

01-11 LUBRICATION

LUBRICATION SYSTEM

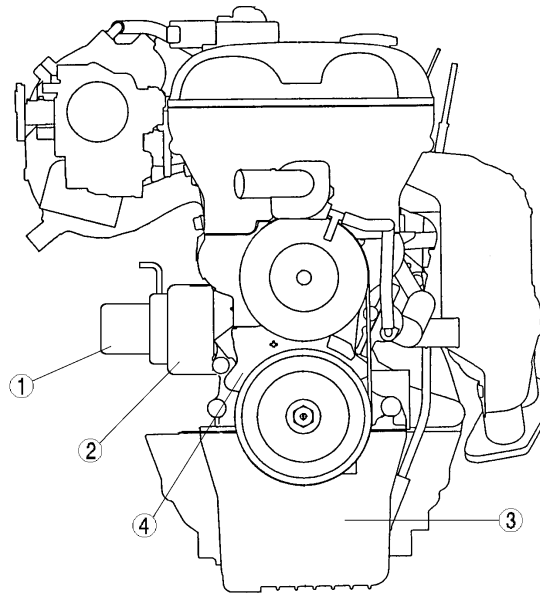
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LUBRICATION SYSTEM LOCATION INDEX

A5U011114001W01



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1	Oil filter (See 01-11-3 OIL FILTER REPLACEMENT)
2	Oil cooler (See 01-11-4 OIL COOLER REMOVAL/ INSTALLATION)
3	Oil pan (See 01-11-4 OIL PAN REMOVAL/ INSTALLATION)

4	Oil pump (See 01-11-9 OIL PUMP REMOVAL/ INSTALLATION) (See 01-11-10 OIL PUMP DISASSEMBLY/ ASSEMBLY) (See 01-11-10 OIL PUMP INSPECTION)
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ENGINE OIL LEVEL INSPECTION

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1. Position the vehicle on level ground.
2. Warm up the engine to normal operating temperature and stop it.
3. Wait for **5 min**.
4. Remove the dipstick and inspect oil level and condition.
5. Verify that the oil level is within the F and L marks on the dipstick.
 - Add or replace oil if necessary.

ENGINE OIL REPLACEMENT

A5U011114001W03

Warning

- Hot engines and the engine oil can cause severe burn. Do not burn yourself with either.
- A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.
- Continuous exposure to USED engine oil has caused skin cancer in laboratory mice. Protect your skin washing with soap and water immediately after working with engine oil.

1. Position the vehicle on level ground.
2. Remove the oil filler cap and the oil pan drain plug.
3. Drain the oil into a container.
4. Install the drain plug with new washer.

Tightening torque

30—41 N·m {3.0—4.2 kgf·m, 22—30 ft·lbf}

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

Note

- The actual oil level may vary from the specified capacity in some cases.

Oil capacity

L {US qt, Imp qt}

Item	Engine
	BP
Oil replacement	3.6 {3.8, 3.2}
Oil and oil filter replacement	3.8 {4.0, 3.3}
Total (dry engine)	4.0 {4.2, 3.5}

Engine oil grade

API Service

SG (Energy Conserving II) , SH (Energy Conserving II) or ILSAC (GF-I) SJ or ILSAC (GF-II)

Engine oil viscosity

Above -25°C {-13°F}: SAE 10W-30

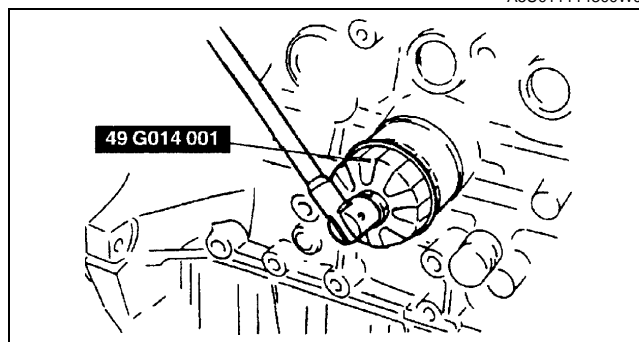
-30—37°C {-22—98°F}: SAE 5W-30

6. Refit the oil filler cap.
7. Run the engine and inspect for oil leakage.
8. Inspect the oil level.
 - Add oil if necessary. (See 01-11-2 ENGINE OIL LEVEL INSPECTION.)

OIL FILTER REPLACEMENT

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1. Remove the oil filter using the **SST**.
2. Use a clean rag to wipe off the mounting surface on the oil filter body.
3. Apply clean engine oil to the O-ring of the oil filter.
4. Using the **SST**, tighten the filter according to the installation direction on the side of it or packing box.
5. Start the engine and inspect for oil leakage.
6. Inspect the oil level.
 - Add oil if necessary. (See 01-11-2 ENGINE OIL LEVEL INSPECTION.)



