

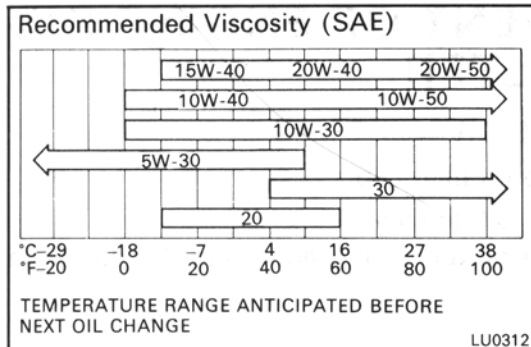
LUBRICATION SYSTEM

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TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Oil leakage	Cylinder head, cylinder block or oil pump body damaged or cracked	Repair as necessary	EM-84
	Oil seal faulty	Replace oil seal	
	Gasket faulty	Replace gasket	
Low oil pressure	Oil leakage	Repair as necessary	LU-6
	Pressure regulator valve faulty	Replace pressure regulator valve	LU-6
	Oil pump faulty	Replace oil pump	LU-4
	Poor engine oil quality	Replace engine oil	EM-64
	Crankshaft bearing faulty	Replace bearing	EM-64
	Connecting rod bearing faulty	Replace bearing	LU-4
	Oil filter clogged	Replace oil filter	LU-4
High oil pressure	Pressure regulator valve faulty	Replace pressure regulator valve	LU-6



OIL PRESSURE CHECK

1. CHECK OIL QUALITY

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

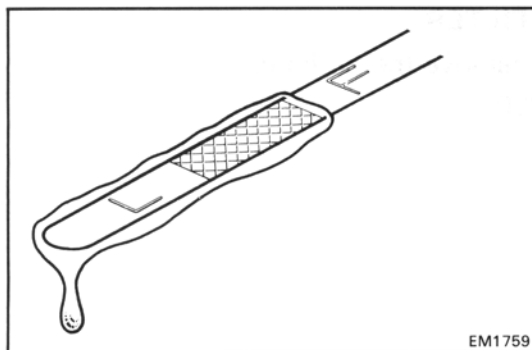
If the oil quality is poor, replace it.

Use API grade CD or better and recommended viscosity oil.

2. CHECK 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.



3. REMOVE OIL PRESSURE SWITCH

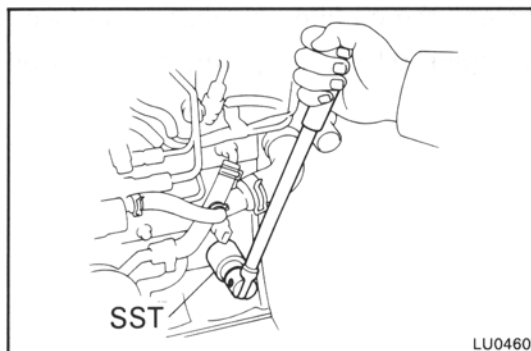
Using SST, remove the oil pressure switch.

SST 09816-30010

4. INSTALL OIL PRESSURE GAUGE

5. START ENGINE

Start the engine and warm it up to the normal operating temperature.



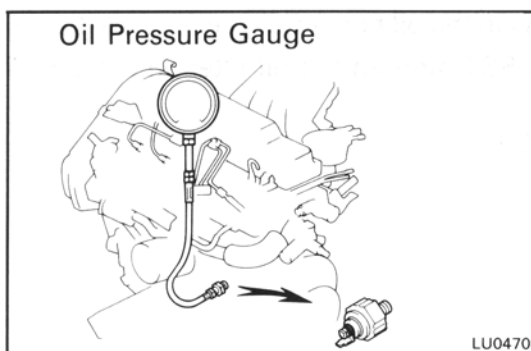
6. MEASURE OIL PRESSURE

Oil pressure:

At idle speed More than 0.5 kg/cm²
(7.1 psi, 49 kPa)

At 3,000 rpm 2.5 – 6.0 kg/cm²
(36 – 85 psi, 245 – 588 kPa)

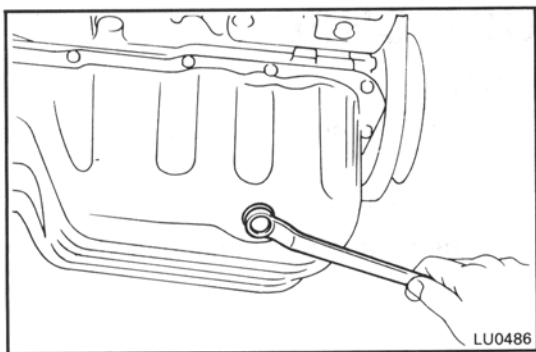
NOTE: Check for oil leakage after reinstalling the pressure switch. (See step 12 on page EM-94)



