25. Separate the solenoid valve harness from the harness clip.

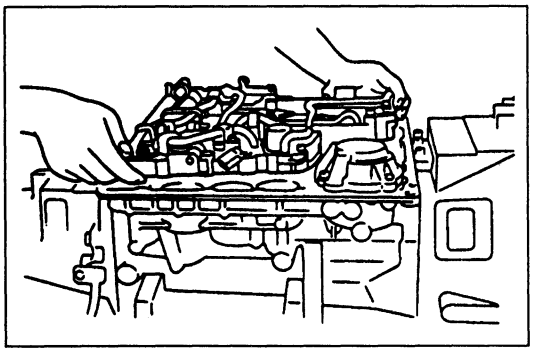


26. Remove bolts A, B, and the brackets shown in the figure.

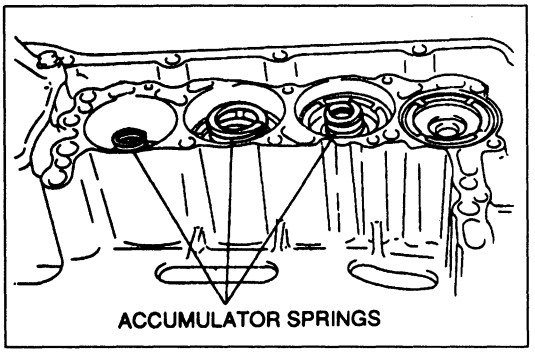
Bolt length (measured from below bolt head)
A: 33 mm {1.299 in}
B: 45 mm {1.772 in}



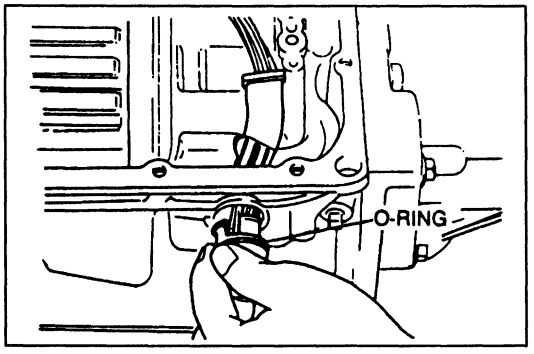
27. Remove the clip by carefully prying with a small flathead screwdriver.
28. Disconnect the solenoid valve connectors.



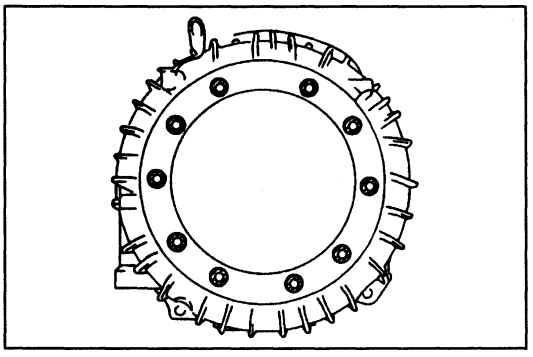
29. Remove the control valve body.



30. Remove the accumulator springs.



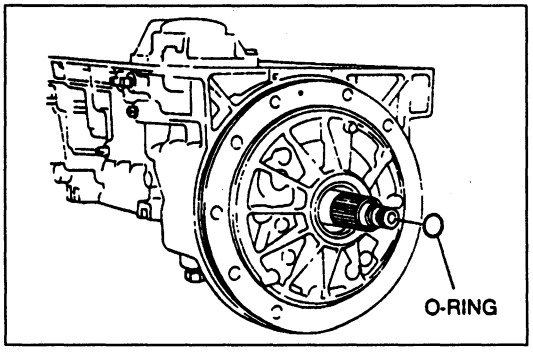
31. Remove the solenoid connector from the transmission case.
32. Remove the O-ring from the solenoid valve harness.



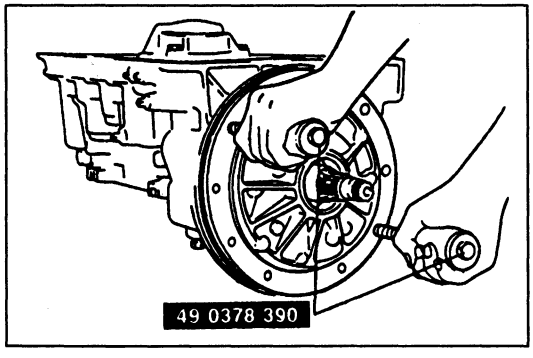
33. Remove the converter housing from the transmission case.

Caution
- **The converter housing is made of aluminum, and is therefore easily dented and scratched by metal tools. When removing old sealant, do not gouge or strike the sealing surface of the converter housing.**

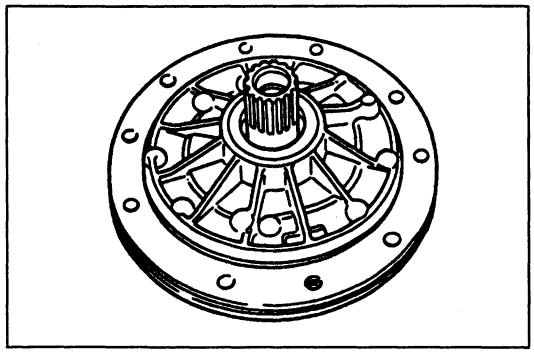
34. Clean the sealant from the converter housing.



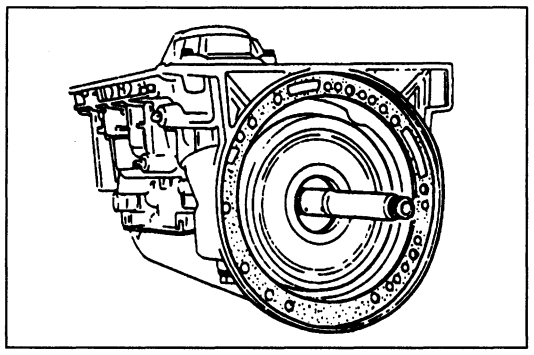
35. Remove the O-ring from the input shaft.



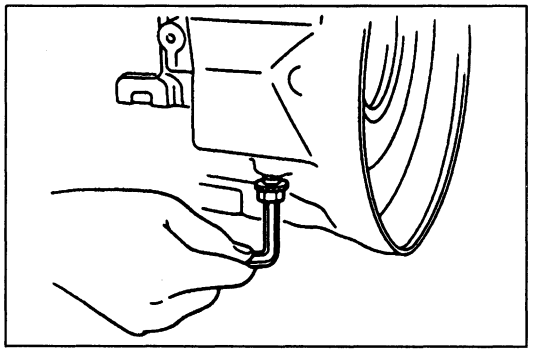
36. Install the **SST** to the oil pump.
37. Slowly remove the oil pump from the transmission case by evenly sliding the weights of the **SST**.
38. Remove the **SST** from the oil pump.



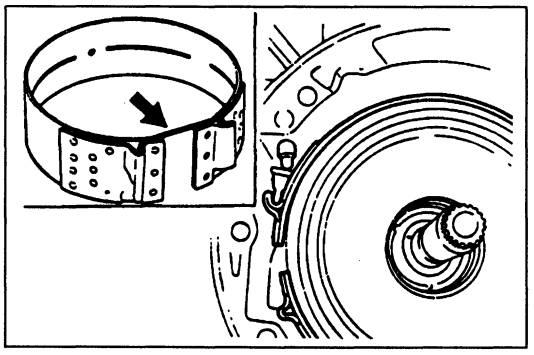
39. Clean the sealant from the oil pump housing, being careful not scratch or dent the machined surfaces.



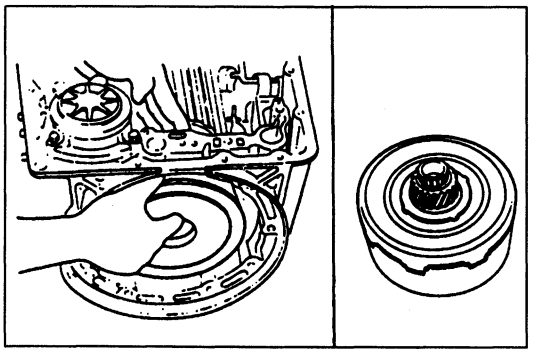
40. Remove the oil pump gasket.
41. Pull out the input shaft while holding the reverse clutch drum.



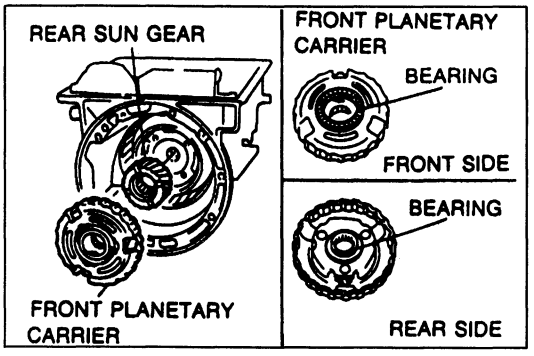
42. While holding the anchor end bolt, loosen the locknut.
43. Remove the anchor end bolt.
44. Clean the sealant from the case threads.



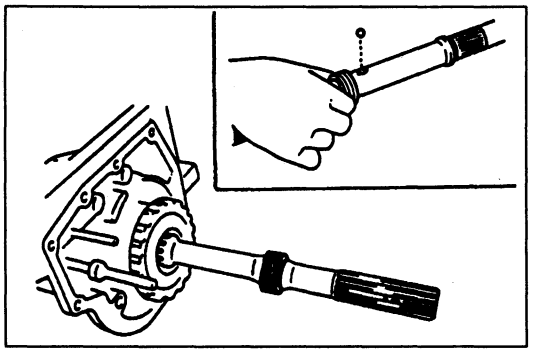
45. Remove the brake band and hold it together with a piece of wire as shown in the figure.
46. Remove the band strut.



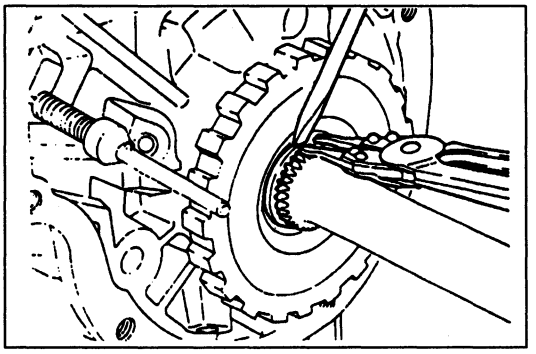
47. Remove the reverse clutch, high clutch, and front sun gear assembly from the transmission case.



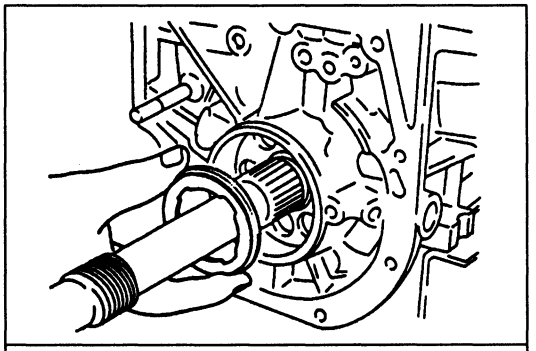
48. Remove the front planetary carrier, bearings, and rear sun gear.
    Inspect the following and replace as necessary.
    1) Front planetary carrier
       Inspect gear teeth for damage, wear, and cracks. Check for rough rotation of pinion gears.
    2) Rear sun gear
       Inspect gear teeth for damage, wear, and cracks.
    3) Bearing
       Inspect for damage and rough rotation.



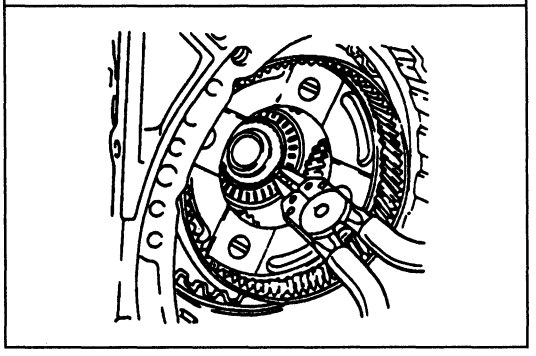
49. Remove the snap ring and the speedometer drive gear.
50. Remove the steel ball.



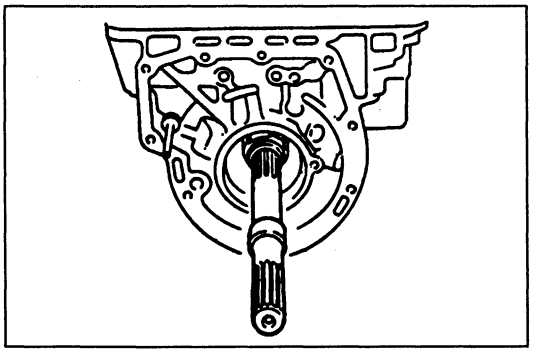
51. Remove the snap ring from the output shaft.
52. Remove the parking gear.



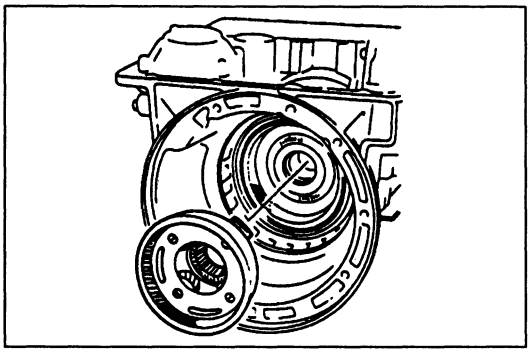
53. Remove the bearing from the rear of the transmission case. Inspect for damage and rough rotation. Replace as necessary.



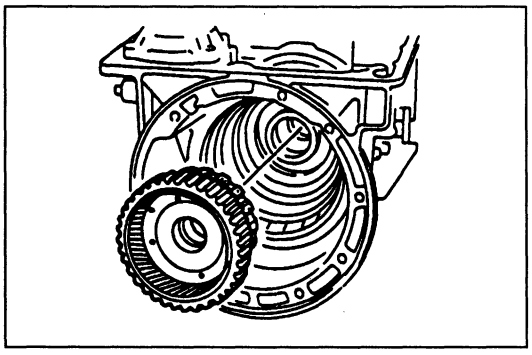
54. Push the output shaft slightly forward and remove the snap ring from the output shaft.



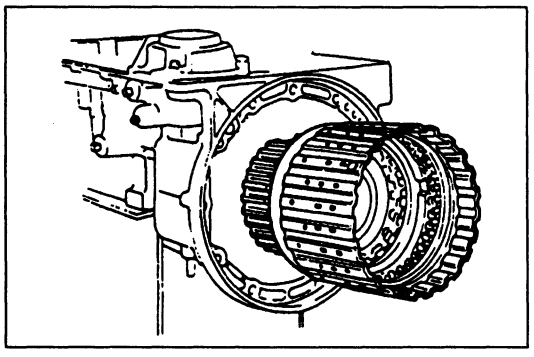
55. Slide the output shaft from the rear of the transmission case.



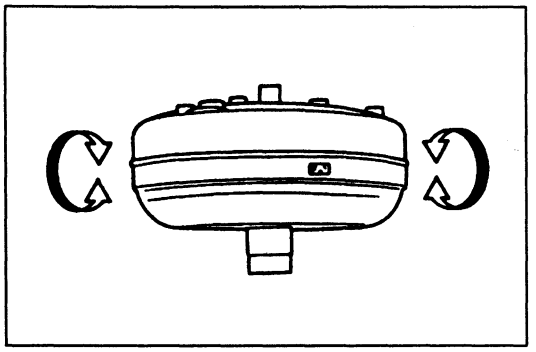
56. Remove the front internal gear (integrated with rear planetary carrier).



57. Remove the rear internal gear, forward clutch hub, and overrunning clutch hub assembly.



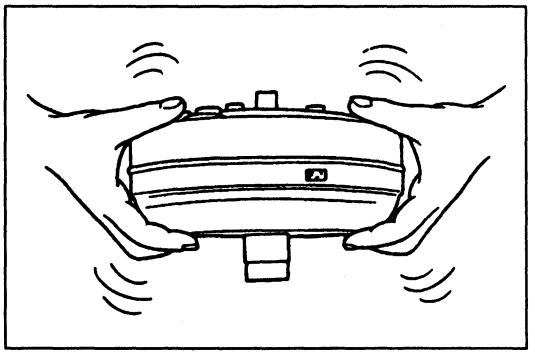
58. Remove the forward clutch drum (forward clutch, overrunning clutch, and low one-way clutch) assembly.



TORQUE CONVERTER

Inspection

1. Check the outside of the converter for damage and cracks. Replace the torque converter if there are any problems.
2. Check for rust on the pilot hub or the boss. Remove any rust completely.



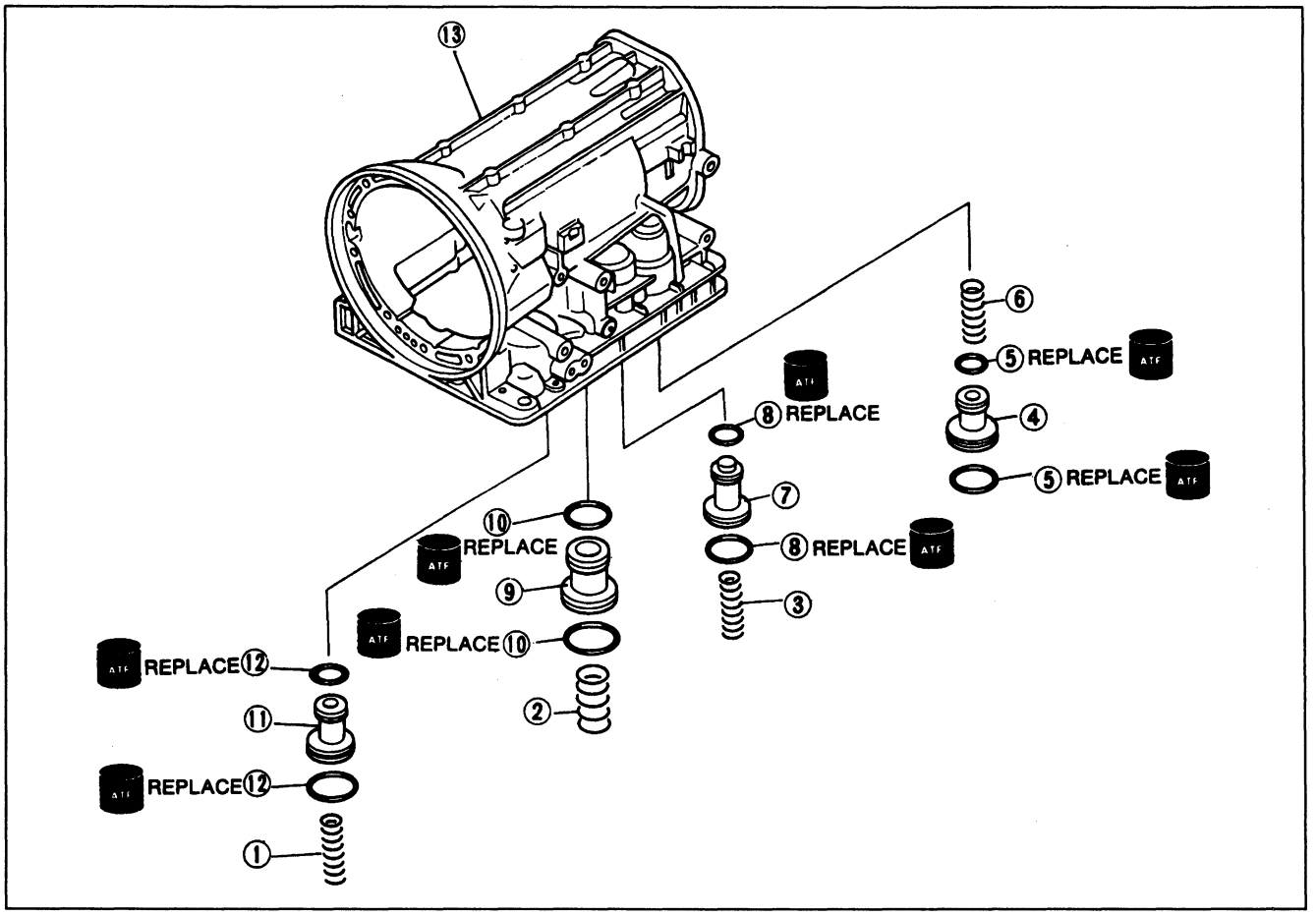
Cleaning the inside of the converter

1. Drain all ATF remaining in the converter.
2. Pour in new ATF **(2.0 L {2.1 US qt, 1.8 Imp qt})**.
3. Shake the converter to clean the inside. Drain the ATF.
4. Repeat steps 2 and 3 until you are sure that the inside of the torque converter is clean.

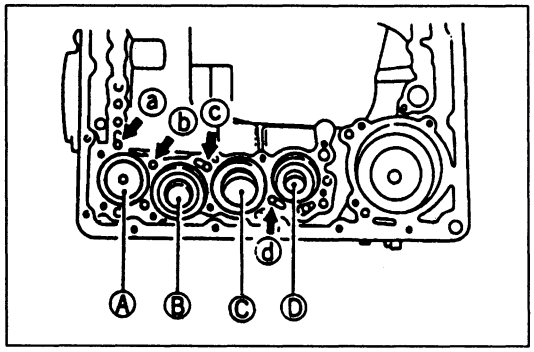
ACCUMULATORS

Disassembly / Inspection / Assembly

1. Disassemble in the order in the figure, referring to **Disassembly Note**.
2. Inspect all parts and replace if necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



1. 3-4/N-R accumulator spring
   Inspection ..... page K-59
2. 1-2 accumulator spring
   Inspection ..... page K-59
3. 2-3 accumulator spring
   Inspection ..... page K-59
4. N-D accumulator piston
   Disassembly Note ..... below
5. O-rings
6. N-D accumulator spring
   Inspection ..... page K-59
7. 2-3 accumulator piston
   Disassembly Note ..... below
8. O-rings
9. 1-2 accumulator piston
   Disassembly Note ..... below
10. O-rings
11. 3-4/N-R accumulator piston
    Disassembly Note ..... below
12. O-rings
13. Transmission case

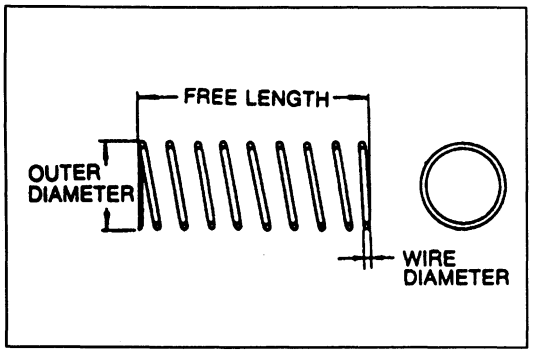


Disassembly note

Accumulator piston

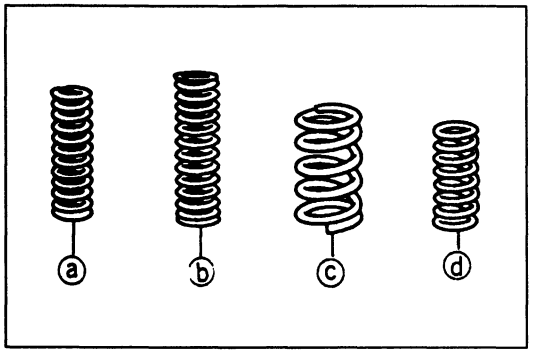
Remove the accumulator pistons from transmission case by applying compressed air through the oil passage as shown in the figure.

Item / Accumulator	Location	Oil passage
N-D accumulator	A	a
2-3 accumulator	B	b
1-2 accumulator	C	c
3-4/N-R accumulator	D	d



Inspection
Accumulator spring
1. Measure the spring free length

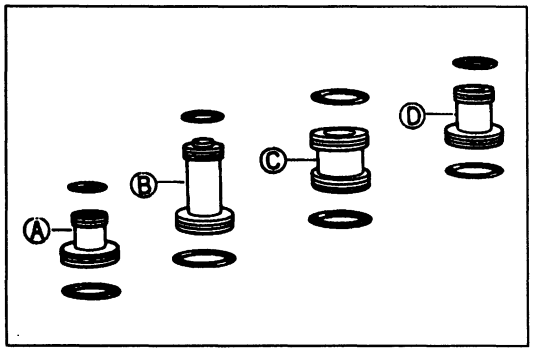
Item / Spring	Outer dia. mm {in}	Free length mm {in}	No. of coils	Wiredia. mm {in}
N-D accumulator spring	18.0 {0.71}	43.0 {1.69}	7.9	2.3 {0.091}
1-2 accumulator spring	29.3 {1.15}	45.0 {1.77}	3.8	3.7 {0.15}
2-3 accumulator spring	19.5 {0.77}	66.0 {2.60}	8.6	3.0 {0.12}
3-4/N-R accumulator spring	18.0 {0.71}	43.0 {1.69}	7.9	2.3 {0.091}

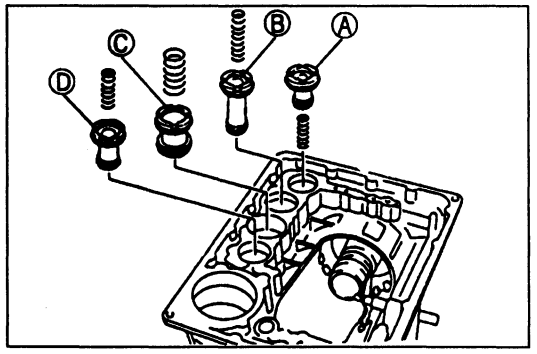


2. If not within specification, replace the spring.

Assembly procedure
Outer diameter and installation order of spring

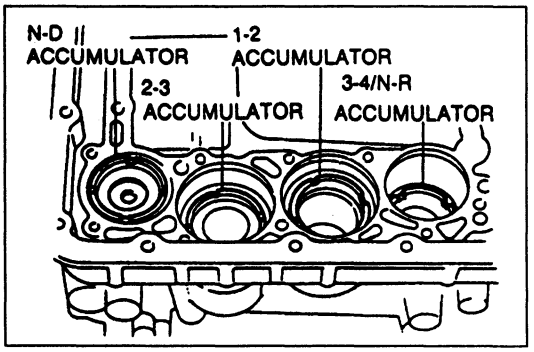
Spring		Installation order	Outer dia. mm {in}
a	N-D accumulator	Spring – Piston	18.0 {0.709}
b	2-3 accumulator	Piston – Spring	20.0 {0.787}
c	1-2 accumulator	Piston – Spring	29.3 {1.154}
d	3-4/N-R accumulator	Piston – Spring	17.3 {0.681}





1. Apply ATF to the new O-rings and install them onto the accumulator pistons.

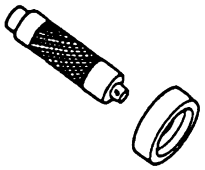
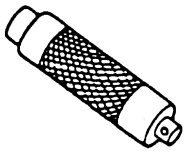
Piston / O-ring		Large mm {in}	Small mm {in}
A	N-D accumulator	45.0 {1.77}	29.0 {1.14}
B	2-3 accumulator	50.0 {1.97}	32.0 {1.26}
C	1-2 accumulator	50.0 {1.97}	45.0 {1.77}
D	3-4/N-R accumulator	45.0 {1.77}	29.0 {1.14}



2. Apply even pressure to the perimeter of the accumulator pistons and install them into the transmission case.
3. Install each spring into its own accumulator piston.

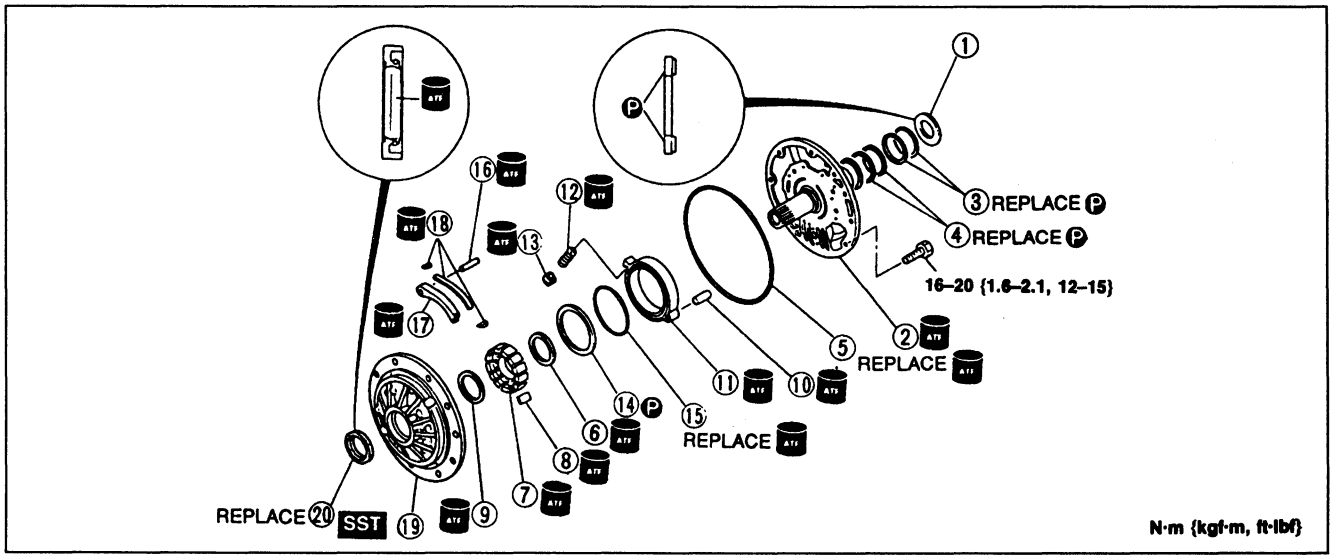
OIL PUMP

Preparation
SST

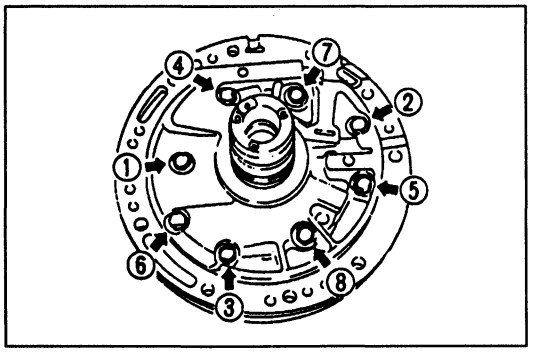
49 G030 795 Installer, oil seal 	For installation of oil seal	49 G030 796 Body (Part of 49 G030 795) 	For installation of oil seal
49 G030 797 Handle (Part of 49 G030 795) 	For installation of oil seal		

Disassembly / Inspection / Assembly

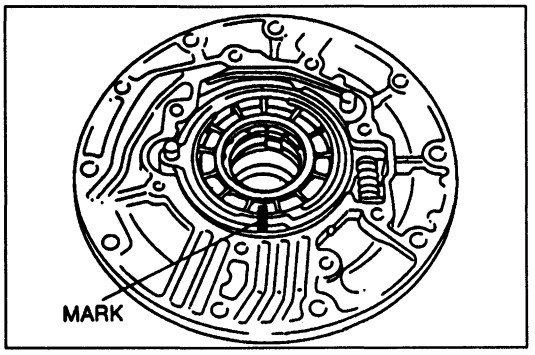
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



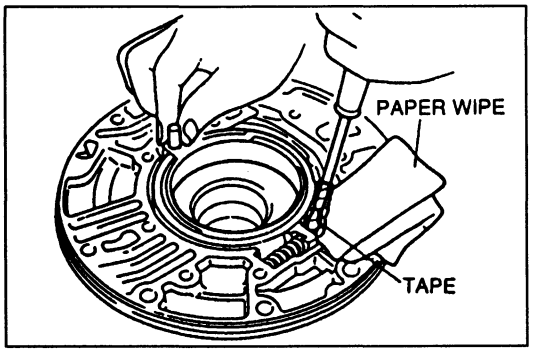
1. Bearing
   Inspect for damage and rough rotation
2. Oil pump cover
   Disassembly Note ..... page K-61
   Inspection ..... page K-61
3. Seal ring (small diameter)
4. Seal ring (large diameter)
5. O-ring
6. Vane ring
7. Rotor
   Disassembly Note ..... page K-61
   Inspection ..... page K-62
8. Vane
   Inspection ..... page K-62
9. Vane ring
10. Pivot pin
    Disassembly Note ..... page K-61
11. Cam ring
    Disassembly Note ..... page K-61
    Inspection ..... page K-62
12. Cam ring spring
    Inspection ..... page K-62
13. Spring seat
14. Friction ring
15. O-ring
16. Pivot pin
17. Control piston
    Inspection ..... page K-62
18. Side seal
19. Oil pump housing
    Inspection ..... page K-62
20. Oil seal



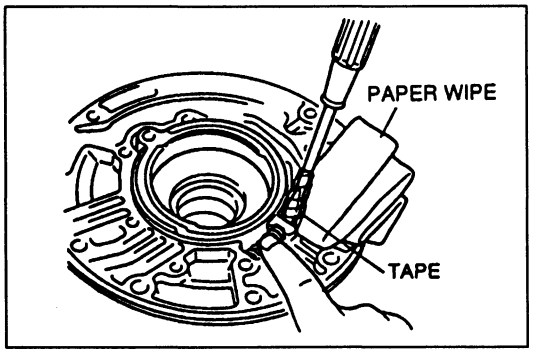
Disassembly note
Oil pump cover
1. Gradually loosen the mounting bolts in the order shown.
2. Remove the oil pump cover from the oil pump housing.



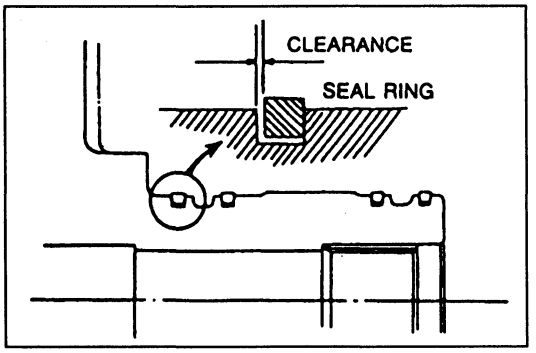
Rotor
1. Mark the rotor and cam ring without scratching or denting them.
2. Remove the rotor and vanes from the cam ring.



Pivot pin
Hold the cam ring back with a tape-wrapped screwdriver and remove the pivot pin.



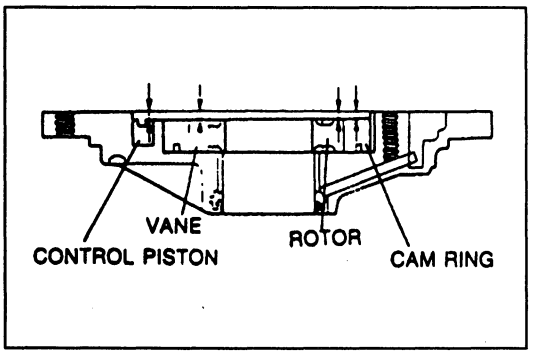
Cam ring
1. Hold the cam ring spring back and remove the cam ring.
2. Remove the cam ring spring.



Inspection
Oil pump cover
1. Fit new seal rings into the oil pump cover.
2. Measure the clearance between the seal ring and the ring groove.

Standard clearance:
0.10–0.25 mm {0.004–0.010 in}
Maximum clearance: 0.25 mm {0.010 in}

3. If not within specification, replace the oil pump assembly.



Oil pump housing, cam ring, rotor, vane, and control piston

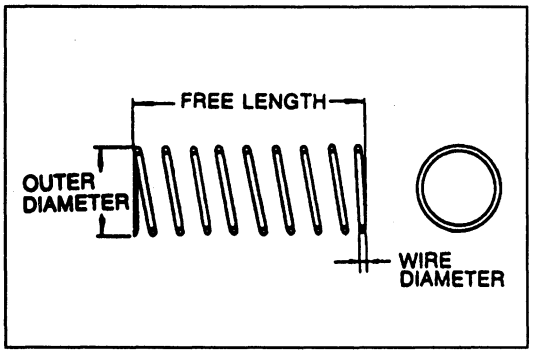
1. Install the cam ring, vanes, rotor, and control piston. Do not install the friction ring, O-ring, control piston, side seals, and cam ring spring yet.
2. Measure the distance from the edge of the oil pump housing to the cam ring, rotor, vanes, and control piston at least four points along their circumferences.

Clearance

mm {in}

Part \ Distance	Standard	Maximum
Cam ring	0.010–0.024 {0.0004–0.0009}	0.030 {0.0012}
Rotor, vane, control piston	0.030–0.044 {0.0012–0.0017}	0.050 {0.0020}

3. If not within specification, replace the oil pump assembly.



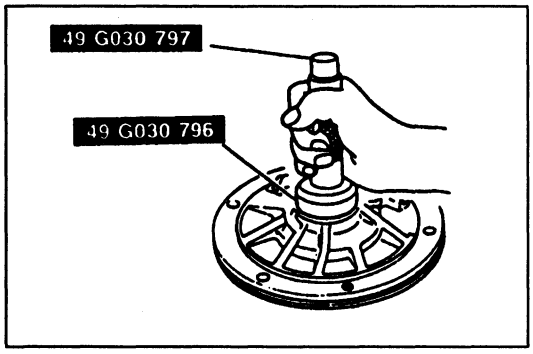
Cam ring spring

1. Measure the spring free length.

Specification

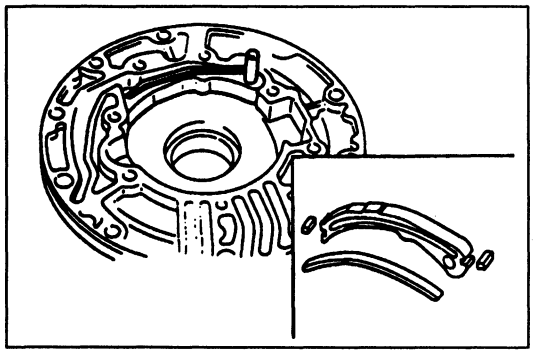
Outerdia. mm {in}	Free length mm {in}	No. of coils	Wiredia. mm {in}
13.7 {0.539}	39.8 {1.567}	7.8	2.3 {0.091}

2. If not correct, replace the cam ring spring.

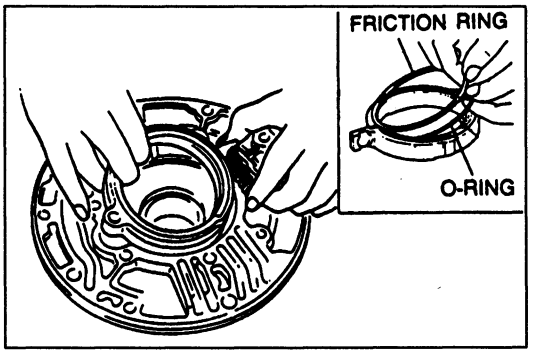


Assembly procedure

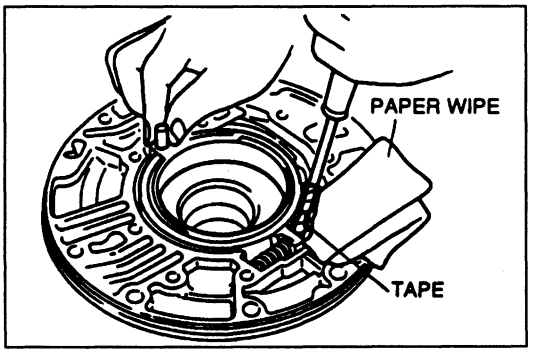
1. Apply ATF to the lip of a new oil seal, and install it by using the **SSTs**.



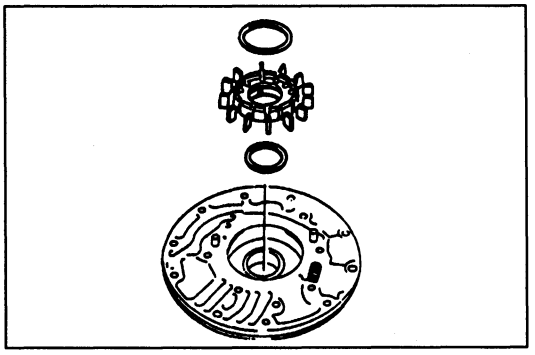
2. Apply ATF to side seals, and install them on the control piston with the black surface facing the control piston.
3. Install the control piston and pivot pin.



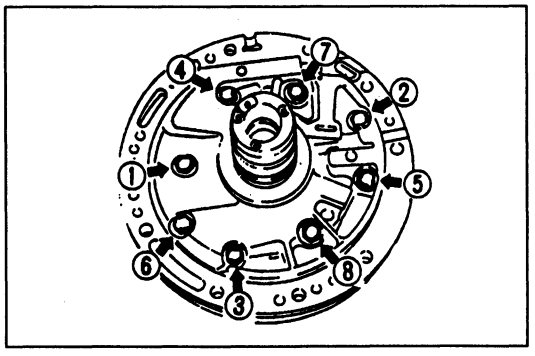
4. Apply petroleum jelly to the cam ring groove and install a new O-ring and friction ring into the cam ring.
5. Install the cam ring and spring while compressing the spring against the oil pump housing.



6. Hold the cam ring with a tape-wrapped screwdriver, and install the pivot pin.

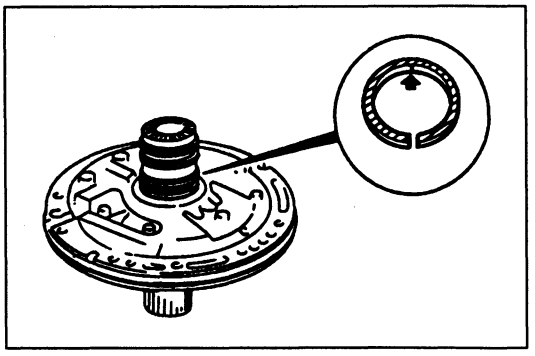


7. Confirm that the mark on the rotor is facing upward, and install the rotor, vanes, and vane rings.
8. Carefully install the oil pump cover onto the oil pump housing.

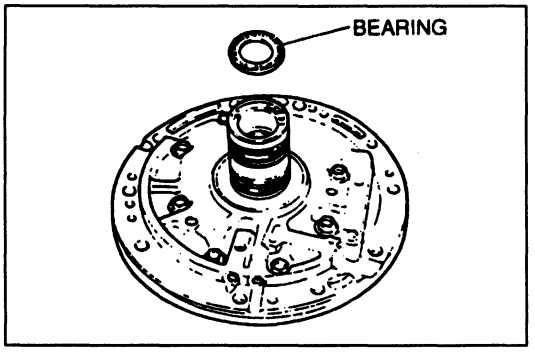


9. Tighten the bolts evenly and gradually in the order shown.

Tightening torque:
16–20 N·m {1.6–2.1 kgf·m, 12–15 ft·lbf}



10. Apply petroleum jelly to the seal rings. Fit the large seal ring (yellow mark) into the bottom ring groove and small ring (no mark) into the top ring groove.
11. Apply ATF to a new O-ring and install it onto the oil pump.

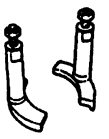
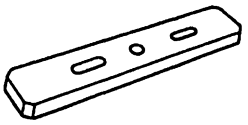
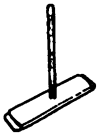
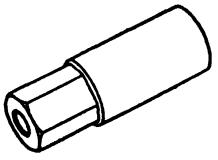


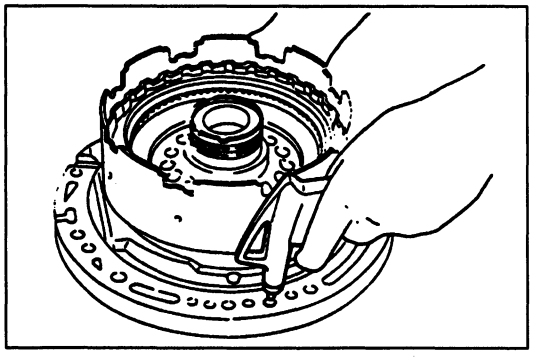
12. Apply petroleum jelly to the bearing and set it on the oil pump.

Bearing outer diameter: 47.0 mm {1.85 in}

REVERSE CLUTCH

Preparation
SST

49 G019 0A7A Compressor set, return spring 	For disassembly / assembly of snap ring	49 G019 025 Body B (Part of 49 G019 0A7A) 	For disassembly / assembly of snap ring
49 G019 026 Plate (Part of 49 G01 9 0A7A) 	For disassembly / assembly of snap ring	49 G019 027 Attachment A (Part of 49 G019 0A7A) 	For disassembly / assembly of snap ring
49 G019 029 Nut (Part of 49 G019 0A7A) 	For disassembly / assembly of snap ring		

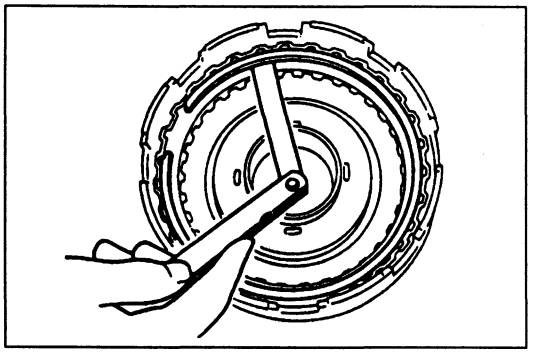


Preinspection
Reverse clutch operation

1. Install the reverse clutch onto the oil pump along with the seal rings. Apply compressed air to the oil passage as shown.
2. Verify that the retaining plate moves toward the snap ring.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

3. If not, the D-ring or the seal ring may be damaged or fluid may be leaking at the piston check ball. Inspect and replace as necessary when assembling



Clearance between retaining plate and snap ring

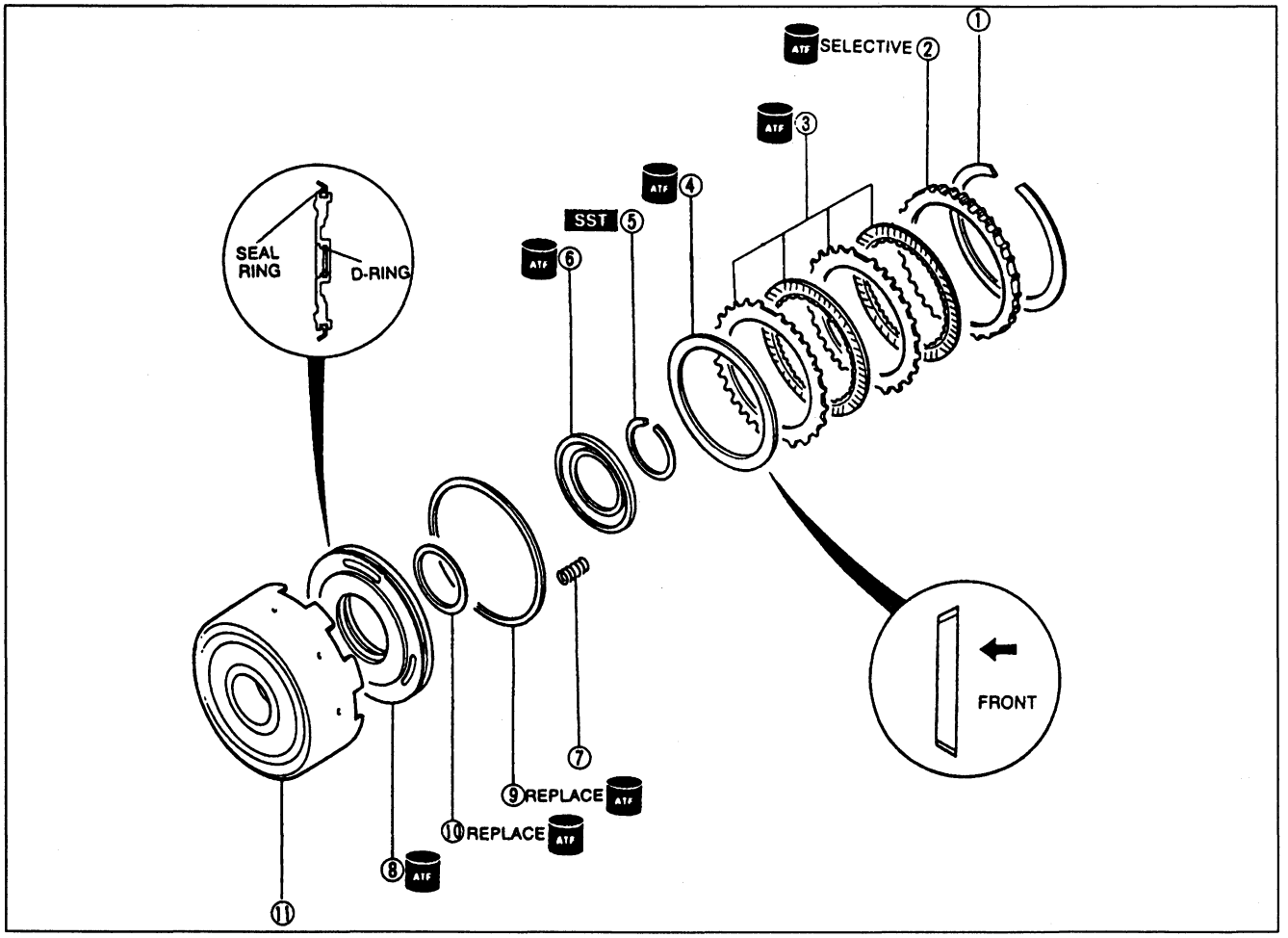
1. Measure the clearance between the retaining plate and the snap ring.

   Clearance: 0.50–1.20 mm {0.020–0.047 in}

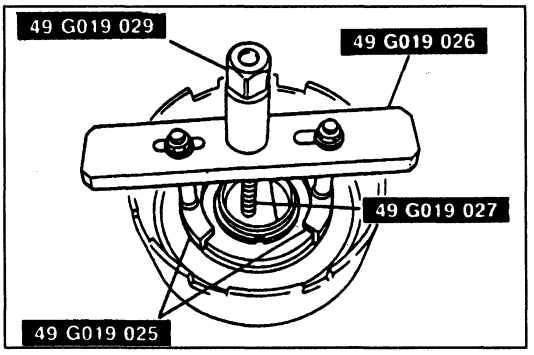
2. Select the correct retaining plate when assembling. (Refer to page K–68)

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 disassembly, referring to **Assembly Procedure**.



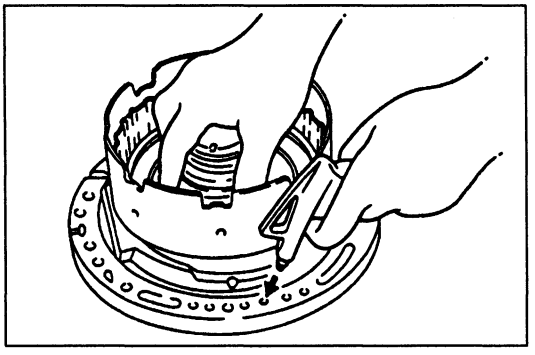
1. Snap ring
2. Retaining plate
3. Drive plates and driven plates
   Inspect for wear and burning
   Inspection ..... page K–66
4. Dished plate
5. Snap ring
   Disassembly Note ..... page K–66
6. Spring retainer
7. Return springs
   Inspection ..... page K–66
8. Clutch piston
   Shake the clutch piston and verify that the check ball is free
   Disassembly Note ..... page K–66
   Inspection ..... page K–66
9. Seal ring
10. D-ring
11. Reverse clutch drum



Disassembly Note
Snap ring

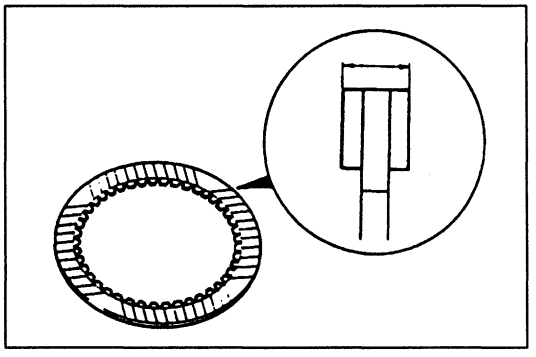
Caution
- **Depress the spring retainer only enough to remove the snap ring. Overpressing will damage the retainer assembly edges.**

1. While holding the spring retainer down with the **SSTs**, remove the snap ring by using snap ring pliers.
2. Remove the spring retainer and return springs.



Clutch piston
1. Install the reverse clutch with seal rings onto the oil pump.
2. Remove the piston by applying compressed air through the oil passage.

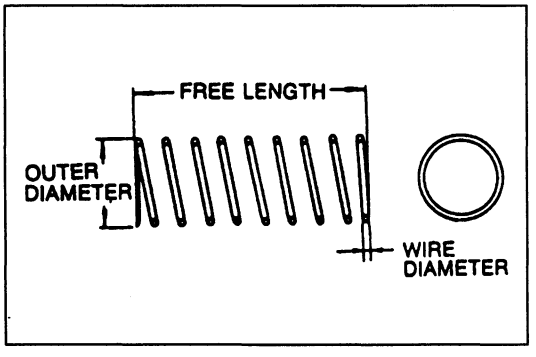
Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.



Inspection
Drive plates
1. Measure the facing thickness in three places, and calculate the average.

Thickness
Standard: 2.0 mm {0.079 in}
Minimum: 1.8 mm {0.071 in}

2. If not within specification, replace the drive plate.

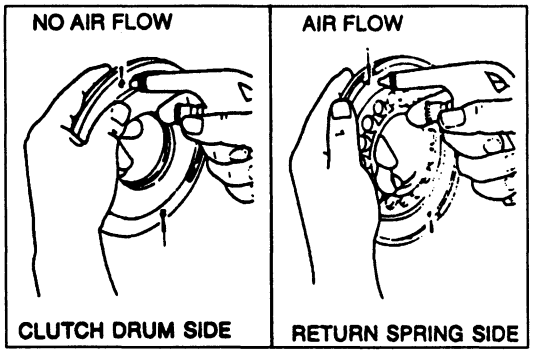


Return springs
1. Measure the spring free length.

Specification

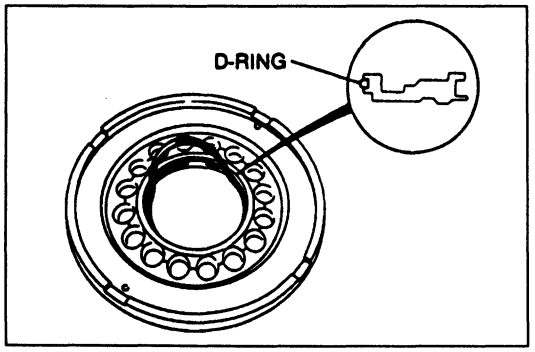
Outerdia. mm {in}	Free length mm {in}	No. of coils	Wiredia. mm {in}
11.6 {0.457}	19.69 {0.775}	4.0	1.3 {0.051}

2. If not within specification, replace the return spring.



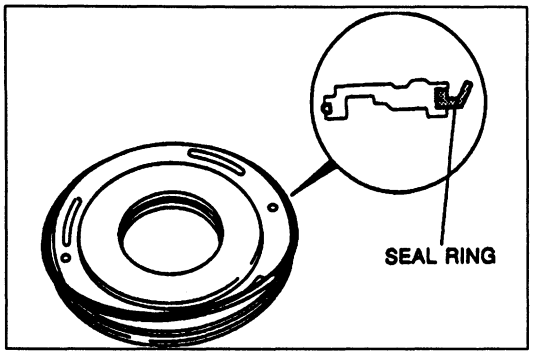
Clutch piston
1. Shake the clutch piston and verify that the check ball is free.
2. Verify that there is no air flow when applying compressed air through the oil hole on the clutch drum side.
3. Verify that there is air flow when applying compressed air through the oil hole on the return spring side.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

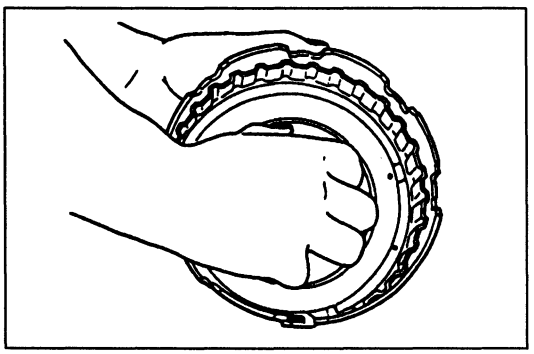


Assembly procedure

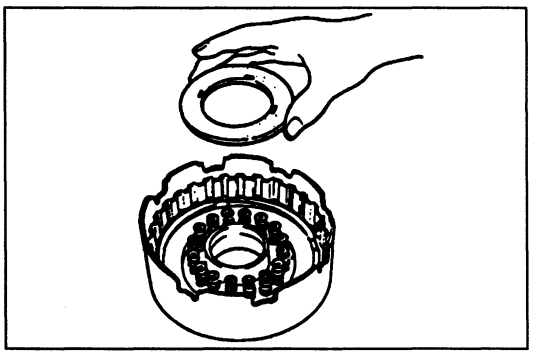
1. Apply ATF to a new D-ring and install it into the clutch piston.



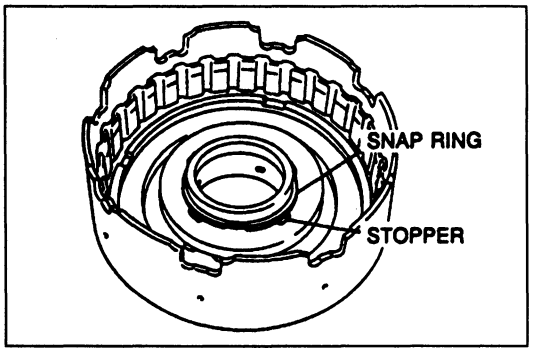
2. Apply ATF to a new seal ring and install it into the clutch piston.



3. Apply ATF to the inner face of the reverse clutch drum.
4. Apply even pressure to the perimeter of the clutch piston, and install it into the reverse clutch drum by turning it evenly and gradually.
5. Verify that the piston can be turned by hand.
   If it cannot, then remove it and check for damage to the seal ring.

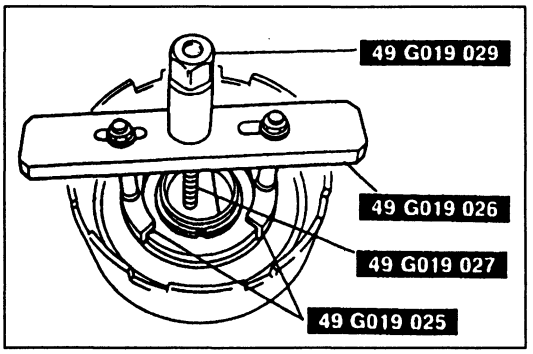


6. Install the return springs and spring retainer.

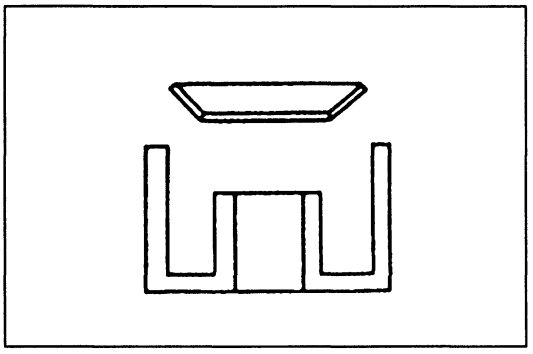


Caution

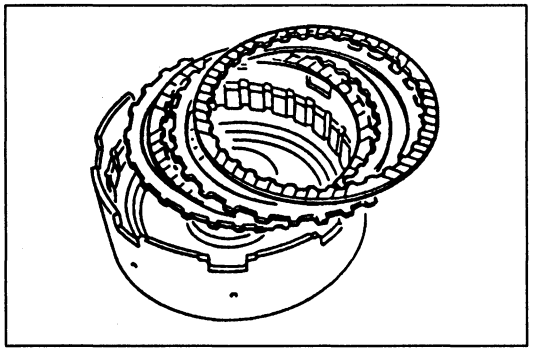
- **Depress the spring retainer only enough to install the snap ring. Overpressing will damage the retainer assembly edges.**



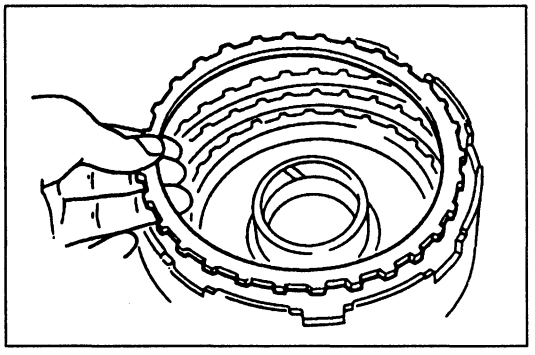
7. While holding the snap ring retainer down with the **SSTs**, install the snap ring into the spring retainer stopper.



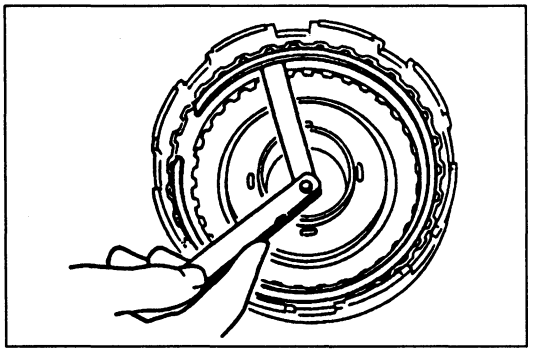
8. Install the dished plate as shown in the figure.



9. Soak new drive plates in ATF for at least two hours.
10. Apply ATF to the driven plates immediately before assembly.
11. Install the drive and driven plates into the reverse clutch drum in the following order.
    Driven-Drive-Driven-Drive



12. Install the retaining plate.
13. Install the snap ring.



14. Measure the clearance between the retaining plate and the snap ring by using a feeler gauge.

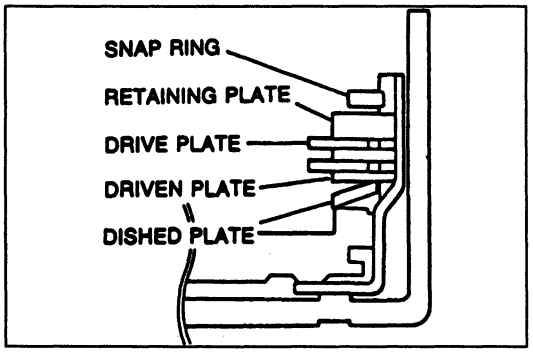
    Clearance: 0.50–1.20 mm {0.020–0.047 in}

15. If not within specification, adjust the clearance by selecting the correct retaining plate.

Retaining plate size

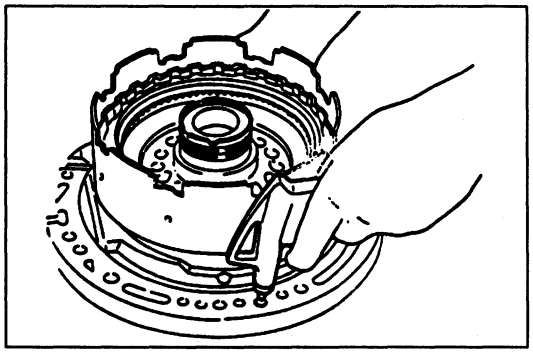
mm {in}

4.6 {0.181}	4.8 {0.189}	5.0 {0.197}	5.2 {0.205}
5.4 {0.213}	5.6 {0.220}	5.8 {0.228}	—



16. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates, and drive plates. Adjust the clearance by selecting the correct retaining plate.

Clearance: 0.50–0.80 mm {0.020–0.031 in}



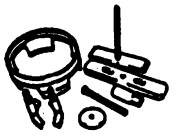
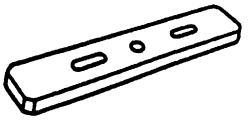
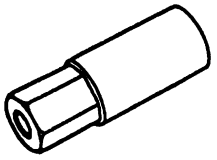
Caution
- **Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal.**

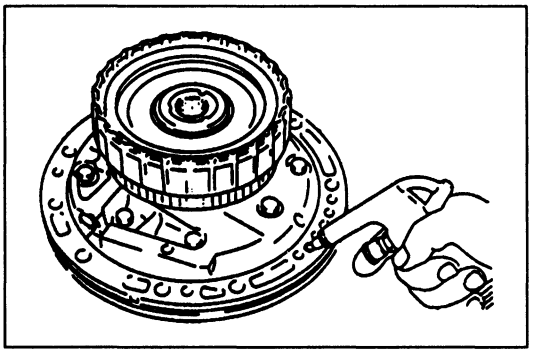
17. Install the reverse clutch with seal rings onto the oil pump. Apply compressed air through the oil passage and verify clutch operation.

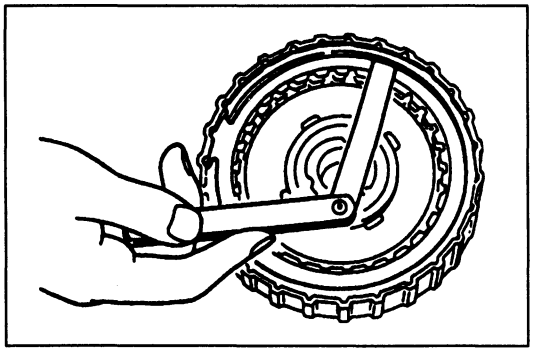
Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

HIGH CLUTCH AND FRONT SUN GEAR

Preparation
SST

49 G019 0A7A Compressor set, return spring 	For removal / installation of snap ring	49 G019 025 Body B (Part of 49 G019 0A7A) 	For removal / installation of snap ring
49 G019 026 Plate (Part of 49G0190A7A) 	For removal / installation of snap ring	49 G019 027 Attachment A (Part of 49 G019 0A7A) 	For removal / installation of snap ring
49 G019 029 Nut (Part of 49 G019 0A7A) 	For removal / installation of snap ring		





Preinspection
High clutch operation

1. Install the high clutch with seal rings onto the oil pump. Apply compressed air through the oil passage as shown.
2. Verify that the retaining plate moves toward the snap ring.

   Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

3. If not, the D-rings may be damaged or fluid may be leaking at the piston check ball. Inspect and replace as necessary when assembling.

Clearance between retaining plate and snap ring

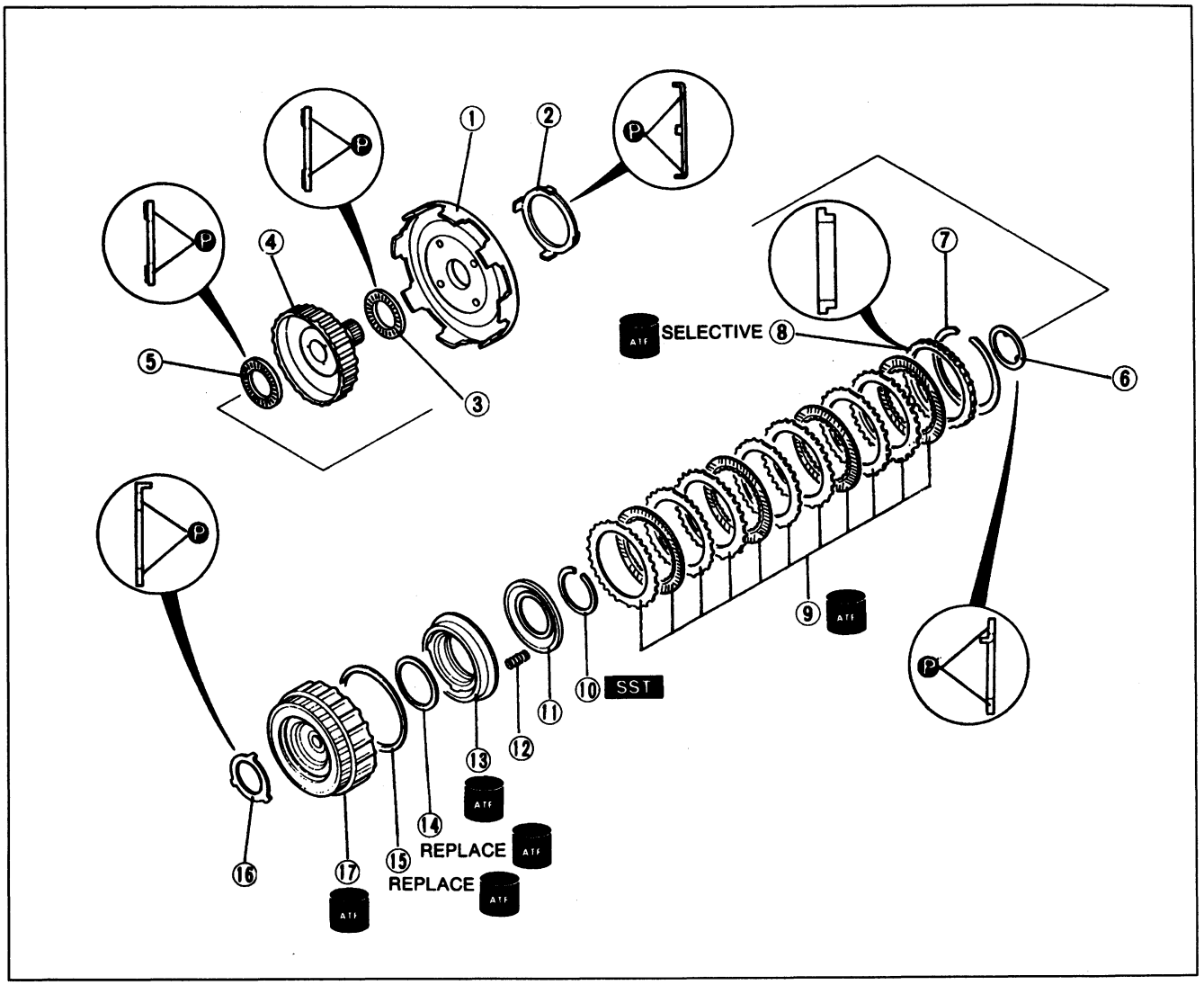
1. Measure the clearance between the retaining plate and the snap ring.

   Clearance: 1.8–3.0 mm {0.071–0.118 in}

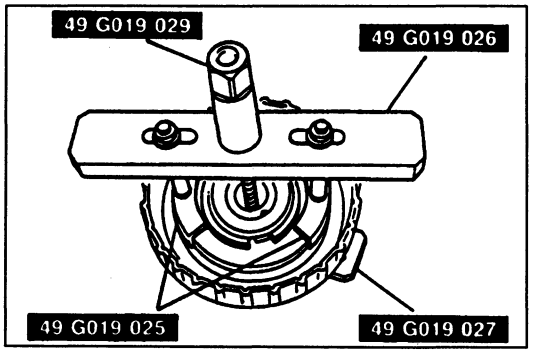
2. Select the correct retaining plate when assembling. (Refer to page K–74.)

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 disassembly, referring to **Assembly procedure.**



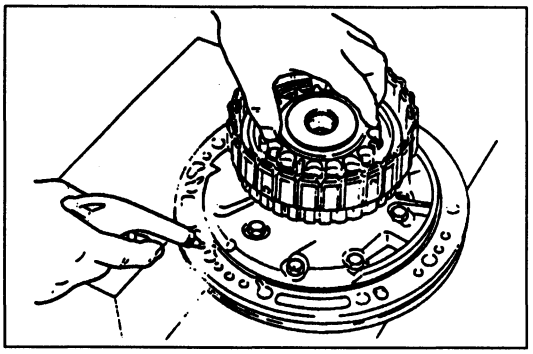
1. Front sun gear
   Inspect gear teeth for damage, wear, and cracks
2. Bearing race
   Inspect bearing surface for scoring and scratches
3. Bearing
   Inspect for damage and rough rotation
4. High clutch hub
5. Bearing
   Inspect for damage and rough rotation
6. Bearing race
   Inspect bearing surface for scoring and scratches
7. Snap ring
8. Retaining plate
9. Drive plates and driven plates
   Inspect for wear and burning
   Inspection ..... page K-72
10. Snap ring
    Disassembly Note ..... page K-72
11. Spring retainer
12. Return springs
    Inspection ..... page K-72
13. Clutch piston
    Shake the clutch piston and verify that the check ball is free
    Disassembly Note ..... page K-72
    Inspection ..... page K-72
14. D-ring
15. D-ring
16. Bearing race
    Inspect bearing surface for scoring and scratches
17. High clutch drum



Disassembly note
Snap ring

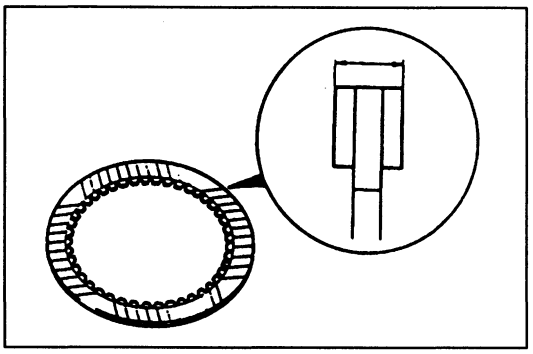
Caution
- **Depress the spring retainer only enough to remove the snap ring. Overpressing will damage the retainer assembly edges.**

1. While holding the spring retainer down by using the **SSTs**, remove the snap ring by using snap ring pliers.
2. Remove the piston retainer and return springs.



Clutch piston
1. Install the high clutch with seal rings onto the oil pump.
2. Remove the piston by applying compressed air through the oil passage.

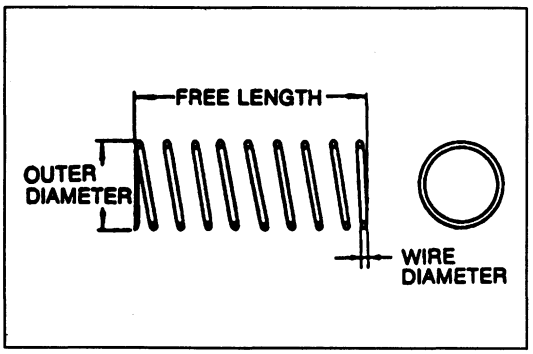
Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.



Inspection
Drive plates
1. Measure the facing thickness in three places, and calculate the average.

Thickness
Standard: 1.6 mm {0.063 in}
Minimum: 1.4 mm {0.055 in}

2. If not within specification, replace the drive plate.

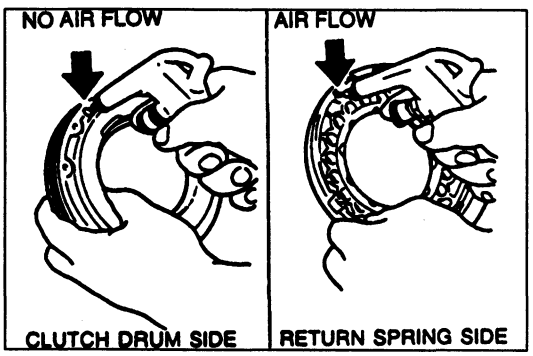


Return springs
1. Measure the spring free length.

Specification

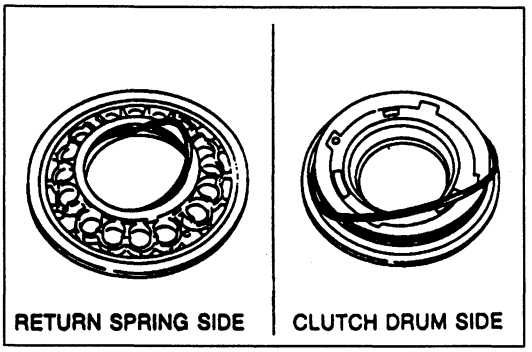
Outer dia. mm {in}	Free length mm {in}	No. of coils	Wiredia. mm {in}
11.6 {0.457}	22.3 {0.878}	5.2	1.2 {0.047}

2. If not within specification, replace the return spring.



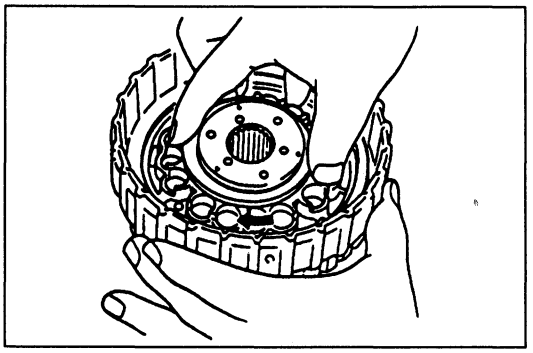
Clutch piston
1. Shake the clutch piston and verify that the check ball is free.
2. Verify that there is no air flow when applying compressed air through the oil hole on the clutch drum side.
3. Verify that there is air flow when applying compressed air through the oil hole on the return spring side.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

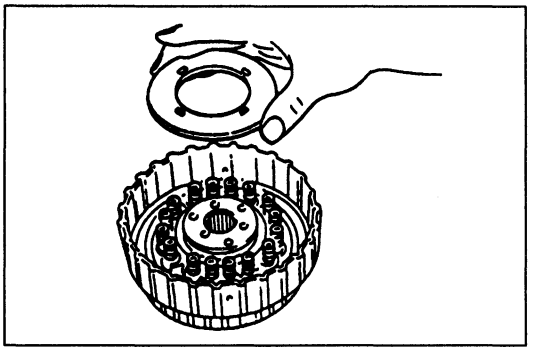


Assembly procedure

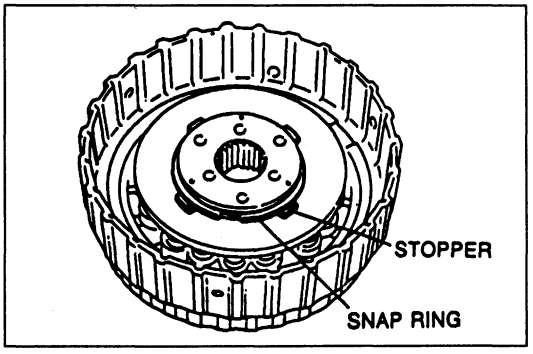
1. Apply ATF to new D-rings and install them into the clutch piston.



2. Apply ATF to the inner face of the high clutch drum.
3. Apply even pressure to the perimeter of the clutch piston, and install it into the reverse clutch drum by turning it evenly and gradually.
4. Verify that the piston can be turned by hand. If it cannot, then remove it and check for damage to the seal ring.

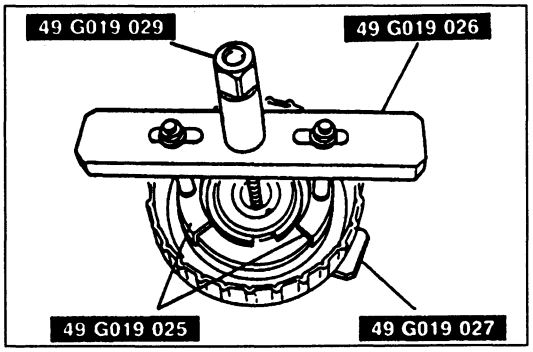


5. Install the return springs and spring retainer.

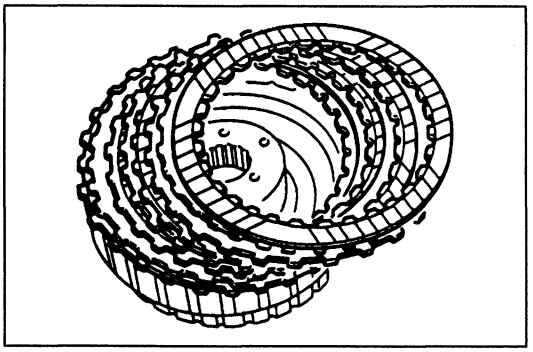


Caution

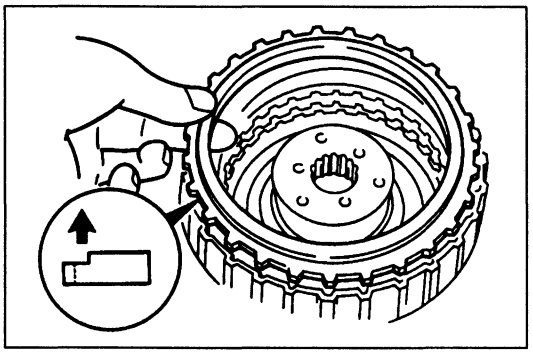
- **Depress the spring retainer only enough to install the snap ring. Overpressing will damage the retainer assembly edges.**



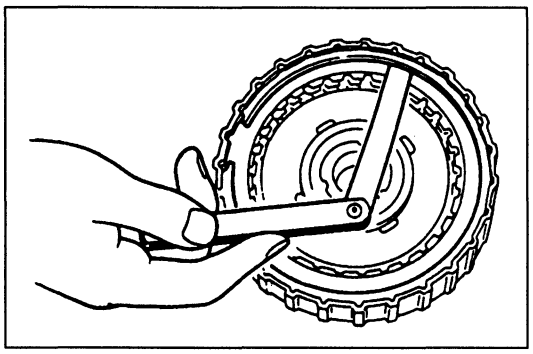
6. While holding the spring retainer down by using the **SSTs**, install the snap ring into the spring retainer stopper.



7. Soak new drive plates in ATF for at least two hours.
8. Apply ATF to the driven plates immediately before assembly.
9. Install the drive and driven plates into the high clutch drum in the following order.
   Driven-Drive-Driven-Driven-Drive-Driven-Driven-Drive-Driven-Driven-Drive



10. Install the retaining plate.
11. Install the snap ring.



12. Measure the clearance between the retaining plate and the snap ring by using a feeler gauge.

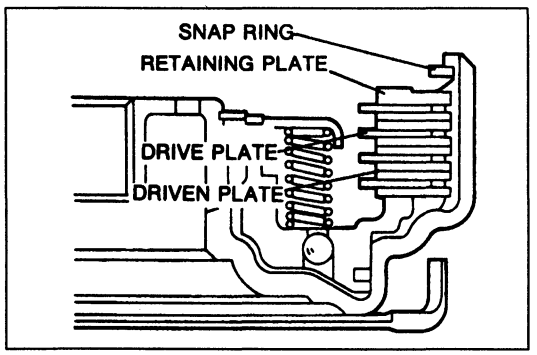
    Clearance: 1.8–3.0 mm {0.071–0.118 in}

13. If not within specification, adjust the clearance by selecting the correct retaining plate.

Retaining plate size

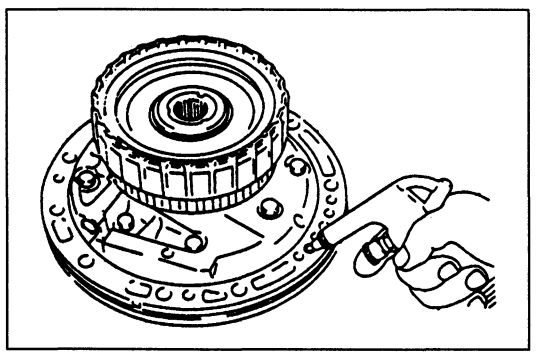
mm {in}

3.4 {0.134}	3.6 {0.142}	3.8 {0.150}
4.0 {0.157}	4.2 {0.165}	—



14. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the driven plates and drive plates. Adjust the clearance by selecting the correct retaining plate.

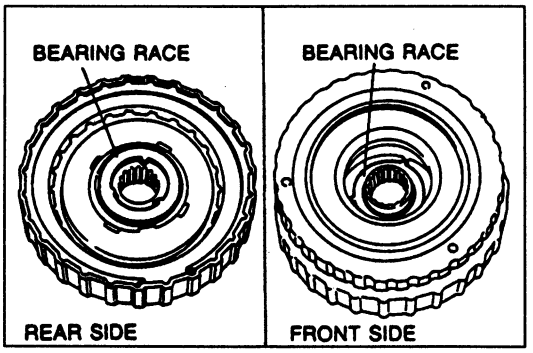
    Clearance: 1.8–2.2 mm {0.071–0.087 in}



Caution
- **Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal.**

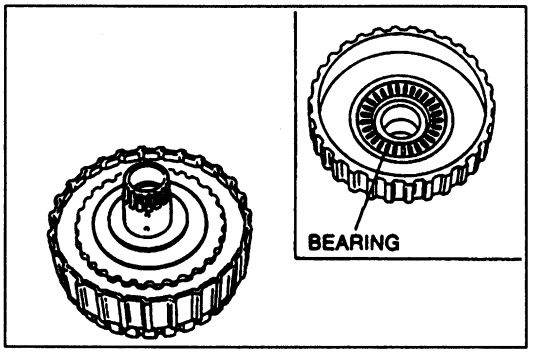
15. Install the high clutch with the seal rings onto the oil pump. Apply compressed air through the oil passage and verify clutch operation.

    Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.



16. Apply petroleum jelly to the bearing races and install them in the high clutch drum as shown.

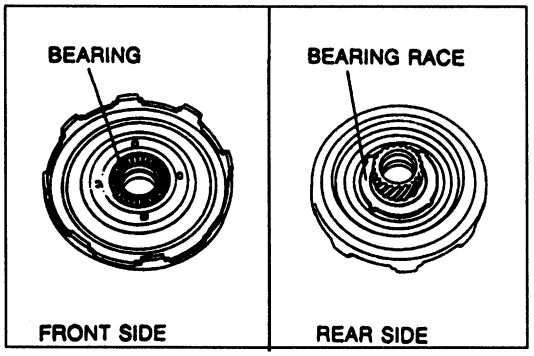
    Bearing race outer diameter
    Front: 43.5 mm {1.71 in}
    Rear: 51.5 mm {2.03 in}



17. Apply petroleum jelly to the bearing and install it in the high clutch hub as shown.

    Bearing outer diameter: 53.0 mm {2.09 in}

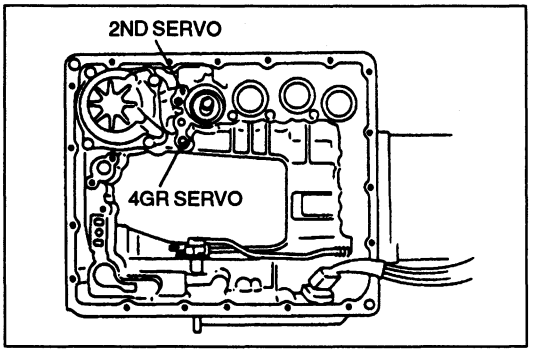
18. Apply ATF to the high clutch hub, and install it in the high clutch drum by turning it evenly and gradually.



19. Apply petroleum jelly to the bearing and bearing race, and install them to the front sun gear.

    Bearing outer diameter: 53.0 mm {2.09 in}
    Bearing race outer diameter: 75.0 mm {2.95 in}

20. Assemble the front sun gear, reverse clutch, high clutch, and high clutch hub.

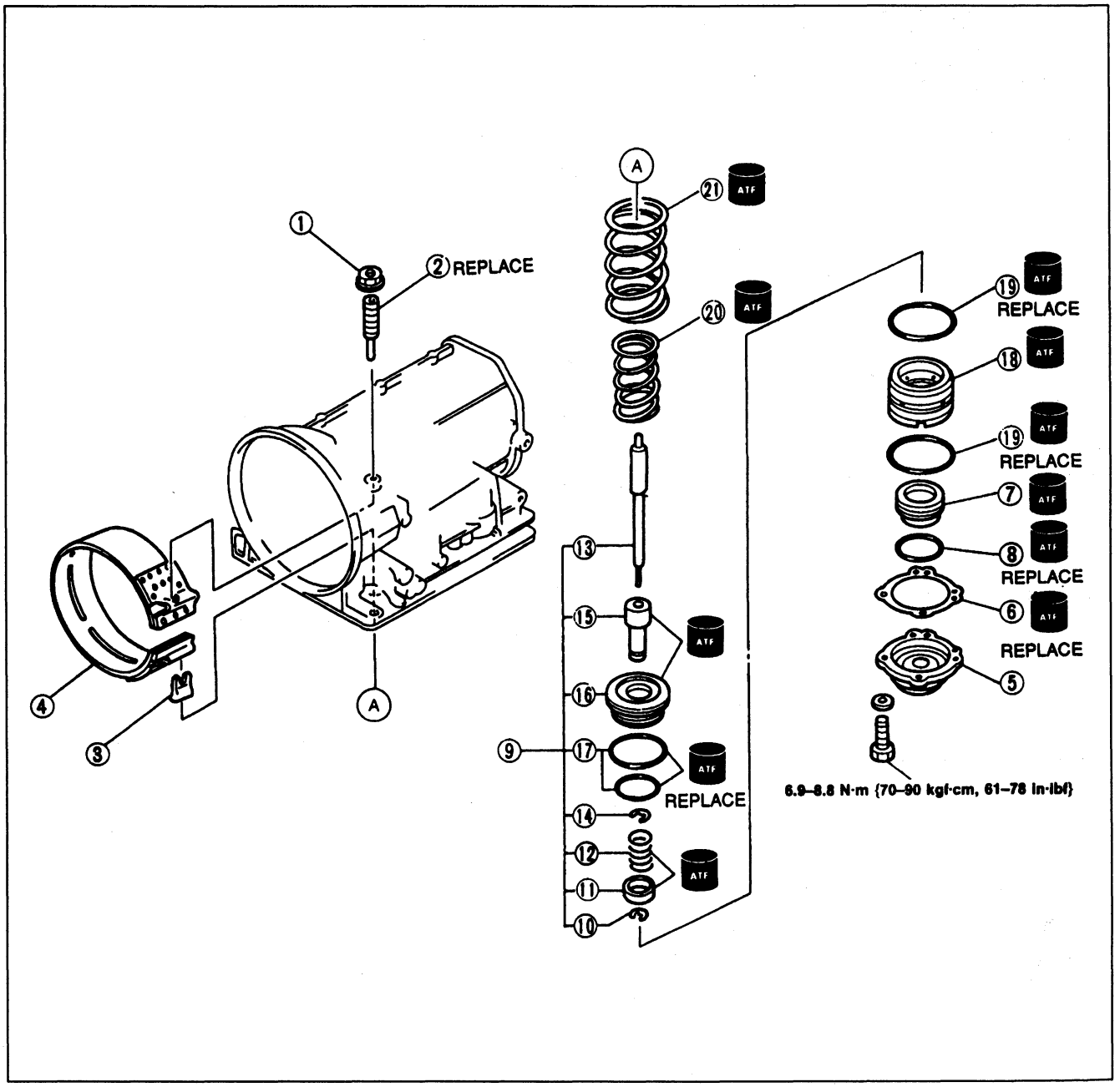


BAND SERVO
Preinspection
Band servo operation
1. Apply compressed air through the oil passage as shown.
2. Verify that the piston stem moves toward the brake band.

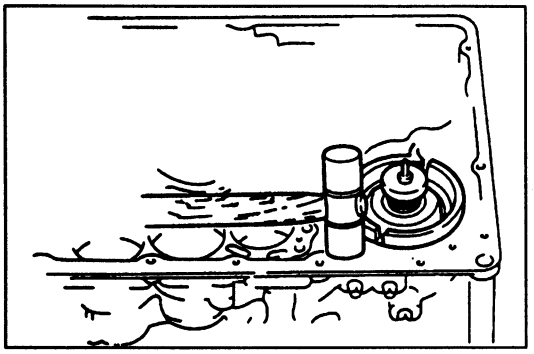
   Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

3. If not, the D-rings or the O-rings may be damaged or the piston assembly may be sticking. Inspect and replace as necessary when assembling.

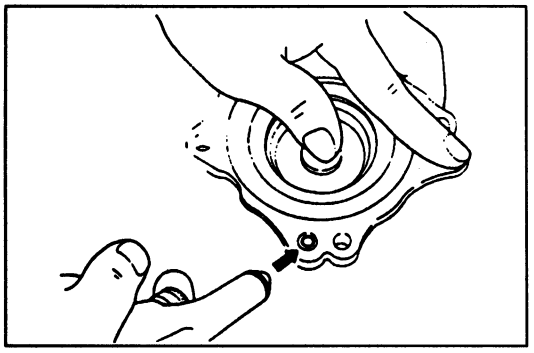
Disassembly / Inspection / Assembly
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



1. Locknut
2. Anchor end bolt
3. Band strut
4. Brake band
5. Band servo retainer
6. Gasket
7. Fourth gear band servo piston
   Disassembly Note ..... below
8. D-ring
9. Piston and servo piston retainer
   Disassembly Note ..... below
10. Retaining ring (small)
11. Spring retainer
12. Return spring C
    Inspection ..... below
13. Piston stem
14. Retaining ring (large)
15. Servo spring retainer
16. Band servo piston
17. D-rings
18. Servo piston retainer
19. O-rings
20. Return spring B
    Inspection ..... below
21. Return spring A
    Inspection ..... below



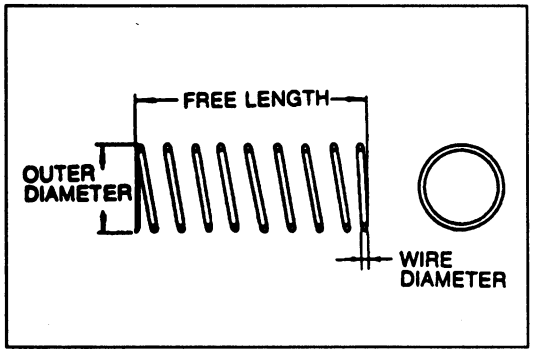
Disassembly note
Piston and servo piston retainer
Remove the piston and servo piston retainer from the transmission case by using a plastic hammer.



4GR band servo piston
1. Block one oil hole of the Fourth gear servo piston retainer and the center hole in the Fourth gear band servo piston.
2. Apply compressed air through the other oil hole in the Fourth gear servo piston retainer to remove the Fourth gear band servo piston.

   Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

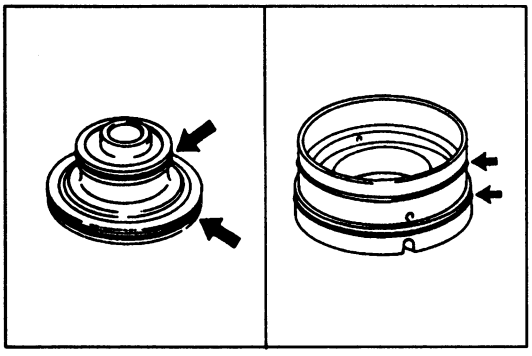
3. Remove the D-ring from the Fourth gear band servo piston.



Inspection
Return spring
1. Measure the spring free length.

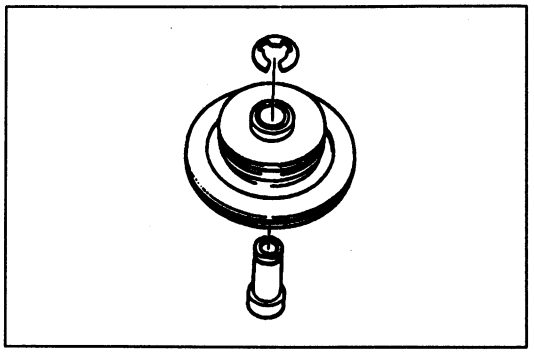
Specification

Item / Spring	Outer dia. mm {in}	Free length mm {in}	No. of coils	Wire dia. mm {in}
Spring A	40.3 {1.59}	53.8 {2.12}	3.0	2.3 {0.091}
Spring B	34.3 {1.35}	45.6 {1.80}	3.0	2.3 {0.091}
Spring C	27.6 {1.09}	2.97 {1.17}	3.2	2.6 {0.102}

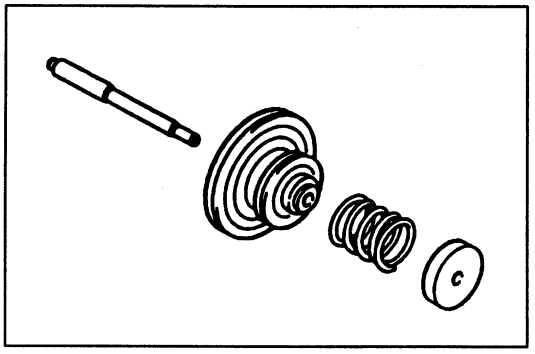


2. If not within specification, replace the return spring.

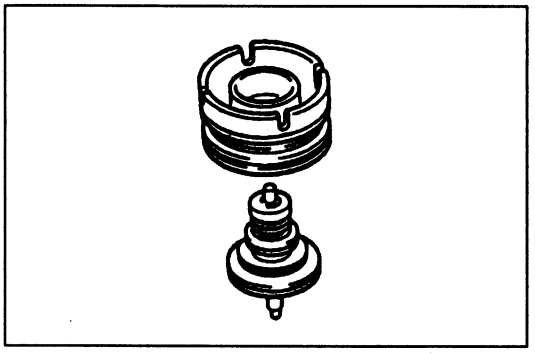
Assembly procedure
1. Apply ATF to new O-rings and install them onto the servo piston retainer.
2. Apply ATF to new D-rings and install them onto the band servo piston.



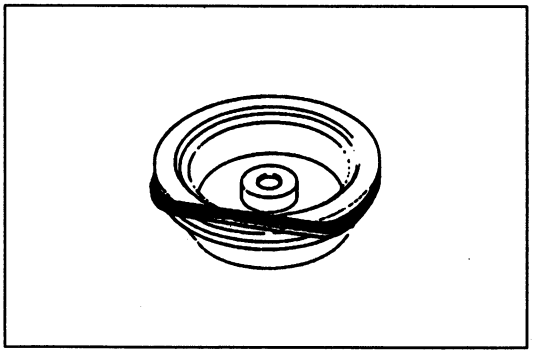
3. Apply ATF to the servo spring retainer and retaining ring (large). Assemble them in the band servo piston.



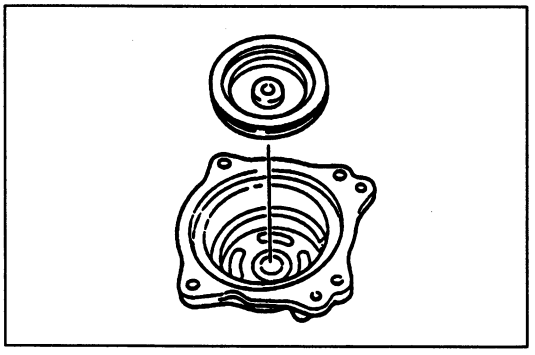
4. Assemble the band servo piston, piston stem, return spring, and spring retainer.
5. Install the retaining ring (small).



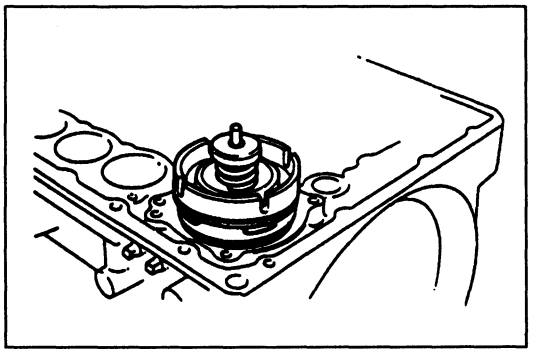
6. Apply ATF to the band servo piston assembly.
7. Apply even pressure to the perimeter of the piston, and install it onto the servo piston retainer.



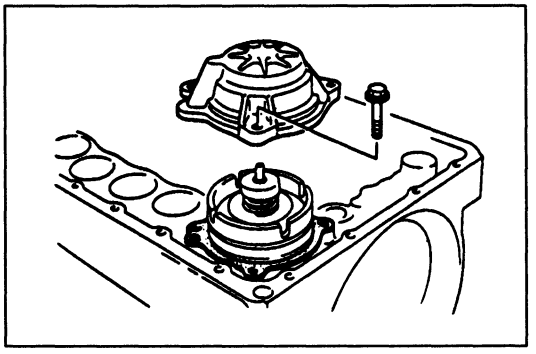
8. Apply ATF to a new D-ring and install it onto the Fourth gear band servo piston.



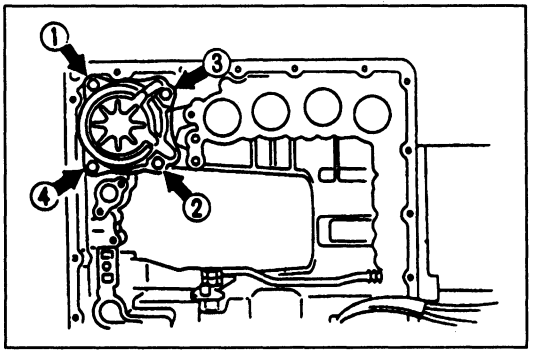
9. Apply ATF to the Fourth gear band servo piston.
10. Apply even pressure to the perimeter of the piston, and install it into the band servo retainer.



11. Install return springs A and B.
12. Apply ATF to the piston assembly.
13. Apply even pressure to the perimeter of the piston assembly, and install it into the transmission case.

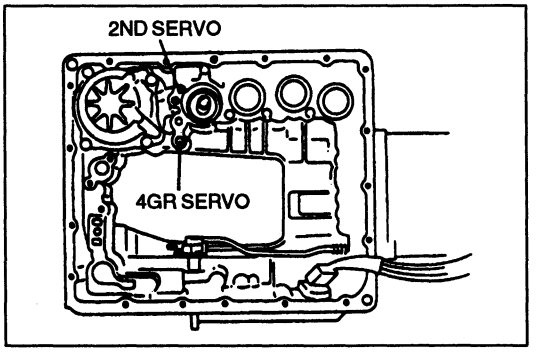


14. Apply ATF to the band servo retainer and a new gasket, and install them on the transmission case.



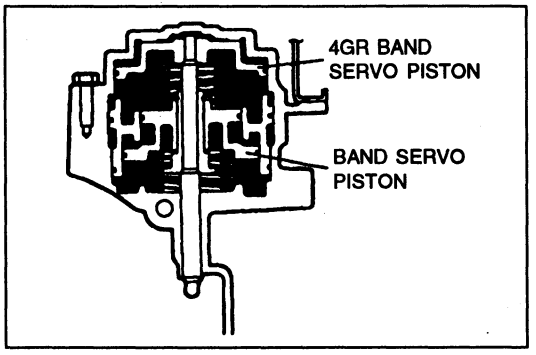
15. Tighten the bolts evenly and gradually in the order shown.

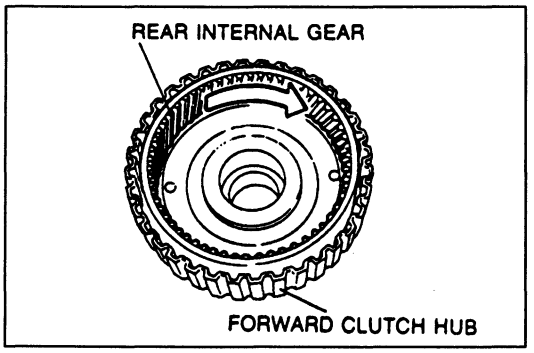
Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}



16. Verify servo piston operation by applying compressed air through the oil holes as shown.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.





FRONT INTERNAL GEAR, REAR INTERNAL GEAR, FORWARD CLUTCH HUB, OVERRUNNING CLUTCH HUB

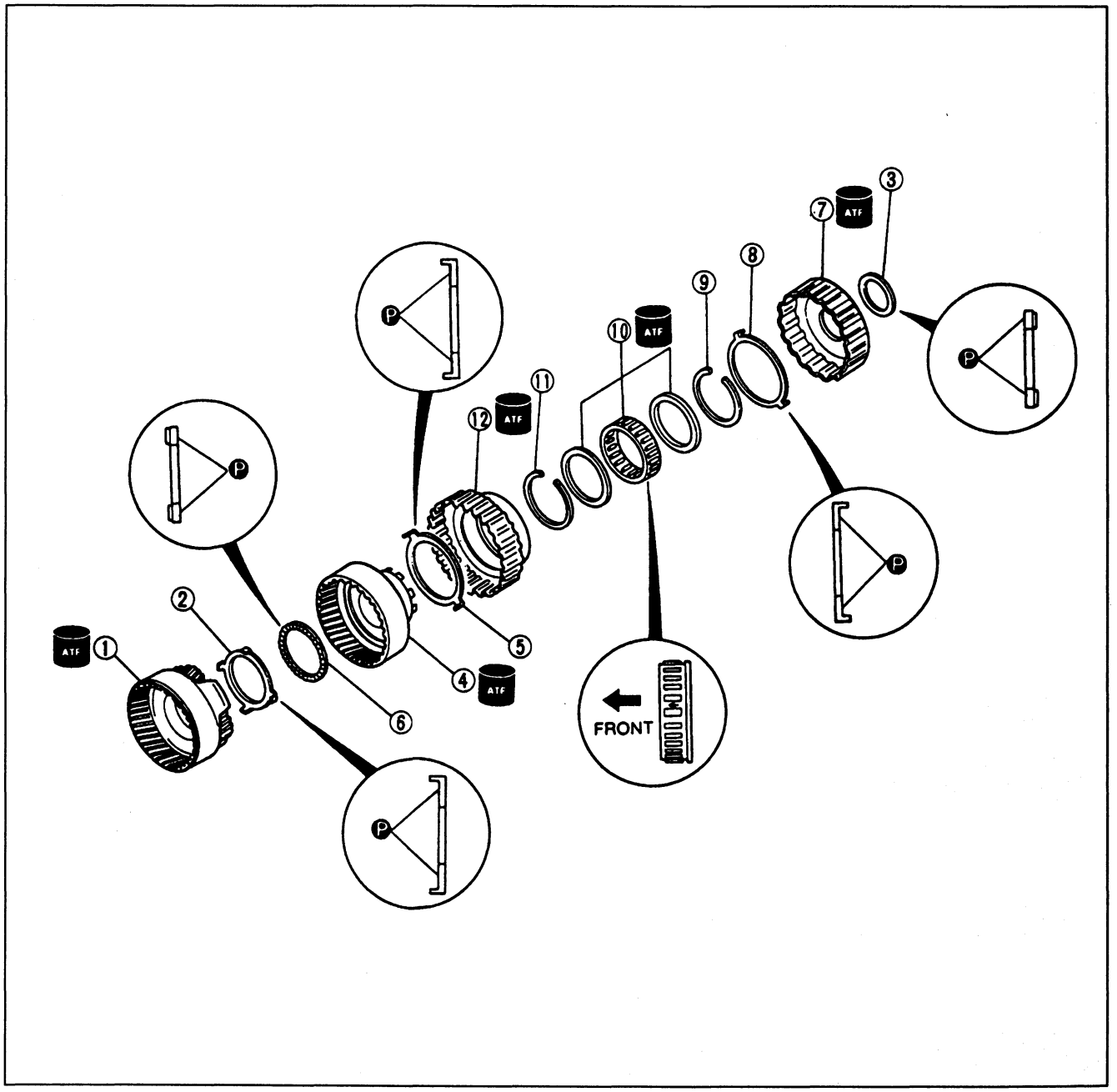
Preinspection

Forward one-way clutch operation

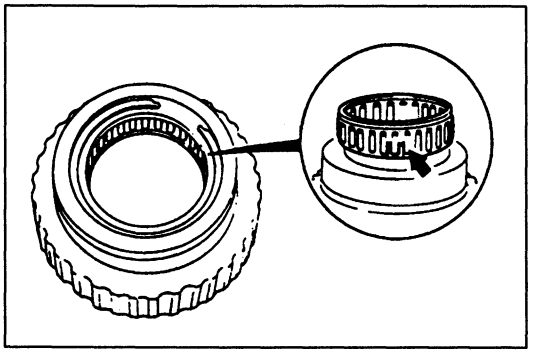
1. While holding the forward clutch hub, verify that the rear internal gear rotates smoothly when turned clockwise and locks when turned counterclockwise.
2. If not as specified, replace the one-way clutch.

Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure.
2. Inspect all parts and replace if necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.

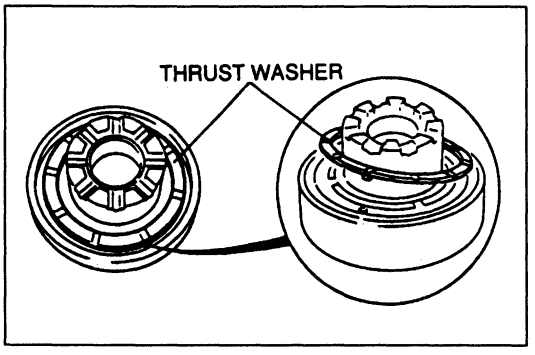


1. Front internal gear (with rear planetary carrier)
   Inspect gear teeth for damage, wear, and cracks
   Check rotation of pinion gears
2. Bearing race
   Inspect bearing surface for scoring and scratches
3. Bearing
   Inspect for damage and rough rotation
4. Rear internal gear
   Inspect gear teeth for damage, wear, and cracks
5. Thrust washer
6. Bearing
   Inspect for damage and rough rotation
7. Overrunning clutch hub
8. Thrust washer
9. Snap ring
10. Forward one-way clutch
    Inspection ..... page K-80
11. Snap ring
12. Forward clutch hub

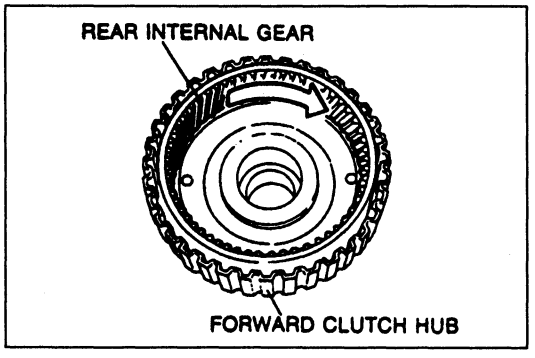


Assembly procedure

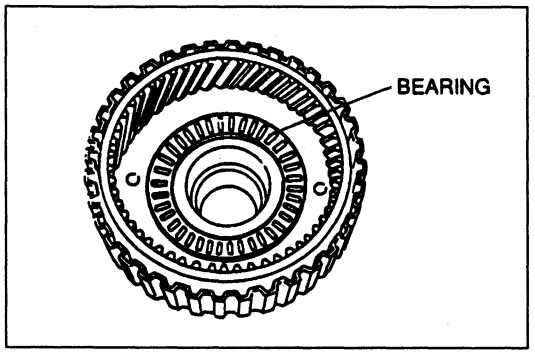
1. Install the snap ring into the forward clutch hub.
2. Apply ATF to the forward one-way clutch. Install it into the forward clutch hub, with the flange facing upward.



3. Apply petroleum jelly to the thrust washer, and set it so that the tabs fit in the holes of the rear internal gear.

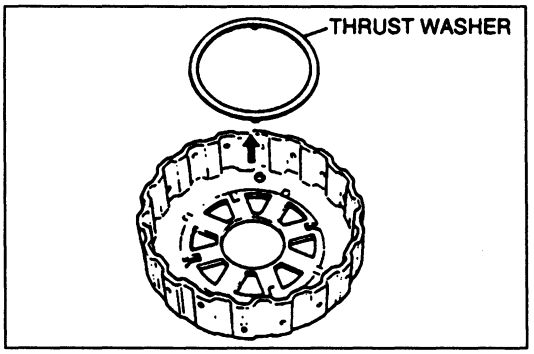


4. Apply ATF to the rear internal gear, and install it in the forward clutch hub by turning it evenly and gradually.
5. Hold the forward clutch hub and verify that the rear internal gear turns counterclockwise. If it does not, then the one-way clutch is installed upside down.

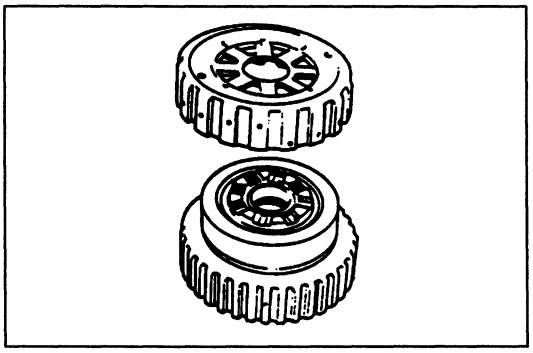


6. Apply petroleum jelly to the bearing, and install it on the rear internal gear.

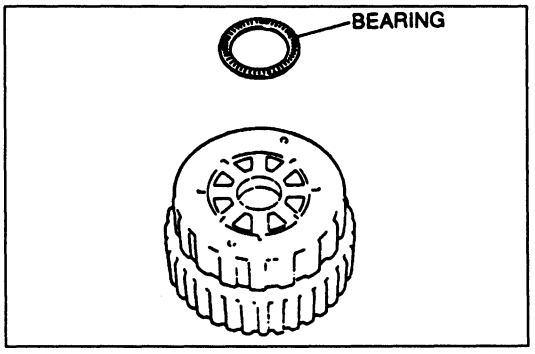
   Bearing outer diameter: 78.0 mm {3.07 in}



7. Apply petroleum jelly to the thrust washer, and set it so that the tabs fit in the holes of the overrunning clutch hub.

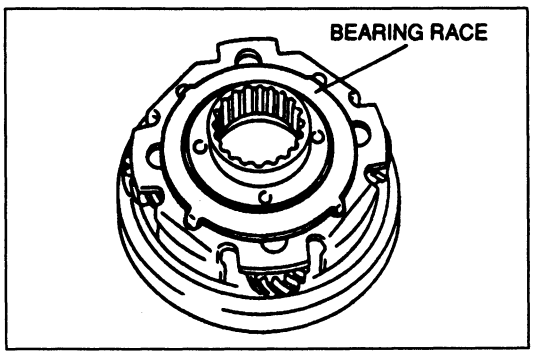


8. Set the overrunning clutch hub on the rear internal gear.



9. Apply petroleum jelly to the bearing, and set it on the overrunning clutch hub.

Bearing outer diameter: 59.0 mm {2.32 in}

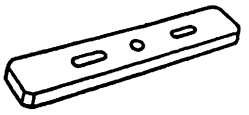
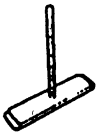
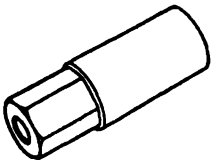
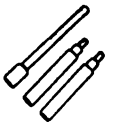


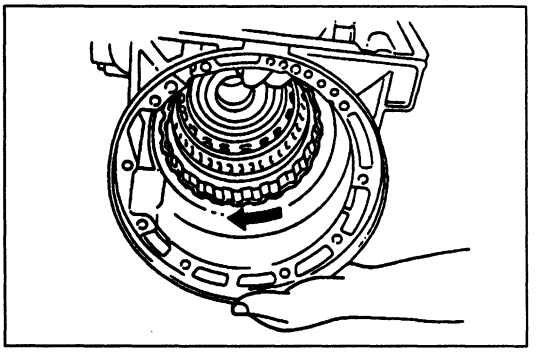
10. Apply petroleum jelly to the bearing race, and set it on the front internal gear.

Bearing race outer diameter: 75.0 mm {2.95 in}

FORWARD CLUTCH DRUM (FORWARD CLUTCH, OVERRUNNING CLUTCH, LOW ONE-WAY CLUTCH)

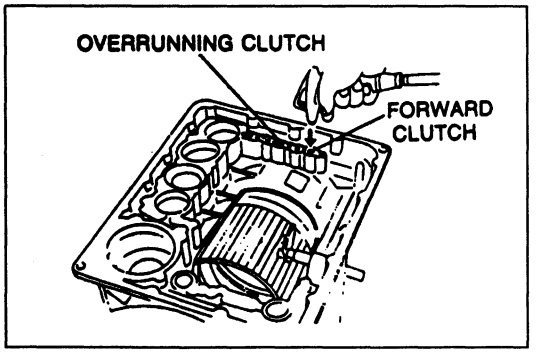
Preparation
SST

49 G019 0A7A Compressor set, return spring 	For removal / installation of snap ring	49 G019 025 Body B (Part of 49 G019 0A7A) 	For removal / installation of snap ring
49 G019 026 Plate (Part of 49 G019 0A7A) 	For removal / installation of snap ring	49 G019 027 Attachment A (Part of 49 G019 0A7A) 	For removal / installation of snap ring
49 G019 029 Nut (Part of 49 G019 0A7A) 	For removal / installation of snap ring	49 L019 001 Bolt 	For removal / installation of snap ring



Preinspection
Low one-way clutch operation

1. Install the forward clutch drum into the transmission case.
2. Verify that the forward clutch drum rotates smoothly when turned clockwise, and locks when turned counterclockwise.
3. If not, replace the one-way clutch.

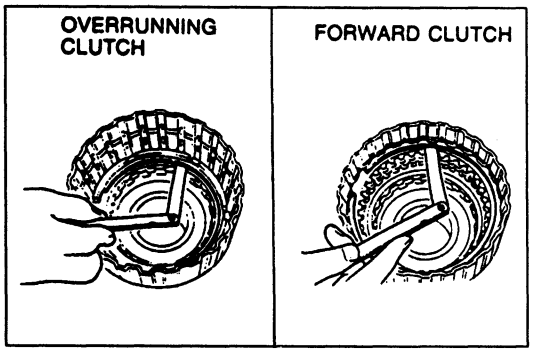


Forward clutch and overrunning clutch operation

1. Install the forward clutch drum and low one-way clutch inner race into the transmission case. Apply compressed air through the oil passage as shown.
2. Verify that the retaining plates move toward the snap rings.

   Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

3. If not, the D-rings or the seal ring may be damaged or fluid may be leaking at the piston check ball. Inspect and replace as necessary when assembling.



Clearance between retaining plate and snap ring

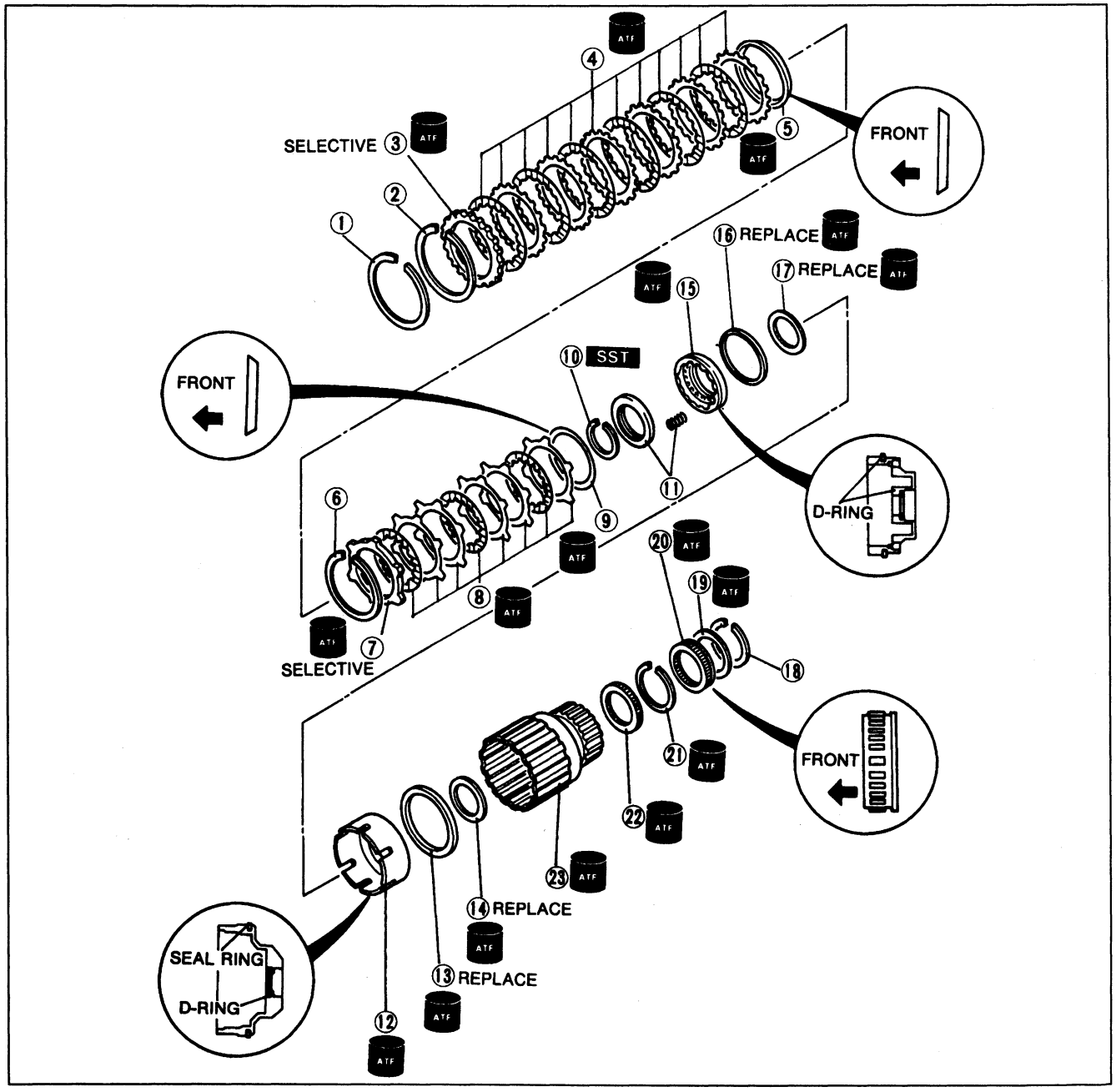
1. Measure the clearance between the retaining plate and the snap ring of the forward clutch and the overrunning clutch.

   Clearance
   Forward clutch: 0.45–1.85 mm {0.018–0.073 in}
   Overrunning clutch: 1.0–2.0 mm {0.039–0.079 in}

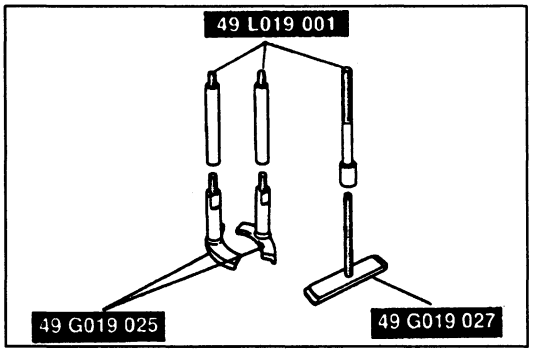
2. Select the correct retaining plate when assembling. (Refer to pages K-89, 90.)

Disassembly / Inspection / Assembly

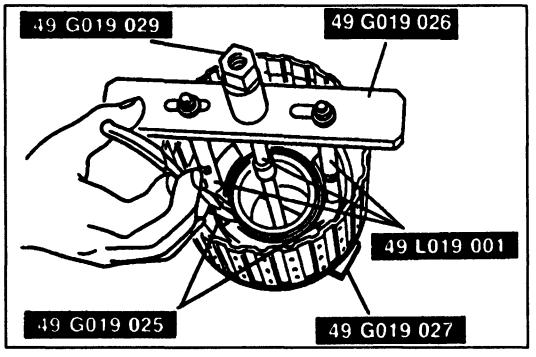
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



1. Snap ring
2. Snap ring
3. Retaining plate
4. Drive plates and driven plates
   Inspect for wear and burning
   Inspection ..... page K-86
5. Dished plate
6. Snap ring
7. Retaining plate
8. Drive plates and driven plates
   Inspect for wear and burning
   Inspection ..... page K-86
9. Dished plate
10. Snap ring
    Disassembly Note ..... below
11. Spring retainer and return springs
    Inspection ..... page K-86
12. Forward clutch piston
    Disassembly Note ..... below
13. Seal ring
14. D-ring
15. Overrunning clutch piston
    Shake the clutch piston and verify that the check ball is free
    Disassembly Note ..... below
    Inspection ..... page K-86
16. D-ring
17. D-ring
18. Snap ring
19. Side plate
20. Low one-way clutch
    Inspection ..... page K-83
21. Snap ring
22. Bearing (radial bearing)
    Inspect for damage and rough rotation
23. Forward clutch drum
    Inspection ..... page K-86

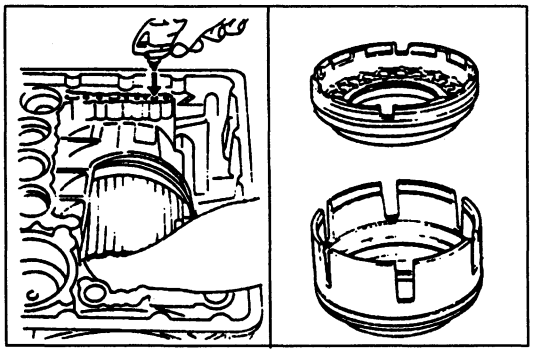


Disassembly note
Snap ring
1. Assemble the **SST**.



Caution
- **Depress the spring retainer only enough to install the snap ring. Overpressing will damage the retainer assembly edges.**

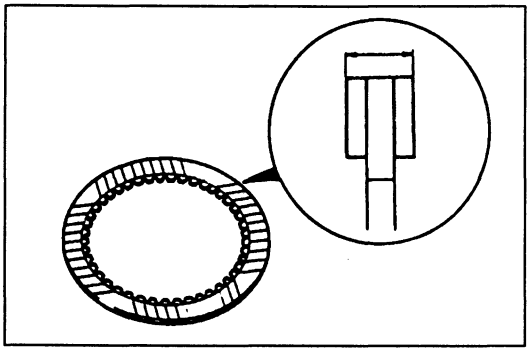
2. While holding the spring retainer down with the **SSTs**, and remove the snap ring by using snap ring pliers.
3. Remove the spring retainer and return springs.



Forward clutch piston, Overrunning clutch piston
1. Set the forward clutch drum in the transmission case.
2. Remove the piston by applying compressed air through the oil passage.

   Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

3. Remove the overrunning clutch piston from the forward clutch piston.

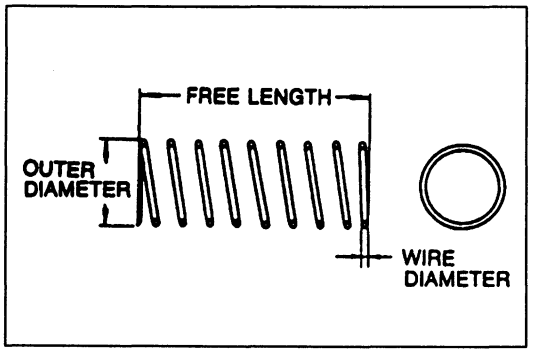


Inspection
Drive plates
1. Measure the facing thickness in three places, and calculate the average.

Forward clutch
Standard: 2.0 mm {0.079 in}
Minimum: 1.8 mm {0.071in}

Overrunning clutch
Standard: 2.0 mm {0.079 in}
Minimum: 1.8 mm {0.071in}

2. If not within specification, replace the drive plate.

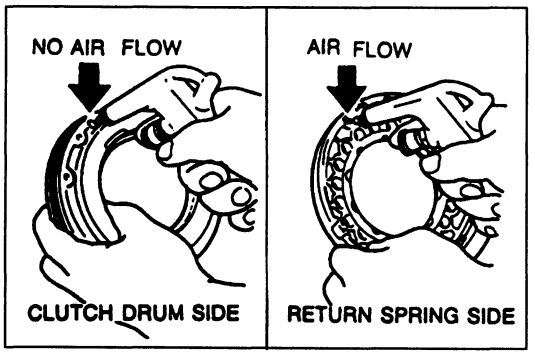


Return springs
1. Measure the spring free length.

Specification

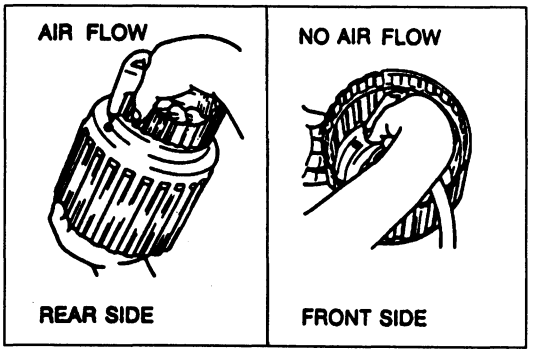
Outer dia. mm {in}	Free length mm {in}	No. of coils	Wire dia. mm {in}
9.7 {0.38}	35.8 {1.41}	10.3	1.3 {0.051}

2. If not within specification, replace the return spring.



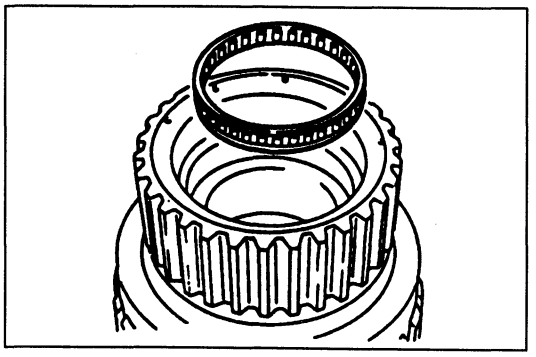
Overrunning clutch piston
1. Shake the clutch piston and verify that the check ball is free.
2. Verify that there is no air flow when applying compressed air through the oil hole on the clutch drum side.
3. Verify that there is air flow when applying compressed air through the oil hole on return spring side.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

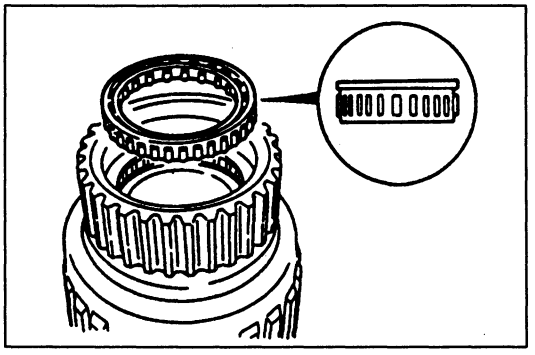


Forward clutch drum
1. Verify that there is no air flow when applying compressed air through the oil hole on the front side.
2. Verify that there is airflow when applying compressed air through the oil hole on the rear side.

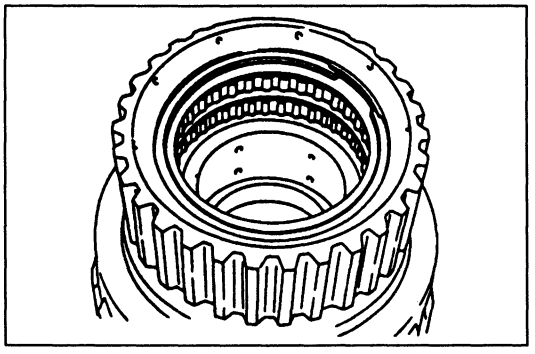
Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.



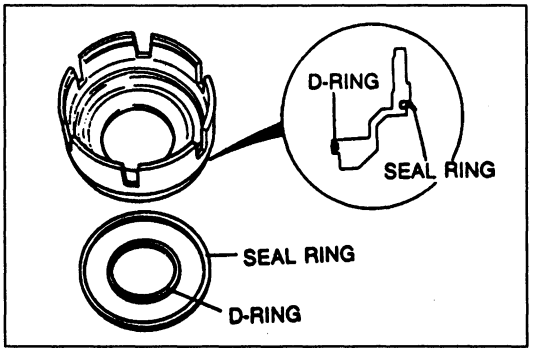
Assembly procedure
1. Apply ATF to the bearing and install it into the forward clutch drum.
2. Install the snap ring.



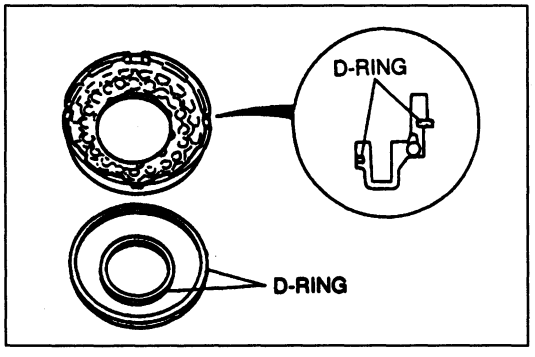
3. Apply ATF to the low one-way clutch.
   Install it carefully into the forward clutch drum, with the flange facing upward.



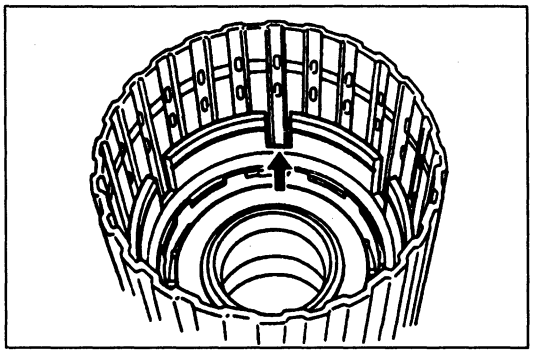
4. Apply ATF to the side plate and snap ring, and install them into the forward clutch drum.



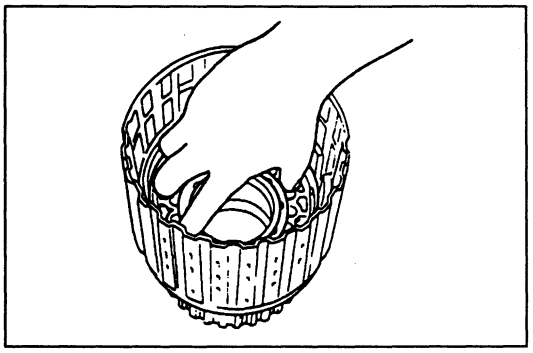
5. Apply ATF to a new D-ring and seal ring, and install them into the forward clutch piston as shown.



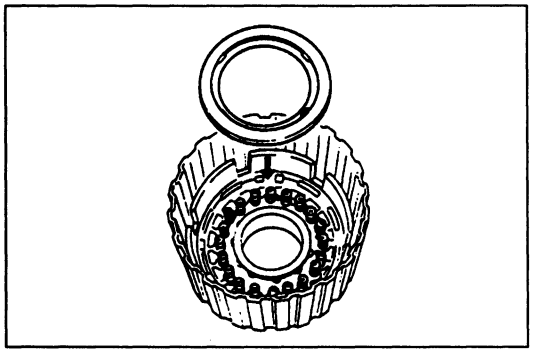
6. Apply ATF to the new D-rings, and install them to the over-running clutch piston as shown.



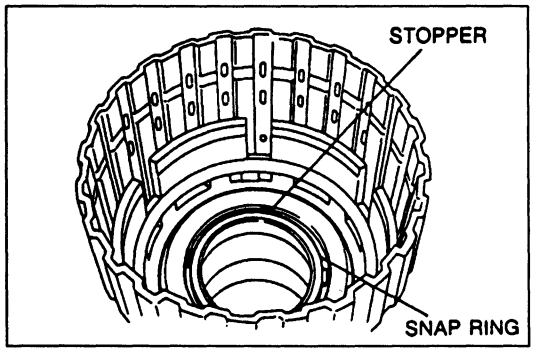
7. Apply ATF to the inner face of the forward clutch drum and to the forward clutch piston.
8. Apply even pressure to the perimeter of the forward clutch piston, and install it into the forward clutch drum by turning it evenly and gradually. Align the notches in the forward clutch piston with the grooves in the forward clutch drum.
9. Verify that the piston can be turned by hand. If it cannot, then remove it and check for damage to the seal ring.



10. Apply ATF to the inner face of the forward clutch piston and to the overrunning clutch piston.
11. Apply even pressure to the perimeter of the overrunning clutch piston, and install it into the forward clutch piston by turning it evenly and gradually.

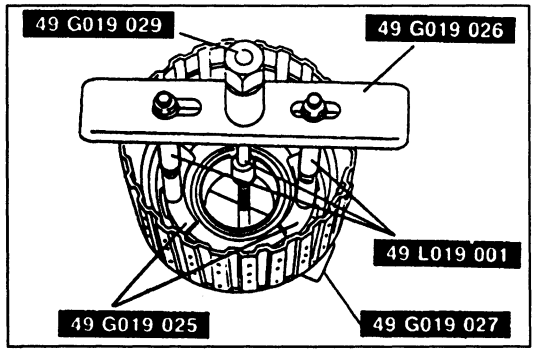


12. Install the return springs and spring retainer.

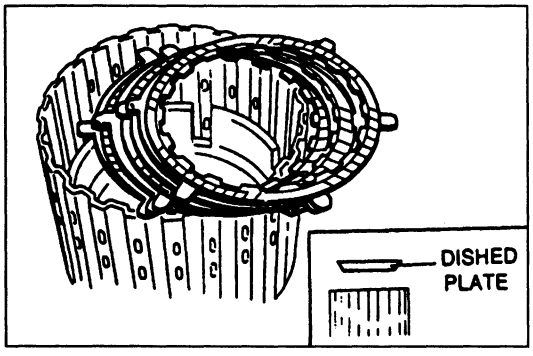


Caution

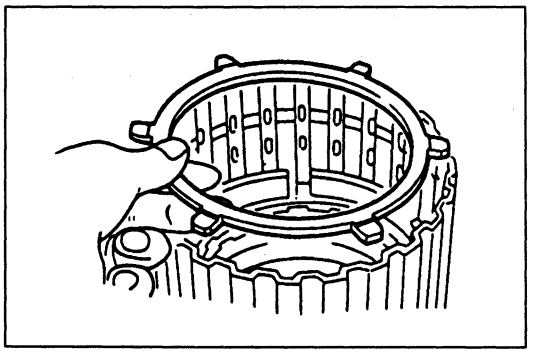
- **Depress the spring retainer only enough to install the snap ring. Overpressing will damage the retainer assembly edges.**



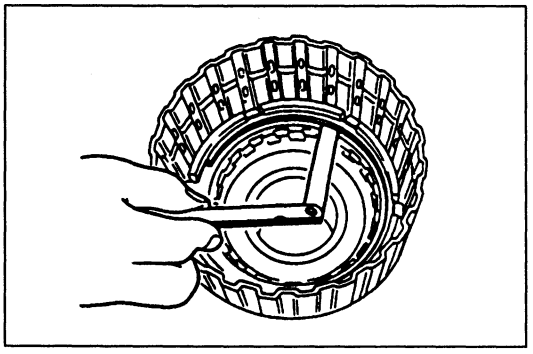
13. While holding the spring retainer down with the **SSTs**, install the snap ring into the spring retainer stopper.



14. Install the dished plate as shown.
15. Soak new drive plates in ATF for at least two hours.
16. Apply ATF to the driven plates immediately before assembly.
17. Install the drive and driven plates into the forward clutch piston in the following order.
    Driven-Drive-Driven-Driven-Drive-Driven-Driven-Drive



18. Install the retaining plate.
19. Install the snap ring.



20. Measure the clearance between the retaining plate and the snap ring by using a feeler gauge

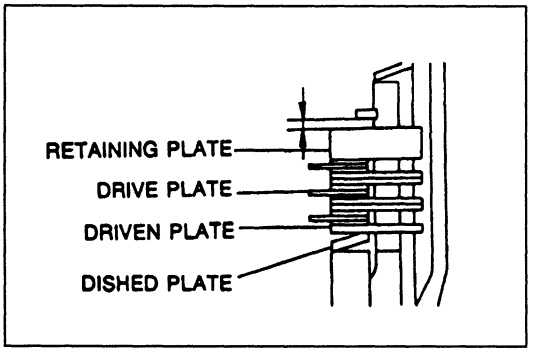
    Clearance: 1.0–2.0 mm {0.039–0.079 in}

21. If not within specification, adjust the clearance by selecting the correct retaining plate.

Retaining plate size

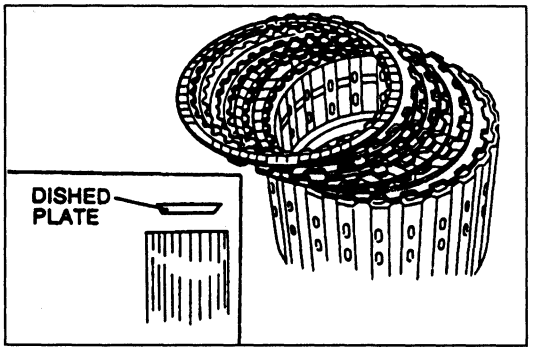
mm {in}

4.0 {0.157}	4.2 {0165}	4.4 {0.173}	4.6 {0.181}
4.8 {0.189}	5.0 {0.197}	5.2 {0.205}	—

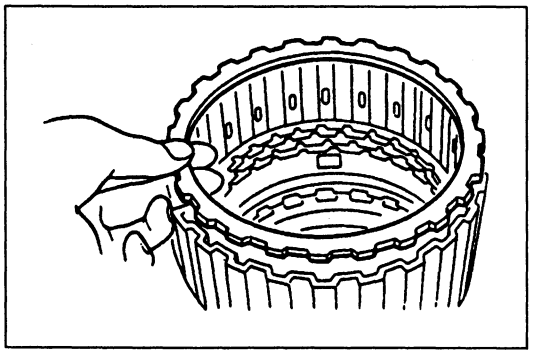


22. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates, and drive plates.
    Adjust the clearance by selecting the correct retaining plate.

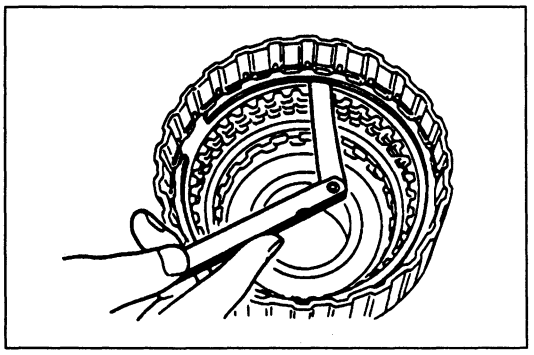
    Clearance: 1.0–1.4 mm {0.039–0.055 in}



23. Install the dished plate as shown.
24. Soak new drive plates in ATF for at least two hours.
25. Apply ATF to the driven plates immediately before assembly.
26. Install the drive and driven plates into the forward clutch drum in the following order.
    Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive



27. Install the retaining plate.
28. Install the snap ring.



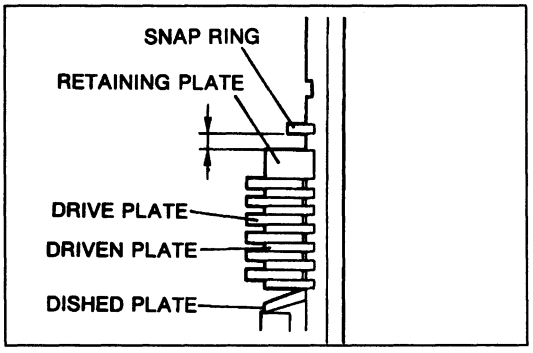
29. Measure the clearance between the retaining plate and the snap ring by using a feeler gauge. If not within specification, adjust the clearance by selecting the correct retaining plate.

Clearance: 0.45–1.85 mm {0.018–0.073 in}

Retaining plate size

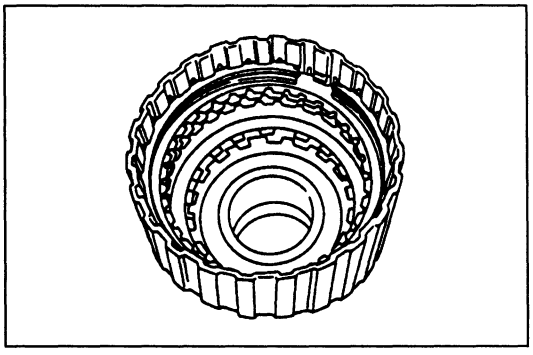
mm {in}

8.0 {0.315}	8.2 {0.323}	8.4 {0.331}	8.6 {0.339}
8.8 {0.346}	9.0 {0.354}	9.2 {0.362}	—



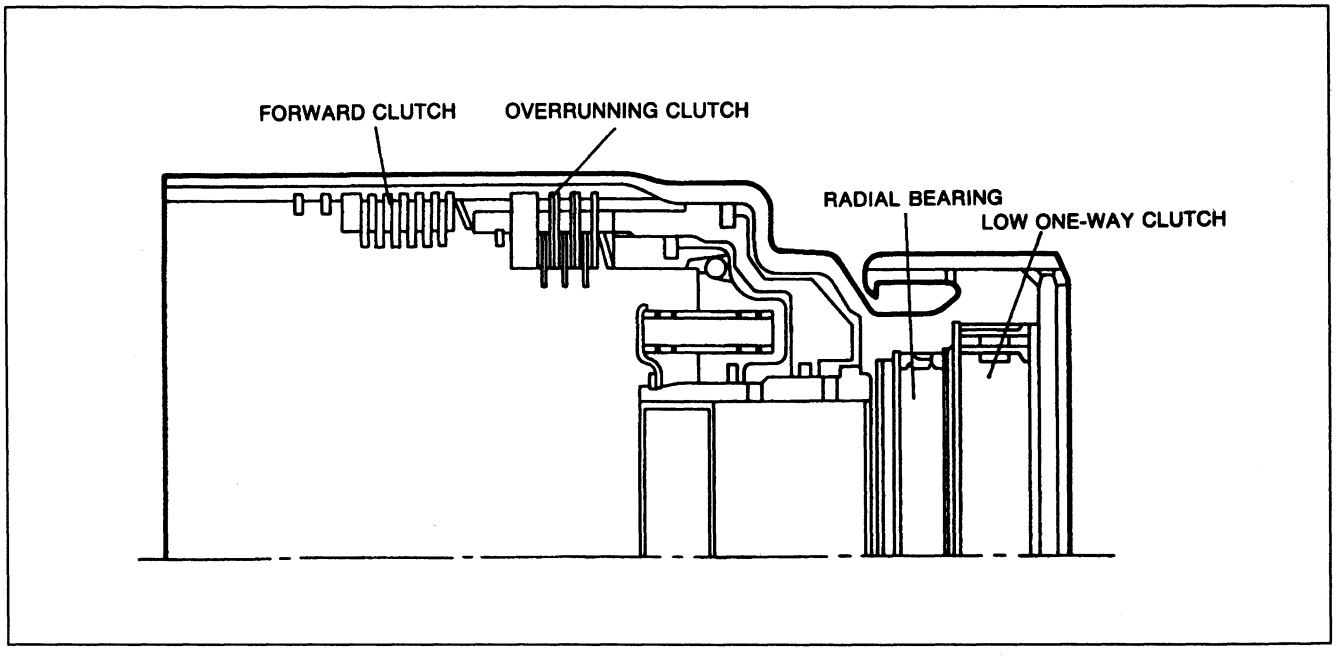
30. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates, and drive plates.
Adjust the clearance by selecting the correct retaining plate.

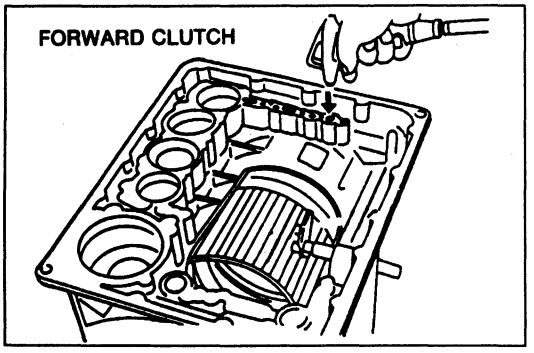
Clearance: 0.45–0.85 mm {0.018–0.033 in}



31. Install the snap ring.

Illustration of proper assembly

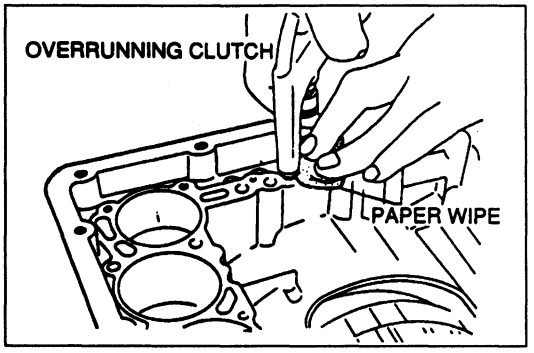




Caution
- **Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal.**

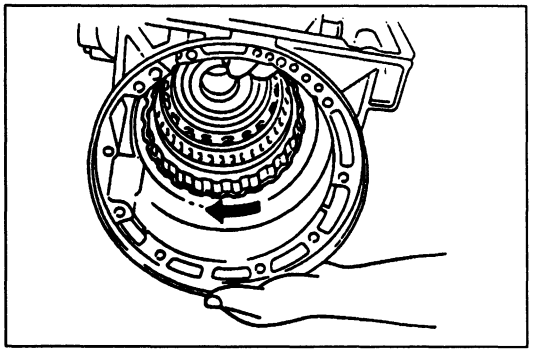
32. Set the forward clutch drum in the transmission.
33. Apply compressed air through the oil passage as shown, and verify the forward clutch operation.

Air pressure: 390 kPa {4.0 kgf/cm², 57 psi} max.

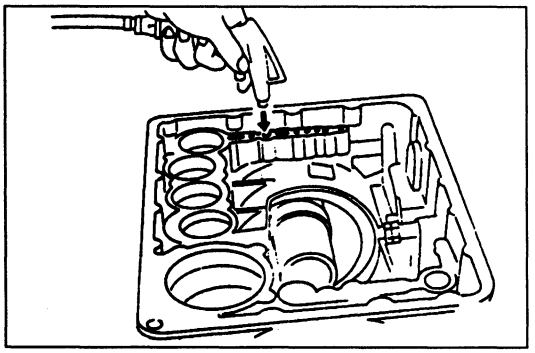


34. Apply compressed air through the oil passage, and check the overrunning clutch operation.
Hold a paper towel around the nozzle of the air gun to keep air from escaping around the edges.

Air pressure: 390 kPa {4.0 kgf/cm², 57 psi} max.



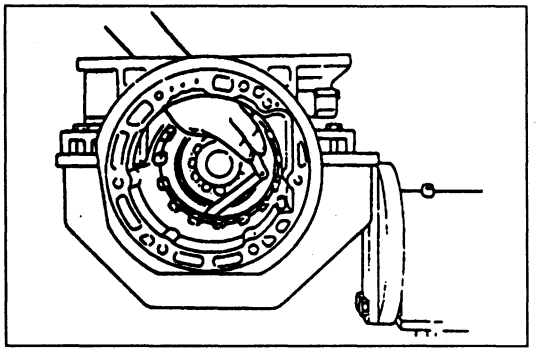
35. Verify that the forward clutch drum turns clockwise only. If it turns counterclockwise, the one-way clutch is installed upside down.



LOW AND REVERSE BRAKE
Preinspection
Low and reverse brake operation
1. Apply compressed air through the oil passage as shown.
2. Verify that the retaining plate moves toward the snap ring.

Air pressure: 390 kPa {4.0 kgf/cm², 57 psi} max.

3. If not, the D-ring or the seal ring may be damaged or fluid may be leaking at the piston check ball. Inspect and replace as necessary when assembling.



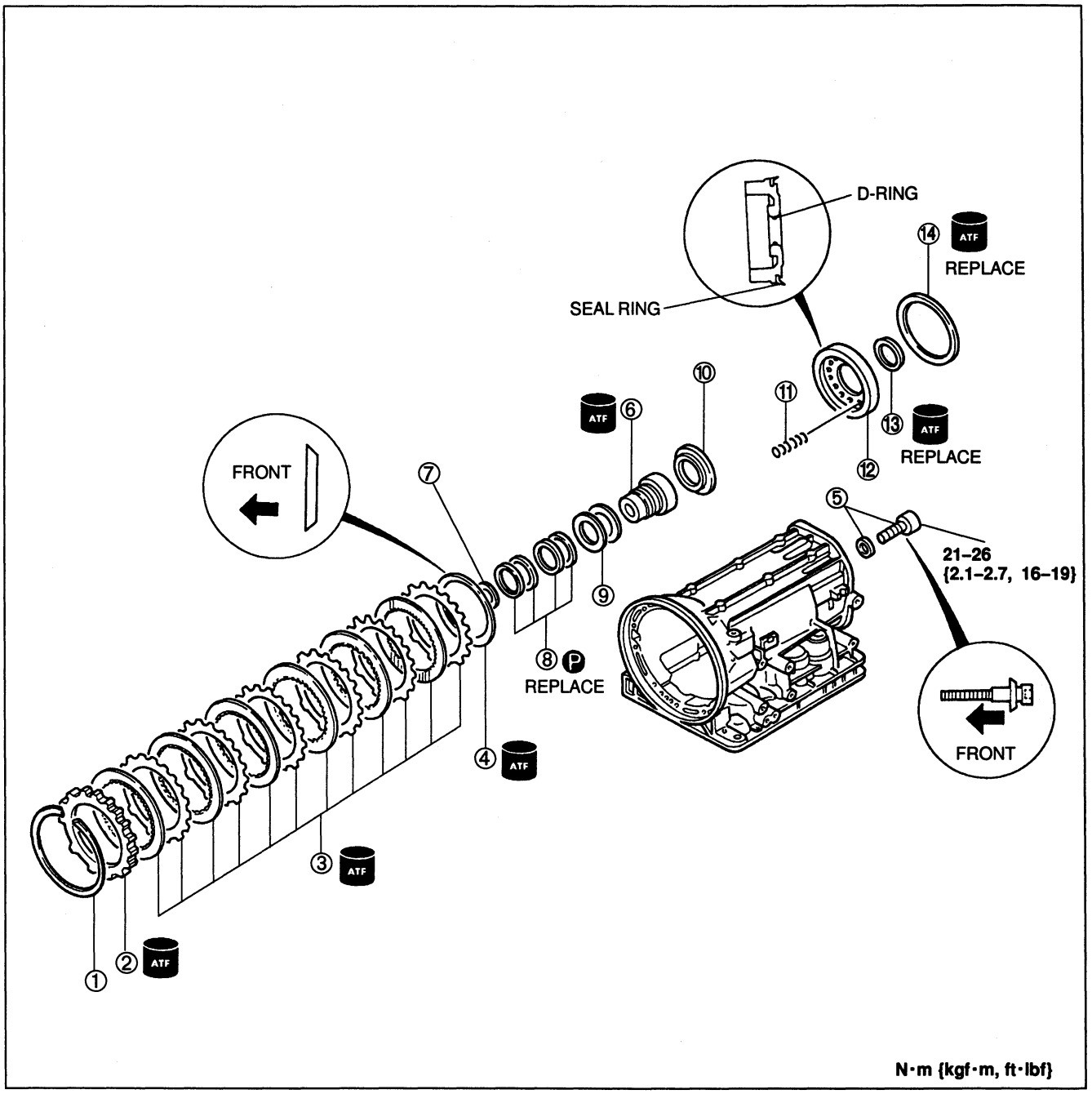
Clearance between retaining plate and snap ring
1. Measure the clearance between the retaining plate and the snap ring.

Clearance: 0.8–2.6 mm {0.031–0.102 in}

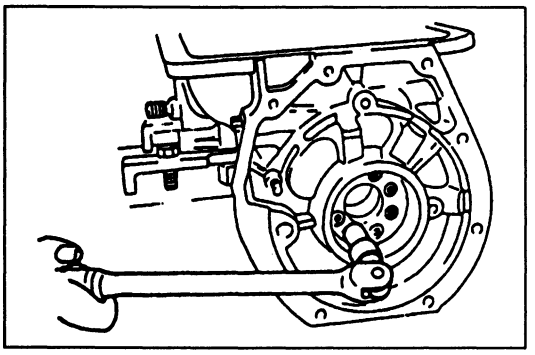
2. Select the correct retaining plate when assembling. (Refer to page K–95.)

Disassembly / Inspection / Assembly

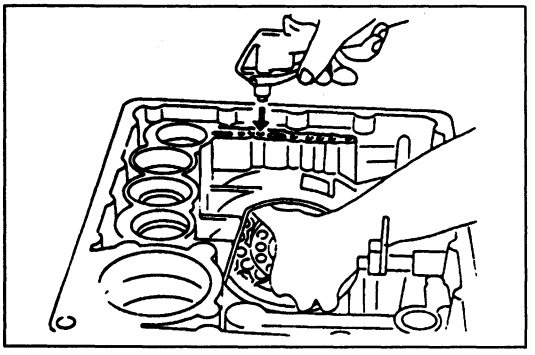
1. Disassemble in the order shown in the figure, referring to **Disassembly note.**
2. Inspect all parts and replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure.**



1. Snap ring
2. Retaining plate
3. Drive plates and driven plates
   Inspect for damage and burning
   Inspection ..... page K–93
4. Dished plate
5. Allen-head bolts and washers
6. Low one-way clutch inner race
   Disassembly Note ..... page K–93
   Inspection ..... page K–93
7. Bearing
   Inspect for damage and rough rotation
8. Seal rings
9. Thrust washeres
10. Spring retainer
11. Return springs
    Inspection ..... page K–93
12. Low and reverse brake piston
    Shake the clutch piston and verify that the check ball is free
    Disassembly Note ..... page K–93
13. D-ring
14. Seal ring

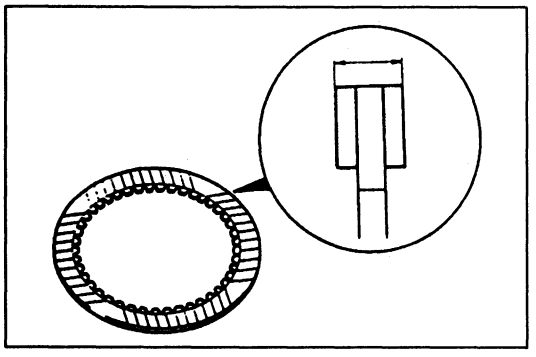


Disassembly note
Low one-way clutch inner race
1. Loosen the bolts gradually in a crisscross pattern. Hold the inner race with your free hand so that it doesn't spring out as the last bolt is removed.
2. Remove the Allen-head bolts, washers, and low one-way clutch inner race.



Low and reverse brake piston
Remove the low and reverse brake piston by applying compressed air through the oil passage as shown.

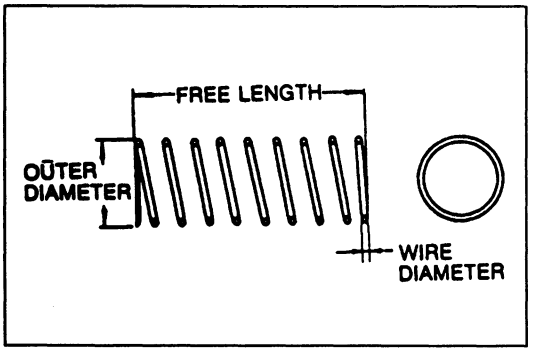
Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.



Inspection
Drive plates
1. Measure the facing thickness in three places, and calculate the average.

Thickness
Standard: 2.0 mm {0.079 in}
Minimum: 1.8 mm {0.071 in}

2. If not within specification, replace the drive plate.

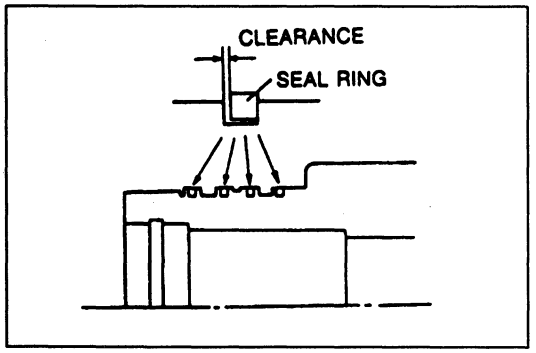


Return springs
1. Measure the spring free length.

Specification

Outer dia. mm {in}	Free length mm {in}	No. of coils	Wire dia. mm {in}
11.6 {0.457}	22.3 {0.878}	5.2	1.2 {0.047}

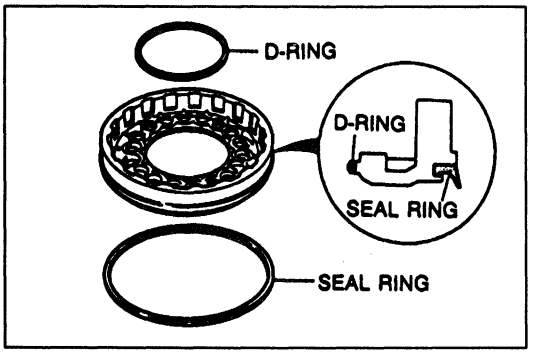
2. If not within specification, replace the return spring.



Low one-way clutch inner race
1. Apply petroleum jelly to new seal rings and install them to the one-way clutch inner race.
2. Measure the clearance between each seal ring and ring groove.

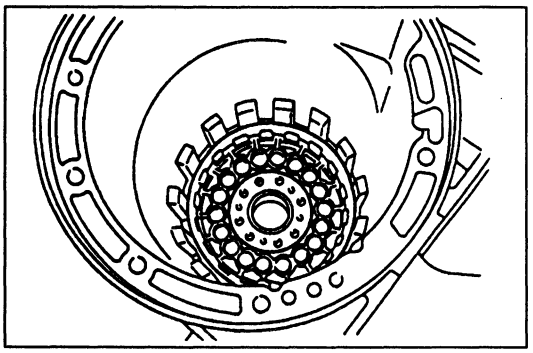
Standard clearance:
0.10–0.25 mm {0.004–0.010 in}
Maximum clearance: 0.25 mm {0.010 in}

3. If not within specification, replace the low one-way clutch inner race.

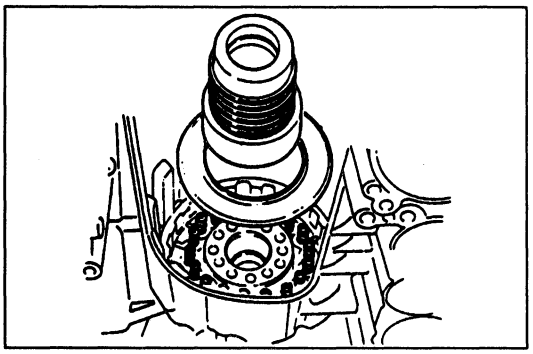


Assembly procedure

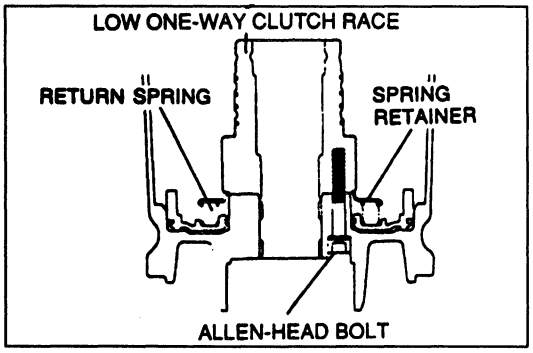
1. Apply ATF to a new D-ring and seal ring and install them to the low and reverse brake piston.



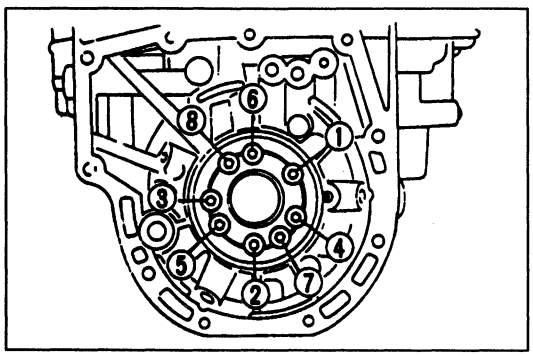
2. Apply ATF to the inner face of the transmission case.
3. Apply even pressure to the perimeter of the low and reverse brake piston, and install it into the transmission case by turning it evenly and gradually.
4. Verify that the piston can be turned by hand. If it cannot, then remove it and check for damage to the seal ring.



5. Set the return springs, spring retainer, and low one-way clutch inner race into the transmission case.

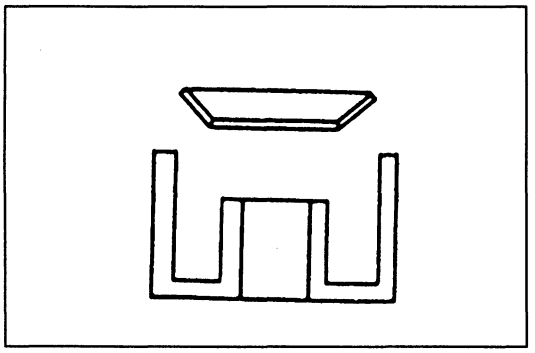


6. Verify that the return springs, spring retainer, and low one-way clutch inner race are properly positioned.

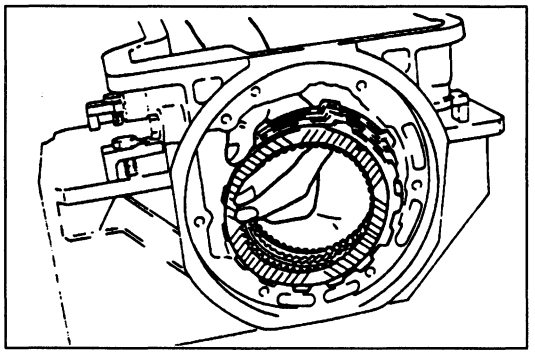


7. Tighten the Allen-head bolts evenly and gradually in the order shown.

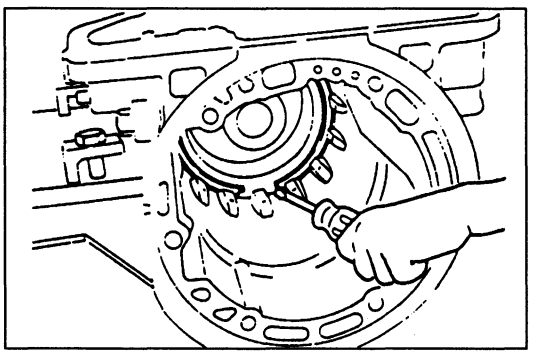
Tightening torque:
21–26 N·m {2.1–2.7 kgf·m, 16–19 ft·lbf}



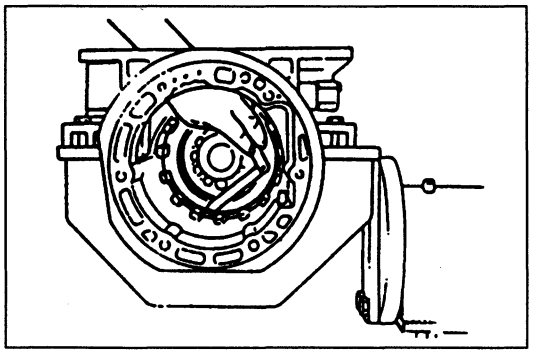
8. Install the dished plate as shown.



9. Soak new drive plates in ATF for at least two hours before installation.
10. Apply ATF to the driven plates immediately before assembly.
11. Install the drive and driven plates into the transmission case in the following order.
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive



12. Install the retaining plate.
13. Install the snap ring.



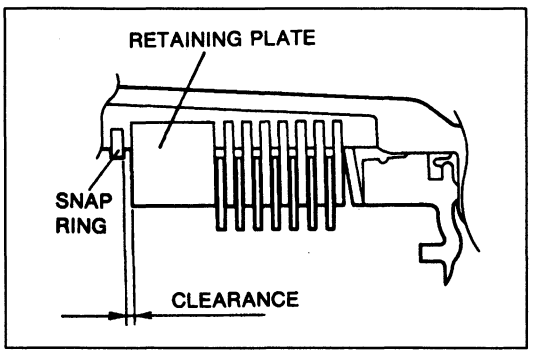
14. Measure the clearance between the retaining plate and the snap ring by using a feeler gauge. If not within specification, adjust the clearance by selecting the correct retaining plate.

Clearance: 0.8–2.6 mm {0.031–0.102 in}

Retaining plate size

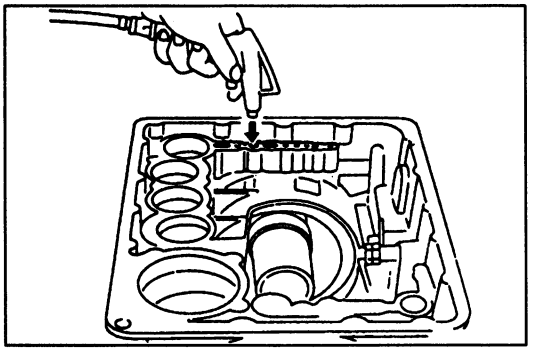
mm {in}

6.2 {0.244}	6.4 {0.252}	6.6 {0.260}	6.8 {0.268}
7.0 {0.276}	7.2 {0.283}	7.4 {0.291}	7.6 {0.299}
7.8 {0.307}	8.0 {0.315}	—	—



15. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates and drive plates.
Adjust the clearance by selecting the correct retaining plate.

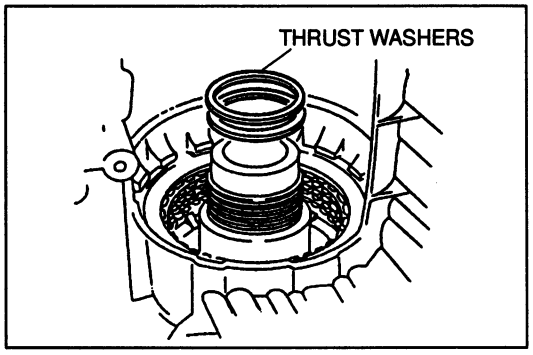
Clearance: 0.8–1.2 mm {0.031–0.047 in}



Caution
- **Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal.**

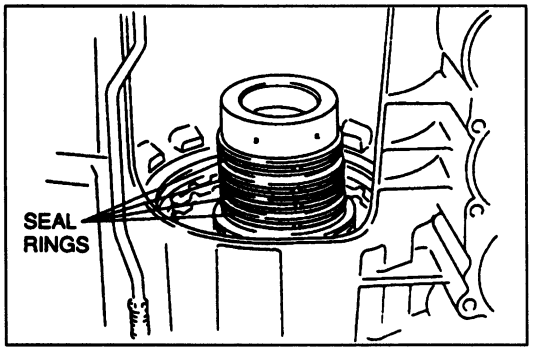
16. Verify operation of the piston by applying compressed air through the oil passage of the low and reverse brake as shown.

    Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

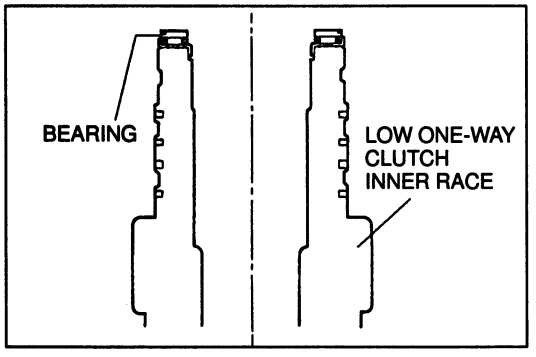


17. Apply petroleum jelly to the bearing, and install it on the low one-way clutch inner race with the black surface facing downward.

    Bearing outer diameter: 78.1 mm {3.07 in}



18. Apply petroleum jelly to the seal rings, and fit them into the ring grooves of the low one-way clutch inner race.

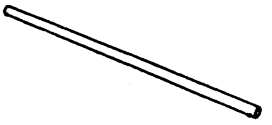
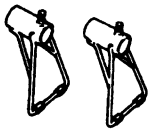
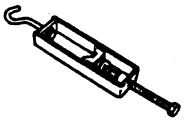
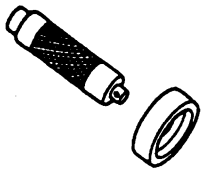


19. Apply petroleum jelly to the bearing, and install it onto the low one-way clutch inner race.

    Bearing outer diameter: 59.0 mm {2.32 in}

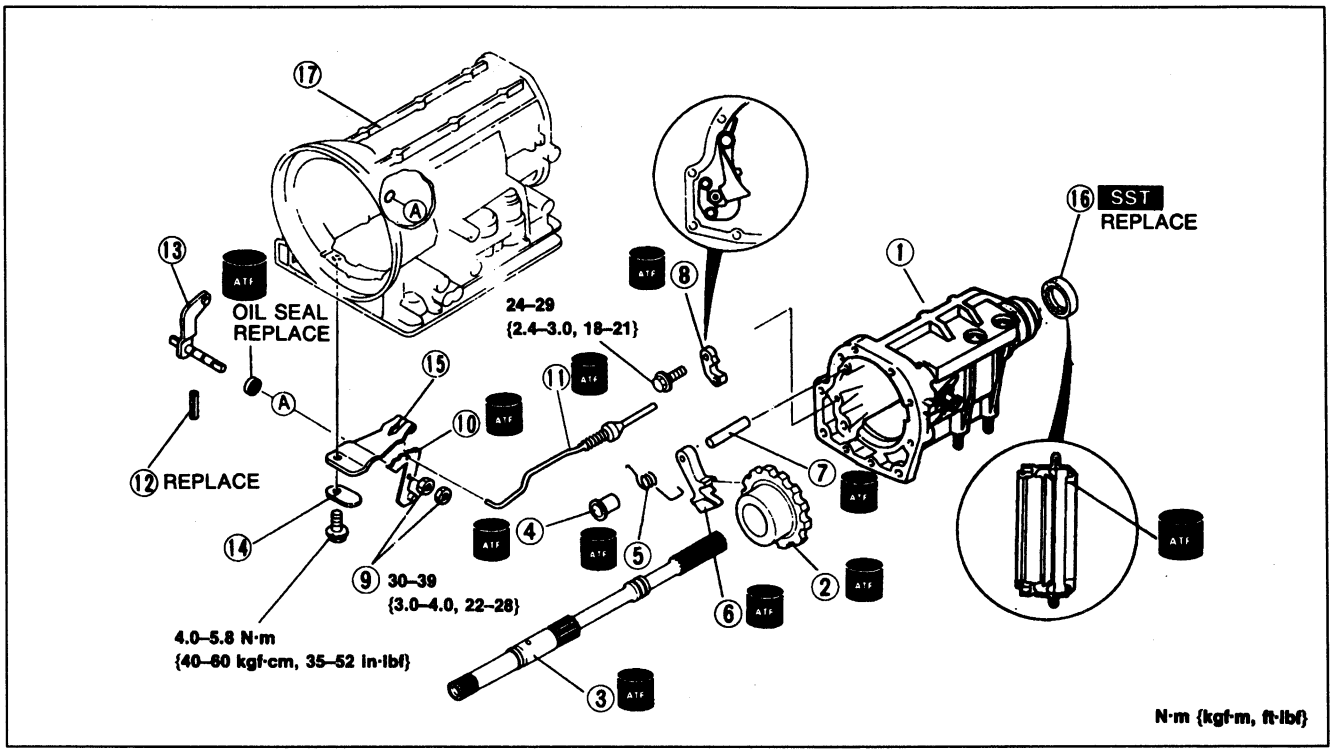
EXTENSION HOUSING / PARKING MECHANISM

Preparation
SST

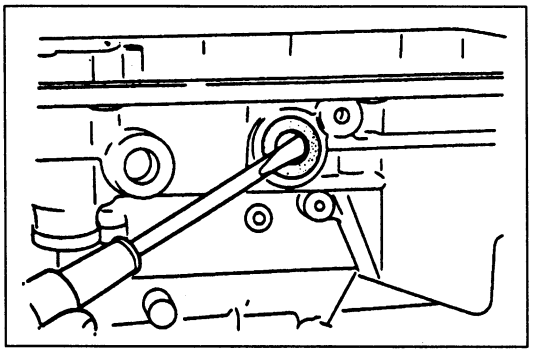
49 G017 5A0 Support, engine 	For support of engine	49 G017 501 Bar (Part of 49 G017 5A0) 	For support of engine
49 G017 502 Support (Part of 49 G017 5A0) 	For support of engine	49 G017 503 Hook (Part of 49 G017 5A0) 	For support of engine
49 G030 795 Installer, oil seal 	For installation of oil seal	49 G030 797 Handle (Part of 49 G030 795) 	For installation of oil seal
49 F019 001 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. Inspect all parts and replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



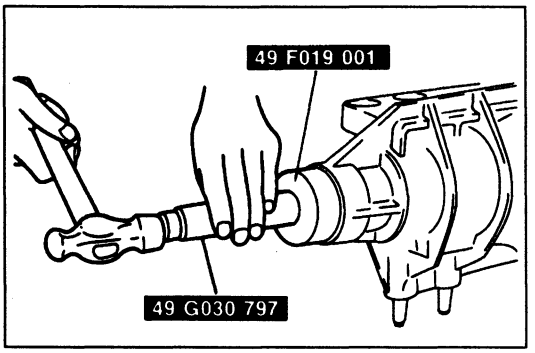
1. Extension housing
2. Parking gear
   Inspect gear teeth for damage and wear
   Inspect bearing for rough rotation
3. Output shaft
   Inspect splines for damage and wear
4. Parking pawl spacer
5. Return spring
6. Parking pawl
7. Parking pawl shaft
8. Parking actuator
9. Locknuts
10. Manual plate
11. Parking rod
12. Roll pin
13. Manual shaft
14. Spacer
15. Detent spring
    Inspect for fracture and wear
16. Oil seal (extension housing)
17. Transmission case
    Inspection
    a) Damage and wear of oil seal
       Disassembly Note ..... below
    b) Damage and rough rotation of inner bearing



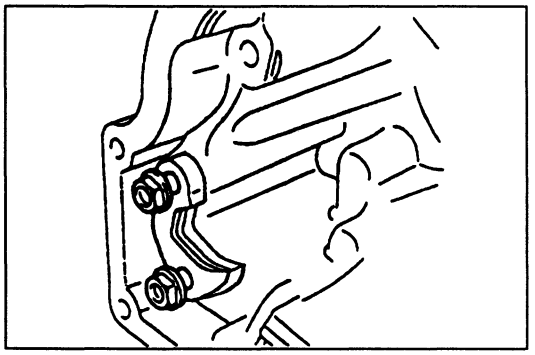
Disassembly note

Oil seal (transmission side)

Remove the oil seal, being careful to not allow any metal tools to scratch the inside of the transmission case.

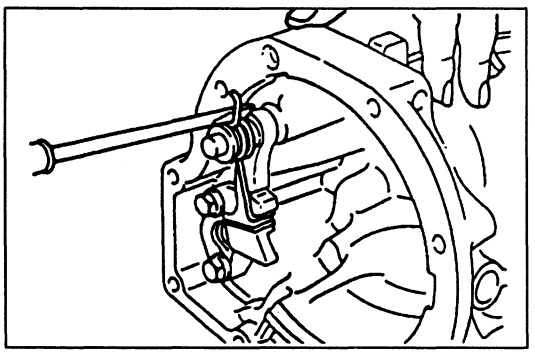


Assembly procedure
1. Apply ATF to the lip of the new oil seal.
2. Install the oil seal by using the **SSTs**.

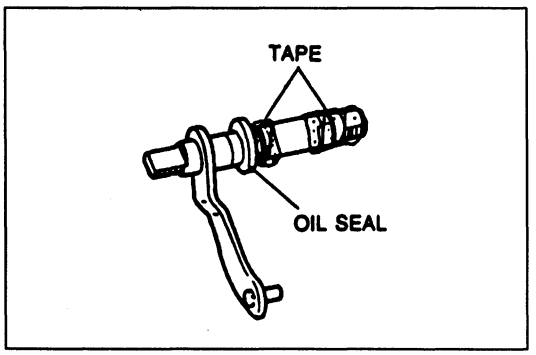


3. Apply ATF to the parking rod guide and parking actuator and install them in the extension housing.

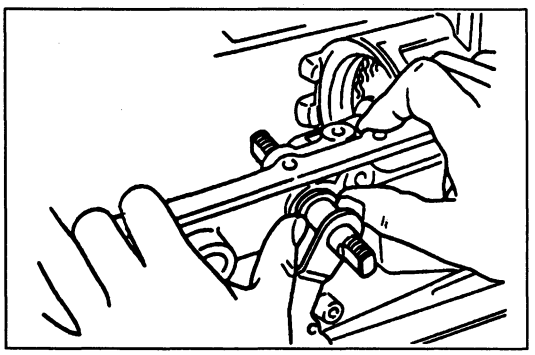
   Tightening torque:
   24–29 N·m {2.4–3.0 kgf·m, 18–21 ft·lbf}



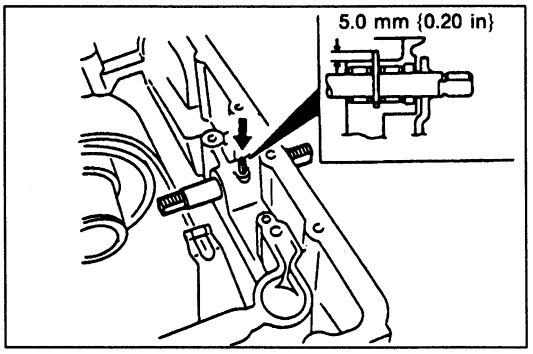
4. Apply ATF to the parking pawl shaft and install it in the extension housing.
5. Apply ATF to the parking pawl, return spring, and spacer. Install them in the extension housing.



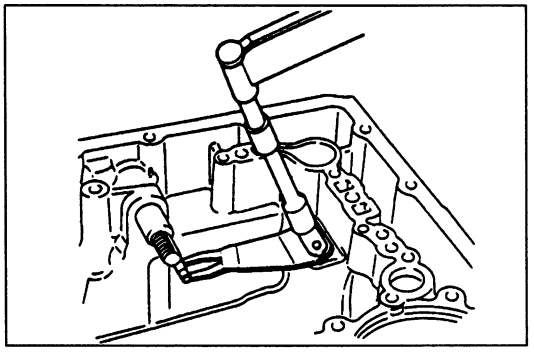
6. Wrap the threads of the manual shaft with tape.
7. Apply ATF to the lip of a new oil seal and install it onto the manual shaft.



8. Apply ATF to the bearing in the transmission case.
9. Install the manual shaft into the transmission case.
10. Push the oil seal squarely into the transmission case.
11. Remove the tape.

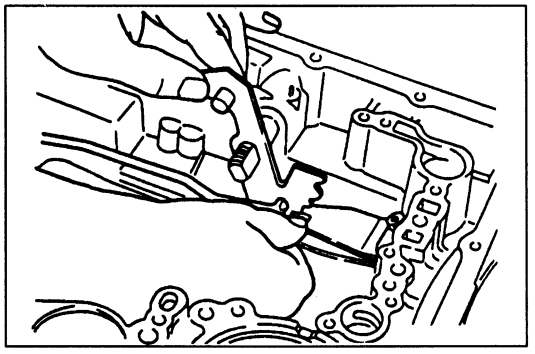


12. Align the groove in manual shaft with the roll pin hole. Tap the roll pin into the case as shown in the figure.

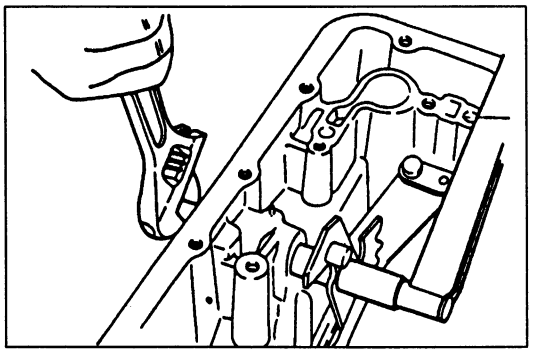


13. Install the detent spring and spacer.

Tightening torque:
4.0–5.8 N·m {40–60 kgf·cm, 36–52 in·lbf}

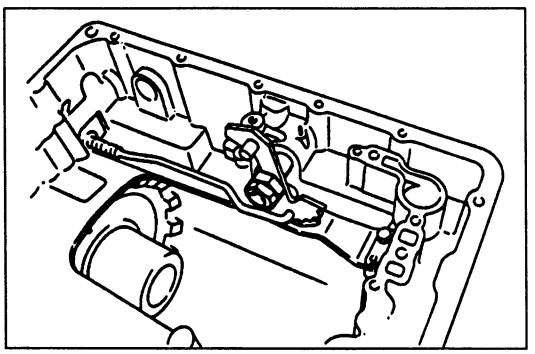


14. Install the manual plate and parking rod.



15. While holding the manual shaft as shown in the figure, tighten the locknuts.

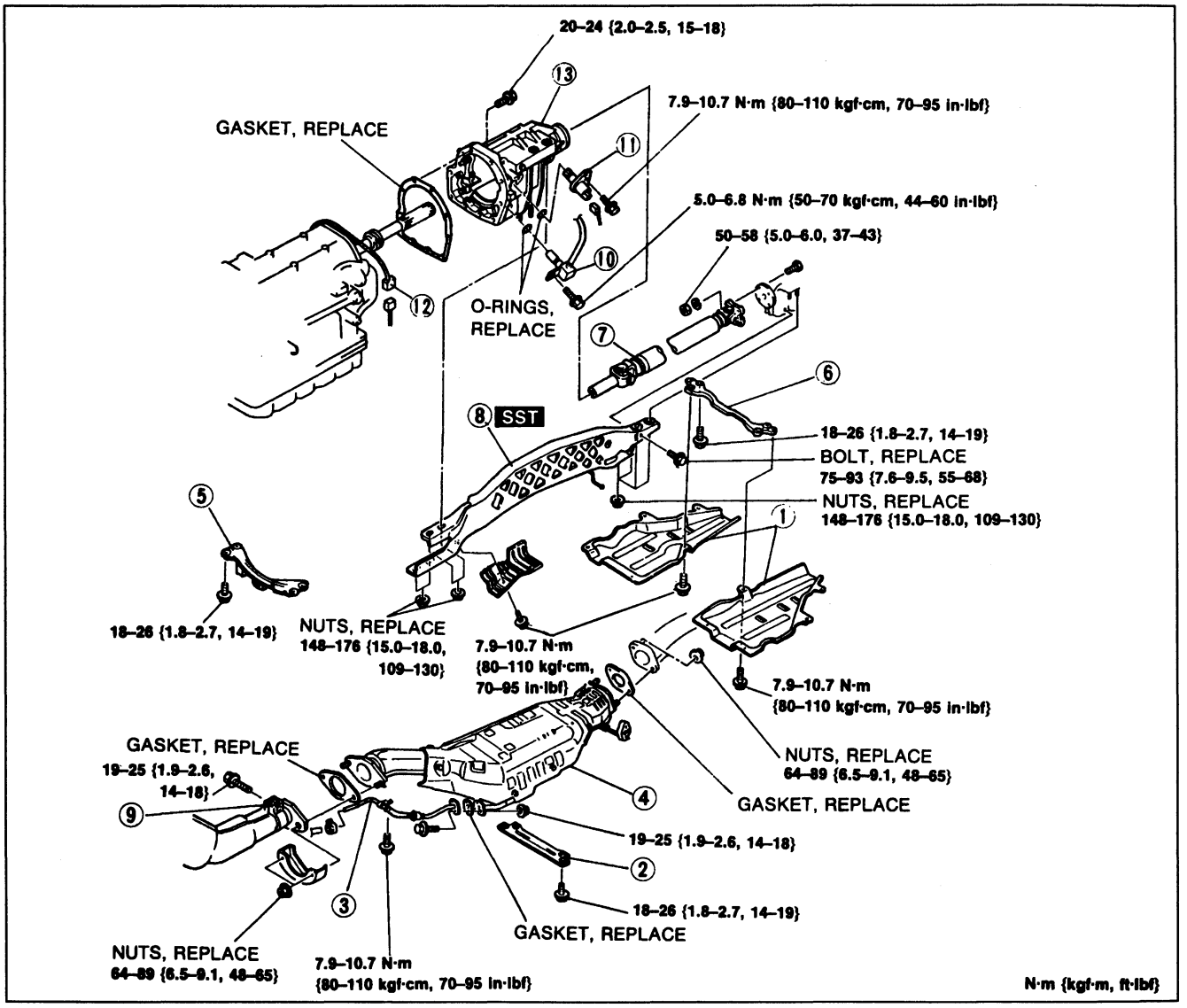
Tightening torque:
30–39 N·m {3.0–4.0 kgf·m, 22–28 ft·lbf}



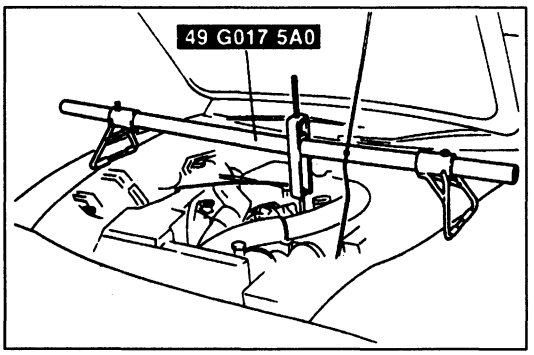
16. Verify operation of the parking mechanism.

On-Vehicle Removal / Installation

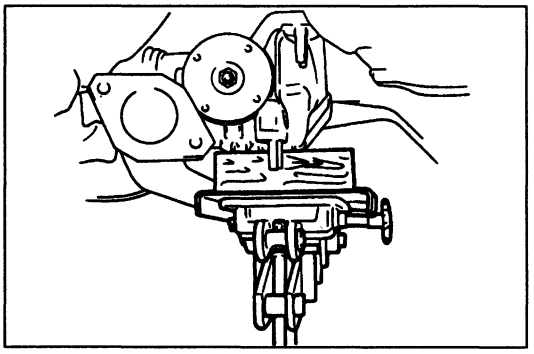
1. Disconnect the negative battery cable.
2. Clean the transmission exterior thoroughly.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install the reverse order of removal, referring to **Installation Note**.
5. Perform the following after installation of the extension housing.
   (1) Connect the negative battery cable.
   (2) Check the ATF level and add ATF to specification, if necessary.



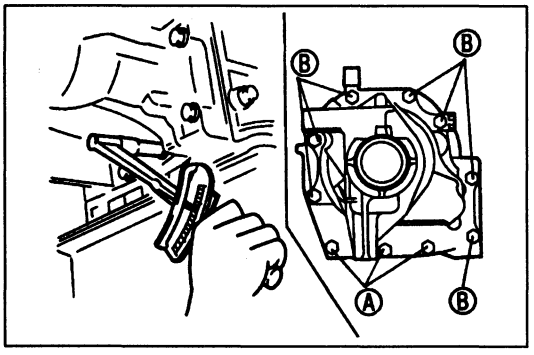
1. Undercover (right and left)
2. Center tunnel member
3. Secondary air injection pipe
4. Three-way catalyst assembly
5. Front tunnel member
6. Rear tunnel member
7. Propeller shaft
   Removal / Installation ..... section L
8. Power plant frame (PPF)
   Removal Note ..... page K–102
   Installation Note ..... page K–102
9. Front exhaust pipe bracket
10. Vehicle speed sensor
11. Vehicle speedometer sensor
12. Solenoid valve connector
13. Extension housing
    Installation Note ..... page K–102



Removal note
Power plant frame (PPF)
1. Hold the engine by using the **SST**.



