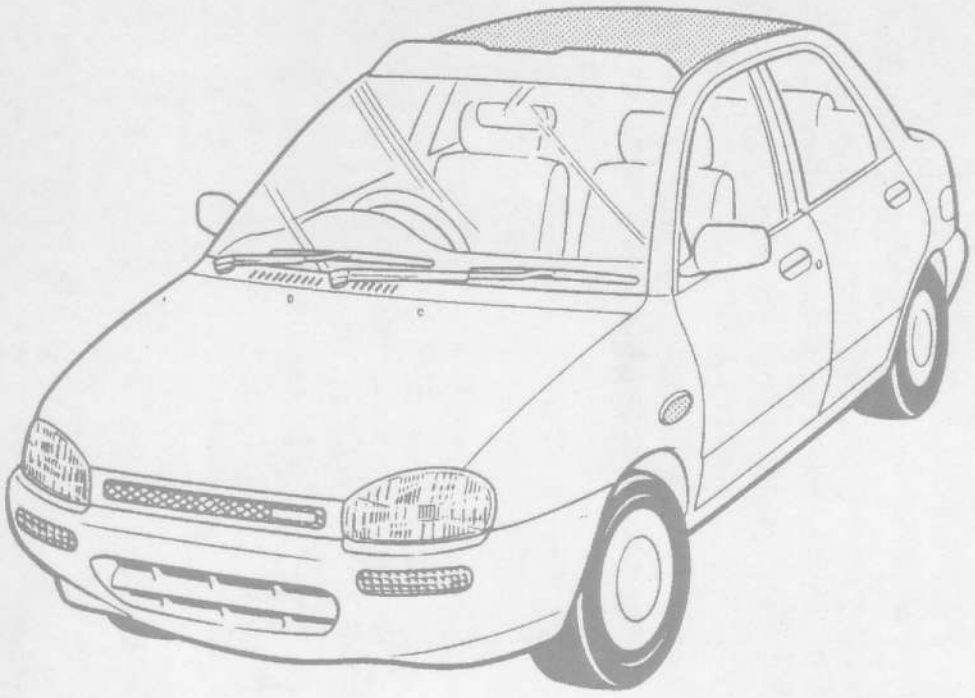
Mazda 121

Workshop Manual
Volume 1 of 2



JMO DB1031 00

10/90 1249-10-90J

mazda

Australia

Mazda 121 Workshop Manual

Volume 1 of 2

FOREWORD

This workshop manual is intended for use by service technicians of Authorized Mazda Dealers to help them service Mazda vehicles. It can also be useful to owners and operators of Mazda vehicles in diagnosing some problems and performing limited repair and maintenance on Mazda vehicles.

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

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

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

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Mazda Motor Corporation
HIROSHIMA, JAPAN

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

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The section Z is published separate from this manual.

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OCT. '90 (N)

1249-10-90J

VEHICLE IDENTIFICATION NUMBERS (VIN)

JM0 DB1031 00 100001 ~

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03UGIX-001

IMPORTANT INFORMATION

BASIC ASSUMPTIONS

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

SAFETY RISK

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

POSSIBLE LOSS OF WARRANTY

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

WARNING ON LUBRICANTS AND GREASES

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

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

Lubricants and greases may be slightly irritating to the eyes.

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

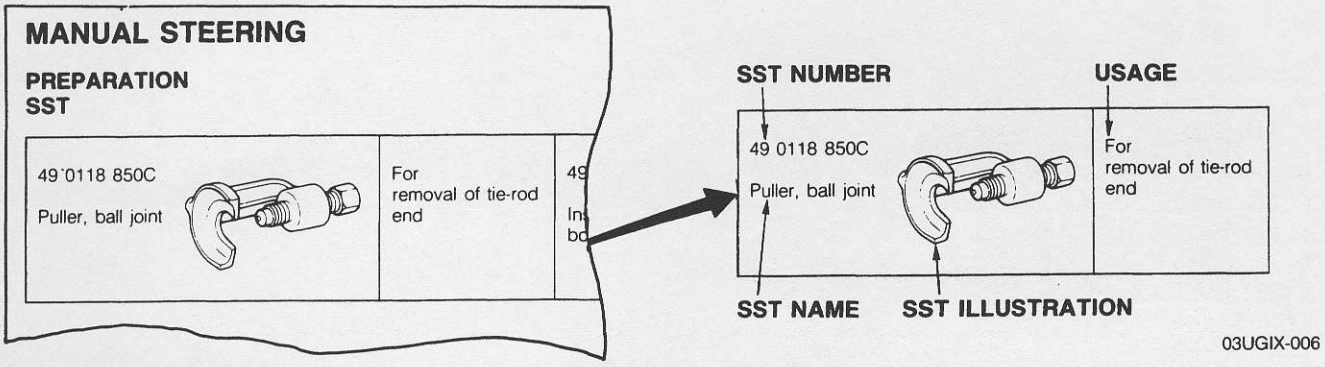
9MUGIX-002

HOW TO USE THIS MANUAL

PREPARATION

PREPARATION points out the needed **Special Service Tool (SST)** for the service operation that it proceeds. Gather all necessary **SST** before beginning work.

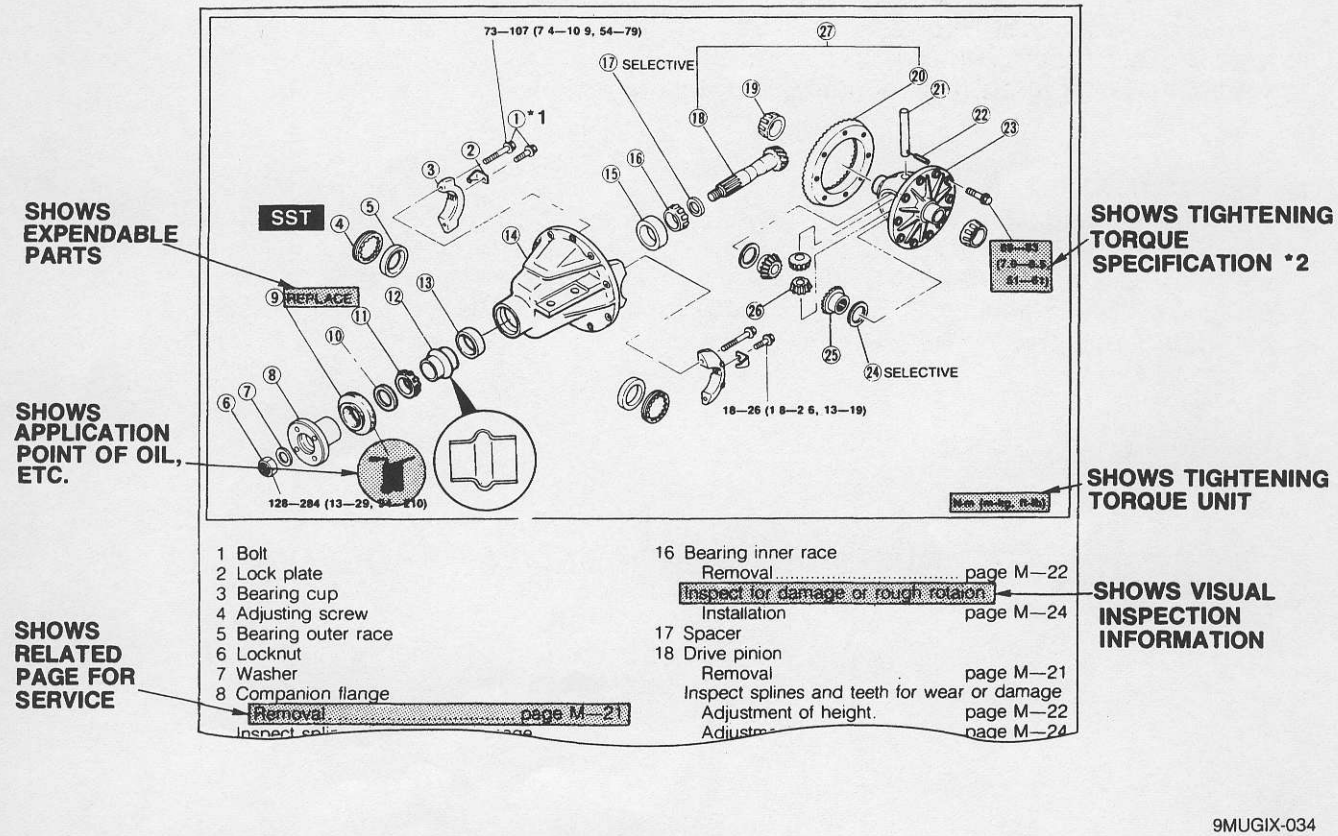
Example:



REPAIR PROCEDURE

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

Example:



*1: The numbering (ex.①) shows service procedure.
*2: Units shown in N·m (m-kg, ft-lb) 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	Only brake fluid
	Apply automatic transmission fluid	Only ATF
	Apply grease	Appropriate grease
	Apply sealant	Appropriate sealant
Ⓟ	Apply petroleum jelly	Appropriate petroleum jelly

05UGIX-005

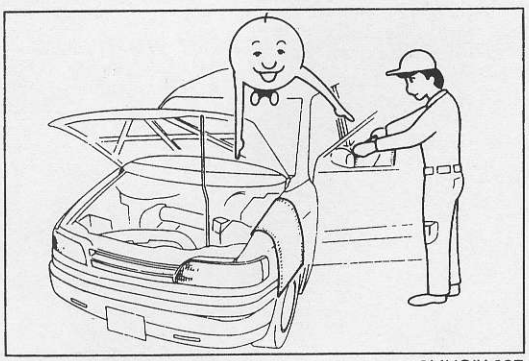
Note

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

NOTES, CAUTIONS, AND WARNINGS

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

01AGIX-002

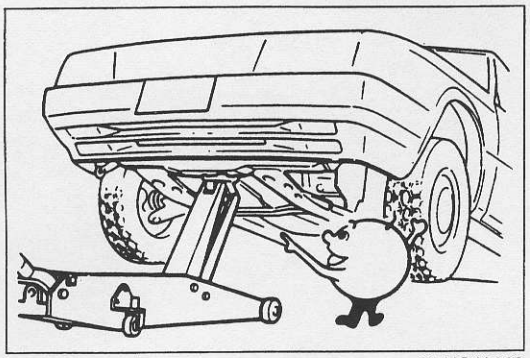


9MUGIX-037

FUNDAMENTAL PROCEDURES

PROTECTION OF THE VEHICLE

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



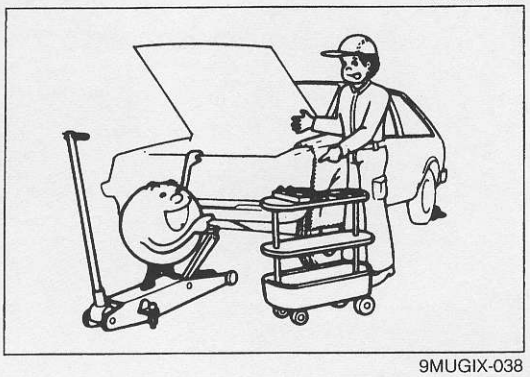
9MUGIX-003

A WORD ABOUT SAFETY

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

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

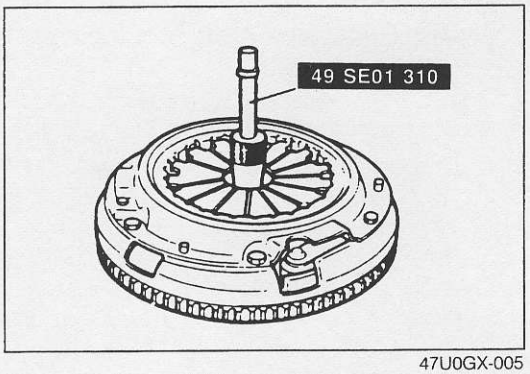
Start the engine only after making certain the engine compartment is clear of tools and people.



9MUGIX-038

PREPARATION OF TOOLS AND MEASURING EQUIPMENT

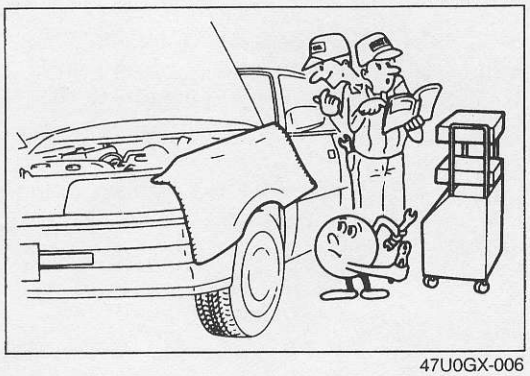
Be sure that all necessary tools and measuring equipment are available before starting any work.



47U0GX-005

SPECIAL TOOLS

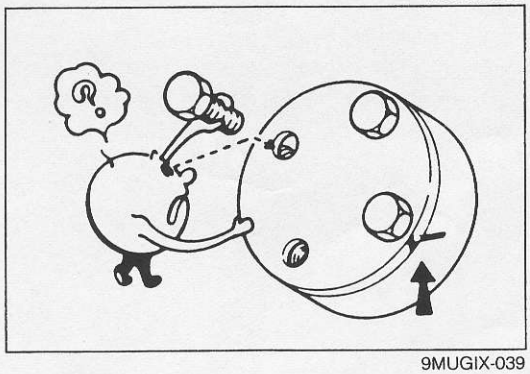
Use special tools when they are required.



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REMOVAL OF PARTS

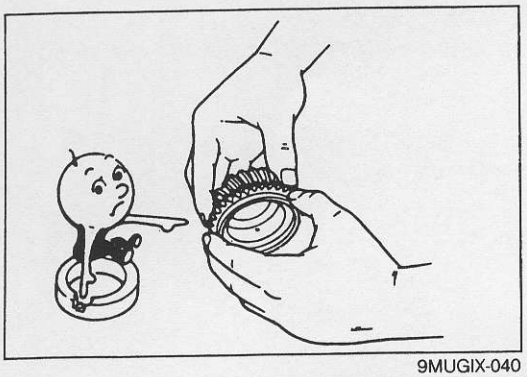
While correcting a problem, try also to determine its cause. Begin work only after first learning which parts and subassemblies must be removed and disassembled for replacement or repair.



9MUGIX-039

DISASSEMBLY

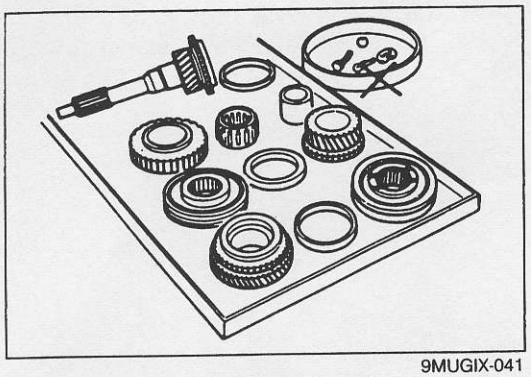
If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be disassembled in a way that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



9MUGIX-040

1. Inspection of parts

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

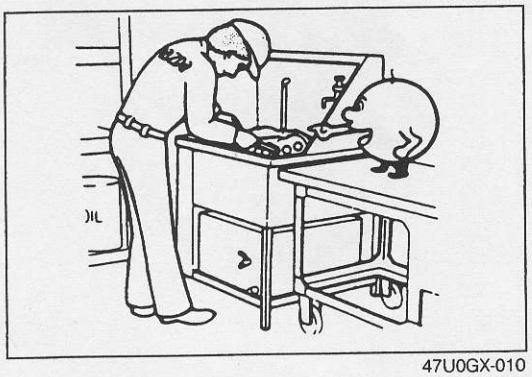


9MUGIX-041

2. Arrangement of parts

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

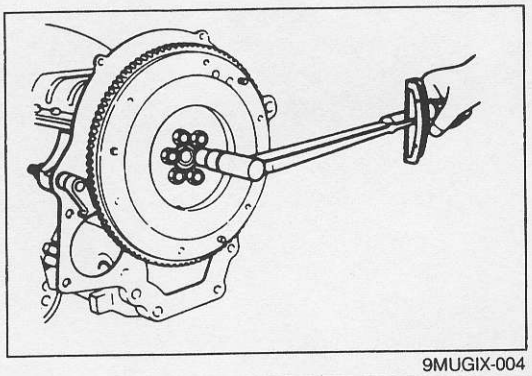
Be sure to separate or otherwise identify the parts to be replaced from those that will be reused.



47U0GX-010

3. Cleaning parts for reuse

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



9MUGIX-004

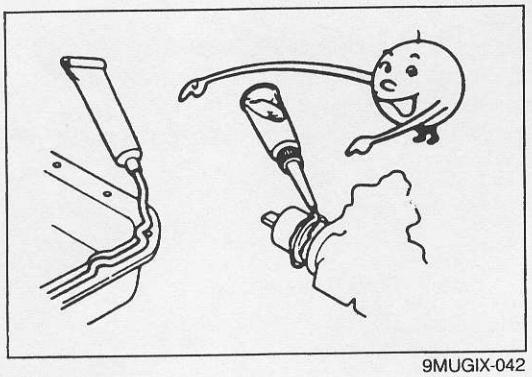
REASSEMBLY

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

Refer to STANDARD BOLT AND NUT TIGHTENING TORQUE in Section TD for tightening torques not mentioned in the main text.

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

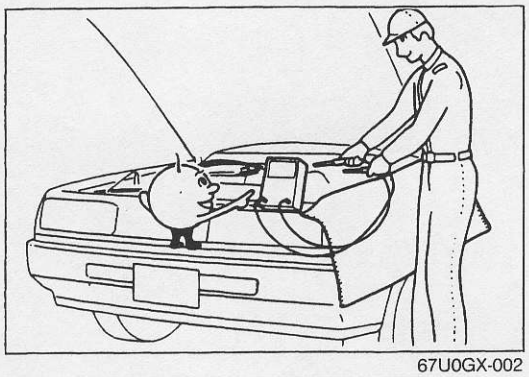
1. Oil seals
2. Gaskets
3. O-rings
4. Lock washers
5. Cotter pins
6. Nylon nuts



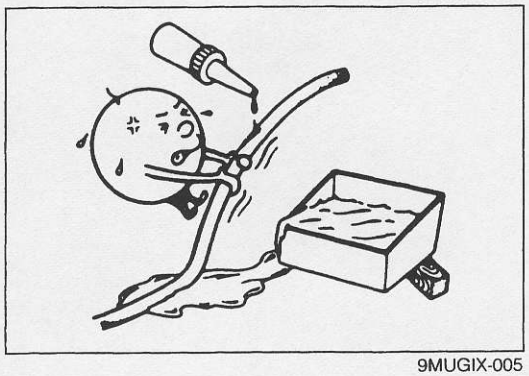
9MUGIX-042

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.



67U0GX-002



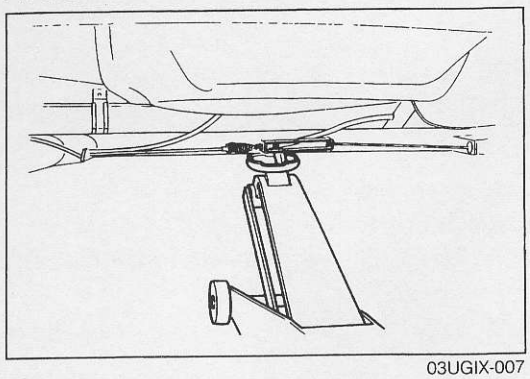
9MUGIX-005

ADJUSTMENTS
Use suitable gauges and/or testers when making adjustments.

RUBBER PARTS AND TUBING
Prevent gasoline or oil from getting on rubber parts or tubing.

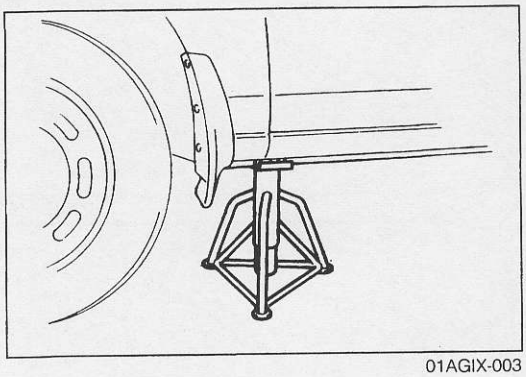
JACK AND SAFETY STAND POSITIONS

FRONT END
Jack position:
At the front crossmember



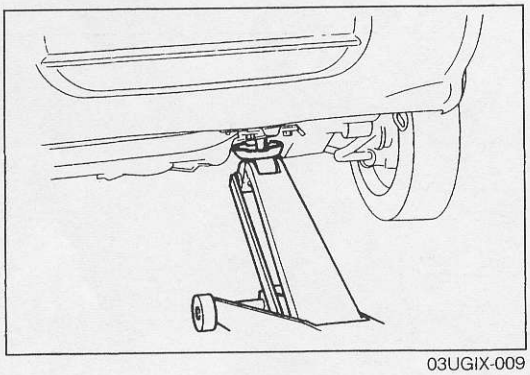
03UGIX-007

Safety stand positions:
Side sills



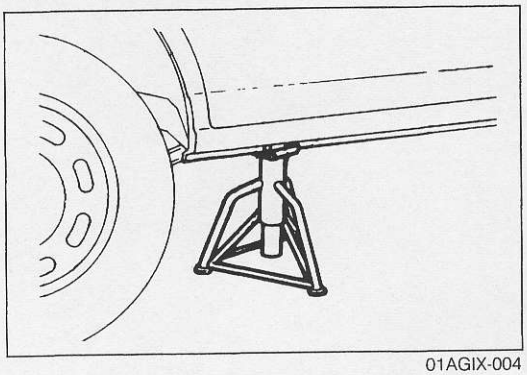
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REAR END
Jack position:
At the center of the rear crossmember



03UGIX-009

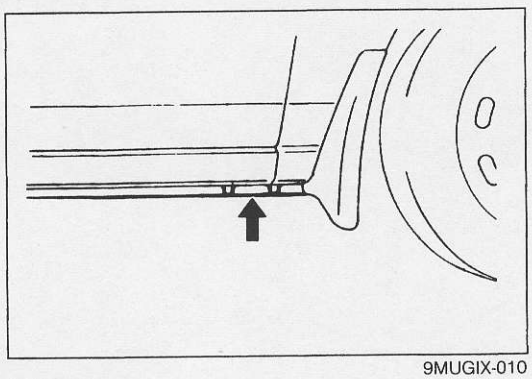
Safety stand positions:
Side sills



01AGIX-004

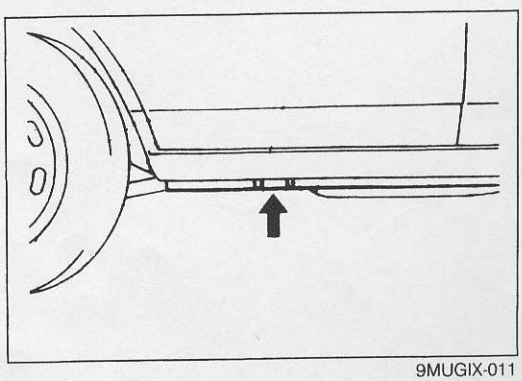
VEHICLE LIFT (2-SUPPORT TYPE) POSITIONS

FRONT END
Frame
Side sills

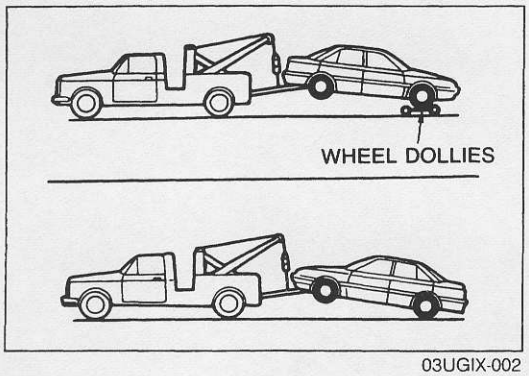


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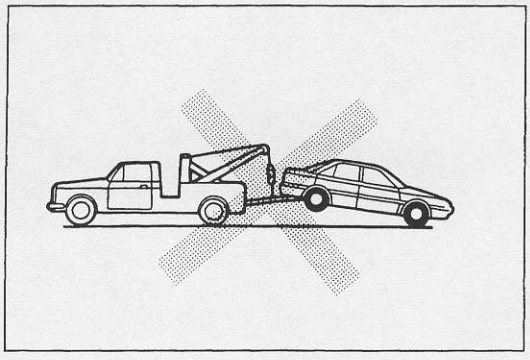
REAR END
Frame
Side sills



9MUGIX-011



03UGIX-002

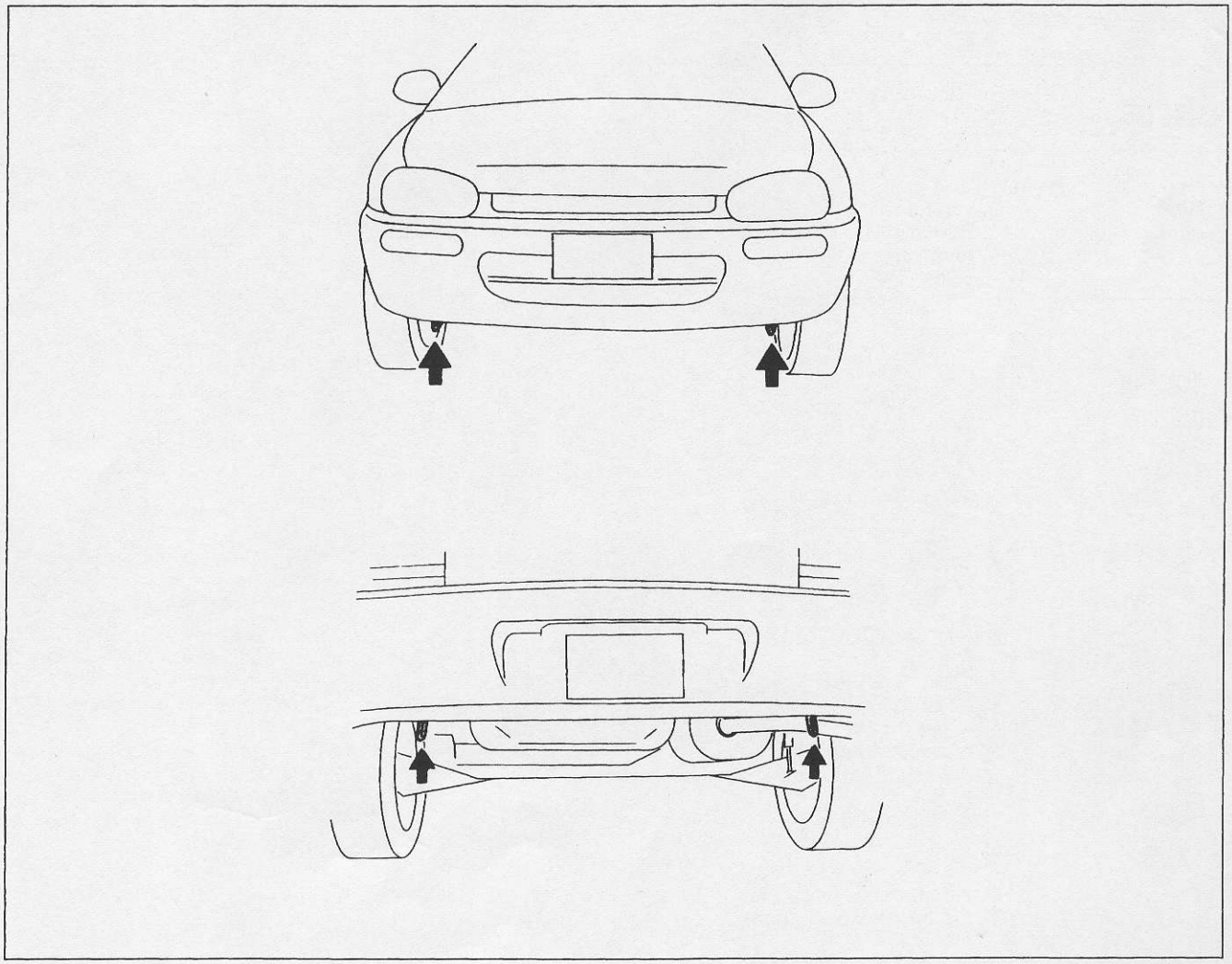


TOWING

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

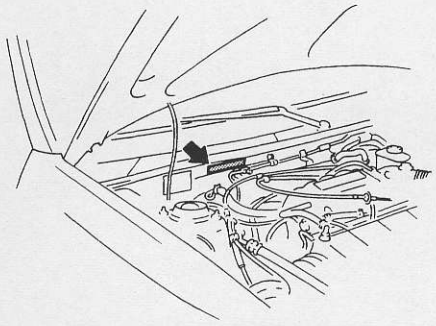
With either automatic or manual transaxle:
1. Set the ignition switch in the ACC position;
2. Place the selector lever or shift lever in N (Neutral);
3. Release the parking brake.

Caution
- **Do not tow the vehicle backward with driving wheels on the ground. This may cause internal damage to the transaxles.**
- **Do not use the hook loops under the front and rear of the vehicle for towing purposes. These hook loops are designed ONLY for transport tie-down. If tie-down hook loops are used for towing, the front/rear bumper will be damaged.**

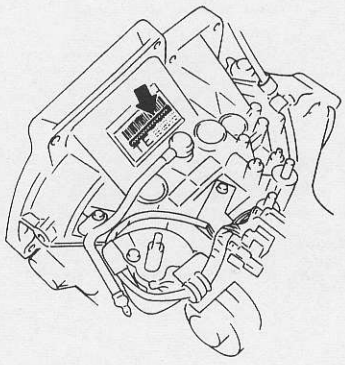


IDENTIFICATION NUMBER LOCATIONS

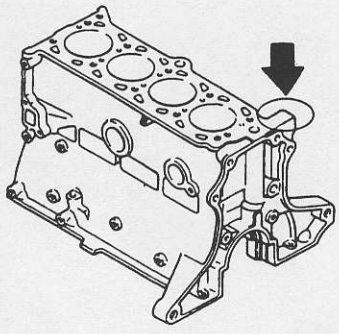
VEHICLE IDENTIFICATION NUMBER (VIN)



AUTOMATIC TRANSAXLE MODEL AND NUMBER



ENGINE MODEL AND NUMBER



9MUGIX-015

UNITS

N·m (m-kg or cm-kg, ft-lb or in-lb)	Torque
rpm	Revolutions per minute
A	Ampere(s)
V	Volt(s)
Ω	Ohm(s) (resistance)
kPa (kg/cm^2, psi)	Pressure (usually positive)
mmHg (inHg)	Pressure (usually negative)
W	Watt
liters (US qt, Imp qt)	Volume
mm (in)	Length

89U0GX-006

ABBREVIATIONS

ABDC	After bottom dead center
A/C	Air conditioner
ACC	Accessories
ATX	Automatic transaxle
ATDC	After top dead center
ATF	Automatic transmission fluid
BAC	Bypass air control
BBDC	Before bottom dead center
BTDC	Before top dead center
CPU	Central processing unit
EC-AT	Electronically-controlled automatic transmission
ECU	Engine control unit
EGI	Electronic gasoline injection
E/L	Electrical load
EX	Exhaust
IC	Integrated circuit
IGN	Ignition
IN	Intake
INT	Intermittent
ISC	Idle speed control
LH	Left hand
M	Motor
MIL	Malfunction indicator lamp
MTX	Manual transaxle
OD	Overdrive
OFF	Switch off
ON	Switch on
PCV	Positive crankcase ventilation
PRC	Pressure regulator control
P/S	Power steering
P/W	Power window
RH	Right hand
SST	Special service tool
ST	Start
SW	Switch
TDC	Top dead center

03UGIX-004

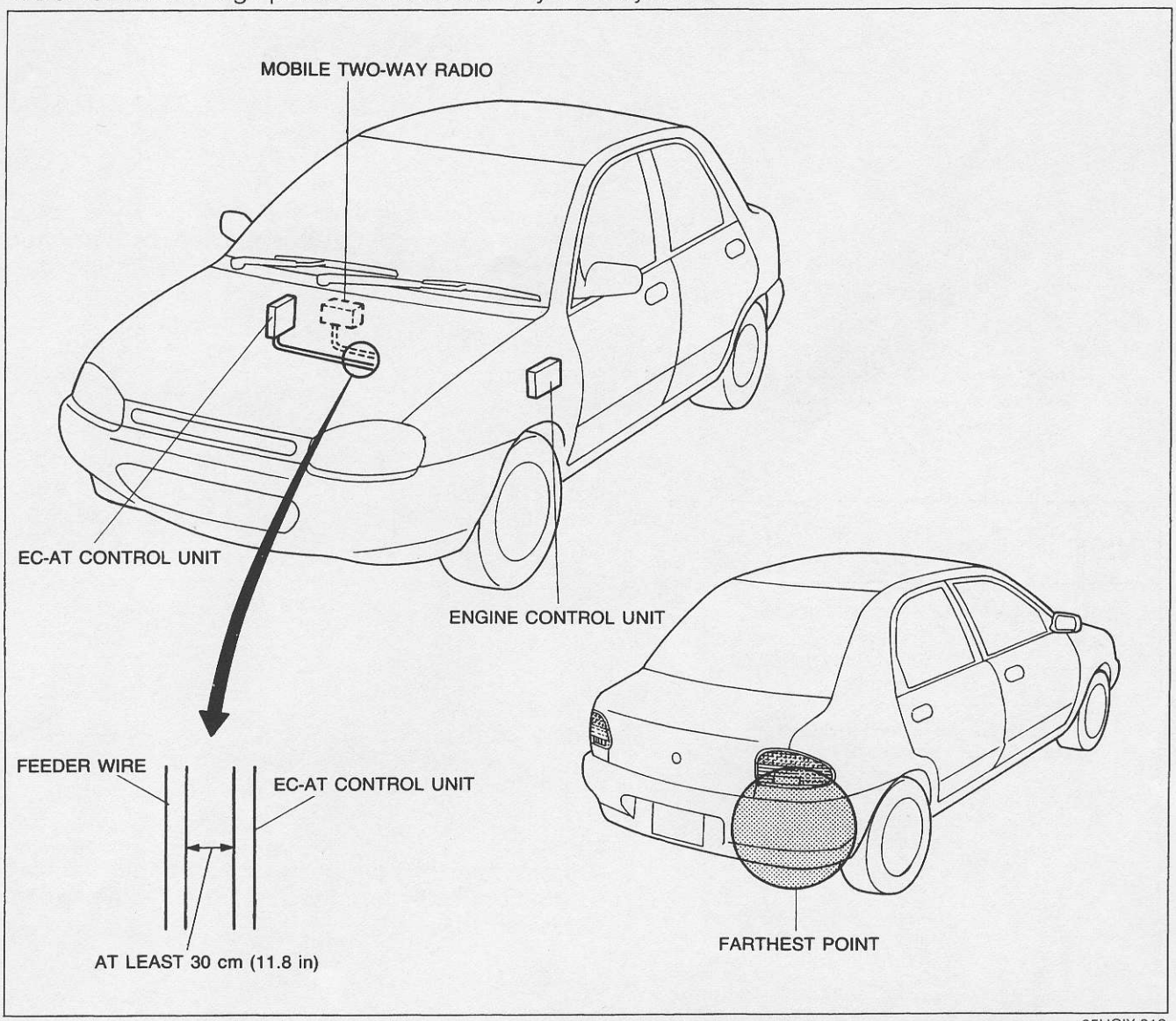
CAUTION

INSTALLATION OF MOBILE TWO-WAY RADIO SYSTEM

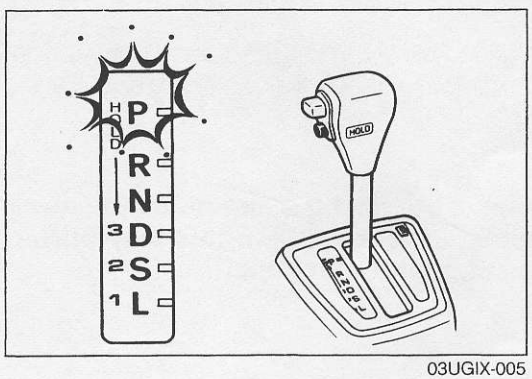
If a mobile two-way radio system is installed improperly or if a high-powered type is used, the EGI system and other systems may be affected.

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 units.
2. Install the antenna feeder as far as possible from the control unit 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.



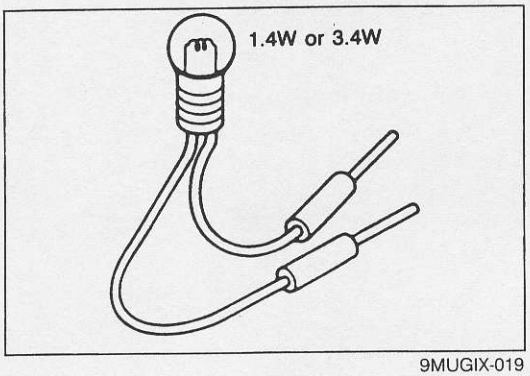
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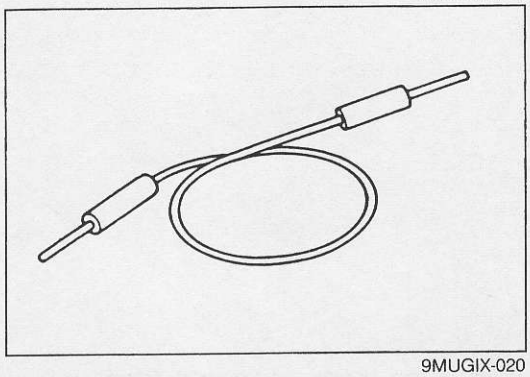
03UGIX-005

REMOVAL OF IGNITION KEY ON AUTOMATIC TRANSAXLE MODEL

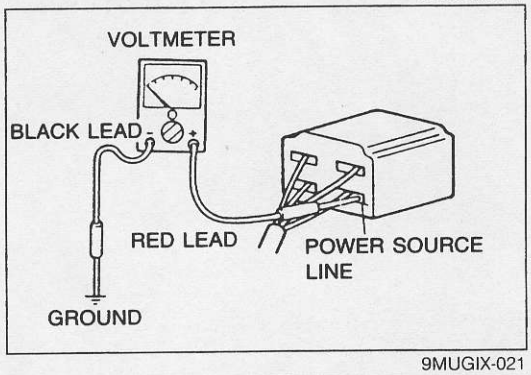
The selector lever must be in P (PARK) to turn the ignition key to the OFF position. If the switch seems to be off but the key cannot be removed, the switch may still be in the ACC position, or the selector lever may not be in P (PARK). Shift the selector lever to P (PARK), and turn the ignition key to the LOCK position. The key should now be free for removal.



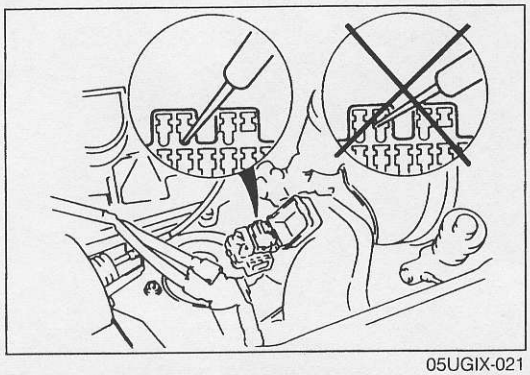
9MUGIX-019



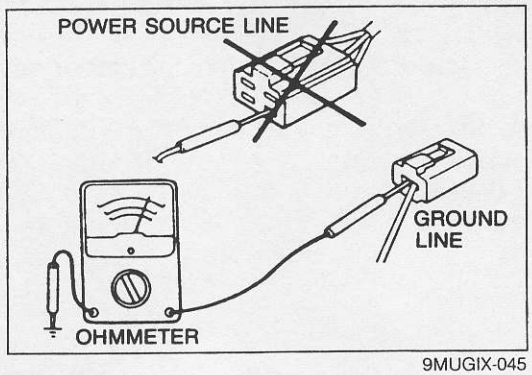
9MUGIX-020



9MUGIX-021



05UGIX-021



9MUGIX-045

CAUTION

ELECTRICAL TROUBLESHOOTING TOOLS

Test Light

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

Caution

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

Jumper Wire

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

Caution

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

Voltmeter

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

Diagnosis Connector

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

Caution

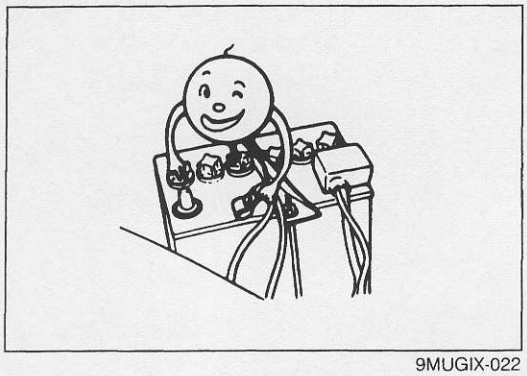
- **Do not insert the jumper wire probe into the diagnosis connector terminal, which may damage the terminal.**

Ohmmeter

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

Caution

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

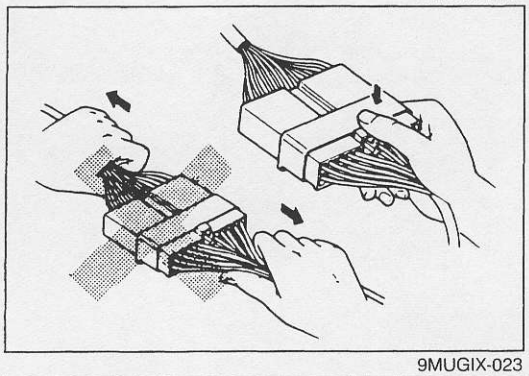


9MUGIX-022

CAUTION WITH ELECTRICAL PARTS

Battery Cable

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

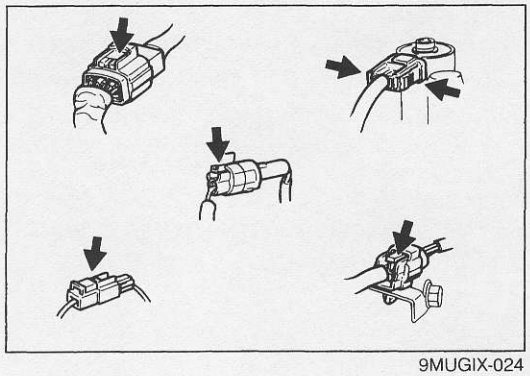


9MUGIX-023

Connectors

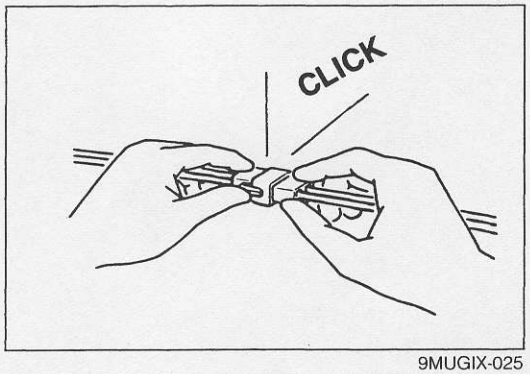
Removal of connector

Never pull on the wiring harness when disconnecting connectors.



9MUGIX-024

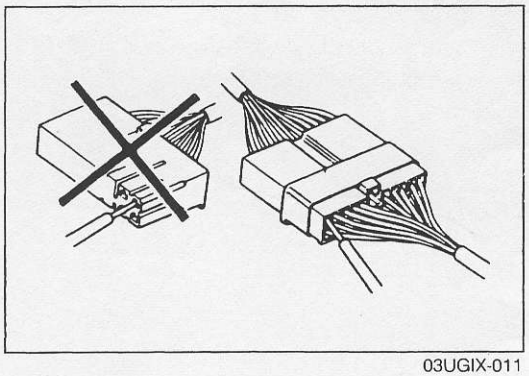
Connectors can be removed by pressing or pulling the lock lever as shown.



9MUGIX-025

Locking of connector

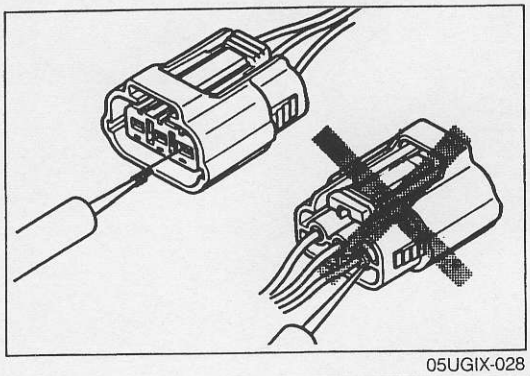
When locking connectors, make sure to listen for a click that will indicate they are securely locked.



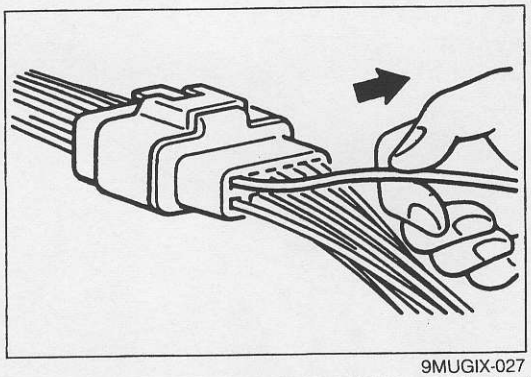
03UGIX-011

Inspection

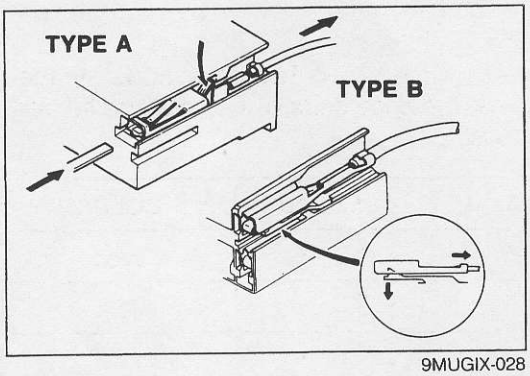
1. When a tester is used to check for continuity or to measure voltage, insert the tester probe from the wire harness side.



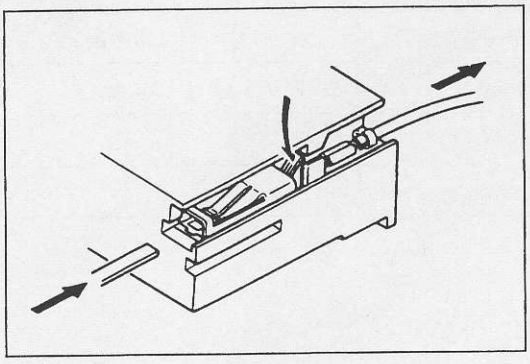
05UGIX-028

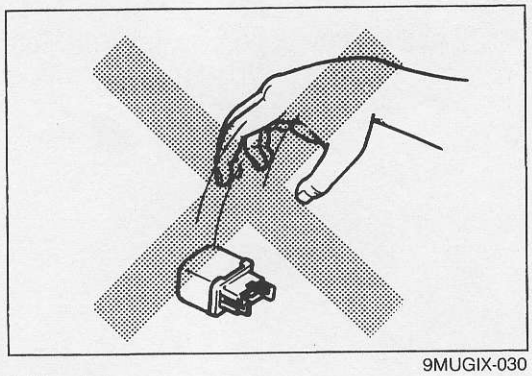


9MUGIX-027



9MUGIX-028





9MUGIX-030

CAUTION

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

Caution
- **Use fine wire to prevent damage to the terminal.**
- **Do not damage the terminal when inserting the tester lead.**

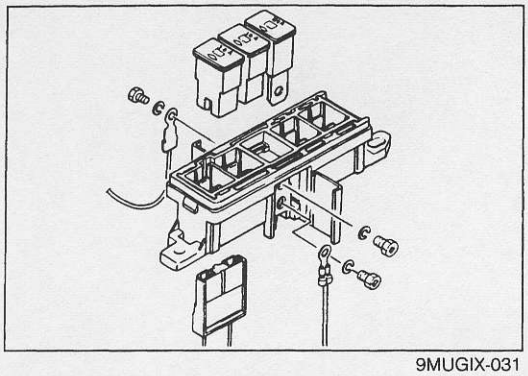
Terminals
Inspection
Pull lightly on individual wires to check that they are secured in the terminal.

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

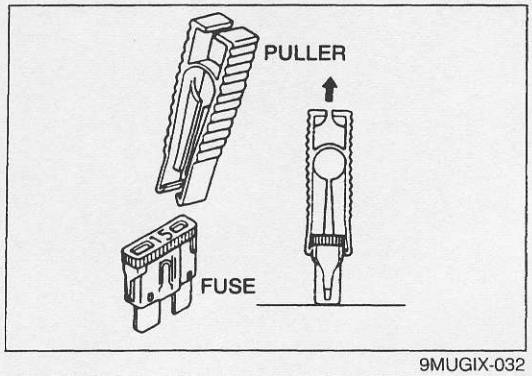
<Female>
Insert a thin piece of metal from the terminal side of the connector, and then, with the terminal locking tab pressed down, pull the terminal out from the connector.

<Male>
Same as the female type.

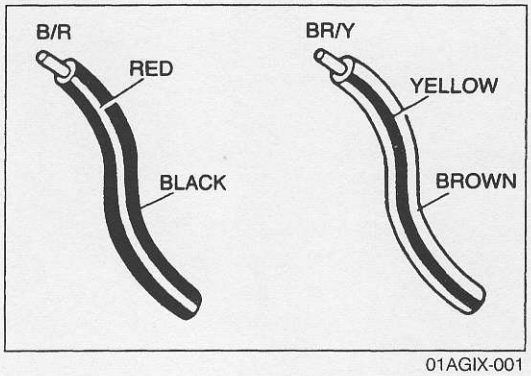
Sensors, Switches, and Relays
Handle sensors, switches, and relays carefully. Do not drop them or strike them against other parts.



9MUGIX-031



9MUGIX-032



01AGIX-001

Fuse
Replacement

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

Wiring Harness
Wiring color codes

Two-color wires are indicated by a two-color code symbol. The first code 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		—	—

PRE-DELIVERY INSPECTION AND SCHEDULED MAINTENANCE SERVICES

PRE-DELIVERY INSPECTION ..... **A– 2**
PRE-DELIVERY INSPECTION TABLE ..... **A– 2**
SCHEDULED MAINTENANCE SERVICES ..... **A– 3**

01E0AX-001

PRE-DELIVERY INSPECTION TABLE

EXTERIOR

INSPECT and **ADJUST**, if necessary, the following items to specification:
- ☐ Glass, exterior bright metal and paint for damage
- ☐ Wheel lug nuts
- ☐ Tire pressures
- ☐ All weatherstrips for damage or detachment
- ☐ Operation of bonnet release and lock
- ☐ Operation of trunk lid and fuel lid opener (if equipped)
- ☐ Door operation and alignment
- ☐ Headlight aiming

INSTALL the following parts
- ☐ Wheel caps or rings (if equipped)
- ☐ Outside mirror(s)
- ☐ Front flap (if equipped)

UNDER BONNET-ENGINE OFF

INSPECT and **ADJUST**, if necessary, the following items to specification.
- ☐ Fuel, coolant and hydraulic lines, fittings, connections and components for leaks
- ☐ Engine oil level
- ☐ Brake master cylinder fluid levels
- ☐ Clutch master cylinder fluid levels (if equipped)
- ☐ Windshield washer reservoir fluid level
- ☐ Radiator coolant level and specific gravity
- ☐ Tightness of water hose clamps
- ☐ Tightness of battery terminals, electrolyte level and specific gravity
- ☐ Manual transaxle oil level
- ☐ Drive belt(s) tension
- ☐ Accelerator cable and linkage for free movement
- ☐ Headlight cleaner and fluid level (if equipped)

CLEAN the spark plugs

INTERIOR

INSTALL the following parts
- ☐ Rubber stopper for inside rear view mirror (if equipped)
- ☐ Fuse for accessories

CHECK the operation of the following items
- ☐ Seat controls (sliding and reclining) and head rest
- ☐ Seat belts
- ☐ Ignition switch and steering lock
- ☐ Power window (if equipped)
- ☐ Door locks including child proof door locks
- ☐ Inhibitor switch (ATX only)
- ☐ All lights including warning and indicator lights
- ☐ Ignition key reminder buzzer (if equipped)
- ☐ Headlight cleaner (if equipped)
- ☐ Horn, wipers and washer
- ☐ Antenna (if equipped)
- ☐ Cigarette lighter and clock (if equipped)
- ☐ Heater and defroster at various mode selections
- ☐ Canvas top (if equipped)

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

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

UNDER BONNET-ENGINE RUNNING AT OPERATING TEMPERATURE

CHECK the following items:
- ☐ Operation of idle-up system for air conditioner or power steering (if equipped)
- ☐ Automatic transaxle fluid level
- ☐ Initial ignition timing
- ☐ Idle speed
- ☐ Operation of throttle sensor
- ☐ Operation of dashpot

ON HOIST

CHECK the following items.
- ☐ Underside fuel, coolant and hydraulic lines, fittings, connections and components for leaks
- ☐ Tires for cuts or bruises
- ☐ Steering linkage, suspension, exhaust system and all underside hardware for looseness or damage

ROAD TEST

CHECK the following items:
- ☐ Brake operation
- ☐ Clutch operation
- ☐ Steering control
- ☐ Operation of meters and gauges
- ☐ Squeaks, rattles or unusual noises
- ☐ Engine general performance
- ☐ Emergency locking retractors

AFTER ROAD TEST

REMOVE the seat and floor mat protective covers
CHECK for the necessary owner information materials, tools and spare tire in vehicle

01A0AX-001

SCHEDULED MAINTENANCE SERVICES

Maintenance item \ Maintenance interval	Number of months or km, whichever comes first												
	Months	—	6	12	18	24	30	36	42	48	54	60	66	72
	×1000 km	1.5	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90
ENGINE														
Engine valve clearance		I		I		I		I		I		I		I
Ex. manifold bolts and nuts		T				T				T				T
Engine timing belt*2		Replace every 105,000 kilometers												
Drive belts*4		A		I		I		I		I		I		I
Engine oil*1		R	R	R	R	R	R	R	R	R	R	R	R	R
Oil filter*1		R		R		R		R		R		R		R
COOLING SYSTEM														
Cooling system		I		I		I		I		I		I		I
Engine coolant (With reservoir)						R				R				R
FUEL SYSTEM														
Idle speed		A		A		A		A		A		A		A
Air cleaner element*3				I		R		I		R		I		R
Fuel filter						R				R				R
Fuel lines and hoses		I		I		I		I		I		I		I
IGNITION SYSTEM														
Initial ignition timing		A		I		I		I		I		I		I
Spark plugs				I		I		I		I		I		I
EVAPORATIVE EMISSION CONTROL SYSTEM														
Evaporative system				I		I		I		I		I		I
EXHAUST EMISSION CONTROL SYSTEM														
Dashpot				I		I		I		I		I		I
Throttle sensor				I		I		I		I		I		I
ELECTRICAL SYSTEM														
Battery electrolyte level and specific gravity		I		I		I		I		I		I		I
CHASSIS AND BODY														
Clutch pedal				I		I		I		I		I		I
Brake lines, hoses and connections		I		I		I		I		I		I		I
Brake fluid*5		I	I	I	I	R	I	I	I	R	I	I	I	R
Parking brake				I		I		I		I		I		I
Drum brakes				I		I		I		I		I		I
Disc brakes				I		I		I		I		I		I
Power steering fluid and lines (If equipped)		I		I		I		I		I		I		I
Steering operation and gear housing		I				I				I				I
Steering linkages rack guide and tie rod ends		I				I				I				I
Manual transaxle oil		I	I	I	I	I	I	I	I	I	I	R	I	I
Automatic transaxle fluid level		I	I	I	I	I	I	I	I	I	I	I	I	I
Front suspension ball joints						I				I				I
Front wheel bearing greases								R						R
Drive shaft dust boots		I		I		I		I		I		I		I
Bolts, nuts on chassis and body		T		T		T		T		T		T		T
Exhaust system heat shields								I						I

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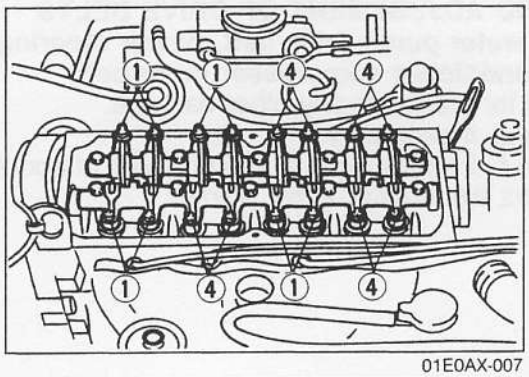
Chart symbols:
I: Inspect : Visual examination of functional measurement of system's operation (performance)
A: Adjust
R: Replace or change
T: Tighten
L: Lubricate

Note:
- **As the result of visual examination or functional measurement of a system's operation (performance), correct, clean or replace as required.**

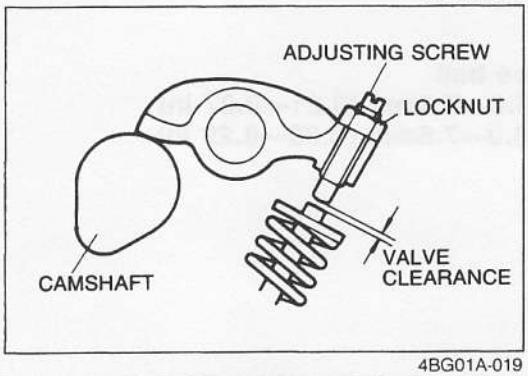
Remarks:
- After 90,000 km or 72 months, continue to follow the described scheduled maintenance items and intervals periodically.
- As for * marked items in this maintenance chart, please pay attention to the following points.
  *1: If the vehicle is operated under the following conditions, it is suggested that the engine oil and oil filter be changed more often than at usual recommended intervals.
    a) Driving in dusty conditions.
    b) Extended periods of idling or low speed operation.
    c) Driving for a prolonged period in cold temperature or driving only short distance regularly.
  *2: Replacement of the timing belt is required at every 105,000 km. Failure to replace timing belt may result in damage to the engine.
  *3: If the vehicle is operated in very dusty or sandy areas, inspect and, if necessary, replace more often than at usual recommended intervals.
  *4: Adjust or inspect alternator and water pump drive belt, and power steering and air conditioner drive belt, if equipped.
  *5: Replace every two years.
    If there has been continuous hard driving, mountain driving, or if the brakes are used extensively or the vehicle is operated in extremely humid climates, the brake fluid should be changed annually.

Emission Control and Related Systems:
The ignition and fuel systems are vitally important to the proper operation of the emission control and related systems, as well as for efficient engine operations.
It is strongly recommended that all servicing related to these systems be done by your authorized Mazda Dealer.

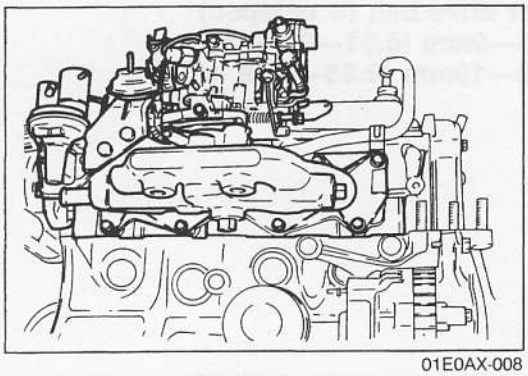
01A0AX-003



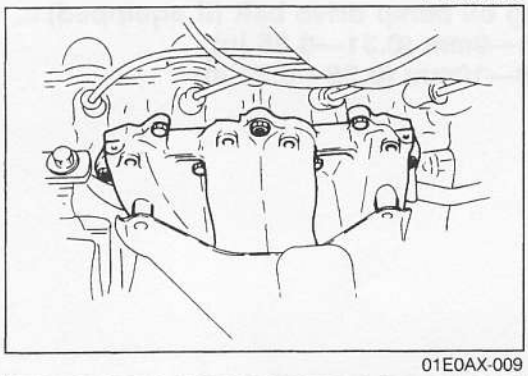
01E0AX-007



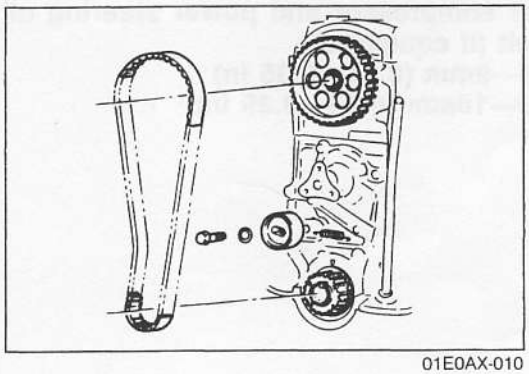
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01E0AX-008



01E0AX-009



01E0AX-010

ADJUSTMENT OF ENGINE VALVE CLEARANCE

Note
- **When valve clearance inspection and cylinderhead bolts retightening service are at the same interval, tighten the cylinder head bolts first.**

1. Warm up the engine to normal operating temperature.
2. With the piston of the No.1 cylinder at TDC of compression, adjust the valve clearances illustrated.

Valve clearance (at valve)
Intake : 0.30mm (0.012 in)
Exhaust: 0.30mm (0.012 in)

3. Turn the crankshaft one full turn so that the piston of the No.4 cylinder is at TDC of compression, and adjust the clearances of the remaining valves.

TIGHTENING INTAKE MANIFOLD BOLTS AND NUTS

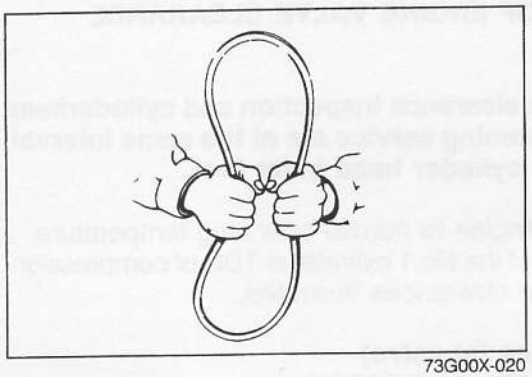
Tightening torque:
19—25 N·m (1.9—2.6 m-kg, 14—19 ft-lb)

TIGHTENING EXHAUST MANIFOLD NUTS

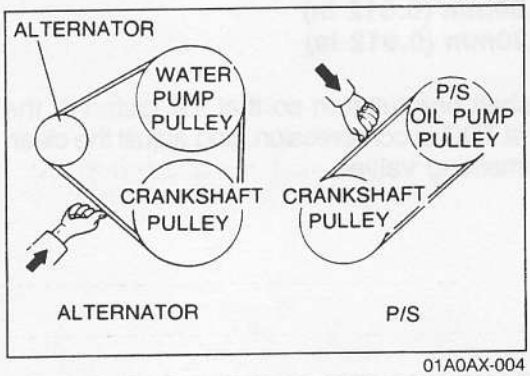
Tightening torque:
16—23 N·m (1.6—2.3 m-kg, 12—17 ft-lb)

REPLACEMENT TIMING BELT

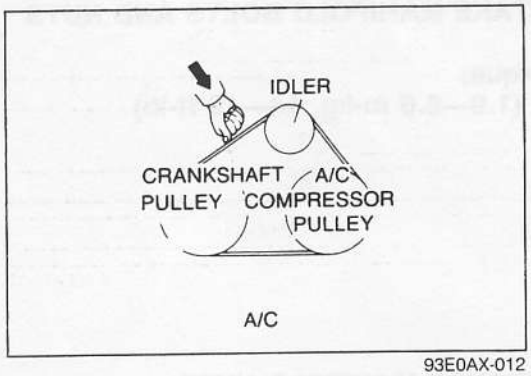
Refer to Section B of the Workshop Manual for the replacement procedure of the timing belt.



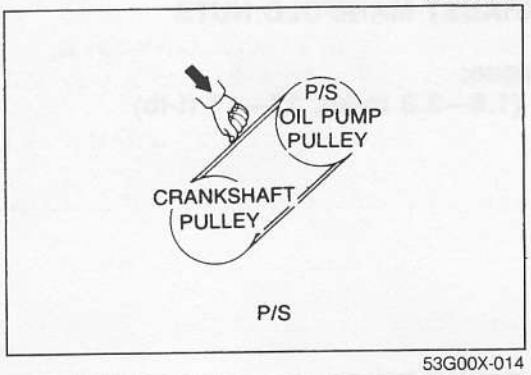
73G00X-020



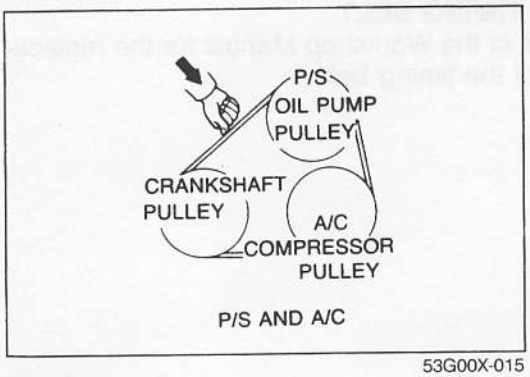
01A0AX-004



93E0AX-012



53G00X-014



53G00X-015

INSPECTION AND ADJUSTMENT OF DRIVE BELTS (Alternator and water pump drive belt, power steering pump and air conditioner compressor drive belt)

1. Check the belt for cracks or any other damage.
2. Adjust or replace, if necessary.
3. Check the drive belt tension with thumb pressure of about **98 N (10 kg, 22 lb)** at each arrow points.

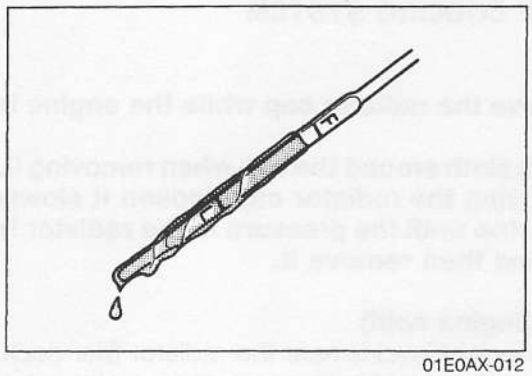
Belt deflection

Alternator drive belt
New belt : 5.5—7.0mm (0.21—0.27 in)
Used belt: 6.0—7.5mm (0.23—0.29 in)

Air conditioner drive belt (if eqipped)
New belt : 8—9mm (0.31—0.35 in)
Used belt: 9—10mm (0.35—0.39 in)

Power steering oil pump drive belt (if equipped)
New belt : 8—9mm (0.31—0.35 in)
Used belt: 9—10mm (0.35—0.39 in)

Air conditioner compressor and power steering oil pump drive belt (if equipped)
New belt : 8—9mm (0.31—0.35 in)
Used belt: 9—10mm (0.35—0.39 in)


01E0AX-012

REPLACEMENT OF ENGINE OIL

1. Warm up the engine.
2. Drain the oil by removing the drain plug and oil filler cap.

Warning
- **Wait a while for the engine is too hot. And be careful to drain.**

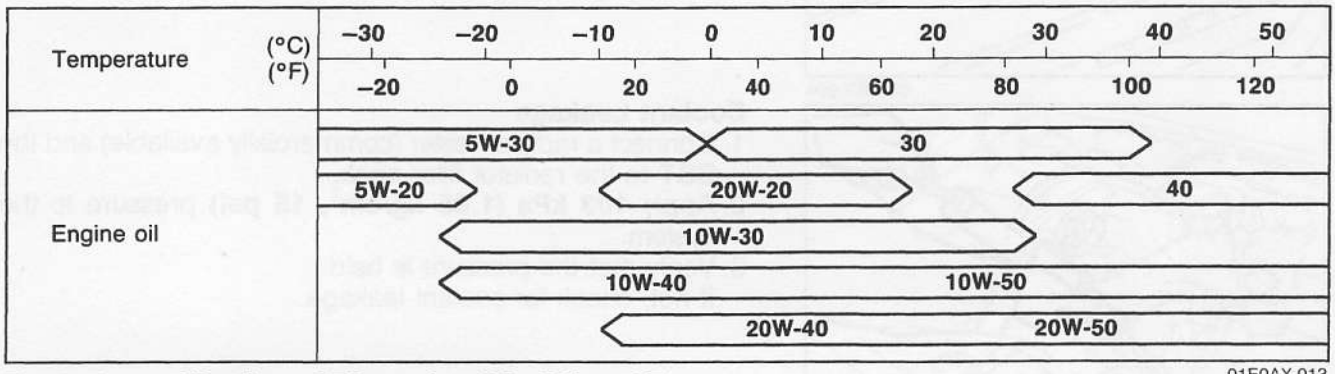
3. Reinstall the drain plug securely.

Tightening torque:
29—41 N·m (3.0—4.2 m-kg, 22—30 ft-lb)

4. Refill the engine with the specified oil to the "F" level marked on the level gauge.
5. Refit the oil filler cap securely.

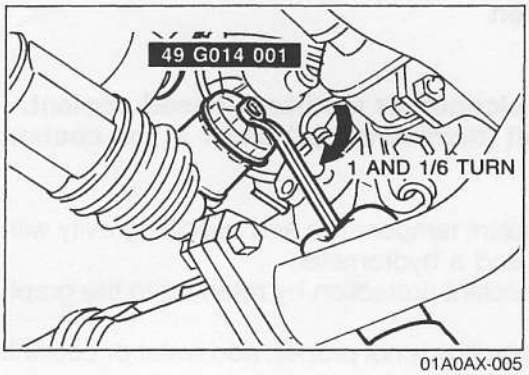
Oil pan capacity: 3.0 liters (3.2 US qt, 2.6 Imp qt)

Recommended SAE viscosity numbers



01E0AX-013

Typical specification: API service SD, SE or SF

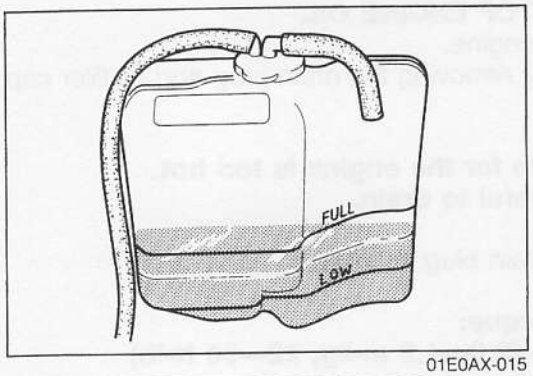


01A0AX-005

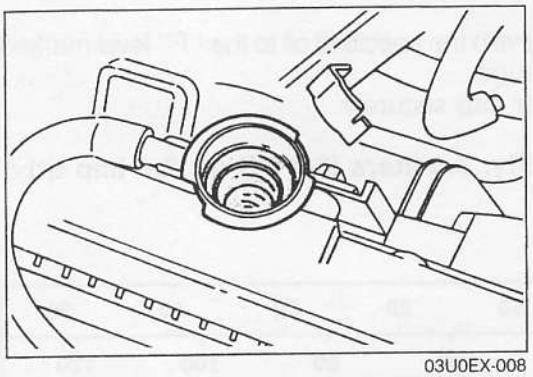
REPLACEMENT OF ENGINE OIL FILTER

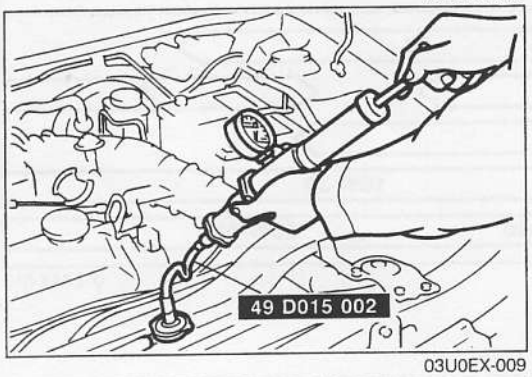
1. Remove the oil filter with the **SST** a suitable wrench.
2. Use a clean rag to wipe off the mounting surface on the engine.
3. Apply a small amount of clean engine oil to the rubber seal of the new filter.
4. Install the oil filter and tighten it by hand until the rubber seal contacts the base.
5. Tighten the filter 1 and 1/6 turns with a filter wrench.
6. Start the engine and check for leaks.
7. Check the oil level and add oil if necessary.

Oil filter capacity
B3: 0.17 liter (0.18 US qt, 0.15 Imp qt)

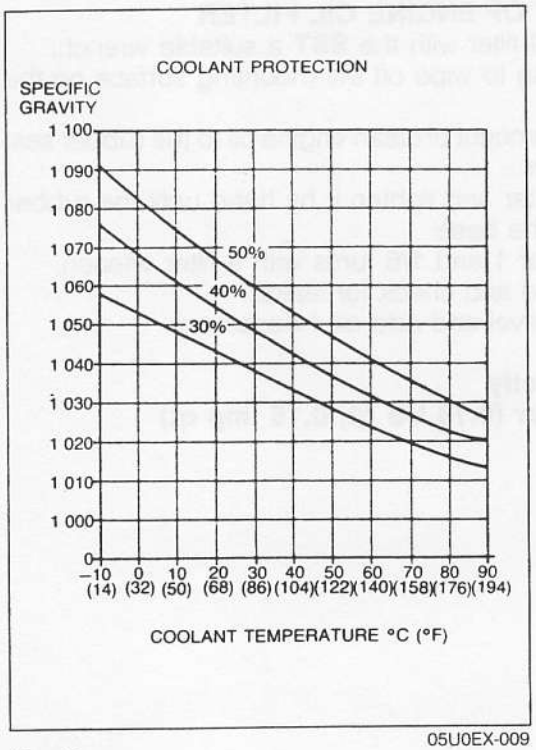


01E0AX-015


03U0EX-008



03U0EX-009



05U0EX-009

INSPECTION OF COOLING SYSTEM

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

Coolant Level (Engine cold)
1. Verify that the coolant level is near the radiator filler neck.
2. Verify that the coolant level in the coolant reservior is between the FULL and LOW marks.
3. Add coolant if necessary.

Coolant Quality
1. Verify that there is no buildup of rust or scale around the radiator cap or radiator 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.
2. Apply **103 kPa (1.05 kg/cm^2, 15 psi)** pressure to the system.
3. Verify that the pressure is held.
   If not, check for coolant leakage.

Coolant Protection

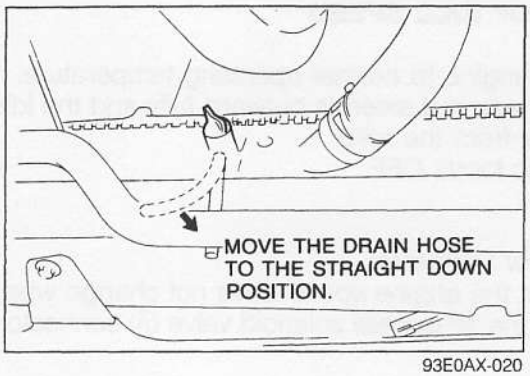
Caution
- **Do not use alcohol- or methanol-based coolant.**
- **Use only soft (demineralized) water in the coolant mixture.**

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

Antifreeze solution mixture percentage

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

05U0EX-010



93E0AX-020

REPLACEMENT OF ENGINE COOLANT

Warning
- **Never open the radiator cap while the engine is hot.**
- **Wrap a thick cloth around the cap when loosening.**
- **Use caution when draining hot coolant.**

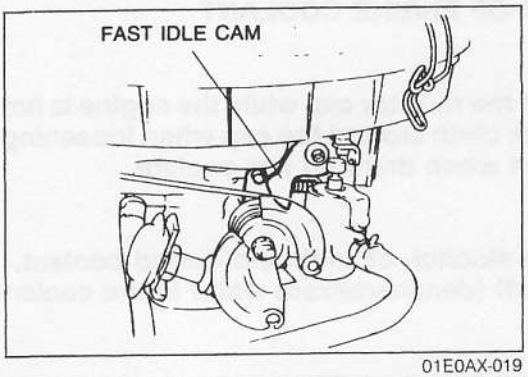
Caution
- **Do not use alcohol- or methanol-based coolant.**
- **Use only soft (demineralized) water in the coolant mixture.**

1. Remove the radiator cap and loosen the drain plug.
2. Drain the coolant into a suitable container.
3. Flush the cooling system with water until all traces of color are gone; then let the system drain completely.
4. Install the drain plug.
5. Fill with the proper amount and mixture of ethylene glycol based coolant by referring to the table above.

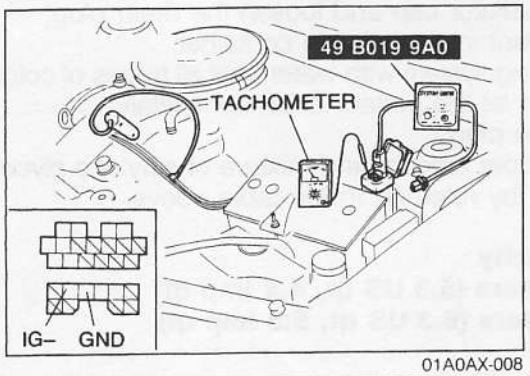
Coolant capacity
MTX: 5.0 liters (5.3 US qt, 4.4 Imp qt)
ATX: 6.0 liters (6.3 US qt, 5.3 Imp qt)

6. Run the engine with the radiator cap removed until the upper radiator hose is hot.
7. With the engine idling, add coolant to the radiator until it reaches the bottom of the filler neck.
8. Install the radiator cap.

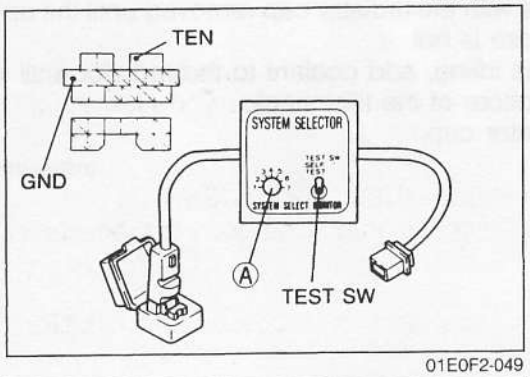
01E0AX-016



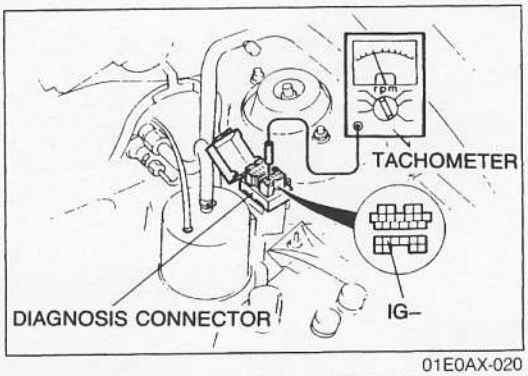
01E0AX-019



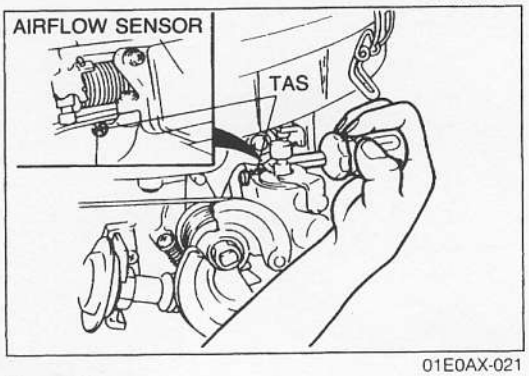
01A0AX-008



01E0F2-049



01E0AX-020



01E0AX-021

ADJUSTMENT OF IDLE SPEED

Preparation

1. Warm up the engine to normal operating temperature.
2. Verify that the wax rod extends outward fully and the idle cam separates from the roller.
3. Turn all electric loads OFF.
   - Blower Fan
   - Headlight
   - Rear Window Defroster
4. Make sure that the engine speed does not change when disconnecting the air bypass solenoid valve Ⓐ connector.

Note

- **If the engine speed decreases, the engine is still under the warm-up condition.**

5. If the electric cooling fan is operating, wait till the fan stops.
6. Verify that the engine is running at idle in good condition.
7. Connect the **SST** to the diagnosis connector.
8. Connect a tachometer to the diagnosis connector **IG–** terminal as shown.
9. Set switch Ⓐ to position 1.
10. Set TEST SW to SELF-TEST.

Note

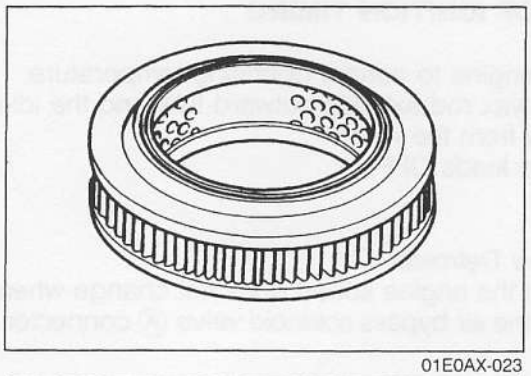
- **If the SST is not used, jump across the TEN terminal and the GND terminal of the diagnosis connector.**

Idle Speed

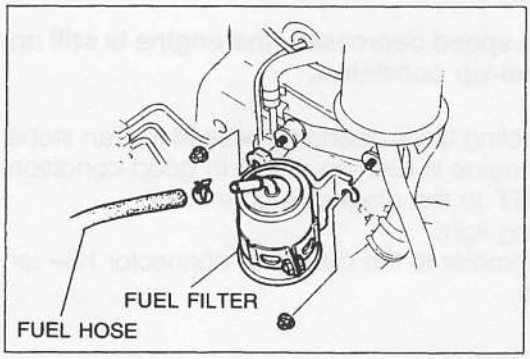
1. Check the idle speed with a tachometer.

Idle speed: MTX (Neutral) 750 $^{+50}_{-0}$ rpm
ATX (P range) 1,100 $^{+50}_{-0}$ rpm

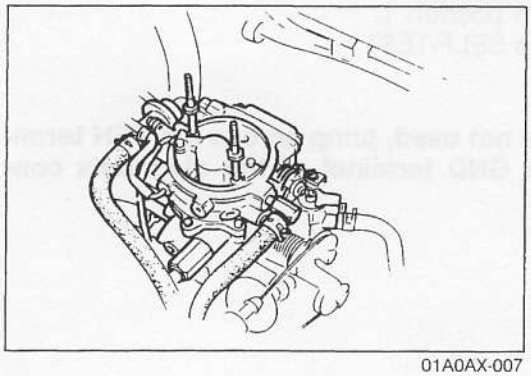
2. If not within the specification, adjust the idle by turning the throttle adjusting screw (TAS).



01E0AX-023



01A0AX-006



01A0AX-007

REPLACEMENT OF AIR CLEANER ELEMENT

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

REPLACEMENT OF FUEL FILTER

Warning

- **Keep sparks and open flames away from the fuel area.**
- **After replacing the fuel filter, check that the filter joints are not leaking.**

To replace the fuel filter, proceed as follows:

1. Disconnect the fuel hoses.
2. Remove the fuel filter with the bracket.
3. Install a new filter in the reverse order of removal.

Note

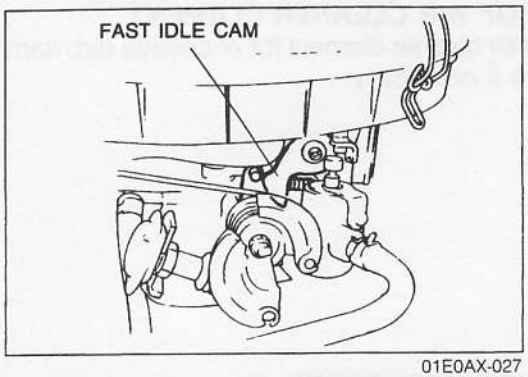
- **When installing the fillter make sure the hoses are pushed on as far as possible. Secure the hoses with clips.**

INSPECTION OF FUEL LINES AND HOSES

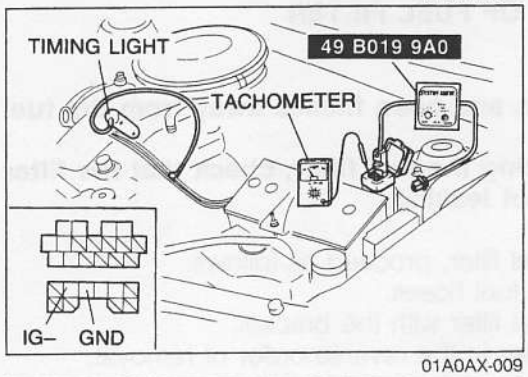
Check the fuel line fittings, connections and components for leaks.

There should be no wetness or stained areas that might indicate leaks.

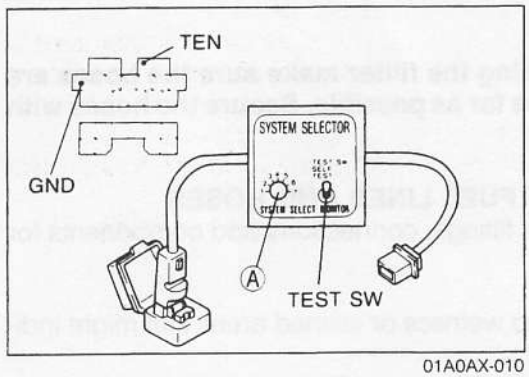
Replace any defective hoses or clips.



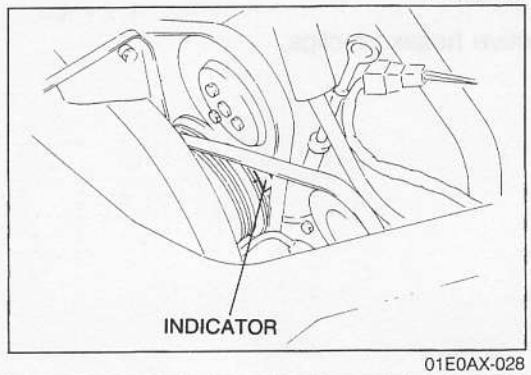
01E0AX-027



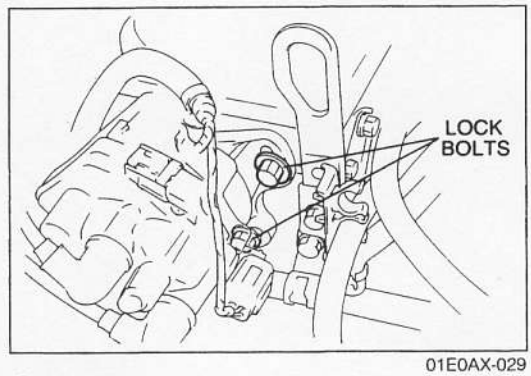
01A0AX-009



01A0AX-010



01E0AX-028



01E0AX-029

ADJUSTMENT OF IGNITION TIMING

Preparation

1. Warm up the engine to normal operating temperature.
2. Verify that the wax rod extends outward fully and the idle cam separates from the roller.
3. Turn all electric loads OFF.
   - Blower Fan
   - Headlight
   - Rear Window Defroster
4. Make sure that the engine speed does not change when disconnecting the air bypass solenoid valve Ⓐ connector.

Note

- **If the engine speed decreases, the engine is still under the warm-up condition.**

5. If the electric cooling fan is operating, wait till the fan stops.
6. Verify that the engine is running at idle in good condition.
7. Connect the **SST** to the diagnosis connector.
8. Connect a timing light.
9. Connect a tachometer to the diagnosis connector **IG–** terminal as shown.
10. Set switch Ⓐ to position 1.
11. Set TEST SW to SELF-TEST.

Note

- **If the SST is not used, jump across the TEN terminal and the GND terminal of the diagnosis connector.**

Ignition Timing

Inspection / Adjustment

1. Check that the idle speed is within the specification.

Idle speed: MTX (Neutral) 750 $^{+50}_{-0}$ rpm
ATX (P range) 1,100 $^{+50}_{-0}$ rpm

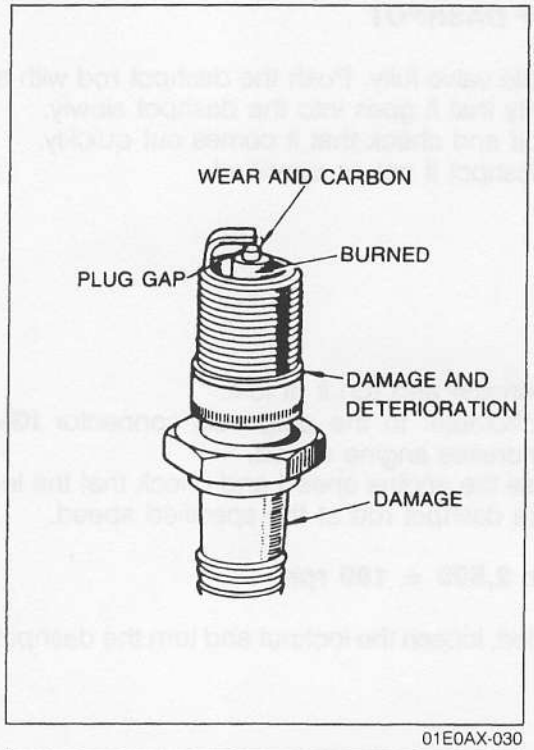
2. Check the ignition timing with a timing light.

Ignition timing: BTDC 16 ± 1°

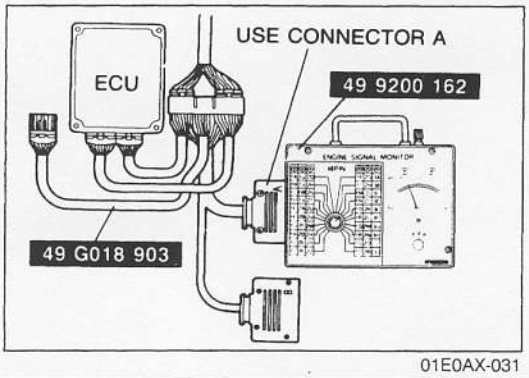
3. If the ignition timing is not within the specification, loosen the distributor lock bolts and turn the distributor to make the adjustment.
4. Tighten the distributor lock bolts to the specified torque.

Tightening torque:
16—23 N·m (1.6—2.3 m-kg, 12—16 ft-lb)

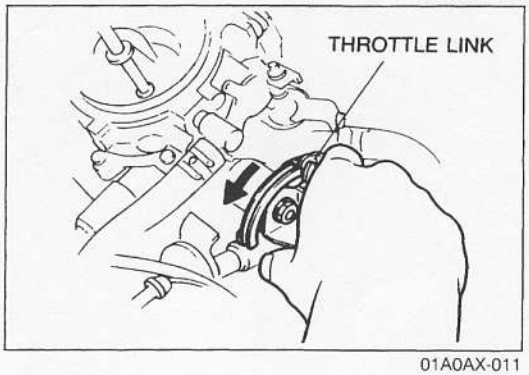
5. Put a seal on the distributor lock bolt.



01E0AX-030



01E0AX-031



01A0AX-011

INSPECTION OF SPARK PLUGS

1. Check the plugs for burned or eroded electrodes, fouling or cracked porcelain.
2. Measure the electrode gap. If necessary, adjust the gap to specifications or replace the spark plugs.

Plug gap: 1.0—1.1mm (0.039—0.043 in)
(0.75—0.85mm [0.029—0.033 in])
-B1 Carburetor

ENGINE	B1	B3
NGK	BPR5ES, BPR6ES	BKR5E-11, BKR6E-11
NIPPONDENSO	W16EXR-U, W20EXR-U	K16PR-U11, K20PR-U11

Caution

- **When installing a new plug or reinstalling old plugs, use a small amount of anti-seize compound or molybdenum-based thread lubricant on the first few threads.**
- **Do not pull the spark plug cables to remove them, pull on the spark plug boots.**

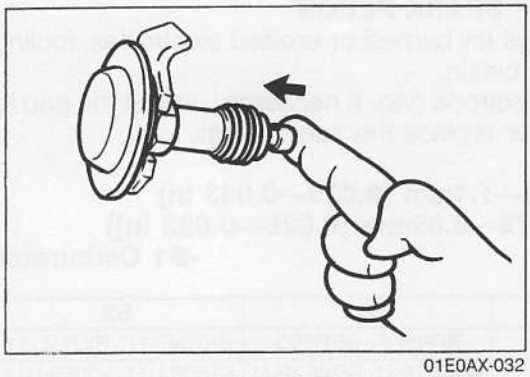
INSPECTION OF THROTTLE SENSOR

1. Warm up the engine to normal operating temperature.
2. Verify that the wax rod expands outward fully and the cam separates from the roller.
3. Stop the engine and turn the ignition switch ON.
4. Connect the **SSTs (Engine Signal Monitor and Adapter Harness)** to the ECU as shown.
5. Set the **SST (Engine Signal Monitor)** to terminal 2M.
6. Rotate the throttle link by hand and verify that the voltage is within the specification.

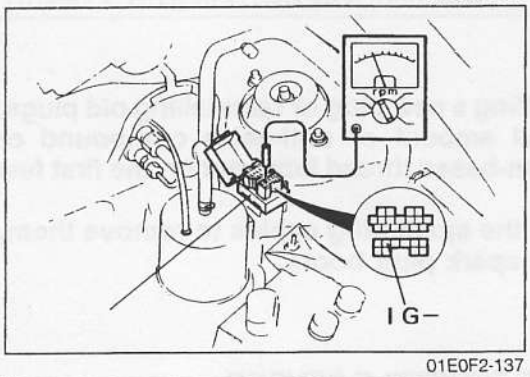
Specification

ECU Terminal	Throttle valve condition	
	Fully closed	Fully open
2M	0.41—0 62V	4.14—4.46V

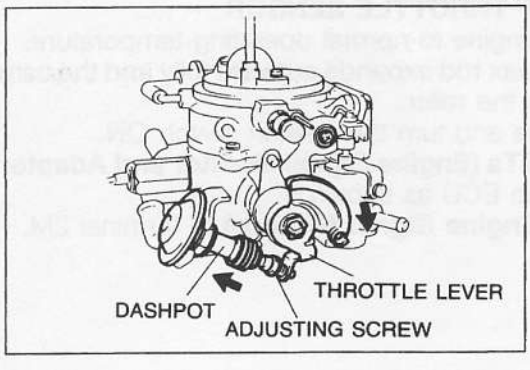
7. If not as specified, adjust the throttle sensor.



01E0AX-032



01E0F2-137



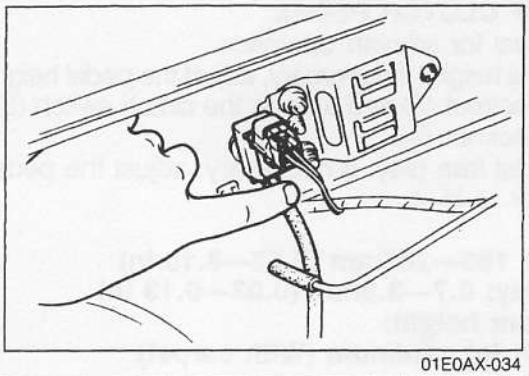
INSPECTION OF DASHPOT

Inspection

1. Open the throttle valve fully. Push the dashpot rod with a finger and verify that it goes into the dashpot slowly.
2. Release the rod and check that it comes out quickly.
3. Replace the dashpot if not as specified.
4. Warm up the engine and run it at idle.
5. Connect a tachometer to the diagnosis connector **IG–** terminal and increase engine speed.
6. Slowly decrease the engine speed and check that the lever touches the dashpot rod at the specified speed.

   Specification: 2,500 ± 100 rpm

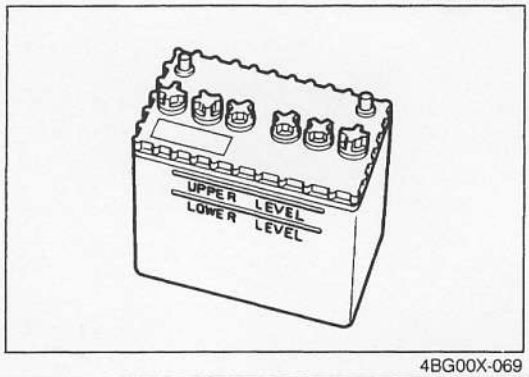
7. If not as specified, loosen the locknut and turn the dashpot to adjust.



01E0AX-034

INSPECTION OF EVAPORATIVE SYSTEM

1 Warm up the engine to normal operating temperature and run it at idle.
2. Disconnect the vacuum hose from the solenoid valve 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.

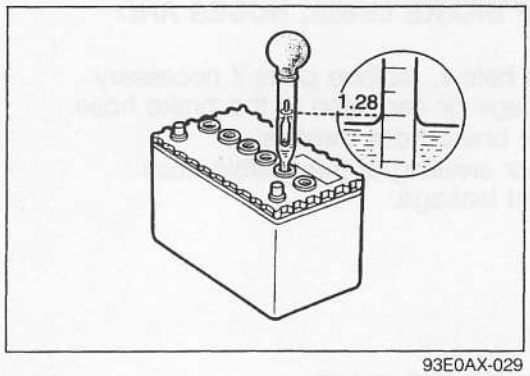


4BG00X-069

INSPECTION OF BATTERY

Check the electrolyte level.
The level should be between the upper and lower lines. If the level is low, add distilled water.
Check the specific gravity.

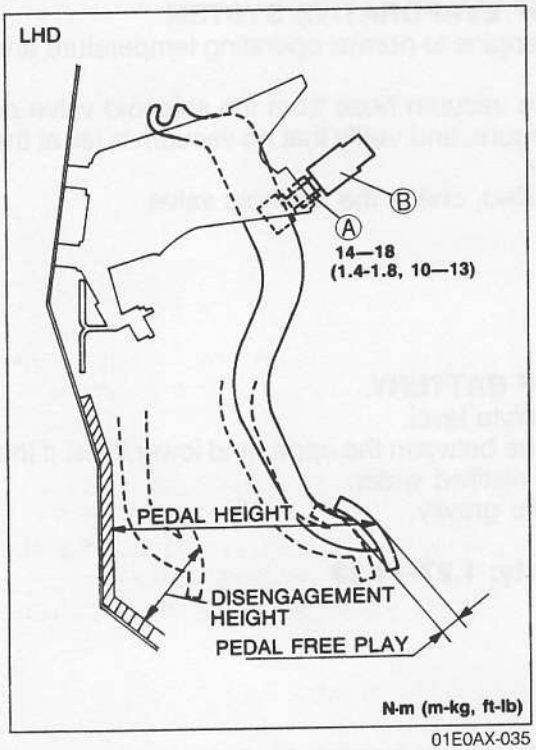
Specific gravity: 1.27—1.29



93E0AX-029

INSPECTION OF ALL ELECTRICAL SYSTEM

Check the all electrical systems.
If the mulfunction is found, refer to Section T or wiring diagrams for repair.

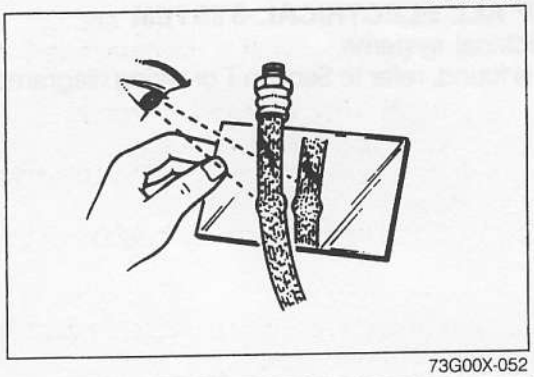


01E0AX-035

INSPECTION OF CLUTCH PEDAL

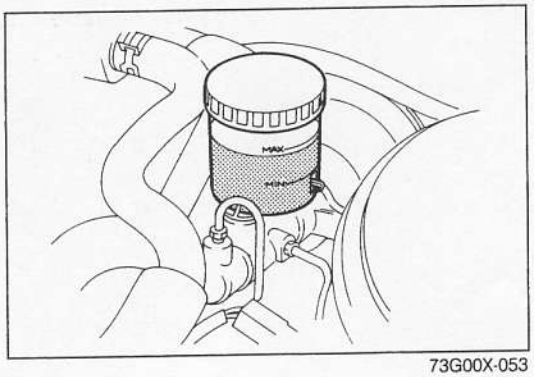
1. Check the pedal for smooth operation.
2. Check the pedal height. If necessary, adjust the pedal height by loosening locknut Ⓐ and turning the clutch switch Ⓑ, retighten the locknut Ⓐ.
3. Check the pedal free play. If necessary, adjust the pedal free play. Refer to H–4.

Pedal height: 196—207mm (7.72—8.15 in)
Pedal free play: 0.7—3.3mm (0.03—0.13 in)
Disengagement height:
41mm (1.61 in) minimum (With carpet)


73G00X-052

INSPECTION OF BRAKE LINES, HOSES AND CONNECTIONS

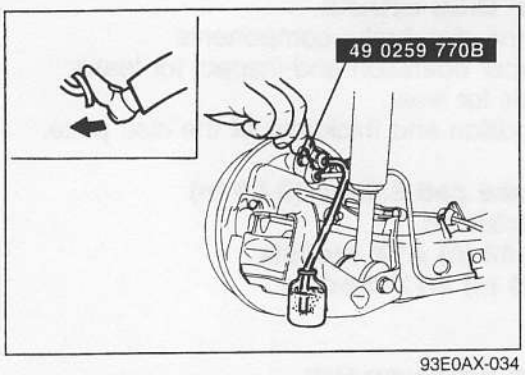
Check the points below, replace parts if necessary.
1. Cracking, damage or corrosion of the brake hose.
2. Damage to the brake hose threads.
3. Scars, cracks or swelling of the flexible hose.
4. All lines for fluid leakage.



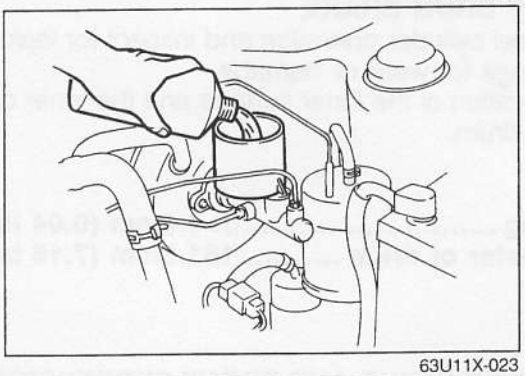
73G00X-053

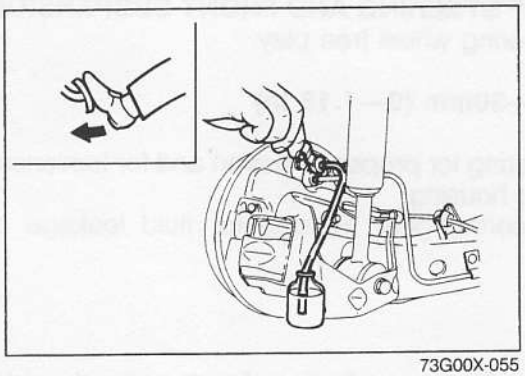
INSPECTION OF BRAKE FLUID

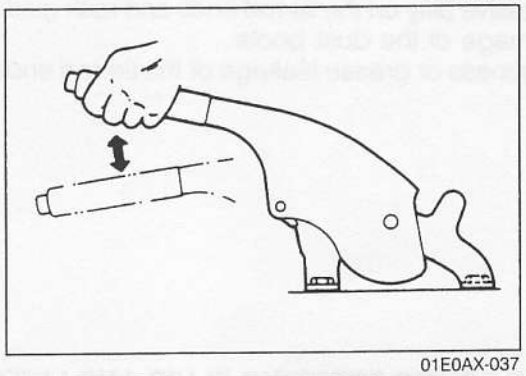
Check fluid level in reservoir. The level should be between the Max. and Min. lines on the reservoir.
If the fluid level is extremely low, check the brake system for leaks.

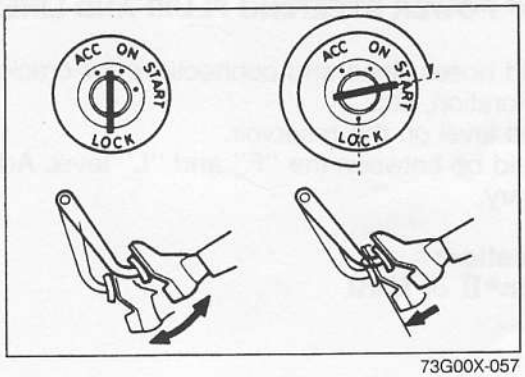


93E0AX-034


63U11X-023


73G00X-055


01E0AX-037



73G00X-057

REPLACEMENT OF BRAKE FLUID AIR BLEEDING

1. Remove the brake fluid from the reservoir by using a suction pump.
2. Fill the reservoir with new brake fluid.

Fluid specification: FMVSS 116: DOT-3
SAE: J1703

3. Attach a vinyl tube to the bleeder screw and place the other end of the vinyl tube in a container.
4. Pump out the old brake fluid by loosening each bleeder screw (one by one) and pumping the brake pedal.
5. Bleed air as described below.

Caution
- **The fluid in the reservoir must be maintained at the 2/4 level or higher during air bleeding.**
- **Be careful not to spill brake fluid onto painted surfaces.**

1. Jack up the vehicle and support it with safety stands.
2. Remove the bleeder cap and attach a vinyl hose to the bleeder plug.
3. Place the other end of the vinyl tube in a container.
4. Slowly pump the brake pedal several times.
5. While the brake pedal is pressed, loosen the bleeder screw to let fluid and air escape.
6. Repeat steps 4 and 5 until there are no air bubbles in the fluid.
7. Check for correct brake operation.
8. Check to be sure that there is no fluid leakage. Be sure to clean away any spilled fluid with rags.
9. After bleeding the air, add brake fluid to the reservoir up to the specified level.

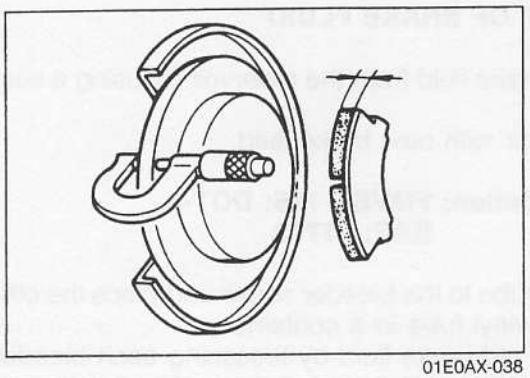
INSPECTION OF PARKING BRAKE

1. Pull the brake lever with **98 N (10 kg, 22 lb)** of force and measure the lever stroke.
2. If necessary, adjust the lever stroke by turning the adjusting nut.

Stroke: 6—8 notches

INSPECTION OF POWER BRAKE UNIT AND HOSES

1. Check the vacuum hose, connectors and check-valve for cracks, chafing, deterioration etc.
2. With the engine stopped, depress the pedal a few times.
3. With the pedal depressed, start the engine.
4. If, immediately after the engine starts, the pedal moves down slightly, the unit is good.



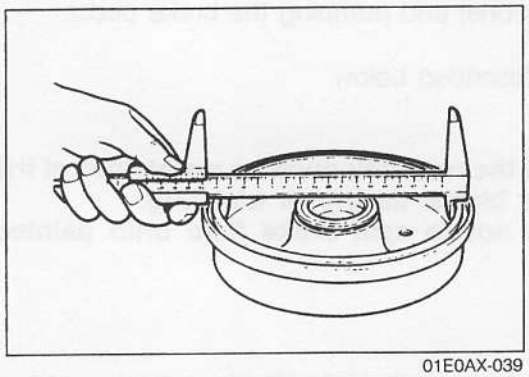
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INSPECTION OF DISC BRAKE

Check the following disc brake components.

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

Minimum: Brake pad 2.0mm (0.08 in)
Disc plate thickness
16.0mm (0.63 in) ATX models
10mm (0.39 in) MTX models

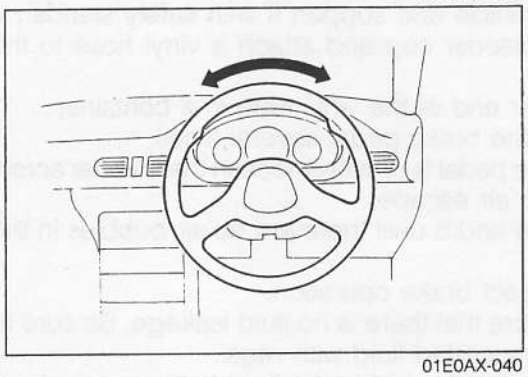


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INSPECTION OF DRUM BRAKE

1. Check the wheel cylinder operation and inspect for leaks.
2. Check the linings for wear or damage.
3. Check the condition of the inner surface and the inner diameter of the drum.

Limit:
Brake lining ..... 1.0mm (0.04 in)
Inner diameter of drum ..... 181.5mm (7.15 in)



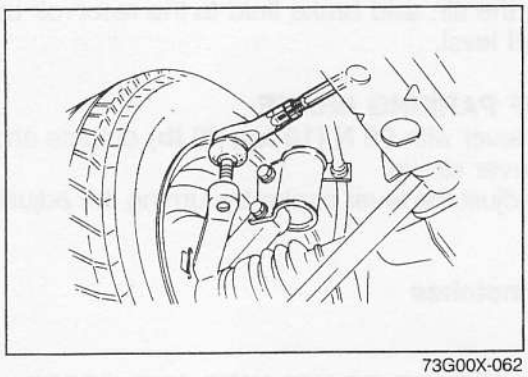
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INSPECTION OF STEERING AND FRONT SUSPENSION

1. Check the steering wheel free play.

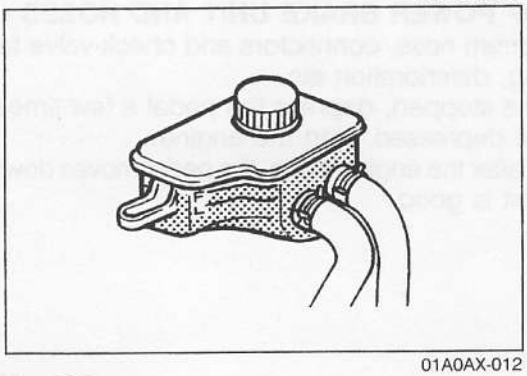
Free play: 0—30mm (0—1.18 in)

2. Check the steering for proper operation and for looseness of the steering housing.
3. Check the steering gear housing for fluid leakage or seepage.



73G00X-062

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.

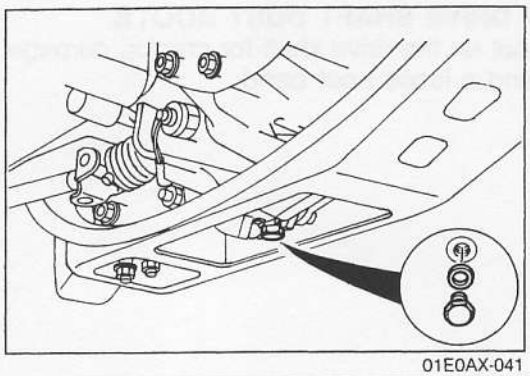


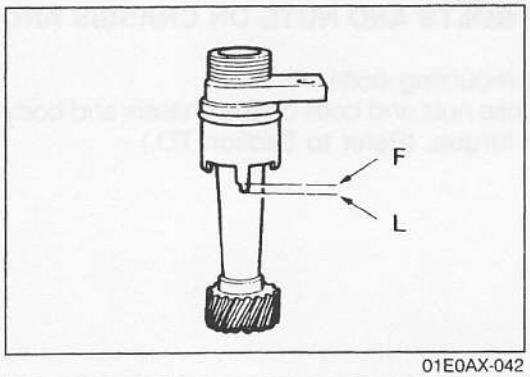
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INSPECTION OF POWER STEERING FLUID AND LINES (if equipped)

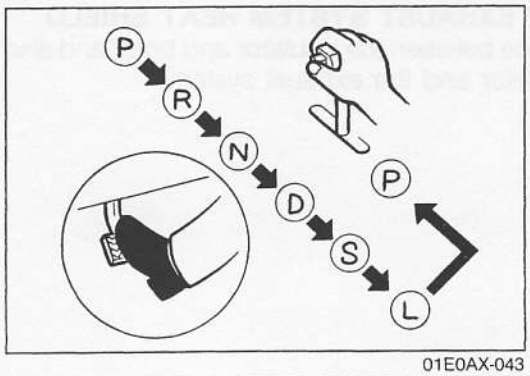
1. Check the fluid hoses, lines and connections for cracks, chafing, deterioration, etc.
2. Check the fluid level on the reservoir.
   The level should be between the "F" and "L" level. Add fluid if necessary.

Fluid specification:
ATF Dexron®II or M-III

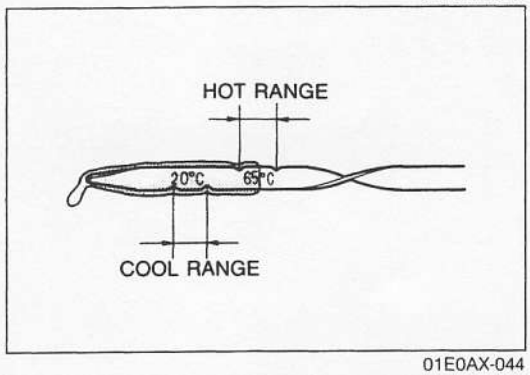

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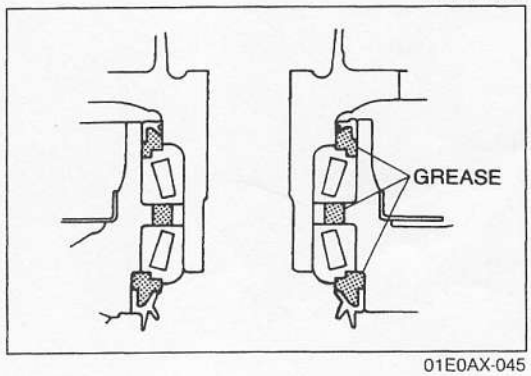
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01E0AX-043



01E0AX-044



01E0AX-045

REPLACEMENT OF MANUAL TRANSAXLE OIL

1. Visually check the manual transaxle for oil leakage. If leakage is found, check for the cause, and repair.
2. Remove the speedometer cable and driven gear.
3. Remove the drain plug and drain the oil.
4. Reinstall the drain plug securely.

Tightening torque:
24—35 N·m (2.4—3.6 m-kg, 17—26 ft-lb)

5. Fill with the specified oil from the speedometer driven gear hole to the F mark on the speedometer driven gear.

Specified oil
Grade: API service GL-4
Viscosity: All-season Dexron®II or M2C33F
Above −18°C (0°F) SAE 75W-80

Capacity:
2.5 liters (2.64 US qt, 2.2 Imp qt)

INSPECTION OF AUTOMATIC TRANSAXLE FLUID LEVEL

Caution
- **Place the vehicle on a flat, level surface.**

1. Apply the parking brake and position wheel chocks securely to prevent the vehicle from rolling.
2. Warm-up the engine until the ATF reaches **60—70°C (140—158°F)**.
3. While depressing the brake pedal, shift the selector lever to each range (P-L) and leave it a few seconds in each range.
4. Shift back to P.

Note
- **Only use the COOL (20°C) range as a rough reference.**

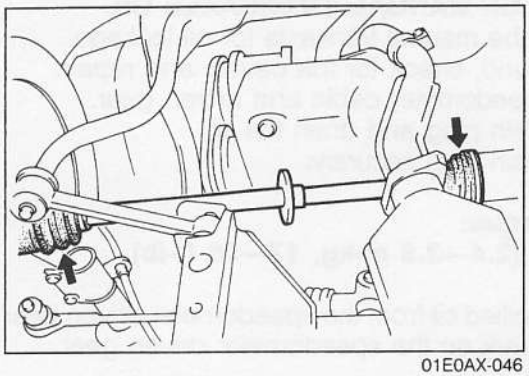
5. Ensure that the ATF level is in the HOT (65°C) range. Add ATF to specification, if necessary.

ATF type: Dexron®II or M-III
Capacity: 6.3 liters (6.7 US qt, 5.5 Imp qt)

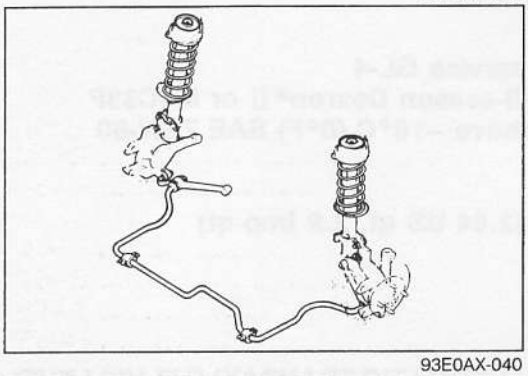
REPLACEMENT OF FRONT WHEEL BEARING GREASES

Completely fill the shaded area shown in the figure with lithium grease.

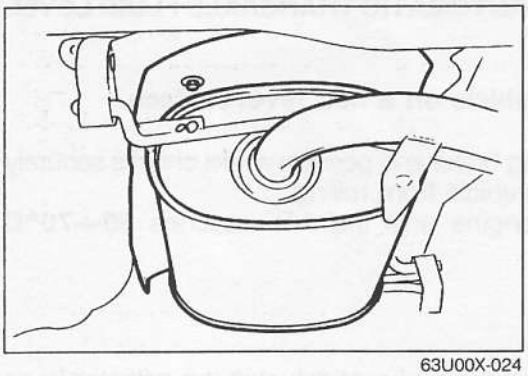
Note
- **Refer to page M-8 for disassembly / assembly procedure.**



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93E0AX-040



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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 OF BOLTS AND NUTS ON CHASSIS AND BODY

1. Tighten all seat mounting bolts.
2. Retighten any loose nuts and bolts on the chassis and body to the specified torque. (Refer to Section TD.)

INSPECTION OF EXHAUST SYSTEM HEAT SHIELD

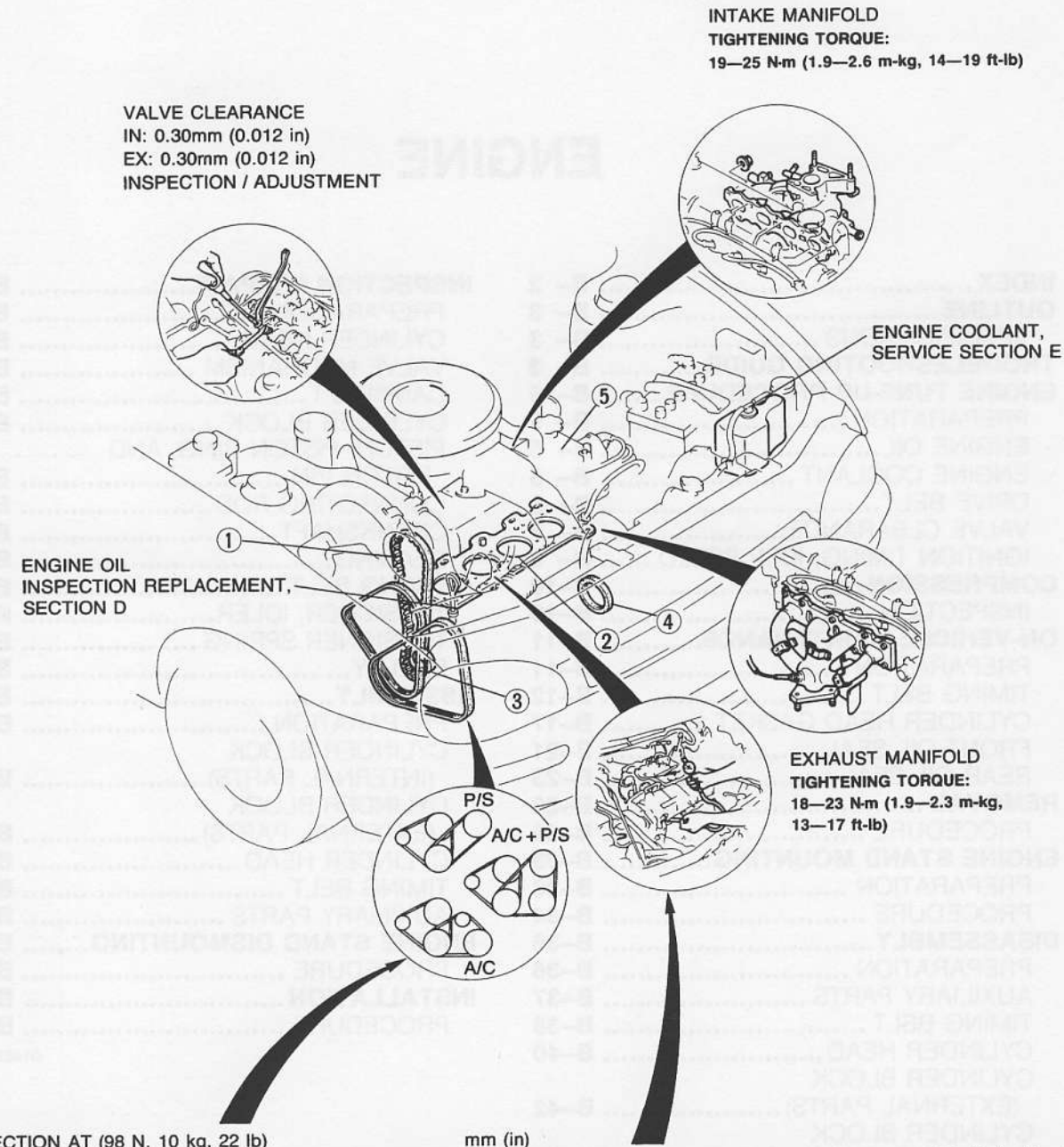
Check the clearance between the insulator and body and also between the insulator and the exhaust system.

ENGINE

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PROCEDURE **B–84**

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

DRIVE BELT	NEW	USED
ALTERNATOR	5.0—7.0 (0.19—0.27)	6.0—7.5 (0.23—0.29)
P/S, P/S + A/C	8.0—9.0 (0.31—0.35)	9.0—10.0 (0.35—0.39)
A/C	8.0—9.0 (0.31—0.35)	9.0—10.0 (0.35—0.39)

COMPRESSION INSPECTION PAGE B–12 kPa (kg/cm², psi)-rpm

	B3
Standard	1412 (14.4, 204)-300
Minimum	1030 (10.5, 149)-300

01A0BX-002

1. Timing belt
   Removal / Installation ..... page B–12
2. Cylinder head gasket
   Replacement ..... page B–17
3. Front oil seal
   Replacement ..... page B–21
4. Rear oil seal
   Replacement ..... page B–23
5. Engine
   Removal ..... page B–26
   Engine stand mounting ..... page B–33
   Disassembly ..... page B–36
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   Assembly ..... page B–60
   Engine stand dismounting ..... page B–82
   Installation ..... page B–84

OUTLINE

SPECIFICATIONS

Item \ Engine				B3
Type				Gasoline, 4-cycle
Cylinder arrangement and number				In-line, 4-cylinders
Combustion chamber				Pentroof
Valve system				OHC, belt-driven 16 valves
Displacement			cc (cu in)	1323 (80.7)
Bore and stroke			mm (in)	71.0 × 83.6 (2.80 × 3.29)
Compression ratio				9.4
Compression pressure			kPa (kg/cm^2, psi)-rpm	1373 (14.4, 199)-300
Valve timing	IN	Open	BTDC	5°
		Close	ABDC	40°
	EX	Open	BBDC	40°
		Close	ATDC	5°
Valve clearance		IN	mm (in)	0.30 (0.012)
		EX		0.30 (0.012)
Idle speed		MTX	rpm	750 $^{+50}_{-0}$
		ATX		1100 $^{+50}_{-0}$
Ignition timing			BTDC	16 ± 1°
Firing order				1—3—4—2

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TROUBLESHOOTING GUIDE

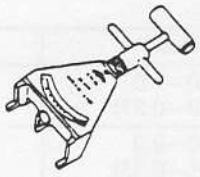
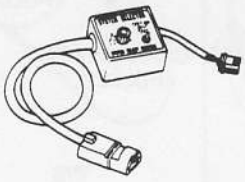
Problem	Possible Cause	Remedy	Page
Difficult starting	**Malfunction of engine-related components**		
	Burned valve	Replace	B–49
	Worn piston, piston ring, or cylinder	Replace or repair	B–54,56
	Failed cylinder head gasket	Replace	B–17
	Malfunction of fuel system	Refer to Section F	
	Malfunction of ignition system	Refer to Section G	
Poor idling	**Malfunction of engine-related components**		
	Poor valve-to-valve seat contact	Replace or repair	B–49
	Failed cylinder head gasket	Replace	B–17
	Malfunction of fuel system	Refer to Section F	
	Malfunction of ignition system	Refer to Section G	
Excessive oil consumption	**Oil working up**		
	Worn piston ring groove or sticking piston ring	Replace	B–56
	Worn piston or cylinder	Replace or repair	B–54,56
	Oil working down		
	Worn valve seal	Replace	B–61,72
	Worn valve stem or guide	Replace	B–50
	Oil leakage	Refer to Section D	

Problem	Possible Cause	Remedy	Page
Insufficient power	**Insufficient compression**		
	Compression leakage from valve seat	Repair	B–51
	Seized valve stem	Replace	B–49
	Weak or broken valve spring	Replace	B–52
	Failed cylinder head gasket	Replace	B–17
	Cracked or distorted cylinder head	Replace	B–48
	Sticking, damaged, or worn piston ring	Replace	B–56
	Cracked or worn piston	Replace	B–56
	Malfunction of fuel system	Refer to Section F	
	Malfunction of ignition system	Refer to Section G	
	Others		
	Slipping clutch	Refer to Section H	
	Dragging brakes	Refer to Section P	
	Wrong size tires	Refer to Section Q	
Abnormal combustion	**Malfunction of engine-related components**		
	Sticking or burned valve	Replace	B–49
	Weak or broken valve spring	Replace	B–52
	Carbon accumulation in combustion chamber	Eliminate carbon	—
	Malfunction of fuel system	Refer to Section F	
	Malfunction of ignition system	Refer to Section G	
Engine noise	**Crankshaft- or bearing-related parts**		
	Excessive main bearing oil clearance	Replace or repair	B–64
	Main bearing seized or heat-damaged	Replace	B–58
	Excessive crankshaft end play	Replace or repair	B–65
	Excessive connecting rod bearing oil clearance	Replace or repair	B–65
	Connecting rod bearing seized or heat-damaged	Replace	B–58
	Piston-related parts		
	Worn cylinder	Replace or repair	B–55
	Worn piston or piston pin	Replace	B–56
	Seized piston	Replace	B–56
	Damaged piston ring	Replace	B–56
	Bent connecting rod	Replace	B–57
	Valves or timing-related parts		
	Broken valve spring	Replace	B–52
	Excessive valve guide clearance	Replace	B–49
	Malfunction of cooling system	Refer to Section E	
	Malfunction of fuel system	Refer to Section F	
	Others		
	Malfunction of water pump bearing	Refer to Section E	
	Improper drive belt tension	Adjust	B– 6
	Malfunction of alternator bearing	Refer to Section G	
	Exhaust gas leakage	Refer to Section F	
	Malfunction of timing belt tensioner	Replace	B–13

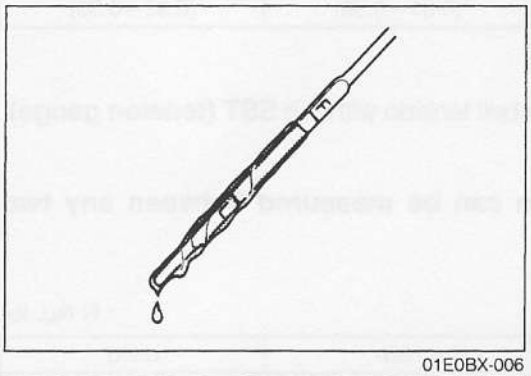
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ENGINE TUNE-UP PROCEDURE

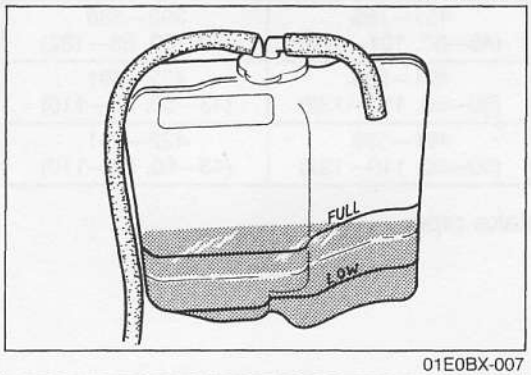
PREPARATION
SST

49 9200 020 Tension gauge, V-ribbed belt 	For inspection of drive belt tension	49 B019 9A0 System selector 	For inspection of ignition timing and idle speed

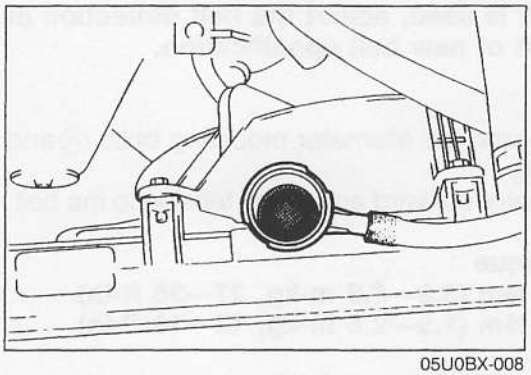
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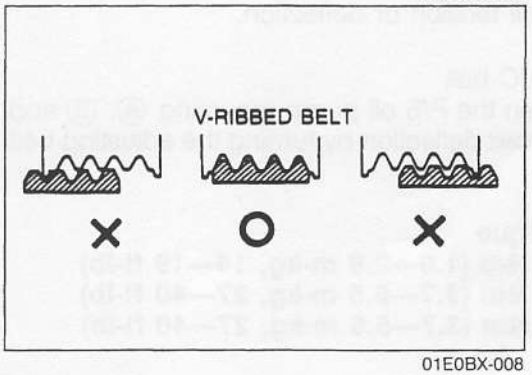
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05U0BX-008



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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 oil 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 0.8 liter (0.85 US qt, 0.70 Imp qt).**

ENGINE COOLANT
Inspection
Coolant level (engine cold)

Warning

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

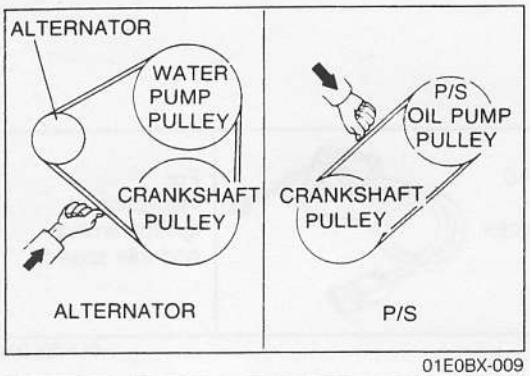
1. Verify that the coolant level is near the radiator filler neck.
2. Check that the coolant level in the coolant reservoir is between the FULL and LOW marks.
3. Add coolant if necessary.

Coolant quality

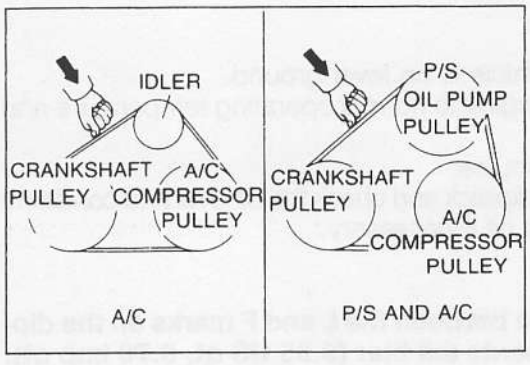
1. Verify that there is no buildup of rust or scale around the radiator cap or radiator filler neck.
2. Verify that the coolant is free of oil.
3. Replace the coolant if necessary.

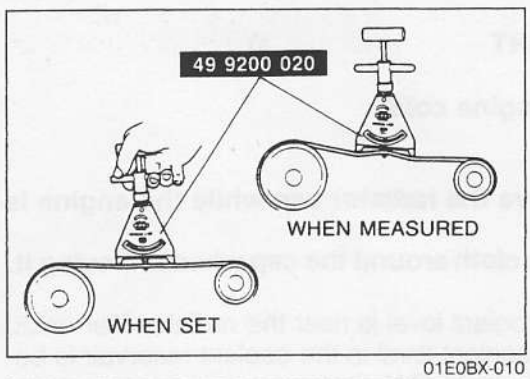
DRIVE BELT
Inspection

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.

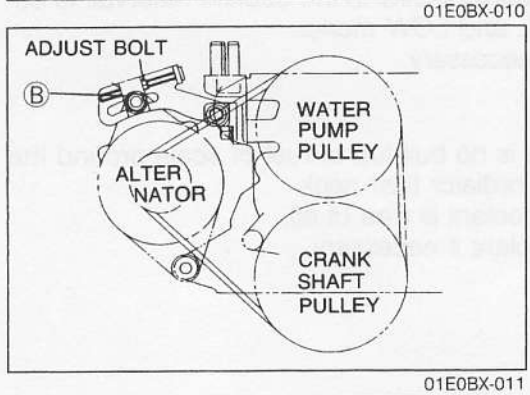


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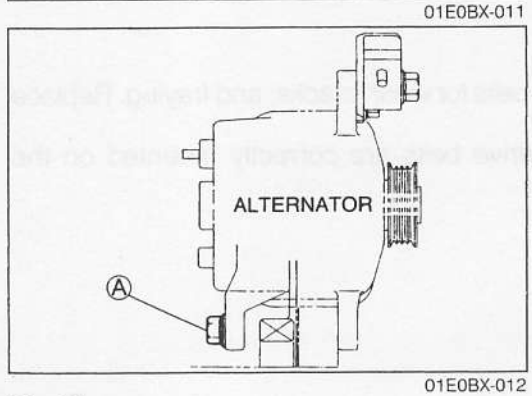




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01E0BX-011



01E0BX-012

3. Check the drive belt deflection by applying moderate pressure **(98 N, 10 kg, 22 lb)** midway between the pulleys, as shown. Adjust if necessary.

Deflection

mm (in)

Drive belt	New	Used
Alternator	5 0—7.0 (0 19—0.27)	6.0—7.5 (0.23—0.29)
P/S, P/S + A/C	8 0—9.0 (0.31—0 35)	9.0—10 0 (0.35—0.39)
A/C	8 0—9.0 (0.31—0.35)	9.0—10.0 (0.35—0.39)

4. Check the drive belt tension with the **SST (tension gauge)**.

Note
- **Belt tension can be measured between any two pulleys.**

Tension

N (kg, lb)

Drive belt	New	Used
Alternator	451—785 (46—80, 101—176)	392—588 (40—60, 88—132)
P/S, P/S + A/C	491—589 (50—60, 110—132)	422—491 (43—50, 95—110)
A/C	491—589 (50—60, 110—132)	422—491 (43—50, 95—110)

5. Install the air intake pipe.

Adjustment

Caution
- **If a new belt is used, adjust the belt deflection at the midpoint of new belt specification.**

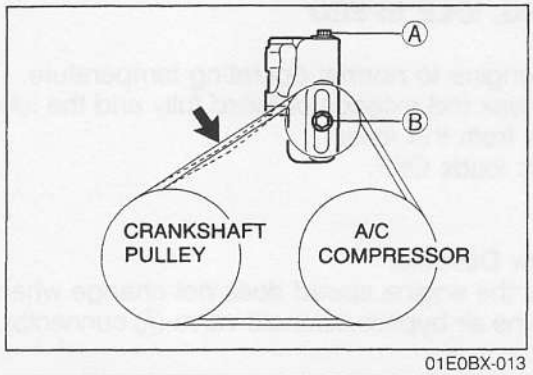
Alternator belt
1. If necessary, loosen the alternator mounting bolts Ⓐ and adjusting bolt Ⓑ.
2. Lever the alternator outward and apply tension to the belt.

Tightening torque
Ⓐ : 37—51 N·m (3.8—5.3 m-kg, 27—38 ft-lb)
Ⓑ : 18—25 N·m (1.9—2.6 m-kg, 13—18 ft-lb)

3. Recheck the belt tension or deflection.

P/S belt, P/S + A/C belt
If necessary, loosen the P/S oil pump mounting Ⓐ, Ⓑ and Ⓒ and adjust the belt deflection by turning the adjusting bolt Ⓓ.

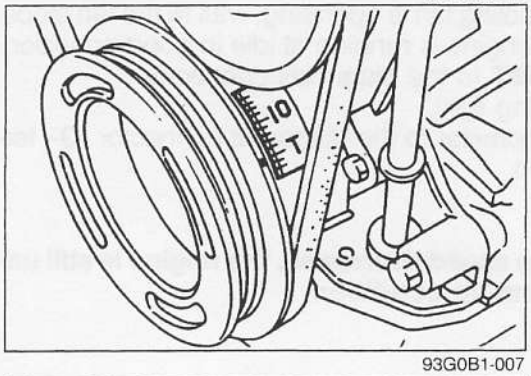
Tightening torque
Ⓐ : 19—25 N·m (1.9—2.6 m-kg, 14—19 ft-lb)
Ⓑ : 36—54 N·m (3.7—5.5 m-kg, 27—40 ft-lb)
Ⓒ : 36—54 N·m (3.7—5.5 m-kg, 27—40 ft-lb)



01E0BX-013

A/C belt
If necessary, loosen the locknut Ⓐ and adjust the belt deflection by turning the adjusting bolt Ⓑ.

Tightening torque:
37—51 N·m (3.8—5.3 m-kg, 27—38 ft-lb)

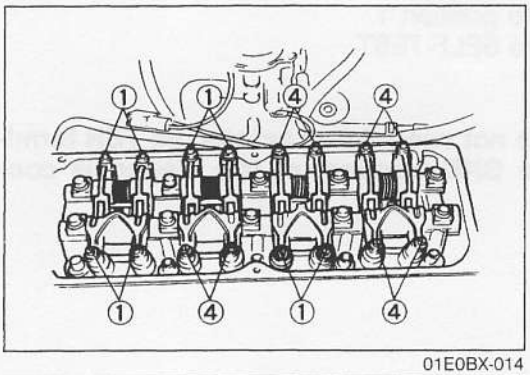


93G0B1-007

VALVE CLEARANCE

Inspection / Adjustment

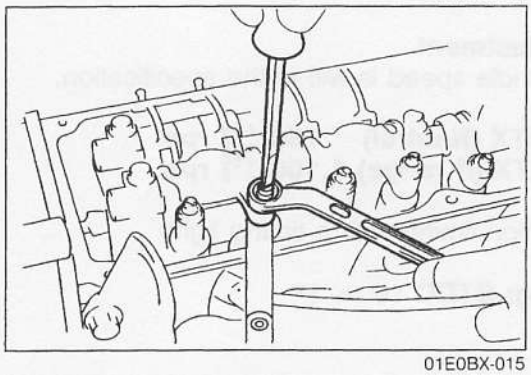
1. Warm up the engine to normal operating temperature.
2. Remove the air cleaner.
3. Remove the accelerator cable.
4. Remove the cylinder head cover.
5. Turn the crankshaft and align the timing mark so that the piston of the No.1 or No.4 cylinder is at TDC of compression.



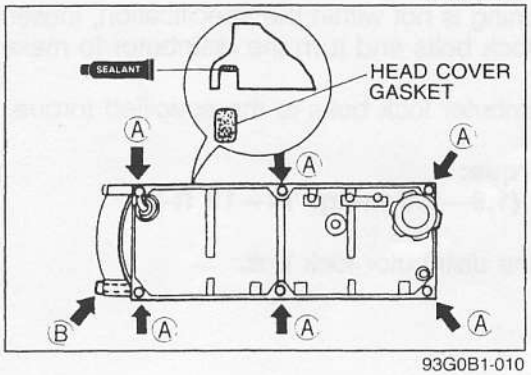
01E0BX-014

6. Measure the valve clearances ① with the No.1 cylinder at TDC of compression, and those of ④ with the No.4 cylinder at TDC of compression.

Valve clearance (valve side)
IN : 0.30mm (0.012 in)
EX: 0.30mm (0.012 in)


01E0BX-015

7. If it is not within specification, adjust and recheck the valve clearance.
8. Turn the crankshaft one full turn and measure the remaining valve clearances. Adjust if necessary.



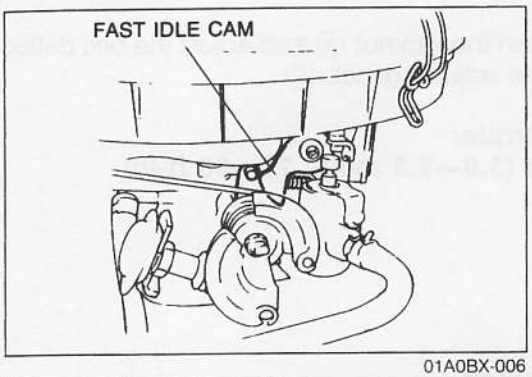
93G0B1-010

9. Install the cylinder head cover.

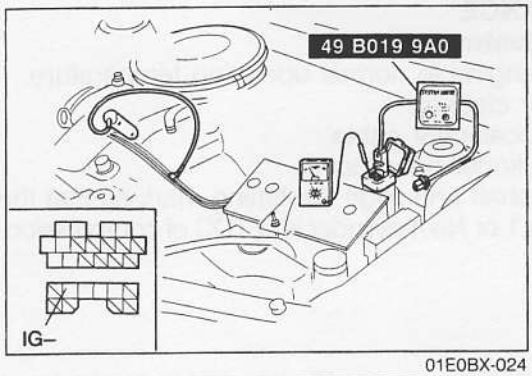
Tightening torque
Bolt Ⓐ: 4.9—9.8 N·m (50—90 cm-kg, 43—78 in-lb)
Bolt Ⓑ: 7.8—11 N·m (80—110 cm-kg, 69—95 in-lb)

Caution
- **If the head cover gasket is reused, apply sealant in the groove as shown.**

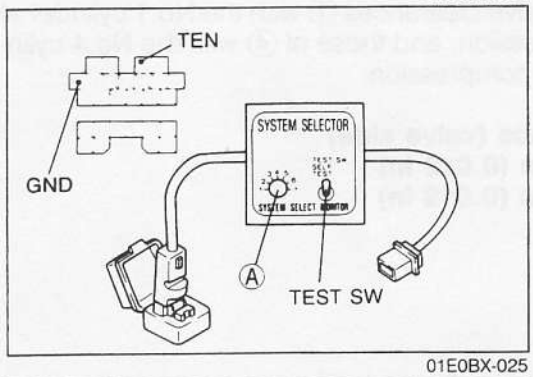
10. Install the accelerator cable.
11. Install the air cleaner.
12. Start the engine and check for excessive tappet noise.



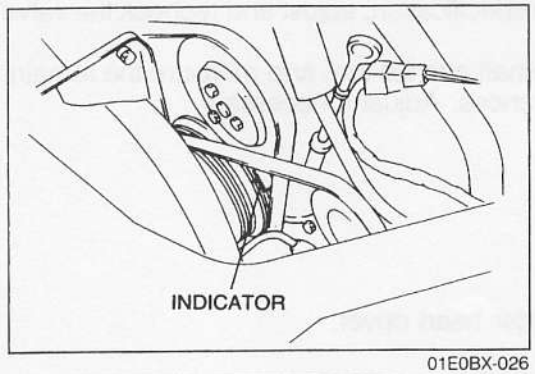
01A0BX-006



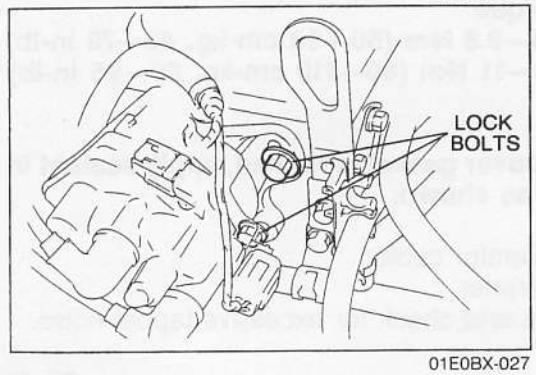
01E0BX-024



01E0BX-025



01E0BX-026



01E0BX-027

IGNITION TIMING, IDLE SPEED

Preparation

1. Warm up the engine to normal operating temperature.
2. Verify that the wax rod extends outward fully and the idle cam separates from the roller.
3. Turn all electric loads OFF.
   - Blower Fan
   - Headlight
   - Rear Window Defroster
4. Make sure that the engine speed does not change when disconnecting the air bypass solenoid valve Ⓐ connector.
5. If the electric cooling fan is operating, wait till the fan stops.
6. Verify that the engine is running at idle in good condition.
7. Connect the **SST** to the diagnosis connector.
8. Connect a timing light.
9. Connect a tachometer to the diagnosis connector **IG–** terminal as shown.

Note
- **If the engine speed decreases, the engine is still under the warm-up condition.**

10. Set switch Ⓐ to position 1.
11. Set TEST SW to SELF-TEST.

Note
- **If the SST is not used, jump across the TEN terminal and the GND terminal of the diagnosis connector.**

Ignition Timing

Inspection / Adjustment

1. Check that the idle speed is within the specification.

Idle speed: MTX (Neutral) 750 $^{+50}_{-0}$ rpm
ATX (P range) 1,100 $^{+50}_{-0}$ rpm

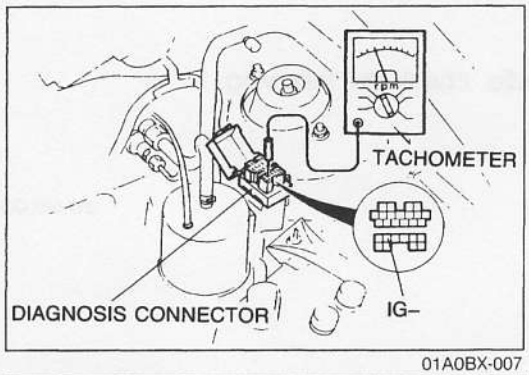
2. Check the ignition timing with a timing light.

Ignition timing: BTDC 16 ± 1°

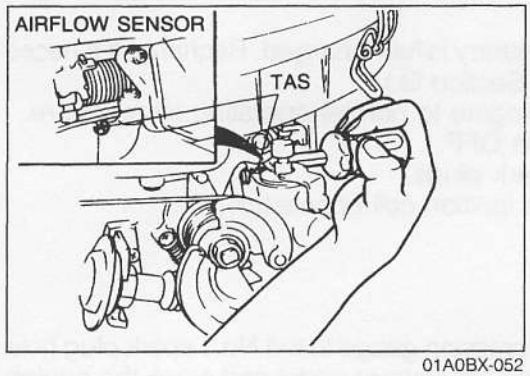
3. If the ignition timing is not within the specification, loosen the distributor lock bolts and turn the distributor to make the adjustment.
4. Tighten the distributor lock bolts to the specified torque.

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

5. Put a seal on the distributor lock bolt.



01A0BX-007



01A0BX-052

Idle Speed

1. Perform "Preparation". (Refer to page B–8.)
2. Check the idle speed with a tachometer.

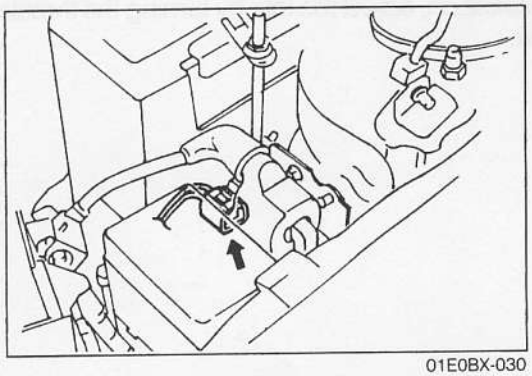
Idle speed: MTX (Neutral) 750 $^{+50}_{-0}$ rpm
ATX (P range) 1,100 $^{+50}_{-0}$ rpm

3. If not within specification, adjust the idle by turning the throttle adjusting screw.

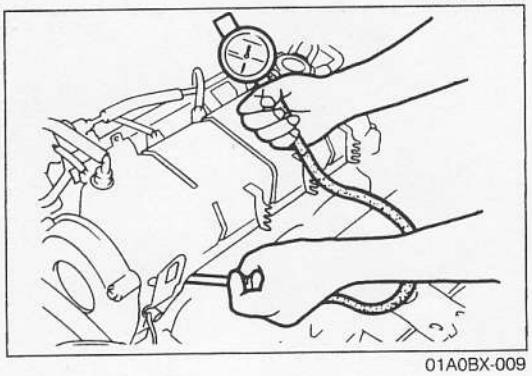
COMPRESSION

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.)

01A0BX-008



01E0BX-030



01A0BX-009

INSPECTION

1. Verify that the battery is fully charged. Recharge it if necessary. (Refer to Section G.)
2. Warm up the engine to normal operating temperature.
3. Turn the engine OFF.
4. Remove all spark plugs.
5. Disconnect the ignition coil connector.
6. Connect a compression gauge to the No.1 spark plug hole.
7. Fully depress the accelerator pedal and crank the engine.
8. Record the maximum gauge reading.
9. Check each cylinder.

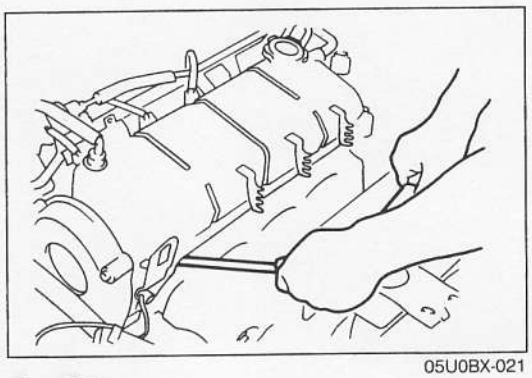
Compression

kPa (kg/cm^2, psi)-rpm

	B3
Standard	1412 (14.4, 204)-300
Minimum	1030 (10.5, 149)-300
Max. difference between cylinders	196 (2.0, 26)

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

05U0BX-020



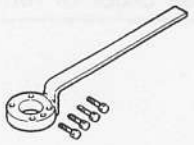
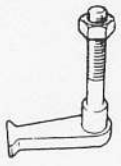
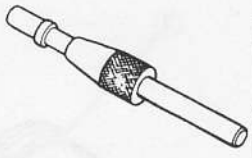
05U0BX-021

12. Apply antiseize compound or molybdenum-based lubricant to the spark plug threads.
13. Install the spark plugs.

Tightening torque:
15—23 N·m (1.5—2.3 m-kg, 11—17 ft-lb)

ON-VEHICLE MAINTENANCE

PREPARATION
SST

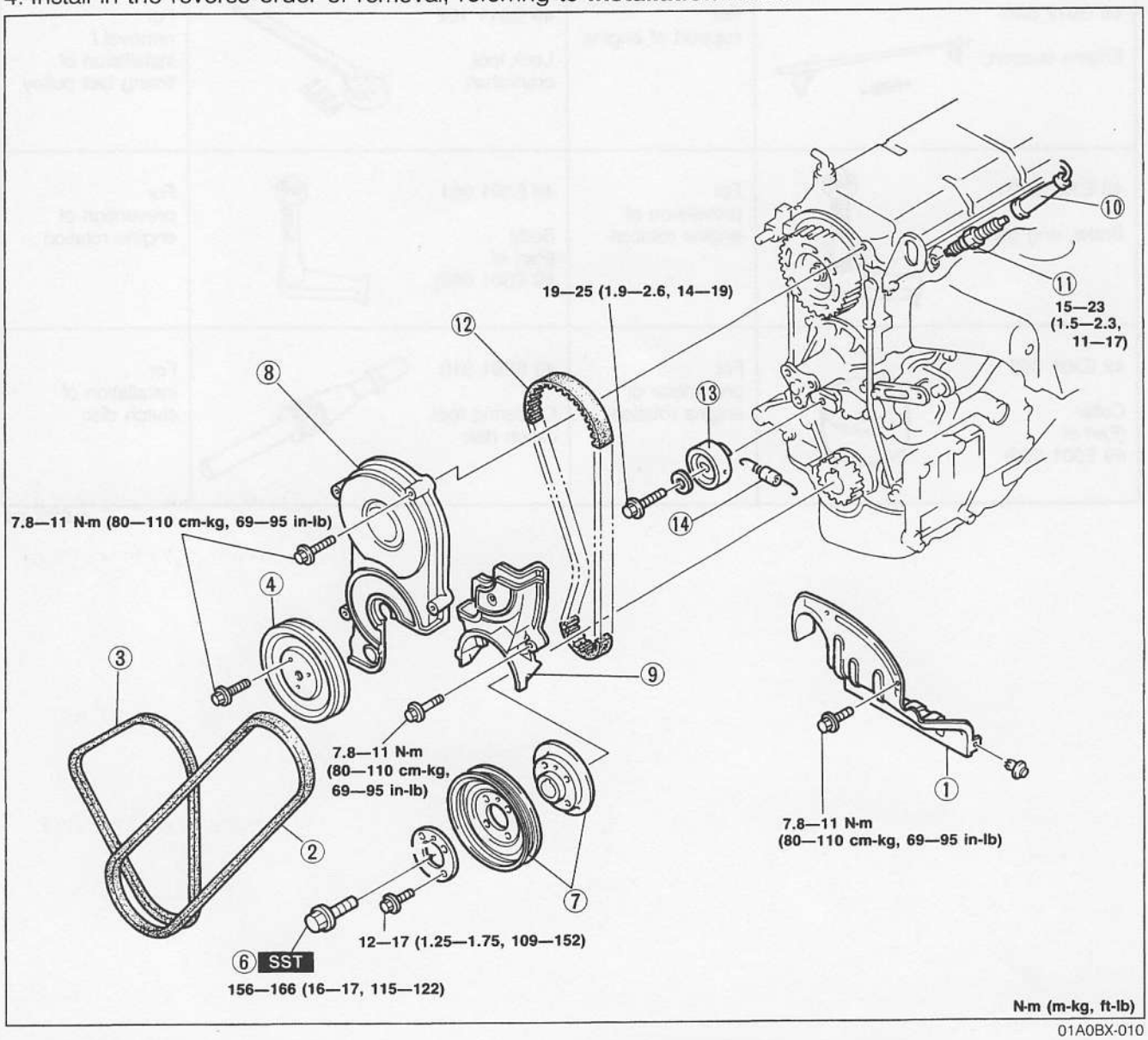
49 G017 5A0 Engine support 	For support of engine	49 D011 102 Lock tool, crankshaft 	For removal / installation of timing belt pulley
49 E301 060 Brake, ring gear 	For prevention of engine rotation	49 E301 061 Body (Part of 49 E301 060) 	For prevention of engine rotation
49 E301 062 Collar (Part of 49 E301 060) 	For prevention of engine rotation	49 SE01 310 Centering tool, clutch disc 	For installation of clutch disc

01E0BX-032

TIMING BELT

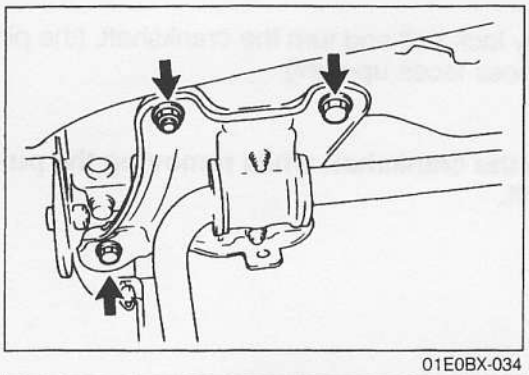
Removal / Installation

1. Disconnect the negative battery cable.
2. Lift up the vehicle.
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**.



01A0BX-010

1. Splash shield
2. P/S and/or A/C drive belt
   Inspection ..... page B– 5
3. Alternator drive belt
   Inspection ..... page B– 5
   Adjustment ..... page B– 6
4. Water pump pulley
5. Plate
   Removal Note ..... page B–13
   Installation Note ..... page B–16
6. Pulley lock bolt
   Removal Note ..... page B–13
   Installation Note ..... page B–15
7. Crankshaft pulley and pulley boss
8. Timing belt cover, upper
9. Timing belt cover, lower
10. High-tension leads
11. Spark plugs
12. Timing belt
    Removal Note ..... page B–14
    Inspection ..... page B–14
    Installation Note ..... page B–14
13. Tensioner
    Inspection ..... page B–14
    Installation Note ..... page B–15
14. Tensioner spring
    Inspection ..... page B–14
    Installation Note ..... page B–15



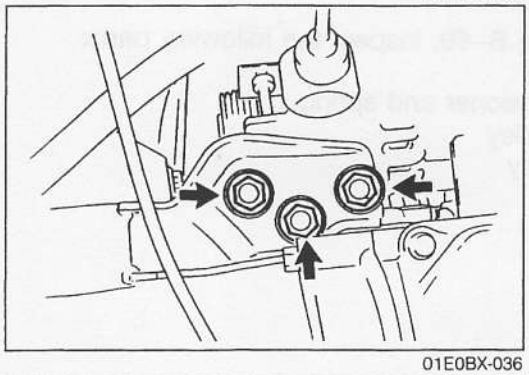
01E0BX-034

Removal note
Plate
1. Remove the right stabilizer mounting bolts.



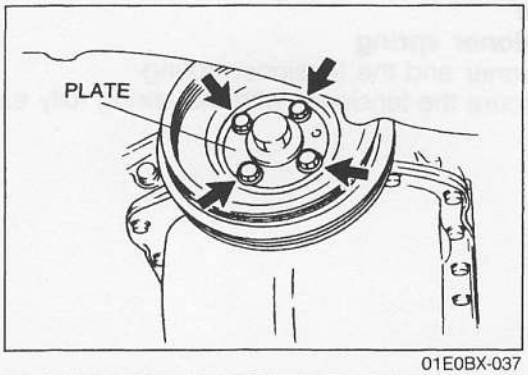
01E0BX-035

2. Suspend the engine with the **SST**.



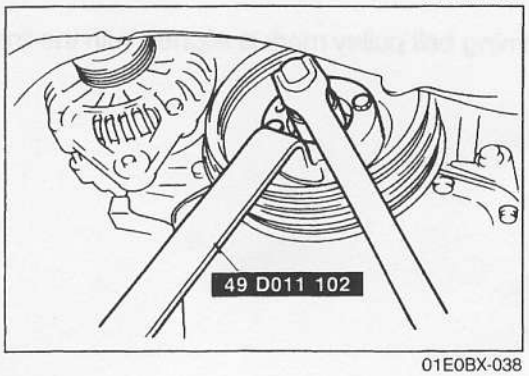
01E0BX-036

3. Remove the engine mount No.3 mounting bolts and turn over the engine mount No.3.
4. Lower the engine approximately **50mm (1.97 in)** gradually.



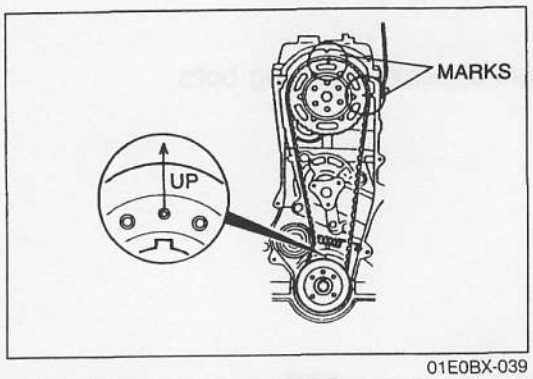
01E0BX-037

5. Remove the plate mounting bolts, and then the plate.



01E0BX-038

Pulley lock bolt
1. Hold the pulley boss with the **SST**.
2. Using the **SST**, loosen the pulley lock bolt.
3. Remove the pulley lock bolt and pulley.



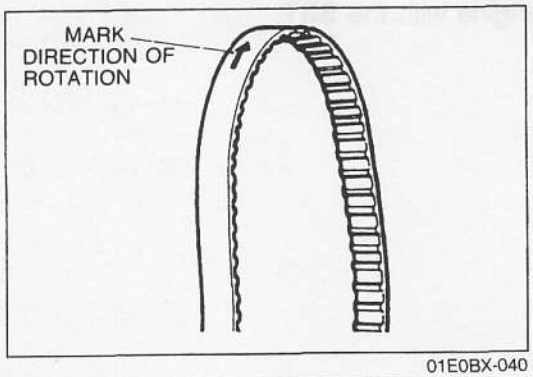
01E0BX-039

Timing belt

1. Install the pulley lock bolt and turn the crankshaft. (the pin on the pulley boss faces up-right)

Caution

- **Do not turn the crankshaft while removing the pulley lock bolt.**

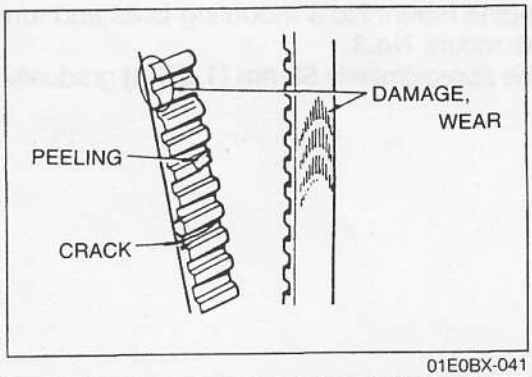


01E0BX-040

2. Remove the timing belt.

Note

- **Mark the timing belt rotation for proper reinstallation.**

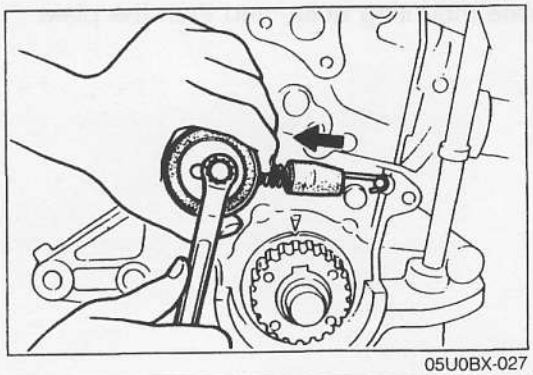


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Inspection

Referring to page B–69, inspect the following parts:

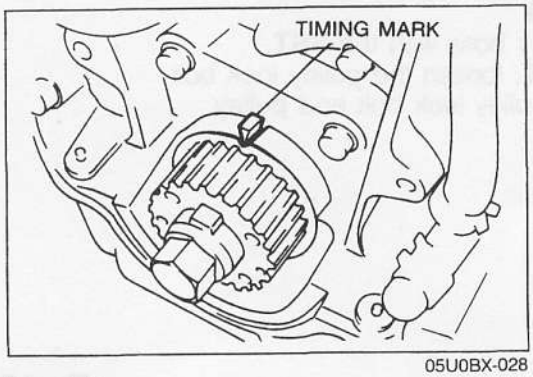
1. Timing belt
2. Timing belt tensioner and spring
3. Timing belt pulley
4. Camshaft pulley


05U0BX-027

Installation note

Tensioner, tensioner spring

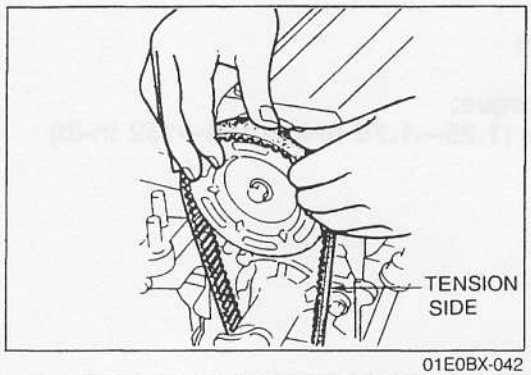
1. Install the tensioner and the tensioner spring.
2. Temporarily secure the tensioner with the spring fully extended.



