

OIL AND FILTER INSPECTION

LU0G0-01

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 SJ, Energy-Conserving or ILSAC multi-grade engine oil.

SAE 5W – 30 is the best choice for your vehicle, for good fuel economy, and good starting in cold weather.

2. CHECK ENGINE OIL LEVEL

After warm up the engine and then 5 minutes after the engine stop, oil level should be between the low level and full level marks on the dipstick.

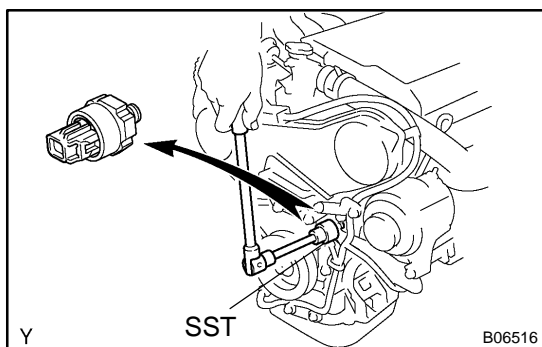
If low, check for leakage and add oil up to the full level mark.

NOTICE:

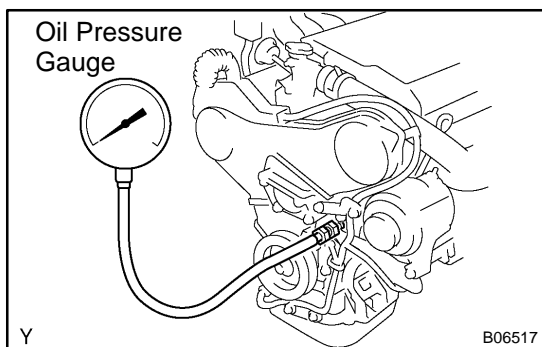
Do not fill with engine oil above the full level mark.

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.



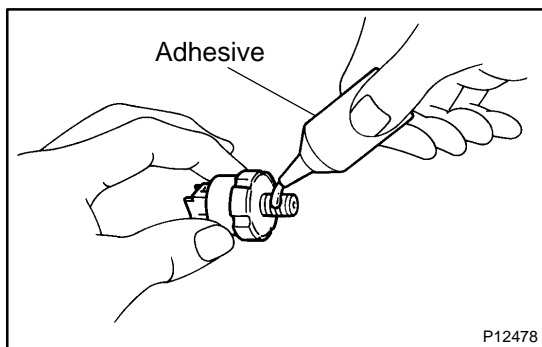
4. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

5. CHECK OIL PRESSURE

Oil pressure:

At idle	29 kPa (0.3 kgf/cm ² , 4.3 psi) or more
At 3,000 rpm	294 – 539 kPa (3.0 – 5.5 kgf/cm ² , 43 – 78 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

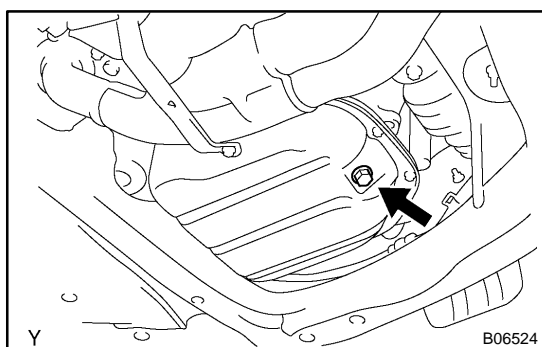
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

7. START ENGINE AND CHECK FOR LEAKS

REPLACEMENT

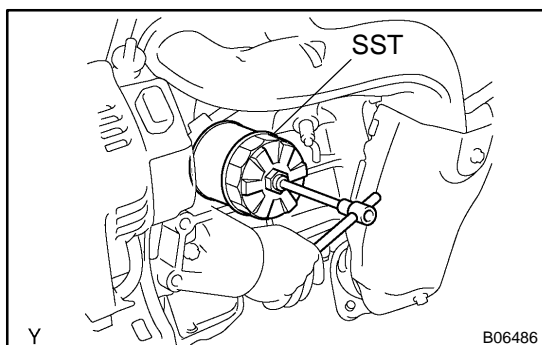
CAUTION:

- ★ 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.
- ★ Exercise caution in order to minimize the length and frequency of contact of your skin to used oil. Wear protective clothing and gloves. Wash your skin thoroughly 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 filter must be disposed of only at designated disposal sites.



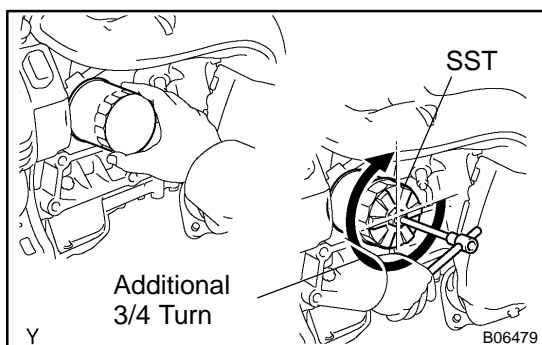
1. DRAIN ENGINE OIL

- (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 09228-07501
- (b) Check and clean the oil filter installation surface.
- (c) Apply clean engine oil to the gasket of a new oil filter.
- (d) Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.
- (e) Using SST, tighten it an additional 3/4 turn.
SST 09228-07501



3. REFILL WITH ENGINE OIL

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

Torque: 45 N·m (460 kgf·cm, 33 ft·lbf)

(b) Fill with fresh engine oil.

