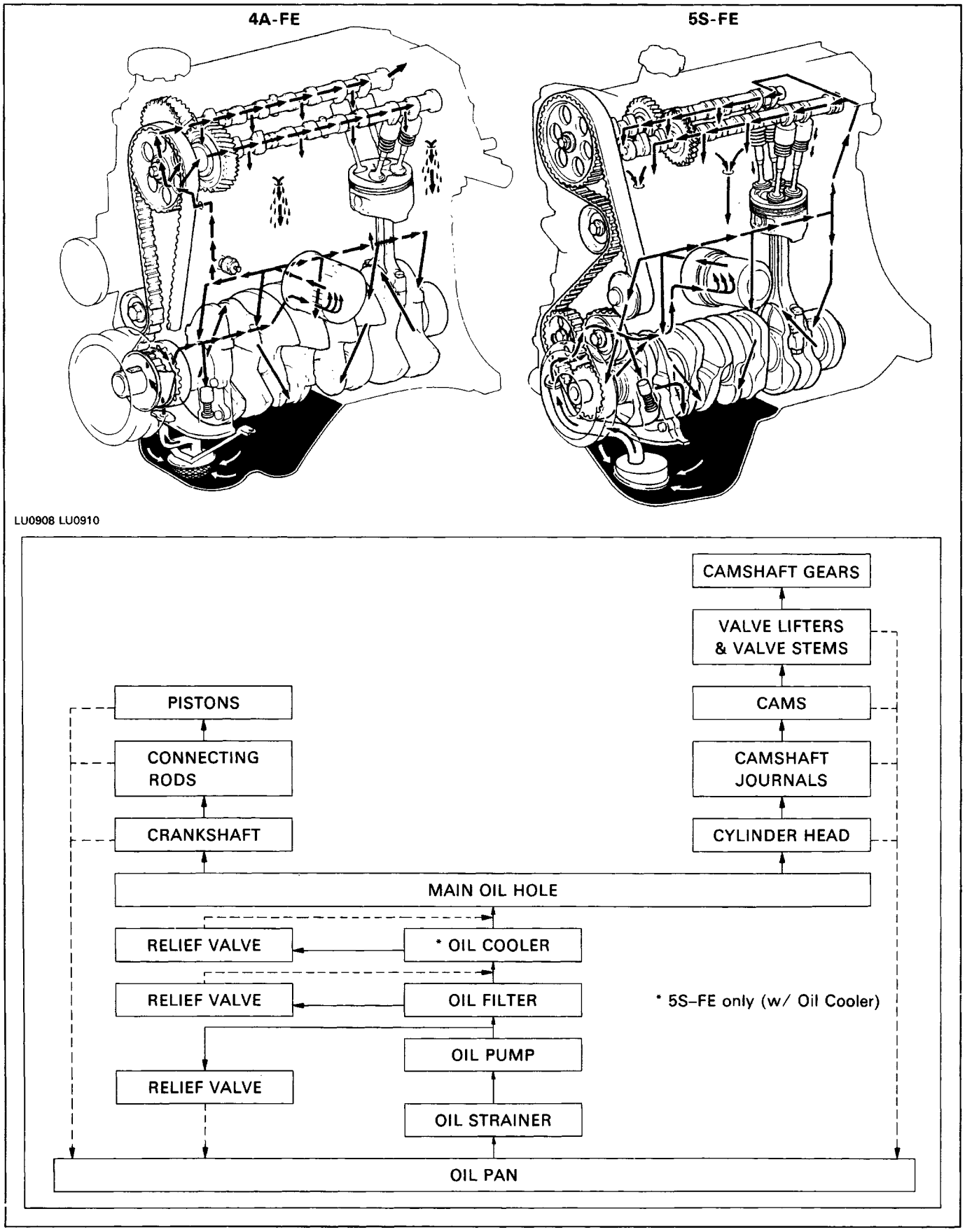
LUBRICATION SYSTEM

DESCRIPTION

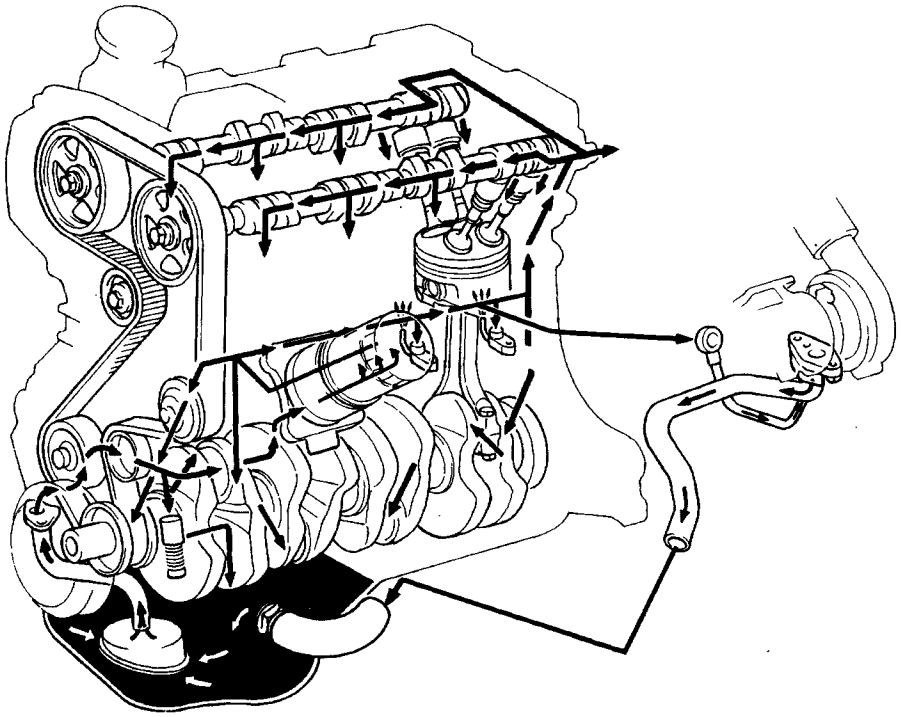
A fully pressurized, fully filtered lubrication system has been adopted for this engine.



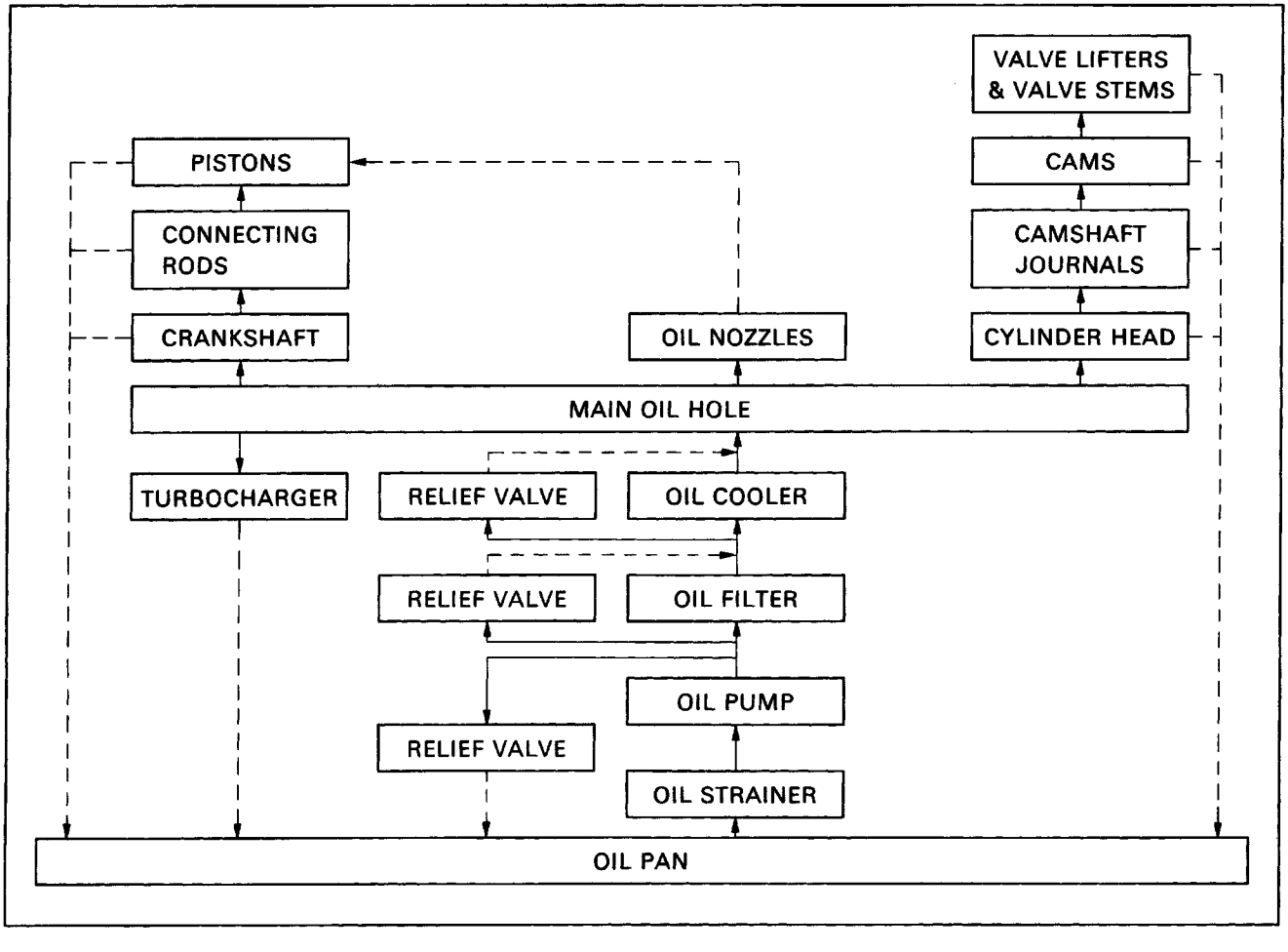
DESCRIPTION

A fully pressurized, fully filtered lubrication system has been adopted for this engine.

3S-GTE



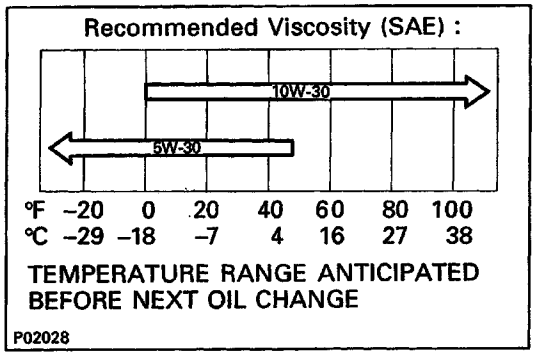
LU0932



-Memo

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Oil leakage	Cylinder head, cylinder block or oil pump body damaged or cracked Oil seal faulty Gasket faulty	Repair as necessary Replace oil seal Replace gasket	EM–207, 249, 294 LU–20
Low oil pressure	Oil leakage Relief valve faulty Oil pump faulty Engine oil poor quality Crankshaft bearing faulty Connecting rod bearing faulty Oil filler clogged	Repair as necessary Repair relief valve Repair oil pump Replace engine oil Replace bearing Replace bearing Replace oil filler	LU–9, 17 LU–9, 17 LU–7 EM–185, 224, 269 EM–185, 224, 269 LU–7
High oil pressure	Relief valve faulty	Repair relief valve	LU–9, 17



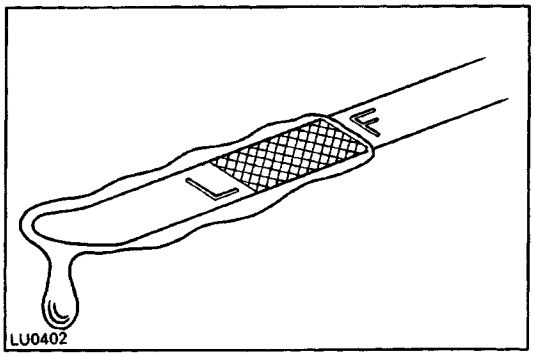
OIL PRESSURE CHECK

1. CHECK ENGINE OIL QUALITY

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

If the quality is poor, replace the oil.

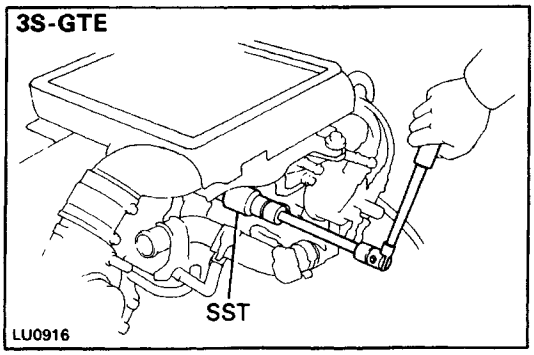
Oil grade: API grade SG multigrade and fuel–efficient engine oil. Recommended viscosity is as shown.



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

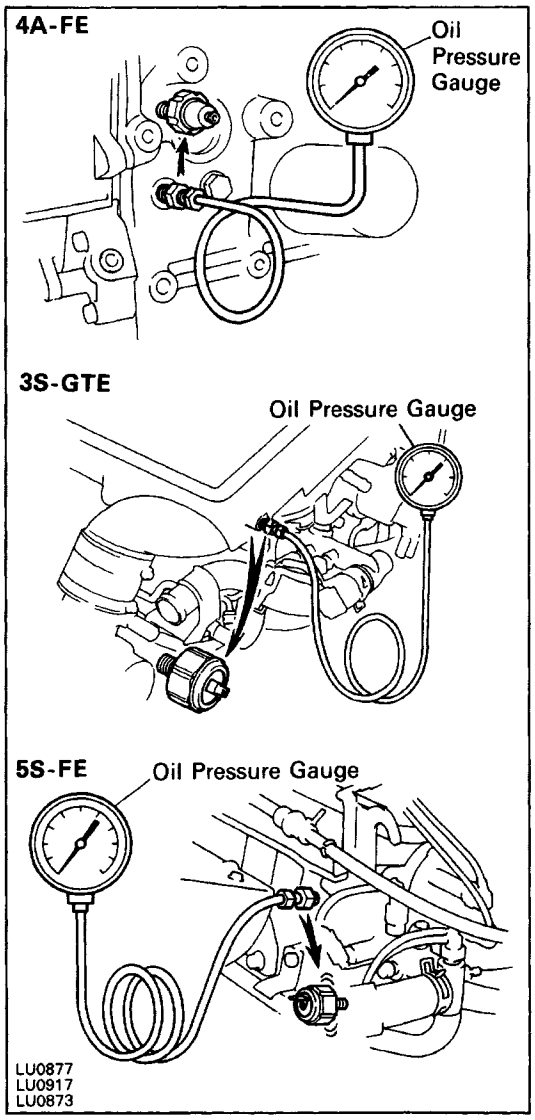
(a) (4A–FE)

Remove the alternator and bracket.