05U0BX-028

Timing belt

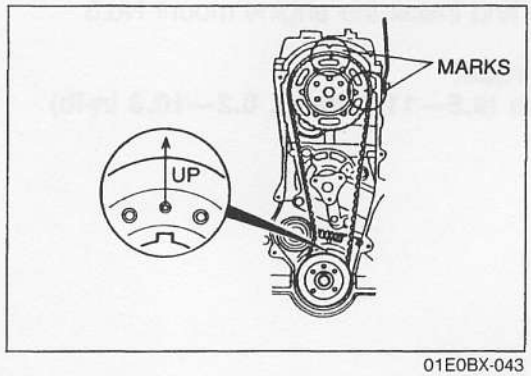
1. Verify that the timing belt pulley mark is aligned with the timing mark.



01E0BX-042

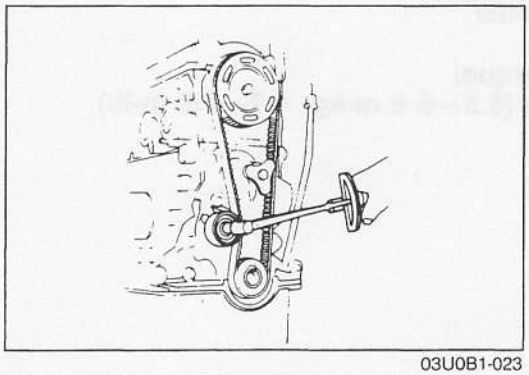
2. Install the timing belt so that there is no looseness at the tension side.

Caution
- **Do not turn the crankshaft counterclockwise.**



01E0BX-043

3. Install the pulley boss and pulley lock bolt.
4. Turn the crankshaft two turns clockwise, and face the pin on the pulley boss up-right.
5. Verify that the camshaft pulley marks are aligned with the cylinder head cover marks.
   If not aligned, remove the timing belt and repeat from tensioner installation.



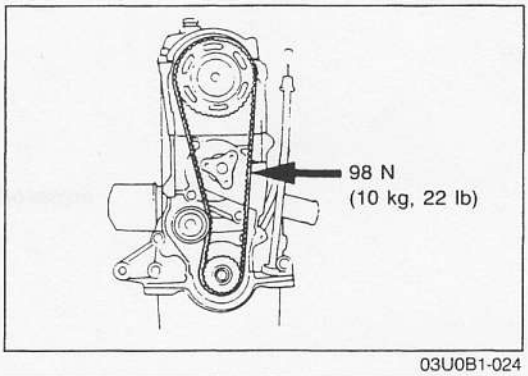
03U0B1-023

6. Loosen the tensioner lock bolt to apply tension to the timing belt.

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

7. Tighten the tensioner lock bolt.

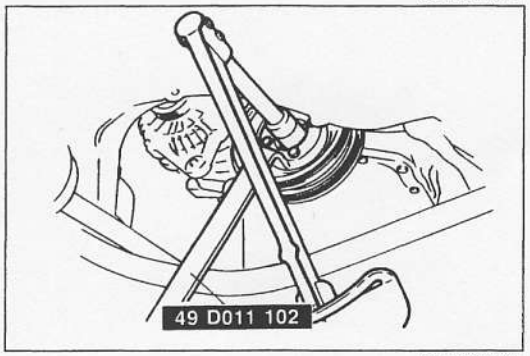
Tightening torque:
19—25 N·m (1.9—2.6 m-kg, 14—19 ft-lb)



03U0B1-024

8. Turn the crankshaft 2 turns clockwise and verify that the marks are correctly aligned.
9. Check the timing belt deflection by applying moderate pressure **(98 N, 10 kg, 22 lb)** midway between the crankshaft pulley and the camshaft pulley.
   If the timing belt deflection is not correct, temporarily secure tensioner lock bolt so the spring is fully extended and repeat steps 4–8 above or replace the tensioner spring.

Deflection:
11.0—13.0mm (0.43—0.51 in) at 98 N (10 kg, 22 lb)

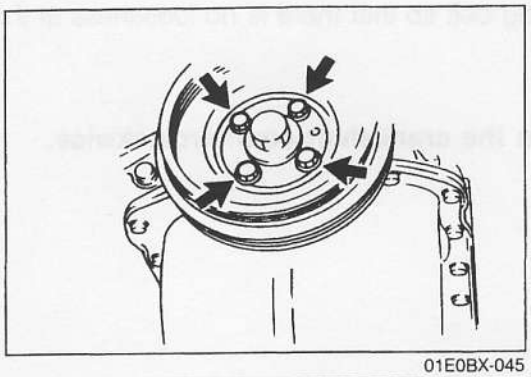


01E0BX-044

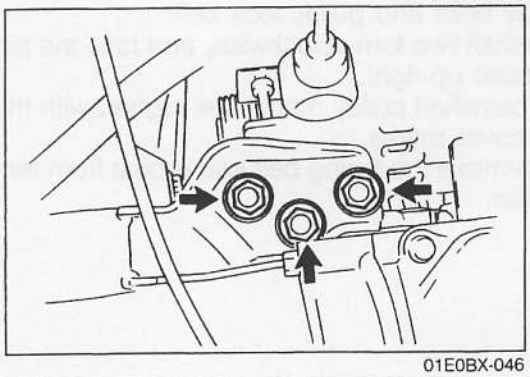
10. Remove the pulley lock bolt and pulley boss using the **SST**.

Pulley lock bolt
Install the crankshaft pulley and tighten the pulley lock bolt using the **SST**.

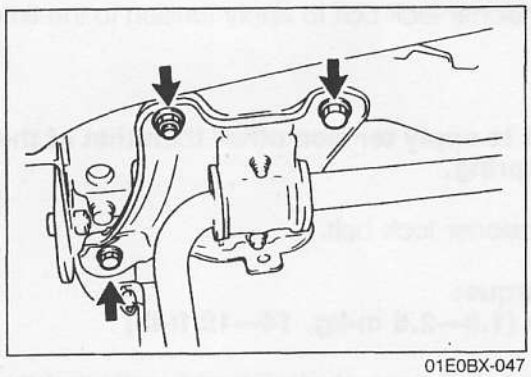
Tightening torque:
157—167 N·m (16—17 m-kg, 116—123 ft-lb)



01E0BX-045



01E0BX-046



01E0BX-047

Plate

1. Install the plate.

Tightening torque:
12—17 N·m (1.25—1.75 m-kg, 109—152 in-lb)

2. Lift the engine and install the engine mount No.3.

Tightening torque:
93—117 N·m (9.5—11.9 m-kg, 8.2—10.3 in-lb)

3. Install the stabilizer.

Tightening torque:
54—67 N·m (5.5—6.9 m-kg, 4.7—5.9 in-lb)

Steps After Installation

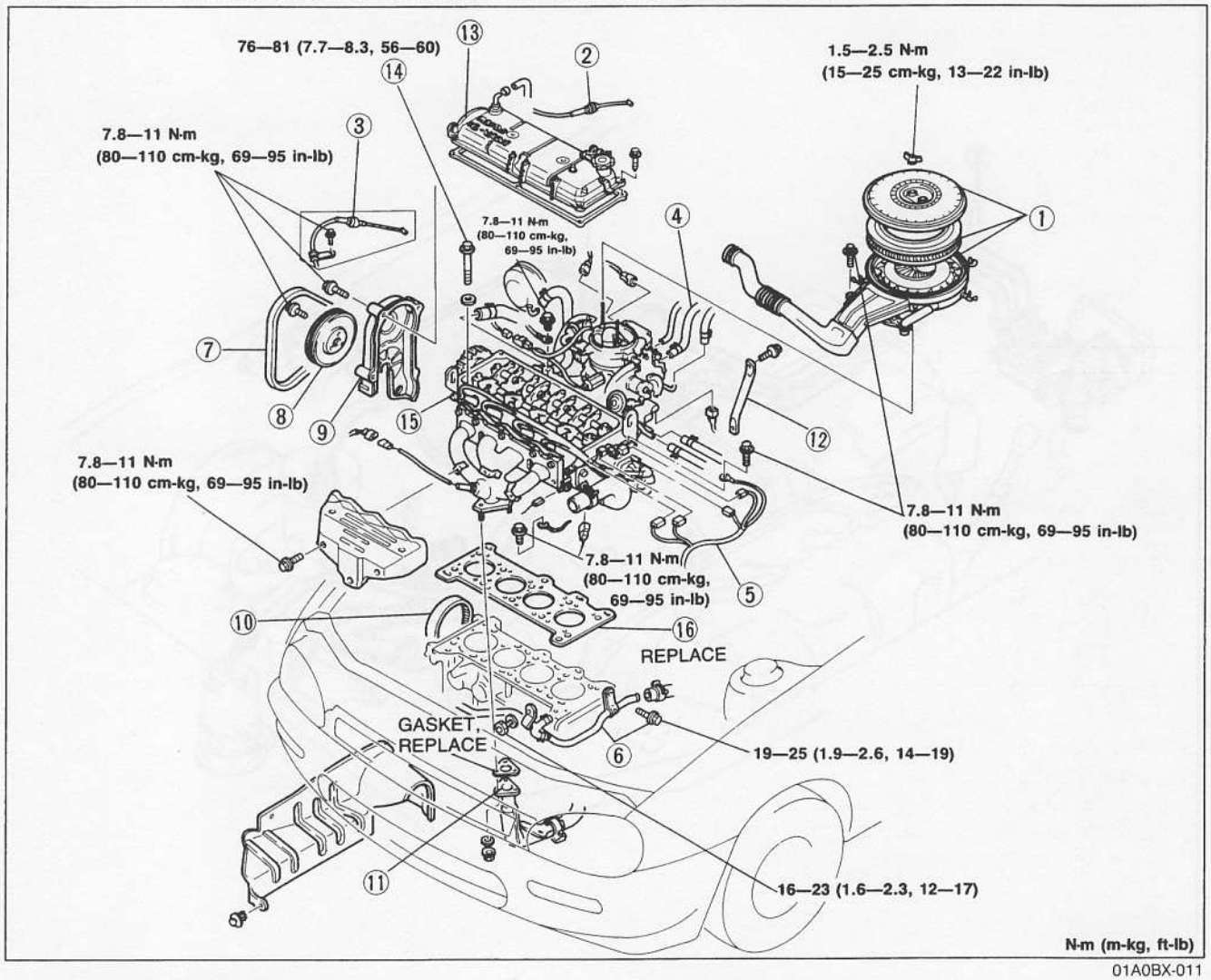
1. Lower the vehicle.
2. Connect the negative battery cable.
3. Start the engine and check as follows:
   - Ignition timing (Refer to page B–8.)

01E0BX-048

CYLINDER HEAD GASKET
Replacement

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

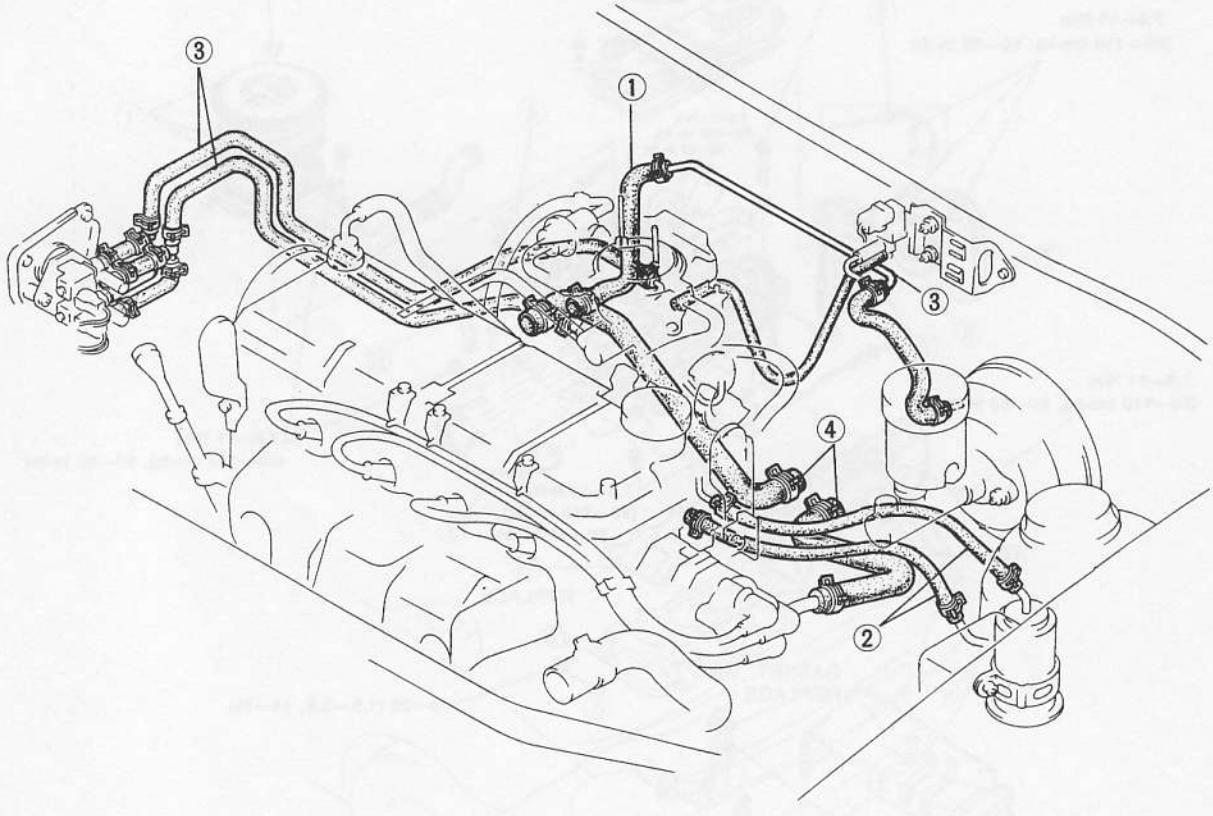
1. Disconnect the negative battery cable.
2. Drain the engine coolant into a container.
3. Remove in the order shown in the figure, referring to **Removal Note**.
4. Install in the reverse order of removal, referring to **Installation Note**.



01A0BX-011

1. Air cleaner assembly
2. Accelerator cable
   Installation Note ..... page B–20
3. Throttle cable
4. Hoses
   Removal / Installation Note ..... page B–18
5. Harnesses
   Removal / Installation Note ..... page B–19
6. Water bypass pipe nuts and bolts
7. Alternator drive belt
8. Water pump pulley
9. Timing belt cover, upper
10. Timing belt
    Removal / Installation ..... page B–12
11. Front exhaust pipe
12. Intake manifold stay
13. Cylinder head cover
14. Cylinder head bolt
    Removal Note ..... page B–19
    Installation Note ..... page B–20
15. Cylinder head
    Disassembly ..... page B–40
    Inspection ..... page B–48
    Assembly ..... page B–72
16. Cylinder head gasket

Removal / Installation note
Hoses
Disconnect the hoses shown in the figure.

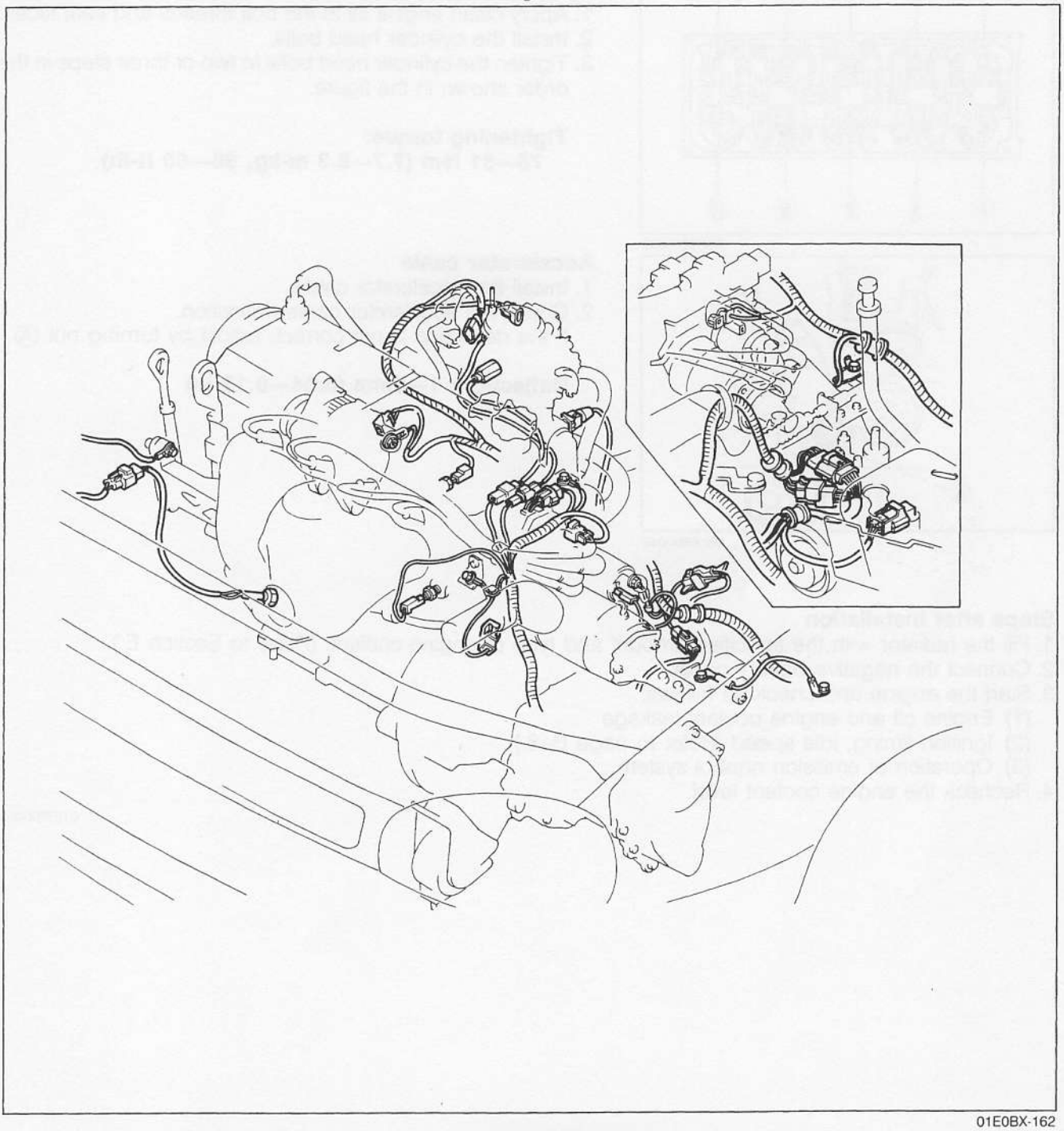


01E0BX-051

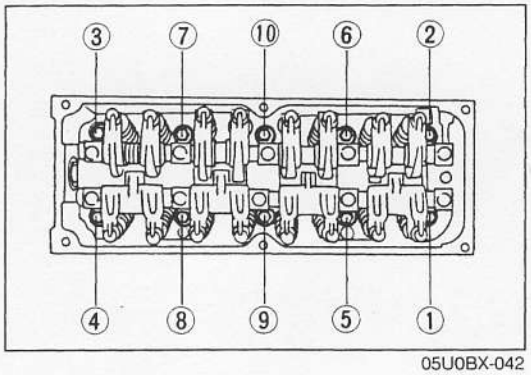
1. Brake vacuum hose
2. Fuel hose
3. Vacuum hose (solenoid valve)
4. Heater hose

Harnesses

Disconnect the harness connectors shown in the figure.



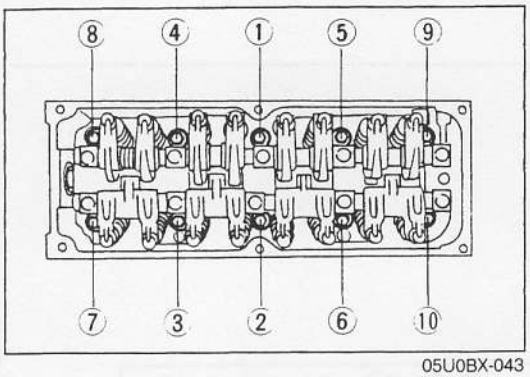
01E0BX-162



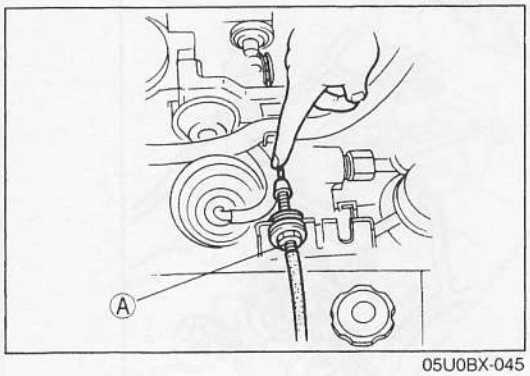
05U0BX-042

Cylinder head bolt

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



05U0BX-043



05U0BX-045

Installation note
Cylinder head bolt
1. Apply clean engine oil to the bolt threads and seat faces.
2. Install the cylinder head bolts.
3. Tighten the cylinder head bolts in two or three steps in the order shown in the figure.

Tightening torque:
76—81 N·m (7.7—8.3 m-kg, 56—60 ft-lb)

Accelerator cable
1. Install the accelerator cable.
2. Check the accelerator cable deflection.
   If the deflection is not correct, adjust by turning nut Ⓐ.

Deflection: 1—3mm (0.04—0.12 in)

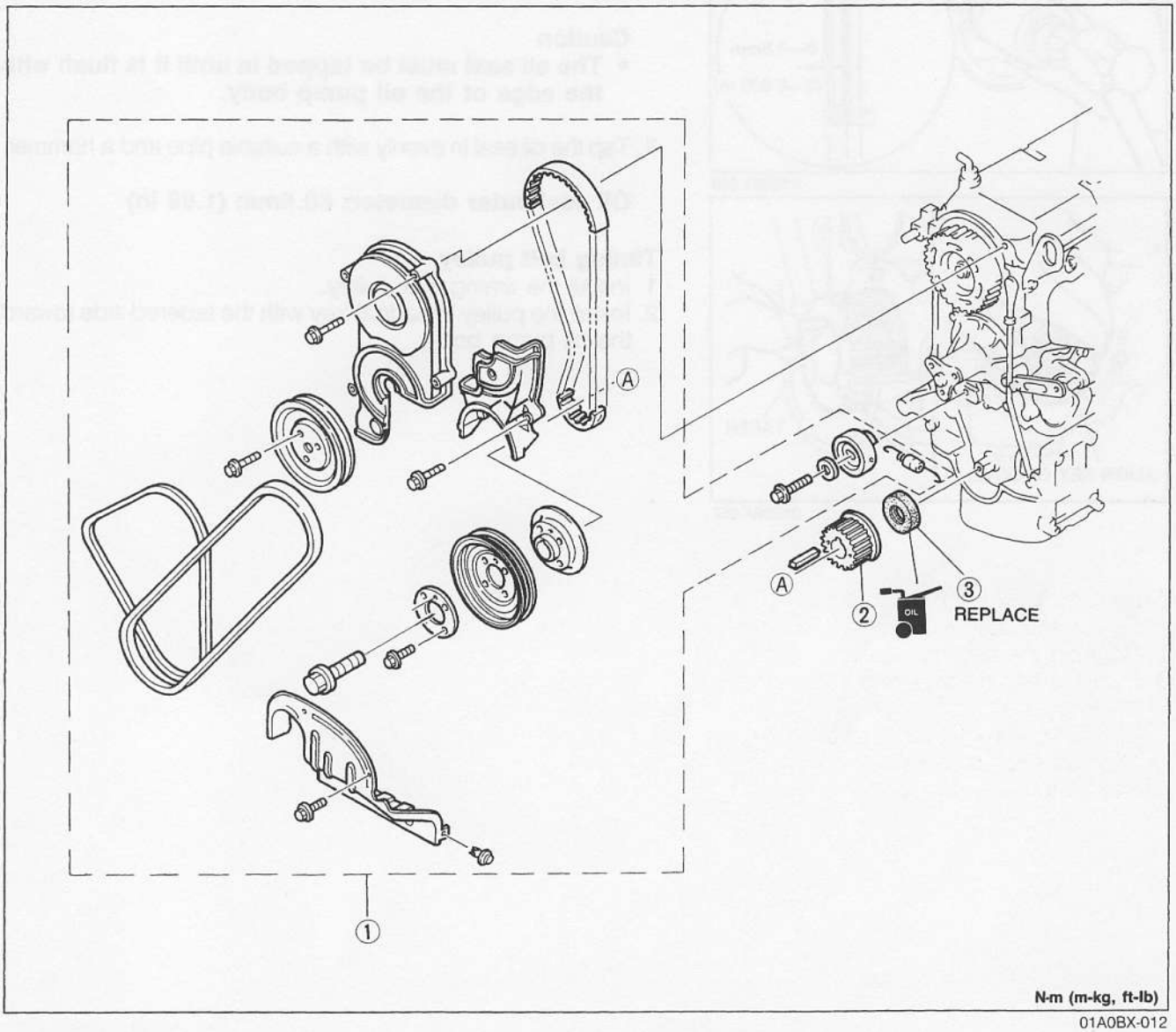
Steps after installation
1. Fill the radiator with the specified amount and type of engine coolant. (Refer to Section E.)
2. Connect the negative battery cable.
3. Start the engine and check as follows:
   (1) Engine oil and engine coolant leakage
   (2) Ignition timing, idle speed (Refer to page B–8.)
   (3) Operation of emission control system
4. Recheck the engine coolant level.

01E0BX-053

FRONT OIL SEAL

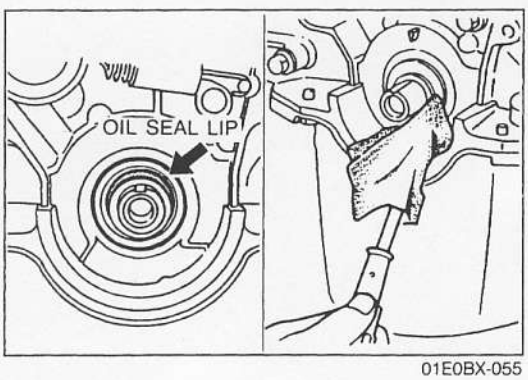
Replacement

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



01A0BX-012

1. Timing belt
   Removal / Installation ..... page B–12
2. Timing belt pulley
   Installation Note ..... page B–22
3. Oil seal
   Removal Note ..... below
   Installation Note ..... page B–22

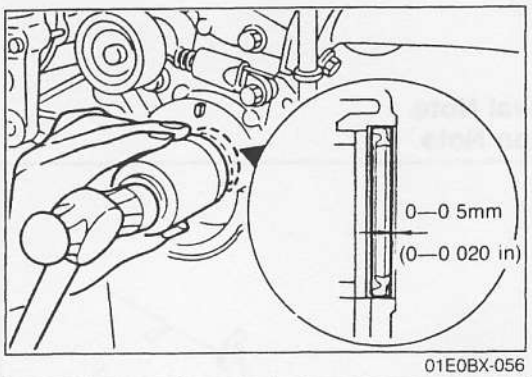


01E0BX-055

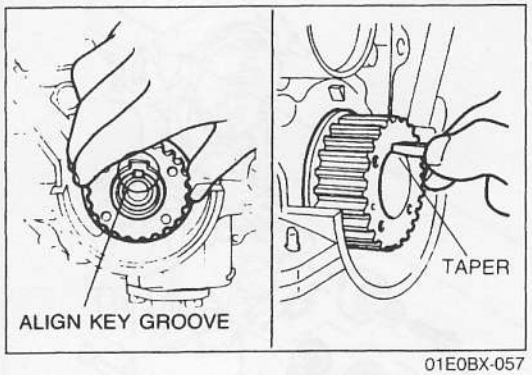
Removal note

Oil seal

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



01E0BX-056



01E0BX-057

Installation note

Oil seal

1. Apply a small amount of clean engine oil to the lip of a new oil seal.
2. Push the oil seal slightly in by hand.

Caution

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

3. Tap the oil seal in evenly with a suitable pipe and a hammer.

Oil seal outer diameter: 50.5mm (1.98 in)

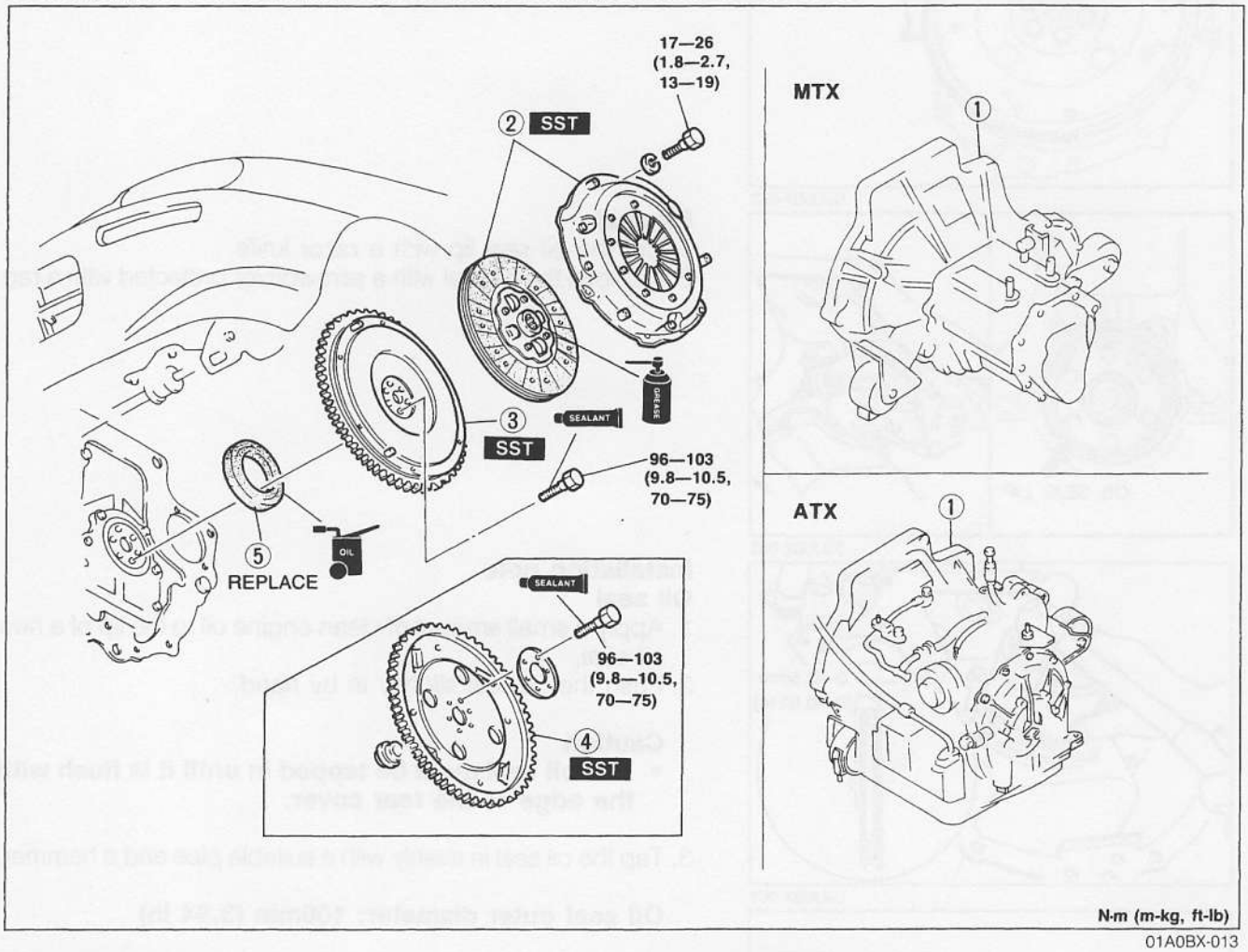
Timing belt pulley

1. Install the timing belt pulley.
2. Install the pulley Woodruff key with the tapered side toward the oil pump body.

REAR OIL SEAL

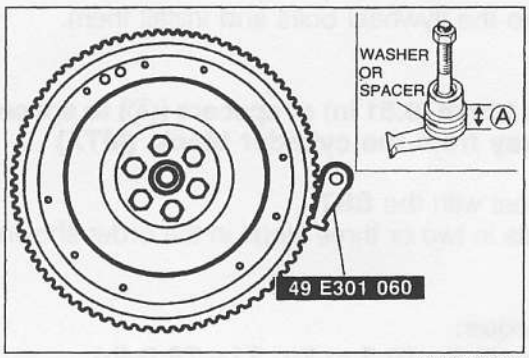
Replacement

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



01A0BX-013

1. Transaxle
   - MTX
     - Service ..... Section J
   - ATX
     - Service ..... Section K
2. Clutch cover, clutch disc (MTX)
   - Service ..... Section H
3. Flywheel (MTX)
   - Removal Note ..... below
   - Installation Note ..... page B–24
4. Drive plate (ATX)
   - Removal Note ..... page B–24
   - Installation Note ..... page B–25
5. Oil seal
   - Removal Note ..... page B–24
   - Installation Note ..... page B–24



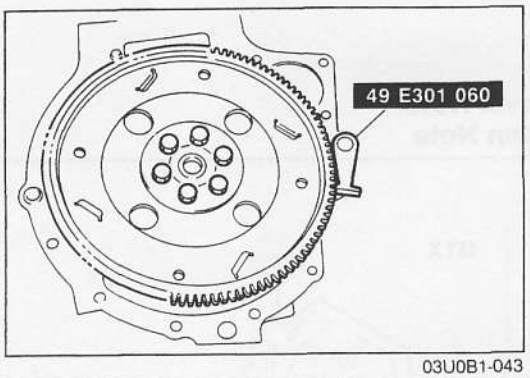
01A0BX-014

Removal note
Flywheel (MTX)

Caution

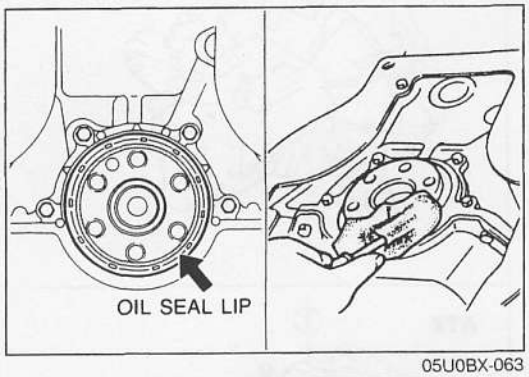
- **Add approx 13mm (0.51 in) of spacers (Ⓐ) to space the SST away from the cylinder block. (MTX)**

1. Hold the flywheel with the **SST**.
2. Remove the flywheel bolts.
3. Remove the flywheel.



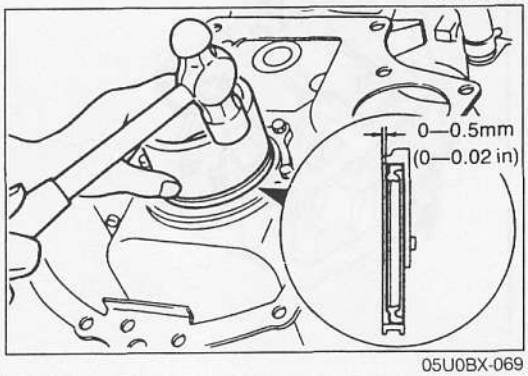
03U0B1-043

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



05U0BX-063

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



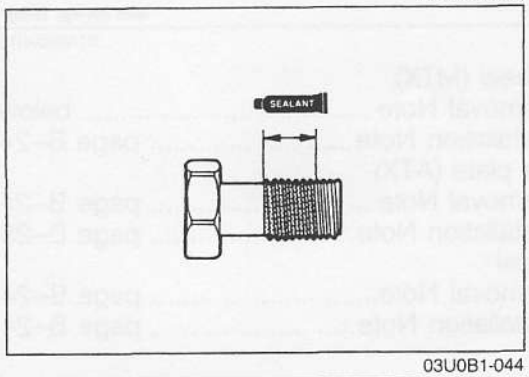
05U0BX-069

Installation note
Oil seal
1. Apply a small amount of clean engine oil to the lip of a new oil seal.
2. Push the oil seal slightly in by hand.

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

3. Tap the oil seal in evenly with a suitable pipe and a hammer.

Oil seal outer diameter: 100mm (3.94 in)



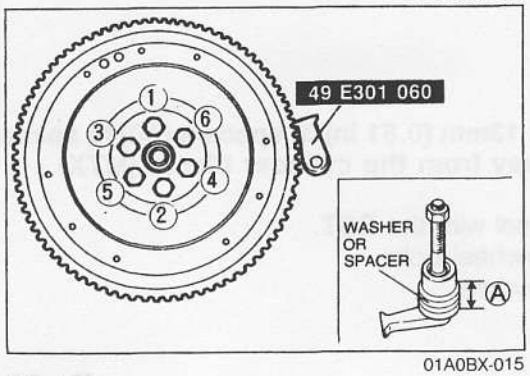
03U0B1-044

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

Caution
- **If all the previous sealant cannot be removed from a bolt, replace the bolt.**
- **Do not apply sealant if a new bolt is used.**

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

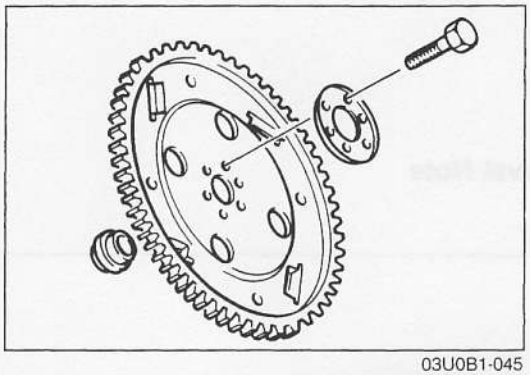
Caution
- **Add approx 13mm (0.51 in) of spacers (Ⓐ) to space the SST away from the cylinder block. (MTX)**



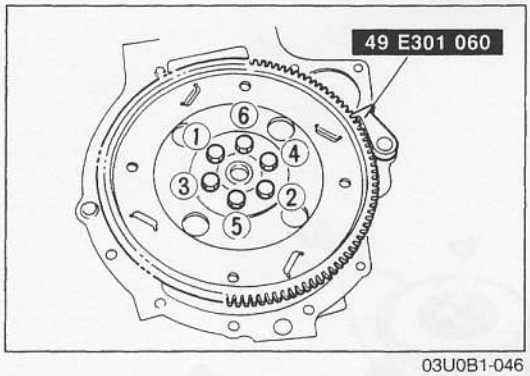
01A0BX-015

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

Tightening torque:
96—103 N·m (9.8—10.5 m-kg, 71—76 ft-lb)



03U0B1-045



03U0B1-046

Drive plate (ATX)

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

Caution

- **If all the previous sealant cannot be removed from a bolt, replace the bolt.**
- **Do not apply new sealant if a new bolt is used.**

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

Tightening torque:
96—103 N·m (9.8—10.5 m-kg, 71—76 ft-lb)

Steps After Installation

1. Connect the negative battery cable.
2. Start the engine and perform engine adjustments as necessary.

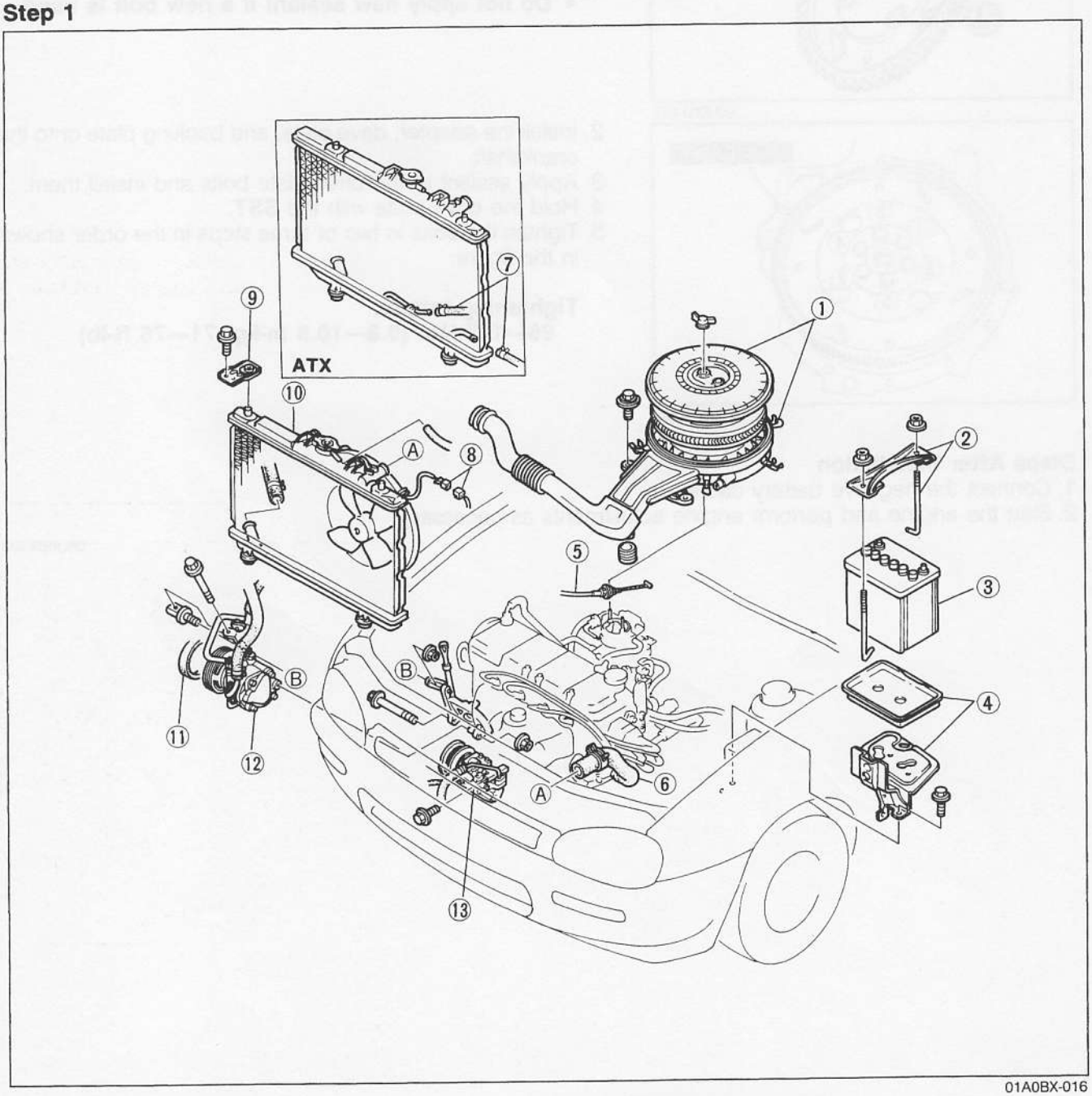
05U0BX-072

REMOVAL

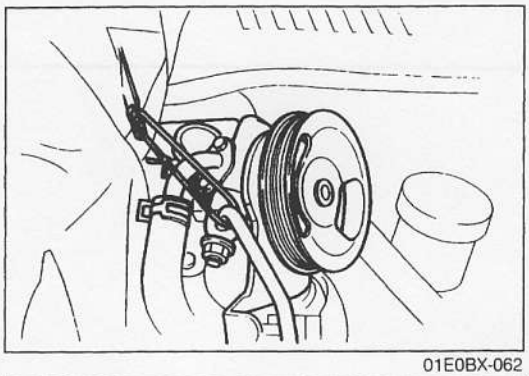
PROCEDURE

1. Disconnect the negative battery cable.
2. Drain the engine coolant and transaxle oil.
3. Remove in the order shown in the figure, referring to **Removal Note**.

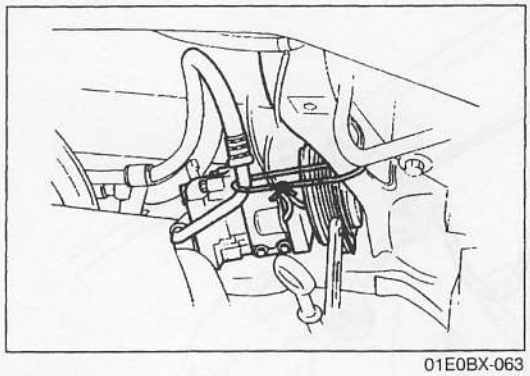
Step 1



1. Air cleaner assembly
2. Battery clamp
3. Battery
4. Battery carrier
5. Accelerator cable
6. Radiator hose
7. Oil cooler hose (ATX)
8. Cooling fan connector
9. Radiator bracket
10. Radiator and cooling fan assembly
11. Drive belt
12. P/S oil pump and bracket (if equipped)
    Removal Note..... page B–27
13. A/C compressor (if equipped)
    Removal Note..... page B–27



01E0BX-062



01E0BX-063

Removal note
P/S oil pump (if equipped)

Caution
- **Do not damage the hoses.**

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

A/C compressor (if equipped)

Caution
- **Do not damage the hoses.**

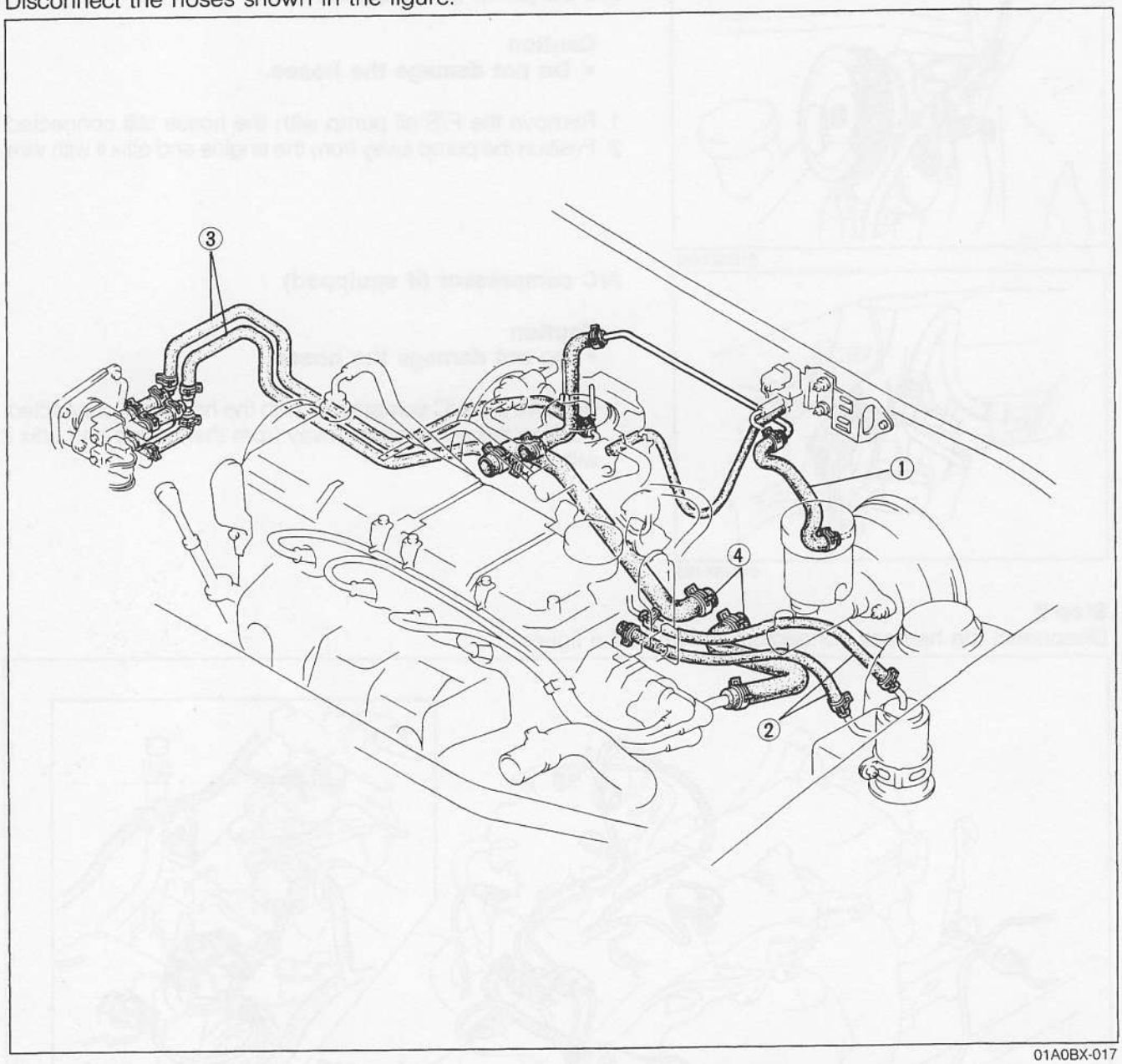
1. Remove the A/C compressor with the hoses still connected.
2. Position the compressor away from the engine and affix it with wire.

Step 2
Disconnect the harness connectors shown in the figure.



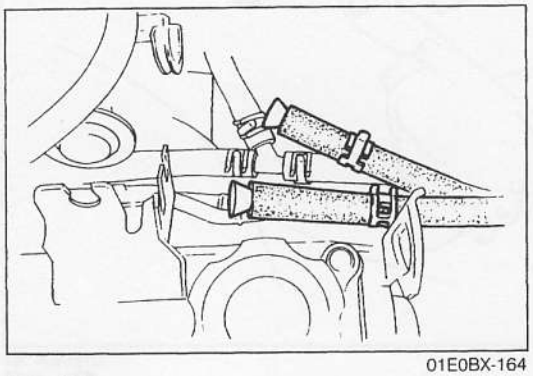
01E0BX-163

Step 3
Disconnect the hoses shown in the figure.



01A0BX-017

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



01E0BX-164

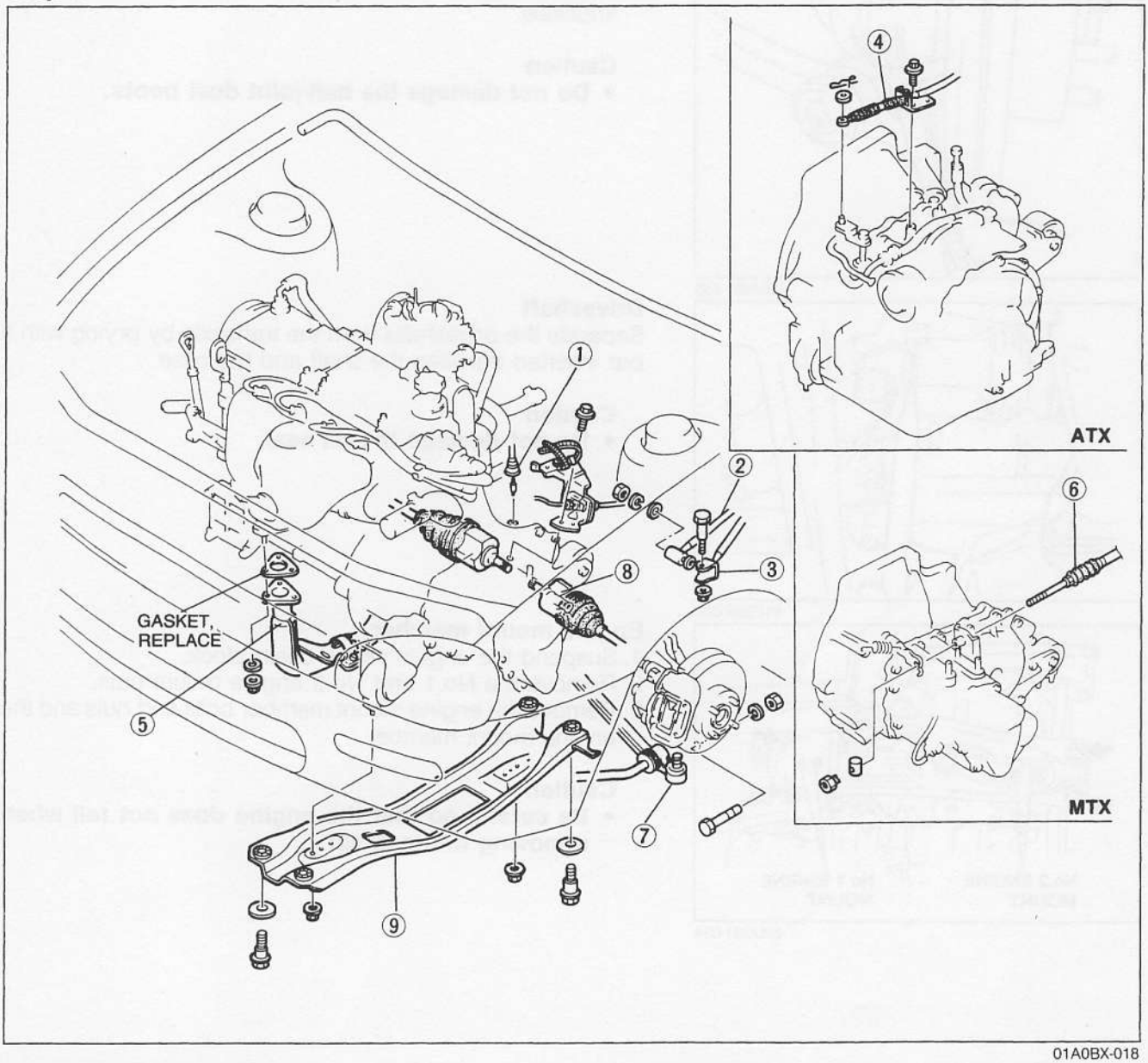
Removal note
Fuel hose

Warning
- **Keep sparks and open flame away from the fuel area.**

Caution
- **Cover the hose with a rag because fuel will spray out when disconnecting.**
- **Plug the disconnected hoses to avoid fuel leakage.**

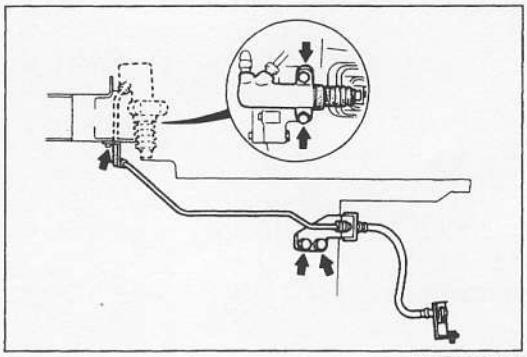
Disconnect the fuel hoses.

Step 4



01A0BX-018

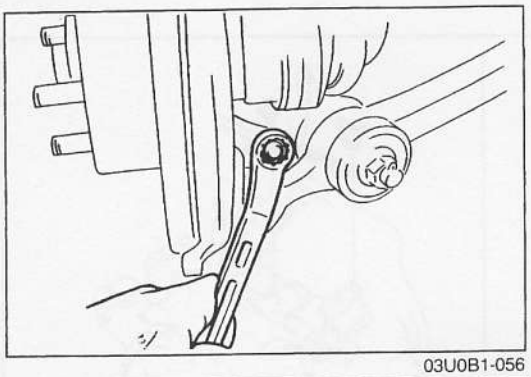
1. Speedometer cable
2. Shift control rod (MTX)
3. Extension bar (MTX)
4. Shift control cable (ATX)
5. Front exhaust pipe
6. Clutch cable
7. Lower arm
   Removal Note..... page B–29
8. Driveshaft
   Removal Note..... page B–30
9. Engine mount member
   Removal Note..... page B–30



01E0BX-068

Removal note
Lower arm

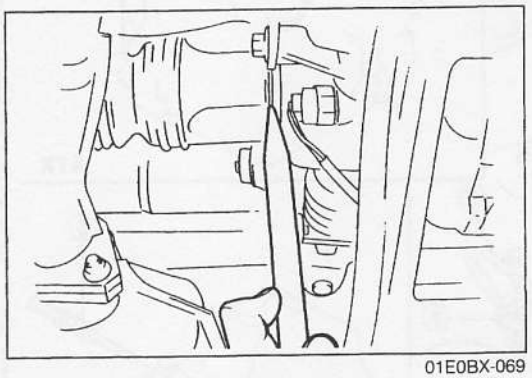
1. Remove the bolts and nuts at the left and right lower arm ball joints.



03U0B1-056

2. Pull the lower arm downward to separate them from the knuckles.

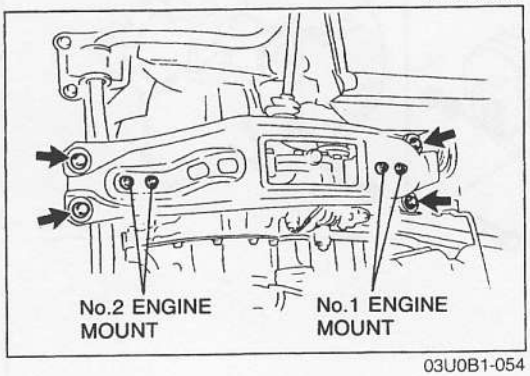
Caution
- **Do not damage the ball-joint dust boots.**



01E0BX-069

Driveshaft
Separate the driveshafts from the transaxle by prying with a bar inserted between the shaft and the case.

Caution
- **Do not damage the oil seal.**

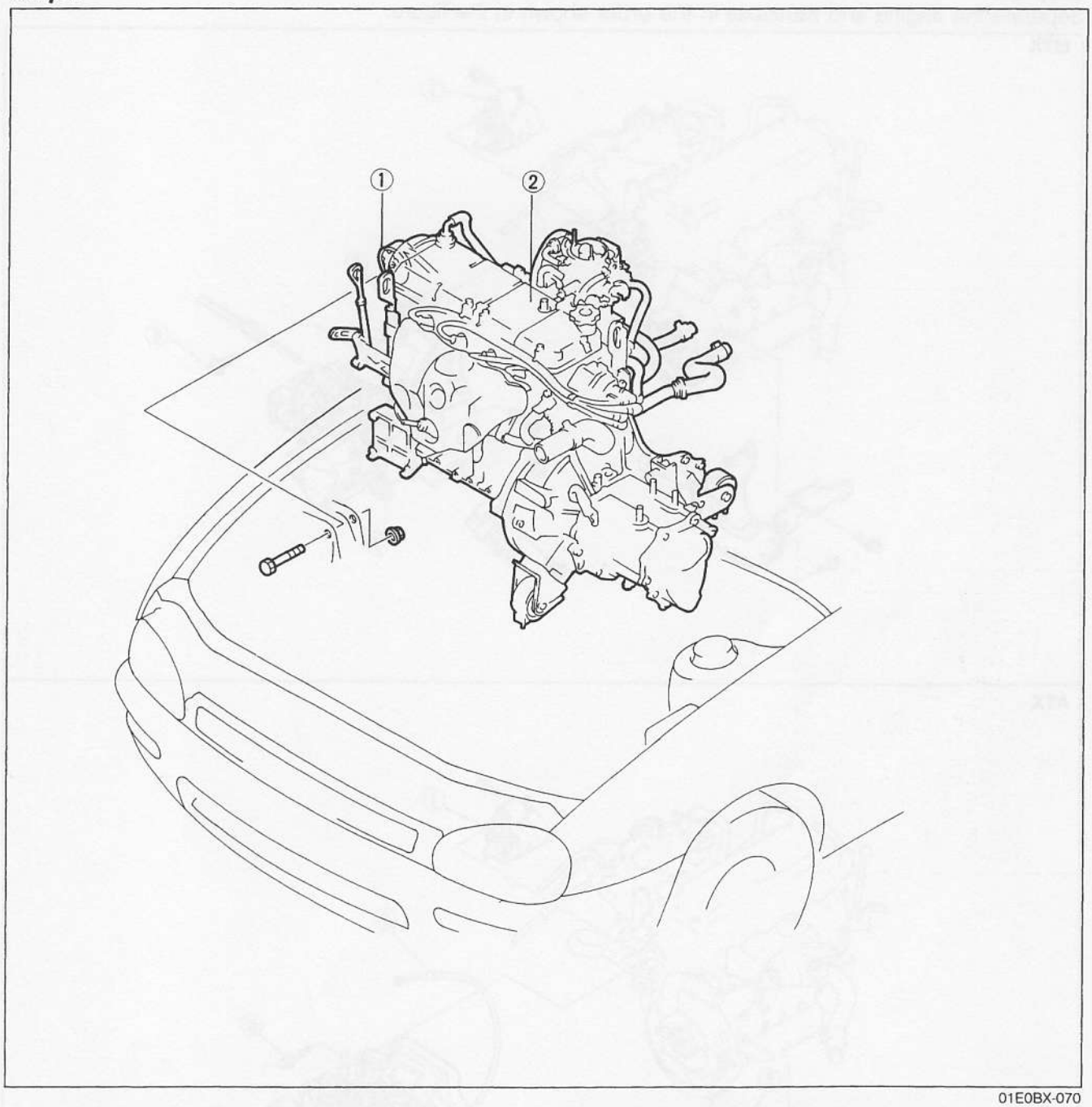


03U0B1-054

Engine mount member
1. Suspend the engine with a chain block.
2. Remove the No.1 and No.2 engine mount nuts.
3. Remove the engine mount member bolts and nuts and the engine mount member.

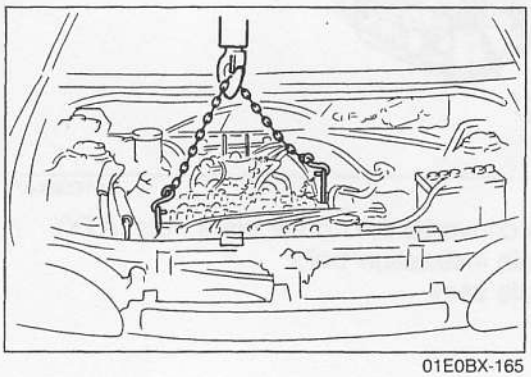
Caution
- **Be careful so that the engine does not fall when removing the member.**

Step 5



01E0BX-070

1. No.3 engine mount
2. Engine and transaxle assembly
   Removal note ..... below



01E0BX-165

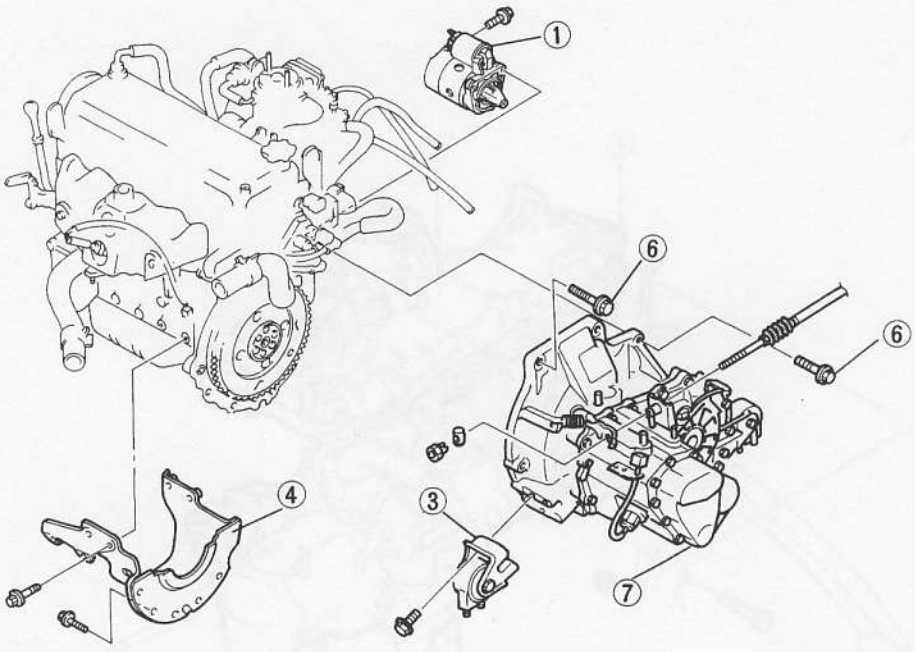
Removal note
Engine and transaxle assembly

Caution
- **Do not damage any components in the engine compartment.**

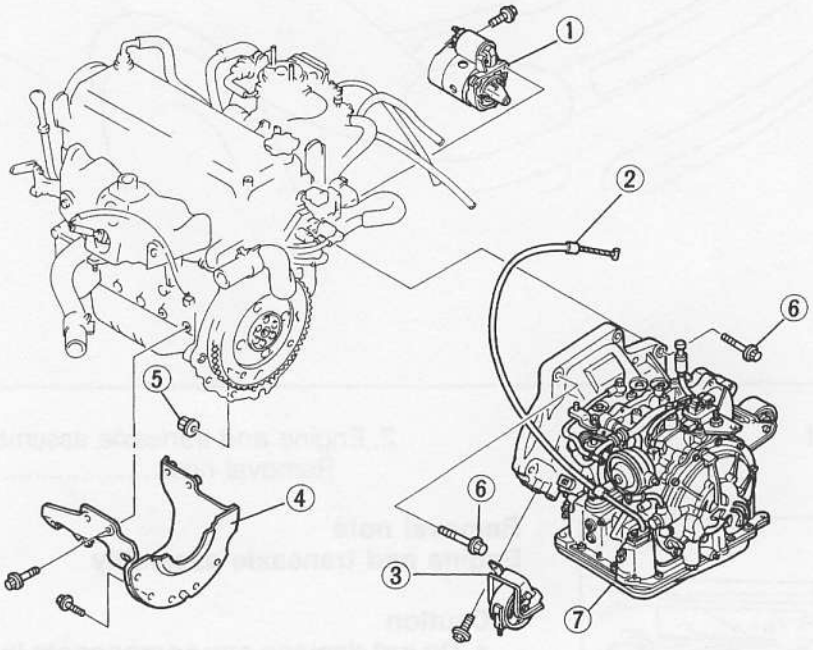
Lift the engine and transaxle assembly out as a unit.

Step 6
Separate the engine and transaxle in the order shown in the figure.

MTX



ATX

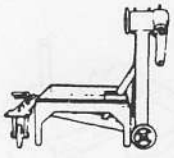
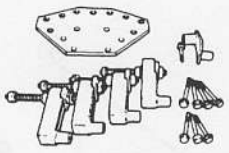
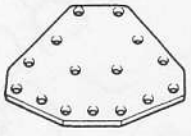
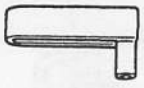
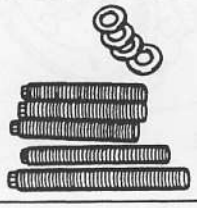


01E0BX-071

1. Starter and bracket
2. Throttle cable (ATX)
3. No.1 engine mount
4. Integrated stiffener
5. Torque converter and drive plate nuts (ATX)
6. Transaxle installation bolts
7. Transaxle assy.

ENGINE STAND MOUNTING

PREPARATION
SST

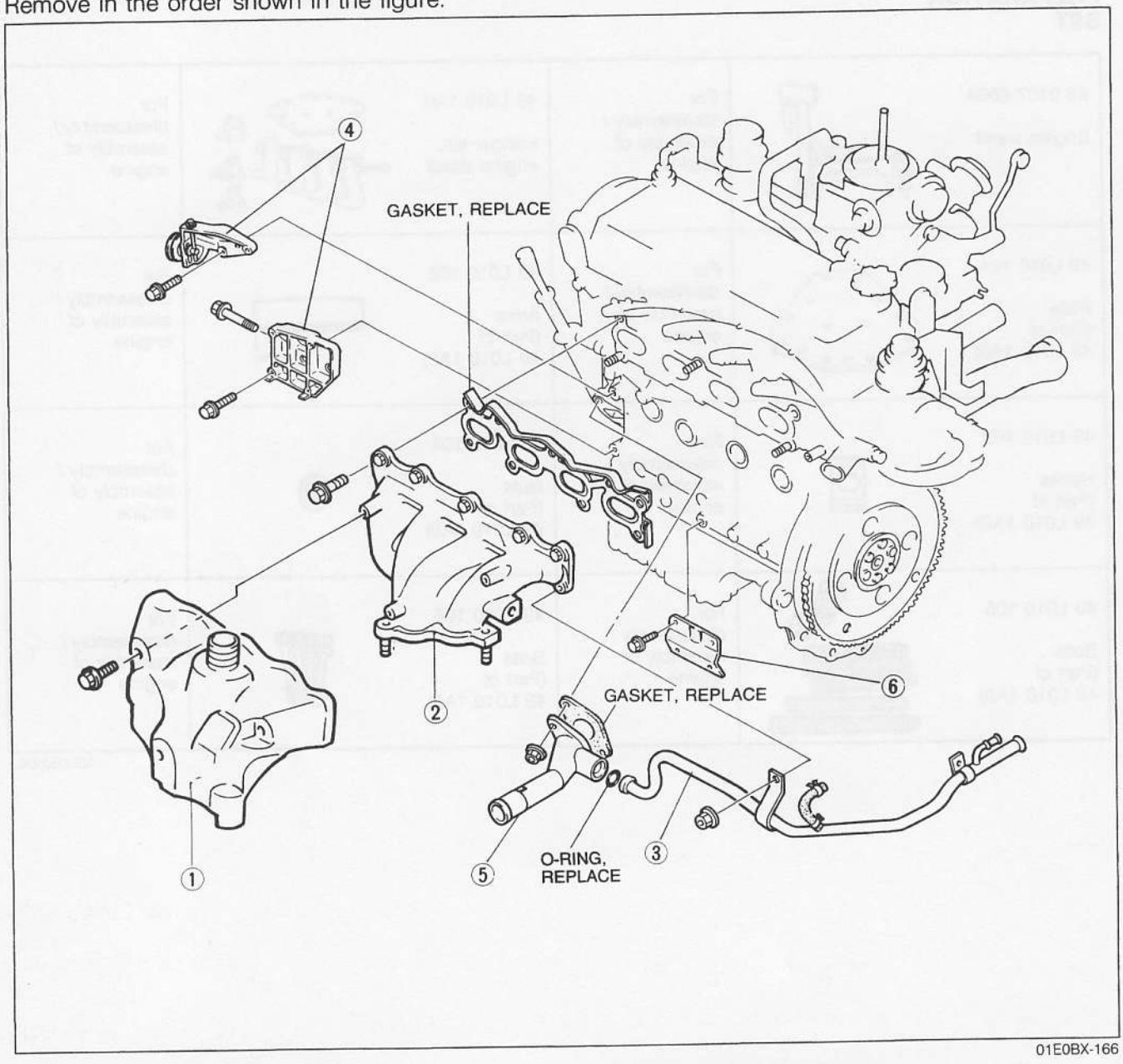
49 0107 680A Engine stand 	For disassembly / assembly of engine	49 L010 1A0 Hanger set, engine stand 	For disassembly / assembly of engine
49 L010 101 Plate (Part of 49 L010 1A0) 	For disassembly / assembly of engine	49 L010 102 Arms (Part of 49 L010 1A0) 	For disassembly / assembly of engine
49 L010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

05U0BX-082

PROCEDURE

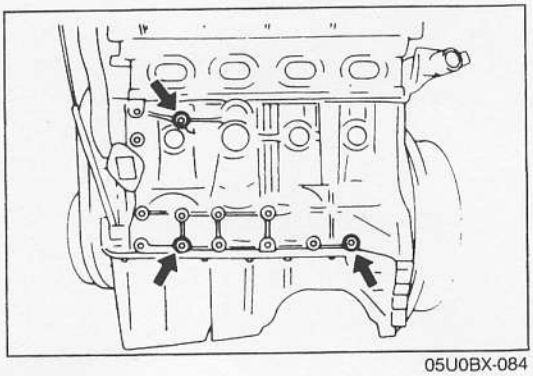
Step 1

Remove in the order shown in the figure.



01E0BX-166

1. Exhaust manifold insulator
2. Exhaust manifold
3. Water bypass pipe
4. A/C compressor bracket and idler
5. Water inlet pipe
6. Exhaust pipe bracket

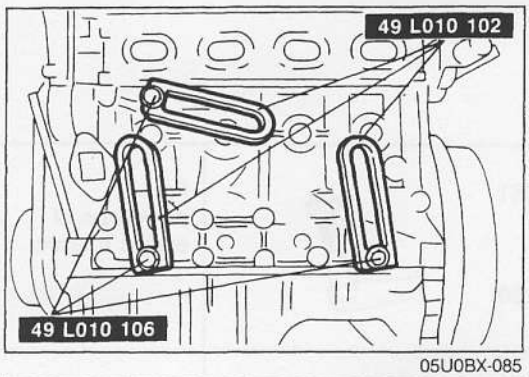


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Step 2

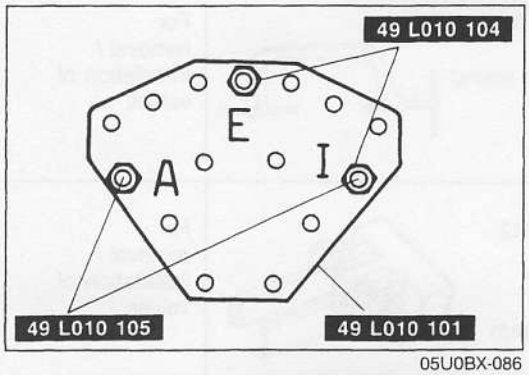
Caution

- **When installing the SST (engine hanger), use the holes shown in the figure.**



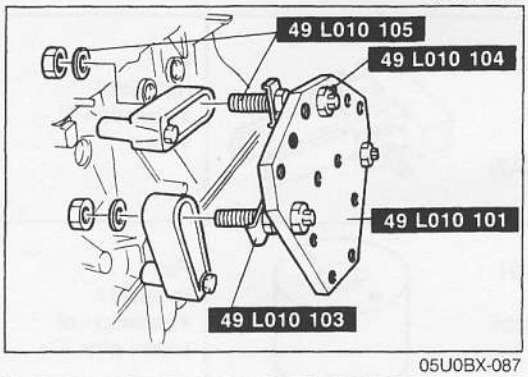
05U0BX-085

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



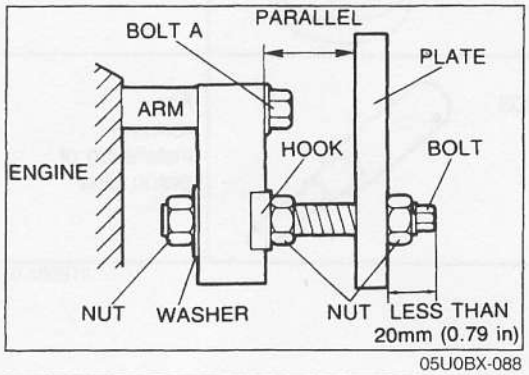
05U0BX-086

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



05U0BX-087

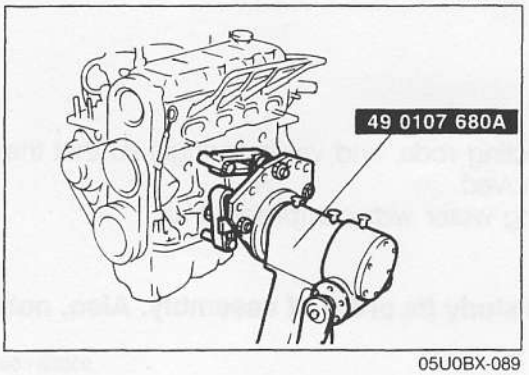
3. Assemble the **SST (nuts, hooks, and bolts)**.
4. Install the **SST** to the respective arms.



05U0BX-088

Note
- **Adjust the SST (bolts) so that less than 20mm (0.79 in) of thread is exposed.**
- **Make the SST (plate and arms) parallel by adjusting the SST (bolts and nuts).**

5. Tighten the **SST (bolts and nuts)** to affix the **SST** firmly.

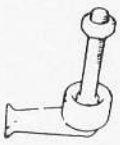
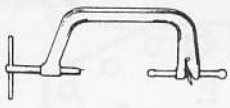
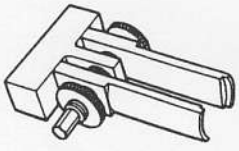
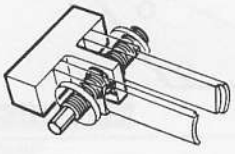
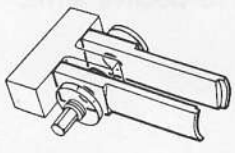
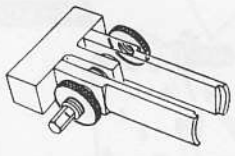
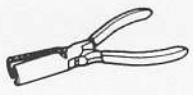
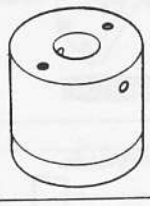
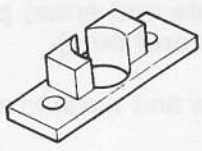
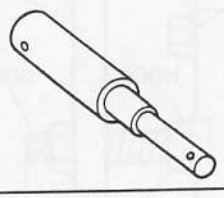
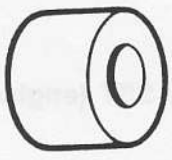


05U0BX-089

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

DISASSEMBLY

PREPARATION
SST

49 E301 060 Brake, ring gear 	For prevention of engine rotation	49 E301 061 Body (Part of 49 E301 060) 	For prevention of engine rotation
49 E301 062 Collar (Part of 49 E301 060) 	For prevention of engine rotation	49 0636 100B Arm, valve spring lifter 	For removal / installation of valves
49 B012 0A2 Pivot, valve spring lifter 	For removal / installation of valves	49 B012 012 Body (Part of 49 B012 0A2) 	For removal / installation of valves
49 B012 013 Foot (Part of 49 B012 0A2) 	For removal / installation of valves	49 B012 014 Locknut (Part of 49 B012 0A2) 	For removal / installation of valves
49 S120 170 Remover, valve seal 	For removal of valve seals	49 D011 001 Support block body 	For removal / installation of piston pins
49 H011 001B Support block head 	For removal / installation of piston pins	49 D011 003 Piston pin installer 	For removal / installation of piston pins
49 8134 045 Piston pin guide 	For removal / installation of piston pins		

01E0BX-072

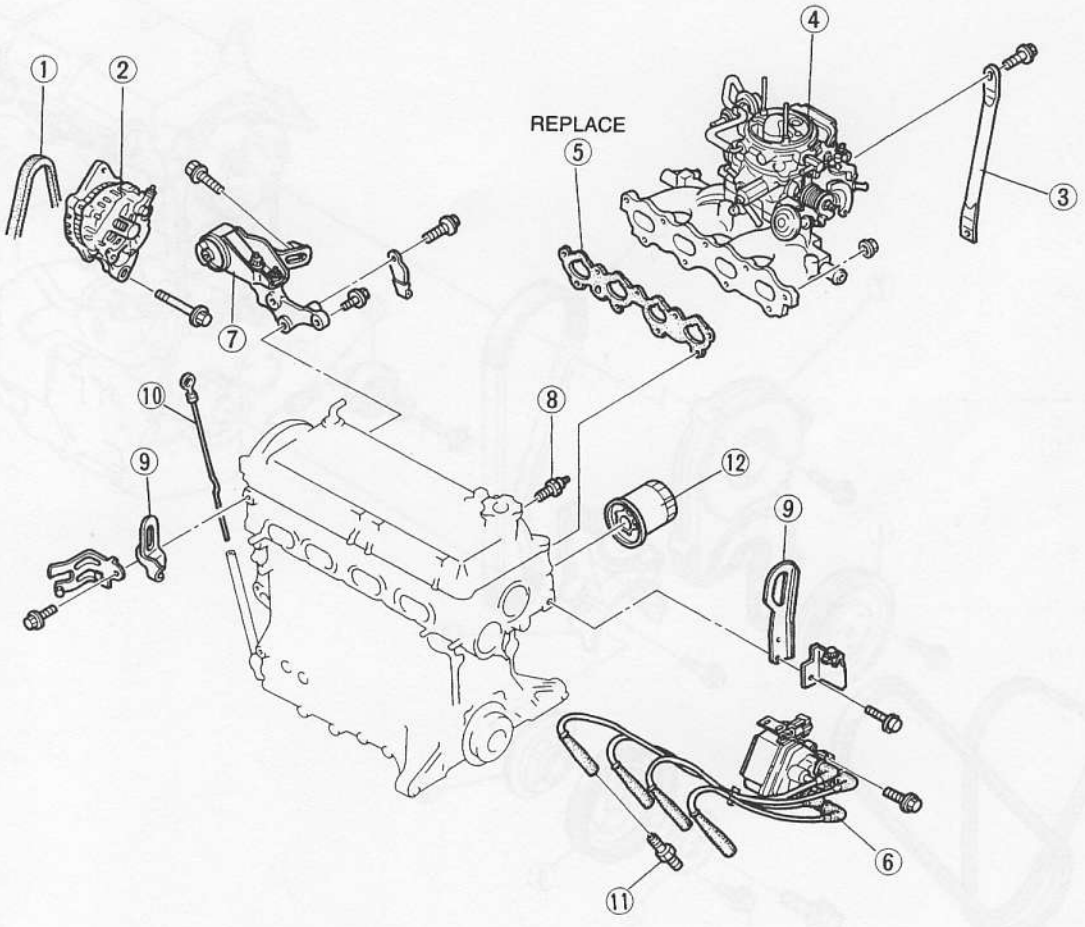
1. Code all identical parts (such as piston, piston rings, connecting rods, and valve springs) so that they can be reinstalled in the cylinder from which they were removed.
2. Clean the parts with a steam cleaner. Blow off any remaining water with compressed air.

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

93G0B1-040

AUXILIARY PARTS

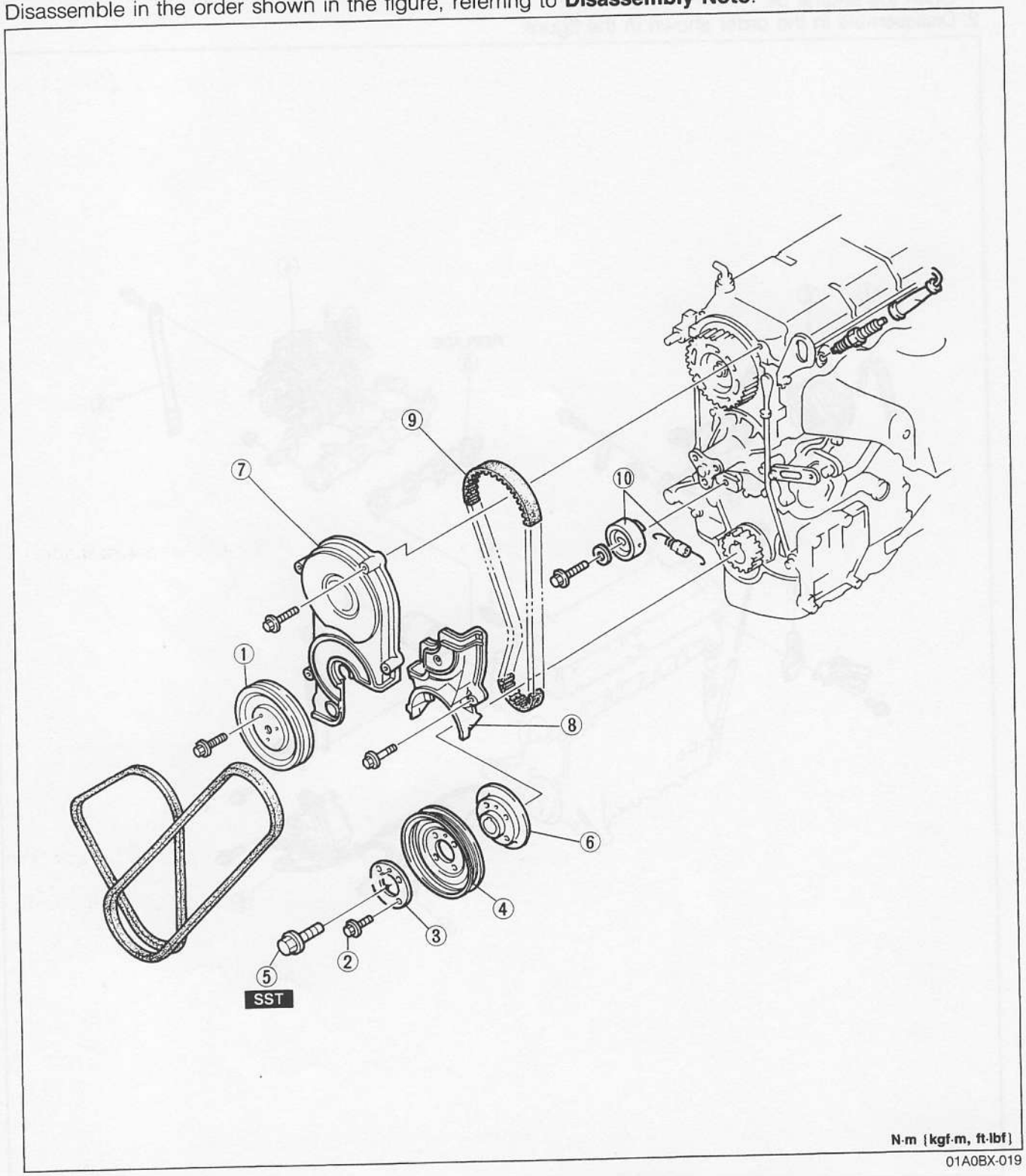
1. Drain the engine oil.
2. Disassemble in the order shown in the figure.



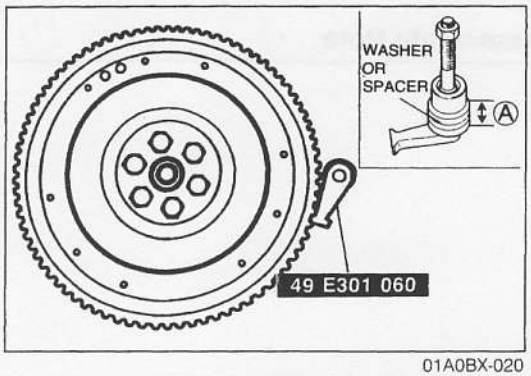
1. Alternator drive belt
2. Alternator
3. Intake manifold stay
4. Intake manifold assembly
5. Intake manifold gasket
6. Distributor and high-tension lead
7. No.3 engine mount bracket
8. Oil pressure switch
9. Engine hanger
10. Oil dipstick
11. Spark plug
12. Oil filter

TIMING BELT

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



1. Water pump pulley
2. Crankshaft pulley bolt
3. Plate
4. Crankshaft pulley
5. Pulley lock bolt
   Disassembly Note ..... page B–47
6. Pulley boss
7. Timing belt cover, upper
8. Timing belt cover, lower
9. Timing belt
   Disassembly Note ..... page B–39
   Inspection ..... page B–59
10. Tensioner, tensioner spring
    Inspection ..... page B–59

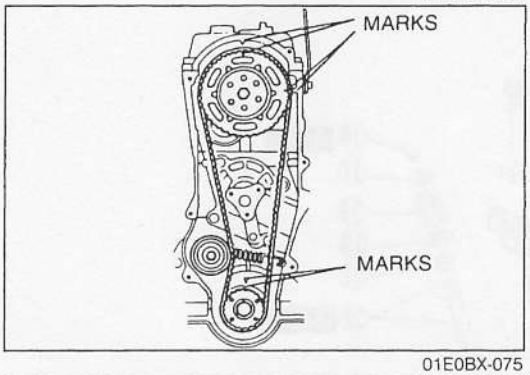


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Disassembly Note
Pulley lock bolt

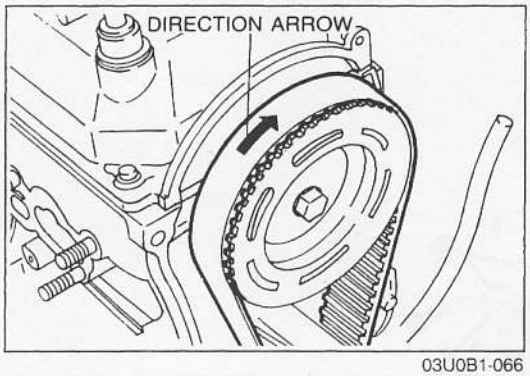
Caution
- **Add approx 13mm (0.51 in) of spacers (Ⓐ) to space the SST away from the cylinder block. (MTX)**

1. Hold the flywheel (MTX) or drive plate (ATX) with the **SST**.
2. Remove the pulley lock bolt.



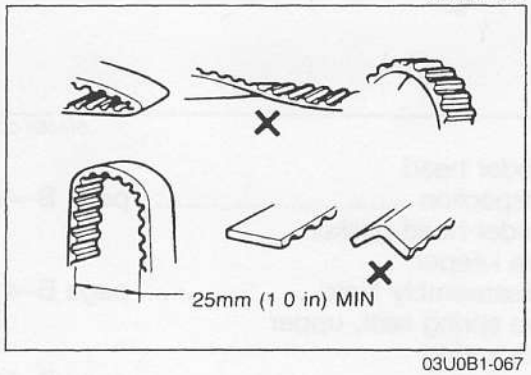
01E0BX-075

Timing belt
1. Turn the crankshaft and align the marks.



03U0B1-066

2. Mark the timing belt rotation for proper reinstallation.

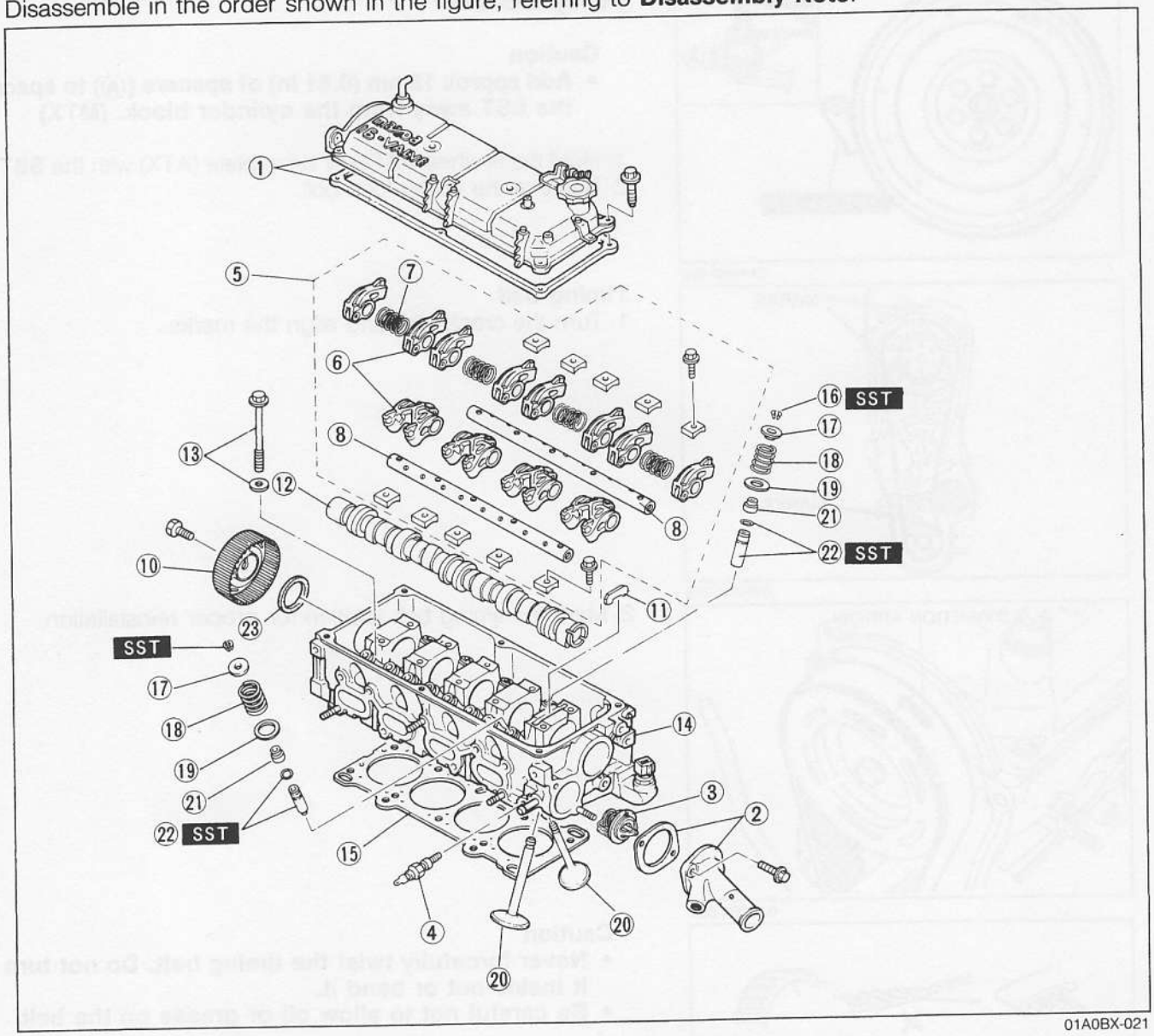


03U0B1-067

Caution
- **Never forcefully twist the timing belt. Do not turn it inside out or bend it.**
- **Be careful not to allow oil or grease on the belt.**

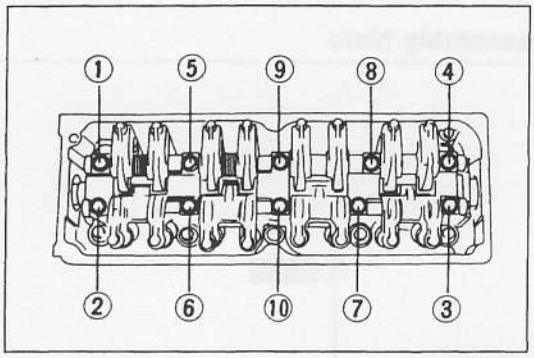
CYLINDER HEAD

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



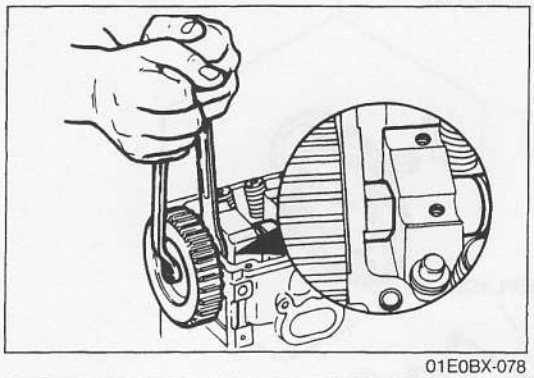
01A0BX-021

1. Cylinder head cover and gasket
2. Thermostat cover and gasket
3. Thermostat
4. Thermosensor
5. Rocker arm and shaft assembly
   Disassembly note ..... page B–41
6. Rocker arm
7. Rocker arm spring
8. Rocker shaft
9. Camshaft pulley
   Disassembly Note ..... page B–41
   Inspection ..... page B–59
10. Thrust plate
11. Camshaft
    Inspection ..... page B–52
12. Cylinder head bolts
    Disassembly Note ..... page B–41
13. Cylinder head
    Inspection ..... page B–48
14. Cylinder head gasket
15. Valve keeper
    Disassembly Note ..... page B–41
16. Valve spring seat, upper
17. Valve spring
    Inspection ..... page B–52
18. Valve spring seat, lower
19. Valve
    Inspection ..... page B–49
20. Valve seal
    Disassembly Note ..... page B–41
    Inspect for wear and damage
21. Valve guide
    Inspection ..... page B–49
    Replacement ..... page B–50
22. Oil seal

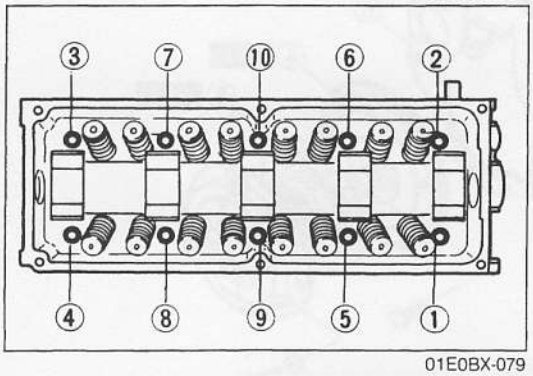


03U0B1-070

Disassembly Note
Rocker arm and rocker shaft assembly
1. Remove the rocker arm and rocker shaft assembly.
2. Code all rocker arms and springs so that they can be reinstalled in the same places from which they were removed.

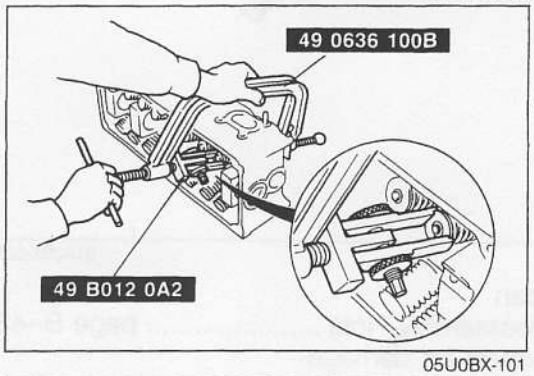

01E0BX-078

Camshaft pulley
1. Hold the camshaft using a suitable wrench on the cast hexagon.
2. Remove the camshaft pulley bolt.
3. Remove the camshaft pulley.



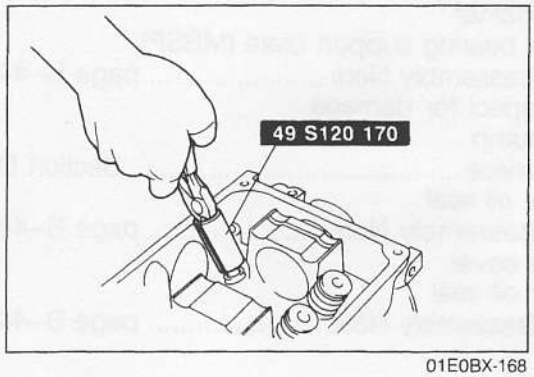
01E0BX-079

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



05U0BX-101

Valve keeper
1. Set the **SST** against the upper valve spring seat as shown in the figure.
2. Remove the valve keepers.

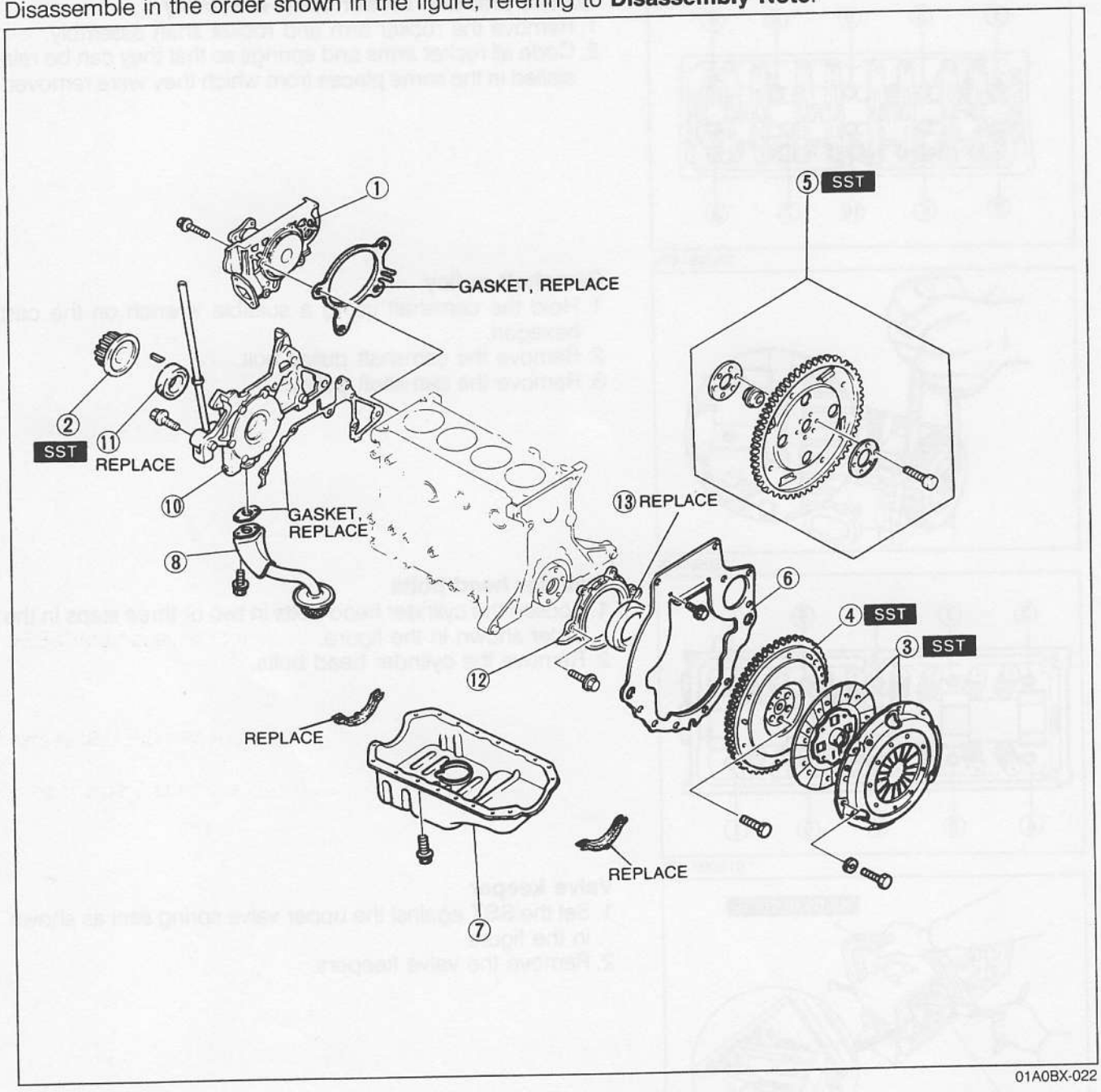


01E0BX-168

Valve seal
Remove the valve seal with the **SST**.

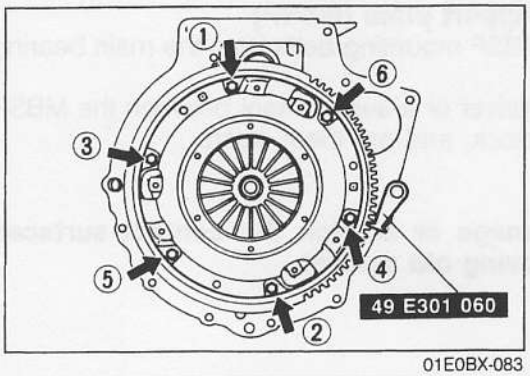
CYLINDER BLOCK (EXTERNAL PARTS)

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

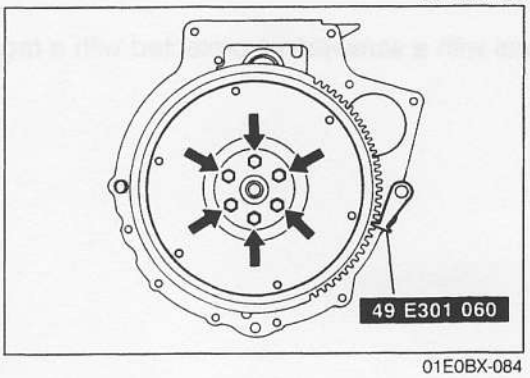


01A0BX-022

1. Water pump
   Service ..... Section E
2. Timing belt pulley
   Inspection ..... page B–59
3. Clutch cover, clutch disc (MTX)
   Service ..... Section H
4. Flywheel (MTX)
   Disassembly Note ..... page B–43
   Inspect for wear and damage
5. Backing plate, drive plate, and adapter (ATX)
   Disassembly Note ..... page B–43
6. End plate
7. Oil pan
   Disassembly Note ..... page B–43
   Inspect for damage
8. Oil strainer
9. Main bearing support plate (MBSP)
   Disassembly Note ..... page B–44
   Inspect for damage
10. Oil pump
    Service ..... Section D
11. Front oil seal
    Disassembly Note ..... page B–44
12. Rear cover
13. Rear oil seal
    Disassembly Note ..... page B–44



01E0BX-083



01E0BX-084

Disassembly Note
Flywheel

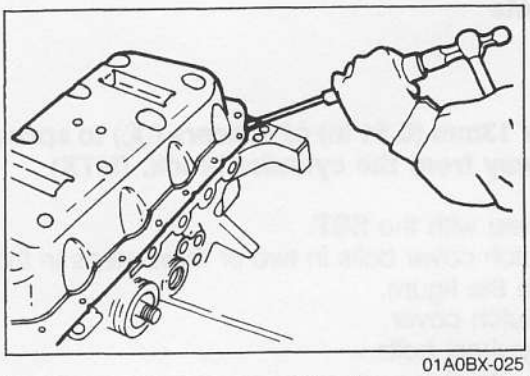
Caution
- **Add approx 13mm (0.51 in) of spacers (Ⓐ) to space the SST away from the cylinder block. (MTX)**

1. Hold the flywheel with the **SST**.
2. Loosen the clutch cover bolts in two or three steps in the order shown in the figure.
3. Remove the clutch cover.
4. Remove the flywheel bolts.
5. Remove the flywheel.
6. Remove the **SST**.

Backing plate, drive plate, and adapter (ATX)
1. Hold the drive plate with the **SST**.
2. Remove the drive plate bolts.
3. Remove the backing plate, drive plate, and adapter.
4. Remove the **SST**.

Oil pan
1. Remove the oil pan mounting bolts.
2. Insert a screwdriver or a suitable tool between the MBSP and oil pan, and pry them apart.

Caution
- **Do not insert the prying tool between the MBSP and cylinder block.**
- **Do not damage or scratch the contact surfaces.**



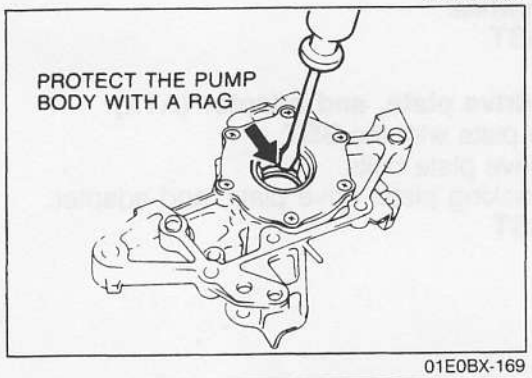
01A0BX-025

Main bearing support plate (MBSP)

1. Remove the MBSP mounting bolts from the main bearing cap.
2. Insert a screwdriver or a suitable tool between the MBSP and cylinder block, and pry them apart.

Caution

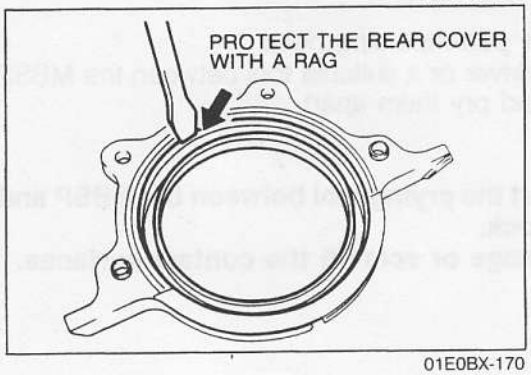
- **Do not damage or scratch the contact surfaces when removing old sealant.**



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Front oil seal

Remove the oil seal with a screwdriver protected with a rag.



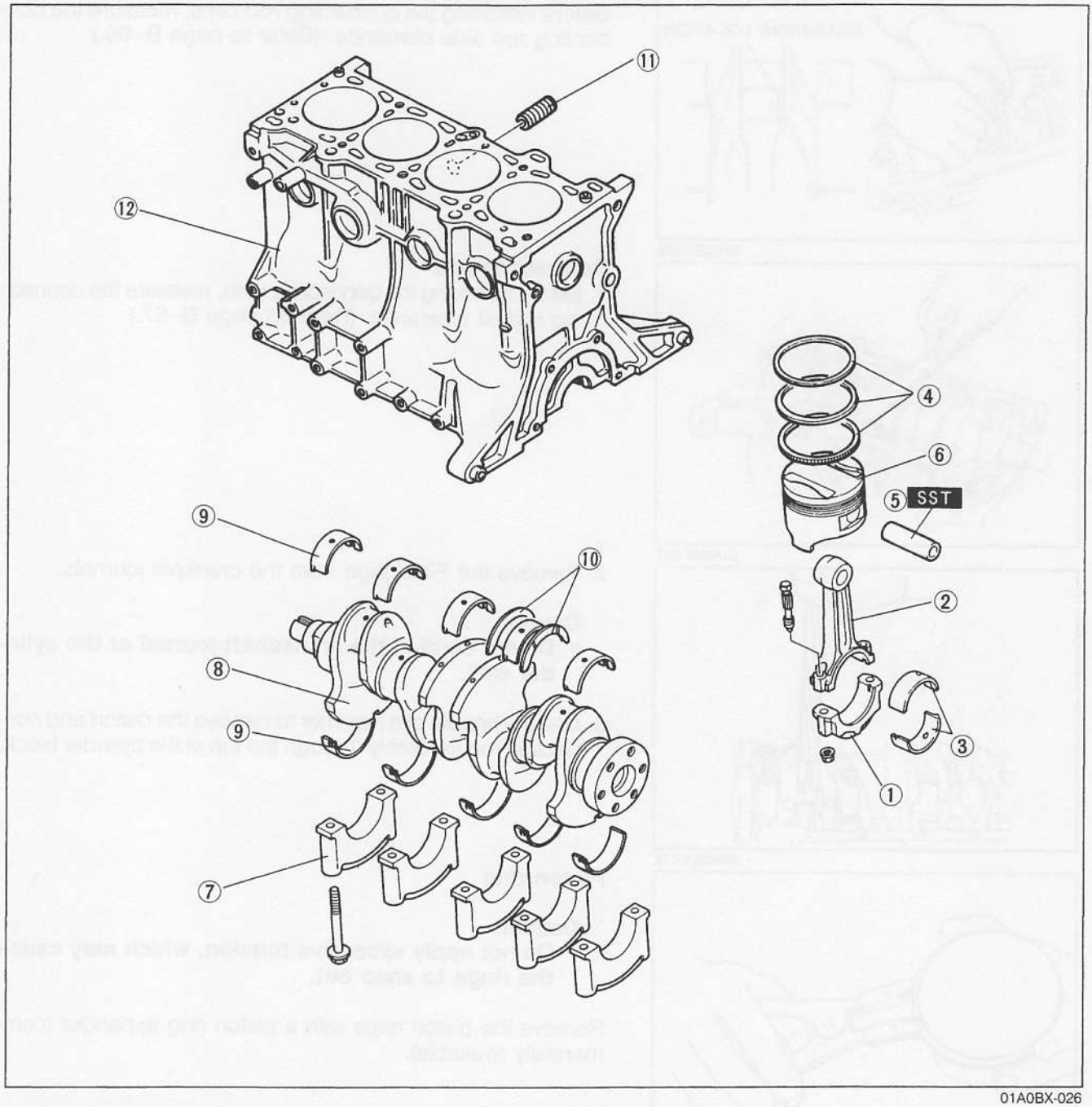
01E0BX-170

Rear oil seal

Remove the oil seal with a screwdriver protected with a rag.

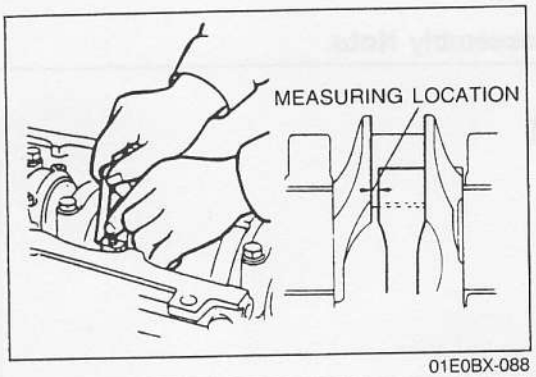
CYLINDER BLOCK (INTERNAL PARTS)

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



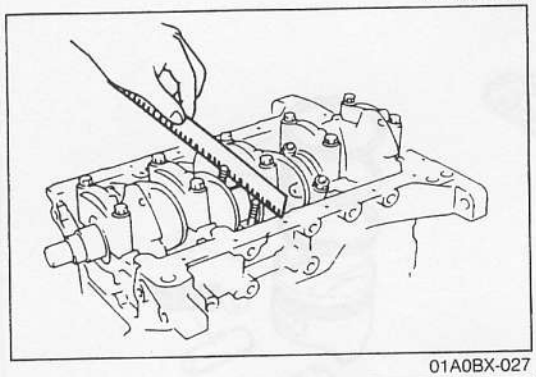
01A0BX-026

1. Connecting rod cap
   Disassembly Note ..... page B–46
2. Connecting rod
   Disassembly Note ..... page B–46
   Inspection ..... page B–57
3. Connecting rod bearing
   Inspection ..... page B–58
4. Piston ring
   Disassembly Note ..... page B–46
   Inspection ..... page B–56
5. Piston pin
   Disassembly Note ..... page B–46
   Inspection ..... page B–57
6. Piston
   Inspection ..... page B–56
7. Main bearing cap
   Disassembly Note ..... page B–47
8. Crankshaft
   Disassembly Note ..... page B–47
   Inspection ..... page B–58
9. Main bearing
   Inspection ..... page B–58
10. Thrust bearing
11. Oil filter joint
12. Cylinder block
    Inspection ..... page B–54

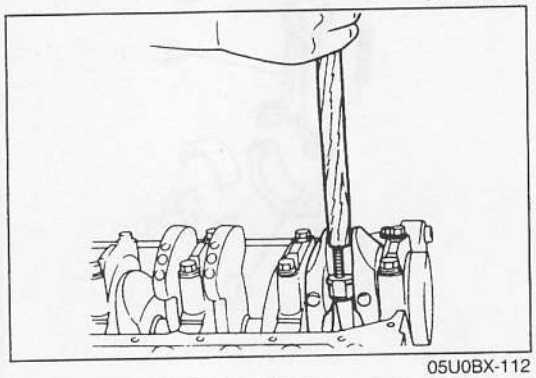


01E0BX-088

Disassembly Note
Connecting rod cap
Before removing the connecting rod caps, measure the connecting rod side clearance. (Refer to page B–66.)


01A0BX-027

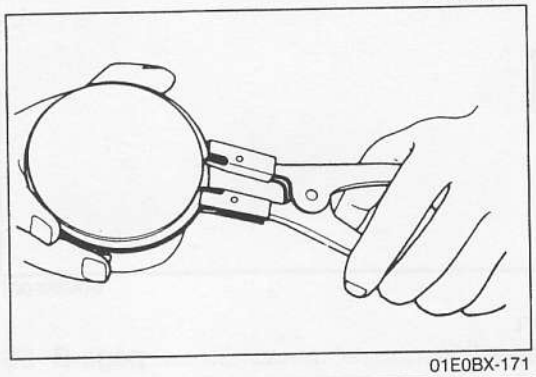
Connecting rod
1. Before removing the connecting rods, measure the connecting rod oil clearance. (Refer to page B–57.)


05U0BX-112

2. Remove the Plastigage from the crankpin journals.

Caution
- **Do not scratch the crankshaft journal or the cylinder wall.**

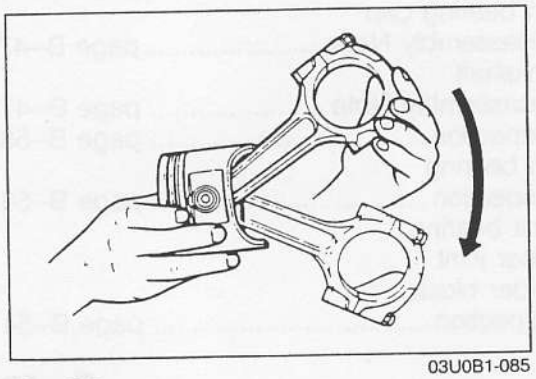
3. Use the handle of a hammer to remove the piston and connecting rod assembly through the top of the cylinder block.


01E0BX-171

Piston ring

Caution
- **Do not apply excessive tension, which may cause the rings to snap out.**

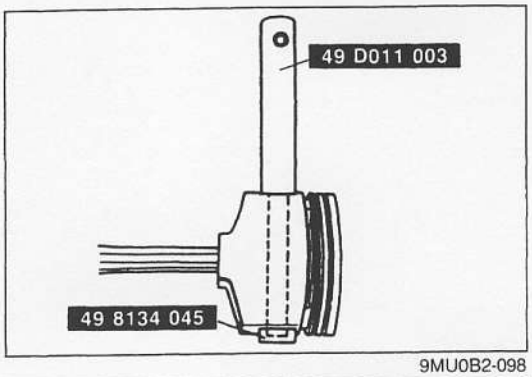
Remove the piston rings with a piston ring expander (commercially available).


03U0B1-085

Piston pin

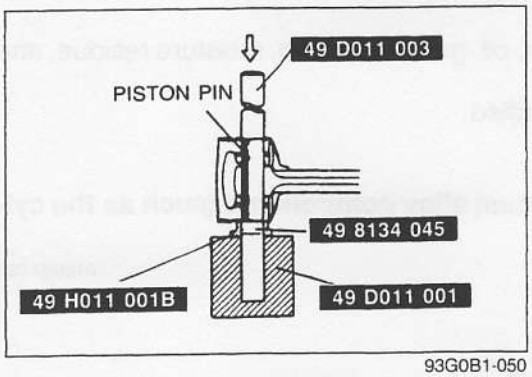
Caution
- **Mark the connecting rod direction for proper reassembly.**

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



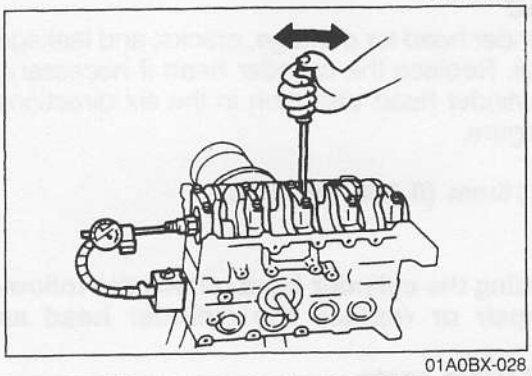
9MU0B2-098

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



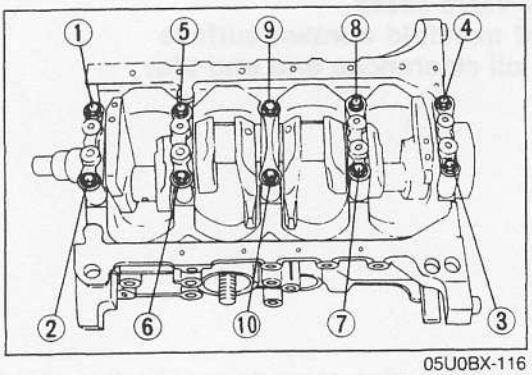
93G0B1-050

3. Mount the piston and connecting rod in the **SST** as shown.
4. Press out the piston pin.
   While removing the piston pin, check the pressure. If it is lower than **4905 N (500 kg, 1100 lb)**, replace the piston pin or connecting rod.


01A0BX-028

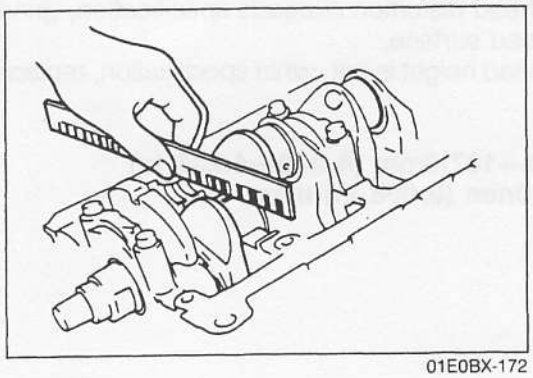
Main bearing cap

1. Before removing the main bearing caps, measure the crankshaft end play. (Refer to page B–65.)



05U0BX-116

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

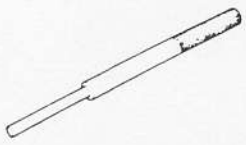

01E0BX-172

Crankshaft

Before removing the crankshaft, measure the main bearing oil clearances. (Refer to page B–74.)

INSPECTION / REPAIR

PREPARATION
SST

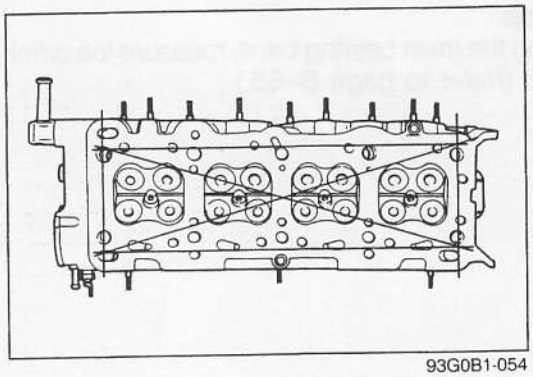
49 B012 005 Remover & installer, valve guide (B3)		For removal / installation of valve guide

01A0BX-029

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

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

01E0BX-093

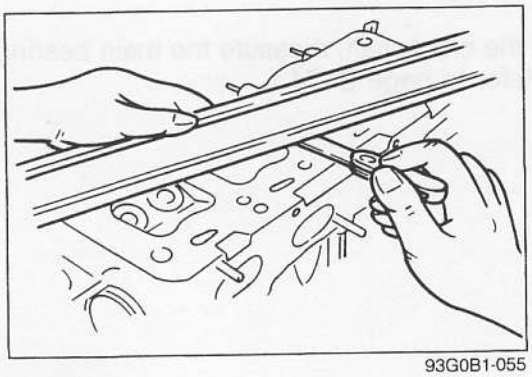


93G0B1-054

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

Distortion: 0.15mm (0.006 in) max.

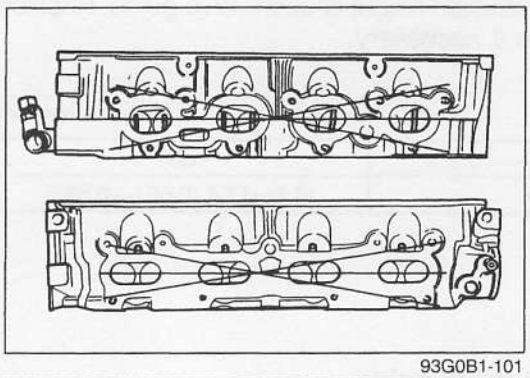
Caution
- **Before grinding the cylinder head, check the following and repair or replace the cylinder head as necessary.**
  Sinking of valve seats
  Damage of manifold contact surface
  Camshaft oil clearances and end play



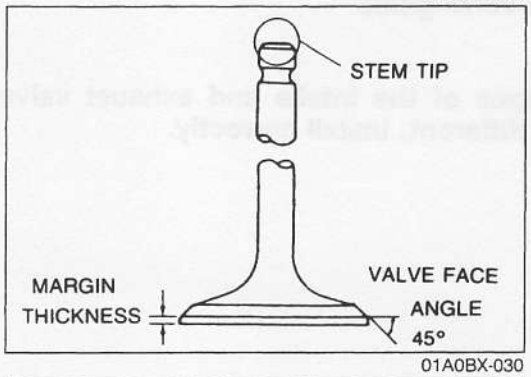
93G0B1-055

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

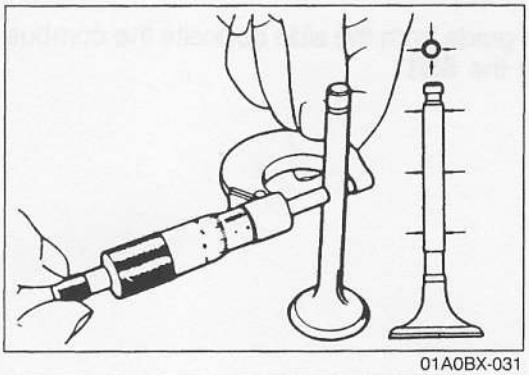
Height: 107.4—107.6mm (4.228—4.236 in)
Grinding: 0.20mm (0.008 in) max.



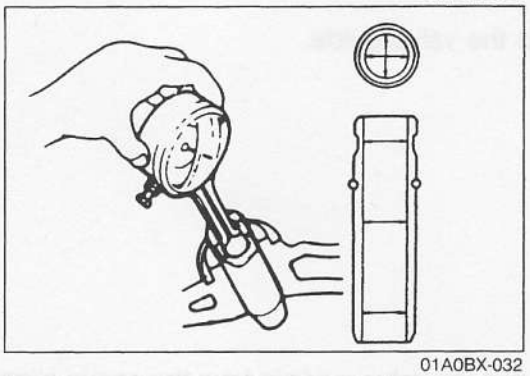
93G0B1-101



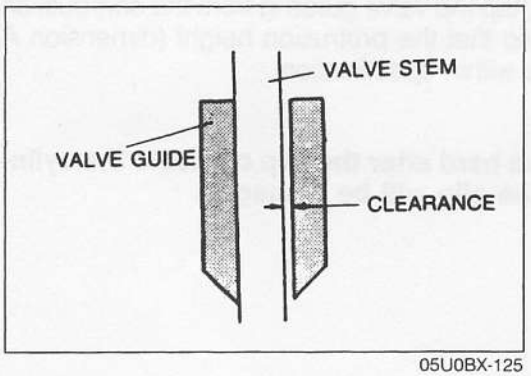
01A0BX-030



01A0BX-031



01A0BX-032



05U0BX-125

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

   Distortion: 0.15mm (0.006 in) max.

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

VALVE MECHANISM

Valve and Valve Guide

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

Margin thickness min.

mm (in)

	B3
IN	1.1 (0.043)
EX	1.2 (0.047)

3. Measure the length of each valve.

Length

mm (in)

		B3
IN	Standard	108.24 (4.261)
	Minimum	107.74 (4.241)
EX	Standard	109.34 (4.304)
	Minimum	108.84 (4.285)

4. Measure the stem diameter of each valve at the points shown.

Diameter

mm (in)

	B3
IN	5.970—5.985 (0.2350—0.2356)
EX	5.965—5.980 (0.2348—0.2354)

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

Inner diameter

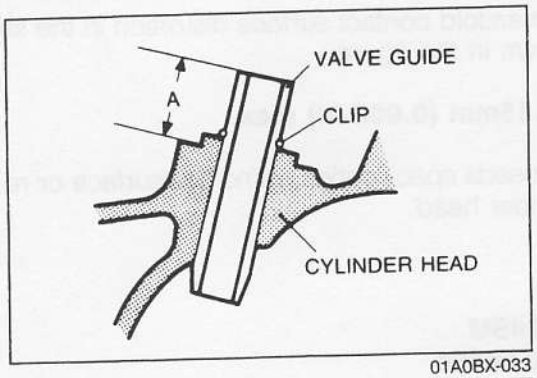
mm (in)

	B3
IN, EX	6.01—6.03 (0.2366—0.2374)

6. Calculate the valve stem to guide clearance.
   Subtract the outer diameter of the valve stem from the inner diameter of the corresponding valve guide.

   Clearance
   IN : 0.025—0.060mm (0.0010—0.0024 in)
   EX: 0.030—0.065mm (0.0012—0.0026 in)
   Maximum: 0.20mm (0.008 in)

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



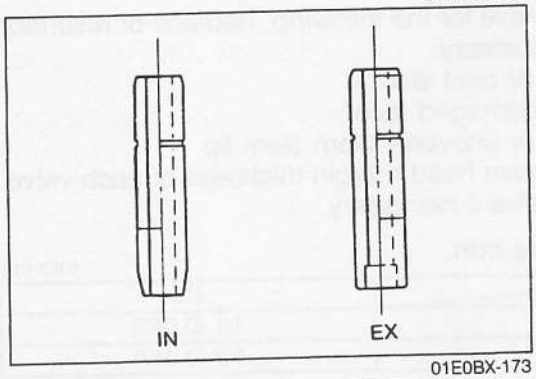
01A0BX-033

8. Measure the protrusion height of each valve guide. Replace the valve guide if necessary.

Height

mm (in)

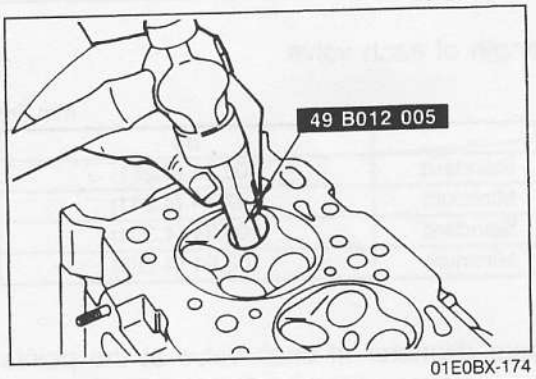
	B3
IN, EX	16.8—17.4 (0.661—0.685)



01E0BX-173

Replacement of valve guide

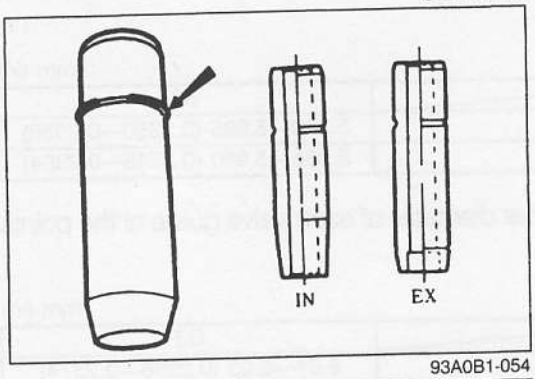
Note
- **As the shapes of the intake and exhaust valve guides are different, install correctly.**



01E0BX-174

Removal

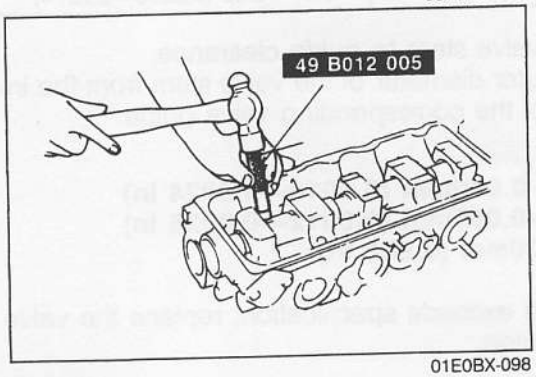
Remove the valve guide from the side opposite the combustion chamber with the **SST**.



93A0B1-054

Installation

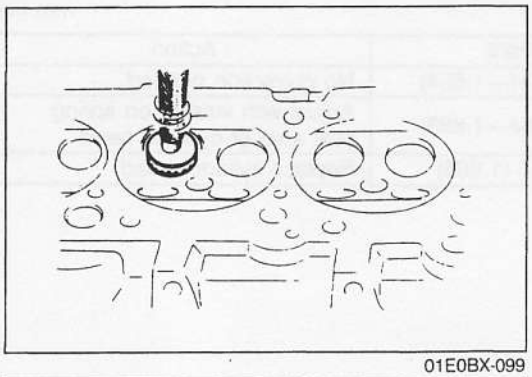
1. Fit the clip onto the valve guide.



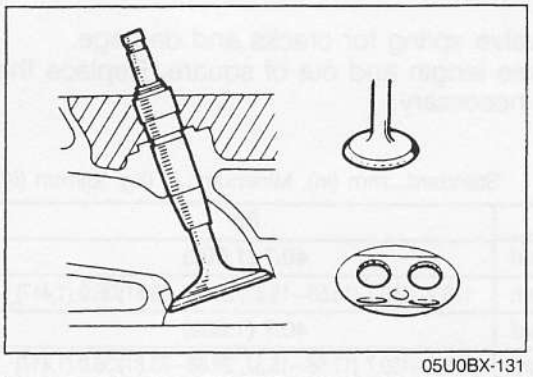
01E0BX-098

2. Using the **SST**, tap the valve guide in from the combustion chamber side so that the protrusion height (dimension A in the figure) is within specification.

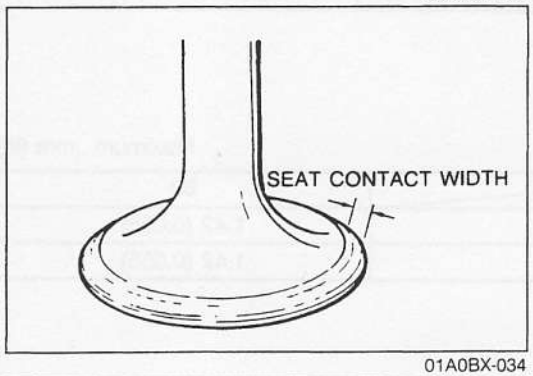
Caution
- **Do not strike hard after the clip contacts the cylinder head, the clip will be damaged.**



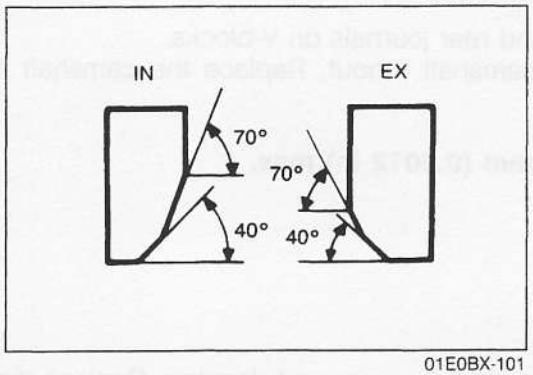
01E0BX-099



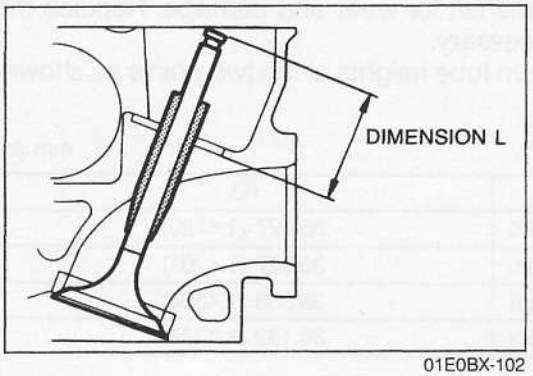
05U0BX-131



01A0BX-034



01E0BX-101



01E0BX-102

Valve Seat

1. Inspect the contact surface of each valve seat and valve face for the following:
   (1) Roughness
   (2) Damage
2. If necessary, resurface the valve seat with a **45°** valve seat cutter and/or resurface the valve face.
3. Apply a thin coat of Prussian blue to the valve face.
4. Inspect the valve seating by pressing the valve against the seat.
   (1) If blue does not appear 360° around the valve face, replace the valve.
   (2) If blue does not appear 360° around the valve seat, resurface the seat.
5. Measure the seat contact width.

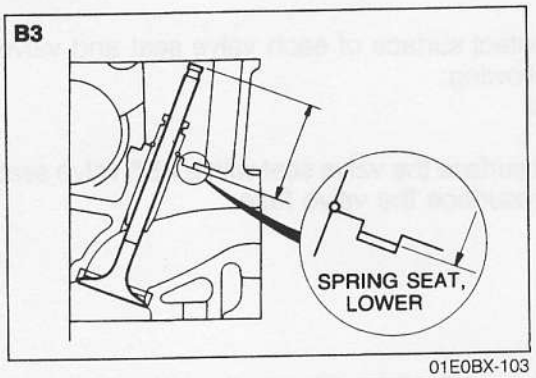
Width

mm (in)

	B3
IN, EX	0.8—1.4 (0.031—0.055)

6. Verify that the valve seating position is at the center of the valve face.
   (1) If the seating position is too high, correct the valve seat with a **70°** cutter and a **45°** cutter.
   (2) If the seating position is too low, correct the valve seat with a **40°** cutter and a **45°** cutter.
7. Seat the valve to the valve seat with lapping compound.
8. Inspect the sinking of the valve seat.
   Measure the protruding length (dimension **L**) of the valve stem.

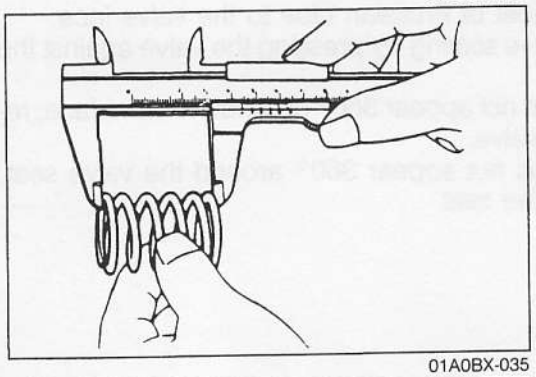
   Dimension L: 41.05—41.95mm (1.616—1.652 in)



01E0BX-103

mm (in)

Measurement	Action
41.5—42.0 (1.634—1.654)	No correction needed
42.0—43.0 (1.654—1.693)	Adjust with washer on spring seat area of cylinder head
More than 43.0 (1.693)	Replace cylinder head


01A0BX-035

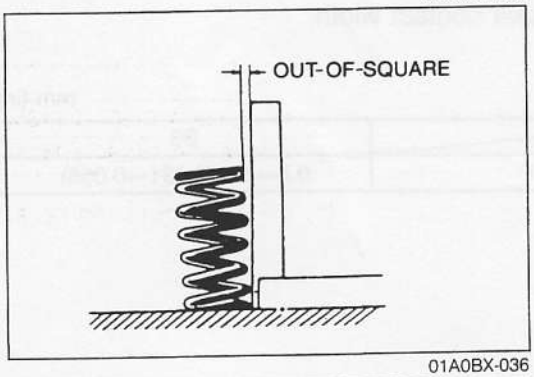
Valve Spring

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

Free length

Standard...mm (in), Minimum...N (kg, lb)/mm (in)

		B3
IN	Standard	40.7 (1.602)
	Minimum	133.2—150.7 (13.58—15.37, 29.88—33.81)/36.0 (1.417)
EX	Standard	40.7 (1.602)
	Minimum	133.2—150.7 (13.58—15.37, 29.88—33.81)/36.0 (1.417)

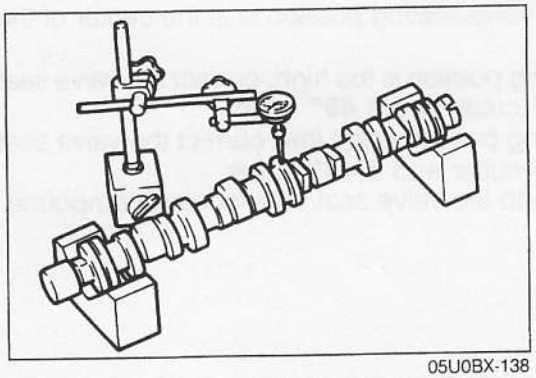


01A0BX-036

Out-of-square

Maximum ..mm (in)

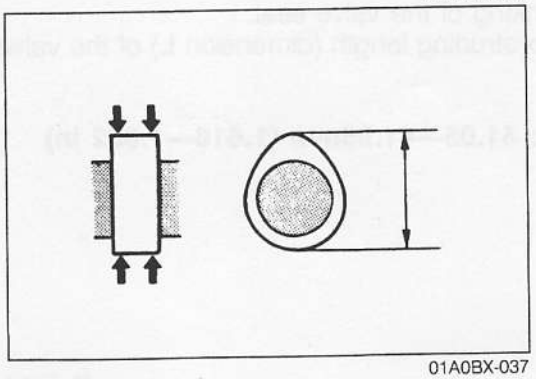
	B3
IN	1.42 (0.055)
EX	1.42 (0.055)


05U0BX-138

CAMSHAFT

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

Runout: 0.03mm (0.0012 in) max.

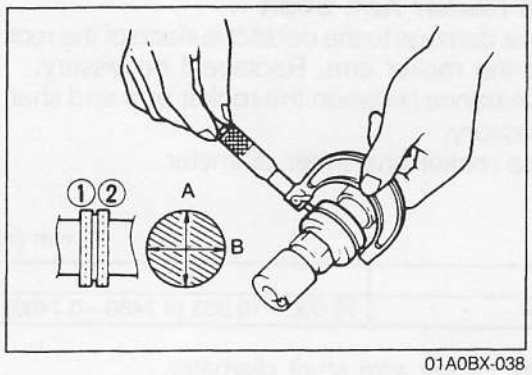

01A0BX-037

3. Inspect the camshaft for wear and damage. Replace the camshaft if necessary.
4. Measure the cam lobe heights at the two points as shown.

Height

mm (in)

		B3
IN	Standard	36.527 (1.4380)
	Minimum	36.327 (1.4301)
EX	Standard	36.333 (1.4304)
	Minimum	36.133 (1.4225)



01A0BX-038

5. Measure the journal diameters X and Y directions at the two points (① and ②) shown.

Diameter

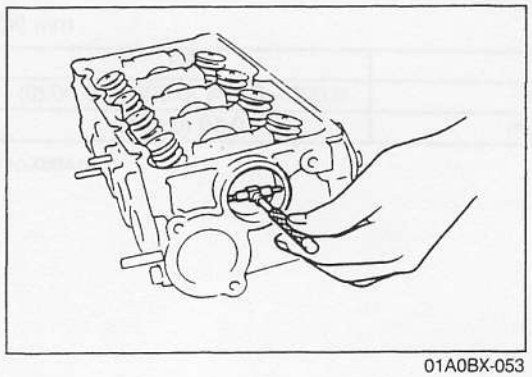
mm (in)

	B3
No.1 & No.5	43.440—43.460 (1.7102—17.110)
No.2 & No.4	43.425—43.450 (1.7096—1.7106)
No.3	43.410—43.435 (1.7091—1.7100)

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

6. Measure the oil clearances between the camshaft and cylinder head.
   (1) Remove all foreign material and oil from the journals and the camshaft bore.
   (2) Measure the camshaft bore diameter.

03U0B1-105


01A0BX-053

Diameter

mm (in)

	B3
No.1 & No.5	43.500—43.525 (1.7126—1.7135)
No.2, No.3, No.4	43.500—43.525 (1.7126—1.7135)

   (3) Subtract the journal diameter from the bore diameter.

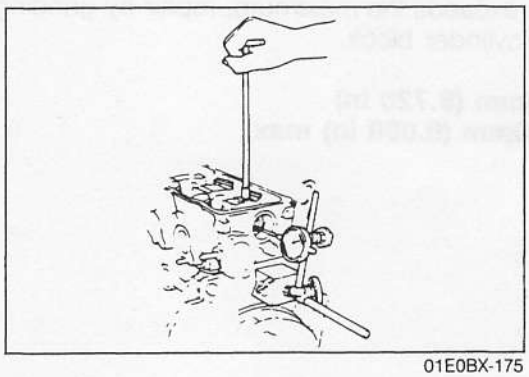
Oil clearance

mm (in)

No.1 & No.5	0.040—0.085 (0.0016—0.0033)
No.2 & No.4	0.050—0.100 (0.0019—0.0039)
No.3	0.065—0.115 (0.0025—0.0045)
Maximum	0.15 (0.006)

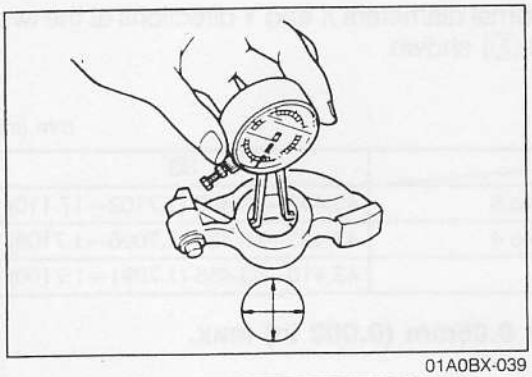
   (4) If the clearance exceeds the maximum, replace the camshaft or cylinder head.

01A0BX-054

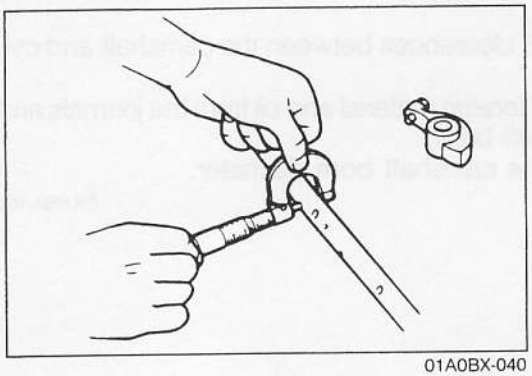

01E0BX-175

7. Measure the camshaft end play. If it exceeds the maximum, replace the thrust plate or camshaft.

End play : 0.060—0.200mm (0.0023—0.0078 in)
Maximum: 0.2mm (0.007 in)



01A0BX-039



01A0BX-040

Rocker Arm and Rocker Arm Shaft

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

Diameter

mm (in)

	B3
IN, EX	19.000—19.033 (0.7480—0.7493)

(2) Measure the rocker arm shaft diameter.

Diameter

mm (in)

	B3
IN, EX	18.959—18.980 (0.7464—0.7472)

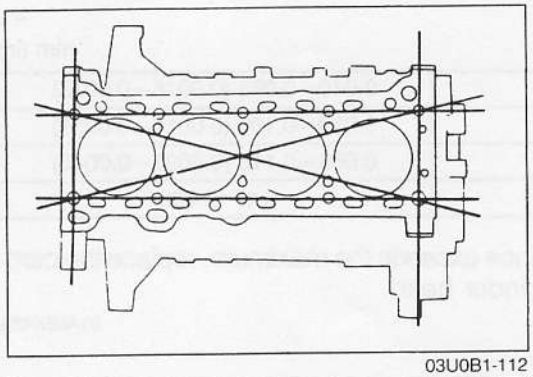
(3) Subtract the shaft diameter from the rocker arm diameter.

Oil clearance

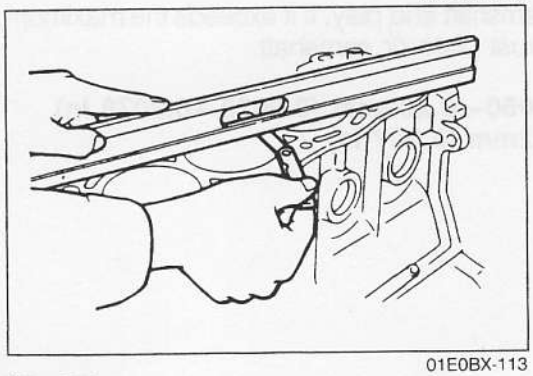
mm (in)

	B3
IN, EX	0.020—0.074 (0.0008—0.0029)
Maximum	0.10 (0.004)

01A0BX-041



03U0B1-112



01E0BX-113

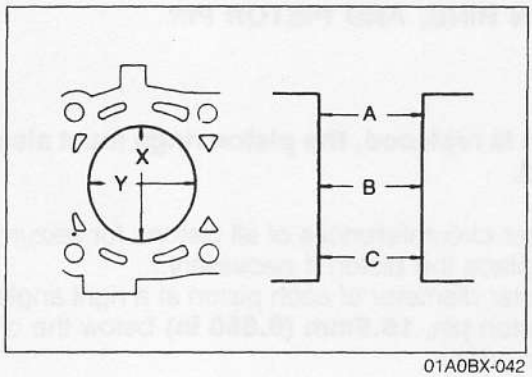
CYLINDER BLOCK

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

   Distortion: 0.15mm (0.006 in) max.

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

   Height: 221.5mm (8.720 in)
   Grinding: 0.20mm (0.008 in) max.



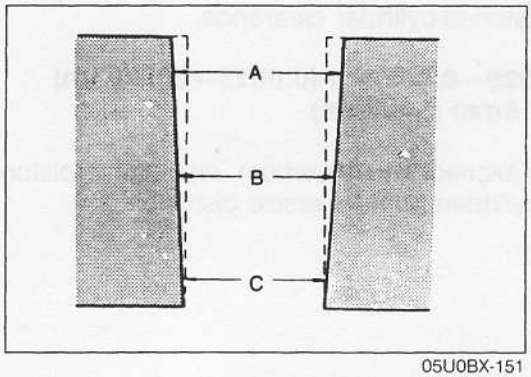
01A0BX-042

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

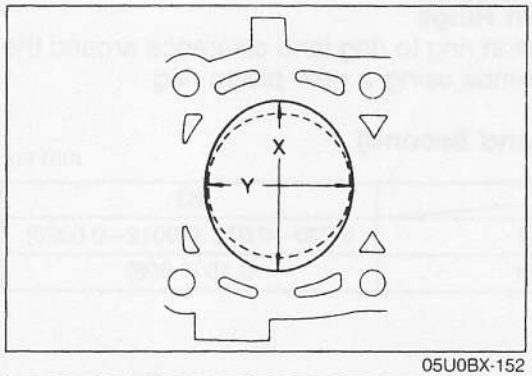
Cylinder bore

mm (in)

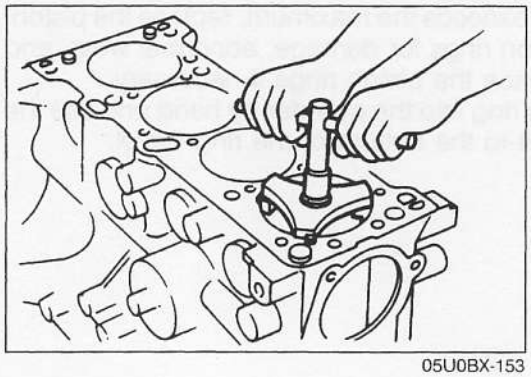
	B3
Standard	71.006—71.013 (2.7955—2.7958)
0.25 (0.010) oversize	71.256—71.263 (2.8053—2.8056)
0.50 (0.020) oversize	71.506—71.513 (2.8152—2.8155)
0.75 (0.030) oversize	71.756—71.763 (2.8250—2.8253)
1.00 (0.04) oversize	72.006—72.013 (2.8349—2.8352)



05U0BX-151



05U0BX-152


05U0BX-153

Caution

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

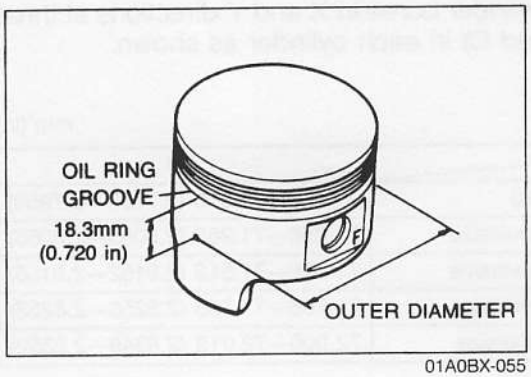
(1) If the cylinder bore exceeds the maximum, rebore the cylinder to oversize.
(2) If the difference between measurements A and C exceeds the maximum taper, rebore the cylinder to oversize.

Taper: 0.019mm (0.0007 in) max.

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

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

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



01A0BX-055

PISTON, PISTON RING, AND PISTON PIN

Piston

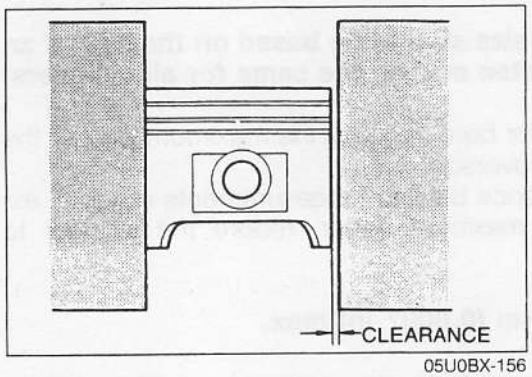
Caution
- **If the piston is replaced, the piston rings must also be replaced.**

1. Inspect the outer circumferences of all pistons for seizure or scoring. Replace the piston if necessary.
2. Measure the outer diameter of each piston at a right angle **(90°)** to the piston pin, **16.5mm (0.650 in)** below the oil ring land lower edge.

Piston diameter

mm (in)

Standard	70.961—70.967 (2.7937—2.7939)
0.25 (0.010) oversize	71.211—71.217 (2.8036—2.8028)
0.50 (0.020) oversize	71.461—71.467 (2.8134—2.8137)
0.75 (0.030) oversize	71.711—71.717 (2.8233—2.8235)
1.00 (0.04) oversize	71.961—71.967 (2.8331—2.8333)

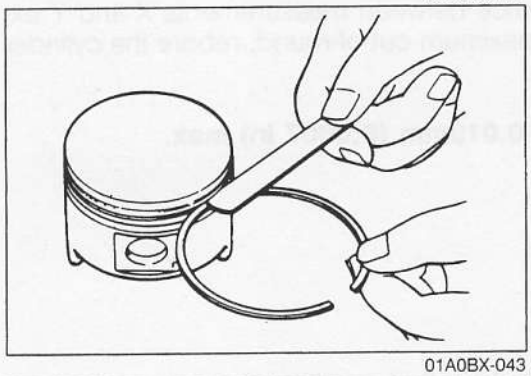


05U0BX-156

3. Measure the piston-to-cylinder clearance.

Clearance: 0.039—0.052mm (0.0015—0.0020 in)
Maximum : 0.15mm (0.006 in)

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


01A0BX-043

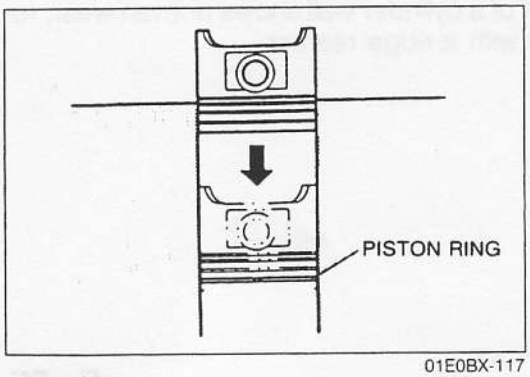
Piston and Piston Rings

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

Clearance (Top and Second)

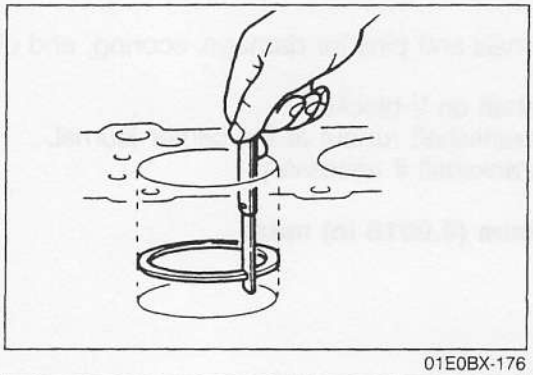
mm (in)

	B3
Standard	0.030—0.070 (0.0012—0.0028)
Maximum	0.15 (0.006)



01E0BX-117

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


01E0BX-176

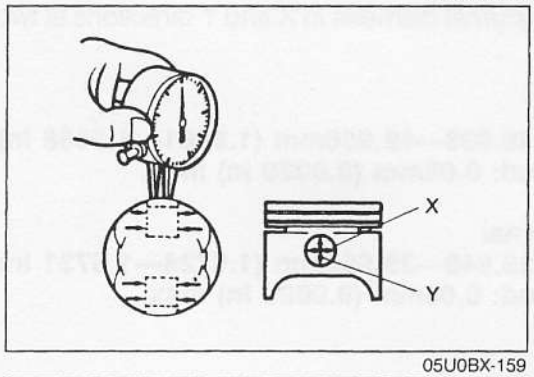
5. Measure each piston ring end gap with a feeler gauge. Replace the piston ring if necessary.

End gap
Top : 0.15—0.30mm (0.006—0.012 in)
Second: 0.30—0.45mm (0.011—0.017 in)
Oil rail : 0.20—0.70mm (0.008—0.028 in)
Maximum : 1.0mm (0.039 in)

Piston and Piston Pin

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

Diameter: 19.988—20.000mm (0.7869—0.7874 in)



05U0BX-159

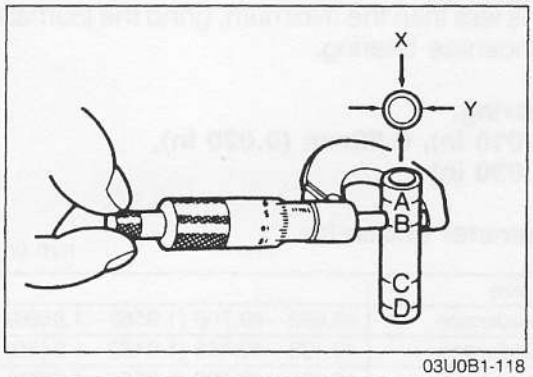
2. Measure each piston pin diameter in X and Y directions at four points.

Diameter: 19.974—19.980mm (0.7864—0.7866 in)

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

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

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

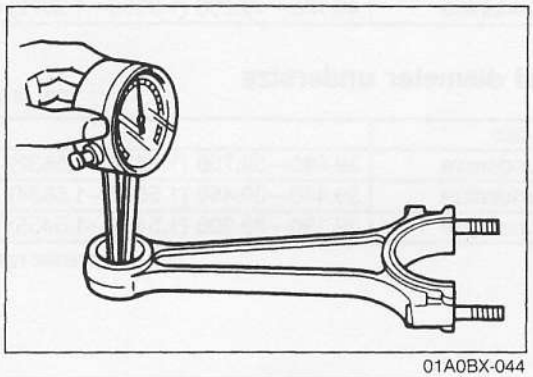


03U0B1-118

CONNECTING ROD

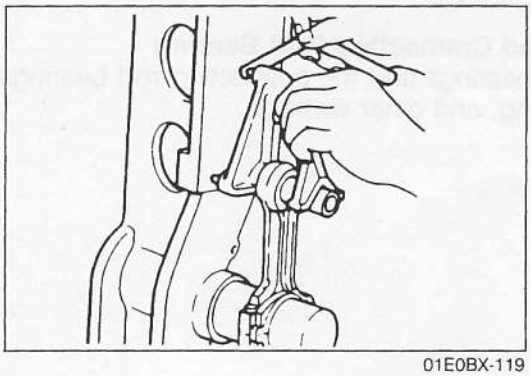
1. Measure each connecting rod bushing inner diameter.

Diameter: 19.943—19.961mm (0.7852—0.7859 in)


01A0BX-044

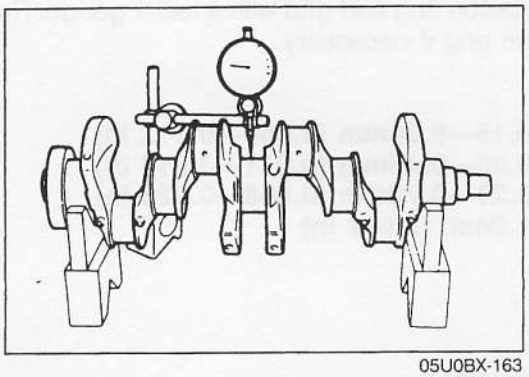
2. Calculate the clearance between the connecting rod bushing and piston pin.

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

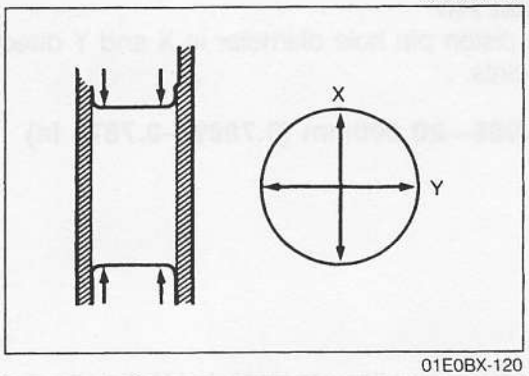

01E0BX-119

3. Measure each connecting rod for bending. Repair or replace the connecting rod if necessary.

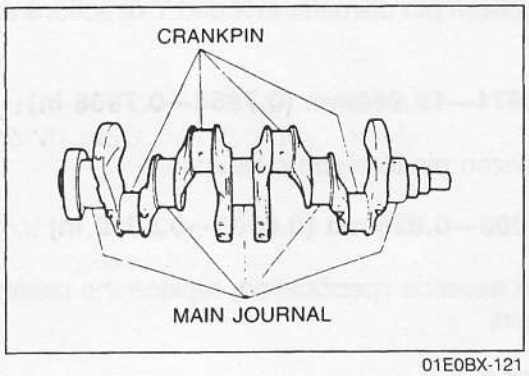
Bending: 0.075mm (0.0030 in) max./50mm (1.97 in)



05U0BX-163



01E0BX-120



01E0BX-121

CRANKSHAFT

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

Runout: 0.04mm (0.0016 in) max.

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

Main journal
Diameter: 49.938—49.956mm (1.9661—1.9668 in)
Out-of-round: 0.05mm (0.0020 in) max.

Crankpin journal
Diameter: 39.940—39.956mm (1.5724—1.5731 in)
Out-of-round: 0.05mm (0.0020 in) max.

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

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

Main journal diameter undersize

mm (in)

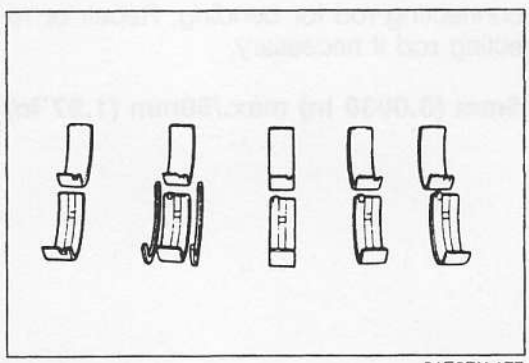
Bearing size	
0.25 (0.010) undersize	49.688—49.706 (1.9562—1.9569)
0.50 (0.020) undersize	49.438—49.456 (1.9463—1.9470)
0.75 (0.030) undersize	49.188—49.206 (1.9365—1.9372)

Crankpin journal diameter undersize

mm (in)

Bearing size	
0.25 (0.010) undersize	39.690—39.706 (1.5626—1.5632)
0.50 (0.020) undersize	39.440—39.456 (1.5528—1.5534)
0.75 (0.030) undersize	39.190—39.206 (1.5429—1.5435)

01E0BX-122

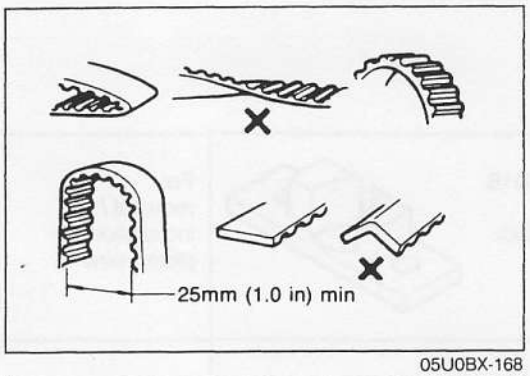


01E0BX-177

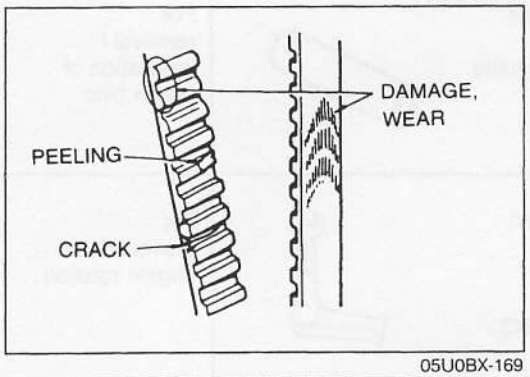
BEARING

Main Bearing and Connecting Rod Bearing

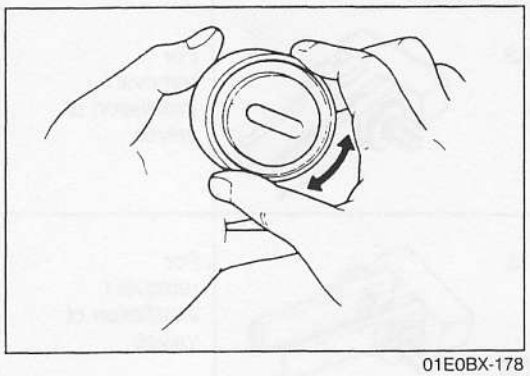
Check the main bearings and the connecting rod bearings for peeling, scoring, and other damage.