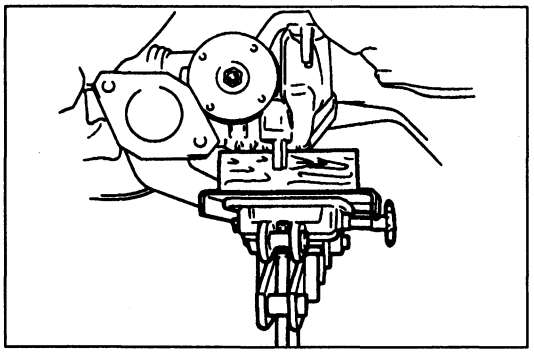
2. Hold the differential with the transmission jack.
3. Remove the PPF.



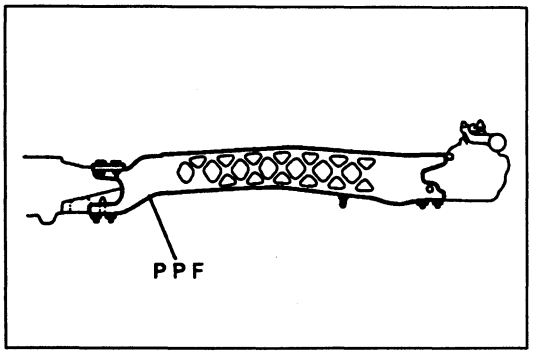
Installation note
Extension housing
1. Install a new gasket on the transmission case.
2. Install the extension housing.

Bolt length (measured from below the head):
A: 30 mm {1.18 in}
B: 45 mm {1.77 in}

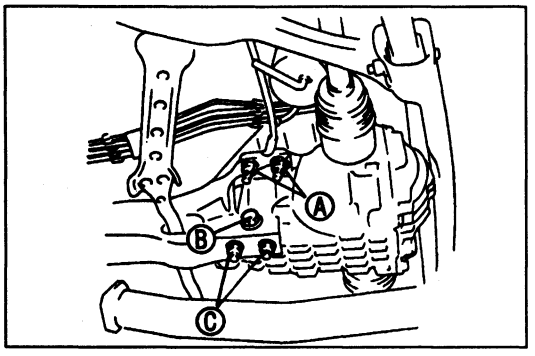
Tightening torque:
20–24 N·m {2.0–2.5 kgf·m, 15–18 ft·lbf}



Power plant frame (PPF)
1. Hold the differential at a 0° angle by using the transmission jack.

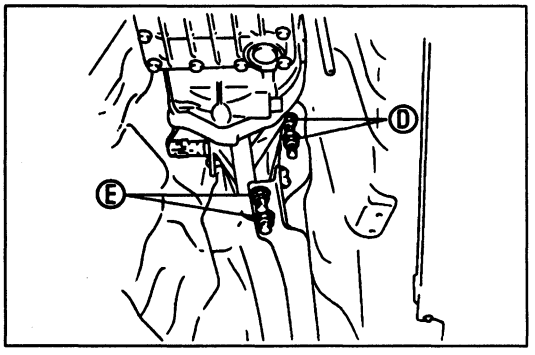


2. Hold the PPF in place with a new bolt and nuts.



3. Tighten the differential-side PPF installation bolt and nuts in the order A, B, C.

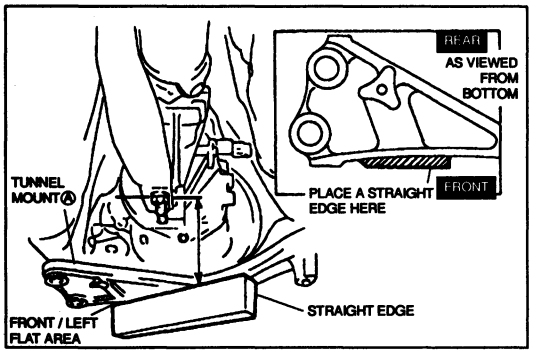
Tightening torque:
A, C: 148–176 N·m {15.0–18.0 kgf·m, 109–130 ft·lbf}
B: 75–93 N·m {7.6–9.5 kgf·m, 55–68 ft·lbf}



4. Tighten the transmission-side PPF installation nuts in the order D, E.

Tightening torque:
148–176 N·m {15.0–18.0 kgf·m, 109–130 ft·lbf}

5. Remove the transmission jack.



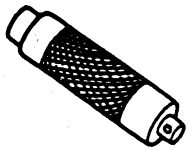
6. Measure A as shown in the figure.

Specification
Right side: 73.0 mm {2.87 in} min.
Left side : 75.0 mm {2.95 in} min.

Note
- When measuring with a straight edge placed on both the right and left sides, the clearance should be 74.0 mm {2.91in} minimum.

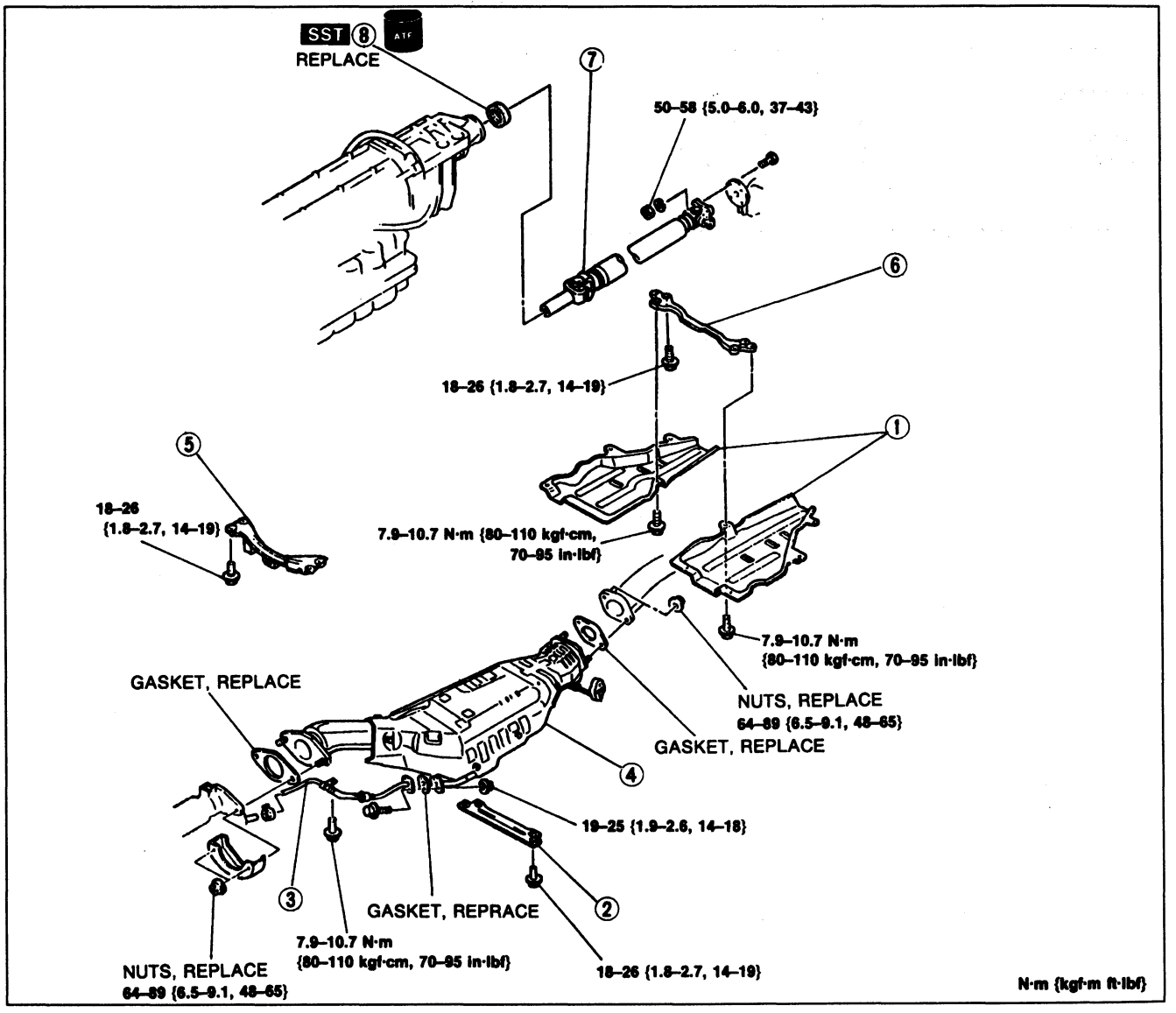
7. If not within specification, readjust the PPF.

OIL SEAL (EXTENSION HOUSING)
Preparation
SST

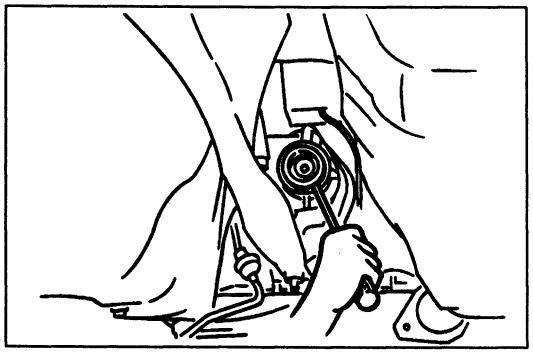
40 G030 795 Installer, oil seal 	For installation of oil seal	40 G030 797 Handle (Part of 49 G030 795) 	For installation of oil seal
40 F019 001 Installer, oil seal 	For installation of oil seal		

On-Vehicle Removal / Installation

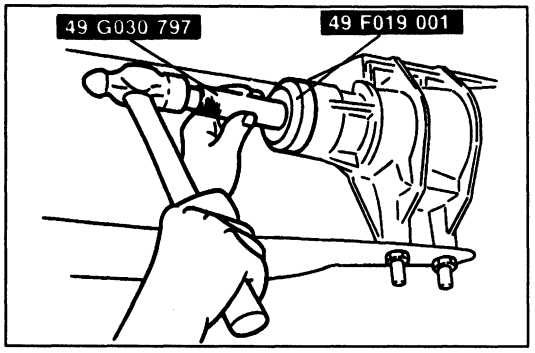
1. Disconnect the negative battery cable.
2. Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvents.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Perform the following after installation of the oil seal.
   (1) Connect the negative battery cable.
   (2) Check the ATF level and add ATF to specification, if necessary.



1. Undercover (right and left)
2. Center tunnel member
3. Secondary air injection pipe
4. Three-way catalyst assembly
5. Front tunnel member
6. Rear tunnel member
7. Propeller shaft
   Removal / Installation ..... section L
8. Oil seal
   Removal Note ..... page K–106
   Installation Note ..... page K–106



Removal note
Oil seal
Remove the oil seal, being careful to not allow any metal tools to scratch the extension housing or output shaft.



Installation note
Oil seal
1. Using the **SST** and a hammer, tap the new oil seal in evenly until the **SST** contacts the extension housing.
2. Coat the lip of the oil seal with ATF.

MEMO

CONTROL VALVE BODY (DISASSEMBLY / INSPECTION)

Disassembly / Inspection

Caution

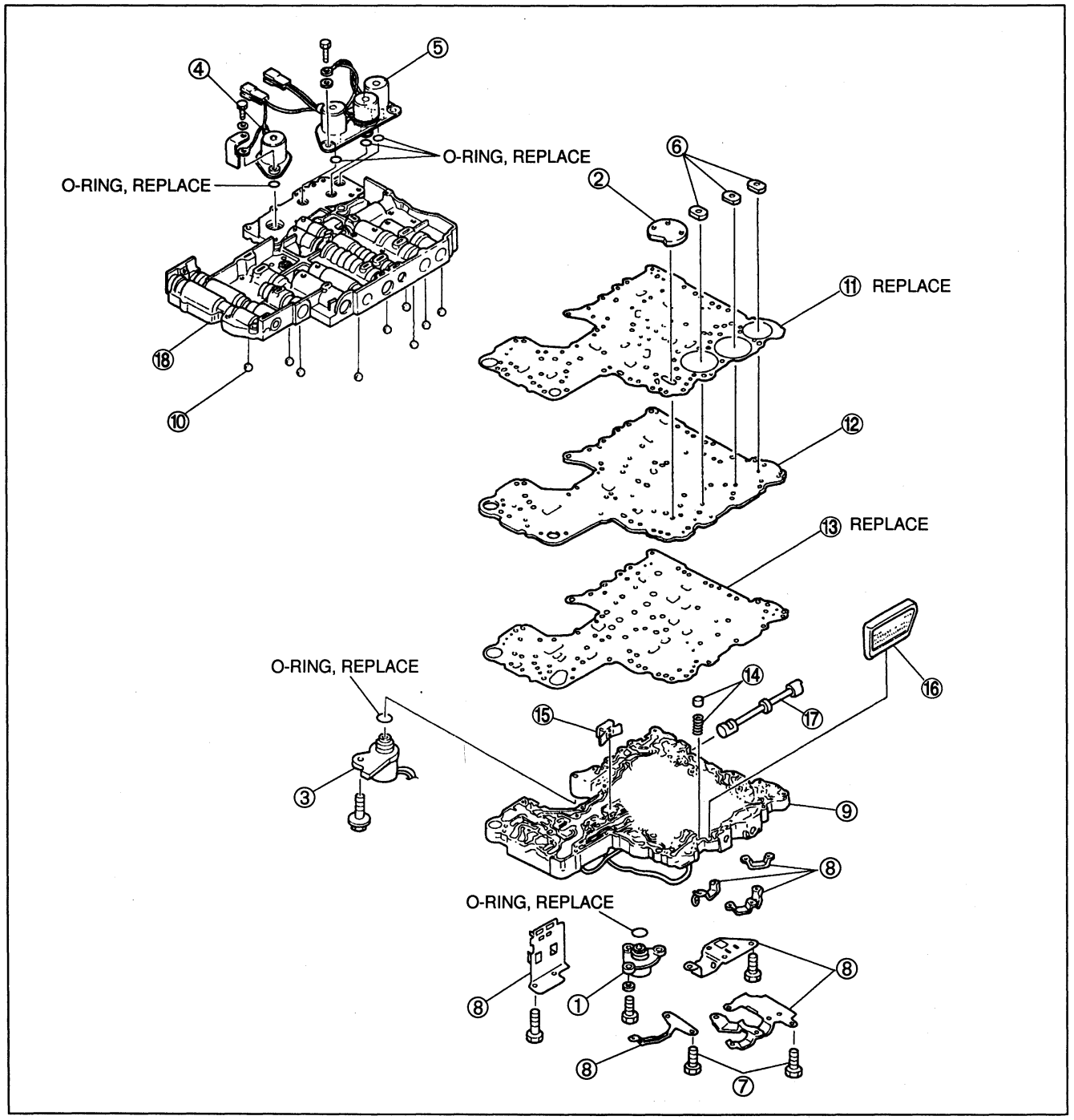
- **Denting or scratching these components will reduce the ability of the transmission to shift properly. When handling these components or the valve body that contains them, be careful not to drop on hit them.**

1. Disassemble in the order shown in the figure, referring to **Disassembly Procedure**.
2. Neatly arrange the removed parts to avoid confusing similar parts.
3. Inspect all parts and repair or replace as necessary.

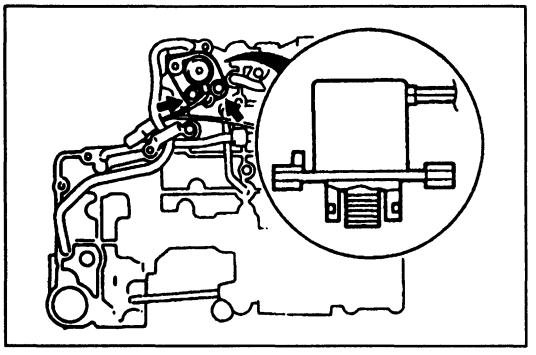
Warning

- **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.**

4. Clean the removed parts with cleaning solvent, and dry them with compressed air. Clean out all holes and passages with compressed air.

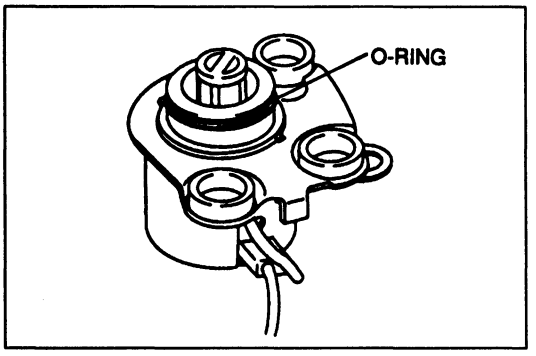


1. Lockup solenoid valve
   Inspect filter for clogging and damage
   Inspection ..... page K- 32
2. Side plate
3. Lockup control solenoid valve
   Inspect filter for clogging and damage
   Inspection ..... page K- 32
4. Line pressure solenoid valve
   Inspect filter for clogging and damage
   Inspection ..... page K- 32
5. Overrunning clutch, shift A, and shift B solenoid valves
   Inspect filter for clogging and damage
   Inspection ..... page K- 32
6. Support plate
7. Retaining bolts and nuts
   Installation position ..... page K-124
8. Brackets
   Installation position ..... page K-123
9. Lower control valve body
   Disassembly / Inspection / Assembly ..... page K-120
10. Steel balls
    Installation position ..... page K-123
11. Upper gasket
12. Separator plate
    Inspect fluid passages for clogging and damage
13. Lower gasket
14. Orifice check valve and spring
15. Pilot filter
    Inspect for clogging and damage
16. Accumulator filter
    Inspect for clogging and damage
17. Manual valve
    Inspect for sticking, scoring, and scratches
18. Upper control valve body
    Disassembly / Inspection / Assembly ..... page K-112

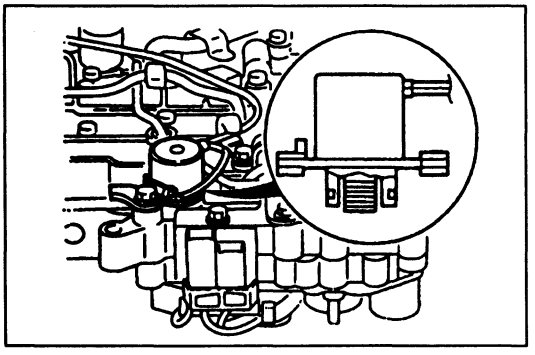


Disassembly procedure

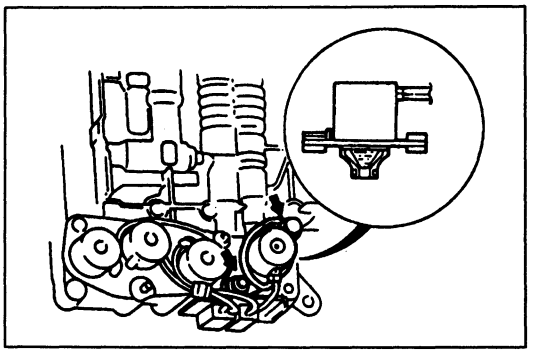
1. Remove the lockup solenoid valve and side plate from the lower control valve body.



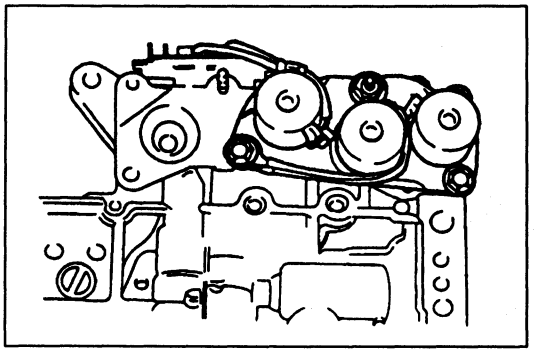
2. Remove the O-ring from the lockup solenoid valve.



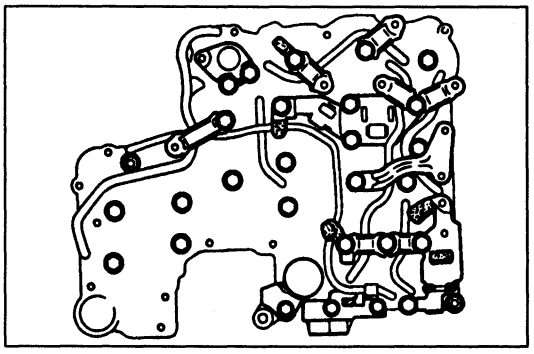
3. Remove the lockup control solenoid valve from the lower control valve body.
4. Remove the O-ring from the lockup control solenoid valve.



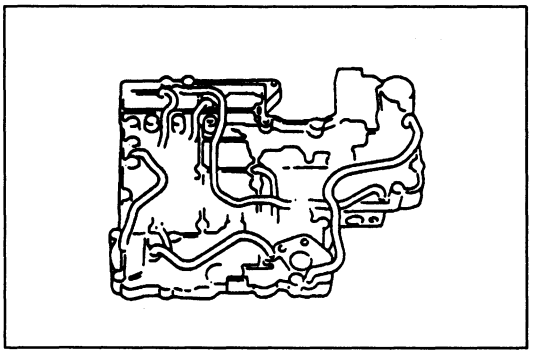
5. Remove the line pressure solenoid valve from the upper control valve body.
6. Remove the O-ring from the line pressure solenoid valve.



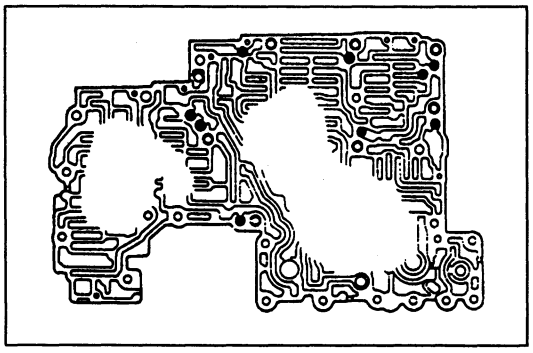
7. Remove the solenoids from the upper control valve body.
8. Remove the O-rings from the solenoids.



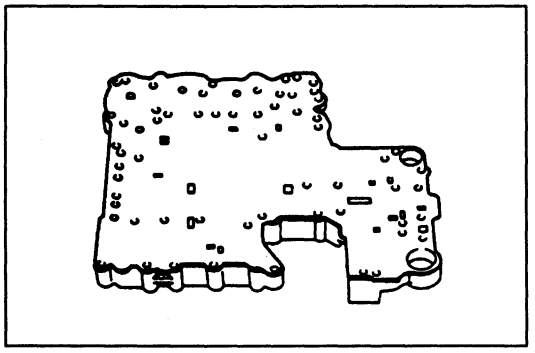
9. Remove the support plates.
10. Remove the bolts, nuts, and brackets.



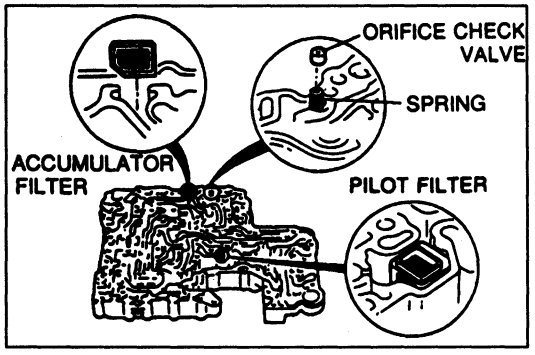
11. Separate the lower control valve body, lower and upper gaskets, and separator plate assembly from the upper control valve body.



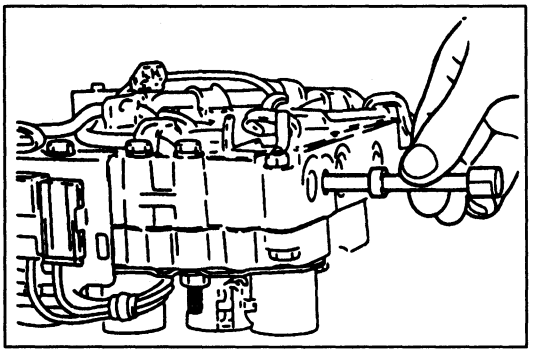
12. Remove the steel balls from the upper control valve body.



13. Face the lower control valve body downward.
14. Remove the separator plate and gaskets.



15. Remove the orifice check valve, spring, pilot filter, and accumulator filter.



16. Remove the manual valve from the lower control valve body.

UPPER CONTROL VALVE BODY

Disassembly / Inspection / Assembly

Caution

- **Denting or scratching these precisely machined components will reduce the ability of the transmission to shift properly. When handling these components or the valve body that contains them, be careful not to drop or hit them.**
- **Using a magnet in this procedure could magnetize the valve body inner components, reducing the ability of the transmission to shift properly.**

Note

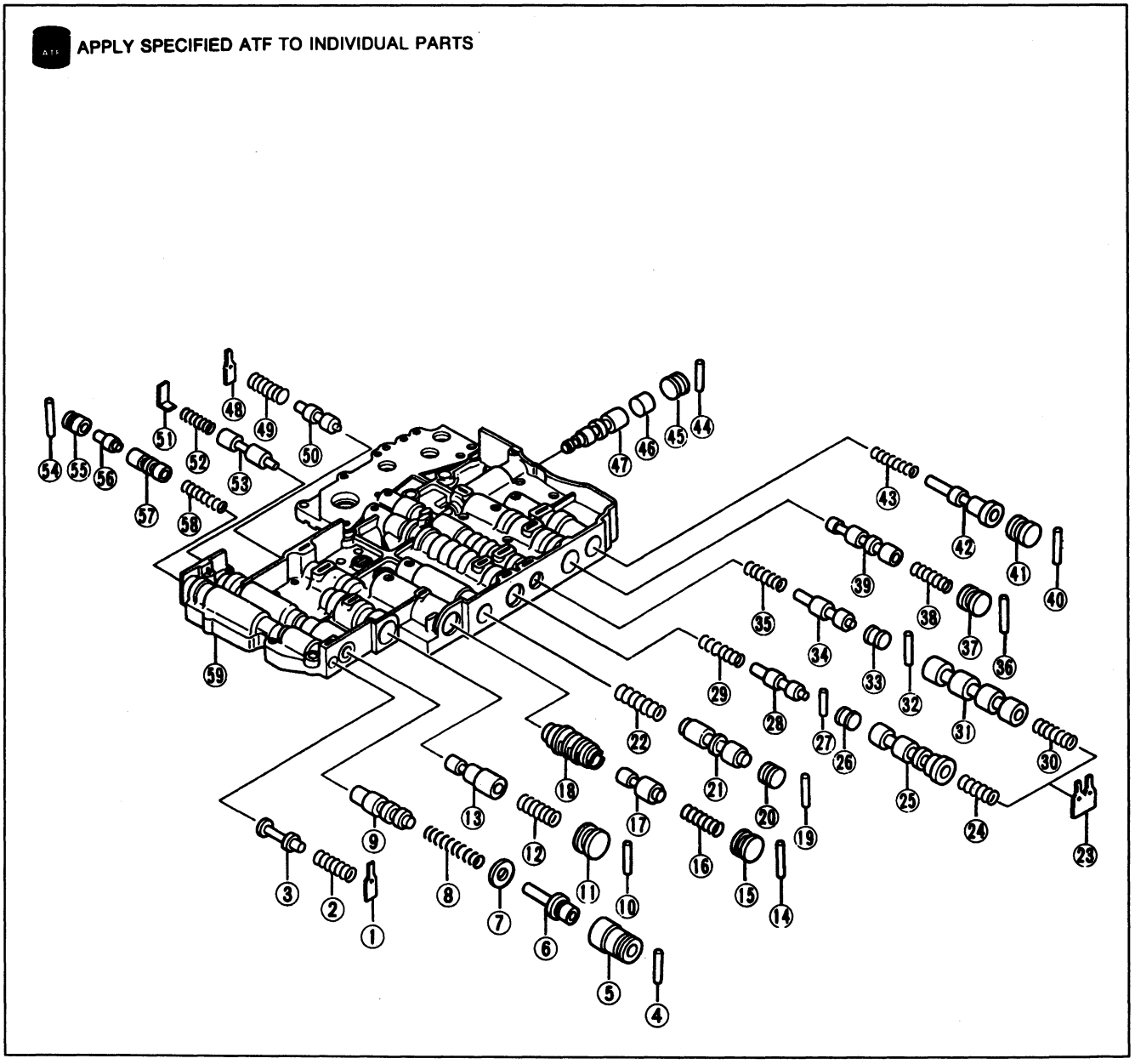
- If a valve does not slide out under its own weight, place the valve body open-side down and tap on the valve body lightly with a plastic hammer.

1. Disassemble in the order shown in the figure, nothing the proper reassembly direction of the valves and internal parts.
2. Inspect all parts and repair or replace as necessary.

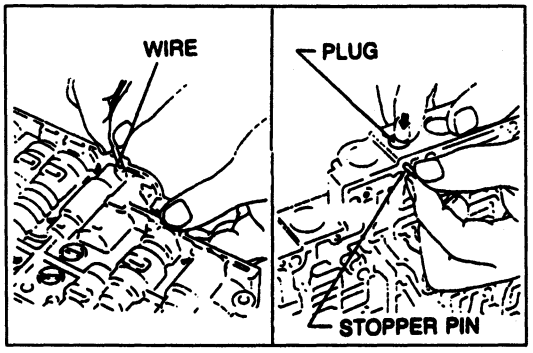
Warning

- **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.**

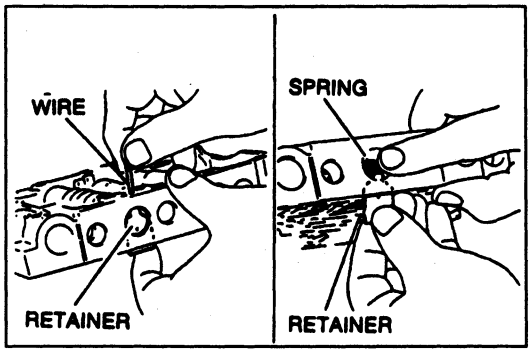
3. Clean all parts and bores with compressed air and apply ATF to them immediately before assembly.
4. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



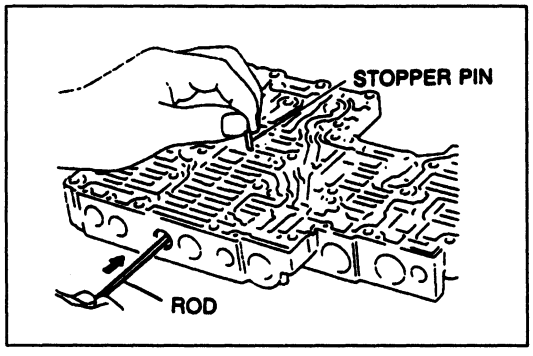
1. Retainer
   Disassembly Note ..... page K–114
2. Torque converter relief spring
   Inspection ..... page K–115
3. Torque converter relief valve
   Inspect for sticking, scoring, and scratches
4. Stopper pin
   Disassembly Note ..... page K–114
5. Pressure regulator sleeve
6. Pressure regulator plug
   Inspect for sticking, scoring, and scratches
7. Spring seat
8. Pressure regulator spring
   Inspection ..... page K–115
9. Pressure regulator valve
   Inspect for sticking, scoring, and scratches
10. Stopper pin
    Disassembly Note ..... page K–114
11. Pressure modifier plug
12. Pressure modifier spring
    Inspection ..... page K–115
13. Pressure modifier valve
    Inspect for sticking, scoring, and scratches
14. Stopper pin
    Disassembly Note ..... page K–114
15. Accumulator control plug
16. Accumulator control valve spring
    Inspection ..... page K–115
17. Accumulator control valve
    Inspect for sticking, scoring, and scratches
18. Accumulator control sleeve
    Inspect for sticking, scoring, and scratches
19. Stopper pin
    Disassembly Note ..... page K–114
20. Shuttle shift valve D plug
21. Shuttle shift valve D
    Inspect for sticking, scoring, and scratches
22. Shuttle shift valve D spring
    Inspection ..... page K–115
23. Retainer
    Disassembly Note ..... page K–114
24. Shift valve B spring
    Inspection ..... page K–115
25. Shift valve B
    Inspect for sticking, scoring, and scratches
26. Stopper pin
    Disassembly Note ..... page K–114
27. 4-2 sequence plug
28. 4-2 sequence valve
    Inspect for sticking, scoring, and scratches
29. 4-2 sequence spring
    Inspection ..... page K–115
30. Shift valve A spring
    Inspection ..... page K–115
31. Shift valve A
    Inspect for sticking, scoring, and scratches
32. Stopper pin
    Disassembly Note ..... page K–114
33. 4-2 relay plug
34. 4-2 relay valve
    Inspect for sticking, scoring and scratches
35. 4-2 relay spring
    Inspection ..... page K–115
36. Stopper pin
    Disassembly Note ..... page K–114
37. Overrunning clutch control plug
38. Overrunning clutch control spring
    Inspection ..... page K–115
39. Overrunning clutch control valve
    Inspect for sticking, scoring and scratches
40. Stopper pin
    Disassembly Note ..... page K–114
41. Overrunning clutch reducing plug
42. Overrunning clutch reducing valve
    Inspect for sticking, scoring and scratches
43. Overrunning clutch reducing spring
    Inspection ..... page K–115
44. Stopper pin
    Disassembly Note ..... page K–114
45. Shuttle shift valve S plug 1
46. Shuttle shift valve S plug 2
47. Shuttle shift valve S
    Inspect for sticking, scoring and scratches
48. Retainer
    Disassembly Note ..... page K–114
49. Pilot spring
    Inspection ..... page K–115
50. Pilot valve
    Inspect for sticking, scoring and scratches
51. Retainer
    Disassembly Note ..... page K–114
52. Lockup modifier spring
    Inspection ..... page K–115
53. Lockup modifier valve
    Inspect for sticking, scoring and scratches
54. Stopper pin
    Disassembly Note ..... page K–114
55. Lockup control sleeve
56. Lockup control plug
    Inspect for sticking, scoring and scratches
57. Lockup control valve
    Inspect for sticking, scoring and scratches
58. Lockup control spring
    Inspection ..... page K–115
59. Upper control valve body
    Inspect for damage and scoring



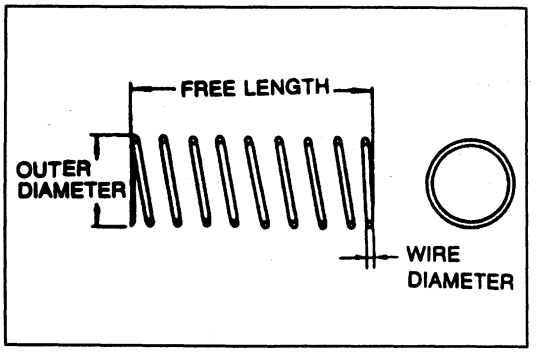
Disassembly note
Stopper pin
1. Push the stopper pin out with a wire.
2. Depress and hold the plug or sleeve with a finger to prevent the valve from popping out.
3. Remove the stopper pin, and remove the valve and internal parts.



Retainer
1. Push the retainer out with a wire.
2. Hold the inside parts with a finger to prevent the valve from popping out.
3. Remove the retainer, the valve, and the internal parts.



Stopper pin
(4-2 sequence valve and 4-2 relay valve)
1. Push the stopper pin out with a wire.
2. Depress the plug with a vinyl-tape-wrapped **1.5 mm {0.059 in}** diameter rod.
3. Remove the stopper pin, the valve, and the internal parts.

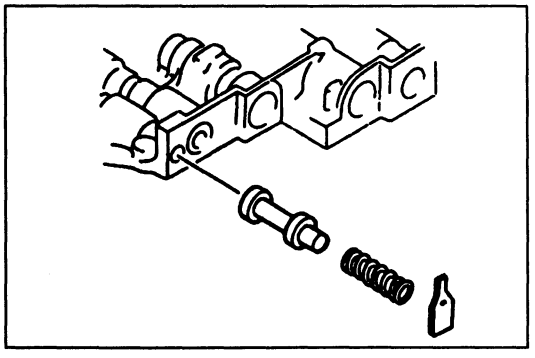


Inspection
Springs
1. Measure the spring free length.
2. If not within specification, replace the spring.

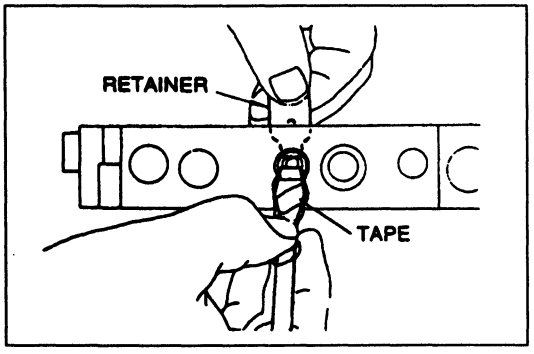
Specification

Spring \ Item		Outer dia. mm {in}	Free length mm {in}	No. of coils	Wire dia. mm {in}
Torque converter relief valve		9.2 {0.362}	38.3 {1.508}	14.2	1.5 {0.059}
Pressure regulator valve		14.0 {0.551}	29.0 {1.142}	5.6	1.6 {0.063}
Pressure modifier valve*	A	6.8 {0.268}	31.95 {1.258}	15.5	0.8 {0.031}
	B	6.9 {0.272}	32.6 {1.283}	13.2	0.8 {0.031}
	C	6.9 {0.272}	32.8 {1.291}	15.6	0.9 {0.035}
Accumulator control valve spring		10.5 {0.413}	17.0 {0.669}	4.3	0.5 {0.012}
Shuttle shift valve D		6.0 {0.236}	26.5 {1.043}	12.0	0.7 {0.028}
4-2 sequence valve		6.95 {0.274}	29.1 {1.146}	11.0	0.55 {0.022}
Shift valve B		7.0 {0.276}	25.0 {0.984}	9.5	0.65 {0.026}
4-2 relay valve		6.95 {0.274}	29.1 {1.146}	11.0	0.55 {0.022}
Shift valve A		7.0 {0.276}	25.0 {0.984}	9.5	0.65 {0.026}
Overrunning clutch control valve		7.0 {0.276}	23.6 {0.929}	7.9	0.6 {0.024}
Overrunning clutch reducing valve		7.0 {0.276}	32.5 {1.280}	12.6	0.85 {0.033}
Pilot valve		9.1 {0.358}	25.7 {1.012}	8.3	1.1 {0.043}
Lockup modifier valve		4.2 {0.165}	21.5 {0.846}	13.6	0.4 {0.016}
Lockup control valve		4.7 {0.185}	23.4 {0.921}	15.6	0.45 {0.018}

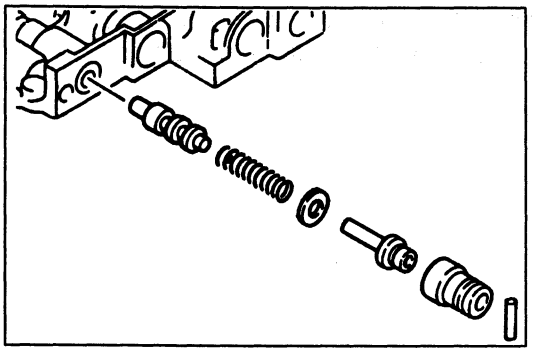
* Either A, B, or C type spring is installed at shipment. Only A type spring is available for replacement.



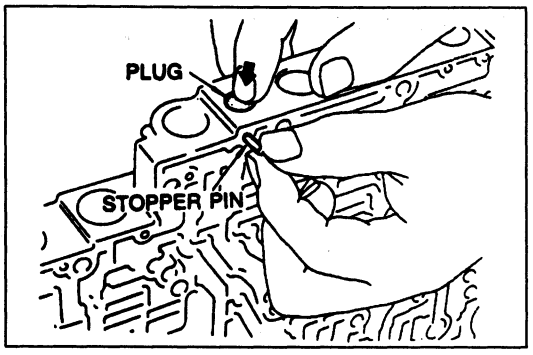
Assemble procedure
1. Insert the torque converter relief valve and spring.



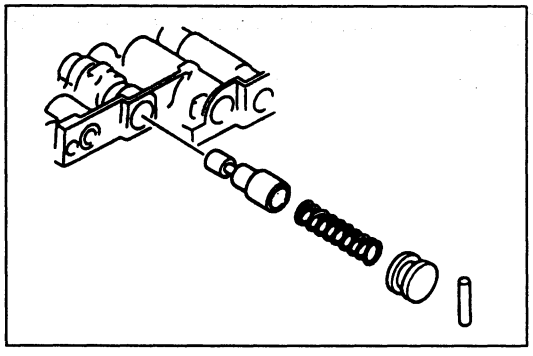
2. Install the retainer while compressing the spring.



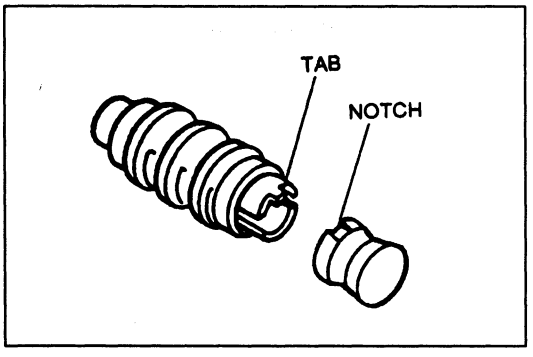
3. Insert the pressure regulator valve, spring, spring seat, plug, and sleeve.



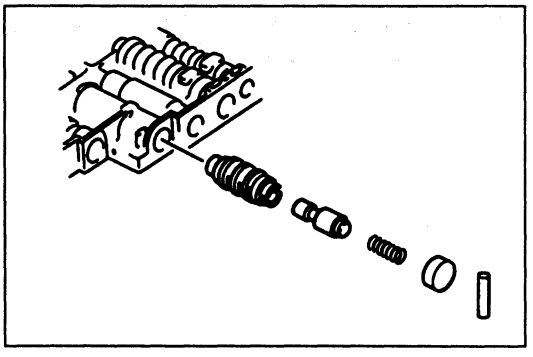
4. Insert the stopper pin while pushing the sleeve.



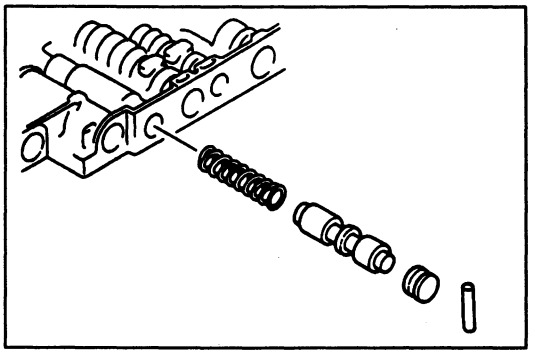
5. Insert the pressure modifier valve, spring, and plug.
6. Insert the stopper pin while pushing the plug.



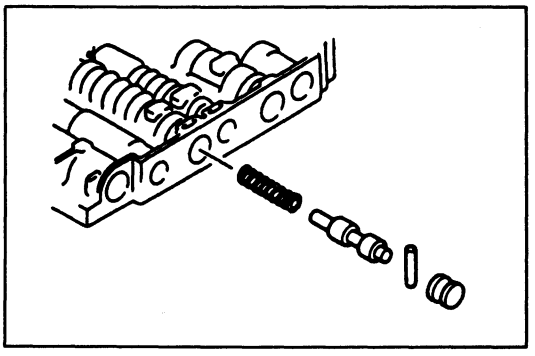
7. Align the tab of the sleeve with the plug notch.



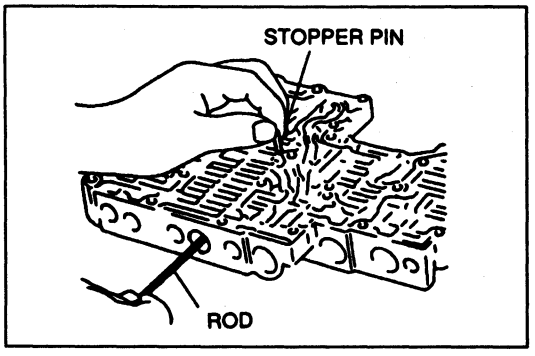
8. Insert the accumulator control sleeve, valve, and spring.
9. Insert the plug.
10. Insert the stopper pin.



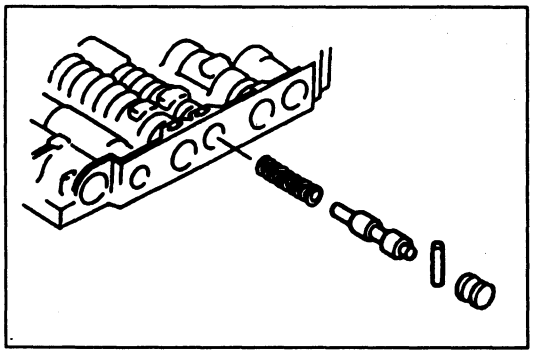
11. Insert the shuttle shift valve D spring, valve, and plug.
12. Insert the stopper pin while pushing the plug.



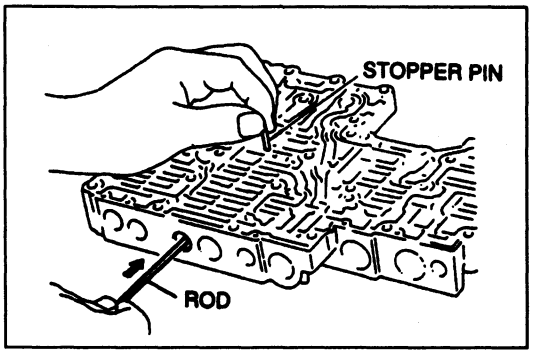
13. Insert the 4-2 sequence spring, valve, and plug.



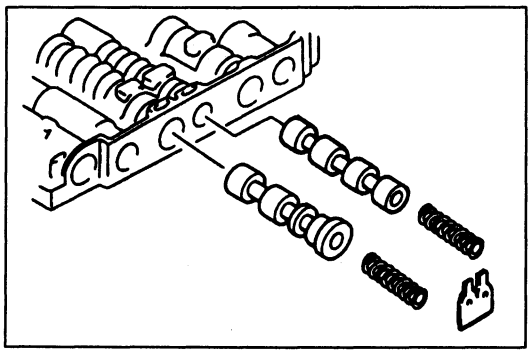
14. Push in the plug with a vinyl-tape-wrapped **1.5 mm {0.059 in}** diameter rod.
15. Insert the stopper pin.



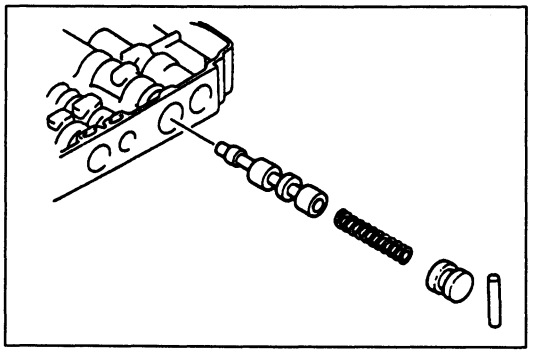
16. Insert the 4-2 relay spring, valve, and plug.



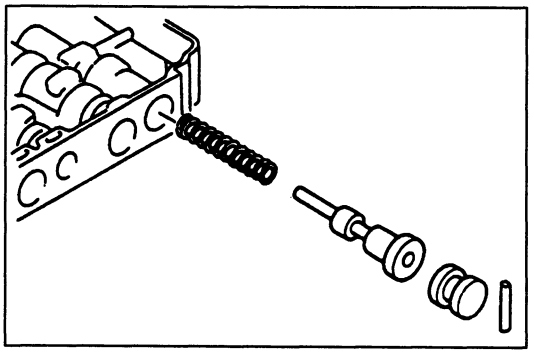
17. Push in the plug with a vinyl-tape-wrapped **1.5 mm {0.059 in}** diameter rod and insert the stopper pin.



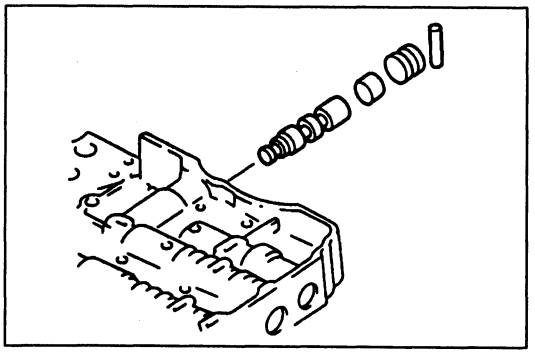
18. Insert shift valve A and spring.
19. Insert shift valve B and spring.
20. Install the retainer while compressing the springs.



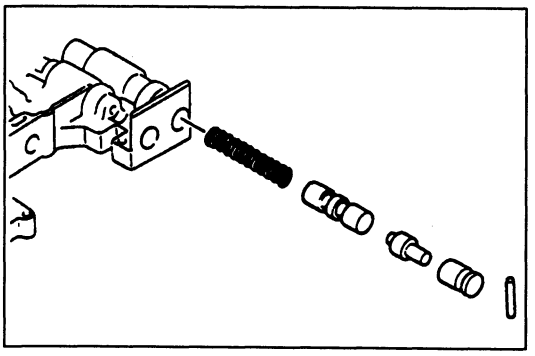
21. Insert the overrunning clutch control valve, spring, and plug.
22. Insert the stopper pin while pushing the plug.



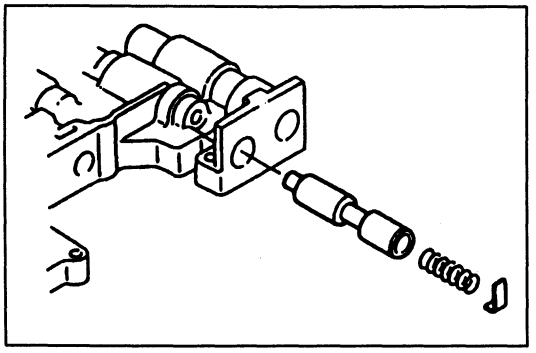
23. Insert the overrunning clutch reducing spring, valve, and plug.
24. Insert the stopper pin while pushing the plug.



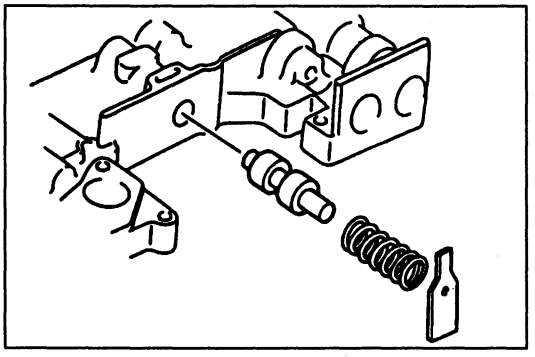
25. Insert the shuttle shift valve S, plug 2, and plug 1.
26. Insert the stopper pin.



27. Insert the lockup control spring, valve, plug, and sleeve.
28. Insert the stopper pin while pushing the sleeve.



29. Insert the lockup modifier valve and spring.
30. Insert the retainer while pushing the spring.



31. Insert the pilot valve and spring.
32. Insert the retainer while pushing the spring.

LOWER CONTROL VALVE BODY

Disassembly / Inspection / Assembly

Caution

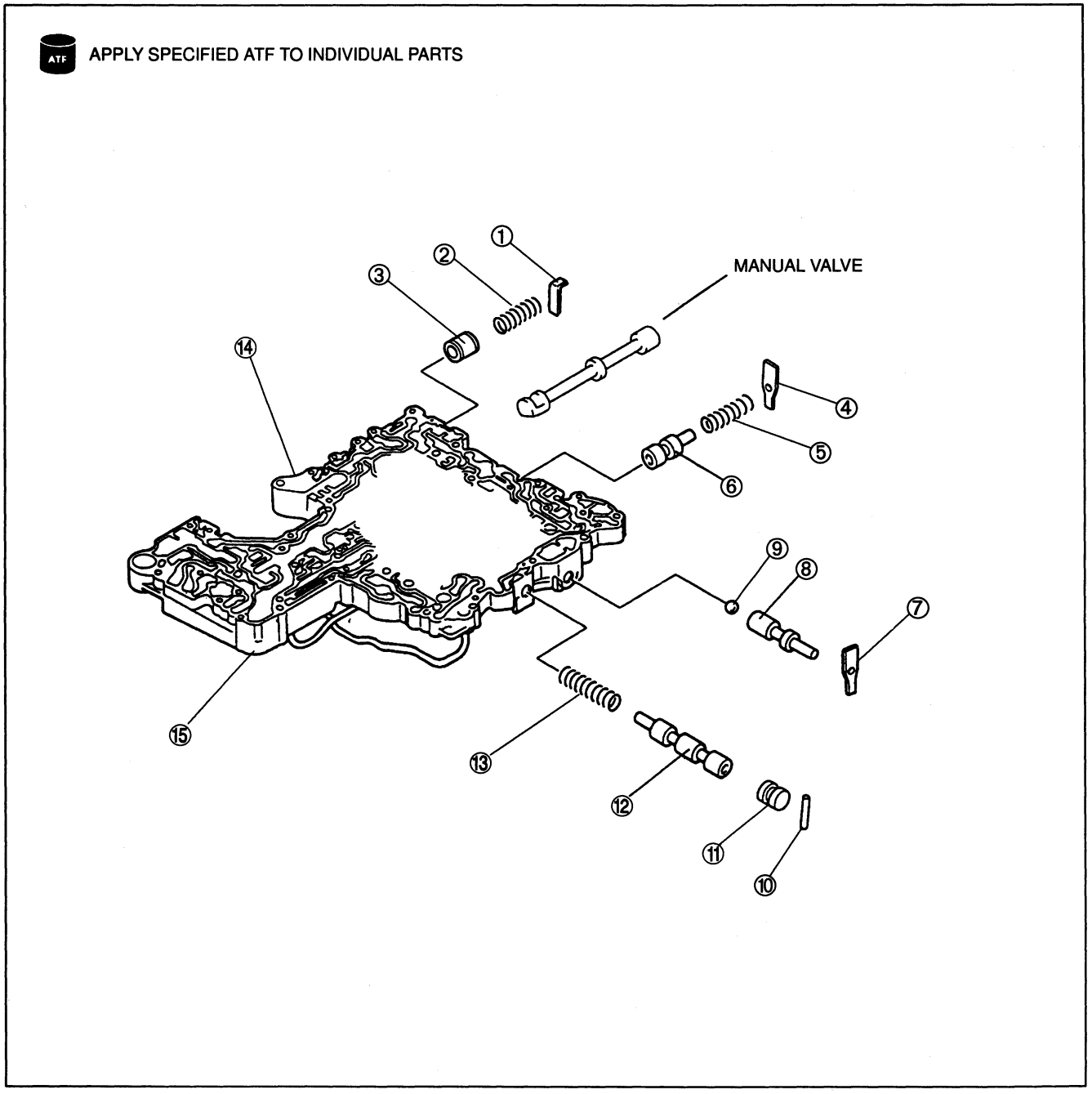
- **Denting or scratching these precisely machined components will reduce the ability of the transmission to shift properly. When handling these components or the valve body that contains them, be careful not to drop or hit them.**
- **Using a magnet in this procedure could magnetize the valve body inner components, reducing the ability of the transmission to shift properly.**

1. Disassemble in the order shown in the figure, nothing the proper reassembly direction of the valves and internal parts.
2. Inspect all parts and repair or replace as necessary.

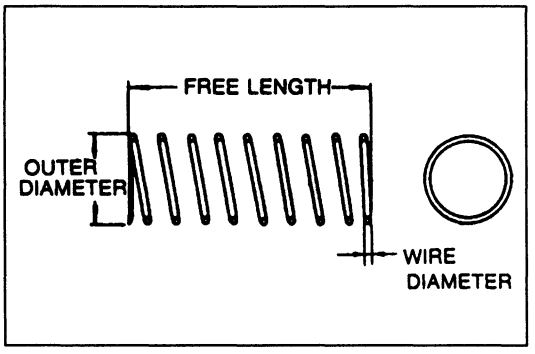
Warning

- **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.**

3. Clean all parts and bores with compressed air and apply ATF to them immediately before assembly.
4. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



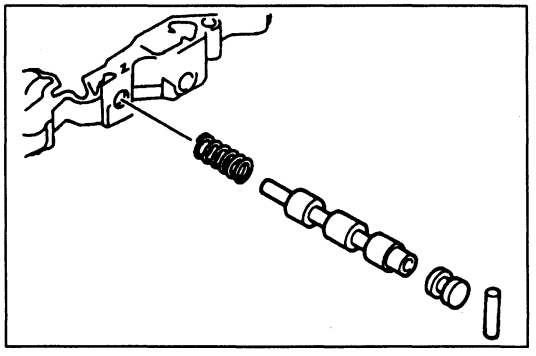
1. Stopper pin
   Disassembly Note ..... page K-114
2. Modifier accumulator plug
3. Modifier accumulator spring
   Inspection ..... below
4. Modifier accumulator valve
   Inspect for sticking, scoring and scratches
5. Retainer
   Disassembly Note ..... page K-114
6. 1st reducing spring
   Inspection ..... below
7. 1st reducing valve
   Inspect for sticking, scoring and scratches
8. Retainer
   Disassembly Note ..... page K-114
9. 3-2 timing valve
   Inspect for sticking, scoring and scratches
10. Steel ball
11. Stopper pin
    Disassembly Note ..... page K-114
12. Servo charger plug
13. Servo charger valve
    Inspect for sticking, scoring and scratches
14. Servo charger spring
    Inspection ..... below
15. Lower control valve body
    Inspect for damage and scoring



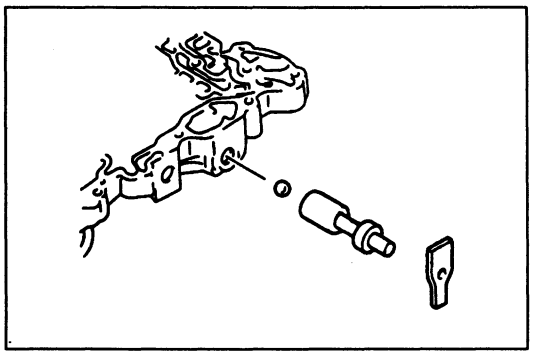
Inspection
Springs
1. Measure the spring free length.
2. If not within specification, replace the spring.

Specification

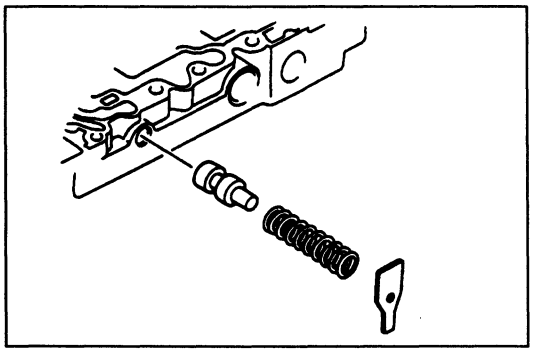
Item / Spring	Outerdia. mm {in}	Free length mm {in}	No. of coils	Wiredia. mm {in}
Modifier accumulator valve	9.8 {0.39}	30.5 {1.20}	8.75	1.3 {0.05}
1st reducing valve	6.8 {0.27}	25.4 {1.00}	12.5	0.8 {0.03}
Servo charger valve	6.5 {026}	33.2 {1.31}	12.0	0.5 {0.02}



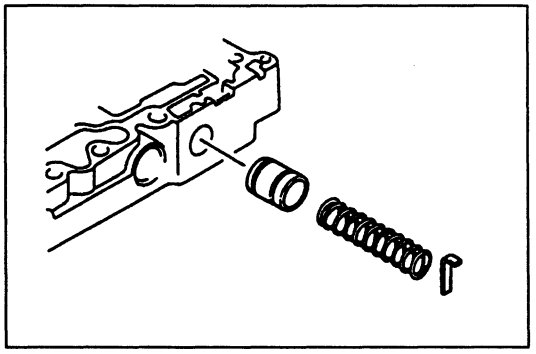
Assembly procedure
1. Insert the servo charger spring, valve, and plug.
2. Insert the stopper pin while pushing the plug.



3. Insert the steel ball and 3-2 timing valve.
4. Insert the retainer.

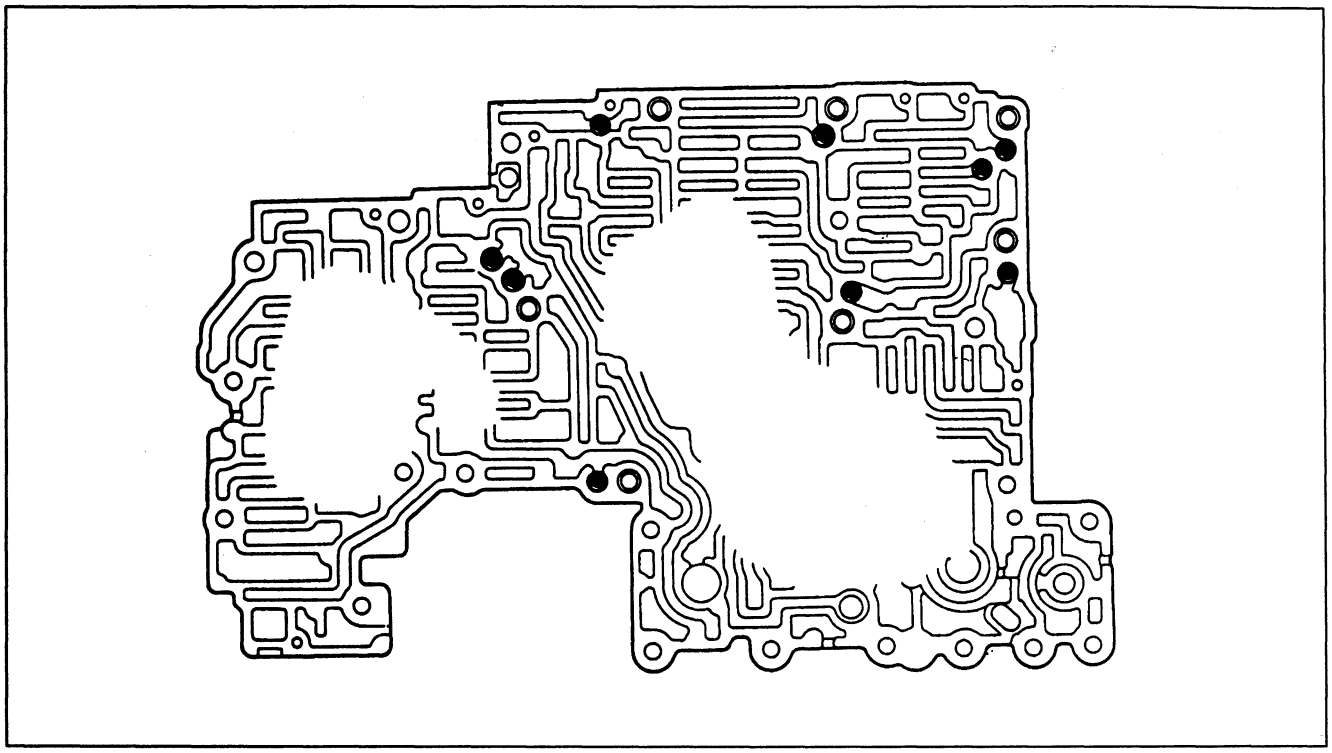


5. Insert the 1st reducing valve and spring.
6. Insert the retainer while compressing the spring.

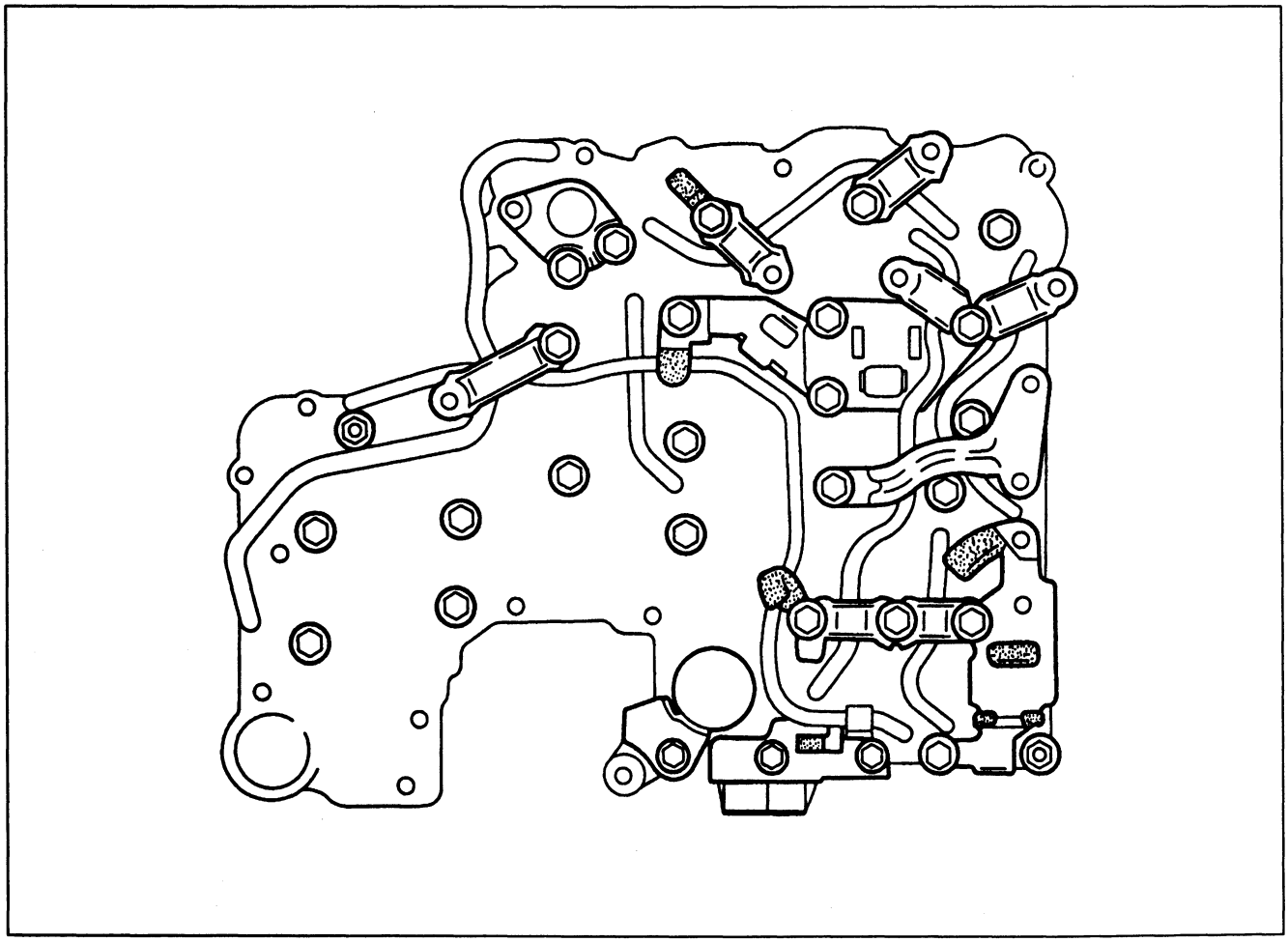


7. Insert the modifier accumulator valve, spring, and plug.
8. Insert the stopper key while pushing the plug.

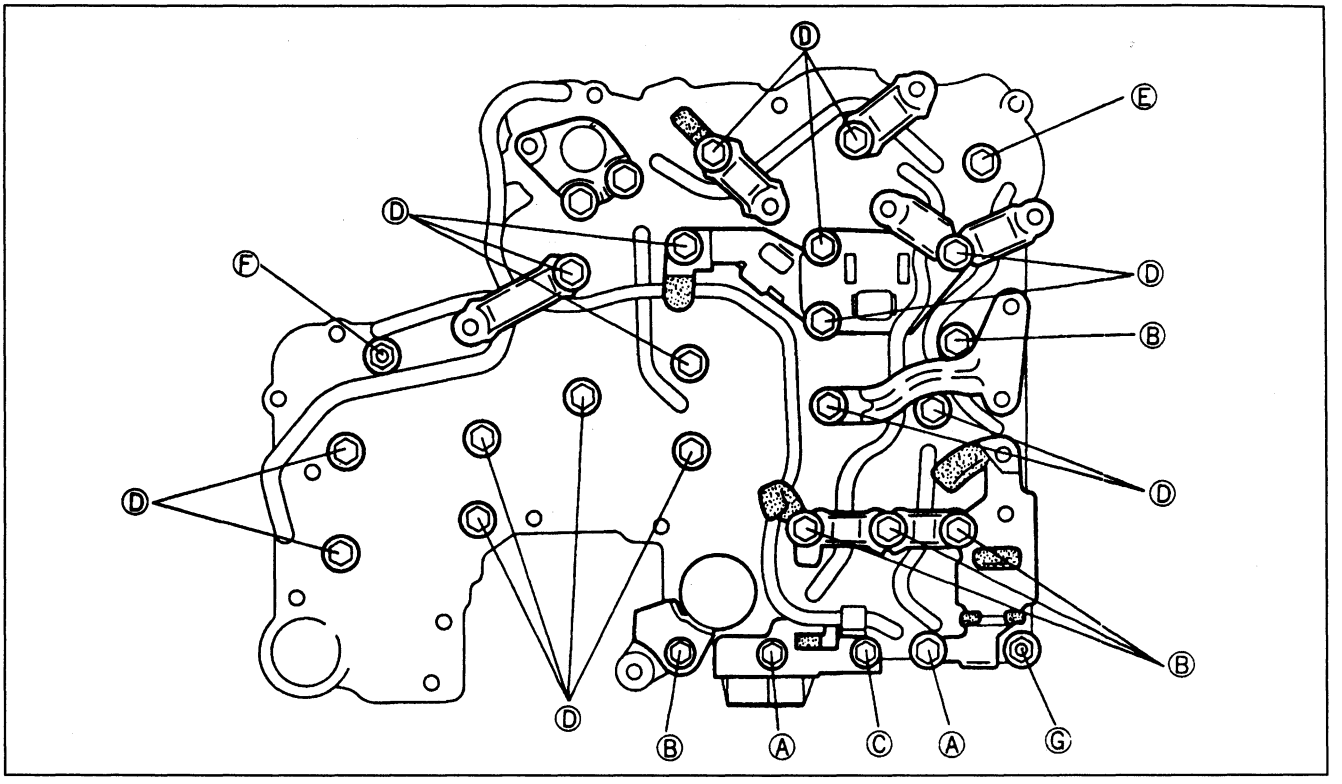
Steel ball installation positions

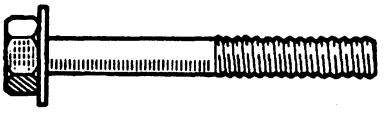
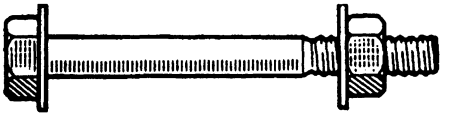
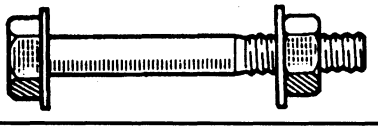


Bracket installation positions



Bolt and nut installation positions

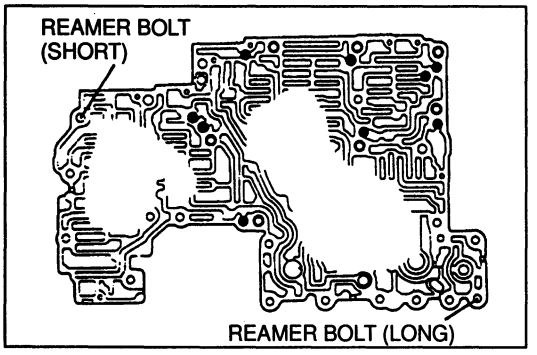


Identification letter	Bolt and nut	Length mm {in}	Torque specification N·m {kgf·cm, in·lbf}
A		65 {2.6}	6.9–8.8 {70–90, 61–78}
B		50 {2.0}	
C		40 {1.6}	
D		33 {1.3}	
E		27 {1.1}	
F		55 {2.2}	
G		45 {1.8}	

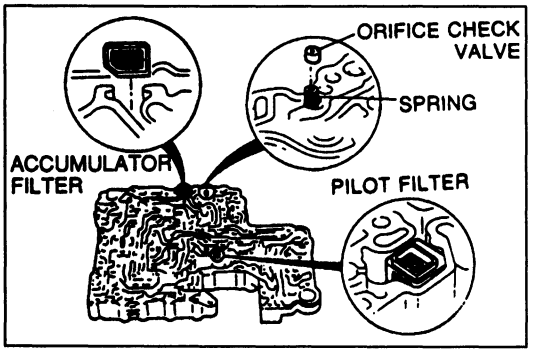
CONTROL VALVE BODY (ASSEMBLY)

Assembly

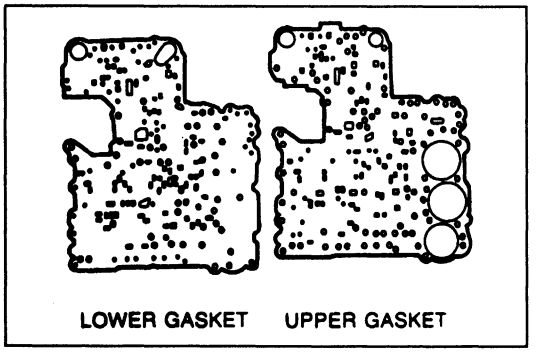
1. Verify that all parts are clean and free of dust and other small particles.
2. Apply ATF to all O-rings and gaskets.
3. Assemble as shown in the figure, referring to **Assembly Procedure**.



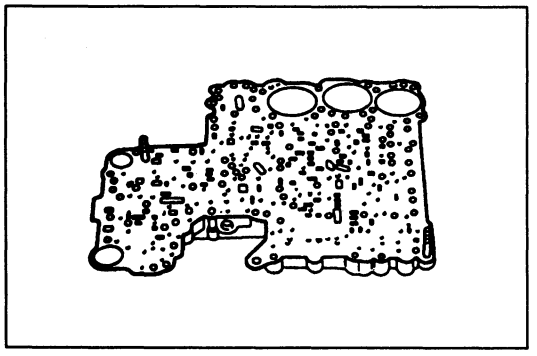
4. Install the steel balls and reamer bolts into their proper positions in the upper control valve body.
(Refer to page K-123 for installation positions.)

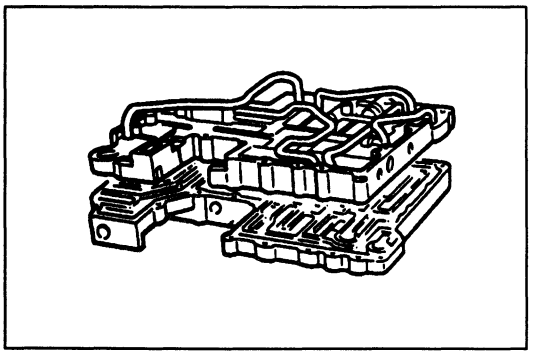


5. Install the pilot filter, accumulator filter, orifice check valve, and spring into their proper positions in the lower control valve body.

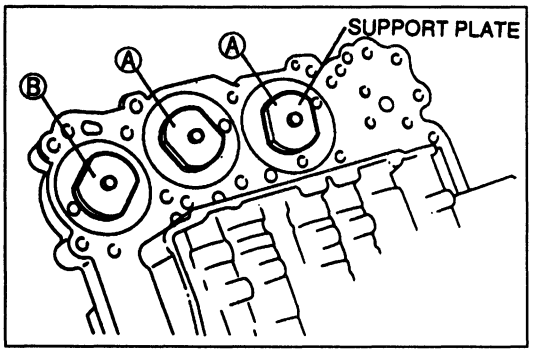


6. Set the new upper and lower gaskets onto the lower valve body. Refer to the figure to distinguish the two gaskets.



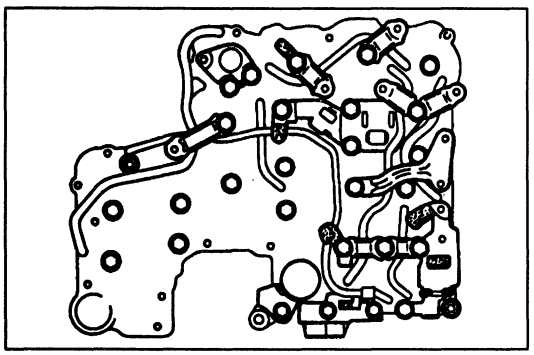


7. Set the lower control valve body onto the upper control valve body.



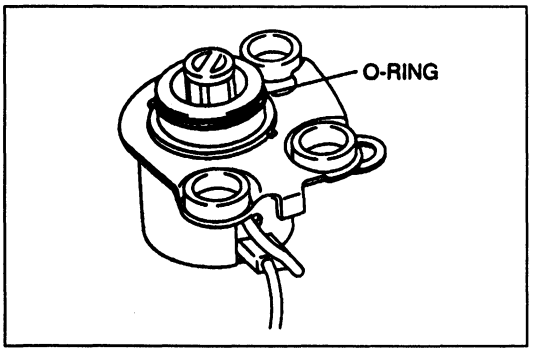
8. Install the support plates as shown.

Bolt length (measured from below bolt head):
A: 33 mm {1.3 in}
B: 27 mm {1.1in}

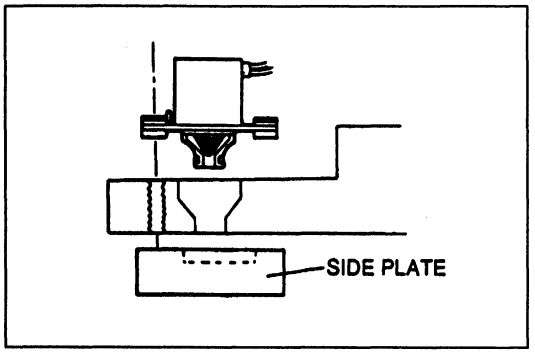


9. Install the brackets in their proper positions. (Refer to page K-123 for installation positions.)
10. Install the bolts and nuts in their proper positions, and tighten the fasteners evenly and gradually. (Refer to page K-124 for installation positions.)

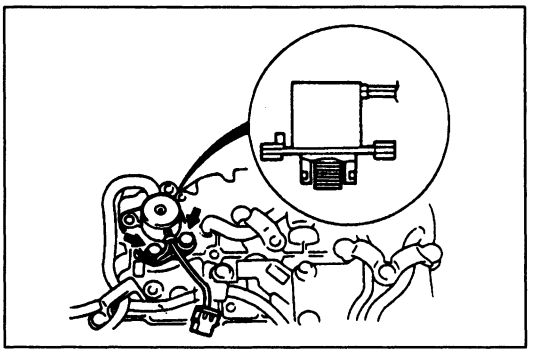
Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}



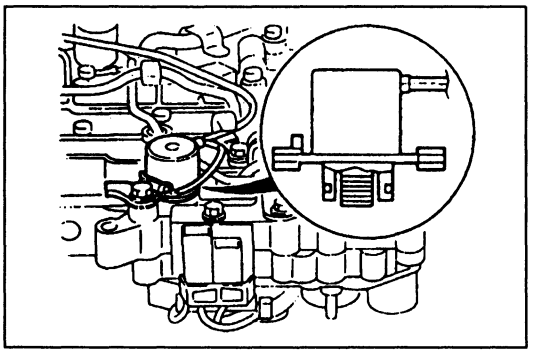
11. Install a new O-ring onto the lockup solenoid valve.



12. Install the lockup solenoid valve and side plate to the lower valve body, as shown in the figure.

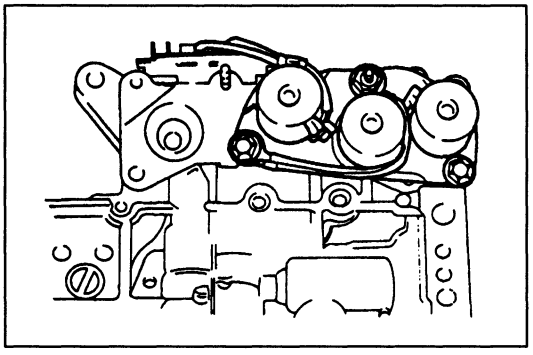


Tightening torque:
9.9–12.7 N·m {100–130 kgf·cm, 87–112 in·lbf}



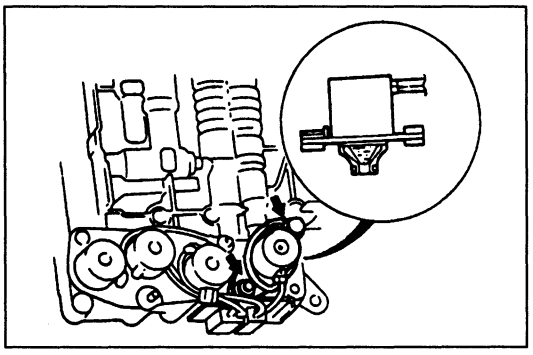
13. Install a new O-ring onto the lockup control solenoid valve.
14. Install the lockup control solenoid valve into the lower control valve body.

Tightening torque:
9.9–12.7 N·m {100–130 kgf·cm, 87–112 in·lbf}



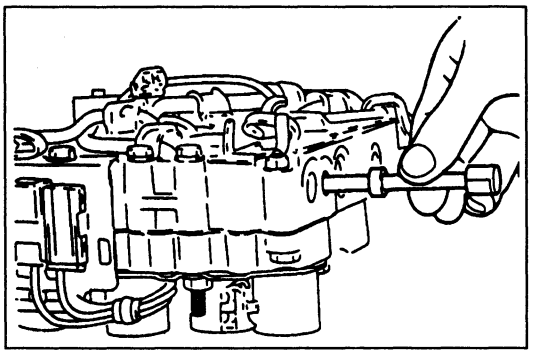
15. Install the new O-rings onto the solenoids.
16. Install the solenoids into the upper control valve body.

Tightening torque:
6.9–9.8 N·m {70–100 kgf·cm, 61–86 in·lbf}

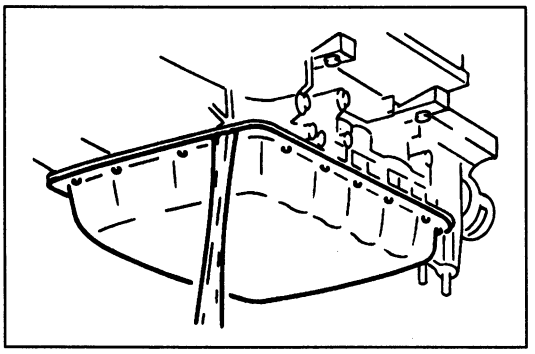


17. Install a new O-ring onto the line pressure solenoid valve.
18. Install the line pressure solenoid valve into the upper control valve body.

Tightening torque:
6.9–9.8 N·m {70–100 kgf·cm, 61–86 in·lbf}



19. Insert the manual valve.

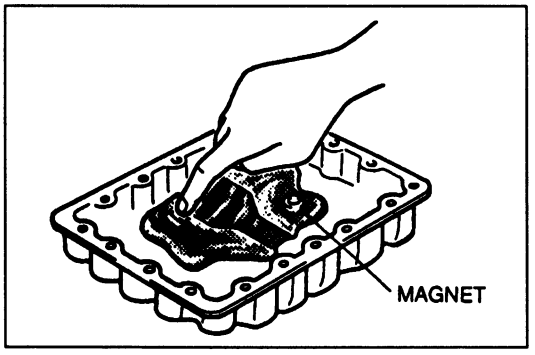


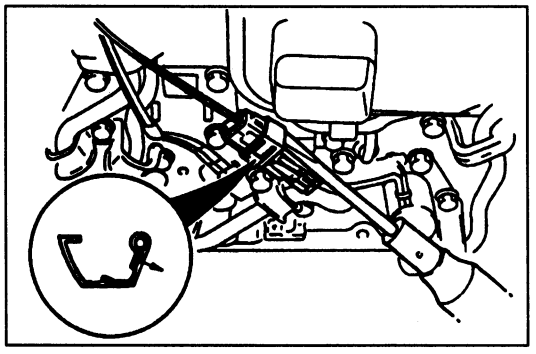
CONTROL VALVE BODY (ON-VEHICLE REMOVAL / INSTALLATION)

On-vehicle Removal

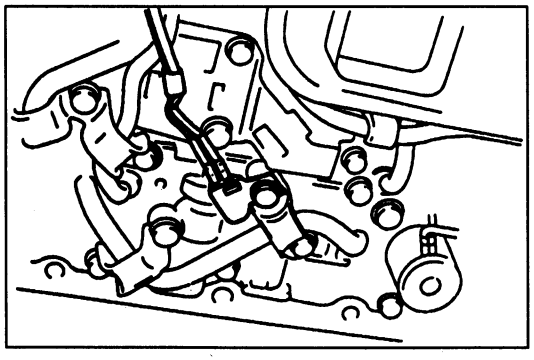
Warning
- **Be careful when draining; the ATF is hot.**

1. Disconnect the negative battery cable.
2. Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvents.
3. On level ground, jack up the vehicle and support it evenly on safety stands.
4. Loosen the oil pan bolts and drain the ATF into a suitable container.
5. Remove the oil pan and gasket.
6. Remove the magnet from the oil pan and examine any material found in the pan or on the magnet to determine the condition of the transmission.



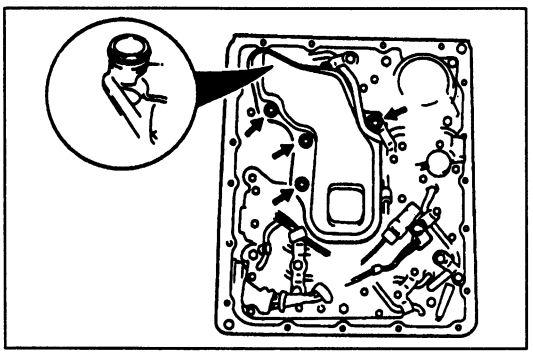


7. Remove the clip.
8. Disconnect the lockup solenoid valve connector.



9. Remove the ATF thermosensor.

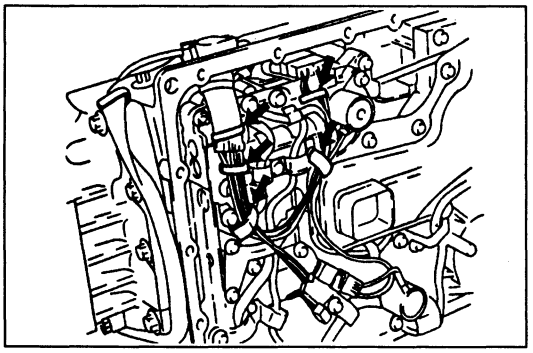
Bolt length (measured from below bolt head):
45 mm {1.8 in}



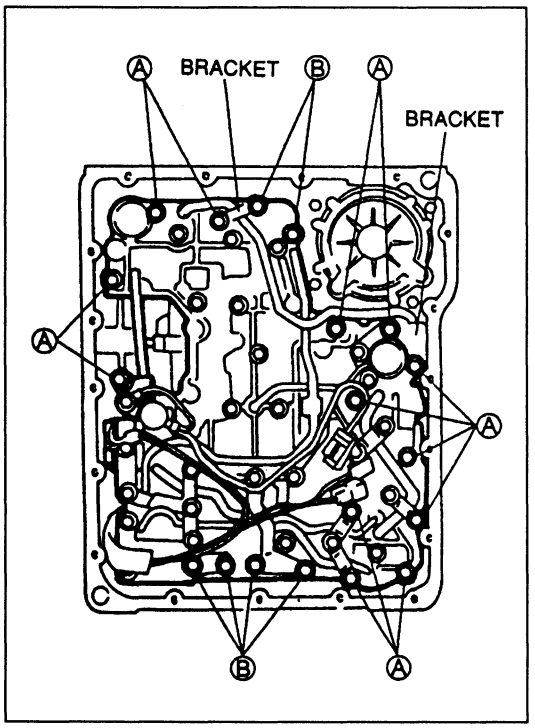
10. Remove the oil strainer.

Bolt length (measured from below bolt head):
50 mm {2.0 in}

11. Remove the O-ring from the oil strainer.

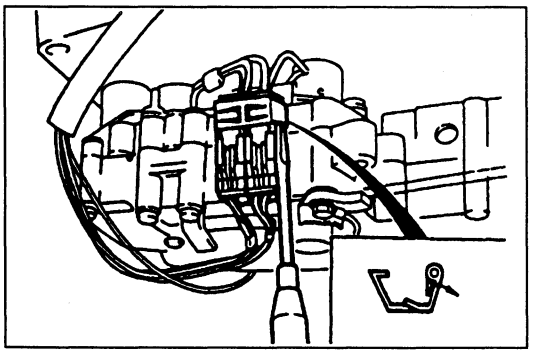


12. Separate the solenoid valve harness from the harness clip.

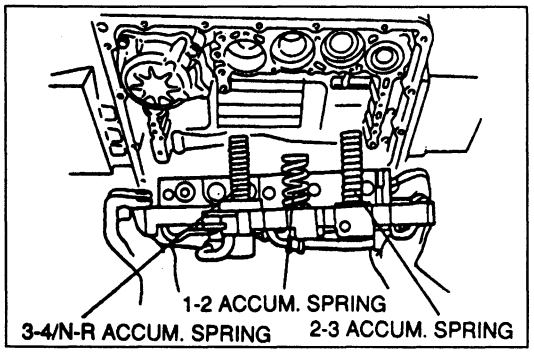


13. Remove bolts A and B and the brackets shown in the figure.

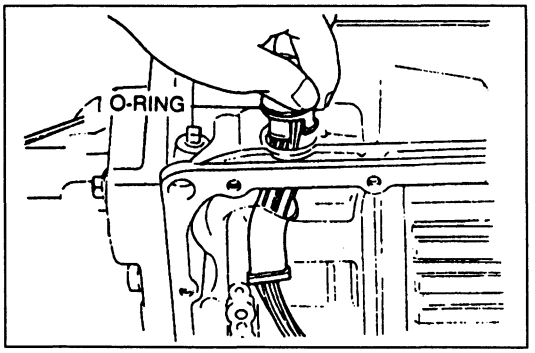
Bolt length (measured from below bolt head):
A: 33 mm {1.3 in}
B: 45 mm {1.8 in}



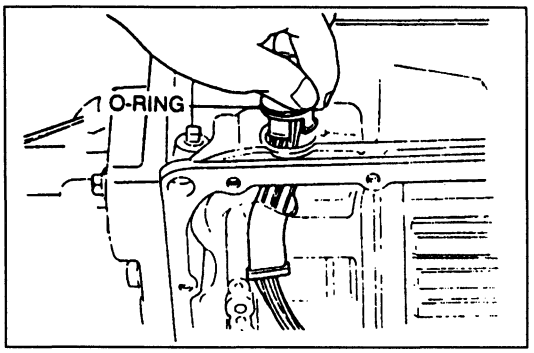
14. Remove the clip.
15. Disconnect the solenoid valve connectors.



16. Carefully remove the control valve body assembly and accumulator springs.

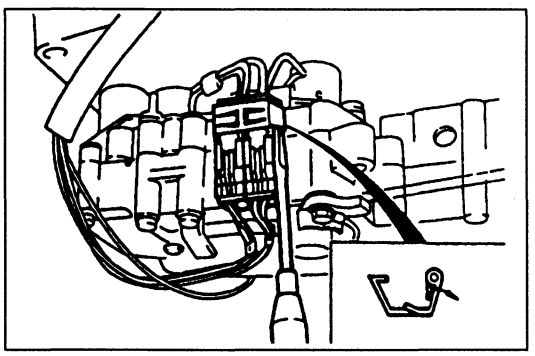


17. If necessary, remove the solenoid valve harness from the transmission case.
18. Remove the O-ring from the solenoid valve harness.

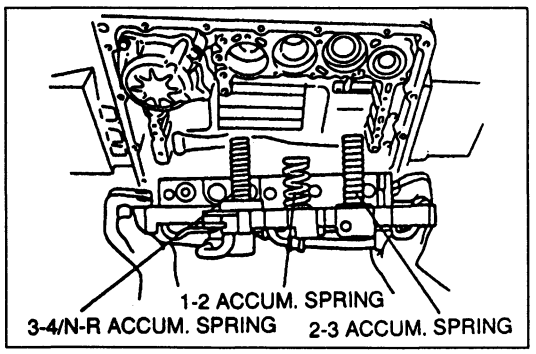


On-Vehicle Installation

1. Apply ATF to the new O-ring and install it onto the solenoid valve harness.
2. Install the solenoid valve harness into the transmission case.



3. Connect the solenoid valve connectors.
4. Install the clip.

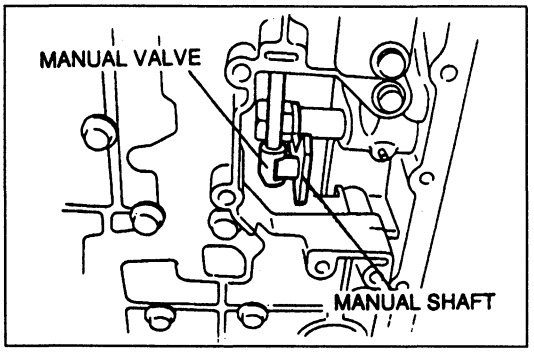


5. Set the accumulator springs into the control valve body as shown.

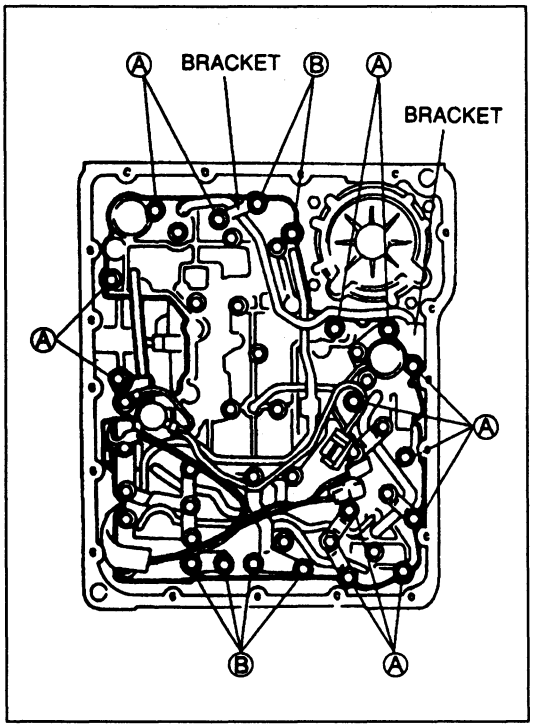
Spring specifications

mm {in}

Item / Spring	Outer dia.	Free length	No. of coils	wire dia.
3-4 / N-R accumulator piston	18.0 {0.71}	43.0 {1.69}	7.9	2.3 {0.091}
1-2 accumulator piston	29.3 {1.15}	45.0 {1.77}	3.8	3.7 {0.15}
2-3 accumulator piston	19.5 {0.77}	66.0 {2.60}	8.6	3.0 {0.12}



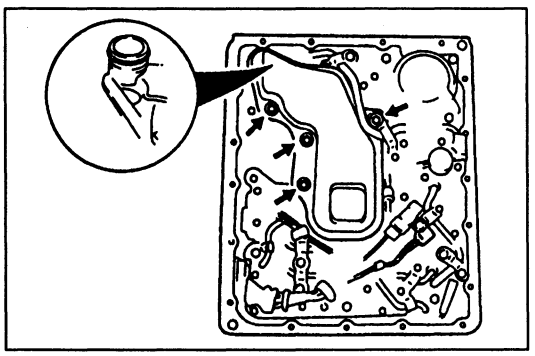
6. Verify that the manual valve and manual shaft are assembled correctly.
7. Set the control valve into the transmission case and secure it.



8. Install the A and B bolts and bracket as shown in the figure.

Bolt length (measured from below bolt head):
A: 33 mm {1.3 in}
B: 45 mm {1.8 in}

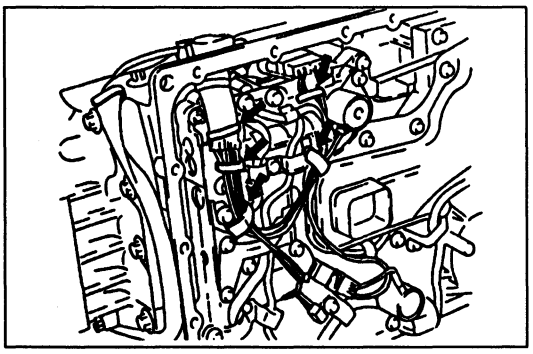
Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}



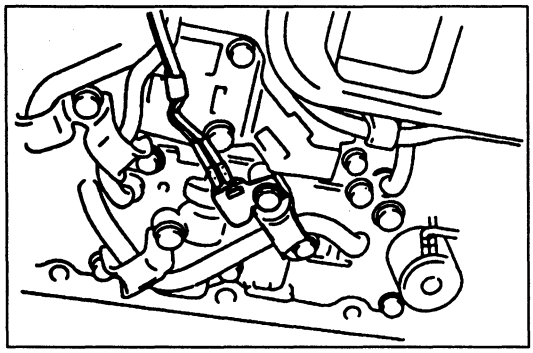
9. Apply ATF to a new O-ring and install it onto the oil strainer.
10. Install the oil strainer.

Bolt length (measured from below bolt head):
50 mm {2.0 in}

Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}



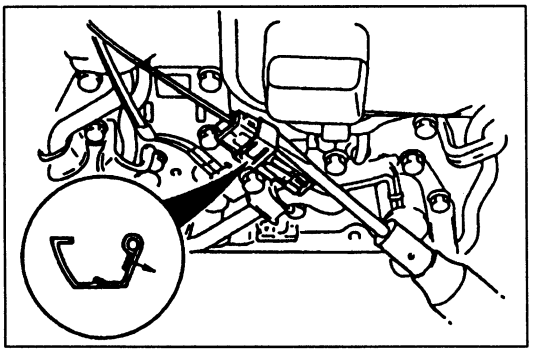
11. Secure the solenoid valve harness with the harness clip.



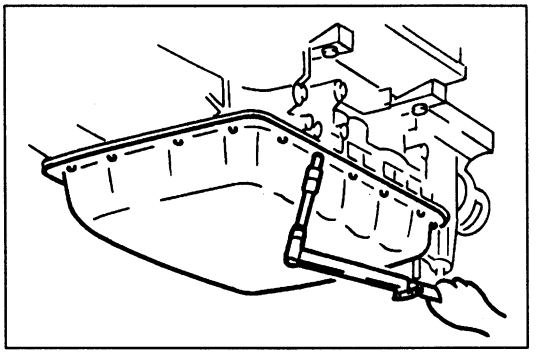
12. Install the ATF thermosensor.

Bolt length (measured from below bolt head):
45 mm {1.8 in}

Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}

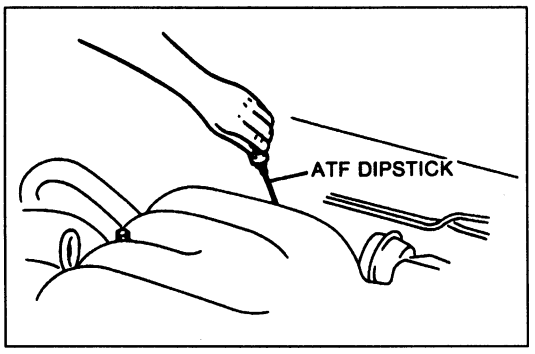


13. Connect the lockup solenoid valve connector.
14. Install the clip.



15. Clean the oil pan and the magnet, and set the magnet into the oil pan.
16. Remove any old locking compound from the bolt holes.
17. Install a new gasket and the oil pan.
18. Tighten the new bolts evenly and quickly.

Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}

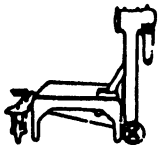
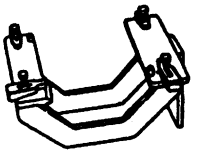
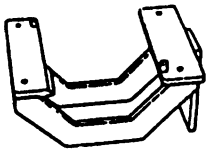
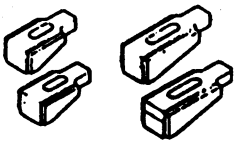


19. Connect the negative battery cable.
20. Pour in ATF and verify that the ATF level is as specified. (Refer to page K–25.)

TRANSMISSION UNIT (ASSEMBLY)

Preparation

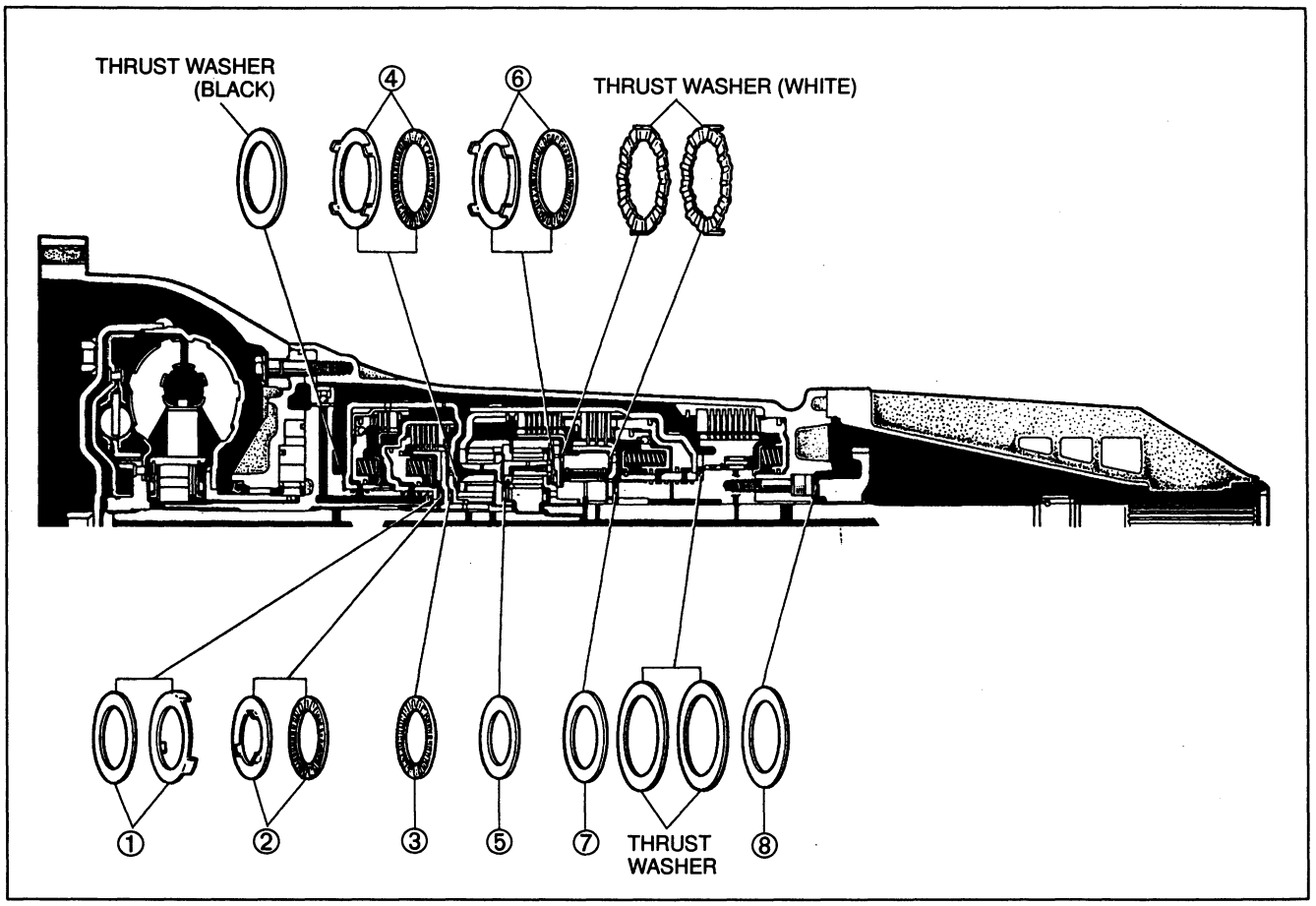
SST

49 0107 680A Engine stand 	For assembly of transmission	49 U019 0A0A Hanger set, transmission 	For assembly of transmission
49 H075 495B Body (Part of 49 U019 0A0A) 	For assembly of transmission	49 U019003 Holder (Part of 49U019 0A0A) 	For assembly of transmission

Precaution

1. If the drive plates or brake band is replaced with new one(s), soak them in ATF for at least 2 hours before installation.
2. Before assembly, apply ATF to all seal rings, rotating parts, O-rings, D-rings and sliding parts.
3. All O-rings, D-rings, seals, and gaskets must be replaced with new ones included in the overhaul kit.
4. Use petroleum jelly, not grease, during reassembly.
5. When it is necessary to replace a bushing, replace the subassembly that includes that bushing.
6. Assemble the housing within 10 minutes after applying sealant, and allow it to cure at least 30 minutes after assembly before filling the transmission with ATF.

Thrust washer, bearing, and bearing race locations

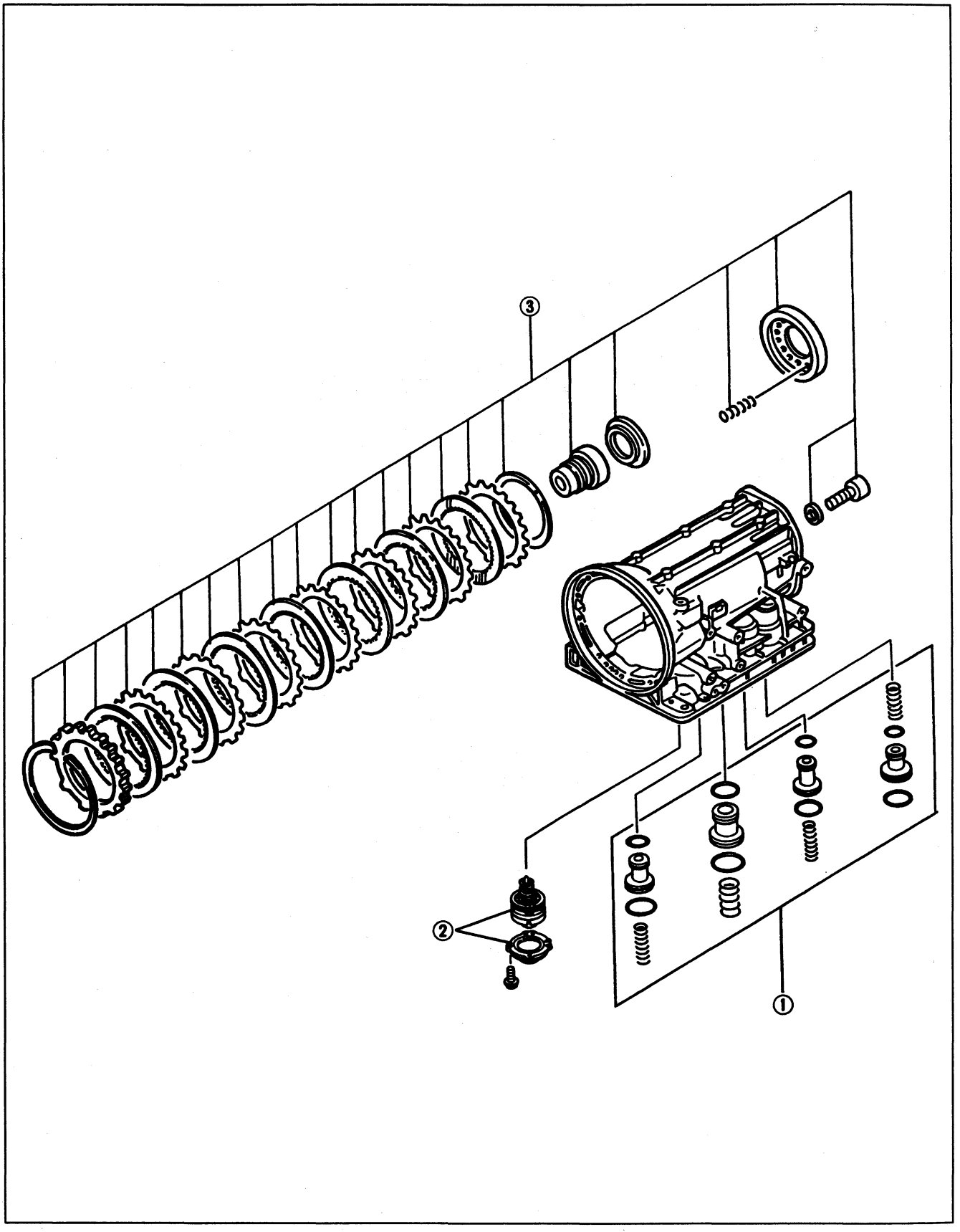


Outer diameter of bearing and race

		1	2	3	4	5	6
Bearing	mm {in}	47.0 {1.85}	53.0 {2.09}	53.0 {2.09}	78.0 {3.07}	53.0 {2.09}	78.0 {3.07}
Race	mm {in}	43.5 {1.71}	51.5 {2.03}	—	75.0 {2.95}	—	75.0 {2.95}

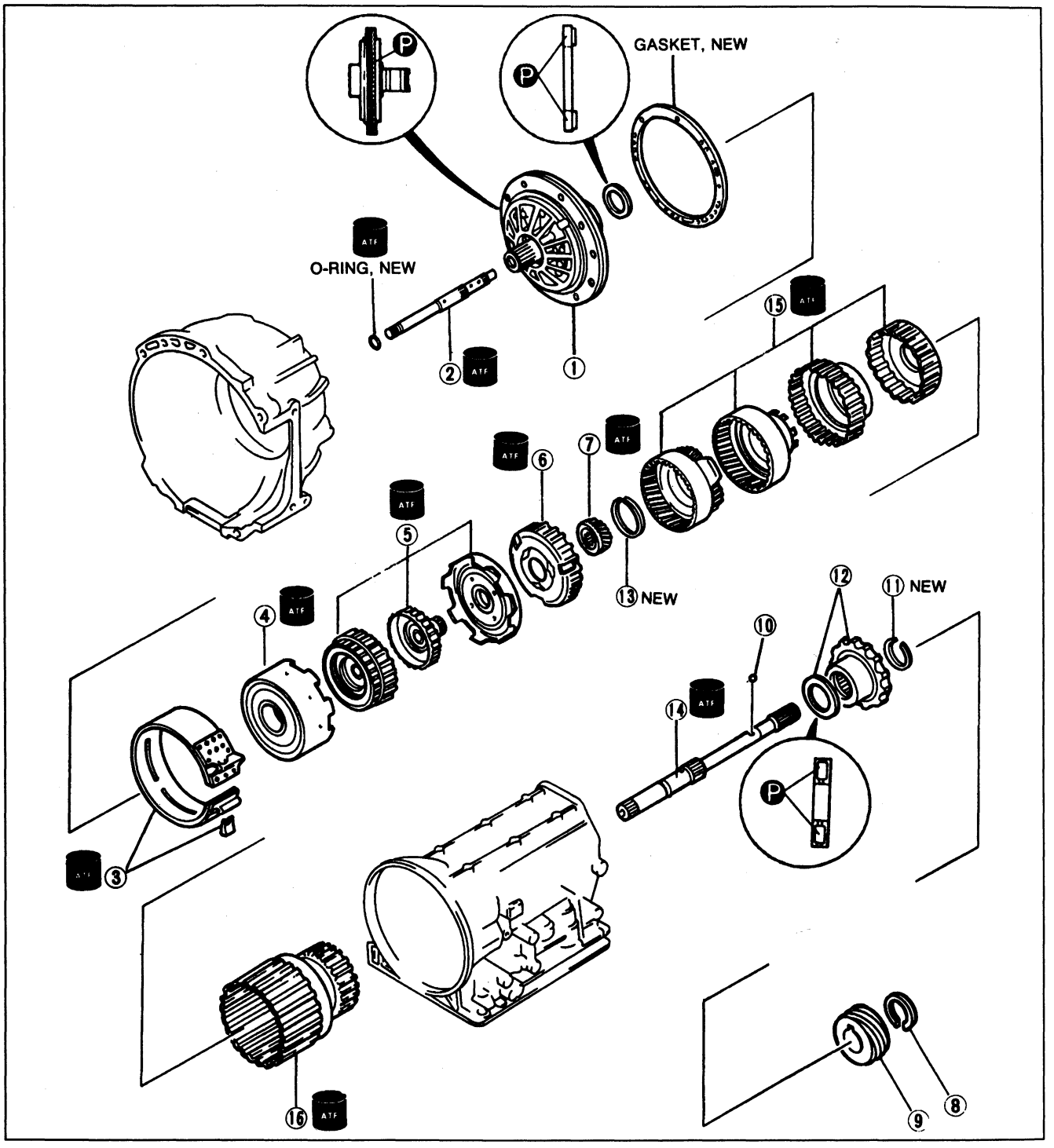
		7	8
Bearing	mm {in}	59.0 {2.32}	64.0 {2.52}
Race	mm {in}	—	—

Components 1



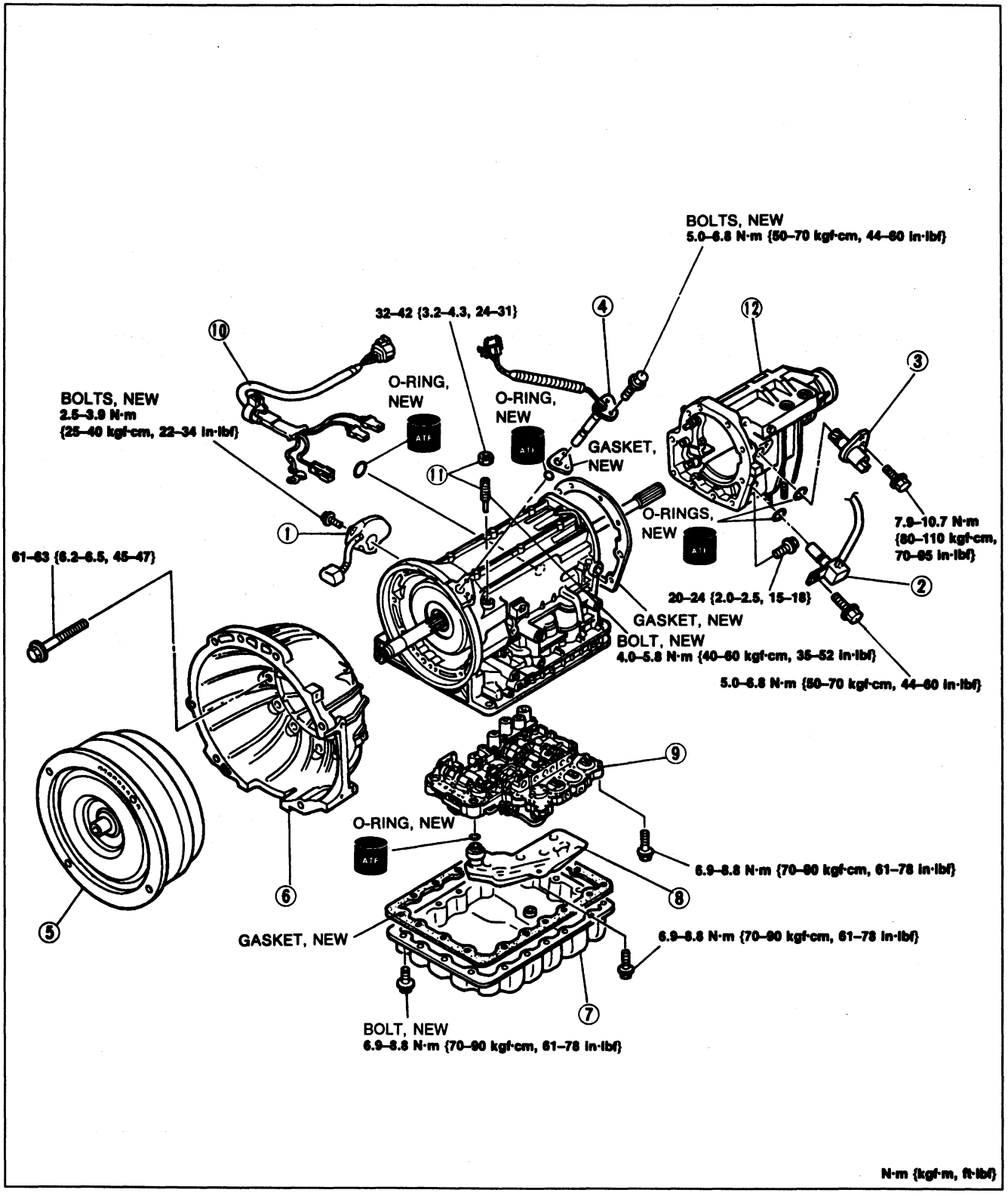
1. Accumulator
2. Band servo
3. Low and reverse brake

Components 2

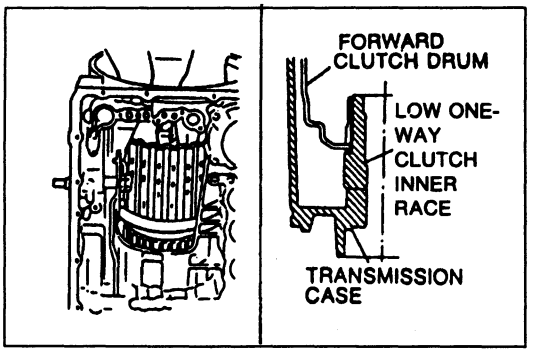


1. Oil pump
2. Input shaft
3. Brake band and strut
4. Reverse clutch
5. High clutch and front sun gear
6. Front planetary carrier
7. Rear sun gear
8. Snap ring
9. Speedometer drive gear
10. Steel ball
11. Snap ring
12. Parking gear and bearing
13. Snap ring
14. Output shaft
15. Front internal gear, rear internal gear, forward clutch hub, overrunning clutch hub
16. Forward clutch drum (forward clutch, overrunning clutch, low one-way clutch)

Components 3

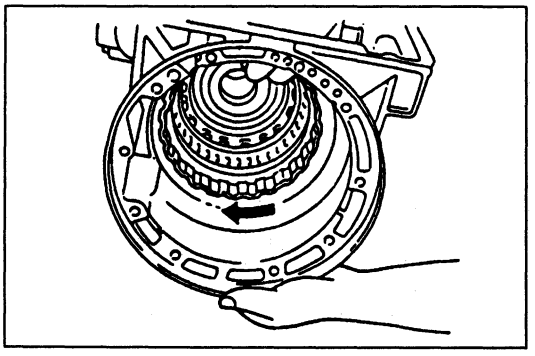


1. Park/neutral switch
2. Vehicle speed sensor
3. Vehicle speedometer sensor
4. Vehicle speed pulse generator
5. Torque converter
6. Converter housing
7. Oil pan
8. Oil strainer
9. Control valve body
10. Solenoid valve harness
11. Anchor end bolt and nut
12. Extension housing / Parking mechanism

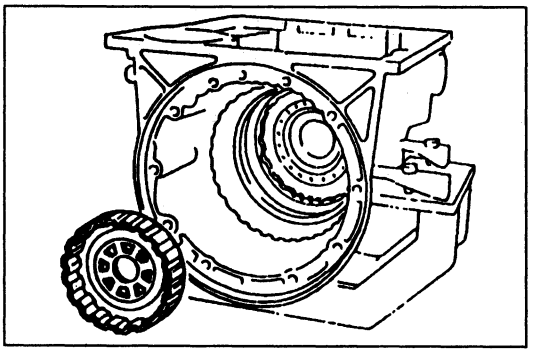


Assembly procedure

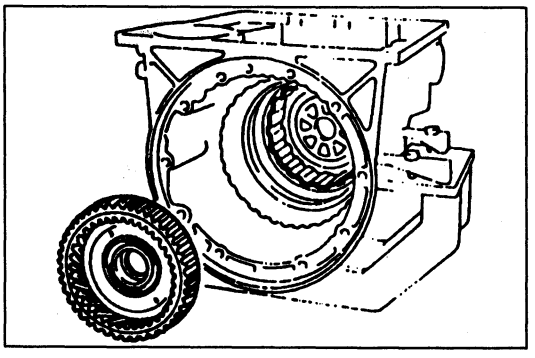
1. Install the forward clutch drum while slowly turning it clockwise until its hub passes fully over the low one-way clutch inner race.



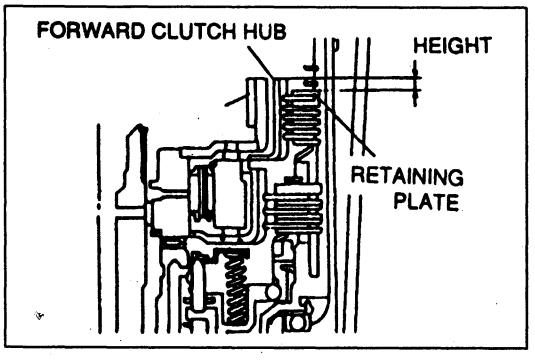
2. Verify that the forward clutch drum will turn only clockwise.



3. Verify that the bearing is installed on the rear of the overrunning clutch hub.
4. Install the overrunning clutch hub into the forward clutch drum.
5. Verify that the thrust washer is installed on the front of the overrunning clutch hub.

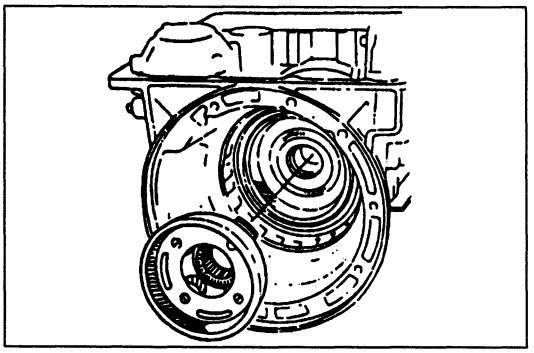


6. Install the rear internal gear and forward clutch hub assembly into the forward clutch drum.
7. Verify that the bearing is installed on the rear internal gear.

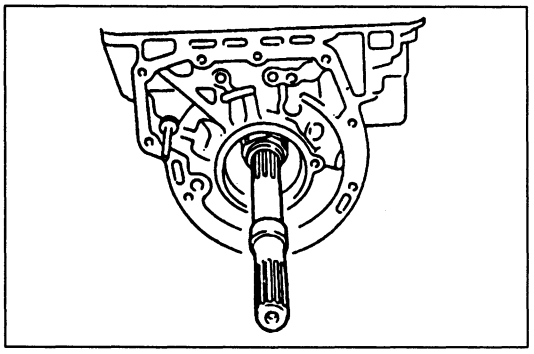


8. Measure the height difference between the forward clutch retaining plate and the top of the forward clutch hub.

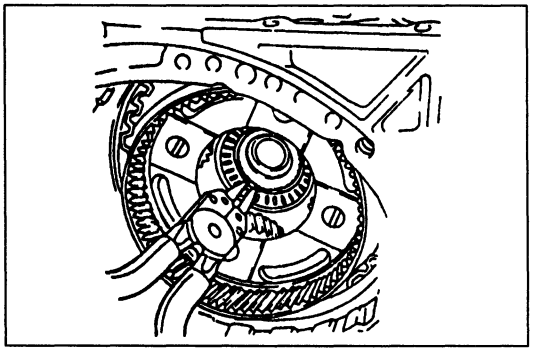
   Height: 2.0–3.0 mm {0.079–0.118 in} approx.



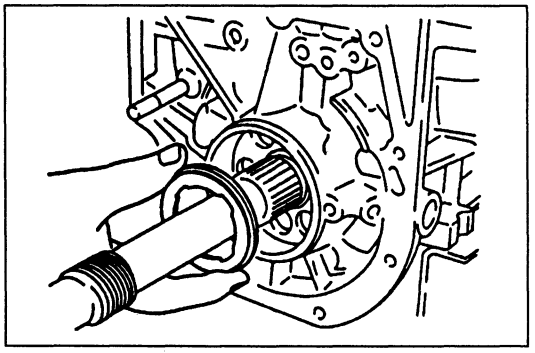
9. Verify that the bearing race is installed on the front internal gear (rear planetary carrier).
10. Install the front internal gear (rear planetary carrier) into the forward clutch assembly.



11. Insert the output shaft from the rear of the transmission case.

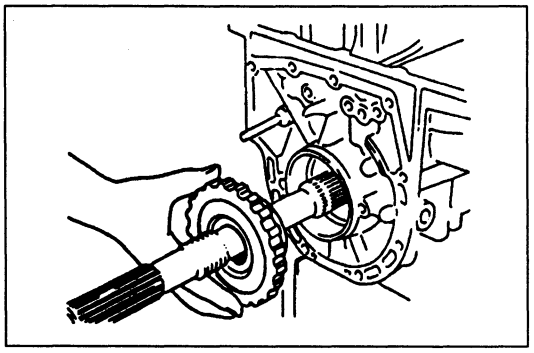


12. Push the output shaft slightly forward, and install a new snap ring on the shaft. Verify that the output shaft cannot be pulled from the rear of the transmission case.

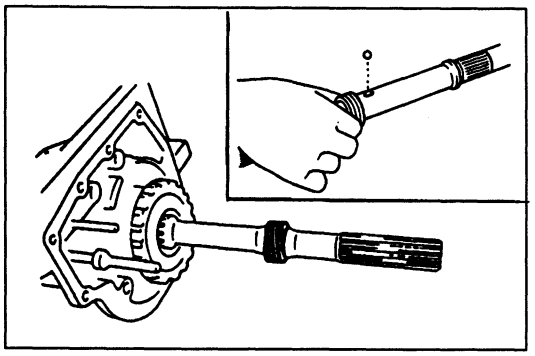


13. Apply petroleum jelly to the bearing and install it to the transmission case with the black surface facing outward.

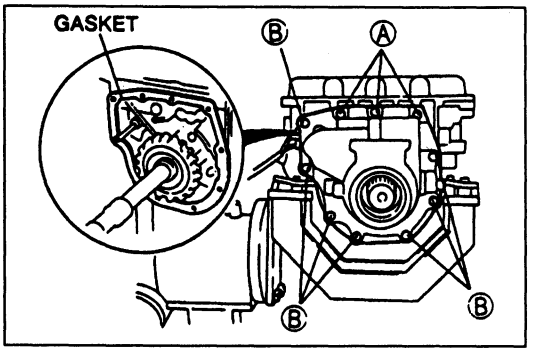
    Bearing outer diameter: 64.0 mm {2.52 in}



14. Install the parking gear.
15. Pull the output shaft slightly back, and install a new snap ring on the shaft. Verify that the output shaft cannot be pulled from the front of the transmission case.



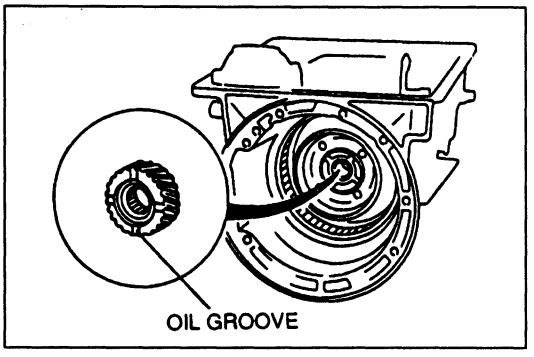
16. Install the steel ball and speedometer drive gear onto the output shaft.
17. Secure the speedometer drive gear with the snap ring.



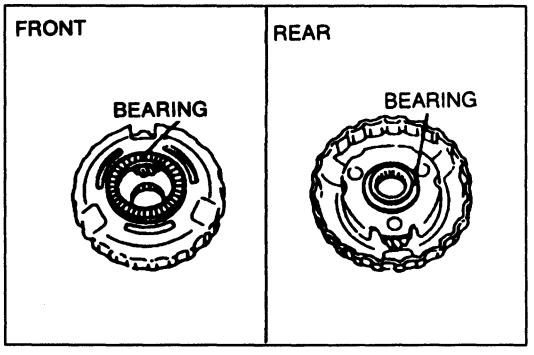
18. Install a new gasket and the extension housing.

Bolt length (measured from below bolt head):
A: 30 mm {1.2 in}
B: 45 mm {1.8 in}

Tightening torque:
20–24 N·m {2.0–2.5 kgf·m, 15–18 ft·lbf}

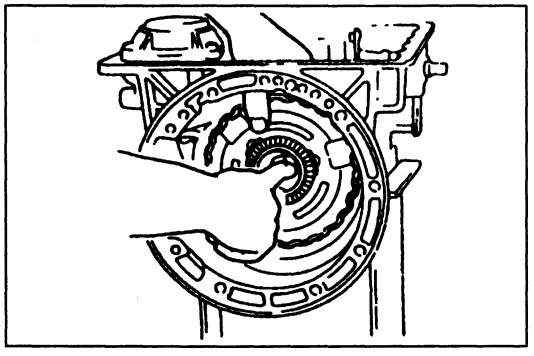


19. Install the rear sun gear into the rear planetary carrier with the oil grooves of the gear facing outward.

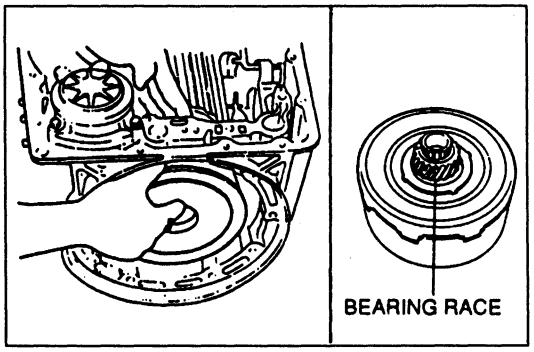


20. Apply petroleum jelly to the bearings and install them to the front planetary carrier. Install the rear bearing with the black surface facing outward.

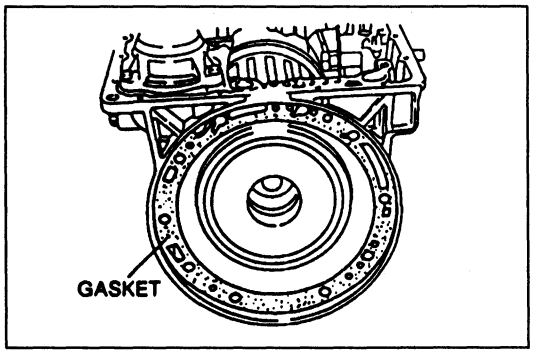
Bearing outer diameter
Front: 78.0 mm {3.07 in}
Rear: 53.0 mm {2.09 in}



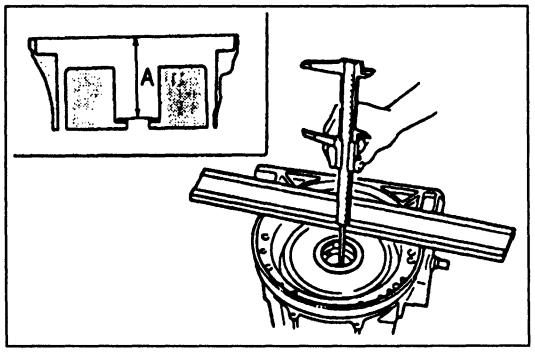
21. While rotating the forward clutch drum clockwise, install the front planetary carrier into the forward clutch drum.



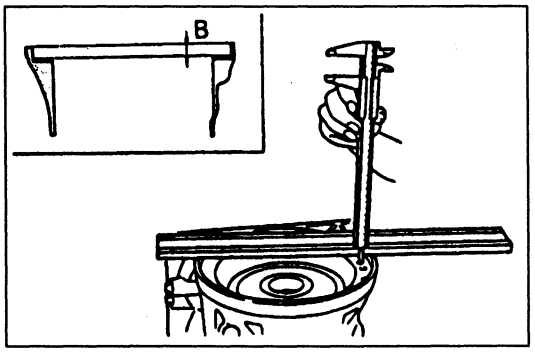
22. Verify that the bearing race is installed on the front sun gear.
23. Install the reverse clutch, high clutch, and front sun gear assembly into the transmission case.
24. Verify that the bearing race is installed on the high clutch drum.



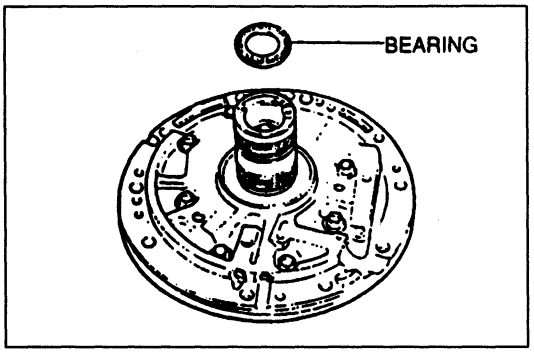
25. Adjust the total end play.
    (1) Install a new oil pump gasket.



(2) Measure height A by using vernier calipers and a straightedge.

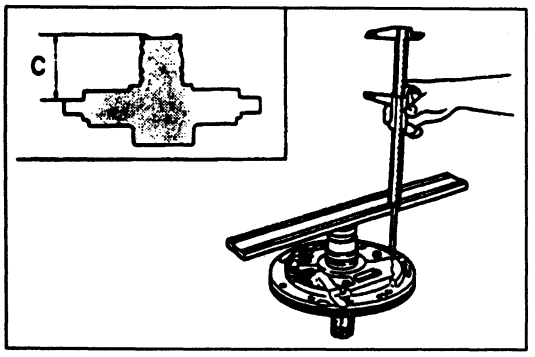


(3) Measure height B.

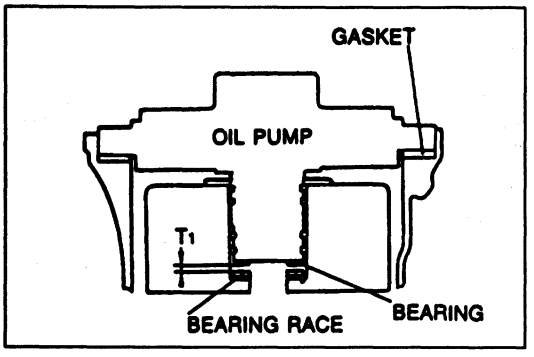


(4) Apply petroleum jelly to the bearing and install it on the oil pump.

Bearing outer diameter: 47.0 mm {1.85 in}



(5) Measure height C.



(6) Calculate the total end play by using the formula below.

Formula: T1 = A – B – C – 0.1 mm {0.004 in}

T1: Total end play
A: Distance between front of transmission case and bearing race on the high clutch drum
B: Distance between front of transmission case and oil pump gasket
C: Distance between upper surface of oil pump bearing and oil pump gasket contact surface.
0.1 mm {0.0039 in}: Amount of compression of new oil pump gasket

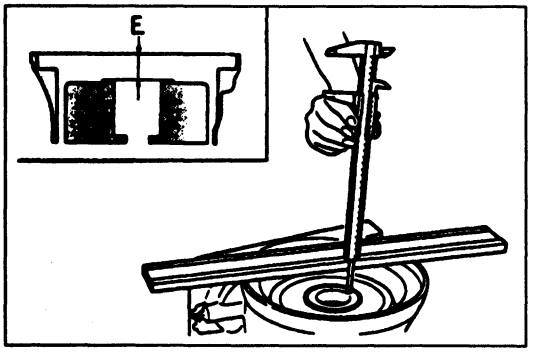
Total end play:
0.25–0.55 mm {0.010–0.022 in}

(7) If the total end play is not within specification, adjust it by selecting and installing the proper bearing race.

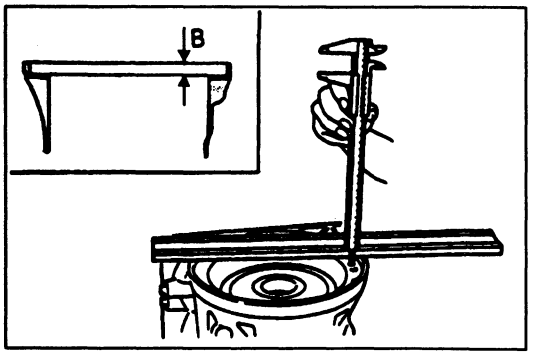
Bearing race size

mm {in}

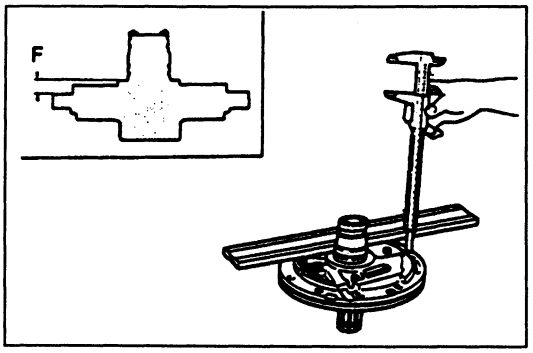
0.8 {0.031}	1.0 {0.039}	1.2 {0.047}	1.4 {0.055}
1.6 {0.063}	1.8 {0.071}	2.0 {0.079}	—



26. Adjust the reverse clutch end play.
(1) Install the thrust washer on the reverse clutch.
(2) Measure height E by using vernier calipers and a straightedge.



(3) Measure height B.

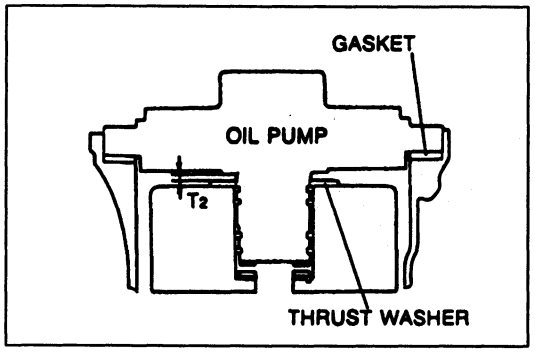


(4) Measure height F.

(5) Calculate the reverse clutch end play by using the formula below.

Formula: T2 = E – B – F – 0.1 mm {0.004 in}

T2: Reverse clutch end play
B: Distance between front of transmission case and oil pump gasket.
E: Distance between front of transmission case and thrust washer on the reverse clutch drum
F: Distance between reverse clutch thrust washer contact surface of oil pump and oil pump gasket contact surface
0.1 mm {0.0039 in}: Amount of compression of new oil pump gasket



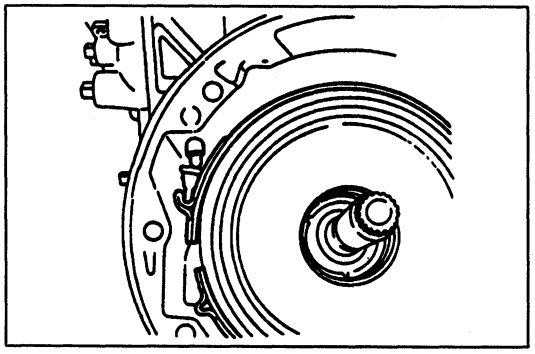
Reverse clutch end play:
0.55–0.90 mm {0.022–0.035 in}

(6) If the reverse clutch end play is not within specification, adjust it by selecting and installing the proper thrust washer.

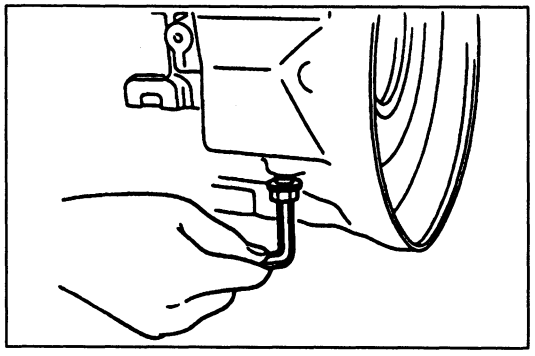
Thrust washer size

mm {in}

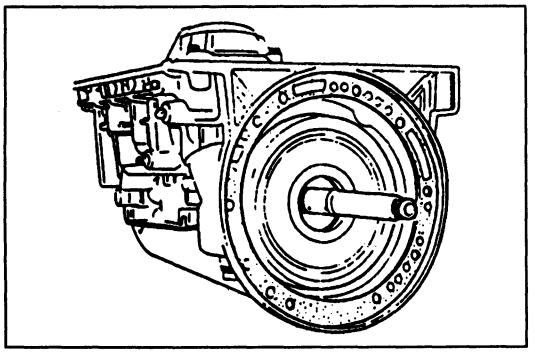
0.7 {0.028}	0.9 {0.035}	1.1 {0.043}	1.3 {0.051}
1.5 {0.059}	1.7 {0.067}	1.9 {0.075}	—



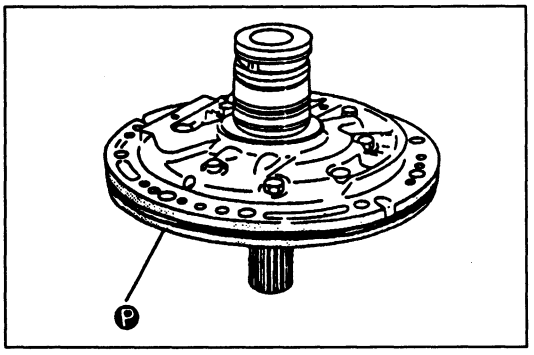
27. Apply ATF to the brake band and band strut, and install them into the transmission. Refer to page K–76 to adjust the brake band during transmission assembly.



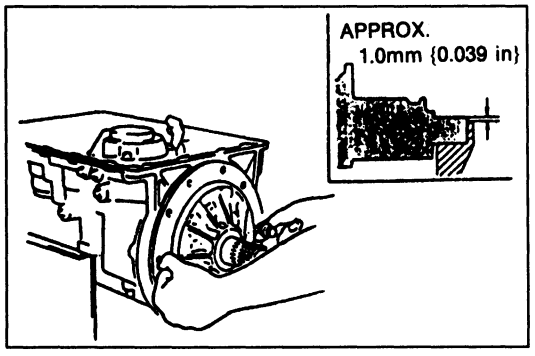
28. Temporarily install a new anchor end bolt.



29. Apply ATF to the input shaft and install it into the transmission case.

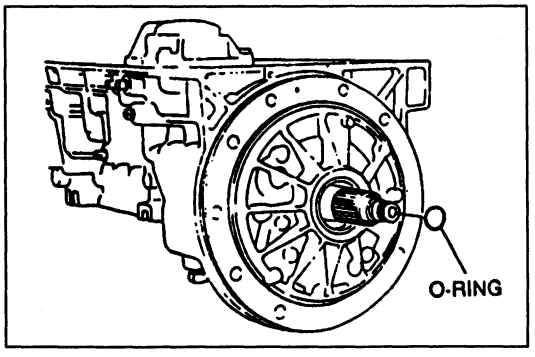


30. Apply petroleum jelly to the oil pump assembly as shown.

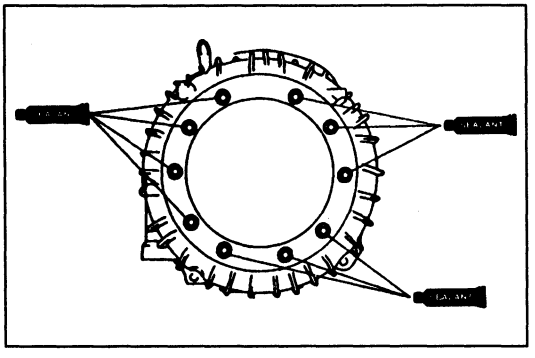


31. Install the oil pump assembly into the transmission case by hand only, using two converter housing bolts as guides.

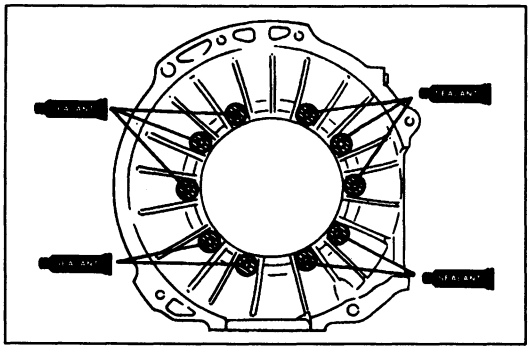
Height: 1.0 mm {0.039 in} approx.

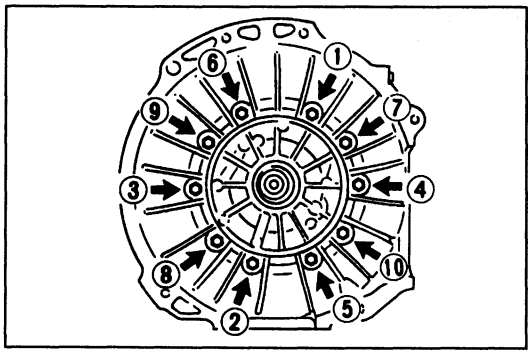


32. Apply ATF to a new O-ring, and install it onto the input shaft.



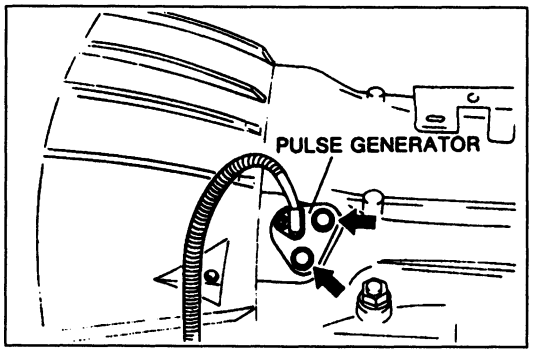
33. Apply sealant lightly around the bolt holes as shown.





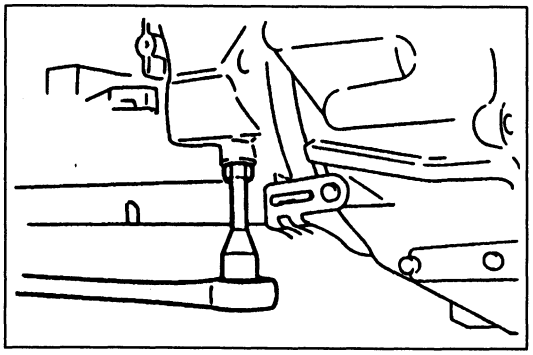
34. Remove the converter housing guide bolts.
35. Install the converter housing onto the transmission case, and tighten the bolts evenly in the order shown.

Tightening torque:
61–63 N·m {6.2–6.5 kgf·m, 45–47 ft·lbf}



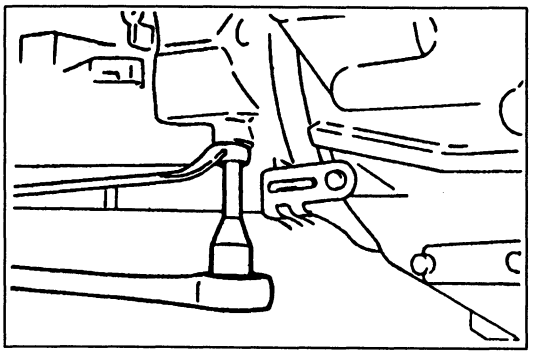
36. Apply ATF to a new O-ring and install it onto the vehicle speed pulse generator.
37. Install a new gasket and the vehicle speed pulse generator.
38. Install new bolts and tighten them.

Tightening torque:
5.0–6.8 N·m {50–70 kgf·cm, 44–60 in·lbf}



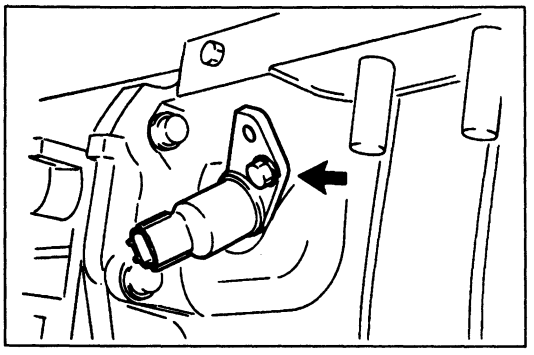
39. Adjust the brake band.
    (1) Tighten the anchor end bolt.

Tightening torque:
4.0–5.8 N·m {40–60 kgf·cm, 35–52 in·lbf}



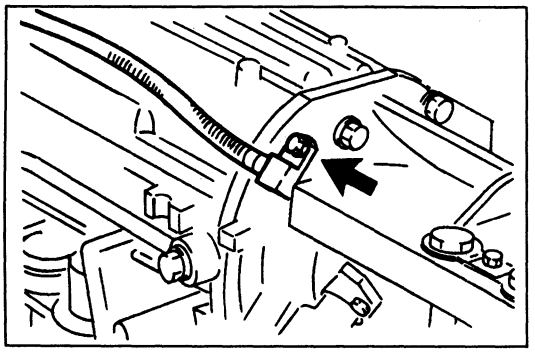
(2) Loosen the anchor end bolt 2.5 turns.
(3) Install the locknut.
(4) Hold the anchor end bolt and tighten the locknut.

Tightening torque:
32–42 N·m {3.2–4.3 kgf·m, 24–31 ft·lbf}



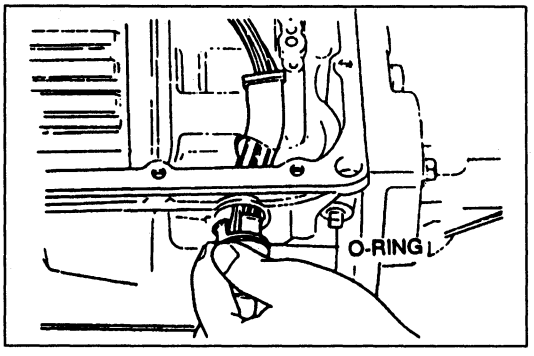
40. Apply ATF to a new O-ring and install it onto the vehicle speedometer sensor.
41. Install the vehicle speedometer sensor into the extension housing.

Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 70–95 in·lbf}

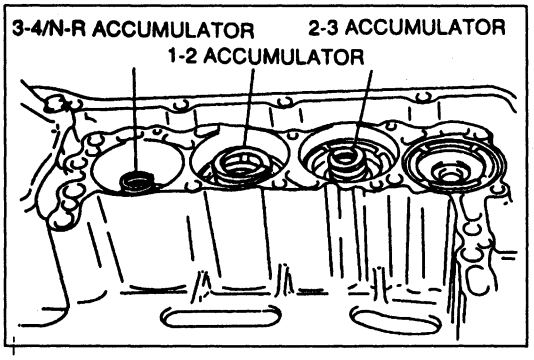


42. Apply ATF to a new O-ring and install it onto the vehicle speed sensor.
43. Install the vehicle speed sensor into the extension housing.

Tightening torque:
5.0–6.8 N·m {50–70 kgf·cm, 44–60 in·lbf}



44. Apply ATF to a new O-ring and install it onto the solenoid valve harness.
45. Install the solenoid valve harness into the transmission case.

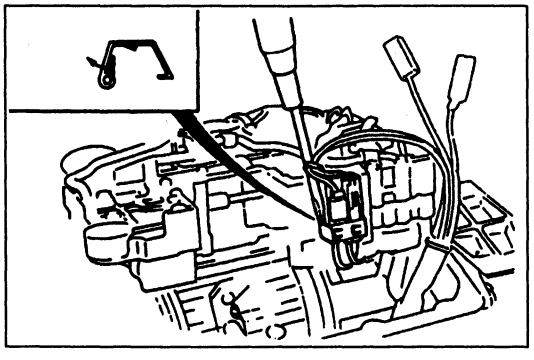


46. Install the accumulator spring into the accumulator piston.

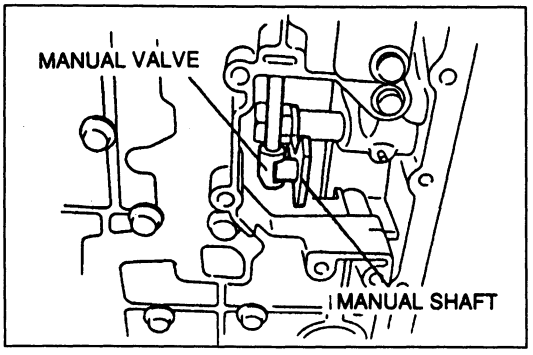
Spring specifications

mm {in}

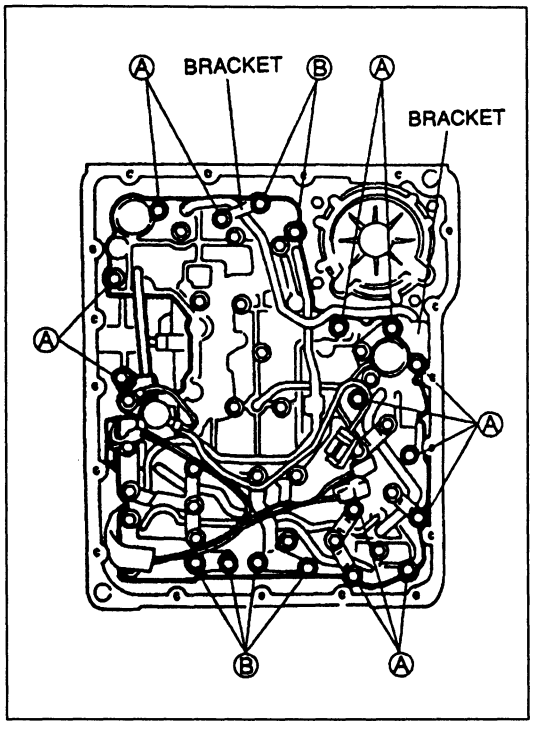
Item / Spring	Outer dia.	Free length	No. of coils	Wire dia.
3-4/N-R accumulator piston	18.0 {0.71}	43.0 {1.69}	7.9	2.3 {0.091}
1–2 accumulator piston	29.3 {1.15}	45.0 {1.77}	3.8	3.7 {0.15}
2–3 accumulator piston	19.5 {0.77}	66.0 {2.60}	8.6	3.0 {0.12}



47. Connect the solenoid valve connectors.
48. Install the clip.



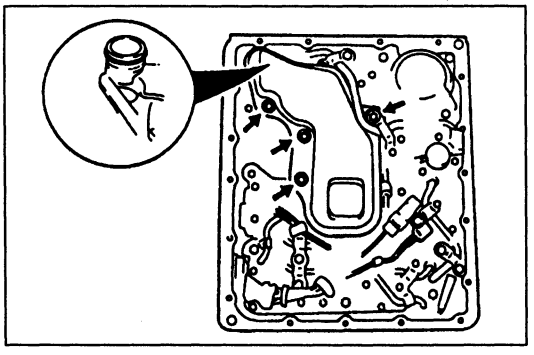
49. Verify that the manual valve and manual shaft are assembled correctly.



50. Install the valve body assembly, and tighten the bolts evenly.

Bolt length (measured from below bolt head):
A: 33 mm {1.3 in}
B: 45 mm {1.8 in}

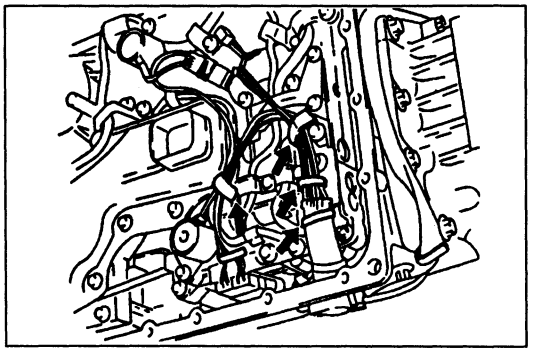
Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}



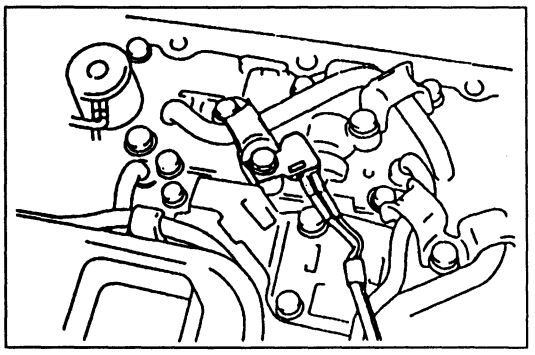
51. Apply ATF to a new O-ring and install it onto the oil strainer.
52. Install the oil strainer into the control valve body.

Bolt length (measured from below bolt head):
50 mm {2.0 in}

Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}



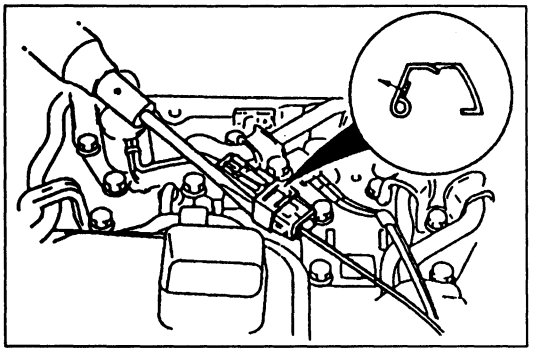
53. Secure the solenoid valve harness with the clips.



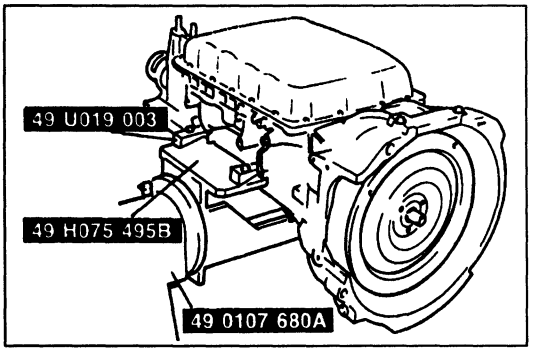
54. Install the ATF thermosensor as shown in the figure.

Bolt length (measured from below bolt head):
45 mm {1.8 in}

Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}



55. Connect the lockup solenoid valve connector.
56. Install the clip.

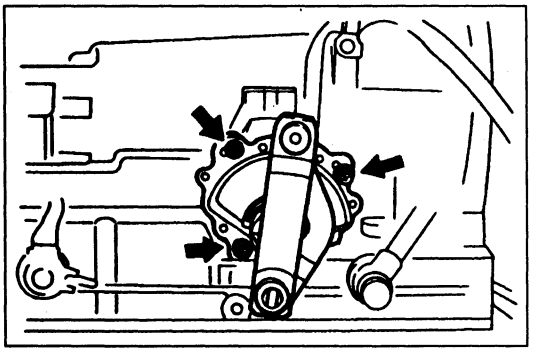


57. Set the magnet into the oil pan.
58. Remove any old locking compound from the bolt holes.
59. Install a new gasket and the oil pan.
60. Tighten the new bolts evenly and quickly.

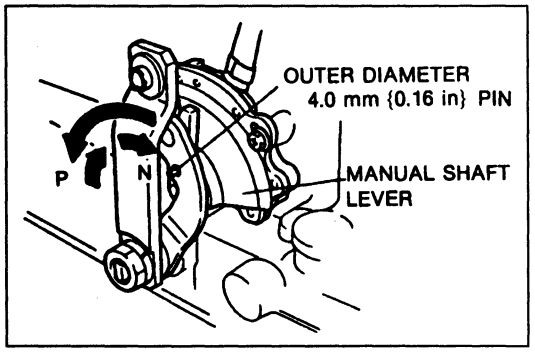
Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}

61. Remove the transmission from the **SSTs (transmission hanger)**.
62. Install the connector brackets onto the extension housing.

Tightening torque:
7.9–11.7 N·m {80–120 kgf·cm, 70–104 in·lbf}



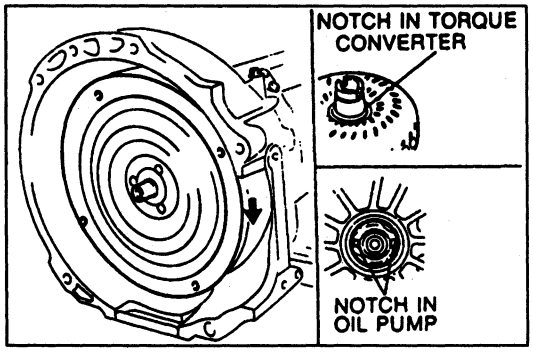
63. Install the harness onto the connector bracket.
64. Install and adjust the park/neutral switch.
    (1) Verify that the manual shaft is set at the L position (fully forward).
    (2) Install the park/neutral switch over the manual shaft and install new bolts.



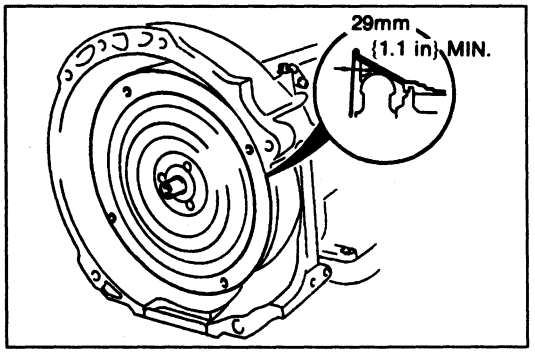
    (3) Turn the manual shaft fully rearward, then return it **2 notches** (N range position).
    (4) Insert a **4.0 mm {0.16 in}** outer diameter pin through the holes of the park/neutral switch and the manual shaft lever.
    (5) Tighten the park/neutral switch retaining bolts.

Tightening torque:
2.5–3.9 N·m {25–40 kgf·cm, 22–34 in·lbf}

    (6) Remove the pin.



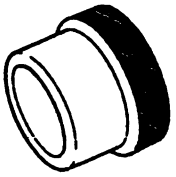
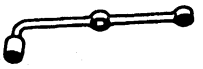
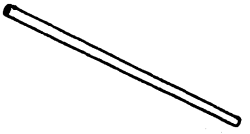
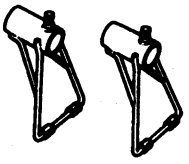
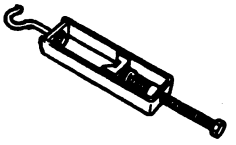
65. Remove the transmission from the **SST**. If the torque converter is completely empty, hold it upright, and fill it with 2.0 L {2.1 US qt, 1.8 Imp qt} of ATF.
66. Install the torque converter to the transmission. Rotate the torque converter to align the splines.



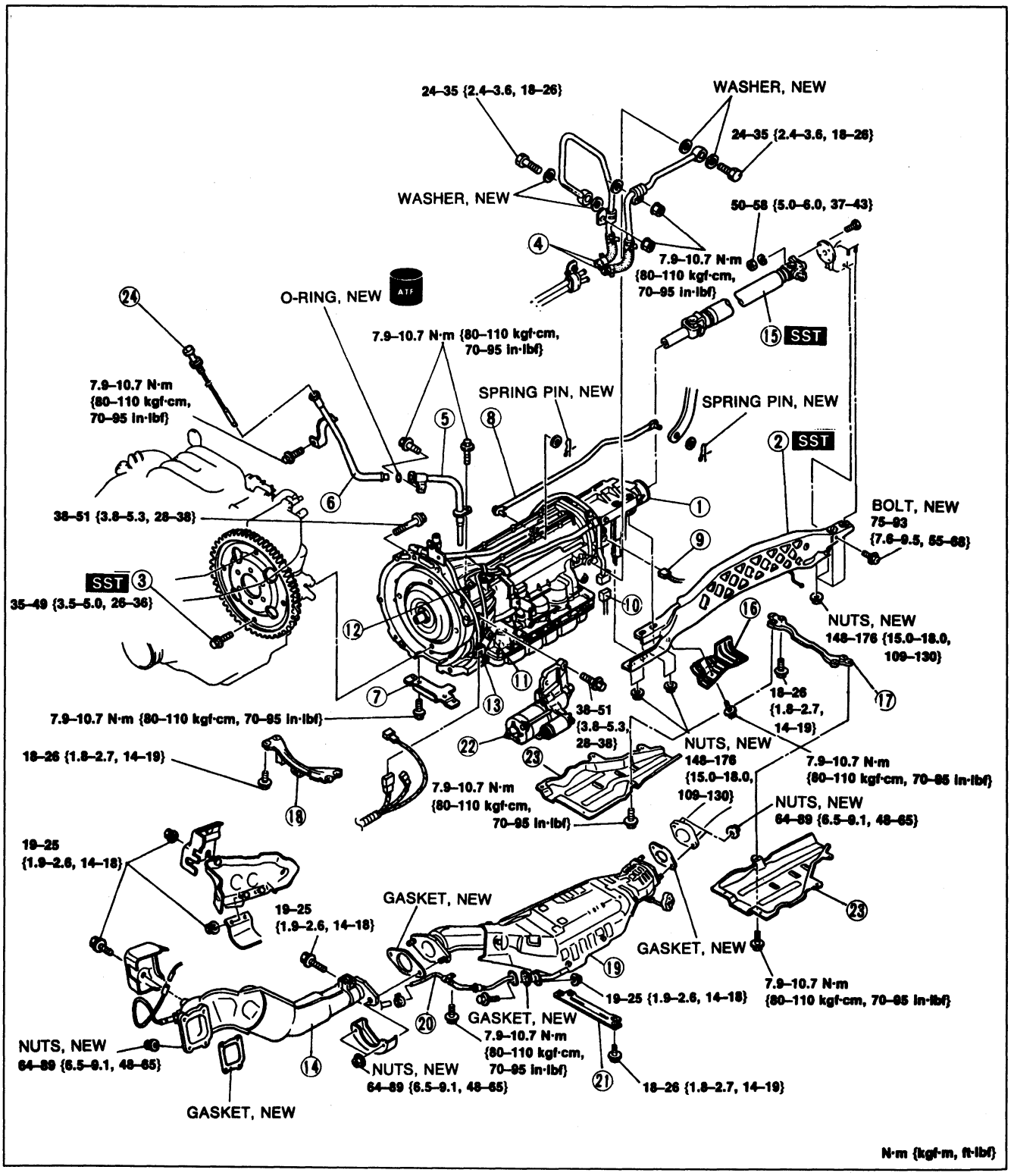
67. Measure the installation depth of the torque converter by using vernier calipers and a straightedge.

    Specification: 29 mm {1.1in} min.

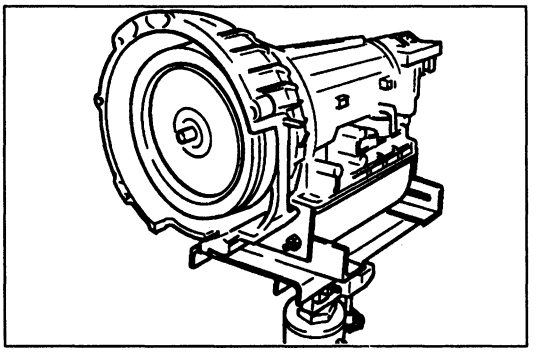
TRANSMISSION UNIT (INSTALLATION)
Preparation
SST

49 J019 002 Cap 	For prevention of ATF leakage	49 0877 435 Special wrench 	For loosening of torque converter installation bolts
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

1. Install in the order shown in the figure, referring to **Installation Note**.
2. Fill the transmission with the specified ATF after installation.
3. Connect the negative battery cable.
4. Inspect the park/neutral switch operation. (Refer to page K-28).
5. Inspect the selector lever operation. (Refer to page K-164).
6. Inspect for oil leakage from the transmission.
7. Perform a road test. (Refer to page K-16).
8. Inspect the ATF level and condition. (Refer to page K-25).

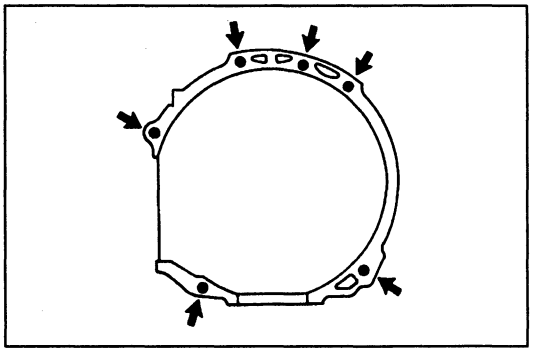


1. Transmission
   Installation Note ..... below
2. Power plant frame (PPF)
   Installation Note ..... below
3. Torque converter bolts
   Installation Note ..... page K-153
4. Oil cooler hose
5. Oil filler tube (lower)
6. Oil filler tube (upper)
7. Service hole cover
8. Selector rod (selector lever side)
   Installation Note ..... page K-153
9. Vehicle speedometer sensor connector
10. Solenoid valve connector
11. Vehicle speed pulse generator connector
12. Vehicle speed sensor connector
13. Park/neutral switch connector
14. Front exhaust pipe
15. Propeller shaft
    Installation ..... section L
16. Cover
17. Rear tunnel member
18. Front tunnel member
19. Three-way catalyst assembly
20. Secondary air injection pipe
21. Center tunnel member
22. Starter
23. Undercover (right and left)
24. ATF dipstick



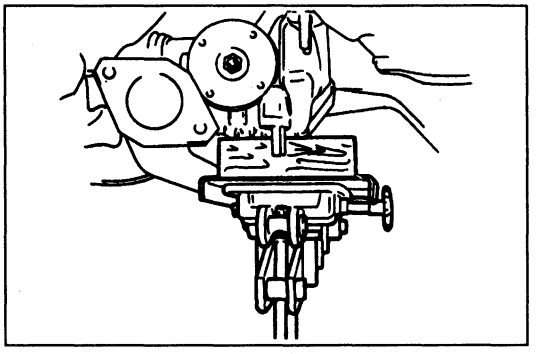
Installation note
Transmission

1. Set the transmission onto the transmission jack, paying special attention not to damage the oil pipes.
   Make sure that the torque converter side of the transmission is tilted slightly upward.
2. Mount the transmission to the engine.



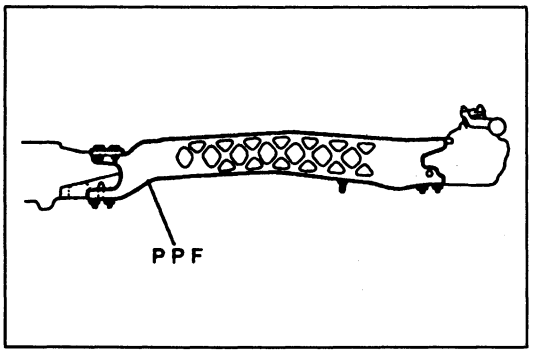
3. Gradually tighten the mounting bolts.

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

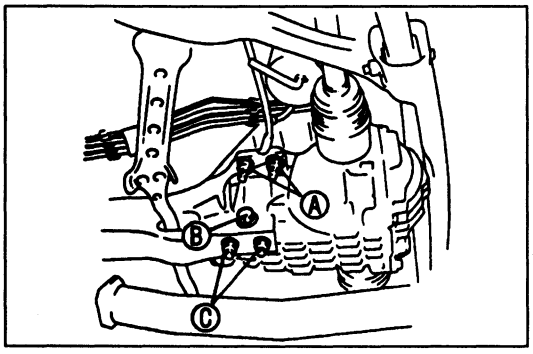


Power plant frame (PPF)

1. Hold the differential at a 0° angle by using the transmission jack.

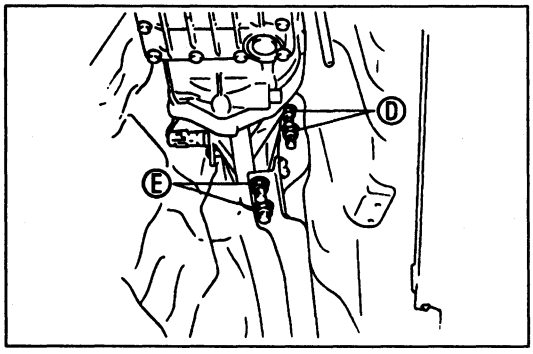


2. Hold the PPF in place with a new bolt and nuts.



3. Tighten the differential-side PPF installation bolt and nuts in the order A, B, C.

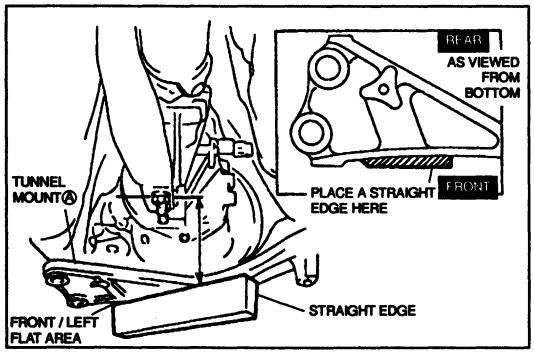
Tightening torque:
A, C: 148–176 N·m {15.0–18.0 kgf·m, 109–130 ft·lbf}
B: 75–93 N·m {7.6–9.5 kgf·m, 55–68 ft·lbf}



4. Tighten the transmission-side PPF installation nuts in the order D, E.

Tightening torque:
148–176 N·m {15.0–18.0 kgf·m, 109–130 ft·lbf}

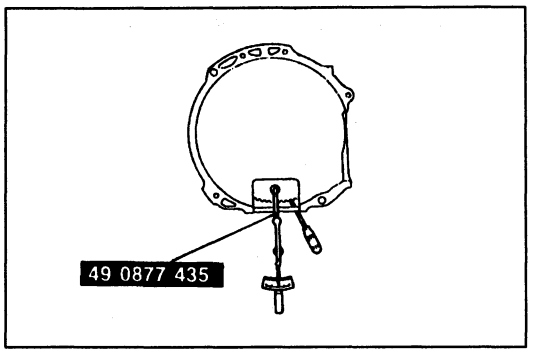
5. Remove the transmission jack.



6. Place a straightedge on the flat area on the front/left edge of the tunnel mount (A) so that it passes under the PPF installation bolts.
Measure from the top of the straightedge to the PPF.

Standard: 75.1 mm {2.96 in}
Acceptable: range : 70–77 mm {2.76–3.03 in}

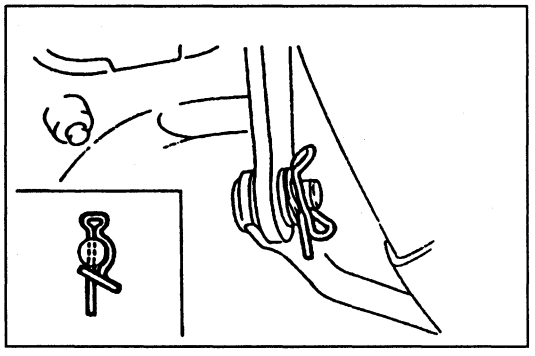
7. If the clearance is not within specification, readjust the PPF.



Torque converter bolts

1. Align the holes by turning the torque converter.
2. Lock the drive plate by using a screwdriver.
3. Hand-tighten the torque converter mounting bolts in a crisscross pattern, and then tighten them to the specified torque by using the **SST**.
4. Modify the torque converter tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI, "Torque Formulas".)
5. Tighten the torque converter installation bolts to the specified torque by using the **SST**.

Tightening torque:
35–49 N·m {3.5–5.0 kgf·m, 26–36 ft·lbf}

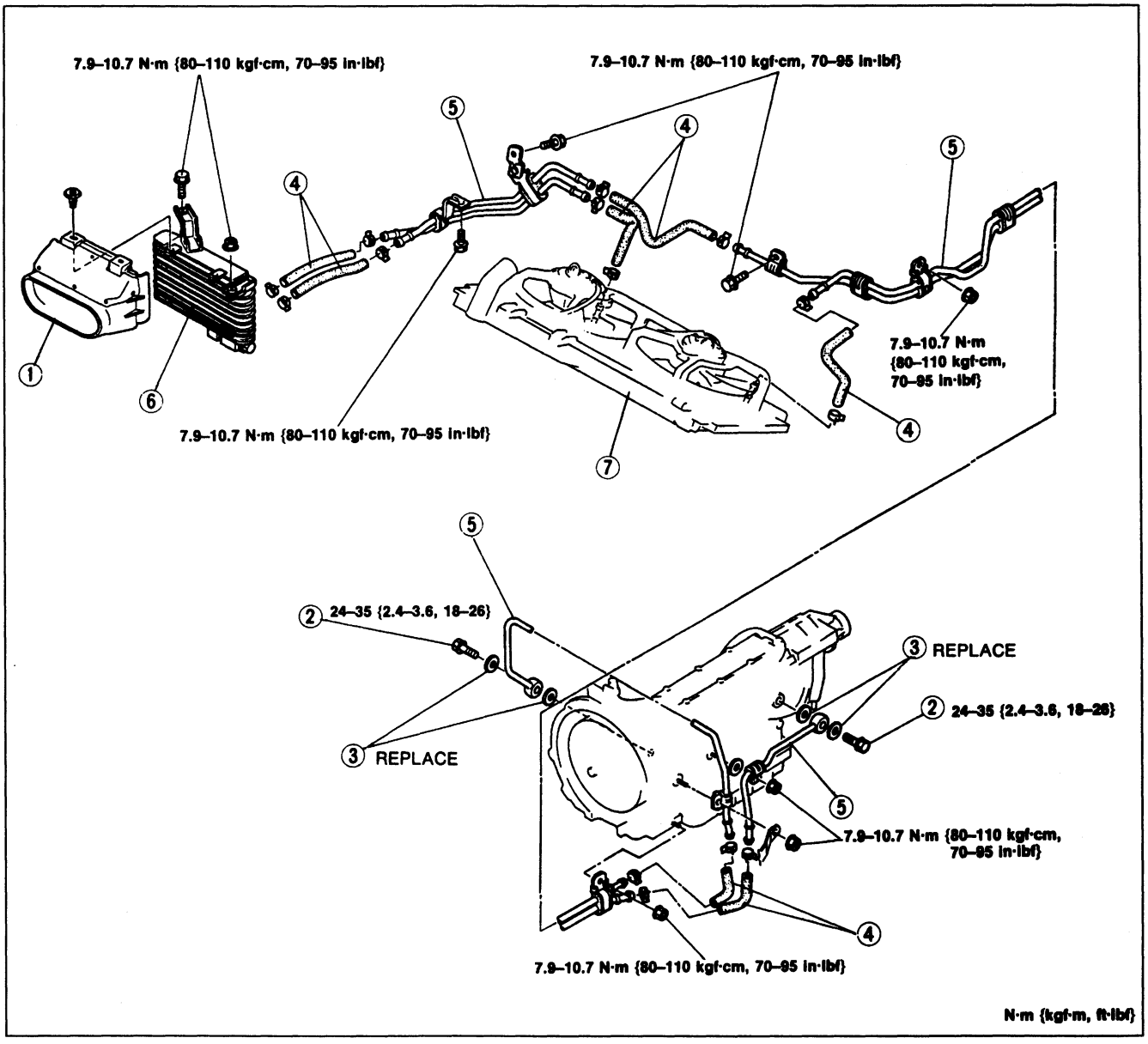


Selector rod

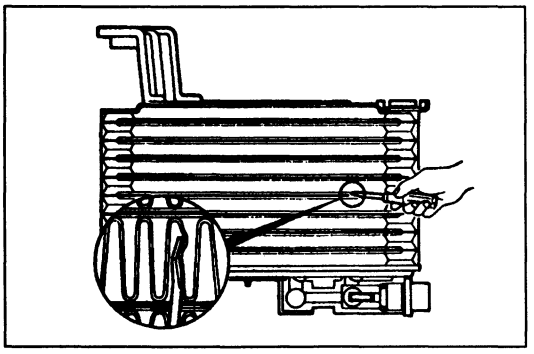
1. Install the selector rod.
2. Install the washer and a new spring pin as shown.

OIL COOLER

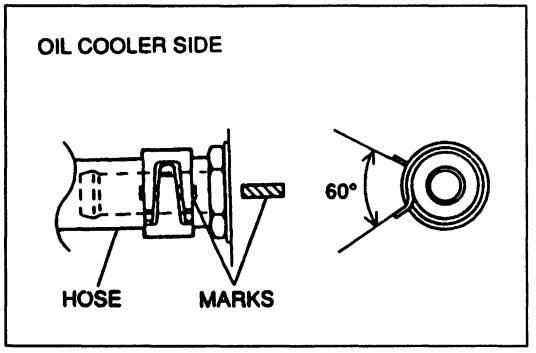
OIL COOLER
Removal / Inspection / Installation
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Inspect all parts and repair or replace as necessary.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Add ATF to the specified level.
6. Connect the negative battery cable.
7. Inspect the oil leakage from the oil pipes and oil hoses.
8. Inspect the ATF level and condition. (Refer to page K-25.)



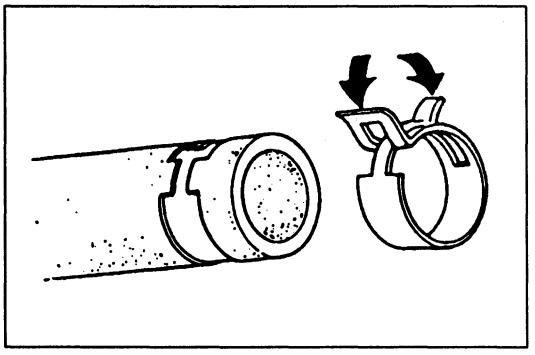
1. Air duct
2. Connector bolts
   Inspect for or clogging
3. Washers
4. Oil hoses
   Inspect for damage and cracks
   Installation Note ..... page K-155
5. Oil pipes
   Inspect for damage and cracks
6. Oil cooler
   Inspection ..... page K-155
7. Radiator
   Service ..... section E



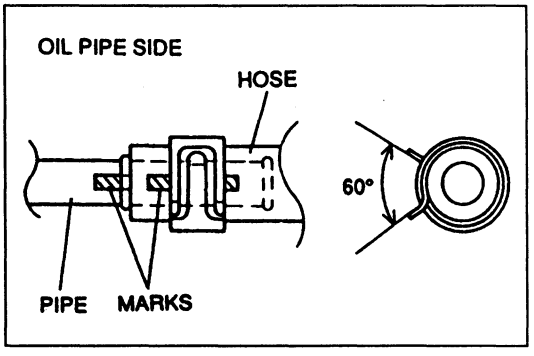
Inspection
Oil cooler
1. Inspect for cracks, damage, and water leakage, and replace as necessary.
2. Inspect for bent fins and repair with a screwdriver as necessary.



Installation note
Oil hoses
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. If reusing the oil hose, position the new hose clamp exactly into the mark left by the previous hose clamp.
3. Verify that the hose clamp does not interfere with any other parts.



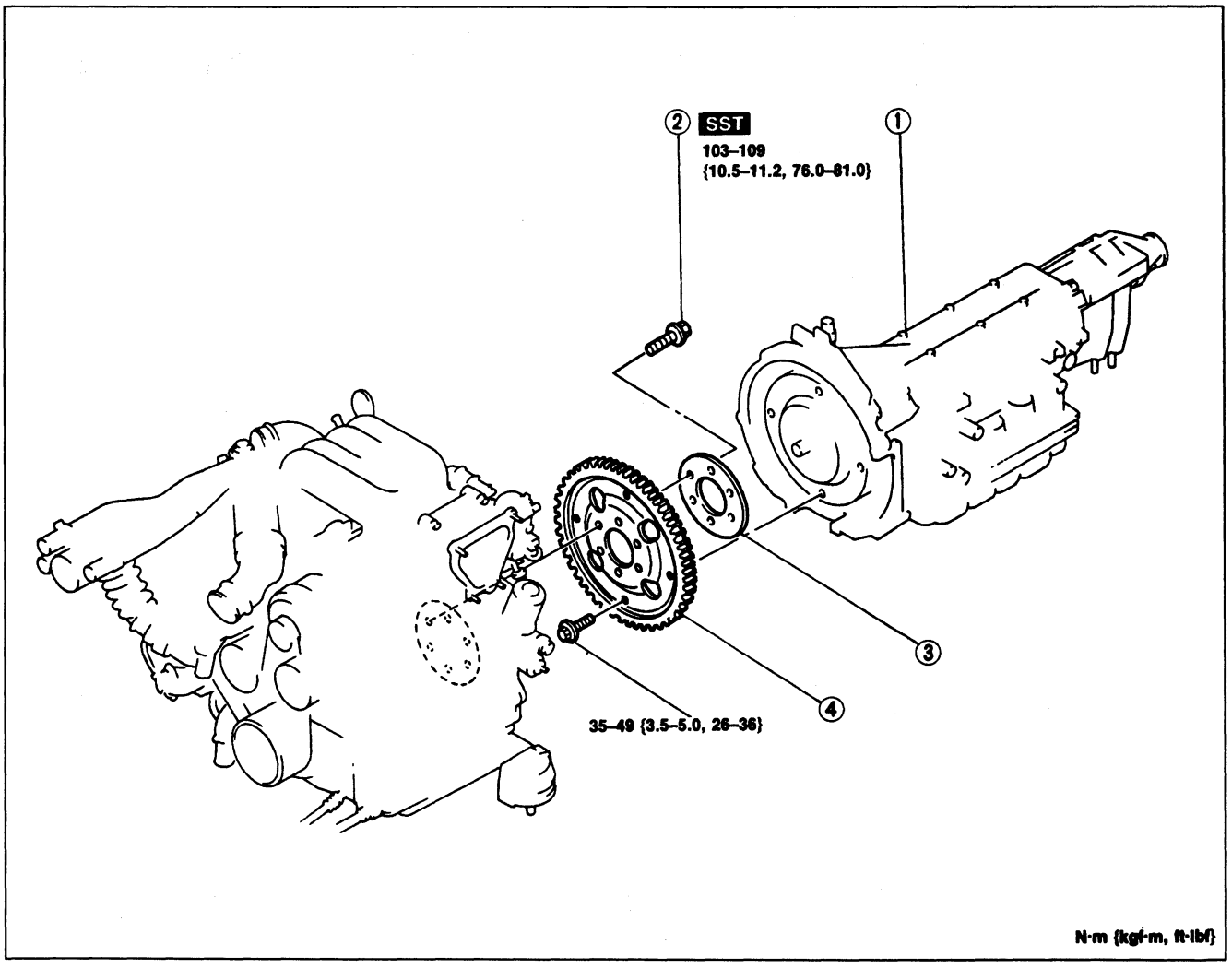
DRIVE PLATE

PREPARATION
SST

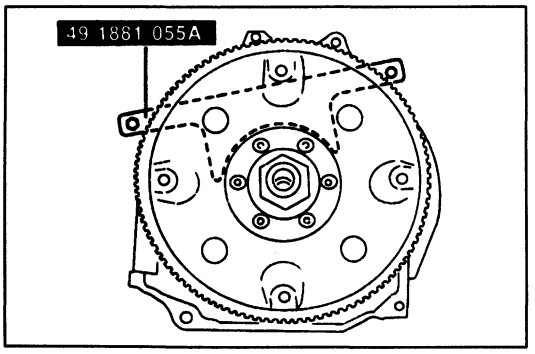
49 1881 055A Stopper, counter weight		For prevention of engine rotation

DRIVE PLATE
Removal / Inspection / Installation

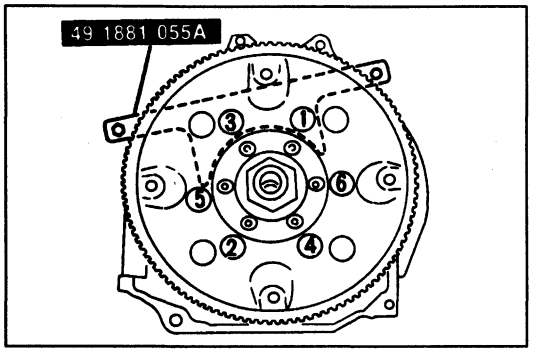
1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Inspect all parts and replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.



1. Transmission
   - Removal ..... page K- 42
   - Installation ..... page K-149
2. Drive plate mounting bolts
   - Removal Note ..... page K-157
   - Installation Note ..... page K-157
3. Adapter
4. Drive plate
   - Inspect for cracks and for ring gear wear and damage



Removal note
Drive plate mounting bolts
1. Set the **SST** or equivalent against the drive plate.
2. Remove the drive plate.

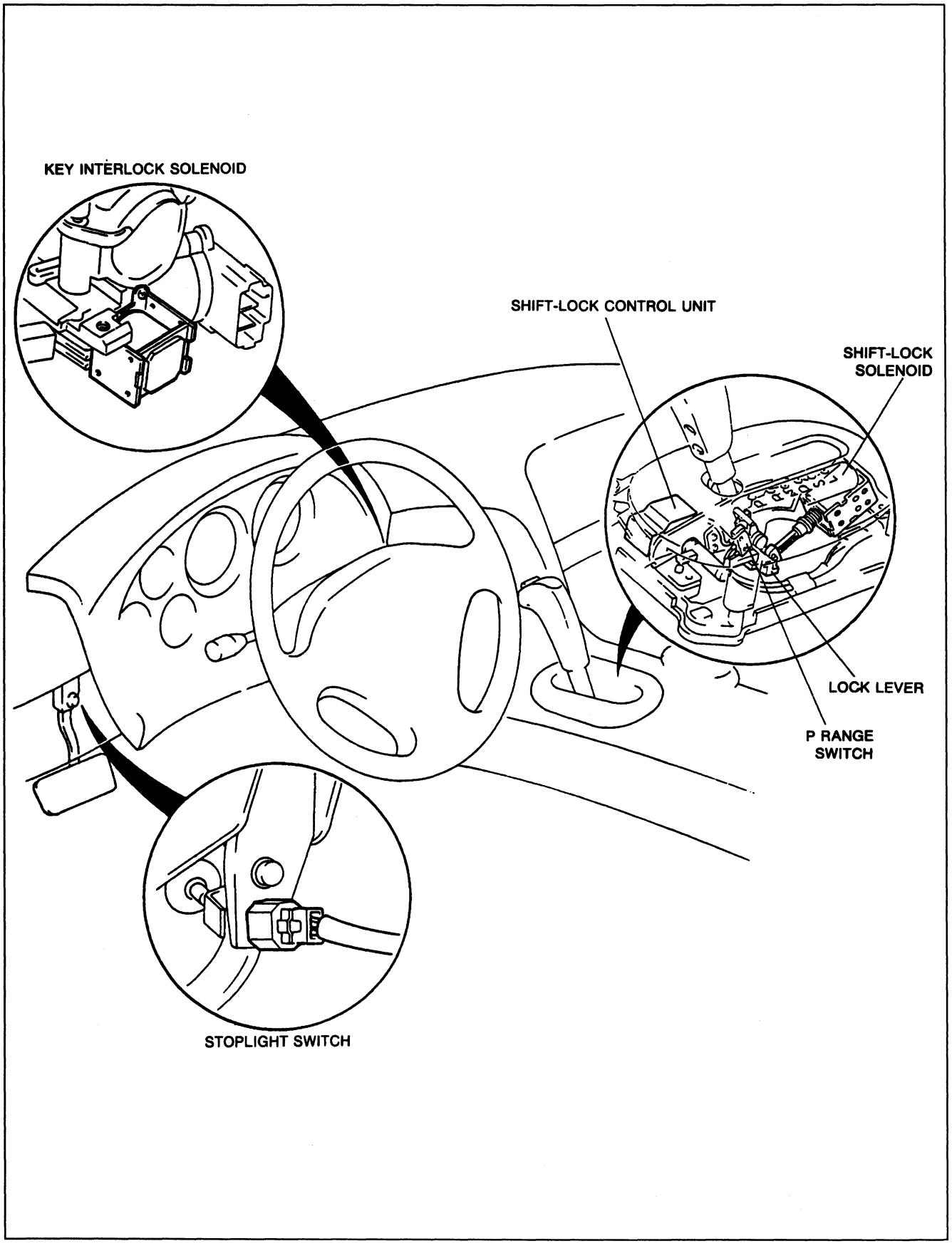


Installation note
Drive plate mounting bolts
1. Set the **SST** or equivalent against the drive plate.
2. Tighten the drive plate installation bolts in two or three steps as shown.