(b) Remove the oil pressure switch.

HINT (3S–GTE): Use SST.

SST 09816–30010



(c) Install an oil pressure gauge.
(d) (4A–FE)
Install the bracket and alternator.

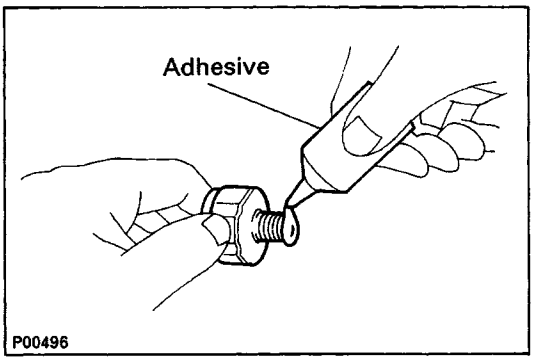
4. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

5. CHECK OIL PRESSURE

Oil pressure:

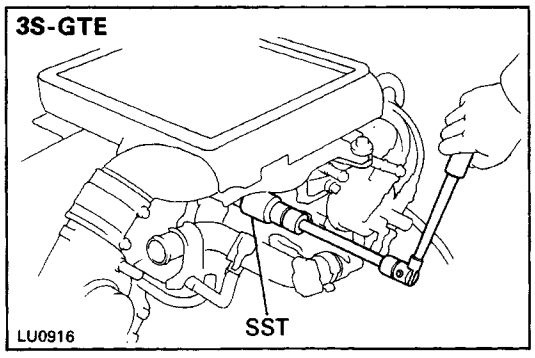
At idle 29 kPa (0.3 kgf/cm^2, 4.3 psi) or more
At 3,000 rpm 245 – 490 kPa (2.5 – 5.0 kgf/cm^2, 36 – 71 psi)



6. REINSTALL OIL PRESSURE SWITCH

(a) (4A–FE)
Remove the alternator and bracket.
(b) Remove the oil pressure gauge.
(c) Apply adhesive to two or three threads of the oil pressure switch.

Adhesive: Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent



(d) Reinstall the oil pressure switch.
HINT (3S–GTE): Use SST.
SST 09816–30010
(e) (4A–FE)
Reinstall the bracket and alternator.

7. START ENGINE AND CHECK FOR LEAKS

REPLACEMENT OF ENGINE OIL AND OIL FILTER

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 waterless 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

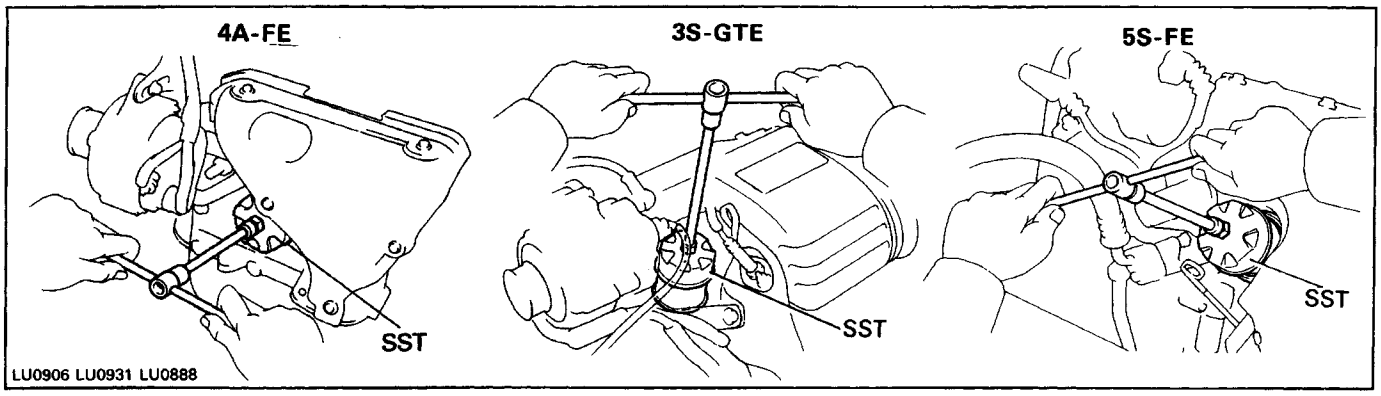
(a) (3S–GTE)

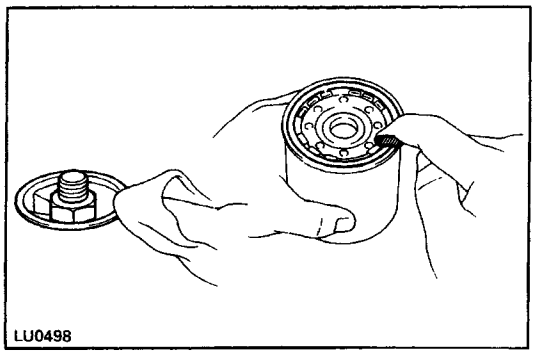
Remove the alternator ducts.

(See steps 2, 4 and 10 on pages CH–7 and 8)

(b) Using SST, remove the oil filter.

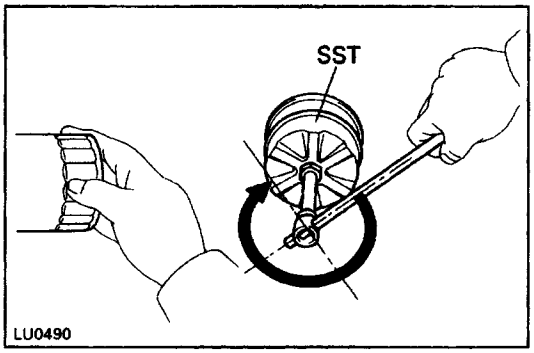
SST 09228–06500





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

(d) Lubricate the filter rubber gasket with engine oil.



(e) Tighten the oil filter by hand until the rubber gasket contacts the seat of the filter mounting. Then using SST, give it an additional 3/4 turn to seat the oil filter.

SST 09228–06500

(f) (3S–GTE)

Reinstall the alternator ducts.

(See steps1, 7 and 9 on pages CH–23 and 24)

3. FILL WITH ENGINE OIL

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

Torque:

4A–FE 34 N–m (350 kgf–cm, 25 ft–lbf)

3S–GTE and 5S–FE 39 N–m (400 kgf–cm, 29 ft–lbf)

(b) Fill with new engine oil.

Oil grade: See page LU–5

Capacity:

(4A–FE)

Drain and refill
w/ Oil filter change
3.2 liters (3.3 US qts, 2.8 Imp. qts)
w/o Oil filter change
3.0 liters (3.1 US qts, 2.6 Imp. qts)
Dry fill 3.7 liters (3.9 US qts, 3.3 Imp. qts)

(3S–GTE)

Drain and refill
w/ oil filter change
3.9 liters (4.1 US qts, 3.4 Imp. qts)
w/o Oil filter change
3.6 liters (3.8 US qts, 3.2 Imp. qts)
Dry fill 4.3 liters (4.5 US qts, 3.8 Imp. qts)

(5S–FE (w/ Oil cooler))

Drain and refill
w/ Oil filter change
4.2 liters (4.4 US qts, 3.7 Imp. qts)
w/o Oil filter change
3.8 liters (4.0 US qts, 3.3 Imp. qts)
Dry fill 4.6 liters (4.9 US qts, 4.0 Imp. qts)

(5S–FE (w/o Oil cooler))

Drain and refill
w/ Oil filter change
4.1 liters (4.3 US qts, 3.6 Imp. qts)
w/o Oil filter change
3.7 liters (3.9 US qts, 3.3 Imp. qts)
Dry fill 4.5 liters (4.8 US qts, 4.0 Imp. qts)

(c) Reinstall the oil filler cap.

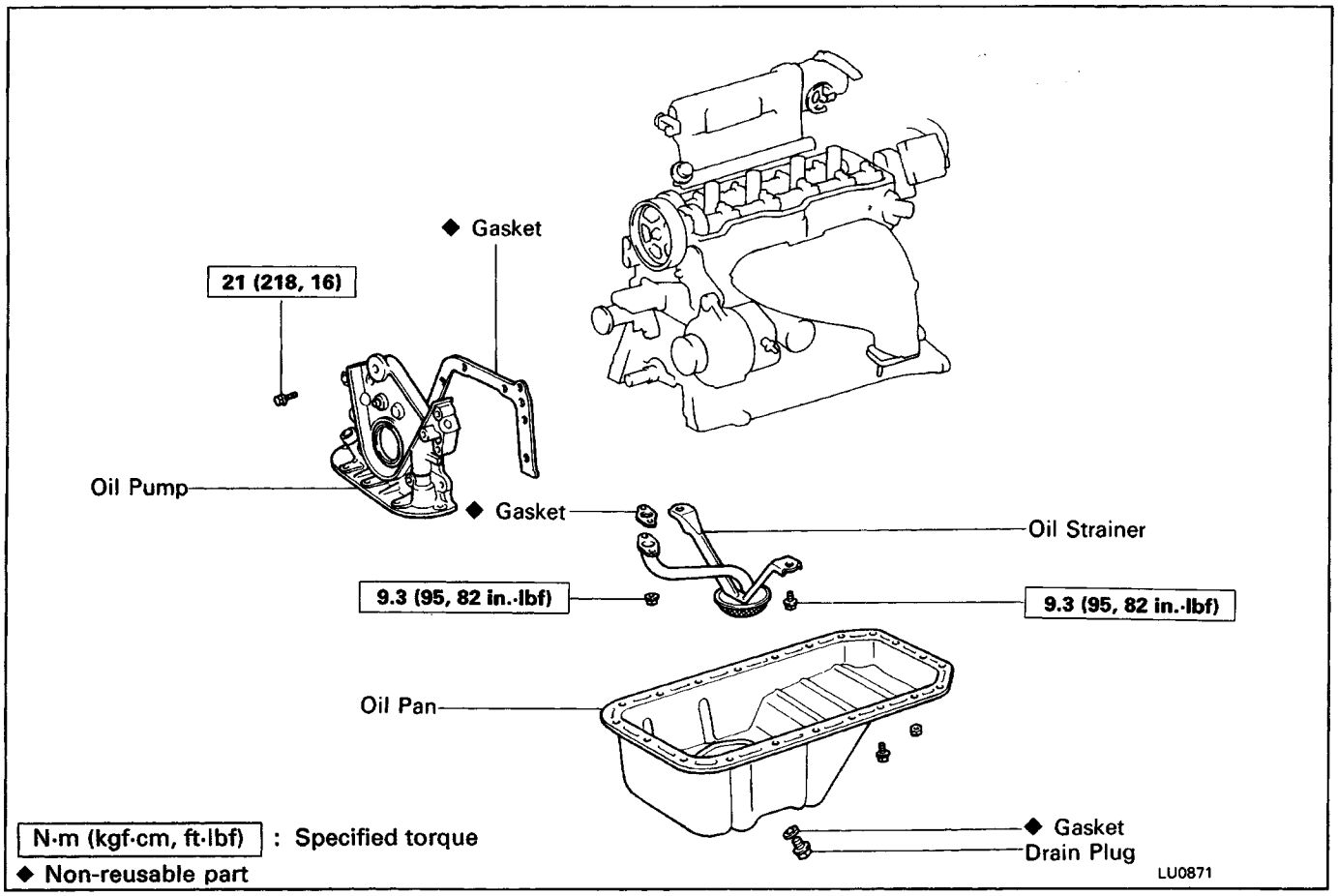
4. START ENGINE AND CHECK FOR LEAKS

5. RECHECK ENGINE OIL LEVEL (See page LU–5)

OIL PUMP (4A–FE)

REMOVAL OF OIL PUMP

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



1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Work must be started after approx. 20 seconds or longer from the time the ignition switch is turned to the "LOCK" position and the negative (–) ter–minal cable is disconnected from the battery.

2. REMOVE HOOD

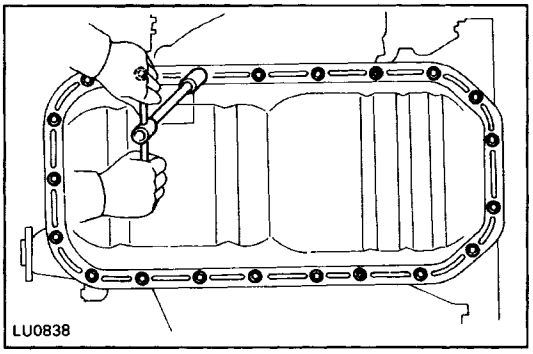
3. REMOVE ENGINE UNDER COVERS

4. DRAIN ENGINE OIL (See page LU–7)

5. REMOVE SUSPENSION LOWER CROSSMEMBER (See step 24 on page EM–189)

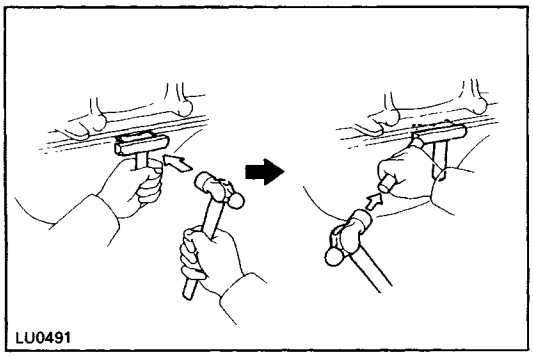
6. REMOVE FRONT EXHAUST PIPE (See step 25 on page EM–189)

7. REMOVE ENGINE MOUNTING CENTER MEMBER (See step 31 on page EM –190)



8. REMOVE OIL PAN

(a) Remove the nineteen bolts and two nuts.