REPLACEMENT OF ENGINE OIL AND OIL FILTER

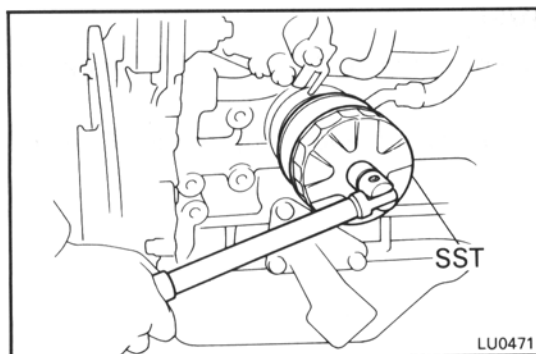
1. DRAIN ENGINE OIL

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

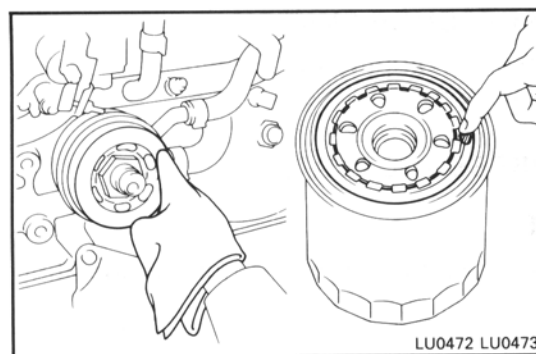


2. REPLACE OIL FILTER

- (a) Using SST, remove the oil filter.
SST 09228-10000

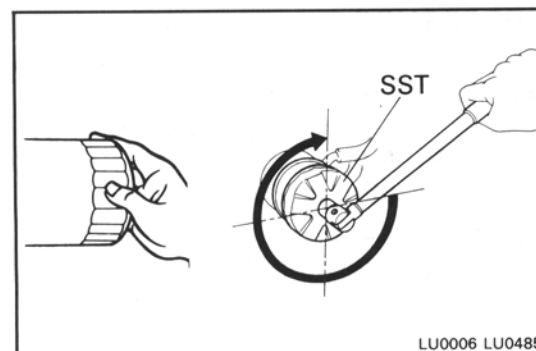


- (b) Inspect and clean the oil filter installation surface.
- (c) Apply clean engine oil to the gasket of a new oil filter.



- (d) Lightly screw in the oil filter until you feel resistance.
- (e) Then, using SST, tighten the oil filter an extra 3/4 turn.

SST 09228-10000



3. FILL WITH ENGINE OIL

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

Torque: 250 kg-cm (18 ft-lb, 25 N·m)

(b) Fill the engine with new oil, API grade CD or better.

Capacity:

Drain and refill-

w/o Oil filter change

3.1 liters (3.3 US qts, 2.7 Imp.qts)

w/ Oil filter change

3.8 liters (4.0 US qts, 3.3 Imp.qts)

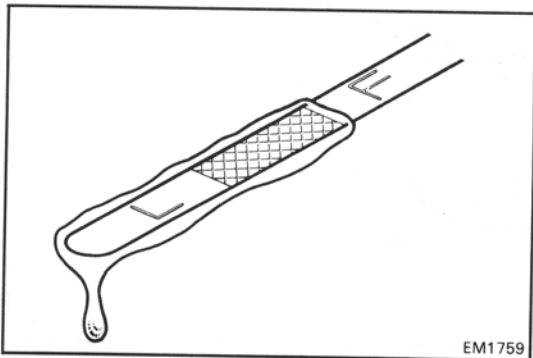
Dry fill-

4.2 liters (4.4 US qts, 3.7 Imp.qts)

(c) Install the oil filler cap with the gasket.

(d) Install the oil dipstick.