Capacity:

Drain and refill	w/ Oilfilter change	4.7 liters (5.0 US qts, 4.1 Imp. qts)
	w/o Oilfilter change	4.5 liters (4.8 US qts, 4.0 Imp. qts)
Dry fill		5.2 liters (5.5 US qts, 4.6 Imp. qts)

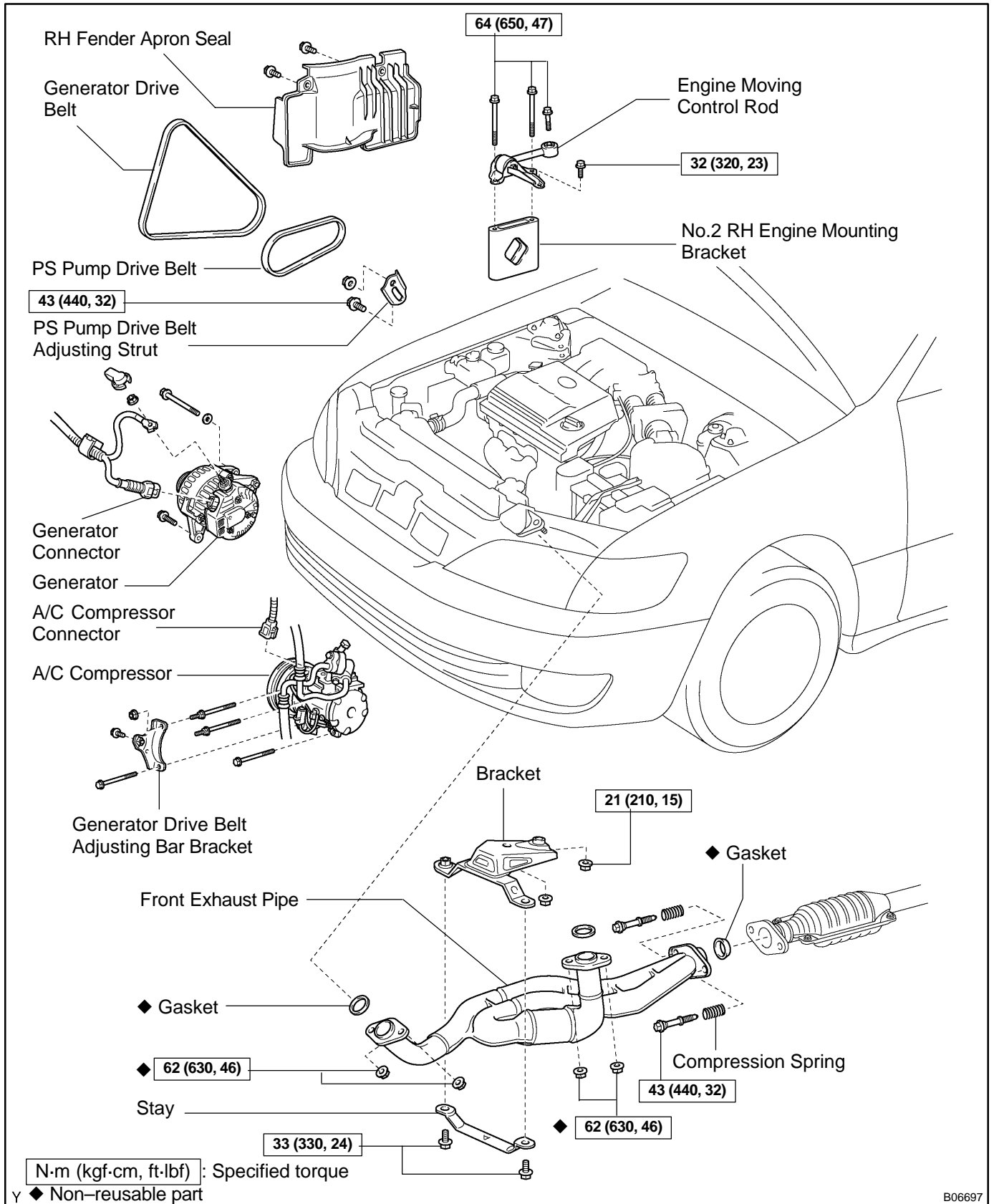
(c) Install the oil filler cap.

