

# **DAIHATSU**

# **Rocky**

**LU**

## **LUBRICATION SYSTEM**

|   |      |
|---|------|
| DESCRIPTION .....                                   | LU-2 |
| TROUBLE SHOOTING .....                              | LU-3 |
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WRU90-LU001

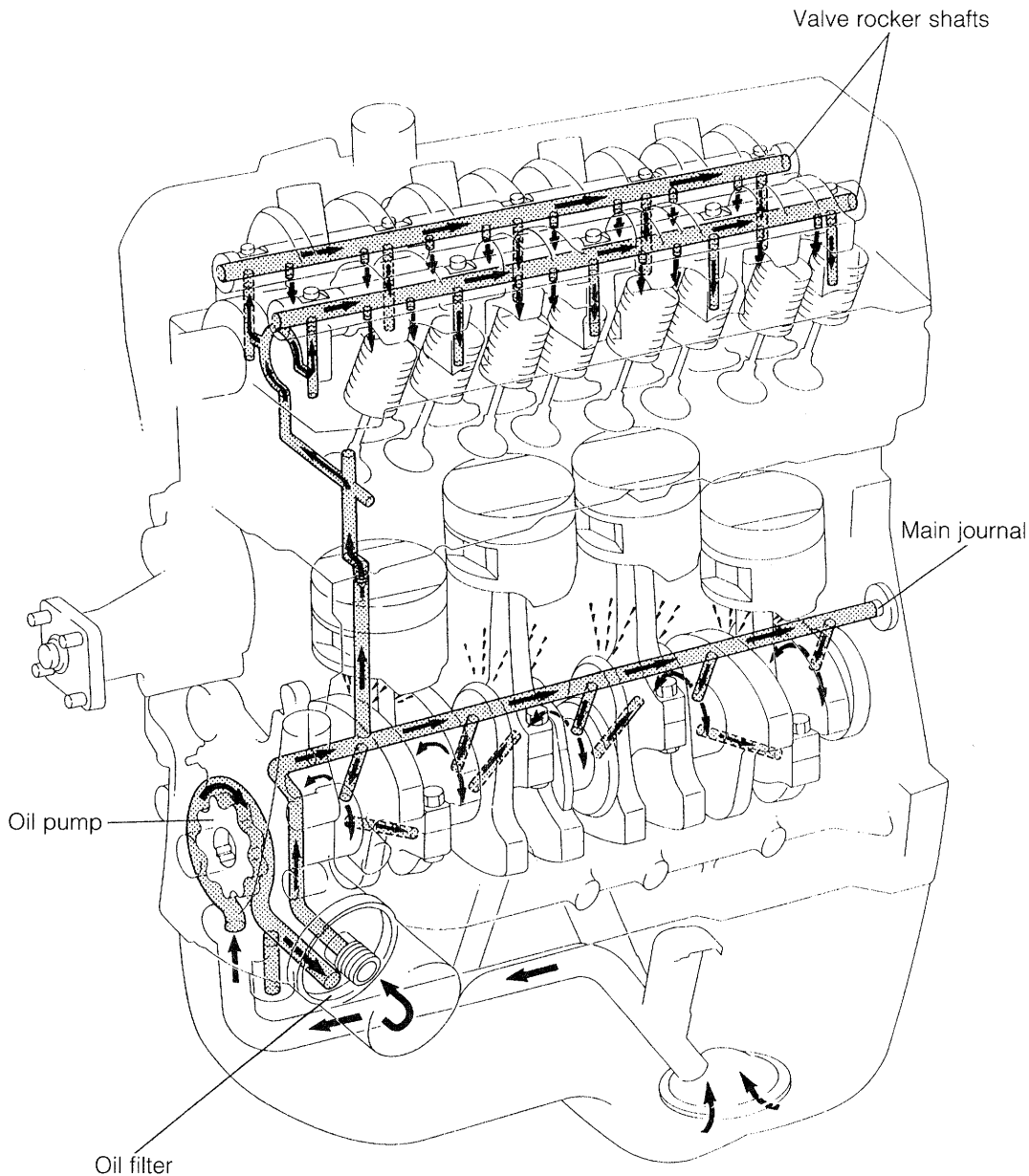
## DESCRIPTION

The lubrication system employs a fully-forced feed, filtering method.

The oil stored in the oil pan is sucked by an oil pump which is directly driven by the crankshaft. Then, the thus-sucked oil flows through an oil pump strainer and is filtered at an oil filter. After having passed through the passages of the cylinder block, it will be divided into two streams so as to lubricate various sections.

One stream of the lubrication oil performs lubrication of various sections of the crankshaft and connecting rod- and piston-related parts. The other stream of the lubrication oil rises to the cylinder head section.

Then, it performs lubrication of the camshaft and valve rocker shaft-related parts.



