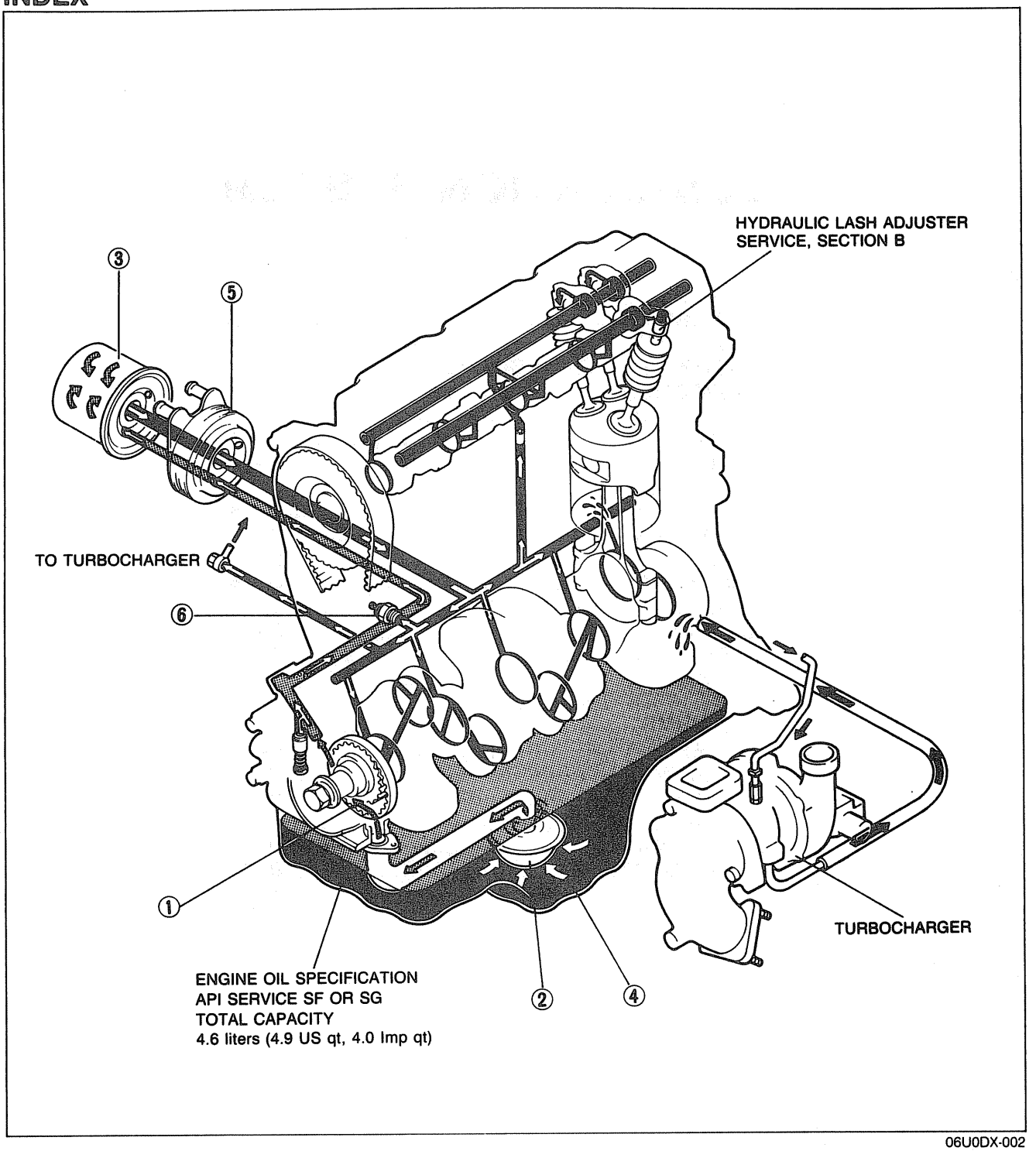
# LUBRICATION SYSTEM





06U0DX-001

# INDEX




06U0DX-002

# OUTLINE

## SPECIFICATIONS

| Item \ Engine | | | F2 | |
|---|---|---|---|---|
| | | | Turbo | Non-Turbo |
| Lubrication system | | | Force-fed | |
| Oil pump | Type | | Trochoid gear | |
| | Regulated pressure | kPa (kg/cm², psi) | 294—392 (3.0—4.0, 43—57) | |
| | Oil pressure | kPa (kg/cm², psi)—rpm | 147—245 (1.5—2.5, 21—36)—1,000 | |
| | | | 294—392 (3.0—4.0, 43—57)—3,000 | |
| Oil filter | Type | | Full-flow, paper element | |
| | Relief pressure differential | kPa (kg/cm², psi) | 78—118 (0.8—1.2, 11—17) | |
| Oil cooler | Type | | Water-cooled, 4-stage | — |
| Oil warning pressure | | kPa (kg/cm², psi) | 29 (0.3, 4.3) | |
| Oil capacity | Total (dry engine) | liters (US qt, Imp qt) | 4.6 (4.9, 4.0) | |
| | Oil pan | liters (US qt, Imp qt) | 3.9 (4.1, 3.4) | |
| | Oil filter | liters (US qt, Imp qt) | 0.22 (0.23, 0.19) | |
| Engine oil (API service) | | | SF or SG | |