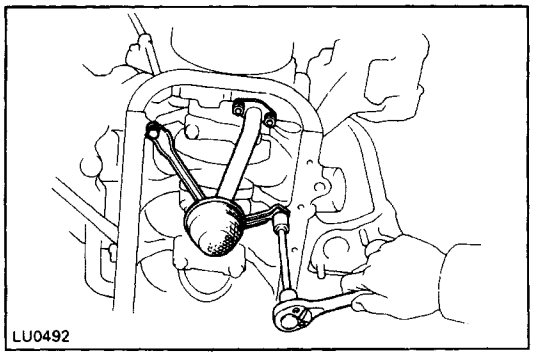


(b) Insert the blade of SST between the cylinder block and oil pan, cut off applied sealer and remove the oil pan.

SST 09032–00100

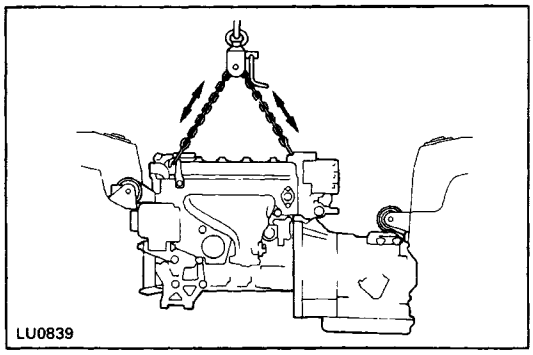
NOTICE:

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



9. REMOVE OIL STRAINER

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

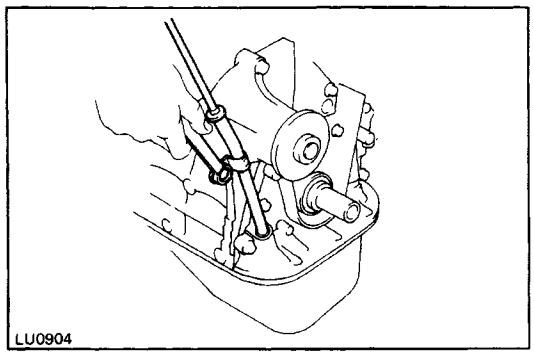


10. SUSPEND ENGINE WITH ENGINE CHAIN HOIST

11. REMOVE TIMING BELT

(See steps 2 to 15 and 17 to 20 on pages EM–33 to 37)

12. REMOVE IDLER PULLEY AND CRANKSHAFT TIMING PULLEY (See steps 21 and 22 on page EM–38)

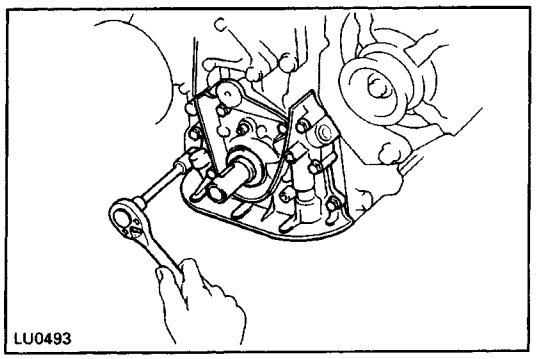


13. REMOVE OIL DIPSTICK AND DIPSTICK GUIDE

(a) Remove the dipstick.

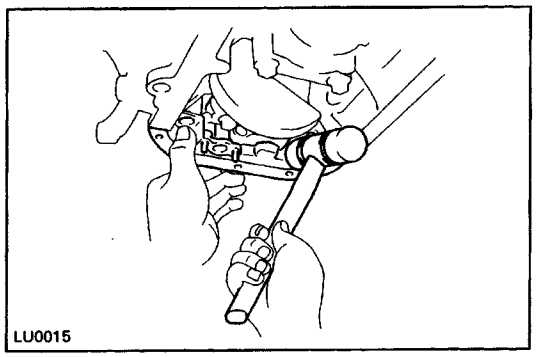
(b) Remove the bolt, and pull out the dipstick guide.

(c) Remove the O–ring from the dipstick guide.



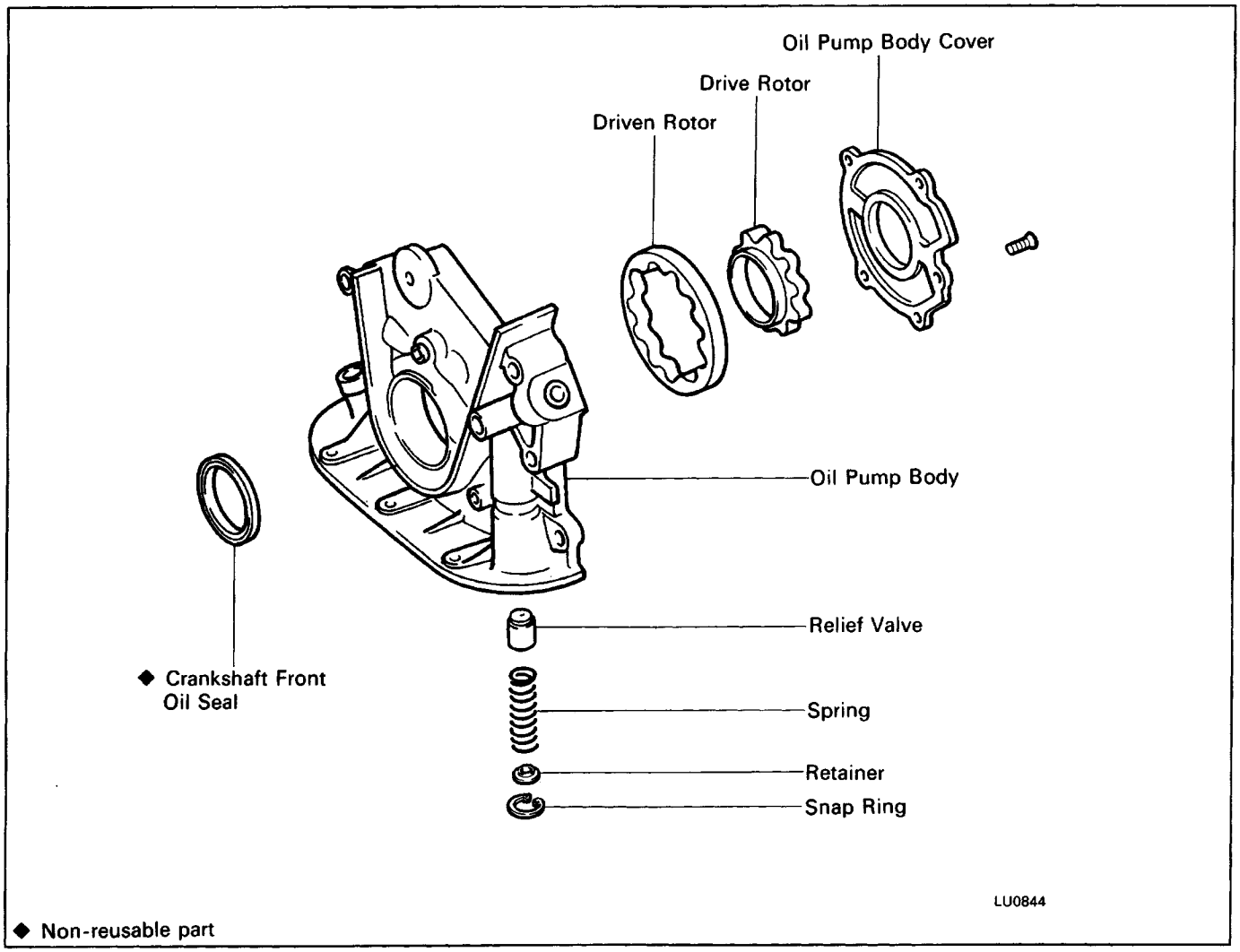
14. REMOVE OIL PUMP

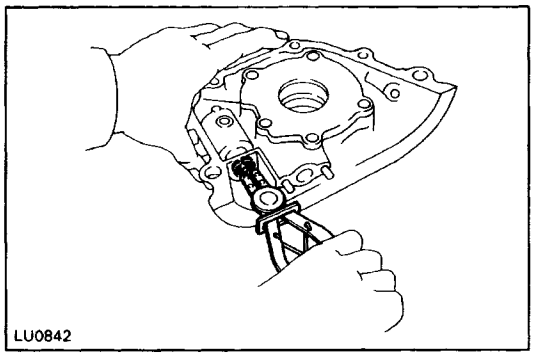
(a) Remove the seven bolts.



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

COMPONENTS





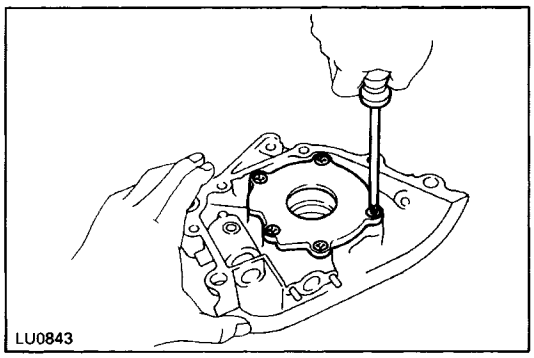
DISASSEMBLY OF OIL PUMP

(See page LU–11)

1. REMOVE RELIEF VALVE

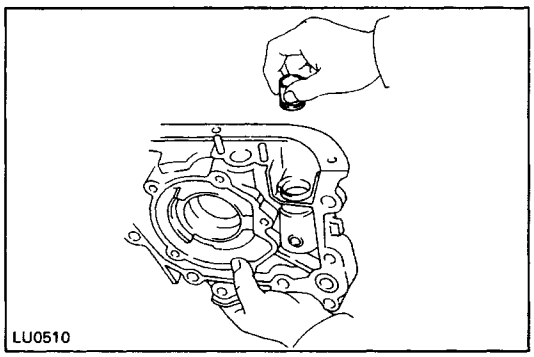
(a) Using snap ring pliers, remove the snap ring.

(b) Remove the retainer, spring and relief valve.



2. REMOVE DRIVE AND DRIVEN ROTORS

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

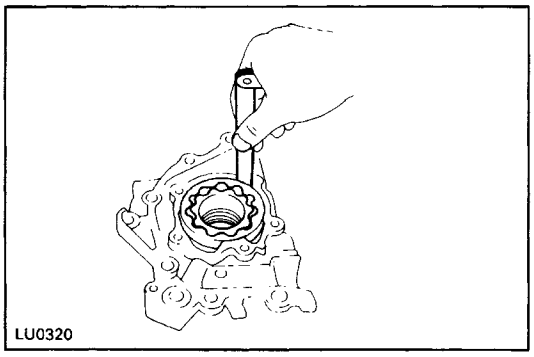


INSPECTION OF OIL PUMP

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. INSPECT DRIVE AND DRIVEN ROTORS

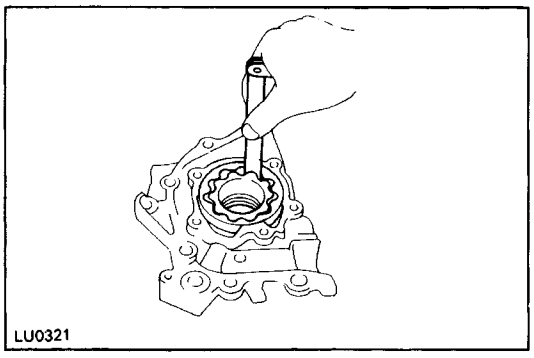
A. Inspect rotor body clearance

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

Standard body clearance: 0.080 – 0.180 mm
(0 . 0031 – 0.0071 i n .)

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.



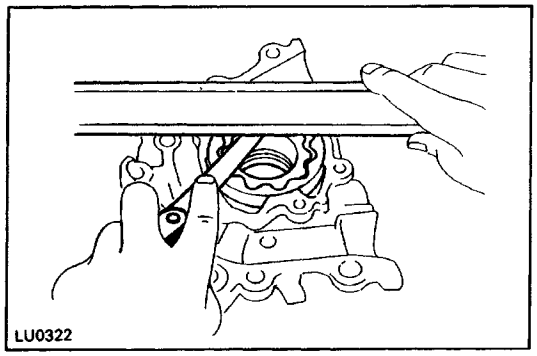
B. Inspect rotor tip clearance

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

Standard tip clearance: 0.025 – 0.085 mm
(0. 0010 – 0.0033 in.)

Maximum tip clearance: 0.35 mm (0.0138 in.)

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



C. Inspect rotor side clearance

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

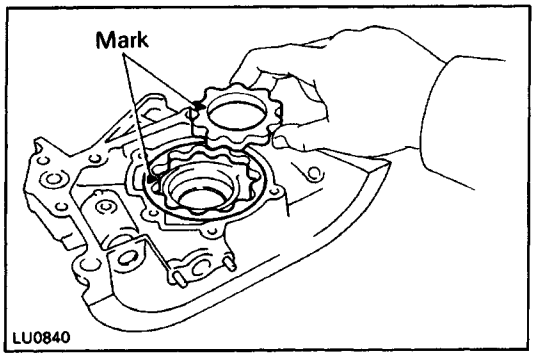
Standard side clearance: 0.025 – 0.085 mm (0.0010 – 0.0033 in.)

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.

REPLACEMENT OF CRANKSHAFT FRONT OIL SEAL

(See page EM–207)

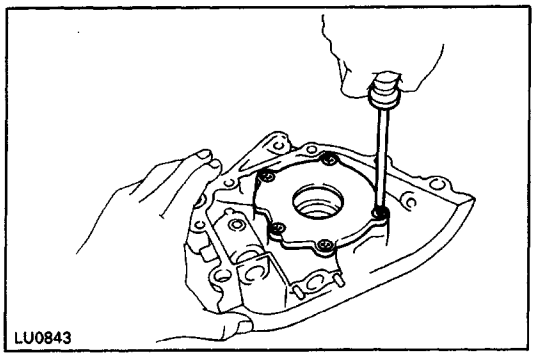


ASSEMBLY OF OIL PUMP

(See page LU–11)

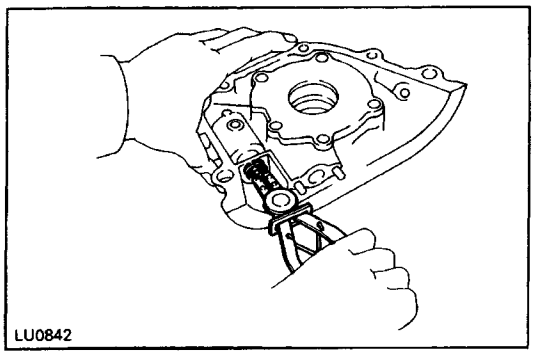
1. INSTALL DRIVE AND DRIVEN ROTORS

(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 five screws.