4. START ENGINE AND CHECK FOR LEAKS

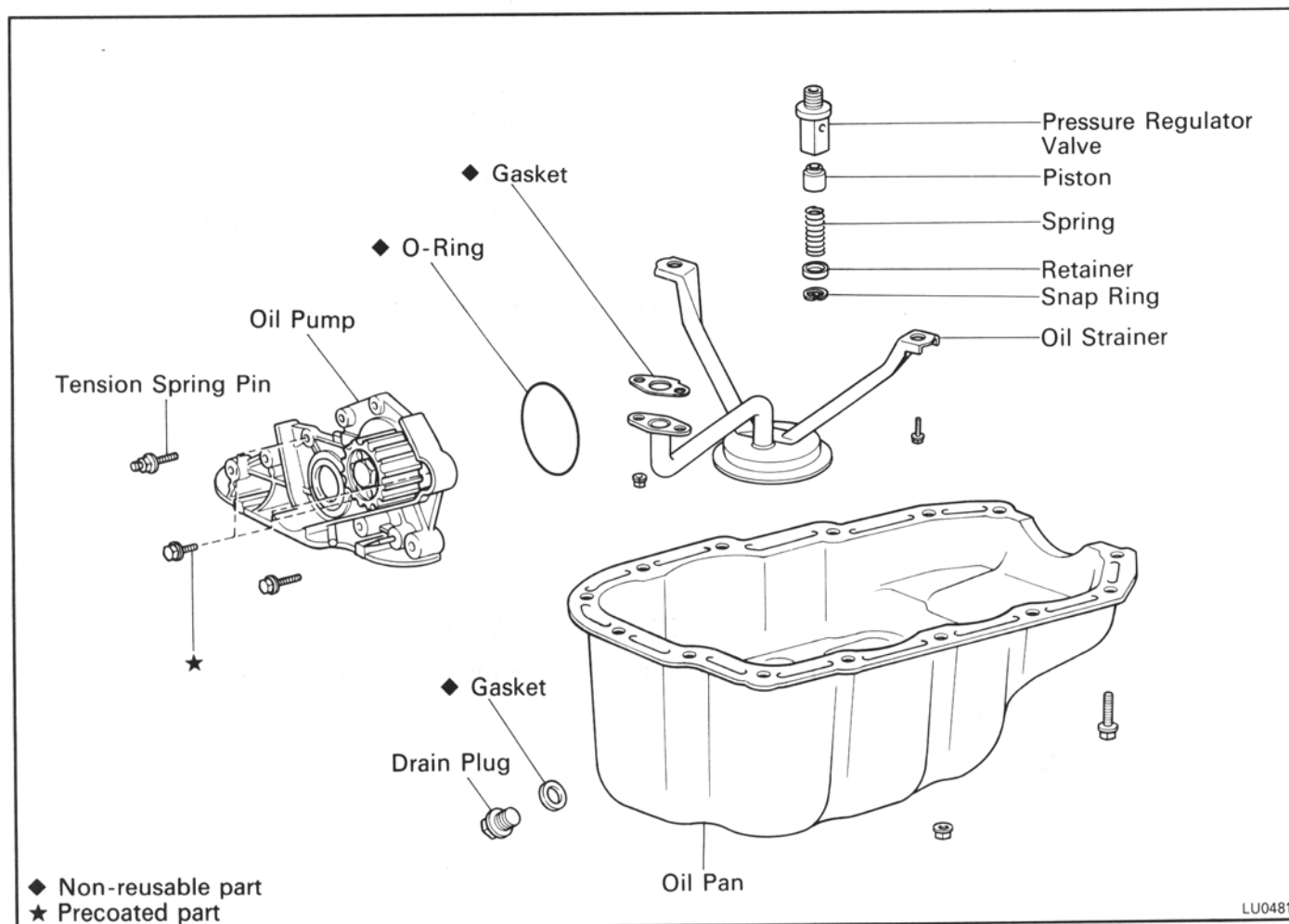


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5. RECHECK OIL LEVEL

Recheck the engine oil level and refill as necessary.

OIL PUMP AND PRESSURE REGULATOR VALVE COMPONENTS



REMOVAL OF OIL PUMP AND PRESSURE REGULATOR VALVE

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

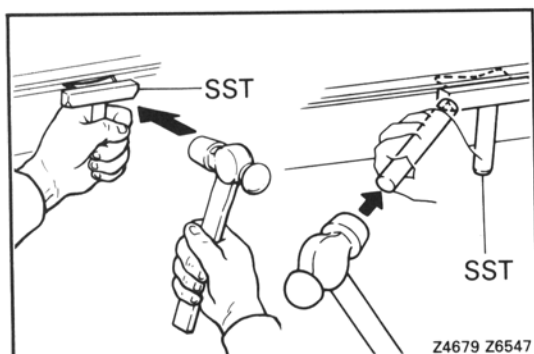
1. **REMOVE TIMING BELT**
(See steps 1 to 8 on pages EM-25 to 27)
2. **REMOVE CRANKSHAFT TIMING PULLEY**
(See step 12 on page EM-28)
3. **REMOVE OIL PAN**

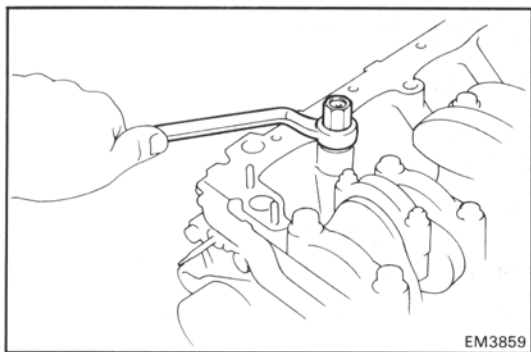
- (a) Remove the two nuts and twelve bolts.
- (b) Insert the SST blade between the cylinder block and oil pan, cut off applied sealer and then remove the oil pan.

