

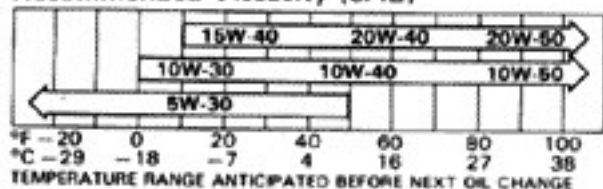
# LUBRICATION SYSTEM

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## TROUBLESHOOTING

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

Recommended Viscosity (SAE)



LU0311

## OIL PRESSURE CHECK

### 1. CHECK OIL QUALITY

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

If the quality is poor, change the oil.

Use API grade SF or SF/CC multigrade, fuel-efficient recommended viscosity oil.

### 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 OR SENDER GAUGE

### 4. INSTALL OIL PRESSURE GAUGE

### 5. START ENGINE

Start engine and warm it up to normal operating temperature.

### 6. MEASURE OIL PRESSURE

Oil pressure:

At idle speed More than 0.3 kg/cm<sup>2</sup>  
(4.3 psi, 29 kPa)

LU0051

# REPLACEMENT OF ENGINE OIL AND OIL FILTER

## 1. DRAIN ENGINE OIL

Remove the oil drain plug and drain the oil into a container.

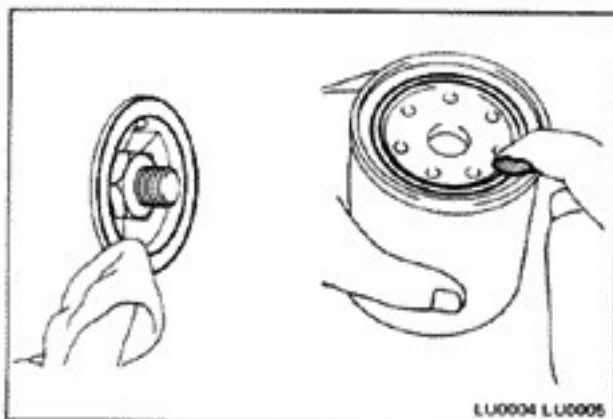
## 2. REPLACE OIL FILTER

(a) Using SST, remove the oil filter (located on right side of the engine block).

SST 09228-44010

(b) Inspect and clean the oil filter installation surface.

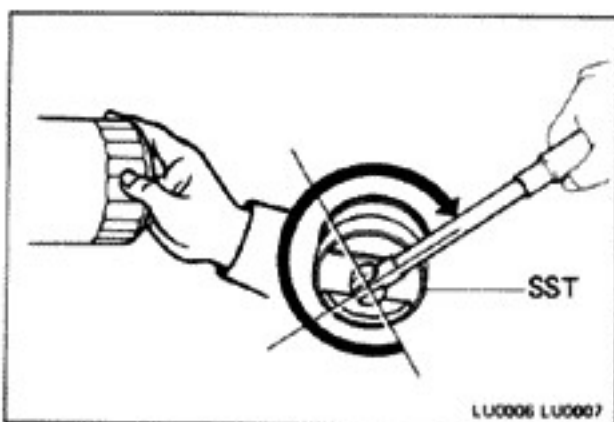
(c) Apply clean engine oil to the gasket of the new oil filter.



(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.

(b) Fill the engine with new oil API grade SF or SF/CC, multigrade, fuel efficient and recommended viscosity oil.

Oil capacity:

Dry fill

5.7 liters

(6.0 US qts, 5.0 Imp. qts)

Drain and refill

w/o Oil filter change

4.6 liters

(4.9 US qts, 4.0 Imp. qts)