4. START ENGINE AND CHECK FOR OIL LEAKS

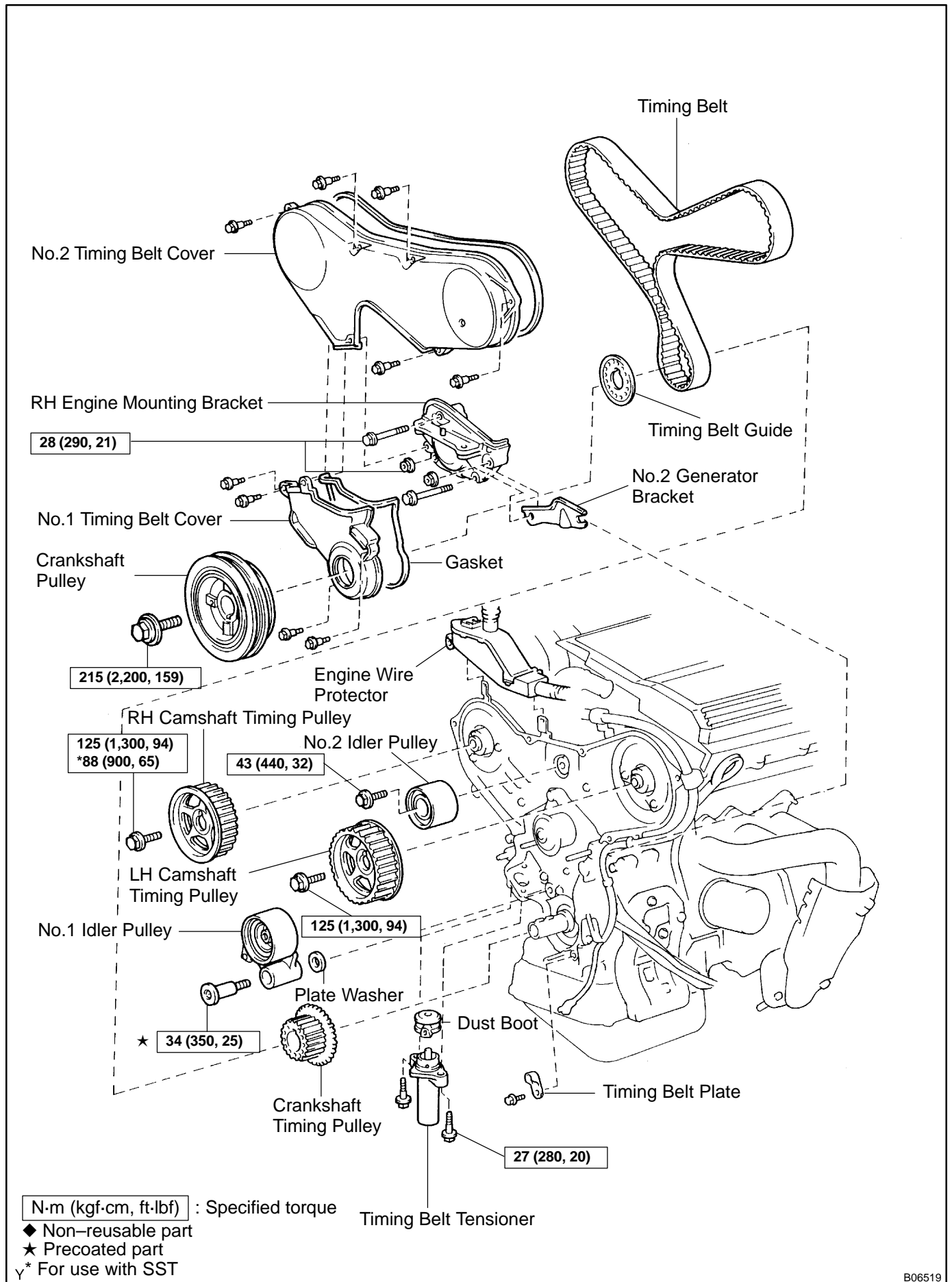
5. RECHECK ENGINE OIL LEVEL

OIL PUMP COMPONENTS

LU01R-02

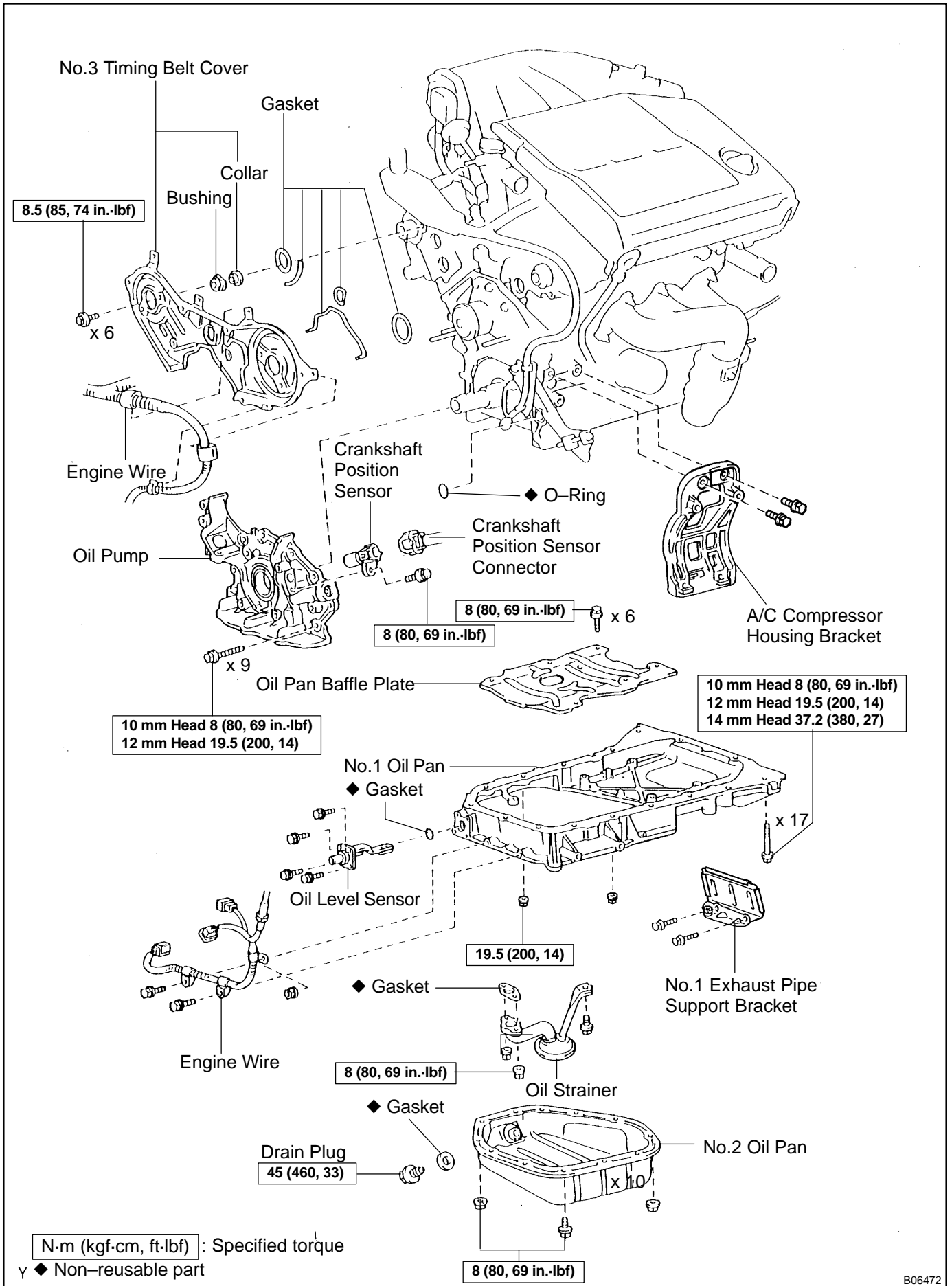


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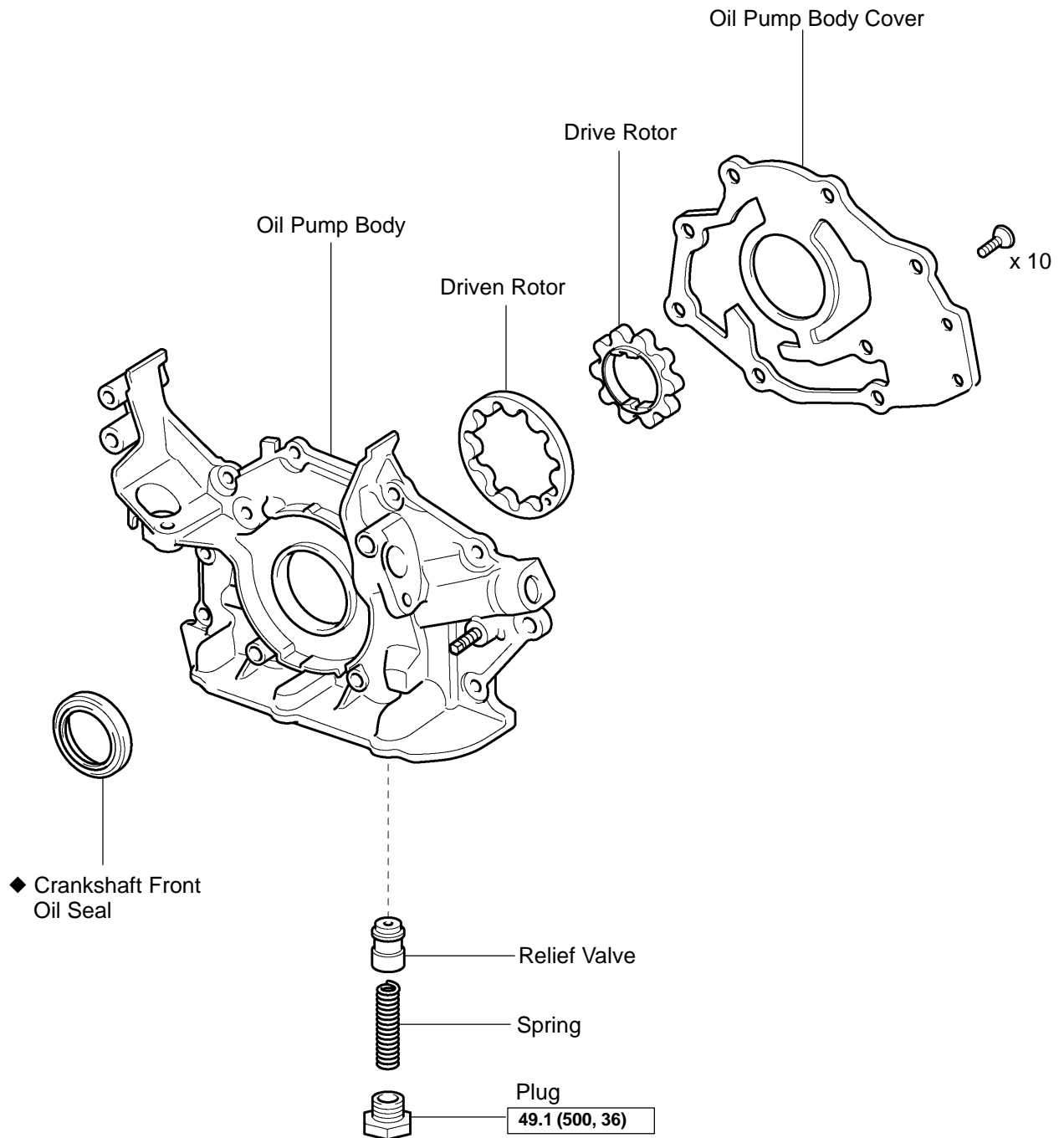


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LUBRICATION - OIL PUMP



B06472



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

◆ Non-reusable part

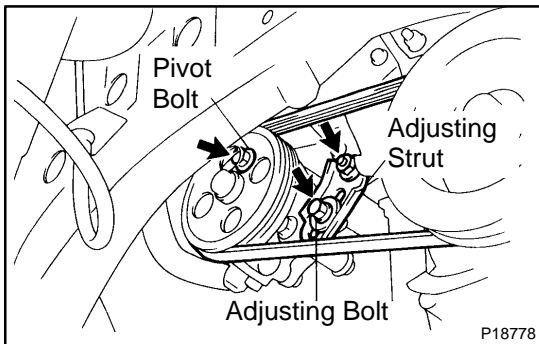
B06473

REMOVAL

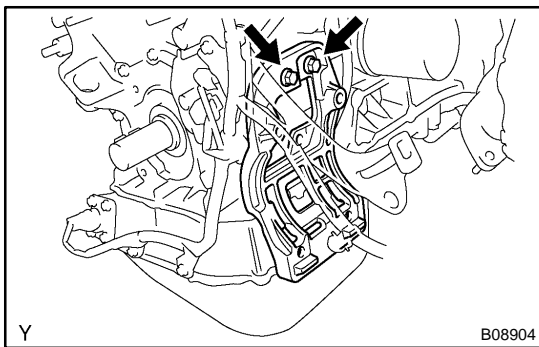
HINT:

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

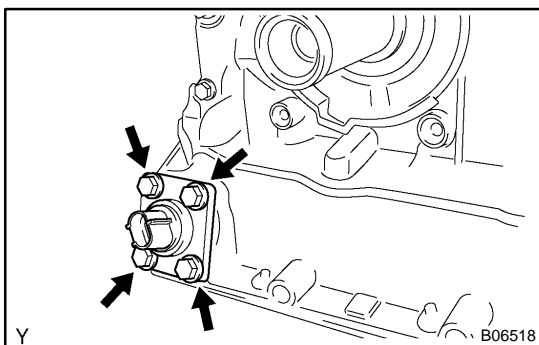
1. **DRAIN ENGINE OIL**
2. **REMOVE RH FRONT WHEEL**
