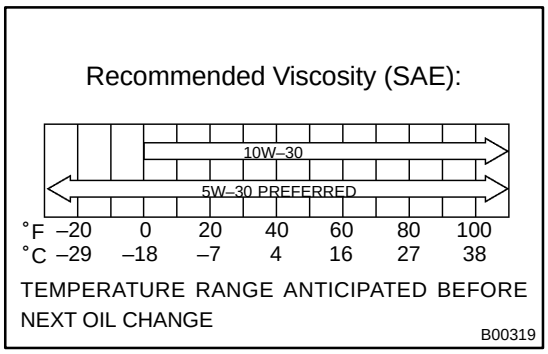


OIL AND FILTER

LU044–03

INSPECTION

1. CHECK ENGINE OIL QUALITY

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

If oil quality is 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.

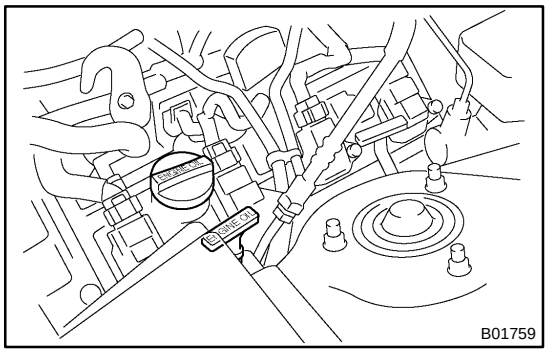
2. CHECK ENGINE OIL LEVEL

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

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

NOTICE:

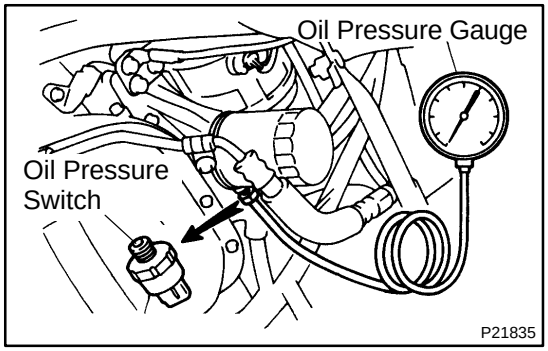
★ **Do not fill with engine oil above the ”F” mark.**



★ **Install the oil dipstick and oil filler cap facing the direction shown in the illustration.**

3. REMOVE OIL PAN PROTECTOR

4. REMOVE ENGINE UNDER COVER



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

6. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

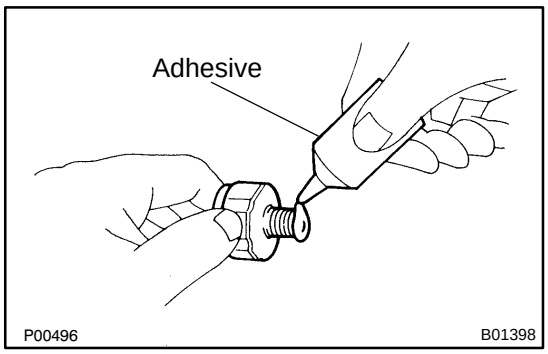
7. CHECK OIL PRESSURE

Oil pressure:

Idle	29 kPa (0.3 kgf/cm^2, 4.3 psi)
3,000 rpm	294 – 588 kPa (3.0 – 6.0 kgf/cm^2, 43 – 85 psi)

8. 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) Install the oil pressure switch.

9. START ENGINE, AND CHECK FOR OIL LEAKS

10. REINSTALL ENGINE UNDER COVER

11. REINSTALL OIL PAN PROTECTOR

LU0G3–01

REPLACEMENT

CAUTION:

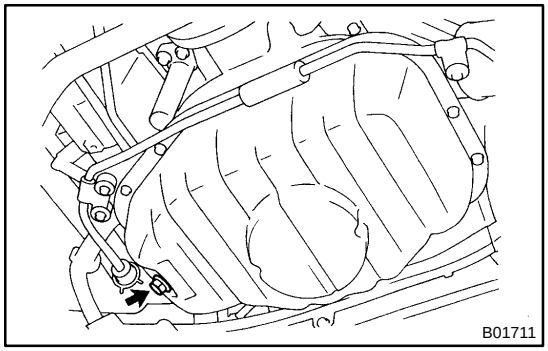
- ★ **Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.**
- ★ **Care should be taken, therefore, when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

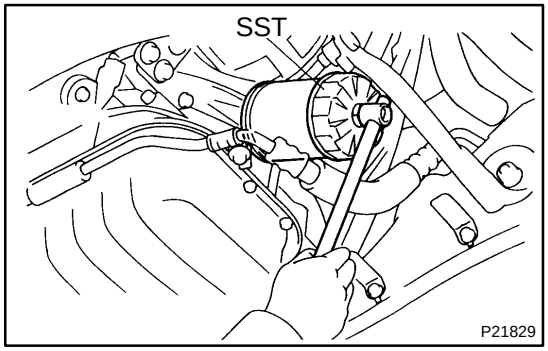
2. REMOVE ENGINE UNDER COVER

3. DRAIN ENGINE OIL

(a) Remove the oil filler cap.

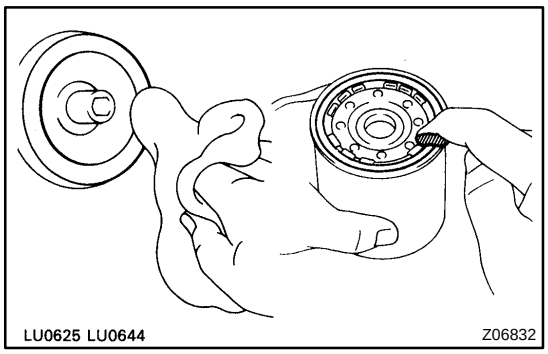


(b) Remove the oil drain plug, and drain the oil into a container.