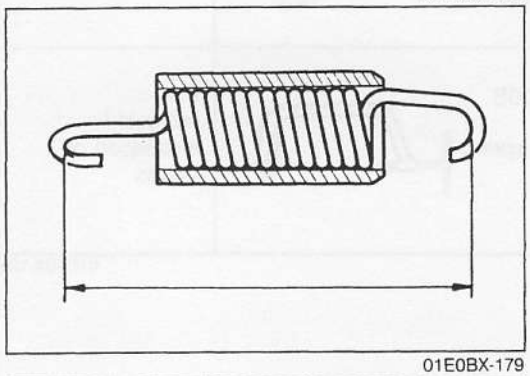
05U0BX-168



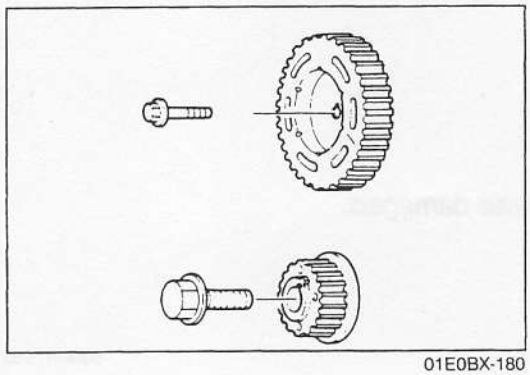
05U0BX-169



01E0BX-178



01E0BX-179



01E0BX-180

TIMING BELT

Caution
- **Never forcefully twist, turn inside out, or bend the timing belt.**
- **Do not allow oil or grease on the belt.**

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

TENSIONER, IDLER

Caution
- **Do not clean the tensioner or idler with cleaning fluids. If necessary, use a soft rag to wipe them clean, and avoid scratching them.**

Check the tensioner and idler for smooth rotation and abnormal noise. Replace the tensioner or idler if necessary.

TENSIONER SPRING

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

Free length: 64.0mm (2.520 in)

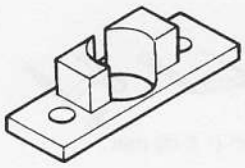
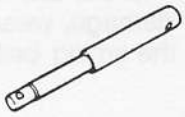
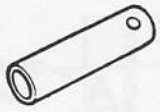
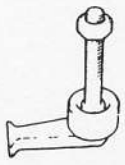
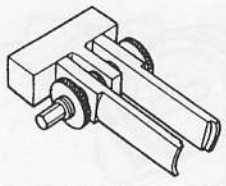
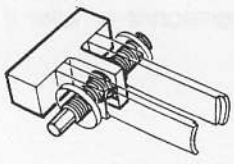
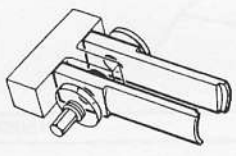
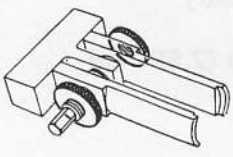
PULLEY
Timing Belt Pulley, Camshaft Pulley

Caution
- **Do not clean the pulleys with cleaning fluids. If necessary, use a soft rag to wipe them clean, and avoid scratching them.**

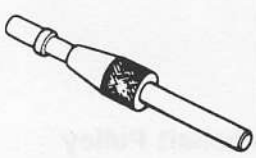
Inspect the pulley teeth for wear, deformation, and other damage. Replace the pulley if necessary.

ASSEMBLY

PREPARATION
SST

49 D011 001 Support block body 	For removal / installation of piston pins	49 H011 001B Support block head 	For removal / installation of piston pins
49 D011 003 Piston pin installer 	For removal / installation of piston pins	49 8134 044 Piston pin guide 	For removal / installation of piston pins
49 E301 060 Brake, ring gear 	For prevention of engine rotation	49 E301 061 Body (Part of 49 E301 060) 	For prevention of engine rotation
49 E301 062 Collar (Part of 49 E301 060) 	For prevention of engine rotation	49 B012 0A2 Pivot, valve spring lifter 	For removal / installation of valves
49 B012 012 Body (Part of 49 B012 0A2) 	For removal / installation of valves	49 B012 013 Foot (Part of 49 B012 0A2) 	For removal / installation of valves
49 B012 014 Locknut (Part of 49 B012 0A2) 	For removal / installation of valves	49 0636 100B Arm, valve spring lifter 	For removal / installation of valves

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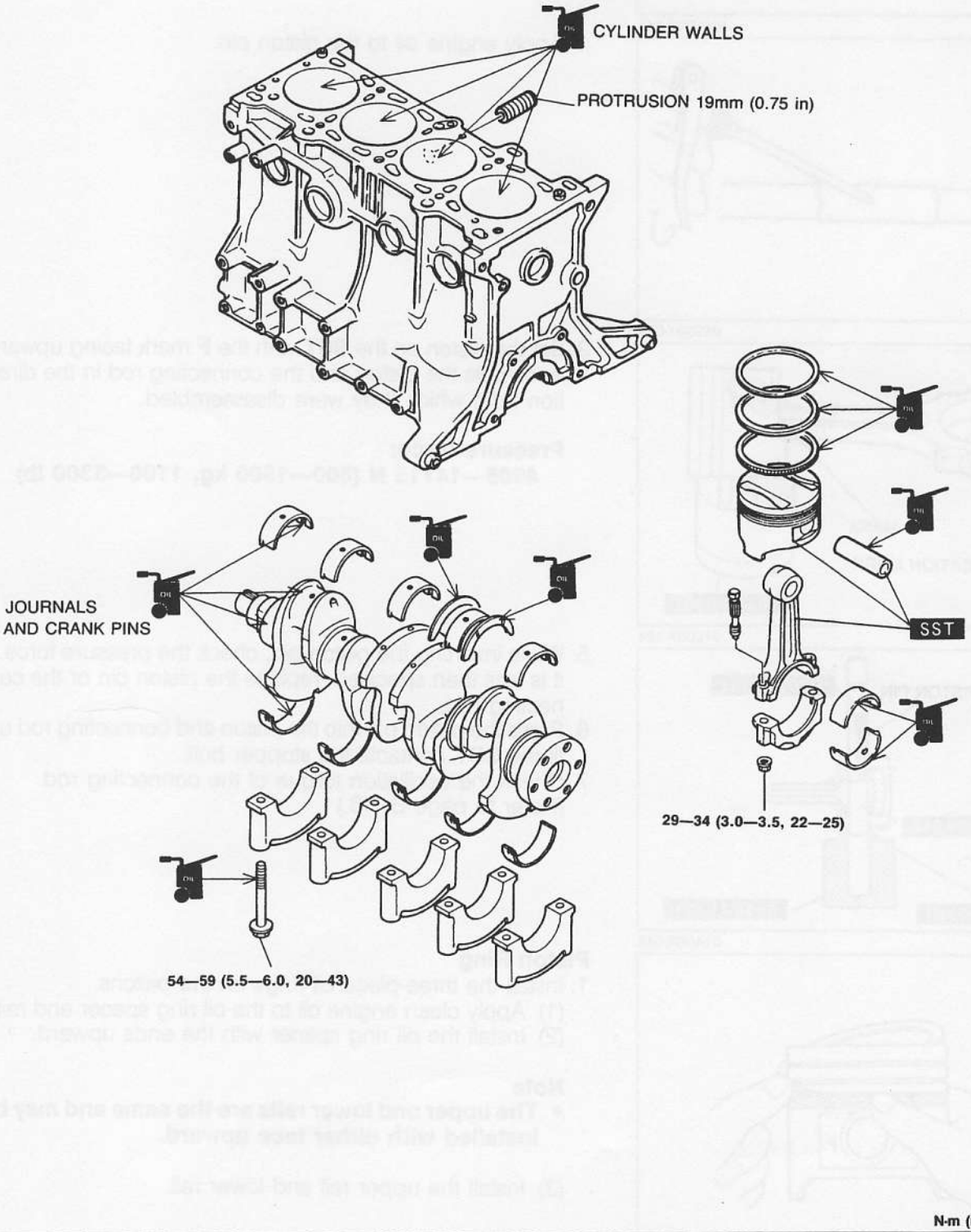
49 SE01 310 Centering tool, clutch disc 	For installation of clutch disc

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

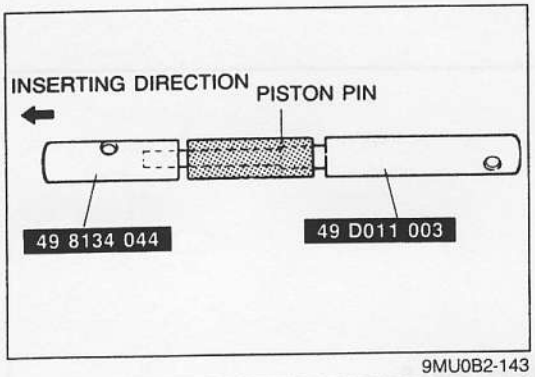
Caution
- **Do not reuse gaskets or oil seals.**

93G0B1-082

CYLINDER BLOCK (INTERNAL PARTS)
Torque Specifications



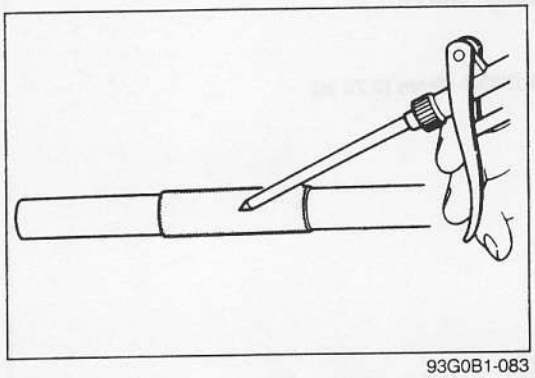
N·m (m-kg, ft-lb)



9MU0B2-143

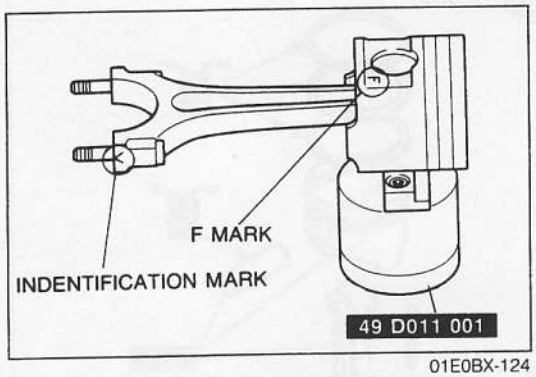
Connecting Rod

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



93G0B1-083

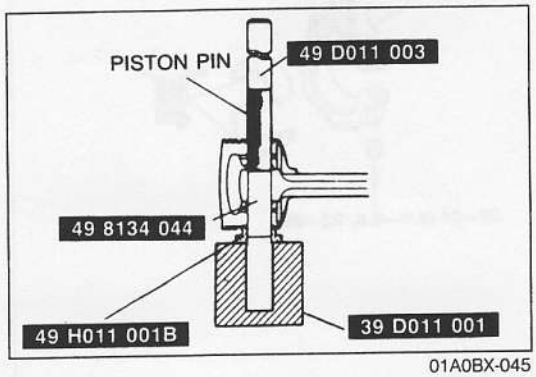
2. Apply engine oil to the piston pin.



01E0BX-124

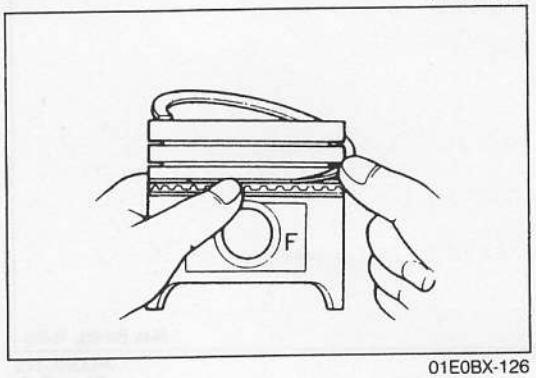
3. Set the piston on the **SST** with the **F** mark facing upward.
4. Assemble the piston and the connecting rod in the direction from which they were disassembled.

Pressure force:
4905—14715 N (500—1500 kg, 1100—3300 lb)



01A0BX-045

5. While inserting the piston pin, check the pressure force. If it is less than specified, replace the piston pin or the connecting rod.
6. Press the piston pin into the piston and connecting rod until the **SST** contacts the stopper bolt.
7. Check the oscillation torque of the connecting rod. (Refer to page B–46.)



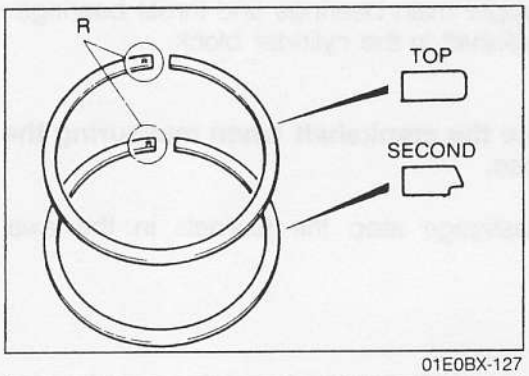
01E0BX-126

Piston Ring

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

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

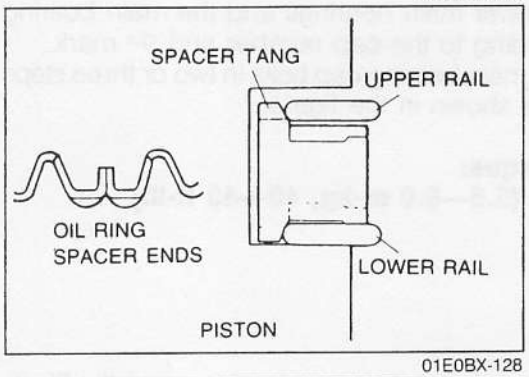
   (3) Install the upper rail and lower rail.



01E0BX-127

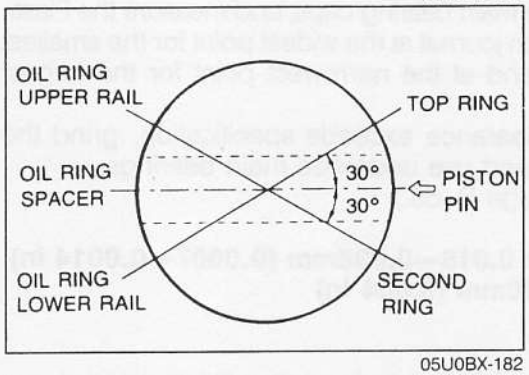
2. Verify that both rails are expanded by the spacer tangs as shown in the figure by making certain the rails turn smoothly in both directions.

Caution
- **The rings must be installed with the R marks upward.**
- **The second ring must be installed with the scraper face downward.**



01E0BX-128

3. Apply clean engine oil to the top and second piston rings.
4. Install the second ring to the piston; then install the top ring. Use a piston ring expander (commercially available).

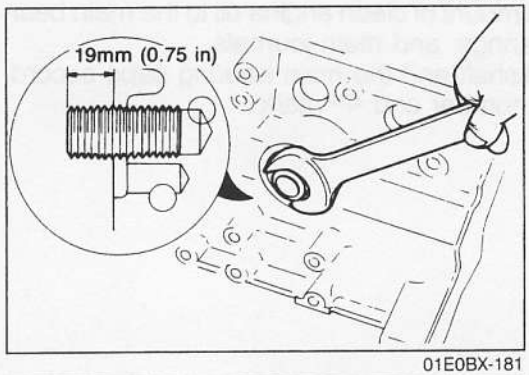


05U0BX-182

5. Position the end gaps of the rings as shown in the figure.

Oil Filter Joint
Install the oil filter joint so that it protrudes as specified.

Protrusion: 19mm (0.75 in)

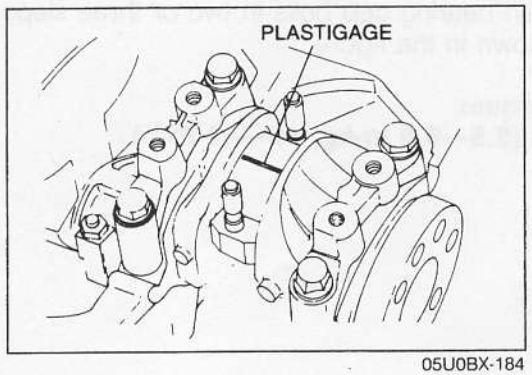


01E0BX-181

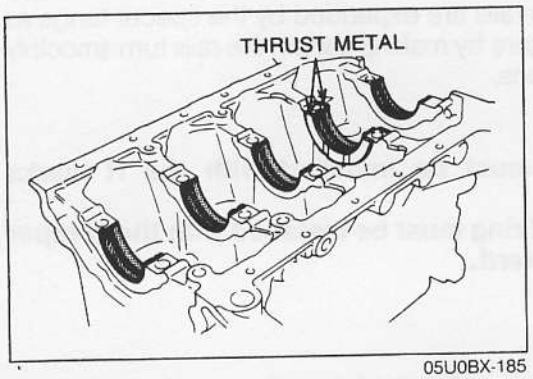
Crankshaft
1. Before installing the crankshaft, inspect the main bearing oil clearances as follows.

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

Caution
- **Install the grooved upper main bearings in the cylinder block.**
- **Install the thrust bearings with the oil groove facing the crankshaft.**



05U0BX-184

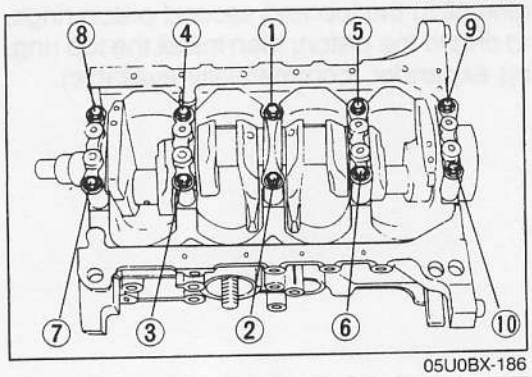


05U0BX-185

(2) Install the upper main bearings and thrust bearings.
(3) Set the crankshaft in the cylinder block.

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

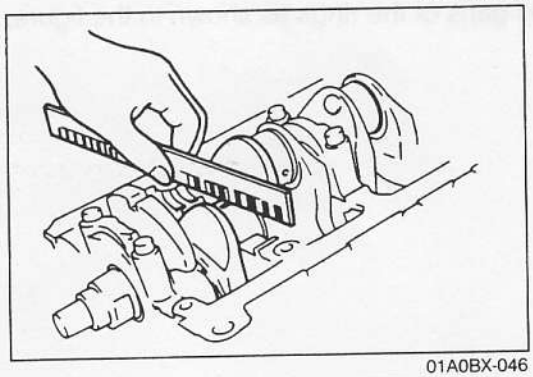
(4) Position Plastigage atop the journals in the axial direction.



05U0BX-186

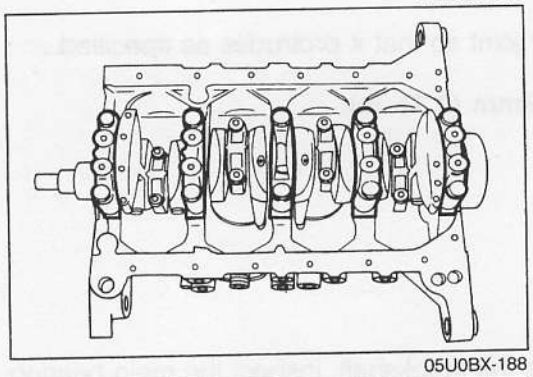
(5) Install the lower main bearings and the main bearing caps according to the cap number and ⇦ mark.
(6) Tighten the main bearing cap bolts in two or three steps in the order shown in the figure.

Tightening torque:
54—59 N·m (5.5—6.0 m-kg, 40—43 ft-lb)

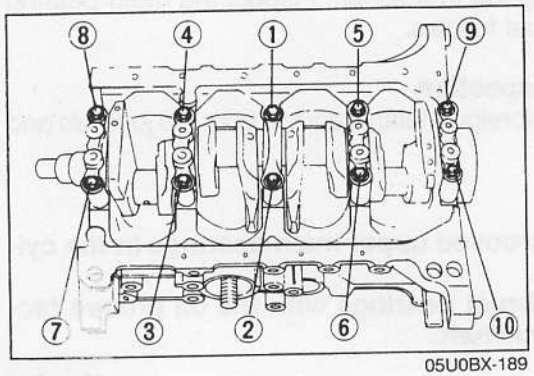

01A0BX-046

(7) Remove the main bearing caps, and measure the Plastigage at each journal at the widest point for the smallest clearance and at the narrowest point for the largest clearance.
(8) If the oil clearance exceeds specification, grind the crankshaft and use undersize main bearings. (Refer to page B–58.)

Oil clearance: 0.018—0.036mm (0.0007—0.0014 in)
Maximum: 0.10mm (0.004 in)


05U0BX-188

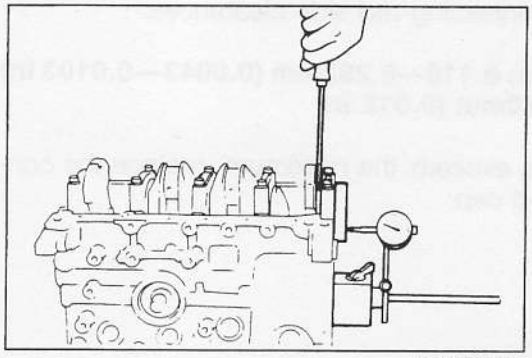
2. Apply a liberal amount of clean engine oil to the main bearings, thrust bearings, and main journals.
3. Install the crankshaft and the main bearing caps according to the cap number and ⇦ mark.



05U0BX-189

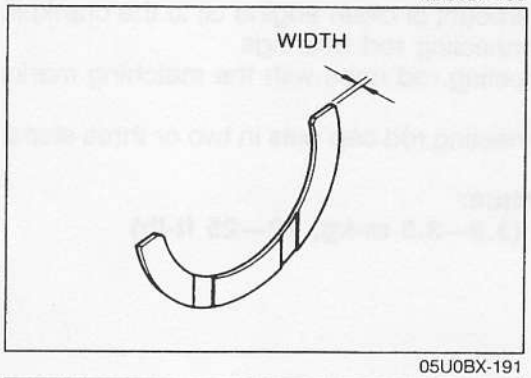
4. Tighten the main bearing cap bolts in two or three steps in the order shown in the figure.

Tightening torque:
54—59 N·m (5.5—6.0 m-kg, 40—43 ft-lb)


05U0BX-190

5. Measure the crankshaft end play.

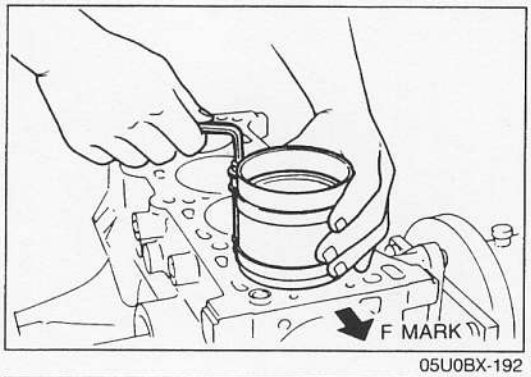
End play : 0.080—0.282mm (0.0031—0.0111 in)
Maximum: 0.30mm (0.012 in)



05U0BX-191

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

Thrust bearing width
Standard:
2.500—2.550mm (0.0984—0.1004 in)
0.25mm (0.010 in) oversize:
2.625—2.675mm (0.1033—0.1053 in)
0.50mm (0.020 in) oversize:
2.750—2.800mm (0.1083—0.1102 in)
0.75mm (0.030 in) oversize:
2.875—2.925mm (0.1132—0.1152 in)



05U0BX-192

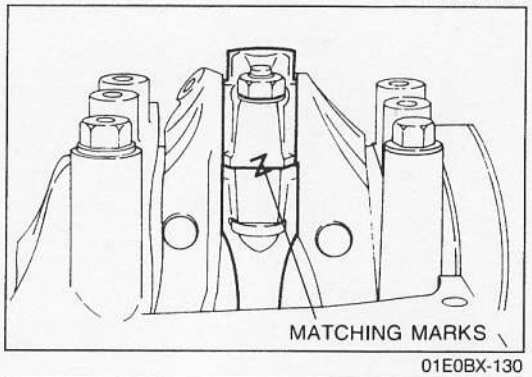
Piston and Connecting Rod Assembly

Caution
- **Protect the connecting rod bolts with rubber sleeves to prevent damage to the crankpin journals.**

Connecting Rod Cap

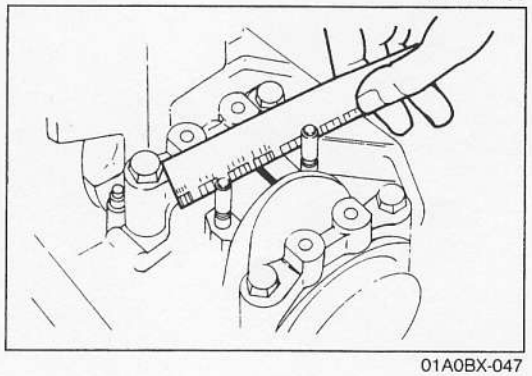
1. Measure the connecting rod bearing oil clearances using the same procedure as for the main bearing oil clearance.

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



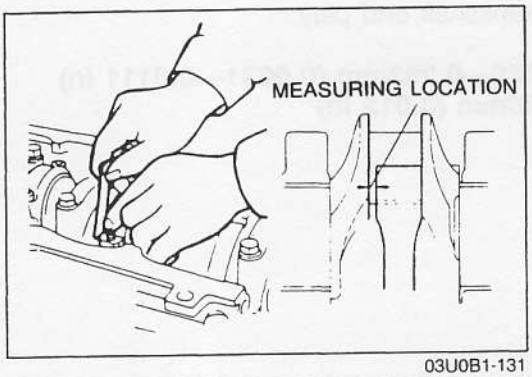
01E0BX-130

Tightening torque:
29—34 N·m (3.0—3.5 m-kg, 22—25 ft-lb)


01A0BX-047

Oil clearance: 0.028—0.068mm (0.0011—0.0027 in)
Maximum: 0.10mm (0.004 in)

2. If the oil clearance exceeds the maximum, grind the crankshaft and use undersize bearings. (Refer to page B–58.)

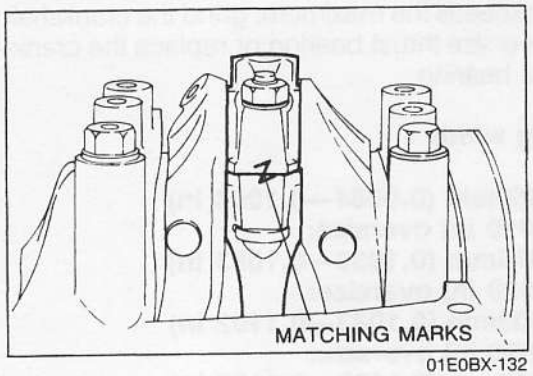


03U0B1-131

3. Measure the connecting rod side clearances.

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

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

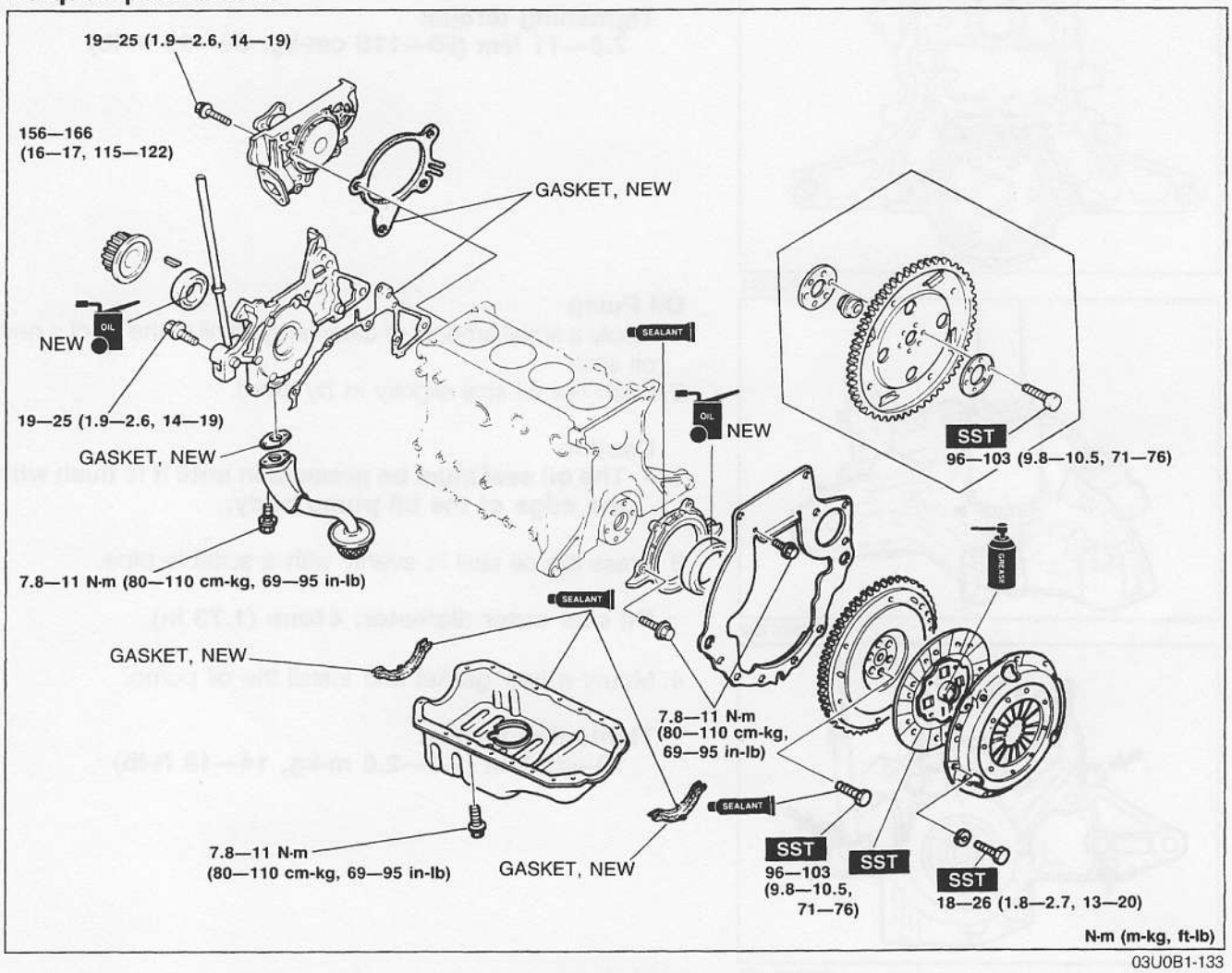


01E0BX-132

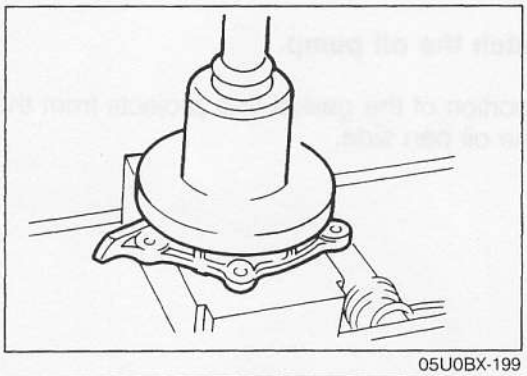
5. Apply a liberal amount of clean engine oil to the crankpin journals and connecting rod bearings.
6. Install the connecting rod caps with the matching marks aligned.
7. Tighten the connecting rod cap nuts in two or three steps.

Tightening torque:
29—34 N·m (3.0—3.5 m-kg, 22—25 ft-lb)

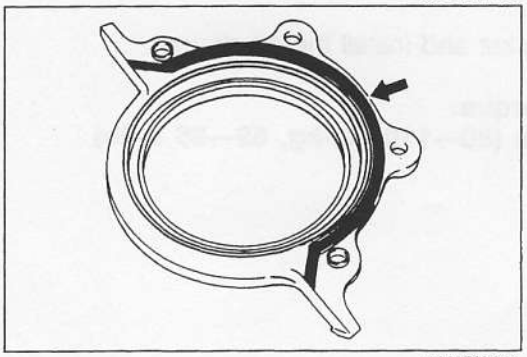
CYLINDER BLOCK (EXTERNAL PARTS)
Torque Specifications



03U0B1-133



05U0BX-199



05U0BX-200

Rear Cover

1. Apply a small amount of clean engine oil to the lip of a new oil seal.
2. Push the oil seal slightly in by hand.

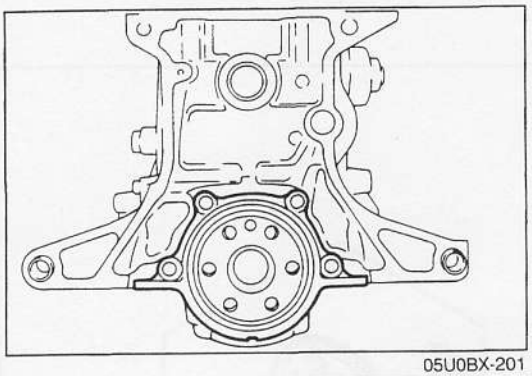
Caution

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

3. Press the oil seal in evenly with a suitable pipe.

Oil seal outer diameter: 100mm (3.94 in)

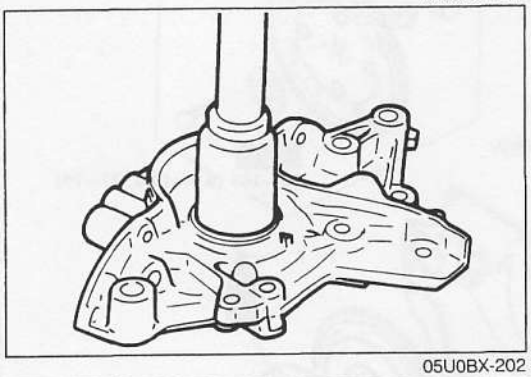
4. Apply silicone sealant to the shaded area shown in the figure.



05U0BX-201

5. Install the rear cover.

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



05U0BX-202

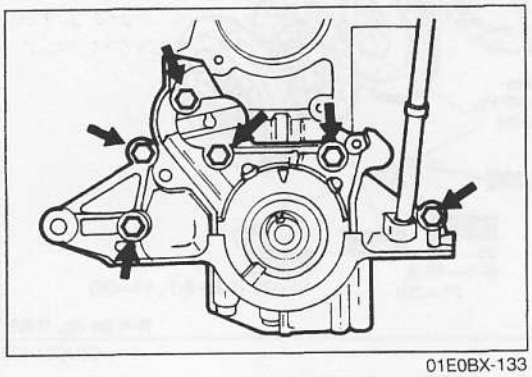
Oil Pump

1. Apply a small amount of clean engine oil to the lip of a new oil seal.
2. Push the oil seal slightly in by hand.

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

3. Press the oil seal in evenly with a suitable pipe.

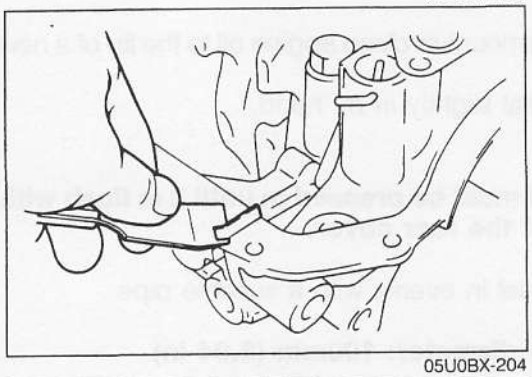
Oil seal outer diameter: 44mm (1.73 in)



01E0BX-133

4. Mount a new gasket and install the oil pump.

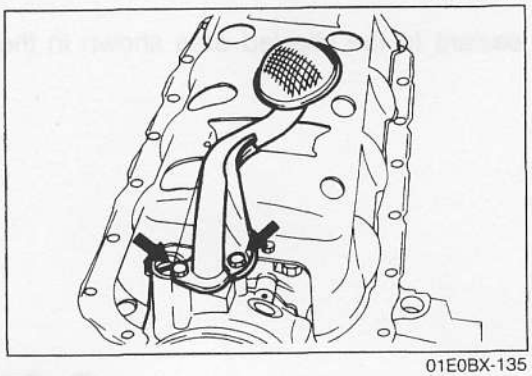
Tightening torque:
19—25 N·m (1.9—2.6 m-kg, 14—19 ft-lb)



05U0BX-204

Caution
- **Do not scratch the oil pump.**

5. Cut away the portion of the gasket that projects from the body toward the oil pan side.

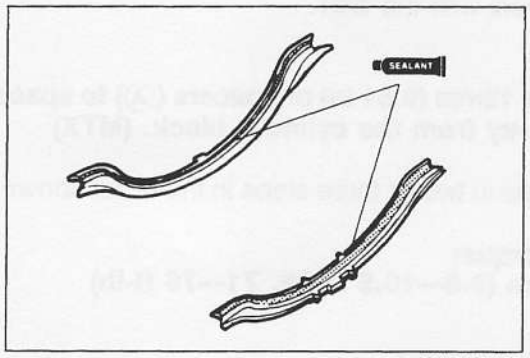


01E0BX-135

Oil Strainer

Mount a new gasket and install the oil strainer.

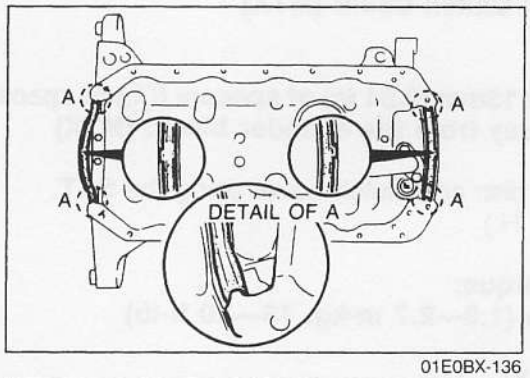
Tightening torque:
7.8—11 N·m (80—110 cm-kg, 69—95 in-lb)



03U0B1-137

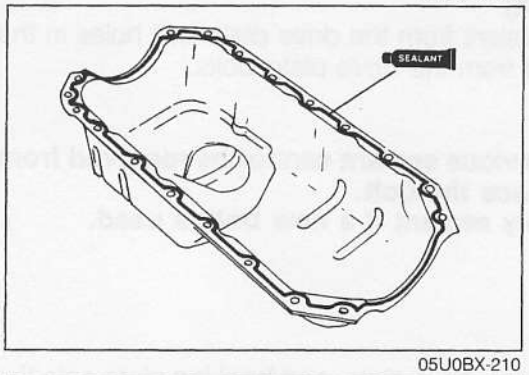
Oil Pan

1. Remove all foreign material from the contact surfaces.
2. Apply silicone sealant to the shaded areas shown in the figure.



01E0BX-136

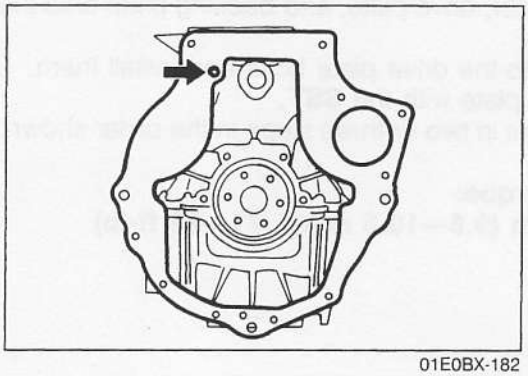
3. Install new gaskets onto the oil pump body and the rear cover with the projections in the notches as shown in the figure.



05U0BX-210

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

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

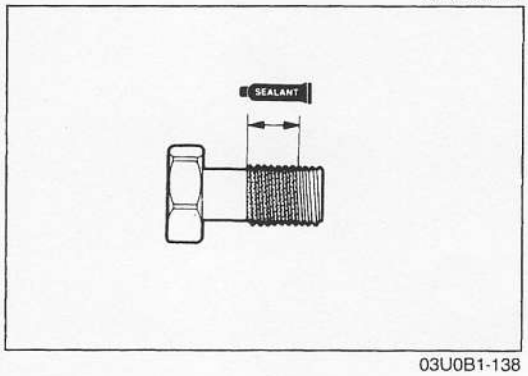


01E0BX-182

End Plate

Install the end plate.

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



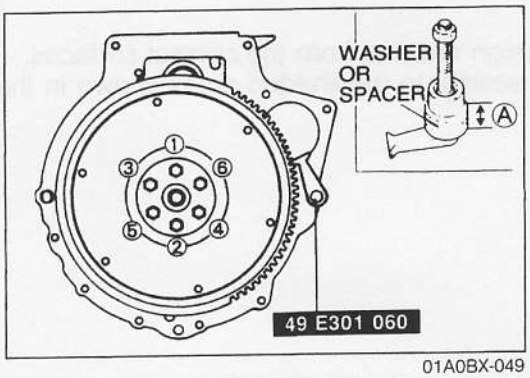
03U0B1-138

Flywheel (MTX)

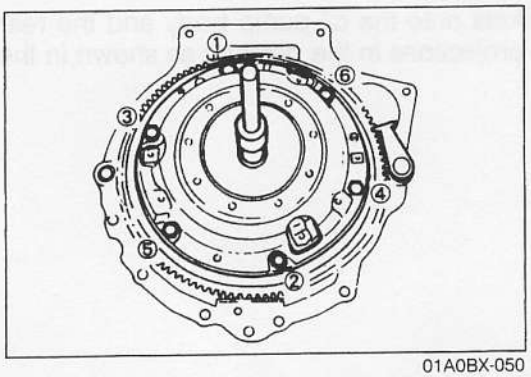
1. Remove the sealant from the flywheel bolt holes in the crankshaft and from the flywheel bolts.

Caution
- **If all the previous sealant cannot be removed from a bolt, replace the bolt.**
- **Do not apply sealant if a new bolt is used.**

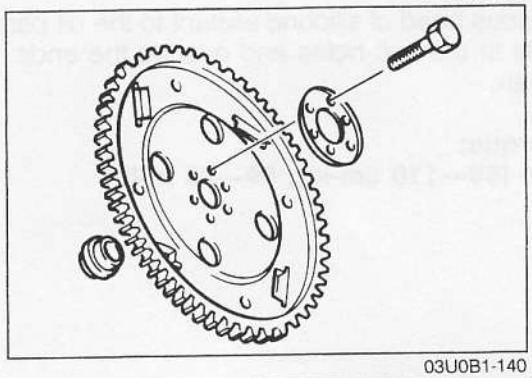
2. Set the flywheel onto the crankshaft.
3. Apply sealant to the flywheel bolts and install them.



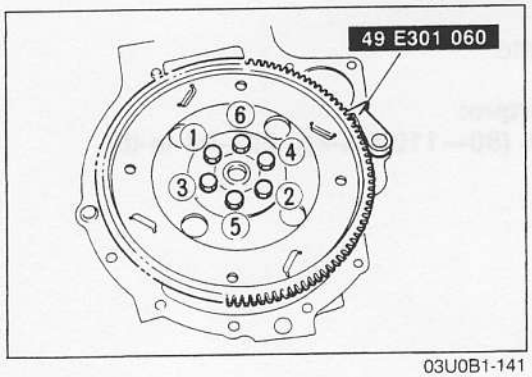
01A0BX-049



01A0BX-050



03U0B1-140



03U0B1-141

4. Hold the flywheel with the **SST**.

Caution
- **Add approx 13mm (0.51 in) of spacers (Ⓐ) to space the SST away from the cylinder block. (MTX)**

5. Tighten the bolts in two or three steps in the order shown.

Tightening torque:
96—103 N·m (9.8—10.5 m-kg, 71—76 ft-lb)

Clutch Disc and Clutch Cover (MTX)

Caution
- **Add approx 13mm (0.51 in) of spacers (Ⓐ) to space the SST away from the cylinder block. (MTX)**

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

Tightening torque:
18—26 N·m (1.8—2.7 m-kg, 13—20 ft-lb)

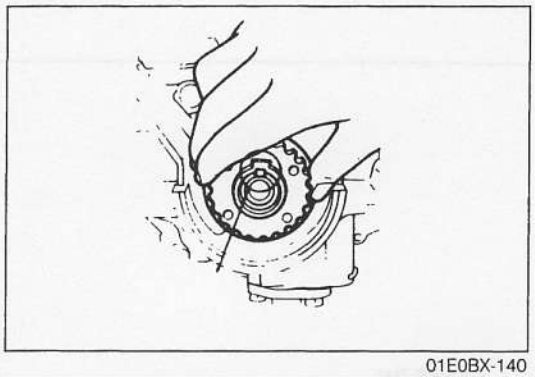
Drive Plate (ATX)

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

Caution
- **If all the previous sealant cannot be removed from a bolt, replace the bolt.**
- **Do not apply sealant if a new bolt is used.**

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

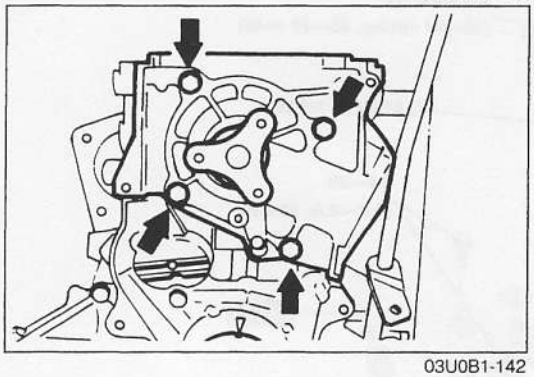
Tightening torque:
96—103 N·m (9.8—10.5 m-kg, 71—76 ft-lb)



01E0BX-140

Timing Belt Pulley

1. Install the timing belt pulley.
2. Install the pulley Woodruff key with the tapered side toward the oil pump body.



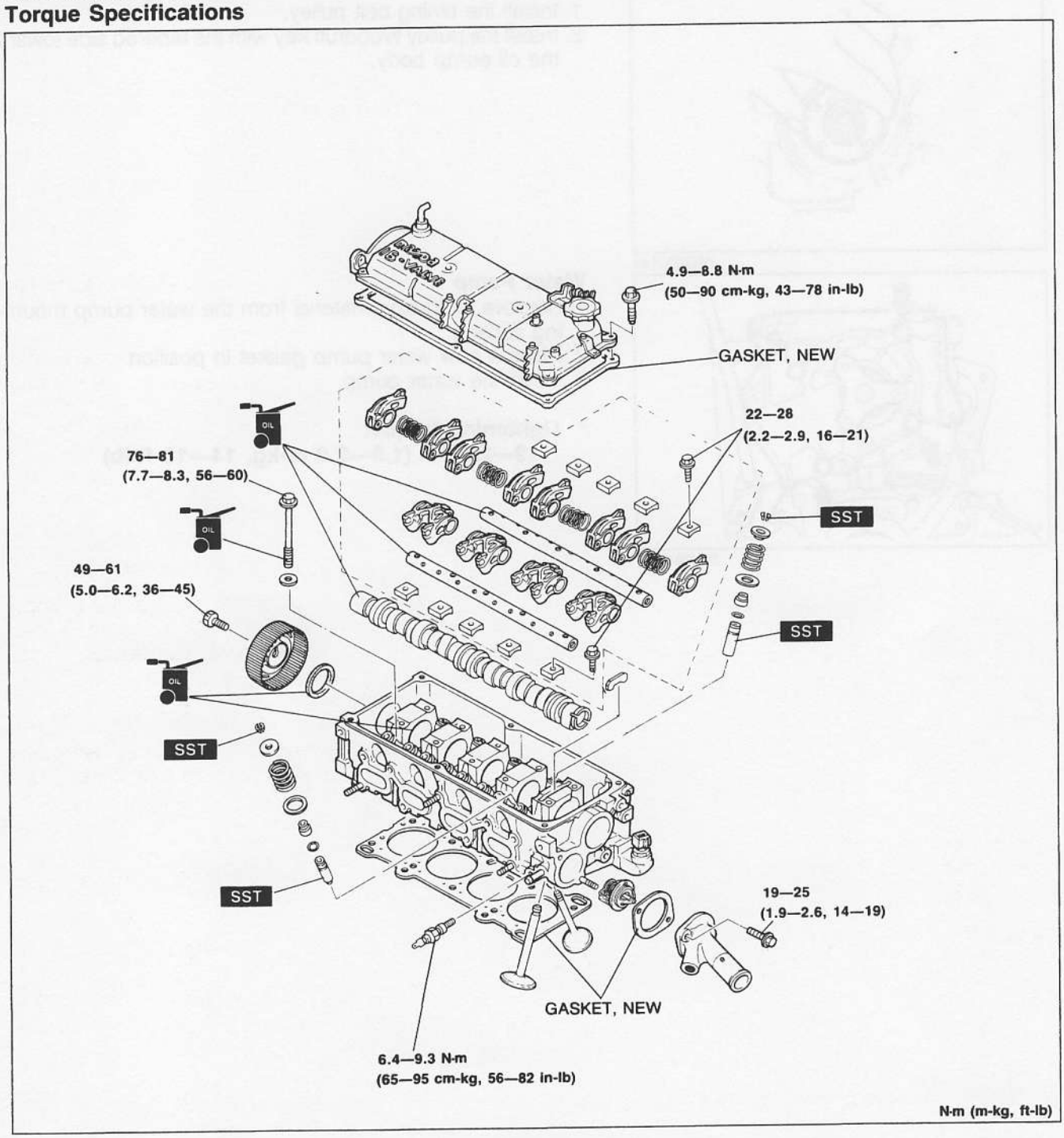
03U0B1-142

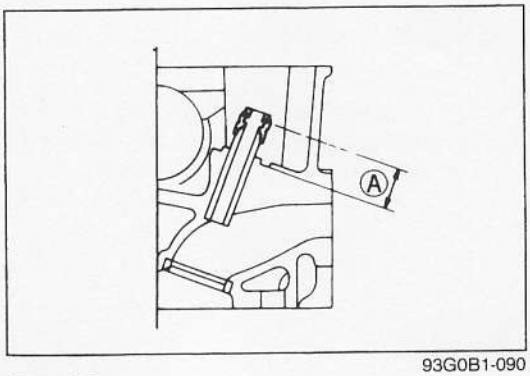
Water Pump

1. Remove all foreign material from the water pump mounting surface.
2. Place a new water pump gasket in position.
3. Install the water pump.

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

CYLINDER HEAD
Torque Specifications



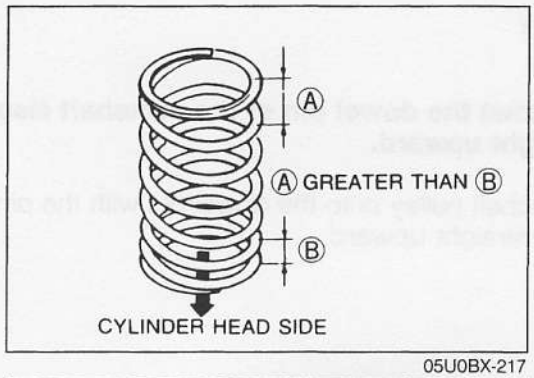


93G0B1-090

Valve Seal

1. Install the new valve seal onto the valve guide by hand.
2. After installation, adjust the protrusion Ⓐ to specification.

Protrusion: 18.1—18.7mm (0.713—0.736 in)



05U0BX-217

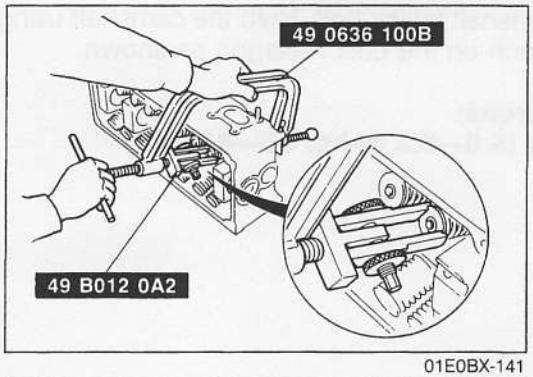
Valve and Valve Spring

1. Install the lower spring seat.
2. Install the valve.

Caution

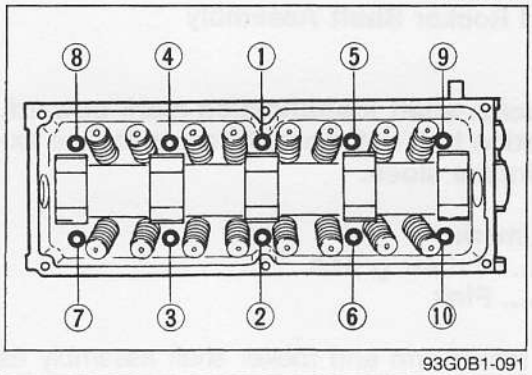
- **Install the spring with the closer pitch toward the cylinder head.**

3. Install the valve spring and the upper spring seat.



01E0BX-141

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



93G0B1-091

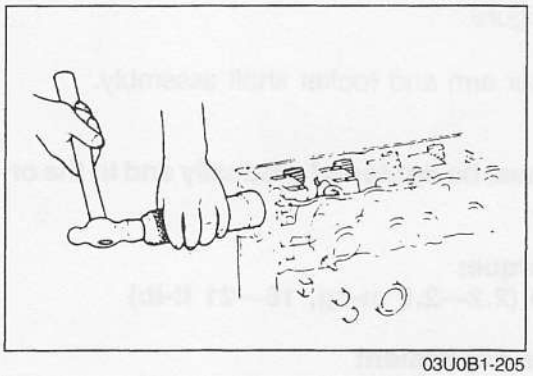
Cylinder Head Gasket

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

Cylinder Head

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

Tightening torque:
76—81 N·m (7.7—8.3 m-kg, 56—60 ft-lb)



03U0B1-205

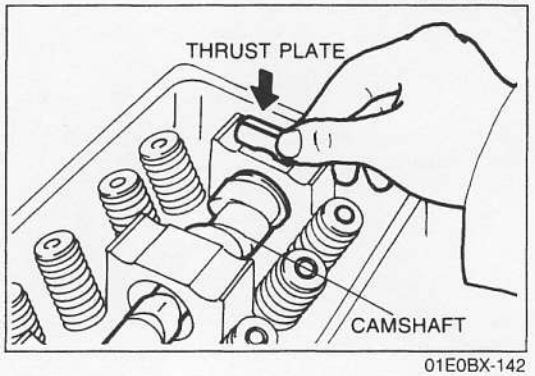
Camshaft Oil Seal

1. Apply a thin coat of engine oil to the camshaft oil seal and cylinder head.
2. Tap the camshaft oil seal into the cylinder head with a suitable pipe.

Caution

- **The oil seal must be tapped in until it is flush with the cylinder head.**

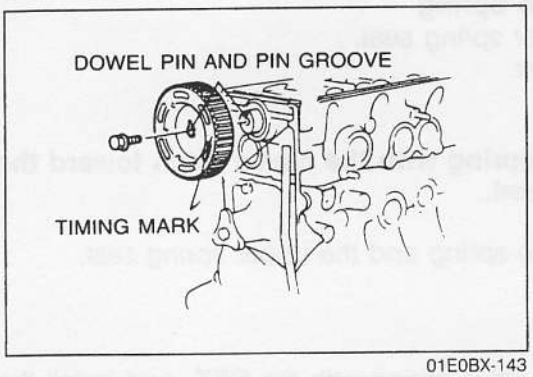
Oil seal outer diameter: 40mm (1.57 in)



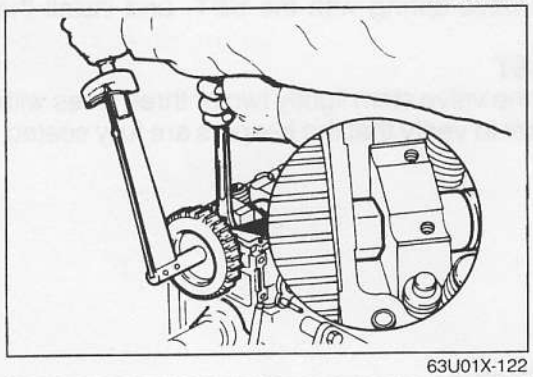
01E0BX-142

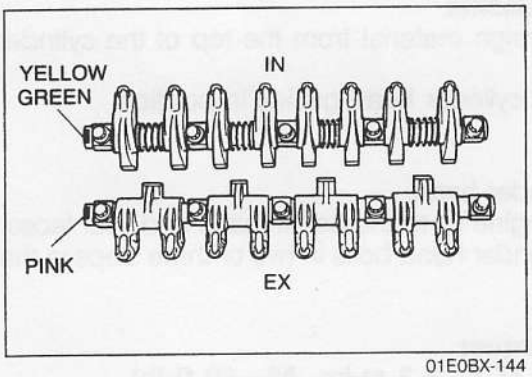
Camshaft

1. Apply engine oil to the journals and bearing.
2. Insert and mount the camshaft into position with the thrust plate.

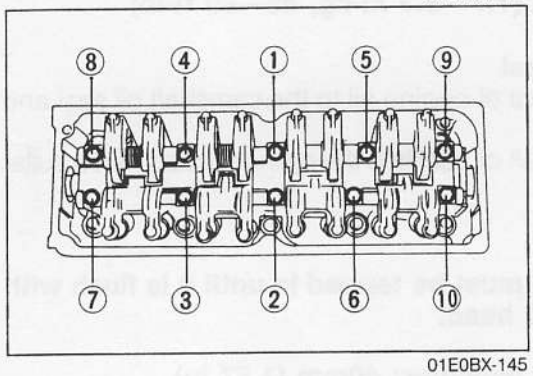


01E0BX-143


63U01X-122



01E0BX-144



01E0BX-145

Camshaft Pulley

Note
- **Be certain that the dowel pin of the camshaft also faces straight upward.**

1. Install the camshaft pulley onto the dowel pin with the pin groove facing straight upward.

2. Tighten the camshaft pulley bolt. Hold the camshaft using a suitable wrench on the cast hexagon as shown.

Tightening torque:
49—61 N·m (5.0—6.2 m-kg, 36—45 ft-lb)

Rocker Arm and Rocker Shaft Assembly

Caution
- **Face the rocker shaft identification mark upward.**
- **The installation bolt holes are different for the exhaust and intake sides.**

Identification mark
IN ..... Yellow green
EX..... Pink

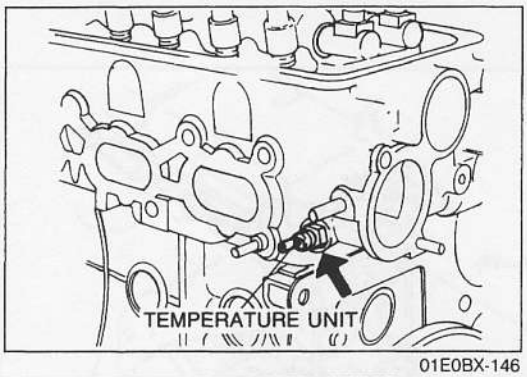
1. Assemble the rocker arm and rocker shaft assembly as shown in the figure.

2. Install the rocker arm and rocker shaft assembly.

Caution
- **The bolts must be tightened gradually and in the order shown.**

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

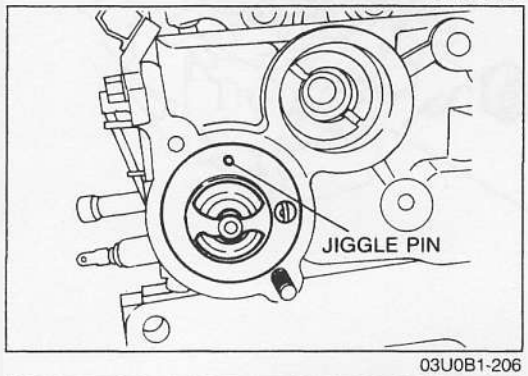
Valve Clearance Adjustment
Refer to page B–7.



01E0BX-146

Temperature gauge unit
Install the temperature gauge unit into the cylinder head with seal tape on the threads.

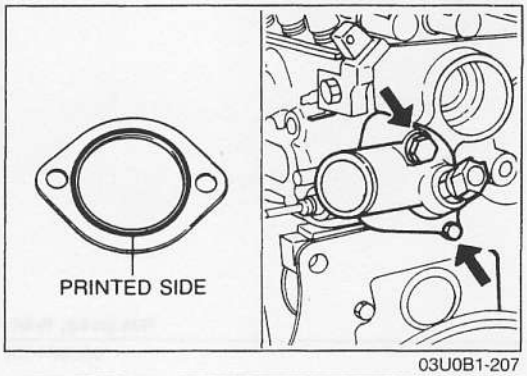
Tightening torque:
6.4—9.3 N·m (65—95 cm-kg, 56—82 in-lb)



03U0B1-206

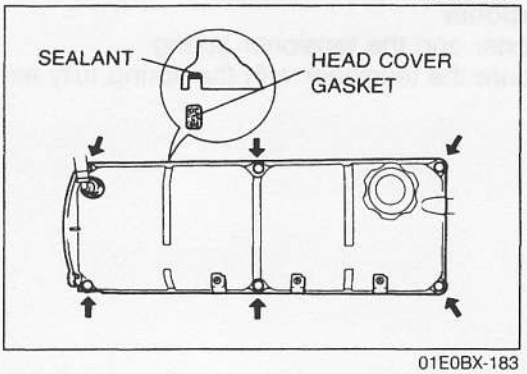
Thermostat and Thermostat Cover
1. Remove all foreign material from the thermostat cover mounting surface.
2. Install the thermostat with the jiggle pin facing upward.
3. Install a new gasket and the thermostat cover.

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



03U0B1-207

Caution
- **The printed side of the gasket must face the thermostat.**



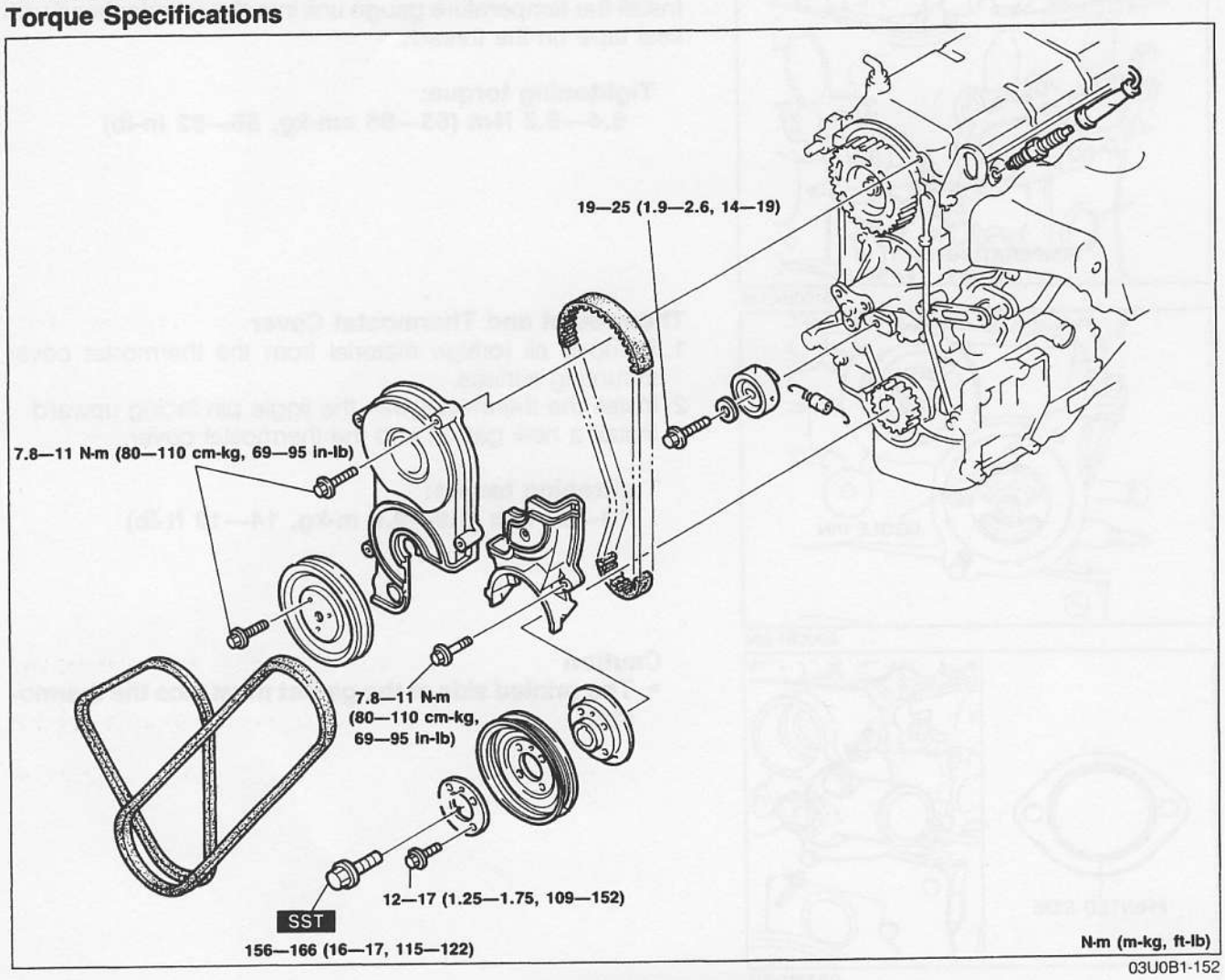
01E0BX-183

Cylinder Head Cover
Install the cylinder head cover.

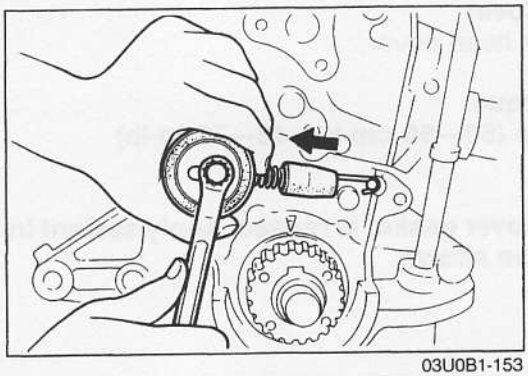
Tightening torque:
4.9—8.8 N·m (50—90 cm-kg, 43—78 in-lb)

Caution
- **If the head cover gasket is reused, apply sealant in the groove as shown.**

TIMING BELT
Torque Specifications



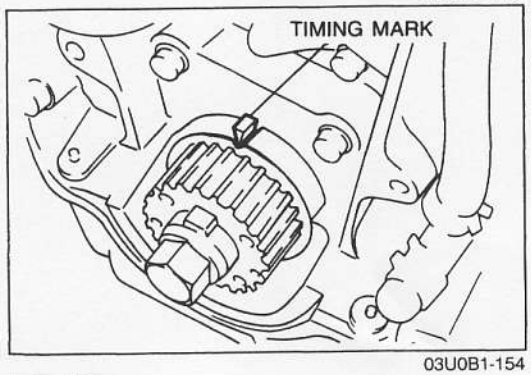
03U0B1-152



03U0B1-153

Timing Belt Tensioner

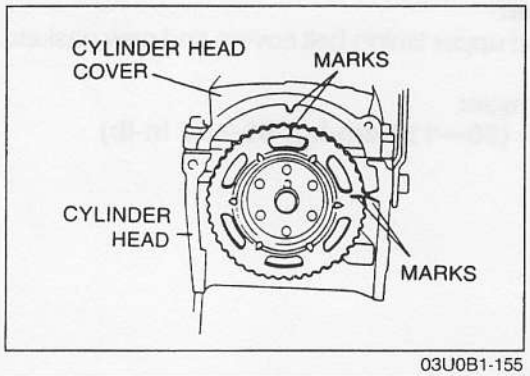
1. Install the tensioner and the tensioner spring.
2. Temporarily secure the tensioner with the spring fully extended.



03U0B1-154

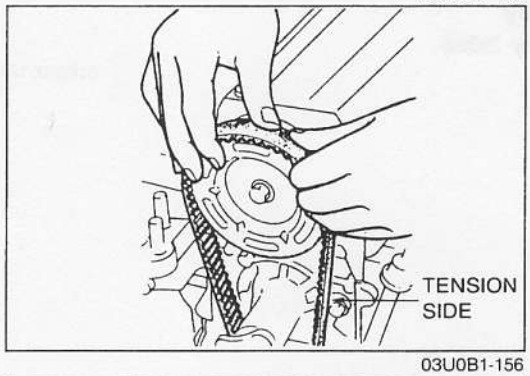
Timing Belt

1. Verify that the timing belt pulley mark is aligned with the timing mark.



03U0B1-155

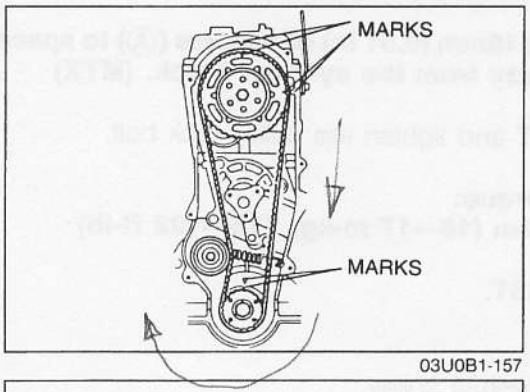
2. Verify that the camshaft pulley marks are aligned with the cylinder head cover marks.



03U0B1-156

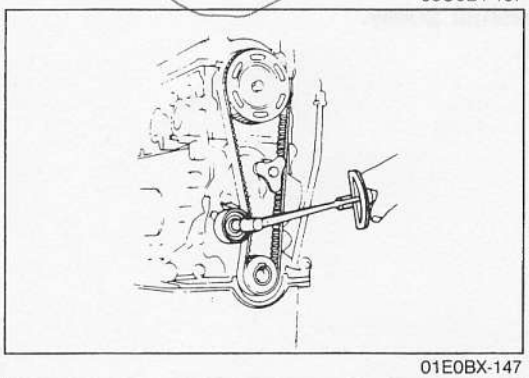
3. Install the timing belt so that there is no looseness at the tension side.

Caution
- **Do not turn the crankshaft counterclockwise.**



03U0B1-157

4. Turn the crankshaft two turns clockwise, and align the timing belt pulley mark with the timing mark.
5. Verify that the camshaft pulley marks are aligned with the cylinder head cover mark.
   If not aligned, remove the timing belt and repeat from tensioner installation.



01E0BX-147

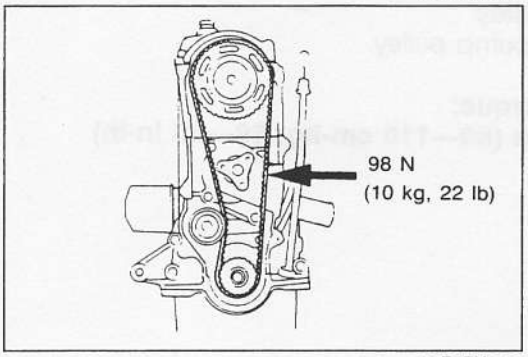
6. Loosen the tensioner bolt to apply tension to the timing belt.

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

7. Tighten the tensioner bolt.

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

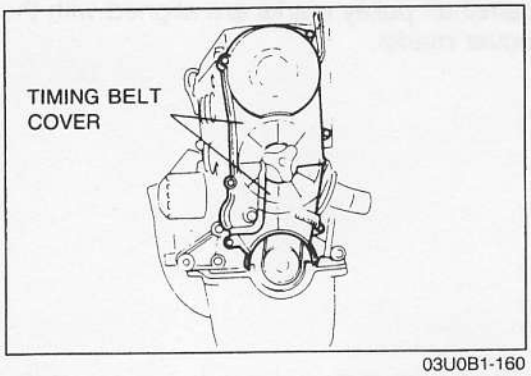
8. Turn the crankshaft two turns clockwise and verify that the timing marks are correctly aligned.



01E0BX-148

9. Measure the timing belt deflection by applying moderate pressure **(98 N, 10 kg, 22 lb)** midway between the crankshaft pulley and the camshaft pulley.
   If the timing belt deflection is not correct, temporarily secure the tensioner bolt so the spring is fully extended and repeat steps 4–8 above or replace the tensioner spring.

Deflection:
11.0—13.0mm (0.43—0.51 in) at 98 N (10 kg, 22 lb)



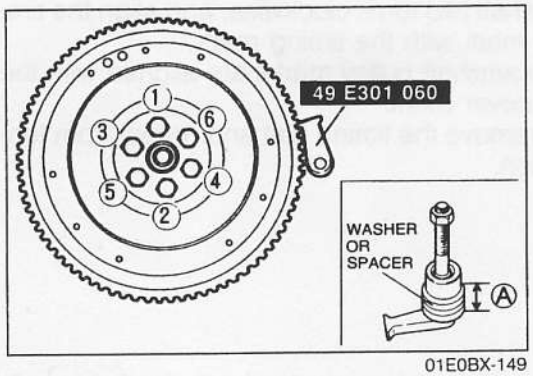
03U0B1-160

Timing Belt Cover
Install the lower and upper timing belt covers and new gaskets.

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

Crankshaft Pulley
1. Install the pulley boss.

01E0BX-184



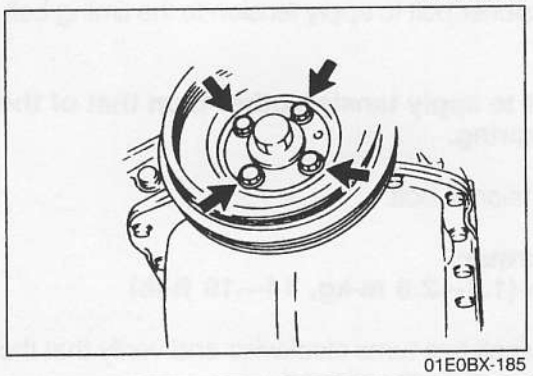
01E0BX-149

Caution
- **Add approx 13mm (0.51 in) of spacers (Ⓐ) to space the SST away from the cylinder block. (MTX)**

2. Mount the **SST** and tighten the pulley lock bolt.

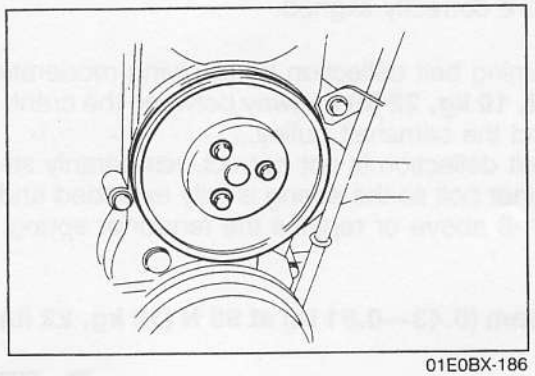
Tightening torque:
156—166 N·m (16—17 m-kg, 115—122 ft-lb)

3. Remove the **SST**.



01E0BX-185

4. Install the crankshaft pulley.
5. Install the plate.

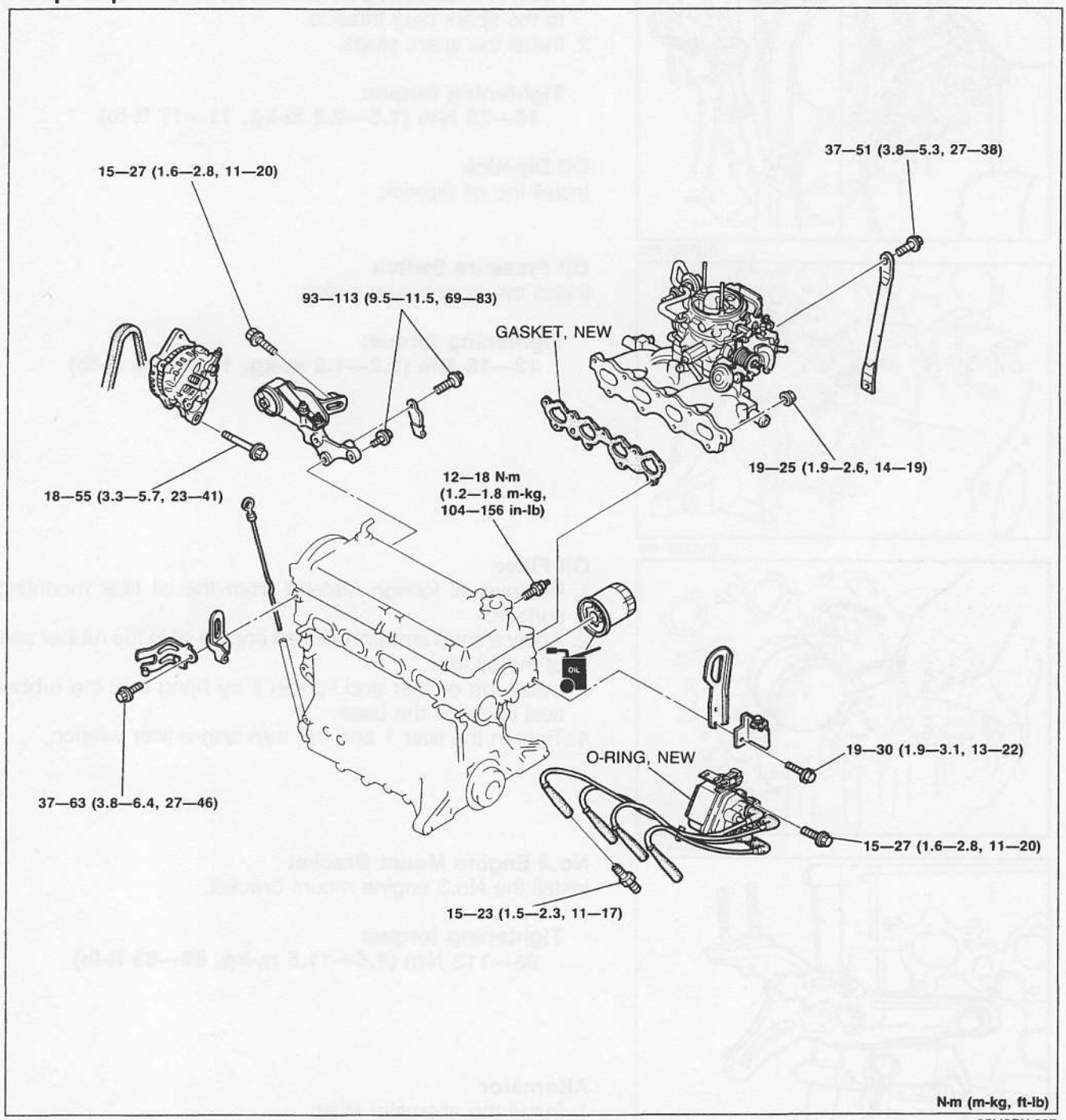


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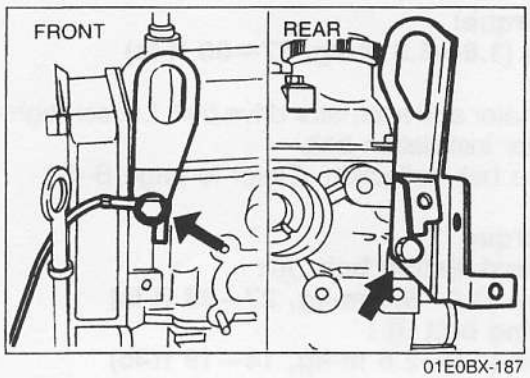
Water Pump Pulley
Install the water pump pulley.

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

AUXILIARY PARTS
Torque Specifications



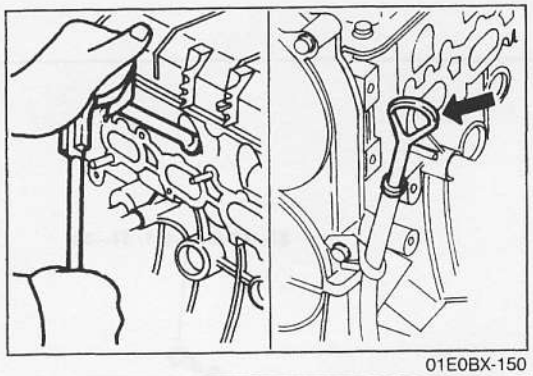
05U0BX-237



01E0BX-187

Engine Hanger
Install the front and rear engine hangers.

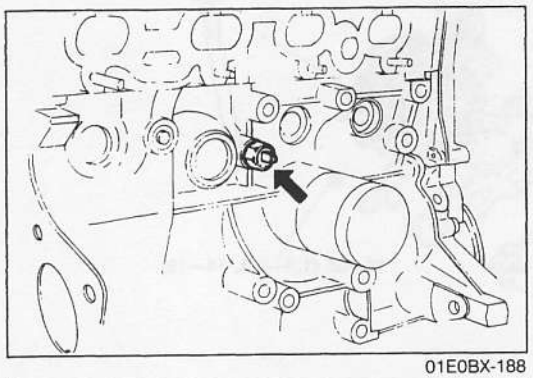
Tightening torque
Front: 37—63 N·m (3.8—6.4 m-kg, 27—46 ft-lb)
Rear : 19—25 N·m (1.9—2.6 m-kg, 14—19 ft-lb)


01E0BX-150

Spark Plug
1. Apply antiseize compound or molybdenum-based lubricant to the spark plug threads.
2. Install the spark plugs.

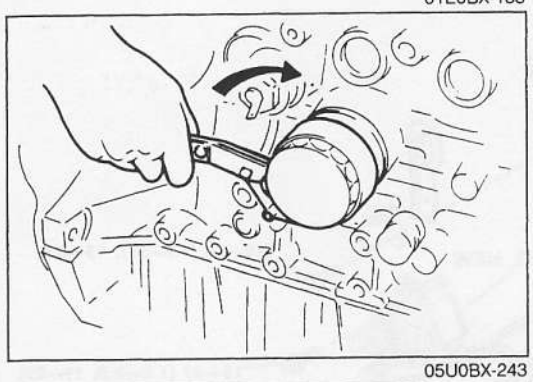
Tightening torque:
15—23 N·m (1.5—2.3 m-kg, 11—17 ft-lb)

Oil Dipstick
Install the oil dipstick.

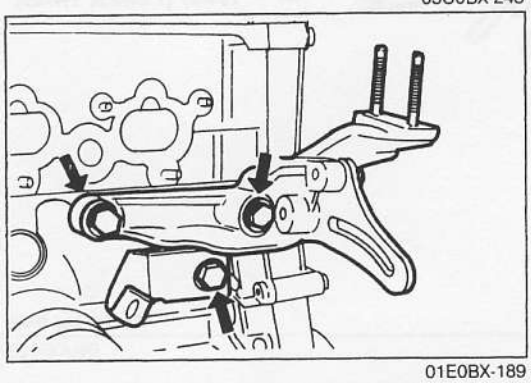

01E0BX-188

Oil Pressure Switch
Install the oil pressure switch.

Tightening torque:
12—18 N·m (1.2—1.8 m-kg, 104—156 in-lb)

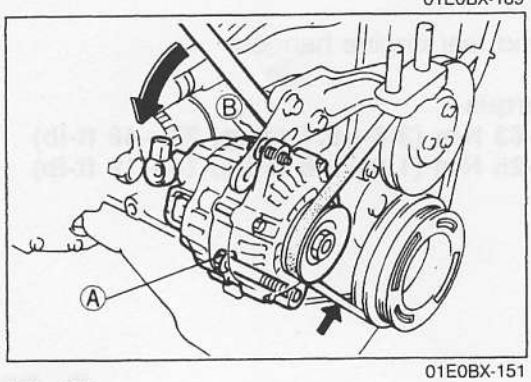

05U0BX-243

Oil Filter
1. Remove all foreign material from the oil filter mounting surface.
2. Apply a small amount of clean engine oil to the rubber seal of the oil filter.
3. Install the oil filter and tighten it by hand until the rubber seal contacts the base.
4. Tighten the filter 1 and 1/6 turn with a filter wrench.


01E0BX-189

No.3 Engine Mount Bracket
Install the No.3 engine mount bracket.

Tightening torque:
93—113 N·m (9.5—11.5 m-kg, 69—83 ft-lb)



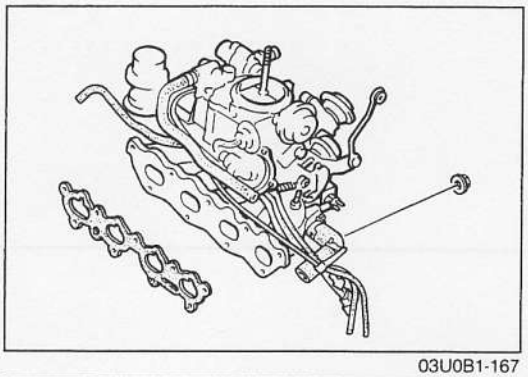
01E0BX-151

Alternator
1. Install the alternator strap.

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

2. Install the alternator and alternator drive belt. Loosely tighten the alternator installation bolt.
3. Adjust the drive belt deflection. (Refer to page B–5.)

Tightening torque
Alternator installation bolt Ⓐ:
37—52 N·m (3.8—5.3 m-kg, 27—38 ft-lb)
Belt-adjusting bolt Ⓑ:
19—25 N·m (1.9—2.6 m-kg, 14—19 ft-lb)

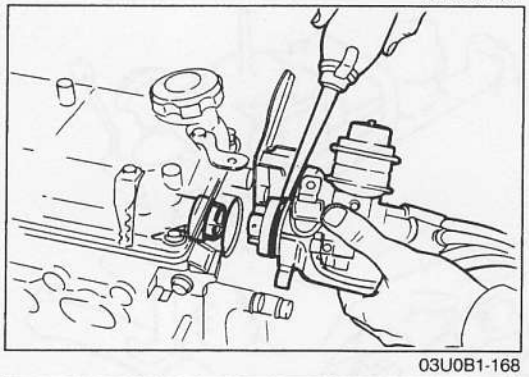


03U0B1-167

Intake Manifold Assembly

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

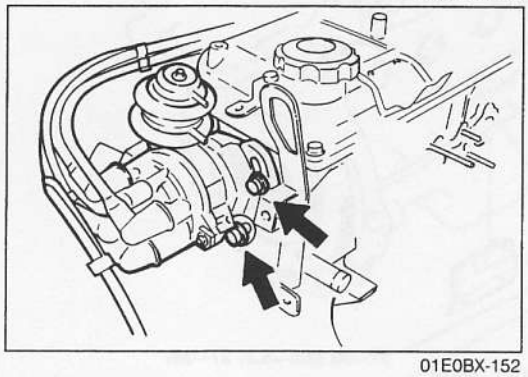
Tightening torque:
19—25 N·m (1.9—2.6 m-kg, 14—19 ft-lb)



03U0B1-168

Distributor and High-tension Lead

1. Apply engine oil to the O-ring, and position it on the distributor.
2. Apply engine oil to the blade.
3. Install the distributor with the blade fit into the camshaft groove.



01E0BX-152

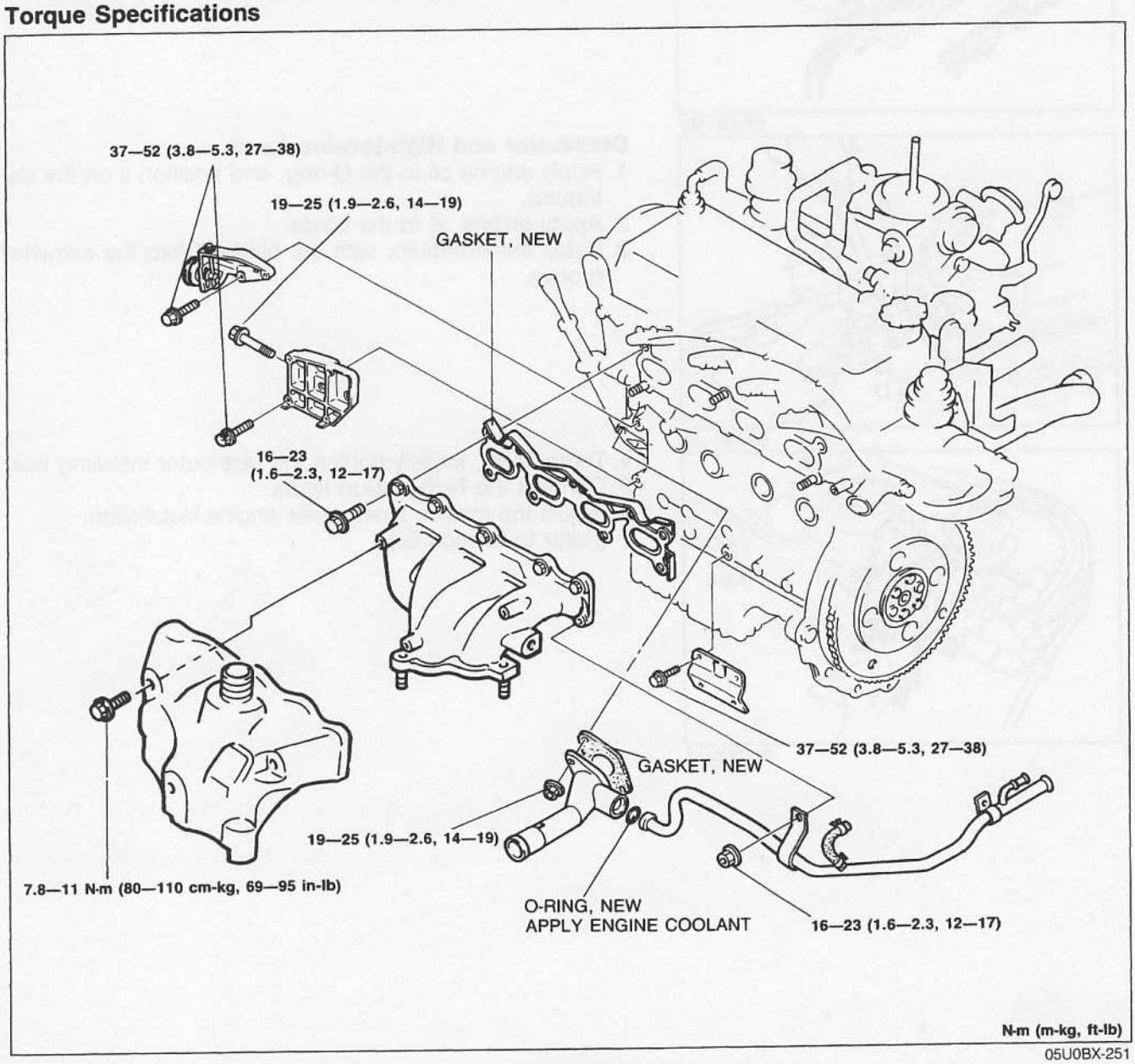
4. Temporarily, loosely tighten the distributor installing bolt.
5. Connect the high-tension leads.
6. Adjust the ignition timing after engine installation. (Refer to Section G.)

ENGINE STAND DISMOUNTING

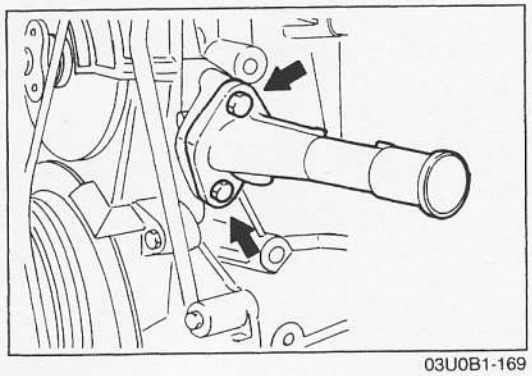
PROCEDURE

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

Torque Specifications



05U0BX-251

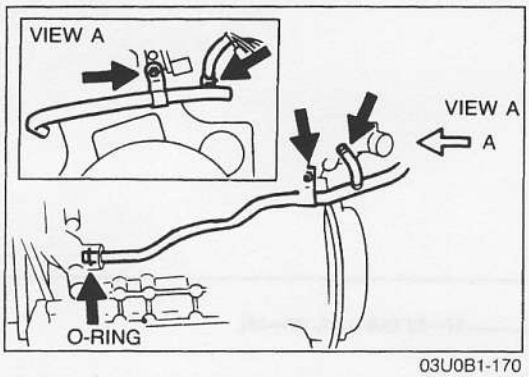


03U0B1-169

Water Inlet Pipe

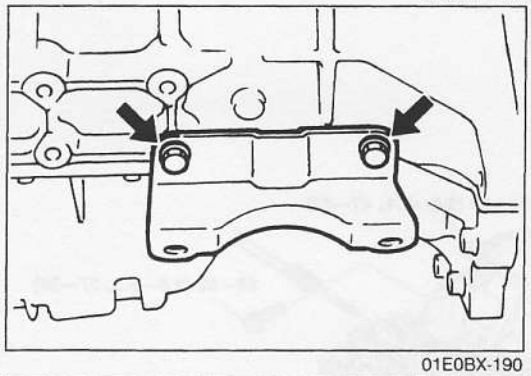
1. Remove all foreign material from the water inlet pipe mounting surface.
2. Install a new gasket and the water inlet pipe.

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



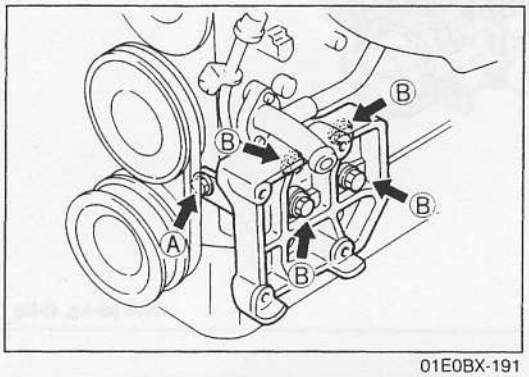
03U0B1-170

3. Apply a small amount of engine coolant to the new O-ring.
4. Install the water bypass pipe.


01E0BX-190

Exhaust Pipe Bracket
Install the exhaust pipe bracket.

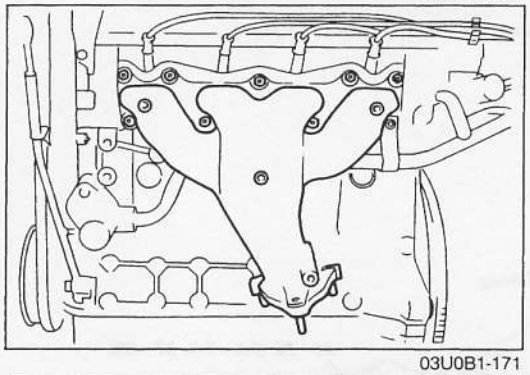
Tightening torque:
37—52 N·m (3.8—5.3 m-kg, 27—38 ft-lb)



01E0BX-191

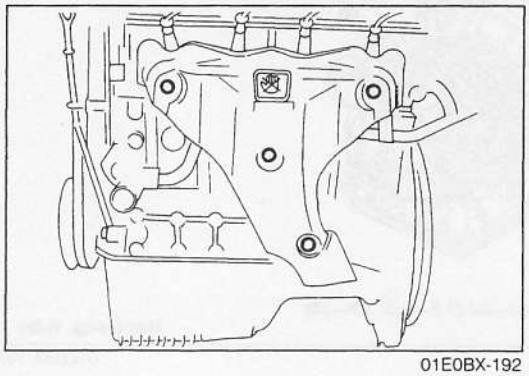
A/C Compressor Bracket
Install the A/C compressor bracket.

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


03U0B1-171

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

Tightening torque:
16—23 N·m (1.6—2.3 m-kg, 12—17 ft-lb)


01E0BX-192

Exhaust Manifold Insulator
Install the exhaust manifold insulator.

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

INSTALLATION

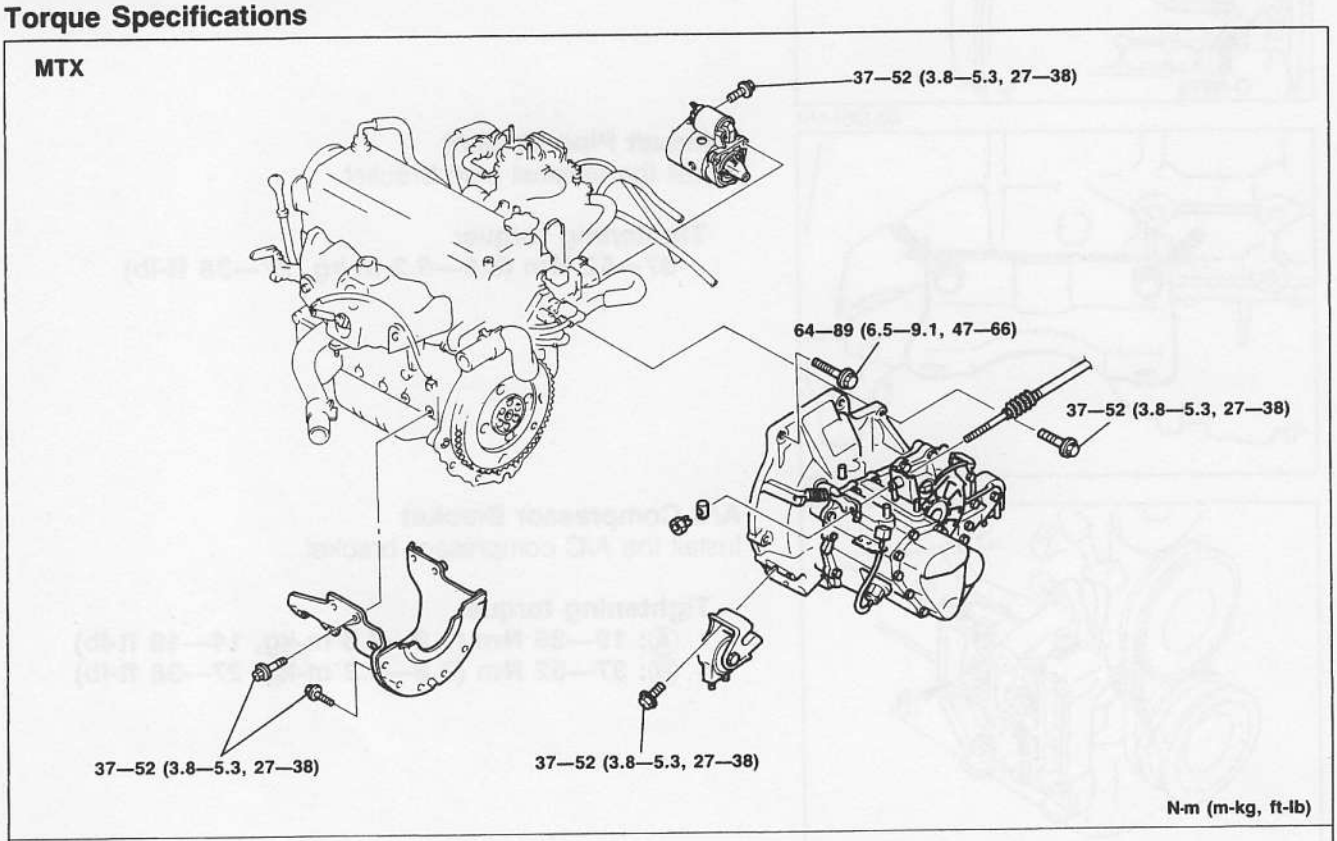
PROCEDURE

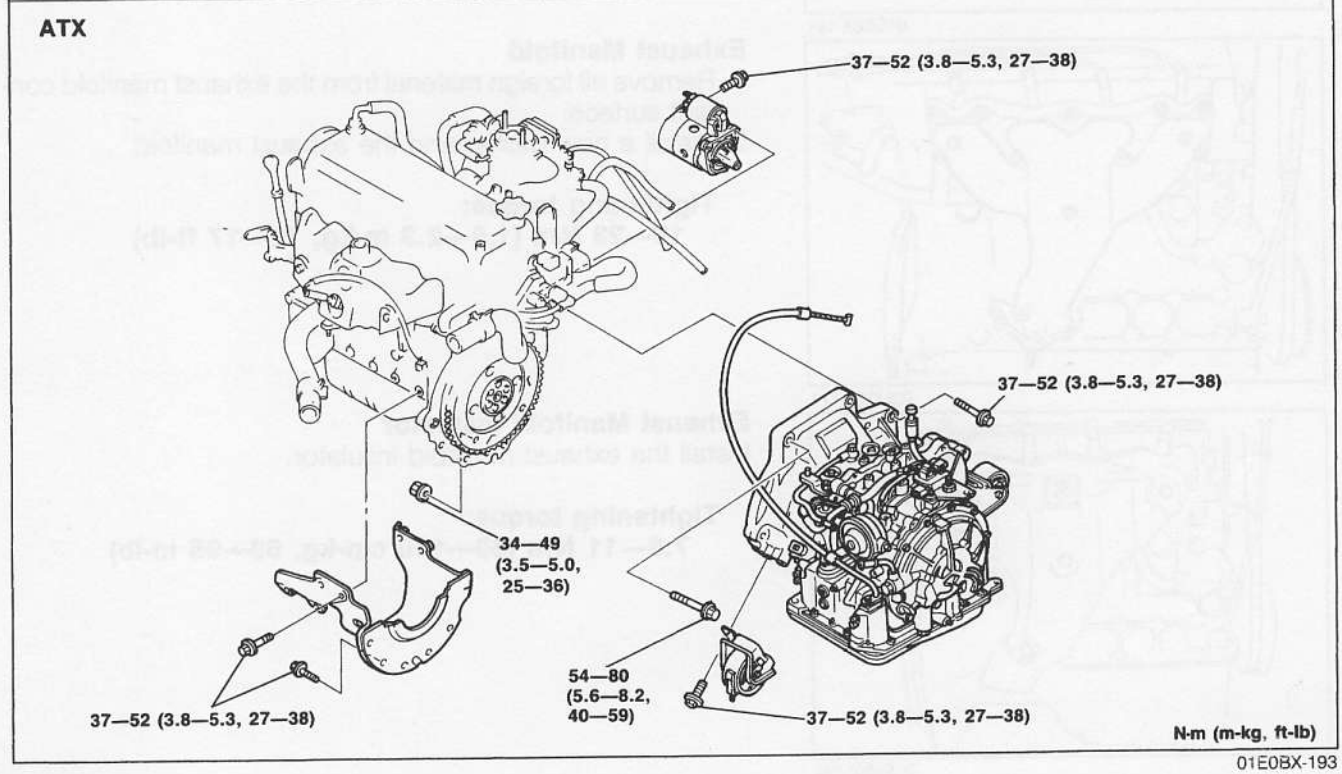
Tighten all bolts and nuts to the specified torques.

Step 1

Join the engine and transmission.

Torque Specifications



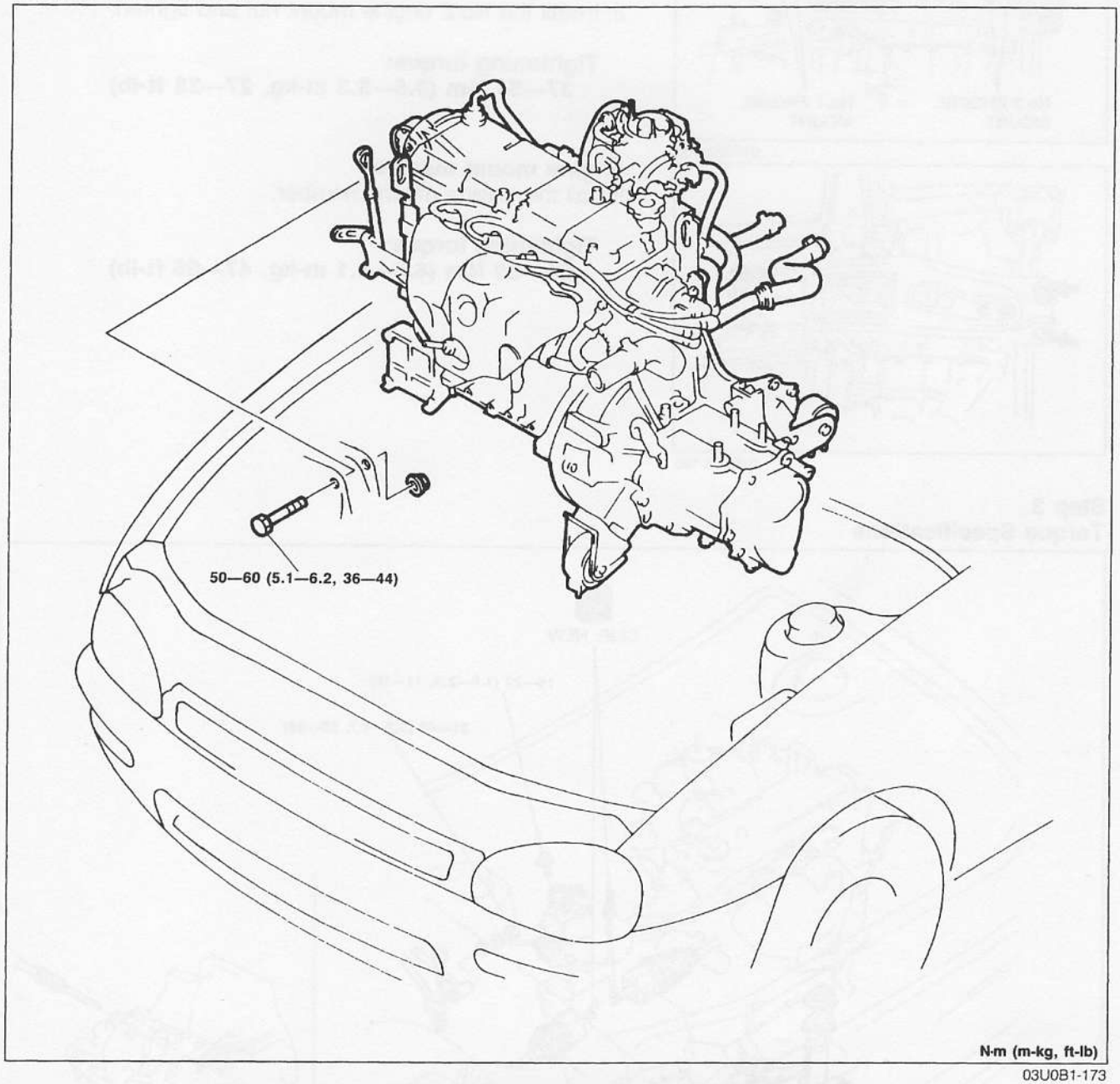


01E0BX-193

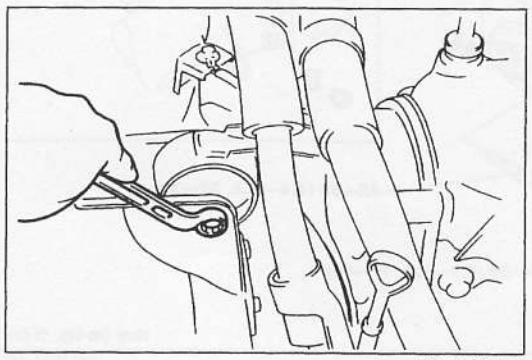
Step 2

Warning
- **Be sure the vehicle is securely supported on safety stands.**

Torque Specifications



03U0B1-173



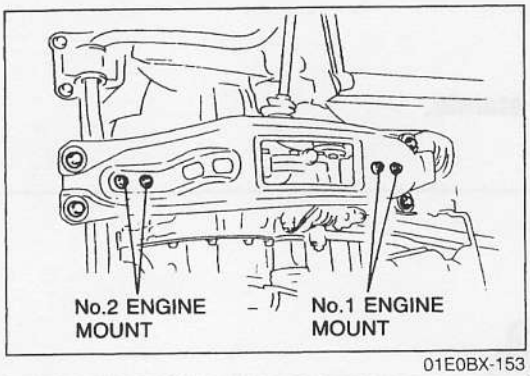
01E0BX-194

Engine and transaxle assembly

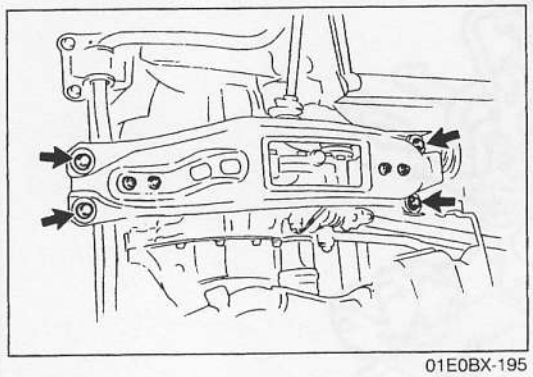
1. Suspend the engine and transaxle assembly.

Caution
- **Do not damage any components in the engine compartment.**

2. Align the No.3 engine mount bolts with the engine mount mounting holes.



01E0BX-153


01E0BX-195

Engine mount

1. Install the No.1 engine mount nut and tighten.

Tightening torque:
37—51 N·m (3.8—5.3 m-kg, 27—38 ft-lb)

2. Install the No.2 engine mount nut and tighten.

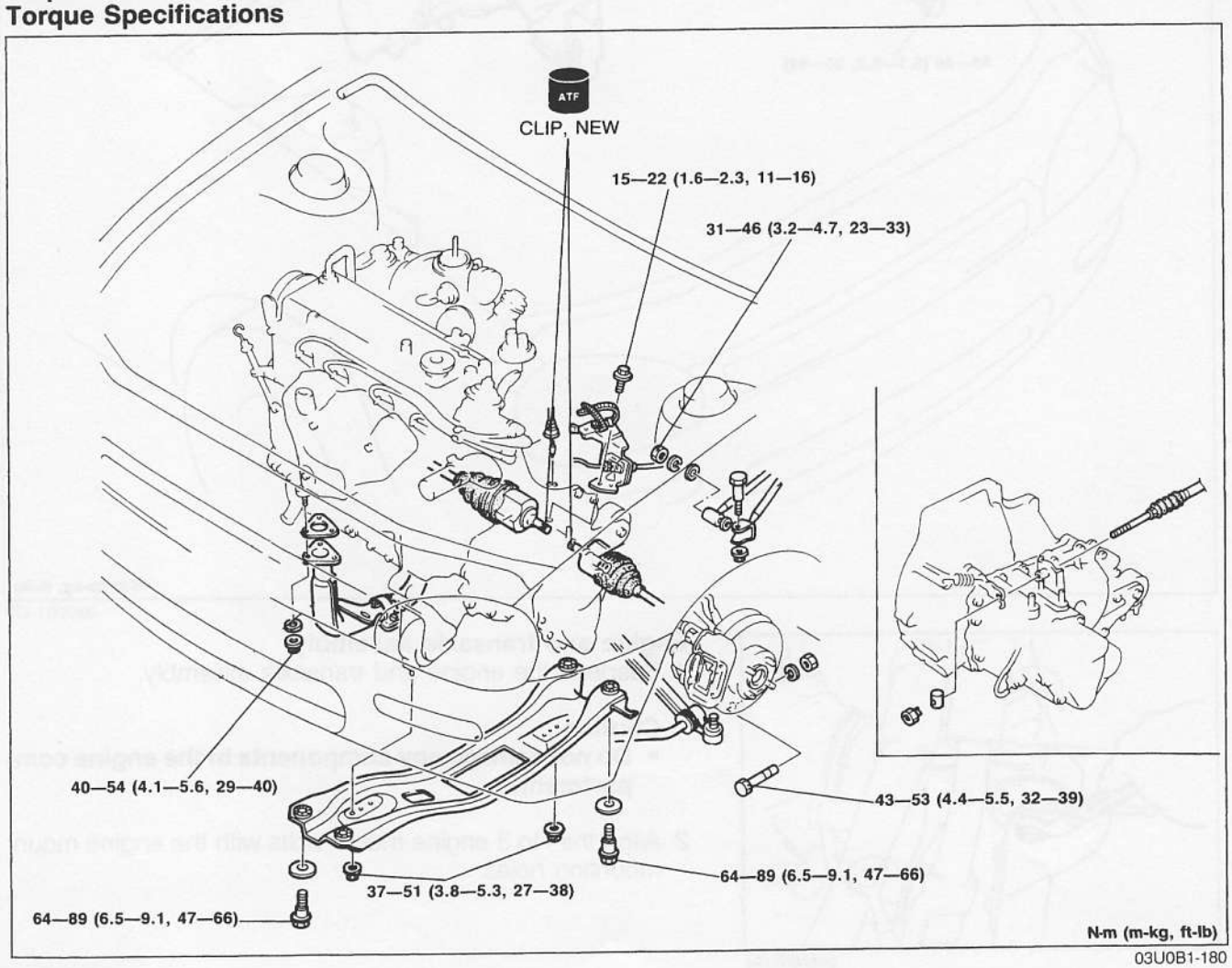
Tightening torque:
37—51 N·m (3.8—5.3 m-kg, 27—38 ft-lb)

Engine mount member

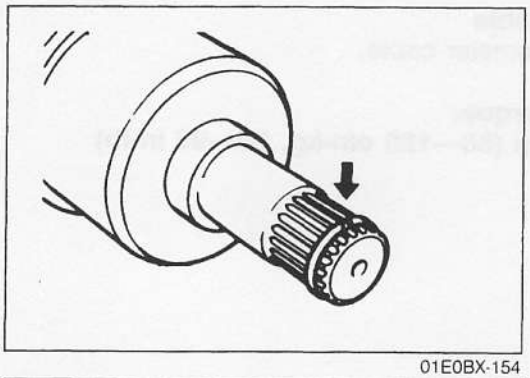
Install the engine mount member.

Tightening torque:
64—89 N·m (6.5—9.1 m-kg, 47—66 ft-lb)

Step 3
Torque Specifications



03U0B1-180



01E0BX-154

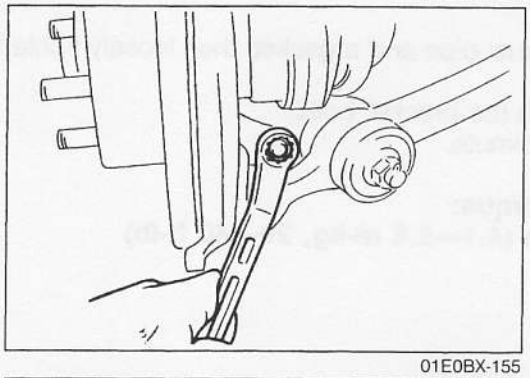
Driveshaft

1. Apply grease to the end of the driveshaft.

Caution

- **When installing the driveshaft, be careful not to damage the oil seal.**
- **After installation, pull the front hub outward to confirm that the driveshaft is securely held by the clip.**

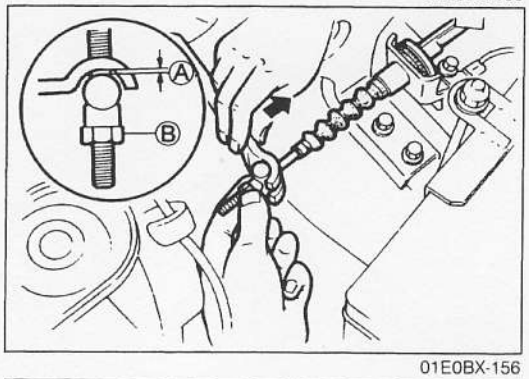
2. Fit a new clip and install the driveshaft.



01E0BX-155

3. Install the lower arm ball-joint to the knuckle, and tighten the clinch bolt.

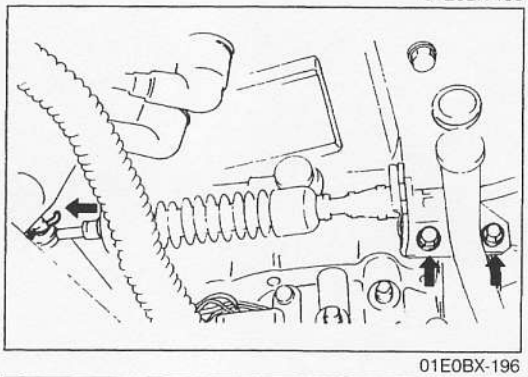
Tightening torque:
43—53 N·m (4.4—5.5 m-kg, 32—39 ft-lb)



01E0BX-156

Clutch cable

Install the clutch cable and check diffrection.
(Refer to Section H.)

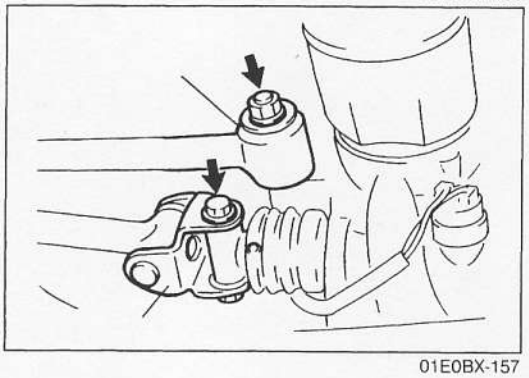


01E0BX-196

Shift control cable (ATX)

Install the shift control cable to the transaxle.

Tightening torque:
6.9—11 N·m (70—110 cm-kg, 61—95 in-lb)



01E0BX-157

Shift control rod (MTX)

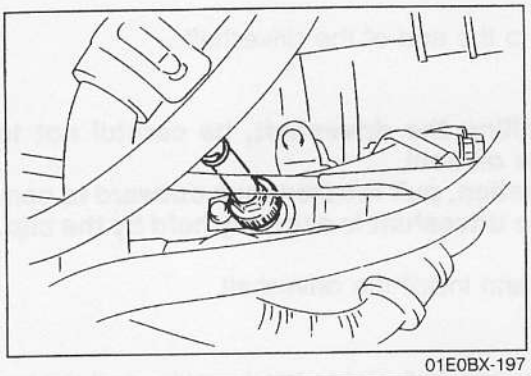
Install the shift control rod to the transaxle.

Tightening torque:
16—22 N·m (1.6—2.3 m-kg, 12—16 in-lb)

Extension bar (MTX)

Install the extension bar to the transaxle.

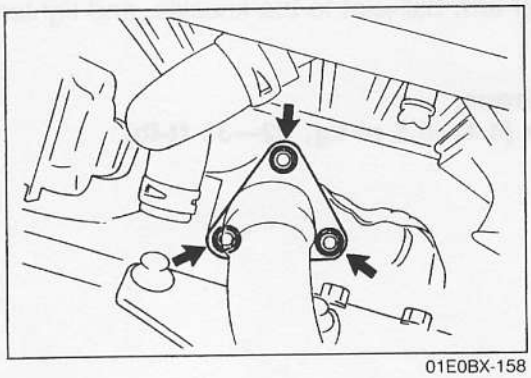
Tightening torque:
31—46 N·m (3.2—4.7 m-kg, 23—34 in-lb)



01E0BX-197

Speedometer cable
Install the speedometer cable.

Tightening torque:
7.8—12 N·m (80—120 cm-kg, 69—96 in-lb)



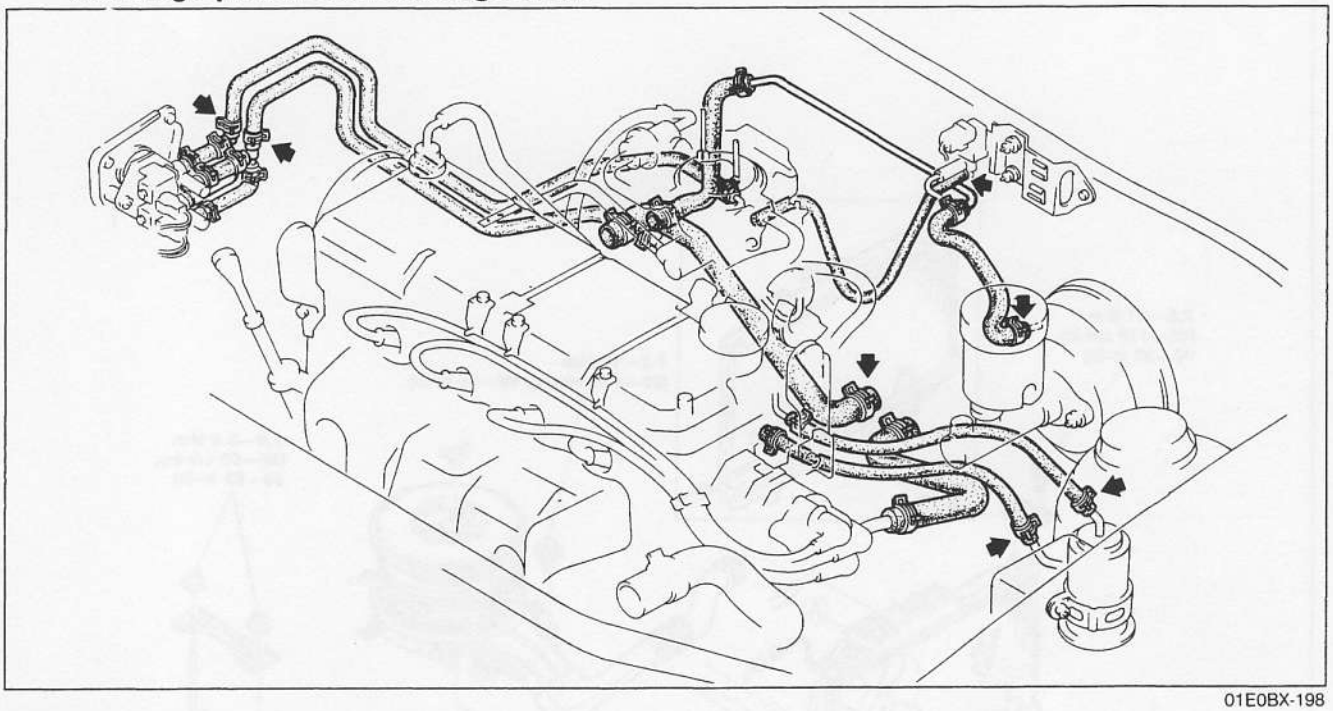
01E0BX-158

Exhaust pipe
1. Install the exhaust pipe and a gasket; then loosely tighten the locknuts.
2. Loosely tighten the bracket bolts.
3. Tighten the locknuts.

Tightening torque:
40—54 N·m (4.1—5.6 m-kg, 29—40 ft-lb)

Step 4
Connect the hoses shown in the figure.

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



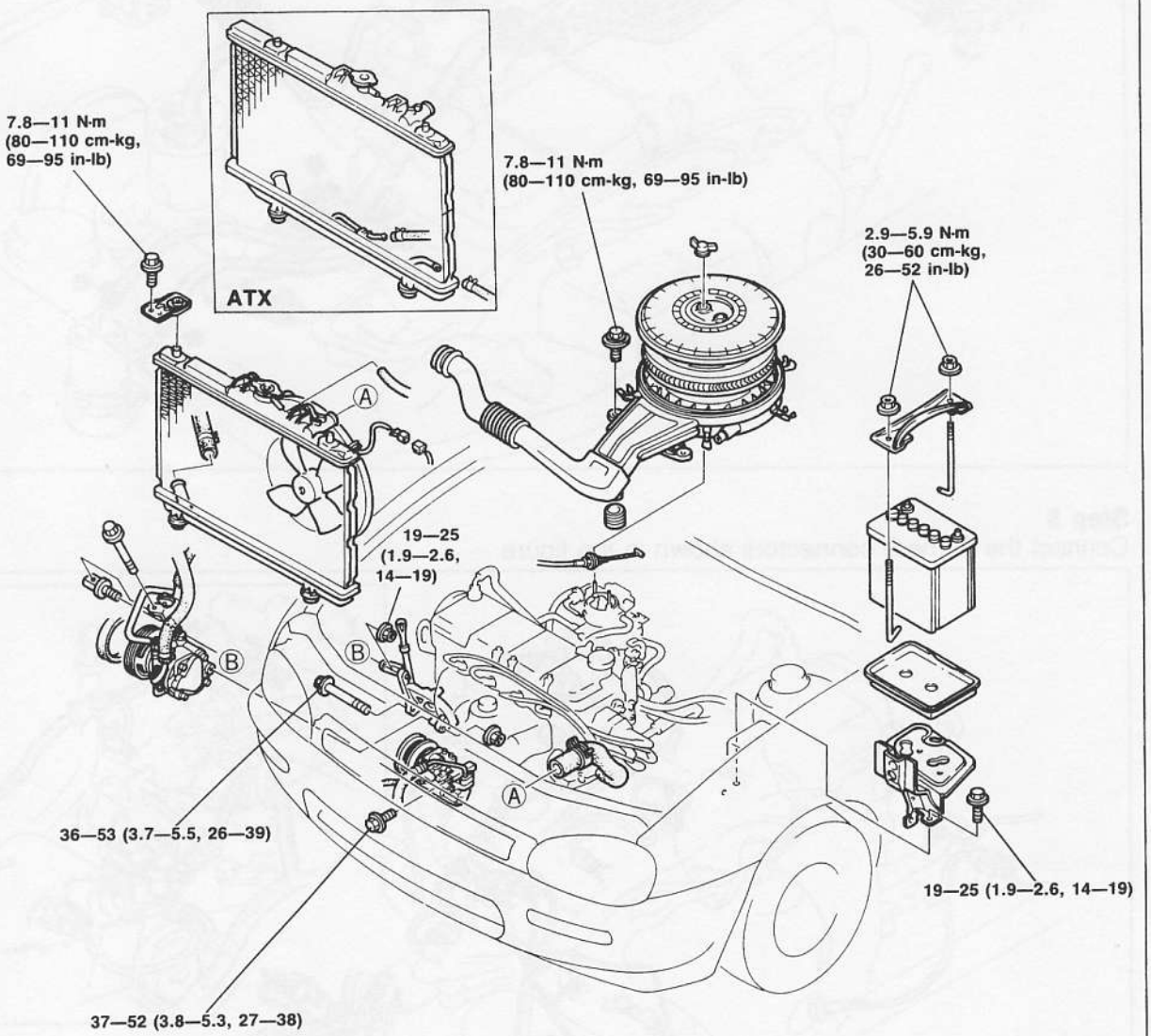
01E0BX-198

Step 5
Connect the harness connectors shown in the figure.



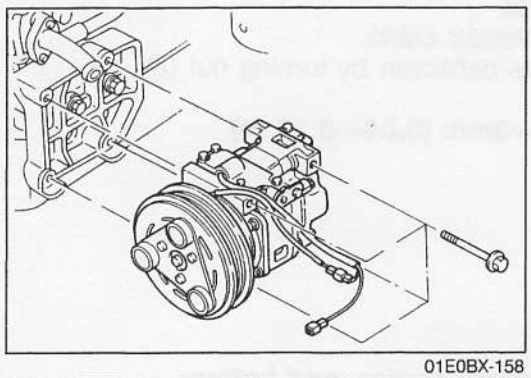
01E0BX-199

Step 6
Torque Specifications



N·m (m-kg, ft-lb)

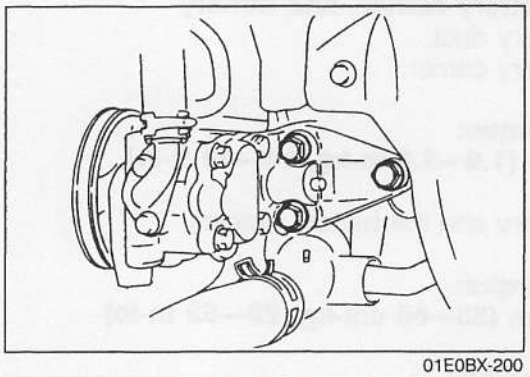
03U0B1-192



01E0BX-158

A/C compressor (if equipped)
Install the A/C compressor.

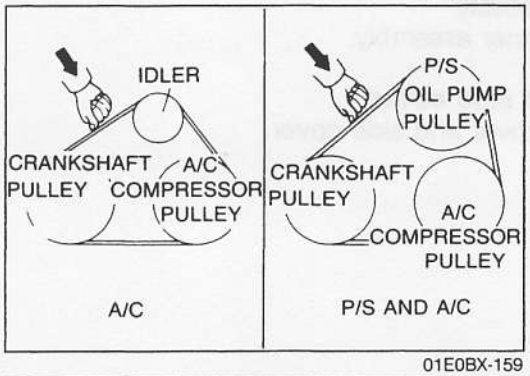
Tightening torque:
37—52 N·m (3.8—5.3 m-kg, 27—38 ft-lb)



01E0BX-200

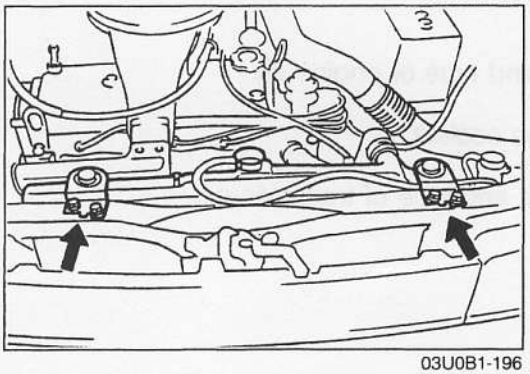
P/S oil pump and bracket
Install the P/S oil pump and bracket.

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



01E0BX-159

Drive belt
1. Install the P/S and/or A/C drive belt.
2. Adjust the drive belt deflections. (Refer to page B–5.)



03U0B1-196

Radiator and cooling fan assembly
1. Install the radiator and cooling fan assembly.

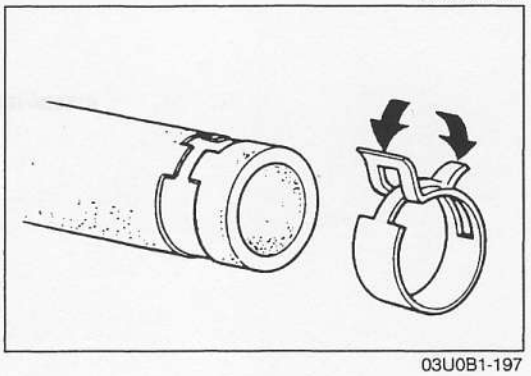
Tightening torque:
7.8—11 N·m (80—110 cm-kg, 69—95 in-lb)

2. Tighten the A/C pipe bracket to the radiator.

Tightening torque:
6.4—9.3 N·m (65—95 cm-kg, 56—82 in-lb)

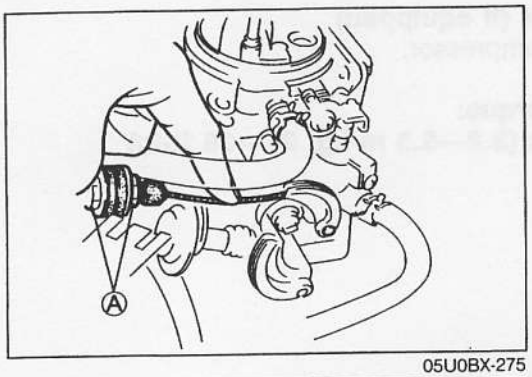
3. Connect the upper and lower radiator hoses.

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



03U0B1-197

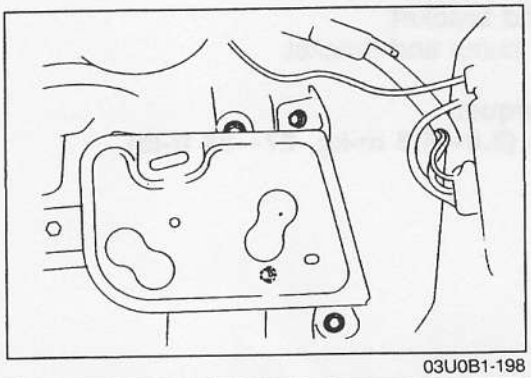
4. Connect the coolant reservoir hose.
5. Connect the cooling fan connector.
6. Connect the oil cooler hose. (ATX)



05U0BX-275

Accelerator cable
1. Install the accelerator cable.
2. Adjust the cable deflection by turning nut Ⓐ.

Deflection: 1—3mm (0.04—0.12 in)



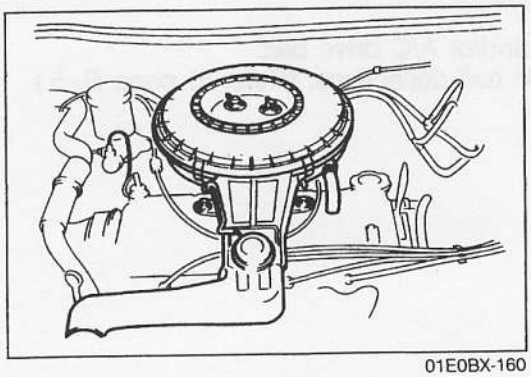
03U0B1-198

Battery duct, battery carrier, and battery
1. Install the battery duct.
2. Install the battery carrier.

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

3. Install the battery and the battery bracket.

Tightening torque:
2.9—5.9 N·m (30—60 cm-kg, 26—52 in-lb)



01E0BX-160

Air cleaner assembly
Install the air cleaner assembly.

Undercover and side cover
Install the undercover and side cover.

Steps After Installation
1. If the engine oil was drained, fill with the specified amount and type of engine oil. (Refer to Section D.)
2. Fill the radiator with the specified amount and type of engine coolant. (Refer to Section E.)
3. If the transaxle oil was drained, fill with the specified amount and type of transaxle oil. (Refer to Sections J, K.)
4. Connect the negative battery cable.
5. Start the engine and check the following
   (1) Engine oil, transaxle oil, and engine coolant leakage
   (2) Ignition timing, idle speed (Refer to page B–8.)
   (3) Operation of emission control system
6. Perform a road test.
7. Recheck the engine oil and engine coolant levels.

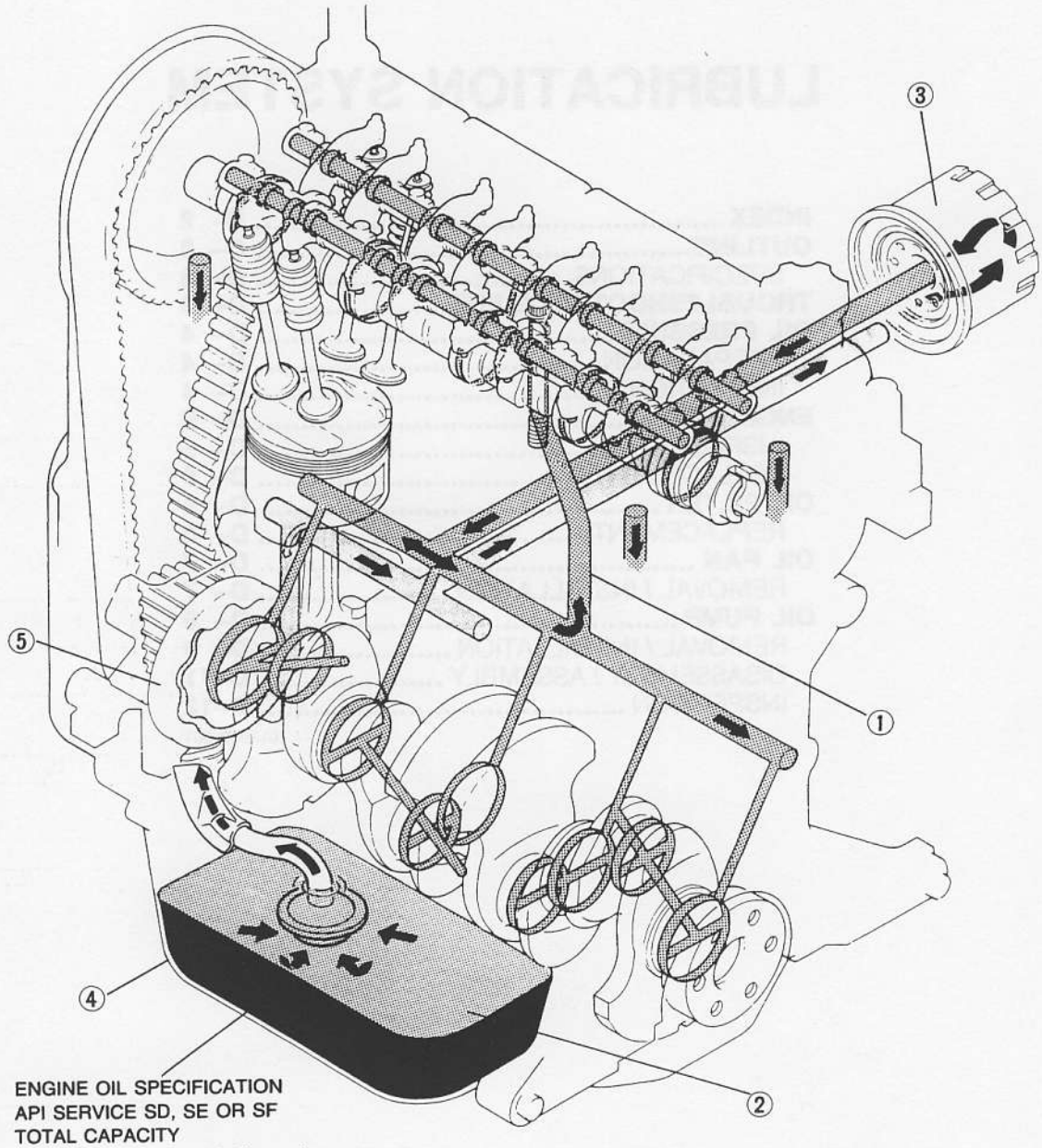
01E0BX-161

LUBRICATION SYSTEM

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01A0DX-001

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01A0DX-002

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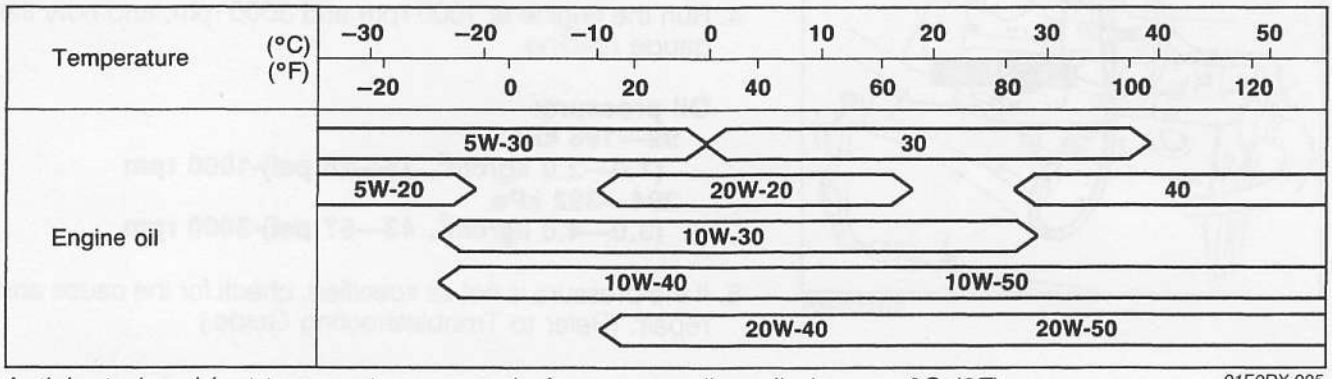
OUTLINE

SPECIFICATIONS

Item \ Engine model			B3
Lubrication system			Force-fed
Oil pump	Type		Trochoid gear
	Regulated pressure	kPa (kg/cm², psi)	343—441 (3.5—4.5, 50—64)
Oil filter	Type		Full-flow, paper element
	Relief pressure differential	kPa (kg/cm², psi)	98 (1.0, 14)
Oil warning pressure		kPa (kg/cm², psi)	4.9—44 (0.05—0.45, 0.7—6.4)
Oil capacity	Total (dry engine)	liters (US qt, Imp qt)	3.4 (3.6, 3.0)
	Oil pan	liters (US qt, Imp qt)	3.0 (3.2, 2.6)
	Oil filter	liters (US qt, Imp qt)	0.17 (0.18, 0.15)
Engine oil (API service)			SD, SE, or SF

01A0DX-003

Recommended SAE Viscosity



Anticipated ambient temperature range before succeeding oil change, °C (°F).

01E0DX-005

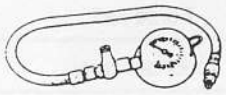
TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Engine hard starting	Improper engine oil Insufficient engine oil	Replace Add oil	D– 5 D– 5
Excessive oil consumption	Oil working up or down Oil leakage	Refer to Section B Repair	— —
Oil pressure drop	Insufficient oil Oil leakage Worn and/or damaged oil pump gear Worn plunger (inside oil pump) or weak spring Clogged oil strainer Excessive main bearing or connecting rod bearing clearance	Add oil Repair Replace Replace Clean Refer to Section B	D– 4 — —
Warning lamp illuminates while engine is running	Oil pressure drop Malfunction of oil pressure switch Malfunction of electrical system	As described above Refer to Section T Refer to Section T	—

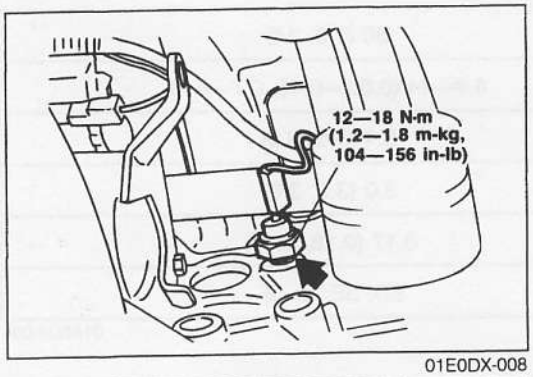
01A0DX-004

OIL PRESSURE

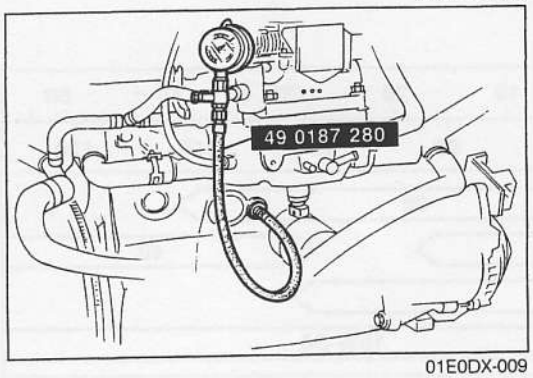
PREPARATION
SST

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

01E0DX-007



01E0DX-008



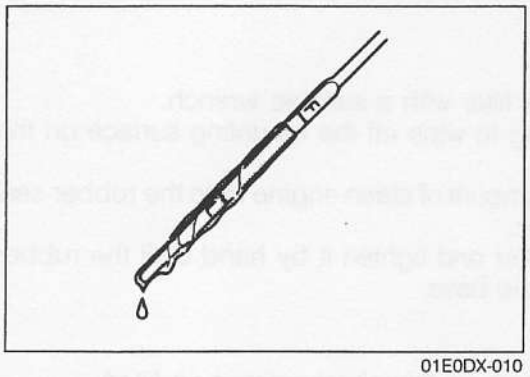
01E0DX-009

INSPECTION

1. Remove the oil pressure switch.
2. Screw the **SST** into the oil pressure switch hole.
3. Warm up the engine to normal operating temperature.
4. Run the engine at 1000 rpm and 3000 rpm, and note the gauge reading.

   Oil pressure:
   99—196 kPa
   (1.0—2.0 kg/cm^2, 15—28 psi)-1000 rpm
   294—392 kPa
   (3.0—4.0 kg/cm^2, 43—57 psi)-3000 rpm

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



01E0DX-010

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 oil 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 0.8 liter (0.85 US qt, 0.70 Imp qt).**

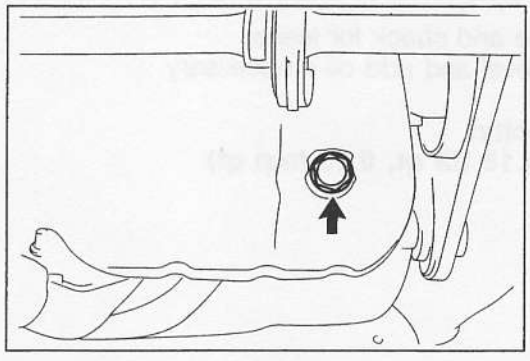
REPLACEMENT

Warning

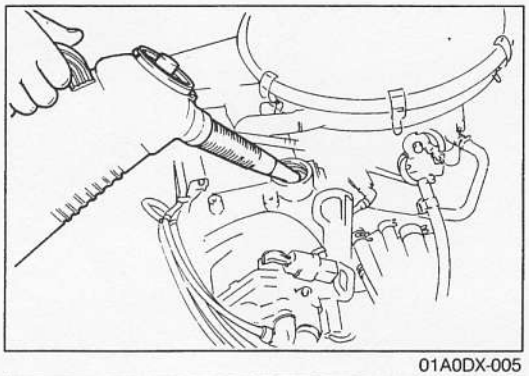
- **Be careful when draining; the oil is hot.**

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

Tightening torque:
29—41 N·m (3.0—4.2 m-kg, 22—30 ft-lb)

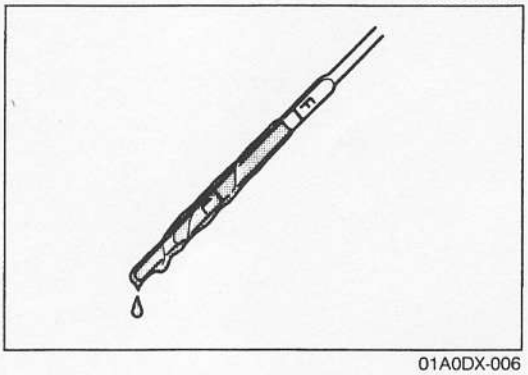


05U0DX-011



01A0DX-005

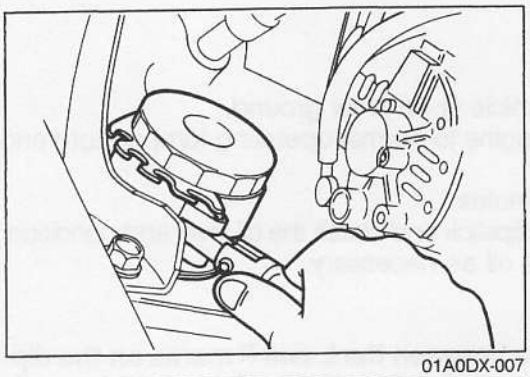
5. Refill the engine with the specified type and amount of engine oil. (Refer to page D–3.)
6. Refit the oil filler cap.

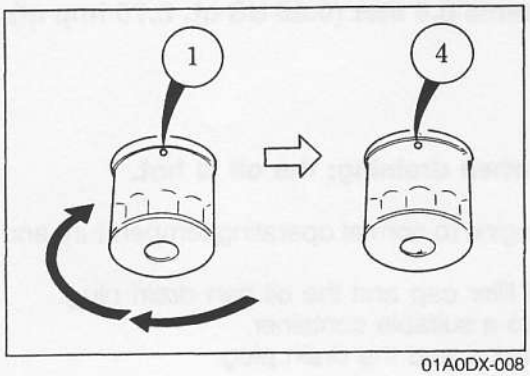


01A0DX-006

7. Run the engine and check for leaks.
8. Check the oil level and add oil if necessary.

Oil pan capacity:
3.0 liters (3.2 US qt, 2.6 Imp qt)


01A0DX-007



01A0DX-008

OIL FILTER

REPLACEMENT

1. Remove the oil filter with a suitable wrench.
2. Use a clean rag to wipe off the mounting surface on the engine.
3. Apply a small amount of clean engine oil to the rubber seal of the new filter.
4. Install the oil filter and tighten it by hand until the rubber seal contacts the base.
5. Hand tightening type (Numbers printed on filter)
   Tighten the filter 3/4 of a turn by hand after it contacts the cylinder block.
   If tightening by hand is difficult, use a suitable wrench.

   Example:
   - **When the oil filter contacts the cylinder block at "1", turn it 3/4 of a turn further to "4."**

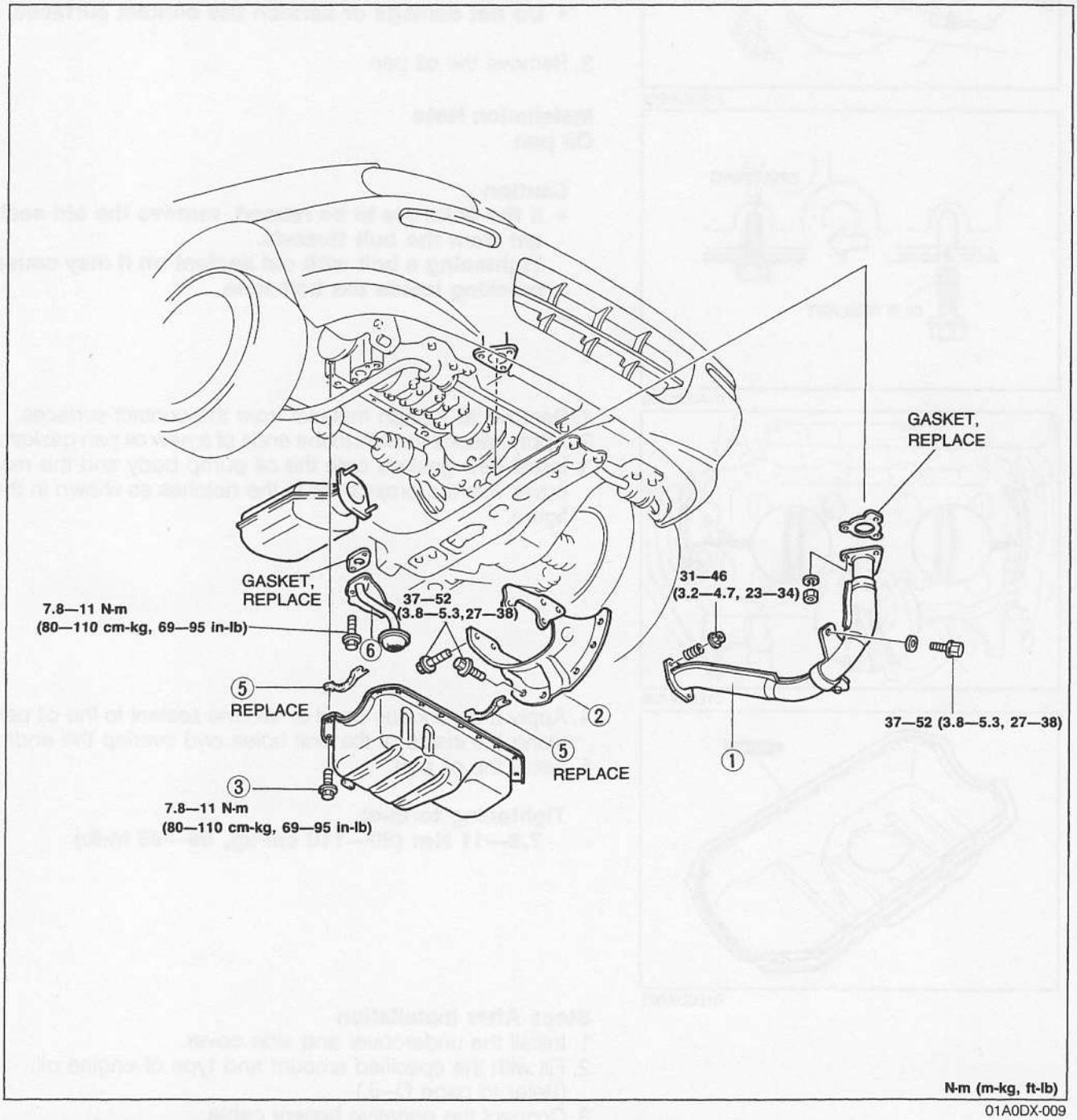
   Filter wrench tightening type (No numbers printed on filter)
   Tighten the filter 1 and 1/6 turns with a suitable wrench after it contacts the cylinder block.
6. Start the engine and check for leaks.
7. Check the oil level and add oil if necessary.

Oil filter capacity:
0.17 liter (0.18 US qt, 0.15 Imp qt)

OIL PAN

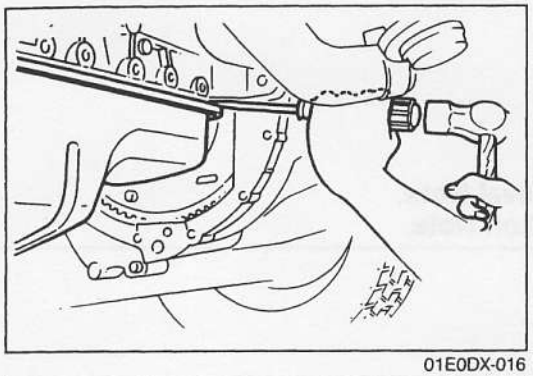
REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the engine oil.
3. Remove the undercover and side cover.
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**.

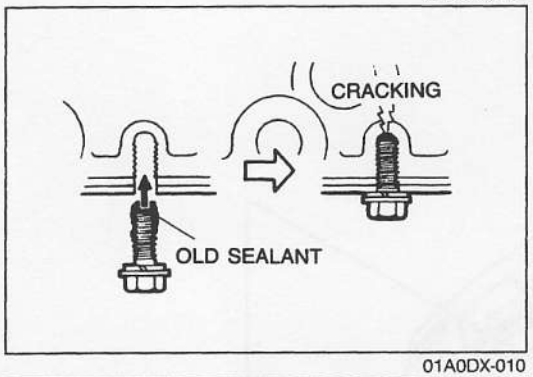


01A0DX-009

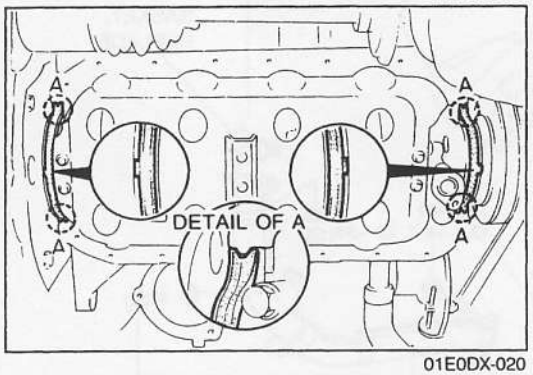
1. Front exhaust pipe and bracket
2. Integrated stiffener
3. Oil pan bolts
4. Oil pan
   - Removal Note ..... page D– 8
   - Installation Note..... page D– 8
5. Gaskets
6. Oil strainer



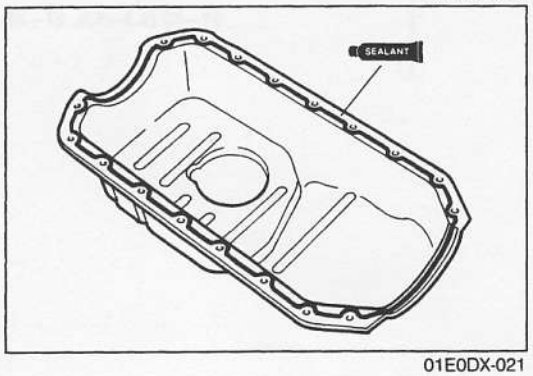
01E0DX-016



01A0DX-010



01E0DX-020



01E0DX-021

Removal Note

1. Remove the oil pan mounting bolts.
2. Insert a screwdriver or a suitable tool between the MBSP and oil pan to pry them apart.

Caution

- **Do not insert the prying tool between the MBSP and cylinder block.**
- **Do not damage or scratch the contact surfaces.**

3. Remove the oil pan.

Installation Note
Oil pan

Caution

- **If the bolts are to be reused, remove the old sealant from the bolt threads.**
  Tightening a bolt with old sealant on it may cause cracking inside the bolt hole.

1. Remove all foreign material from the contact surfaces.
2. Apply silicone sealant to the ends of a new oil pan gaskets.
3. Install new gaskets onto the oil pump body and the rear cover with the projections in the notches as shown in the figure.

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

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

Steps After Installation

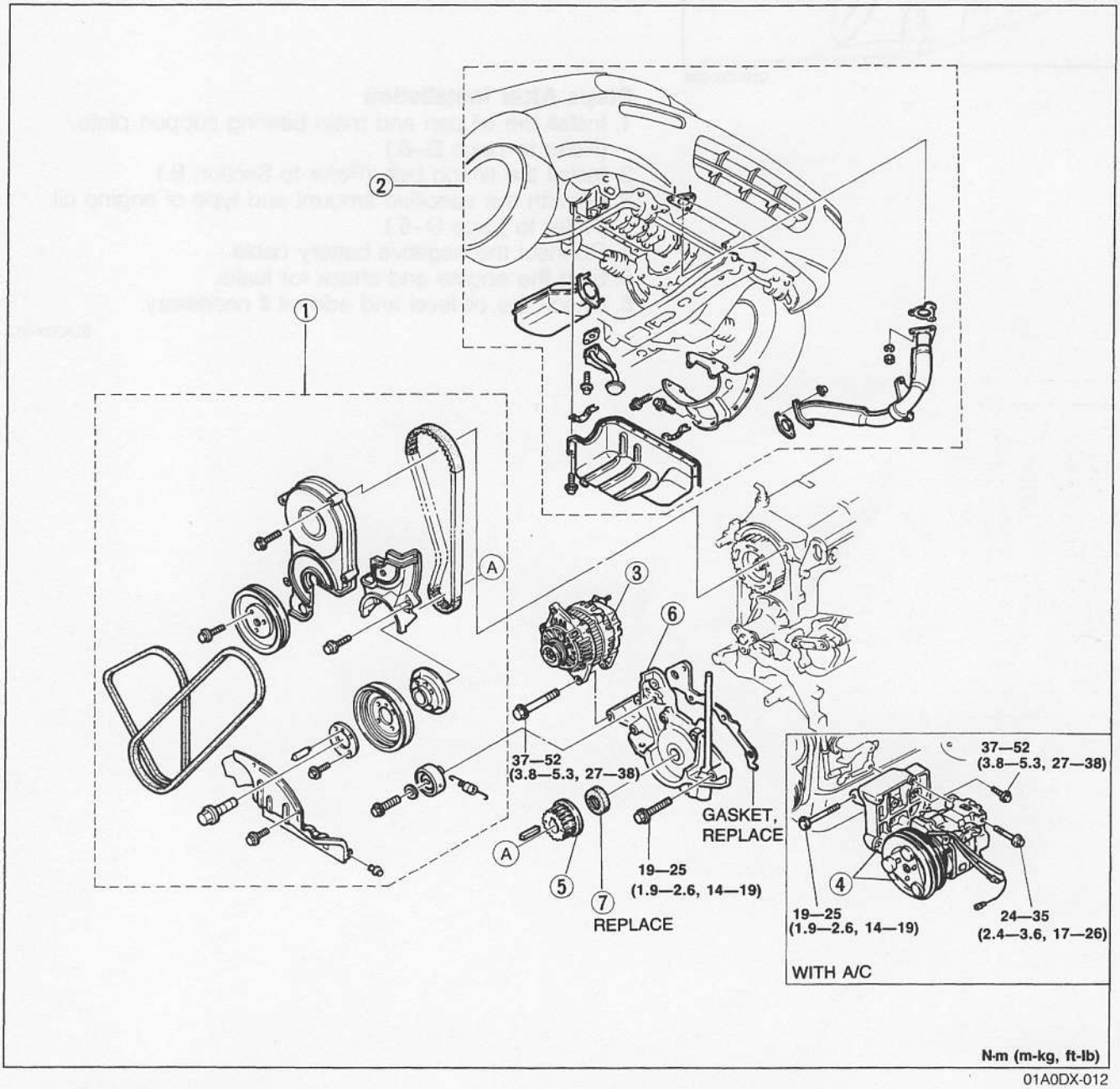
1. Install the undercover and side cover.
2. Fill with the specified amount and type of engine oil. (Refer to page D–5.)
3. Connect the negative battery cable.
4. Start the engine and check for leaks.
5. Check the oil level and add oil if necessary.

01A0DX-011

OIL PUMP

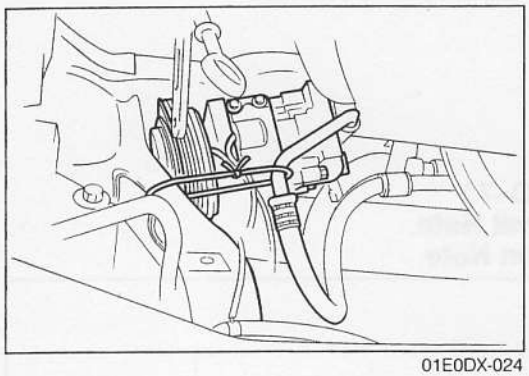
REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the engine oil.
3. Remove the timing belt. (Refer to Section B.)
4. Remove the oil pan and integrated stiffener. (Refer to page D–7.)
5. Remove in the order shown in the figure, referring to **Removal Note**.
6. Install in the reverse order of removal, referring to **Installation Note**.



