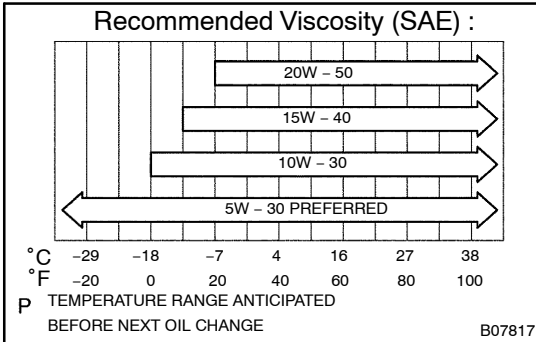




OIL AND FILTER INSPECTION

LU0N5-02

1. CHECK ENGINE OIL QUALITY

Check the oil for deterioration, entry of water, discoloring or thinning.

If the quality is visibly poor, replace the oil.

Oil grade:

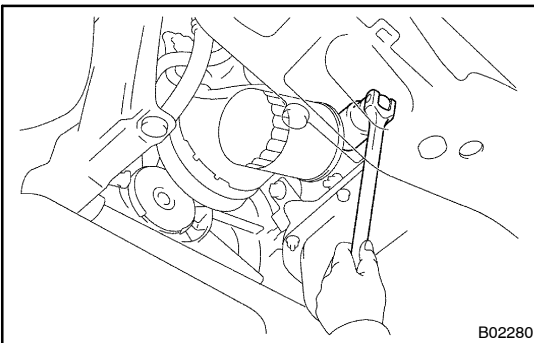
API grade SH, Energy-Conserving II or SJ Energy-Conserving or ILSAC multigrade engine oil. Recommended viscosity is as shown in the illustration.

2. CHECK ENGINE OIL LEVEL

After warming up the engine and then 5 minutes after the engine stop, oil level should be between "L" and "F" of the dipstick. If low, check for leakage and add oil up to "F" mark.

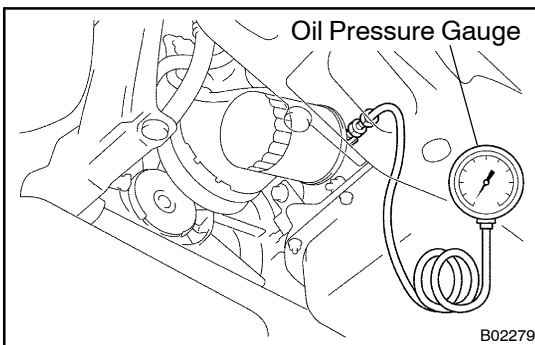
NOTICE:

Do not fill with engine oil above the "F" mark.



3. REMOVE OIL PRESSURE SWITCH

- Disconnect the oil pressure switch connector.
- Remove the oil pressure switch.



4. INSTALL OIL PRESSURE GAUGE

5. WARM UP ENGINE

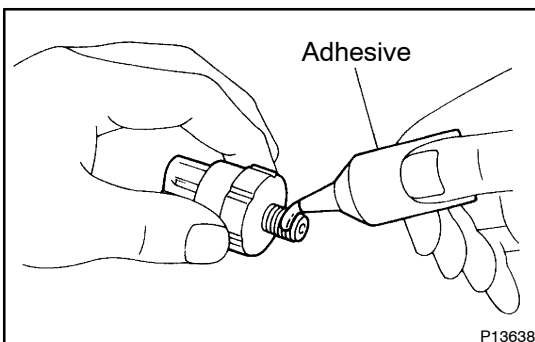
Allow the engine to warm up to normal operating temperature.

6. CHECK OIL PRESSURE

Oil pressure:

At idle	29 kPa (0.3 kgf/cm ² , 4.3 psi) or more
At 3,000 rpm	294 - 588 kPa (3.0 - 6.0 kgf/cm ² , 43 - 85 psi)

7. REMOVE OIL PRESSURE GAUGE

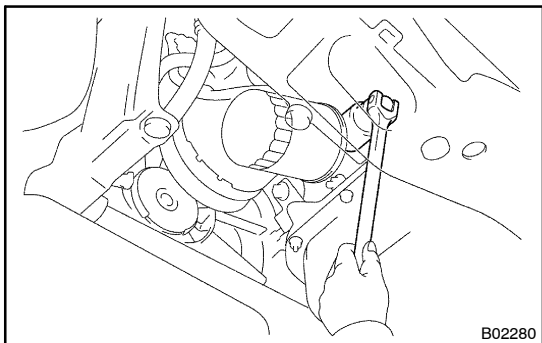


8. REINSTALL OIL PRESSURE SWITCH

- Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent



(b) Reinstall the oil pressure switch.

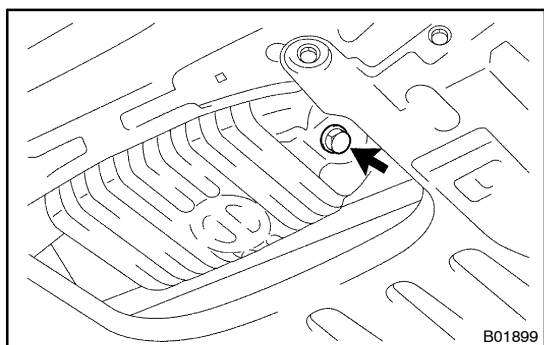
9. START ENGINE AND CHECK FOR ENGINE OIL LEAKS

10. REINSTALL ENGINE UNDER COVER

REPLACEMENT

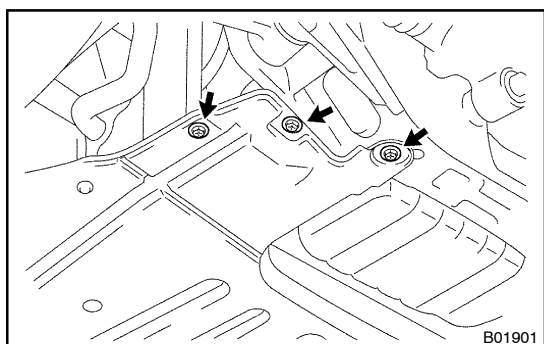
CAUTION:

- Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Care should be taken, therefore, when changing engine oil to minimize the frequency and length of time your skin is exposed to used engine oil. Protective clothing and gloves that cannot be penetrated by oil should be worn. The skin should be thoroughly washed with soap and water, or use water-less hand cleaner, to remove any used engine oil. Do not use gasoline, thinners, or solvents.
- In order to preserve the environment, used oil and used oil filters must be disposed of only at designated disposal sites.



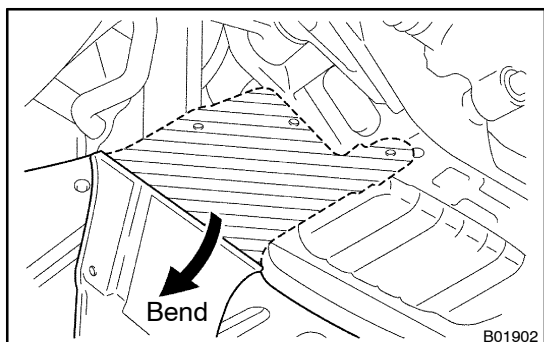
1. DRAIN ENGINE OIL

- Remove the oil filler cap.
- Remove the oil drain plug, and drain the oil into a container.

