

TO INDEX

LU

LUBRICATION SYSTEM

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MLU00001-00000

CHECK & CHANGE OF ENGINE OIL

OIL QUALITY & LEVEL CHECK

WARNING:

- Be sure to perform this inspection when the engine oil is not hot, to prevent you from getting scalded.

1. Park the vehicle on a level surface.
2. Pull out the oil level gauge .
3. Check the engine oil for deterioration, ingress of water, discoloring or dilution.

If oil quality is poor, change the engine oil.

(As for the procedure, see "CHANGE OF ENGINE OIL AND REPLACEMENT OF OIL FILTER" section.)

4. Wipe off the engine oil from the oil level gauge.
5. Reinsert the oil level gauge as far as it will go.
6. Pull out the oil level gauge again.
7. Ensure that the engine oil level is between the "L" level and "F" level on the oil level gauge.

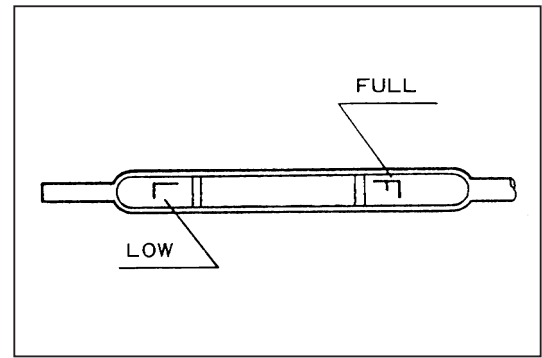
If the engine oil level is below the "L" level, replenish the specified engine oil to the "F" level after the checking of the oil quality and leakage.

CAUTION:

- Use API grade SG or higher multi-grade viscosity, fuel efficient oil. (As for the procedure, see "CHANGE OF ENGINE OIL AND REPLACEMENT OF OIL FILTER" section.)

NOTE:

- The amount of oil whose level is between "L" level and "F" level equals to 0.8 liter.



MLU00002-00001

CHANGE OF ENGINE OIL & REPLACEMENT OF OIL FILTER

WARNING:

- Protect your eyes by wearing safety goggles.
- Be very careful not to burn yourself with hot engine oil or hot engine components.

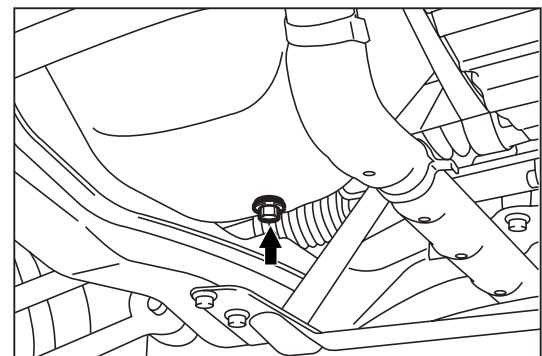
1. Park the vehicle on a level surface.
2. Place a suitable container under the oil drain plug.
3. Remove the drain plug and gasket, and drain the engine oil into the placed container completely.
4. Remove the oil filler cap.
5. Place a suitable container under the oil filter.
6. Slacken the oil filter with a suitable oil filter wrench or the following SST.

SST: 09228-87201-000

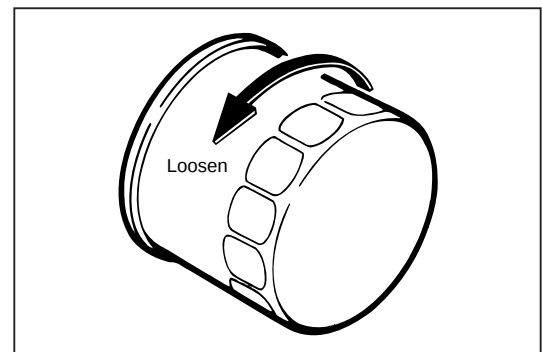
CAUTION:

- Be careful at this time, for the oil may flow out.

7. Remove the oil filter by hand.

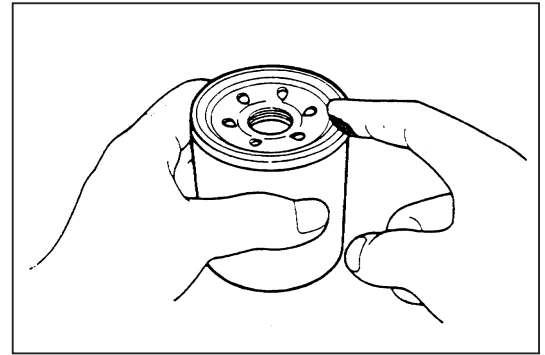


MLU00003-00002



MLU00004-00003

8. Wipe off the engine oil from the oil filter attaching part of the engine.
9. Thinly apply engine oil to the O-ring of the new oil filter.
10. Screw in the oil filter by hand, until the O-ring of the oil filter contacts the oil filter installing surface.