01A0DX-012

1. Timing belt assembly
   Service ..... Section B
2. Oil pan
   Removal Note ..... page D– 8
   Installation Note..... page D– 8
3. Alternator
4. A/C compressor (with A/C)
   Removal Note ..... page D–10
5. Timing belt pulley
   Service ..... Section B
6. Oil pump
   Disassembly / Assembly..... page D–11
7. Front oil seal
   Service ..... Section B



01E0DX-024

Removal Note
A/C compressor (with A/C)

Caution
- **Do not damage the hoses.**

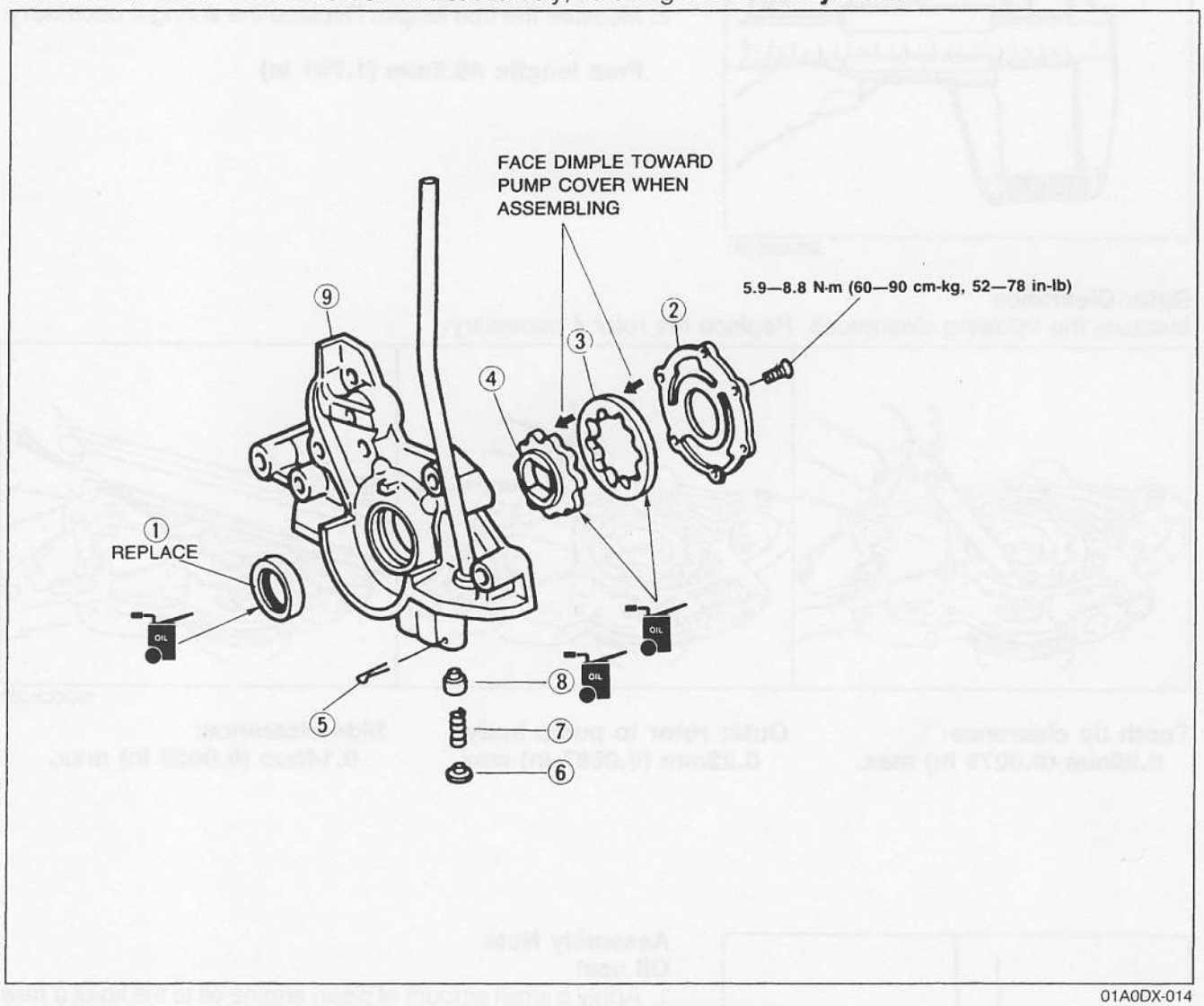
1. Remove the A/C compressor with the hoses still connected.
2. Position the compressor away from the engine and affix it with wire.

Steps After Installation
1. Install the oil pan and main bearing support plate. (Refer to page D–8.)
2. Install the timing belt. (Refer to Section B.)
3. Fill with the specified amount and type of engine oil. (Refer to page D–5.)
4. Connect the negative battery cable.
5. Start the engine and check for leaks.
6. Check the oil level and add oil if necessary.

01A0DX-013

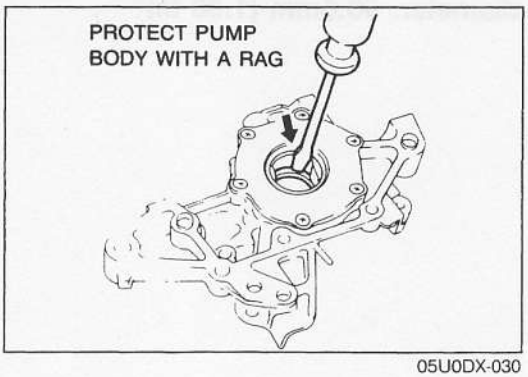
DISASSEMBLY / ASSEMBLY

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**.



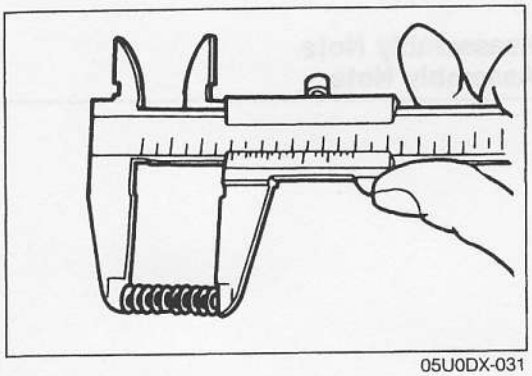
01A0DX-014

1. Oil seal
   Disassembly Note ..... below
   Assembly Note ..... page D–12
2. Pump cover
   Inspect for distortion and damage
3. Outer rotor
4. Inner rotor
5. Roll pin
6. Spring seat
7. Pressure spring
   Inspection ..... page D–12
8. Control plunger
   Inspect for wear and damage
9. Pump body
   Inspect for distortion and damage



05U0DX-030

Disassembly Note
Oil seal
Remove the oil seal with a screwdriver protected with a rag.


05U0DX-031

INSPECTION

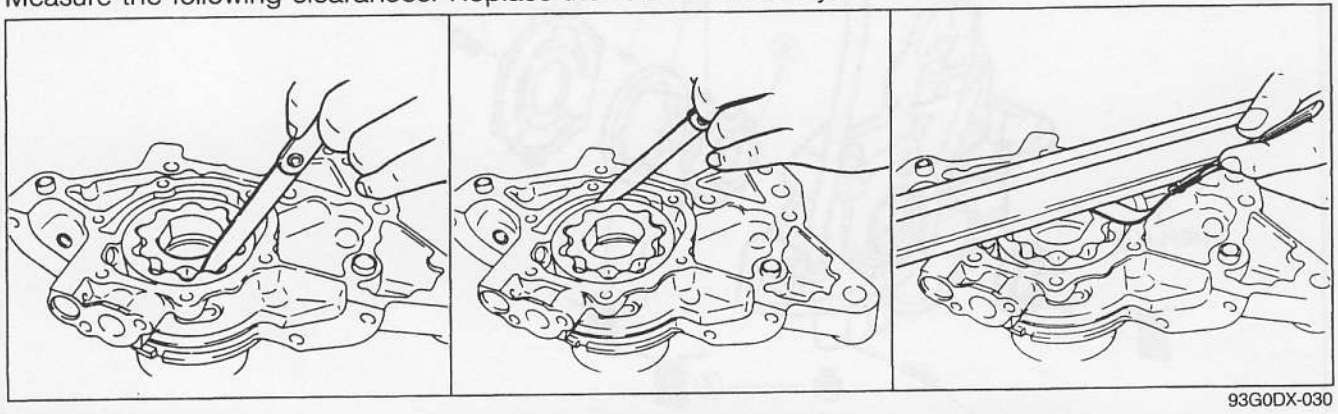
Pressure Spring

1. Inspect the spring for weakness or breakage.
2. Measure the free length. Replace the spring if necessary.

Free length: 45.5mm (1.791 in)

Rotor Clearance

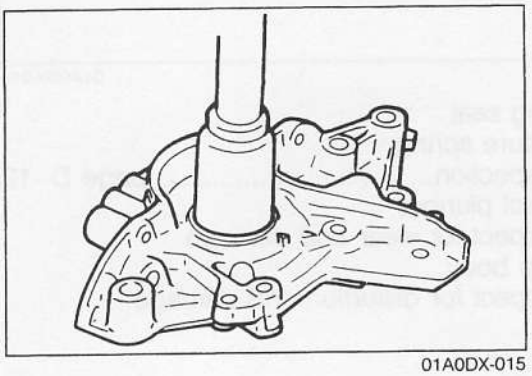
Measure the following clearances. Replace the rotor if necessary.


93G0DX-030

Tooth tip clearance:
0.20mm (0.0079 in) max.

Outer rotor to pump body:
0.22mm (0.0087 in) max.

Side clearance:
0.14mm (0.0055 in) max.


01A0DX-015

Assembly Note

Oil seal

1. Apply a small amount of clean engine oil to the lip of a new oil seal.
2. Push the oil seal slightly in by hand.

Caution

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

3. Press the oil seal in evenly with a suitable pipe.

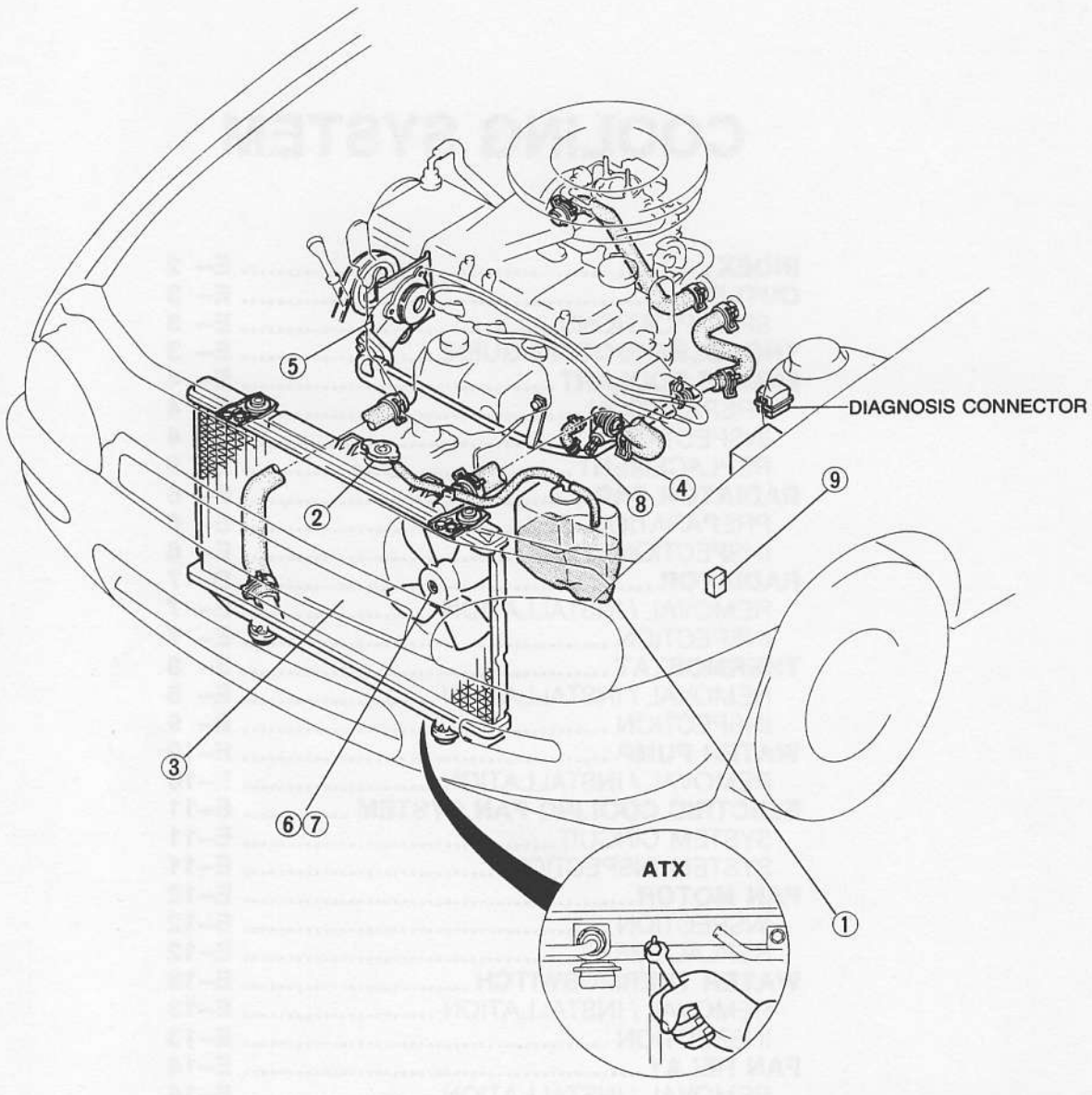
Oil seal outer diameter: 50.5mm (1.98 in)

COOLING SYSTEM

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SPECIFICATIONS ..... E– 3
TROUBLESHOOTING GUIDE ..... E– 3
ENGINE COOLANT ..... E– 4
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INSPECTION ..... E– 4
REPLACEMENT ..... E– 5
RADIATOR CAP ..... E– 6
PREPARATION ..... E– 6
INSPECTION ..... E– 6
RADIATOR ..... E– 7
REMOVAL / INSTALLATION ..... E– 7
INSPECTION ..... E– 7
THERMOSTAT ..... E– 8
REMOVAL / INSTALLATION ..... E– 8
INSPECTION ..... E– 9
WATER PUMP E–10
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SYSTEM CIRCUIT E–11
SYSTEM INSPECTION E–11
FAN MOTOR E–12
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WATER THERMOSWITCH E–13
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FAN RELAY E–14
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INSPECTION E–14

01E0EX-001

INDEX



ENGINE COOLANT TOTAL CAPACITY:
liters (US qt, Imp qt)

MTX	ATX
5.0 (5.3, 4.4)	6.0 (6.3, 5.3)

01E0EX-002

1. Engine coolant
Inspection ..... page E– 4
Replacement..... page E– 5
2. Radiator cap
Inspection ..... page E– 6
3. Radiator
Removal / Installation ..... page E– 7
4. Thermostat
Removal / Installation ..... page E– 8
5. Water pump
Removal / Installation ..... page E–10
6. Electric cooling fan system
System circuit ..... page E–11
System inspection..... page E–11
7. Fan motor
Inspection ..... page E–12
Replacement..... page E–12
8. Water thermoswitch
Removal / Installation ..... page E–13
9. Fan relay
Removal / Installation ..... page E–14

OUTLINE

SPECIFICATIONS

Item \ Engine model			B3
Cooling system			Water-cooled, forced circulation
Coolant capacity		liters (US qt, Imp qt)	MTX: 5.0 (5.3, 4.4) ATX: 6.0 (6.3, 5.3)
Water pump	Type		Centrifugal, belt-driven
	Water seal		Unified mechanical seal
Thermostat	Type		Wax
	Opening temperature	°C (°F)	86.5—89.5 (187—193)
	Full-open temperature	°C (°F)	100 (212)
	Full-open lift	mm (in)	8.5 (0.335) or more
Radiator	Type		Corrugated fin
	Cap valve opening pressure	kPa (kg/cm^2, psi)	74—103 (0.75—1.05, 11—15)
Cooling fan	Motor current	A	6.6 ± 1
	Number of blade		4
	Outer diameter of blade	mm (in)	300 (11.9)

01A0EX-001

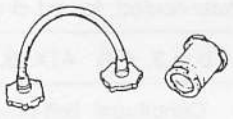
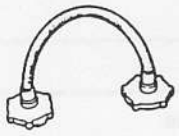
TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Overheating	Coolant level insufficient	Add	E– 4
	Coolant leakage	Repair	—
	Radiator fins clogged	Clean	E– 7
	Radiator cap malfunction	Replace	E– 6
	Cooling fan malfunction	Replace	E–11
	Thermostat malfunction	Replace	E– 8
	Water passage clogged	Clean	E– 5
	Water pump malfunction	Replace	E–10
Corrosion	Impurities in coolant	Replace	E– 5

01E0EX-004

ENGINE COOLANT

PREPARATION
SST

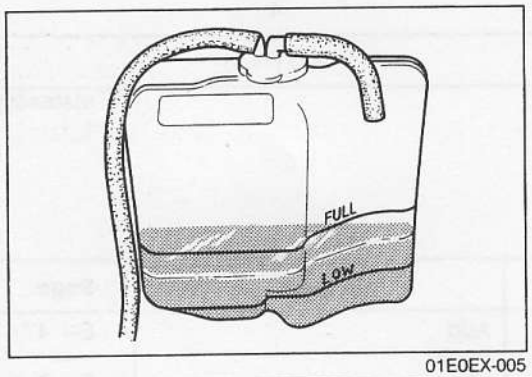
49 D015 0A0 Adapter set, radiator tester 	For inspection of cooling system pressure	49 D015 002 Adapter A (Part of 49 D015 0A0) 	For inspection of cooling system pressure

01A0EX-005

INSPECTION

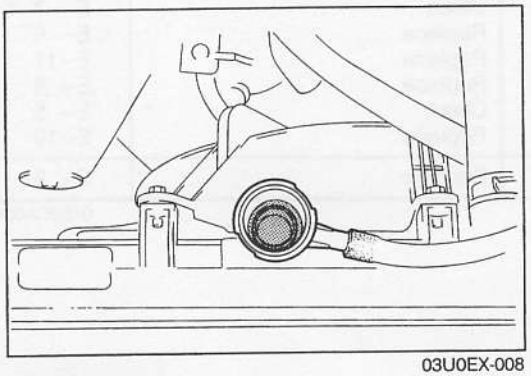
Warning
- **Never remove the radiator cap while the engine is hot.**
- **Wrap a thick cloth around the cap when removing it.**
- **When removing the radiator cap, loosen it slowly to the first stop until the pressure in the radiator is released, and then remove it.**

03U0EX-006



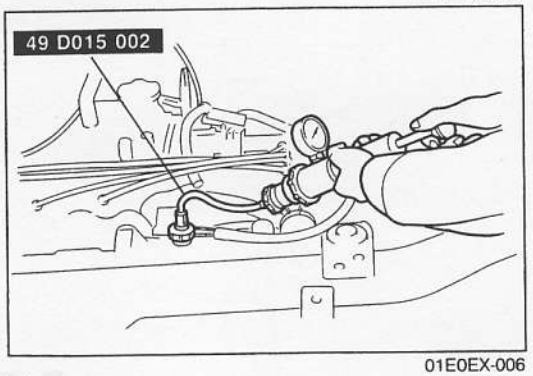
01E0EX-005

Coolant Level (Engine cold)
1. Verify that the coolant level is near the radiator filler neck.
2. Verify that the coolant level in the coolant reservior is between the FULL and LOW marks.
3. Add coolant if necessary



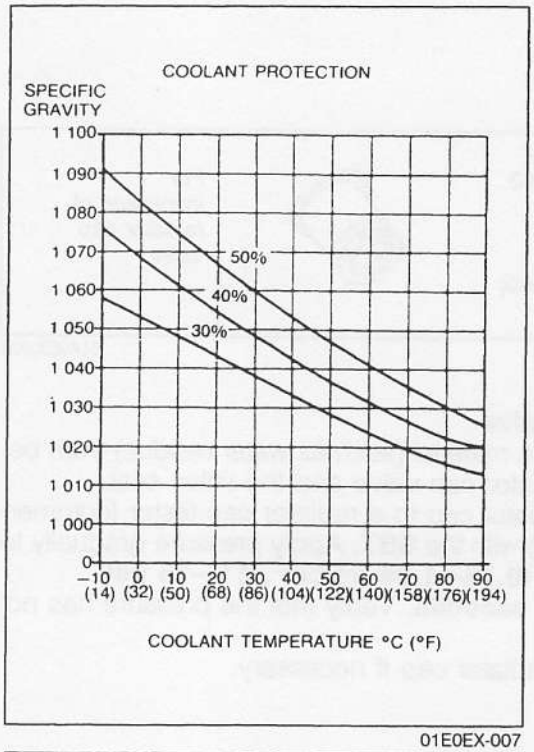
03U0EX-008

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

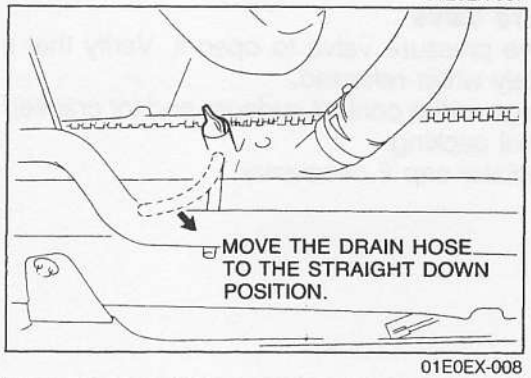


01E0EX-006

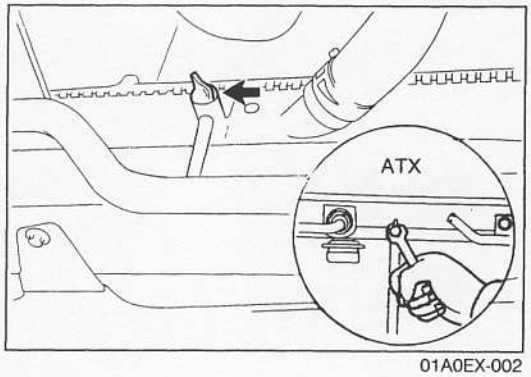
Coolant Leakage
1. Connect a radiator tester (commercially available) and the **SST** to the radiator filler neck.
2. Apply **103 kPa (1.05 kg/cm^2, 15 psi)** pressure to the system.
3. Verify that the pressure is held.
4. If not as specified, check for coolant leakage.



01E0EX-007



01E0EX-008



01A0EX-002

Coolant Protection

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

1. Measure the coolant temperature and specific gravity with a thermometer and a hydrometer.
2. Determine the coolant protection by referring to the graph shown.
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	1054
Above −26°C (−15°F)	55	45	1066
Above −40°C (−40°F)	45	55	1078

05U0EX-010

REPLACEMENT

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

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

1. Remove the radiator cap and loosen the drain plug by hand (MTX) or by a wrench (ATX).
2. Drain the coolant into a suitable container.
3. Flush the cooling system with water until all traces of color are gone; then let the system drain completely.
4. Install the drain plug.
5. Fill with the proper amount and mixture of ethylene glycol based coolant by referring to the table above.

Coolant capacity

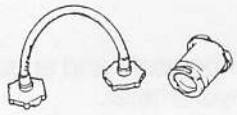
liters (US qt, Imp qt)

B3	
MTX	ATX
5.0 (5.3, 4.4)	6.0 (6.3, 5.3)

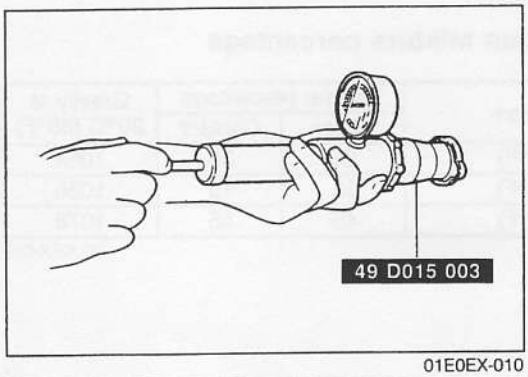
6. Run the engine with the radiator cap removed until the upper radiator hose is hot.
7. With the engine idling, add coolant to the radiator until it reaches the bottom of the filler neck.
8. Install the radiator cap.

RADIATOR CAP

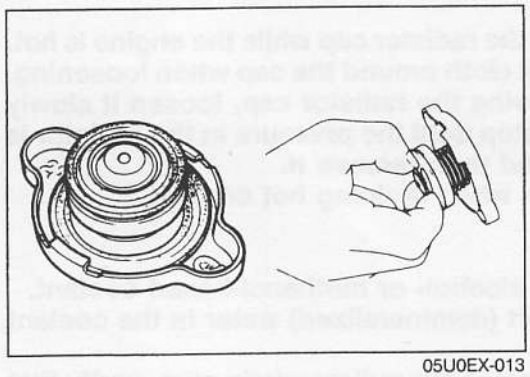
PREPARATION
SST

49 D015 0A0 Adapter set, radiator tester 	For inspection of radiator cap valve	49 D015 003 Adapter B (Part of 49 D015 0A0) 	For inspection of radiator cap valve

01A0EX-006



01E0EX-010



05U0EX-013

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) with the **SST**. Apply pressure gradually to **74—103 kPa (0.75—1.05 kg/cm^2, 11—15 psi)**.
3. Wait about **10 seconds**. Verify that the pressure has not decreased.
4. Replace the radiator cap if necessary.

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

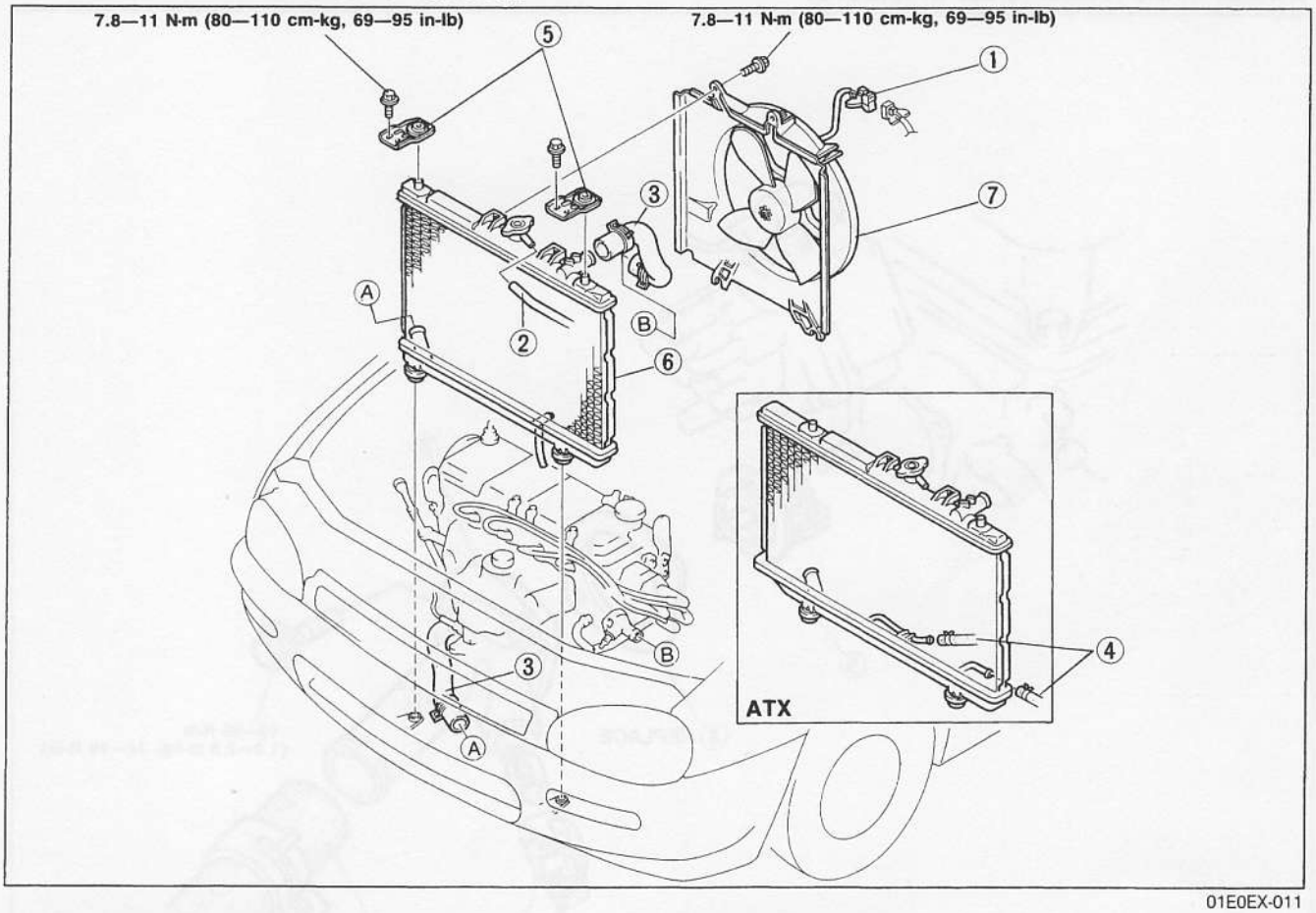
RADIATOR

REMOVAL / INSTALLATION

Caution

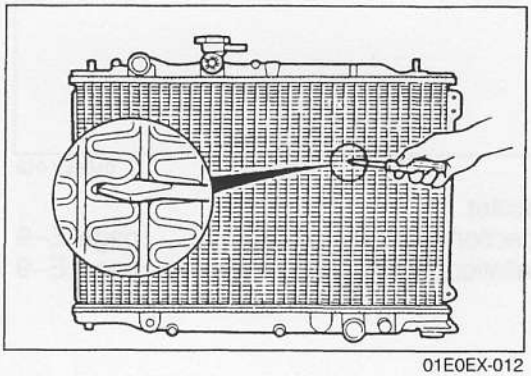
- **Before loosening the radiator drain plug, verify that the radiator drain hose faces straight down.**
- **Position the hose clamp in the original location on the hose, and squeeze the clamp lightly with large pliers to ensure a good fit.**

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



01E0EX-011

1. Cooling fan connector
2. Coolant reservoir hose
3. Radiator hose
4. Oil cooler hose (ATX)
5. Radiator bracket
6. Radiator
   Inspection ..... page E–7
7. Cooling fan and radiator cowling assembly



01E0EX-012

INSPECTION

Check for the following and repair or replace as necessary.
1. Cracks, damage, and water leakage.
2. Bent fins (repair with a screwdriver).
3. Distorted or bent radiator inlet.

Steps After Installation

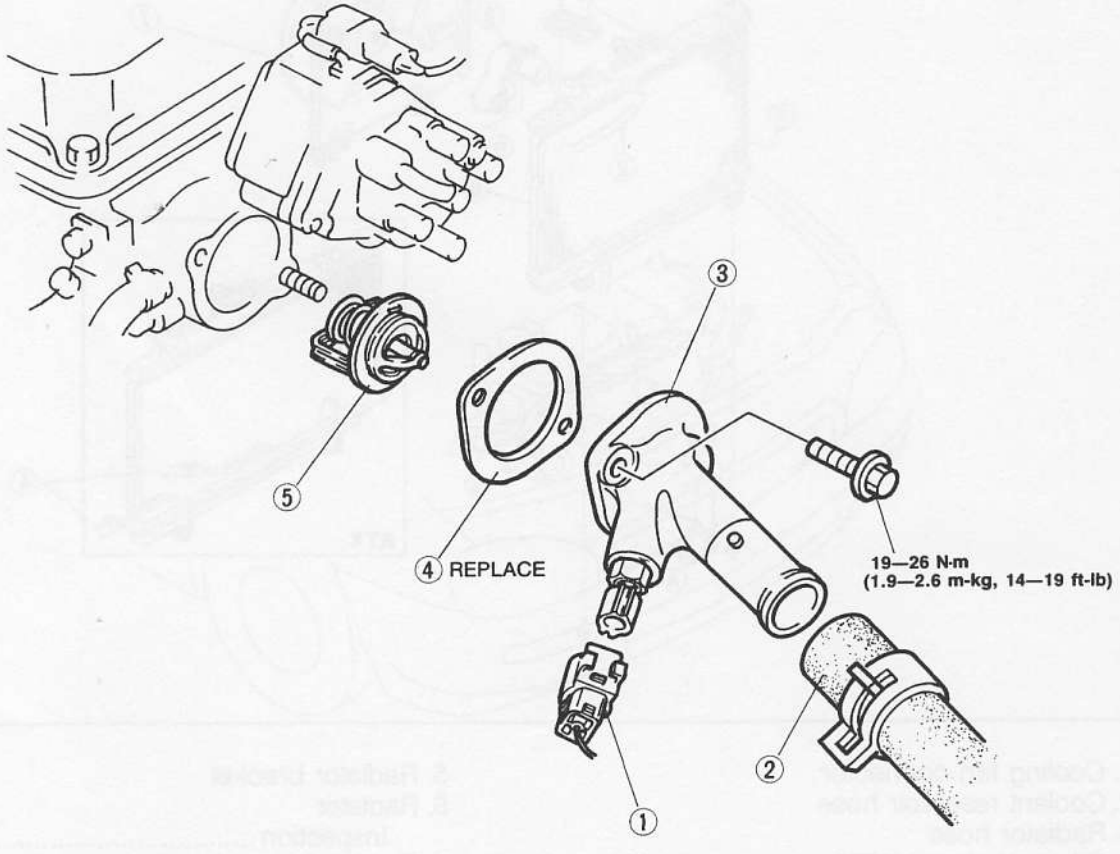
1. Fill the radiator with the specified amount and type of engine coolant. (Refer to page E–4.)
2. Connect the negative battery cable.
3. Start the engine and check for leaks.

THERMOSTAT

REMOVAL / INSTALLATION

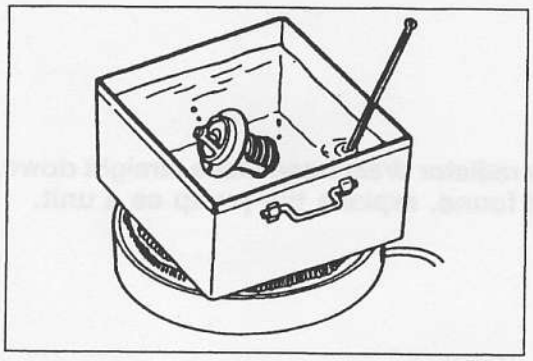
Caution
- **Before loosening the radiator drain plug, verify that the radiator drain hose faces straight down.**
- **Position the hose clamp in the original location on the hose, and squeeze the clamp lightly with large pliers to ensure a good fit.**

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

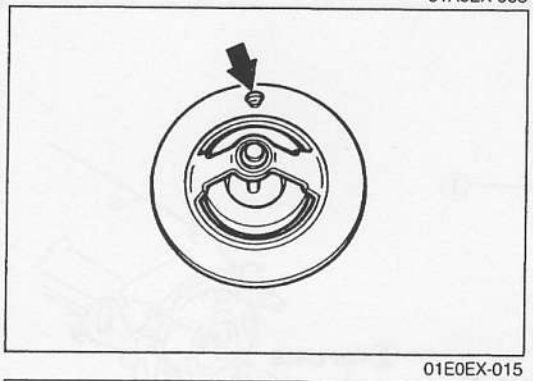


01E0EX-013

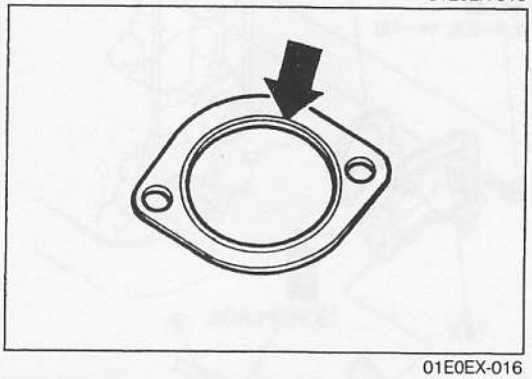
1. Water thermoswitch connector
2. Upper radiator hose
3. Thermostat cover
4. Thermostat gasket
   Installation Note ..... page E–9
5. Thermostat
   Inspection ..... page E–9
   Installation Note ..... page E–9



01A0EX-003



01E0EX-015



01E0EX-016

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:

		B3
Opening temperature	°C (°F)	86.5—89.5 (187—193)
Full-open temperature	°C (°F)	100 (212)
Full-open lift	mm (in)	8.5 (0.335) or more

E

Installation Note

Thermostat

Install the thermostat into the cylinder head with the jiggle pin at the top.

Thermostat gasket

Install a new gasket with the sealing ring facing the cylinder head.

Steps After Installation

1. Fill the radiator with the specified amount and type of engine coolant. (Refer to page E–5.)
2. Connect the negative battery cable.
3. Start the engine and check for leaks.

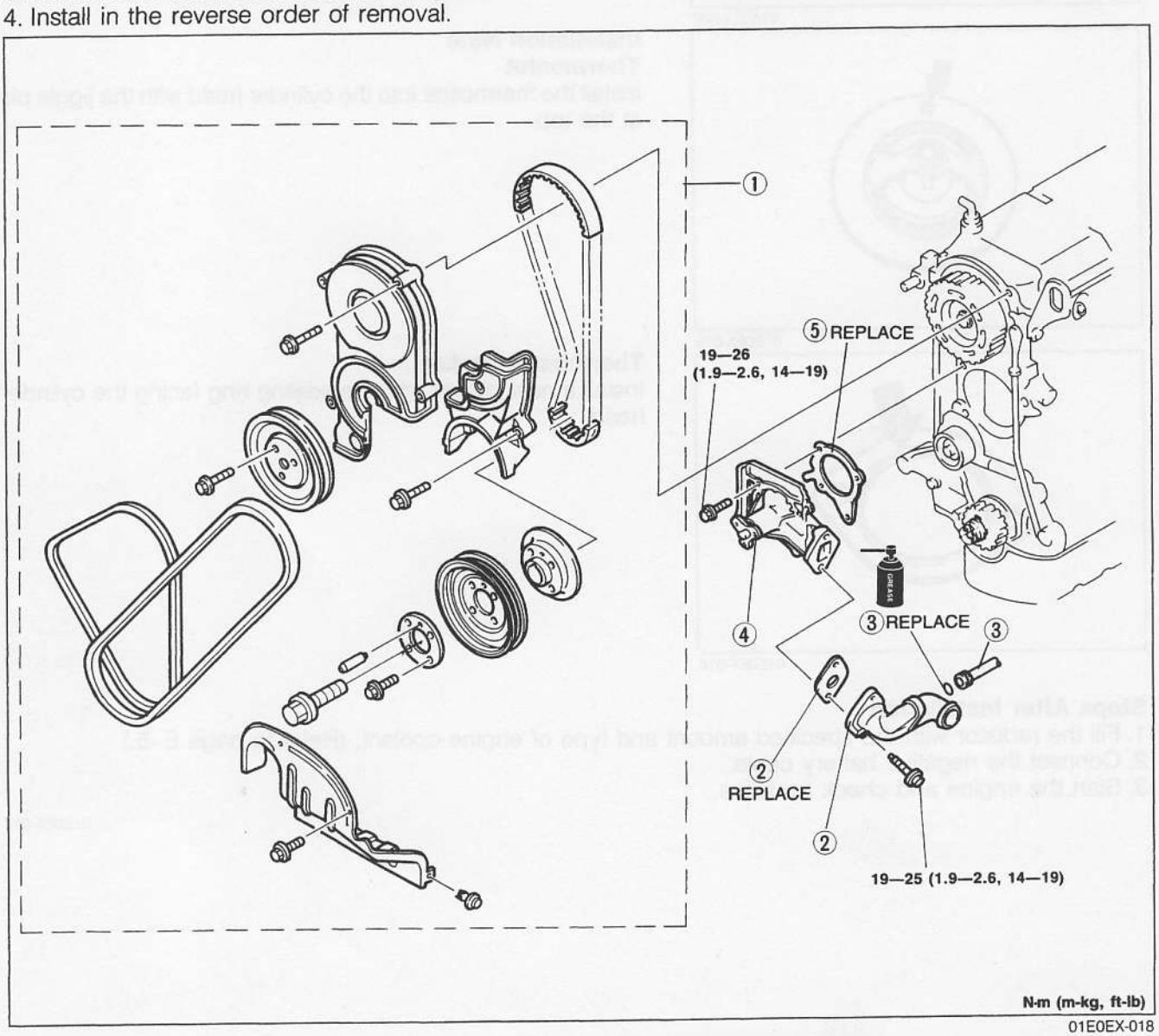
01E0EX-017

WATER PUMP

REMOVAL / INSTALLATION

Caution
- **Before loosening the radiator drain plug, verify that the radiator drain hose faces straight down.**
- **Do not disassemble the water pump. If a problem is found, replace the pump as a unit.**

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



01E0EX-018

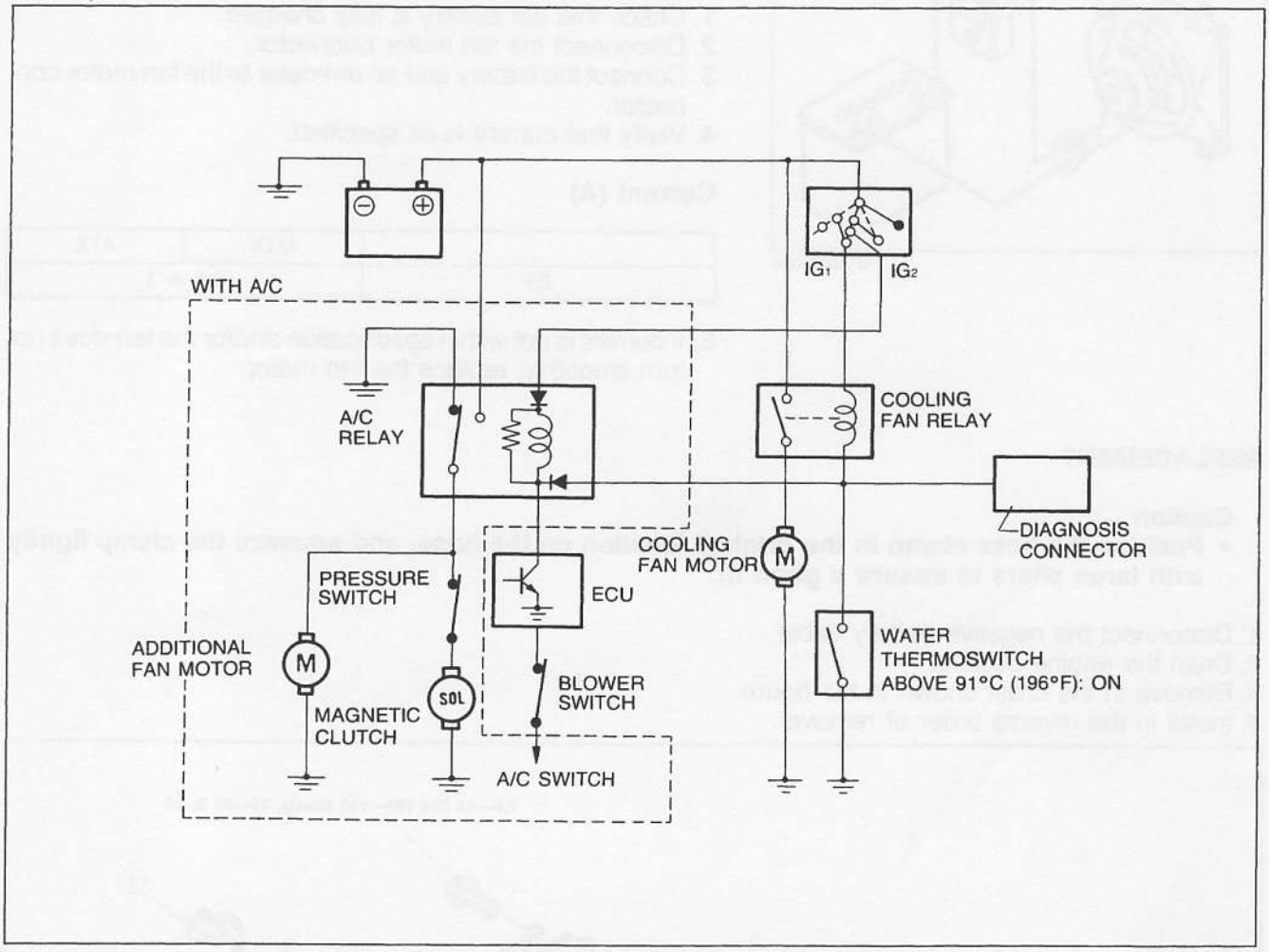
1. Timing belt
   Service ..... Section B
2. Water inlet pipe and gasket
3. Water bypass pipe and O-ring
4. Water pump assembly
   Inspect for cracks, damaged mounting surface, bearing condition, and leakage
5. Water pump gasket

Steps After Installation
1. Fill the radiator with the specified amount and type of engine coolant. (Refer to page E–5.)
2. Connect the negative battery cable.
3. Start the engine and check for leaks.

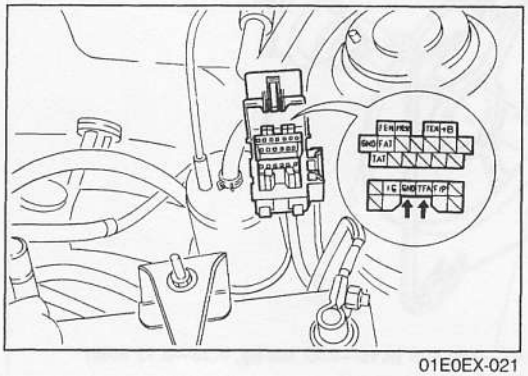
01E0EX-019

ELECTRIC COOLING FAN SYSTEM

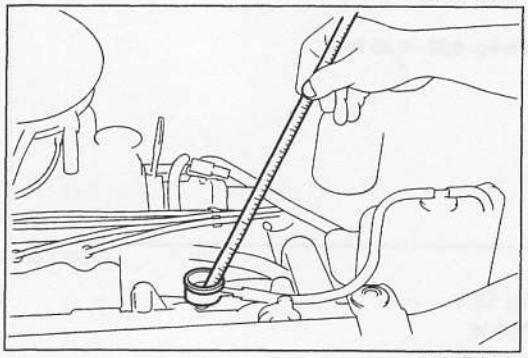
SYSTEM CIRCUIT



01E0EX-020



01E0EX-021



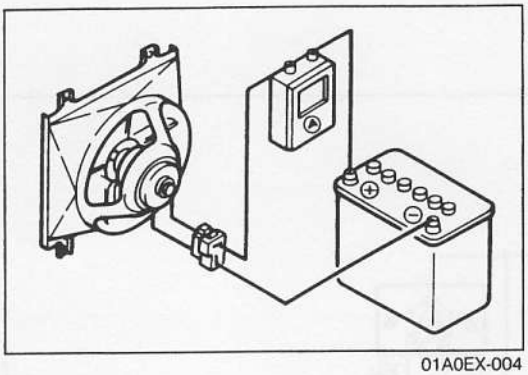
01A0EX-007

SYSTEM INSPECTION

1. Jump across the fan test (TFA) terminal and the ground (GND) terminal of the diagnosis connector.
2. Turn the ignition switch ON and verify that the fan operates. If the fan does not operate, inspect the cooling fan system components and wiring harness.
3. Remove the radiator cap and place a thermometer in the radiator filler neck.
4. Start the engine.
5. Verify that the fan operates when the coolant temperature is as specified.

Operation temperature: above 91°C (196°F)

If the fan does not operate, check the water thermoswitch. (Refer to page E–13.)


01A0EX-004

FAN MOTOR

INSPECTION

1. Check that the battery is fully charged.
2. Disconnect the fan motor connector.
3. Connect the battery and an ammeter to the fan motor connector.
4. Verify that current is as specified.

Current (A)

	MTX	ATX
B3	6.6 ± 1	

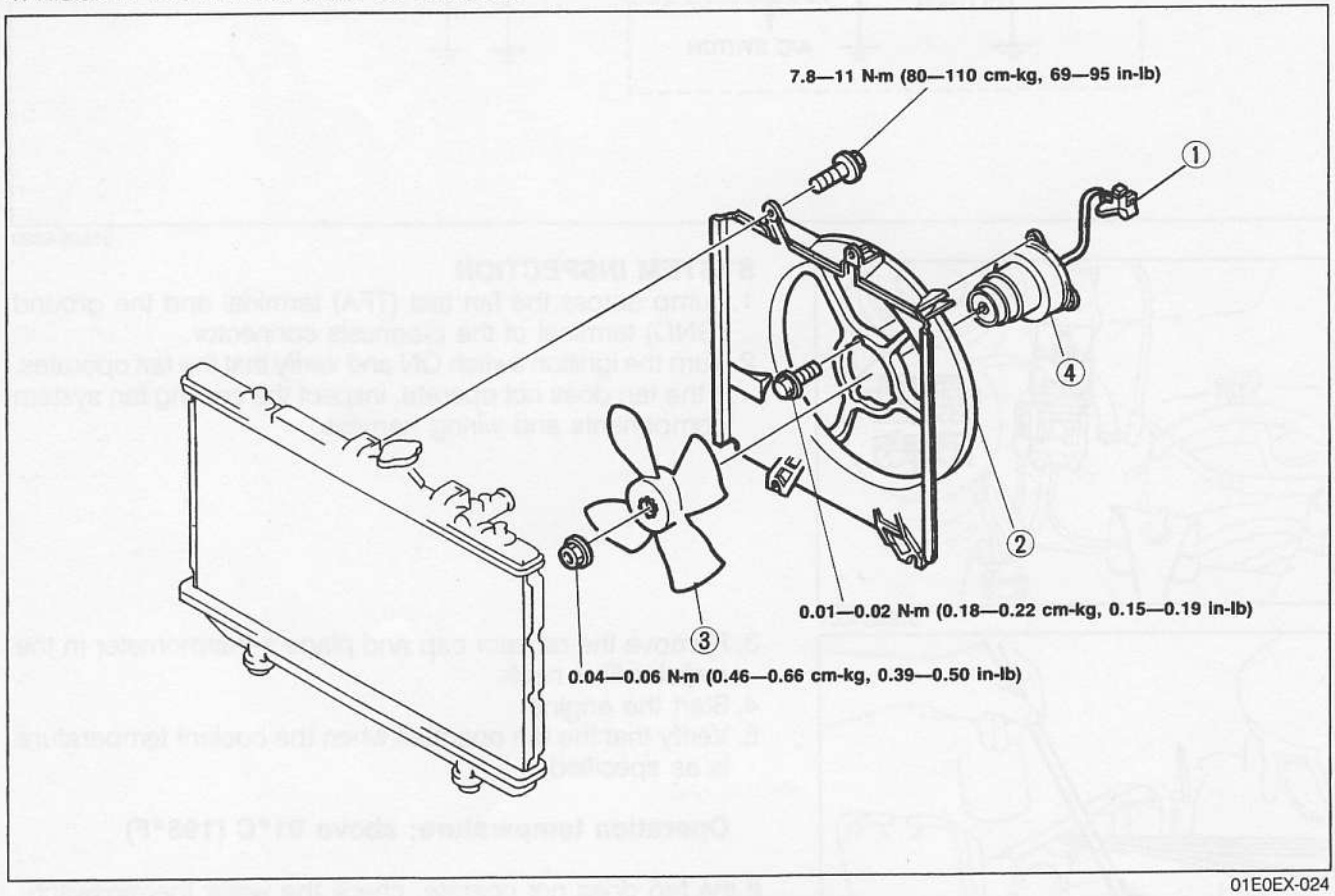
5. If current is not within specification and/or the fan does not turn smoothly, replace the fan motor.

REPLACEMENT

Caution

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

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



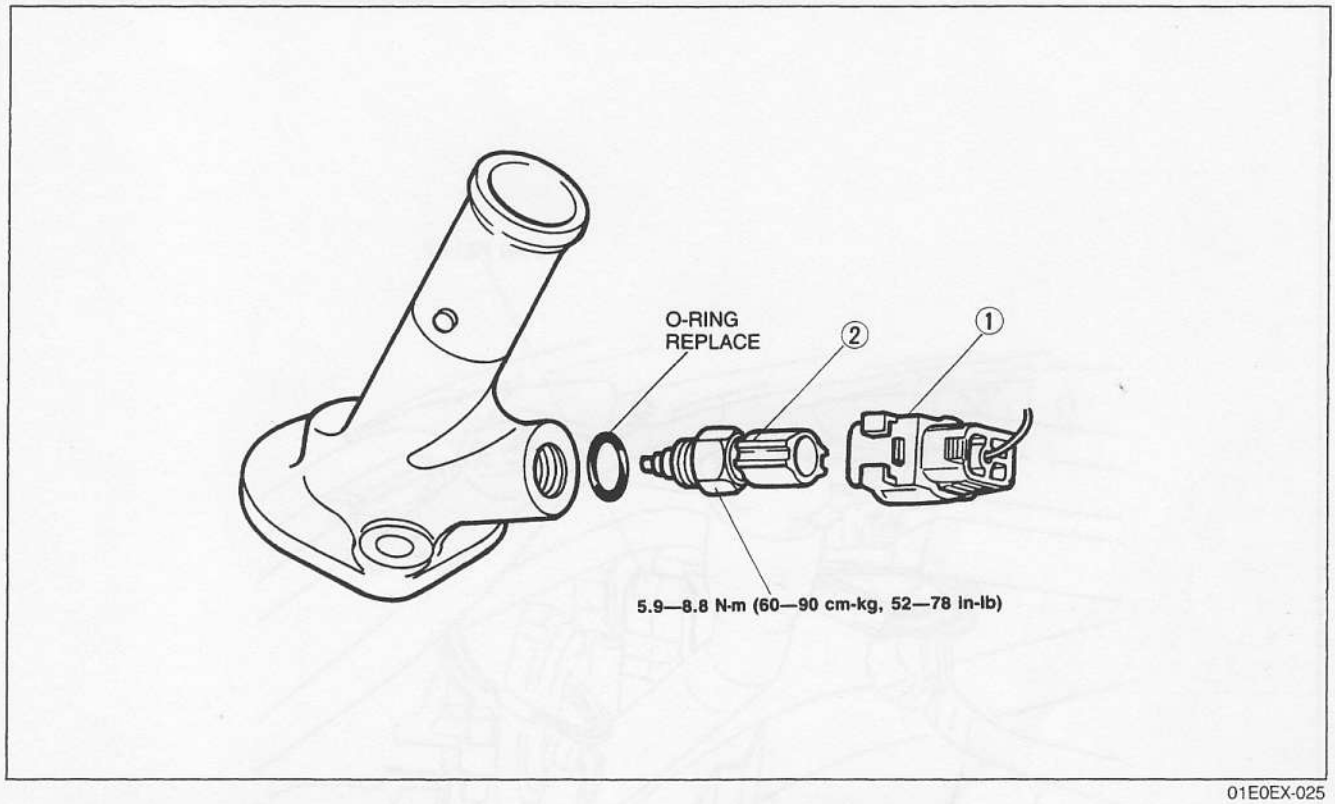
01E0EX-024

1. Cooling fan connector
2. Radiator cowling
3. Cooling fan
4. Fan motor

WATER THERMOSWITCH

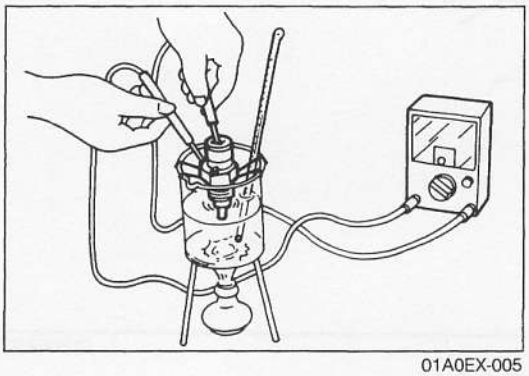
REMOVAL / INSTALLATION

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

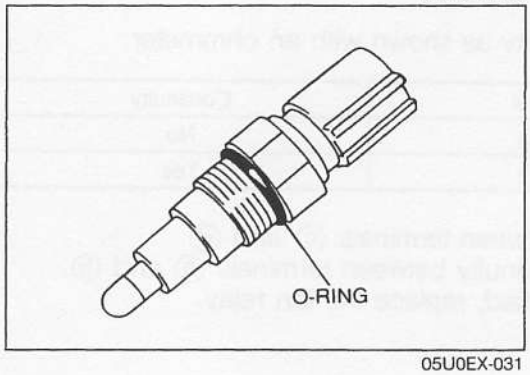


01E0EX-025

1. Water thermoswitch connector
2. Water thermoswitch
   Inspection ..... page E–13
   Installation Note ..... page E–13



01A0EX-005



05U0EX-031

INSPECTION

1. Place the switch and a thermometer in water.
2. Heat the water gradually and check continuity of the switch with an ohmmeter.

Coolant temperature °C (°F)	Continuity
More than 91 (196)	Yes
Less than 84 (183)	No

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

Installation Note

Water thermoswitch

1. Apply a small amount of engine coolant to the new O-ring.

Caution

- **Do not use an impact wrench for installation.**

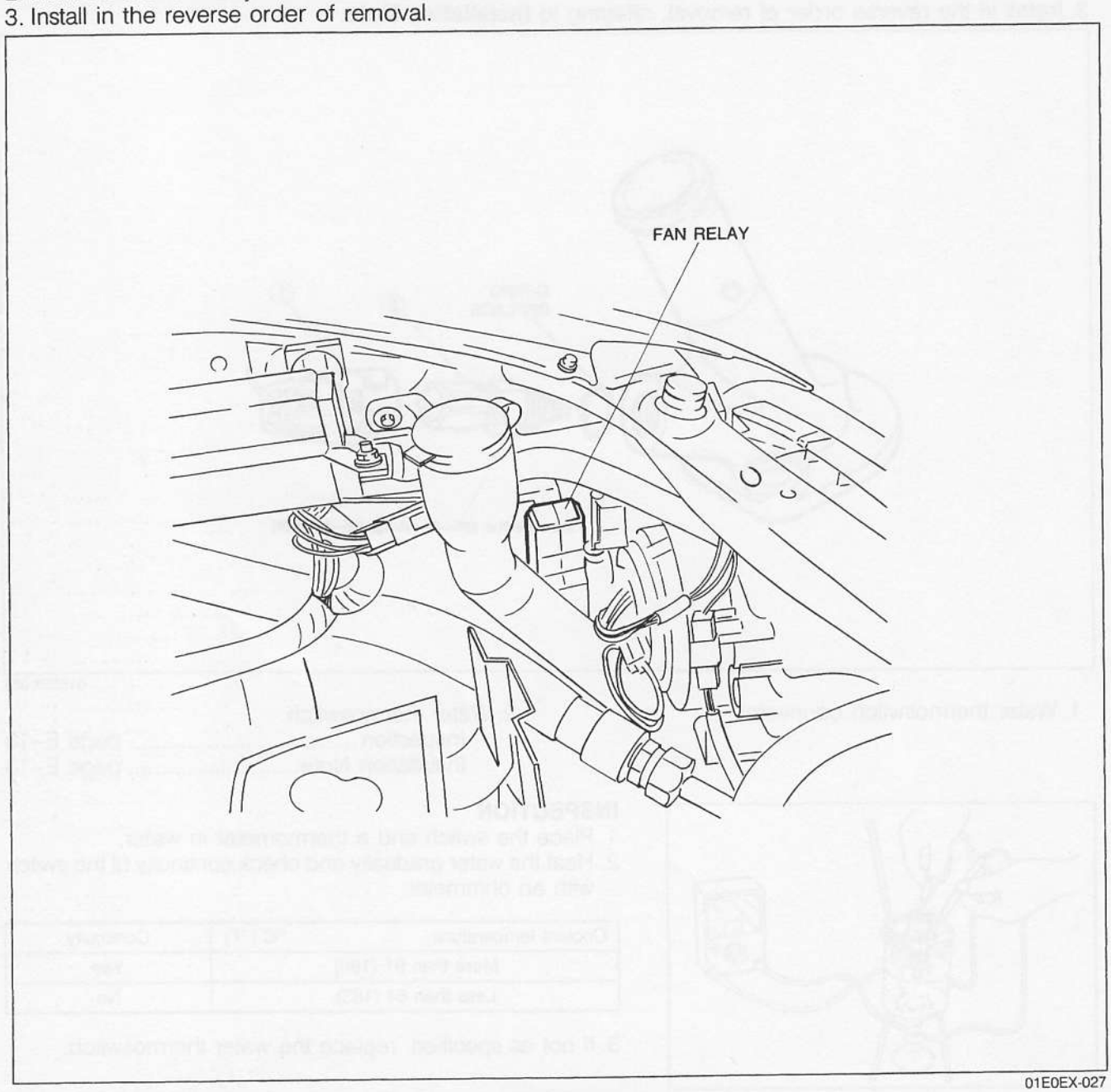
2. Install the water thermoswitch.

Tightening torque:
5.9—8.8 N·m (60—90 cm-kg, 52—78 in-lb)

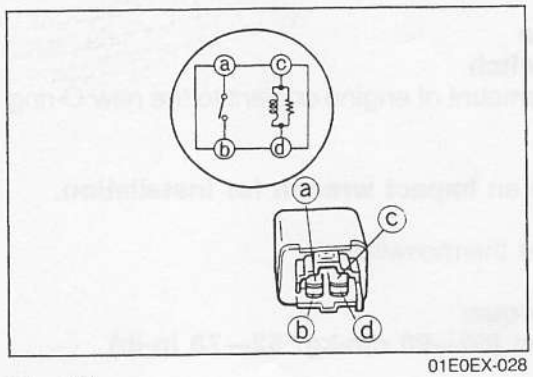
FAN RELAY

REMOVAL / INSTALLATION

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



01E0EX-027



01E0EX-028

INSPECTION

1. Check continuity as shown with an ohmmeter.

Terminal	Continuity
ⓐ—ⓑ	No
ⓒ—ⓓ	Yes

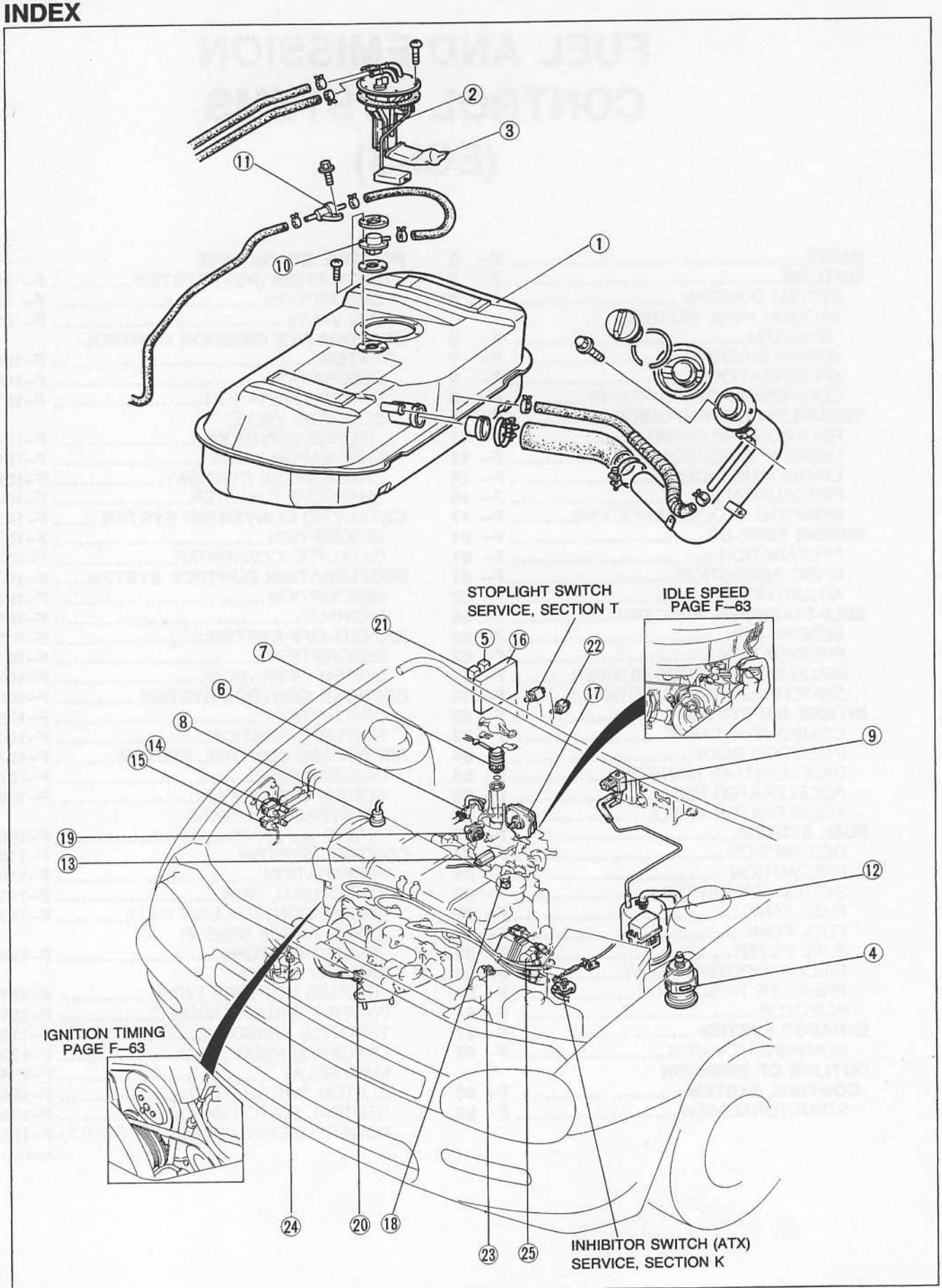
2. Apply 12V between terminals ⓒ and ⓓ.
   Check for continuity between terminals ⓐ and ⓑ.
3. If not as specified, replace the fan relay.

FUEL AND EMISSION CONTROL SYSTEMS (EGI-S)

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01A0FX-001

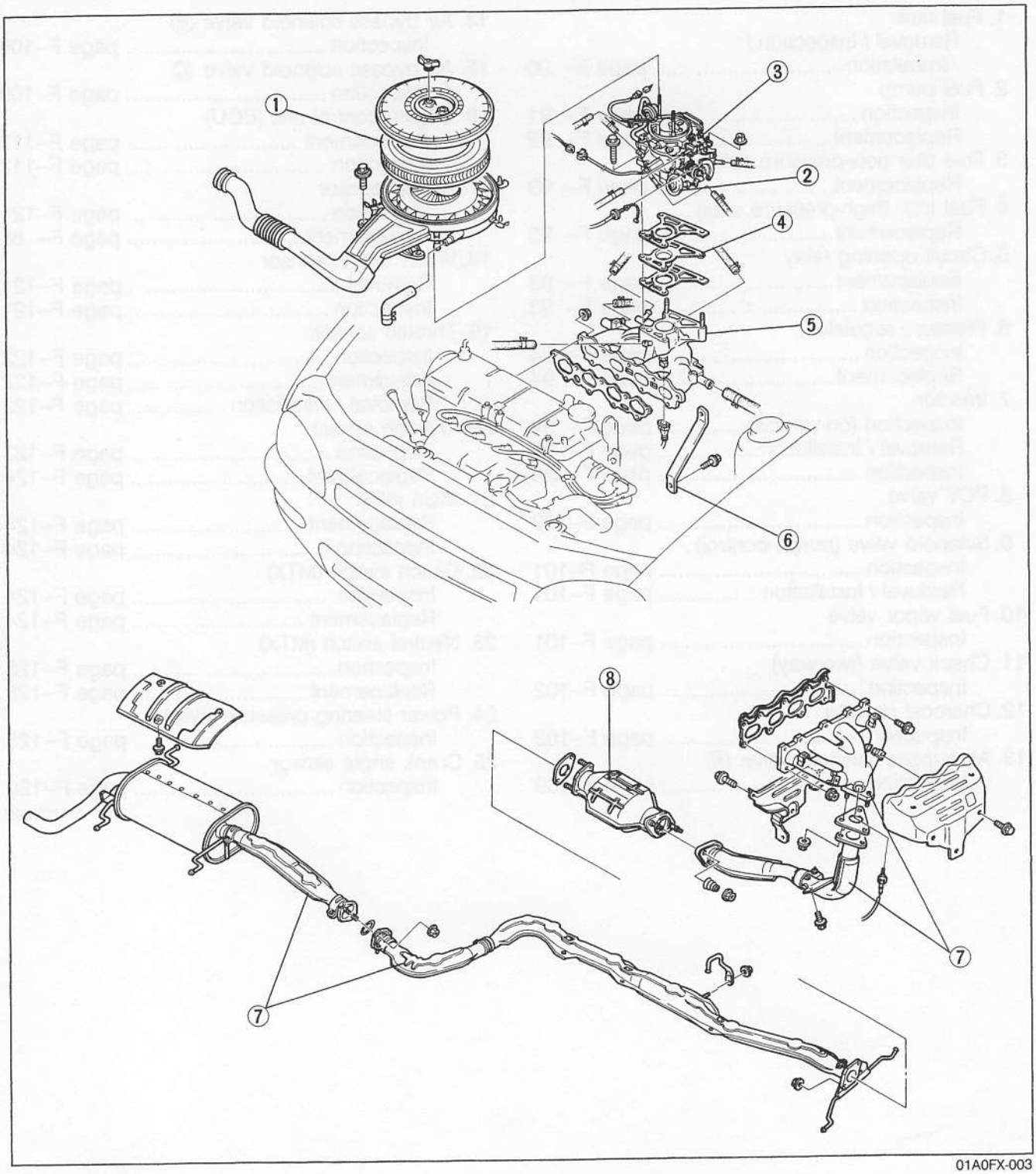
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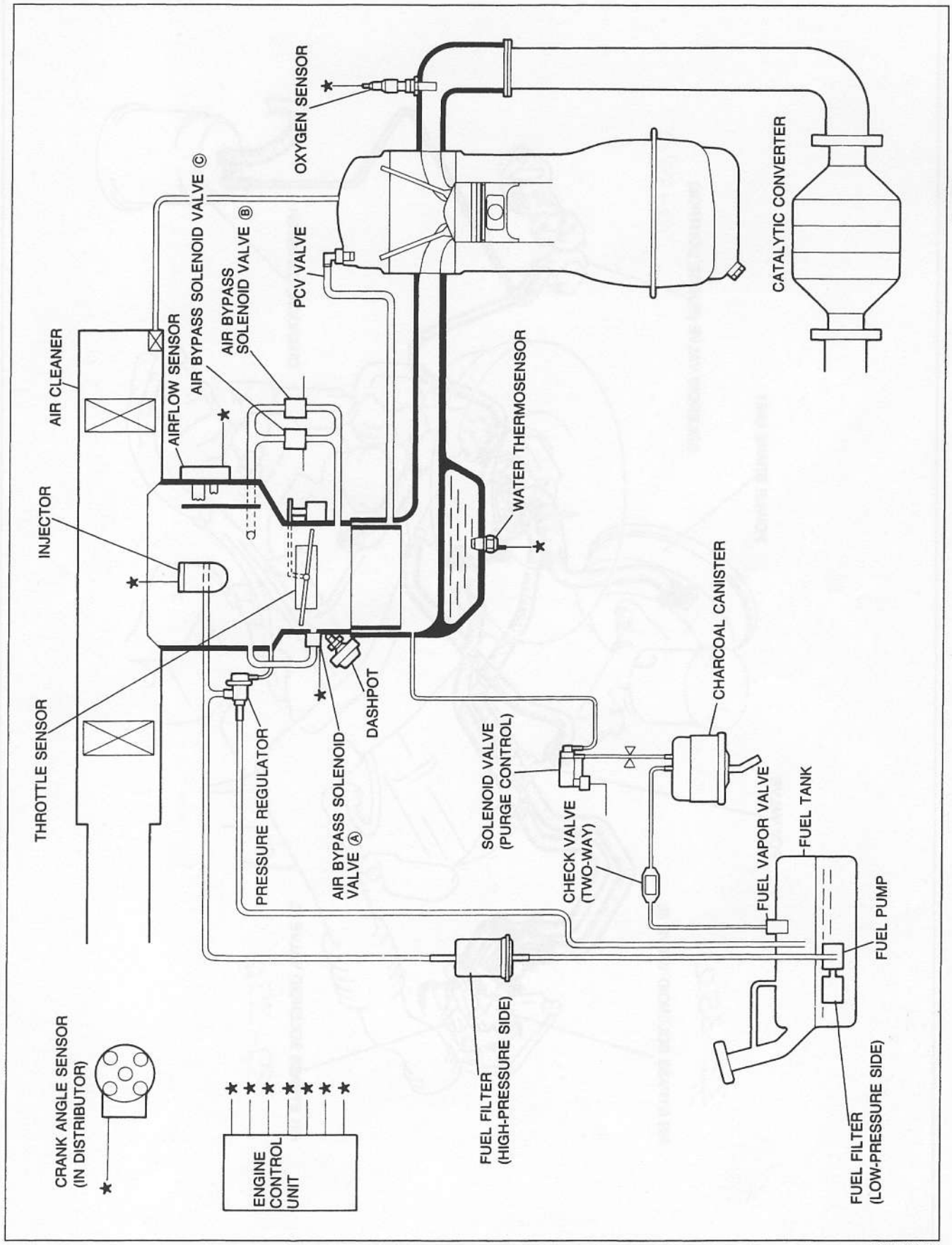


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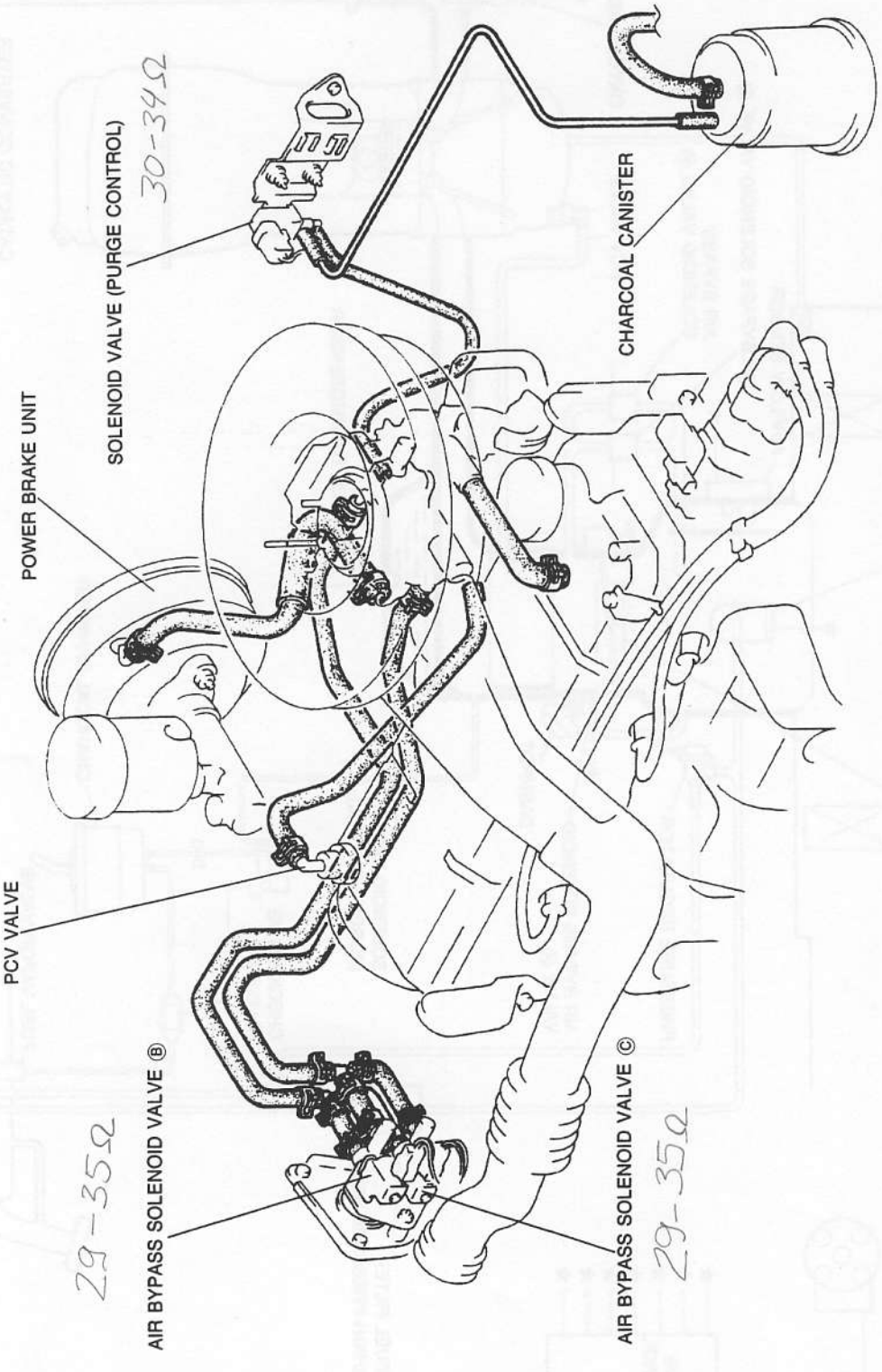
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OUTLINE

SYSTEM DIAGRAM

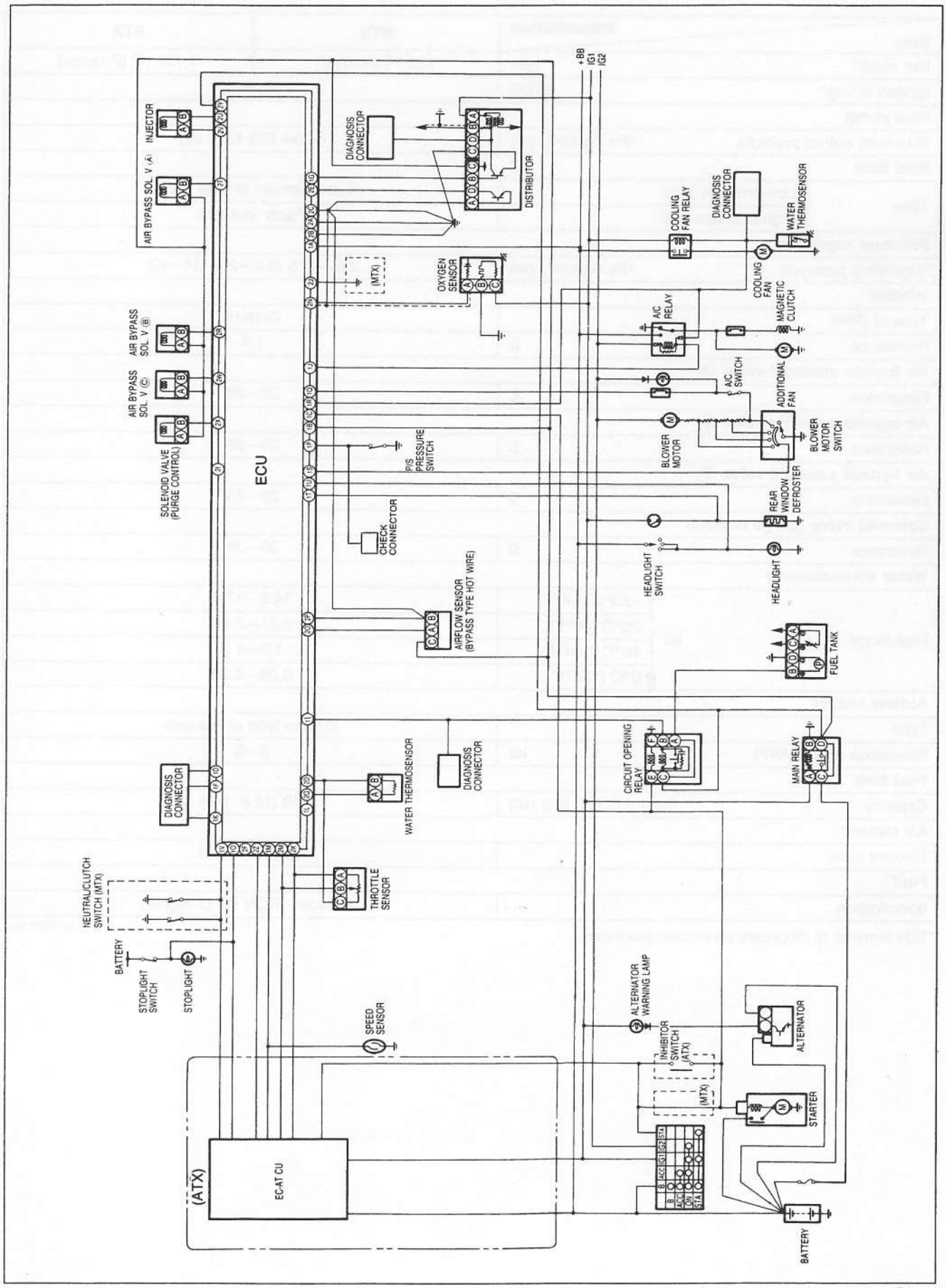


VACUUM HOSE ROUTING DIAGRAM



01A0FX-005

WIRING DIAGRAM



SPECIFICATIONS

Item \ Transmission			MTX	ATX
Idle speed		rpm	750 $^{+50}_{-0}$ (Neutral)	1,100 $^{+50}_{-0}$ (P range)
Ignition timing*		BTDC	*16 ± 1°	
Fuel pump				
Maximum output pressure		kPa (kg/cm², psi)	Below 638 (6.5, 92)	
Fuel filter				
Type	Low-pressure side		Nylon element (in fuel pump)	
	High-pressure side		Paper element	
Pressure regulator				
Regulating pressure		kPa (kg/cm², psi)	235—275 (2.4—2.8, 34—40)	
Injector				
Type of drive			Current	
Resistance		Ω	1.4	
Air bypass solenoid valve Ⓐ				
Resistance		Ω	22—28	
Air bypass solenoid valve Ⓑ				
Resistance		Ω	29—35	
Air bypass solenoid valve Ⓒ				
Resistance		Ω	29—35	
Solenoid valve (purge control)				
Resistance		Ω	30—34	
Water thermosensor				
Resistance		kΩ	−20°C (−4°F)	14.6—17.8
			20°C (68°F)	2.21—2.69
			40°C (104°F)	1.0—1.3
			80°C (176°F)	0.29—0.35
Airflow sensor				
Type			Bypass type of hot-wire	
Resistance (HWN-HWP)		kΩ	3—5	
Fuel tank				
Capacity		liters (US gal, Imp gal)	40 (10.6, 8.8)	
Air cleaner				
Element type			Oil permeated	
Fuel				
Specification			Unleaded (RON 90 or higher)	

01A0FX-007

*TEN terminal of diagnosis connector grounded.

COMPONENT DESCRIPTIONS

Component	Function	Remark
Air bypass solenoid valve Ⓐ INJECTION BODY	Supplies bypass air into intake manifold by opening bypass air passage at either following condition: a) Engine cranking b) Electric load c) P/S pressure switch ON d) A/C switch ON e) Range change (N→D) f) Deceleration control	• Electrical load a) Cooling fan b) Blower motor switch c) Headlight switch d) Rear window defroster switch
Air bypass solenoid valve Ⓑ	Supplies bypass air into intake manifold by opening bypass air passage at either following condition: a) Engine cranking b) P/S pressure switch ON c) Deceleration control	—
Air bypass solenoid valve Ⓒ	Supplies bypass air into intake manifold by opening bypas air passage with A/C switch ON	—
Air cleaner	Filters air entering injection body	Oil permeated
Airflow senser	Detects amount of intake air; sends signal to ECU	Uses Vref (5V) as power source
Baffle	Directs fuel/air mixture into intake manifold	
Catalytic converter	Reduce HC, CO and NOx by chemical reaction	Monolith type
Charcoal canister	Stores fuel tank fumes while engine stopped	
Check valve (two-way)	Controls pressure in fuel tank	Two-way type
Circuit opening relay	Voltage for fuel pump while engine running	—
Clutch switch (MTX)	Detects clutch condition; sends signal to ECU	Switch OFF when clutch pedal released
Crank angle sensor Ne-signal	Detects crank angle at 180° intervals; sends signal to ECU	
Diagnosis connector	Concentrated service connector Terminals: 1. EGI self-diagnostic terminal 2. EC-AT self-diagnostic terminal 3. Initial set terminal 4. Fuel pump check terminal 5. Cooling fan check terminal 6. Engine rpm output terminal	21-pin (located near left strut tower)
Dashpot	Prevents after burn when throttle valve closes suddenly	Atmospheric type
Engine control unit (ECU)	Controls operation of the following. a) Fuel injection control system b) Electronic spark advance (ESA) control system c) A/C cut-off system d) Deceleration control system e) Fuel pump control system f) Evaporative emission control system g) Fail-safe control system h) Secondary air injection system	
Fuel filter	Filters particles from fuel	
Fuel pump	Provides fuel to injector	Operates while engine running Installed in fuel tank
Fuel vapor valve	Supply only evaporative emission into charcoal canister to prevent charcoal canister from fuel leak.	

Component	Function	Remark
Ignition switch (START position)	Engine cranking signal sent to ECU	
Inhibitor switch (ATX)	Detects in-gear condition; sends signal to ECU	Switch ON in N or P ranges
Injection body	a) Injects fuel into intake manifold b) Adjusts intake air amount by throttle valve c) Idle-up by air bypass solenoid valve Ⓐ d) Detects amount of intakes air by airflow sensor	Consists of throttle valve, dashpot, throttle sensor, fast idle cam, airflow sensor, injector, pressure regulator, and air bypass solenoid valve Ⓐ
Injector	Injects fuel in relation to engine needs	Controlled by signals from ECU High-ohmic injector Installed on injection body
Main relay (FUEL INJ relay)	Supplies electric current to injector, ECU, etc.	
Neutral switch (MTX)	Detects in-gear condition; sends signal to ECU	Switch ON in neutral
Oxygen sensor	Detects oxygen concentration; sends signal to ECU	Zirconia ceramic and platinum coating
PCV valve	Controls blowby gas introduced into engine	
P/S pressure switch	Detects P/S operation; sends signal to ECU	P/S: ON when steering wheel turned
Pressure regulator	Adjusts fuel pressure supplied to injector	
Speed sensor	Detects speed; sends signal to ECU	Installed on instrument cluster
Stoplight switch	Detects braking operation (deceleration); sends signal to ECU	
Solenoid valve (purge control)	Controls evaporative fumes from canister to intake manifold	
Throttle sensor	Detects throttle valve opening angle; sends signal to ECU	Installed on injection body
Water thermosensor	Detects coolant temperature; sends signal to ECU	Installed on intake manifold

01A0FX-008

TROUBLESHOOTING GUIDE

RELATIONSHIP CHART

OUTPUT DEVICE / INPUT DEVICE	INJECTOR		CIRCUIT OPENING RELAY (FUEL PUMP CONTROL)	SOLENOID VALVE (PURGE CONTROL)	IGNITER (IGNITION TIMING CONTROL)	A/C RELAY (A/C CUT-OFF)	AIR BYPASS SOLENOID VALVE Ⓐ	AIR BYPASS SOLENOID VALVE Ⓑ	AIR BYPASS SOLENOID VALVE Ⓒ	SELF-DIAGNOSIS CHECKER (MALFUNCTION CODE)	SELF-DIAGNOSIS CHECKER (MONITOR LAMP)
	FUEL INJECTION AMOUNT	FUEL INJECTION TIMING									
EC-AT CONTROL UNIT					○						
DIAGNOSIS CONNECTOR (TEN TERMINAL)					○					○	○
IGNITION SWITCH (START POSITION)	○		○		○	○	○	○			
E/L SIGNAL*	○				○		○				○
P/S PRESSURE SWITCH	○				○		○	○			○
A/C SWITCH	○					○			○		
INHIBITOR SWITCH (ATX)	○			○			○	○			○
NEUTRAL AND CLUTCH SWITCHES (MTX)	○			○			○	○			○
STOPLIGHT SWITCH								○			○
SPEED SENSOR	○										
THROTTLE SENSOR	○			○	○	○	○	○	○	○	
AIRFLOW SENSOR	○			○	○		○	○		○	
OXYGEN SENSOR	○			○						○	
WATER THERMOSENSOR	○			○	○		○	○		○	○
CRANK ANGLE SENSOR (Ne-SIGNAL)	○	○	○	○	○	○	○	○	○	○	

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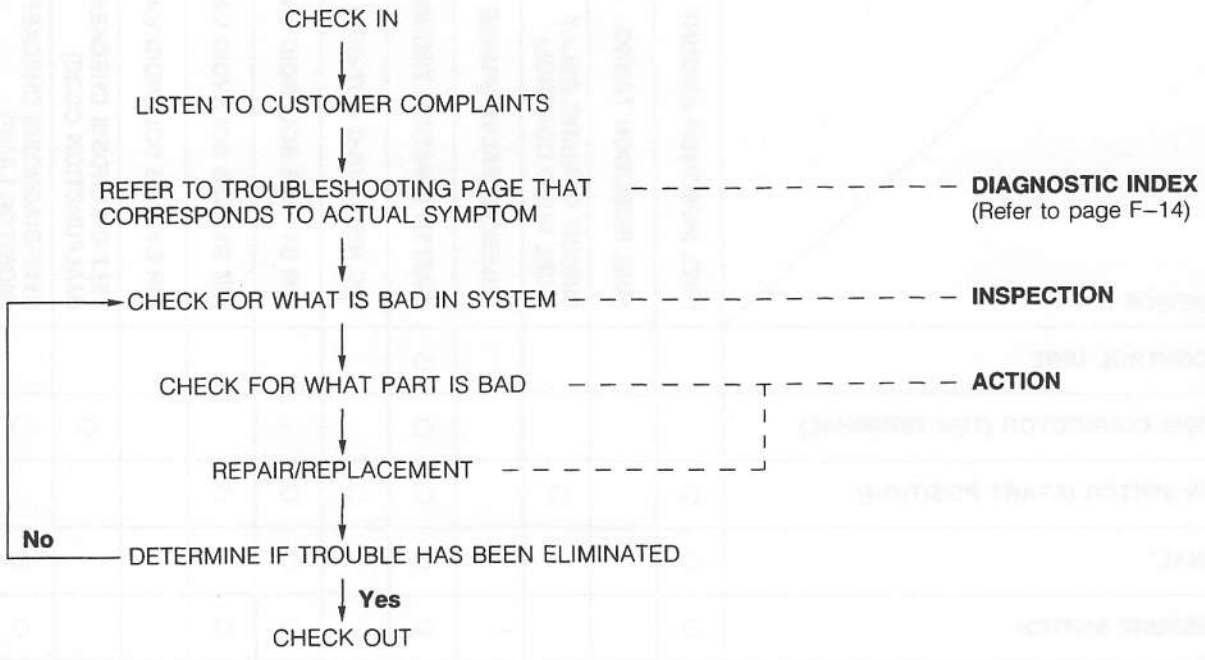
* E/L signal is headlights, rear window defroster, blower switch and cooling fan.

USING THIS SECTION

Introduction

Most of the fuel and emission control system is electrically 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

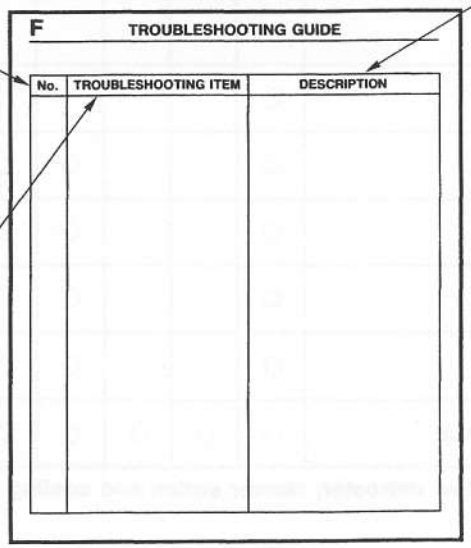


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Diagnostic index

DESCRIPTION:
Describes each troubleshooting item.

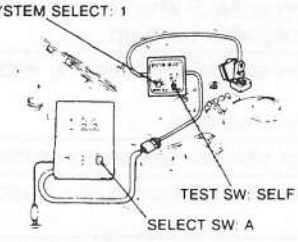
No.:
Each troubleshooting item is assigned a number.



TROUBLESHOOTING ITEM:
There are 26 troubleshooting items. Choose the item that most closely corresponds to the actual symptom.

01E0F2-014

Troubleshooting chart

6	CRANKS NORMALLY BUT HARD TO START — WHEN ENGINE COLD		
DESCRIPTION	• Engine cranks at normal speed but requires excessive cranking time before starting • Battery in normal condition • Restarts OK after warm-up • Engine runs normally at idle [If idle condition is not OK, refer to "Rough idle" (Nos. 8—12)]		
[TROUBLESHOOTING HINTS] ① Air/Fuel mixture too rich • Airflow meter sticking • Air cleaner element clogged ② Air/Fuel mixture too lean • Fuel injection control malfunction (Correction for coolant temperature) ③ Poor atomization			
STEP	INSPECTION		ACTION
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON ☞ page F2–70 SYSTEM SELECT: 1  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ page F2–71
			"88" flashes Check ECU terminal 1F voltage ☞ page F2–120 **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ page F2–119 ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Check if ECU terminal voltages are OK (Especially 1C, 2D and 2Q) ☞ page F2–120	Yes	Go to next step
		No	Check for cause ☞ page F2–121
3	Check if engine starts easily when throttle valve quarter open	Yes	Check if idle-up solenoid valve is OK ☞ page F2–88 ⇨ If OK, check air valve ☞ page F2–88 ⇨ If not O...

05U0FX-015

DESCRIPTION:
Further describes the symptom. Confirm that the chart addresses the actual symptom before beginning troubleshooting.

TROUBLESHOOTING HINTS:
This describes the possible point of malfunction.

STEP:
This shows the order of troubleshooting. Proceed with troubleshooting as indicated.

INSPECTION:
This describes an inspection to quickly determine the malfunction of parts. If a detailed procedure is necessary to perform the INSPECTION, refer to the page shown by the "☞" mark.

ACTION:
This recommends the appropriate action to take as a result (Yes/No) of the INSPECTION. How to perform the action is described on the reference page shown by the "☞" mark.

05U0FX-016

DIAGNOSTIC INDEX

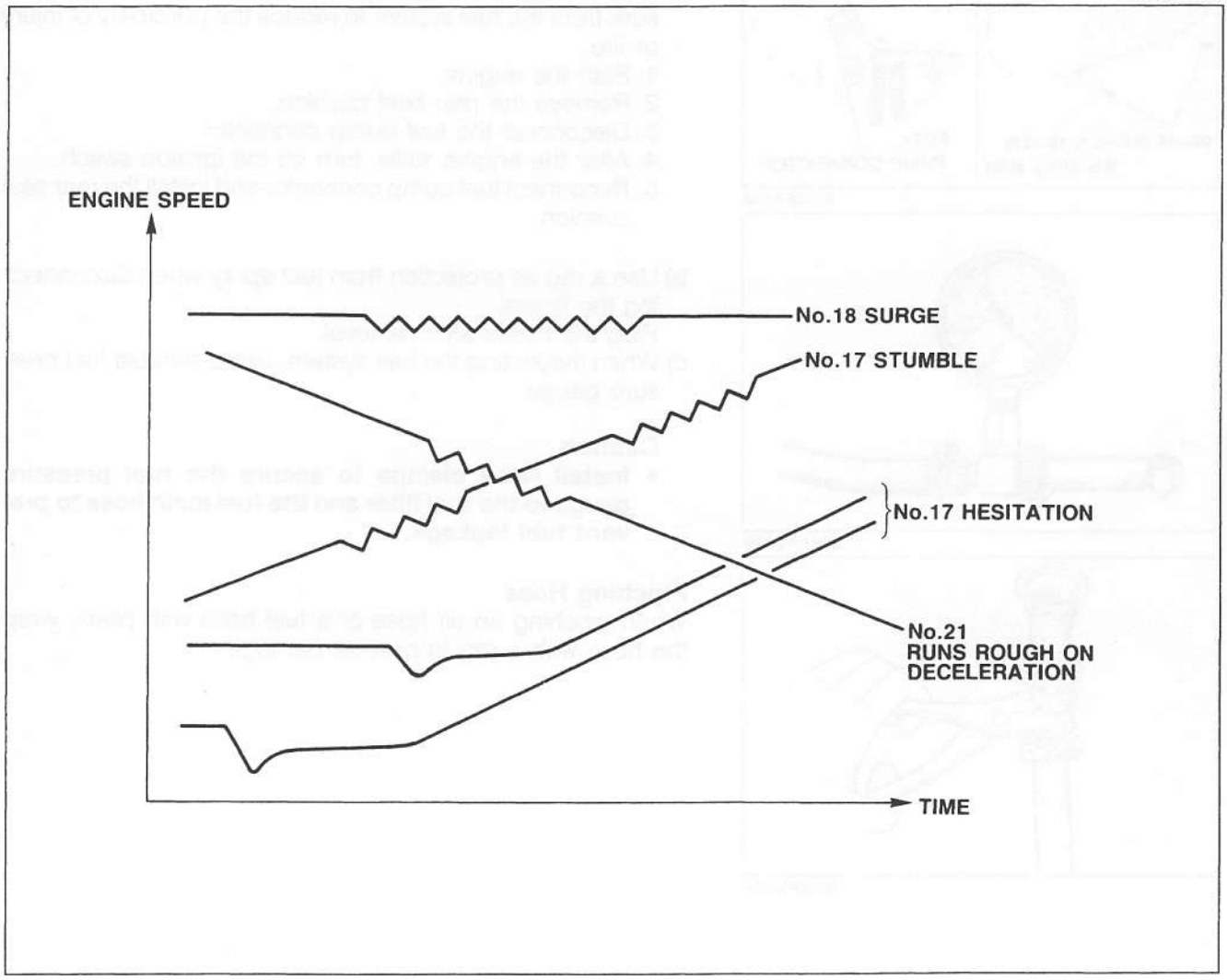
No.	TROUBLESHOOTING ITEM		DESCRIPTION	PAGE
1	Will not crank or cranks slowly		Refer to Engine Electrical System	G–4
2	Cranks normally but will not start	No combustion	Engine cranks at normal speed but shows no sign of firing	F–17
3		Partial combustion—When engine cold	Engine cranks at normal speed but shows only partial combustion and will not continue to run	F–19
4		Partial combustion—After warm-up	Engine starts normally when cold, but will not start after running and hot soaked	F–21
5	Cranks normally but hard to start	Always	Engine cranks at normal speed but requires excessive cranking time before starting	F–23
6		When engine cold	Same condition as No.5 when engine cold Restarts normally after warm-up	F–25
7		After warm-up	Same condition as No.5 after running and hot soaked Starts normally when cold	F–27
8	Rough idle (Low idle speed)/ Engine stalls at idle	Always	Engine stalls or vibrates excessively at idle	F–29
9		Before warm-up	Engine stalls or vibrates excessively at idle during warm-up	F–31
10		After warm-up	Engine runs normally at idle during warm-up but vibrates excessively or stalls after warm-up	F–33
11		When A/C, P/S, or E/L ON	Engine stalls or vibrates excessively at idle when A/C, P/S, or E/L ON	F–35
12	Rough idle/Engine stalls just after starting		Engine stalls or vibrates excessively only just after starting (acceleration from idle)	F–36
13	High idle speed after warm-up		Idle speed excessive after warm-up	F–38
14	Idle moves up and down/Idle hunting		Engine speeds up and down periodically at idle	F–39
15	Engine stalls on deceleration		Engine unexpectedly stops running while decelerating or after deceleration	F–41
16	Engine stalls suddenly (Intermittent)		Engine intermittently stops running	F–42
17	Hesitates/Stumbles on acceleration		Flat spot occurs just after accelerator depressed or mild jerking occurs during acceleration	F–43
18	Surges while cruising		Unexpected change in engine speed which is usually repetitive	F–45
19	Lack of power		Performance poor under load when throttle valve wide open Maximum speed reduced	F–47
20	Poor acceleration		Performance poor while accelerating	F–50
21	Runs rough on deceleration/Backfire		Engine runs rough while decelerating and abnormal combustion occurs in exhaust system	F–53
22	Knocking		Abnormal combustion accompanied by audible "pinging" noise	F–55
23	Fuel odor		Gasoline odor in cabin	F–57
24	Exhaust sulfur smell		Exhaust gas smells like rotten eggs	F–58
25	High oil consumption		Oil consumption excessive	F–58
26	Poor fuel economy		Fuel economy unsatisfactory	F–59

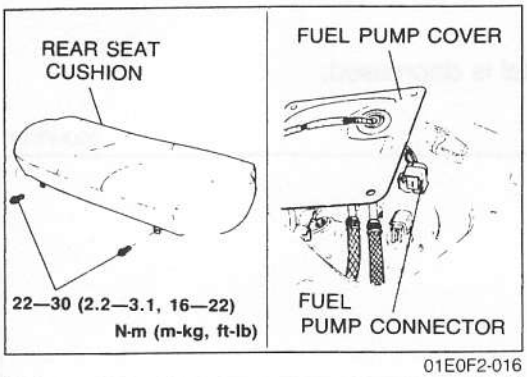
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Description of Drivability

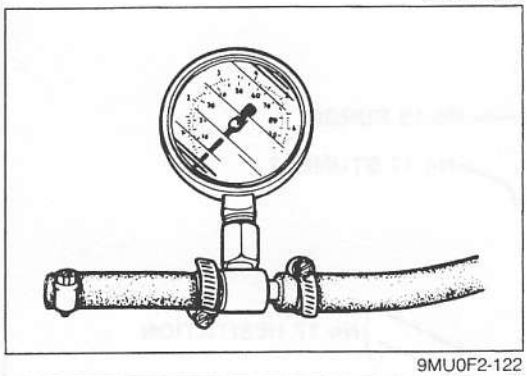
STUMBLE : Mild jerking during acceleration.
HESITATION: Flat spot occurring just after the accelerator pedal is depressed.
SURGE : Continuous soft jerking during cruise.

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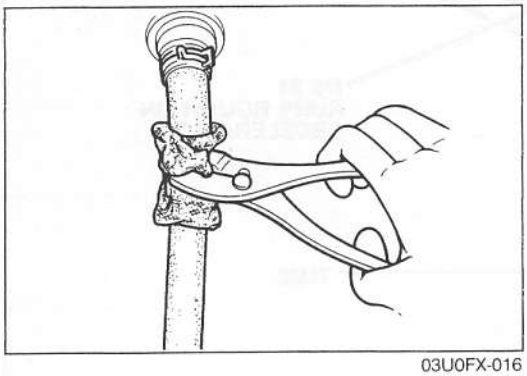




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03U0FX-016

PRECAUTION

Fuel Pressure Release and Servicing Fuel System

Fuel in the fuel system remains under high pressure even when the engine is not running.

a) Before disconnecting any fuel line, release the fuel pressure from the fuel system to reduce the possibility of injury or fire.
   1. Start the engine.
   2. Remove the rear seat cushion.
   3. Disconnect the fuel pump connector.
   4. After the engine stalls, turn off the ignition switch.
   5. Reconnect fuel pump connector and install the rear seat cushion.

b) Use a rag as protection from fuel spray when disconnecting the hoses.
   Plug the hoses after removal.

c) When inspecting the fuel system, use a suitable fuel pressure gauge.

Caution

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

Pinching Hose

When pinching an air hose or a fuel hose with pliers, wrap the hose with a rag to prevent damage.

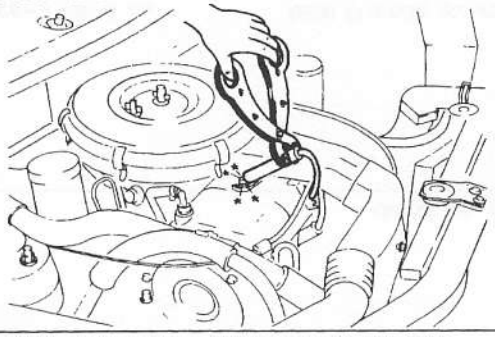
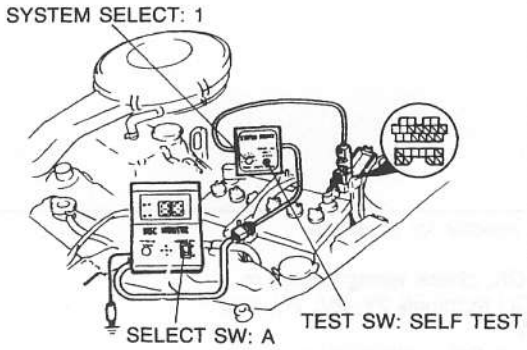
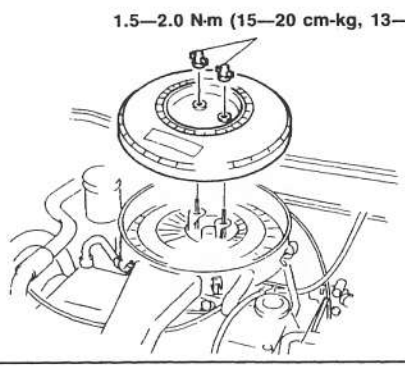
SYMPTOM TROUBLESHOOTING

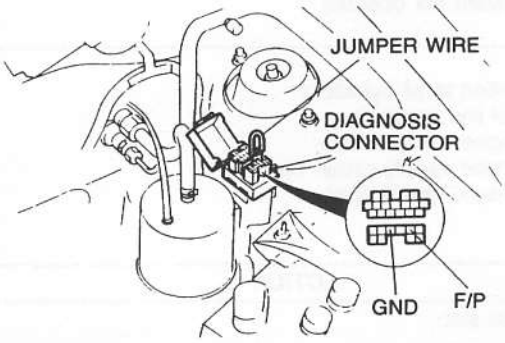
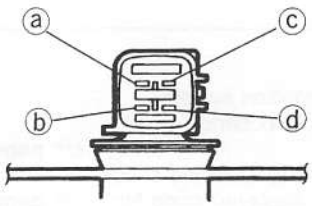
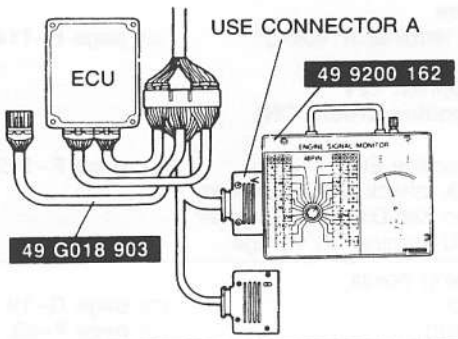
2	CRANKS NORMALLY BUT WILL NOT START (NO COMBUSTION)
DESCRIPTION	• Engine cranks at normal speed but shows no sign of "firing" • Battery in normal condition • Throttle valve not held fully open while cranking (Dechoke system not operate) • Fuel in tank

[TROUBLESHOOTING HINTS]
Because of no combustion, possibly no fuel is injected to engine or no ignition at all cylinders
① No spark
- Ignition control malfunction
- Ignition system component malfunction

② No fuel injection
- Fuel pump inoperative
- Injector inoperative

③ Low fuel line pressure
④ Low engine compression
⑤ ECU power supply circuit open
⑥ ECU ground circuit open

STEP	INSPECTION		ACTION
1	Is strong blue spark visible at disconnected high-tension lead? 	Yes	Go to next step
		No	Perform Step 2 ⇨ If OK, check ignition system (Refer to troubleshooting "Misfire") ☞ **page G–17** ⇨ If not OK, refer to specified check sequence for displayed code No. ☞ **page F–70**
2	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67** 	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence for displayed code No.) ☞ **page F–70** **"88" flashes** Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker and ECU terminal 1B voltage
3	Remove air cleaner cover; is fuel injected from injector while cranking engine? 	Yes	Check following points • Spark plugs ☞ **page G–19** • Ignition timing ☞ **page F–63** • Engine compression ☞ **page B–10** • Water thermosensor (ECU 2Q terminal voltage) ☞ **page F–118** • Fuel pressure (If injected fuel is small amount) ☞ **page F–89** • Injector (If injected fuel is small amount) ☞ **page F–97**
		No	Check for injector operating sound while cranking engine ⇨ If OK, go to next step ⇨ If not OK, go to Step 6

STEP	INSPECTION		ACTION
4	Connect diagnosis connector terminals F/P and GND with jumper wire; is fuel pump operating sound evident with ignition switch ON? ☞ page F–92 	Yes	Check if fuel is injected while cranking engine in this condition ⇨ If injected, check circuit opening relay ⇨ If not injected, check injector for clogging and if fuel is in tank
		No	Go to next step
5	Is there continuity between fuel pump connector ⓐ and ⓑ? 	Yes	Check circuit opening relay ☞ page F–93
		No	Replace fuel pump
6	Is there approx. 12V momentarily at ECU 2V terminal while cranking engine? (Engine signal monitor green and red lamps flash) 	Yes	Try to replace injector (Injector stuck)
		No	Check injector for continuity ⇨ If OK, check wiring related to ECU terminals 2Y, 2V, 2U, and 2A ⇨ If not OK, replace injector

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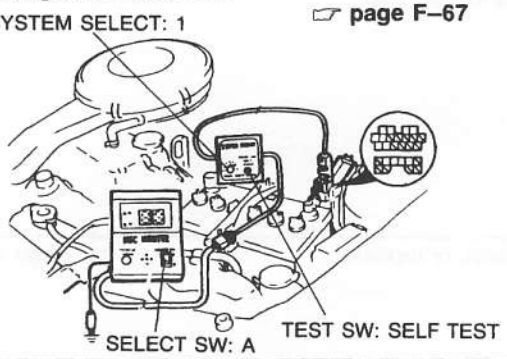
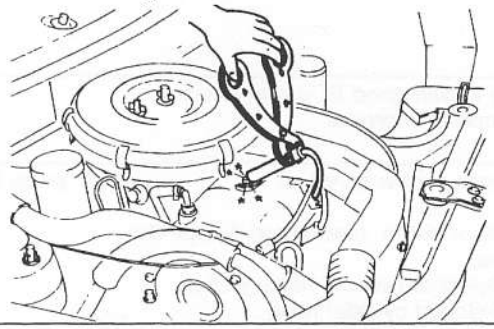
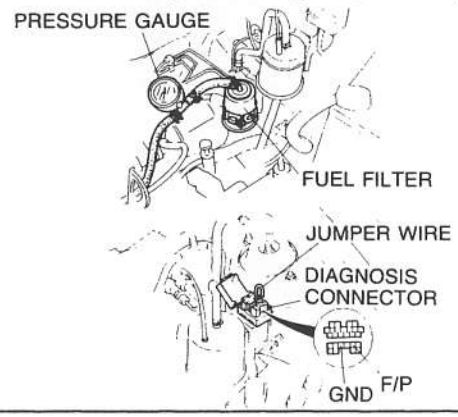
3	CRANKS NORMALLY BUT WILL NOT START (PARTIAL COMBUSTION) — WHEN ENGINE COLD
DESCRIPTION	• Engine cranks at normal speed but shows only partial combustion and will not continue to run • Battery in normal condition • Fuel in tank

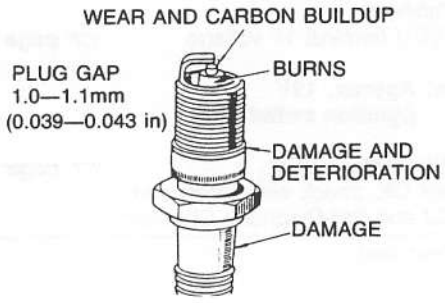
[TROUBLESHOOTING HINTS]

① Air/Fuel mixture too rich
- Water thermosensor malfunction

② Air/Fuel mixture too lean
- Fuel injection control malfunction (Correction for coolant temperature)
- Low fuel line pressure
- Air leakage of intake air system

③ Low engine compression

STEP	INSPECTION		ACTION
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67**  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70**
			"88" flashes Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Is strong blue spark visible at each disconnected high-tension lead? 	Yes	Go to next step
		No	Check distributor cap and rotor ☞ **page G–23**
3	Connect diagnosis connector terminals F/P and GND with jumper wire; is there correct fuel line pressure with ignition switch ON? ☞ **page F–89** **Fuel line pressure:** **235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)**  	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure ☞ **page F–91**
			High pressure Is fuel return hose clogged or restricted? ⇨ If OK, replace pressure regulator ☞ **page F–94** ⇨ If not OK, repair or replace

STEP	INSPECTION		ACTION
4	Are ECU terminal voltages OK? (Especially 1C, 1K, 2O and 2Q) ☞ page F–112	Yes	Go to next step
		No	Check for cause ☞ page F–114 F–116
5	Is there air leakage of intake air system components?	Yes	Repair or replace
		No	Go to next step
6	Does engine starts when water thermosensor is disconnected?	Yes	Check water thermosensor ☞ page F–121
		No	Go to next step
7	Are spark plugs OK? ☞ page G–19 	Yes	Go to next step
		No	Clean, or replace ☞ page G–19
8	Is engine compression correct? ☞ page B–10 **Engine compression: More than 1,030 kPa (10.5 kg/cm^2, 149 psi)-300 rpm**	Yes	Try known good ECU and check if condition improves
		No	Check engine condition ☞ page B–10 • Worn piston, piston rings or cylinder wall • Defective cylinder head gasket • Distorted cylinder head • Improper valve seating • Valve sticking in guide

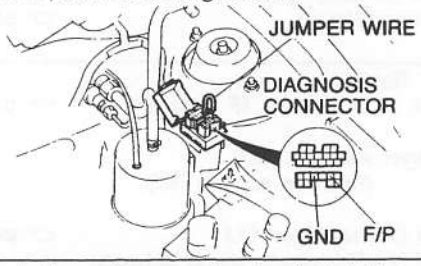
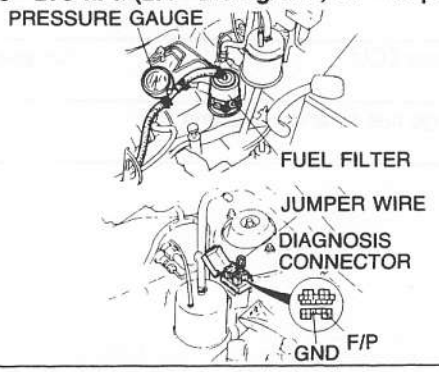
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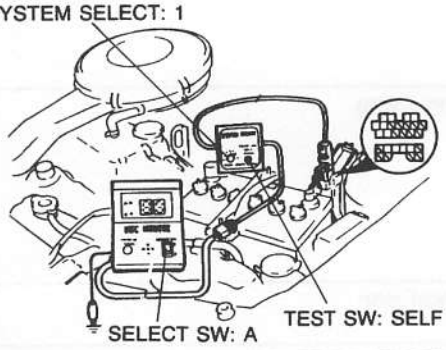
4	CRANKS NORMALLY BUT WILL NOT START (PARTIAL COMBUSTION) — AFTER WARM-UP
DESCRIPTION	• Engine cranks at normal speed and shows partial combustion but will not continue to run after running and hot soaked • Battery in normal condition • Engine starts normally when cold

[TROUBLESHOOTING HINTS]

① Air/Fuel mixture too rich
- Insufficient fuel injection control (Correction for coolant temperature)
- Injector fuel leakage

② Vapor lock
- Fuel pressure not held in fuel line after engine stopped
- High RVP (winter) fuel used in warm weather

STEP	INSPECTION		ACTION
1	Warm-up engine to normal operating temperature and stop it Connect diagnosis connector terminals F/P and GND with jumper wire for 3 minutes with ignition switch ON, then does engine start? 	Yes	Change fuel to another brand
		No	Go to next step
2	Connect diagnosis connector terminals F/P and GND with jumper wire; is fuel line pressure correct with ignition switch ON? ☞ **page F–89** **Fuel line pressure:** **235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)** 	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check fuel line and filter for clogging If not clogged, check fuel pump maximum pressure ☞ **page F–91**
			High pressure Is fuel return hose clogged or restricted? ⇨ If OK, replace pressure regulator ☞ **page F–94** ⇨ If not OK, repair or replace
3	In same condition as Step 2, is fuel line pressure held after ignition switch is turned OFF? ☞ **page F–88** **Fuel line pressure: More than 147 kPa (1.5 kg/cm², 21 psi) for 5 min.**	Yes	Go to Step 5
		No	Go to next step
4	Plug outlet of pressure regulator; is fuel line pressure held after ignition switch is turned OFF? ☞ **page F–88** **Fuel line pressure: More than 147 kPa (1.5 kg/cm², 21 psi) for 5 min.**	Yes	Replace pressure regulator ☞ **page F–94**
		No	Check fuel pump hold pressure ☞ **page F–88** ⇨ If OK, check injector for fuel leakage ☞ **page F–96** ⇨ If not OK, replace fuel pump ☞ **page F–92**

STEP	INSPECTION		ACTION
5	Disconnect water thermosensor connector; does engine start? 	Yes	Check water thermosensor ☞ **page F–121** ⇨ If OK, check connections of water thermosensor and ECU 2Q terminal ⇨ If not OK, replace water thermosensor ☞ **page F–121**
		No	Go to next step
6	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67** SYSTEM SELECT: 1  SELECT SW: A TEST SW: SELF TEST	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70**
			"88" flashes Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
7	Are ECU terminal voltages OK? (Especially 1C, 2O and 2Q) ☞ **page F–112**	Yes	Go to next step
		No	Check for cause ☞ **page F–115, F–117, F–119**
8	Try known good ECU and check if condition improve?	Yes	Replace ECU ☞ **page F–112**
		No	Change fuel to another brand

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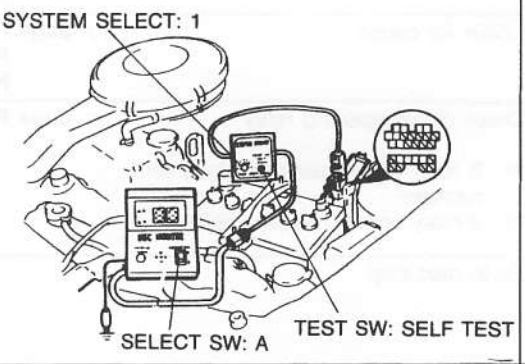
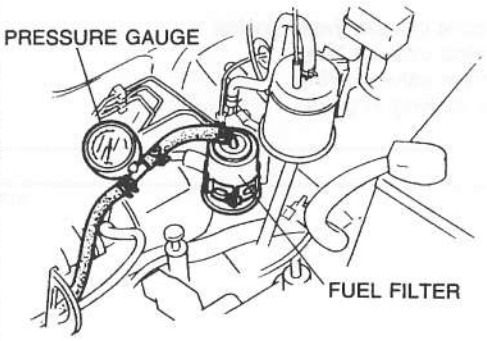
5	CRANKS NORMALLY BUT HARD TO START — ALWAYS
DESCRIPTION	• Engine cranks at normal speed but requires excessive cranking time before starting • Battery in normal condition • Engine runs normally at idle [If idle condition not OK, refer to "Rough idle" (Nos. 8—12)]

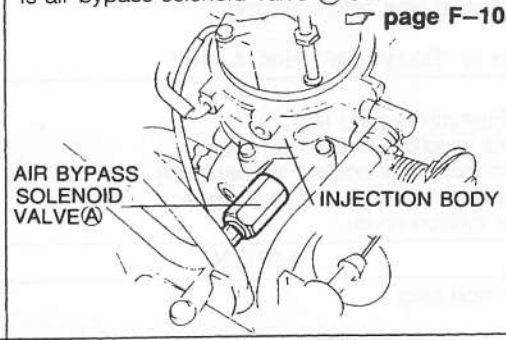
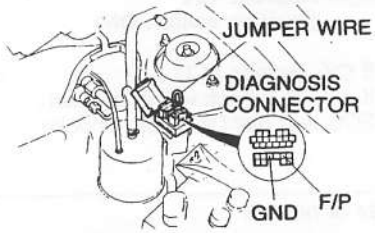
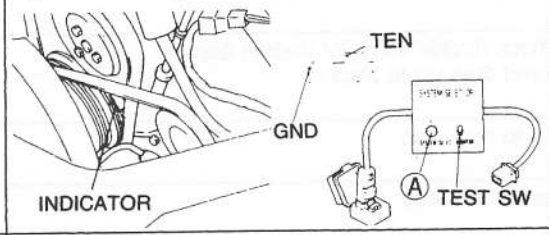
[TROUBLESHOOTING HINTS]

① Air/Fuel mixture too lean
- Fuel injection control malfunction (Correction for coolant temperature)
- Low fuel line pressure
- Air leakage

② Air/Fuel mixture too rich
- Fuel injection control malfunction (Correction for coolant temperature)
- Carbon deposit in hot-wire passage

③ Poor ignition spark

STEP	INSPECTION		ACTION
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ page F–67  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ page F–70
			"88" flashes Check ECU terminal 1F voltage ☞ page F–114 **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ page F–112 ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Is there air leakage of intake air system components?	Yes	Repair or replace
		No	Go to next step
3	Is air cleaner element clean? ☞ page F–62	Yes	Go to next step
		No	Replace air cleaner element
4	Does engine start easily when throttle valve quarter open?	Yes	Check throttle valve for carbon deposit and then go to Step 6
		No	Go to next step
5	Is fuel line pressure correct at idle? ☞ page F–94 **Fuel line pressure: 235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)**  	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure ☞ page F–91

STEP	INSPECTION		ACTION
6	Is air bypass solenoid valve Ⓐ OK? ☞ **page F–108**  	Yes	Go to next step
		No	Replace solenoid valve
7	Are ECU terminal voltages OK? (Especially 1C, 1K and 2Q) ☞ **page F–109**	Yes	Go to next step
		No	Check for cause ☞ **page F–115, F–117, F–119**
8	Connect diagnosis connector terminals F/P and GND with jumper wire; does engine start normally?  	Yes	Check circuit opening relay ☞ **page F–93** ⇨ If relay OK, repair or replace wire harness ⇨ If relay not OK, replace relay
		No	Go to next step
9	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST"; is there correct ignition timing at idle after warm-up? ☞ **page F–63** **Ignition timing: BTDC 16 ± 1°**  	Yes	Go to next step
		No	Adjust ignition timing ☞ **page F–63**
10	Is engine compression correct? ☞ **page B–10** **Engine compression (Minimum): 1,030 kPa (10.5 kg/cm², 149 psi)-300 rpm**	Yes	Go to next step
		No	Check engine condition ☞ **page B–10** • Worn piston, piston rings or cylinder wall • Defective cylinder head gasket • Distorted cylinder head • Improper valve seating • Valve sticking in guide
11	Try known good ECU; does condition improve?		

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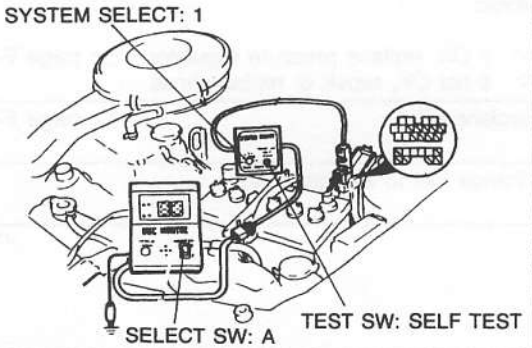
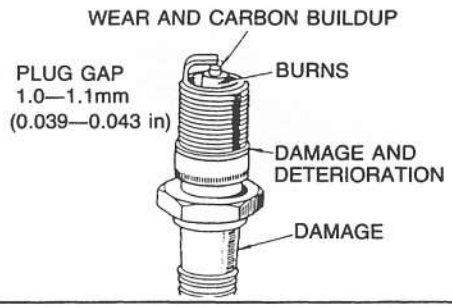
6	CRANKS NORMALLY BUT HARD TO START — WHEN ENGINE COLD
DESCRIPTION	• Engine cranks at normal speed but requires excessive cranking time before starting • Battery in normal condition • Restarts OK after warm-up • Engine runs normally at idle [If idle condition is not OK, refer to "Rough idle" (Nos. 8—12)]

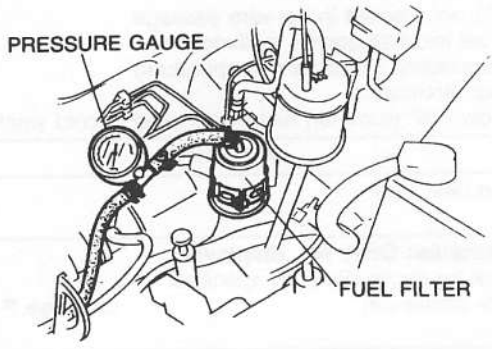
[TROUBLESHOOTING HINTS]

① Air/Fuel mixture too rich
- Fuel injection control malfunction (Correction for coolant temperature)
- Thermowax malfunction

② Air/Fuel mixture too lean
- Carbon deposit in hot-wire passage
- Fuel injection control malfunction (Correction for coolant temperature)

③ Poor atomization
- Low RVP (summer) fuel being used in cold weather

STEP	INSPECTION		ACTION
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67** 	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70**
			"88" flashes Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Are ECU terminal voltages OK? (Especially 1C, 2D, and 2Q) ☞ **page F–112**	Yes	Go to next step
		No	Check for cause ☞ **page F–115, F–117, F–119**
3	Does engine start easily when throttle valve quarter open?	Yes	Check thermowax ☞ **page F–85** ⇨ If OK, go to Step 5 ⇨ If not OK, replace injection body
		No	Go to next step
4	Is there air leakage of intake air system components?	Yes	Repair or replace
		No	Go to next step
5	Is air cleaner element clean? ☞ **page F–62**	Yes	Go to next step
		No	Replace air cleaner element
6	Are spark plugs OK? ☞ **page G–19** 	Yes	Go to next step
		No	Clean or replace

STEP	INSPECTION		ACTION
7	Is fuel line pressure correct at idle? ☞ page F–94 **Fuel line pressure:** **235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)**  	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check fuel line for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure ☞ page F–91
			High pressure Is fuel return hose clogged or restricted ⇨ If OK, replace pressure regulator ☞ page F–94 ⇨ If not OK, repair or replace hose
8	Try known good ECU; does condition improve?	Yes	Replace ECU ☞ page F–112
		No	Change fuel to another brand

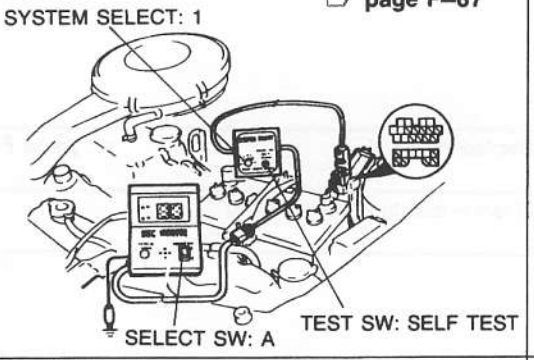
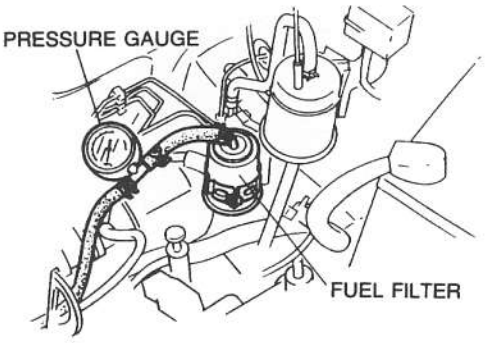
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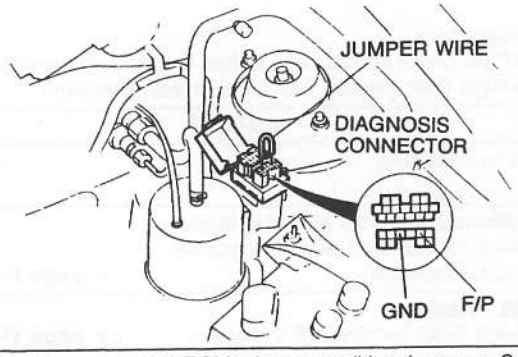
7	CRANKS NORMALLY BUT HARD TO START — AFTER WARM-UP
DESCRIPTION	• Engine cranks at normal speed but requires excessive cranking time before starting after running and hot soaked • Battery in normal condition • Engine starts normally when cold • Engine runs normally at idle [If idle condition not OK, refer to "Rough idle" (Nos. 8—12)]

[TROUBLESHOOTING HINTS]

① Air/Fuel mixture too rich
- Fuel injection control malfunction
- Injector fuel leakage

② Vapor lock
- Fuel pressure not held in fuel line after engine stopped
- High RVP (winter) fuel used in warm weather

STEP	INSPECTION		ACTION
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ page F–67  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ page F–70
			"88" flashes Check ECU terminal 1F voltage ☞ page F–114 **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ page F–112 ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Are ECU terminal voltages OK? (Especially 1C, 2Q, and 2T) ☞ page F–112	Yes	Go to next step
		No	Check for cause ☞ page F–115, F–117, F–119
3	Run engine at idle; is fuel line pressure is held after ignition switch turned OFF? ☞ page F–88 **Fuel line pressure: More than 147 kPa (1.5 kg/cm², 21 psi) for 5 min.**  	Yes	Go to next step
		No	Plug outlet of pressure regulator and check if fuel line pressure is held after ignition switch turned OFF ⇨ If OK, replace pressure regulator ☞ page F–94 ⇨ If not OK, check fuel pump hold pressure ☞ page F–88 If fuel pump is OK, check injector for fuel leakage ☞ page F–96

STEP	INSPECTION		ACTION
4	Warm-up engine to normal operating temperature and stop it Connect diagnosis connector terminals F/P and GND with jumper wire for 3 minutes with ignition switch ON; does if engine starts easily?  	Yes	Change fuel to another brand
		No	Go to next step
5	Try known good ECU; does condition improves?	Yes	Replace ECU ☞ page F–112
		No	Change fuel to another brand

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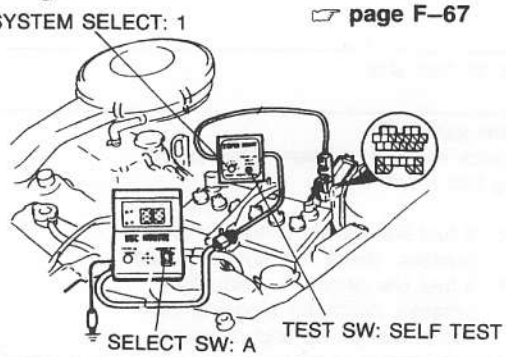
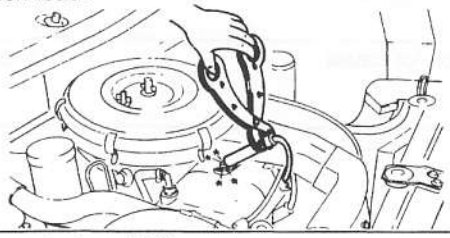
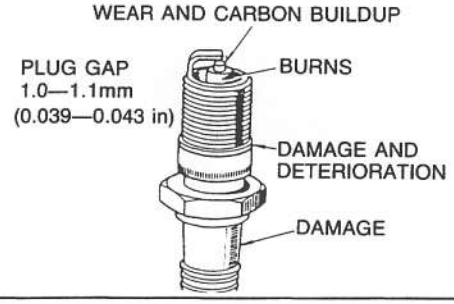
8	ROUGH IDLE/ENGINE STALLS AT IDLE — ALWAYS
DESCRIPTION	• Engine starts normally but stalls or vibrates excessively at idle in every condition

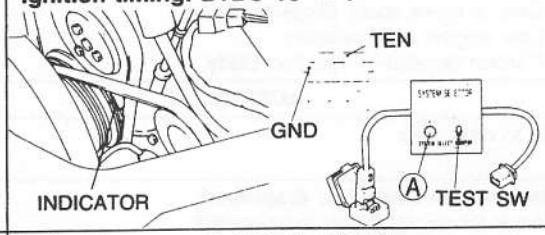
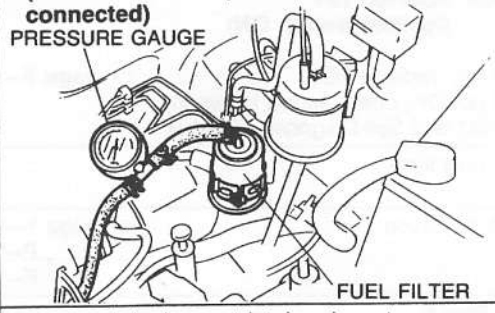
[TROUBLESHOOTING HINTS]

① Air/Fuel mixture too lean
- Air leakage
- Fuel injection control malfunction
- Low fuel line pressure

② Low intake air amount
③ Incorrect idle speed
- Idle speed misadjustment

④ One or more spark plugs not firing
⑤ Low engine compression
⑥ Carbon deposit in injection body

STEP	INSPECTION		ACTION
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67**  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70**
			"88" flashes Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Are ECU terminal voltages OK? (Especially 1K, 2M, 2O and 2Q) ☞ **page F–112**	Yes	Go to next step
		No	Check for cause ☞ **page F–115, F–117, F–119**
3	Disconnect each high-tension lead at idle; does engine speed decrease equally at each cylinder?	Yes	Go to Step 5
		No	Go to next step
4	Is strong blue spark visible at disconnected high-tension lead? 	Yes	Go to next step
		No	Check high-tension lead ☞ **page G–23** ⇨ If OK, check distributor cap and rotor ☞ **page G–23** ⇨ If not OK, replace high-tension lead
5	Are spark plugs OK? ☞ **page G–19**  	Yes	Check for correct engine compression ☞ **page B–10** ⇨ If OK, replace injector ☞ **page F–96** ⇨ If not OK, check for cause ☞ **page B–10**
		No	Clean or replace ☞ **page G–19**

STEP	INSPECTION		ACTION
6	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST"; is correct ignition timing correct at idle after warm-up? ☞ **page F–62** **Ignition timing: BTDC 16 ± 1°**  	Yes	Go to next step
		No	Adjust ignition timing ☞ **page F–62**
7	Is fuel line pressure correct at idle? ☞ **page F–94** **Fuel line pressure:** **235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)** **(Vacuum hose to pressure regulator disconnected)**  	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure ☞ **page F–91**
8	Is there air leakage at intake air system components?	Yes	Repair or replace
		No	Go to next step
9	Is engine compression correct? ☞ **page B–10** **Engine compression (Minimum):** **1,030 kPa (10.5 kg/cm², 149 psi)-300 rpm**	Yes	Try known good ECU and does condition improve?
		No	Check for cause ☞ **page B–10**

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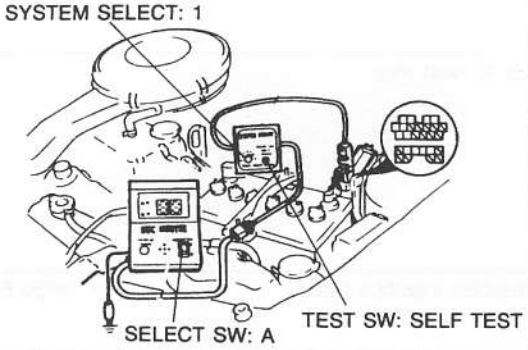
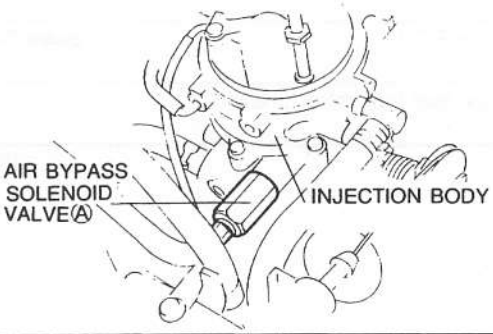
9	ROUGH IDLE/ENGINE STALLS AT IDLE — BEFORE WARM-UP
DESCRIPTION	• Engine speed low or engine stalls or vibrates excessively at idle during warm-up

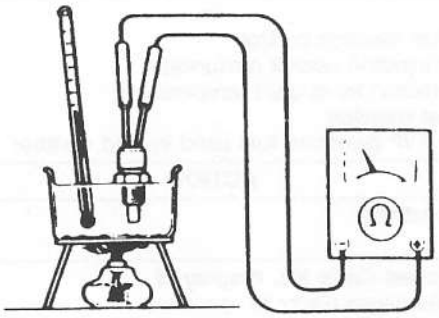
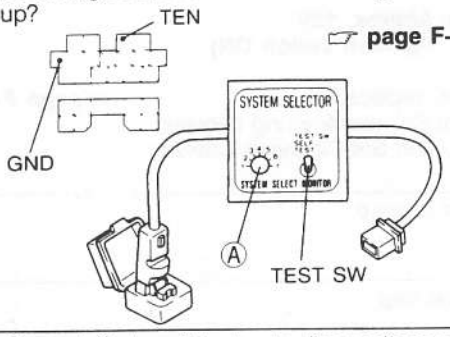
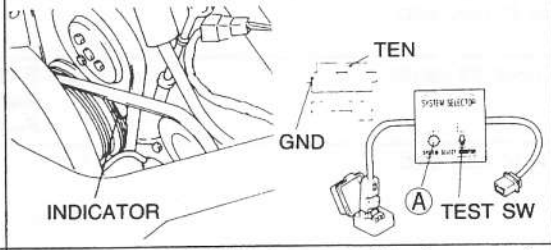
[TROUBLESHOOTING HINTS]

① Low intake air amount
- Carbon deposit in injection body
- Air cleaner element clogged
- Thermowax unit stuck

② Low fuel injection control
- Fuel injection control malfunction (Correction for coolant temperature)

③ Poor atomization
- Low RVP (summer) fuel used in cold weather

STEP	INSPECTION		ACTION
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67** 	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70** **"88" flashes** Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Is there air leakage of intake air system components?	Yes	Repair or replace
		No	Go to next step
3	Is air cleaner element clean? ☞ **page F–62**	Yes	Go to next step
		No	Replace air cleaner element
4	Are ECU terminal voltages OK? (Especially 1K, 2M, 2O, 2T and 2Q) ☞ **page F–112**	Yes	Go to next step
		No	Check for cause ☞ **page F–115, F–117, F–119**
5	Is air bypass solenoid valve Ⓐ OK? ☞ **page F–109** 	Yes	Go to next step
		No	Replace solenoid valve ☞ **page F–109**

STEP	INSPECTION		ACTION
6	Is water thermosensor resistance correct? ☞ **page F–121** 	Yes	Go to next step
		No	Replace water thermosensor ☞ **page F–121**
7	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST" when engine is cold Does engine speed decrease as engine warms up? ☞ **page F–85** 	Yes	Go to next step
		No	Replace injection body ☞ **page F–84**
8	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST" Is ignition timing correct at idle after warm-up? ☞ **page F–62** **Ignition timing: BTDC 16 ± 1°** 	Yes	Go to next step
		No	Adjust ignition timing ☞ **page F–62**
9	Try known good ECU; does condition improves?	Yes	Replace ECU ☞ **page F–112**
		No	Change fuel to another brand

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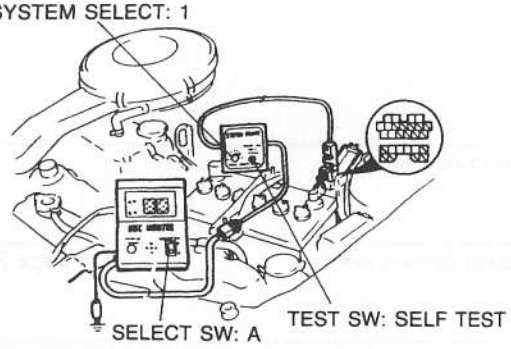
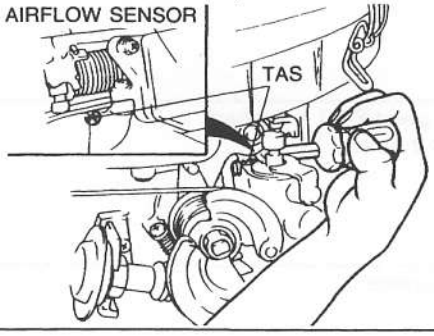
10	ROUGH IDLE/ENGINE STALLS AT IDLE — AFTER WARM-UP
DESCRIPTION	• Engine runs normally at idle during warm-up but engine stalls or vibrates excessively after warm-up

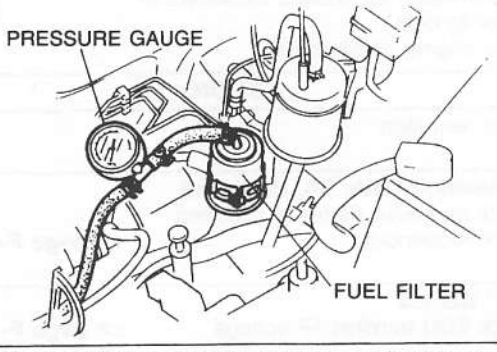
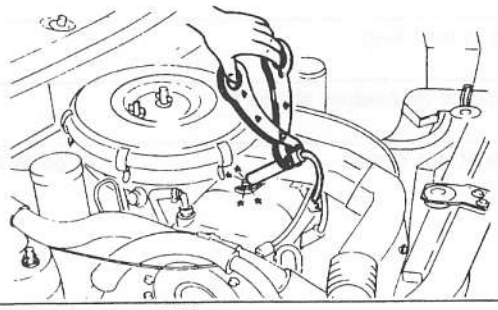
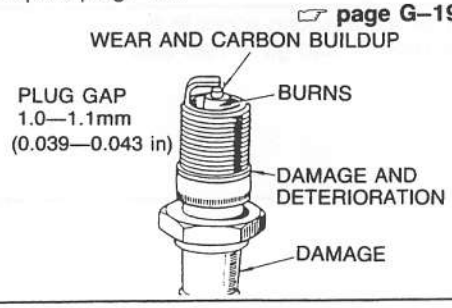
[TROUBLESHOOTING HINTS]

① Idle speed control system malfunction
② Air/Fuel mixture too lean
- Air leakage
- Low fuel line pressure
- PCV valve stuck (open)

③ Air/Fuel mixture too rich
- Fuel injection control malfunction (Correction for coolant temperature)

④ Poor ignition
⑤ Low engine compression

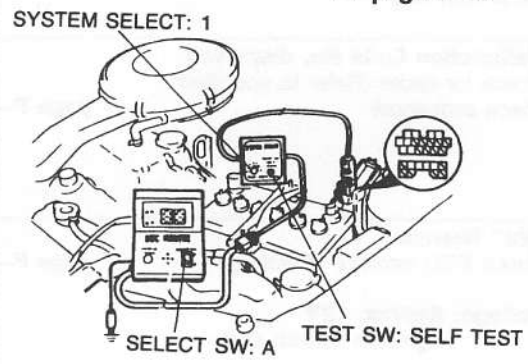
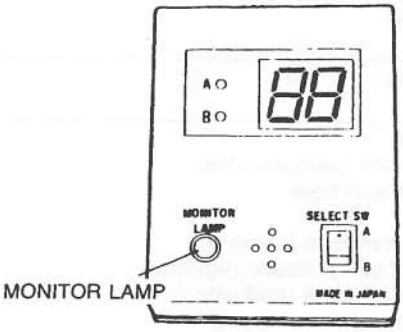
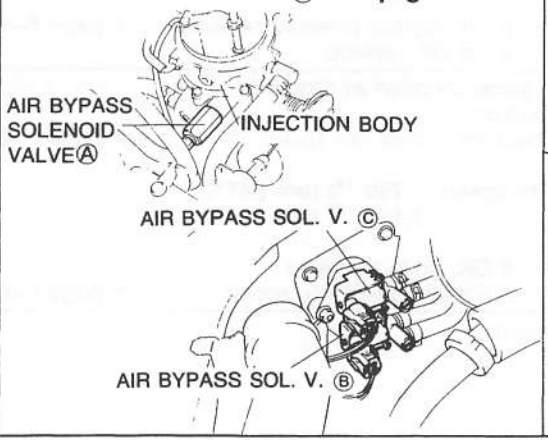
STEP	INSPECTION		ACTION
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67** SYSTEM SELECT: 1  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70**
			"88" flashes Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Are ECU terminal voltages OK? (Especially 1K, 2M, 2O and 2Q) ☞ **page F–112**	Yes	Go to next step
		No	Check for cause ☞ **page F–115, F–117, F–119**
3	Disconnect high-tension lead at idle; does engine speed decrease equally at all cylinders?	Yes	Go to next step
		No	Go to Step 10
4	Is there air leakage of intake air system components?	Yes	Repair or replace
		No	Go to next step
5	Is air cleaner element clean? ☞ **page F–62**	Yes	Go to next step
		No	Replace air cleaner element
6	Turn throttle adjusting screw counterclockwise; does idle condition improve? AIRFLOW SENSOR  	Yes	Adjust idle speed ☞ **page F–62**
		No	Return throttle adjusting screw to its original position, and go to next step

STEP	INSPECTION		ACTION
7	Is fuel line pressure correct at idle? ☞ page F–94 **Fuel line pressure:** **235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)**  	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure ☞ page F–91
8	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST" Is ignition timing correct at idle after warm-up? ☞ page F–62 **Ignition timing: BTDC 16 ± 1°**	Yes	Go to next step
		No	Adjust ignition system ☞ page F–62
9	Disconnect water thermosensor connector Does engine condition improve?	Yes	Replace water thermosensor
		No	Try known good ECU and check if condition improves
10	Is engine compression correct? ☞ page B–10 **Engine compression (Minimum):** **1,030 kPa (10.5 kg/cm², 149 psi)-300 rpm**	Yes	Go to next step
		No	Check engine ☞ page B–10
11	Is strong blue spark visible at each disconnected high-tension lead? 	Yes	Go to next step
		No	Check high-tension lead ☞ page G–23 ⇨ If OK, check distributor cap and rotor ☞ page G–23 ⇨ If not OK, replace high-tension lead
12	Are spark plugs OK? ☞ page G–19  	Yes	Try known good ECU and check if condition improves
		No	Repair or replace

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11	ROUGH IDLE/ENGINE STALLS AT IDLE — WHEN A/C, P/S, E/L ON
DESCRIPTION	• Engine stalls or vibrates excessively at idle when P/S or E/L ON • A/C, P/S, headlights, blower fan and electric cooling fan operate normally • Idle condition is normal when A/C, P/S and E/L are OFF

[TROUBLESHOOTING HINTS]
① Idle speed control system malfunction

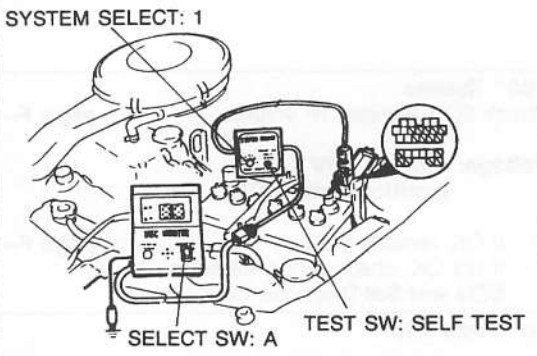
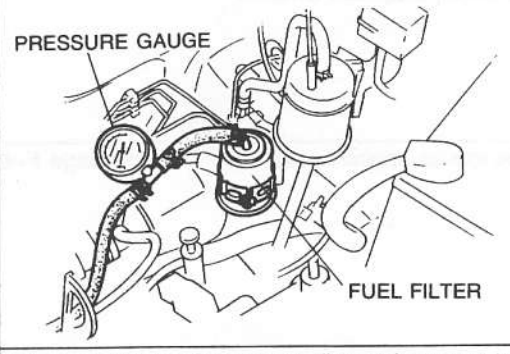
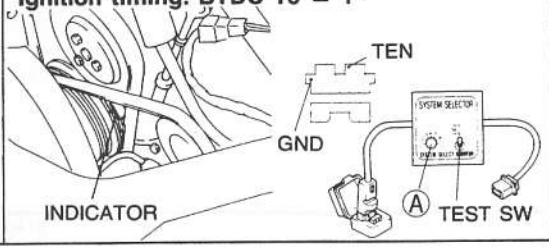
STEP	INSPECTION		ACTION
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ page F–67  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ page F–70
			"88" flashes Check ECU terminal 1F voltage ☞ page F–114 **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ page F–112 ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Using Self-Diagnosis Checker Monitor Lamp; are switches OK with ignition switch ON? ☞ page F–80  	Yes	Go to next step
		No	**Lamp not ON or OFF with specified switch** Check for cause (Refer to specified check sequence) ☞ page F–81 F–82
			Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker
3	Is air bypass solenoid valve OK? • **A/C.....Solenoid valve Ⓒ** ☞ page F–109 • **E/L.....Solenoid valve Ⓐ** ☞ page F–109 • **P/S.....Solenoid valve Ⓑ** ☞ page F–109  	Yes	Adjust idle-up engine speed ☞ page F–64
		No	Replace solenoid valve

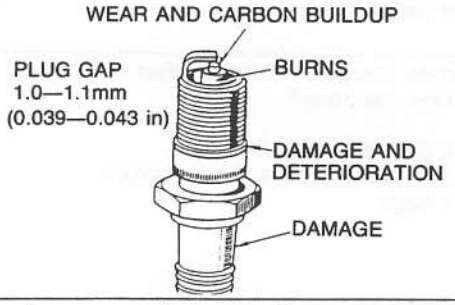
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12	ROUGH IDLE/ENGINE STALLS JUST AFTER STARTING
DESCRIPTION	• Engine starts normally but vibrates excessively or stalls just after starting (acceleration from idle) • Idle conditions are normal in other conditions

[TROUBLESHOOTING HINTS]
① Air/Fuel mixture too lean
- Air leakage
- Fuel injection control malfunction
- Low fuel line pressure

② Throttle sensor malfunction

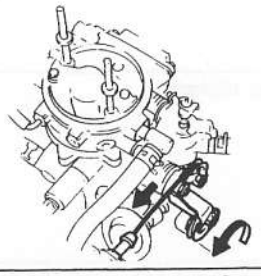
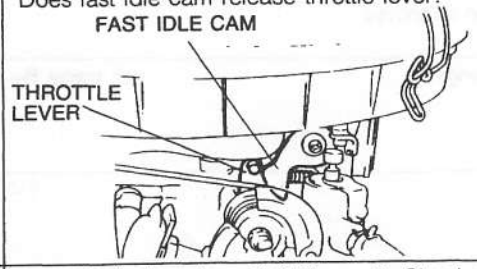
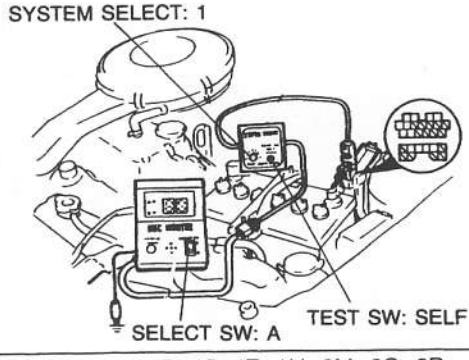
STEP	INSPECTION		ACTION
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67**  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70**
			"88" flashes Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Is there air leakage of intake air system components?	Yes	Repair or replace
		No	Go to next step
3	Is fuel line pressure correct at idle? ☞ **page F–94** **Fuel line pressure:** **235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)**  	Yes	Go to next step
		No	**Low pressure** Check for fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure ☞ **page F–91**
			High pressure Is fuel line clogged? ⇨ If OK, replace pressure regulator ☞ **page F–94** ⇨ If not OK, replace
4	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST" Is ignition timing correct at idle after warm-up? ☞ **page F–63** **Ignition timing: BTDC 16 ± 1°**  	Yes	In same condition as Step 3 inspection Check for correct idle speed ☞ **page F–63** **Idle speed: 750 $^{+50}_{0}$ rpm (MTX)** **1,100 $^{+50}_{0}$ rpm (ATX)** ⇨ If OK, go to next step ⇨ If not OK, adjust idle speed ☞ **page F–63**
		No	Adjust

STEP	INSPECTION		ACTION
5	Are ECU terminal voltages OK? (Especially 1B, 2M, 2O, and 2Q) **Note** • **When checking voltages, tap, move, and wiggle harness and connector to recreate problem**	Yes	Go to next step
		No	Check for cause
6	Are spark plugs OK?  	Yes	Go to next step
		No	Repair or replace
7	Is engine compression correct? ☞ **page B–10** **Engine compression (Minimum): 1,030 kPa (10.5 kg/cm^2, 149 psi)—300 rpm**	Yes	Try known good ECU and check if condition improves
		No	Check engine ☞ **page B–10**

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13	HIGH IDLE SPEED AFTER WARM-UP
DESCRIPTION	• Idle speed excessive after warm-up

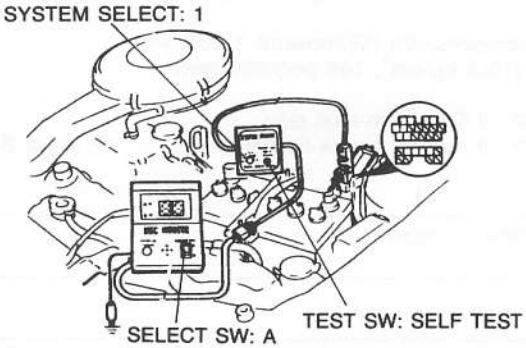
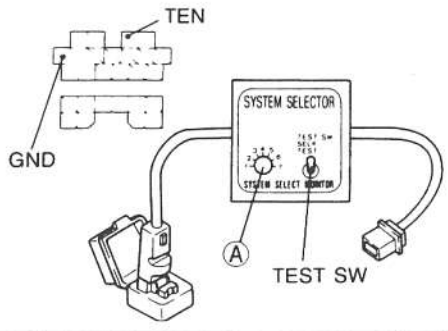
[TROUBLESHOOTING HINTS]
Excessive intake air supplied to engine
① Throttle valve not fully closed
② Idle speed control malfunction
- Thermowax malfunction
- Air bypass solenoid valve ON at idle
- A/C, P/S or E/L signal sent to ECU

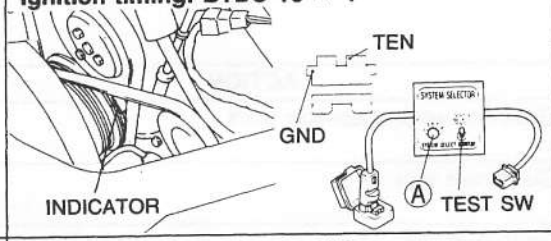
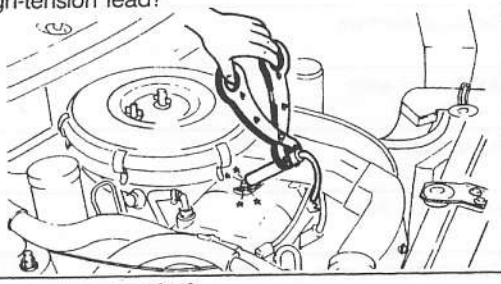
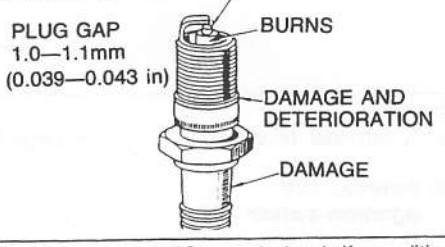
STEP	INSPECTION		ACTION
1	Is throttle valve fully closed when accelerator released? 	Yes	Go to Step 3
		No	Is throttle linkage correctly installed and operates freely? ⇨ If OK, go to Step 2 ⇨ If not OK, clean, adjust or replace linkage
2	Does fast idle cam release throttle lever? 	Yes	Adjust idle speed by turning throttle adjust screw ☞ **page F–63**
		No	Replace injection body
3	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67** 	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70** **"88" flashes** Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
4	Are ECU 1P, 1R, 1S, 1T, 1U, 2M, 2Q, 2R, and 2T terminal voltages OK?	Yes	Adjust idle speed by turning throttle adjust screw ☞ **page F–63**
		No	Check for cause ☞ **page F–115, F–117, F–119**

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14	IDLE MOVES UP AND DOWN/IDLE HUNTING
DESCRIPTION	• Engine speeds up and down periodically at idle

[TROUBLESHOOTING HINTS]
① Air leakage
② Throttle sensor misadjusted
③ Fuel injection amount inconstant
④ Poor ignition

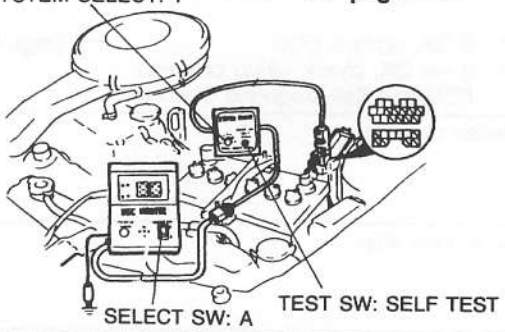
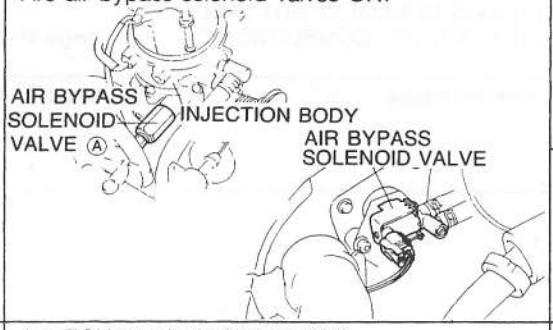
STEP	INSPECTION		ACTION
1	Is there air leakage at intake air system?	Yes	Repair or replace leakage point
		No	Go to next step
2	Is PCV valve OK? ☞ **page F–99**	Yes	Go to next step
		No	Replace PCV valve
3	Is air cleaner element clean?	Yes	Go to next step
		No	Replace element
4	Disconnect high-tension lead at idle; does engine speed decrease equally at each cylinder?	Yes	Go to next step
		No	Go to Step 9
5	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67** 	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70** **"88" flashes** Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
6	Connect System Selector to diagnosis connector and set Test Switch to " SELF TEST" Is idle normal? 	Yes	Try known good ECU
		No	Go to next step

STEP	INSPECTION		ACTION
7	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST" Is ignition timing correct at idle after warm-up? ☞ **page F–62** **Ignition timing: BTDC 16 ± 1°** 	Yes	Check for injector leakage
		No	Adjust ignition timing ☞ **page F–62**
8	Are ECU terminal voltages OK? (Especially 2M) ☞ **page F–118**	Yes	Go to next step
		No	Check for cause ☞ **page F–119**
9	Is strong blue spark visible at each disconnected high-tension lead? 	Yes	Go to next step
		No	Check high-tension lead ⇨ If OK, check distributor cap and rotor ⇨ If not OK, replace high-tension lead
10	Are spark plugs OK? WEAR AND CARBON BUILDUP ☞ **page G–19** 	Yes	Check for correct engine compression ☞ **page B–10** **Compression (Minimum): 1,030 kPa (10.5 kg/cm^2, 149 psi)-300 rpm** ⇨ If OK, go to next step ⇨ If not OK, check for cause ☞ **page B–10**
		No	Clean or replace
11	Try known good ECU and check if condition improves		

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15	ENGINE STALLS ON DECELERATION
DESCRIPTION	• Engine unexpectedly stops running while decelerating or after deceleration • Idle condition normal

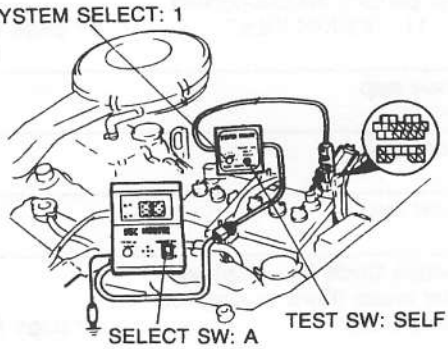
[TROUBLESHOOTING HINTS]
Engine speed drops too much when releasing accelerator or poor connector connection disconnected by deceleration force
① Dashpot misadjusted
② Fuel cut control malfunction
③ Idle speed misadjustment

STEP	INSPECTION		ACTION
1	Is idle condition normal?	Yes	Go to next step
		No	Adjust or perform troubleshooting Nos. 8—11 "ROUGH IDLE" ☞ **page F–29 F–35**
2	Is dashpot correctly adjusted? ☞ **page F–104** **Dashpot set speed: 2,500 ± 100 rpm**	Yes	Go to next step
		No	Adjust dashpot
3	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67**  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70** **"88" flashes** Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
4	Are air bypass solenoid valves OK?  	Yes	Go to next step
		No	Replace
5	Are ECU terminal voltages OK? (Especially 1B, 2M, 2Q and 2V) ☞ **page F–112**	Yes	Go to next step
		No	Check for cause ☞ **page F–115 F–117 F–119**
6	Is there poor connection at either of following? • Ignition coil • Igniter • Distributor • High-tension lead • Injector • Circuit opening relay • ECU	Yes	Repair or replace
		No	Try known good ECU Does condition improves?

