

OIL AND FILTER INSPECTION

LU060-04

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:

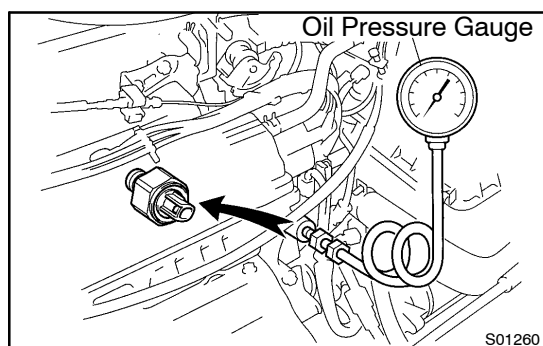
API grade SH, Energy – Conserving II multigrade engine oil or ILSAC multigrade engine oil.

Recommended viscosity is as shown in the illustration.

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.



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

4. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

5. CHECK OIL PRESSURE

Oil pressure:

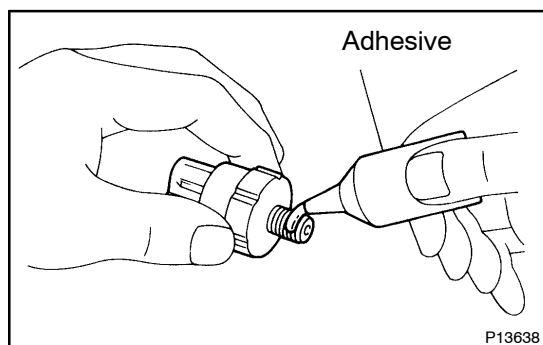
At idle

29 kPa (0.3 kgf/cm², 4.3 psi) or more

At 3,000 rpm

245 – 490 kPa

(2.5 – 5.0 kgf/cm², 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

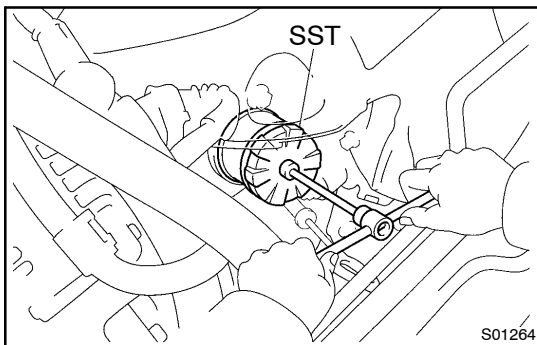
(c) Reinstall the oil pressure switch.

7. START ENGINE AND CHECK FOR 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.

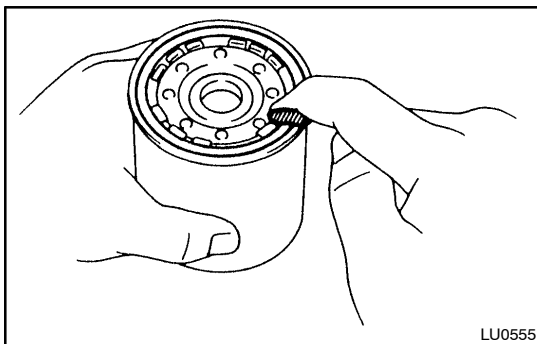


1. DRAIN ENGINE OIL

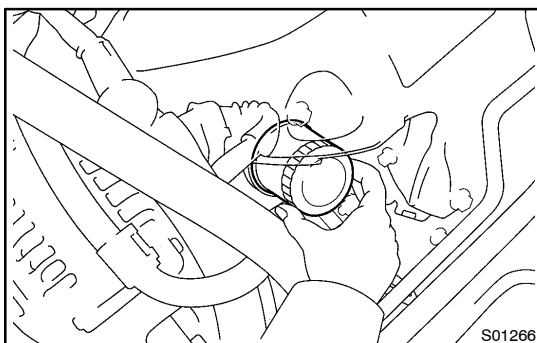
- (a) Remove the oil filler cap.
- (b) Remove the oil drain plug, and drain the oil into a container.

2. REPLACE OIL FILTER

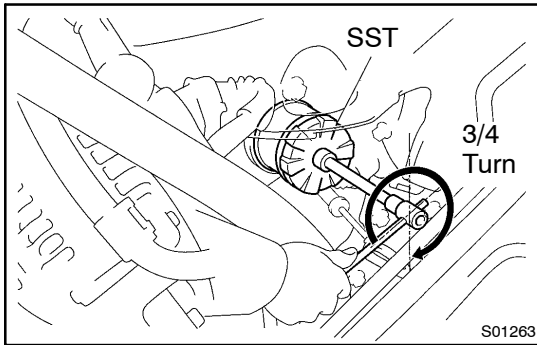
- (a) Using SST, remove the oil filter.
SST 09228-06501
- (b) Check and clean the oil filter installation surface.



- (c) Lubricate the filter rubber gasket with clean engine oil.



- (d) Lightly 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: 37 N·m (375 kgf·cm, 27 ft·lbf)
- (b) Fill with new engine oil.