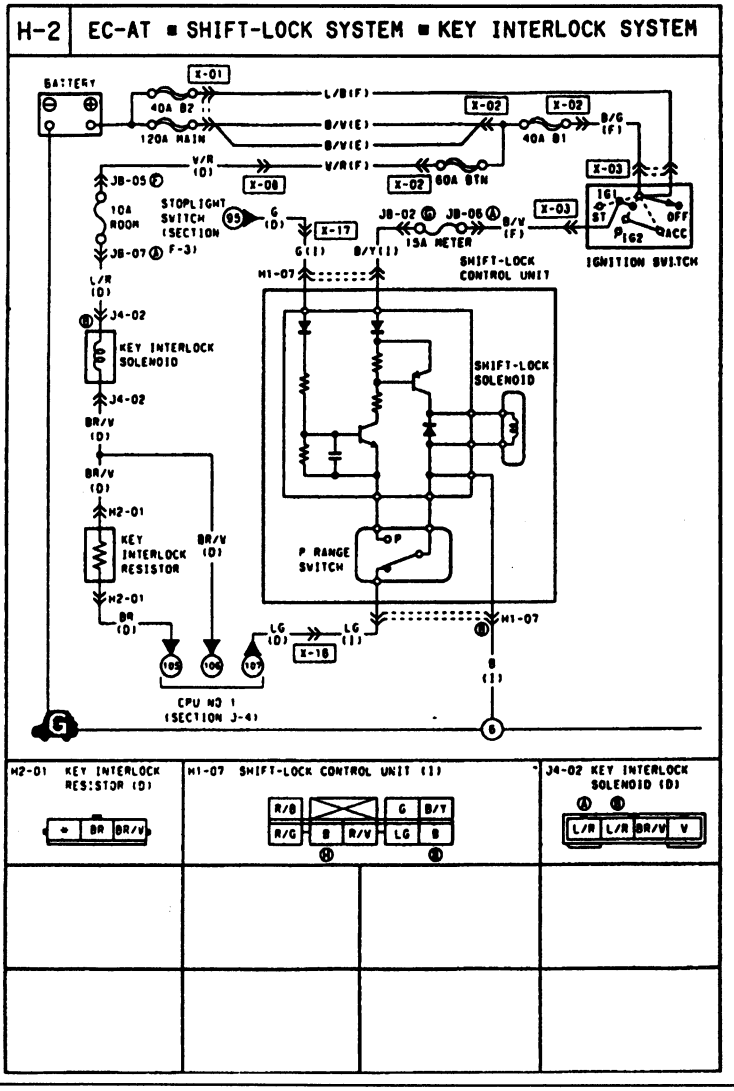
Tightening torque:
103–109 N·m {10.5–11.2 kgf·m, 76.0–81.0 ft·lbf}

SHIFT MECHANISM

SHIFT-LOCK SYSTEM COMPONENTS



TROUBLESHOOTING
Circuit Diagram



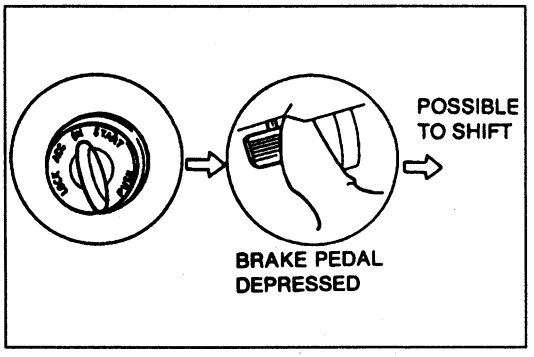
Diagnosis chart

Problem	Possible cause	Action	Page
Selector lever cannot be moved from P range with brake pedal depressed and ignition switch ON	MAIN 120A fuse burned	Replace	K-159
	BTN 60A fuse burned	Replace	K-159
	STOP 20A fuse burned	Replace	K-159
	METER 15A fuse burned	Replace	K-159
	Ignition switch system malfunction ● Wire harness broken ● Poor connection	 Repair or replace Connect firmly	 K-159 K-159
	Ignition switch malfunction	Inspect and replace	section T*
	Stoplight switch system malfunction ● Wire harness broken ● Poor connection	 Repair or replace Connect firmly	 K-159 K-159
	Stoplight switch remains OFF	Adjust or replace	section T*
	Shift-lock control system malfunction ● Wire harness broken ● Poor connection ● P range switch remains OFF ● Shift-lock control unit malfunction ● Shift-lock solenoid malfunction	 Repair or replace Connect firmly Inspect and replace Inspect and replace Inspect and replace	 K-159 K-159 K-162 K-162 K-162
	Misadjustment of selector lever or improper assembly of shift-look solenoid	Adjust or repair	K-164

* Refer to 1994 RX-7 Body Electrical Troubleshooting Manual.

Problem	Possible cause	Action	Page
Selector lever can be moved from P range with ignition switch ON, but without brake pedal depressed	Stoplight switch remains ON	Adjust or replace	section T*
	Shift-lock control system malfunction ● Shift-lock control unit malfunction	Inspect and replace	K-162
	Misadjustment of selector lever or improper assembly of Shift-lock solenoid	Adjust or repair	K-164
Selector lever can be moved from P range with ignition switch OFF and brake pedal depressed	Ignition switch malfunction	Inspect and replace	section T*
	Shift-lock control system malfunction ● Shift-lock control unit malfunction	Inspect and replace	K-162
	Misadjustment of selector lever or improper assembly of Shift-lock solenoid	Adjust or repair	K-164
Shift-lock solenoid operation heard when brake pedal depressed with ignition switch ON in other than P range	P range switch remains ON	Inspect and replace	K-162
	Misadjustment of selector lever or improper assembly of Shift-lock solenoid	Adjust or repair	K-164
Selector lever remains locked when emergency override button operated	Emergency override button not pushed fully down	Push down fully and hold emergency override button, and move selector lever	—
	Broken emergency override button	Replace	K-168
	Misadjustment of indicator panel	Adjust	K-165
Ignition key can be turned to lock position with selector lever in other than P range	MAIN 120A fuse burned	Replace	K-159
	BTN 60A fuse burned	Replace	K-159
	ROOM 10A fuse burned or not installed	Replace or install	K-159
	P range switch system malfunction ● Wire harness broken ● Poor connection	 Repair or replace Connect firmly	 K-159 K-159
	P range switch remains ON	Inspect and replace	K-162
	Key interlock solenoid malfunction ● Wire harness broken ● Poor connection ● Key interlock solenoid malfunction	 Repair or replace Connect firmly Inspect and replace	 K-159 K-159 K-162
	Key interlock resistor malfunction ● Wire harness broken ● Poor connection	 Repair or replace Connect firmly	 — —
	Key cylinder (push switch) malfunction ● Wire harness broken ● Poor connection	Inspect and replace Repair or replace Connect firmly	section T* K-159 K-159
	Central processing unit (CPU) malfunction	Inspect and replace	section T*
Ignition key cannot be turned to lock position with selector lever in P range	P range switch remains OFF	Inspect and replace	K-162
	Key interlock solenoid malfunction	Inspect and replace	K-162
	Key cylinder (push switch) malfunction	Inspect and replace	section T*
	Misadjustment of selector lever	Adjust	K-164

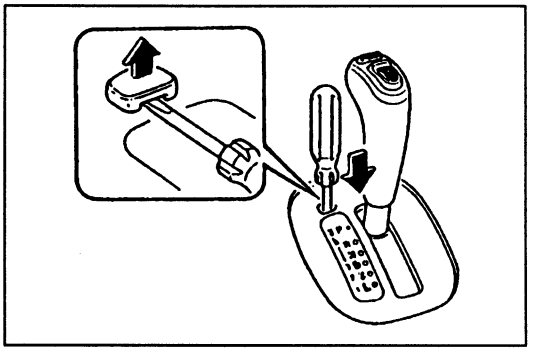
* Refer to 1994 RX-7 Body Electrical Troubleshooting Manual



SHIFT-LOCK

Inspection

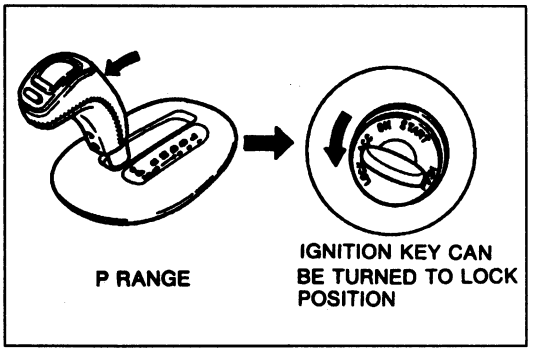
1. Turn the ignition switch to ON (engine off).
2. Verify that the selector lever is in P range.
3. Without the brake pedal depressed, verify that the selector lever cannot be shifted from P range.
4. Depress the brake pedal and verify that the selector lever can be shifted from P range.
5. If not as specified, check the Shift-lock control system connector terminal voltage and continuity. (Refer to page K-162)



EMERGENCY OVERRIDE BUTTON

Inspection

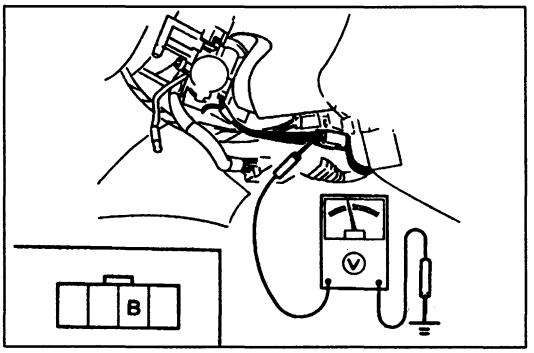
1. Turn the ignition switch to OFF.
2. Verify that the selector lever is in P range.
3. Without the brake pedal depressed, verify that the selector lever cannot be shifted from P range.
4. Insert the screwdriver provided in the tool kit into the emergency override hole and push down. Verify that the selector lever can be shifted from P range.
5. If not as specified, inspect and repair as necessary, referring to Troubleshooting. (Refer to page K-159.)

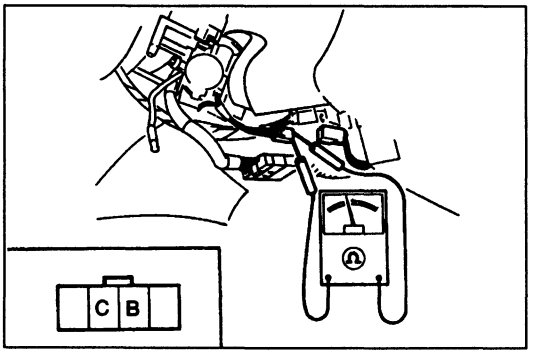


KEY INTERLOCK

Inspection

1. Turn the ignition switch ON (engine off).
2. Shift the selector lever to R range.
3. Verify that the ignition key cannot be turned to LOCK position.
4. Shift the selector lever to P range.
5. Verify that the ignition key can be turned to LOCK position.
6. If not as specified, inspect and repair as necessary, referring to Troubleshooting. (Refer to page K-159.)





KEY INTERLOCK SOLENOID

Inspection

Terminal voltage

1. Remove the column cover.
2. Turn the ignition switch ON.
3. Measure the voltage between terminals B and a ground.

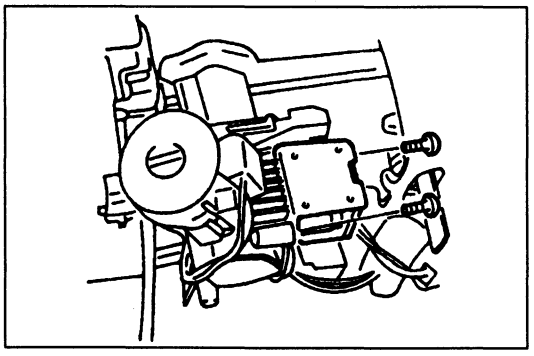
B+: Battery positive voltage

Selector lever position	Voltage
P range	B+
Except P range	0V

4. If not correct, check the key interlock solenoid continuity.

Continuity

1. Disconnect the negative battery cable and the key interlock solenoid connector.
2. Check continuity between terminals B and C.
3. If not correct, replace the key interlock solenoid.
4. Connect the key interlock solenoid connector.
5. Connect the negative battery cable.

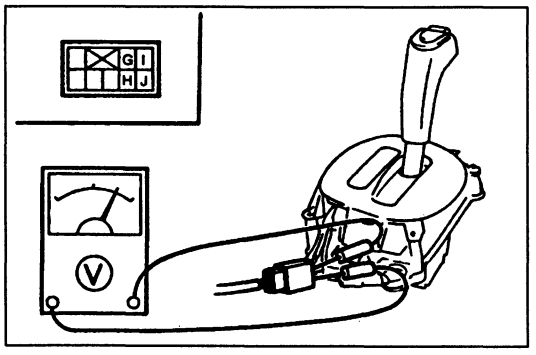


Replacement

1. Disconnect the negative battery cable.
2. Remove the column cover.
3. Disconnect the key interlock solenoid connector.
4. Remove the screws and the key interlock solenoid.
5. Install the new key interlock solenoid and tighten the screws.

Tightening torque:
6.9–12.7 N·m {70–130 kgf·cm, 61–112 in·lbf}

6. Connect the key interlock solenoid connector.
7. Install the column cover.
8. Connect the negative battery cable.



SHIFT-LOCK CONTROL SYSTEM

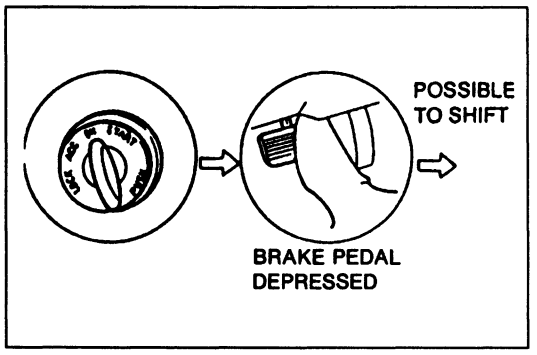
Inspection

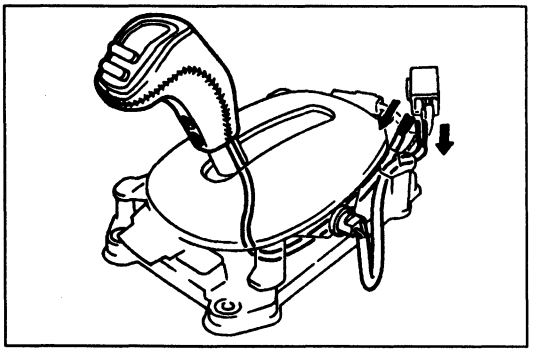
1. Remove the console panel.
2. Shift the selector lever to P range.
3. Turn the ignition switch to ON (engine off), and check terminal voltages and continuity, referring to the chart below. When checking continuity between terminal J (harness side) and ground, disconnect the connector.

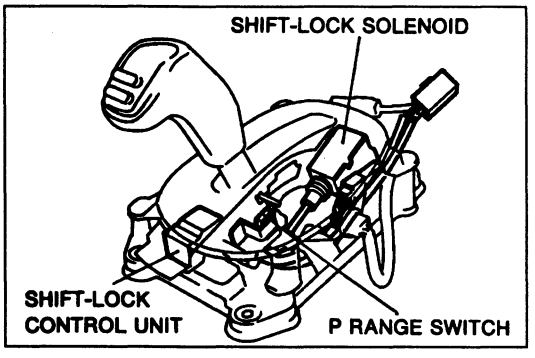
4. Turn the ignition switch OFF, and check continuity between terminal J and a ground, referring to the chart below.
5. If not as specified, repair the wire harness and/or replace the P range switch, shift-lock solenoid, and shift-lock control unit as an assembly.

B+: Battery positive voltage

Terminal	(–) terminal connected to	Measured value	Condition		Specification
G	Ground	Voltage	Brake pedal released → depressed		0V → B+
H	J	Continuity	P range	Selector lever push button released	No
				Selector lever push button depressed	Yes
			Except P range		Yes
I	Ground	Voltage	Ignition switch OFF → ON		0V → B+
J	Ground	Continuitiy	Constant		Yes





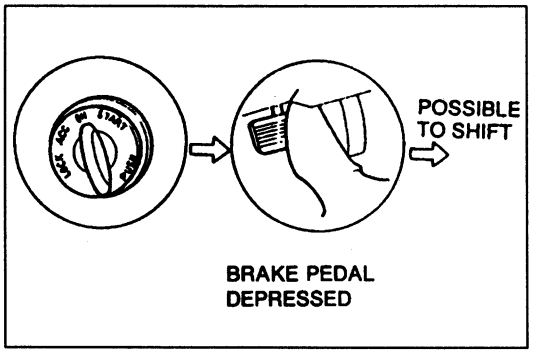


5. Install the console panel.
6. Verify correct operation of the shift-lock system. (Refer to page K-161.)

Replacement

Replace the P range switch, shift-lock solenoid, and shift-lock control unit as an assembly if even one of them is not correct.

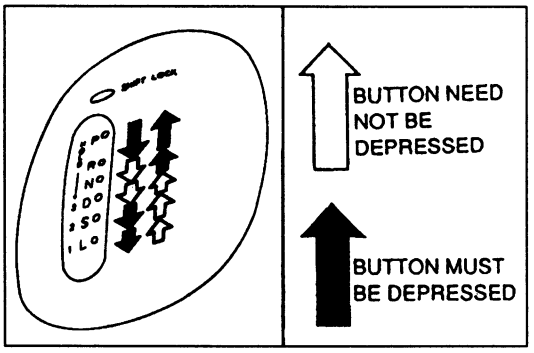
1. Disconnect the negative battery cable.
2. Remove the console panel and rear console.
3. Remove the indicator screws and lift up the indicator panel.
4. Disconnect the shift-lock control unit connector.
5. Pull the hold switch terminals and the position indicator light terminals out of the connector.
6. Remove the P range switch, shift-lock solenoid, and shift-lock control unit as an assembly.
7. Install the new P range switch, shift-lock solenoid, and shift-lock control unit as an assembly.
8. Insert the hold switch terminals and the position indicator light terminals into the connector.
9. Connect the shift-lock control unit connector.
10. Install and adjust the indicator panel. (Refer to page K-165.)
11. Install the console panel and rear console.
12. Connect the negative battery cable.
13. Verify correct operation of the shift-lock system. (Refer to page K-161.)



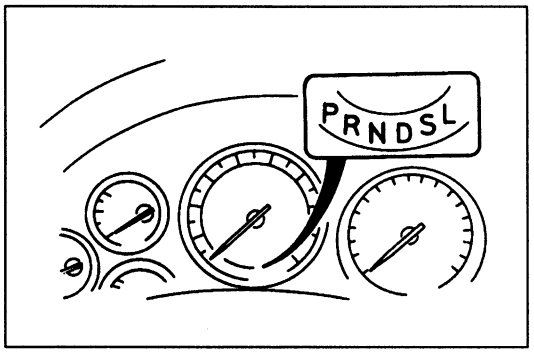
SELECTOR LEVER

Inspection

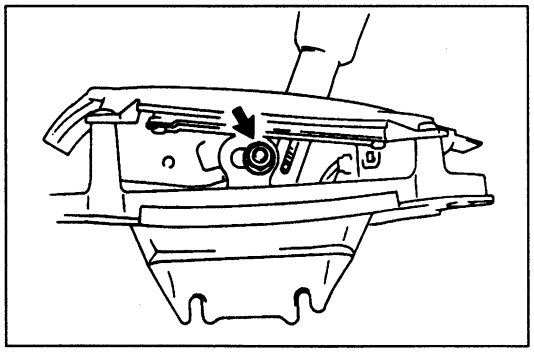
1. Turn the ignition switch to ON (engine off).
2. With the brake pedal depressed, verify that there is a "click" at each range when shifted in the pattern shown.



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 → L 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 K-165.)



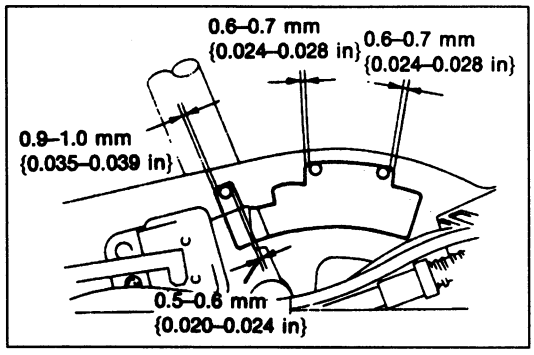
7. Verify that the positions of the selector lever and the selector indicator light in the instrument cluster are aligned.
8. If not as specified, adjust the park/neutral switch. (Refer to page K-28.)
9. Verify that the vehicle operates correctly in the selected ranges.



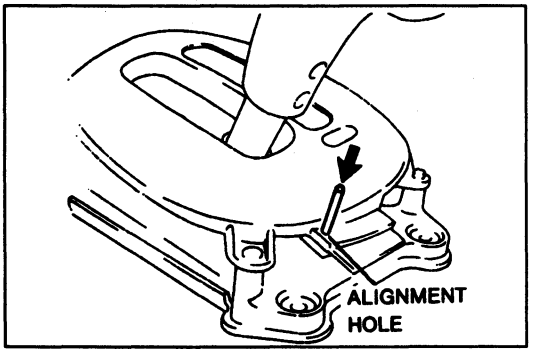
Adjustment

1. Remove the console panel.
2. Remove the indicator screws and lift up the indicator panel.
3. Shift the selector lever to P range.
4. Loosen the locknut as shown.
5. Adjust the lever so that the clearance between the guide plate and the guide pin in P range is as shown.
6. Tighten the locknut.

Tightening torque:
20–28 N·m {2.0–2.9 kgf·m, 15–20 ft·lbf}



7. Move the selector lever to N and D ranges and verify that the clearance between the guide plate and the guide pin is the same at both positions.
8. If not as specified, readjust the lever.
9. Install and adjust the indicator panel. (Refer to page K-165.)
10. Install the console panel.
11. Connect the negative battery cable.



Indicator panel adjustment

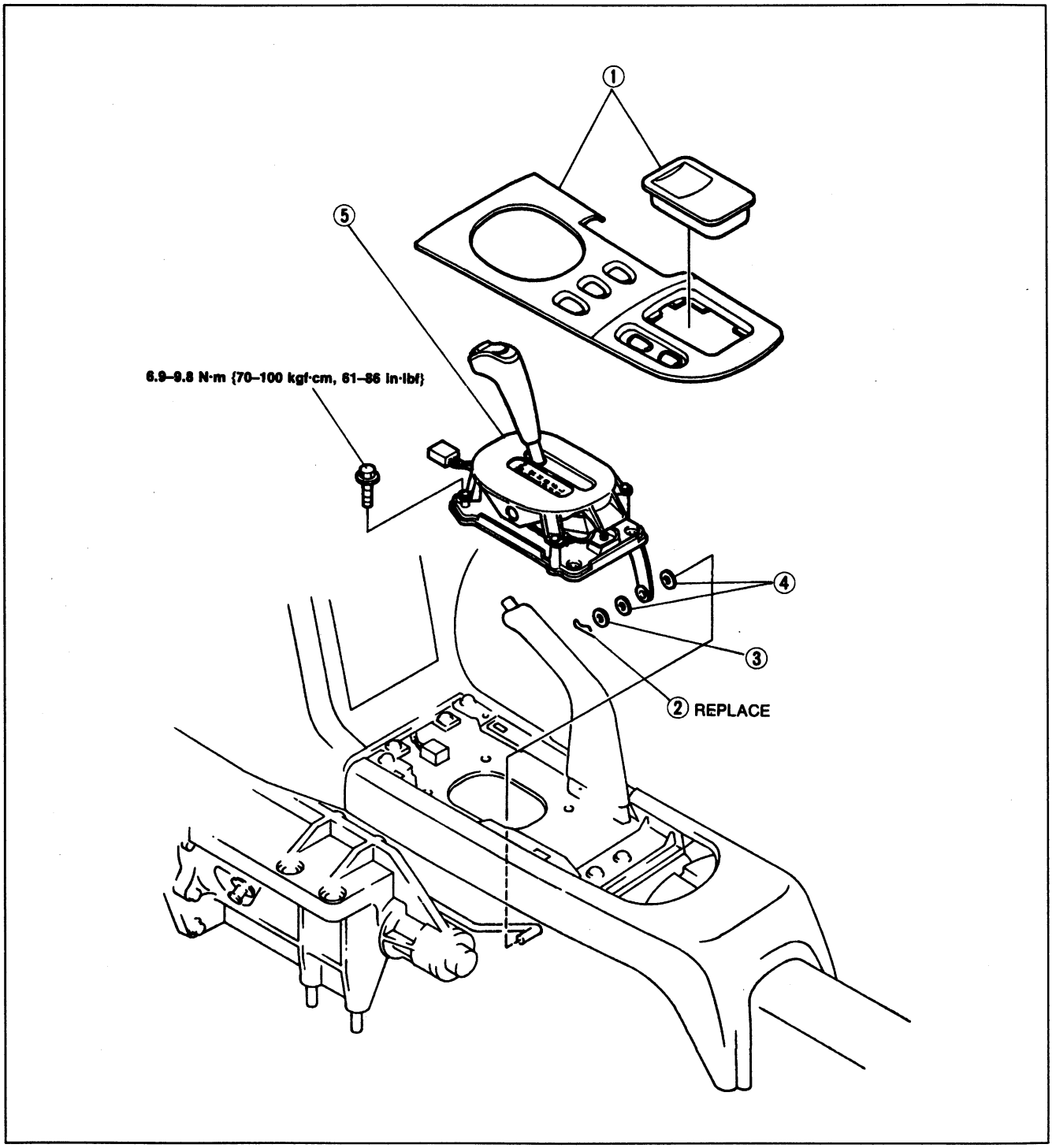
1. Shift the selector lever to P range.
2. Align the alignment holes in the slider with the holes in the indicator panel.
3. Install a suitable heavy-gauge wire to hold the slider.
4. Tighten the indicator screws.

   Tightening torque:
   2.0–2.9 N·m {20–30 kgf·cm, 18–26 in·lbf}

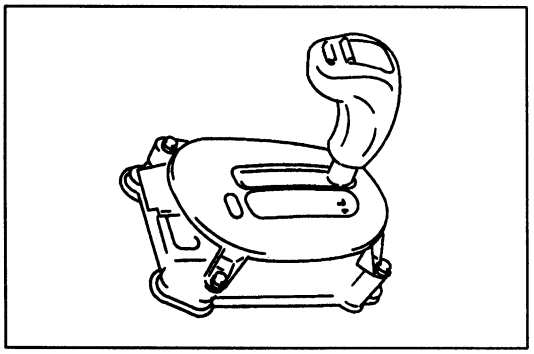
5. Remove the wire.
6. Verify that the selector lever properly aligns with the indicator in each range.

Removal / Installation

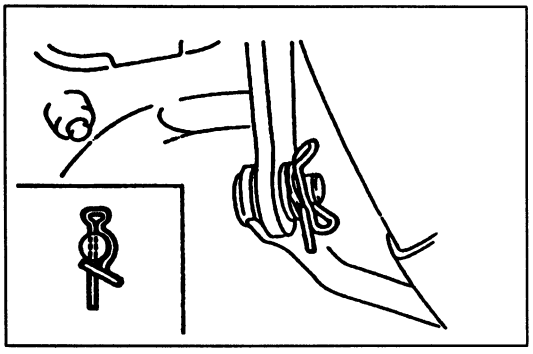
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. Connect the negative battery cable.
5. After installation, check the shift-lock, emergency override button, and key interlock operations.



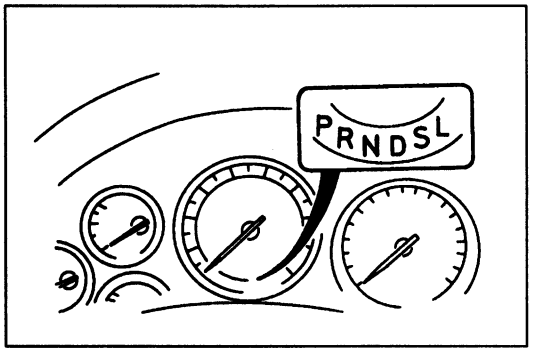
1. Console panel
2. Spring pin
   - Removal Note ..... page K-167
   - Installation Note ..... page K-167
3. Wave washer
4. Washer
5. Selector lever
   - Inspection ..... page K-164
   - Adjustment ..... page K-164
   - Disassembly / Inspection / Assembly ..... page K-168



Removal Note
Spring pin
1. Shift the selector lever to L range.
2. Remove the spring pin and washer.
3. Remove the selector rod from the adjustment lever.



Installation Note
Spring pin
1. Shift the selector lever to L range.
2. Install the selector rod to the adjustment lever.
3. Install the washer and new spring pin as shown.



4. Tighten the selector lever bolt.

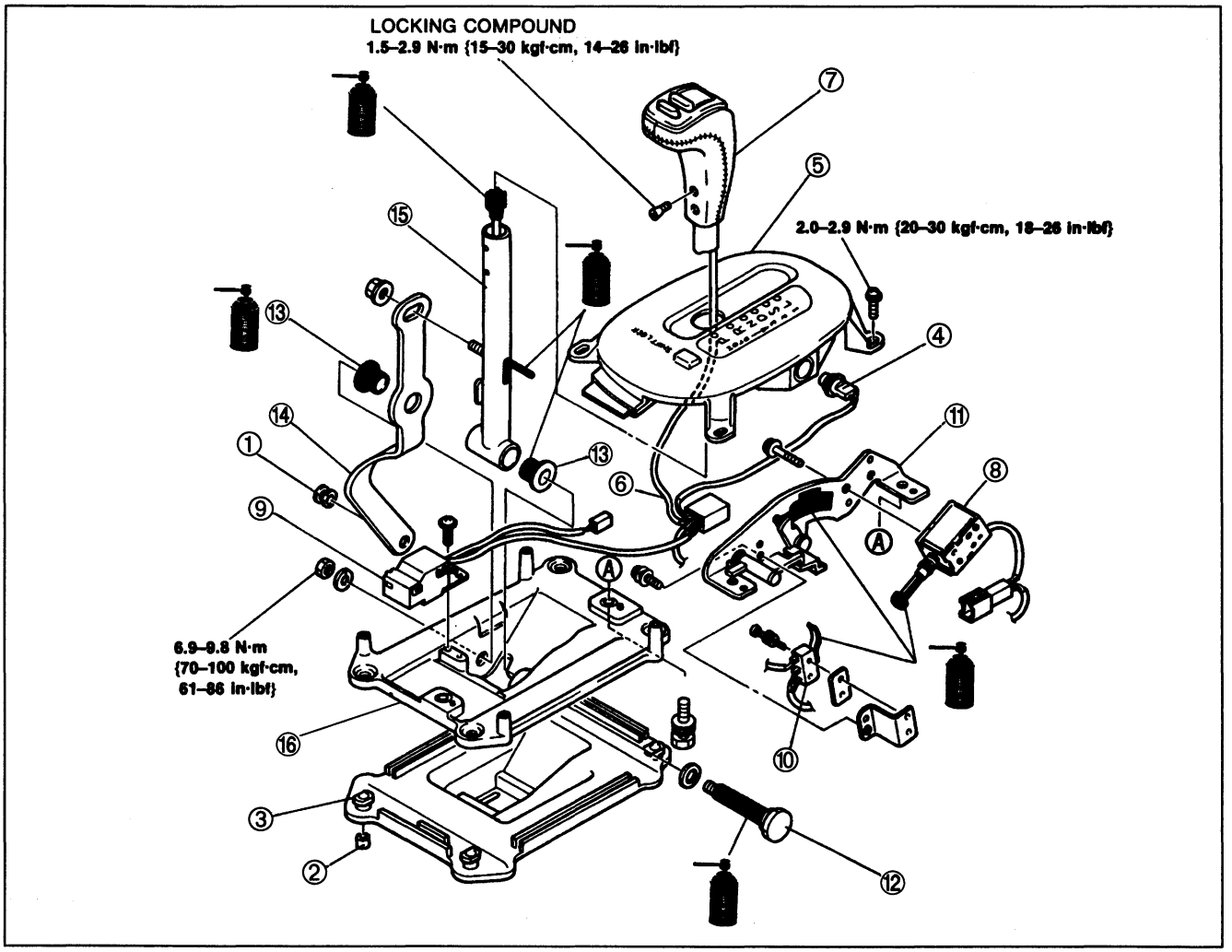
   Tightening torque:
   6.9–9.8 N·m {70–100 kgf·cm, 61–86 in·lbf}

5. Verify that the positions of the selector lever and the selector indicator light are aligned.

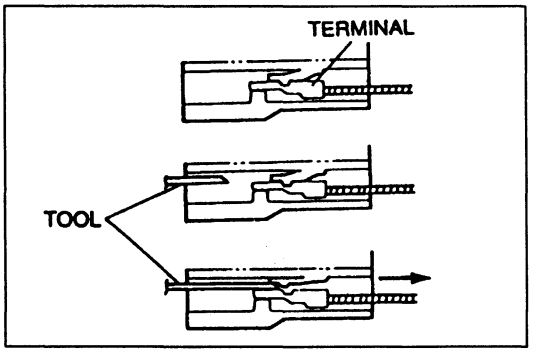
Disassembly / Inspection / Assembly

Note
- The P range switch does not need to be removed unless necessary.

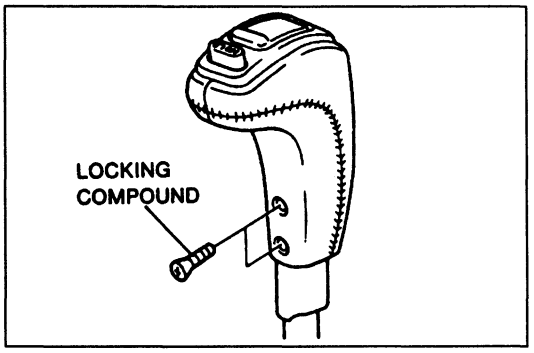
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.
4. If the adjustment lever locknut is loosened, adjust the selector lever after installation. (Refer to page K-164.)



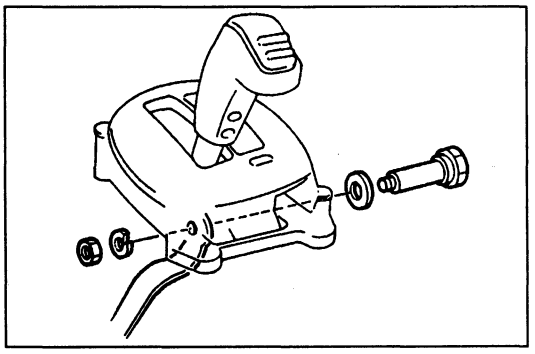
1. Bushing
2. Spacer
3. Boot
4. Position indicator light
5. Indicator panel
   Assembly Note ..... page K-170
6. Connector pin
   Disassembly Note ..... page K-169
7. Selector lever knob
   Disassembly Note ..... page K-169
   Assembly Note ..... page K-170
8. Shift-lock solenoid
   Inspection ..... page K-162
9. Shift-lock control unit
   Inspection ..... page K-162
10. P range switch
    Inspection ..... page K-162
11. Guide plate
12. Spindle
    Disassembly Note ..... page K-169
    Assembly Note ..... page K-169
13. Bushing
14. Adjustment lever
15. Selector lever
    Inspection for smooth operation
    Inspection guide pin for damage and wear
16. Selector lever bracket.



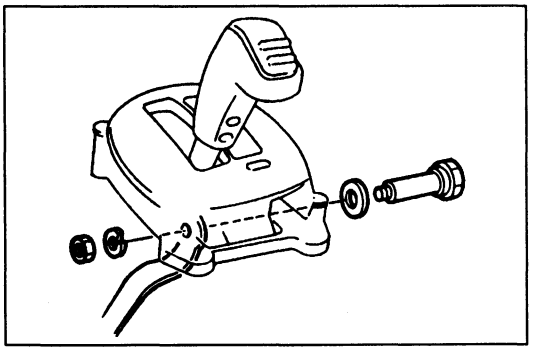
Disassembly Note
Connector pin
1. Insert a thin piece of metal from the terminal side of the connector, and press down the terminal locking top.
2. Pull the terminal out of the connector.



Selector lever knob
1. Remove the screws from selector lever knob.
2. Remove the selector lever knob and sleeve.

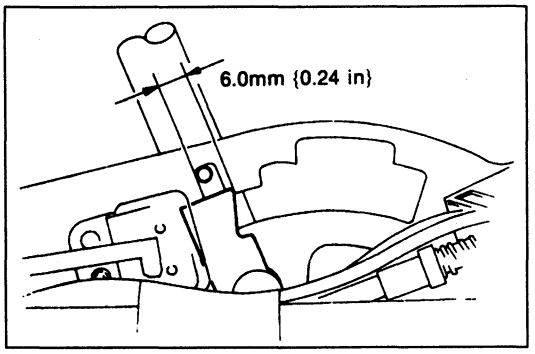


Spindle
1. Shift the selector lever to P range.
2. Secure the adjustment lever in a vise.
3. Remove the spindle nut.

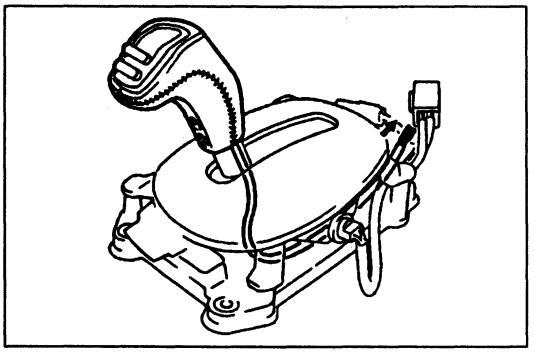


Assembly Note
Spindle
1. Install the selector lever and spindle to the selector lever bracket.
2. Shift the selector lever to P range.
3. Place the adjustment lever in a vise and tighten the spindle nut.

Tightening torque:
6.9–9.8 N·m {70–100 kgf·cm, 61–86 in·lbf}

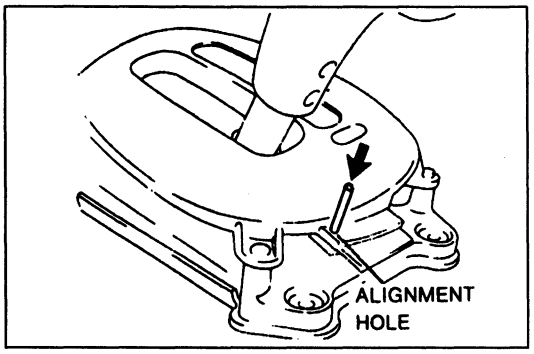


4. Verify that the overlap of the guide pin and the lock lever is within specification with the selector lever pushed forward.



Indicator panel

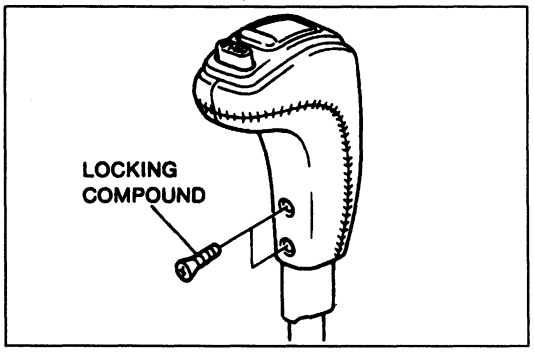
1. Install the selector sleeve and the selector lever knob to the selector lever.
2. Position the hold switch harness as shown.
3. Insert the connector pin to the connector.
4. Shift the selector lever to P range.



5. Align the align ment holes in the slider with the holes in the indicator panel.
6. Install a suitable heavy-gauge wire to hold the slider.
7. Tighten the indicator screws.

Tightening torque:
2.0–2.9 N·m {20–30 kgf·cm, 18–26 in·lbf}

8. Remove the wire.
9. Verify that the selector lever properly aligns with the indicator in each range.



Selector lever knob

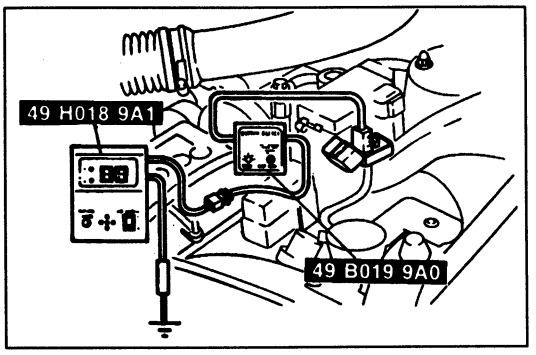
1. Apply locking compound to the screws.
2. Tighten the screws.

Tightening torque:
1.5–2.9 N·m {15–30 kgf·cm, 14–26 in·lbf}

TROUBLESHOOTING GUIDE

GENERAL NOTES

A problem with the Powertrain Control Module (Transmission) may be caused by the engine, the Powertrain Control Module (Transmission), the hydraulic control system, or the electronic control system. When troubleshooting, begin with those points which can be inspected quickly and easily. The recommended troubleshooting sequence is described below.

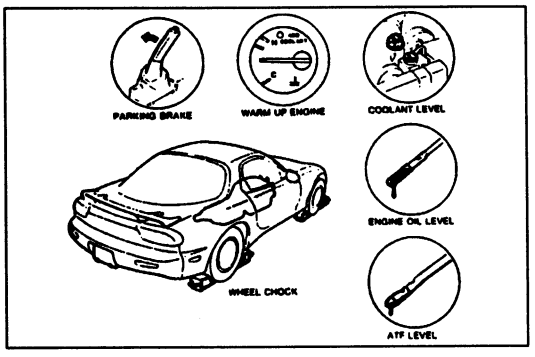


Step 1: Self-diagnostic System Inspection

Check for diagnostic trouble code(s) memorized in the Powertrain Control Module (Transmission) by using the **Self-Diagnosis Checker**. (Refer to page K-214.)

Note

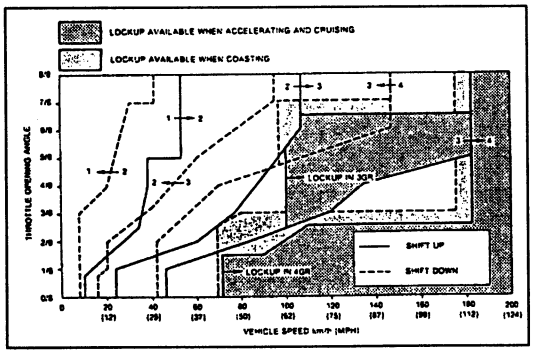
- You can also check the flashing sequence of the HOLD indicator light for diagnostic trouble codes (Refer to page K-214)



Step 2: Mechanical System Test

1. Check the engine stall speed, time lag, and line pressure. (Refer to page K-9.)

2. Check the shift point, shift schedule, and shift shock (Refer to page K-16). Use the Powertrain Control Module (Transmission) when checking vehicle speed, engine speed, throttle opening (throttle position sensor voltage), and gear position



Step 3: Road Test

Check the shift point, shift schedule, and shift shock. (Refer to page K-16) For correct testing, the vehicle speed, engine speed, throttle opening (throttle sensor voltage), and gear position should be checked with the Engine Signal Monitor.

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 "Self-diagnosis" row of the QUICK DIAGNOSIS CHART (I) are diagnosed by the powertrain control module (Transmission) self-diagnosis function. **Self-Diagnosis Checker** can be used for easy retrieval of the service code numbers.
2. Components indicated in the "Adjustment" row 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 (Transmission) for the components indicated in the Engine Signal Monitor row of the QUICK DIAGNOSIS CHART (I) can be easily checked by using the **Engine Signal Monitor**.
4. Components indicated in the "Stall Test" row of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the stall test.
5. Components indicated in the "Time Lag Test" row of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the time lag test.
6. Components indicated in the "Line Pressure Test" row of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the row pressure test.
7. Components indicated in the "Road Test" row of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the road test.
8. 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								Electronic system																
		K-25	K-164	section F	section G	K-9	K-12	K-14	K-16	K-28	section F	K-29	K-29	section G	K-31	K-32	K-32	K-32	K-33	K-32	K-32	K-32	K-30	K-35	section F	K-35	K-27	K-35
		ATF level and condition	Selector lever	Idle speed and ignition timing	Ignition system and starter	Stall test	Time lag test	Line pressure test	Road test	Park/neutral switch	Throttle position sensor	Vehicle speed sensor (revolution sensor)	Vehicle speedometer sensor	Engine rpm signal	ATF thermosensor	Shift A solenoid valve	Shift B solenoid valve	Line pressure solenoid valve	Dropping resistor	Lockup solenoid valve	Lockup control solenoid valve	Overrunning clutch solenoid valve	Vehicle speed pulse generator	Inhibitor signal	Idle signal	4GR inhibit signal (ASC signal)	Hold switch	A/C signal
Self-diagnosis											○	○	○	○	○	○	○	○		○	○	○	○					
Adjustment		○	○	○						○	○																	
Testers	Self-diagnosis Checker										○	○	○	○	○	○	○	○		○	○	○	○					
	Engine Signal Monitor									○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
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 / Item	
Slip lockup signal	Torque reduced signal	Reduce torque signal	Stoplight switch	Slip lockup OFF signal	Water thermoswitch	Barometric absolute pressure sensor	Mileage switch		Control valve body	N-D accumulator	1-2 accumulator	2-3 accumulator	3-4/N-R accumulator	Band servo	Oil pump	Hydraulic circuit	Torque converter	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrunning clutch	Low one-way clutch	Low and reverse brake	Brake band (and servo)	Parking mechanism	
K-35	K-35	K-35	K-35	K-35	K-34	K-35	K-35		K-108	K-58	K-58	K-58	K-58	K-76	K-60	K-253	K-57	K-64	K-70	K-83	K-80	K-83	K-83	K-91	K-76	K-97	
	○					○																					Self-diagnosis
			○																								Adjustment
	○	○				○																					Self-Diagnosis Checker (Testers)
○	○	○	○		○	○	○																				Engine Signal Monitor (Testers)
									○						○		○	○	○	○	○		○	○	○		Stall test
										○	○		○					○		○			○	○	○		Time lag test
									○						○	○		○		○				○			Line pressure test
									○	○	○	○	○							○	○	○	○	○	○	○	Road test

QUICK DIAGNOSIS CHART (II-1)

Troubleshooting item \ Possible parts and reference page			Preliminary						Electronic system																				
			K-25	K-164	section F	section G	K-9	K-12	K-14	K-16	K-28	section F	K-29	K-29	section G	K-31	K-32	K-32	K-32	K-33	K-32	K-32	K-32	K-30	K-35	section F	K-35	K-27	K-35
			ATF level and condition	Selector lever	Idle speed and ignition timing	Ignition system and starter	Stall test	Time lag test	Line pressure test	Road test	Park/neutral switch	Throttle position sensor	Vehicle speed sensor (revolution sensor)	Vehicle speedometer sensor	Engine rpm signal	ATF thermosensor	Shift A solenoid valve	Shift B solenoid valve	Line pressure solenoid valve	Dropping resistor	Lockup solenoid valve	Lockup control solenoid valve	Overrunning clutch solenoid valve	Vehicle speed pulse generator	Inhibitor signal	Idle signal	4GR inhibit signal (ASC signal)	Hold switch	A/C signal
6	Engine starts in other than P and N ranges			3		2					1																		
14	Engine stalls	Idle when shifted from N or P to other ranges			1						3		5											4	2				
18		On deceleration	1		2						4		6											5	3				
24	Engine rough	On deceleration	1	3					2			6							4	5									
25	Poor acceleration	Drive away	1				3		2	7	10	6	12				8	9	4	5								11	
26		On acceleration																											
30	Surges while cruising											1	3								4					2			
31	Lack of power		1				3		2	7	10	6	12				8	9	4	5								11	
32	Poor fuel economy										10	7	11		9	6	3	4			1	2	5			8	13	14	
40	Vehicle does not move in D, S, L, and/or R range		1	4					2	3		7							5	6									
	①	Vehicle does not move in D, S, and/or L range		1																									
	②	Vehicle does not move in D, and/or S range		1					2										3	4									
	③	Vehicle does not move in R range	1						2										3	4									
41	Vehicle moves in N range		1	3					2			6							4	5									
42	Vehicle moves in P range			1						2																			
43	Excessive creep				1		3		2		9	6							4	5				8	7				
44	No shift									1			5				2	3									4		
	①	Does not shift from 1st to 2nd											4				2	3									1		
	②	Does not shift from 2nd to 3GR											2					1											
	③	Does not shift from to 4GR															1												
	④	Does not shift from 4GR to 3GR									5		6			1	2	3					4				7	8	
	⑤	Does not shift from 4GR to 2nd, or 3GR to 2nd	1						6			2					3	4										5	
	⑥	Does not shift from 3GR to 1st, or 2nd to 1st	1						6			2					3	4										5	
45	Abnormal shift		1									2	3																
	①	Shifts directly from 1st to 3GR	1																										
	②	Does not kickdown when accelerator is depressed in 4GR within kickdown range										1	2				3	4											
	③	Excessive engine speed when accelerated in 4GR due to delayed kickdown										2	1				3	4											
46	Frequent shifting											1																	
47	Shift point high or low											1	3		2														4
48	No lockup										7	4	8		6	3					1	2				5			
49	No kickdown											1	5				2	3									4		

* Numbers in ○ indicate the inspection sequence.

QUICK DIAGNOSIS CHART (II-1)

Electronic system									Hydraulic control system								Powertrain										Possible parts and reference page / Troubleshooting item		
K-35	K-35	K-35	K-35	K-35	K-34	K-35	K-35	K-108	K-58	K-58	K-58	K-58	K-76	K-60	K-253	K-57	K-64	K-70	K-83	K-80	K-83	K-83	K-91	K-76	K-97			
Slip lockup signal	Torque reduced signal	Reduce torque signal	Stoplight switch	Slip lockup OFF signal	Water thermoswitch	Barometric absolute pressure sensor	Mileage switch	Control valve body	N-D accumulator	1-2 accumulator	2-3 accumulator	3-4/N-R accumulator	Band servo	Oil pump	Hydraulic circuit	Torque converter	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrunning clutch	Low one-way clutch	Low and reverse brake	Brake band (and servo)	Parking mechanism			
																										Engine starts in other than P and N ranges		6
									6						8	7										Idle when shifted from N or P to other ranges	Engine stalls	14
									7						9	8										On deceleration		18
								7										10	9		8		12	11		On deceleration	Engine rough	24
5								13					14	19	21	20	15	16					18	17		Drive away	Poor acceleration	25
																										On acceleration		26
								6							7	8										Surges while cruising		30
								13					14	19	21	20	15	16					18	17		Lack of power		31
					12			15					18		17	16								19		Poor fuel economy		32
								8					9	10	18	14	17	11	16				13	12	15	Vehicle does not move in D, S, L, and/or R range		
															3							2				Vehicle does not move in D, S, and/or L range	①	40
								5							11		6	7	8		9		10			Vehicle does not move in D, and/or S range	②	
								5	6						12		7	8	9	10		11				Vehicle does not move in R range	③	
								7							11		10		8		9					Vehicle moves in N range		41
																									3	Vehicle moves in P range		42
								10																		Excessive creep		43
								6					7		10			9						8		No shift		
								5					6		9			8						7		Does not shift from 1st to 2nd	①	
								3					4		7			6						5		Does not shift from 2nd to 3GR	②	
								2					3		7						5		6	4		Does not shift from to 4GR	③	44
								9					10		12									11		Does not shift from 4GR to 3GR	④	
								7					9		11			8						10		Does not shift from 4GR to 2nd, or 3GR to 2nd	⑤	
								7					10		12			8				9		11		Does not shift from 3GR to 1st, or 2nd to 1st	⑥	
								4					5		7									6		Abnormal shift		
										2			3		5									4		Shifts directly from 1st to 3GR	①	
																										Does not kickdown when accelerator is depressed in 4GR with in kickdown range	②	45
																										Excessive engine speed when accelerated in 4GR due to delayed kickdown	③	
								2							3											Frequent shifting		46
								5																		Shift point high or low		47
								9							11	10										No lockup		48
								6																		No kickdown		49

QUICK DIAGNOSIS CHART (II-2)

Troubleshooting item \ Possible parts and reference page				Preliminary						Electronic system																				
				K-25	K-164	section F	section G	K-9	K-12	K-14	K-16	K-28	section F	K-29	K-29	section G	K-31	K-32	K-32	K-32	K-33	K-32	K-32	K-32	K-30	K-35	section F	K-35	K-27	K-35
				ATF level and condition	Selector lever	Idle speed and ignition timing	Ignition system and starter	Stall test	Time lag test	Line pressure test	Road test	Park/neutral switch	Throttle position sensor	Vehicle speed sensor (revolution sensor)	Vehicle speedometer sensor	Engine rpm signal	ATF thermosensor	Shift A solenoid valve	Shift B solenoid valve	Line pressure solenoid valve	Dropping resistor	Lockup solenoid valve	Lockup control solenoid valve	Overrunning clutch solenoid valve	Vehicle speed pulse generator	Inhibitor signal	Idle signal	4GR inhibit signal (ASC signal)	Hold switch	A/C signal
50		Engine speed flares up	When accelerating	1	3					2			6						4	5										
51			When upshifting and/or downshifting	1	3			9		2			6	8					4	5				7						
	①		During 1st to 2nd shifting	1	2			9		3			6	8					4	5					7					
	②		During 2nd to 3GR shifting	1	2			9		3			6	8					4	5					7					
	③		During 3GR to 4GR shifting	1	2			9		3			6	8					4	5				7						
	④		During 4GR, or 3GR to 2nd shifting	1	2			8		3			6						4	5				7						
	⑤		During 3GR, or 2nd to 1st shifting	1	2			9		3			6					8	4	5				7						
52		Excessive shift shock	P, N to R and/or N to D	1		2		4		3		10	7						5	6				9	8					
53			When upshifting and/or downshifting	1				3		2			6	10			8		4	5				9		7				
	①		During 1st to 2nd shifting					12		1			4	7			5		2	3				6						
	②		During 2nd to 3GR shifting					12		1			4	7			5		2	3				6						
	③		During 3GR to 4GR shifting					8		1			4	7			5		2	3				6						
	④		During 2nd to 1st shifting in L range					10		1			4	7			5		2	3				6						
	⑤		When coasting							2			5	8			6		3	4			1	7		9				
	⑥		During lockup	1									3	7		6					2			5		4				
54	No engine braking			1								5	3										2				4			
55	No mode changes																											1		
56	Transmission noise		N and/or P ranges	1									4	5		6			2	3										
57			All ranges	1																										
58	Transmission overheats			1				3		2			6						4	5	7	8								
				2		1				4			7	10		9			5	6	3					8				
					3		2					1																		
												3													2	1				

* Numbers in ○ indicate the inspection sequence.

QUICK DIAGNOSIS CHART (II-2)

Electronic system									Hydraulic control system								Powertrain										Possible parts and reference page / Troubleshooting item		
K-35	K-35	K-35	K-35	K-35	K-34	K-35	K-35	K-108	K-58	K-58	K-58	K-58	K-76	K-60	K-253	K-57	K-64	K-70	K-83	K-80	K-83	K-83	K-91	K-76	K-97			
Slip lockup signal	Torque reduced signal	Reduce torque signal	Stoplight switch	Slip lockup OFF signal	Water thermoswitch	Barometric absolute pressure sensor	Mileage switch	Control valve body	N-D accumulator	1-2 accumulator	2-3 accumulator	3-4/N-R accumulator	Band servo	Oil pump	Hydraulic circuit	Torque converter	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrunning clutch	Low one-way clutch	Low and reverse brake	Brake band (and servo)	Parking mechanism			
								7						13	15	14	11		8	9		10	12			When accelerating	Engine speed flares up	50
							10	11		12	13	14			20			16	17	18		19		15		When upshifting and/or downshifting		51
								11		12					14									13		During 1st to 2nd shifting	①	
								11			12				15			14						13		During 2nd to 3GR shifting	②	
								10				11			14			13						12		During 3GR to 4GR shifting	③	
								9							12			11						10		During 4GR, or 3GR to 2nd shifting		
								10							12									11		During 3GR, or 2nd to 1st shifting	④	
								11	12			13			17		15		14			16				P, N to R and/or N to D	Excessive shift shock	52
	11	12				13		14		15	16	17			21			20			19			18		When upshifting and/or downshifting		53
	8	9				11	10	12		13					15									14		During 1st to 2nd shifting	①	
	8	9				11	10	12			13				16			15						14		During 2nd to 3GR shifting	②	
						9		10				11			14						13			12		During 3GR to 4GR shifting	③	
	8	9				11		12							14								13			During 2nd to 1st shifting in L range	④	
								10																		When coasting	⑤	
								8							10	9										During lockup	⑥	
								6							9						7		8			No engine braking		54
																										No mode changes		55
														7		8										N and/or P ranges	Transmission noise	56
																2										All ranges		57
								9						10	18	17	11	12	14		15		16	13		Transmission overheats		58
								11							13	12												

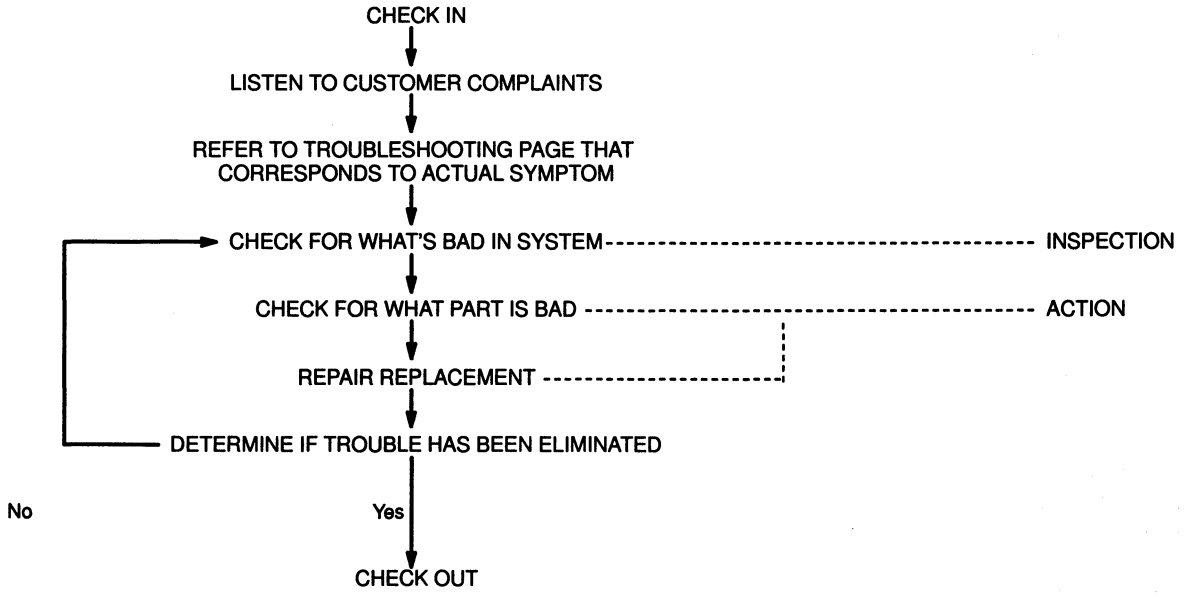
SYMPTOM TROUBLESHOOTING

USING THIS SECTION

Introduction

Most of the automatic transmission 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 drivability complaint. The customer is often a good source of information on such problems, especially intermittent ones. Through talks with the customer, one can find out what the symptoms are and under what conditions they occur.

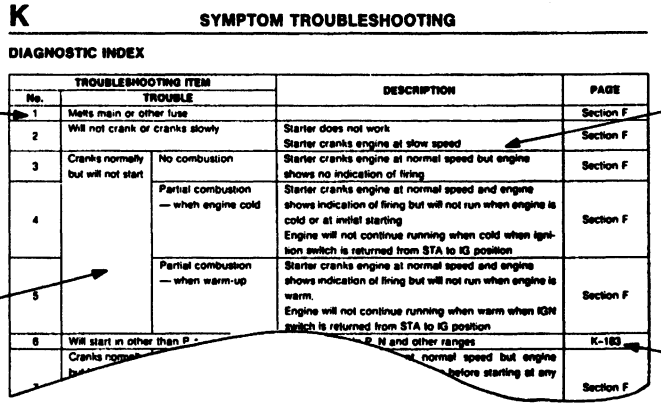
Work Flow



Diagnostic 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.



K SYMPTOM TROUBLESHOOTING

DIAGNOSTIC INDEX

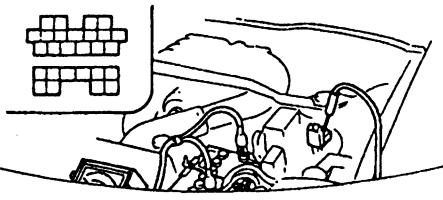
TROUBLESHOOTING ITEM No.	TROUBLE		DESCRIPTION	PAGE
1	Melts main or other fuse			Section F
2	Will not crank or cranks slowly		Starter does not work Starter cranks engine at slow speed	Section F
3	Cranks normally but will not start	No combustion	Starter cranks engine at normal speed but engine shows no indication of firing	Section F
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 F
5		Partial combustion — when 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 IG position	Section F
6	Will start in other than P ...		... P, N and other ranges	K-183
7	Cranks normally ...		... normal speed but engine ... before starting at any	Section F

Description:
Describes each troubleshootiong item

Page:
Shows the reference page.

Troubleshooting Chart

K SYMPTOM TROUBLESHOOTING

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 (lockup control valve, shuttle shift valve D, lockup modifier valve, or pilot valve) ③ Inhibitor signal malfunction ④ Park/Neutral switch worn or misadjusted ⑤ Vehicle speed pulse generator malfunction ⑥ Vehicle speed sensor (revolution sensor) malfunction			
STEP	INSPECTION		ACTION
1	Are ignition timing and idle speed OK? ☞Section F **Ignition timing: Leading 5° ATDC, Trailing 20° ATDC** **Idle speed: 700–750 rpm (P range)** 	Yes	Go to next step
		No	Adjust ignition timing and/or idle speed ☞Section F

DESCRIPTION:
Further describes the symptom. Confirm that the chart addresses the actual symptom before beginning troubleshooting.

TROUBLESHOOTING HINTS:
Describes the possible point of malfunction.

STEP:
Shows the order of troubleshooting. Proceed with troubleshooting as indicated.

INSPECTION:
Describes an inspection method 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:
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	Melts main or other fuse			section F
2	Will not crank or cranks slowly		Starter does not work Starter cranks engine at slow speed	section F
3	Cranks normally but will not start	No combustion	Starter cranks engine at normal speed but engine shows no indication of firing	section F
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 F
5		Partial combustion – when 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 IG position	section F
6	Will start in other than P and N ranges		Engine starts in P, N and other ranges	K–183
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 F
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 F
9		After warm-up	Starter cranks engine at normal speed but engine requires excessive cranking time before starting after warm-up	section F
10	Engine stalls	Idle at any engine temp.	Engine stops unexpectedly at any engine temp.	section F
11		During fast idle	Engine stops unexpectedly during fast-idle operation	section F
12		Idle after warm-up	Engine stops unexpectedly at idle after warm-up	section F
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 F
* 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	section F K–184
15		Driveway	Engine stops unexpectedly upon driveaway	section F
16		On acceleration	Engine stops unexpectedly at beginning of acceleration or during acceleration	section F
17		While cruising	Engine stops unexpectedly while cruising	section F
*18		On deceleration	Engine stops unexpectedly at beginning of deceleration or recovery from deceleration exhaust afterburn	section F K–186
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 F
20		During fast idle	Fast idle speed too slow and excessive engine shake during fast idle, but returns to normal after warm-up	section F
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 F

* Refer to section F before referring to K sections.

TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
22	Engine 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 F
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 F
* 24		On deceleration	Engine shakes at beginning of deceleration, during deceleration, or recovery from deceleration Exhaust afterburn	section F K-187
* 25	Poor acceleration	Driveaway	Engine speed increases normally but vehicle speed slowly increases during driveaway	section F K-189
* 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 acceleration is released	section F
28	Idle fluctuates / Idle hants		Engine speed changes back and forth between specified idle speed and higher speed	section F
29	Hesitates / Stumbles on acceleration		Momentary pause at beginning of acceleration or during acceleration	section F
* 30	Surges while cruising		Momentary minor irregularity in engine output at steady vehicle speed	section F K-192
* 31	Lack of power		Performance poor under load (i.e., power down when climbing hills)	section F K-194
* 32	Poor fuel economy		Fuel economy unsatisfactory	section F K-194
33	A/C does not work		A/C compressor magnetic clutch does not engage when Air conditioning sensor ON	section F
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 F
35	Fuel odor		Gasoline fuel smell or visible leaks	section F
36	Exhaust sulfur smell		Rotten egg smell from exhaust	section F
37	High oil consumption		Oil consumption excessive	section F
38	Self-Diagnosis Checker flashes 88		MIL always ON/Self-Diagnosis Checker flashes 88 with test connector ground	section F
39	MIL never ON		Self-Diagnosis Checker indicates diagnostic trouble code No. of input device but MIL never ON	section F
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	K-194
41	Vehicle moves in N range		Vehicle creeps in N range Vehicle moves when accelerator pedal not depressed	F-195
42	Vehicle moves in P range		Vehicle rolls in P range, and drivetrain not lockup	F-195
43	Excessive creep		Vehicle moves quickly in D, S, L and R ranges (accelerator pedal not depressed) Excessive N to R range and N to D range shift shock felt	F-195

* Refer to section F before referring to K section.

TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
44	No shift		With gear position in hold mode: Single range shift (1st → 2nd, 2nd → 3GR, or 3GR → 4GR) only Sometimes shifts correctly	K-196
45	Abnormal shift		Shifts incorrectly (incorrect shift pattern) (ex) Vehicle shifts 1st → 4GR directly when accelerating with accelerator pedal depressed slightly	K-198
46	Frequent shifting		Downshift occurs when accelerator depressed slightly in D, S and L ranges (except hold mode)	K-200
47	Shift point high or low		Shift points do not match shift diagram Shift delayed when accelerating Shifts occur too fast when accelerating and engine speed does not increase	K-201
48	No lockup		No lockup when vehicle speed reaches lockup range	K-202
49	No kickdown		Does not downshift when accelerator pedal depressed more than 7/8 within kickdown range	K-202
50	Engine speed flares up	When accelerating	Engine speed flares up on acceleration	K-202
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	K-203
52	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	K-205
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	K-208
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	K-211
55	No mode change		Mode does not change to/from normal mode in D range Hole mode not selected or not cancelled	K-213
56	Transmission noise	All ranges	Transmission noisy in all ranges when vehicle is idling	K-213
57		D, S, L, R ranges	Abnormal noise from transmission in D, S, L, R	K-213
58	Transmission overheats		ATF smells burnt and/or is discolored	K-213

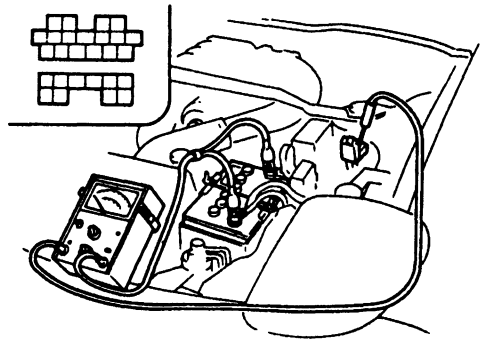
SYMPTOM TROUBLESHOOTING CHART

6	WILL START IN OTHER THAN P AND N RANGES
DESCRIPTION	• Engine starts in P, N and other ranges
[TROUBLESHOOTING HINTS] Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary ① Park/Neutral switch worn or misadjusted ☞**page K–28** ② Ignition system malfunction ☞**section G** ③ Selector lever installation or adjustment incorrect ☞**page K–164**	

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 (lockup control valve, shuttle shift valve D, lockup modifier valve, or pilot valve)
③ Inhibitor signal malfunction
④ Park/Neutral switch worn or misadjusted
⑤ Vehicle speed pulse generator malfunction
⑥ Vehicle speed sensor (revolution sensor) malfunction

STEP	INSPECTION		ACTION
1	Are ignition timing and idle speed OK? ☞section F 	Yes	Go to next step
		No	Adjust ignition timing and/or idle speed ☞section F
2	Is problem corrected when 20-pin and 16-pin connectors of powertrain control module (Transmission) are 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 transmission and repair or replace parts as necessary
3	Is output voltage of inhibitor signal at powertrain control module (Transmission) terminal OK? B+: Battery positive voltage	Yes	Check wiring and connector from terminal 1C of powertrain control module (Transmission) to terminal 1R of powertrain control module (Engine)
		No	Go to next step

Term.	Unit	Spec.	Condition	Page
1C	V	B+	D range	K-35
		Below 1.0	P and N ranges	

Unit: V → Voltage

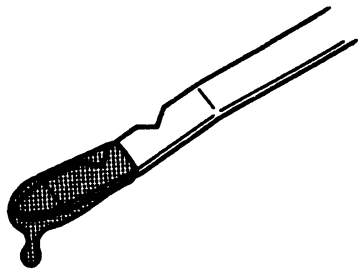
<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Are measurements at powertrain control module (Transmission) terminals OK?

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">2D</td><td rowspan="2">V</td><td>0</td><td>P and N ranges</td><td rowspan="10">K-35</td></tr>
<tr><td>B+</td><td>Except P and N ranges</td></tr>
<tr><td rowspan="2">1E</td><td rowspan="2">V</td><td>B+</td><td>R range</td></tr>
<tr><td>0</td><td>Except R range</td></tr>
<tr><td rowspan="2">2B</td><td rowspan="2">V</td><td>B+</td><td>D range</td></tr>
<tr><td>0</td><td>Except D range</td></tr>
<tr><td rowspan="2">2S</td><td rowspan="2">V</td><td>B+</td><td>S range</td></tr>
<tr><td>0</td><td>Except S range</td></tr>
<tr><td rowspan="2">2Q</td><td rowspan="2">V</td><td>B+</td><td>L range</td></tr>
<tr><td>0</td><td>Except L range</td></tr>
<tr><td>2E↔2L</td><td>kΩ</td><td>2.2–3.5</td><td>Constant (Ign: OFF)</td><td></td></tr>
<tr><td>2J↔2L</td><td>Ω</td><td>500–1,000</td><td>Constant (Ign: OFF)</td><td></td></tr>
</table>
Unit: V → Voltage
Ω → Resistance

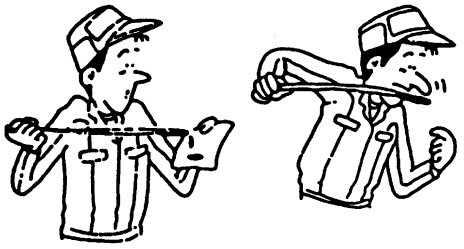
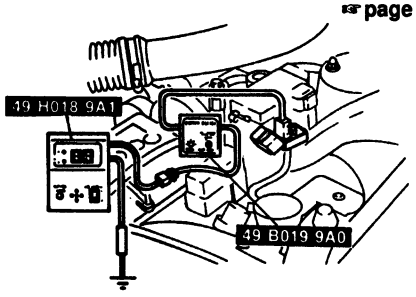
<table>
<tr><th>TERMINAL</th><th>FUNCTION</th></tr>
<tr><td>2D, 1E, 2B, 2S, 2Q</td><td>Park/Neutral switch</td></tr>
<tr><td>2E</td><td>Vehicle speed pulse generator</td></tr>
<tr><td>2J</td><td>Vehicle speed sensor</td></tr>
<tr><td>2L</td><td>Ground (input)</td></tr>
</table></td><td>Yes</td><td>Replace powertrain control module (Transmission) ☞page K-41</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
● Park/Neutral switch ☞page K-28
● Vehicle speed pulse generator ☞page K-30
● Vehicle speed sensor (revolution sensor) ☞page K-29</td></tr>
</table>

18	ENGINE STALLS ON DECELERATION
DESCRIPTION	• Engine stops unexpectedly at beginning of deceleration or recovery from deceleration • Exhaust afterburn
[TROUBLESHOOTING HINTS] ① ATF level low	

STEP	INSPECTION		ACTION
1	Is ATF level OK? ☞page K-25 **Level: Between notches on dipstick** 	Yes	Go to No.14 "ENGINE STALLS WHEN SHIFTED FROM N TO D AND/OR FROM N TO R RANGE" in section K of this manual ☞page K-184
		No	Adjust ATF level ☞page K-25

24	ENGINE ROUGH ON DECELERATION
DESCRIPTION	• Engine shakes at beginning of deceleration, during deceleration, or recovery from deceleration • Exhaust afterburn

[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, forward one-way clutch, low one-way clutch, reverse clutch, or low and reverse brake)
⑥ Control valve stuck (pressure regulator valve, pressure modifier valve, or pilot valve)
⑦ Line pressure solenoid valve worn
⑧ Dropping resistor malfunction

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞page K-25 	Yes	Go to next step
		No	Problem within transmission Go to next step, and check for the main cause When the problem is found, overhaul the transmission and repair or replace parts as necessary
2	Are there any diagnostic trouble code(s) displayed on the Self-Diagnosis Checker when the ignition switch is ON? ☞page K-214 	Yes	Check for cause of code(s) ☞page K-214 If problem remains, overhaul transmission and repair or replace parts as necessary
		No	Go to next step
3	Is line pressure OK? ☞page K-14 **Specified line pressure** **kPa (kgf/cm², psi)**	Yes	Overhaul transmission and repair or replace parts as necessary
		No	Check selector lever operation ☞page K-164 If OK, go to next step If not OK, adjust, repair or replace selector lever ☞page K-164, 166

Engine	Range	Idle	Stall
13B	D, S, L	500–520 {5.0–5.4, 72–76}	1,200–1,270 {12.2–13.0, 174–184}
	R	620–650 {6.3–6.7, 90–95}	1,510–1,570 {15.3–16.1, 218–228}

<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 (Transmission) terminals OK?
<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>Ω</td><td>2.5–5.0</td><td>Constant (Ign OFF)</td><td>K-35</td></tr>
<tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve fully closed (Ign: ON)</td><td rowspan="2">K-246</td></tr>
<tr><td>Approx. 5</td><td>Throttle valve fully opened (Ign: ON)</td></tr>
<tr><td rowspan="2">1H</td><td>Ω</td><td>12.5–19.0</td><td>Constant (Ign OFF)</td><td>K-35</td></tr>
<tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve fully closed v(Ign: ON)</td><td rowspan="2">K-246</td></tr>
<tr><td>Approx. 5</td><td>Throttle valve opened (Ign: ON)</td></tr>
</table>
Unit: Ω → Resistance
% → ON duty
<table>
<tr><th>TERMINAL</th><th>FUNCTION</th></tr>
<tr><td>1F</td><td>Line pressure solenoid valve</td></tr>
<tr><td>1H</td><td>Dropping resistor</td></tr>
</table></td><td>Yes</td><td>Replace control valve body assembly
☞ page K-128

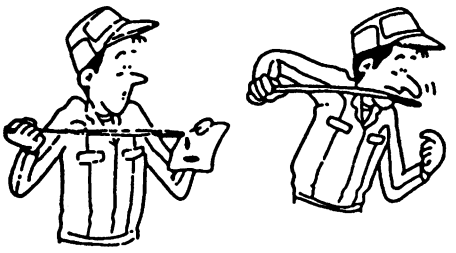
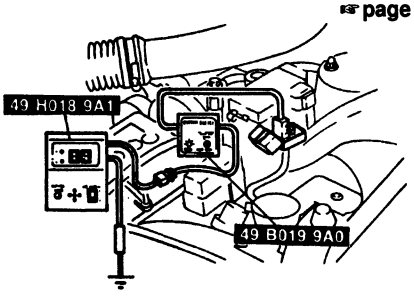
If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Lline pressure solenoid valve ☞page K-32
• Dropping resistor ☞page K-33

If resistance OK but voltage not, go to next step</td></tr>
<tr><td>5</td><td>Is input voltage of throttle position sensor at powertrain control module (Transmission) OK?
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve closed throttle position</td><td rowspan="2">K-35</td></tr>
<tr><td>4.0–4.5</td><td>Throttle valve wide open throttle</td></tr>
</table>
Unit: V → Voltage</td><td>Yes</td><td>Replace powertrain control module (Transmission)
☞page K-41</td></tr>
<tr><td></td><td></td><td>No</td><td>Check throttle position sensor and wiring
☞section F</td></tr>
</table>

25, 26	POOR ACCELERATION WHEN DRIVE AWAY OR ON ACCELERATION
DESCRIPTION	• Engine speed increases normally but vehicle speed slowly increases during driveaway. • Engine speed increases normally but vehicle speed slowly increases during acceleration.

[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
⑥ Control valve stuck (pressure regulator valve, pressure modifier valve, pilot valve, shift valve A, or shift valve B)
⑦ Line pressure solenoid valve worn
⑧ Dropping resistor malfunction
⑨ Shift A, B solenoid valve worn
⑩ Park/Neutral switch worn
⑪ Hold switch worn
⑫ Vehicle speed sensor (revolution sensor) malfunction
⑬ Torque converter worn
⑭ Engine power low

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞page K-25 	Yes	Go to next step
		No	Problem within transmission Go to next step, and check for the main cause when the problem is found, overhaul the transmission and repair or replace parts as necessary
2	Are there any diagnostic trouble code(s) displayed on the Self-Diagnosis Checker when the ignition switch is ON? ☞page K-214 	Yes	Check for cause of code(s) ☞ page K-214
		No	Go to next step
3	Is line pressure OK? ☞page K-14 **Specified line pressure** **kPa {kgf/cm², psi}** Engine / Range / Idle / Stall 13B / D, S, L / 500–520 {5.0–5.4,72–76} / 1,200–1,270 {12.2–13.0, 174–184} 13B / R / 620–650 {6.3–67,90–95} / 1,510–1,570 {15.3–16.1, 218–228}	Yes	Go to next step
		No	Check selector lever operation ☞page K-164 If OK, go to next step If not OK, adjust, repair or replace selector lever ☞ page K-164, 166

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Is engine stall speed OK?
☞page K-9
rpm
<table><tr><th>Engine</th><th>Engine stall speed</th></tr><tr><td>13B</td><td>3,000–3,300</td></tr></table></td><td>Yes</td><td>Go to Step 7</td></tr>
<tr><td></td><td></td><td>No</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td>5</td><td>Are measurements at powertrain control module (Transmission) terminals OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="3">1F</td><td>Ω</td><td>2.5–5.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr><tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve closed throttle position (Ign: ON)</td><td rowspan="2">K-246</td></tr><tr><td>Approx. 5</td><td>Throttle valve wide open throttle (Ign: ON)</td></tr><tr><td rowspan="3">1H</td><td>Ω</td><td>12.5–190</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr><tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve closed throttle position (Ign: ON)</td><td rowspan="2">K-246</td></tr><tr><td>Approx. 5</td><td>Throttle valve wide open throttle (Ign: ON)</td></tr></table>Unit: Ω → Resistance
% → ON duty
<table><tr><th>TERMINAL</th><th>FUNCTION</th></tr><tr><td>1F</td><td>Line pressure solenoid valve</td></tr><tr><td>1H</td><td>Dropping resistor</td></tr></table></td><td>Yes</td><td>Overhaul transmission 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
• Line pressure solenoid valve ☞page K-32
• Dropping resistor ☞page K-33

If resistance OK but duty not, go to next step</td></tr>
<tr><td>6</td><td>Is input voltage of throttle position sensor at powertrain control module (Transmission) OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve closed throttle position</td><td rowspan="2">K-35</td></tr><tr><td>4.0–4.5</td><td>Throttle valve wide open throttle</td></tr></table>Unit: V → Voltage</td><td>Yes</td><td>Replace powertrain control module (Transmission)
☞page K-41

If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>Check throttle position sensor and wiring
☞section F

If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td>7</td><td>Disconnect solenoid 8-pin connector; is vehicle driven as follows?
☞page K-247
<table><tr><th>Range</th><th>Gear position</th></tr><tr><td>D range</td><td>3GR (fixed)</td></tr><tr><td>S range</td><td>3GR (fixed)</td></tr><tr><td>L range</td><td>2nd (fixed)</td></tr><tr><td>R range</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 K-128

If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td>8</td><td>Drive vehicle in D, S, and L ranges (except hold mode); does vehicle start from stop in 1st gear?

Are engine rpm at 20km/h {12 mph} and throttle opening OK?
RPM: Approx. 2,100
Throttle opening: 4/8</td><td>Yes</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>Go to next step</td></tr>
</table>

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>9</td><td>Are measurements at powertrain control module (Transmission) 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">1D</td><td>Ω</td><td>20–40</td><td>Constant (Ign: OFF)</td><td rowspan="6">K–35</td></tr>
<tr><td rowspan="2">V</td><td>Below 1.0</td><td>2nd and 3GR gear</td></tr>
<tr><td>B+</td><td>1st and 4GR gear</td></tr>
<tr><td rowspan="3">1B</td><td>Ω</td><td>20–40</td><td>Constant (Ign: OFF)</td></tr>
<tr><td rowspan="2">V</td><td>Below 1.0</td><td>3GR and 4GR gear</td></tr>
<tr><td>B+</td><td>1st and 2nd gear</td></tr>
</table>
Unit: Ω → Resistance
V → Voltage
<table>
<tr><th>TERMINAL</th><th>FUNCTION</th></tr>
<tr><td>1D</td><td>Shift A solenoid valve</td></tr>
<tr><td>1B</td><td>Shift B solenoid valve</td></tr>
</table></td><td>Yes</td><td>Replace control valve body assembly
☞page K–128

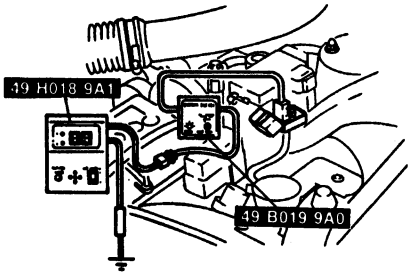
If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Shift A solenoid valve ☞page K–32
• Shift B solenoid valve ☞page K–32

If resistance OK but voltage not, go to next step</td></tr>
<tr><td>10</td><td>Are measurements at powertrain control module (Transmission) 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">2D</td><td rowspan="2">V</td><td>0</td><td>P and N ranges</td><td rowspan="12">K–35</td></tr>
<tr><td>B+</td><td>Except P and N ranges</td></tr>
<tr><td rowspan="2">1E</td><td rowspan="2">V</td><td>0</td><td>R range</td></tr>
<tr><td>B+</td><td>Except R range</td></tr>
<tr><td rowspan="2">2B</td><td rowspan="2">V</td><td>0</td><td>D range</td></tr>
<tr><td>B+</td><td>Except D range</td></tr>
<tr><td rowspan="2">2S</td><td rowspan="2">V</td><td>0</td><td>S range</td></tr>
<tr><td>B+</td><td>Except S range</td></tr>
<tr><td rowspan="2">2Q</td><td rowspan="2">V</td><td>0</td><td>L range</td></tr>
<tr><td>B+</td><td>Except L range</td></tr>
<tr><td rowspan="2">2I</td><td rowspan="2">V</td><td>0</td><td>Switch depressed</td></tr>
<tr><td>B+</td><td>Switch released</td></tr>
<tr><td>2J ↔ 2L</td><td>Ω</td><td>500–1,000</td><td>Constant (Ign: OFF)</td></tr>
</table>
Unit: V → Resistance
Ω → Voltage
<table>
<tr><th>TERMINAL</th><th>FUNCTION</th></tr>
<tr><td>2D, 1E, 2B, 2S, 2Q</td><td>Park/Neutral switch</td></tr>
<tr><td>2I</td><td>Hold switch</td></tr>
<tr><td>2J</td><td>Vehicle speed sensor</td></tr>
<tr><td>2L</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
• Park/Neutral switch ☞ page K–28
• Hold switch ☞ page K–27
• Vehicle speed sensor (revolution sensor) ☞ page K–29

If problem remains, return to step 7</td></tr>
<tr><td>11</td><td>Replace with known good powertrain control module (Transmission); is problem corrected?
☞page K–41</td><td>Yes</td><td>Replace powertrain control module (Transmission)
☞page K–41</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace torque converter</td></tr>
</table>

30	SURGES WHILE CRUISING
DESCRIPTION	• Momentary minor irregularity in engine output at steady vehicle speed

[TROUBLESHOOTING HINTS]
① ATF level low
② Throttle position sensor malfunction or misadjusted
③ Lockup solenoid valve worn
④ Idle signal malfunction
⑤ Slip lockup OFF signal malfunction

STEP	INSPECTION		ACTION
1	Are there any diagnostic trouble code(s) displayed on the Self-Diagnosis Checker when the ignition switch is ON? ☞page K-214  	Yes	Check for cause of code(s) ☞page K-214
		No	Go to next step
2	Is input voltage of throttle position sensor at powertrain control module (Transmission) OK? Term. / Unit / Spec. / Condition / Page 2T / V / 0.1–1.1 / Throttle valve closed throttle position / K-35 2T / V / 4.0–4.5 / Throttle valve wide open throttle / K-35 Unit: V → Voltage	Yes	Go to next step
		No	Check throttle position sensor and wiring ☞section F
3	Are resistance and output duty of lockup solenoid valve at powertrain control module (Transmission) terminals OK? Term. / Unit / Spec. / Condition / Page 1M / Ω / 10–20 / Constant (Ign: OFF) / K-35 1M / % / Approx. 5 / No lockup (Ign: ON) / K-247 1M / % / Approx. 95 / Lockup (Ign: ON) / K-247 Unit: Ω → Resistance % → ON duty	Yes	Replace control valve body assembly ☞page K-128 If problem remains, overhaul transmission and repair or replace parts as necessary
		No	If resistance not OK, check for lockup solenoid valve and wiring ☞page K-32 If resistance OK but duty not, go to next step

<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 (Transmission) 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">2M</td><td rowspan="2">V</td><td>Below 1.0</td><td>Throttle valve closed throttle position</td><td rowspan="4">K-35</td></tr>
<tr><td>4.5–5.5</td><td>Throttle valve opened</td></tr>
<tr><td rowspan="2">2G</td><td rowspan="2">V</td><td>Below 1.0</td><td>Engine running at 3,000 rpm</td></tr>
<tr><td>B+</td><td>Engine running at idle</td></tr>
</table>
Unit: V → Voltage

<table>
<tr><th>TERMINAL</th><th>FUNCTION</th></tr>
<tr><td>2M</td><td>Idle signal</td></tr>
<tr><td>2G</td><td>Slip lockup OFF signal</td></tr>
</table></td><td>Yes</td><td>Replace powertrain control module (Transmission)

☞page K-41

If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Idle signal ☞page K-35
• Slip lockup OFF signal ☞page K-35</td></tr>
</table>

31	LACK OF POWER
DESCRIPTION	• Performance poor under load (i.e., power down when climbing hills)

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low ☞**page K-25**
② Selector lever installation or adjustment incorrect ☞**page K-164**
③ Throttle position sensor malfunction or misadjusted ☞**section F**
④ Line pressure low ☞**page K-14**
⑤ Powertrain slippage
⑥ Control valve stuck (pressure regulator valve, pressure modifier valve, shift valve A or shift valve B)
⑦ Lline pressure solenoid valve worn ☞**page K-32**
⑧ Dropping resistor malfunction ☞**page K-33**
⑨ Shift A and/or B solenoid valve worn ☞**page K-32**
⑩ Park/Neutral switch worn or misadjusted ☞**page K-28**
⑪ Hold switch circuit malfunction ☞**page K-27**
⑫ Vehicle speed sensor (revolution sensor) malfunction ☞**page K-29**
⑬ Torque converter worn ☞**page K-57**
⑭ Engine power low

32	POOR FUEL ECONOMY
DESCRIPTION	• Fuel economy unsatisfactory

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Lockup solenoid valve worn ☞**page K-32**
② Lockup control solenoid valve worn ☞**page K-32**
③ Control valve stuck (lockup control valve, lockup modifier valve, pilot valve, or shuttle shift valve D)
④ ATF thermosensor malfunction ☞**page K-31**
⑤ Throttle position sensor malfunction or misadjusted ☞**section F**
⑥ Engine rpm signal malfunction ☞**page K-35**
⑦ Vehicle speed sensor (revolution sensor) malfunction ☞**page K-29**
⑧ Park/Neutral switch worn or misadjusted ☞**page K-28**

40	VEHICLE DOES NOT MOVE IN D, S, L AND/OR R RANGES
DESCRIPTION	• No creep at all • Vehicle does not move when accelerator pedal depressed after shifted to D, S, L and/or R range

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low ☞**page K-25**
② Selector lever installation or adjustment incorrect ☞**page K-164**
③ Throttle position sensor malfunction or misadjusted ☞**section F**
④ Line pressure low ☞**page K-14**
⑤ Powertrain slippage (high clutch, brake band, forward clutch, or reverse clutch)
⑥ Control valve stuck (manual valve pressure regulator valve, pressure modifier valve or pilot valve)
⑦ Line pressure solenoid valve worn ☞**page K-32**
⑧ Dropping resistor malfunction ☞**page K-33**
⑨ Parking mechanism worn ☞**page K-97**

41	VEHICLE MOVES IN N RANGE
DESCRIP-TION	• Vehicle creeps in N range • Vehicle moves when accelerator pedal not depressed

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Selector lever installation or adjustment incorrect ☞page K-164
② Powertrain burnt (forward clutch, or overrunning clutch)
③ Throttle position sensor malfunction or misadjusted ☞section F
④ Control valve stuck (manual valve)
⑤ Line pressure solenoid valve worn ☞page K-32
⑥ Dropping resistor malfunction ☞page K-33

42	VEHICLE MOVES IN P RANGE
DESCRIP-TION	• Vehicle rolls in P range, and drivetrain not lookup

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Selector lever installation or adjustment incorrect ☞page K-164
② Parking mechanism worn ☞page K-97

43	EXCESSIVE CREEP
DESCRIP-TION	• Vehicle moves quickly in D, S, L, and R ranges (accelerator pedal not depressed) • Excessive N to R range and N to D range shift shock felt

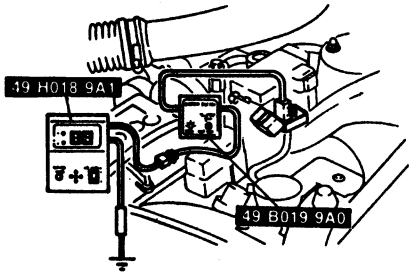
[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Engine idle speed misadjusted ☞section F
② Line pressure at idle high ☞page K-14

44	NO SHIFT
DESCRIPTION	With gear position usually in hold mode: ● Single range shift (1st → 2nd, 2nd → 3GR, or 3GR → 4GR) only ● Sometimes shifts correctly

[TROUBLESHOOTING HINTS]

① Shift A and B solenoid valves worn
② Control valve stuck
③ Hold switch malfunction
④ Vehicle speed sensor (revolution sensor) malfunction
⑤ Poor ground
⑥ Powertrain control module (Transmission) malfunction

STEP	INSPECTION		ACTION
1	Are there any diagnostic trouble code(s) displayed on the Self-Diagnosis Checker when the ignition switch is ON? ☞page K-214  	Yes	Check for cause of code(s) ☞page K-214
		No	Go to next step
2	Disconnect solenoid 8-pin connector; is vehicle driven as follows? ☞page K-247 Range / Gear position: D range: 3GR (fixed) S range: 3GR (fixed) L range: 2nd (fixed) R range: Reverse (fixed)	Yes	Go to next step
		No	Replace control valve body assembly ☞page K-128 If problem remains, overhaul transmission and repair or replace parts as necessary
3	Drive vehicle in D, S, and L ranges (except hold mode); does vehicle start from stop in 1st gear? Are engine rpm at 20 km/h {12 mph} and throttle opening OK? **RPM: Approx. 2,100** **Throttle opening: 4/8**	Yes	Go to step 5
		No	Go to next step

<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 (Transmission) 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">1D</td><td>Ω</td><td>20–40</td><td>Constant (Ign: OFF)</td><td rowspan="6">K–35</td></tr>
<tr><td rowspan="2">V</td><td>Below 1.0</td><td>2nd and 3GR gear</td></tr>
<tr><td>B+</td><td>1st and 4GR gear</td></tr>
<tr><td rowspan="3">1B</td><td>Ω</td><td>20–40</td><td>Constant (Ign: OFF)</td></tr>
<tr><td rowspan="2">V</td><td>Below 1.0</td><td>3GR and 4GR gear</td></tr>
<tr><td>B+</td><td>1st and 2nd gear</td></tr>
</table>
Unit: Ω → Resistance
V → Voltage

<table>
<tr><th>TERMINAL</th><th>FUNCTION</th></tr>
<tr><td>1D</td><td>Shift A solenoid valve</td></tr>
<tr><td>1B</td><td>Shift B solenoid valve</td></tr>
</table></td><td>Yes</td><td>Replace control valve body assembly
☞page K–128

If problem remains, overhaul transmission 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 A solenoid valve ☞page K–32
• Shift B solenoid valve ☞page K–32

If resistance OK, but voltage not, go to next step</td></tr>
<tr><td>5</td><td>Are measurements at powertrain control module (Transmission) terminals OK?

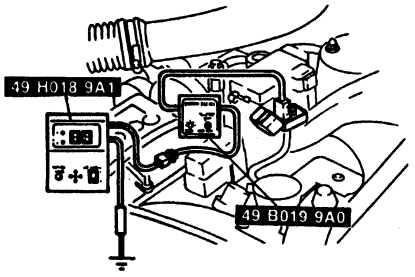
B+: Battery positive voltage

<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">2I</td><td rowspan="2">V</td><td>0</td><td>Switch depressed</td><td rowspan="2">K–35</td></tr>
<tr><td>B+</td><td>Switch released</td></tr>
<tr><td>2J ↔ 2L</td><td>Ω</td><td>500–1,000</td><td>Constant (Ign: OFF)</td></tr>
</table>
Unit: V → Voltage
Ω → Resistance

<table>
<tr><th>TERMINAL</th><th>FUNCTION</th></tr>
<tr><td>2I</td><td>Hold switch</td></tr>
<tr><td>2J</td><td>Vehicle speed sensor</td></tr>
<tr><td>2L</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
• Hold switch ☞page K–27
• Vehicle speed sensor (revolution sensor) ☞page K–29

If problem remains, return to step 3</td></tr>
<tr><td>6</td><td>Is voltage between terminal 1L of powertrain control module (Transmission) and transmission case OK?

Specified voltage: 0V (Normal condition)</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>7</td><td>Replace with known good powertrain control module (Transmission); is problem corrected?
☞page K–41</td><td>Yes</td><td>Replace powertrain control module (Transmission)
☞page K–41</td></tr>
<tr><td></td><td></td><td>No</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
</table>

45	ABNORMAL SHIFT		
DESCRIPTION	• Shifts incorrectly (incorrect shift pattern) Ex) Vehicle shifts 1st → 4GR directly when accelerating with accelerator pedal depressed slightly		
[TROUBLESHOOTING HINTS] ① ATF level low ② Poor ground ③ Throttle position sensor malfunction or misadjusted ④ Vehicle speed sensor (revolution sensor) malfunction ⑤ Powertrain control module (Transmission) malfunction ⑥ Stuck control valve (shift valve A, shift valve B, or pilot valve)			
STEP	**INSPECTION**		**ACTION**
1	Are ATF level and condition OK? **☞page K-25** 	Yes	Go to next step
		No	Problem within transmission Go to next step and check for cause When the problem is found, overhaul the transmission and repair or replace parts as necessary
2	Are there any diagnostic trouble code(s) displayed on the Self-Diagnosis Checker when the ignition switch is ON? **☞page K-214** 	Yes	Check for cause of code(s) **☞page K-214**
		No	Go to next step
3	Is voltage between terminal 1L of powertrain control module (Transmission) and transmission case OK? **Specified voltage: 0V (Normal condition)**	Yes	Go to next step
		No	Problem in ground circuit Repair wiring or replace connector

<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 (Transmission) terminals OK?

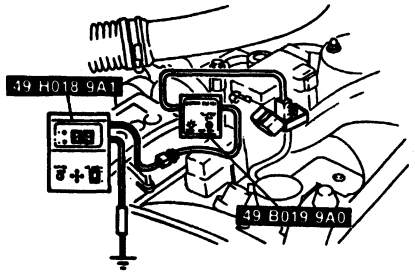
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve closed throttle position</td><td rowspan="3">K-35</td></tr>
<tr><td>4.0–4.5</td><td>Throttle valve wide open throttle</td></tr>
<tr><td>2J ↔ 2L</td><td>Ω</td><td>500–1,000</td><td>Constant</td></tr>
</table>
Unit: V → Voltage
Ω → Resistance

<table>
<tr><th>TERMINAL</th><th>FUNCTION</th></tr>
<tr><td>2T</td><td>Throttle position sensor</td></tr>
<tr><td>2J</td><td>Vehicle speed sensor</td></tr>
<tr><td>2L</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
● Throttle position sensor ☞section F
● Vehicle speed sensor (revolution sensor) ☞page K-29</td></tr>
<tr><td>5</td><td>Replace with known good powertrain control module (Transmission); is problem corrected? ☞page K-41</td><td>Yes</td><td>Replace powertrain control module (Transmission) ☞page K-41</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace control valve body assembly ☞page K-128

If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
</table>

46	FREQUENT SHIFTING
DESCRIPTION	• Downshift occurs when accelerator depressed slightly in D, S, and L ranges (except hold mode)

[TROUBLESHOOTING HINTS]
① Poor ground
② Throttle position sensor malfunction or misadjusted
③ Powertrain control module (Transmission) misadjusted

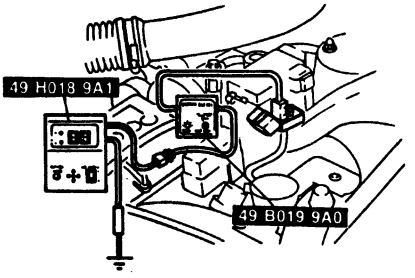
STEP	INSPECTION		ACTION
1	Are there any diagnostic trouble code(s) displayed on the Self-Diagnosis Checker when the ignition switch is ON? ☞page K-214 	Yes	Check for cause of code(s) ☞page K-214 If problem remains, overhaul transmission and repair or replace parts as necessary
		No	Go to next step
2	Is voltage between terminal 1L of powertrain control module (Transmission) and transmission case OK? **Specified voltage: 0V (Normal condition)**	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 (Transmission) OK? Unit: V → Voltage	Yes	Go to next step
		No	Check for throttle position sensor and wiring ☞section F

Term.	Unit	Spec.	Condition	Page
2T	V	0.1–1.1	Throttle valve closed throttle position	K-35
		4.0–4.5	Throttle valve wide open throttle	

4	Replace with known good powertrain control module (Transmission); is problem corrected? ☞page K-41	Yes	Replace powertrain control module (Transmission) ☞page K-41
		No	Replace control valve body assembly ☞page K-128 If problem remains, overhaul transmission and repair or replace parts as necessary

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 Throttle position sensor malfunction or misadjusted
② Engine rpm signal malfunction
③ Vehicle speed sensor (revolution sensor) malfunction
④ A/C signal malfunction

STEP	INSPECTION		ACTION
1	Are there any diagnostic trouble code(s) displayed on the Self-Diagnosis Checker when the ignition switch is ON? ☞page K-214  	Yes	Check for cause of code(s) ☞page K-214
		No	Go to next step
2	Is input voltage of throttle position sensor at powertrain control module (Transmission) OK? Unit: V → Voltage	Yes	Go to next step
		No	Check throttle position sensor and wiring ☞section F
3	Are measurements at powertrain control module (Transmission) terminals OK? B+: Battery positive voltage Unit: V → Voltage Ω → Resistance	Yes	Replace powertrain control module (Transmission) ☞page K-41 If problem remains, overhaul transmission and repair or replace parts as necessary
		No	Check for malfunctioning parts and wiring • Engine rpm signal ☞section G • Vehicle speed sensor (revolution sensor) ☞page K-29 • A/C signal ☞section F

Term.	Unit	Spec.	Condition	Page
2T	V	0.1–1.1	Throttle valve closed throttle position	K-35
		4.0–4.5	Throttle valve wide open throttle	

Term.	Unit	Spec.	Condition	Page
1G	V	0.3–0.8	Engine running at idle	K-35
		0	Engine stopped	
		1.8–2.2	Engine running at 3,000 rpm (no load)	
2J ↔ 2L	Ω	500–1,000	Constant (Ign: OFF)	
1L	V	Below 3.0	A/C ON	
		B+	A/C OFF	

TERMINAL	FUNCTION
1G	Engine rpm signal
2J	Vehicle speed sensor
1L	A/C signal
2L	Ground (Input)

48	NO LOCKUP
DESCRIPTION	• No lockup when vehicle speed reaches lockup range

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Lockup solenoid valve worn ☞page K-32
② Lockup control solenoid valve worn ☞page K-32
③ Control valve stuck (lockup control valve, lockup modifier valve, pilot valve, or shuttle shift valve D)
④ ATF thermosensor malfunction ☞page K-31
⑤ Throttle position sensor malfunction or misadjusted ☞section F
⑥ Idle signal malfunction ☞page K-35
⑦ Engine rpm signal malfunction ☞page K-35
⑧ Vehicle speed sensor (revolution sensor) ☞page K-29
⑨ Park/Neutral switch worn or misadjusted ☞page K-28

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 F
② Shift A and/or B solenoid valve worn ☞page K-32
③ Control valve stuck (shift valve A, shift valve B, or pilot valve)
④ Hold switch malfunction ☞page K-27
⑤ Vehicle speed sensor (revolution sensor) malfunction ☞page K-29

50	ENGINE SPEED FLARES UP WHEN ACCELERATING
DESCRIPTION	• Engine speed flares up on acceleration

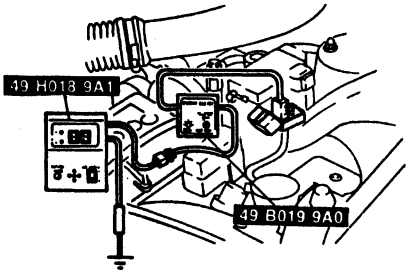
[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low ☞page K-25
② Selector lever installation or adjustment incorrect ☞page K-164
③ Throttle position sensor malfunction or misadjusted ☞section F
④ Line pressure low ☞page K-14
⑤ Powertrain slippage (forward clutch, forward one-way clutch, low one-way clutch, reverse clutch, or low and reverse brake)
⑥ Control valve stuck (pressure regulator valve, pressure modifier valve or pilot valve)
⑦ Line pressure solenoid valve worn ☞page K-32
⑧ Dropping resister malfunction ☞page K-33

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 (brake band, high clutch, forward clutch, forward one-way clutch, or low one-way clutch)
⑥ Control valve stuck (pressure regulator valve, pressure modifier valve, pilot valve, shift valve A, or shift valve B)
⑦ Line pressure solenoid valve worn
⑧ Dropping resistor malfunction
⑨ Vehicle speed pulse generator malfunction
⑩ Vehicle speed sensor (revolution sensor) malfunction
⑪ Barometric absolute pressure sensor malfunction

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞page K-25 	Yes	Go to next step
		No	Problem within transmission Go to next step, and check for the main cause When the problem is found, overhaul the transmission and repair or replace parts as necessary
2	Are there any diagnostic trouble code(s) displayed on the Self-Diagnosis Checker when the ignition switch is ON? ☞page K-214 	Yes	Check for cause of code(s) ☞ page K-214
		No	Go to next step
3	Is line pressure OK? ☞page K-14 **Specified line pressure** **kPa (kgf/cm², psi)**	Yes	Overhaul transmission and repair or replace parts as necessary
		No	Check selector lever operation ☞page K-164 If OK, go to next step If not OK, adjust, repair, or replace selector lever ☞page K-164, 166

Engine	Range	Idle	Stall
13B	D, S, L	500–520 {5.0–5.4, 72–76}	1,200–1,270 {12.2–13.0,174–184}
	R	620–650 {6.3–6.7, 90–95}	1,510–1,570 {15.3–16.1, 218–228}

<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 (Transmission) terminals OK?
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="3">1F</td><td>Ω</td><td>2.5–5.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr>
<tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve closed throttle position (Ign: ON)</td><td rowspan="2">K-246</td></tr>
<tr><td>Approx. 5</td><td>Throttle valve wide open throttle (Ign: ON)</td></tr>
<tr><td rowspan="3">1H</td><td>Ω</td><td>12.5–19.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr>
<tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve closed throttle position (Ign: ON)</td><td rowspan="2">K-246</td></tr>
<tr><td>Approx. 5</td><td>Throttle valve wide open throttle (Ign: ON)</td></tr>
</table>
Unit: Ω → Resistance
% → ON duty
<table>
<tr><th>TERMINAL</th><th>FUNCTION</th></tr>
<tr><td>1F</td><td>Line pressure solenoid valve</td></tr>
<tr><td>1H</td><td>Dropping resistor</td></tr>
</table></td><td>Yes</td><td>Replace control valve body assembly
☞page K-128

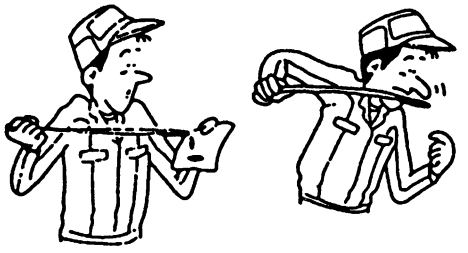
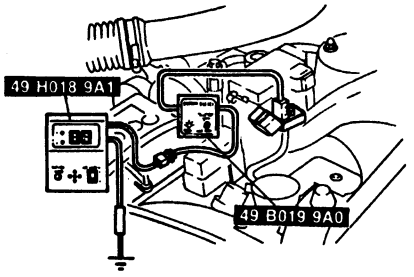
If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Line pressure solenoid valve ☞page K-32
• Dropping resistor ☞page K-33

If resistance OK but duty not, go to next step</td></tr>
<tr><td>5</td><td>Is input voltage of throttle position sensor at powertrain control module (Transmission) OK?
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve closed throttle position</td><td rowspan="2">K-35</td></tr>
<tr><td>4.0–4.5</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 F</td></tr>
<tr><td>6</td><td>Are measurements at powertrain control module (Transmission) terminals OK?
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td>2E ↔ 2L</td><td>kΩ</td><td>2.2–3.5</td><td>Constant (Ign: OFF)</td><td rowspan="4">K-35</td></tr>
<tr><td>2J ↔ 2L</td><td>Ω</td><td>500–1,000</td><td>Constant (Ign: OFF)</td></tr>
<tr><td rowspan="2">2C</td><td rowspan="2">V</td><td>2.0–4.5V</td><td>Ignition switch ON</td></tr>
<tr><td>0V</td><td>Ignition switch OFF</td></tr>
</table>
Unit: Ω → Resistance
V → Voltage
<table>
<tr><th>TERMINAL</th><th>FUNCTION</th></tr>
<tr><td>2E</td><td>Vehicle speed pulse generator</td></tr>
<tr><td>2J</td><td>Vehicle speed sensor</td></tr>
<tr><td>2C</td><td>Barometric absolute pressure sensor</td></tr>
<tr><td>2L</td><td>Ground (input)</td></tr>
</table></td><td>Yes</td><td>Replace powertrain control module (Transmission)
☞page K-41</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Vehicle speed pulse generator ☞page K-30
• Vehicle speed sensor (revolution sensor) ☞page K-29
• Barometric absolute pressure sensor ☞page K-35</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 to D or R range

[TROUBLESHOOTING HINTS]

① ATF level low
② Idle speed high
③ Throttle position sensor malfunction or misadjusted
④ Line pressure high
⑤ Control valve stuck (pressure regulator valve, pressure modifier valve, or pilot valve)
⑥ Powertrain slippage
⑦ Line pressure solenoid valve worn
⑧ Dropping resistor malfunction
⑨ N-D, or 3-4/N-R accumulator worn
⑩ Inhibitor signal malfunction
⑪ Vehicle speed pulse generator malfunction
⑫ Park/Neutral switch worn or misadjusted

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞page K-25	Yes	Go to next step
		No	Problem within transmission Go to next step and check for the main cause When the problem is found, overhaul the transmission and repair or replace parts as necessary
2	Are ignition timing and idle speed OK? ☞section F	Yes	Go to next step
		No	Adjust ignition timing and/or idle speed ☞section F
3	Are there any diagnostic trouble code(s) displayed on the Self-Diagnosis Checker when the ignition switch is ON? ☞page K-214	Yes	Check for cause of code(s) ☞page K-214
		No	Go to next step
4	Is line pressure OK? ☞page K-14	Yes	Go to next step
	Specified line pressure **kPa (kgf/cm², psi)**	No	Go to step 6

Engine	Range	Idle	Stall
13B	D, S, L	500–520 {5.0–5.4, 72–76}	1,200–1,270 {12.2–13.0,174–184}
	R	620–650 {6.3–6.7, 90–95}	1,510–1,570 {15.3–16.1, 218–228}

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>5</td><td>Is engine stall speed OK? ☞page K-9
rpm
<table><tr><th>Engine</th><th>Engine stall speed</th></tr><tr><td>13B</td><td>3,000–3,300</td></tr></table></td><td>Yes</td><td>Go to step 8</td></tr>
<tr><td></td><td></td><td>No</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td>6</td><td>Are measurements at powertrain control module (Transmission) terminals OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="3">1F</td><td>Ω</td><td>2.5–5.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr><tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve closed throttle position (Ign: ON)</td><td rowspan="2">K-246</td></tr><tr><td>Approx. 5</td><td>Throttle valve wide open throttle (Ign: ON)</td></tr><tr><td rowspan="3">1H</td><td>Ω</td><td>12.5–19.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr><tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve closed throttle position (Ign: ON)</td><td rowspan="2">K-246</td></tr><tr><td>Approx. 5</td><td>Throttle valve wide open throttle (Ign: ON)</td></tr></table>Unit: Ω → Resistance
% → ON duty
<table><tr><th>TERMINAL</th><th>FUNCTION</th></tr><tr><td>1F</td><td>Line pressure solenoid valve</td></tr><tr><td>1H</td><td>Dropping resistor</td></tr></table></td><td>Yes</td><td>Overhaul transmission 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
• Line pressure solenoid valve ☞page K-32
• Dropping resistor ☞page K-33

If resistance OK but duty not, go to next step</td></tr>
<tr><td>7</td><td>Is input voltage of throttle position sensor at powertrain control module (Transmission) OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve closed throttle position</td><td rowspan="2">K-35</td></tr><tr><td>4.0–4.5</td><td>Throttle valve wide open throttle</td></tr></table>Unit: V → Voltage</td><td>Yes</td><td>Replace powertrain control module (Transmission) ☞page K-41</td></tr>
<tr><td></td><td></td><td>No</td><td>Check throttle position sensor and wiring ☞section F</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 (Transmission) terminals OK?

B+: Battery positive voltage

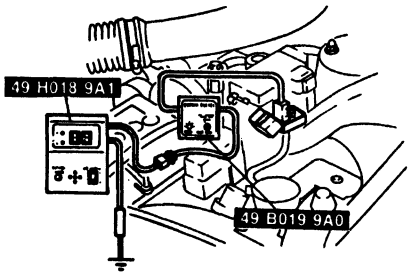
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">1C</td><td rowspan="2">V</td><td>B+</td><td>D range</td><td rowspan="14">K-35</td></tr>
<tr><td>Below. 1.0</td><td>P and N ranges</td></tr>
<tr><td>2E ↔ 2L</td><td>kΩ</td><td>2.2–3.5</td><td>Constant (Ign: OFF)</td></tr>
<tr><td rowspan="2">2D</td><td rowspan="2">V</td><td>0</td><td>P and N ranges</td></tr>
<tr><td>B+</td><td>Except P and N ranges</td></tr>
<tr><td rowspan="2">1E</td><td rowspan="2">V</td><td>B+</td><td>R range</td></tr>
<tr><td>0</td><td>Except R range</td></tr>
<tr><td rowspan="2">2B</td><td rowspan="2">V</td><td>B+</td><td>D range</td></tr>
<tr><td>0</td><td>Except D range</td></tr>
<tr><td rowspan="2">2S</td><td rowspan="2">V</td><td>B+</td><td>S range</td></tr>
<tr><td>0</td><td>Except S range</td></tr>
<tr><td rowspan="2">2Q</td><td rowspan="2">V</td><td>B+</td><td>L range</td></tr>
<tr><td>0</td><td>Except L range</td></tr>
</table>
Unit: V → Voltage
Ω → Resistance

<table>
<tr><th>TERMINAL</th><th>FUNCTION</th></tr>
<tr><td>1C</td><td>Inhibitor signal</td></tr>
<tr><td>2E</td><td>Vehicle speed pulse generator</td></tr>
<tr><td>2D, 1E, 2B, 2S, 2Q</td><td>Park/Neutral switch</td></tr>
<tr><td>2L</td><td>Ground (Input)</td></tr>
</table></td><td>Yes</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Park/Neutral signal ☞page K-35
• Vehicle speed pulse generator ☞page K-30
• Park/Neutral switch ☞page K-28</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, pressure modifier valve, pilot valve, servo charger valve, or accumulator control valve)
⑥ Line pressure solenoid valve worn
⑦ Dropping resistor malfunction
⑧ Idle signal malfunction
⑨ ATF thermosensor malfunction
⑩ Vehicle speed pulse generator malfunction
⑪ Vehicle speed sensor (revolution sensor) malfunction
⑫ Barometric absolute pressure sensor
⑬ Torque reduced signal and/or reduce torque signal malfunction?

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞page K-25 	Yes	Go to next step
		No	Problem within transmission Go to next step, and check for the main cause When the problem is found, overhaul the transmission and repair or replace parts as necessary
2	Are there any diagnostic trouble code(s) displayed on the Self-Diagnosis Checker when the ignition switch is ON? ☞page K-214 	Yes	Check for cause of code(s) ☞page K-214
		No	Go to next step
3	Is line pressure OK? ☞page K-14 **Specified line pressure** **kPa (kgf/cm², psi)**	Yes	Go to next step
		No	Go to step 5

Engine	Range	Idle	Stall
13B	D, S, L	500–520 {5.0–5.4, 72–76}	1,200–1,270 {12.2–13.0,174–184}
	R	620–650 {6.3–6.7, 90–95}	1,510–1,570 {15.3–16.1, 218–228}

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Is engine stall speed OK?
☞page K-9
rpm
<table><tr><th>Engine</th><th>Engine stall speed</th></tr><tr><td>13B</td><td>3,000–3,300</td></tr></table></td><td>Yes</td><td>Go to step 8</td></tr>
<tr><td></td><td></td><td>No</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td>5</td><td>Are measurements at powertrain control module (Transmission) terminals OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="3">1F</td><td>Ω</td><td>2.5–5.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr><tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve closed throttle position (Ign: ON)</td><td rowspan="2">K-246</td></tr><tr><td>Approx. 5</td><td>Throttle valve wide open throttle (Ign: ON)</td></tr><tr><td rowspan="3">1H</td><td>Ω</td><td>12.5–19.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr><tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve closed throttle position (Ign: ON)</td><td rowspan="2">K-246</td></tr><tr><td>Approx. 5</td><td>Throttle valve wide open throttle (Ign: ON)</td></tr></table>Unit: Ω → Resistance
% → ON duty
<table><tr><th>TERMINAL</th><th>FUNCTION</th></tr><tr><td>1F</td><td>Line pressure solenoid valve</td></tr><tr><td>1H</td><td>Dropping resistor</td></tr></table></td><td>Yes</td><td>Overhaul transmission 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
• Line pressure solenoid valve ☞page K-32
• Dropping resistor ☞page K-33

If resistance OK but duty not, go to next step</td></tr>
<tr><td>6</td><td>Is input voltage of throttle position sensor at powertrain control module (Transmission) OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve closed throttle position</td><td rowspan="2">K-35</td></tr><tr><td>4.0–4.5</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 F</td></tr>
<tr><td>7</td><td>Is input voltage of idle signal at powertrain control module (Transmission) OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">2M</td><td rowspan="2">V</td><td>Below 1.0</td><td>Throttle valve closed throttle position</td><td rowspan="2">K-35</td></tr><tr><td>4.5–5.5</td><td>Throttle valve opened</td></tr></table>Unit: V → Voltage</td><td>Yes</td><td>Replace powertrain control module (Transmission)
☞page K-41</td></tr>
<tr><td></td><td></td><td>No</td><td>Check throttle position sensor and wiring
☞section F</td></tr>
</table>

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>8</td><td>Are measurement at powertrain control module (Transmission) terminals OK?

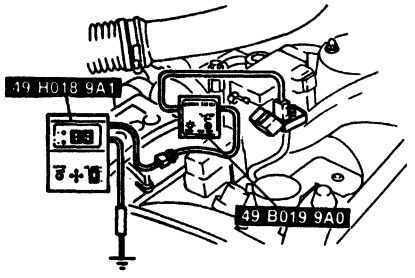
B+: Battery positive voltage

<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="3">2R ↔ 2L</td><td rowspan="3">V</td><td>Approx. 1.8</td><td>ATF temp. 10°C {50°F}</td><td rowspan="9">K-35</td></tr>
<tr><td>Approx. 1.1</td><td>ATF temp. 40°C {104°F}</td></tr>
<tr><td>Approx. 0.4</td><td>ATF temp. 80°C {176°F}</td></tr>
<tr><td>2E ↔ 2L</td><td>kΩ</td><td>2.2–3.5</td><td>Constant (Ign: OFF)</td></tr>
<tr><td>2J ↔ 2L</td><td>Ω</td><td>500–1,000</td><td>Constant (Ign: OFF)</td></tr>
<tr><td rowspan="2">2C</td><td rowspan="2">V</td><td>2.0–4.5V</td><td>Ignition switch ON</td></tr>
<tr><td>0V</td><td>Ignition switch OFF</td></tr>
<tr><td rowspan="2">2H</td><td rowspan="2">V</td><td>B+</td><td>Engine running at idle</td></tr>
<tr><td>Below 1.0</td><td>Throttle opening above 1/8 (Engine coolant temp. below 40°C {104°F})</td></tr>
<tr><td rowspan="2">2P</td><td rowspan="2">V</td><td>Below 1.0</td><td>Shifting</td></tr>
<tr><td>B+</td><td>Engine running at idle</td></tr>
</table>
Unit: V → Voltage
Ω → Resistance

<table>
<tr><th>TERMINAL</th><th>FUNCTION</th></tr>
<tr><td>2R</td><td>ATF thermosensor</td></tr>
<tr><td>2E</td><td>Vehicle speed pulse generator</td></tr>
<tr><td>2J</td><td>Vehicle speed sensor</td></tr>
<tr><td>2C</td><td>Barometric absolute pressure sensor</td></tr>
<tr><td>2H</td><td>Reduce torque signal</td></tr>
<tr><td>2P</td><td>Torque reduced signal</td></tr>
<tr><td>2L</td><td>Ground (input)</td></tr>
</table></td><td>Yes</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• ATF thermosensor ☞page K-31
• Vehicle speed pulse generator ☞page K-30
• Vehicle speed sensor (revolution sensor) ☞page K-29
• Barometric absolute pressure sensor ☞page K-35
• Reduce torque signal ☞page K-35
• Torque reduced signal ☞page K-35</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 L range at low vehicle speed

[TROUBLESHOOTING HINTS]
① ATF level low
② Powertrain slippage
③ Control valve stuck (overrunning clutch control valve, overrunning clutch reducing valve, 1st reducing valve, or pilot valve)
④ Overrunning clutch solenoid valve worn
⑤ Throttle position sensor malfunction or misadjusted
⑥ 4GR inhibit signal (ASC signal) malfunction
⑦ Park/Neutral switch worn or misadjusted

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞page K-25 	Yes	Go to next step
		No	Problem within transmission Go to next step and check for the main cause When the problem is found, overhaul the transmission and repair or replace parts as necessary
2	Are there any diagnostic trouble code(s) displayed on the Self-Diagnosis Checker when the ignition switch is ON? ☞page K-214 	Yes	Check for cause of code(s) ☞page K-214
		No	Go to next step
3	Is there slippage when accelerating or shifting, or flare up when shifting?	Yes	Powertrain slipped Go to No.50 "ENGINE SPEED FLARES UP WHEN ACCELERATING" or No.51 "ENGINE SPEED FLARES UP WHEN UP-SHIFTING AND/OR DOWNSHIFTING" in section K of this manual ☞page K-202, 203
		No	Go to next step

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Is engine braking felt in L range?
☞page K-21</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 K-128

If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td>5</td><td>Are resistance and output voltage of overrunning clutch solenoid valve at powertrain control module (Transmission) terminal 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">1O</td><td>Ω</td><td>20–40</td><td>Constant (Ign: OFF)</td><td rowspan="3">K-35</td></tr>
<tr><td rowspan="2">V</td><td>Below 1.0</td><td>2nd gear and throttle opening less than 1.3/8 in S range hold mode</td></tr>
<tr><td>B+</td><td>4GR</td></tr>
</table>
Unit: V → Resistance
Ω → Voltage</td><td>Yes</td><td>Go to next or replace step</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for overrunning clutch solenoid valve and wiring
☞page K-32

If resistance OK and voltage not, go to next step</td></tr>
<tr><td>6</td><td>Are measurements at powertrain control module (Transmission) 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">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve closed throttle position</td><td rowspan="12">K-35</td></tr>
<tr><td>4.0–4.5</td><td>Throttle valve wide open throttle</td></tr>
<tr><td rowspan="2">2K</td><td rowspan="2">V</td><td>4.5–5.5</td><td>Ignition switch ON</td></tr>
<tr><td>0</td><td>TAT terminal grounded</td></tr>
<tr><td rowspan="2">2D</td><td rowspan="2">V</td><td>0</td><td>P and N ranges</td></tr>
<tr><td>B+</td><td>Except F and N ranges</td></tr>
<tr><td rowspan="2">1E</td><td rowspan="2">V</td><td>B+</td><td>R range</td></tr>
<tr><td>0</td><td>Except R range</td></tr>
<tr><td rowspan="2">2B</td><td rowspan="2">V</td><td>B+</td><td>D range</td></tr>
<tr><td>0</td><td>Except D range</td></tr>
<tr><td rowspan="2">2S</td><td rowspan="2">V</td><td>B+</td><td>S range</td></tr>
<tr><td>0</td><td>Except S range</td></tr>
<tr><td rowspan="2">2Q</td><td rowspan="2">V</td><td>B+</td><td>L range</td></tr>
<tr><td>0</td><td>Except L range</td></tr>
</table>
Unit: V → Voltage

<table>
<tr><th>TERMINAL</th><th>FUNCTION</th></tr>
<tr><td>2T</td><td>Throttle position sensor</td></tr>
<tr><td>2K</td><td>4GR inhibit signal, TAT terminal</td></tr>
<tr><td>2D, 1E, 2B, 2S, 2Q</td><td>Park/Nertral switch</td></tr>
</table></td><td>Yes</td><td>Replace powertrain control module (Transmission)
☞page K-41</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Throttle position sensor ☞section F
• 4GR inhibit signal (ASC signal), TAT terminal ☞page K-35
• Park/Neutral switch ☞page K-28</td></tr>
</table>

55	NO MODE CHANGE
DESCRIPTION	• Mode does not change to/from normal mode in D range • Hold mode not selected or not cancelled

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Hold switch malfunction ☞**page K-27**
② Throttle position sensor malfunction or misadjusted ☞**section F**
③ Powertrain control module (Transmission) malfunction ☞**page K-35**

56	TRANSMISSION NOISE ALL RANGES
DESCRIPTION	• Transmission noisy in all ranges when vehicle is idling

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low ☞**page K-25**
② Throttle position sensor malfunction or misadjusted ☞**section F**
③ Vehicle speed sensor (revolution sensor) malfunction ☞**page K-29**
④ Engine rpm signal malfunction ☞**page K-35**

57	TRANSMISSION NOISE D, S, L, R RANGES
DESCRIPTION	• Abnormal noise from transmission in D, S, L, R

[TROUBLESHOOTING HINTS]
Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low ☞**page K-25**
② Torque converter malfunction ☞**page K-57**

58	TRANSMISSION 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 K-25**
② Line pressure low ☞**page K-14**
③ Powertrain burnt
④ Line pressure solenoid valve stuck ☞**page K-246**
⑤ Dropping resistor malfunction ☞**page K-33**
⑥ Throttle position sensor malfunction or misadjusted ☞**section F**
⑦ Lockup solenoid valve worn ☞**page K-32**
⑧ Lockup control solenoid valve worn ☞**page K-32**
⑨ Oil cooler circuit malfunction ☞**page K-154**

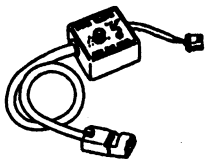
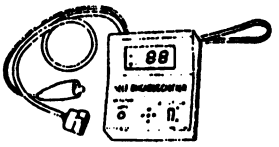
SELF-DIAGNOSIS FUNCTION

DESCRIPTION

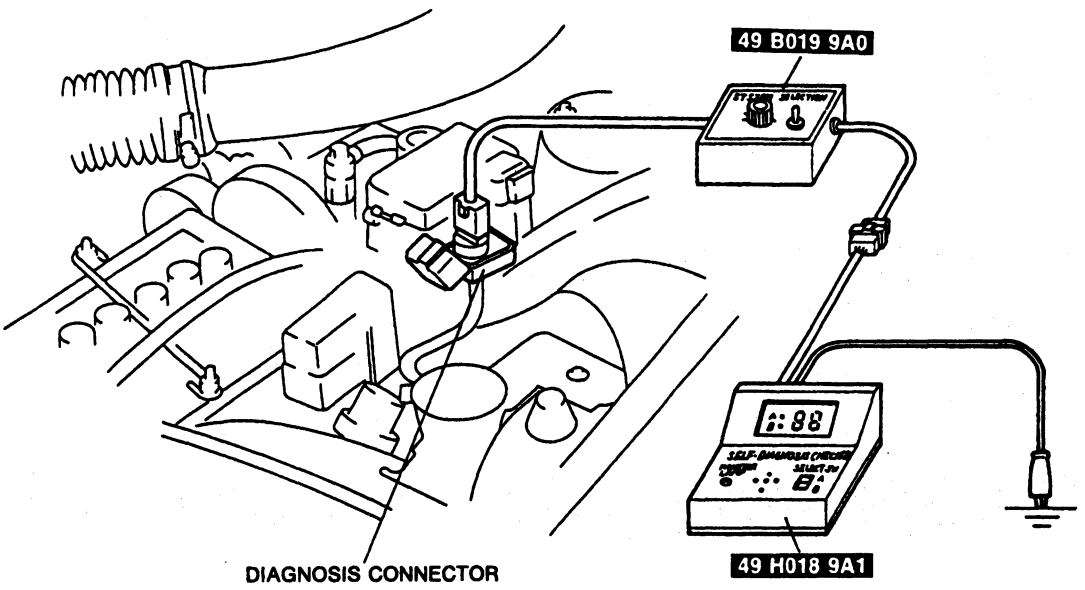
The self-diagnosis system integrated in the powertrain control module (Transmission) diagnoses malfunction of the main sensors (input), solenoid valves (output), and of the powertrain control module (Transmission) itself.
Malfunctions or intermittent malfunctions are memorized in the powertrain control module (Transmission) to later be output as diagnostic trouble codes.
The **Self-Diagnosis Checker** can be used to retrieve these diagnostic trouble codes. The **Self-Diagnosis Checker** indicates a malfunction by displaying a code and sounding a buzzer.
When the TAT and GND terminals of the data link connector are jumped with the ignition switch ON, the powertrain control module (Transmission) outputs any memorized diagnostic trouble codes by flashing the hold indicator.

PREPARATION

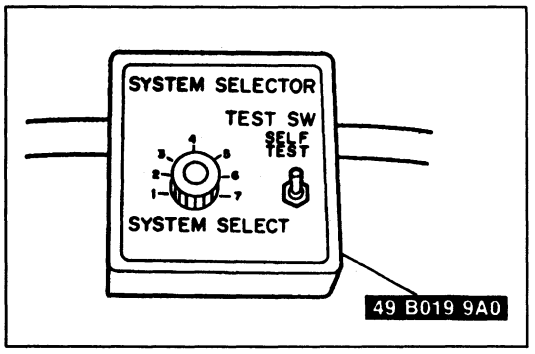
SST

49 B019 9A0 System Selector 	For diagnosis of PCMT	49 H018 9A1 Self-Diagnosis Checker 	For diagnosis of PCMT

Assembly of SST

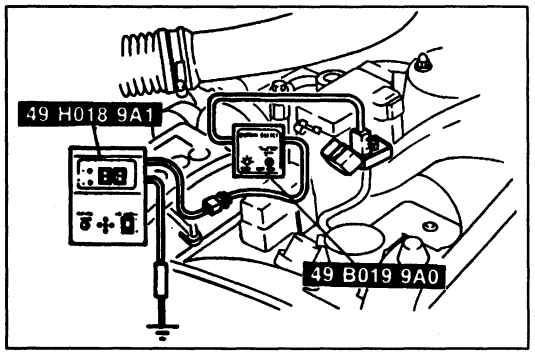


MEMO

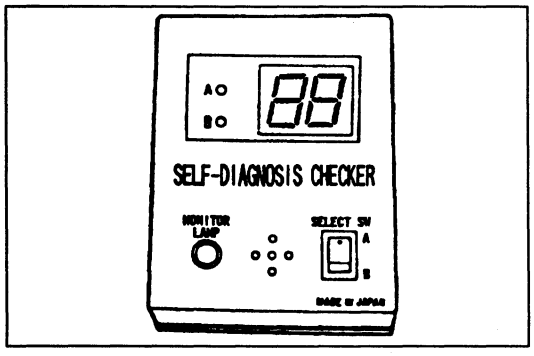


DIAGNOSTIC TROUBLE CODE NUMBER
Inspection Procedure
Self-Diagnosis Checker

1. Connect the **SST (System Selector)** to the data link connector.
2. Set the SYSTEM SELECT switch A to position 2.
3. Set the TEST SW to SELF TEST position.



4. Connect the **SST (Self-Diagnosis Checker)** to the **SST (System Selector)** and a ground.
5. Set the SELECT SW to position A.
6. Turn the ignition switch ON.
7. Verify that **"88"** flashes on the digital display and that the buzzer sounds for 3 seconds.
8. If **"88"** does not flash, check the main relay and terminals 1N and/or 1P of the powertrain control module (Transmission) for an open or short circuit.
9. If **"88"** flashes and the buzzer sounds continuously for more than 20 seconds, check the wiring to terminal 2N of the powertrain control module (Transmission) for an open or short circuit.
   If necessary, replace the powertrain control module (Transmission) and repeat from step 2.
10. Note any code(s) and check for the cause(s). Repair as necessary.
11. After repairs are made, do the After-Repair Procedure (Refer to page K–234) to verify that there are no remaining codes.

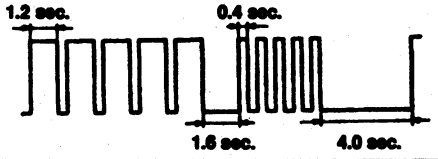


Diagnostic trouble code number

Code No.	Indicator flashing pattern	Diagnosed circuit	Condition	Point	Memorized	Page
01		Engine rpm signal	No input signal from ECU	• Wiring from powertrain control module (Engine) to powertrain control module (Transmission) • Powertrain control module (Engine)	Yes	K-219
06		Vehicle speed sensor (Revolution sensor)	No input signal from vehicle speed sensor (Revolution sensor)	• Vehicle speed sensor connector • Wiring from vehicle speed sensor to powertrain control module (Transmission) • Vehicle speedometer sensor resistance	Yes	K-220
07		Vehicle speedometer sensor	No input signal from vehicle speedometer sensor	• Vehicle speedometer sensor connector • Wiring from vehicle speedometer sensor to combination meter • Wiring from combination meter to powertrain control module (Transmission) • Speedometer resistance	Yes	K-221
12		Throttle position sensor	Open or short circuit of throttle position sensor or wiring	• Throttle position sensor connector • Wiring from throttle position sensor to powertrain control module (Transmission) • Throttle position sensor resistance	Yes	K-222
55		Vehicle speed pulse generator	No input signal from vehicle speed pulse generator	• Vehicle speed pulse generator connector • Wiring from vehicle speed pulse generator to powertrain control module (Transmission) • Vehicle speed pulse generator resistance	Yes	K-223
56		ATF thermosensor	Open or short circuit of ATF thermosensor or wiring	• ATF thermosensor connector • Wiring from ATF thermosensor to powertrain control module (Transmission) • ATF thermosensor resistance	Yes	K-224
57		Reduce torque signal/Slip lock-up signal, torque reduced signal	Open or short circuit of reduce torque signal/ slip lockup signal wiring, and/or torque reduced signal wiring	• Wiring from powertrain control module (Engine) to powertrain control module (Transmission) • Powertrain control module (Transmission) • Powertrain control module (engine)	Yes	K-225
58		Barometric absolute pressure sensor	Open or short circuit of barometic absolute pressure sensor wiring	• Wiring from powertrain control module (Engine) to powertrain control module (Transmission) • Powertrain control module (engine)	Yes	K-226
60		Shift A solenoid valve	Open or short circuit of solenoid valve wiring	• Solenoid valve connector • Wiring from solenoid valve to powertrain control module (Transmission) • Solenoid valve resistance • Wiring from dropping resistor to powertrain control module (Transmission) (Only No.64) • Dropping resistor resistance (Only No.64)	Yes	K-227
61		Shift B solenoid valve			Yes	K-228
62		Overrunning clutch solenoid valve			Yes	K-229
63		Lockup solenoid valve			Yes	K-230
64		Line pressure solenoid valve			Yes	K-231
65		Lockup control solenoid valve			Yes	K-233

Note
- If there is more than one malfunction, the codes will be indicated in numerical order, lowest number first.

Diagnostic trouble code display pattern example

Diagnostic trouble code number	Display pattern
55	

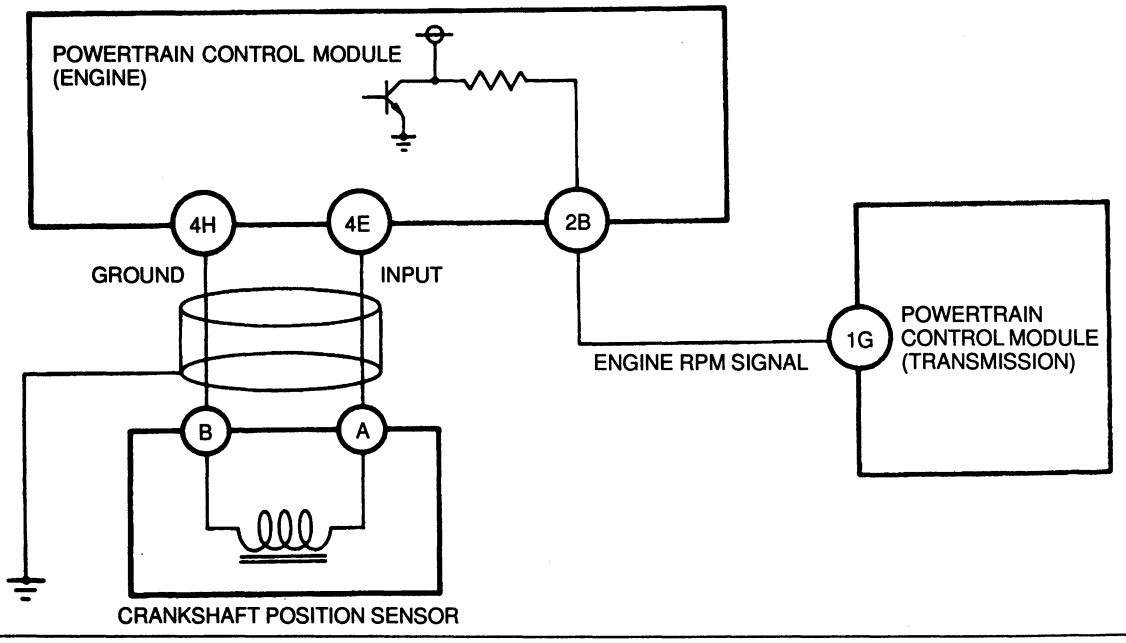
DIAGNOSTIC TROUBLE CODE NO.01 ENGINE RPM SIGNAL

STEP	INSPECTION		ACTION
1	Are there any poor connections at distributor, powertrain control module (Engine) and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector
		No	Go to next step
2	Connect a circuit tester to terminals as shown Is input voltage of engine rpm signal at powertrain control module (Transmission) OK? ☞page K-35	Yes	Go to step 5
		No	Go to next step
3	Disconnect 16-pin powertrain control module (Transmission) connector Is there continuity between terminal 1G of powertrain control module (Transmission) and terminal 2B of powertrain control module (Engine)	Yes	Go to next step
		No	Repair wiring
4	Connect a circuit tester to terminals as shown Is input voltage of engine rpm signal at powertrain control module (Engine) OK? ☞section F	Yes	Go to next step
		No	Check crank angle sensor and/or wiring ☞section F If OK, replace powertrain control module (Engine) If not OK, repair or replace malfunction parts and/or wiring
5	Disconnect negative battery cable for at least 20 seconds, and depress the brake pedal. Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞page K-234	Yes	Replace powertrain control module (Transmission) ☞page K-41
		No	Intermittent poor connection Check for cause

(+) tern.	(–) term.	Voltage (V)	Condition
1G	Ground	0	Engine stopped
		0.3–0.8	Engine idling
		1.8–2.2	Engine running at 3,000 rpm (no load)

(+) tern.	(–) term.	Voltage (V)	Condition
2B	Ground	0	Engine stopped
		0.3–0.8	Engine idling
		1.8–2.2	Engine running at 3,000 rpm (no load)

CIRCUIT DIAGRAM



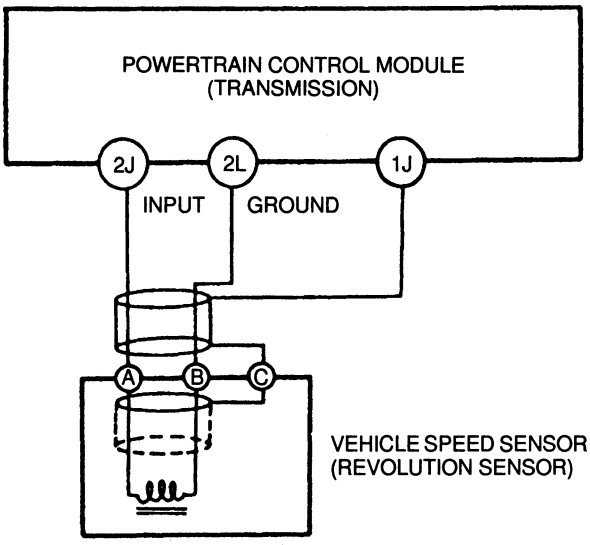
DIAGNOSTIC TROUBLE CODE NO.06 VEHICLE SPEED SENSOR (REVOLUTION SENSOR)

STEP	INSPECTION		ACTION
1	Are there any poor connections at vehicle speed sensor and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector
		No	Go to next step
2	Connect a circuit tester to terminals as shown Is input voltage of vehicle speed sensor at powertrain control module (Transmission) OK? ☞page K-35	Yes	Go to step 5
		No	Go to next step
3	Disconnect 20-pin powertrain control module (Transmission) connector Is resistance between terminal 2J and terminal 2L OK? **Resistance: 500–1,000 Ω**	Yes	Go to step 5
		No	Go to next step
4	Disconnect vehicle speed sensor connector Is resistance of sensor OK? ☞page K-29	Yes	Check wiring and connectors from powertrain control module (Transmission) to vehicle speed sensor If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace vehicle speed sensor ☞page K-29
5	Disconnect negative battery cable for at least 20 seconds, and depress the brake pedal. Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞page K-234	Yes	Replace powertrain control module (Transmission) ☞page K-41
		No	Intermittent poor connection Check for cause

(+) tern.	(–) term.	Voltage (V)	Condition
2J	2L	Approx. above 1.0 (AC range)	While driving (above 25km/h {16MPH})
		Approx. 0 (AC range)	Vehicle stopped

Terminal	Resistance (Ω)
A ↔ B	500–1,000
B ↔ C	∞
A ↔ C	∞

CIRCUIT DIAGRAM

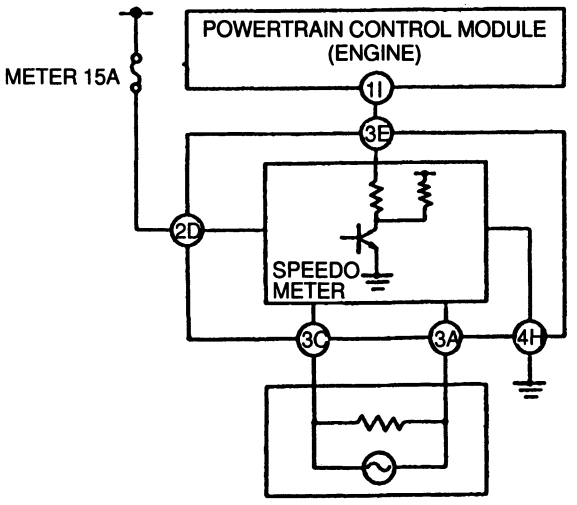


DIAGNOSTIC TROUBLE CODE NO.07 VEHICLE SPEEDOMETER SENSOR

STEP	INSPECTION		ACTION
1	Are there any poor connections at vehicle speedometer sensor and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector
		No	Go to next step
2	Connect a circuit tester to terminals as shown Is input voltage of vehicle speedometer sensor at powertrain control module (Transmission) OK? ☞page K-35	Yes	Go to step 8
		No	Go to next step
3	Remove combination meter Is there continuity between terminal 3E of meter connector and terminal 1I of powertrain control module (Transmission)?	Yes	Go to next step
		No	Repair or replace wiring and/or connector
4	Connect circuit tester to terminals 3C and 3A of meter connector Does pointer of circuit tester move slightly when rear wheels are slowly turned? ☞page K-29	Yes	Go to next step
		No	Replace speedometer
5	Remove vehicle speedometer sensor Is resistance felt when turning speedometer driven gear by hand? ☞page K-30	Yes	Go to next step
		No	Replace vehicle speedometer sensor ☞page K-30
6	Disconnect vehicle speedometer sensor connector and connect circuit tester Does pointer of circuit tester move slightly when driven gear is slowly turned? ☞page K-30	Yes	Go to next step
		No	Replace vehicle speedometer sensor ☞page K-30
7	Disconnect vehicle speedometer sensor connector Is continuity of sensor OK? ☞page K-30 **Resistance: Approx. 290 Ω (20°C {68°F}); reference**	Yes	Check wiring and connectors from vehicle speedometer sensor to speedmetor If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace vehicle speedometer sensor ☞page K-30
8	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞page K-234	Yes	Replace powertrain control module (Transmission) ☞page K-41
		No	Intermittent poor connection Check for cause

(+) tern.	(–) term.	Voltage (V)	Condition
1I	Ground	2–3	Vehicle moving
		0 or 4.5–5.5	Vehicle stopped

CIRCUIT DIAGRAM



VEHICLE SPEEDOMETER SENSOR

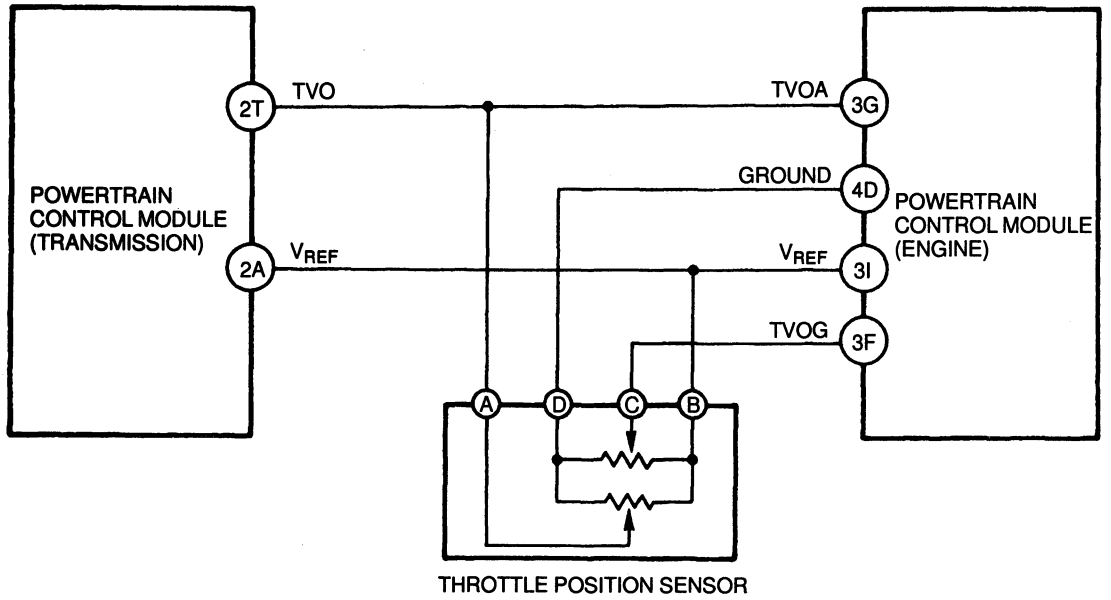
DIAGNOSTIC TROUBLE CODE NO.12 THROTTLE POSITION SENSOR

STEP	INSPECTION		ACTION
1	Are there any poor connections at throttle position sensor and powertrain control module (Transmission) connector or terminal?	Yes	Repair or replace connector
		No	Go to next step
2	Connect a circuit tester to terminals as shown Is input voltage of throttle position sensor (TVO) at powertrain control module (Transmission) OK? ☞page K-35	Yes	Go to step 5
		No	Go to next step
3	Connect a circuit tester to terminals as shown Is input voltage of throttle position sensor (VREP) at powertrain control module (Transmission) OK? ☞page K-35	Yes	Go to next step
		No	Check voltage at terminal 3I of powertrain control module (Engine) **Voltage: 4.5–5.5V (ignition switch ON)** If OK, go to next step If not OK, repair wiring and/or connector, or replace powertrain control module (Transmission)
4	Is throttle position sensor OK? ☞section F	Yes	Check wiring and connectors from powertrain control module (Transmission) to throttle position sensor If OK, go to next step If not OK, repair wiring and/or connector
		No	Adjust or replace throttle position sensor ☞section F
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞page K-234	Yes	Replace powertrain control module (Transmission) ☞page K-41
		No	Intermittent poor connection Check for cause

(+) tern.	(-) term.	Voltage (V)	Condition
2T	Ground	0.1–1.1	Throttle valve closed throttle position
		4.0–4.5	Throttle valve wide open throttle

(+) tern.	(-) term.	Voltage (V)	Condition
2A	Ground	4.5–5.5	Ignition switch ON
		0	Ignition switch OFF

CIRCUIT DIAGRAM



THROTTLE POSITION SENSOR

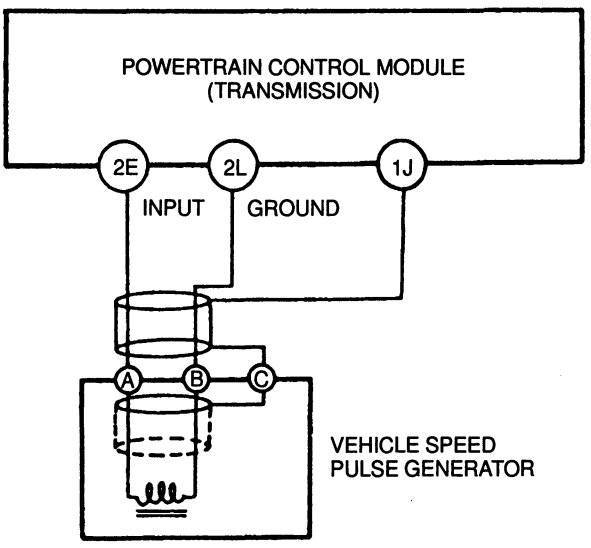
DIAGNOSTIC TROUBLE CODE NO.55 VEHICLE SPEED PULSE GENERATOR

STEP	INSPECTION		ACTION
1	Are there any poor connections at vehicle speed pulse generator and powertrain control module (Transmission) connector or terminal?	Yes	Repair or replace connector
		No	Go to next step
2	Connect a circuit tester to terminals as shown Is input voltage of vehicle speed pulse generator at powertrain control module (Transmission) OK? ☞page K-35	Yes	Go to step 5
		No	Go to next step
3	Disconnect 20-pin powertrain control module (Transmission) connector Is resistance between terminal 2E and terminal 2L OK? **Resistance: 2.2–3.5 kΩ**	Yes	Go to next step
		No	Go to next step
4	Disconnect vehicle speed pulse generator connector Is resistance of vehicle speed pulse generator OK? ☞page K-30	Yes	Check wiring and connectors from powertrain control module (Transmission) to vehicle speed pulse generator If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace vehicle speed pulse generator ☞page K-31
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed. Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞page K-234	Yes	Replace powertrain control module (Transmission) ☞page K-41
		No	Intermittent poor connection Check for cause

(+) tern.	(–) term.	Voltage (V)	Condition
2E	2L	Approx.0 above 0.5 (AC range)	While driving (above 25km/h {16mph})
		Approx. 0 (AC range)	Vehicle stopped

Terminal	Resistance (KΩ)
A ↔ B	2.2–3.5
B ↔ C	∞
A ↔ C	∞

CIRCUIT DIAGRAM



DIAGNOSTIC TROUBLE CODE NO.56 ATF THERMOSENSOR

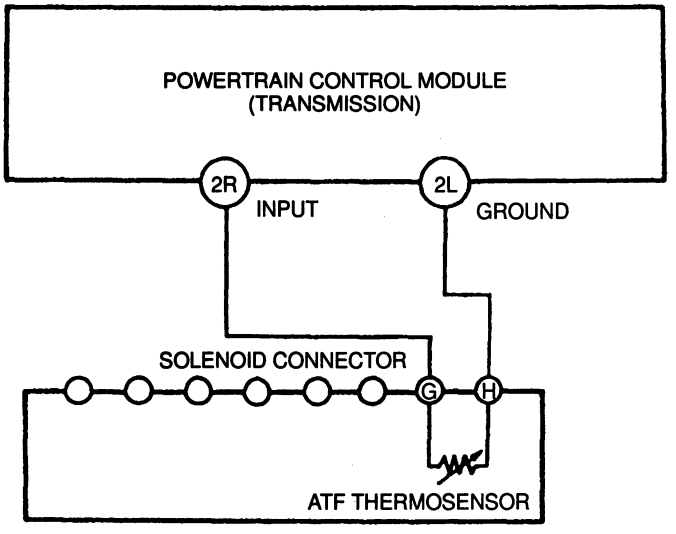
STEP	INSPECTION		ACTION
1	Are there any poor connections at ATP thermosensor and powertrain control module (Transmission) connector or terminal?	Yes	Repair or replace connector
		No	Go to next step
2	Connect a circuit tester to terminals as shown Is input voltage of ATF thermosensor at powertrain control module (Transmission) OK? ☞page K-35	Yes	Go to step 5
		No	Go to next step
3	Disconnect 20-pin powertrain control module (Transmission) connector Is resistance between terminal 2R and terminal 2L OK?	Yes	Go to step 5
		No	Go to next step
4	Disconnect solenoid connector Is resistance between terminal G and terminal H of ATF thermosensor OK? ☞page K-32	Yes	Check wiring and connectors from powertrain control module (Transmission) to ATF thermosensor If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace ATF thermosensor ☞page K-31
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞page K-234	Yes	Replace powertrain control module (Transmission) ☞page K-41
		No	Intermittent poor connection Check for cause

(+) tern.	(–) term.	Voltage (V)	Condition
2R	2L	Approx. 1.8	ATF temp. 10°C {50°F}
		Approx. 1.1	ATF temp. 40°C {104°F}
		Approx. 0.4	ATF temp. 80°C {176°F}

Terminal	Resistance (KΩ)
2R ↔ 2L	Approx. 3.8 ATF temp. 10°C {50°F}
	Approx. 1.2 ATF temp. 40°C {104°F}
	Approx. 0.3 ATF temp. 80°C {176°F}

Terminal	Resistance (KΩ)
G ↔ H	Approx. 3.8 ATF temp. 10°C {50°F}
	Approx. 1.2 ATF temp. 40°C {104°F}
	Approx. 0.3 ATF temp. 80°C {176°F}

CIRCUIT DIAGRAM



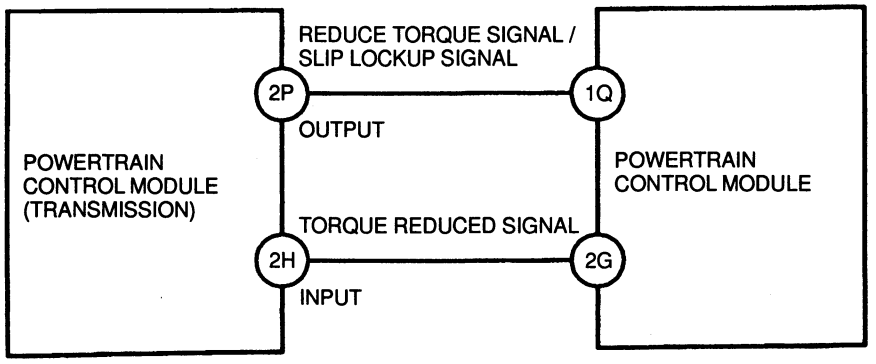
DIAGNOSTIC TROUBLE CODE NO.57 REDUCE TORQUE SIGNAL / SLIP LOCKUP SIGNAL, TORQUE REDUCED SIGNAL

STEP	INSPECTION		ACTION
1	Are there any poor connections at powertrain control module (Engine) and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector
		No	Go to next step
2	Connect a circuit tester to terminals as shown Is input voltage of torque reduced signal at powertrain control module (Transmission) OK? ☞page K-35 B+: Battery positive voltage	Yes	Go to step 4
		No	Go to next step
3	Disconnect 20-pin powertrain control module (Transmission) connector Is there continuity between terminal 2H of powertrain control module (Transmission) and terminal 2G of powertrain control module (Engine)?	Yes	Go to next step
		No	Repair wiring
4	Connect a circuit tester to terminals as shown Is input voltage of torque reduced signal at powertrain control module (Transmission) OK? ☞page K-35 B+: Battery positive voltage	Yes	Go to step 6
		No	Go to next step
5	Disconnect 20-pin powertrain control module (Transmission) connector Is there continuity between terminal 2P of powertrain control module (Transmission) and terminal 1Q of powertrain control module (Engine)?	Yes	Go to next step
		No	Repair wiring
6	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞page K-234	Yes	Replace powertrain control module (Transmission) or powertrain control module (Engine) ☞page K-41
		No	Intermittent poor connection Check for cause

(+) tern.	(-) term.	Voltage (V)	Condition
2H	Ground	B+	Engine idling
		Below 1.0	Throttle opening above 1/8 (Engine coolant temp below 40°C {104°F})

(+) tern.	(-) term.	Voltage (V)	Condition
2P	Ground	Below 1.0	When shifting from 1st to 2nd or from 2nd to 3GR with the throttle opening above 1.5/8 When slip lockup with the throttle opening below 0.5/8
		B+	Engine idling

CIRCUIT DIAGRAM



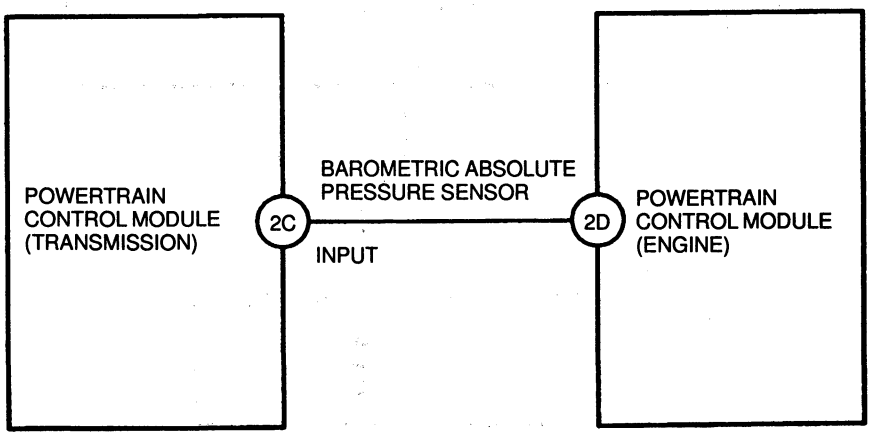
DIAGNOSTIC TROUBLE CODE NO.58 BAROMETRIC ABSOLUTE PRESSURE SENSOR

STEP	INSPECTION		ACTION
1	Are there any poor connections at powertrain control module (Engine) and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector
		No	Go to next step
2	Connect a circuit tester to terminals as shown Is input voltage of barometric absolute pressure sensor at powertrain control module (Transmission) OK? ☞page K-35	Yes	Go to step 5
		No	Go to next step
3	Disconnect 20-pin powertrain control module (Transmission) connector Is there continuity between terminal 2C of powertrain control module (Transmission) and terminal 2D of powertrain control module (Engine)?	Yes	Go to next step
		No	Repair wiring
4	Connect a circuit fester to terminals as shown Is output voltage of barometric absolute pressure sensor at powertrain control module (Engine) OK? ☞section F	Yes	Go to next step
		No	Replace powertrain control module (Engine) ☞section F
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞page K-234	Yes	Replace powertrain control module (Transmission) ☞page K-41
		No	Intermittent poor connection Check for cause

(+) tern.	(-) term.	Voltage (V)	Condition
2C	Ground	2.0–4.5	Ignition switch ON
		0V	Ignition switch OFF

(+) tern.	(-) term.	Voltage (V)	Condition
2D	Ground	2.0–4.5V	Ignition switch ON
		0V	Ignition switch OFF

CIRCUIT DIAGRAM

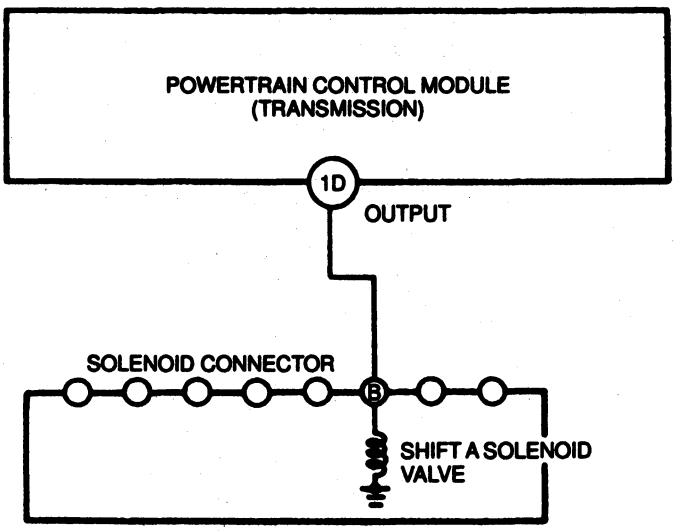


DIAGNOSTIC TROUBLE CODE NO.60 SHIFT A SOLENOID VALVE

STEP	INSPECTION		ACTION
1	Are there any poor connections at solenoid valve and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector
		No	Go to next step
2	Connect a circuit tester to terminals as shown Is output voltage of shift A solenoid valve at powertrain control module (Transmission) OK? ☞page K-35 B+: Battery positive voltage	Yes	Check wiring and go to step 5
		No	Go to next step
3	Disconnect 16-pin powertrain control module (Transmission) connector Is resistance between terminal 1D and a ground **Resistance: 20–40Ω**	Yes	Go to step 5
		No	Go to next step
4	Disconnect solenoid connector Is resistance between ground and terminal B of shift A solenoid valve OK? ☞page K-32 **Resistance: 20–40Ω**	Yes	Check wiring and connectors from powertrain control module (Transmission) to shift A solenoid valve If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace shift A solenoid valve ☞page K-33
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞page K-234	Yes	Replace powertrain control module (Transmission) ☞page K-41
		No	Intermittent poor connection Check for cause

(+) term.	(–) term.	Voltage (V)	Condition
1D	Ground	B+	1st, 4GR gear
		Below 1.0	2nd, 3GR gear

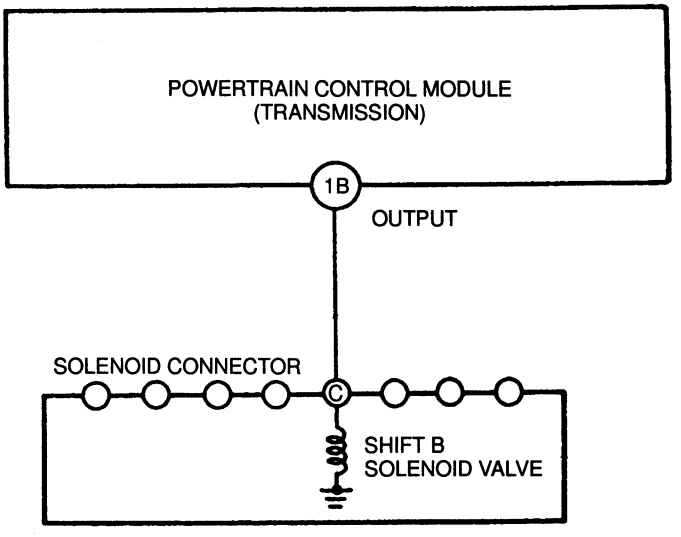
CIRCUIT DIAGRAM



DIAGNOSTIC TROUBLE CODE NO.61 SHIFT B SOLENOID VALVE

STEP	INSPECTION		ACTION
1	Are there any poor connections at solenoid valve and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector
		No	Go to next step
2	Connect a circuit tester to terminals as shown Is output voltage of shift B solenoid valve at powertrain control module (Transmission) OK? ☞page K-35 B+: Battery positive voltage (+) tern. 1B; (−) term. Ground; Voltage (V): B+; Condition: 1st, 2nd gear Voltage (V): Below 1.0; Condition: 3GR, 4GR gear	Yes	Check wiring and go to step 5
		No	Go to next step
3	Disconnect 16-pin powertrain control module (Transmission) connector Is resistance between terminal 1B and a ground OK? **Resistance: 20–40Ω**	Yes	Go to step 5
		No	Go to next step
4	Disconnect solenoid connector Is resistance between ground and terminal C of shift B solenoid valve OK? ☞page K-32 **Resistance: 20–40Ω**	Yes	Check wiring and connectors from powertrain control module (Transmission) to shift B solenoid valve If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace shift B solenoid valve ☞page K-33
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞page K-234	Yes	Replace powertrain control module (Transmission) ☞page K-41
		No	Intermittent poor connection Check for cause

CIRCUIT DIAGRAM

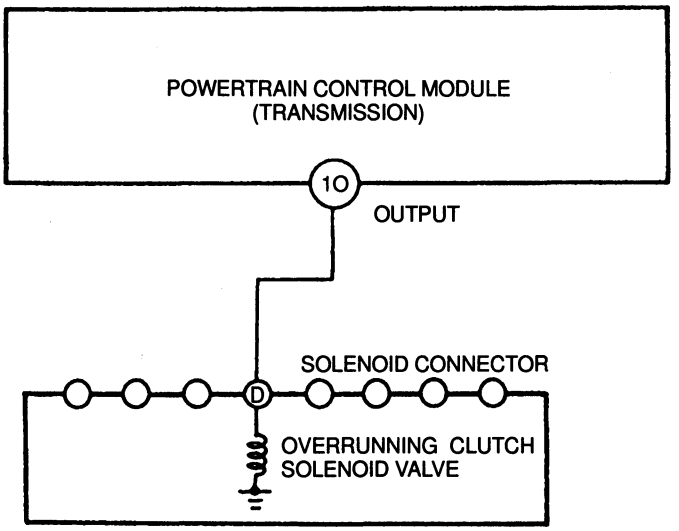


DIAGNOSTIC TROUBLE CODE NO.62 OVERRUNNING CLUTCH SOLENOID VALVE

STEP	INSPECTION		ACTION
1	Are there any poor connections at solenoid valve and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector
		No	Go to next step
2	Connect a circuit fester to terminals as shown Is output voltage of overrunning clutch solenoid valve at powertrain control module (Transmission) OK? ☞page K–35 B+: Battery positive voltage	Yes	Check wiring and go to step 5
		No	Go to next step
3	Disconnect 16-pin powertrain control module (Transmission) connector Is resistance between terminal 1O and a ground OK? **Resistance: 20–40Ω**	Yes	Go to step 5
		No	Go to next step
4	Disconnect solenoid connector Is resistance between ground and terminal D of overrunning clutch solenoid valve OK? ☞page K–32 **Resistance: 20–40Ω**	Yes	Check wiring and connectors from powertrain control module (Transmission) to overrunning clutch solenoid valve If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace overrunning clutch solenoid valve ☞page K–33
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞page K–234	Yes	Replace powertrain control module (Transmission) ☞page K–41
		No	Intermittent poor connection Check for cause

(+) tern.	(–) term.	Voltage (V)	Condition
1O	Ground	B+	D range (throttle valve closed)
		Below 1.0	D range (throttle valve wide open throttle)

CIRCUIT DIAGRAM

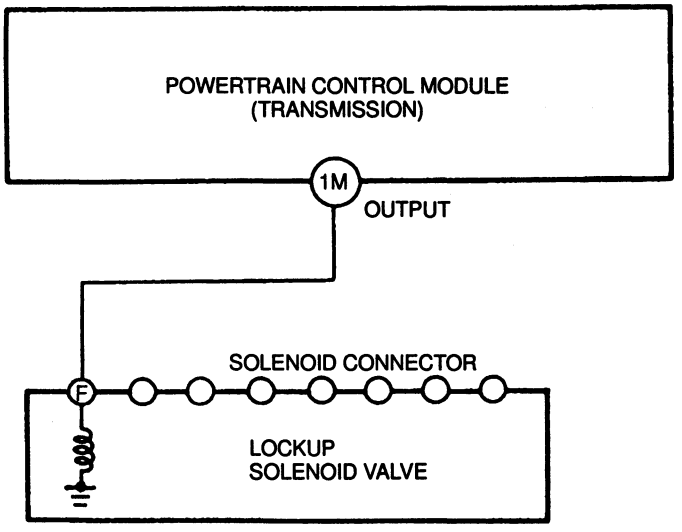


DIAGNOSTIC TROUBLE CODE NO.63 LOCKUP SOLENOID VALVE

STEP	INSPECTION		ACTION
1	Are there any poor connections at solenoid valve and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector
		No	Go to next step
2	Disconnect 16-pin powertrain control module (Transmission) connector Is resistance between terminal 1M and a ground OK? **Resistance: 10–20Ω**	Yes	Go to step 4
		No	Go to next step
3	Disconnect solenoid connector Is resistance between ground and terminal F of lockup solenoid valve OK? ☞**page K–32** **Resistance: 10–20Ω**	Yes	Check wiring and connectors from powertrain control module (Transmission) to lockup solenoid valve If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace lockup solenoid valve ☞**page K–33**
4	Connect a dwell meter to terminals as shown Is output duty of lockup solenoid valve at powertrain control module (Transmission) OK? ☞**page K–247**	Yes	Go to next step
		No	Replace powertrain control module (Transmission) ☞**page K–41**
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞**page K–234**	Yes	Replace powertrain control module (Transmission) ☞**page K–41**
		No	Intermittent poor connection Check for cause

(+) tern.	(–) term.	Duty (ON %)	Condition
1M	Ground	Approx. 5	No lockup
		Approx. 100	Lockup

CIRCUIT DIAGRAM



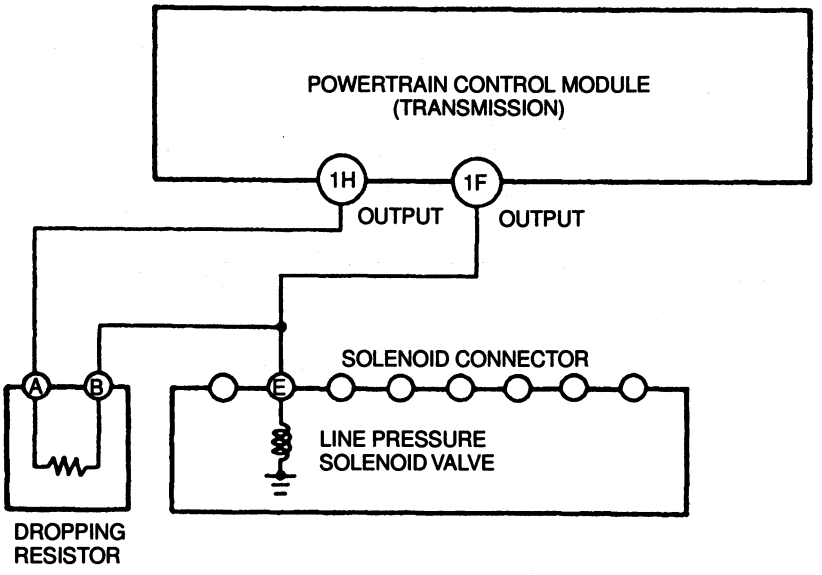
DIAGNOSTIC TROUBLE CODE NO.64 LINE PRESSURE SOLENOID VALVE

STEP	INSPECTION		ACTION
1	Are there any poor connections at solenoid valve and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector
		No	Go to next step
2	Disconnect 16-pin powertrain control module (Transmission) connector Is resistance between terminal 1F (line pressure solenoid valve) and a ground OK? **Resistance: 2.5–5.0Ω**	Yes	Go to next step
		No	Go to step 4
3	Disconnect 16-pin powertrain control module (Transmission) connector Is resistance between terminal 1H (dropping resistor) and a ground OK? **Resistance: 12.5–19.0Ω**	Yes	Go to step 5
		No	Go to step 7
4	Disconnect solenoid connector Is resistance between ground and terminal E of line pressure solenoid valve OK? ☞**page K–32** **Resistance: 2.5–5.0Ω**	Yes	Check wiring and connectors from powertrain control module (Transmission) to line pressure solenoid valve If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace line pressure solenoid valve ☞**page K–33**
5	Connect a dwell meter to terminals as shown Is output duty of dropping resistor at powertrain control module (Transmission) OK? ☞**page K–246**	Yes	Go to next step
		No	Replace powertrain control module (Transmission), perform road test, and go to step 8 ☞**page K–41,16**
6	Connect a dwell meter to terminals as shown Is output duty of line pressure solenoid valve at powertrain control module (Transmission) OK? ☞**page K–246**	Yes	Go to next step
		No	Replace powertrain control module (Transmission), perform road test, and go to step 8 ☞**page K–41,16**
7	Disconnect dropping resistor connector Is resistance of resistor OK? ☞**page K–33** **Resistance: 10–14Ω**	Yes	Check wiring and connectors from powertrain control module (Transmission) to dropping resistor If OK, go to next step If not OK, repair wiring and/or connector
		No	Repair or dropping resistor ☞**page K–33**
8	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞**page K–234**	Yes	Replace powertrain control module (Transmission) ☞**page K–41**
		No	Intermittent poor connection Check for cause

(+) tern.	(–) term.	Duty (ON %)	Condition
1H	Ground	Approx. 100	Throttle valve closed throttle
		Approx. 5	Throttle valve wide open throttle

(+) tern.	(–) term.	Duty (ON %)	Condition
1F	Ground	Approx. 100	Throttle valve closed throttle position
		Approx. 5	Throttle valve wide open throttle

CIRCUIT DIAGRAM

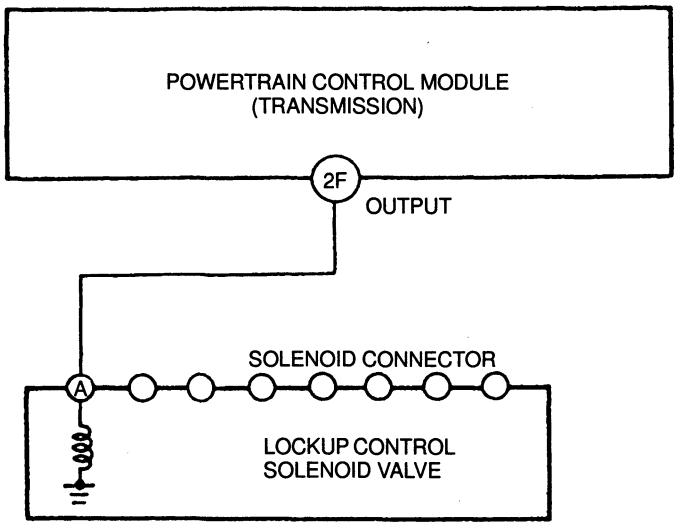


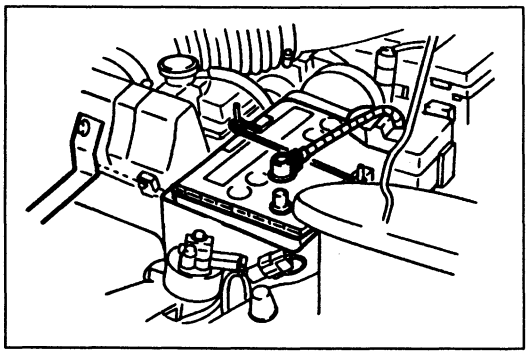
DIAGNOSTIC TROUBLE CODE NO.65 LOCKUP CONTROL SOLENOID VALVE

STEP	INSPECTION		ACTION
1	Are there any poor connections at solenoid valve and powertrain control module (Transmission) connectors?	Yes	Repair or replace connector
		No	Go to next step
2	Connect a circuit fester to terminals as shown Is output voltage of lockup control solenoid valve at powertrain control module (Transmission) OK? ☞page K-35 B+: Battery positive voltage	Yes	Check wiring and go to step 5
		No	Go to next step
3	Disconnect 20-pin powertrain control module (Transmission) connector Is resistance between terminal 2F and a ground OK? **Resistance: 20–40Ω**	Yes	Go to step 5
		No	Go to next step
4	Disconnect solenoid connector Is resistance between ground and terminal A of lockup control solenoid valve OK? ☞page K-32 **Resistance: 20–40Ω**	Yes	Check wiring and connectors from powertrain control module (Transmission) to lockup control solenoid valve If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace lockup control solenoid valve ☞page K-33
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for diagnostic trouble code Is diagnostic trouble code displayed? ☞page K-234	Yes	Replace powertrain control module (Transmission) ☞page K-41
		No	Intermittent poor connection Check for cause

(+) tern.	(–) term.	Voltage (V)	Condition
2F	Ground	B+	Lockup
		Below 1.0	No lockup

CIRCUIT DIAGRAM





After-Repair Procedure

1. Cancel the memory of diagnostic trouble codes by disconnecting the negative battery cable for at least **20 seconds** and the brake pedal is depressed.
   Reconnect the battery cable.
2. Remove the **SST (Self-diagnosis Checker)** if connected.

DRIVE AT 50 km/h {31 MPH}
|
KICKDOWN
|
STOP THE VEHICLE

3. Drive the vehicle at 50 km/h {31MPH}, and depress the accelerator pedal fully to activate kickdown. Stop the vehicle gradually.
4. Connect the **SST (Self-diagnosis Checker)** to the data link connector.
5. Turn the ignition switch to ON.
6. Verify that no codes are displayed.

SERVICE POINTS

OUTLINE

Hold Switch

- If the wiring of the hold switch is open or shorted, selection to/from hold mode is not possible.

Park/Neutral Switch

- If a malfunction occurs in the wiring of the park/neutral switch, the powertrain control module (Transmission) cannot determine the range position, and shifting may be abnormal in D, S, and L ranges. There may not be a shift to Fourth gear.

Throttle Position Sensor

- If the wiring of the throttle position sensor is open or shorted, diagnostic trouble code No.12 is displayed by the self-diagnosis function, and hold mode is canceled.
- If a malfunction occurs in the throttle position sensor, the powertrain control module (Transmission) judges the throttle opening signals from the idle signal, and sets the line pressure as follows:

Idle signal	Throttle opening angle	Line pressure
OFF (throttle valve opened)	4/8 stroke	Maximum
ON (throttle valve closed throttle position)	0/8 stroke	Minimum

Idle Signal

- If the wiring is open, the powertrain control module (Transmission) does not correct the throttle characteristics. In this case, lockup is not canceled when cruising (closed throttle position) and vehicle jolts when accelerator pedal is depressed or released.
- If the wiring is shorted, the line pressure will be low (does not match throttle characteristics) and the transmission may slip when shifting.

Vehicle Speed Sensor

- If there is no input signal from vehicle speed sensor, diagnostic trouble code No.06 is displayed by the self-diagnosis function and hold mode is canceled.
- Shifting is made based on signals from vehicle speedometer sensor.
- If a malfunction occurs in vehicle speed sensor and vehicle speedometer sensor at the same time, shift A and B solenoid valve go OFF and D and S ranges become in Third gear position, L range becomes in 2nd gear position, and lockup is inhibited.

Vehicle Speedometer Sensor

- If there is no input signal from vehicle speedometer sensor, diagnostic trouble code No.07 is displayed by the self-diagnosis function, and hold mode is canceled.
- If a malfunction occurs in vehicle speedometer sensor, shifting is made normal based on signals from the vehicle speed sensor (revolution sensor).
- If a malfunction occurs in vehicle speed sensor and vehicle speedometer sensor at the same time, shift A and B solenoid valve go OFF and D and S ranges become in Third gear position, L range becomes in 2nd gear position, and lockup is inhibited.

Vehicle Speed Pulse Generator

- If no input signal from the vehicle speed pulse generator, diagnostic trouble code No.55 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the vehicle speed pulse generator, the torque reduction control function is inhibited.
  The gear position at shifting cannot be determined and timing control at shifting is made based on signals from vehicle speed sensor (revolution sensor). Shift shock may be slightly strong.

Stoplight Switch

- If the wiring of the stoplight switch is open or shorted, PCMT control is made normal.
- If the wiring is shorted to the battery power, there may be a shift from Fourth gear to Third gear when the throttle valve is at the closed throttle position.

Torque Reduced Signal
- If the wiring is open or shorted, diagnostic trouble code No.57 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the torque reduced signal, the torque reduction control function is inhibited and the line pressure characteristics will be high when shifting. Shift shock may be slightly strong.
- If a malfunction occurs in the reduce torque signal or slip lockup signal, diagnostic trouble code No.57 is displayed by the self-diagnosis function.

Mileage Switch
- If the wiring is open, the line pressure characteristics will be slightly high. Shift shock may be slightly strong when shifting from 1st to 2nd or from 2nd to Third gear.
- If the wiring is shorted, the transmission may slip when shifting from 1st to 2nd or from 2nd to Third gear until the total mileage of the vehicle exceeds approximately 600 km {372 miles}.

Water Thermoswitch
- If the wiring of the water thermoswitch is open or shorted, PCMT control is made normal.
- If the wiring is shorted, the engine coolant temperature may increase.

A/C Signal
- If the wiring is open, normal mode, A/C ON is selected because an ON A/C signal is judged.
- If the wiring is shorted, normal mode, A/C OFF is selected because an OFF A/C signal is judged.

Slip Lockup OFF Signal
- If the wiring of the slip lockup OFF signal is open or shorted, PCMT control is made normal.

Engine RPM Signal
- If there is no input signal from the engine rpm signal, diagnostic trouble code No.01 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the engine rpm signal, lockup shock may be slightly strong.

ATF Thermosensor
- If the wiring is open, diagnostic trouble code No.56 is memorized by the self-diagnosis function. Line pressure is set at maximum and Fourth gear and lockup are inhibited.
- If the wiring is shorted, diagnostic trouble code No.56 is memorized by the self-diagnosis function. Shift shock at low ATF temperature may be strong.

Barometric Absolute Pressure Sensor
- If the wiring is open or shorted, diagnostic trouble code No.58 is displayed by the self-diagnosis function. Line pressure is not controlled correctly at high altitude and shift shock will be strong.

4GR Inhibit Signal (ASC Signal)
- If the wiring is open, there is no input signal from the cruise control unit and acceleration feeling (driving performance) will be deteriorated when the vehicle speed drops 8km/h {5mph} below the set speed or RESUME/ACCEL switch is operated during cruise control operation.
- If the wiring is shorted, there is no shift to Fourth gear.

TAT Terminal (Data Link Connector)
- If the wiring is open, diagnostic trouble code(s) are not displayed by the self-diagnosis function.
- If the wiring is shorted, diagnostic trouble code(s) memorized in the powertrain control module (Transmission) are displayed by hold indicator.

Shift A and B Solenoid Valve
- If the wiring is open or shorted, diagnostic trouble code No.60 for shift A solenoid valve or diagnostic trouble code No.61 for shift B solenoid valve is displayed and hold mode is canceled.
- If either solenoid valve malfunctions, both solenoid valves go OFF and D and S ranges become in Third gear position, L range becomes in 2nd gear position, and lockup is inhibited.

Line Pressure Solenoid Valve
- If the wiring is open or shorted, diagnostic trouble code No.64 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the line pressure solenoid valve, line pressure is set at maximum to make driving possible.
- If a malfunction occurs in the dropping resistor, diagnostic trouble code No.64 is displayed by the self-diagnosis function.

Lockup Solenoid Valve
- If the wiring is open or shorted, diagnostic trouble code No.63 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the lockup solenoid valve, the solenoid valve goes OFF and lockup is canceled.

Lockup Control Solenoid Valve
- If the wiring is open or shorted, diagnostic trouble code No.65 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the lockup control solenoid valve, the solenoid valve goes OFF and lockup is canceled.

Overrunning Clutch Solenoid Valve
- If the wiring is open or shorted, diagnostic trouble code No.62 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the overrunning clutch solenoid valve, the solenoid valve goes OFF and the overrunning clutch engages. Engine braking is available when coasting. There is no shift to Fourth gear.

Dropping Resistor
- If the wiring is open or shorted, diagnostic trouble code No.64 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the dropping resistor, the line pressure is set at maximum to make driving possible.
- If a malfunction occurs in the line pressure solenoid valve, diagnostic trouble code No.64 is displayed by the self-diagnosis function.

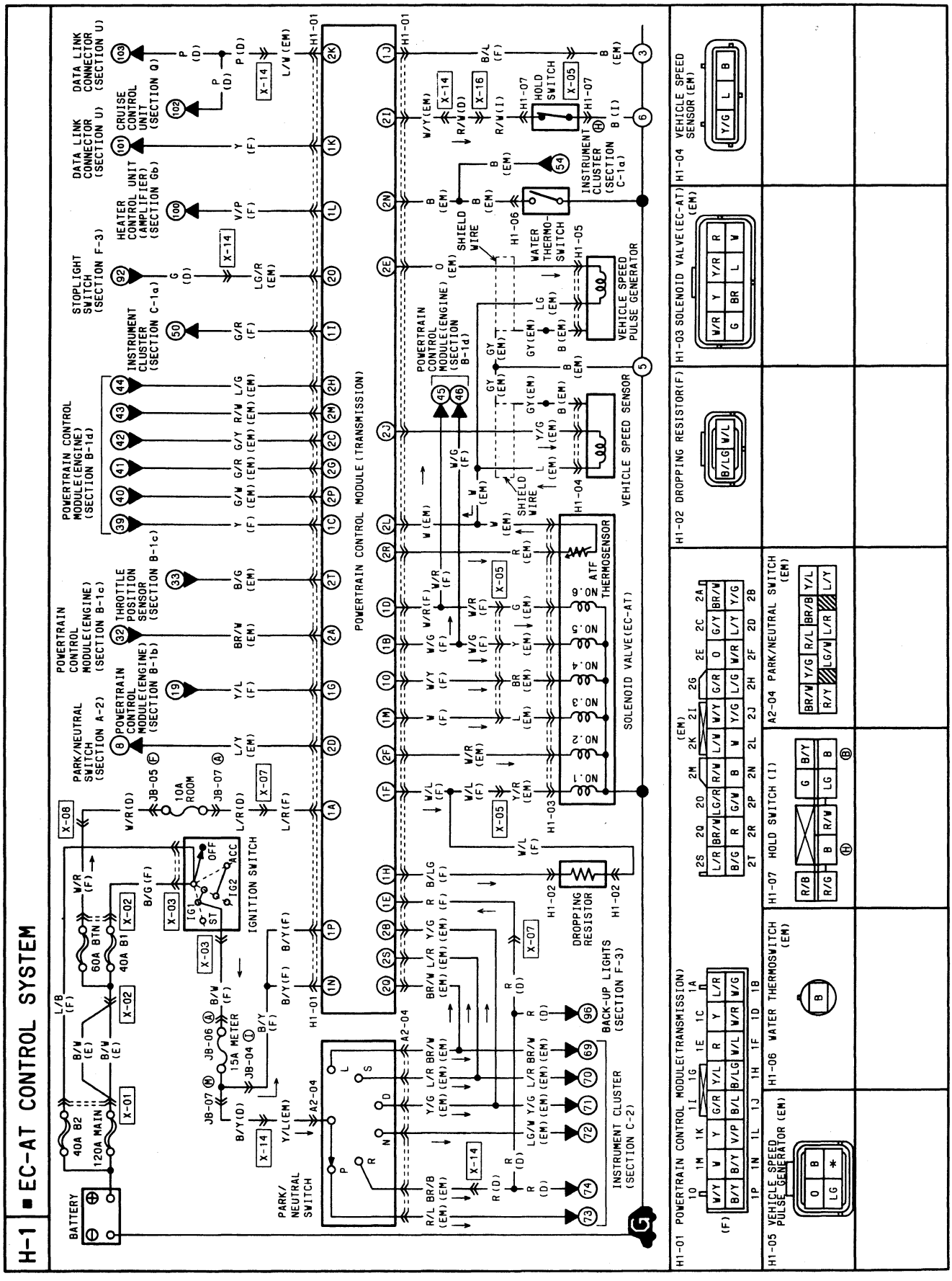
Reduce Torque Signal
- If the wiring is open or shorted, diagnostic trouble code No.57 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the reduce torque signal, the torque reduction control function is inhibited and line pressure will be high at shifting. Shift shock may be slightly strong.
- If a malfunction occurs in the torque reduced signal or slip lockup signal, diagnostic trouble code No.57 is displayed by the self-diagnosis function.

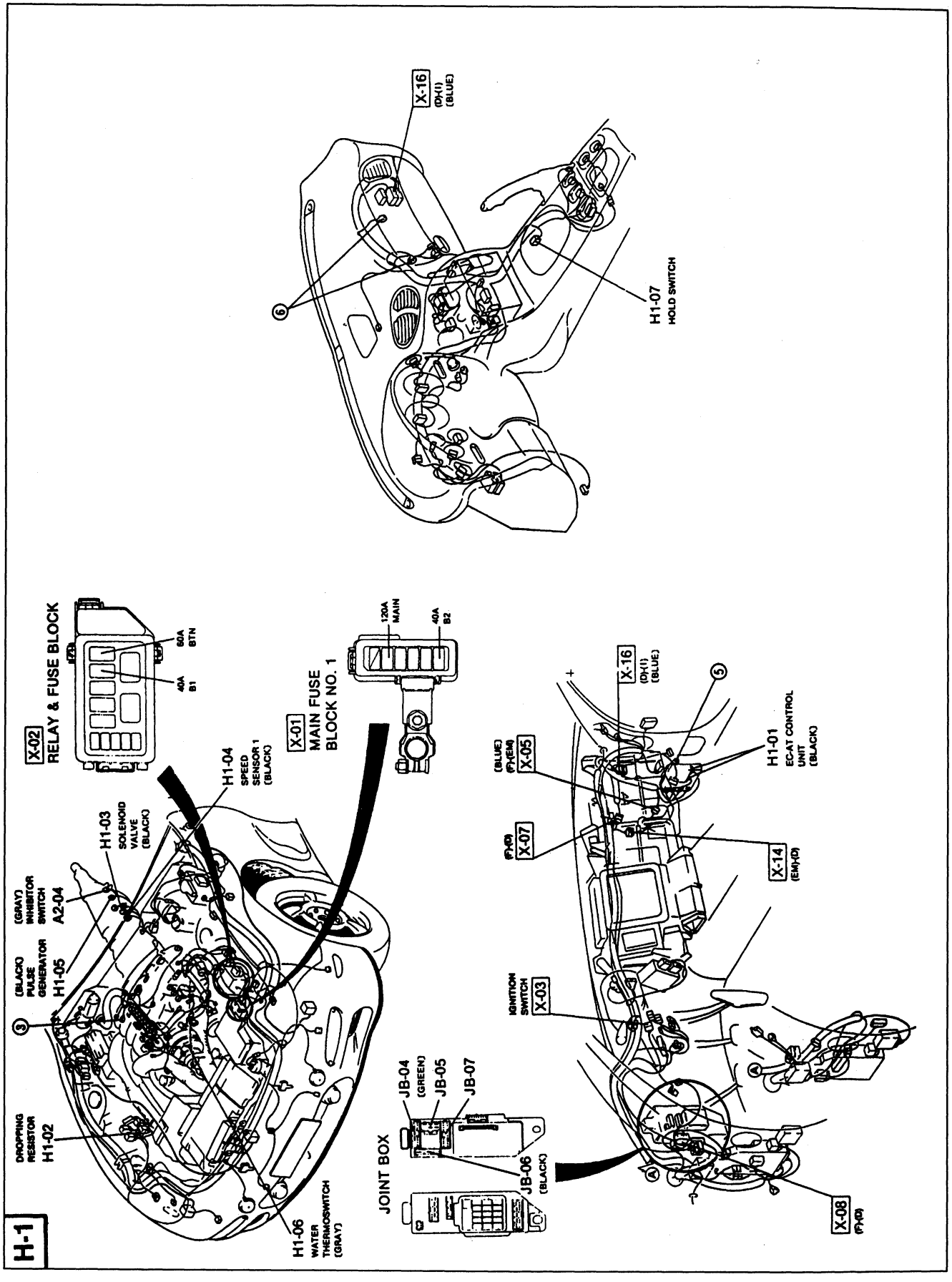
Slip Lockup Signal
- If the wiring is open or shorted, diagnostic trouble code No.57 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the slip lockup signal, the torque reduction control function is inhibited and line pressure will be high at shifting. Shift shock may be slightly strong.
- If a malfunction occurs in the torque reduced signal or reduce torque signal, diagnostic trouble code No.57 is displayed by the self-diagnosis function.