## TROUBLE SHOOTING

| Problem           | Possible causes   | Remedies  | Page  |
|-------------------|---|---|---|
| Oil leakage       | Cylinder head, cylinder block, oil cooler or oil pump body damaged or cracked<br>Oil seal faulty<br>Gasket faulty   | Repair, if necessary.<br><br>Replace oil seal.<br>Replace gasket.   | EM- 36  |
| Low oil pressure  | Oil leakage<br>Relief valve faulty<br>Oil pump faulty<br>Poor quality engine oil<br>Crankshaft bearing faulty<br>Connecting rod bearing faulty<br>Oil filter clogged<br>Low oil level | Repair, as necessary.<br>Replace relief valve.<br>Repair oil pump.<br>Change engine oil<br>Replace bearing.<br>Replace bearing.<br>Replace oil filter.<br>Check oil level | EM-122<br>EM-121<br>LU- 2<br>EM-106<br>EM-110<br>LU- 5<br>LU- 3 |
| High oil pressure | Relief valve faulty   | Replace relief valve.   | EM-122  |

WRU90-LU003

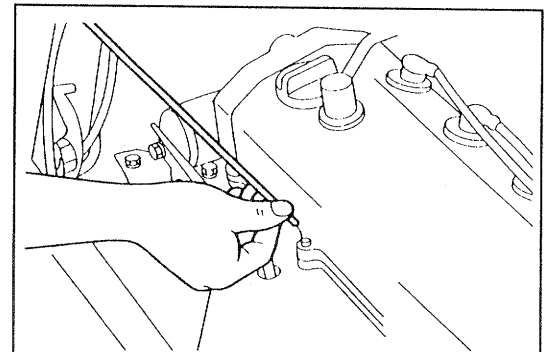
## OIL PRESSURE CHECK

## 1. Oil quality check

Check the oil for deterioration, water entry, discoloring or dilution.

If oil quality is poor, change the oil.

Use API grade SG or SF multigrade viscosity, fuel-efficient oil. (See page LU-5.)



WRU90-LU004

## 2. Oil level check

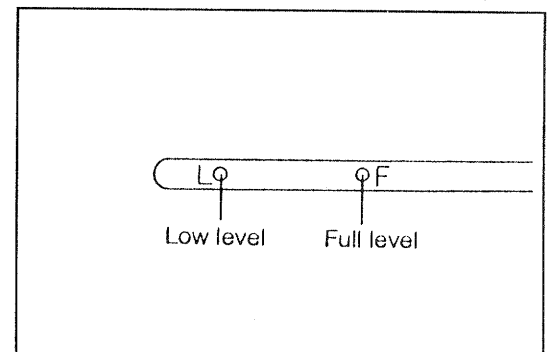
The oil level should be between the L and F levels on the dipstick.

If the level is low, check to see if any oil leakage is present.

Add oil to the F level.

**NOTE:**

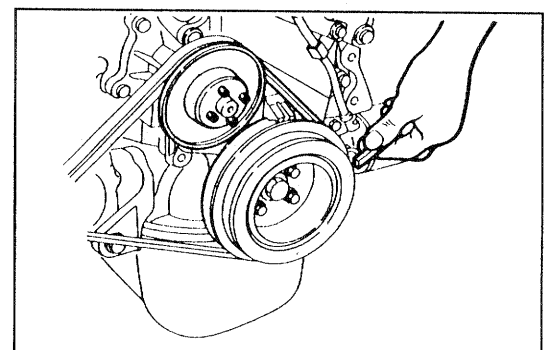
The amount of oil between the [L] level and the [F] equals to one liter (1.1 US qt.).



WRU90-LU005

## 3. Oil pressure check

- (1) Disconnect the battery ground cable from the negative (-) terminal of the battery.
- (2) Remove the air cleaner and hose assembly.
- (3) Temporarily detach the air conditioner compressor assembly. (See EM-86.)
- (4) Disconnect the oil pressure switch connector.



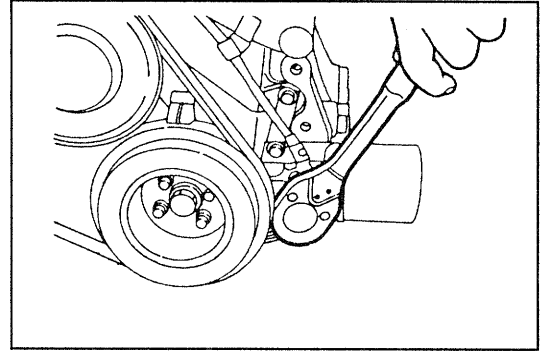
WRU90-LU006

# LUBRICATION SYSTEM

(5) Remove the oil pressure switch.

**NOTE:**

Use a hexagonal long box wrench for the removal.