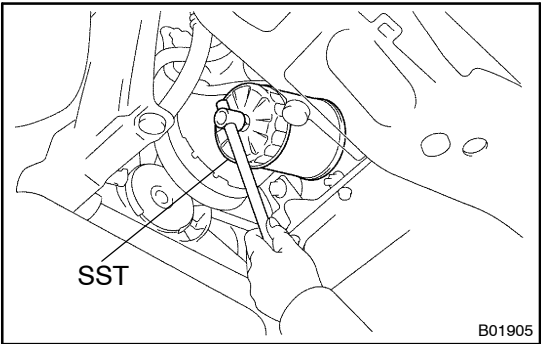


2. REPLACE OIL FILTER

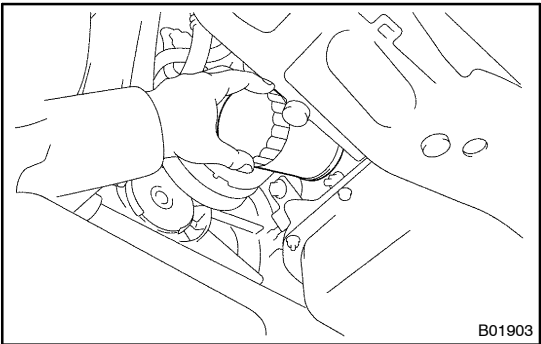
- Remove the 3 screws.



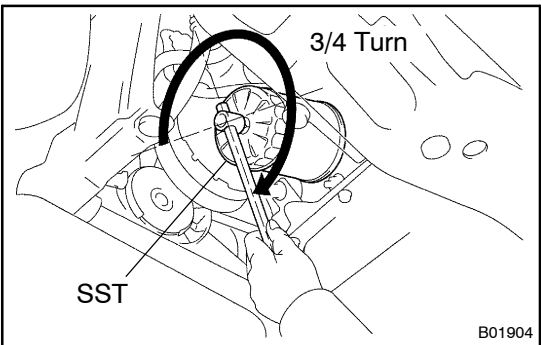
- Bend the engine under cover as shown in the illustration.



- (c) Using SST, remove the oil filter.
SST 09228-07501
- (d) Clean the oil filter contact surface on the oil filter mounting.
- (e) Lubricate the filter rubber gasket with clean engine oil.



- (f) Tighten the oil filter by hand until the rubber gasket contacts the seat of the filter mounting.



- (g) Using SST, give it an additional 3/4 turn to seat the filter.
SST 09228-07501

- (h) Reinstall the engine under cover with the 3 screws.

3. FILL WITH ENGINE OIL

- (a) Clean and install the oil drain plug with a new gasket.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

- (b) Fill with new engine oil.

Capacity:

Drain and refill	w/ Oil filter change	5.5 liters (5.8 US qts, 4.8 Imp. qts)
	w/o Oil filter change	5.2 liters (5.5 US qts, 4.6 Imp. qts)
Dry fill		6.9 liters (7.3 US qts, 6.1 Imp. qts)

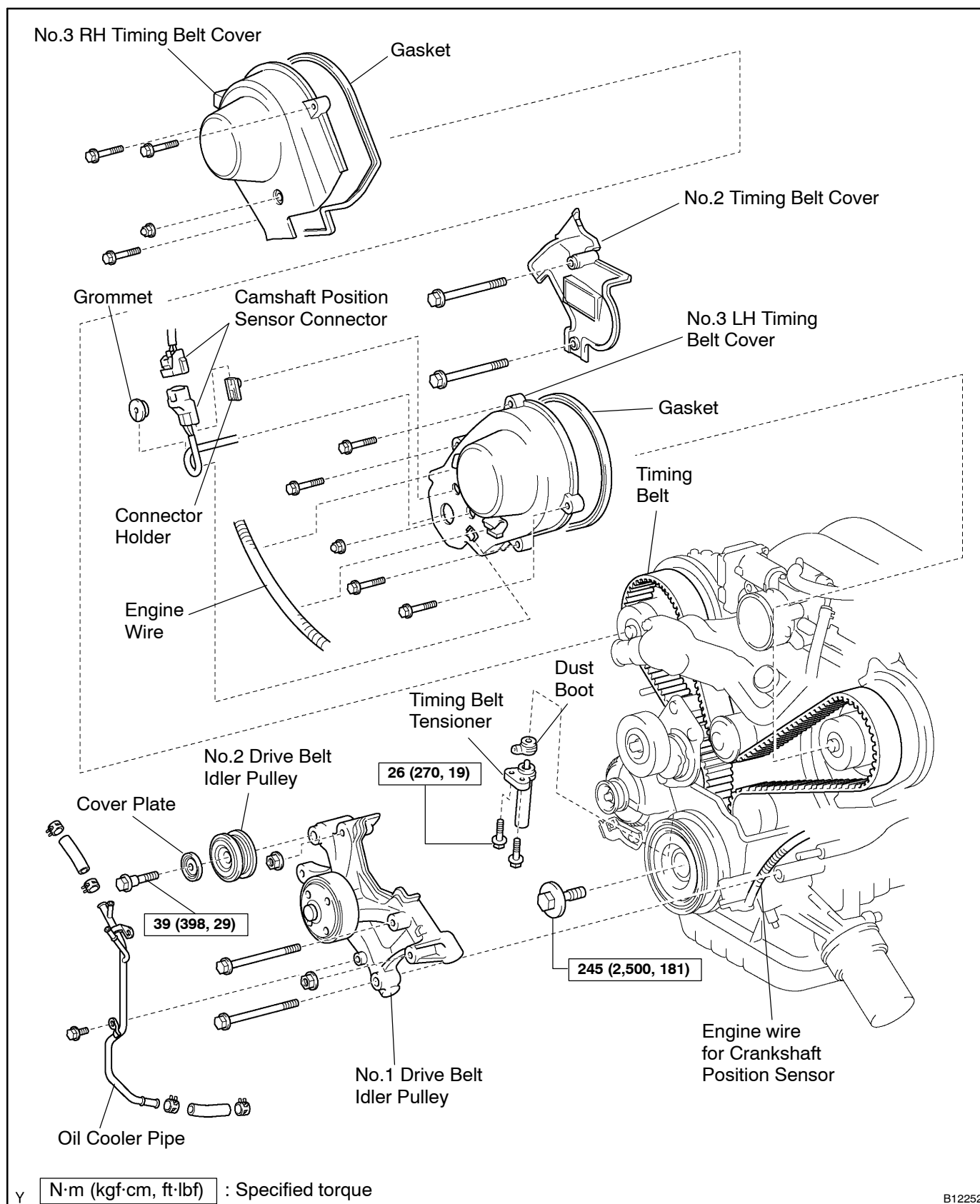
- (c) Reinstall the oil filler cap.