Inhibitor Signal
- If the wiring is open, the engine speed will be slightly low in P and N ranges.
- If the wiring is shorted, the engine speed will be slightly high in R, D, S, and L ranges.

Hold Indicator Light
- If the wiring is open, the hold indicator light will not illuminate.
- If the wiring is shorted, the hold indicator light will remain illuminated.
- If the wiring between the FAT terminal and terminal 2N is open or shorted, diagnostic trouble code(s) will not be displayed by the self-diagnosis function.

WIRING DIAGRAM




H-1
X-16 (D)(I) (BLUE)
H1-07 HOLD SWITCH
X-02 RELAY & FUSE BLOCK
60A B1N
40A B1
X-01 MAIN FUSE BLOCK NO. 1
120A MAIN
40A B2
H1-04 SPEED SENSOR 1 (BLACK)
H1-03 SOLENOID VALVE (BLACK)
(GRAY) INHIBITOR SWITCH A2-04
(BLACK) PULSE GENERATOR H1-05
DROPPING RESISTOR H1-02
H1-06 WATER THERMOSWITCH (GRAY)
JOINT BOX
JB-04 (GREEN)
JB-05
JB-07
JB-06 (BLACK)
(BLUE) (F)-(EM) X-05
(F)-(D) X-07
IGNITION SWITCH X-03
X-16 (D)(I) (BLUE)
H1-01 ECAT CONTROL UNIT (BLACK)
X-14 (EM)-(D)
X-08 (F)-(D)

MEMO

ELECTRICAL DIAGNOSIS SUPPORT

Hold Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2I – hold switch	Mode does not change when hold switch is not operated	Mode does not change when hold switch is operated	Shifting may be abnormal Mode may change when hold switch not operated
Hold switch-ground		No symptom	

Park/Neutral Switch

If the park/neutral switch fuse burns out while the vehicle is being driven, the Powertrain control module (Transmission) will operate as if in the current range only. If the ignition switch is turned from OFF to ON after the fuse burns out, the vehicle can still be driven, but the Powertrain control module (Transmission) will operate as if in N range, and will inhibit lockup.

R Range Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1E – R range switch	No symptom	METER 15A fuse burns out when R range is selected	May not shift to 4GR in D range S, L range shift pattern may be same as D range
R range switch – battery		Fuse burns out	
R range switch – range indicator light	Range indicator light does not illuminate	METER 15A fuse burns out when R range is selected	

L Range Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2Q – L range switch	L range shift pattern may be same as D or S range	METER 15A fuse burns out when L range is selected	May not shift to 4GR in D range S, L range shift pattern may be same as D range
L range switch – battery		Fuse burns out	
L range switch – range indicator light	Range indicator light does not illuminate	METER 15A fuse burns out when L range is selected	

S Range Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2S – S ran e switch	S range shift pattern may be same as D or L range	METER 15A fuse burns out when S range is selected	May not shift to 4GR in D range S, R range shift pattern may be same as D range
S range switch – battery		Fuse burns out	
S range switch – range indicator light	Range indicator light does not illuminate	METER 15A fuse burns out when S range is selected	

D Range Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2B – D range switch	D range shift pattern may be same as S or L range	METER 15A fuse burns out when D ran e is selected	May not shift to 4GR in D range S, R range shift pattern may be same as D range
D range switch – battery		Fuse burns out	
D range switch – range indicator light	Range indicator light does not illuminate	METER 15A fuse burns out when D range is selected	

P, N Range Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2D – P, N range switch	No symptom	IG KEY 40A fuse burns out when ignition switch turned START	May not shift to 4GR in D range S, L range shift pattern may be same as D range
P, N range switch – starter circuit	Starter does not operate		

NA: Not applicable

Throttle Position Sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2A – throttle position sensor	Code No.12 output Shift point incorrect and shift shock strong	Code No.12 output Shift point incorrect and shift shock strong	Line pressure will be abnormal and clutch may slip if Powertrain control module (Transmission) does not judge malfunction Vehicle may jolt
Powertrain control module (Transmission) terminal 2T – throttle position sensor			

Idle Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2M – Powertrain control module (Engine) terminal 2E	Vehicle jolts when accelerator pedal depressed or released	Clutches may slip when shifting	Line pressure will be abnormal and clutches may slip if Powertrain control module (Transmission) does not judge Vehicle malfunction may jolt

Vehicle Speed Sensor (Revolution Sensor)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2J – vehicle speed sensor	Code No.06 output	Code No.06 output	NA
Vehicle speed sensor – ground (Powertrain control module (Transmission) terminal 2L)		NA	

Vehicle Speedometer Sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1I – vehicle speedometer sensor	Code No.07 output	Code No.07 output	NA

Vehicle Speed Pulse Generator

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2E – vehicle speed pulse generator	Code No.55 output Shift shock may be slightly strong	Code No.55 output Shift shock may be slightly strong	NA
Vehicle speed pulse generator – ground (Powertrain control module (Transmission) terminal 2L)		NA	

Stoplight Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2Q – stoplight switch	No symptom	Stop 15A fuse burns out when brake pedal is depressed	NA
Stoplight switch – battery		NA	

NA: Not applicable

Torque Reduced Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2H – Powertrain control module (Engine) terminal 2G	Code No.57 output Shift shock may be slightly strong	Code No.57 output Shift shock may be slightly strong	NA

Mileage Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2N – speedometer	Shift shock may be strong when shifting from 1st to 2nd or from 2nd to 3GR	Transmission may slip when shifting from 1st to 2nd or from 2nd to 3GR until the total mileage of the vehicle exceeds approximately 600 km {372 mile}	NA

Water Thermoswitch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2N – water thermoswitch	Acceleration feeling (driving performance) will be deteriorated	Engine coolant temperature may increase	Acceleration feeling (driving performance) will be deteriorated

A/C Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1L – Powertrain control module (Engine) terminal 1K	Will always be normal, A/C ON mode	Will always be normal, A/C OFF mode	NA

Slip Lockup OFF Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2G – Powertrain control module (Engine) terminal 2C	No symptom	No symptom	NA

Engine RPM Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1G – Powertrain control module (Engine) terminal 2B	Code No.01 output Lockup shock will be strong	Code No.01 output Lockup shock will be strong	NA

ATF Thermosensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2R – ATF thermosensor	Code No.56 output 4GR and lockup will be inhibited	No code No.56 output Shift shock will be strong at low ATF temperature	NA
ATF thermosensor – ground (Powertrain control module (Transmission) terminal 2L)		NA	

NA: Not applicable

Barometric Absolute Pressure Sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2C – Powertrain control module (Engine) terminal 2D	Code No.58 output Shift shock will be strong at high altitude	Code No.58 output Shift shock will be strong at high altitude	NA

4GR Inhibit Signal (ASC Signal)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2K – cruise control unit terminal 1G	4GR not inhibited when 4GR inhibit signal ON	Does not shift to 4GR Always diagnoses Powertrain control module (Transmission) system	NA

TAT Terminal (Data Link Connector)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2K – TAT terminal	Does not diagnose PCMT system	Always diagnoses Powertrain control module (Transmission) system Does not shift to 4GR	NA

Shift A Solenoid Valve

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1D – shift A solenoid valve	Code No.60 output D, S range: Third gear fixed L range: 2nd gear fixed	Code No. 60 output D, S range: Third gear fixed L range: 2nd gear fixed	Shifting may be abnormal if Powertrain control module (Transmission) does not judge malfunction
Shift A solenoid valve – ground		No symptom	

Shift B Solenoid Valve

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1B – shift B solenoid valve	Code No.61 output D, S range: Third gear fixed L range: 2nd gear fixed	Code No.61 output D, S range: Third gear fixed L range: 2nd gear fixed	Shifting may be abnormal if Powertrain control module (Transmission) does not judge malfunction
Shift B solenoid valve – ground		No symptom	

Line Pressure Solenoid Valve

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1F – line pressure solenoid valve	Code No.64 output Shift shock and select shock will be strong	Code No.64 output Shift shock and select shock will be strong	Shifting may be abnormal if Powertrain control module (Transmission) does not judge malfunction
Line pressure solenoid valve – ground		No symptom	

Lockup Solenoid Valve

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1M – lockup solenoid valve	Code No.63 output Lockup will not operate	Code No.63 output Lockup will not operate	Lockup may not be operated in lockup zone
Lockup solenoid valve – ground		No symptom	

NA: Not applicable

Lockup Control Solenoid Valve

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2P – lockup control solenoid valve	Code No.65 output Lockup will not operate	Code No.65 output Lockup will not operate	Lockup may not be operated in lockup zone
Lockup control solenoid valve – ground		No symptom	

Overrunning Clutch Solenoid Valve

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1O – overrunning clutch solenoid valve	Code No.62 output Engine breaking always operated during coasting Does not shift to 4GR	Code No.62 output Engine breaking always operated during coasting Does not shift to 4GR	May not shift to 4GR
Overrunning clutch solenoid valve – ground		No symptom	

Dropping Resister

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1H – dropping resister	Code No.64 output Shift shock and select shock will be strong	Code No.64 output Shift shock and select shock will be strong	NA
Dropping resister – solenoid valve (line pressure)			

Reduce Torque Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2P – Powertrain control module (Engine) terminal 1Q	Code No.57 output Shift shock may be slightly strong	Code No.57 output Shift shock may be slightly strong	NA

Slip Lockup Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 2P – Powertrain control module (Engine) terminal 1Q	Code No.57 output Shift shock may be slightly strong	Code No.57 output Shift shock may be slightly strong	NA

Inhibitor Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1C – Powertrain control module (Engine) terminal 1R	Engine speed will be slightly low in P and N ranges	Engine speed will be slightly high in R, D, S, and L ranges	NA

Hold Indicator Light

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1K – Hold indicator light	Hold indicator light not illuminated	Hold indicator light always illuminated	NA

NA: Not applicable

FAT Terminal (Data Link Connector)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1K – FAT terminal (data link connector)	Diagnostic trouble code(s) not displayed by self-diagnosis function When using Self-Diagnosis Checker, "88" flashes after 20 seconds	Diagnostic trouble code(s) not displayed by self-diagnosis function When using Self-Diagnosis Checker, "88" flashes after 20 seconds	NA

Battery Power (Backup)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1A – battery	Memory functions that rely on Self-Diagnosis, such as diagnostic trouble code memory, do not operate	ROOM 10A fuse burns out	NA

Battery Power

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Powertrain control module (Transmission) terminal 1N – battery	No symptom	METER 15A fuse burns out when ignition switch is ON	NA
Powertrain control module (Transmission) terminal 1P – battery	No symptom	METER 15A fuse burns out when ignition switch is ON	NA
Powertrain control module (Transmission) terminals 1N and 1P – battery	Powertrain control module (Transmission) does not function D, S range: Third gear fixed L range: 2nd gear fixed	METER 15A fuse burns out when ignition switch is ON	NA

Ground

Circuit	Condition		
	Open circuit	Short circuit	Poor around
Powertrain control module (Transmission) 1J terminal – ground	Powertrain control module (Transmission) does not function D, S range: Third gear fixed L range: 2nd gear fixed	No symptom	Shifting may be abnormal

NA: Not applicable

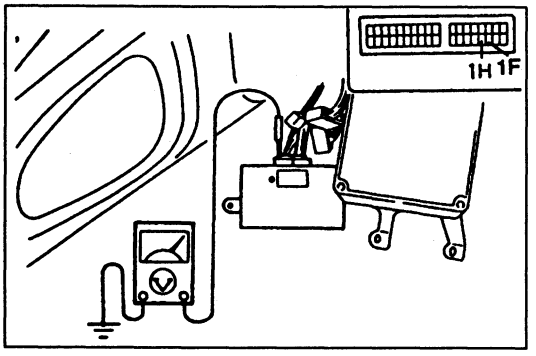
If a solenoid circuit or sensor circuit has poor grounding, the following malfunctions may exist:
1. Abnormal shifting
   - Shift points abnormal
   - Transmission hunts (repeated upshifting/downshifting)
   - Drives away except in 1st gear
   - Does not shift to Fourth gear.
   - Fail-safe function may be operated by on-board diagnosis system according to extent of malfunction
2. Deterioration of shift feeling
   - Oil pressure high and shift shock strong
   - Shift timing incorrect and engine flares up
   - Shift timing incorrect and vehicle brakes on shifting
   - Fail-safe function may be operated by on-board diagnosis system according to extent of malfunction

SYSTEM INSPECTION

LINE PRESSURE SOLENOID VALVE OUTPUT DUTY

Inspection

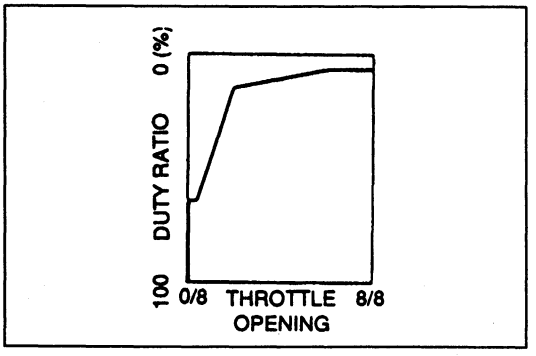
1. Connect the (+) terminal of a dwell meter to terminal 1F (line pressure solenoid valve) and terminal 1H (dropping resistor) of the powertrain control module (Transmission). Set the dwell meter selector to the 4 cylinder position.
2. Turn the ignition switch to ON.
3. Depress and release the accelerator pedal, and verify the OFF duty ratio by using the dwell meter.



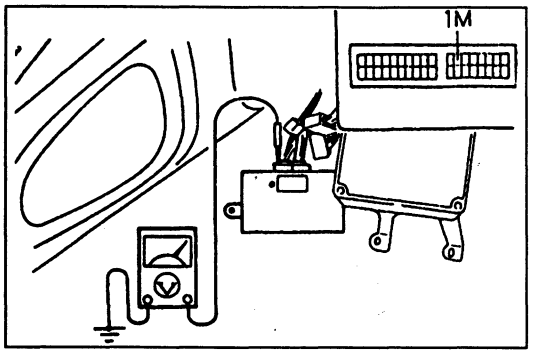
Throttle opening	Duty ratio (ON %)
Closed throttle position (0/8)	Approx. 100
Wide open throttle (8/8)	Approx. 5

Dwell angle/Duty ratio relationship

Dwell angle (°)	0	18	36	54	72	90
Duty ratio (%)	0	20	40	60	80	100



4. Depress the accelerator pedal slowly and verify the duty ratio charges as shown in the graph.
5. If not as specified, check the powertrain control module (Transmission) (refer to page K-35), dropping resistor (refer to page K-33), and line pressure solenoid (refer to page K-32).



LOCKUP SOLENOID VALVE OUTPUT DUTY

Inspection

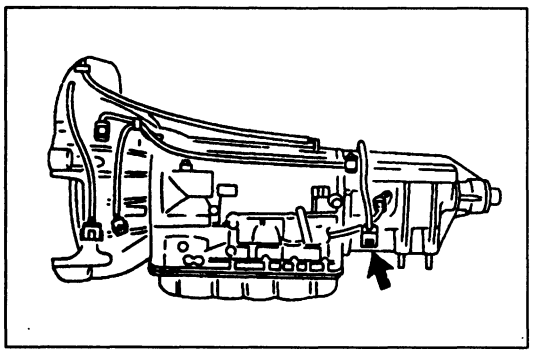
1. Connect the (+) terminal of a dwell meter to terminal 1M of the powertrain control module (Transmission) and the (–) terminal to a ground.
2. Drive the vehicle and verify the OFF duty ratio in the lock-up condition by using the dwell meter.
3. Verify the duty ratio in the lockup condition.

Condition	Duty ratio (ON %)
No lockup	Approx. 5
Lockup	Approx. 95

Dwell angle/Duty ratio relationship

Dwell angle (°)	0	18	36	54	72	90
Duty ratio (%)	0	20	40	60	80	100

4. If not as specified, check the powertrain control module (Transmission) (refer to page K–35), and lockup solenoid valve (refer to page K–32).



MANUAL OPERATION TEST

Inspection

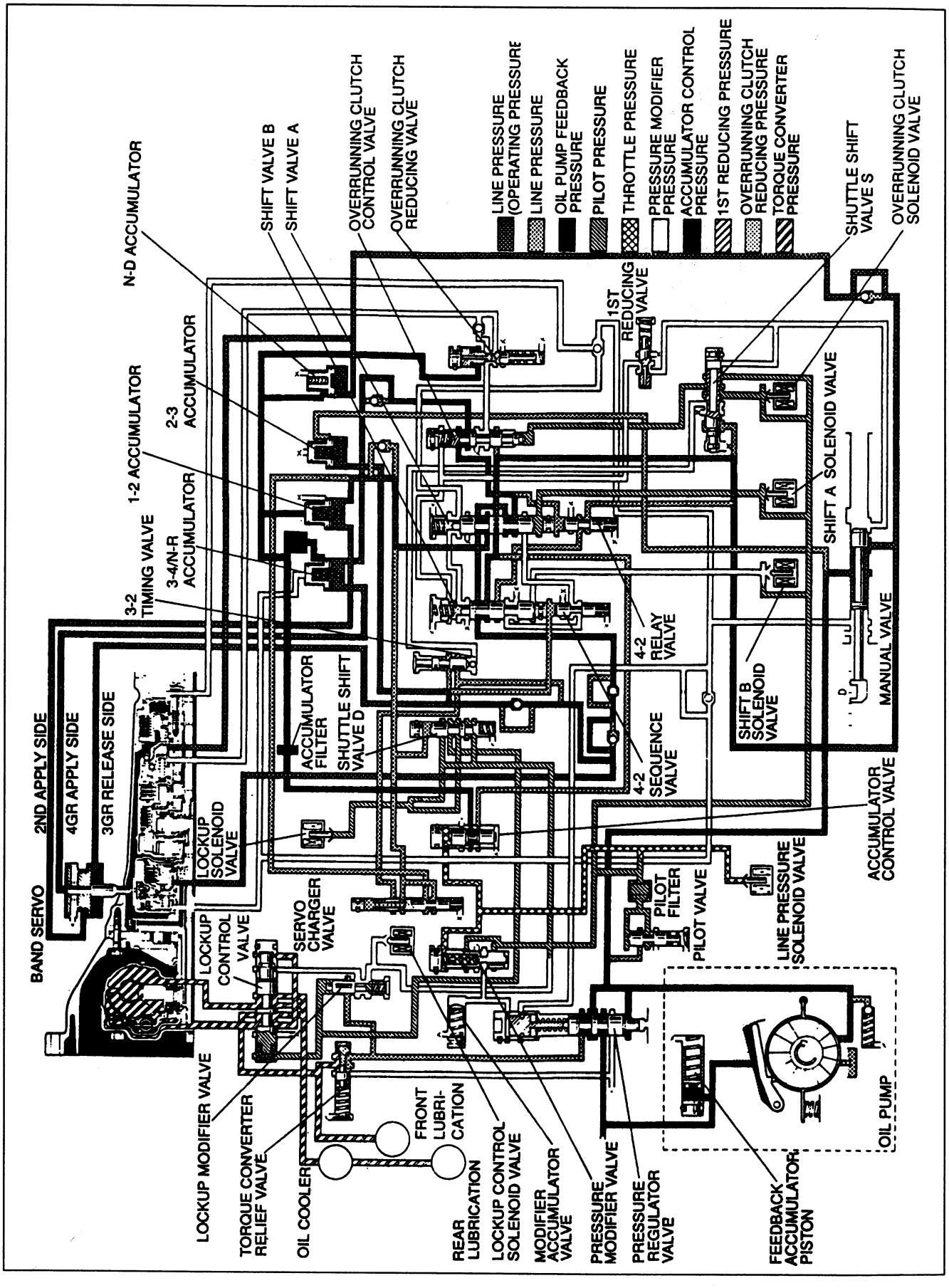
1. Disconnect solenoid connector.
2. Accelerate the vehicle from 0 km/h, and determine the gear position by observing the engine speed.
   When vehicle speed is 40 km/h {25 mph}, engine rpm in 2nd gear should be approximately 2,300 rpm, and in Third gear it should be approximately 1,500 rpm.
3. Verify the gear position of each range.

Range	Gear Position
D range	3rd, fixed
S range	3rd, fixed
L range	2nd, fixed
R range	Reverse

4. If not within specification, check the oil pressure or transmission.

MEMO

HYDRAULIC CIRCUIT

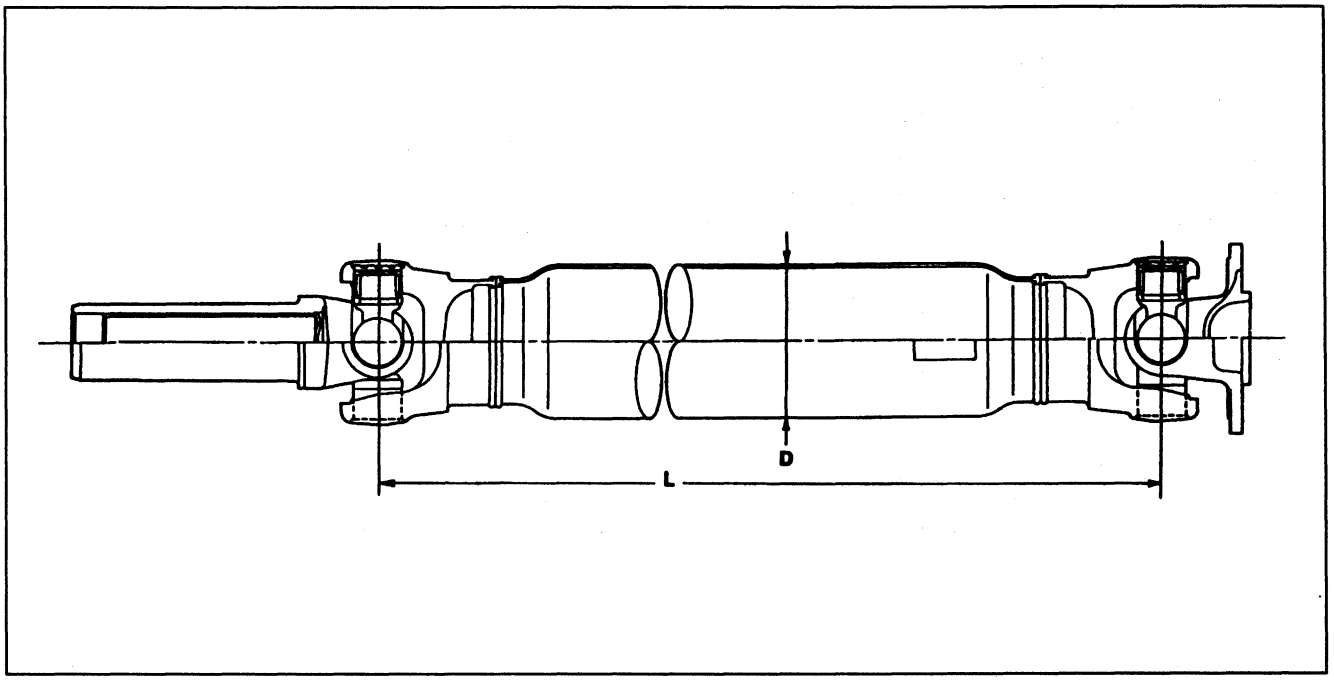


PROPELLER SHAFT

OUTLINE

SPECIFICATIONS

Item \ Engine / Transmission			RE 13B (TURBO)	
			R15M-D (MT)	RB4A-EL (AT)
Length	mm {in}	L	863 {33.98}	875 {34.45}
Outer diameter	mm {in}	D	75 {3.0}	

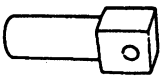


TROUBLESHOOTING GUIDE

Problem	Possible cause	Action	Page
Vibration	Bent propeller shaft	Replace	L-3
	Worn or damaged universal joint	Replace	L-3
	Worn slip yoke or splines	Replace	L-3
	Damaged slip yoke	Replace	L-3
	Damaged universal joint yoke	Replace	L-3
Abnormal noise	Worn or damaged universal joint	Replace	L-3
	Damaged slip yoke	Replace	L-3
	Damaged universal joint yoke	Replace	L-3
	Worn slip yoke or splines	Replace	L-3

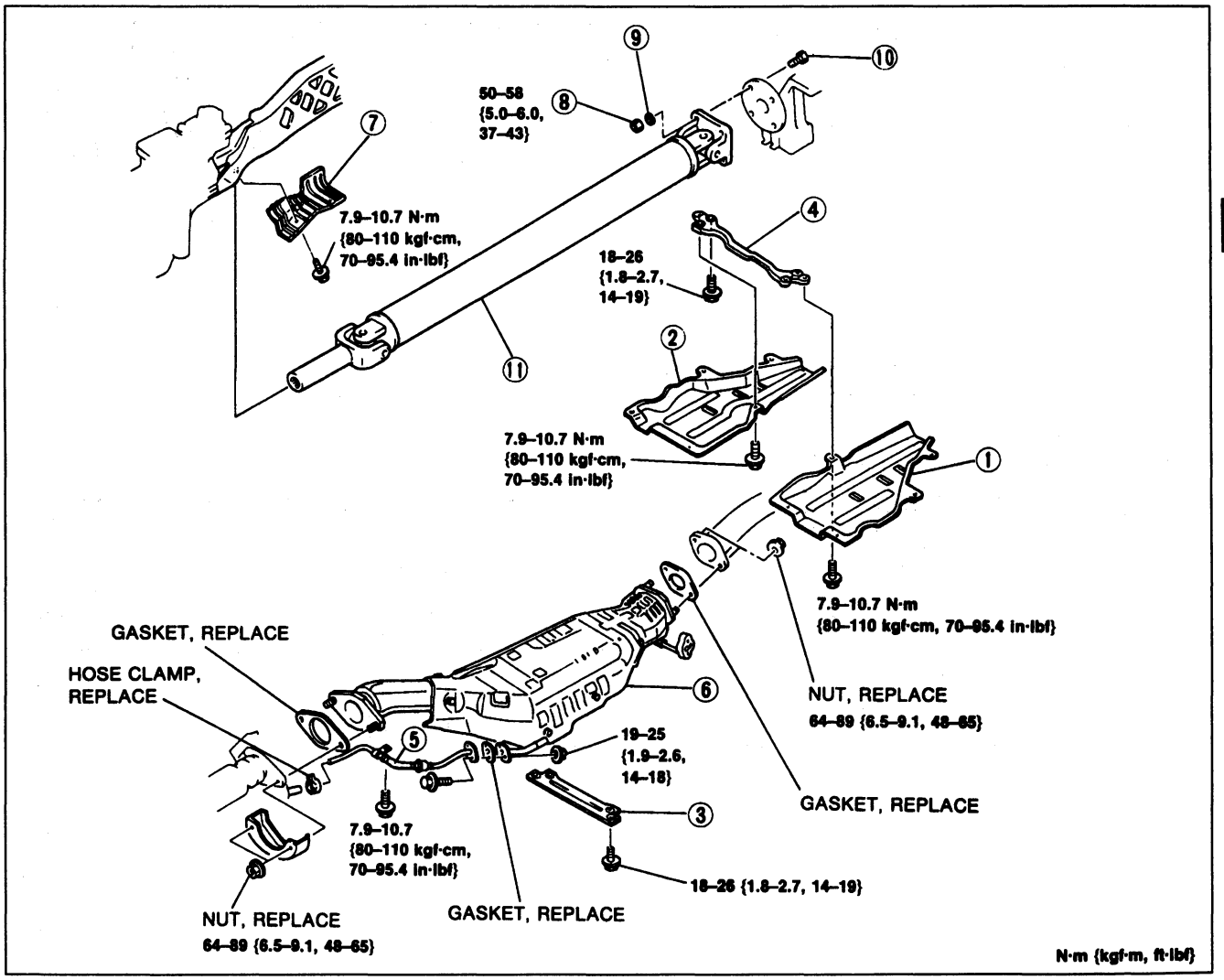
PROPELLER SHAFT

PREPARATION
SST

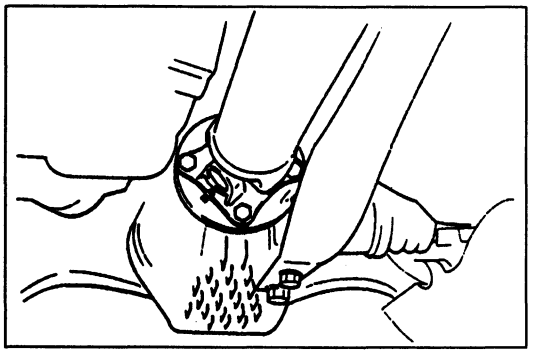
49 S120 440 Holder, mainshaft		For prevention of oil leakage

REMOVAL / INSPECTION / INSTALLATION

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Clean the propeller shaft (except for the universal joint) with a steam cleaner or solvent.
3. Inspect all parts and repair or replace as necessary.
4. Install in the reverse order of removal, referring to **Installation Note**.

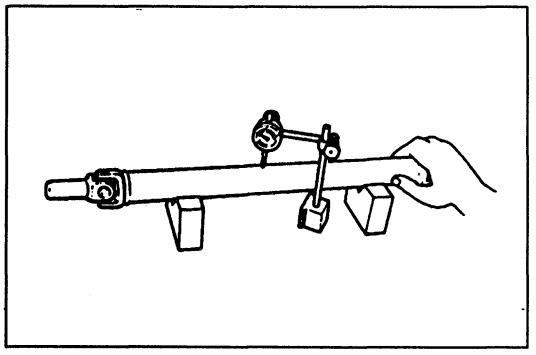


1. Left undercover
2. Right undercover
3. Tunnel reinforcement (center)
4. Tunnel reinforcement (rear)
5. Secondary air injection pipe
6. Catalytic converter assembly
7. Cover
8. Nut
9. Lock washer
10. Bolt
11. Propeller shaft
    Removal Note ..... page L–4
    Inspection ..... page L–4
    Installation Note ..... page L–4



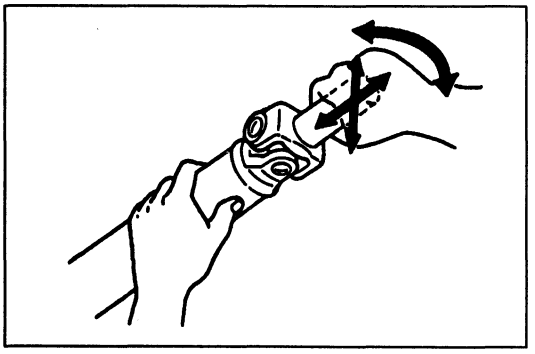
Removal Note
Propeller shaft
1. Before removing the propeller shaft, mark the companion flange and yoke for correct reassembly.

2. Remove the propeller shaft from the extension housing, and immediately install the **SST** to prevent oil leakage.



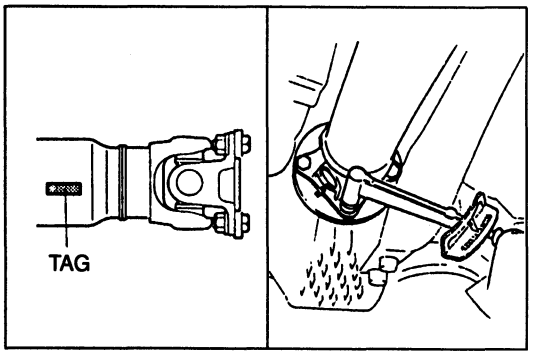
Inspection
Propeller shaft
1. Measure the propeller shaft runout with a dial indicator.
2. If the runout is excessive, replace the propeller shaft assembly.

Runout: 0.4 mm {0.02 in} max.



3. Move the universal joint in the direction shown, and inspect joint play.

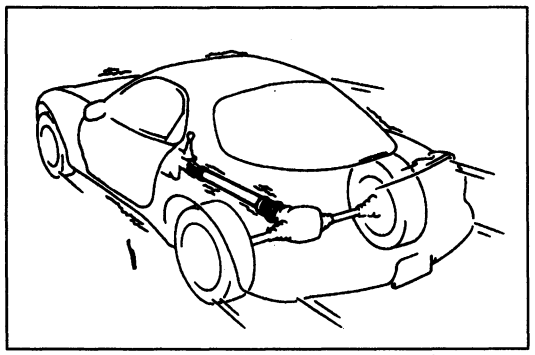
Note
- **Starting torque**
  Front yoke:
  30–98 N·m{3.0–10 kgf·m,22–72 ft·lbf}
  Rear yoke:
  30–98 N·m{3.0–10 kgf·m,22–72 ft·lbf}



4. If there is excessive play or the starting torque is not within specification, replace the propeller shaft.

Installation Note
Propeller shaft
1. Align the marks made during removal, and install the propeller shaft. If installing a new propeller shaft, align the differential companion flange precast marking with the tag on the propeller shaft.

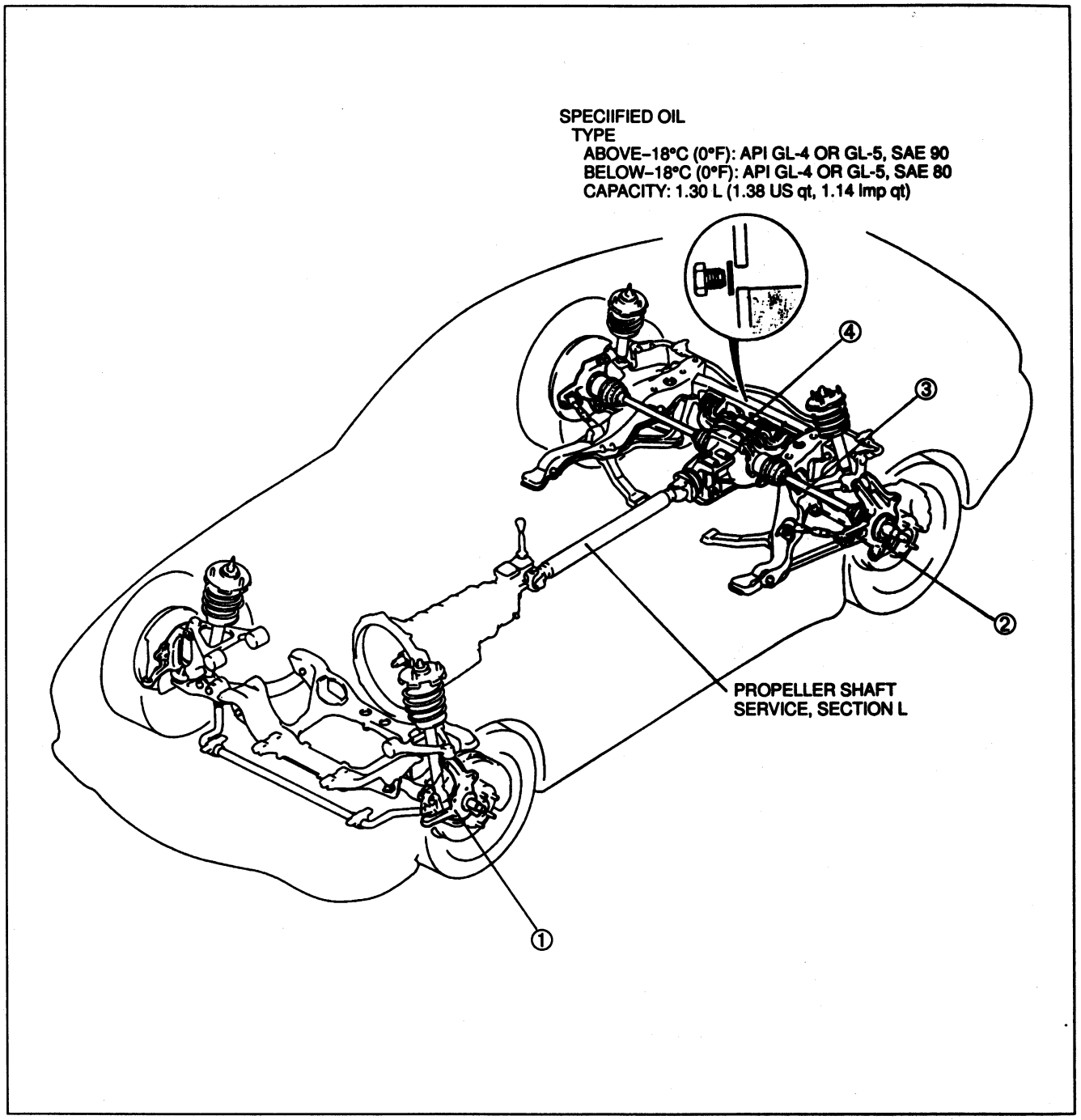
Tightening torque:
50–58 N·m{5.0–6.0 kgf·m,37–43 ft·lbf}



2. Perform a road test and verify that there is no noise or vibration when driving the vehicle.
3. Replace the propeller shaft assembly if noise or vibration comes from it.

FRONT AND REAR AXLES

INDEX



OUTLINE

SPECIFICATION

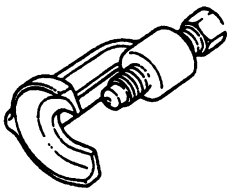
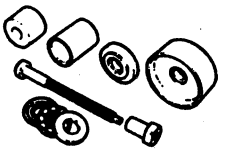
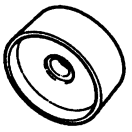
Item \ Engine / Transmission			13B	
			MT	AT
Front axle				
Bearing type			Unitized angular ball bearing	
Rear axle				
Bearing type			Unitized angular ball bearing	
Drive shaft				
Type			Constant velocity (tripod) joint	
Length (between centers of joints)		mm {in}	484.2 {19.06}	
Diameter		mm {in}	29.0 {1.14}	
Differential				
Type			Torque sensing LSD	
Reduction gear			Hypoid gear	
Differential gear			Worm gear	
Reduction ratio			4.100	3.909
Number of teeth	Ring gear		41	43
	Drive pinion gear		10	11
Ring gear size		mm {in}	204.2 {8.038}	
Oil	Grade		API service GL-4 or GL-5	
	Viscosity		Above–18°C (0°F): SAE 90 Below–18°C (0°F): SAE 80	
	Capacity	L {US qt, Imp qt}	1.30 {1.38,1.14}	

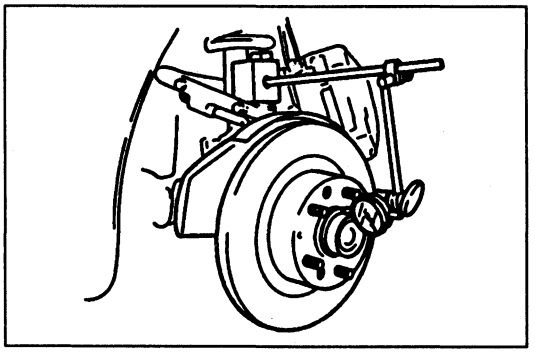
TROUBLESHOOTING GUIDE

Problem	Possible Cause	Action	Page
Front axle			
Steering wheel vibration	Worn or damaged wheel bearing	Replace	M–5
Pulls or one-sided braking	Worn or damaged wheel bearing	Replace	M–5
Rear axle			
Abnormal noise	Worn or damaged wheel bearing Bent drive shaft Worn drive shaft spline	Replace Replace Replace	M–12 M–15 M–15
Differential			
Abnormal noise	Insufficient differential oil Incorrect differential oil Worn or damaged side bearing Worn or damaged ring gear Worn or damaged drive pinion bearing Worn or damaged gear in LSD assembly Worn side gear spline Improperly adjusted drive pin ion gear preload Improperly adjusted ring gear backlash Poor contact of ring gear teeth	Add oil Replace Replace Replace Replace Replace gear case Replace Adjust Adjust Adjust	M–23 M–23 M–30 M–30 M–30 M–30 M–30 M–38 M–39 M–41
Heat bildup	Insufficient differential oil Insufficient drive pinion gear backlash Excessive bearing preload	Add oil Adjust Adjust	M–23 M–39 M–38
Oil leakage	Excessive differential oil Worn or damaged oil seal Loose differential carrier	Remove oil Replace Tighten or repair	M–23 M–24 M–30
No differential operation	Misassembled or damaged	Repair or replace	M–30

FRONT AXLE

PREPARATION
SST

49 0118 850C Puller, ball joint 	For removal of ball joint	49 H028 2A0 Replacer set, rubber bushing 	For installation of ABS sensor rotor
49 H028 204 Attachment (Part of 49 H028 2A0) 	For installation of ABS sensor rotor		



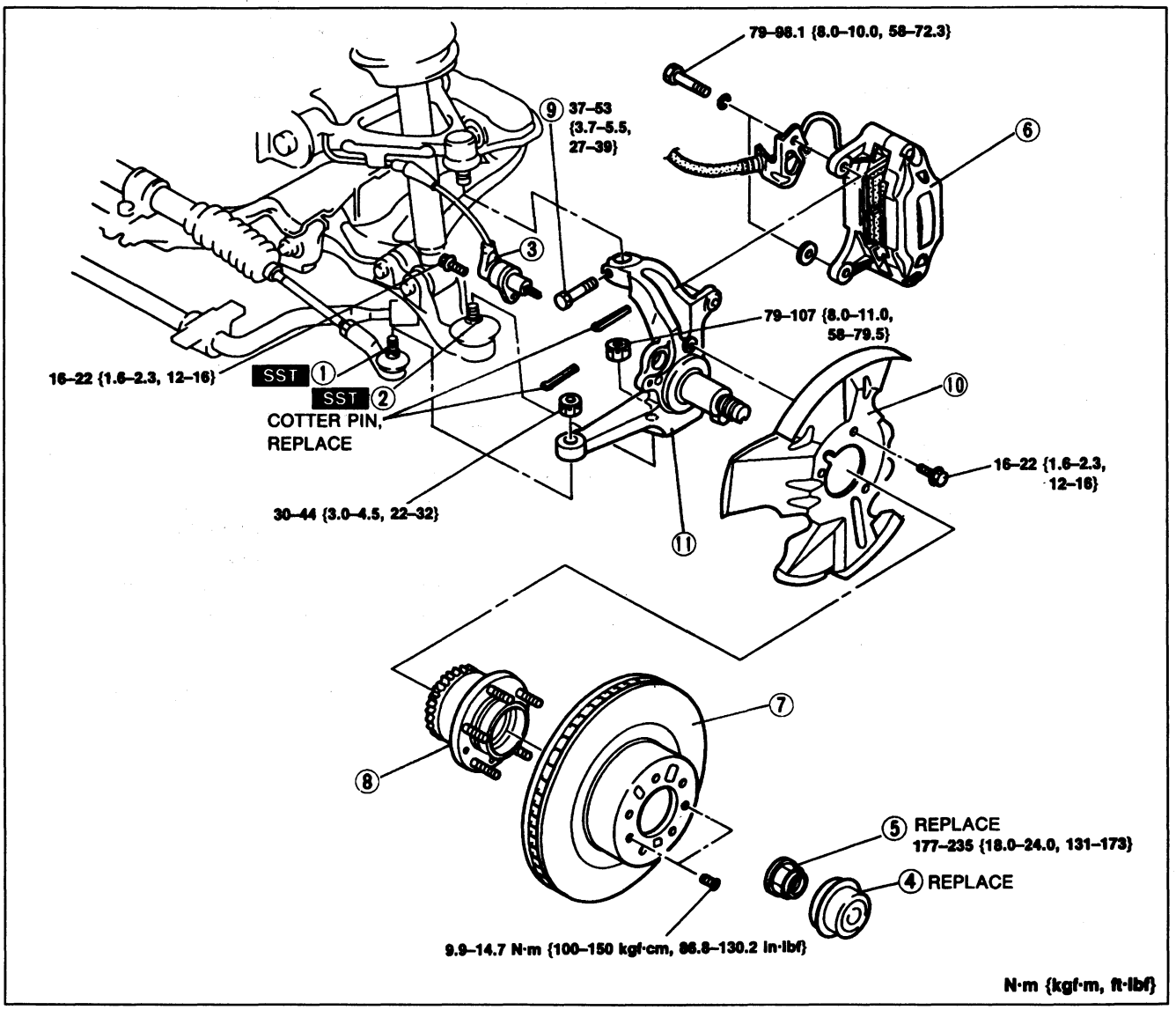
WHEEL HUB / STEERING KNUCKLE
Preinspection
Wheel bearing play

1. Position a dial indicator against the wheel hub.
2. Push and pull the wheel hub by hand in the axial direction and measure the wheel bearing play.
3. If the bearing play exceeds specification, check and adjust the wheel hub nut torque or replace the wheel hub assembly, if necessary.

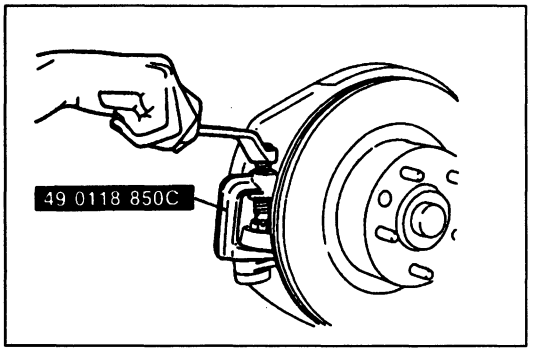
Wheel bearing play: 0.05 mm {0.002 in} max.

Removal / Inspection / Installation

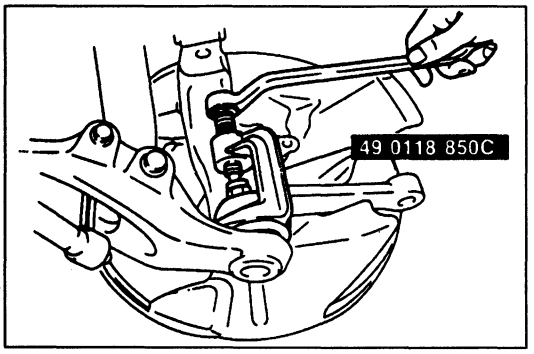
1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the wheel.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Inspect all parts and repair or replace as necessary.
5. Install in the reverse order of removal, referring to **Installation Note**.
6. Install the wheel. (Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–86 in·lbf})
7. After installation, check the front wheel alignment. (Refer to section R.)



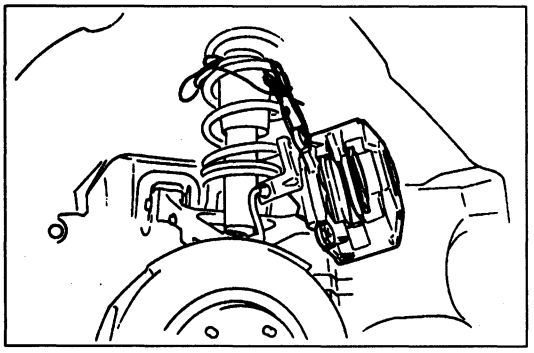
1. Tie rod end ball joint
   - Removal Note ..... page M–6
   - Service ..... Section N
2. Lower arm ball joint
   - Removal Note ..... page M–6
   - Service ..... Section R
3. ABS wheel-speed sensor
   - Service ..... Section P
4. Hub cap
5. Wheel hub nut
   - Installation Note ..... page M–6
6. Brake caliper assembly
   - Removal Note ..... page M–6
   - Service ..... Section P
7. Disc plate
   - Service ..... Section P
8. Wheel hub assembly
   - Inspect for cracks and damage
   - Inspect bearing for rough rotation
   - Disassembly / Inspection / Installation ..... page M–7
9. Bolt (upper arm)
10. Dust cover
    - Inspect for cracks and damage
11. Steering knuckle
    - Inspect for cracks and damage



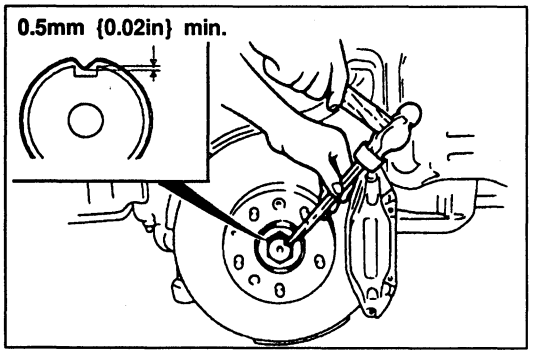
Removal note
Tie rod end ball joint
1. Loosen the tie rod end nut until it is flush with the end of the stud.
2. With the nut protecting the tie rod end stud, separate the tie rod end from the steering knuckle by using the **SST**.



Lower arm ball joint
1. Loosen the nut until it is flush with the end of the stud.
2. With the nut protecting the ball joint stud, separate the ball joint from the knuckle by using the **SST**.



Brake caliper assembly
Hang the brake caliper assembly out of the way as shown in the figure.

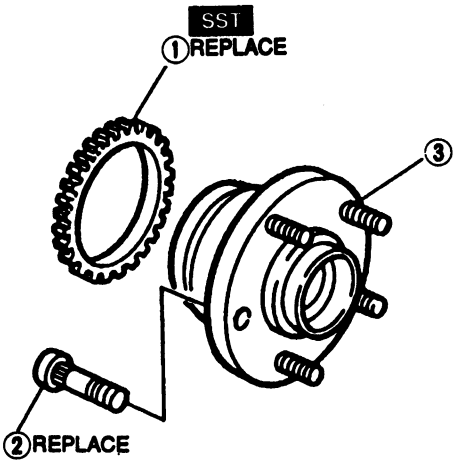


Installation note
Wheel hub nut
1. Install a new hub nut and stake it as shown.

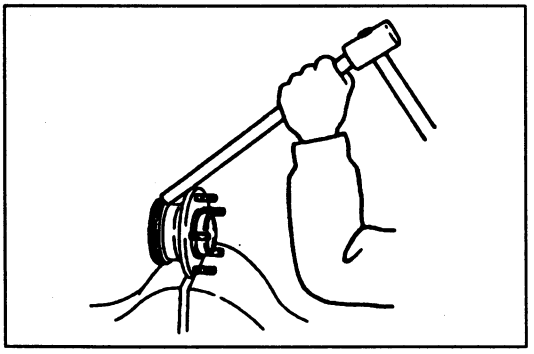
Tightening torque:
177–235 N·m{18.0–24.0 kgf·m,131–173 ft·lbf}

2. Measure the wheel bearing play. (Refer to page M–4.)

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**.



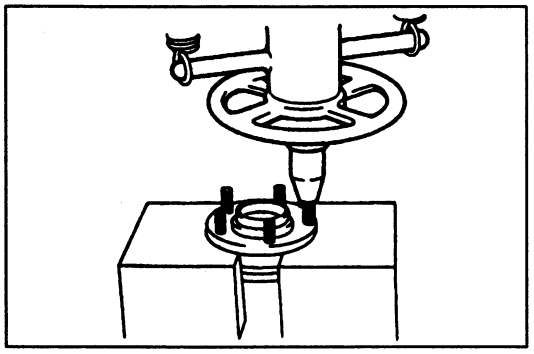
1. ABS sensor rotor
   Disassembly Note ..... below
   Assembly Note ..... page M-8
2. Hub bolt
   Disassembly Note ..... below
   Assembly Note ..... page M-8
3. Wheel hub
   Inspect bearing for rough rotation
   (Not repairable, replace hub assembly)



Disassembly note
ABS sensor rotor

Note
- The sensor rotor does not need to be removed unless you are replacing it.

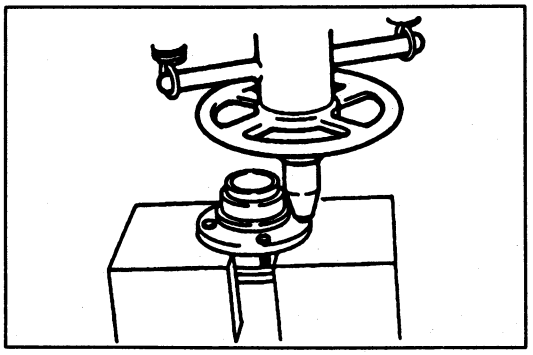
Remove the sensor rotor by using a brass bar and a hammer.



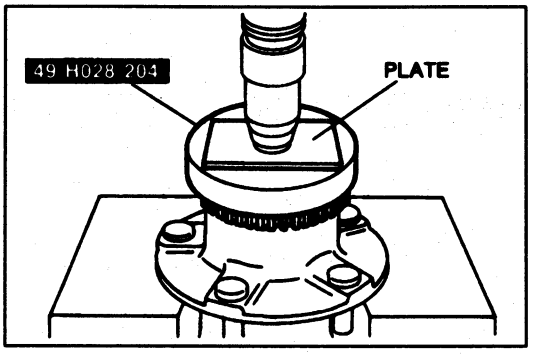
Hub bolt

Note
- The hub bolts do not need to be removed unless you are replacing them.

Remove the hub bolts by using a press.



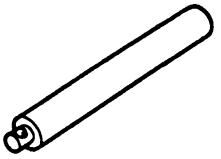
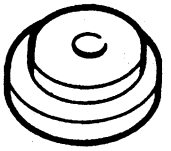
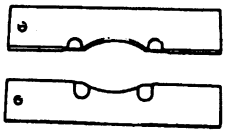
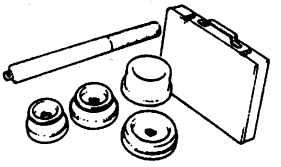
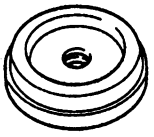
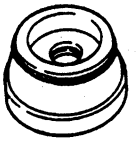
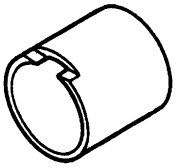
Assembly note
Hub bolt
Press in new hub bolts.

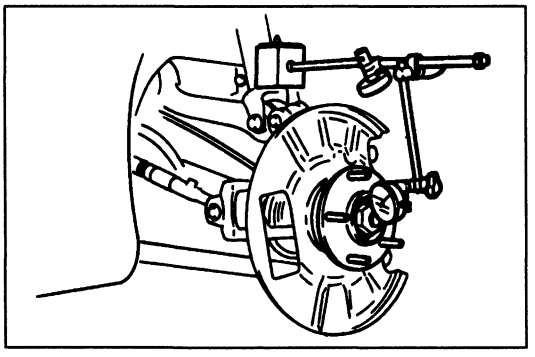


ABS sensor rotor
Press on the new sensor rotor by using the **SST**.

REAR AXLE

PREPARATION
SST

49 G033 102 Handle 	For removal of axle flange	49 G033 105 Attachment 	For removal of axle flange
49 F026 103 Plate, removing 	For removal of axle flange	49 F027 0A1 Installer set, bearing 	For removal of wheel bearing and installation of axle flange
49 F027 004 Attachment (Part of 49 F027 0A1) 	For installation of wheel bearing	49 F027 005 Attachment (part of 49 F027 0A1) 	For removal of wheel bearing and installation of axle flange
49 H034 201 Block, support 	For installation of wheel bearing		



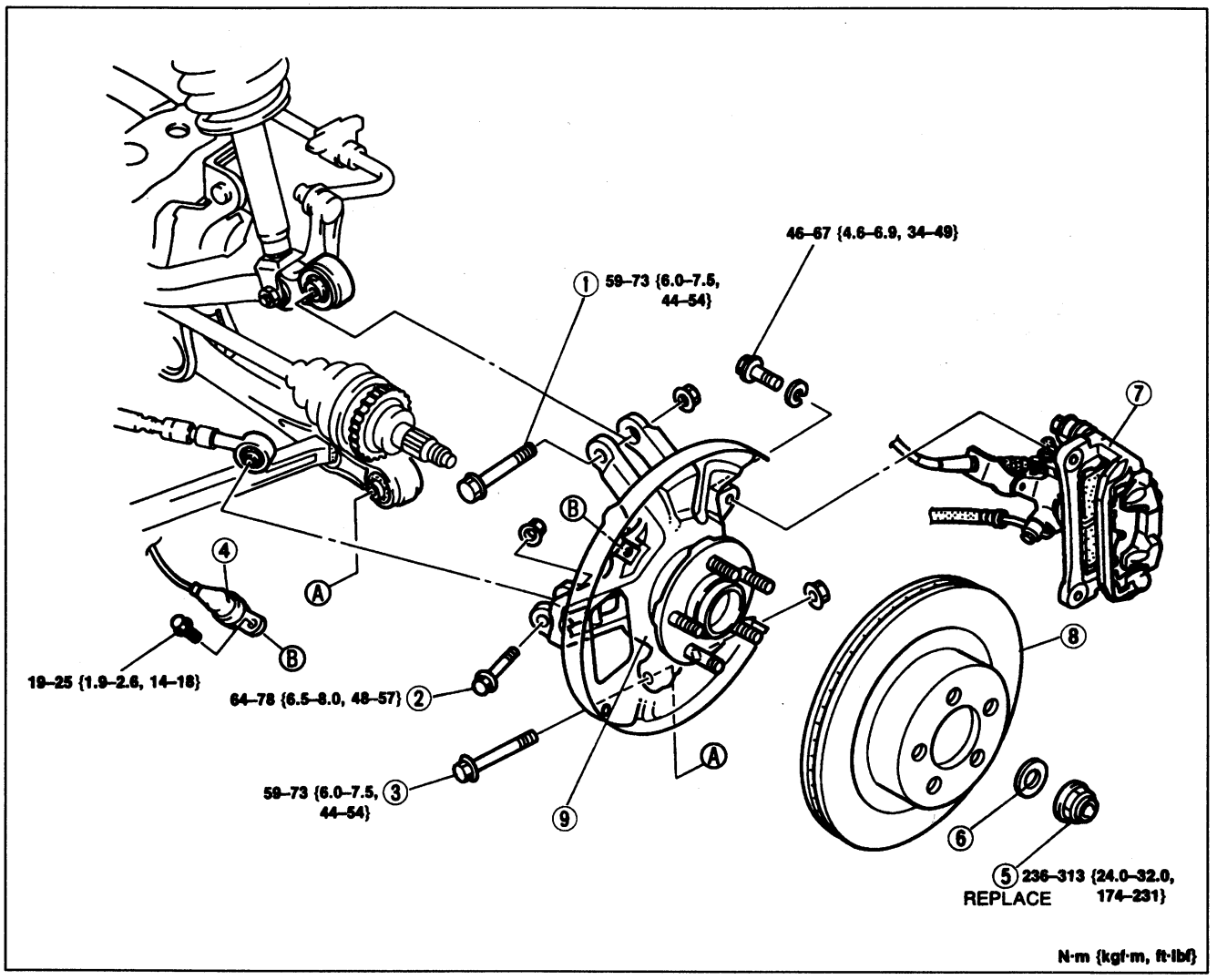
WHEEL HUB
Preinspection
Wheel bearing play

1. Position a dial indicator against the wheel hub.
2. Push and pull the wheel hub by hand in the axial direction and measure the wheel bearing play.
3. If the bearing play exceeds specification, check and adjust the wheel hub nut torque or replace the wheel bearing, if necessary.

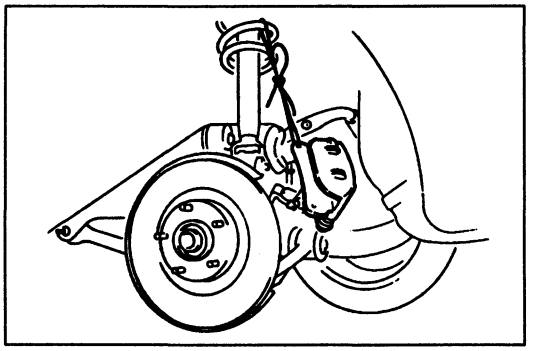
Wheel bearing play: 0.05 mm {0.002 in} max.

Removal / Inspection / Installation

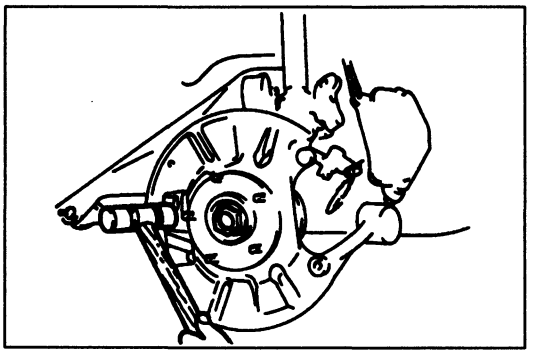
1. Jack up the rear of the vehicle and support it on safety stands.
2. Remove the wheel.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Inspect all parts and repair or replace as necessary.
5. Install in the reverse order of removal, referring to **Installation Note**.
6. Install the wheel. (Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–86 ft·lbf})
7. After installation, check the rear wheel alignment. (Refer to section R.)



1. Bolt (upper arm)
2. Bolt (toe control link)
3. Bolt (I-arm)
4. ABS wheel-speed sensor
   Service ..... Section P
5. Wheel hub nut
   Installation Note ..... page M–11
6. Washer
7. Brake caliper assembly
   Removal Note ..... page M–11
   Service ..... Section P
8. Disc plate
   Service ..... Section P
9. Rear hub support assembly
   Removal Note ..... page M–11
   Disassembly / Inspection / Assembly ..... page M–12

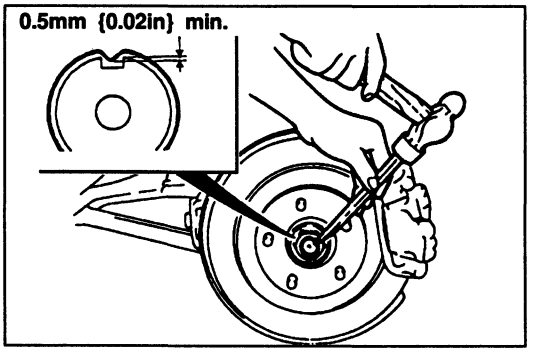


Removal note
Brake caliper assembly
Hang the brake caliper assembly as shown in the figure.



Rear hub support assembly

Note
- If the drive shaft will not come out of the wheel hub easily, install a 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 wheel hub.

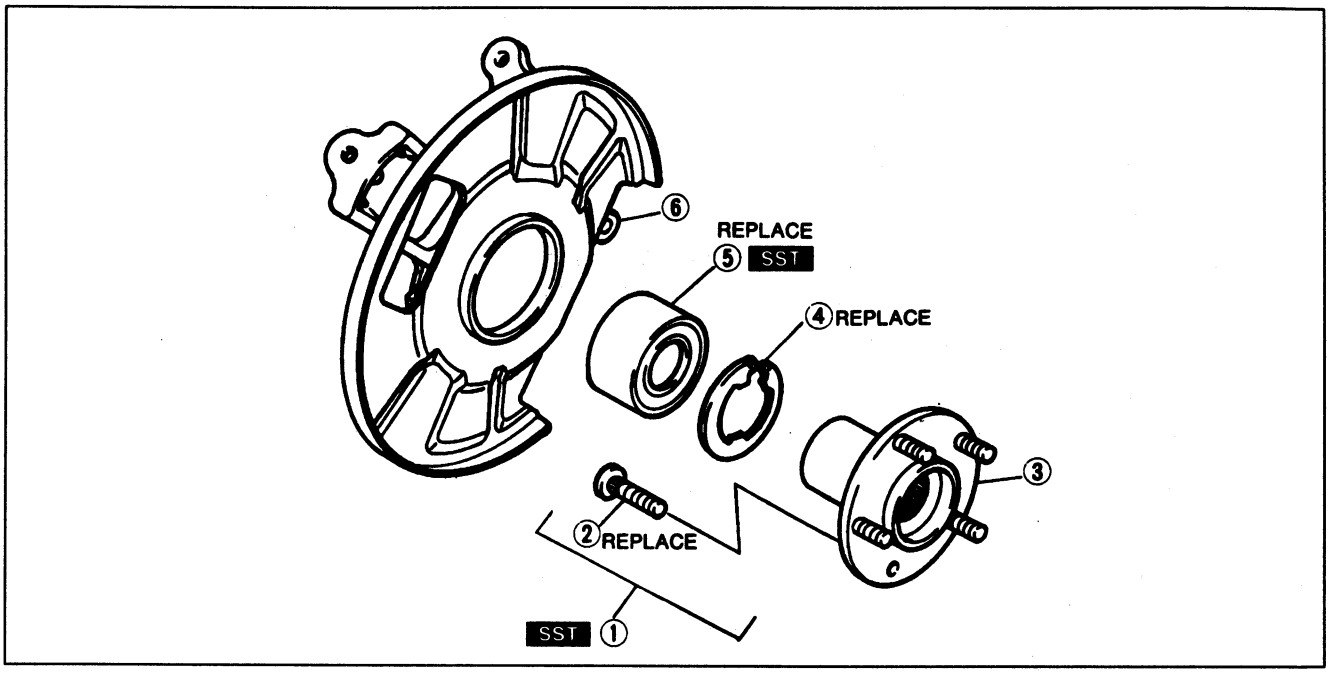


Installation note
Wheel hub nut
1. Install a new hub nut and stake it as shown.

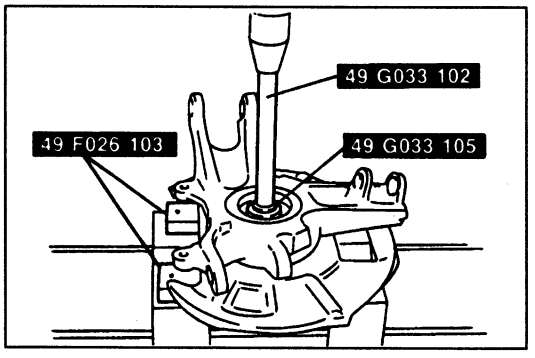
Tightening torque:
236–313 N·m{24.0–32.0 kgf·m,174–231 ft·lbf}

2. Check the wheel bearing play. (Refer to page M–9.)

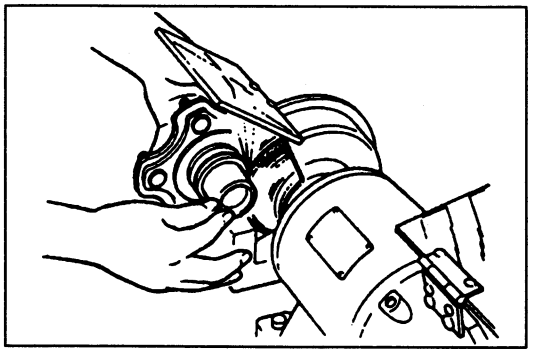
Disassembly / Inspection / Assembly
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



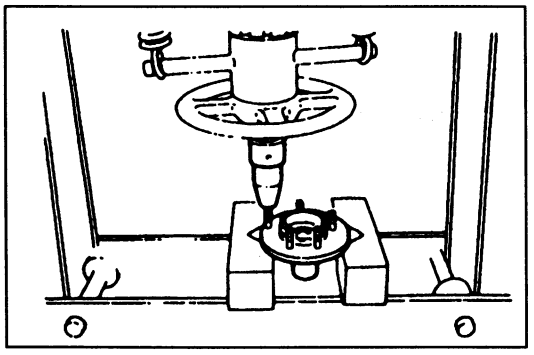
1. Axle flange assembly
   Disassembly Note ..... below
   Assembly Note ..... page M-13
2. Hub bolt
   Disassembly Note ..... page M-13
   Assembly Note ..... page M-13
3. Axle flange
   Inspect for cracks and damage
4. Retaining ring
5. Wheel bearing
   Disassembly Note ..... page M-13
   Assembly Note ..... page M-13
6. Rear hub support assembly
   Inspect for cracks and damage



Disassembly note
Axle flange assembly
1. Remove the axle flange assembly by using the **SST**.



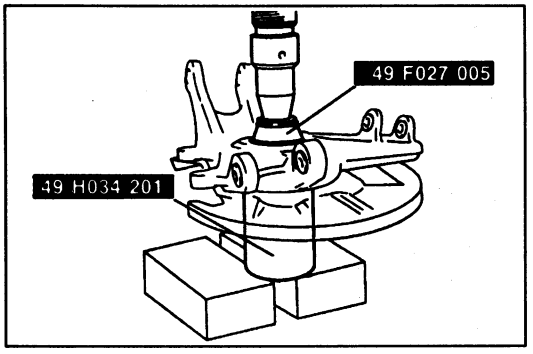
2. Grind a section of the bearing race until **approx. 0.5 mm {0.02 in}** thickness remains.
3. Cut the race by using a chisel and remove it.



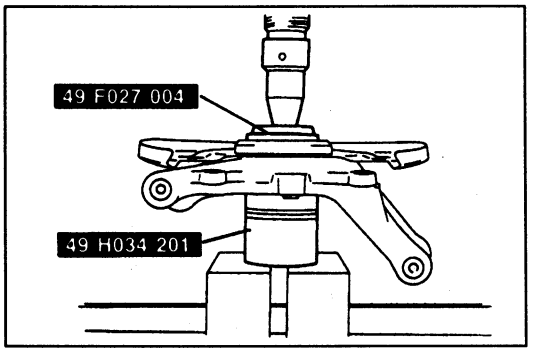
Hub bolt

Note
- The hub bolts do not need to be removed unless you are replacing them.

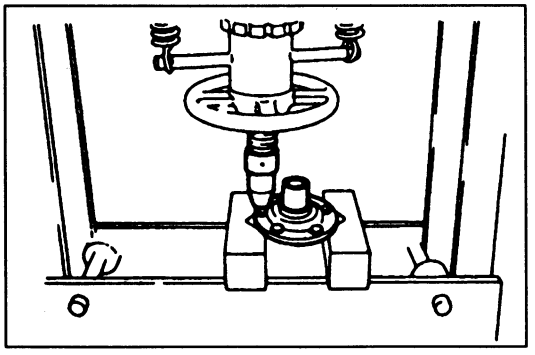
Remove the hub bolts by using a press.



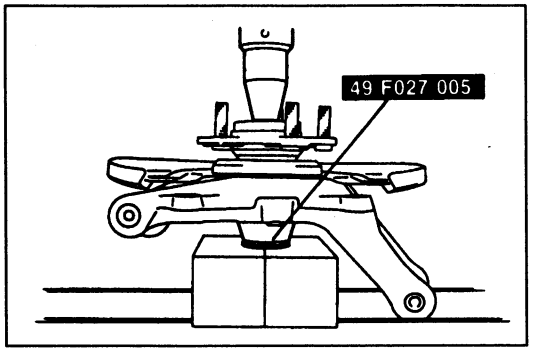
Wheel bearing
Remove the wheel bearing by using the **SST**.



Assembly note
Wheel bearing
Install the new wheel bearing by using the **SST**.



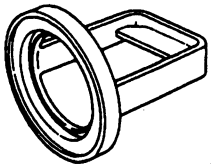
Hub bolt
Press in new hub bolts.

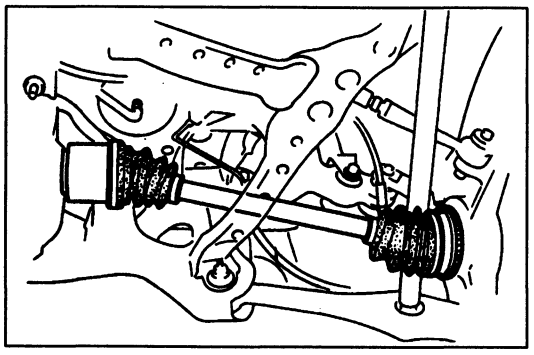


Axle flange assembly
Install the axle flange assembly by using the **SST**.

DRIVE SHAFT

PREPARATION

49 F026 104 Installer, sensor rotor		For installation of ABS sensor rotor

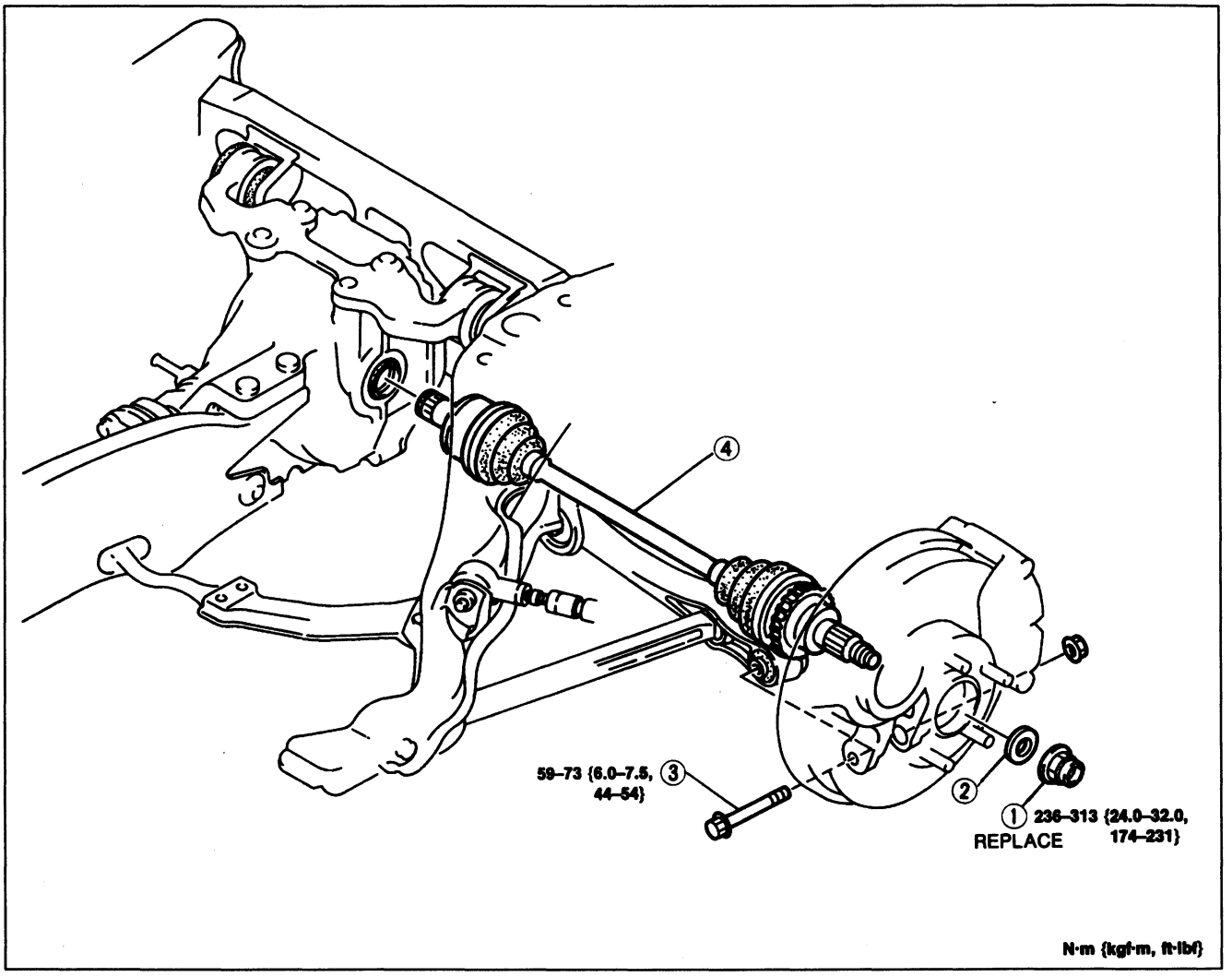


DRIVE SHAFT (TRIPOD JOINT)
Preinspection
Drive shaft

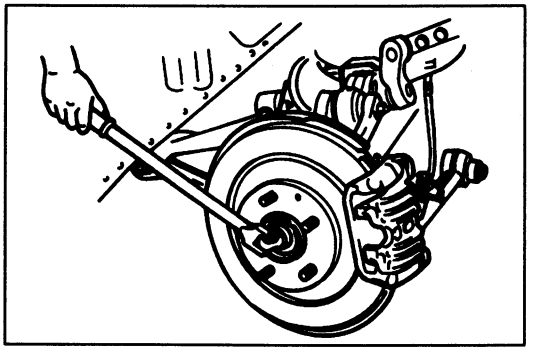
1. Check the dust boot on the drive shaft for cracks, damage, grease leakage, and a loose boot band.
2. Check the drive shaft for bending, cracks, and wear of the joints and splines.
3. Repair or replace the drive shaft as necessary.

Removal / Installation

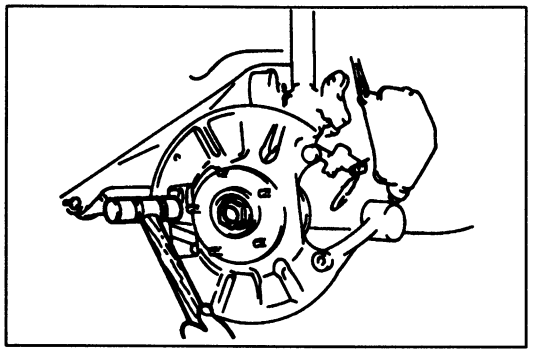
1. Jack up the rear of the vehicle and support it on safety stands.
2. Remove the wheel.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Install the wheel. (Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–86 ft·lbf})
6. Check the rear wheel alignment. (Refer to section R.)



1. Wheel hub nut
   - Removal Note ..... page M–16
   - Installation Note ..... page M–17
2. Washer
3. Bolt (I-arm)
4. Drive shaft
   - Removal Note ..... page M–16
   - Installation Note ..... page M–16
   - Overhaul ..... page M–18



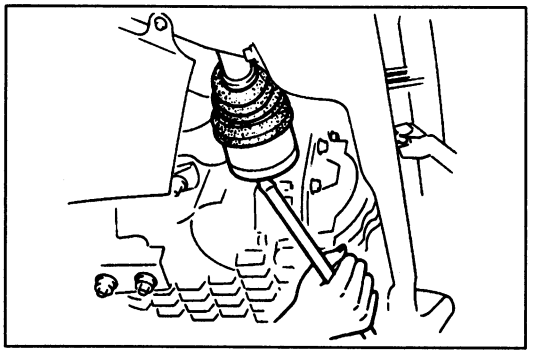
Removal note
Wheel hub nut
1. Raise the staked portion of the hub nut by using a chisel.
2. Lock the hub by applying the parking brakes.
3. Remove the hub nut.



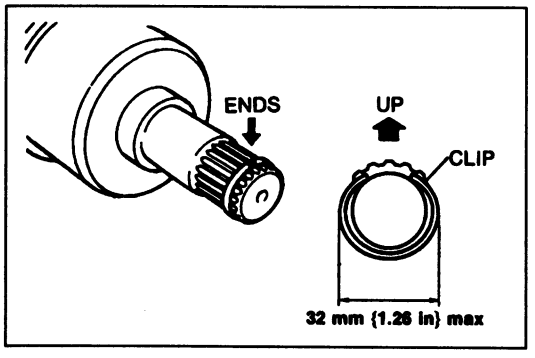
Drive shaft

Note
- If the drive shaft will not come out of the rear hub support easily, install a 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 wheel hub.

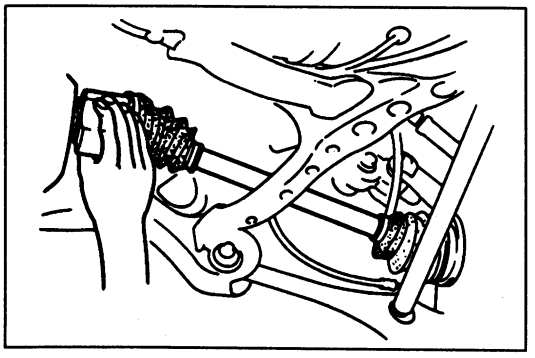
1. Pull the rear hub support from the drive shaft.



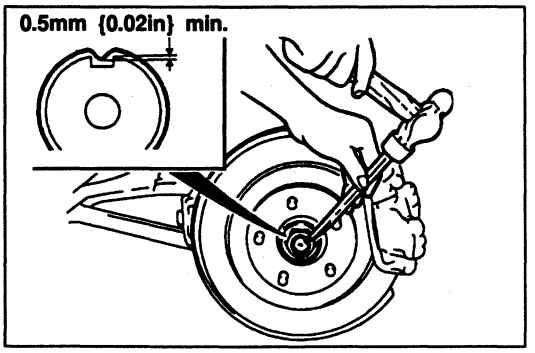
2. Remove the drive shaft from the differential by using a pry bar.



Installation note
Drive shaft
1. Install a new clip onto the drive shaft.
2. Measure the outer diameter of the clip after installing, and replace the clip if it exceeds the specification.



3. With the ends of the clip facing upward, push the drive shaft into the differential. Then pull outward, on the drive shaft to verify that it is securely held by the clip.



Wheel hub nut

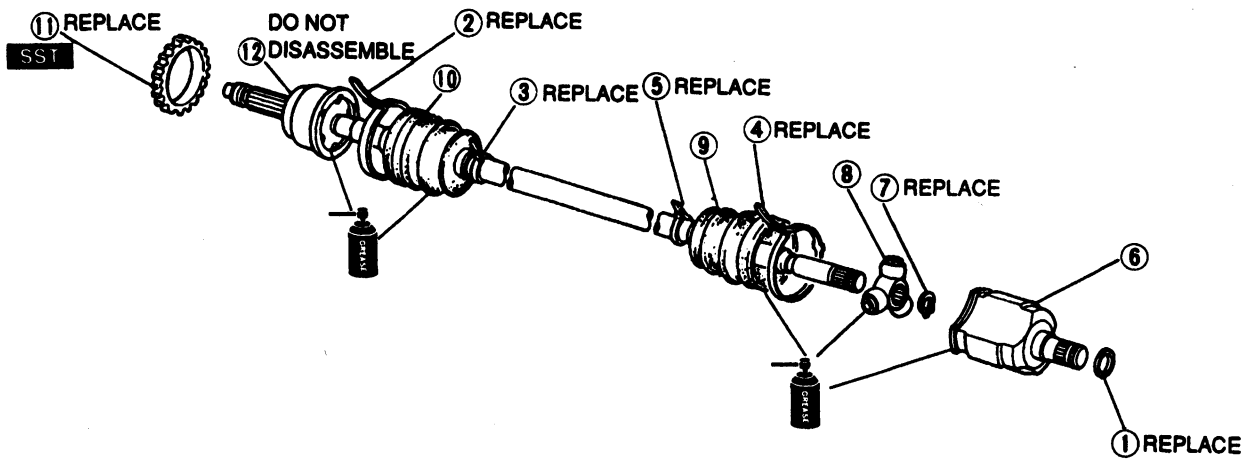
1. Install a new hub nut and stake it as shown.

Tightening torque:
236–313 N·m{24.0–32.0 kgf·m,174–231 ft·lbf}

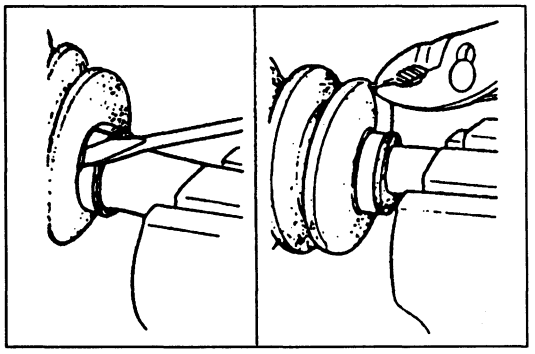
2. Check the wheel bearing play. (Refer to page M–9.)

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.**



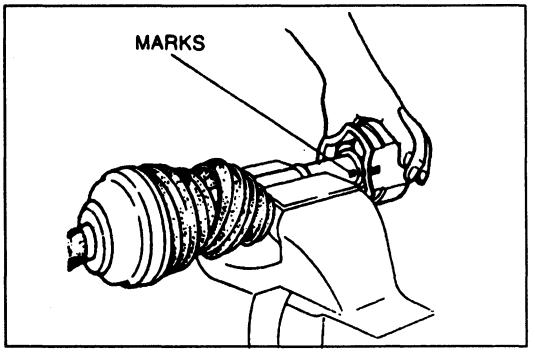
1. Clip
2. Boot band
   Disassembly Note ..... below
   Assembly Note ..... page M-21
3. Boot band
   Disassembly Note ..... below
   Assembly Note ..... page M-21
4. Boot band
   Disassembly Note ..... below
   Assembly Note ..... page M-21
5. Boot band
   Disassembly Note ..... below
   Assembly Note ..... page M-21
6. Outer ring
   Disassembly Note ..... below
   Inspect inside bore for wear, corrosion, and scoring
   Assembly Note ..... page M-21
7. Snap ring
   Disassembly Note ..... below
   Assembly Note ..... page M-21
8. Tripod joint
   Disassembly Note ..... below
   Inspect for wear and damage
   Assembly Note ..... page M-21
9. Boot
   Disassembly Note ..... page M-20
   Inspect for damage
   Assembly Note ..... page M-20
10. Boot
    Disassembly Note ..... page M-20
    Inspect for damage
    Assembly Note ..... page M-20
11. ABS sensor rotor
    Disassembly Note ..... page M-20
    Assembly Note ..... page M-20
12. Shaft and ball joint assembly
    Inspect splines for damage and wear
    Inspect wheel-side joint for excessive play and rough rotation.



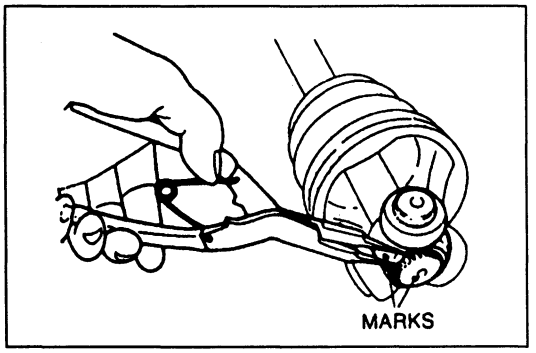
Disassembly note
Boot band

Note
- The wheel-side boot band does not need to be removed unless you are replacing the boot.

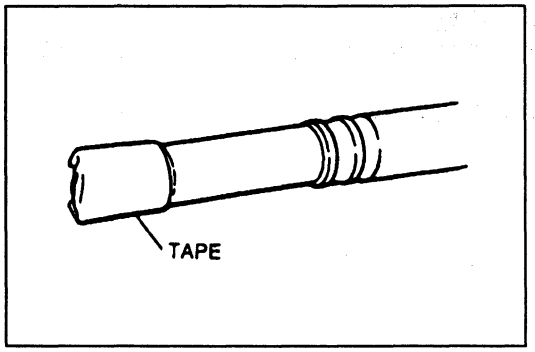
1. Pry up the locking tabs of the boot band by using a screwdriver.
2. Remove the band by using pliers.



Outer ring
Mark the outer ring and the shaft for proper reassembly.



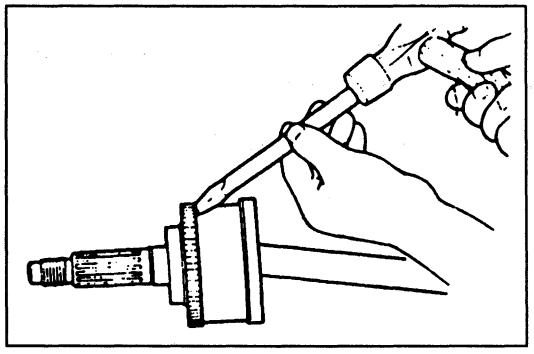
Snap ring / Tripod joint
1. Mark the shaft and tripod joint for proper reassembly.
2. Remove the snap ring by using snap-ring pliers.
3. Drive the tripod joint from the shaft by using a bar and a hammer.



Boot

Note
- The wheel-side boot does not need to be removed unless you are replacing it.

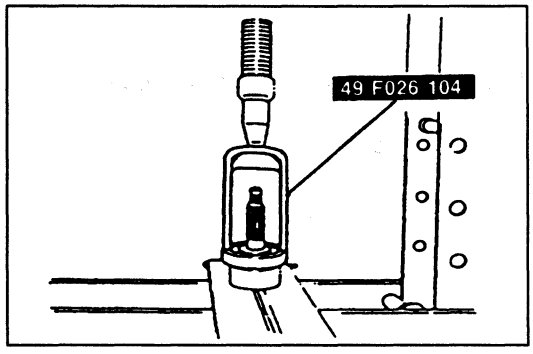
Wrap the splines of the shaft with tape to prevent damaging the boot.



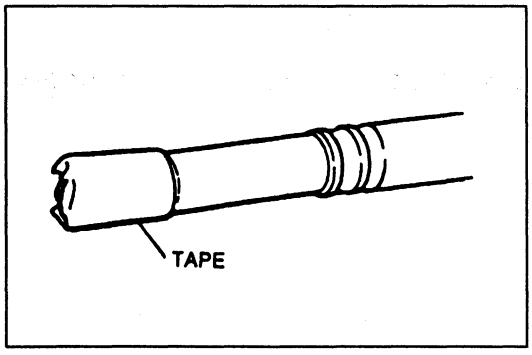
ABS sensor rotor

Note
- The sensor rotor does not need to be removed unless you are replacing it.

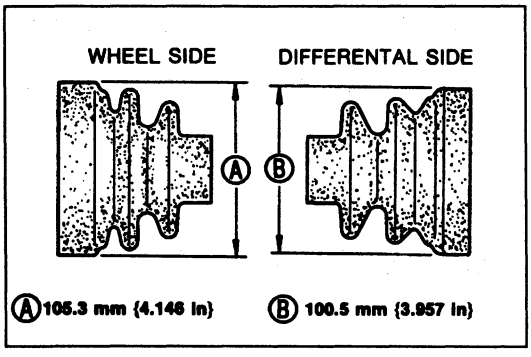
Tap the sensor rotor off the drive shaft by using a chisel and a hammer.



Assembly note
ABS sensor rotor
Set a new sensor rotor on the drive shaft and press it on by using the **SST**.

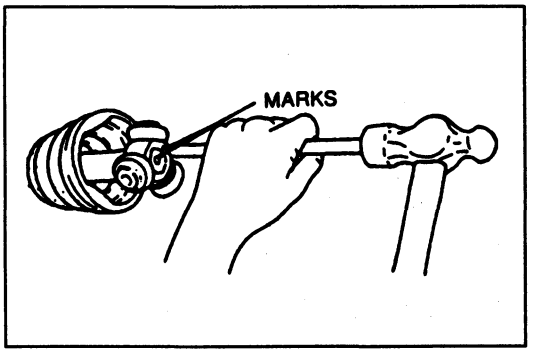


Boot
1. Wrap the differential-side splines with tape.



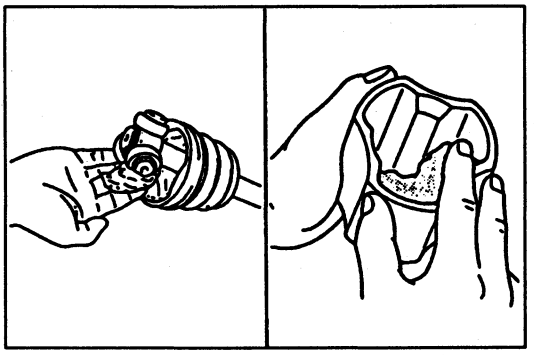
2. Install the wheel-side and differential-side boots, nothing the shape and size of each one.
3. Fill the boot with the specified grease (supplied in the boot kit).

Grease amount: 100–120 g (3.53–4.23 oz)



Tripod joint / Snap ring

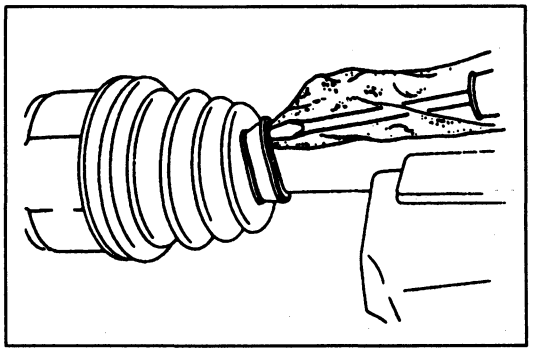
1. Align the marks and install the tripod joint by using a bar and a hammer.
2. Install a new snap ring by using snap-ring pliers.



Outer ring

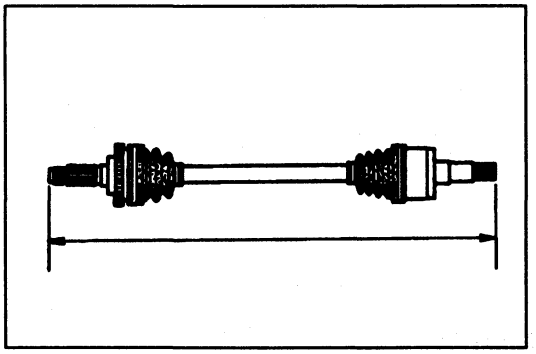
Fill the outer ring and differential-side boot with the specified grease (Supplied in the boot kit).

Grease amount: 170–190 g (6.01–6.70 oz)



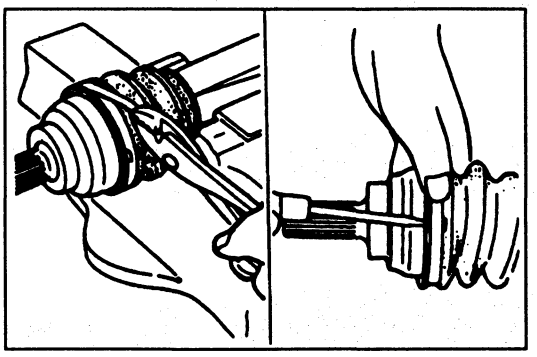
Boot band

1. Install the boot.
2. Carefully lift up the small end of the boot to release any trapped air.
3. Verify that the boot is not dented or twisted.



4. Measure the length of drive shaft.

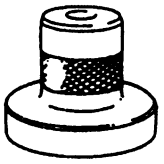
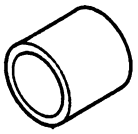
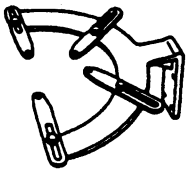
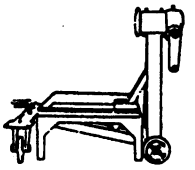
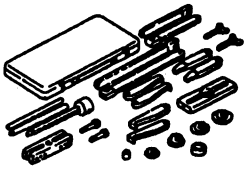
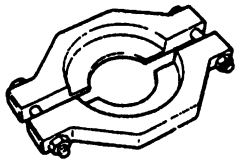
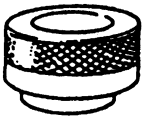
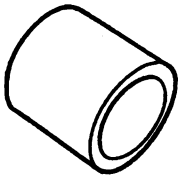
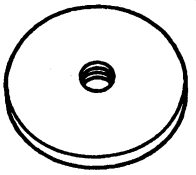
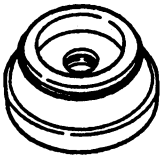
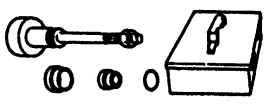
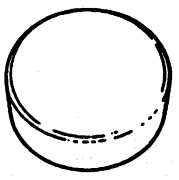
Drive shaft length: 791.2–801.2 mm {31.15–31.54 in}

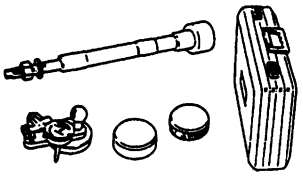
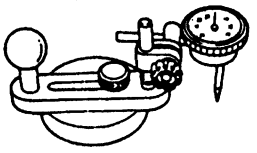
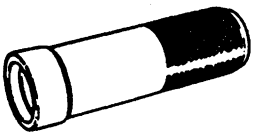


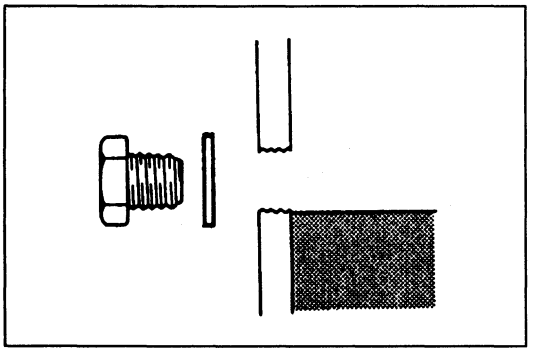
5. Fold the new boot band back by pulling on the end with pliers.
6. Lock the end of the boot band by bending the locking tabs.

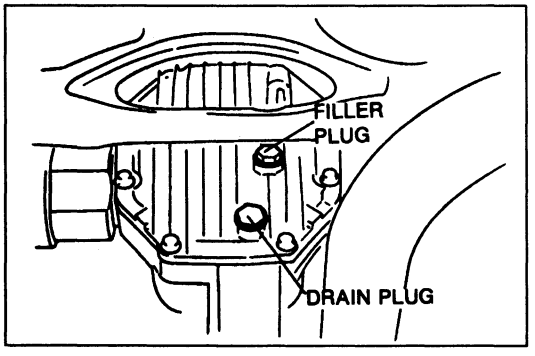
DIFFERENTIAL

PREPARATION
SST

49 V001 795 Installer, oil seal 	For installation of oil seal (companion flange)	49 B001 795 Installer, oil seal 	For installation of oil seal (side bearing)
49 U027 003 Installer, oil seal 	For installation of oil seal (side bearing)	49 B001 797 Handle (Part of 49 B001 795) 	For installation of oil seal (side bearing)
49 M005 561 Hanger, differential carrier 	For disassembly / assembly of differential	49 0107 680A Stand, engine 	For disassembly / assembly of differential
49 S120 710 Holder, coupling flange 	For removal / installation of companion flange nut	49 0839 425C Puller set, bearing 	For Removal of companion flange and side bearing
49 H027 002 Remover, bearing 	For removal of rear bearing	49 UB71 525 Installer, bearing 	For installation of side bearing
49 J027 002 Collar 	For adjustment of pinion height	49 J027 001 Installer, bearing 	For installation of rear bearing race
49 F027 007 Attachment ϕ 72 	For installation of front bearing race	49 8531 567 Collar A (Part of 49 8531 565) 	For adjustment of pinion height
49 8531 565 Pinion model 	For adjustment of pinion height	49 0660 555 Gauge block (Part of 49 F027 0A0) 	For adjustment of pinion height

49 F027 0A0 Gauge set, pinion height adjustment 	For adjustment of pinion height	49 F401 330B Installer set, bearing 	For installation of rear bearing
49 0727 570 Gauge body, pinion height (Part of 49 F027 0A0) 	For adjustment of pinion height	49 G030 338 Attachment E 	For installation of rear bearing
49 F401 331 Body (Part of 49 F401 330B) 	For installation of rear bearing		





DIFFERENTIAL OIL

Inspection

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Remove the filler plug.
3. Verify that the oil is at the bottom of the filler plug hole. If it is low, add the specified oil.
4. Install a new washer and the filler plug.

Tightening torque:
40–53 N·m{4.0–5.5 kgf·m,29–39 ft·lbf}

Replacement

1. Remove the filler and drain plugs.
2. Drain the differential oil into a suitable container.
3. Wipe the plugs clean.
4. Install a new washer and the drain plug.

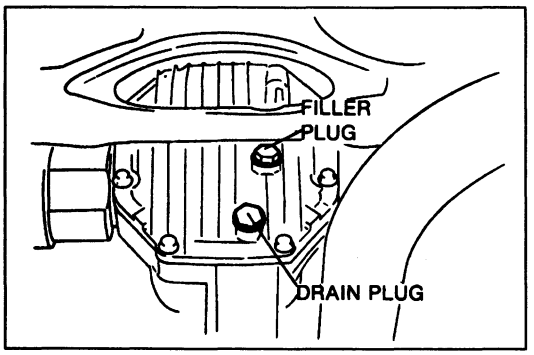
Tightening torque:
40–53 N·m{4.0–5.5 kgf·m,29–39 ft·lbf}

5. Add the specified oil from the filler plug hole unit it reaches the bottom of the hole.

Specified oil
Type
Above – 18°C {0°F}: API GL-4 or GL-5, SAE 90
Below – 18°C {0°F}: API GL-4 or GL-5, SAE 80
Capacity: 1.30 L {1.38 US qt, 1.14 Imp qt}

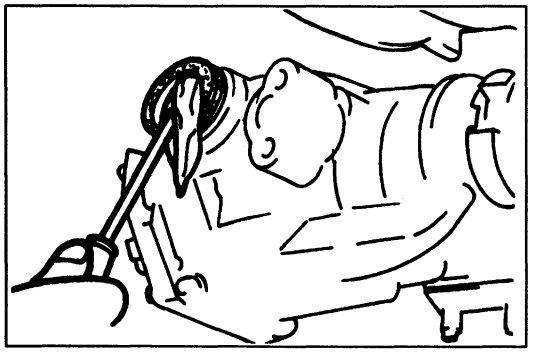
6. Install a new washer and the filler plug.

Tightening torque:
40–53 N·m{4.0–5.5 kgf·m,29–39 ft·lbf}

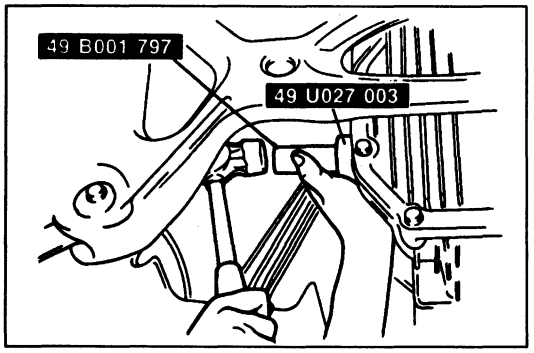


OIL SEAL
Replacement
Oil seal (side bearing)
1. Remove the filler and drain plugs.
2. Drain the differential oil into a suitable container.
3. Wipe the plugs clean.
4. Install a new washer and the drain plug.

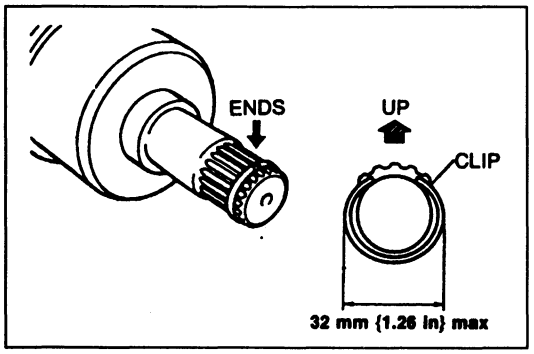
Tightening torque:
40–53 N·m{4.0–5.5 kgf·m,29–39 ft·lbf}



5. Remove the drive shaft. (Refer to page M–15.)
6. Remove the clip from the drive shaft.
7. Remove the oil seal by using a cloth-wrapped screwdriver.



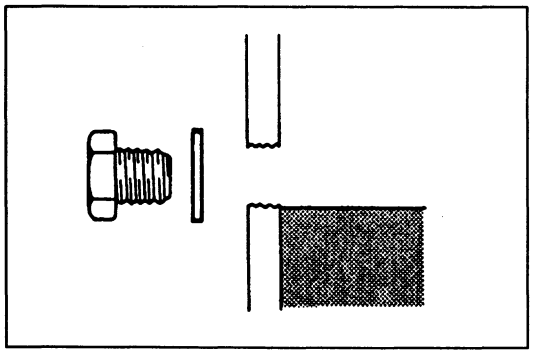
8. Apply clean differential oil to the lip of a new oil seal.
9. Install the oil seal by using the **SST**.



10. Install a new clip onto the drive shaft.
11. Measure the outer diameter of the clip after installing, and replace the clip if it exceeds the specification.

Caution
- **The sharp edges of the drive shaft snap ring can slice or puncture the oil seal. Be careful when installing the drive shaft to the transmission.**

12. Install the drive shaft with the ends of the clip facing upward.
13. Verify that the drive shaft is seated into the side gear by pulling it outward by hand. It should not come out.
14. Add the specified oil through the filler plug hole until it reaches the bottom of the hole.

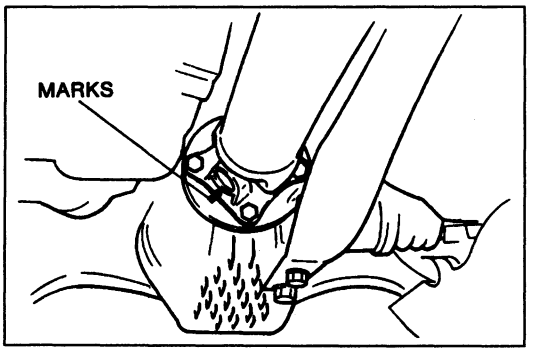


Specified oil
Type
Above – 18°C {0°F}: API GL-4 or GL-5, SAE 90
Below – 18°C {0°F}: API GL-4 or GL-5, SAE 80
Capacity: 1.30 L {1.38 US qt, 1.14 Imp qt}

15. Install a new washer and the filler plug.

Tightening torque:
40–53 N·m{4.0–5.5 kgf·m,29–39 ft·lbf}

16. Check for oil leakage.

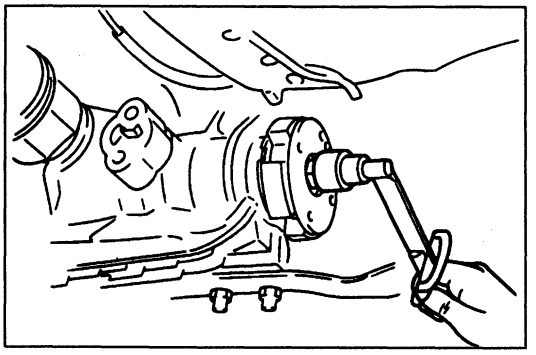


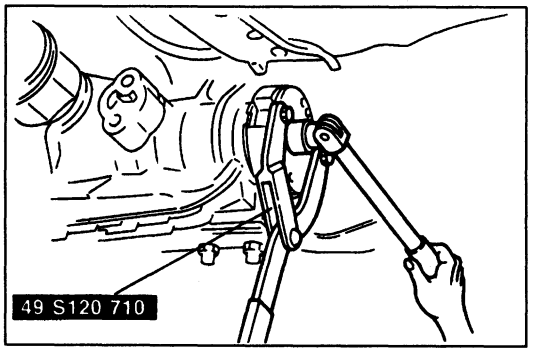
Oil seal (companion flange)

1. Remove the filler and drain plugs.
2. Drain the differential oil into a suitable container.
3. Wipe the plugs clean.
4. Install a new washer and the drain plug.

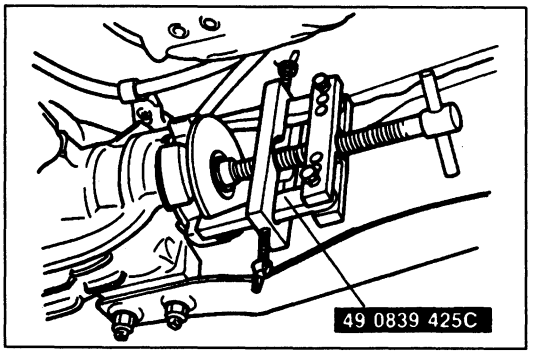
Tightening torque:
40–53 N·m{4.0–5.5 kgf·m,29–39 ft·lbf}

5. Mark the propeller shaft and differential companion flange for proper reinstallation.
6. Remove the nuts and bolts and remove the propeller shaft.
7. Measure and record the rotation staring torque of the drive pinion.

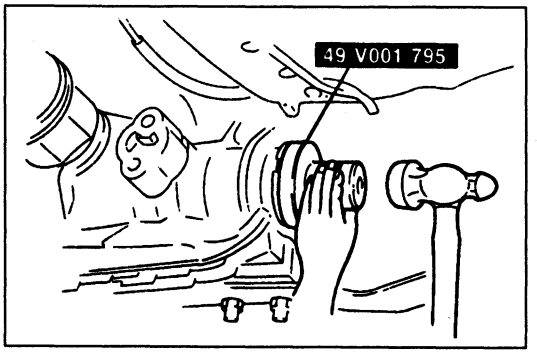




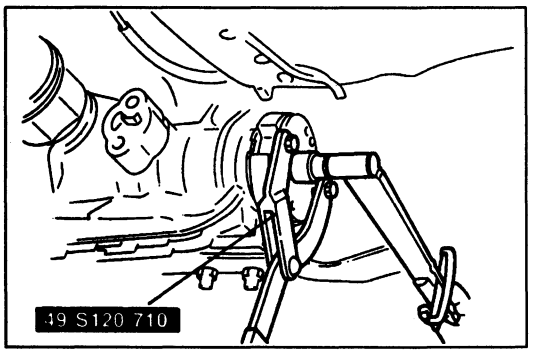
8. Using the **SST** to hold the companion flange, remove the nut.



9. Use the **SST** to remove the companion flange.
10. Remove the oil seal by using a screwdriver.

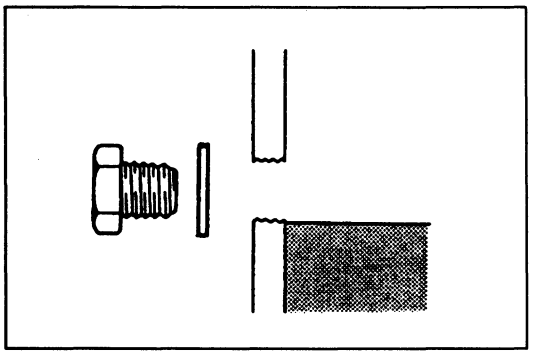


11. Apply clean differential oil to the lip of the new oil seal.
12. Install the oil seal by using the **SST**.



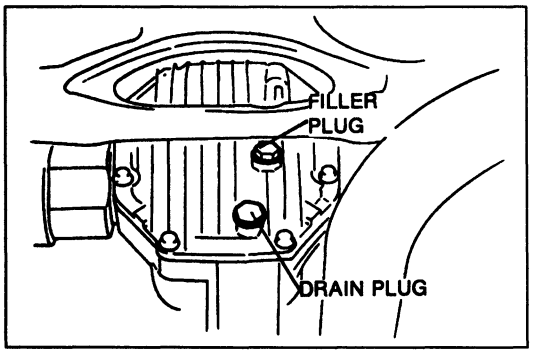
13. Using the **SST**, hold the companion flange and tighten the new companion flange nut to the specified torque.

Tightening torque:
128–284 N·m{13.0–29.0 kgf·m,94.1–209 ft·lbf}



14. Loosen the nut. Retighten it to get the starting torque recorded in Step 7.
15. Add the specified oil through the filler plug hole until it reaches the bottom of the hole.

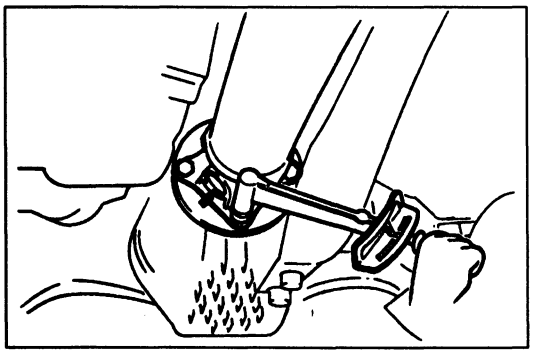
Specified oil
Type
Above – 18°C {0°F}: API GL-4 or GL-5, SAE 90
Below – 18°C {0°F}: API GL-4 or GL-5, SAE 80
Capacity: 1.30 L {1.38 US qt, 1.14 Imp qt}



16. Install a new washer and the filler plug.

Tightening torque:
40–53 N·m{4.0–5.5 kgf·m,29–39 ft·lbf}

17. Check for oil leakage.



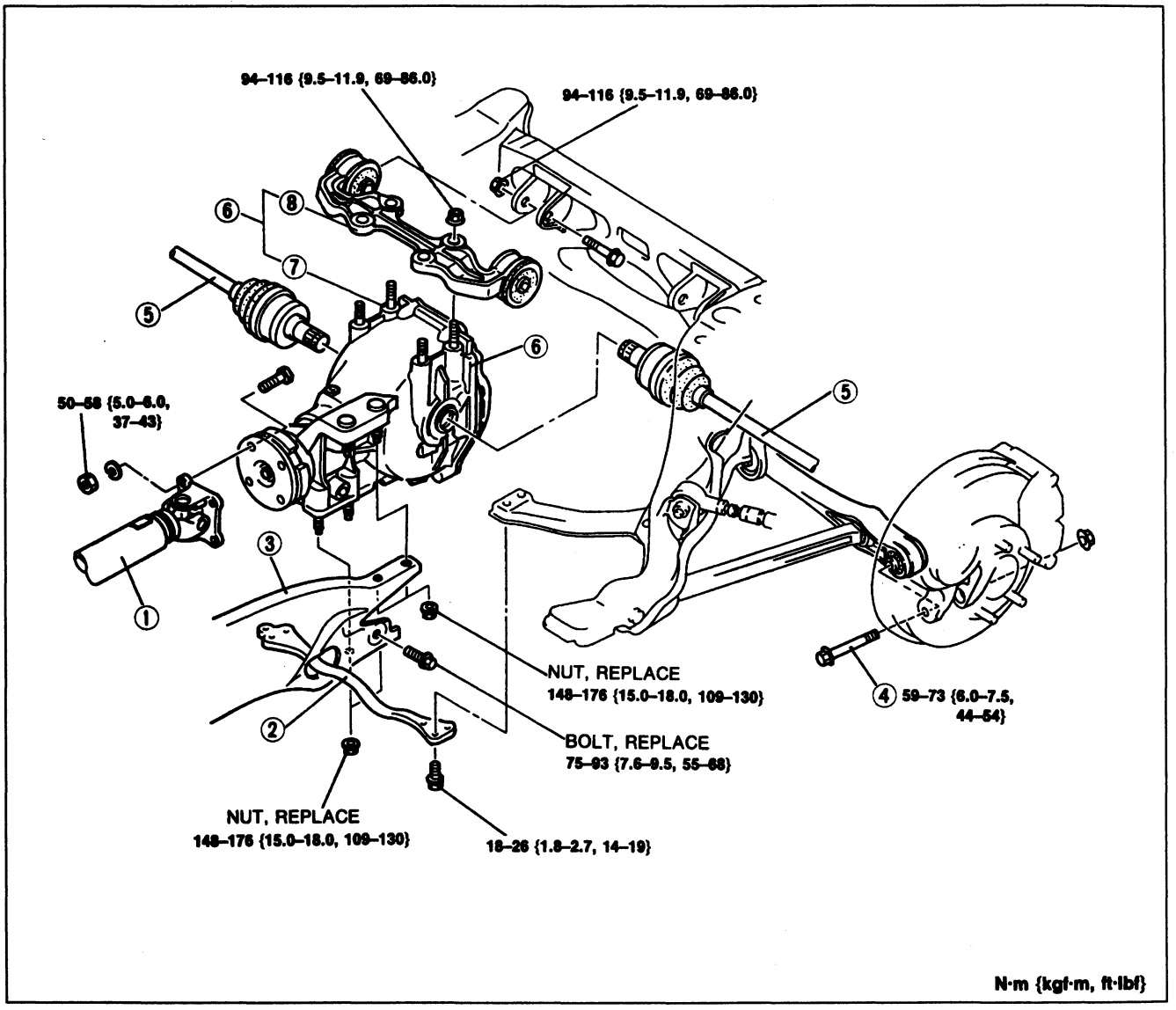
18. Align the marks and install the propeller shaft.

Tightening torque:
50–58 N·m{5.0–6.0 kgf·m,37–43 ft·lbf}

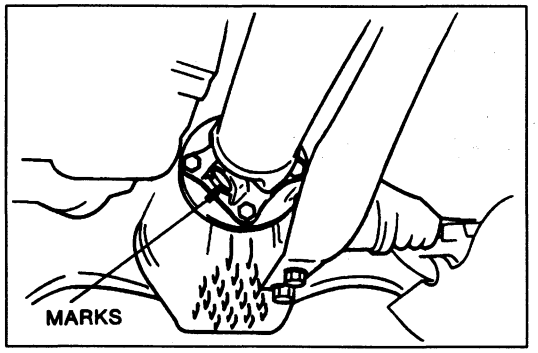
DIFFERENTIAL (TORQUE SENSING LSD)

Removal / Installation

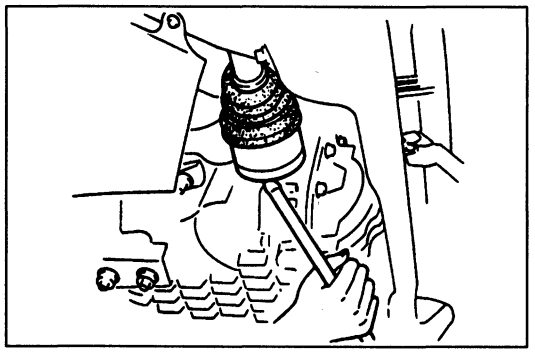
1. Remove the exhaust pipe. (Refer to section F.)
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. After installation, check the rear wheel alignment. (Refer to section R.)
5. Refill the differential with the specified type and amount of oil. (Refer to page M-23.)
6. Install the exhaust pipe. (Refer to section F.)



1. Propeller shaft
   - Removal Note ..... page M-28
   - Service ..... Section L
   - Installation Note ..... page M-29
2. Tunnel reinforcement bracket
3. Power plant flame
   - Service ..... Section J
4. Bolt (I-arm)
5. Drive shaft
   - Removal Note ..... page M-28
   - Installation Note ..... page M-28
6. Differential assembly
   - Removal Note ..... page M-28
7. Differential
   - Disassembly / Inspection / Assembly ..... page M-30
8. Differential mount
   - Inspect bushing for wear and damage



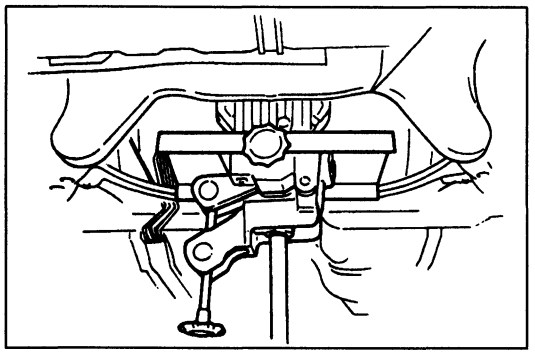
Removal note
Propeller shaft
1. Mark the propeller shaft and differential companion flange for proper reassembly.
2. Remove the nuts and bolts and remove the propeller shaft.



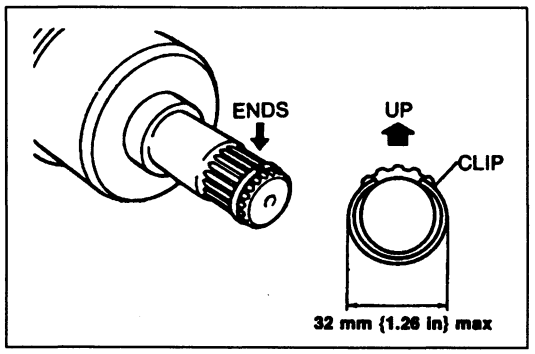
Drive shaft

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 transmission.**

1. Remove the drive shaft from the differential by using a pry bar.
2. Pull outward on the rear hub support and disc plate to disconnect the drive shaft from the differential.



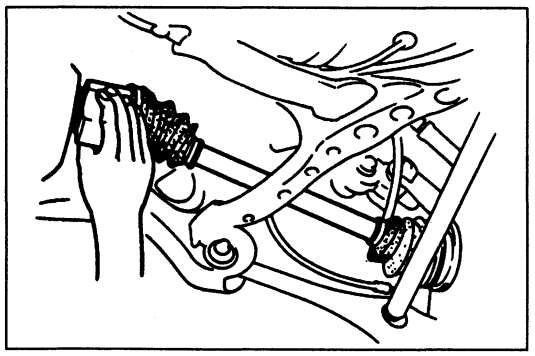
Differential assembly
1. Support the differential on a jack.
2. Remove the differential.

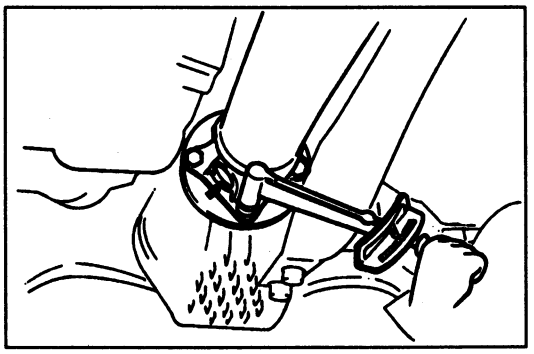


Installation note
Drive shaft
1. Install a new clip onto the drive shaft.
2. Measure the outer diameter of the clip after installing, and replace the clip if it exceeds the specification.

Caution
- **The sharp edges of the drive shaft snap ring can slice or puncture the oil seal. Be careful when installing the drive shaft to the transmission.**

3. With the ends of the clip facing upward, push the drive shaft into the differential.
4. After installation, pull outward on the tripod joint outer ring and verify that the drive shaft is securely held by the clip.



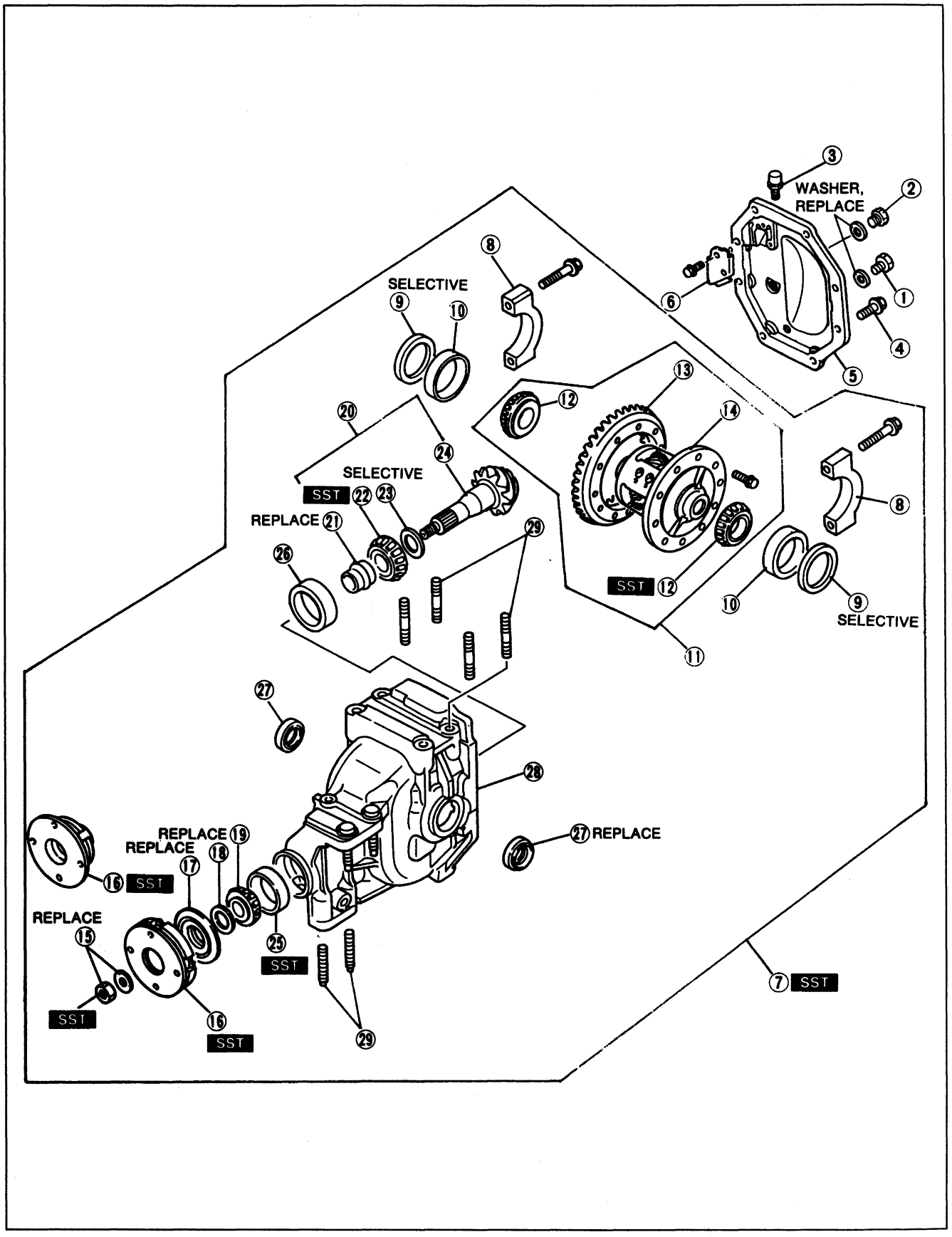


Propeller shaft
Align the marks and install the propeller shaft.

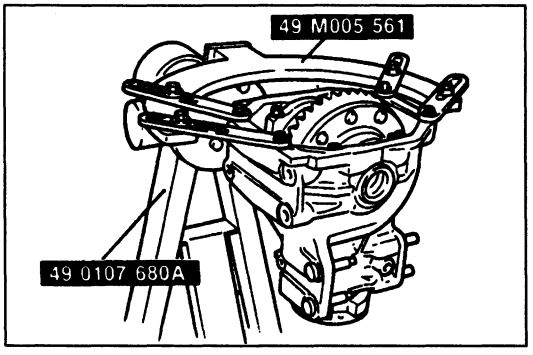
Tightening torque:
50–58 N·m{5.0–6.0 kgf·m,37–43 ft·lbf}

Disassembly / Inspection

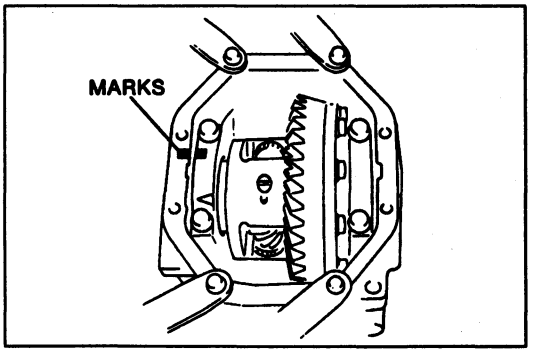
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.



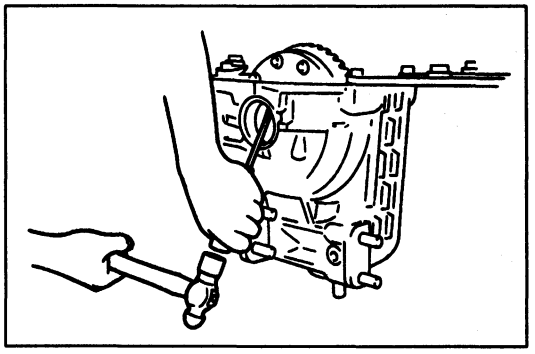
1. Drain plug
2. Filler plug
3. Breather
   Inspect for clogging
4. Carrier bolt
5. Rear cover
6. Baffle
7. Differential gear assembly
   Disassembly Note ..... below
8. Bearing cap
   Disassembly Note ..... page M-32
9. Adjustment shim
   Disassembly Note ..... page M-32
10. Side bearing race
    Disassembly Note ..... page M-32
    Inspect for cracks and damage
11. Gear case assembly
12. Side bearing
    Disassembly Note ..... page M-32
    Inspect for damage and rough rotation
13. Ring gear
    Inspect gear teeth for wear and cracks
14. Gear case (Torsen LSD assembly)
    Inspect gear teeth for wear and cracks
    Inspect housing for cracks and damage
15. Companion flange nut and washer
    Disassembly Note ..... page M-32
16. Companion flange
    Disassembly Note ..... page M-33
17. Oil seal (companion flange)
18. Spacer
19. Front bearing
    Inspect for damage and rough rotation
20. Drive pinion assembly
    Disassembly Note ..... page M-33
21. Collapsible spacer
22. Rear bearing
    Disassembly Note ..... page M-33
    Inspect for damage and rough rotation
23. Spacer
24. Drive pinion
    Inspect splines for wear and damage
    Inspect gear teeth for wear and cracks
25. Front bearing race
    Disassembly Note ..... page M-33
    Inspect for cracks and damage
26. Rear bearing race
    Disassembly Note ..... page M-33
    Inspect for cracks and damage
27. Oil seal (side bearing)
28. Differential carrier
    Inspect for cracks and damage
29. Stud



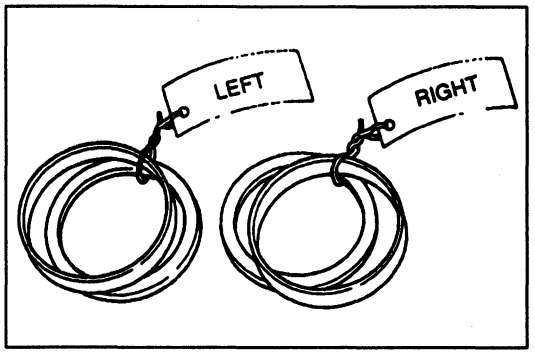
Disassembly note
Differential gear assembly
Mount the differential gear assembly on the **SSTs**.



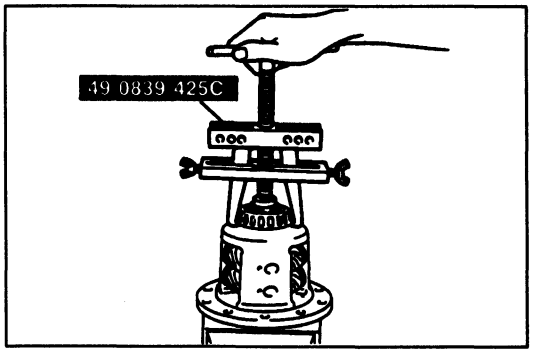
Bearing cap
1. Mark the bearing caps and differential carrier for proper reassembly.
2. Remove the bearing caps.



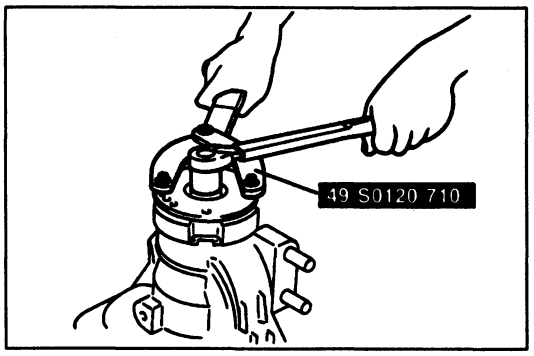
Adjustment shim and side bearing race
1. Remove the adjustment shim, without prying against the side bearing races.
2. Remove the gear case assembly, the side bearing races, and the other adjustment shim.



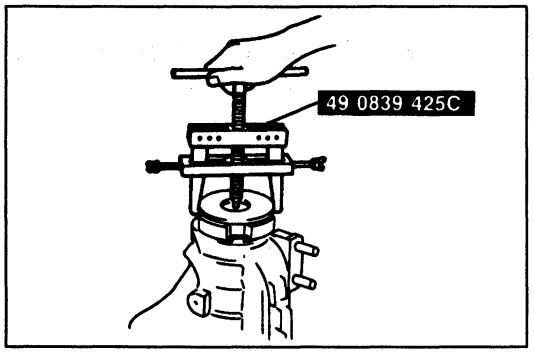
3. Tag the right and left adjustment shims and side bearing races for proper reassembly.



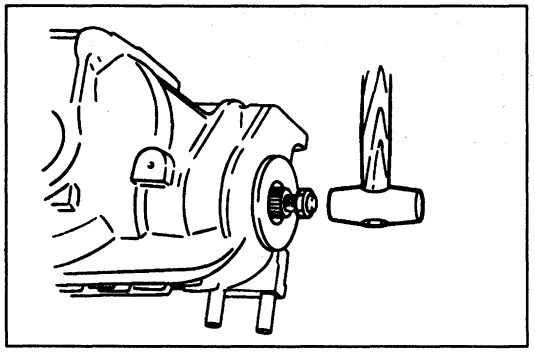
Side bearing
1. Mark the left and right side bearings for proper reassembly.
2. Remove the side bearings from the gear case by using the **SST**.



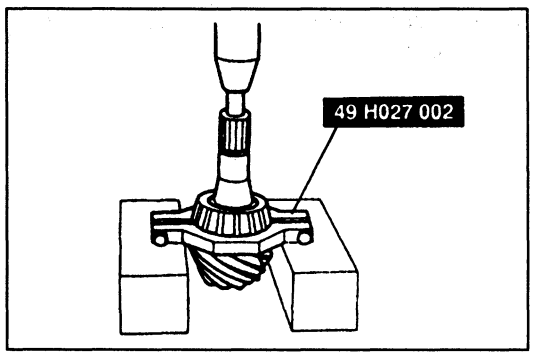
Companion flange nut
Hold the companion flange by using the **SST** and remove the nut.



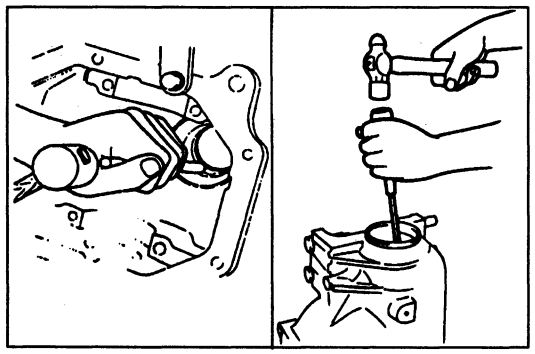
Companion flange
Remove the companion flange by using the **SST**.



Drive pinion assembly
1. Turn a used nut onto the drive pinion until it is about flush with the end of the shaft.
2. Tap the nut by using a brass hammer to drive the pinion assembly out of the differential carrier.



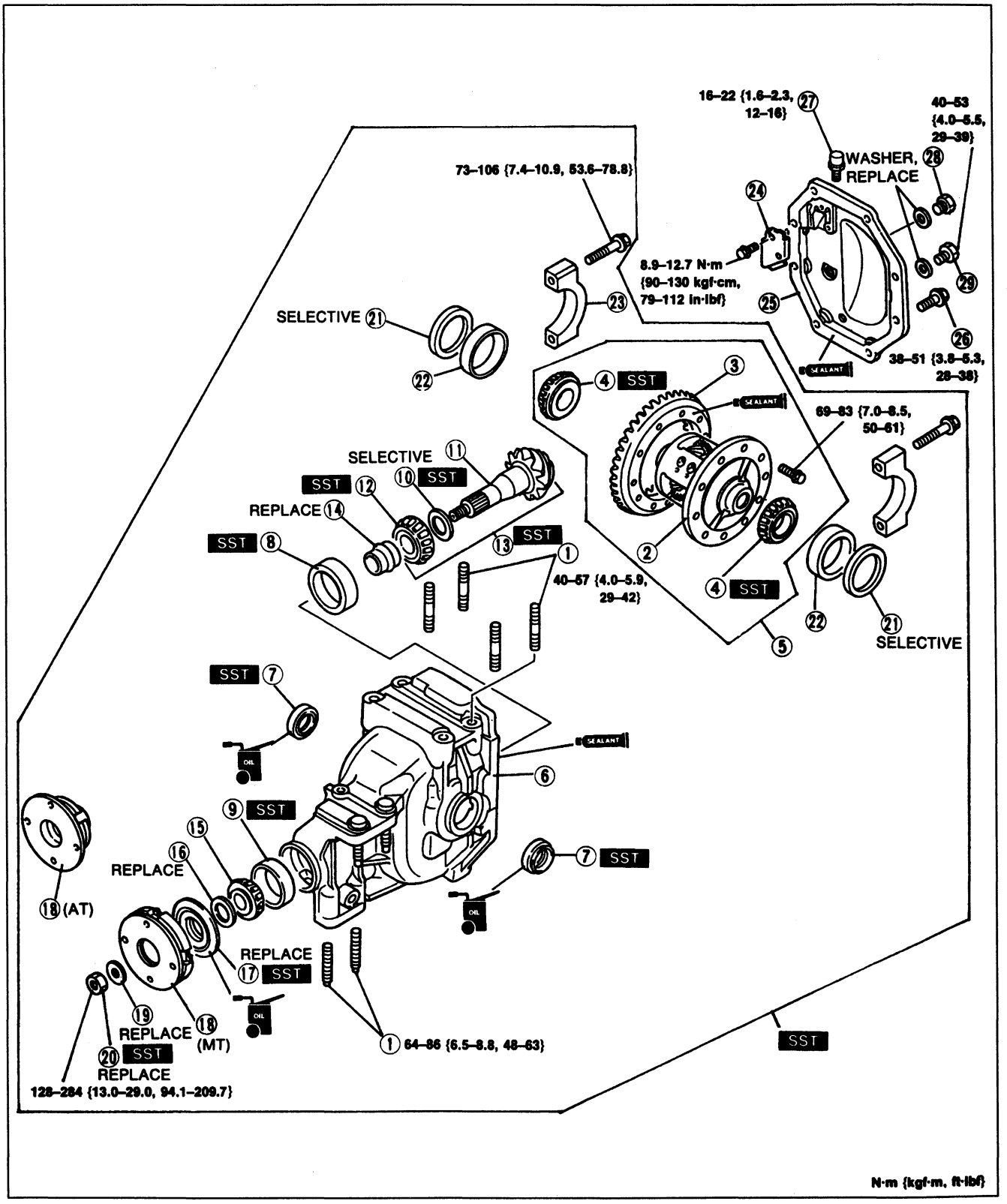
Rear bearing
While supporting the drive pinion, remove the rear bearing by using the **SST**.



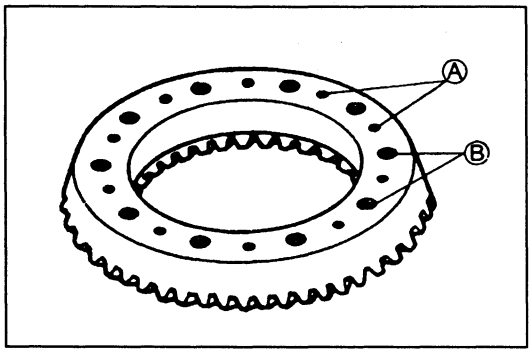
Front bearing race and rear bearing race
Remove the bearing races by alternately tapping the sides of the races at the grooves in the differential carrier.

Assembly

Assemble in the other shown in the figure, referring to **Assembly Note**. When installing the rear cover, install it within 10 minutes after applying sealant. Allow the sealant to set at least 30 minutes after installation before filling the differential with the specified oil.

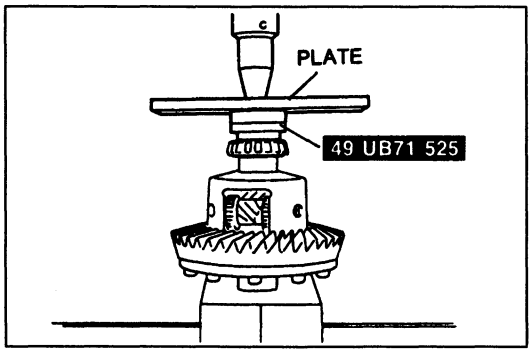


1. Stud
2. Gear case (Torsen LSD assembly)
3. Ring gear
   Assembly Note ..... page M-35
4. Side bearing
   Assembly Note ..... page M-35
5. Gear case assembly
6. Differential carrier
7. Oil seal (side gear)
   Assembly Note ..... page M-35
8. Rear bearing race
   Assembly Note ..... page M-36
9. Front bearing race
   Assembly Note ..... page M-36
10. Spacer
    Assembly Note ..... page M-36
11. Drive pinion
12. Rear bearing
    Assembly Note ..... page M-37
13. Drive pinion assembly
    Assembly Note ..... page M-38
14. Collapsible spacer
15. Front bearing
16. Spacer
17. Oil seal (companion flange)
    Assembly Note ..... page M-38
18. Companion flange
    Assemble Note ..... page M-38
19. Washer
20. Companion flange nut
    Assembly Note ..... page M-39
21. Adjustment shim
    Assembly Note ..... page M-39
22. Side bearing race
23. Bearing cap
    Assemble Note ..... page M-40
24. Baffle
25. Rear cover
26. Carrier bolt
27. Breather
28. Filler plug
29. Drain plug

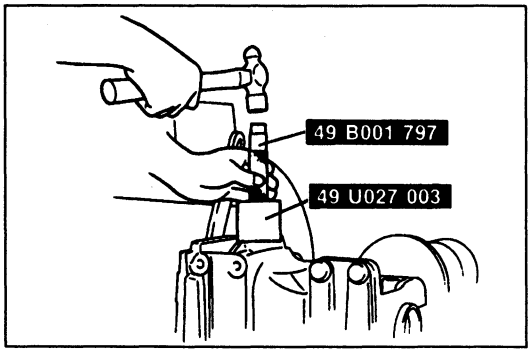


Assembly note
Ring gear
1. Apply about 0.04 cm^3 {0.0024 cu in} of thread locking compound to each of the bolt threads A and points B.
2. Install the ring gear onto the gear case.

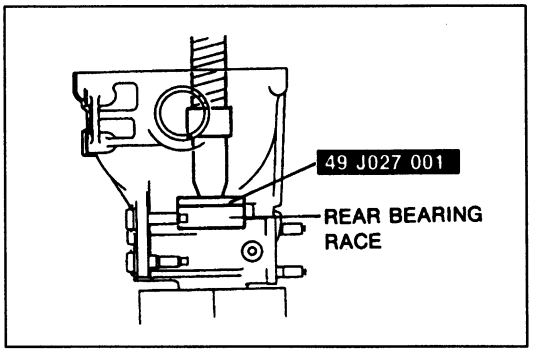
Tightening torque:
69–83 N·m{7.0–8.5 kgf·m,50–61 ft·lbf}



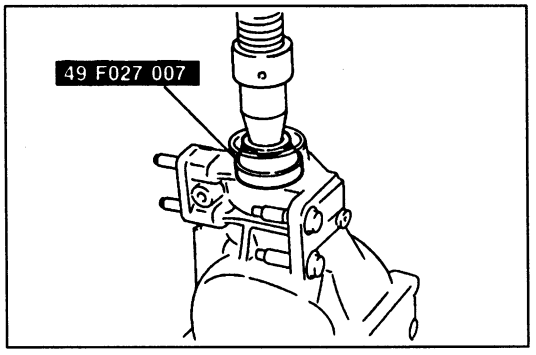
Side bearing
Press the side bearings on by using the **SST**.



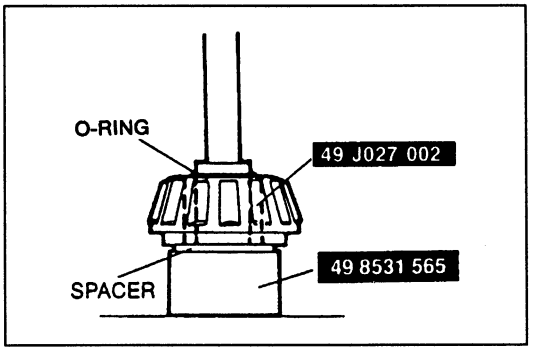
Oil seal
1. Apply differential oil to the lips of the new seals.
2. Install the seals by using the **SST**.



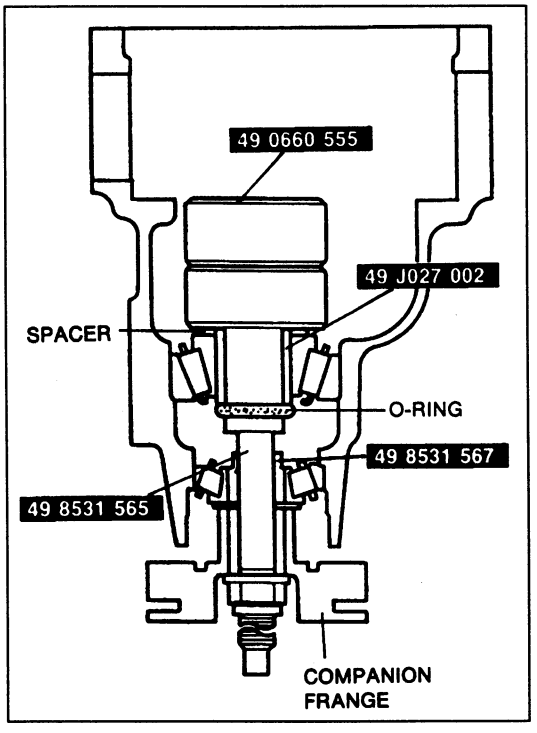
Rear bearing race
Install the rear bearing race by using the **SST**.



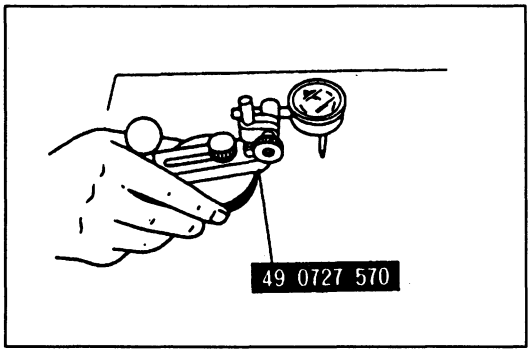
Front bearing race
Install the front bearing race by using **SST**.



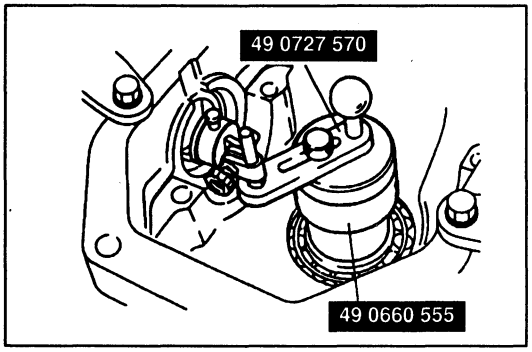
Spacer (adjustment of pinion height)
1. Install the previously-removed spacer onto the **SST** so that the beveled side of the spacer faces the drive pinion. Then install the rear bearing and O-ring onto the **SST**/ spacer as shown in the figure.
2. Install this assembly into the differential carrier.



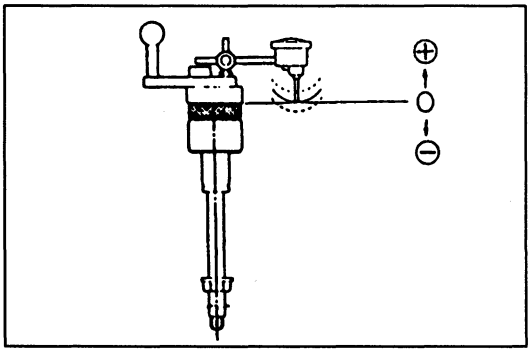
3. Install the **SST** (collar), front bearing, companion flange, washer and nut.
4. Tighten the nut just enough so that the companion flange can still be turned by hand.
5. Place the **SST** (gauge block) atop the **SST** (pinion model).



6. Place the **SST** on a surface plate and set the dial indicator to Zero.



7. Set the **SST** (gauge body) atop the **SST** (gauge block).
8. Place the feeler of the dial indicator so that it contacts the side bearing saddle in the carrier. Measure the lowest position on the left and right sides of the carrier.

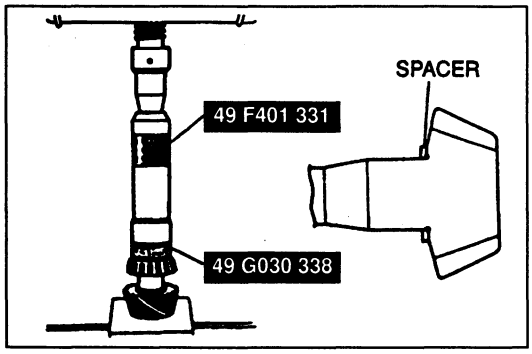


9. Add the two (left and right) values obtained in Step 8 and divide the total by 2.

   Specification : 0 mm {0 in}

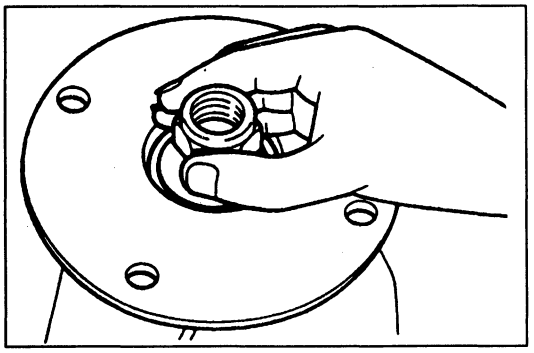
Mark	Thickness	Mark	Thickness
08	3.08 mm {0.1213 in}	29	3.29 mm {0.1295 in}
11	3.11 mm {0.1224 in}	32	3.32 mm {0.1307 in}
14	3.14 mm {0.1236 in}	35	3.35 mm {0.1319 in}
17	3.17 mm {0.1248 in}	38	3.38 mm {0.1331 in}
20	3.20 mm {0.1260 in}	41	3.41 mm {0.1343 in}
23	3.23 mm {0.1271 in}	44	3.44 mm {0.1354 in}
26	3.26 mm {0.1283 in}	47	3.47 mm {0.1366 in}

10. If not within specification, adjust the pinion height by using a spacer chosen from the table.

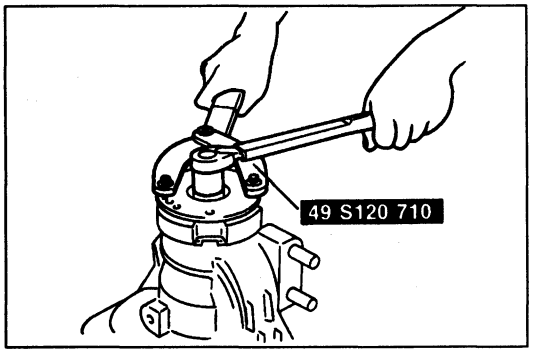


Rear bearing

1. Install the spacer, selected in the procedure above, with the beveled side facing the drive pinion.
2. Press the spacer onto the drive pinion until the force required starts to increase sharply.
3. Press on the spacer and rear bearing by using the **SST**.



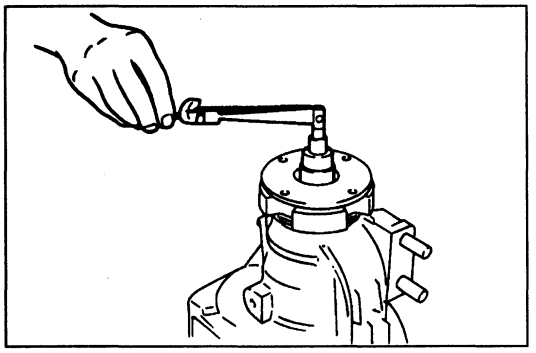
Drive pinion assembly
(adjustment of drive pinion preload)
Perform the following procedure without the companion flange oil seal installed.
1. Apply a light coat of grease to the end face of the companion flange.
2. Install the drive pinion assembly in the differential carrier.



3. Install a new collapsible spacer, front bearing, new front spacer, companion flange, and new washer.
4. Temporarily tighten the new companion flange nut.
5. Hold the companion flange by using the **SST** and tighten the nut.

   Tightening torque: 128 N·m{13 kgf·m,94.1 ft·lbf}

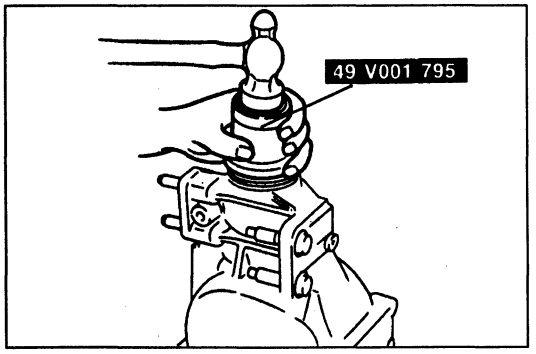
6. Turn the companion flange several turns by hand to seat the bearings.



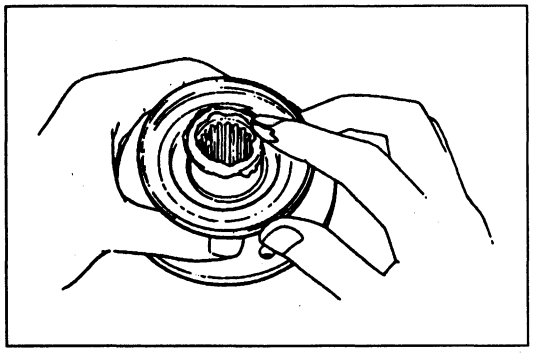
7. Measure the drive pinion preload.
8. Adjust the preload by tightening the nut; then record the required tightening torque.

   Drive pinion preload:
   1.3–1.8 N·m{13–18 kgf·cm,12–15 in·lbf}
   Tightening torque:
   128–284 N·m{13.0–29.0 kgf·m,94.1–209.7 ft·lbf}

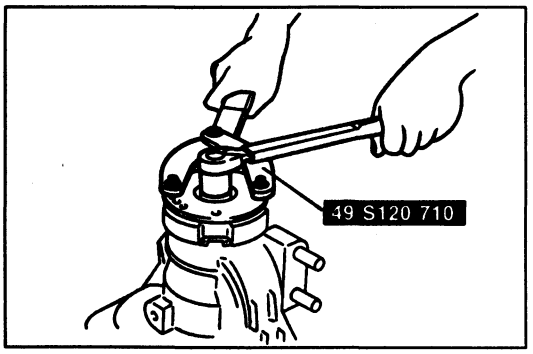
9. If the specified preload is not obtained after tightening the nut to the maximum torque, replace the collapsible spacer with a new one.
10. Remove the nut, washer, and companion flange.



Oil seal (companion flange)
1. Apply clean differential oil to the lip of the new oil seal.
2. Install the oil seal by using the **SST**.



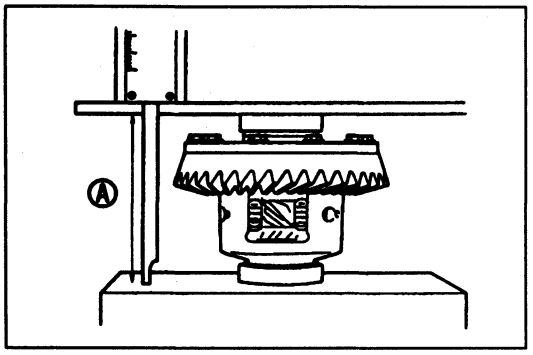
Companion flange
Apply a light coat of grease to the end face of the companion flange.



Companion flange nut

1. Using the **SST**, hold the companion flange and tighten the nut to the tightening torque recorded in "adjustment of drive pinion preload."
2. Verify that the drive pinion preload is within specification.

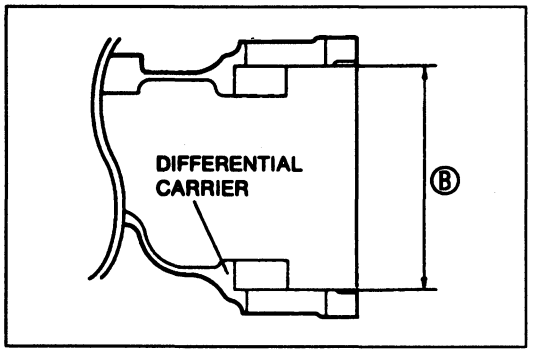
Drive pinion preload:
1.3–1.8 N·m{13–18 kgf·cm,12–15 in·lbf}



Adjustment shims (adjustment of ring gear backlash)

1. Install the bearing races and measure the side bearing and gear case assembly height **A** as shown.

Standard height:
158.4–159.6 mm {6.24–6.28 in}

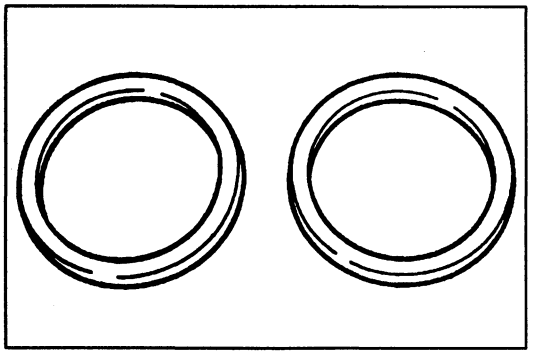


2. Measure the width **B** of the inside of the differential carrier as shown.

Standard width:
170.9–171.1 mm {6.729–6.736 in}

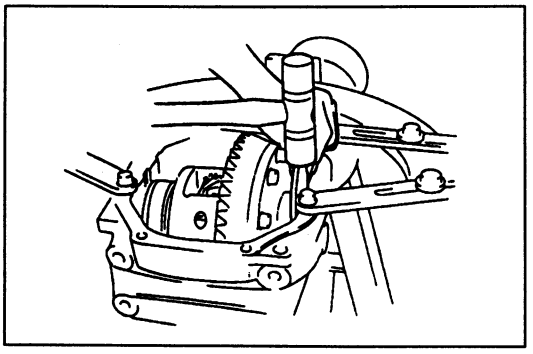
3. The right and left total adjustment shims thickness **C** is determined by the following.

C mm = B–A mm + (0.01–0.03 mm)
C in = B–A in + (0.0004–0.0012 in)

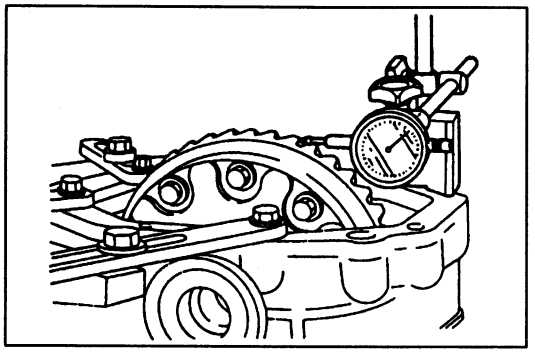


4. If **C** is equal to the total thickness of the removed right and left adjustment shims, reuse them.
5. If **C** is not equal to the removed shims, or when the shims are to be replaced, select and use the shims from the following table. Use adjustment shims of the same thickness for both sides.

Identification mark	Thickness	Identification mark	Thickness
550	5.50 mm {0.2165 in}	605	6.05 mm {0.2382 in}
560	5.60 mm {0.2205 in}	610	6.10 mm {0.2402 in}
565	5.65 mm {0.2224 in}	615	6.15 mm {0.2421 in}
570	5.70 mm {0.2244 in}	620	6.20 mm {0.2441 in}
575	5.75 mm {0.2264 in}	625	5.25 mm {0.2461 in}
580	5.80 mm {0.2283 in}	630	6.30 mm {0.2480 in}
585	5.85 mm {0.2303 in}	635	6.35 mm {0.2500 in}
590	5.90 mm {0.2323 in}	640	6.40 mm {0.2520 in}
595	5.95 mm {0.2343 in}	650	6.50 mm {0.2559 in}
600	6.00 mm {0.2362 in}	—	—

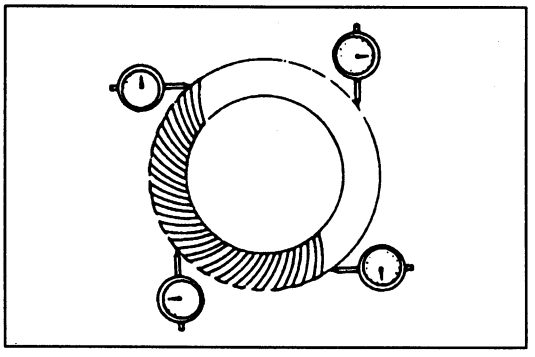


6. Install the right and left side bearing race into the differential carrier, in exactly the same positions they were in at disassembly. Then install the gear case assembly and adjustment shim(s), making sure not to interchange the adjustment shim(s) if they are being reused.
7. Tap the other side adjustment shim(s) in by using a plastic hammer.
8. Install the bearing caps and loosely tighten the bolts.

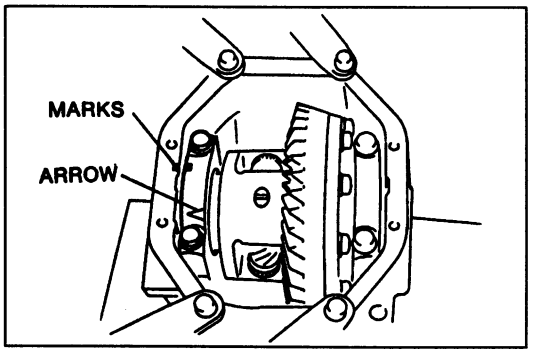


9. Mark the ring gear at four points at **approx. 90 degrees** intervals. Mount a dial indicator to the carrier so that the feeler comes into contact at a right angle with one of the ring gear teeth at a point marked.
10. Measure the ring gear backlash.

Standard backlash:
0.09–0.11 mm {0.0035–0.0043 in}

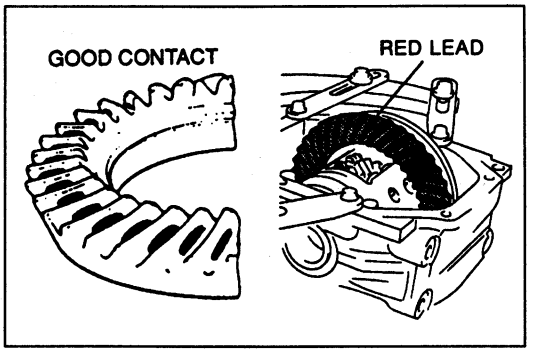


11. Measure the backlash at the three other marked points, and verify that the minimum backlash is more than **0.05 mm {0.002 in}** and the difference between the maximum and minimum is less than **0.07 mm {0.0028 in}**.
12. If the backlash is not within specification, adjust it by inserting appropriate adjustment shim at both sides of the carrier. If replacing the adjustment shim on one side with a thinner shim, replace the shim on the other side with an equally thicker shim.



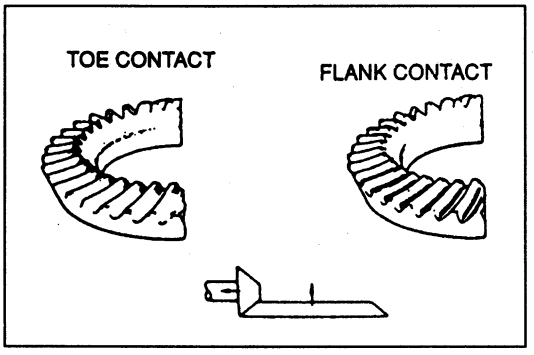
Bearing caps
1. Align the marks made on the right and left bearing caps and the differential case.
2. Tighten the bolts to the specified torque.
3. Check the drive pinion and ring gear tooth contact (page M–41)

Tightening torque:
73–106 N·m{7.4–10.9 kgf·cm,53.6–78.8 ft·lbf}

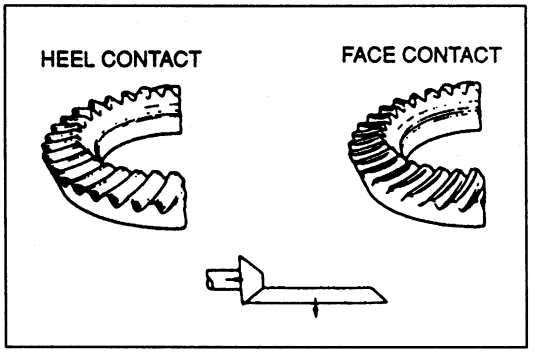


Inspection and adjustment of tooth contact

1. Coat both surfaces of 6–8 teeth of the ring gear with a uniformly thin coat of red lead.
2. While moving the ring gear back and forth by hand, rotate the drive pinion several times and check the tooth contact.
3. If the tooth contact is good, wipe off the red lead.



4. If it is not good, readjust the pinion height, and then adjust the backlash.
   (1) Toe and flank contact
   Replace the spacer with a thinner one to move the drive pinion outward.

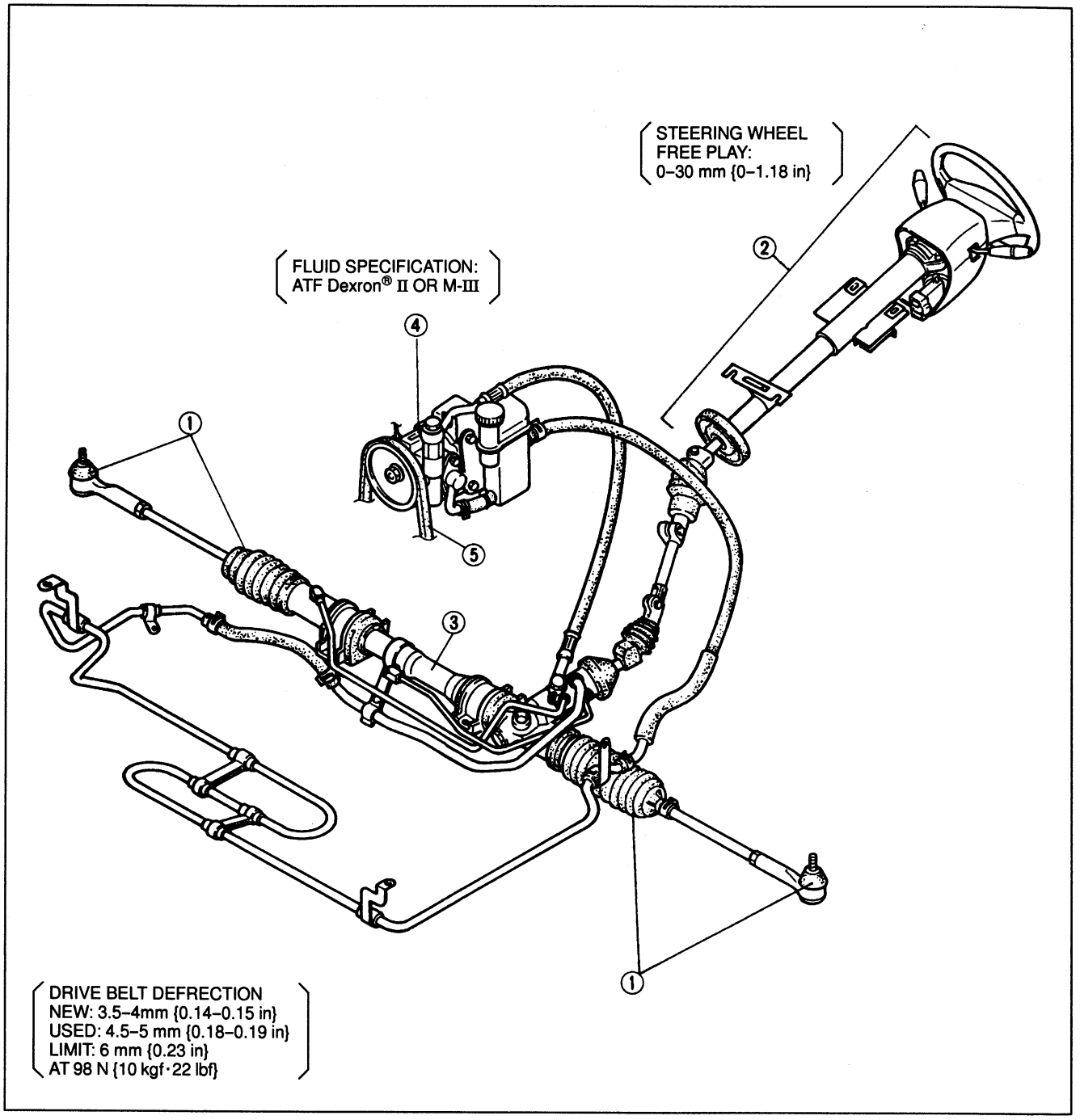


   (2) Heel and face contact
   Replace the spacer with a thicker one to bring the drive pinion inward.

Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

STEERING SYSTEM

INDEX



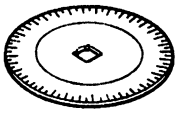
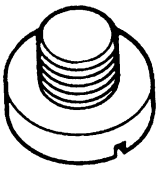
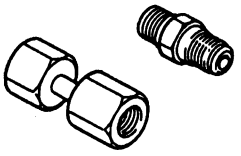
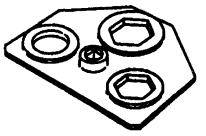
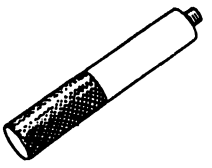
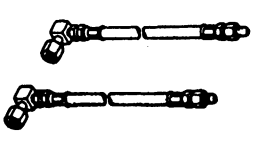
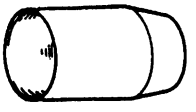
OUTLINE

SPECIFICATIONS

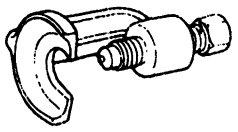
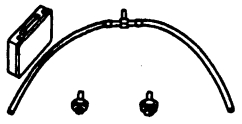
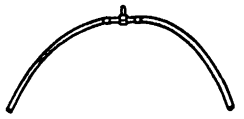
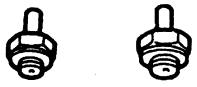
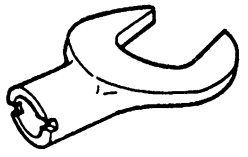
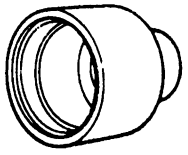
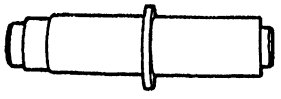
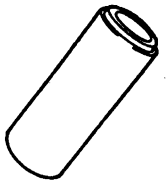
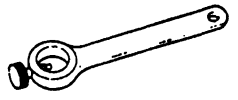
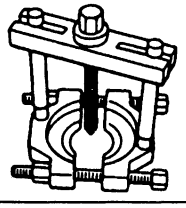
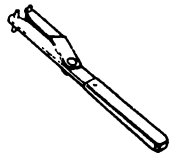
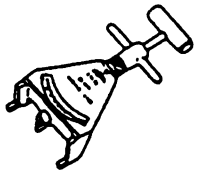
Item			Specifications
Steering wheel	Outer diameter	mm {in}	380 {15.0}
	Lock-to-lock	turns	2.9
Steering shaft	Shaft		Collapsible
Steering gear	Power assist		Engine speed sensing
	Gear		Rack-and-pinion
	Gear ratio		∞ (infinite)
	Back stroke	mm {in}	160 {6.30}
	Power steering fluid		ATF Dexron® II or M-III
	Fluid capacity	L {US qt, Imp qt}	0.96 {1.01, 0.84}

ENGINE SPEED SENSING POWER STEERING

PREPARATION
SST

49 1232 670A Gauge set, power steering		For inspection of power steering fluid pressure	49 D032 316 Protractor		For installation of adjusting cover
49 1232 673 Body, valve (Part of 49 1232 670A)		For inspection of power steering fluid pressure	49 F032 317 Remover, oil seal		For removal of oil seal and backup washer
49 H032 322 Adapter, power steering gauge		For inspection of power steering fluid pressure	49 F032 313 Wrench		For removal of locknut
49 1232 672 Gauge (Part of 49 1232 670A)		For inspection of power steering fluid pressure	49 F032 305 Handle		For removal of needle bearing
49 H002 671 Adapter, power steering gauge		For inspection of power steering fluid pressure	49 F032 310 Protector		For installation of oil seal

ENGINE SPEED SENSING POWER STEERING

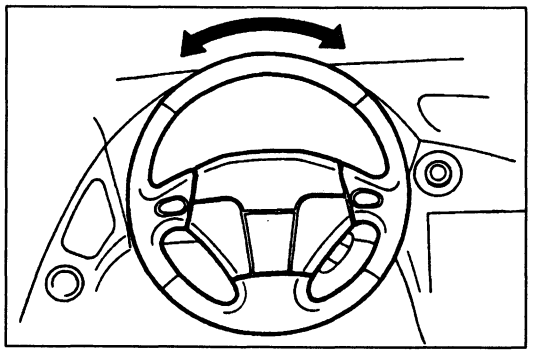
49 0118 850C Puller, ball joint 	For removal of tie rod end ball joint	49 F032 303 Handle 	For installation of oil seal and backup washer
49 G032 3AI Set, joint hose 	For hermetic inspection of cylinder	49 G032 317 Hose (Part of 49 G032 3AI) 	For hermetic inspection of cylinder
49 G032 319 Adapter (Part of 49 G032 3AI) 	For hermetic inspection of cylinder	49 H032 301 Wrench 	For removal of tie rod
49 1243 785 Installer, boot 	For installation of outer ball joint	49 H032 328 Former, seal ring 	For formation of seal ring
49 F032 318 Installer, oil seal and bearing 	For installation of oil seal and bearing	49 F032 304 Body 	For installation of oil seal
49 F032 319 Installer 	For installation of oil seal	49 0180 510B Attachment, preload 	For measurement of pinion preload
49 0710 520 Puller, bearing 	For removal of bearing	49 F032 306A Body 	For removal of needle bearing
49 F032 301 Hanger, power steering pump 	For disassembly / assembly of power steering oil pump	49 W023 585A Adjust wrench 	For removal / installation of oil pump pulley
49 9200 020 V-ribbed belt tension gauge 	For measurement of drive belt tension		

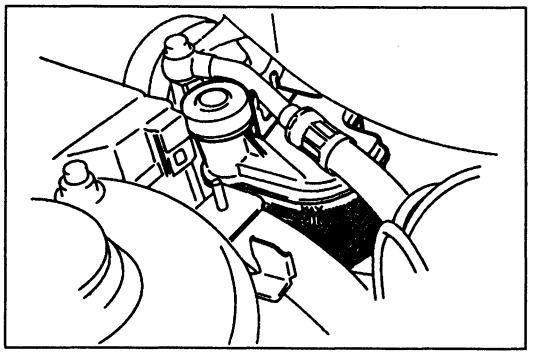
TROUBLESHOOTING GUIDE

Problem	Possible cause	Action	Page/section
Steering feels heavy	Poor lubrication, foreign material, or abnormal wear of steering ball joint	lubricate or replace	N- 9
	Stuck or damaged lower arm ball joints	Replace	Section R
	Improper steering pinion preload	Repair of replace	N-26
	Damaged steering gear	Repair of replace	N-16, 18
	Damaged steering shaft joint	Replace	N-12
	Improperly adjusted wheel alignment	Adjust	Section R
	Incorrect tire pressure	Adjust	Section Q
	Loose or damaged oil pump drive belt	Adjust or replace	N-31
	Low fluid level or air in fluid	Add fluid or bleed air	N- 6
	Leakage of fluid	Repair or replace	—
	Insufficient oil pump pressure	Replace	N-28
Steering wheel pulls to one side	Incorrect tire pressure	Adjust	Section Q
	Unevenly worn tires	Replace	Section Q
	Weak front coil spring	Replace	Section R
	Worn or damaged stabilizer and/or suspension bushing	Replace	Section R
	Dragging brake	Repair or adjust	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 joint	Replace	N-12
	Improper steering pinion preload	Repair of replace	N-26
	Weak front coil spring	Replace	Section R
	Worn or damaged stabilizer and/or upper 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	Adjust or replace	Section Q
	Cracked or worn engine mount rubber	Replace	Section B
	Cracked or worn transmission mount rubber	Replace	Section K
Shimmy (steering wheel vibrates circumferentially)	Cracked or worn steering gear mount rubber	Replace	N-18
	Loose steering gear mounting bolts	Tighten	N-16
	Stuck or damaged steering ball joint	Replace	N- 9, 18
	Excessive tire and/or wheel runout	Replace	Section Q
	Loose lug nuts	Tighten	Section Q
	Unbalanced wheel	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 bushings	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	Repair or replace	N-16, 18
	Worn or damaged steering joints	Replace	N-12
	Worn or damaged lower arm bushing	Replace	Section R
	Loose steering gear mounting bolts	Tighten	N-16
	Worn linkage or tie rod ball joint	Replace	N-18
Poor steering wheel return	Incorrect tire pressure	Adjust	Section Q
	Stuck or damaged steering joints	Replace	N-12
	Improperly adjusted front wheel alignment	Adjust	Section R
	Improper steering pinion preload	Repair or replace	N-26
	Ball joint not operating smoothly	Replace	N-16, 18
	Obstruction near steering column	Repair	N-12

TROUBLESHOOTING GUIDE (Cont'd)

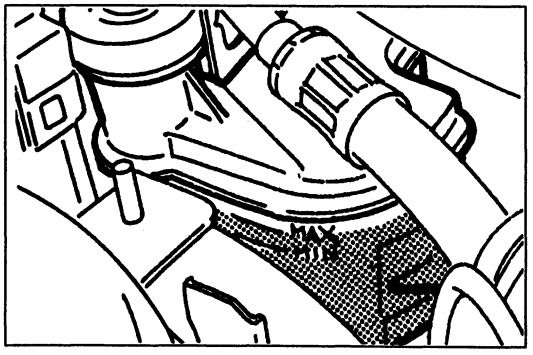
Problem	Possible cause	Action	Page/section
Abnormal noise from steering system	Loose oil pump	Tighten	N-28
	Loose steering gear	Tighten	N-16
	Loose oil pump bracket	Tighten	N-28
	Loose or too tight drive belt	Adjust	N-31
	Air in system	Bleed air	N- 6
	Damaged steering gear	Repair or replace	N-16, 18
	Damaged oil pump	Repair or replace	N-28, 29
	Obstruction near steering column	Repair or replace	N-12
	Loose steering linkage	Tighten or replace	N-16
	Worn steering joints	Replace	N-12





AIR BLEEDING

1. Check the fluid level. (Refer to below.)
2. Jack up the front of the vehicle and support it on safety stands.
3. Turn the steering wheel fully to the left and right several times with the engine not running.
4. Recheck the fluid level. If it has dropped, add fluid.
5. Repeat Steps 3 and 4 until the fluid level stabilizes.
6. Lower the vehicle.
7. Start the engine and let it idle.
8. Turn the steering wheel fully to the left and right several times.
9. Verify that fluid is not foamy and that the fluid level has not dropped.
10. Add fluid if necessary and repeat Steps 6 and 7.



POWER STEERING FLUID

Inspection

Fluid level

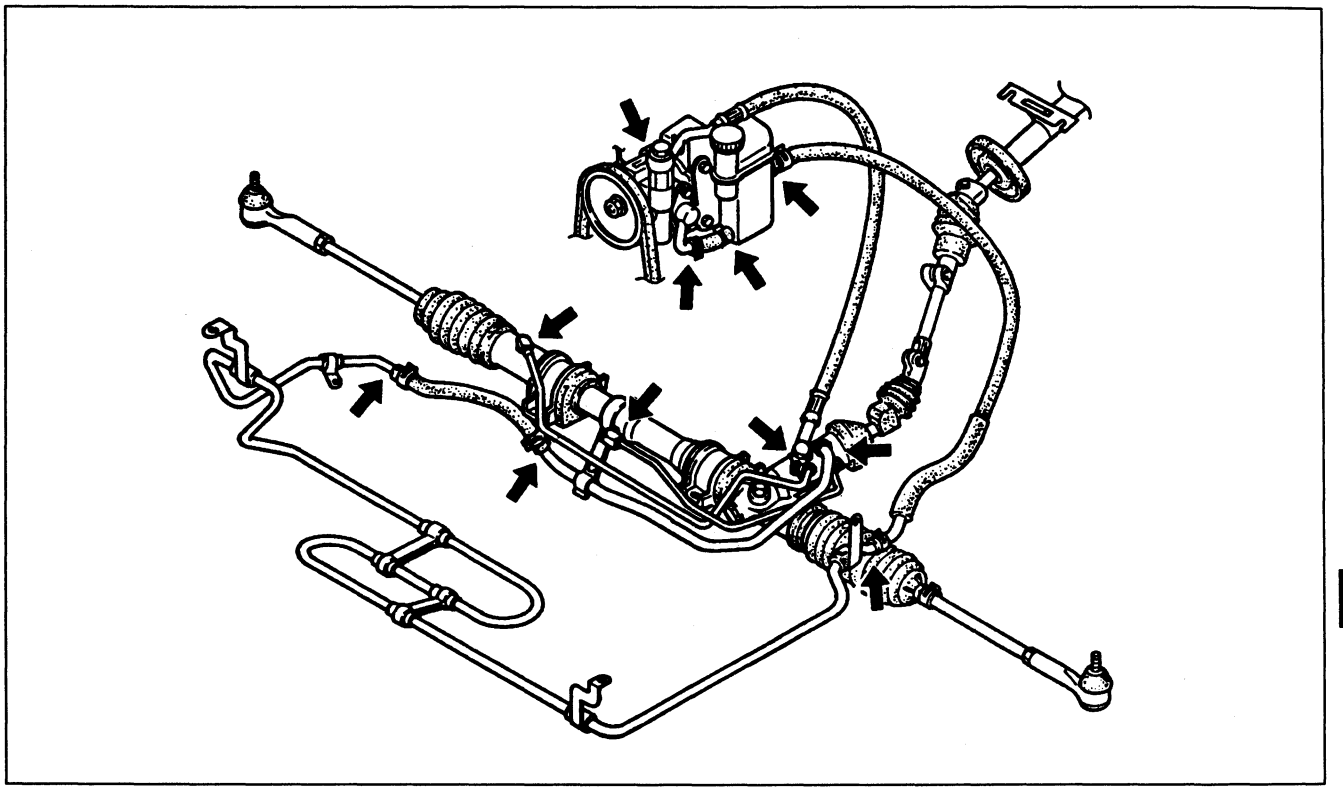
Check the power steering fluid level. Add specified power steering fluid to MAX if necessary.

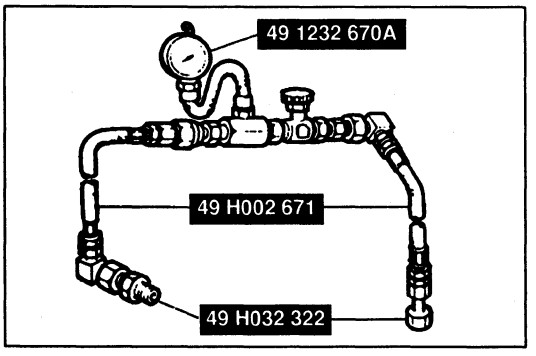
Fluid specification: ATF Dexron® II or M-III

Fluid leakage

Caution
- **Never hold the steering wheel to the extreme left or right for more than five seconds with the engine running. This could damage the power steering pump.**

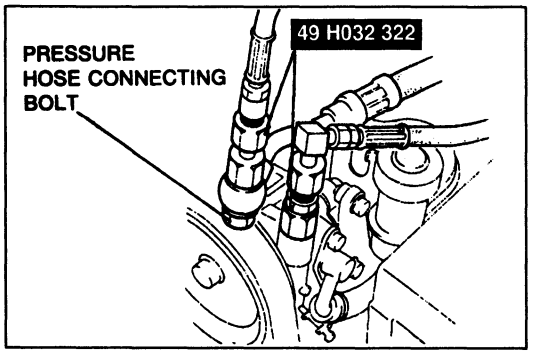
Start the engine and let it idle. Turn the steering wheel fully left and fully right to apply fluid pressure. Inspect the points shown in the figure for fluid leakage.



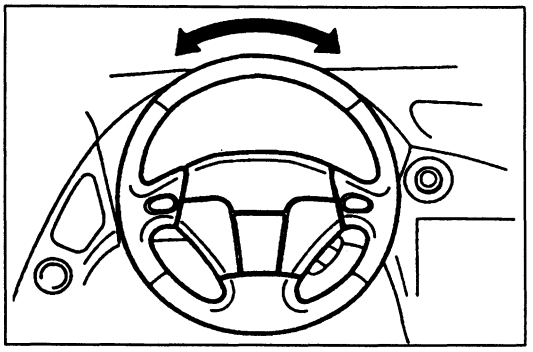


Fluid pressure
1. Assemble the **SST** as shown in the figure.

Tightening torque:
40–49 N·m {4.0–5.0 kgf·m, 29–36 ft·lbf}

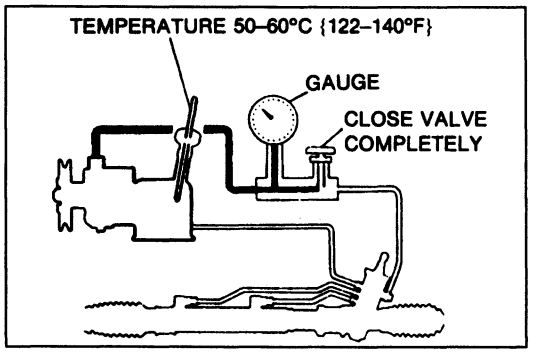


2. Disconnect the pressure pipe from the oil pump, and connect the **SST**.
3. Bleed the air from the system. (Refer to page N–6.)



Caution
- **Never hold the steering wheel to the extreme left or right for more than 15 seconds with the engine running. This could damage the power steering pump.**

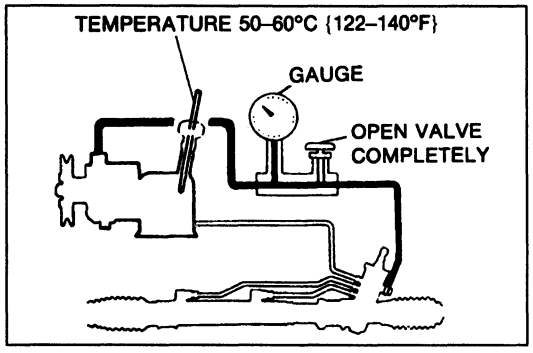
4. Open the gauge valve fully. Start the engine and turn the steering wheel fully left and right to raise the fluid temperature to **50–60°C {122–144°F}**.



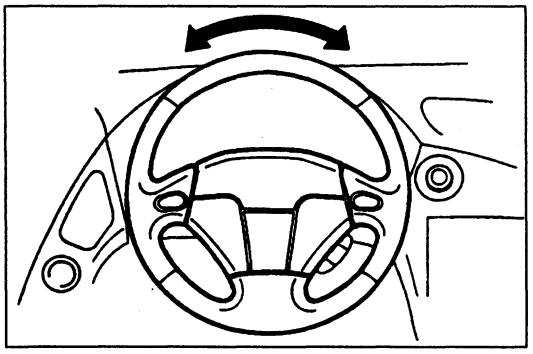
Caution
- **Do not let the valve stay closed for more than 15 seconds. The increase in fluid temperature will damage the oil pump.**

5. Close the gauge valve completely. Increase the engine speed to **1,000–1,500** rpm and measure the fluid pressure generated by the oil pump. If the pressure is not within specification, repair or replace the oil pump assembly. (Refer to page N–28.)

   Oil pump fluid pressure:
   7,620–8,350 kPa {77.7–85.2 kgf/cm^2, 1,110–1,210 psi}



6. Open the gauge valve fully and increase the engine speed to **1,000–1,500 rpm**.



7. Turn the steering wheel fully to the left and right and measure the fluid pressure generated at the gear housing. If the pressure is not within specification, repair or replace the steering gear assembly.

   Gear housing fluid pressure:
   7,620–8,350 kPa {77.7–85.2 kgf/cm^2, 1,110–1,210 psi}

8. Remove the gauge set. Install and tighten the pressure pipe to the specified torque.

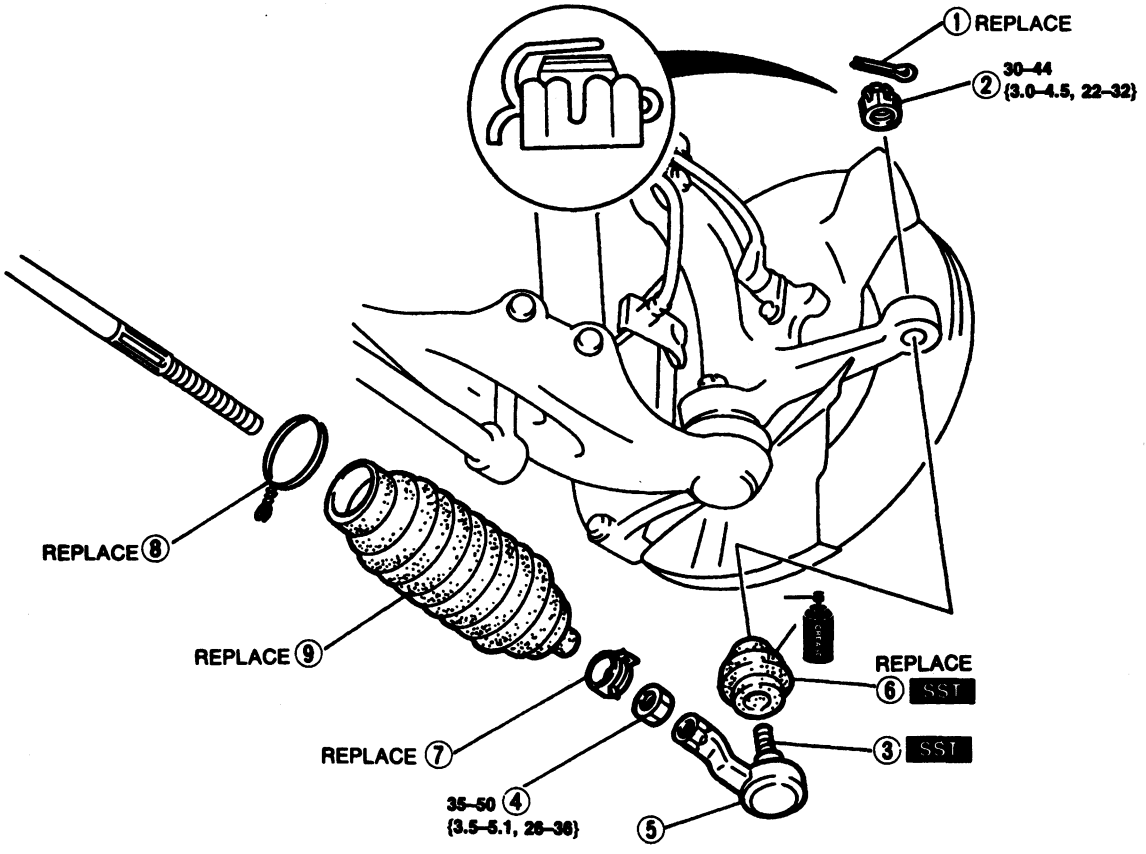
   Tightening torque:
   24–35 N·m {2.4–3.6 kgf·m, 18–26 ft·lbf}

9. Bleed the air from the system. (Refer to page N–6.)

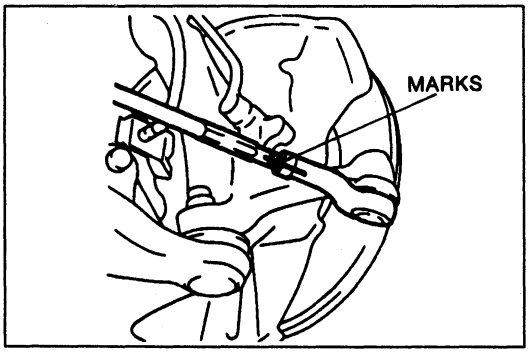
BOOT

Replacement

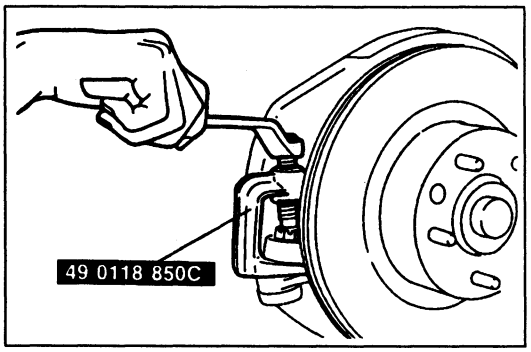
1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the wheel and tire.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal, referring **Installation Note**.
5. Install the wheel and tire.
   Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 66–86 ft·lbf}
6. After installation, check the steering angle and toe-in and adjust if necessary. (Refer to section R.)