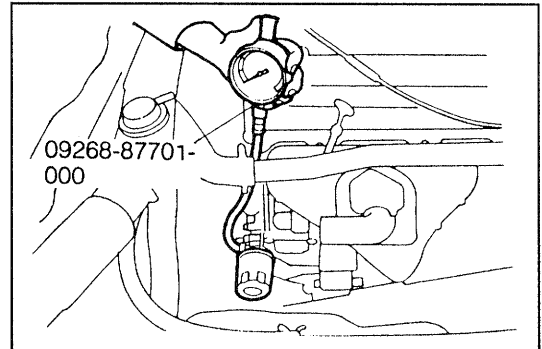
WRU90-LU007

(6) Install the oil pressure gauge.

**NOTE:**

The pressure gauge is available as a SST.

SST: 09268-87701-000



WRU90-LU008

(7) Start the engine and warm it to the normal operating temperature. Check the oil pressure.

**At Idle Speed: More Than 0.2 kg/cm<sup>2</sup> (2.8 psi)**

**At 3000 rpm: 2.5 - 5.0 kg/cm<sup>2</sup> (35.6 - 71.0 psi)**

If the measured value fails to conform to the specified value, check and repair the oil pump.

(See page EM-121.)

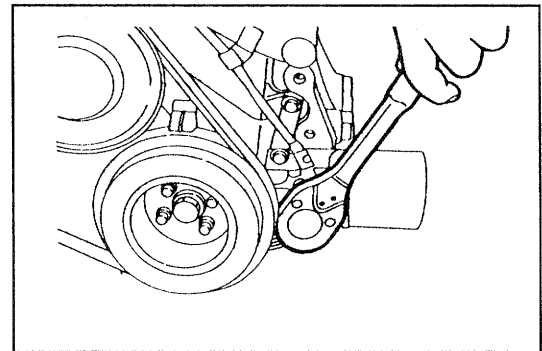
(8) Stop the engine.

(9) Remove the oil pressure gauge.

(10) Clean the threaded portion of the oil pressure switch. Wind seal tape around the threaded portion. Install the oil pressure switch in the oil pump.

**Tightening Torque:**

**1.2 - 2.0 kg-m (8.7 - 14.5 ft-lb, 11.8 - 19.6 N-m)**



WRU90-LU009

**NOTE:**

- Use a hexagonal long box wrench for the installation.
- The new oil pressure switch is coated with sealing materials.

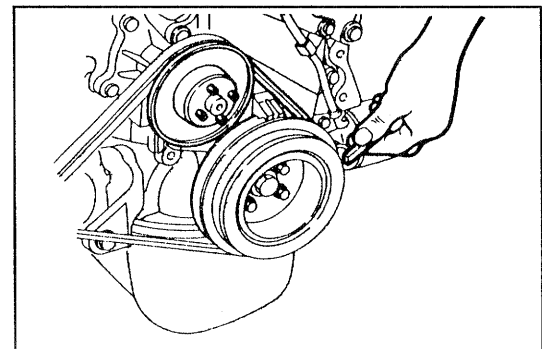
(11) Connect the connector of the oil pressure switch.

(12) Install the air conditioner compressor assembly onto bracket. (See page EM-146.)

(13) Install the air cleaner and hose assembly into position. (See page EM-35.)

(14) Connect the battery ground cable to the negative (-) terminal of the battery.

(15) Start the engine and check it for oil leakage. Repair the leaky point if oil leakage exists.



WRU90-LU010

## ENGINE OIL CHANGE & OIL FILTER REPLACEMENT

1. Drain the engine oil as follows:
  - (1) Disconnect the battery ground cable from the negative (-) terminal of the battery.
  - (2) Place a suitable container under the oil drain plug.
  - (3) Remove the engine under cover.
  - (4) Drain the oil by removing the oil drain plug.

**WARNING:**

When the oil is still hot, care must be exercised to avoid getting scalded.

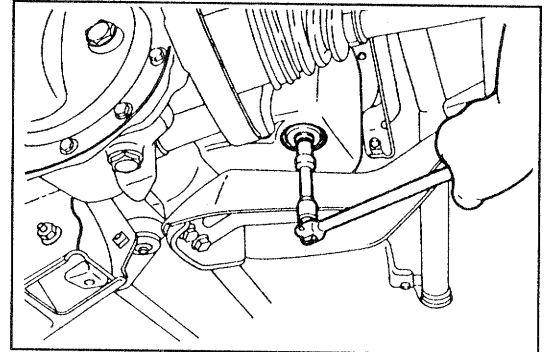
2. Oil filter replacement
  - (1) Remove the air cleaner and hose assembly.
  - (2) Remove the oil filter element, using the oil filter remover.

**NOTE:**  
Place a suitable container under the oil filter because the engine oil flows out.

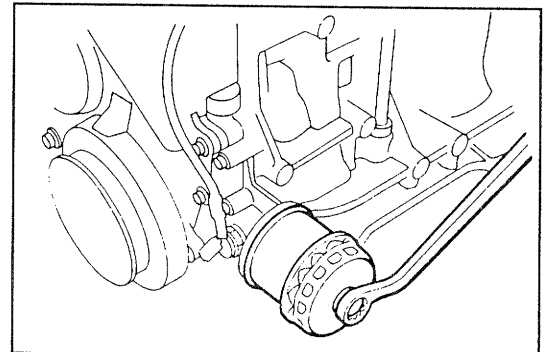
- (3) Inspect and clean the oil filter installation surface.