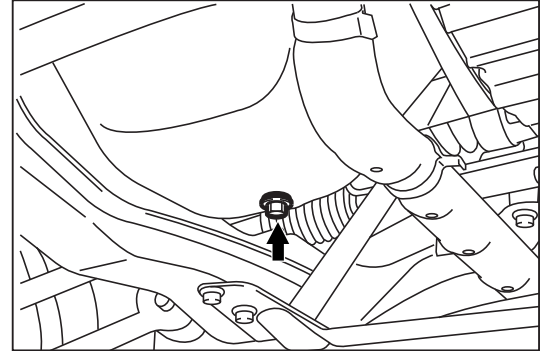
MLU00005-00004

11. Tighten the oil filter three fourths to one complete turn, using a suitable oil filter wrench or the following SST.

SST: 09228-87201-000

CAUTION:

- Do not overtighten the oil filter. Failure to observe this caution will cause oil leakage or damage of the oil pump or oil filter.



MLU00006-00005

12. Clean the drain plug. Tighten the drain plug to the specified torque with a new gasket interposed.

Tightening Torque: $24.0 \pm 4.8 \text{ N}\cdot\text{m}$

13. Pour engine oil to the engine.

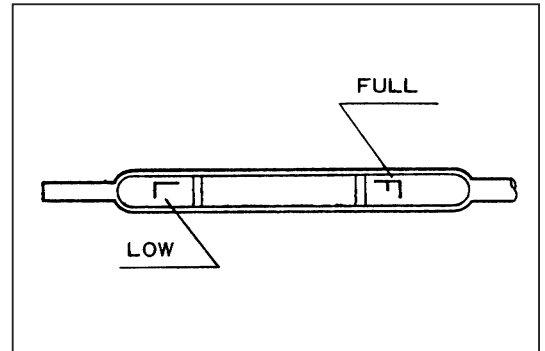
NOTE:

- Use multigrade viscosity, fuel-efficient engine oil of API grade SG or higher.
- The amount of the oil whose level is between the "L" level and the "F" level equals to one liter.

Oil Capacity

With oil filter: 2.3 liters

Without oil filter: 2.1 liters



MLU00007-00006

14. Close the oil filler cap.

WARNING:

- Securely install the oil filler cap. Failure to observe this warning will cause a fire.

15. Check the oil level. (Refer to the "ENGINE OIL QUALITY & LEVEL CHECK".)

OIL PRESSURE WARNING

Check to see if the oil pressure warning lamp will be illuminated when the ignition switch is turned on.

NOTE:

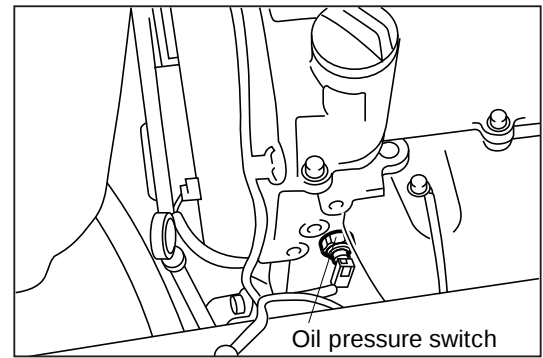
- If the warning lamp will not illuminate, check to see if the bulb in the combination meter is burnt out. (Refer to the BE section.)
- If the warning lamp is illuminated when the engine has started, perform the oil pressure check. (In advance, be sure to check that the engine oil is at a sufficient level.)



MLU00008-00007

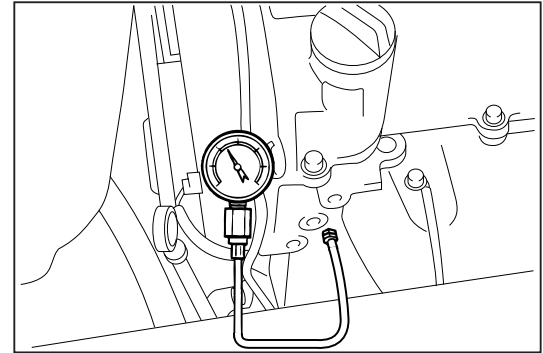
OIL PRESSURE CHECK

1. Disconnect the ground cable terminal from the negative (–) terminal of the battery.
2. Disconnect the connector of the oil pressure switch.
3. Remove the oil pressure switch from the cylinder block.



MLU00009-00008

4. Install the oil pressure gauge.
NOTE:
 - The oil pressure gauge is available as the SST.
SST: 09990-87702-000
5. Measurement of oil pressure.
Start the engine and measure the oil pressure. Ensure that the oil pressure conforms to the specified value.
 - At 1000 rpm: 147 kPa
 - At 4000 rpm: 343 kPa



MLU00010-00009

If the measured value fails to conform to the specified value, check and repair the oil pump. Also, check to see if each oil clearance is within the specified value, as required.

When the warning lamp goes on even if the oil pressure is normal, replace the oil pressure switch.

6. Remove the oil pressure gauge.
7. Installation of oil pressure switch
 - (1) Clean the oil pressure switch attaching hole of the cylinder block.