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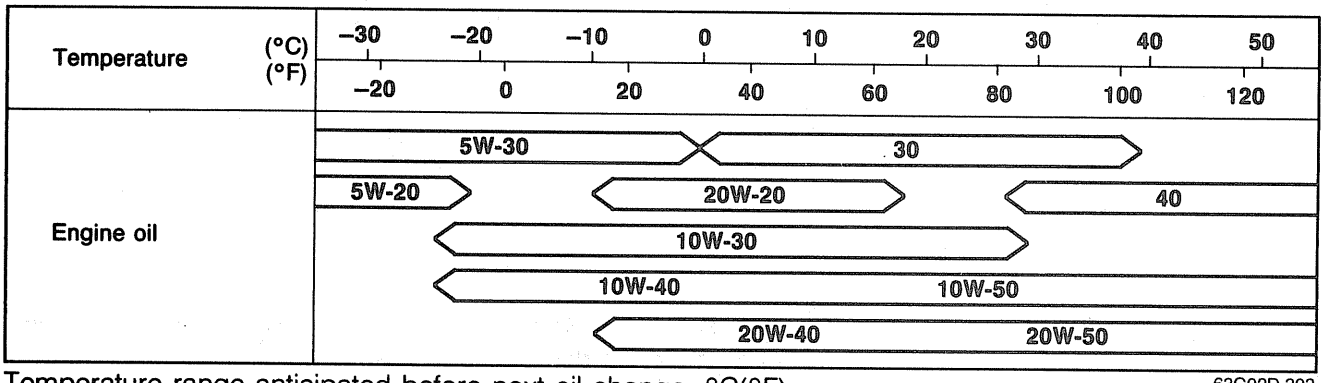
### Recommended SAE Viscosity




Temperature range anticipated before next oil change, °C(°F)

63G02D-303

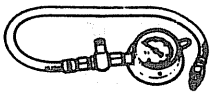
# TROUBLESHOOTING GUIDE

| Problem | Possible Cause | Remedy | Page |
|---|---|---|---|
| **Engine hard starting** | Improper engine oil<br>Insufficient engine oil | Replace<br>Add oil | D– 4<br>D– 4 |
| **Excessive oil consumption** | Oil working up or working down<br>Oil leakage | Refer to Section B<br>Repair | <br>— |
| **Oil pressure drop** | Insufficient oil<br>Oil leakage<br>Worn or damaged oil pump gear (outer and inner rotor)<br>Worn plunger (inside oil pump) or weak spring<br>Clogged oil strainer<br>Excessive main bearing or connecting rod bearing clearance | Add oil<br>Repair<br>Replace<br>Replace<br>Clean<br>Refer to Section B | D– 4<br>—<br>D– 9<br>D– 9<br>—<br> |
| **Warning lamp illuminated while engine running** | Oil pressure drop<br>Malfunction of oil pressure switch<br>Malfunction of electrical system | As described above<br>Refer to Section T<br>Refer to Section T | — |

06U0DX-004

# INSPECTION

## PREPARATION
### SST

| | | |
|---|---|---|
| 49 0187 280<br>Oil-pressure gauge |  | For inspection of oil pressure |

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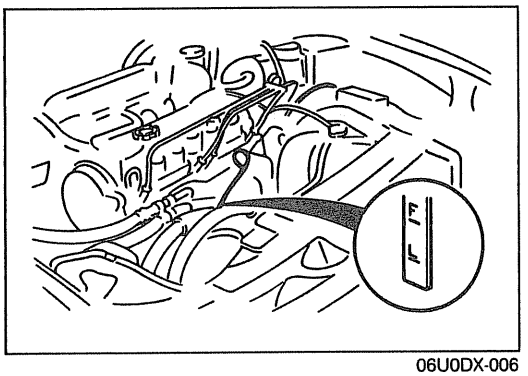

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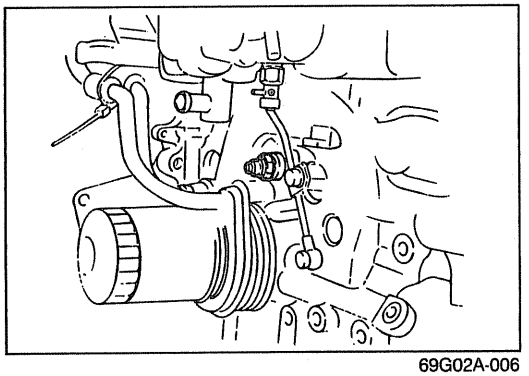

