

LUBRICATION SYSTEM

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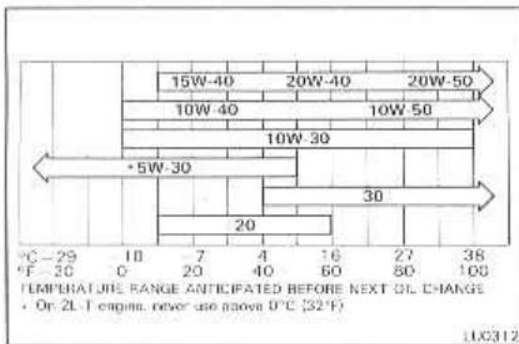
LU

LU-2

LUBRICATION SYSTEM — Troubleshooting, Oil Pressure Check

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Oil leakage	Cylinder head, cylinder block or oil pump body damaged or cracked	Repair as necessary	EM-63 LU-4
	Oil seal faulty	Replace oil seal	
	Gasket faulty	Replace gasket	
Low oil pressure	Oil leakage	Repair as necessary	LU-8
	Relief valve faulty	Repair relief valve	
	Oil pump faulty	Repair oil pump	LU-4
	Poor engine oil quality	Replace engine oil	LU-3
	Crankshaft bearing faulty	Replace bearing	EM-50
	Connecting rod bearing faulty	Replace bearing	EM-50
	Oil filter clogged	Replace oil filter	LU-3
High oil pressure	Relief valve faulty	Repair relief valve	LU-8



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 CC, CD (L, 2L), CD (2L-T) or better and recommended viscosity oil.

NOTE: Be sure to use CD type for the vehicle with turbocharger.

2. CHECK OIL LEVEL

The oil level should be between the "L" and "F" marks on the level gauge.

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

3. REMOVE OIL PRESSURE SWITCH

4. INSTALL OIL PRESSURE GAUGE

5. START ENGINE

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

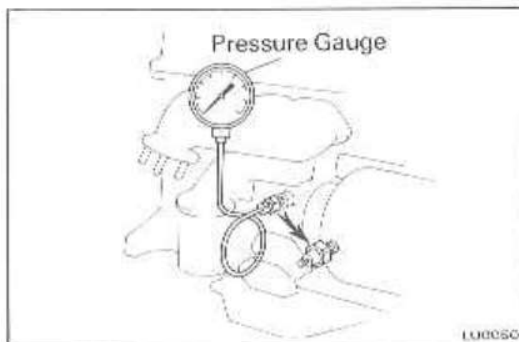
6. MEASURE OIL PRESSURE

Oil pressure:

At idle More than 0.3 kg/cm² (4.3 psi, 29 kPa)

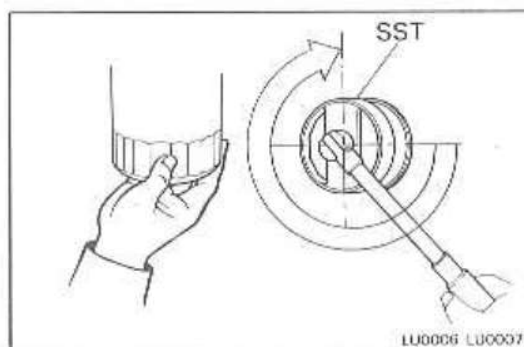
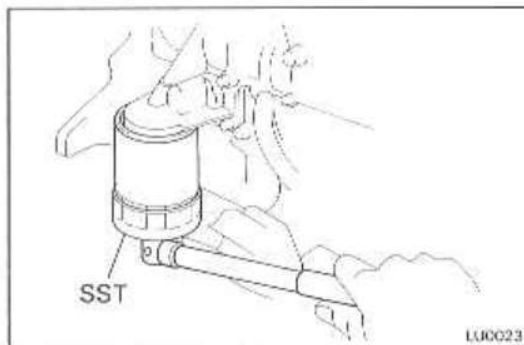
At 3,000 rpm 2.5 – 6.0 kg/cm²
(36 – 85 psi, 245 – 588 kPa)

NOTE: Check for oil leakage after reinstalling the pressure switch.