4. START ENGINE AND CHECK FOR ENGINE OIL LEAKS

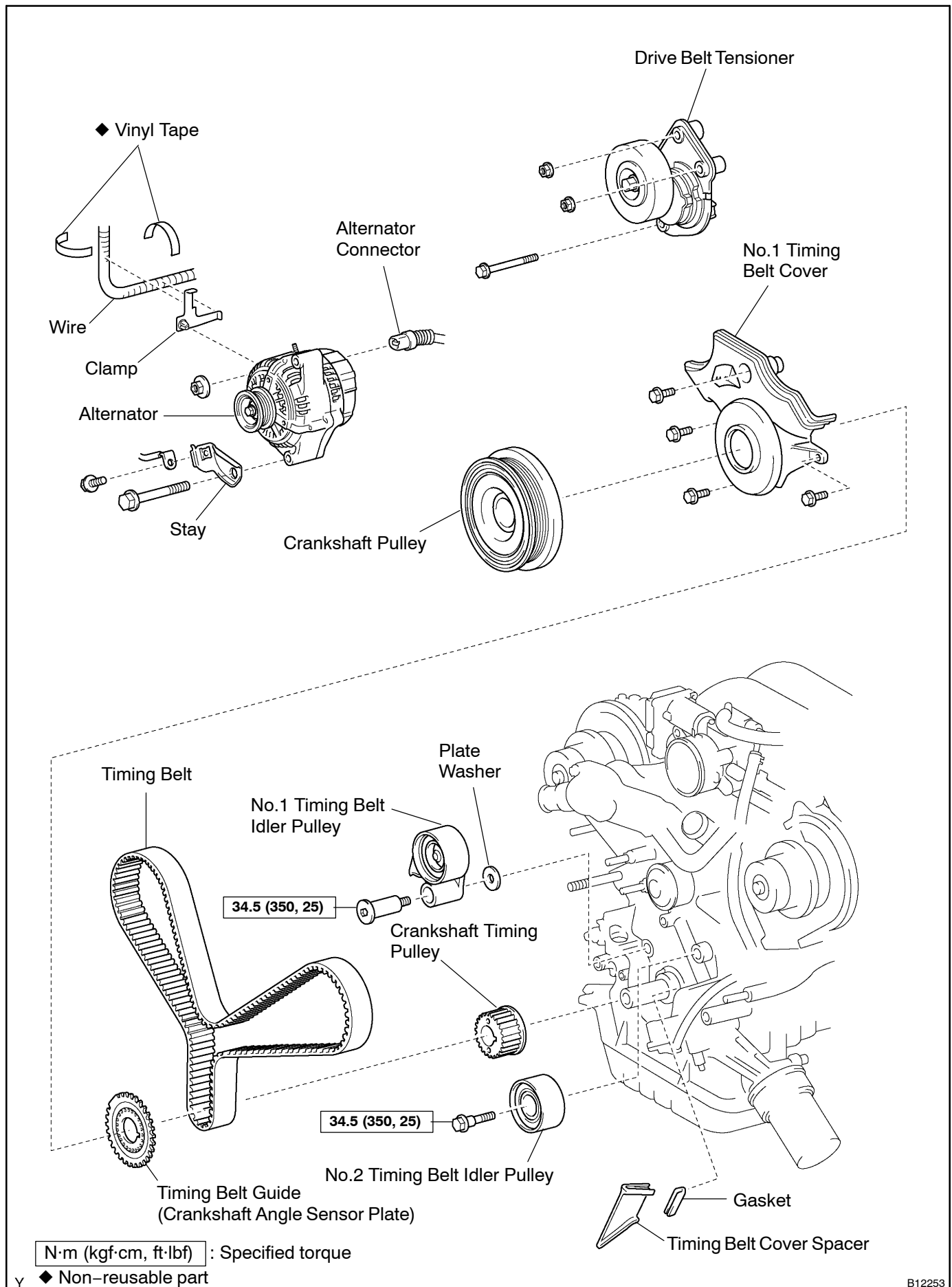
5. RECHECK ENGINE OIL LEVEL

OIL PUMP COMPONENTS

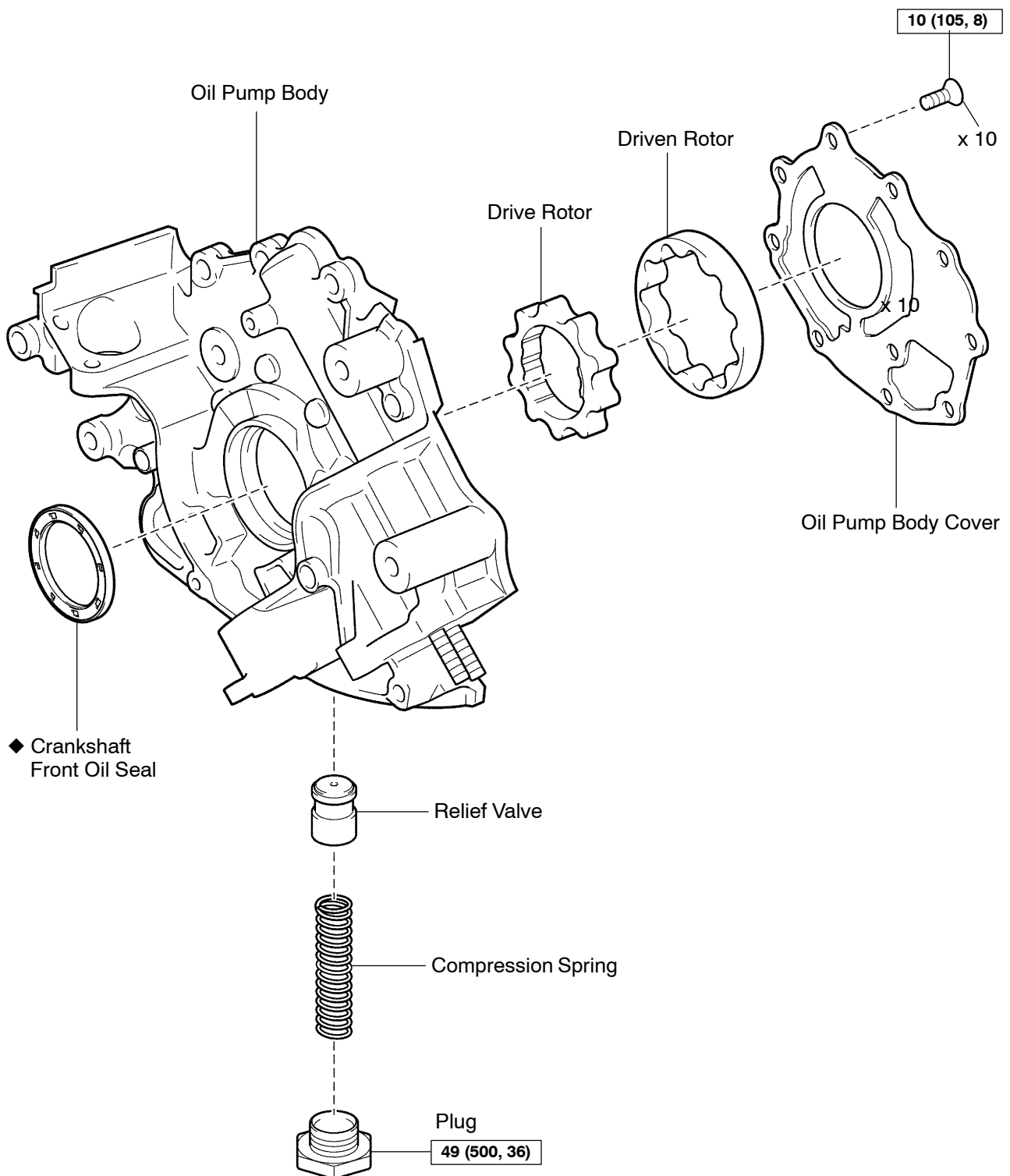
LU05Q-03



B12252







N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

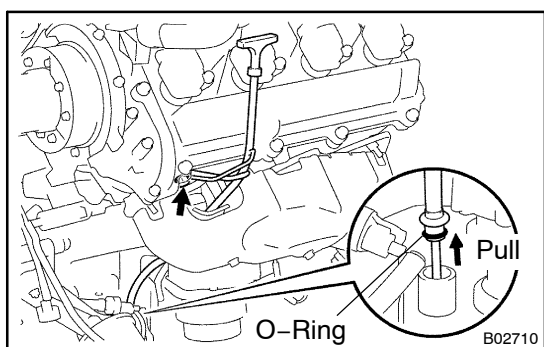
B02608

REMOVAL

HINT:

When repairing the oil pump, the oil pan and strainer should be removed and cleaned.

1. REMOVE ENGINE AND TRANSMISSION ASSEMBLY FROM VEHICLE (See page EM-80)
2. SEPARATE ENGINE AND TRANSMISSION (See page EM-80)
3. INSTALL ENGINE TO ENGINE STAND FOR DIS-ASSEMBLY
4. REMOVE TIMING BELT (See page EM-15)
5. REMOVE NO.1 IDLER PULLEY (See page EM-15)
6. REMOVE NO.2 IDLER PULLEY (See page EM-15)
7. REMOVE CRANKSHAFT TIMING PULLEY (See page EM-15)



8. REMOVE OIL DIPSTICK AND GUIDE

- (a) Remove the bolt holding the oil dipstick to the LH cylinder head.
- (b) Pull out the dipstick guide together with the dipstick from the No.1 oil pan.
- (c) Remove the O-ring from the dipstick guide.

9. REMOVE OIL LEVEL SENSOR

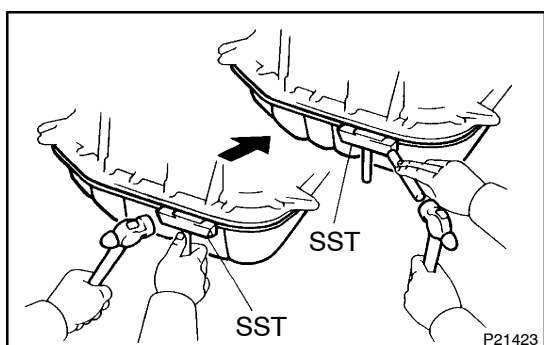
- (a) Remove the 4 bolts and level sensor.
- (b) Remove the gasket from the level sensor.