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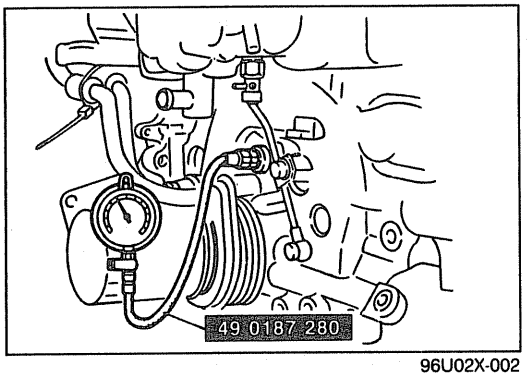


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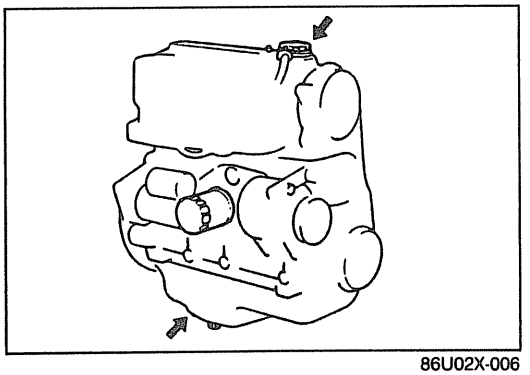

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### ENGINE OIL
1. Be sure the vehicle is on level ground.
2. Warm up the engine to normal operating temperature and stop it.
3. Wait for five minutes.
4. Remove the oil level gauge and check the oil level and condition.
5. Add or replace oil if necessary.

**Note**
- **The distance between the L and F marks on the level gauge represents 1.0 liter (1.06 US qt, 0.88 Imp qt).**

### OIL PRESSURE
1. Remove the oil pressure switch.
2. Screw the **SST** into the pressure switch installation hole.
3. Warm up the engine to normal operating temperature.
4. Run the engine at **3,000 rpm**, and note the gauge reading.

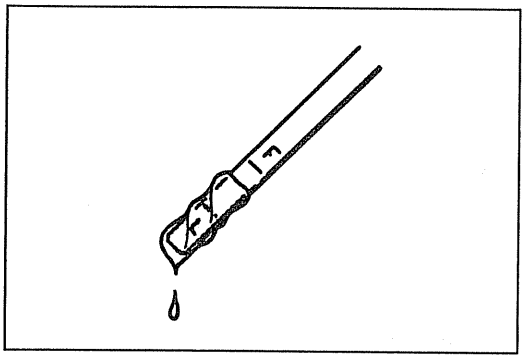
**Oil pressure:**
**147—245 kPa**
**(1.5—2.5 kg/cm$^2$, 21—36 psi)—1,000 rpm**
**294—392 kPa**
**(3.0—4.0 kg/cm$^2$, 43—57 psi)—3,000 rpm**

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

# ENGINE OIL

## REPLACEMENT
1. Warm up the engine to the 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.

**Warning**
- **Be careful when draining, the oil is very hot.**



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4. Install the drain plug and a new gasket.
5. Refill the engine with the specified type and amount of engine oil.
6. Refit the oil filler cap.

**Oil pan capacity:**
**3.9 liters (4.1 US qt, 3.4 Imp qt)**

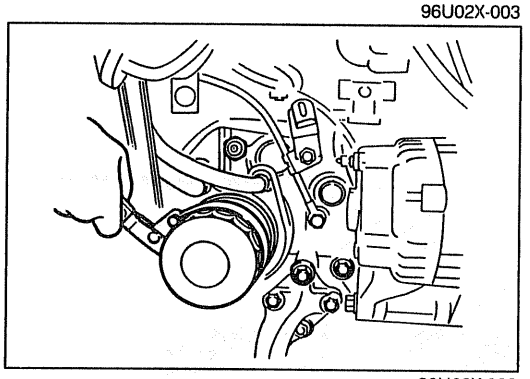
7. Recheck the oil level after the engine has been run.



## OIL FILTER

### REPLACEMENT

1. Remove the oil filter with a suitable wrench.
2. Use a clean rag to wipe off the mounting surface on the engine.



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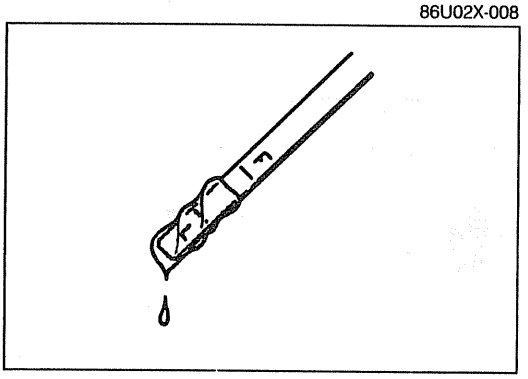

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3. Apply a small amount of engine oil to the rubber seal of the new filter.
4. Install the oil filter until the rubber seal contacts the base, and then tighten the filter 1-1/6 turn with a wrench.
5. Start the engine and inspect around the filter seal for leaks.
6. Check the oil level and add oil if necessary.