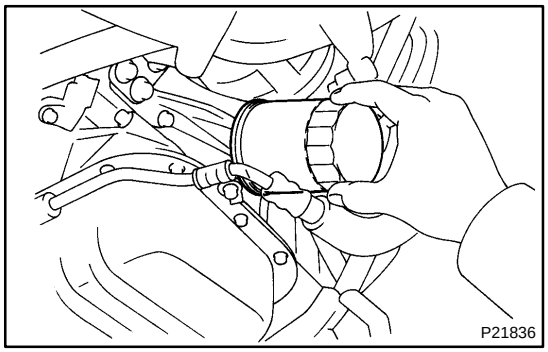
4. REPLACE OIL FILTER

(a) Using SST, remove the oil filter.
SST 09228–07501

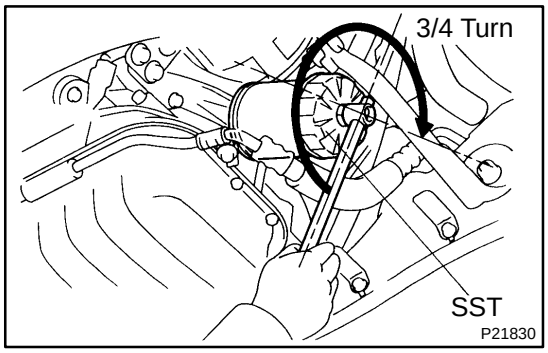


(b) Clean the oil filter contact surface on the oil filter mounting.

(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 09228–07501

5. REFILL WITH ENGINE OIL

(a) Clean the drain plug, and install a new gasket and it.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(b) Fill with new engine oil.
Oil grade: See step 1 in oil pressure check
Capacity:

Dry fill	7.0 litters (7.4 US qts, 6.2 Imp. qts)
Drain and refill	
w/ Oil filter change	5.6 litters (5.9 US qts, 4.9 Imp. qts)
w/o Oil filter change	5.3 litters (5.6 US qts, 4.7 Imp. qts)

(c) Reinstall the oil filler cap.