10. REMOVE OIL FILTER AND FILTER BRACKET ASSEMBLY

- (a) Disconnect the oil pressure switch connector.
- (b) Remove the stud bolt, 2 nuts, the oil filter and filter bracket assembly.
- (c) Remove the gasket from the filter bracket.

11. REMOVE CRANKSHAFT POSITION SENSOR

- (a) Disconnect the position sensor connector.
- (b) Remove the bolt and position sensor.

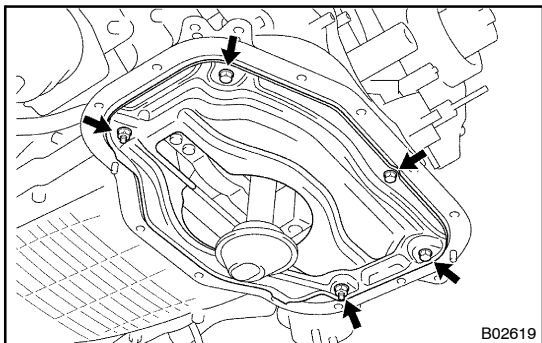


12. REMOVE NO.2 OIL PAN

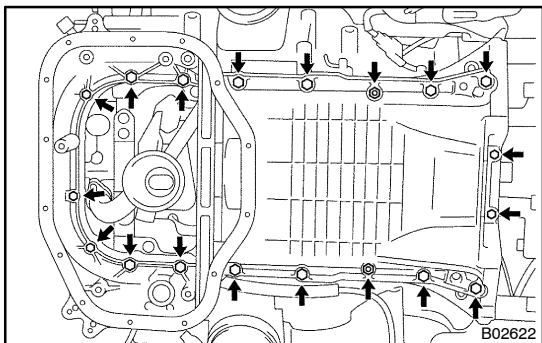
- (a) Remove the 12 bolts and 2 nuts.
- (b) Insert the blade of SST between the No.1 and No.2 oil pans, cut off applied sealer and remove the No.2 oil pan. SST 09032-00100

NOTICE:

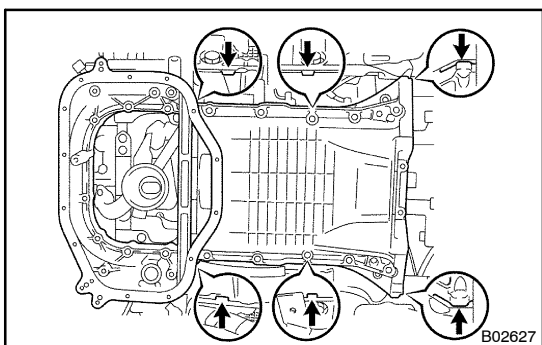
- Be careful not to damage the No.2 oil pan contact surface of the No.1 oil pan.
- Be careful not to damage the No.2 oil pan flange.

**13. REMOVE OIL PAN BAFFLE PLATE**

Remove the 3 bolts, 2 nuts and baffle plate.

**14. REMOVE NO.1 OIL PAN**

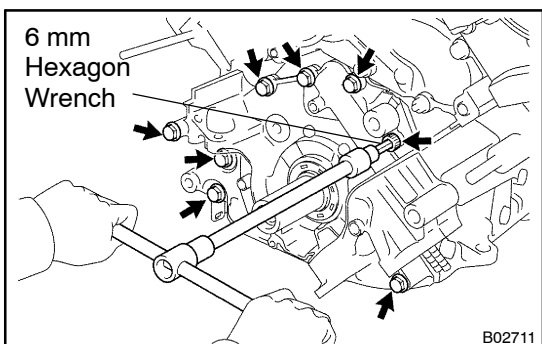
(a) Remove the 17 bolts and 2 nuts.



(b) Using a screwdriver, remove the No.1 oil pan by prying between the oil pan and cylinder block in the sequence shown.