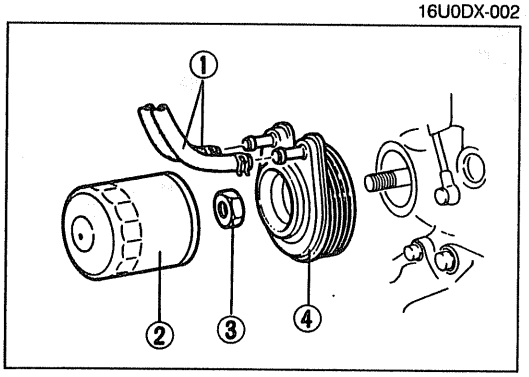
**Oil filter capacity:**
**0.22 liters (0.23 US qt, 0.19 Imp qt)**

## OIL COOLER (Turbo)

### REMOVAL / INSTALLATION

Remove in the sequence shown in the figure.
Install in the reverse order of removal.

1. Water hose
2. Oil filter
3. Nut
4. Oil cooler




16U0DX-003

**Nut tightening torque:**
**29—39 N·m (3.0—4.0 m-kg, 22—29 ft-lb)**

# OIL PAN

## REMOVAL

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

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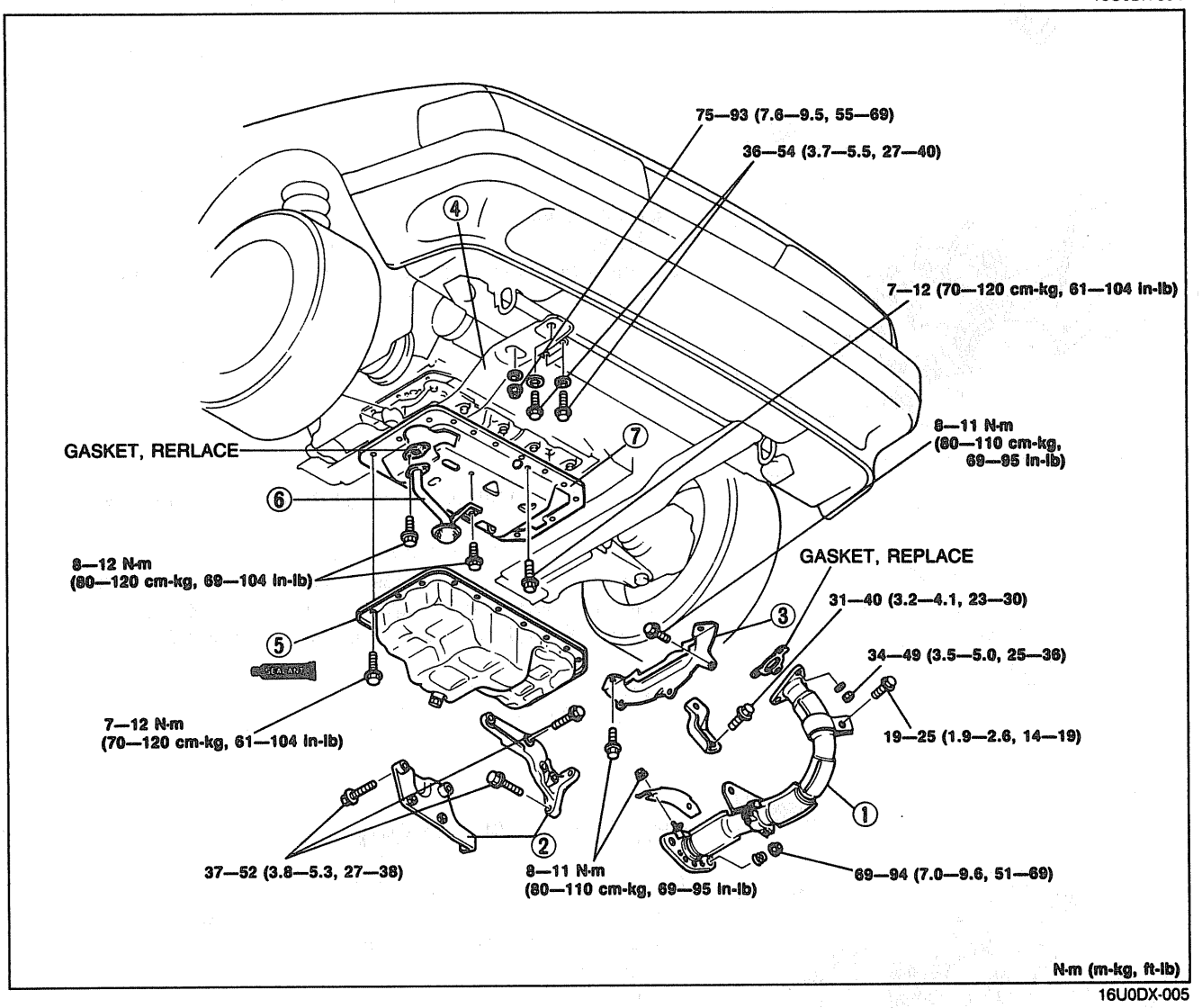
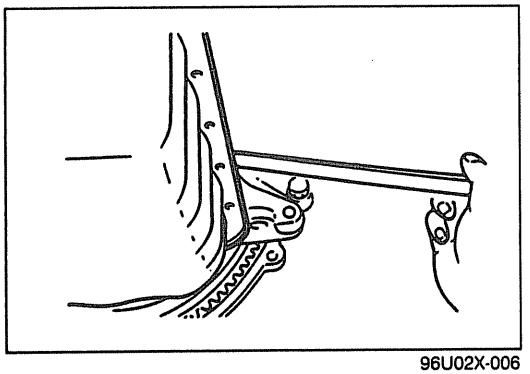