Capacity:

Drain and refill

w/ Oil filter change

3.9 liters (4.1 US qts, 3.4 Imp. qts)

w/o Oil filter change

3.7 liters (3.9 US qts, 3.3 Imp. qts)

Dry fill

4.4 liters (4.7 US qts, 3.9 Imp. qts)

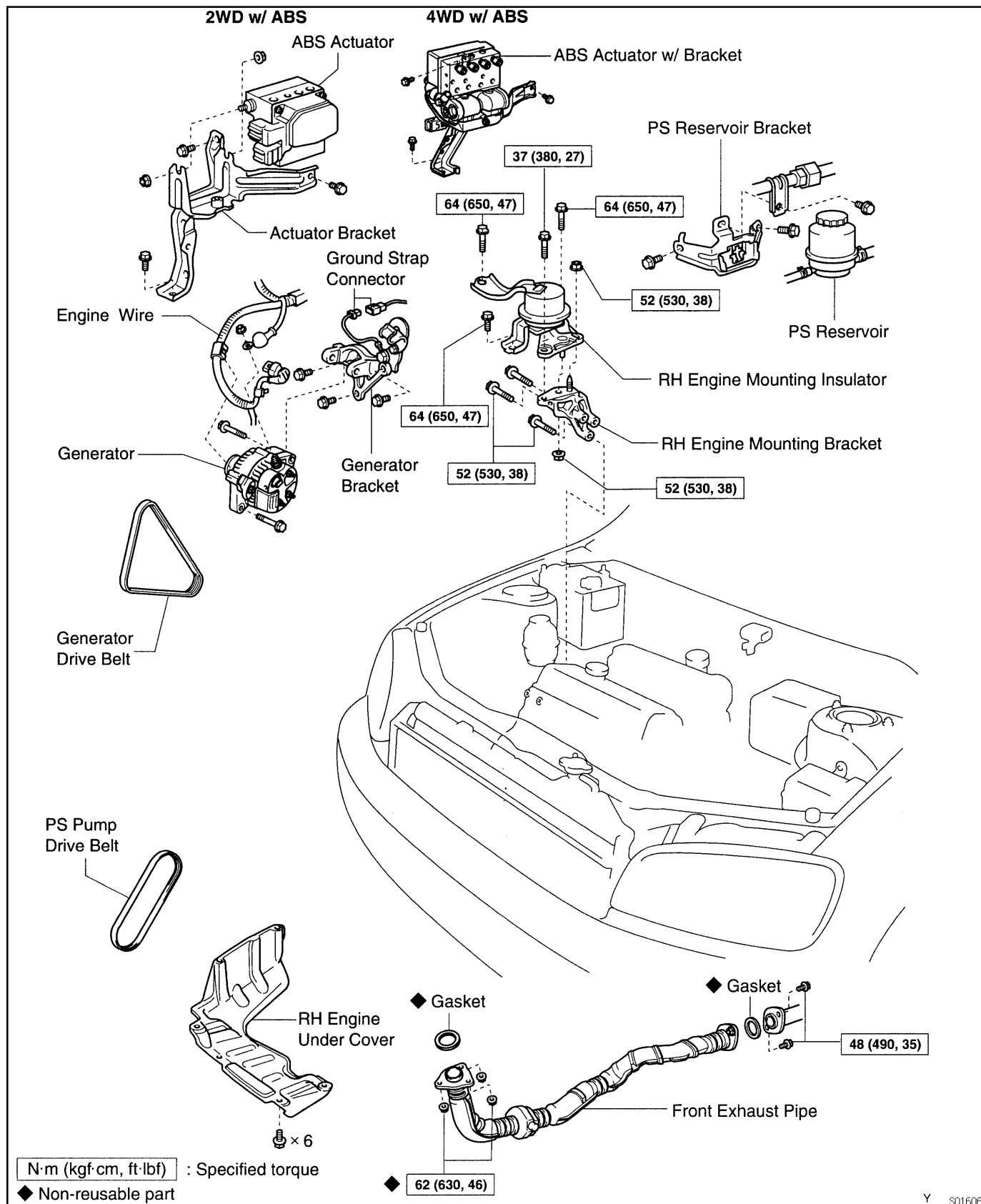
- (c) Reinstall the oil filler cap.