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16	ENGINE STALLS SUDDENLY (INTERMITTENT)
DESCRIPTION	• Engine intermittently stops running • Before stalling, engine condition OK

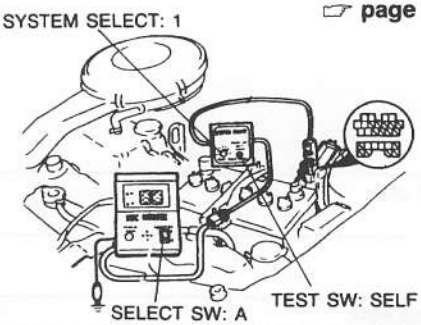
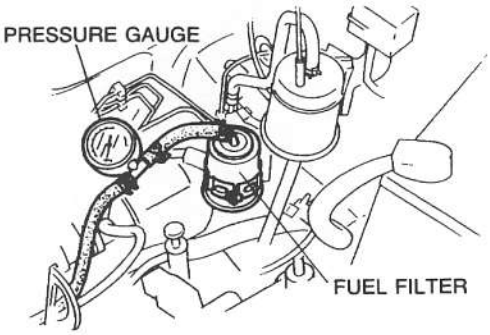
[TROUBLESHOOTING HINTS]
① Intermittently no spark or no fuel injection caused by vehicle vibration, acceleration, or deceleration
• Poor connection in wiring harness

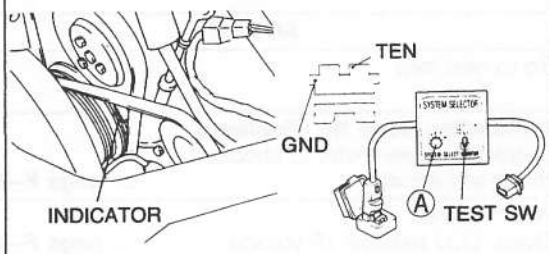
STEP	INSPECTION		ACTION
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ page F–67  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ page F–70 **Note** **• When checking wiring harness and connectors, tap, move, and wiggle suspect sensor and/or harness to recreate problem**
			"88" flashes Check ECU terminal 1F voltage ☞ page F–114 **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ page F–112 ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Is there poor connection at either of following? • Ignition coil • Igniter • Distributor • High-tension lead • Injector • Circuit opening relay • ECU	Yes	Repair or replace
		No	Go to next step
3	Are ECU terminal voltages OK? (Especially 1B, 1G, 1I, 2A, 2B, 2C, 2E and 2V) ☞ page F–112 **Note** **• When checking voltages, tap, move, and wiggle harness and connector to recreate problem**	Yes	Go to Troubleshooting No.2 "CRANKS NORMALLY BUT WILL NOT START (NO COMBUSTION)" ☞ page F–17
		No	Check for cause ☞ page F–115 F–117 F–119

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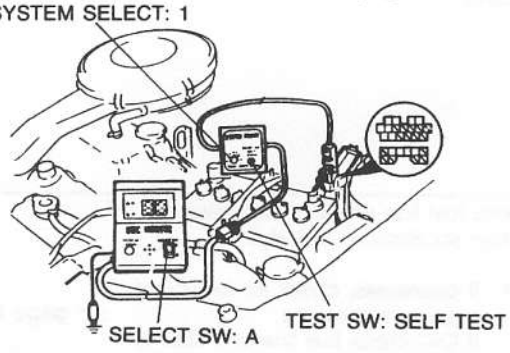
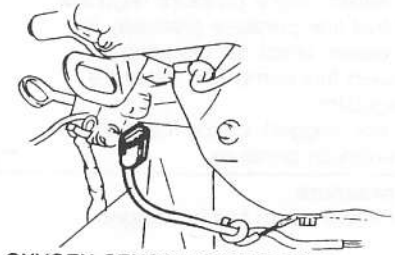
17	HESITATES/STUMBLES ON ACCELERATION
DESCRIPTION	• Flat spot occurs just after accelerator depressed or mild jerking occurs during acceleration

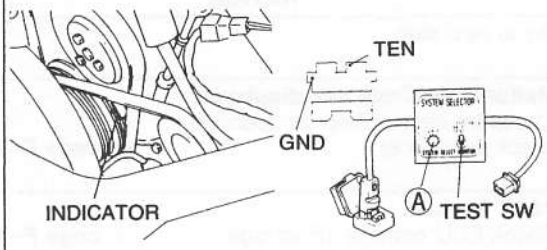
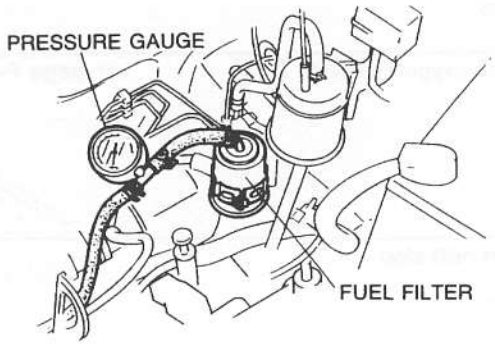
[TROUBLESHOOTING HINTS]
① Air/Fuel mixture becomes lean when depressing accelerator
- Fuel injection control malfunction (Correction for accelerating condition)
- Air leakage
- Fuel line pressure decreases
- Spark advance control malfunction

STEP	INSPECTION		ACTION
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ page F–67  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ page F–70
			"88" flashes Check ECU terminal 1F voltage ☞ page F–114 **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ page F–112 ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Is there air leakage at intake air system components?	Yes	Repair or replace
		No	Go to next step
3	Is air cleaner element clean? ☞ page F–62	Yes	Go to next step
		No	Replace air cleaner element
4	Are ECU terminal 1K, 2M, 2O and 2Q voltages OK? ☞ page F–112	Yes	Go to next step
		No	Check for cause ☞ page F–115 F–117 F–119
5	Is throttle linkage correctly installed and does throttle valve open freely?	Yes	Go to next step
		No	Clean or replace as required any binding or damaged linkage and adjust cable deflection at injection body ☞ page F–86
6	Is fuel line pressure correct at idle? ☞ page F–94 **Fuel line pressure: 235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)**  	Yes	Does fuel line pressure decrease when accelerating quickly? ⇨ If decreases, check fuel line and filter for clogging ⇨ If no decrease, go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure ☞ page F–91

STEP	INSPECTION		ACTION
7	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST" Is ignition timing correct at idle after warm-up? ☞ **page F–62** **Ignition timing: BTDC 16 ± 1°**  	Yes	Does ignition timing advance when accelerating? ⇨ If advances, go to next step ⇨ If not advance, replace ECU ☞ **page F–112**
		No	Adjust
8	Are air duct and air hoses correctly installed?	Yes	Go to next step
		No	Repair
9	Is exhaust system restricted? ☞ **page F–97**	Yes	Repair or replace
		No	Go to next step
10	Try known good ECU and check if condition improves		

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18	SURGES WHILE CRUISING		
DESCRIPTION	• Unexpected change in engine speed which is usually repetitive		
[TROUBLESHOOTING HINTS] ① Air/Fuel mixture too lean ② Misfire ③ Poor connection in wiring harness			
STEP	**INSPECTION**		**ACTION**
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67**  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70**
			"88" flashes Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Is throttle sensor OK? ☞ **page F–122**	Yes	Go to next step
		No	Adjust
3	Disconnect oxygen sensor connector; does condition improves?  	Yes	Check oxygen sensor ☞ **page F–123**
		No	Go to next step
4	Are ECU terminal voltages OK? ☞ **page F–112**	Yes	Go to next step
		No	Check for cause ☞ **page F–115, F–117, F–119**
5	Is throttle linkage correctly installed and does throrttle valve open operates freely?	Yes	Go to next step
		No	Correct, clean, or replace as required any binding or damaged linkage, and adjust cable deflection at injection body ☞ **page F–86**
6	Is there air leakage of intake air system components?	Yes	Repair or replace
		No	Go to next step
7	Is air cleaner element clean? ☞ **page F–62**	Yes	Go to next step
		No	Replace air cleaner element

STEP	INSPECTION		ACTION
8	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST" Is ignition timing correct at idle after warm-up? ☞ **page F–62** **Ignition timing: BTDC 16 ± 1°**  	Yes	Does ignition timing advance when accelerating? ⇨ If advances, go to next step ⇨ If not advance, replace ECU ☞ **page F–112**
		No	Adjust
9	Is fuel line pressure correct at idle? ☞ **page F–94** **Fuel line pressure:** **235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)**  	Yes	Does fuel line pressure decrease when accelerating quickly? ⇨ If decreases, check for fuel pump maximum pressure ☞ **page F–91** If OK, check fuel line and filter for clogging ⇨ If no decrease, go to next step
		No	**Low pressure** Check fuel line pressure by pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure ☞ **page F–91**
			High pressure Check if fuel return line is clogged ⇨ If OK, replace pressure regulator ☞ **page F–94** ⇨ If not OK, replace
10	Check for poor connection of following parts • Ignition coil • Igniter • Distributor • High-tension lead • Injector • Circuit opening relay • ECU	Yes	Repair or replace
		No	Go to next step
11	Try known good ECU and check if condition improves		

01A0FX-028

19	LACK OF POWER
DESCRIPTION	• Performance poor under load when throttle valve wide open • Reduced maximum speed • Idle condition normal

[TROUBLESHOOTING HINTS]

① Factors other than engine malfunction
- Clutch slipping
- ATX slipping
- Brake dragging
- Low tire pressure
- Incorrect tire size
- Overloaded

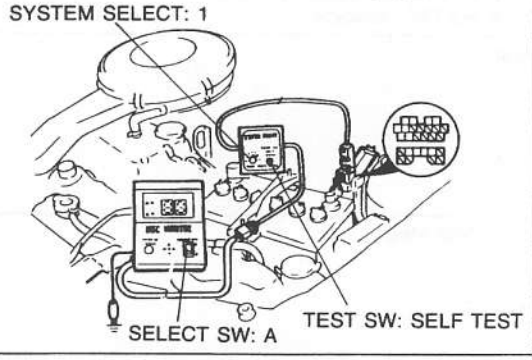
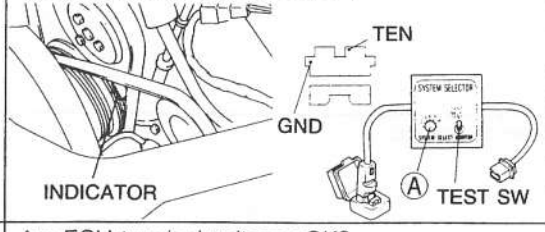
② Low intake air amount
- Throttle valve not open fully
- Clogged intake air system

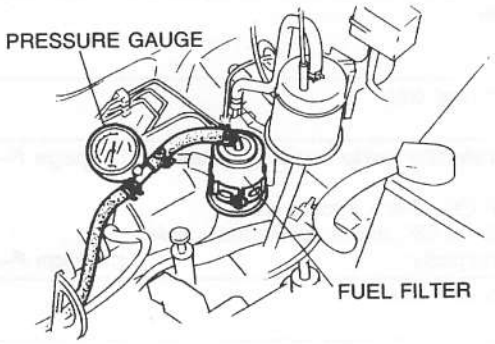
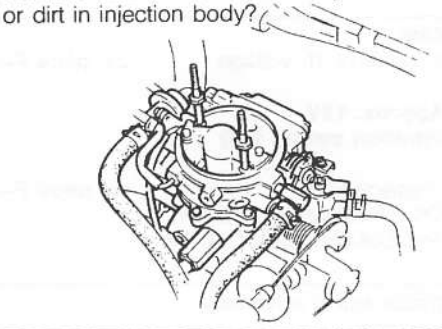
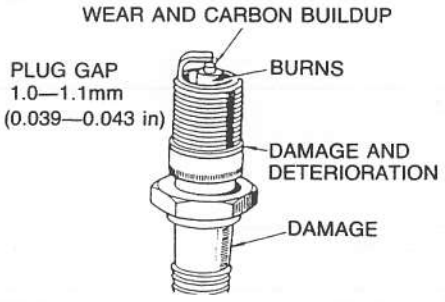
③ Air/Fuel mixture too lean
- Fuel line pressure decreases
- Fuel injection malfunction

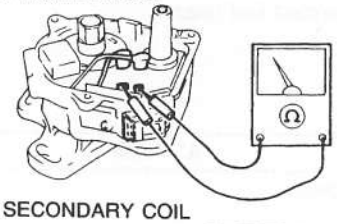
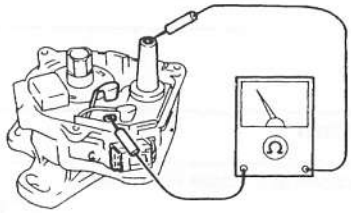
④ Poor ignition

⑤ Low engine compression

⑥ Alcohol blended fuel used

STEP	INSPECTION		ACTION
1	Check factors other than engine • Clutch slipping ☞ **page H–3** • ATX slipping ☞ **page K–10** • Brake dragging ☞ **page P–5** • Low tire pressure ☞ **page Q–2**	Yes	Go to next step
		No	Repair
2	Is throttle valve fully opened when accelerator depressed fully?	Yes	Go to next step
		No	Is accelerator cable correctly installed ☞ **page F–86** ⇨ If OK, check throttle valve ⇨ If not OK, install accelerator cable correctly ☞ **page F–86**
3	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67**  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70** **"88" flashes** Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If no OK, check wiring between ECU and Self-Diagnosis Checker
4	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST" Is ignition timing correct at idle after warm-up? ☞ **page F–62** **Ignition timing: BTDC 16 ± 1°**  	Yes	Check if ignition timing advances when accelerating ⇨ If advances, go to next step ⇨ If not advance, check ECU terminal voltages ☞ **page F–112**
		No	Adjust
5	Are ECU terminal voltages OK? (Especially 1K, 2M, 2K, and 2S) ☞ **page F–112**	Yes	Go to next step
		No	Check for cause ☞ **page F–115, F–117, F–119**

STEP	INSPECTION		ACTION
6	Is there air leakage of intake air system components?	Yes	Repair or replace
		No	Go to next step
7	Is air cleaner element clean? ☞ **page F–62**	Yes	Go to next step
		No	Replace air cleaner element
8	Is fuel line pressure correct at idle? ☞ **page F–94** **Fuel line pressure:** **235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)**  	Yes	Does fuel line pressure decrease when accelerating quickly ⇨ If decreases, check fuel pump maximum pressure ☞ **page F–91** If OK, check fuel line and filter for clogging ⇨ If not decrease, go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure ☞ **page F–91**
			High pressure Check if fuel return line is clogged ⇨ If OK, replace pressure regulator ☞ **page F–95** ⇨ If not OK, replace
9	Remove air cleaner; is there any carbon deposit or dirt in injection body? 	Yes	Clean
		No	Go to next step
10	Are spark plugs OK? ☞ **page G–19**  	Yes	Go to next step
		No	Clean or replace

STEP	INSPECTION		ACTION
11	Is resistance of ignition coil OK? ☞ **page G–20** **Resistance (at 20°C [68°F]):** **Primary coil winding..... 0.68—0.84Ω** **Secondary coil winding.... 9.6—14.4 kΩ** PRIMARY COIL  SECONDARY COIL 	Yes	Go to next step
		No	Replace
12	Is engine compression correct? ☞ **page B–10** **Engine compression:** **1,030 kPa (10.5 kg/cm², 149 psi)-300 rpm**	Yes	Go to next step
		No	Check engine condition ☞ **page B–10** • Worn piston, piston rings or cylinder wall • Defective cylinder head gasket • Distorted cylinder head • Improper valve seating • Valve sticking in guide
13	Change fuel; does condition improves?	Yes	Change fuel to another brand
		No	Try known good ECU and see if drivability improves

01A0FX-029

20	POOR ACCELERATION
DESCRIPTION	• Performance poor while accelerating • Idle condition normal

[TROUBLESHOOTING HINTS]

① Factors other than engine malfunction
- Clutch slipping
- ATX slipping
- Brake dragging
- Low tire pressure
- Incorrect tire size
- Over-loaded

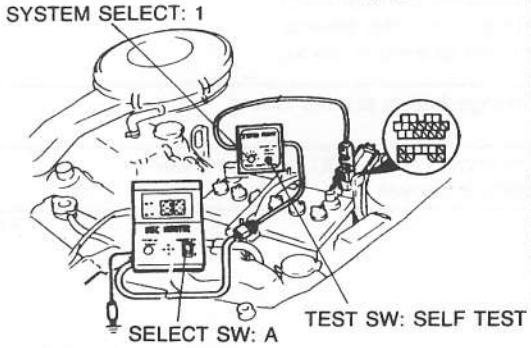
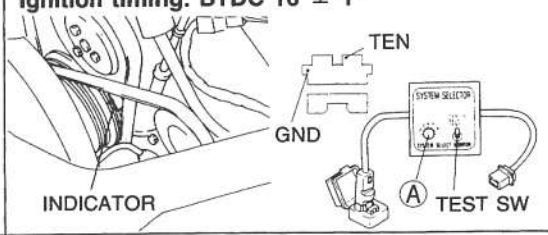
② Low intake air amount
- Throttle valve not open fully
- Clogging in intake air system

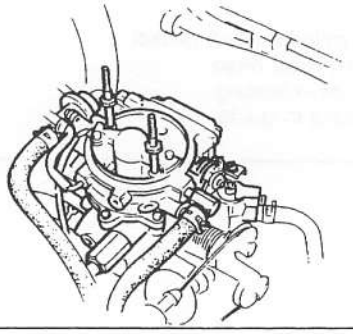
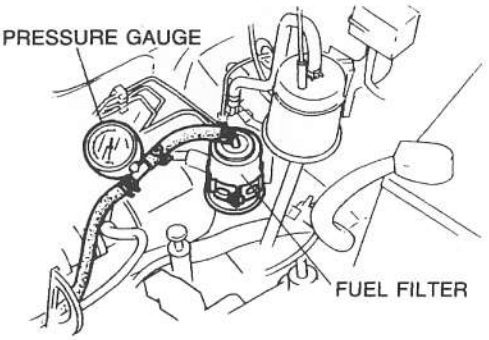
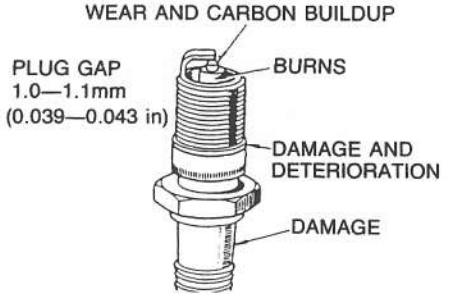
③ Air/Fuel mixture too lean
- Fuel line pressure decreases
- Fuel injection malfunction

④ Poor ignition

⑤ Low engine compression

⑥ Alcohol blended fuel used

STEP	INSPECTION		ACTION
1	Check factors other than engine • Clutch slipping ☞ **page H–3** • Brake dragging ☞ **page P–5** • Low tire pressure ☞ **page Q–2** • Incorrect tire size ☞ **page Q–2** • ATX slipping ☞ **page K–10**	Yes	Go to next step
		No	Repair
2	Does throttle valve fully open when depressing accelerator fully?	Yes	Go to next step
		No	Check if accelerator cable is correctly installed ☞ **page F–86** ⇨ If OK, check throttle valve ⇨ If not OK, install accelerator cable correctly ☞ **page F–86**
3	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67**  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70**
			"88" flashes Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
4	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST" Is ignition timing correct at idle after warm-up? ☞ **page F–62** **Ignition timing: BTDC 16 ± 1°**  	Yes	Does ignition timing advance when accelerating? ⇨ If advances, go to next step ⇨ If not advance, check ECU terminal voltages ☞ **page F–112**
		No	Adjust
5	Are ECU terminal voltages OK? (Especially 2M) ☞ **page F–112**	Yes	Go to next step
		No	Check for cause ☞ **page F–115, F–117, F–119**

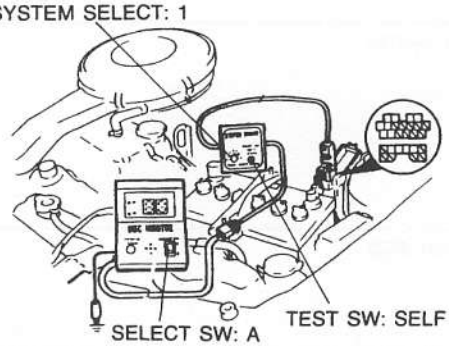
STEP	INSPECTION		ACTION
6	Is there air leakage at intake air system components?	Yes	Repair or replace
		No	Go to next step
7	Is there any carbon deposit or dirt in injection body? 	Yes	Clean
		No	Go to next step
8	Is fuel line pressure correct at idle? ☞ **page F–94** **Fuel line pressure:** **235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)**  	Yes	Check if fuel line pressure decreases when accelerating quickly ⇨ If decrease, check fuel pump maximum pressure ☞ **page F–91** If OK, check fuel line and filter for clogging ⇨ If not decrease, go to next step
		No	**Low pressure** Check for fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure ☞ **page F–91**
			High pressure Check if fuel line is clogged ⇨ If OK, replace pressure regulator ☞ **page F–95** ⇨ If not OK, replace
9	Are spark plugs OK? ☞ **page G–19**  	Yes	Go to next step
		No	Clean or replace

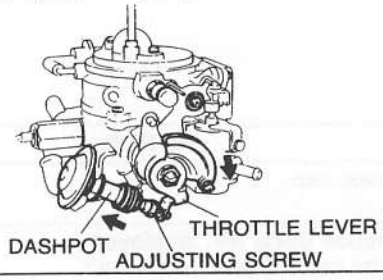
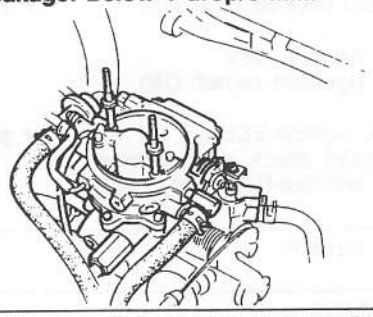
STEP	INSPECTION		ACTION
10	Change fuel and check if acceleration improves	Yes	Change fuel to another brand
		No	Go to next step
11	Check for correct engine compression ☞ page B–10 **Engine compression (Minimum): 1,030 kPa (10.5 kg/cm^2, 149 psi)-300 rpm**	Yes	Try known good ECU and check if engine condition improves
		No	Check engine condition ☞ page B–10 • Worn piston, piston rings or cylinder wall • Defective cylinder head gasket • Distorted cylinder head • Improper valve seating • Valve sticking in guide

01A0FX-030

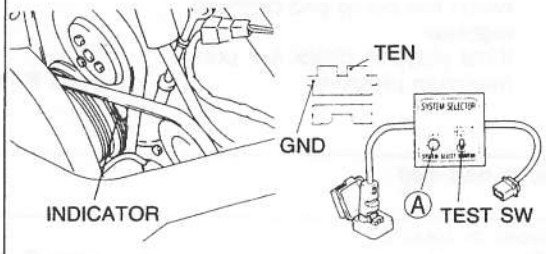
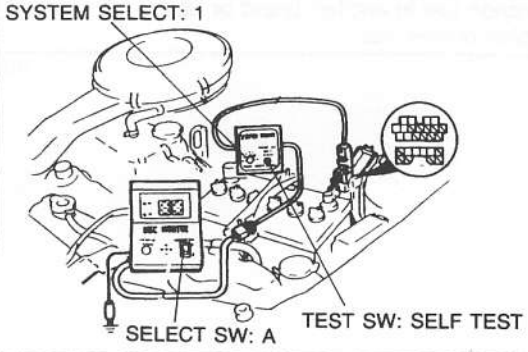
21	RUNS ROUGH ON DECELERATION/BACKFIRE
DESCRIPTION	• Engine runs rough while decelerating and abnormal combustion occurs in exhaust system • Transaxle in normal condition

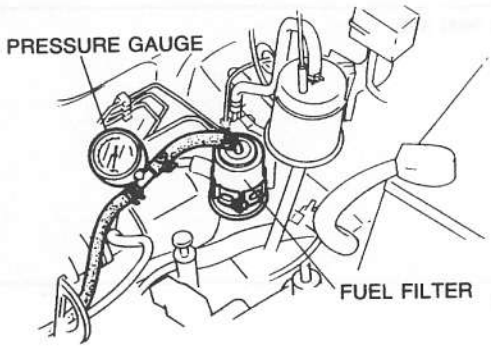
[TROUBLESHOOTING HINTS]
① Air/Fuel mixture too rich
- Air cleaner element clogged
- Fuel injection control malfunction (Fuel cut control)
- Injector fuel leakage
- Throttle sensor malfunction
- Dashpot malfunction

STEP	INSPECTION		ACTION
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67** SYSTEM SELECT: 1  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70**
			"88" flashes Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Is there air leakage at intake air system components?	Yes	Repair or replace
		No	Go to next step
3	Is air cleaner element clean? ☞ **page F–62**	Yes	Go to next step
		No	Replace air cleaner element
4	Are ECU terminal voltages OK? (Especially 2M and 2Q) ☞ **page F–112**	Yes	Go to next step
		No	Check for cause ☞ **page F–115, F–117, F–119**
5	Is there 0V at ECU 2V terminal above 3,000 rpm on deceleration? (Engine signal monitor green lamp illuminates)	Yes	Go to next step
		No	Try known good ECU and check if condition improves
6	Is throttle sensor OK? ☞ **page F–122**	Yes	Go to next step
		No	Adjust ☞ **page F–122**

STEP	INSPECTION		ACTION
7	Is dashpot correctly adjusted? ☞ **page F–104** **Dashpot set speed:** **Approx. 2,500 ± 100 rpm**  	Yes	Check if throttle valve is contaminated ⇨ If contaminated, clean throttle body ⇨ If not contaminated, replace throttle body
		No	Adjust
8	Is there injector fuel leakage? ☞ **page F–96** **Fuel leakage: Below 1 drop/5 min.** 	Yes	Replace injector
		No	Go to next step
9	Try known good ECU and check if condition improves		

01A0FX-031

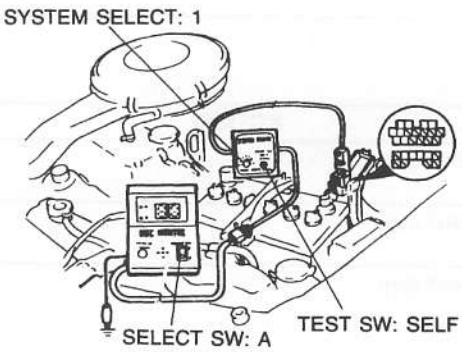
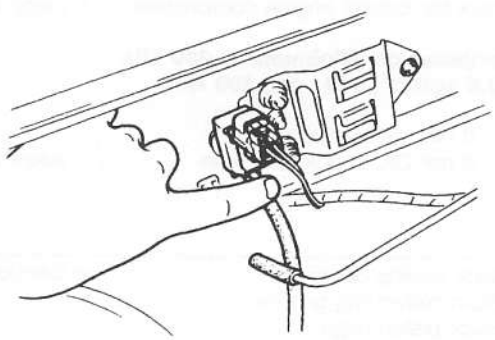
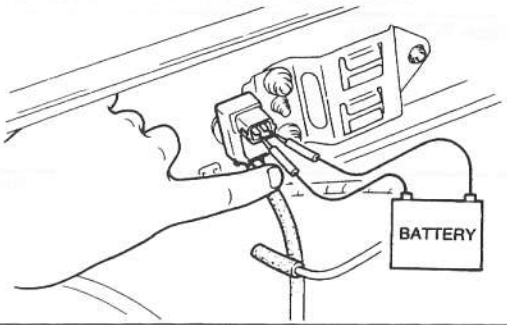
22	KNOCKING		
DESCRIPTION	• Abnormal combustion accompanied by audible "pinging" noise		
[TROUBLESHOOTING HINTS] ① Incorrect ignition timing (Too advanced) ② Carbon deposits in cylinder ③ Overheating ④ Air/Fuel mixture too lean • Fuel injection amount not correct • Fuel line pressure decreases while accelerating			
STEP	**INSPECTION**		**ACTION**
1	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST" Is ignition timing correct at idle after warm-up? ☞ **page F–62** **Ignition timing: BTDC 16 ± 1°**  	Yes	Go to next step
		No	Adjust
2	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67**  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70**
			"88" flashes Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
3	Is there air leakage of intake air system components?	Yes	Repair or replace
		No	Go to next step
4	Is engine compression correct? ☞ **page B–10** **Engine compression (Minimum):** **1,030 kPa (10.5 kg/cm², 149 psi)-300 rpm**	Yes	Go to next step
		No	**High compression** Check engine condition ☞ **page B–10** • Carbon deposits

STEP	INSPECTION		ACTION
5	Is fuel line pressure correct at idle? ☞ page F–94 **Fuel line pressure:** **235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)**  	Yes	Does if fuel line pressure decrease when accelerating quickly? ⇨ If decreases, check for clogging between fuel pump and pressure regulator ⇨ If not decrease, go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure ☞ page F–91
6	Is cooling system OK? ☞ page E–3	Yes	Go to next step
		No	Repair or replace • Thermostat ☞ page E–8 • Electric cooling fan ☞ page E–11 • Radiator ☞ page E–7
7	Try known good ECU and check if condition improves	Yes	Replace ECU ☞ page F–112
		No	Change fuel to another brand or use higher octane fuel

01A0FX-032

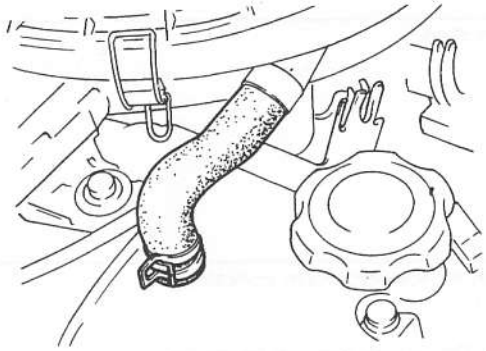
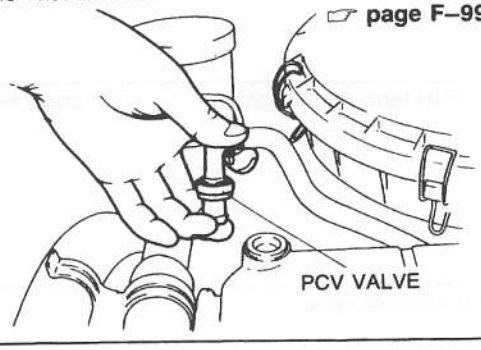
23	FUEL ODOR
DESCRIPTION	• Gasoline odor in cabin

[TROUBLESHOOTING HINTS]
① Poor connection or damaged at fuel system or evaporative emission control system
② Charcoal canister overflow due to evaporative emission control system malfunction

STEP	INSPECTION		ACTION
1	Is there fuel leakage or damage of fuel system and evaporative emission control system?	Yes	Repair or replace
		No	Go to next step
2	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ page F–67  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ page F–70
			"88" flashes Check ECU terminal 1F voltage ☞ page F–114 **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ page F–112 ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
3	Is vacuum felt at solenoid valve (purge control) with engine running and throttle valve opened? (Neutral switch connector disconnected) 	Yes	Go to Step 5
		No	Check for solenoid valve operating sound ⇨ If OK, check vacuum hoses for clogging ⇨ If not OK, go to next step
4	Apply 12V and ground to solenoid valve (purge control) Is vacuum felt at solenoid valve at idle?  	Yes	Check ECU terminal voltages ☞ page F–112
		No	Replace solenoid valve
5	Try known good ECU and check if condition improves		

24	EXHAUST SULFER SMELL	
DESCRIPTION	• Exhaust gas smells abnormally	
[TROUBLESHOOTING HINTS] High sulfer content fuel used		
STEP	INSPECTION	ACTION
1	Change fuel to another brand	

03U0FX-039

25	HIGH OIL CONSUMPTION		
DESCRIPTION	• Oil consumption excessive		
[TROUBLESHOOTING HINTS] ① PCV system malfunction ② Engine malfunction (Oil working up, working down, or leakage)			
STEP	INSPECTION		ACTION
1	Are there PCV hose, ventilation hose or their attaching nipples separated, damaged, clogged, or restricted? ☞ **page F–99**	Yes	Repair or replace
		No	Go to next step
2	Is there air pressure or oil at ventilation hose? 	Yes	Go to next step
		No	Check for correct engine compression ☞ **page B–10** **Compression (Minimum): 1,030 kPa (10.5 kg/cm², 149 psi)-300 rpm** ⇨ If OK, go to next step ⇨ If not OK, check for cause ☞ **page B–10**
3	Is vacuum felt at PCV valve at idle? ☞ **page F–99** 	Yes	Check engine condition ☞ **Section B** • Worn piston ring groove • Stuck piston rings • Worn piston or cylinder
		No	Replace PCV valve

01A0FX-034

26	POOR FUEL ECONOMY
DESCRIPTION	• Fuel economy unsatisfactory

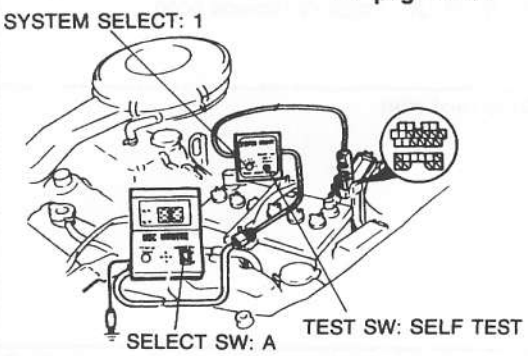
[TROUBLESHOOTING HINTS]
While fuel consumption is drastically increased by city driving, short-run operation, stop and go driving, extended winter warm-up periods, etc., as opposed to "trip" mileage, an attempt should be made to determine these factors when confronted with "poor mileage" conditions. However, since the operator is not always at fault, the following is offered.

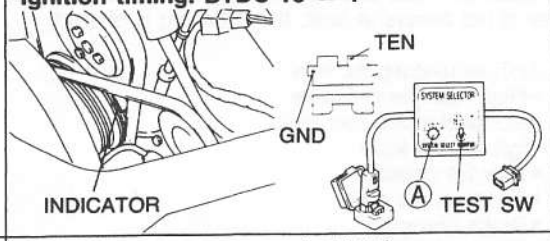
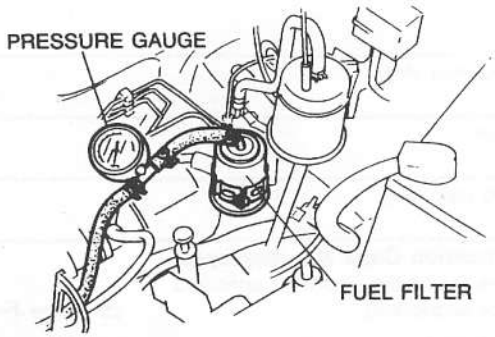
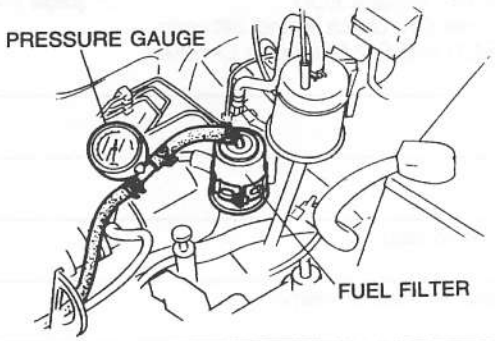
① Operator depressing accelerator more than usual due to low engine power
- Poor ignition
- Low intake air amount
- Electronic spark advance control system malfunction
- Clutch slipping/ATX slipping
- Exhaust component restricted

② Air/Fuel mixture too rich
- High fuel line pressure

③ Alcohol blended fuel used

④ High vehicle load
- Low tire pressure
- Incorrect tire size
- Brake dragging

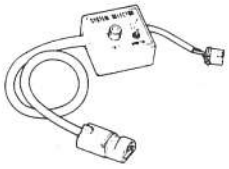
STEP	INSPECTION		ACTION
1	Check factors other than engine • Low tire pressure ☞ **page Q–2** • Unrecommended tire size ☞ **page Q–2** • Clutch slipping ☞ **page H–3** • Brake dragging ☞ **page P–5** • Exhaust component restricted ☞ **page F–97**	Yes	Go to next step
		No	Repair
2	Are air hoses connected correctly? ☞ **page F–83**	Yes	Go to next step
		No	Repair
3	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67**  	Yes	Go to next step
		No	**Malfunction Code No. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–70** **"88" flashes** Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
4	Is there air leakage at intake air system components?	Yes	
		No	
5	Is air cleaner element clean? ☞ **page F–62**	Yes	Go to next step
		No	Replace air cleaner element
6	Are ECU terminal voltages OK? (Especially 2M, 2N, 2R and 2T) ☞ **page F–112**	Yes	Go to next step
		No	Check for cause ☞ **page F–115, F–117, F–119**

STEP	INSPECTION		ACTION
7	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST" Is ignition timing correct at idle after warm-up? ☞ **page F–62** **Ignition timing: BTDC 16 ± 1°**  	Yes	Go to next step
		No	Adjust
8	Is fuel line pressure correct at idle? ☞ **page F–94** **Fuel line pressure:** **235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)**  	Yes	Go to next step
		No	**High pressure** Check if vacuum hose to pressure regulator is damaged or poorly connected ⇨ If OK, replace pressure regulator ☞ **page F–94** ⇨ If not OK, repair or replace hose
9	Run engine at idle and then stop engine Is fuel line pressure hold? ☞ **page F–88** **Fuel line pressure: More than 147 kPa (1.5 kg/cm², 21 psi) for 5 min.**  	Yes	Go to next step
		No	Check injectors for fuel leakage ☞ **page F–96**
10	Change fuel to another brand		

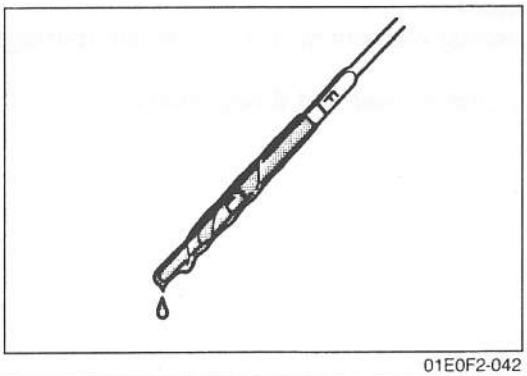
01A0FX-035

ENGINE TUNE-UP

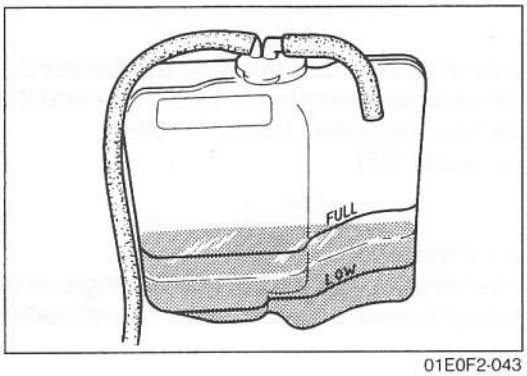
PREPARATION
SST

49 B019 9A0 System selector		For inspection of ignition timing and idle speed

01E0F2-041



01E0F2-042



01E0F2-043

BASIC INSPECTION
Engine Oil

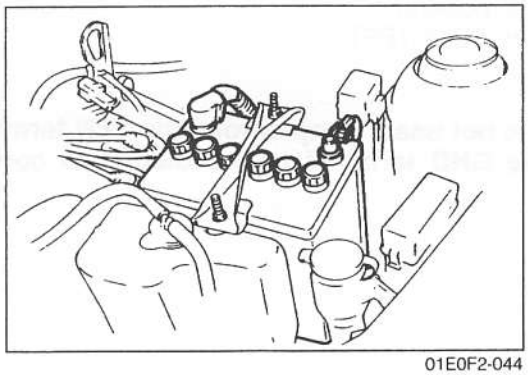
1. Be sure the vehicle is on level ground.
2. Warm up the engine to normal operating temperature and stop it.
3. Wait for five minutes.
4. Remove the oil dipstick and check the oil level and condition.
5. Add or replace oil if necessary.

Note
- **The distance between the L and F marks on the dipstick represents 0.8 liter (0.85 US qt, 0.70 Imp qt).**

Engine Coolant
Coolant level (engine cold)

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

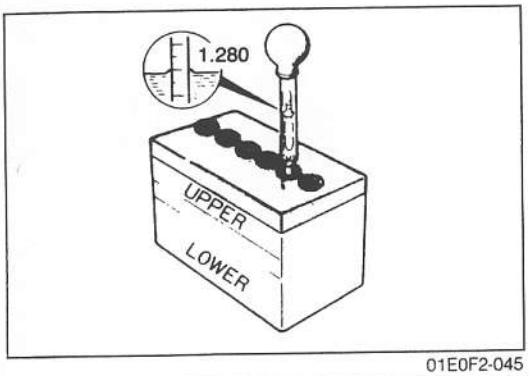
1. Pull out the sub tank cap.
2. Verify that the coolant level is near the radiator filler neck.
3. Verify that the coolant level in the coolant reservoir is between the FULL and LOW marks.
4. Add coolant if necessary.



01E0F2-044

Battery

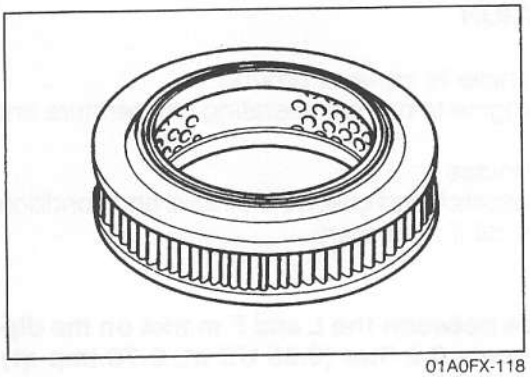
1. Check the tightness of the terminals to ensure good electrical connections.
2. Check for corroded or frayed battery cables.
3. Wash the top of the battery with water to prevent arc over.
4. Verify that the electrolyte level is between the upper and lower marks. Add distilled water if necessary.



01E0F2-045

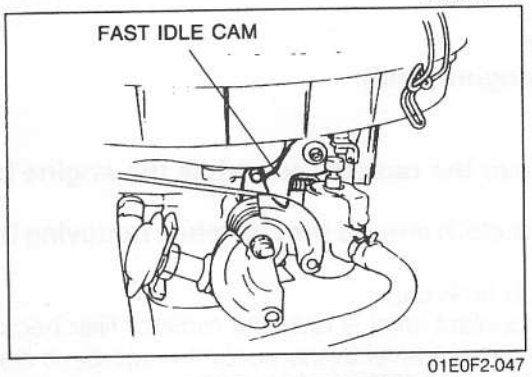
5. Disconnect the negative battery cable.
6. Open the cap.
7. Measure the specific gravity of each cell with a hydrometer.

Specification: 1.27—1.29 (at 20°C [68°F])


01A0FX-118

Air Cleaner Element

1. Check the air cleaner element for excessive dirt, damage, and oil.
2. Replace the air cleaner element if necessary.



01E0F2-047

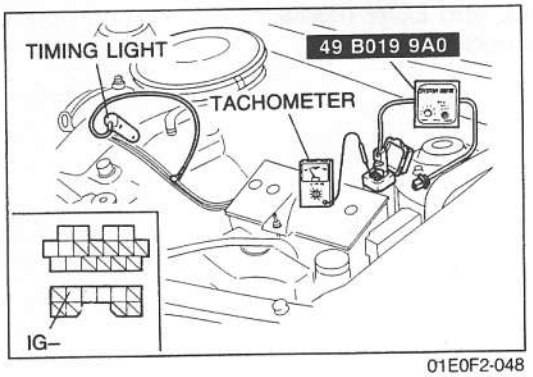
ADJUSTMENT

Preparation

1. Warm up the engine to normal operating temperature.
2. Verify that the wax rod has extended outward fully and that the fast idle cam has separated from the roller.
3. Turn all electrical loads OFF.
   - Blower fan
   - Headlight
   - Rear window defroster
4. Make sure that the engine speed does not change when disconnecting the air bypass solenoid valve Ⓐ connector.

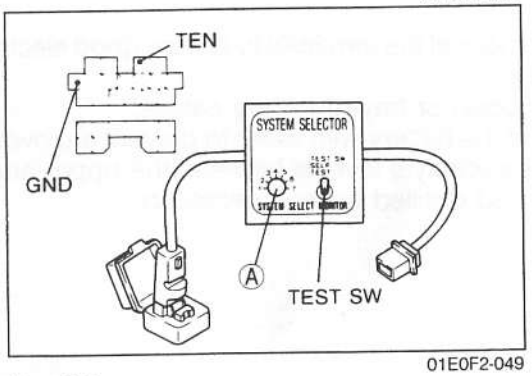
Note

- **If the engine speed decreases, the engine is still under the warm-up condition.**



01E0F2-048

5. If the electric cooling fan is operating, wait until it stops.
6. Verify that the engine is running at idle in good condition.
7. Connect the **SST** to the diagnosis connector.
8. Connect a timing light.
9. Connect a tachometer to the diagnosis connector **IG–** terminal.

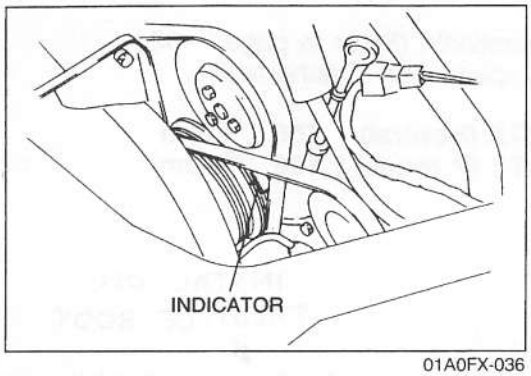


01E0F2-049

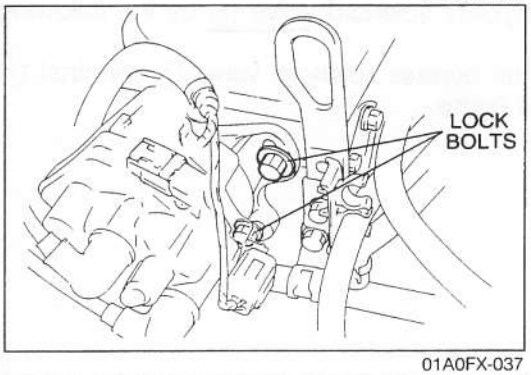
10. Set switch Ⓐ to position 1.
11. Set TEST SW to SELF-TEST.

Note

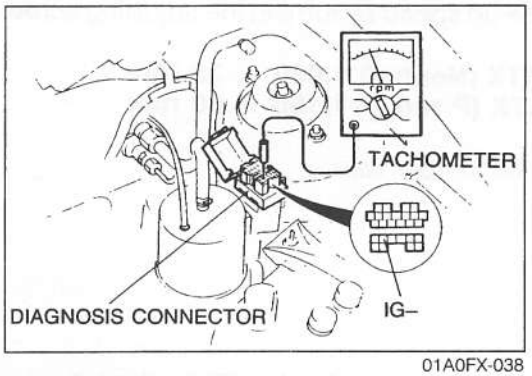
- **If the SST is not used, jump across the TEN terminal and the GND terminal of the diagnosis connector.**



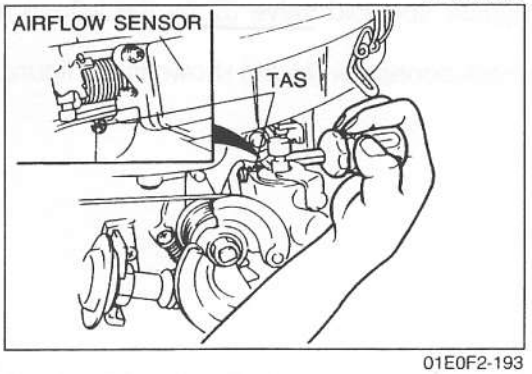
01A0FX-036



01A0FX-037



01A0FX-038



01E0F2-193

Ignition Timing
Inspection / Adjustment
1. Perform "Preparation". (Refer to page F–62.)
2. Verify that the idle speed is within the specification.

Idle speed: MTX (Neutral) 750 $^{+50}_{-0}$ rpm
ATX (P range) 1,100 $^{+50}_{-0}$ rpm

3. Check the ignition timing with a timing light.

Ignition timing: BTDC 16 ± 1°

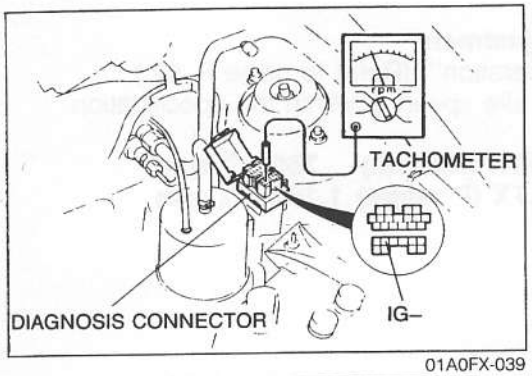
4. If the ignition timing is not within specification, loosen the distributor lock bolts and turn the distributor to make the adjustment.
5. Tighten the distributor lock bolts to the specified torque.

Tightening torque:
16—23 N·m (1.6—2.3 m-kg, 12—16 ft-lb)

Idle Speed
1. Perform "Preparation". (Refer to page F–62.)
2. Check the idle speed with a tachometer.

Idle speed: MTX (Neutral) 750 $^{+50}_{-0}$ rpm
ATX (P range) 1,100 $^{+50}_{-0}$ rpm

3. If not within specification, adjust the idle by tuning the throttle adjusting screw.



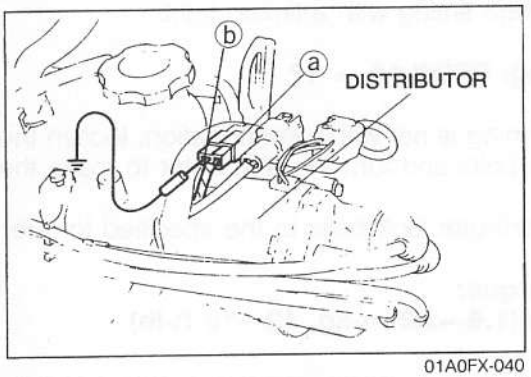
01A0FX-039

Idle-up Speed

1. Perform "Preparation". (Refer to page F–62.)
2. Check the idle speed with a tachometer.

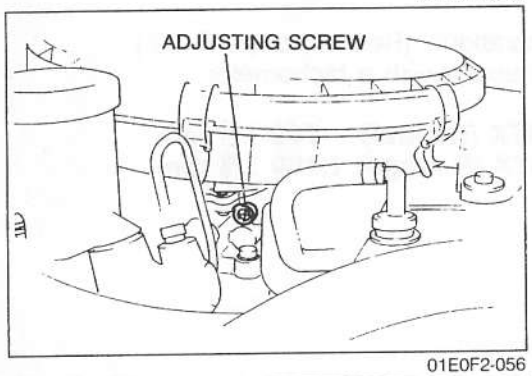
Idle speed: MTX (Neutral) 750 $^{+50}_{-0}$ rpm
ATX (P range) 1,100 $^{+50}_{-0}$ rpm

INSTAL ON THROTTLE BODY



01A0FX-040

3. Adjust the air bypass solenoid valve Ⓐ by the following procedure.
   1) Ground the air bypass solenoid valve Ⓐ terminal ⓑ shown in the figure.

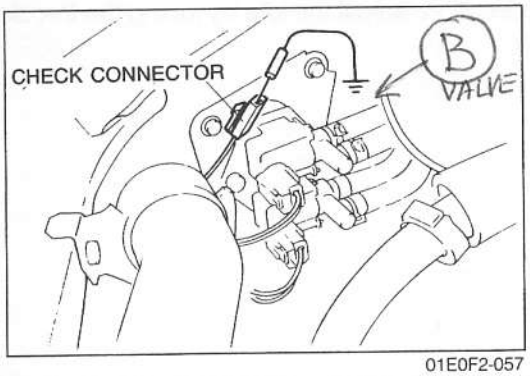


01E0F2-056

   2) Adjust the idle-up speed by turning the adjusting screw.

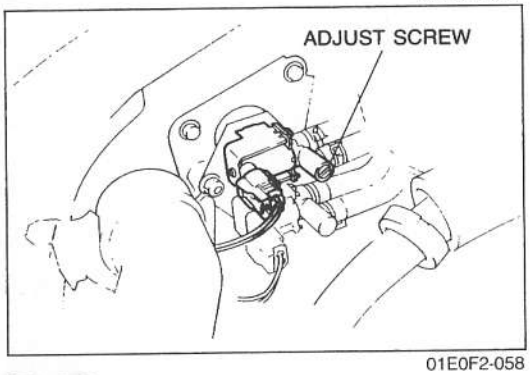
Idle speed: MTX (Neutral) 1,080 ± 30 rpm
ATX (P range) 1,350 ± 30 rpm

   3) Disconnect the jumper wire.



01E0F2-057

4. Adjust the air bypass solenoid valve Ⓑ by the following procedure.
   1) Ground the check connector (black) shown in the figure.

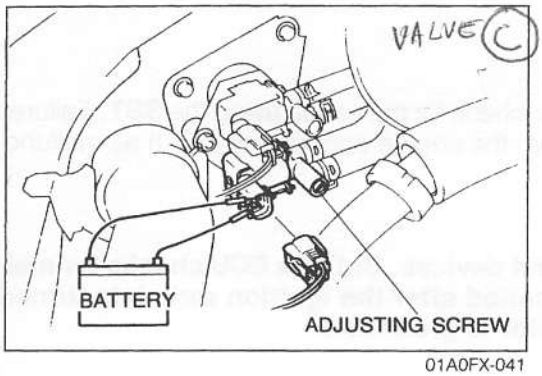


01E0F2-058

   2) Adjust the idle-up speed by turning the adjusting screw.

Idle speed: MTX (Neutral) 1,030 $^{+50}_{-0}$ rpm
ATX (P range) 1,700 $^{+50}_{-0}$ rpm

   3) Disconnect the jumper wire.



01A0FX-041

5. Adjust the air bypass solenoid valve Ⓒ by the following procedure.
   1) Disconnect the connector of the air bypass solenoid valve Ⓒ.
   2) Apply battery voltage to air bypass solenoid valve Ⓒ terminal.
   3) Adjust the idle-up speed by turning the adjusting screw.

   Idle speed: MTX (Neutral) 1,250 ± 25 rpm
   ATX (P range) 1,600 ± 25 rpm

   4) Install the connector of air bypass solenoid valve Ⓒ.

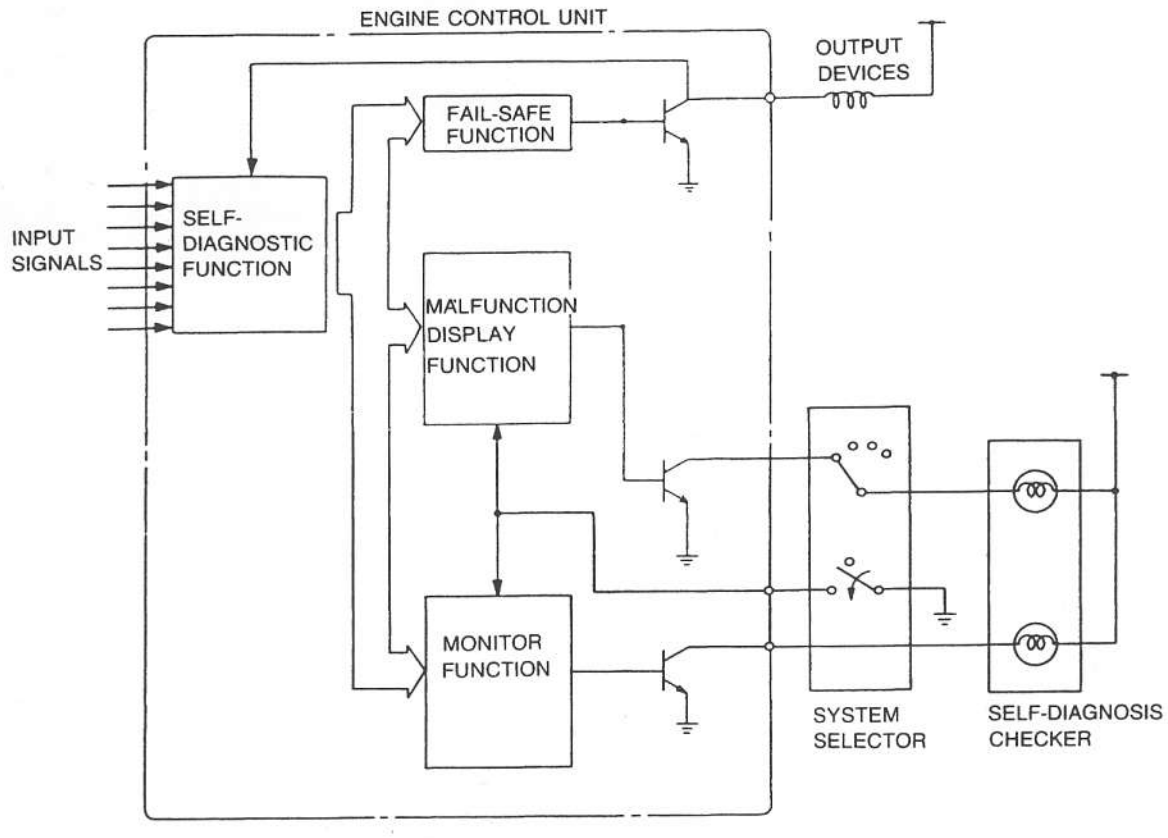
SELF-DIAGNOSIS FUNCTION

DESCRIPTION

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

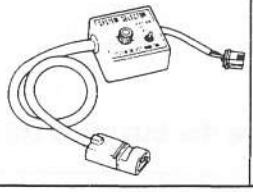
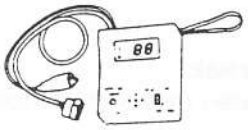
Note

- **The ECU constantly checks for malfunction of the input devices. But, the ECU checks for malfunction of output devices only in a three seconds period after the ignition switch is turned ON when the TEN terminal of the diagnosis connector is grounded.**

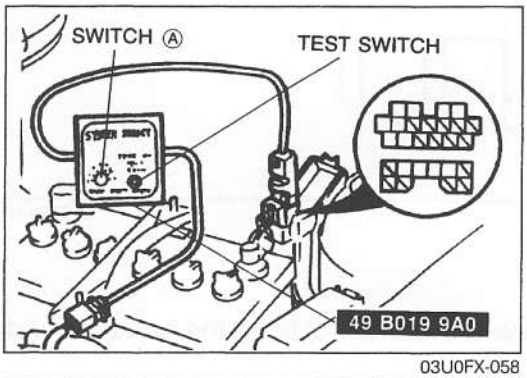


03U0FX-056

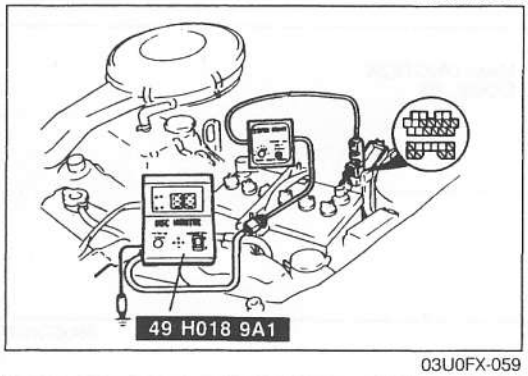
PREPARATION
SST

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

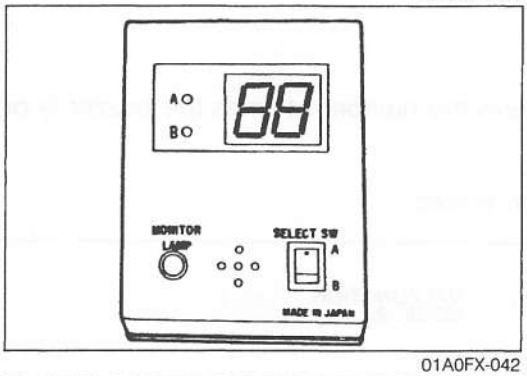
03U0FX-057



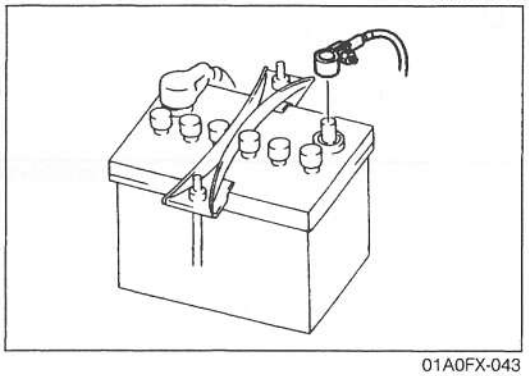
03U0FX-058



03U0FX-059



01A0FX-042



01A0FX-043

MALFUNCTION CODE NUMBER
Inspection Procedure

1. Connect the **SST** to the diagnosis connector.
2. Set switch Ⓐ to position 1.
3. Set TEST SW 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 that "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–124), power supply circuit, and diagnosis connector wiring.
9. If 88 flashes and the buzzer sounds continuously for more than **20 sec.**, check for a short circuit between the ECU terminal 1F and the diagnosis connector. Replace the ECU if necessary and 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–70** through **F–78**. Repair as necessary.

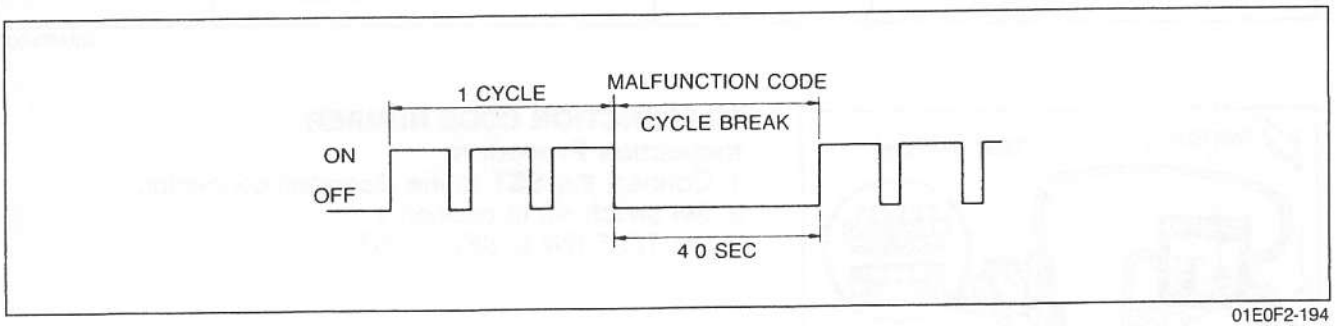
Note

- **Cancel the code numbers by performing the after-repair procedure following repairs. (Refer to page F–79.)**

Principle of Code Cycle
Malfunction codes are determined as shown below.

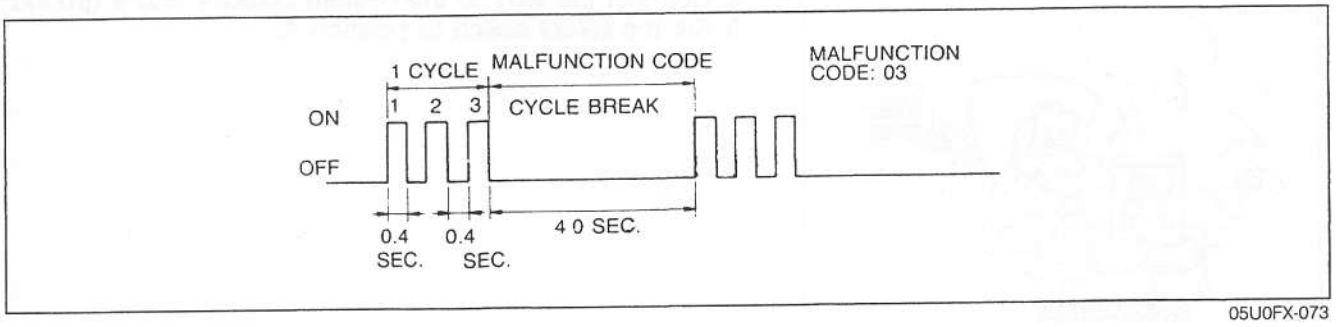
05U0FX-071

1. Code cycle break
The time between malfunction code cycles is 4.0 seconds (the time the buzzer is off).



01E0F2-194

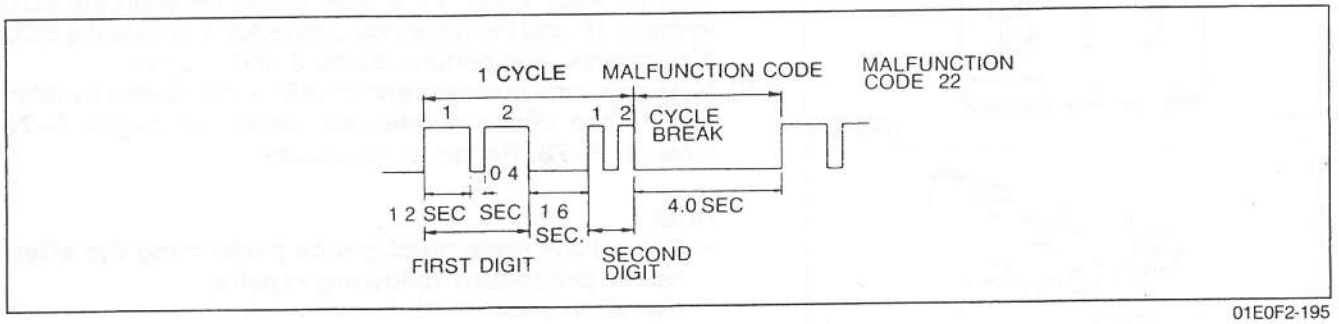
2. Second digit of malfunction code (ones position)
The digit in the ones position of the malfunction code represents the number of times the buzzer sounds 0.4 second during one cycle.



05U0FX-073

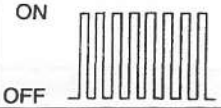
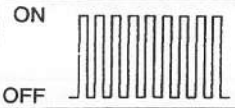
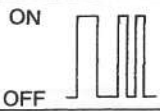
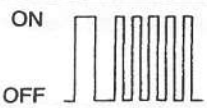
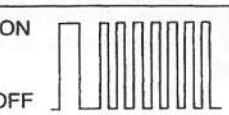
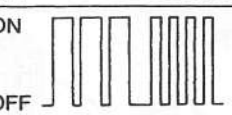
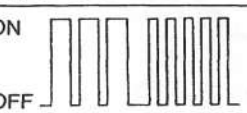
3. First digit of malfunction code (tens position)
The digit in the tens position of the malfunction code represents the number of times the buzzer is on 1.2 seconds during one cycle.

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



01E0F2-195

Code Numbers

Sensor or subsystem	Condition	Fail-safe	Malfunction display	
			Malfunction Code No.	Output signal pattern
Ne-signal	No Ne-signal while cranking	Stops fuel injection	02	
Airflow sensor	Open or short of airflow sensor circuit	Measures intake air amount by throttle valve opening angle	08	
Water thermosensor	Open or short of water thermosensor circuit	Maintains constant 20°C (68°F) command	09	
Throttle sensor	Open or short of throttle sensor circuit	Maintains constant 33-degree command	12	
Oxygen sensor	Lean signal continues unchanged 2 min. after engine exceeds 2,000 rpm	Cancels engine feedback operation	15	
Feedback system	Sensor output continues unchanged 40 sec. after engine exceeds 1,500 rpm	Cancels engine feedback operation	17	
Solenoid valve (purge control)	Open or short of purge control solenoid valve circuit	—	26	
Air bypass solenoid valve Ⓐ	Open or short of air bypass solenoid valve Ⓐ circuit	—	34	
Air bypass solenoid valve Ⓑ	Open or short of air bypass solenoid valve Ⓑ circuit	—	35	

01A0FX-044

Note

- **The buzzer sounds only for the ones position when using the Digital Code Checker. To judge the correct malfunction code number, refer to the digital display.**

Caution

- **If there is more than one failure present, the code numbers will be indicated in numerical order, lowest number first.**
- **After repairing a failure, perform the after-repair procedure. (Refer to page F–79.)**

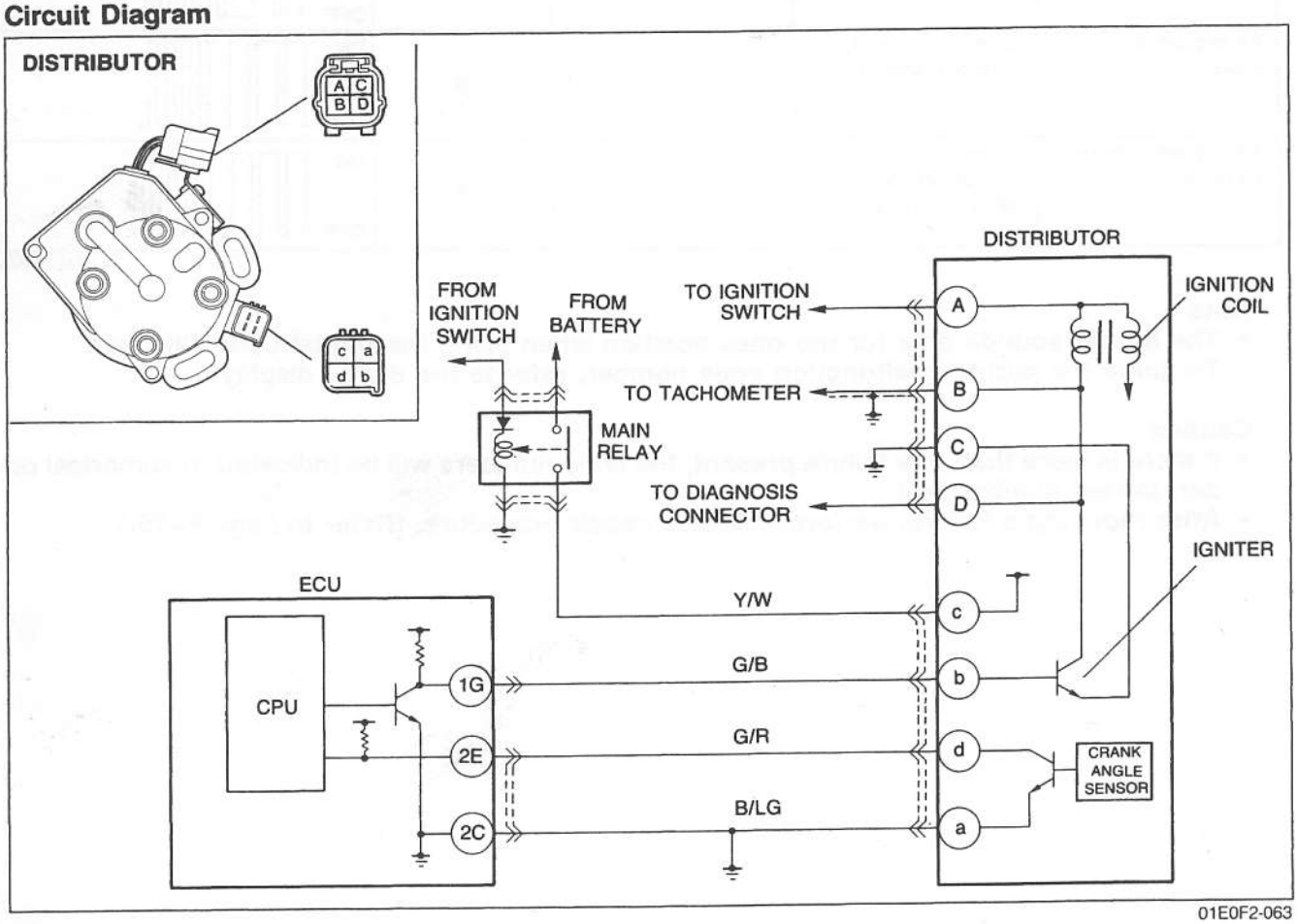
Troubleshooting

If a malfunction code number is shown on the **SST**, check for the cause by using the chart related to the code number shown.

CODE No.	02 (DISTRIBUTOR Ne-SIGNAL)		
STEP	INSPECTION		ACTION
1	Is there a poor connection in distributor circuit?	Yes	Repair or replace wiring
		No	Go to next step
2	Is there continuity between distributor terminal wire (B/LG) and ground?	Yes	Go to next step
		No	Check for open circuit in wiring from distributor to ground
3	Is there battery voltage at distributor terminal-wire (Y/W)?	Yes	Go to next step
		No	Check for open circuit in wiring from distributor to main relay (FUEL INJ relay)
4	Is there approx. 5V at ECU terminal 2E? (With distributor connector disconnected)	Yes	Go to next step
		No	Replace ECU
5	Is there approx. 5V distributor terminal-wire (G/R)? (At harness-side connector with disconnected)	Yes	Replace distributor
		No	Check for short or open circuit in wiring from distributor ECU terminal 2E

01E0F2-062

Circuit Diagram

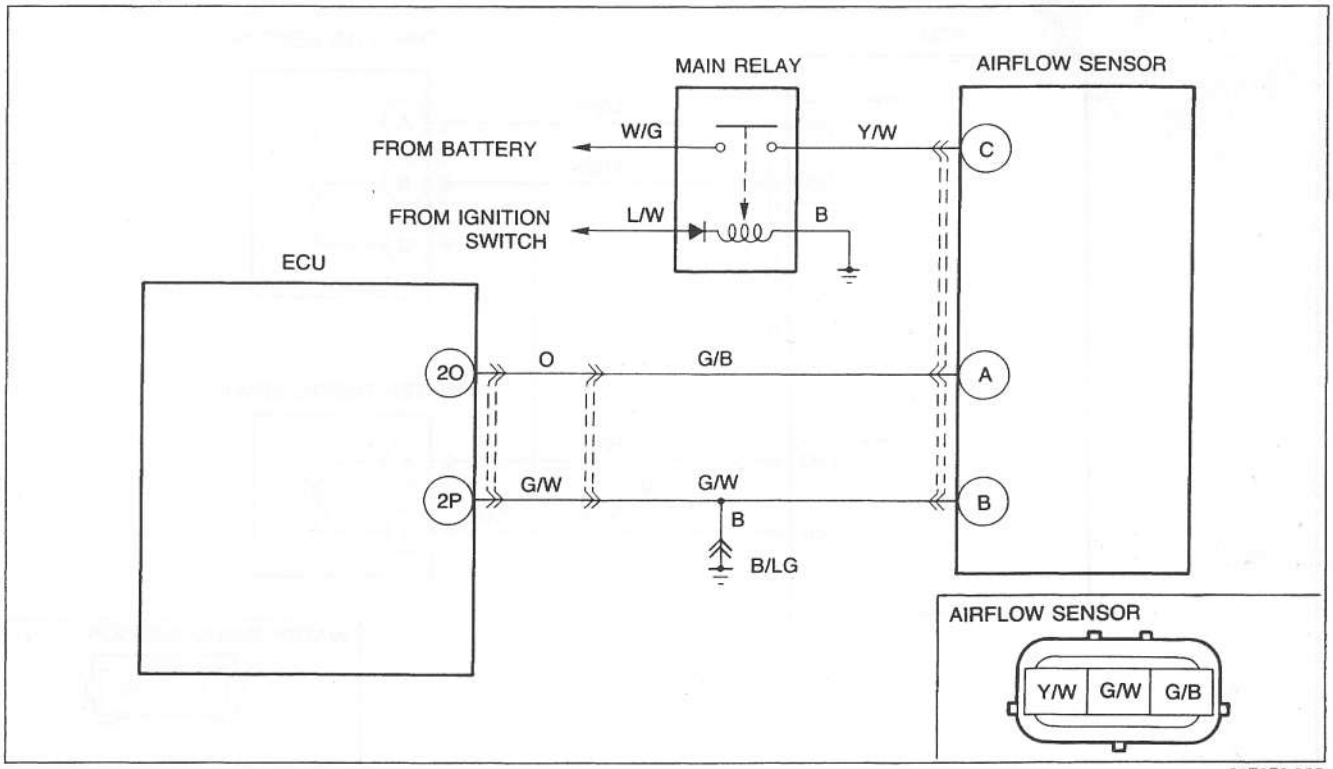


01E0F2-063

CODE No.	08 (AIRFLOW SENSOR)		
STEP	INSPECTION		ACTION
1	Is there poor connection in airflow sensor circuit?	Yes	Repair or replace wiring
		No	Go to next step
2	Is ECU terminal 2O voltage OK? ☞ **page F–118** Ignition switch ON: Approx. 0.4V Idle: Approx. 1.2V	Yes	Is same Code present after performing after-repair procedure? ☞ **page F–79** ⇨ If YES, replace ECU ⇨ If NO, recheck airflow sensor and ECU for poor connection
		No	Go to next step
3	Is there battery voltage at airflow sensor connector terminal C with airflow sensor connector disconnected?	Yes	Go to next step
		No	Check for short or open circuit in wiring from airflow sensor connector terminal C to main relay. ⇨ If OK, check main realy ⇨ If not OK, repair or replace
4	Is there continuity between airflow sensor terminal B and ground?	Yes	Go to next step
		No	Repair or replace wiring
5	Is resistance between airflow sensor terminals A and B OK? ☞ **page F–121** **Resistance: 4 ± 1 kΩ (20°C [68°F])**	Yes	Is there continuity between ECU terminal 2O and airflow sensor terminal A? ⇨ If OK, replace airflow sensor ⇨ If not OK, repair or replace
		No	Replace airflow sensor

01A0FX-045

Circuit Diagram

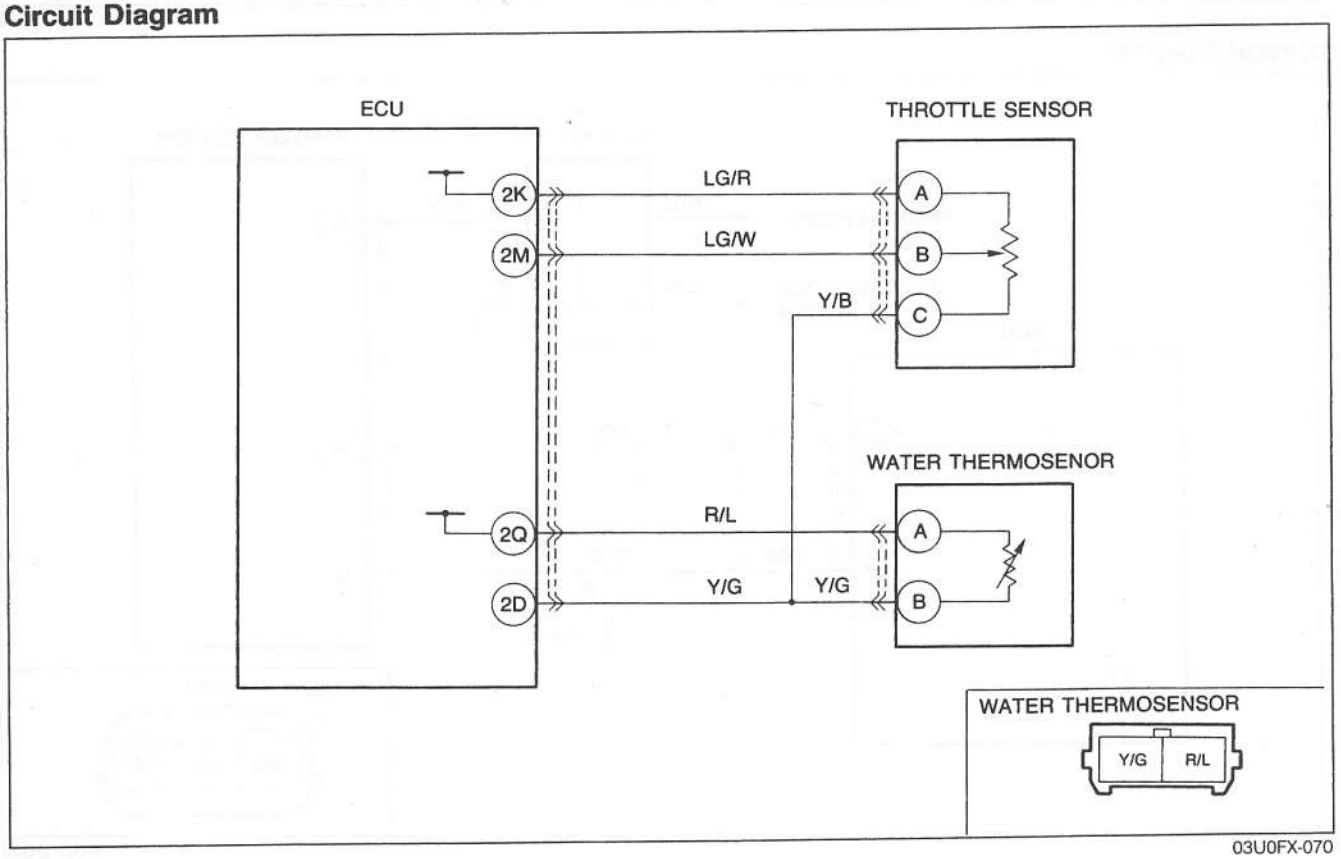


01E0F2-065

CODE No.	09 (WATER THERMOSENSOR)		
STEP	INSPECTION		ACTION
1	Is there a poor connection in water thermosensor circuit?	Yes	Repair or replace wiring
		No	Go to next step
2	Is there continuity between water thermosensor and ECU? Water thermosensor: A (R/L), B (Y/G) ECU: 2Q (R/L), 2D (Y/G)	Yes	Go to next step
		No	Repair wiring
3	Is resistance of water thermosensor correct? Coolant temp. / Resistance (kΩ) –20°C (–4°F) / 14.6—17.8 20°C (68°F) / 2.21—2.69 80°C (176°F) / 0.29—0.35	Yes	Go to next step
		No	Replace water thermosensor
4	Is same Code No. present following after-repair procedure? ☞ page F–67	Yes	Go to next step
		No	Water thermosensor and circuit OK
5	Are ECU terminals 2D and 2Q voltages correct? ☞ page F–116	Yes	Replace ECU ☞ page F–112
		No	Check for short circuit in wiring from water thermosensor to ECU

01A0FX-046

Circuit Diagram

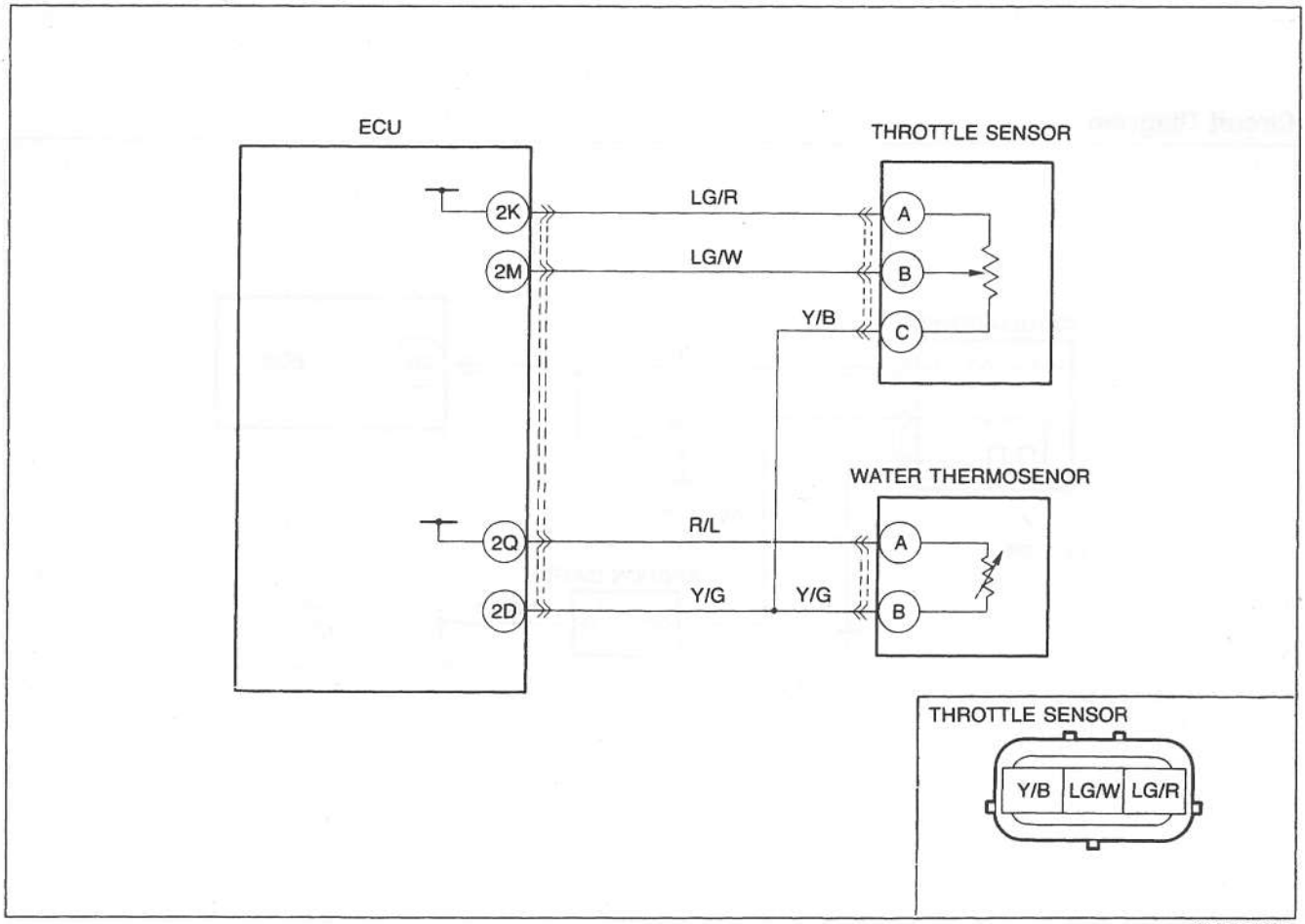


03U0FX-070

CODE No.	12 (THROTTLE SENSOR)		
STEP	INSPECTION		ACTION
1	Is there a poor connection in throttle sensor circuit?	Yes	Repair or replace wiring
		No	Go to next step
2	Is there continuity between throttle sensor and ECU? Throttle sensor – ECU A (LG/R) – 2K (LG/R) B (LG/W) – 2M (LG/W) D (Y/B) – 2D (Y/G)	Yes	Go to next step
		No	Repair wiring
3	Is resistances between terminals B (LG/W) and C (Y/B) correct? Throttle valve – Resistance Fully closed – Below 1 kΩ Fully open – Approx. 5 kΩ	Yes	Go to next step
		No	Adjust or replace throttle sensor ☞ **page F–122**
4	Is ECU terminal 2M voltage correct? ☞ **page F–116**	Yes	Replace ECU ☞ **page F–112**
		No	Check for short circuit in wiring from throttle sensor to ECU

01A0FX-047

Circuit Diagram

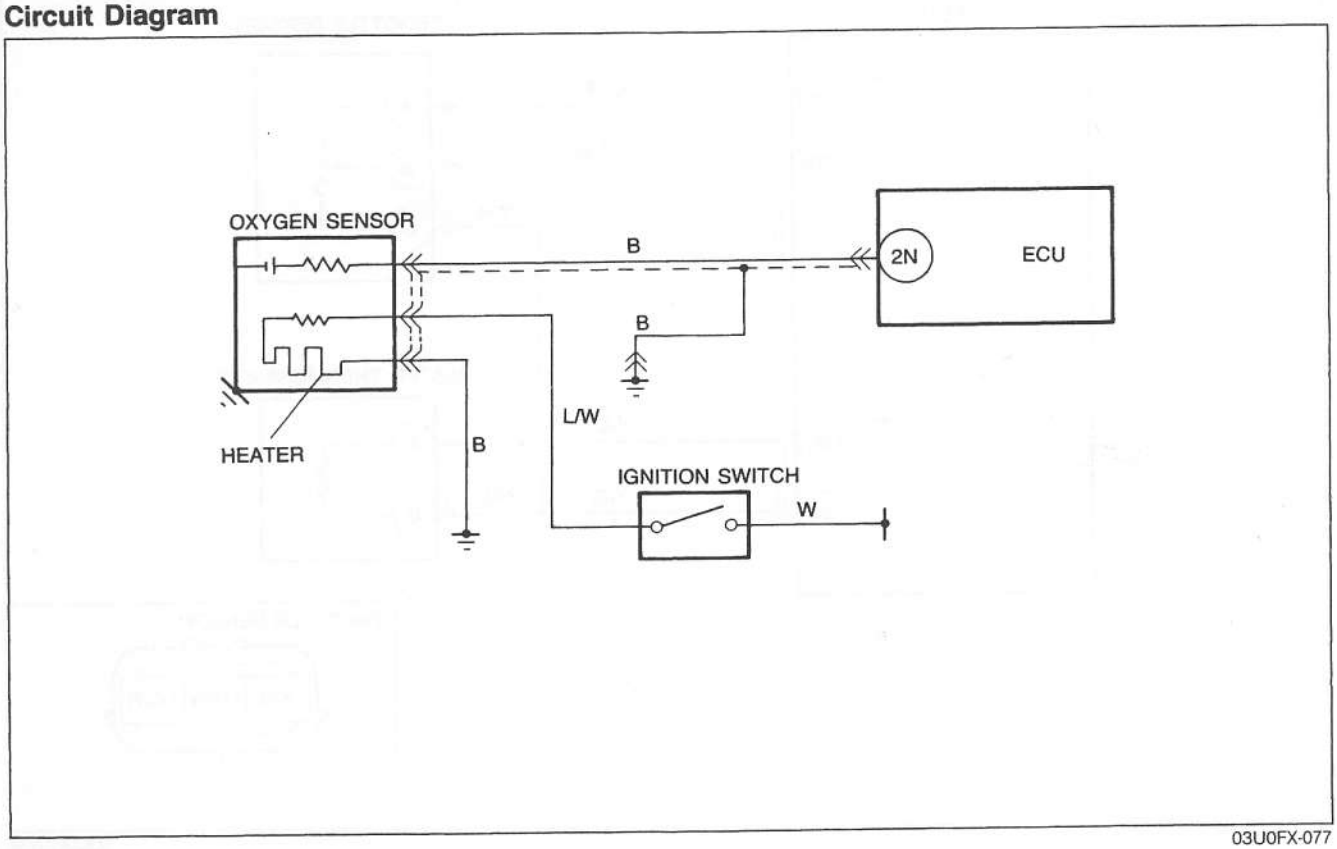


03U0FX-074

CODE No.	15 (OXYGEN SENSOR — INACTIVATION)		
STEP	INSPECTION		ACTION
1	Is there a poor connection in oxygen sensor circuit?	Yes	Repair or replace wiring
		No	Go to next step
2	Is oxygen sensor output voltage correct? ☞ page F–123	Yes	Go to next step
		No	Replace oxygen sensor
3	Is there continuity between oxygen sensor and ECU terminal 2N?	Yes	Go to next step
		No	Repair wiring
4	Is ECU terminal 2N voltage correct? ☞ page F–118	Yes	Go to next step
		No	Check for short circuit in wiring from oxygen sensor to ECU
5	Is sensitivity of oxygen sensor correct? ☞ page F–123	Yes	Replace ECU ☞ page F–112
		No	Try known good oxygen sensor and check if condition improves ☞ page F–124

01A0FX-048

Circuit Diagram

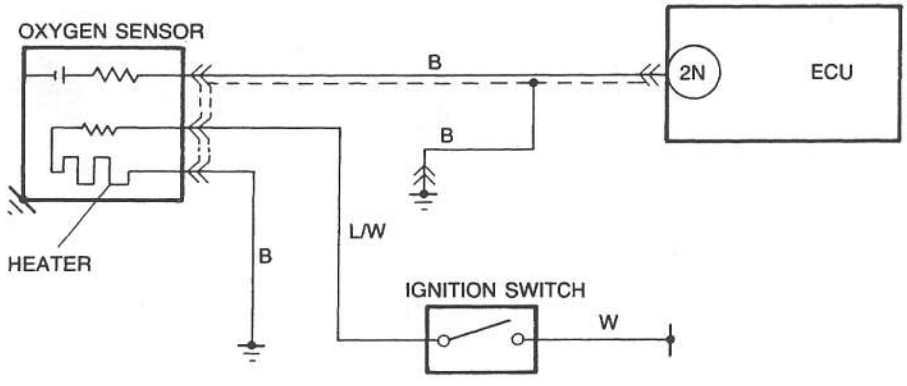


03U0FX-077

CODE No.	17 (FEEDBACK SYSTEM)		
STEP	INSPECTION		ACTION
1	Is same Code No. present after performing after-repair procedure? ☞ **page F–67**	Yes	Go to next step
		No	Check oxygen sensor circuit for poor connection ⇨ If OK, perform troubleshooting Code No.15 ☞ **page F–74** ⇨ If not OK, repair or replace connector
2	Check monitor lamp of Self-Diagnosis Checker illuminate at idle after warming-up engine and running it at **2,500—3,000 rpm** for **3 minutes**?	Yes	Go to next step **Note** • **A/F mixture is rich**
		No	Go to Step 5 **Note** • **A/F mixture is lean or misfire occuring**
3	Is fuel line pressure at idle correct? ☞ **page F–94** **Fuel line pressure: 235—275 kPa (2.4—2.8 kg/cm², 34—40 psi) (Vacuum hose to pressure regulator disconnected)**	Yes	Go to next step
		No	**High pressure** Is fuel return hose clogged or restricted? ⇨ If OK, replace pressure regulator ☞ **page F–94** ⇨ If not OK, repair or replace hose
4	Is there leakage of fuel injector? ☞ **page F–97**	Yes	Replace injector
		No	Is water thermosensor OK? ☞ **page F–121** ⇨ If OK, Go to Step 7 ⇨ If not OK, replace water thermosensor ☞ **page F–121**
5	Disconnect each high-tension lead at idle; does engine speed decrease equally at each cylinder?	Yes	Go to next step
		No	Go to Step 8

01A0FX-049

Circuit Diagram



03U0FX-079

STEP	INSPECTION		ACTION
6	Is fuel line pressure at idle correct? ☞ **page F–94** **Fuel line pressure:** **235—275 kPa (2.4—2.8 kg/cm², 34—40 psi)** **(Vacuum hose to pressure regulator disconnected)**	Yes	Go to next step
		No	**Low pressure** Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ☞ **page F–95** ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure ☞ **page F–91**
7	Is there air leakage in intake air system components?	Yes	Replace
		No	Go to Step 10
8	Was misfire found in Step 5 of inspection?	Yes	Repair or replace ignition system
		No	Go to next step
9	Replace injector Is same Code No. present following performing after-repair procedure? ☞ **page F–67**	Yes	Go to next step
		No	Replace injector
10	Try known good ECU; does condition improve? ☞ **page F–112**		

01A0FX-050

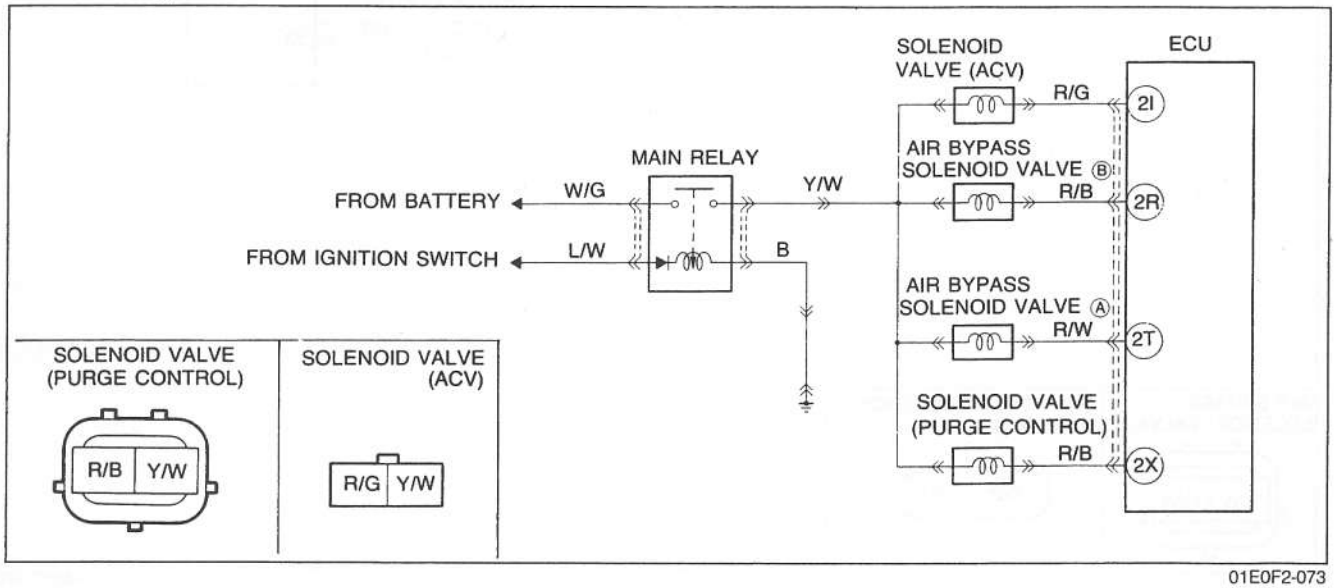
CODE No.	26 (SOLENOID VALVE — PURGE CONTROL)		
STEP	INSPECTION		ACTION
1	Disconnect connector from ECU Is there battery voltage at ECU terminal 2X wire harness (R/B) with ignition switch ON?	Yes	Check ECU terminal connector for poor connection ⇨ If OK, replace ECU ☞ page F–112 ⇨ If not OK, repair or replace wiring
		No	Go to next step
2	Keep condition Step 1 Is there battery voltage at solenoid valve connector terminal-wire (R/B)?	Yes	Repair wiring (R/B)
		No	Go to next step
3	Is solenoid valve OK? ☞ page F–101	Yes	Check for short or open circuit in wiring from main relay (FUEL INJ relay) to solenoid valve
		No	Replace solenoid valve

01A0FX-051

CODE No.	34 (AIR BYPASS SOLENOID VALVE Ⓐ)		
STEP	INSPECTION		ACTION
1	Disconnect connector from ECU Is there battery voltage at ECU terminal 2T wire harness (R/W) with ignition switch ON?	Yes	Check ECU terminal connector for poor connection ⇨ If OK, replace ECU ☞ page F–112 ⇨ If not OK, repair or replace wiring
		No	Go to next step
2	Keep condition as Step 1 Is there battery voltage at solenoid valve connector terminal-wire (R/W)?	Yes	Repair wiring (R/W)
		No	Go to next step
3	Is solenoid valve OK? ☞ page F–109	Yes	Check for short or open circuit in wiring from main relay (FUEL INJ relay) to solenoid valve
		No	Replace solenoid valve

01A0FX-052

Circuit Diagram

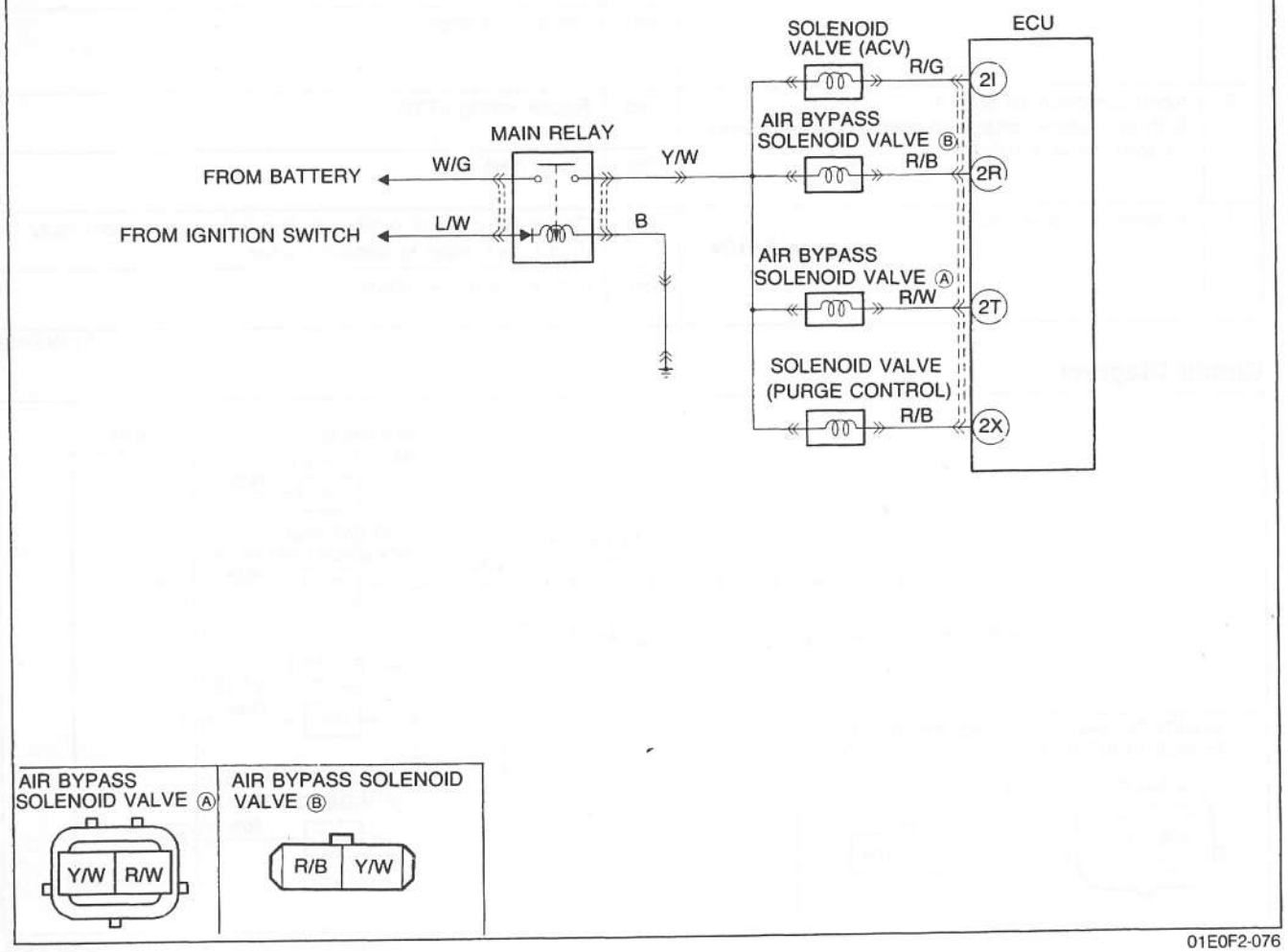


01E0F2-073

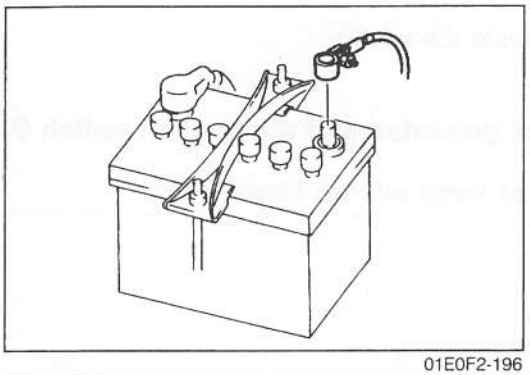
CODE No.	35 (AIR BYPASS SOLENOID VALVE Ⓑ)		
STEP	INSPECTION		ACTION
1	Disconnect connector from ECU Is there battery voltage at ECU terminal 2R wire (R/B) with ignition switch ON?	Yes	Check ECU terminal connector for poor connection ⇨ If OK, replace ECU ☞ page F–112 ⇨ If not OK, repair or replace wiring
		No	Go to next step
2	Keep condition as Step 1 Is there battery voltage at solenoid valve connector terminal-wire (R/B)?	Yes	Repair wiring (R/B)
		No	Go to next step
3	Is solenoid valve OK? ☞ page F–109	Yes	Check for short or open circuit in wiring from main relay to solenoid valve
		No	Replace solenoid valve

01A0FX-053

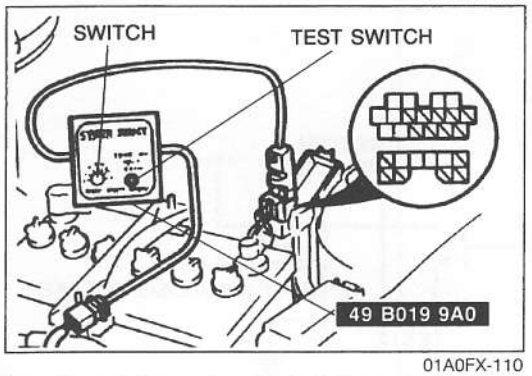
Circuit Diagram



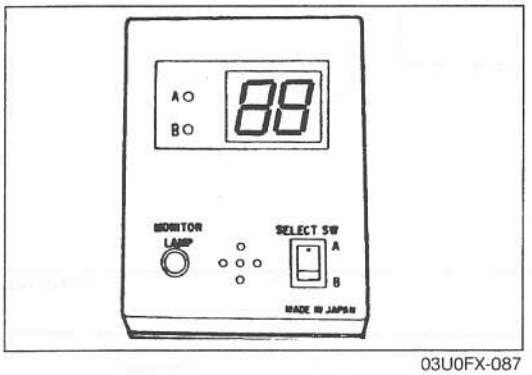
01E0F2-076



01E0F2-196



01A0FX-110



03U0FX-087

After-repair Procedure

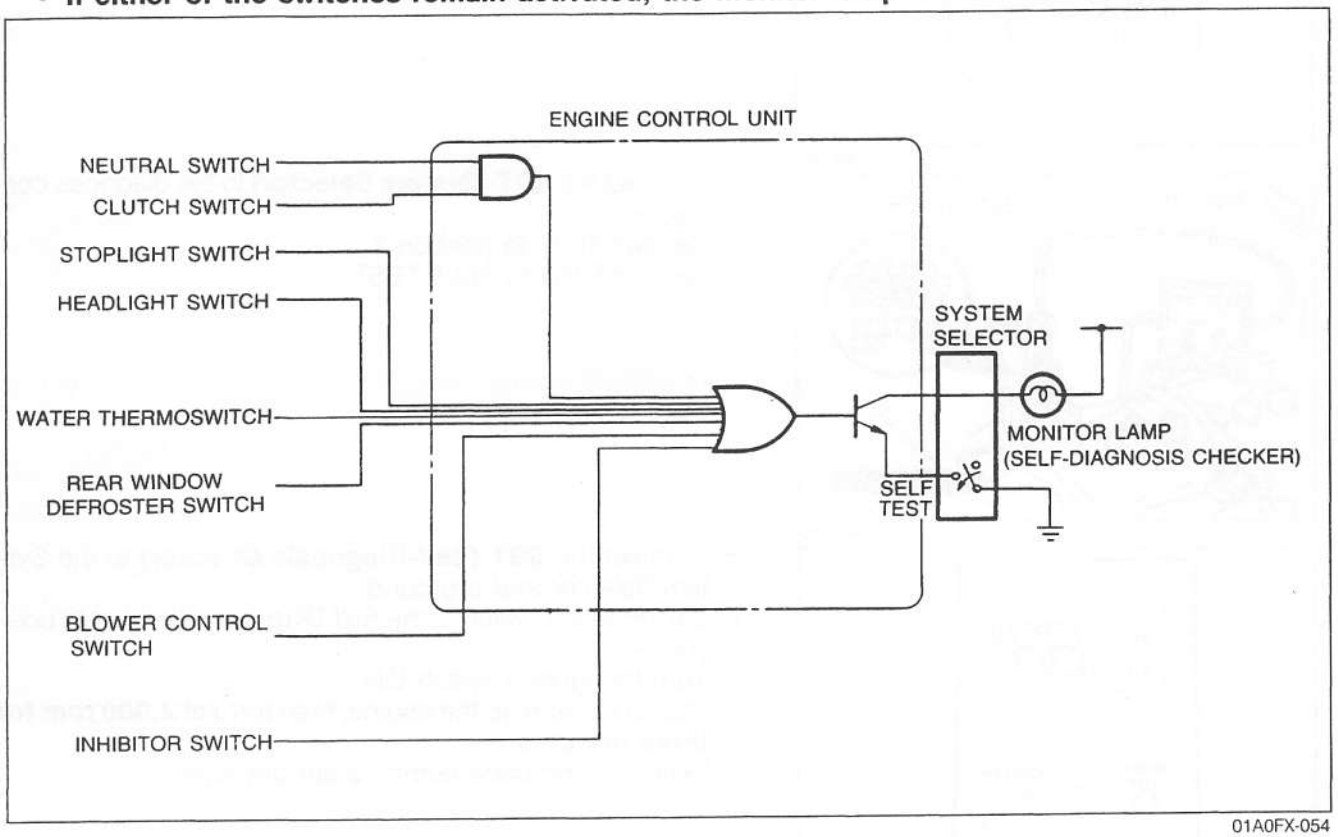
1. Cancel the memory of malfunctions from the ECU by disconnecting the negative battery cable and depressing the brake pedal for **at least three seconds**. Reconnect the negative battery cable.
2. Connect the **SST (System Selector)** to the diagnosis connector.
3. Set switch Ⓐ to position 1.
4. Set TEST SW to SELF-TEST.
5. Connect the **SST (Self-Diagnosis Checker)** to the System Selector and a ground.
6. Set the select switch of the Self-Diagnosis Checker to position A.
7. Turn the ignition switch ON.
8. Start and warm up the engine, then run it at **2,000 rpm for three minutes**.
9. Verity that no code numbers are displayed.

SWITCH MONITOR FUNCTION

Individual switches can be inspected by the **SST (Self-Diagnosis Checker)**.

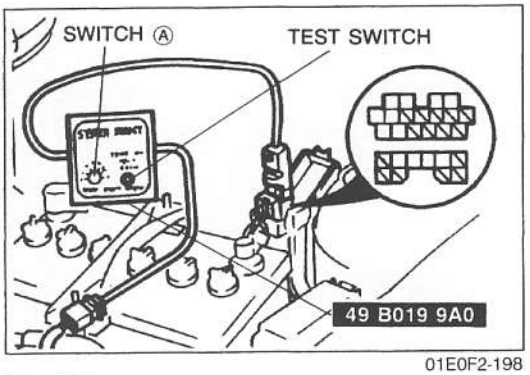
Note

- **The TEN terminal of the diagnosis connector must be grounded and the ignition switch ON (engine stopped).**
- **If either of the switches remain activated, the monitor lamp will be illuminated.**



01A0FX-054

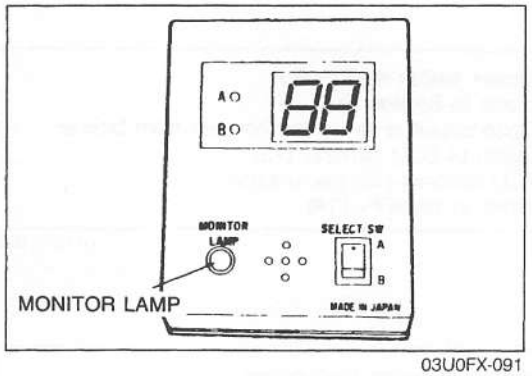
Switch		Self-Diagnosis Checker (Monitor lamp)		Remark
		Light ON	Light OFF	
Clutch switch	(MTX)	Pedal released	Pedal depressed	In gear
Neutral switch	(MTX)	In gear	Neutral	Clutch pedal released
Stoplight switch		Pedal depressed	Pedal released	—
Headlight switch		ON	OFF	Headlights/small lights. ON
Water thermoswitch		ON	OFF	—
Rear window defroster switch		ON	OFF	—
Blower switch		ON	OFF	—
Inhibitor switch	(ATX)	L, S, D or R range	N or P range	—



01E0F2-198

Inspection Procedure

1. Connect the **SST (System Selector)** to the diagnosis connector.
2. Set switch Ⓐ to position 1.
3. Set TEST SWITCH to SELF-TEST.



03U0FX-091

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 monitor lamp illuminates when each switch is made to function as described below.

Caution
- **If either of the switches remain 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

Verify that monitor lamp does not illuminate

NO →
Check each switch and related wiring harness
- Clutch and Neutral switch .Refer to pages F–124, 125
- Stoplight switch :Refer to Section T
- Headlight switch Refer to Section T
- Water thermoswitch Refer to Section E
- Rear defroster switch :Refer to Section T
- Blower switch Refer to Section T
- Inhibitor switch :Refer to Section K

YES ↓
Check each switch as described

01A0FX-055

Neutral and Clutch Switches (MTX)

Shift transmission into gear
Is monitor lamp illuminated with clutch pedal released?

NO →
PC
- Neutral or clutch switch malfunction (Refer to pages F–124, 125)
- Open circuit in related wiring harness
- ECU terminal (1V) malfunction (Refer to page F–116)

YES ↓

Depress clutch pedal
Does monitor lamp go out?
Return transmission to neutral

NO →
PC
- Clutch switch malfunction (Refer to page F–124)

01A0FX-056

Stoplight switch

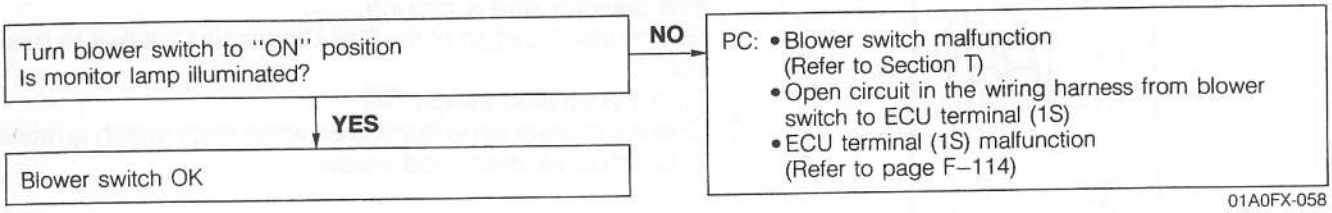
Depress brake pedal
Is monitor lamp illuminated?

NO →
PC.
- Stoplight switch malfunction (Refer to Section T)
- Open circuit in wiring harness from stoplight switch to ECU
- ECU terminal (1O) malfunction (Refer to page F–114)

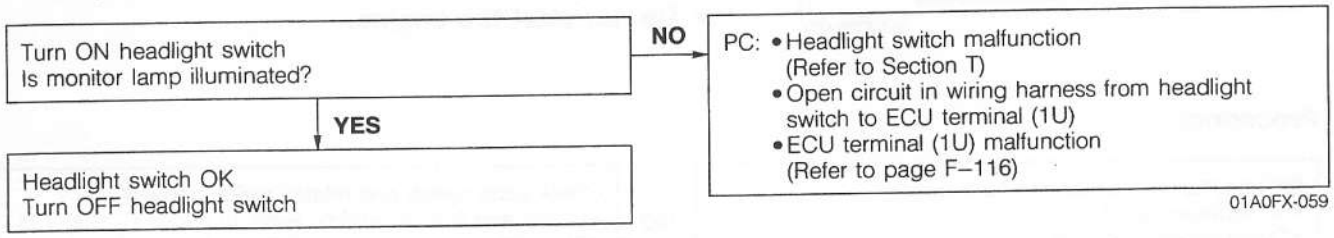
YES ↓
Stoplight switch OK
Release brake pedal

01A0FX-057

Blower switch



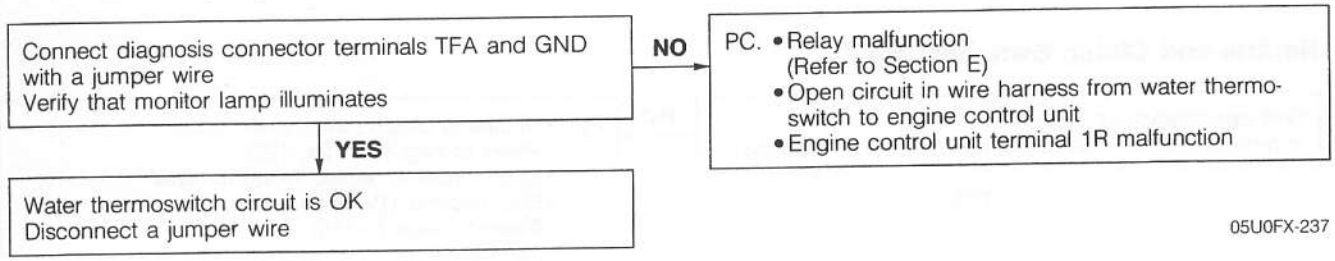
Headlight switch



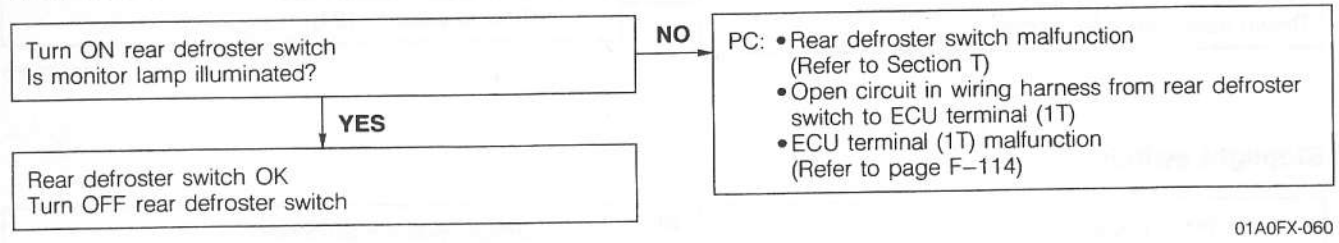
Water thermoswitch circuit (not included in switch inspection)

Warning

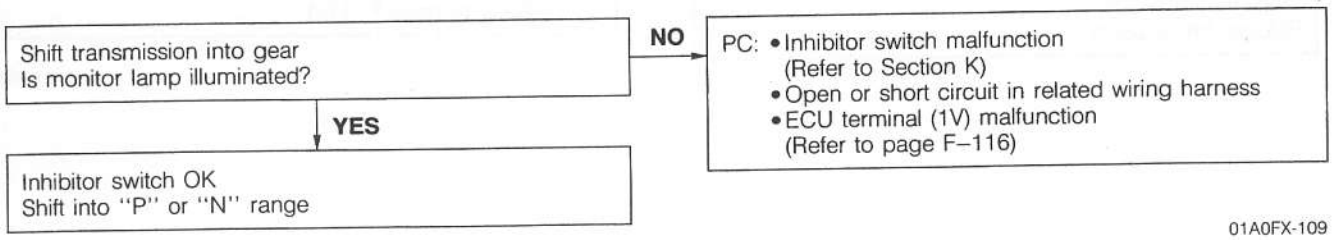
- **The cooling fan operates when the diagnosis connector terminals TFA and GND are connected with a jumper wire. Use caution.**



Rear defroster switch



Inhibitor switch (ATX)

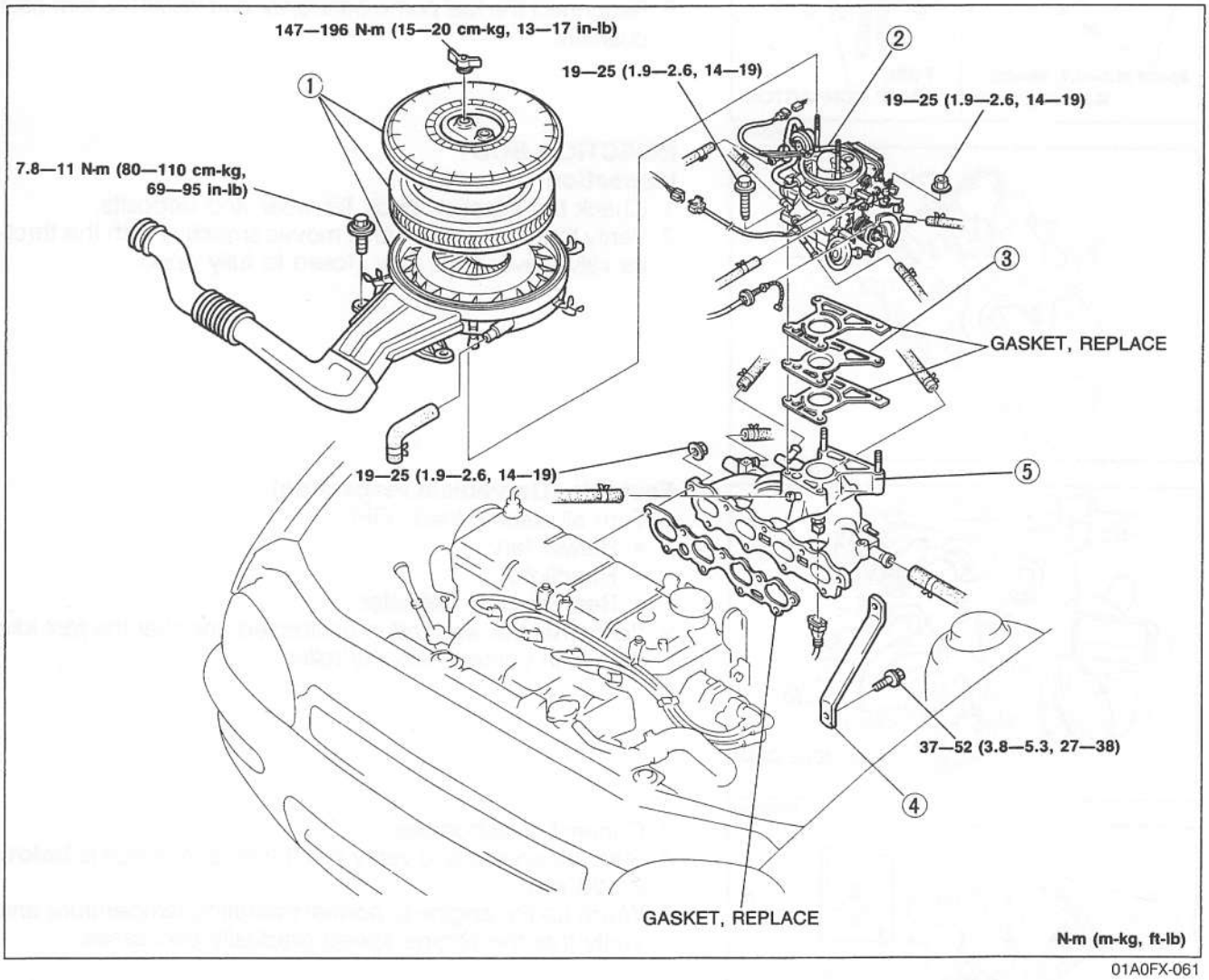


INTAKE AIR SYSTEM

COMPONENT PARTS

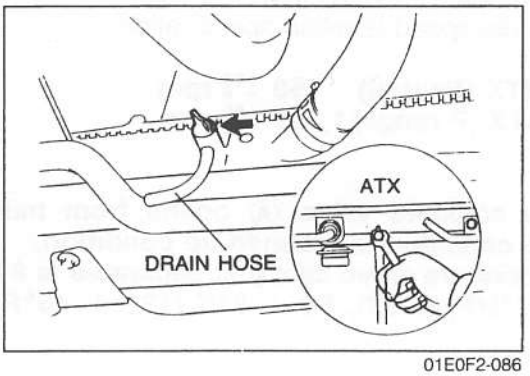
Removal / Inspection / Installation

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Visually inspect the intake air system components and repair or replace as necessary.
3. Install in the reverse order of removal.



01A0FX-061

1. Air cleaner
   Inspect for excessive dirt or damage
2. Injection body
   Inspection ..... page F–84
   Disassembly / Assembly ..... page F–85
3. Baffle
   Inspection ..... page F–86
4. Intake manifold stay
5. Intake manifold
   Inspection ..... page F–86



01E0F2-086

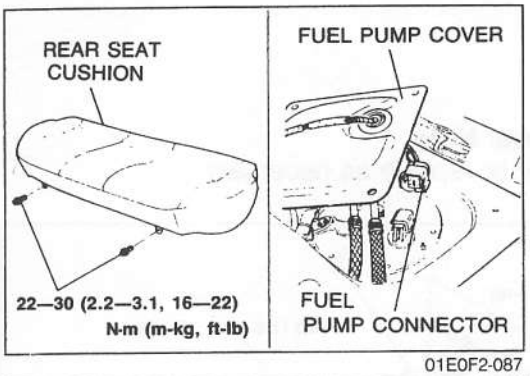
Removal Note

Coolant

1. Drain the coolant into a suitable container before removing the injection body.
2. Refill with coolant after installation.

Caution

- **Before loosening the radiator drain plug verify that the radiator drain hose faces straight down.**

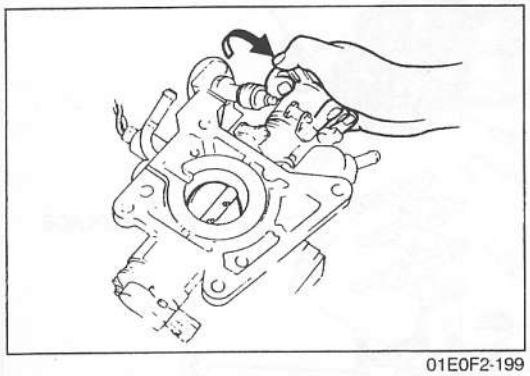


01E0F2-087

Fuel Pressure Release

Before disconnecting any fuel line, release the fuel pressure from the fuel system to reduce the possibility of injury or fire.

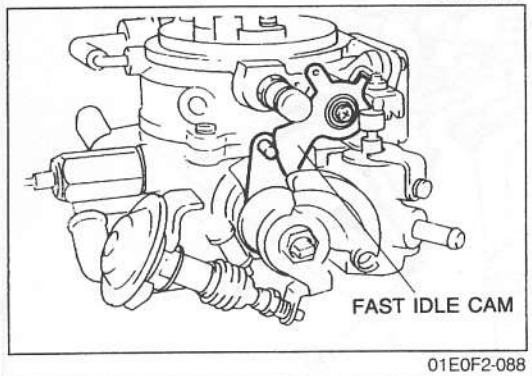
1. Start the engine.
2. Remove the rear seat cushion.
3. Disconnect the fuel pump connector.
4. After the engine stalls, turn off the ignition switch.
5. Reconnect the fuel pump connector and install the rear seat cushion.


01E0F2-199

INJECTION BODY

Inspection

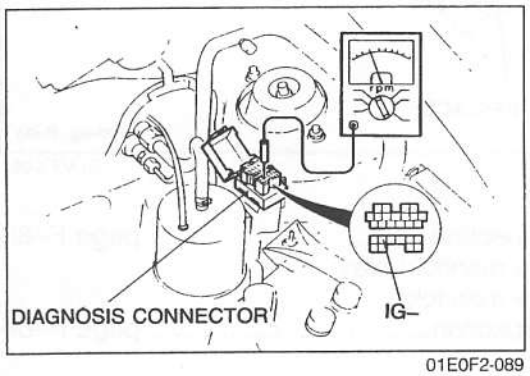
1. Check the injection body for wear and deposits.
2. Verify that the throttle valve moves smoothly with the throttle valve lever from fully closed to fully open.



01E0F2-088

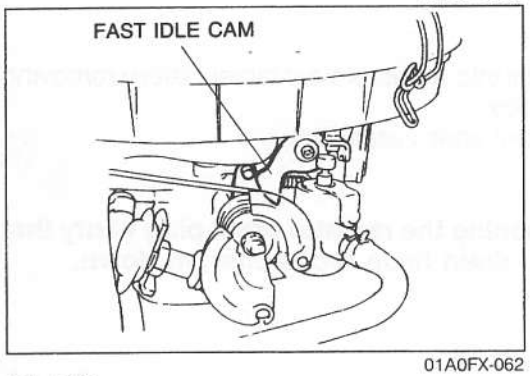
Fast-idle (On-vehicle inspection)

1. Turn all electric loads OFF.
   - Blower fan
   - Headlight
   - Rear window defroster
2. Verify that the wax rod is contracted and that the fast idle cam is in contact with the roller.



01E0F2-089

3. Connect a tachometer.
4. Start the engine and verify that the engine speed is **below 2,500 rpm**.
5. Warm up the engine to normal operating temperature and verify that the engine speed gradually decreases.



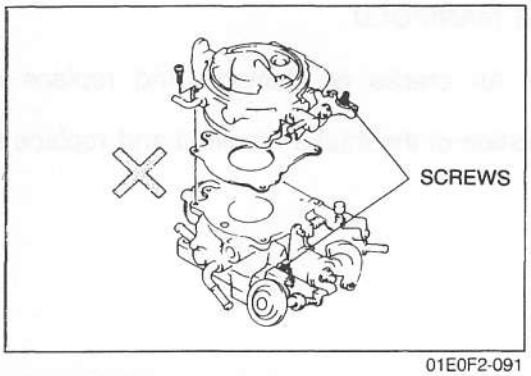
01A0FX-062

6. After the engine warms up, verify that the wax rod extends fully and that the cam separtes from the roller.
7. Verify that the idle speed is within specification.

Idle speed: MTX (Neutral) 750 $^{+50}_{-0}$ rpm
ATX (P range) 1,100 $^{+50}_{-0}$ rpm

Note

- **Air bypass solenoid valve Ⓐ opens from half warmed up condition to warmed up condition.**
- **Water temperature when cam just separates is 61 $^{+5}_{-6}$°C (142 $^{+41}_{-43}$°F) (MTX), 55 ± 8°C (131 ± 46°F) (ATX).**



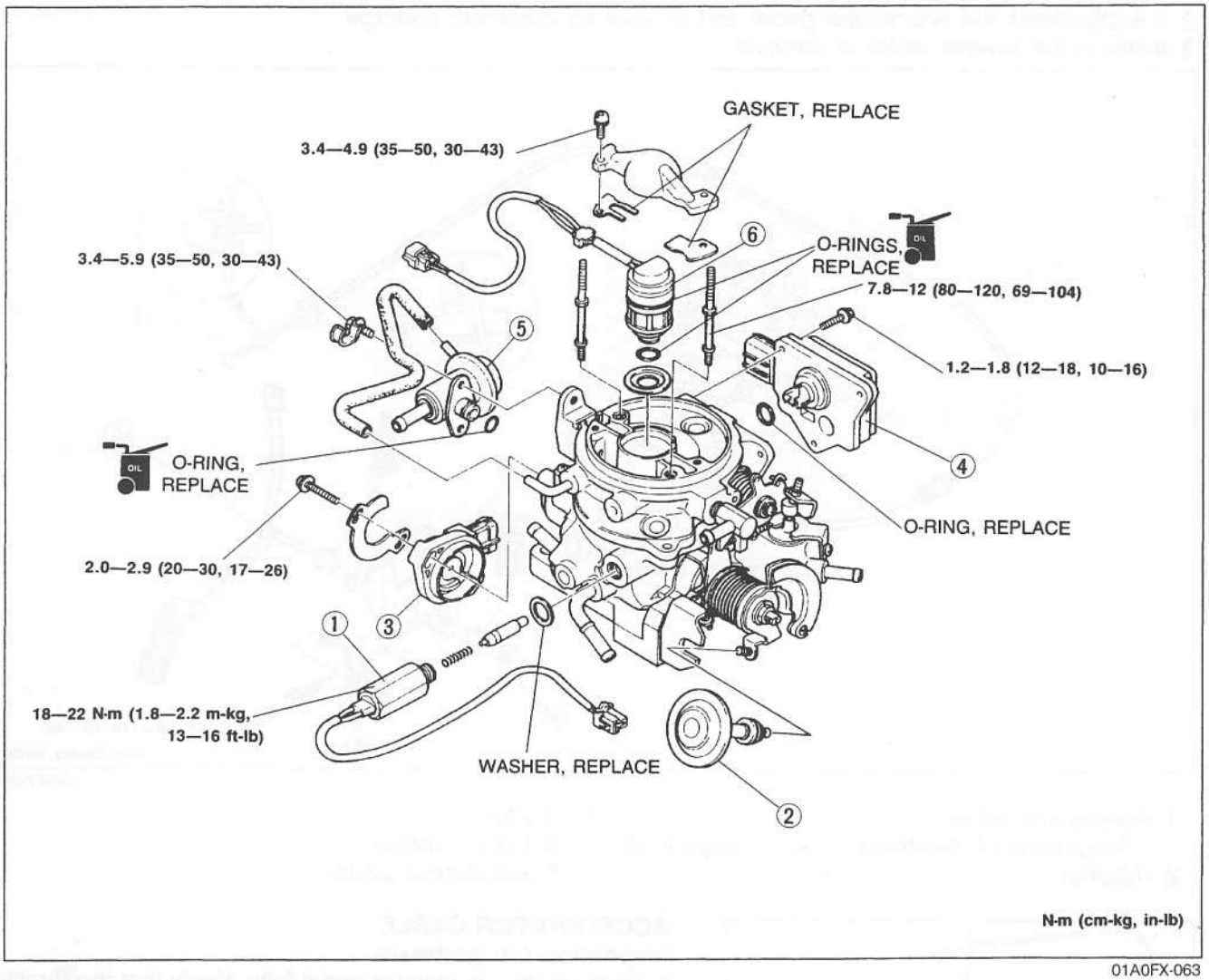
01E0F2-091

8. Replace the injection body if necessary.

Caution
- **Do not disassemble the injection body.**
- **Do not turn the screws shown in the figure.**

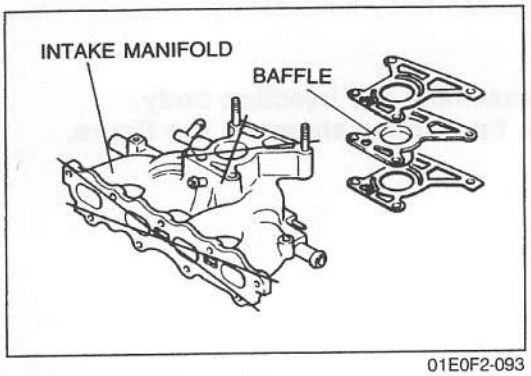
Disassembly / Assembly

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.



01A0FX-063

1. Air bypass solenoid valve Ⓐ
   Inspection ..... page F–109
2. Dashpot
   Inspection ..... page F–104
3. Throttle sensor
   Inspection ..... page F–122
   Adjustment ..... page F–122
   Removal / Installation ..... page F–122
4. Airflow sensor
   Inspection ..... page F–121
5. Pressure regulator
   Inspection ..... page F– 94
   Replacement ..... page F– 94
6. Injector
   Inspection (on-vehicle) ..... page F– 95
   Removal / Installation ..... page F– 96



01E0F2-093

BAFFLE/INTAKE MANIFOLD

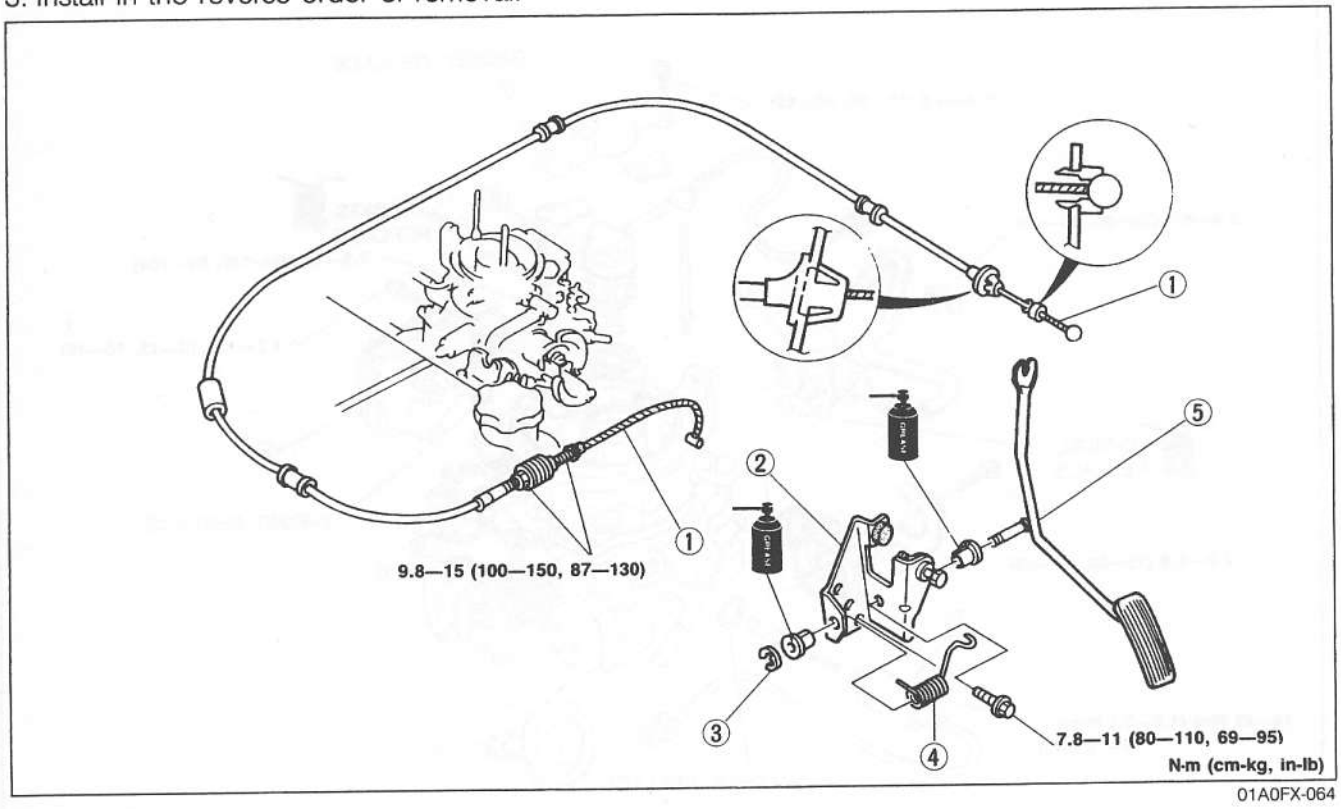
Inspection

1. Visually check for cracks or damage and replace if necessary.
2. Check for distortion of the intake manifold and replace if necessary.

ACCELERATOR PEDAL

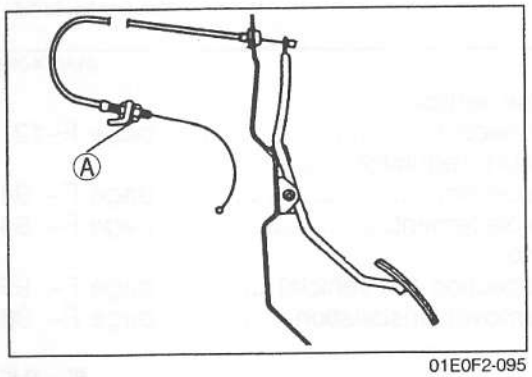
Removal / Inspection / Installation

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.



01A0FX-064

1. Accelerator cable
   Inspection / Adjustment..... page F–86
2. Retainer
3. Clip
4. Return spring
5. Accelerator pedal



01E0F2-095

ACCELERATOR CABLE

Inspection / Adjustment

1. Depress the accelerator pedal fully. Verify that the throttle valve is fully opened by turning the throttle lever by hand.
2. Inspect the play of the accelerator cable.

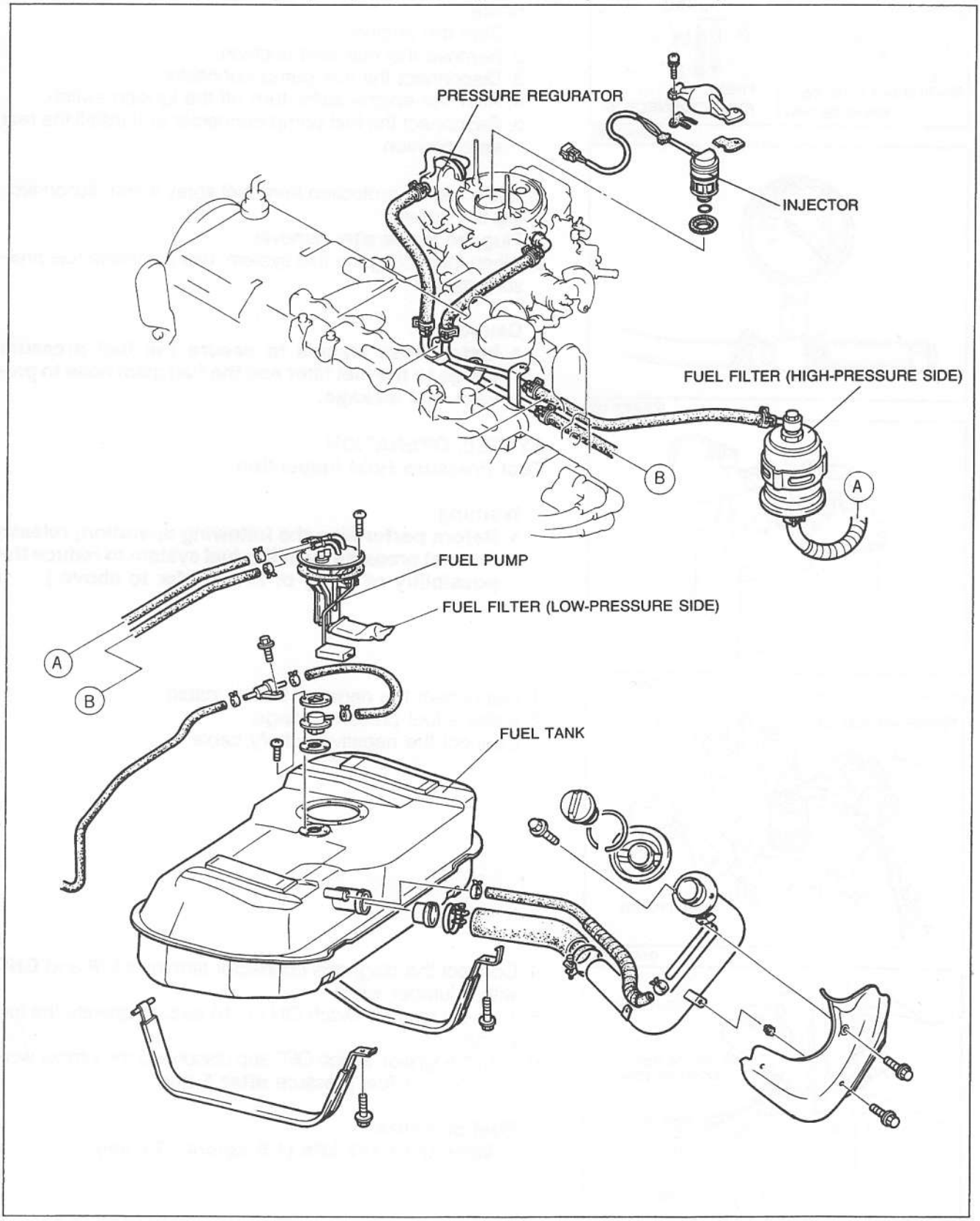
   Play: 1—3mm (0.04—0.12 in)

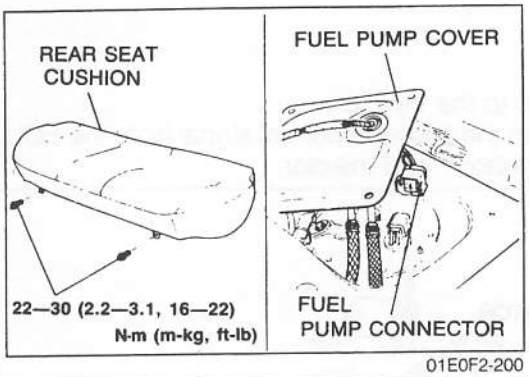
3. Loosen nuts Ⓐ to adjust the play if necessary.

FUEL SYSTEM

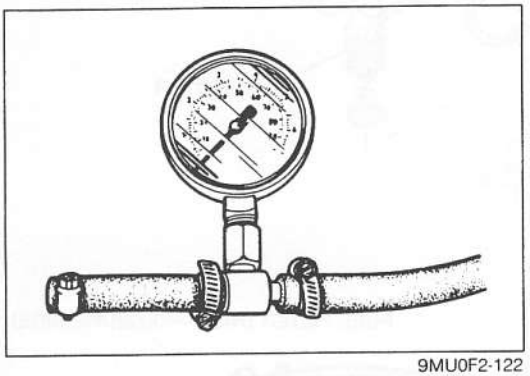
DESCRIPTION

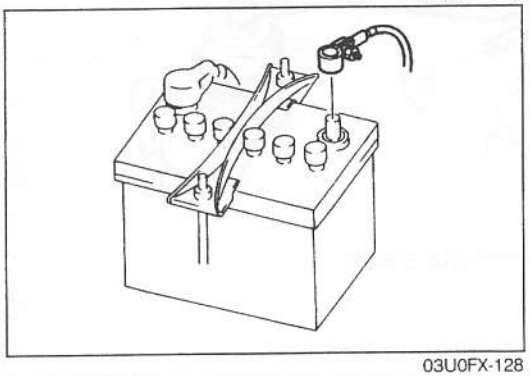
This system supplies the necessary fuel at a constant pressure to the injector.
Fuel is metered and injected into the intake manifold according to the injection control signal from the ECU.
This system consists of the fuel pump, fuel filters, pressure regulator, and injector.

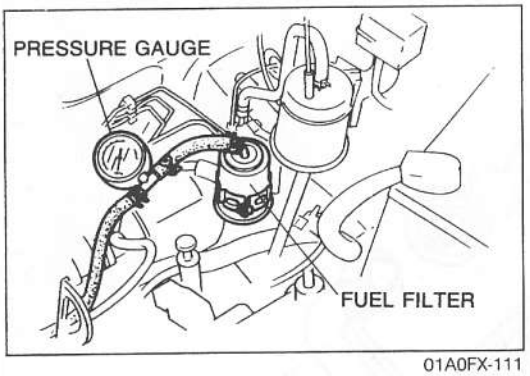




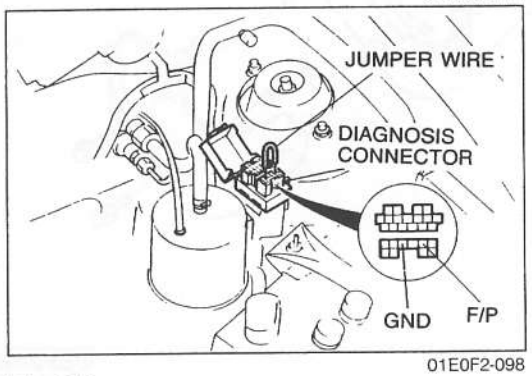
01E0F2-200


9MU0F2-122


03U0FX-128



01A0FX-111



01E0F2-098

PRECAUTION

Fuel Pressure Release and Servicing Fuel System

Fuel in the fuel system remains under high pressure when the engine is not running.

a) Before disconnecting any fuel line, release the fuel pressure from the fuel system to reduce the possibility of injury or fire.
   1. Start the engine.
   2. Remove the rear seat cushion.
   3. Disconnect the fuel pump connector.
   4. After the engine stalls, turn off the ignition switch.
   5. Reconnect the fuel pump connector and install the rear seat cushion.

b) Use a rag as protection from fuel spray when disconnecting the hoses.
   Plug the hoses after removal.

c) When inspecting the fuel system, use a suitable fuel pressure gauge.

Caution

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

SYSTEM OPERATION

Fuel Pressure Hold Inspection

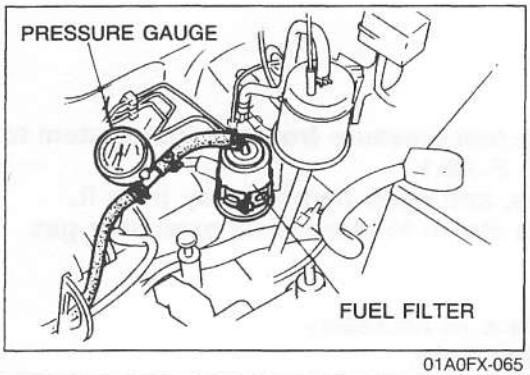
Warning

- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to above.)**

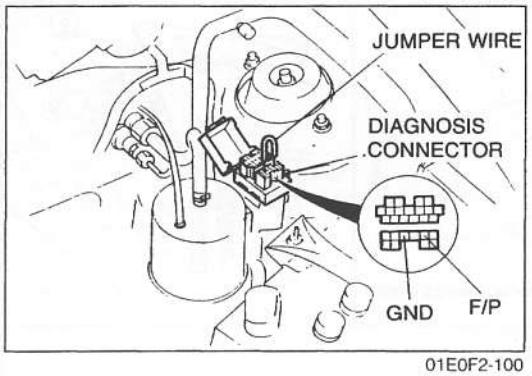
1. Disconnect the negative battery cable.
2. Install a fuel pressure gauge.
3. Connect the negative battery cable.

4. Connect the diagnosis connector terminals **F/P** and **GND** with a jumper wire.
5. Turn the ignition switch ON for **10 sec.** to operate the fuel pump.
6. Turn the ignition switch OFF and disconnect the jumper wire.
7. Observe the fuel pressure **after 5 min.**.

Fuel pressure:
More than 147 kPa (1.5 kg/cm^2, 21 psi)



01A0FX-065



01E0F2-100

Fuel Line Pressure Inspection

Warning

- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F–88.)**

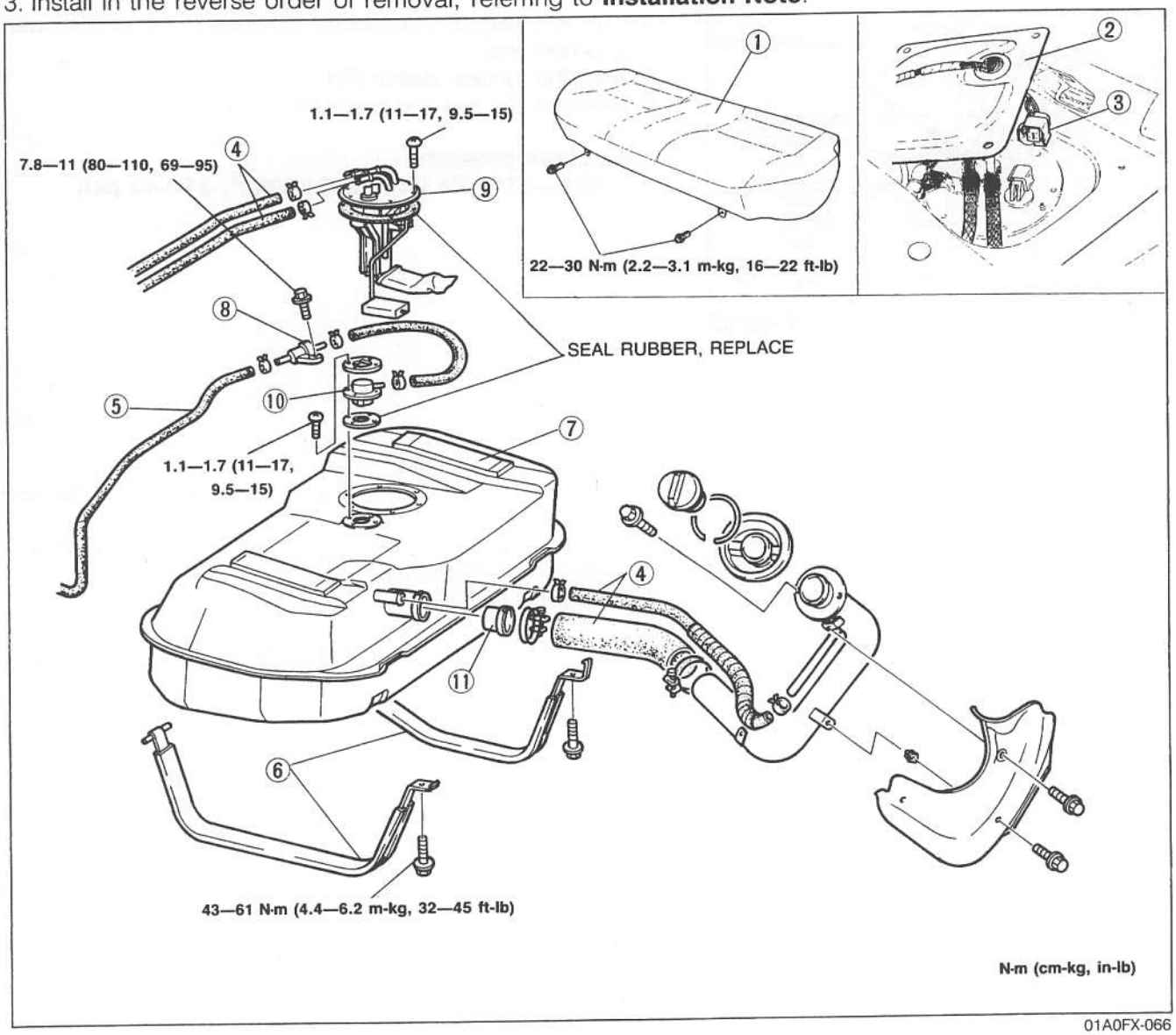
1. Disconnect the negative battery cable.
2. Connect a fuel pressure gauge.
3. Connect the negative battery cable.
4. Connect diagnosis connector terminals **F/P** and **GND** with a jumper wire.
5. Turn the ignition switch ON.
6. Measure the fuel line pressure.

Fuel line pressure:
235—275 kPa (2.4—2.8 kg/cm^2, 34—40 psi)

FUEL TANK
Removal / Inspection / Installation

Warning
- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F–88.)**
- **When removing the fuel tank, keep sparks, cigarettes, and open flames away from it.**
- **Before repairing the fuel tank, clean it throughly with steam to remove all explosive gas.**

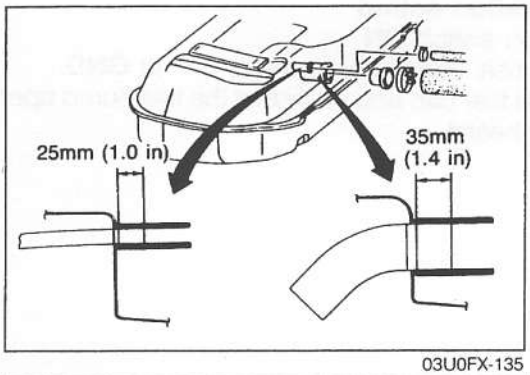
1. Remove in the order shown in the figure.
2. Visually inspect the fuel tank components and repair or replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.



01A0FX-066

Note
- **Drain the fuel from the fuel tank before removing the tank.**

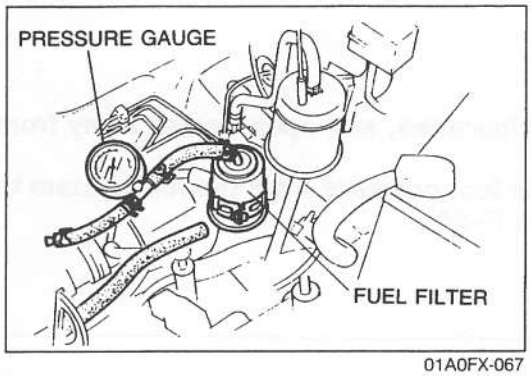
1. Rear seat cushion
2. Fuel pump cover
3. Fuel pump connector
4. Fuel hoses
5. Evaporative hoses
6. Fuel tank straps
7. Fuel tank
   Inspect for cracks and corrosion
8. Check valve (two-way)
9. Fuel tank unit
10. Fuel vapor valve
11. Non-return valve



03U0FX-135

Installation Note

1. Push the ends of the main fuel hose, fuel return hose, and evaporative hoses onto the fuel tank fittings **at least 25mm (1.0 in)**.
2. Push the fuel filler hose onto the fuel tank pipe and filler pipe **at least 35mm (1.4 in)**.



01A0FX-067

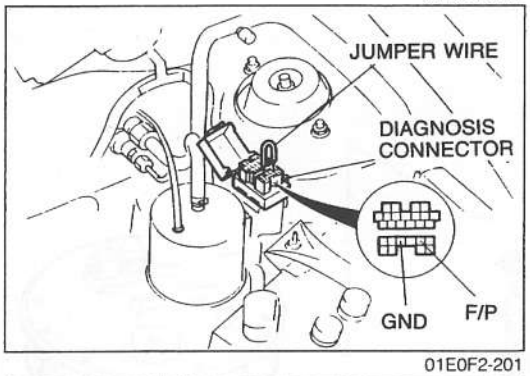
FUEL PUMP

Inspection

Maximum pressure

Warning

- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F–88.)**
- **When inspecting fuel system parts, keep sparks, cigarettes, and open flames away from the fuel.**

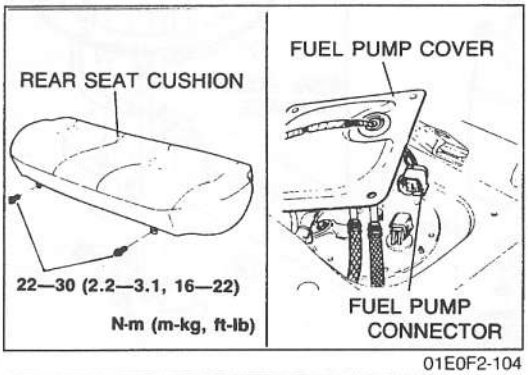


01E0F2-201

1. Disconnect the negative battery cable.
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 cable.
4. Connect diagnosis connector terminals **F/P** and **GND** with a jumper wire.
5. Turn the ignition switch ON **for 10 sec.** to operate the fuel pump and measure the fuel pressure.

Fuel pressure:
491—658 kPa (5.0—6.5 kg/cm^2, 71.1—92.4 psi)

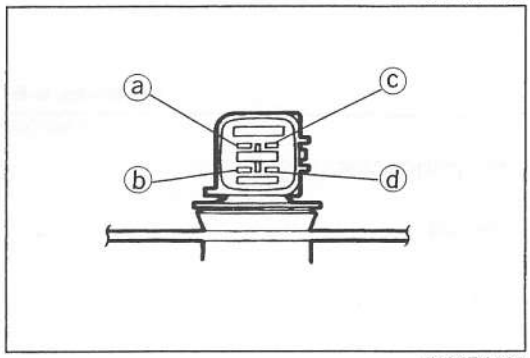
6. Turn the ignition switch OFF and disconnect the jumper wire.
7. If not as specified, replace the fuel pump.



01E0F2-104

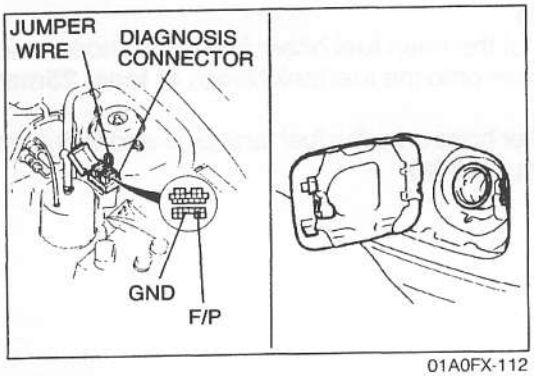
Continuity

1. Remove the rear seat cushion.
2. Disconnect the fuel pump connector.



01A0FX-068

3. Check for continuity between the terminals ⓐ and ⓑ of the connector at the fuel pump shown in the figure.
4. If there is no continuity, replace the fuel pump. (Refer to page F–92.)



01A0FX-112

Fuel pump operation sound

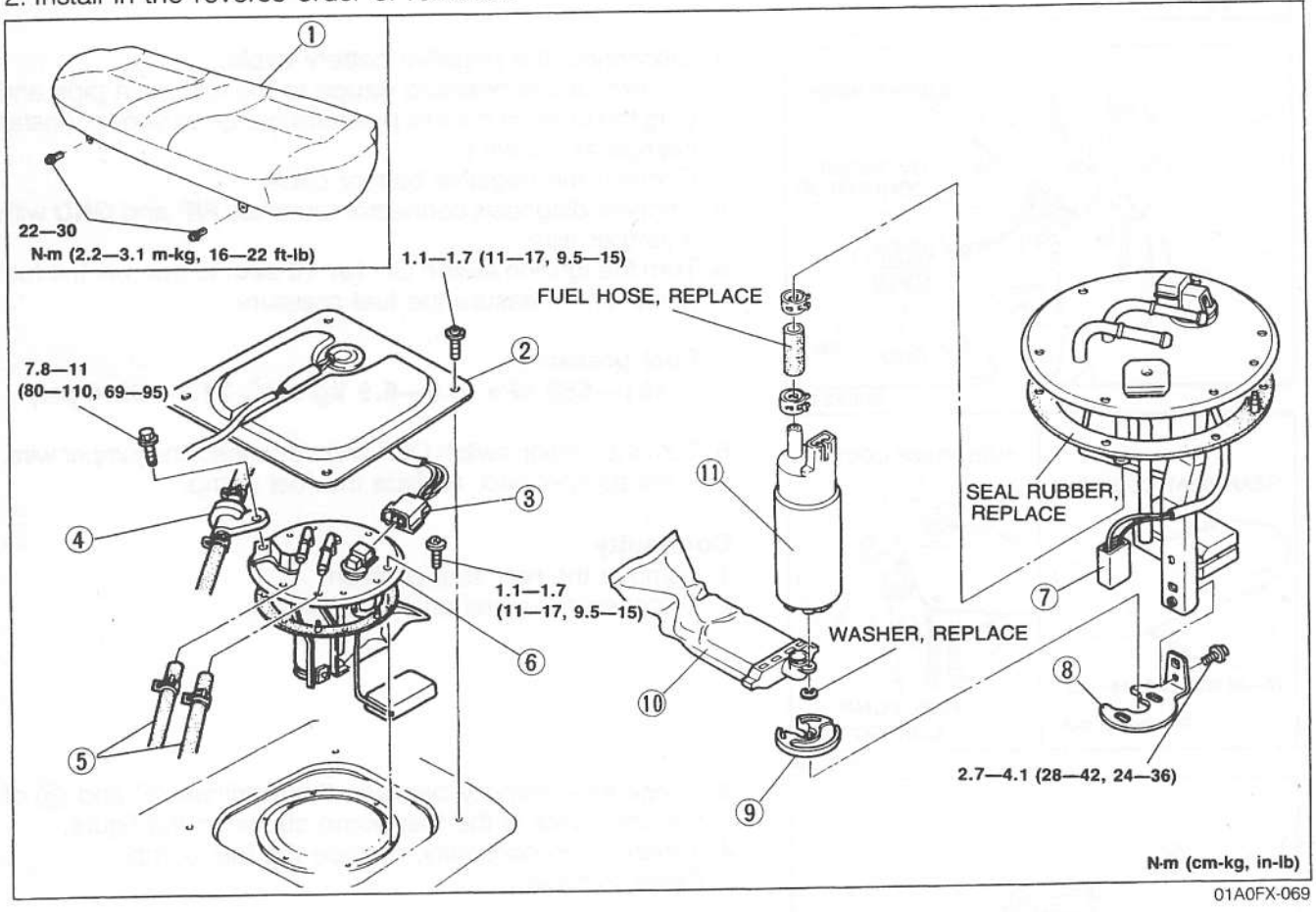
1. Turn the ignition switch ON.
2. Connect diagnosis connector terminal **F/P** to **GND**.
3. Remove the fuel filler cap and verify that the fuel pump operation sound is heard.

Replacement

Warning

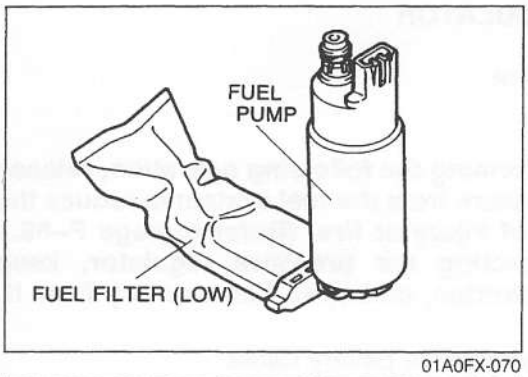
- **When replacing the fuel system parts, keep sparks, cigarettes, and open flames away from the fuel.**
- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F–88).**

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

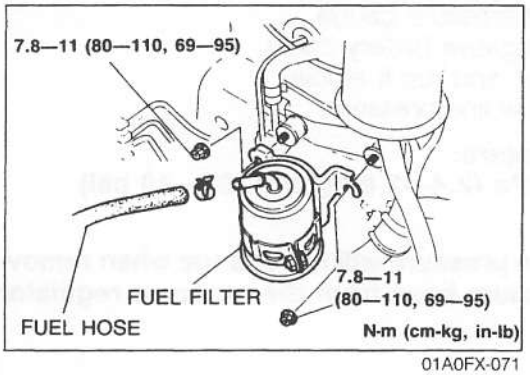


01A0FX-069

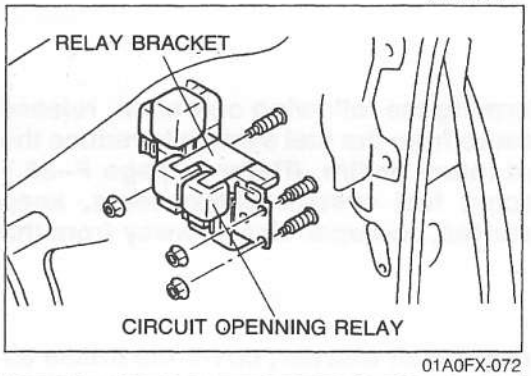
1. Rear seat cushion
2. Fuel pump cover
3. Fuel pump gauge unit connector
4. Check valve
5. Fuel hoses
6. Fuel pump gauge unit
7. Fuel pump connector
8. Bracket
9. Rubber mount
10. Fuel filter
11. Fuel pump



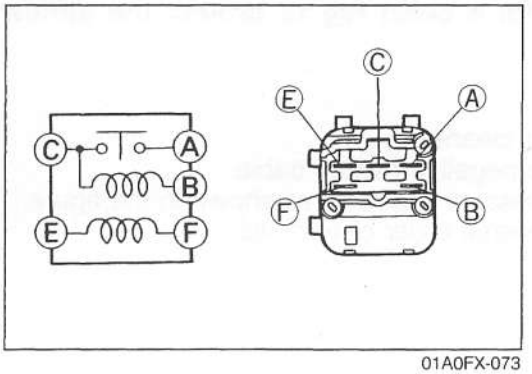
01A0FX-070



01A0FX-071



01A0FX-072



01A0FX-073

FUEL FILTER

Replacement

Low-pressure side

Refer to page F–92.