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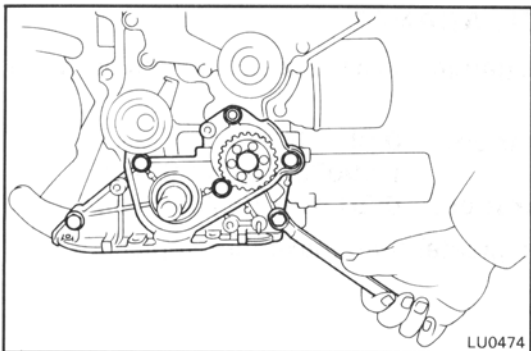
NOTE:

- Do not use SST for the oil pump body side. If necessary, use a screwdriver.
- When removing the oil pan, be careful not to damage the oil pan flange.



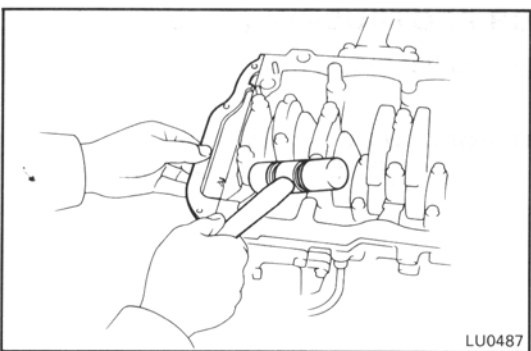


4. REMOVE PRESSURE REGULATOR VALVE ASSEMBLY



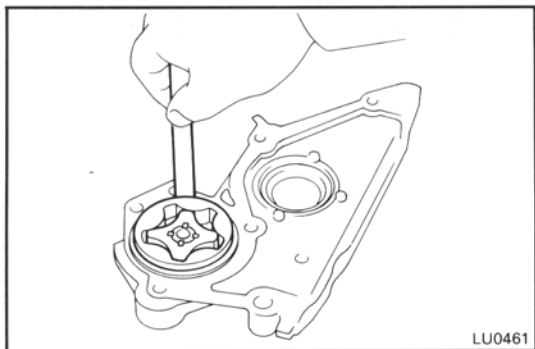
5. REMOVE OIL PUMP

(a) Remove the five bolts and tension spring pin.



(b) Using a plastic-faced hammer, carefully tap off the oil pump.

(c) Remove the oil pump body and O-ring.



INSPECTION OF OIL PUMP

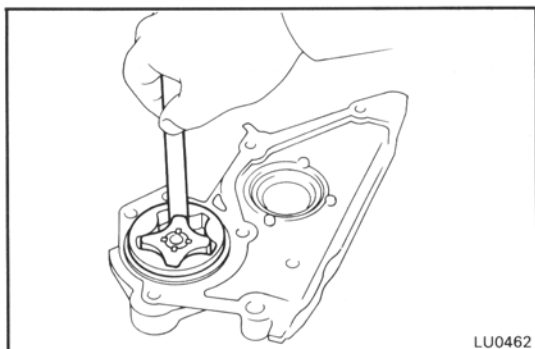
1. INSPECT BODY CLEARANCE

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

Standard clearance: 0.10 – 0.17 mm
(0.0039 – 0.0067 in.)

Maximum clearance: 0.20 mm (0.0079 in.)

If the clearance is greater than maximum, replace the oil pump.



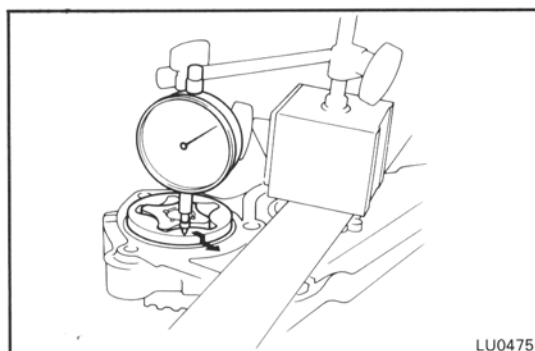
2. INSPECT TIP CLEARANCE

Using a thickness gauge, measure the clearance between both rotor trips.

Standard clearance: 0.05 – 0.15 mm
(0.0020 – 0.0059 in.)

Maximum clearance: 0.20 mm (0.0079 in.)