LUBRICATION SYSTEM — Replacement of Engine Oil and Oil Filter

LU-3



REPLACEMENT OF ENGINE OIL AND OIL FILTER

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 09228-44010
- (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 to where you feel resistance.

- (e) Then, using SST, tighten the oil filter an extra 3/4 turn.

SST 09228-44010

3. FILL WITH ENGINE OIL

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

Torque: 175 kg-cm (13 ft-lb, 17 N·m)

- (b) Fill the engine with new oil, API grade CC, CD (L, 2L), CD (2L-T) or better.

Capacity:

Drain and refill—

w/o Oil filter change

4.8 liters (5.1 US qts, 4.2 Imp.qts)

w/ Oil filter change

5.8 liters (6.1 US qts, 5.1 Imp.qts)

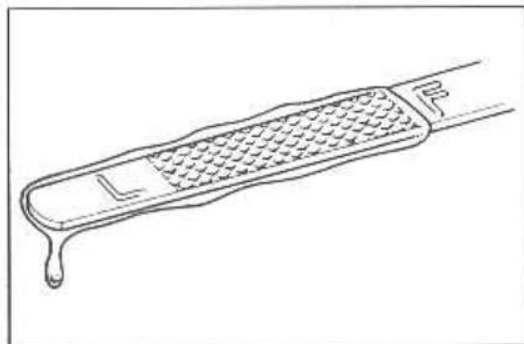
Dry fill— 6.5 liters (6.9 US qts, 5.7 Imp.qts)