16U0DX-005

1. Exhaust pipe
2. Gusset plate
3. Clutch housing under cover
4. Sub frame (RH)
5. Oil pan
6. Oil strainer
7. Stiffener



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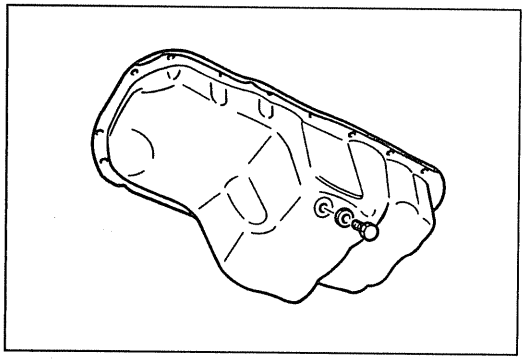
**Removal Note**

**Oil pan**

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

**Caution**

- **Do not bend the oil pan when prying loose.**



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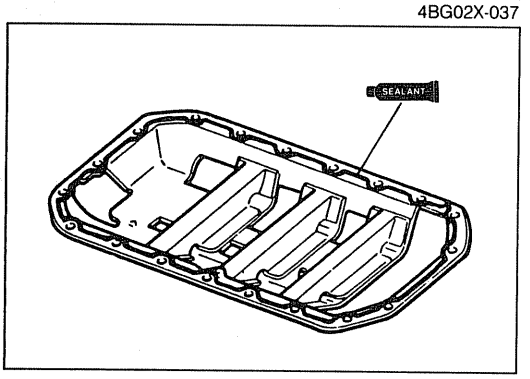
## INSPECTION

Check the following points. Repair or replace if necessary.
1. Cracks, deformation, damage
2. Damaged drain plug threads



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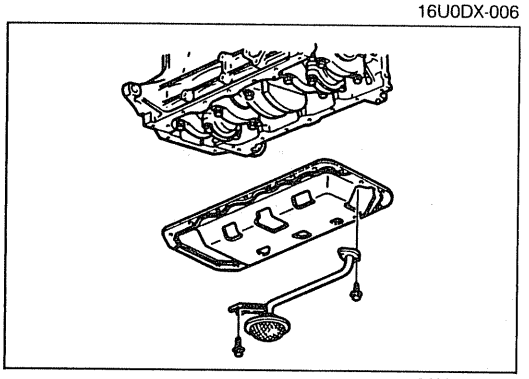
## INSTALLATION

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

**Installation Note**
**Stiffener, oil strainer, oil pan**
1. Remove any dirt or other material from the contact surface.
2. Apply silicon sealant to the stiffener around the inside of the bolt holes and overlap the ends.
3. Install the stiffener.

**Tightening torque:**
**7—12 N·m (70—120 cm-kg, 61—104 in-lb)**



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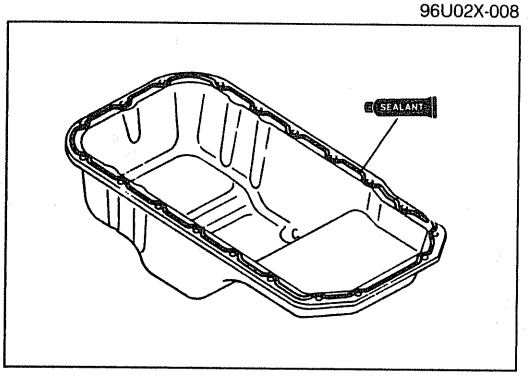
4. Install the oil strainer and a new gasket.

**Tightening torque:**
**8—12 N·m (80—120 cm-kg, 69—104 in-lb)**

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5. Apply a continuous bead of silicon sealant to the oil pan around the inside of the bolt holes and overlap the ends.

**Caution**
- **Secure the stiffener and oil pan within 30 minutes after applying the sealant.**

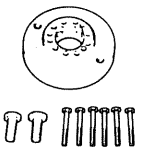
6. Install the oil pan.