3. **REMOVE RH FENDER APRON SEAL**
4. **REMOVE FRONT EXHAUST PIPE**
(See page [EM-72](#))
5. **REMOVE GENERATOR FROM ENGINE**
(See page [CH-6](#))
6. **REMOVE A/C COMPRESSOR FROM ENGINE**
(See page [EM-72](#))



7. **REMOVE PS PUMP DRIVE BELT AND ADJUSTING STRUT**
 - (a) Loosen the pivot and adjusting bolts, and remove the drive belt.
 - (b) Remove the bolt, nut and adjusting strut.
8. **REMOVE TIMING BELT** (See page [EM-15](#))
9. **REMOVE TIMING PULLEYS** (See page [EM-15](#))
10. **REMOVE NO.3 TIMING BELT COVER**
(See page [EM-31](#))



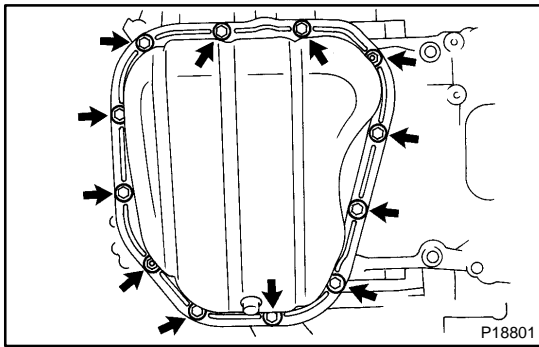
11. **REMOVE A/C COMPRESSOR HOUSING BRACKET**
Remove the 2 bolts and housing bracket.