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

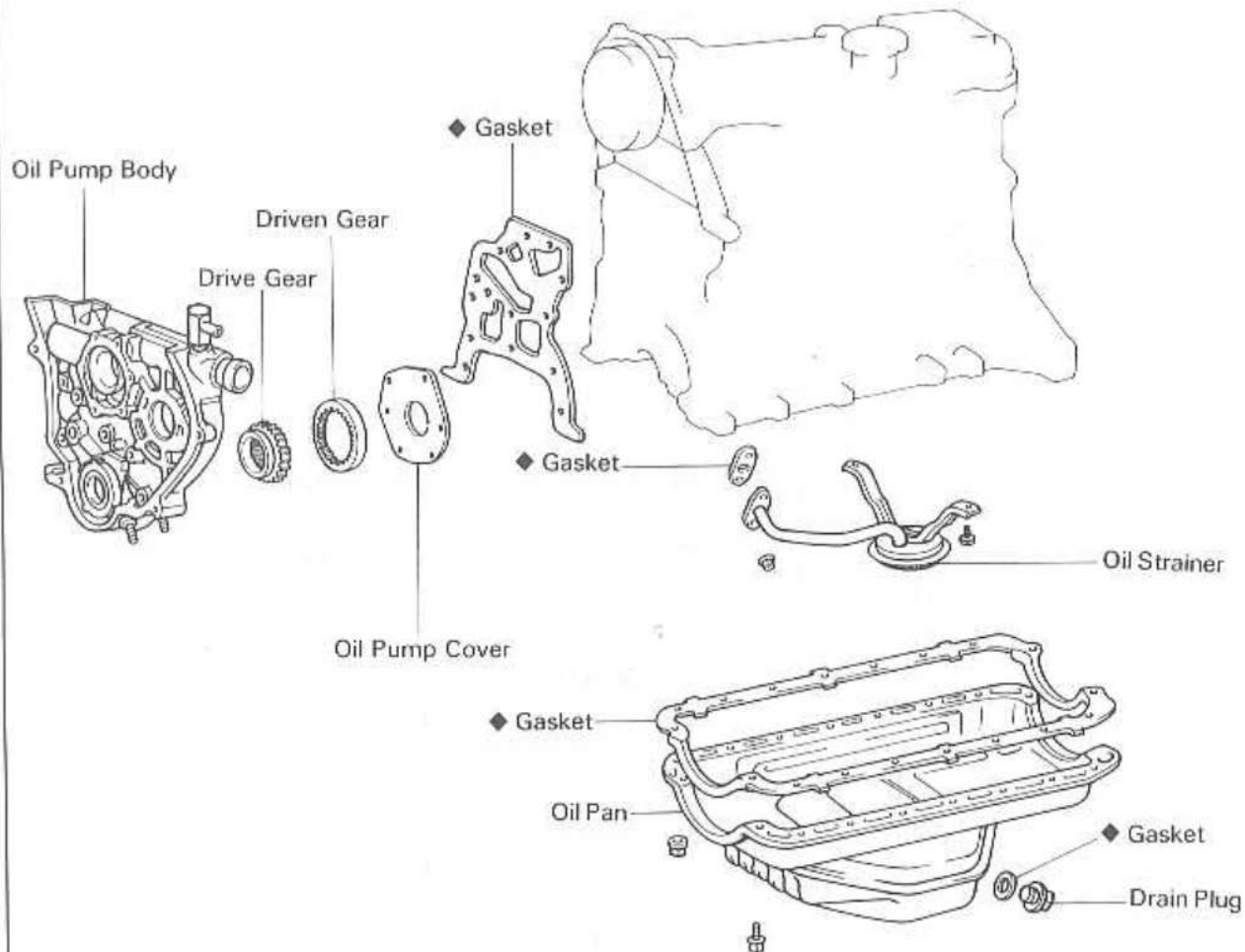
4. START ENGINE AND CHECK FOR LEAKS

5. RECHECK OIL LEVEL

Recheck the engine oil level and refill as necessary.



OIL PUMP COMPONENTS



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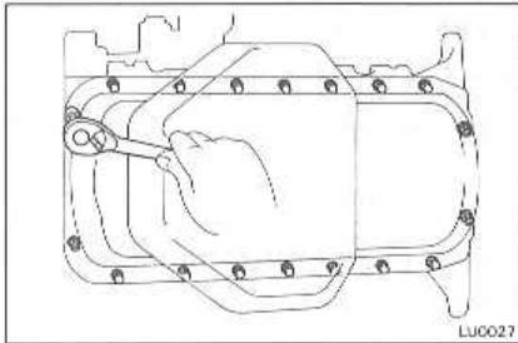
REMOVAL AND DISASSEMBLY OF OIL PUMP

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

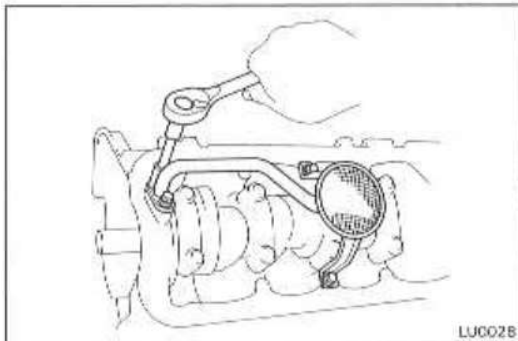
1. REMOVE TIMING BELT
(See steps 1 to 9 and 11 to 13 on pages EM-20 to 23)
2. REMOVE WATER PUMP (See page CO-5)
3. DRAIN ENGINE OIL

LUBRICATION SYSTEM — Oil Pump

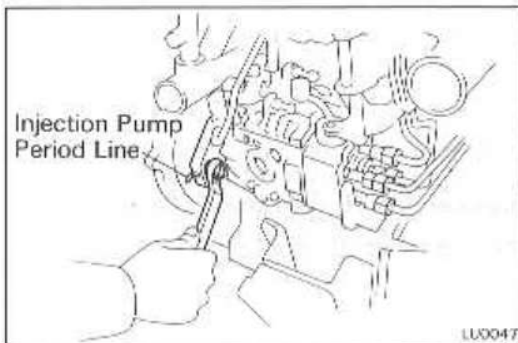
LU-5

**4. REMOVE OIL PAN**

Remove the fourteen bolts, four nuts, oil pan and gasket.