w/ Oil filter change

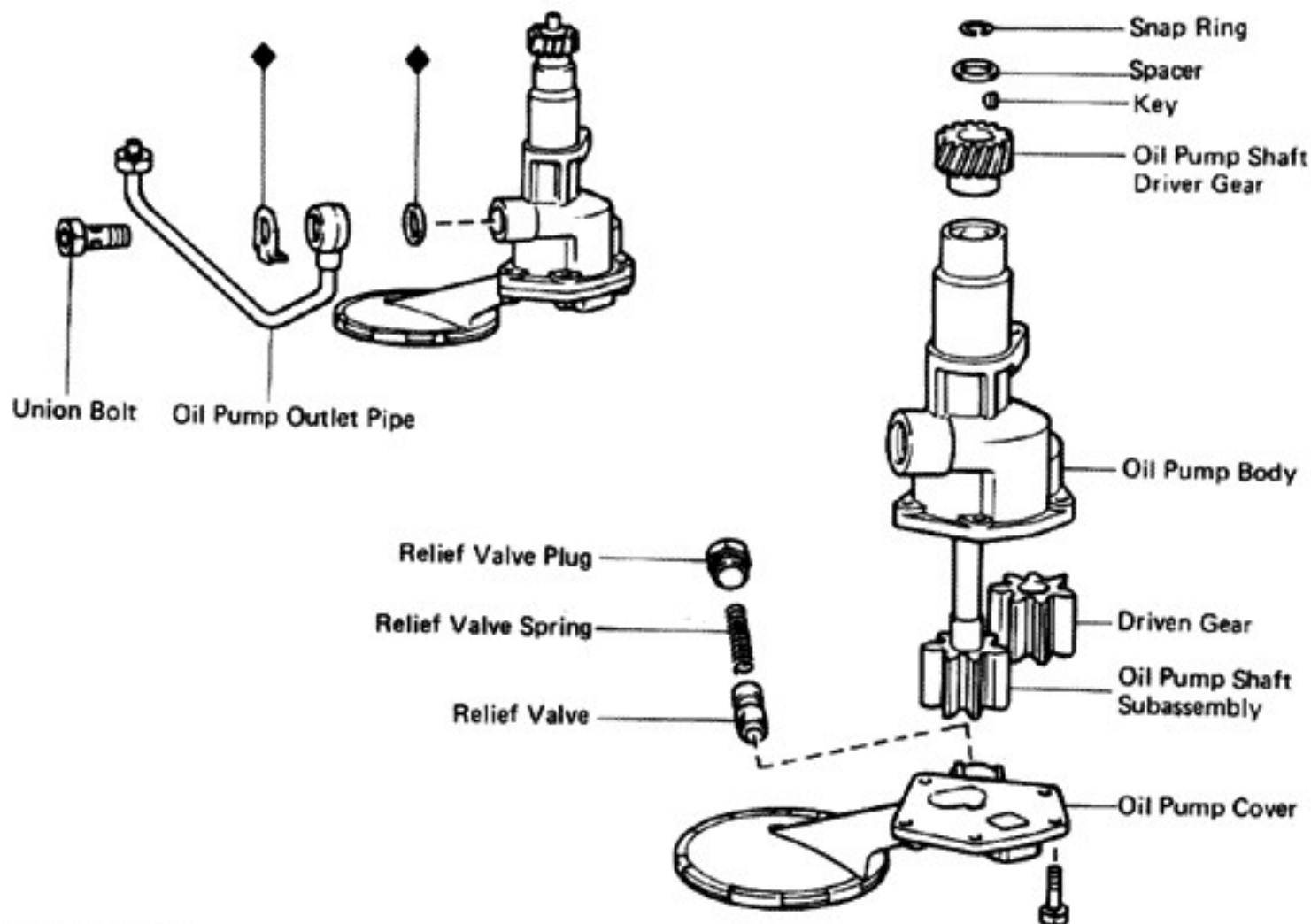
5.1 liters

(5.4 US qts, 4.5 Imp. qts)