4. START ENGINE AND CHECK FOR OIL LEAKS

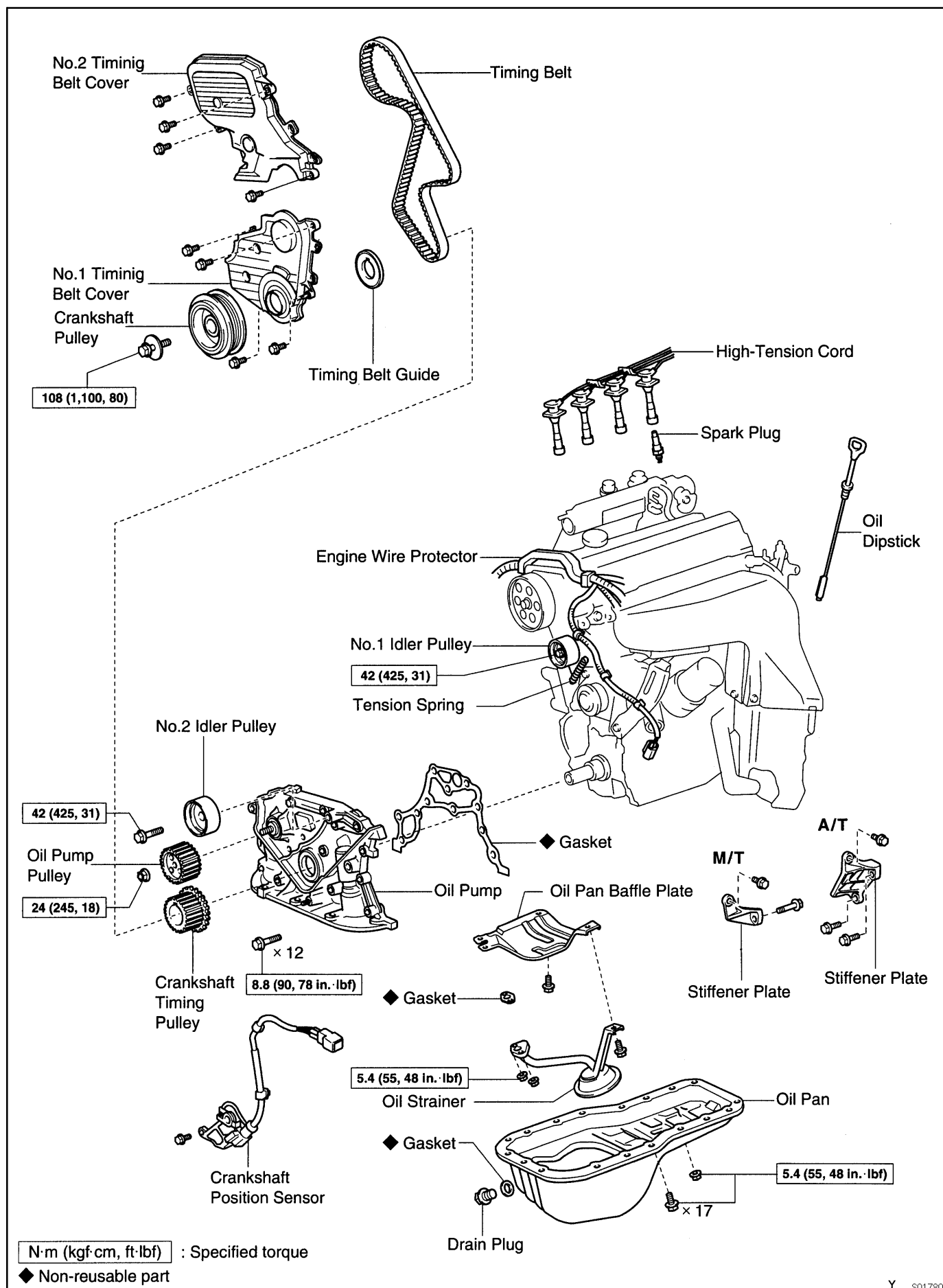
5. RECHECK ENGINE OIL LEVEL

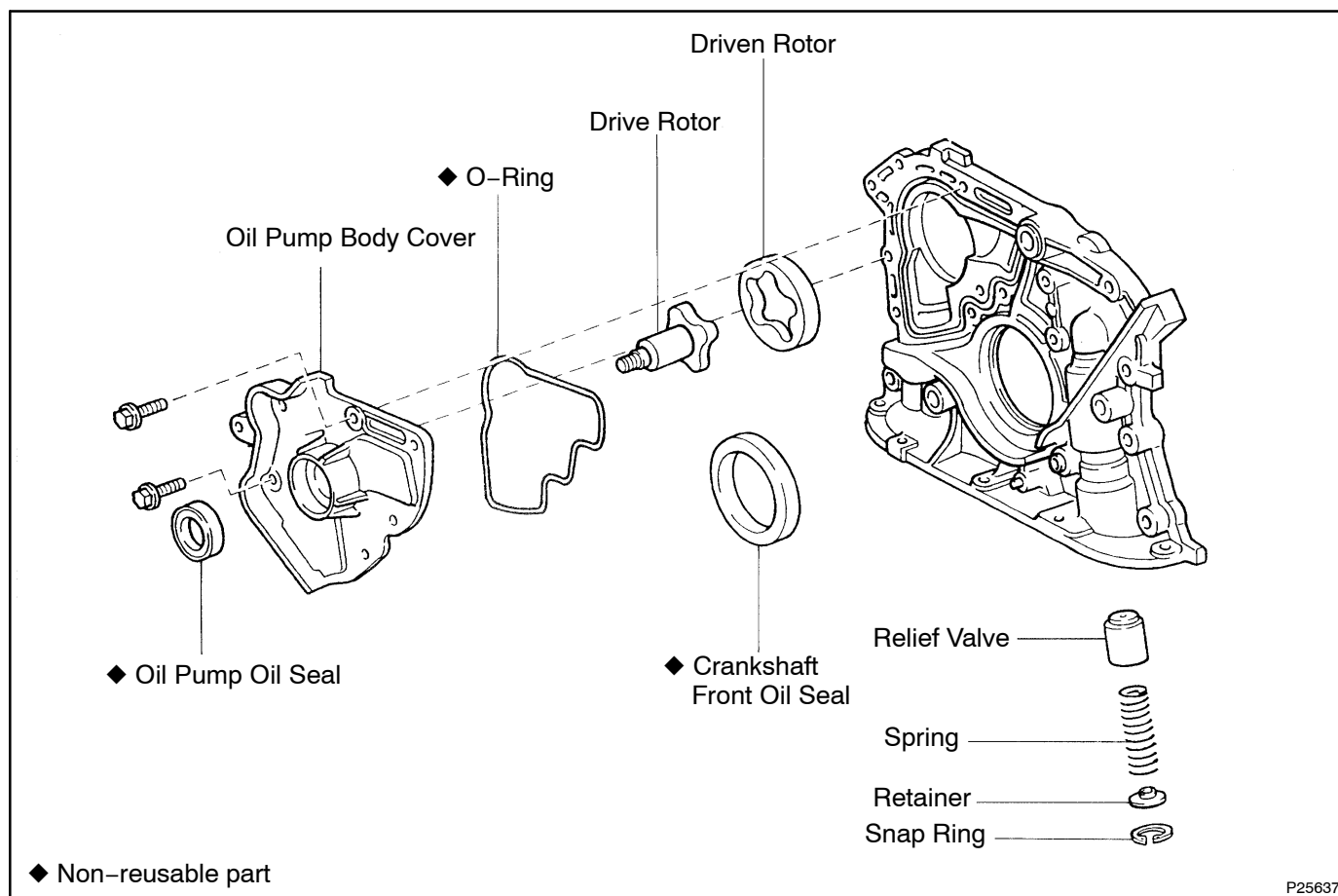
OIL PUMP COMPONENTS

LU062-03



Y S01606





REMOVAL

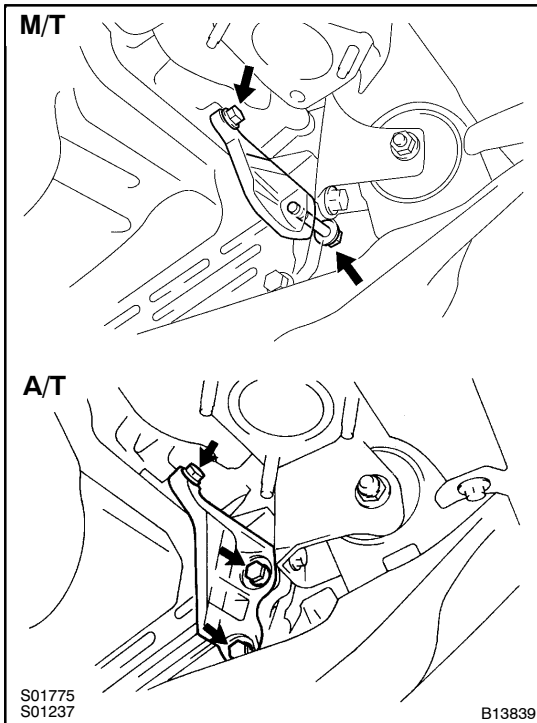
HINT:

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

1. **REMOVE HOOD**
2. **REMOVE RH ENGINE UNDER COVER**
3. **DRAIN ENGINE OIL**
4. **REMOVE FRONT EXHAUST PIPE (See page [EM-33](#))**

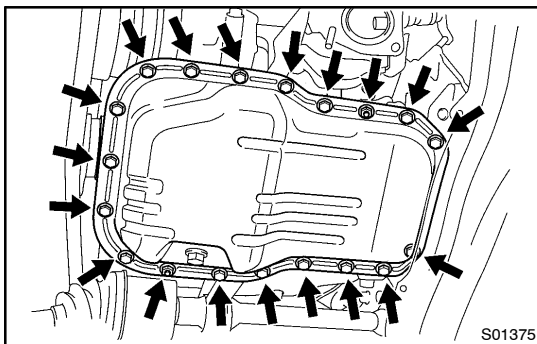
5. REMOVE STIFFENER PLATE

Remove the 2 bolts (M/T) or 3 bolts (A/T) and stiffener plate.



6. REMOVE OIL PAN

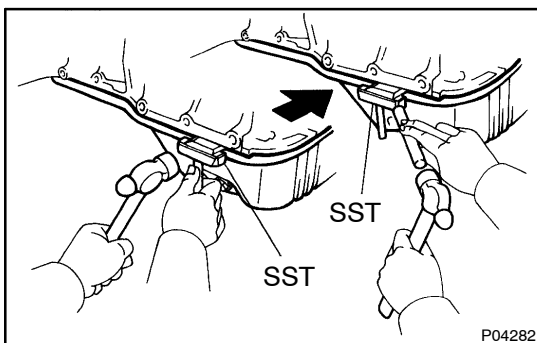
- (a) Remove the dipstick.
- (b) Remove the 17 bolts and the 2 nuts.

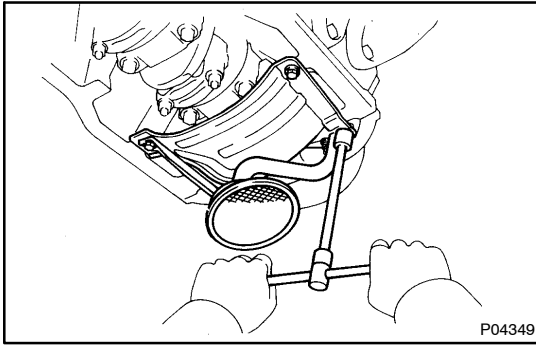