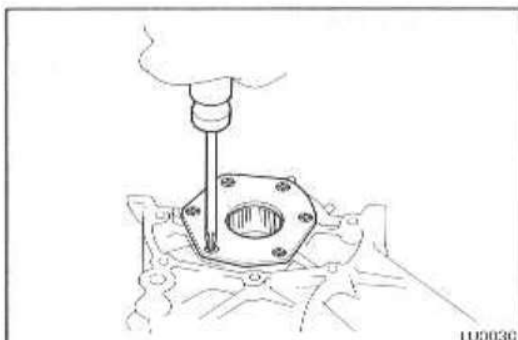
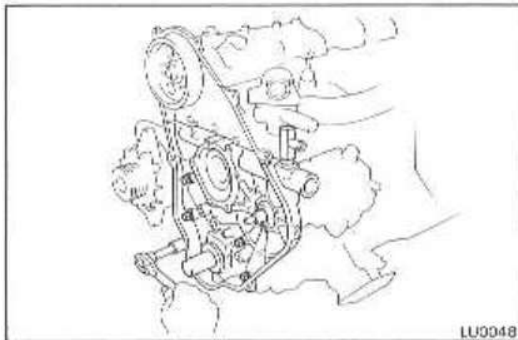
**5. REMOVE OIL STRAINER**

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

6. REMOVE TIMING POINTER FROM OIL PUMP BODY**7. REMOVE OIL PUMP ASSEMBLY**

(a) Check the position of the injection period line before removing the two nuts holding the injecting pump to the oil pump body.

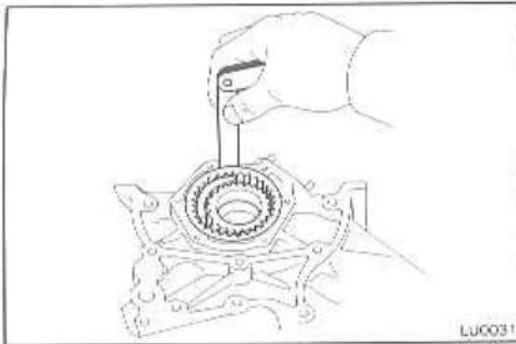
(b) Remove the five bolts, oil pump assembly and gasket.

**8. DISASSEMBLE OIL PUMP ASSEMBLY**

Remove the six bolts, oil pump cover, drive and driven gears from the oil pump body.

LU-6

LUBRICATION SYSTEM — Oil Pump



INSPECTION OF OIL PUMP

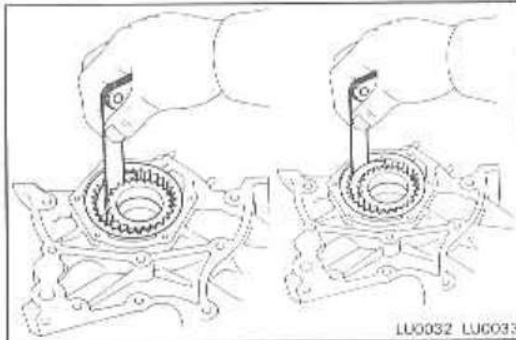
1. INSPECT BODY CLEARANCE

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

Standard clearance: 0.06 – 0.15 mm
(0.0024 – 0.0059 in.)

Maximum clearance: 0.20 mm (0.0079 in.)

If the clearance is greater than maximum, replace the gear and/or body.



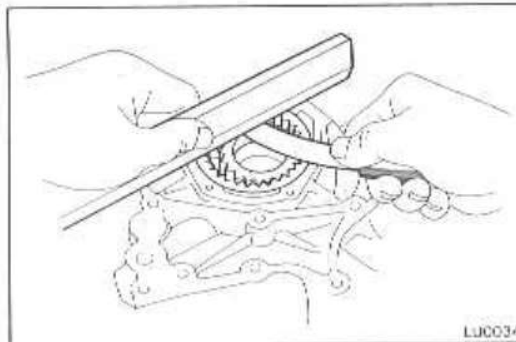
2. INSPECT TIP CLEARANCE

Using a feeler gauge, measure the clearance between both gear tips and crescent.

Standard clearance: 0.15 – 0.21 mm
(0.0059 – 0.0083 in.)