6. START ENGINE AND CHECK FOR OIL LEAKS

7. RECHECK ENGINE OIL LEVEL

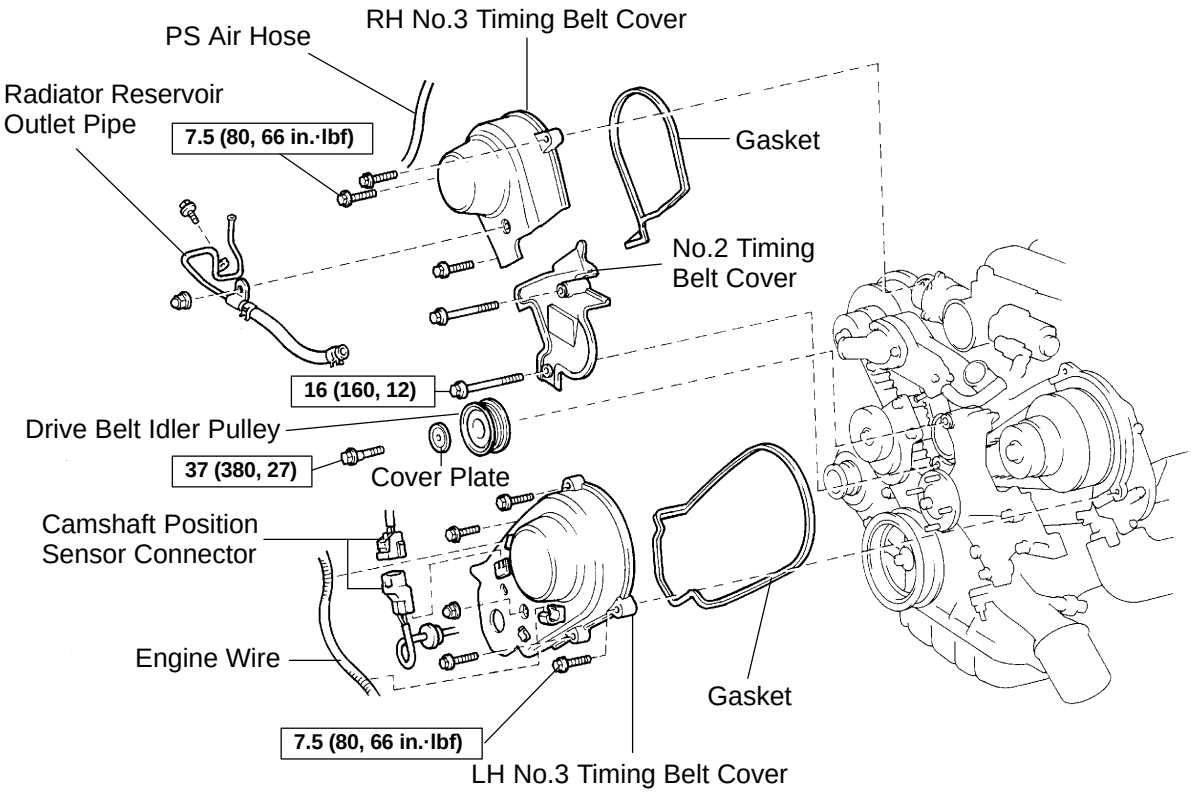
8. REINSTALL ENGINE UNDER COVER

9. REINSTALL OIL PAN PROTECTOR

OIL PUMP

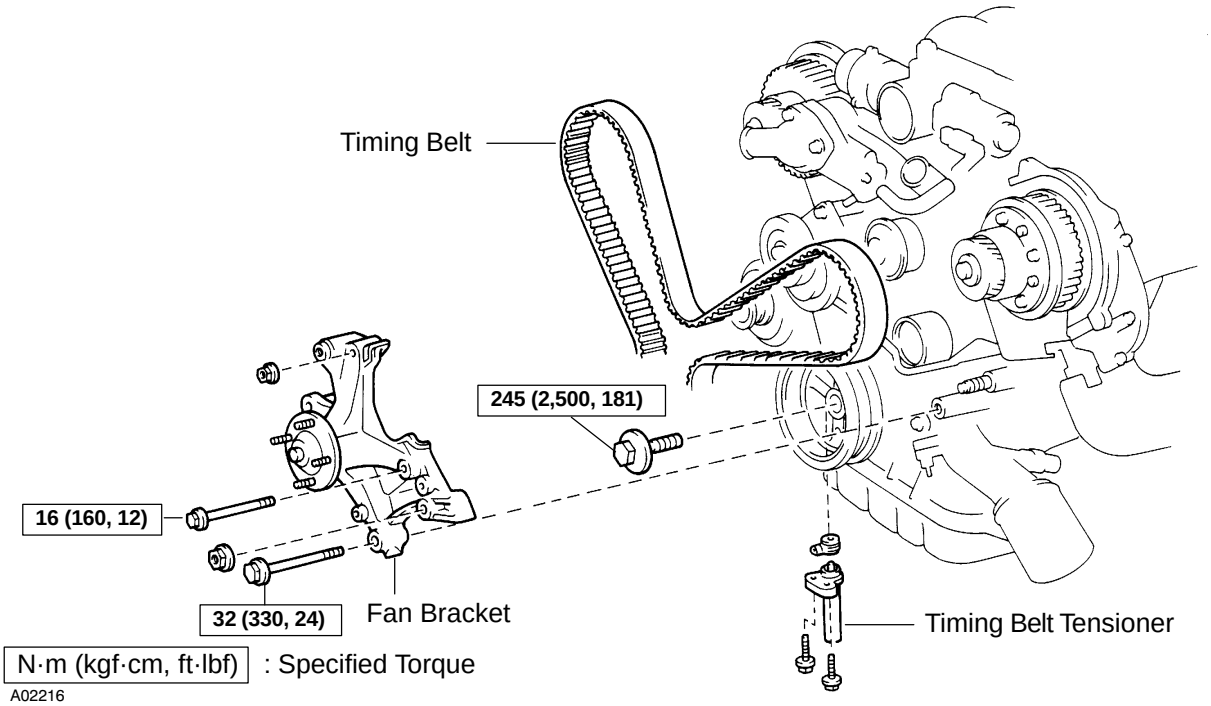
COMPONENTS

LU046–02



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

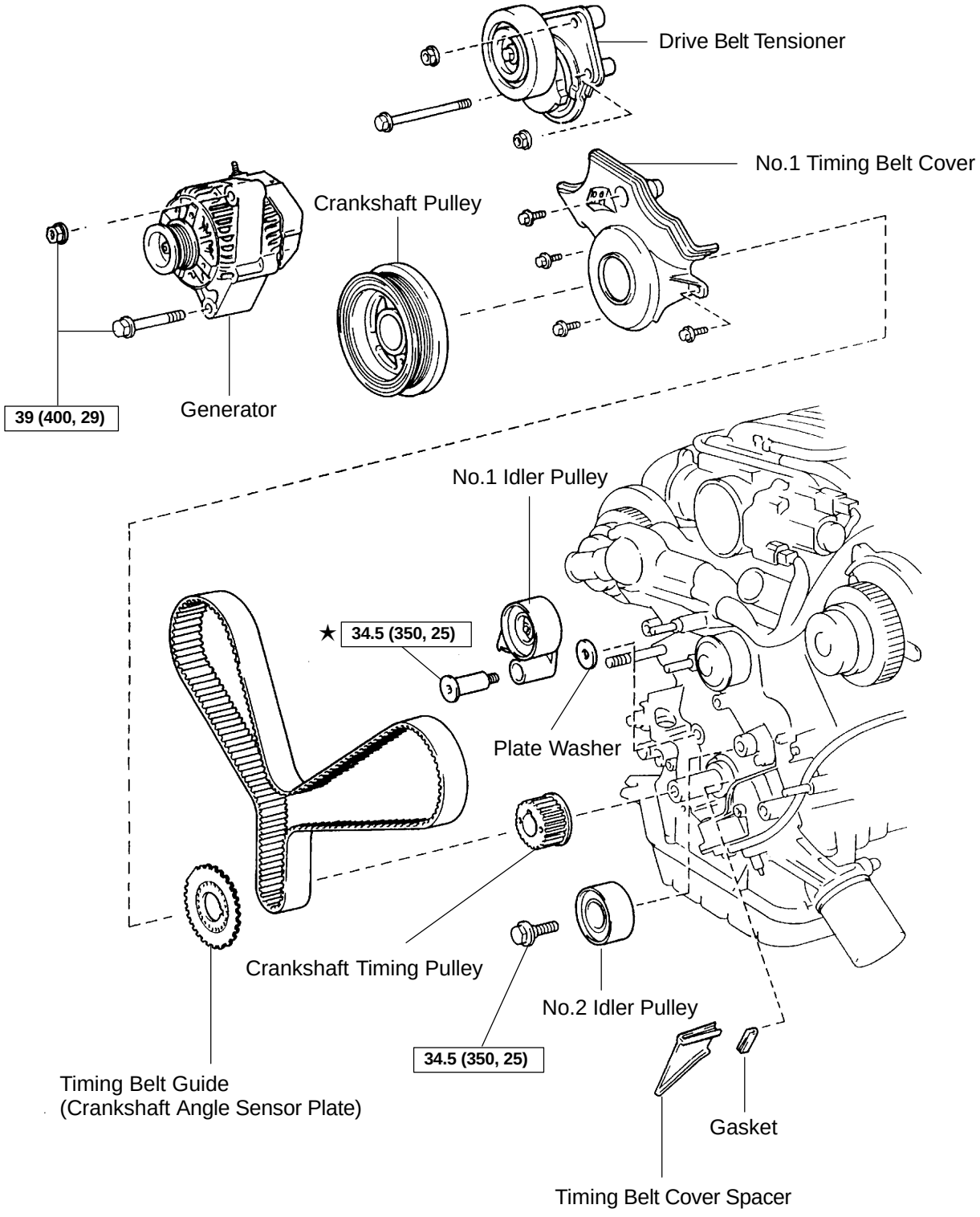
A01862



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

A02216

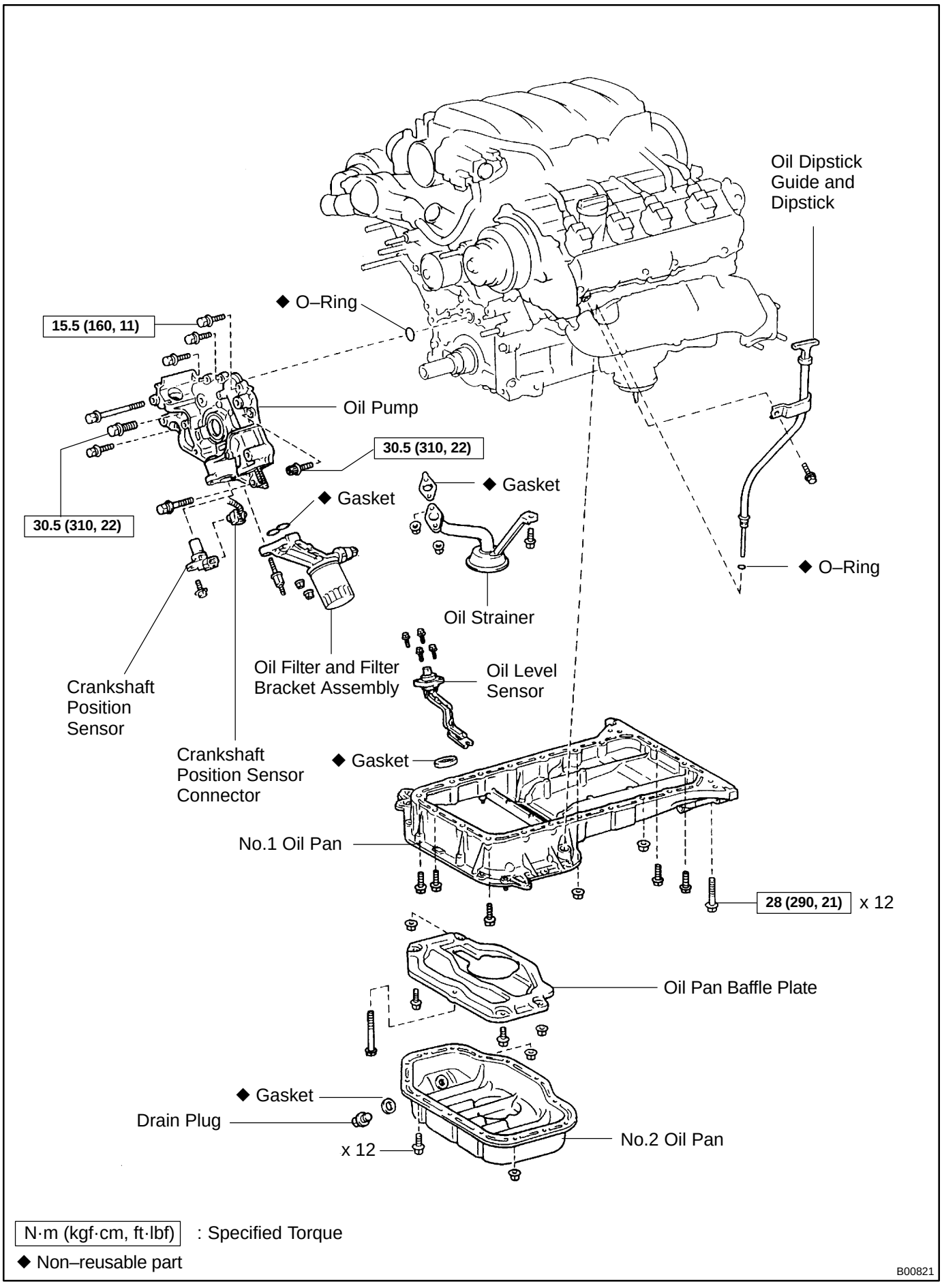
B01399

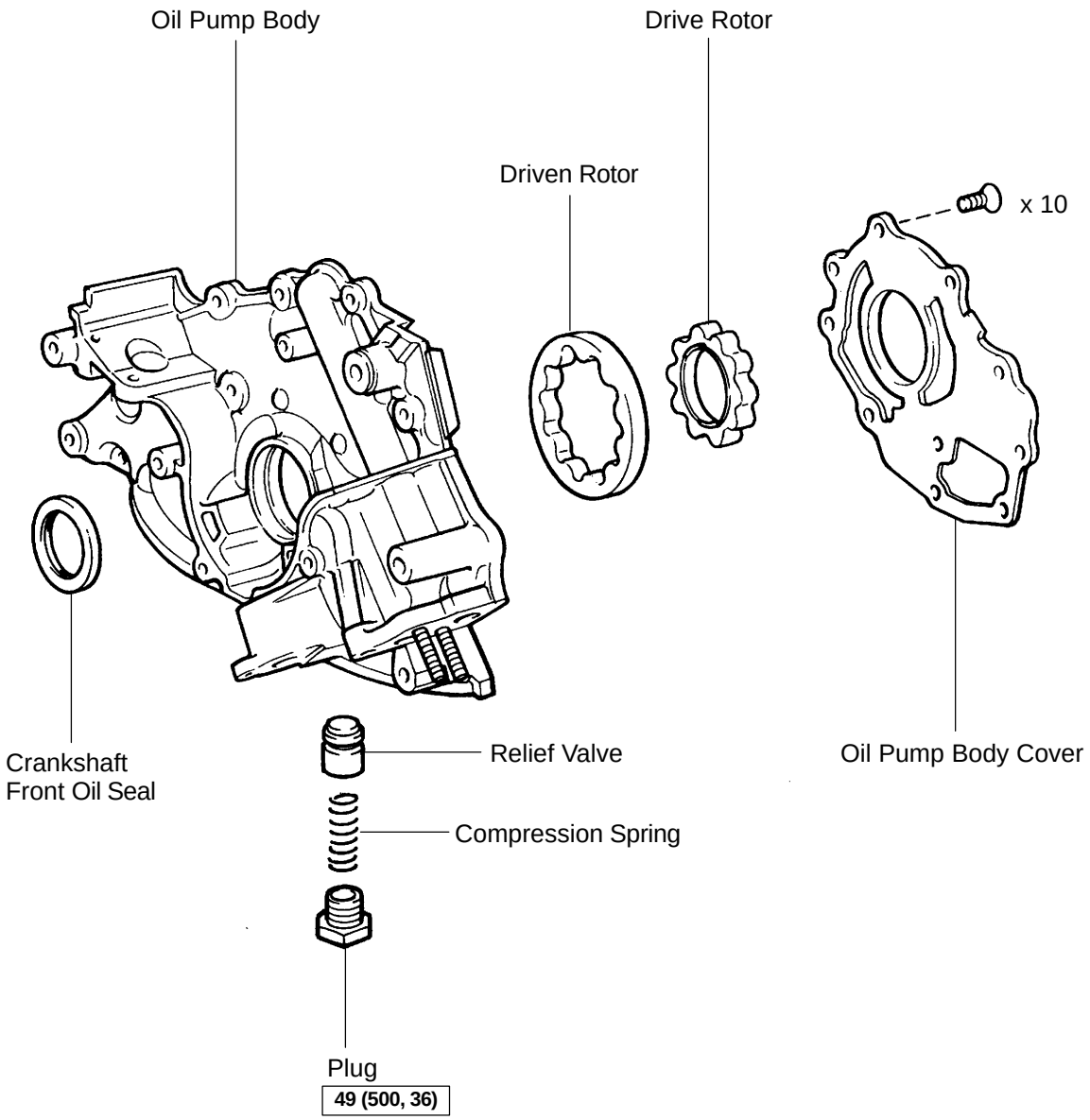


N·m (kgf·cm, ft·lbf) : Specified Torque

★ Precoated part

B01712


Oil Dipstick Guide and Dipstick
◆ O–Ring
15.5 (160, 11)
Oil Pump
30.5 (310, 22)
◆ Gasket
30.5 (310, 22)
◆ Gasket
◆ O–Ring
Oil Strainer
Oil Filter and Filter Bracket Assembly
Oil Level Sensor
Crankshaft Position Sensor
Crankshaft Position Sensor Connector
◆ Gasket