High-pressure side

The fuel filter must be replaced at the intervals outlined in the maintenance schedule.

Warning

- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F–88.)**
- **When replacing the fuel filter, keep sparks, cigarettes and open flames away from it.**

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

CIRCUIT OPENING RELAY

Replacement

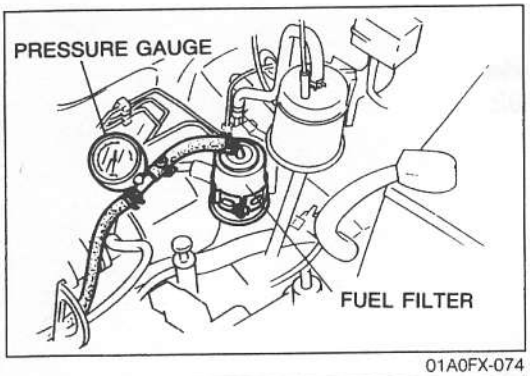
1. Disconnect the negative battery terminal.
2. Remove the ECU. (Refer to page F–112.)
3. Remove the relay bracket.
4. Remove the circuit opening relay from the relay bracket.

Inspection of Continuity

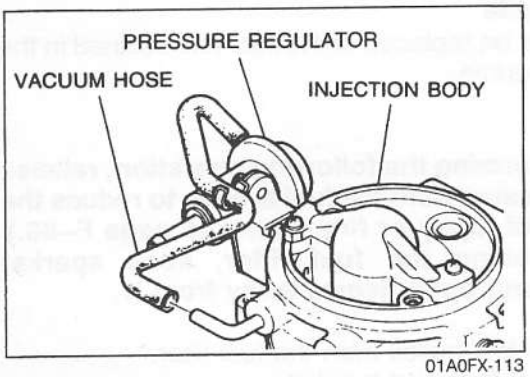
1. Check continuity between terinals Ⓐ and Ⓒ in the following condition.

Terminals	Apply 12V	Continuity (Ⓐ — Ⓒ)
Ⓑ ↔ Ⓒ	Yes	Yes
	No	No
Ⓔ ↔ Ⓕ	Yes	Yes
	No	No

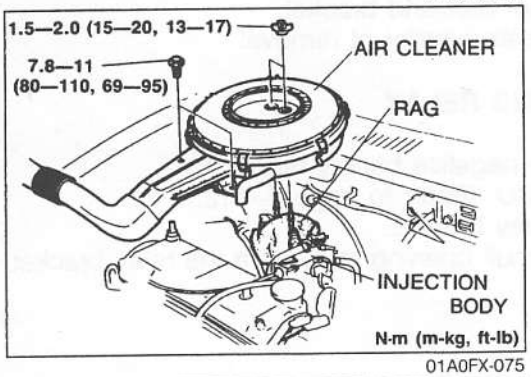
2. Replace the relay if not as specified.



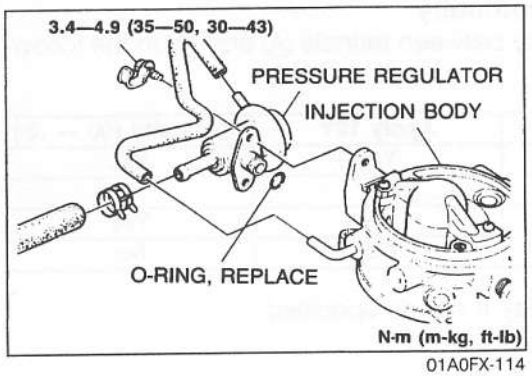
01A0FX-074



01A0FX-113



01A0FX-075



01A0FX-114


01E0F2-119

PRESSURE REGULATOR

Inspection

Fuel line pressure

Warning

- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F–88.)**
- **When inspecting the pressure regulator, keep sparks, cigarettes, and open flames away from it.**

1. Disconnect the negative battery cable.
2. Connect a fuel pressure gauge.
3. Connect the negative battery cable.
4. Start the engine and run it at idle.
5. Measure the fuel line pressure.

Fuel line pressure:
235—275 kPa (2.4—2.8 kg/cm^2, 34—40 psi)

Note

- **The fuel line pressure will not change when removing the vacuum hose from the pressure regulator at idle.**

Replacement

Warning

- **Before performing the following operation, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page F–88.)**
- **When replacing fuel system components, keep sparks, cigarettes, and open flames away from the fuel.**

Caution

- **After removing the air cleaner, cover the intake air passage with a clean rag to protect the airflow sensor.**

1. Remove the air cleaner.
2. Disconnect the negative battery cable.
3. Remove the pressure regulator as shown in the figure.
4. Install in the reverse order of removal.

INJECTOR

Inspection (On-vehicle)

1. Remove the air cleaner cover.

Caution

- **Perform the following inspection carefully to protect the airflow sensor from damage.**

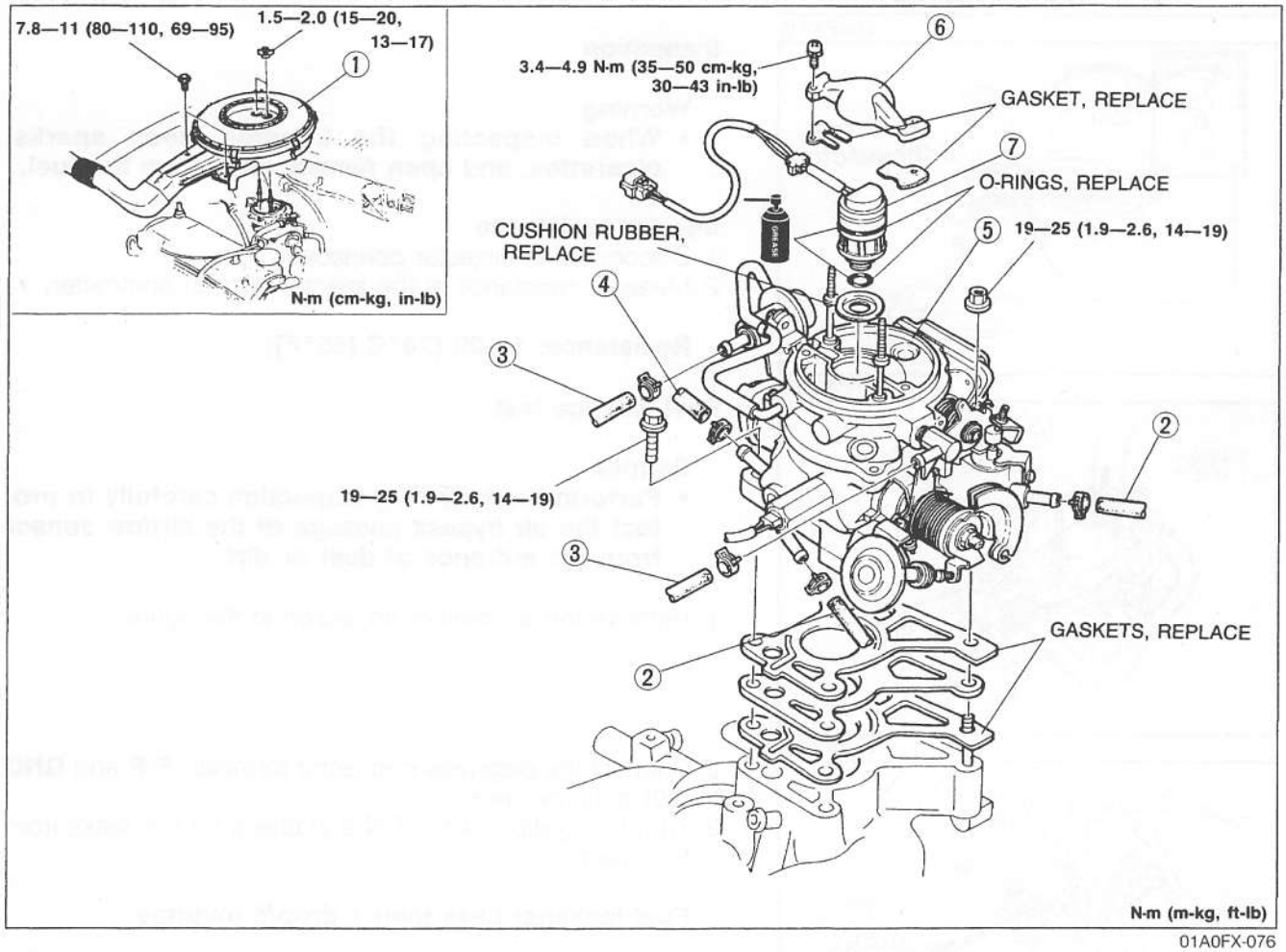
2. Start the engine and run it at idle.
3. Using a sound scope, verify that injector operating sounds are heard.

Removal / Installation

Warning

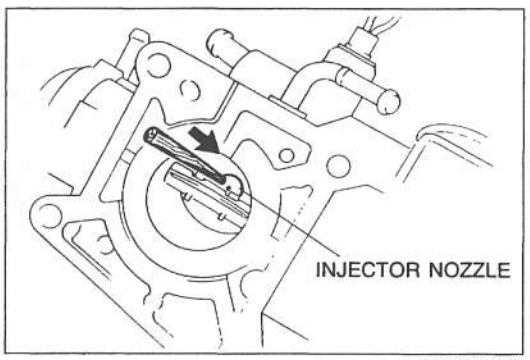
- **Before performing the following operation, release the fuel pressure from the fuel system ot reduce the possibility of injury or fire. (Refer to page F–88.)**
- **When removing the fuel system parts, keep sparks, cigarettes, and open flames away from the fuel.**

1. Loosen the radiator drain plug and drain the coolant.
2. Remove in the order shown in the figure, referring to **Removal Note**. (Refer to page F–95.)
3. Install in the reverse order of removal, referring to **Installation Note**. (Refer to page F–96.)



01A0FX-076

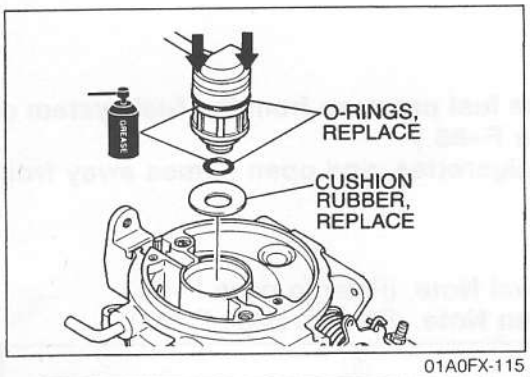
1. Air cleaner
2. Water hose
3. Fuel hose
4. Air bypass hose
5. Injection body
6. Injector cover
7. Injector



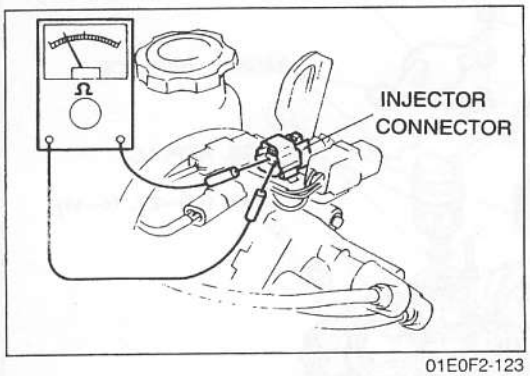
01A0FX-077

Removal Note

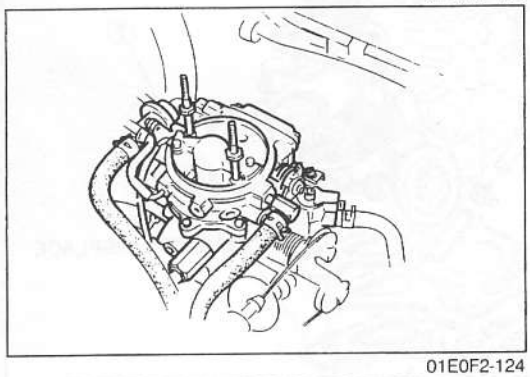
- When replacing the injector, push the injector nozzle out with a plastic or wood stick.

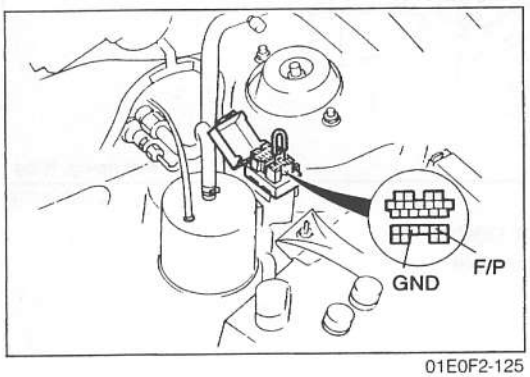


01A0FX-115



01E0F2-123


01E0F2-124



01E0F2-125

Installation Note
- Use new O-rings, cushion rubber, and gaskets.
- Apply a small amount of silicone grease to the O-rings before installation.
- Install the injector squarely into injection body and do not twist it while installing.
- After installation, connect the diagnosis connector, **F/P** and **GND** terminals with a jumper wire, and check for fuel leakage with the ignition switch ON. (Refer to page F–96.)

Inspection

Warning
- **When inspecting the injector, keep sparks, cigarettes, and open flames away from the fuel.**

Injector resistance
1. Disconnect the injector connector.
2. Measure resistance of the injector with an ohmmeter.

Resistance: 1—2Ω (20°C [68°F])

Fuel leakage test

Caution
- **Perform the following inspection carefully to protect the air bypass passage of the airflow sensor from the entrance of dust or dirt.**

1. Remove the air cleaner as shown in the figure.
2. Connect the diagnosis connector terminals **F/P** and **GND** with a jumper wire.
3. Turn the ignition switch ON and check for fuel leaks from the injector.

Fuel leakage: Less than 1 drop/5 minutes

EXHAUST SYSTEM

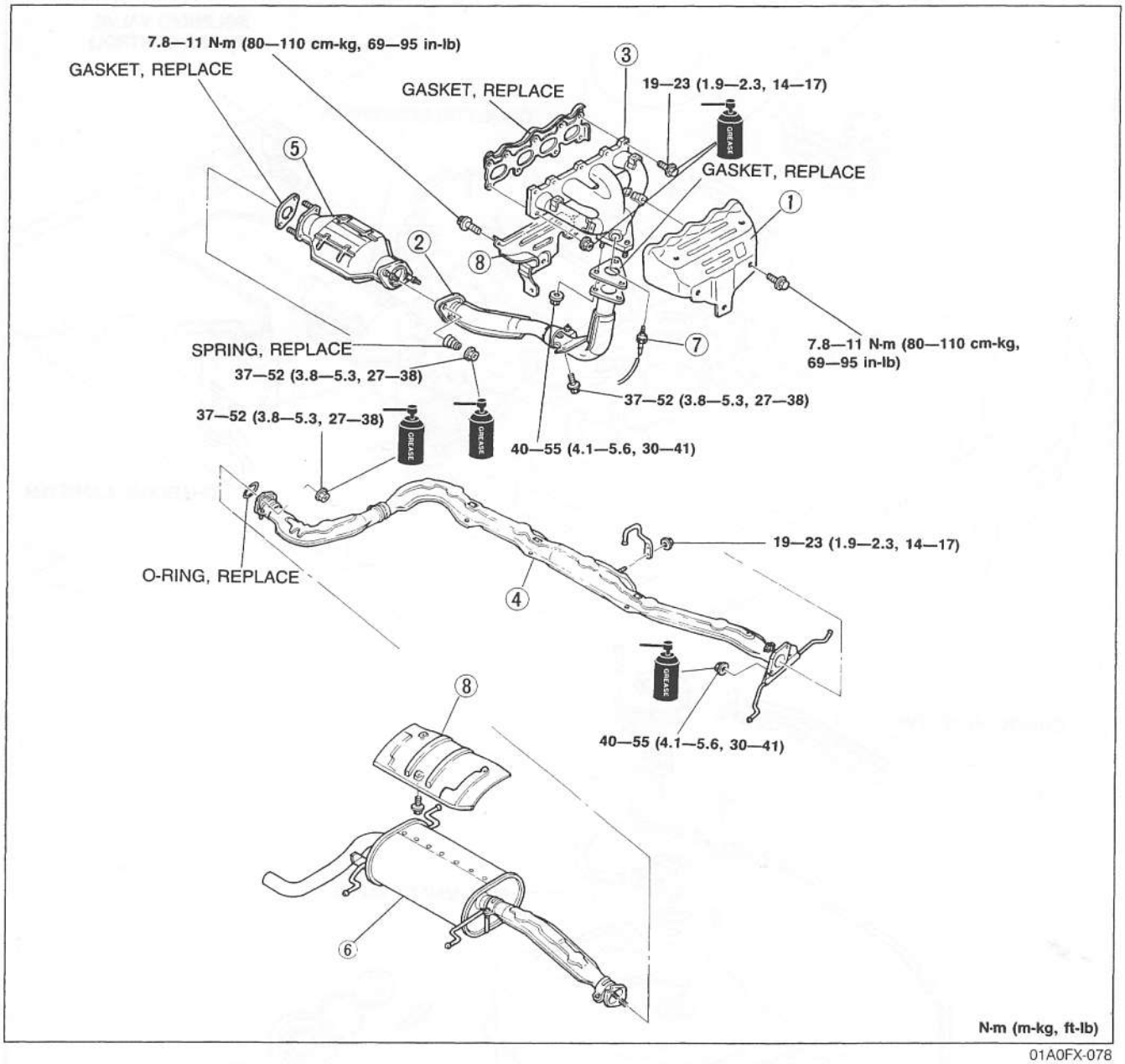
COMPONENT PARTS

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. Visually inspect the exhaust system components and repair or replace as necessary.
3. Install in the reverse order of removal.



01A0FX-078

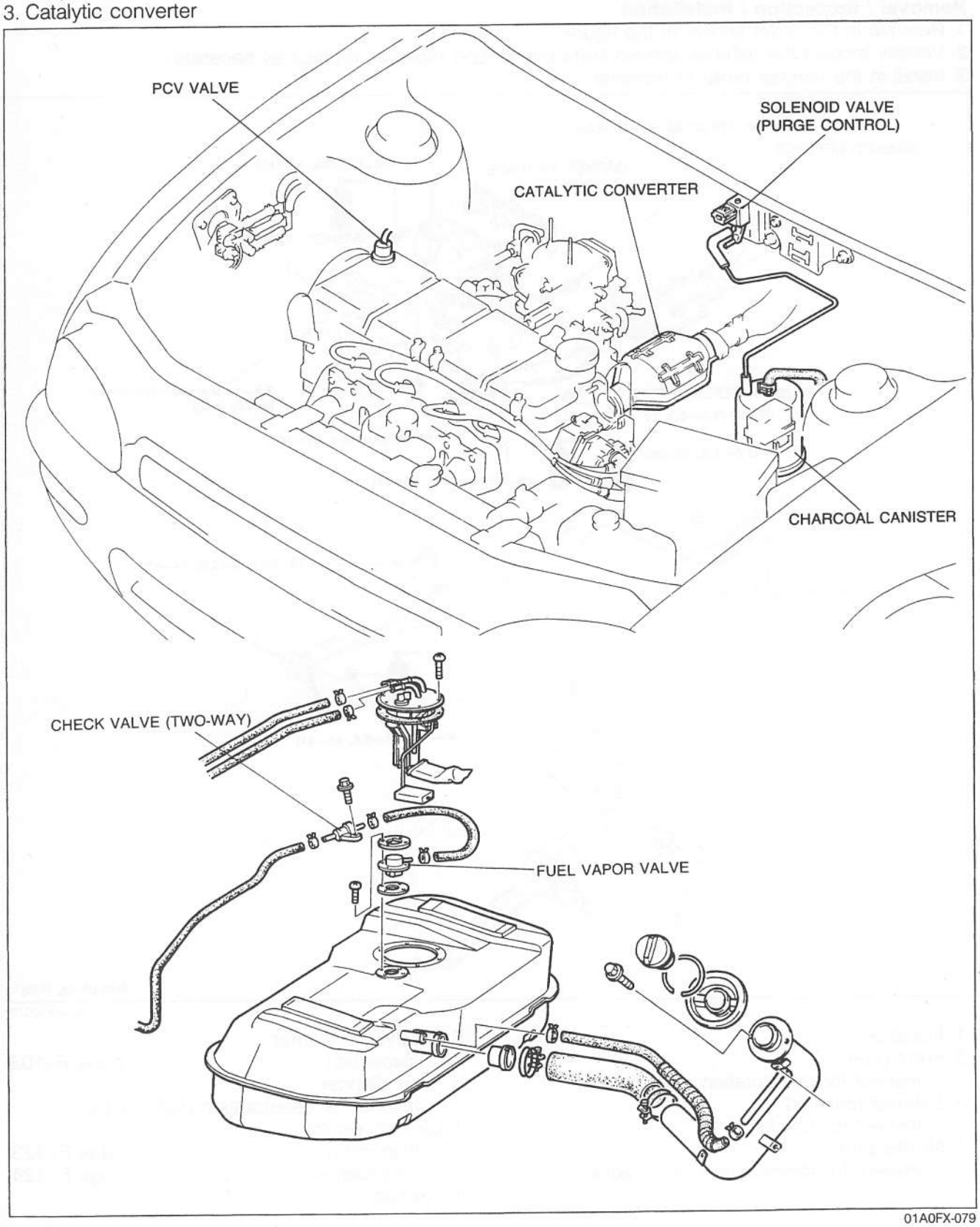
1. Insulator
2. Front pipe
   Inspect for deterioration and cracks
3. Exhaust manifold
   Inspect for cracks
4. Middle pipe
   Inspect for deterioration and cracks
5. Catalytic converter
   Inspection ..... page F–103
6. Main silencer
   Inspect for deterioration and cracks
7. Oxygen sensor
   Inspection ..... page F–123
   Replacement..... page F–124
8. Insulator

OUTLINE OF EMISSION CONTROL SYSTEM

STRUCTURAL VIEW

The following systems are employed to reduce CO, HC, and NOx emissions.

1. Positive crankcase ventilation (PCV) system
2. Evaporative emission control system
3. Catalytic converter

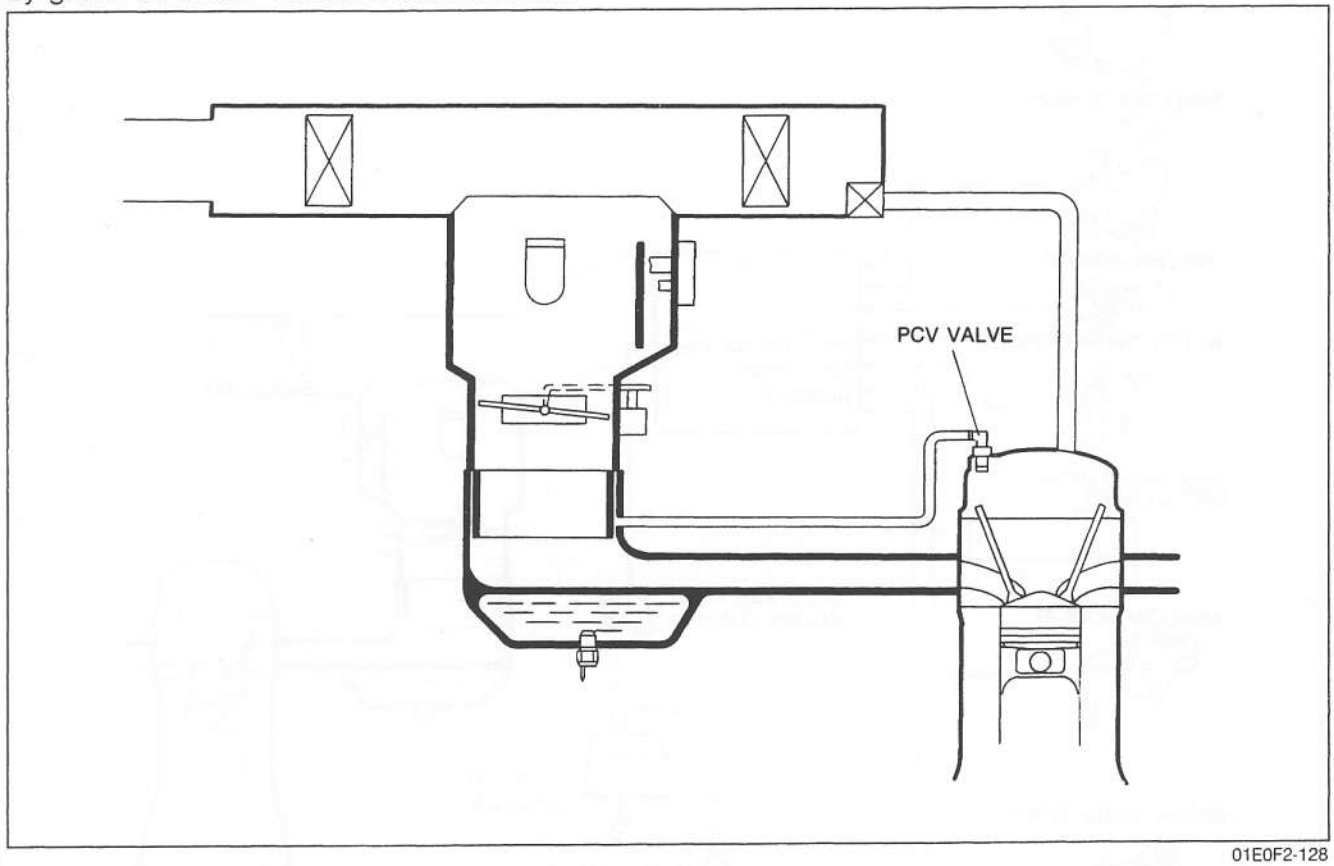


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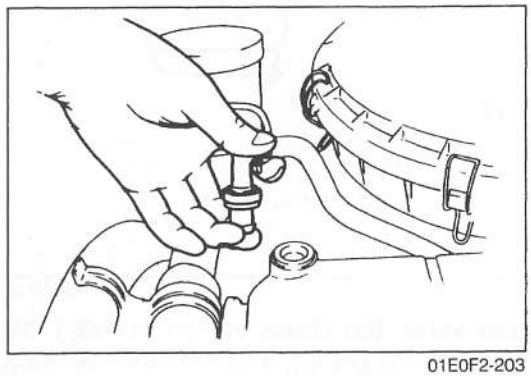
POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

DESCRIPTION

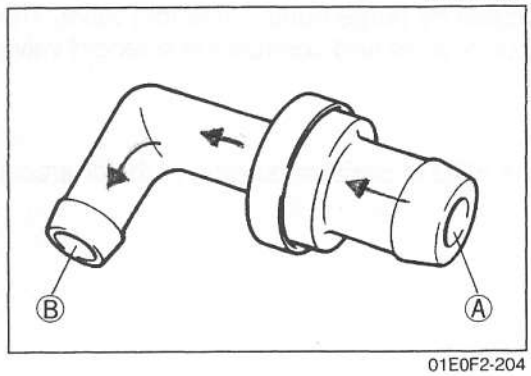
The PCV valve is operated by the intake manifold vacuum.
When the engine is running at idle, the PCV valve is opened slightly and a small amount of blowby gas is drawn into the intake manifold to be burned.
As the engine speed rises the PCV valve is opened further, allowing a proportionately larger amount of blow-by gas to be drawn into the intake manifold.



01E0F2-128



01E0F2-203



01E0F2-204

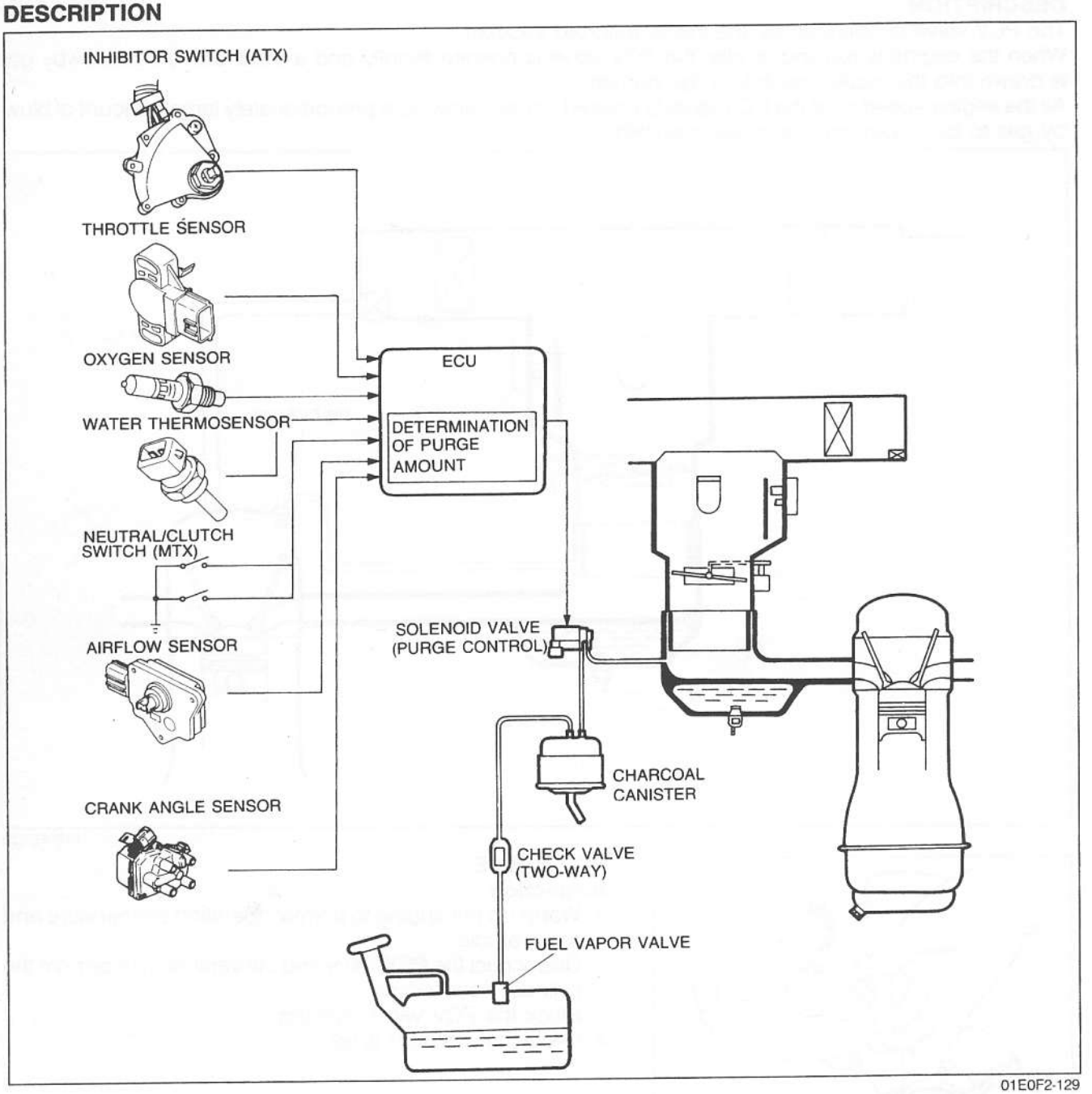
PCV VALVE

Inspection

1. Warm up the engine to normal operating temperature and run it at idle.
2. Disconnect the PCV valve and the ventilation hose from the cylinder head cover.
3. Block the PCV valve opening.
4. Verify that vacuum is felt.
5. Remove the PCV valve.
6. Blow through the valve from port Ⓐ and verify that airflows from of port Ⓑ.
7. Blow through the valve from port Ⓑ and verify that no airflows from of port Ⓐ.
8. Replace the PCV valve if not as specified.

EVAPORATIVE EMISSION CONTROL SYSTEM

DESCRIPTION



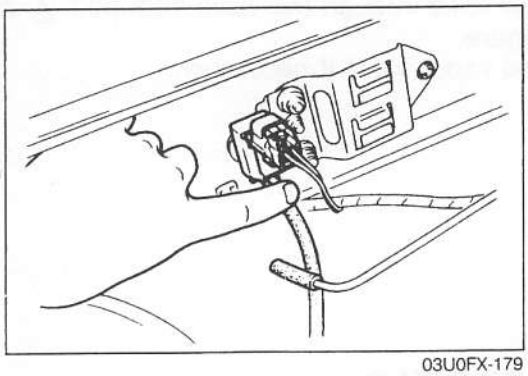
01E0F2-129

The evaporative emission control system consists of the fuel vapor valve, the check valve (two-way), the charcoal canister, the solenoid valve (purge control), the engine control unit (ECU), and the input devices. The evaporative fumes drawn into the engine and burned is controlled by purge control solenoid valve. The ECU detects the engine's operating conditions by the various input devices and controls the solenoid valve operation by electrical signals according to these values.

Operation

The solenoid valve (purge control) is controlled by signals from the ECU to perform purging of the charcoal canister. Purging is done when these conditions are met:

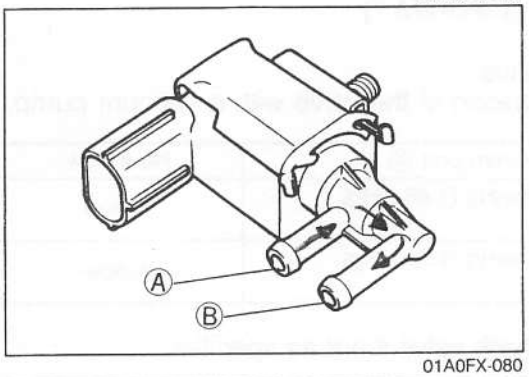
(1) After warm-up
(2) Driving in gear
(3) Accelerator pedal depressed
(4) Oxygen sensor functioning normally



03U0FX-179

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 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.

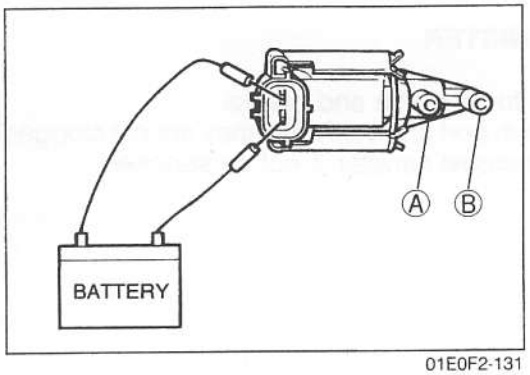


01A0FX-080

SOLENOID VALVE (PURGE CONTROL)

Inspection

1. Disconnect the vacuum hoses from the solenoid valve.
2. Verify that no air flows through the valve from port Ⓐ to port Ⓑ.

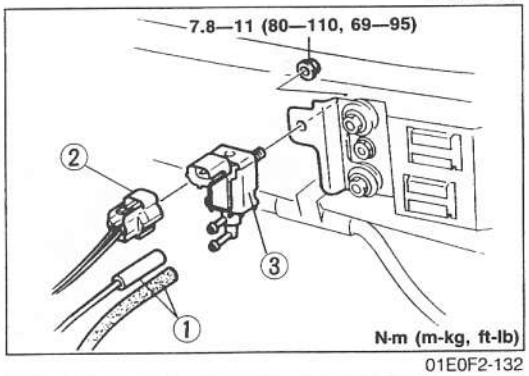


01E0F2-131

3. Disconnect the solenoid valve conector and apply 12V.
4. Verify that air flows through the valve from port Ⓐ to port Ⓑ. If no air is felt, measure the resistance of the solenoid valve.

   Resistance: 32 ± 2Ω

5. If not as specified, replace the solenoid valve.

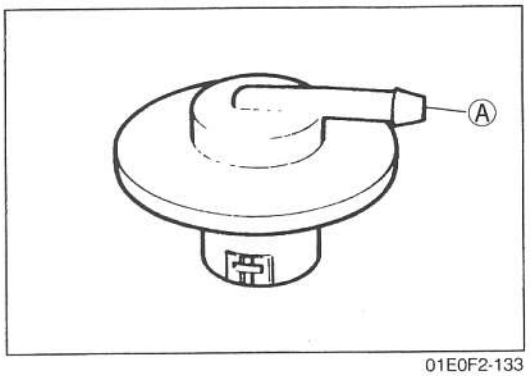


01E0F2-132

Removal / Installation

1. Disconnect the evaporative hoses from the solenoid valve.
2. Disconnect the solenoid valve connector.
3. Remove the nut and the solenoid valve.
4. Install in the reverse order of removal.

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

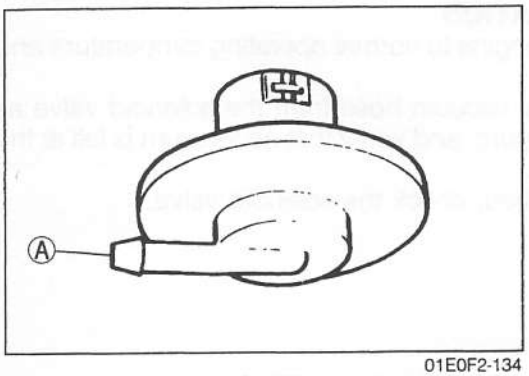


01E0F2-133

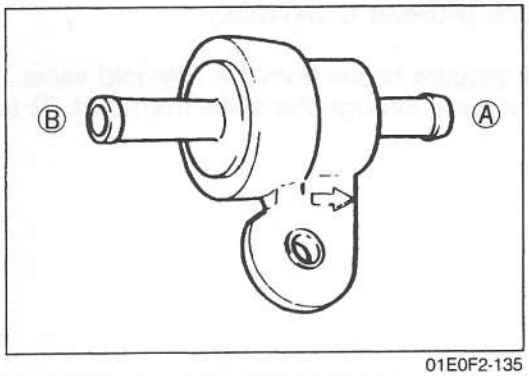
FUEL VAPOR VALVE

Inspection

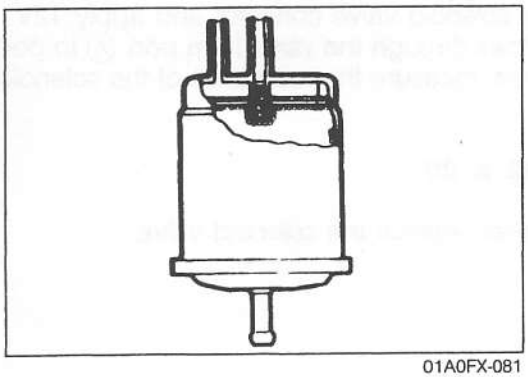
1. Verify that air flows through the valve from port Ⓐ as shown in the figure.



01E0F2-134



01E0F2-135



01A0FX-081

2. Verify that no air flows through the valve from port Ⓐ as shown in the figure.
3. Replace the fuel vapor valve if necessary.

CHECK VALVE (TWO-WAY)

Inspection

1. Remove the valve.
2. Check the operation of the valve with a vacuum pump.

Blow through valve from port Ⓐ	No airflow
Apply approx. 37 mmHg (1.46 inHg) vacuum at port Ⓐ	Airflow
Apply approx. 44 mmHg (1.73 inHg) vacuum at port Ⓑ	Airflow

3. Replace the check valve if not as specified.

CHARCOAL CANISTER

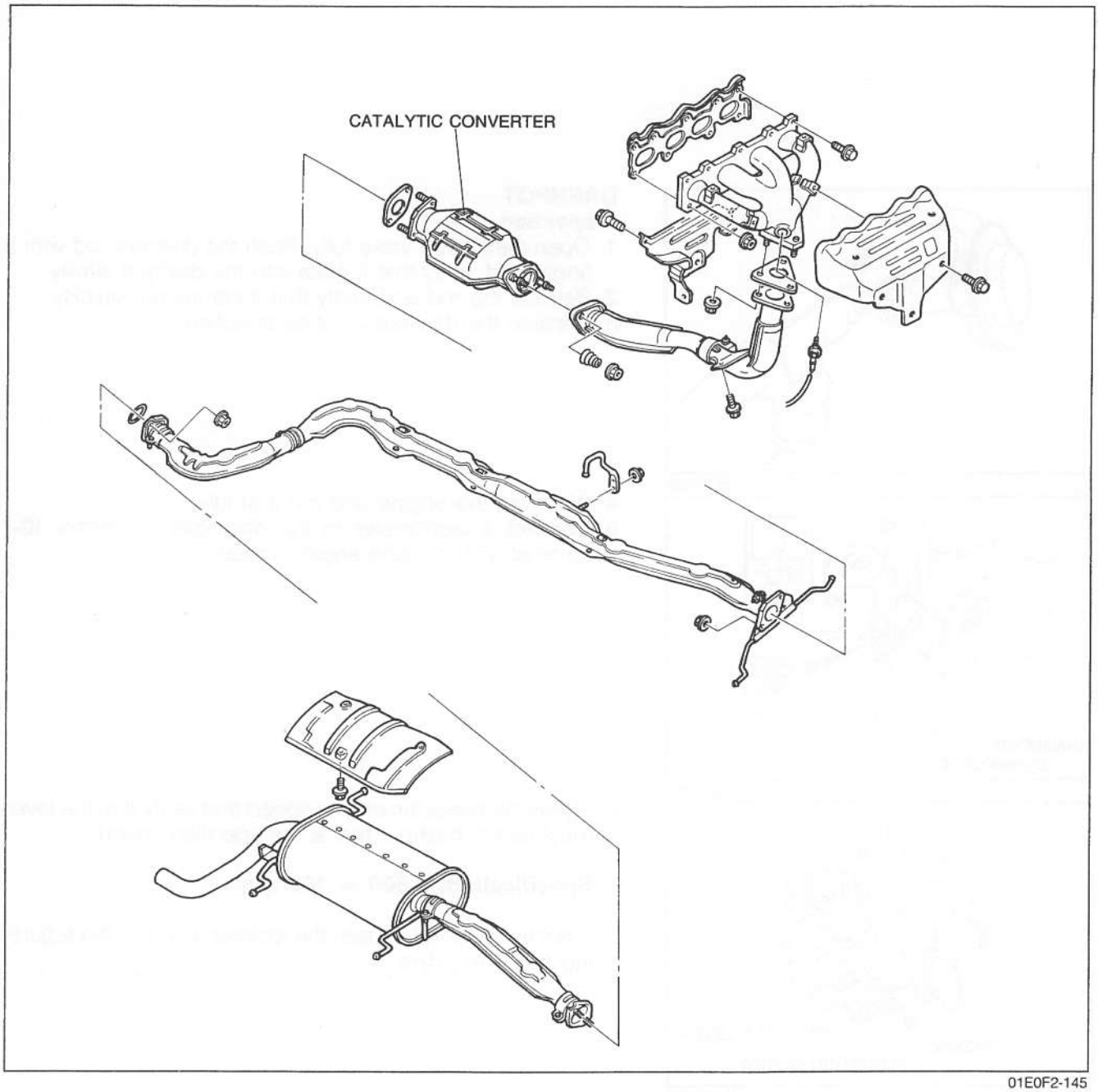
Inspection

1. Visually check for damage and cracks.
2. Blow air into each port and verify that they are not clogged.
3. Replace the charcoal canister if not as specified.

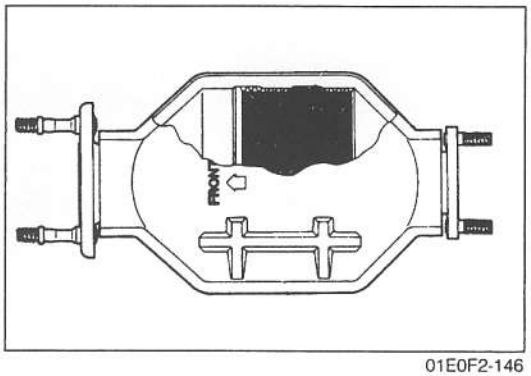
CATALYTIC CONVERTER SYSTEM

DESCRIPTION

The catalytic converter reduces CO, HC, and NOx by chemical reaction. The converter contains platinum and rhodium compounds.



01E0F2-145



01E0F2-146

CATALYTIC CONVERTER
Inspection

Note
- **The insulator cannot be removed.**

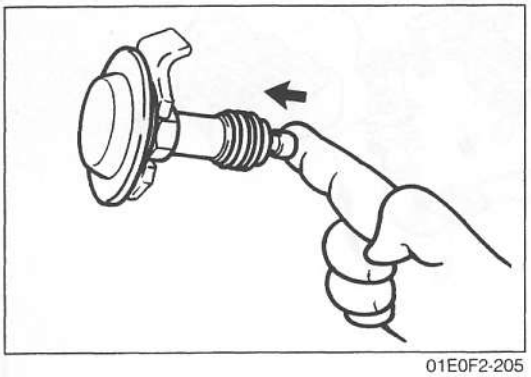
Remove the catalytic converter and visually check for deterioration and cracks.

DECELERATION CONTROL SYSTEM

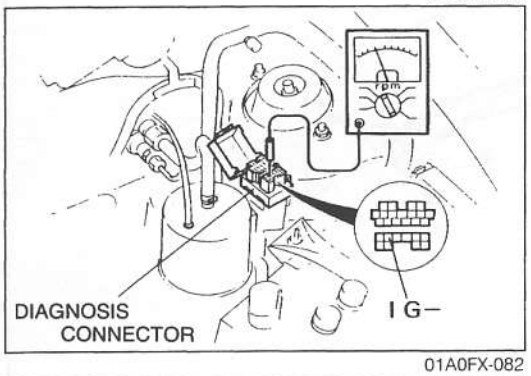
DESCRIPTION

The dashpot is used to prevent the throttle valve from suddenly closing.

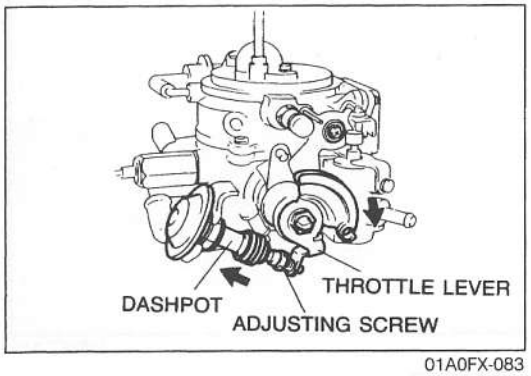
03U0FX-185



01E0F2-205



01A0FX-082



01A0FX-083

DASHPOT

Inspection

1. Open the throttle valve fully. Push the dashpot rod with a finger and verify that it goes into the dashpot slowly.
2. Release the rod and verify that it comes out quickly.
3. Replace the dashpot if not as specified.

4. Warm up the engine and run it at idle.
5. Connect a tachometer to the diagnosis connector **IG–** terminal and increase engine speed.

6. Slowly decrease the engine speed and verify that the lever touches the dashpot rod at the specified speed.

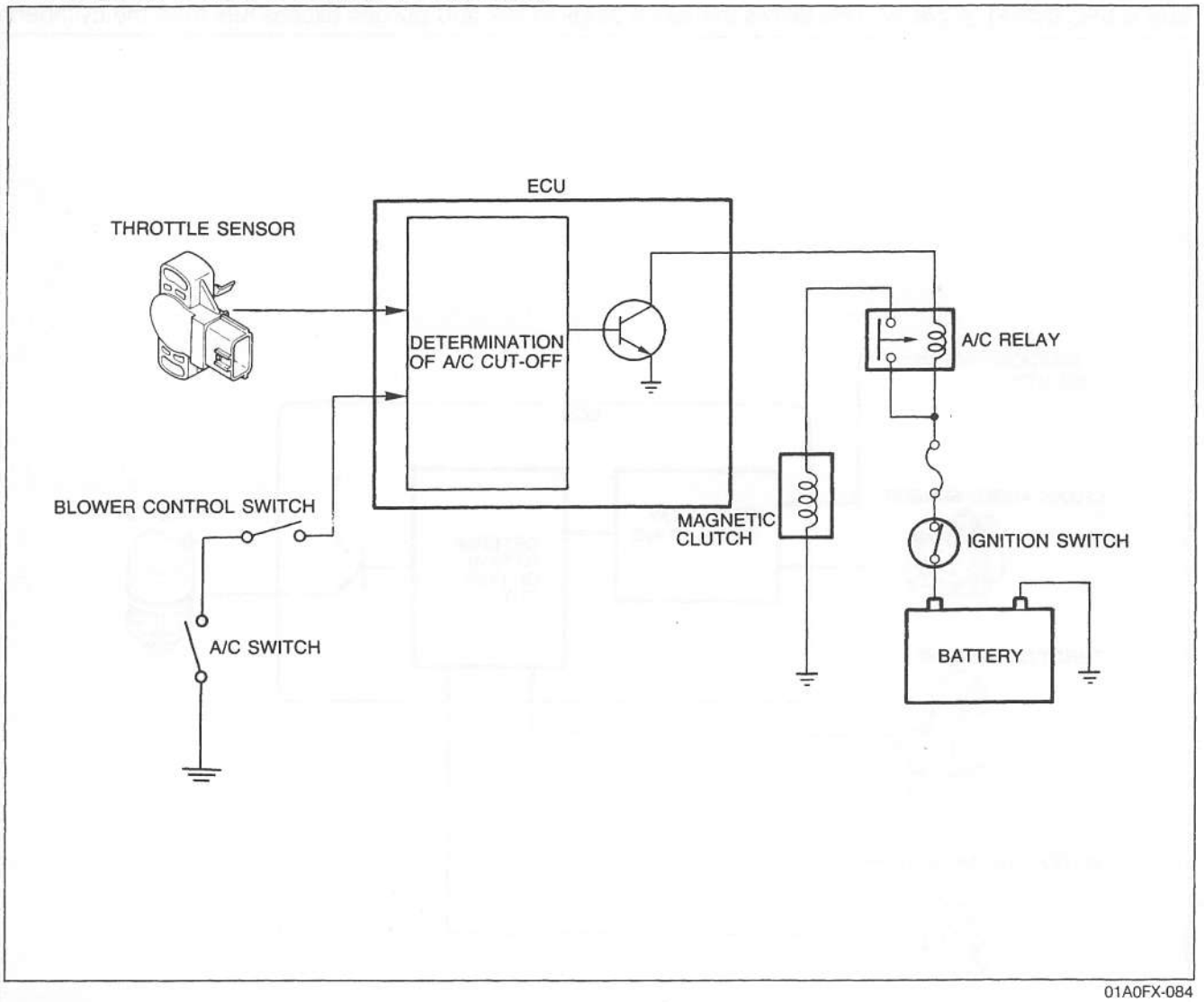
   Specification: 2,500 ± 100 rpm

7. If not as specified, loosen the locknut and turn the adjusting screw to adjust.

A/C CUT-OFF SYSTEM

DESCRIPTION

To improve idle smoothness after just starting the engine and to improve acceleration performance, an A/C cut-off system is used to control A/C operation.

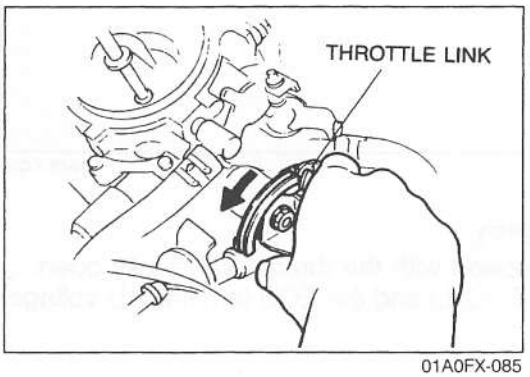


01A0FX-084

Operation

The A/C is cut off under the conditions below.

Engine condition	Purpose	Cut-off period
Throttle valve fully open	Improved drivability	Approx. 5 sec.
Acceleration from stop		Approx. 1 sec.



01A0FX-085

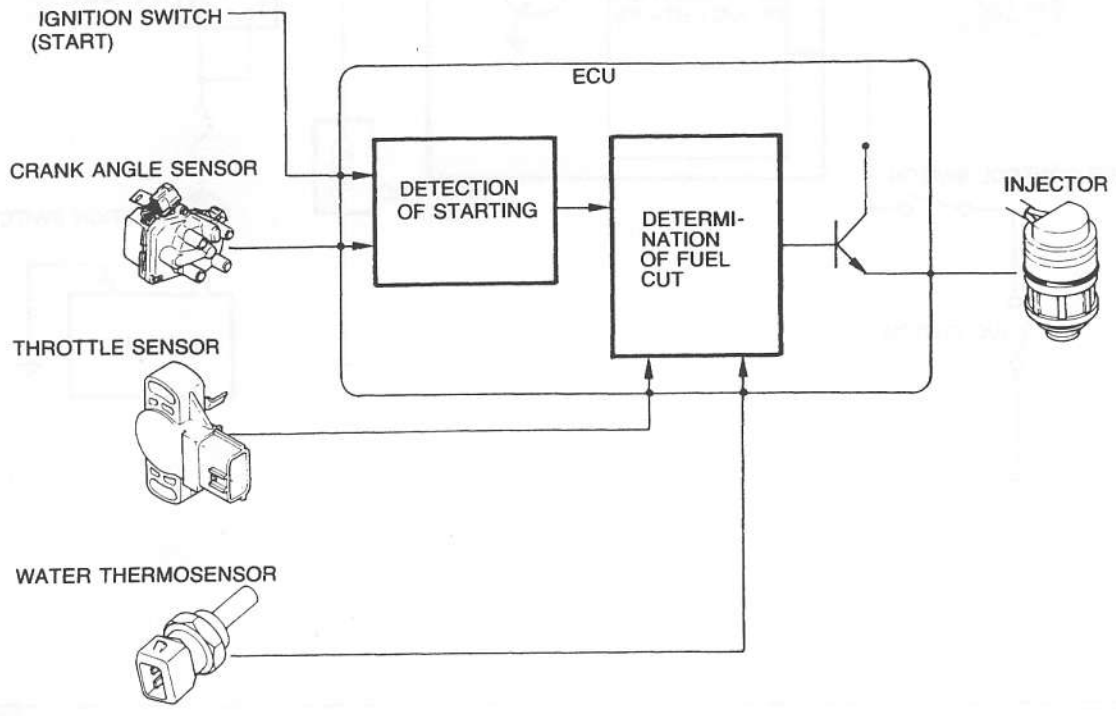
SYSTEM OPERATION

1. Turn the ignition switch, blower switch, and A/C switch ON.
2. Open the throttle valve and verify that the additional fan stops for **approximately 1 second**.

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 while cranking the engine if the engine coolant temperature is 0°C (32°F) or below. This allows the spark plugs to dry and purges excess fuel from the cylinders.



01A0FX-086

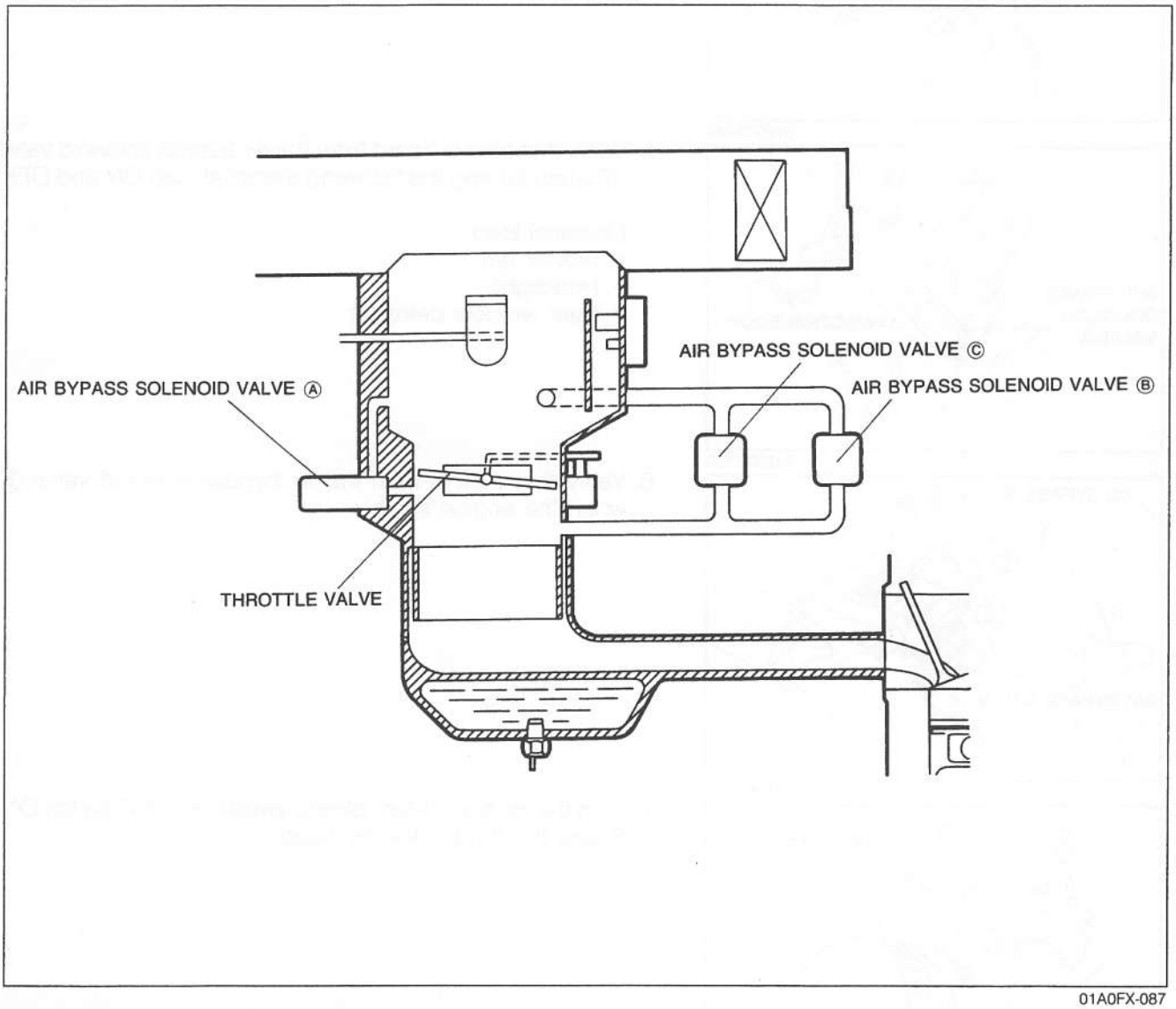
SYSTEM OPERATION

1. Verify that the engine coolant temperature is **below 0°C (32°F)**.
2. Verify that the engine will not start when cranked at normal speed with the throttle valve fully open.
3. If the engine starts, inspect the throttle sensor. (Refer to page F–122.) and the ECU terminal 1U voltage. (Refer to page F–116.)

AIR BYPASS CONTROL SYSTEM

DESCRIPTION

The air bypass system operates to improve idle stability and vehicle drivability.
This system supplies throttle valve bypass air into intake manifold according to engine load condition and driving conditions.
This system consists of two solenoid valves controlled by the ECU.

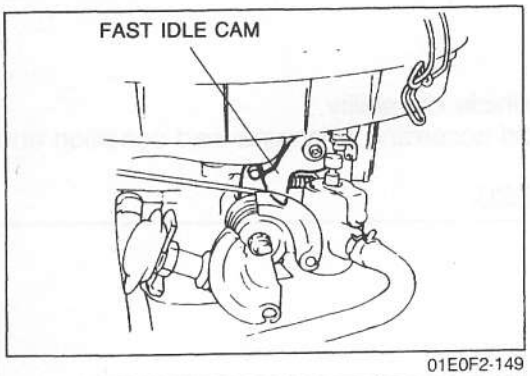


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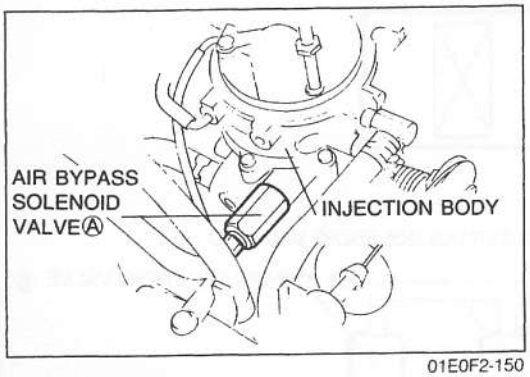
Operation of Air Bypass Solenoid Valve

Engine condition	Purpose	Air bypass solenoid valve		
		Ⓐ	Ⓑ	Ⓒ
During cranking	To improve startability	○	○	
Ignition switch OFF→ON	To prevent from sticking			○
*Accessory ON	To improve startability	○		
P/S pressure switch ON		○	○	
A/C switch ON		○		○
Warm up (45°C→80°C)		○		
Select lever N→D (ATX)	To alleviate sudden engine speed drop	○		
During deceleration (deceleration control)	To improve drivability	○	○	

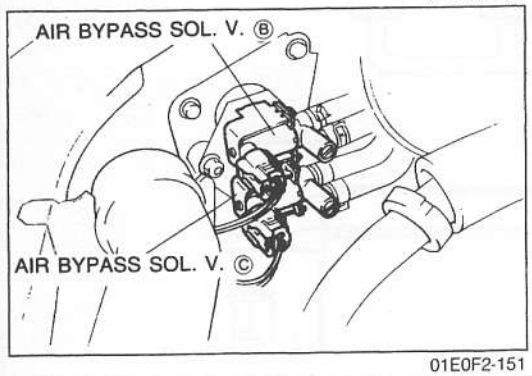
*Accessory is headlights, rear window defroster, blower switch and cooling fan.



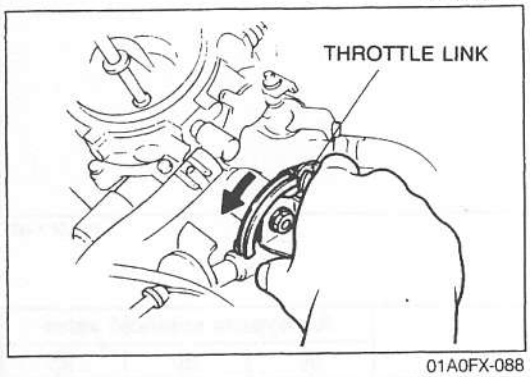
01E0F2-149



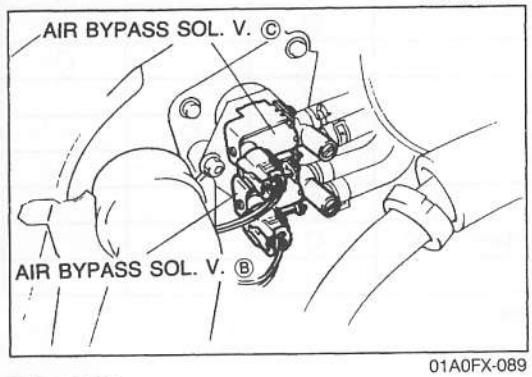
01E0F2-150



01E0F2-151



01A0FX-088

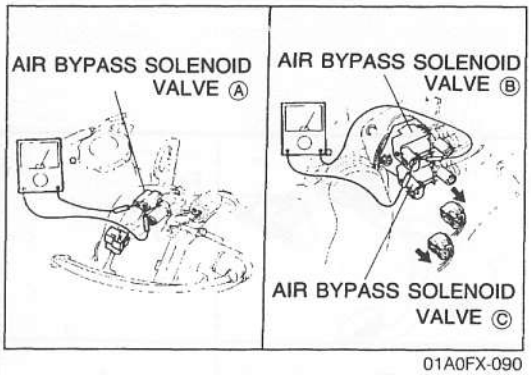


01A0FX-089

SYSTEM OPERATION

1. Warm up the engine to normal operating temperature.
2. Verify that the thermowax unit rod extends outward fully and that the cam separates from the roller.
3. If the electric cooling fan is operating, wait until it stops.
4. Verify that the engine is idling smoothly.
5. Verify that click is heard from the air bypass solenoid valve Ⓐ when turning the following electrical load ON and OFF.

   Electrical load
   - Blower fan
   - Headlight
   - Rear window defroster
6. Verify that click is from the air bypass solenoid valve Ⓑ when the engine starts.
7. Turn the ignition switch, blower switch, and A/C switch ON.
8. Rotate the throttle link by hand.
9. Verify that click is heard from the air bypass solenoid valve Ⓒ.

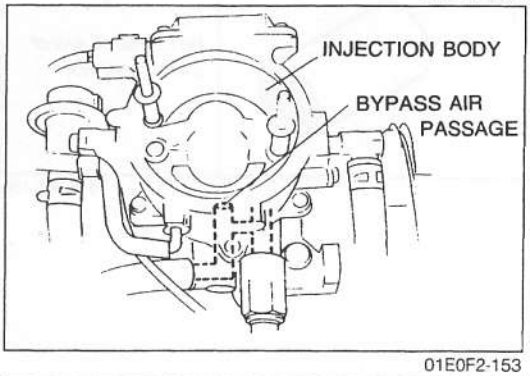


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AIR BYPASS SOLENOID VALVE Ⓐ, Ⓑ, Ⓒ

Inspection for continuity

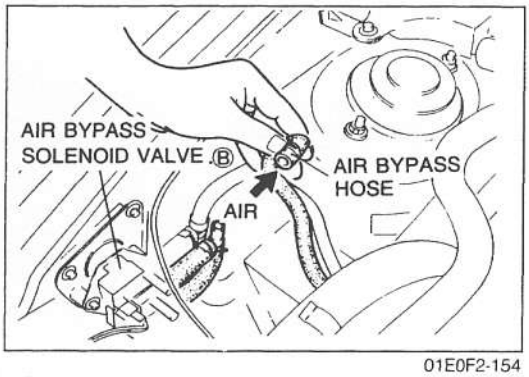
1. Disconnect each air bypass solenoid valve connector.
2. Inspect for continuity between the solenoid valve connector terminals.
3. Replace the air bypass solenoid valve if not as specified.



01E0F2-153

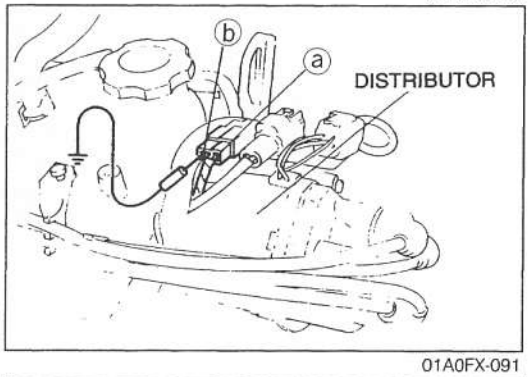
Inspection for Airflow

1. Inspect air bypass solenoid valve Ⓐ.
   1) Remove the air cleaner.
   2) Close the bypass air passage with tape.



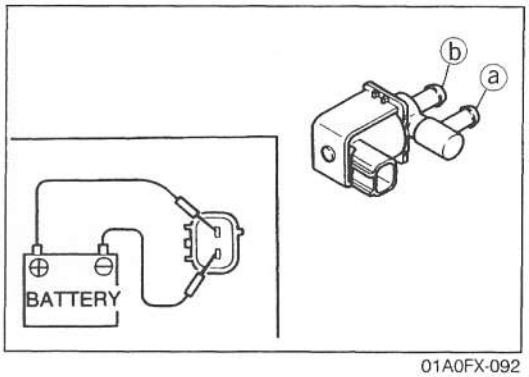
01E0F2-154

   3) Disconnect the bypass air hose from the air bypass solenoid valve Ⓐ as shown in the figure.
   4) Verify that no air flows through air bypass solenoid valve Ⓐ when blowing air lighty into the air bypass hose.



01A0FX-091

   5) Turn the ignition switch ON.
   6) Ground the terminal ⓑ as shown in the figure.
   7) Verify that air flows through air bypass solenoid valve Ⓐ when blowing air into the air bypass hose.



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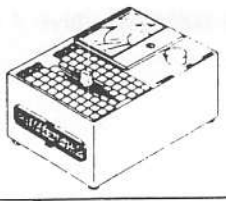
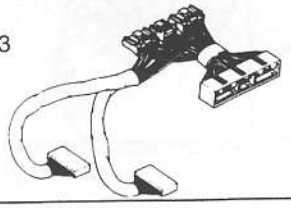
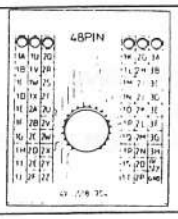
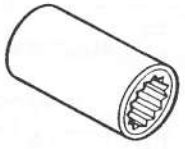
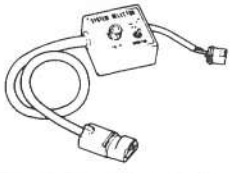
2. Inspect air bypass solenoid valve Ⓑ, Ⓒ
   1) Remove air bypass solenoid valve Ⓑ or Ⓒ.
   2) Blow through the valve from port ⓐ and verify that no air comes out of port ⓑ.
   3) Apply 12V to the solenoid valve connector.
   4) Blow through the valve from port ⓐ and verify that air comes out of port ⓑ.

Adjustment (idle-up speed)

Refer to page F–64.

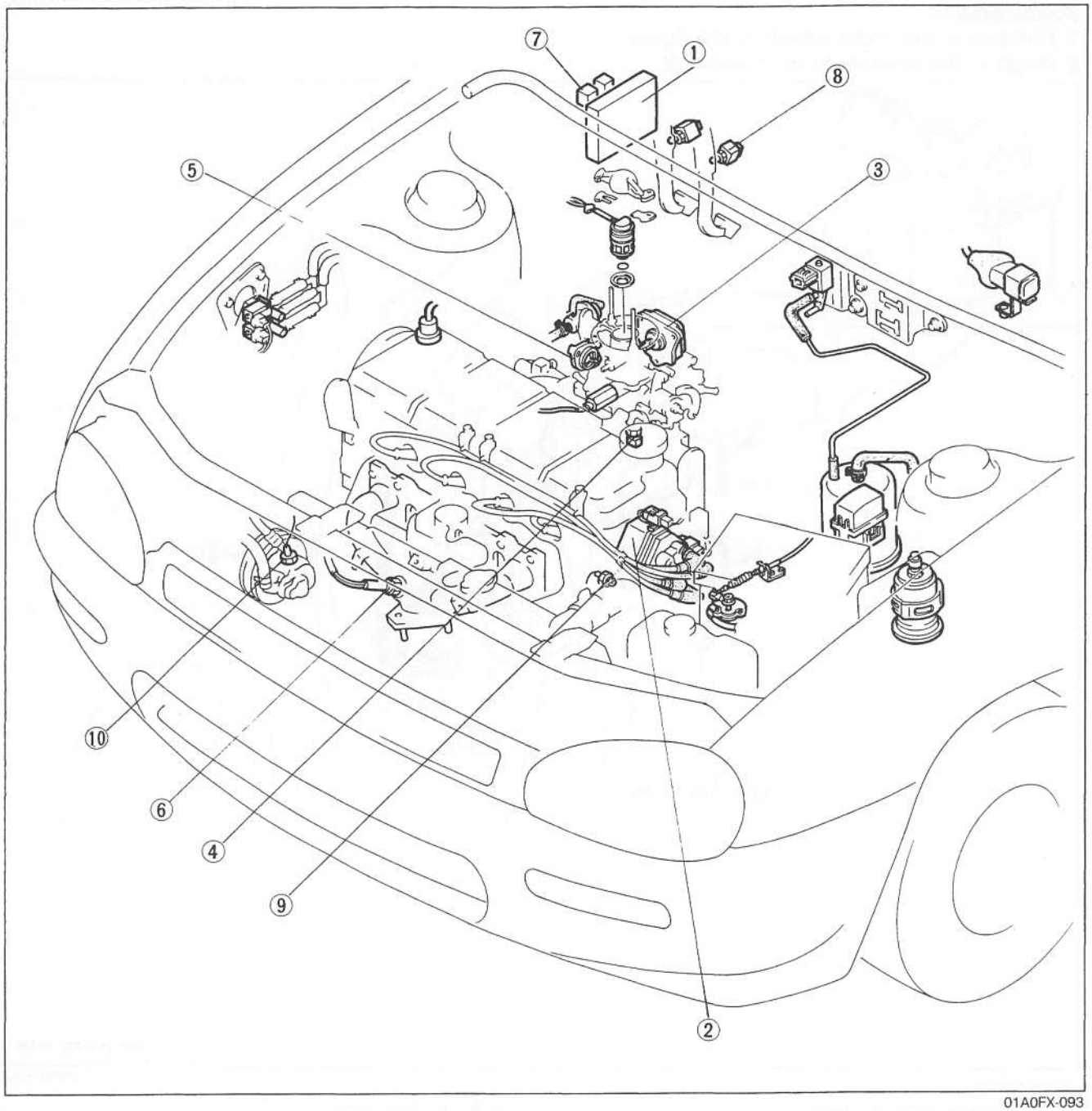
CONTROL SYSTEM

PREPARATION
SST

49 9200 162 Engine Signal Monitor 	For inspection of ECU	49 G018 903 Adapter harness 	For inspection of ECU
49 G018 904 Sheet 	For inspection of ECU	49 D015 001 Box wrench 	For removal of water thermosensor
49 B019 9A0 System Selector 	For inspection of ignition timing and idle speed		

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STRUCTURAL VIEW



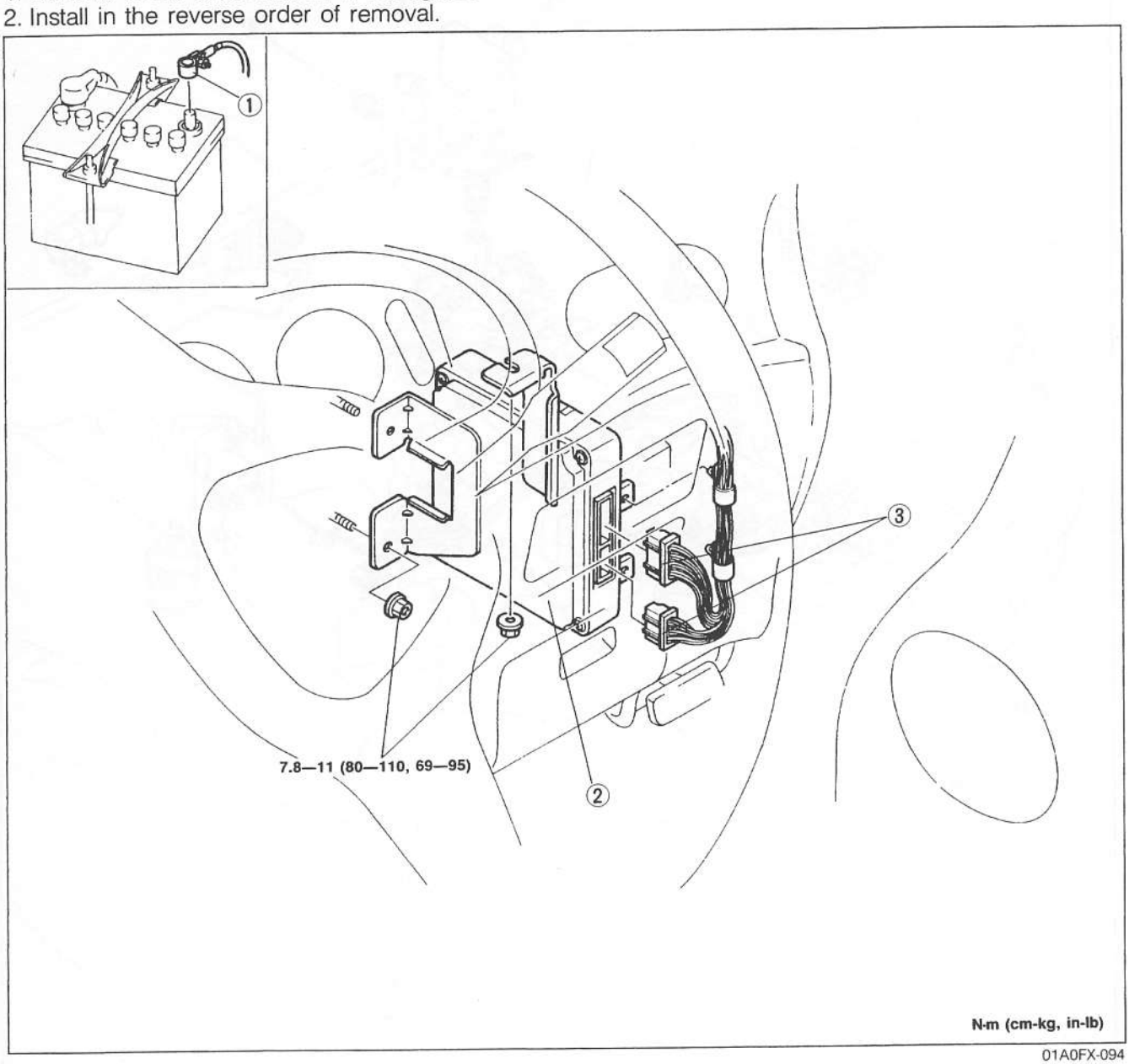
01A0FX-093

1. ECU
   - Replacement ..... page F–115
   - Inspection ..... page F–115
2. Crank angle sensor
   - Inspection ..... page F–120
3. Airflow sensor
   - Inspection ..... page F–121
   - Removal / Installation ..... page F–121
4. Water thermosensor
   - Removal ..... page F–121
   - Inspection ..... page F–121
5. Throttle sensor
   - Inspection / Adjustment ..... page F–122
6. Oxygen sensor
   - Inspection ..... page F–123
   - Replacement ..... page F–124
7. Main relay
   - Replacement ..... page F–124
   - Inspection ..... page F–124
8. Clutch switch (MTX)
   - Inspection ..... page F–124
   - Replacement ..... page F–124
9. Neutral switch (MTX)
   - Inspection ..... page F–125
   - Replacement ..... page F–125
10. P/S pressure switch
    - Inspection ..... page F–125

ENGINE CONTROL UNIT (ECU)

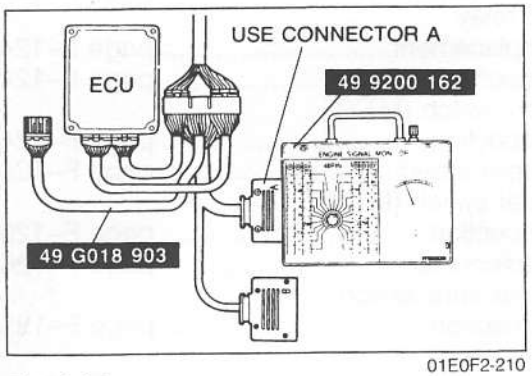
Replacement

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



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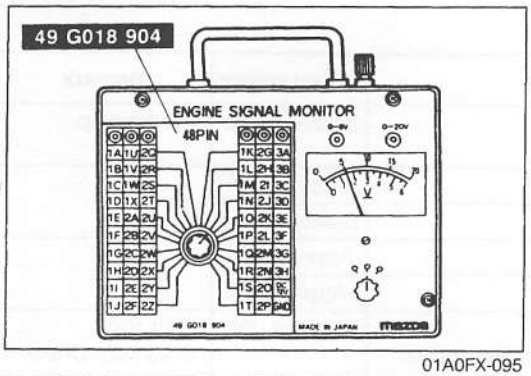
1. Negative battery cable
2. ECU
   Inspection ..... page F–112
3. ECU connector



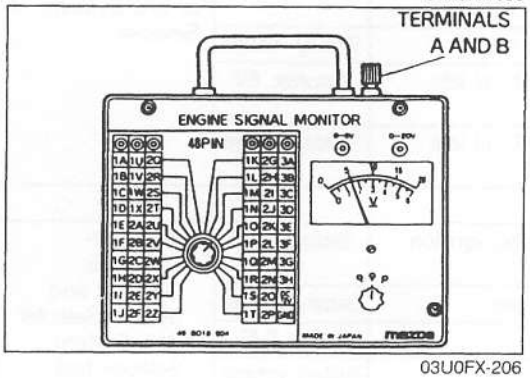
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Inspection

1. Disconnect the ECU connectors.
2. Connect the **SSTs (Engine Signal Monitor and Adapter Harness)** to the ECU as shown.



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03U0FX-206

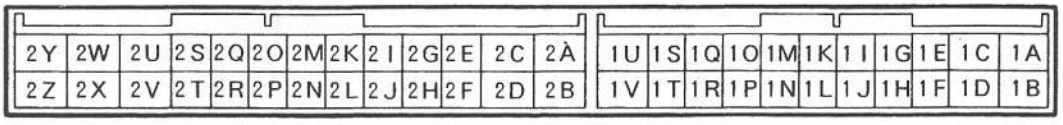
3. Place the **SST (Sheet)** on the **Engine Signal Monitor**.
4. Measure the voltage at each terminal.
   (Refer to pages F–114 to F–119.)
5. If any ECU terminal voltage is incorrect, check the related input or output devices and wiring. If no problem is found, replace the ECU. (Refer to above.)

Caution

- **Never apply voltage to SST terminals A and B.**

Terminal voltage (reference data)

Terminal	Input	Output	Connection to	Test condition		Correct voltage	Remark
1A	—	—	Battery	Constant		Battery voltage	For backup
1B	○		Main relay (FUEL INJ relay)	Ignition switch	OFF	Approx. 0V	—
					ON	Battery voltage	
1C	○		Ignition switch (START)	While cranking		Approx. 10V	—
				Ignition switch ON		Approx. 0V	
1D		○	Self-Diagnosis Checker (Monitor lamp)	Test switch at "SELF-TEST" Lamp illuminated for 3 sec after ignition switch OFF→ON		Approx. 5V	With Self-Diagnosis Checker and System Selector
				Lamp not illuminated after 3 sec.		Battery voltage	
				Test switch at "O_2 MONITOR" at idle Monitor lamp illuminated		Approx. 5V	
				Test switch at "O_2 MONITOR" at idle Monitor lamp not illuminated		Battery voltage	
1E	—	—	—	—		—	—
1F		○	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 after 3 sec.		Battery voltage	
				Buzzer sounded		Below 2.5V	
				Buzzer not sounded		Battery voltage	
1G		○	Igniter (in distributor)	Ignition switch ON		Approx. 0V	—
				Idle		Approx. 0.5V	
1H	—	—	—	—		—	—
1I		○	Circuit opening relay	Ignition switch	OFF	Approx. 0V	—
					ON	Battery voltage	
					START	Below 1.0V	
					ON (at idle)		
1J		○	A/C relay	Ignition switch ON		Battery voltage	—
				Idle	A/C ON	Below 2.5V	
					A/C OFF	Battery voltage	
1K	○		Diagnosis connector (TEN terminal)	System Selector test switch at "O_2 MONITOR"		Battery voltage	—
				System Selector test switch at "SELF-TEST"		Below 1.0V	
1L	—	—	—	—		—	—
1M	○		Speed sensor	Ignition switch ON		Approx. 0V or 5V	—
1N	—	—	—	—		—	—
1O	○		Stoplight switch	Brake pedal released		Below 1.0V	—
				Brake pedal depressed		Battery voltage	
1P	○		P/S pressure switch	Ignition switch ON		Battery voltage	—
				P/S ON at idle		Below 1.0V	
				P/S OFF at idle		Battery voltage	

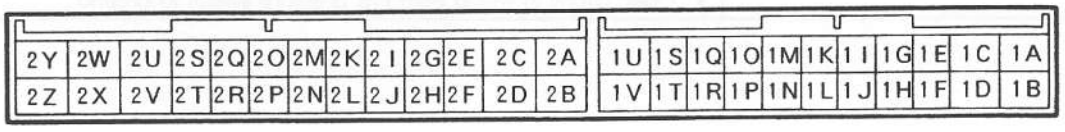


01A0FX-096

Incorrect voltage		Possible cause
Always 0V		• ROOM 10A fuse burned • Open circuit in wiring from ROOM 10A fuse to ECU terminal 1A
Always 0V		• Main relay malfunction (Refer to page F–124) • Open or short circuit in wiring from main relay to ECU terminal 1B
Always 0V (Starter turns)		• Open or short circuit in wiring from ignition switch (MTX), or inhibitor switch (ATX) to ECU terminal 1C
Always 0V		• Main relay (FUEL INJ relay) malfunction (Refer to page F–124) • Open circuit in wiring from main relay to diagnosis connector terminal +B • Open or short circuit in wiring from diagnosis connector terminal MEN to ECU terminal 1D
Always battery voltage		• Poor connection at ECU connector • ECU malfunction
Always approx. 5V		• ECU malfunction
—		—
Always below 2.5V	No display on Self-Diagnosis Checker	• Main relay (FUEL INJ relay) malfunction (Refer to page F–124) • Open circuit in wiring from main relay to diagnosis connector terminal +B
	"88" displayed and buzzer sounds continuously	• Open or short circuit in wiring from diagnosis connector terminal FEN to ECU terminal 1F
Always Battery voltage		• Poor connection at ECU connector • ECU malfunction
Always 0V		• Short circuit in wiring from igniter to ECU terminal 1G
—		—
Always 0V		• Main relay (FUEL INJ relay) malfunction (Refer to page F–124) • Poor connection at ECU connector • Open circuit in wiring from circuit opening relay to ECU terminal 1I
Always 0V		• Open circuit in wiring from A/C relay to ECU terminal 1J
Always below 1.0V		• Short circuit in wiring from diagnosis connector terminal TEN to ECU terminal 1K
Always battery voltage		• Open circuit in wiring from diagnosis connector terminal TEN to ECU terminal 1K • Open circuit in wiring from diagnosis connector terminal GND to ground
—		—
Always 0V or Approx. 5V		• Open or short circuit in wiring from speed switch (Section T) to ECU terminal 1M
—		—
Always below 1.0V (stoplights OK)		• Open circuit in wiring from stoplight switch to ECU terminal 1O
Always below 1.0V		• P/S pressure switch malfunction (Refer to page F–125) • Short circuit in wiring from P/S pressure switch ECU terminal 1P • ECU malfunction
Always battery voltage		• P/S pressure switch malfunction (Refer to page F–125) • Open circuit in wiring from P/S pressure switch to ECU terminal 1P • Open circuit in wiring from P/S pressure switch to ground

01A0FX-097

Terminal	Input	Output	Connection to	Test condition		Correct voltage	Remark
1Q	○		A/C switch	Ignition switch ON	A/C SW ON and blower control SW ON	Below 1.0V	—
					A/C SW OFF	Battery voltage	
1R	○		Water thermo switch	Cooling fan operating (engine coolant temperature over 97°C (207°F) or diagnosis connector terminal TFA grounded)		Below 1.0V	—
				Fan not operating (idle)		Battery voltage	
1S	○		Blower control switch	Blower control switch OFF		Battery voltage	Ignition switch ON
				Blower control switch ON		Below 1.0V	
1T	○		Rear window defroster switch	Rear window defroster switch OFF		Below 1.0V	Ignition switch ON
				Rear window defroster switch ON		Battery voltage	
1U	○		Headlight switch	Headlights ON		Battery voltage	—
				Headlights OFF		Below 1.0V	
1V	○		Neutral/Clutch switches (MTX)	Neutral position or clutch pedal depressed		Below 1.0V	—
				Others		Battery voltage	
			Inhibitor switch (ATX)	N or P range		Below 1.0V	
				Others		Battery voltage	
2A	—	—	Ground (Injector)	Constant		0V	—
2B	—	—	Ground (Output)	Constant		0V	—
2C	—	—	Ground (CPU)	Constant		0V	—
2D	—	—	Ground (Input)	Constant		0V	—
2E	○		Crank angle sensor (in distributor) (Ne-signal)	Ignition switch ON		Approx. 0V or 5V	—
				Idle		Approx. 2V	
2F	—	—	—	—		—	—
2G	—	—	—	—		—	—
2H	—	—	—	—		—	—
2I	—	—	—	—		—	—
2J	—	—	Ground	MTX		Below 1.0V	—
			Open	ATX		Battery voltage	
2K	○		Throttle sensor/EC-AT control unit (ATX)	Constant		Approx. 5V	—
2L	—	—	—	—		—	—

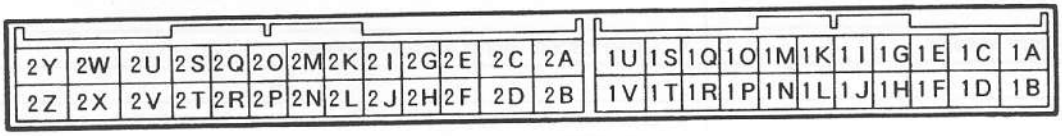


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Incorrect voltage		Possible cause
Always 0V		• Open circuit in wiring from A/C switch to ECU terminal 1Q
Always battery voltage		• A/C switch malfunction (Refer to Section U)
Always below 1.0V (electric cooling fan OK)		• Open or short circuit in wiring from fan relay to ECU terminal 1R • ECU malfunction
Always below 1.0V (blower fan OK)		• Short circuit in wiring from blower control switch to ECU terminal 1S • Poor connection at ECU connector • ECU malfunction
Always battery voltage (blower fan OK)		• Open circuit in wiring from blower control switch to ECU terminal 1S
Always below 1.0V	Illumination lamp ON when rear window defroster switch ON	• Open or short circuit in wiring from rear window defroster switch to ECU terminal 1T
	Illumination lamp never ON	• Open circuit in wiring from ignition switch to rear window defroster switch • Rear window defroster switch malfunction (Refer to Section T)
Always below 1.0V (Headlights OK)		• Open or short circuit in wiring from headlight relay to ECU terminal 1U
Always below 1.0V		• Neutral switch malfunction (Refer to page F–125) • Clutch switch malfunction (Refer to page F–124) • Short circuit in wiring from ECU terminal 1V to neutral or clutch switch
Always approx. 12V		• Neutral switch malfunction (Refer to page F–125) • Clutch switch malfunction (Refer to page F–124) • Open circuit in wiring from ECU terminal 1V to neutral or clutch switch • Poor connection at ECU connector
Always below 1.0V		• Inhibitor switch malfunction (Refer to Section K) • Short circuit wiring from inhibitor switch to ECU terminal 1V
Always approx. 12V		• Inhibitor switch malfunction (Refer to Section K) • Open circuit in wiring from inhibitor switch to ECU terminal 1V
Above 0V		• Poor contact at ground terminal • Open circuit in wiring from ECU to ground
Always approx. 0V or approx. 2V		• Refer to Troubleshooting, Code No.02 (Refer to page F–70)
—		—
—		—
—		—
—		—
Always battery voltage		• Open circuit wiring from to ground
—		—
Always 0V		• Short circuit in wiring from ECU terminal 2K to throttle sensor EC-AT control unit (ATX), or in airflow sensor • Poor connection at ECU connector • ECU malfunction
Below 4.5V or above 5.5V		• ECU malfunction
—		—

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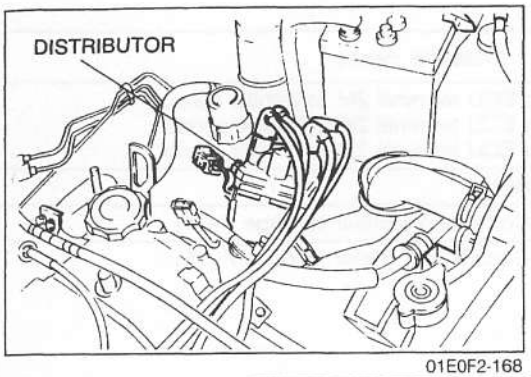
Terminal	Input	Output	Connection to	Test condition		Correct voltage	Remark
2M	○		Throttle sensor EC-AT control unit (ATX)	Accelerator pedal released		Approx. 0.5V	—
				Accelerator pedal fully depressed		Approx. 4.2V	
2N	○		Oxygen sensor	Ignition switch ON		0V	—
				Idle (cold engine)		0V	
				Idle (after warm-up)		0—0.1V	
				Increasing engine speed (after warm-up)		0.5—1.0V	
				Deceleration		0—0.4V	
2O	○		Airflow sensor (positive)	Ignition switch ON		Approx. 0.4V	—
				Idle		Approx. 1.2V	
2P		○	Airflow sensor (negative)	Constant		0V	—
2Q	○		Water thermo-sensor	Engine coolant temperature 20°C (68°F)		Approx. 2.5V	—
				After warm-up		Below 0.5V	
2R		○	Air bypass solenoid valve Ⓑ	Engine cranking and few seconds after cranking		Approx. 2.3V	—
				Other condition		Battery voltage	
2S	—	—	—	—		—	—
2T		○	Air bypass solenoid valve Ⓐ	Accessory ON		Below 1.0V	—
				Others condition		Battery voltage	
2U	○		Injector (negative)	Constant		0V	—
2V		○	Injector (positive)	Ignition switch ON		0V	Engine Signal Monitor: Green and red lamps flash
				Idle		Below 1.0V	
2W		○	Air bypass solenoid valve Ⓒ	A/C switch	OFF	Approx. 2.3V	—
					ON	Battery voltage	
2X		○	Solenoid valve (purge control)	Ignition switch ON		Battery voltage	—
				Idle		Battery voltage	
2Y		○	Main relay	Ignition switch	OFF	0V	—
					ON	Approx. 12V	
2Z		○	EC-AT control unit (ATX)	Engine coolant temperature below 70°C (158°F) at idle		Below 1.0V	—
				Engine coolant temperature above 70°C (158°F) at idle		Battery voltage	



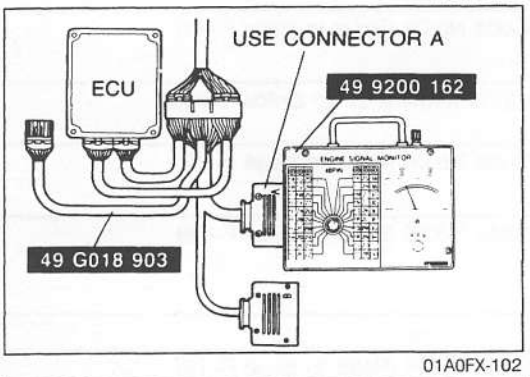
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Incorrect voltage	Possible cause
Always constant	• Open circuit in wiring from ECU terminal 2M to throttle sensor • Open circuit in wiring from ECU terminal 2K to throttle sensor • Open circuit in wiring from ECU terminal 2D to throttle sensor
Always above 1V	• Throttle sensor misadjustment
0V after warm-up	• Refer to Troubleshooting, Code No.15 (Refer to page F–74)
Always approx. 1V after warm-up	• Refer to Troubleshooting, Code No.17 (Refer to page F–75)
Always approx. 0V or approx. 5V	• Refer to Troubleshooting, Code No.08 (Refer to page F–71)
Always 0V	• Open circuit in wiring from ECU terminal 2P to airflow sensor
Always approx. 0V or approx. 5V	• Refer to Troubleshooting, Code No.09 (Refer to page F–72)
Always 0V	• Refer to Troubleshooting, Code No.35 (Refer to page F–78)
—	—
Always 0V	• Refer to Troubleshooting, Code No.34 (Refer to page F–78)
Always 0V	• Open or short circuit in wiring from injector to ECU terminal 2V
Always 0V	• Open circuit in wiring from injector to ECU terminal 2V
Always 0V	• Open or short circuit in wiring from ECU terminal 2W to air bypass solenoid valve ⓒ
Always approx. 0V or approx. 12V	• Refer to Troubleshooting, Code No.26 (Refer to page F–77)
Always 0V	• Open circuit in wiring from main relay to ECU terminal 2Y
Always approx. 0V or approx. 12V	• Open or short circuit in wiring from ECU terminal 2Z to EC-AT control unit terminal 1N

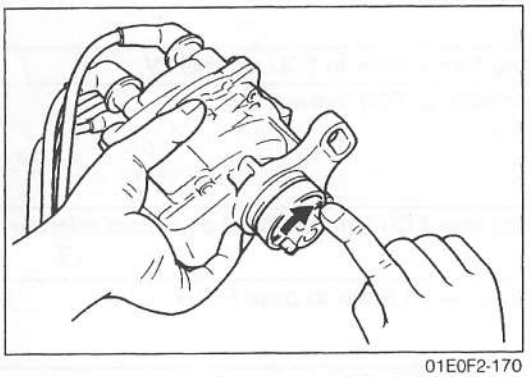
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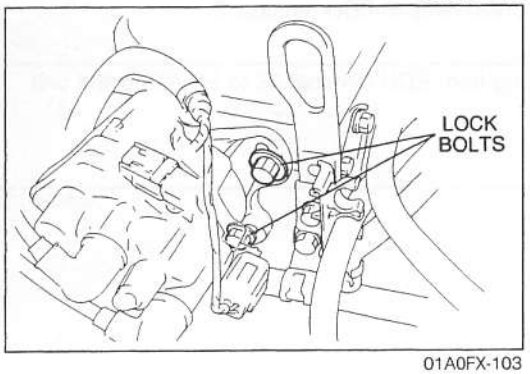


01E0F2-168



01A0FX-102


01E0F2-170



01A0FX-103

CRANK ANGLE SENSOR (IN DISTRIBUTOR)

Inspection

1. Remove the distributor. (Refer to Section G.)
2. Connect the distributor connector as shown in the figure.
3. Connect the high-tension lead.
4. Turn the ignition switch ON.
5. Connect the **SSTs (Engine Signal Monitor and Adapter)** to the ECU as shown.
6. Set the **SSTs (Engine Signal Monitor and Adapter)** terminal 2E.
7. Rotate the distributor drive by hand and measure the output voltage.

Specification

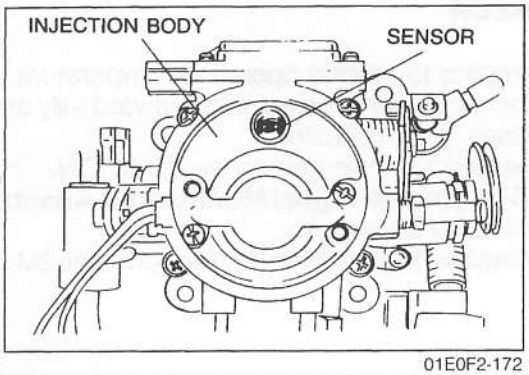
Terminal	Test condition	Voltage
2E	Rotate distributor one full turn	Approx. 5V (4 pulses)

8. After the inspection, install the distributor. (Refer to Section G.)
9. Start the engine and adjust the ignition timing. (Refer to page F–63.)

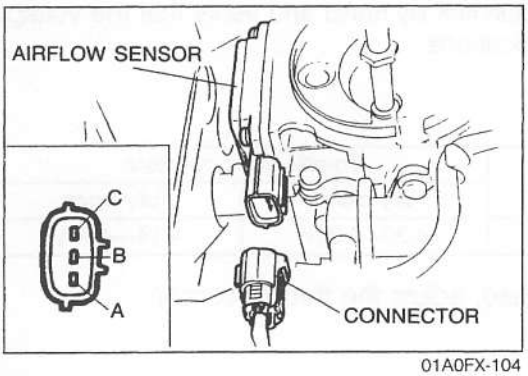
   Ignition timing: BTDC 16 ± 1°

10. Tighten the distributor lock bolts to the specified torque.

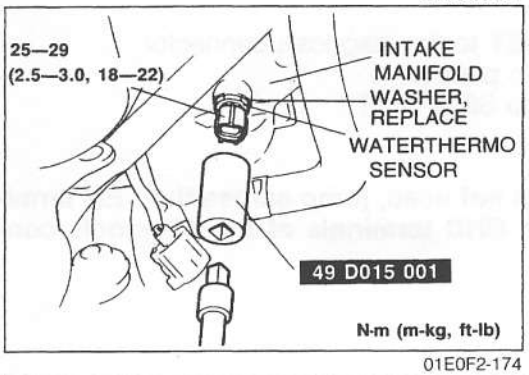
    Tightening torque:
    16—23 N·m (1.6—2.3 m-kg, 12—16 ft-lb)



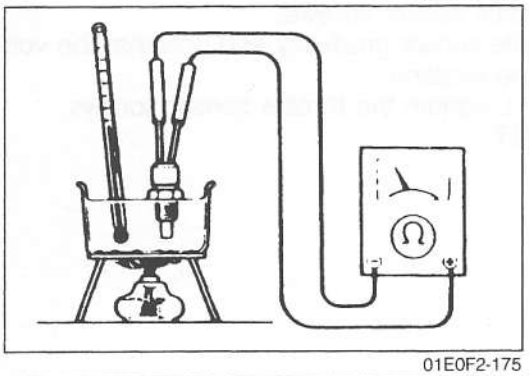
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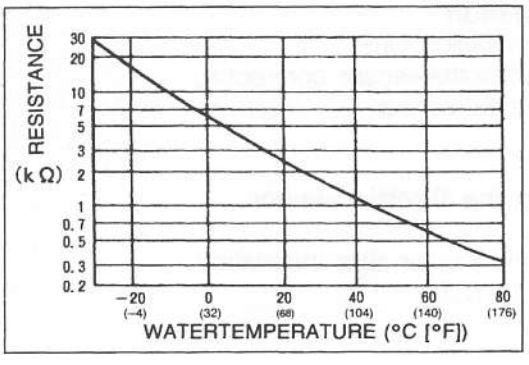
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01E0F2-174



01E0F2-175



AIRFLOW SENSOR (BYPASS HOT-WIRE TYPE)

Inspection

1. Remove the air cleaner.
2. Visually check for an open circuit of the airflow sensor hot wire.
3. Check the airflow sensor body for cracks.
4. Disconnect the airflow sensor connector.
5. Using an ohmmeter, measure resistance between the terminals.

Specification

Terminal	Resistance (20°C [68°F])
A → B	4 ± 1 kΩ
A → C	∞
B → C	∞

Removal / Installation

Refer to page F–84.

WATER THERMOSENSOR

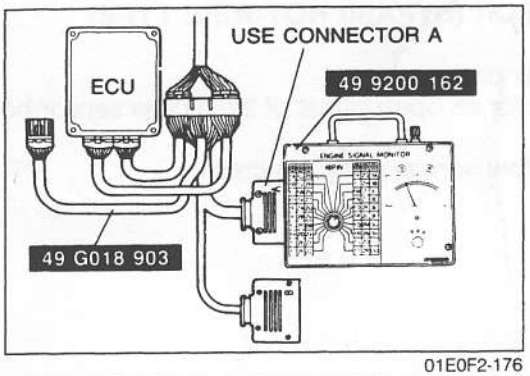
Removal

1. Disconnect the water thermosensor connector.
2. Remove the water thermosensor using the **SST**.

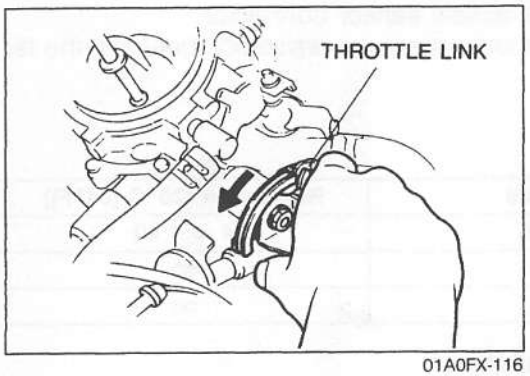
Inspection

1. Place the sensor in water with a thermometer and heat the water gradually.
2. Using an ohmmeter, measure resistance of the sensor.

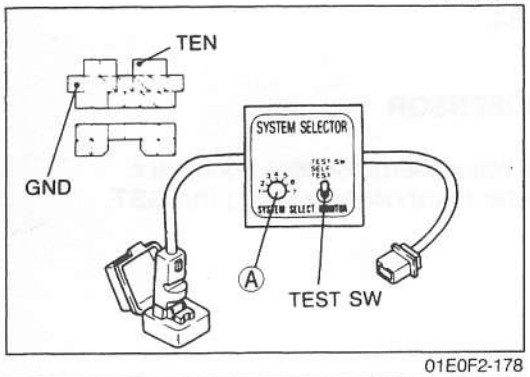
Coolant	Resistance (kΩ)
−20°C (−4°F)	14.6 —17.8
0°C (32°F)	5.2 — 6.5
20°C (68°F)	2.21— 2.69
40°C (104°F)	1.0 — 1.3
60°C (140°F)	0.50— 0.65
80°C (176°F)	0.29— 0.354



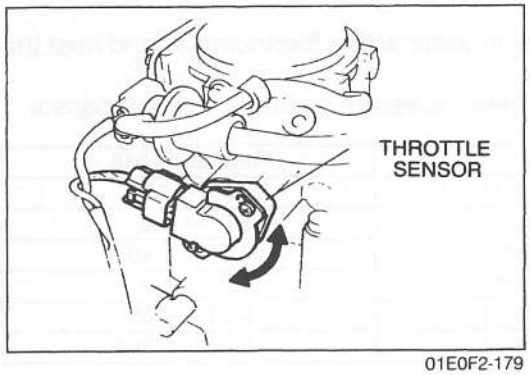
01E0F2-176



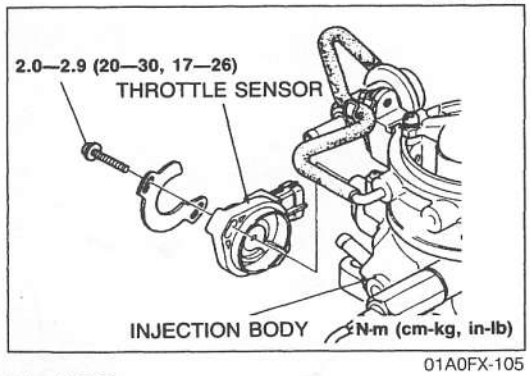
01A0FX-116



01E0F2-178



01E0F2-179



01A0FX-105

THROTTLE SENSOR

Inspection

1. Warm up the engine to normal operating temperature.
2. Verify that the thermowax unit rod extends outward fully and the cam separates from the roller.
3. Stop the engine and turn the ignition switch to ON.
4. Connect the **SSTs (Engine Signal Monitor and Adapter Harness)** to the ECU as shown.
5. Set the **SST (Engine Signal Monitor)** to terminal 2M.
6. Rotate the throttle link by hand and verify that the voltage is within specifications.

Specification

ECU Terminal	Throttle valve condition	
	Fully closed	Fully open
2M	0.30—0.80V	4.14—4.46V

7. If not as specified, adjust the throttle sensor.

Adjustment

1. Connect the **SST** to the diagnosis connector.
2. Set switch Ⓐ to position 1.
3. Set TEST SW to SELF-TEST.

Note

- **If the SST is not used, jump across the TEN terminal and the GND terminals of the diagnosis connector.**

4. Loosen the throttle sensor screws.
5. Rotate the throttle sensor gradually and until that the voltage is within specification.
6. After adjustment, tighten the throttle sensor screws.
7. Remove the **SST**.

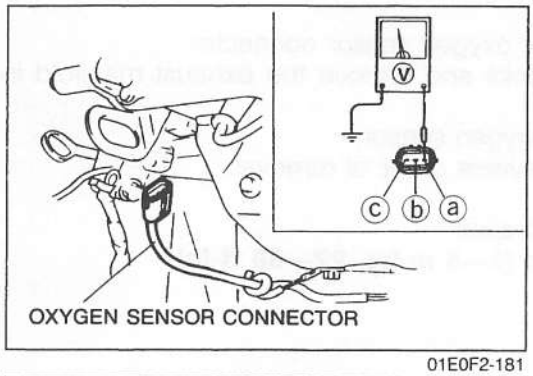
Removal / Installation

1. Turn the ignition switch OFF.
2. Disconnect the throttle sensor connector.
3. Remove the throttle sensor.

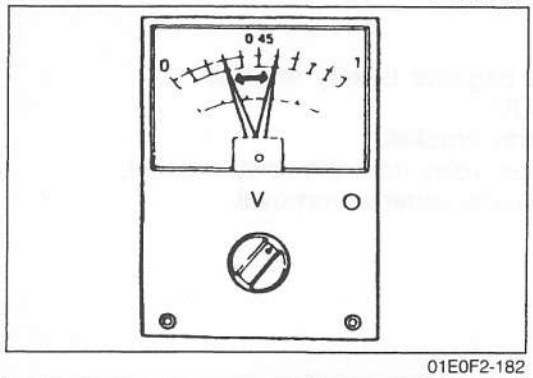
Caution

- **Do not drop the throttle sensor.**

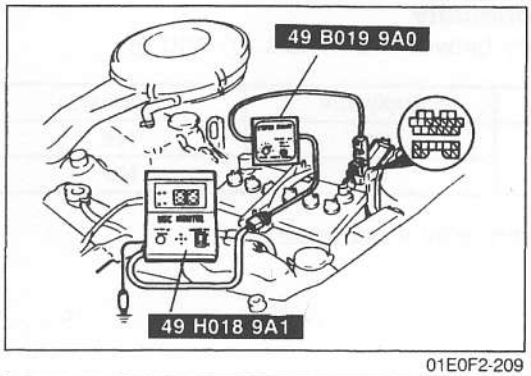
4. Adjust the throttle sensor after installation. (Refer to page F–122.)



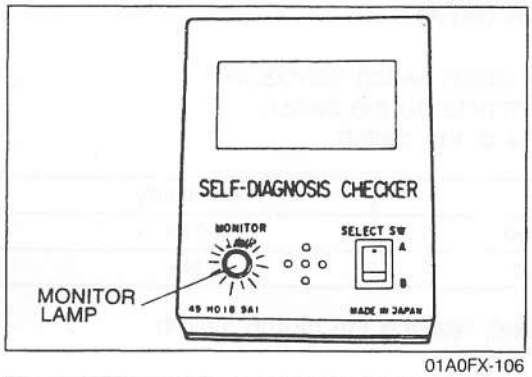
01E0F2-181



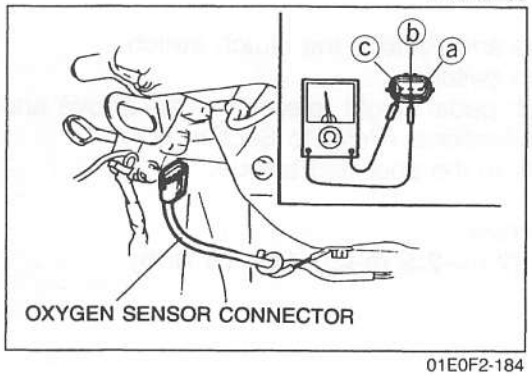
01E0F2-182



01E0F2-209



01A0FX-106



01E0F2-184

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 voltmeter between the oxygen sensor and a ground.
4. Measure the voltage while increasing and decreasing the engine speed suddenly several times.

Specification

Engine condition	Voltage (V)
While deceleration	Below 0.4
While acceleration	Above 0.5

5. Replace the oxygen sensor if not as specified.

Inspection of Sensitivity

1. Warm up the engine to normal operating temperature.
2. Connect the **SSTs (System Selector and Self-Diagnosis Checker)** to the diagnosis connector as shown.
3. Set switch Ⓐ to position 1.
4. Set TEST SW to O_2 MONITOR.
5. Increase the engine speed to **between 2,000 and 3,000 rpm**, and verify that the monitor lamp flashes for **10 sec.**. If not as specified, replace the oxygen sensor. (Refer to page F–124.)

   Monitor lamp: Flashes more than 8 times/10 seconds

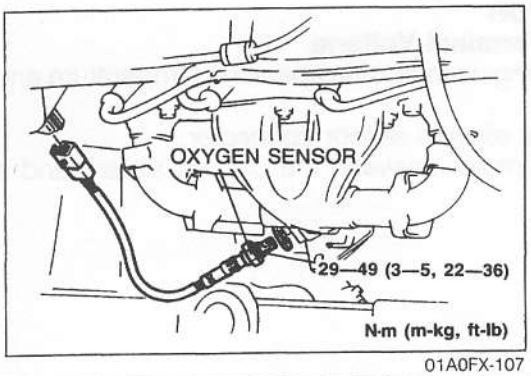
6. Replace the oxygen sensor if not as specified.

Inspection of Heater

1. Measure resistance between terminals ⓒ and ⓑ.

   Resistance: 6Ω (20°C [68°F])

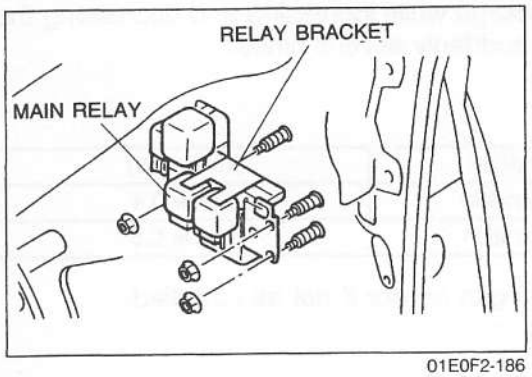
2. Replace the heater if not as specified.



01A0FX-107

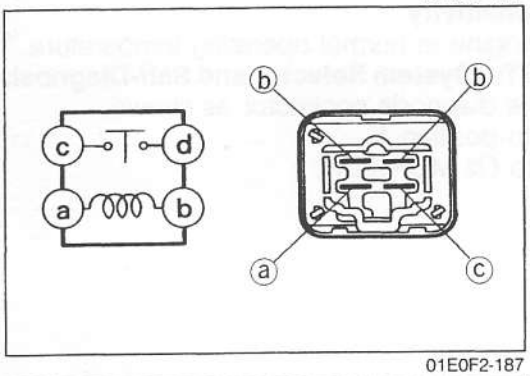
Replacement
1. Disconnect the oxygen sensor connector.
2. Remove the bolts and remove the exhaust manifold insulator.
3. Remove the oxygen sensor.
4. Install in the reverse order of removal.

Tightening torque:
29—49 N·m (3—5 m-kg, 22—36 ft-lb)



01E0F2-186

MAIN RELAY
Replacement
1. Disconnect the negative battery terminal.
2. Remove the ECU.
3. Remove the relay bracket.
4. Remove the main relay from the relay bracket.
5. Install in the reverse order of removal.

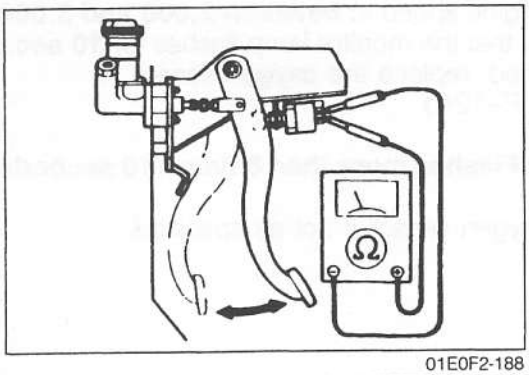


01E0F2-187

Inspection of Continuity
1. Check continuity between terminals ⓒ and ⓓ.

Terminals	Apply 12V	Continuity
ⓐ ↔ ⓑ	Yes	Yes
	No	No

2. Replace the main relay if necessary.

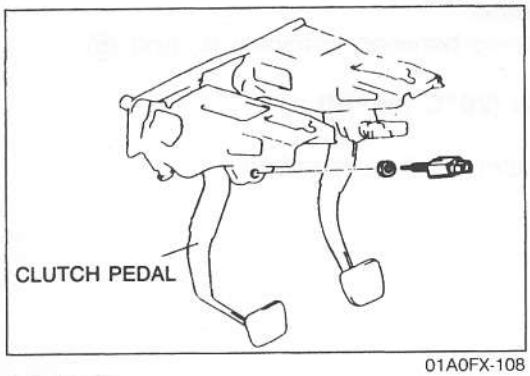


01E0F2-188

CLUTCH SWITCH (MTX)
Inspection
1. Disconnect the clutch switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

Pedal	Continuity
Depressed	Yes
Released	No

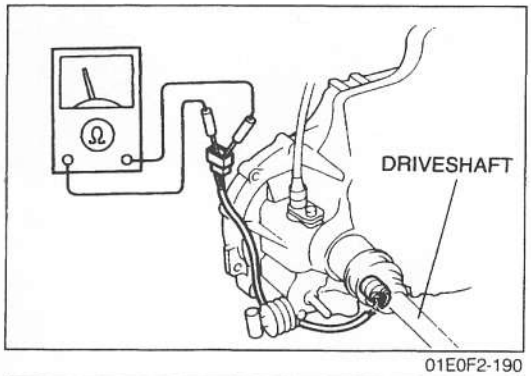
4. If not as specified, replace the clutch switch.



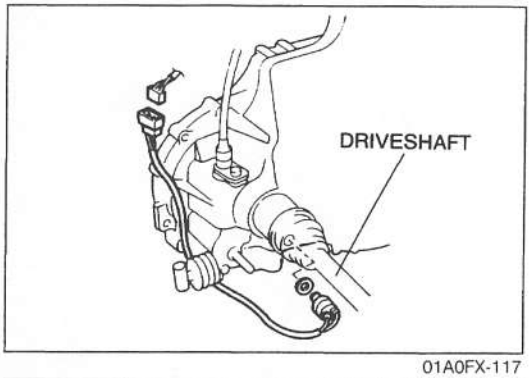
01A0FX-108

Replacement
1. Loosen the nuts and remove the clutch switch.
2. Install the clutch switch.
3. Adjust the clutch pedal height referring to the above and the height specifications. (Refer to Section H.)
4. Tighten the nuts to the specified torque.

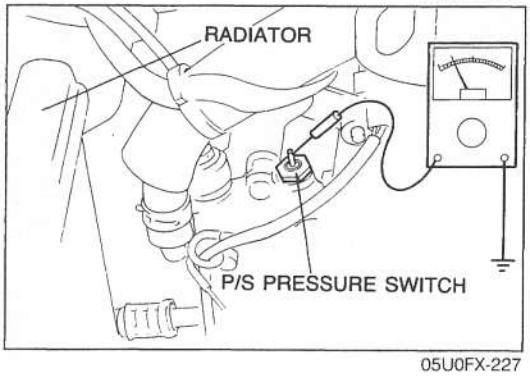
Tightening torque:
20—25 N·m (2.0—2.5 m-kg, 14—18 ft-lb)



01E0F2-190



01A0FX-117



05U0FX-227

NEUTRAL SWITCH (MTX)

Inspection

1. Disconnect the neutral switch connector shown in the figure.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

Transaxle	Continuity
Neutral	Yes
Other ranges	No

4. If not as specified, replace the neutral switch.

Replacement

1. Disconnect the neutral switch connector.
2. Remove the bracket.
3. Remove the neutral switch.
4. Install in the reverse order of removal.

Tightening torque:
20—29 N·m (2.0—3.0 m-kg, 14—22 ft-lb)

POWER STEERING PRESSURE SWITCH

Inspection

1. Disconnect the P/S pressure switch connector.
2. Connect an ohmmeter to the switch.
3. Start the engine and let it idle. Check continuity of the switch while turning the steering wheel.

P/S	Continuity
Turning	Yes
Not turning	No

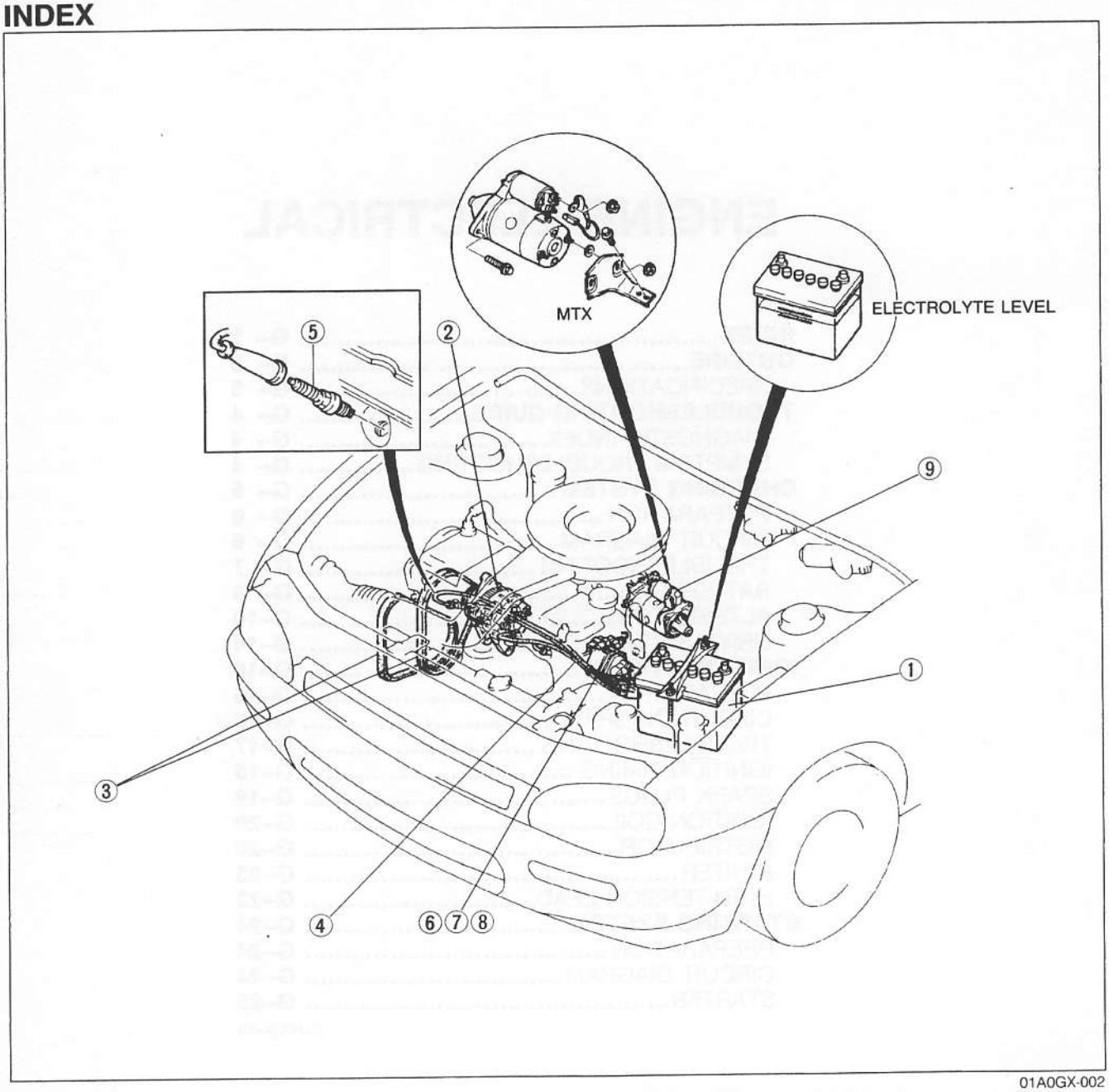
4. If not as specified, replace the P/S pressure switch.

ENGINE ELECTRICAL

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01A0GX-001

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OUTLINE

SPECIFICATIONS

Item			Engine B3
Battery	Voltage	V	12
	Type and capacity	(20-hour rate)	34B19L-S (33AH)
Dark current		mA	Max. 20
Alternator	Type		A.C.
	Output	V-A	12-65
	Regulator type		Transistorized (built-in IC regulator)
	Regulated voltage	V	14.1—14.7
	Brush length mm (in)	Standard	25 (0.98)
		Minimum	6 (0.24)
	Drive belt deflection mm (in)/98 N, 10 kg, 22 lb	New	5.5—7.0 (0.21—0.27)
		Used	6.0—7.5 (0.23—0.29)
Starter	Type		Direct
	Output	V-kW	12-0.85···(MTX) 12-0.95···(ATX)
	Brush length mm (in)	Standard	17 (0.65)
		Minimum	11 5 (0.45)
Distributor	Spark advance type		ESA
Ignition timing (TEN terminal of diagnosis connector ground)		BTDC	16 ± 1°
Ignition coil	Resistance (20°C [68°F])	Primary coil winding	0.68—0.84Ω
		Secondary coil winding	9.6—14.4kΩ
Spark plug	Type	NGK	BKR5E-11* BKR6E-11
		NIPPONDENSO	K16PR-U11* K20PR-U11
	Plug gap	mm (in)	1.0—1.1 (0.039—0 043)
Firing order			1—3—4—2

* . standard plug

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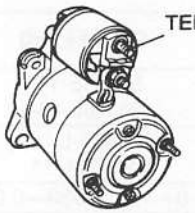
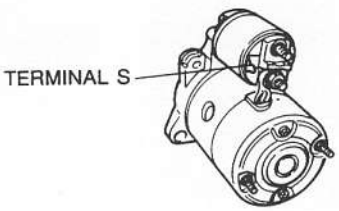
TROUBLESHOOTING GUIDE

DIAGNOSTIC INDEX

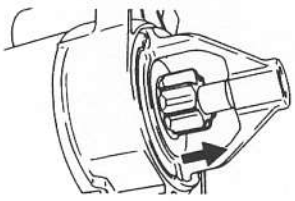
No.	Troubleshooting items	Page
1	Will not crank—starter motor does not operate	G– 4
2	Will not crank—starter motor spins	G– 4
3	Cranks slowly	G– 5
4	Alternator warning lamp illuminates while engine running	G– 5
5	Discharged battery	G– 5
6	Misfire	G–17

01A0GX-036

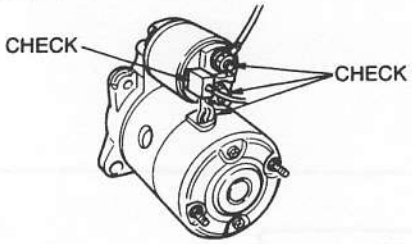
SYMPTOM TROUBLESHOOTING

1	Will not crank—Starter motor does not operate		
STEP	INSPECTION		ACTION
1	Does engine crank with fully charged battery?	Yes	Check charging system ☞ page G–7
		No	Go to next step
2	Is battery voltage present at terminal B?  	Yes	Go to next step
		No	Check wiring harness
3	Is battery voltage present at terminal S with ignition switch in START position?  	Yes	• Check magnetic switch ☞ page G–29 • Check field coil ☞ page G–30 • Check armature ☞ page G–31
		No	• Check inhibitor switch (ATX) ☞ Section K • Check ignition switch ☞ Section T • Check wiring harness

01A0GX-004

2	Will not crank—starter motor spins		
STEP	INSPECTION		ACTION
1	Is drive pinion pushed out while cranking (click is heard when pushed out)? 	Yes	Remove starter and check flywheel ring gear teeth and starter drive pinion teeth
		No	Check magnetic switch ☞ page G–29

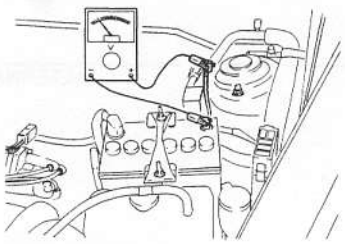
01A0GX-005

3	Cranks slowly		
STEP	INSPECTION		ACTION
1	Does engine crank normally with fully charged battery?	Yes	Check charging system ☞ page G–7
		No	Go to next step
2	Are starter cable connections loose or corroded?  	Yes	Repair or replace connection
		No	Check starter for binding (such as brush and armature.)

01E0GX-006

4	Alternator warning lamp illuminates while engine running		
STEP	INSPECTION		ACTION
1	Is battery voltage correct at idle? **Specification: 14.1—14.7V**	Yes	Check wiring harness between alternator L terminal and alternator warning lamp
		No	Check charging system ☞ page G–7

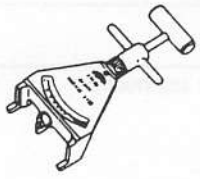
01E0GX-007

5	Discharged battery		
STEP	INSPECTION		ACTION
1	Check charging system; is it OK? ☞ page G–7	Yes	Turn ignition switch ON and measure dark current as shown  Dark current: Below 20mA
		No	Repair or replace parts as necessary

01E0GX-008

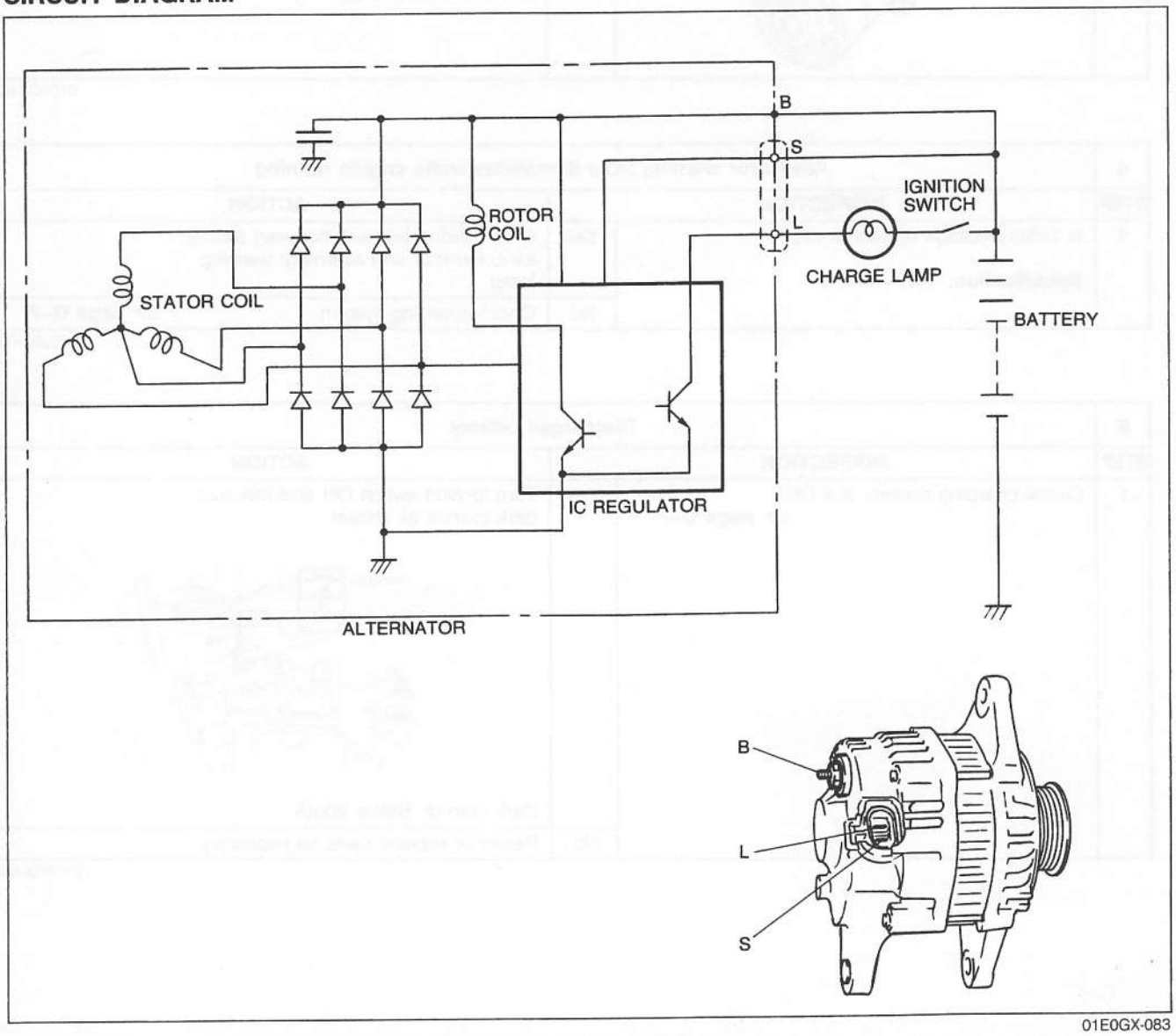
CHARGING SYSTEM

PREPARATION
SST

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

03U0GX-011

CIRCUIT DIAGRAM



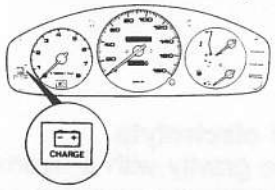
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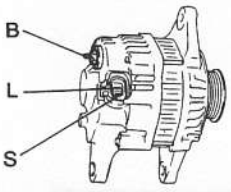
The alternator has a self-diagnostic function to warn of the following problems in the charging system. If a problem arises, the alternator warning lamp illuminates.

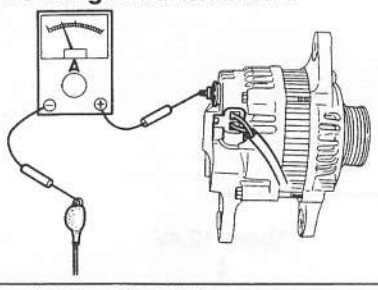
1. Terminal S circuit open
2. No voltage output
3. Field coil circuit open
4. Terminal B circuit open
5. Voltage output too high

TROUBLESHOOTING

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>1</td><td>Check battery voltage; is it correct?

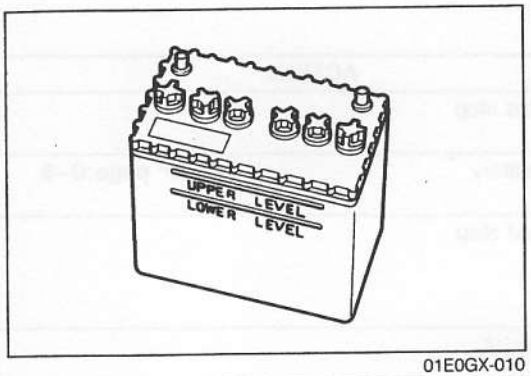
Specification: Above 12.4V</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check battery ☞ page G–8</td></tr>
<tr><td>2</td><td>Start engine; does alternator warning lamp go out?
  </td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Go to Step 4</td></tr>
<tr><td>3</td><td>Is voltage at alternator terminals correct?

Specification:
<table><tr><th>Terminal</th><th>Ign : ON (V)</th><th>Idle (V)</th></tr><tr><td>B</td><td>Approx. 12</td><td>14.1—14.7</td></tr><tr><td>L</td><td>Approx. 1</td><td>14.1—14.7</td></tr><tr><td>S</td><td>Approx. 12</td><td>14.1—14.7</td></tr></table>  </td><td>Yes</td><td>Check wiring harness between terminal L and warning lamp</td></tr>
<tr><td></td><td></td><td>No</td><td>• Check wiring harness
• Replace alternator ☞ page G–10</td></tr>
<tr><td>4</td><td>1. Connect an ammeter (70A min) between terminal B and harness
2. Start engine
3. Turn all electrical loads ON and depress brake pedal
4. Is output current 65A or more at 2,500—3,000 rpm?

Caution
• Do not ground terminal B
  </td><td>Yes</td><td>Charging system normal</td></tr>
<tr><td></td><td></td><td>No</td><td>Go to next step</td></tr>
<tr><td>5</td><td>Is drive belt tension OK?

N (kg, lb)
<table><tr><th>Drive belt</th><th>New</th><th>Used</th></tr><tr><td>Alternator</td><td>451—785
(46—80,
101—176)</td><td>392—588
(40—60,
88—132)</td></tr><tr><td>A/C and P/S</td><td>491—589
(50—60,
110—132)</td><td>422—491
(43—50,
95—110)</td></tr></table></td><td>Yes</td><td>Replace alternator ☞ page G–10</td></tr>
<tr><td></td><td></td><td>No</td><td>• Adjust drive belt tension
• Replace drive belt</td></tr>
</table>

01E0GX-009



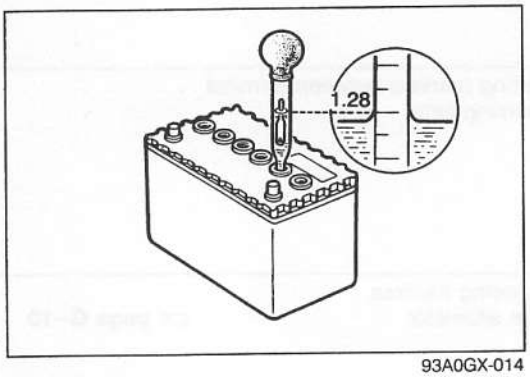
01E0GX-010

BATTERY

Inspection

Electrolyte level

1. Check if the electrolyte level lies between the upper and lower lines.
2. If low, add distilled water; do not overfill.



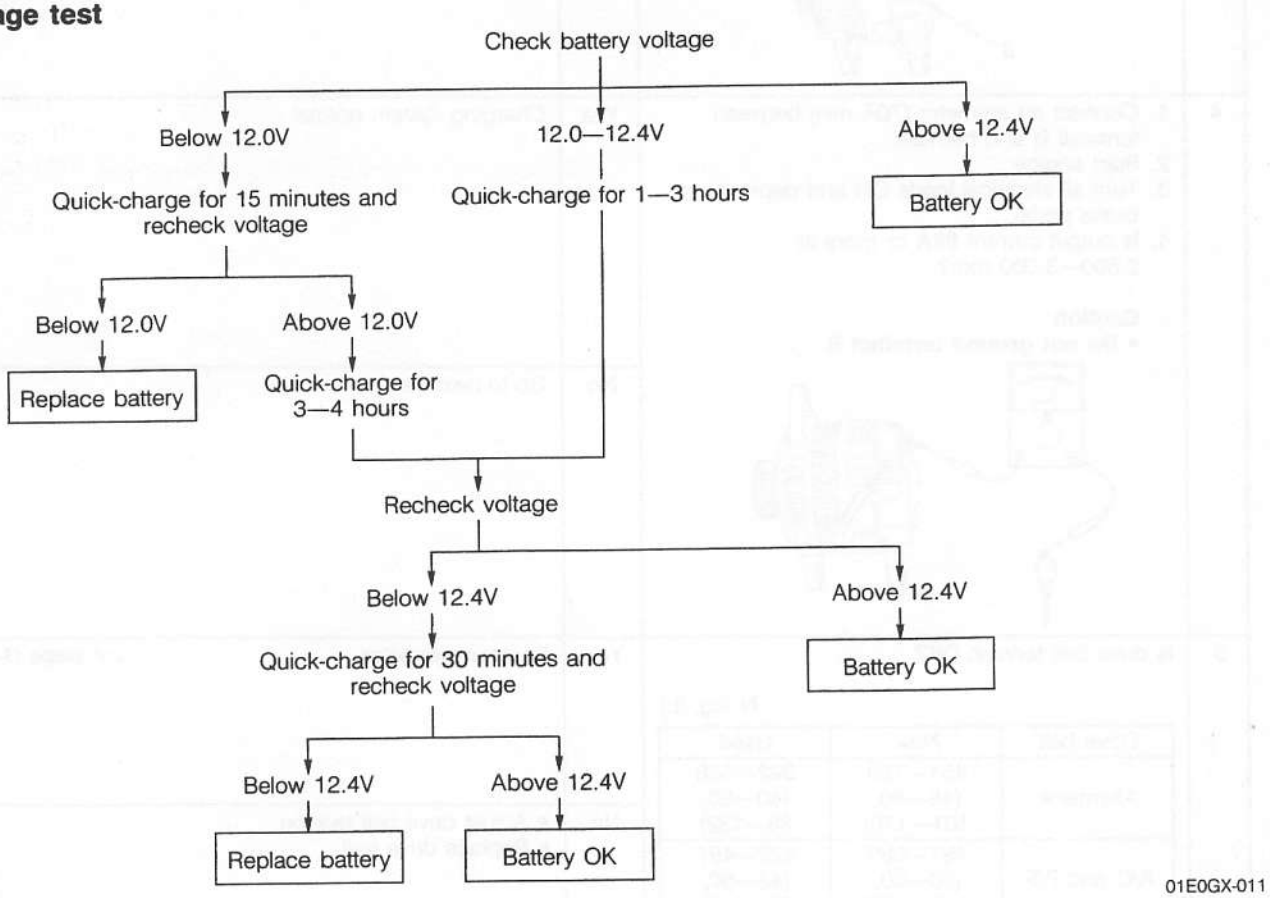
93A0GX-014

Specific gravity of electrolyte

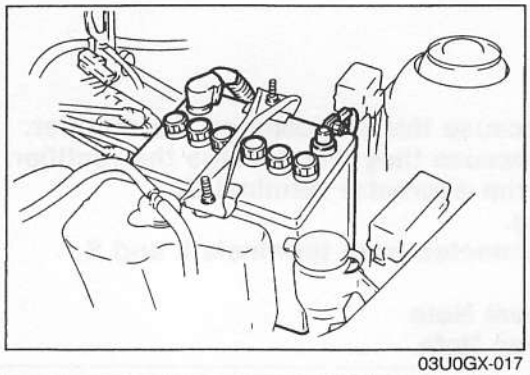
Measure the specific gravity with a hydrometer.

Specification: 1.27—1.29 (at 20°C [68°F])

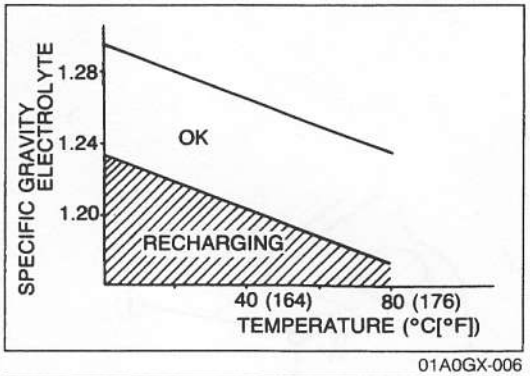
Voltage test



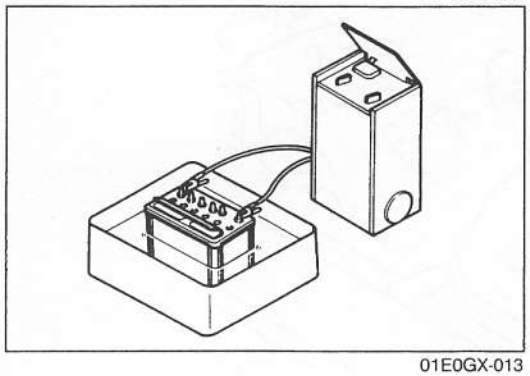
01E0GX-011



03U0GX-017



01A0GX-006



01E0GX-013

Terminal and cable

1. Check the tightness of the terminals to ensure good electrical connections.
2. Check for corroded or frayed battery cables.
3. Check the rubber protector on the positive terminal for proper coverage.
4. Clean the terminals if necessary, and coat them with grease.

Recharging

Battery	Slow charge (A)	Quick charge (A)
34B19L-S	Under 3	Max. 20

Slow-charging

It is not necessary to remove the vent caps.

Quick-charging

Remove the battery from the vehicle and remove the vent caps.

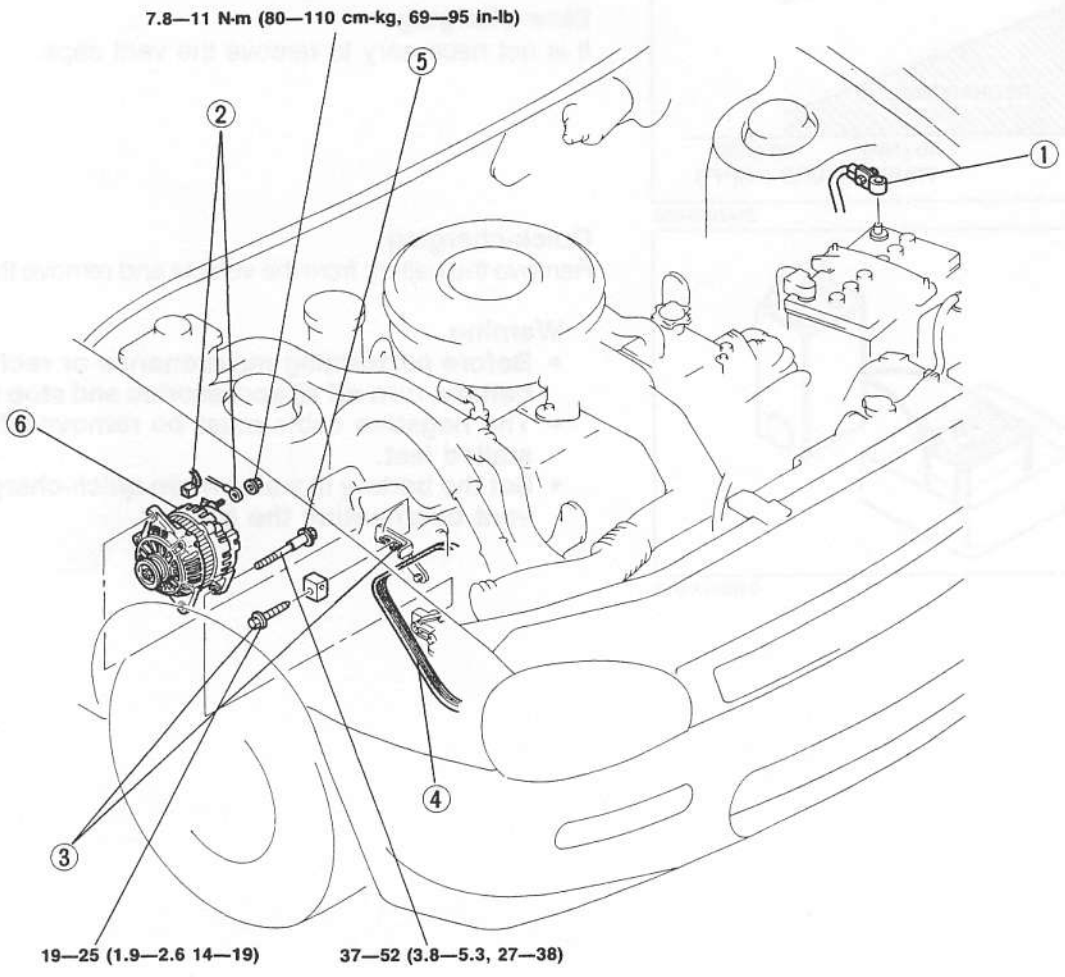
Warning

- **Before performing maintenance or recharging the battery, turn off all accessories and stop the engine.**
- **The negative cable must be removed first and installed last.**
- **Set the battery in water when quick-charging to prevent overheating the battery.**

ALTERNATOR
Removal / Installation

Caution
- **Be sure the battery connections are not reversed because this will damage the rectifier.**
- **Do not use high-voltage testers such as a megger because they will damage the rectifier.**
- **Remember that battery voltage is always present at the alternator terminal B.**
- **Do not ground terminal L while the engine is running.**
- **Do not start the engine while the connector is disconnected from terminals L and S.**

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**.



N·m (m-kg, ft-lb)

01A0GX-007

1. Negative battery cable
2. Connector
3. Mounting bolt, adjust nut
4. Drive belt
   - Inspection..... page G–14
   - Adjustment..... page G–14
   - Replacement..... page G–15
5. Mounting bolt
6. Alternator
   - Disassembly / Assembly..... page G–11
   - Inspection..... page G–12

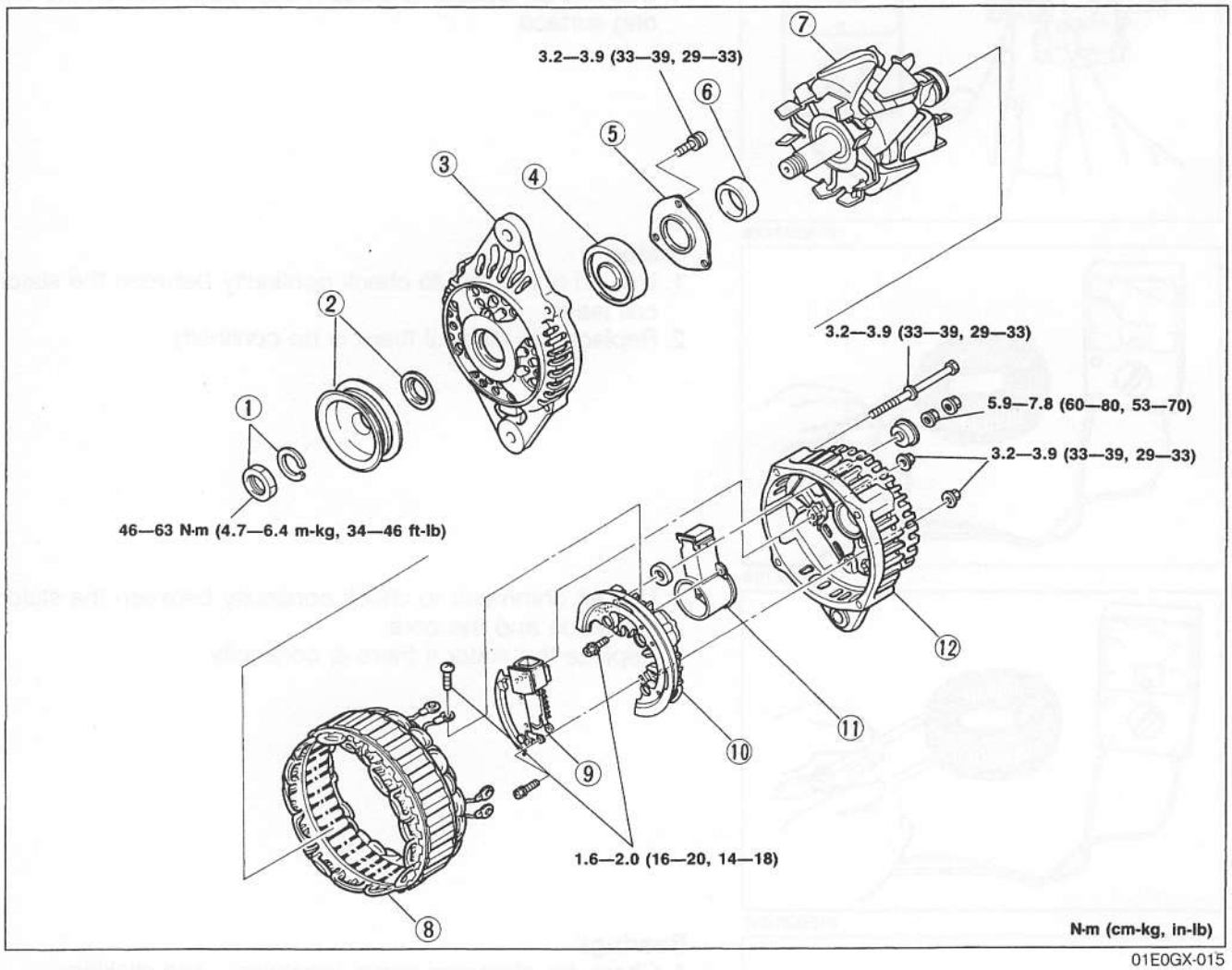
Removal / Installation Note

The alternator is removed and installed from under the vehicle.

01E0GX-094

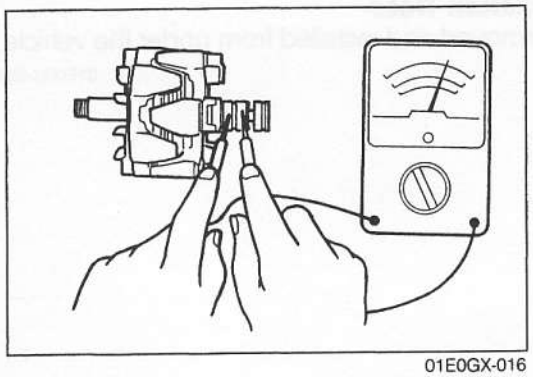
Disassembly / Assembly

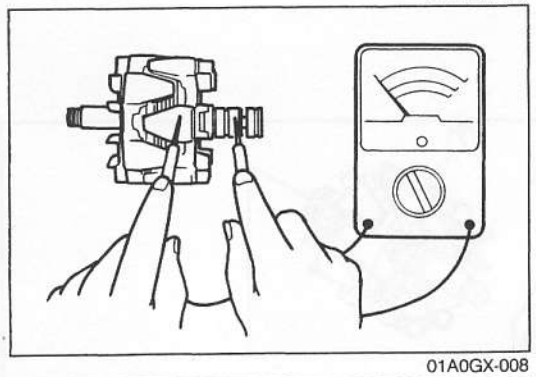
1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.

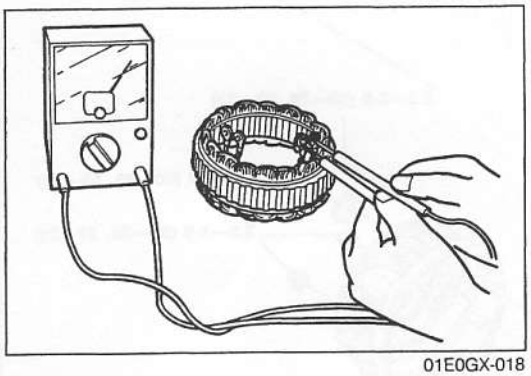


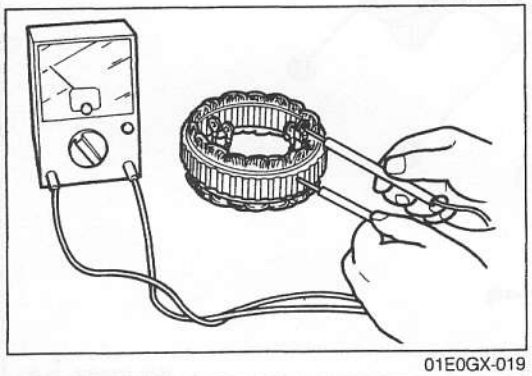
01E0GX-015

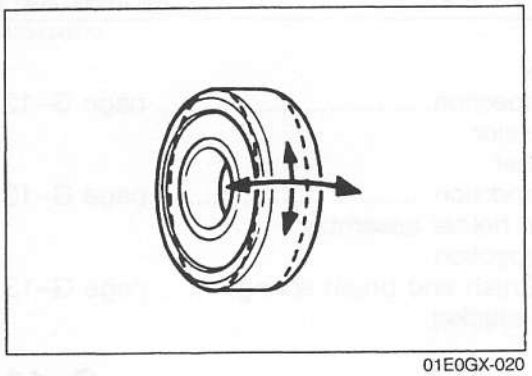
1. Nut set
2. Pulley set
3. Front cover
4. Bearing
   Inspection..... page G–12
5. Retainer
6. Spacer
7. Rotor
   Inspection..... page G–12
8. Stator
   Inspection..... page G–12
9. Regulator
10. Rectifier
    Inspection..... page G–13
11. Brush holder assembly
    Inspection
    (Brush and brush spring)..... page G–13
12. Rear bracket


01E0GX-016


01A0GX-008


01E0GX-018


01E0GX-019


01E0GX-020

Inspection

Rotor

1. Use an ohmmeter to measure the resistance between the slip rings.

   Specification: 2.4—2.9Ω (at 20°C [68°F])

2. If not within specification, replace the rotor.

3. (1) Use an ohmmeter to check continuity between each slip ring and the core.
   (2) Replace the rotor if there is continuity.
4. Use fine sandpaper to smooth any roughness on the slip ring surface.

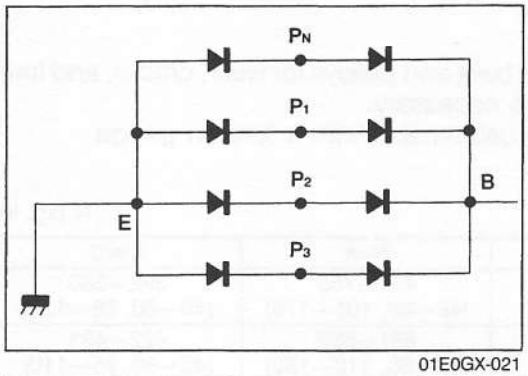
Stator

1. Use an ohmmeter to check continuity between the stator coil leads.
2. Replace the stator if there is no continuity.

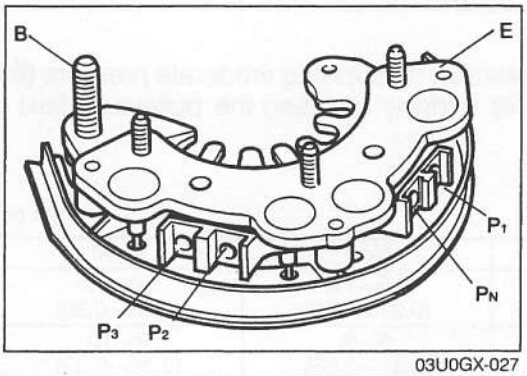
3. Use an ohmmeter to check continuity between the stator coil leads and the core.
4. Replace the stator if there is continuity.

Bearings

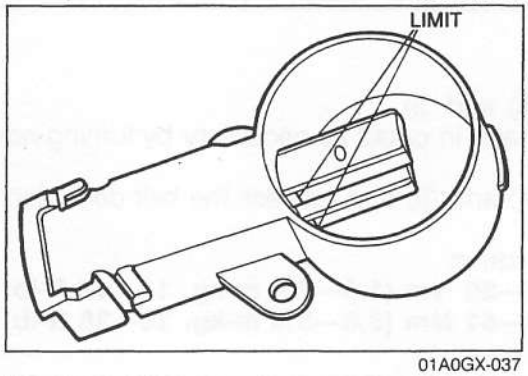
1. Check for abnormal noise, looseness, and sticking.
2. Replace the bearing(s) if necessary.



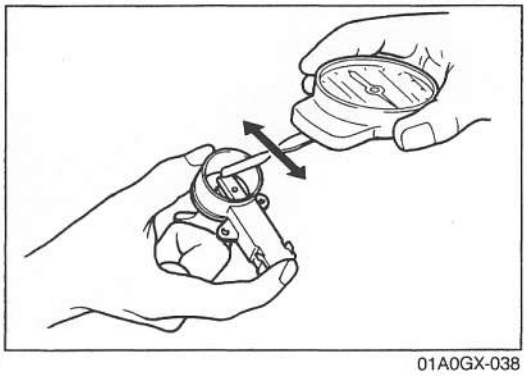
01E0GX-021



03U0GX-027



01A0GX-037


01A0GX-038

Rectifier

Caution
- **Don't use megger tester to prevent the rectifier from breaking down.**

1. Use an **analog** ohmmeter to check continuity of the diodes.

Negative	Positive	Continuity
E	P1, P2, P3, PN	Yes
B		No
P1, P2, P3, PN	E	No
	B	Yes

2. Replace the rectifier if necessary.

Brush

If a brush is worn almost to the limit or beyond, replace all the brushes.

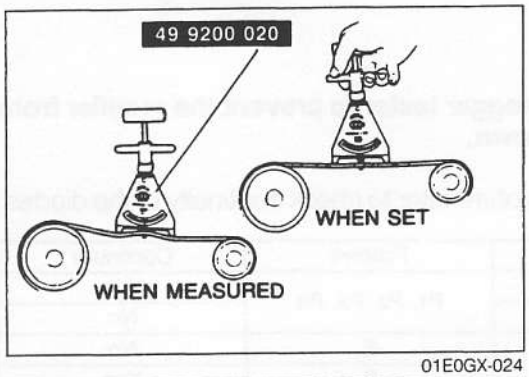
Standard: 25.0mm (0.984 in)
Minimum: 6.0mm (0.236 in)

Brush spring

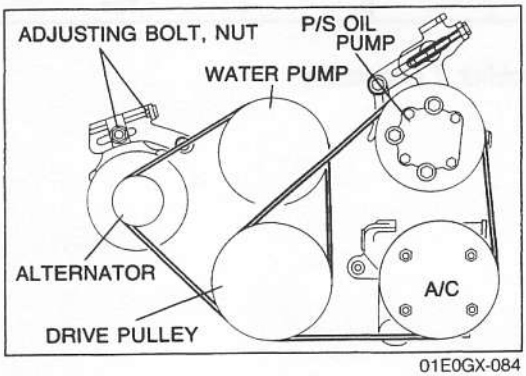
1. Use a spring pressure gauge to measure the force of the brush spring.
2. Replace the spring if not within.

Standard force:
2.9—3.9 N (300—400 g, 10.6—14.1 oz)
Minimum:
0.8—1.2 N (80—120 g, 2.8—4.2 oz)

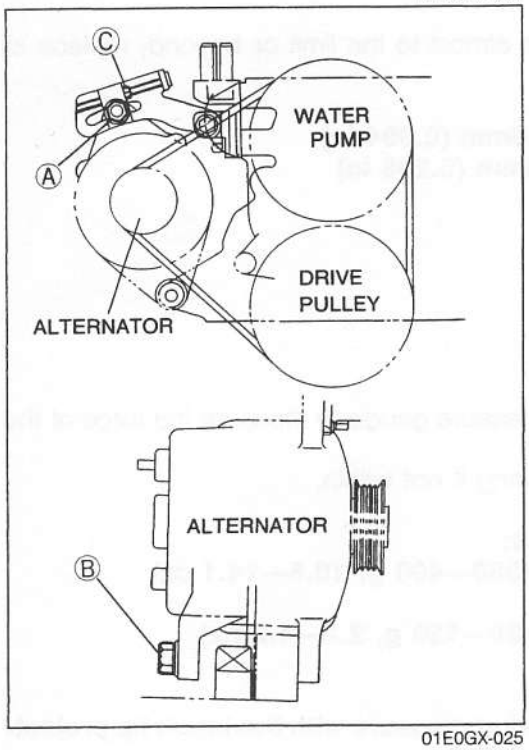
Note
- **Read the spring pressure with the brush tip projecting 2mm (0.079 in).**



01E0GX-024



01E0GX-084



01E0GX-025

DRIVE BELT

Inspection

1. Check the drive belts and pulleys for wear, cracks, and fraying. Replace as necessary.
2. Measure drive belt tension with a tension gauge.

Tension

N (kg, lb)

Drive belt	New	Used
Alternator	451—785 (46—80, 101—176)	392—588 (40—60, 88—132)
A/C and P/S	491—589 (50—60, 110—132)	422—491 (43—50, 95—110)

3. Measure the deflection by applying moderate pressure **(98 N, 10 kg, 22 lb)** midway between the pulleys. Adjust if necessary.

Deflection

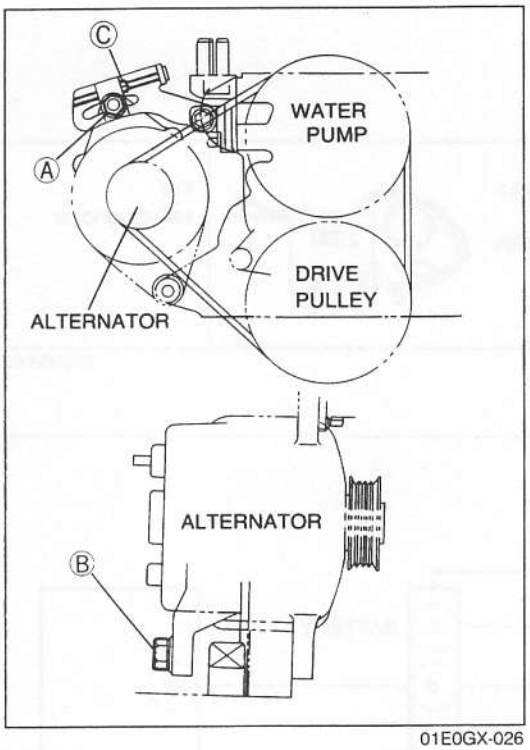
mm (in)

Drive belt	New	Used
Alternator	5.5—7.0 (0.21—0.28)	6.0—7.5 (0.23—0.30)
A/C and P/S	8—9 (0.31—0.35)	9—10 (0.35—0.39)

Adjustment

1. Loosen bolts Ⓐ and Ⓑ.
2. Move the alternator in or out as necessary by turning adjusting nut Ⓒ.
3. Tighten bolts Ⓐ and Ⓑ and recheck the belt deflection.