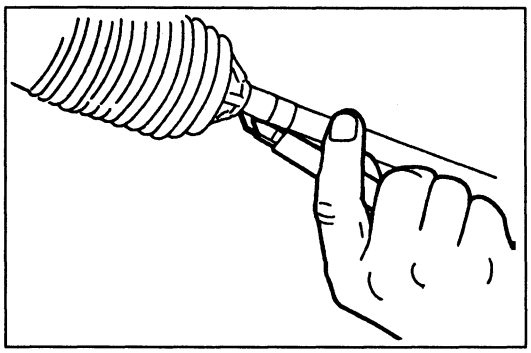
1. Cotter pin
2. Nut
3. Tie rod end ball joint
   Removal Note ..... page N–10
4. Locknut
   Removal Note ..... page N–10
5. Tie rod end
6. Tie rod end boot
   Removal Note ..... page N–10
   Installation Note ..... page N–10
7. Boot clamp
8. Boot wire
9. Steering gear boot
   Removal Note ..... page N–10
   Installation Note ..... page N–10



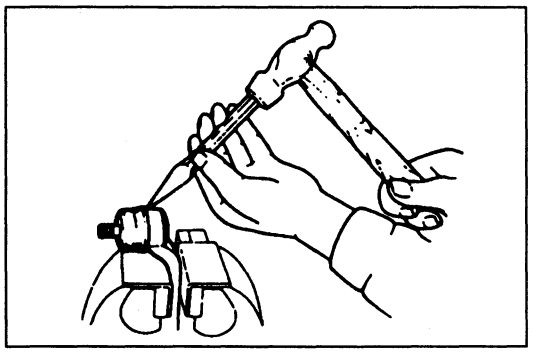
Removal note
Locknut
Before loosening the tie rod end locknut, make mark for reference when tightening.



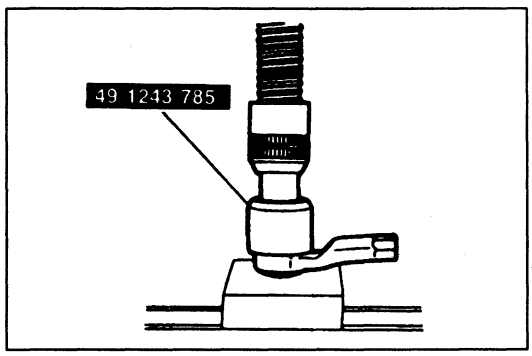
Tie rod end ball joint
1. Loosen the tie rod end ball joint nut until it is about flush with the end of the stud.
2. With the nut protecting the stud, separate the tie rod end from the steering knuckle by using the **SST**.



Steering gear boot
If the steering gear boot is difficult to remove, use a razor knife to cut open the small diameter end.

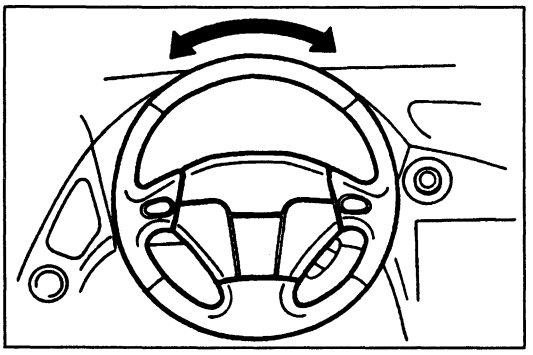


Tie rod end boot
1. Secure the tie rod end in a vise.
2. Place a chisel against the boot and hold it at an angle as shown.
3. Remove the boot by tapping it with a hammer.



Installation note
Tie rod end boot
1. Wipe away the grease on the ball joint.
2. Put a small amount of grease (lithium base) into the new boot and set it onto the tie rod end.
3. Press the boot onto the tie rod end by using the **SST** and a press.
4. Wipe away any excess grease.

Steering gear boot
Verify that the boot is not twisted.



STEERING WHEEL AND COLUMN

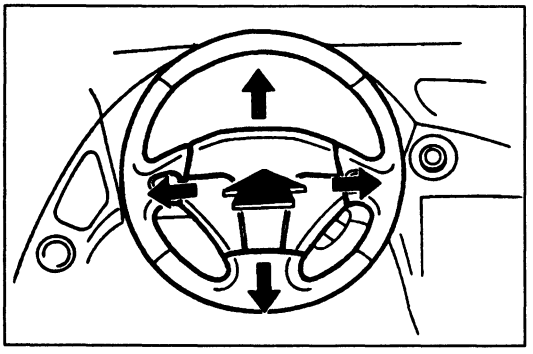
On-vehicle Inspection

Steering wheel play

1. With the wheels in the straight-ahead position, gently turn the steering wheel to the left and right and verify that the play is within specification.

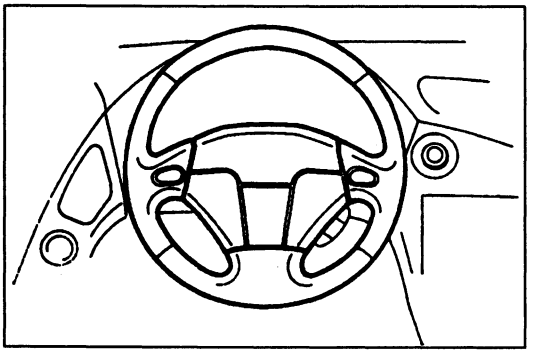
   Play: 0–30 mm {0–1.18 in}

2. If the play exceeds specification, check the steering joints for wear and check the steering gear for excessive backlash. Correct as necessary.



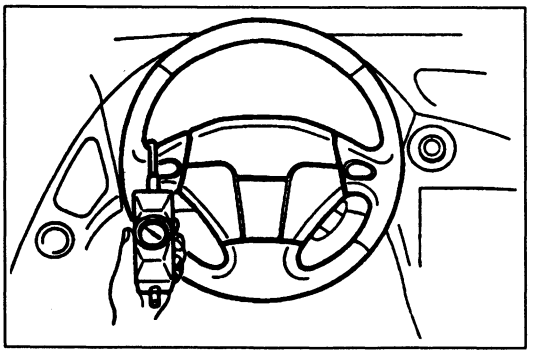
Looseness or play of steering wheel

1. Move the steering wheel in the directions of the arrows to check for column bearing wear, steering shaft joint play, steering wheel looseness, and column looseness.
2. If looseness is noted, inspect for the cause and repair as necessary.



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}**.



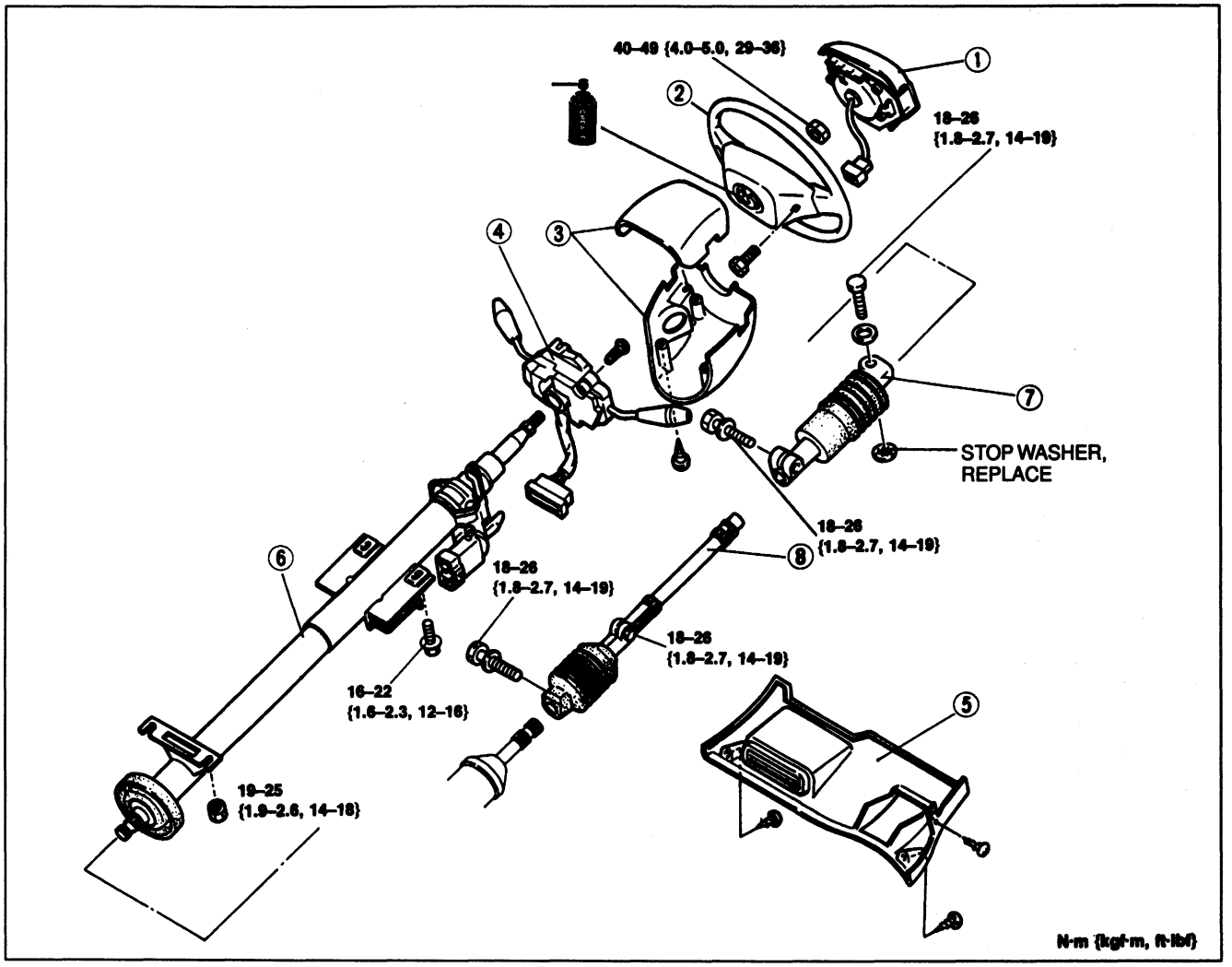
3. With the engine running at idle, attach a pull scale to the outermost point of the steering wheel spoke. Then, starting with the wheels in the straight-ahead position, measure the effort required to turn the steering wheel to the left and to the right.

   Steering wheel effort:
   30–38 N {3.0–3.9 kgf, 6.6–8.5 lbf}
   [during one turn of the steering wheel]

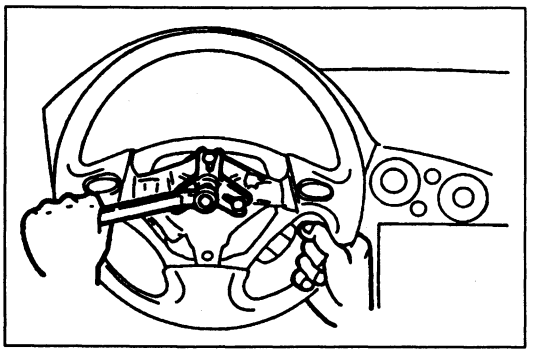
4. If not within specification, check the following: fluid level, air in system, fluid leakage in piping or connections, function of oil pump and gear box, and tire pressures.

Removal / Inspection / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal Note.**
3. Inspect all parts and repair or replace as necessary.
4. Install in the reverse order of removal, referring to **Installation Note.**



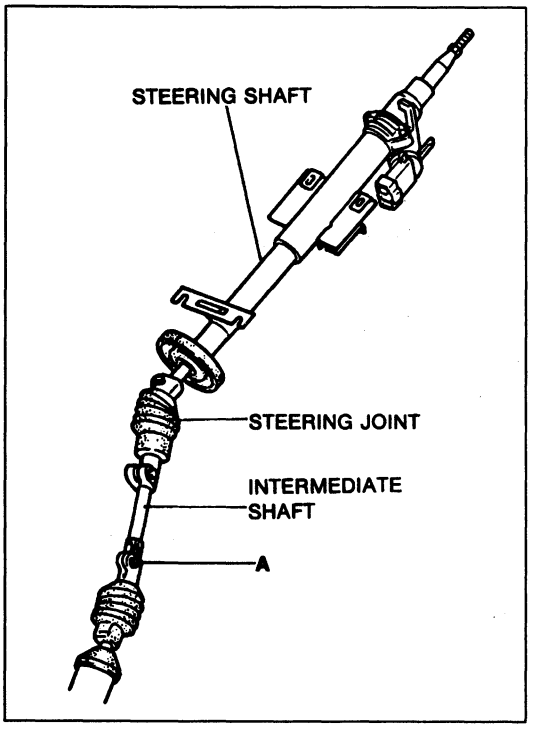
1. Air bag module
   Service ..... 1994 RX-7 Body Electrical Troubleshooting Manual
2. Steering wheel
   Removal Note ..... page N–13
   Installation Note ..... page N–13
3. Column cover
4. Combination switch
   Service ..... 1994 RX-7 Body Electrical Troubleshooting Manual
5. Lower panel
6. Steering shaft assembly
   Installation Note ..... page N–13
   Disassembly / Inspection / Assembly ..... page N–14
   Inspect dust cover for damage
7. Steering joint
   Installation Note ..... page N–13
   Inspect for damage and poor operation
   Inspect boot for cracking and tearing
8. Intermediate shaft
   Installation Note ..... page N–13
   Inspect for damage and bending
   Inspect boot for cracking and tearing



Removal note
Steering wheel

Caution
- **Do not try to remove the steering wheel by hitting the shaft with a hammer. The column will collapse.**

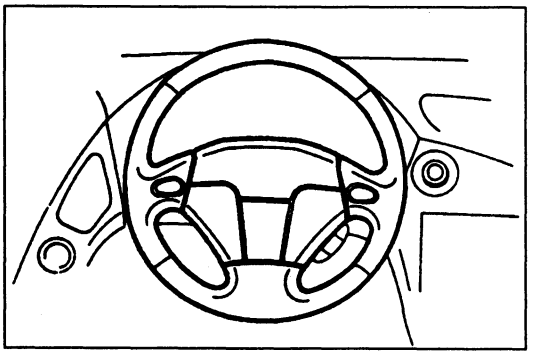
Remove the steering wheel by using a suitable puller.



Intermediate shaft

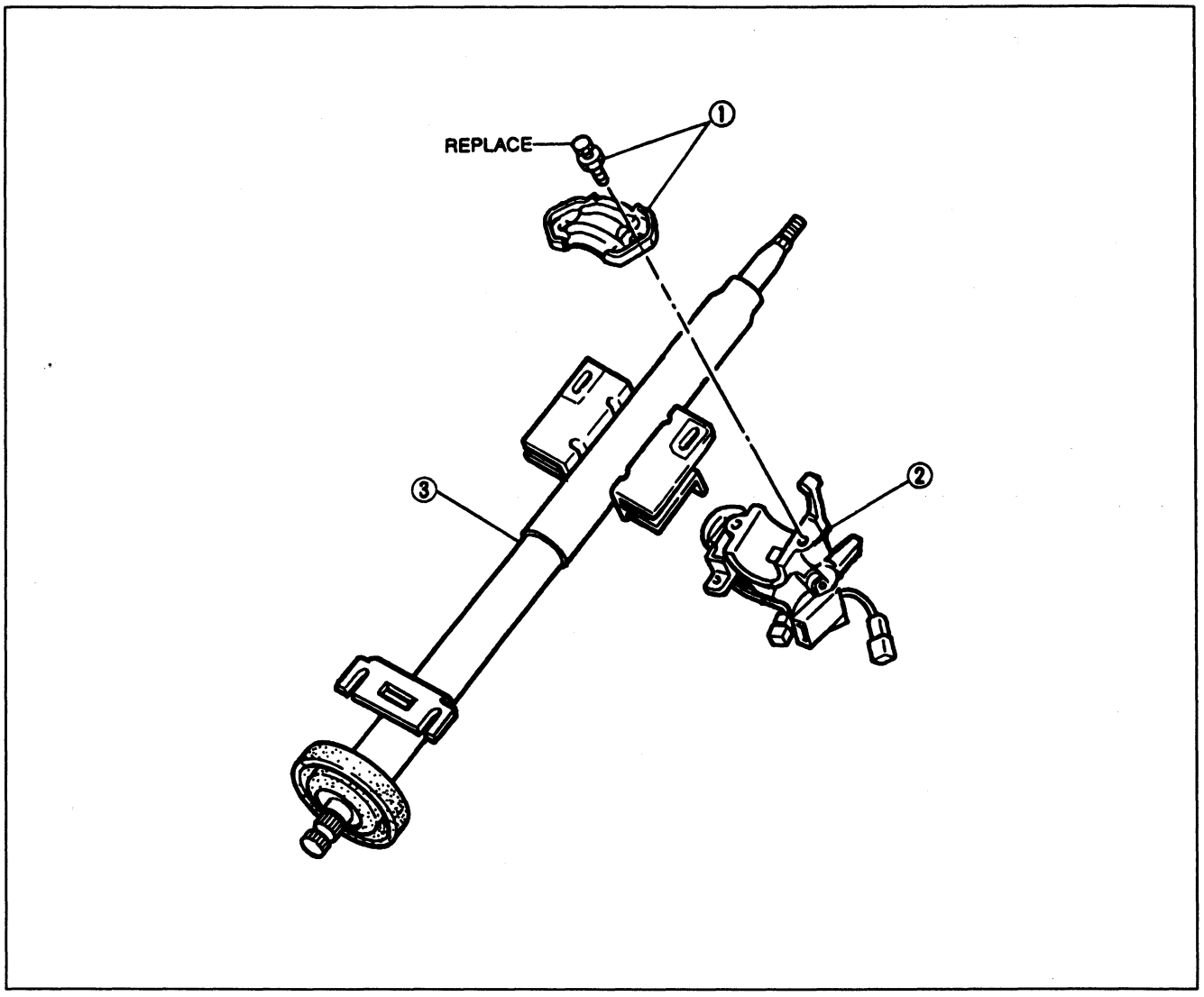
Note
- Bolt A can be loosened but not removed from the intermediate shaft.

Installation note
Steering shaft, steering joint, and intermediate shaft
Assemble the steering shaft, steering joint, and intermediate shaft, then tighten the bolts. Tighten bolt A last.

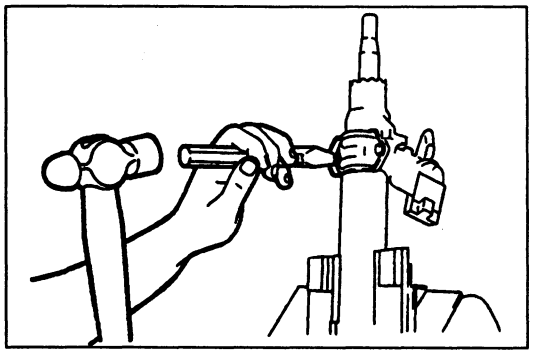


Steering wheel
Install the steering wheel with the wheels in the straight-ahead position.

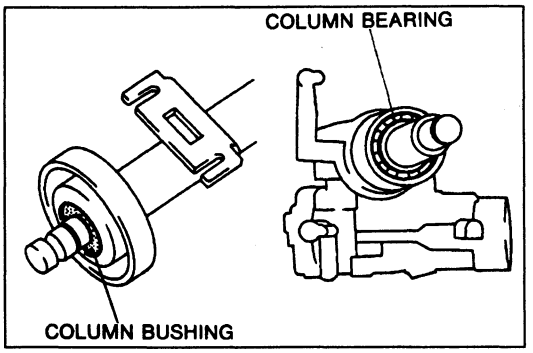
Disassembly / Inspection / Assembly
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assembly in the reverse order of disassembly, referring to **Assembly Note**.



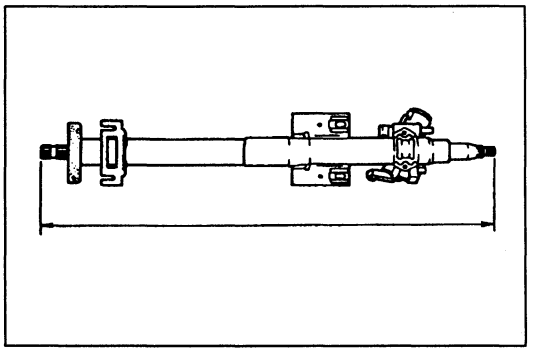
1. Steering lock mounting bolts and bracket
   Disassembly Note ..... below
   Assembly Note ..... page N-15
2. Steering lock assembly
   Inspection ..... page N-15
3. Steering shaft assembly
   Inspection ..... page N-15



Disassembly note
Steering lock mounting bolts and bracket
1. Secure the steering shaft in a vise.
2. Use a chisel to make a groove in the heads of the steering lock mounting bolts.
3. Remove the bolts by using a screwdriver.
4. Remove the steering lock assembly.

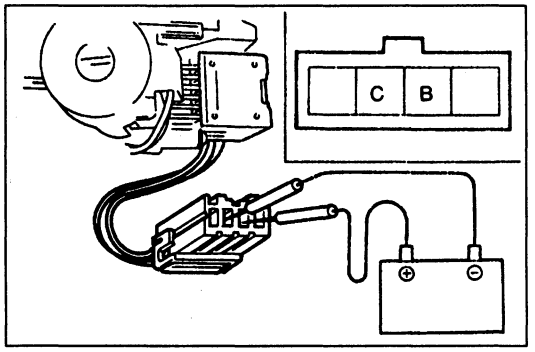


Inspection
Steering shaft assembly
Check for the following and replace the steering shaft assembly if necessary.
1. Column bearing for damage
2. Column bushing for damage

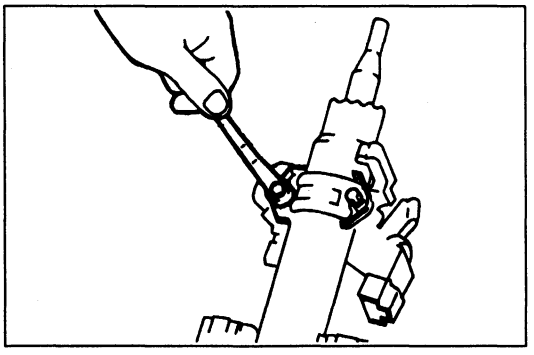


3. Steering shaft length

Length: 779.5–781.5 mm {30.69–30.76 in}



Steering lock assembly
1. Insert the ignition key in the key cylinder. Apply battery positive voltage between terminals B and C.
2. Verify that the solenoid operates.
3. If not as specified replace the key interlock solenoid. (Refer to section K).



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 each bolt until its head breaks off.

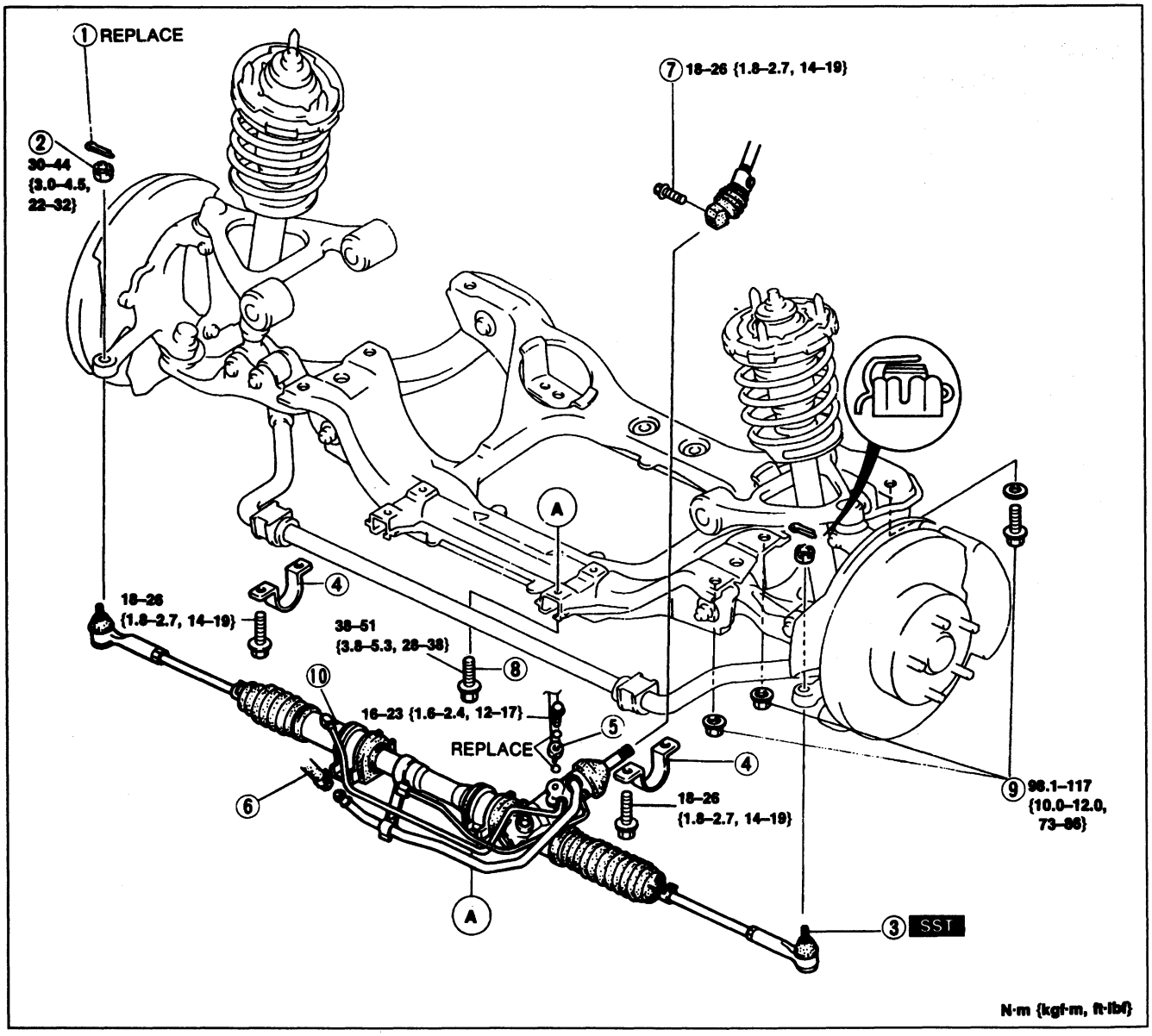
STEERING GEAR AND LINKAGE

Removal / Installation

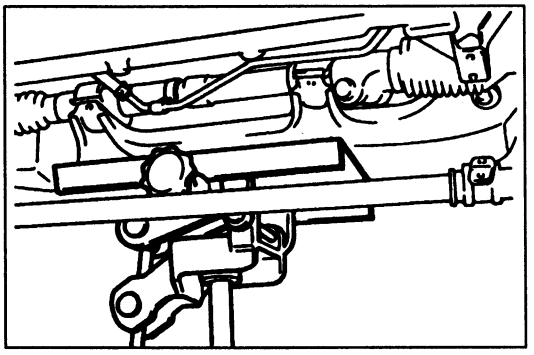
1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the wheels and tires and the undercover.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Install the wheels and tires.

Tightening torque: 89–117 N·m{9.0–12.0 kgf·m,66–86 ft·lbf}

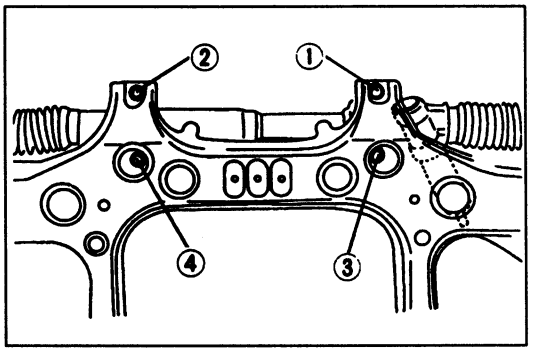
6. Install the undercover.
7. After installation:
   (1) Check for fluid leakage.(Refer to page N–7.)
   (2) Bleed air from the system.(Refer to page N–6.)
   (3) Check, and if necessary adjust, the toe-in and maximum steering angle.



1. Cotter pin
2. Nut
3. Tie rod end ball joint
   Removal Note ..... page N-10
4. Stabilizer bracket
5. Pressure hose
   Installation Note ..... Below
6. Return hose
7. Bolt(steering joint / pinion shaft)
8. Mounting bracket bolts
   Installation Note ..... Below
9. Crossmember nuts and bolts
   Removal Note ..... Below
10. Steering gear and linkage
    Removal Note ..... Below
    Disassembly / Inspection ..... page N-18
    Assembly ..... page N-23

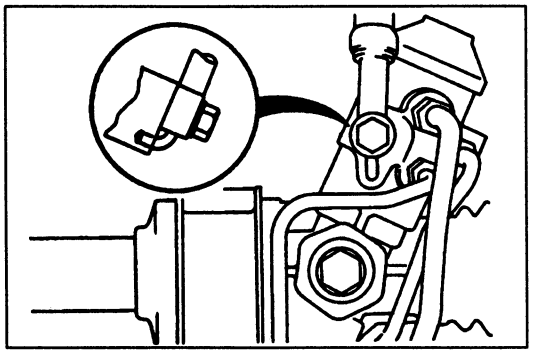


Removal note
Crossmember nuts and bolts, steering gear and linkage
1. Support the crossmember with a jack, and remove the crossmember nuts, and bolts.
2. Slowly lower the crossmember and remove the steering gear and linkage.



Installation note
Mounting bracket bolts
1. Loosely tighten the bolts 3 and 4.
2. Tighten all of the mounting bracket bolts to the specified torque in the order shown.

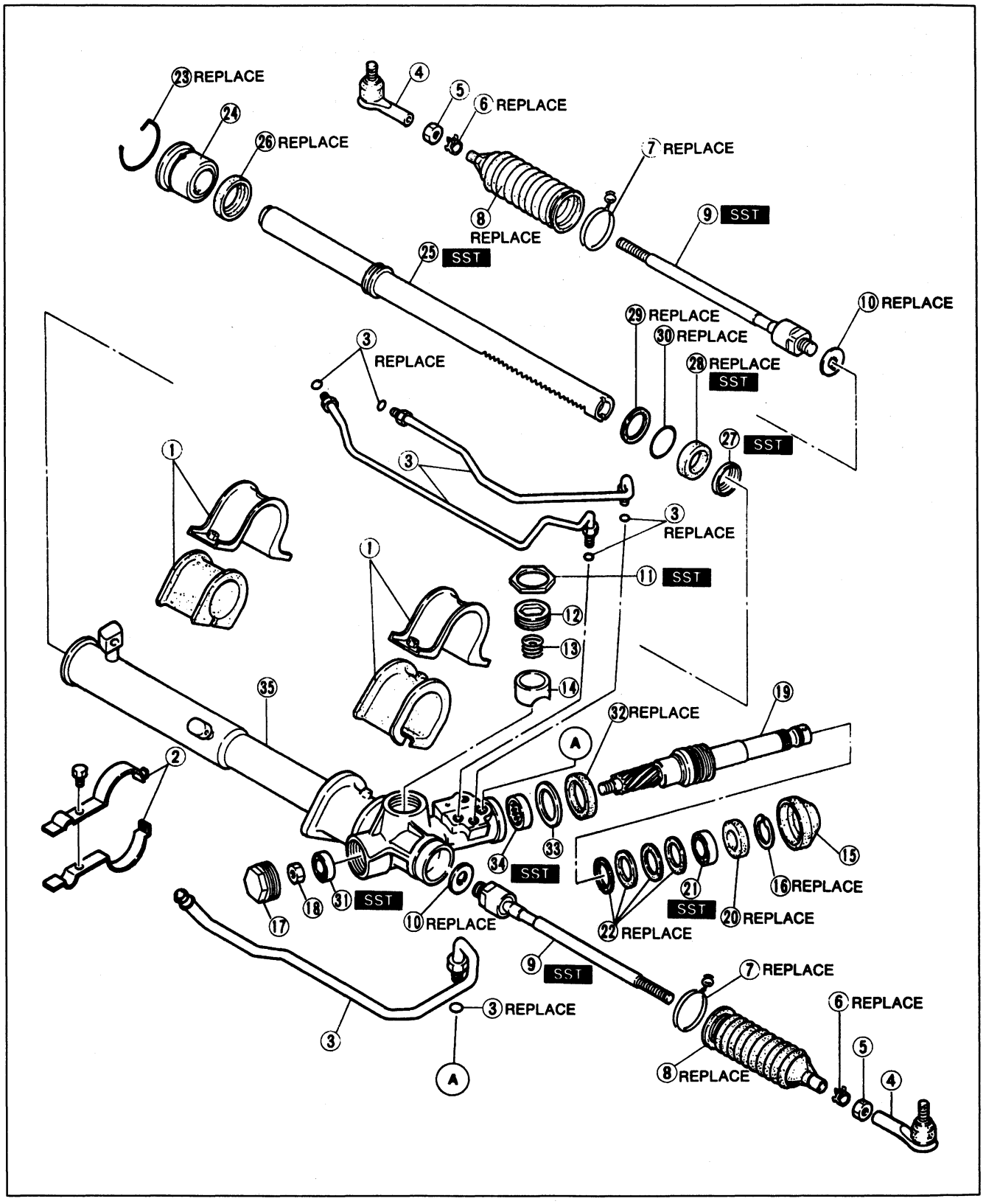
Tightening torque:
38–51 N·m{3.8–5.3 kgf·m,27–38 ft·lbf}



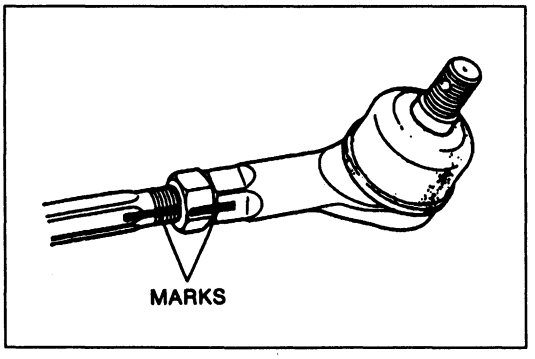
Pressure hose
Before assembly, align the pin with the positioning hole.

Disassembly / Inspection

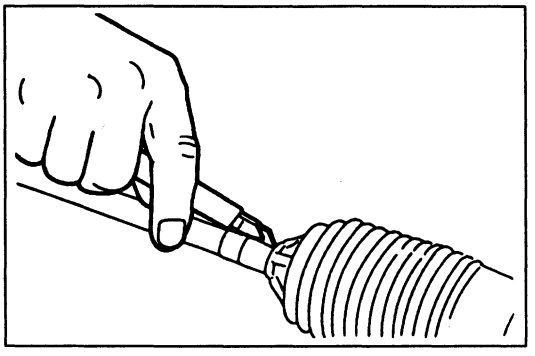
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.



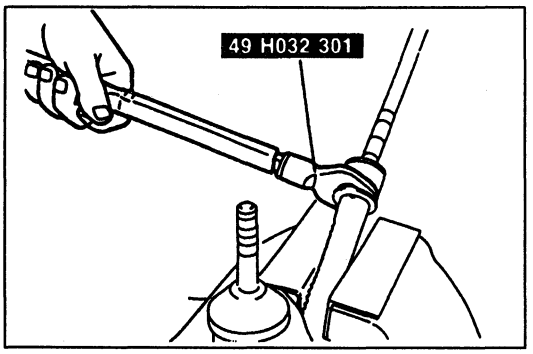
1. Mounting bracket and rubber
2. Pipe clamp
3. Oil pipe and O-ring
   Inspect for clogging and damage
4. Tie rod end
   Inspection ..... page N-22
   Disassembly Note ..... Below
5. Locknut (tie rod end)
6. Boot clamp
7. Boot wire
8. Boot
   Disassembly Note ..... Below
9. Tie rod
   Inspection ..... page N-22
   Disassembly Note ..... page N-20
10. Washer (tie rod)
11. Locknut (adjusting cover)
    Disassembly Note ..... page N-20
12. Adjusting cover
13. Yoke spring
    Inspect for damage
14. Support yoke
    Inspect for damage
15. Dust cover
16. Snap ring
17. Housing cover
18. Locknut (pinion shaft)
19. Pinion shaft assembly
    Inspect teeth for wear and damage
    Inspect valve for clogging, damage and wear
    Disassembly Note ..... page N-20
20. Oil seal
21. Upper bearing
    Inspect for wear and damage
    Disassembly Note ..... page N-20
22. Seal ring
    Disassembly Note ..... page N-20
23. Clip
    Disassembly Note ..... page N-21
24. Rack stop
    Disassembly Note ..... page N-21
25. Rack
    Disassembly Note ..... page N-21
    Inspection ..... page N-22
26. Oil seal
    Disassembly Note ..... page N-21
27. Backup washer
    Disassembly Note ..... page N-21
28. Oil seal
    Disassembly Note ..... page N-21
29. Seal ring
    Disassembly Note ..... page N-21
30. O-ring
    Disassembly Note ..... page N-21
31. Lower bearing
    Disassembly Note ..... page N-21
    Inspect for wear and damage
32. Oil seal
    Disassembly Note ..... page N-21
33. Washer
34. Needle bearing
    Disassembly Note ..... page N-22
    Inspect for wear and damage
35. Gear housing
    Inspect for damage and cracks



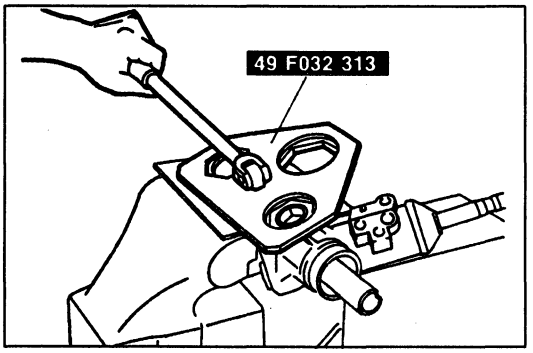
Disassembly note
Tie rod end
Before loosening, mark the tie rod end as shown for reference during installation.



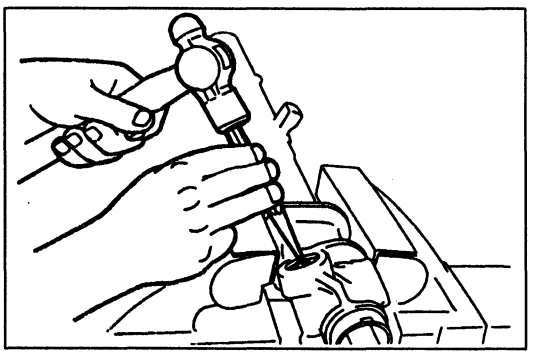
Boot
If the boot is difficult to remove, use a razor knife to cut open the small diameter end.



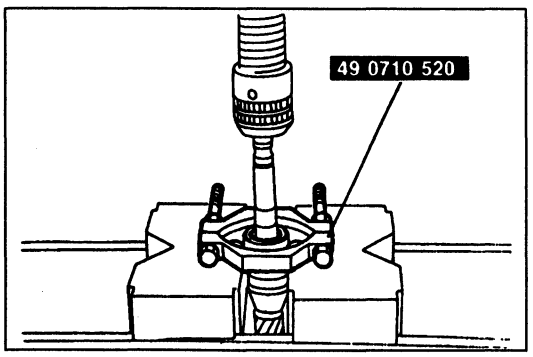
Tie rod
1. Unbend the washer
2. Remove the tie rod by using the **SST**.



Locknut
Remove the locknut by using the **SST**.



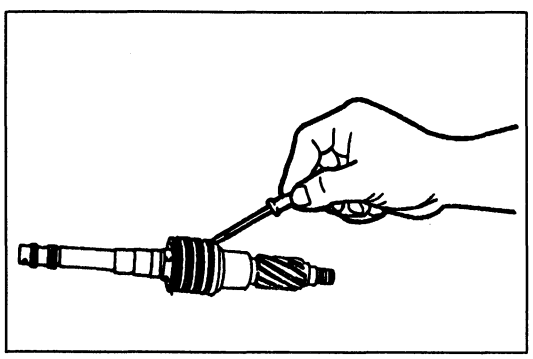
Pinion shaft assembly
Place a punch on the center of the shaft, and tap lightly with a hammer to remove it.



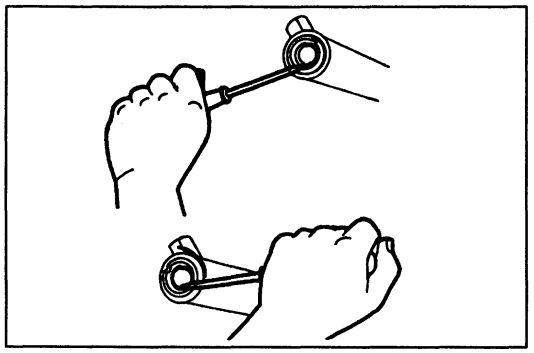
Upper bearing

Note
- The upper bearing does not need to be removed unless you are replacing it.

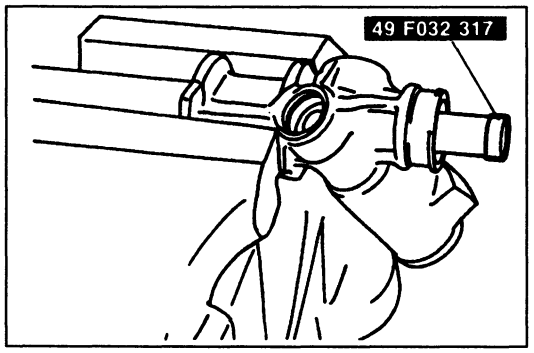
Remove the upper bearing by using the **SST**.



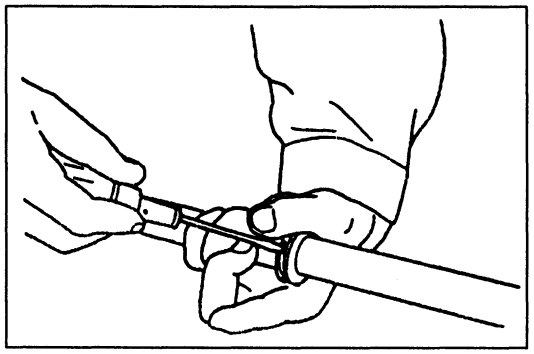
Seal ring
Remove the seal rings by using a small, cloth-wrapped screwdriver.



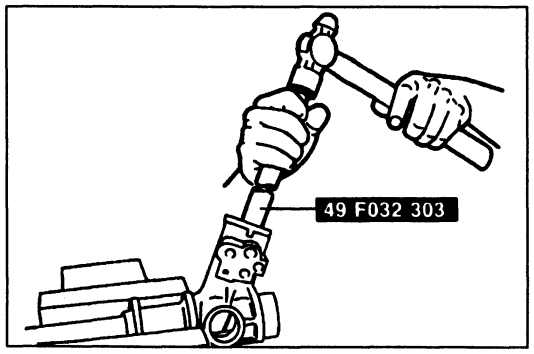
Clip and rack stop
1. Turn the rack stop in the direction that is easiest to turn, until the end of the clip comes out of the hole. Do not force the clip and rack stop when turning.
2. Turn the rack stop the opposite direction and remove the clip.
3. Remove the rack stop.



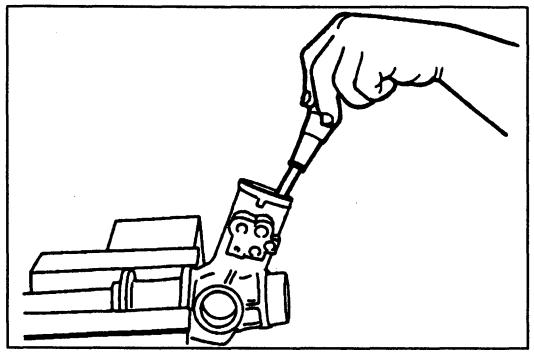
Rack, oil seal and backup washer
1. Set the **SST** into the end of the rack.
2. Pull out the rack assembly, with the oil seal and backup washer.



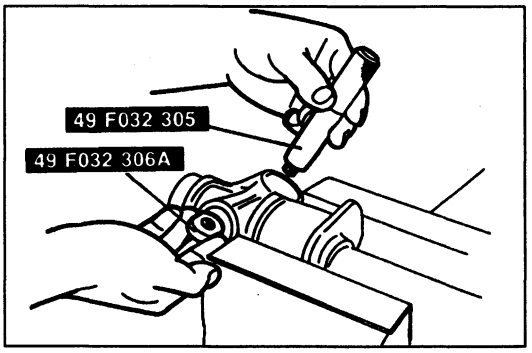
Seal ring and O-ring
1. Remove the seal ring by using a small screwdriver.
2. Remove the O-ring.



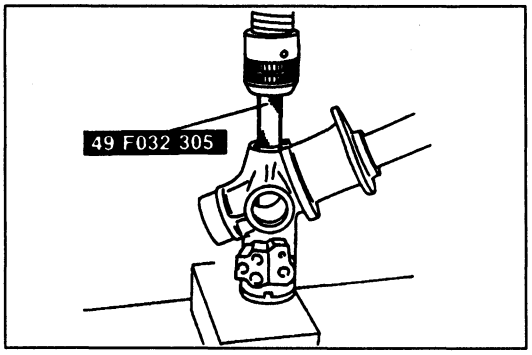
Lower bearing
Drive the lower bearing out of the housing by using the **SST**.



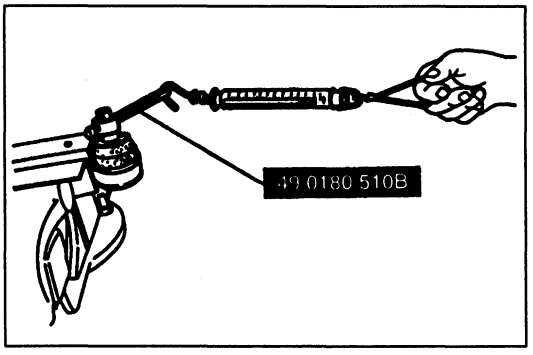
Oil seal
Remove the oil seal, being careful not to scratch the inner surface of the valve housing.



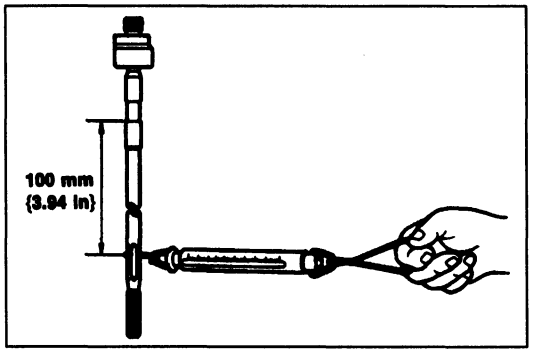
Needle bearing
1. Insert the **SST** (body) through the adjusting cover hole.
2. Set the **SST** (handle) against the **SST** of Step 1.



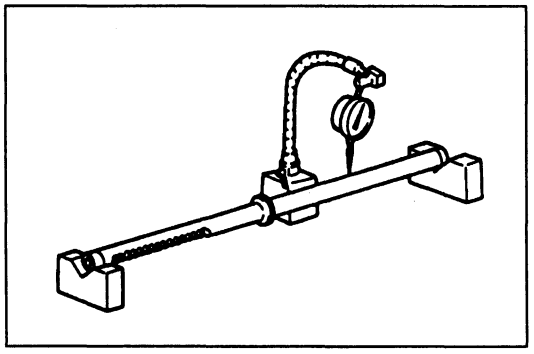
3. Press out the needle bearing by using **SST**.



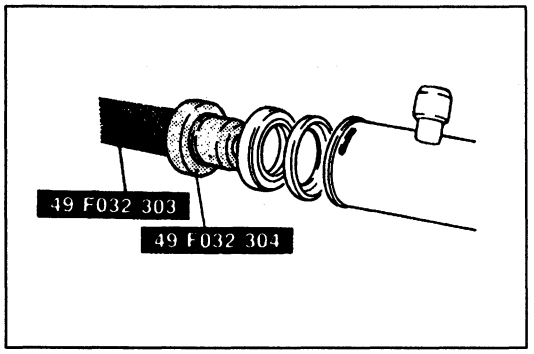
Inspection
Tie rod end
1. Inspect the tie rod end for damage and the boot cracks. Replace as necessary.
2. Inspect the ball joint for looseness. Replace the tie rod end if necessary.
3. Shake and rotate the ball joint several times.
4. Measure the rotation torque of the ball joint by using the **SST** 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 necessary.
3. Swing the tie rod several 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 kgf, 0.16–4.8 lbf}
5. If not within specification, replace the tie rod.



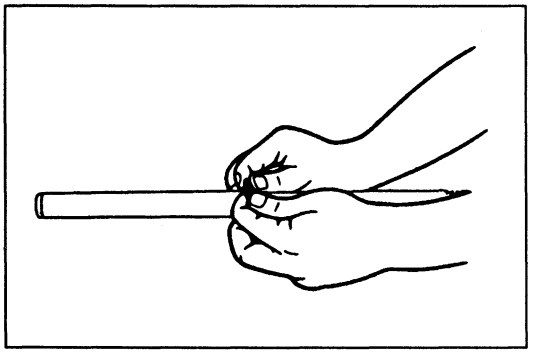
Rack
1. Inspect the rack for cracking, damage and tooth wear. Replace it if necessary.
2. Measure runout of the rack.
   Runout: 0.4 mm {0.016 in} max.
3. If not within specification, replace the rack.



Assembly

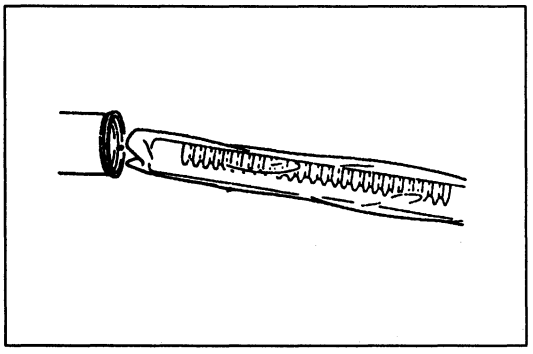
1. Backup washer and oil seal

(1) Apply ATF to the new oil seal.
(2) Install the backup washer and oil seal by using the **SST**.
(3) After installing, shake the gear housing and verify that the backup washer does not rattle.
(4) If it rattles, remove the oil seal and backup washer and reinstall them.

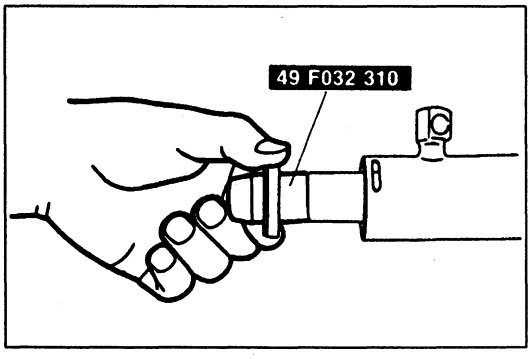


2. Rack

(1) Apply ATF to a new O-ring and seal ring.
(2) Install the O-ring then seal ring in the piston groove.

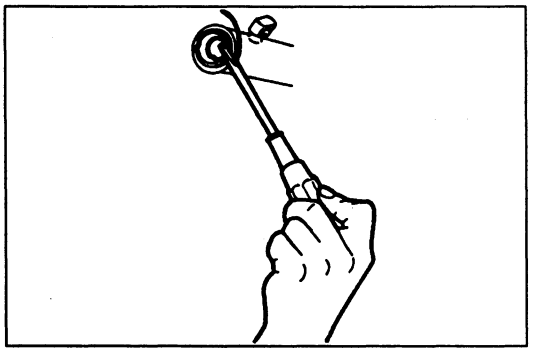


(3) Apply grease to the friction surface and teeth of the rack.
(4) Slide the vinyl sleeve supplied in the seal kit over the rack and slide the rack in from the tube side.
(5) Remove the vinyl sleeve.



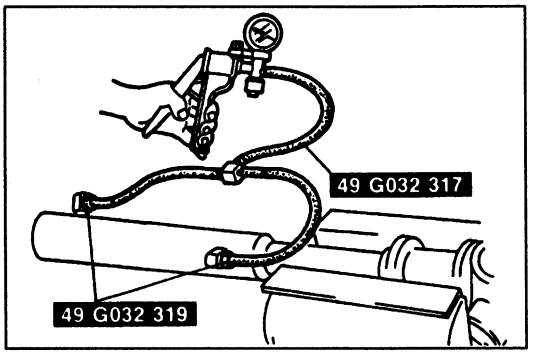
3. Oil seal

(1) Set the **SST** onto the end of the rack.
(2) Apply ATF to the new oil seal and slide it onto the and into the rack housing.

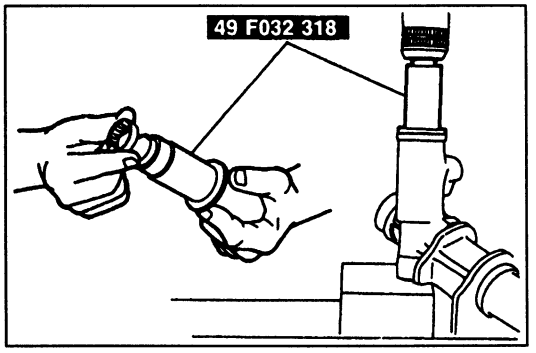


4. Rack stop and clip

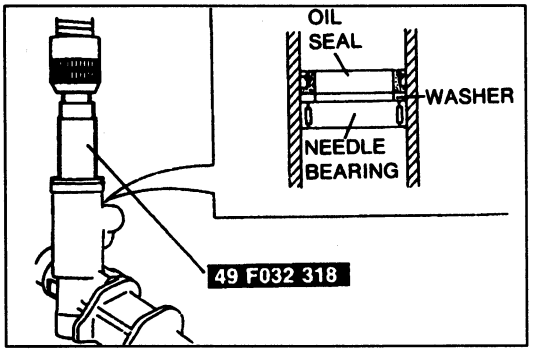
(1) Turn the rack stop into the housing until the holes of the stop and rack housing are aligned.
(2) Install the new clip.
(3) Turn the rack stop until the clip is fully installed (approx. 1.5 turns).



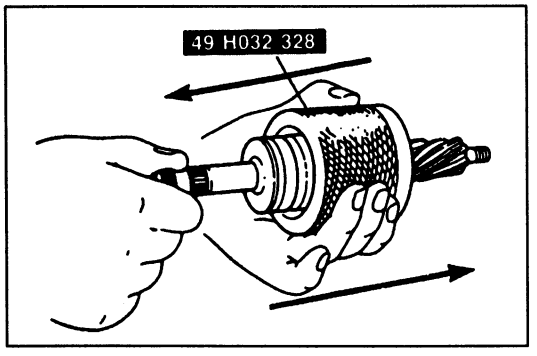
5. Hermetic inspection of cylinder
(1) Connect the **SST** (adapters) to the cylinder housing.
(2) Connect a vacuum pump to the **SST** (hose) and apply **53.3 KPa {400 mmHg}** vacuum.
(3) Verify that vacuum is held for at least **30 seconds**. If not, replace the oil seals.



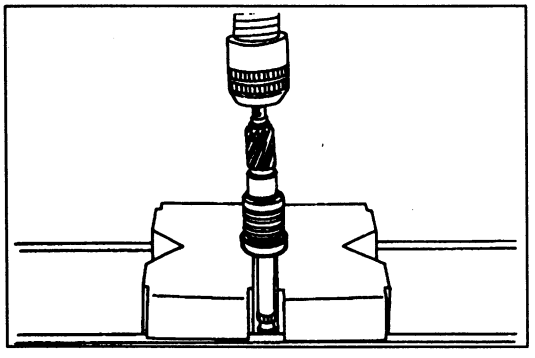
6. Needle bearing
(1) Press in the needle bearing by using the **SST**.
(2) Apply grease to the needle bearing.



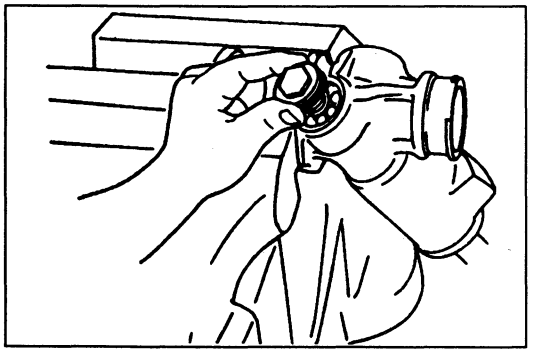
7. Washer and oil seal
(1) Install the washer
(2) Apply ATF to the new oil seal.
(3) Press in the oil seal by using the **SST**.



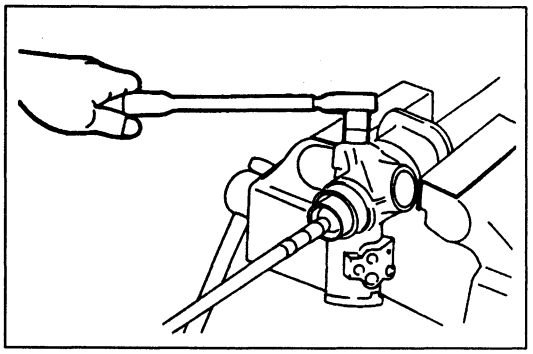
8. Seal ring
(1) Apply ATF to the new seal rings.
(2) Install the seal rings onto the pinion shaft assembly.
(3) Pass the pinion shaft assembly back and forth through the **SST** to form the seal rings.



9. Upper bearing
Press the upper bearing onto the pinion shaft assembly.



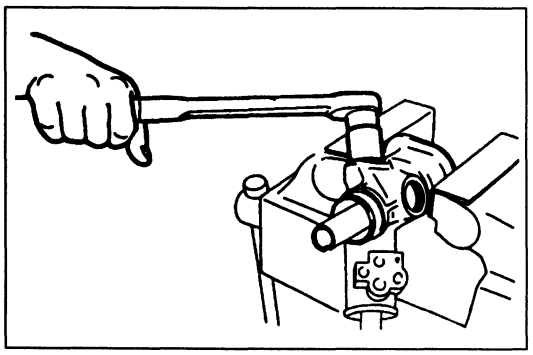
10. Pinion shaft assembly and lower bearing
(1) Apply grease to the teeth of the rack.
(2) Insert the pinion shaft assembly into the gear housing.
(3) Apply grease to the lower bearing and install it onto the pinion shaft.
(4) Seat the bearing by installing the housing cover and gradually tightening it until the tightening force suddenly increases.



(5) Remove the housing cover.

11. Locknut (pinion shaft)
(1) Temporally install the tie rod to hold the rack.
(2) Tighten the pinion shaft locknut.

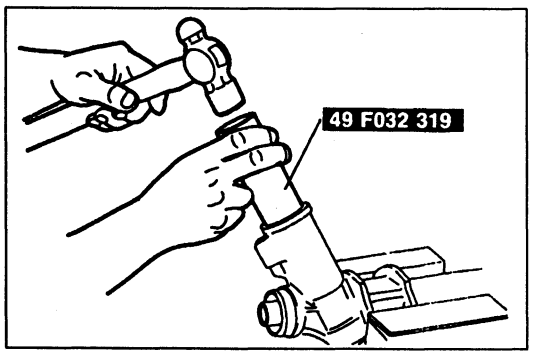
Tightening torque:
29–29 N·m {2.0–3.0 kgf·m, 15–21 ft·lbf}



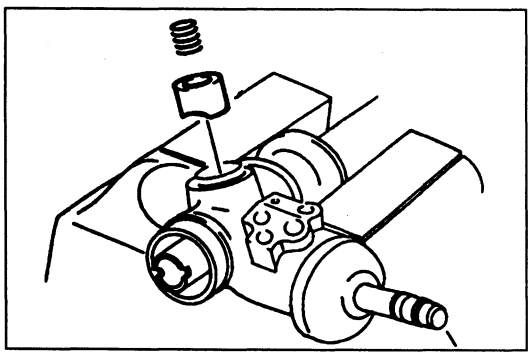
12. Housing cover
(1) Apply a thin coat of sealant to the threads of the housing cover.
(2) Install the housing cover.

Tightening torque:
59–69 N·m {5.9–7.0 kgf·m, 36–50 ft·lbf}

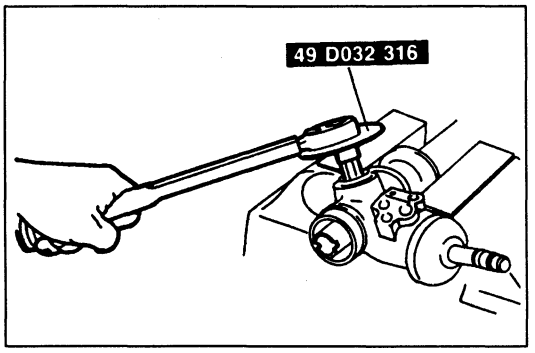
(3) Stake the housing cover at two points by using a center punch.



13. Oil seal (upper pinion shaft)
(1) Install the new oil seal by using the **SST**.
(2) Install the new snap ring.
(3) Install the dust cover.



14. Support yoke assembly
(1) Apply grease to the friction surface of the support yoke.
(2) Install the support yoke and the yoke spring.

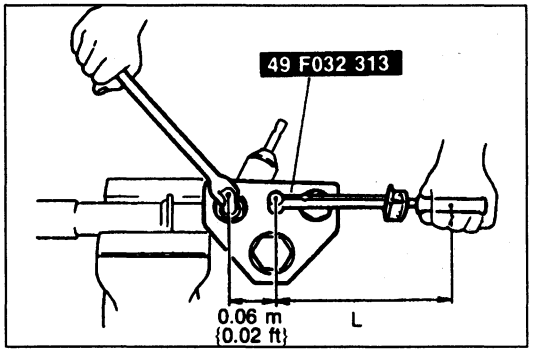


15. Adjusting cover and locknut

(1) Apply sealant to the threads of the adjusting cover.
(2) Using the **SST** as shown in the figure, tighten the adjusting cover to **9.81 N·m{100 kgf·cm,86.8 in·lbf}** and return the adjusting cover **20°–25°**.
(3) Modify the locknut tightening torque to allow for use of a to wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
(4) Using the **SST** as shown in the figure, hold the adjusting cover in a fixed position and tighten the locknut.
(L = torque wrench length)

N·m	N·m × L m ÷ (L m + 0.06)
kgf·m	kgf·m × L m ÷ (L m + 0.06)
ft·lbf	ft·lbf × L ft ÷ (L ft + 0.02)

Tightening torque:
50–68 N·m{5.0–7.0 kgf·m,37–50 ft·lbf}

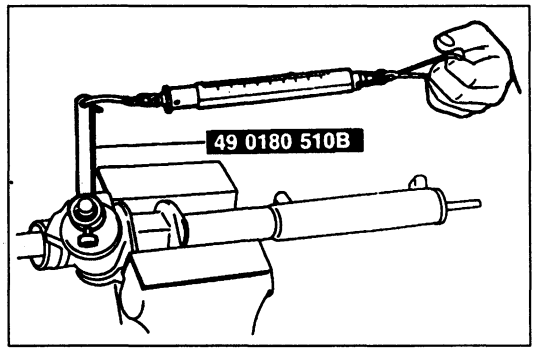


16. Measurement of pinion preload

(1) Attach the **SST** and a pull scale to the pinion shaft.
(2) Measure the pinion preload. (Center of rack ±90 degrees)

Pinion preload: 1.5 N·m{15 kgf·cm,13 in·lbf}max.
Pull scale reading: 14.7 N·m{15 kg, 3.3 lbf}max.

(3) If not within specification, repeat Steps 15 (2) and 15 (3).

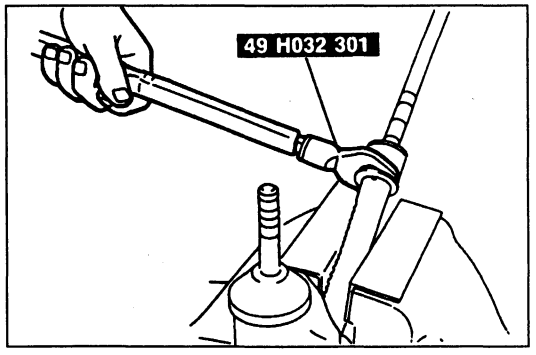


17. Tie rod

(1) Install the tie rod by using **SST**.

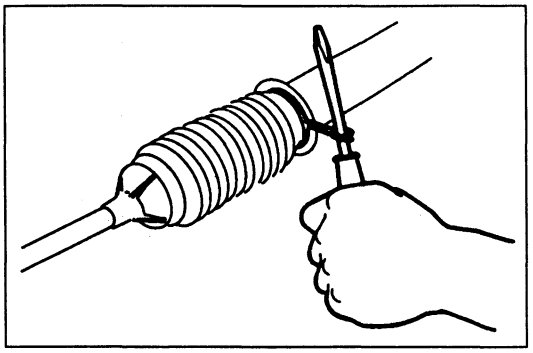
Tightening torque:
78–98 N·m{8.0–10.0 kgf·m,58–72 ft·lbf}

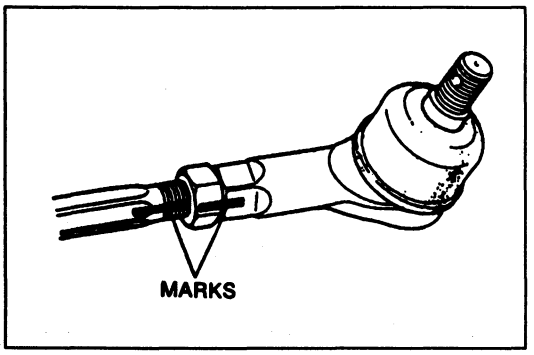
(2) Bend the new washer at two places to hold the tie rod.



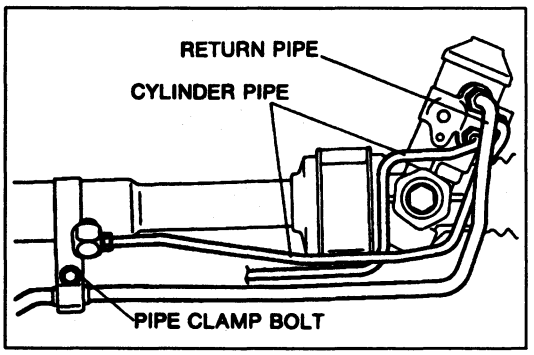
18. Boot

(1) Apply grease to the inner bore of the small end of the boot.
(2) Install the boot. Wrap a new boot wire around the large end of the boot two times and then twist it 4–4.5 times. Bend the twisted part toward mounting bracket.
(3) Install a new boot clamp on the small end of the boot.
(4) Slide the rack its full stroke and verify that the boot is not twisted.





19. Tie rod end
Install the tie rod end and align the reference marks.



20. Oil pipe and O-ring
(1) Install the new O-rings and the oil pipes.
(2) Install the pipe clamp.

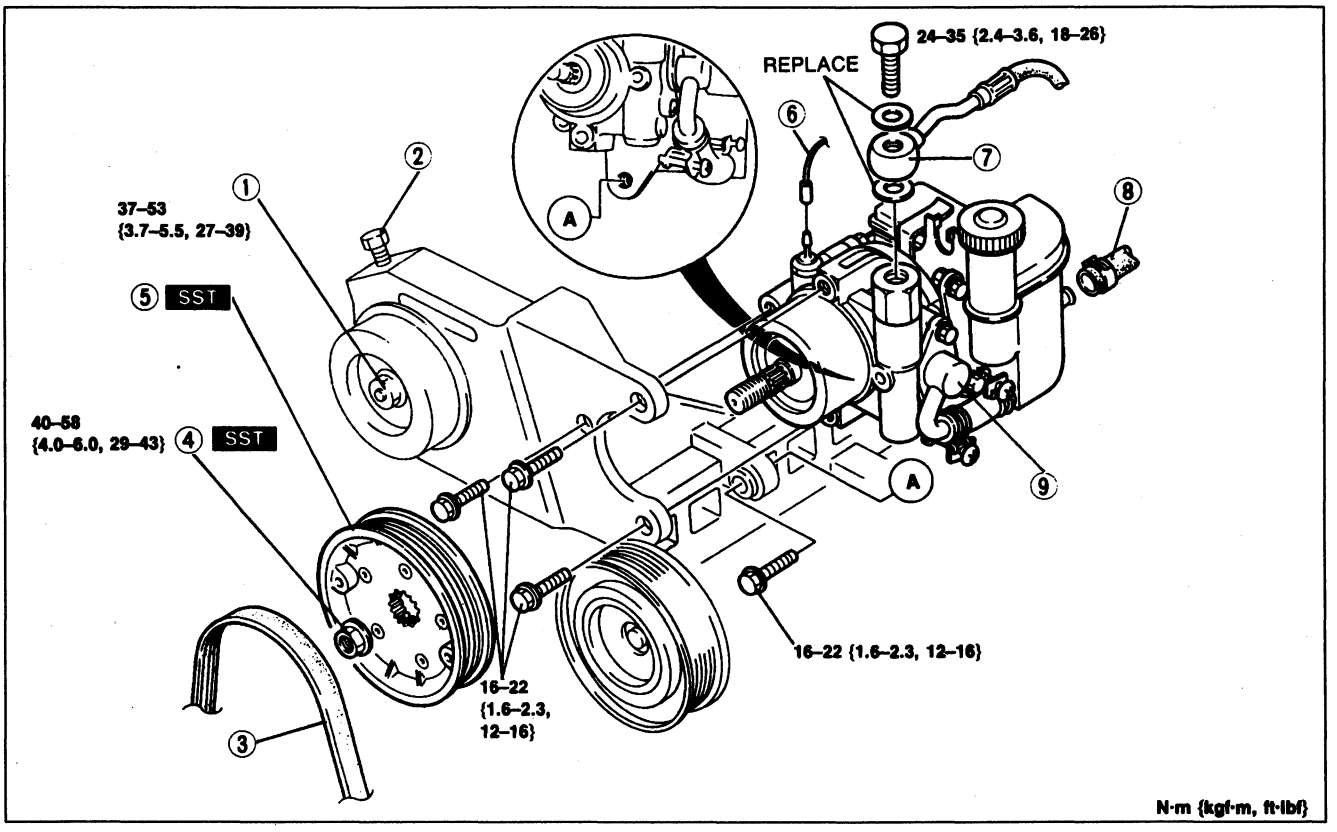
Tightening torque
Return pipe: 24–29 N·m
{2.4–3.0 kgf·m,17–22 ft·lbf}
Cylinder pipe: 9.81–15.6 N·m
{100–160 kgf·cm,86.9–138 in·lbf}
Pipe clamp bolt: 5.0–6.8 N·m
{50–70 kgf·cm,44–60 in·lbf}

21. Mounting rubber and bracket
Install the mounting rubber and bracket

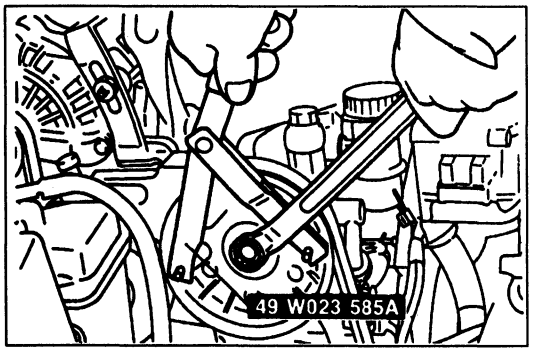
POWER STEERING OIL PUMP

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. After installation:
   (1) Adjust the belt deflection. (Refer to page N-31.)
   (2) Check connections for fluid leakage. (Refer to page N-7.)
   (3) Bleed air from the system. (Refer to page N-6.)



1. Locknut
2. Adjusting bolt
3. Drive belt
4. Nut
   Removal / Installation Note ..... below
5. Pulley
   Removal / Installation Note ..... below
6. Steering pressure sensor connector
7. Pressure hose
8. Return hose
9. Power steering oil pump
   Disassembly / Inspection / Assembly ..... page N-29



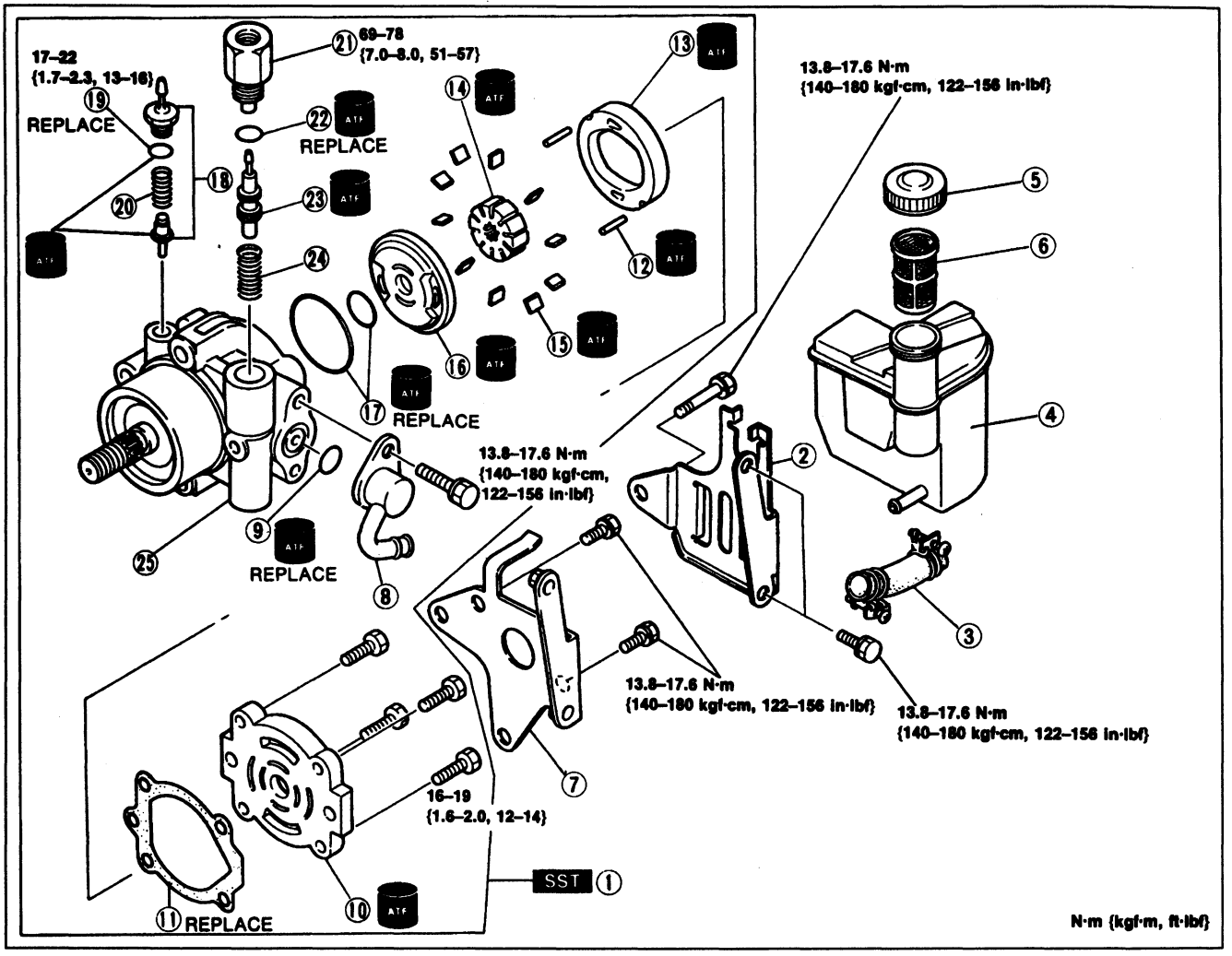
Removal / Installation note

Nut / Pulley

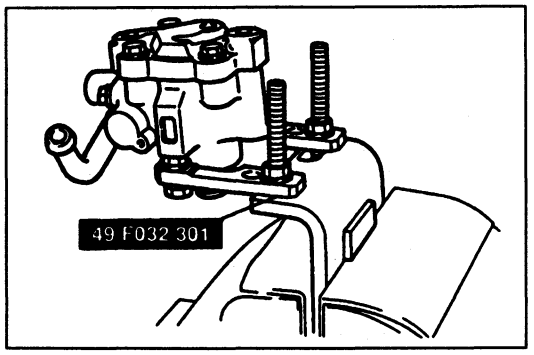
Hold the pulley by using the **SST** and loosen / tighten the nut.

Disassembly / Inspection / Assembly

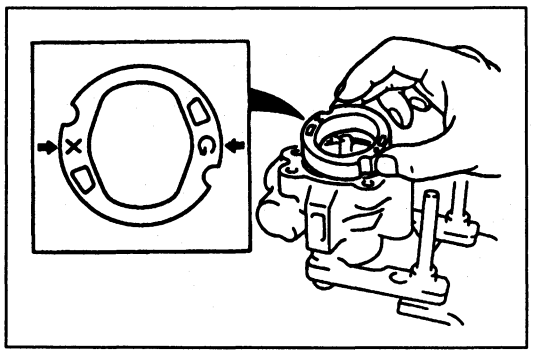
1. The following procedure is for replacement of the O-rings only. Replace the oil pump assembly if other repairs are necessary.
2. Disassemble in the order shown in the figure, referring to **Disassembly Note.**
3. Assemble in the reverse order of disassembly, referring to **Assembly Note.**



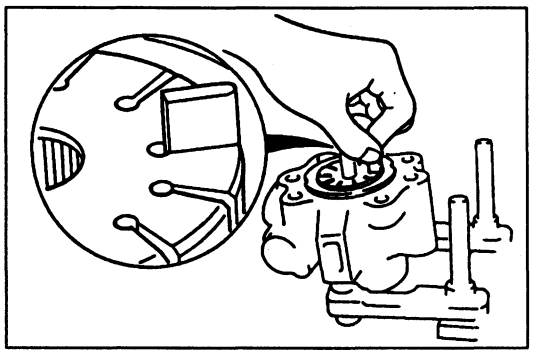
1. Oil pump
   Disassembly Note ..... page N–30
2. Bracket
3. Suction hose
   Inspect for cracks and damage
4. Reservoir
   Inspect for cracks and damage
5. Cap
6. Filter
   Inspect for clogging
7. Bracket
8. Suction pipe
9. O-ring
10. Pump body (rear)
    Assembly Note ..... page N–30
    Inspect for cracks, wear, and damage
11. Gasket
12. Pin
13. Cam ring
    Assembly Note ..... page N–30
    Inspect for wear and damage
14. Rotor
    Inspect for wear and damage
15. Blade
    Assembly Note ..... page N–30
    Inspect for wear and damage
16. Side plate
    Inspect for wear and damage
17. O-ring
18. Steering pressure sensor assembly
19. O-ring
20. Spring
    Inspect for weakness
21. Connector
22. O-ring
23. Control valve
    Inspect for clogging, cracks, and damage
24. Spring
    Inspect for weakness
25. Pump body (front)
    Inspect for cracks, wear, and damage



Disassembly note
Oil pump
Install the pump to the **SST**, and hold the pump and **SST** in a vise.

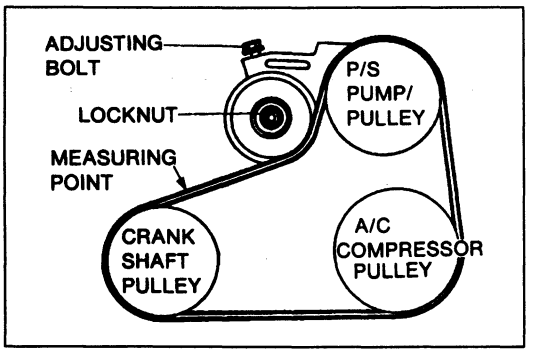


Assembly note
Cam ring
Install the cam ring in the front pump body with the marks facing upward.



Blade
Place the blades in the rotor so that the rounded edges contact the cam.

Pump body (rear)
After installing the rear pump body, 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 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.

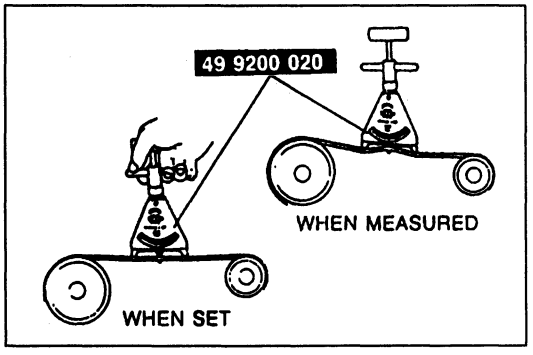
Deflection

mm{in}

New	Used	Limit
3.5–4 {0.14–0.15}*	4.5–5 {0.18–0.19}	6 {0.23}

* A belt that has been on a running engine for less than 5 minutes

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



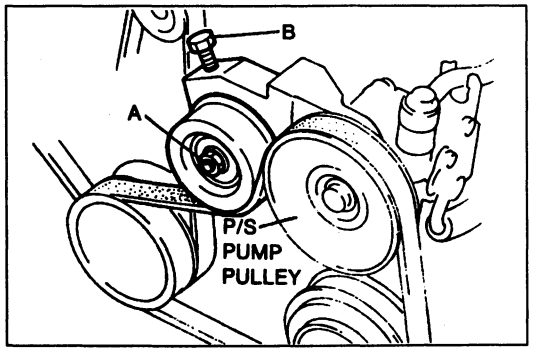
Drive belt tension check

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
740–880 {75–90, 165–198}	540–630 {55–65, 121–143}	320 {33, 73}



Adjustment

1. Loosen idler pulley locknut A, and adjust the belt deflection or tension by turning adjusting bolt B.
2. Tighten locknut A.

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

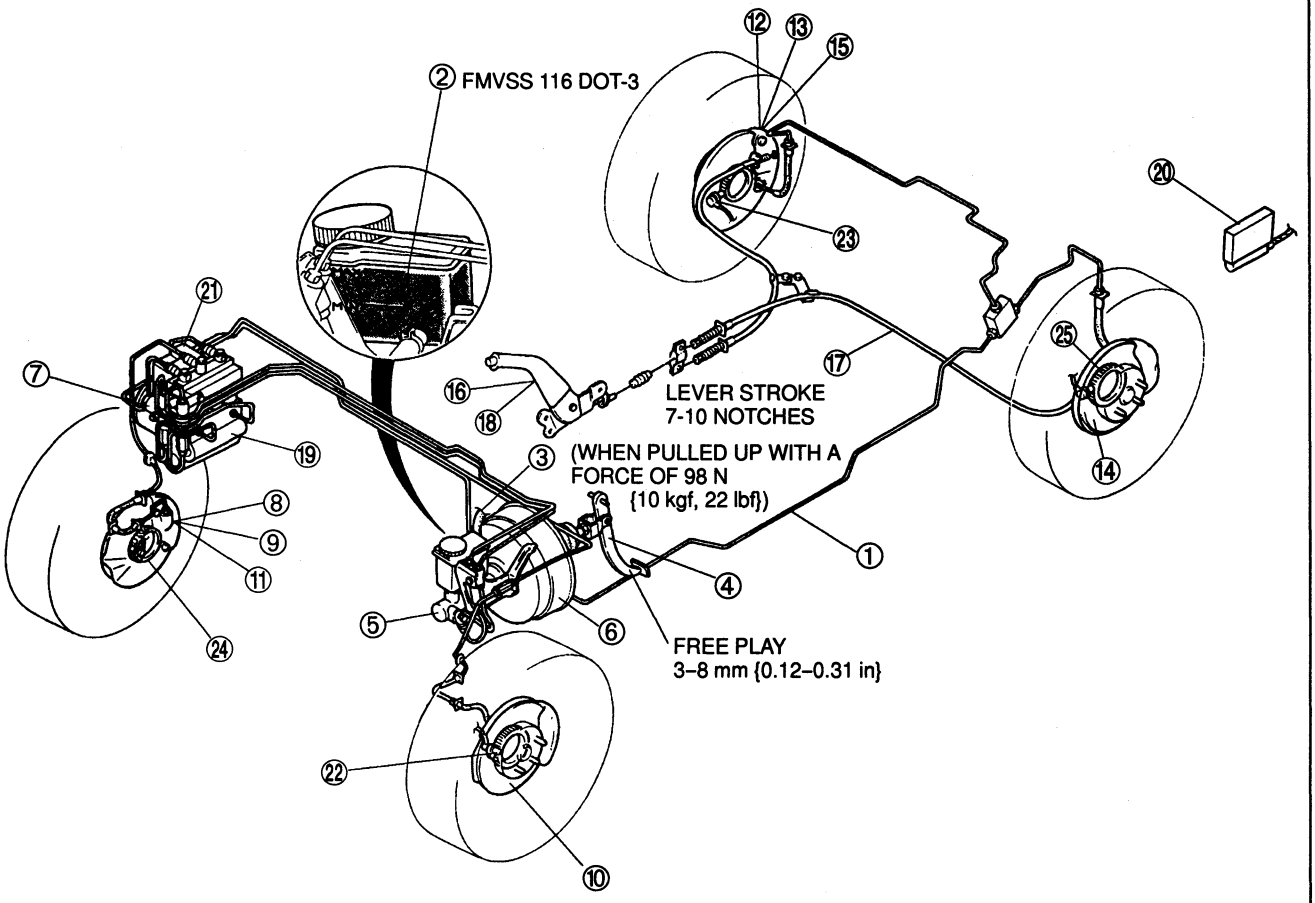
Replacement

1. Loosen locknut A and adjusting bolt B.
2. Remove and replace the drive belt.
3. Adjust the deflection or tension.(Refer to above.)

Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

BRAKING SYSTEM

INDEX


② FMVSS 116 DOT-3
⑫ ⑬ ⑮
⑳
㉓
㉑
⑦
⑯ ⑱
LEVER STROKE
7-10 NOTCHES
⑰
㉕
⑲
③ (WHEN PULLED UP WITH A FORCE OF 98 N {10 kgf, 22 lbf})
⑭
⑧
⑨
⑪
①
④
⑤
⑥
FREE PLAY
3–8 mm {0.12–0.31 in}
㉔
㉒
⑩

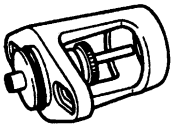
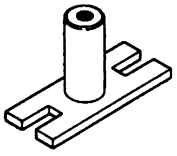
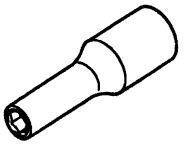
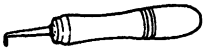
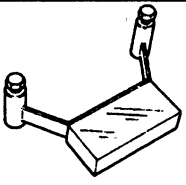
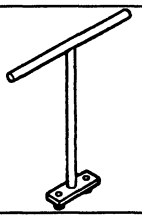
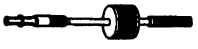
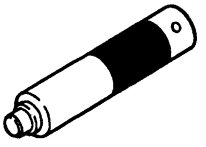
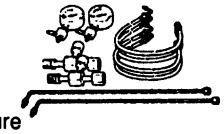
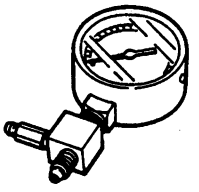
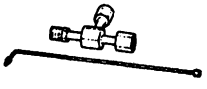
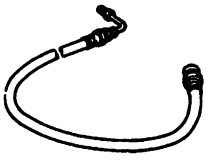
OUTLINE

SPECIFICATIONS

Item			Specifications
Brake pedal			
Type			Suspended
Lever ratio			4.1 : 1
Maximum stroke	mm {in}		135 {5.31}
Master cylinder			
Type			Tandem (with level sensor)
			Portless, recessed type
Bore	mm {in}		23.8 {0.94}
Front brake			
Type			Disc (ventilated)
Cylinder bore	mm {in}		36.1 {1.42}
Pad dimension (area × thickness)	mm^2 × mm {in^2 × in)	Outer	4,500 × 10.3 {6.97 × 0.41}
		Inner	4,500 × 9.3 {6.97 × 0.37}
Disc plate dimension (outer diameter × thickness)	mm × mm {in × in}		294.0 × 22.0 {11.57 × 0.87}
Rear brake			
Type			Disc (ventilated)
Cylinder bore	mm {in}		34.9 {1.37}
Pad dimension (area × thickness)	mm^2 × mm {in^2 × in)		3,210 × 8.0 {4.98 × 0.31}
Disc plate dimension (outer diameter × thickness)	mm × mm {in × in}		294.0 × 20.0 {11.57 × 0.79}
Power brake unit			
Type			Vacuum multiplier
Size	mm {in}		209.5 + 215.2 {8 + 8}
Rear wheel hydraulic control system			
Type			Proportioning bypass valve
Switching point (master cylinder pressure)	kPa {kgf/cm^2, psi}		3,920 {40.0, 570}
Parking brake			
Type			Mechanical two-rear-wheel control
Operation system			Hand lever
Brake fluid			
Type			FMVSS 116 DOT-3

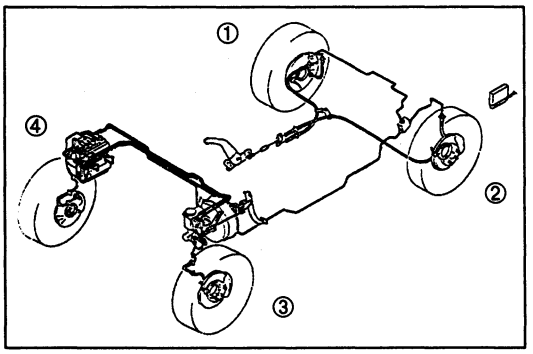
CONVENTIONAL BRAKE SYSTEM

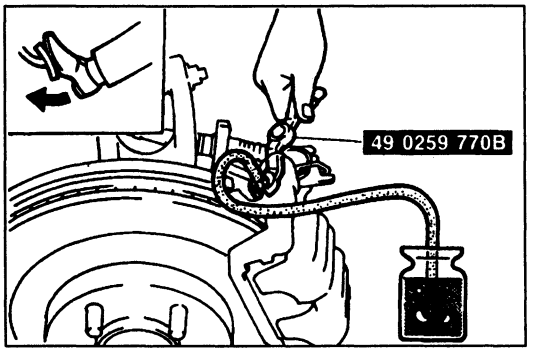
PREPARATION
SST

49 0259 770B Wrench, flare nut 	For removal / installation of brake pipe	49 B043 001 Gauge, adjustment 	For adjustment of push rod clearance
49 B043 003 lock tool, turning 	For adjustment of push rod clearance	49 B043 004 Wrench, socket 	For adjustment of push rod clearance
49 0208 701A Air-out tool, boot 	For removal of piston seal	49 0221 600C Expansion tool, disc brake 	For installation of disc pads
49 F033 001 Stopper, disc brake piston 	For removal of disc brake piston	49 FA18 602 Wrench, disc brake piston 	For removal of disc brake piston
49 1285 071 Puller, bearing 	For removal of bearing	49 B043 002 Installer, bearing 	For installation of bearing
49 U043 0A0 Gauge set, oil pressure 	For measurement of fluid pressure	49 U043 004 Gauge, oil pressure (Part of 49 U043 0A0) 	For measurement of fluid pressure
49 U043 005 Joint (Part of 49 U043 0A0) 	For measurement of fluid pressure	49 U043 006 Hose (Part of 49 U043 0A0) 	For measurement of 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	Replace	P-24, 29
	Brake fluid, grease, oil, or water on disc pad	Clean or replace	P-24, 29
	Hardening of disc pad surface, or poor contact	Grind or replace	P-24, 29
	Malfunction of caliper piston	Replace	P-26, 31
	Malfunction of master cylinder	Repair or replace	P-11, 15
	Malfunction of power brake unit	Replace	P-18
	Malfunction of check valve (vacuum hose)	Replace	P-8
	Damaged vacuum hose	Replace	P-8
	Deterioration of flexible hose	Replace	P-7
	Malfunction of proportioning bypass valve (PBV)	Replace	P-20
Brakes pull to one side	Worn disc pad	Replace	P-24, 29
	Brake fluid, grease, oil, or water on disc pad	Clean or replace	P-24, 29
	Hardening of disc pad surface, or poor contact	Grind or replace	P-24, 29
	Abnormal wear, distortion, or runout of disc plate	Repair or replace	P-24, 30
	Malfunction of automatic adjuster	Repair or replace	P-26, 31
	Loose or damaged dust cover mounting bolt	Tighten or replace	Section M
	Malfunction of caliper piston	Replace	P-26, 31
	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-9
	Improper adjustment of push rod clearance	Adjust	P-11
	Clogged master cylinder return port	Clean	—
	Brake pad not returning properly	Repair	—
	Improper return or malfunction of caliper piston	Repair or Replace	P-26, 31
	Excessive runout of disc plate	Replace	P-24, 30
	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, 8
	Improper adjustment of pedal play	Adjust	P-9
	Worn disc pad	Replace	P-24, 29
Abnormal noise or vibration during braking	Worn disc pad	Replace	P-24, 29
	Damaged pad	Grind or replace	P-24, 29
	Brakes do not release	Repair	—
	Foreign material or scratches on disc plate contact surface	Clean	—
	Loose caliper mounting bolt	Tighten	P-22, 28
	Damaged disc plate contact surface	Replace	P-22, 28
	Poor contact of pad	Repair or replace	P-24, 29
	Insufficient grease on sliding parts	Apply grease	—





AIR BLEEDING

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 anywhere 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. On level ground, jack up the vehicle and support it evenly on safety stands.

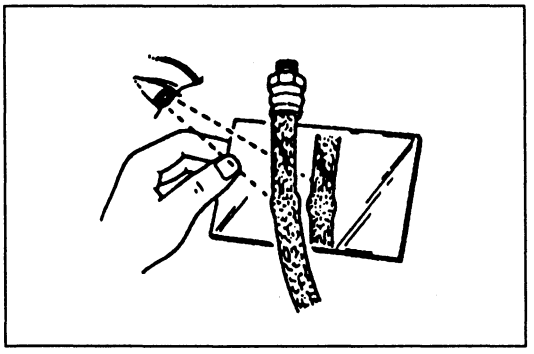
Caution

- **Brake fluid will damage painted surfaces. If brake fluid does get on a painted surface, wipe it off immediately.**

2. Remove the bleeder cap and attach a vinyl tube to the bleeder screw.
3. Place the other end of the vinyl tube in a clear, fluid-filled container.
4. Have a helper depress the brake pedal several times, and then hold it in the depressed position.
5. Loosen the bleeder screw, drain out the fluid, and close the screw by using the **SST**.
6. Repeat steps 4 and 5 until no air bubbles are seen.
7. Modify the bleeder screw tightening torque to allow for use of 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. Perform the above steps for the remaining wheels.
10. Check for correct brake operation.
11. Check that there is no fluid leakage. Wipe off any spilled fluid immediately.
12. After bleeding the brakes, add brake fluid to MAX.

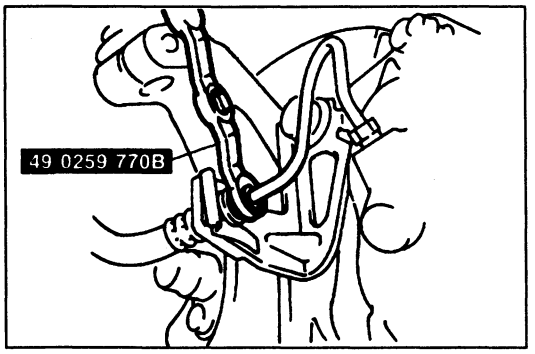


BRAKE LINE

Inspection

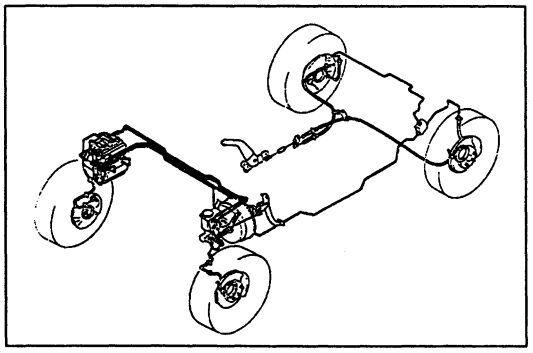
Check for the following and repair or replace parts as necessary.

1. Cracks, damage, and corrosion of brake lines
2. Damage to brake hose threads
3. Scars, cracks, and swelling of flexible hoses
4. Fluid leakage from brake lines



Removal / Installation

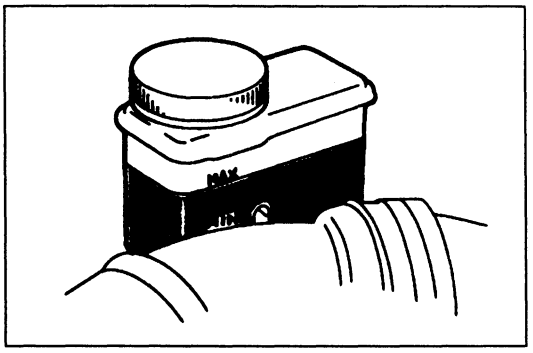
1. When disconnecting the flexible hose and brake line, loosen the nut by using the **SST**, then remove the holding clip.
2. When connecting the flexible hose, do not overtighten or twist it.
3. Install the holding clip and tighten the brake pipe nut by using the **SST**.
4. Verify that the hose does not contact other parts when the vehicle bounces or when the steering wheel is turned all the way to the left or right.
5. Bleed the air from the brake system. (Refer to above.)



BRAKE FLUID

Inspection

1. Depress the brake pedal several times, and check the brake system for leaks.



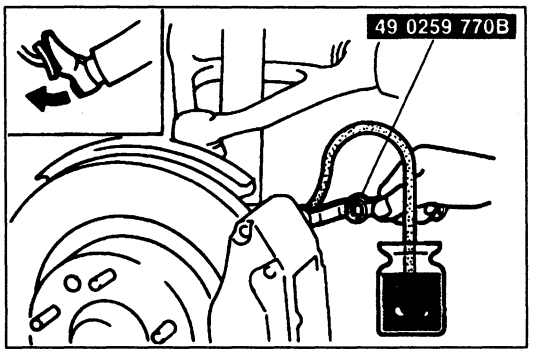
2. Verify that the fluid level in the reservoir is between MAX and MIN.
3. If the fluid level is extremely low, check the brake system for leaks.

Fluid specification: FMVSS 116 DOT-3

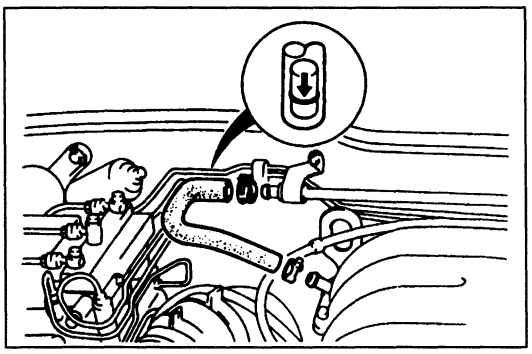
Replacement

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 this procedure to prevent air from re-entering the lines.
5. Modify the bleeder screw tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
6. Tighten the bleeder screw.



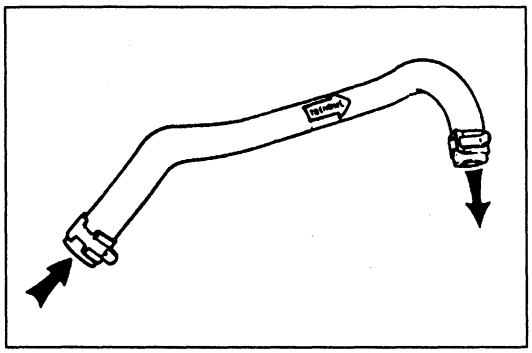
Tightening torque:
5.9–9.8 N·m {60–100 kgf·cm, 53–86 in·lbf}

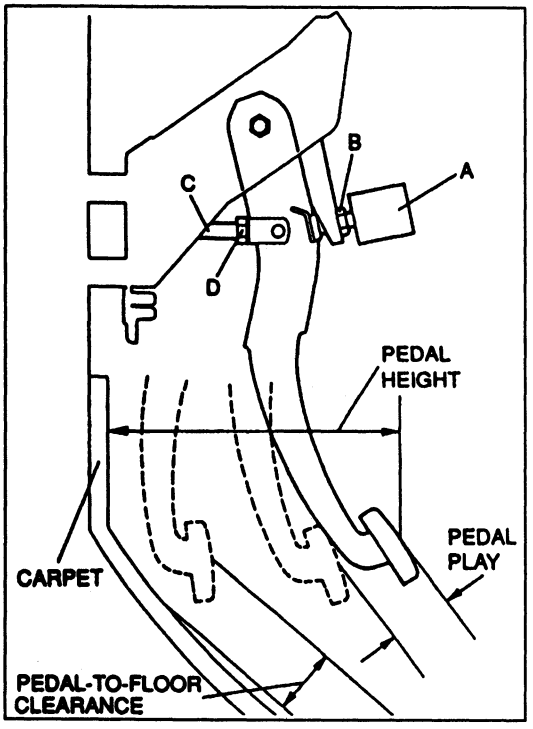
7. Perform the above steps for the remaining wheels.
8. Fill the reservoir to MAX.

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)

Pedal height inspection

Verify that the distance from the center of the upper surface of the pedal pad to the carpet is as specified.

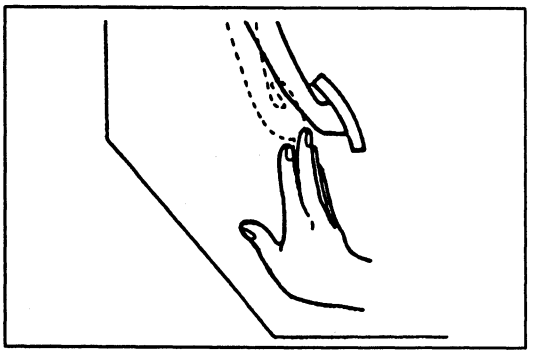
Pedal height: 164.5–176.0 mm {6.48–6.92 in} (with carpet)

Pedal height adjustment

1. Disconnect the stoplight switch connector.
2. Loosen locknut B and turn switch A until it does not contact the pedal arm.
3. Loosen locknut D and turn rod C to adjust the height.
4. Adjust the pedal free play and tighten locknut D. (Refer to below.)
5. Turn switch A until it contacts the pedal arm; then turn the switch a half-turn more.
6. Tighten locknut B.

Tightening torque:
13.8–17.6 N·m {140–180 kgf·cm, 122–156 in·lbf}

7. Connect the stoplight switch connector.

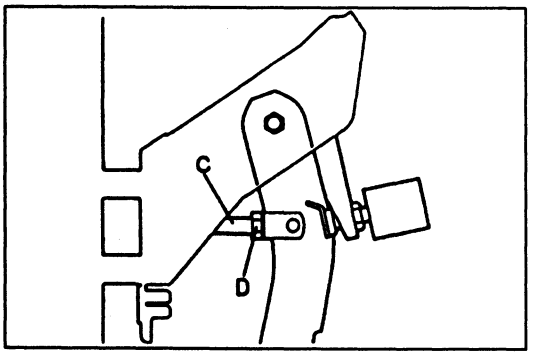


Pedal play inspection

1. Depress the pedal a few times to eliminate the vacuum in the system.
2. Lightly depress the pedal by hand until resistance is felt, and check the free play.

Free play: 3–8 mm {0.12–0.31 in}

P



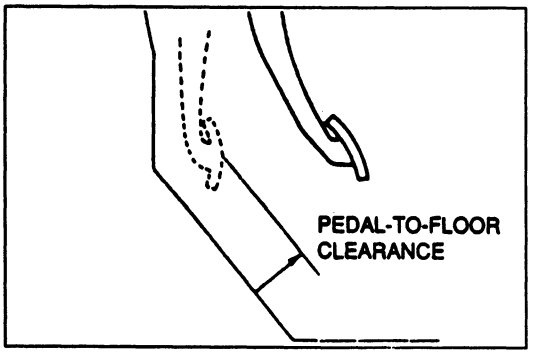
Pedal play adjustment

1. Loosen locknut D and turn rod C to adjust the free play.

Free play: 3–8 mm {0.12–0.31 in}

2. Tighten locknut D.

Tightening torque:
24–34 N·m {2.4–3.5 kgf·m, 17–25 ft·lbf}



Pedal-to-floor clearance

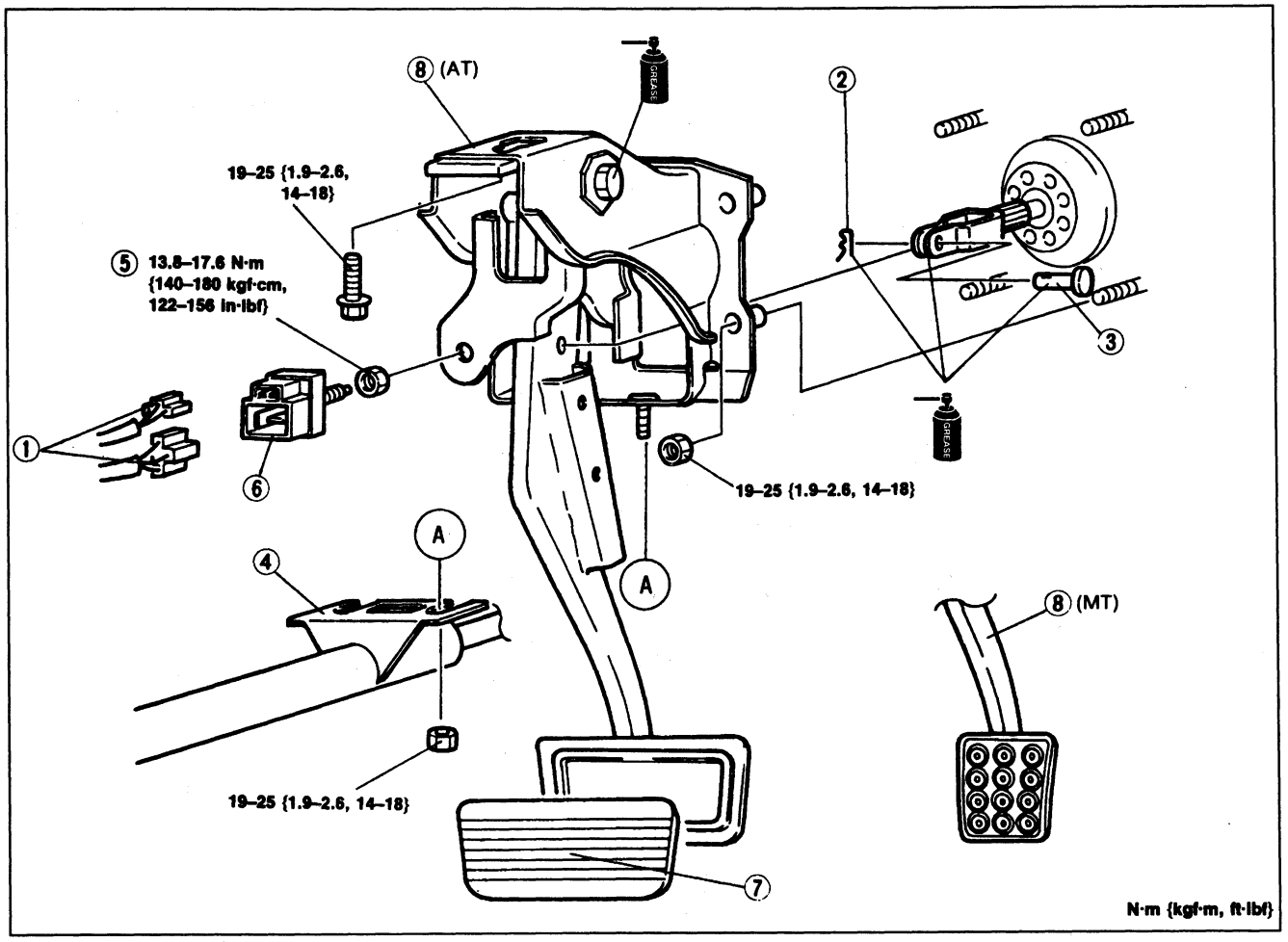
1. Check if the distance from the floor panel to the center of the upper surface of the pedal pad is as specified when the pedal is depressed with a force of **589 N {60 kgf, 132 lbf}**.

Pedal-to-floor clearance: 100 mm {3.94 in} min. (without carpet)

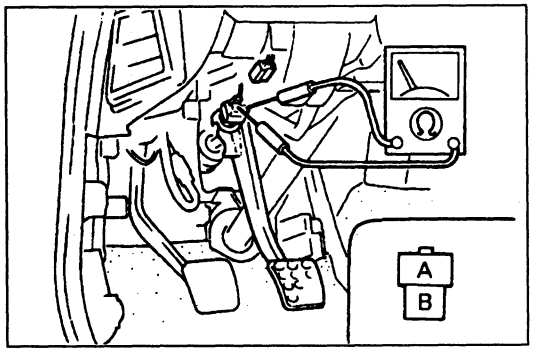
2. If the distance is less than specified, inspect for air in the brake system.

Removal / Inspection / Installation

1. Remove the side wall. (Refer to section S.)
2. Remove the lower panel. (Refer to section S.)
3. Remove the column cover.
4. Remove in the order shown in the figure.
5. Inspect all parts and repair or replace as necessary.
6. Install in the reverse order of removal.
7. After installation, check and adjust the pedal height and free play.



1. Stoplight switch connector
2. Spring clip
3. Clevis pin
4. Steering shaft bracket mounting nut
   Service ..... Section N
5. Nut
6. Stoplight switch
   Inspection ..... below
7. Pedal pad
   Inspect for wear and damage
8. Brake pedal
   Inspect for bending and damage



Inspection

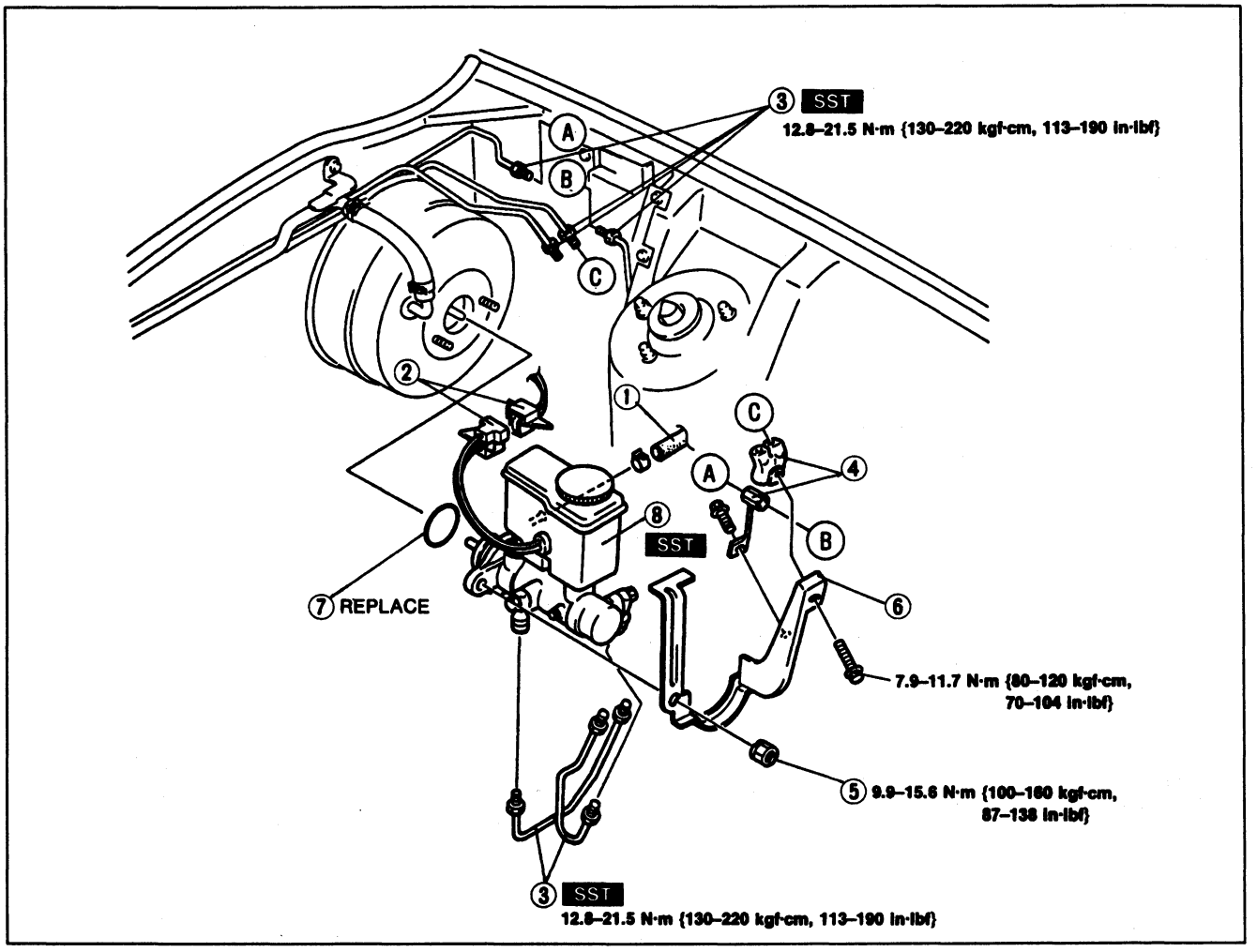
Stoplight switch

1. Disconnect the stoplight switch connector.
2. Connect an ohmmeter to the terminals of the stop-light switch.
3. Verify continuity between the terminals when the brake pedal is depressed.

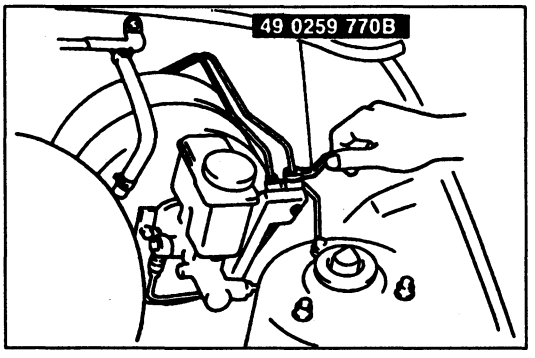
MASTER CYLINDER

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, perform the following.
   (1) Add fluid and bleed the brakes. (Refer to page P-7.)
   (2) Check for fluid leakage. (Refer to page P-8.)



1. Hose (MT)
2. Brake fluid level sensor connector
3. Brake pipe
   Removal Note ..... below
   Installation Note ..... page P-14
4. Pipe joint and bracket
5. Nut
6. Bracket
7. O-ring
8. Master cylinder
   Disassembly / Inspection / Assembly ..... page P-15
   Installation Note ..... page P-12



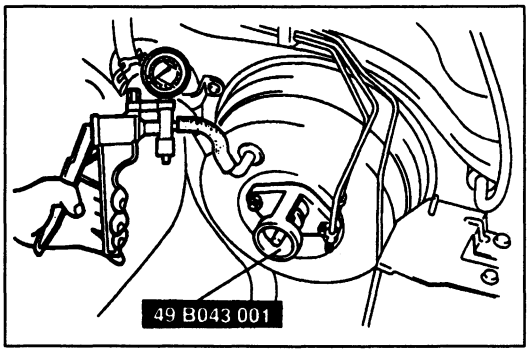
Removal note

Brake pipe

Loosen the brake pipe at the master cylinder by using the **SST**.

Caution

- **Brake fluid will damage painted surfaces. If brake fluid does get on a painted surface, wipe it off immediately.**

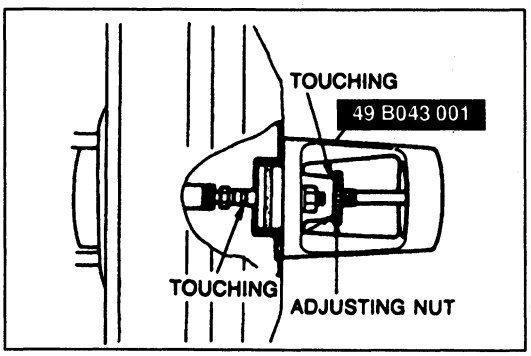


Installation note
Master cylinder
Piston to push rod clearance

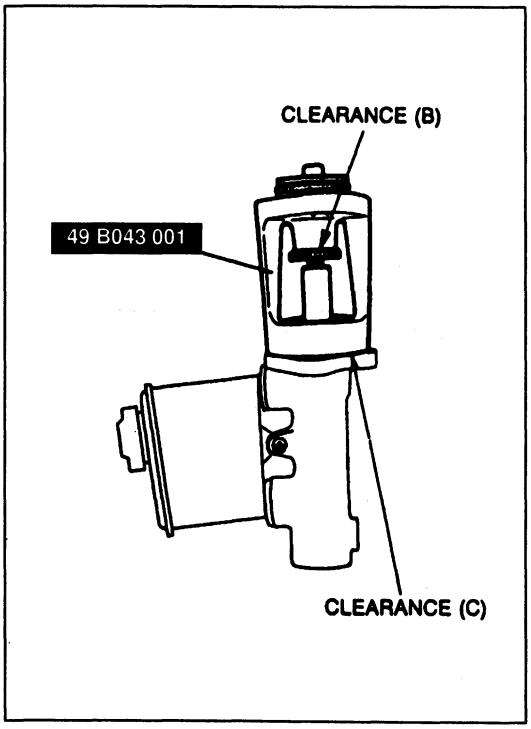
1. Turn the nut of the **SST** clockwise to fully retract the gauge rod. Attach the **SST** to the power brake unit.

   Tightening torque:
   9.9–15.6 N·m {100–160 kgf·cm, 87–138 in·lbf}

2. Apply **66.7 kPa {500 mmHg, 19.7 inHg}** vacuum by using a vacuum pump.

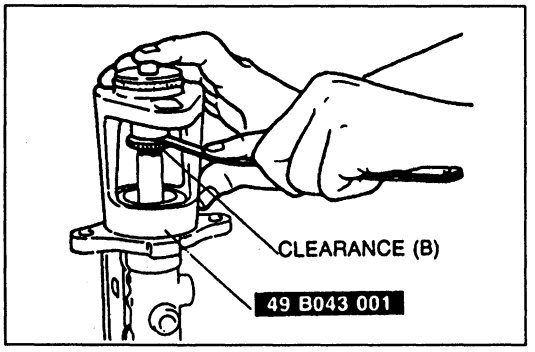


3. Turn the adjusting nut of the **SST** counterclockwise until the gauge rod just contacts the end of the master cylinder push rod.
   Push lightly on the end of the gauge rod to be sure it is seated. Verify that there is no gap between the adjusting nut and the **SST** body.



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" on the next page.

Measurement	Push rod
Clearance at (B)	Too short
Clearance at (C)	Too long
No clearance at (B) or (C)	OK

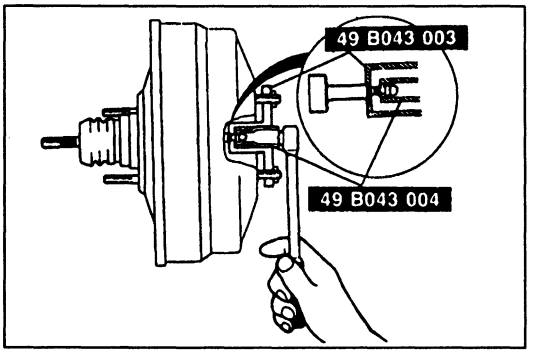


Adjustment

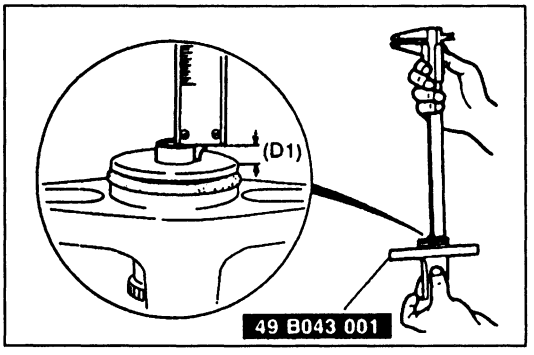
The threads of the push rod are specially designed so that the bolt becomes harder to turn past a certain point. This is to prevent the bolt from coming loose. Turn the bolt only within this range when adjusting.

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.

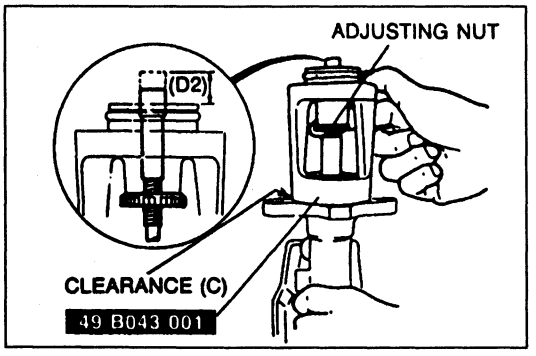


2. Using the **SSTs**, turn the nut to lengthen the master cylinder push rod an amount equal to the clearance measured at B.

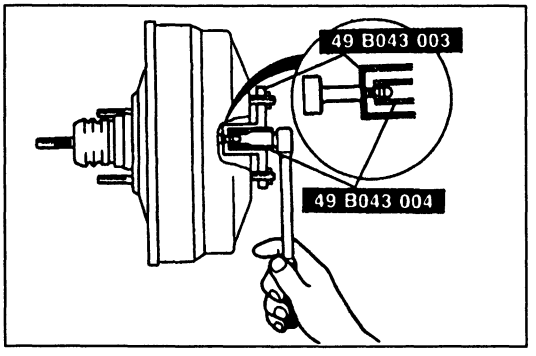


Clearance at C

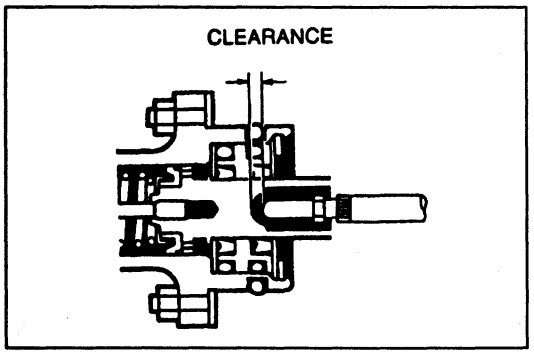
1. Measure and record height D1 of the gauge rod.



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.



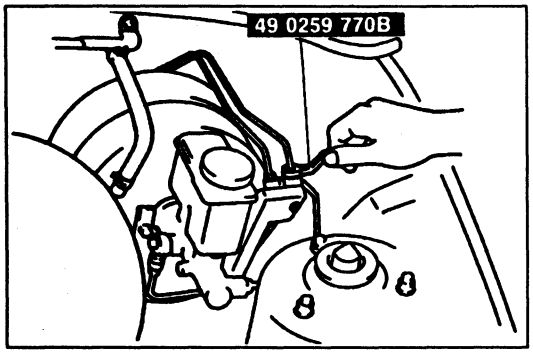
4. Subtract D1 from D2. Using the **SSTs**, turn the nut to shorten the master cylinder push rod an amount equal to the difference.



Note

- **The previous 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}



Brake pipe

1. Modify the brake pipe flare nut tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
2. Tighten the brake pipe flare nut by using the **SST**.

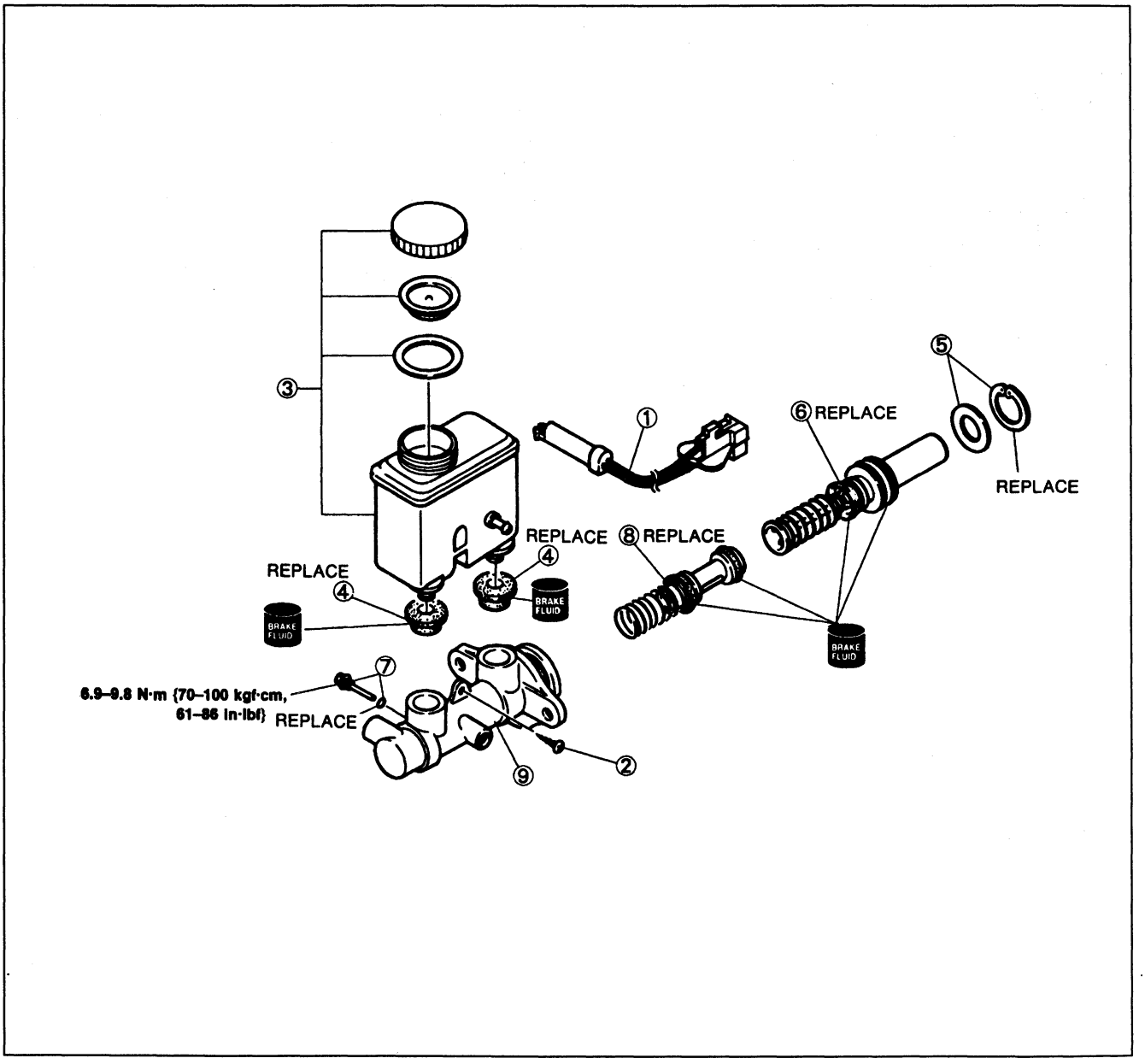
Tightening torque:
12.8–21.5 N·m{130–220 kgf·cm,113–190 in·lbf}

Disassembly / Inspection / Assembly

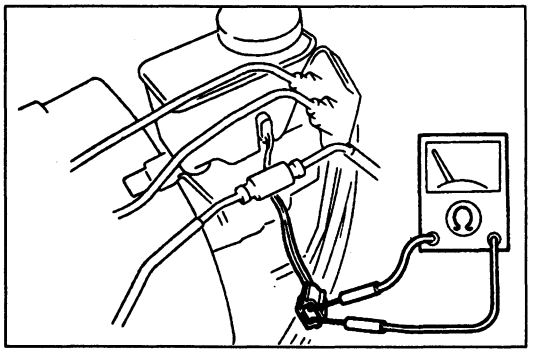
Caution

- **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 master cylinder flange.**

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 Note.**



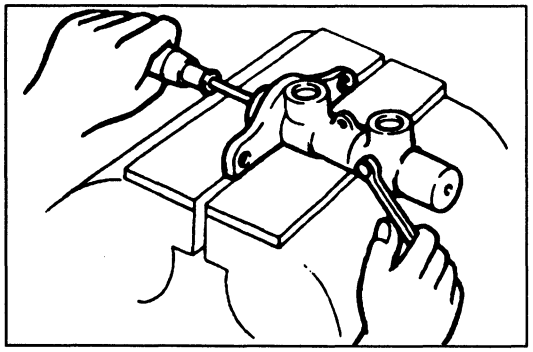
1. Brake fluid level sensor
   Inspection ..... page P–16
2. Screw
3. Reservoir assembly
   Inspect for damage and deformation
4. Bushings
5. Snap ring and spacer
6. Primary piston assembly
   Inspect for abnormal wear, rust, and damage
7. Stop pin and O-ring
   Assembly Note ..... page P–16
8. Secondary piston assembly
   Inspect for abnormal wear, rust, and damage
9. Master cylinder body
   Inspect for damage and wear
   Inspect inside of body for corrosion



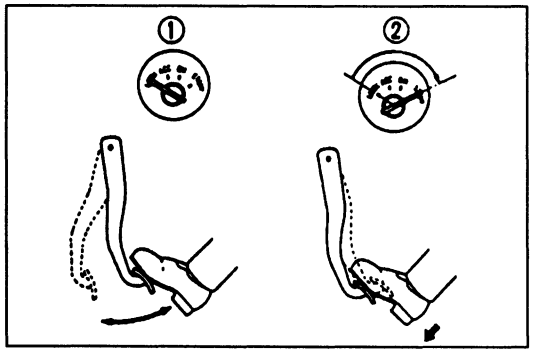
Inspection
Brake fluid level sensor
1. Disconnect the brake fluid level sensor connector.
2. Check continuity of the brake fluid level sensor.

Fluid level	Continuity
Below MIN	Yes
Above MIN	No

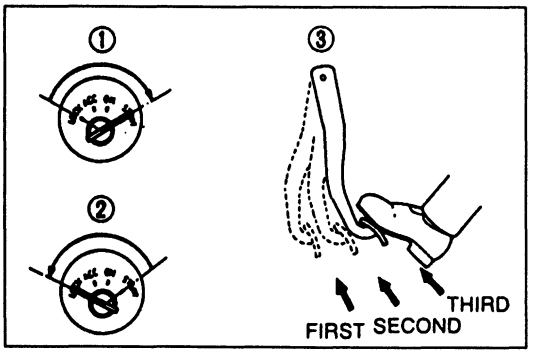
3. If not as specified, replace the brake fluid level sensor.



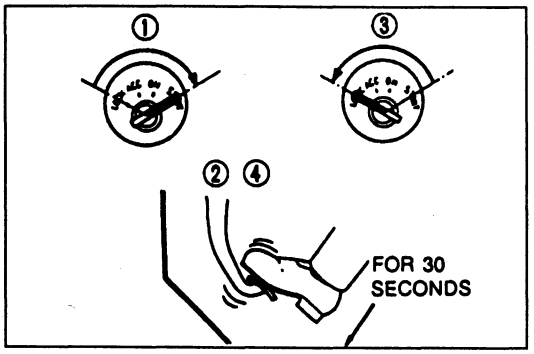
Assembly note
Stop pin and O-ring
1. Install a new O-ring onto the stop pin.
2. Install the secondary piston assembly with the hole in the piston facing the stop pin.
3. Install and tighten the stop pin.
4. Push and release the piston to verify that it is held by the stop pin.



POWER BRAKE UNIT
Inspection (on-vehicle)
Power brake unit function check
(Simple method)
Step 1
1. With the engine stopped, depress the brake pedal a few times.
2. With the pedal depressed, start the engine.
3. If immediately after the engine starts the pedal moves down slightly, the unit is operating.

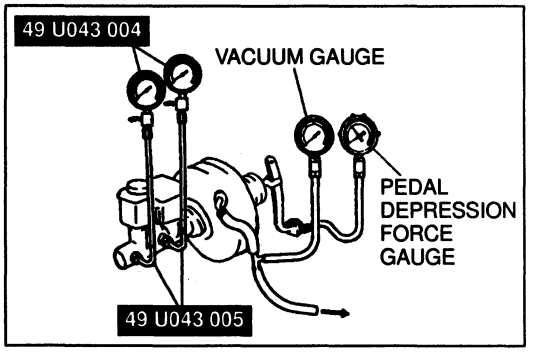


Step 2
1. Start the engine.
2. Stop the engine after it has run for **1 or 2 minutes.**
3. Depress the pedal with the usual force.
4. If the first pedal stroke is long and becomes shorter with subsequent strokes, the unit is operating.
5. If a problem is found, inspect for damage of the check valve or vacuum hose and examine the installation. Repair if necessary, and inspect it once again.



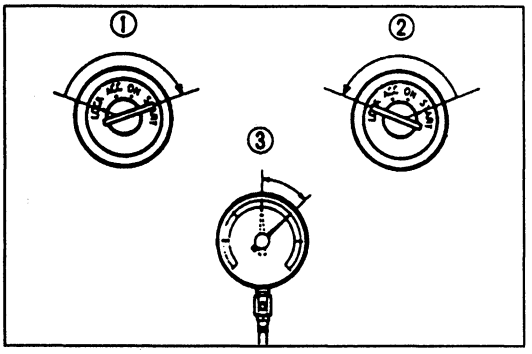
Step 3
1. Start the engine.
2. Depress the pedal with the usual force.
3. Stop the engine with the pedal held depressed.
4. Hold the pedal down for **about 30 seconds.**
5. If the pedal height does not change, the unit is operating.
6. If there is a problem, inspect for damage to the check valve or vacuum hose, and inspect the hose connections. Repair if necessary, and inspect once again.

If the nature of the problem is still not clear after the three steps above, follow the more detailed check described in "Using the testers". (Refer to page P–17).



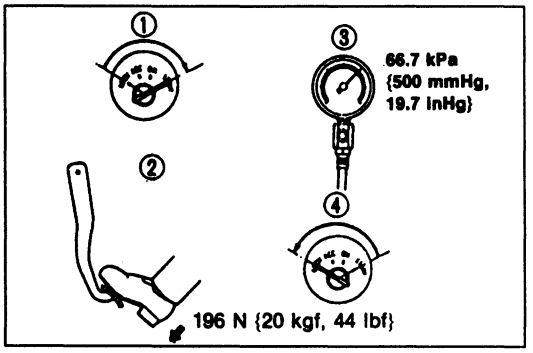
(Using the testers)

1. Connect the **SST** or equivalent, vacuum gauge, and pedal depression force gauge as shown in the figure.
2. After bleeding the air from the **SST**, conduct the test as described in the steps below.



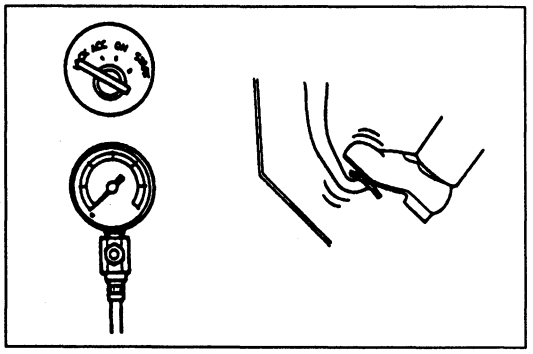
a) Checking for vacuum loss
Unloaded condition

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 **63.4–66.7 kPa {475–500 mmHg, 18.7–19.7 inHg}**, the unit is operating.



Loaded condition

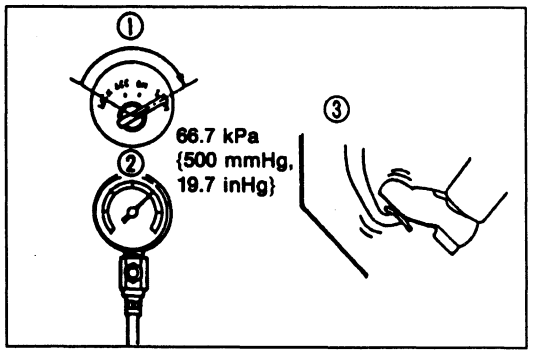
1. Start the engine.
2. Depress the brake pedal with a force of **196 N {20 kgf, 44lbf}**.
3. With the brake pedal depressed, stop the engine when the vacuum gauge reading reaches **66.7 kPa {500 mmHg, 19.7 inHg}**.
4. Observe the vacuum gauge for 15 seconds. If the gauge shows **63.4–66.7 kPa {475–500 mmHg, 18.7–19.7 inHg}**, the unit operating.



b) Checking for hydraulic pressure

1. If, with the engine stopped (vacuum **0 kPa {0 mmHg, 0 inHg}**), the fluid pressure is within specification, the unit is operating.

Pedal force	Fluid pressure kPa {kgf/cm², psi}
196 N {20 kgf, 44 lbf}	590 {6, 85} min.

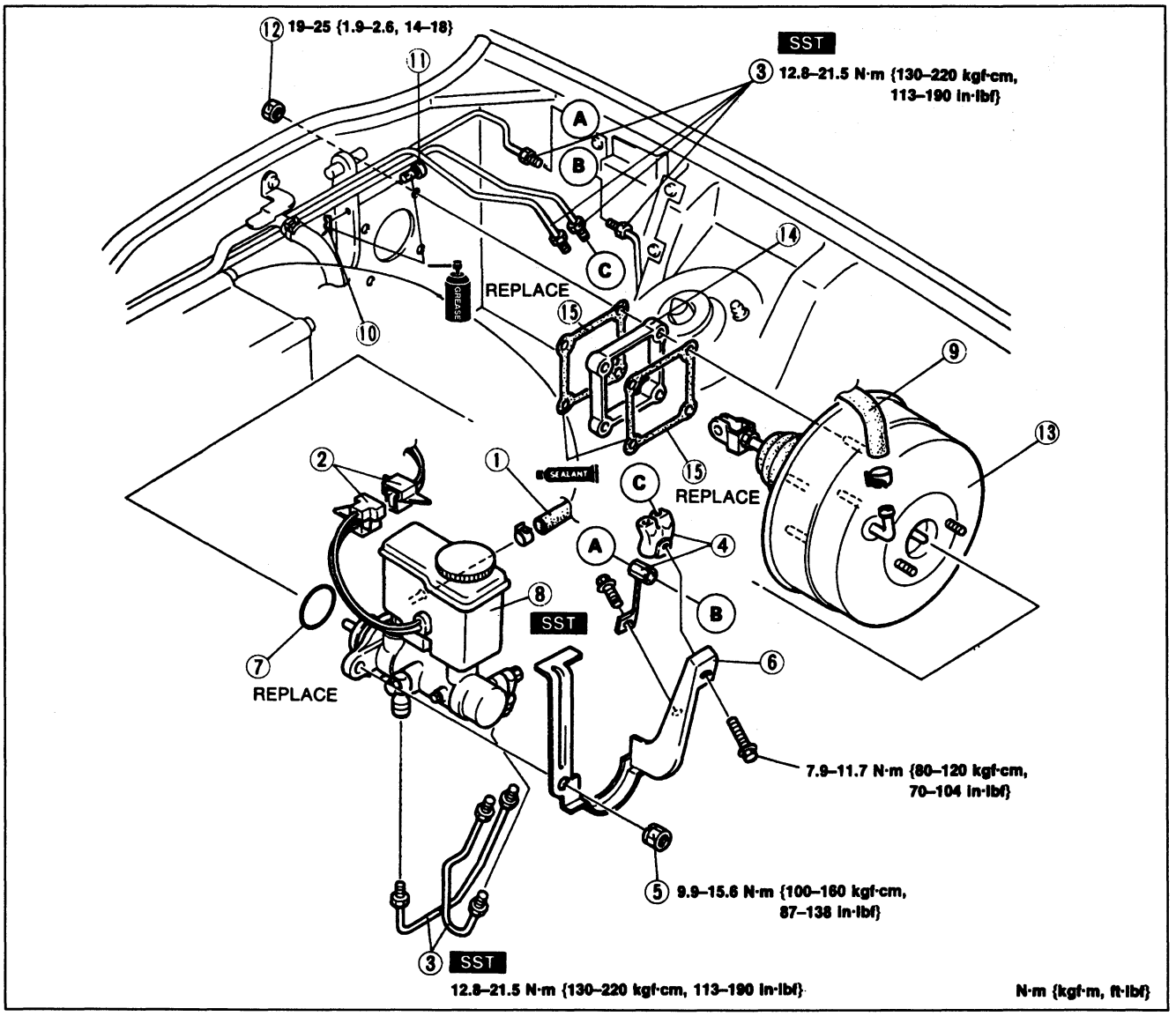


2. Start the engine. Depress the brake pedal when the vacuum reaches **66.7 kPa {500 mmHg, 19.7 inHg}**. If the fluid pressure is within specification, the unit is operating.

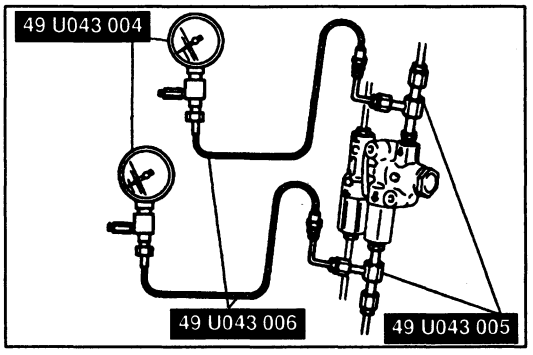
Pedal force	Fluid pressure kPa {kgf/cm², psi}
196 N {20 kgf, 44 lbf}	7750 {79,1120} min.

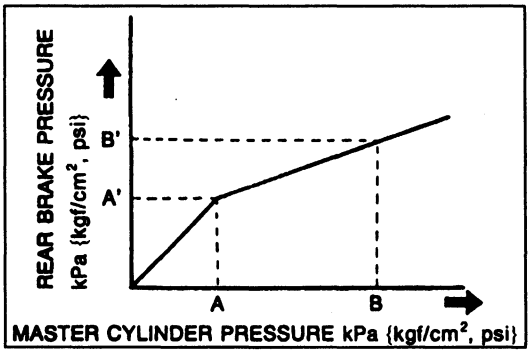
Removal / Installation

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. Add fluid and bleed the brakes. (Refer to page P-7.)
4. Check and adjust the brake pedal height. (Refer to page P-9.)
5. Check for fluid leakage. (Refer to page P-8.)



1. Hose (MT)
2. Brake fluid level sensor connector
3. Brake pipe
   Removal Note ..... page P-11
   Installation Note ..... page P-14
4. Pipe joint and bracket
5. Nut
6. Bracket
7. O-ring
8. Master cylinder
   Removal / Installation ..... page P-11
   Disassembly / Inspection / Assembly ..... page P-15
9. Vacuum hose
   Inspection ..... page P- 8
10. Spring clip
11. Clevis pin
12. Nut
13. Power brake unit
    Inspection ..... page P-16
14. Spacer
15. Gasket





PROPORTIONING BYPASS VALVE

Inspection

1. Connect the **SST** or equivalent to the inlet and outlet pipes to the rear brake system.
2. After bleeding the air from the **SST**, measure the fluid pressure from the master cylinder and to the rear brakes.

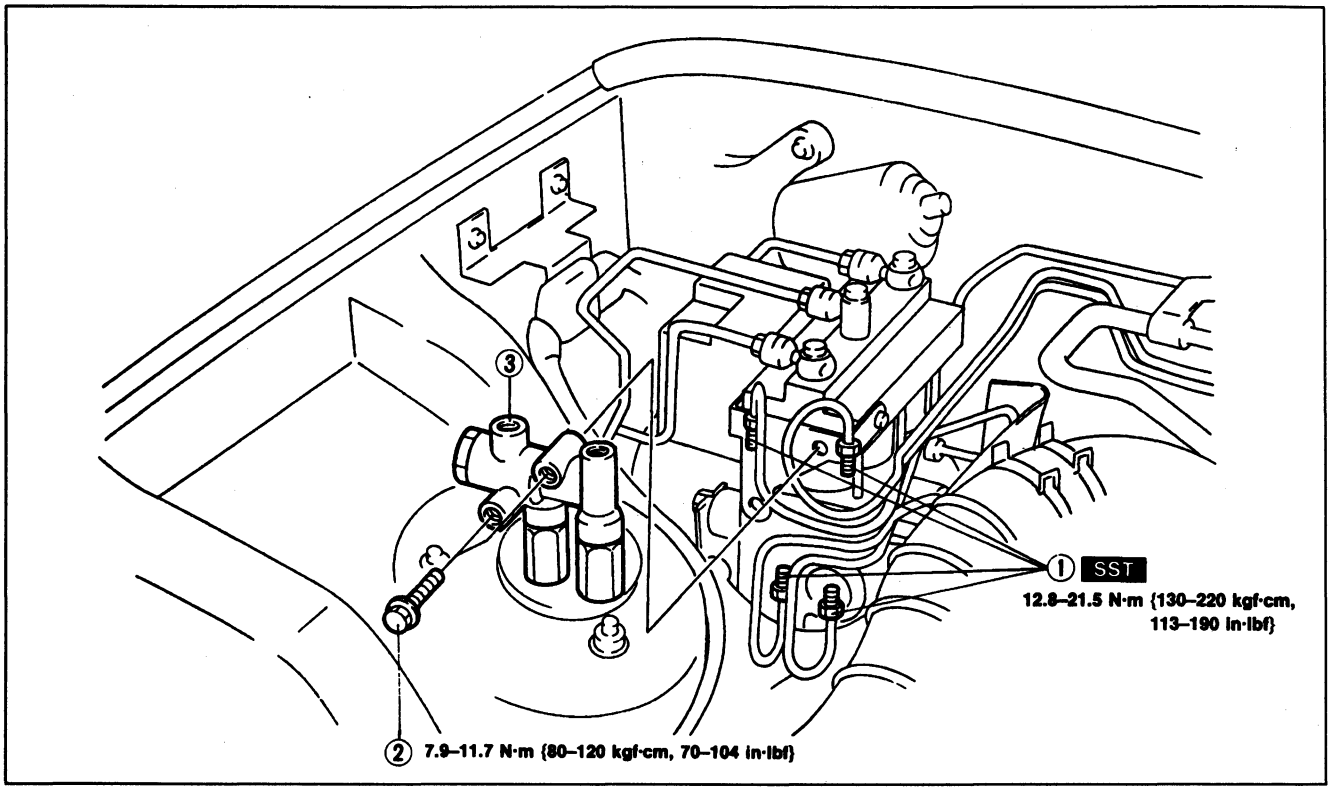
Specification:

FLUID PRESSURE KPa {kgf/cm², psi}		REAR BRAKE PRESSURE
MASTER CYLINDER PRESSURE	A = 3,920 {40,570}	A' = 3,630–4,210 {37–43, 530–610}
	B = 5,880 {60,850}	B' = 4,320–5,090 {44–52, 626–739}

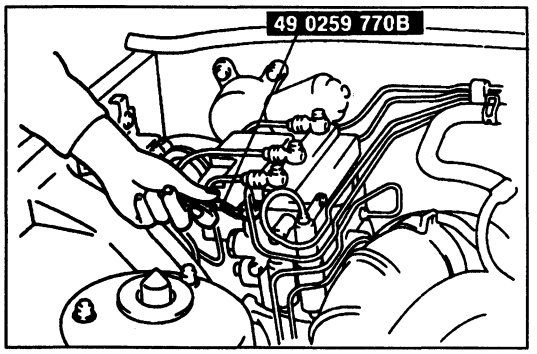
3. If not as specified, replace the proportioning bypass valve assembly.
4. Add fluid and bleed the air. (Refer to page P–7.)
5. Check for fluid leakage. (Refer to page P–8.)

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. Add fluid and bleed the brakes. (Refer to page P-7.)
4. Check for fluid leakage. (Refer to page P-8.)



1. Brake pipe
   Removal Note ..... below
   Installation Note ..... below
2. Bolt
3. Proportioning bypass valve
   Inspection ..... page P-19



Removal note
Brake pipe

Loosen the brake pipes by using the **SST**.

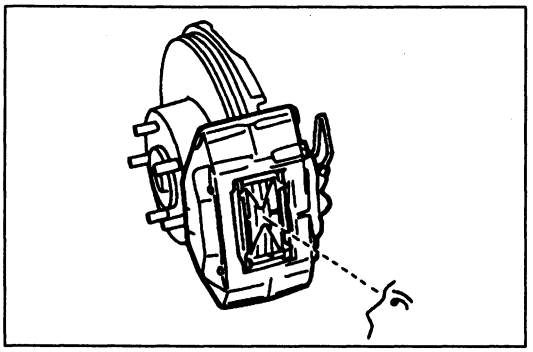
Caution

- **Brake fluid will damage painted surfaces. If brake fluid does get on a painted surface, wipe it off immediately.**

Installation note
Brake pipe

1. Modify the brake pipe flare nut tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
2. Tighten the brake pipes by using the **SST**.

Tightening torque:
12.8–21.5 N·m{130–220 kgf·cm,113–190 in·lbf}



FRONT BRAKE (DISC)

Inspection (on-vehicle)

Disc pad

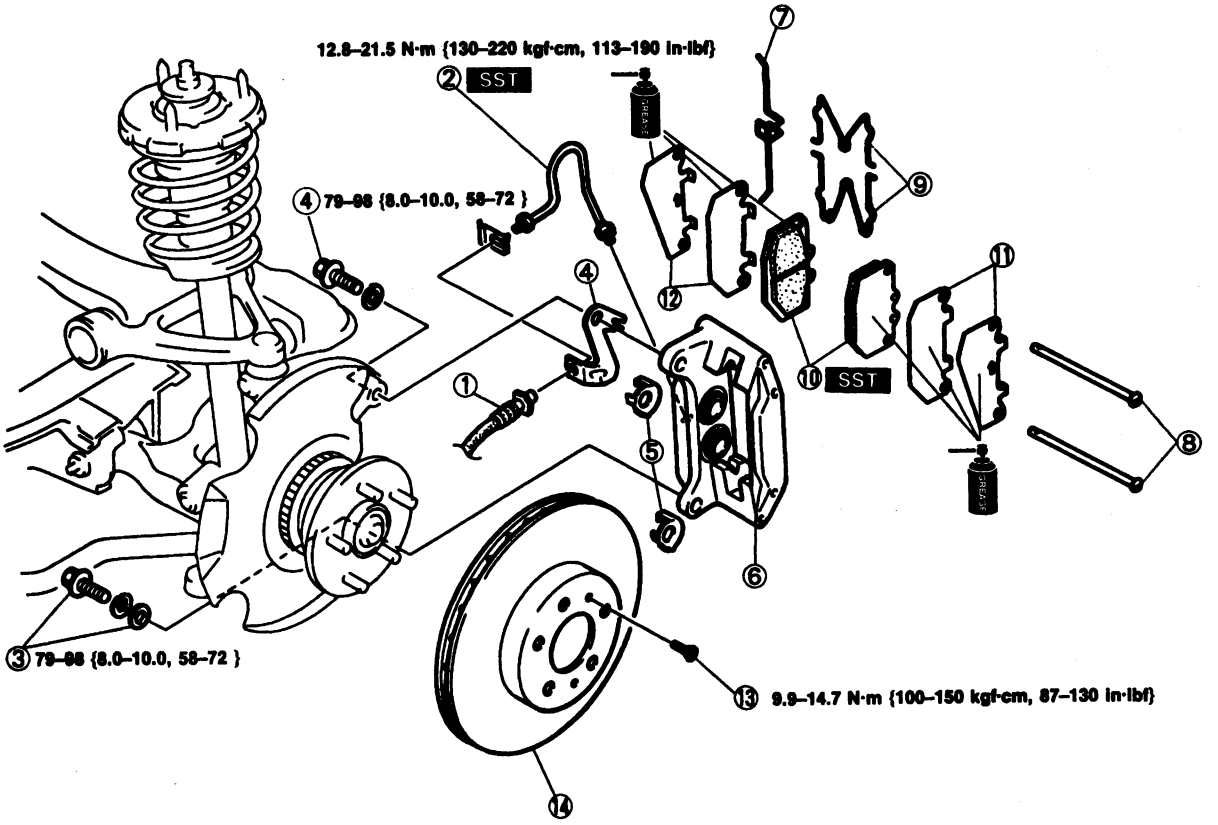
1. On level ground, jack up the front of the vehicle and support it on safety stands.
2. Remove the wheels.
3. Look through the caliper inspection hole and inspect the remaining thickness of the pads.

   Thickness: 1.0 mm {0.04 in} min.

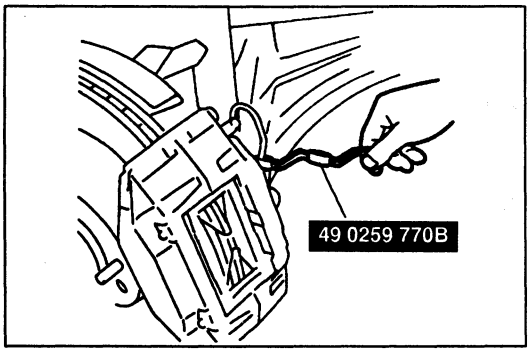
4. Replace the pads as a set (right and left wheels) if either is at or less than the minimum thickness.

Removal / Inspection / Installation

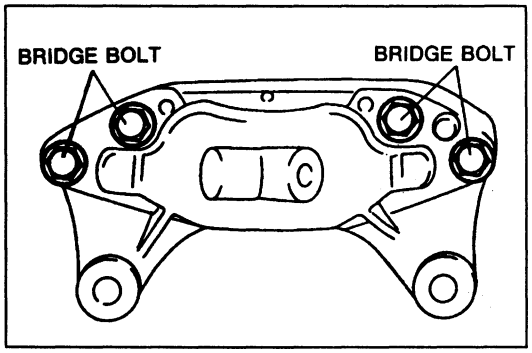
1. Remove in the order shown in the figure, referring to **Removal Note.**
2. Inspect all parts and repair or replace as necessary
3. Install in the reverse order of removal, referring to **Installation Note.**
4. Add fluid and bleed the air. (Refer to page P-7.)
5. Check for fluid leakage. (Refer to page P-8.)
6. Depress the pedal a few times, then verify that the brakes do not drag while the wheels are being rotated by hand.



1. Brake hose
   Inspect for damage and cracks
2. Brake pipe
   Removal Note ..... page P-23
   Installation Note ..... page P-23
3. Bolt, spacer
4. Bolt, brake pipe bracket
5. Guard plate
6. Caliper
   Removal Note ..... page P-23
   Disassembly / Inspection / Assembly .... page P-26
7. M-spring
8. Pad pin
9. M-clip
10. Disc pad
    Inspection .... page P-21
    Installation Note ..... page P-23
11. Outer shim
    Installation Note ..... page P-23
12. Inner shim
    Installation Note ..... page P-23
13. Screw
14. Disc plate
    Inspection .... page P-24

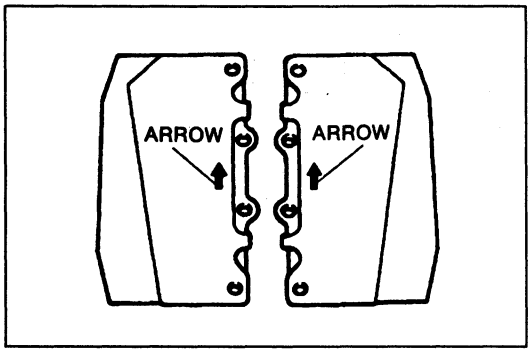


Removal note
Brake pipe
Remove the brake pipe by using the **SST**.

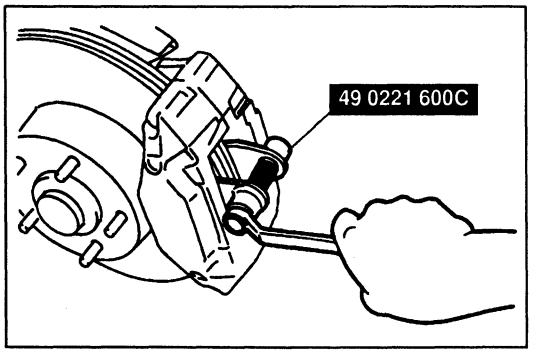


Caliper

Caution
- **Loosening the caliper bridge bolts will damage the brake caliper. Do not loosen or remove the caliper bridge bolts.**



Installation note
Outer shim, inner shim
Align the arrow with the disc plate rotation and install the shims.



Disc pad
1. Clean the piston.
2. Push the piston Inward by using the **SST**.
3. Install the disc pads.

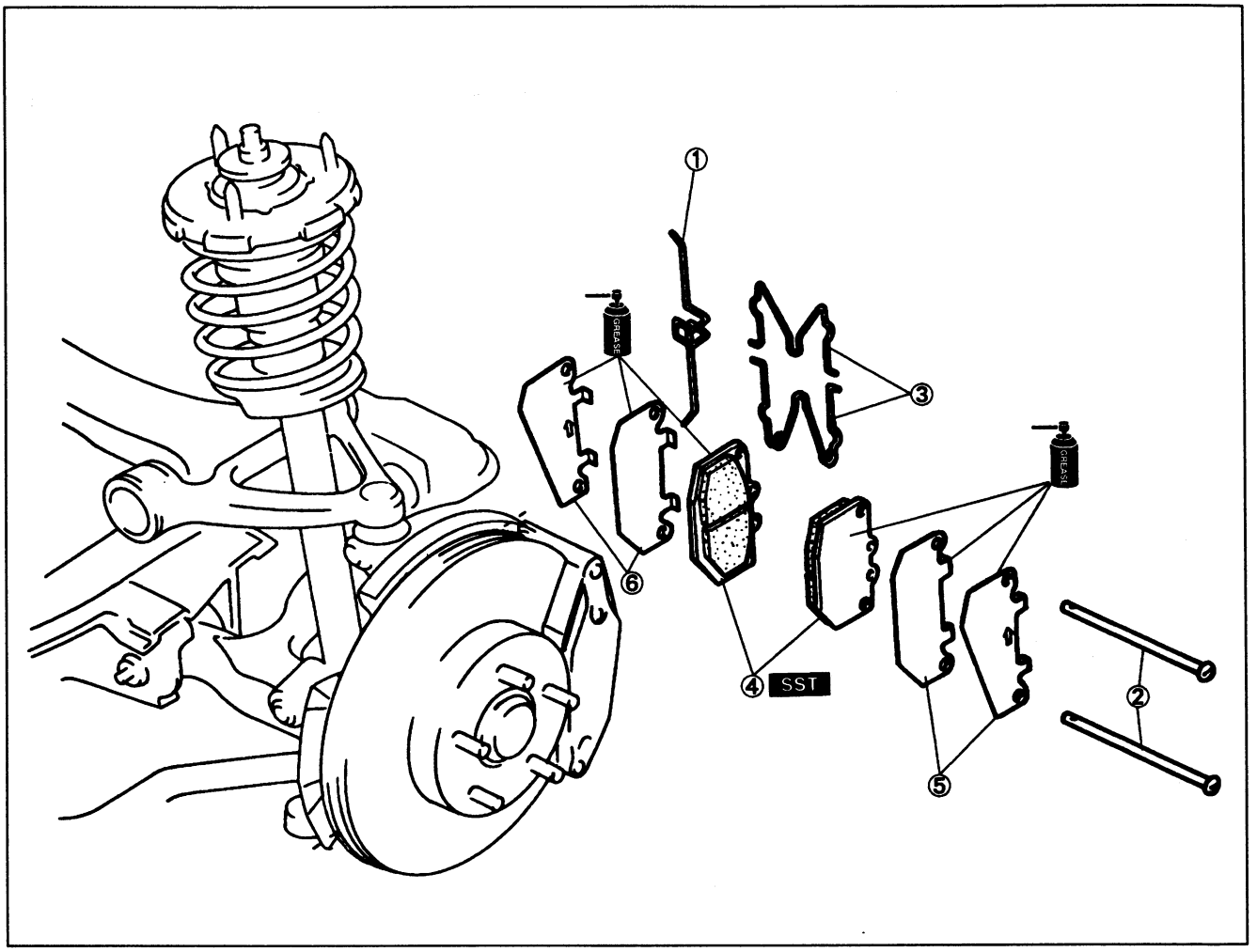
Brake pipe
1. Modify the brake pipe tightening torque to allow for a torque wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
2. Tighten the brake pipe by using the **SST**.

Tightening torque:
12.8–21.5 N·m{130–220 kgf·cm,113–190 in·lbf}

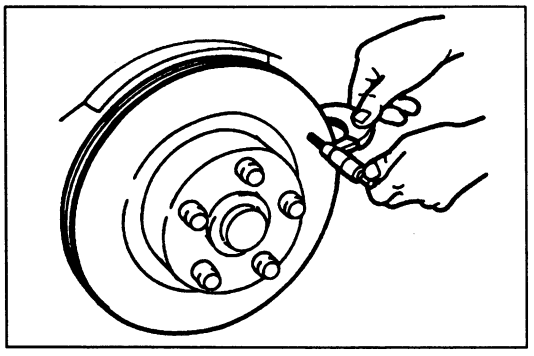
DISC PAD (FRONT)

Replacement

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal, referring to **Installation Note**.



1. M-clip
2. Pad pin
3. M-spring
4. Disc pad
   Installation Note
   ..... Page P-23
5. Outer shim
   Installation Note
   ..... page P-23
6. Inner shim
   Installation Note
   ..... page P-23



DISC PLATE (FRONT)

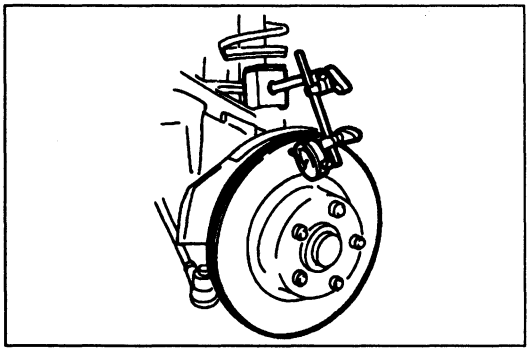
Inspection

Disc plate thickness

1. Measure the thickness of the disc plate.

   Standard: 22.0 mm {0.87 in}
   Minimum: 20.0 mm {0.79 in}

2. If the thickness is less than minimum, 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.

   Runout: 0.1mm {0.004 in} max.

3. If the runout exceeds specification, repair or replace the disc plate.

CALIPER (FRONT)

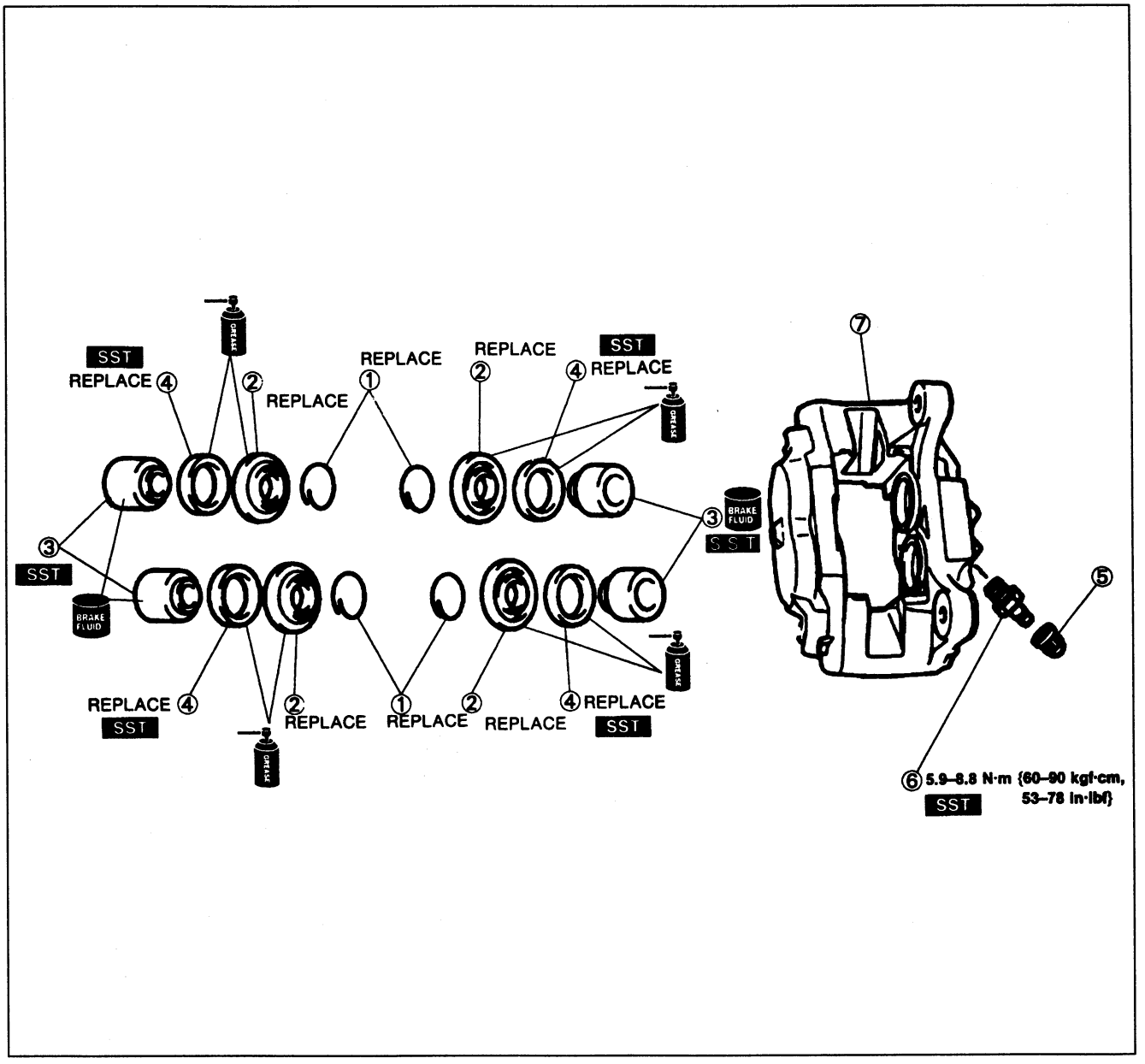
Disassembly / Inspection / Assembly

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

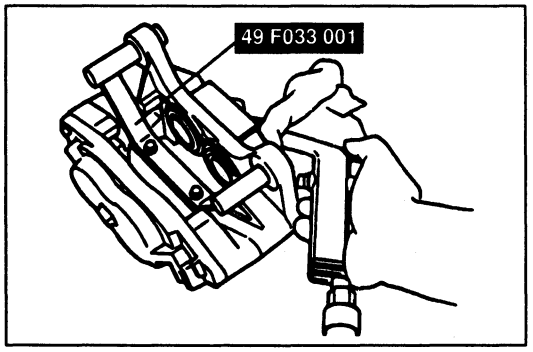
Caution

- **Loosening the caliper bridge bolts will damage the brake caliper. Do not loosen or remove the caliper bridge bolts.**

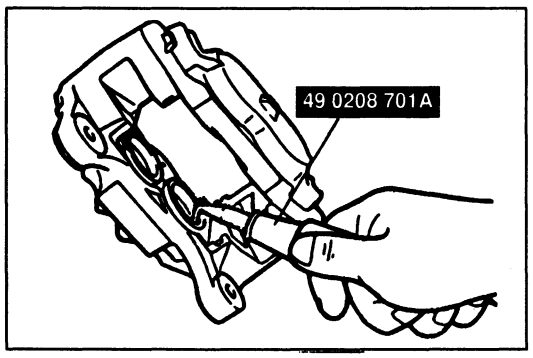
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



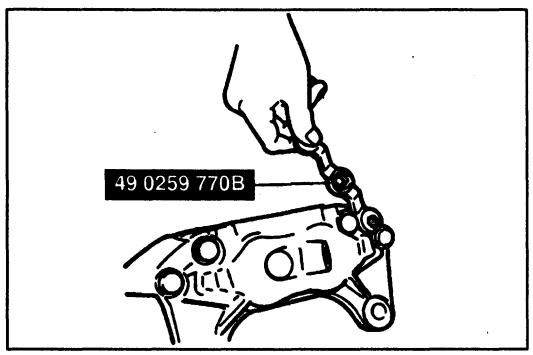
1. Piston ring
2. Dust boot
   Inspect for wear and cracks
3. Piston
   Disassembly Note ..... page P-27
   Inspect for wear and cracks
4. Piston seal
   Disassembly Note ..... page P-27
5. Bleeder cap
6. Bleeder screw
   Disassembly Note ..... page P-27
   Assembly Note ..... page P-27
7. Caliper body
   Inspect for damage and wear



Disassembly note
Piston
1. Place the **SST** in the caliper.
2. Blow compressed air through the pipe hole to force the pistons out of the caliper.



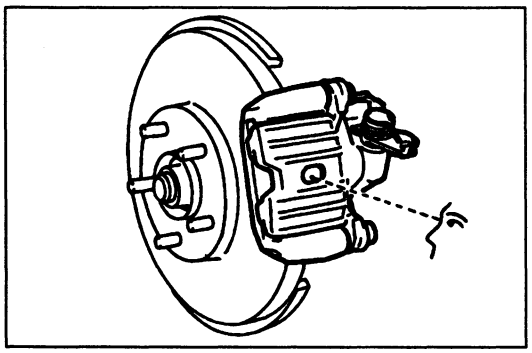
Piston seal
Remove the piston seal from the caliper by using the **SST**.



Bleeder screw
Loosen the bleeder screw by using the **SST**.

Assembly note
Bleeder screw
1. Modify the bleeder screw tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
2. Tighten the bleeder screw by using the **SST**.

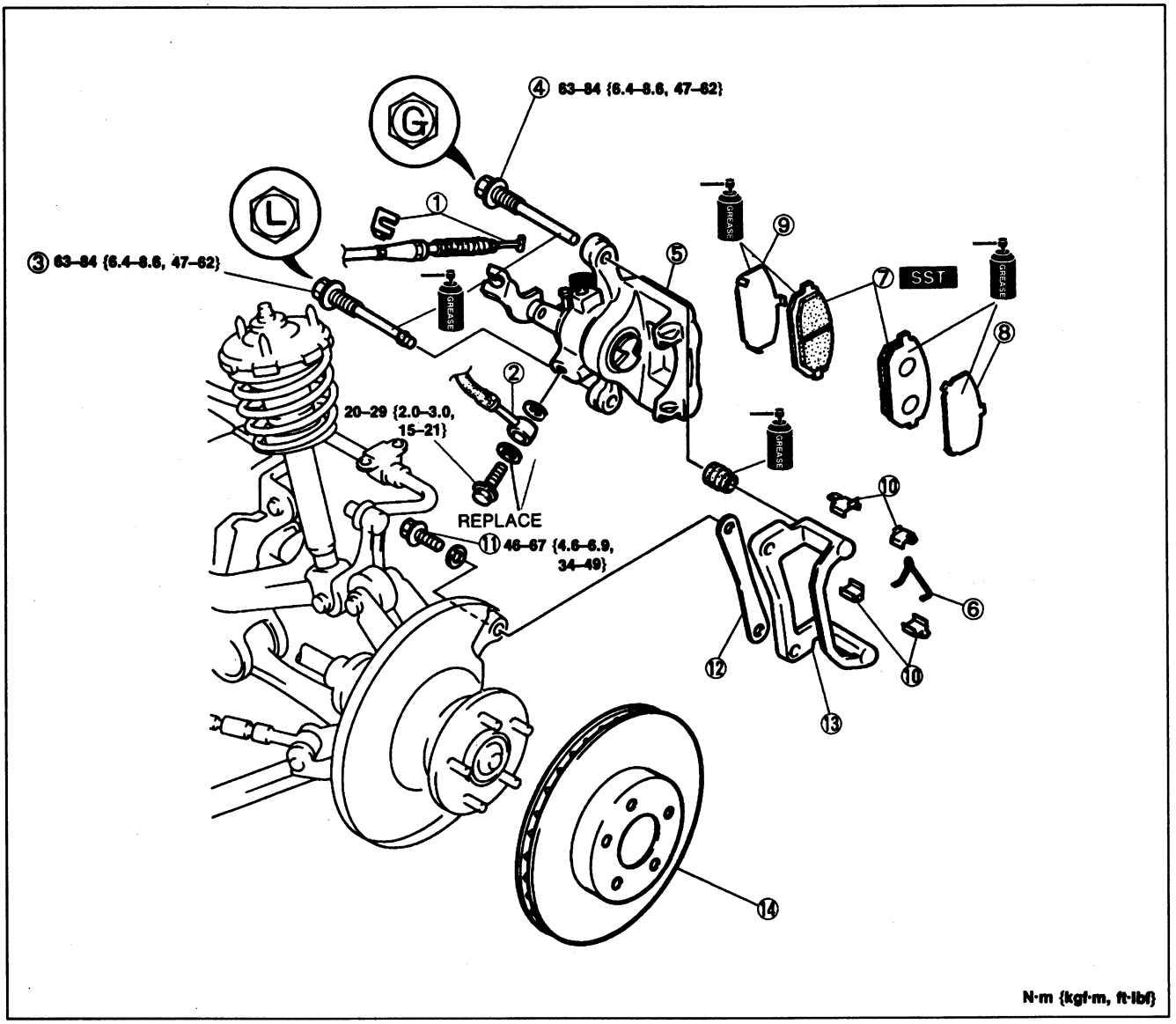
Tightening torque:
5.9–9.8 N·m{60–100 kgf·cm,53–86 in·lbf}



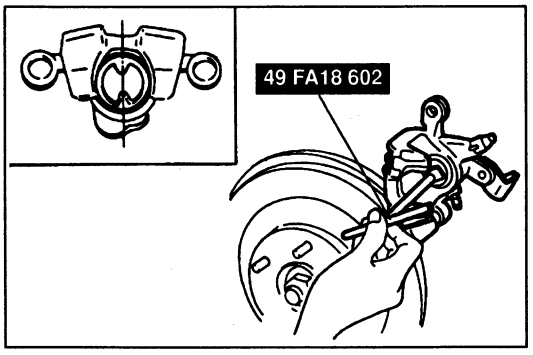
REAR BRAKE (DISC)
Inspection (on-vehicle)
Disc pad
1. On level ground, jack up the rear of the vehicle and support it on safety stands.
2. Remove the wheel.
3. Look through the caliper inspection hole and inspect the remaining thickness of the pads.
Thickness: 1.0 mm {0.04 in} min.
4. Replace the pads 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. Add fluid and bleed the air. (Refer to page P-7.)
5. Check for fluid leakage. (Refer to page P-8.)
6. Depress the pedal a few times, then verify that the brakes do not drag while the wheels are rotated by hand.

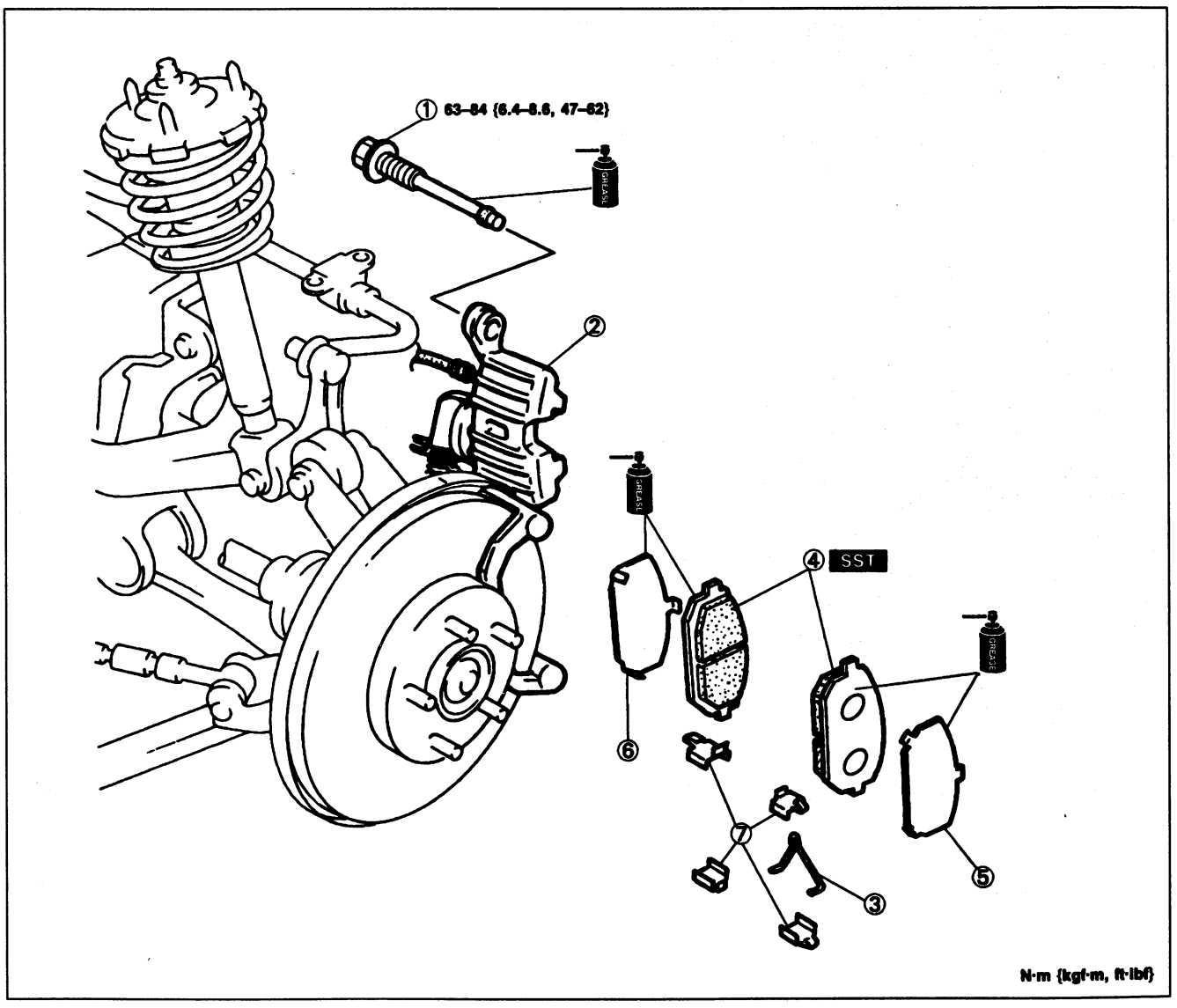


1. Clip and rear parking cable
2. Flexible brake hose
   Inspect for damage and cracks
3. Lock pin
4. Guide pin
5. Caliper
   Disassembly / Inspection / Assembly .... page P-31
6. V-spring
7. Disc pad
   Inspection .... page P-27
   Installation Note ..... page P-29
8. Outer shim
9. Inner shim
10. Pad clip
11. Bolt, washer
12. Protector
13. Mounting support
14. Disc plate
    Inspection .... page P-30

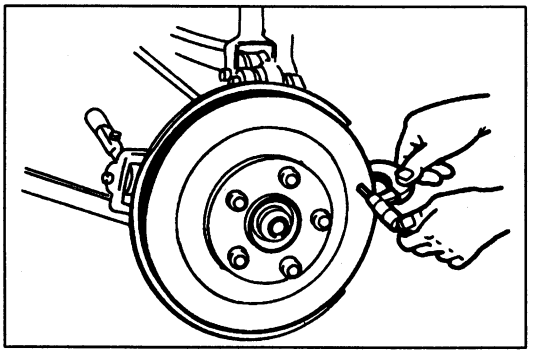


Installation note
Disc pad
1. Clean up the piston with clean brake fluid.
2. Rotate the piston clockwise by using the **SST**.
3. Align the piston grooves as shown in the illustration, and install the disc pads.

DISC PAD (REAR)
Replacement
1. Disconnect the rear parking cable from the caliper.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal, referring to **Installation Note**.



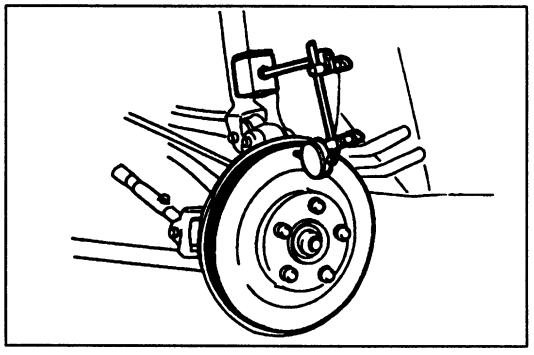
1. Lock pin
2. Caliper
3. V-spring
4. Disc pad
   Installation Note ..... above
5. Outer shim
6. Inner shim
7. Pad clip



DISC PLATE (REAR)
Inspection
Disc plate thickness
1. Measure the thickness of the disc plate.

   Standard: 20.0 mm {0.79 in}
   Minimum: 18.0 mm {0.71in}

2. If the thickness is less than minimum, 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.

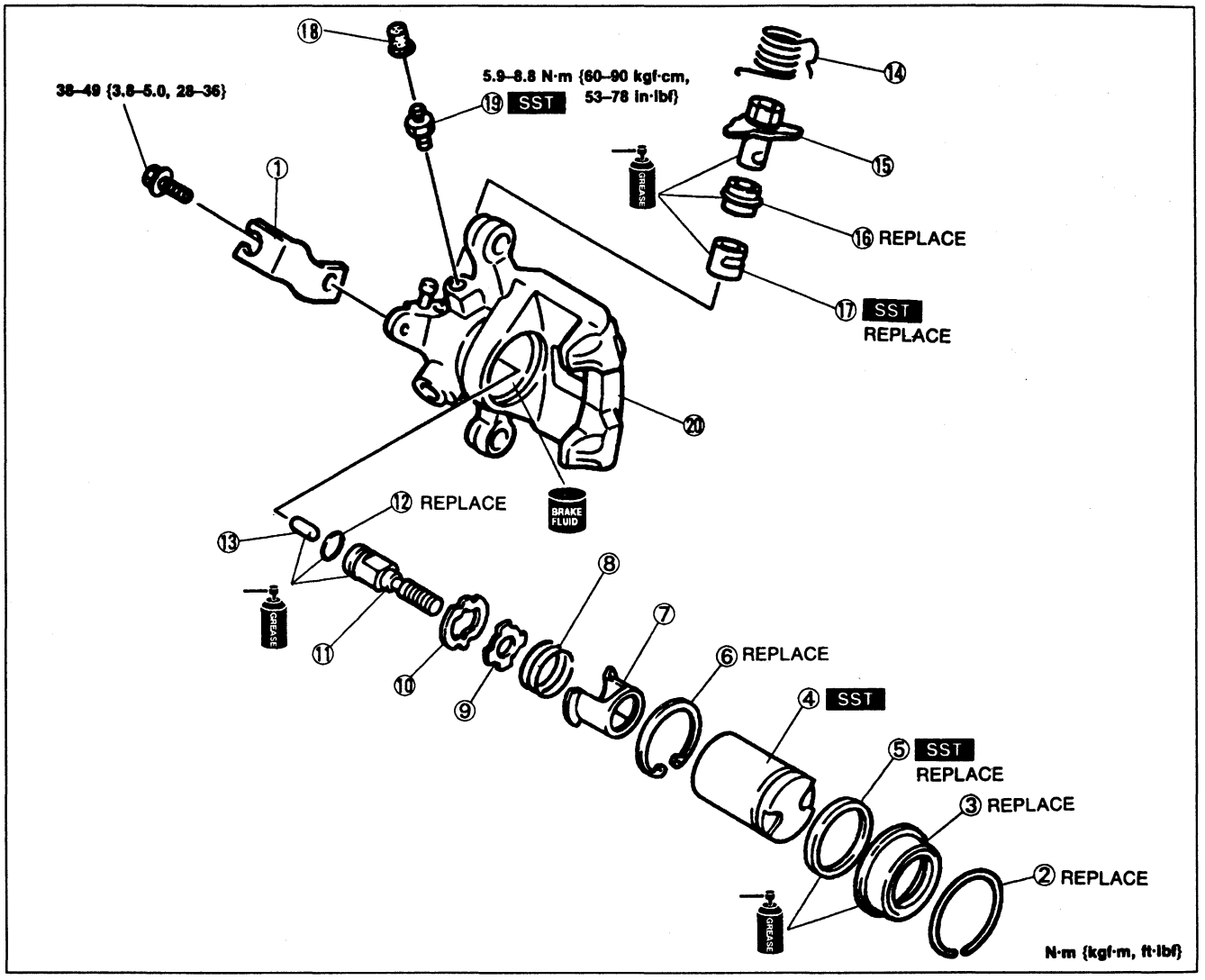
   Runout: 0.1mm {0.004 in} max.

3. If the runout exceeds specification, repair or replace the disc plate.

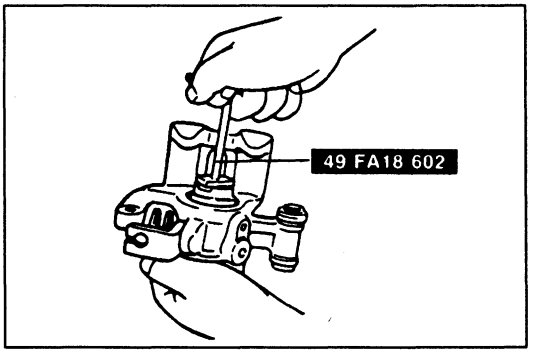
CALIPER (REAR)

Disassembly / Inspection / Assembly

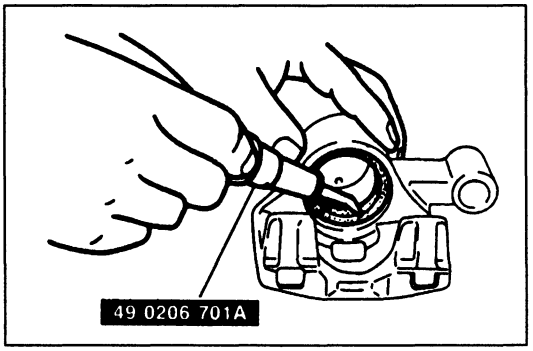
1. Disassembly in the order shown in the figure, referring to **Disassembly Note.**
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note.**



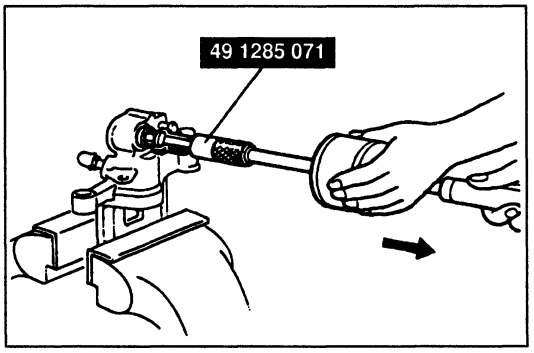
1. Cable bracket
2. Retaining ring
3. Dust boot
4. Piston
   Disassembly Note ..... page P-32
   Inspect for wear and damage
   Assembly Note ..... page P-33
5. Piston seal
   Disassembly Note ..... page P-32
6. Snap ring
7. Case cover
8. Spring
9. Spring washer
10. Stopper
11. Adjuster spindle
    Inspect for wear and damage
12. O-ring
13. Connecting link
    Inspect for wear and damage
14. Lever spring
15. Operating lever
16. Lever boot
17. Bearing
    Disassembly Note ..... page P-32
    Assembly Note ..... page P-33
18. Bleeder cap
19. Bleeder screw
    Disassembly Note ..... page P-32
    Assembly Note ..... page P-32
20. Caliper body
    Inspect for wear and damage



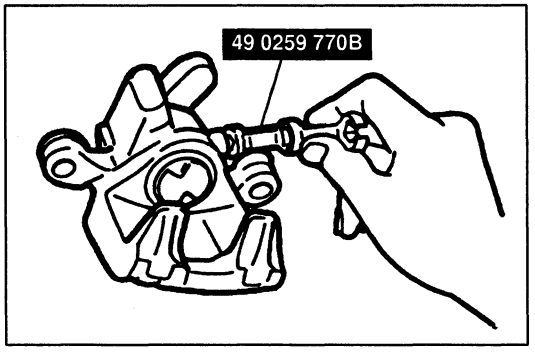
Disassembly note
Piston
Remove the piston by turning the **SST** counterclockwise.



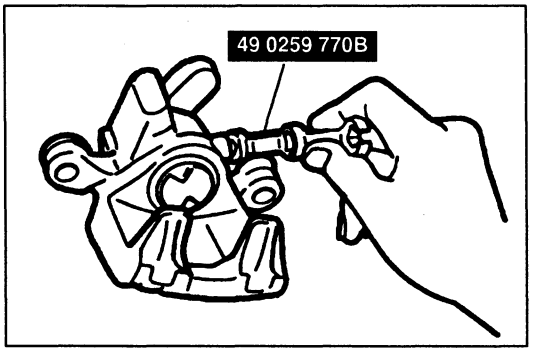
Piston seal
Remove the piston seal by using the **SST**.



Bearing
1. Secure the caliper in a vise.
2. Remove the bearing from the caliper by using the **SST**.