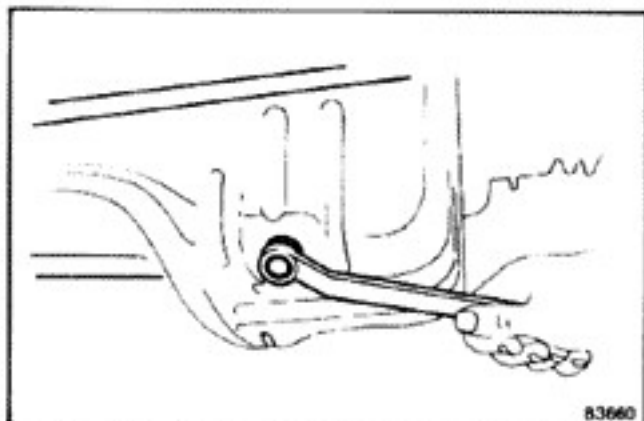
## 4. START ENGINE AND CHECK FOR LEAKS



## OIL PUMP COMPONENTS



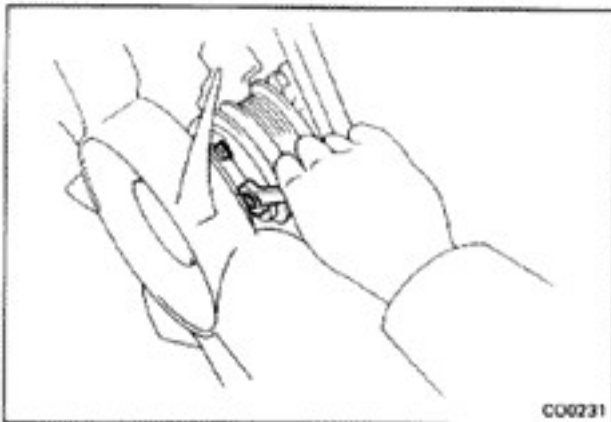
◆ Non-reusable part



## REMOVAL AND DISASSEMBLY OF OIL PUMP

1. DRAIN ENGINE OIL
2. DRAIN COOLANT
3. REMOVE AIR CLEANER CASE
4. REMOVE AIR CONNECTOR PIPE WITH NO.1 AND AIR CLEANER HOSES
5. REMOVE OIL LEVEL GAUGE
6. DISCONNECT UPPER RADIATOR HOSE
7. LOOSEN FAN BELTS



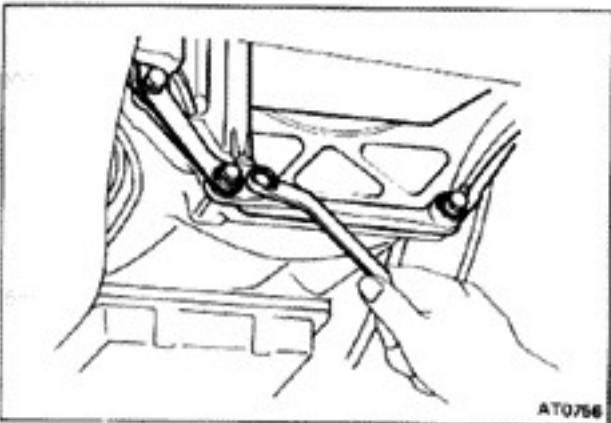


9. **REMOVE FLUID COUPLING WITH FAN AND FAN SHROUD**
  - (a) Remove the four nuts from the fluid coupling flange.
  - (b) Remove the fluid coupling with the fan shroud.