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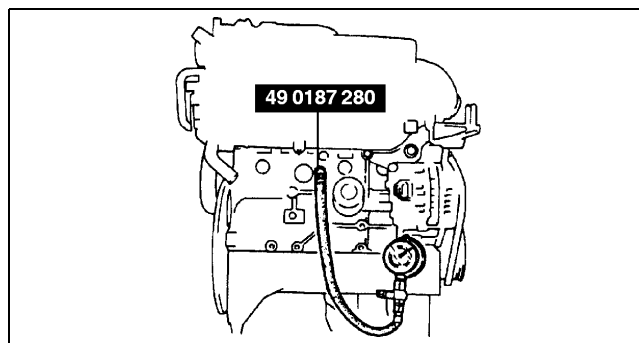
OIL PRESSURE INSPECTION

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Warning

- Continuous exposure to USED engine oil has caused skin cancer in laboratory mice. Protect your skin washing with soap and water immediately after working with engine oil.
- Hot engines and engine oil are hot, they can cause burns. Turn off the engine and wait until it and engine oil have cooled.

1. Remove the oil pressure switch.
2. Screw the **SST** into the oil pressure switch installation hole.
3. Warm up the engine to normal operating temperature.
4. Run the engine at the specified speed, and note the gauge readings.
 - If the pressure is not as specified, inspect amount of engine oil, and inspect for oil leakage or any wear parts inside of engine, etc. Repair or replace if necessary.



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Note

- The oil pressure can vary with oil viscosity and temperature.

Oil pressure

295—392 kPa {3.0—4.0 kgf/cm², 43—56 psi} [3,000 rpm]

5. Stop the engine and wait until it is cool.
6. Remove the **SST**.
7. Apply silicone sealant to the oil pressure switch threads as shown.

Caution

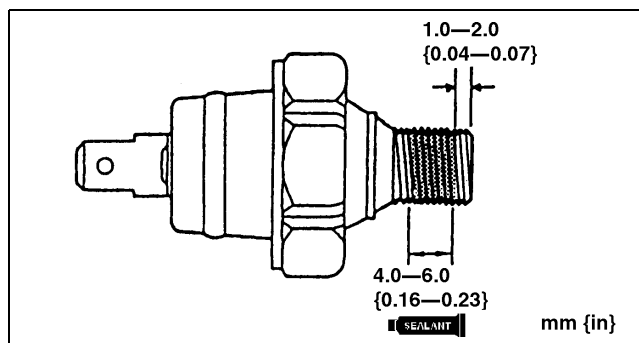
- Do not apply liquid gasket to the tip of the oil pressure switch by 1.0—2.0 mm {0.4—0.7 in }.

8. Install the oil pressure switch.

Tightening torque

12—17 N·m {1.2—1.8 kgf·m, 9—13 ft·lbf}

9. Start the engine and inspect for oil leakage.



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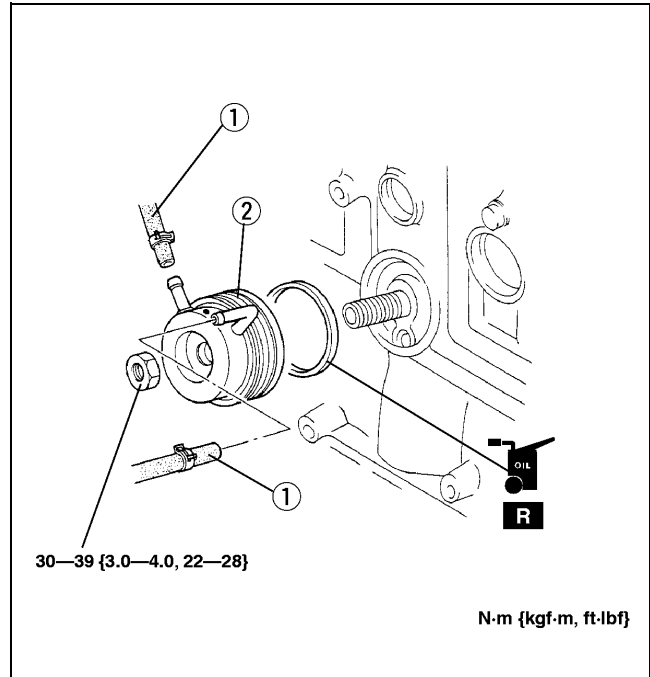
OIL COOLER REMOVAL/INSTALLATION

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1. Disconnect the negative battery cable.
2. Drain the engine coolant. (See 01-12-2 ENGINE COOLANT REPLACEMENT.)
3. Remove the intake manifold bracket.
4. Remove the oil filter. (See 01-11-3 OIL FILTER REPLACEMENT.)
5. Remove in the order indicated in the table.