Tightening torques
Bolt Ⓐ: 19—26 N·m (1.9—2.6 m-kg, 14—18 ft-lb)
Bolt Ⓑ: 38—51 N·m (3.8—5.3 m-kg, 28—38 ft-lb)



01E0GX-026

Replacement

1. Remove the A/C and P/S drive belt, if equipped.

Note
- **Refer to B Section.**

2. Loosen alternator bolts Ⓐ and Ⓑ.
3. Remove the alternator belt.
4. Install the new alternator belt and adjust it to specifications.
5. Tighten all bolts to the specified torques.

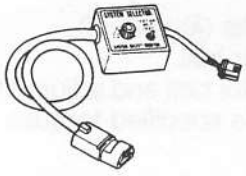
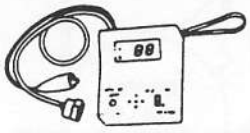
Tightening torques
Mounting bolt:
38—51 N·m (3.8—5.3 m-kg, 28—38 ft-lb)
Adjusting bolt:
19—26 N·m (1.9—2.6 m-kg, 14—18 ft-lb)

6. Install the A/C and P/S drive belt if equipped, and adjust it to specification.

Note
- **Refer to B Section.**

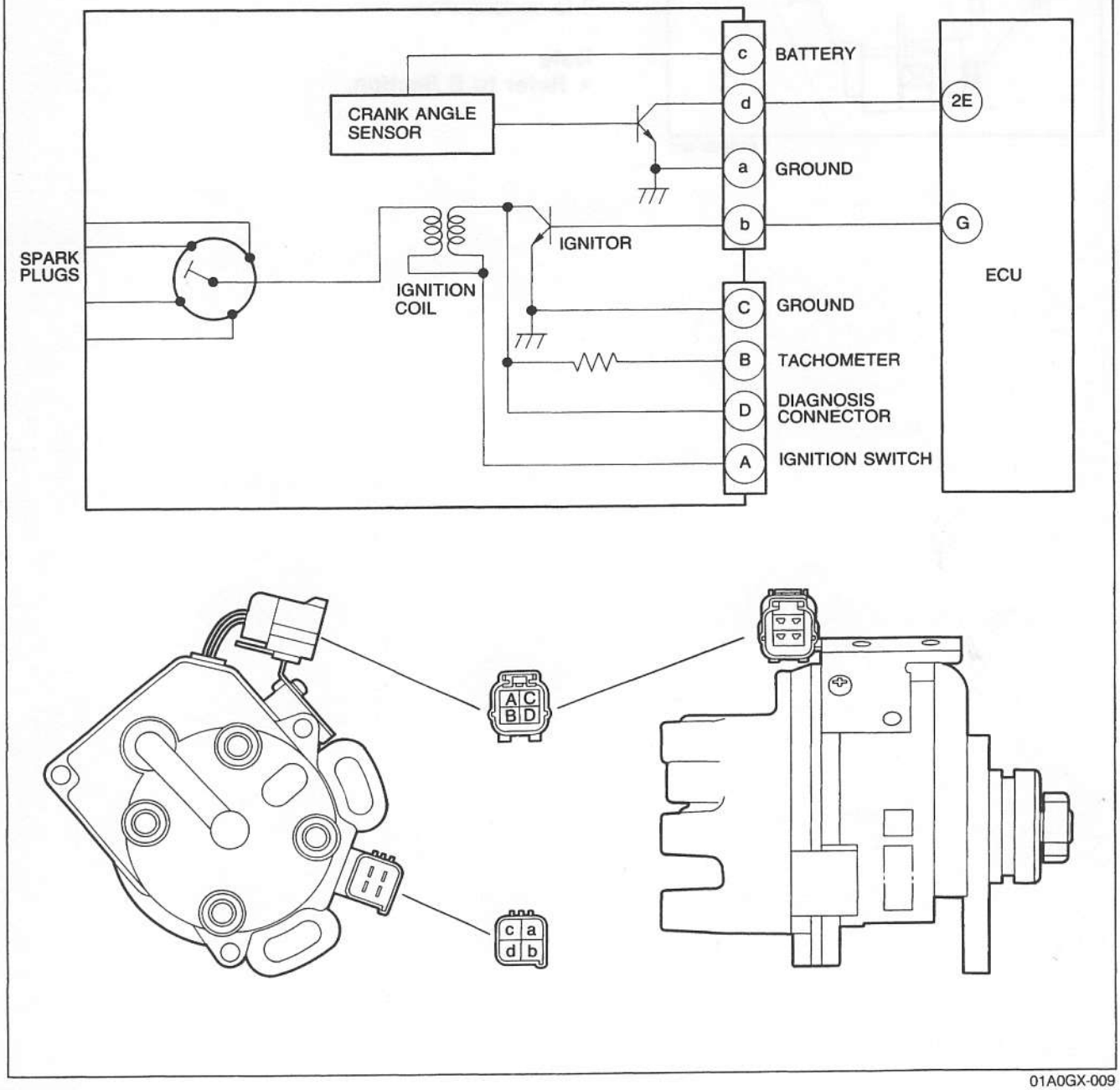
IGNITION SYSTEM

PREPARATION
SST

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

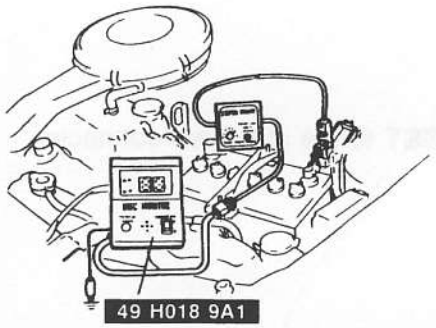
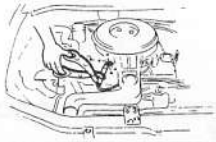
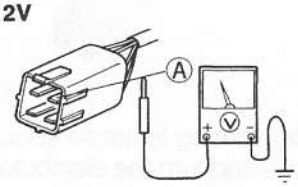
01E0GX-027

CIRCUIT DIAGRAM

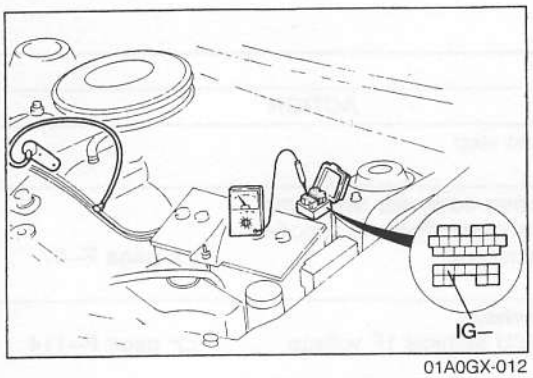


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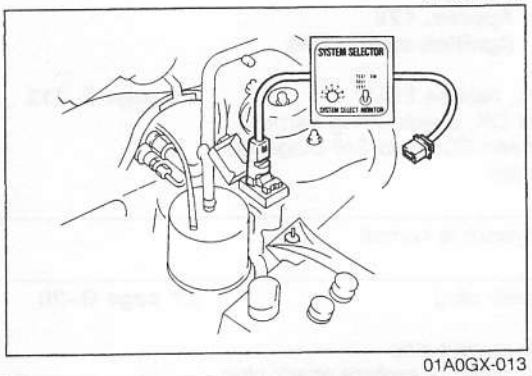
TROUBLESHOOTING

6	Misfire		
STEP	INSPECTION		ACTION
1	Is "00" displayed on Self-Diagnosis Checker with ignition switch ON? ☞ **page F–67**  49 H018 9A1	Yes	Go to next step
		No	**Malfunction code no. displayed** Check for cause (Refer to specified check sequence) ☞ **page F–67**
			"88" flashes Check ECU terminal 1F voltage ☞ **page F–114** **Voltage: Approx. 12V (Ignition switch ON)** ⇨ If OK, replace ECU ☞ **page F–112** ⇨ If not OK, check wiring harness between ECU and Self-Diagnosis Checker
2	Remove spark plug; is there a strong blue spark while engine is cranking? 	Yes	Ignition system is normal
		No	Check spark plug ☞ **page G–20** If OK, Go to next step If not OK, clean or replace spark plug
3	Is resistance of high-tension leads OK? **Specification: 16 kΩ per 1m (3.28 ft)** ☞ **page G–23**	Yes	Go to next step
		No	Replace high-tension leads
4	Are there corrosion, damage or cracks on the distributor cap and rotor? ☞ **page G–23**	Yes	Replace cap or rotor
		No	Go to next step
5	Is ignition coil normal? ☞ **page G–20**	Yes	Go to next step
		No	Replace ignition coil
6	Are distributor connector and ECU connector connected?	Yes	Go to next step
		No	Connect connectors
7	Measure voltage of Ⓐ terminal (distributor top connector); is it correct? **Voltage: Approx. 12V**  	Yes	Go to next step
		No	Check main fuse, ignition switch, wiring harness, and ECU
8	Is ECU normal? ☞ **page F–112**	Yes	Replace distributor
		No	Replace ECU

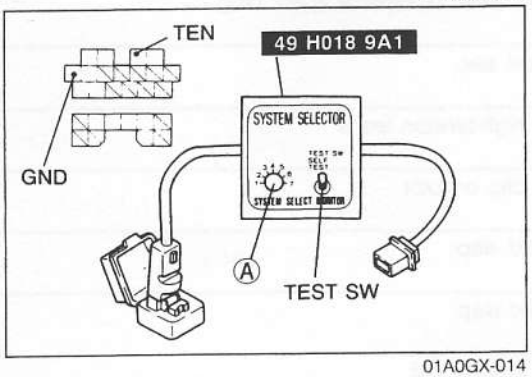
01A0GX-010



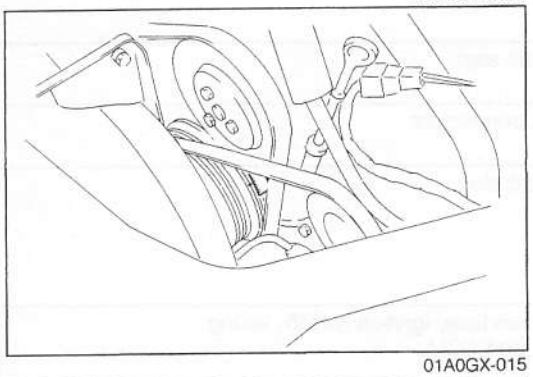
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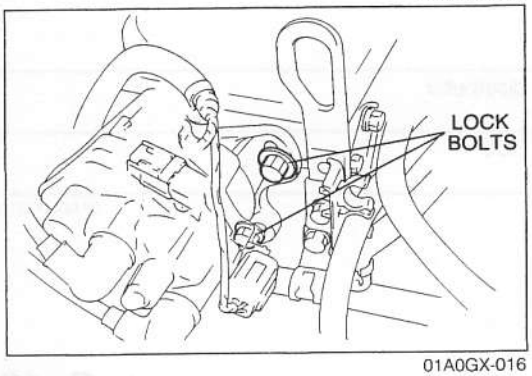


01A0GX-013



01A0GX-014


01A0GX-015



01A0GX-016

IGNITION TIMING

Adjustment

1. Warm up the engine to normal operating temperature and run it at idle (P range [ATX] or neutral [MTX]).
2. Turn all electrical loads OFF.
3. Turn the A/C switch OFF.
4. Connect a test tachometer to the diagnosis connector **IG–** terminal.
5. Connect the **SST** to the diagnosis connector.
6. Set switch A on the System Selector to position 1 and TEST SWITCH to SELF-TEST.

Note

- **To create the test condition without using the System Selector, connect terminals TEN and GND of the diagnosis connector with a jumper wire.**

7. Check the idle speed and set it to the specified speed if necessary.

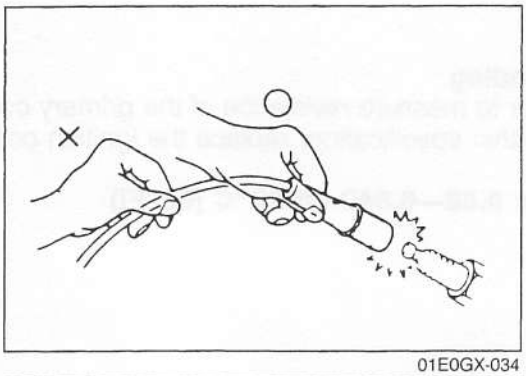
Idle speed: 600—650 rpm (MTX)
810—860 rpm (ATX)

8. Check the ignition timing.

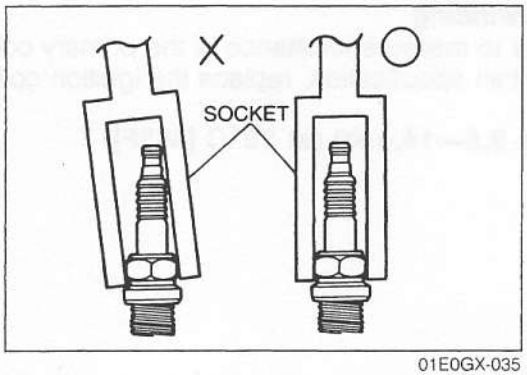
Specification: BTDC 16 ± 1°

9. If the ignition timing is not as specified, loosen the distributor lock bolts and turn the distributor to make the adjustment.
10. Tighten the distributor lock bolts to specified torque.

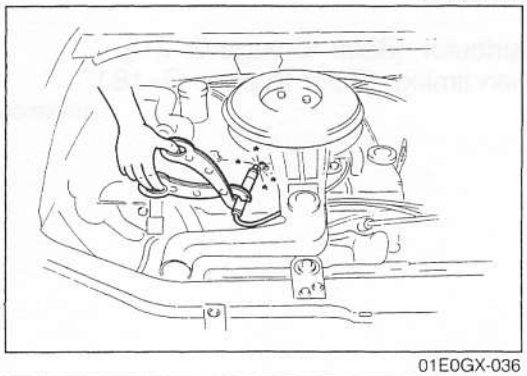
Tightening torque:
16—23 N·m (1.6—2.3 m-kg, 12—16 ft-lb)



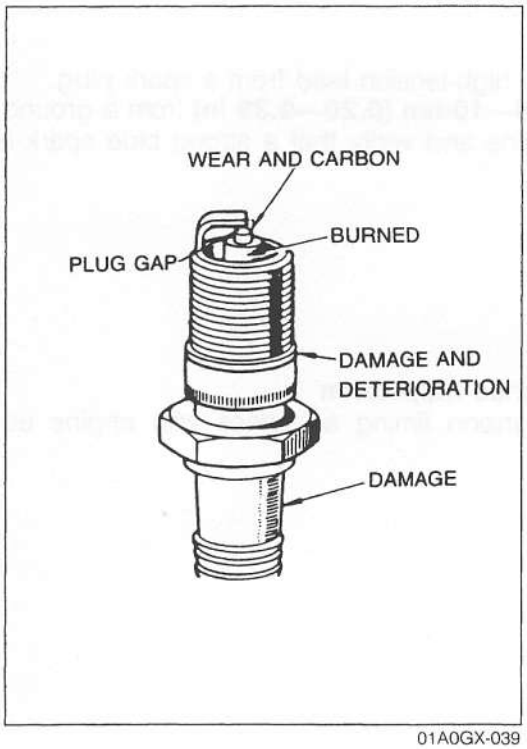
01E0GX-034



01E0GX-035



01E0GX-036



01A0GX-039

SPARK PLUGS

Removal / Installation

1. Remove and install the high-tension leads carefully.

Caution

- **When the spark plug lead is to be pulled off, pull on the boot itself, not the wire.**

2. Remove and install the spark plug with a plug socket.

Caution

- **Be sure the socket must be fit squarely over the spark plug.**

3. Apply antiseize compound or molybdenum-based lubricant to the spark plug threads.
4. Tighten the spark plug to the specified torque.

Tightening torque:
15—23 N·m (1.5—2.3 m-kg, 11—17 ft-lb)

Inspection

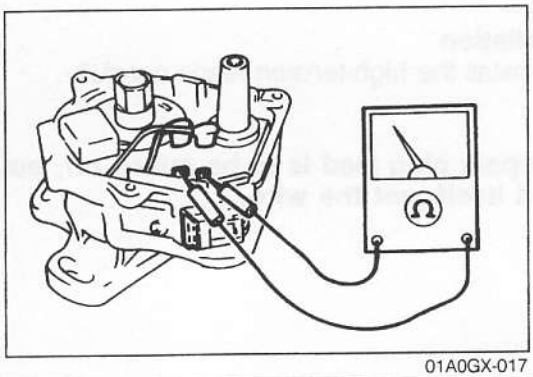
1. Remove the spark plug.
2. Connect the spark plug to a high-tension lead.
3. Hold the high-tension lead with insulated pliers **5—10mm (0.20—0.39 in)** from a ground.
4. Crank the engine and verify that there is a strong blue spark.

Note

- **If there is no spark, replace the spark plug or high-tension lead as necessary.**

5. Check the following. If a problem is found, replace the spark plug.
   - Damaged insulation
   - Worn electrodes
   - Carbon deposits
     If cleaning is necessary, use a plug cleaner or a wire brush. Clean the upper insulator also
   - Damaged gasket
   - Burned condition

Plug gap: 1.0—1.1mm (0.039—0.043 in)



01A0GX-017

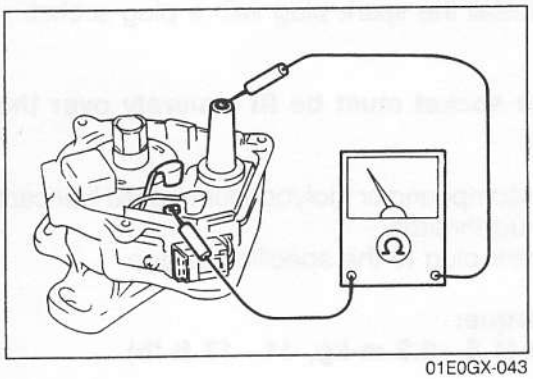
IGNITION COIL

Inspection

Primary coil winding

Use an ohmmeter to measure resistance of the primary coil winding. If not within specification, replace the ignition coil.

Specification: 0.68—0.84Ω (at 20°C [68°F])



01E0GX-043

Secondary coil winding

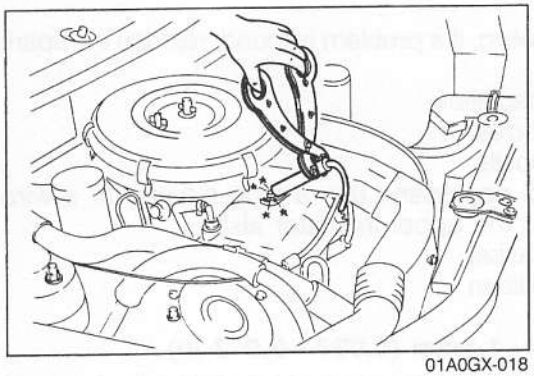
Use an ohmmeter to measure resistance of the primary coil winding. If not within specification, replace the ignition coil.

Specification: 9.6—14.4 kΩ (at 20°C [68°F])

Replacement

1. Replace the distributor. (Refer to page G–21.)
2. Adjust the ignition timing. (Refer to page G–18.)

01A0GX-040

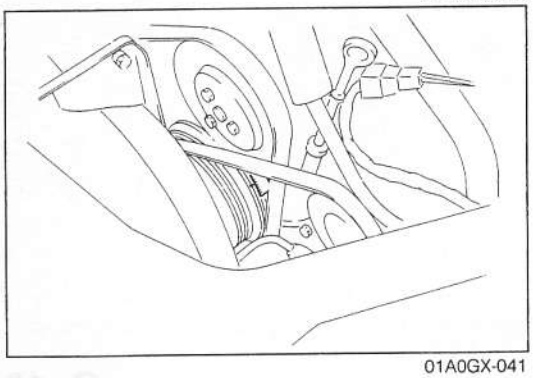


01A0GX-018

DISTRIBUTOR

Spark Test

1. Disconnect the high-tension lead from a spark plug.
2. Hold the lead **5—10mm (0.20—0.39 in)** from a ground.
3. Crank the engine and verify that a strong blue spark is visible.



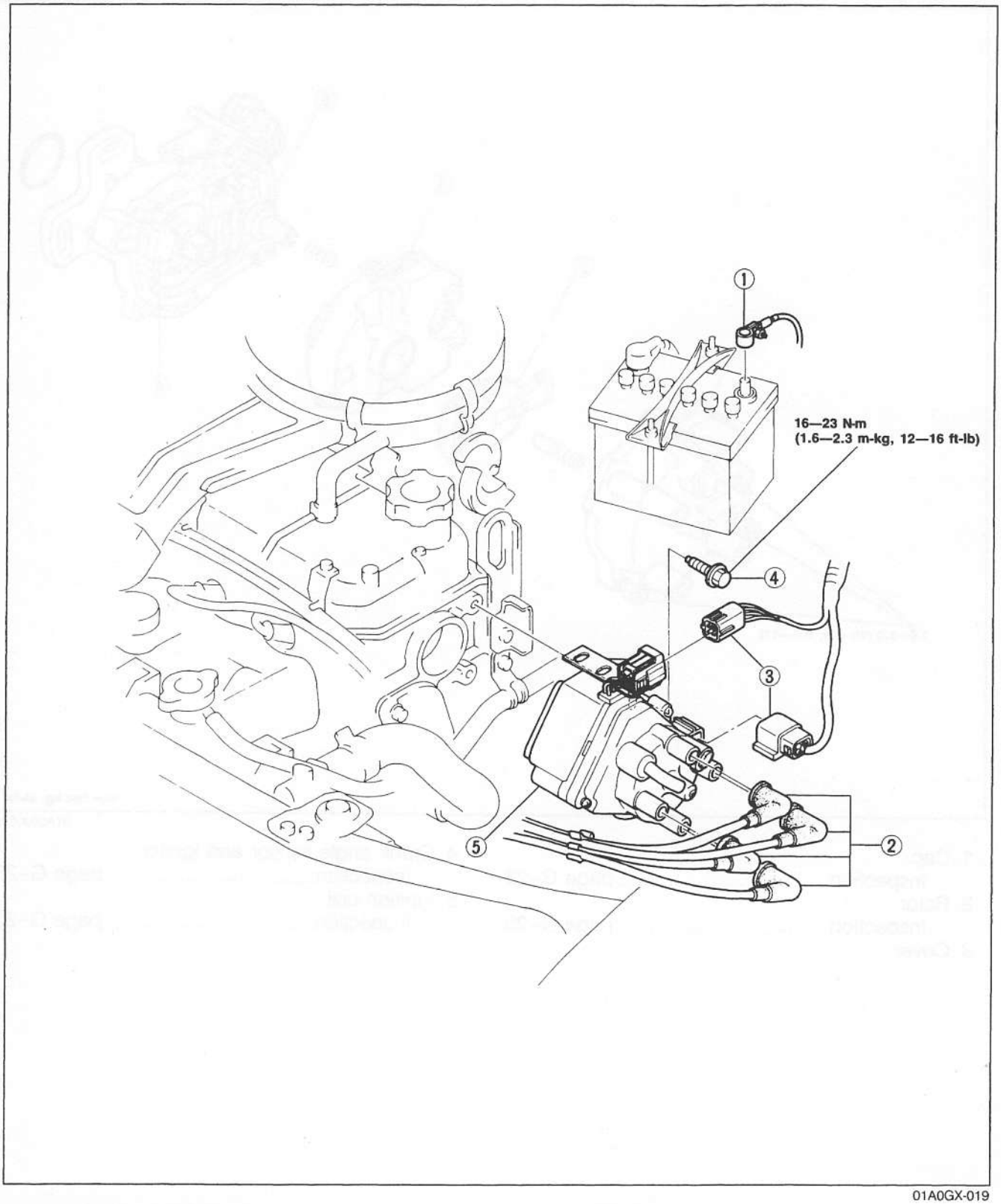
01A0GX-041

Electronic Advance Inspection

Verify that the ignition timing advances with engine acceleration.

Removal / Installation

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

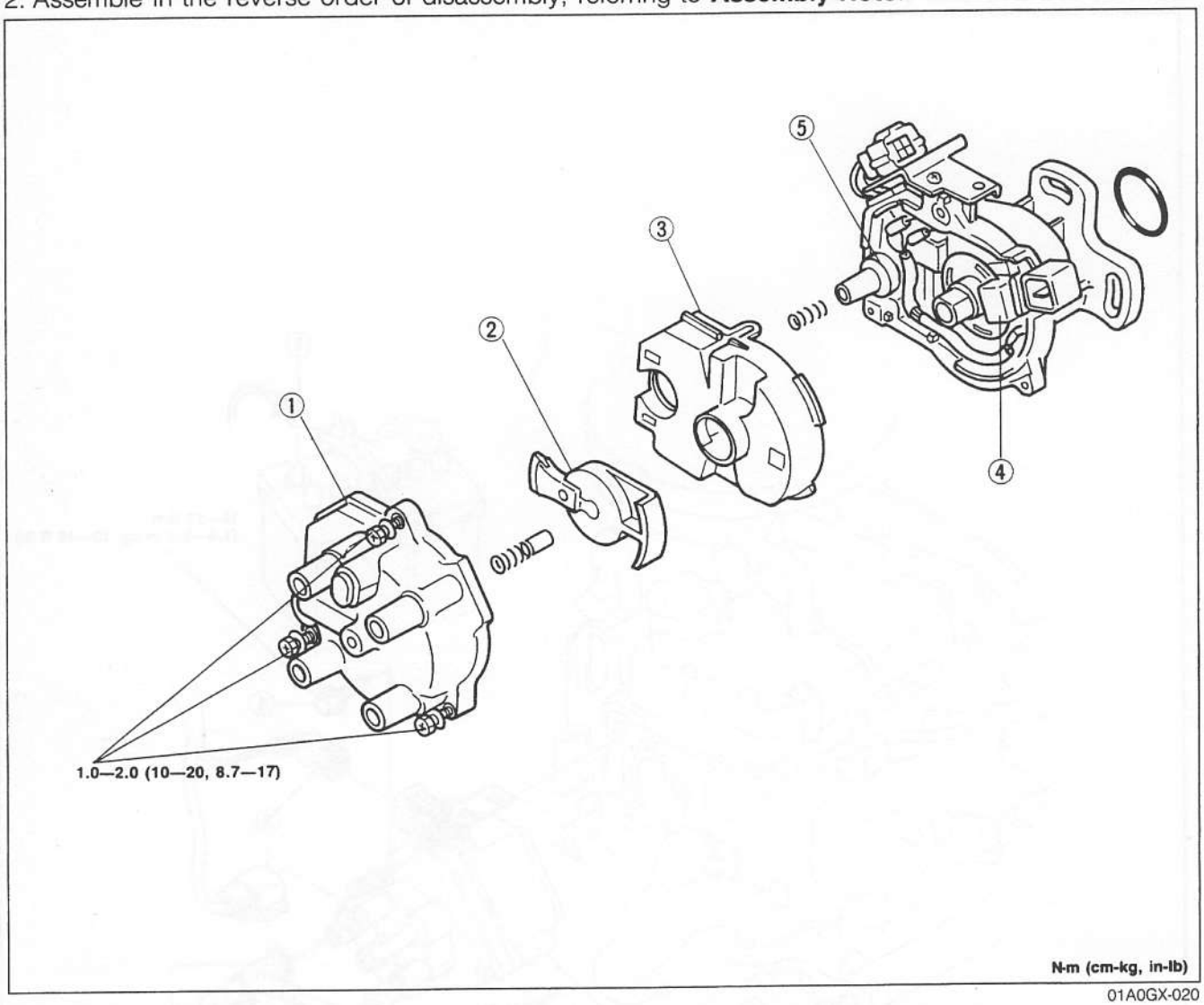


01A0GX-019

1. Negative battery cable
2. High-tension lead
   Inspection..... page G–23
3. Connector
4. Mounting bolt
5. Distributor
   Disassembly / Assembly..... page G–22
   Inspection..... page G–23

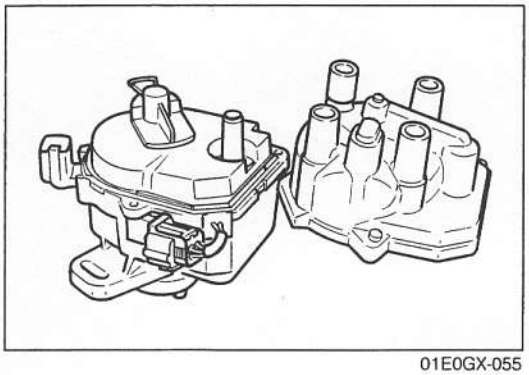
Disassembly / Assembly

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



01A0GX-020

1. Cap
   Inspection..... page G–23
2. Rotor
   Inspection..... page G–23
3. Cover
4. Crank angle sensor and igniter
   Inspection..... page G–23
5. Ignition coil
   Inspection..... page G–20



01E0GX-055

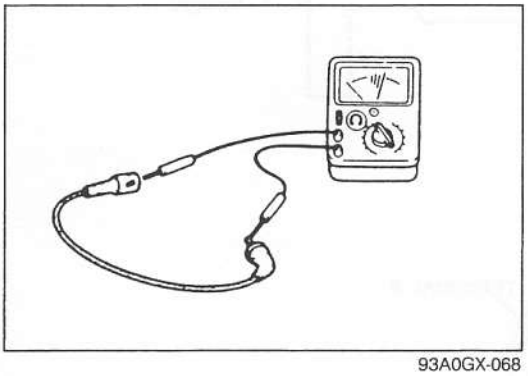
Inspection
Cap and rotor
1. Check for corrosion, damage, and cracks.
2. Replace if necessary.

IGNITER
Inspection
1. Check the ECU. (Refer to page F–112.)
2. Check the condition of the connector, distributor cap, rotor, ignition coil, and high-tension leads.
3. If all are normal but misfire still occurs, replace the igniter.

01A0GX-021

Replacement
1. Replace the distributor. (Refer to page G–21.)
2. Adjust the ignition timing. (Refer to page G–18.)

01A0GX-022



93A0GX-068

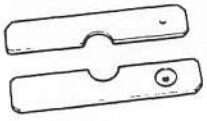
HIGH-TENSION LEAD
Inspection
1. Measure resistance of high-tension lead.

Specification: 16 kΩ per 1 m (3.28 ft)

2. If not as specified, replace the high-tension lead set.

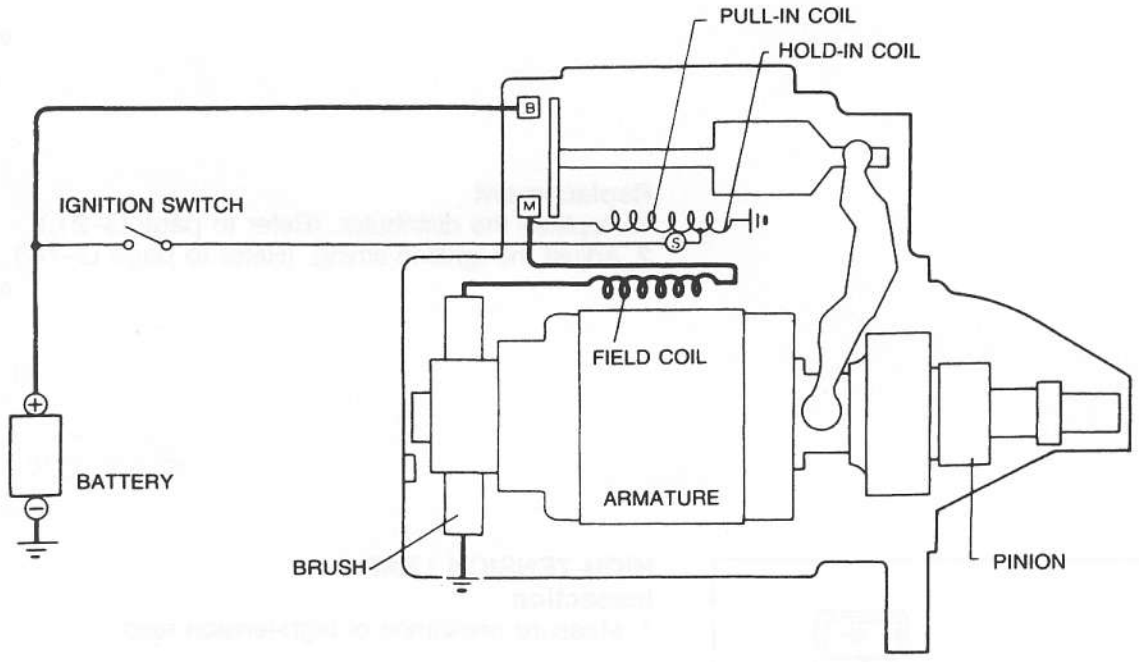
STARTING SYSTEM

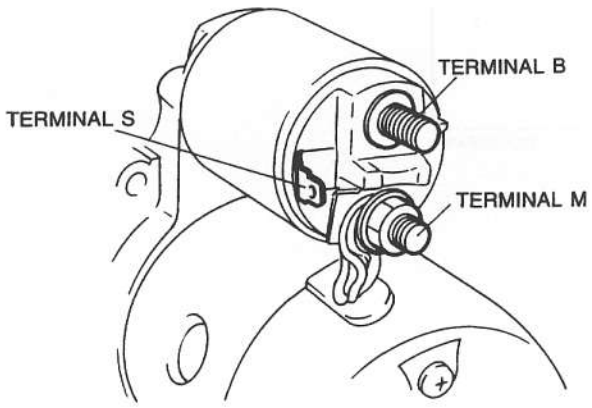
PREPARATION
SST

49 E301 144 Plate, removing		For installation of overrunning clutch

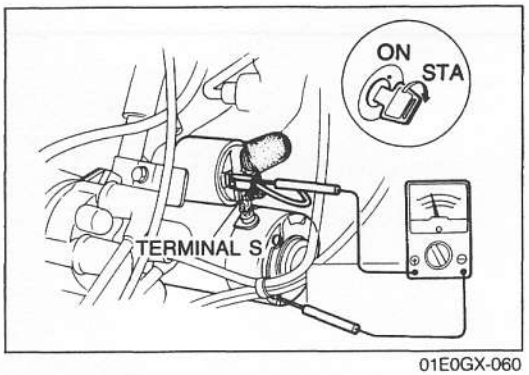
01E0GX-090

CIRCUIT DIAGRAM





93A0GX-049



01E0GX-060

STARTER

Inspection (on vehicle)

1. Measure the battery voltage.

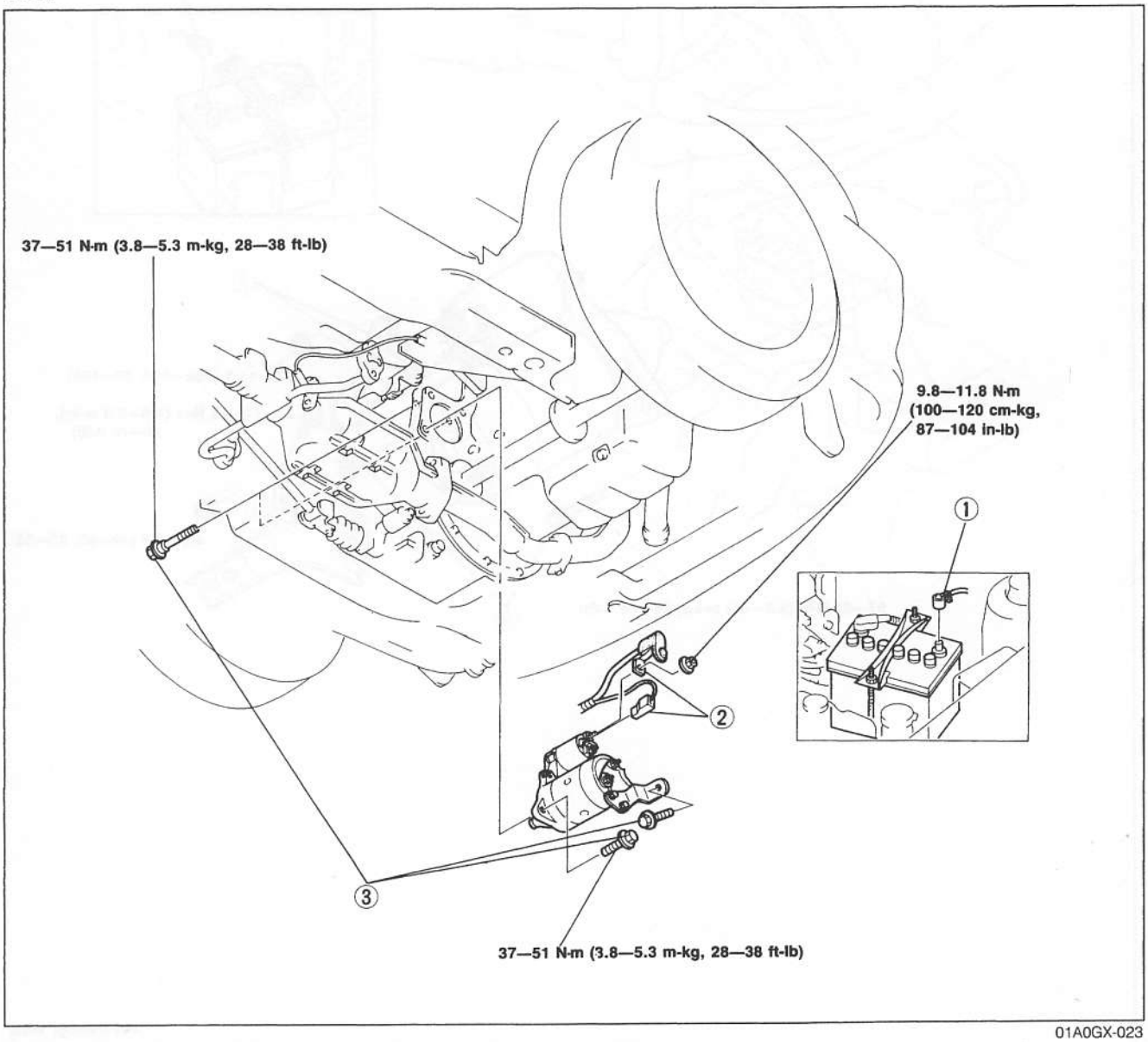
Specification: Above 12.4V

2. Crank the engine, and verify that the starter turns smoothly.
3. If the starter does not turn, check the voltage of terminal S.
4. If the voltage is above 8V, remove and inspect the starter. If the voltage is below 8V, check the wiring harness, ignition switch, and inhibitor swtich (ATX).

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**.

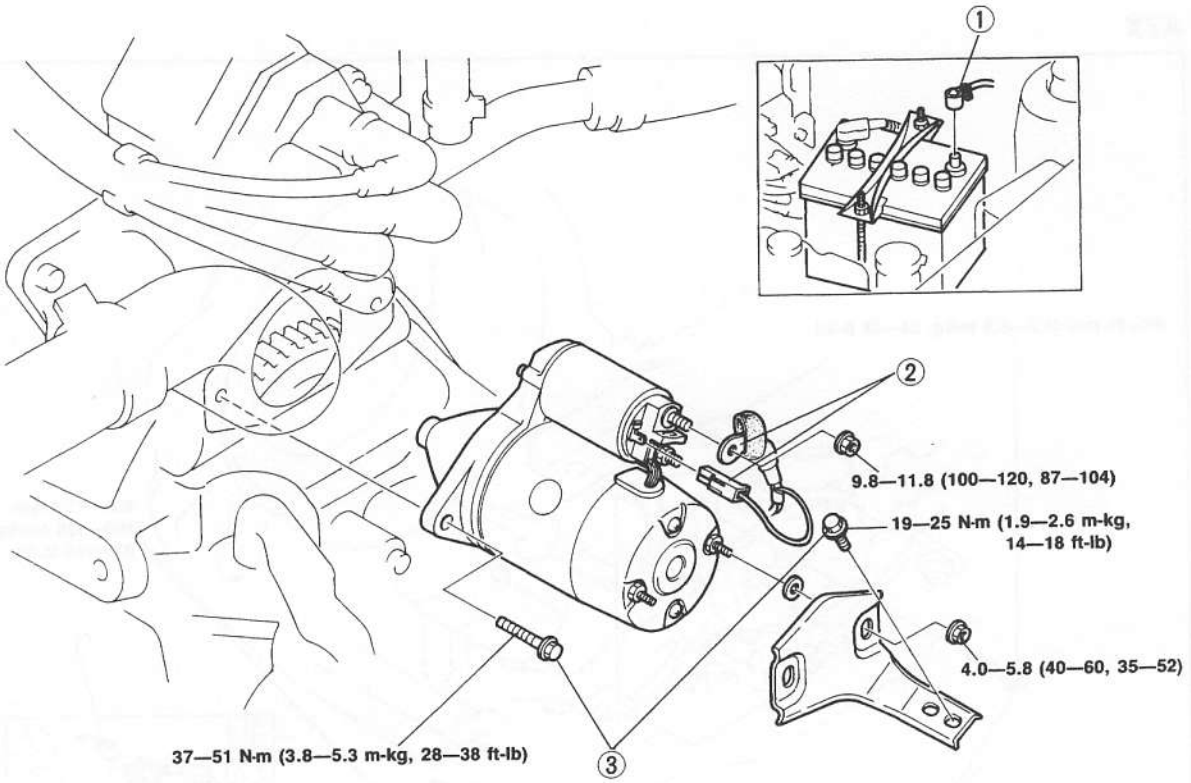
ATX



01A0GX-023

1. Negative battery cable
2. S terminal, B terminal connector
3. Mounting bolt

MTX

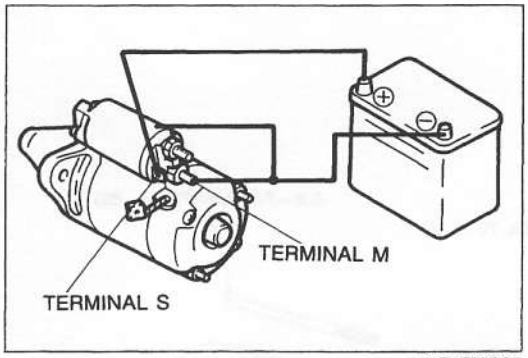


01A0GX-024

1. Negative battery cable
2. Terminal connectors S and B
3. Mounting bolt

Removal / Installation Note
ATX
The starter is removed and installed from below the vehicle.
MTX
The starter is removed and installed from above.

01A0GX-025

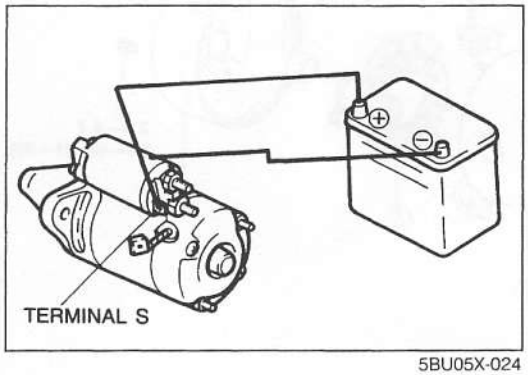


01E0GX-065

Performance Inspection
Magnetic switch
Disconnect the terminal M wire, and perform the following tests.

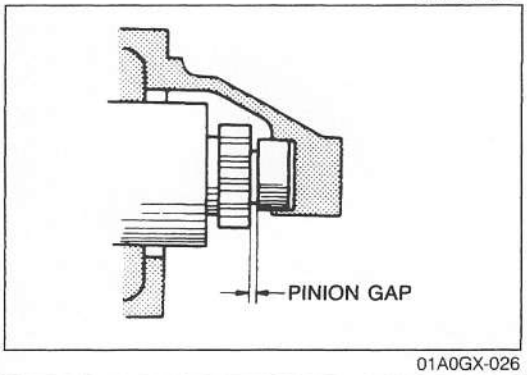
Pull-in test
The switch is normal if the pinion ejects outward when the battery is connected as shown in the figure.

Caution
- **Do not apply power continuously for more than 10 seconds.**



5BU05X-024

Hold-in test
After completing the pull-in test, disconnect the wire from terminal M (with the pinion left ejected). The holdin coil is functioning properly if the pinion does not return.



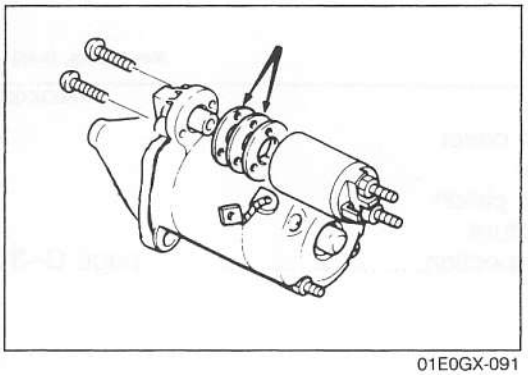
01A0GX-026

Adjustment of pinion gap
1. Disconnect the wiring from terminal M.
2. When the battery is connected between terminal S and the starter body, the pinion will be ejected and then stop. Measure the clearance (pinion gap) between the pinion and the stopper.

Note
- **Do not apply power continuously for more than 10 seconds.**

Pinion gap: 0.5—2.0mm (0.020—0.078 in)

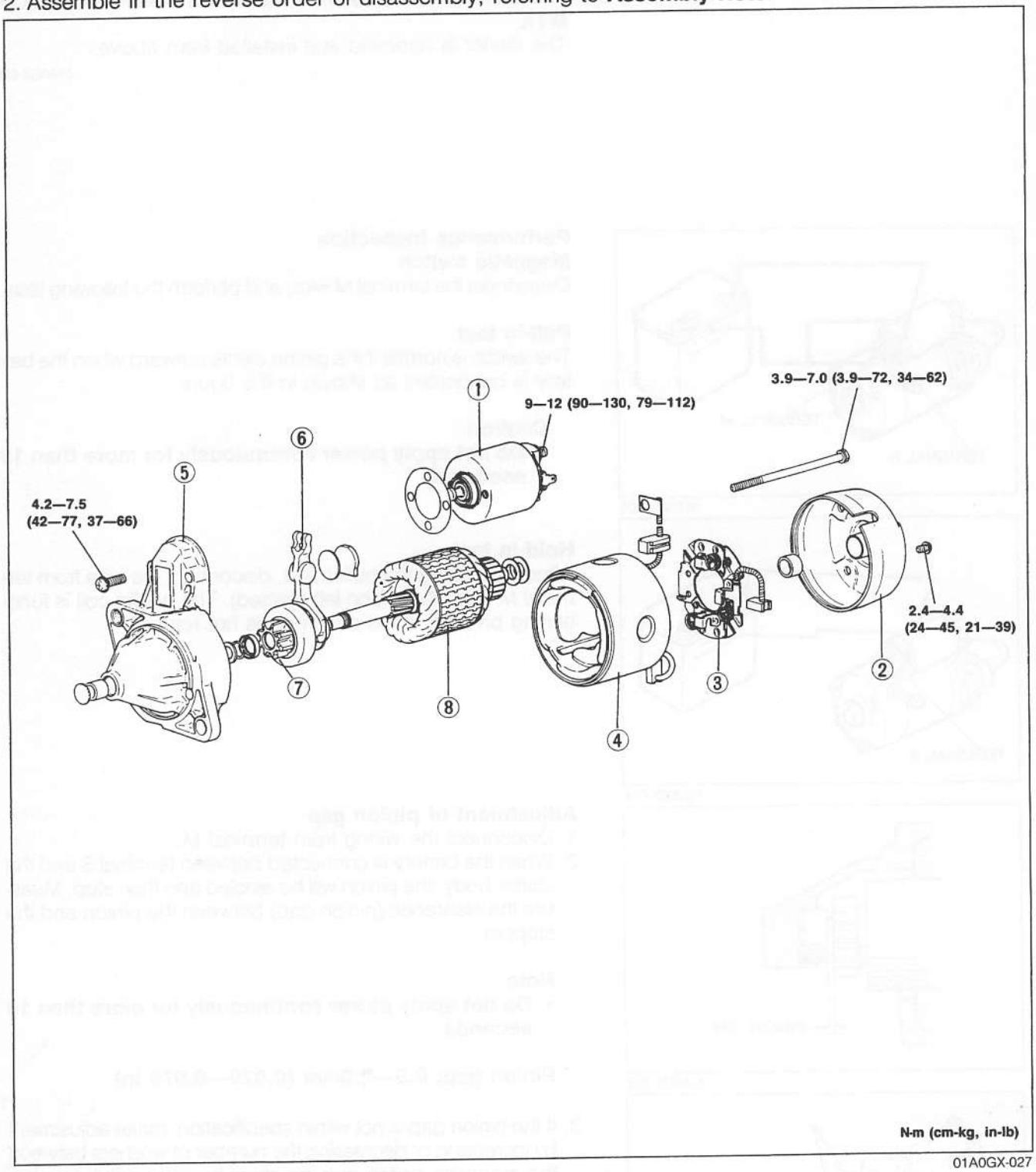
3. If the pinion gap is not within specification, make adjustment by increasing or decreasing the number of washers between the magnetic switch and the drive housing. (The gap becomes smaller as the number of washers is increased.)



01E0GX-091

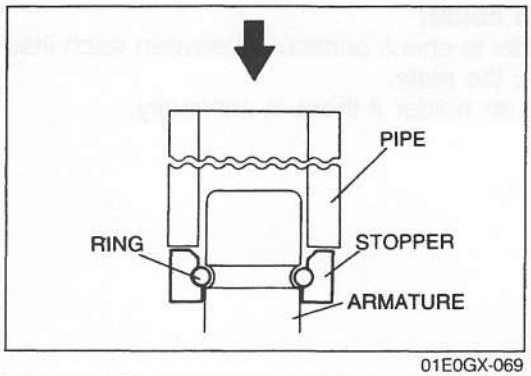
Disassembly / Assembly

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**.



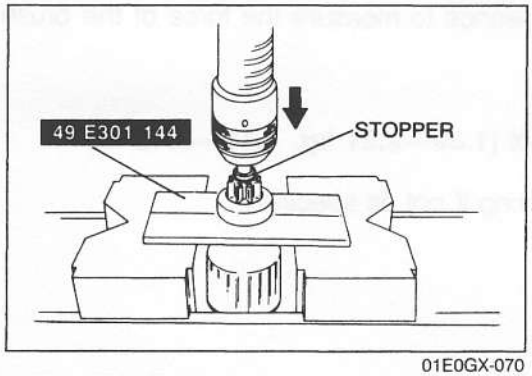
01A0GX-027

1. Magnetic switch
   Inspection..... page G–29
2. Rear cover
3. Brush holder assembly
   Inspection..... page G–30
4. Field coil
   Inspection..... page G–30
5. Front cover
6. Lever
7. Drive pinion
8. Armature
   Inspection..... page G–31



01E0GX-069

Disassembly Note
Drive pinion
Remove the stopper for the overrunning clutch with a pipe as shown.



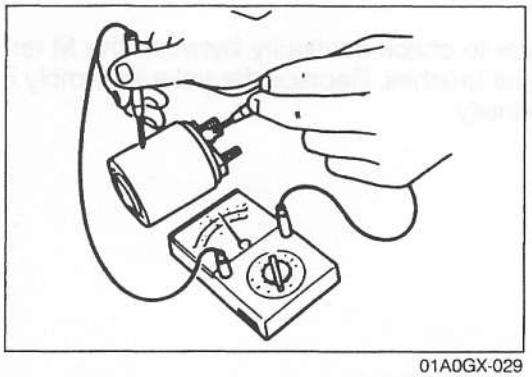
01E0GX-070

Assembly Note
Drive pinion
1. Set the drive pinion onto the armature and install the ring.
2. Install the stopper with the **SST** and press it, as shown.



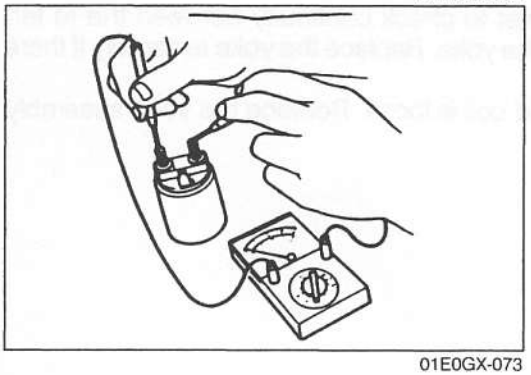
01A0GX-028

Inspection
Magnetic switch
1. Use an ohmmeter to check continuity between the S and M terminals. Replace the magnetic switch if there is no continuity.



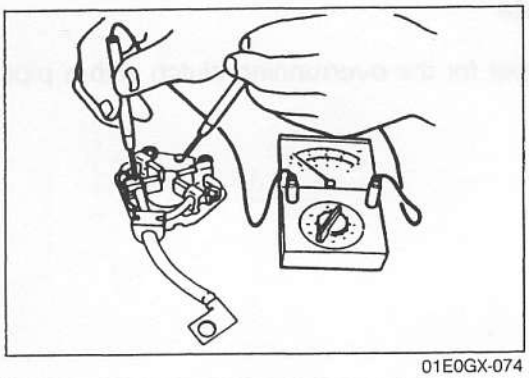
01A0GX-029

2. Use an ohmmeter to check continuity between the S terminal and the body. Replace the magnetic switch if there is no continuity.



01E0GX-073

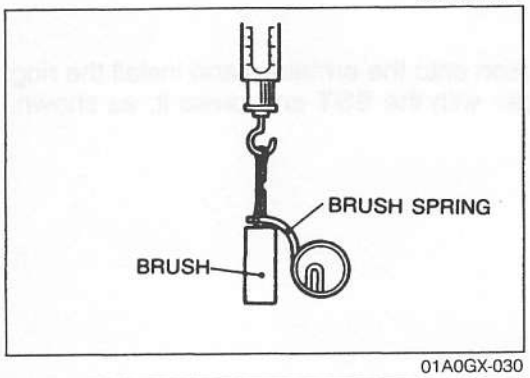
3. Use an ohmmeter to check continuity between the M and B terminals. Replace the magnetic switch if there is continuity.



01E0GX-074

Brush and brush holder

1. Use an ohmmeter to check continuity between each insulated brush and the plate.
   Replace the brush holder if there is continuity.

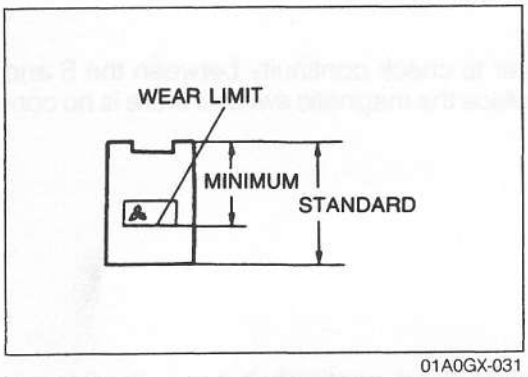


01A0GX-030

2. Use a spring balance to measure the force of the brush spring.

   Standard:
   18.9—23.1 N (1.89—2.31 kg, 4.18—5.12 lb)

3. Replace the spring if not as specified.

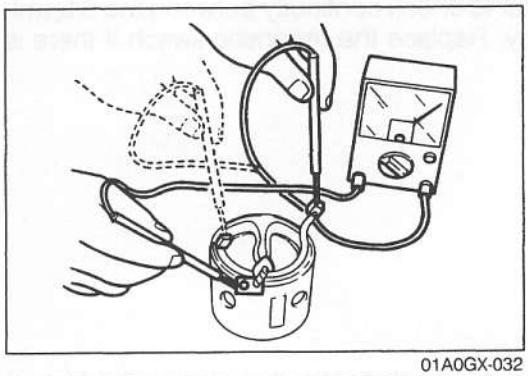


01A0GX-031

Brush

If a brush is worn almost to the wear limit or beyond, replace all the brushes.

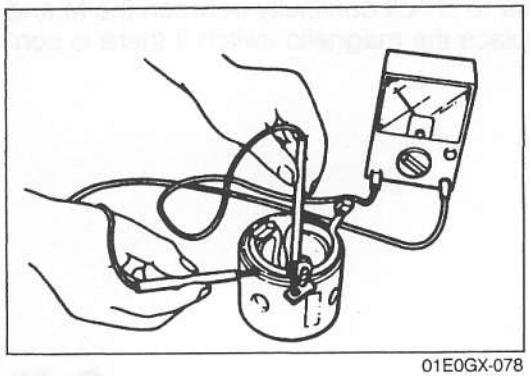
Standard: 17mm (0.67 in)
Minimum: 11.5mm (0.453 in)



01A0GX-032

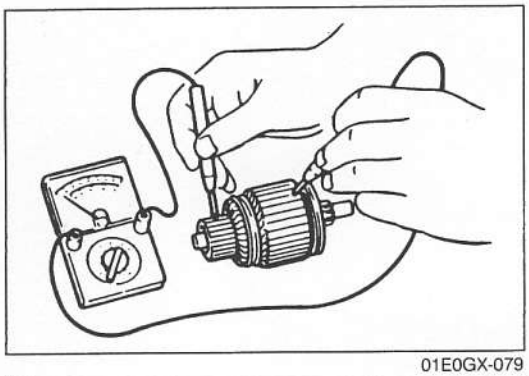
Field coil

1. Use an ohmmeter to check continuity between the M terminal wire and the brushes. Replace the yoke assembly if there is no continuity.



01E0GX-078

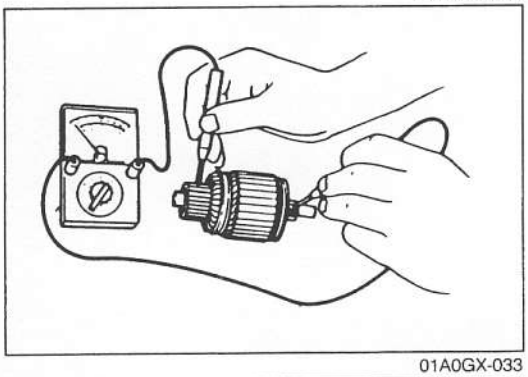
2. Use an ohmmeter to check continuity between the M terminal wire and the yoke. Replace the yoke assembly if there is continuity.
3. Check if the field coil is loose. Replace the yoke assembly if it is.



01E0GX-079

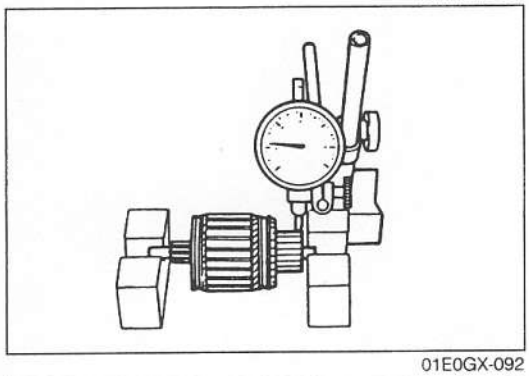
Armature

1. Use an ohmmeter to check continuity between the commutator and the core. Replace the armature it there is continuity.



01A0GX-033

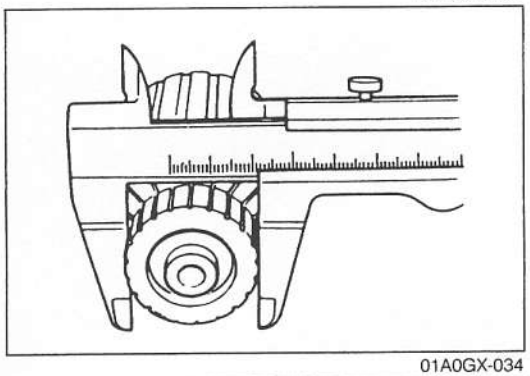
2. Use an ohmmeter to check continuity between the commutator and the shaft. Replace the armature if there is continuity.



01E0GX-092

3. Place the armature on V-blocks, and measure the runout with a dial indicator.
   If the runout is not within specification, repair it with a lathe or replace the armature.

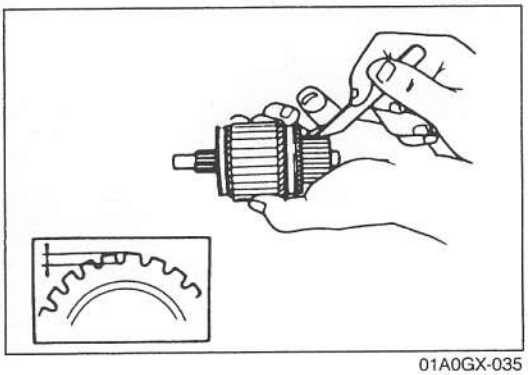
   Runout: 0.05mm (0.002 in)



01A0GX-034

4. Replace the armature if the outer diameter of the commutator is almost at or less than the minimum.
5. If the commutator surface is dirty, wipe it with a cloth; if it is rough, repair it with a lathe or fine sandpaper.

   Grind limit: 31.4mm (1.23 in)



01A0GX-035

6. If the depth of the mold between segments is almost at or less than the minimum, undercut the grooves to the standard depth.

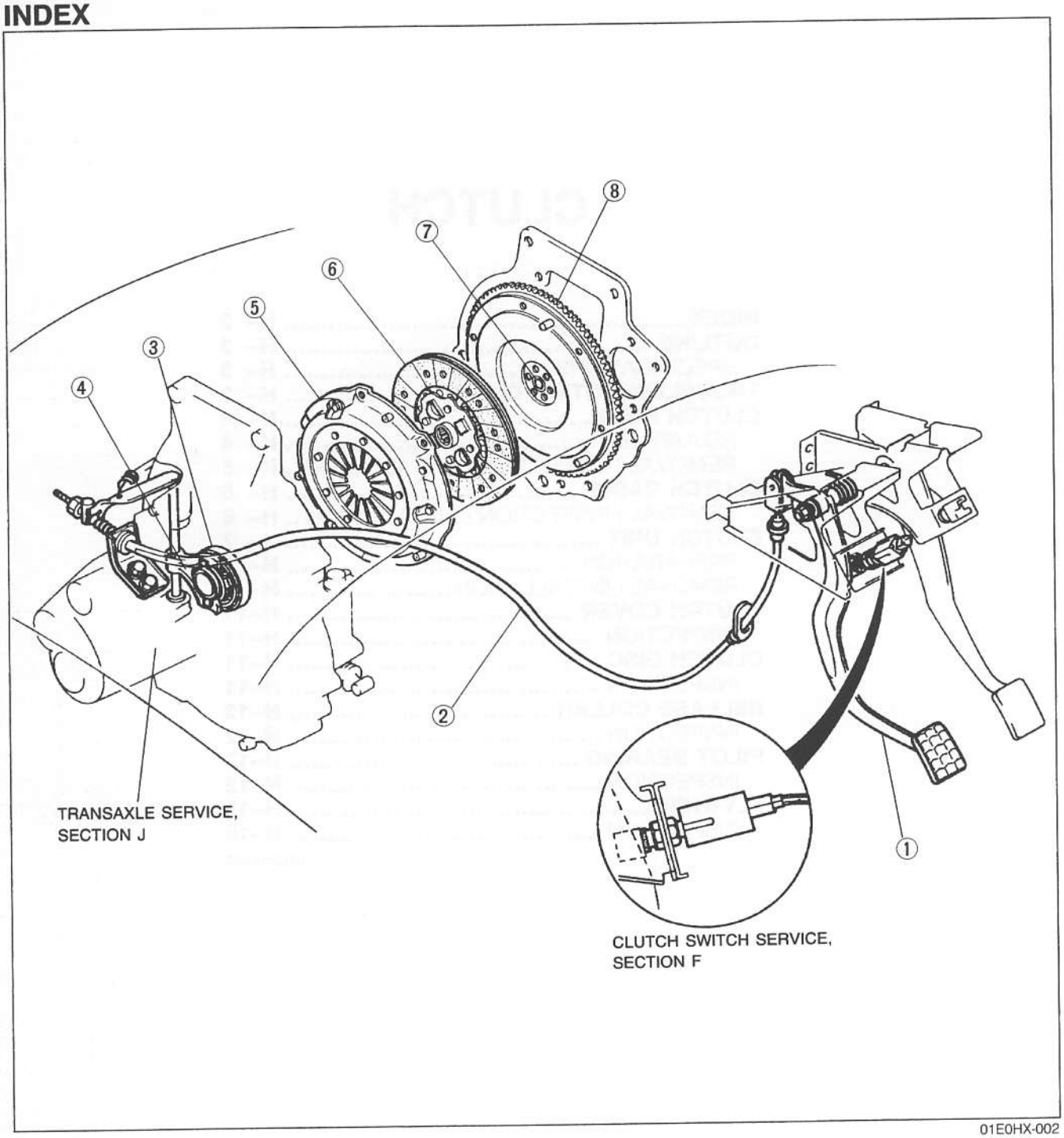
   Depth : 0.5—0.8mm (0.02—0.03 in)
   Minimum: 0.2mm (0.008 in)

CLUTCH

INDEX ..... H– 2
OUTLINE ..... H– 3
SPECIFICATIONS ..... H– 3
TROUBLESHOOTING GUIDE ..... H– 3
CLUTCH PEDAL ..... H– 4
ADJUSTMENT ..... H– 4
REMOVAL / INSPECTION / INSTALLATION .. H– 5
CLUTCH CABLE ..... H– 6
REMOVAL / INSPECTION / INSTALLATION .. H– 6
CLUTCH UNIT ..... H– 7
PREPARATION ..... H– 7
REMOVAL / INSTALLATION ..... H– 8
CLUTCH COVER H–11
INSPECTION H–11
CLUTCH DISC H–11
INSPECTION H–11
RELEASE COLLAR H–12
INSPECTION H–12
PILOT BEARING H–12
INSPECTION H–12
FLYWHEEL H–12
INSPECTION H–12

01E0HX-001

INDEX



01E0HX-002

1. Clutch pedal
Inspection / Adjustment ..... page H– 4
Removal / Inspection / Installation ..... page H– 5
2. Clutch cable
Removal / Inspection / Installation ..... page H– 6
3. Release Collar
Removal / Installation..... page H– 8
Inspection..... page H–12
4. Release fork
Removal / Installation..... page H– 8
5. Clutch cover
Removal / Installation..... page H– 8
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6. Clutch disc
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Inspection..... page H–11
7. Pilot bearing
Removal / Installation..... page H– 8
Inspection..... page H–12
8. Flywheel
Removal / Installation..... page H– 8
Inspection..... page H–12

OUTLINE

SPECIFICATIONS

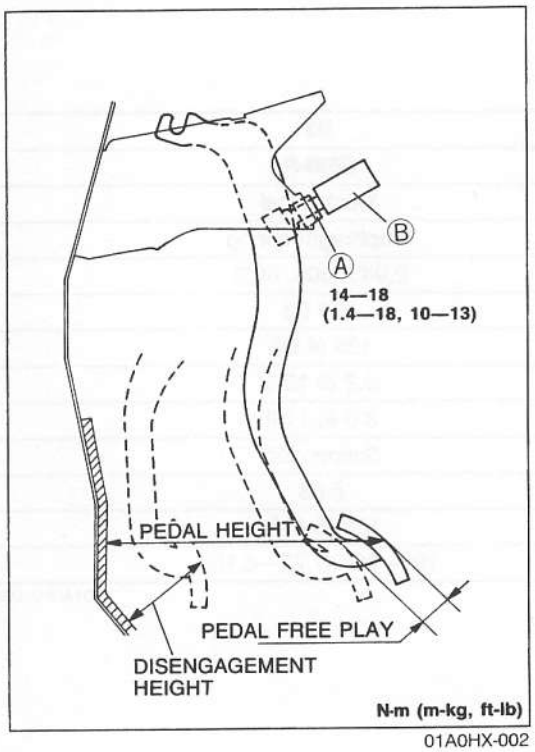
Item \ Engine/Transaxle Model				B3 / B5M-R
Clutch control				Mechanical
Clutch cover	Type			Diaphragm spring
	Set load		N (kg, lb)	2,943 (300, 660)
Clutch disc	Outer diameter		mm (in)	180 (7)
	Inner diameter		mm (in)	125 (4.92)
	Thickness	Pressure plate	mm (in)	3.2 (0.126)
		Flywheel side	mm (in)	3.0 (0.118)
Clutch pedal	Type			Suspended
	Pedal ratio			5.83
	Full stroke		mm (in)	138 (5.433)
	Height (With carpet)			196—207 (7.72—8.15)

01A0HX-003

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Action	Page
Slipping	Clutch disc facing worn excessively	Replace	H– 8, 11
	Clutch disc facing surface hardened or oiled	Repair or replace	H– 8
	Pressure plate damaged	Repair or replace	H– 8
	Diaphragm spring damaged or weakened	Replace	H– 8
	Insufficient clutch pedal play	Adjust	H– 4
	Clutch pedal sticking	Repair or replace	H– 5
	Flywheel damaged	Repair or replace	H– 8
Faulty disengagement	Excessive runout or damaged clutch disc	Replace	H– 8, 11
	Clutch disc splines rusted or worn	Remove rust or replace	H– 8
	Clutch disc oiled	Repair or replace	H– 8
	Diaphragm spring weakened	Replace	H– 8
	Excessive clutch pedal play	Adjust	H– 4
Clutch vibrates when accelerating	Clutch disc oiled	Repair or replace	H– 8
	Torsion rubbers weakened	Replace	H– 8
	Clutch disc facing hardened or damaged	Repair or replace	H– 8
	Clutch disc facing rivets loose	Replace	H– 8
	Diaphragm spring weakened	Replace	H– 8
	Pressure plate damaged or excessive runout	Replace	H– 8
	Flywheel surface hardened or damaged	Repair or replace	H– 8
	Loose or worn engine mount	Tighten or replace	Refer to Sections B, J
Clutch pedal sticking	Pedal shaft not properly lubricated	Lubricate or replace	H– 5
Abnormal noise	Clutch release collar damaged	Replace	H– 8, 11
	Poor lubrication of release collar sleeve	Lubricate or replace	H– 8
	Torsion rubbers weakened	Replace	H– 8
	Excessive crankshaft end play	Repair	Refer to Section B
	Pilot bearing worn or damaged	Replace	H– 8, 12
	Worn pivot points of release fork	Repair or replace	H– 8

01A0HX-001



01A0HX-002

CLUTCH PEDAL

ADJUSTMENT

Clutch Pedal Height

Inspection

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

Pedal height: (With carpet)
196—207mm (7.72—8.15 in)

2. If necessary, adjust the pedal height.

Adjustment

1. Disconnect the clutch switch connector.
2. Loosen locknut Ⓐ and turn clutch switch Ⓑ until the height is correct.
3. Tighten locknut Ⓐ.

Tightening torque:
14—18 N·m (1.4—1.8 m-kg, 10—13 ft-lb)

4. After adjustment, measure the pedal free play.

Clutch Pedal Free Play

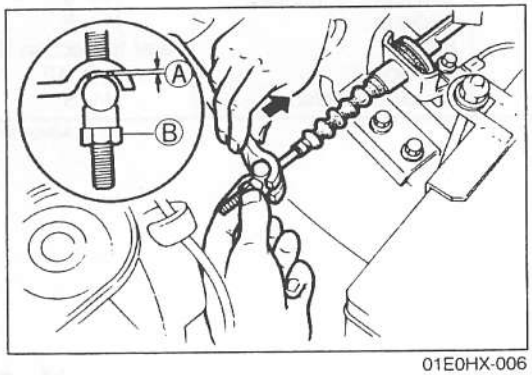
Inspection

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

Pedal free play: 9—15mm (0.35—0.59 in)

2. If necessary, adjust the pedal free play.
3. Verify that the disengagement height (from the uppersurface of the pedal to the carpet) is correct when the pedal is fully depressed.

Minimum disengagement height: 85mm (3.35 in)
(With carpet)



01E0HX-006

Adjustment

1. Pull the release lever as shown in the figure. Then turn the adjusting nut Ⓑ until the recommended clearance Ⓐ between the pin and the release lever is obtained.

Standard clearance: 1.95—2.05mm (0.077—0.081 in)

2. Measure the clutch pedal play.

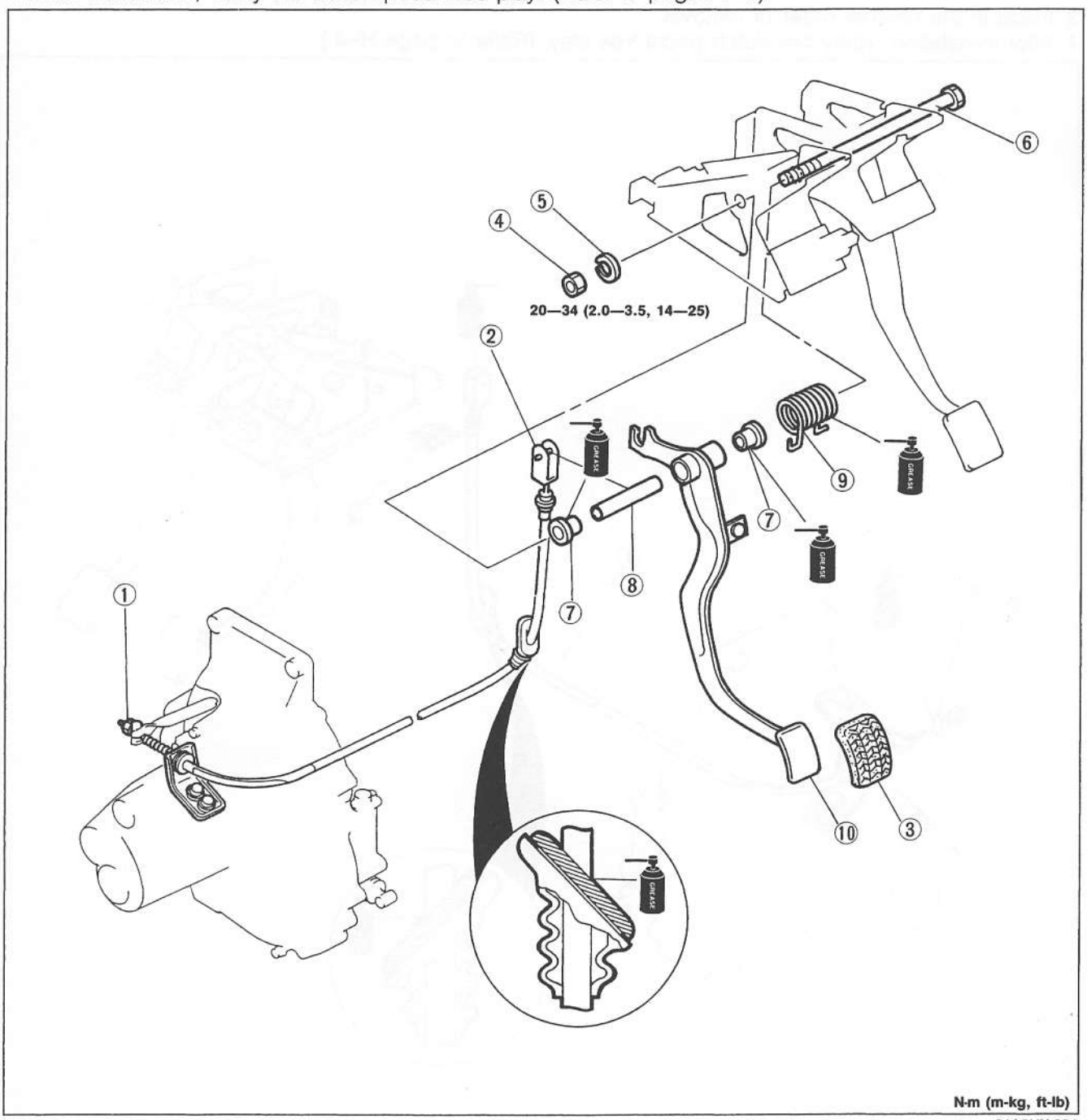
REMOVAL / INSPECTION / INSTALLATION

1. Remove in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.

Note

- **Apply lithium based grease to the bushing and pins before installation.**

3. Install in the reverse order of removal.
4. After installation, verify the clutch pedal free play. (Refer to page H–4.)



1. Adjusting nut
2. Clutch cable
3. Pedal pad
4. Nut
5. Lock washer
6. Bolt
7. Bushing
8. Spacer
9. Spring
10. Clutch pedal

CLUTCH CABLE

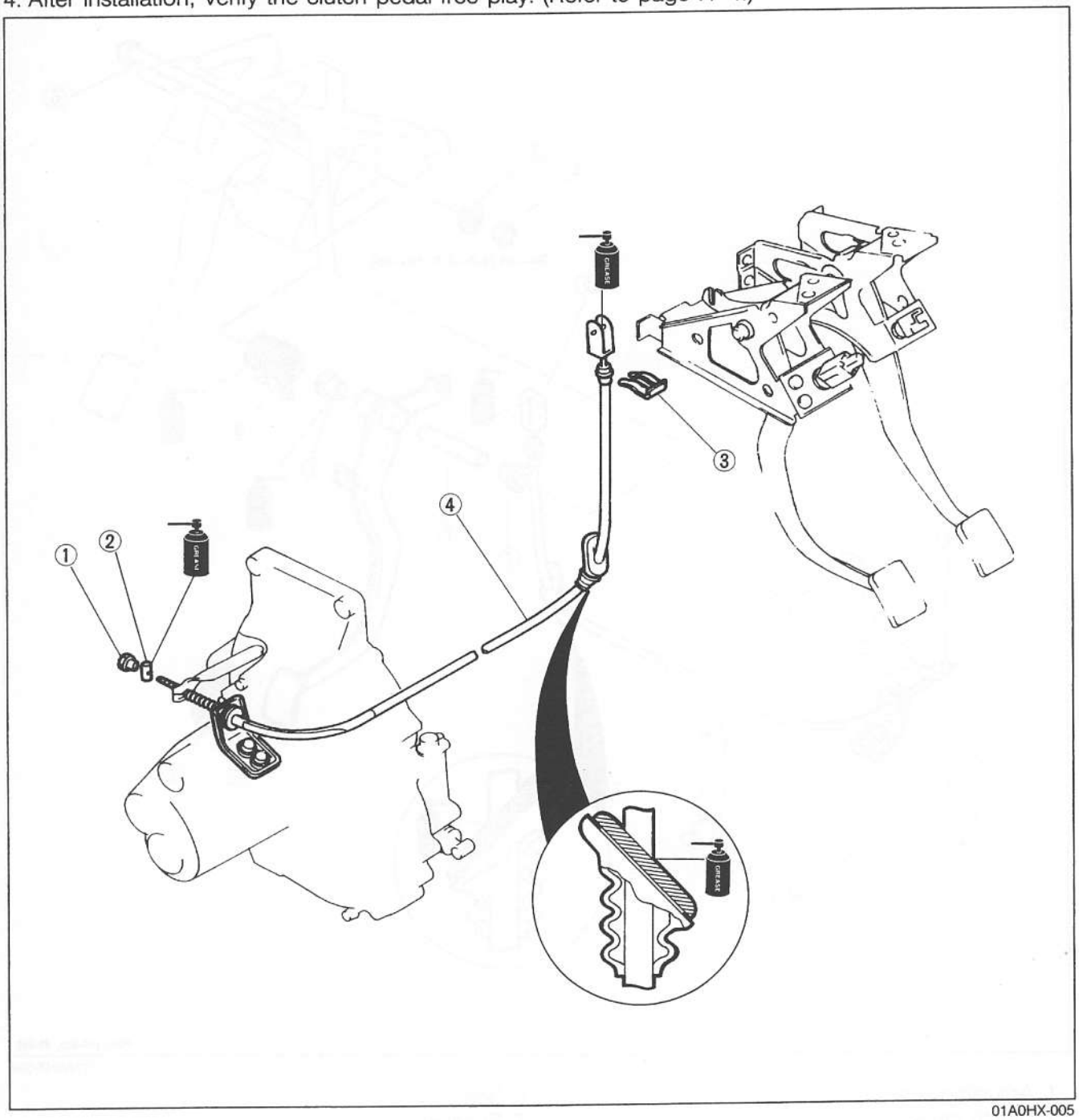
REMOVAL / INSPECTION / INSTALLATION

1. Remove in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.

Note

- **Apply lithium based grease to the pin and the release lever before installation.**

3. Install in the reverse order of removal.
4. After installation, verify the clutch pedal free play. (Refer to page H–4.)

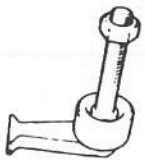
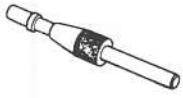
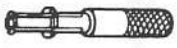


01A0HX-005

1. Adjusting nut
2. Pin
3. Clip
4. Clutch cable
   Inspect for damage
   Adjustment ..... page H–4

CLUTCH UNIT

PREPARATION
SST

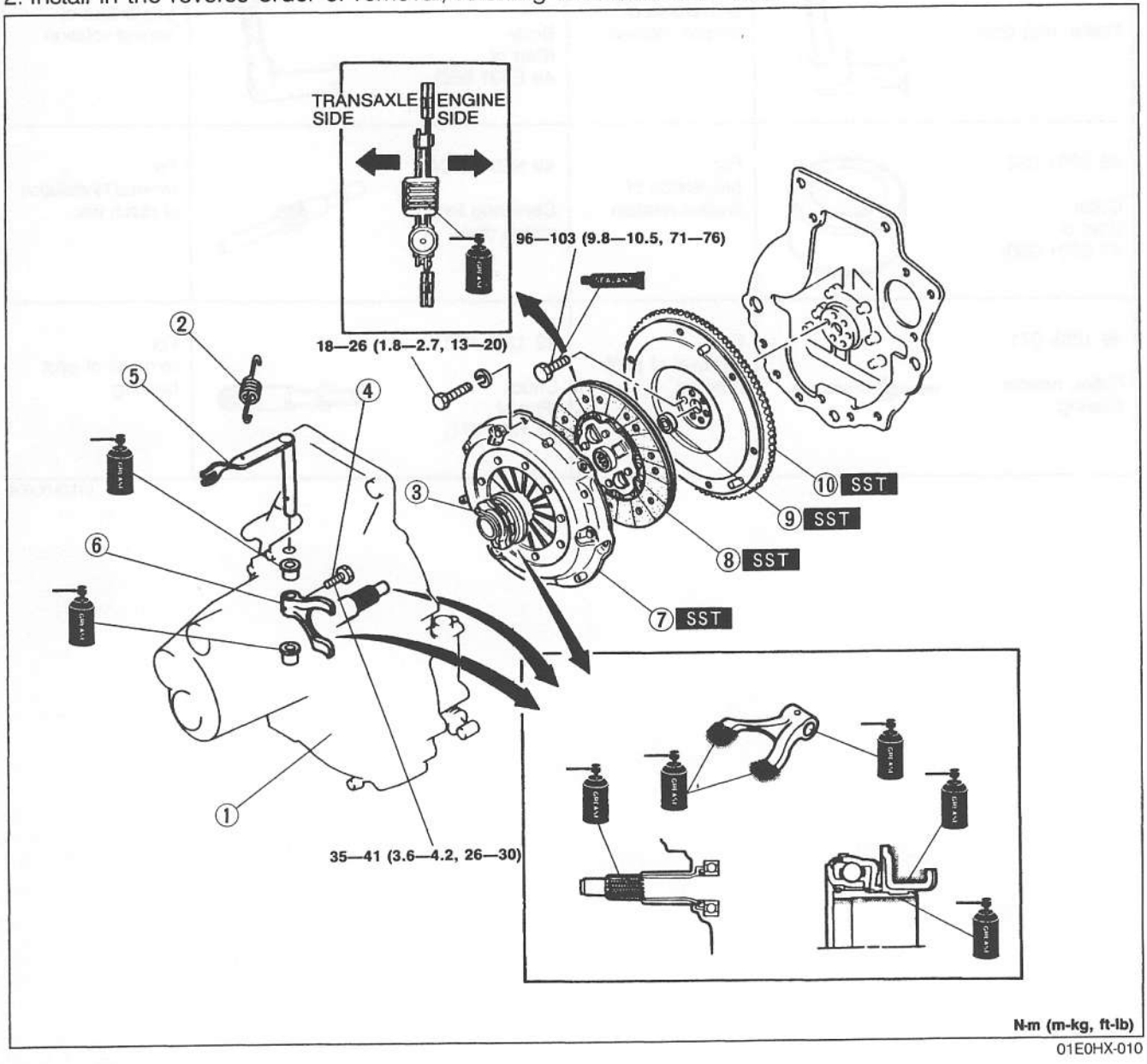
49 E301 060 Brake, ring gear 	For prevention of engine rotation	49 E301 061 Body (Part of 49 E301 060) 	For prevention of engine rotation
49 E301 062 Collar (Part of 49 E301 060) 	For prevention of engine rotation	49 SE01 310A Centering tool, clutch disc 	For removal / installation of clutch disc
49 1285 071 Puller, needle bearing 	For removal of pilot bearing	49 1285 073 Chuck (Part of 49 1285 071) 	For removal of pilot bearing

01E0HX-009

REMOVAL / INSTALLATION

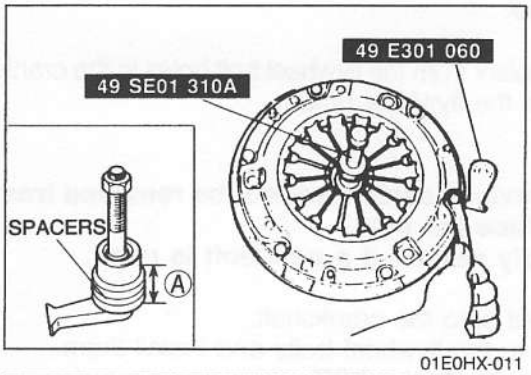
Note
- **Do not remove the pilot bearing if not necessary.**

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**.

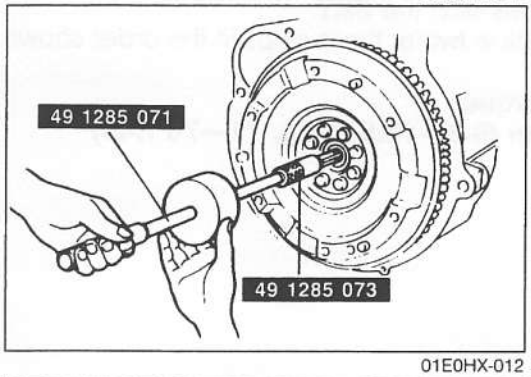


01E0HX-010

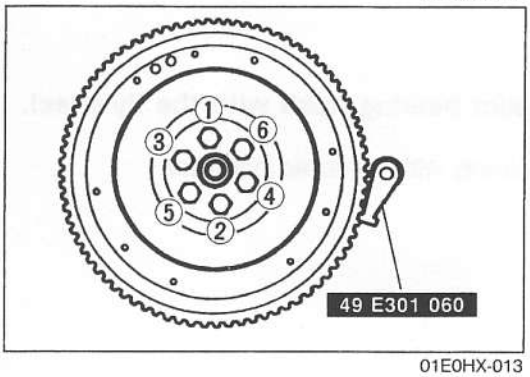
1. Transaxle
   Service ..... Section J
2. Return spring
3. Release collar
   Inspection ..... page H–12
4. Reamer bolt
5. Release lever
6. Release fork
7. Clutch cover
   Removal Note ..... page H– 9
   Inspection ..... page H–11
   Installation Note ..... page H–11
8. Clutch disc
   Removal Note ..... page H– 9
   Inspection ..... page H–11
   Installation Note ..... page H–10
9. Pilot bearing
   Removal Note ..... page H– 9
   Inspection ..... page H–12
   Installation Note ..... page H–10
10. Flywheel
    Removal Note ..... page H– 9
    Inspection ..... page H–12
    Installation Note ..... page H–10



01E0HX-011



01E0HX-012



01E0HX-013

Removal Note
Clutch cover and disc
1. Install the **SST**.

Caution
- **Put spacers between the (49 E301 060) and the cylinder block, setting dimesion Ⓐ as shown in the figure to 13mm (0.51 in). (Except B3 ATX)**

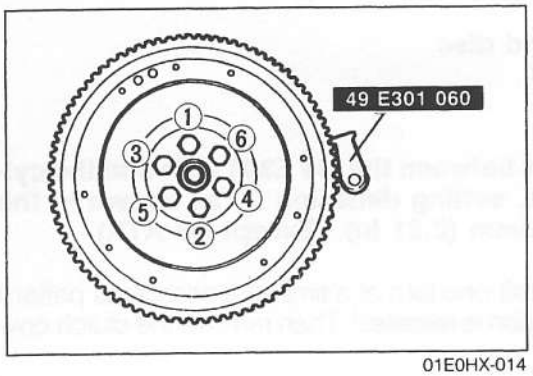
2. Loosen each bolt one turn at a time in a crisscross pattern until spring tension is released. Then remove the clutch cover and disc.

Pilot bearing
Remove the pilot bearing with the **SST** if necessary.

Flywheel

Note
- **After removing the flywheel, inspect for oil leakage past the crankshaft rear oil seal. If necessary, replace the oil seal. (Refer to Section B.)**

1. Hold the flywheel with the **SST**.
2. Remove the bolts in the sequence shown in the figure in steps.
3. Remove the flywheel.



01E0HX-014

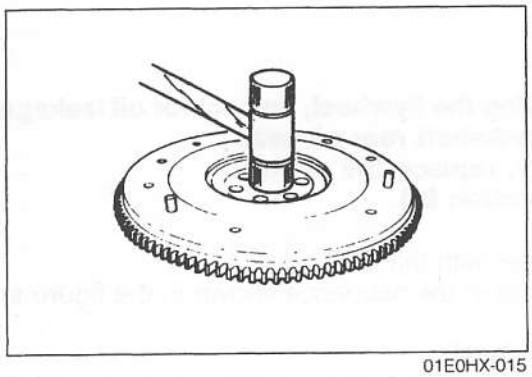
Installation Note
Flywheel

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

Caution
- **If all the previous sealant cannot be removed from a bolt, replace the bolt.**
- **Do not apply sealant if a new bolt is used.**

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

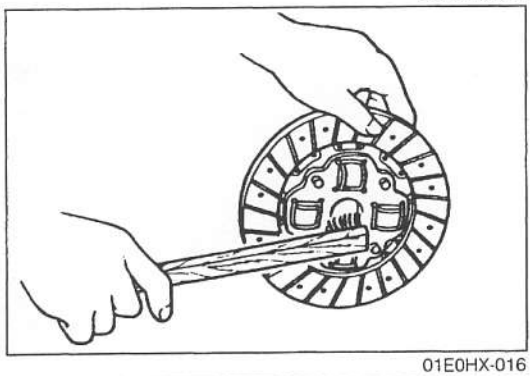
Tightening torque:
96—103 N·m (9.8—10.5 m-kg, 71—76 ft-lb)


01E0HX-015

Pilot bearing

Note
- **Install the pilot bearing flush with the flywheel.**

Install the new bearing with a plastic hammer.


01E0HX-016

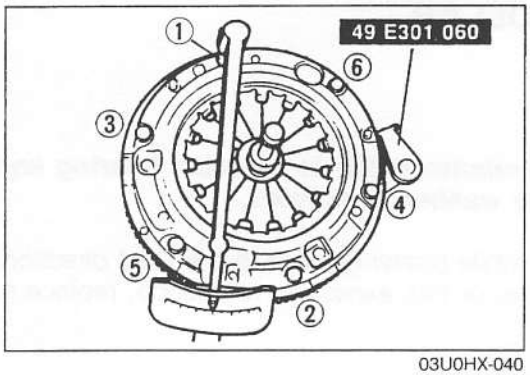
Clutch disc

1. Clean the clutch disc splines and main drive gear splines.
2. Lightly grease the splines with molybdenum grease.



01E0HX-017

3. Set the clutch disc onto the flywheel with the **SST**.

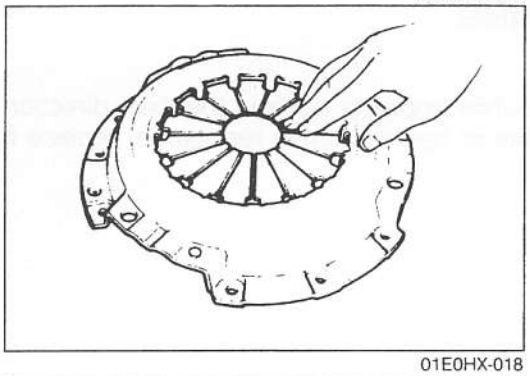


03U0HX-040

Clutch cover

1. Install the **SST**.
2. Align the dowel holes with the flywheel dowels.
3. Tighten the bolts evenly and gradually in the pattern shown.

Tightening torque:
18—26 N·m (1.8—2.7 m-kg, 13—20 ft-lb)



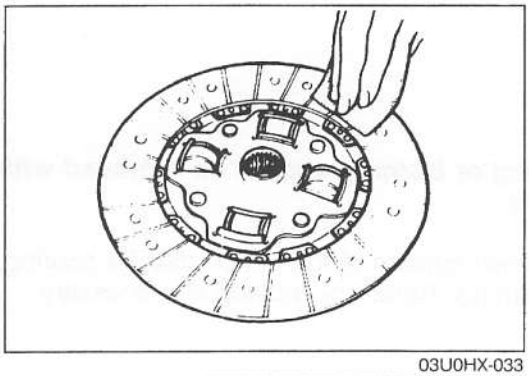
01E0HX-018

CLUTCH COVER

INSPECTION

Note
- **Minor scoring or burning should be removed with emery paper.**

1. Inspect the contact surface of the clutch disc for scoring, cracks, and burning. Repair or replace as necessary.
2. Inspect the contact surface of the clutch release bearing for wear and cracks.
   Replace the clutch cover if cracked or worn.



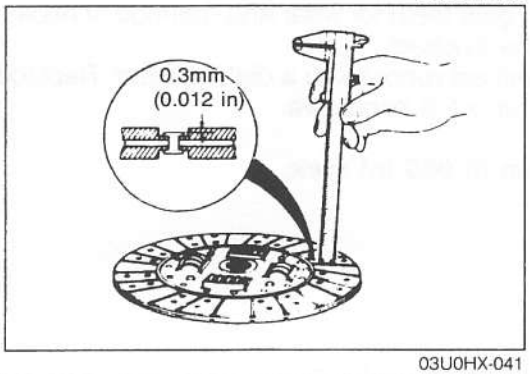
03U0HX-033

CLUTCH DISC

INSPECTION

Note
- **Use sandpaper if the trouble is minor.**

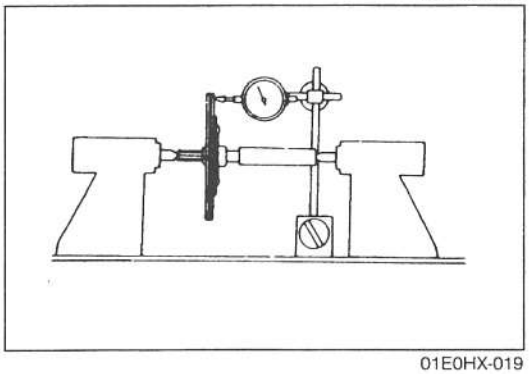
1. Inspect the lining surface for burning and oil contamination. Replace the clutch disc if it is badly burned or oil soaked.
2. Inspect for loose facing rivets and rubbers.
   Replace the clutch disc if either is loose.



03U0HX-041

3. Measure the thickness of the lining at a rivet head on both sides with vernier calipers.
   Replace the clutch disc if its thickness is less than minimum.

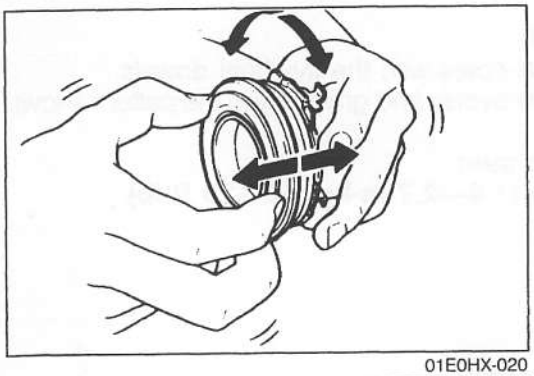
Minimum thickness: 0.3mm (0.012 in)



01E0HX-019

4. Measure the clutch disc runout with a dial indicator.
   Replace the clutch disc if runout is excessive.

Runout: 0.7mm (0.027 in) max.

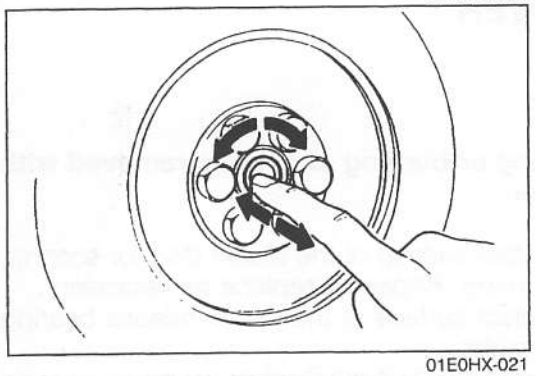

01E0HX-020

RELEASE COLLAR

INSPECTION

Note
- **The clutch release collar is a sealed bearing and must not be washed in solvent.**

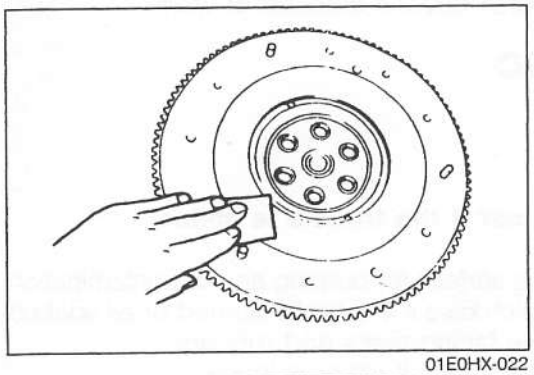
Turn the bearing while applying force in the axial direction. If the bearing sticks or has excessive resistance, replace it.


01E0HX-021

PILOT BEARING

INSPECTION

Turn the bearing while applying force in the axial direction. If the bearing sticks or has excessive resistance, replace it.

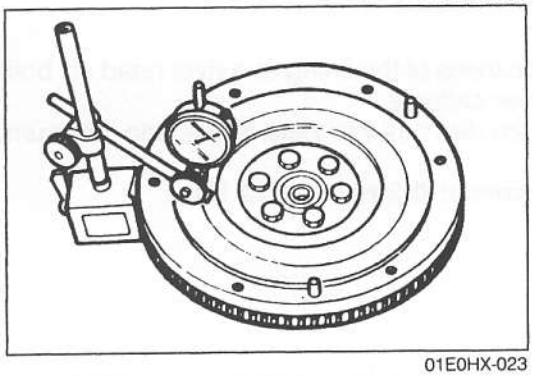

01E0HX-022

FLYWHEEL

INSPECTION

Note
- **Minor scoring or burning should be removed with emery paper.**

1. Inspect the contact surface of the clutch disc for scoring, cracks, and burning. Repair or replace as necessary.


01E0HX-023

2. Inspect the ring gear teeth for wear and damage. If necessary, replace the flywheel.
3. Measure the flywheel runout with a dial indicator. Replace the flywheel if runout is excessive.

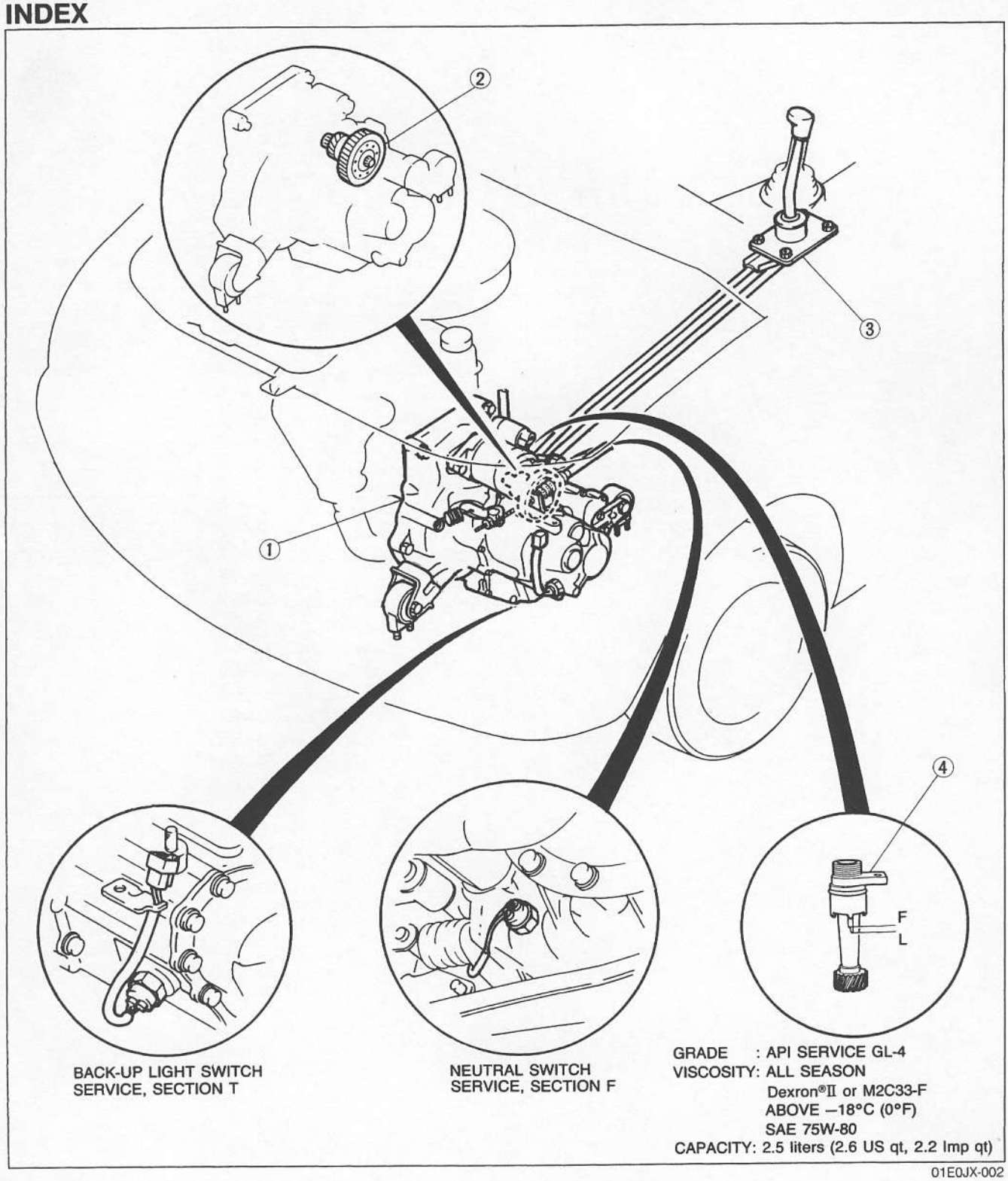
Runout: 0.2mm (0.008 in) max.

MANUAL TRANSAXLE

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OUTLINE ..... J– 3
SPECIFICATIONS ..... J– 3
STRUCTURAL VIEW ..... J– 4
POWERFLOW ..... J– 5
TROUBLESHOOTING GUIDE ..... J– 6
TRANSAXLE OIL ..... J– 7
INSPECTION ..... J– 7
REPLACEMENT ..... J– 7
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PREPARATION ..... J– 9
REMOVAL J–11
DISASSEMBLY J–14
INSPECTION J–27
ASSEMBLY J–30
INSTALLATION J–56
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PREPARATION J–59
DISASSEMBLY / INSPECTION / ASSEMBLY .. J–60
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OVERHAUL J–64

01E0JX-001

INDEX



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Installation ..... page J–56
2. Differential
Disassembly / Inspection / Assembly ..... page J–60
3. Shift mechanism
Overhaul ..... page J–64
4. Transaxle oil
Inspection ..... page J– 7
Replacement ..... page J– 7

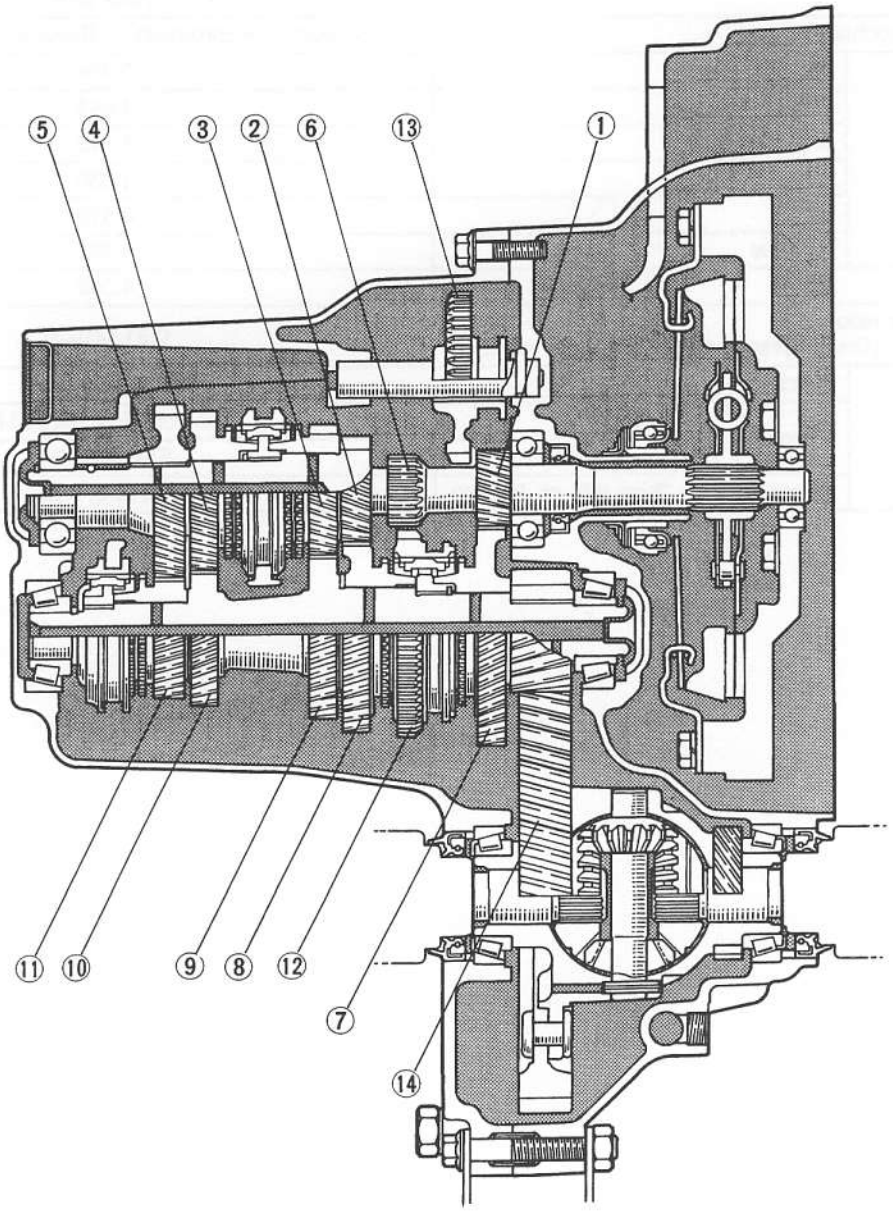
OUTLINE

SPECIFICATIONS

Item \ Engine			B3
Transaxle type			B5M-R
Transaxle control			Floor shift
Synchronization mechanism			Forward: Synchromesh Reverse: Selective sliding
Gear ratio	1st		3.454
	2nd		1.944
	3rd		1.392
	4th		1.030
	5th		0.810
	Reverse		3.583
Final gear ratio			4.058
Speedometer gear ratio (Driven gear number/Drive gear number)			0.91 (21/23)
Oil	Grade		API service GL-4
	Viscosity	All season	Dexron®II or M2C33-F
		Above −18°C (0°F)	SAE 75W-80
	Capacity	liters (US qt, Imp qt)	2.5 (2.6, 2.2)

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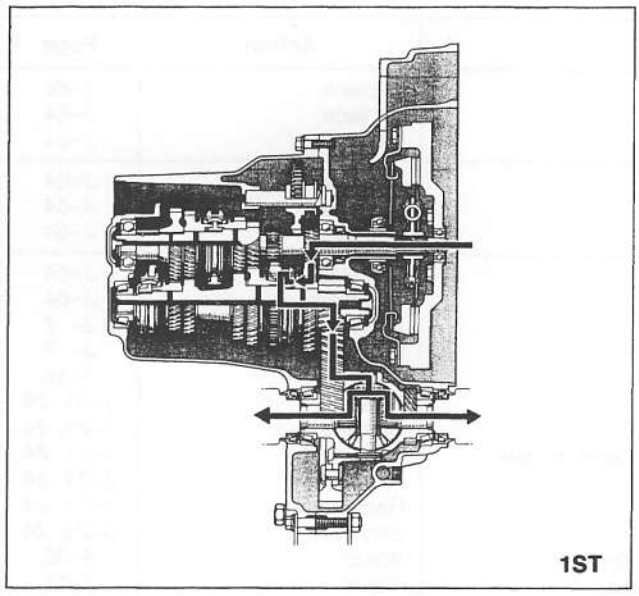
STRUCTURAL VIEW

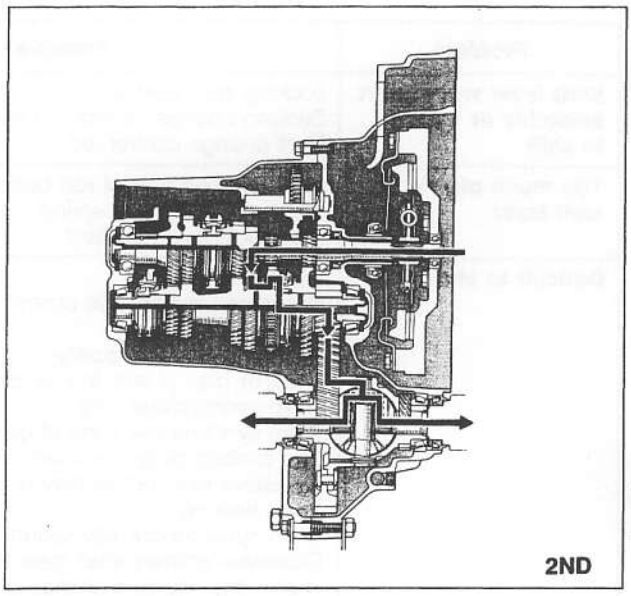


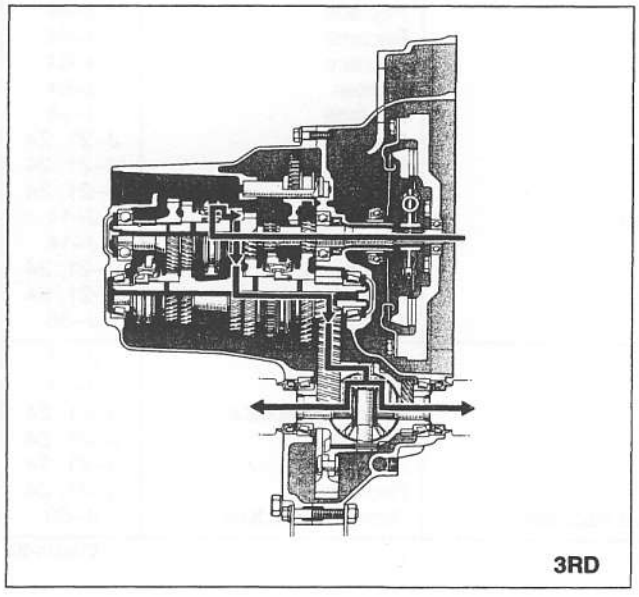
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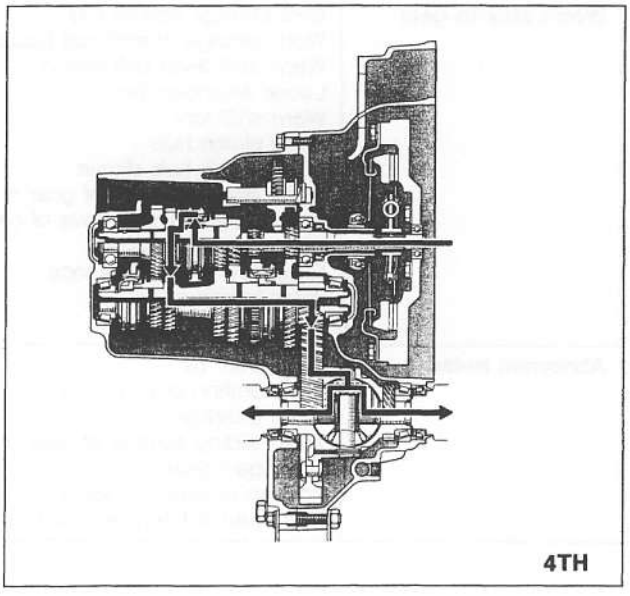
1. Primary 1st gear
2. Primary 2nd gear
3. Primary 3rd gear
4. Primary 4th gear
5. Primary 5th gear
6. Primary reverse gear
7. Secondary 1st gear
8. Secondary 2nd gear
9. Secondary 3rd gear
10. Secondary 4th gear
11. Secondary 5th gear
12. Secondary reverse gear
13. Reverse idler gear
14. Differential

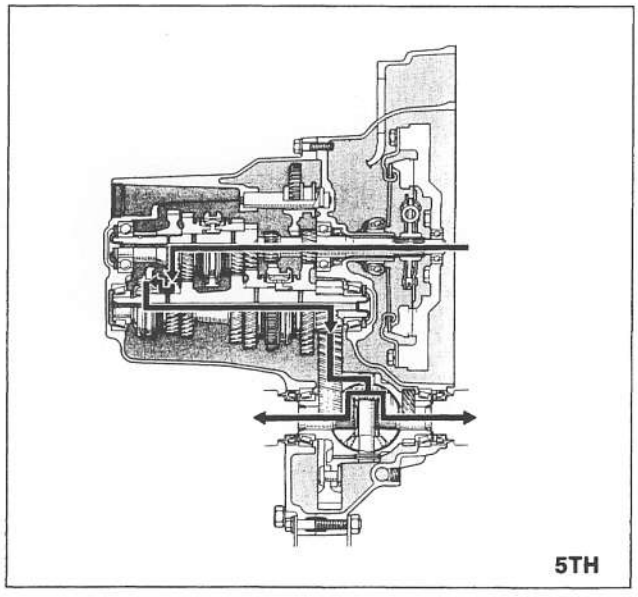
POWERFLOW

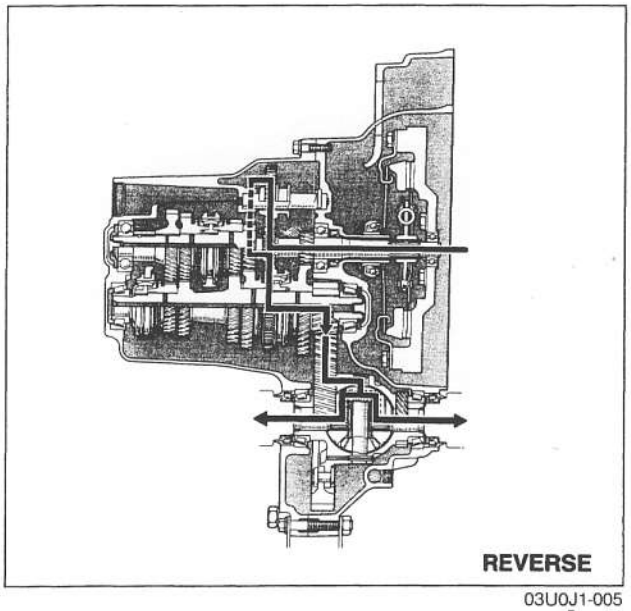








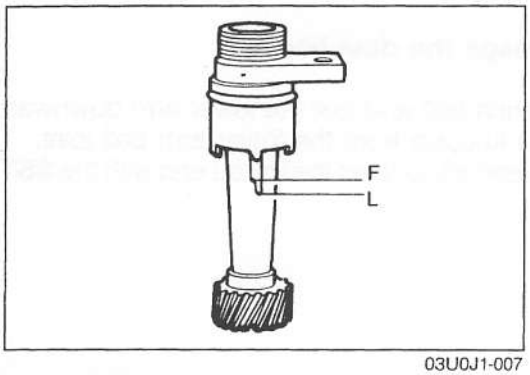




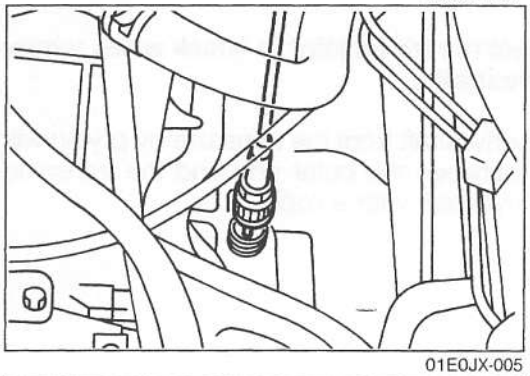
TROUBLESHOOTING GUIDE

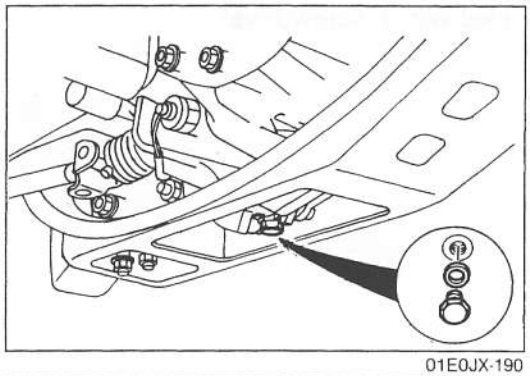
Problem	Possible cause	Action	Page
Shift lever won't shift smoothly or is hard to shift	Sticking shift lever ball	Replace	J–64
	Sticking change control rod joint	Replace	J–64
	Bent change control rod	Replace	J–64
Too much play in shift lever	Worn change control rod bushing	Replace	J–64
	Weak shift lever ball spring	Replace	J–64
	Worn shift lever ball seat	Replace	J–64
Difficult to shift	Bent change rod	Replace	J–64
	No grease in transaxle control	Lubricate	J–64
	Insufficient oil	Add oil	J– 7
	Deterioration of oil quality	Replace oil	J– 7
	Wear or play of shift fork or shift rod	Replace	J–14
	Worn synchronizer ring	Replace	J–21, 24
	Worn synchronizer cone of gear	Replace	J–21, 24
	Bad contact of synchronizer ring and cone of gear	Replace	J–21, 24
	Excessive longitudinal play of gears	Replace	J–21, 24
	Worn bearing	Replace	J–21, 24
	Worn synchronizer key spring	Replace	J–21, 24
	Excessive primary shaft gear bearing preload	Adjust	J–38
	Improperly adjusted change guide plate	Adjust	J–17
Won't stay in gear	Bent change control rod	Replace	J–64
	Worn change control rod bushing	Replace	J–64
	Weak shift lever ball spring	Replace	J–64
	Loose extension bar	Tighten	J–64
	Worn shift fork	Replace	J–14
	Worn clutch hub	Replace	J–21, 24
	Worn clutch hub sleeve	Replace	J–21, 24
	Worn sliding surface of gear or shaft	Replace	J–21, 24
	Worn steel sliding groove of control end	Replace	J–14
	Weak detent spring	Replace	J–14
	Excessive thrust clearance	Replace	J–21, 24
	Worn bearing	Replace	J–21, 24
	Loose engine mount	Tighten	J–56
Abnormal noise	Insufficient oil	Add oil	J– 7
	Deterioration of oil quality	Replace oil	J– 7
	Worn bearing	Adjust or replace	J–21, 24
	Worn sliding surface of gear or shaft	Replace	J–21, 24
	Damaged gear teeth	Replace	J–21, 24
	Foreign material in gears	Replace	J–21, 24
	Damaged differential gear or excessive backlash	Replace or adjust	J–60

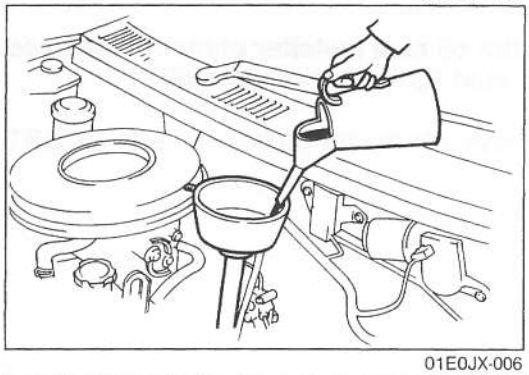
01E0JX-004

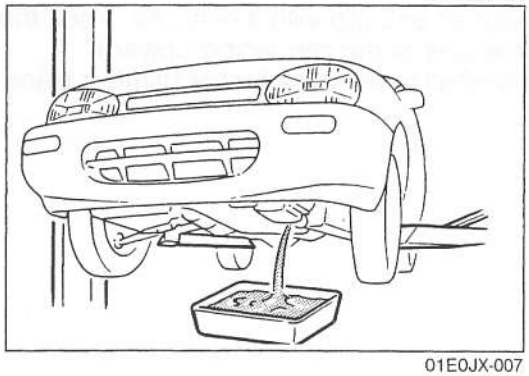


03U0J1-007


01E0JX-005


01E0JX-190


01E0JX-006


01E0JX-007

TRANSAXLE OIL

INSPECTION

Note
- **Park the vehicle on level ground.**

1. Disconnect the speedometer cable and remove the speedometer driven gear.
2. Verify that the oil level is between the F and L.
3. Install the speedometer driven gear.

Tightening torque:
7.8—12 N·m (0.8—1.2 m-kg, 5.8—8.7 ft-lb)

4. Connect the speedometer cable.

REPLACEMENT

1. Disconnect the speedometer cable and remove the speedometer driven gear.
2. Remove the drain plug and washer. Drain the oil into a suitable container.
3. Install a new washer and the drain plug.

Tightening torque:
24—35 N·m (2.4—3.6 m-kg, 17—26 ft-lb)

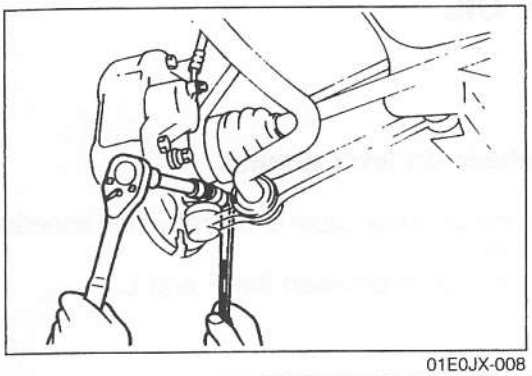
4. Add the necessary amount of the specified oil through the speedometer driven gear hole.

Specified oil
Grade: API service GL-4
Viscosity: All-season Dexron®II or M2C33-F
Above −18°C (0°F) SAE 75W-80

Capacity: 2.5 liters (2.6 US qt, 2.2 Imp qt)

5. Verify the oil level.
6. Install the speedometer driven gear and connect the speedometer cable.

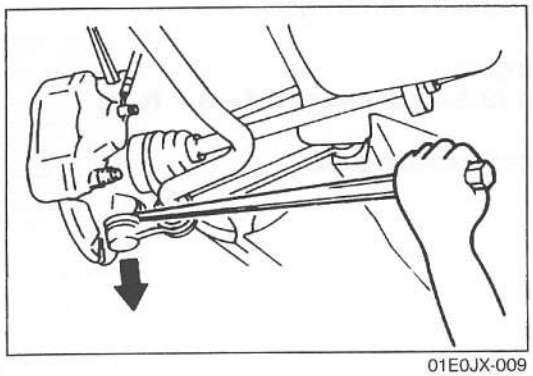
Oil seal
Replacement (On-vehicle)
1. Jack up the vehicle and support it with safety stands.
2. Drain the transaxle oil.
3. Remove the front wheel.
4. Remove the splash shield.
5. Separate the front stabilizer from the lower arm.



01E0JX-008

Caution
- **Do not damage the dust boots.**

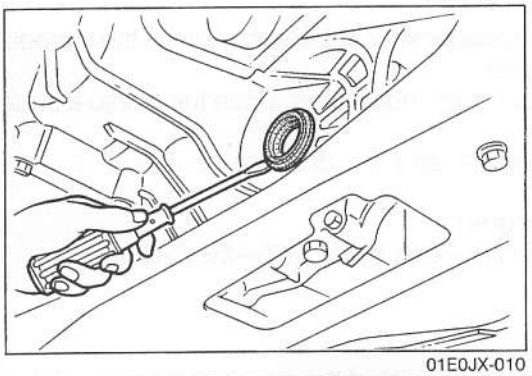
6. Remove the clinch bolt and pull the lower arm downward to separate the knuckle from the lower arm ball joint.
7. Loosen the nut and disconnect the tie-rod end with the **SST**.



01E0JX-009

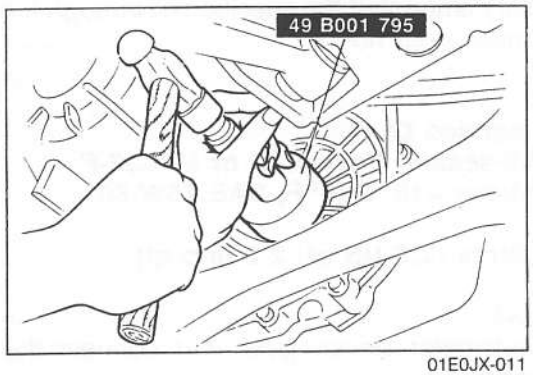
Caution
- **Do not subject the tripod joint to shock when removing the driveshaft.**

8. Disconnect the driveshaft from the transaxle by prying with a bar inserted between the outer ring and the transaxle.
9. Suspend the driveshaft with a rope.



01E0JX-010

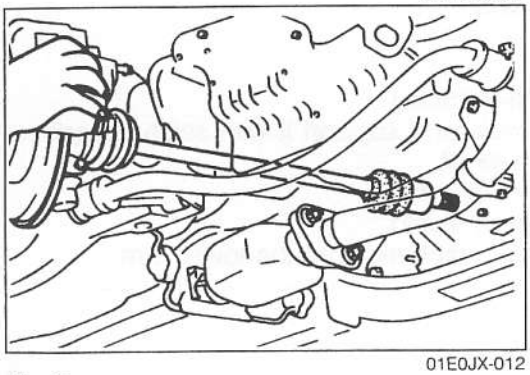
10. Remove the oil seal with a screwdriver.



01E0JX-011

Note
- **Tap in until the oil seal installer contacts the case.**
- **Coat the oil seal lip with transaxle oil.**

11. Tap the new oil seal into the transaxle case with the **SST**.

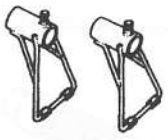
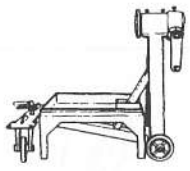
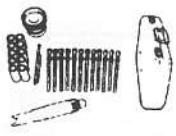
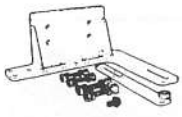
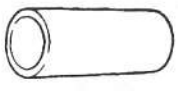
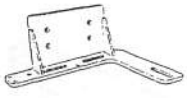
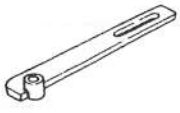
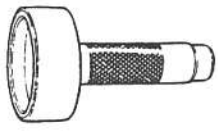


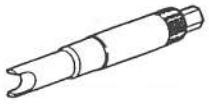
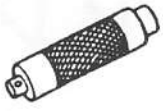
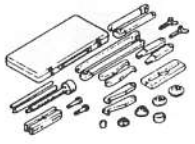
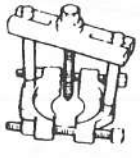
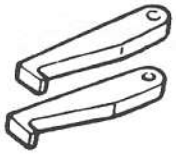
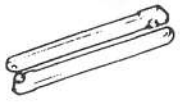
01E0JX-012

12. Replace the driveshaft end clip with a new one. Insert the driveshaft with the split of the clip facing upward.
13. Pull out on the driveshaft to verify that it is held firmly in place.

TRANSAXLE

PREPARATION
SST

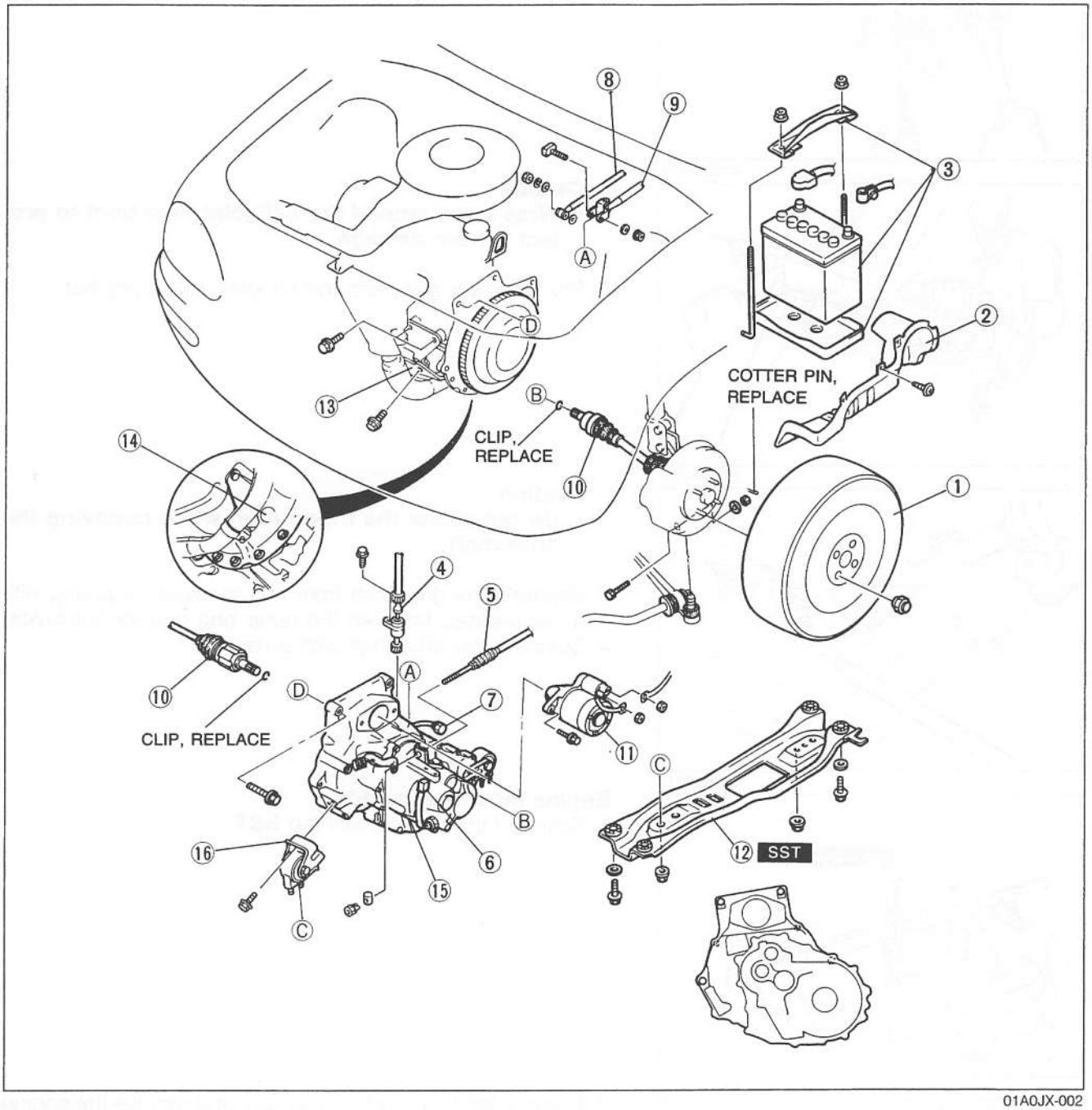
49 G017 5A0 Support, engine		For support of engine	49 G017 501 Bar (Part of 49 G017 5A0)		For support of engine
49 G017 502 Support (Part of 49 G017 5A0)		For support of engine	49 G017 503 Hook (Part of 49 G017 5A0)		For support of engine
49 0107 680A Engine stand		For disassembly and assembly of transaxle	49 D017 2A2A Shim selector set		For adjustment of bearing preload
49 G019 0A0 Hanger, transaxle		For disassembly and assembly of transaxle	49 F401 384 Collar (Part of 49 D017 2A2A)		For adjustment of bearing preload
49 G019 001 Body (Part of 49 G019 0A0)		For disassembly and assembly of transaxle	49 F401 385 Bar (Part of 49 D017 2A2A)		For adjustment of bearing preload
49 G019 002 Stay (Part of 49 G019 0A0)		For disassembly and assembly of transaxle	49 F401 381B Selector ϕ60 (Part of 49 F401 381A)		For adjustment of bearing preload
49 G019 003 Bolt set (Part of 49 G019 0A0)		For disassembly and assembly of transaxle	49 G019 019 Bolt set (Part of 49 D017 2A2A)		For adjustment of bearing preload
49 D017 101 Adaptor, preload		For adjustment of bearing preload	49 B001 795 Installer, oil seal		For installation of oil seal

49 FT01 361 Remover, bearing 	For removal of bearing outer race	49 B027 002A Adapter, preload (Part of 49 D017 2A2A) 	For adjustment of bearing preload
49 G030 795 Installer, oil seal 	For installation of oil seal	49 0180 510B Attachment, steering worm bearing preload measuring 	For adjustment of bearing preload
49 D017 2A1 Installer set, bearing 	For installation of bearing	49 G030 797 Body (Part of 49 G030 795) 	For installation of oil seal
49 F401 331 Body (Part of 49 D017 2A1) 	For installation of bearing	49 G030 796 Body (Part of 49 G030 795) 	For installation of oil seal
49 D017 201 Attachment (Part of 49 D017 2A1) 	For installation of gear	49 0839 425C Puller set, bearing 	For removal of bearing
49 0710 520 Puller, bearing 	For removal of gear	49 0862 428 Attachment, bearing puller (Part of 49 0839 425C) 	For removal of bearing
49 0636 145 Puller, fan pulley boss 	For removal of gear	49 0839 426 Attachment, bearing puller (Part of 49 0839 425C) 	For removal of bearing

01E0JX-013

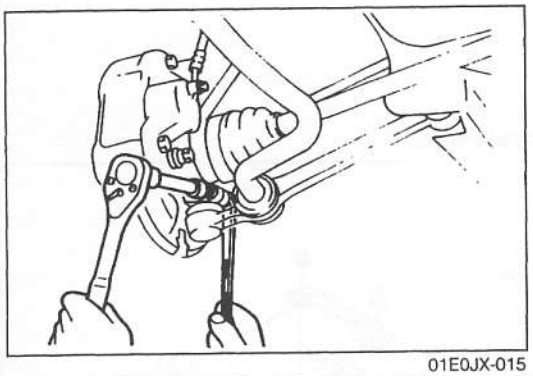
REMOVAL

1. Disconnect the negative battery cable.
2. Raise the vehicle on a vehicle hoist.
3. Drain the transaxle oil into a suitable container.
4. Remove in the order shown in the figure, referring to **Removal Note**.



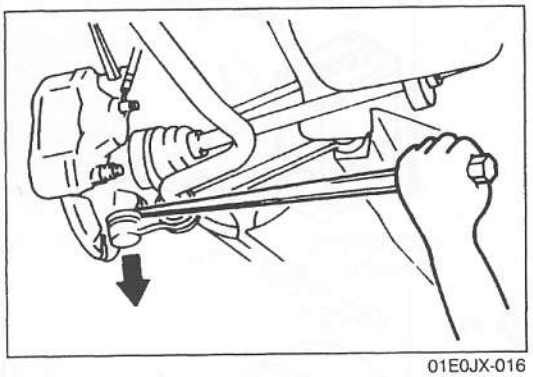
01A0JX-002

1. Wheel and tire
2. Splash shield
3. Battery, battery carrier
4. Speedometer cable
5. Clutch cable
6. Back-up light switch connector
7. Neutral switch connector
8. Extension bar
9. Control rod
10. Driveshafts
    Removal Note ..... page J–12
11. Starter
12. Engine mounting member
    Removal Note ..... page J–12
13. Exhaust pipe bracket
14. Stiffner
15. Transaxle
    Removal Note ..... page J–13
16. Engine mount No.2



01E0JX-015

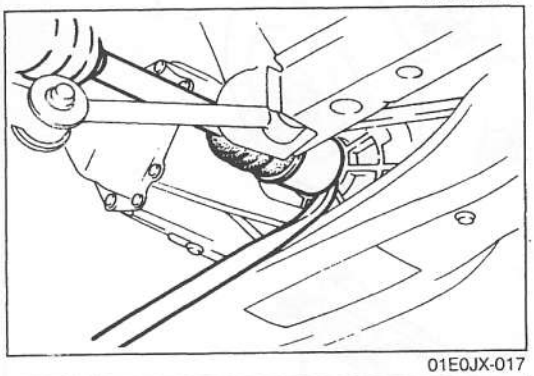
Removal Note
Driveshaft
1. Remove the ball joint clinch bolt.



01E0JX-016

Caution
- **Wrap a rag around the ball joint dust boot to protect it from damage.**

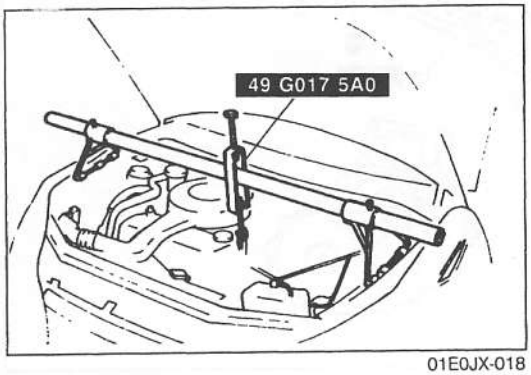
2. Pry the lower arm from the knuckle with a pry bar.



01E0JX-017

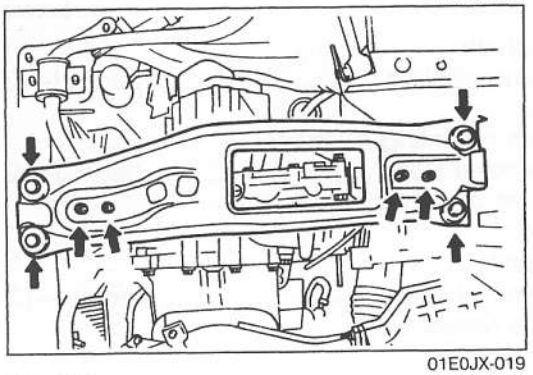
Caution
- **Do not shock the tripod joint when removing the driveshaft.**

3. Separate the driveshaft from the transaxle by prying with a bar inserted between the outer ring and the transaxle.
4. Suspend the driveshaft with a rope.



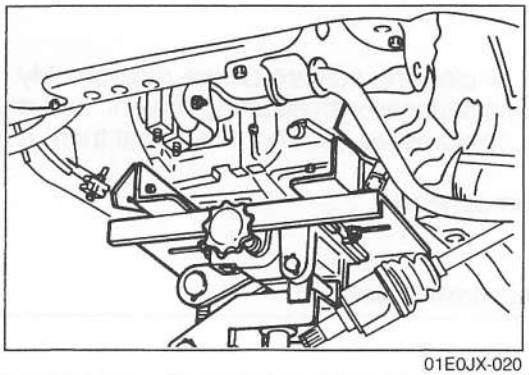
01E0JX-018

Engine mounting member
1. Suspend the engine with the **SST**.

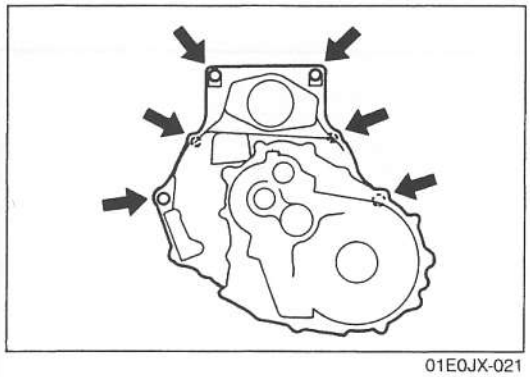


01E0JX-019

2. Remove the bolts and nuts shown, and remove the engine mounting member.



01E0JX-020



01E0JX-021

Transaxle

1. Loosen the **SST (engine support)** and lean the engine toward the transaxle.
2. Support the transaxle with a jack.
3. Remove the transaxle mounting bolts.
4. Remove the transaxle.

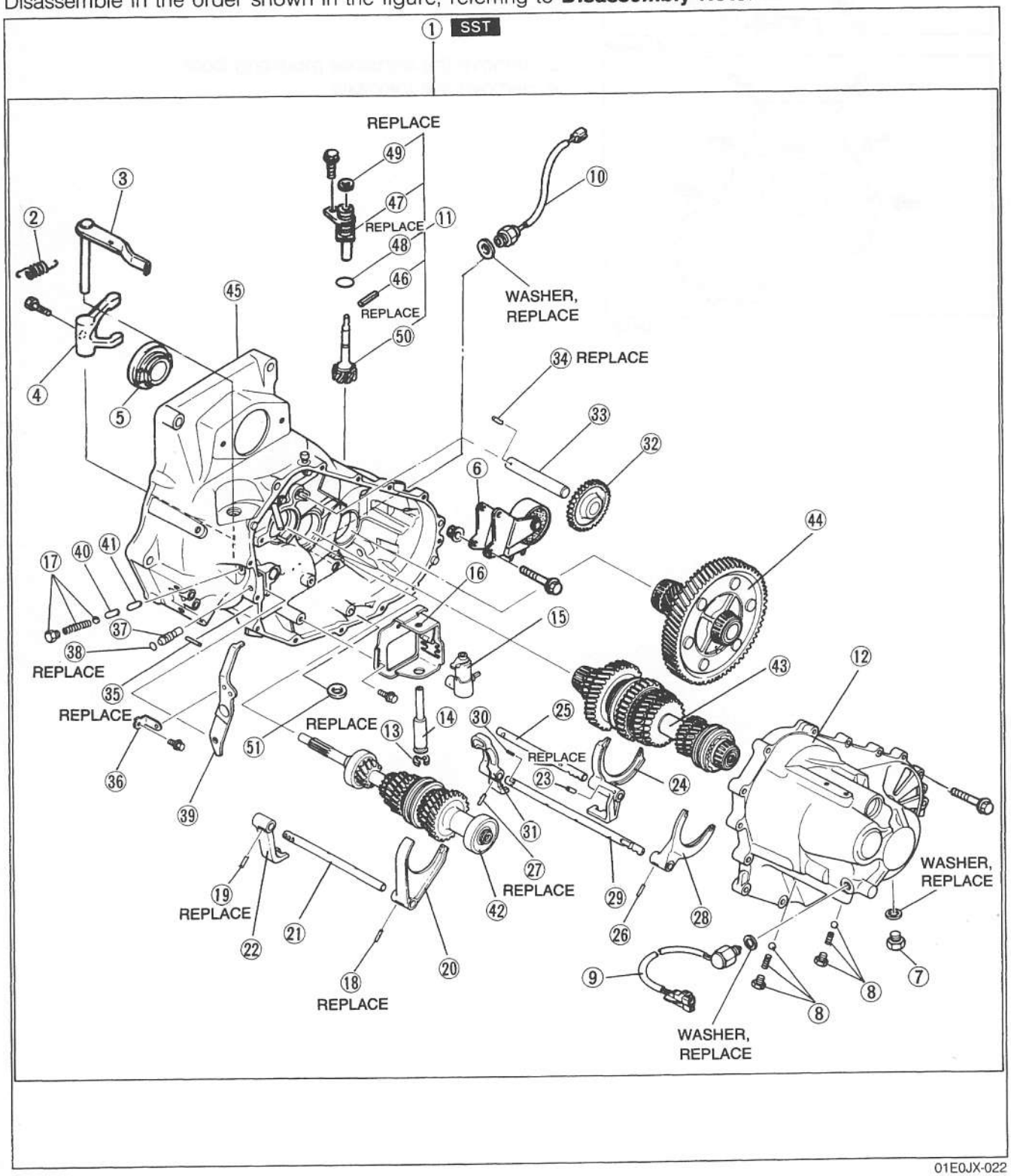
DISASSEMBLY

Precaution

1. Clean the transaxle exterior thoroughly with a steam cleaner or cleaning solvent before disassembly.
2. Clean the removed parts (except sealed bearings) and all sealing surfaces with cleaning solvent, and dry with compressed air. Clean out all holes and passages with a compressed air, and check that there are no obstructions.
3. Wear eye protection when using compressed air to clean components.

Housing Parts

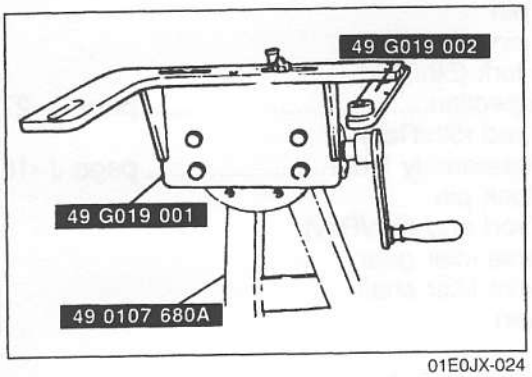
Disassemble in the order shown in the figure, referring to **Disassembly Note**.



01E0JX-022

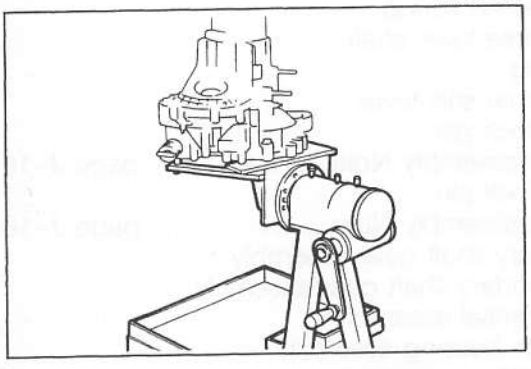
1. Transaxle
   Disassembly Note ..... page J–16
2. Return spring
3. Clutch lever
4. Clutch release fork
5. Clutch release collar
   Inspection ..... page J–27
6. Engine mount No.1
7. Drain plug
8. Plug, spring, steel ball
9. Back-up light switch
10. Neutral switch
11. Speedometer driven gear assembly
12. Transaxle case assembly
13. Retaining ring
14. Crank lever shaft
15. Crank lever assembly
16. Base plate unit
17. Plug, spring, steel ball
18. Roll pin
19. Roll pin
20. Shift fork (3rd/4th)
    Inspection ..... page J–27
21. Shift rod (3rd/4th)
    Disassembly Note ..... page J–16
22. Shift rod end (3rd/4th)
23. Roll pin
24. Shift fork (1st/2nd)
    Inspection ..... page J–27
25. Shift rod (1st/2nd)
    Disassembly Note ..... page J–16
26. Roll pin
27. Roll pin
28. Shift fork (5th/Rev)
    Inspection ..... page J–27
29. Shift rod (5th/Rev)
    Disassembly Note ..... page J–16
30. Interlock pin
31. Shift rod end (5th/Rev)
32. Reverse idler gear
33. Reverse idler shaft
34. Roll pin
35. Pin
36. Lever set spring
37. Reverse lever shaft
38. O-ring
39. Reverse shift lever
40. Interlock pin
    Disassembly Note ..... page J–16
41. Interlock pin
    Disassembly Note ..... page J–16
42. Primary shaft gear assembly
43. Secondary shaft gear assembly
44. Differential assembly
45. Clutch housing assembly
46. Roll pin
47. Speedometer gear sleeve
48. O-ring
49. Oil seal
    Disassembly Note ..... page J–16
50. Driven gear
51. Magnet

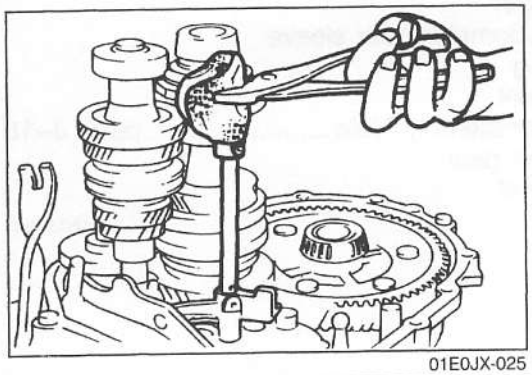
01E0JX-023



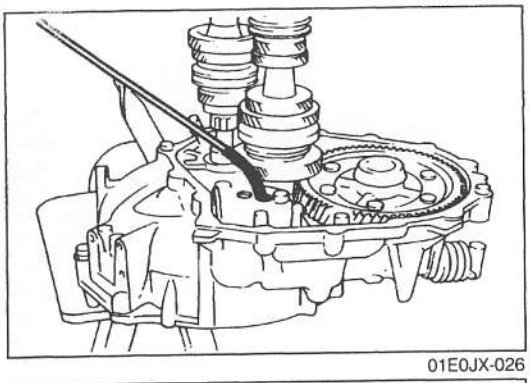
01E0JX-024

Disassembly Note
Transaxle
Mount the transaxle on the **SST**.

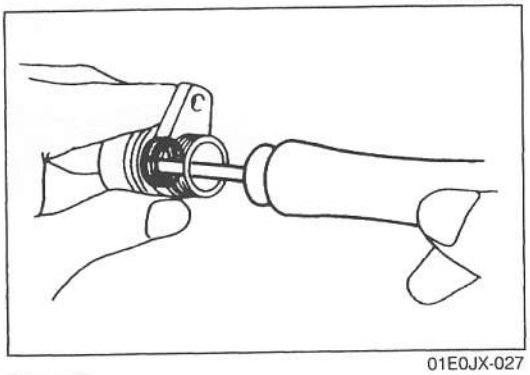



01E0JX-025

Shift rod
Wrap the shift rod with a rag and turn it with pliers while pulling it out.


01E0JX-026

Interlock pin
Remove the interlock pin with a magnet.

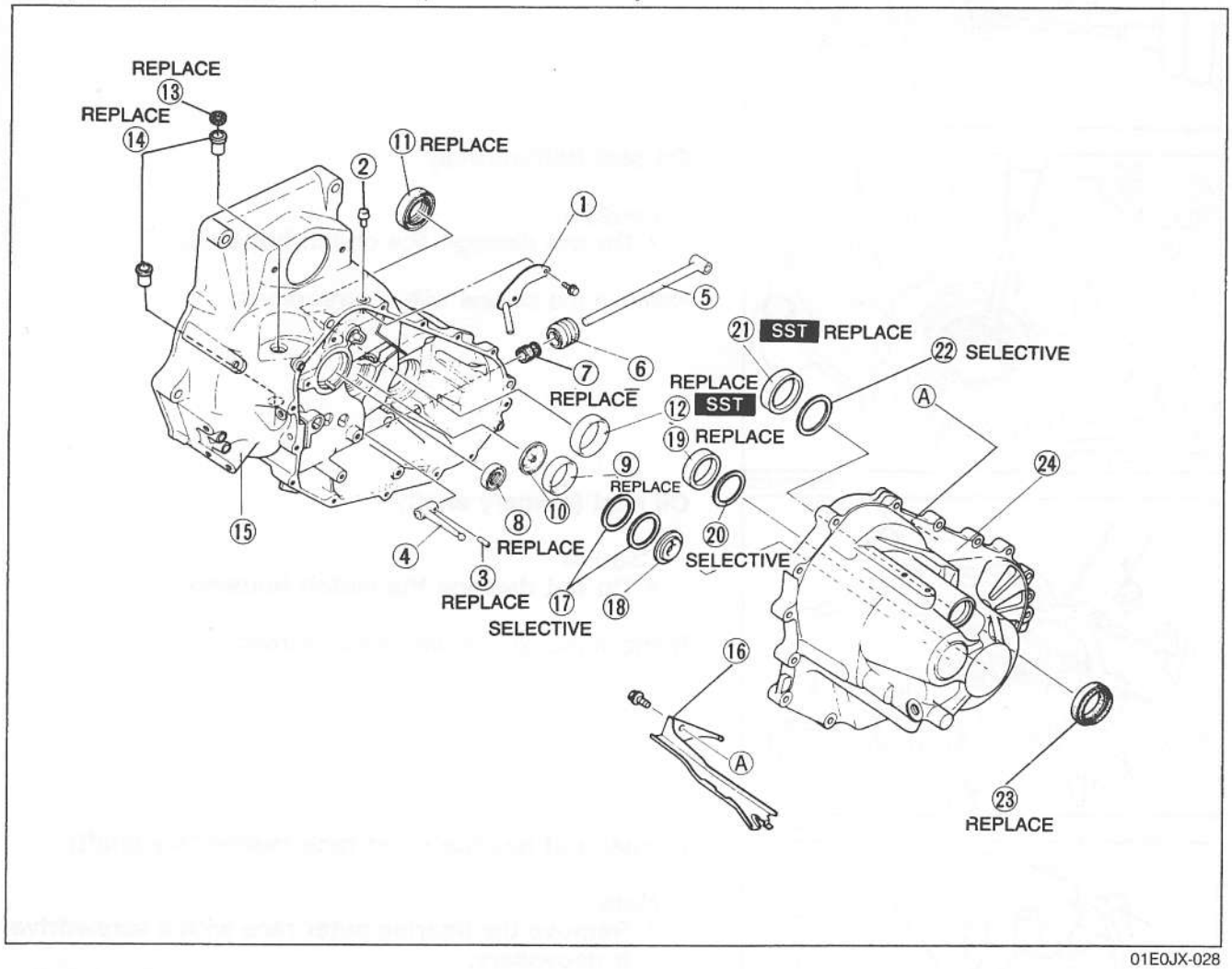

01E0JX-027

Oil seal
Remove the speedometer driven gear oil seal as shown in the figure.

Clutch Housing and Transaxle Case Components

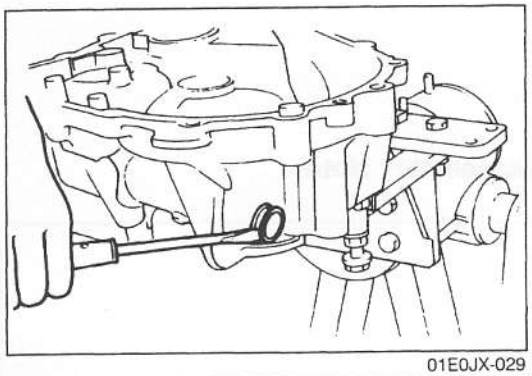
Caution
- **Do not remove an oil seal if not necessary.**

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



01E0JX-028

1. Baffle plate
2. Bleeder
3. Roll pin
4. Change arm
5. Change rod assembly
6. Boot
7. Oil seal (change rod)
   Disassembly Note ..... page J–18
8. Oil seal (primary shaft)
   Disassembly Note ..... page J–18
9. Bearing outer race (secondary shaft)
   Disassembly Note ..... page J–18
10. Funnel
    Disassembly Note ..... page J–18
11. Oil seal (differential)
    Disassembly Note ..... page J–18
12. Bearing outer race (differential)
    Disassembly Note ..... page J–19
13. Oil seal
14. Bushing
15. Clutch housing
16. Oil passage
17. Adjustment shim
18. Funnel
    Disassembly Note ..... page J–19
19. Bearing outer race
    Disassembly Note ..... page J–20
20. Adjustment shim (secondary shaft)
    Disassembly Note ..... page J–20
21. Bearing outer race (differential)
    Disassembly Note ..... page J–19
22. Adjustment shim
23. Oil seal (differential)
    Disassembly Note ..... page J–18
24. Transaxle case

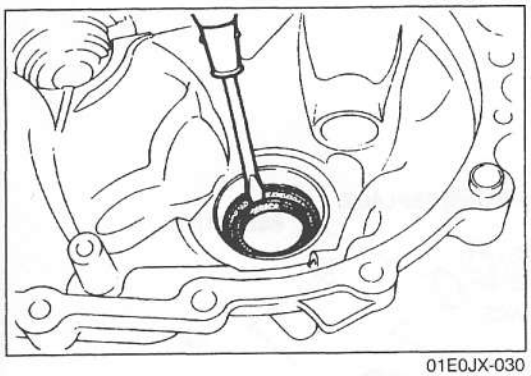


01E0JX-029

Disassembly Note
Oil seal (change rod)

Caution
- **Do not damage the clutch housing.**

Remove the oil seal with a screwdriver.

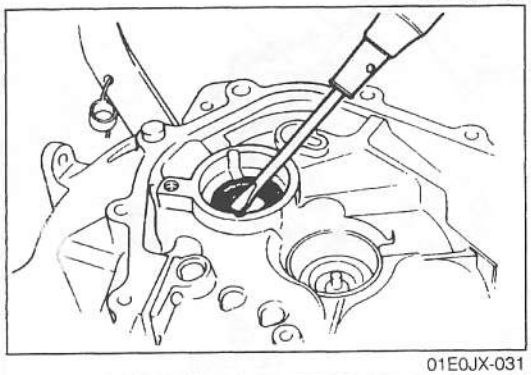


01E0JX-030

Oil seal (differential)

Caution
- **Do not damage the clutch housing.**

Remove the oil seal with a screwdriver.

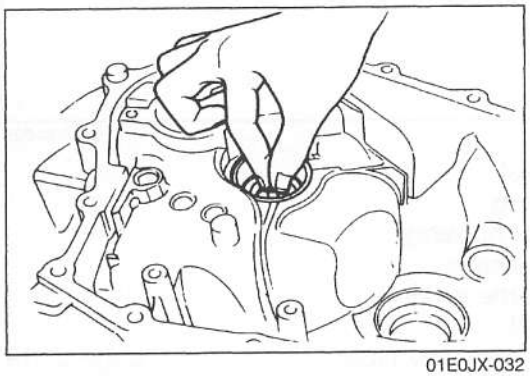


01E0JX-031

Oil seal (primary shaft)

Caution
- **Do not damage the clutch housing.**

Remove the oil seal with a screwdriver.

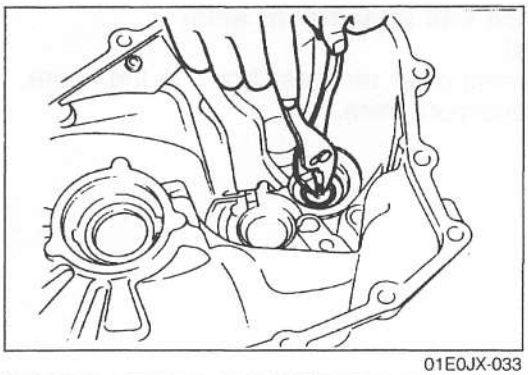


01E0JX-032

Funnel and bearing outer race (secondary shaft)

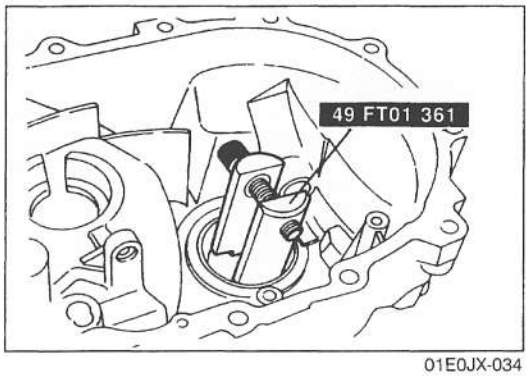
Note
- **Remove the bearing outer race with a screwdriver if necessary.**
  1) **Insert a screwdriver between the clutch housing and bearing outer race.**
  2) **Pry the bearing outer race free.**

Remove the bearing outer race by lifting out the funnel and race together.



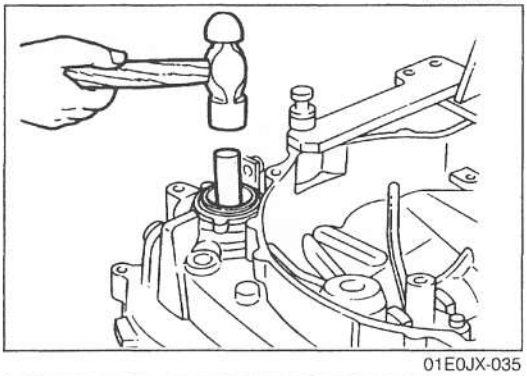
01E0JX-033

Funnel
Remove the funnel with pliers.



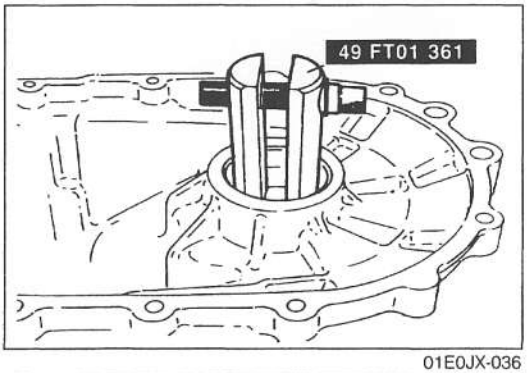
01E0JX-034

Bearing outer race (differential)
1. Install the **SST** to the bearing outer race.



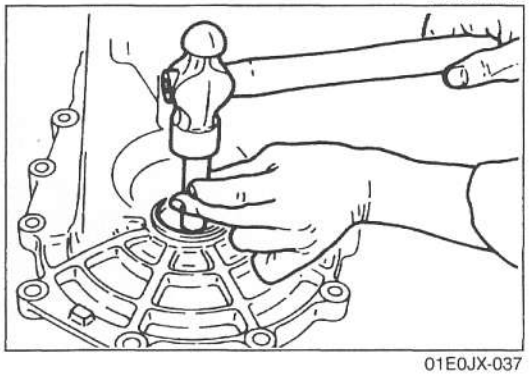
01E0JX-035

2. Turn over the clutch housing.
3. Remove the bearing outer race with a suitable pipe.



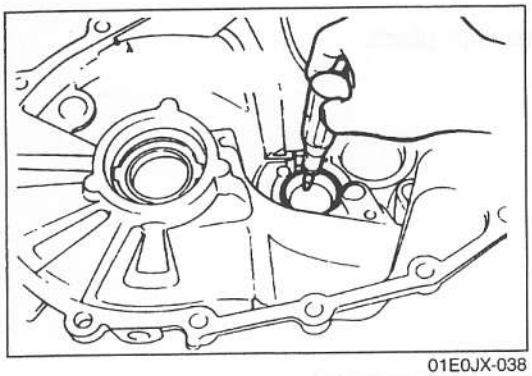
01E0JX-036

Bearing outer race and adjustment shim (differential)
1. Install the **SST** to the bearing outer race.