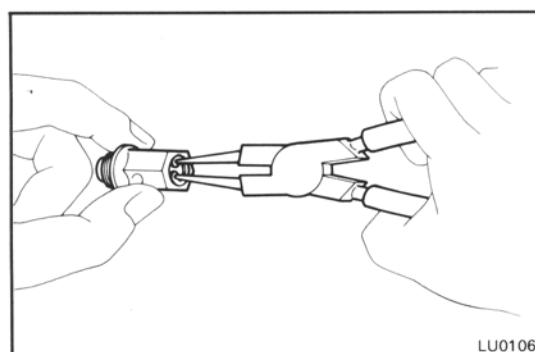
If the clearance is greater than maximum, replace the oil pump.



3. INSPECT ROTOR PROTRUSION (Reference)

Using a dial gauge and flat block, measure the side clearance as shown.

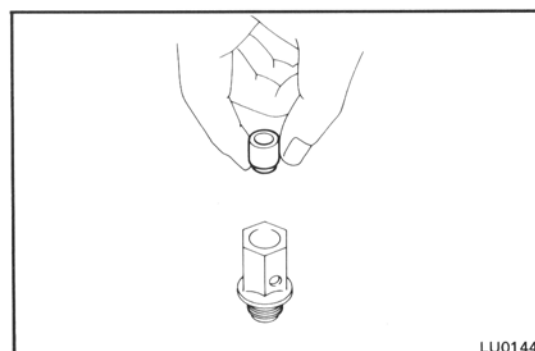
Standard protrusion: 5.00 – 5.08 mm
(0.1969 – 0.2000 in.)



INSPECTION OF PRESSURE REGULATOR

1. DISASSEMBLE PRESSURE REGULATOR VALVE

- Using snap ring pliers, remove the snap ring.
- Remove the retainer, spring and pressure regulator valve piston.



2. INSPECT PRESSURE REGULATOR VALVE

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

If necessary, replace the valve.

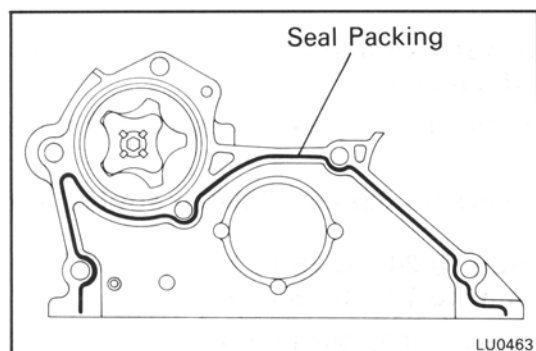
3. ASSEMBLE PRESSURE REGULATOR VALVE

- Insert the pressure regulator valve piston, spring and retainer.
- Using snap ring pliers, install the snap ring.

INSTALLATION OF OIL PUMP AND PRESSURE REGULATOR VALVE

(See page LU-6)

1. REPLACE CRANKSHAFT FRONT OIL SEAL, IF NECESSARY (See step 1 on page EM-84)



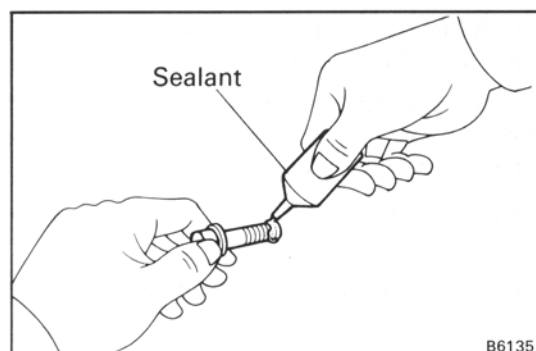
2. INSTALL OIL PUMP ASSEMBLY

- (a) Apply seal packing to the oil pump body as shown in the figure.

Seal packing: Part No.08826-00080 or equivalent

NOTE: Cleaning and application of seal packing to the installation surface is the same as for the oil pan.

However, use a nozzle cut to 2 mm (0.08 in.)

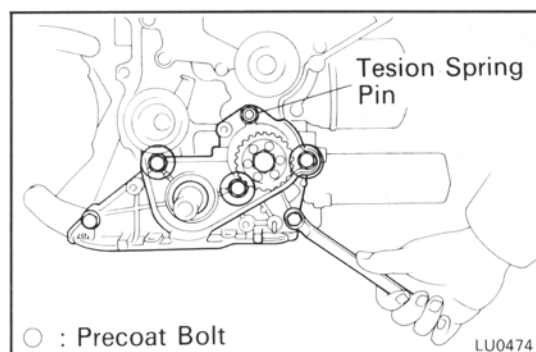


- (b) Place a new O-ring into the groove.