1	Water hose
2	Oil cooler

6. Install in the reverse order of removal.
7. Inspect the engine oil level. (See 01-11-2 ENGINE OIL LEVEL INSPECTION.)
8. Start the engine and inspect for engine oil leakage.



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OIL PAN REMOVAL/INSTALLATION

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1. Disconnect the negative battery cable.
2. Remove the air cleaner component. (See 01-13-3 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)

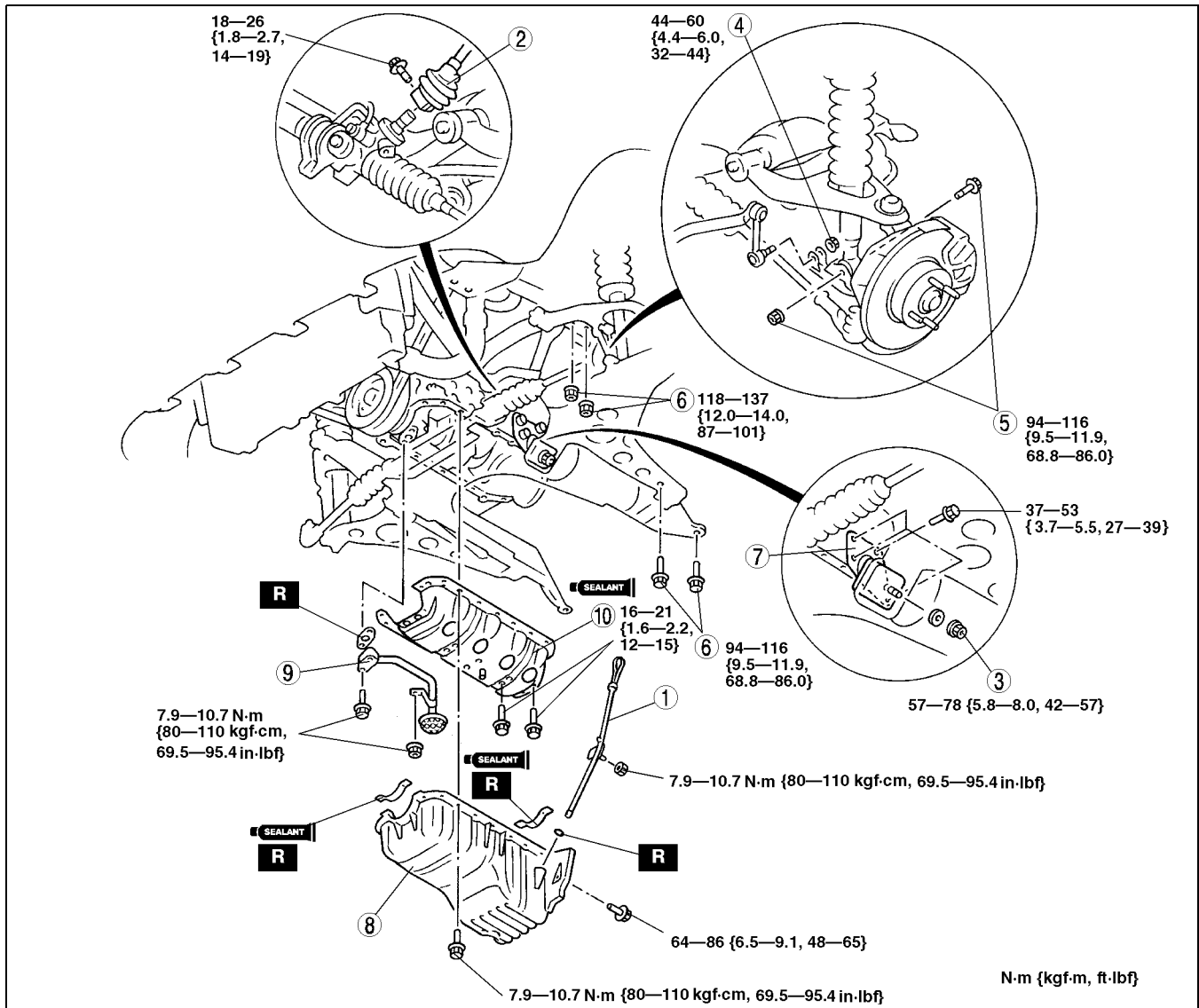
Caution

- Performing the following procedures without first removing the ABS wheel-speed sensor may possibly cause an open circuit in the harness if it is pulled by mistake. Before performing the following procedures, remove the ABS wheel-speed sensor (axle side) and fix it to an appropriate place where the sensor will not be pulled by mistake while servicing the vehicle.

3. Remove the ABS wheel-speed sensor.
4. Drain the engine oil. (See 01-11-2 ENGINE OIL REPLACEMENT.)
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.