**Tightening torque:**
**7—12 N·m (70—120 cm-kg, 61—104 in-lb)**

**Steps After Installation**
1. Supply the specified amount and type of oil.
2. Start the engine and check for leakage.

# OIL PUMP

## PREPARATION
## SST

| | | | |
|---|---|---|---|
| 49 S120 710<br>Holder, coupling flange  | For removal and installation of timing belt pulley | 49 H011 101A<br>Lock tool, crankshaft  | For removal and installation of timing belt pulley |

06U0DX-008

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

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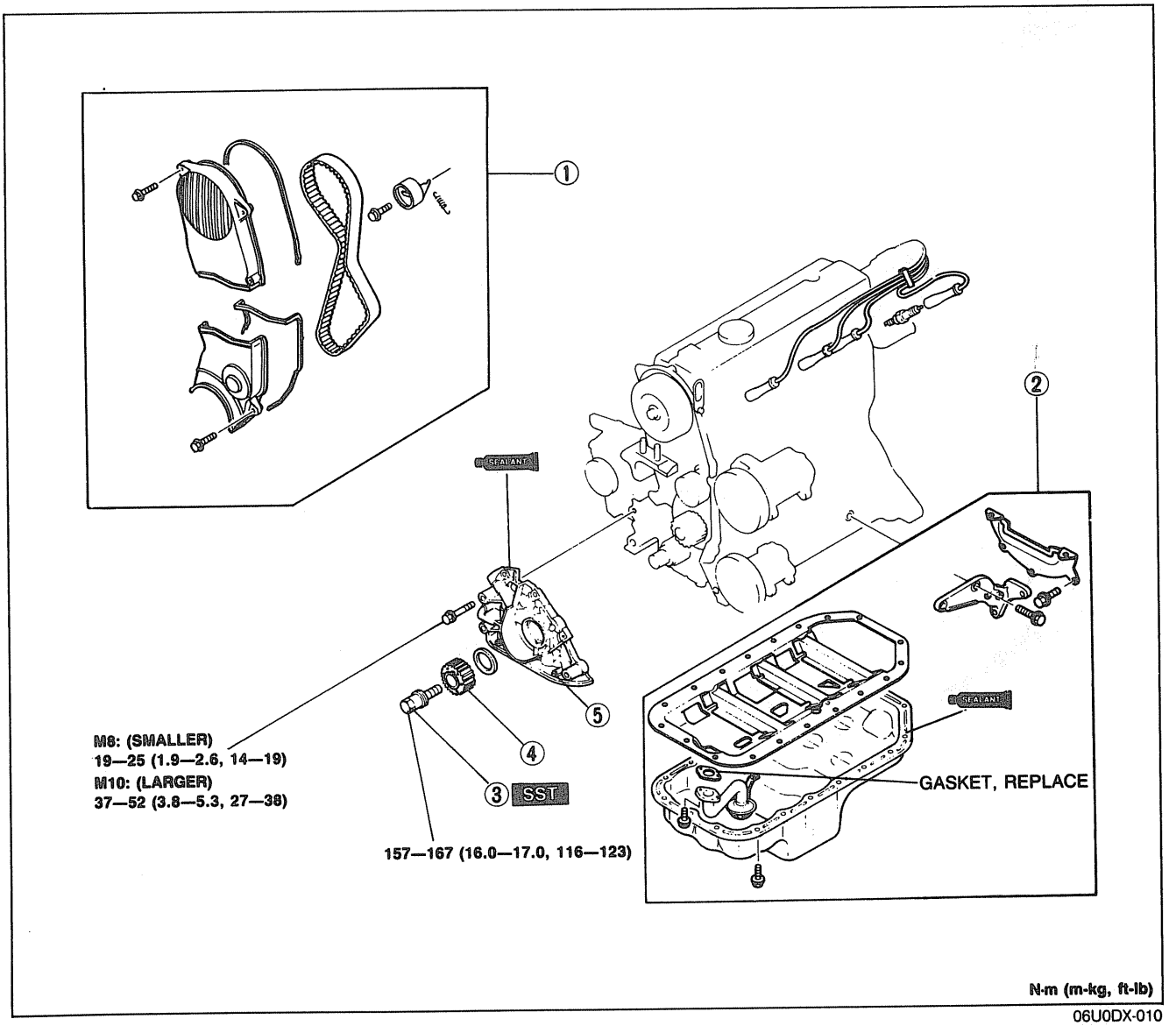


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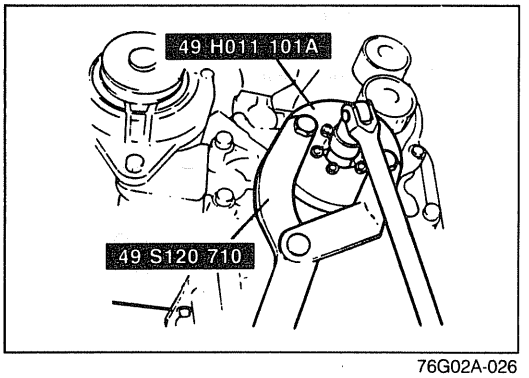
1. Timing belt (Refer to Section B)
2. Oil pan (Refer to page D–6)
3. Timing belt pulley lock bolt
4. Timing belt pulley
5. Oil pump