15. REMOVE OIL STRAINER

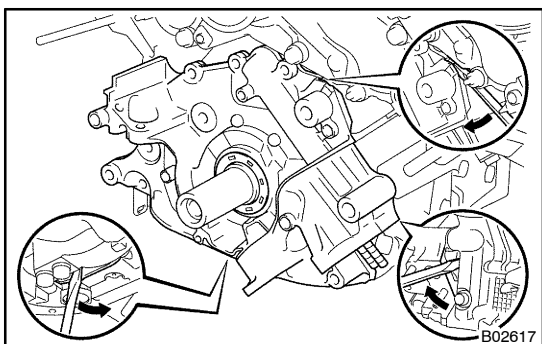
Remove the bolt, 2 nuts, oil strainer and gasket.

**16. REMOVE OIL PUMP**

(a) Remove the 8 bolts.

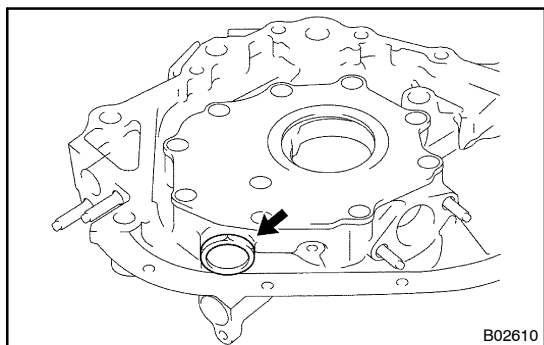
HINT:

Use a 6 mm hexagon wrench for the hexagon head bolt.



(b) Using a screwdriver, remove the oil pump by prying the portions between the oil pump and cylinder block.

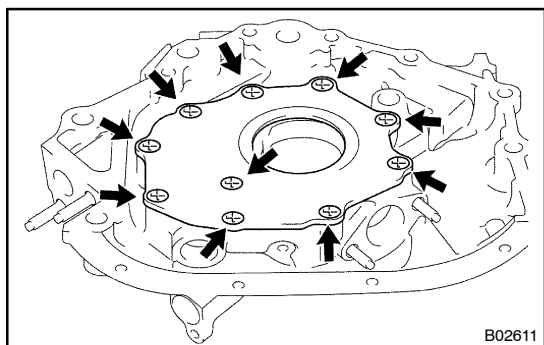
(c) Remove the O-ring from the cylinder block.



DISASSEMBLY

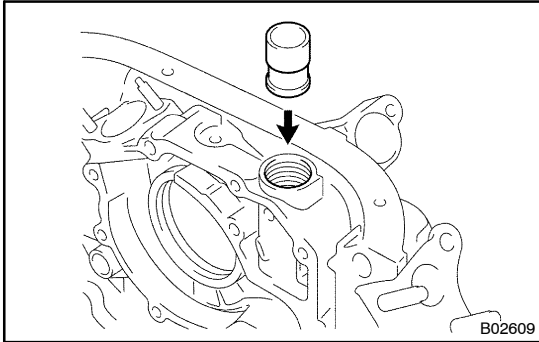
1. REMOVE RELIEF VALVE

Remove the plug, compression spring and relief valve.



2. REMOVE DRIVE AND DRIVEN ROTORS

Remove the 10 screws, pump body cover, the drive and driven rotors.



INSPECTION

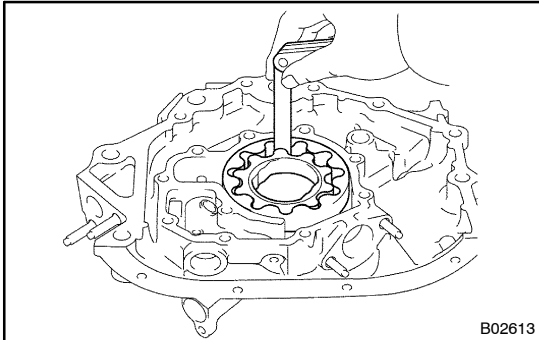
1. INSPECT RELIEF VALVE

Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.

If it doesn't, replace the relief valve. If necessary, replace the oil pump assembly.

2. INSPECT DRIVE AND DRIVEN ROTORS

- (a) Place the drive and driven rotors into the oil pump body.
(See [page LU-14](#))



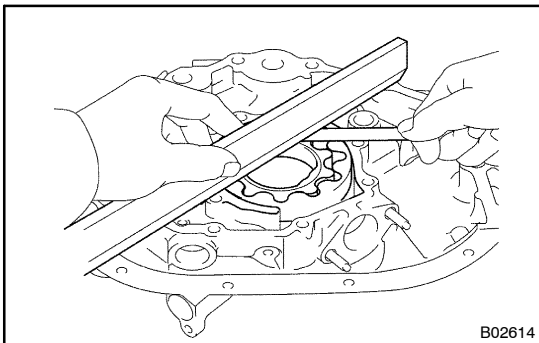
- (b) Inspect the rotors for the body clearance.
Using a feeler gauge, measure the clearance between the drive and driven rotor tips.

Standard tip clearance:

0.060 – 0.180 mm (0.0024 – 0.0071 in.)

Maximum tip clearance: 0.18 mm (0.0071 in.)

If the tip clearance is greater than maximum, replace the rotors as a set.



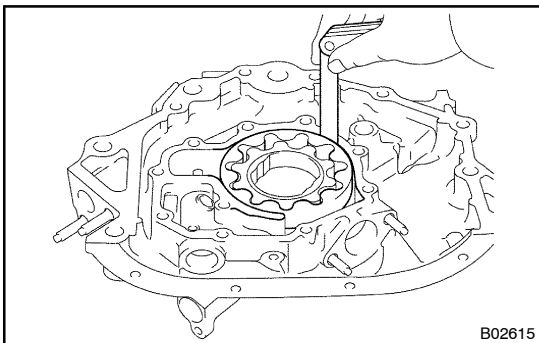
- (c) Inspect the rotors for the side clearance.
Using a feeler gauge and precision straight edge, measure the clearance between the rotors and precision straight edge.

Standard body clearance:

0.030 – 0.090 mm (0.0012 – 0.0035 in.)

Maximum body clearance: 0.09 mm (0.0035 in.)

If the side clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.



- (d) Inspect the rotor for the body clearance.
Using a feeler gauge, measure the clearance between the driven rotor and body.

Standard body clearance:

0.250 – 0.325 mm (0.0098 – 0.0128 in.)

Maximum body clearance: 0.325 mm (0.0128 in.)

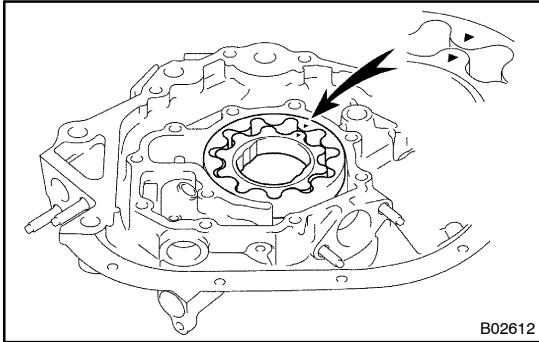
If the body clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.

- (e) Remove the drive and driven rotors.