No.1 Oil Pan
28 (290, 21) x 12
Oil Pan Baffle Plate
◆ Gasket
Drain Plug
x 12
No.2 Oil Pan
N·m (kgf·cm, ft·lbf) : Specified Torque
◆ Non–reusable part
B00821



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

◆ Non–reusable part

B00952

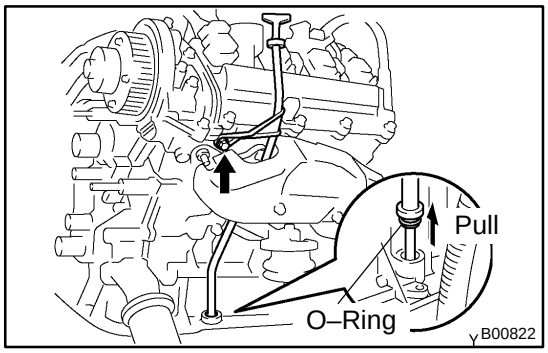
LU047–03

REMOVAL

HINT:

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

1. **REMOVE ENGINE FROM BODY (See page EM–77)**
2. **SEPARATE ENGINE AND TRANSMISSION (See page EM–77)**
3. **INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY**
4. **REMOVE TIMING BELT (See page EM–15)**
5. **REMOVE NO.2 AND NO.1 IDLER PULLEYS (See page EM–15)**
6. **REMOVE CRANKSHAFT TIMING PULLEY (See page EM–15)**



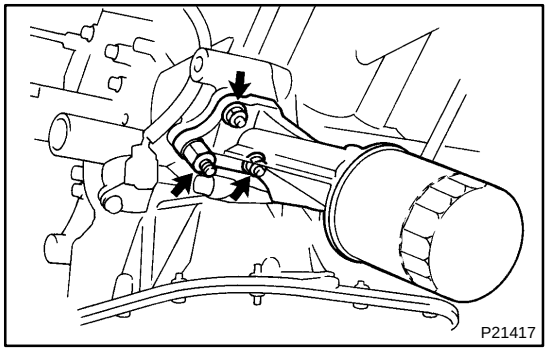
7. **REMOVE OIL DIPSTICK AND GUIDE**

(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.