#### 10. RAISE VEHICLE

**CAUTION:** Be sure the vehicle is securely supported.

#### 11. REMOVE ENGINE UNDERCOVER

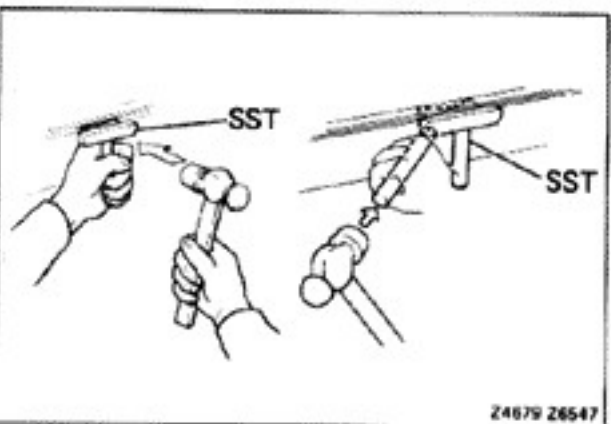


#### 12. REMOVE EXHAUST PIPE CLAMP BOLT FROM PIPE STAND

#### 13. REMOVE TWO STIFFENER PLATES

#### 14. REMOVE FLYWHEEL HOUSING UNDERCOVER

#### 15. REMOVE FOUR ENGINE MOUNT BOLTS

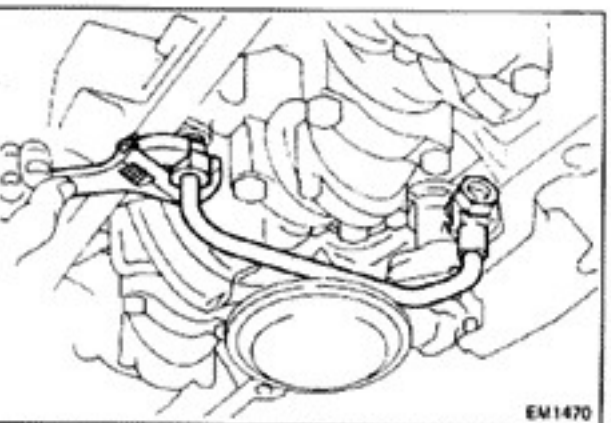


#### 16. REMOVE OIL PAN

- (a) Remove the twenty six bolts, and remove the oil pan.
- (b) Using SST and a brass bar, separate the oil pan from the cylinder block.

SST 09032-00100

**NOTE:** When removing the oil pan, be careful not to damage the oil pan flange.



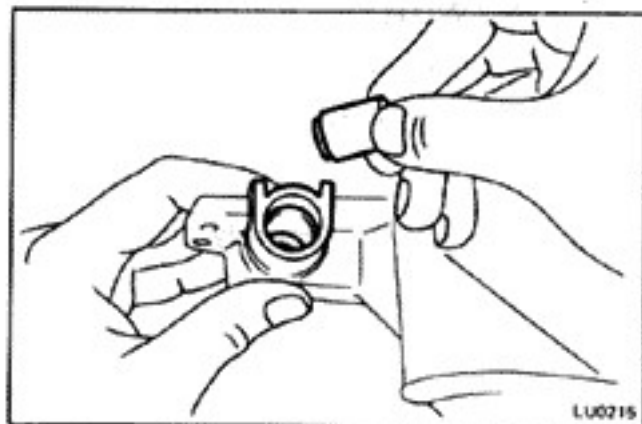
#### 17. REMOVE OIL PUMP ASSEMBLY

- (a) Remove the union bolt and nut and disconnect the oil pump outlet pipe.
- (b) Remove the oil pump mounting bolt and remove the oil pump.

#### 18. DISASSEMBLE OIL PUMP ASSEMBLY

- (a) Unscrew the relief valve plug, and remove spring and relief valve.

- (b) Remove the five bolts and remove the oil pump housing.

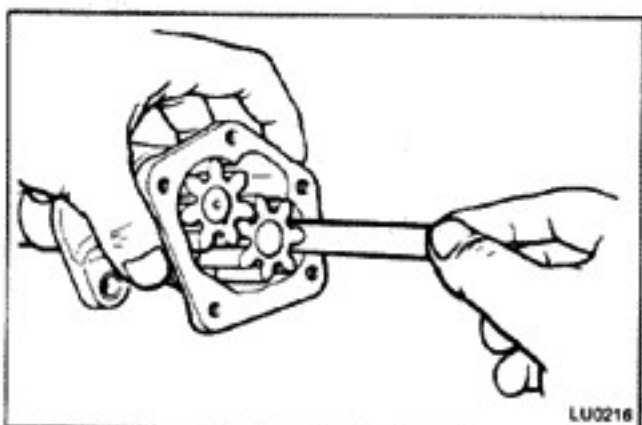


## INSPECTION OF OIL PUMP

### 1. INSPECT RELIEF VALVE

Check the relief valve for scoring or wear.

If damaged, replace the valve or pump assembly.