REPLACEMENT

REPLACE CRANKSHAFT FRONT OIL SEAL

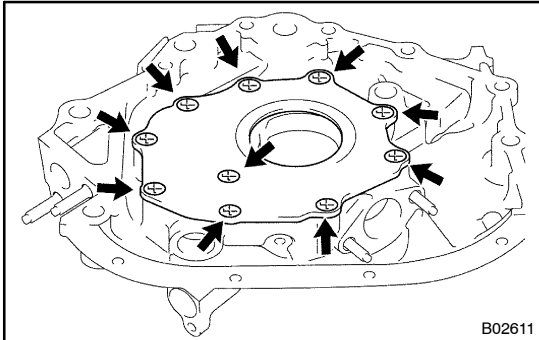
(See [page EM-108](#))



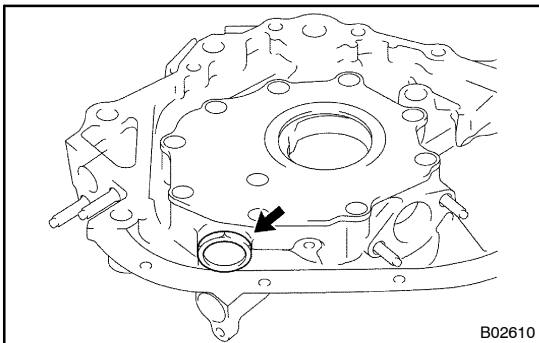
REASSEMBLY

1. INSTALL DRIVE AND DRIVEN ROTORS

- (a) Place the drive and driven rotors into pump body with the marks facing the pump body cover side.



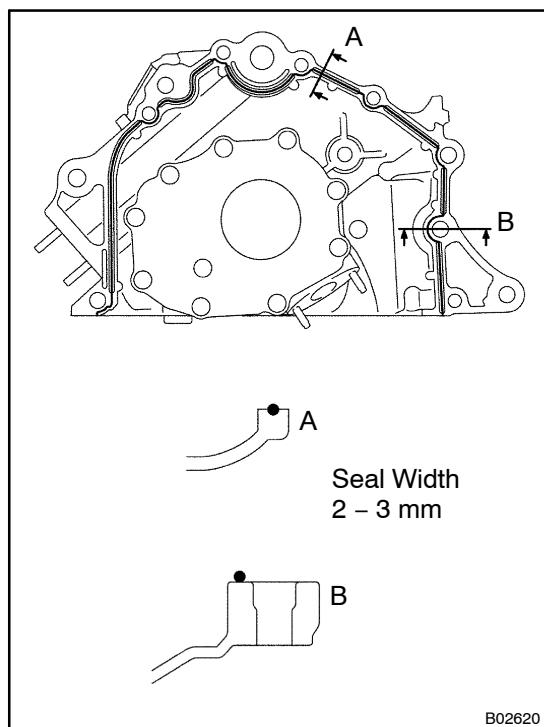
- (b) Install the pump body cover with the 10 screws.
Torque: 10 N·m (105 kgf·cm, 7 ft·lbf)



2. INSTALL RELIEF VALVE

- (a) Insert the relief valve and compression spring into the oil pump body hole.
- (b) Install the plug.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



INSTALLATION

1. INSTALL OIL PUMP

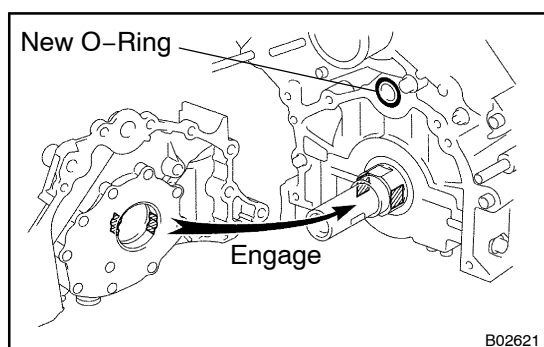
- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil pump and cylinder block.
 - Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
 - Thoroughly clean all components to remove all the loose material.
 - Using a non-residue solvent, clean both sealing surfaces.
- (b) Apply seal packing to the oil pump as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

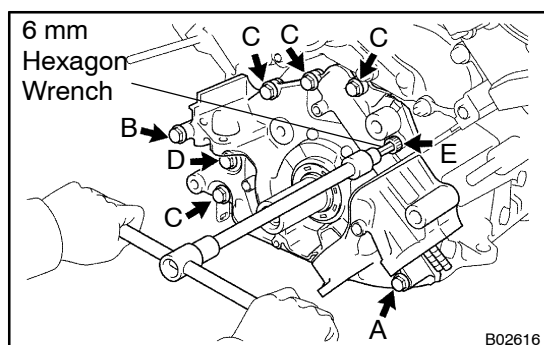
NOTICE:

Avoid applying an excessive amount to the surface. Be particularly careful near oil passage.

- Install a nozzle that has been cut to a 2 – 3 mm (0.08 – 0.12 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



- (c) Install a new O-ring to the cylinder block.
- (d) Engage the spline teeth of the oil pump drive gear with the large teeth of the crankshaft, and slide the oil pump on the crankshaft.



- (e) Install the oil pump with the 8 bolts. Uniformly tighten the bolts in several passes.

Torque:

15.5 N·m (160 kgf·cm, 11 ft·lbf) for 12 mm head

30.5 N·m (310 kgf·cm, 22 ft·lbf)

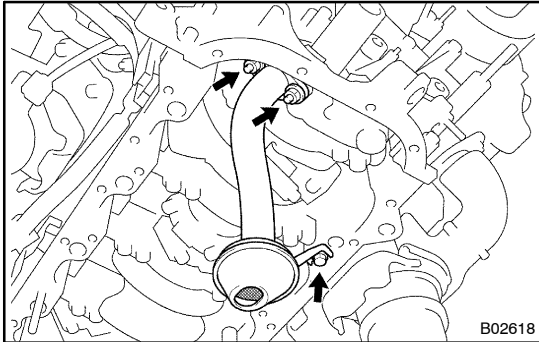
for 14 mm head and 6 mm hexagon head

HINT:

- Use a 6 mm hexagon wrench for the hexagon head bolt.
- Each bolt length is indicated in the illustration.

Bolt length:

50 mm (1.97 in.) for A of 12 mm head
 106 mm (4.17 in.) for B of 12 mm head
 30 mm (1.18 in.) for C of 12 mm head
 44 mm (1.73 in.) for D of 14 mm head
 28 mm (1.10 in.) for E of 6 mm hexagon head

**2. INSTALL OIL STRAINER**

Install a new gasket and the oil strainer with the bolt and 2 nuts.