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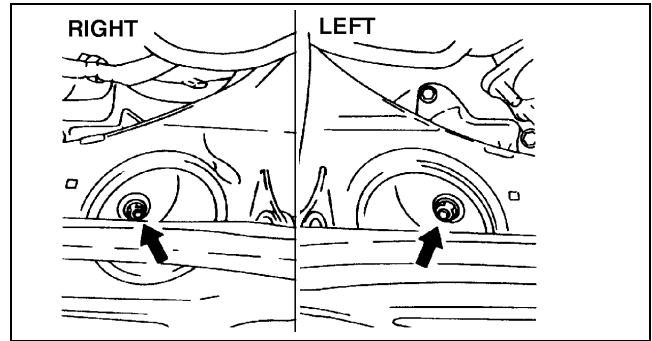
1	Dipstick and pipe
2	Intermediate shaft
3	Engine mount nut (See 01-11-6 Engine Mount Nut Removal Note)
4	Stabilizer control link nut
5	Shock absorber bolt and nut
6	Crossmember bolt and nut (See 01-11-6 Crossmember Bolt and Nut Removal Note)

7	Engine mount
8	Oil pan (See 01-11-6 Oil Pan Removal Note) (See 01-11-7 Oil Pan Installation Note)
9	Oil strainer
10	MBSP (See 01-11-7 MBSP Removal Note) (See 01-11-7 MBSP Installation Note)

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Engine Mount Nut Removal Note

1. Loosen the oil pan mounting bolts.
2. Remove the engine mounting nuts.
3. Lift the engine slightly using a hoist.



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Crossmember Bolt and Nut Removal Note

1. Support the crossmember using a transmission jack.
2. Remove the crossmember bolts and nuts.

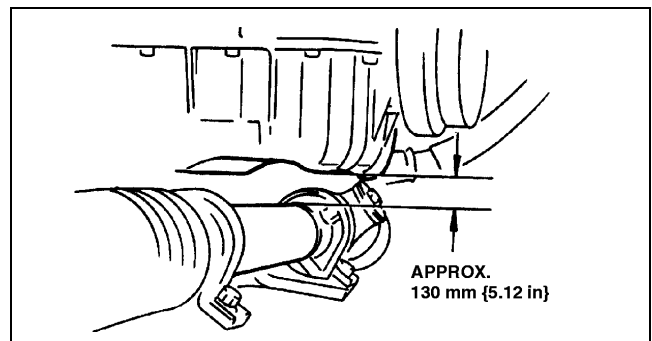
Caution

- Do not damage the brake hoses, A/C pipes and P/S pipes when lowering the crossmember.

Note

- Lower the crossmember after separating the steering intermediate shaft from the pinion shaft.

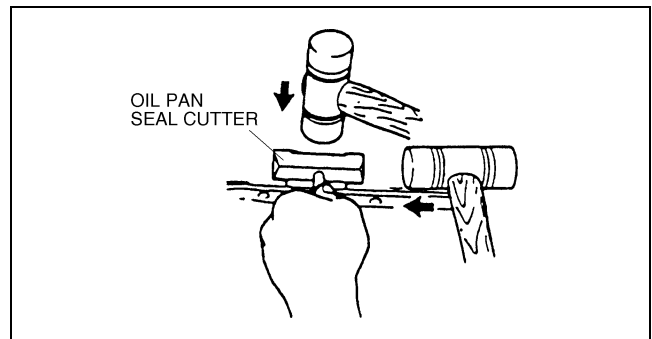
3. Lower the crossmember until the clearance between the oil pan and the steering gear housing exceeds **approx. 130 mm {5.12 in}**.



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Oil Pan Removal Note

1. Remove the oil pan mounting bolts.
2. Disconnect the cylinder block and oil pan using an oil pan seal cutter.



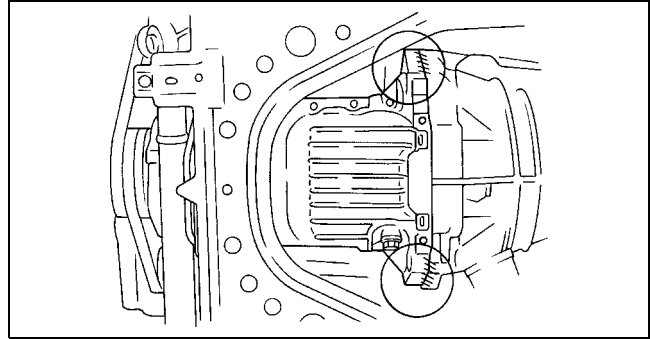
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3. Remove the oil pan by inserting the flathead screwdriver into the part shown in the figure.

Caution

- Do not insert the flathead screwdriver or the like into the mating surface between the cylinder block and oil pan.