12. **REMOVE OIL LEVEL SENSOR**
 - (a) Disconnect the level sensor connector.
 - (b) Remove the 2 bolts and nut, and disconnect the engine wire.
 - (c) Remove the 4 bolts and oil level sensor.
 - (d) Remove the gasket from the level sensor.

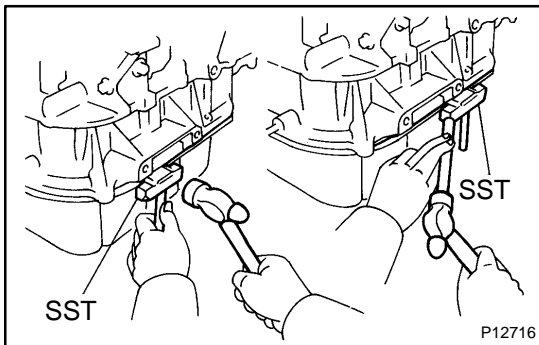
NOTICE:

Be careful not to drop the oil level sensor when removing it.



13. REMOVE NO.2 OIL PAN

(a) Remove the 10 bolts and 2 nuts.

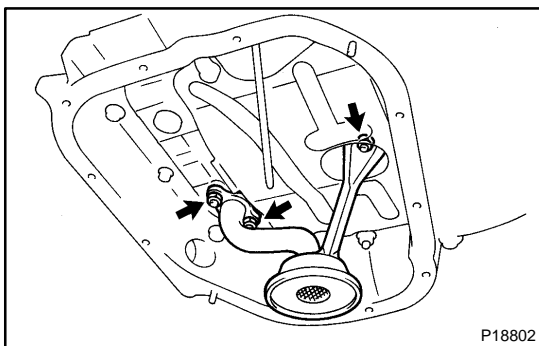


(b) Insert the blade of SST between the No.1 and No.2 oil pans, and cut off applied sealer and remove the No.1 oil pan.

SST 09032-00100

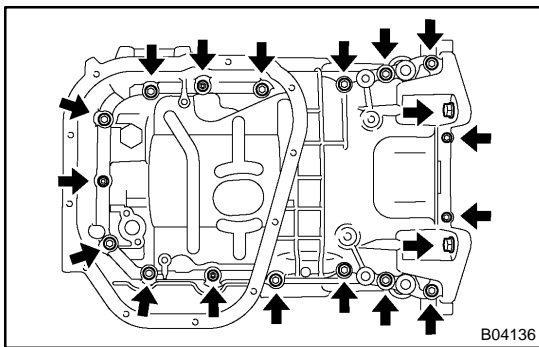
NOTICE:

- ★ 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.



14. REMOVE OIL STRAINER

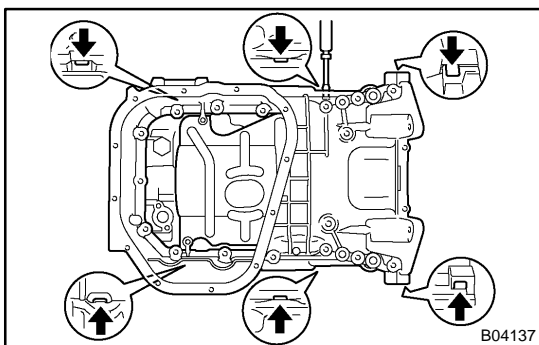
Remove the bolt, 2 nuts, oil strainer and gasket.



15. REMOVE NO.1 OIL PAN

(a) Remove the 2 bolts and No.1 exhaust pipe support bracket.

(b) Remove the 17 bolts and 2 nuts.



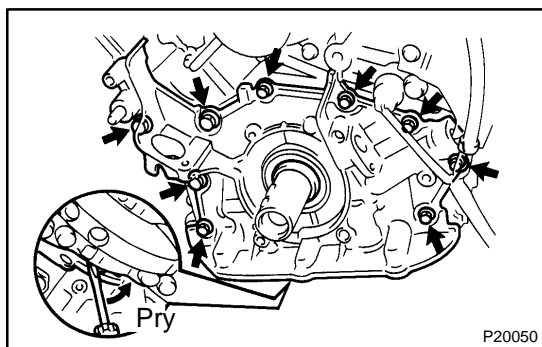
(c) Using a screwdriver, remove the oil pan by prying the portions between the cylinder block and oil pan.

NOTICE:

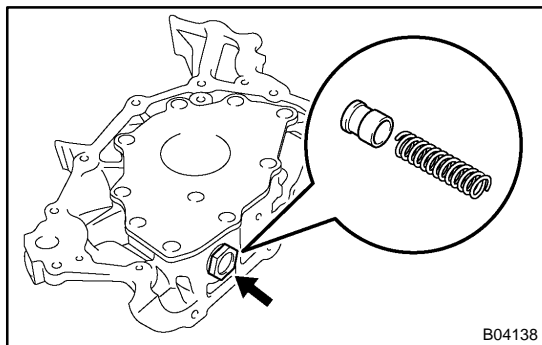
Be careful not to damage the contact surfaces of the cylinder block and oil pan.

16. REMOVE Baffle Plate From No.1 Oil Pan

17. REMOVE Crankshaft Position Sensor

**18. REMOVE OIL PUMP**

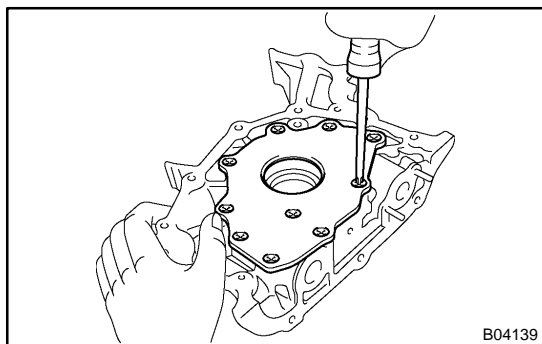
- (a) Remove the 9 bolts.
- (b) Remove the oil pump by prying a screwdriver between the oil pump and main bearing cap.
- (c) Remove the O-ring.