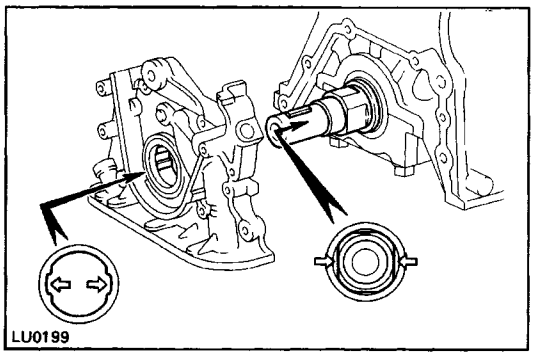
Torque: 10 N–m (105 kgf–cm, 8 ft–lbf)



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.



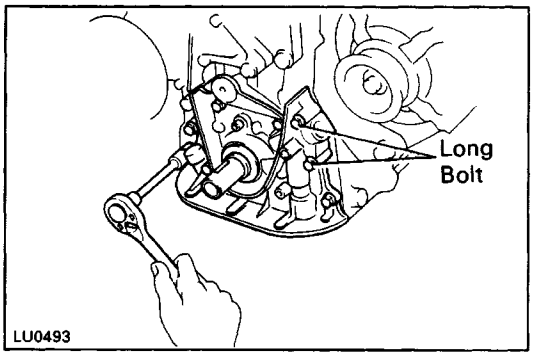
INSTALLATION OF OIL PUMP

(See page LU–9)

1. INSTALL OIL PUMP

(a) Place a new gasket in position on the cylinder block.

(b) Engage the spline teeth of the oil pump drive rotor with the large teeth of the crankshaft, and slide the oil pump.



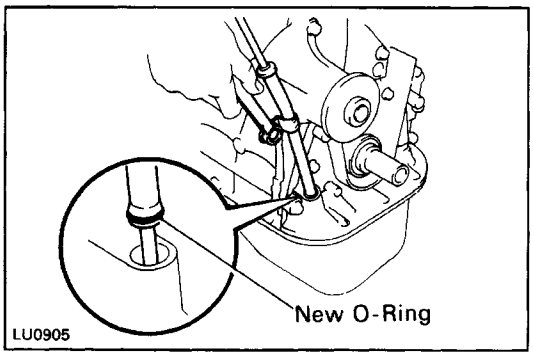
(c) Install the oil pump with the seven bolts.

Torque: 21 N–m (218 kgf–cm, 16 ft–lbf)

HINT: Each bolt length is indicated in the illustration.

Bolt length: Long bolt 35 mm (1.38 in.)

Others 25 mm (0.98 in.)



2. INSTALL OIL DIPSTICK GUIDE AND DIPSTICK

(a) Install a new 0–ring to the dipstick guide.

(b) Apply soaply water to the 0–ring.

(c) Push in the dipstick guide, and install it with the bolt.

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

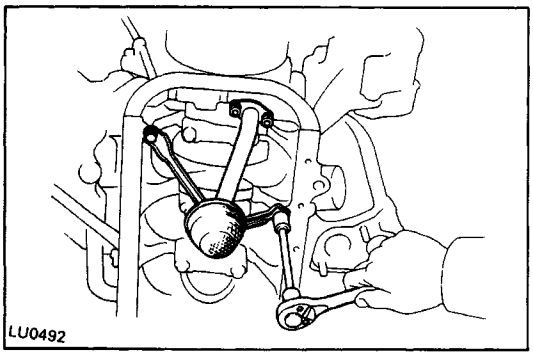
(d) Install the dipstick.

3. INSTALL CRANKSHAFT TIMING PULLEY AND IDLER PULLEY (See steps 1 and 2 on page EM–40)

4. INSTALL TIMING BELT

(See steps 3 to 6 and 8 to 21 on pages EM–40 to 45)

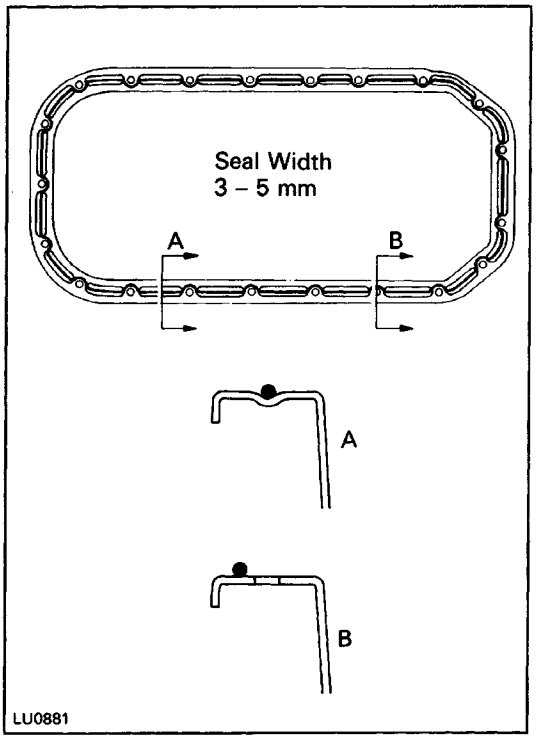
5. REMOVE ENGINE CHAIN HOIST FROM ENGINE

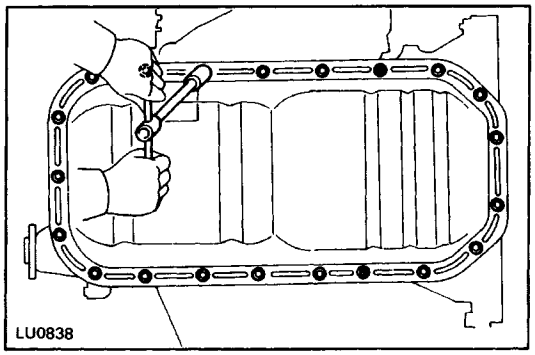


6. INSTALL OIL STRAINER

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

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





7. 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.
  H I NT: Avoid applying an excessive amount to the surface. Be particularly careful near oil passages.
- 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 nineteen bolts and two nuts.

Torque: 4.9 N–m (50 kgf–cm, 43 MAW)

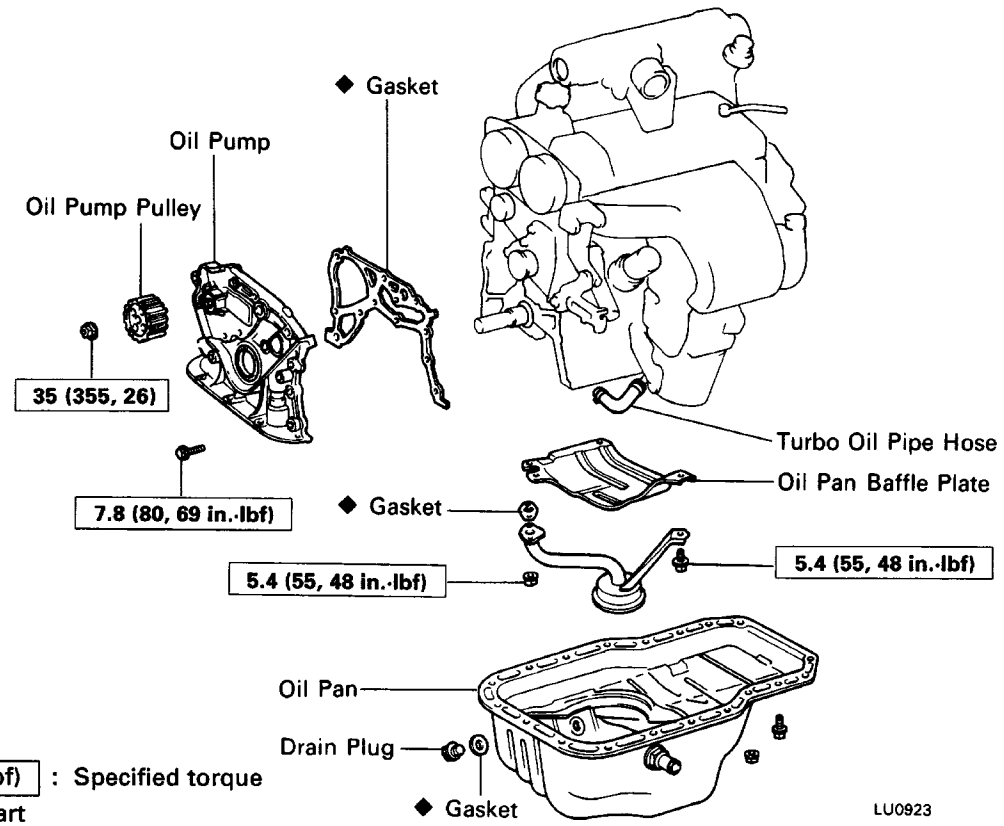
8. INSTALL ENGINE MOUNTING CENTER MEMBER
(See step 10 on page EM–216)
9. INSTALL FRONT EXHAUST PIPE
(See step 17 on page EM–217)
10. INSTALL SUSPENSION LOWER CROSSMEMBER
(See step 18 on page EM–218)
11. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
12. FILL WITH ENGINE OIL (See page LU–8)
13. START ENGINE AND CHECK FOR LEAKS
14. RECHECK ENGINE OIL LEVEL (See page LU–5)
15. INSTALL HOOD
16. INSTALL ENGINE UNDER COVERS

OIL PUMP (3S–GTE and 5S–FE)

REMOVAL OF OIL PUMP

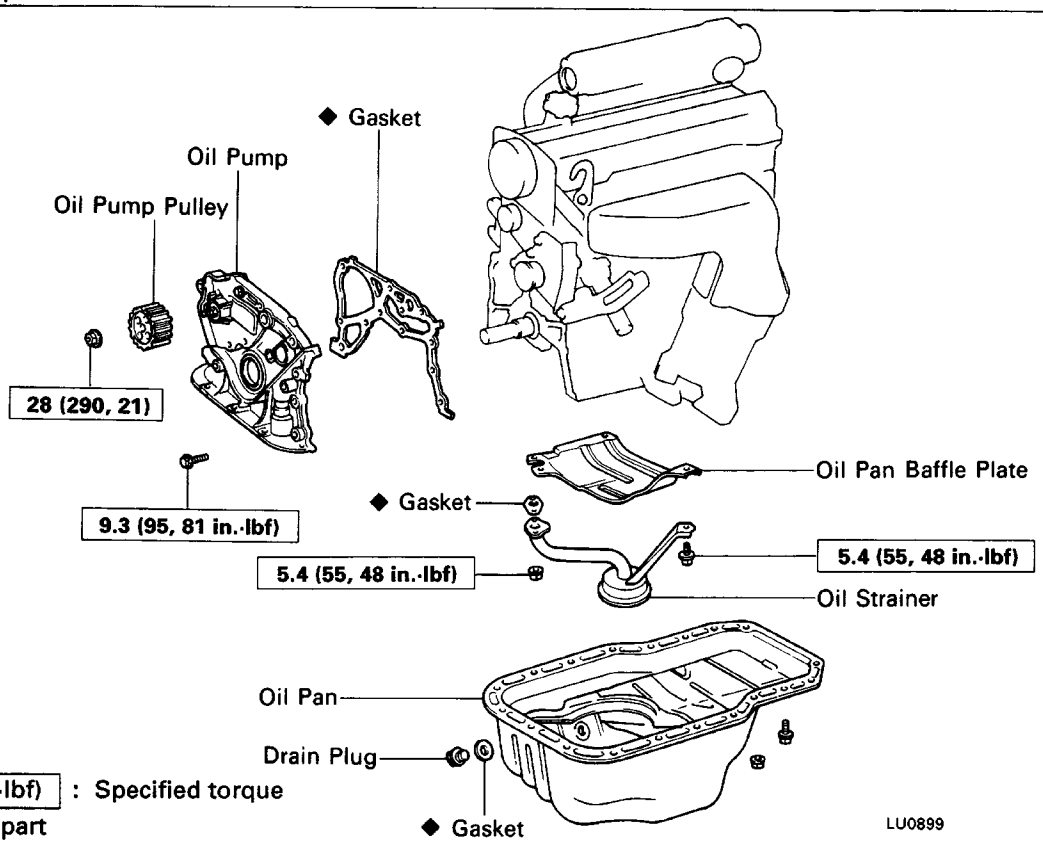
HINT: When repairing the oil pump, the oil pan and strainer should be removed and cleaned.

3S-GTE



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

5S-FE



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL O F BATTERY

CAUTION: Work must be started after approx. 20 seconds or longer from the time the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.

2. REMOVE HOOD

3. REMOVE ENGINE UNDER COVERS

4. DRAIN ENGINE OIL (See page LU–7)

5. REMOVE SUSPENSION LOWER CROSSMEMBER

3S–GTE (See step 33 on page EM–228)

5S–FE (See step 28 on page EM–274)

6. REMOVE FRONT EXHAUST PIPE

3S–GTE (See step 34 on page EM–229)

5S–FE (See step 29 on page EM–274)

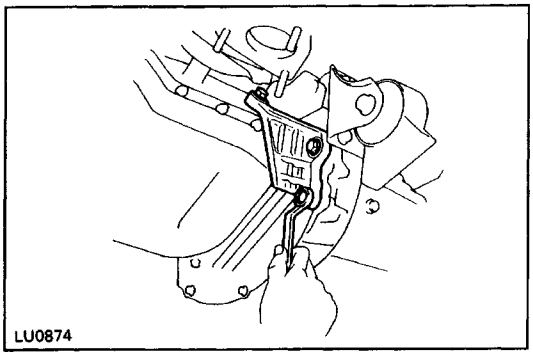
7. REMOVE ENGINE MOUNTING CENTER MEMBER

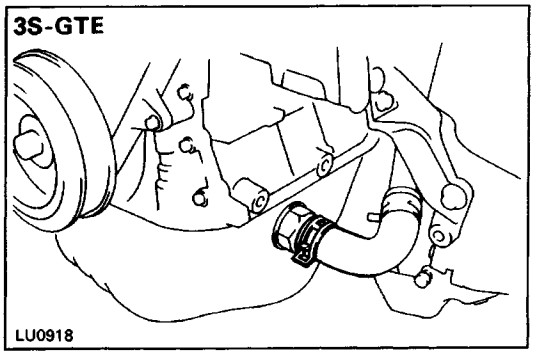
3S–GTE (See step 42 on page EM–229)

5S–FE (See step 34 on page EM–275)

8. REMOVE STIFFENER PLATE

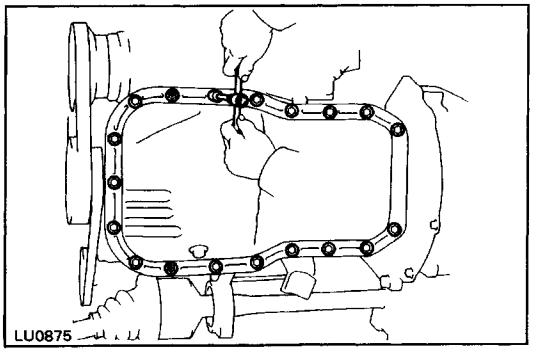
Remove the three bolts and stiffener plate.