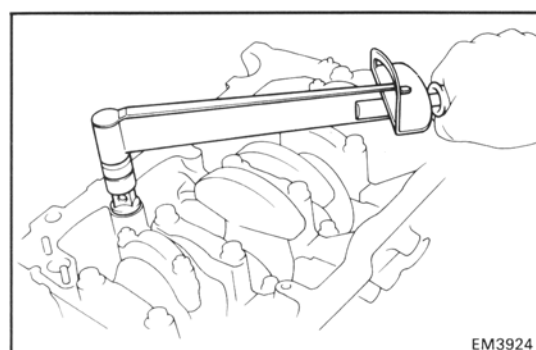
- (c) Apply sealant to the three bolts as shown in the figure.

Sealant: Part No. 08833-00070 or equivalent

NOTE: This adhesive will not harden while exposed to air. It will act as a sealant or binding agent only when applied to threads, etc. and air is cut off.



- (d) Install the oil pump with the five bolts and tension spring pin.

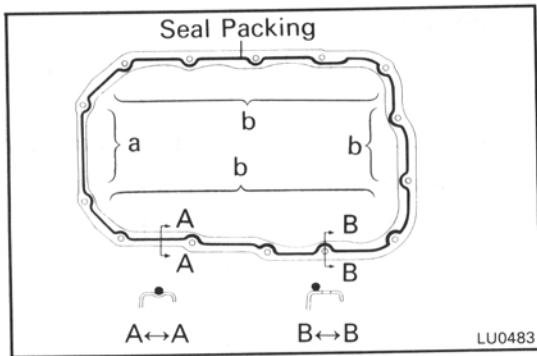


3. INSTALL PRESSURE REGULATOR VALVE

Torque: 250 kg-cm (18 ft-lb, 25 N·m)

4. INSTALL OIL PAN

- (a) Remove any old packing material and be careful not to drop any oil on the contacting surfaces of the oil pan and cylinder block.
- Using a razor blade and gasket scraper, remove all the packing (FIPG) material from the gasket surfaces.
 - Thoroughly clean all components to remove all the loose material.
 - Clean both sealing surfaces with a non-residue solvent.



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

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

Seal packing: Part No.08826-00080 or equivalent
Seal diameter:

- a 6 – 7 mm (0.24 – 0.28 in.)
- b 3 – 4 mm (0.12 – 0.16 in.)

Install a nozzle that has been cut to a 3 mm (0.12 in.) or 6 mm (0.24 in.) opening.

NOTE: Avoid applying an excess amount to the surface. Be especially careful near oil passages.

- Parts must be assembled within 15 minutes of application. Otherwise, the seal packing black must be removed and re-applied.
 - Immediately remove nozzle from tube and reinstall cap.
- (c) Install the oil pan with the two nuts and twelve bolts.

Torque: 80 kg-cm (69 in.-lb, 7.8 N·m)