- (c) Insert the blade of SST between the cylinder block and oil pan, and cut off applied sealer and remove the oil pan.
SST 09032-00100

NOTICE:

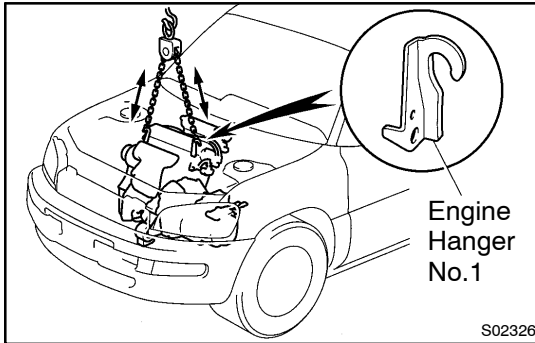
- **Do not use SST for the oil pump body side and rear oil seal retainer.**
- **Be careful not to damage the oil pan flange.**





7. REMOVE OIL PAN BAFFLE PLATE AND OIL STRAINER

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



8. SUSPEND ENGINE WITH ENGINE SLING DEVICE

Install a engine hanger No. 1 in the correct direction.

Part No. :

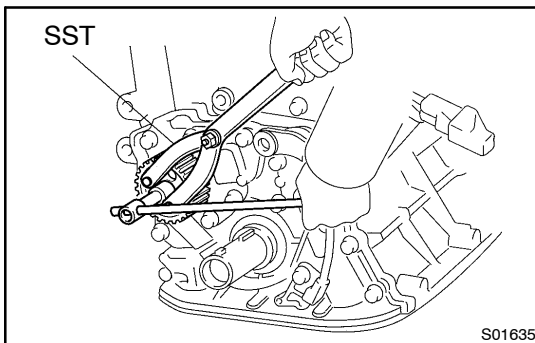
Engine hanger No. 1 12281-74060

Bolt 91611-B1020

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

9. REMOVE TIMING BELT (See page EM-15)

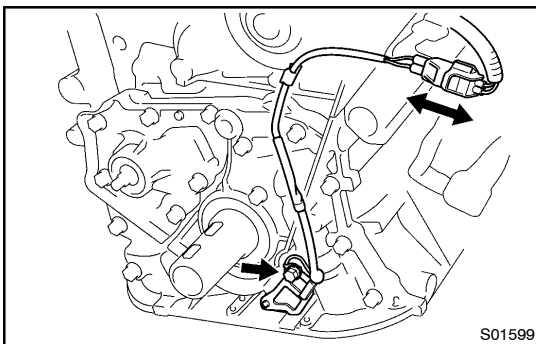
10. REMOVE NO.2 IDLER PULLEY AND CRANKSHAFT TIMING PULLEY (See page EM-81)