9. (3S–GTE)

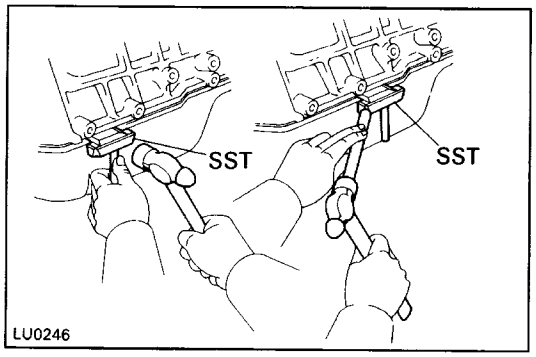
DISCONNECT TURBO OIL PIPE HOSE FROM OIL PAN



10. REMOVE OIL PAN

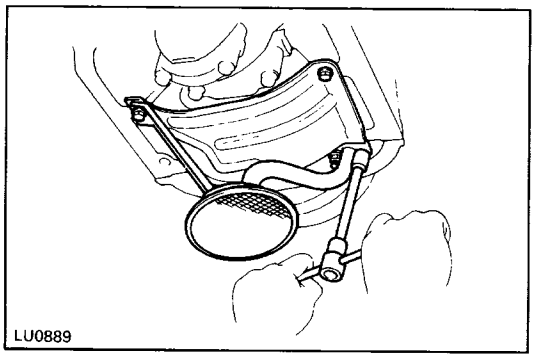
(a) Remove the dipstick.

(b) Remove the seventeen bolts and two nuts.

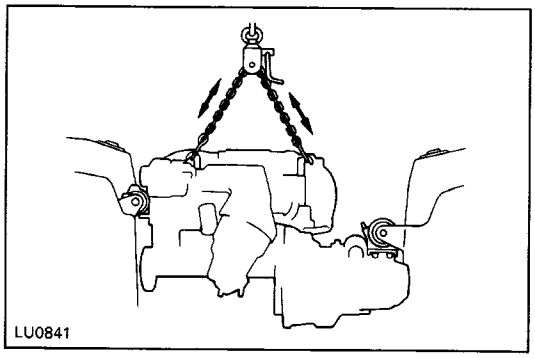


(c) Insert the blade of SST between the cylinder block and oil pan, cut off applied sealer and remove the oil pa n.
SST 09032–00100
NOTICE:

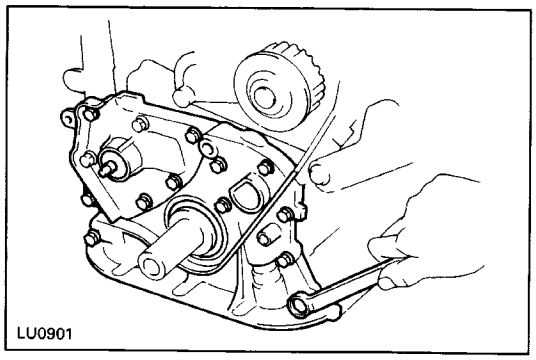
- **Do not use SST for the oil pump body side and rear oil seal retainer.**
- **Be careful not to damage the oil pan flange.**

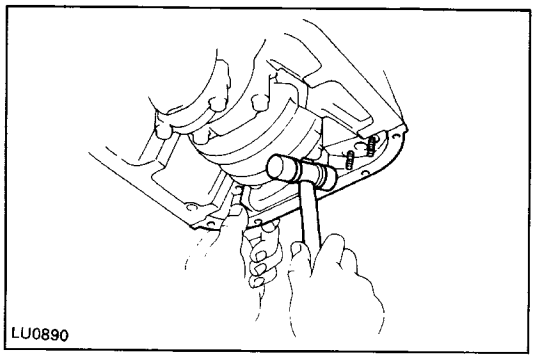


11. REMOVE OIL STRAINER AND BAFFLE PLATE
Remove the two bolts, two nuts, oil strainer, baffle plate and gasket.



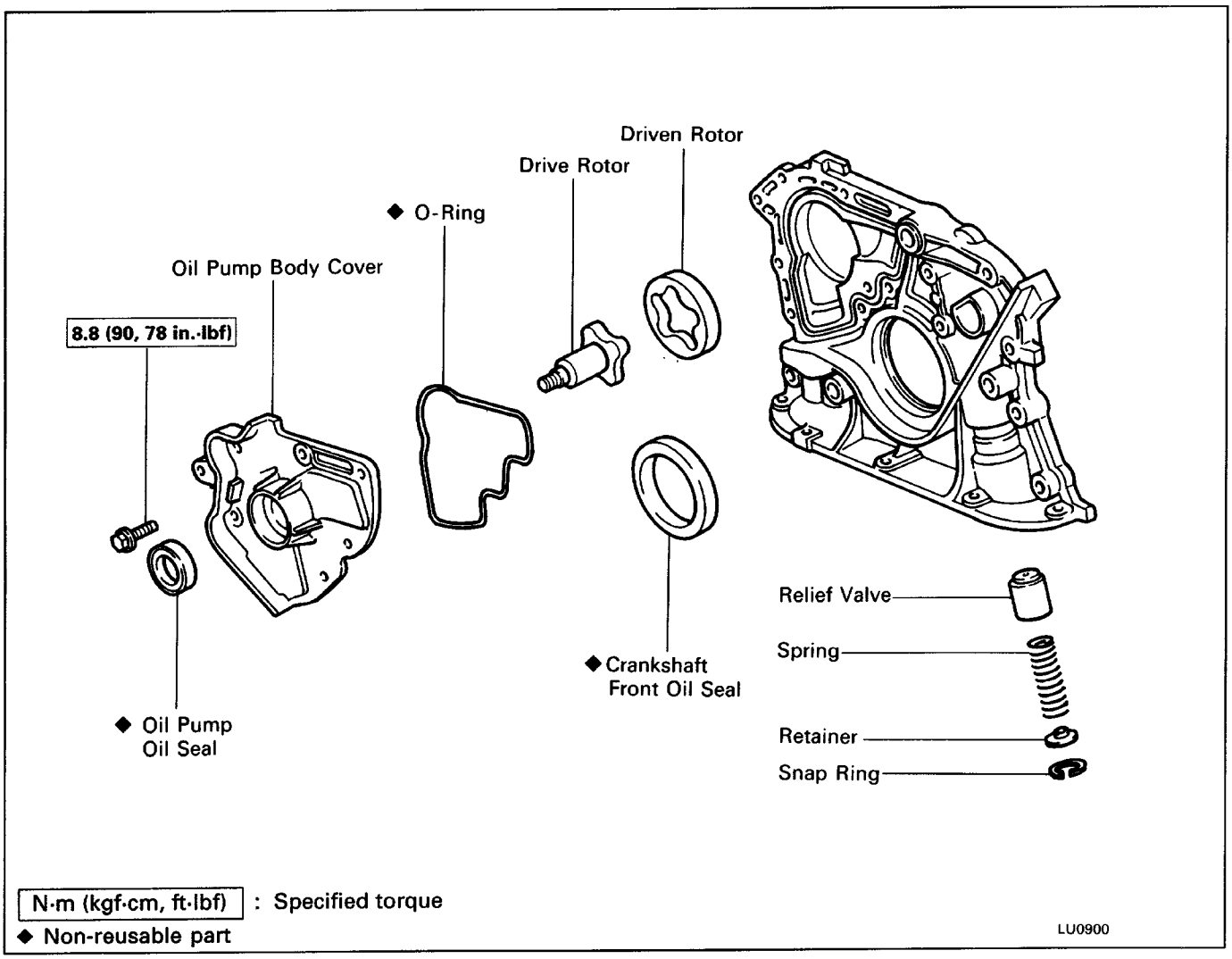
12. SUSPEND ENGINE WITH ENGINE CHAIN HOIST
13. REMOVE TIMING BELT
3S–GTE (See steps 2 to 18 and 20 to 23 on pages EM–46 to 51)
5S–FE (See steps 2 to 17 and 19 to 22 on pages EM–67 to 72)
14. REMOVE N0.2 IDLER PULLEY, CRANKSHAFT TIMING PULLEY AND OIL PUMP PULLEY
3S–GTE (See steps 25 to 27 on page EM–52)
5S–FE (See steps 24 to 26 on pages EM–72 and 73)
15. REMOVE OIL PUMP
(a) Remove the twelve bolts.

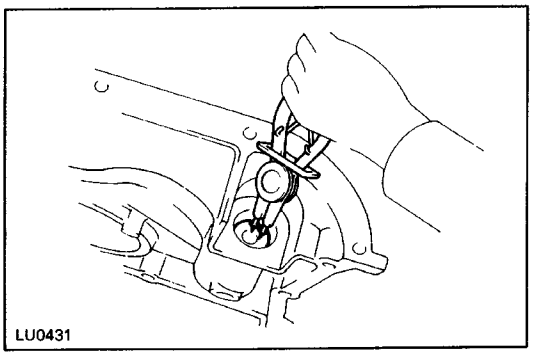




(b) Using a plastic–faced hammer, remove the oil pump by carefully tapping the oil pump dody.
(c) Remove the gasket.

COMPONENTS

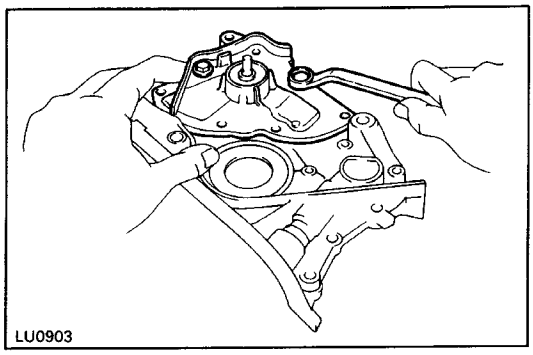




DISASSEMBLY OF OIL PUMP

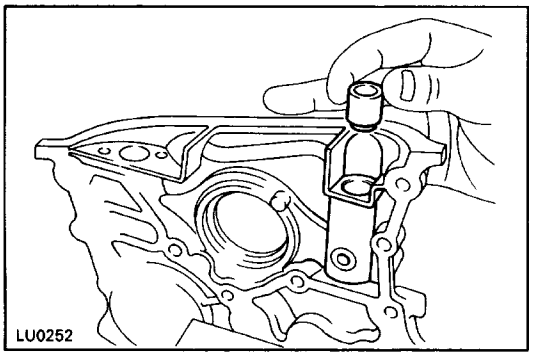
1. REMOVE RELIEF VALVE

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



2. REMOVE DRIVE AND DRIVEN ROTORS

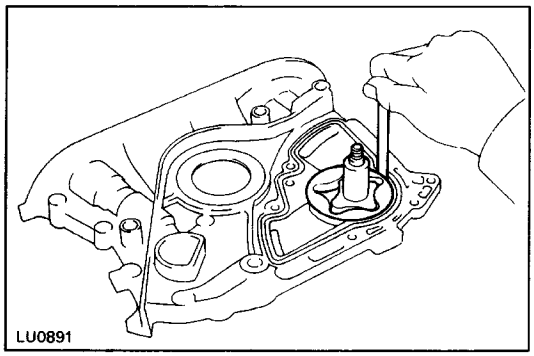
Remove the two bolts, pump body cover, 0–ring, the drive and driven rotors.



INSPECTION OF OIL PUMP

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. INSPECT DRIVE AND DRIVEN ROTORS

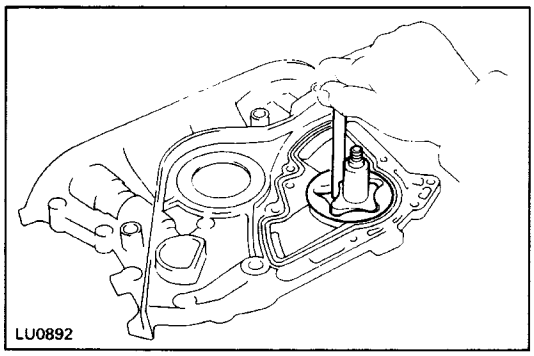
A. Inspect rotor body clearance

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

Standard body clearance: 0.100 – 0.160 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.



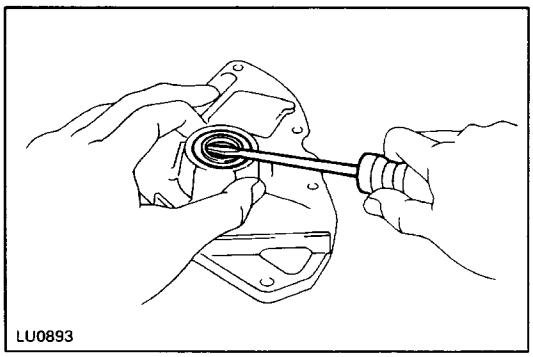
B. Inspect rotor tip clearance

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

Standard tip clearance: 0.040 – 0.160 mm (0. 0016 – 0.0063 in.)

Maximum tip clearance: 0.20 mm (0.0079 in.)