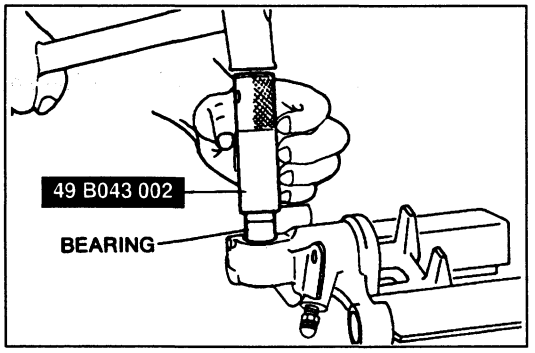


Bleeder screw
Loosen the bleeder screw by using the **SST**.



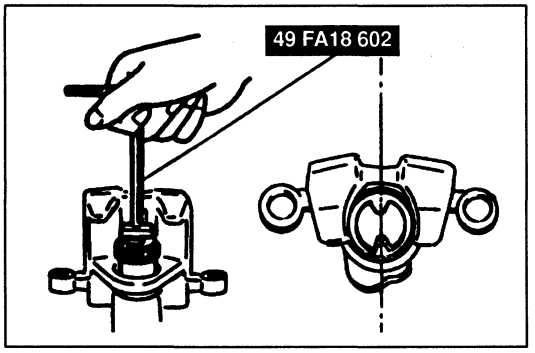
Assembly note
Bleeder screw
1. Modify the bleeder screw tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
2. Tighten the bleeder screw by using the **SST**.

Tightening torque:
5.9–9.8 N·m {60–100 kgf·cm, 53–86 in·lbf}



Bearing

Press the new bearing into the caliper with the **SST** until the **SST** bottoms against the caliper.



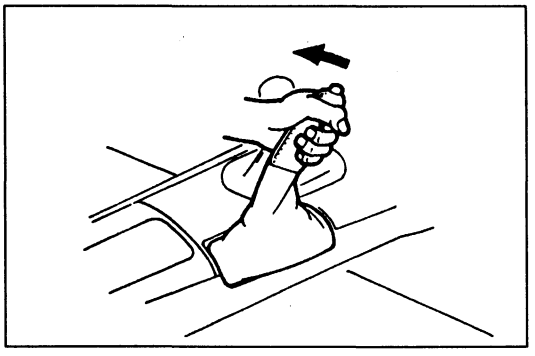
Piston

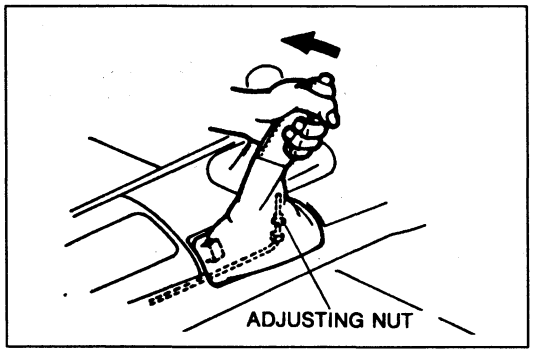
1. Clean the piston with clean brake fluid.
2. Install the new dust boot in the piston groove.
3. Install the piston into the caliper body by turning the **SST** clockwise, and align the piston grooves, as shown in the illustration.
4. Fit the dust boot into the caliper body.

PARKING BRAKE SYSTEM

TROUBLESHOOTING GUIDE

Problem	Possible cause	Action	Page
Brakes do not release	Improper return of parking cable or improper adjustment	Repair or adjust	P-34
Parking brake does not hold well	Excessive parking brake lever stroke	Adjust	P-33
	Parking cable stuck or damaged	Repair or replace	P-34
	Brake fluid or oil on pads	Clean or replace	P-29
	Hardening of pad surfaces, or poor contact	Grind or replace	P-29





PARKING BRAKE (LEVER TYPE)

Inspection

Parking brake lever stroke

1. Depress the brake pedal several times.
2. Pull and release the parking brake lever several times.
3. Verify that the stroke is within specification when the parking brake lever is pulled up with a force of **98 N {10 kgf, 22 lbf}**.

   Stroke: 7–10 notches
4. If not within specification, adjust the parking brake lever stroke. (Refer to below.)

Adjustment

Parking brake lever stroke

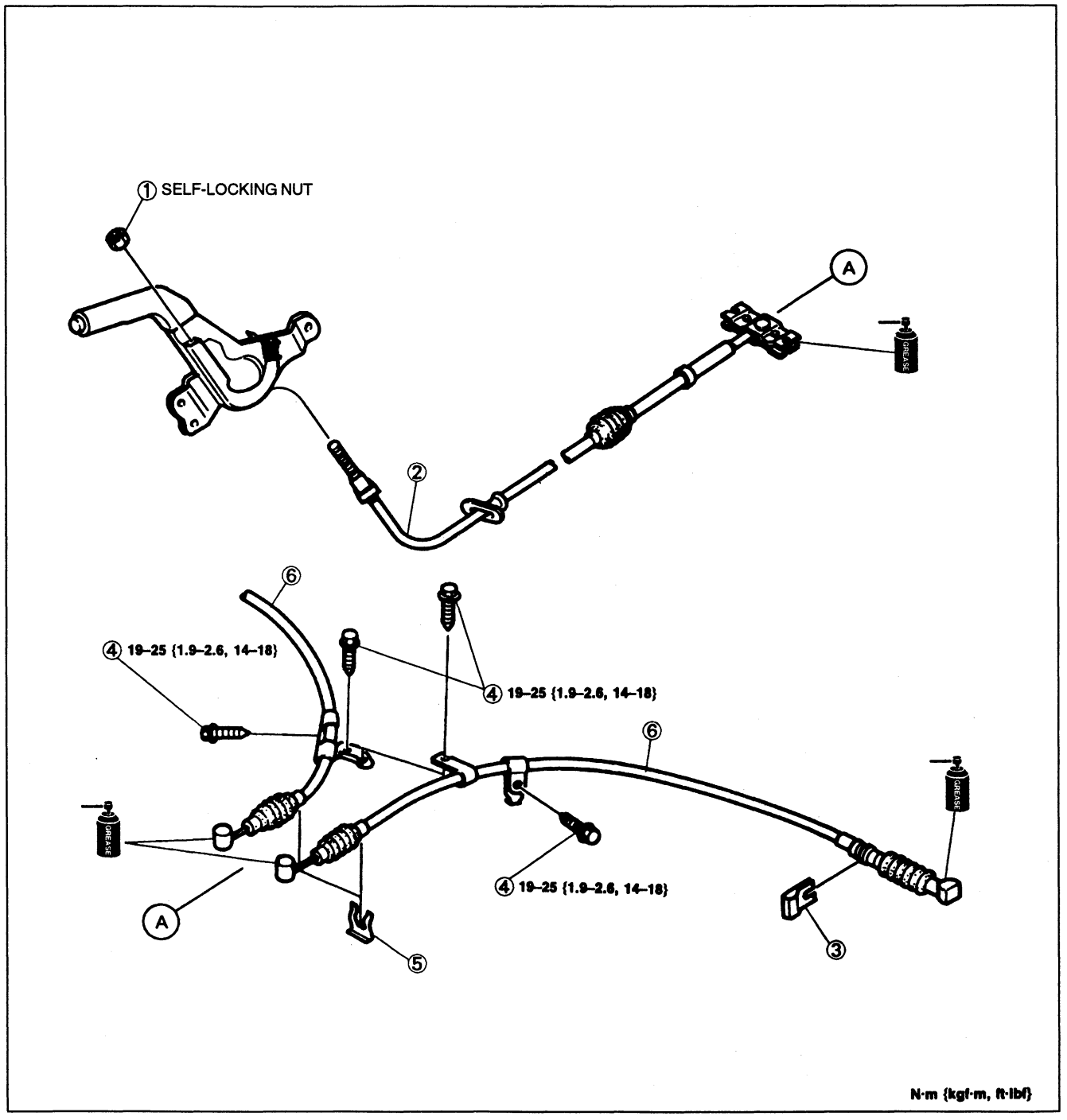
1. Depress the brake pedal several times.
2. Pull and release the parking brake lever several times.
3. Remove the console panel. (Refer to section S.)
4. Adjust the parking brake lever stroke by turning the adjusting nut.

   Stroke: 7–10 notches
5. Pull the parking brake lever up one notch, and verify that the parking brake warning light comes on. Release the parking brake.
6. Turn the wheels by hand, and verify that the brakes do not drag.

PARKING CABLE (LEVER TYPE)

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 the parking brake lever stroke. (Refer to page P-33.)

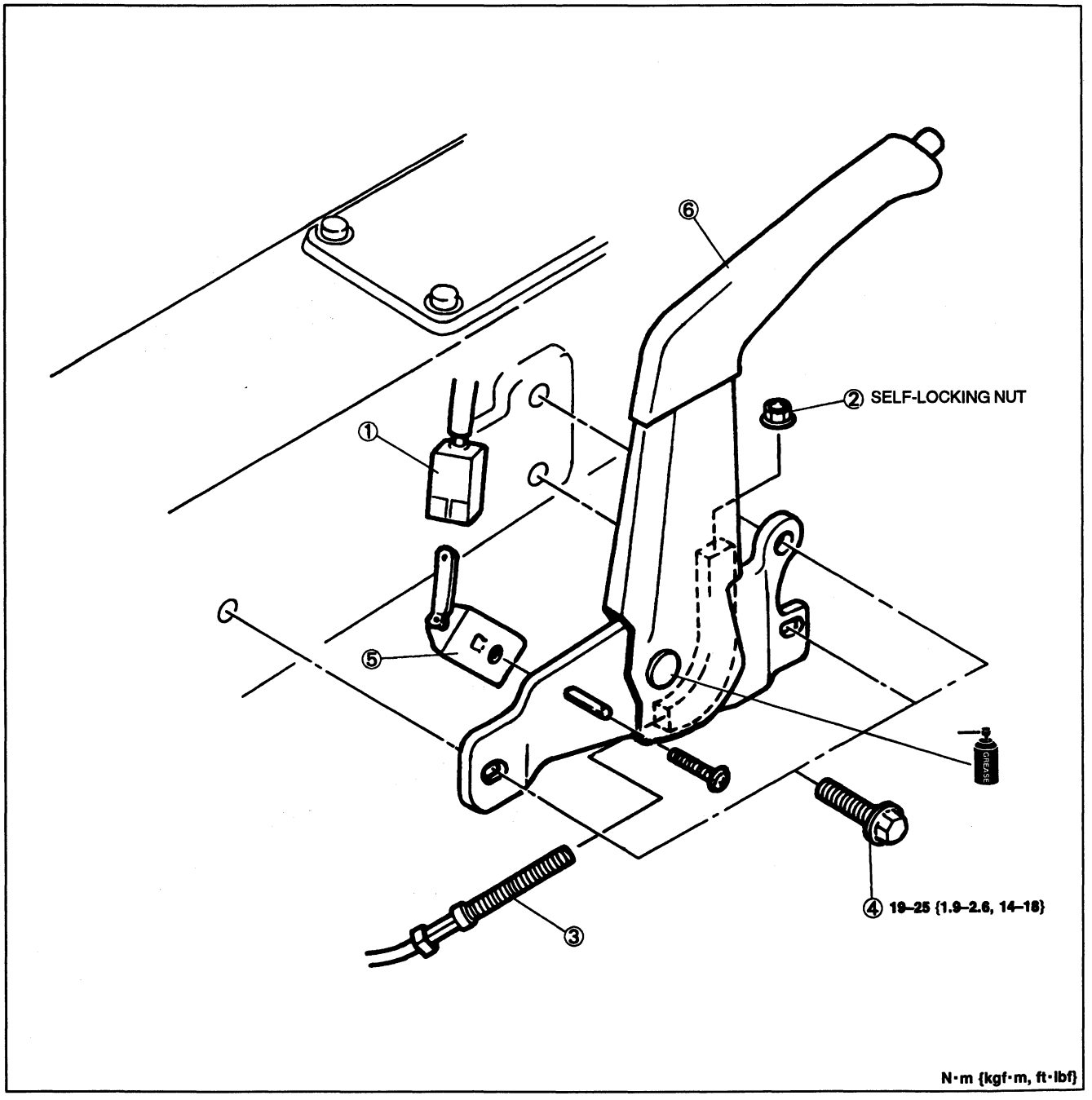


1. Adjusting nut
2. Front parking cable
   Inspect for damage and wear
3. Clip
4. Bolt
5. Clip
6. Rear parking cable
   Inspect for damage and wear

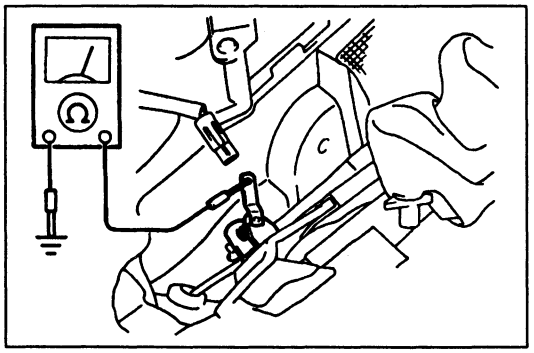
PARKING BRAKE LEVER

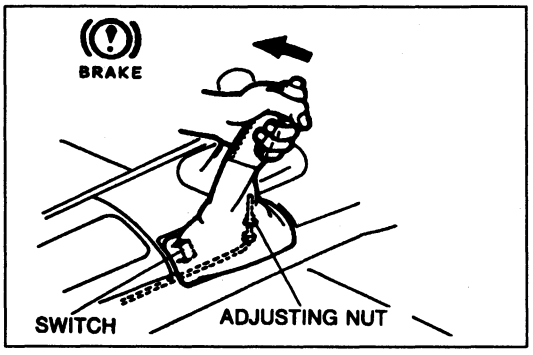
Removal / Inspection / Installation

1. Remove the console panel. (Refer to section S.)
2. Remove the rear console. (Refer to section S.)
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. After Installation, check the parking brake lever stroke. (Refer to page P-33.)



1. Parking brake switch connector
2. Adjusting nut
3. Front parking cable
4. Bolt
5. Parking brake switch
   Inspection .... page P-36
   Installation Note
   ..... page P-36
6. Parking brake lever
   Inspect for damage and bending





Inspection

Parking brake switch

1. Remove the console panel. (Refer to section S.)
2. Disconnect the connector from the parking brake switch.
3. Pull the parking brake lever and check continuity between the terminal of the switch and a ground.

Parking brake lever	continuity
Released	No
Pulled	Yes

4. If not as specified, replace the parking brake switch.

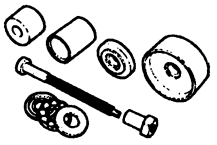
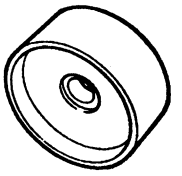
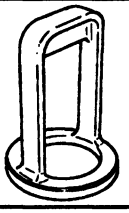
Installation note

Parking brake switch

1. Install the parking brake switch so that it contacts the parking brake lever when the lever is fully released.
2. Turn the ignition switch ON, and check that the parking brake warning lamp illuminates with the lever is pulled up one notch.

ANTILOCK BRAKE SYSTEM (ABS)

PREPARATION
SST

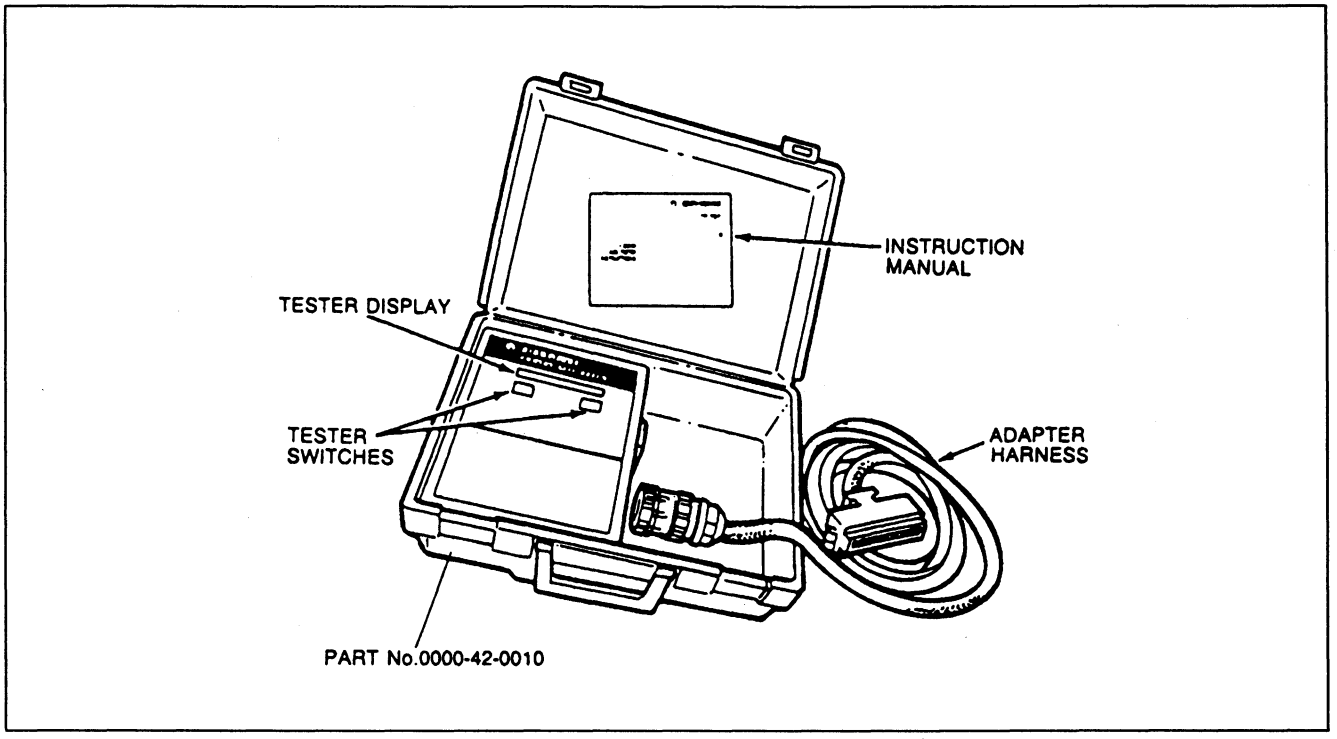
49 H066 003 Harness, adapter 	For connecting ABS tester	49 0259 770B Wrench, flare nut 	For removal / installation of brake pipe
49 H028 2A0 Set, rubber bushing replacer 	For installation of sensor rotor (front)	49 H028 204 Attachment (Part of 49 H028 2A0) 	For installation of sensor rotor (front)
49 F026 104 Installer, sensor rotor 	For installation of sensor rotor (rear)		

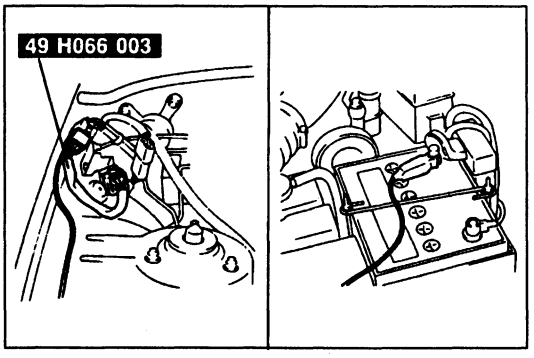
TROUBLESHOOTING GUIDE

Outline

The ABS tester is used to locate the cause of a problem within the antilock brake system by retaining and reducing the hydraulic fluid pressure in the hydraulic unit.
Because there is no way to check the ABS control unit itself, replace the control unit assembly only after first confirming that the other electrical parts are not malfunctioning.

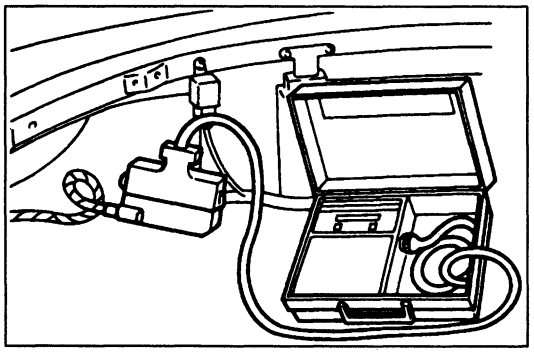
ABS tester





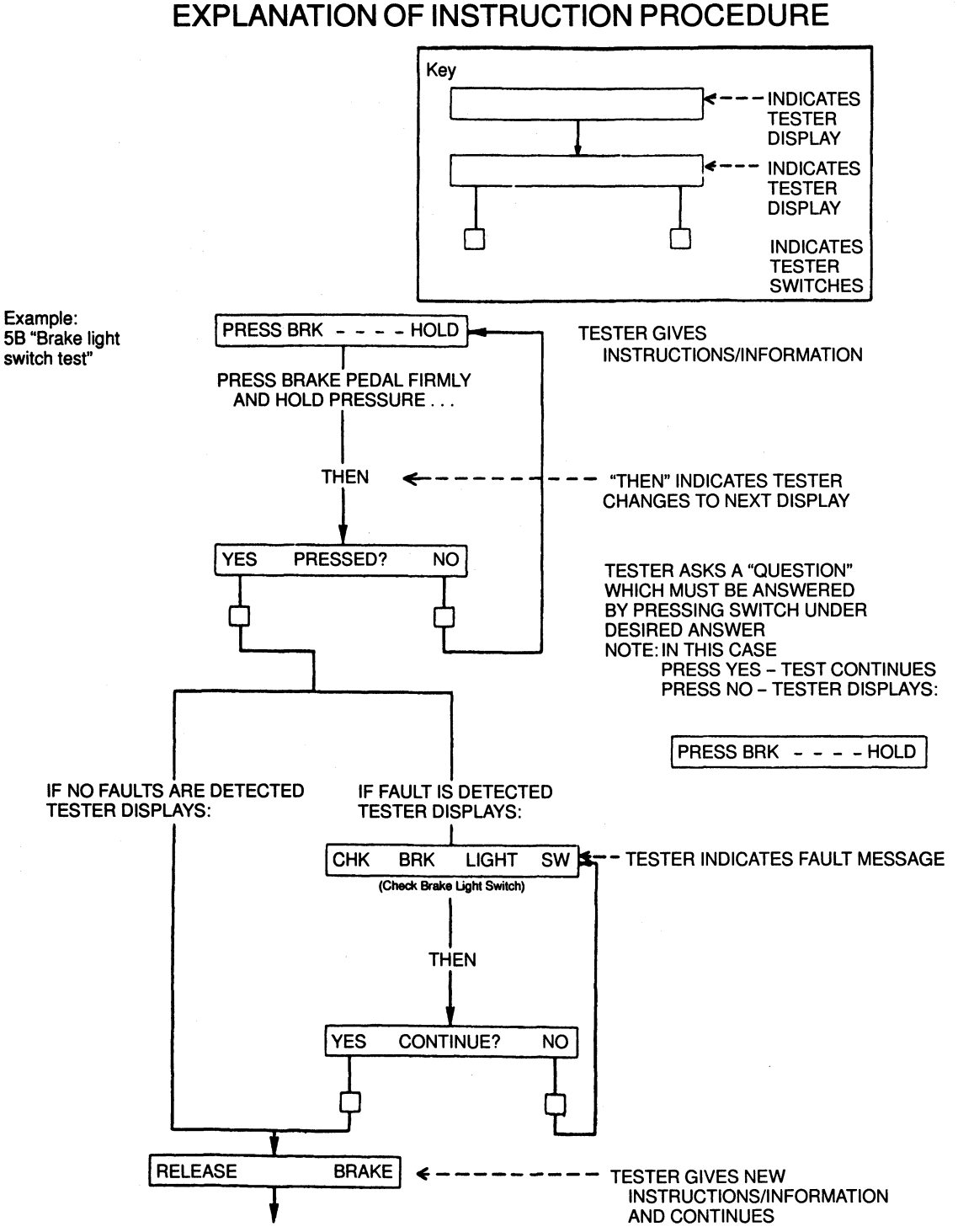
Connecting the ABS tester

1. Turn the ignition switch OFF.
2. Connect the **SST** between the hydraulic unit wiring harness connectors, and to the positive battery terminal.

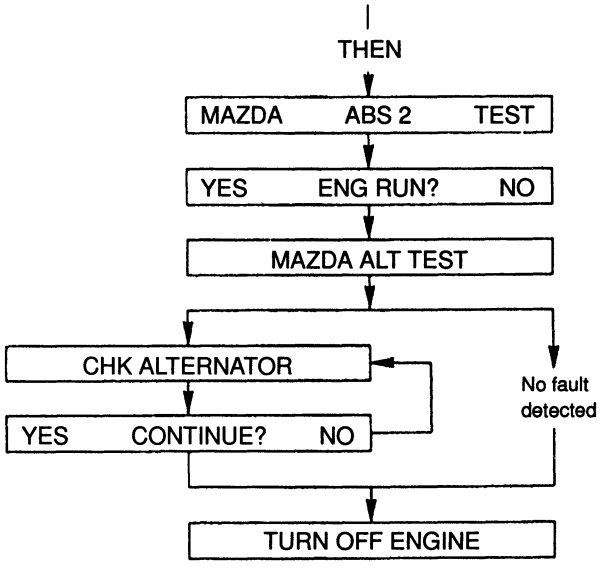
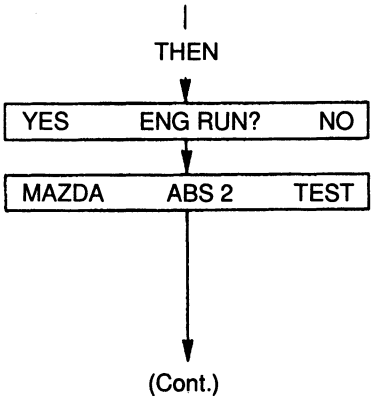


3. Remove the trunk side trim.
4. Remove the ABS control unit.
5. Disconnect the control unit connector and connect the ABS tester to the control unit connector at the harness side.

Explanation of instruction procedure

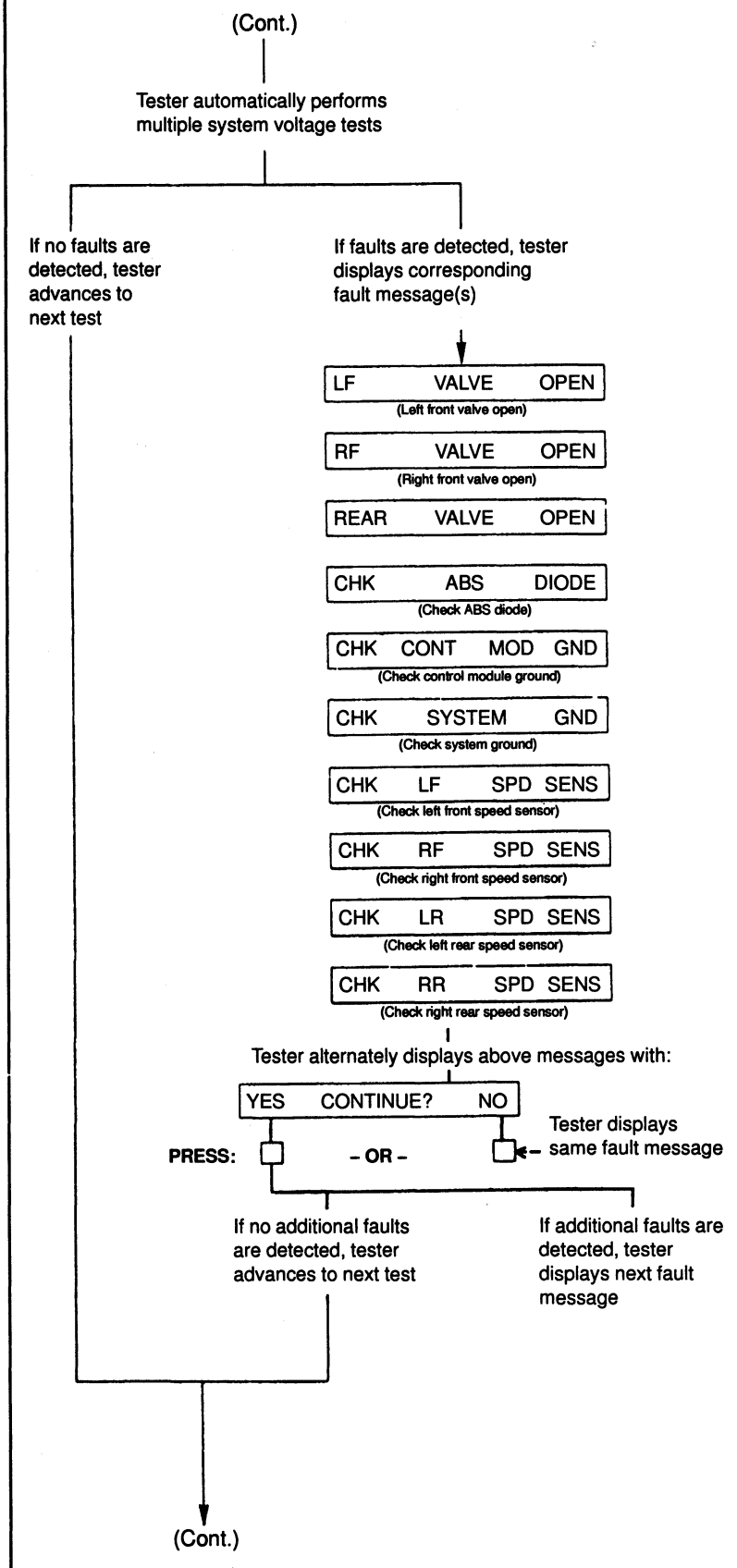


Troubleshooting procedure

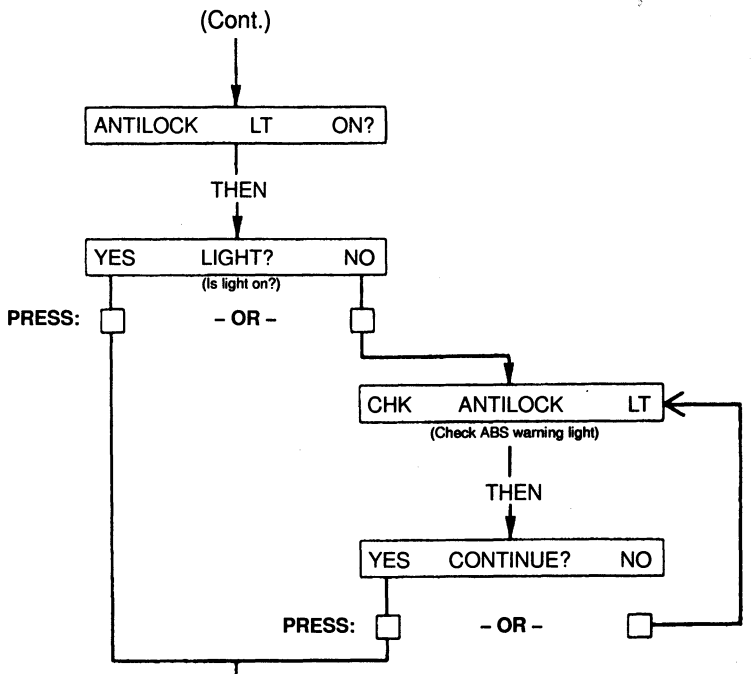
ITEM	
1. CONNECTION / POWER ON	1. Locate ABS control unit. 2. Disconnect control unit harness connector from control unit. 3. Connect ABS tester harness to control unit harness connector. 4. Turn ignition key to ON position.
2. ALTERNATOR TEST ● **Start engine**	Tester rapidly dlsplays several messages during initial segment check. 
3. ABS SYSTEM TEST ● **Turn ignition key ON (Do not run engine)**	Tester rapidly displays several messages during initial segment check. 

4. SYSTEM VOLTAGE CHECKS

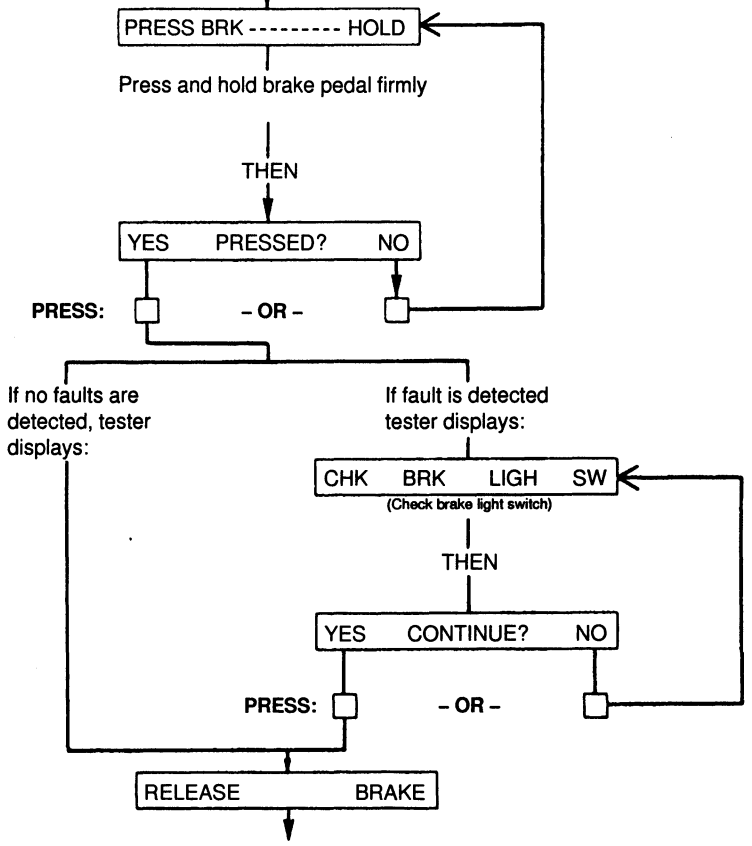
- **If tester displays a fault message, check and repair or replace parts as necessary.**



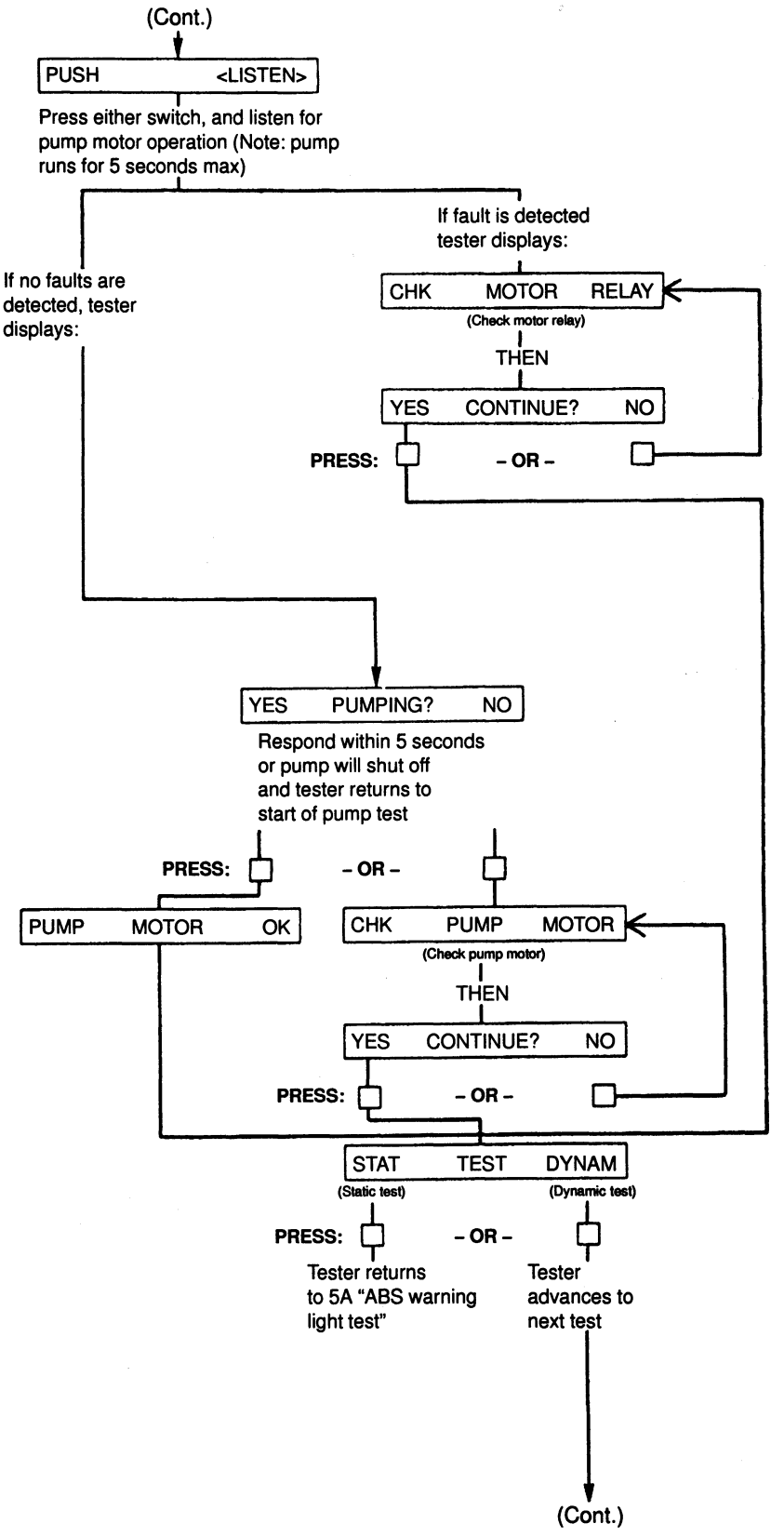
5. STATIC TESTS
5A ABS WARNING LIGHT TEST



5B. BRAKE LIGHT SWITCH TEST



5C PUMP TEST


(Cont.)
PUSH <LISTEN>
Press either switch, and listen for pump motor operation (Note: pump runs for 5 seconds max)
If fault is detected tester displays:
If no faults are detected, tester displays:
CHK MOTOR RELAY
(Check motor relay)
THEN
YES CONTINUE? NO
PRESS:
- OR -
YES PUMPING? NO
Respond within 5 seconds or pump will shut off and tester returns to start of pump test
PRESS:
- OR -
PUMP MOTOR OK
CHK PUMP MOTOR
(Check pump motor)
THEN
YES CONTINUE? NO
PRESS:
- OR -
STAT TEST DYNAM
(Static test)
(Dynamic test)
PRESS:
- OR -
Tester returns to 5A "ABS warning light test"
Tester advances to next test
(Cont.)

6. DYNAMIC TESTS
6A WHEEL SELECTION OR EXIT

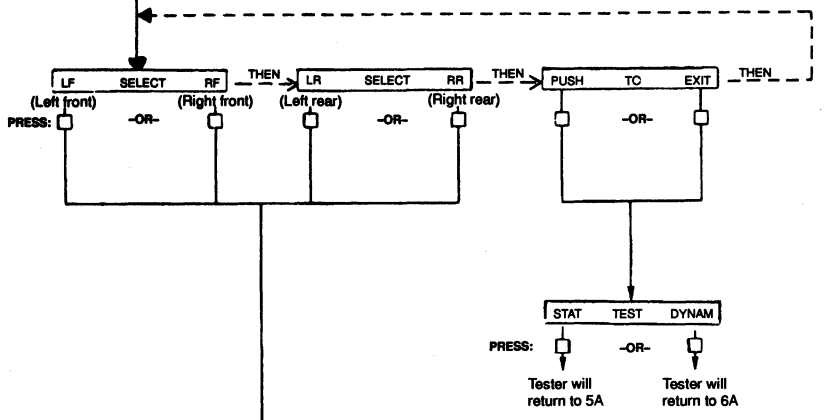
Each messages will displayed 3-1/2 seconds
Select one wheel to begin dynamic test sequence

OR

Press either switch under "PUSH TO EXIT" to return to "STAT TEST DYNAM" selection

IMPORTANT:
After completing testing of selected wheel return to 6A "WHEEL SELECTION," to select another wheel
Complete test procedures for all four wheels

(Cont.)



On level ground, jack up the vehicle and support it evenly on safety stands.
An extra person will be needed to spin wheels during the test.

6B WHEEL SENSOR TEST

SPIN — — TIRE

Display shows wheel selected in 6A

Spin wheel
If speed is incorrect tester displays:

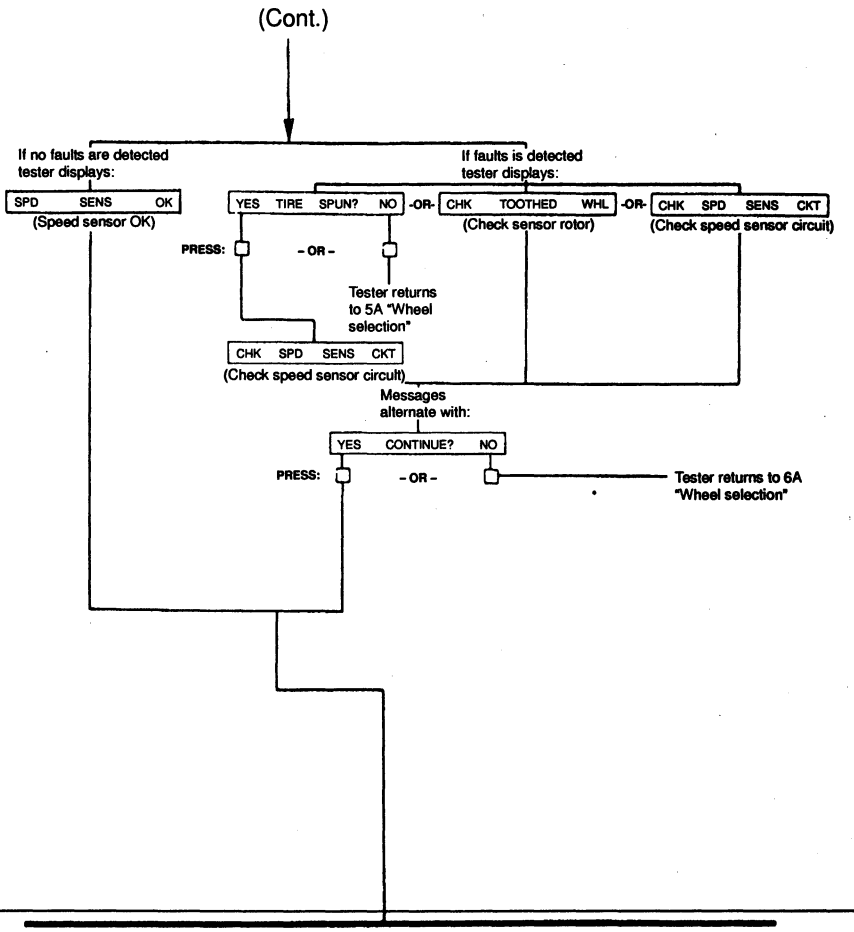
SPIN FASTER

OR

SPIN SLOWER

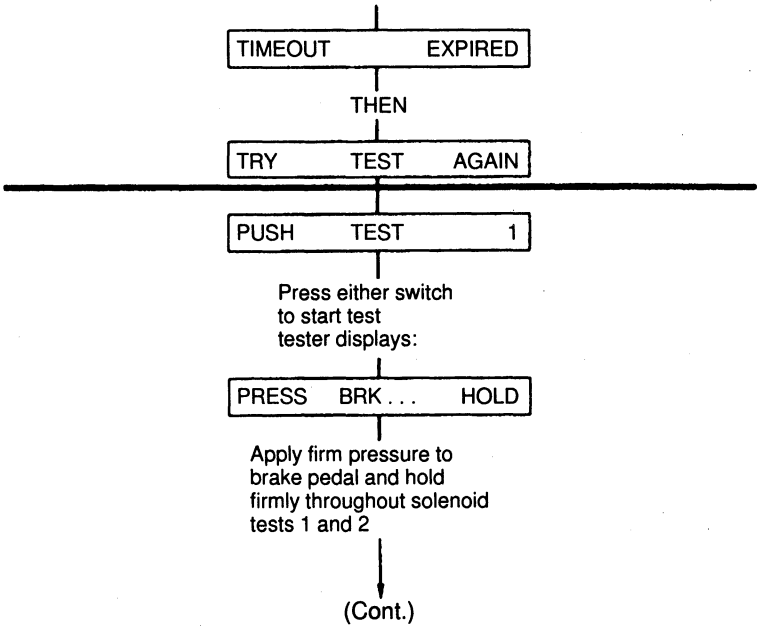
(Cont.)

6B WHEEL SENSOR TEST

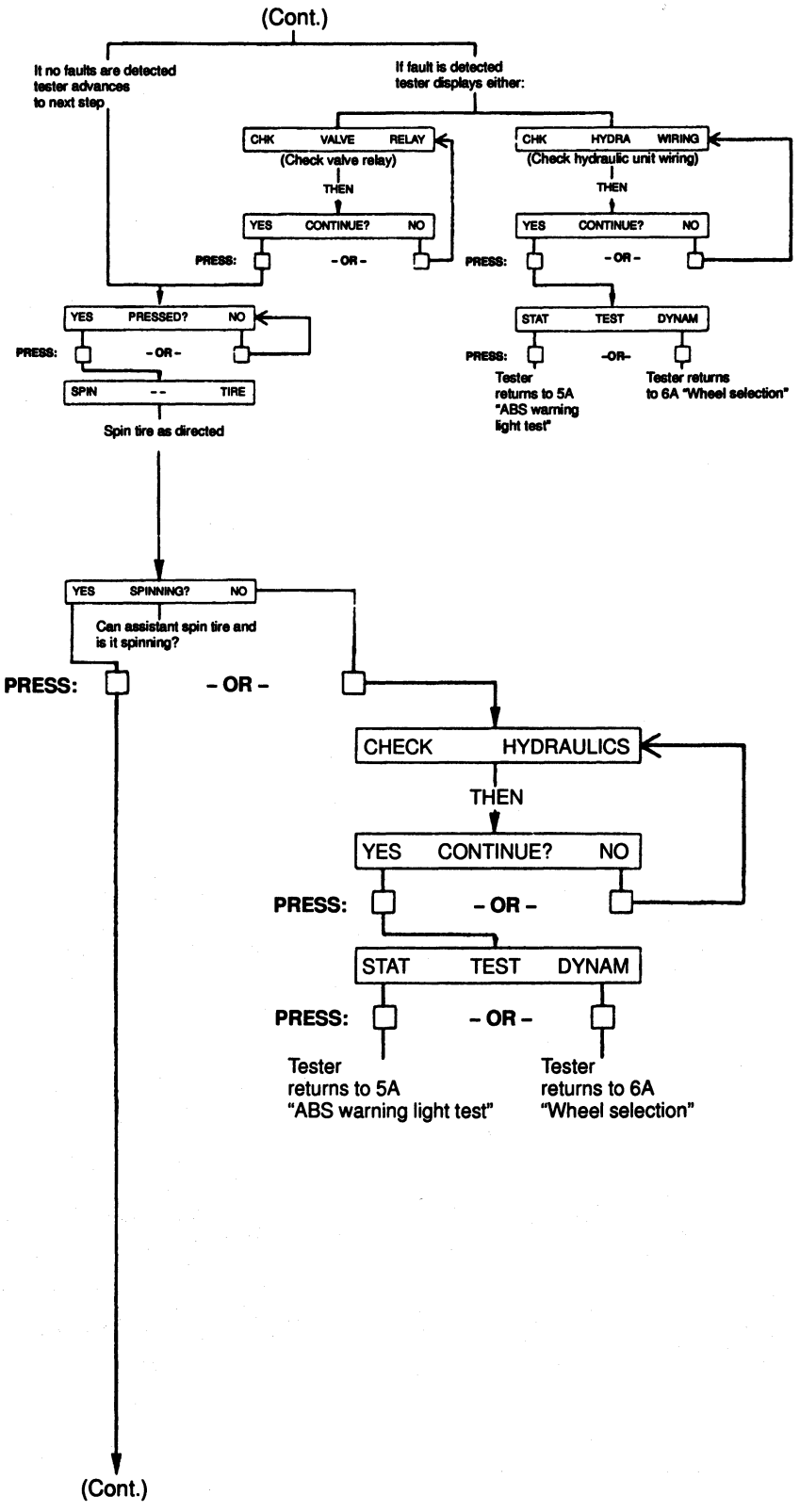


6C SOLENOID TEST

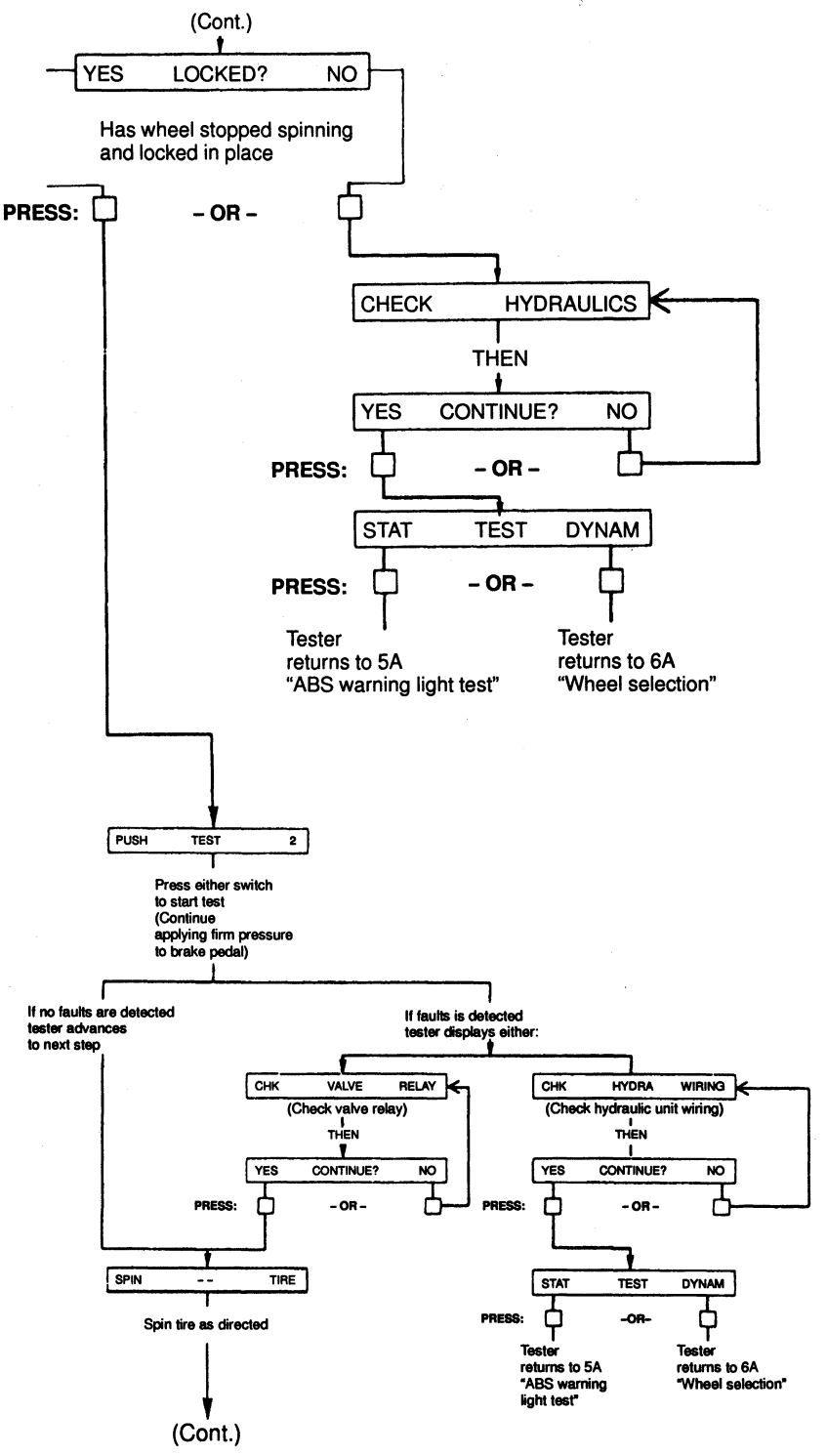
Each solenoid test can be conducted for 15 seconds maximum.
The tester will display the following message if the time limit is exceeded.



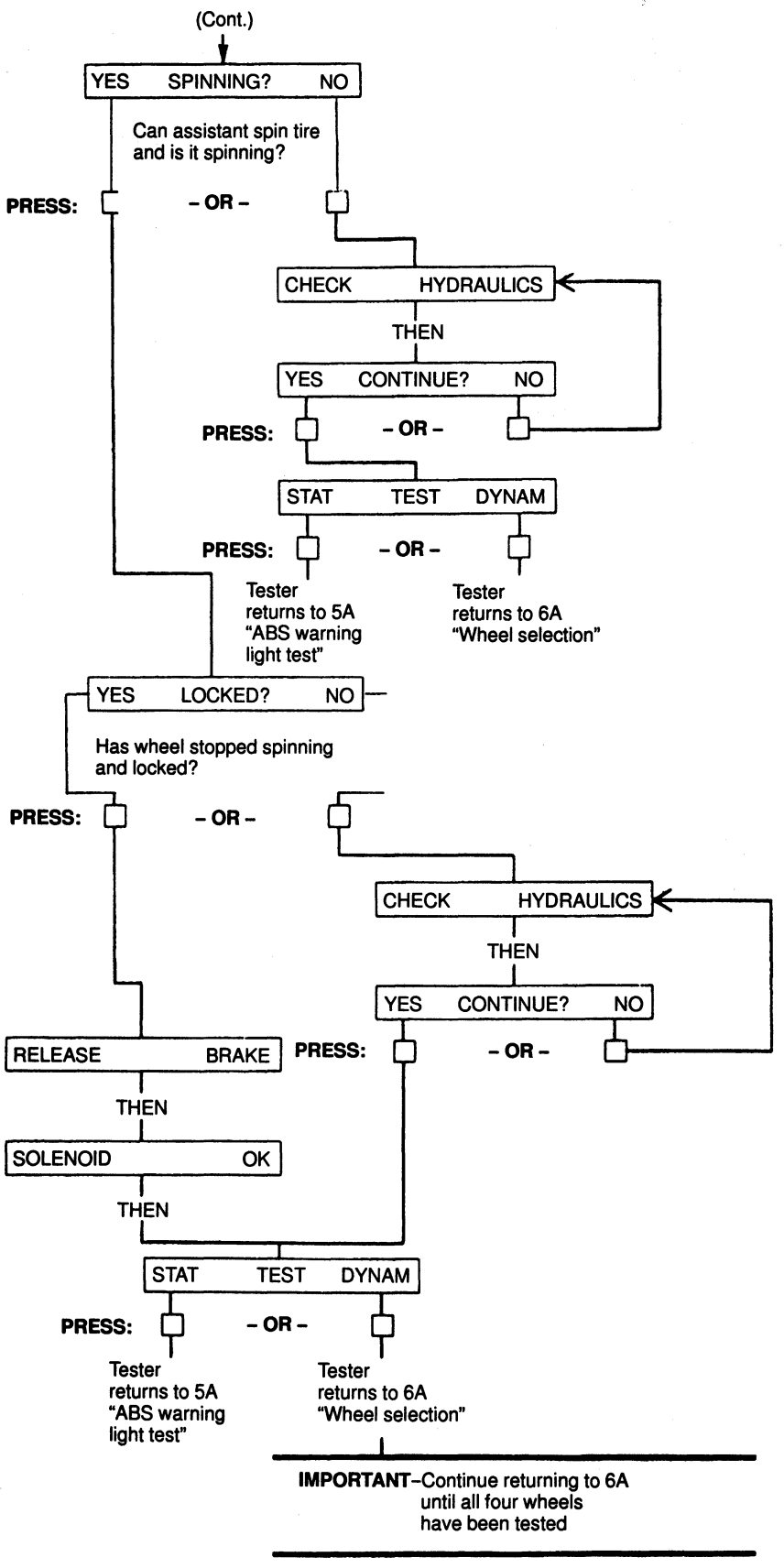
6C SOLENOID TEST

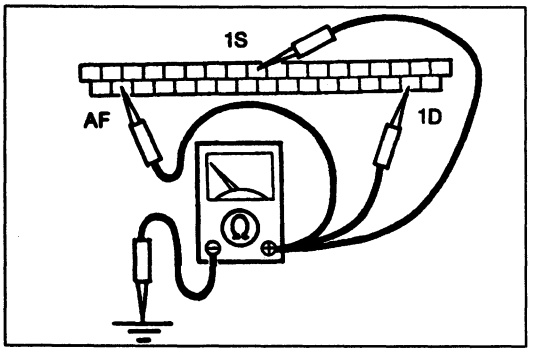


6C SOLENOID TEST



6C SOLENOID TEST



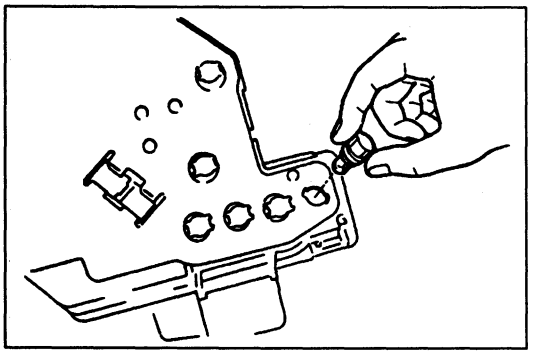


Inspection of ABS system
Check system ground

Check for an open circuit in (B) wire from terminals 1D, 1S, and AF of the ABS control unit O-01 connector and ground.

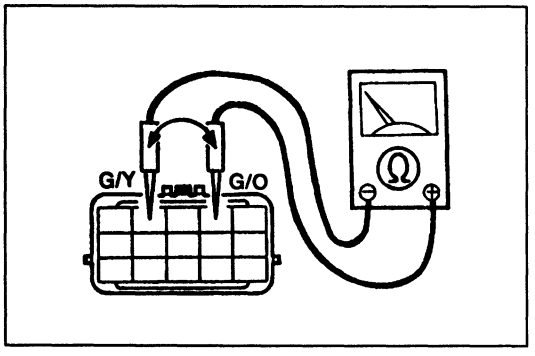
Caution

- **To prevent damage to the terminals, create a probe by wrapping a thin wire around the tester lead before inserting.**



Check antilock warning light

1. Remove the switch assembly. (Refer to 1994 RX-7 body electrical troubleshooting manual section Z4.)
2. Remove and check the ABS warning light bulb.
3. If a problem is found, replace the bulb.
4. If OK repair or replace the wiring harness. (Battery–ABS control unit–ABS warning light)



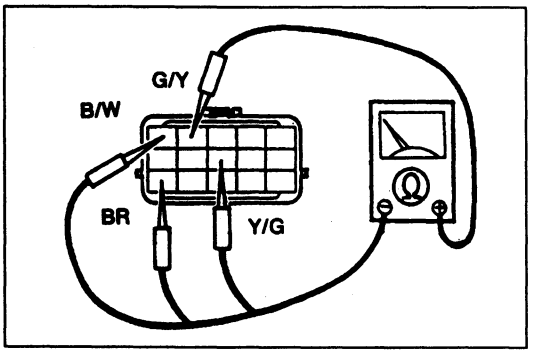
Check ABS diode

1. Check the wiring harness between the warning light and the control unit and hydraulic unit. Repair if necessary.
2. Disconnect the hydraulic unit O-02 connector.
3. Using an ohmmeter, check for continuity between the terminals of the connector (hydraulic unit side).

Terminal	
(G/O)	(G/Y)
O	O

O–O: Continuity

4. If continuity is not specified, replace the hydraulic unit.

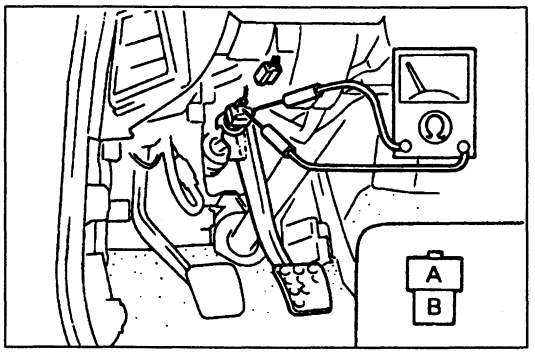


Check front and rear valves

1. Disconnect the negative battery cable.
2. Disconnect the hydraulic unit O-02 connector.
3. Check for continuity between terminals of the connector (hydraulic unit side).

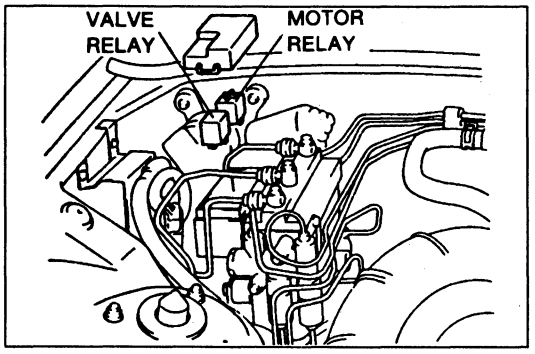
Wire		Continuity
(G/Y)	(Y/G)	Yes
	(BR)	Yes
	(B/W)	Yes

4. If not as specified, replace the hydraulic unit.



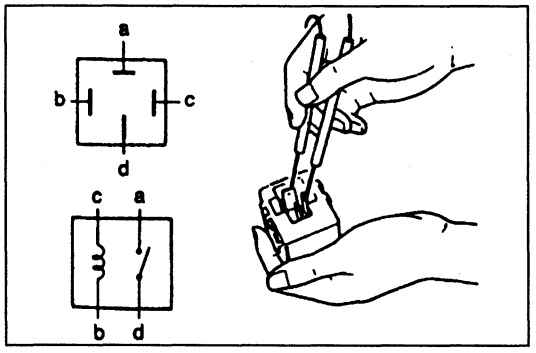
Check stoplight switch

1. Disconnect the stoplight switch connector.
2. Connect an ohmmeter between terminals of the switch.
3. Verify that there is continuity between the terminals when the brake pedal is depressed.
4. If there is no continuity, replace or adjust the stoplight switch.



Check motor relay

1. Disconnect the negative battery cable.
2. Remove the motor relay.

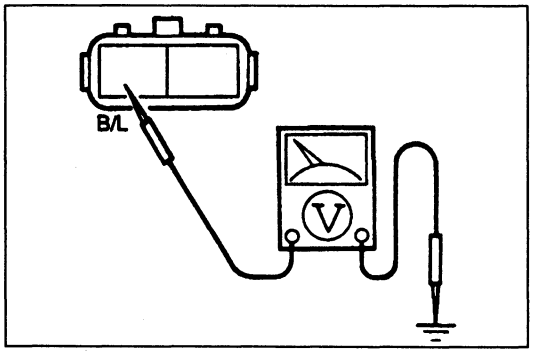


3. Using an ohmmeter, check continuity between terminals of the relay.

Connect to		a	b	c	d
12V	Ground				
—	—		○—○		
c	b	○			○

○—○: Continuity

4. If cotinuity is not as specified, replace the motor relay.

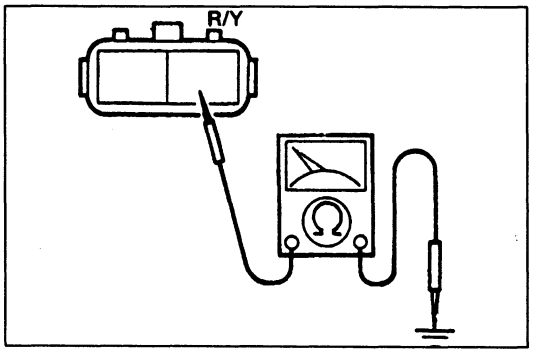


Check pump motor

1. Disconnect the hydraulic unit O-03 connector.
2. Measure the voltage between wire (B/L) and a ground.

Wire	Voltage
(B/L)	Battery positive voltage

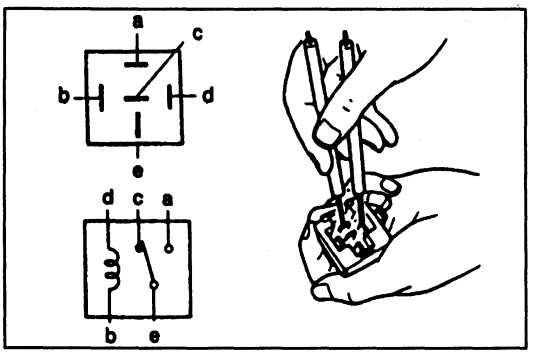
3. If not as specified, check the fuse (MAIN and ABS 60A) and repair or replace the wiring harness (battery-hydraulic unit).



4. If as specified, check for continuity between wire (G) of O-03 connector and a ground (hydraulic unit side).

Wire	Continuity
(R/Y)	Yes

5. If there is no continuity, replace the hydraulic unit.



Check valve relay

1. Disconnect the negative battery cable.
2. Remove the valve relay.
3. Using an ohmmeter, check for continuity between terminals of the relay.

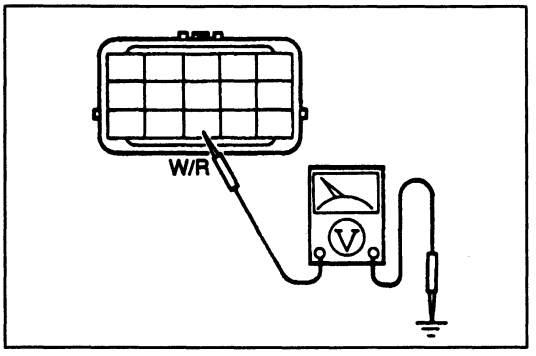
Connect to		a	b	c	d	e
12V	Ground					
—	—		○	○	○	○
b	d	○				○

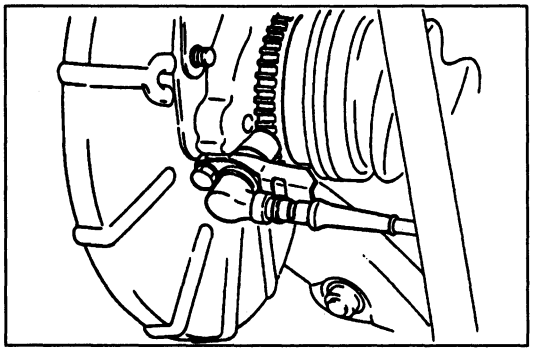
○-○: Continuity

4. If continuity is not as specified, replace the valve relay.
5. If as specified, connect the negative battery cable.
6. Disconnect the hydraulic unit O-02 connector.
7. Measure voltage between wire (W/R) of O-02 connector and ground.

Wire	Voltage
(W/R)	Battery positive voltage

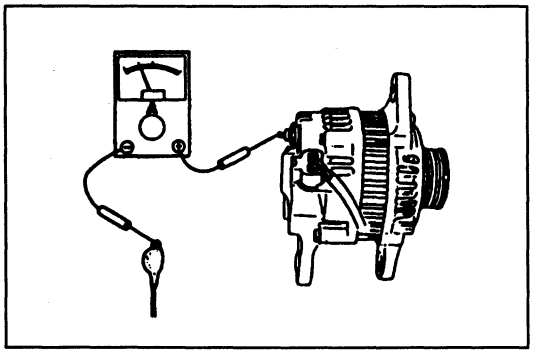
8. If not as specified, check the fuse (MAIN and ABS 15A) and repair or replace the wiring harness (battery-hydraulic unit).





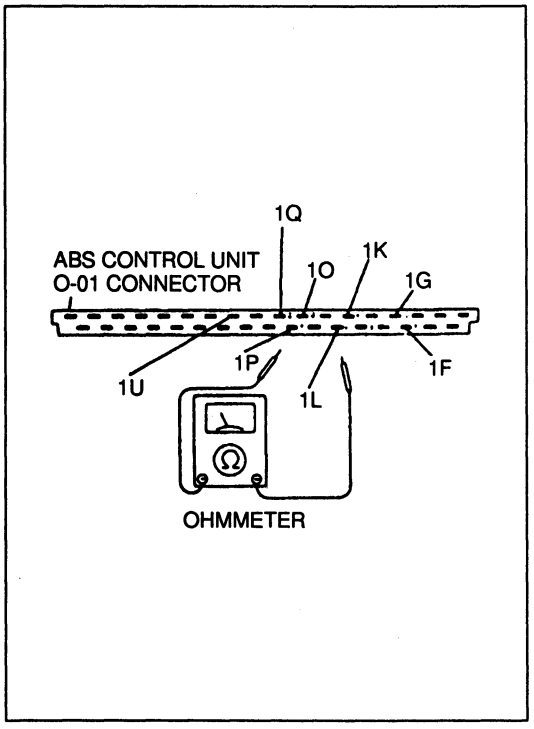
Check rotor

1. Check the rotor for looseness and missing or damaged teeth.
2. Replace if necessary.



Check alternator

Refer to section G.



Check wheel-speed sensor

1. Disconnect the O-01 connector.
2. Using an ohmmeter, check for continuity between the ABS control unit O-01 connector terminals.

Sensor \ Terminal	1K	1G	1O	1Q	1U	1F	1L	1P
Left front	○—○							
Right front					○—○			
Left rear			○—○					
Right rear							○—○	

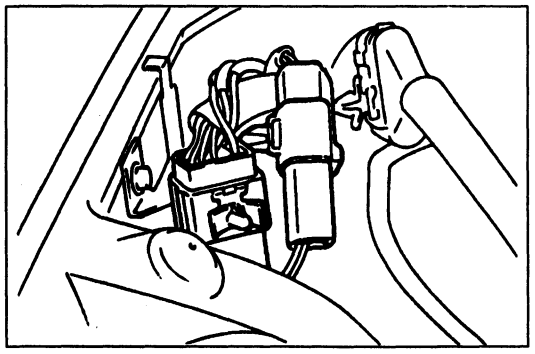
○—○: Continuity

2. If the continuity is not as specified, repair the wiring harness (wheel-speed sensor–ABS control unit).
3. If continuity is as specified, check voltage between the following terminals while rotating the wheel one rotation per second by hand.

Sensor	Terminal	Voltage
Left front	1K and 1G	50–60 mV*
Right front	1U and 1F	50–60 mV*
Left rear	10 and 1Q	50–60 mV*
Right rear	1L and 1P	50–60 mV*

*Alternating current voltage

4. If voltage is not as specified, replace the wheel-speed sensor.
5. If voltage is as specified, replace the ABS control unit.



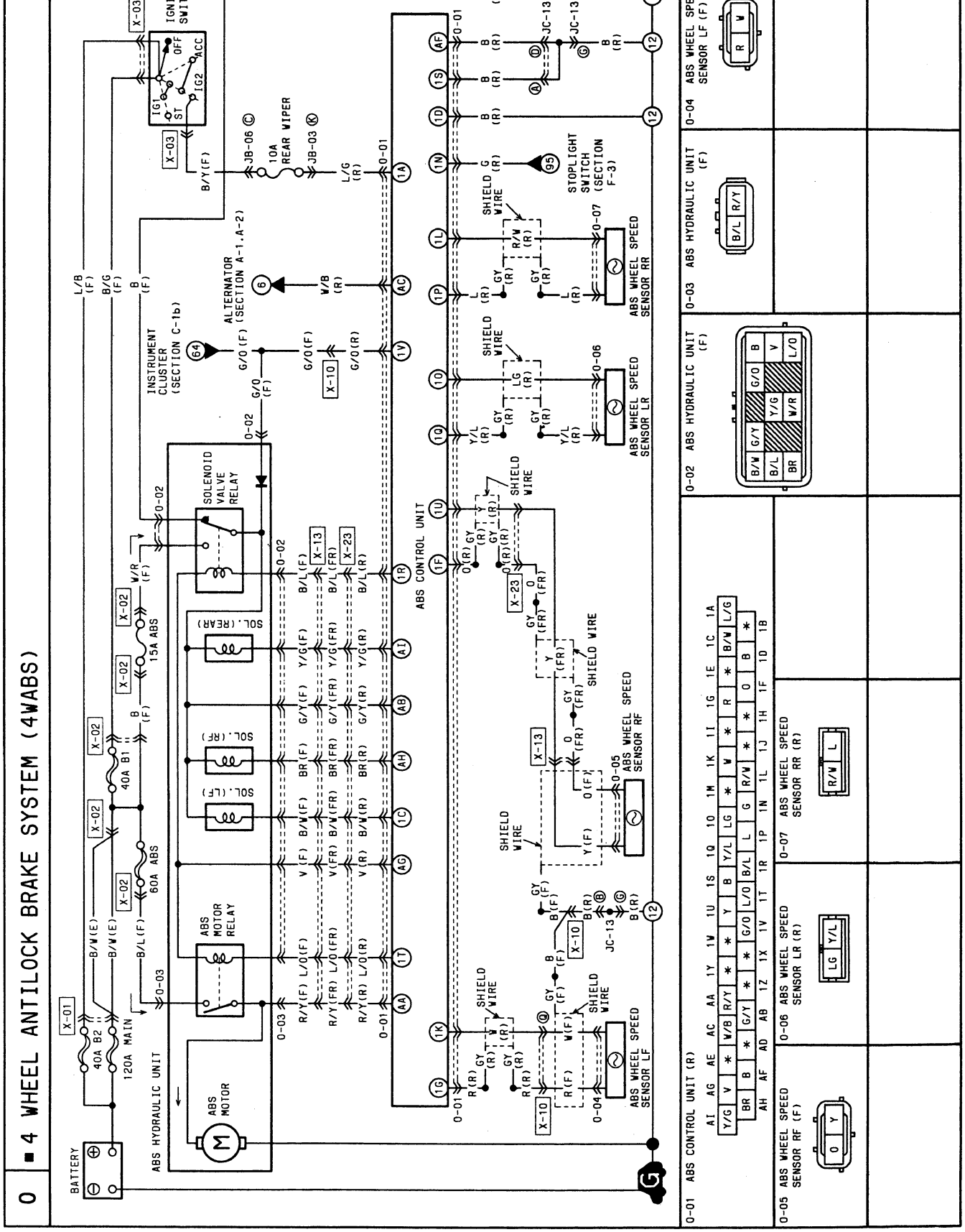
Check hydraulics

Verify that all brake fluid line connections are tight and that no fluid is leaking.

Check hydraulic unit wiring

1. Verify that the hydraulic unit connectors are properly secured.
2. Verify that the valve relay and motor relay are properly secured.

SERVICE POINTS
Circuit Diagram



Electrical diagnosis support
Hydraulic Unit (HU)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Valve relay, motor relay and solenoid valve–ABS CU	System shut down ↓ Normal braking	System shut down ↓ Normal braking	NA
HU–Fuse–Battery	System shut down ↓ Normal braking	System shut down ↓ Normal braking Fuse (ABS) burns out	NA
Motor–Ground	System shut down ↓ Normal braking	No symptom	System shut down ↓ Normal braking
O–02 connector (B) –Ground	ABS warning light does not illuminate when ABS CU disconnected	No symptom	ABS warning light does not illuminate when ABS CU disconnected
HU–ABS warning light	ABS warning light does not illuminate when ABS CU disconnected	ABS warning light illuminates continuously	NA

Wheel-speed sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
Wheel speed sensor–ABS CU	Partial control	Partial control	NA

Partial control: If failure occurs during ABS operation, system is controlled by remaining sensors until ABS cycle is completed, then system is shut down.
NA: Not applicable

ABS Control Unit (ABS CU)

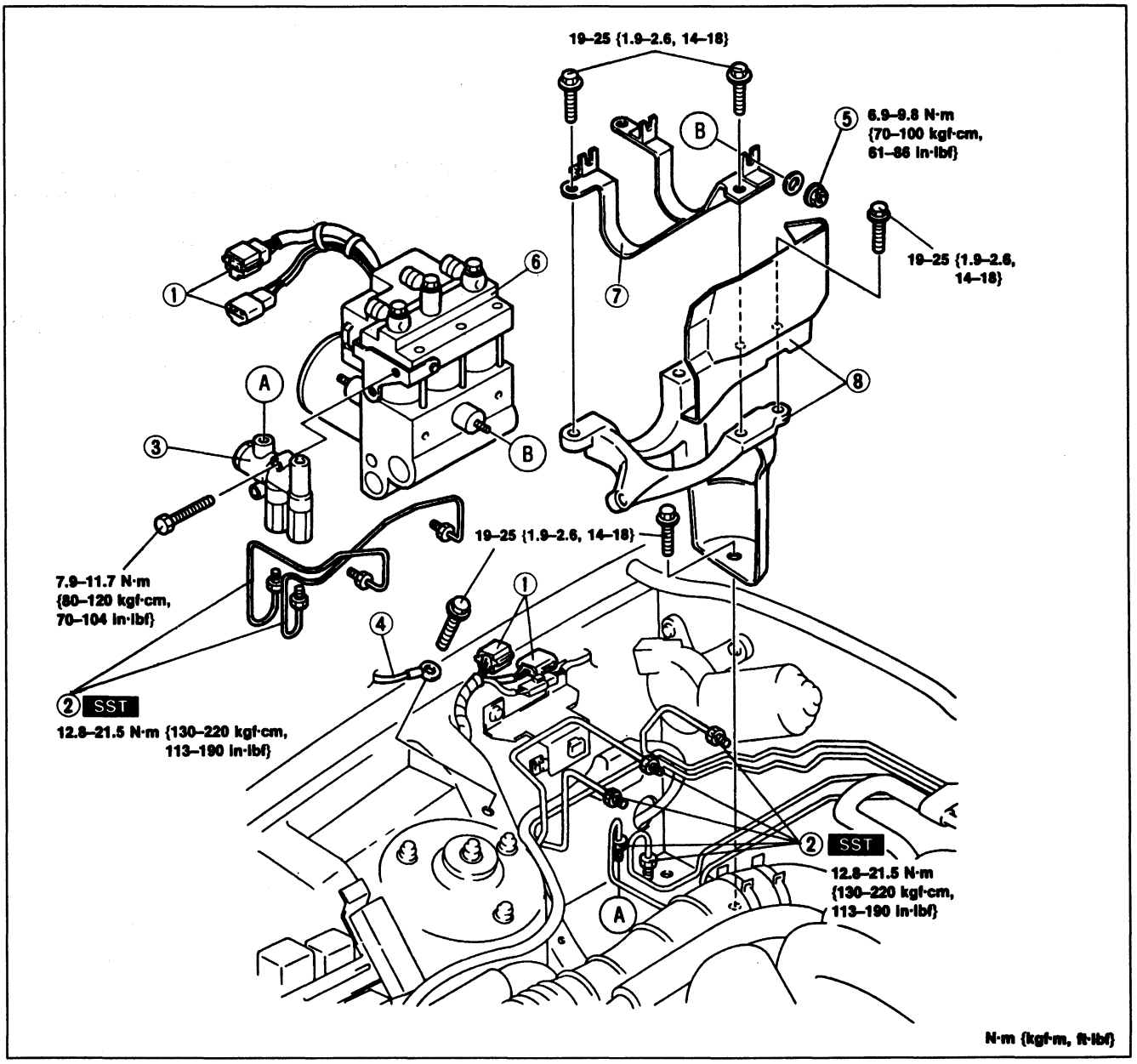
Circuit	Condition		
	Open circuit	Short circuit	Poor ground
ABS CU–Ignition switch–Battery	System shut down ↓ Normal braking	System shut down ↓ Normal braking Fuse (AIR CON 15A) burns out	NA
ABS CU–Stoplight switch–Battery	ABS controllability slightly down on low coefficient road, but no other effects	ABS controllability slightly down on low coefficient road, but no other effects Fuse (STOP 20A) burns out	NA
ABS CU–Alternator	ABS warning light remains illuminated after engine started ABS control normal	ABS warning light remains illuminated after engine started ABS control normal	NA
ABS CU–Ground	If all ground harnesses are open, system shut down	No symptom	If all ground harnesses are open, system shut down
ABS CU–ABS warning light	ABS warning light does not illuminate when ABS CU disconnected ABS warning light does not illuminate when ignition switch is ON and system has been shut down	ABS warning light illuminates continuously	NA

NA: Not applicable

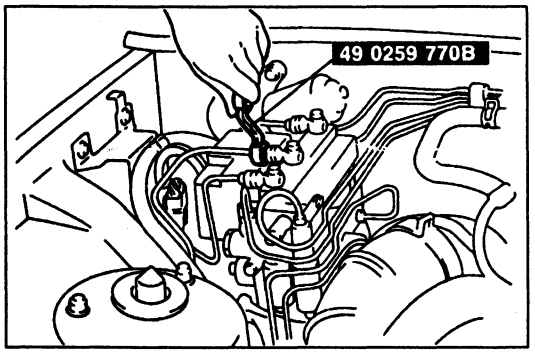
HYDRAULIC UNIT

Removal / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. The only serviceable parts of the hydraulic unit are the valve relay and the motor relay, if there is a failure of any other part, replace the hydraulic unit assembly.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Add fluid and bleed the air. (Refer to page P-7.)
6. Check for fluid leakage. (Refer to page P-8.)



1. Connector
2. Brake pipe
   Removal Note ..... page P-57
   Installation Note ..... page P-57
3. Proportioning bypass valve
4. Ground wire
5. Nut
6. Hydraulic unit
   Disassembly / Inspection / Assembly .... page P-58
7. ABS bracket
8. Insulator and bracket



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 pipe by using the **SST**.

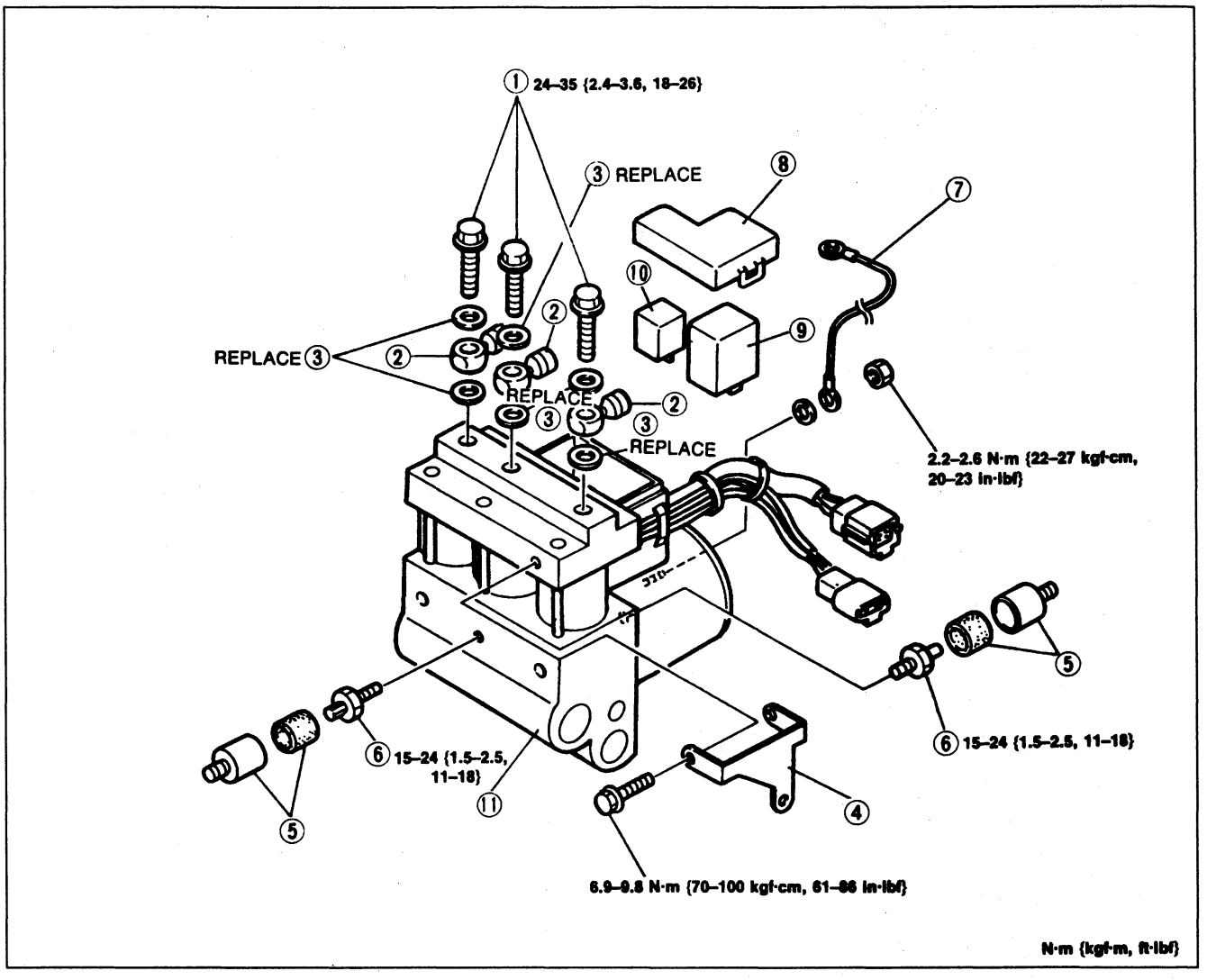
Installation note
Brake pipe

1. Modify the brake pipe flare nut tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI "Torque Formulas".)
2. Tighten the brake pipes by using the **SST**.

Tightening torque:
12.8–21.5 N·m{130–220 kgf·cm,113–190 in·lbf}

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.

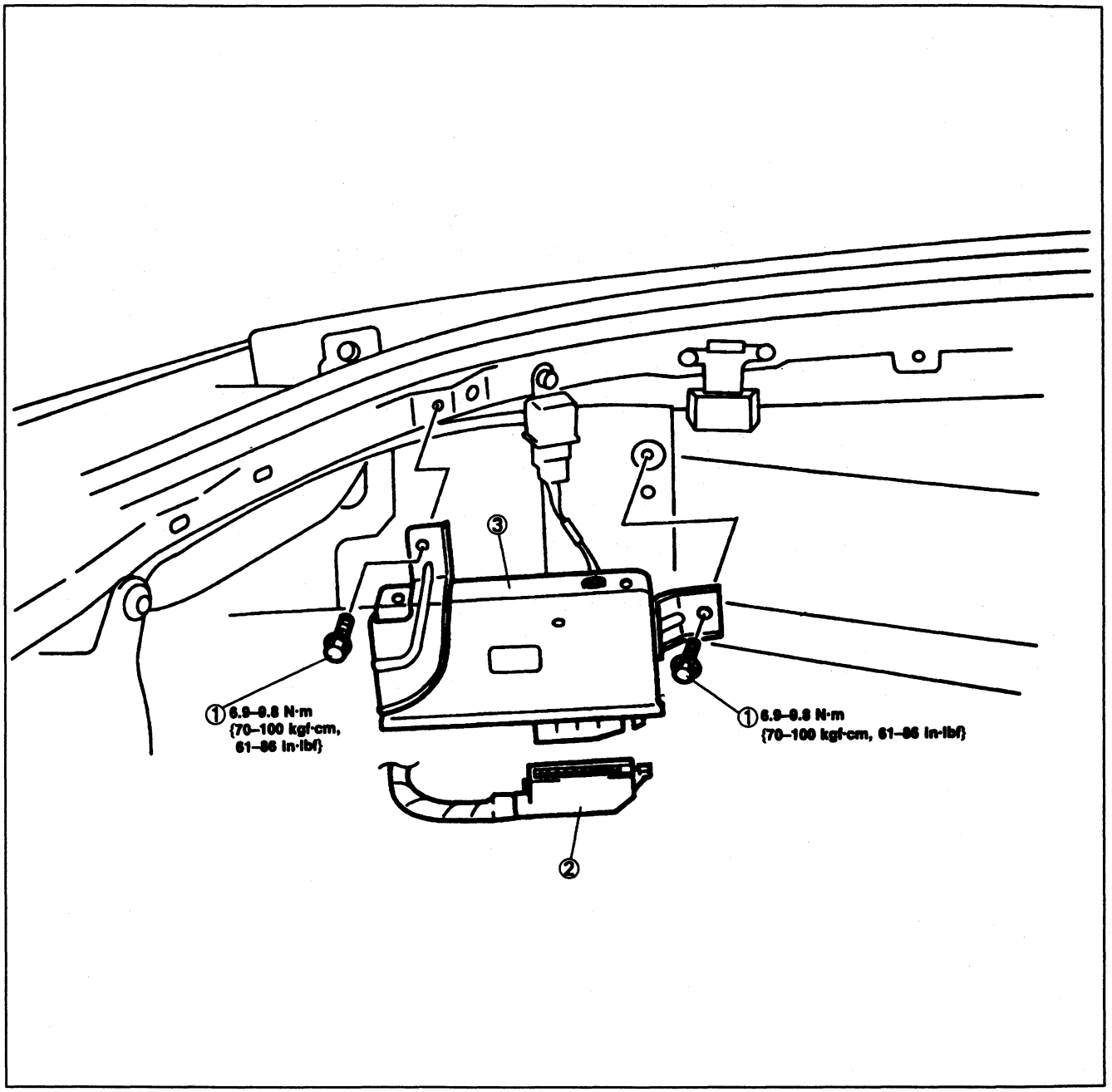


1. Connector bolt
2. Pipe joint
3. Gasket
4. Proportioning bypass valve holder
5. Casing and mount rubber
6. Hex stud
7. Ground wire
8. Cover
9. Motor relay
   Inspection .... page P–64
10. Valve relay
    Inspection .... page P–64
11. Hydraulic unit

ABS CONTROL UNIT

Removal / Installation

1. Disconnect the negative battery cable.
2. Remove the luggage compartment side trim. (Refer to section S.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.

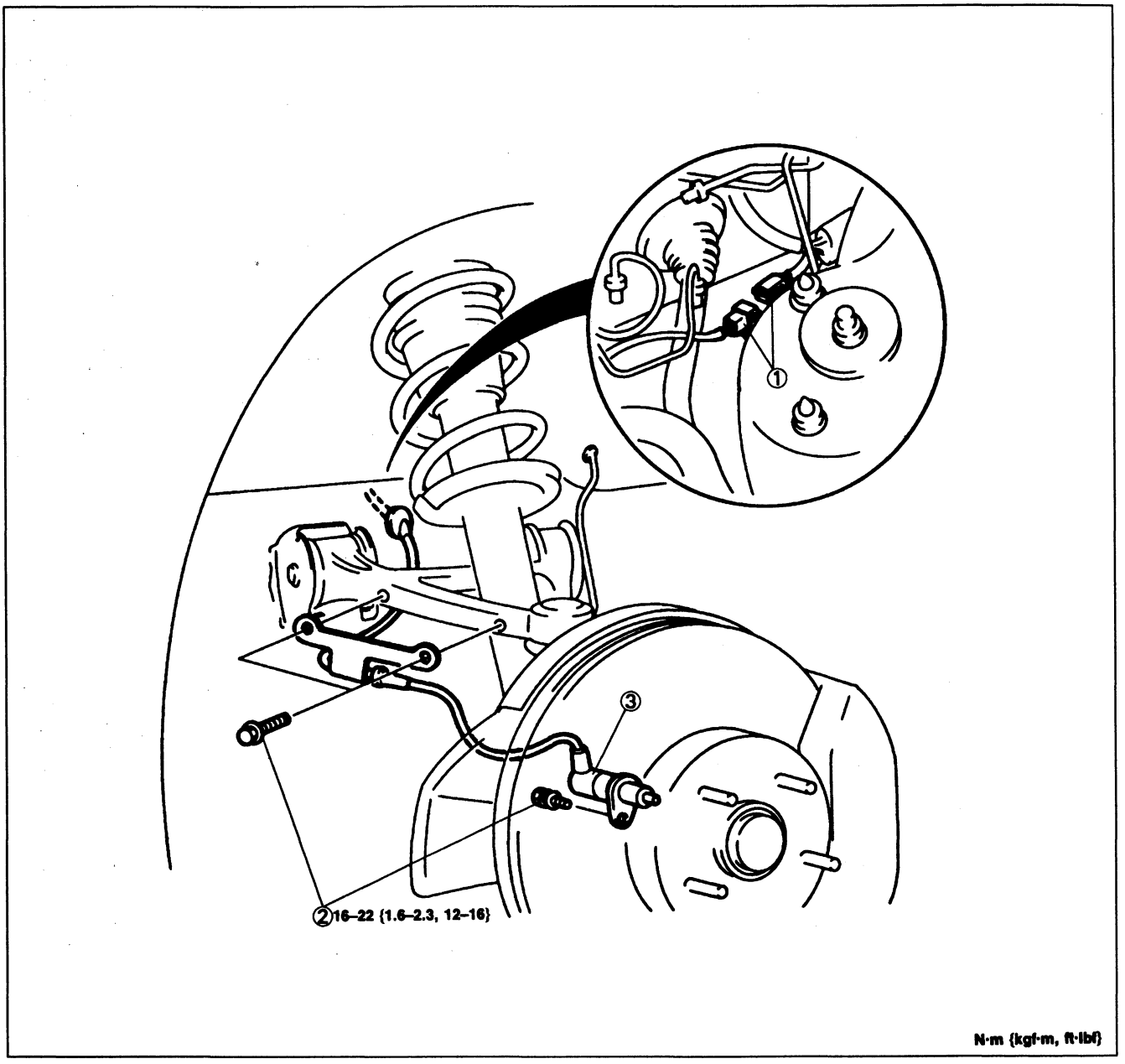


1. Bolt
2. Connector
3. ABS control unit

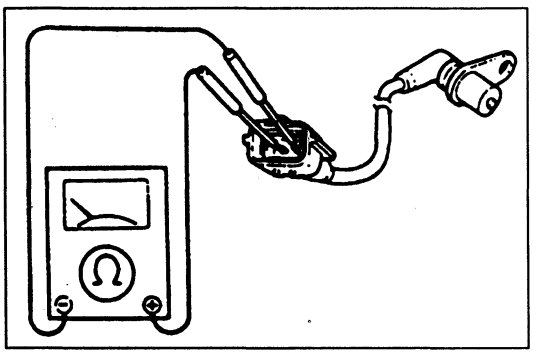
WHEEL-SPEED SENSOR (FRONT)

Removal / Installation

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



1. Connector
2. Bolt
3. Wheel-speed sensor (front)
   Inspection ..... below



Inspection

Wheel speed sensor (front)

1. Measure resistance between terminals of the wheel-speed sensor.

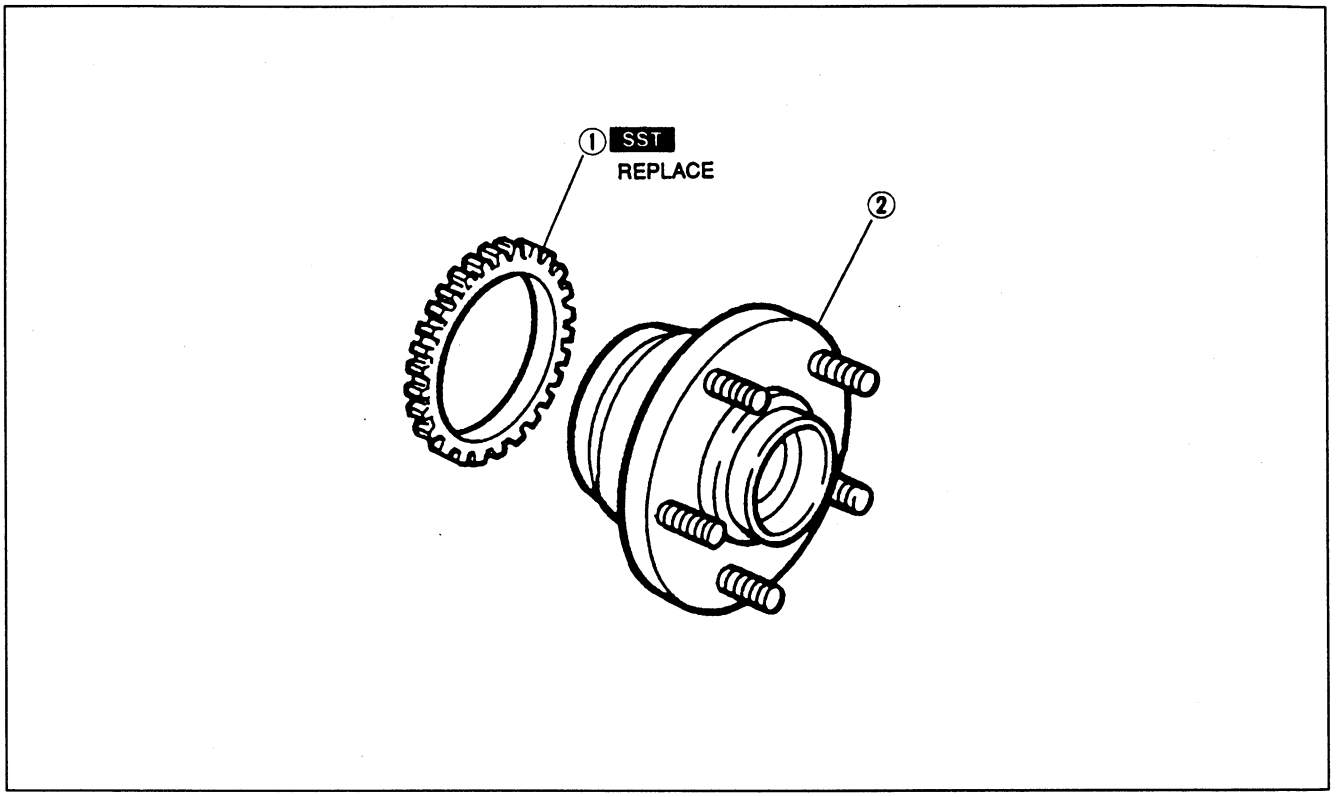
   Resistance: 0.8–1.2 kΩ

2. If resistance is not as specified, replace the wheel-speed sensor.

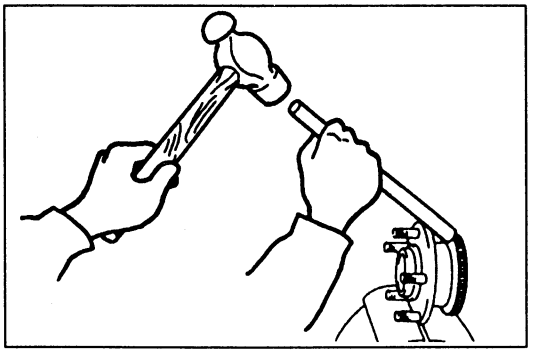
SENSOR ROTOR (FRONT)

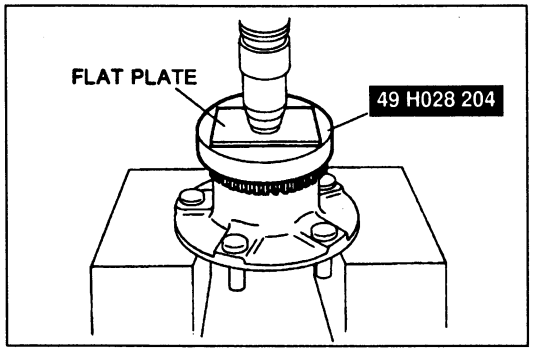
Removal / Installation

1. Remove the 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 reverse order of removal, referring to **Installation Note**.
4. Install the wheel hub assembly to the vehicle. (Refer to section M.)



1. Sensor rotor (front)
   Removal Note ..... below
   Installation Note ..... below
2. Front wheel hub assembly





Removal note
Sensor rotor (front)

Note
- **The sensor rotor does not need to be removed unless you are replacing it.**

Remove the sensor rotor by using a brass bar and a hammer.

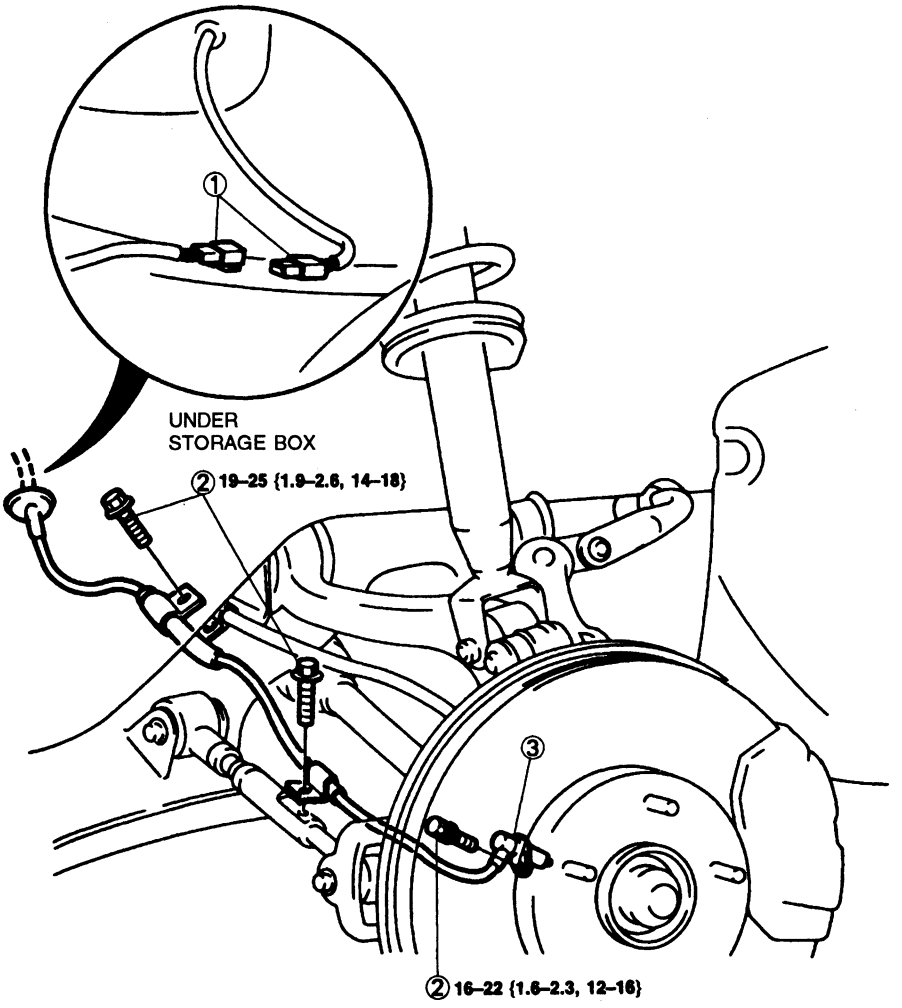
Installation note
Sensor rotor (front)

Press on the new sensor rotor by using the **SST**.

WHEEL-SPEED SENSOR (REAR)

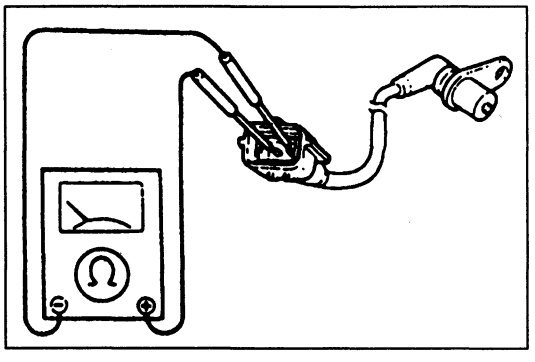
Removal / Installation

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



N·m {kgf-m, ft-lbf}

1. Connector
2. Bolt
3. Wheel-speed sensor (rear)
   Inspection ..... below



Inspection

Wheel-speed sensor (rear)

1. Measure resistance between terminals of the wheel-speed sensor.

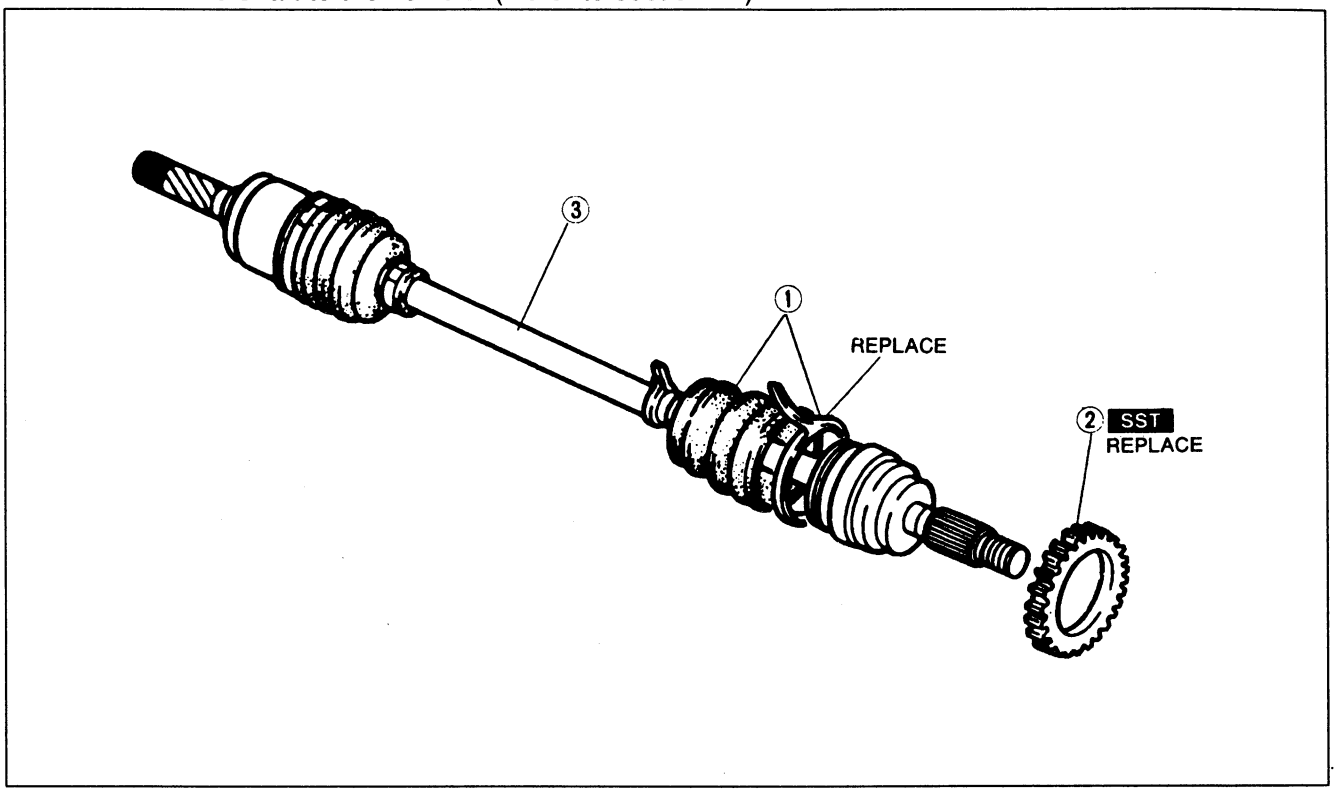
   Resistance: 0.8–1.2 kΩ

2. If resistance is not as specified, replace the wheel-speed sensor.

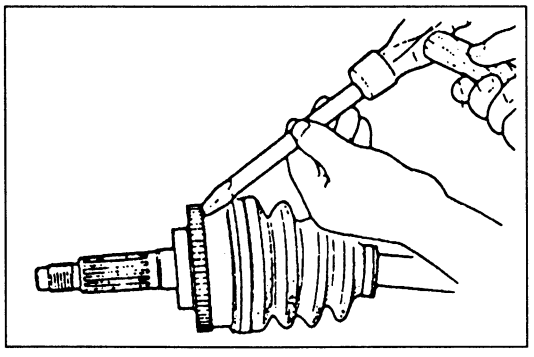
SENSOR ROTOR (REAR)

Removal / Installation

1. Remove the drive shaft from the vehicle. (Refer to section M.)
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. Install the drive shaft to the vehicle. (Refer to section M.)



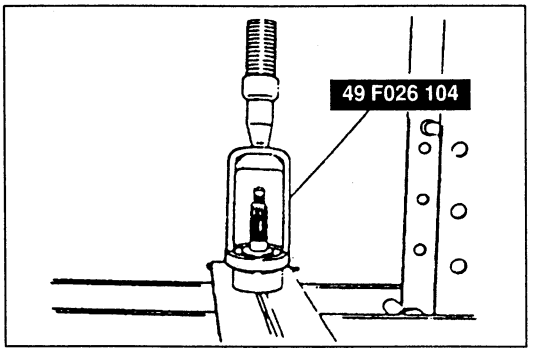
1. Boot band and boot
2. Sensor rotor (rear)
   Removal Note ..... below
   Installation Note ..... below
3. Drive shaft



Removal note
Sensor rotor (rear)

Note
- The sensor rotor does not need to be removed unless you are replacing it.

Tap the sensor rotor off the drive shaft by using a chisel and a hammer.

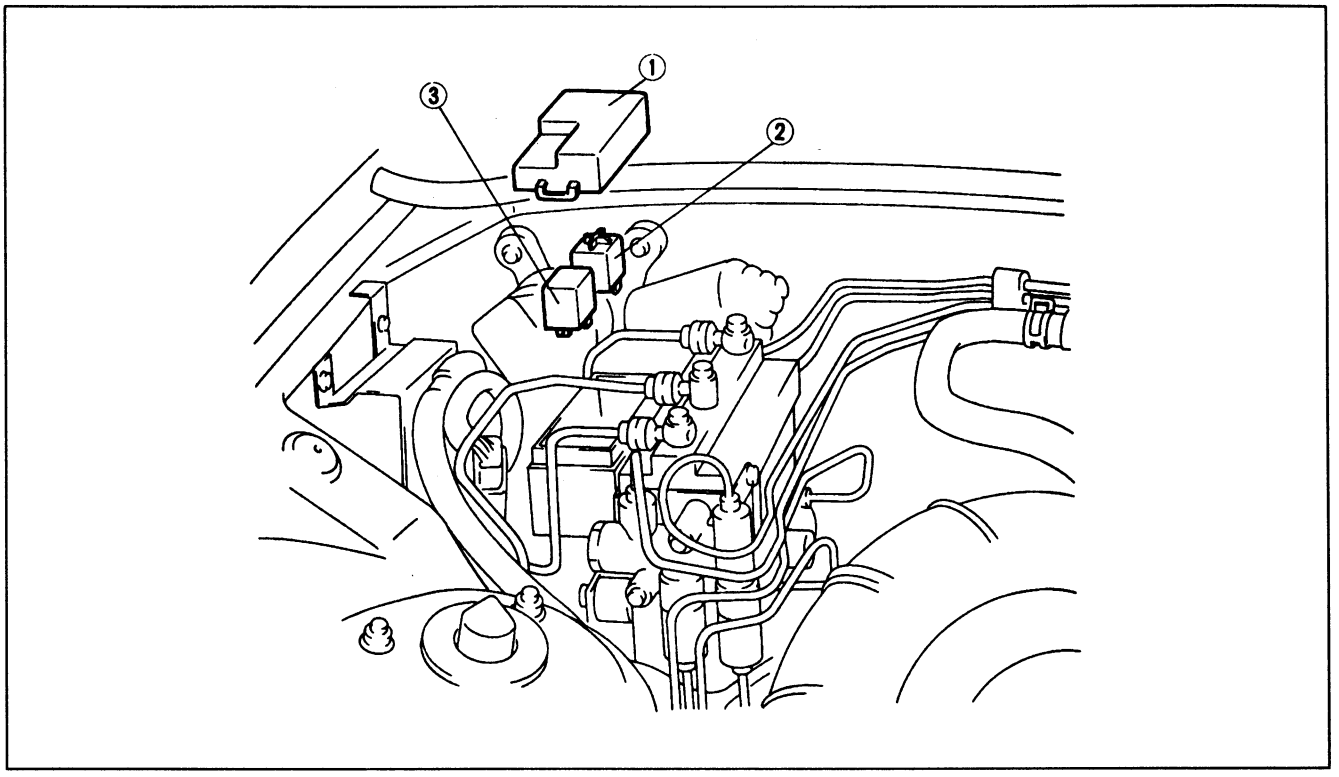


Installation note
Sensor rotor (rear)
Set a new sensor rotor on the drive shaft and press it on by using the **SST**.

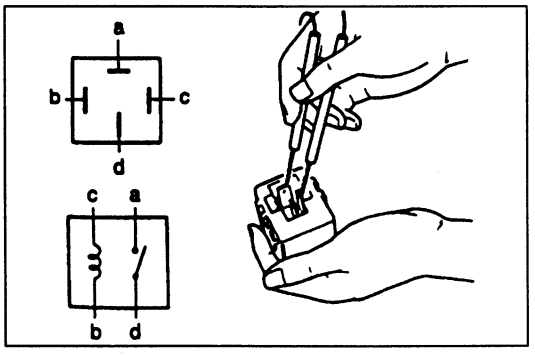
RELAY

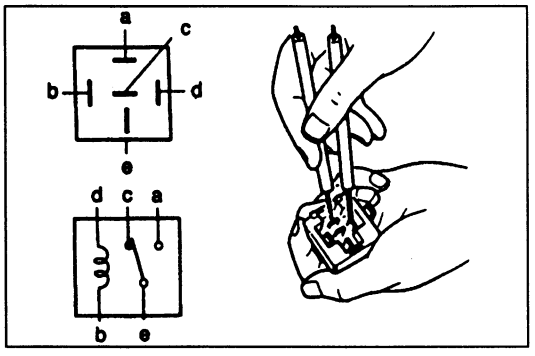
Removal / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.



1. Cover
2. Motor relay
   Inspection ..... below
3. Valve relay
   Inspection ..... below





Inspection

Motor relay

1. Using an ohmmeter, check for continuity between the relay terminals.

Connect to		a	b	c	d
12V	Ground				
—	—		○	○	
c	b	○			○

○-○: Continuity

2. If continuity is not as specified, replace the motor relay.

Valve relay

1. Using an ohmmeter, check for continuity between the relay terminals.

Connect to		a	b	c	d	e
12V	Ground					
—	—		○	○	○	○
b	d	○				○

○-○: Continuity

2. If continuity is not as specified, replace the valve relay.

WHEELS AND TIRES

OUTLINE

SPECIFICATIONS

Item \ Type			Standard	Temporary spare
wheel	Size		16 × 8JJ	16 × 4T
	Offset	mm {in}	50 {1.97}	40 {1.57}
	Pitch circle diameter	mm {in}	114.3 (4.50)	
	Material		Aluminum alloy	
Tire	Size		P225/50R16 91V P225/50 ZR 16	T135/70D16
	Air pressure	kPa {kgf/cm^2, psi}	220 {2.2, 32}	415 {4.2, 60}

TROUBLESHOOTING GUIDE

Problem	Possible cause	Action	Page
Excessive or irregular tire wear	Refer to page Q–4 for details.		
Premature tire wear	Incorrect tire pressure	Adjust	Q–3
Tire squeal	Incorrect tire pressure Tire deterioration	Adjust Replace	Q–3 —
Road noise or body vibration	Insufficient tire pressure Unbalanced wheel Deformed wheel or tire Irregular tire wear	Adjust Adjust Repair or replace Replace	Q–3 Q–5 — —
Shake (steering wheel vibrates up/down)	Excessive tire or wheel runout Loose lug nuts Unbalanced wheel Cracked or worn engine mount rubber Cracked or worn transmission mount rubber	Replace Tighten Adjust or replace Replace Replace	— Q–4 Q–5 Section C Section J, K
Shimmy (steering wheel vibrates left/right)	Cracked or worn steering gear mount rubber Loose steering gear mounting bolts Stuck or damaged steering ball joint Excessive tire or wheel runout Loose lug nuts Unbalanced wheel Insufficient tire pressure Unevenly worn tires Malfunction of shock absorber Loose shock absorber mounting bolts Stuck or damaged lower arm ball joint Cracked or worn suspension bushings Damaged or worn front wheel bearing Improperly adjusted front wheel alignment	Replace Tighten Replace Replace Tighten Adjust or replace Adjust Replace Replace Tighten Replace Replace Replace Adjust	Section N Section N Section N — Q–4 Q–5 Q–3 — Section R Section R Section R Section R Section M Section R
Uneven (onesided) braking	Unequal tire pressures	Adjust	Q–3
Steering wheel doesn't return properly or pulls left or right	Incorrect tire pressure Irregular tire wear (left/right) Unequal tire pressures Different types or brands of tires mixed (left/right) Loose lug nuts	Adjust Replace Adjust Replace Tighten	Q–3 — Q–3 — Q–4
General driving instability	Unequal tire pressures Damaged or unbalanced wheel Loose lug nuts	Adjust Replace or adjust Tighten	Q–3 Q–5 Q–4
Excessive steering wheel play	Loose lug nuts	Tighten	Q–4

WHEELS AND TIRES

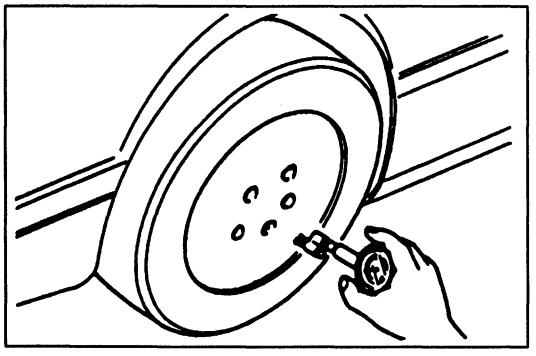
SPECIAL NOTES ABOUT WHEELS AND TIRES

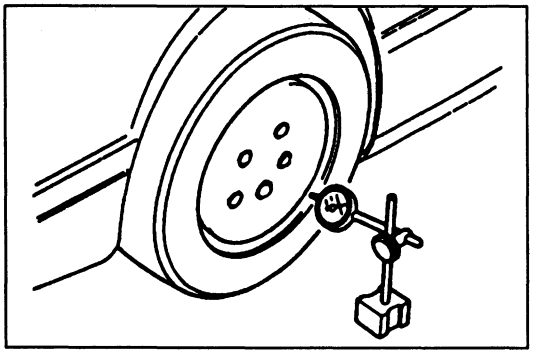
1. Do not use wheels or tires other than the specified types.
2. Aluminum wheels are easily scratched. When washing them, use a soft cloth, never a wire brush. If the vehicle is steam cleaned, do not allow boiling water to contact the wheels.
3. If alkaline compounds (such as salt-water or road salts) 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. Apply a soapy solution to the tire bead and the edge of the rim.
3. Use a wire brush, sandpaper, or cloth to clean and remove all rust and dirt from the rim edge and the rim bead. For aluminum wheels, use only a cloth for this purpose; never use 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. After mounting a tire onto a wheel, inflate it to 250–300 kPa {2.5–3.0 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.
7. 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

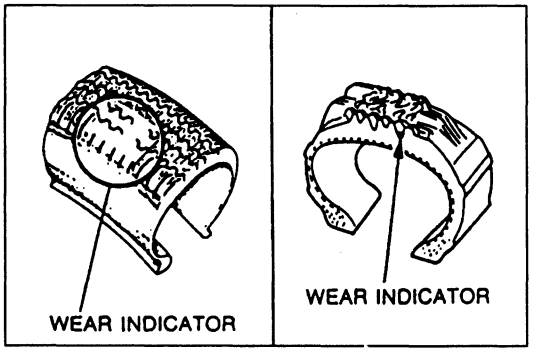
Perform the following inspections and adjust or replace as necessary.

1. Check the air pressure of all tires when they are cold, including the spare tire.

Air pressure
Standard tire: 220 kPa {2.2 kgf/cm^2, 32 psi}
Temporary spare tire: 415 kPa {4.2 kgf/cm^2, 60 psi}

2. Turn the wheel one full revolution and check the wheel runout.

Wheel runout
Horizontal: 2.0 mm {0.079 in} max.
Vertical: 1.5 mm {0.059 in} max.

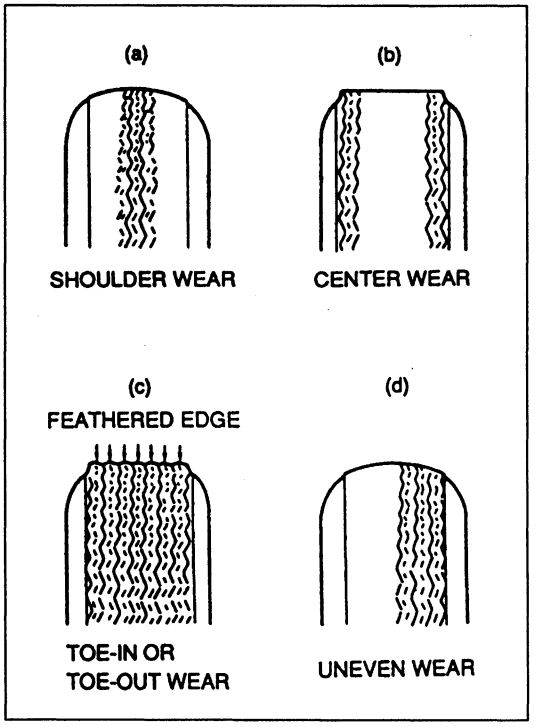


3. Inspect for tire wear.

Specifications

Remaining tread
Ordinary tires: 1.6 mm {0.063 in} min.
(Tire should be replaced if wear indicators are exposed.)

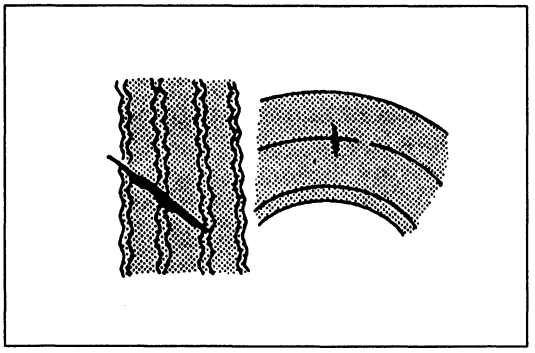
Snow tires: 50% of tread
(Tire should be replaced if wear indicators are exposed.)



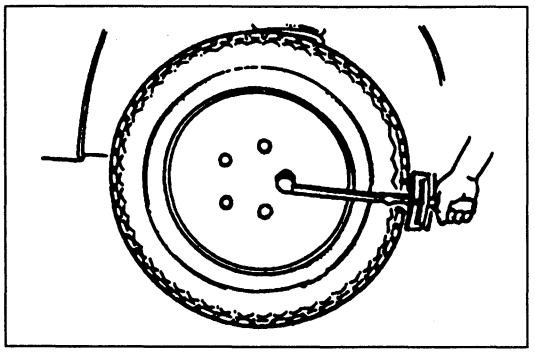
Troubleshooting guide

Abnormal tire wear patterns as 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 conditions • Lack of rotation	• Repair or replace suspension parts • Repair or replace • Balance or replace • Correct or replace • Correct or replace • Rotate tires



4. Cracks, damage, and foreign matter (such as metal pieces, nails, and stones) in the tire and cracks, deformation, and damage to the wheel.
5. Loose wheel lug nut (s).
6. Air leaking from valve stem.

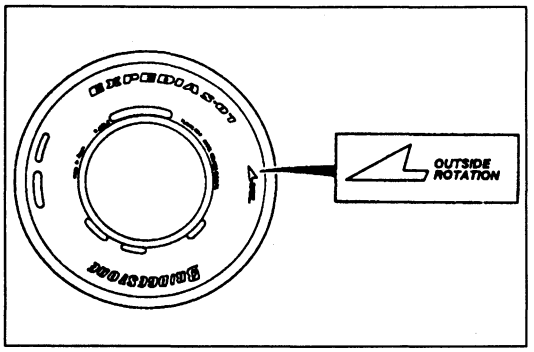


REMOVAL/INSTALLATION

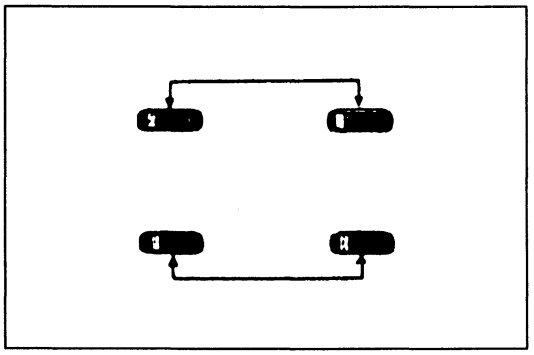
After making sure that the wheel-to-hub contact surfaces are clean, tighten the lug nuts to the specified torque in a crisscross pattern.

Tightening torque:
89–117 N·m{9.0–12.0 kgf·m,66–86 ft·lbf}

Caution
- **Applying oil to the lug nuts, studs, or wheels will cause the lug nuts to loosen.**



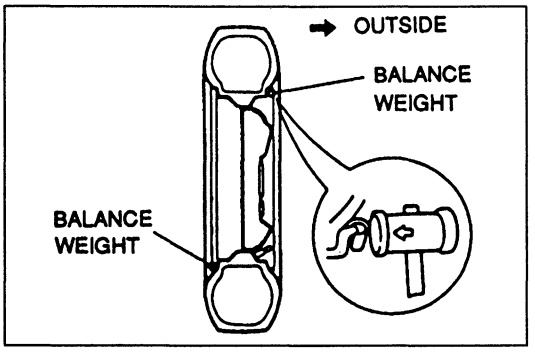
Mount the tires so that OUTSIDE marks face out, and rotation marks match the tire's rotation.



TIRE ROTATION

To prolong tire life and assure uniform tire wear, rotate all tires as specified below except the "TEMPORARY USE ONLY" spare tire.

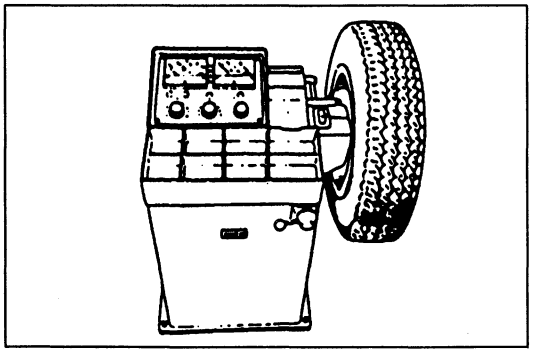
USA : Every 6000km {3750miles}
Canada : Every 24000km {15000miles} or 15monthes (whichever comes first)



WHEEL BALANCE ADJUSTMENT

If a wheel has becomes unbalanced or if a tire has been repaired or repaired, rebalance the wheel.

Maximum unbalance (at rim edge): 8g {0.28 oz}



When balancing a wheel:

(1) Use no more than two balance weights on the inner or outer side of the wheel.
(2) One balance weight should weigh no more than 60 g {2.1 oz}. If the total weight of all the balance weights on one side exceeds 100 g {3.53 oz}, then rebalance after repositioning the tire on the rim.
(3) Select suitable balance weights for steel or aluminum alloy wheels.

Caution

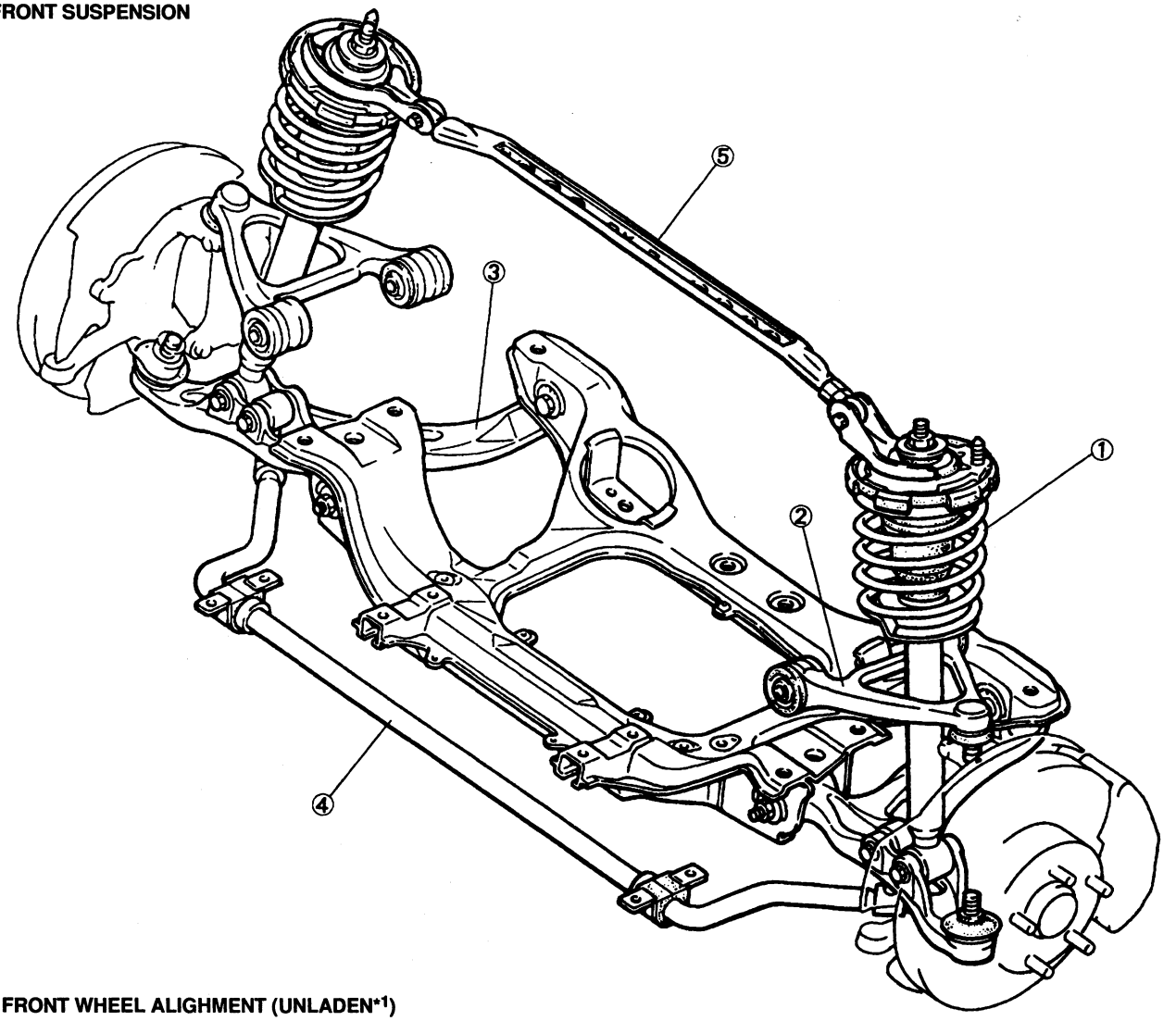
- **Using an on-vehicle balancer may cause damage to the transmission. Always use an off-vehicle balancer whenever balancing a wheel.**

Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

SUSPENSION

INDEX

FRONT SUSPENSION

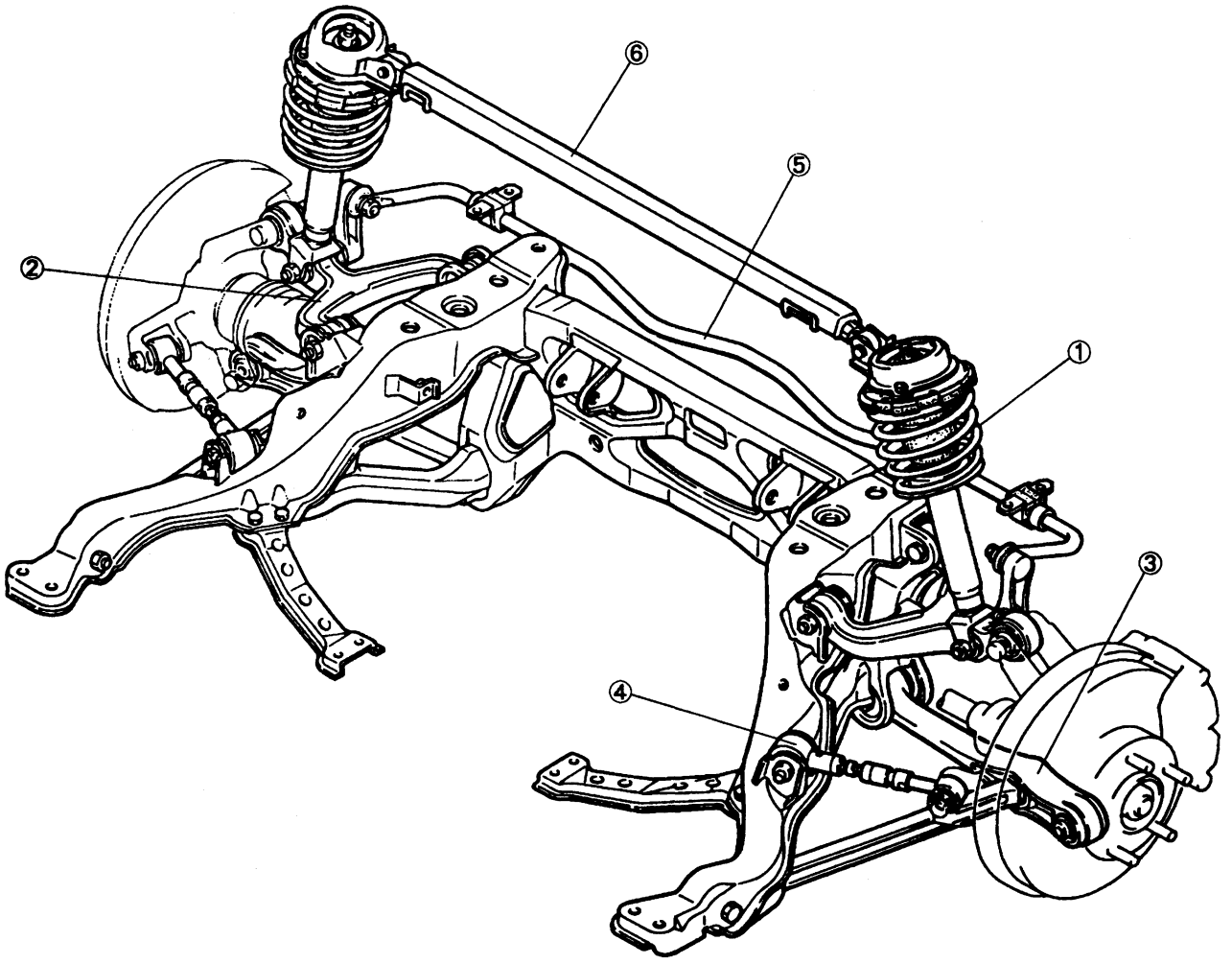


FRONT WHEEL ALIGHMENT (UNLADEN*1)

Item			Inspection standard	Adjustment standard
Total toe-in		mm {in}	2 ± 3 {0.08 ± 0.11}	2 ± 1 {0.08 ± 0.04}
Toe-in (per side)		Degree	0.1° ± 0.75°	0.1° ± 0.05°
Maximum steering angle		In	36° ± 2°	
		Out	32° ± 2°	
Kingpin angle		Degree	13°55'	
Camber angle		Degree	0.1° ± 0.75°	0.1° ± 0.5°
	Difference between left and right	Degree	1° Max.	1° Max.
Caster angle		Degree	6.08° ± 0.75°	6.08° ± 0.5°
	Difference between left and right	Degree	1° Max.	1° Max.

*1 Fuel tank full; radiator coolant and engine oil at specified levels; spare tire, jack, and tools in designated positions.

REAR SUSPENSION



REAR WHEEL ALIGHMENT (UNLADEN*1)

Item		Inspection standard	Adjustment standard
Total toe-in	mm {in}	2 ± 3 {0.08 ± 0.11}	2 ± 1 {0.08 ± 0.04}
Toe-in (per side)	Degree	0.1° ± 0.1°	0.1° ± 0.05°
Camber angle	Degree	-1.22° ± 0.75°	-1.22° ± 1.0°
Difference between left and right	Degree	1° Max.	1° Max.
Thrust angle	Degree	0° ± 0.1°	0° ± 0.1°

*1 Fuel tank full; radiator coolant and engine oil at specified levels; spare tire, jack, and tools in designated positions.

1. Rear shock absorber and spring
   Removal / Installation ..... page R-27
   Disassembly / Inspection / Assembly .... page R-29
2. Upper arm
   Removal / Inspection
   Installation ... page R-32
   Disassembly / Inspection / Assembly .... page R-33
3. Rear lower arm
   Removal / Inspection
   Installation ... page R-36
   Disassembly / Inspection / Assembly .... page R-37
4. Toe-control link
   Removal / Inspection
   Installation ... page R-40
5. Rear stabilizer
   Removal / Inspection / Assembly .... page R-41
6. Rear strut bar
   Removal / Inspection / Assembly .... page R-42

OUTLINE

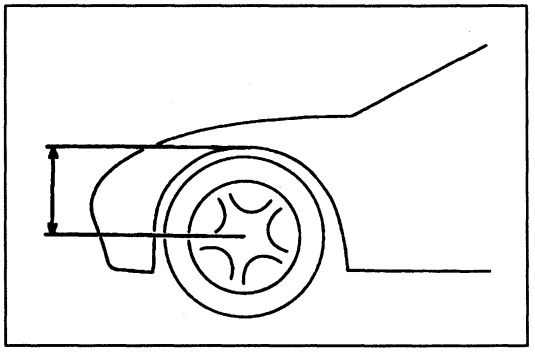
SPECIFICATIONS

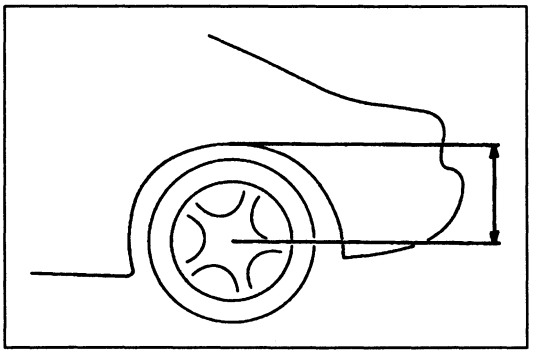
Item \ Transmission / Suspension			MT		AT
			Standard suspension	Hard suspension	Standard suspension
Front suspension					
Suspension type			Double-wishbone		
Coil spring	Identification mark color		Red		Brown
	Wire diameter	mm {in}	12.3 {0.48}		12.5 {0.49}
	Coil center diameter	mm {in}	104.8 {4.126}		105.0 {4.134}
	Free length	mm {in}	270.0 {10.63}		276.3 {10.88}
	Active coil number		4.14		4.39
Shock absorber	Type		Cylindrical, double-acting, low-pressure gas-charged		
	Damping force characteristics		Standard	Hard	Standard
Stablizer	Type		Torsion bar, hollow type		
	Diameter	mm {in}	28.6 {1.13}		
Front weel alignment (unladen*1)	Inspection standard				
	Total toe-in	mm {in}	2 ± 3 {0.08 ± 0.11}		
	Toe-in (per side)	Degree	0.1° ± 0.75°		
	Maximum steering angle	in	36° ± 2°		
		out	32° ± 2°		
	Camber angle	Degree	0.1° ± 0.75°		
	Difference between left and right	Degree	1° max		
	Caster angle	Degree	6.08° ± 0.75°		
	Difference between left and right	Degree	1° max		
	King pin angle	Degree	13°55'		
	Adjustment standard				
	Total toe-in	mm {in}	2 ± 1 {0.08 ± 0.04}		
	Toe-in (per side)	Degree	0.1° ± 0.05°		
	Maximum steering angle	in	36° ± 2°		
		out	32° ± 2°		
	Camber angle	Degree	0.1° ± 0.5°		
	Difference between left and right	Degree	1° max		
	Caster angle	Degree	6.08° ± 0.5°		
	Difference between left and right	Degree	1° max		
	King pin angle	Degree	13°55'		
Rear suspension					
Suspension type			Double-wishbone		
Coil spring	Identification mark color		Purple		
	Wire diameter	mm {in}	12.2 {0.48}		
	Coil center diameter	mm {in}	114.7 {4.516}		
	Free length	mm {in}	303.0 {11.93}		
	Active coil number		4.21		
Shock absorber	Type		Cylindrical, double-acting, low-pressure gas-charged		
	Damping force characteristics		Standard	Hard	Standard
Stabilizer	Type		Torsion bar, hollow type		
	Diameter	mm {in}	13.8 {0.54}		
Rear weel alignment (unladen*1)	Inspection standard				
	Total toe-in	mm {in}	2 ± 3 {0.08 ± 0.11}		
	Toe-in (per side)	Degree	0.1° ± 0.1°		
	Camber angle	Degree	-1.22° ± 0.75°		
	Difference between left and right	Degree	1° max		
	Thrust angle	Degree	0° ± 0.1°		
	Adjustment standard				
	Total toe-in	mm {in}	2 ± 1 {0.08 ± 0.04}		
	Toe-in (per side)	Degree	0.1° ± 0.05°		
	Camber angle	Degree	-1.22° ± 0.5°		
	Difference between left and right	Degree	1° max		
	Thrust angle	Degree	0° ± 0.1°		

*1 Fuel tank full; radiator coolant and engine oil at specified levels; spare tire, jack, and tools in designated positions.

TROUBLESHOOTING GUIDE

Problem	Possible cause	Action	Page
Body rolls	Weak stabilizer or stabilizer link	Replace	R-24, 41
	Damaged or worn stabilizer control link	Replace	R-24, 41
	Worn or deteriorated upper arm or lower arm bushings	Replace	R-17,21,33,37
	Damaged shock absorber	Replace	R-12, 27
Poor riding comfort	Weak coil spring	Replace	R-13, 29
	Damaged shock absorber	Replace	R-12, 27
Body leans	Weak coil spring	Replace	R-13, 29
	Damaged or worn stabilizer control link	Replace	R-24, 41
	Worn or deteriorated upper arm or lower arm bushings	Replace	R-17,21,33,37
Abnormal noise from suspension system	Poor lubrication of or worn upper arm or lower arm ball joint	Lubricate or replace	R-17, 21
	Looseness of peripheral connections	Tighten	—
	Damaged shock absorber	Replace	R-12, 27
	Damaged or worn stabilizer control link	Replace	R-24, 41
	Worn or deteriorated upper arm or lower arm bushings	Replace	R-17,21,33,37
General driving instability	Weak coil spring	Replace	R-13, 29
	Damaged shock absorber	Replace	R-12, 27
	Worn or deteriorated upper arm or lower arm bushings	Replace	R-17,21,33,37
	Damaged or worn stabilizer control link	Replace	R-24, 41
	Improperly adjusted wheel alignment	Adjust	R-6
	Damaged or worn upper arm or lower arm ball joint	Replace	R-17, 21
	Malfunction of steering system	—	Section N
	Damaged or unbalanced wheel	—	Section Q
Heavy steering	Poor lubrication of or worn upper arm or lower arm ball joint	Lubricate or replace	R-17, 21
	Improperly adjusted wheel alignment	Adjust	R-6
	Malfunction of steering system	—	Section N
	Damaged or unbalanced wheel	—	Section Q
Steering wheel pulls to one side	Weak coil spring	Replace	R-13, 29
	Damaged or worn stabilizer control link	Replace	R-24, 41
	Worn or deteriorated upper arm or lower arm bushings	Replace	R-17,21,33,37
	Damaged or worn upper arm or lower arm	Replace	R-17,21,33,37
	Improperly adjusted wheel alignment	Adjust	R-6
	Malfunction of steering system	—	Section N
	Malfunction of braking system	—	Section P
	Damaged or unbalanced wheel	—	Section Q
Shimmy occurs (steering wheel vibrates circumferential)	Damaged or worn upper arm or lower arm ball joint	Replace	R-17, 21
	Damaged shock absorber	Replace	R-12
	Loose shock absorber mounting	Tighten	R-12
	Worn or deteriorated upper arm or lower arm bushings	Replace	R-17, 21
	Damaged or worn stabilizer control link	Replace	R-24
	Improperly adjusted wheel alignment	Adjust	R-6
	Damaged or worn wheel bearing	—	Section M
	Malfunction of steering system	—	Section N
	Damaged or unbalanced wheel	—	Section Q
Steering wheel doesn't return properly	Stuck or damaged upper arm or lower arm ball joint	Replace	R-17, 21
	Improperly adjusted wheel alignment	Adjust	R-6
	Malfunction of steering system	—	Section N
	Damaged or unbalanced wheel	—	Section Q





WHEEL ALIGNMENT

PRE-INSPECTION

1. Check the tire inflations and set to the recommended pressure, if necessary.
2. Inspect the front wheel bearing play. Replace the bearing(s) as necessary.
3. Inspect the wheel and tire runout of all wheels.
4. Inspect the ball joints and steering linkage for excessive looseness.
5. Place the vehicle on level ground with no luggage or passenger load.
6. Rock the vehicle to settle the suspension.
7. Verify that the height difference between the left and right sides from the center of the wheel to the fender brim does not exceed specification.

   Specification: 10 mm {0.39 in}

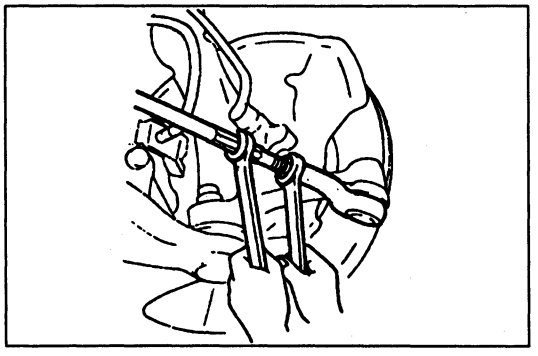
8. Verify that the height difference between the front and rear does not exceed specifications.

   Specification: 15 mm {0.59 in}

FRONT WHEEL ALIGNMENT
Specifications (Unladen*1)

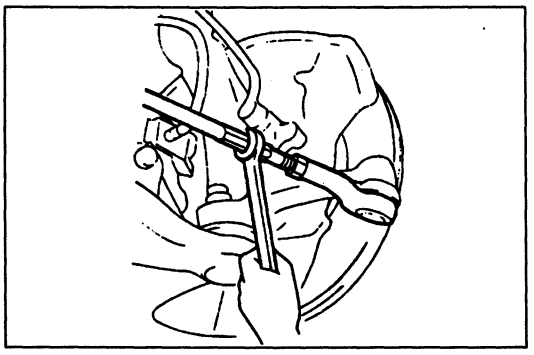
Item			Specifications	Specifications
Total toe-in		mm {in}	2 ± 3 {0.08 ± 0.11}	2 ± 1 {0.08 ± 0.11}
Toe-in (per side)		Degree	0.1° ± 0.75°	0.1° ± 0.05°
Maximum steering angle		In	36° ± 2°	
		Out	32° ± 2°	
King pin angle			13°55'	
Camber angle		Degree	0.1° ± 0.75°	0.1° ± 0.5°
	Difference between left and right	Degree	1° max.	1° max.
Caster angle		Degree	6.08° ± 0.75°	6.08° ± 0.5°
	Difference between left and right	Degree	1° max.	1° max.

*1 Fuel tank full; radiator coolant and engine oil at specified levels; spare tire, jack, and tools in designated positions.

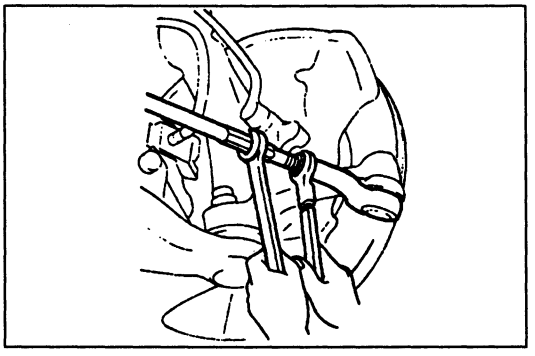


Adjustment
Toe-in

1. Remove the steering gear boot clamp.
2. Loosen the left and right tie rod locknuts and turn the tie rod 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.



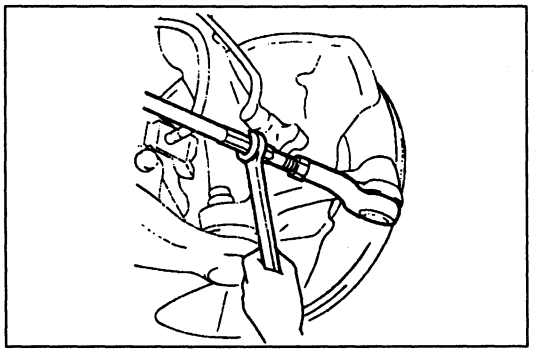
Note
- Turning one tie rod one complete turn changes toe-in by about 0.42 in {10.6mm}.



3. Tighten the tie rod locknuts to the specified torque.

Tightening torque:
31–50 N·m {3.1–5.1 kgf·m, 23–36 ft·lbf}

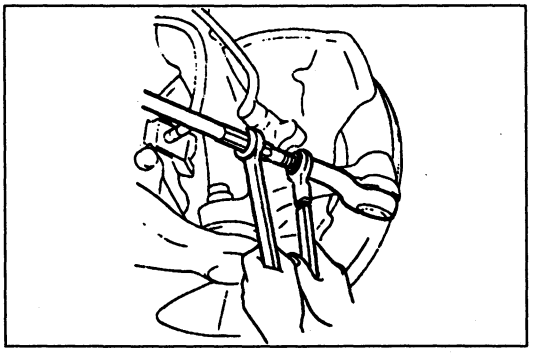
4. Verify that the boot is not twisted. Install the boot clamp.



Maximum steering angle
1. Remove the steering gear boot clamp.
2. Loosen the tie rod locknut.
3. Turn the tie rod to provide the correct maximum steering angle.

Maximum left / right difference: 3 mm {0.12 in}

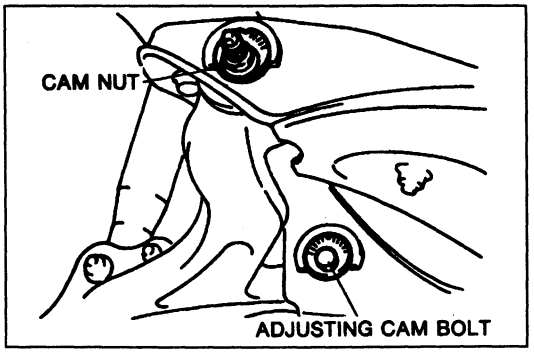
R



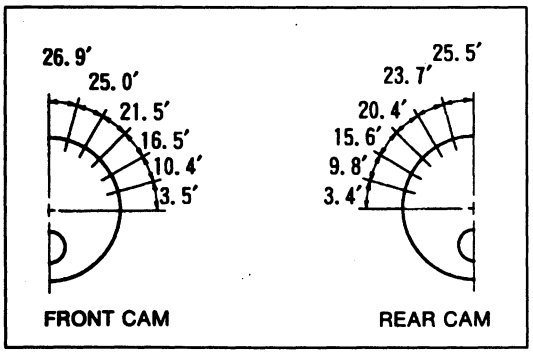
4. After adjustment, tighten the locknut to the specified torque.

Tightening torque:
31–50 N·m {3.1–5.1 kgf·m, 23–36 ft·lbf}

5. Adjust the toe-in. (Refer to page R–6.)
6. Verify that the boot is not twisted. Install the boot clamp.

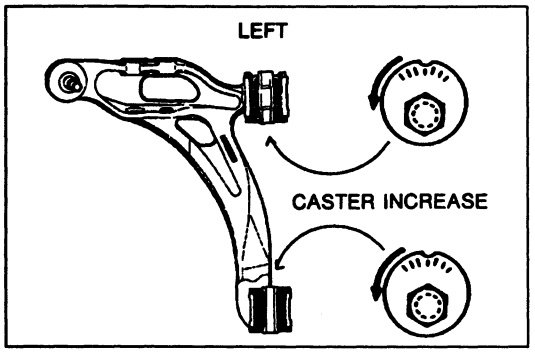


Caster
1. Loosen the front or rear cam nut on the front lower arm.



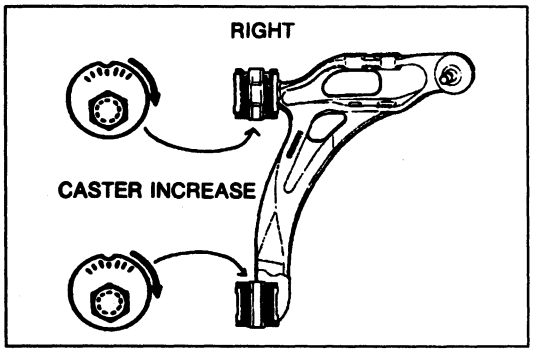
Note

- Turning the adjusting cam bolt one graduation changes the caster as shown in the illustration.

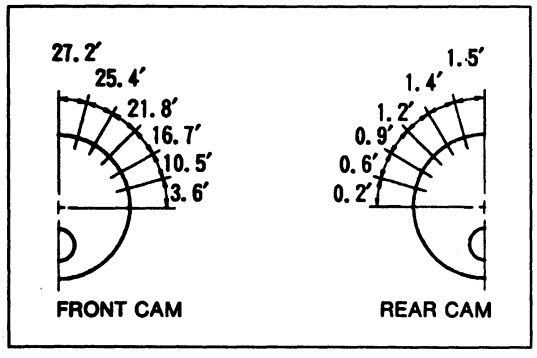


2. Turn the adjusting cam bolt as indicated to provide the correct caster angle.

Caster	Left wheel		Right wheel	
	Front cam	Rear cam	Front cam	Rear cam
Increase	Counter-clockwise	Counter-clockwise	Clockwise	Clockwise
Decrease	Clockwise	Clockwise	Counter-clockwise	Counter-clockwise



3. Adjust the camber and the toe-in.

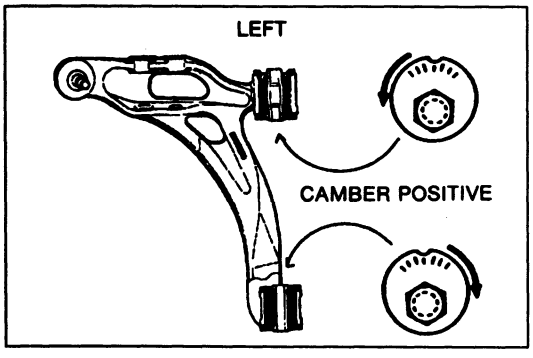


Camber

1. Adjust the caster before adjusting the camber.
2. Loosen the front or rear cam nut on the front lower arm.

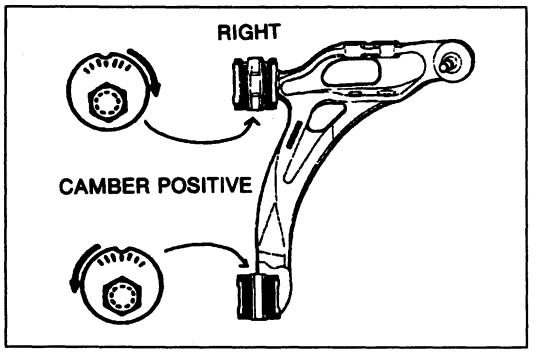
Note

- Turning the adjusting cam bolt one graduation changes the caster as shown in the illustration.

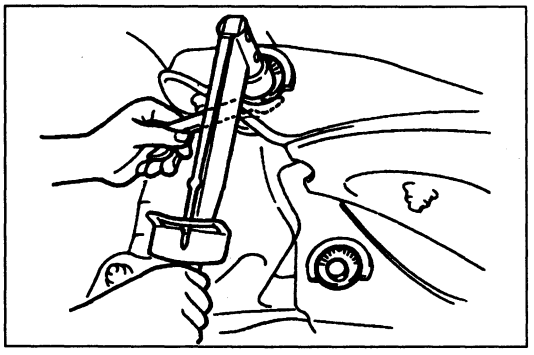


3. Turn the adjusting cam bolt as indicated to provide the correct camber angle.

Camber	Left wheel		Right wheel	
	Front cam	Rear cam	Front cam	Rear cam
Positive	Counter-clockwise	Clockwise	Clockwise	Counter-clockwise
Negative	Clockwise	Counter-clockwise	Counter-clockwise	Clockwise



4. If the cam cannot be turned enough to make the adjustment, readjust the caster using the other cam.



5. Hand-tighten the cam nut and lower the vehicle.
6. With the vehicle unloaded, tighten the cam nut to the specified torque.

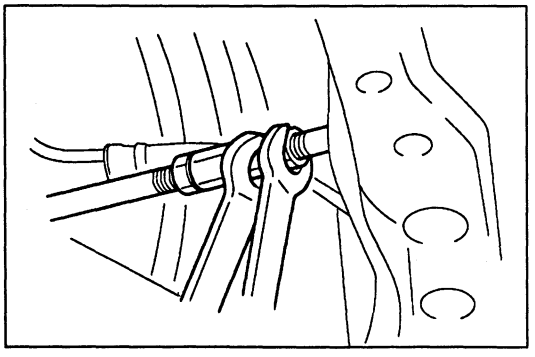
Tightening torque:
94–116 N·m {9.5–11.9 kgf·m, 69–86 ft·lbf}

7. Adjust the toe-in.

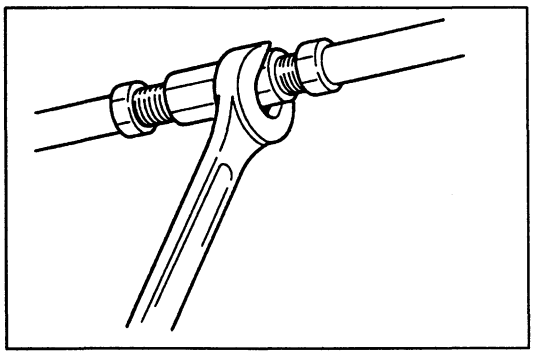
REAR WHEEL ALIGNMENT
Specifications (Unladen*1)

Item			Inspection standard	Adjustment standard
Total toe-in		mm {in}	2 ± 3 {0.08 ± 0.11}	2 ± 1 {0.08 ± 0.04}
Toe-in (per side)		Degree	0.1° ± 0.1°	0.1° ± 0.05°
Camber angle		Degree	-1.22° ± 0.75°	-1.22° ± 0.5°
	Difference between left and right	Degree	1° max.	1° max.
Thrust angle		Degree	0° ± 0.1°	0° ± 0.1°

*1 Fuel tank full; radiator coolant and engine oil at specified levels; spare tire, jack, and tools in designated positions.

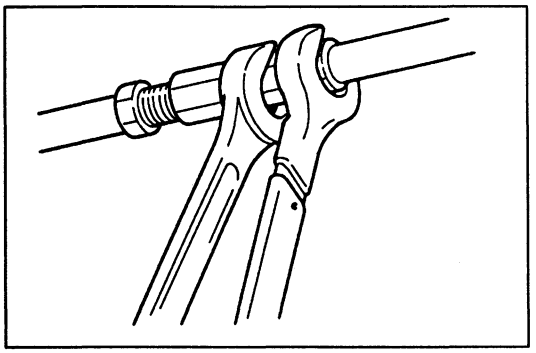


Adjustment
toe-in
The specified thrust angle **(0° ± 0.1°)** must be maintained while adjusting the rear toe-in.
If the thrust angle cannot be maintained at that specification, check the body dimensions. Refer to the 1992 RX-7 Body Shop Manual (Form No. 3256-10-92A).



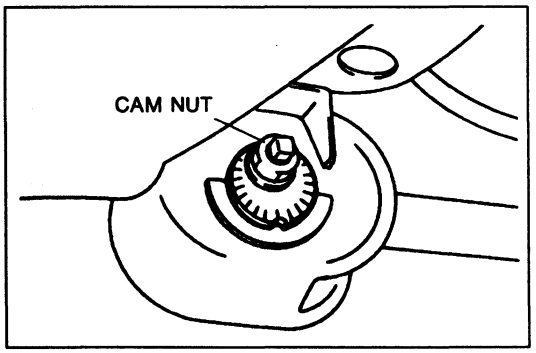
1. Loosen the left and right toe-control link locknuts and turn each link equally. Both are right threaded, so turning the right link toward the front of the vehicle and the left toward the rear increases toe-in.

Note
- Turning one link one complete turn changes toe-in by about 16.5 mm {0.65 in}.



2. Tighten the toe control link locknuts to the specified torque.

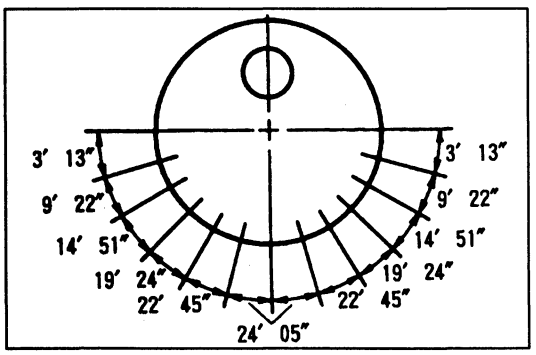
Tightening torque:
35–50 N·m {3.5–5.1 kgf·m, 26–33 ft·lbf}



Camber
1. Loosen the cam nut on the I-arm.

Note
- Turning the adjusting cam bolt one graduation changes the camber as shown in the illustration.

2. Turn the adjusting cam bolt as indicated to provide the correct camber angle.



Camber	Left wheel	Right wheel
Positive	Clockwise	Counterclockwise
Negative	Counterclockwise	Clockwise

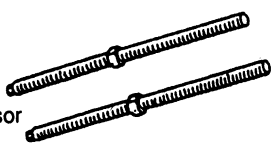
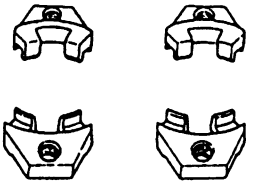
3. Tighten the cam nut to the specified torque.

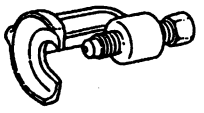
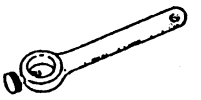
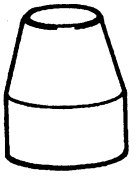
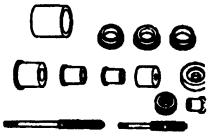
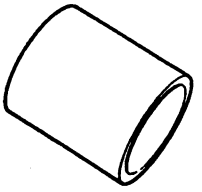
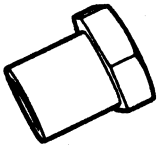
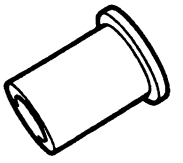
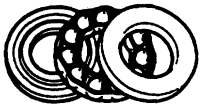
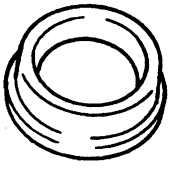
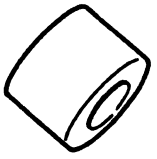
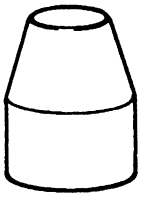
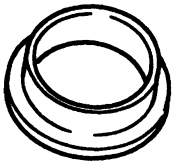
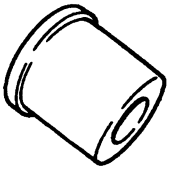
Tightening torque:
94–116 N·m {9.5–11.9 kgf·m, 69–86 ft·lbf}

4. Adjust the toe-in.

FRONT SUSPENSION (DOUBLE WISHBONE, COIL SPRING TYPE)

PREPARATION
SST

49 0370 641 Screw, coil spring compressor 	For removal / installation of coil spring	49 0223 640B Arm, coil spring compressor 	For removal / installation of coil spring

49 0118 850C Puller, ball joint 	For removal of ball joint	49 0180 510B Attachment, preload measuring 	For inspection of ball joint
49 F034 211 Guide, clip 	For installation of dust boot clip	49 F034 2A0 Replacer set, rubber bushing 	For removal / installation of bushing
49 G028 203 Support (Part of 49 F034 2A0) 	For removal of bushing	49 G028 206 Shaft (Part of 49 F034 2A0) 	For removal / installation of bushing
49 G028 207 Nut (Part of 49 F034 2A0) 	For removal / installation of bushing	49 G028 208 Installer (Part of 49 F034 2A0) 	For removal of bushing
49 G034 205 Bearing (Part of 49 F034 2A0) 	For removal / installation of bushing	49 F034 204 Support (Part of 49 F034 2A0) 	For removal of bushing
49 F034 203 Support (Part of 49 F034 2A0) 	For installation of bushing	49 F034 206 Shaft (Part of 49 F034 2A0) 	For installation of bushing
49 F034 209 Installer (Part of 49 F034 2A0) 	For removal / installation of bushing	49 F034 210 Guide, clip 	For installation of dust boot clip
49 F034 205 Support (Part of 49 F034 2A0) 	For removal / installation of bushing	49 F034 208 Installer (Part of 49 F034 2A0) 	For installation of bushing

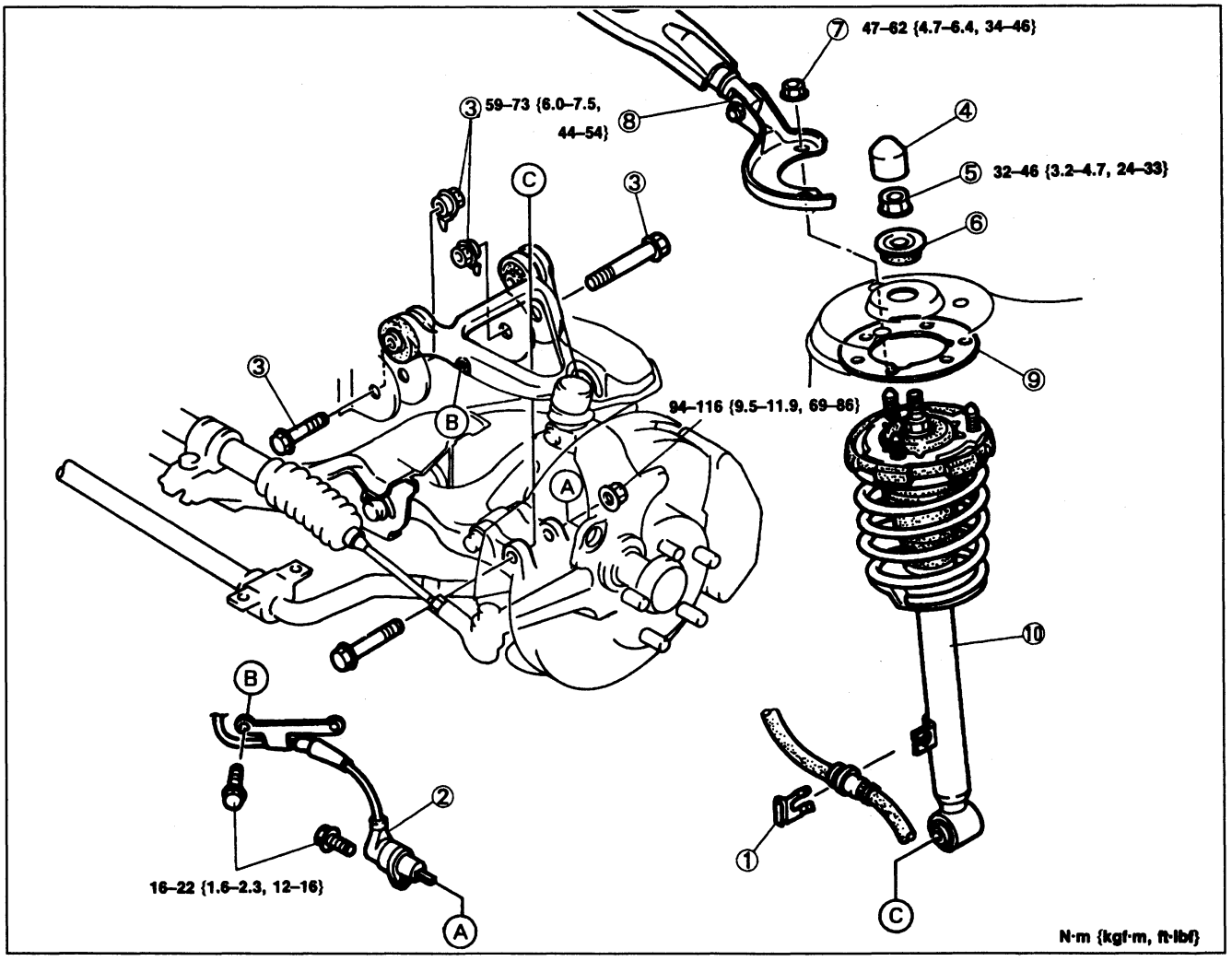
FRONT SHOCK ABSORBER AND SPRING

Removal / Installation

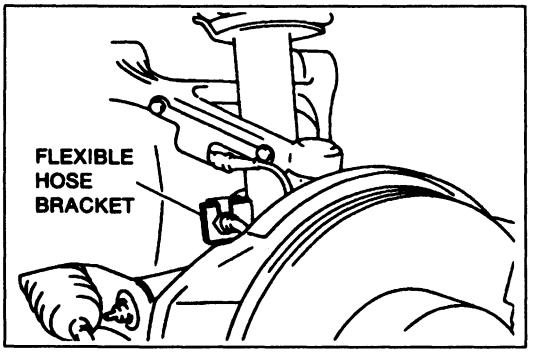
1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the wheel and tire.
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Install the wheel and tire.

Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–87 ft·lbf}

6. Adjust the front wheel alignment. (Refer to page R–6.)

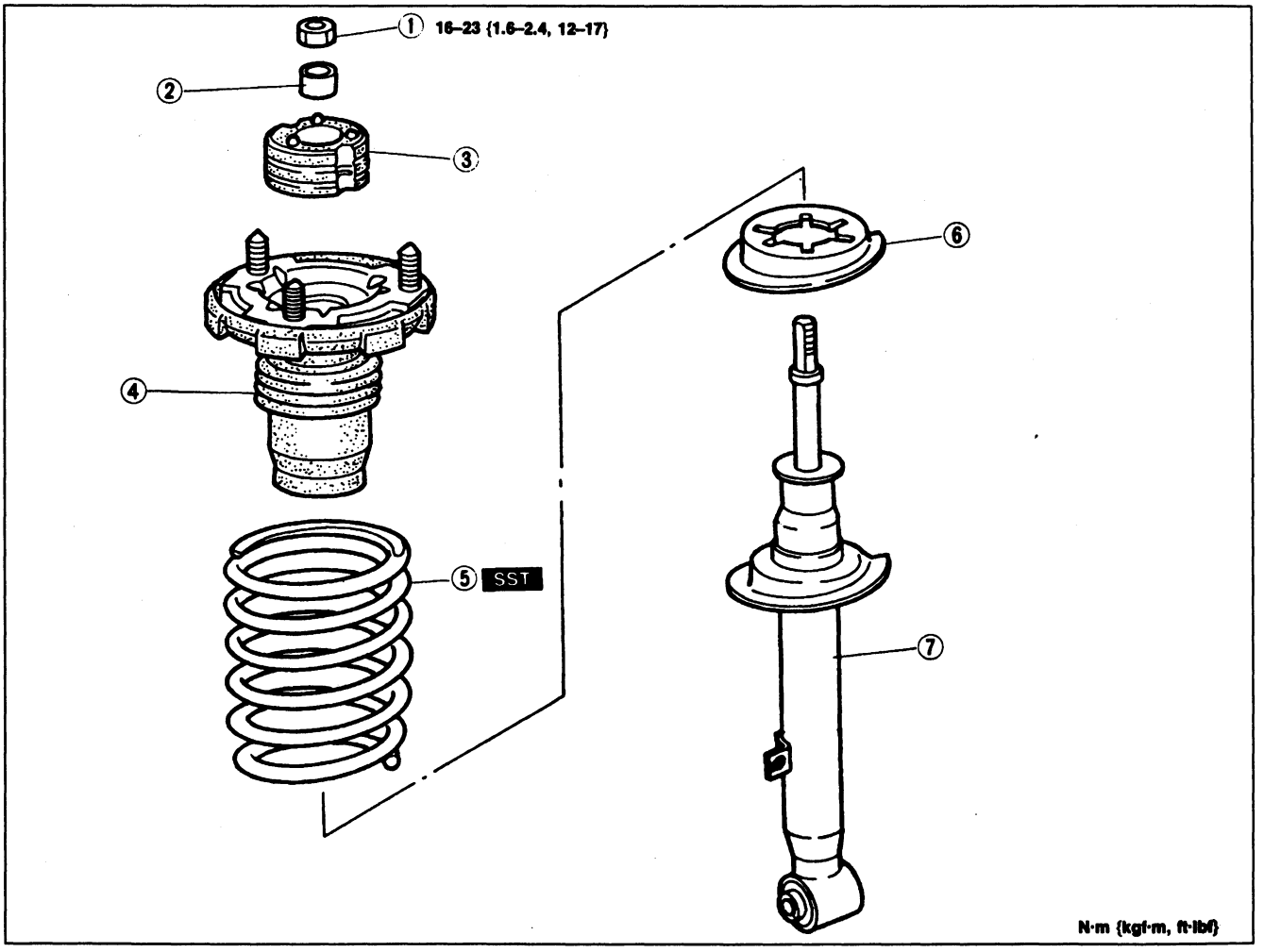


1. Clip (brake hose)
2. ABS wheel-speed sensor
3. Bolt, nut
4. Cap
5. Nut
6. Stopper rubber
7. Nut
8. Front strut bar
   Removal / Inspection / Installation
   ..... page R–25
9. Insulator
10. Front shock absorber and spring
    Installation Note
    ..... page R–13
    Disassembly / Inspection / Assembly .... page R–13

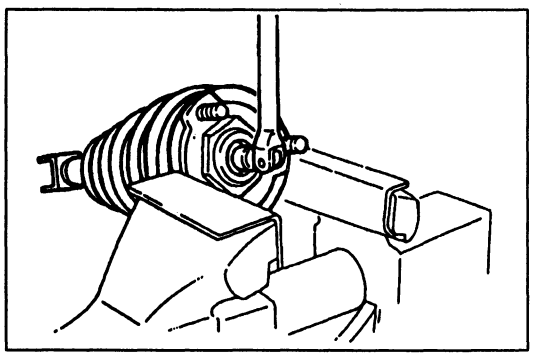


Installation note
Front shock absorber and spring
Install the shock absorber and spring so that the flexible hose bracket faces forward.

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 removal, referring to **Assembly Note**.



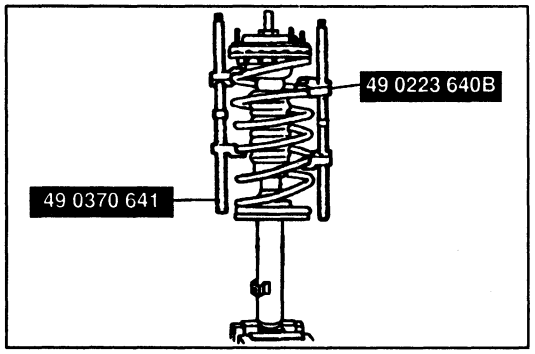
1. Nut
   Disassembly Note ..... page R–14
   Assembly Note ..... page R–15
2. Spacer
3. Mounting rubber
   Inspect for damage and deterioration
   Assembly Note ..... page R–15
4. Bound stopper assembly
   Inspect for damage and cracks
5. Coil spring
   Inspect for damage and weakness
   Assembly Note ..... page R–14
6. Lower spring seat
   Inspect for damage and cracks
7. Shock absorber
   Inspection .... page R–14

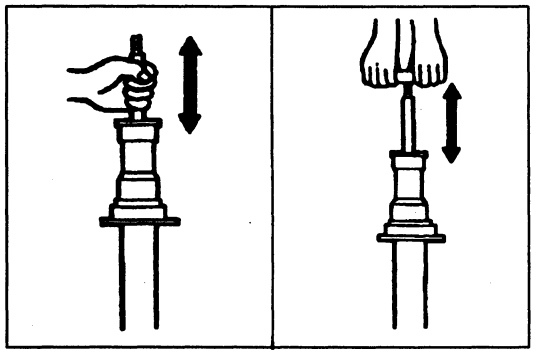


Disassembly note
Nut

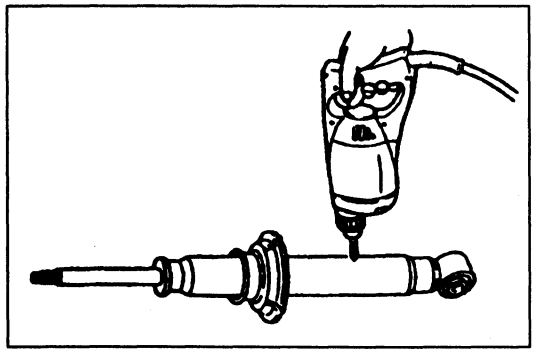
Warning
- **Removing the piston-rod nut is dangerous. The shock absorber and spring could fly off under tremendous pressure and cause serious injury or death. Secure the shock absorber in the SST before removing the piston-rod nut.**

1. Secure the mounting rubber bracket in a vise.
2. Loosen the mounting rubber nut several turns, but do not remove it.
3. Assemble the **SST**.
4. Compress the coil spring by using the **SST** and remove the mounting nut.





Inspection
Shock absorber
Check the following and replace the shock absorber if necessary.
1. Inspect for damage and oil leakage.
2. (1) Compress the shock absorber rod and release it.
   (2) Verify that the rod extends fully at a normal speed.
3. Compress and extend the rod at least three times. Verify that the operational force does not change and that there is no unusual noise.



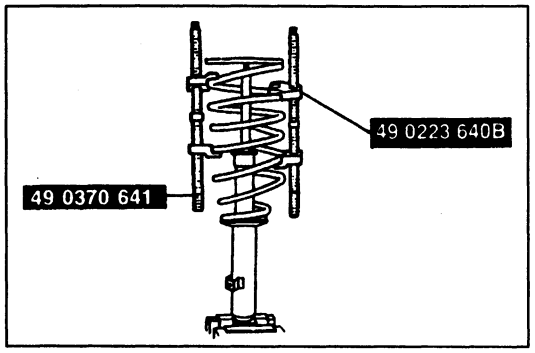
Disposal of shock absorber

Warning
- **The gas in the shock absorber is highly pressurized, and could spray metal chips into the eyes and face when drilling. Whenever drilling into a shock absorber, wear protective eye wear.**

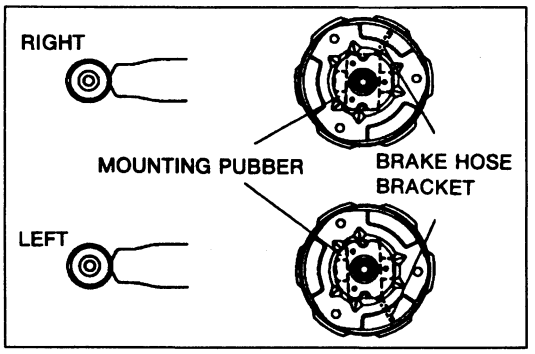
1. Lay the shock absorber flat.
2. Drill a hole in its body.

Drill size: 2–3 mm {0.08–0.12 in}

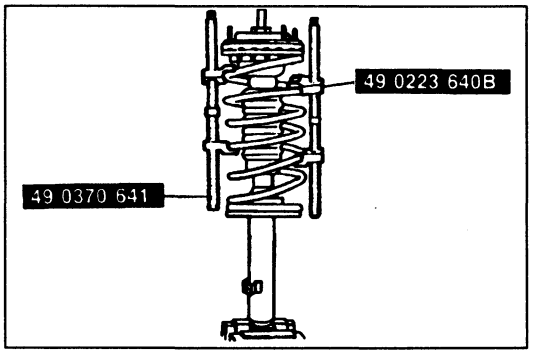
3. Allow the gas to escape from the shock absorber.
4. Discard the shock absorber.



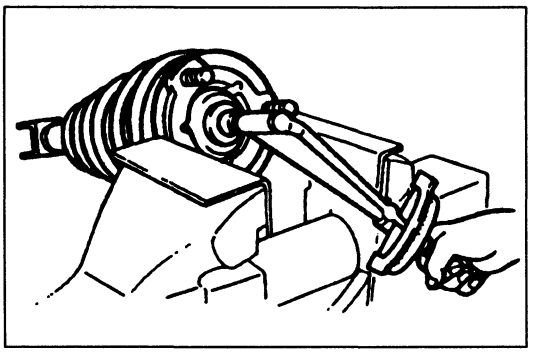
Assembly note
Coil spring
1. Compress the coil spring by using the **SST**.
2. Install the spring so that the lower coil is seated on the step of the lower seat.



Mounting rubber
Install the mounting rubber as shown.



Nut
1. Tighten the mounting nut several turns.
2. Remove the **SST**.
3. Verify that the lower coil of the spring is seated on the step of the lower seat.



4. Secure the mounting rubber bracket in a vise.
5. Tighten the nut.

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

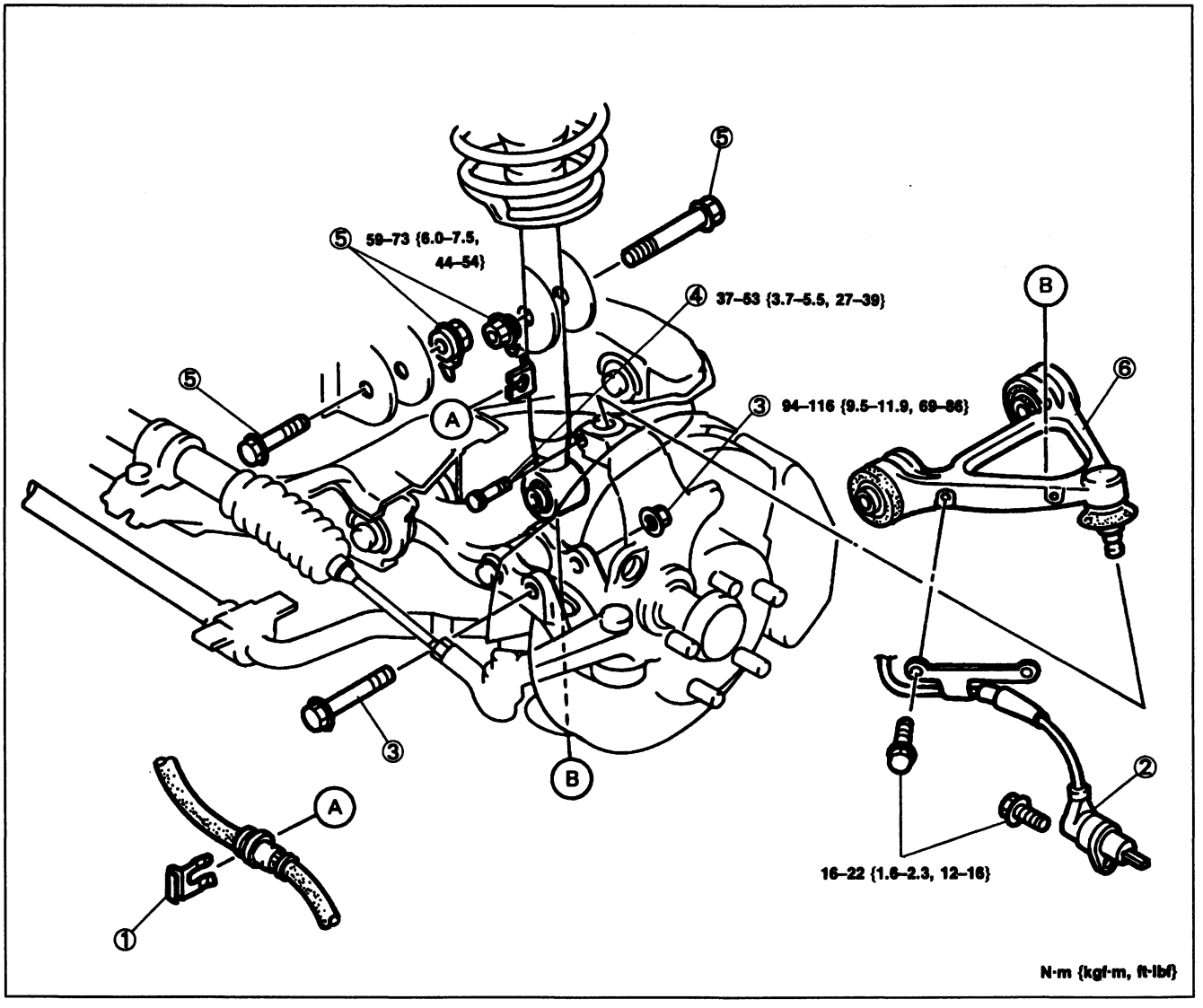
UPPER ARM

Removal / Inspection / Installation

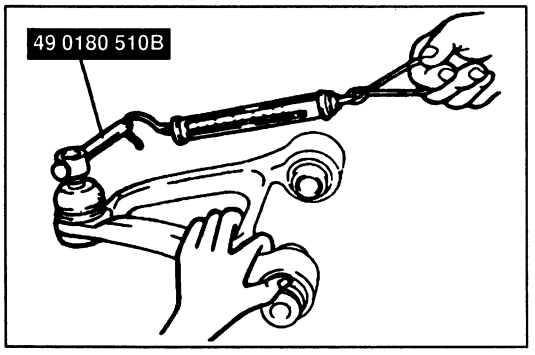
1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the wheel and tire.
3. Remove in the order shown in the figure.
4. Inspect all parts and repair or replace as necessary.
5. Install in the reverse order of removal.
6. Install the wheel and tire.

Tightening torque: 89–117N·m{9.0–12.0kgf·m,65–87ft·lbf}

7. Adjust the front wheel alignment. (Refer to page R–6.)



1. Clip (brake hose)
2. ABS wheel-speed sensor
3. Bolt, nut
4. Bolt
5. Bolt, nut
6. Upper arm
   - Inspect for damage and cracks
   - Inspect bushing for damage and wear
   - Inspect boot for tearing and cracks
   - Inspection .... page R–17
   - Disassembly / Inspection / Assembly .... page R–17



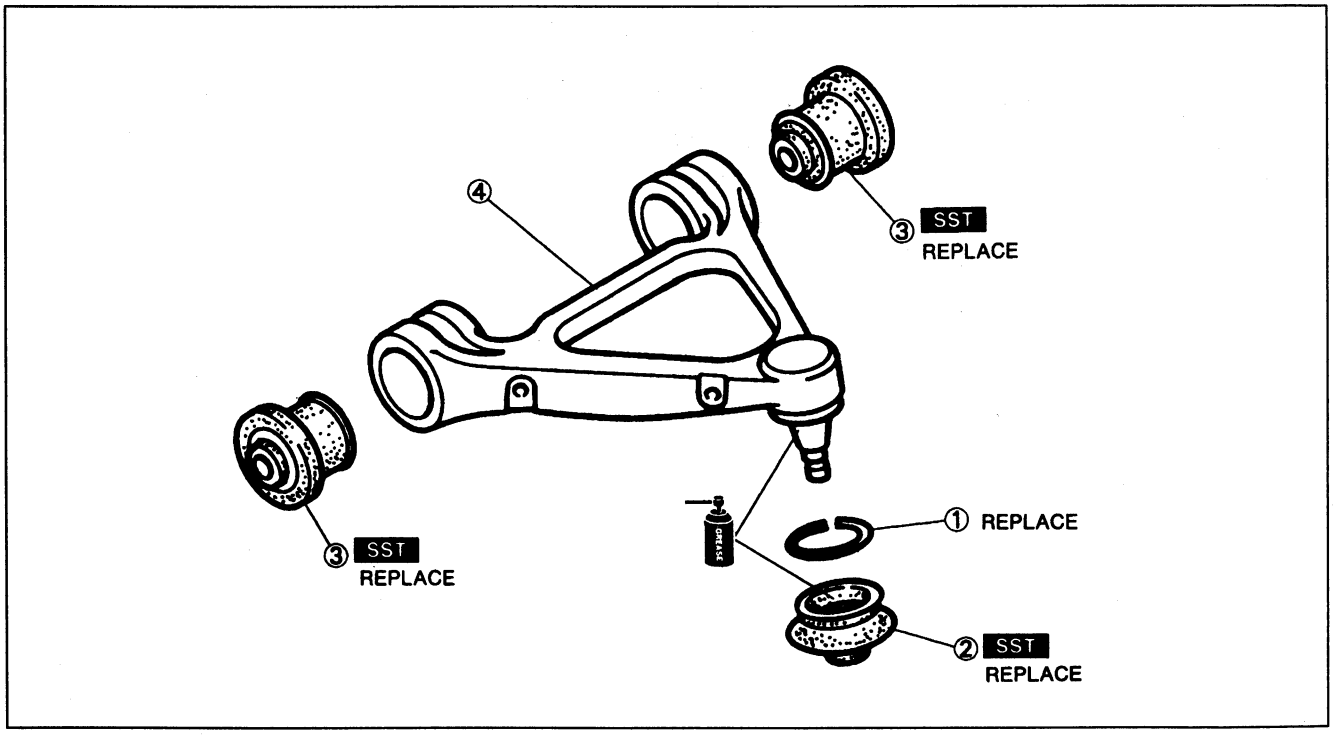
Inspection
Upper arm ball joint
Ball joint rotation torque
1. Shake and rotate the ball joint stud several times.
2. Connect the **SST** to the stud and measure the starting torque and the rotation torque by using a pull scale.