11. REMOVE OIL PUMP PULLEY

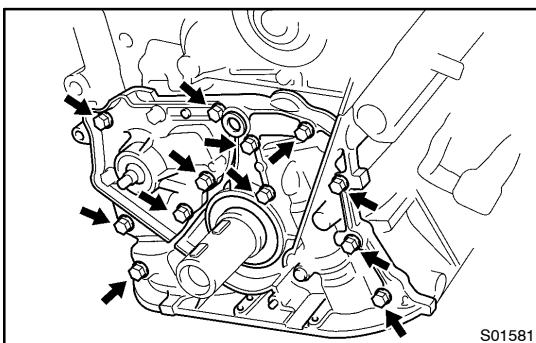
Using SST, remove the nut and pulley.

SST 09960-10010 (09962-01000, 09963-00600)



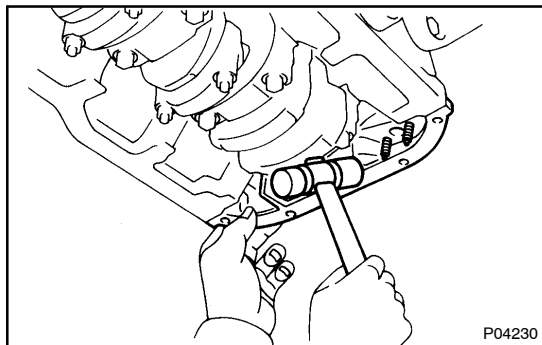
12. REMOVE CRANKSHAFT POSITION SENSOR

- Disconnect the connector from the generator drive belt adjusting bar.
- Remove the bolt and crankshaft position sensor.

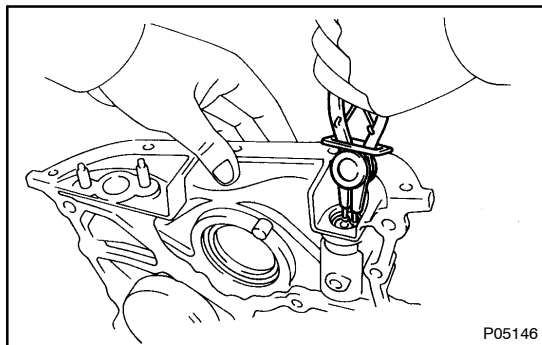


13. REMOVE OIL PUMP

- Remove the 12 bolts.



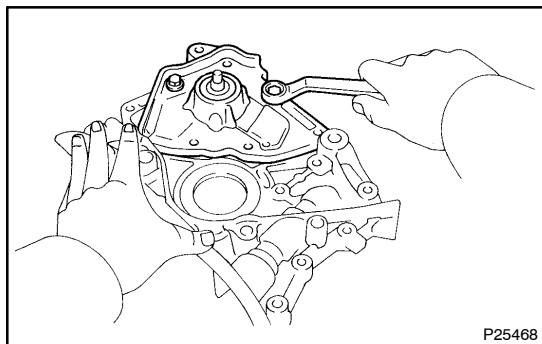
- (b) Using a plastic-faced hammer, remove the oil pump by carefully tapping the oil pump body.
- (c) Remove the gasket.



DISASSEMBLY

1. REMOVE RELIEF VALVE

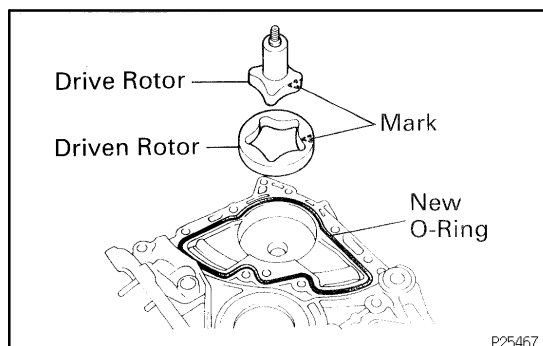
- Using snap ring pliers, remove the snap ring.
- Remove the retainer, spring and relief valve.



2. REMOVE DRIVE AND DRIVEN ROTORS

Remove the 2 bolts, pump body cover, O-ring, the drive and driven rotors.

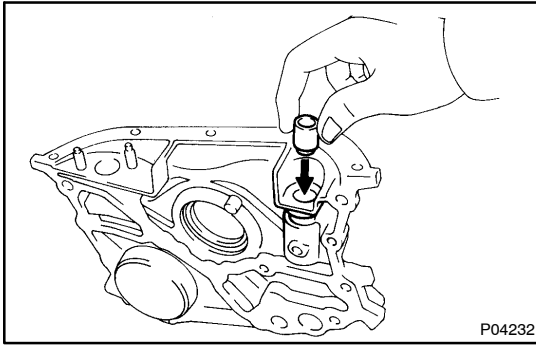
Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)



HINT:

At the time of reassembly, please refer to the following items.

- Place the drive and driven rotors into pump body with the marks facing the pump body side.
- Use a new O-ring.



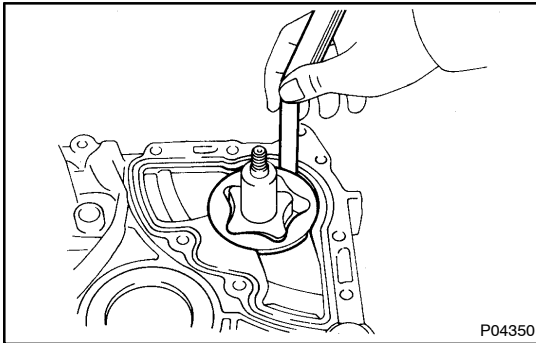
P04232

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.