8. **REMOVE OIL LEVEL SENSOR**



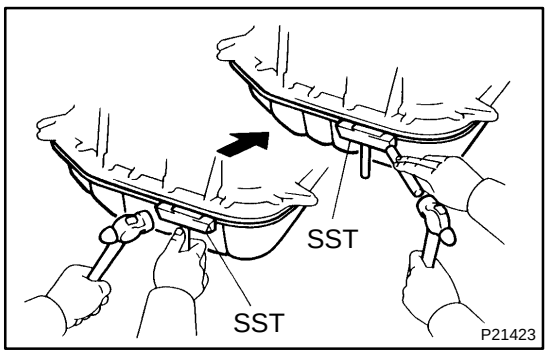
9. **REMOVE OIL FILTER AND FILTER BRACKET ASSEMBLY**

(a) Remove the stud bolt, 2 nuts, the oil filter and filter bracket assembly.

(b) Remove the gasket from the filter bracket.

10. **REMOVE CRANKSHAFT POSITION SENSOR**
11. **REMOVE NO.2 OIL PAN**

(a) Remove the 12 bolts and 2 nuts.

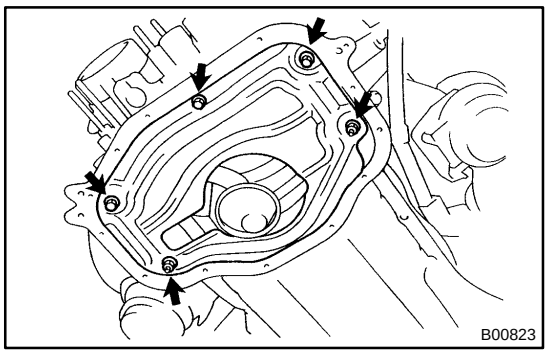


(b) Insert the blade of SST between the No.1 and No.2 oil pans, cut off applied sealer and remove the No.2 oil pan.
SST 09032–00100

NOTICE:

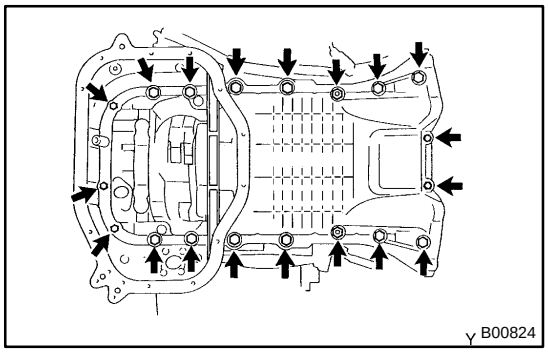
★ **Be careful not to damage the No.2 oil pan contact surface of the No.1 oil pan.**

★ **Be careful not to damage the No.2 oil pan flange.**



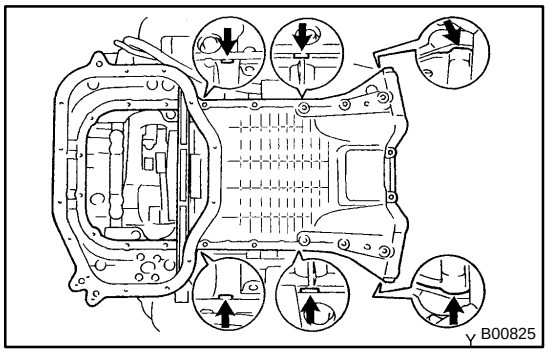
12. REMOVE OIL PAN BAFFLE PLATE

Remove the 3 bolts, 2 nuts and baffle plate.