01E0JX-037

2. Turn over the clutch housing.
3. Tap the **SST** with a pipe through the driveshaft hole to remove the bearing outer race.

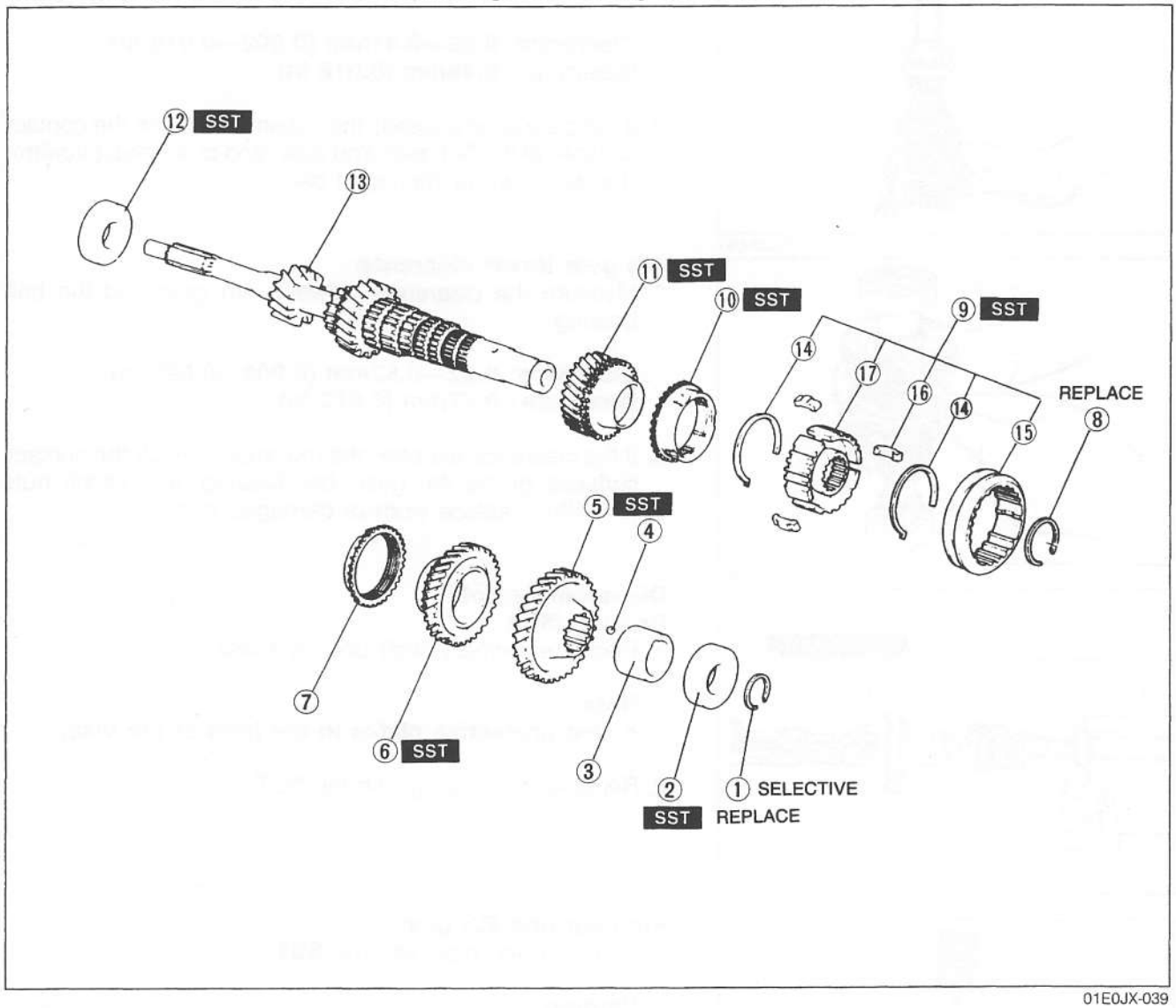

01E0JX-038

Bearing outer race and adjustment shim (secondary shaft)

1. Pull out the bearing outer race as shown in the figure.
2. Remove the adjustment shim.

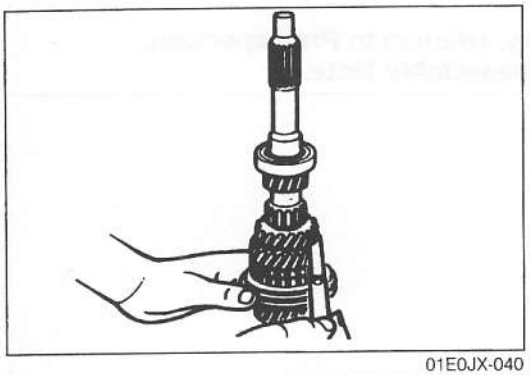
Primary Shaft Assembly

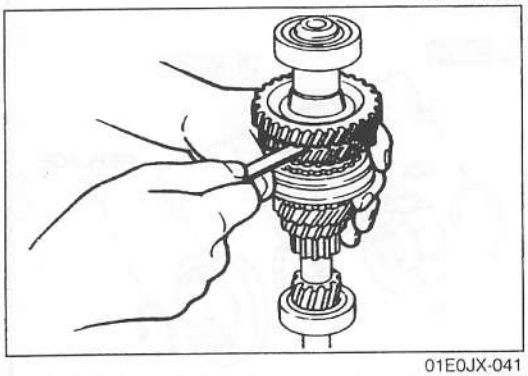
1. Measure the thrust clearances of all gears before disassembly, referring to **Preinspection**.
2. Disassemble in the order shown in the figure, referring to **Disassembly Note**.

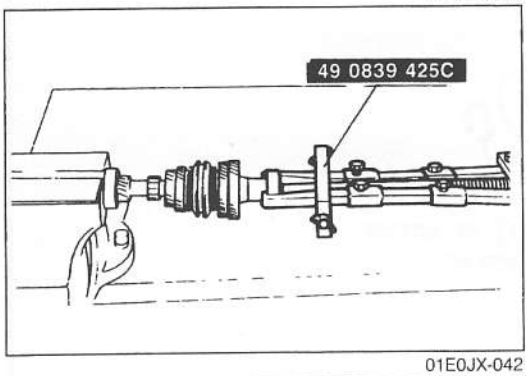


01E0JX-039

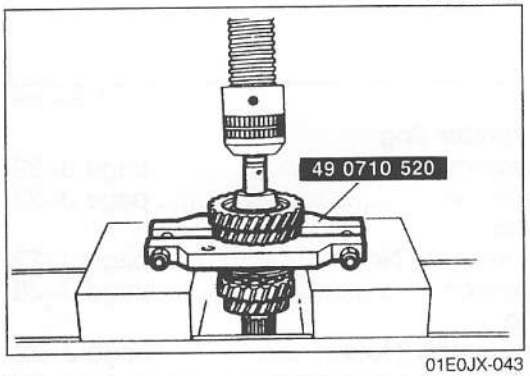
1. Retaining ring
2. Bearing (5th)
   - Disassembly Note ..... page J–22
   - Inspection ..... page J–28
3. Spacer
4. Steel ball
5. 5th gear
   - Disassembly Note ..... page J–22
   - Inspect gear teeth for damage, wear, and cracks
6. 4th gear
   - Disassembly Note ..... page J–22
   - Inspection ..... page J–28
7. Synchronizer ring
   - Inspection ..... page J–27
8. Retaining ring
9. Clutch hub assembly (3rd/4th)
   - Disassembly Note ..... page J–22
   - Inspection ..... page J–29
10. Synchronizer ring
    - Disassembly Note ..... page J–22
    - Inspection ..... page J–27
11. 3rd gear
    - Disassembly Note ..... page J–22
    - Inspection ..... page J–28
12. Bearing
    - Disassembly Note ..... page J–22
    - Inspection ..... page J–28
13. Primary shaft
    - Inspection ..... page J–28
14. Synchronizer spring
15. Clutch hub sleeve (3rd/4th)
    - Inspection ..... page J–27
16. Synchronizer key
17. Clutch hub (3rd/4th)


01E0JX-040

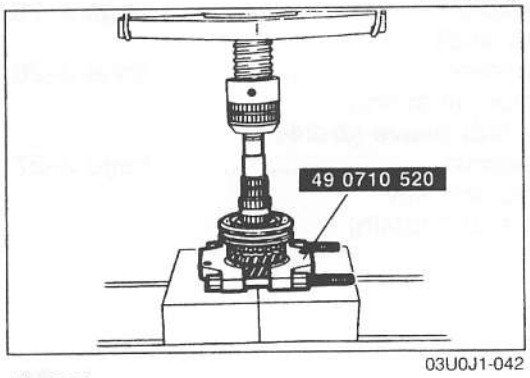

01E0JX-041



01E0JX-042



01E0JX-043



03U0J1-042

Preinspection
3rd gear thrust clearance
1. Measure the clearance between 3rd gear and 2nd gear.

Clearance: 0.06—0.41mm (0.002—0.016 in)
Maximum : 0.46mm (0.018 in)

2. If the clearance exceeds the maximum, check the contact surfaces of the 3rd gear, 2nd gear, and clutch hub (3rd/4th). Replace worn or damaged parts.

4th gear thrust clearance
1. Measure the clearance between 4th gear and the ball bearing.

Clearance: 0.22—0.52mm (0.009—0.020 in)
Maximum : 0.57mm (0.022 in)

2. If the clearance exceeds the maximum, check the contact surfaces of the 4th gear, ball bearing, and clutch hub (3rd/4th). Replace worn or damaged parts.

Disassembly Note
Bearing (5th)
1. Place the primary shaft gear in a vise.

Note
- **Use protective plates in the jaws of the vise.**

2. Remove the bearing with the **SST**.

4th gear and 5th gear
1. Install the 4th gear with the **SST**.

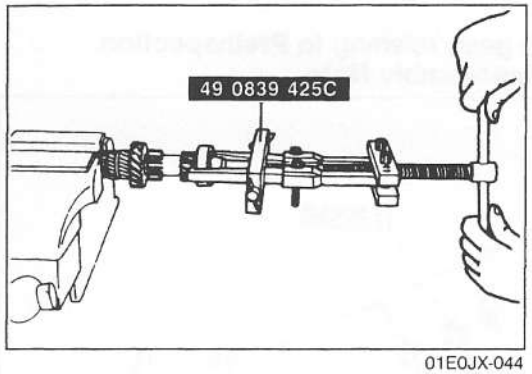
Caution
- **Hold the shaft with one hand so that it does not fall.**

2. Remove the 4th gear and 5th gear with the **SST**.

Clutch hub assembly (3rd/4th), synchronizer ring (3rd) and 3rd gear

Caution
- **Hold the shaft with one hand so that it does not fall.**

1. Remove the retaining ring.
2. Remove the clutch hub assembly (3rd/4th), synchronizer ring (3rd) and 3rd gear with the **SST**.



01E0JX-044

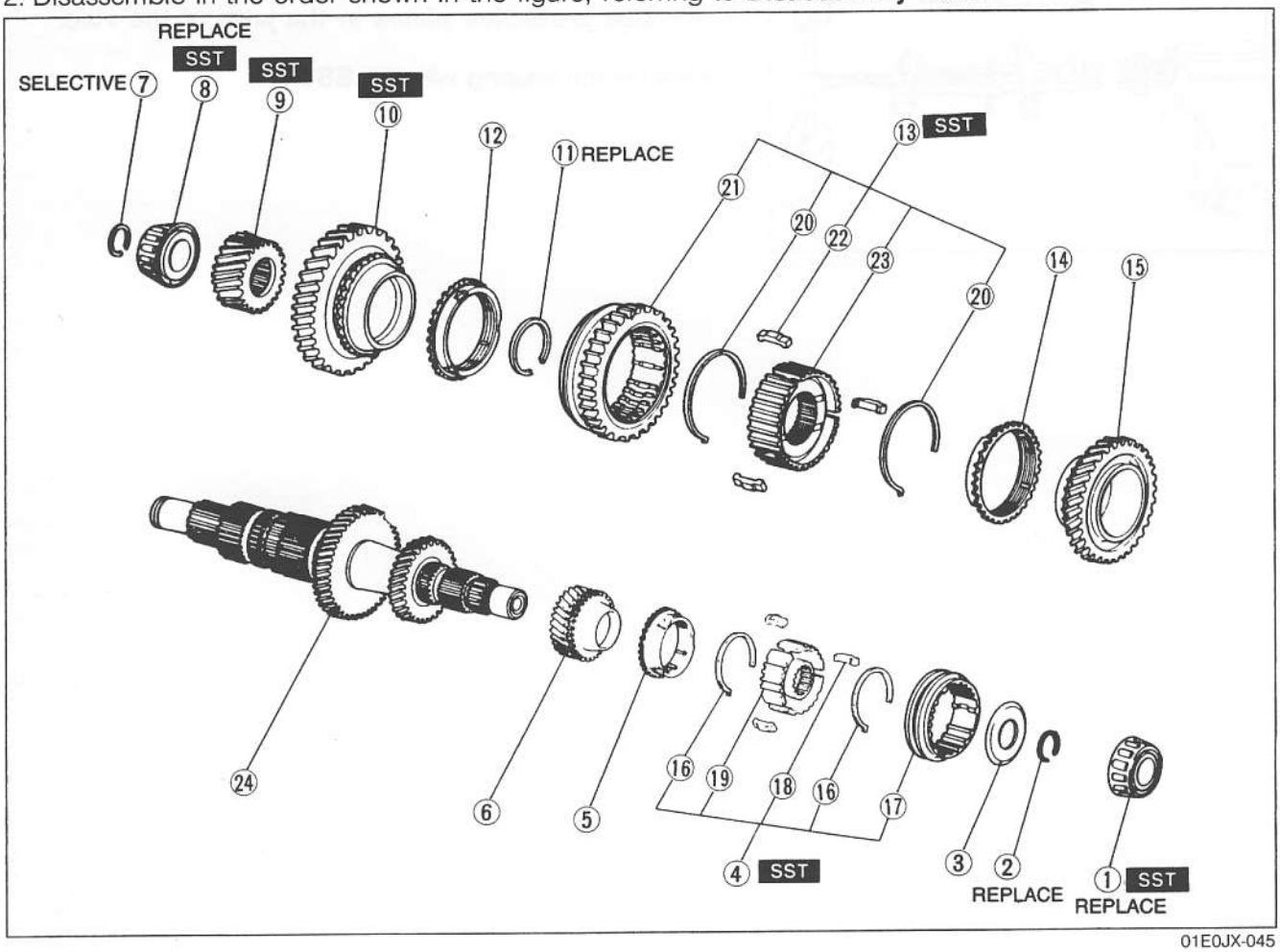
Bearing

Note
- **Use protective plates in the jaws of the vise.**

Remove the bearing with the **SST**.

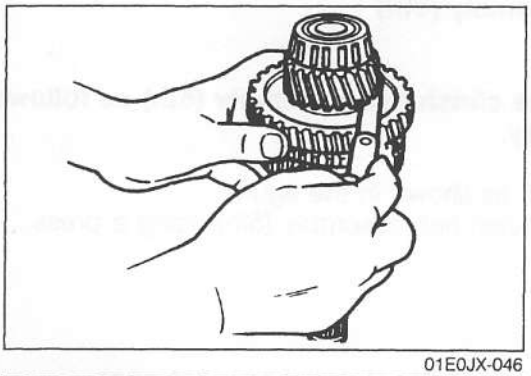
Secondary Shaft Assembly

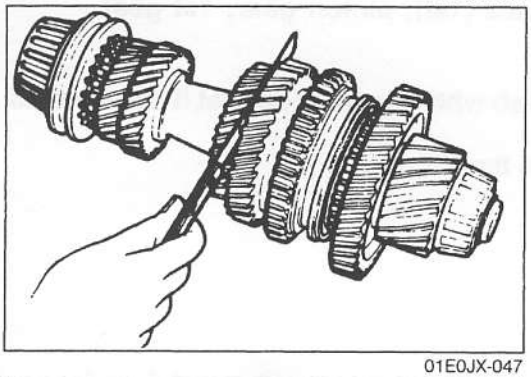
1. Measure the thrust clearance of 1st gear, 2nd gear, and 5th gear, referring to **Preinspection**.
2. Disassemble in the order shown in the figure, referring to **Disassembly Note**.

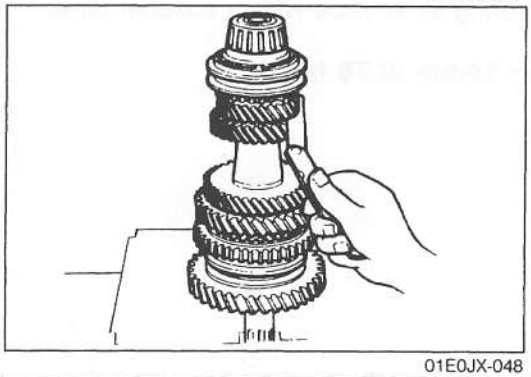


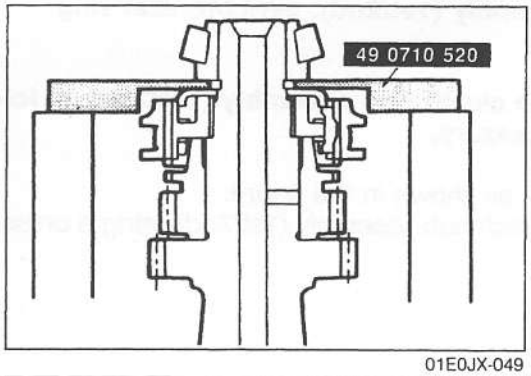
01E0JX-045

1. Bearing inner race (5th)
   - Disassembly Note ..... page J–25
   - Inspect for damage and rough rotation
2. Retaining ring
3. Washer
4. Clutch hub assembly (5th)
   - Disassembly Note ..... page J–26
   - Inspection ..... page J–29
5. Synchronizer ring
   - Inspection ..... page J–27
6. 5th gear
   - Inspection ..... page J–29
7. Retaining ring
8. Bearing inner race (1st)
   - Disassembly Note ..... page J–26
   - Inspect for damage and rough rotation
9. Pinion gear
   - Disassembly Note ..... page J–26
   - Inspect gear teeth for damage, wear, and cracks
10. 1st gear
    - Disassembly Note ..... page J–26
    - Inspection ..... page J–29
11. Retaining ring
12. Synchronizer ring
    - Disassembly Note ..... page J–26
    - Inspection ..... page J–27
13. Clutch hub assembly (1st/2nd)
    - Disassembly Note ..... page J–26
    - Inspection ..... page J–29
14. Synchronizer ring
    - Disassembly ..... page J–26
    - Inspection ..... page J–27
15. 2nd gear
    - Inspection ..... page J–29
16. Synchronizer spring
17. Clutch hub sleeve (5th)
    - Inspection ..... page J–27
18. Synchronizer key
19. Clutch hub (5th)
20. Synchronizer spring
21. Clutch hub sleeve (1st/2nd)
    - Inspection ..... page J–27
22. Synchronizer key
23. Clutch hub (1st/2nd)
24. Secondary shaft
    - Inspection ..... page J–29

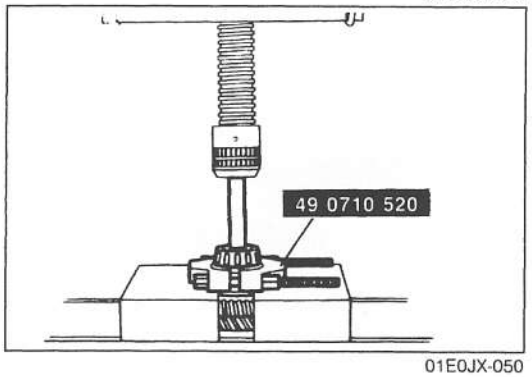

01E0JX-046


01E0JX-047


01E0JX-048



01E0JX-049



01E0JX-050

Preinspection

1st gear thrust clearance

1. Measure the clearance between 1st gear and the pinion gear.

   Clearance: 0.22—0.62mm (0.008—0.024 in)
   Maximum: 0.67mm (0.026 in)

2. If the clearance exceeds the maximum, check the contact surfaces of the 1st gear, pinion gear of the secondary shaft gear, and clutch hub assembly (1st/2nd). Replace worn or damaged parts.

2nd gear thrust clearance

1. Measure the clearance between 2nd gear and secondary 3rd gear.

   Clearance: 0.06—0.21mm (0.002—0.008 in)
   Maximum: 0.26mm (0.010 in)

2. If the clearance exceeds the maximum, check the contact surfaces of the 2nd gear, secondary 3rd gear, and clutch hub assembly (1st/2nd). Replace worn or damaged parts.

5th gear thrust clearance

1. Measure the clearance between 5th gear and secondary 4th gear.

   Clearance: 0.06—0.21mm (0.002—0.008 in)
   Maximum: 0.26mm (0.010 in)

2. If the clearance exceeds the maximum, check the contact surfaces of the 5th gear, secondary 4th gear, and clutch hub assembly (5th). Replace worn or damaged parts.

Disassembly Note

Bearing inner race (5th)

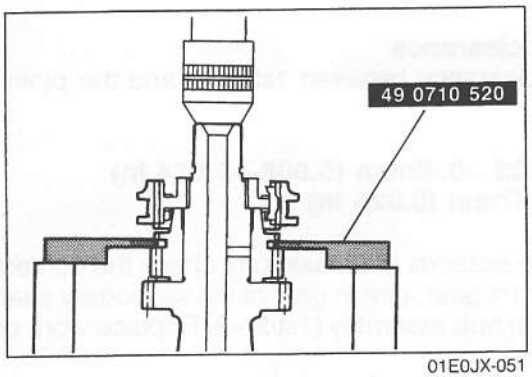
Caution

- **Hold the shaft with one hand so that it does not fall.**

1. Set the **SST** to the 5th gear.

2. Remove the bearing outer race with a suitable pipe.

   Pipe diameter: 20mm (0.79 in)

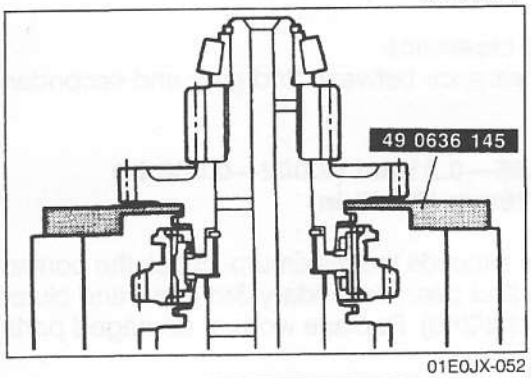


01E0JX-051

Clutch hub assembly (5th)

Note
- **Remove the clutch hub assembly (5th) as follows if necessary.**

1. Install the **SST** as shown in the figure.
2. Remove the clutch hub assembly (5th) using a press.

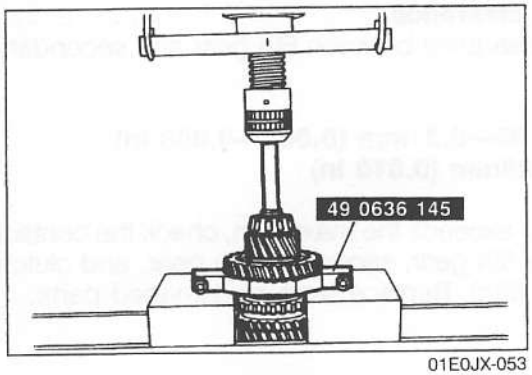


01E0JX-052

Bearing inner race (1st), pinion gear, 1st gear

Caution
- **Hold the shaft with one hand so that it does not fall.**

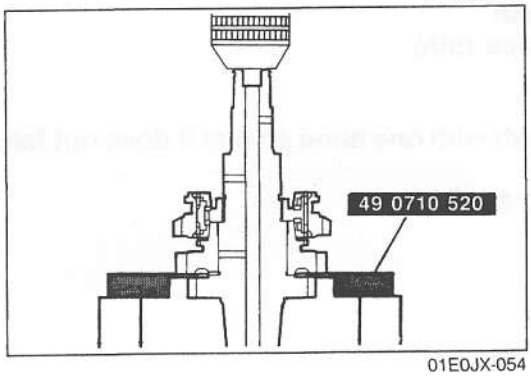
1. Set the **SST** to the 1st gear.



01E0JX-053

2. Remove the bearing inner race with a suitable pipe.

Pipe diameter: 20mm (0.79 in)

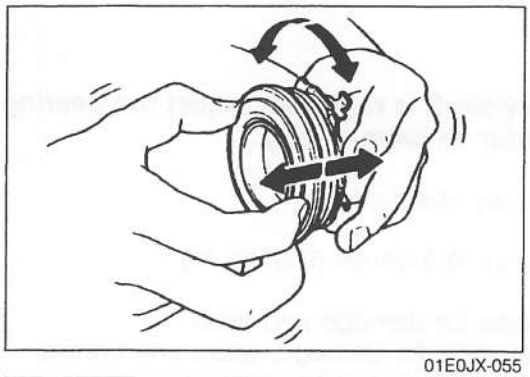


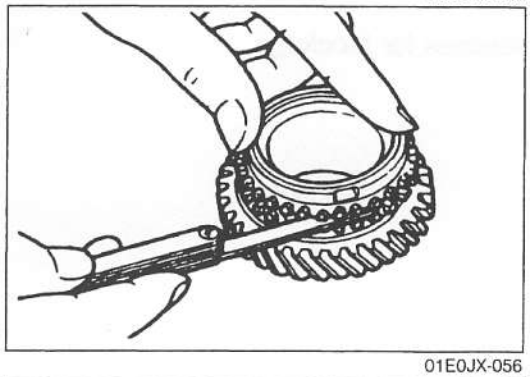
01E0JX-054

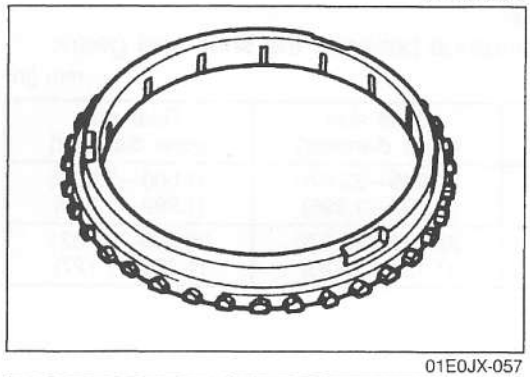
Clutch hub assembly (1st/2nd), synchronizer ring

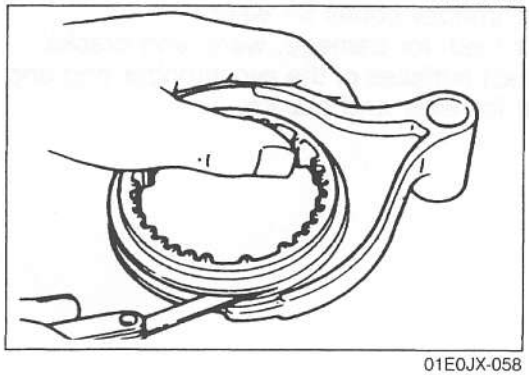
Note
- **Remove the clutch hub assembly (1st/2nd) as follows if necessary.**

1. Install the **SST** as shown in the figure.
2. Remove the clutch hub assembly (1st/2nd) using a press.


01E0JX-055


01E0JX-056


01E0JX-057


01E0JX-058

INSPECTION

Inspect all parts and repair or replace as necessary.

Clutch release collar

Inspect the clutch release collar for roughness or noise while turning.

Synchronizer ring

Note

- **Set the synchronizer ring squarely in the gear; then measure around the circumference.**

1. Measure the clearance between the synchronizer ring and flank surface of the gear.

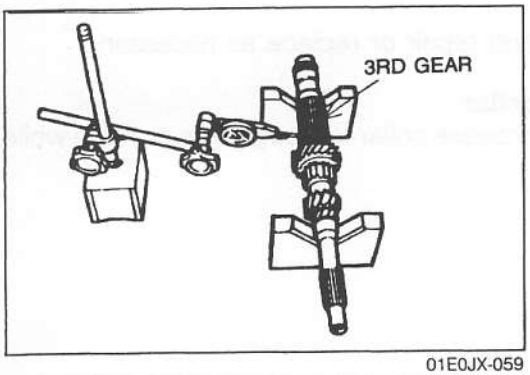
Standard clearance: 1.5mm (0.059 in)
Minimum: 0.8mm (0.015 in)

2. Inspect the synchronizer ring teeth for damage, wear, and cracks.
3. Inspect the taper surface for wear or cracks.

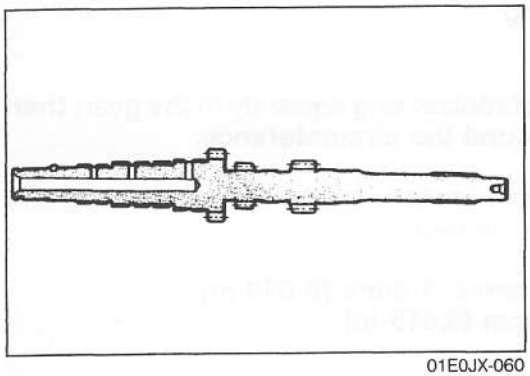
Shift fork, clutch hub sleeve

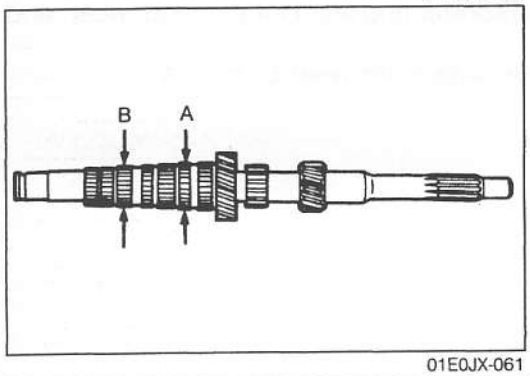
1. Measure the clearance between the shift fork and clutch hub sleeve groove.

Standard clealance
(1st/2nd): 0.100—0.358mm (0.004—0.014 in)
(3rd/4th): 0.150—0.458mm (0.006—0.018 in)
(5th) : 0.150—0.458mm (0.006—0.018 in)
Maximum (1st/2nd): 0.408mm (0.016 in)
(3rd/4th): 0.508mm (0.020 in)
(5th) : 0.508mm (0.020 in)

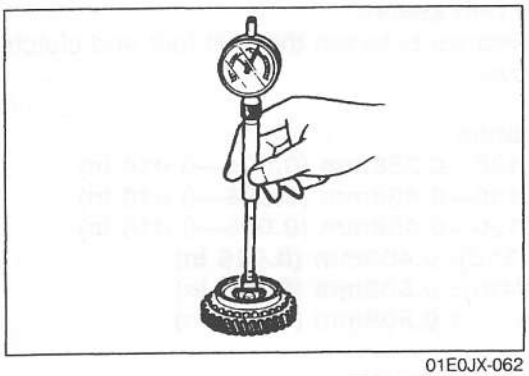


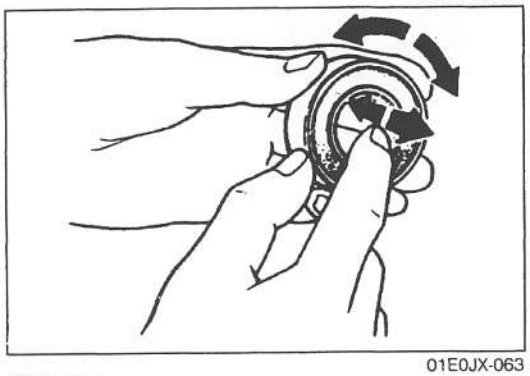
01E0JX-059


01E0JX-060



01E0JX-061


01E0JX-062


01E0JX-063

Primary Shaft

Note
- **If the primary shaft is replaced, adjust the bearing preload. (Refer to page J–39.)**

1. Inspect the primary shaft runout.

   Maximum runout: 0.015mm (0.0006 in)

2. Inspect the splines for damage and wear.
3. Inspect the gear teeth for damage, wear, and cracks.
4. Inspect the oil passage for blockage.

3rd gear, 4th gear

1. Measure the clearance between the shaft and gears.

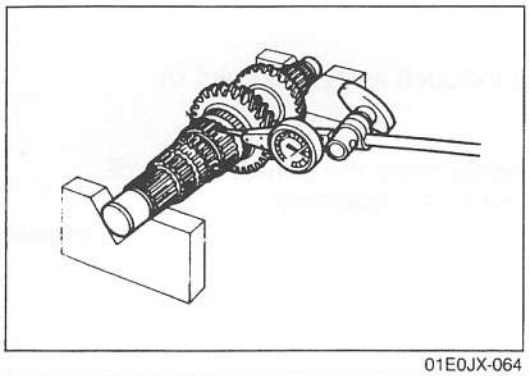
mm (in)

	Shaft side (outer diameter)	Gear side (inner diameter)
3rd gear side A	32.945—32.970 (1.297—1.298)	33.000—33.025 (1.299—1.300)
4th gear side B	28.545—28.570 (1.123—1.125)	28.600—28.621 (1.126—1.127)

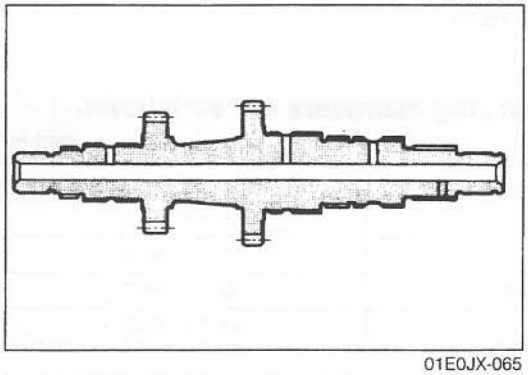
2. Inspect the synchronizer cones for wear.
3. Inspect the gear teeth for damage, wear, and cracks.
4. Inspect the contact surfaces of the synchronizer ring and the 3rd/4th gear for wear and cracks.

Bearing

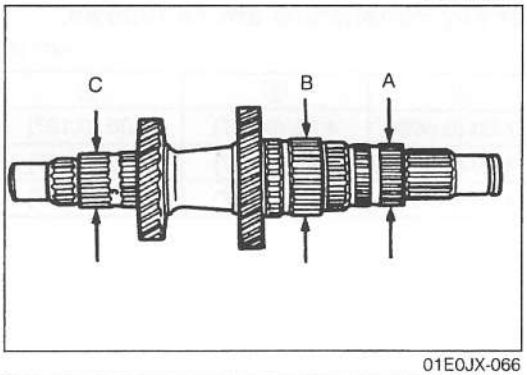
Inspect the bearing for damage or rough rotation.



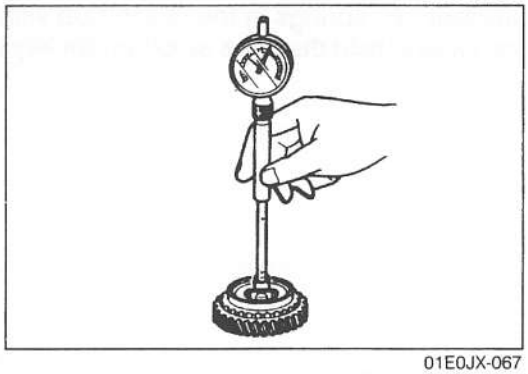
01E0JX-064



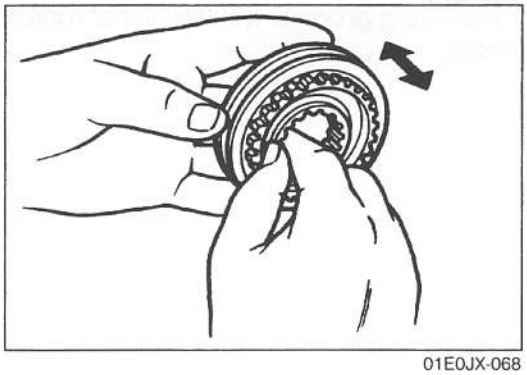
01E0JX-065



01E0JX-066



01E0JX-067



01E0JX-068

Secondary Shaft

Note
- **If the secondary shaft is replaced, adjust the bearing preload. (Refer to page J–39.)**

1. Inspect the secondary shaft runout.

   Maximum runout: 0.015mm (0.001 in)

2. Inspect the splines for damage and wear.
3. Inspect the gear teeth for damage, wear, and cracks.
4. Inspect the oil passage for blockage.

1st gear, 2nd gear, 5th gear

1. Measure the clearance between the shaft and the gear.

mm (in)

	Shaft side (outer diameter)	Gear side (inner diameter)
1st gear side A	32.945—32.970 (1.297—1.298)	33.000—33.025 (1.299—1.300)
2nd gear side B	39.945—39.970 (1.573—1.574)	40.000—40.025 (1.575—1.576)
5th gear side C	28.545—28.570 (1.124—1.125)	28.600—28.621 (1.126—1.127)

2. Inspect the synchronizer cones for wear.
3. Inspect the gear teeth for damage, wear, and cracks.
4. Inspect the contact surfaces of the synchronizer ring and the 1st/2nd and 5th gear for wear and cracks.

Clutch hub assembly

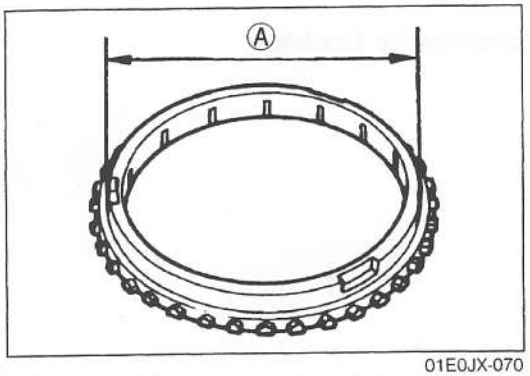
1. Inspect the clutch hub sleeve and hub operation.
2. Inspect the gear teeth for damage, wear, and cracks.
3. Inspect the synchronizer key for damage, wear, and cracks.

ASSEMBLY

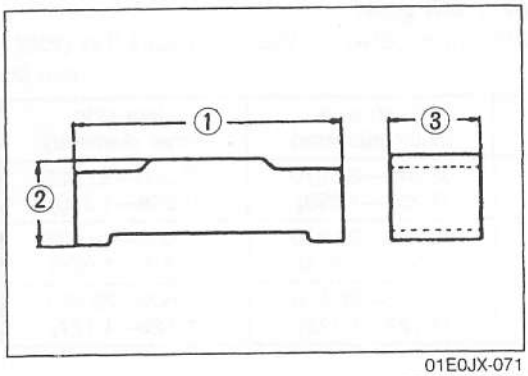
Precaution

1. All O-rings and gaskets must be replaced with the new ones included in the overhaul kit.
2. Verify that all parts are completely clean before assembly.
3. Assemble parts within 10 minutes after applying sealant.
   Allow all sealant to cure at least 30 minutes after assembly before filling the transaxle with oil.
4. A bearing outer race and bearing inner race must be replaced as an assembly.

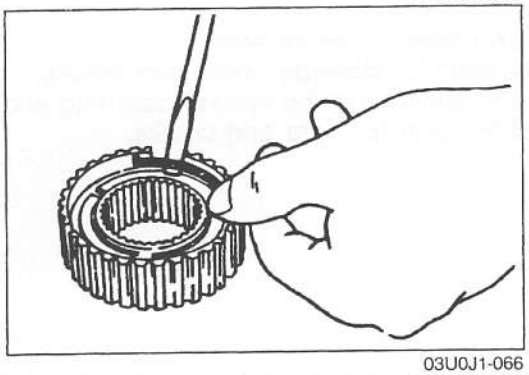
01E0JX-069



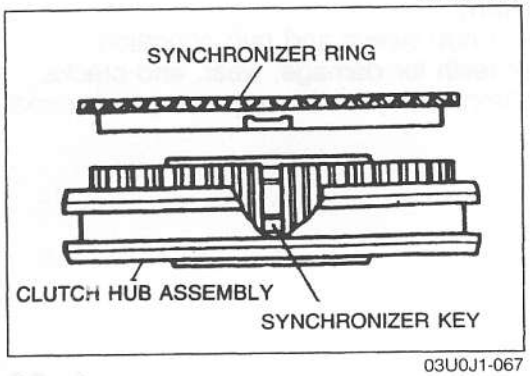
01E0JX-070



01E0JX-071



03U0J1-066



03U0J1-067

Clutch hub assembly

Note

- **Synchronizer ring diameters are as follows.**

mm (in)

	Ⓐ
1st	55.7 (2.193)
2nd	55.7 (2.193)
3rd and 4th	49.7 (1.957)
5th	43.7 (1.720)

- **Synchronizer key dimensions are as follows.**

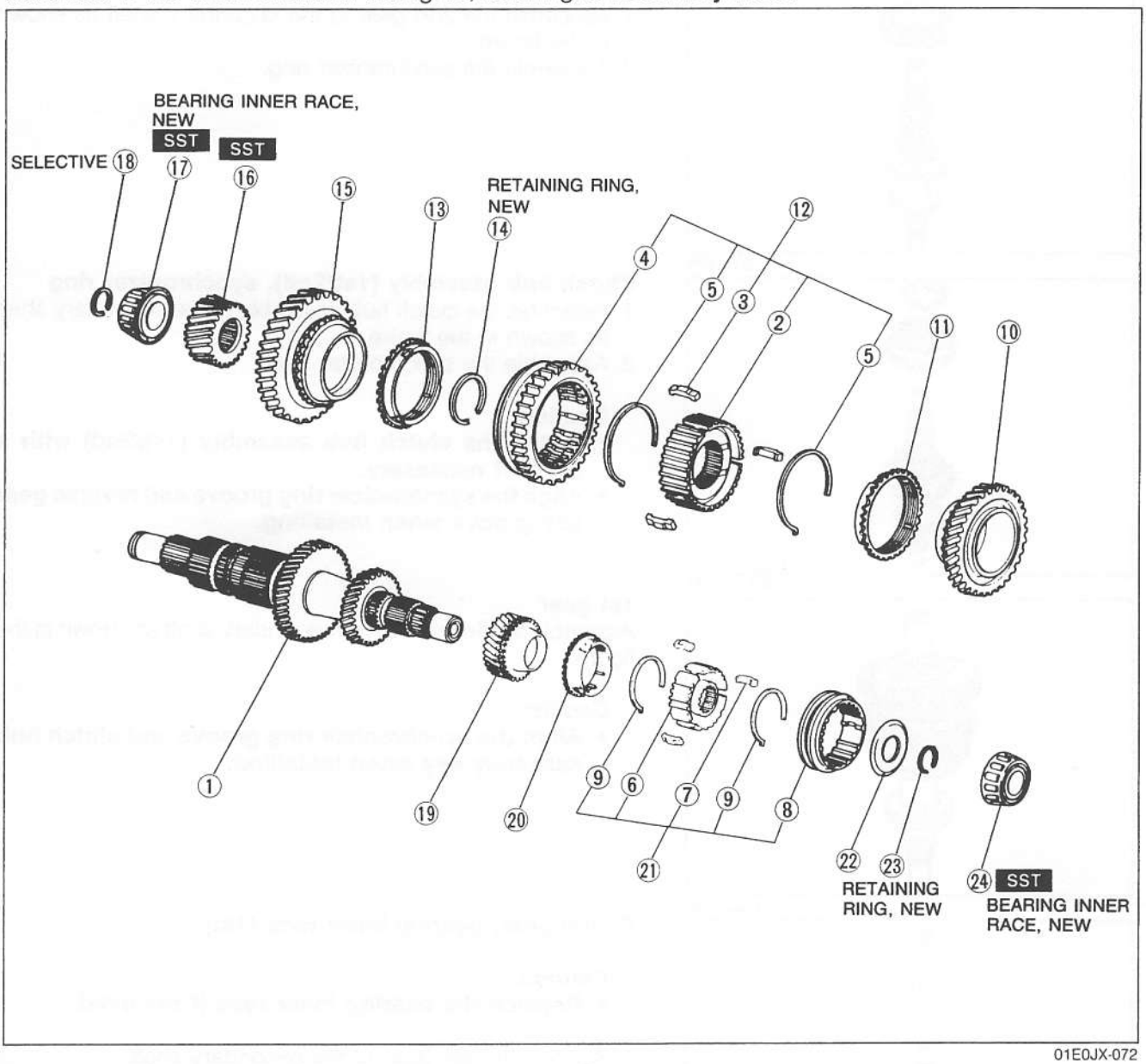
mm (in)

	①	②	③
1st/2nd	17.00 (0.669)	4.25 (0.167)	5.00 (0.197)
3rd/4th	14.00 (0.551)	4.25 (0.167)	5.00 (0.197)
5th/Rev	14.00 (0.551)	4.25 (0.167)	5.00 (0.197)

1. Install the synchronizer key springs in the clutch hub with the hooks in the grooves to hold the three synchronizer keys in place.

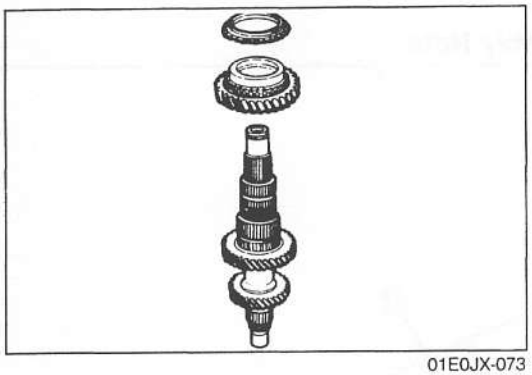
2. Align the synchronizer ring grooves with the synchronizer key during assembly.

Secondary Shaft Assembly
Assemble in the order shown in the figure, referring to **Assembly Note**.



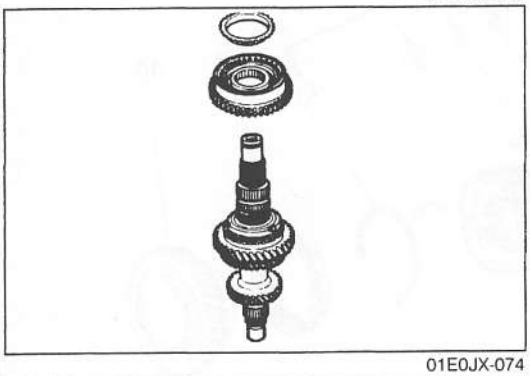
01E0JX-072

1. Secondary shaft
2. Clutch hub (1st/2nd)
3. Synchronizer key
4. Clutch hub sleeve
5. Synchronizer key spring
6. Clutch hub
7. Synchronizer key
8. Clutch hub sleeve (5th)
9. Synchronizer key spring
10. 2nd gear
    Assembly Note..... page J–32
11. Synchronizer ring
    Assembly Note..... page J–32
12. Clutch hub assembly (1st/2nd)
    Assembly Note..... page J–32
13. Synchronizer ring
    Assembly Note..... page J–32
14. Retaining ring
15. 1st gear
    Assembly Note..... page J–32
16. Pinion gear
    Assembly Note..... page J–32
17. Bearing inner race (1st)
    Assembly Note..... page J–32
18. Retaining ring
    Assembly Note..... page J–33
19. 5th gear
20. Synchronizer ring
21. Clutch hub assembly (5th)
    Assembly Note..... page J–33
22. Washer
23. Retaining ring
24. Bearing inner race (5th)
    Assembly Note..... page J–33



01E0JX-073

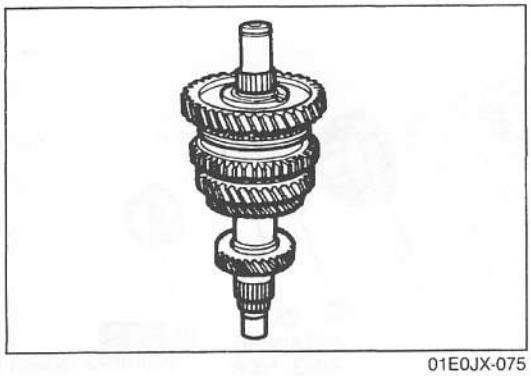
Assembly note
2nd gear, synchronizer ring
1. Assemble the 2nd gear to the secondary shaft as shown in the figure.
2. Assemble the synchronizer ring.



01E0JX-074

Clutch hub assembly (1st/2nd), synchronizer ring
1. Assemble the clutch hub assembly to the secondary shaft as shown in the figure.
2. Assemble the synchronizer ring.

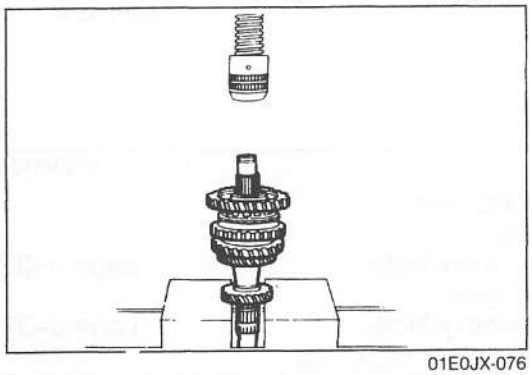
Caution
- **Install the clutch hub assembly (1st/2nd) with a press if necessary.**
- **Align the synchronizer ring groove and reverse gear key groove when installing.**



01E0JX-075

1st gear
Assemble the 1st gear to the secondary shaft as shown in the figure.

Caution
- **Align the synchronizer ring groove and clutch hub assembly key when installing.**

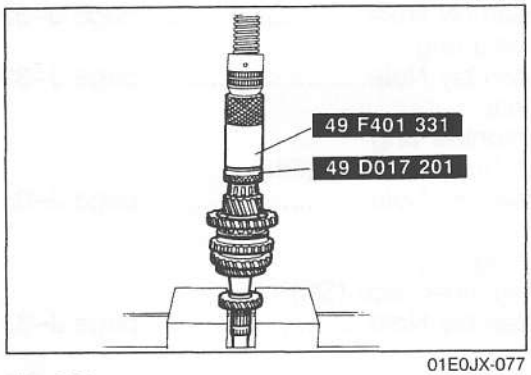


01E0JX-076

Pinion gear, bearing inner race (1st)

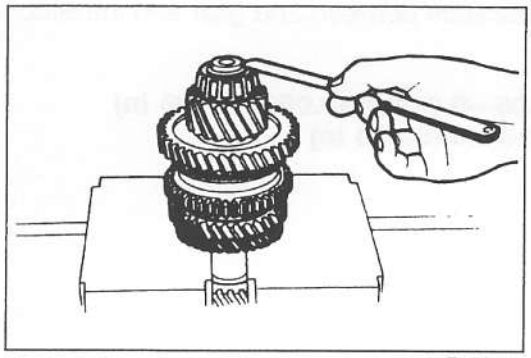
Caution
- **Replace the bearing inner race if removed.**

1. Support the 4th gear of the secondary shaft.
2. Install the plain end of pinion gear with the bottom up.



01E0JX-077

3. Set the **SST** to the new bearing inner race as shown in the figure.



01E0JX-078

Retaining ring

Caution
- **Replace the retaining ring if removed.**

1. Install the retaining ring.
2. Measure the clearance between the retaining ring and secondary shaft groove.

Clearance: 0—0.1mm (0—0.004 in)

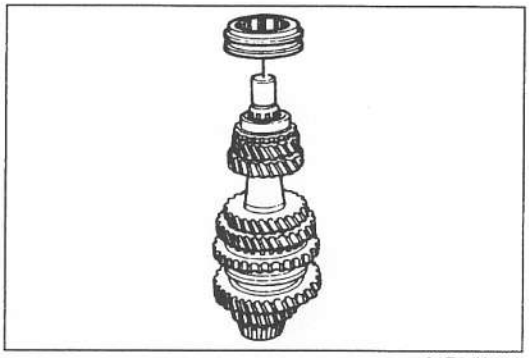
3. If not as specified, select the proper retaining ring from the chart below and install it.

Retaining ring thickness:

mm (in)

2.0 (0.079)	2.1 (0.082)	2.2 (0.086)	2.3 (0.090)	2.4 (0.094)

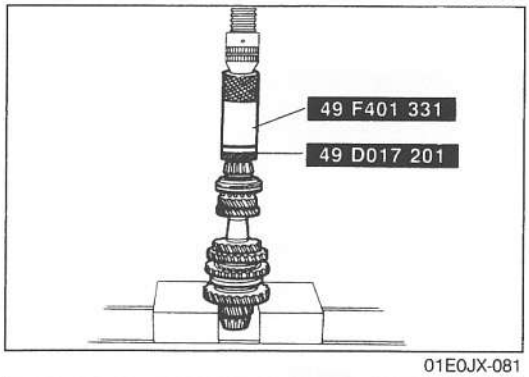
01E0JX-079



01E0JX-080

Clutch hub assembly (5th)
Install the clutch hub assembly onto the secondary shaft.

Note
- **Install the clutch hub assembly (5th) with a press if necessary.**

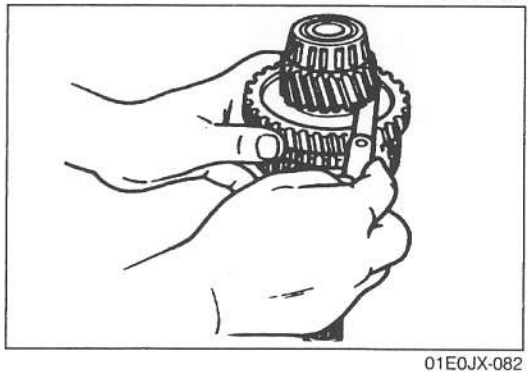


01E0JX-081

Bearing inner race (5th)

Caution
- **Replace the bearing inner race if removed.**

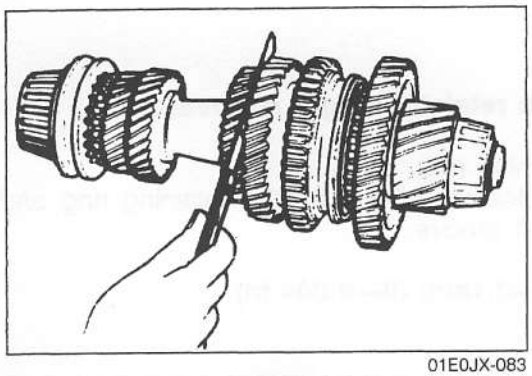
1. Support the 1st gear of the secondary shaft and press the bearing inner race on.
2. Install the new bearing inner race using the **SST** and press, as shown in the figure.



01E0JX-082

3. Measure the clearance between 1st gear and the pinion gear.

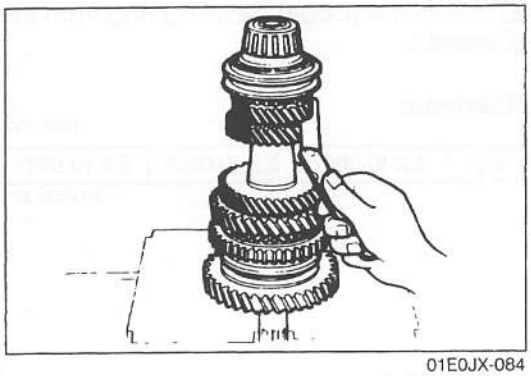
Clearance: 0.22—0.62mm (0.008—0.024 in)
Maximum: 0.67mm (0.026 in)



01E0JX-083

4. Measure the clearance between 2nd gear and the secondary 3rd gear.

Clearance: 0.06—0.21mm (0.002—0.008 in)
Maximum: 0.26mm (0.010 in)

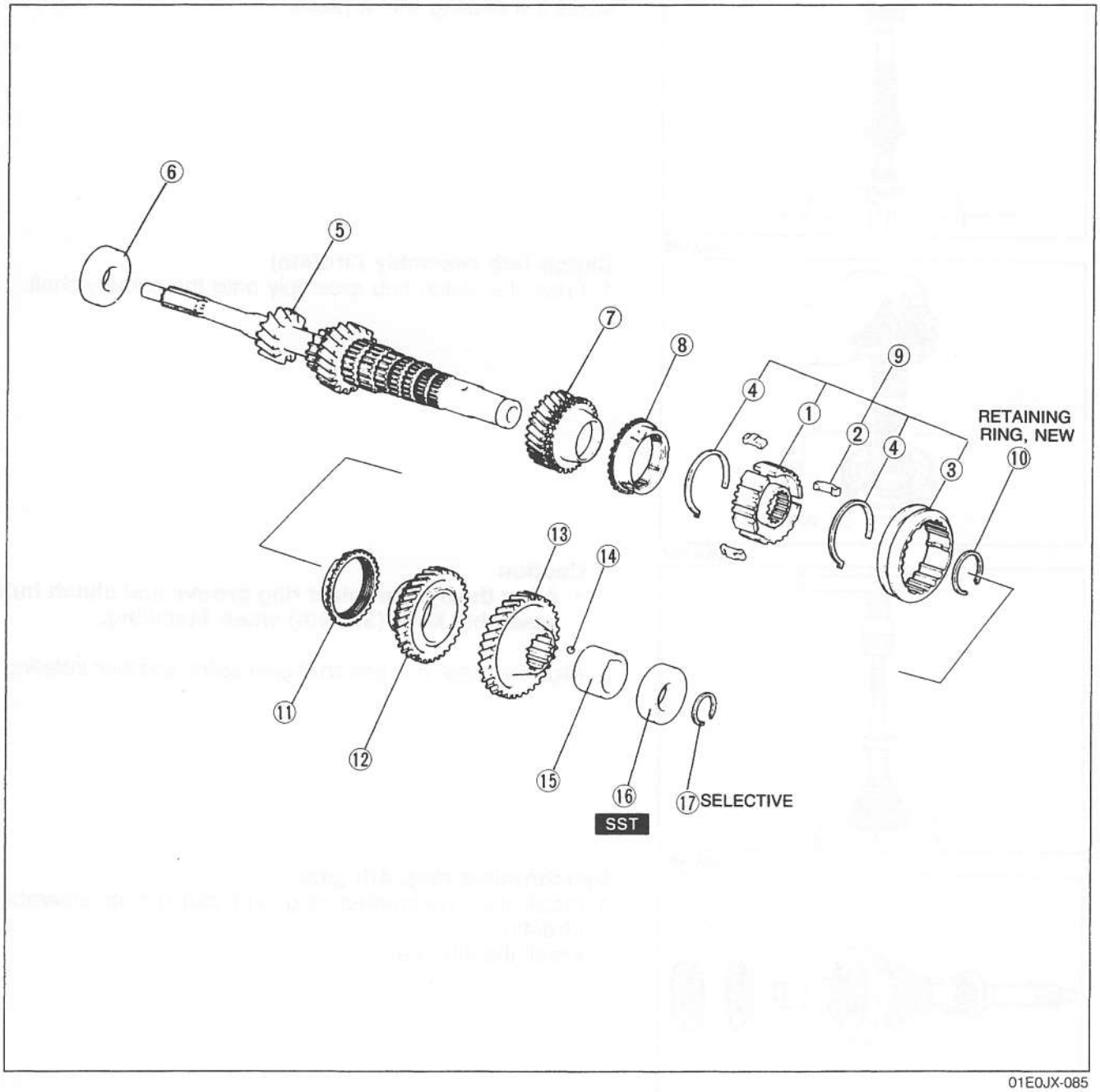


01E0JX-084

5. Measure the clearance between 5th gear and the secondary 4th gear.

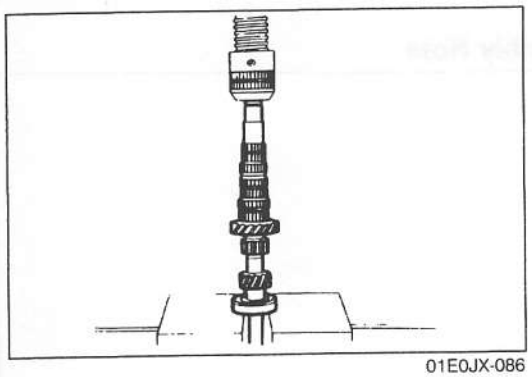
Clearance: 0.06—0.21mm (0.002—0.008 in)
Maximum: 0.26mm (0.010 in)

Primary Shaft Assembly
Assemble in the order shown in the figure, referring to **Assembly Note**.



01E0JX-085

1. Clutch hub (3rd/4th)
2. Synchronizer key
3. Clutch hub sleeve
4. Synchronizer key spring
5. Primary shaft
6. Bearing (1st)
   Assembly Note..... page J–36
7. 3rd gear
8. Synchronizer ring
9. Clutch hub assembly (3rd/4th)
   Assembly Note..... page J–36
10. Retaining ring
11. Synchronizer ring
    Assembly Note..... page J–36
12. 4th gear
    Assembly Note..... page J–36
13. 5th gear
    Assembly Note..... page J–36
14. Steel ball
    Assembly Note..... page J–37
15. Spacer
    Assembly Note..... page J–37
16. Bearing (5th)
    Assembly Note..... page J–37
17. Retaining ring
    Assembly Note..... page J–37



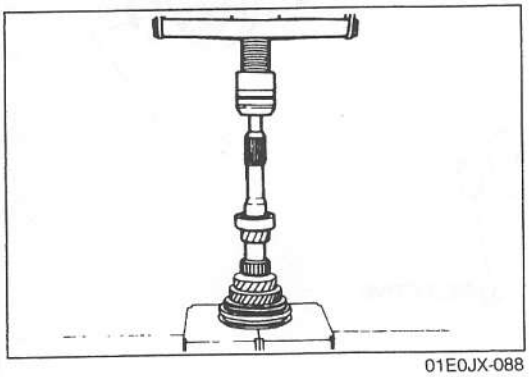
01E0JX-086

Assembly Note
Bearing (1st)
Install the bearing with a press.



01E0JX-087

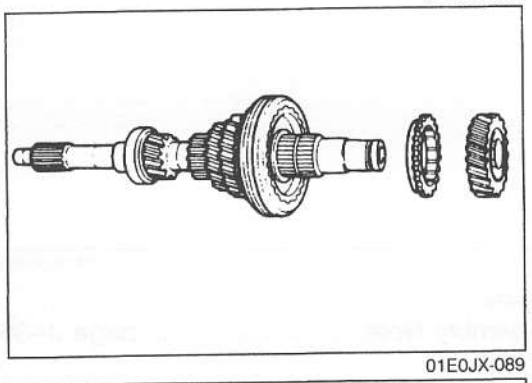
Clutch hub assembly (3rd/4th)
1. Press the clutch hub assembly onto the primary shaft.



01E0JX-088

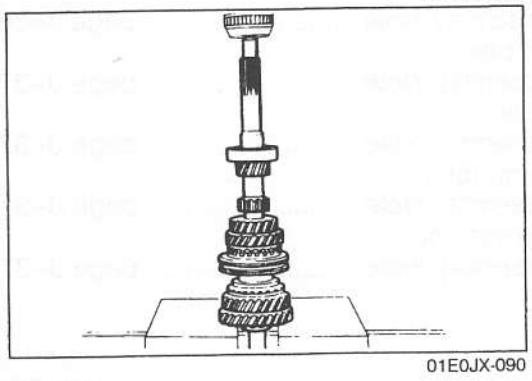
Caution
- **Align the synchronizer ring groove and clutch hub assembly keys (3rd/4th) when installing.**

2. Align the clutch hub and shaft gear spline and then installing.



01E0JX-089

Synchronizer ring, 4th gear
1. Install the synchronizer ring and clutch hub assembly (3rd/4th).
2. Install the 4th gear.

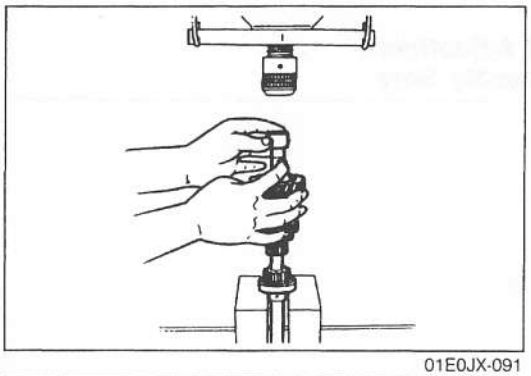


01E0JX-090

5th gear

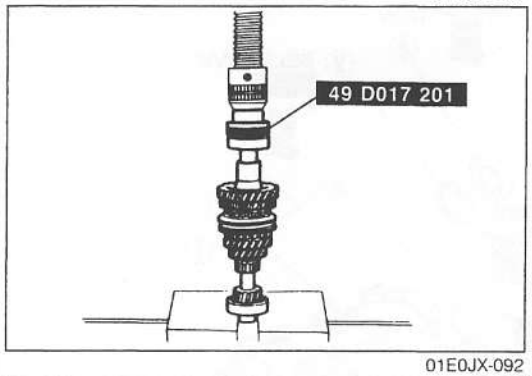
Caution
- **Align the synchronizer ring groove and clutch hub assembly keys (3rd/4th) when installing.**

1. Align the clutch hub and primary shaft splines.
2. Press the 5th gear on.



01E0JX-091

Steel ball, spacer
Hold the steel ball with a finger, and install the spacer.

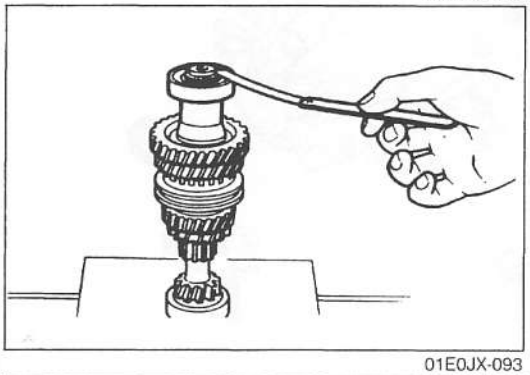


01E0JX-092

Bearing (5th)

Caution
- **Replace the ball bearing if removed.**

Install the ball bearing with the **SST** and a press.



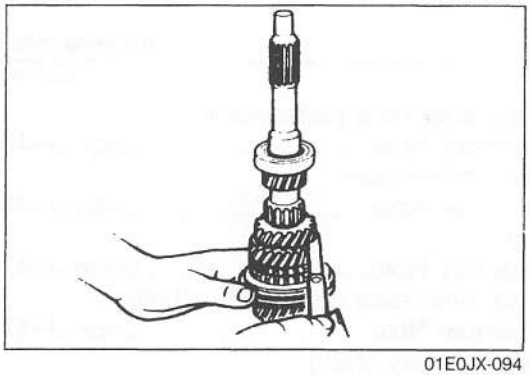
01E0JX-093

Retaining ring

Caution
- **Replace the retaining ring if removed.**

1. Install the retaining ring.
2. Measure the clearance between retaining ring and the primary shaft.

Clearance: 0—0.1mm (0—0.004 in)



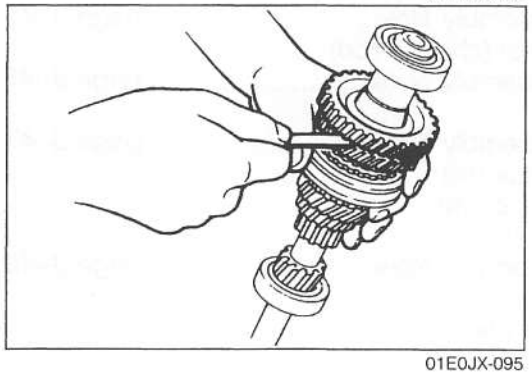
01E0JX-094

3. If not as specified, select the proper retaining ring from the chart below and install it.

Retaining ring

mm (in)

2.0 (0.079)	2.1 (0.082)	2.2 (0.086)	2.3 (0.090)	2.4 (0.094)

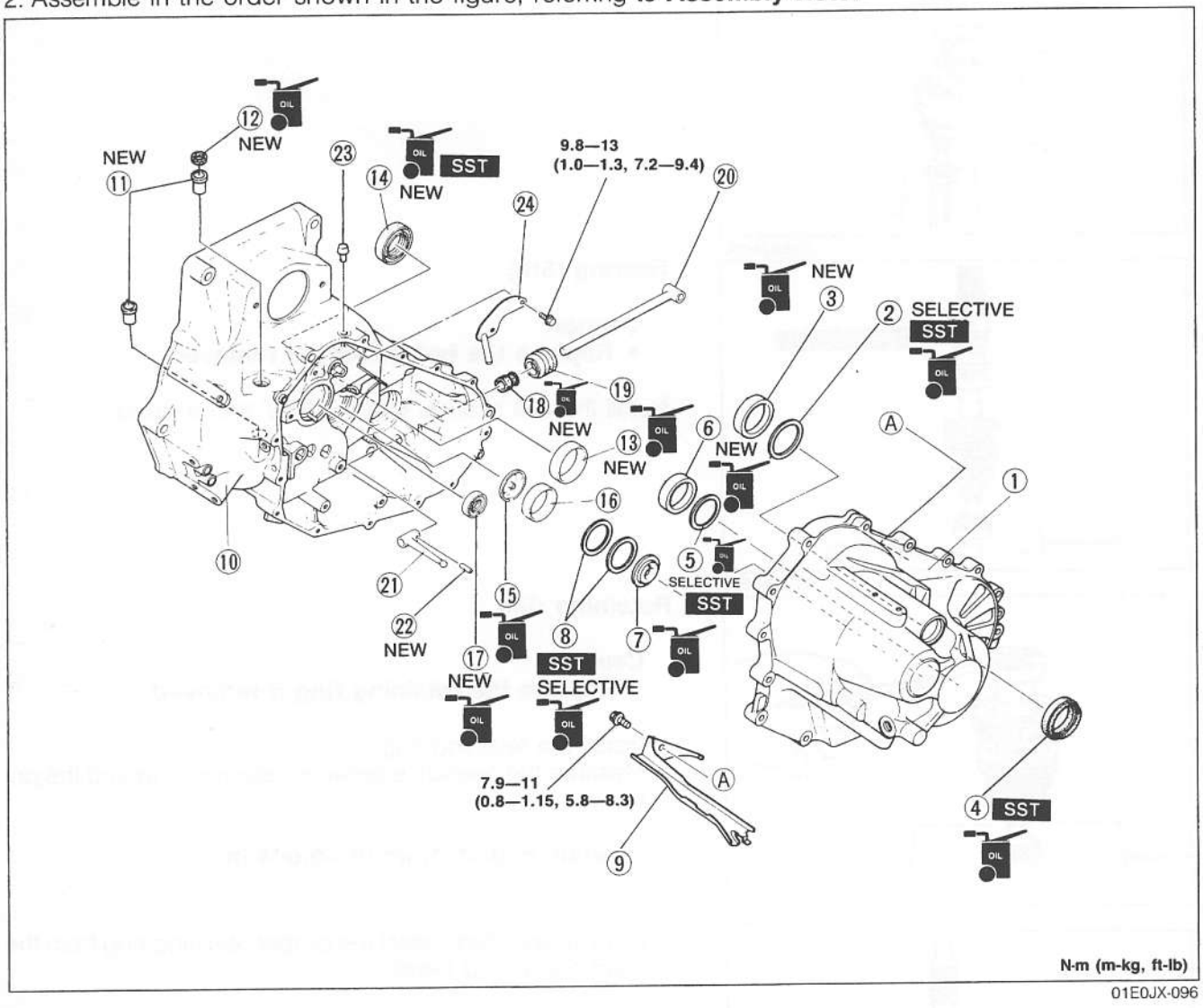


01E0JX-095

Note
- **The following inspection is to verify proper assembly of the primary shaft.**
- **Measure the clearance between the 3rd gear and 2nd gear. (Refer to page J–22.)**
- **Measure the clearance between the 4th gear and ball bearing. (Refer to page J–22.)**

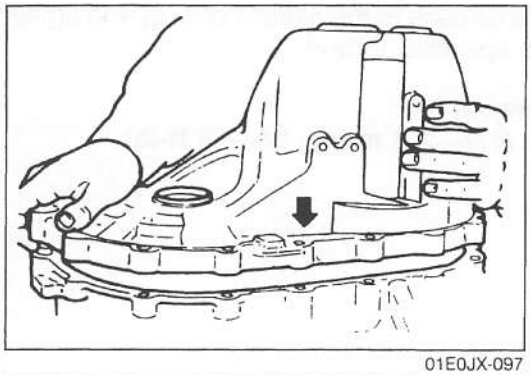
Clutch Housing and Transaxle Case Components

1. Select the adjustment shim(s), referring to **Bearing Preload Adjustment**.
2. Assemble in the order shown in the figure, referring to **Assembly Note**.

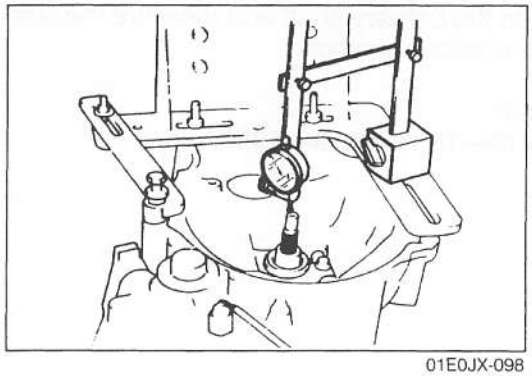


01E0JX-096

1. Transaxle case
2. Adjustment shim
   Assembly Note..... page J–45
3. Bearing outer race (differential)
   Assembly Note..... page J–45
4. Oil seal (differential)
   Assembly Note..... page J–45
5. Adjustment shim
   Assembly Note..... page J–45
6. Bearing outer race (secondary shaft)
   Assembly Note..... page J–45
7. Funnel
   Assembly Note..... page J–46
8. Adjustment shim
   Assembly Note..... page J–46
9. Oil passage
10. Clutch housing
11. Bushing
12. Oil seal
13. Bearing outer race (differential)
    Assembly Note..... page J–46
14. Oil seal (differential)
    Assembly Note..... page J–46
15. Funnel
    Assembly Note..... page J–47
16. Bearing outer race (secondary shaft)
    Assembly Note..... page J–47
17. Oil seal (primary shaft)
    Assembly Note..... page J–47
18. Oil seal (change rod)
    Assembly Note..... page J–47
19. Boot
    Assembly Note..... page J–47
20. Change rod
21. Change arm
22. Roll pin
    Assembly Note..... page J–48
23. Bleeder
24. Baffle plate



01E0JX-097



01E0JX-098

Adjustment shim selection
Select the shim(s) as follows.

Primary shaft assembly
1. Set the primary shaft assembly into the clutch housing.
2. Install the transaxle case to the clutch housing and tighten the bolts to the specified torque.

   Tightening torque:
   19—26 N·m (1.9—2.6 m-kg, 14—19 ft-lb)

3. Mount a dial indicator to the transaxle hanger and measure the primary shaft thrust clearance.

   Clearance: 0—0.1mm (0—0.004 in)

   Caution
   - **Do not use more than three (3) shims.**

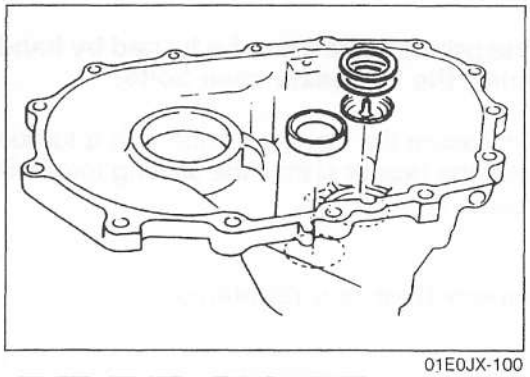
4. Select the closest shim on the thin side from the table for adjustment of the primary shaft.

Adjustment shim thickness:

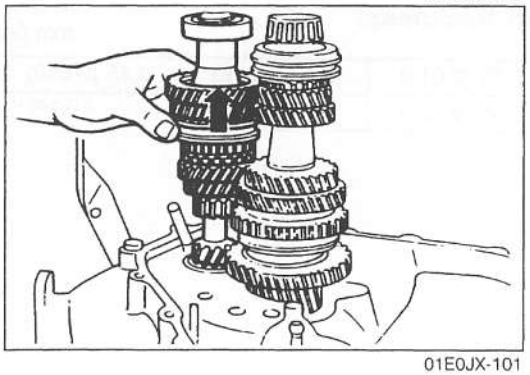
mm (in)

0.30 (0.012)	0 40 (0.016)	0 50 (0 019)

01E0JX-099



01E0JX-100

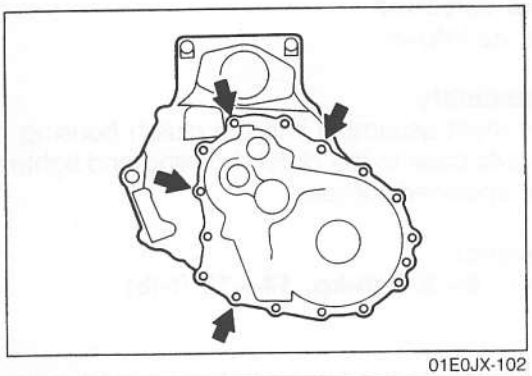


01E0JX-101

Secondary shaft assembly

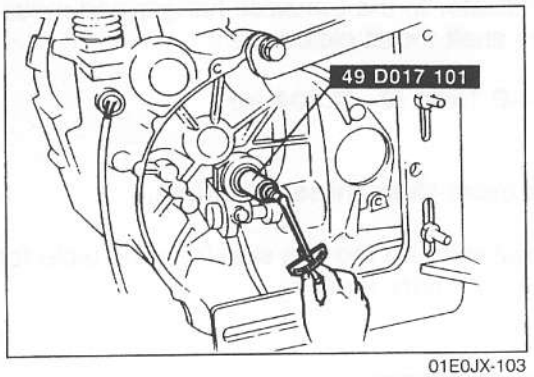
Caution
- **Do not install the secondary shaft shim.**
- **Apply petroleum jelly to prevent the shim from falling when installing it.**

1. Remove the transaxle case and install the proper adjustment shim for the primary shaft.
2. Install the primary shaft gear assembly and the secondary shaft gear assembly.
   Do not install the secondary shaft shim at this time.
3. Shift the gears to 4th gear.


01E0JX-102

4. Install the transaxle case to the clutch housing and tighten the bolts to the specified torque.

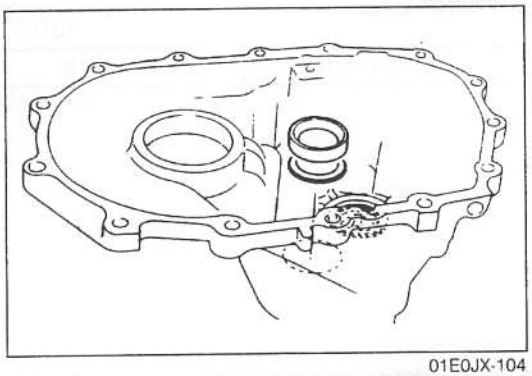
Tightening torque:
19—26 N·m (1.9—2.6 m-kg, 14—19 ft-lb)



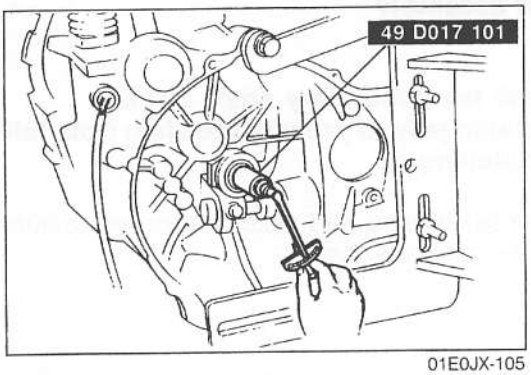
01E0JX-103

5. Set the **SST** onto the primary shaft and measure the starting torque with a torque wrench.

Starting torque:
0—147 N·m (0—15 m-kg, 0—108 ft-lb)


01E0JX-104

6. Remove the transaxle case and the bearing outer race.
7. Install the shim removed during disassembly and the bearing outer race.



01E0JX-105

Caution
- **Verify that the primary shaft can be turned by hand after tightening the transaxle case bolts.**

8. Using the **SST** measure the starting torque with a torque wrench and select the proper shim if the starting torque is greater than in Step 4.

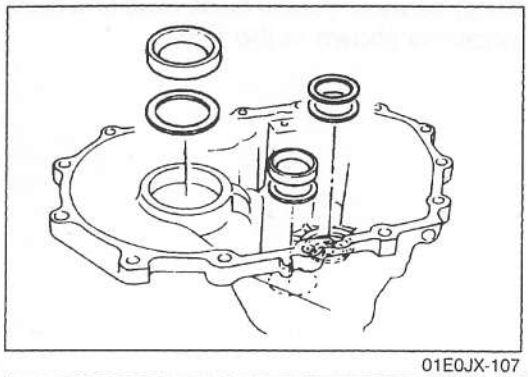
Caution
- **Do not use more than two (2) shims.**

Adjustment shim thickness:

mm (in)

0.30 (0.011)	0.35 (0.013)	0.40 (0.016)	0.45 (0.018)
0.50 (0.020)	0.55 (0.021)	0.60 (0.023)	

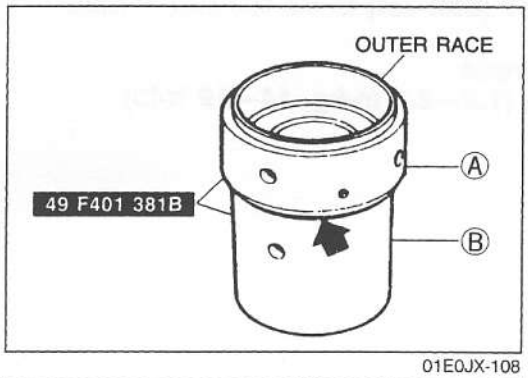
01E0JX-106



01E0JX-107

Differential

1. Remove the bearing outer races from the transaxle case and remove the adjustment shims.

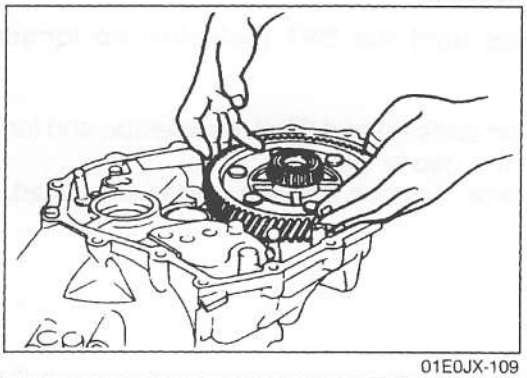


01E0JX-108

Note

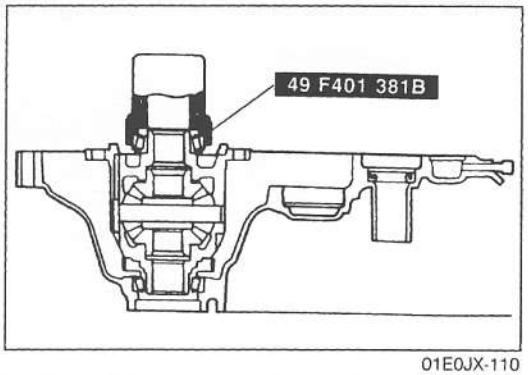
- **Turn A and B until the gap (arrow) in the figure is eliminated.**

2. Install the differential side bearing outer race to the **SST (selector)**.



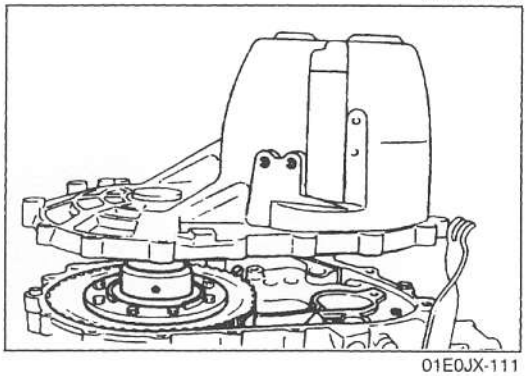
01E0JX-109

3. Set the bearing outer race and differential assembly into the clutch housing.



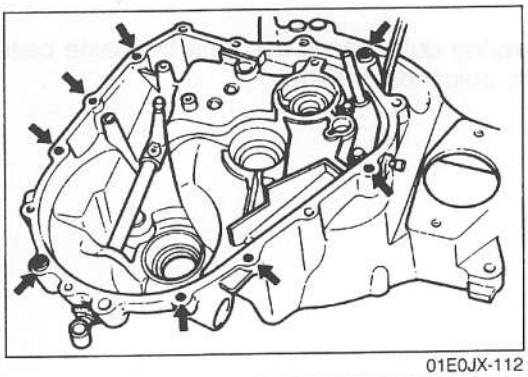
01E0JX-110

4. Set the bearing outer race and **SST** onto the differential assembly as shown in the figure.

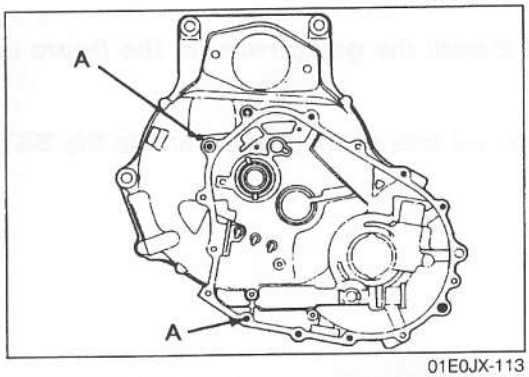


01E0JX-111

5. Slide the transaxle case over the differential assembly.


01E0JX-112

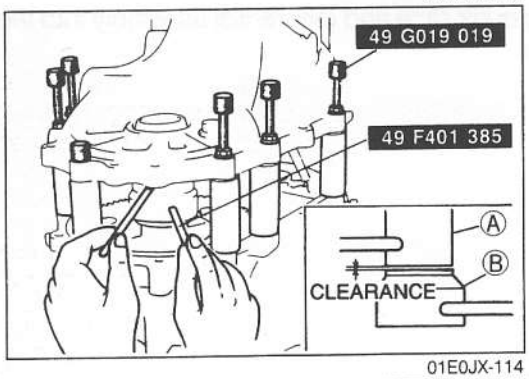
6. Set the **SST (collars)** between the transaxle case and clutch housing in the positions shown in the figure.



01E0JX-113

7. Tighten the **SST (bolt set)** to the specified torque.

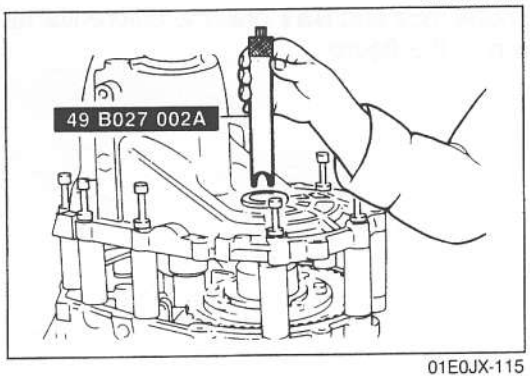
Tightening torque:
19—26 N·m (1.9—2.6 m-kg, 14—19 ft-lb)



01E0JX-114

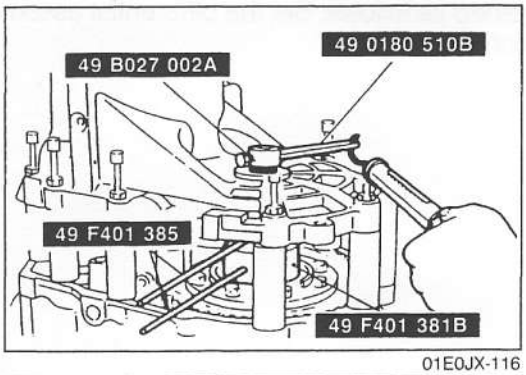
Note
- **Turn the bars until the SST (selector) no longer turns.**

8. Mount the bars on parts Ⓐ and Ⓑ of the selector, and turn the selector so the gap is widened.
9. Turn in the reverse direction until the gap is eliminated.

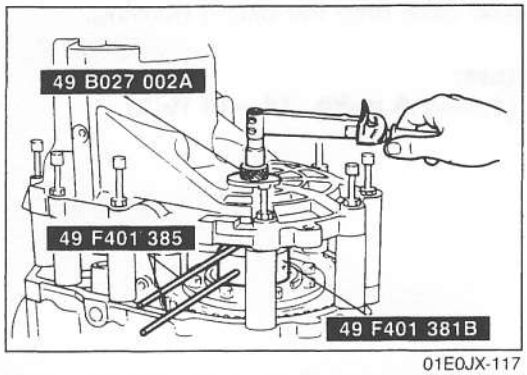


01E0JX-115

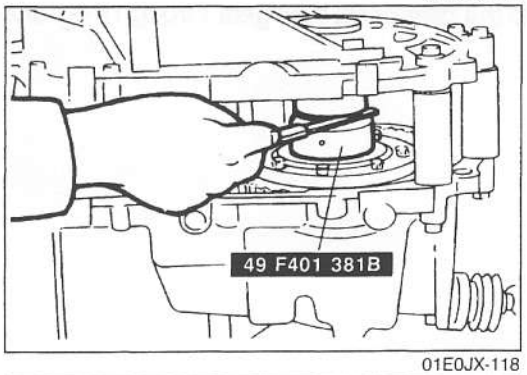
10. Install the **SST** to the differential pinion shaft through the transaxle case.



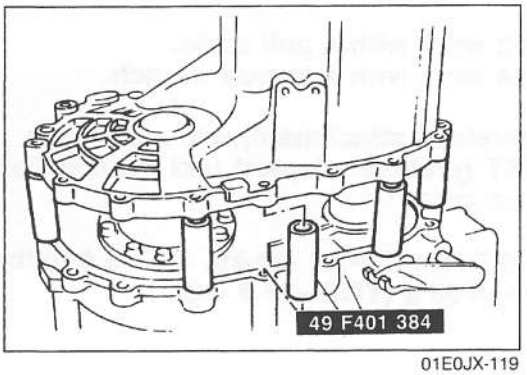
01E0JX-116



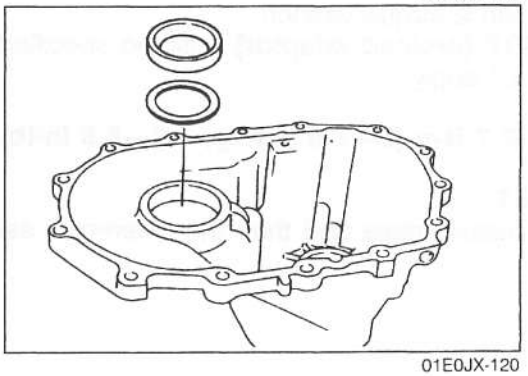
01E0JX-117



01E0JX-118



01E0JX-119


01E0JX-120

Note
- **Procedure work with a pull scale.**
- **Procedure 12 work with a torque wrench.**

11. Turn the **SST** with a pull scale. Adjust the **SST (preload adapter)** until the specified preload.

    Preload: 0.5—0.7 N·m (5—7.6 cm-kg, 4.3—6.6 in-lb)
    Pull scale: 500—760 g (17.7—26.8 oz)

12. Turn the **SST** with a torque wrench. Adjust the **SST (selector)** with the bars until the specified preload is obtained.

    Preload: 0.5—0.7 N·m (5—7.6 cm-kg, 4.3—6.6 in-lb)

13. Remove the **SST**.

14. Measure the gap around the entire circumference of the **SST (selector)**.
15. Select the proper adjustment shim(s) to be used for the differential by referring to the table and selecting the shim which is nearest (on the thick side) to the largest measured clearance in the selector.

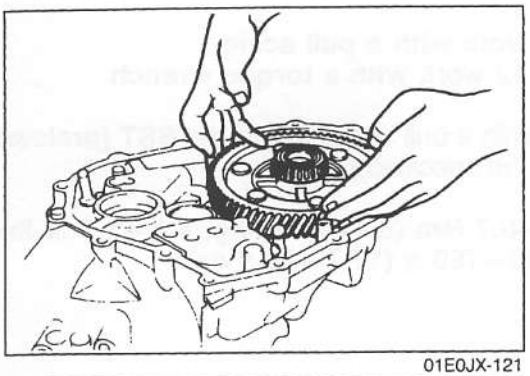
Adjustment shim thickness:

mm (in)

0.10 (0.004)	0.15 (0.006)	0.20 (0.008)	0.25 (0.010)	0.30 (0.012)
0.35 (0.014)	0.40 (0.016)	0.45 (0.018)	0.50 (0.020)	0.55 (0.022)
0.60 (0.024)	0.65 (0.026)	0.70 (0.028)	0.75 (0.030)	0.80 (0.031)
0.85 (0.033)	0.90 (0.035)			

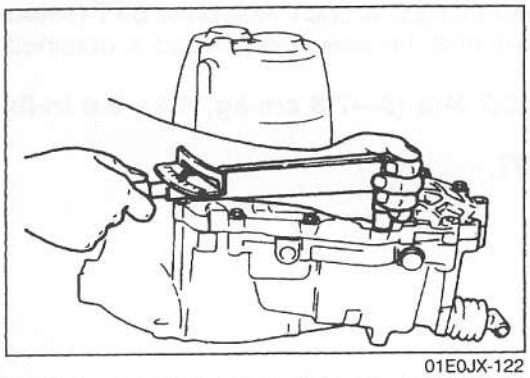
16. Remove the **SST (bolts)**.
17. Remove the transaxle case and the **SST (collars)**.
18. Remove the bearing outer race from the **SST (selector)**.

19. Install the selected shim(s) and bearing outer race to the transaxle case.



01E0JX-121

20. Measure the preload as follows. Set the differential assembly into the clutch housing.



01E0JX-122

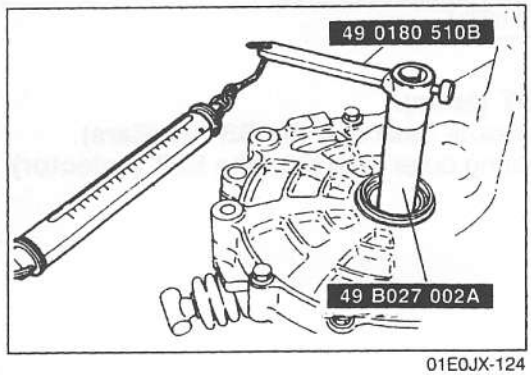
21. Install the transaxle case onto the clutch housing.

Tightening torque:
19—26 N·m (1.9—2.6 m-kg, 14—19 ft-lb)



01E0JX-123

22. Install the **SST** to the differential side gear through the transaxle case.

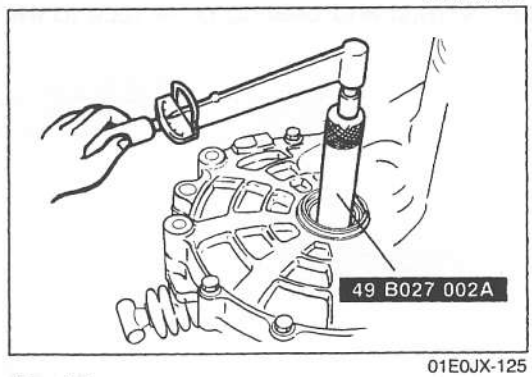


01E0JX-124

Note
- **Procedure 23 work with a pull scale.**
- **Procedure 24 work with a torque wrench.**

23. Turn the **SST (preload attachment)** with a pull scale. Readjust the **SST (preload adaptor)** until the specified preload when not apply.

Preload: 0.5—0.7 N·m (5—7.6 cm-kg, 4.3—6.6 in-lb)
Pull scale: 500—760 g (17.7—26.8 oz)

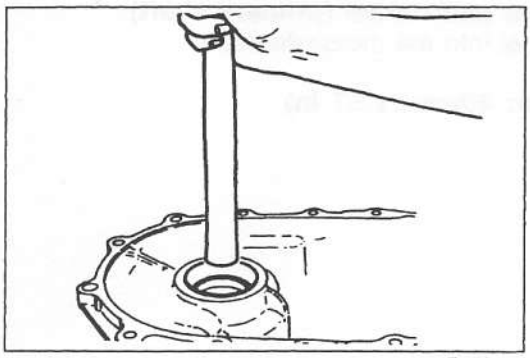


01E0JX-125

24. Turn the **SST** with a torque wrench. Readjust the **SST (preload adaptor)** until the specified preload when not apply.

Preload: 0.5—0.7 N·m (5—7.6 cm-kg, 4.3—6.6 in-lb)

25. Remove the **SST**.
26. Remove the transaxle case and then the differential assembly.

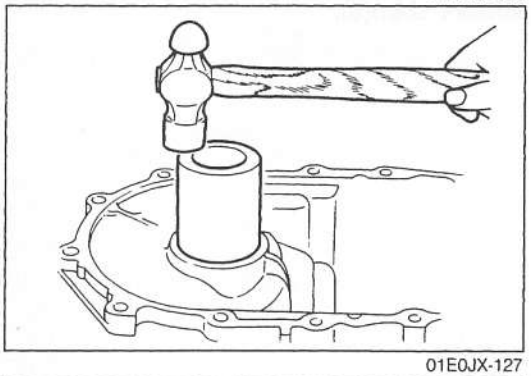


01E0JX-126

Assembly Note

Adjustment shim and bearing outer race (differential)

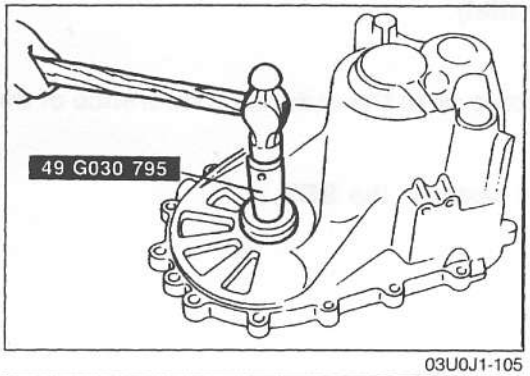
1. Set the adjustment shim and new bearing outer race into the transaxle case.



01E0JX-127

2. After mounting the clutch housing onto the transaxle hanger, tap in the differential bearing outer races with a hammer until it is flush with the end of the transaxle case.

   Pipe diameter: 59mm (2.32 in)



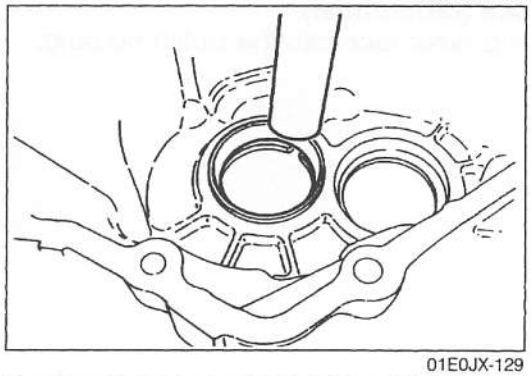
03U0J1-105

Oil seal (differential)

Caution

- **Apply transaxle oil to the outer circumference of the oil seal.**

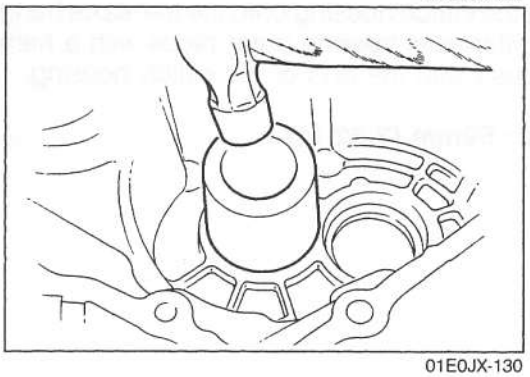
Install the new oil seal with the **SST**.



01E0JX-129

Adjustment shim, bearing outer race (secondary shaft)

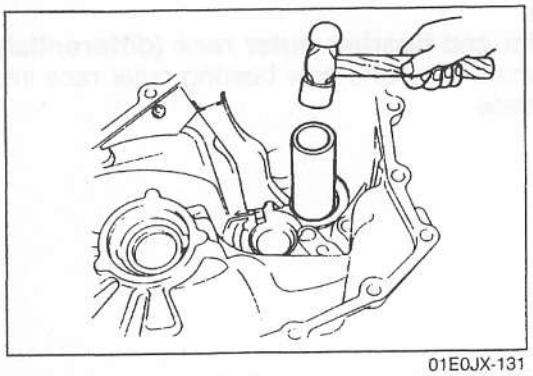
1. Install the adjustment shim and bearing outer race into the clutch housing.



01E0JX-130

2. After mounting the clutch housing onto the transaxle hanger, tap in the differential bearing outer races with a hammer until it is flush with the end of the clutch housing.

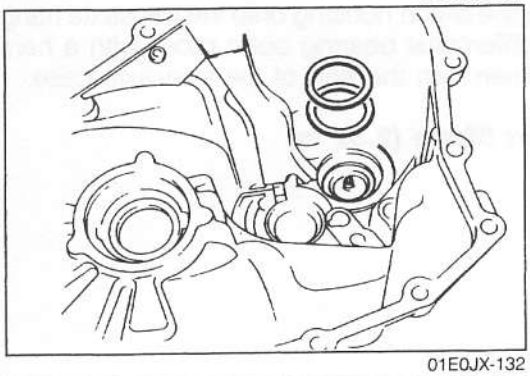
   Pipe diameter: 47mm (1.85 in)



01E0JX-131

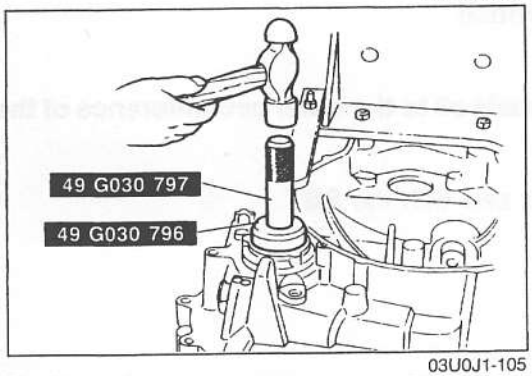
Adjustment shim and funnel (primary shaft)
1. Install the funnel into the transaxle case.

Pipe diameter: 40mm (1.57 in)



01E0JX-132

2. Install the adjustment shim(s).

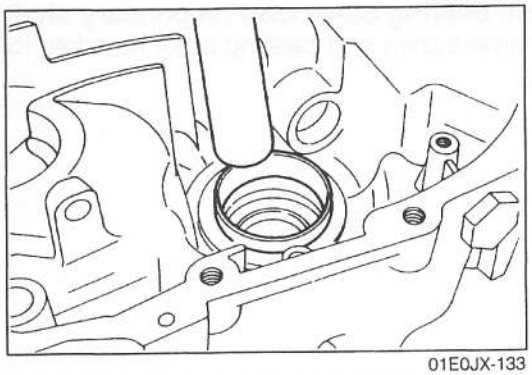


03U0J1-105

Oil seal (differential)

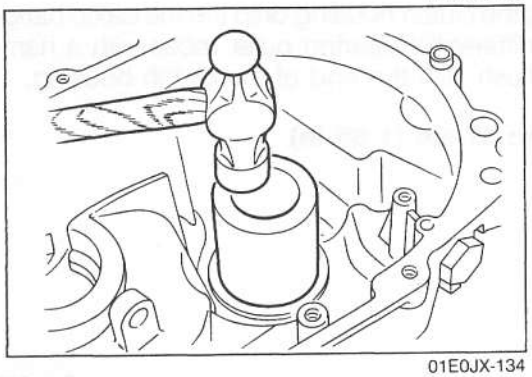
Caution
- **Apply transaxle oil to the outer circumference of the oil seal.**

Install the new oil seal with the **SST**.



01E0JX-133

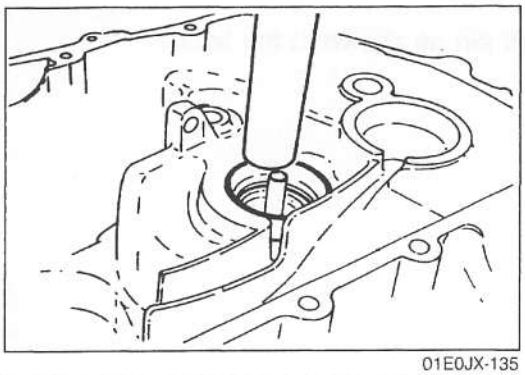
Bearing outer race (differential)
1. Install the bearing outer race into the clutch housing.



01E0JX-134

2. After mounting the clutch housing onto the transaxle hanger, tap in the differential bearing outer races with a hammer until it is flush with the end of the clutch housing.

Pipe diameter: 59mm (2.32 in)



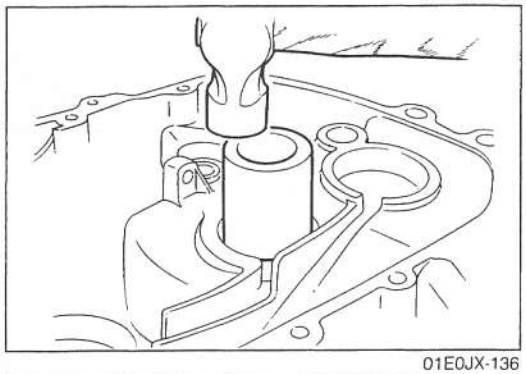
01E0JX-135

Funnel and bearing outer race (secondary shaft)

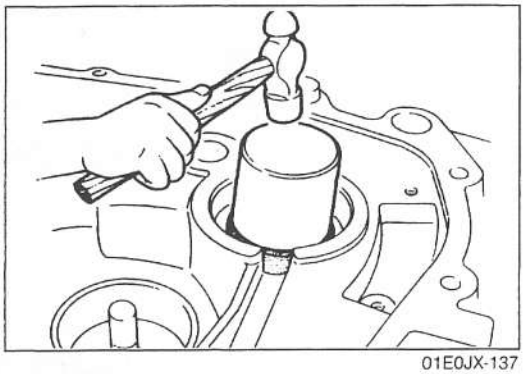
Note
- **Install the funnel which has the extra hole.**

1. Set the funnel and bearing outer race into the clutch housing.
2. Tap the bearing outer race with a suitable pipe until it is fully seated in the clutch housing.

Pipe diameter: 50mm (1.97 in)



01E0JX-136



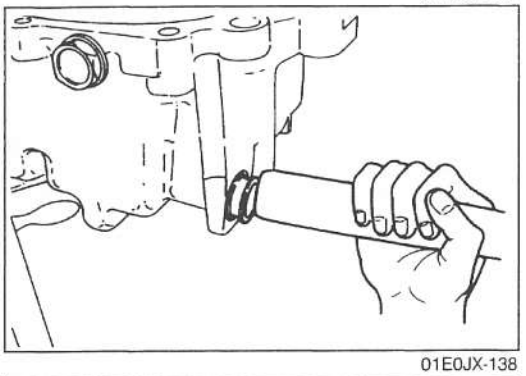
01E0JX-137

Oil seal (primary shaft gear)

Caution
- **Apply transaxle oil to the outer circumference of the oil seal.**

Install the new oil seal with a suitable pipe.

Pipe diameter: 38mm (1.50 in)

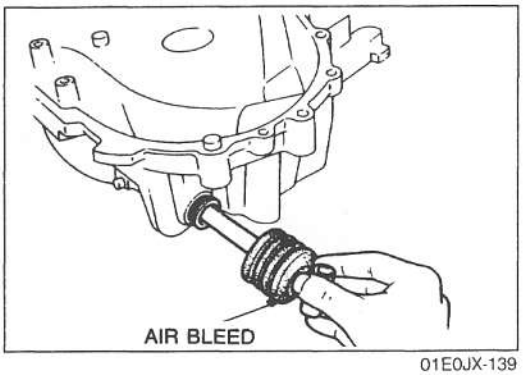


01E0JX-138

Oil seal (change rod)

Caution
- **Apply transaxle oil to the outer circumference of the oil seal.**

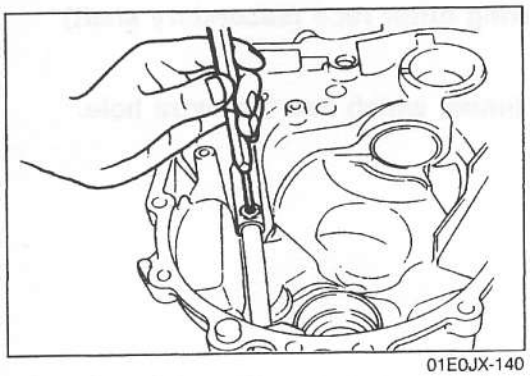
Tap the new oil seal in until it is fully seated.



01E0JX-139

Change rod and boot
1. Install the change rod and boot into the transaxle.
2. Fit the boot over the seal.

Caution
- **Install the boot with the air bleed downward as shown in the figure.**



01E0JX-140

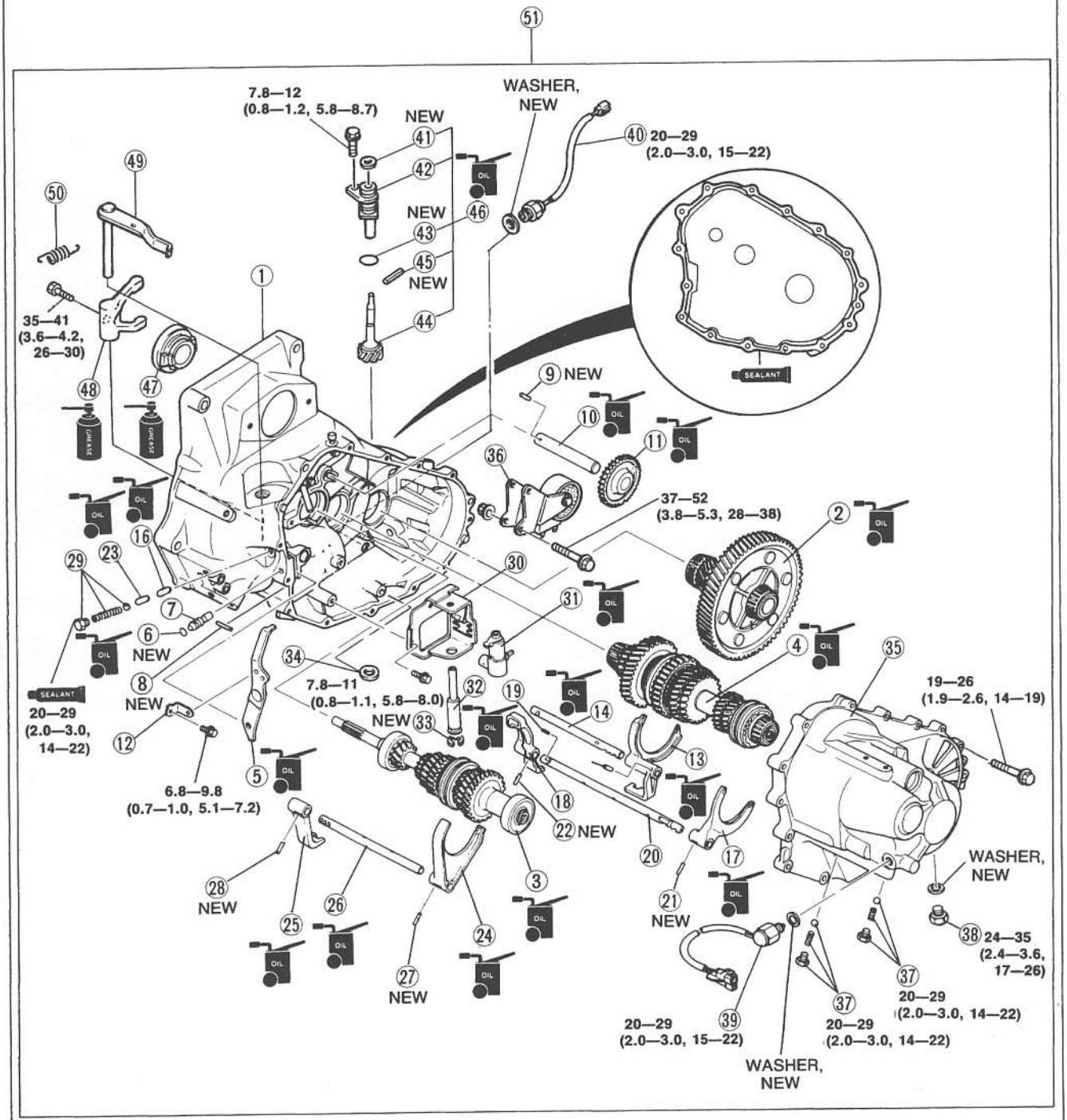
Roll pin

Install the new roll pin as shown in the figure.

MEMO

Housing Parts

Assemble in the order shown in the figure, referring to **Assembly Note**.

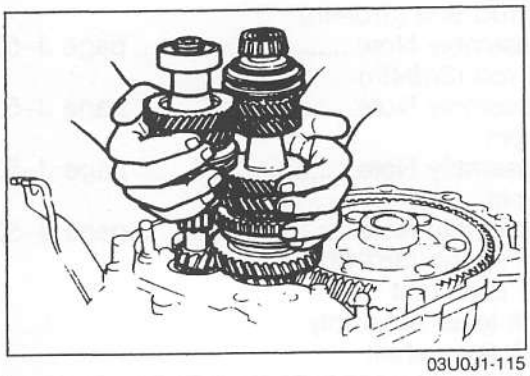


N-m (m-kg, ft-lb)

01E0JX-141

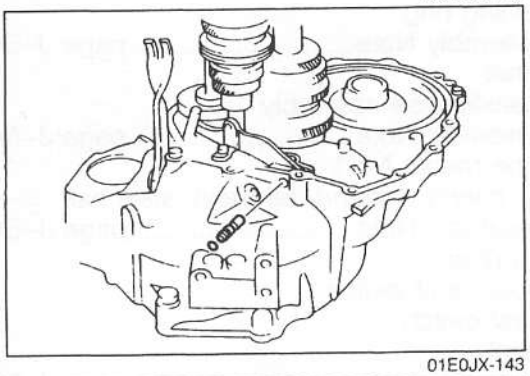
1. Clutch housing assembly
2. Differential assembly
3. Primary shaft gear assembly
   Assembly Note..... page J–52
4. Secondary shaft gear assembly
   Assembly Note..... page J–52
5. Reverse shift lever
   Assembly Note..... page J–52
6. O-ring
7. Reverse lever shaft
   Assembly Note..... page J–52
8. Pin
9. Roll pin
10. Reverse idler shaft
11. Reverse idler gear
    Assembly Note..... page J–52
12. Lever set spring
13. Shift fork (1st/2nd)
    Assembly Note..... page J–52
14. Shift rod (1st/2nd)
    Assembly Note..... page J–52
15. Roll pin
    Assembly Note..... page J–52
16. Interlock pin
    Assembly Note..... page J–52
17. Shift fork (5th/Rev)
    Assembly Note..... page J–53
18. Shift rod end (5th/Rev)
    Assembly Note..... page J–53
19. Interlock pin
    Assembly Note..... page J–53
20. Shift rod (5th/Rev)
    Assembly Note..... page J–53
21. Roll pin
    Assembly Note..... page J–53
22. Roll pin
    Assembly Note..... page J–53
23. Interlock pin
    Assembly Note..... page J–53
24. Shift fork (3rd/4th)
    Assembly Note..... page J–53
25. Shift rod end (3rd/4th)
    Assembly Note..... page J–53
26. Shift rod (3rd/4th)
    Assembly Note..... page J–53
27. Roll pin
    Assembly Note..... page J–53
28. Roll pin
    Assembly Note..... page J–53
29. Plug, spring (3rd/4th), steel ball
30. Base plate unit
31. Crank lever assembly
32. Crank lever shaft
33. Retaining ring
    Assembly Note..... page J–54
34. Magnet
35. Transaxle case assembly
    Assembly Note..... page J–54
36. Engine mount No.1
37. Plug, spring (1st/2nd, 5th/Rev), steel ball
    Assembly Note..... page J–54
38. Drain plug
39. Back-up light switch
40. Neutral switch
41. Oil seal
    Assembly Note..... page J–55
42. Speedometer gear sleeve
43. O-ring
44. Driven gear
45. Roll pin
    Assembly Note..... page J–55
46. Speedometer driven gear assembly
47. Clutch release collar
    Assembly Note..... page J–55
48. Clutch release fork
    Assembly Note..... page J–55
49. Clutch lever
    Assembly Note..... page J–55
50. Return spring
51. Transaxle

01E0JX-142



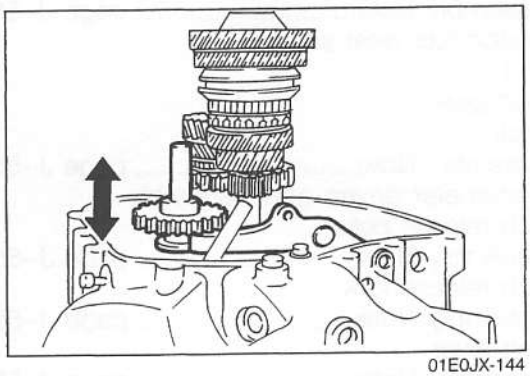
03U0J1-115

Assembly Note
Primary shaft gear assembly and secondary shaft gear assembly
Install the primary shaft gear assembly and the secondary shaft gear assembly together.



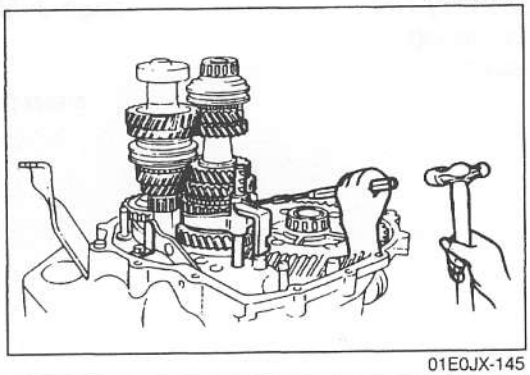
01E0JX-143

Reverse shift lever, reverse lever shaft
1. Apply transaxle oil to the new O-ring and then install the reverse lever shaft.
2. Install the reverse shift lever and then install the reverse lever shaft.
3. Install the new pin.



01E0JX-144

Reverse idler gear
Install the reverse idler gear and the reverse idler shaft.



01E0JX-145

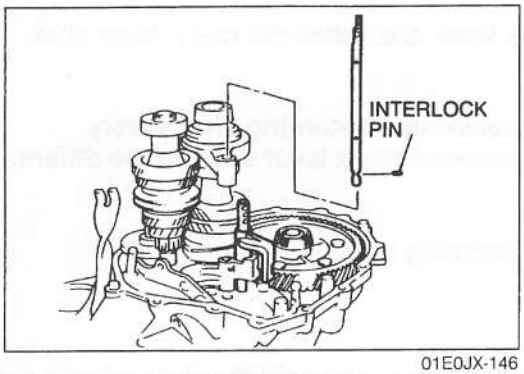
Shift rod (1st/2nd), shift fork (1st/2nd), roll pin, interlock pin

Caution
- **The mark (indicated by the arrow in the figure) and the shift rod end mounting bolt hole must be in the same direction.**

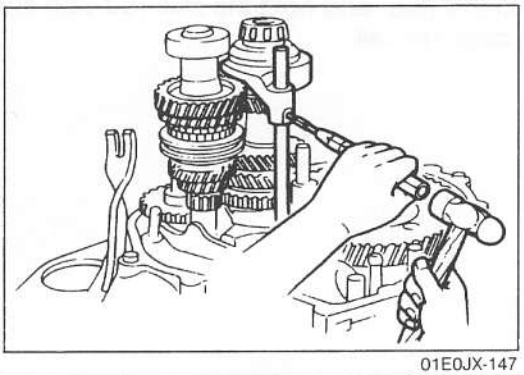
1. Install the shift fork and the shift rod.

Caution
- **When installing the roll pin, be careful not to damage the shift rod.**

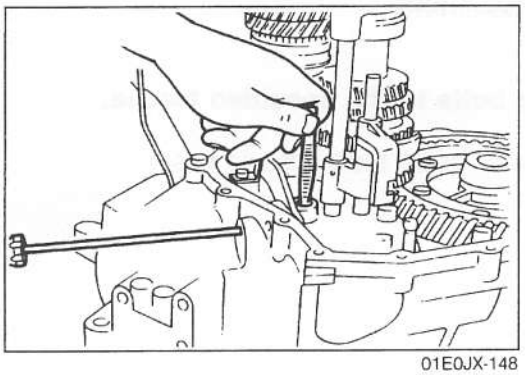
2. Install the new roll pin.
3. Install the interlock pin.



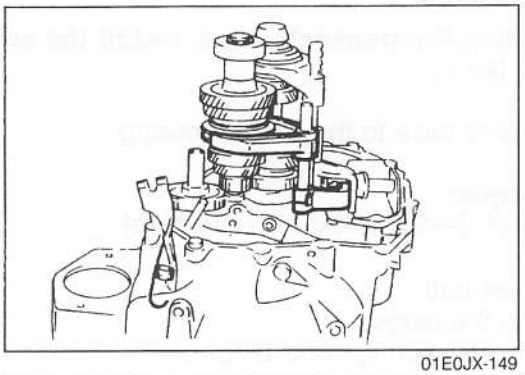
01E0JX-146



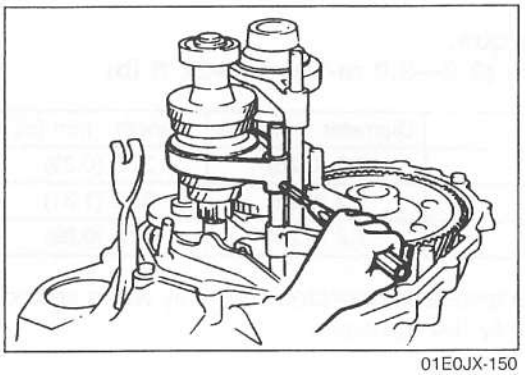
01E0JX-147



01E0JX-148



01E0JX-149



01E0JX-150

Shift rod (5th/Rev), shift fork (5th/Rev), shift rod end (5th/Rev), roll pin, interlock pin

Caution
- **Install the interlock pin into the hole of clutch housing as shown in the figure.**

1. Install the interlock pin to the shift rod and install the shift rod.

Caution
- **When installing the roll pin, be careful not to damage the shift rod.**

Note

mm (in)

Roll pin size	Diameter	Length
Shift fork (5th/Rev)	5.0 (0.20)	22 (0.87)
Shift rod end (5th/Rev)	5.0 (0.20)	20 (0.79)

2. Install the new roll pin.

3. Install the interlock pin.

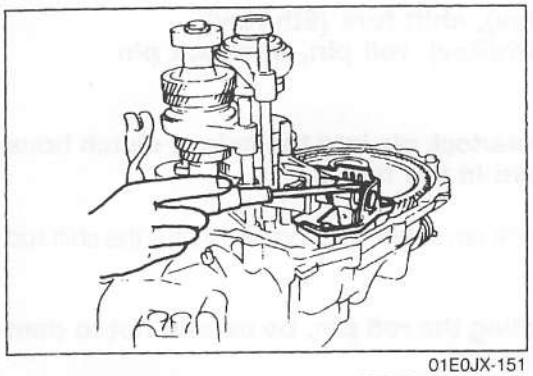
Shift rod (3rd/4th), shift fork (3rd/4th), shift rod end (3rd/4th), roll pin

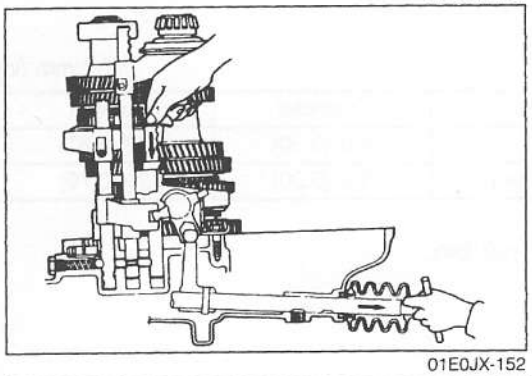
Caution
- **Install the interlock pin into the hole of clutch housing as shown in the figure.**

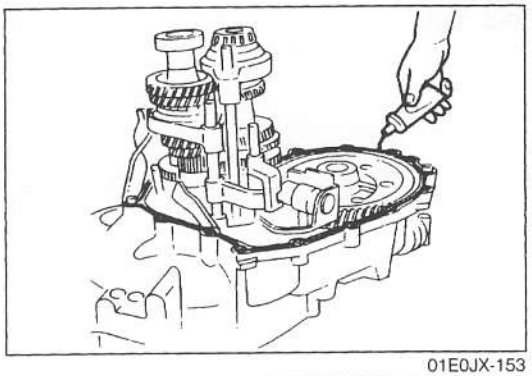
1. Install the interlock pin to the shift rod and install the shift rod.

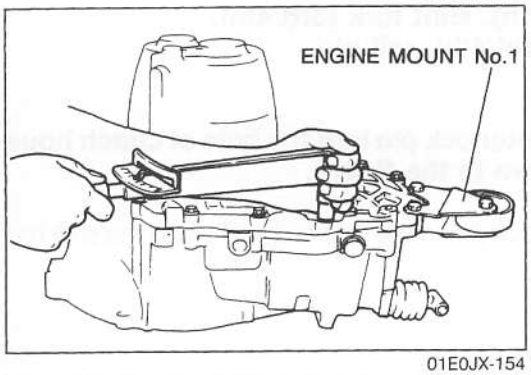
Caution
- **When installing the roll pin, be careful not to damage the shift rod.**

2. Install the new roll pin.

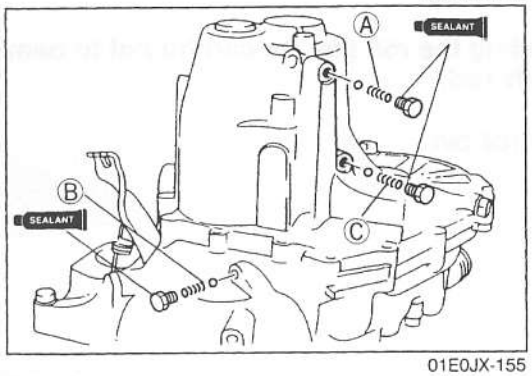

01E0JX-151


01E0JX-152


01E0JX-153



01E0JX-154



01E0JX-155

Retaining ring

1. Install the crank lever and install the crank lever shaft.

Caution
- **Verify the installing a retaining ring surely.**
- **Install the groove of crank lever shaft to the differential end.**

2. Install the new retaining ring.

3. Shift the gears to 3rd gear and hold the shift rod with one hand so that it does not fall.

Transaxle case assembly

Note
- **Tighten the bolts to the specified torque.**

1. Apply sealant and install the transaxle case.

Caution
- **When installing the transaxle case, install the engine mount No.1.**

2. Install the transaxle case to the clutch housing.

Tightening torque:
19—26 N·m (1.9—2.6 m-kg, 14—19 ft-lb)

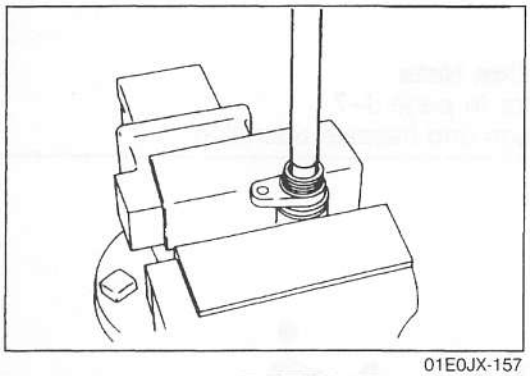
Plug, spring, steel ball

1. Apply sealant to the plugs.
2. Install the steel balls, springs and plugs.

Tightening torque:
20—29 N·m (2.0—3.0 m-kg, 14—22 ft-lb)

Spring	Diameter mm (in)	Length mm (in)
Ⓐ	7.2 (0.28)	22.5 (0.89)
Ⓑ	7.2 (0.28)	33.2 (1.31)
Ⓒ	7.2 (0.28)	22.5 (0.89)

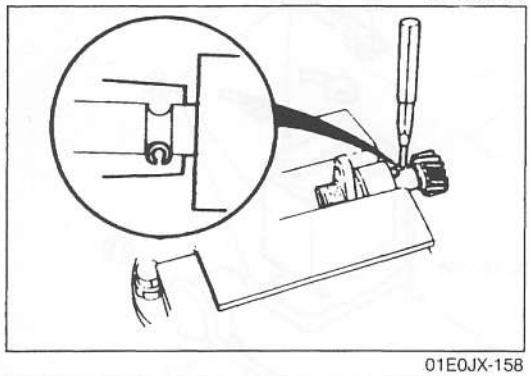
3. Confirm that the transaxle operates smoothly when shifted. If not, reassembly the transaxle.



01E0JX-157

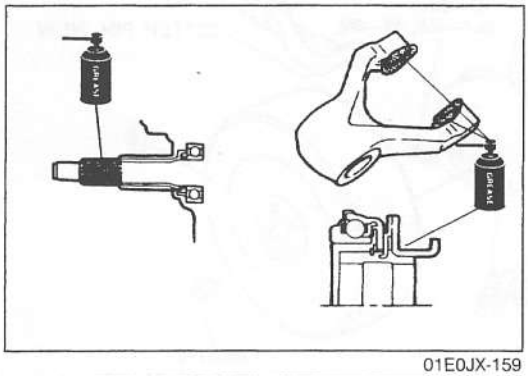
Oil seal
1. Place the speedometer gear sleeve in a vice.
2. Tap the new oil seal into the speedometer gear sleeve using a suitable pipe.

Pipe diameter: 15mm (0.59 in)



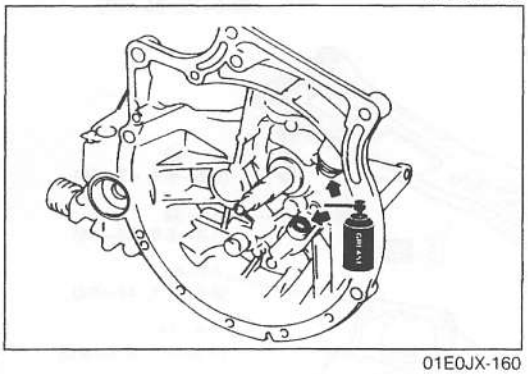
01E0JX-158

Roll pin
Install the new roll pin as shown in the figure.



01E0JX-159

Clutch release fork, clutch release color
Apply grease as shown in the figure.



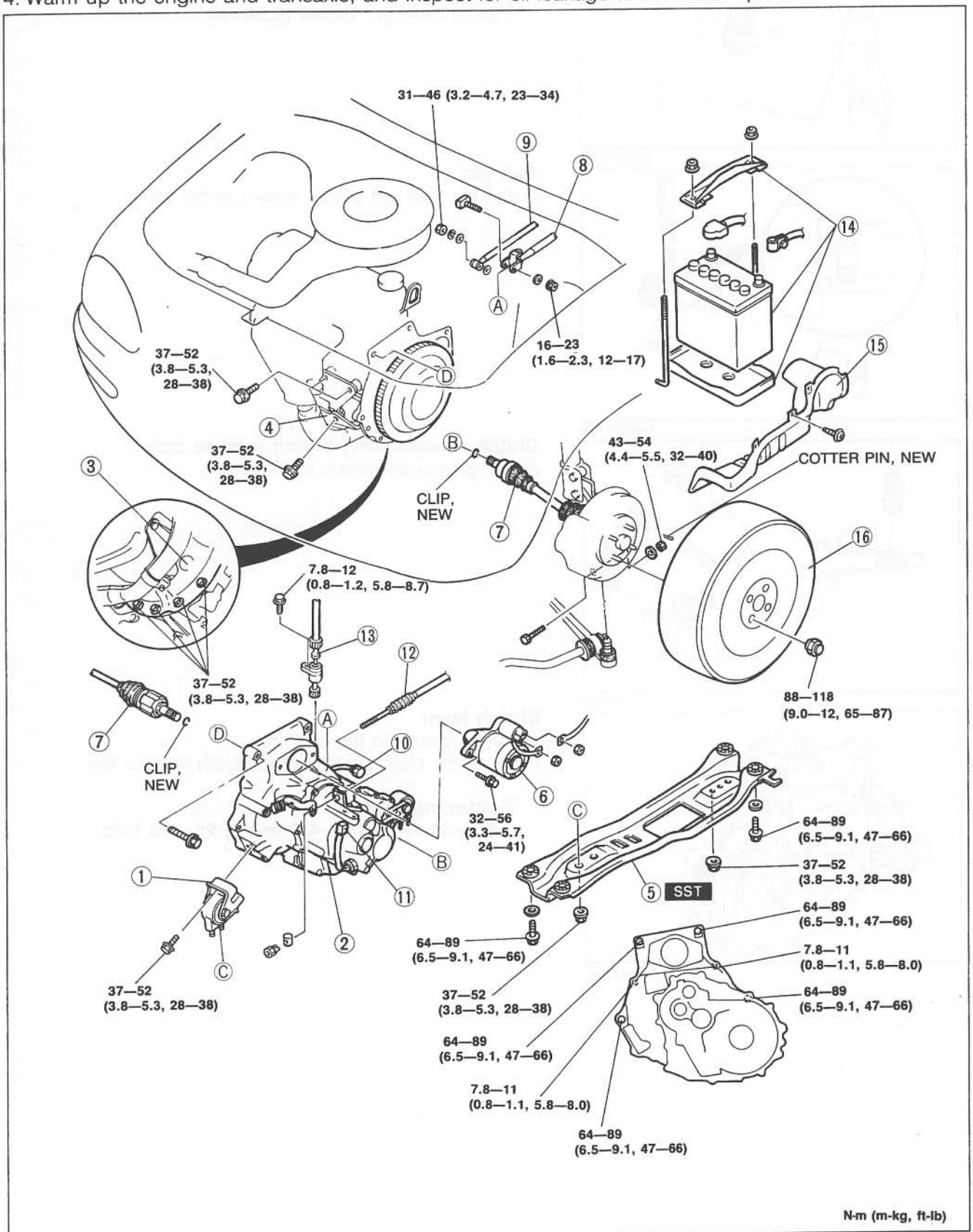
01E0JX-160

Clutch lever
1. Apply grease to the bushing.
2. Install the clutch lever to the clutch release fork.

Tightening torque:
35—41 N·m (3.6—4.2 m-kg, 26—30 ft-lb)

INSTALLATION

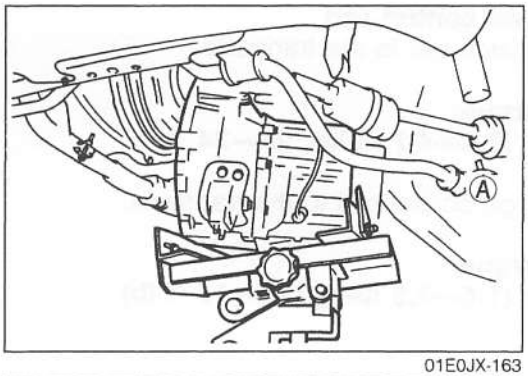
1. Raise the vehicle and support with safety stands.
2. Install in the order shown in the fighre, refferring to **Installation Note**.
3. Add the specified amount of the specified transaxle oil. (Refer to page J–7.)
4. Warm up the engine and transaxle, and inspect for oil leakage and trasaxle operation.



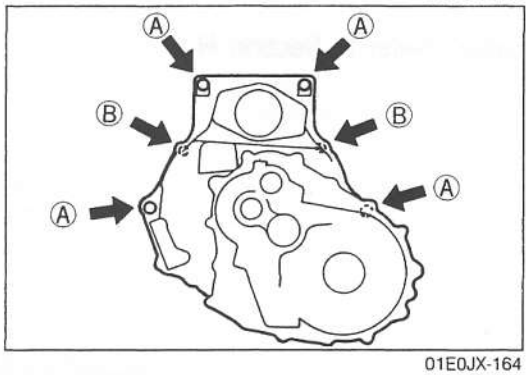
01E0JX-161

1. Engine mount No.2
2. Transaxle
   Installation Note ..... page J–57
3. Stiffner
4. Exhaust pipe bracket
5. Engine mount member
   Installation Note ..... page J–57
6. Starter
7. Driveshaft
   Installation Note ..... page J–58
8. Control rod
   Installation Note ..... page J–58
9. Extension bar
   Installation Note ..... page J–58
10. Neutral switch connector
11. Back-up light switch connector
12. Clutch cable
   Installation Note ..... page J–58
13. Speedometer cable
   Installation Note ..... page J–58
14. Battery, battery carrier
15. Splash shied
16. Wheel and tire

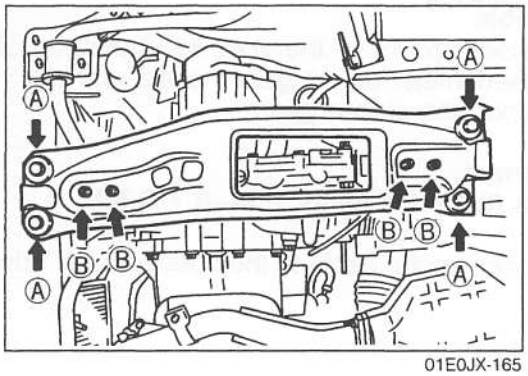
01A0JX-003



01E0JX-163



01E0JX-164



01E0JX-165

Installation Note
Transaxle

1. Set the transaxle on a jack and lift it into place.

2. Install the transaxle bolts.

Tightening torque
A: 64—89 N·m (6.5—9.1 m-kg, 47—66 ft-lb)
B: 7.3—11 N·m (0.8—1.1 m-kg, 5.8—8.0 ft-lb)

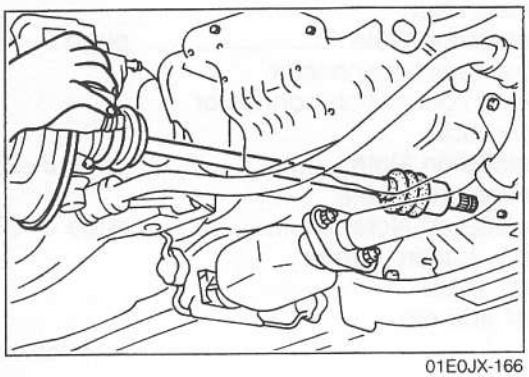
Engine mount member

1. Install the bolts and nuts as shown.

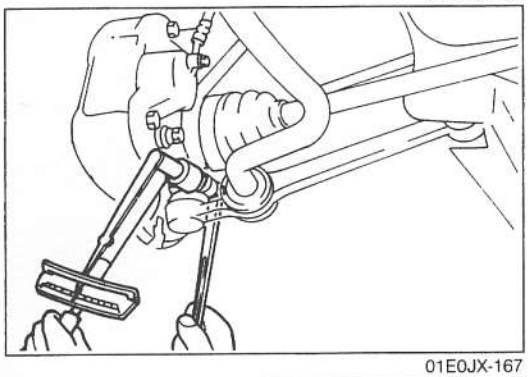
Tightening torque
Ⓐ: 64—89 N·m (6.5—9.1 m-kg, 47—66 ft-lb)
Ⓑ: 37—52 N·m (3.8—5.3 m-kg, 28—38 ft-lb)

Caution
- **Before install the engine mount member, put engine mount No.1 and No.2 studs in the installing hole.**

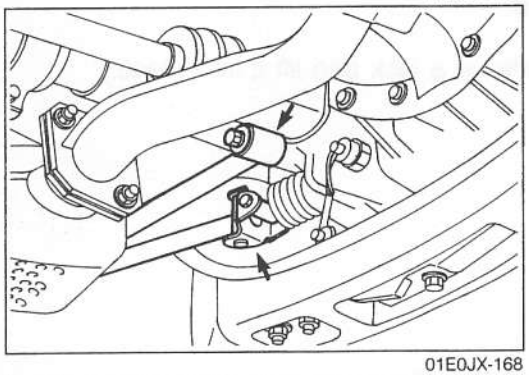
2. Remove the **SST (Engine support)**.



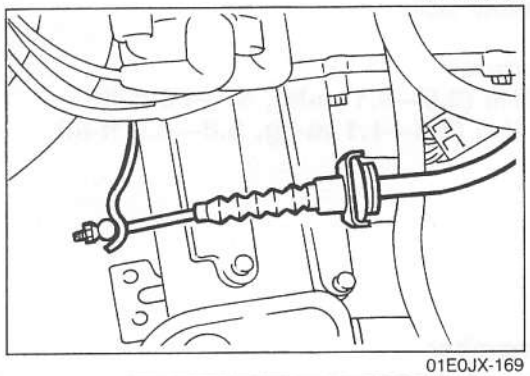
01E0JX-166



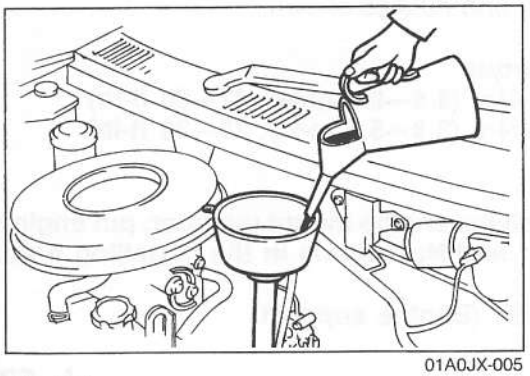
01E0JX-167



01E0JX-168



01E0JX-169



01A0JX-005

Driveshaft

Caution
- **Verify that the oil seal is not damaged.**
- **Do not damage the oil seal.**

1. Insert the new clip with the end-gap at the top of the groove.
2. Apply transaxle oil around the oil seal lip. Install the driveshaft.
3. Verify that the driveshaft is correctly seated by pulling on the shaft.
4. Connect the lower arm to the knuckle and tighten the clinch bolt.

Tightening torque:
43—54 N·m (4.4—5.5 m-kg, 32—40 ft-lb)

Extension bar and control rod

1. Install the extension bar to the transaxle.

Tightening torque:
31—46 N·m (3.2—4.7 m-kg, 23—34 ft-lb)

2. Install the change control rod to the transaxle.

Tightening torque:
16—23 N·m (1.6—2.3 m-kg, 12—17 ft-lb)

Clutch cable

Install the clutch cable. (Refer to Section H.)

Speedometer cable

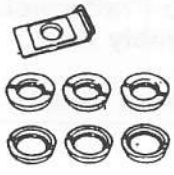
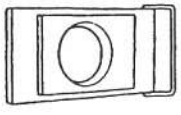
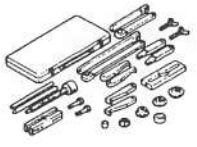
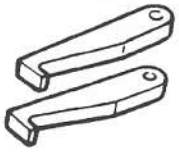
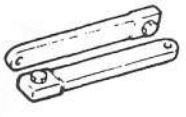
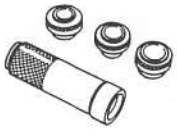
1. Add the specified amount of the specified transaxle oil thought the speedometer driven gear installation hole.
2. Install the speedometer driven gear.

Tightening torque:
7.8—12 N·m (0.8—1.2 m-kg, 5.8—8.7 ft-lb)

3. Connect the speedometer cable to the speedometer driven gear.

DIFFERENTIAL

PREPARATION
SST

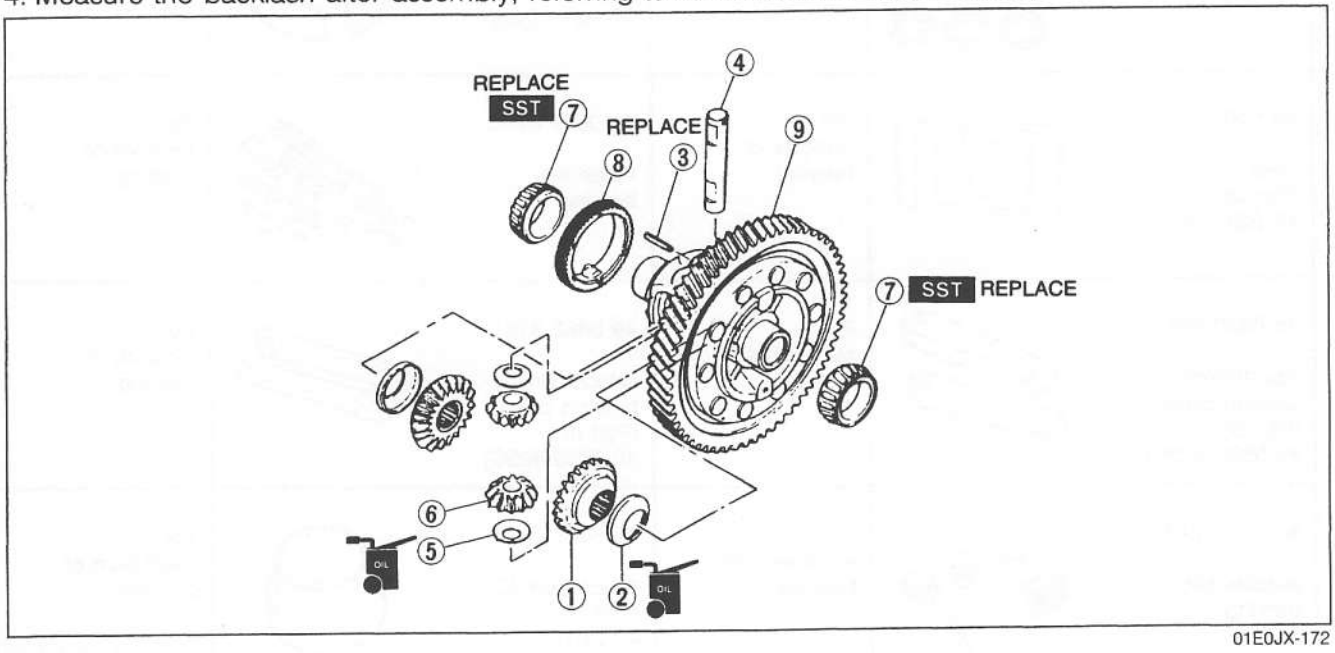
49 B017 2A0 Remover set, bearing		For removal of bearing	49 D027 002 Attachment L (Part of 49 B017 2A0)		For removal of bearing
49 F401 366A Plate (Part of 49 B017 2A0)		For removal of bearing	49 0839 425C Puller set, bearing		For removal of bearing
49 0839 428 Attachment, bearing puller (Part of 49 0839 425C)		For removal of bearing	49 0862 426 Attachment, bearing puller (Part of 49 0839 425C)		For removal of bearing
49 D017 2A1 Installer set, bearing		For installation of bearing	49 F401 337A Attachment C (Part of 49 D017 2A1)		For installation of bearing

01E0JX-171

DISASSEMBLY / INSPECTION / ASSEMBLY

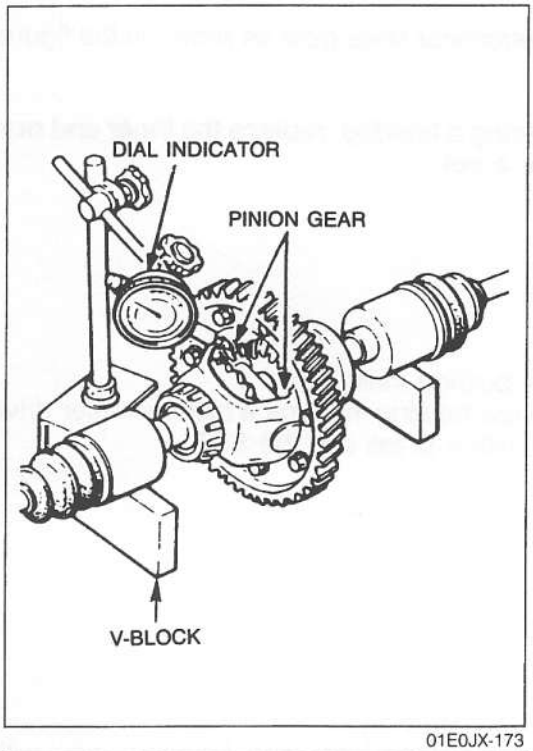
Caution
- **Do not remove the inner race if not necessary.**

1. Before disassembly, inspect the backlash of side gears, referring to **Preinspection**.
2. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
3. Inspect all parts and repair or replace as necessary.
4. Measure the backlash after assembly, referring to **Backlash of Pinion Gears**.



01E0JX-172

1. Side gear
   Inspect for wear and cracks
2. Washer
3. Roll pin
   Disassembly Note ..... page J–61
4. Pinion shaft
5. Thrust washer
6. Pinion gear
   Inspect for wear and cracks
7. Side bearing inner race
   Disassembly Note ..... page J–61
   Inspect for wear and cracks
8. Speedometer drive gear
9. Ring gear and gear case
   Inspect for wear and cracks

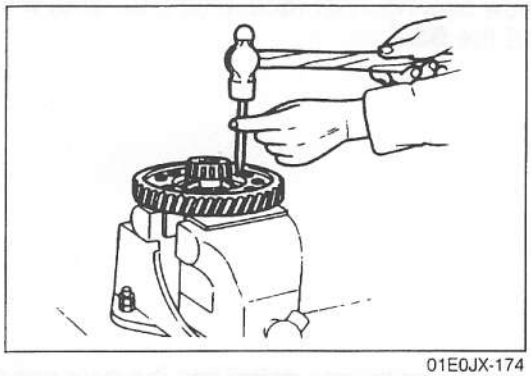


01E0JX-173

Preinspection
Backlash of pinion gears
Measure the backlash as follows.
1. Install the left and right driveshafts into the differential assembly.
2. Measure the backlash of both pinion gears.

Backlash : 0—0.1mm (0—0.004 in)
Maximum: 0.5mm (0.020 in)

3. If the backlash is not as specified, replace the differential as an assembly.

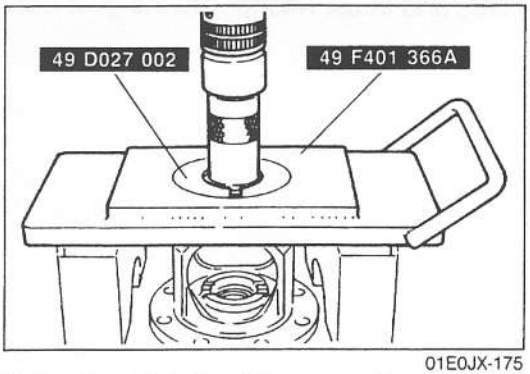


01E0JX-174

Disassembly Note
Roll pin

Caution
- **Use protective plates in the vise.**
- **Insert the punch into the roll pin hole from the ring gear side.**

Secure the gear case in a vice and tap out the roll pin.



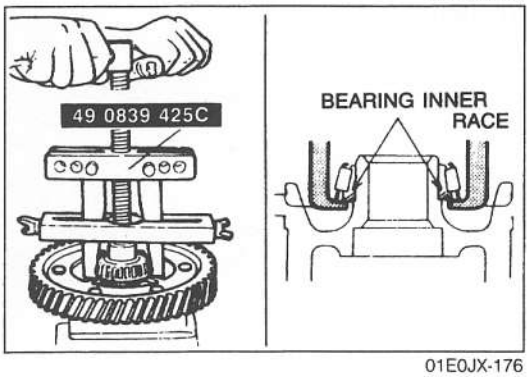
01E0JX-175

Side bearing inner race

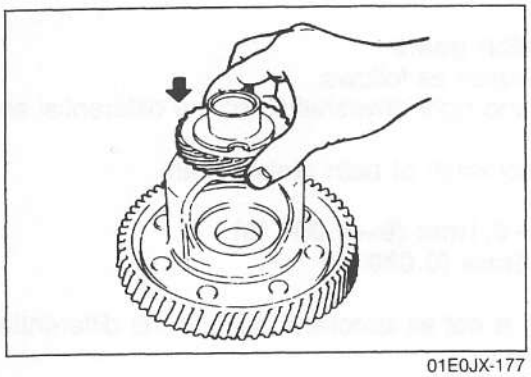
Caution
- **When replacing a bearing, replace the inner and outer races as a set.**

1. Remove the bearing inner race (speedometer drive gear side) with the **SST**.

2. Remove the bearing inner race (ring gear side) with the **SST**.



01E0JX-176



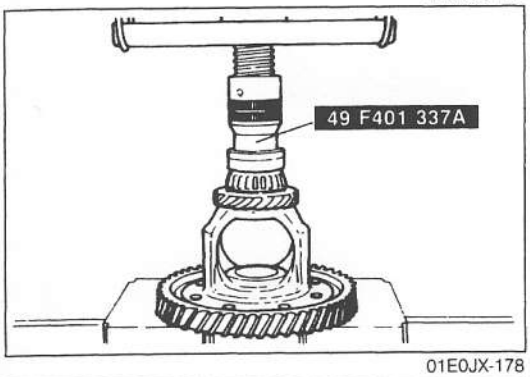
01E0JX-177

Assembly

1. Install the speedometer drive gear as shown in the figure.

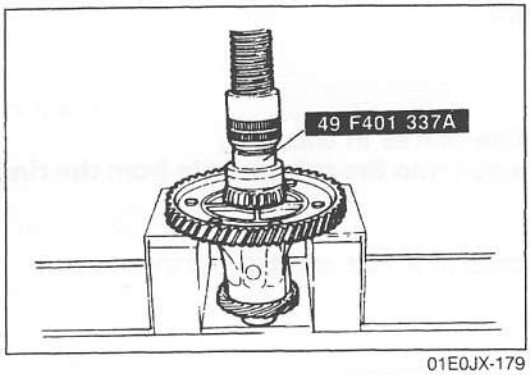
Caution

- **When replacing a bearing, replace the inner and outer races as a set.**



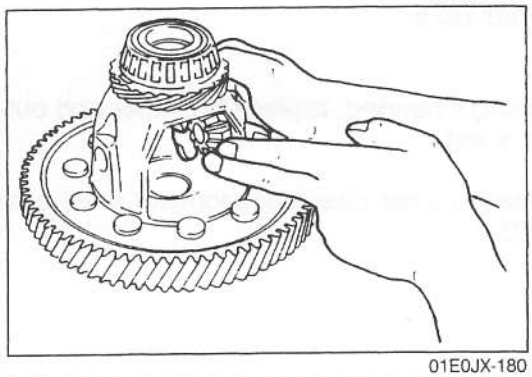
01E0JX-178

2. Install the new bearing inner race.
   (1) Install the new bearing inner race (speedometer drive gear side) with a press and the **SST**.



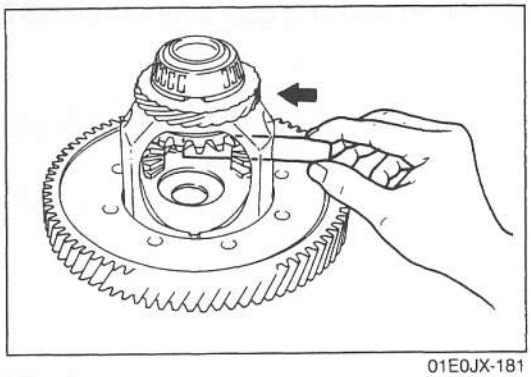
01E0JX-179

   (2) Install the new bearing inner race. (ring gear side) with a press and the **SST**.



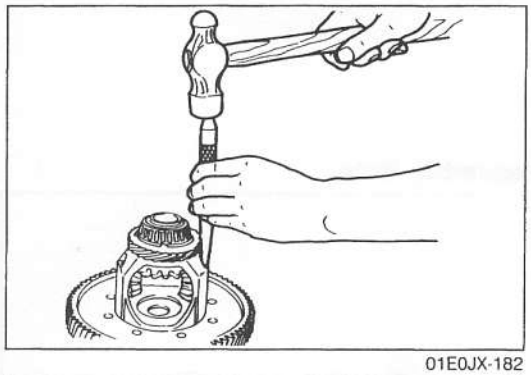
01E0JX-180

3. Set the pinion gears and thrust washer into the gear case.



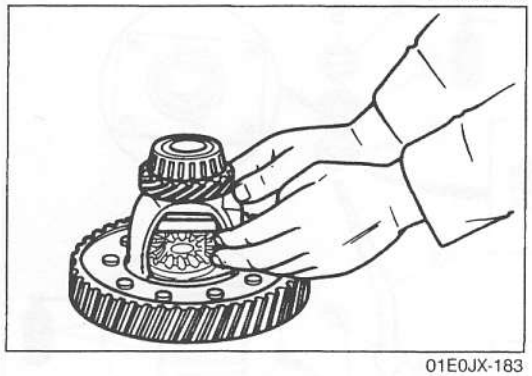
01E0JX-181

4. Insert the pinion shaft.



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5. Install a new roll pin and stake the case to prevent it from working out.



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6. Install the side gears and washers.

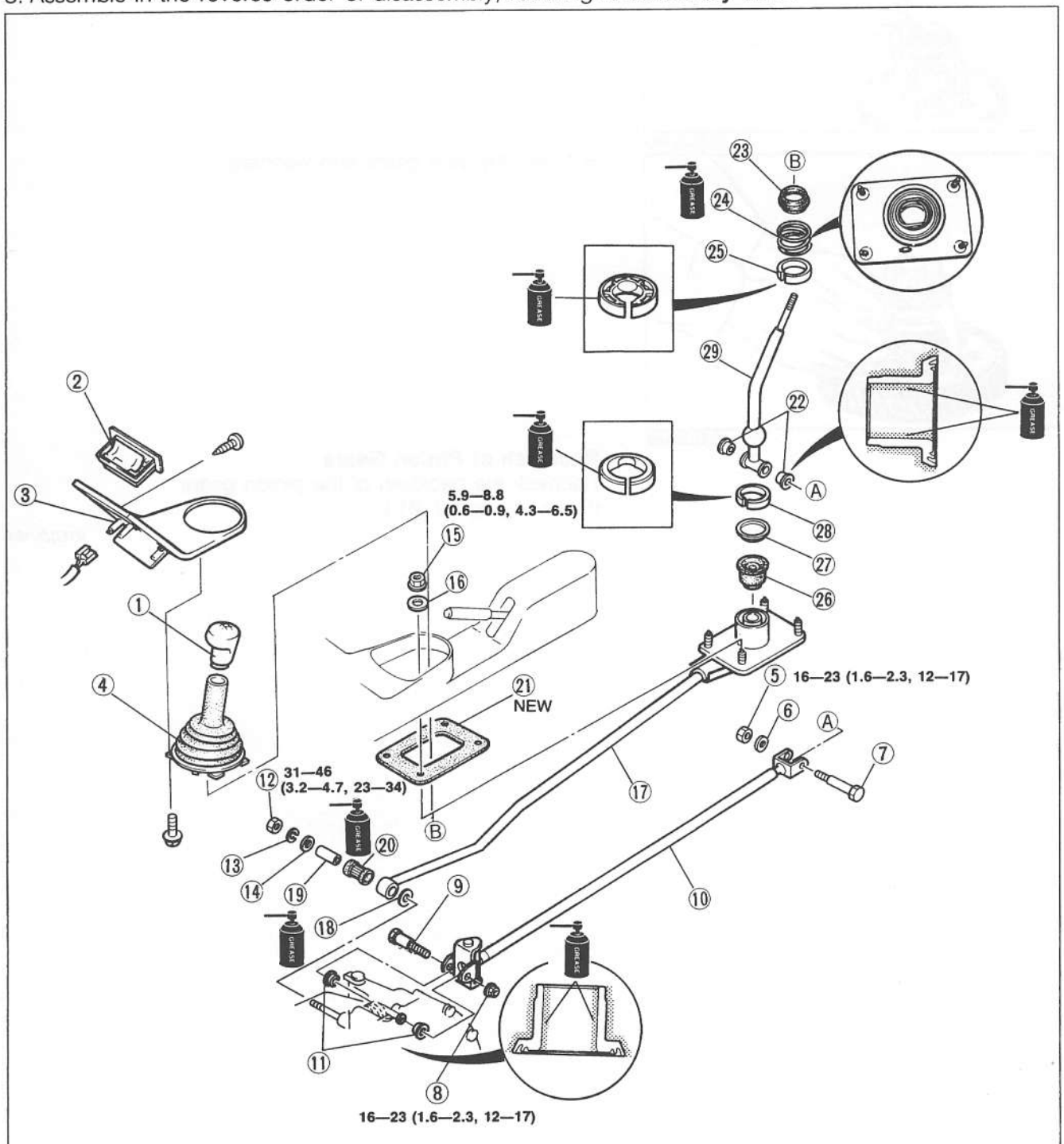
Backlash of Pinion Gears
Recheck the backlash of the pinion gears.
(Refer to page J–61.)

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SHIFT MECHANISM

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**.

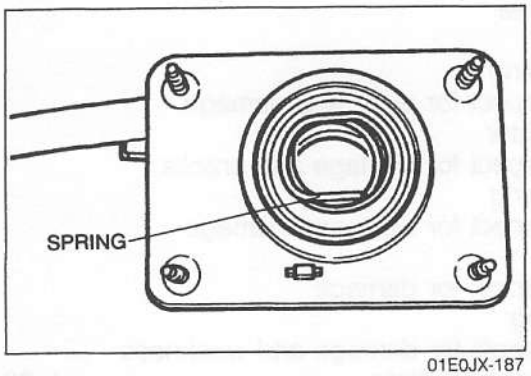


N-m (m-kg, ft-lb)

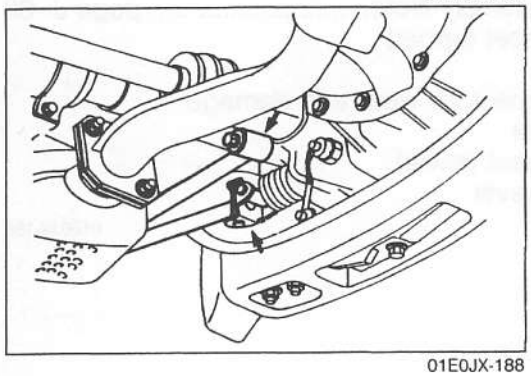
01E0JX-185

1. Shift lever knob
2. Ashtray
3. Front console
4. Boot
5. Nut
6. Washer
7. Bolt
8. Nut
9. Bolt
10. Control rod
    Inspect for bending
    Assembly Note..... page J–66
11. Bushing
    Inspect for wear and damage
12. Nut
13. Washer
14. Washer
15. Nut
16. Washer
17. Extension bar
    Inspect for bending
    Assembly Note..... page J–66
18. Washer
19. Pipe
20. Bushing
    Inspect for wear and damage.
21. Insulator
    Inspect for damage and cracks
22. Bushing
    Inspect for wear and damage
23. Boot
    Inspect for damage
24. Spring
    Inspect for damage and weakness
    Assembly Note..... page J–66
25. Ball seat (upper)
26. Boot
    Inspect for wear and damage
27. Holder
28. Ball seat (lower)
29. Shift lever

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Assembly Note
Spring
1. Apply grease to the spring.
2. Assemble the spring as shown in the figure.

Extension bar
1. Assemble the insulator to the bracket of the extension bar and install the nuts and washers.
2. Connect the extension bar to the transaxle, then to the body.

Tightening torque
Transaxle:
5.9—8.8 N·m (0.6—0.9 m-kg, 4.3—6.5 ft-lb)
Shift lever:
31—46 N·m (3.2—4.7 m-kg, 23—34 ft-lb)

Control rod
1. Install the control rod.
2. Verify smooth operation of the shift mechanism.

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