P04350

2. INSPECT DRIVE AND DRIVEN ROTORS

3. INSPECT ROTOR BODY CLEARANCE

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

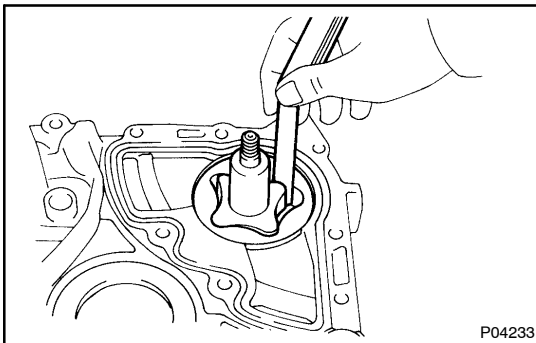
Standard body clearance:

0.10 – 0.16 mm (0.0039 – 0.0063 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.



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4. INSPECT ROTOR TIP CLEARANCE

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

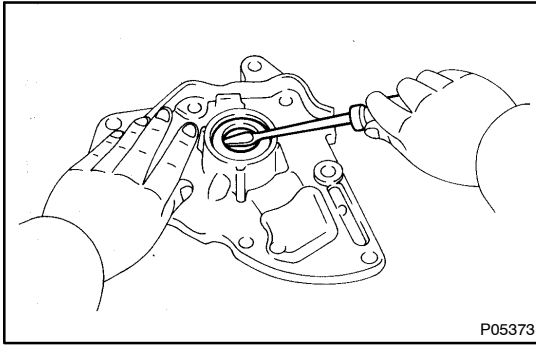
Standard tip clearance:

0.04 – 0.16 mm (0.0016 – 0.0063 in.)

Maximum tip clearance:

0.20 mm (0.0079 in.)

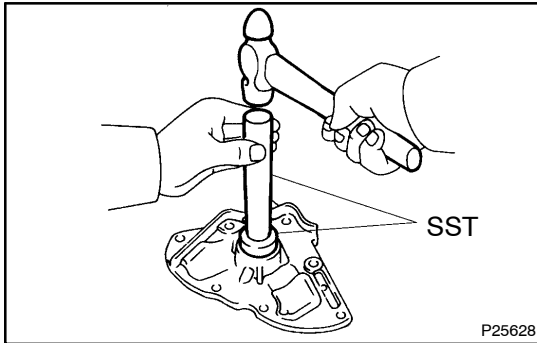
If the tip clearance is greater than maximum, replace the rotors as a set.



REPLACEMENT

1. REMOVE OIL SEAL

Using a screwdriver, pry out the oil seal.



2. INSTALL OIL SEAL

- (a) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump cover edge.

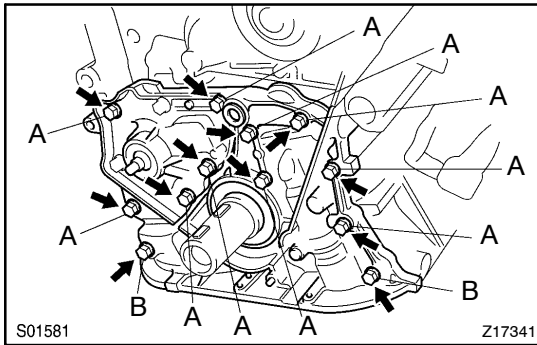
SST 09950-60010 (09951-00310),
09950-70010 (09951-07100)

- (b) Apply MP grease to the oil seal lip.

3. REPLACE CRANKSHAFT FRONT OIL SEAL (See page [EM-96](#))

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page [LU-10](#)).



INSTALLATION

1. INSTALL OIL PUMP

Install a new gasket and the oil pump with the 12 bolts. Uniformly tighten the bolts in several passes.

Torque: 8.8 N·m (90 kgf·cm, 78 in·lbf)

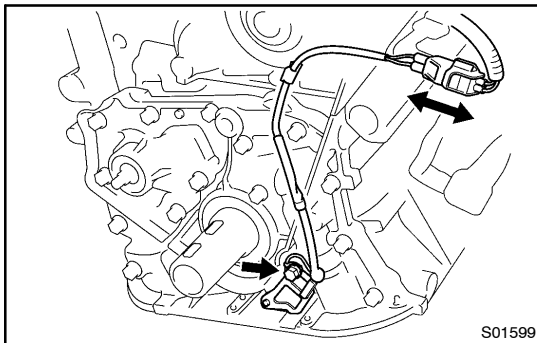
HINT:

Each bolt length is indicated in the illustration.

Bolt length:

A: 25 mm (0.98 in.)

B: 35 mm (1.38 in.)

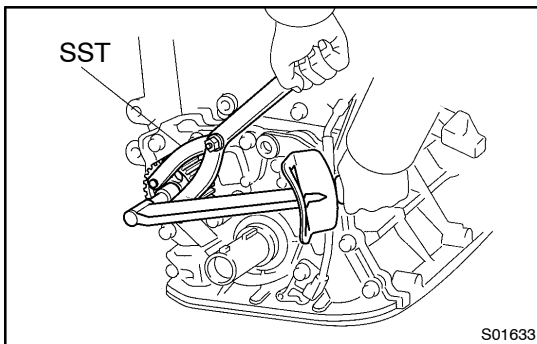


2. INSTALL CRANKSHAFT POSITION SENSOR

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

Torque: 8.8 N·m (90 kgf·cm, 78 in·lbf)

(b) Connect the connector to the generator drive belt adjusting bar.



3. INSTALL OIL PUMP PULLEY

(a) Align the cutouts of the pulley and shaft, and slide on the pulley.