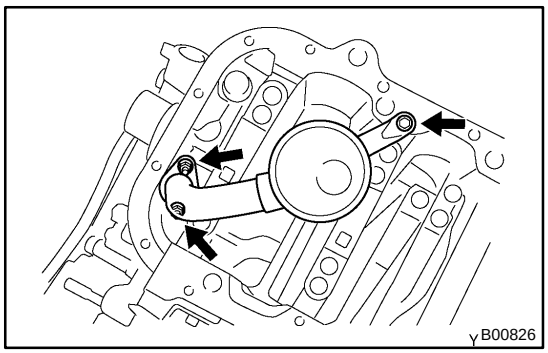


13. REMOVE NO.1 OIL PAN

(a) Remove the 17 bolts and 2 nuts.

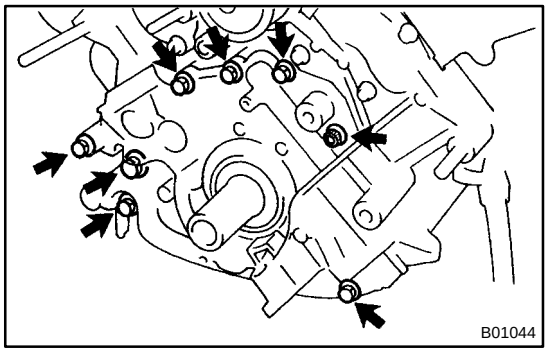


(b) Using a screwdriver, remove the No.1 oil pan by prying between the oil pan and cylinder block in the sequence shown.



14. REMOVE OIL STRAINER

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

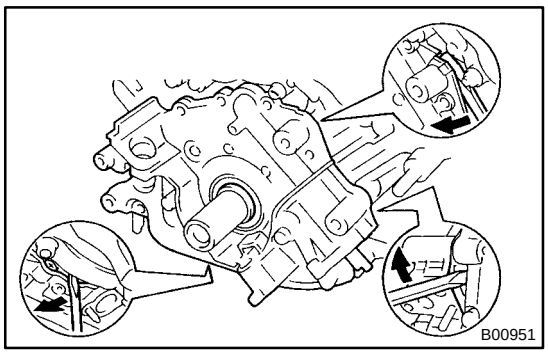


15. REMOVE OIL PUMP

(a) Remove the 8 bolts.

HINT:

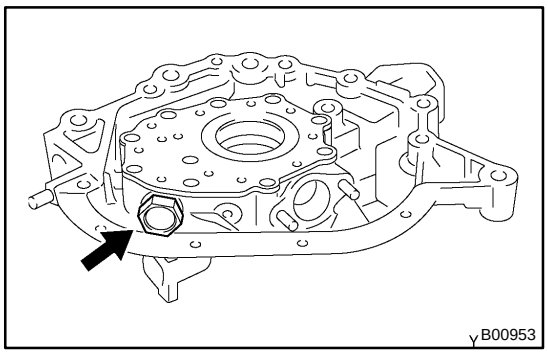
Use a 6 mm hexagon socket wrench for hexagon socket head bolt.



(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.

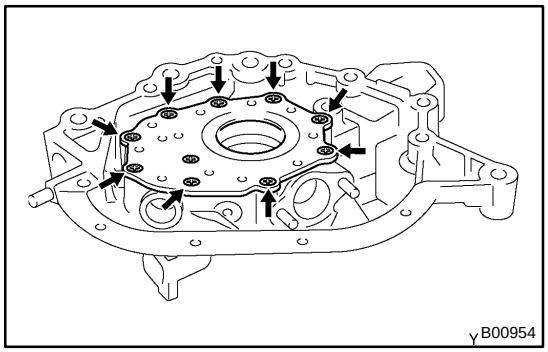
LU048–03



DISASSEMBLY

1. REMOVE RELIEF VALVE

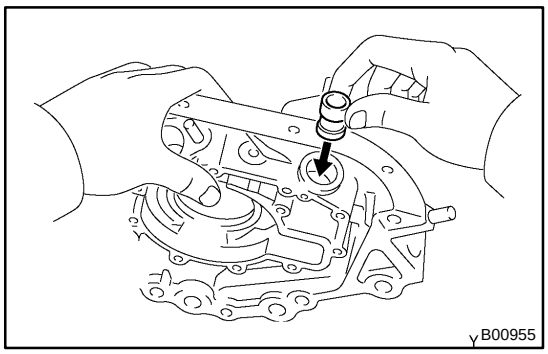
Remove the plug, compression spring and relief valve.



2. REMOVE DRIVE AND DRIVEN ROTORS

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

LU049–03

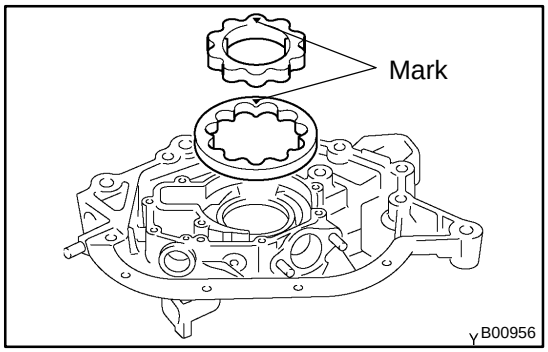


INSPECTION

1. INSPECT RELIEF VALVE

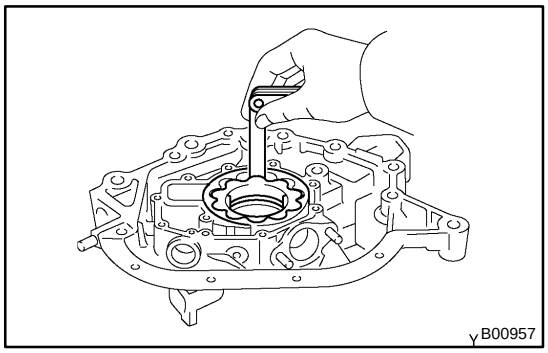
Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.

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



2. 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.