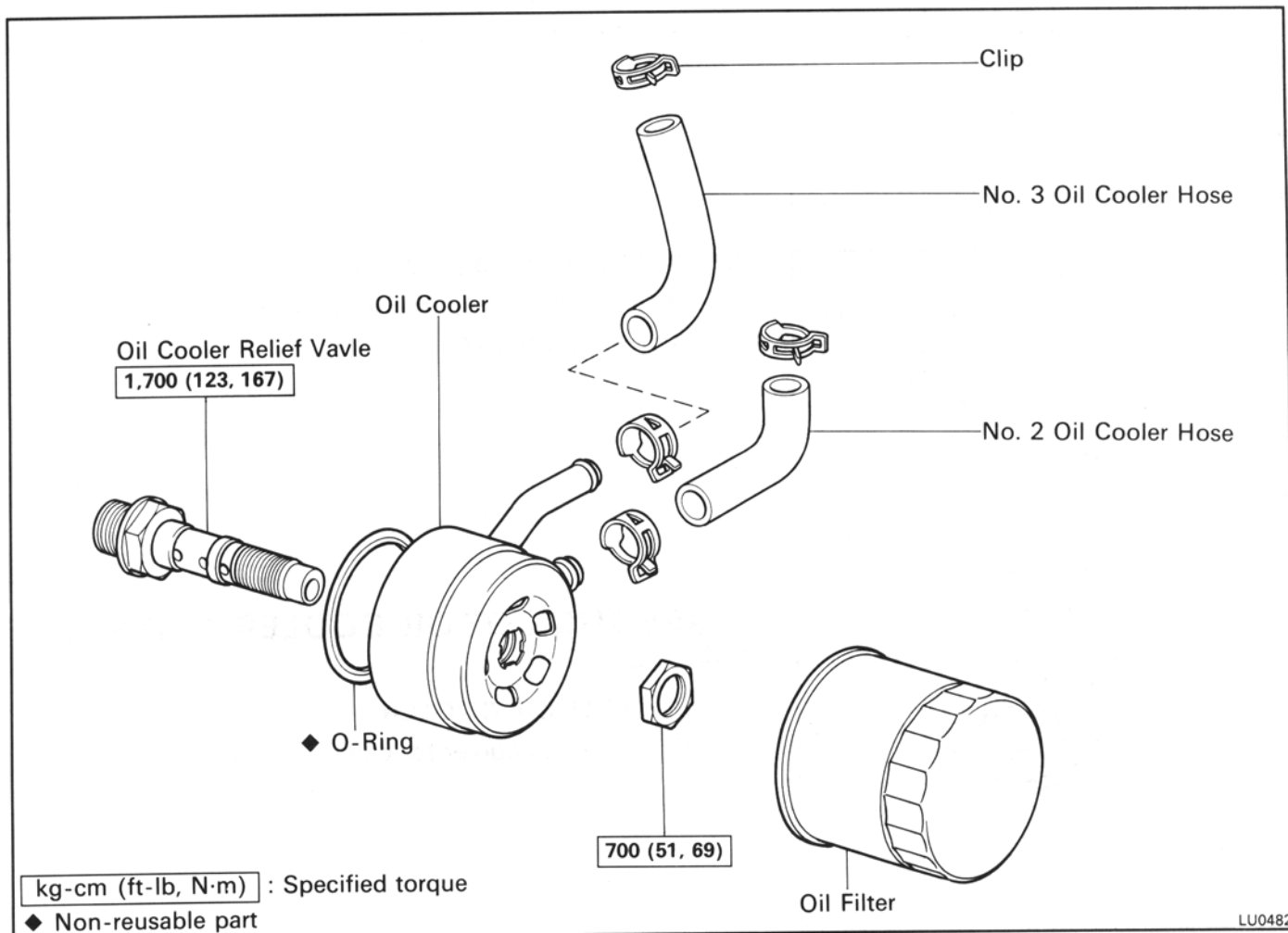
5. INSTALL TIMING BELT

(See steps 5 to 14 on pages EM-32 to 36)

6. INSTALL CRANKSHAFT TIMING PULLEY

(See step 1 on page EM-31)

OIL COOLER AND RELIEF VALVE COMPONENTS

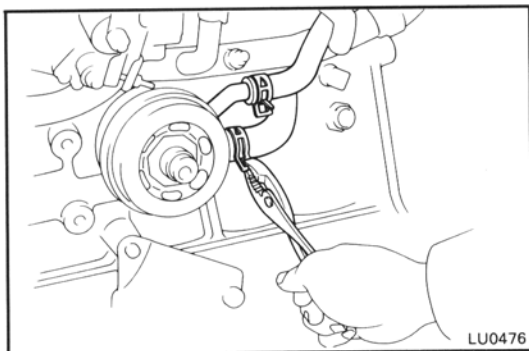


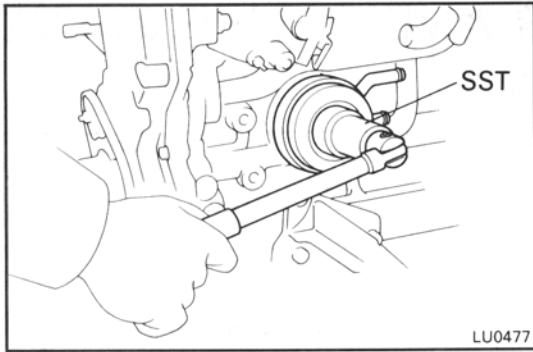
REMOVAL OF OIL COOLER AND RELIEF VALVE

1. REMOVE OIL FILTER
(See step 2 on page LU-4)

2. REMOVE OIL COOLER

- (a) Disconnect the No.2 and No.3 oil cooler hoses.



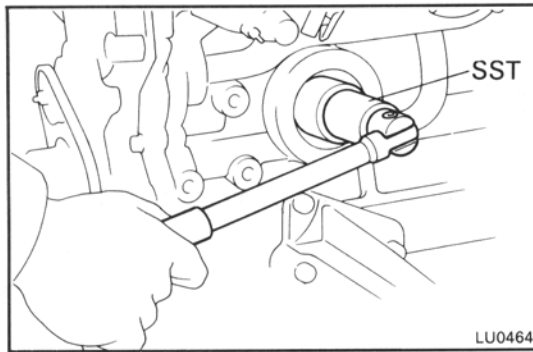


(b) Using SST, loosen the nut.

SST 09229-55010

(c) Remove the nut and oil cooler.