Starting torque:
2.0–5.8 N·m {20–60 kgf-cm, 18–52 in·lbf}
Pull scale reading:
20–58 N {2.0–6.0 kgf, 4.4–13.2 lbf}

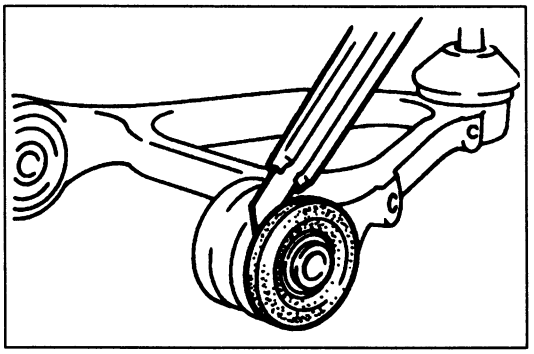
Rotation torque:
0.4–1.1N·m {4–12 kgf-cm, 3.5–10.4 in·lbf}
Pull scale reading:
4–11N {0.4–1.2 kgf, 0.9–2.6 lbf}

3. If not within specification, replace the upper arm.

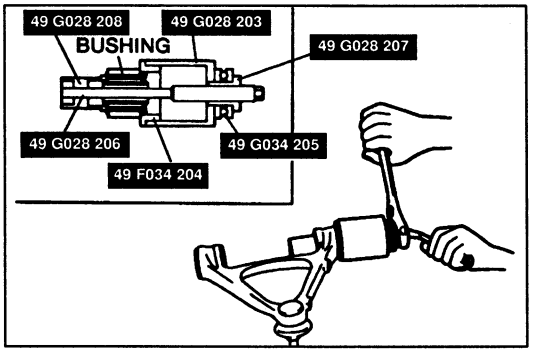
Disassembly / Inspection / Assembly
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



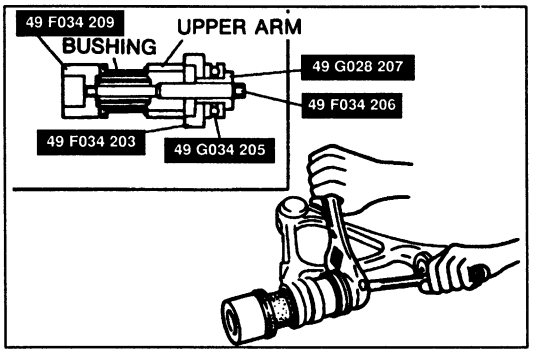
1. Clip
2. Dust boot
   Assembly Note ..... page R-18
3. Bushing
   Disassembly Note ..... page R-18
   Assembly Note ..... page R-18
4. Upper arm
   Inspect for damage and cracks



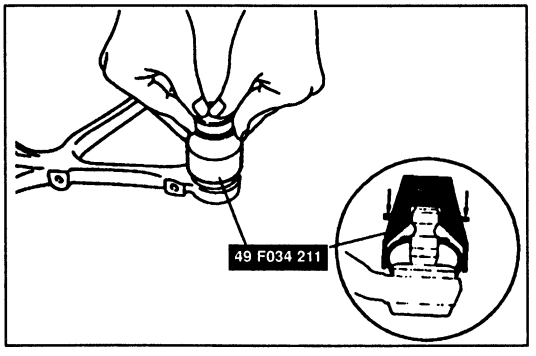
Disassembly note
Bushing
1. Cut away the projecting rubber of the bushing.



2. Remove the bushing by using the **SST**.



Assembly note
Bushing
1. Apply soapy water to the new bushing.
2. Install the bushing by using the **SST**.

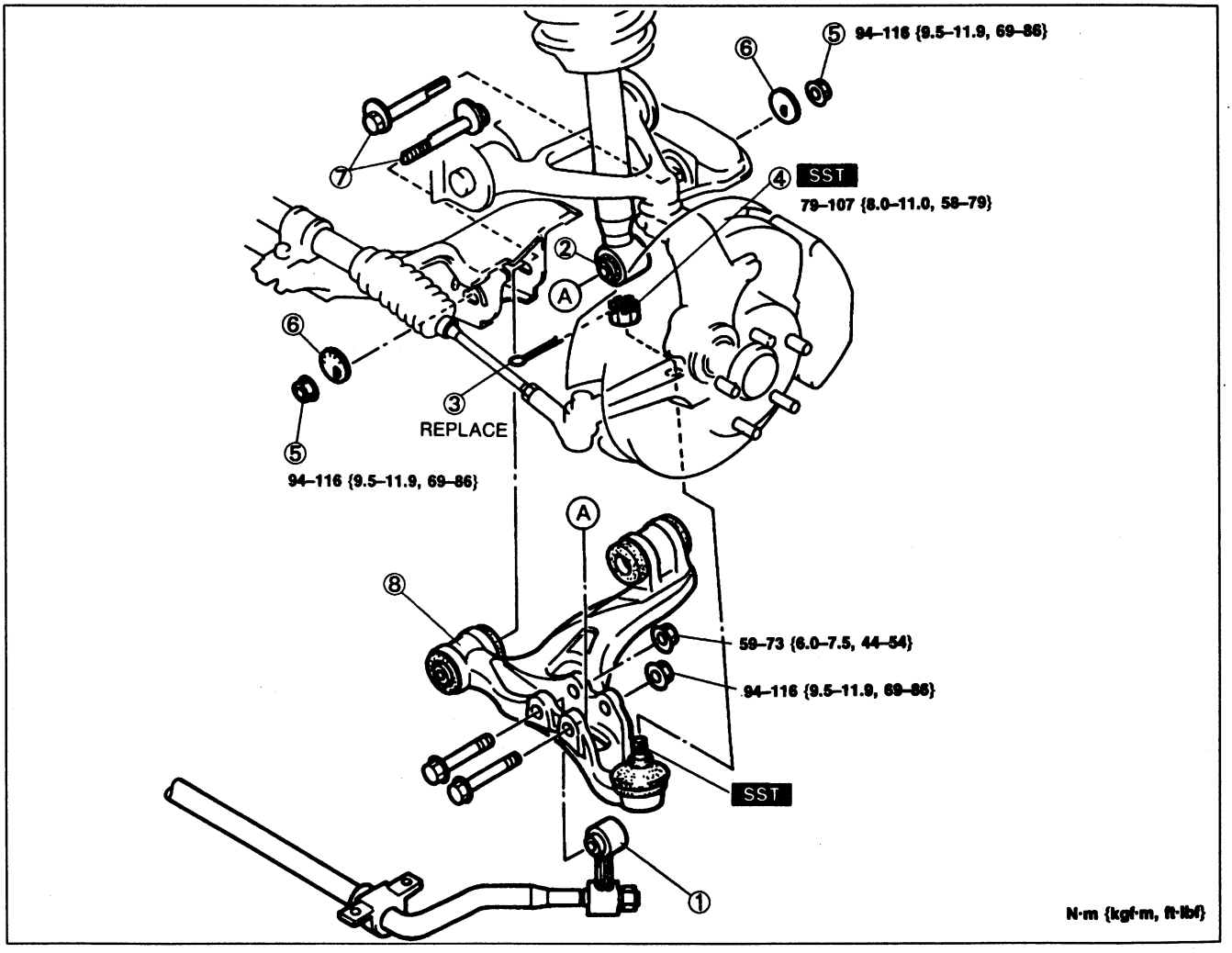


Dust boot
1. Wipe the grease off the ball stud.
2. Fill the inside of the new dust boot with grease.
3. Install the dust boot onto the ball joint.
4. Set the **SST** over the boot and install a new clip.
5. Wipe off the excess grease.

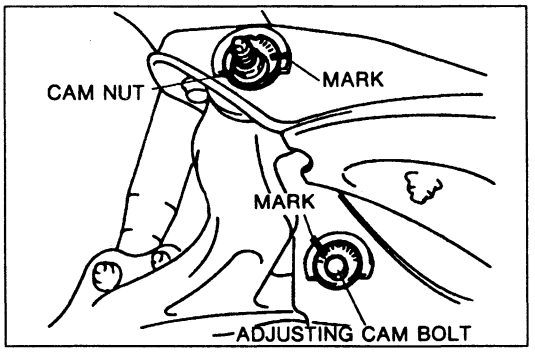
FRONT LOWER ARM

Removal / Inspection / Installation

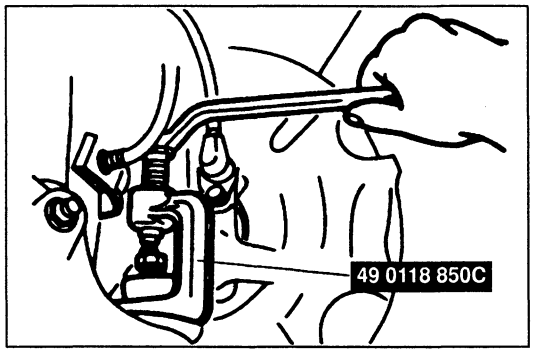
1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the wheel and tire.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Inspect all parts and repair or replace as necessary.
5. Install in the reverse order of removal, referring to **Installation Note**.
6. Loosely tighten the lower arm rear cam nut.
7. Install the wheel and tire.
   Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–87 ft·lbf}
8. Lower the vehicle.
9. With the vehicle unloaded, tighten the lower arm rear cam nut to the specified torque.
   Tightening torque: 94–116 N·m {9.5–11.9 kgf·m, 69–86 ft·lbf}
10. Adjust the front wheel alignment. (Refer to page R–6.)



1. Front stabilizer control link
2. Shock absorber and spring
3. Cotter pin
4. Nut
5. Nuts
   - Removal Note ..... page R–20
   - Installation Note ..... page R–20
6. Cam plates
   - Removal Note ..... page R–20
   - Installation Note ..... page R–20
7. Adjusting Cam bolt
   - Installation Note ..... page R–20
8. Front lower arm
   - Removal Note ..... page R–20
   - Inspect for damage and cracks
   - Inspect bushing for damage and wear
   - Inspect boot for tearing and cracks
   - Inspection .... page R–20
   - Disassembly / Inspection / Assembly .... page R–21

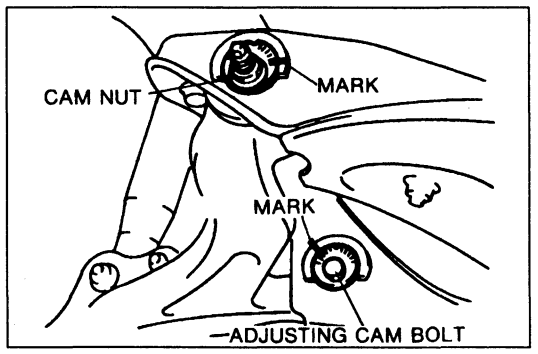


Removal note
Nut and cam plate
Before loosening the nut, make a mark on the cam plate and the crossmember for reference during installation.

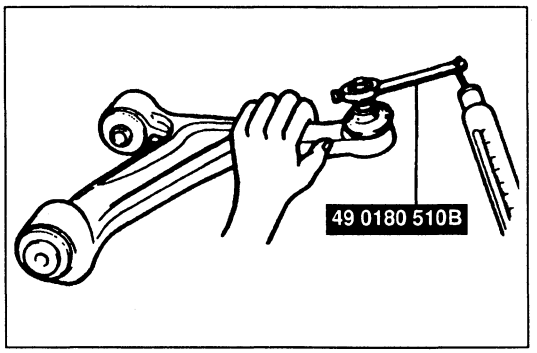


Front lower arm
1. Loosen the nut until it is flush with the end of the stud.
2. With the nut protecting the ball joint stud, separate the ball joint from the knuckle by using the **SST**.

Caution
- **The sharp edges of the SST can slice the dust boot. Install the SST so that the sharp edges are between the dust boot and the knuckle.**



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 the mark made before removing the adjusting cam bolt. Temporarily tighten the nut.



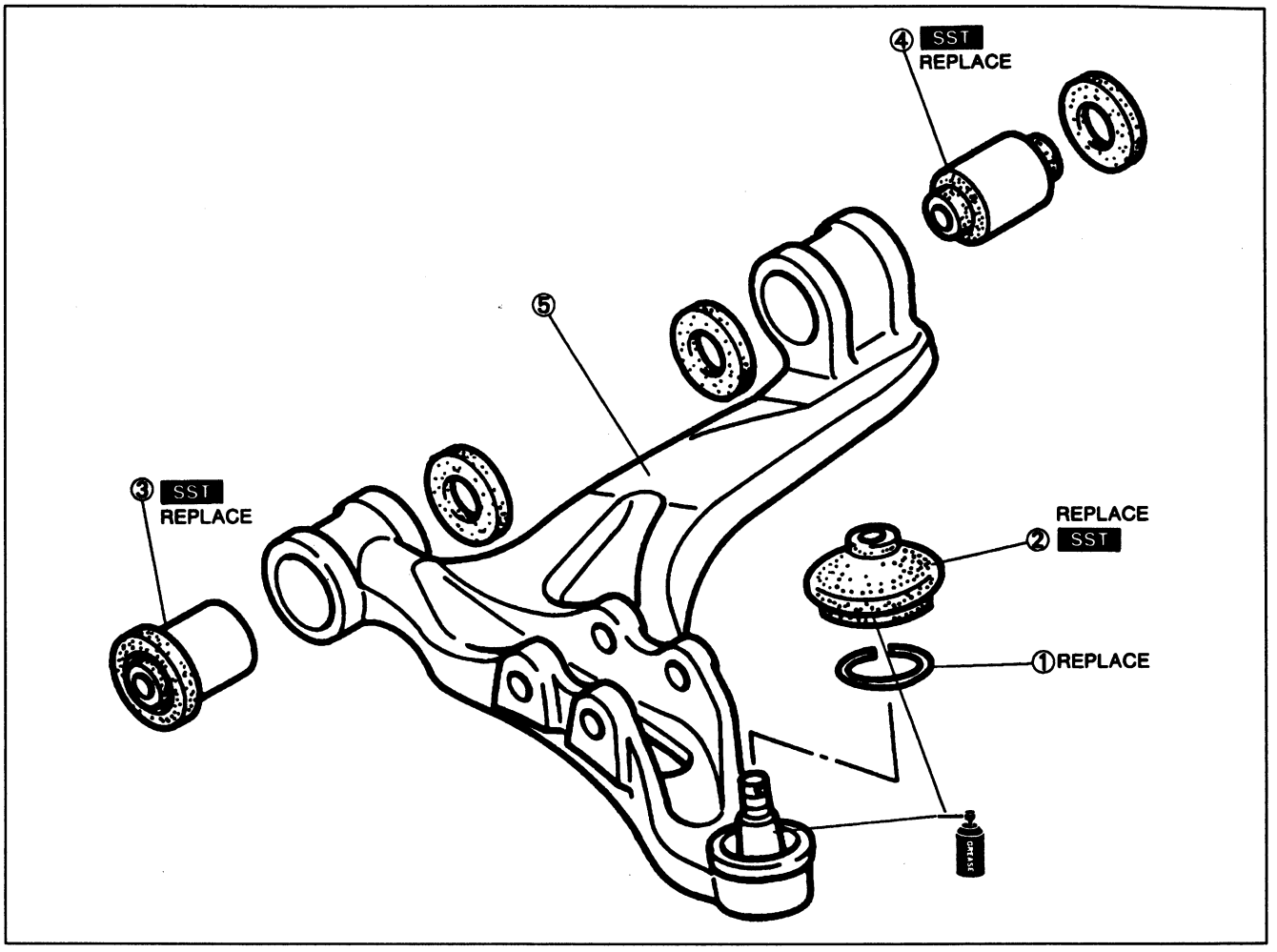
Inspection
Front lower arm ball joint
Ball joint rotation torque
1. Shake and rotate the ball joint stud at least five times.
2. Connect the **SST** to the stud and measure the starting torque and the rotation torque by using a pull scale.

Starting torque:
2.5–7.3 N·m {25–75 kgf-cm, 22–65 in·lbf}
Pull scale reading:
25–73 N {2.5–7.5 kgf, 5.5–16.5 lbf}

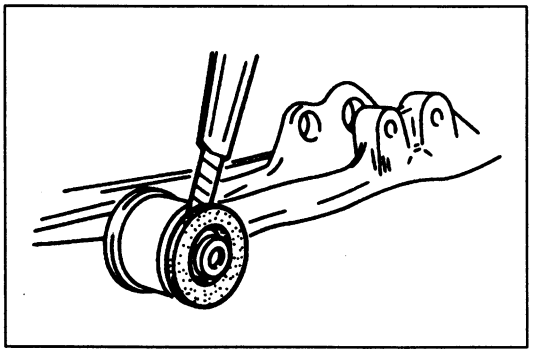
Rotation torque:
0.5–1.4 N·m {5–15 kgf-cm, 4.4–13.0 in·lbf}
Pull scale reading:
5–14 N {0.5–1.5 kgf, 1.1–3.3 lbf}

3. If not within specification, replace the front lower arm.

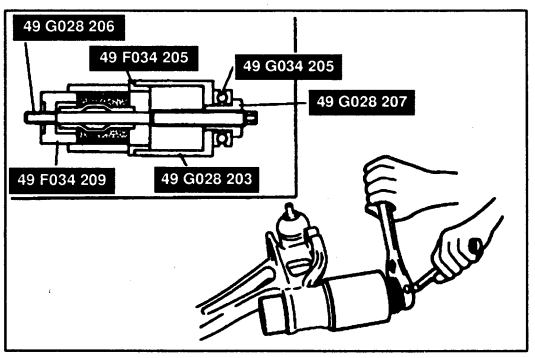
Disassembly / Inspection / Assembly
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



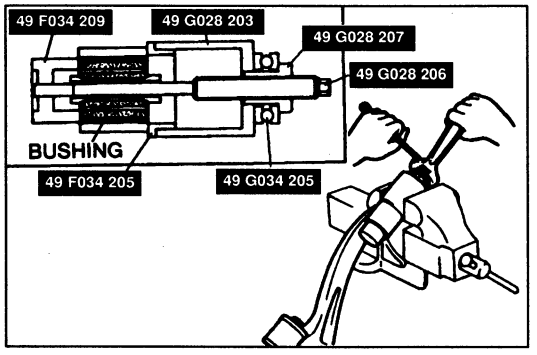
1. Clip
2. Dust boot
   Assembly Note
   ..... page R-23
3. Bushing (front)
   Disassembly Note
   ..... below
   Assembly Note
   ..... page R-22
4. Bushing (rear)
   Disassembly Note
   ..... page R-22
   Assembly Note
   ..... page R-22
5. Front lower arm
   Inspect for damage and cracks



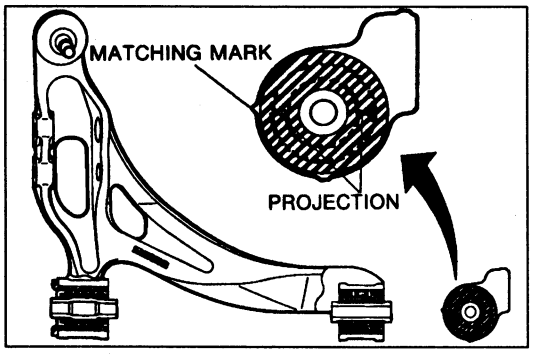
Disassembly note
Bushing (front)
1. Cut away the projecting rubber of the bushing.



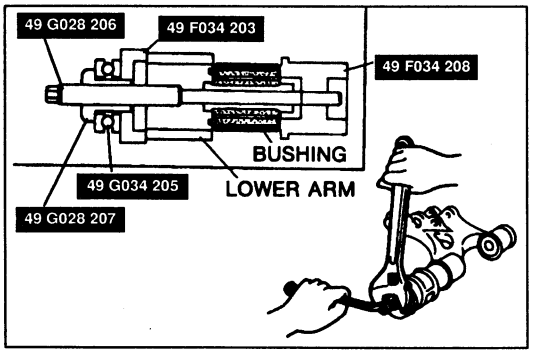
2. Remove the bushing by using the **SST**.



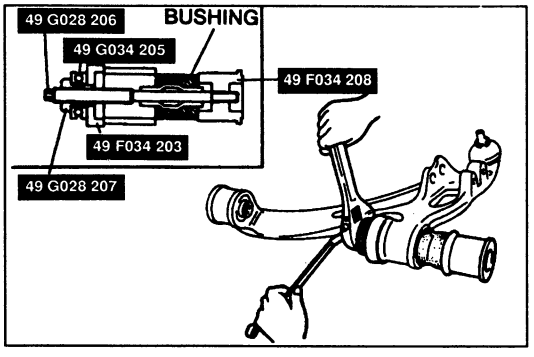
Bushing (rear)
Remove the bushing by using the **SST**.



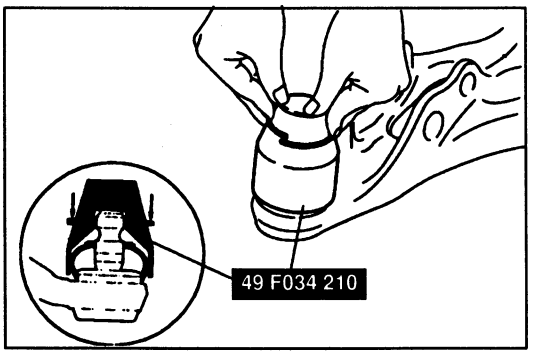
Assembly note
Bushing (rear)
1. Align the matching marks.



2. Apply soapy water to the new bushing.
3. Install the bushing by using the **SST**.



Bushing (front)
1. Apply soapy water to the new bushing.
2. Install the bushing by using the **SST**.



Dust boot

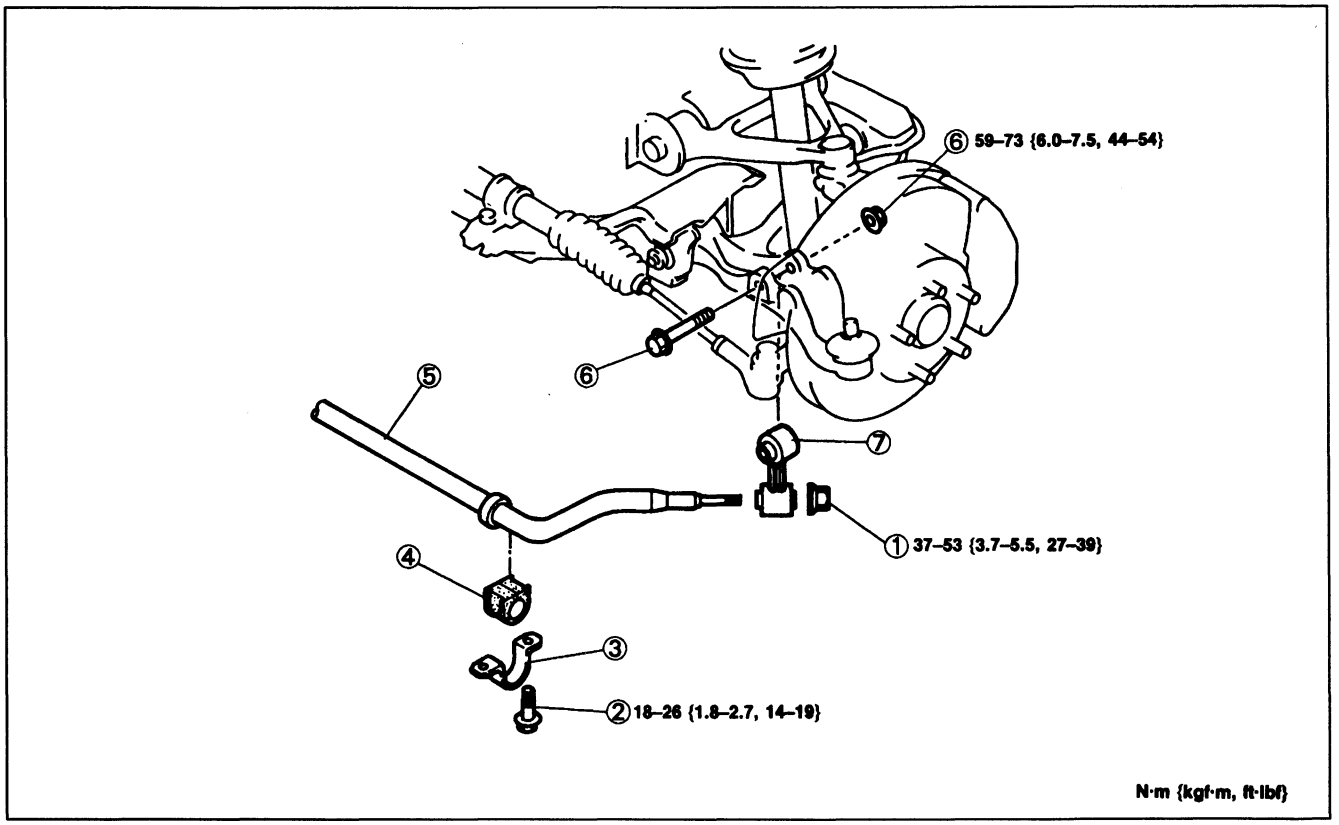
1. Wipe the grease off the ball stud.
2. Fill the inside of the new dust boot with grease.
3. Install the dust boot onto the ball joint.
4. Set the **SST** over the boot and install a new clip.
5. Wipe off the excess grease.

FRONT STABILIZER

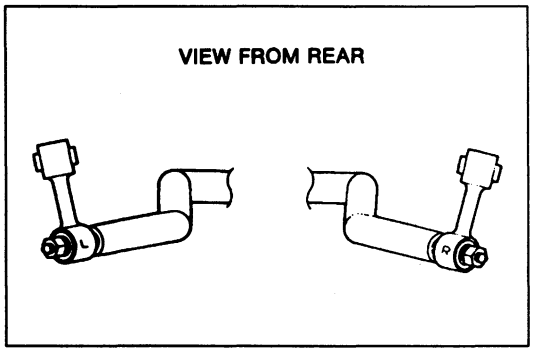
Removal / Inspection / Installation

1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the wheels and tires and 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, referring to **Installation Note**.
6. Install the wheels and tires.

Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–87 ft·lbf}



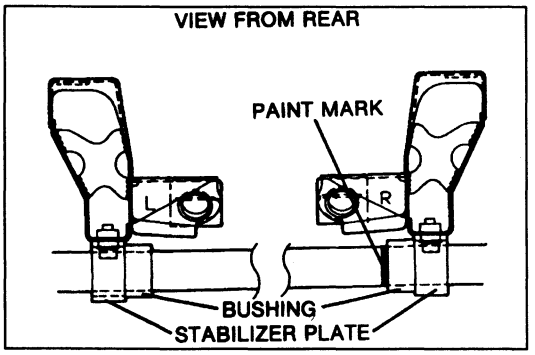
1. Nut
2. Bolt
3. Stabilizer plate
   Inspect for damage and cracks
4. Stabilizer bushing
   Inspect for wear and deterioration
5. Stabilizer bar
   Inspect for damage and bending
   Installation Note ..... page R-25
6. Bolt, nut
7. Stabilizer control link
   Inspect for damage and cracks
   Installation Note .... below



Installation note

Stabilizer control link

Install the stabilizer control links with the R (right) and L (left) marks as shown.



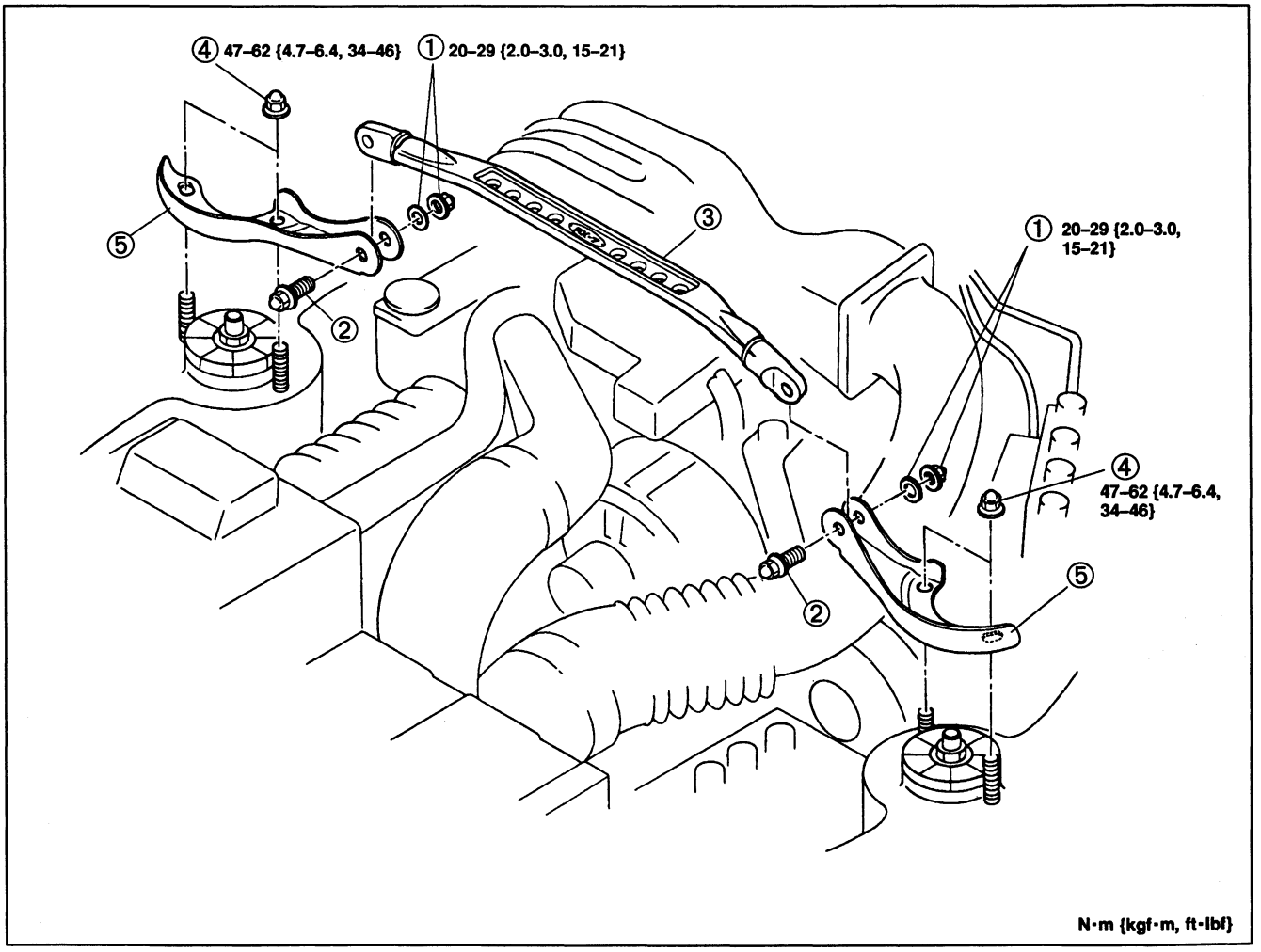
Stabilizer bar

Install the stabilizer bar with the white paint mark at the right side.

FRONT STRUT BAR

Removal / Inspection / Installation

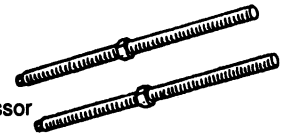
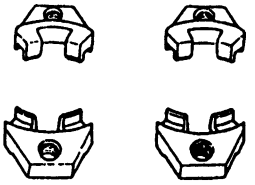
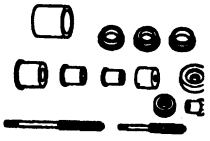
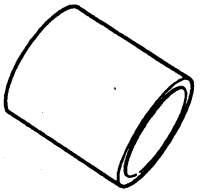
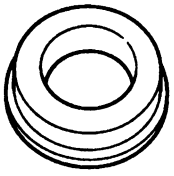
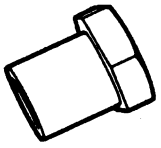
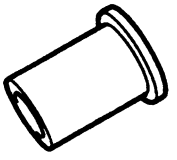
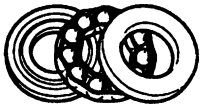
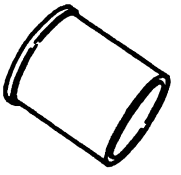
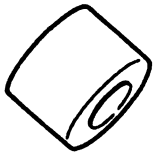
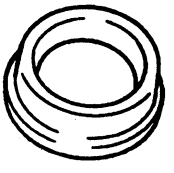
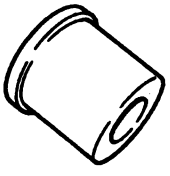
1. Remove in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.



1. Nut, washer
2. Bolt
3. Front strut bar
   Inspect for damage and bending
4. Nut
5. Strut plate

REAR SUSPENSION (DOUBLE WISHBONE, COIL SPRING TYPE)

PREPARATION
SST

49 0370 641 Screw, coil spring compressor 	For removal / installation of coil spring	490223 640B Arm, coil spring compressor 	For removal / installation of coil spring
49 F034 2A0 Replacer set, rubber bushing 	For removal / installation of bushing	49 G028 203 Support (Part of 49 F034 2A0) 	For removal / installation of bushing
49 G028 205 Support (Part of 49 F034 2A0) 	For removal / installation of pillow ball	49 G028 206 Shaft (Part of 49 F034 2A0) 	For removal / installation of bushing
49 G028 207 Nut (Part of 49 F034 2A0) 	For removal / installation of bushing	49 G028 208 Installer (Part of 49 F034 2A0) 	For removal / installation of pillow ball
49 G034 205 Bearing (Part of 49 F034 2A0) 	For removal / installation of bushing	49 F034 207 Installer (Part of 49 F034 2A0) 	For removal / installation of bushing
49 F034 203 Support (Part of 49 F034 2A0) 	For installation of bushing	49 F034 206 Shaft (Part of 49 F034 2A0) 	For installation of bushing
49 F034 209 Installer (Part of 49 F034 2A0) 	For installation of pillow ball	49 F034 204 Support (Part of 49 F034 2A0) 	For removal / installation of bushing
49 F034 208 Installer (Part of 49 F034 2A0) 	For removal / installation of bushing		

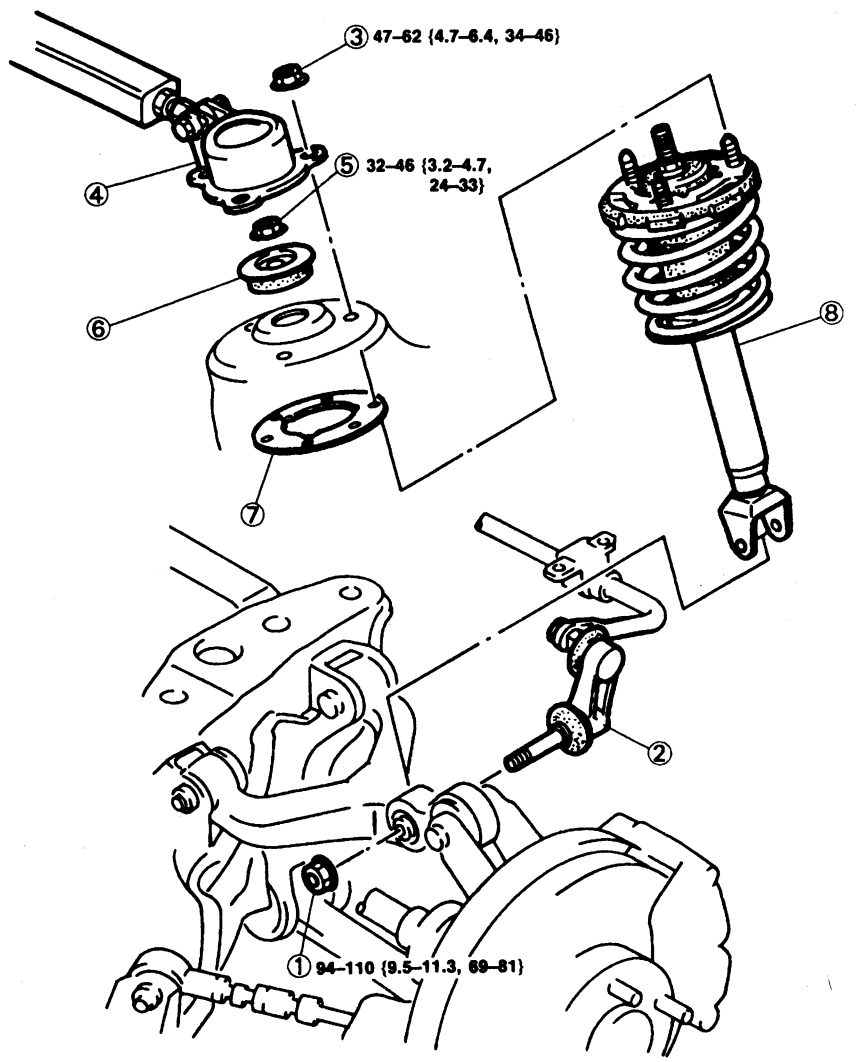
REAR SHOCK ABSORBER AND SPRING

Removal / Installation

1. Jack up the rear of the vehicle and support it on safety stands.
2. Remove the wheel and tire.
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Install the wheel and tire.

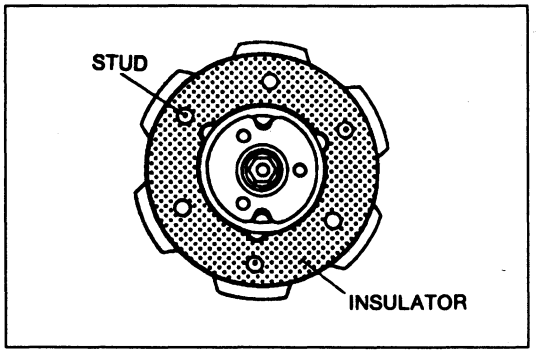
Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–87 ft·lbf}

6. Check the rear wheel alignment. (Refer to page R–9.)



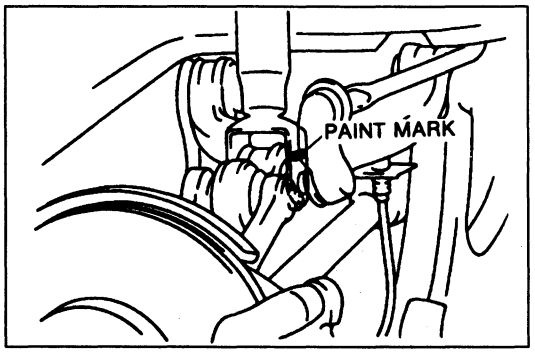
N·m {kgf·m, ft·lbf}

1. Nut
2. Rear stabilizer control link
3. Nut
4. Rear strut bar
   Removal / Inspection / Installation . . . page R–43
5. Nut
6. Stopper rubber
7. Insulator
8. Shock absorber and spring
   Installation Note . . . . . page R–28
   Disassembly / Inspection / Assembly . . . . page R–29



Installation note
Shock absorber and spring

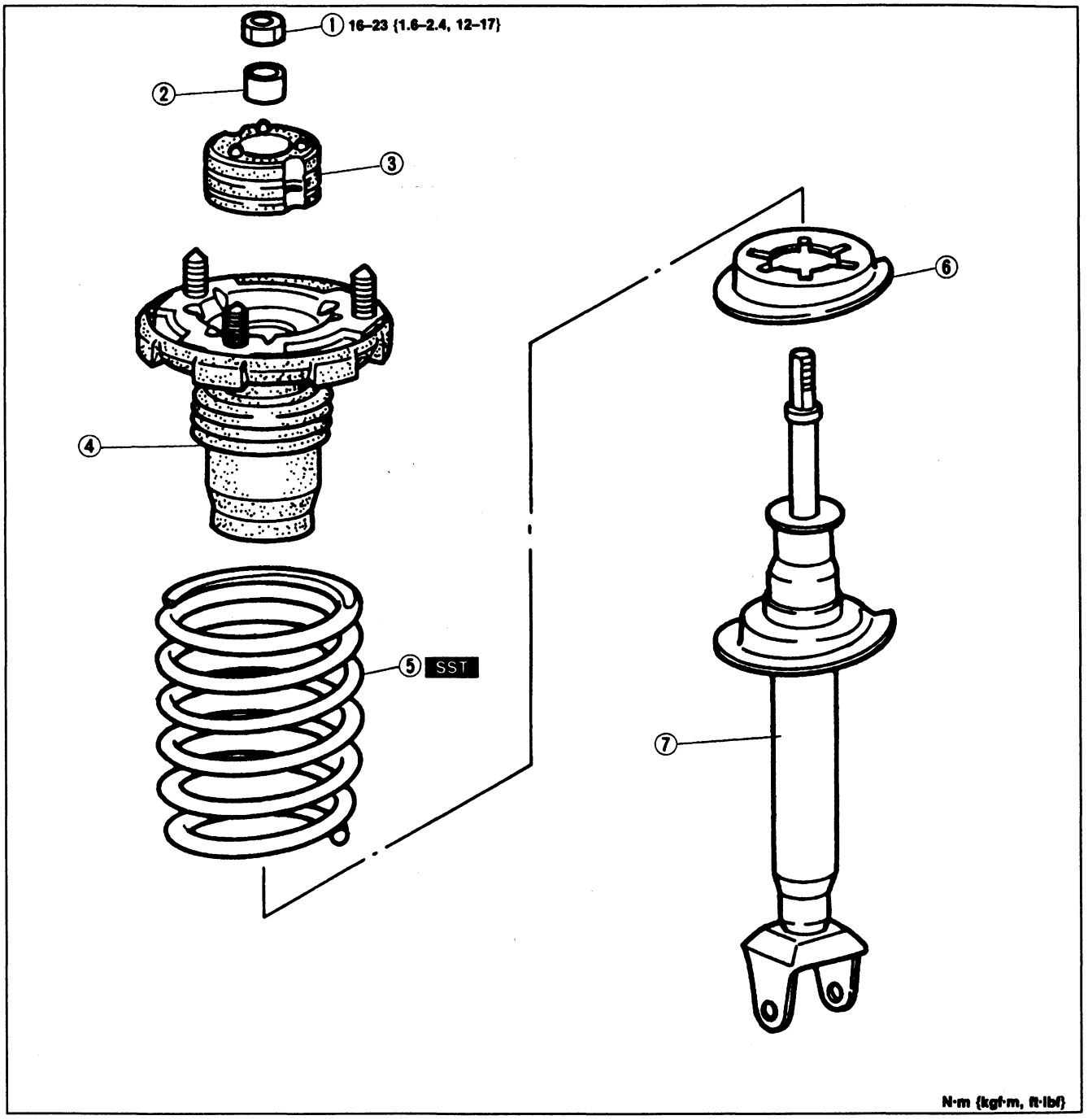
1. Install the insulator so that the notches in it face the studs as shown.



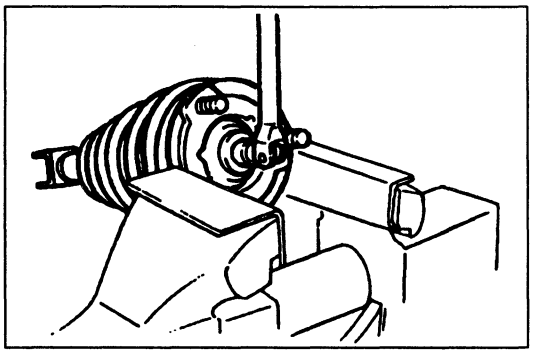
2. Install the shock absorber and spring so that the identification paint mark faces rearward.

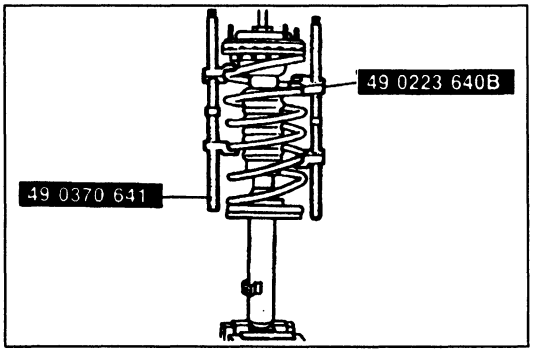
Disassembly / Inspection / Assembly

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 removal, referring to **Assembly Note.**



1. Nut
   Disassembly Note ..... page R-30
   Assembly Note ..... page R-31
2. Spacer
3. Mounting rubber
   Inspect for damage and deterioration
   Assembly Note ..... page R-31
4. Bound stopper assembly
   Inspect for damage and cracks
5. Coil spring
   Inspect for damage and weakness
   Assembly Note ..... page R-30
6. Lower spring seat
   Inspect for damage and cracks
7. Shock absorber
   Inspection ..... page R-30

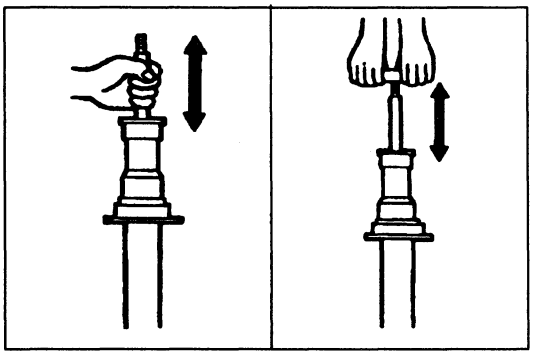




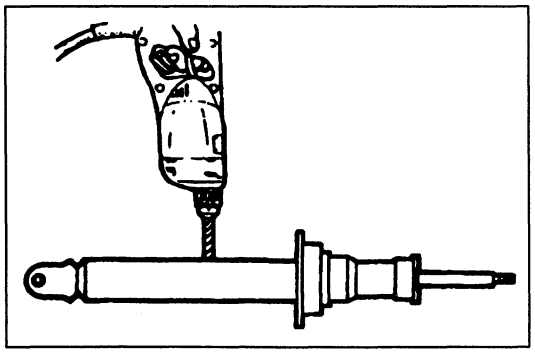
Disassembly note
Nut

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.**

1. Secure the mounting rubber bracket in a vise.
2. Loosen the mounting rubber nut several turns, but do not remove it.
3. Assemble the **SST**.
4. Compress the coil spring by using the **SST** and remove the mounting nut.



Inspection
Shock absorber
Check the following and replace the shock absorber if necessary.
1. Inspect for damage and oil leakage.
2. (1) Compress the shock absorber rod and release it.
   (2) Verify that the rod extends fully at a normal speed.
3. Compress and extend the rod at least three times. Verify that the operational force does not change and that there is no unusual noise.



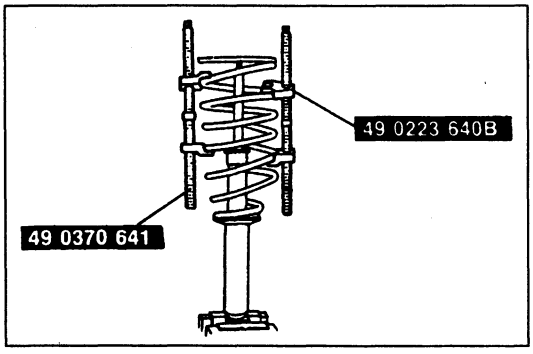
Disposal of shock absorber

Warning
- **The gas in the shock absorber is highly pressurized, and could spray metal chips into the eyes and face when drilling. Whenever drilling into a shock absorber, wear protective eye wear.**

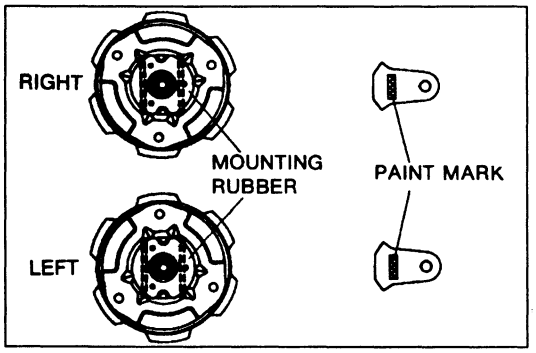
1. Lay the shock absorber flat.
2. Drill a hole in its body.

Drill size: 2–3 mm {0.08–0.12 in}

3. Allow the gas to escape.
4. Discard the shock absorber.

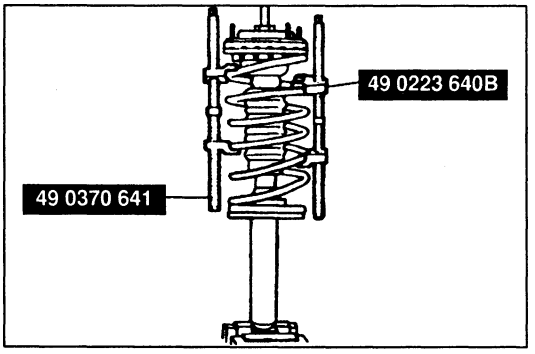


Assembly note
Coil spring
1. Compress the coil spring by using the **SST**.
2. Install the spring so that the lower coil is seated on the step of the lower seat.



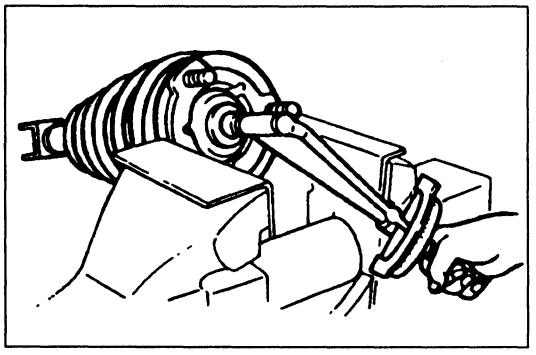
Mounting rubber

Install the mounting rubber as shown.



Nut

1. Tighten the mounting nut several turns.
2. Remove the **SST**.
3. Verify that the lower coil of the spring is seated on the step of the lower seat.



3. Secure the mounting rubber bracket in a vise.
4. Tighten the nut.

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

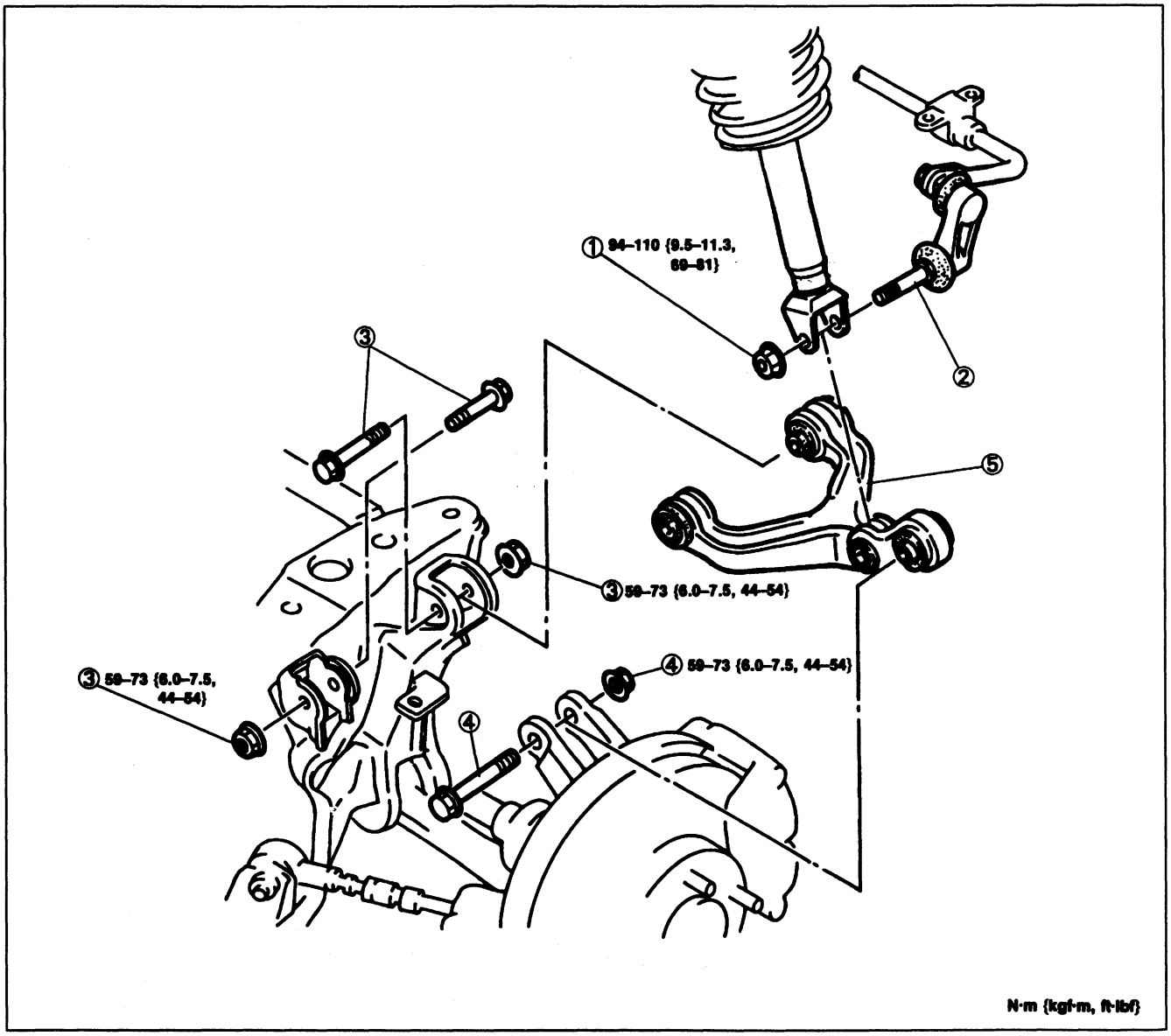
UPPER ARM

Removal / Inspection / Installation

1. Jack up the rear of the vehicle and support it on safety stands.
2. Remove the wheel and tire.
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 wheel and tire.

Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–87 ft·lbf}

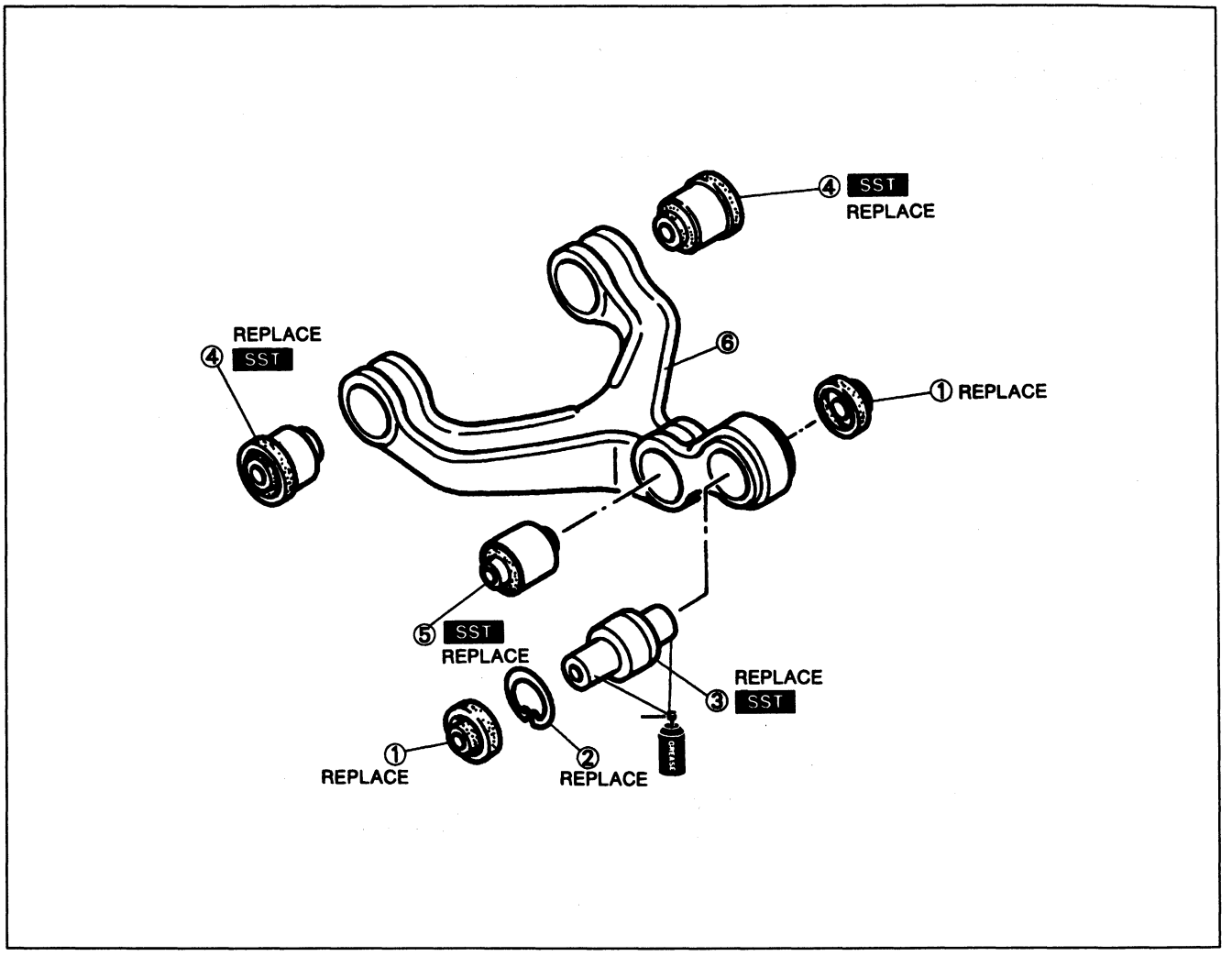
7. Check the rear wheel alignment. (Refer to page R–9.)



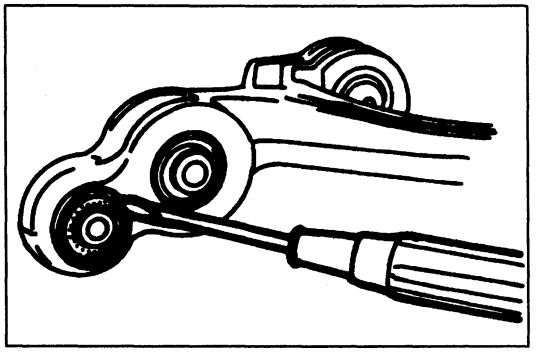
1. Nut
2. Stabilizer control link
3. Nut, bolt
4. Nut, bolt
5. Upper arm
   Inspect for damage and cracks
   Inspect bushing for wear and deterioration
   Disassembly / Inspection / Assembly .... page R–33

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.**



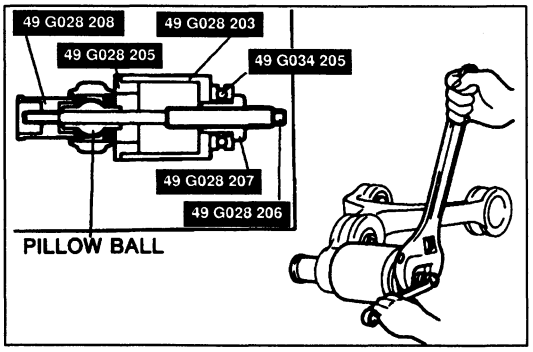
1. Rubber seal
2. Retaining ring
3. Pillow ball
   Disassembly Note . . below
   Assembly Note
   . . . . . page R-35
4. Upper arm bushing
   Disassembly Note
   . . . . . page R-34
   Assembly Note
   . . . . . page R-34
5. Damper bushing
   Disassembly Note
   . . . . . page R-34
   Assembly Note
   . . . . . page R-34
6. Upper arm
   Inspect for damage and cracks



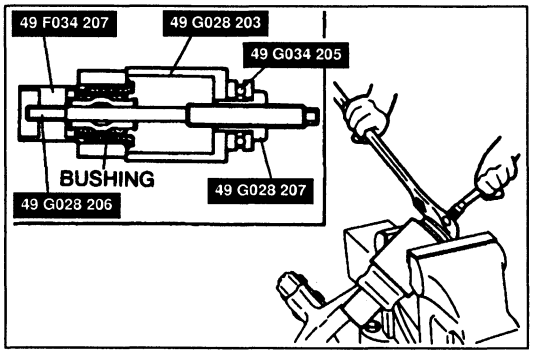
Disassembly note

Pillow ball

1. Remove the rubber seal by using a screw driver as shown.
2. Remove the retaining ring.

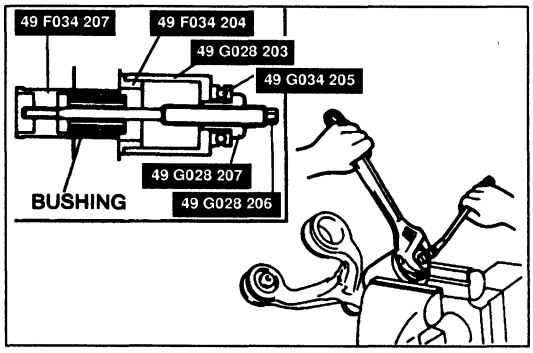


3. Remove the pillow ball by using the **SST**.



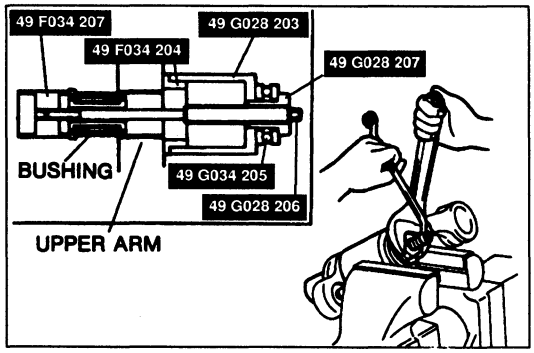
Upper arm bushing

Remove the upper arm bushing by using the **SST**.



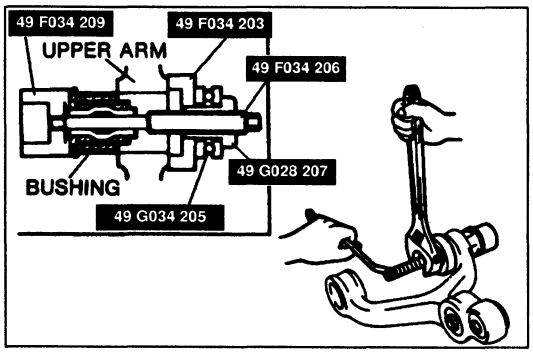
Damper bushing

Remove the damper bushing by using the **SST**.



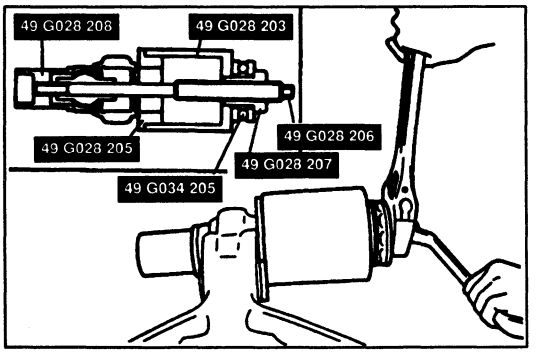
Assembly note
Damper bushing

1. Apply soapy water to the new damper bushing.
2. Install the damper bushing by using the **SST**.



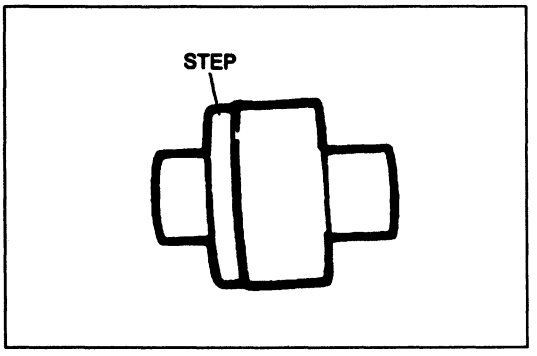
Upper arm bushing

1. Apply soapy water to the new bushing.
2. Install the upper arm bushing by using the **SST**.



Pillow ball

1. With the **SST**, install the pillow ball so that the step faces into the upper arm.

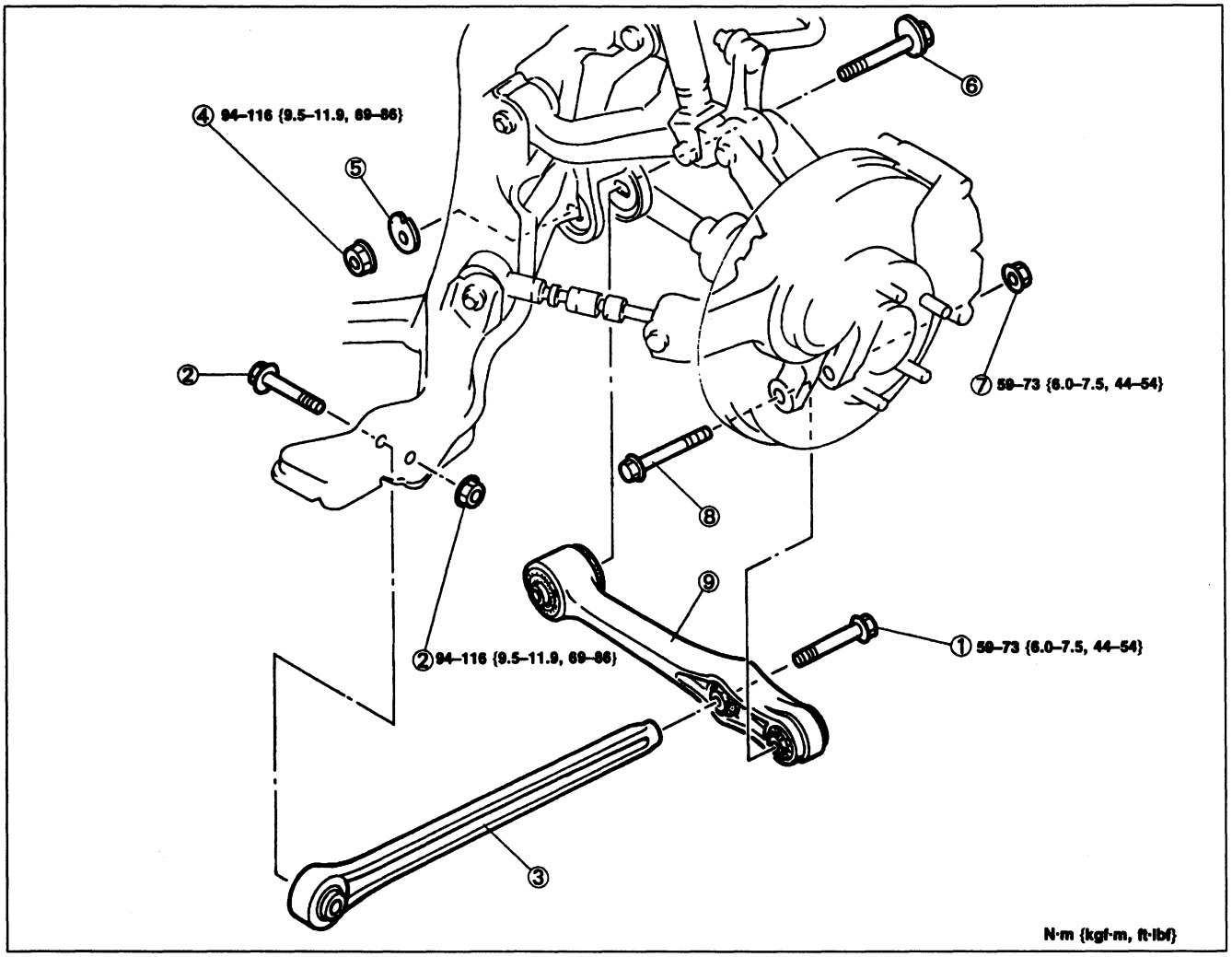


2. Install the retaining ring.
3. Fill the space between the pillow ball and rubber seal with grease.
4. Install the rubber seal.

REAR LOWER ARM

Removal / Inspection / Installation

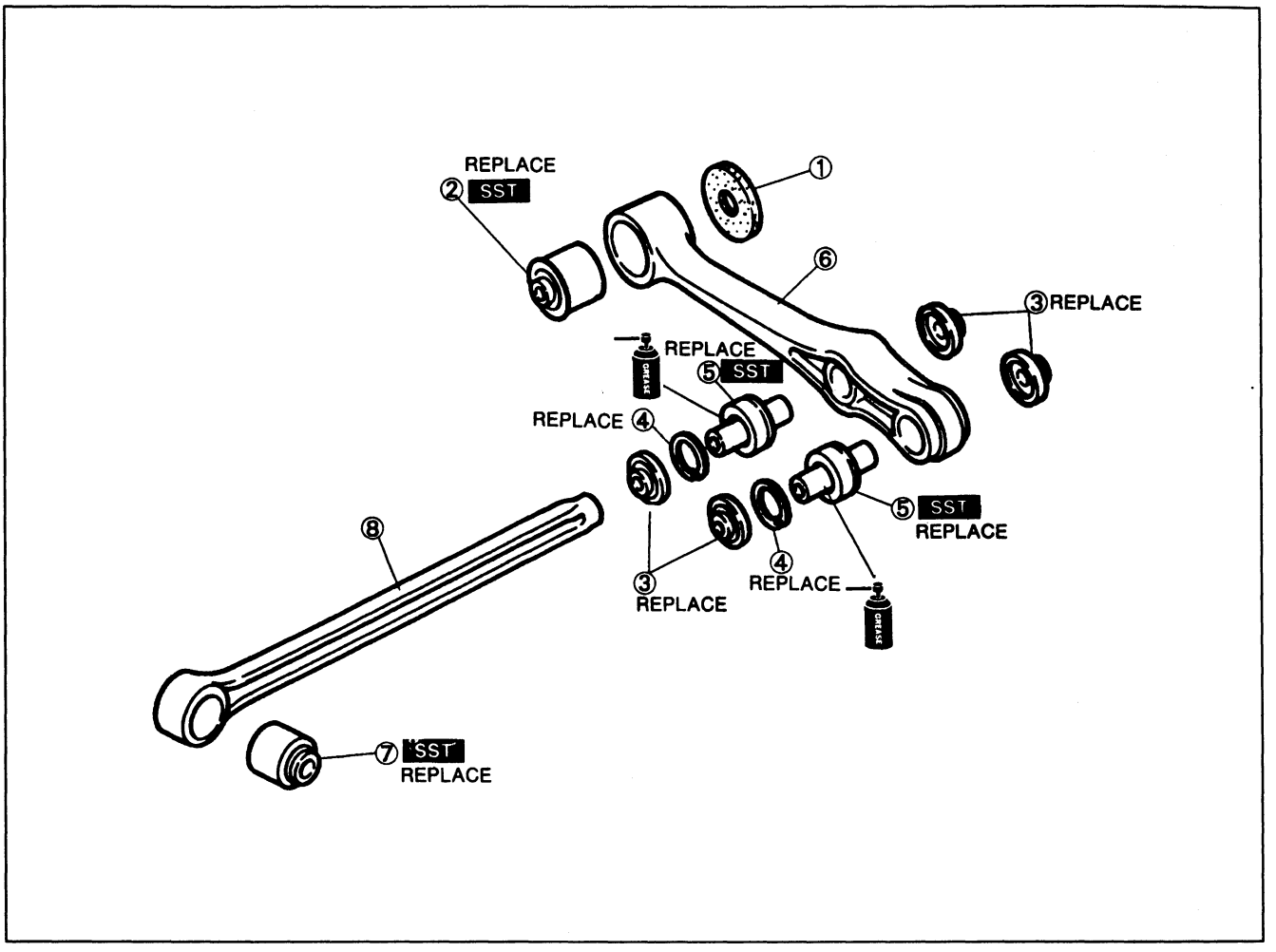
1. Jack up the rear of the vehicle and support it on safety stands.
2. Remove the wheel and tire.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Inspect all parts and repair or replace as necessary.
5. Install in the reverse order of removal, referring to **Installation Note**.
6. Loosely tighten the trailing link front nut.
7. Install the wheel and tire.
   Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–87 ft·lbf}
8. Lower the vehicle.
9. With the vehicle unloaded, tighten the trailing link front nut to the specified torque.
   Tightening torque: 94–116 N·m {9.5–11.9 kgf·m, 69–86 ft·lbf}
10. Check the rear wheel alignment. (Refer to page R–9.)



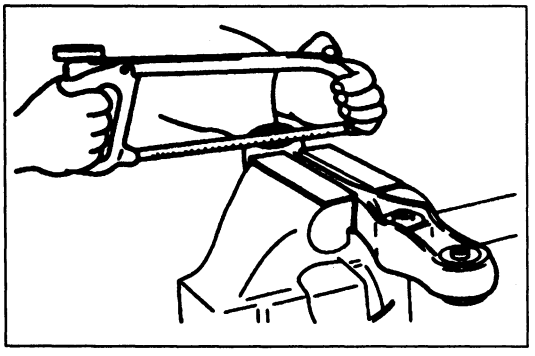
1. Bolt
2. Bolt, nut
3. Trailing link
   - Inspect for damage and cracks
   - Inspect bushing for wear and deterioration
   - Disassembly / Inspection / Assembly .... page R–37
4. Nut
   - Removal Note ..... page R–20
   - Installation Note ..... page R–20
5. Cam plate
   - Removal Note ..... page R–20
   - Installation Note ..... page R–20
6. Adjusting cam bolt
   - Installation Note ..... page R–20
7. Nut
8. Bolt
9. I-arm
   - Inspect for damage and cracks
   - Inspect bushing for wear and deterioration
   - Disassembly / Inspection / Assembly .... page R–37

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**.

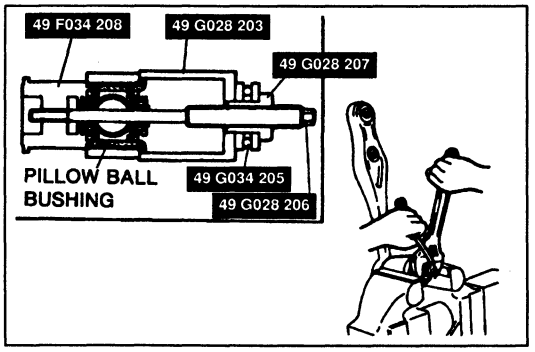


1. Stopper
2. Pillow ball bushing
   Disassembly Note ... below
   Assembly Note
   ..... page R-39
3. Rubber seal
4. Retaining ring
5. Pillow ball
   Disassembly Note
   ..... page R-38
   Assembly Note
   ..... page R-39
6. I-arm
   Inspect for damage and cracks
7. Bushing
   Disassembly Note
   ..... page R-38
   Assembly Note
   ..... page R-38
8. Trailing link
   Inspect for damage and cracks

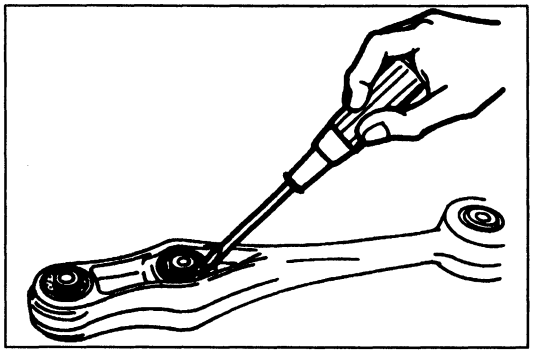


Disassembly note
Pillow ball bushing

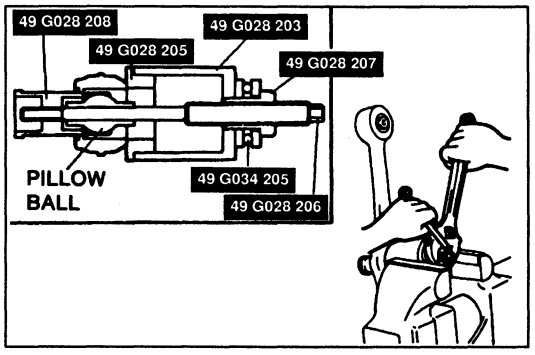
1. Cut away the flange of the bushing.



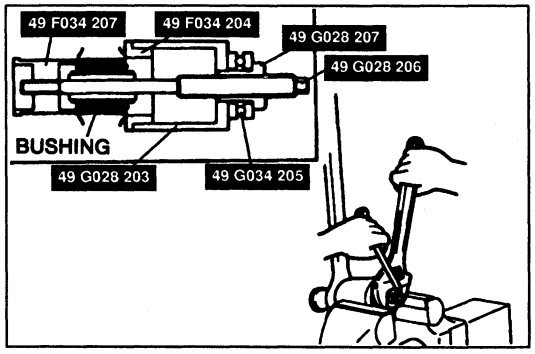
2. Remove the pillow ball bushing by using the **SST**.



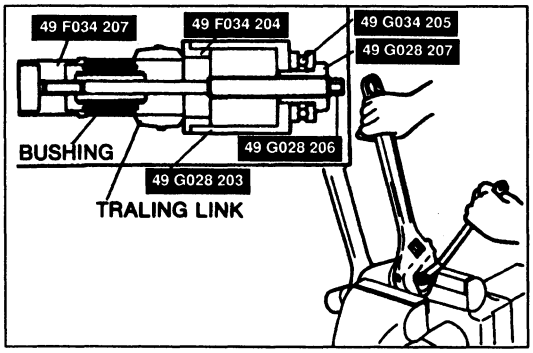
Pillow ball
1. Remove the rubber seal by using a screwdriver as shown.
2. Remove the retaining ring.



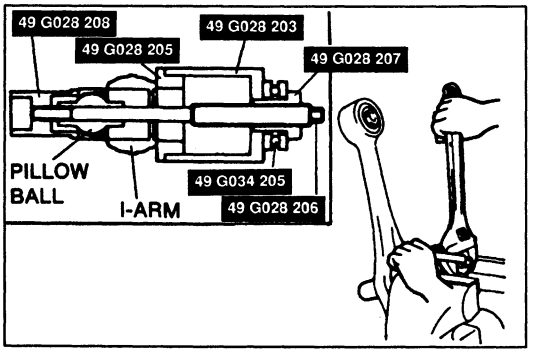
3. Remove the pillow ball by using the **SST**.



Bushing
Remove the bushing by using the **SST**.

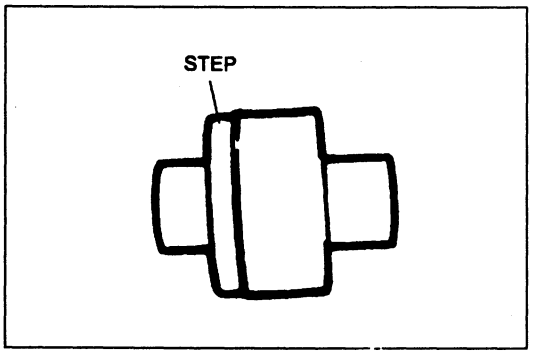


Assembly note
Bushing
1. Apply soapy water to the new bushing.
2. Install the bushing by using the **SST**.

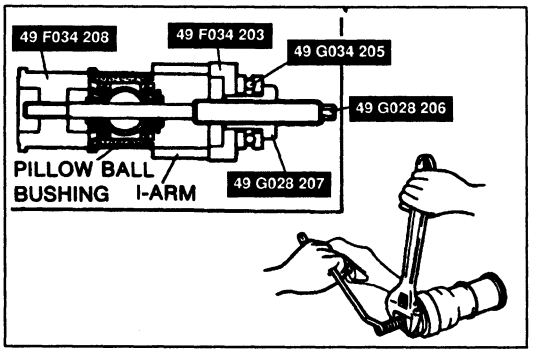


Pillow ball

1. With the **SST**, install the pillow ball so that the step faces into the I-arm.



2. Install the retaining ring.
3. Fill the space between the pillow ball and rubber seal with grease.
4. Install the rubber seal.



Pillow ball bushing

1. Apply soapy water to the new pillow ball bushing.
2. Install the pillow ball bushing by using the **SST**.

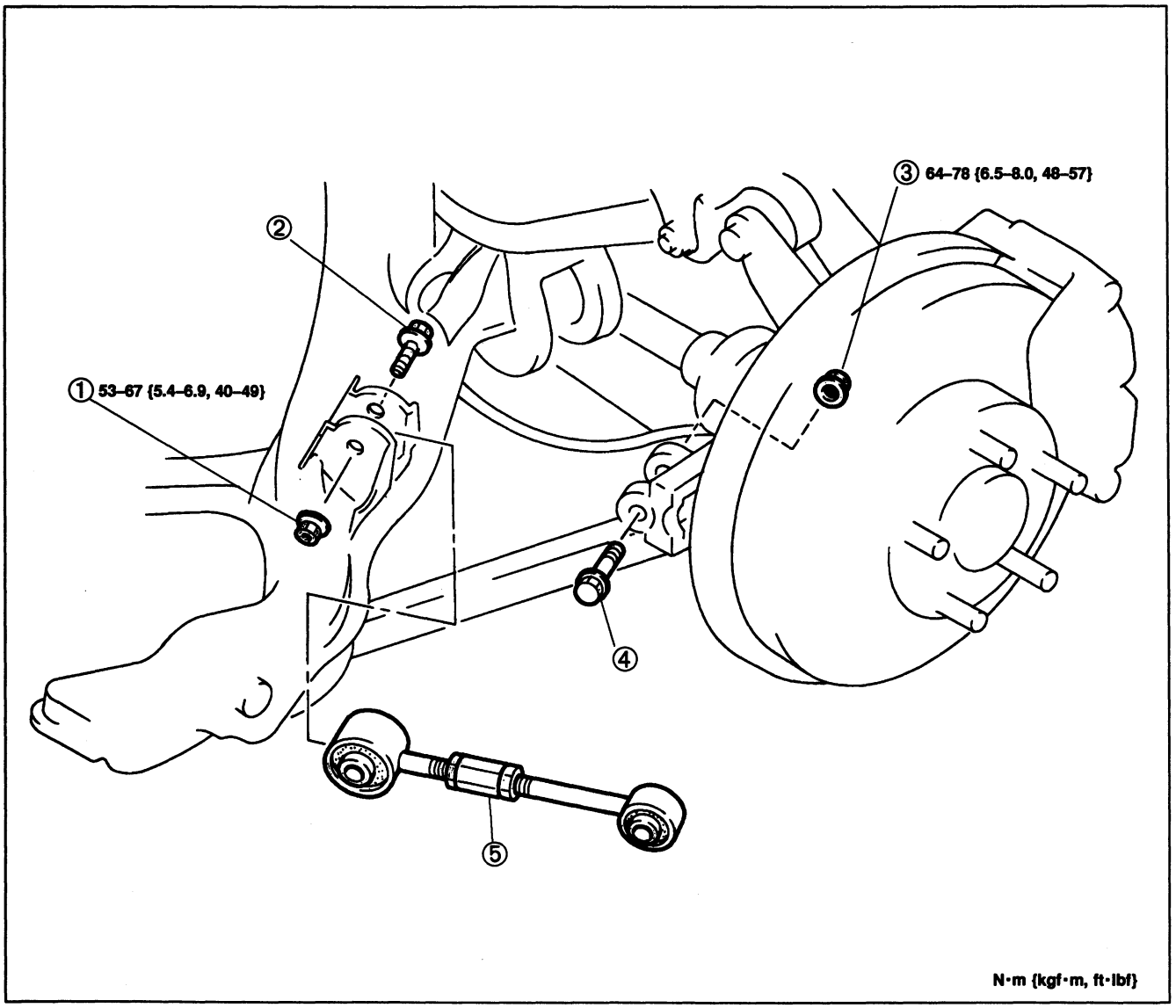
TOE-CONTROL LINK

Removal / Inspection / Installation

1. Jack up the rear of the vehicle and support it on safety stands.
2. Remov
   e the wheel and tire.
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. Install the wheel and tire.

Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–87 ft·lbf}

7. Check the rear wheel alignment. (Refer to page R–9.)

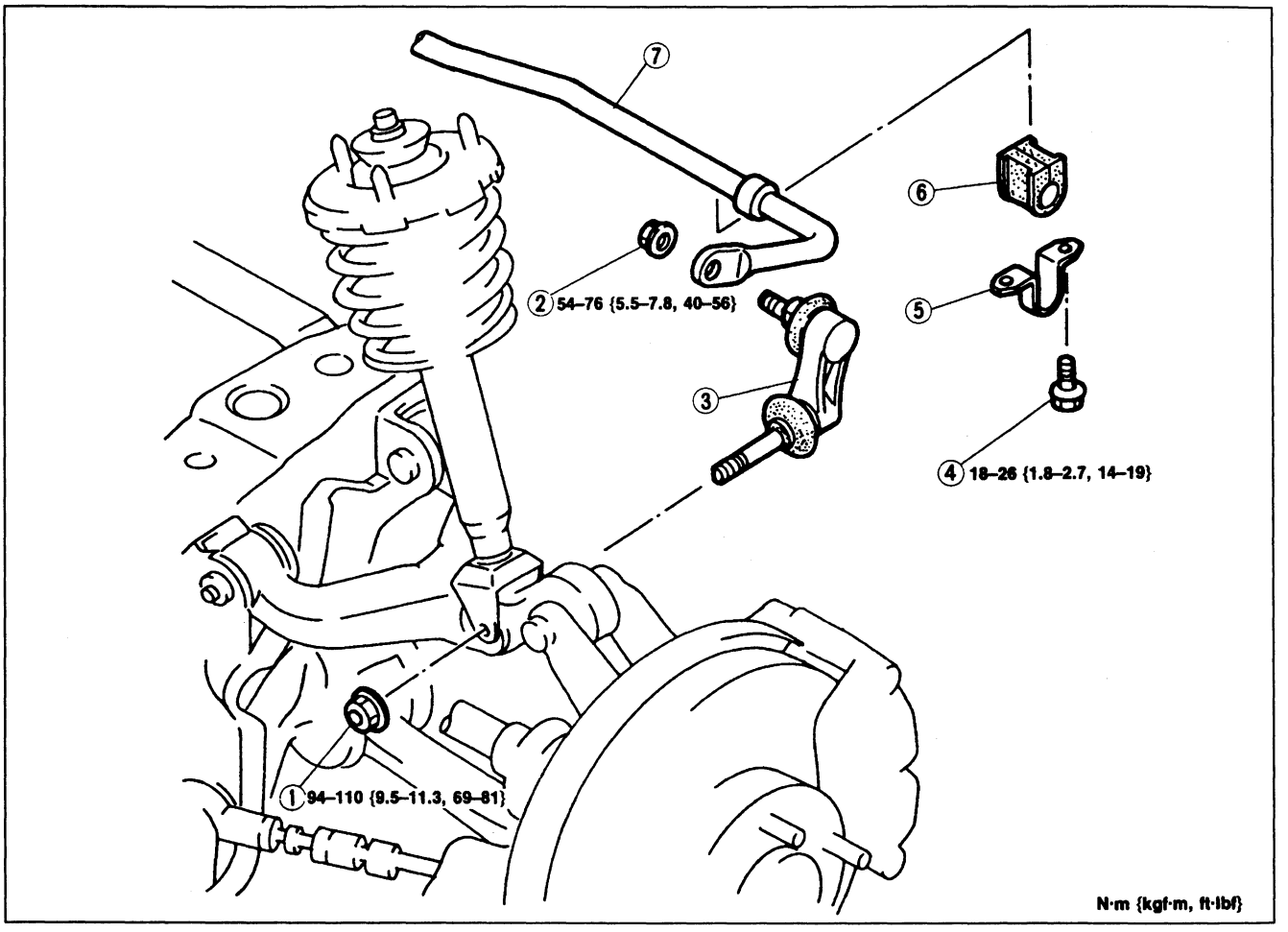


1. Nut
2. Bolt
3. Nut
4. Bolt
5. Toe-control link
   Inspect bushing for wear and deterioration

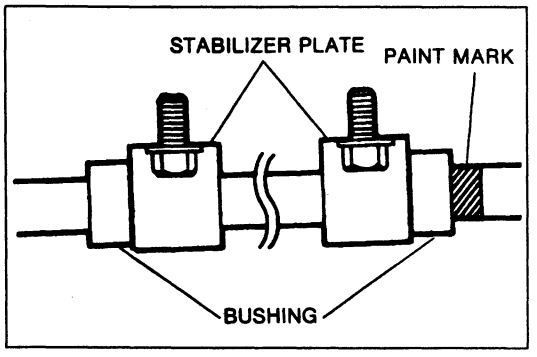
REAR STABILIZER

Removal / Inspection / Installation

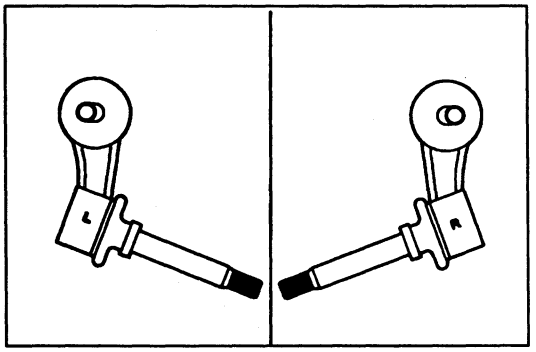
1. Jack up the rear of the vehicle and support it on safety stands.
2. Remove the wheels and tires and the undercover.
3. Remove in the order shown in the figure.
4. Inspect all parts and repair or replace as necessary.
5. Install in the reverse order of removal, referring to **Installation Note**.
6. Install the wheels and tires.
   Tightening torque: 89–117 N·m {9.0–12.0 kgf·m, 65–87 ft·lbf}



1. Nut
2. Nut
3. Stabilizer control link
   Inspect for damage and cracks
   Installation Note
   ..... page R-43
4. Bolt
5. Stabilizer plate
   Inspect for damage and cracks
6. Stabilizer bushing
   Inspect for wear and deterioration
7. Stabilizer bar
   Inspect for damage and bending
   Installation Note
   ..... below



Installation note
Stabilizer bar
Install the stabilizer bar with the white paint mark at the right side.



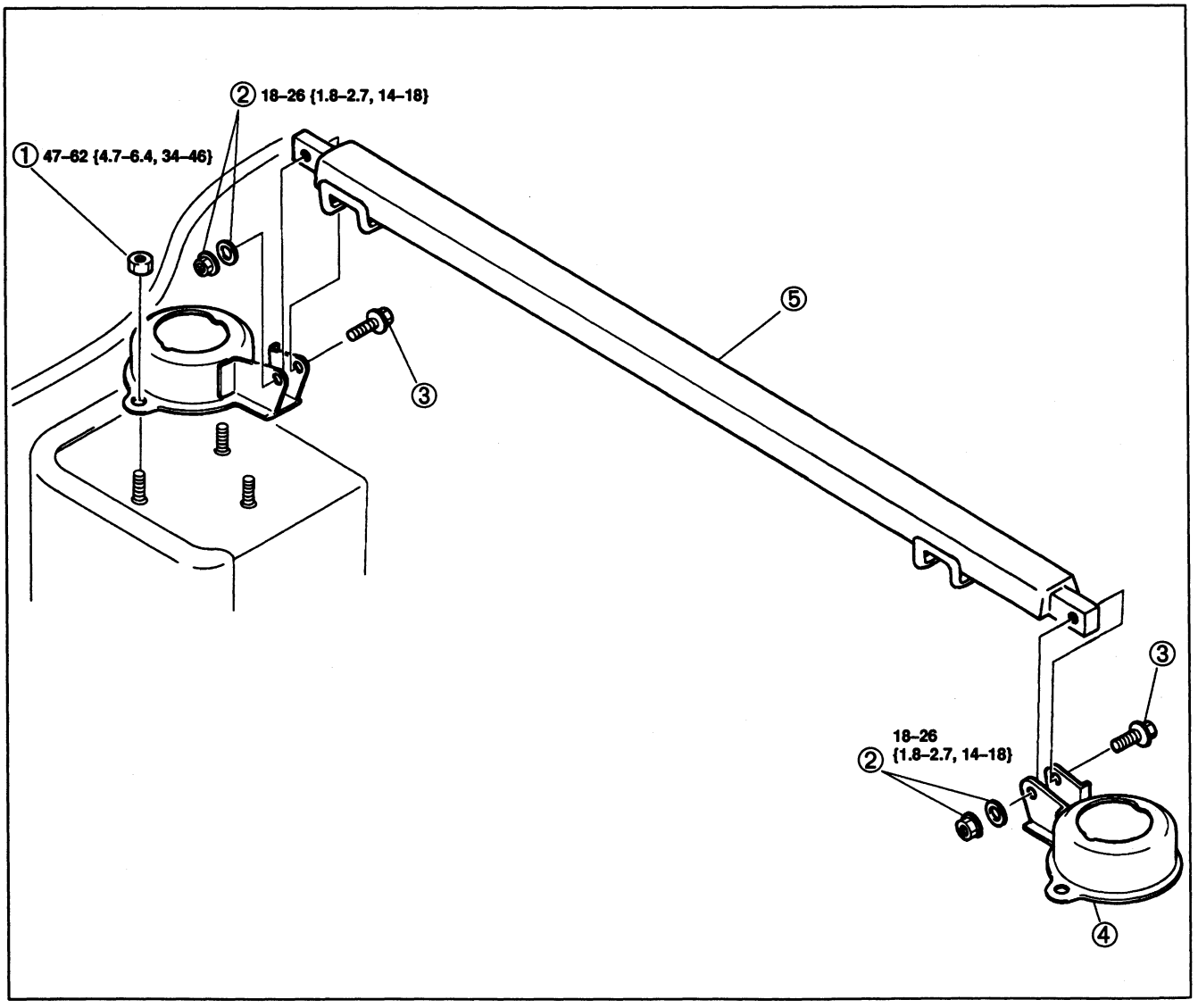
Stabilizer control link

Install the stabilizer control links with the R (right) and L (left) marks as shown.

REAR STRUT BAR

Removal / Inspection / Installation

1. Remove the suspension tower cover. (Refer to section S.)
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.



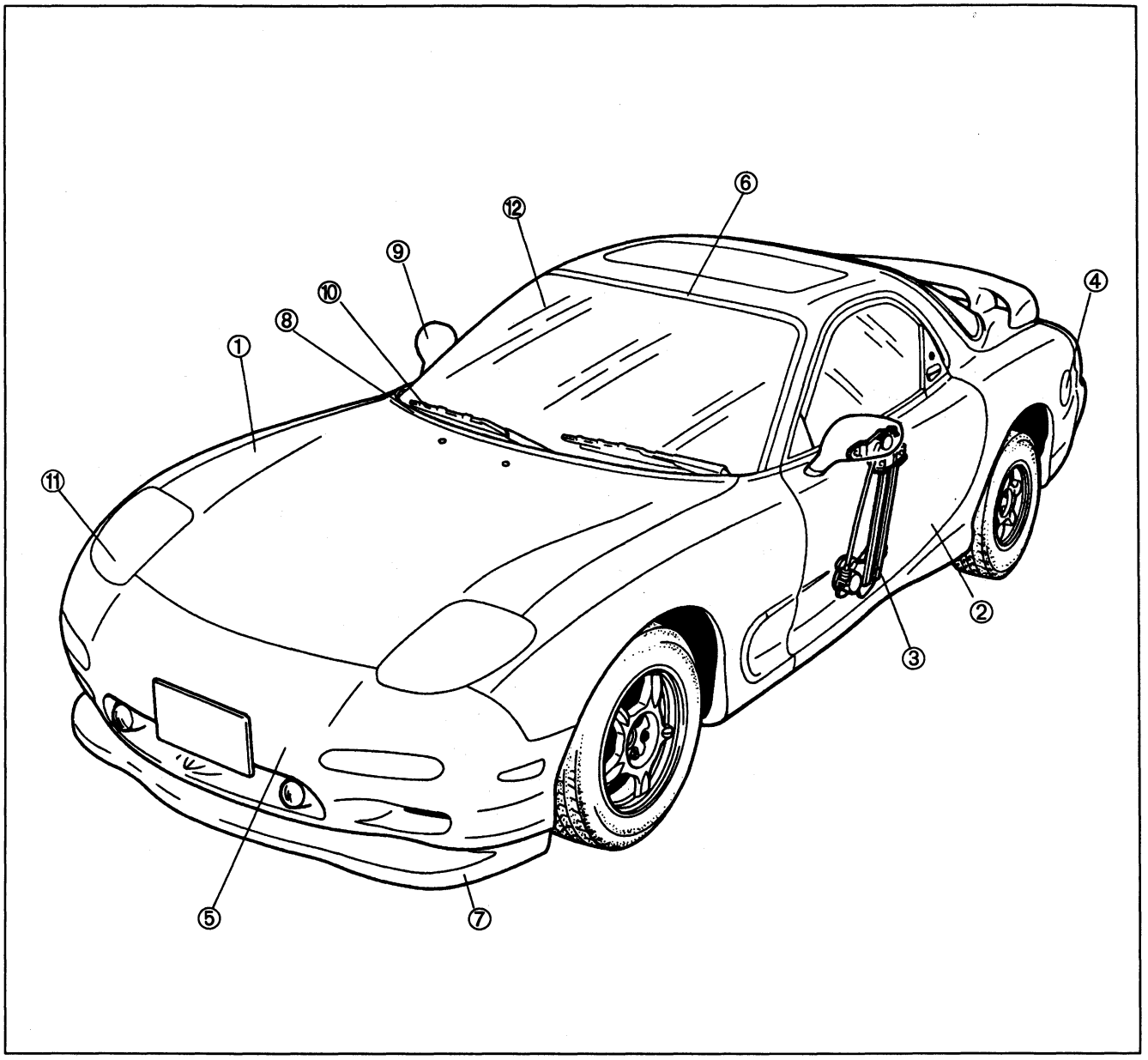
1. Nut
2. Nut, washer
3. Bolt
4. Strut plate
5. Rear strut bar
   Inspect for damage and bending

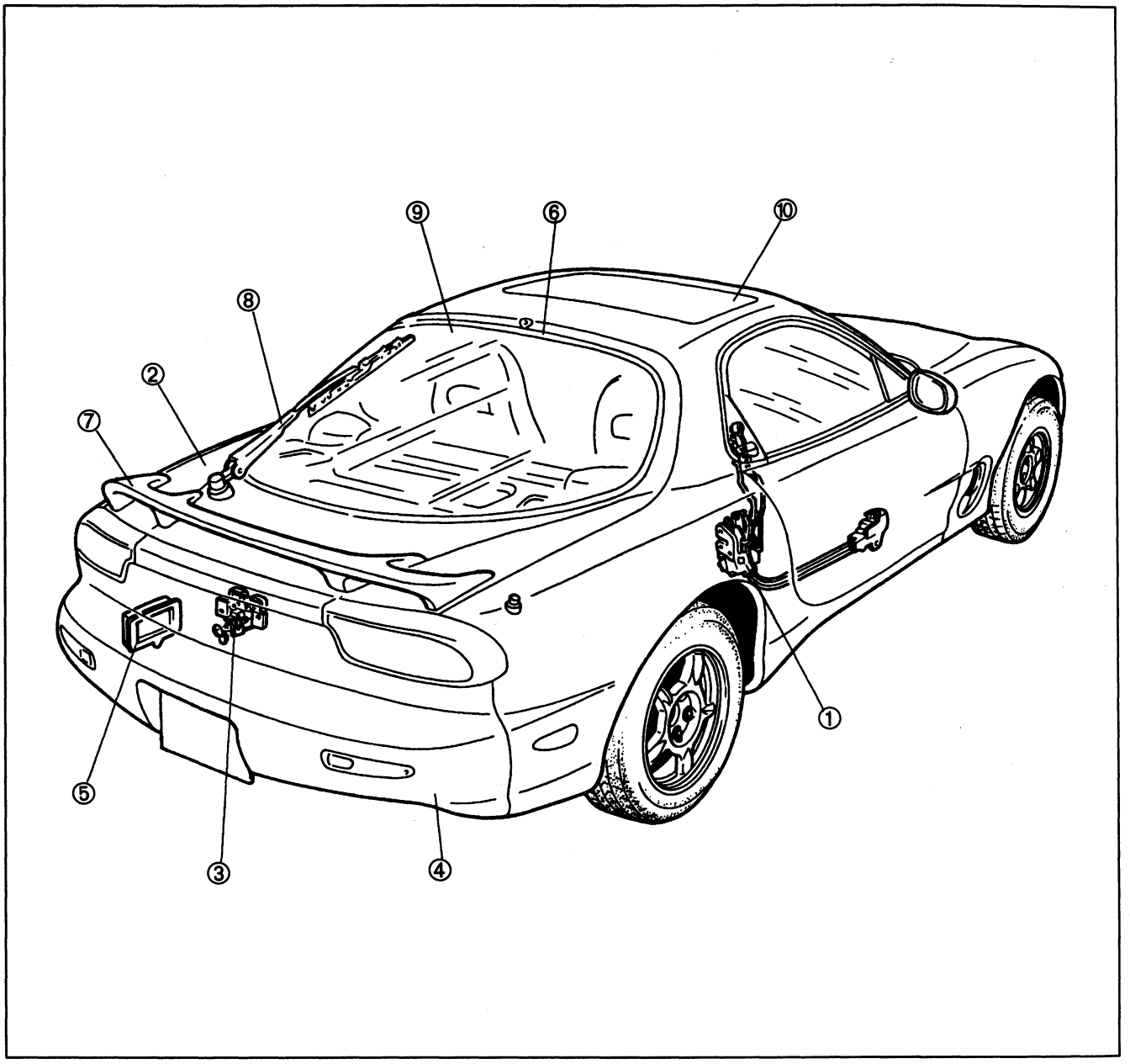
Before beginning any service procedure, refer to the 1994 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system service warnings and section J1 for audio antitheft system alarm conditions.

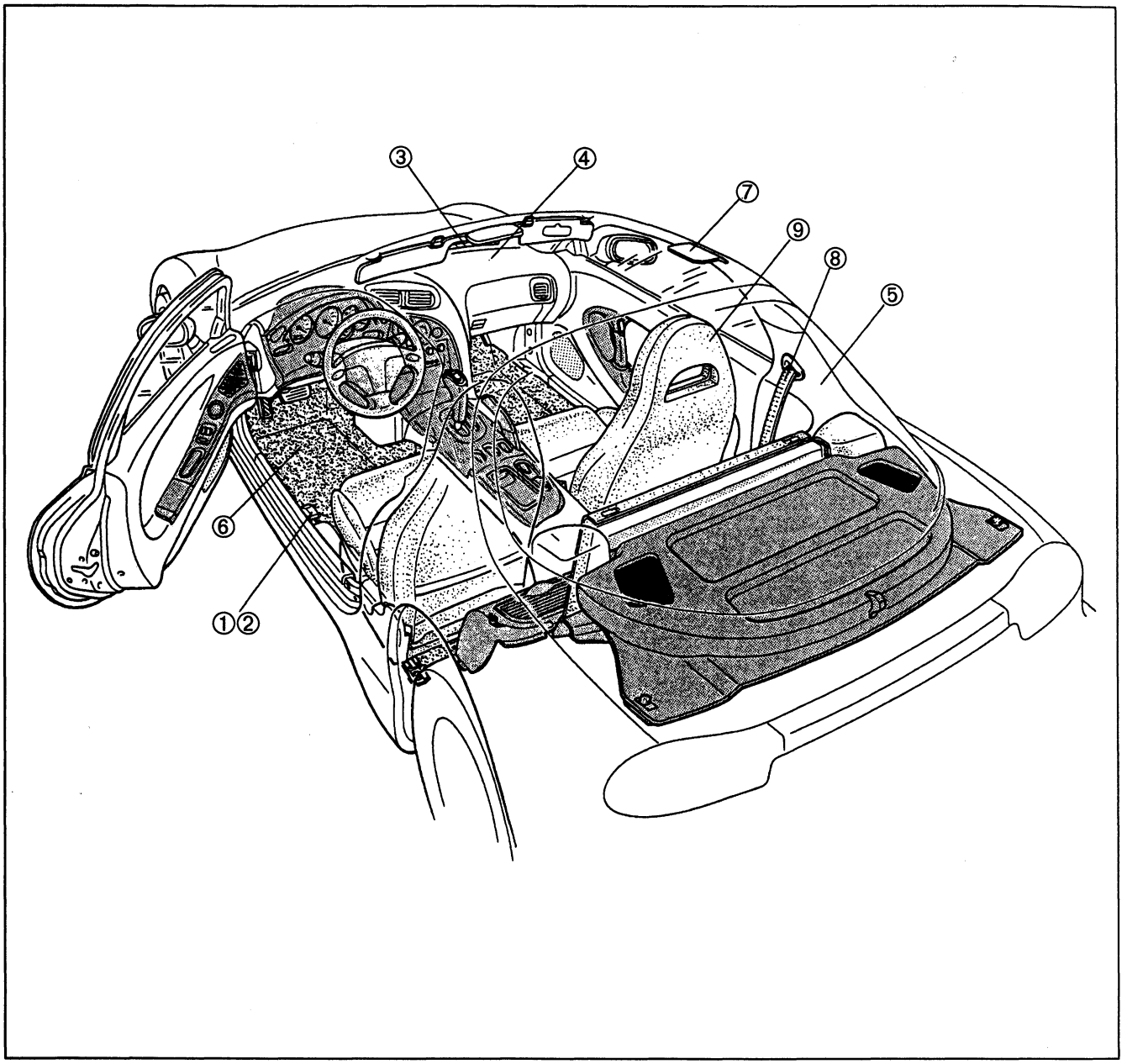
BODY

NOTE: Refer to the 1994 RX-7 Body Electrical Troubleshooting Manual (No. 1380-10-93H) for servicing of the body electrical components.

INDEX





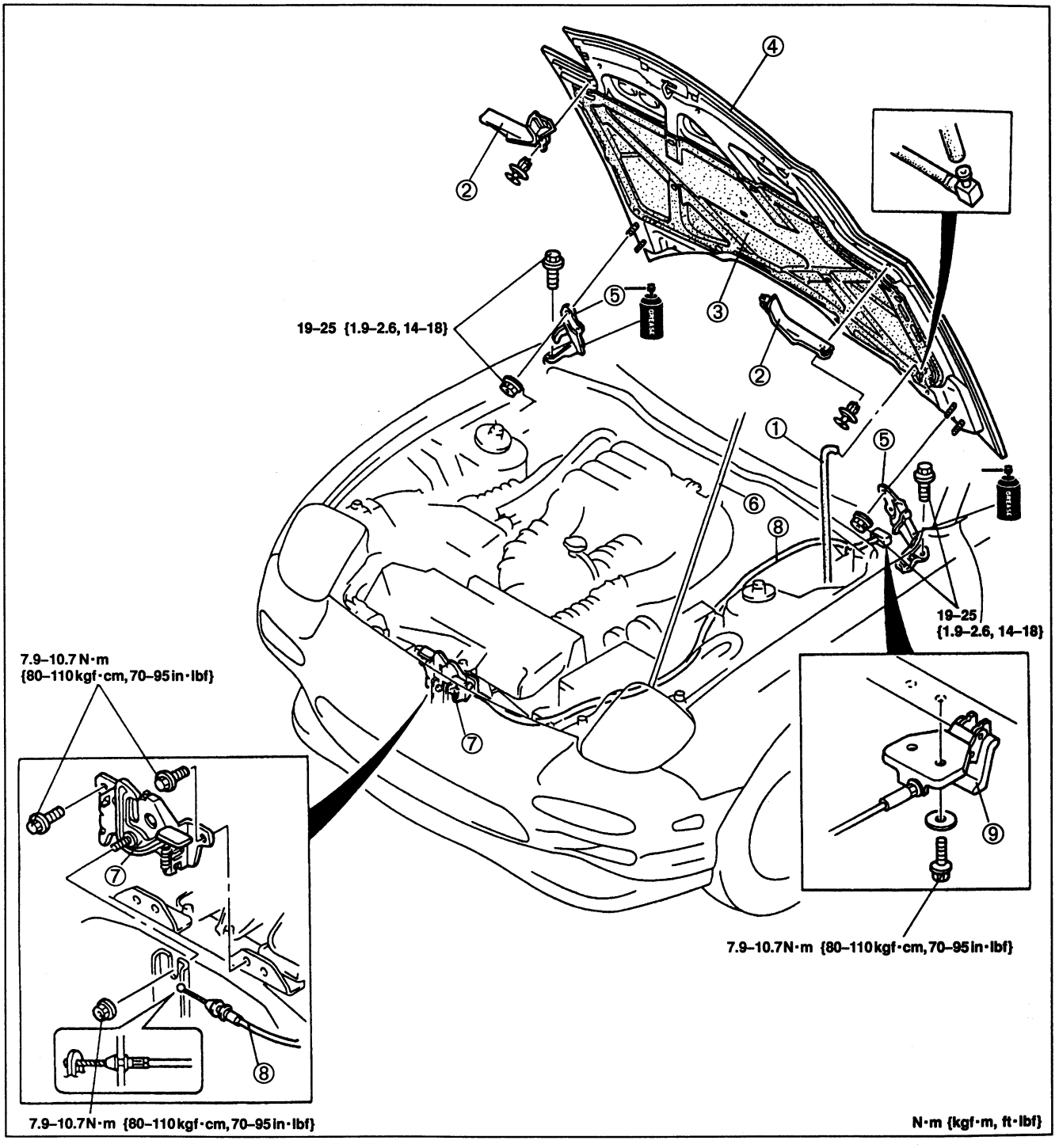


HOOD

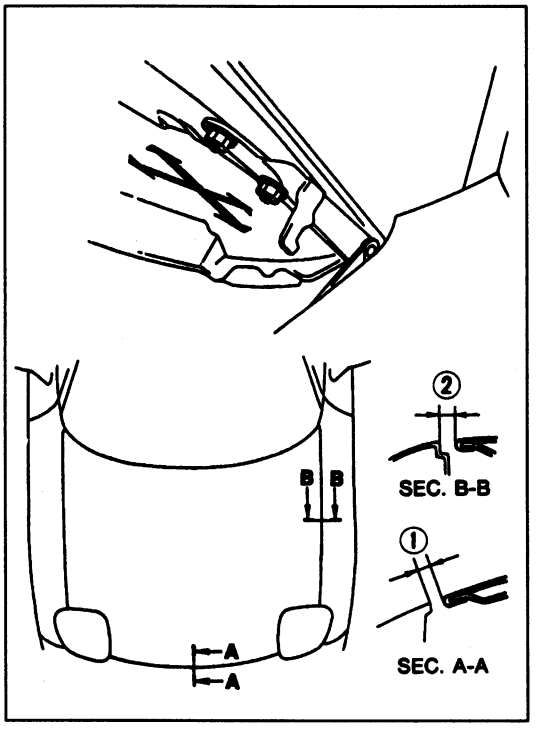
COMPONENTS

Removal/Installation

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



1. Washer pipe
2. Protector
3. Hood insulator
4. Hood
   Adjustment ..... page S–6
5. Hinge
6. Stay
7. Lock assembly
   Adjustment ..... page S–6
8. Release cable
9. Hood release Konb



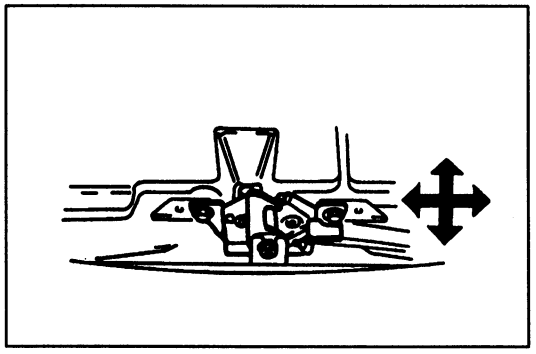
Adjustment

Hood

Adjust the hood laterally or vertically by loosening the hood-to-hinge mounting nuts and repositioning the hood.

Clearance: ① 4.0 ± 1.0 mm {0.16 ± 0.04 in}
② 4.5 ± 1.0 mm {0.18 ± 0.04 in}

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



Lock assembly

1. Adjust the lock assembly after the hood has been aligned.
2. Loosen the 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 in·lbf}
Nut : 7.9–10.7 N·m {80–110 kgf·cm, 70–95 in·lbf}

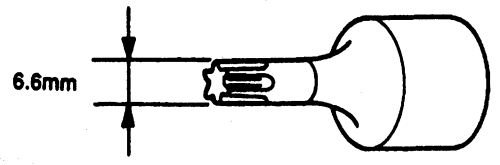
DOOR

PREPARATION

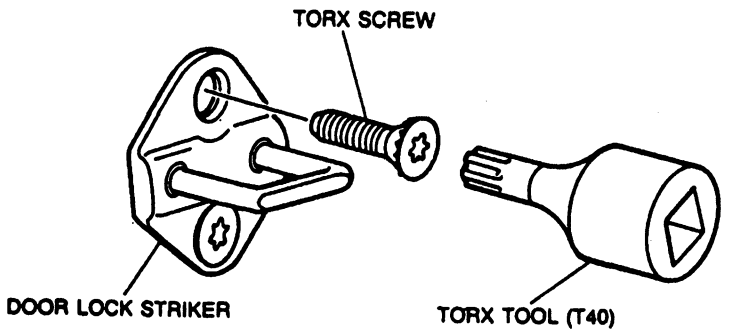
TORX tool (T40)	For installation / removal of door lock striker

TORX TOOL (T40)

1. ILLUSTRATION



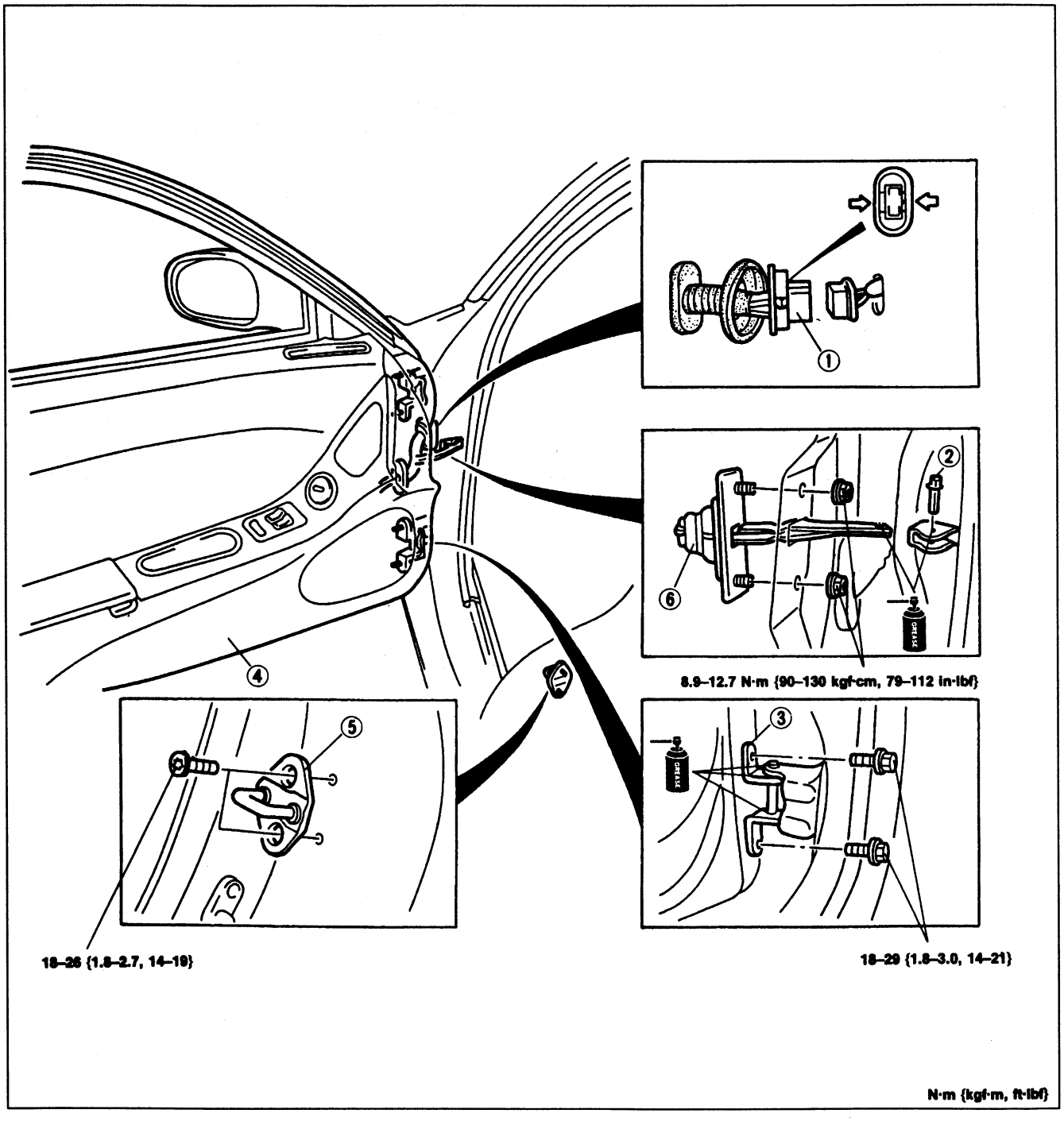
2. USAGE



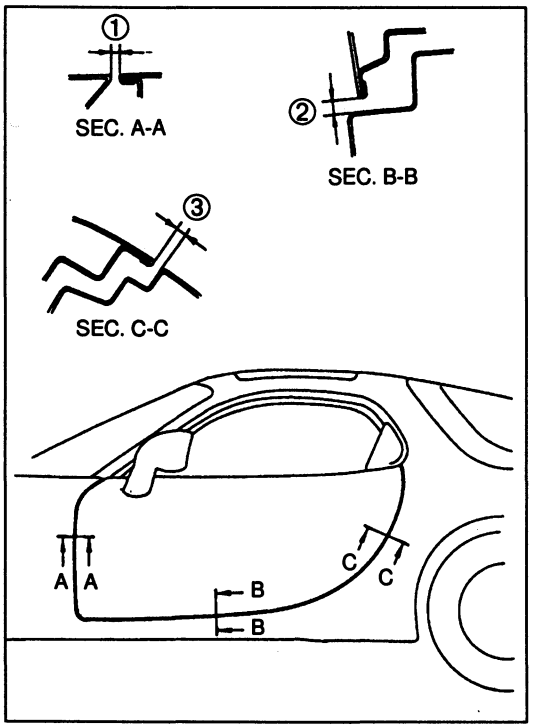
COMPONENTS

Removal / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure. To remove the checker, remove the front door trim and door screen. (Refer to page S-10.)
3. Install in the reverse order of removal. Adjust the door lock striker after adjusting the front door.



1. Harness connector
2. Checker pin
3. Door hinge
4. Door
   Adjustment ..... page S-9
5. Door lock striker
   Adjustment ..... page S-9
6. Checker



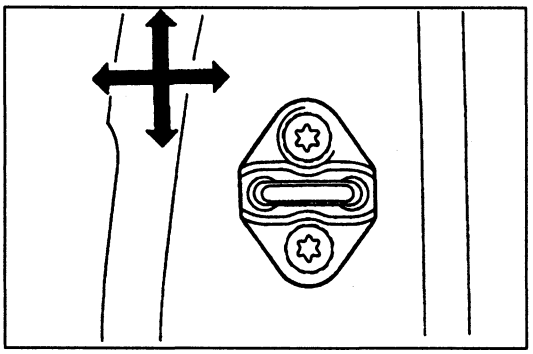
Adjustment

Door

Adjust the door laterally or vertically by loosening the door-hinge-to-body mounting bolts and repositioning the door.

Clearance: **① 4 ± 1 mm {0.2 ± 0.04 in}**
② 6 ± 2 mm {0.3 ± 0.07 in}
③ 4 ± 1 mm {0.2 ± 0.04 in}

Tightening torque:
18–29 N·m {1.8–3.0 kgf·m, 14–21 ft·lbf}



Door lock striker

1. Verify that the door can be closed easily and that there is no looseness. If there is a problem, loosen the striker mounting screws and move the striker horizontally or vertically.
2. Verify the rear offset of the door to the body. If there is a problem, move the door lock striker vertically.

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

WINDOW REGULATOR, GLASS AND GUIDE

COMPONENTS

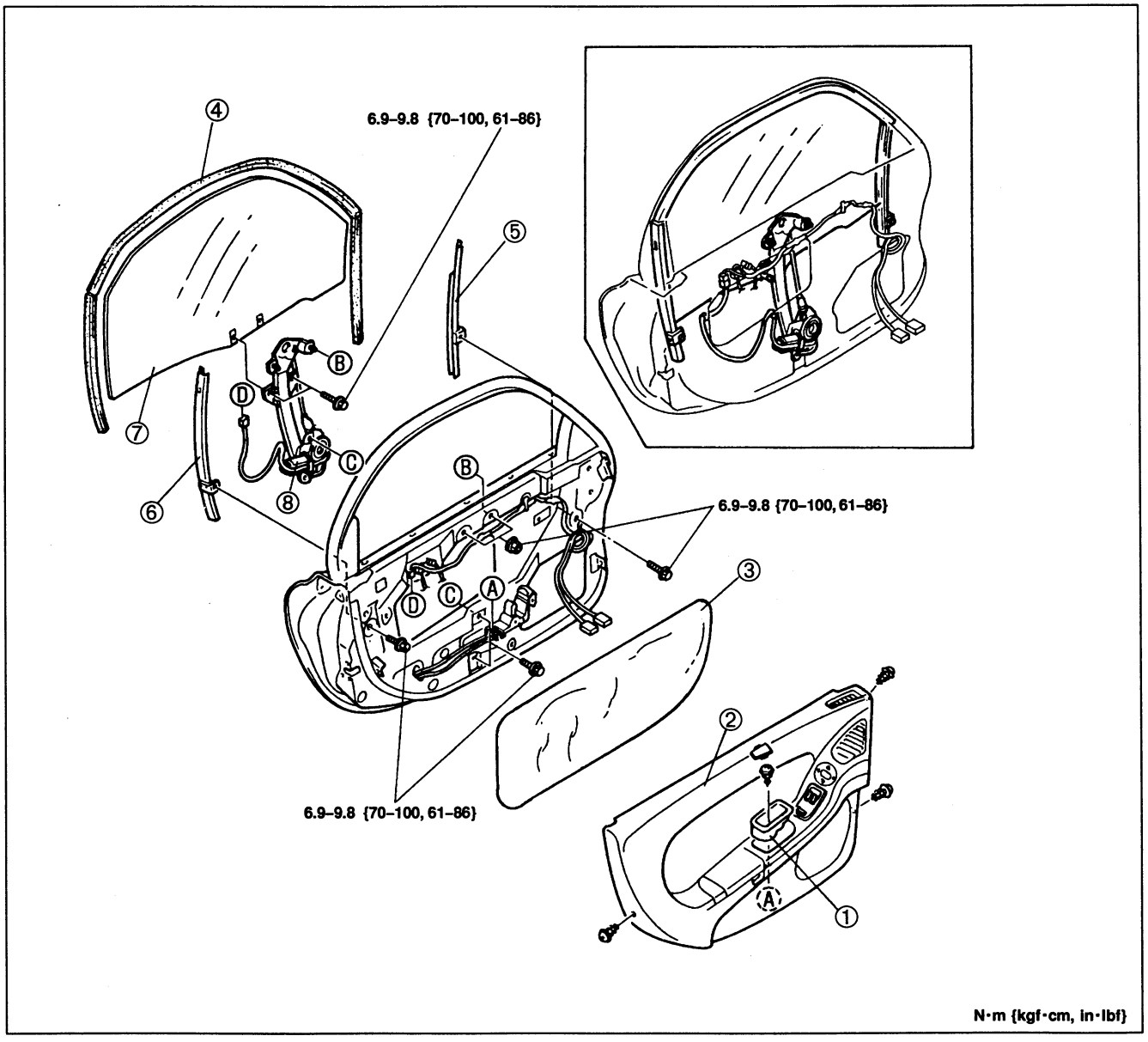
Removal / Installation

1. Lower the door glass **200 mm {0.79 in}** from the fully raised 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.
4. Install in the reverse order of removal.



1. Inner handle cover
2. Door trim
   Removal / Installation ..... page S–55
3. Door screen
4. Glass run channel
5. Glass guide A
6. Glass guide B
7. Door glass
8. Power window regulator

DOOR LOCK AND OPENER

COMPONENTS

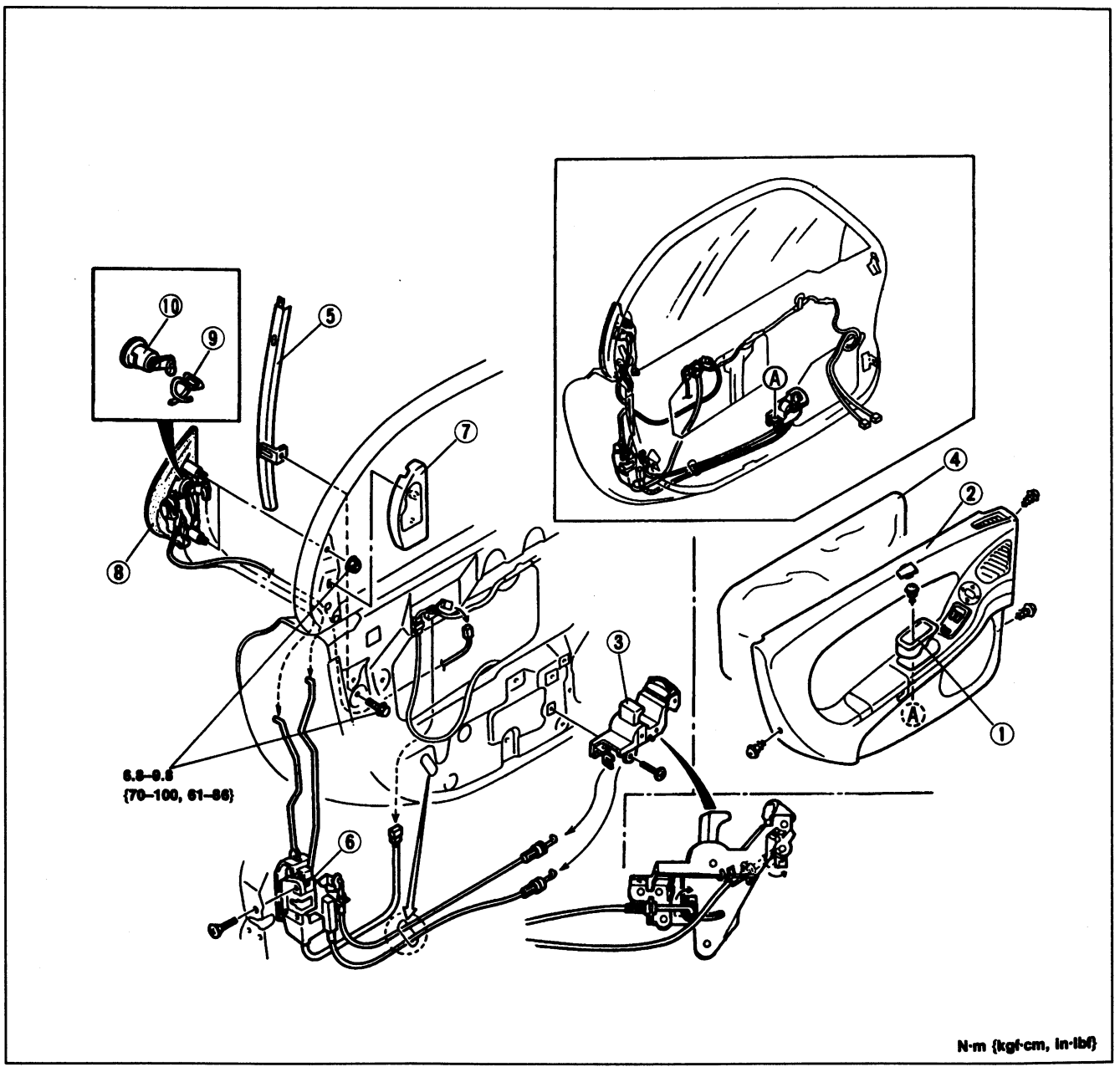
Removal / Installation

1. Raise the front door glass fully.
2. Disconnect the negative battery cable.

Note

- Remove the door screen carefully so that it may be reused.

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



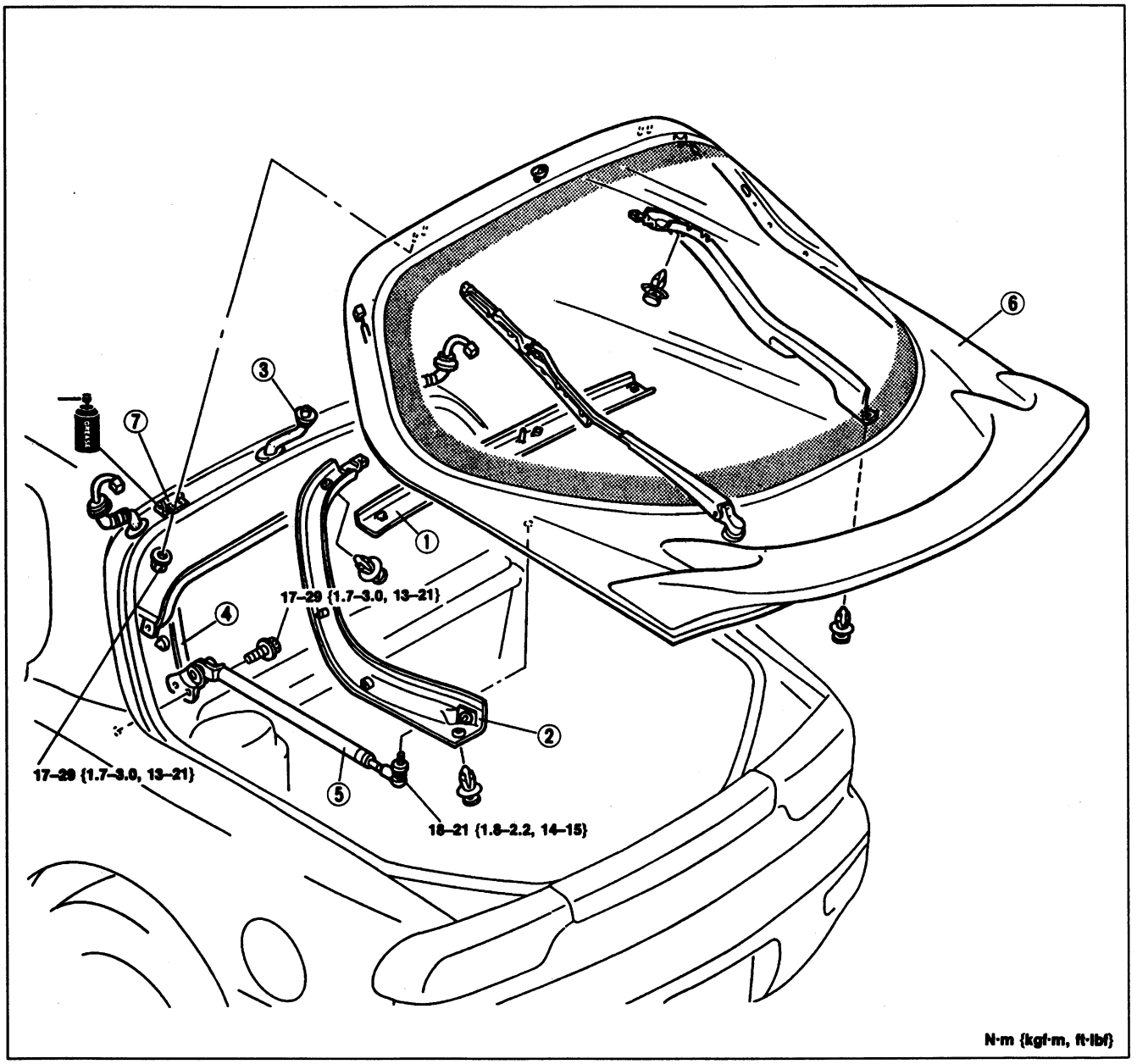
1. Inner handle cover
2. Door trim
   Removal / Installation ..... page S–55
3. Inner handle
4. Door screen
5. Glass guide B
6. Door lock
7. Inner garnish
8. Outer handle
9. Lock cylinder retainer
10. Lock cylinder

REAR HATCH

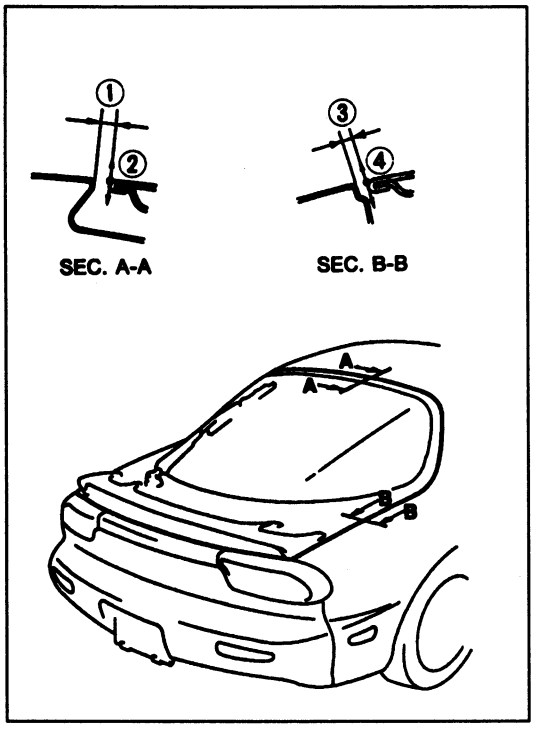
COMPONENTS

Removal / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure. To remove the rear hatch hinges, remove the headliner. (Refer to page S-60.)
3. Install in the reverse order of removal.



1. Rear hatch upper trim
   Removal / Installation ..... page S-55
2. Rear hatch side trim
   Removal / Installation ..... page S-55
3. Washer pipe
4. Quarter trim
   Removal / Installation ..... page S-55
5. Stay damper
6. Rear hatch
   Adjustment ..... page S-13
7. Rear hatch hinge



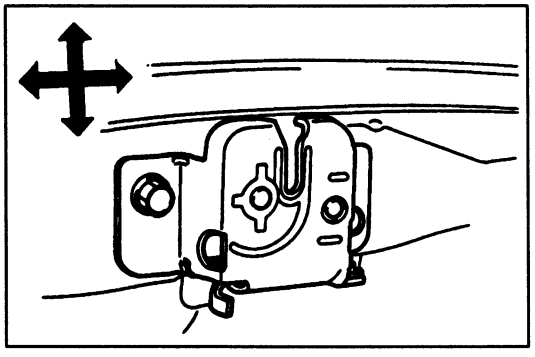
Adjustment

Rear hatch

Adjust the rear hatch laterally and vertically by loosening the rear-hatch-to-hinge mounting bolts and repositioning the rear hatch.

Clearance: ① 7 ± 1.5 mm {0.3 ± 0.06 in}
② 1 $^{+1.0}_{-1.5}$ mm{0.04 $^{+0.04}_{-0.06}$ in}
③ 4 ± 2 mm {0.16 ± 0.08 in}
④ 1 ± 2 mm {0.04 ± 0.08 in}

Tightening torque:
17–29 N·m {1.7–3.0 kgf·m, 13–21 ft·lbf}



Rear hatch lock

1. Adjust the rear hatch lock after the rear hatch has been aligned.
2. Remove the trunk end trim. (Refer to page S–55.)
3. Loosen the rear hatch lock mounting bolts, and align the lock with the striker on the rear hatch.

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

REAR HATCH LOCK AND OPENER

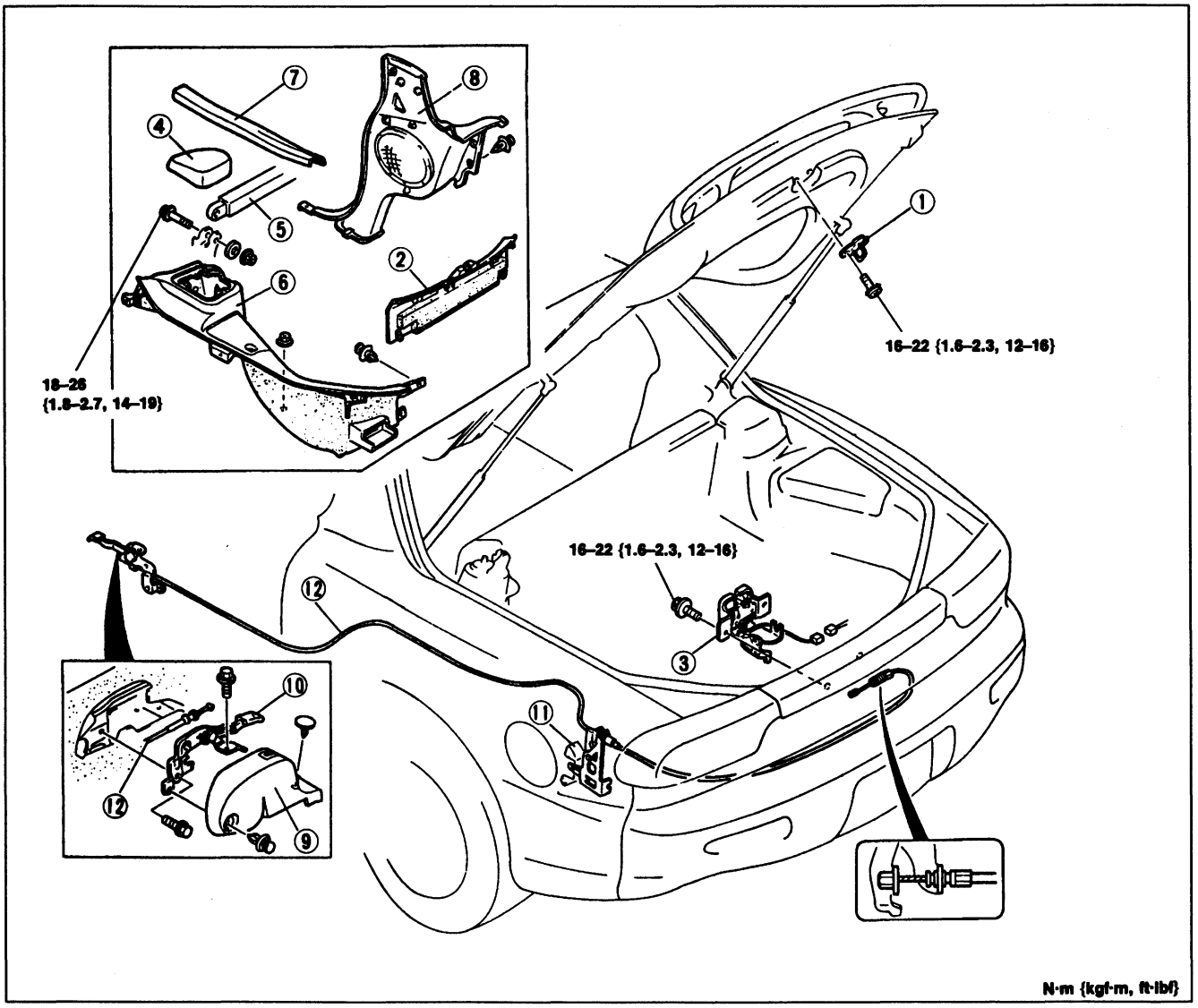
PREPARATION

TORX tool (T40)	For installation / removal of rear hatch striker

COMPONENTS

Removal / Installation

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



Rear hatch lock

1. Rear hatch striker
2. Trunk end trim
   Removal / Installation ..... page S–55
3. Rear hatch lock
   Adjustment ..... page S–13

Rear hatch opener, rear hatch opener cable

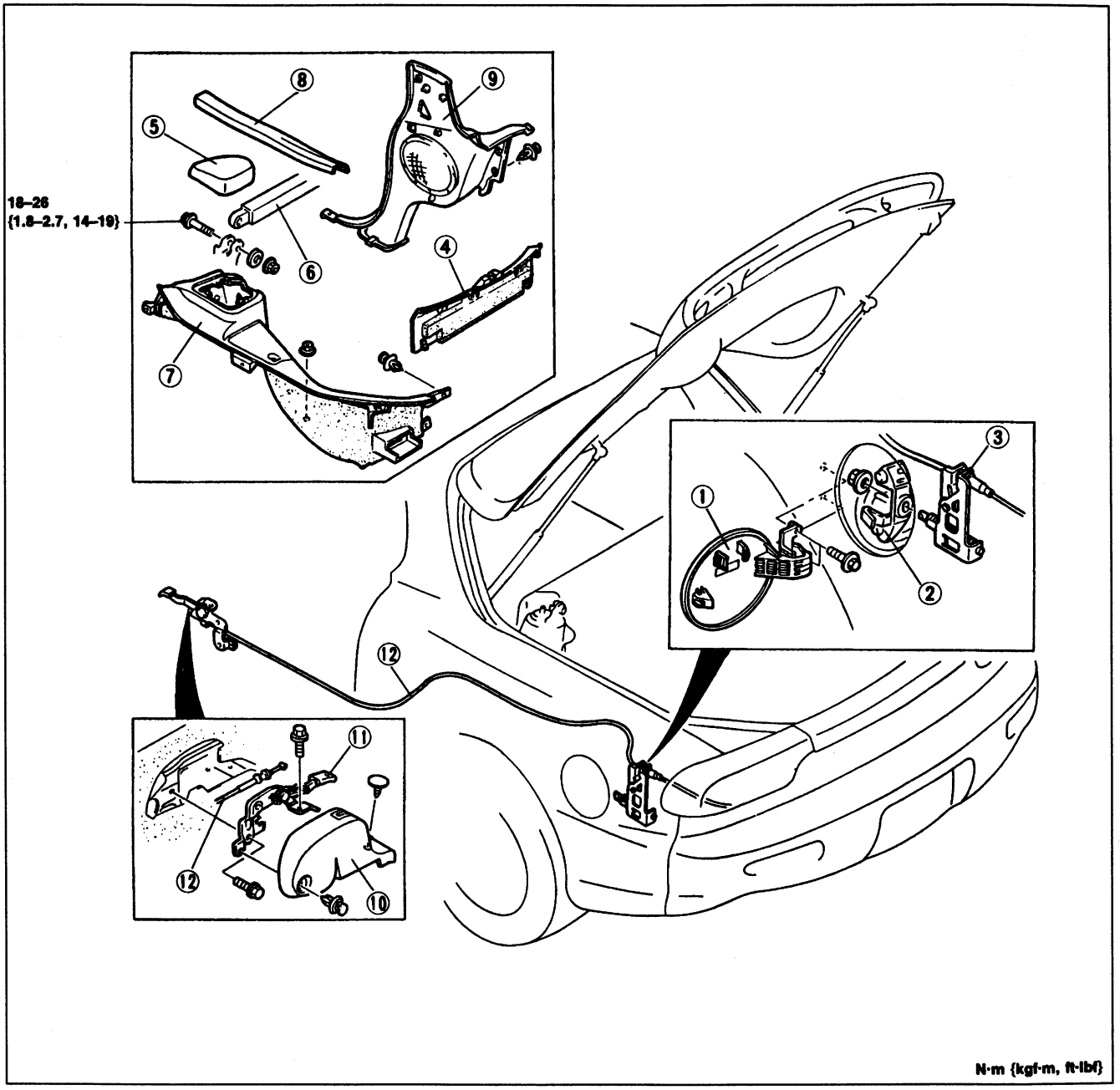
4. Suspension tower cover
5. Suspension rear strut bar
6. Trunk side trim
   Removal / Installation ..... page S–55
7. Scuff plate
   Removal / Installation ..... page S–55
8. Quarter trim
   Removal / Installation ..... page S–55
9. Opener bezel
10. Opener lever
11. Stopper bracket
12. Opener cable

FUEL-FILLER LID AND OPENER

COMPONENTS

Removal / Installation

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



Filler lid

1. Filler lid
2. Stopper bracket
3. Filler lid opener

Filler lid opener, opener lever, opener cable

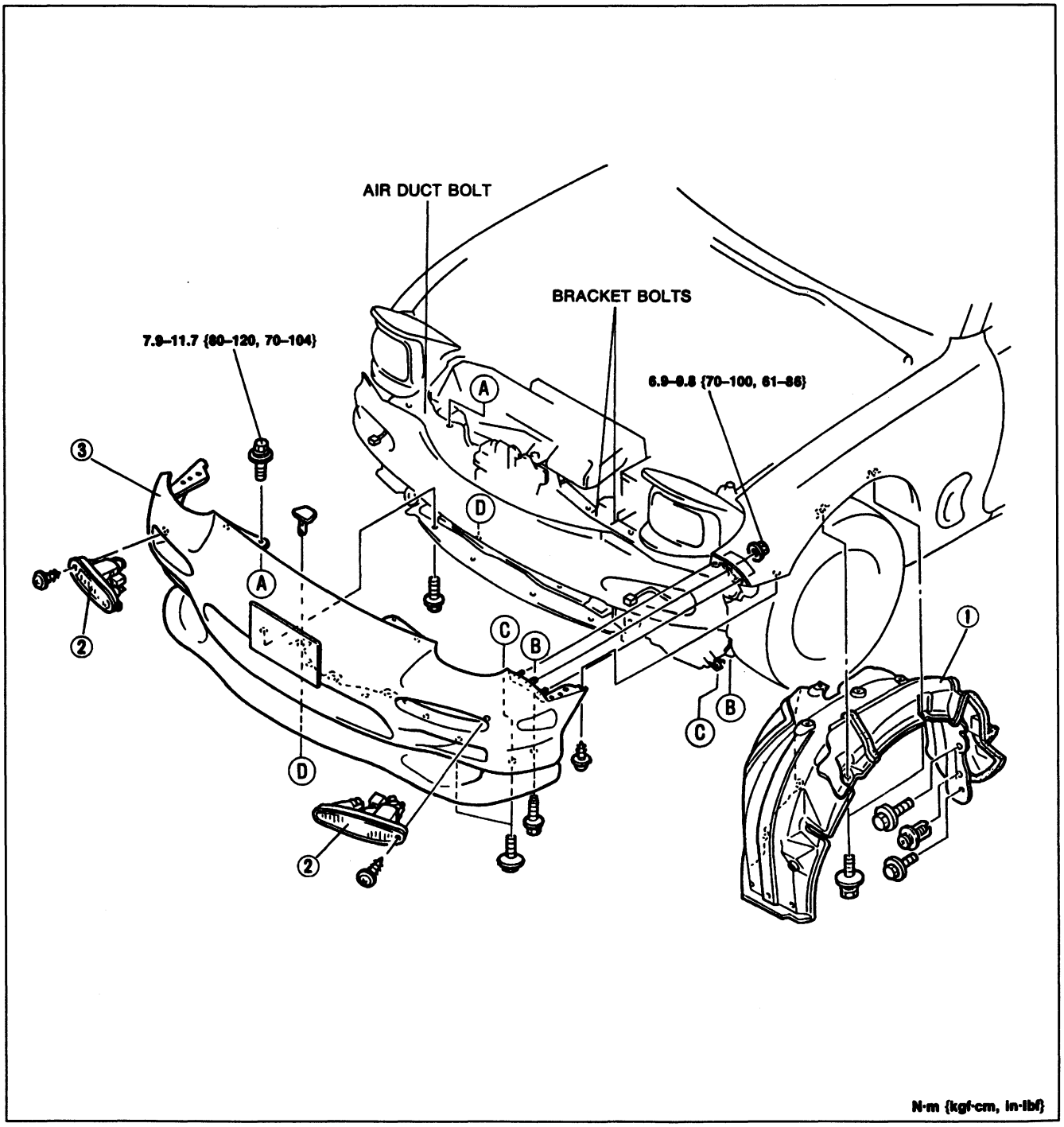
4. Trunk end trim
   Removal / Installation ..... page S–55
5. Suspension tower cover
6. Suspension rear strut bar
7. Trunk side trim
   Removal / Installation ..... page S–55
8. Scuff plate
   Removal / Installation ..... page S–55
9. Quarter trim
   Removal / Installation ..... page S–55
10. Opener bezel
11. Opener lever
12. Opener cable

FRONT BUMPER

COMPONENTS

Removal / Installation

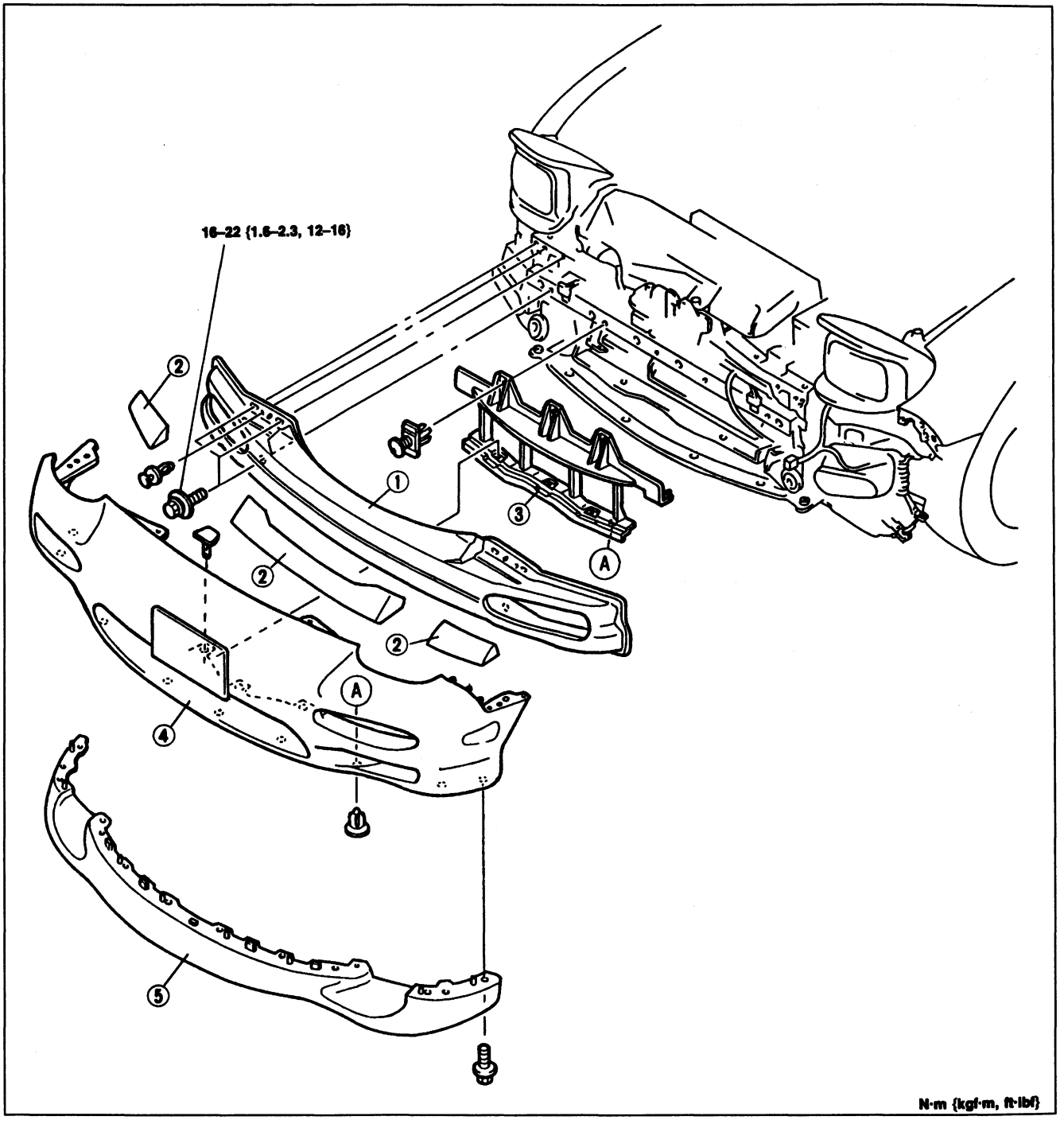
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure. To remove the front bumper, remove the left air duct bolt and receiver / drier bracket bolts. (Refer to the 1994 RX-7 Body Electrical Troubleshooting Manual, section E, when removing the front combination light.)
3. Install in the reverse order of removal.



1. Mud guard
2. Front combination light
3. Front bumper
   Disassembly / Assembly ..... page S–17

Disassembly / Assembly

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.



1. Front bumper reinforcement
2. Support foam
3. Air guide
4. Front bumper fascia
5. Front air dam

REAR BUMPER

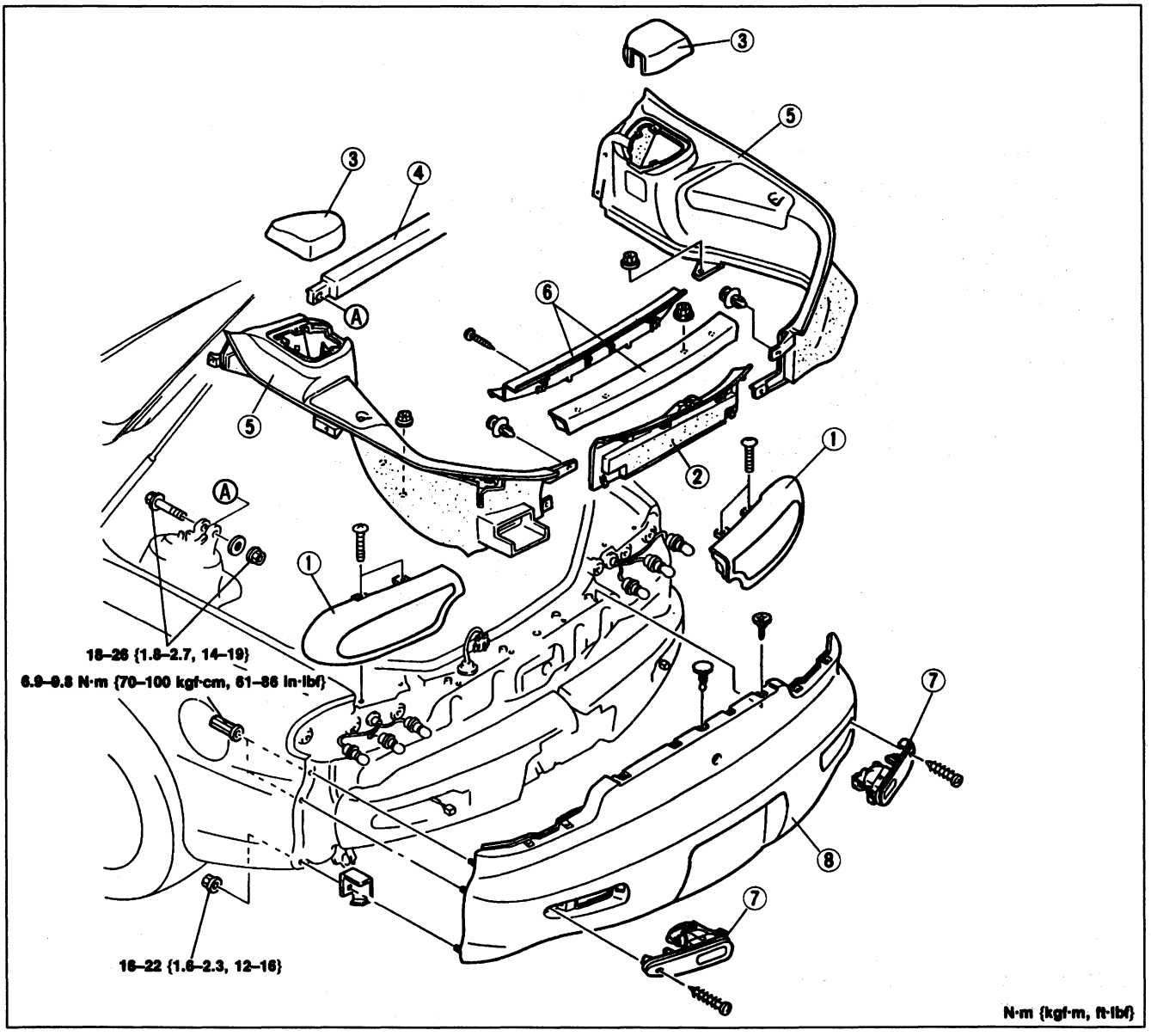
PREPARATION

TORX tool (T30)	For installation / removal of rear bumper

COMPONENTS

Removal / Installation

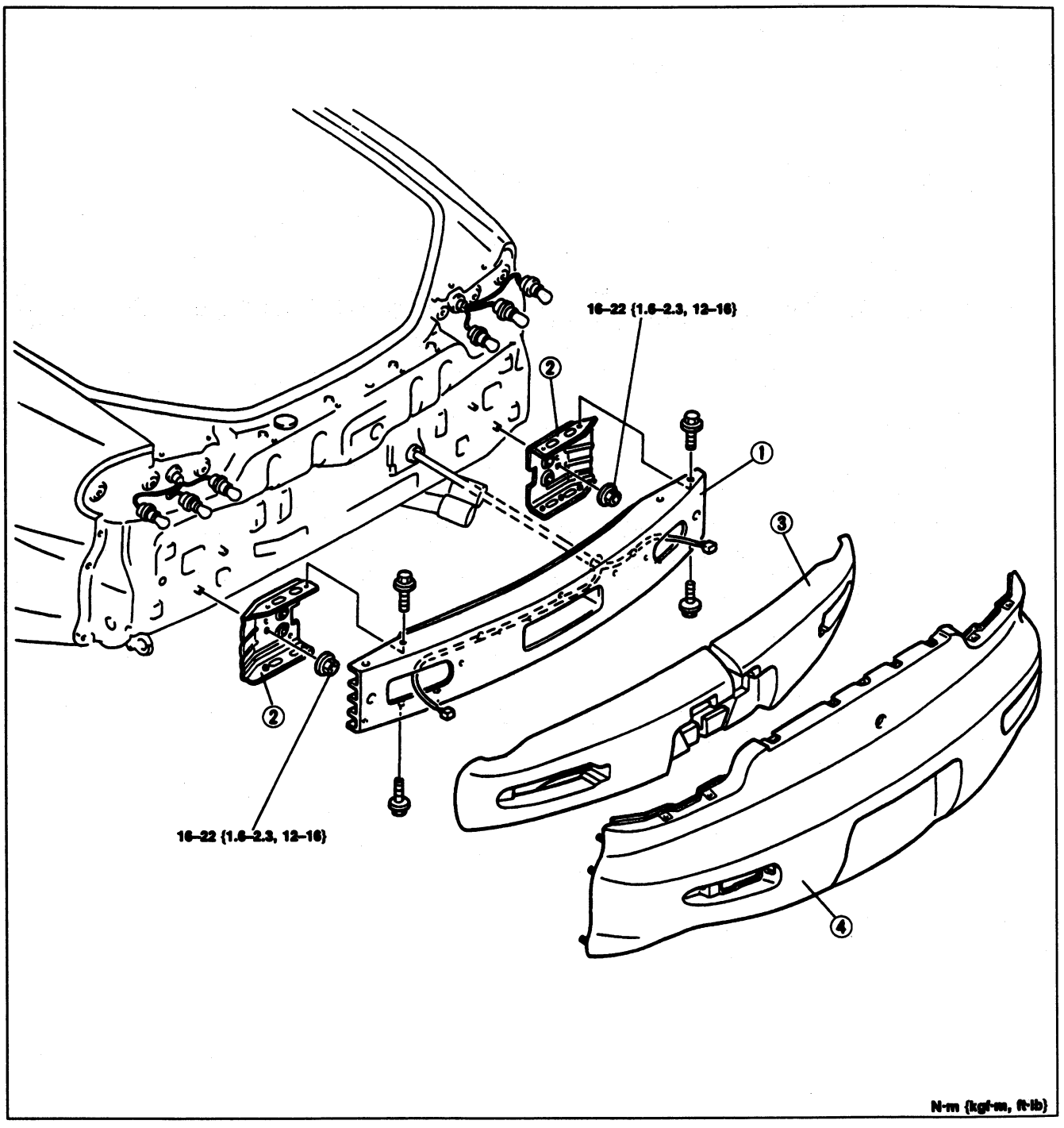
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure. (Refer to the 1994 RX-7 Body Electrical Troubleshooting Manual, section E, when removing the rear combination light, high-mount stoplight, and back-up light.)
3. Install in the reverse order of removal.



1. Rear combination light
2. Trunk end trim
   Removal / Installation ..... page S–55
3. Suspension tower cover
4. Suspension rear strut bar
5. Trunk side trim
   Removal / Installation ..... page S–55
6. High-mount stoplight
7. Back-up light
8. Rear bumper
   Disassembly / Assembly ..... page S–19

Disassembly / Assembly

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.



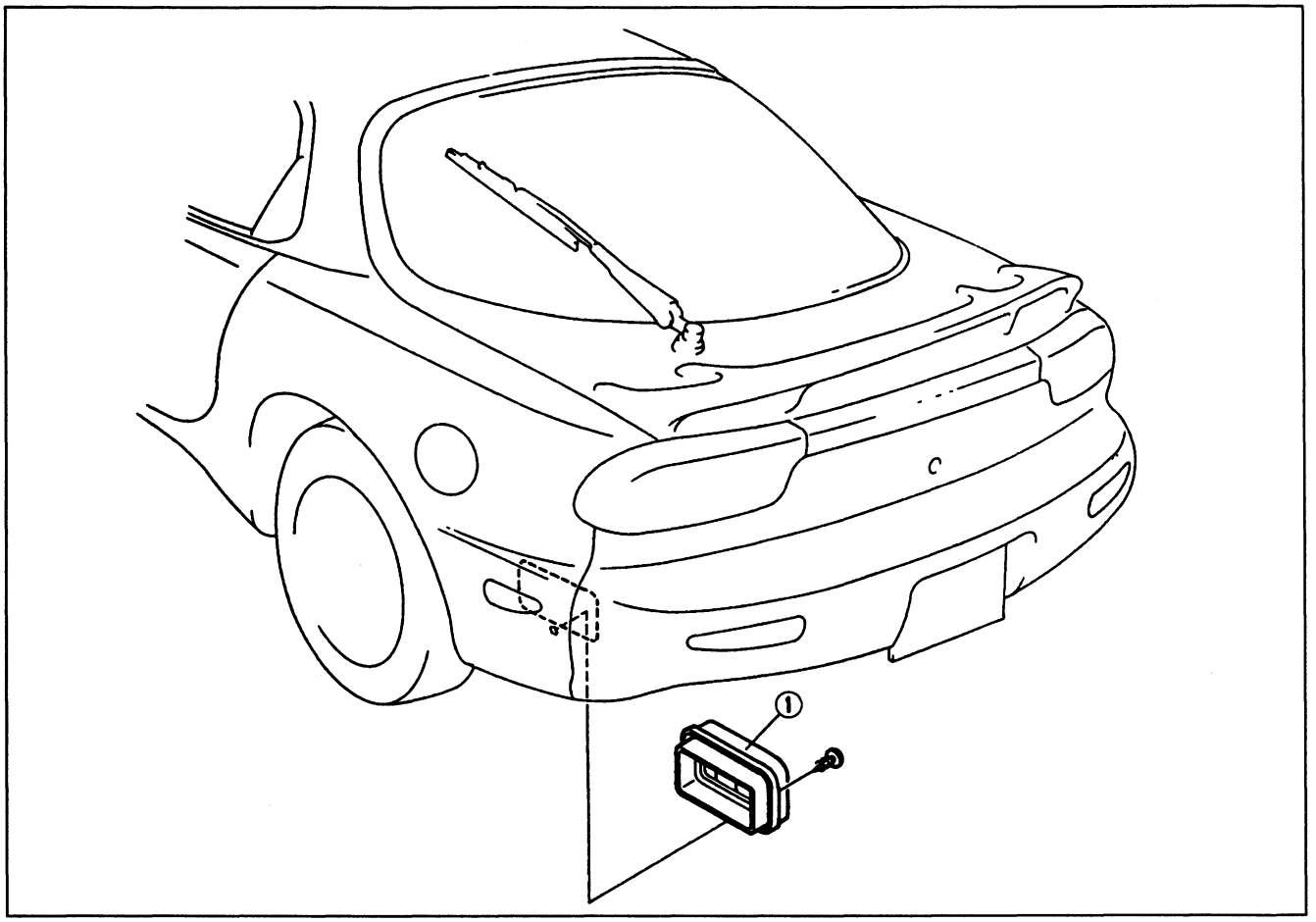
1. Rear bumper reinforcement
2. Rear bumper bracket
3. Energy-absorbing foam
4. Rear bumper fascia

EXTRACTOR CHAMBER

COMPONENTS

Removal / Installation

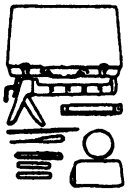
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.



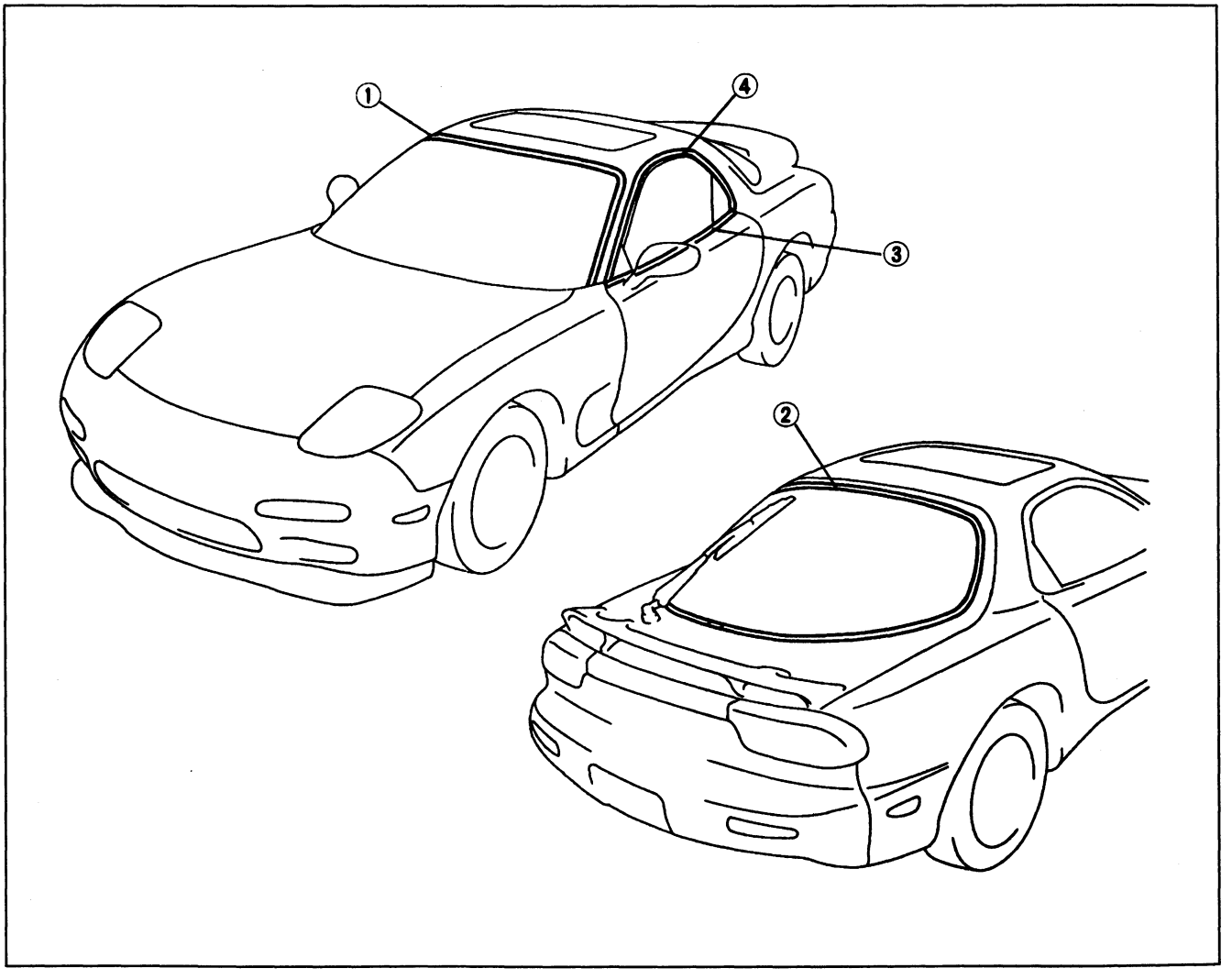
1. Extractor chamber

MOLDING

PREPARATION
SST

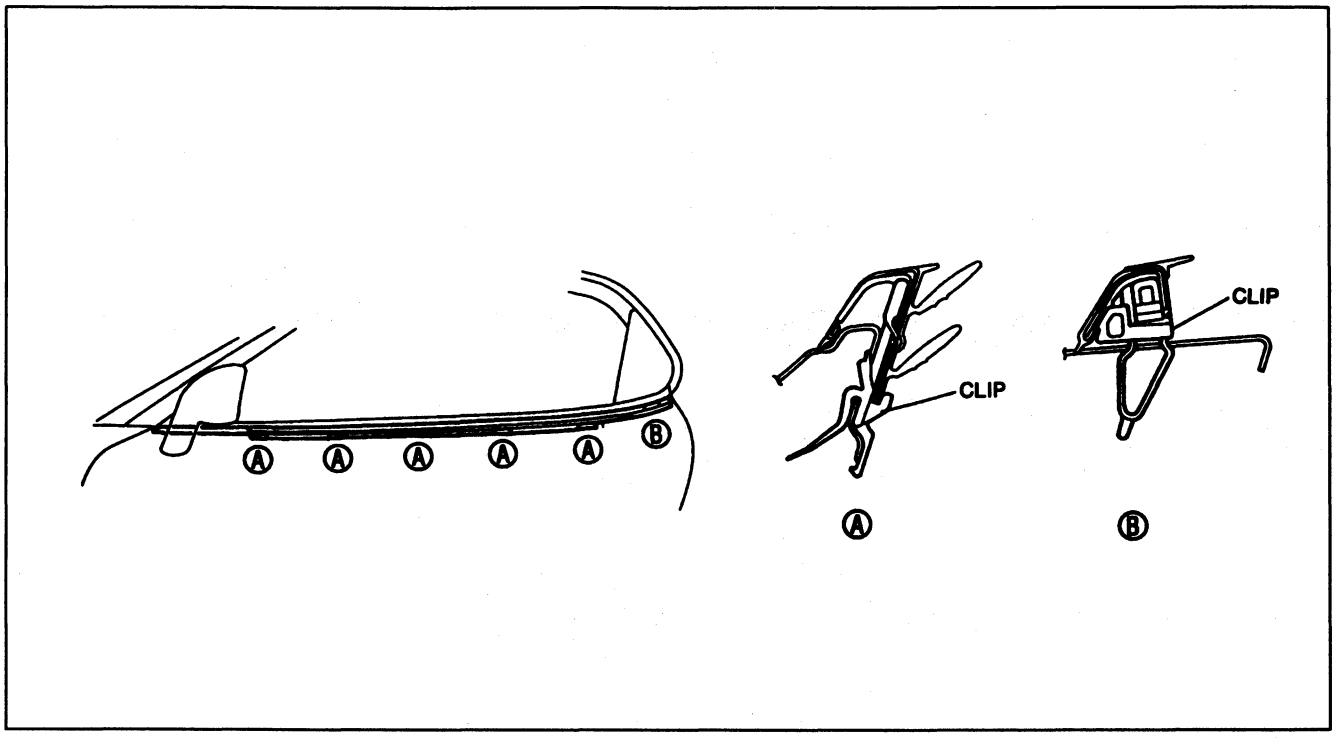
49 0305 870A Tool set, window		For removal / installation of molding	49 G0501A0 Remover, sealant		For removal of sealant

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**.

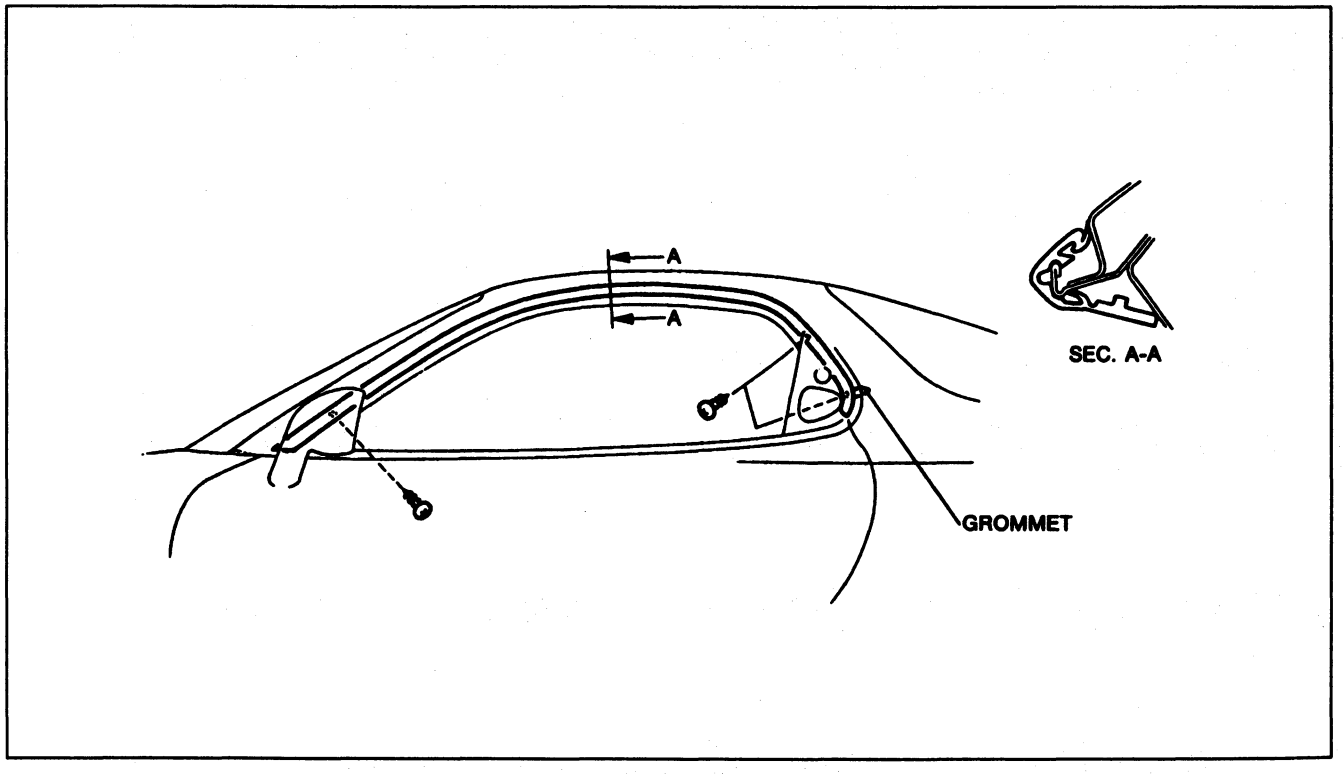


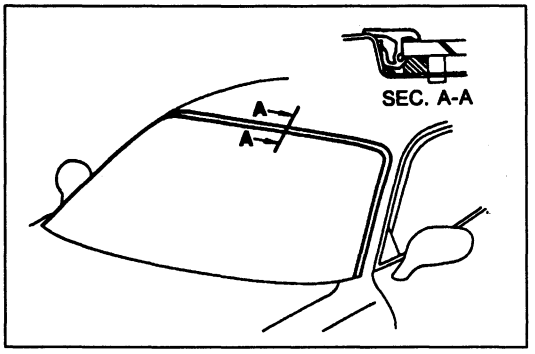
1. Windshield molding
   - Removal Note ..... page S-23
   - Installation Note ..... page S-23
2. Rear hatch molding
   - Removal Note ..... page S-23
   - Installation Note ..... page S-25
3. Beltline molding
   - Removal Note ..... page S-22
4. Drip molding
   - Removal Note ..... page S-22

Removal Note
Beltline molding
1. Lower the door glass fully.
2. Remove the power outside mirror. (Refer to page S-29.)
3. Pull the beltline molding up to disengage the clips from the body.



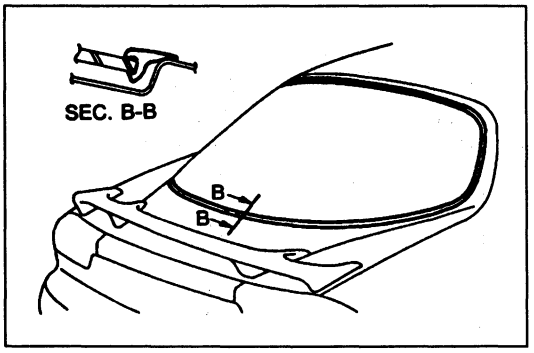
Drip molding
1. Remove the drip molding mounting screws and grommet.
2. Pull the rear of the molding forward and remove the drip molding from the body.





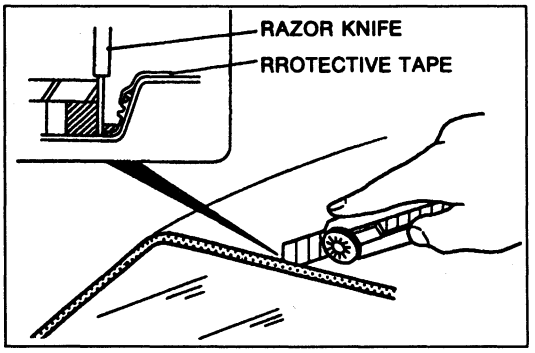
Windshield molding

Lift the edge of the molding and cut the sealant to remove the molding.



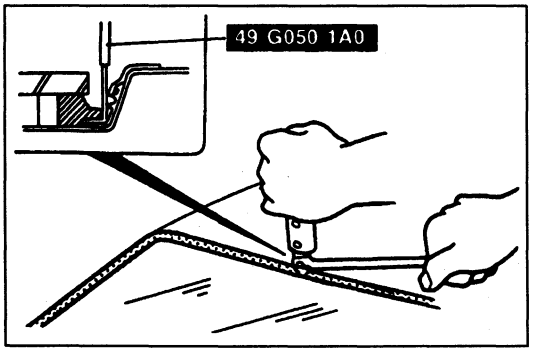
Rear hatch molding

Lift the edge of the molding and cut the sealant to remove the molding.

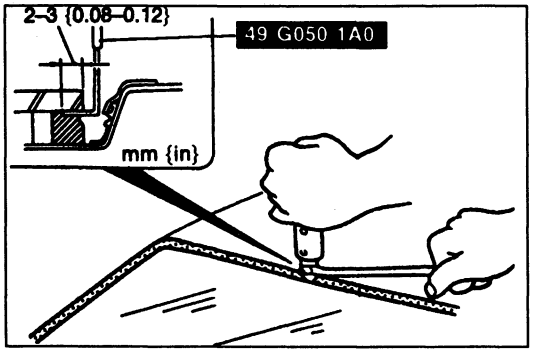


Installation Note
Windshield molding

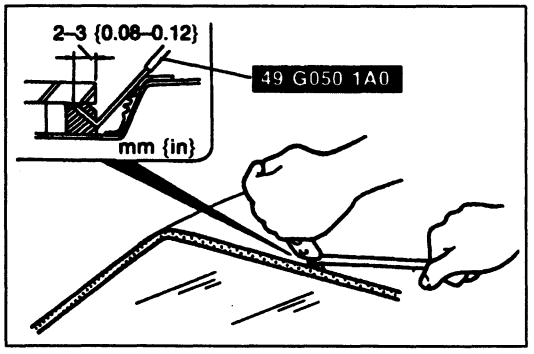
1. Apply protective tape along the edge of the body to protect it from damage.
2. Cut the sealant by using a razor knife as shown.



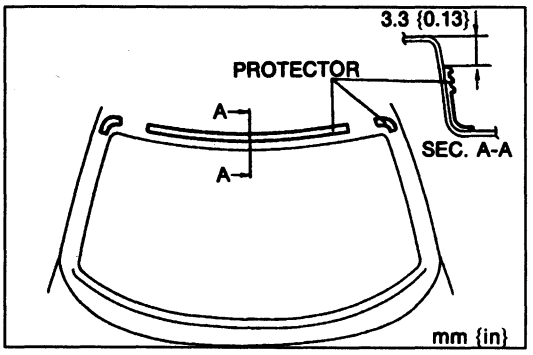
3. Insert the blade of the **SST** into the sealant, and pull on the bar to cut the sealant near the body as shown.



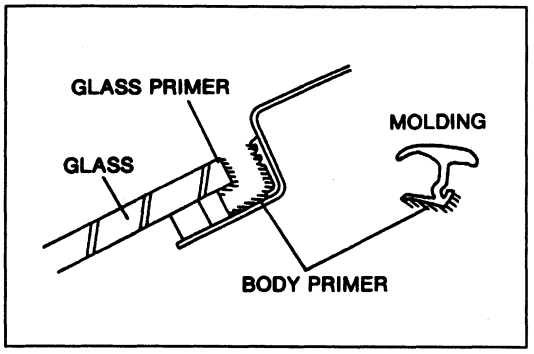
4. Insert the blade of the **SST** into the sealant, and pull on the bar to cut the sealant under the glass as shown.



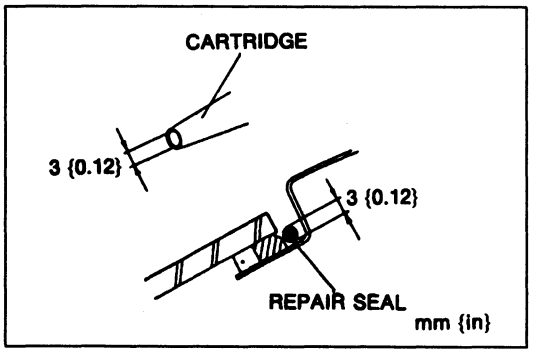
5. Cut the sealant at an angle shown.
6. Remove as much sealant as possible from between the body and the glass.
7. Carefully clean around the edge of the glass and the adhesion surface at the body.



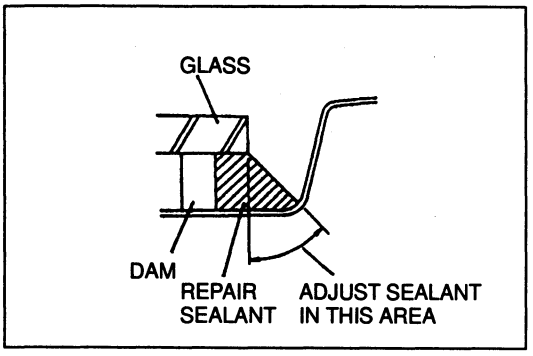
8. If the protector is damaged, bond a new protector onto the body as shown,



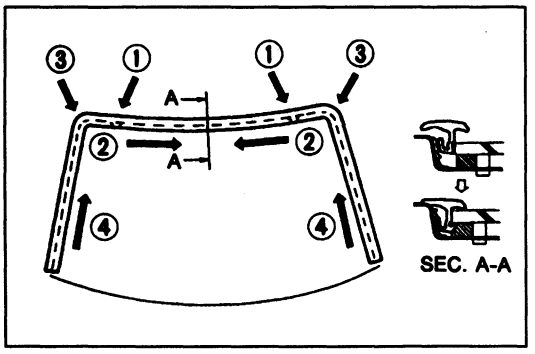
9. Apply primer onto the bonding area of the glass, body, and new windshield molding by using a brush. Use only glass primer on the glass and body primer on the body and molding. Keep the bonding area free of dirt and grease, and do not touch the surface. Allow the primer to dry for approximately **30 minutes**.



10. Apply a **3mm {0.12in}** bead of repair sealant between the glass and the body.



11. Reshape the repair sealant as shown.

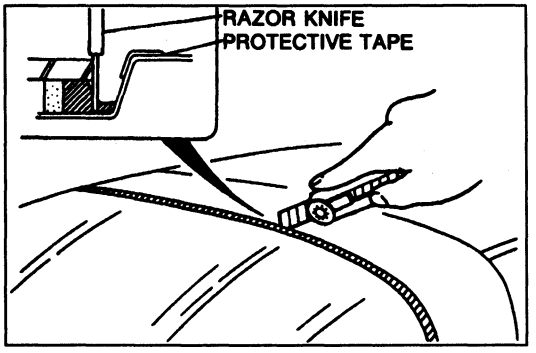


12. Install the molding.
    ① Align the white marks on the molding with the marks on the glass.
    ② Install the upper part of the molding.
    ③ Install the corner parts of the molding.
    ④ Install the side parts of the molding, starting from the bottom and working toward the top.

Hardening time of repair sealant

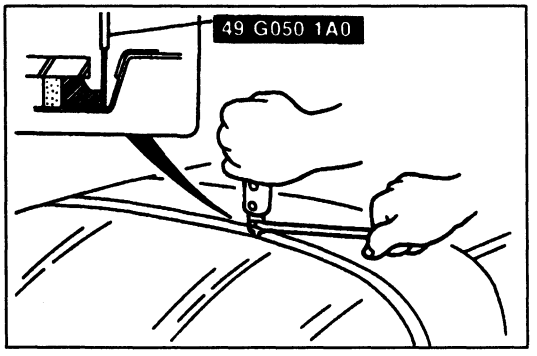
Temperature	Surface hardening time	Time required until car can be put into service
5°C {41°F}	Approx. 1.5 hr	12 hr
20°C {68°F}	Approx. 1hr	4 hr
35°C {95°F}	Approx. 10 min	2 hr

13. Check for water leaks. If a leak is found, wipe the water off well and repeat the installation.

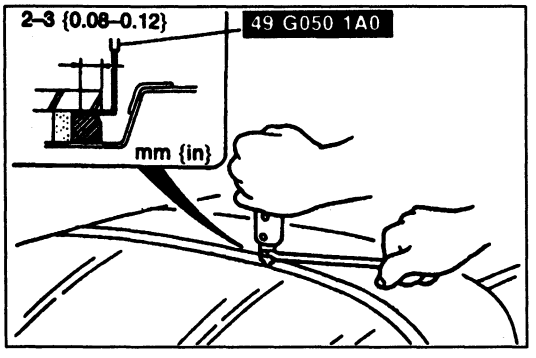


Rear hatch molding

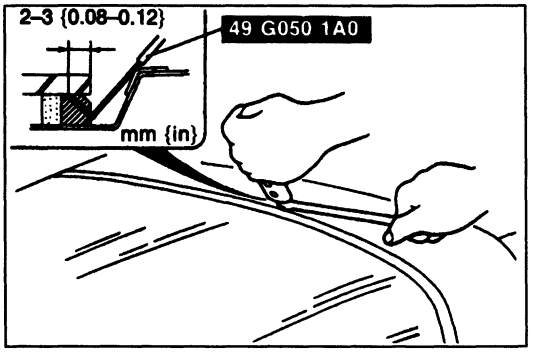
1. Apply protective tape along the edge of the hatch to protect it from damage.
2. Cut the sealant by using a razor knife as shown.



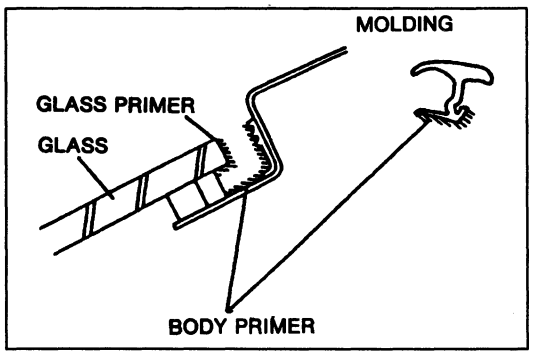
3. Insert the blade of the **SST** into the sealant and pull on the bar to cut the sealant near the hatch as shown.



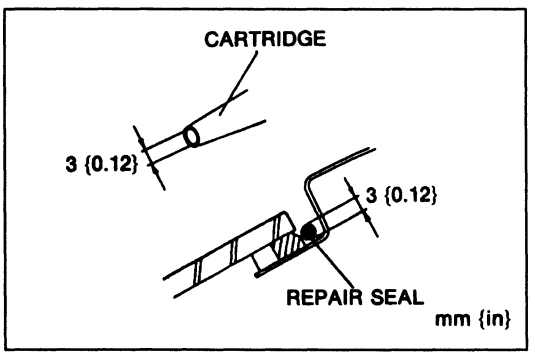
4. Insert the blade of the **SST** into the sealant and pull on the bar to cut the sealant under the glass as shown.



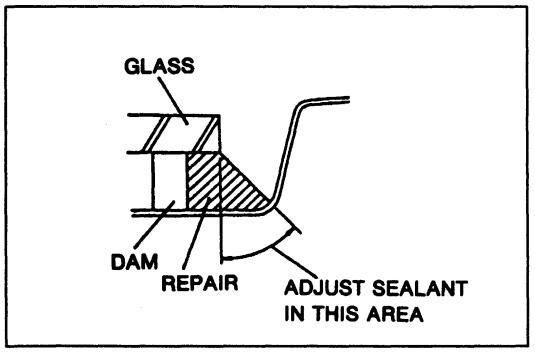
5. Insert the blade of the **SST** into the sealant and pull on the bar to cut the sealant at an angle as shown.



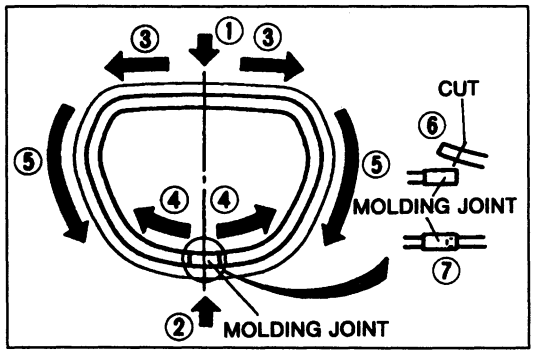
6. Brush primer onto the bonding area of the glass, rear hatch, and new rear hatch molding. Use only glass primer on the glass and body primer on the hatch and molding. Keep the area free of dirt and grease, and do not touch the surface. Allow the primer to dry for approximately **30 minutes**.



7. Apply a **3mm {0.12in}** bead of repair sealant between the glass and the rear hatch.



8. Reshape the repair sealant as shown.
9. Install the molding while the repair sealant is soft.
   ① Align the white mark on the molding with that on the upper part of the glass.
   ② Align the mark on the lower part of the glass with the molding joint.
   ③ Install the upper part of the molding.
   ④ Install the lower part of the molding.
   ⑤ Install the side parts of the molding, starting from the top and working toward the bottom.
   ⑥ Cut the molding to fit securely into the molding joint.
   ⑦ Insert the molding into the molding joint.