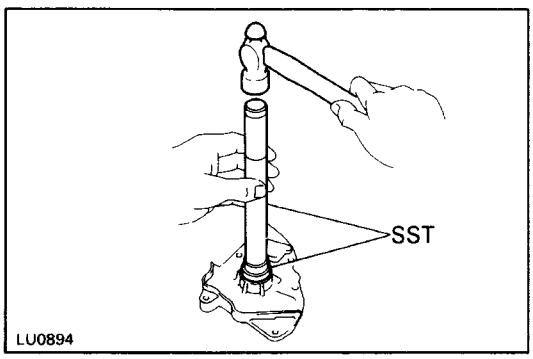
If the tip clearance is greater than maximum, replace the rotors as a set.



REPLACEMENT OF OIL PUMP OIL SEAL

1. REMOVE OIL SEAL

Using a screwdriver, pry out the oil seal.



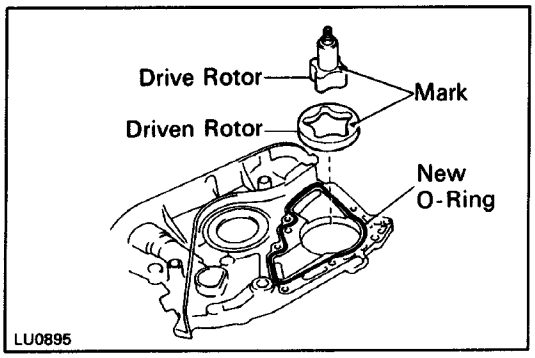
2. INSTALL OIL SEAL

(a) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump cover edge.
SST 09620–30010 (09627–30010, 09631–00020)

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

REPLACEMENT OF CRANKSHAFT FRONT OIL SEAL

(See page EM–249)

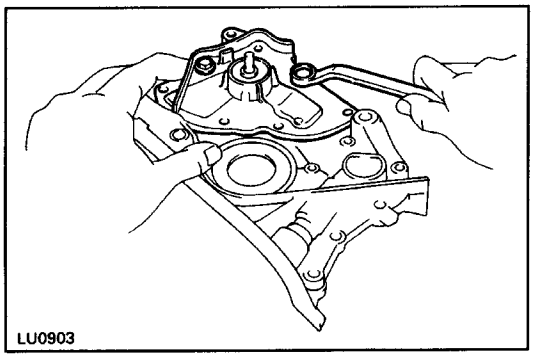


ASSEMBLY OF OIL PUMP

(See page LU–19)

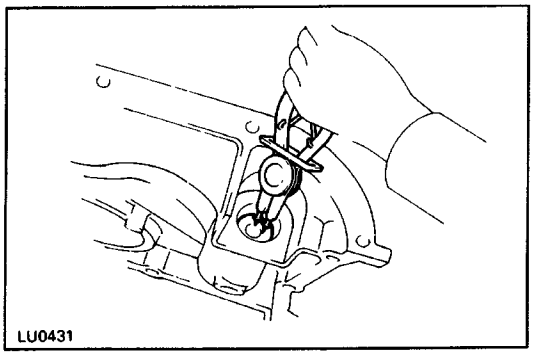
1. INSTALL DRIVE AND DRIVEN ROTORS

(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 two bolts.

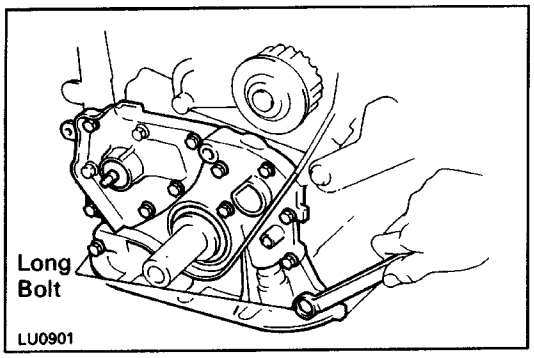
Torque: 8.8 N–m (90 kgf–cm, 78 in.–lbf)



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.



INSTALLATION OF OIL PUMP

(See page LU–16)

1. INSTALL OIL PUMP

Install a new gasket and the oil pump with the twelve bolts.

Torque: 3S–GTE 7.8 N–m (80 kgf–cm, 69 in.–lbf)
5S–FE 8.8 N–m (90 kgf–cm, 78 MAW)

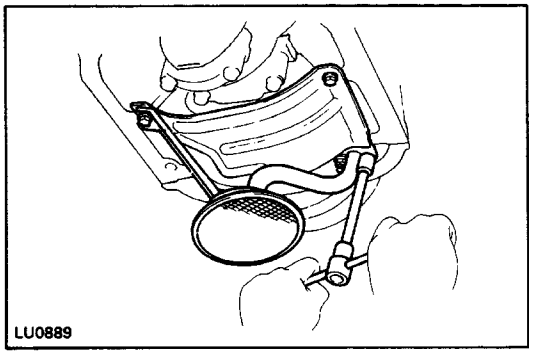
HINT: Each bolt length is indicated in the illustration.
Bolt length: Long bolt 35 mm (1.38 in.)
Others 25 mm (0.98 in.)

2. INSTALL OIL PUMP PULLEY, CRANKSHAFT TIMING PULLEY AND NO.2 IDLER PULLEY

3S–GTE (See steps 1 to 3 on page EM–55)
5S–FE (See steps 1 to 3 on page EM–75)

3. INSTALL TIMING BELT

3S–GTE (See steps 5 to 8, 10 to 26 and 30 on pages EM–55 to 61)
5S–FE (See steps 5 to 8 and 10 to 24 on pages EM –75 to 80)

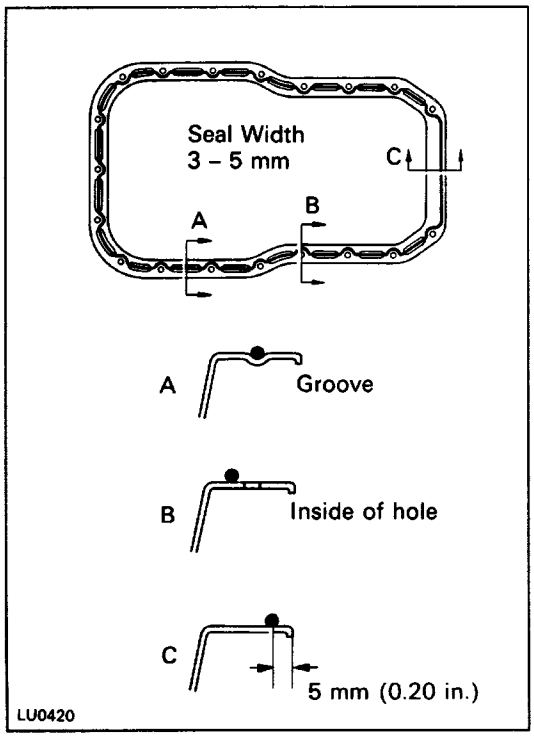


4. REMOVE ENGINE CHAIN HOIST FROM ENGINE

5. INSTALL BAFFLE PLATE AND OIL STRAINER

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

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



6. 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.

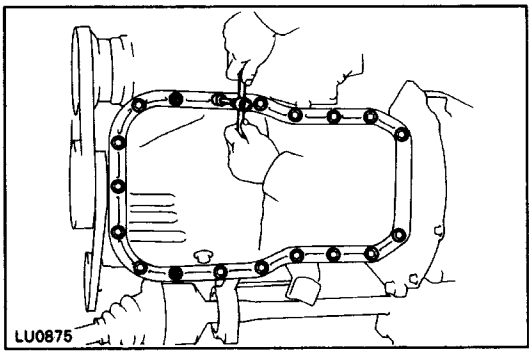
(b) Apply seal packing to the oil pan as shown in the illustration.

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.

HINT: Avoid applying an excessive amount to the surface. Be particularly careful near oil passages.

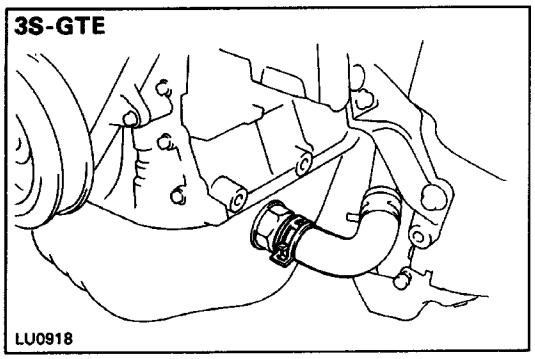
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



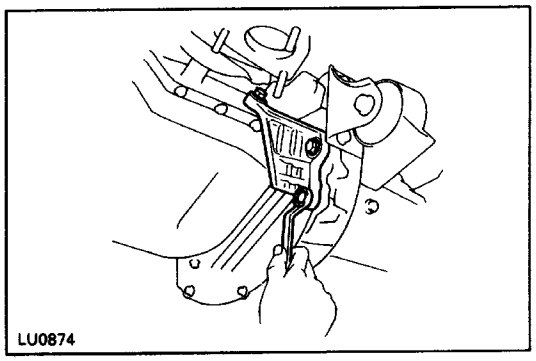
(c) Install the oil pan with the seventeen bolts and four nuts.

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

(d) Install the dipstick.



7. (3S–GTE)
CONNECT TURBO OIL PIPE HOSE TO OIL PAN

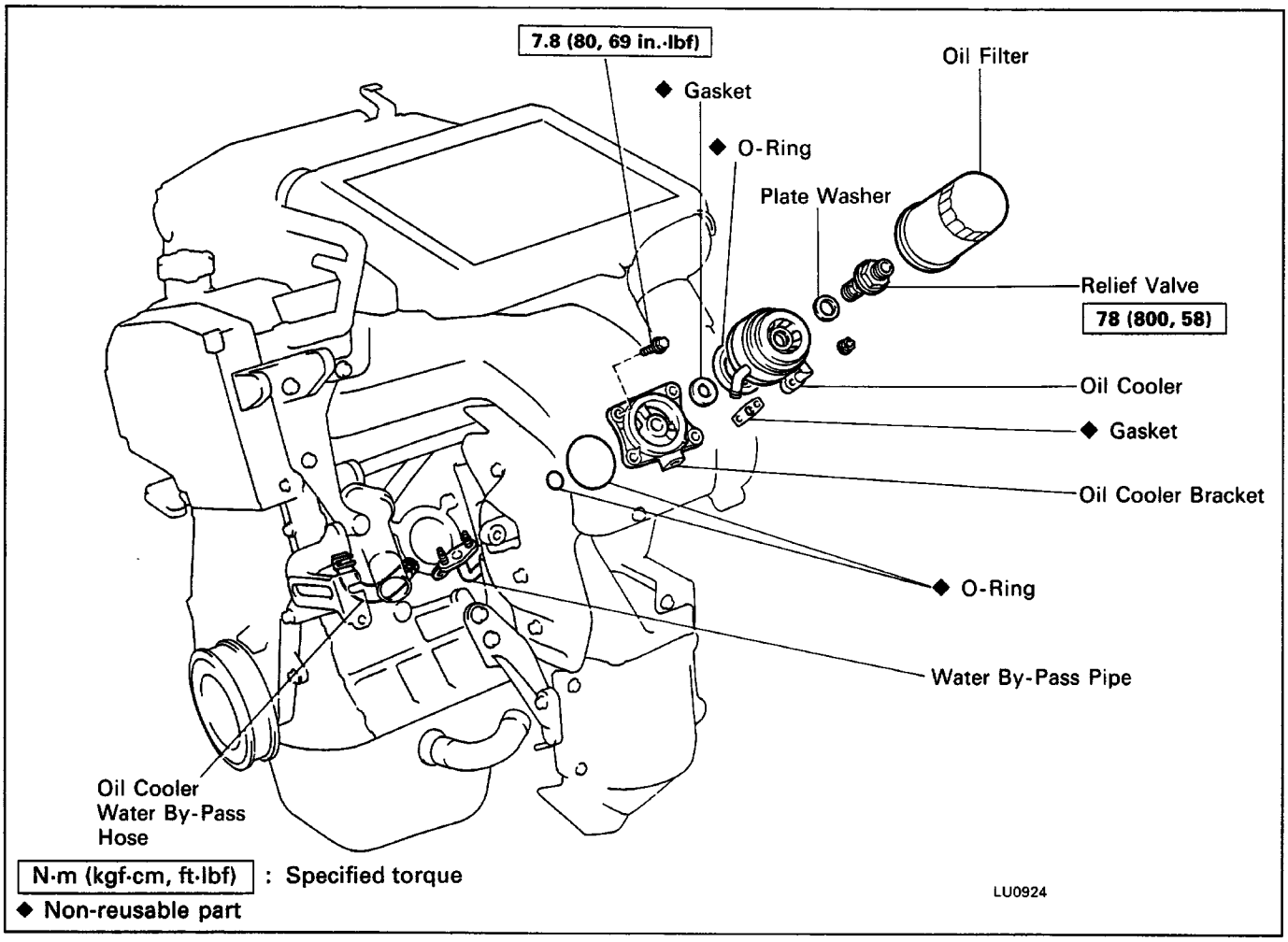


8. INSTALL STIFFENER PLATE
Install the stiffener plate with the three bolts.
Torque: 37 N–m l380 kgf–cm, 27 ft–lbf)

9. INSTALL ENGINE MOUNTING CENTER MEMBER
3S–GTE (See step 9 on page EM–260)
5S–FE (See step 9 on page EM–304)
10. INSTALL FRONT EXHAUST PIPE
3S–GTE (See step 18 on page EM–261)
5S–FE (See step 15 on page EM–305)
11. INSTALL SUSPENSION LOWER CROSSMEMBER
3S–GTE (See step 19 on page EM–262)
5S–FE (See step 16 on page EM–306)
12. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
13. FILL WITH ENGINE OIL (See page LU–8)
14. START ENGINE AND CHECK FOR LEAKS
15. RECHECK ENGINE OIL LEVEL (See page LU–5)
16. INSTALL HOOD
17. INSTALL ENGINE UNDER COVERS

OIL COOLER (3S–GTE)