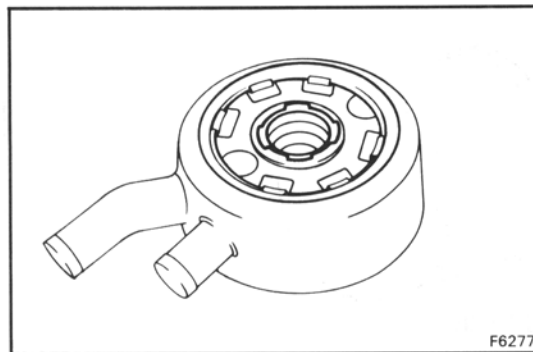
(d) Remove the O-ring.



3. REMOVE RELIEF VALVE

Using SST, remove the relief valve.

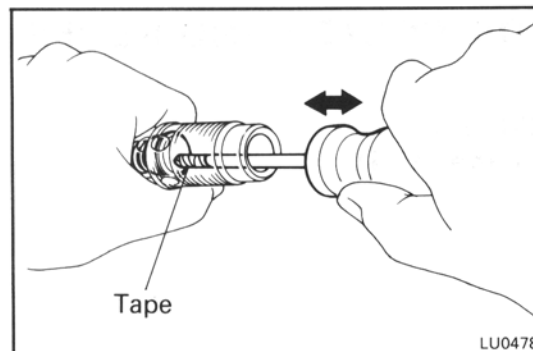
SST 09229-55010



INSPECTION OF OIL COOLER AND RELIEF VALVE

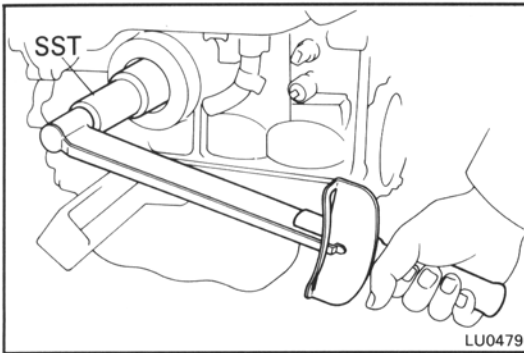
1. INSPECT OIL COOLER

Check the oil cooler for damage or clogging.



2. INSPECT RELIEF VALVE

Check the relief valve for scoring or wear.



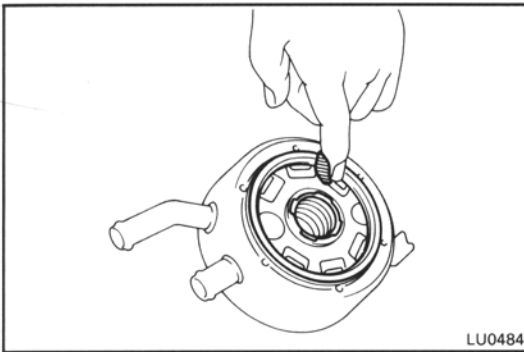
INSTALLATION OF RELIEF VALVE AND OIL COOLER

1. INSTALL RELIEF VALVE

Using SST, install and torque the relief valve.

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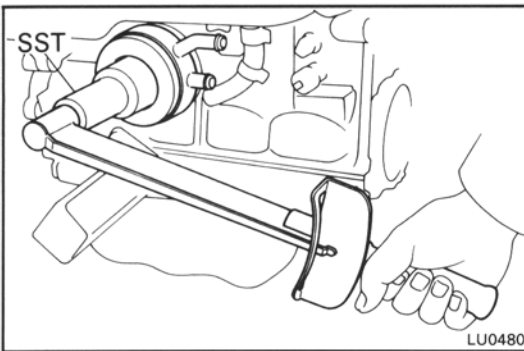
Torque: 1,700 kg-cm (123 ft-lb, 167 N·m)



2. INSTALL OIL COOLER

(a) Install a new O-ring to the oil cooler.

(b) Apply clean engine oil to the O-rings.

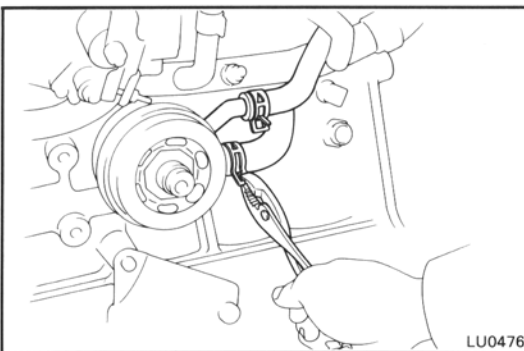


(c) Install the oil cooler with the nut.

(d) Using SST, torque the nut.

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Torque: 700 kg-cm (51 ft-lb, 69 N·m)



(e) Connect the No.3 and No.2 oil cooler hoses.

3. INSTALL OIL FILTER

(See step 2 on page LU-4)