NOTE:

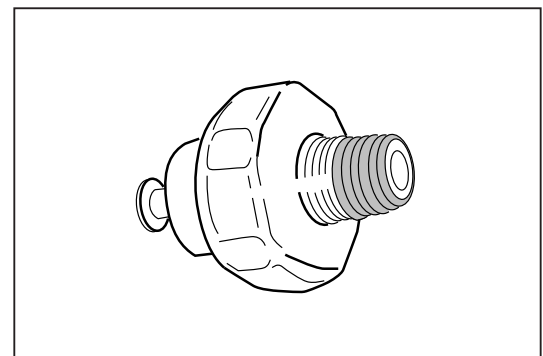
- Be very careful not to allow any admission of dust or the like.

- (2) Clean the threaded portion of the oil pressure switch.
- (3) Wind seal tape around the threaded portion.
- (4) Install the oil pressure switch to the cylinder block.
Tightening Torque: 13.5 ± 4.0 N·m

NOTE:

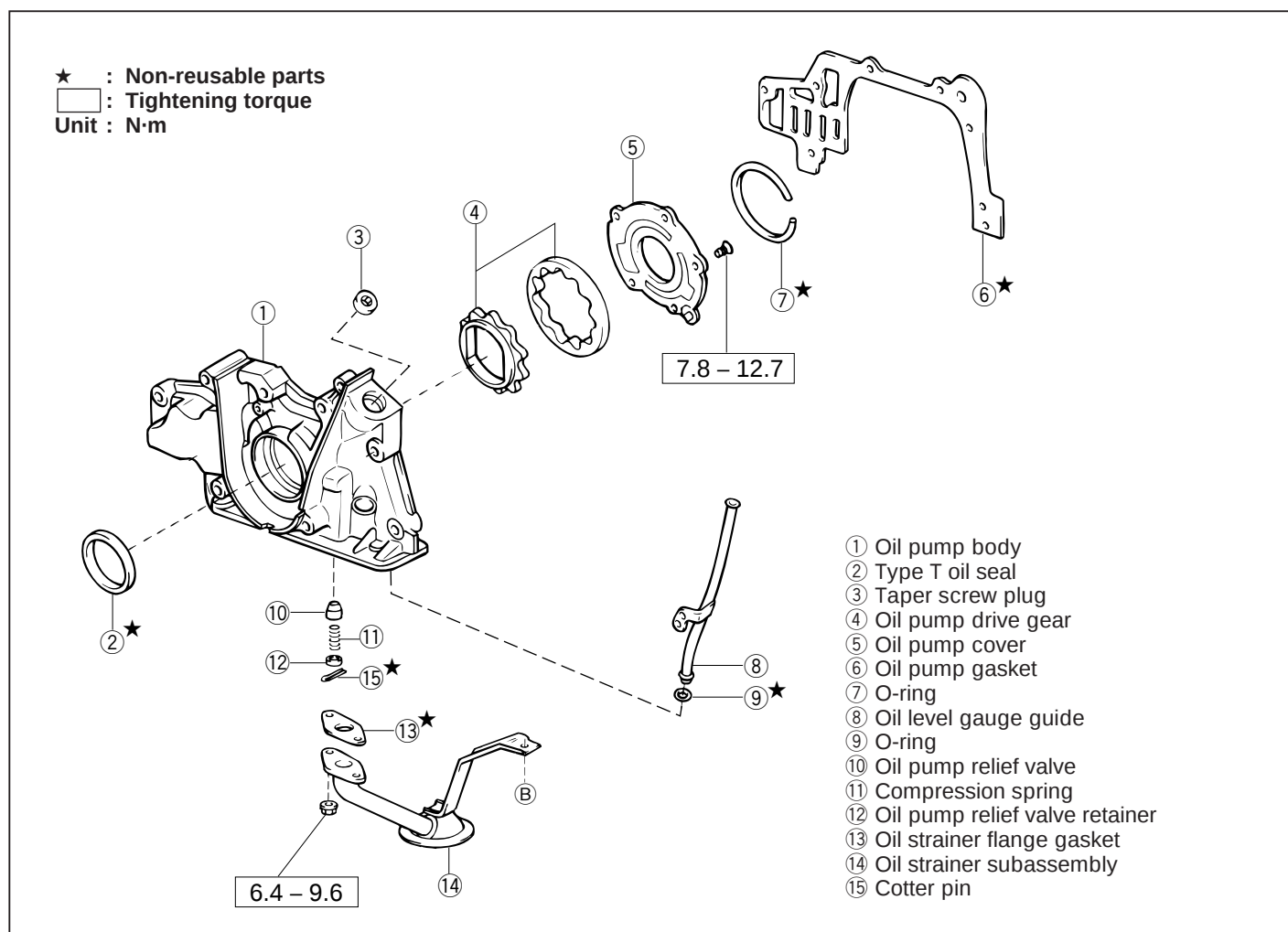
- A new oil pressure switch is coated with sealer.
- Therefore, when replacing the oil pressure switch with a new one, remove the sealer thoroughly before winding seal tape. Be sure to clean the threaded holes at the cylinder block side.

- (5) Connect the connector of the oil pressure switch.
- (6) Connect the ground cable terminal to the negative (–) terminal of the battery.
- (7) Start the engine and check it for oil leakage. