
LUBRICATION

| | |
|----------------------|-------|
| OIL AND FILTER | LU-1 |
| OIL PUMP | LU-4 |
| OIL NOZZLE | LU-10 |

OIL AND FILTER INSPECTION

LU28-01

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 SG or SH, multigrade engine oil or ILSAC multigrade engine oil

2. CHECK ENGINE OIL LEVEL

The oil level should be between the "L" and "F" marks on the dipstick.

If low, check for leakage and add oil up to "F" mark.

NOTICE:

- When inserting the oil dipstick, insert the curved tip of the dipstick facing the same direction as the curve of the guide.
- If the dipstick gets caught while inserting it, do not force it in. Reconfirm the direction of the dipstick.

3. REMOVE OIL PRESSURE SWITCH, AND INSTALL OIL PRESSURE GAUGE

- (a) Using SST, remove the oil pressure switch.
SST 09816-30010

- (b) Install the oil pressure gauge.

4. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

5. CHECK OIL PRESSURE

Oil pressure:

| | |
|--------------|-------------------------------------------------------------|
| At idle | 59 kPa (0.6 kgf/cm ² , 8.5 psi) or more |
| At 3,000 rpm | 245 - 490 kPa (2.5 - 5.0 kgf/cm ² , 36 - 71 psi) |

6. REMOVE OIL PRESSURE GAUGE, AND REINSTALL OIL PRESSURE SWITCH

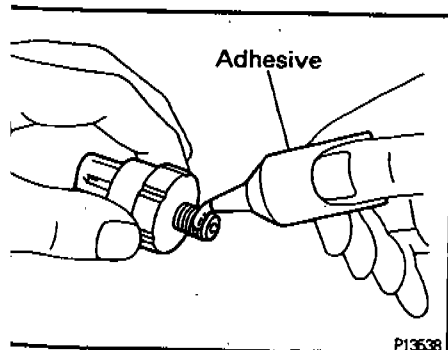
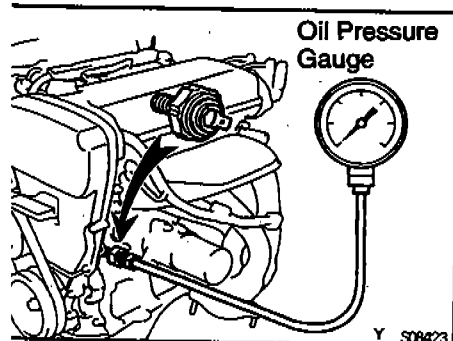
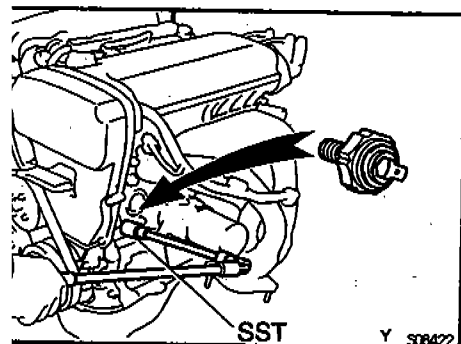
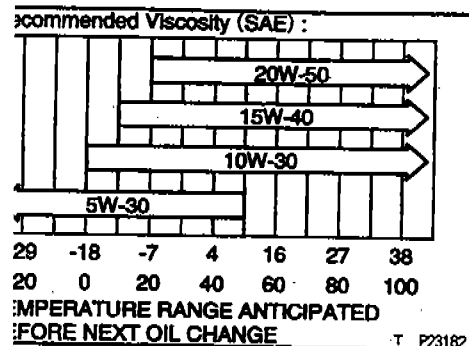
- (a) Remove the oil pressure gauge.
(b) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

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

- (c) Using SST, install the oil pressure switch.
SST 09816-30010

7. START ENGINE AND CHECK FOR OIL LEAKS



REPLACEMENT

CAUTION:

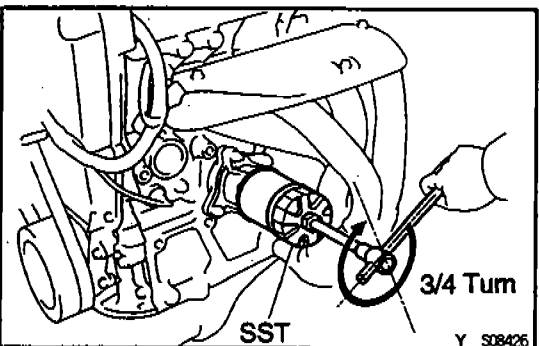
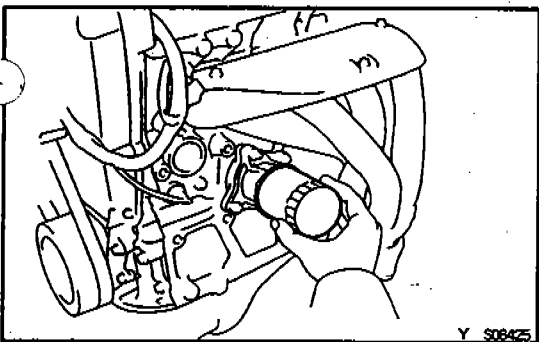
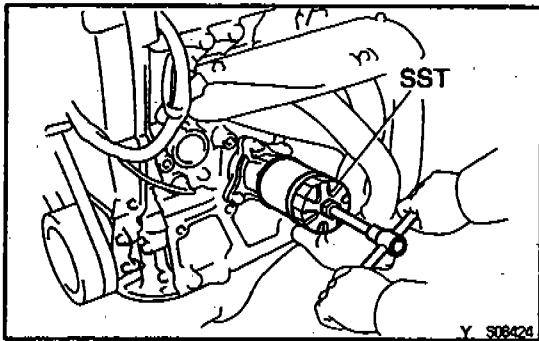
- Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Care should be taken, therefore, when changing 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

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

2. REPLACE OIL FILTER

- (a) Using SST, remove the oil filter.
SST 09228-06501
- (b) Clean the oil filter contact surface on the oil filter mounting.
- (c) Lubricate the filter rubber gasket with clean engine oil.
- (d) Tighten the oil filter by hand until the rubber gasket contacts the seat of the filter mounting.



- (e) Using SST, give it an additional 3/4 turn to seat the filter.
SST 09228-06501

3. FILL WITH ENGINE OIL

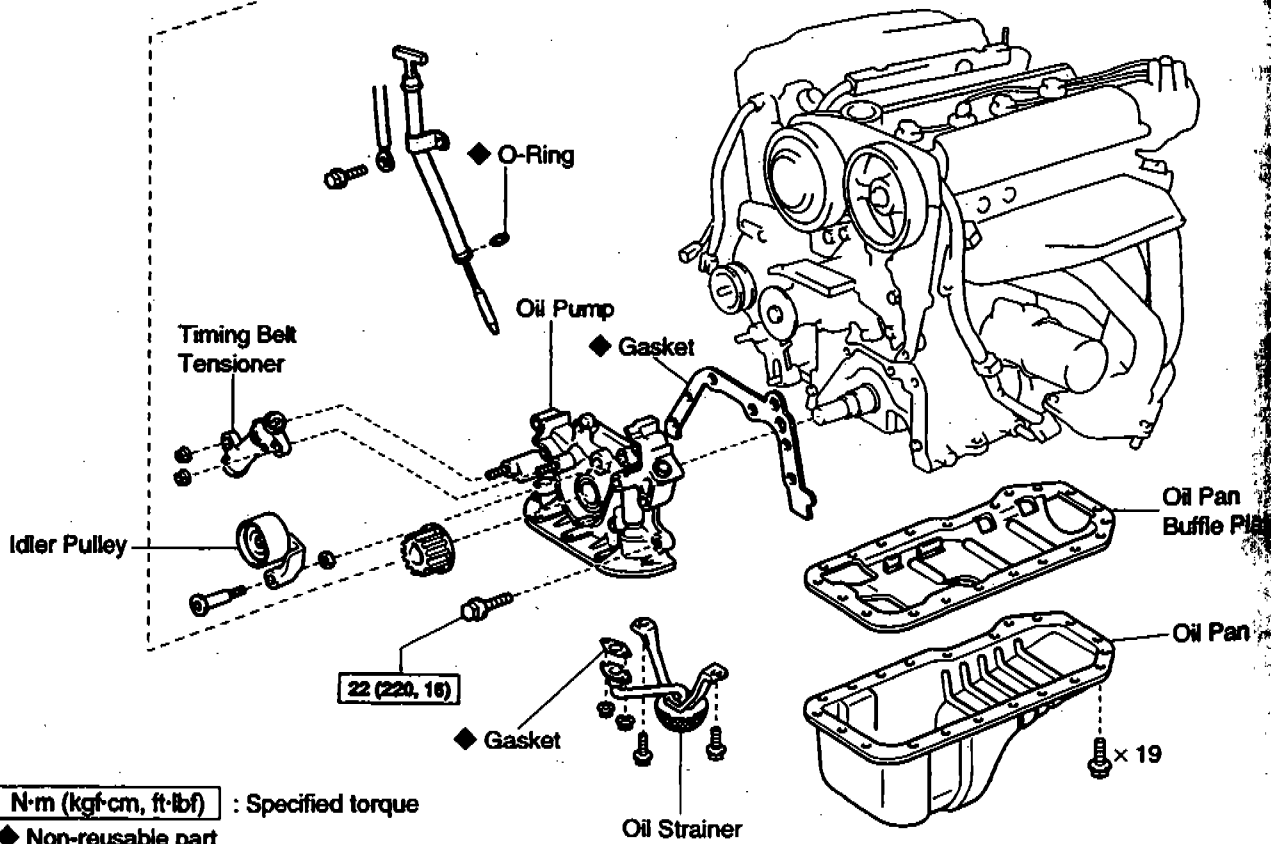
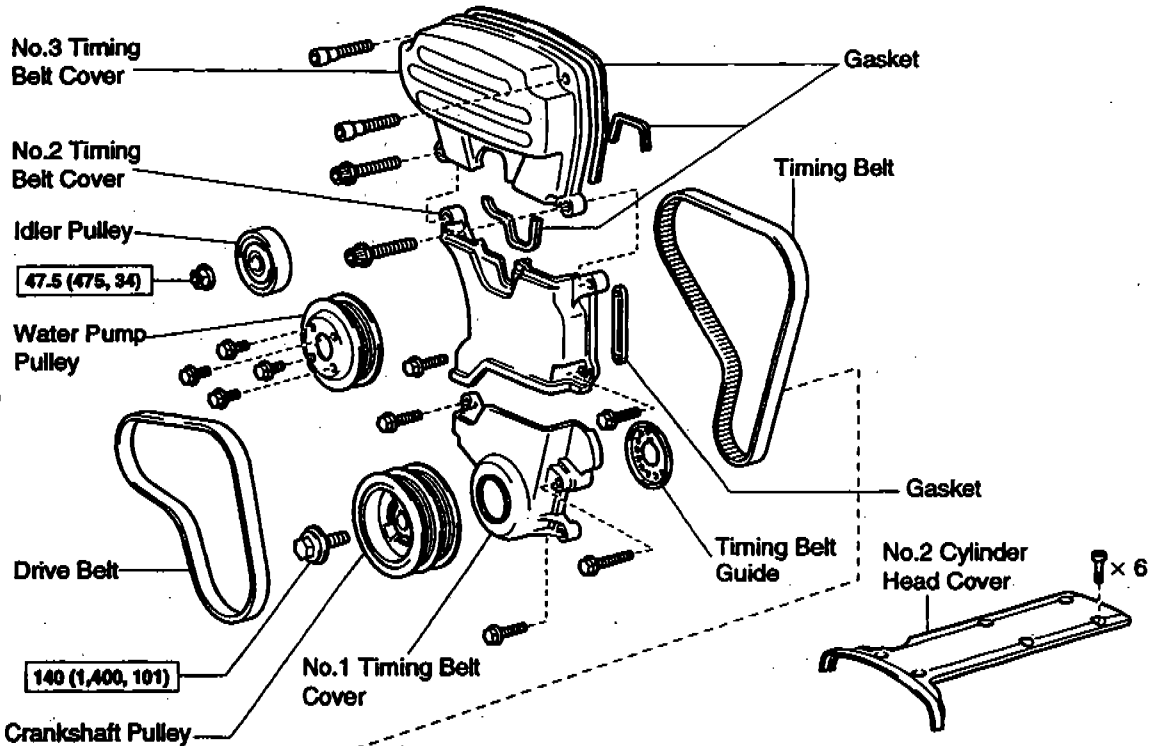
- (a) Clean and install the oil drain plug with a new gasket.
Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)
- (b) Fill with new engine oil.

Capacity:

| | |
|-----------------------|---------------------------------------|
| Drain and refill | |
| w/ Oil filter change | 3.0 liters (3.2 US qts, 2.6 Imp. qts) |
| w/o Oil filter change | 2.8 liters (3.0 US qts, 2.5 Imp. qts) |
| Dry fill | 3.5 liters (3.7 US qts, 3.1 Imp. qts) |

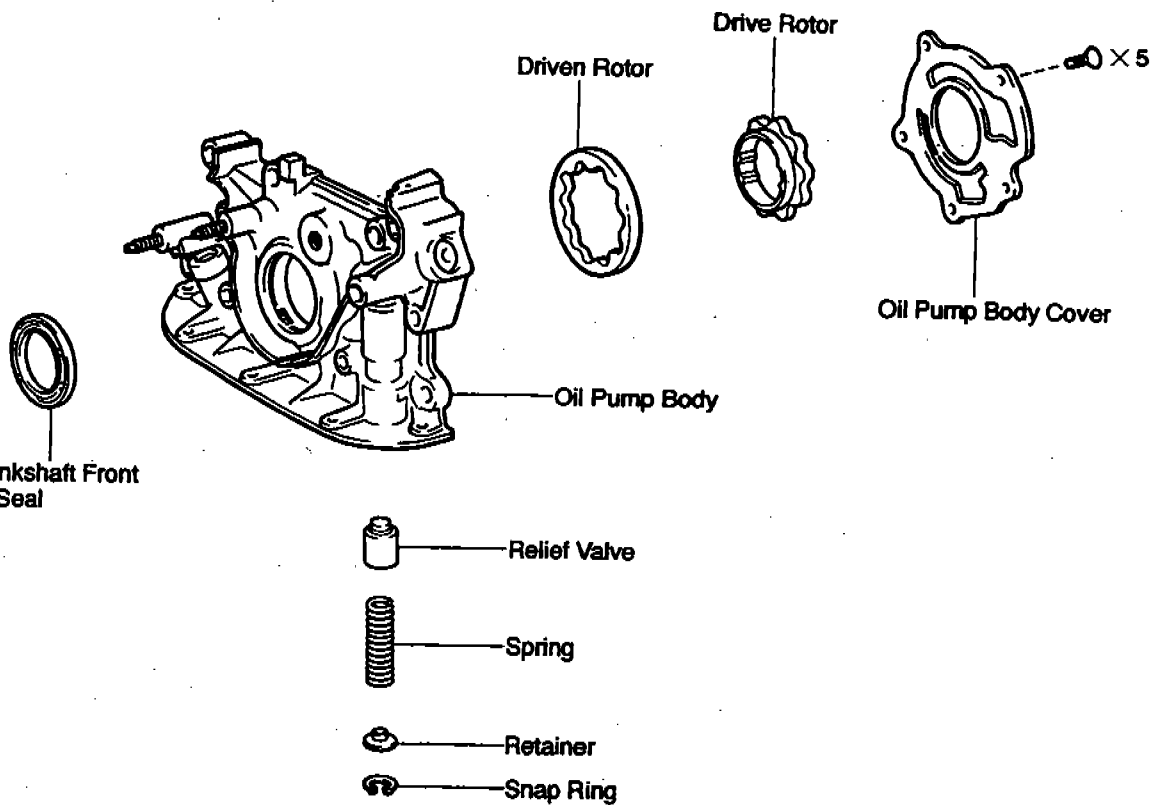
- (c) Reinstall the oil filler cap.
- 4. START ENGINE AND CHECK FOR OIL LEAKS**
- 5. RECHECK ENGINE OIL LEVEL**

OIL PUMP COMPONENTS



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

◆ Non-reusable part



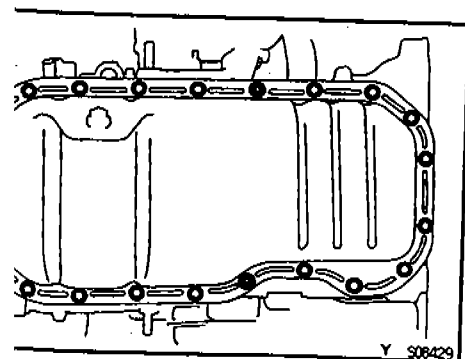
Y 308428

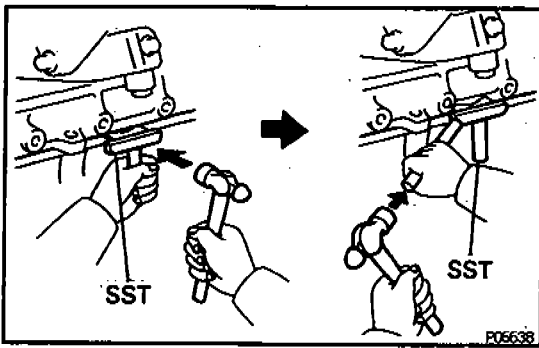
LU028-01

REMOVAL

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

1. **DRAIN ENGINE OIL**
2. **REMOVE TIMING BELT**
(See EM section)
3. **REMOVE IDLER PULLEY AND CRANKSHAFT TIMING PULLEY**
(See EM section)
4. **REMOVE OIL DIPSTICK AND GUIDE**
 - (a) Remove the mounting bolt.
 - (b) Pull out the dipstick guide together with the dipstick.
 - (c) Remove the O-ring from the dipstick guide.
5. **REMOVE OIL PAN**
 - (a) Remove the 19 bolts and 2 nuts.

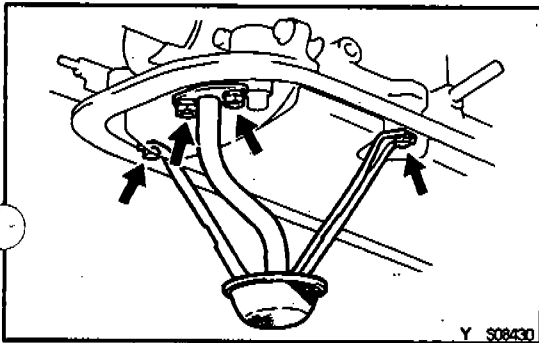




- (b) Insert the blade of SST between the cylinder block and oil pan, and cut off applied sealer and remove the oil pan, SST 09032-00100

NOTICE:

- Do not use SST for the oil pump body side and rear oil seal retainer.
- Be careful not to damage the oil pan flange.

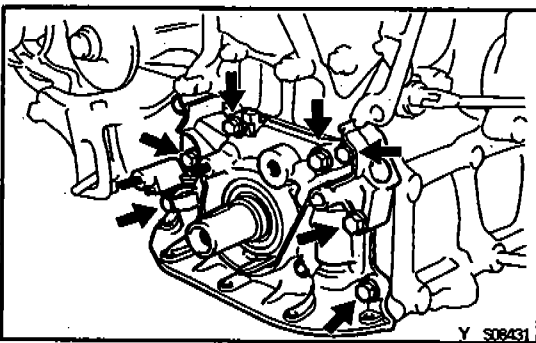


6. REMOVE OIL STRAINER

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

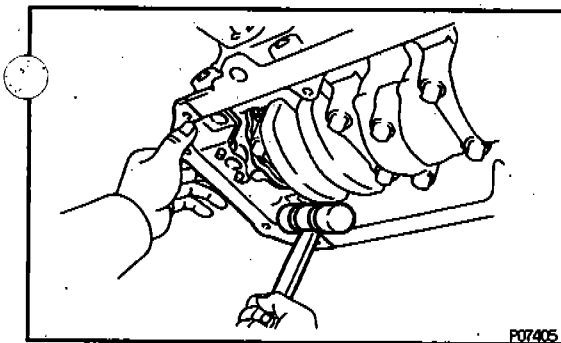
7. REMOVE OIL PAN BUFFLE PLATE

(See procedure step 5)



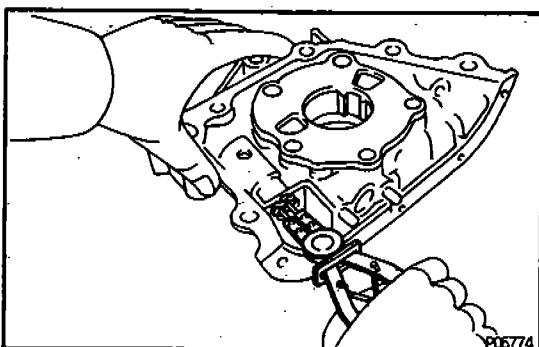
8. REMOVE OIL PUMP

- (a) Remove the 7 bolts.



- (b) Using a plastic-faced hammer, remove the oil pump carefully tapping the oil pump body.

- (c) Remove the gasket.



DISASSEMBLY

1. REMOVE RELIEF VALVE

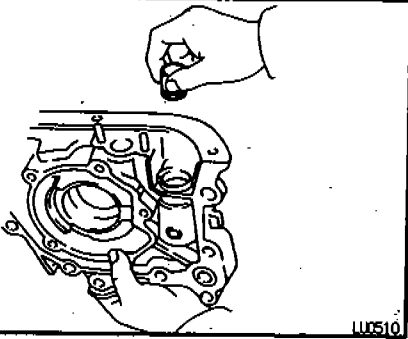
- (a) Using snap ring pliers, remove the snap ring.
 (b) Remove the retainer, spring and relief valve.

2. REMOVE DRIVE AND DRIVEN ROTORS

Remove the 5 screws, pump body cover, O-ring, 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.



LU0510

2. INSPECT ROTOR BODY CLEARANCE

Using a thickness gauge, measure the clearance between the driven rotor and body.

Standard body clearance:

0.100 - 0.191 mm (0.0039 - 0.0075 in.)

Maximum body clearance:

0.20 mm (0.0079 in.)

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

3. INSPECT ROTOR TIP CLEARANCE

Using a thickness gauge, measure the clearance between the drive and driven rotor tips.

Standard tip clearance:

0.060 - 0.220 mm (0.0024 - 0.0087 in.)

Maximum tip clearance:

0.35 mm (0.0138 in.)

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

4. INSPECT ROTOR SIDE CLEARANCE

Using a thickness gauge and precision straight edge, measure the clearance between the rotors and precision straight edge.

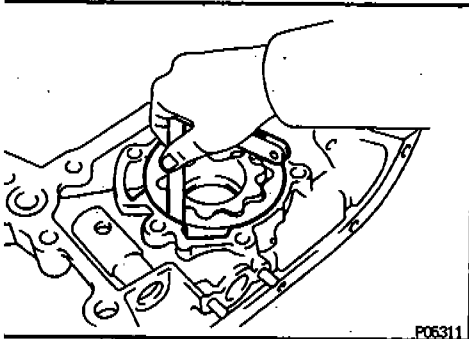
Standard side clearance:

0.025 - 0.075 mm (0.0010 - 0.0030 in.)

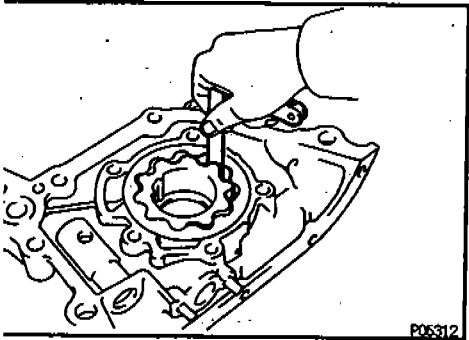
Maximum side clearance:

0.10 mm (0.0039 in.)

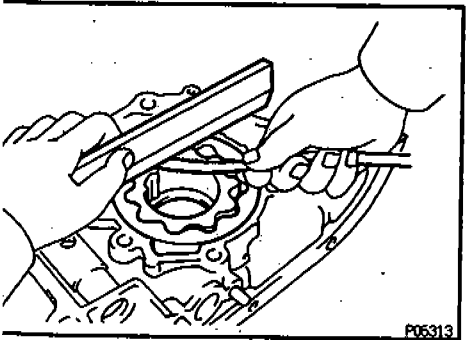
If the side clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.



P06311



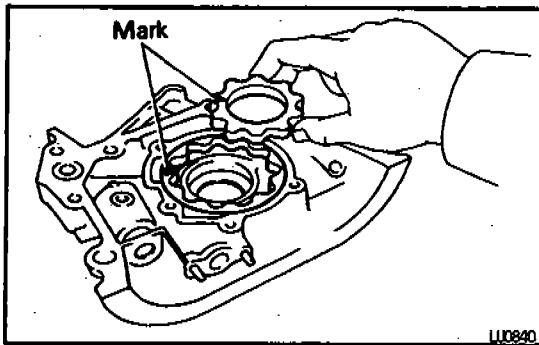
P06312



P06313

REPLACEMENT**REPLACE CRANKSHAFT FRONT OIL SEAL**

(See EM section)



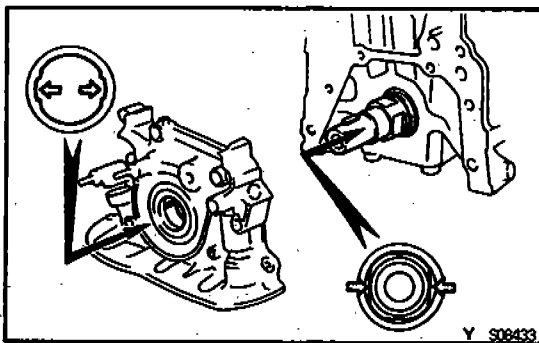
REASSEMBLY

1. INSTALL DRIVE AND DRIVEN ROTORS

- (a) Place the drive and driven rotors into pump body cover with marks facing the pump body cover side.
- (b) Install the oil pump body cover with the 5 bolts. Torque: 10 N·m (105 kgf·cm, 8 ft·lbf)

2. INSTALL RELIEF VALVE

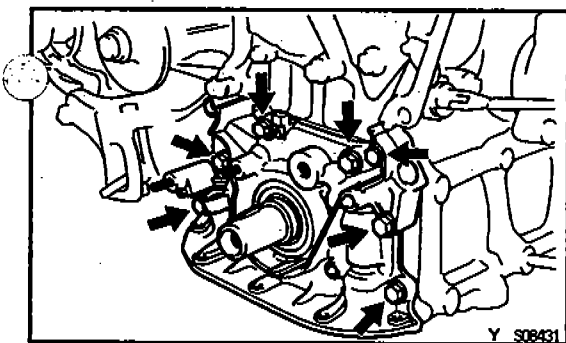
- (a) Insert the relief valve, spring and retainer into the pump body hole.
- (b) Using snap ring pliers, install the snap ring into the pump body hole.



INSTALLATION

1. INSTALL OIL PUMP

- (a) Place a new gasket on the cylinder block.
- (b) Engage the spline teeth of the oil pump with the large teeth of the crankshaft, and install the oil pump with the 7 bolts.



- (c) Install the oil pump with the 7 bolts. Torque: 22 N·m (220 kgf·cm, 16 ft·lbf)

Bolt length:

35 mm (1.38 in.) for long bolt

25 mm (0.98 in.) for other bolt

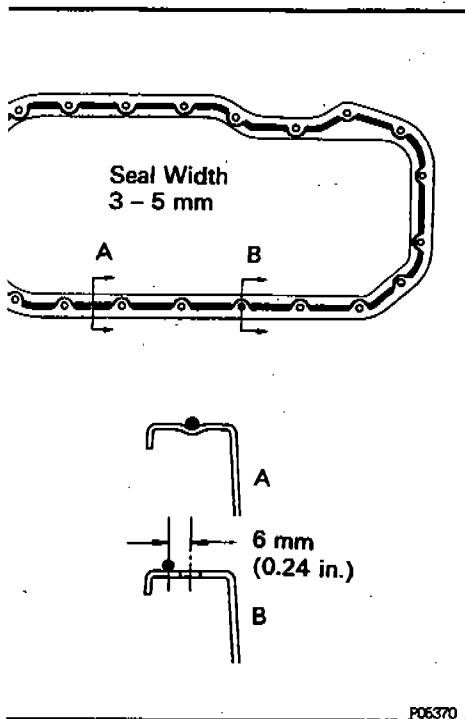
2. INSTALL OIL PAN BUFFLE PLATE

(See procedure step 4)

3. INSTALL OIL STRAINER

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

Torque: 9.3 N·m (95 kgf·cm, 82 in·lbf)



4. INSTALL OIL PAN

- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil pan 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.

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

- (b) Apply seal packing to the 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 oil pan with the 19 bolts and 2 nuts.

Torque: 4.9 N-m (50 kgf-cm, 43 in.-lbf)

5. 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 together with the dipstick, and install them with the bolt.

Torque: 9.3 N-m (95 kgf-cm, 82 in.-lbf)

6. INSTALL CRANKSHAFT TIMING PULLEY AND IDLER PULLY

(See EM section)

7. INSTALL TIMING BELT

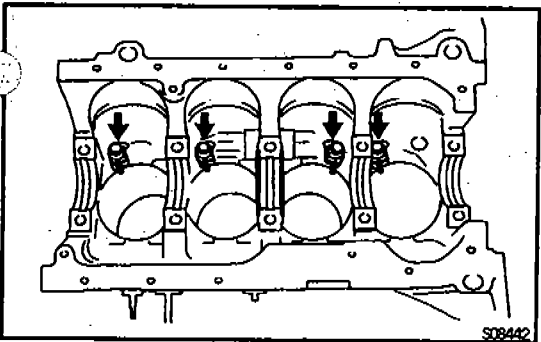
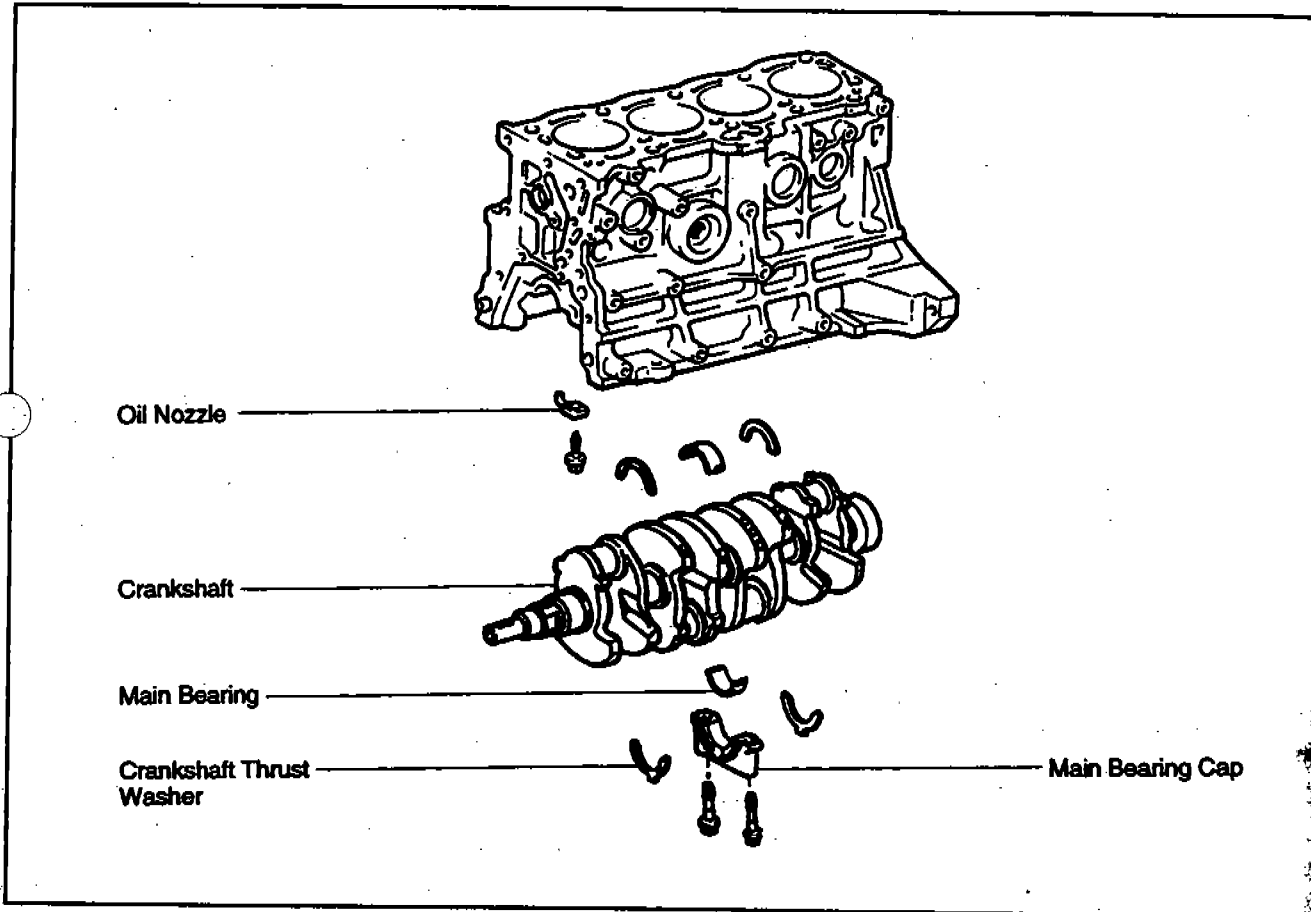
(See EM section)

8. FILL WITH ENGINE OIL

9. START ENGINE AND CHECK FOR OIL LEAKS

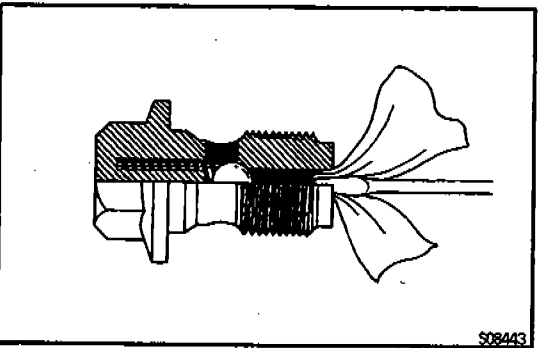
10. RECHECK ENGINE OIL LEVEL

OIL NOZZLE COMPONENTS



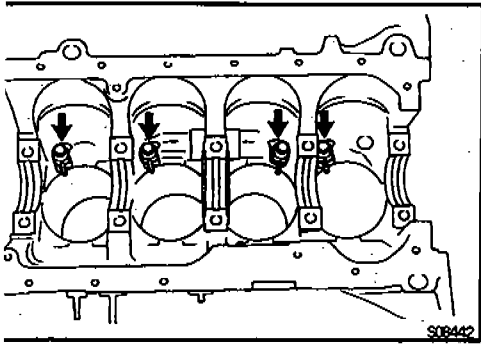
REMOVAL

1. **REMOVE CRANKSHAFT**
(See EM section)
2. **REMOVE OIL NOZZLES**
Remove the union bolt and oil nozzle. Remove the nozzles.



INSPECTION

1. **INSPECT RELIEF VALVES (UNION BOLTS)**
Push the valve with a wooden stick to check if it is stuck.
If stuck, replace the union bolts.
2. **INSPECT OIL NOZZLE**
Check the oil nozzles for damage or clogging.
If necessary, replace the oil nozzle.



INSTALLATION

1. INSTALL OIL NOZZLES

Install the oil nozzle with the union bolt. Install the 4 oil nozzles.

Torque: 25 N-m (250 kgf-cm, 18 ft-lbf)

2. INSTALL CRANKSHAFT

(See EM section)