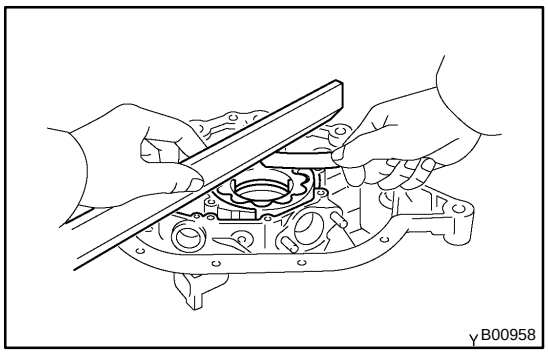
3. INSPECT ROTOR TIP CLEARANCE

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

Tip clearance:

Standard	0.060 – 0.180 mm (0.0024 – 0.0071 in.)
Maximum	0.18 mm (0.0071 in.)

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



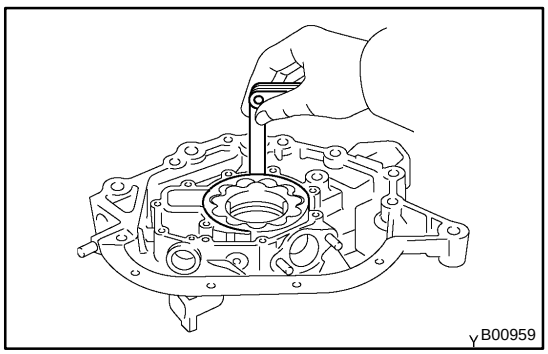
4. INSPECT ROTOR SIDE CLEARANCE

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

Side clearance:

Standard	0.030 – 0.090 mm (0.0012 – 0.0035 in.)
Maximum	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.



5. INSPECT ROTOR BODY CLEARANCE

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

Body clearance:

Standard	0.250 – 0.325 mm (0.0098 – 0.0127 in.)
Maximum	0.325 mm (0.0127 in.)

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

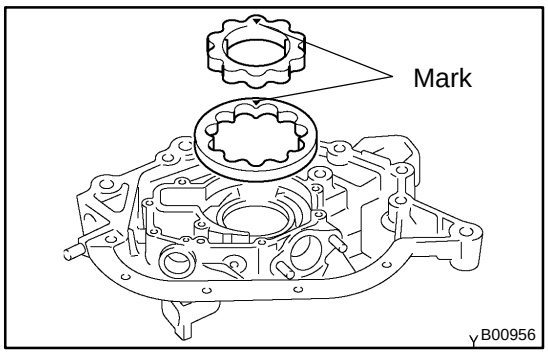
6. REMOVE DRIVE AND DRIVEN ROTORS

LU04A–03

REPLACEMENT

REPLACE CRANKSHAFT FRONT OIL SEAL (See page EM–107)

LU04B–02

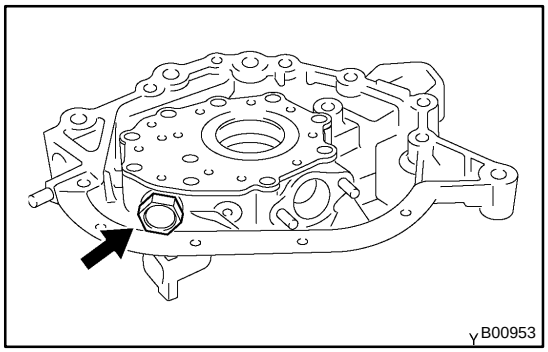


REASSEMBLY

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 oil 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, compression spring into the oil pump body hole:

(b) Install the plug.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

LU04C–03

INSTALLATION

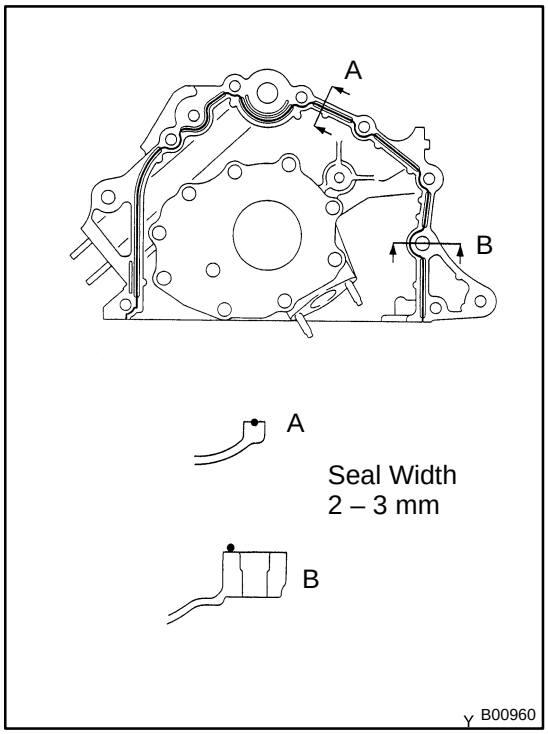
1. INSTALL OIL PUMP

(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

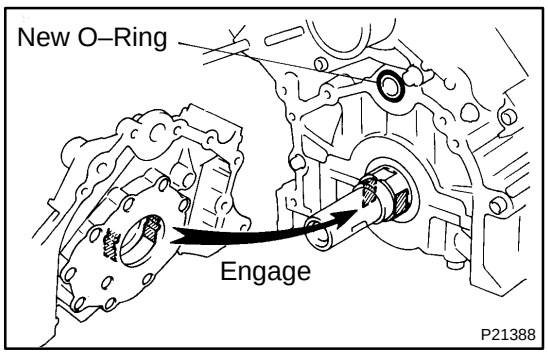
NOTICE:

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.

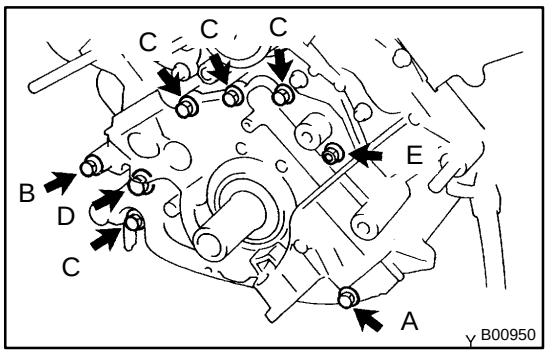
★ Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.

★ 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:
12 mm head:
15.5 N·m (160 kgf·cm, 11 ft·lbf)
14 mm and 6 mm hexagon socket head
30.5 N·m (310 kgf·cm, 22 ft·lbf)

HINT:

★ Use a 6mm hexagon wrench for the hexagon socket 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 socket 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.