Maximum clearance: 0.30 mm (0.0118 in.)

If the clearance is greater than maximum, replace the gear and/or body.



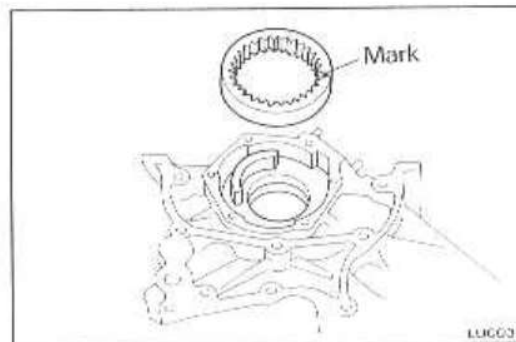
3. INSPECT SIDE CLEARANCE

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

Standard clearance: 0.03 – 0.09 mm
(0.0012 – 0.0035 in.)

Maximum clearance: 0.15 mm (0.0059 in.)

If the clearance is greater than maximum, replace the gears and/or body.



ASSEMBLY AND INSTALLATION OF OIL PUMP

(See page LU-4)

1. ASSEMBLE OIL PUMP ASSEMBLY

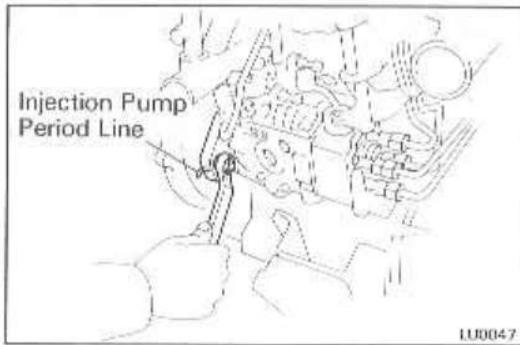
- Put the drive and driven gears into the oil pump body with the marks facing the oil pump cover side.
- Install the oil pump cover with the six screws.

2. INSTALL OIL PUMP ASSEMBLY

- Install a new gasket and the oil pump assembly with the five bolts. Torque the bolts.

Torque: 195 kg-cm (14 ft-lb, 19 N·m)



LUBRICATION SYSTEM — Oil Pump**LU-7**

- (b) Install the two nuts holding the injection pump to the oil pump body. Torque the nuts.

Torque: 210 kg-cm (15 ft-lb, 21 N·m)

- (c) Check the position of the injection period line.

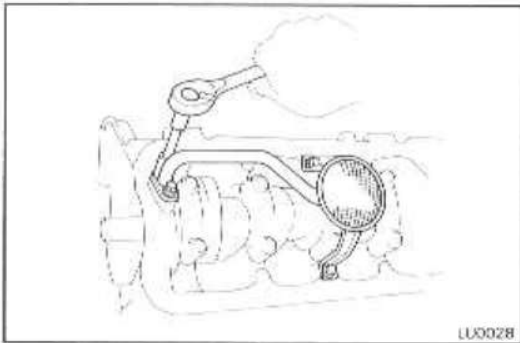
If not correct, adjust the injection period line by tilting the injection pump.

3. INSTALL TIMING POINTER

4. INSTALL OIL STRAINER

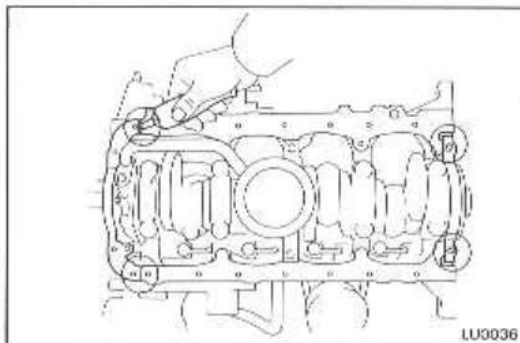
Install a new gasket and the oil strainer with the two bolts and nuts. Torque the bolts and nuts.