- (4) Thinly apply engine oil to the "O" ring of a new oil filter.

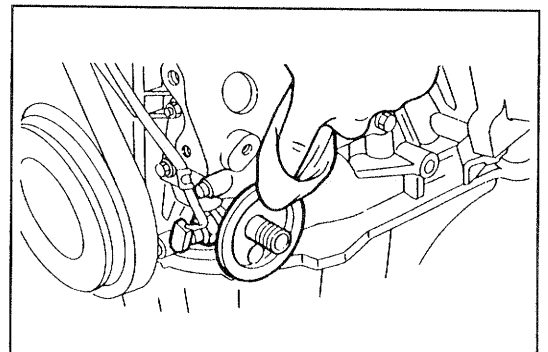
- (5) Screw in the oil filter by hand, until the "O" ring of the oil filter contacts the oil filter installing surface.



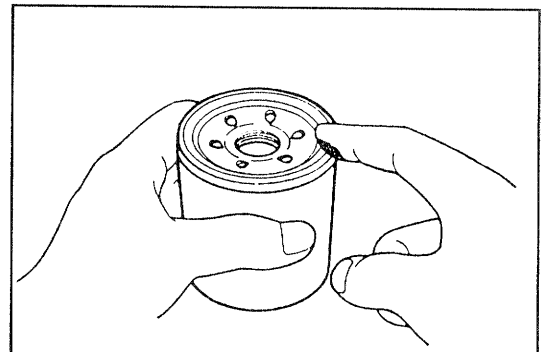
WRU90-LU011



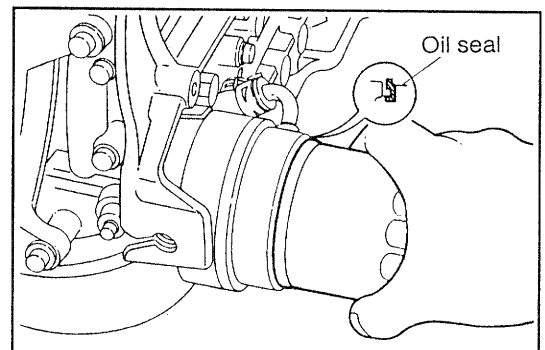
WRU90-LU012



WRU90-LU013



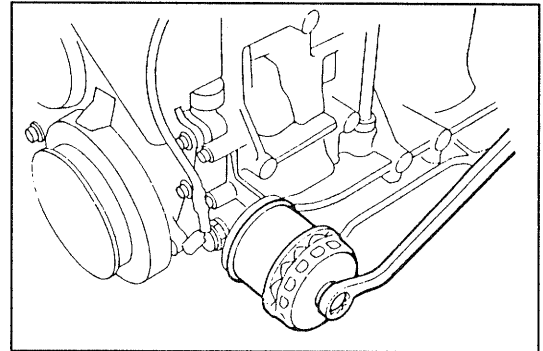
WRU90-LU014



WRU90-LU015

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- (6) Tighten the oil filter three fourths to one complete turn, using the oil filter remover.
- (7) Install the air cleaner and hose assembly into position.  
(See page EM-35.)



WRU90-LU016

## 3. Filling engine oil

- (1) Clean the oil drain plug. Install it with a new gasket interposed.

### NOTE:

Remove any remaining gasket material from the oil pan, using a gasket scraper.

#### Tightening Torque:

2.0 - 3.0 kg-m (14.5 - 21.7 ft-lb, 19.6 - 29.4 N·m)

- (2) Fill the engine with engine oil.

The oil should be API grade SG or SF multigrade viscosity, fuel-efficient oil.

#### Oil capacity

When only engine oil is changed:

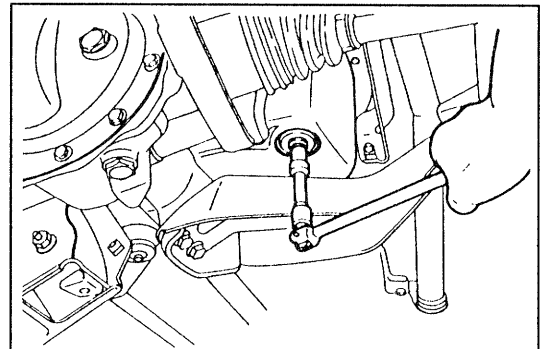
3.3 liter (3.5 US qt.)