76G02A-026

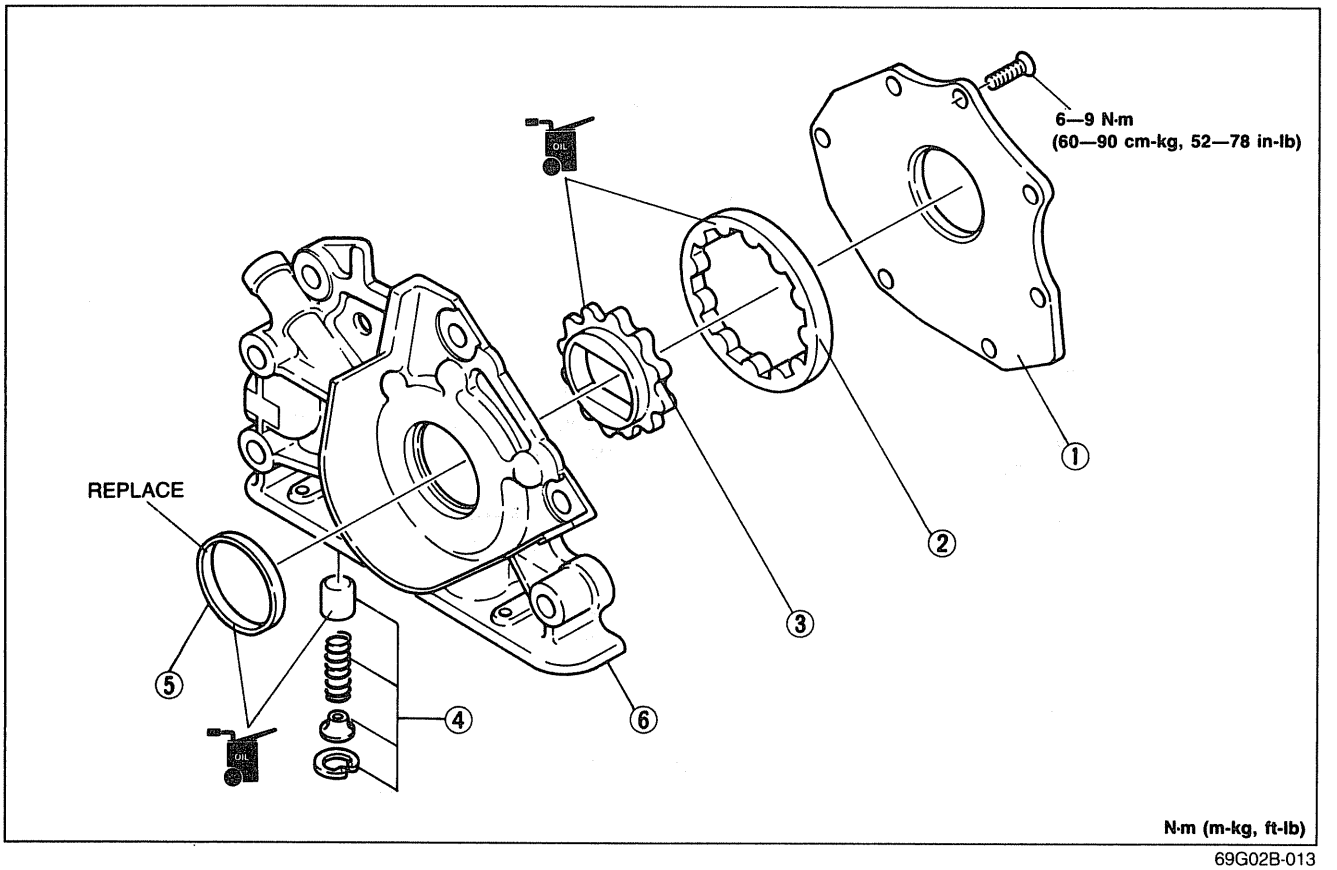
**Removal Note**
**Timing belt pulley lock bolt**
Hold the timing belt pulley with the **SST** and remove the lock bolt.



## DISASSEMBLY

Disassemble in the order shown in the figure.