Torque: 120 kg-cm (9 ft-lb, 12 N·m)



5. INSTALL OIL PAN

- (a) Apply seal packing black (Part No. 08826-00080) or equivalent to the oil pump body, cylinder block and rear oil seal retainer as shown.



- (b) Install a new gasket and the oil pan with the fourteen bolts and four nuts.

Torque:

Bolts 80 kg-cm (69 in.-lb, 8 N·m)

Nuts 175 kg-cm (13 ft-lb, 17 N·m)

6. INSTALL WATER PUMP (See page CO-6)

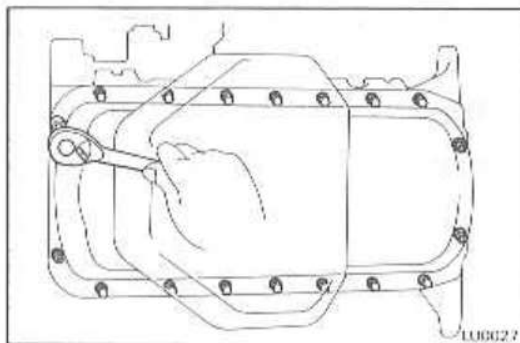
7. INSTALL TIMING BELT

(See steps 1 to 3 and 5 to 16 on pages EM-25 to 30)