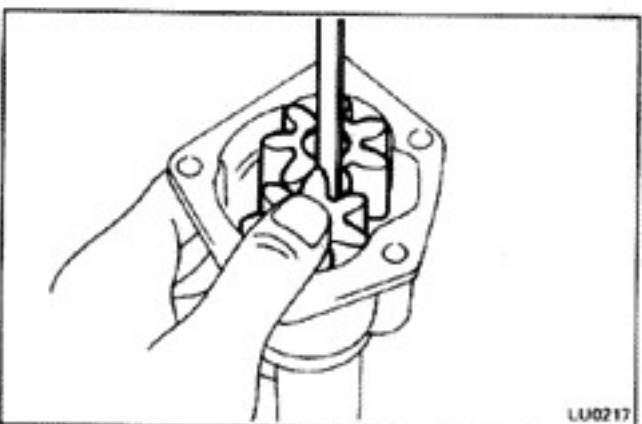
### 2. MEASURE BODY CLEARANCE

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

**Standard clearance:** 0.03 — 0.06 mm  
(0.0012 — 0.0024 in.)

**Maximum clearance:** 0.2 mm (0.008 in.)

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



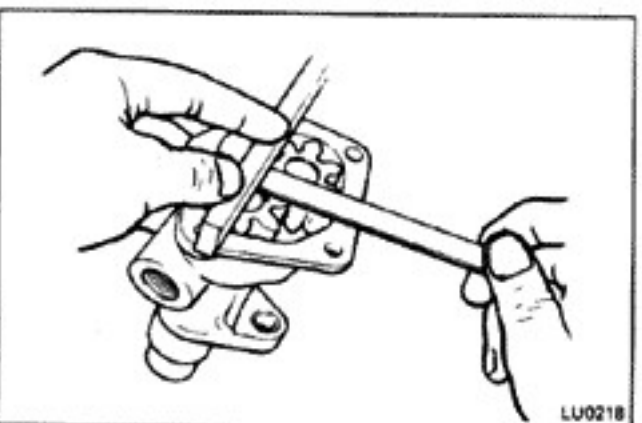
### 3. MEASURE GEAR BACKLASH

Using a feeler gauge, measure the backlash as shown.

**Standard clearance:** 0.5 — 0.6mm  
(0.020 — 0.024 in.)

**Maximum backlash:** 0.9 mm (0.035 in.)

If the backlash is greater than maximum, replace the subassembly and/or driven gear.



### 4. MEASURE 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 and/or body.

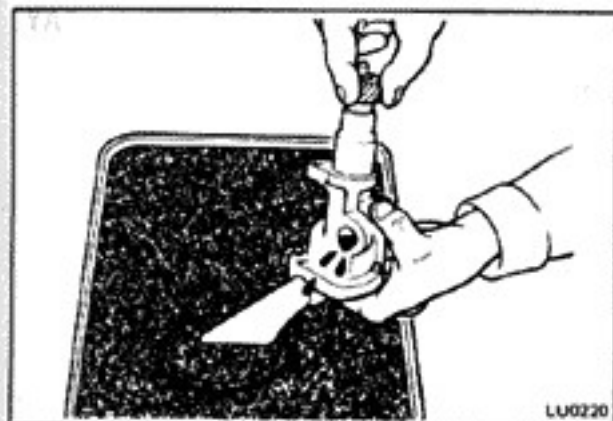


## ASSEMBLY OF OIL PUMP

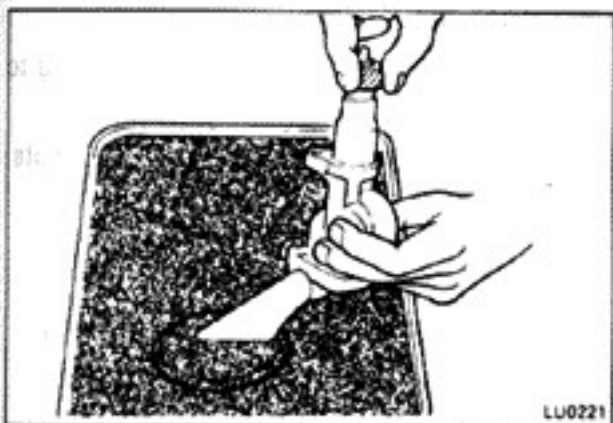
(See page LU-4)

ASSEMBLE OIL PUMP ASSEMBLY





LU0220

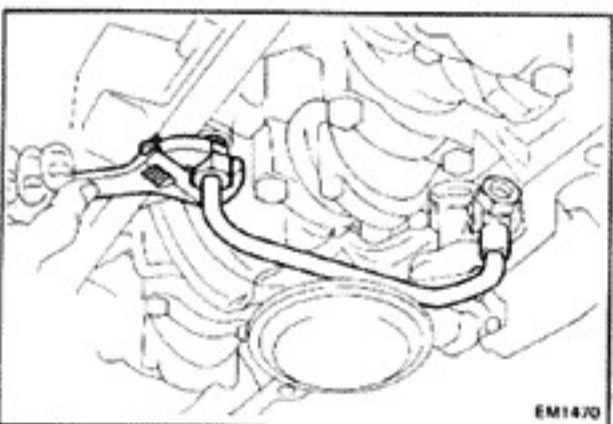


LU0221

## OPERATION CHECK OF OIL PUMP

### CHECK PUMP OPERATION

- (a) Immerse the suction end of the pump into clean engine oil and turn the shaft counterclockwise with your hand. Oil should come out of the discharge hole.
- (b) Close the discharge hole with your thumb, and turn the shaft as before. The shaft should be difficult to turn.