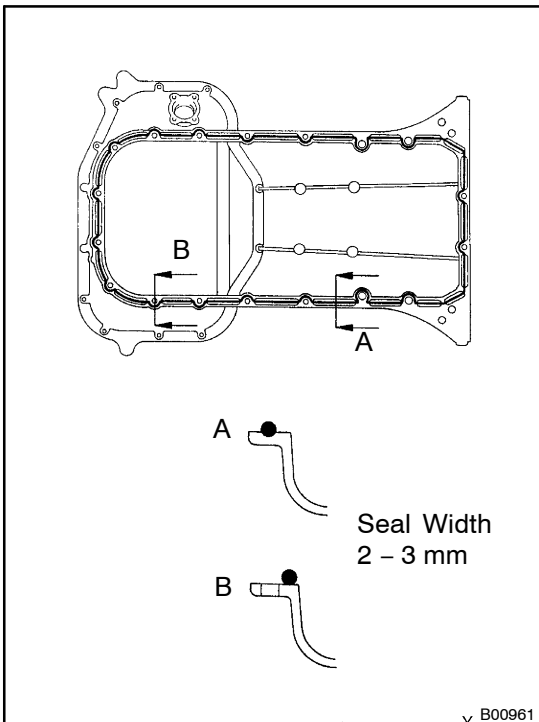
Torque: 7.5 N·m (80 kgf·cm, 66 in·lbf)

HINT:

Use bolt 12 mm (0.47 in.) in length.

3. INSTALL NO.1 OIL PAN

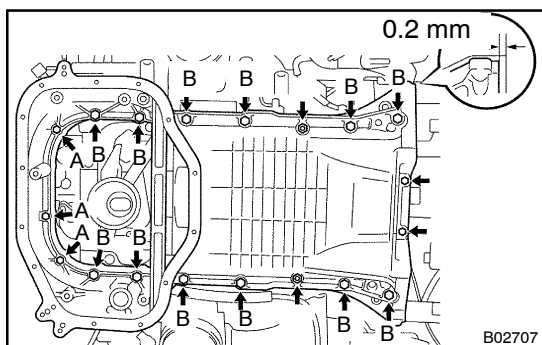
- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the No.1 oil pan, cylinder block, oil pump and rear oil seal retainer.
- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
 - Thoroughly clean all components to remove all the loose material.
 - Using a non-residue solvent, clean both sealing surfaces.



- (b) Apply seal packing to the No.1 oil pan as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

- Install a nozzle that has been cut to a 3 – 5 mm (0.12 – 0.20 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



- (c) Temporarily install the No.1 oil pan with the 17 bolts, stud bolt and 2 nuts.

HINT:

Each bolt length is indicated in the illustration.

Bolt length:

35 mm (1.38 in.) for A of 10 mm head

56 mm (2.20 in.) for B of 12 mm head

- (d) Set the No.1 oil pan as shown in the illustration.

NOTICE:

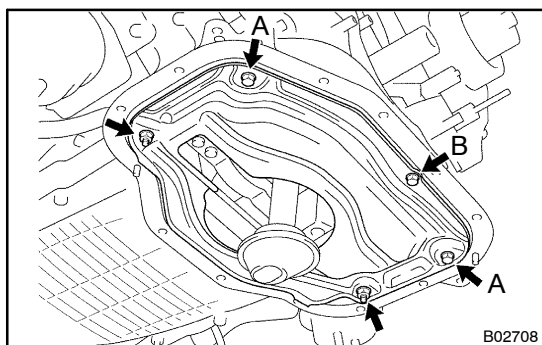
Make sure the clearance between the rear ends of the No.1 oil pan and cylinder block is 0.2 mm (0.008 in.) or less. If the clearance is more than 0.2 mm (0.008 in.), the No.1 oil pan will be stretched.

- (e) Uniformly tighten the bolts, stud bolts and nuts in several passes.

Torque:

7.5 N·m (80 kgf·cm, 66 in·lbf) for 10 mm head

28 N·m (290 kgf·cm, 21 ft·lbf) for 12 mm head



4. INSTALL OIL PAN BAFFLE PLATE

Install the baffle plate with the 3 bolts and 2 nuts.

Torque: 7.5 N·m (80 kgf·cm, 66 in·lbf)

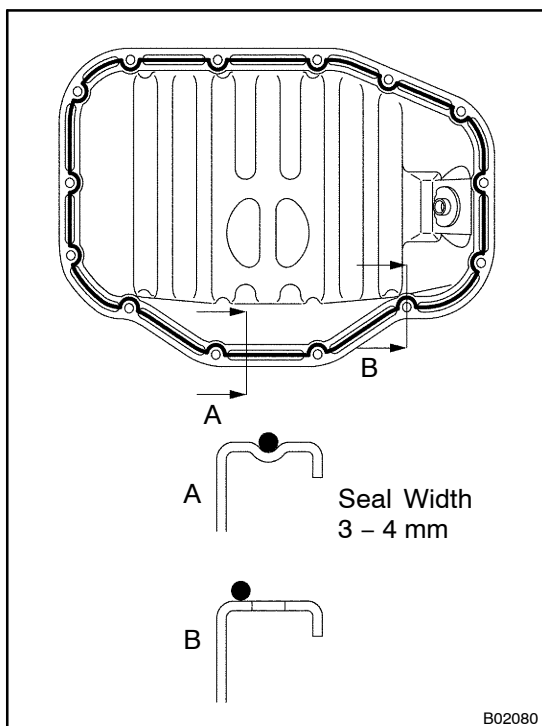
HINT:

Each bolt length is indicated in the illustration.

Bolt length:

12 mm (0.47 in.) for A

80 mm (3.15 in.) for B



5. INSTALL NO.2 OIL PAN

- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the No.1 and No.2 oil pans.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the loose material.
- Using a non-residue solvent, clean both sealing surfaces.

NOTICE:

Do not use a solvent which will affect the painted surfaces.

- (b) Apply seal packing to the No.2 oil pan as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

- Install a nozzle that has been cut to a 3 – 5 mm (0.12 – 0.20 in.) opening.

- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

- (c) Install the No.2 oil pan with the 12 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

HINT:

Use bolts 14 mm (0.55 in.) in length.

6. INSTALL OIL LEVEL SENSOR

- (a) Install a new gasket to the level sensor as shown in the illustration.

- (b) Install the level sensor with the 4 bolts.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

HINT:

Use bolts 16 mm (0.63 in.) in length.

7. INSTALL CRANKSHAFT POSITION SENSOR

- (a) Install the position sensor with the bolt.

Torque: 6.5 N·m (65 kgf·cm, 58 in.·lbf)

HINT:

Use bolt 17 mm (0.67 in.) in length.

- (b) Connect the position sensor connector.

8. INSTALL OIL FILTER AND FILTER BRACKET ASSEMBLY

- (a) Install a new gasket to the oil filter bracket.

- (b) Install the oil filter and filter bracket assembly with the stud bolt and 2 nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

- (c) Connect the oil pressure switch connector.

9. INSTALL OIL DIPSTICK GUIDE AND DIPSTICK

- (a) Install a new O-ring to the dipstick guide.

- (b) Apply soapy water to the O-ring.

- (c) Push in the dipstick guide end into the guide hole of the No.1 oil pan.

- (d) Install the dipstick guide with the bolt.

- (e) Install the dipstick.