8. FILL WITH ENGINE OIL (See page LU-3)

9. FILL ENGINE WITH COOLANT (See page CO-3)

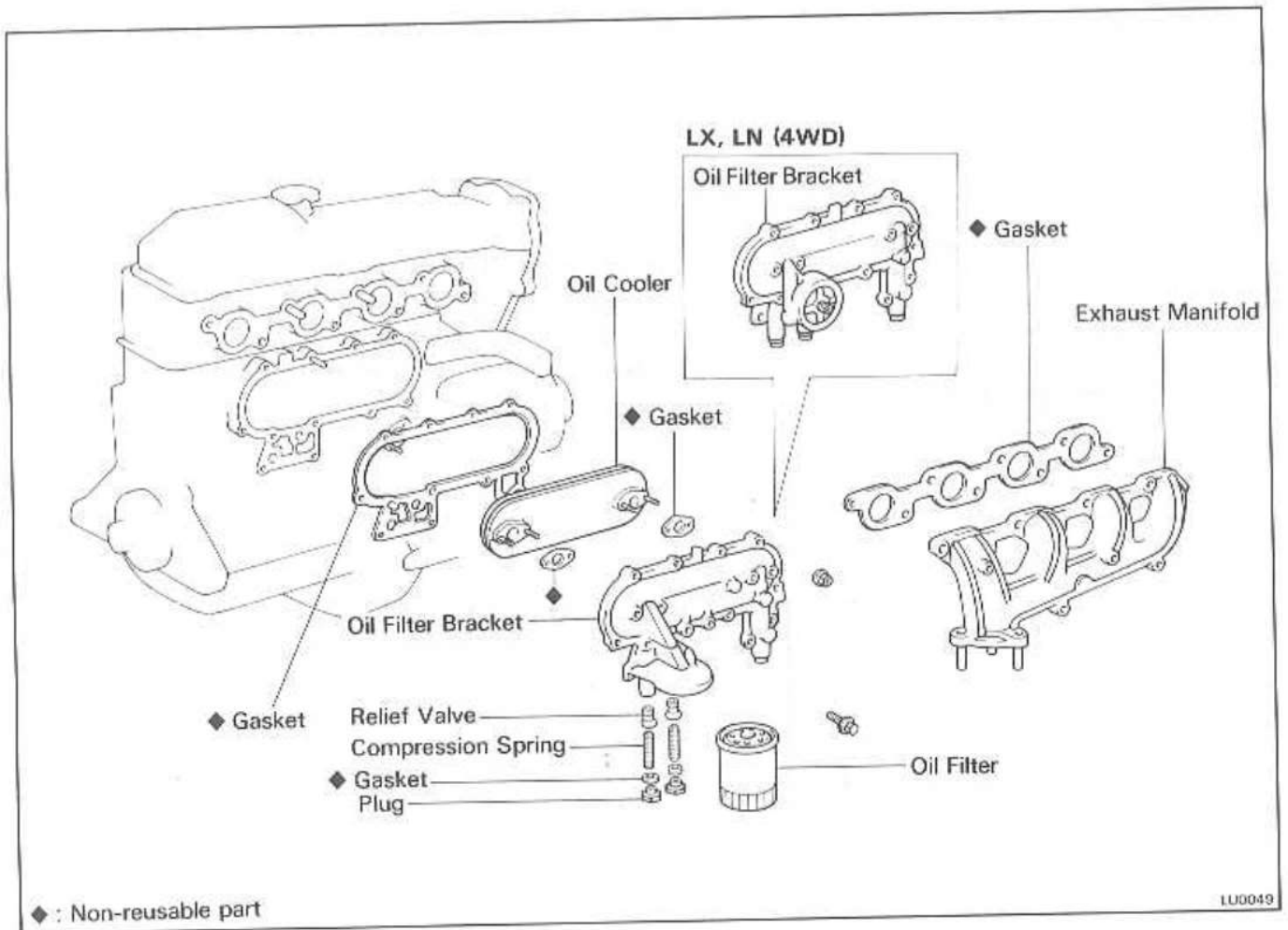
10. START ENGINE AND CHECK FOR LEAKS



LU-8

LUBRICATION SYSTEM — Oil Cooler and Relief Valves

OIL COOLER AND RELIEF VALVES COMPONENTS

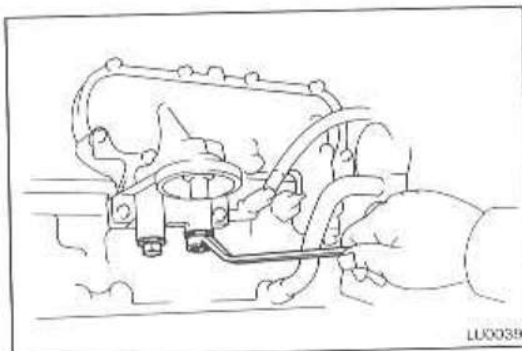


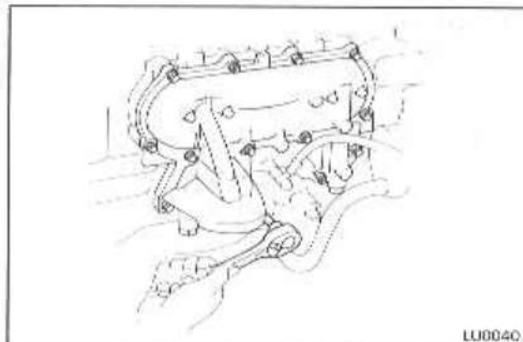
REMOVAL OF OIL COOLER AND RELIEF VALVE

1. DRAIN ENGINE COOLANT (See page CO-3)
2. REMOVE EXHAUST MANIFOLD (See page EM-33)
3. REMOVE OIL FILTER (See page LU-3)

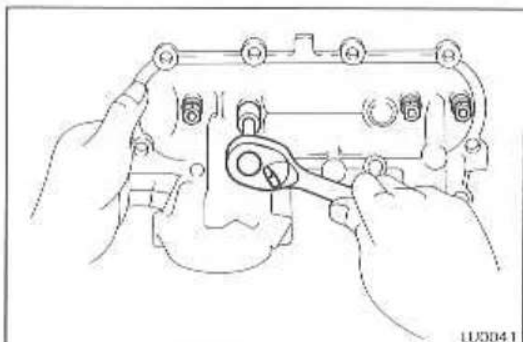
4. REMOVE TWO RELIEF VALVES

Remove the two plugs, washers, springs and relief valves.
NOTE: Arrange the disassembled parts in order.