EM1470

## INSTALLATION OF OIL PUMP ASSEMBLY

### 1. INSTALL OIL PUMP ASSEMBLY

- (a) Install the oil pump and mounting bolt. Torque the bolt.

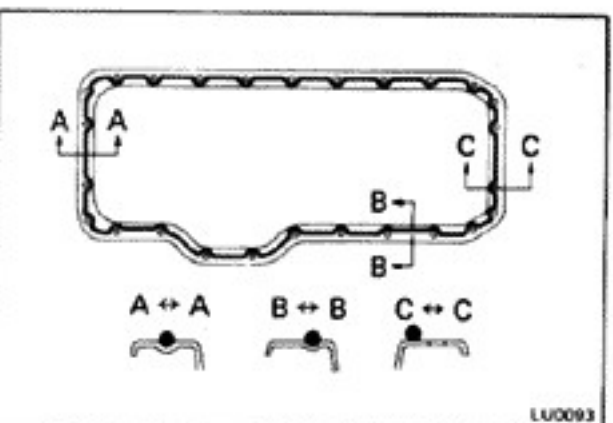
**Torque:** 220 kg-cm (16 ft-lb, 22 N·m)

- (b) Install the oil pipe with gasket lock washer and union bolt. Tighten the oil pipe union bolt and nut.

**Torque:** 350 kg-cm (25 ft-lb, 34 N·m)

### 2. INSTALL OIL PAN

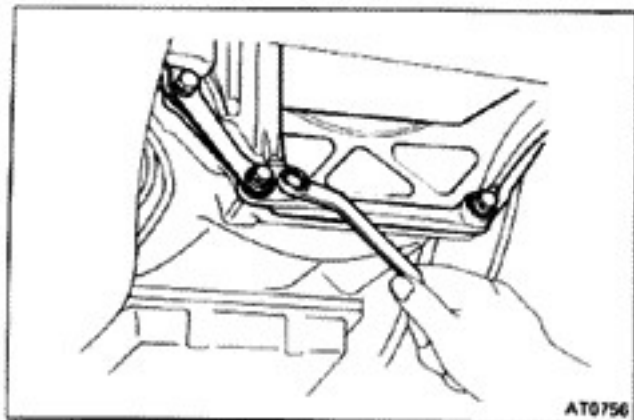
- (a) Remove any packing material and be careful not to drop the oil on the contacting surfaces of the oil pan and cylinder block.
  - Using a razor blade and gasket scraper, remove all the packing (FIPG) material from the gasket surfaces.
  - Thoroughly clean all components to remove all the loose material.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



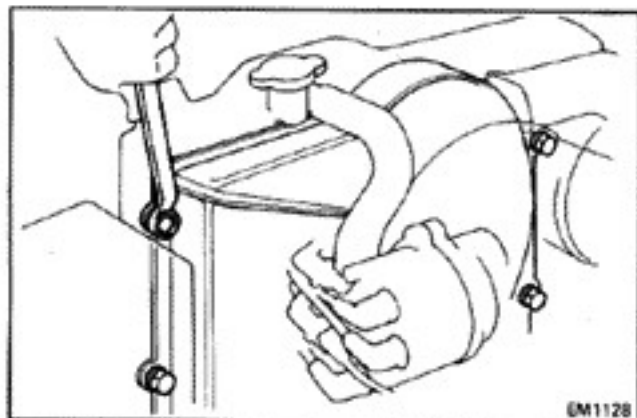
LU0093

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

- (b) Apply seal packing to the cylinder block installing surface of the oil pan.