When engine oil is changed and oil filter is replaced:

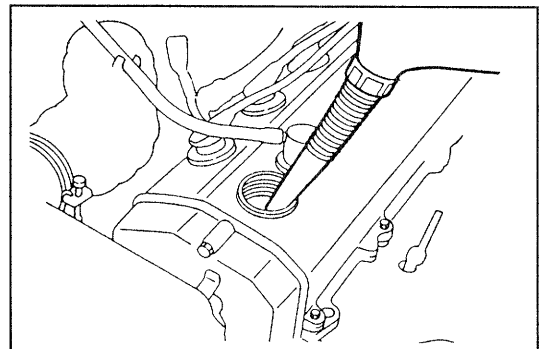
3.5 liter (3.7 US qt.)

After engine has been overhauled or when engine oil has been drained completely from engine:

3.8 liter (4.0 US qt.)

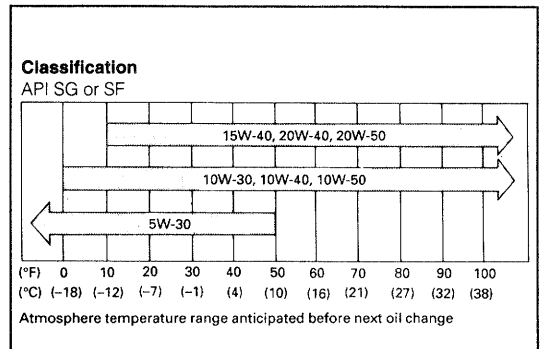


WRU90-LU017



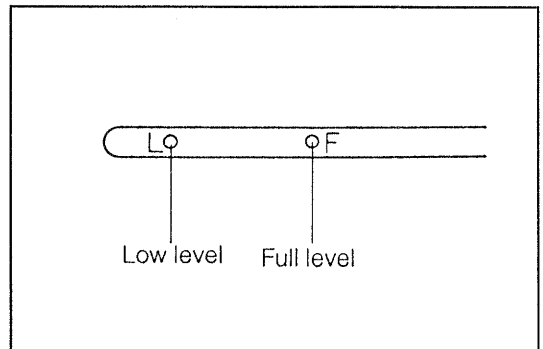
WRU90-LU018

- (3) Connect the battery ground cable to the negative (-) terminal of the battery.



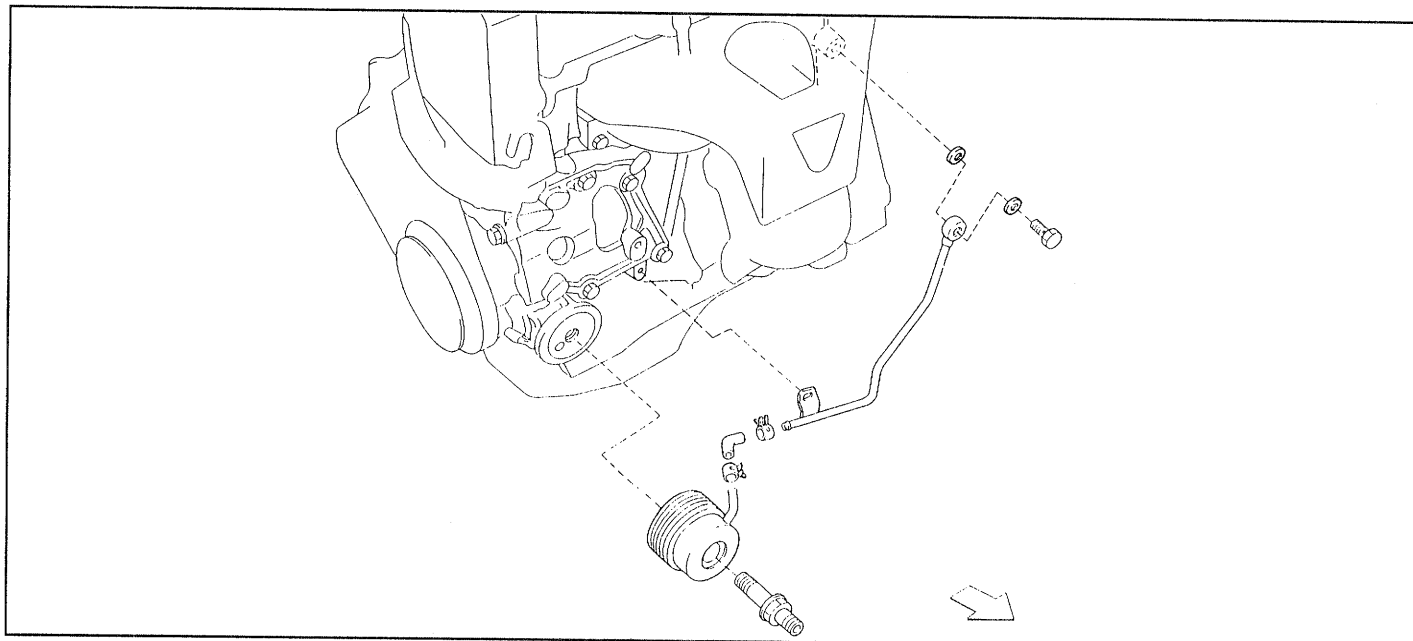
WRU90-LU019

- (4) Start the engine and check it for leakage.  
Repair the leaky point if oil leakage exists.
- (5) Stop the engine. After a lapse of two or three minutes, check the oil level.  
If oil level is less than the full level, replenish the oil to the full level.