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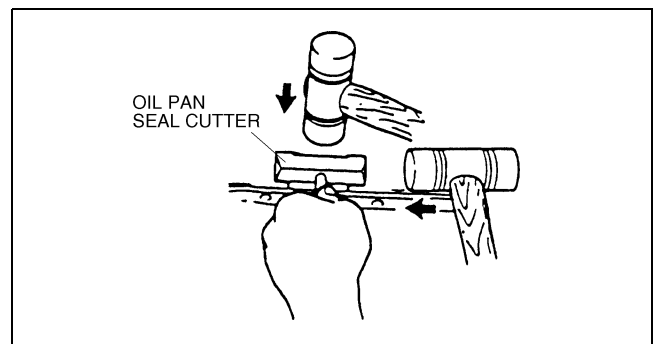
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Engine Mount Removal Note

1. Hang the engine with chain block or the like to lift up.
2. Remove the engine mount.

MBSP Removal Note

1. Remove the MBSP using an oil pan seal cutter.



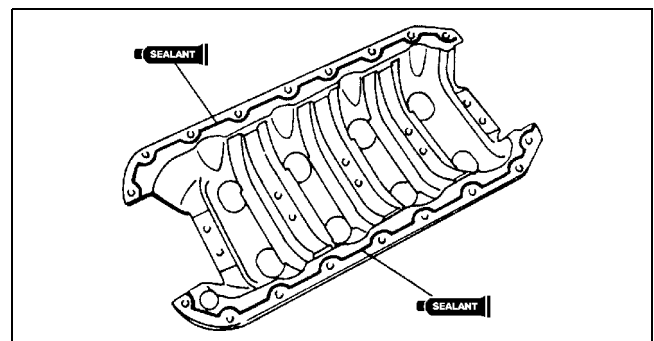
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MBSP Installation Note

1. Apply liquid gasket of SH780 or TB1207B to MBSP ceaselessly as shown in the figure.

Thickness

ø2.5—3.5 mm {0.099—0.137 in}

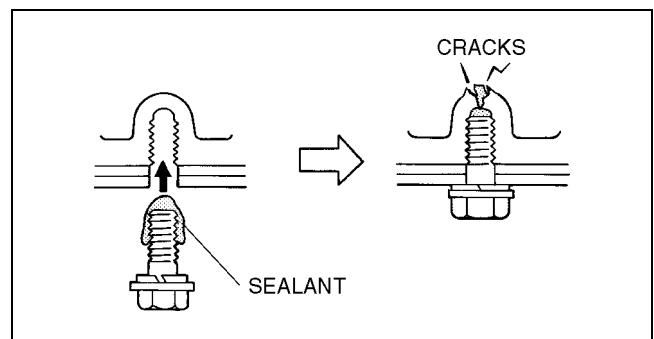


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Oil Pan Installation Note

Caution

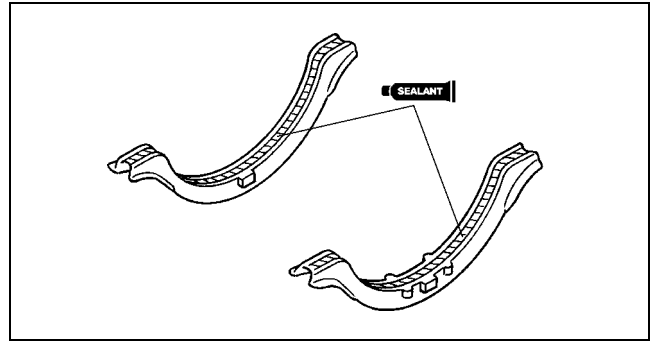
- If the bolts are reused, remove the old sealant from the bolt threads. Tightening a bolt that has old sealant on it can cause thread damage.



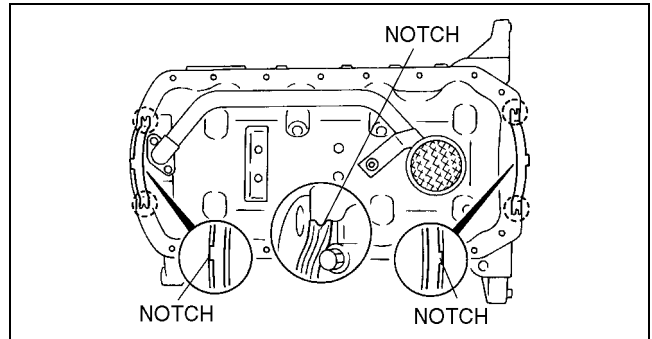
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1. Apply silicone sealant to the contact surfaces of new oil pan gaskets as shown.