DISASSEMBLY

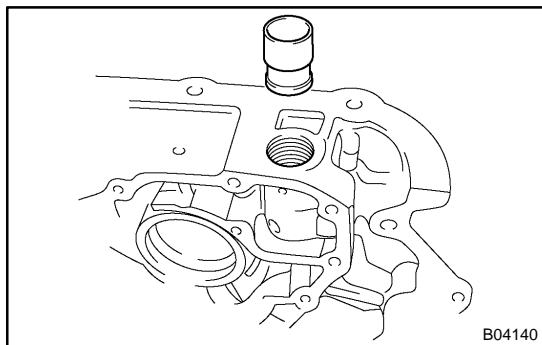
1. REMOVE RELIEF VALVE

Remove the plug, spring and relief valve.



2. REMOVE DRIVE AND DRIVEN ROTORS

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



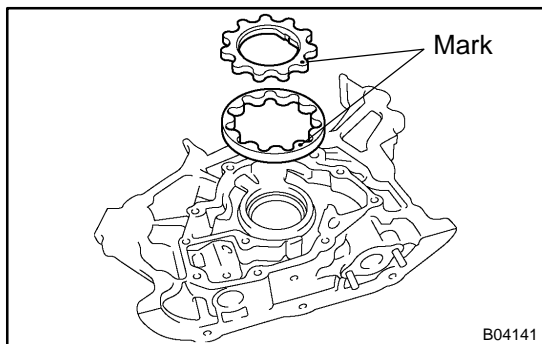
B04140

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.

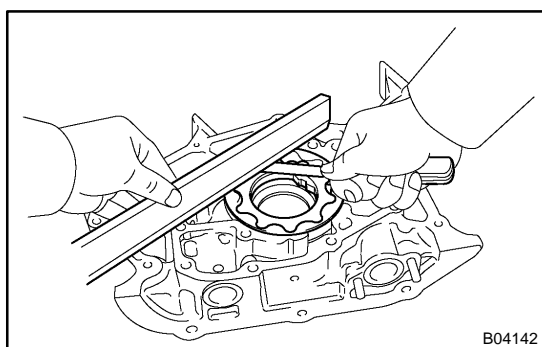
If it does not, replace the relief valve. If necessary, replace the oil pump assembly.



B04141

2. PLACE DRIVE AND DRIVEN ROTORS INTO OIL PUMP BODY

Place the drive and driven rotors into the oil pump body with the mark facing upward.



B04142

3. INSPECT ROTOR SIDE CLEARANCE

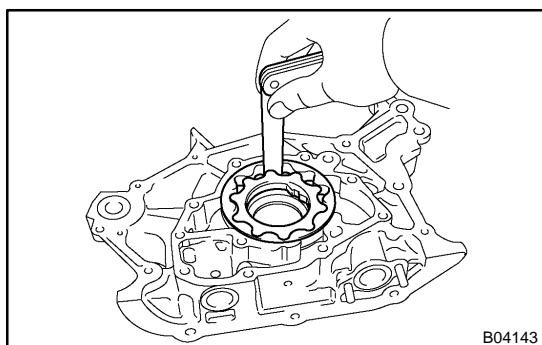
Using a feeler gauge and precision straight edge, measure the clearance between the rotors and precision straight edge.

Standard side clearance:

0.030 – 0.090 mm (0.0012 – 0.0035 in.)

Maximum side clearance: 0.15 mm (0.0059 in.)

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



B04143

4. INSPECT ROTOR TIP CLEARANCE

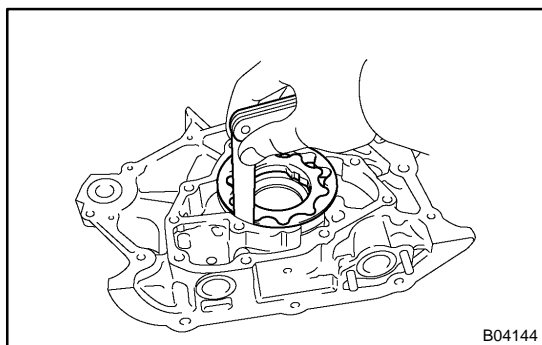
Using a feeler gauge, measure the clearance between the drive and driven rotor tips.

Standard tip clearance:

0.110 – 0.240 mm (0.0043 – 0.0094 in.)

Maximum tip clearance: 0.35 mm (0.0138 in.)

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



B04144

5. INSPECT ROTOR 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: 0.40 mm (0.0157 in.)

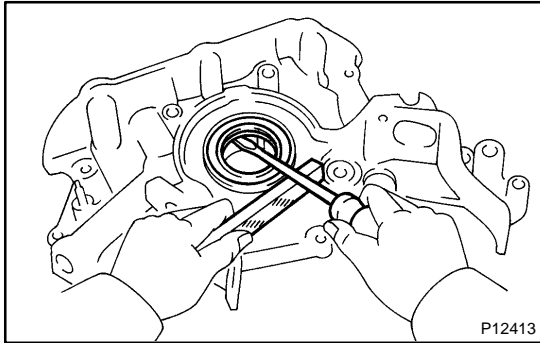
If the body clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.