10. INSTALL CRANKSHAFT TIMING PULLEY

(See page EM-22)

11. INSTALL NO.1 IDLER PULLEY (See page EM-22)

12. INSTALL NO.2 IDLER PULLEY (See page EM-22)

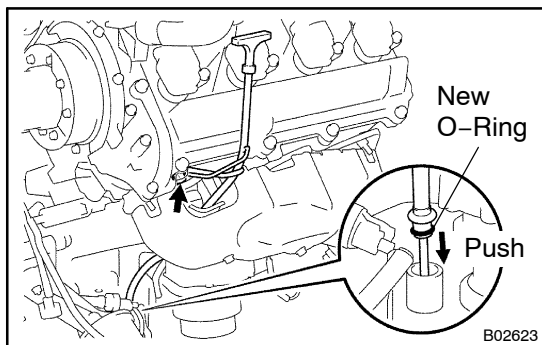
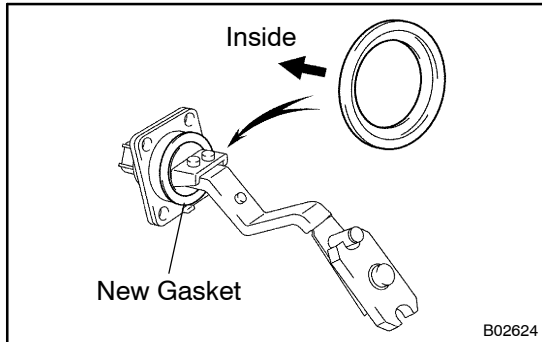
13. INSTALL TIMING BELT (See page EM-22)

14. DISCONNECT ENGINE FROM ENGINE STAND

15. ASSEMBLE ENGINE AND TRANSMISSION

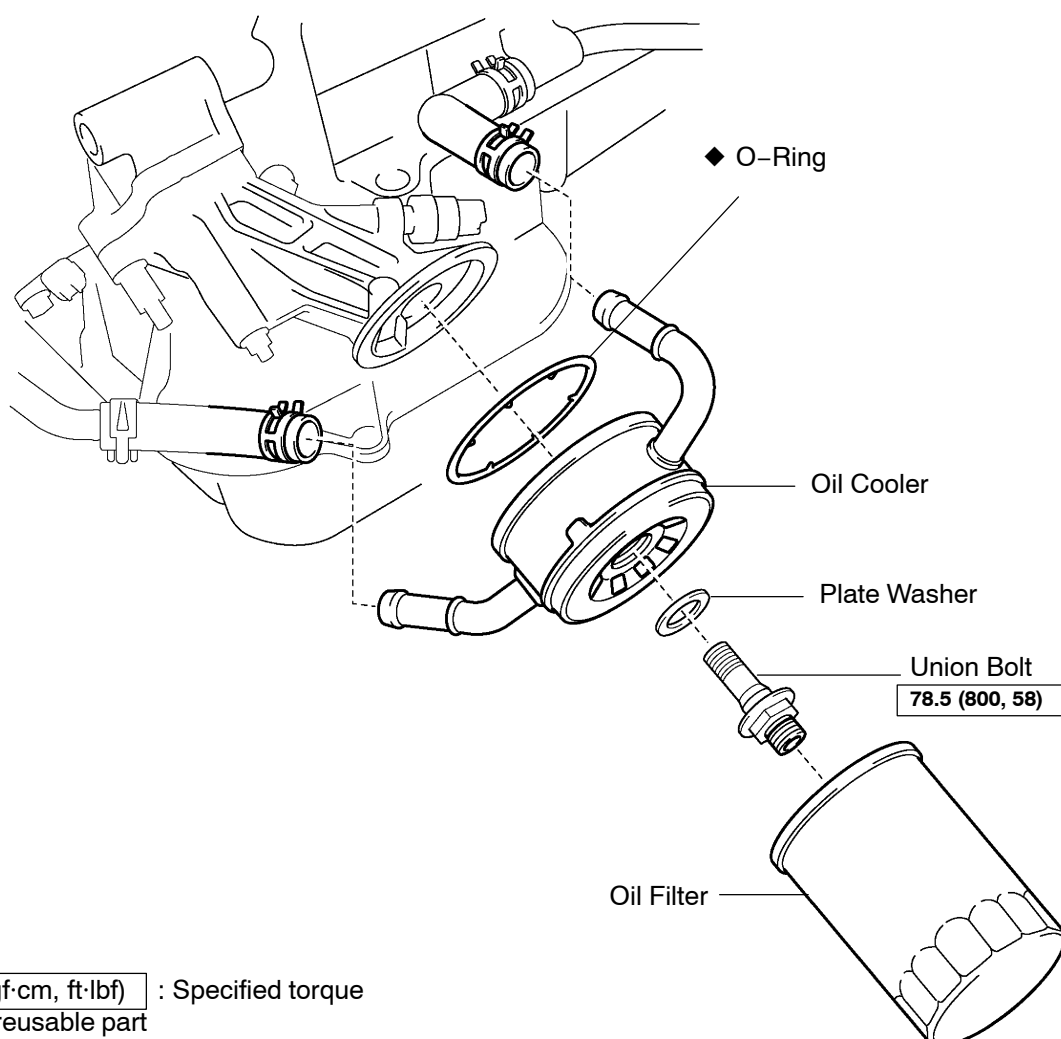
(See page EM-85)

16. INSTALL ENGINE AND TRANSMISSION ASSEMBLY TO VEHICLE (See page EM-85)



OIL COOLER COMPONENTS

LU01J-05

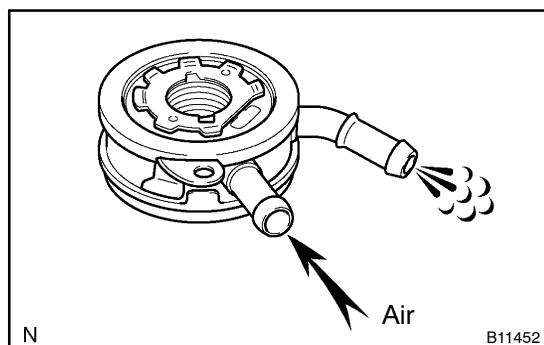


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REMOVAL

1. DRAIN ENGINE COOLANT
2.  REMOVE OIL FILTER (See [page LU-3](#))
3. DISCONNECT WATER BYPASS HOSES FROM OIL COOLER
4. REMOVE OIL COOLER
 - (a) Remove the union bolt and oil cooler.
 - (b) Remove the O-ring from the oil cooler.
 - (c) Remove the plate washer from the union bolt.



INSPECTION

INSPECT OIL COOLER

Check the oil cooler for damage or clogging.
If necessary, replace the oil cooler.

INSTALLATION

1. INSTALL OIL COOLER

- (a) Install a new O-ring to the oil cooler.
- (b) Apply a light coat of engine oil on the threads and under the head of the union bolt.
- (c) Install the plate washer to the union bolt.
- (d) Install the oil cooler and union bolt.

Torque: 78.5 N·m (800 kgf·cm, 58 ft·lbf)

2. CONNECT WATER BYPASS HOSES TO OIL COOLER

3. INSTALL OIL FILTER

4. FILL WITH ENGINE COOLANT (See [page CO-2](#))

5. START ENGINE AND CHECK FOR LEAKS

6. CHECK ENGINE OIL LEVEL