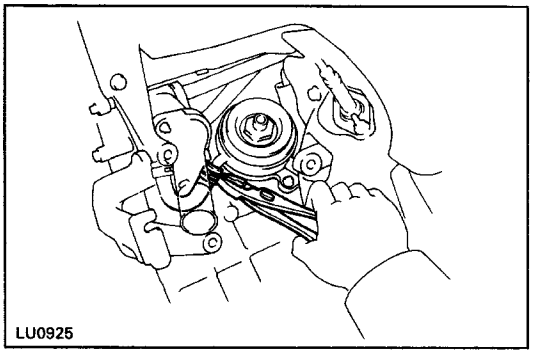
COMPONENTS

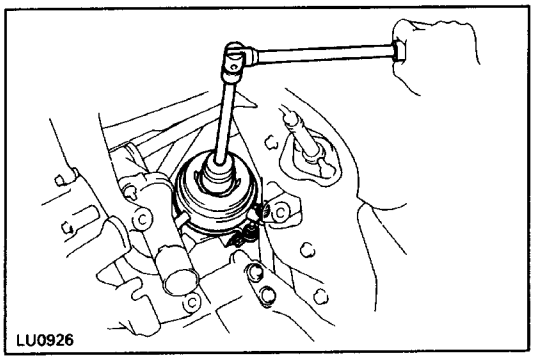


REMOVAL OF OIL COOLER

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

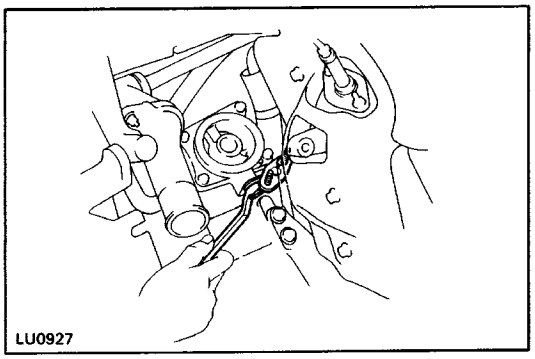
   CAUTION: Work must be started after approx. 20 seconds or longer from the time the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.
2. DRAIN ENGINE COOLANT (See page CO–6)
3. REMOVE ALTERNATOR (See page CH–7)
4. REMOVE OIL FILTER (See page LU–7)
5. DISCONNECT WATER BY–PASS HOSE FROM OIL COOLER



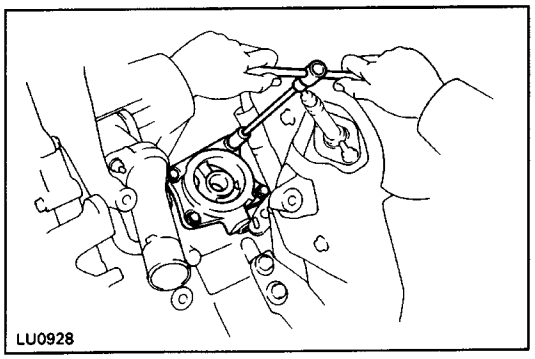


6. REMOVE OIL COOLER

.(a) Remove the relief valve and plate washer.
(b) Remove the two nuts, oil cooler and two gaskets.
(c) Remove the 0–ring from the oil cooler.



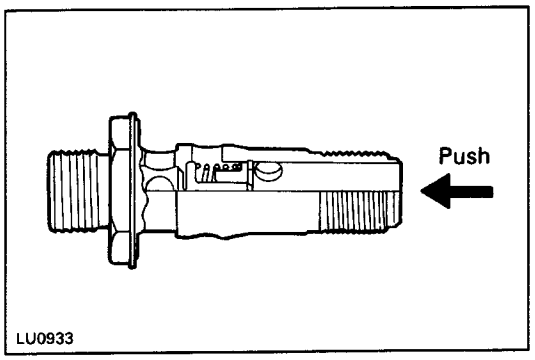
(d) Remove the bolt, and disconnect the water by–pass pipe from the oil cooler bracket.



7. REMOVE OIL COOLER BRACKET

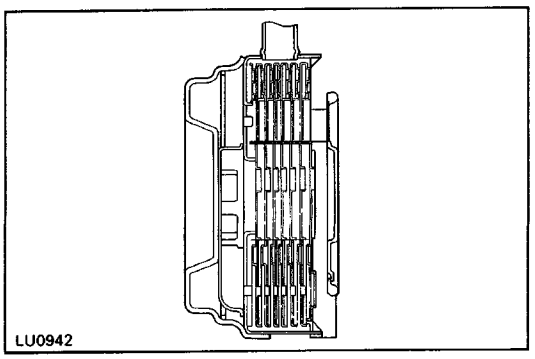
(a) Remove the four bolts and oil cooler bracket.
(b) Remove the two 0–rings from the oil cooler.

INSPECTION OF OIL COOLER



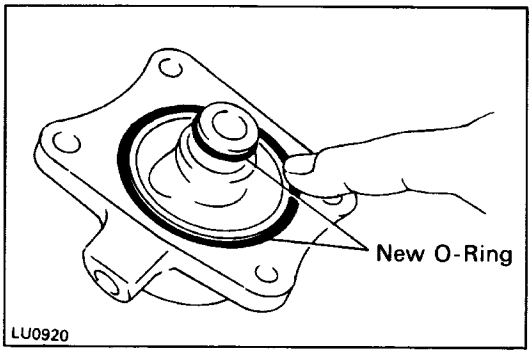
1. INSPECT RELIEF VALVE

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.

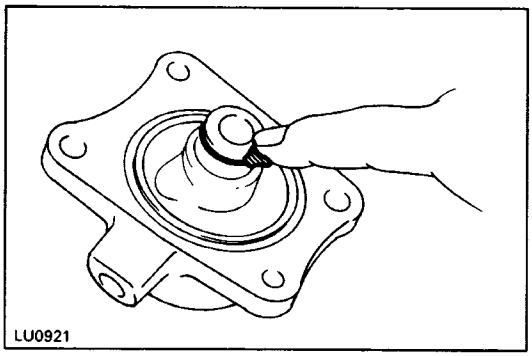


INSTALLATION OF OIL COOLER

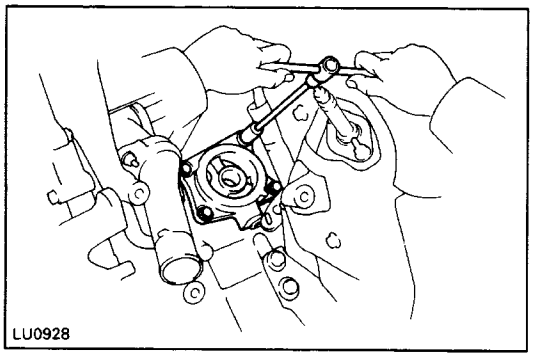
(See page LU–24)

1. INSTALL OIL COOLER BRACKET

(a) Install two new 0–rings to the oil cooler bracket.

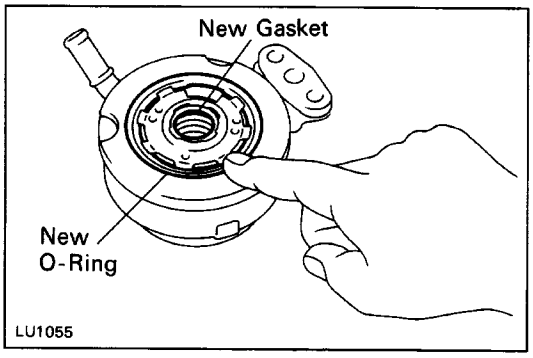


(b) Apply a light coat of engine oil on the small 0–ring.



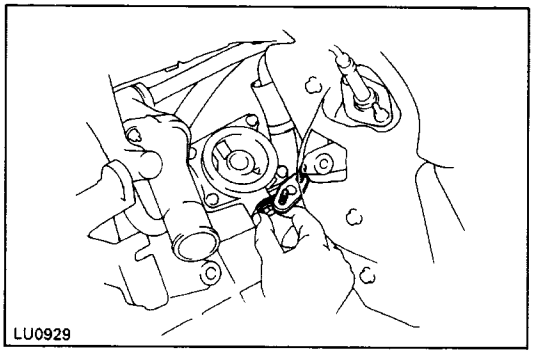
(c) Install the oil cooler bracket with the four bolts.

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

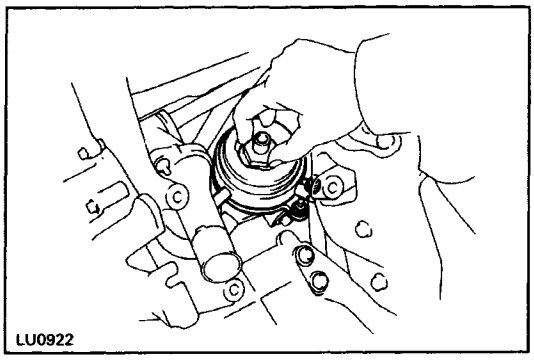


2. INSTALL OIL COOLER

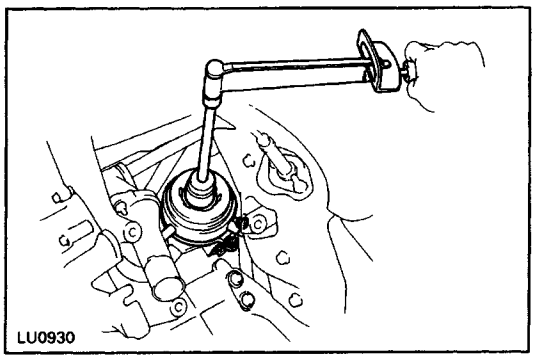
(a) Install new 0–ring and gasket to the oil cooler.



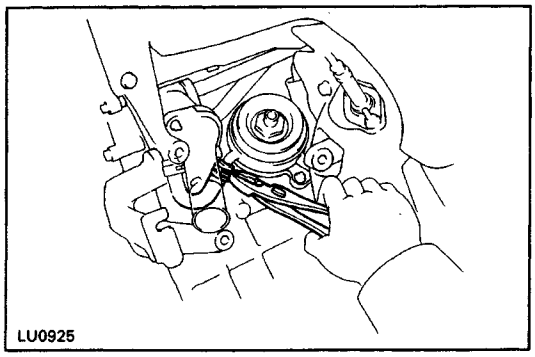
(b) Temporarily install the water by–pass pipe with the bolt.



(c) Apply a light coat of engine oil on the threads and under the head of the relief valve.
(d) Temporarily install two new gaskets and the oil cooler with the plate washer, relief valve and two nuts.



(e) Tighten the relief valve.
Torque: 78 N–m (800 kgf–cm, 58 ft–lbf)
(f) Tighten the two nuts holding the oil cooler to the water by–pass pipe..
Torque: 12 N–m (120 kgf–cm, 9 ft–lbf)
(g) Tighten the bolt holding the water by–pass pipe to oil cooler bracket.
Torque: 18 N–m (180 kgf–cm, 13 ft–lbf)

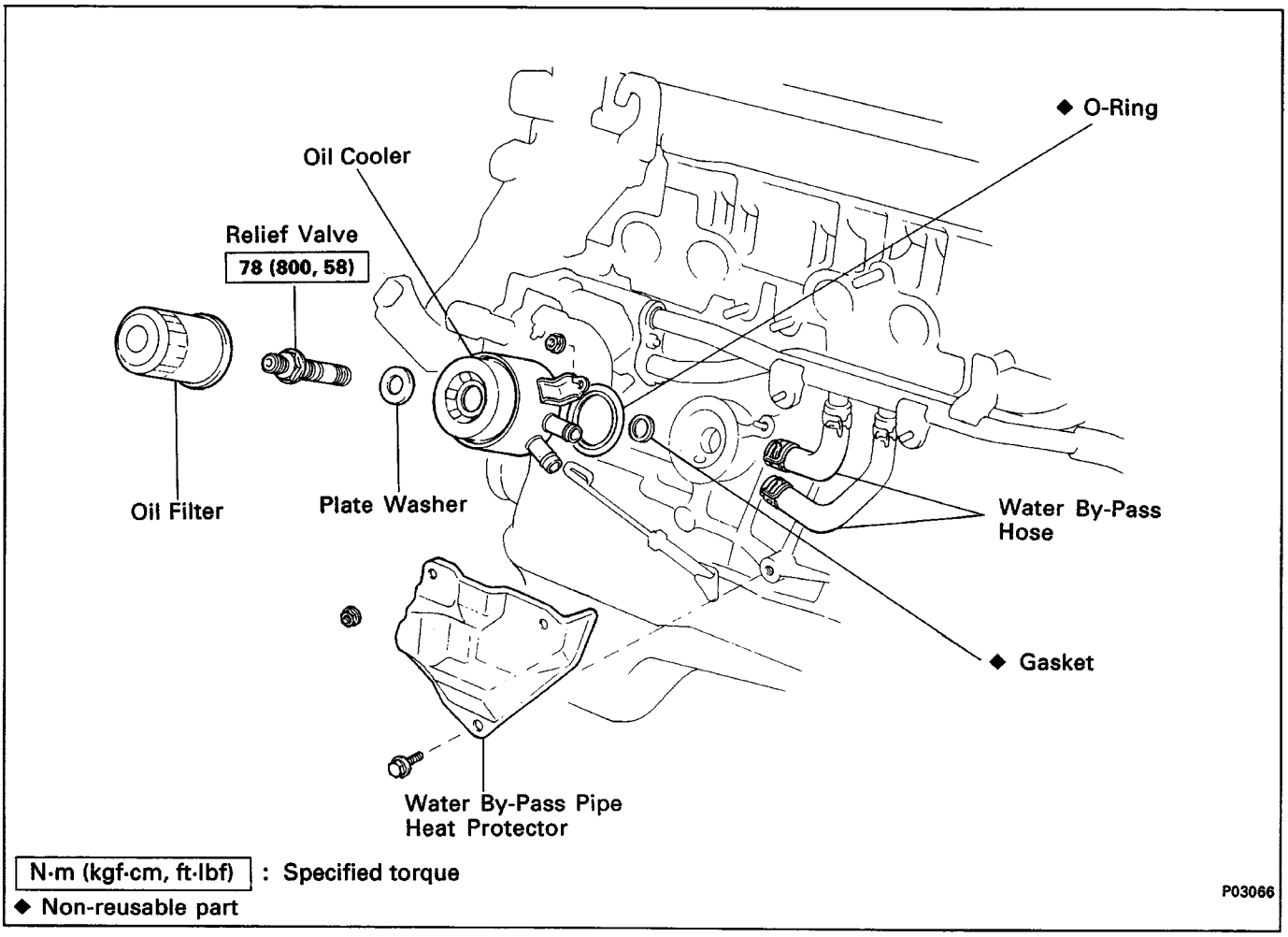


3. CONNECT WATER BY–PASS HOSE TO OIL COOLER

4. INSTALL OIL FILTER (See page LU–7)
5. INSTALL ALTERNATOR (See page CH–23)
6. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
7. FILL WITH ENGINE COOLANT (See page CO–6)
8. START ENGINE AND CHECK FOR LEAKS
9. CHECK ENGINE OIL LEVEL (See page LU–5)

OIL COOLER (5S–FE)

COMPONENTS



REMOVAL OF OIL COOLER

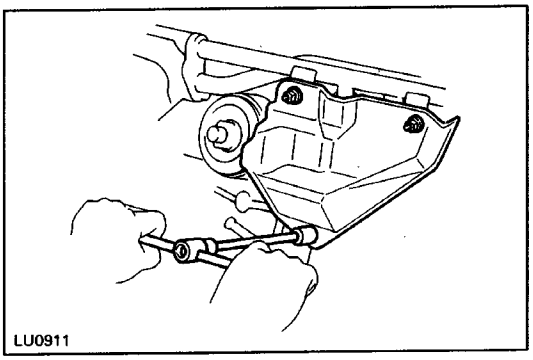
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

   CAUTION: Work must be started after approx. 20 seconds or longer from the time the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.