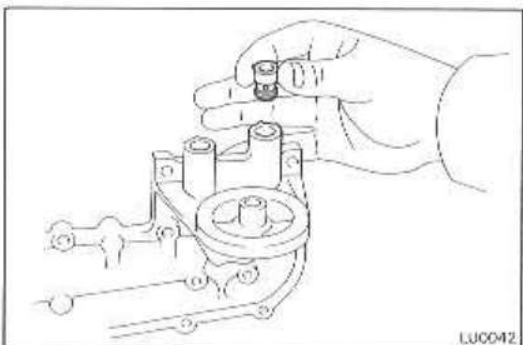


LUBRICATION SYSTEM — Oil Cooler and Relief Valves**LU-9****5. REMOVE OIL FILTER BRACKET WITH OIL COOLER**

Remove the eleven bolts, two nuts, oil filter bracket and gasket with the oil cooler.

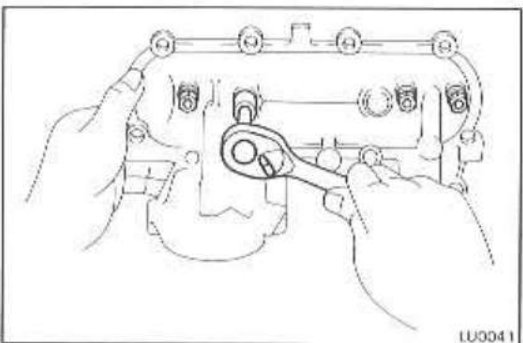
**6. REMOVE OIL COOLER FROM OIL FILTER BRACKET**

Remove the four nuts, oil cooler and two gaskets.

**INSPECTION OF COMPONENTS****INSPECT RELIEF VALVE**

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

If necessary, replace the valve and/or oil filter bracket.

**INSTALLATION OF OIL COOLER AND RELIEF VALVE**

(See page LU-8)

1. INSTALL OIL COOLER TO OIL FILTER BRACKET

Install two new gaskets and the oil cooler with the four nuts. Torque the nuts.

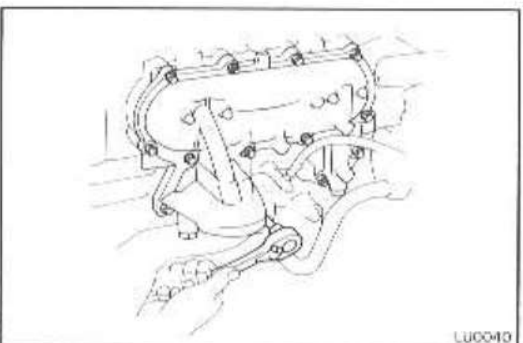
Torque: 145 kg-cm (10 ft-lb, 14 N·m)

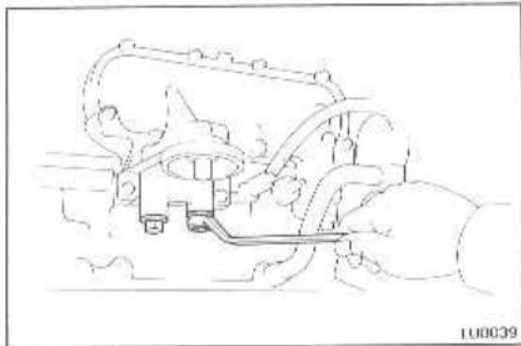
2. INSTALL OIL FILTER BRACKET AND OIL COOLER ASSEMBLY

Install a new gasket, the oil filter bracket and oil cooler assembly with the ten bolts and three nuts. Torque the bolts and nuts.

Torque: Bolts 195 kg-cm (14 ft-lb, 19 N·m)

Nuts 210 kg-cm (15 ft-lb, 21 N·m)



LU-10**LUBRICATION SYSTEM — Oil Cooler and Relief Valves****3. INSTALL RELIEF VALVES**

Install the two relief valves, springs, new gaskets and plugs. Torque the plugs.

Torque: 370 kg-cm (27 ft-lb, 36 N·m)

- 4. INSTALL OIL FILTER (See page LU-3)**
- 5. INSTALL EXHAUST MANIFOLD (See page EM-47)**
- 6. FILL ENGINE WITH COOLANT (See page CO-3)**
- 7. START ENGINE AND CHECK FOR LEAKS**
- 8. CHECK ENGINE OIL (See step 5 on page LU-3)**