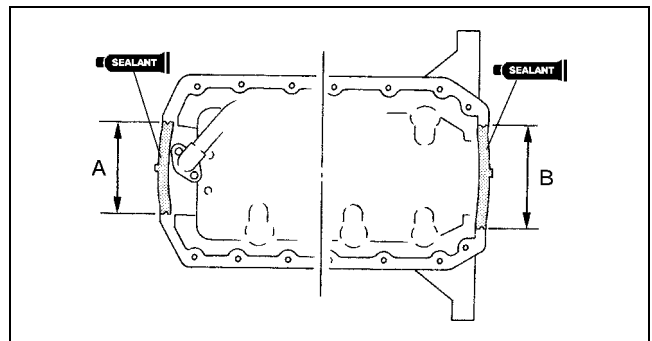


2. Install new gaskets onto the oil pump body and the rear cover facing the notches as shown.

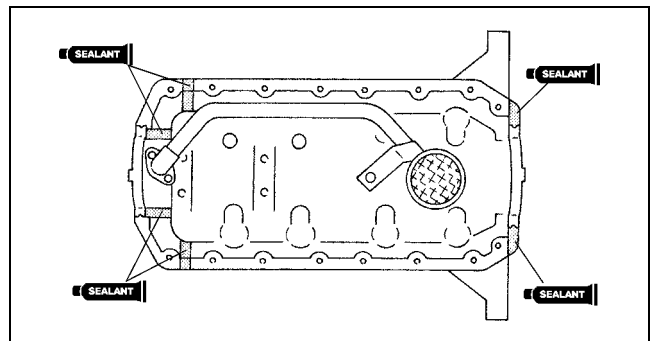


3. Apply silicone sealant onto the area of oil pan gasket indicated by A and B.

Thickness
ø2.0 mm {0.079 in}

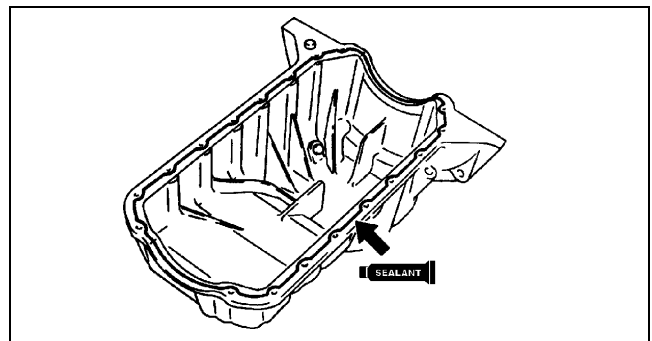


4. Apply silicone sealant to the shaded areas shown.



5. Apply silicone sealant to the oil pan along the inside of the bolt holes and overlap the ends.

Thickness
ø2.5—3.5 mm {0.099—0.137 in}



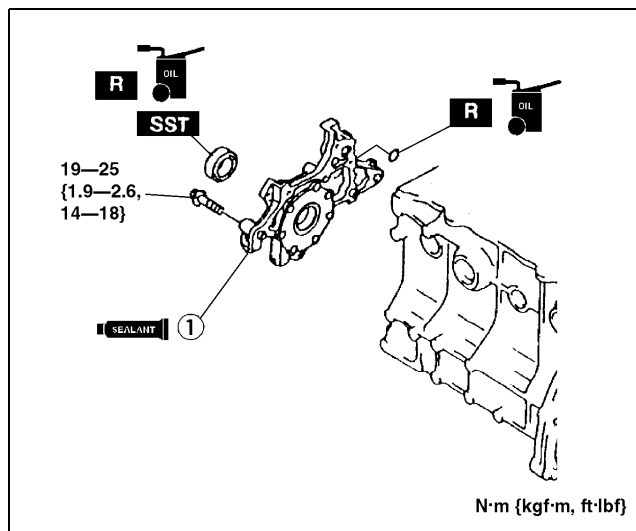
OIL PUMP REMOVAL/INSTALLATION

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1. Remove the timing belt. (See 01-10-10 TIMING BELT REMOVAL/INSTALLATION.)
2. Remove the timing belt pulley.
3. Remove the oil pan. (See 01-11-4 OIL PAN REMOVAL/INSTALLATION.)
4. Remove the A/C compressor with the pipe still connected.
5. Remove the A/C compressor bracket.
6. Remove the generator.
7. Remove in the order indicated in the table.

1	Oil pump (See 01-11-9 Oil Pump Removal Note) (See 01-11-9 Oil Pump Installation Note)
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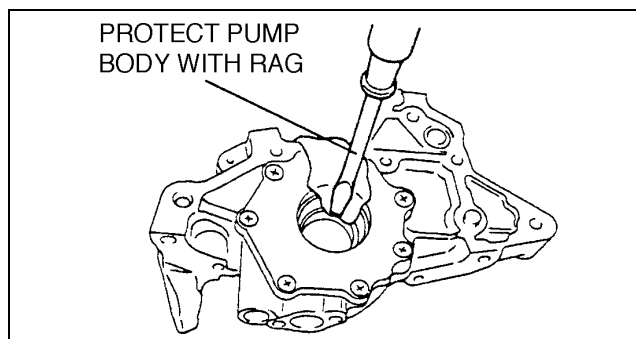
8. Install in the reverse order of removal.