WRU90-LU020

## OIL COOLER COMPONENTS



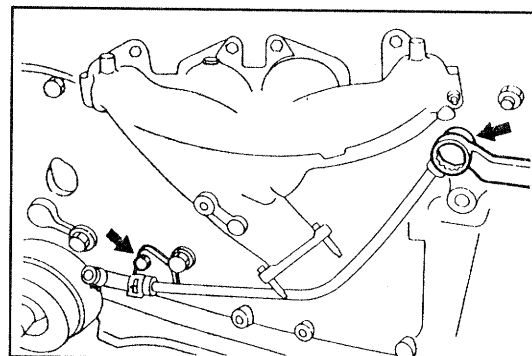
WRU90-LU021

### REMOVAL OF OIL COOLER

1. Disconnect the battery ground cable from the negative (-) terminal of the battery.
2. Drain the coolant. (See page CO-4.)
3. Remove the air cleaner and hose assembly.
4. Temporarily remove the air conditioner compressor assembly. (See EM-86.)
5. Remove the oil filter. (See page LU-5.)
6. Disconnect the oil cooler hose at the radiator side.

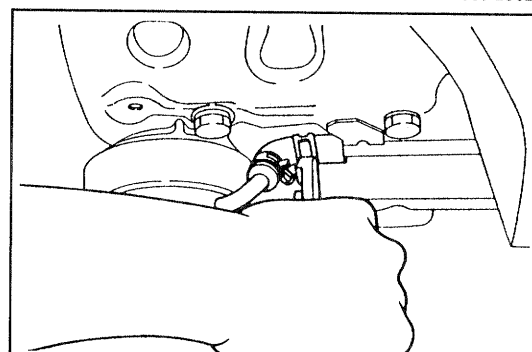
WRU90-LU022

7. Disconnect the oil cooler pipe from the cylinder block.



WRU90-LU023

8. Remove the oil cooler pipe from the hose by sliding the hose bands.



WRU90-LU024

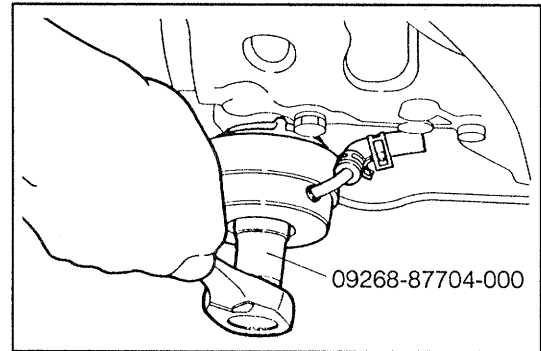
## LUBRICATION SYSTEM

9. Remove the oil cooler, using the following SST.

SST: 09268-87704-000

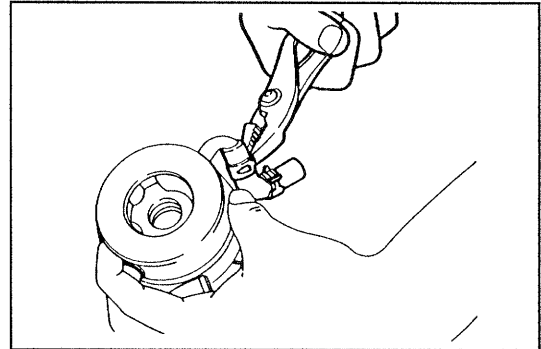
### NOTE:

Place a suitable container below the oil cooler attaching section so as to receive any oil and water flowing from the oil cooler.



WRU90-LU025

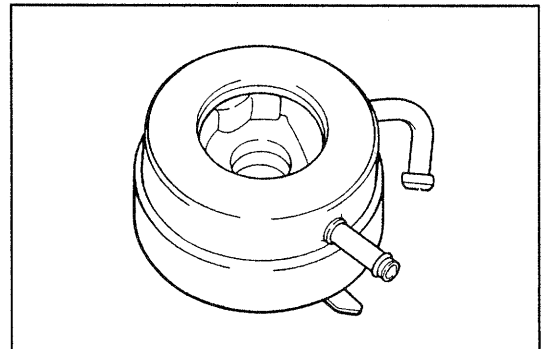
10. Disconnect the water hose from the oil cooler.