16U0DX-008

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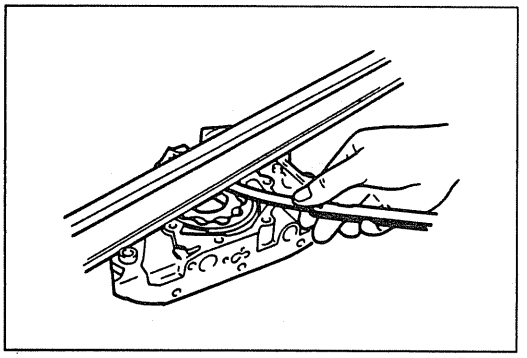
1. Pump cover
2. Outer rotor
3. Inner rotor
4. Pressure relief valve
5. Oil seal
6. Oil pump body



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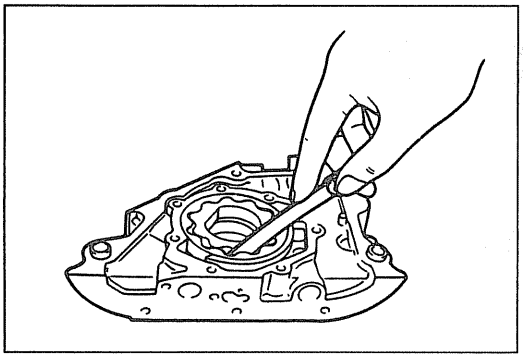
## INSPECTION

1. Check for the following and repair or replace as necessary.
   (1) Distorted or damaged oil pump body or cover
   (2) Worn or damaged plunger
   (3) Weak or broken plunger spring
2. Measure the side clearance.

**Clearance: 0.10mm (0.004 in) max.**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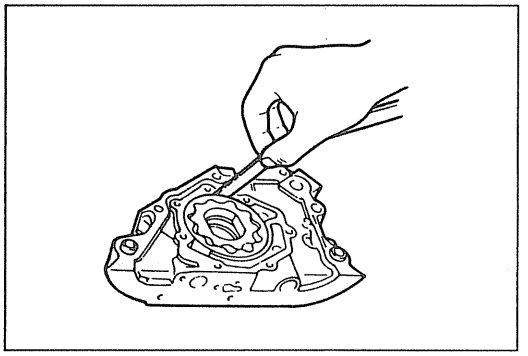
3. Measure the tooth tip clearance.

**Clearance: 0.18mm (0.007 in) max.**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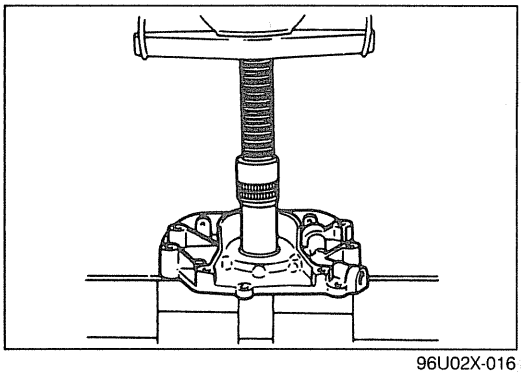
4. Measure the outer rotor to pump body clearance.

**Clearance: 0.20mm (0.008 in) max.**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## ASSEMBLY

Assemble the pump as follows.

### Oil Seal

1. Apply engine oil to the pump body and the outside of the new oil seal.
2. Press in the oil seal with a suitable pipe (outer diameter: 48mm (1.89 in)).

### Pressure Relief Valve

1. Install the plunger and spring in the pump body.
2. Fit the snap ring.

### Outer and Inner Rotor

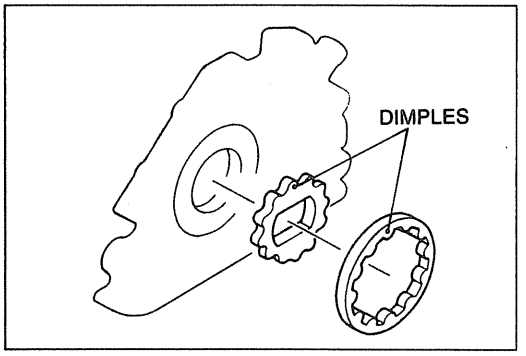
Install the rotors with the dimples facing the pump cover.

### Oil Pump Cover

1. Apply thread locking compound to the cover mounting screws' threads.
2. Attach the oil pump cover to the body.

**Tightening torque:**
**6—9 N·m (60—90 cm-kg, 52—78 in-lb)**

3. Check that the rotor turns smoothly.



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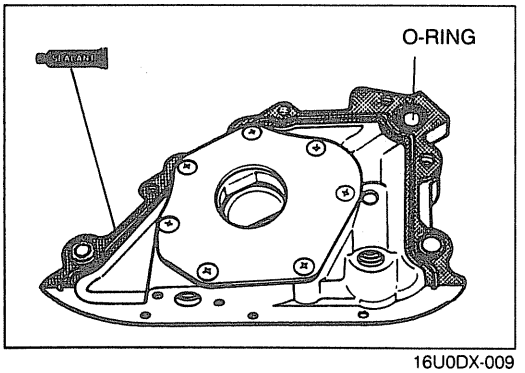
## INSTALLATION

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



16U0DX-009

### Installation Note

**Oil pump**

1. Apply grease to a new O-ring and install it in the oil pump body.
2. Apply silicon sealant to the shaded area as shown in the figure.
3. Apply engine oil to the oil seal lip.

### Steps After Installation

1. Supply the specified amount and type of oil.
2. Start the engine and check for leakage.