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Oil Pump Removal Note

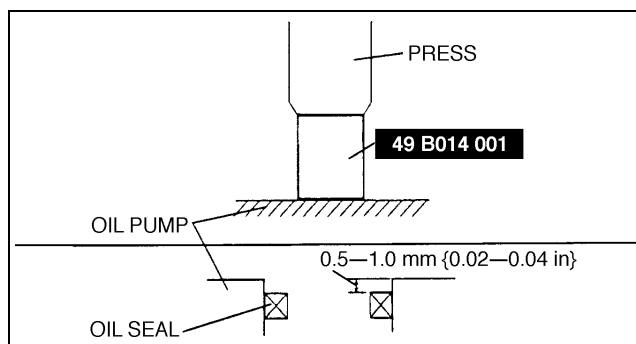
1. Remove the oil seal using a screwdriver protected with a rag.



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Oil Pump Installation Note

1. Apply clean engine oil to the new oil seal.
2. Push the oil seal slightly in by hand.
3. Press the oil seal in evenly using the SST.
4. Install a new O-ring.



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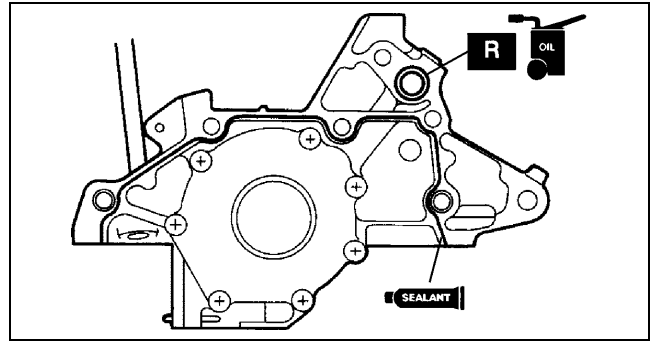
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5. Apply silicone sealant to the oil pump as shown.

Thickness

ø1—2 mm {0.040—0.078 in}

6. Install the oil pump.
7. Cut away the portion of the silicone sealant that projects from the body toward the oil pan side.



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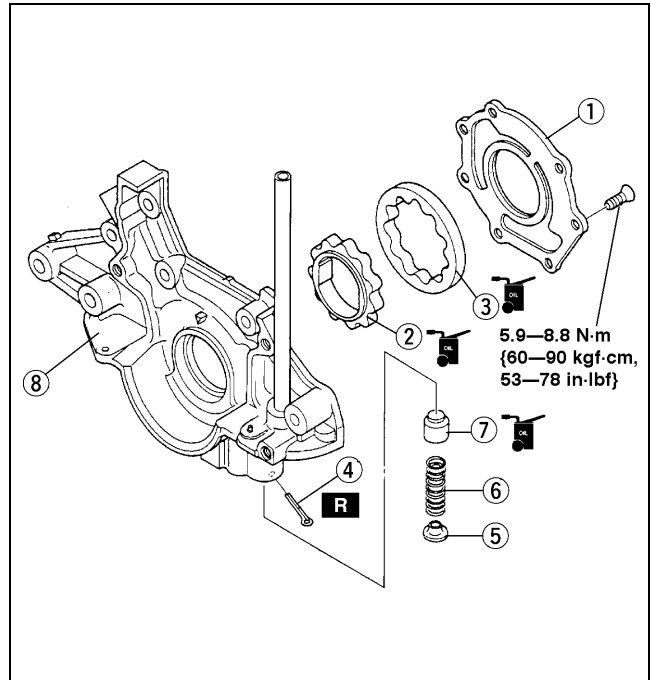
OIL PUMP DISASSEMBLY/ASSEMBLY

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1. Remove the oil pump. (See 01-11-9 OIL PUMP REMOVAL/INSTALLATION.)
2. Disassemble in the order indicated in the table.

1	Oil pump cover
2	Inner rotor
3	Outer rotor
4	Cotter pin (See 01-11-10 Cotter Pin Assembly Note)
5	Spring seat
6	Pressure spring
7	Control plunger
8	Oil pump body

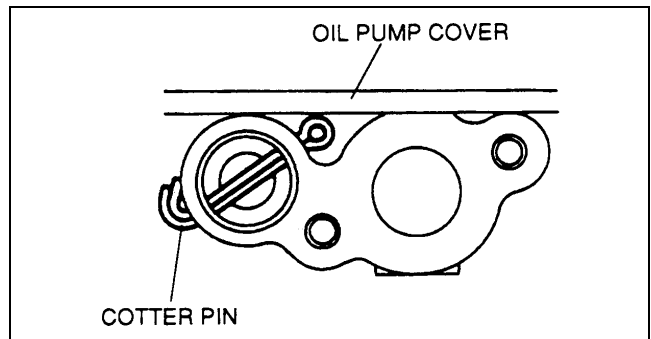
3. Assemble in the reverse order of disassembly.