REPLACEMENT

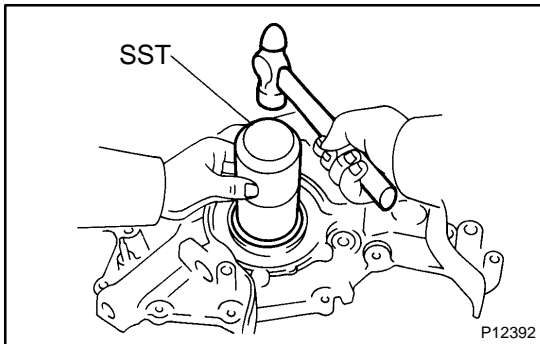
REPLACE CRANKSHAFT FRONT OIL SEAL

HINT:

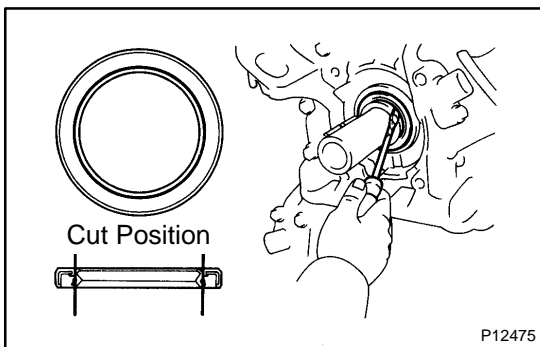
There are 2 methods ((a) and (b)) to replace the oil seal which are as follows:



- (a) If the oil pump is removed from the cylinder block.
 - (1) Using a screwdriver, pry out the oil seal.



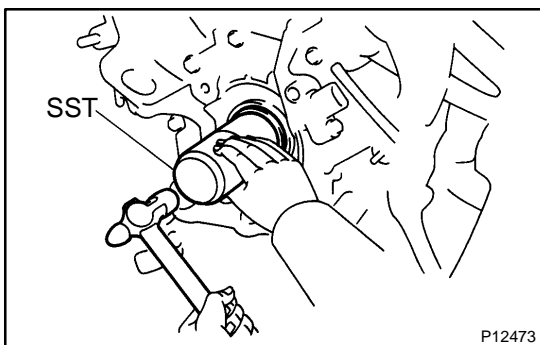
- (2) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.
 SST 09223-00010
- (3) Apply MP grease to the oil seal lip.



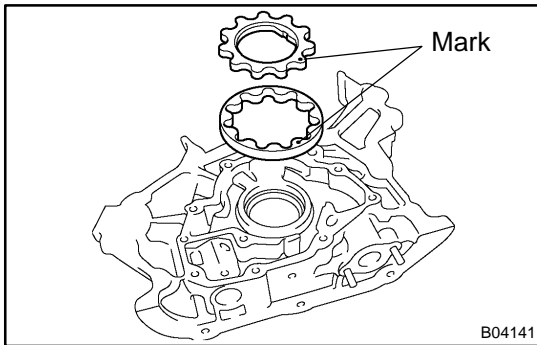
- (b) If the oil pump is installed to the cylinder block.
 - (1) Using a knife, cut off the oil seal lip.
 - (2) Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the crankshaft. Tape the screwdriver tip.



- (3) Apply MP grease to a new oil seal lip.
- (4) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump body edge.
 SST 09223-00010



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.

2. INSTALL RELIEF VALVE

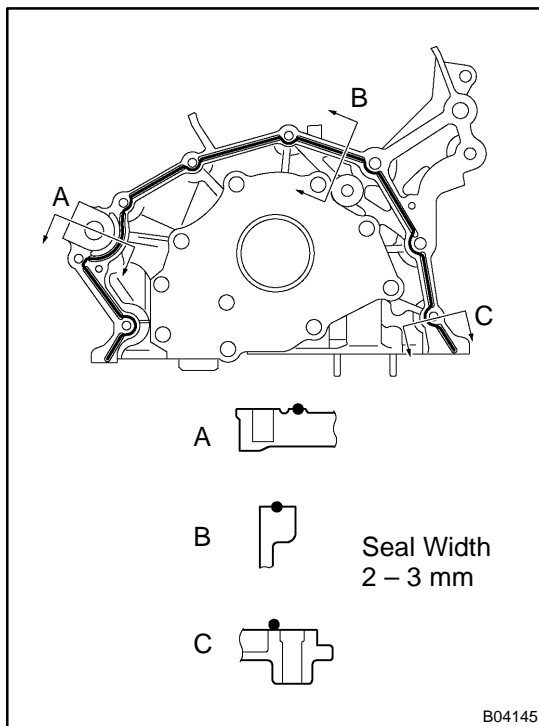
Insert the relief valve and spring into the pump body hole, and install the plug.

Torque: 49.1 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 grooves.
 - ★ 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.

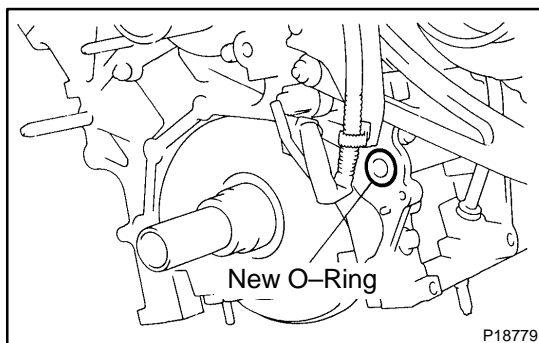
Seal packing: Part No. 08826-00080 or equivalent

- ★ Install a nozzle that has been cut to a 2 – 3 mm (0.08 – 0.12 in.) opening.

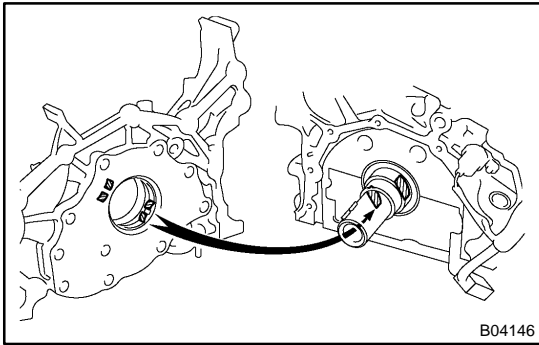
HINT:

Avoid applying an excessive amount to the surface.

- ★ Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- ★ Immediately remove nozzle from the tube and reinstall cap.



- (c) Place a new O-ring on 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 9 bolts. Uniformly tighten the bolts in several passes.