2. REMOVE RH ENGINE UNDER COVER
3. DRAIN ENGINE COOLANT (See page CO–6)
4. REMOVE FRONT EXHAUST PIPE

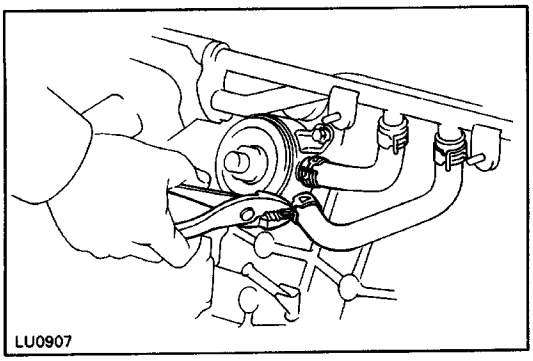
   (See step 30 on page EM–274)
5. REMOVE ALTERNATOR (See page CH–9)
6. REMOVE EXHAUST MANIFOLD AND CATALYTIC CONVERTER ASSEMBLY

   (See step 14 on pages EM –151 and 152)
7. REMOVE OIL FILTER (See page LU–7)



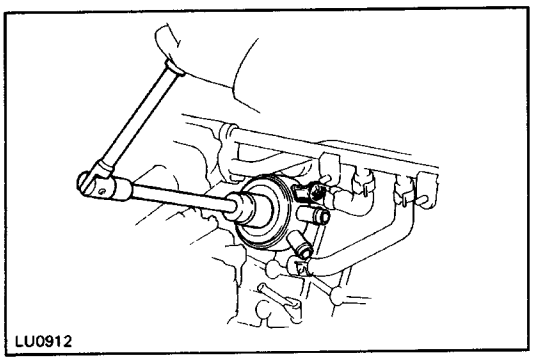
8. REMOVE WATER BY–PASS HOSE HEAT PROTECTOR

Remove the bolt, two nuts and heat protector.



9. DISCONNECT WATER BY–PASS HOSES FROM OIL COOLER

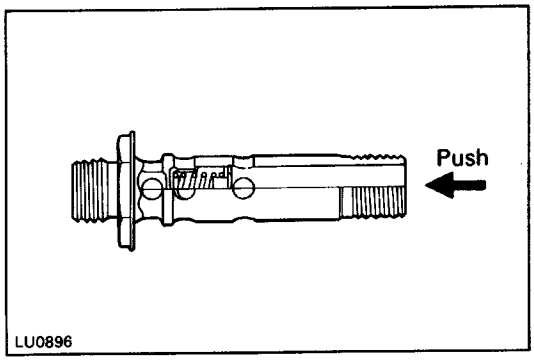
Disconnect the two water by–pass hoses.



10. REMOVE OIL COOLER

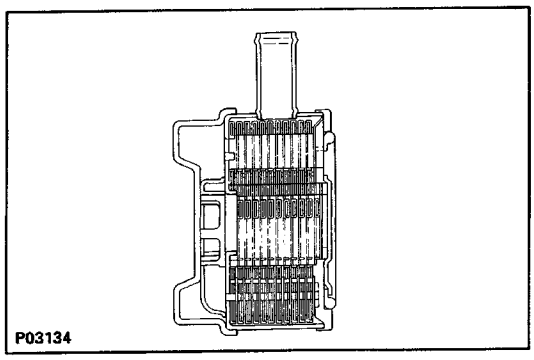
(a) Remove the relief valve and plate washer.
(b) Remove the nut and oil cooler.
(c) Remove the 0–ring and gasket from the oil cooler.

INSPECTION OF OIL COOLER



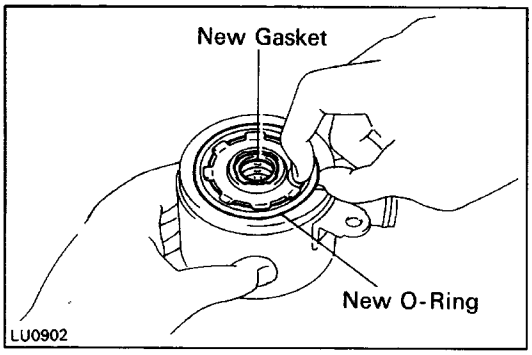
1. INSPECT RELIEF VALVE

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.

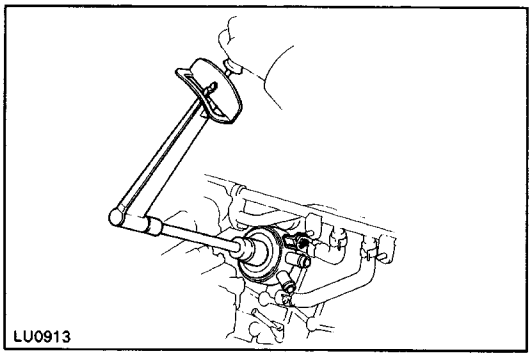


INSTALLATION OF OIL COOLER

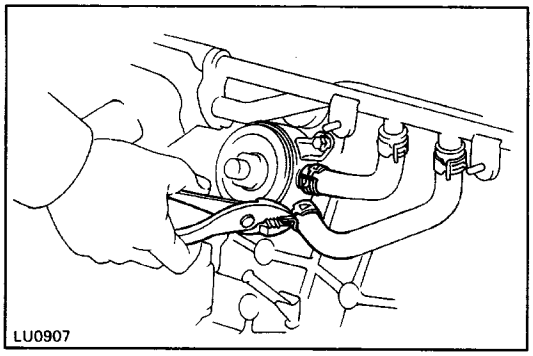
(See page LU–28)

1. INSTALL OIL COOLER

(a) Install new 0–ring and gasket to the oil cooler.

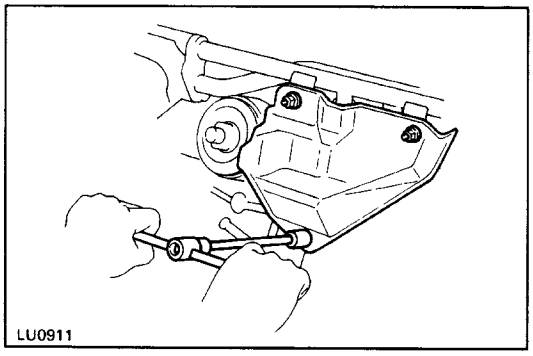


(b) Apply a light coat of engine oil on the threads and under the head of the relief valve.
(c) Temporarily install the oil cooler with the nut.
(d) Install the plate washer and relief valve.
Torque: 800 kg–cm (58 ft–lb, 78 N–m)
(e) Tighten the nut.
Torque: 80 kg–cm (69 in.–lb, 7.8 N–m)



2. CONNECT WATER BY–PASS HOSES

Connect the two water by–pass hoses.



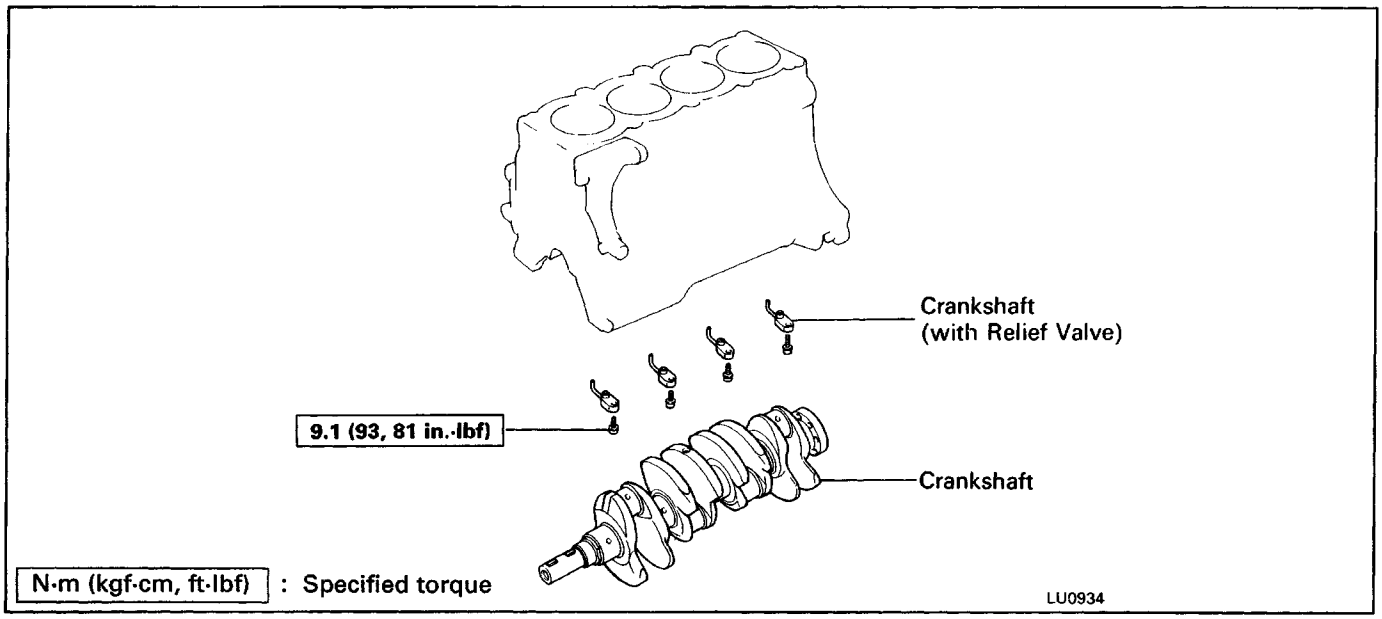
3. INSTALL WATER BY–PASS HOSE HEAT PROTECTOR

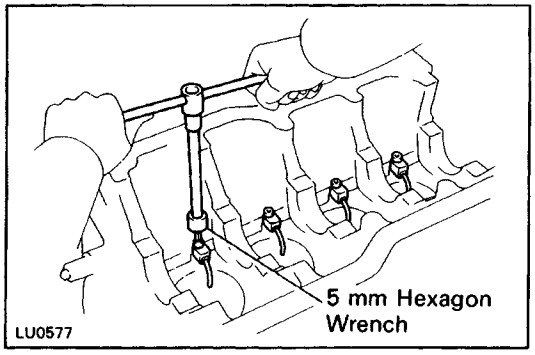
Install the heat protector with the bolt and two nuts.

4. INSTALL OIL FILTER (See page LU–7)
5. INSTALL EXHAUST MANIFOLD AND CATALYTIC CONVERTER ASSEMBLY
(See step 27 on page EM–182)
6. INSTALL ALTERNATOR (See page CH–25)
7. INSTALL FRONT EXHAUST PIPE
(See step 15 on page EM–305)
8. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
9. FILL WITH ENGINE COOLANT (See page CO–6)
10. START ENGINE AND CHECK FOR LEAKS
11. CHECK ENGINE OIL LEVEL (See page LU–5)
12. INSTALL RH ENGINE UNDER COVER

OIL NOZZLES (3S–GTE)

COMPONENTS



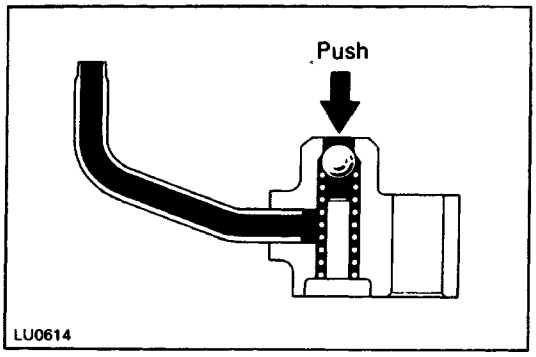


REMOVAL OF OIL NOZZLES

1. REMOVE CRANKSHAFT (See pages EM–224 to 239)

2. REMOVE OIL NOZZLES (WITH RELIEF VALVES)

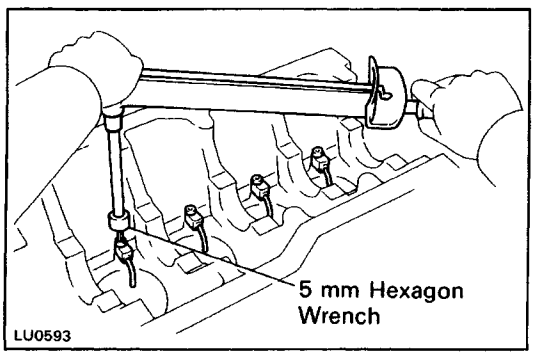
Using a 5 mm hexagon wrench, remove the bolt and oil nozzle. Remove the four oil nozzles.



INSPECTION OF OIL NOZZLES

INSPECT RELIEF VALVES (OIL NOZZLES)

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



INSTALLATION OF OIL NOZZLES

1. INSTALL OIL NOZZLES (WITH RELIEF VALVES)

Using a 5 mm hexagon wrench, install the oil nozzle with the bolt. Install the four oil nozzles.

Torque: 9.1 N–m (93 kgf–cm, 81 in.–lbf)

2. REMOVE CRANKSHAFT (See pages EM–253 to 267)