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Cotter Pin Assembly Note

1. Bend the cotter pin so that its tip does not project from the oil pump cover mounting surface.



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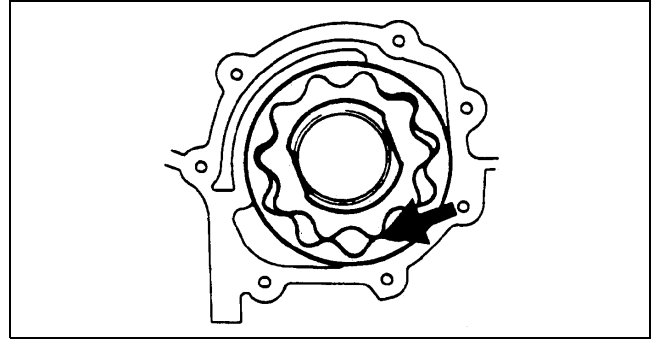
OIL PUMP INSPECTION

A5U011119220W03

Rotor Clearance Inspection

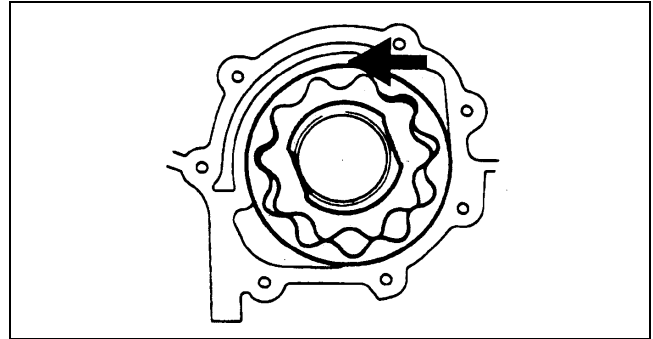
1. Measure the following clearances.
 - If not as specified, replace the rotor or oil pump body.

Standard tip clearance
 0.02—0.18 mm {0.0008—0.0070 in}
Maximum tip clearance
 0.20 mm {0.0079 in}



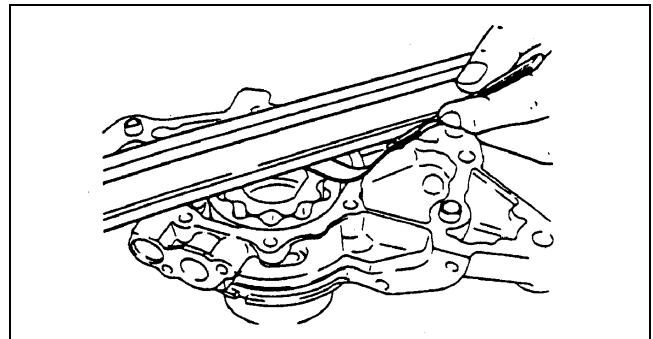
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Standard body clearance
 0.09—0.17 mm {0.0036—0.0066 in}
Maximum body clearance
 0.22 mm {0.0087 in}



W5U111AA3

Standard side clearance
 0.03—0.11 mm {0.0012—0.0043 in}
Maximum side clearance
 0.14 mm {0.0055 in}

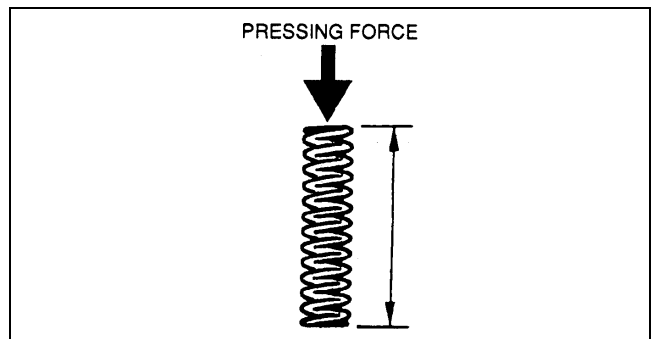


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Pressure Spring Inspection

1. Apply pressing force to the pressure spring and measure the spring height.
 - If not as specified, replace the pressure spring.

Standard height
 35.37 mm {1.393 in} [Pressing force: 88.1 N
 {8.98 kgf, 19.8 lbf}]
Free length (Reference)
 46.79 mm {1.842 in}



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