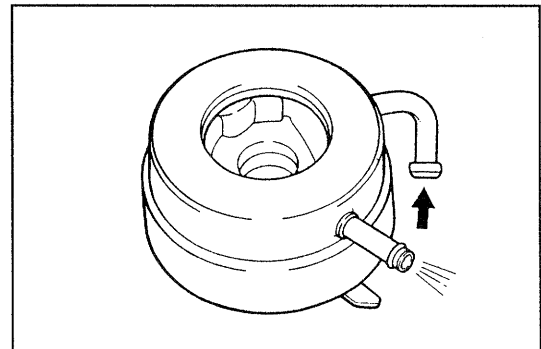
WRU90-LU026

## INSPECTION OF OIL COOLER

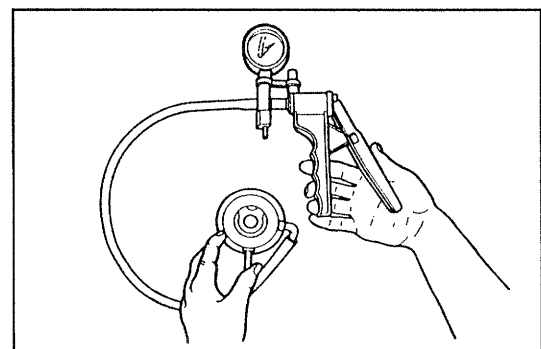
1. Check the oil cooler for damage.  
Replace the oil cooler if the oil cooler exhibits damage.
2. Blow air from one end of the oil cooler pipe. Ensure that air continuity exists.
3. With one end of the oil cooler pipe plugged with your finger, apply a negative pressure of 100 mmHg (3.937 inchHg) to the other end, using a MityVac or a vacuum pump. Ensure that the applied negative pressure is retained.  
If the negative pressure is not kept, replace the oil cooler.



WRU90-LU027



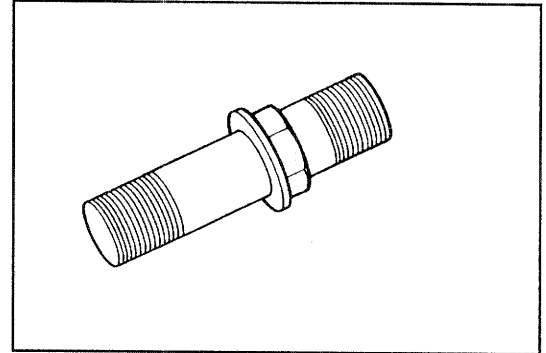
WRU90-LU028



WRU90-LU029



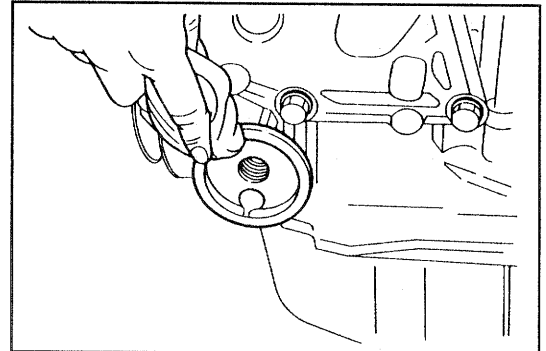
4. Check the oil cooler set bolt for damage.  
Replace the oil cooler set bolt if it exhibits damage.



WRU90-LU030

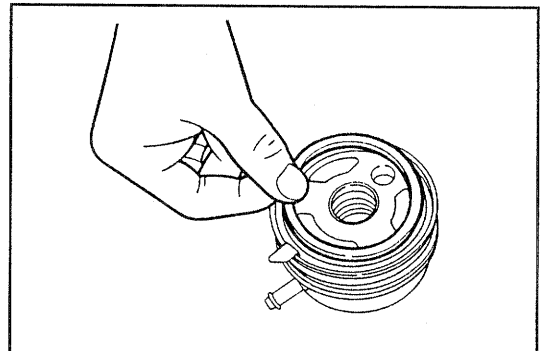
## INSTALLATION OF OIL COOLER

1. Clean the oil cooler attaching surface of the oil pump.



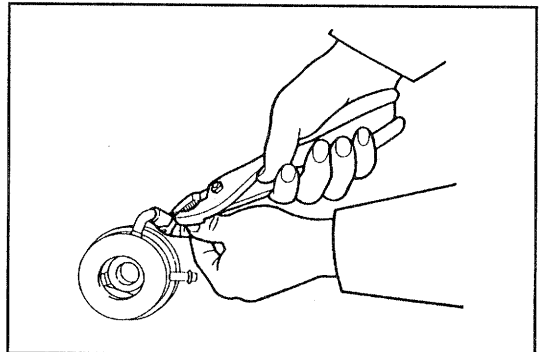
WRU90-LU031

2. Install the new "O" ring on the cooler.



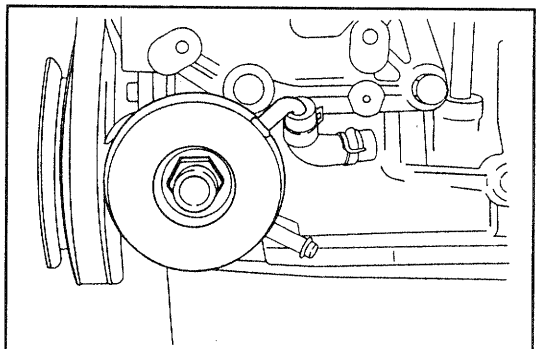
WRU90-LU032

3. Connect the water hose to the oil cooler. Attach the hose bands.



WRU90-LU033

4. Using the set bolts, install the oil cooler by making the locating rib of the oil cooler contact with the cylinder block.  
**NOTE:**  
Care must be exercised to ensure that the "O" ring may not be displaced during the installation.