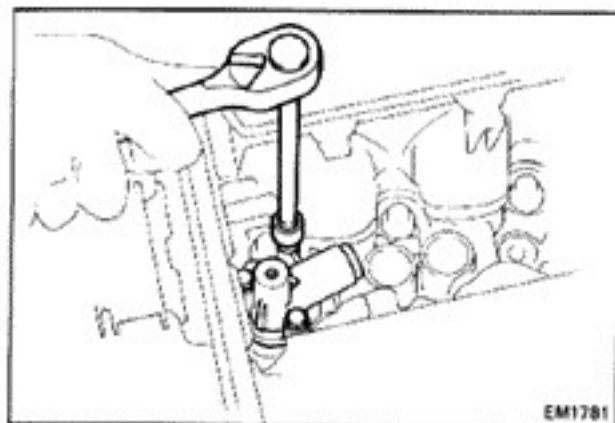
4. INSTALL EXHAUST PIPE CLAMP BOLT TO PIPE STA
5. INSTALL TWO STIFFENER PLATES
6. INSTALL ENGINE UNDER COVER



7. INSTALL FAN AND FAN SHROUD
  - (a) Put on the fan shroud together the fluid coupling the engine compartment.
  - (b) Install the fluid coupling on the pulley with four n
  - (c) Install the four fan shroud bolts.

8. ADJUST FAN BELT TENSION  
(See page MA-4)
9. CONNECT UPPER RADIATOR HOSE
10. INSTALL AIR CONNECTOR PIPE WITH NO.1 AND NO.2  
AIR CLEANER HOSES
11. INSTALL AIR CLEANER CASE
12. FILL WITH COOLANT
13. FILL WITH ENGINE OIL
14. START ENGINE AND CHECK FOR LEAKS



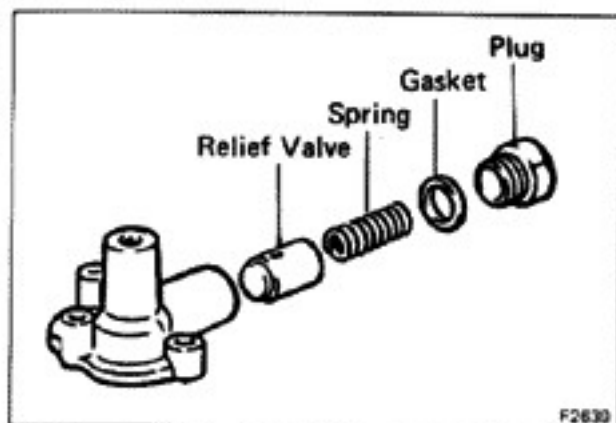


## OIL PRESSURE REGULATOR (For Lash Adjuster Valve)

### REMOVAL AND DISASSEMBLY OF OIL PRESSURE REGULATOR

1. REMOVE NO. 3 TIMING BELT COVER
2. REMOVE TIMING BELT COVER STAY
3. REMOVE OIL PRESSURE REGULATOR AND GASKET
4. DISASSEMBLE OIL PRESSURE REGULATOR ASSEMBLY

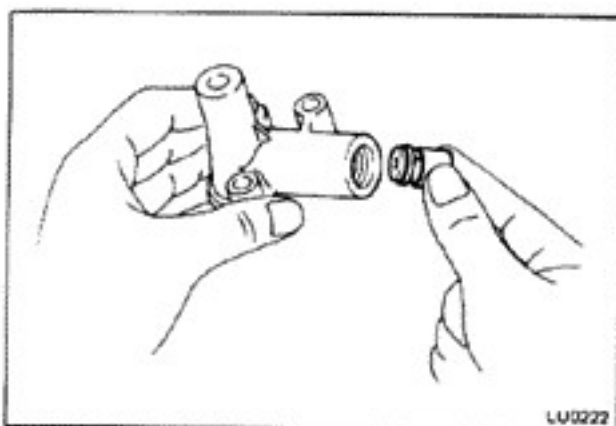
Unscrew the relief valve plug, and remove the spring and relief valve.



### INSPECTION OF OIL PRESSURE REGULATOR

Check the relief valve for scoring or wear.

If damaged, replace the valve or regulator assembly.



### ASSEMBLY AND INSTALLATION OF OIL PRESSURE REGULATOR

1. ASSEMBLE OIL PRESSURE REGULATOR ASSEMBLY  
Install the relief valve and spring in the body, and screw on the relief valve plug.
2. INSTALL OIL PRESSURE REGULATOR OVER NEW GASKET
3. INSTALL TIMING BELT COVER STAY
4. INSTALL NO. 3 TIMING BELT COVER
5. START ENGINE AND CHECK FOR LEAKS