(b) Using SST, install the pulley nut.

SST 09960-10010 (09962-01000, 09963-00600)

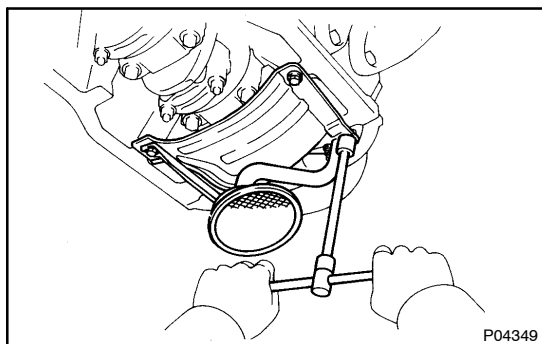
Torque: 24 N·m (245 kgf·cm, 18 ft·lbf)

4. INSTALL CRANKSHAFT TIMING PULLEY AND NO.2 IDLER PULLEY (See page [EM-20](#))

5. INSTALL TIMING BELT (See page [EM-20](#))

6. REMOVE ENGINE SLING DEVICE

Remove the engine hanger No.1.



7. INSTALL OIL PAN BAFFLE PLATE AND OIL STRAINER

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

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

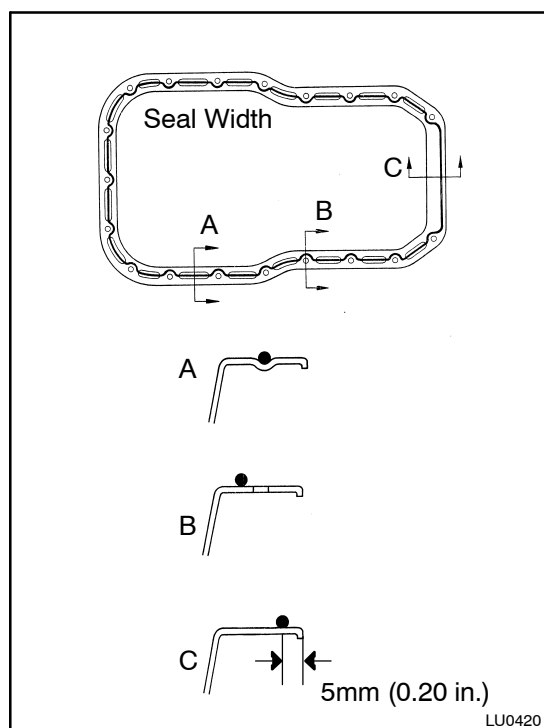
8. INSTALL OIL PAN

(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.

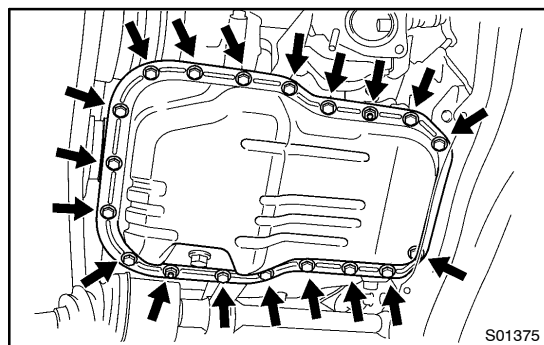


(b) Apply seal packing to the oil pan as shown in the illustration.

Seal packing:

Part No.08826-00080 or equivalent

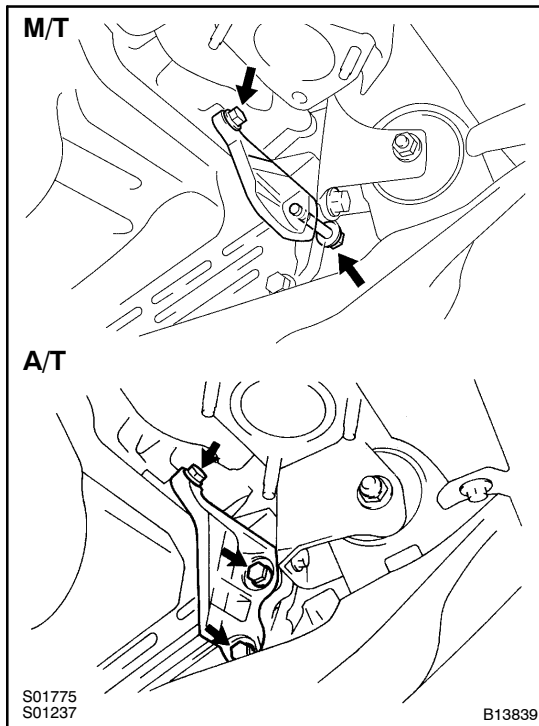
- Install a nozzle that has been cut to a 3–5 mm (0.12 – 0.20 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



(c) Install the oil pan with 17 bolts and 2 nuts.

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

(d) Install the dipstick.

**9. INSTALL STIFFENER PLATE**

Install the stiffener plate with the 2 bolts (M/T) or 3 bolts (A/T).