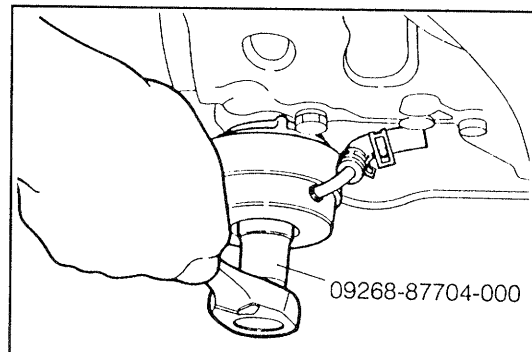
WRU90-LU034

5. Tighten the set bolts to the specified torque, using the following SST.

SST: 09268-87704-000

Tightening Torque:

2.5 - 3.5 kg-m (18.1 - 25.3 ft-lb, 24.5 - 34.3 N-m)

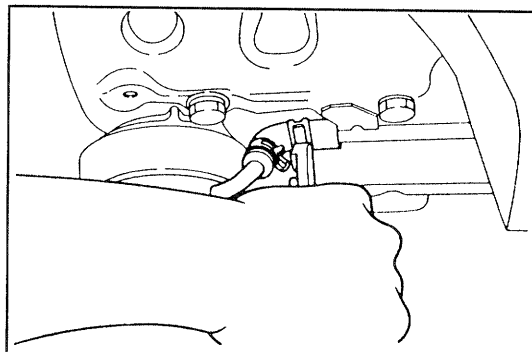


WRU90-LU035

6. Connect the oil cooler inlet pipe to the oil cooler hose that has been installed on the oil cooler.

**NOTE:**

Install the oil cooler pipe, by taking into consideration an angle at which it is mounted on the cylinder block.

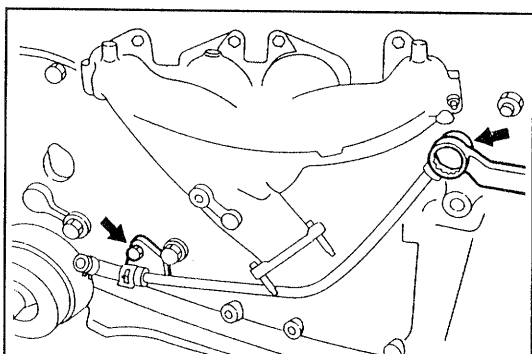


WRU90-LU036

7. Connect the oil cooler hose to the radiator lower tank.

**NOTE:**

Ensure that the clamp is securely installed.



WRU90-LU037

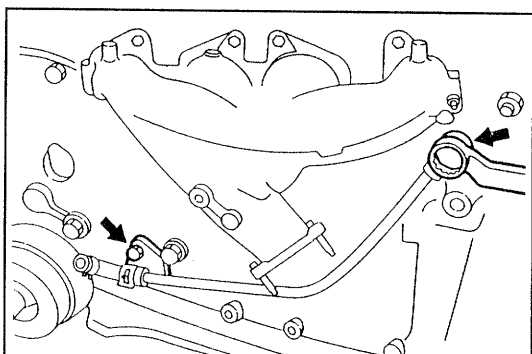
8. Install the oil cooler pipe on the cylinder block with a new gasket interposed.

Tightening Torque (Union bolt):

2.5 - 3.5 kg-m (18.1 - 25.3 ft-lb, 24.5 - 34.3 N·m)

**NOTE:**

Never reuse the gasket.



WRU90-LU037

9. Installation of oil filter

(1) Clean the oil filter installation surface of the oil cooler.

(2) Install the oil filter. (See page LU-6.)

10. Install the air conditioner compressor assembly. (See EM-146.)

11. Install the air cleaner and hose assembly onto position. (See EM-35.)

12. Fill coolant. (See page CO-4.)

13. Connect the battery ground cable to the negative (-) terminal of the battery.

14. Start the engine. Check to see if any oil leakage or fuel leakage is present.

If the engine exhibits any defect, repair it or replace the defective part, as required.

15. Stop the engine. After two or three minutes, check the engine oil level, using the oil level gauge. Replenish engine oil to the FULL level, as required. (See page LU-6.)

WRU90-LU038