Torque:

10 mm head: 8 N-m (80 kgf-cm, 69 in.-lbf)

12 mm head: 19.5 N-m (200 kgf-cm, 14 ft-lbf)

2. INSTALL CRANKSHAFT POSITION SENSOR

Torque: 8 N-m (80 kgf-cm, 69 in.-lbf)

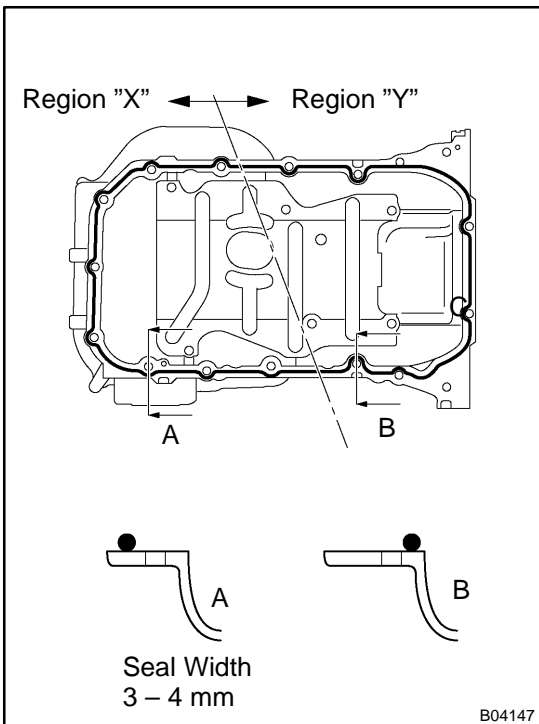
3. INSTALL BAFFLE PLATE TO NO.1 OIL PAN

Torque: 8 N-m (80 kgf-cm, 69 in.-lbf)

4. 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 oil pan, 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 grooves.
- ★ 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 pan as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

Region "X" is at the outer side of the bolt hole.

Region "Y" is at the inner side of the bolt hole.

- ★ Install a nozzle that has been cut to a 3 – 4 mm (0.12 – 0.16 in.) opening.

HINT:

Avoid applying an excessive amount to the surface.

- ★ Parts must be assembled within 3 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 17 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.

Torque:

10 mm head: 8 N-m (80 kgf-cm, 69 in.-lbf)

12 mm head: 19.5 N-m (200 kgf-cm, 14 ft-lbf)

14 mm head: 37.2 N-m (380 kgf-cm, 27 ft-lbf)

- (d) Install the No.1 exhaust pipe support bracket with the 2 bolts.

Torque: 7.8 N-m (80 kgf-cm, 69 in.-lbf)

5. INSTALL OIL STRAINER

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

Torque: 8 N-m (80 kgf-cm, 69 in.-lbf)

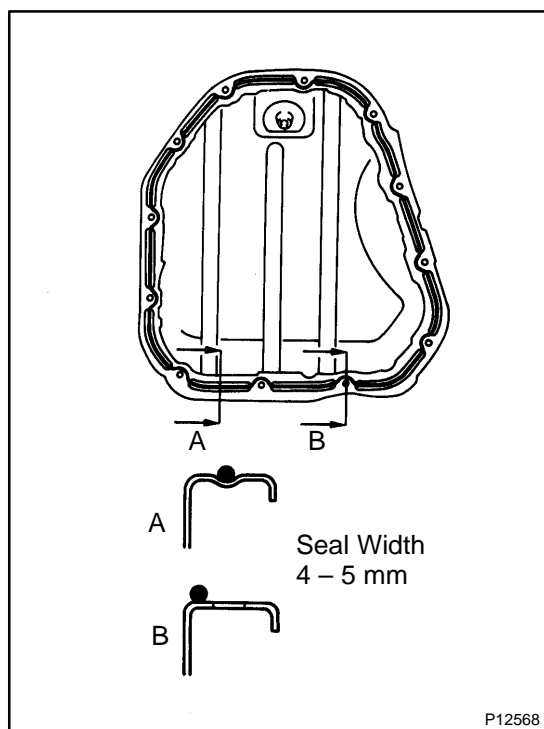
6. INSTALL NO.2 OIL PAN

- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surface 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 grooves.
- ★ 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 4 – 5 mm (0.16 – 0.20 in.) opening.

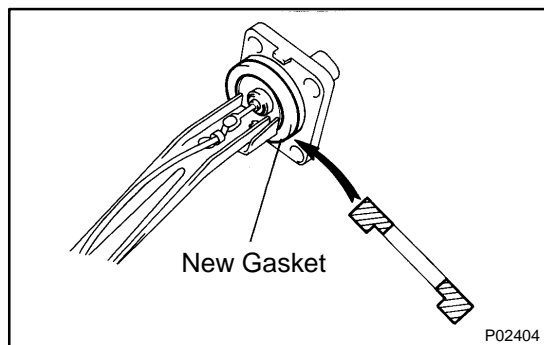
HINT:

Avoid applying an excessive amount to the surface.

- ★ Parts must be assembled within 3 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 10 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.

Torque: 8 N-m (80 kgf-cm, 69 in.-lbf)



7. INSTALL OIL LEVEL SENSOR

- (a) Install a new gasket to the level sensor.
- (b) Install the level sensor with the 4 bolts.

Torque: 8 N-m (80 kgf-cm, 69 in.-lbf)

- (c) Connect the engine wire with the 2 bolts and nut.
- (d) Connect the level sensor connector.

8. INSTALL A/C COMPRESSOR HOUSING BRACKET

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

9. INSTALL NO.3 TIMING BELT COVER

(See page EM-59)

10. **INSTALL TIMING PULLEYS (See page EM-21)**
11. **INSTALL TIMING BELT (See page EM-21)**
12. **INSTALL ADJUSTING STRUT AND PS PUMP DRIVE BELT**
 - (a) Temporarily install the adjusting strut with the bolt and nut.
 - (b) Install the drive belt with the pivot and adjusting bolts.
Torque: 43.1 N·m (440 kgf·cm, 32 ft·lbf)
 - (c) Tighten the nut.
Torque: 43.1 N·m (440 kgf·cm, 32 ft·lbf)
13. **INSTALL A/C COMPRESSOR (See page EM-77)**
14. **INSTALL GENERATOR (See page CH-2)**
15. **INSTALL RH FENDER APRON SEAL**
16. **INSTALL FRONT EXHAUST PIPE (See page EM-77)**
17. **INSTALL RH FRONT WHEEL**
18. **FILL ENGINE WITH OIL**
19. **START ENGINE AND CHECK FOR LEAKS**
20. **RECHECK ENGINE OIL LEVEL**