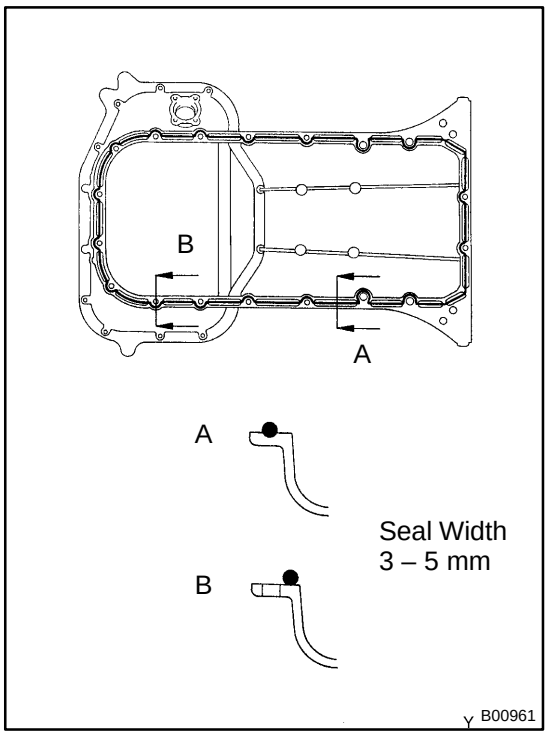
3. INSTALL NO.1 OIL PAN

(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.

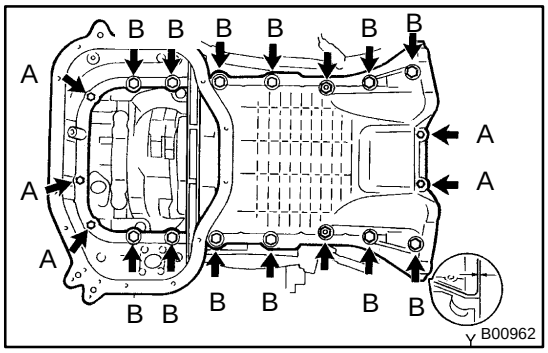


(b) Apply seal packing to the No.1 oil pan as shown in the illustration.

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 (2.21 in.) for B of 12 mm head

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

NOTICE:

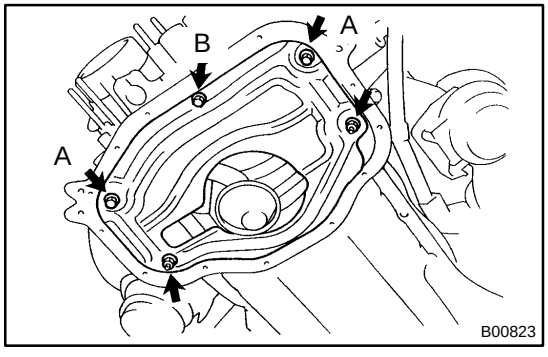
Make sure the clearance between the rear ends of the No.1 oil pan and cylinder block is 0.2 mm (0.008 in.) or less. If the clearance is more than 0.2 mm (0.008 in.), the No.1 oil pan will be stretched.

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

Torque:

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

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



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.

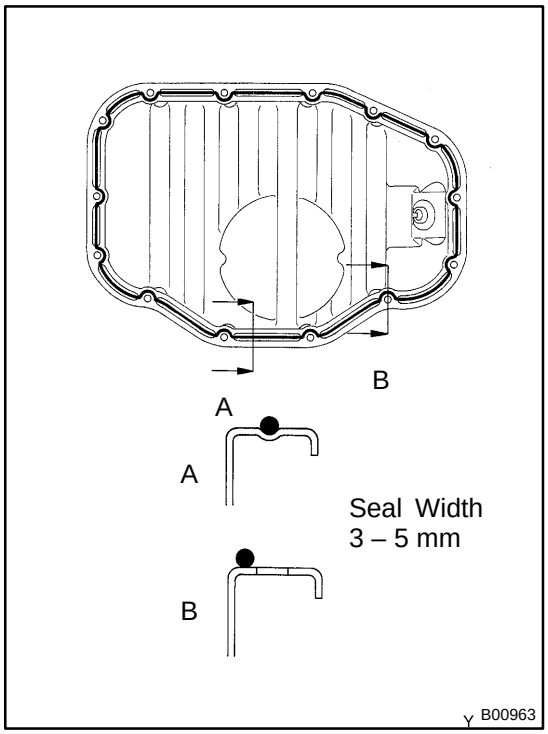
★ Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.

★ 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.

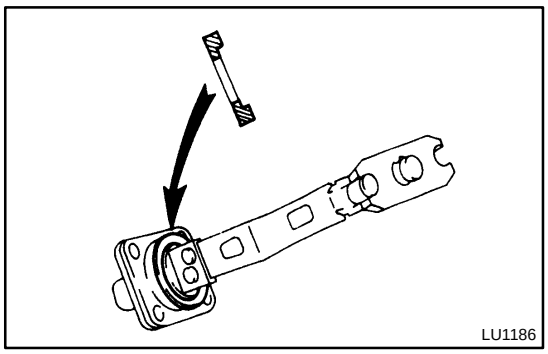
6. INSTALL CRANKSHAFT POSITION SENSOR
(See page IG–13)

7. INSTALL OIL FILTER AND FILTER BRACKET ASSEMBLY

(a) Install the 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)



8. INSTALL OIL LEVEL SENSOR

(a) Install a new gasket to the level sensor.

NOTICE:

Be careful of the installation direction.

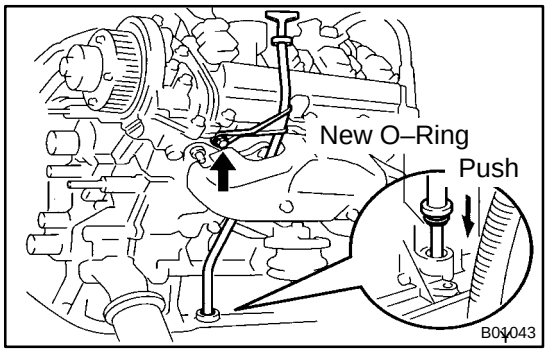
(b) Install the level level sensor with the 4 bolts.

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

HINT:

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

(c) Connect the level sensor 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 AND NO.2 IDLER PULLEYS (See page EM–22)

12. INSTALL TIMING BELT (See page EM–22)

13. DISCONNECT ENGINE FROM ENGINE STAND

14. REASSEMBLE ENGINE AND TRANSMISSION (See page EM–82)

15. INSTALL ENGINE TO BODY (See page EM–82)