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. 1hr	4 hr
35°C {95°F}	Approx. 10 min	2 hr

10. Check for water leaks. If a leak is found, wipe the water off well and repeat the installation.

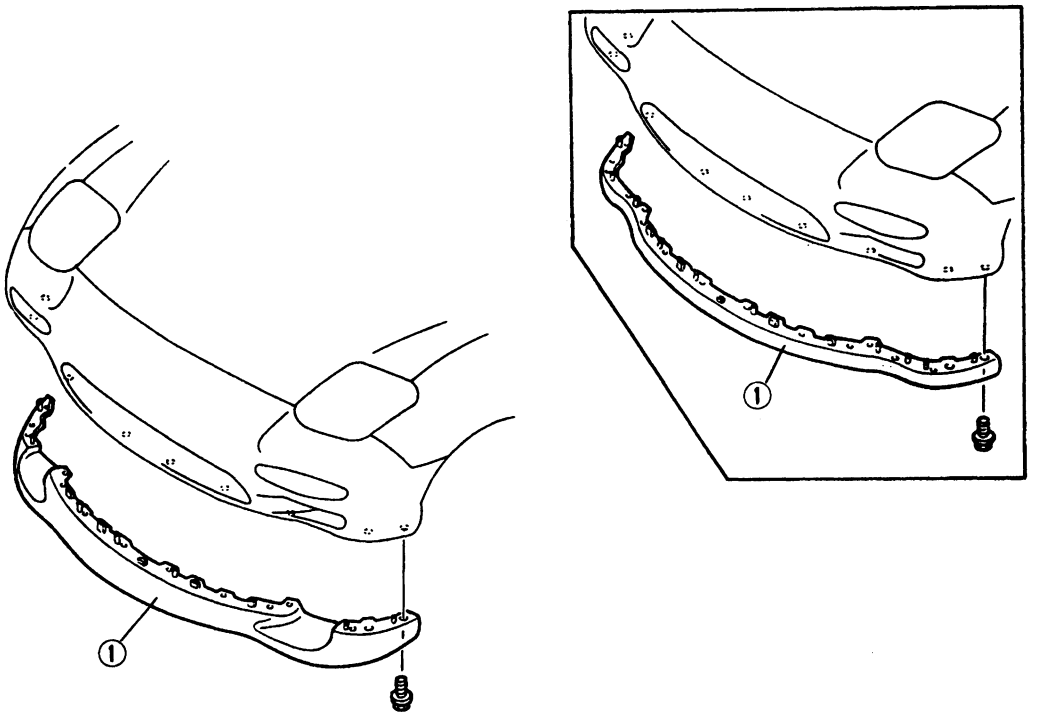
SPOILER

COMPONENTS

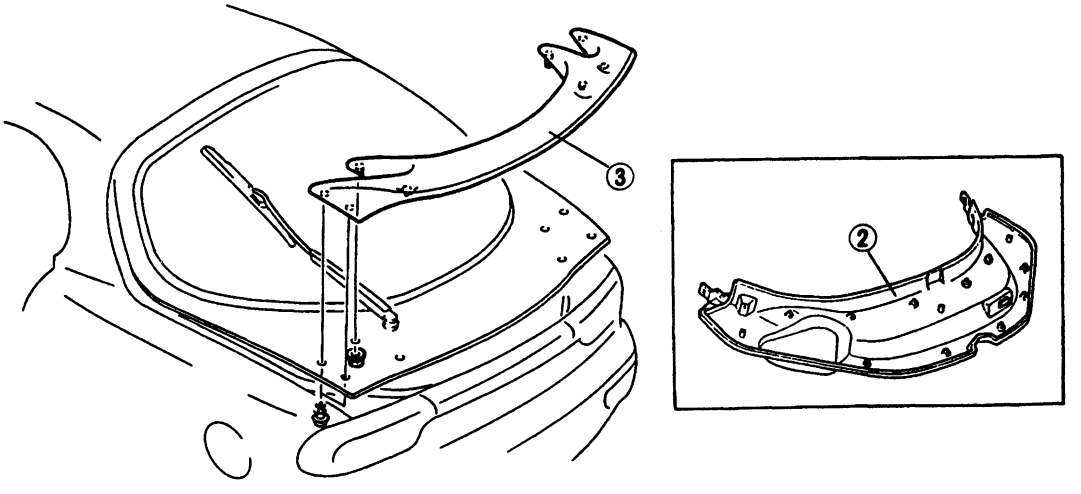
Removal / Installation

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

FRONT



REAR



Front air dam

1. Front air dam

Rear spoiler

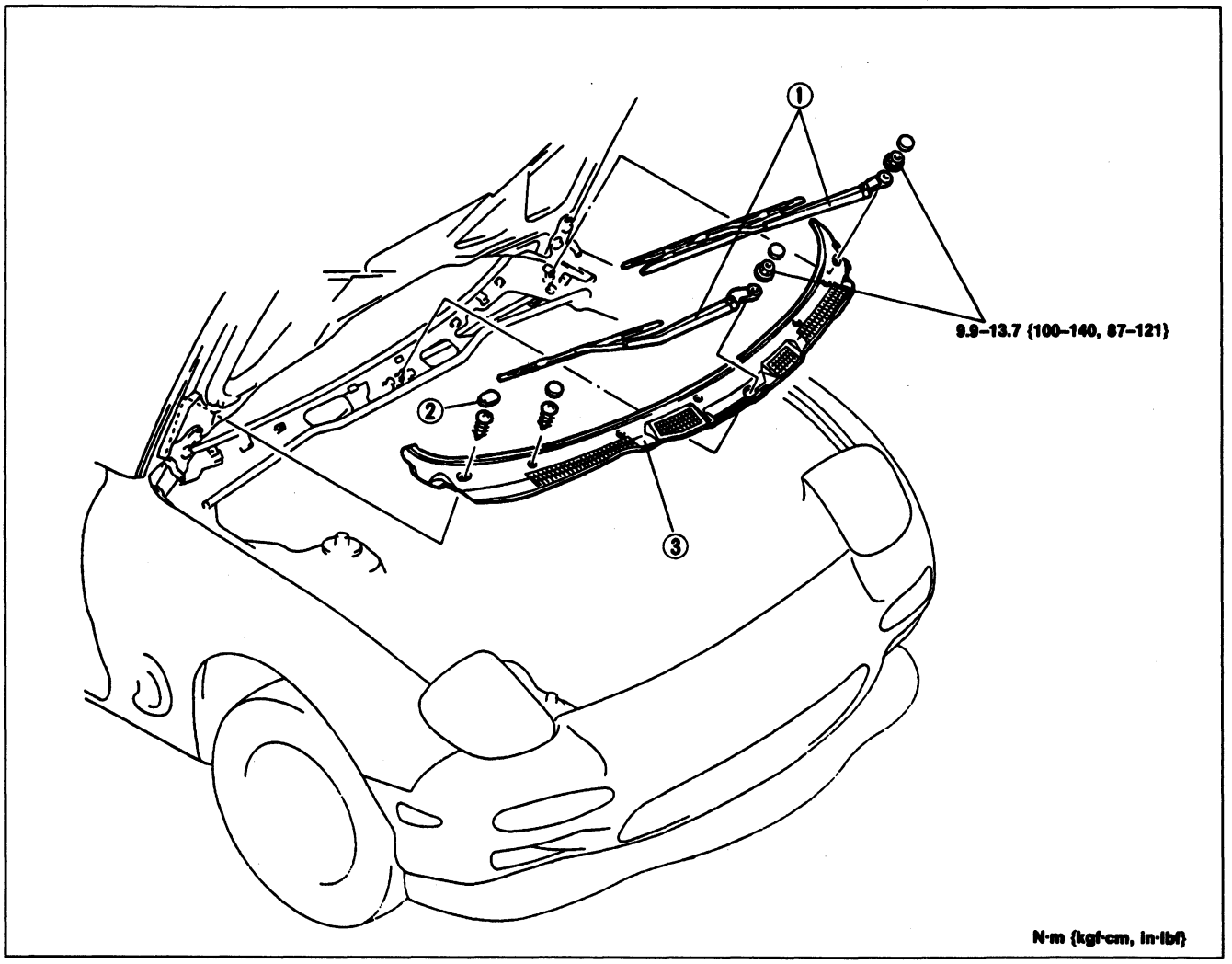
2. Rear hatch lower trim
   Removal / Installation ..... page S-55
3. Rear spoiler

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–34
2. Cowl cap
3. Cowl grille

POWER OUTSIDE MIRROR

COMPONENTS

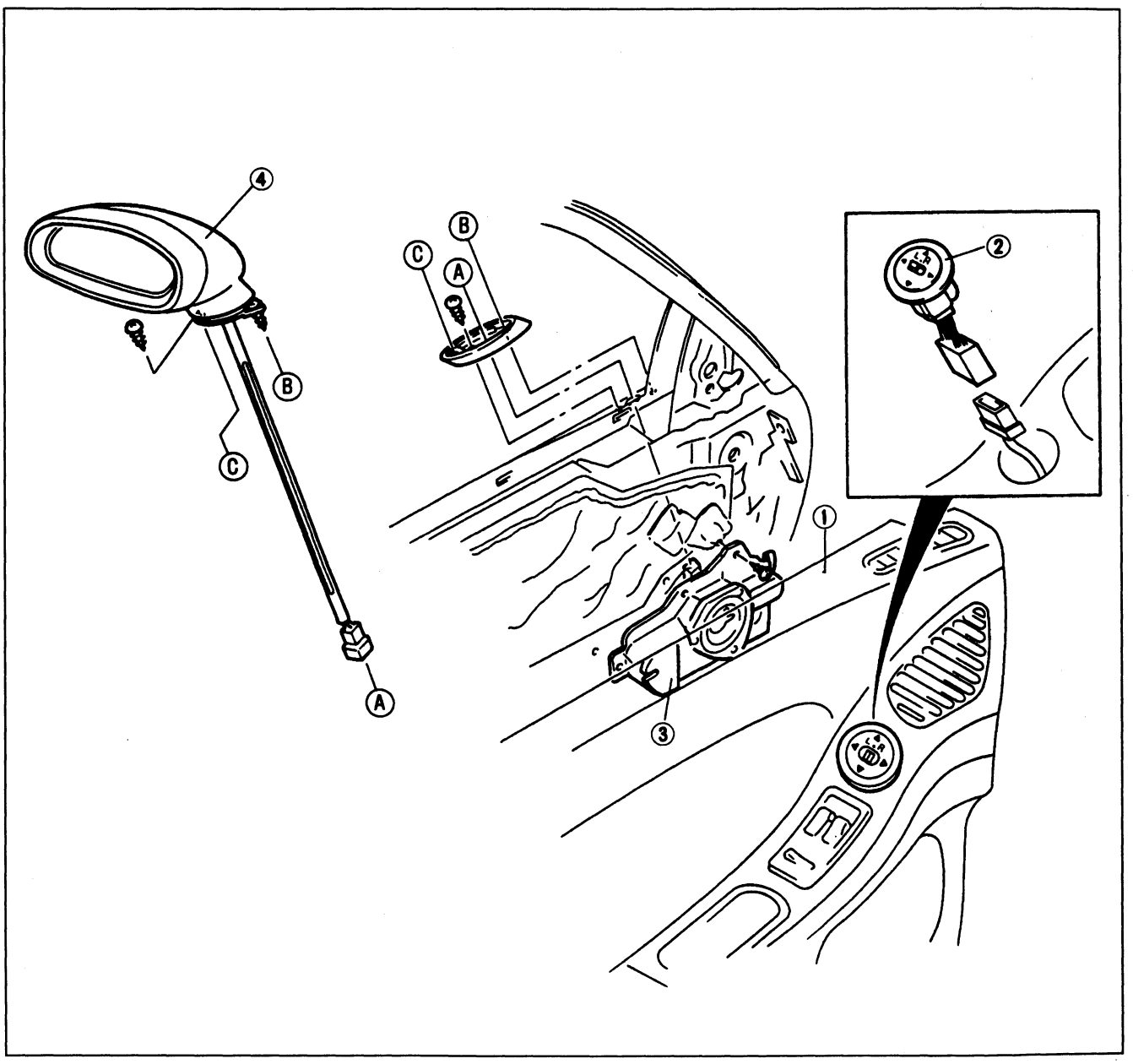
Removal / Installation

1. Disconnect the negative battery cable.

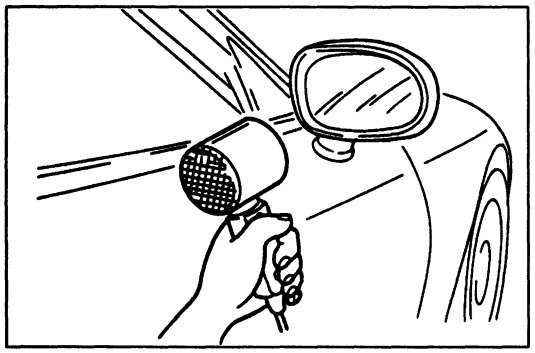
Note

- Remove the plastic surrounding the harness carefully so that it may be reused.

2. Remove in the order shown in the figure. (Refer to the 1994 RX-7 Body Electrical Troubleshooting Manual, section J1, when removing the door speaker.)
3. Install in the reverse order of removal.

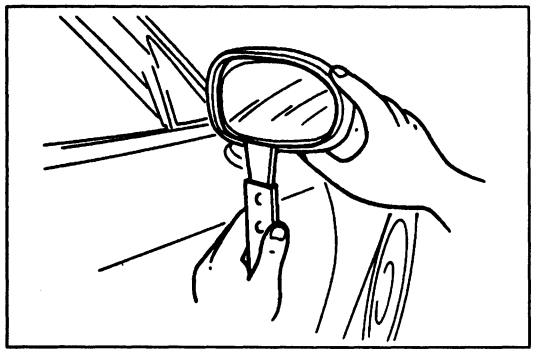


1. Door trim
   Removal / Installation ..... page S-55
2. Power outside mirror switch
3. Door speaker
4. Power outside mirror
   Replacement of mirror glass
   ..... page S-30

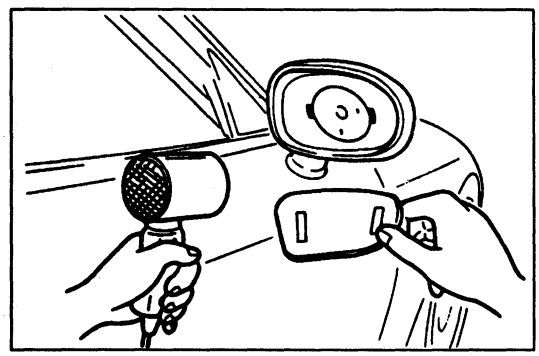


Replacement of Mirror Glass

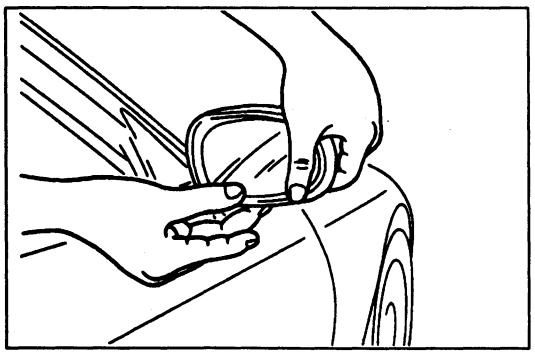
1. Warm the frame and the mirror glass by using a hot air blower.



2. Insert a scraper between the mirror glass and the frame, and pry the glass loose.
3. Remove the remaining adhesive.



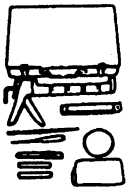
4. Warm the adhesive surface of the frame and the mirror by using a hot air blower.



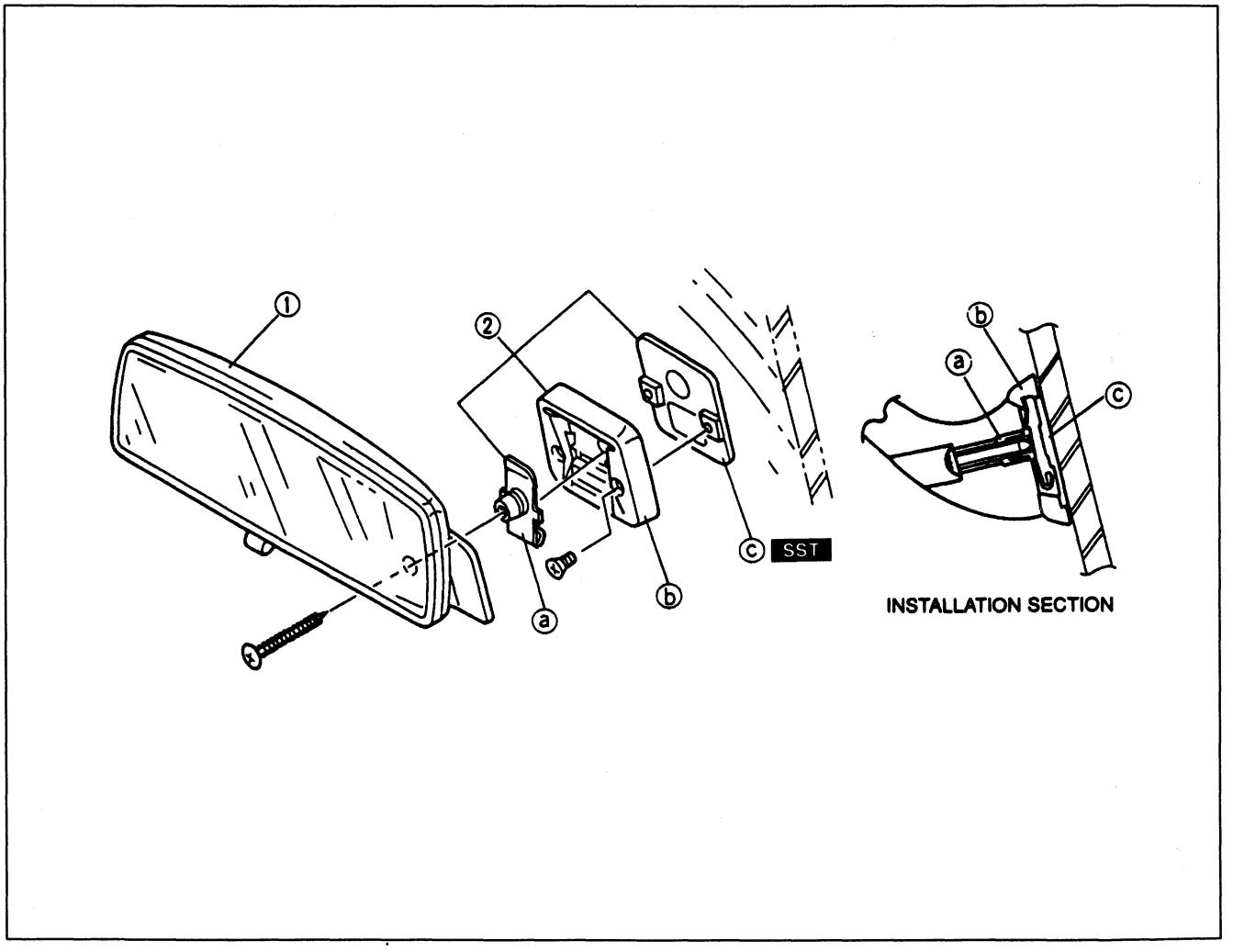
5. Install the glass on the frame and gently press on the glass to secure it.

REARVIEW MIRROR

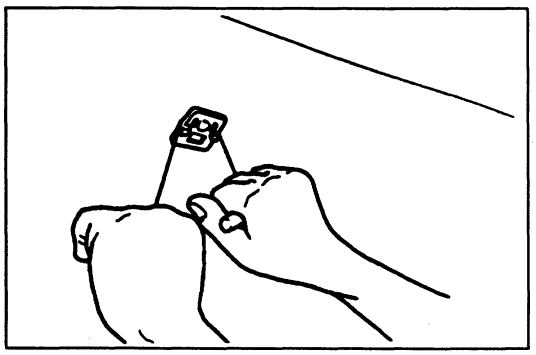
PREPARATION
SST

49 0305 870A Tool set, window		For removal / installation of mirror base

COMPONENTS
Removal / Installation
1. Remove in order shown in the figure, referring to **Removal Note**.
2. Install in the reverse order of removal, referring to **Installation Note**.

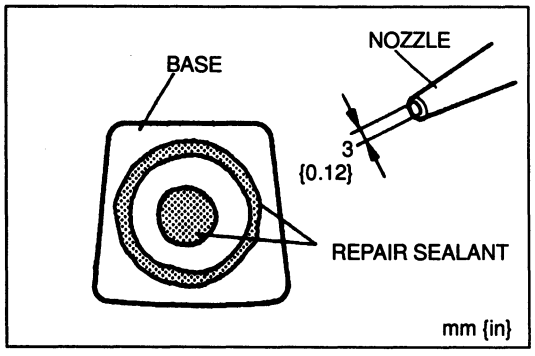


1. Rearview mirror
2. Mirror base assembly
   a. Holder
      Installation Note ..... page S-32
   b. Cover
   c. Base
      Removal Note ..... page S-32
      Installation Note ..... page S-32

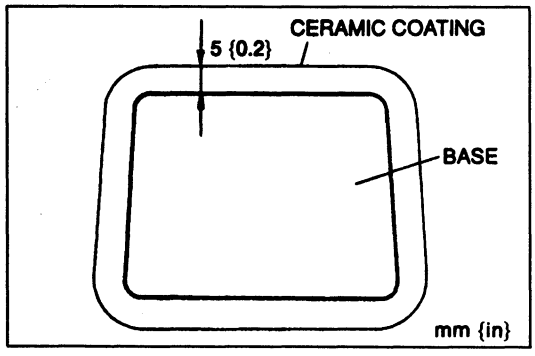


Removal Note
Base
1. Wind each end of the wire around a bar.
2. Saw through the sealant. Use a long sawing action to spread the work over the whole length of the wire to prevent it from breaking.
3. Remove the base.

Installation Note
Base
1. Cut away all of the original sealant by using a razor knife.
2. Clean and degrease the glass.
3. Apply primer to the glass and base. Use only glass primer on the glass and body primer on the base. Keep the area free of dirt and grease, and do not touch the surface. Allow the primer to dry for approximately **30 minutes**.



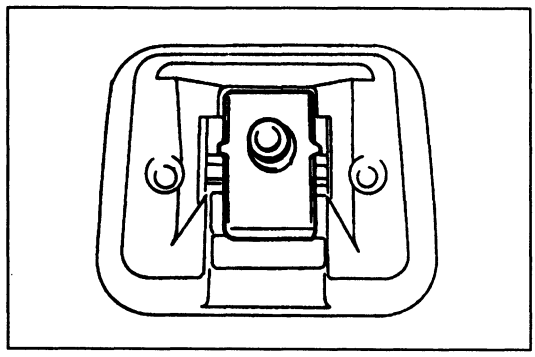
4. Apply a **3 mm {0.12 in}** bead of repair sealant on the base.
5. Center the base in the ceramic coating and press it onto the glass.



6. Remove any excessive repair sealant with ethyl alcohol before the 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. 1hr	4 hr
35°C {95°F}	Approx. 10 min	2 hr



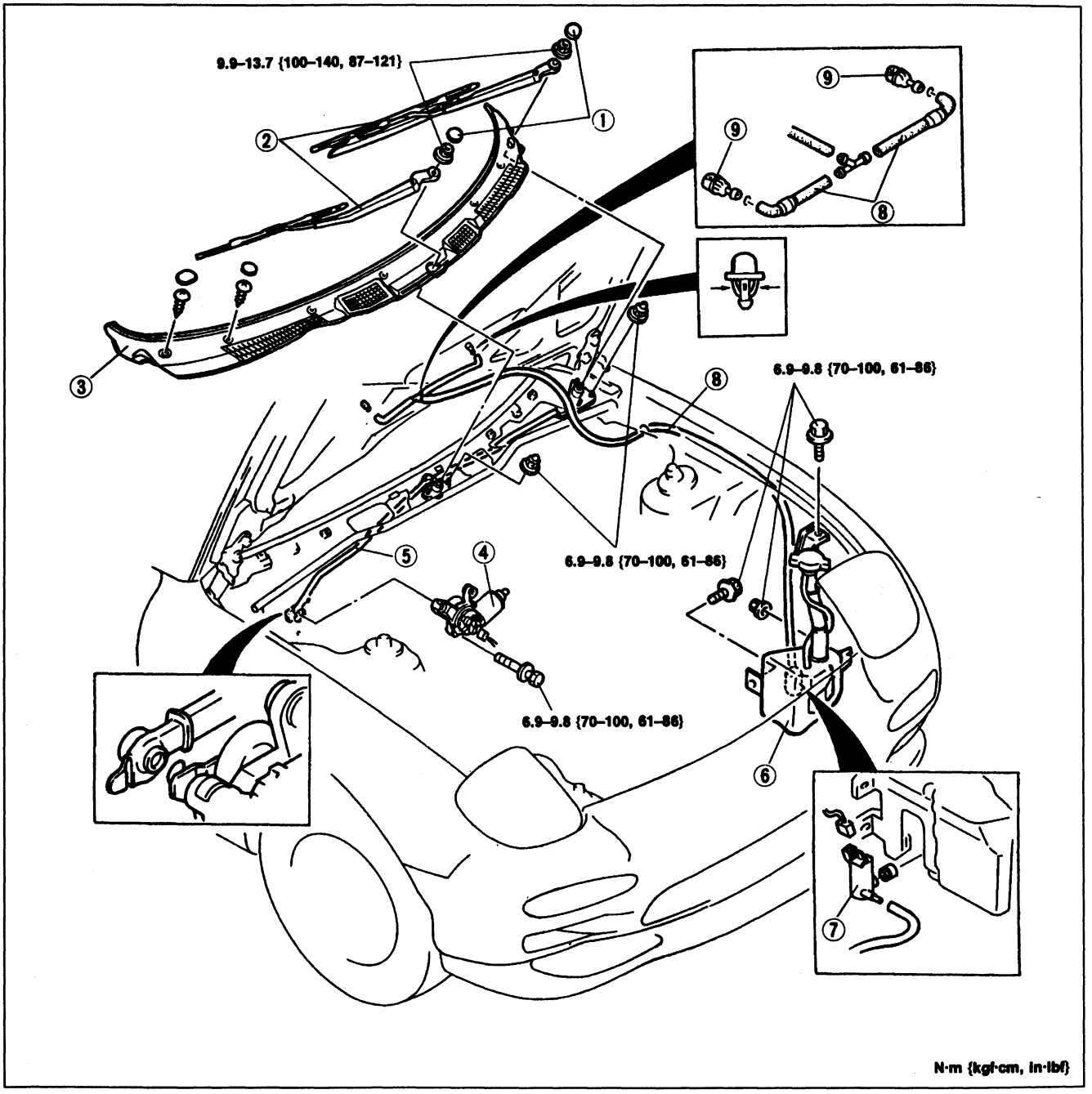
Holder
Install the holder on the cover as shown in the figure.

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.

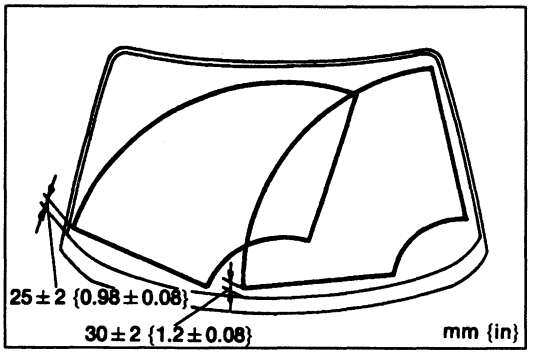


Windshield wiper

1. Wiper arm cover
2. Wiper arm and blade
   - Adjustment ..... page S–34
   - Installation Note ..... page S–34
3. Cowl grille
4. Wiper motor
   - Disassembly / Assembly ..... page S–35
5. Wiper link

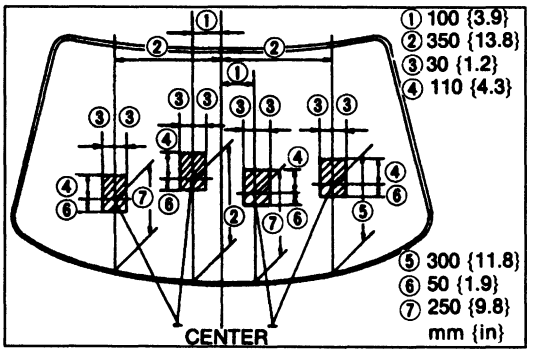
Windshield washer

6. Washer tank
7. Washer motor
8. Washer pipe
9. Washer nozzle
   - Adjustment ..... page S–34

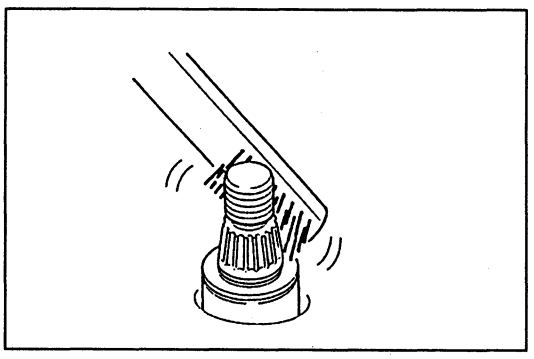


Adjustment
Windshield wiper arm and blade
1. Operate the wipers once to set them in the park position.
2. Set the height of the wiper arms as shown.

Tightening torque:
9.9–13.7 N·m {100–140 kgf·cm, 87–121 in·lbf}



Windshield washer nozzle
Insert a needle or similar object into the nozzle hole and move the nozzle to adjust the spray direction.

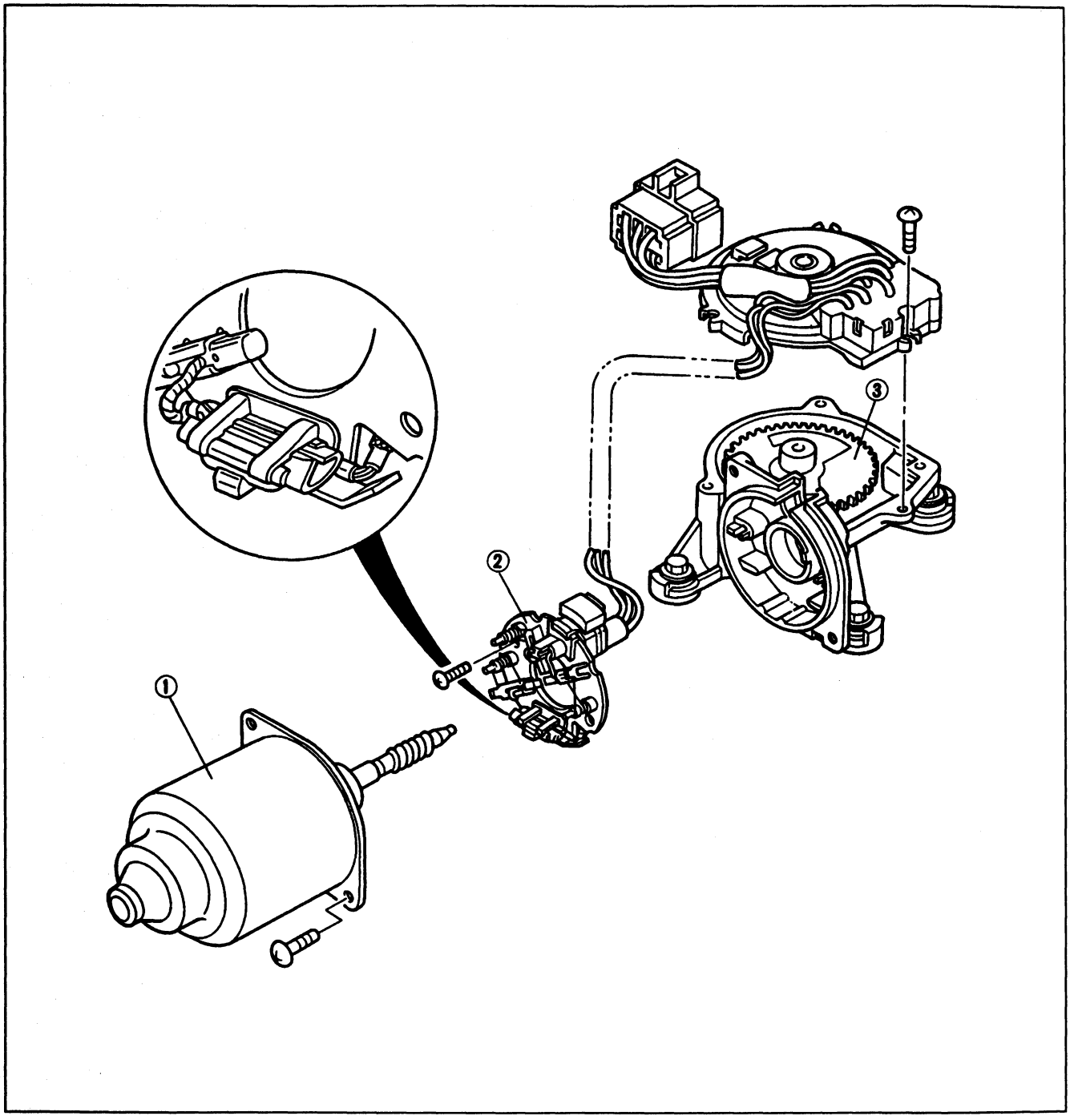


Installation Note
Wiper arm and blade
Clean the wiper arm connector shafts with a wire brush before installing the wiper arms.

WINDSHIELD WIPER MOTOR

Disassembly / Assembly

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.



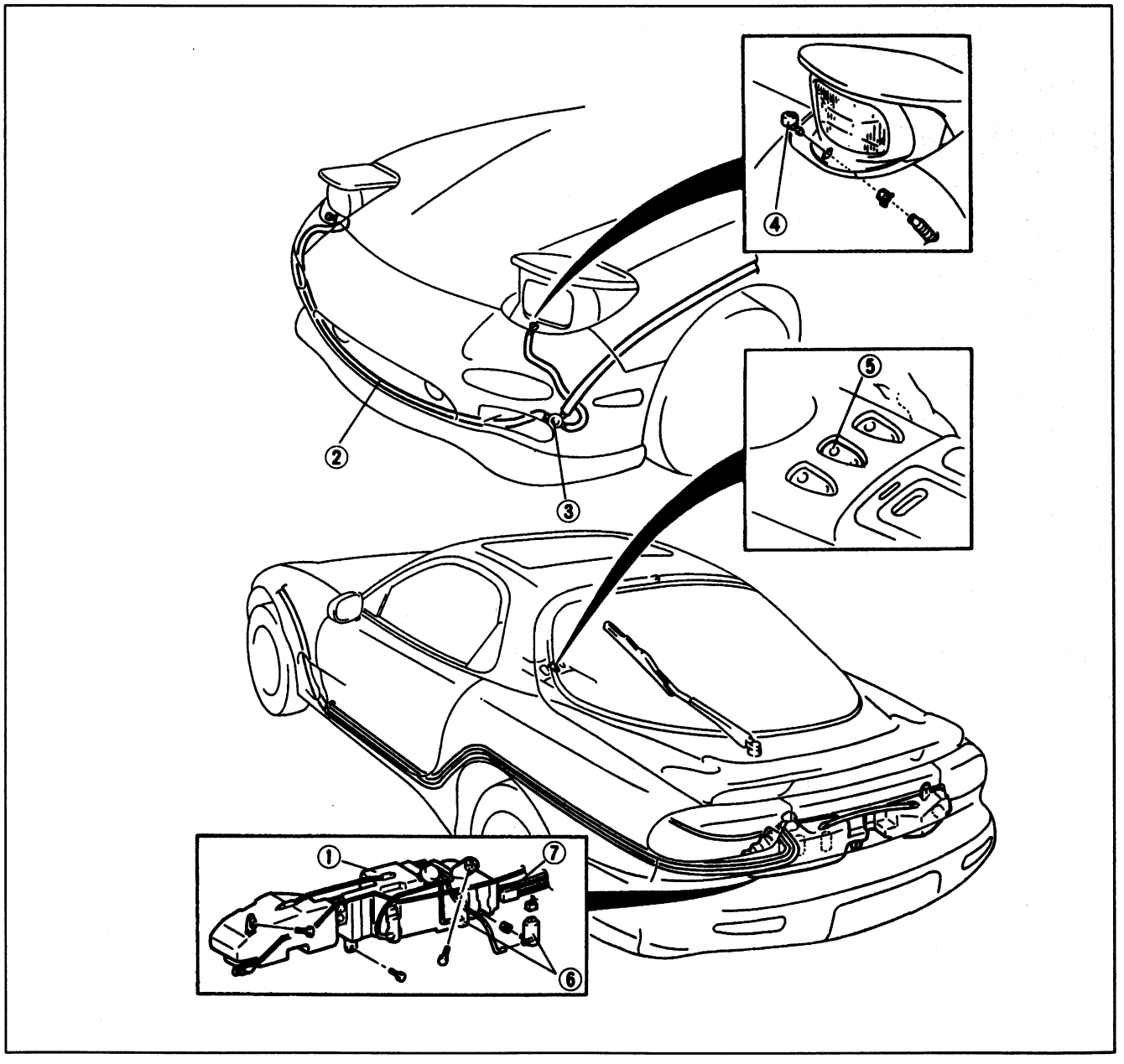
1. Wiper motor
2. Brush plate holder
3. Motor gear shaft

HEADLIGHT CLEANER

COMPONENTS

Removal / Installation

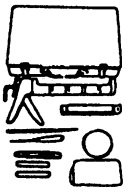
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure. To remove the pipe assembly, remove the front bumper (page S-16) and floor covering (page S-59). To remove the headlight cleaner switch, remove the console panel. (Refer to page S-53.) To remove the headlight cleaner motor and relay, remove the trunk end trim and trank side trim. (Refer to page S-55.)
3. Install in the reverse order of removal.



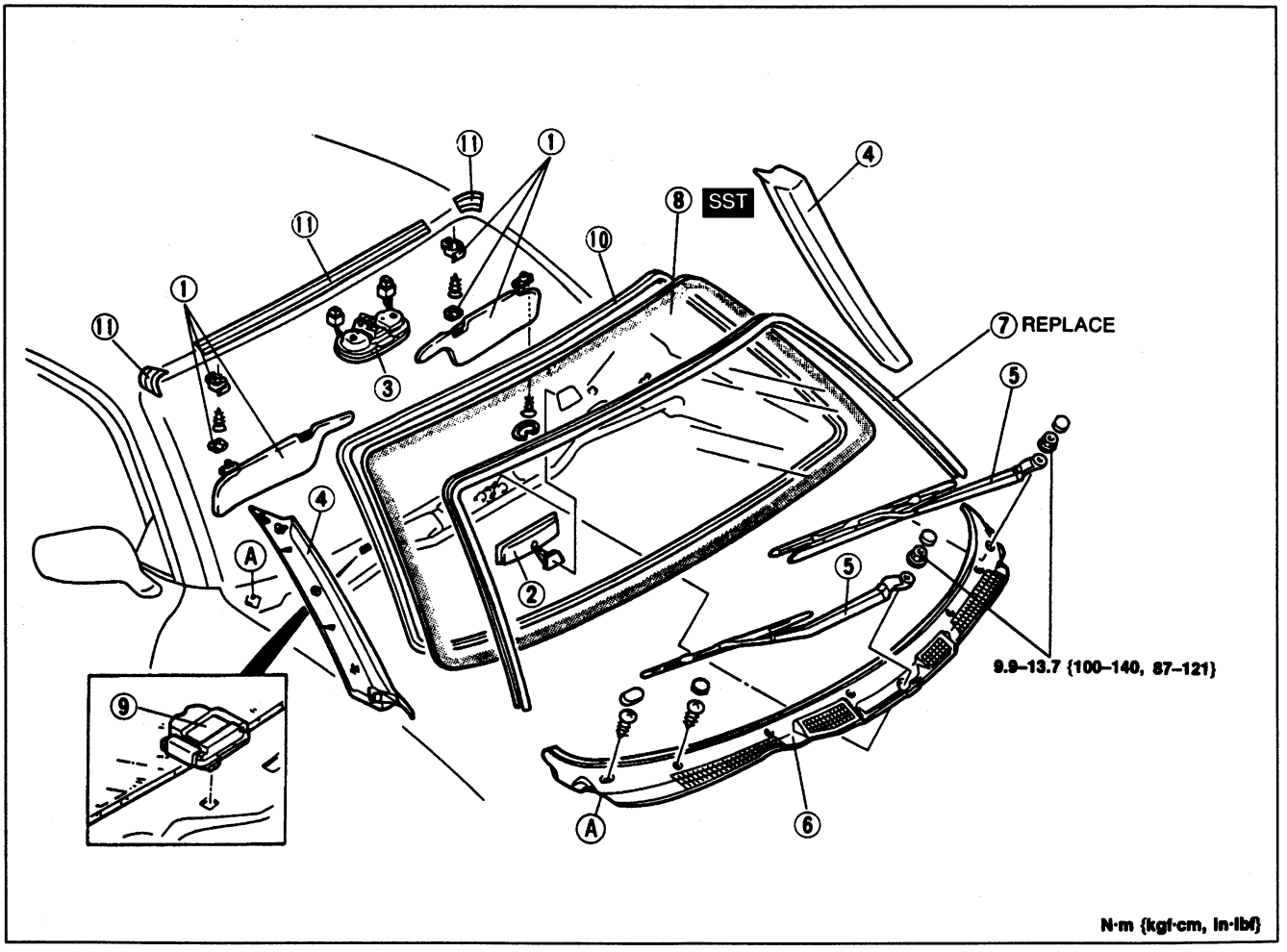
1. Washer tank assembly
2. Pipe assembly
3. Check valve
4. Cleaner nozzle
5. Headlight cleaner switch
6. Headlight cleaner motor
7. Headlight cleaner relay

WINDSHIELD

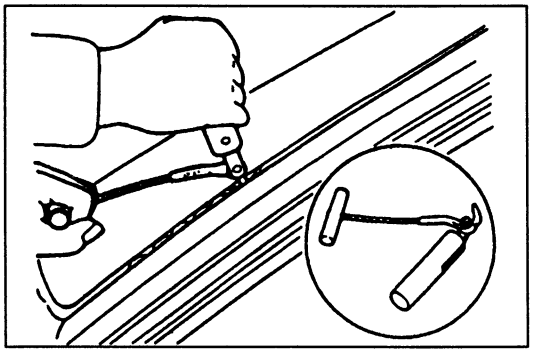
PREPARATION
SST

49 0305 870A Tool set, window		For removal / installation of windshield

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**.

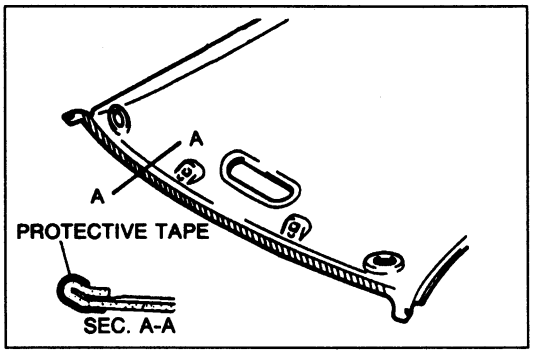


1. Sunvisor and adapter
2. Rearview mirror
3. Overhead console
4. A-pillar trim
   Removal / Installation ..... page S-55
5. Windshield wiper arm and blade
   Adjustment ..... page S-34
6. Cowl grille
7. Windshield molding
   Removal / Installation ..... page S-21
8. Windshield
   Removal Note ..... page S-40
   Installation Note ..... page S-40
9. Spacer
10. Dam
11. Protector

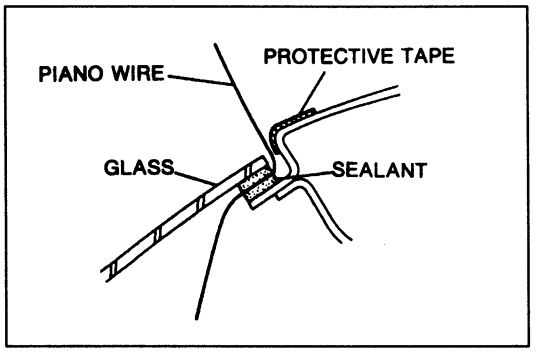


Removal Note
Windshield

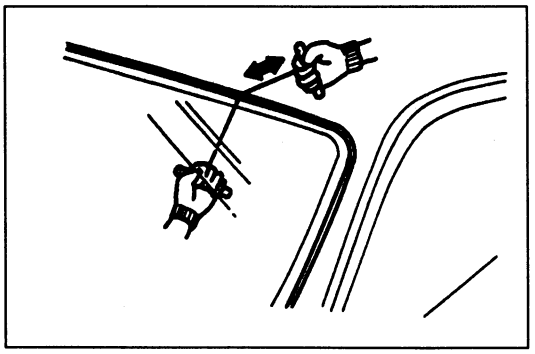
If the glass will not be reused
1. Use a tool like that shown in the figure and insert the blade into the sealant.
2. Pull through the sealant around the edge of the glass.
3. If the protector is damaged, remove it.
4. Remove the glass.



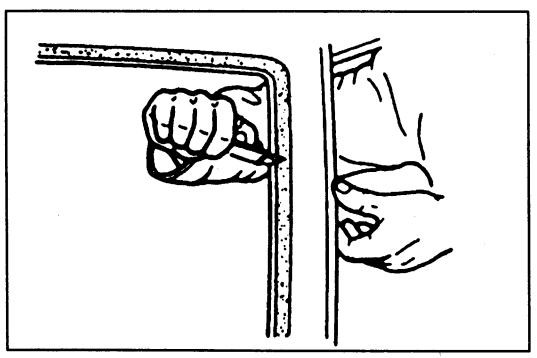
If the glass will be reused
1. Apply protective tape along the front edge of the headliner to protect it from damage.



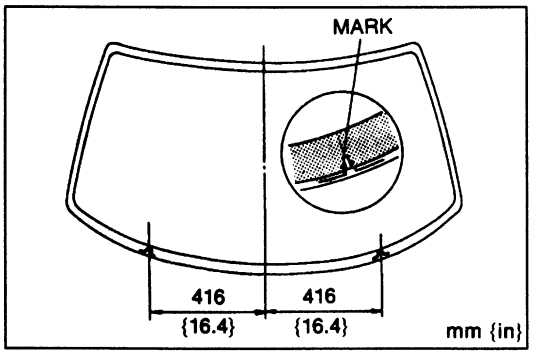
2. Apply protective tape along the edge of the body to protect it from damage.
3. Make a hole through the sealant from the inside of the vehicle by using an awl.
4. Pass piano wire through the hole.



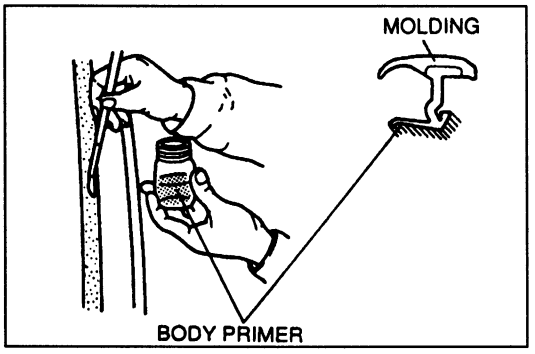
5. Wind each end of the wire around a bar.
6. Working with another person, saw through the sealant around the edge of the glass. Use a long sawing action to spread the work over the whole length of wire to prevent if from breaking.
7. Remove the glass.



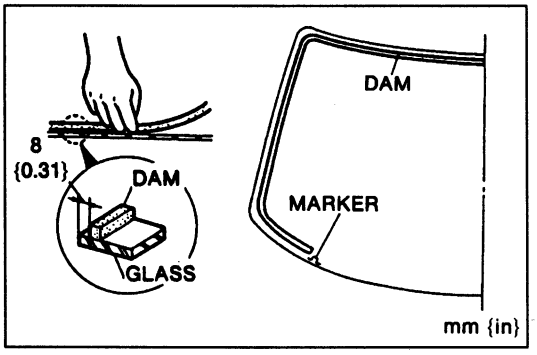
Installation Note
Windshield
1. Cut away the old sealant by using a razor knife so that approximately **2 mm {0.08 in}** of sealant remains around the circumference of the frame. If all the sealant has come off in any one place, apply some primer after degreasing, and allow it **30 minutes** to dry. Then apply new sealant to create a **2mm {0.08in}** layer.
2. Carefully clean an area **5 cm {1.97 in}** wide around the circumference of the glass and clean the bonding area on the body.



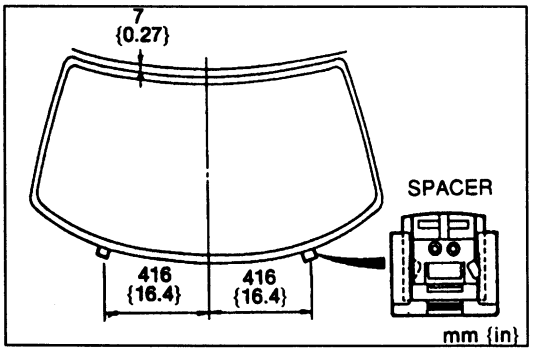
3. Mark the outer edge of the glass with a marking pen to ensure proper reinstallation.



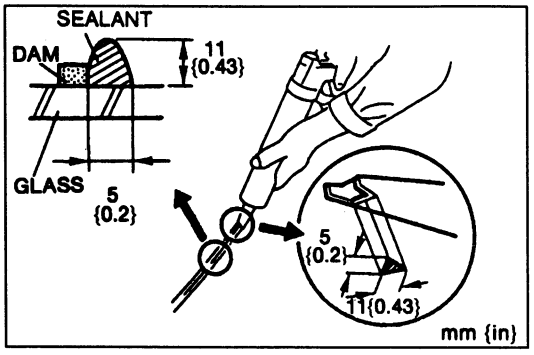
4. Apply primer with a brush to the bonding area of the glass and the body. Keep the area free of dirt and grease, and do not touch the surface. Allow it to dry for approximately **30 minutes**.



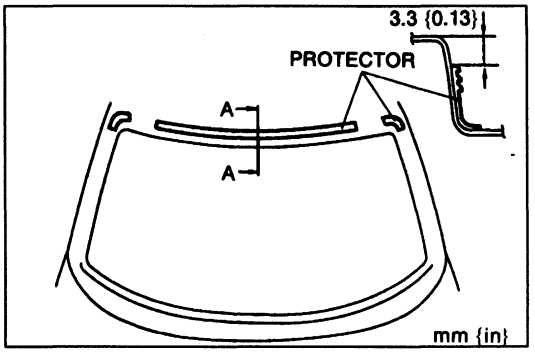
5. Securely bond a new dam along the circumference of the glass **8mm {0.31in}** from the edge. Allow it to dry completely.



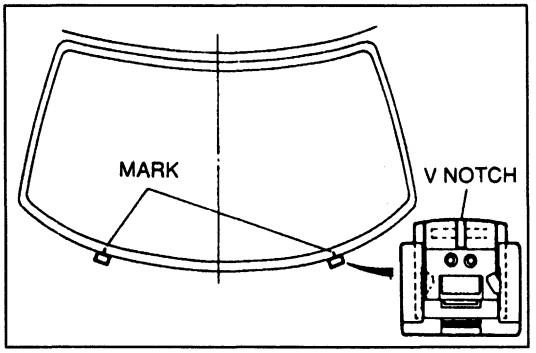
6. Install the spacers onto the body asshown. If a spacer is damaged, replace it.
7 Set the glass onto the body and adjust the clearance between the top of the glass and the body to **7mm {0.27in}** by moving the spacers up or down.
8. Remove the glass from the body.



9. 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. 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 **11mm {0.43in}** high. Keep the bead of sealant smooth and even, reshaping it where necessary with a spatula.



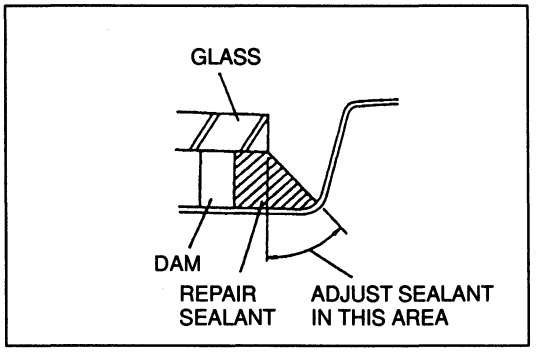
10. If the protector was removed, bond a new one onto the body as shown.



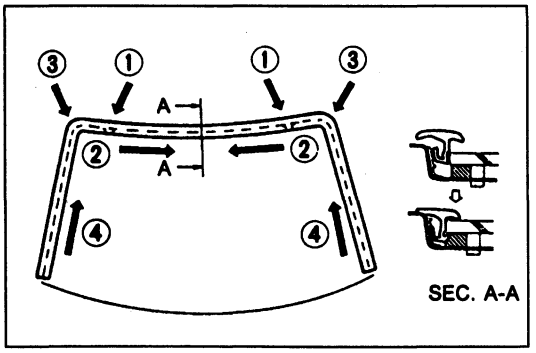
11. Align the glass marks with the notches in the spacers and install the glass onto the body.
12. Press firmly on the glass to compress the sealant.
13. To prevent the glass from being pushed out by air pressure if a door is closed, open all of the windows until the repair sealant has hardened.

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. 1hr	4 hr
35°C {95°F}	Approx. 10 min	2 hr



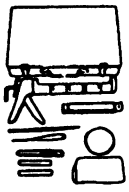
14. Use a scraper to smooth away any sealant that oozes out. Add more sealant to any points of poor contact. Adjust the upper and side sealants as shown, if neccssary.



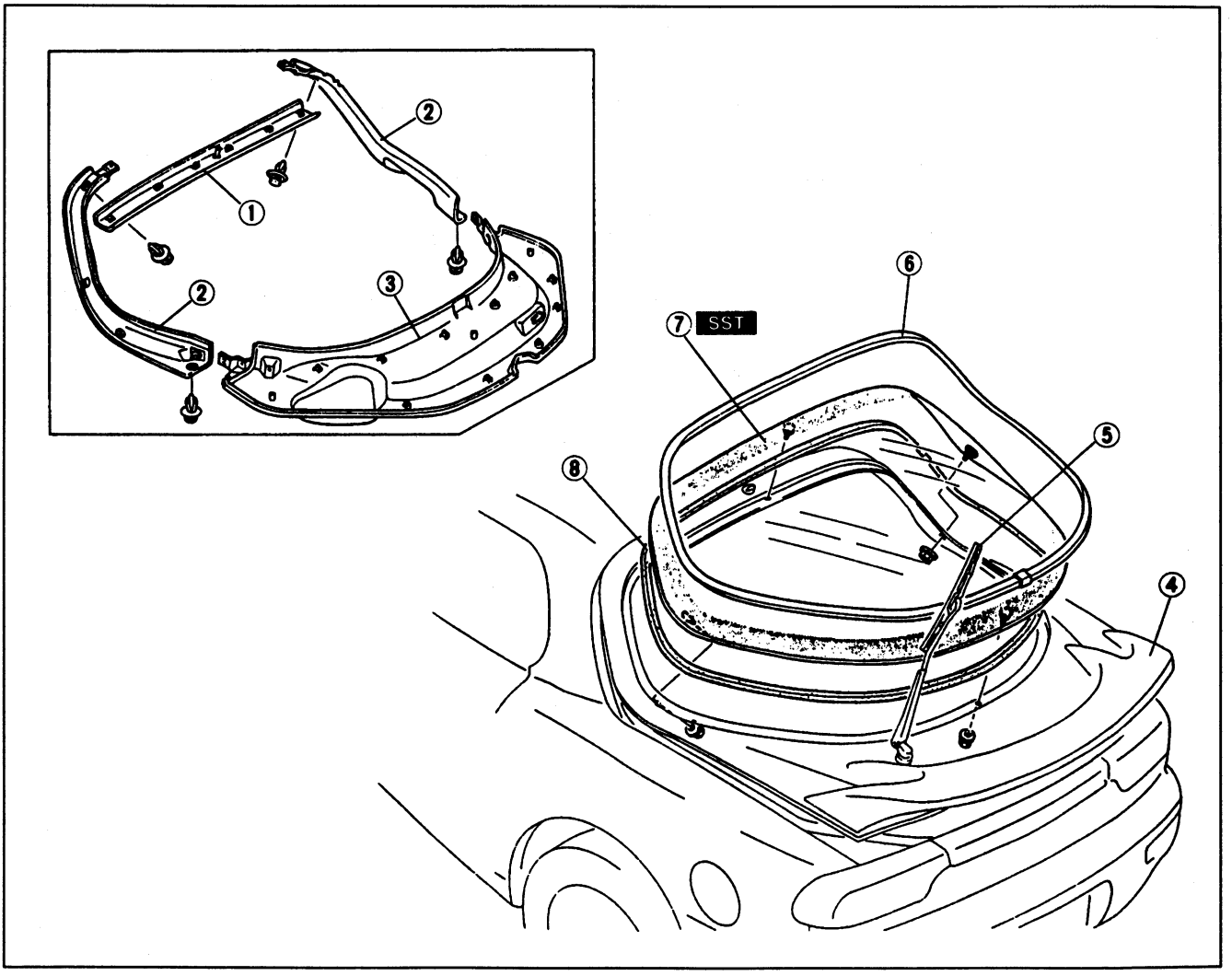
15. Install the molding.
    ① Align the white marks on the molding with the marks on the glass.
    ② Install the upper part of the molding.
    ③ Install the corners of the molding.
    ④ Install the sides of the molding, starting from the bottom and working toward the top.
16. If a leak is found, wipe the water off well and remove the glass. Reinstall the glass.

REAR HATCH GLASS

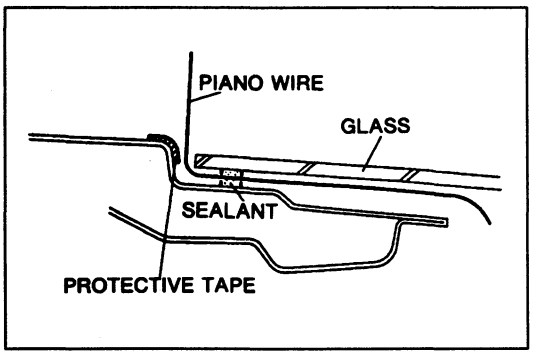
PREPARATION
SST

49 0305 870A Tool set, window		For removal / installation of rear hatch 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**.

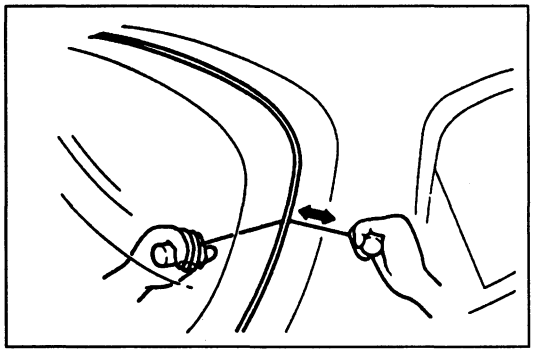


1. Rear hatch upper trim
   Removal / Installation ..... page S-55
2. Rear hatch side trim
   Removal / Installation ..... page S-55
3. Rear hatch lower trim
   Removal / Installation ..... page S-55
4. Rear spoiler
   Removal / Installation ..... page S-27
5. Rear wiper arm and blade
   Adjustment ..... page S-37
6. Rear hatch molding
   Removal / Installation ..... page S-21
7. Rear hatch glass
   Removal Note ..... page S-44
   Installation Note ..... page S-44
8. Dam

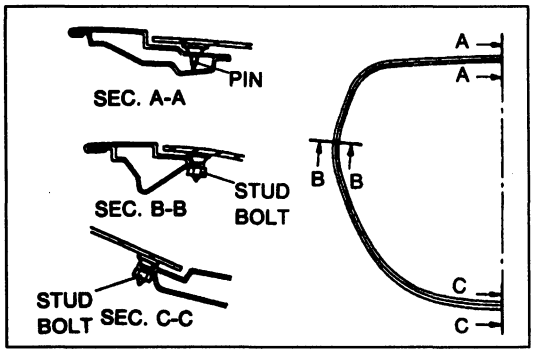


Removal Note
Rear hatch glass

1. Apply protective tape along the edge of the rear hatch to protect it from damage.
2. Make a hole through the sealant from the inside of the vehicle by using an awl.
3. Pass piano wire through the hole.

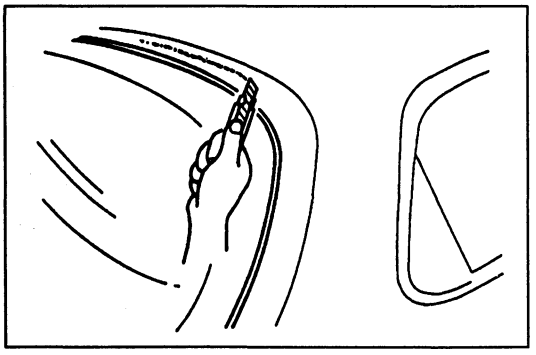


4. Wind each end of the wire around a bar.
5. Working with another person, saw through the sealant around the edge of the glass. Use a long sawing action to spread the work over the whole length of wire to prevent it from bearking.
6. Remove the glass.



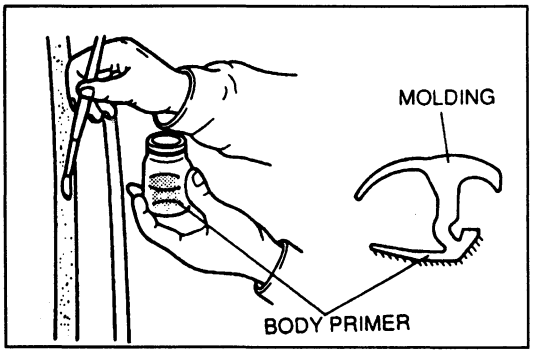
Note

- The rear hatch glass has locating studs at the top, bottom, and sides. If it is difficult to cut the sealant with the piano wire, use a razor knife from the inside of the vehicle where necessary.

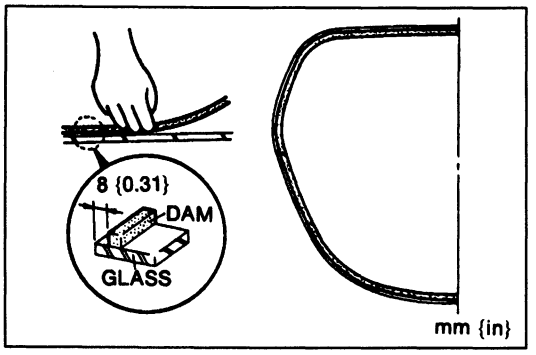


Installation Note
Rear hatch glass

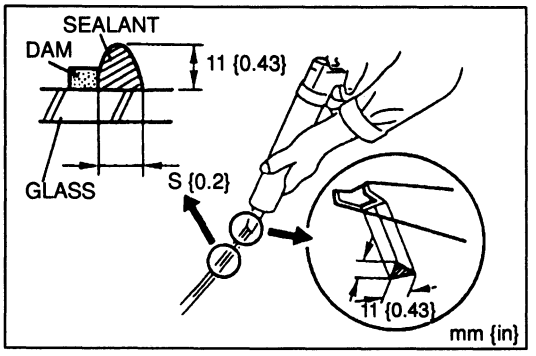
1. Cut away the old sealant with a razor knife so that **1 to 2 mm {0.04 to 0.08 in}** of sealant remains around the circumference of the frame. If all the sealant has come off in any one place, apply, apply primer after degreasing, and allow it **30 minutes** to dry. Then put on new sealant to create a **2mm {0.08in}** layer.
2. Carefully clean an area **5 cm {1.97 in}** wide around the circumference of the glass and clean the bonding area on the rear hatch.



3. Apply primer with a brush to the bonding area of the glass and the body. Keep the area free of dirt and grease, and do not touch the surface. Allow it to dry for approximately **30 minutes**.

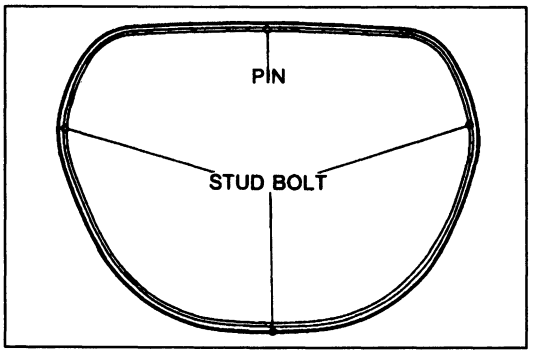


4. Securely bond a new dam along the circumference of the glass **8mm {0.31in}** from the edge. Allow it dry compietely.



5. Prepare the nozzle of the sealant gun so that it has a flange that can run along the edge of the glass and a V from which the sealant can flow. 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 **11mm {0.43in}** high. Keep the bead of sealant smooth and even, reshaping it where necessary with a spatula.
6. Align the locating studs and install the glass onto the body. Verify that the clearance between the top of the glass and the rear hatch is 8 mm {0.31in}.
7. Press firmly on the glass to compress the sealant. Install the nuts onto the studs.

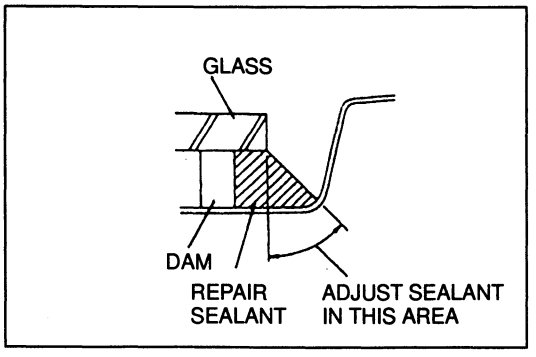
Tightening torque:
2.0–2.9 N·m {20–30 kgf·cm, 18–26 in·lbf}



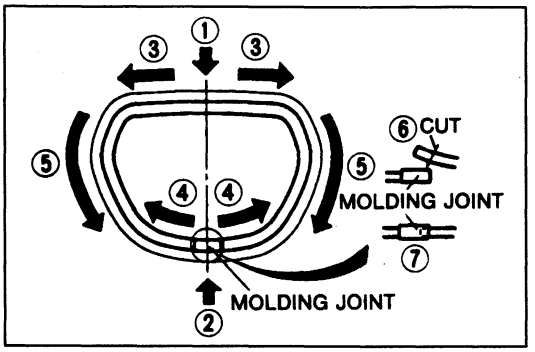
8. To prevent the glass from being pushed out by air pressure if a door is closed, open all of the windows until the repair sealant has hardened.

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. 1hr	4 hr
35°C {95°F}	Approx. 10 min	2 hr



9. Use a scraper to smooth away any sealant that oozes out. Add more sealant to any points of poor contact. Adjust the upper and side sealants as shown, if necessary.



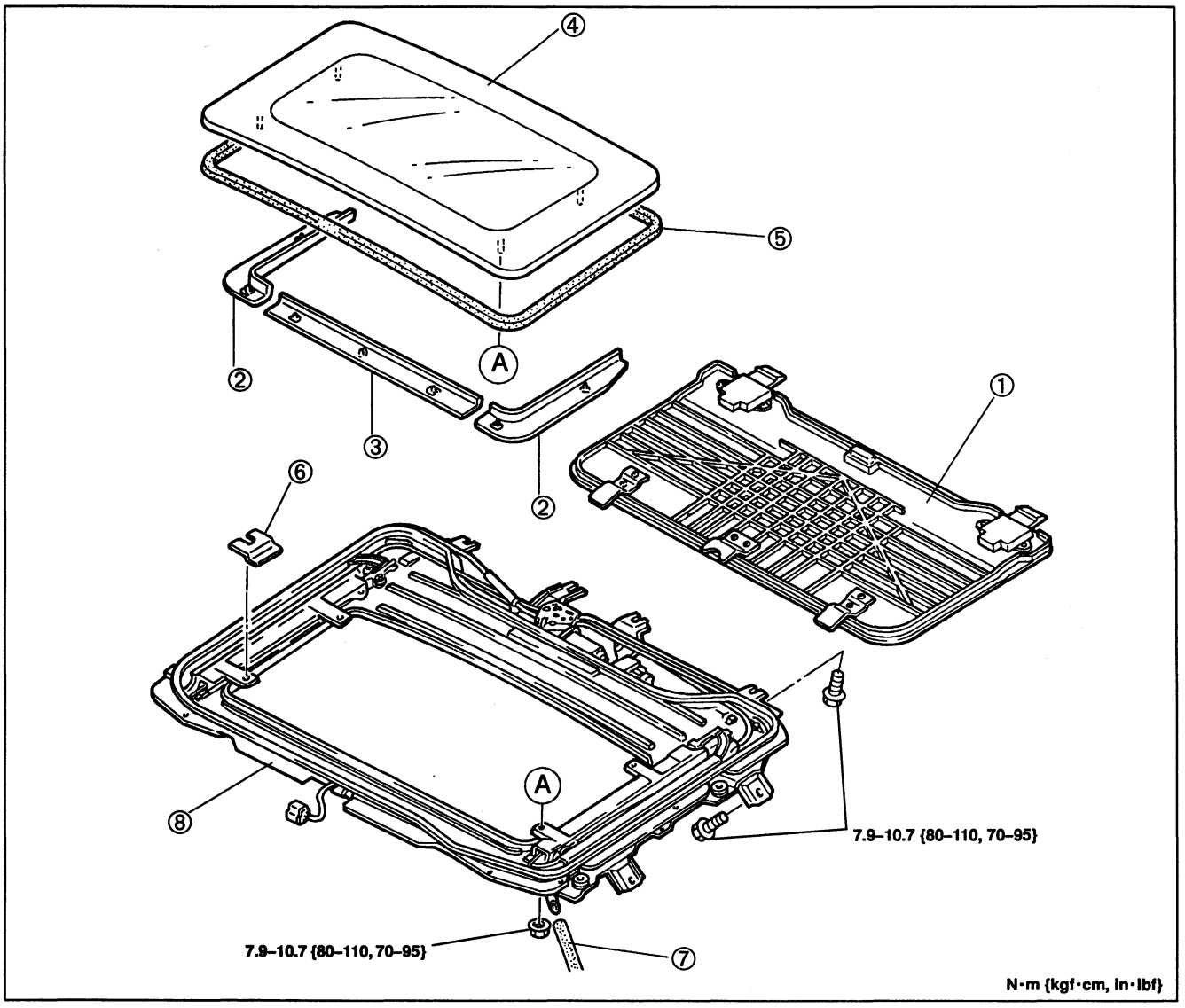
10. Install the molding.
    ① Align the white mark on the molding with that on the upper part of the glass.
    ② Align the mark on the lower part of the glass with the molding joint.
    ③ Install the upper part of the molding.
    ④ Install the lower part of the molding.
    ⑤ Install the side parts of the molding, starting from the top and working toward the bottom.
    ⑥ Cut the molding to fit securely into the molding joint.
    ⑦ Insert the molding into the molding joint.
11. If a leak is found, wipe the water off well and remove the glass. Reinstall the glass.

SLIDING SUNROOF

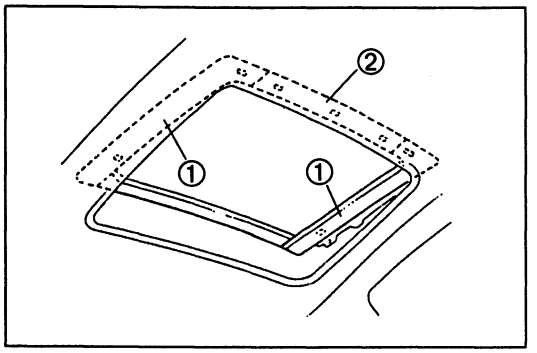
COMPONENTS

Removal / Installation

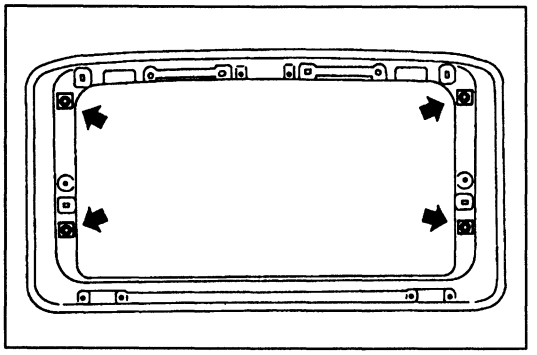
1. Open the slide panel **100 mm {3.9 in}** from the closed throttle position.
2. Disconnect the negative battery cable.
3. Remove in the order shown in the figure, referring to **Removal Note**. To remove the sunroof drive unit assembly, remove the headliner. (Refer to page S-61.)
4. Install in the reverse order of removal, referring to **Installation Note**.



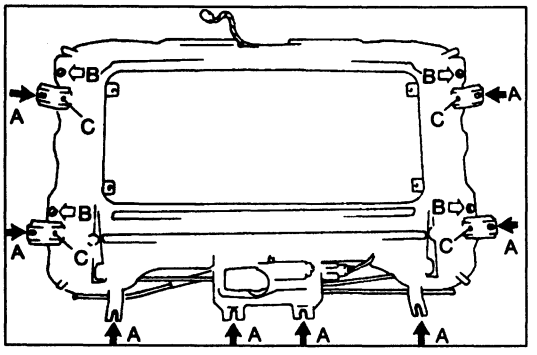
1. Sunshade
2. Decoration cover
   Removal Note ..... page S-47
3. Lower panel cover
   Removal Note ..... page S-47
4. Slide panel assembly
   Removal Note ..... page S-47
   Adjustment ..... page S-52
5. Weatherstrip
6. Sunroof shim
7. Drain hose
   Installation Note ..... page S-48
8. Sunroof drive unit assembly
   Removal Note ..... page S-47
   Installation Note ..... page S-47
   Disassembly / Assembly ..... page S-49



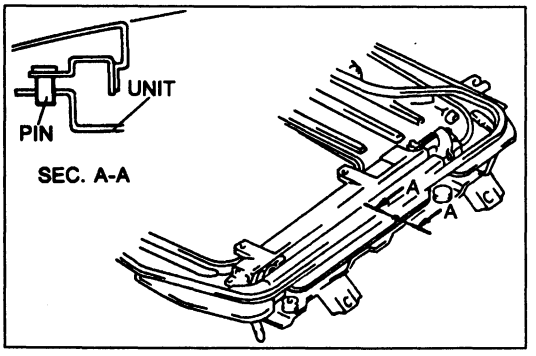
Removal Note
Decoration cover, lower panel cover
Remove the decoration covers and lower panel cover in the order shown in the figure.



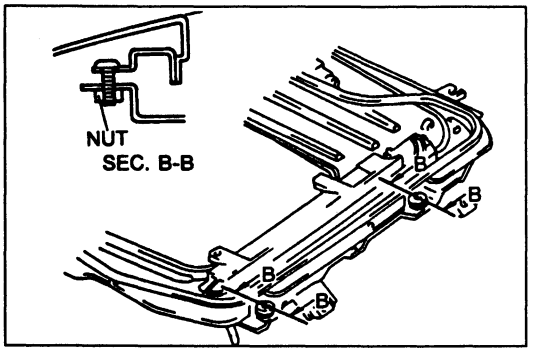
Slide panel
1. Fully close the slide panel by using the emergency handle (supplied in vehicle).
2. Remove the slide panel fixing nuts. Push the slide panel up from the inside and remove it from the guide.



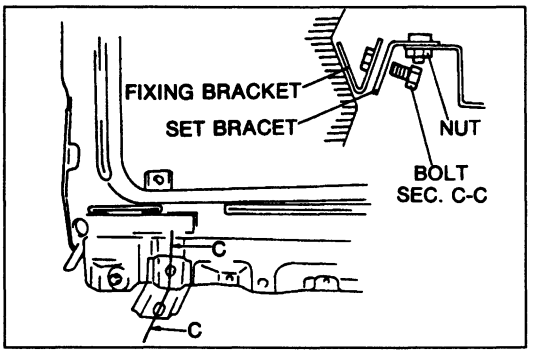
Sunroof drive unit assembly
1. Remove bolts A.
2. Loosen nuts C.
3. Loosen height adjusting nuts B and remove the sunroof drive unit from the body.



Installation Note
Sunroof drive unit assembly
1. Align the locator pins and set the sunroof drive unit to the roof panel.

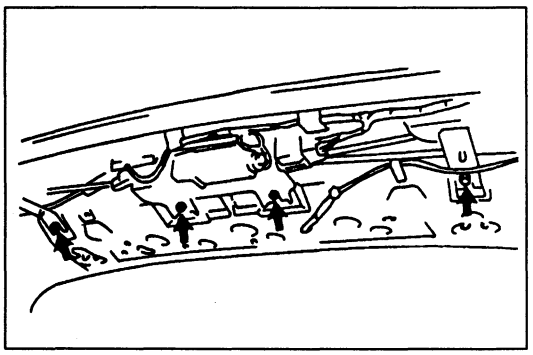


2. Loosely install the sunroof drive unit to the roof panel with the height adjusting nuts.



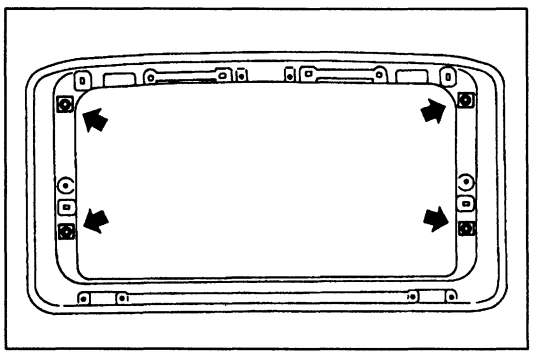
3. Loosen the set bracket attaching nuts. Position the set bracket so that it touches the roof panel fixing bracket. Tighten the fixing bracket bolts, then tighten the nuts.

Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 70–95 in·lbf}



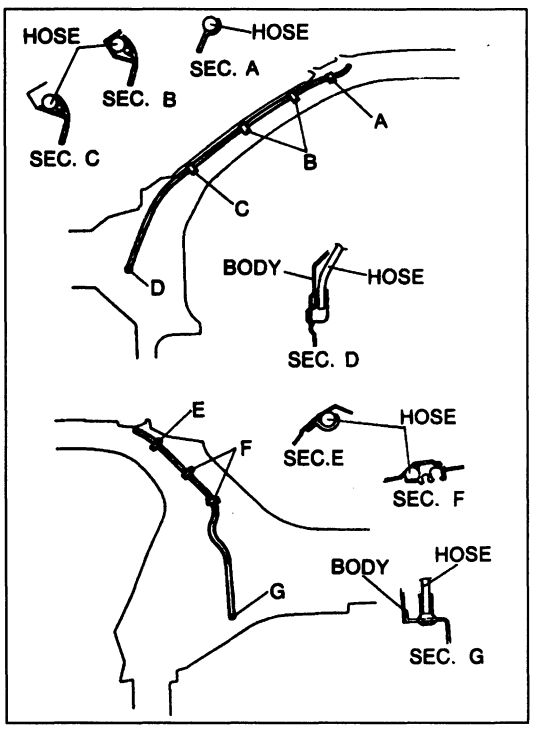
4. Affix the rear of the sunroof frame to the roof panel.

Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 70–95 in·lbf}



Slide panel
Install the slide panel to the guide. If the height difference between the slide panel and the roof panel is greater than 2.0 mm {0.08 in}, loosen the slide panel attaching nuts and insert shim(s) between the panels.

Tightening torque:
7.9–10.7 N·m {80–110 kgf·m, 70–95 in·lbf}

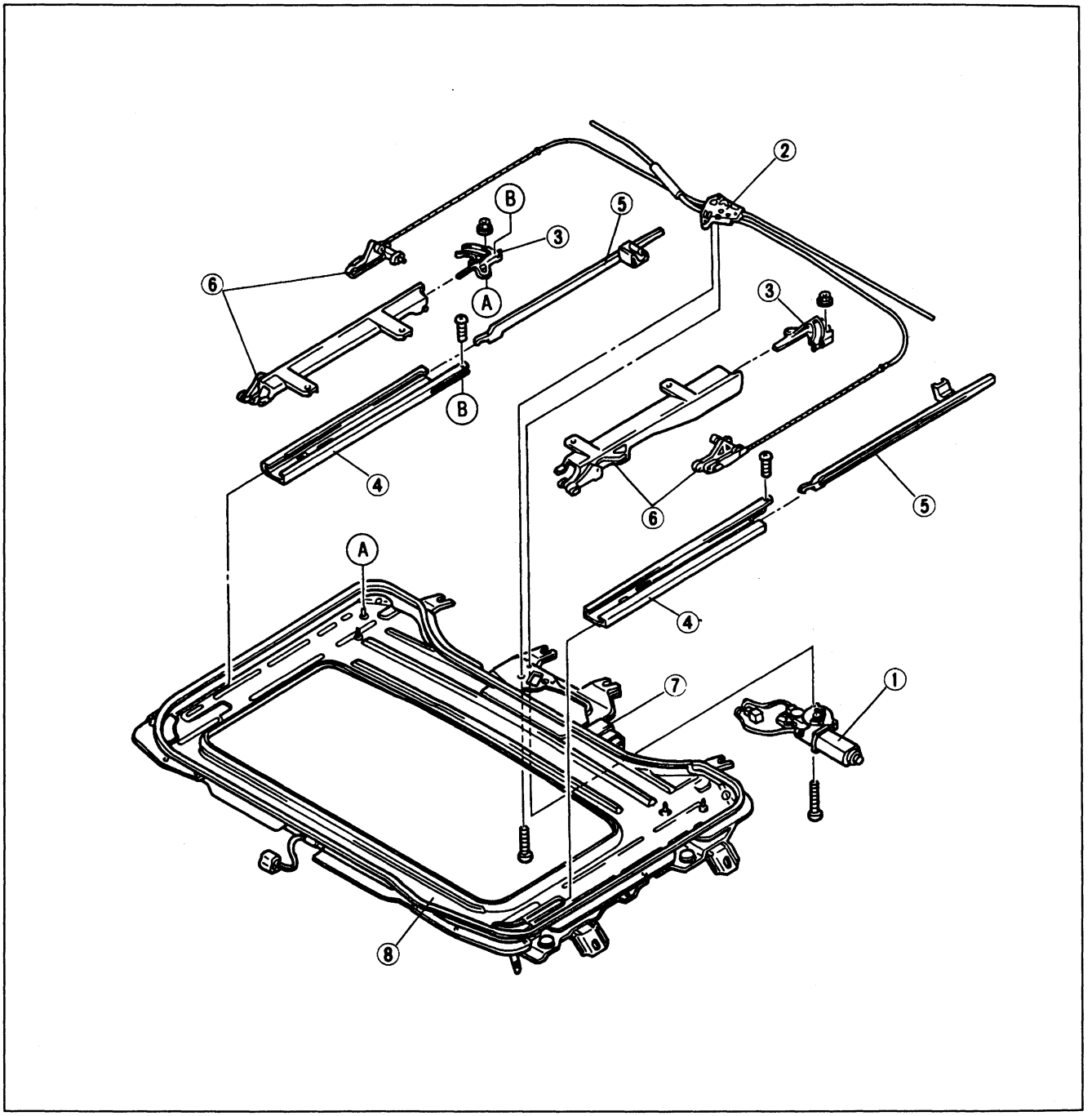


Drain hose
Apply soapy water to the drain hose and insert it fully into the sunroof frame.
1. On the A-pillar side, insert one end of the hose into the sunroof frame, set the hose along the A-pillar, and insert the other end into the cowl side panel hole.
2. On the B-pillar side, insert one end of the hose into the sunroof frame and insert the other end into the rear fender panel hole via the hole in the upper part of the B-pillar.

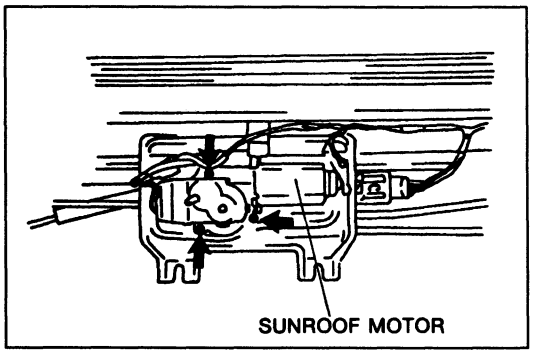
SLIDING SUNROOF DRIVE UNIT ASSEMBLY

Disassembly / Assembly

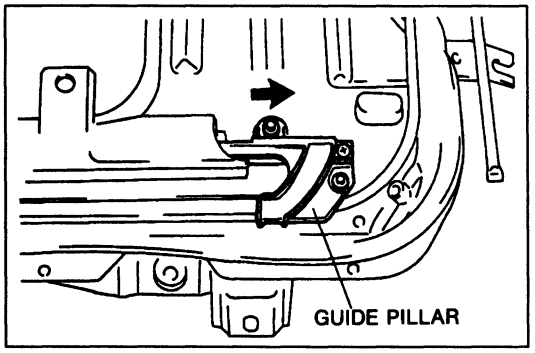
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



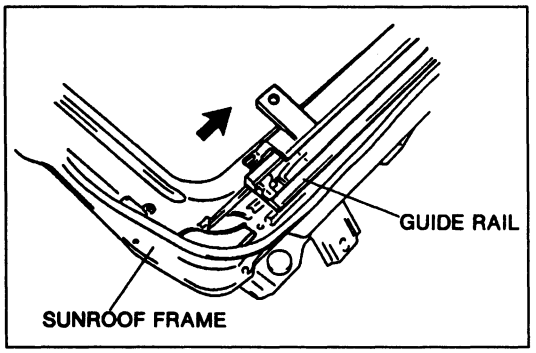
1. Sunroof motor
   - Disassembly Note ..... page S-50
   - Assembly Note ..... page S-51
   - Adjustment ..... page S-52
2. Drive unit
3. Guide pillar
   - Disassembly Note ..... page S-50
   - Assembly Note ..... page S-51
4. Guide rail
   - Disassembly Note ..... page S-50
   - Assembly Note ..... page S-52
5. Shutting assembly
   - Disassembly Note ..... page S-50
   - Assembly Note ..... page S-51
6. Guide
   - Disassembly Note ..... page S-50
   - Assembly Note ..... page S-51
7. Sunroof relay
8. Sunroof frame



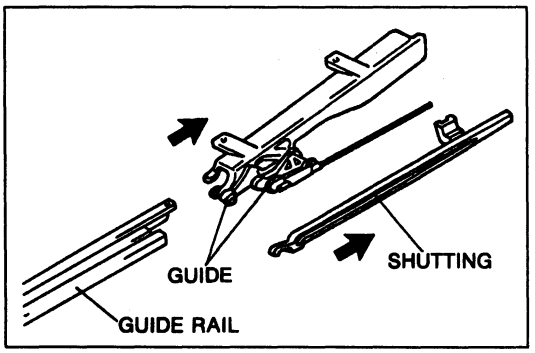
Disassembly Note
Sunroof motor
1. Remove the screws and remove the motor from the sunroof frame.
2. Disconnect the motor harness connector.



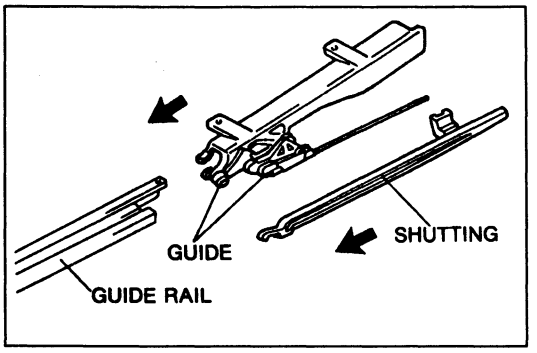
Guide pillar
1. Remove the guide pillar mounting nuts and screw.
2. Pull the guide pillar to remove it from the guide rail.



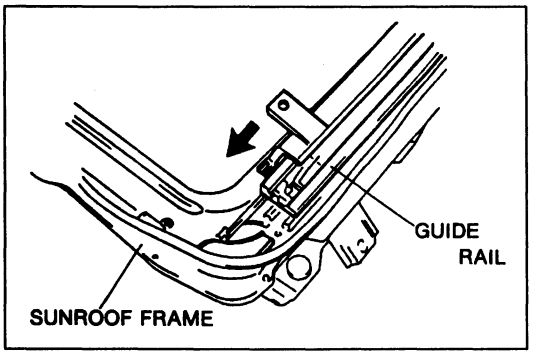
Guide rail
Pull the guide rail with the guide to remove them from the sunroof frame.



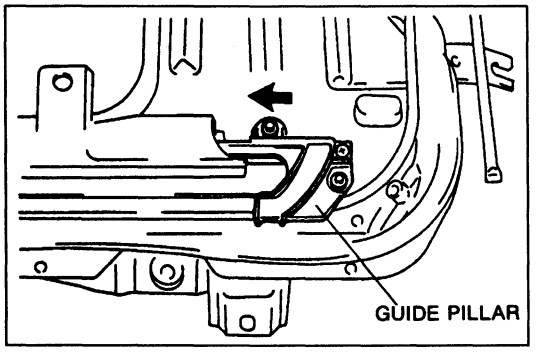
Shutting assembly, guide
1. Pull the shutting assembly to remove it from the guide rail.
2. Pull the guide to remove it from the guide rail.



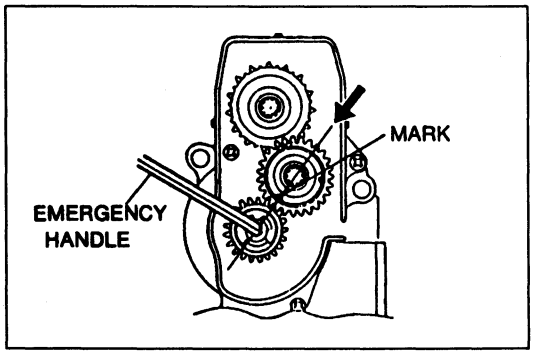
Assembly Note
Shutting assembly, guide
1. Insert the guide into the guide rail.
2. Insert the shutting assembly into the guide rail.



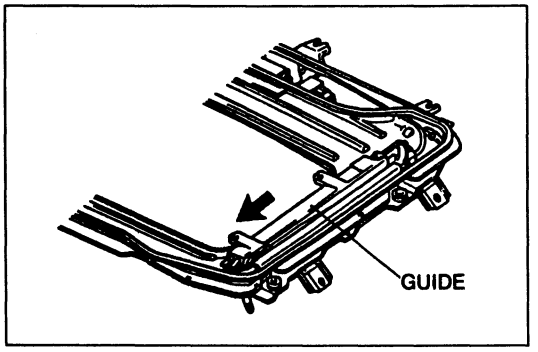
Guide rail
Insert the guide rail with the guide into the sunroof frame.



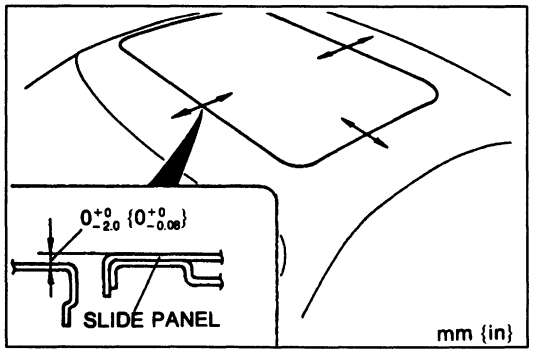
Guide pillar
1. Insert the guide pillar into the guide rail.
2. Install the guide pillar mounting nuts and screw.



Sunroof motor
1. Remove the motor cover. Position the mark on the timing gear as shown in the figure by using the emergency handle (supplied in vehicle).



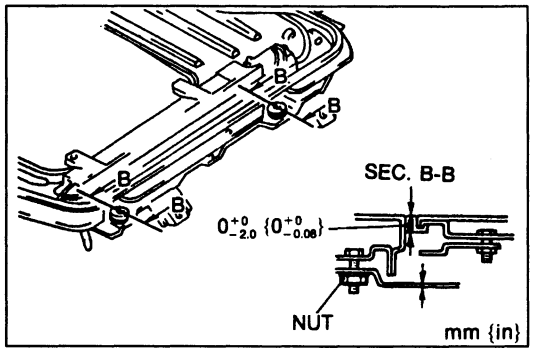
2. Move the guide fully forward by hand.
3. Install the motor to the sunroof frame.
4. Connect the motor harness connector.



Adjustment
Slide panel
Height

Adjust the height difference between the slide panel and the roof panel according to the following procedure.

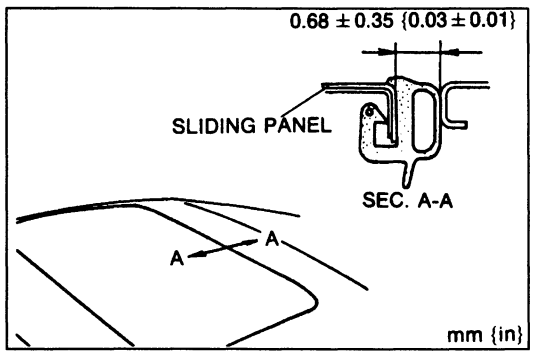
Allowable height difference: 2.0 mm {0.08 in} max.



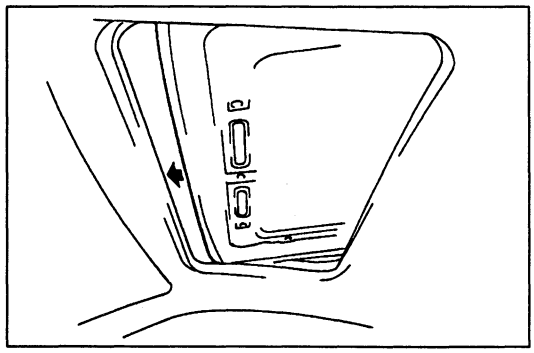
1. Remove the headliner. (Refer to page S-60.)
2. Loosen the set bracket attaching nuts.
3. Turn the height adjusting nuts to adjust the sunroof frame height.

Note
- Clockwise rotation increases the frame height.

4. After adjustment, securely install the sunroof to the roof panel.

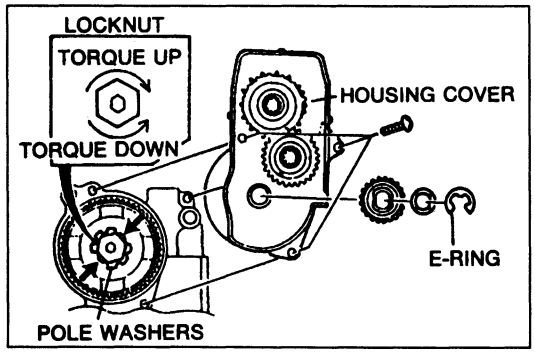


Gap
1. Verify that the slide panel does not interfere with the roof panel when operated.
2. If necessary, loosen the slide panel mounting nuts and move the panel.
3. If the above adjustment is not enough, loosen the mounting screws and bolts of the sun roof frame and set bracket and adjust again.
(Refer to page S-47 Installation Note for the sunroof drive unit assembly.)



Sunroof motor
1. Measure the operation time of the slide panel from wide open throttle to closed throttle position or vice versa.

Specified time: 4–7 sec.



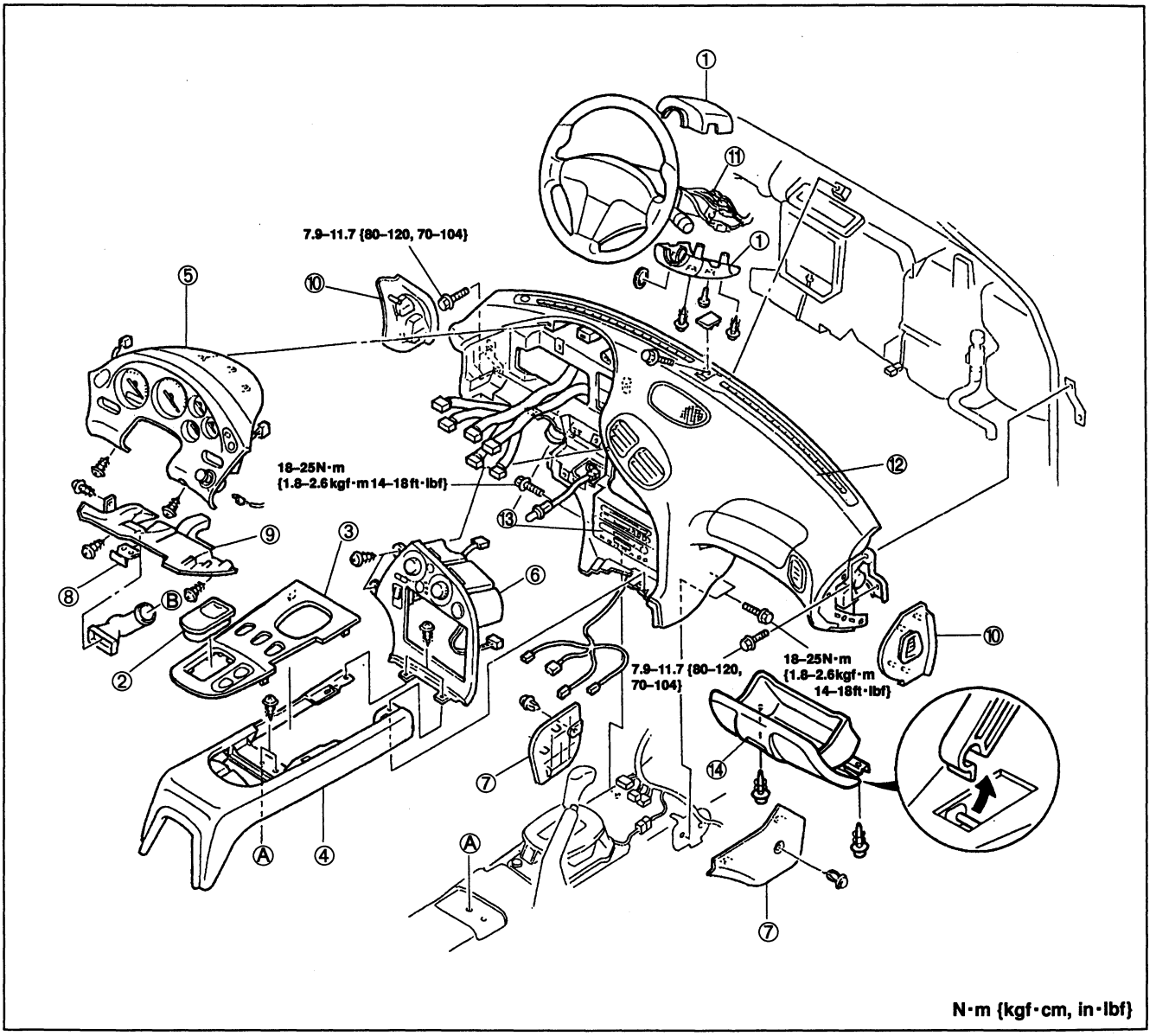
2. If not as specified, adjust it by turning the locknut on the sunroof motor.
   (1) Remove the housing cover attaching screw and the E-ring. Remove the housing cover from the motor.
   (2) Unfold the pole washers indicated by the arrows.
   (3) Hold the motor shaft with the emergency handle (supplied in vehicle) and turn the locknut to adjust the torque.
   (4) Fold the pole washers against the locknut.

DASHBOARD AND CONSOLE

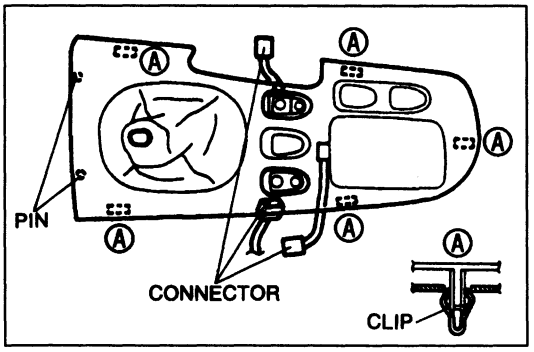
COMPONENTS

Removal / Installation

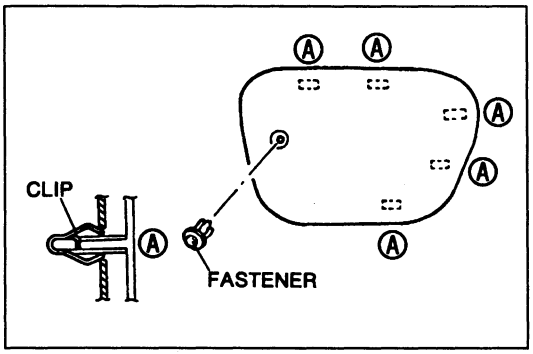
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal Note**. To remove the dashboard, remove the parking brake lever. (Refer to Section P.) (Refer to the 1994 RX-7 Body Electrical Troubleshooting Manual, section J1, when removing the audio unit.)
3. Install in the reverse order of removal.



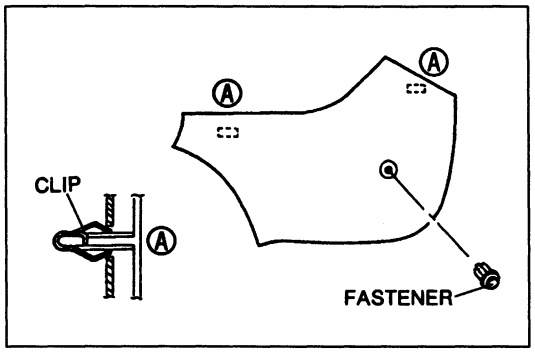
1. Column cover
2. Ashtray
3. Console panel
   Removal Note ..... page S-54
4. Rear console
5. Meter hood and instrument cluster
6. Center panel
7. Side wall
   Removal Note ..... page S-54
8. Hood release knob
   Removal / Installation ..... page S-5
9. Lower panel
10. Side panel
    Removal Note ..... page S-54
11. Steering shaft
    Removal Note ..... page S-54
12. Dashboard
13. Audio unit
14. Glove compartment



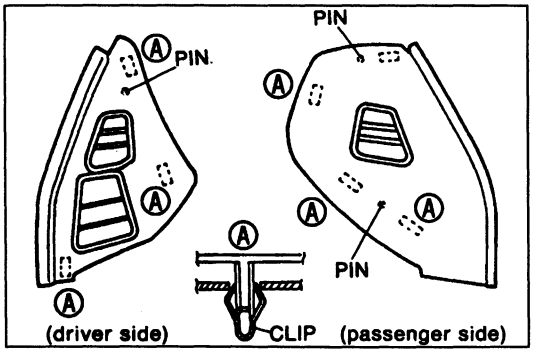
Removal Note
Console panel
1. Remove the ashtray.
2. Insert a protected screwdriver at point A to pry out the rear of the panel.
3. Pull the console panel upward to disengage the clips from the body.
4. Remove the ashtray lamp.
5. Disconnect the harness connector from the switches.



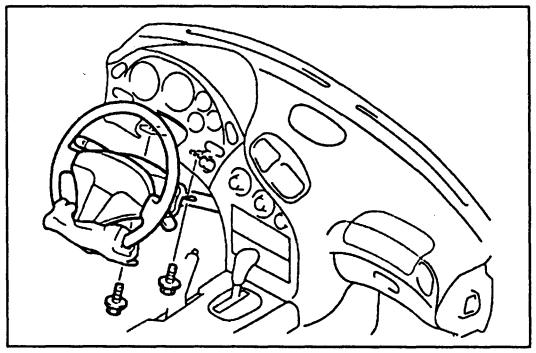
Side wall
(driver side)
1. Remove the installation fastener.
2. Pull the side wall forward disengage the clips from the body.



(passenger side)
1. Remove the installation fastener.
2. Pull the side wall forward disengage the clips from the body.



Side panel
Pull the rear of the side panel forward to disengage the clips from the body.



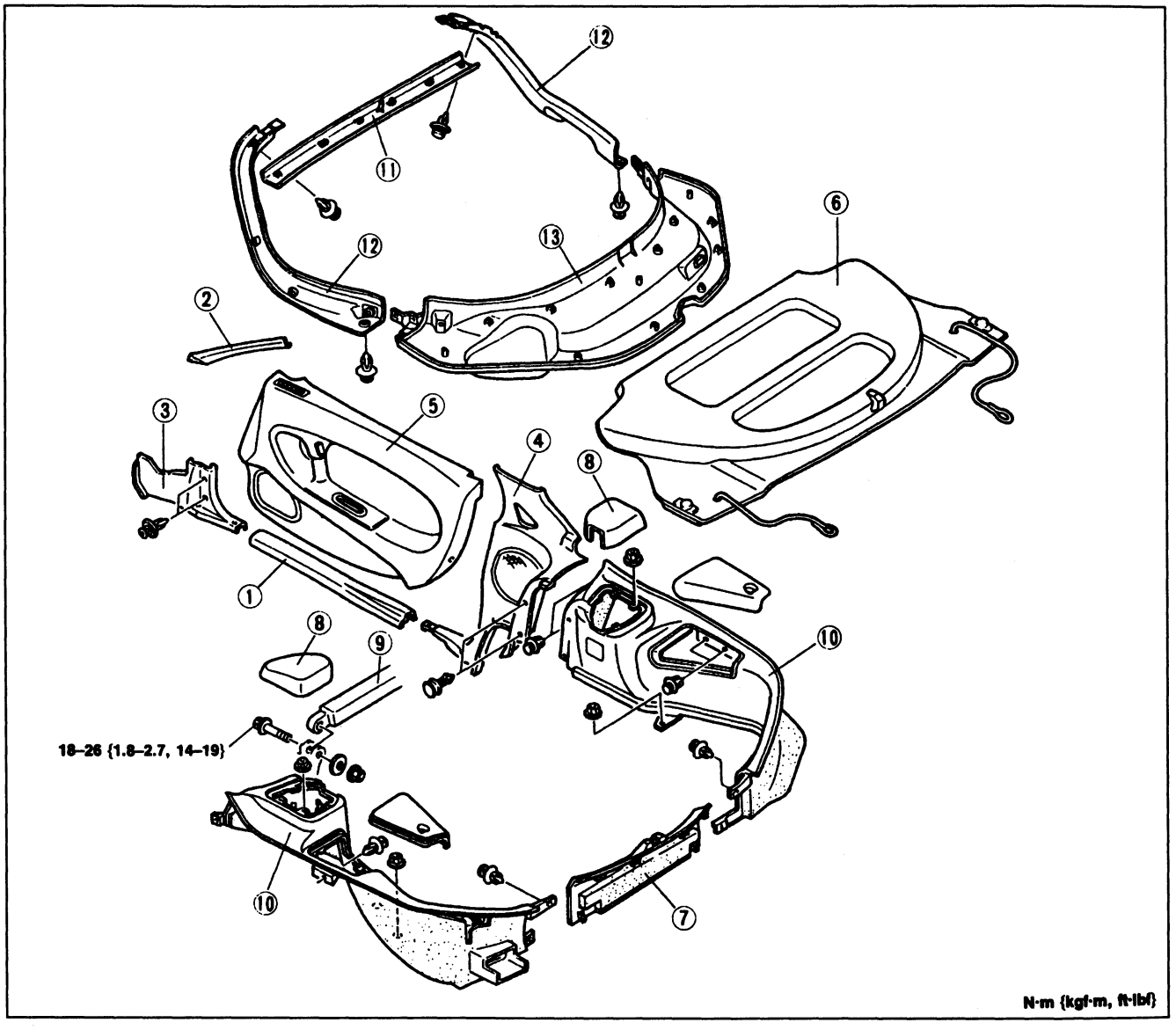
Steering shaft
1. Protect the steering wheel with a clean rag.
2. Remove the steering shaft mounting bolts to lower the shaft.

TRIM

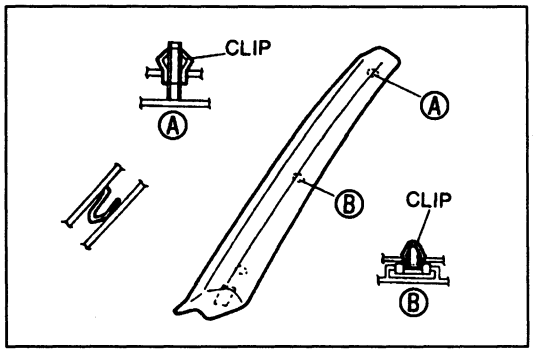
COMPONENTS

Removal / Installation

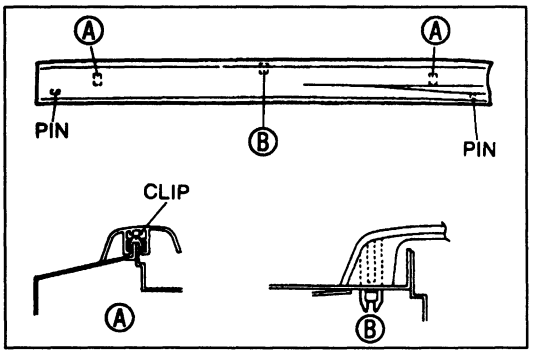
1. Remove in the order shown in the figure, referring to **Removal Note**. To remove the trunk end trim and trunk side trim, remove the acoustic wave guide assembly. (Refer to the 1994 RX-7 Body Electrical Troubleshooting Manual, section J1.)
2. Install in the reverse order of removal.



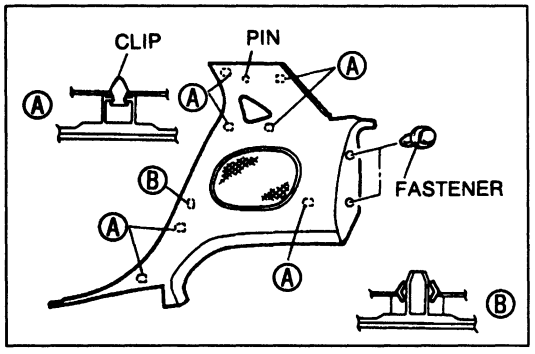
1. Scuff plate
   Removal Note ..... page S–56
2. A-pillar trim
   Removal Note ..... page S–56
3. Front side trim
4. Quarter trim
   Removal Note ..... page S–56
5. Door trim
   Removal Note (driver side) .... page S–56
   Removal Note
   (passengerside) ..... page S–57
6. Rear package tray
7. Trunk end trim
   Removal Note ..... page S–57
8. Suspension tower cover
9. Suspension rear strut bar
10. Trunk side trim
11. Rear hatch upper trim
    Removal Note ..... page S–57
12. Rear hatch side trim
    Removal Note ..... page S–57
13. Rear hatch lower trim
    Removal Note ..... page S–58



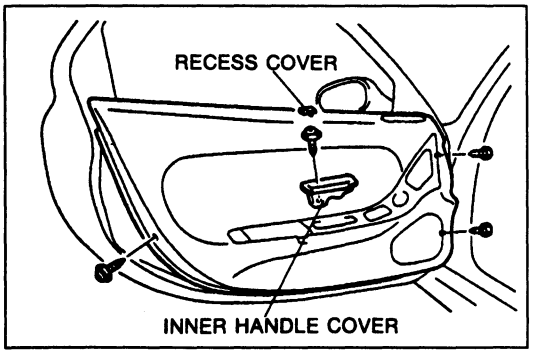
Removal Note
A-pillar trim
1. Remove the seaming welt.
2. Pull the A-pillar trim to disengage the clips from the body.
3. Pull the A-pillar trim up to remove it.



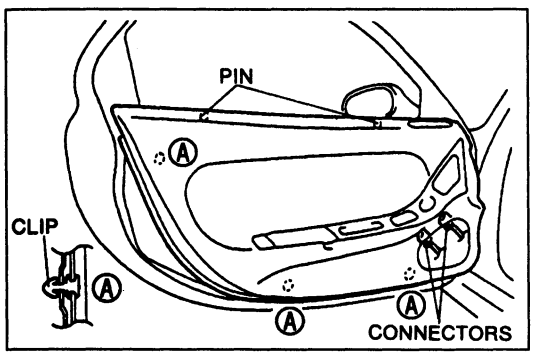
Scuff plate
Pull the scuff plate up to disengage the clips from the body.



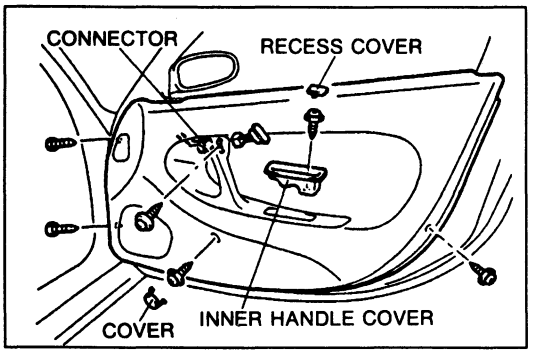
Quarter trim
1. Remove the scuff plate.
2. Remove the seaming welt.
3. Remove the seat belt lower anchor. (Refer to page S-62.)
4. Remove the installation screw and fasteners.
5. Pull the quarter trim to disengage the clips from the body.



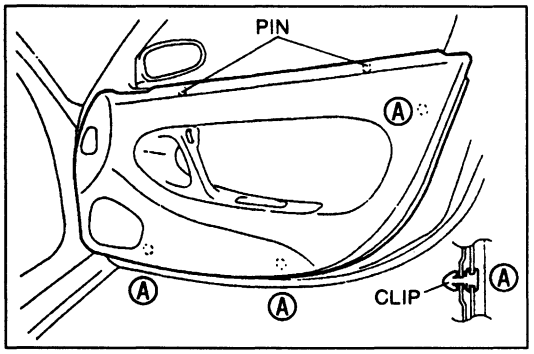
Door trim
(driver side)
1. Remove the recess cover and the installation screw.
2. Remove the inner handle cover.
3. Remove the door trim installation screws.



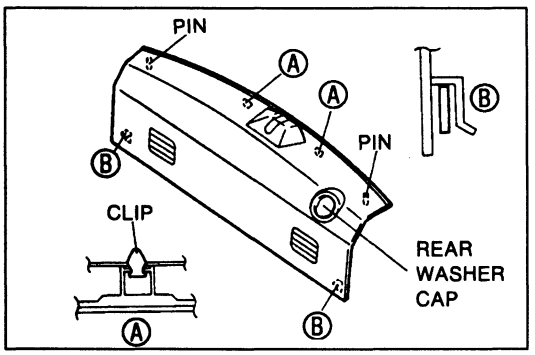
4. Pull the door trim to disengage the clips from the body.
5. Lift the door trim up to remove it.
6. Disconnect the harness connectors.



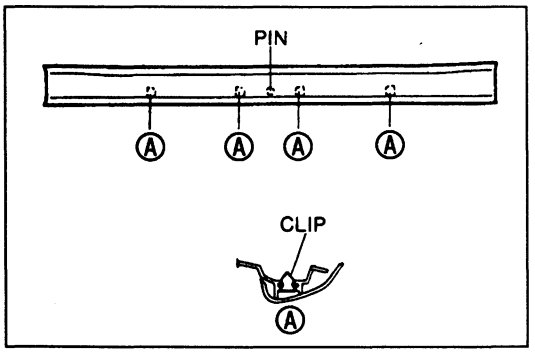
(passenger side)
1. Remove the recess cover and the installation screw.
2. Remove the inner handle.
3. Disconnect the harness connector.
4. Remove the cap and door trim mounting screws.



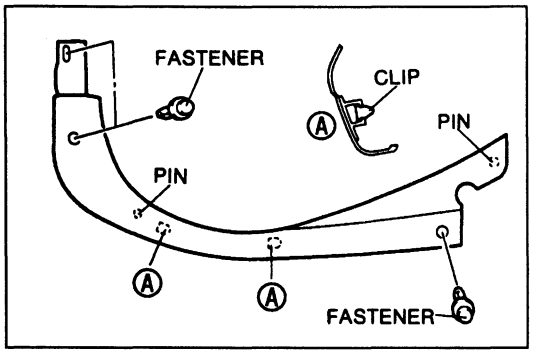
5. Pull the door trim to disengage the clips from the body.
6. Lift the door trim up to remove it.



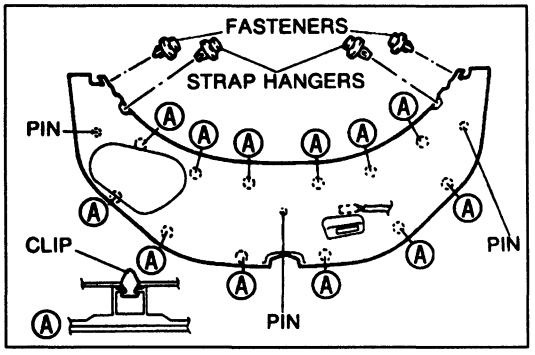
Trunk end trim
1. Remove the rear washer cap.
2. Remove the installation fasteners.
3. Pull the trunk end trim to disengage the clips from the body.
4. Lift the trunk end trim up to remove it.



Rear hatch upper trim
1. Remove the installation fasteners.
2. Pull the rear hatch upper trim to disengage the clips from the body.



Rear hatch side trim
1. Remove the rear hatch upper trim.
2. Remove the fasteners.
3. Pull the rear hatch side trim to disengage the clips from the body.



Rear hatch lower trim

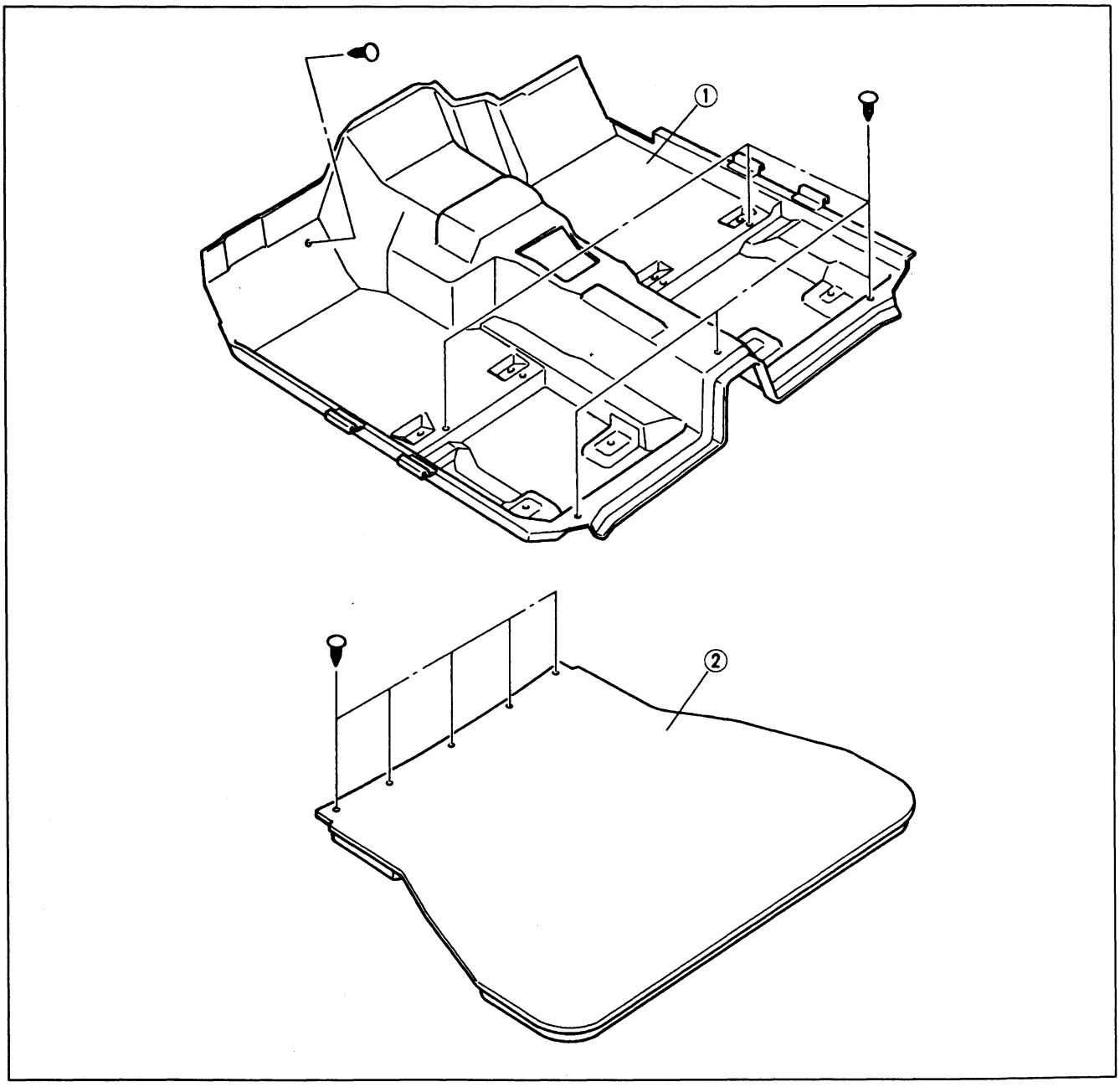
1. Remove the rear hatch side trim (page S-57).
2. Rotate the strap hangers 90° and remove them.
3. Remove the fasteners.
4. Pull the rear hatch lower trim to disengage the clips from the body.

FLOOR COVERING

COMPONENTS

Removal / Installation

1. Disconnect the negative battery cable.
2. Remove the following:
   a. Seats (Refer to page S-64.)
   b. Scuff plates (Refer to page S-55.)
   c. Seat belt lower anchor (Refer to page S-62.)
   d. Quarter trim (Refer to page S-55.)
   e. Storage compartment (Refer to page S-67.)
   f. Dashboard and console (Refer to page S-53.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.



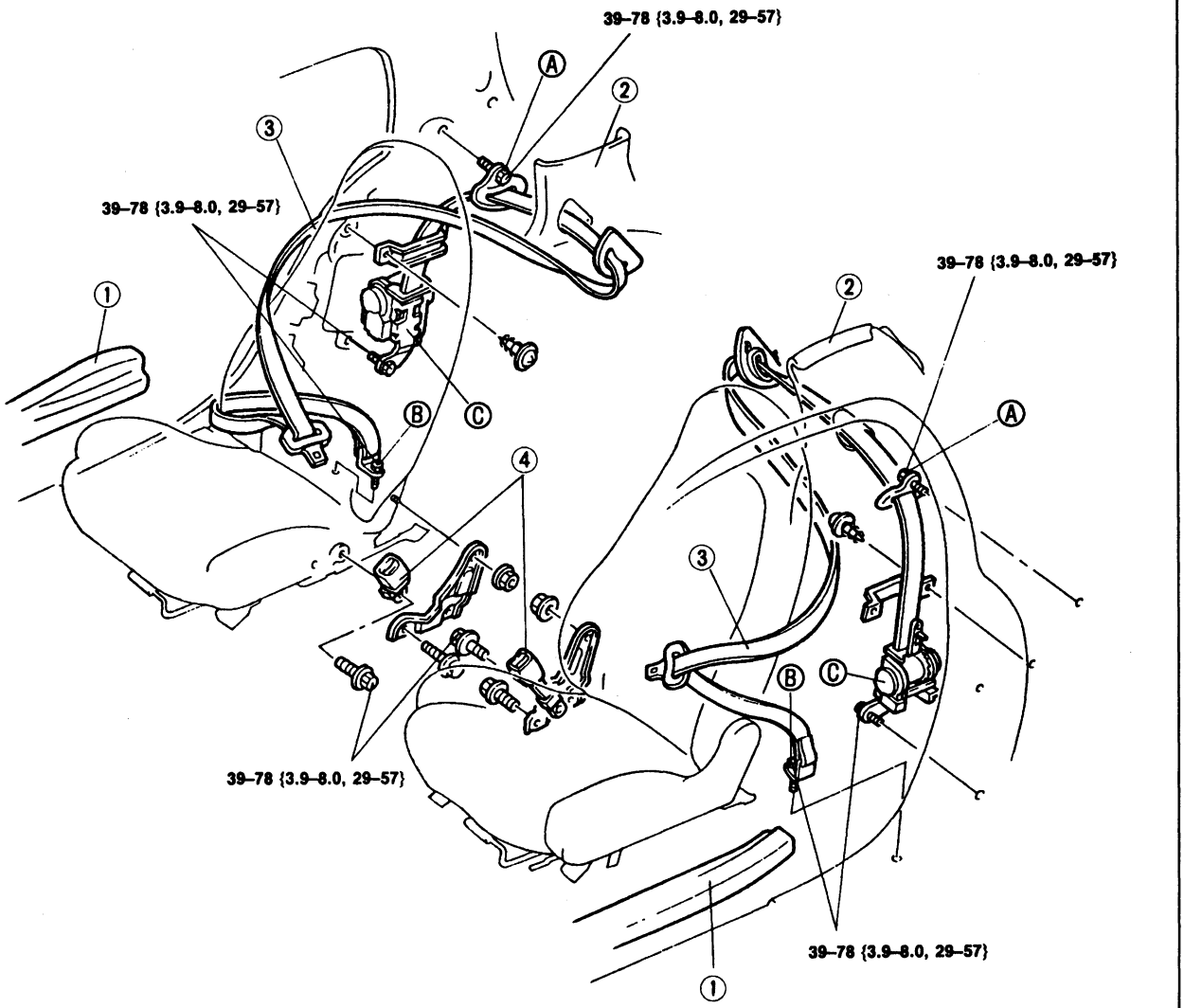
1. Cabin carpet
2. Trunk carpet

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 retractor.**

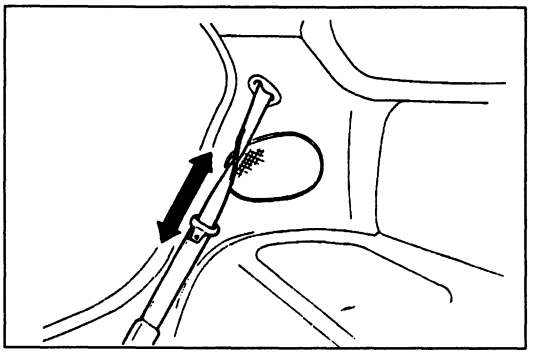
1. Removal in the order shown in the figure.
2. Install in the reverse order of removal.



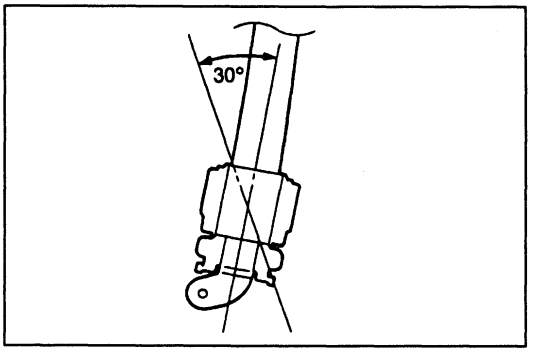
1. Scuff plate
   Removal / Installation ..... page S–55
2. Quarter trim
   Removal / Installation ..... page S–55
3. Seat belt assembly
   A. Upper anchor
   B. Lower anchor
   C. Retractor
   Inspection ..... page S–63
4. Buckle

SEAT BELT

Inspection
Webbing and fittings
1. Inspect the webbing for scars and tears.
2. Inspect the fittings for deformation.
3. If any problem is found, replace the seat belt assembly.



Emergency locking retractor (ELR)
1. Pull out the seat belt slowly and then release it. Verifythat it returns smoothly.
2. Verify that the retractor locks when the belt is quickly pulled.



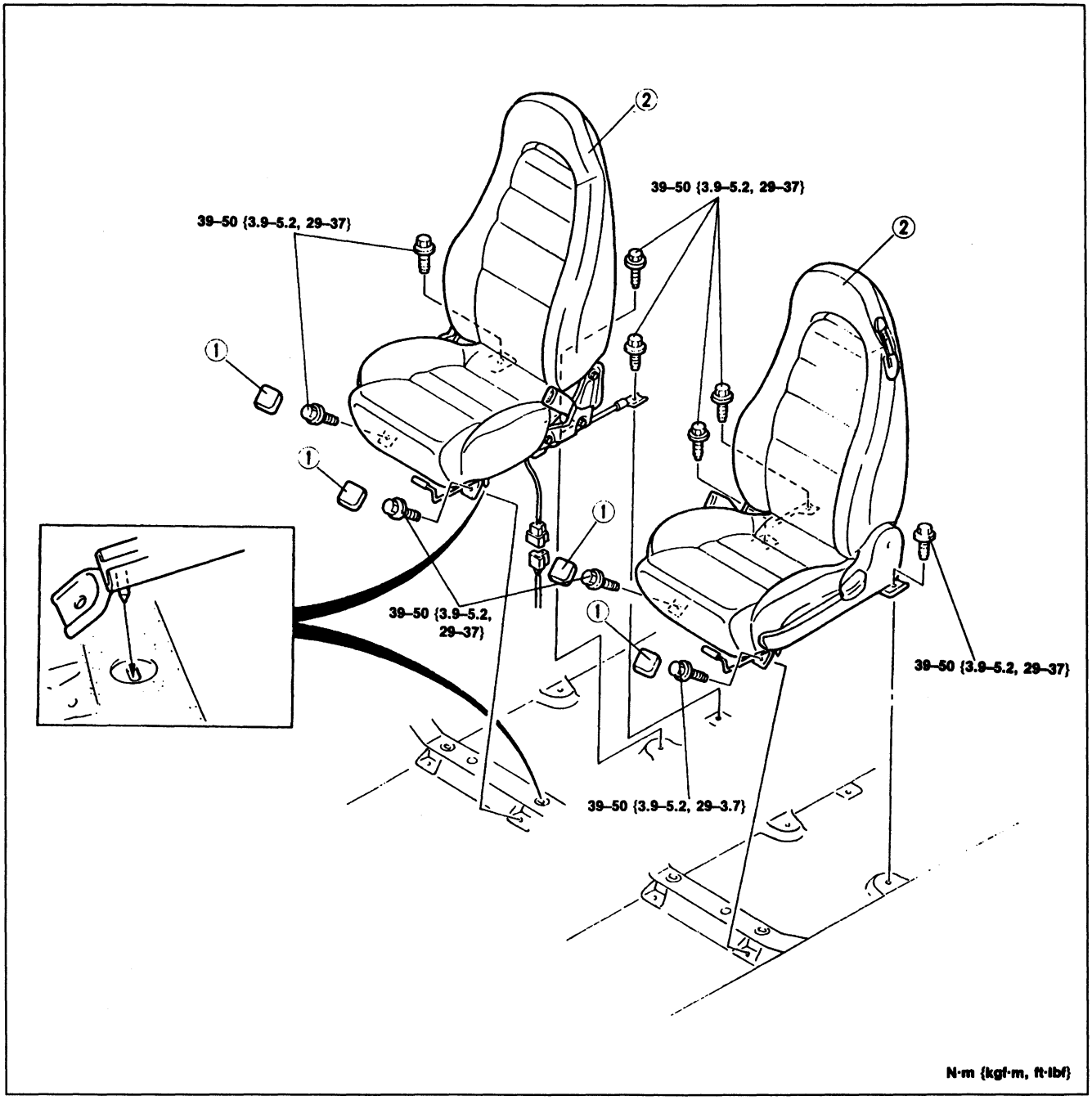
3. Remove the retractor.
4. Hold the retractor as it would be installed.
5. Slowly incline the retractor while pulling out the belt.
6. Verify that the retractor locks at angle of approximatcly **30 degrees**.
7. If not as specified, replace the seat belt assembly.

SEAT

COMPONENTS

Removal / Installation

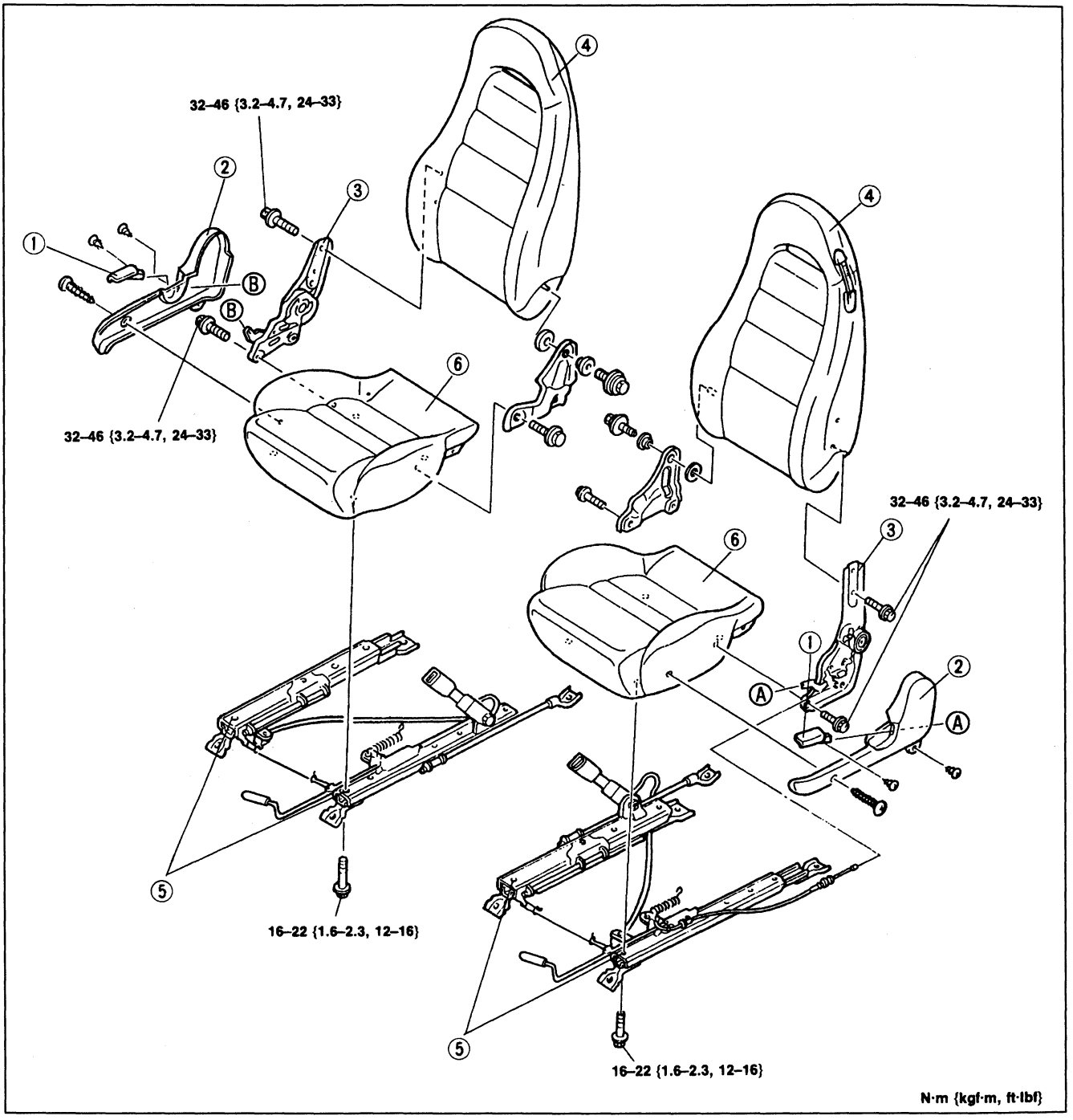
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.



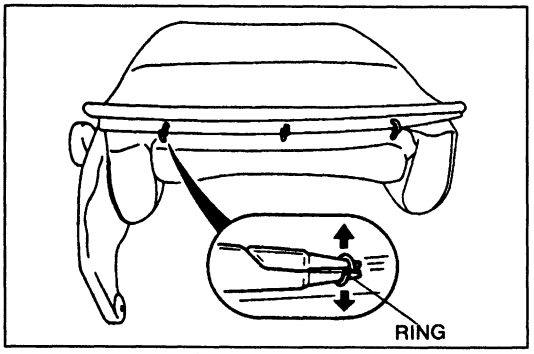
1. Adjuster cover
2. Seat
   Disassembly / Assembly ..... page S–65

Disassembly / Assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly.

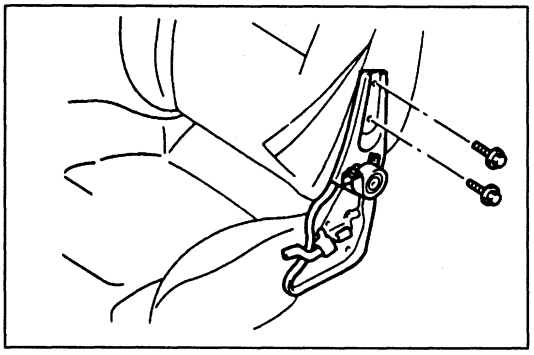


1. Knuckle knob
2. Knuckle cover
3. Recliner knuckle
   Disassembly Note ..... page S–66
4. Seat back
5. Slide adjuster
6. Seat cushion



Disassembly Note
Recliner knuckle

1. Remove the hog rings from the seat back.



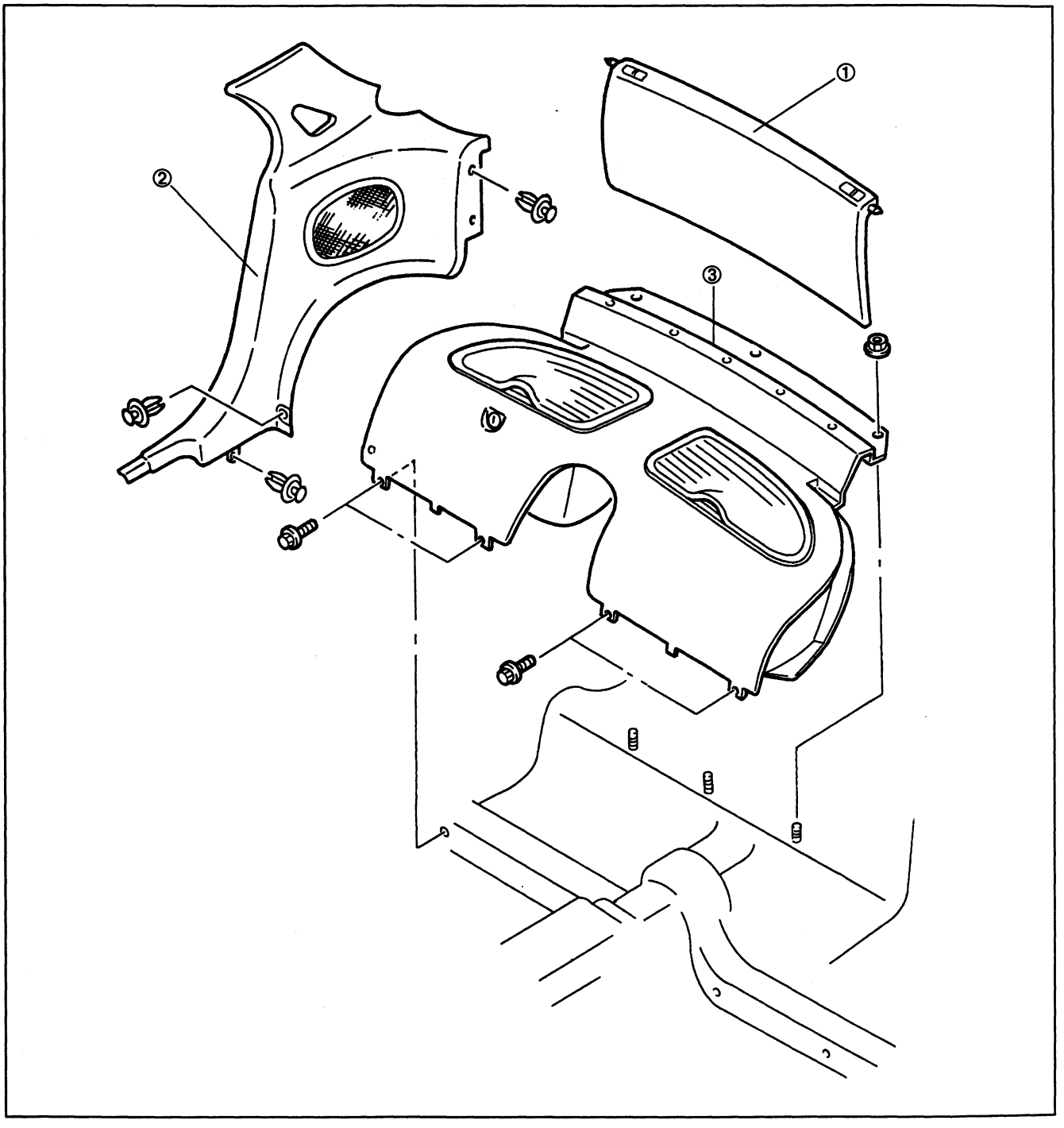
2. Turn over the seat back cover to reveal the recliner knuckle mounting bolts.
3. Remove the mounting bolts and the recliner knuckle.

STORAGE COMPARTMENT

COMPONENTS

Removal / Installation

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



1. Luggage compartment panel
2. Quarter trim
   Removal / Instllation S-55
3. Storage compartment

SPECIAL TOOLS

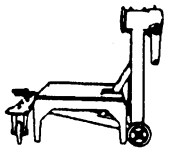
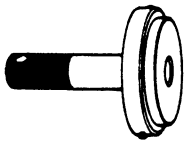
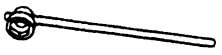
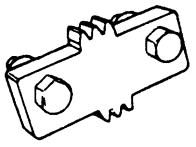
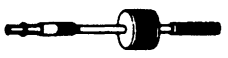
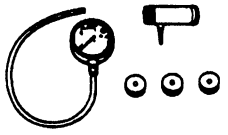
GENERAL INFORMATION

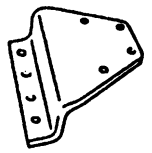
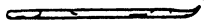
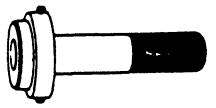
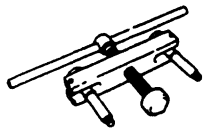
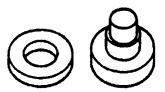
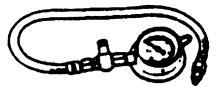
The letters A and B in the priority column indicate the degree of importance of each tool.
A . . . Indispensable
The tools ranked A in this list are indispensable for performing operations satisfactorily, easily, safely, and efficiently. It is, therefore advisable that all service shops have these tools.
B . . . Selective
The tools in this list are not as necessary as tools ranked A, but all service shops should have these tools to perform repairs more easily and more efficiently.

Note

- When ordering tool sets which consist of several tools, check the list in the Special Service Tools Booklet (4063-12-87J) etc. to make sure that some tools are duplicated in other sets which may already have been purchased. If so, order only those new tools which are needed.

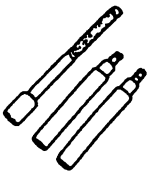
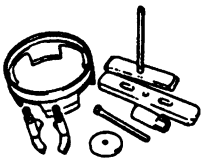
ENGINE

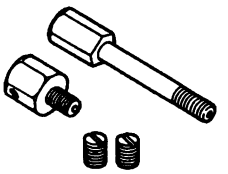
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0107 680A Engine stand	A	
49 0813 215A Puller, tubular dowel & A/T oil pump	A	
49 0813 250 Seal case	B	
49 0813 240 Installer & puller, rotor bush	A	
49 0820 035 Box wrench, flywheel	A	
49 F011 101 Brake, ring gear (Manual transmission)	A	
49 1285 071 Puller, bearing	A	
49 2113 010B Gauge set, air pump	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 1114 005 Hanger, engine stand	A	
49 0813 225 Remover, oil seal	B	
49 0813 235 Puller & installer, main bearing	A	
49 0839 165 Gauge, corner seal	A	
49 1881 055A Stopper, counter weight (Automatic transmission)	A	
49 0839 305A Puller, counter weight	A	
49 F011 1A1 Installer set, bearing	A	
49 0187 280 Oil pressure gauge	B	

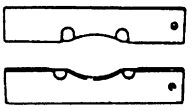
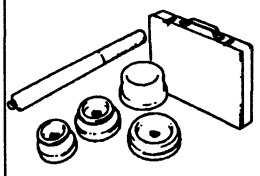
ST

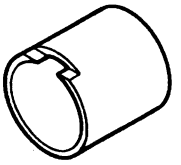
AUTOMATIC TRANSMISSION (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 L019 001 Bolt	A	
49 G019 0A7A Compressor set, return spring	A	

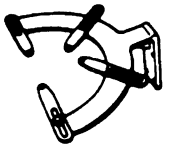
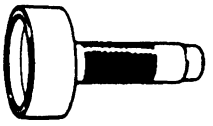
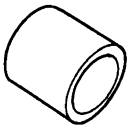
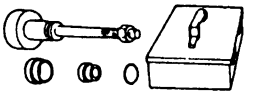
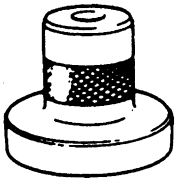
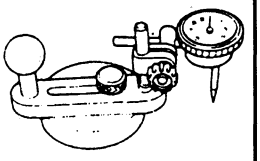
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F019 0A0 Adapter set	A	

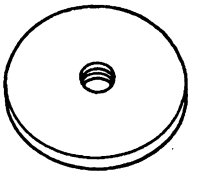
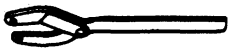
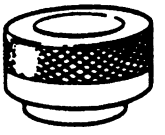
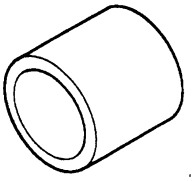
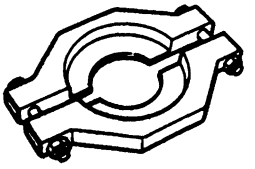
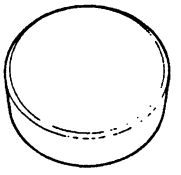
FRONT AND REAR AXLES

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F026 103 Puller, wheel hub	A	
49 G033 105 Attachment	A	
49 F027 0A1 Installer set, bearing	A	

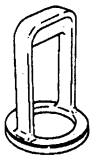
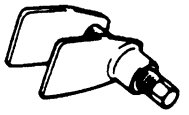
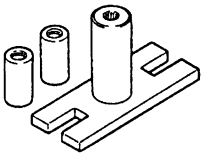
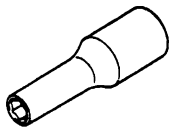
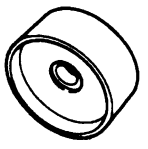
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 H034 201 Support block	A	
49 G033 102 Handle	A	

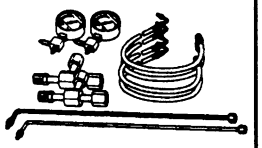
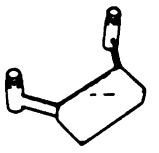
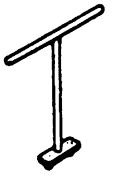
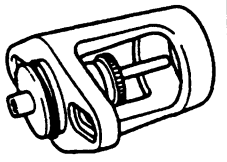
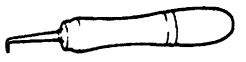
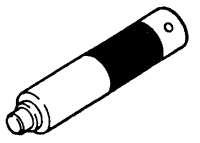
DIFFERENTIAL

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 M005 561 Hanger, diff. carrier	A	
49 B001 795 Installer, oil seal	A	
49 F027 0A0 Gauge set, pinion height adjustment	A	
49 J027 002 Collar	A	
49 8531 565 Pinion model	A	
49 V001 795 Installer, oil seal	A	
49 0727 570 Pinion height gauge	A	

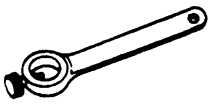
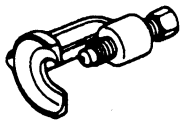
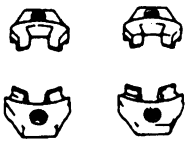
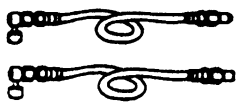
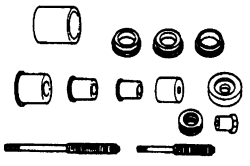
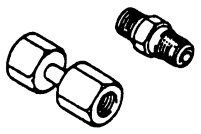
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G030 338 Attachment E	A	
49 J027 001 Installer, bearing	A	
49 S120 710 Holder, coupling flange	B	
49 UB71 525 Installer, bearing	A	
49 U027 003 Installer, oil seal	A	
49 H027 002 Remover, bearing	A	
49 0660 555 Gauge block	A	

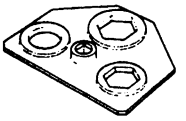
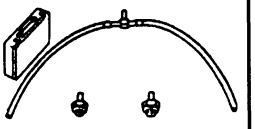
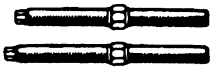
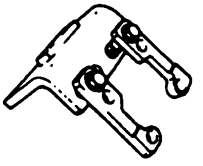
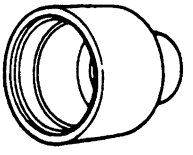
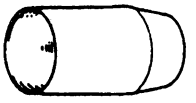
BRAKING SYSTEM

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0259 770B Wrench, flare nut	A	
49 F026 104 Installer, sensor rotor	A	
49 0221 600C Expand tool, disc brake	B	
49 E043 003 Turning lock tool	A	
49 B043 004 Socket wrench	A	
49 H028 204 Attachment	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 U043 0A0 Gauge set, oil pressure	A	
49 F033 001 Stopper, disc brake piston	A	
49 FA18 602 Wrench, disc brake piston	B	
49 B043 001 Adjust gauge	A	
49 0208 701A Boot air out tool	B	
49 B043 002 Installer, bearing	A	

STEERING SYSTEM AND SUSPENSION

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0180 510B Attachment, preload measuring	A	
49 0118 850C Puller, ball joint	A	
49 0223 640B Arm, coil spring compressor	A	
49 1232 670A Gauge set, power steering	A	
49 H002 671 Adapter, power steering gauge	A	
49 F034 2A0 Replacer set, rubber bush	A	
49 H032 322 Adapter set, power steering	A	
49 W023 585A Adjust wrench	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F032 313 Wrench	A	
49 G032 3A1 Joint hose	A	
49 0370 641 Screw, coil spring compressor	A	
49 F032 305 Handle	A	
49 F032 303 Handle	A	
49 F032 301 Hanger, power steering pump	A	
49 1243 785 Installer, boot	A	
49 F032 310 Protector	A	

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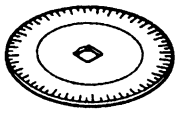
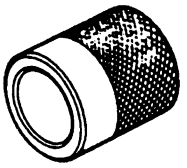
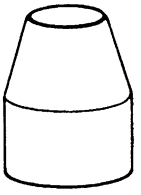
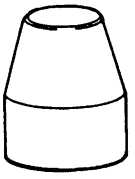
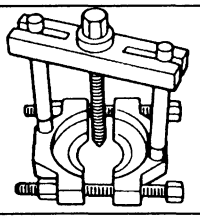
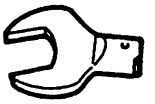
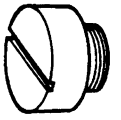
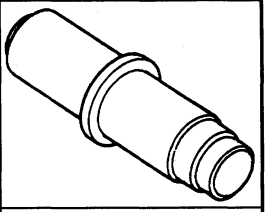
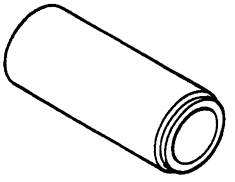
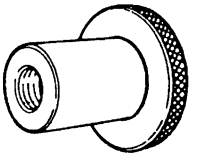
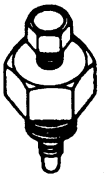
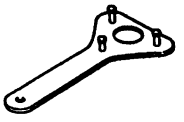
STEERING SYSTEM AND SUSPENSION (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 D032 316 Protractor	A	
49 H032 328 Seal ring former	A	
49 F034 210 Guide, clip	A	
49 F034 211 Guide, clip	A	
49 0710 520 Puller, bearing	A	
49 F032 304 Body	A	

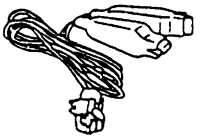
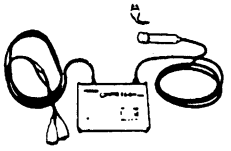
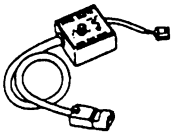
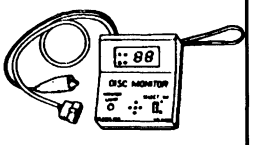
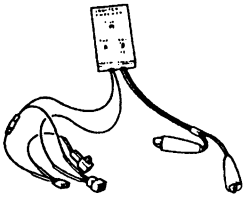
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 H032 301 Wrench	A	
49 F032 306A Body	A	
49 F032 317 Remover, oil seal	A	
49 F032 318 Installer, bearing and oil seal	A	
49 F032 319 Installer, oil seal	A	
49 L033 102 Adapter, caster, camber gauge	A	

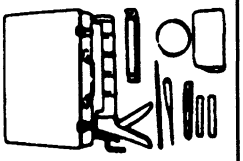
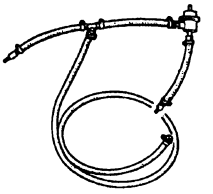
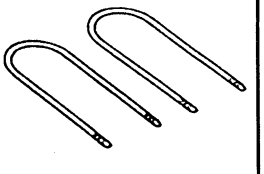
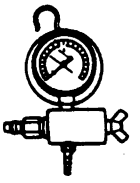
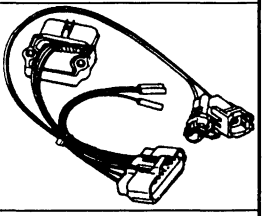
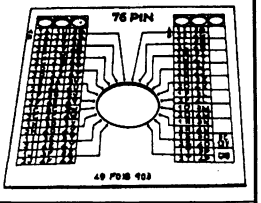
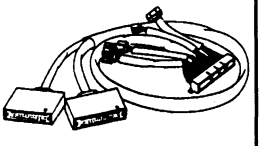
HEATER AND AIR CONDITIONER SYSTEMS

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
4992-02-020 Pressure plate remover	A	

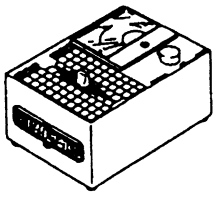
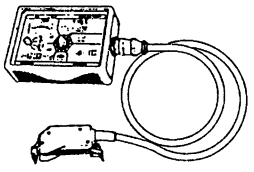
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 L061 001 Stopper, magnetic clutch	A	

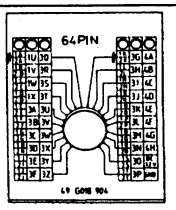
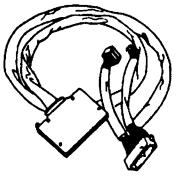
CHECKER AND OTHER EQUIPMENT

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0839 285 Checker, fuel thermometer	A	
49 L018 901 Injector checker	A	
49 F018 9A0 Compression tester	A	
49 H066 002 Deployment tool	A	
49 B019 9A0 System selector	A	
49 H066 003 Adapter harness	A	
49 H018 9A1 Self-diagnosis checker	A	
49 F018 002 Igniter checker	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0305 870A Tool set, window (bond type)	A	
49 F013 102 Hose, injector checker	A	
49 UN01 050 Removing tool	A	
49 H080 740 Pressure tester	A	
49 F018 003 Adapter harness	A	
49 F018 903 Sheet	A	
49 F018 902 Adapter harness	A	
49 G050 1A0 Remover, sealant	A	

CHECKER AND OTHER EQUIPMENT (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 9200 162 A Monitor, engine signal	A	
49 9200 164 ABS tester	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G018 904 Sheet (EC-AT) Except CANADA	A	
49 H019 905 Adapter harness (EC-AT) Except CANADA	A	

TECHNICAL DATA

C. ENGINE

Item \ Engine					13B (Turbo)
Type					Rotary engine
Displacement				ml {cc, cu in}	654 {654, 40.0} × 2
Number of rotors and arrangement					2 rotors, longitudinal
Combustion chamber type					Bathtub
Compression ratio					9.0: 1
Port timing	Intake	Open	Primary		45° BTDC
			Secondary		32° BTDC
		Close	Primary		50° ABDC
			Secondary		50° ABDC
	Exhaust	Open			75° BBDC
		Close			48° ATDC
Compression pressure kPa {kgf/cm^2, psi}-rpm		Minimum			686 {7.0, 100}-250
		Maximum difference between chambers			147 {1.5, 21}-250
Side housing (Front, intermediate and rear housing)		Distortion limit		mm {in}	0.04 {0.002}
		Side seal wear limit		mm {in}	0.10 {0.004}
		Side seal wear limit, overlapping oil seal wear		mm {in}	0.01 {0.0004}
		Side seal wear limit, outside oil seal wear		mm {in}	0.10 {0.004}
		Oil seal wear limit		mm {in}	0.02 {0.0008}
Rotor housing		Width		mm {in}	80 {3.1}
		Maximum width difference		mm {in}	0.06 {0.0024}
Rotor		Width (Apex)		mm {in}	79.675 {3.1368}
		Clearance of side housing to rotor		mm {in}	Standard: 0.12–0.21 {0.0048–0.0082}; Min.: 0.10 {0.0039}
		Diameter of corner seal groove		mm {in}	11.000–11.018 {0.4331–0.4338}
		Width of side seal groove		mm {in}	0.714–0.739 {0.0281–0.0291}
		Width of apex seal groove		mm {in}	1.995–2.012 {0.0785–0.0792}
Apex seal and spring		Width		mm {in}	2.0 {0.079}
		Height (upper and lower)		mm {in}	Standard: 8.5 {0.33}; Min.: 6.5 {0.256}
		Clearance of apex seal and rotor groove		mm {in}	Standard: 0.051–0.101 {0.002–0.039}; Max.: 0.15 {0.0059}
		Spring free height	Long	mm {in}	Standard: 6.25 {0.246}; Min.: 3.5 {0.138}
			Short	mm {in}	Standard: 3.3 {0.130}
Side seal and spring		Thickness		mm {in}	0.661–0.686 {0.0260–0.0270}
		Clearance of side seal to rotor groove		mm {in}	Standard: 0.028–0.078 {0.0011–0.0030}; Max.: 0.10 {0.0039}
		Height		mm {in}	3.0 {0.118}
		Protrusion min.		mm {in}	0.50 {0.020}
		Clearance of side seal to corner seal		mm {in}	Standard: 0.05–0.15 {0.0020–0.0059}; Max.: 0.40 {0.016}
Corner seal and spring		Outer diameter		mm {in}	10.990–11.014 {0.4327–0.4336}
		Height		mm {in}	7.0 {0.276}
		Protrusion min.		mm {in}	0.50 {0.020}
Rotor oil seal and spring		Height		mm {in}	5.6–5.8 {0.220–0.228}
		Oil seal lip width max.		mm {in}	0.50 {0.020}
		Protrusion min.		mm {in}	0.50 {0.020}
Main bearing		Inner diameter		mm {in}	43.025–43.050 {1.6939–1.6949}
Rotor bearing		Inner diameter		mm {in}	74.025–74.050 {2.9144–2.9153}

Item			Engine 13B (Turbo)
Eccentric shaft	Runout max. mm {in}		0.06 {0.0024}
	End play mm {in}	Standard	0.040–0.070 {0.0016–0.0027}
		Limit	0.09 {0.0035}
	Main journal diameter mm {in}		43 {0.37}
	Clearance of main journal mm {in}	Standard	0.08–0.11 {0.0032–0.0043} . . . outside 0.06–0.08 {0.0024–0.0031} . . . inside
		Limit	0.13 {0.0051} . . . outside 0.11 {0.0043} . . . inside
	Rotor journal diameter mm {in}		74 {2.9}
	Clearance of rotor journal mm {in}	Standard	0.060–0.080 {0.0024–0.0031}
		Limit	0.10 {0.0039}
Drive belt deflection at 98 N {10 kgf, 22 lbf} mm {in}	Alternator and Air pump	Used	7.0–7.5 {0.28–0.29}
	P/S pump and A/C compressor	Used	4.5–5.0 {0.18–0.19}

D. LUBRICATING SYSTEM

Item			Engine 13B (Turbo)
Lubrication system			Forced-fed
Oil pump	Type		Trochoid
	Lobe clearance of outer rotor to inner rotor mm {in}	Standard	0.03–0.12 {0.0012–0.0047}
		Max.	0.15 {0.0059}
	Clearance of outer rotor to pump body mm {in}	Standard	0.20–0.25 {0.0079–0.0098}
		Max.	0.30 {0.0118}
	End float mm {in}	Standard	0.03–0.125 {0.0012–0.0049}
		Max.	0.15 {0.0059}
Pressure control valve	Relief pressure kPa {kgf/cm^2, psi}		1,080 {11.0, 156}
Oil cooler	Type		Air-cooled, with bypass valve
	Relief temperature °C {°F}		60–65 {140–149} or below
	Relief pressure dif. kPa {kgf/cm^2, psi}		349 {3.56, 50} at 60°C {140°F}
	Bypass valve protrusion mm {in}		6 {0.24} min.
Regulator valve	Relief pressure kPa {kgf/cm^2, psi}		490 {5.0, 71}
Oil filter	Type		Full flow, paper element
	Relief pressure dif. kPa {kgf/cm^2, psi}		98 {1.0, 14}
Eccentric shaft bypass valve	Relief temperature °C {°F}		60 {140} or below
	Protrusion mm {in}		6 {0.24} or more
Engine oil	Total (Dry engine) L {US qt, Imp qt}		4.9 {5.2, 4.3} *5.4 {5.7, 4.8}
	Oil replacement L {US qt, Imp qt}		3.6 {3.8, 3.2}
	Oil replacement (with oil filter) L {US qt, Imp qt}		3.8 {4.0, 3.3}
	Oil filter L {US qt, Imp qt}	Factory installed	0.19 {0.20, 0.17}
		Service part	0.17 {0.18, 0.15}
	Grade		API Service SG, SH (EC II) ILSAC (Mineral oil only)
	Above −25°C {−10°F}		10W-30
	Below 0°C {32°F}		5W-30

* R1 model

E. COOLING SYSTEM

Item \ Engine			13B (Turbo)		
Cooling method			Water-cooled, forced circulation		
Water pump	Type		Centrifugal		
	Pulley ratio (Speed)		1: 1.22		
Thermostat	Type		Wax, bottom bypass		
	Opening temperature	°C {°F}	80.5–83.5 {177–182}		
	Full-open temperature	°C {°F}	95 {203}		
	Full-open lift min.	mm {in}	8–10 {0.31–0.39}		
Radiator	Type		Corrugated fin		
Coolant filler cap	Relief pressure	kPa {kgf/cm², psi}	115–145 {1.15–1.45, 16.4–20.6}		
Coolant fan	Type		Electrical		
	Capacity	W	160 × 2		
	Number of blades		No1: 5, No2: 4		
	Outer diameter	mm {in}	300 {11.8}		
Drive belt deflection at 98 N {10 kgf, 22 lbf} mm {in}	Alternator and air pump	Used	7.0–7.5 {0.28–0.29}		
Coolant	Capacity	L {US qt, Imp qt}	8.8 {9.3, 7.7}		
Antifreeze solution	Mixture Protection		Mixture percentage % Water	Mixture percentage % Antifreeze	Specific gravity at 20°C {68°F}
	Above −16°C {3°F}		65	35	1.054
	Above −26°C {−15°F}		55	45	1.066
	Above −40°C {−40°}		45	55	1.078

F. FUEL AND EMISSION CONTROL SYSTEMS

Item			Specification
Idle speed*		rpm	700–750
Ignition timing	Leading	ATDC	5°
	Trailing	ATDC	20°
Air cleaner housing			
Element type			Oil permeated
Throttle body			
Type			Horizontal draft (2 stage-3 barrel)
Throat diameter	Primary	mm {in}	45 {1.772}
	Secondary	mm {in}	50 {1.969} × 2
Dashpot touch angle			8
Water thermovalve operation (full open) temperature		°C {°F}	55–65 {131–149} or more
Charge air cooler			
Type			Air cooled
Core size {w × h × t}		mm {in}	294 × 114 × 65 {11.575 × 4.4882 × 2.5591}
Turbocharger			
System type			Sequential twin turbocharged
Cooling method			Water + engine oil
Boost control actuator			Turbo precontrol + wastegate control
Boost control method			Solenoid valve (duty-controled) × 2
Fuel filter			
Type	Low-pressure		Nylon element
	High-pressure		Paper element
Pressure regulator			
Type			Diaphragm
Regulated pressure		kPa {kgf/cm², psi}	250–260 {2.5–2.6, 35.6–37.0}

* TEN terminal of data link connector grounded

Item			Specification
Fuel pump			
Type			Impeller (In tank)
Output pressure		kPa {kgf/cm^2, psi}	490–740 {5.0–7.5, 71.1–106.7}
Injector			
Type			Side-feeding
Injection volume	Primary	ml {cc, fl oz}/min	550 {550, 165}
	Secondary	ml {cc, fl oz}/min	850 {850, 255}
Three-way catalyst			
Type	Warm-up three-way catalyst		Metal
	Three-way catalyst		Monolithic
Air pump			
Capacity		cm^3 {cc}/rev	375 {375}
Output		L/min	MT 130–200, AT 160–200
Fuel			
Specification			Unleaded premium (RON95 or higher)

G. ENGINE ELECTRICAL SYSTEM

Item \ Transmission				MT	AT
Voltage			V	12, negative ground	
Battery	Type and capacity (5-hour rate)			65D23L (43Ah)	75D26L (52Ah)
Ignition system	Spark timing (TEN terminal grounded)			Leading : ATDC 5° (BTDC – 5°) Trailing : ATDC 20° (BTDC – 20°) at idle (AT: P range)	
	Spark advance			Electronic spark advance (ESA)	
	Spark plug	Type	Leading	NGK: BUR7EQP*1, BUR6EQP, BUR7EQ, BUR6EQ	
			Trailing	NGK: BUR9EQ*1, BUR8EQP, BUR9EQP, BUR8EQ	
		Plug gap	mm {in}	1.1–1.7 {0.044–0.066}	
Alternator	Output		V-A	12–100	
	Regulated voltage		V	14.1–14.7 (With temperature gradient characteristics)	
	Brush length	Standard	mm {in}	21.5 {0.846}	
		Minimum	mm {in}	8.0 {0.315}	
Stater	Type			Direct	Reduction
	Output		V-kW	12–1.2	12–2.0
	Output (no load)	Voltage	V	11	
		Current	A	Max 90	
		Speed	rpm	Min 3000	Min 2200
	Brush length	Standard	mm {in}	17.5 {0.689}	18 {0.71}
		Minimum	mm {in}	12 {0.47}	11 {0.43}

*1 Standard plug

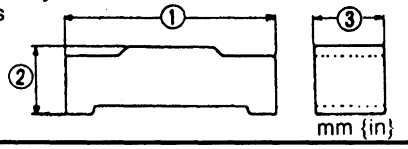
H. CLUTCH

Item \ Transmission		R15M-D
Clutch control		Hydraulic
Clutch pedal		
Type		Suspended
Pedal ratio		6.35
Full stroke	mm {in}	135 {5.32}
Height (with carpet)	mm {in}	165.5–177.0 {6.516–6.968}
Free play	mm {in}	0.6–3.2 {0.02–0.13}
Distance from carpet when clutch is fully disengaged	mm {in}	48 {1.9} min.

Item \ Transmission			R15M-D
Flywheel			
Runout limit		mm {in}	0.2 {0.008}
Clutch disc			
Type			Single dry-plate
Runout limit		mm {in}	0.6 {0.024}
Wear limit		mm {in}	0.3 {0.012} from rivet head
Outer diameter		mm {in}	236 {9.29}
Inner diameter		mm {in}	160 {6.30}
Facing thickness mm {in}	Flywheel side		3.5 {0.14}
	Pressure plate side		3.5 {0.14}
Clutch cover			
Type			Diaphragm spring
Set load		N {kgf, lbf}	7220 {736, 1619}
Clutch master cylinder	Inner diameter	mm {in}	15.87 {0.625}
Clutch release cylinder	Inner diameter	mm {in}	19.05 {0.750}
Clutch fluid			FMVSS116 DOT-3

J. MANUAL TRANSMISSION (R15M-D)

Item \ Engine			13B (Turbo)
Specifications			
Transmission type			R15M-D
Transmission control			Floor shift
Synchronization mechanism			Forward : Synchromesh Reverse : Synchromesh
Gear ratio	1st		3.483
	2nd		2.015
	3rd		1.391
	4th		1.000
	5th		0.719
	Reverse		3.288
Final gear ratio			4.100
Speedometer gear ratio (driven gear/drive gear)			0.304 (23/7)
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}	2.5 {2.6, 2.2}
Runout			
Mainshaft		mm {in}	0.03 {0.0012}
Clearance			
Each gear inner diameter and mainshaft outer diameter		mm {in}	0.15 {0.006}
Each clutch hub sleeve gtoove and shift fork mm {in}		Standard	0.2–0.3 {0.008–0.012}
		Maximum	0.5 {0.020}
Reverse idler gear and shaft mm {in}		Standard	0.02–0.05 {0.0008–0.0020}
		Maximum	0.15 {0.006}
Synchronizer ring (all) and flank surface of gear mm {in}		Standard	1.5 {0.059}
		Minimum	0.8 {0.031}
Control rod lever and shift rod gate		mm {in}	0.8 {0.031}
Thrust plam			
Synchronizer key and synchronizer ring (4th) mm {in}		Standard	0.66–2.0 {0.026–0.079}
		Available thrust washer thick-nesses	2.5 {0.098}, 3.0 {0.118}, 3.5 {0.138}

Item		Engine	13B (Turbo)
Thrust lock washer and C-washers (5th gear thrust play) mm {in}		Standard	0.1–0.2 {0.004–0.008}
		Available thrust lock washer thicknesses	6.2 {0.244}, 6.3 {0.248}, 6.4 {0.252}, 6.5 {0.256}, 6.6 {0.260}, 6.7 {0.264}
C-washers and mainshaft groove mm {in}		Standard	0–0.1 {0–0.004}
		Available C-washer thicknesses	2.9 {0.114}, 3.0 {0.118}, 3.1 {0.122}, 3.2 {0.126}
Clutch housing and main drive gear bearing mm {in}		Standard	0–0.1 {0–0.004}
		Available adjust shim thicknesses	0.3 {0.012}, 0.4 {0.016}, 0.5 {0.020}, 0.6 {0.024}, 0.7 {0.028}
Mainshaft front bearing mm {in}		Standard	0–0.05 {0–0.002}
		Available adjust shim thicknesses	0.1 {0.004}, 0.3 {0.012}
Countershaft front bearing mm {in}		Bearing height	0.9–1.0 {0.035–0.039}
		Available adjust shim thicknesses	0.1 {0.004}, 0.3 {0.012}
Reference			
Detent ball spring	Free length mm {in}		22.5 {0.886}
5th/reverse retaining spring	Free length mm {in}		73.00 {2.874}
Select lock spindle spring	Free length mm {in}		43.25 {1.703}
Synchronizer key dimensions  mm {in}		1st and 2nd	① 18.00 {0.709}, ② 5.45 {0.215}, ③ 6.00 {0.236}
		3rd, 4th, 5th and Reverse	① 17.00 {0.669}, ② 4.25 {0.167}, ③ 5.00 {0.197}

K. AUTOMATIC TRANSMISSION

Item \ Transmission			RB4A-EL
Gear ratio		1st gear	3.027
		2nd gear	1.619
		Third gear	1.000
		Fourth gear	0.694
		Reverse	2.272
Final gear ratio			3.909
Automatic transmission fluid (ATF)	Type		Dexron®II or M-III
	Capacity L {US qt, Imp qt}		8.6 {9.1, 7.6}
Torque converter	Stall torque ratio		2.200
Number of drive plates / driven plates	Reverse clutch		2/2
	High clutch		4/7
	Forward clutch		6/6
	Overrunning clutch		3/5
	Low and reverse brake		7/7
Band servo mm {in}	Servo piston outer dia. / inner dia.		80.0 {3.15} / 50.0 {1.97}
	4GR servo piston outer dia.		72.0 {2.83}
Mechanical system test			
Engine stall speed rpm		D, S, L, R range	3,000–3,300
Time lag sec.		N → D range	Approx. below 1.0
		N → R range	Approx. below 1.2
Line pressure kPa {kgf/cm², psi}	D range	Idle	500–520 {5.0–5.4, 72–76}
		Stall	1,200–1,270 {12.2–13.0, 174–184}
	S range	Idle	500–520 {5.0–5.4, 72–76}
		Stall	1,200–1,270 {12.2–13.0, 174–184}
	L range	Idle	500–520 {5.0–5.4, 72–76}
		Stall	1,200–1,270 {12.2–13.0, 174–184}
	R range	Idle	620–650 {6.3–6.7, 90–95}
		Stall	1,510–1,570 {15.3–16.1, 218–228}
Shift point km/h {MPH}			
POWER	D range	Wide open throttle	$D_1 \rightarrow D_2$ 50–56 {31–35}
			$D_2 \rightarrow D_3$ 103–111 {64–69}
			$D_3 \rightarrow D_4$ 178–188 {111–117}
		Half throttle	$D_1 \rightarrow D_2$ 35–41 {22–25}
			$D_2 \rightarrow D_3$ 81–93 {50–58}
			$D_3 \rightarrow D_4$ 126–144 {78–99}
			Lockup ON (D_3) 94–106 {58–66} (*81–93 {50–58})
			Lockup ON (D_4) 174–192 {108–119} (*126–144 {78–89})
		Closed throttle position	$D_4 \rightarrow D_3$ 39–45 {24–28}
			$D_3 \rightarrow D_2$ 13–19 {8–12}
			$D_2 \rightarrow D_1$ 5–11 {3–7}
		Kickdown (Wide open throttle)	$D_4 \rightarrow D_3$ 142–152 {88–94}
			$D_3 \rightarrow D_2$ 91–99 {57–62}
			$D_2 \rightarrow D_1$ 38–44 {24–27}

Caution
- **Lockup indicates complete lockup.**
- *** mark indicates lockup points when the engine coolant temperature is above 115°C {239°F}.**

Item \ Transmission				RB4A-EL
NORMAL	D range (A/C ON)	Wide open throttle	$D_1 \rightarrow D_2$	50–56 {31–35}
			$D_2 \rightarrow D_3$	103–111 {64–69}
			$D_3 \rightarrow D_4$	178–188 {111–117}
		Half throttle	$D_1 \rightarrow D_2$	32–38 {20–24}
			$D_2 \rightarrow D_3$	80–92 {50–57}
			$D_3 \rightarrow D_4$	126–144 {78–89}
			Lockup ON (D_3)	94–106 {58–66} (*80–92 {50–57})
			Lockup ON (D_4)	174–192 {108–119} (*126–144 {78–89})
		Closed throttle position	$D_4 \rightarrow D_3$	39–45 {24–28}
			$D_3 \rightarrow D_2$	13–19 {8–12}
			$D_2 \rightarrow D_1$	5–11 {3–7}
		Kickdown (Wide open throttle)	$D_4 \rightarrow D_3$	142–152 {88–94}
			$D_3 \rightarrow D_2$	91–99 {57–62}
			$D_2 \rightarrow D_1$	38–44 {24–27}
	D range (A/C OFF)	Wide open throttle	$D_1 \rightarrow D_2$	50–56 {31–35}
			$D_2 \rightarrow D_3$	103–111 {64–69}
			$D_3 \rightarrow D_4$	178–188 {111–117}
		Half throttle	$D_1 \rightarrow D_2$	32–38 {20–24}
			$D_2 \rightarrow D_3$	80–92 {50–57}
			$D_3 \rightarrow D_4$	126–144 {78–89}
			Lockup ON (D_3)	94–106 {58–66} (*80–92 {50–57})
			Lockup ON (D_4)	174–192 {108–119} (*126–144 {78–89})
		Closed throttle position	$D_4 \rightarrow D_3$	35–41 {22–25}
			$D_3 \rightarrow D_2$	13–19 {8–12}
			$D_2 \rightarrow D_1$	5–11 {3–7}
		Kickdown (Wide open throttle)	$D_4 \rightarrow D_3$	142–152 {88–94}
			$D_3 \rightarrow D_2$	91–99 {57–62}
			$D_2 \rightarrow D_1$	38–44 {24–27}
HOLD	D range	—	$D_4 \rightarrow D_3$	180–186 {112–116}
			$D_3 \rightarrow D_2$	7–13 {4–8}
			$D_2 \rightarrow D_3$	15–25 {9–16}
			Lockup ON (D_3)	94–106 {58–66} (*39–51 {24–32})
NORMAL	S range	Wide open throttle	$S_1 \rightarrow S_2$	50–56 {31–35}
			$S_2 \rightarrow S_3$	103–111 {64–69}
		Half throttle	$S_1 \rightarrow S_2$	35–41 {22–25}
			$S_2 \rightarrow S_3$	81–93 {50–58}
			Lockup ON (S_3)	94–106 {58–66} (*81–93 {50–58})
		Closed throttle position	$S_3 \rightarrow S_2$	13–19 {8–12}
			$S_2 \rightarrow S_1$	5–11 {3–7}
		Kickdown (Wide open throttle)	$S_3 \rightarrow S_2$	91–99 {57–62}
			$S_2 \rightarrow S_1$	38–44 {24–27}
HOLD		—	$S_3 \rightarrow S_2$	112–118 {70–73}

Caution
- **Lockup indicates complete lockup.**
- *** mark indicates lockup points when the engine coolant temperature is above 115°C {239°F}.**

Item \ Transmission			RB4A-EL
Forward clutch			
Clutch clearance mm {in}	With new drive / driven plates		0.45–0.85 {0.018–0.033}
	With reusing drive / driven plates		0.45–1.85 {0.018–0.073}
Retaining plate size mm {in}			8.0 {0.315}, 8.2 {0.323}, 8.4 {0.331}, 8.6 {0.339}, 8.8 {0.346}, 9.0 {0.354}, 9.2 {0.362}
Return spring mm {in}		Outer diameter	9.7 {0.38}
		Free length	35.8 {1.41}
Overrunning clutch			
Clutch clearance mm {in}	With new drive / driven plates		1.0–1.4 {0.039–0.055}
	With reusing drive / driven plates		1.0–2.0 {0.039–0.079}
Retaining plate size mm {in}			4.0 {0.157}, 4.2 {0.165}, 4.4 {0.173}, 4.6 {0.181}, 4.8 {0.189}, 5.0 {0.197}, 5.2 {0.205}
Low and reverse brake			
Brake clearance mm {in}	With new drive / driven plates		0.8–1.2 {0.031–0.047}
	With reusing drive / driven plates		0.8–2.6 {0.031–0.102}
Retaining plate size mm {in}			6.2 {0.244}, 6.4 {0.252}, 6.6 {0.260}, 6.8 {0.268}, 7.0 {0.276}, 7.2 {0.283}, 7.4 {0.291}, 7.6 {0.299}, 7.8 {0.307}, 8.0 {0.315}
Return spring mm {in}		Outer diameter	11.6 {0.457}
		Free length	22.3 {0.878}
Low one-way clutch inner race			
Seal ring clearance mm {in}		Standard	0.10–0.25 {0.004–0.010}
		Maximum	0.25 {0.010}
Total end play			
Standard end play mm {in}			0.25–0.55 {0.010–0.022}
Bearing race size mm {in}			0.8 {0.031}, 1.0 {0.039}, 1.2 {0.047}, 1.4 {0.055}, 1.6 {0.063}, 1.8 {0.071}, 2.0 {0.079}
Reverse clutch end play			
Standard end play mm {in}			0.55–0.90 {0.022–0.035}
Thrust washer size mm {in}			0.7 {0.028}, 0.9 {0.035}, 1.1 {0.043}, 1.3 {0.051}, 1.5 {0.059}, 1.7 {0.067}, 1.9 {0.075}
Torque converter distance (A)			
Torque converter distance (A) mm {in}			29.0 {1.14} min.

L. PROPELLER SHAFT

Item \ Transmission		R15M-D
Length	mm {in}	863 {33.98}
Outer diameter	mm {in}	75 {3.0}
Max. permissible runout	mm {in}	0.4 {0.02}

M. FRONT AND REAR AXLES

Item			Specifications
Drive shaft			
Type		Wheel side	BJ (bell joint)
		Differential side	TJ (Tripod joint)
Outer diameter of large boot end	mm {in}	Wheel side	105.3 {4.146}
		Differential side	100.5 {3.957}
Grease amount	g {oz}	Wheel side	100–120 {3.53–4.23}
		Differential side	170–190 {6.01–6.70}
Shaft length*		mm {in}	791.2–801.2 {31.15–31.54}
Front axle			
Bearing play axil direction		mm {in}	0.05 {0.002} max.
Rear axle			
Bearing play axil direction		mm {in}	0.05 {0.002} max.
Differential			
Backlash (Ring gear and drive pinion)		mm {in}	0.09–0.11 {0.0035–0.0043}
Drive pinion preload (without oil seal)		N·m {kgf·cm, in·lbf}	1.3–1.7 {13–18, 12–15}
Differential oil	Grade		API Service GL-4 or 5
	Viscosity		Above −18°C {0°F} : SAE 90 Below −18°C {0°F} : SAE 80
	Capacity	L {US qt, Imp qt}	1.30 {1.38, 1.14}

* Before measuring the drive shaft length, lift the boot to equalize the pressure within it.

N. STEERING SYSTEM

Item		Specifications
Steering wheel		
Outer diameter	mm {in}	380 {15.0}
Free play	mm {in}	0–30 {0–1.18}
Wheel effort	N {kgf, lbf}	30–38 {3.0–3.9, 6.6–8.5}
Lock-to-lock	turns	2.9
Steering shaft		
Shaft type		Collapsible
Joint type		2-cross joint
Power steering system		
Gear type		Rack and pinion
Gear ratio		∞ (infinite)
Rack stroke	mm {in}	160 {6.30}
Power steering fluid		ATF Dexron®II or M-III
Fluid capacity	L {US qt, Imp qt}	0.96 {1.01, 0.84}
Fluid pressure	kPa {kgf/cm^2, psi}	7620–8350 {77.7–85.2, 1110–1210}

P. BRAKING SYSTEM

Item				Specifications
Brake pedal				
Type				Suspended
Height (with carpet)			mm {in}	164.5–176.0 {6.48–6.92}
Free play			mm {in}	3–8 {0.12–0.31}
Reserve travel (When depressed at 590 N {60 kgf, 132 lbf}) (without carpet)			mm {in}	100 {3.94} min.
Master cylinder				
Type				Tandem (with level sensor)
				Portless & recessed type
Push rod-to-piston clearance mm {in}	Power brake unit at 66.7 kPa {500 mmHg, 19.7 inHg}			0.1–0.4 {0.004–0.015}
Front brake				
Type				Ventilated disc
Disc pad thickness	Standard mm {in}		Outer	10.3 {0.41}
			Inner	9.3 {0.37}
	Limit		mm {in}	1.0 {0.04}
Disc plate	Runout limit		mm {in}	0.1 { 0.004}
	Thickness	Standard	mm {in}	22.0 {0.87}
		Limit	mm {in}	20.0 {0.79}
Rear brake				
Type				Ventilated disc
Disc pad thickness	Standard		mm {in}	8.0 {0.31}
	Limit		mm {in}	1.0 {0.04}
Disc plate	Runout limit		mm {in}	0.1 {0.004}
	Thickness	Standard	mm {in}	20.0 {0.79}
		Limit	mm {in}	18.0 {0.71}
Power brake unit				
Type				Tandem diaphragm
Fluid pressure when pedal depressed at 200 N {20 kgf, 44 lbf} kPa {kgf/cm^2}	Power brake unit at 0 kPa {0 mmHg, 0 inHg}			590 {6} min.
	Power brake unit at 66.7 kPa {500 mmHg, 19.7 inHg}			7750 {79} min.
Rear wheel hydraulic control system				
Type				Proportioning bypass valve
Switching point			kPa {kgf/cm^2, psi}	3900 {40.0, 570}
Parking brake				
Type				Mechanical, two-rear-wheel control
Operation system				Hand lever type
Parking lever stroke (When pulled at 200 N {20 kgf, 44 lbf})			notches	7–10
Brake fluid				
Type				FMVSS 116 DOT-3
Anti-lock brake system (ABS)				
Type				4-sensor, 3-channel system
Resistance between terminals of wheel speed sensor			kΩ	0.8–1.2

Q, WHEELS AND TIRES

Item				Specifications
Standard tire				
Tires	Size			P225/50R16 91V P225/50 ZR 16
	Air pressure		kPa {kgf/cm², psi}	220 {2.2, 32}
	Remaining tread	Ordinary tires	mm {in}	1.6 {0.063} min.
		Snow tires	%	50 min.
Wheels	Size			16 × 8JJ
	Material			Aluminum alloy
	Offset		mm {in}	50.0 {1.97}
	Pitch circle diameter		mm {in}	114.3 {4.50}
Temporary spare tire				
Tires	Size			T135/70D16
	Air pressure		kPa {kgf/cm², psi}	415 {4.2, 60}
Wheels	Size			16 × 4T
	Material			Aluminum alloy
	Offset		mm {in}	40.0 {1.57}
	Pitch circle diameter		mm {in}	114.3 {4.50}
Wheel and tire				
Runout limit	mm {in}	Horizontal		2.0 {0.08}
		Vertical		1.5 {0.06}
Maximum unbalance (at rim edge)			g {oz}	8 {0.28}

R. SUSPENSION

Item \ Transmission / Suspension				MT		AT
				Standard	Hard	Standard
Front suspension						
Suspension type				Double-wishbone		
Coil spring	Identification mark color			Red		Brown
	Wire diameter		mm {in}	12.3 {0.48}		12.5 {0.49}
	Coil center diameter		mm {in}	104.8 {4.126}		105.0 {4.134}
	Free length		mm {in}	270.0 {10.63}		276.3 {10.88}
	Active coil number			4.14		4.39
Shock absorber	Type			Cylindrical, double-acting, low-pressure gas charged		
	Damping force characteristics			Standard	Hard	Standard
Stabilizer	Type			Torsion bar, hollow type		
	Diameter		mm {in}	28.6 {1.13}		
Front wheel alignment (unladen*1)	Inspection standard					
	Total toe-in		mm {in}	2 ± 3 {0.08 ± 0.11}		
	Toe-in (per side)		Degree	0.1° ± 0.75°		
	Maximum steering angle		in	36° ± 2°		
			out	32° ± 2°		
	Camber angle		Degree	0.1° ± 0.75°		
		Difference between left and right	Degree	1.0° max.		
	Caster angle		Degree	6.08° ± 0.75°		
		Difference between left and right	Degree	1.0° max.		
	King pin angle		Degree	13°55'		
	Adjustment standard					
	Total toe-in		mm {in}	2 ± 1 {0.08 ± 0.04}		
	Toe-in (per side)		Degree	0.1° ± 0.05°		
	Maximum steering angle		in	36° ± 2°		
			out	32° ± 2°		

*1 Fuel tank full; radiator coolant and engine oil at specified levels; spare tire, jack, and tools in designated positions.

Item			Transmission / Suspension	MT Standard	MT Hard	AT Standard
Front wheel alignment (unladen*1)	Camber angle		Degree	0.1° ± 0.5°		
		Difference between left and right	Degree	1.0° max.		
	Caster angle		Degree	6.08° ± 0.5°		
		Difference between left and right	Degree	1.0° max.		
	King pin angle		Degree	13°55'		
Rear suspension						
Suspension type				Double-wishbone		
Coil spring	Identification mark color			Purple		
	Wire diameter		mm {in}	12.2 {0.48}		
	Coil center diameter		mm {in}	114.7 {4.516}		
	Free length		mm {in}	303.0 {11.93}		
	Active coil number			4.21		
Shock absorber	Type			Cylindrical, double-acting, low-pressure gas charged		
	Damping force characteristics			Standard	Hard	Standard
Stabilizer	Type			Torsion bar, hollow type		
	Diameter		mm {in}	13.8 {0.54}		
Rear wheel alignment (unladen*1)	Inspection standard					
	Total toe-in		mm {in}	2 ± 3 {0.08 ± 0.11}		
	Toe-in (per side)		Degree	0.1° ± 0.1°		
	Camber angle		Degree	-1.22° ± 0.75°		
		Difference between left and right	Degree	1.0° max		
	Thrust angle		Degree	0° ± 0.1°		
	Adjustment standard					
	Total toe-in		mm {in}	2 ± 1 {0.08 ± 0.04}		
	Toe-in (per side)		Degree	0.1° ± 0.05°		
	Camber angle		Degree	-1.22° ± 0.5°		
		Difference between left and right	Degree	1.0° max		
	Thrust angle		Degree	0° ± 0.1°		

*1 Fuel tank full; radiator coolant and engine oil at specified levels; spare tire, jack, and tools in designated positions.

T. BODY ELECTRICAL SYSTEM

Item		Specification (W) (BULB TRADE NO.)
Front exterior lights	Headlight (Halogen)	60/55 [HB_2]
	Parking light	5
	Front turn signal	27 (3497)
	Front fog light	35
	Daytime running light (For Canada)	27 (3496)
	Front side marker light	4.9 (168)
Rear exterior lights	Back-up light	27 (1156)
	License plate light	5
	Stop / Tail light	27/8 (1157)
	High-mount stoplight	18.4 (921)
	Rear turn signal light	27 (1156)
	Rear side marker light	3.8 (194)
Interior lights	Interior light	5
	Glove compartment light	3.4
	Cargo compartment light	8

Item		Specification (W) (BULB TRADE NO.)
Warning lights	Seat belt ABS Brake	1.4
	Alternator Oil-level Fuel-level Coolant level	3
	Air bag system	2
Indicator	Shift-up	2
	High beam Turn signal Security light Check Rear window defroster Cruise set HOLD	1.4
Illumination lights	Instrument cluster Head light cleaner switch Front fog light switch Heater unit Cigarette lighter Ash tray	3.4
	Retractor switch Automatic selector Rear window defroster switch Cruise control main switch Door key cylinder Ignition key	1.4

U. HEATER AND AIR CONDITIONER SYSTEMS

Item			Specifications	
			R-12	R-134a
Refrigerant amount		g{oz}	750-850 {26.5-30.0}	450-550 {15.9-19.4}
Compressor oil	Oil type		ND-OIL 7	ND-OIL 9
	Amount	ml {cc, fl oz}	100-140 {100-140, 3.0-4.2}	130-170 {130-170, 3.9-5.1}
Refrigerant normal pressure at 25°C {77°F} MPa {kgf/cm^2, psi}	Low pressure		0.15-0.20 {1.5-2.0, 21-28}	0.15-0.25 {1.5-2.5, 21-36}
	High pressure		1.42-1.47 {14.5-15.0, 206-213}	1.37-1.57 {14-16, 199-228}

STANDARD BOLT AND NUT TIGHTENING TORQUE

Diameter mm {in}	Pitch mm {in}	4T			6T			8T		
		N·m	kgf·m	ft·lbf	N·m	kgf·m	ft·lbf	N·m	kgf·m	ft·lbf
6 {0.236}	1 {0.039}	4.2-6.2	0.43-0.63	3.1-4.6	6.9-9.8	0.7-1.0	5.0-7.2	7.8-11.8	0.8-1.2	5.8-8.8
8 {0.315}	1.25 {0.049}	9.8-14.7	1.0-1.5	7.2-10.8	16-23	1.6-2.3	12-17	18-26	1.8-2.7	13-20
10 {0.394}	1.25 {0.049}	20-28	2.0-2.9	14-21	31-46	3.2-4.1	23-34	36-54	3.7-5.5	27-40
12 {0.472}	1.5 {0.059}	34-50	3.5-5.1	25-37	55-80	5.6-8.2	41-59	63-93	6.4-9.5	46-69
14 {0.551}	1.5 {0.059}	—	—	—	75-103	7.7-10.5	56-76	102-137	10-14	75-101
16 {0.630}	1.5 {0.059}	—	—	—	116-157	12-16	85-116	156-211	16-22	115-156
18 {0.709}	1.5 {0.059}	—	—	—	167-225	17-23	123-166	221-299	23-31	163-221
20 {0.787}	1.5 {0.059}	—	—	—	231-314	24-32	171-231	308-417	31-43	227-307
22 {0.866}	1.5 {0.059}	—	—	—	314-423	32-43	231-312	417-564	43-58	307-416
24 {0.945}	1.5 {0.059}	—	—	—	475-546	41-56	298-403	536-726	55-74	396-536