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

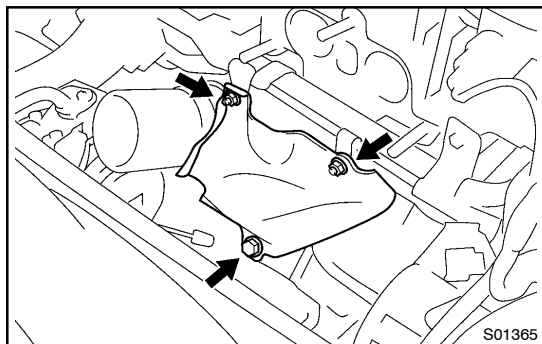
10. INSTALL FRONT EXHAUST PIPE (See page [EM-55](#))**11. FILL WITH ENGINE OIL****12. START ENGINE AND CHECK FOR LEAKS****13. RECHECK ENGINE OIL LEVEL****14. INSTALL RH ENGINE UNDER COVER****15. INSTALL HOOD**

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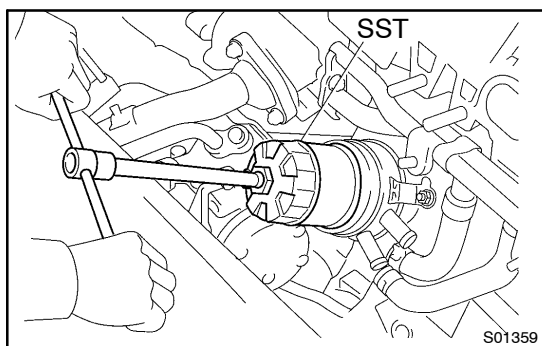


REMOVAL

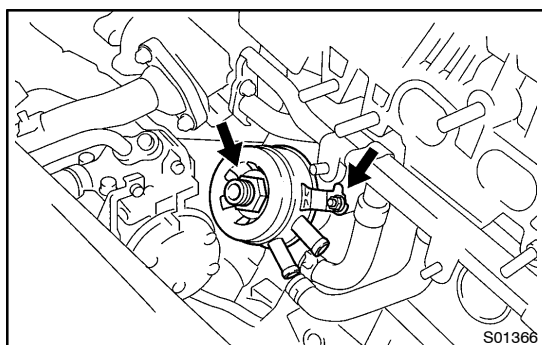
1. REMOVE RH ENGINE UNDER COVER
2. DRAIN ENGINE COOLANT
3. REMOVE FRONT EXHAUST PIPE (See page [EM-33](#))
4. REMOVE GENERATOR (See page [CH-7](#))
5. REMOVE OIL DIPSTICK
6. REMOVE EXHAUST MANIFOLD AND FRONT TWC ASSEMBLY (See page [EM-33](#))



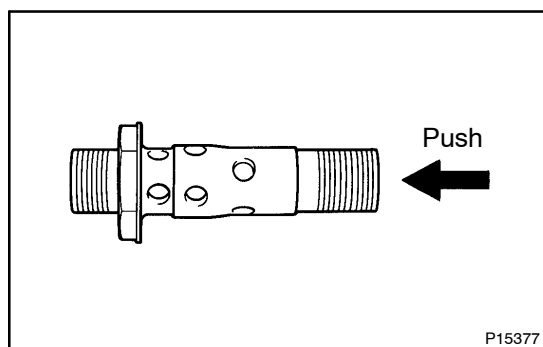
7. REMOVE WATER BYPASS PIPE HEAT PROTECTOR
Remove the bolt, 2 nuts and heat protector.



8. REMOVE OIL FILTER
Using SST, remove the oil filter.
SST 09228-06501



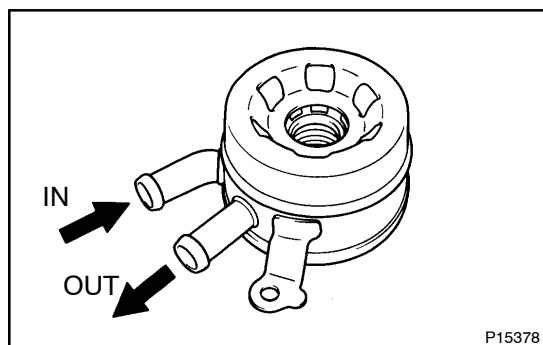
9. REMOVE OIL COOLER
 - (a) Disconnect the 2 water bypass hoses from the oil cooler.
 - (b) Remove the union bolt and plate washer.
 - (c) Remove the nut and oil cooler.
 - (d) Remove the O-ring from the oil cooler.



INSPECTION

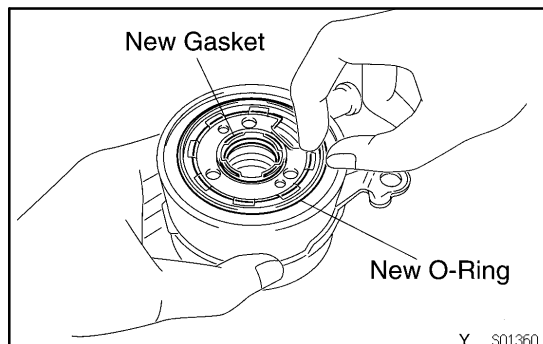
1. INSPECT RELIEF VALVE

Push the valve with a wooden stick to check if it is stuck. If stuck, replace the relief valve.



2. INSPECT OIL COOLER

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



INSTALLATION

1. INSTALL OIL COOLER

- (a) Clean the oil cooler contact surface on the oil cooler mounting.
- (b) Install a new O-ring to the oil cooler.
- (c) Temporarily install the oil cooler with the nut.
- (d) Apply a light coat of engine oil on the threads and under the head of the relief valve.
- (e) Install the plate washer and union bolt.

Torque: 78 N·m (800 kgf·cm, 58 ft·lbf)

- (f) Tighten the nut.

Torque: 8.8 N·m (90 kgf·cm, 78 in·lbf)

- (g) Connect the 2 water bypass hoses to the oil cooler.

2. INSTALL OIL FILTER

3. INSTALL WATER BYPASS HOSE HEAT PROTECTOR

Install the heat protector with the bolt and 2 nuts.

4. INSTALL EXHAUST MANIFOLD AND FRONT TWC ASSEMBLY (See page [EM-55](#))

5. INSTALL OIL DIPSTICK

6. INSTALL GENERATOR (See page [CH-19](#))

7. INSTALL FRONT EXHAUST PIPE (See page [EM-55](#))

8. FILL WITH ENGINE COOLANT

9. START ENGINE AND CHECK FOR LEAKS

10. CHECK ENGINE OIL LEVEL

11. INSTALL RH ENGINE UNDER COVER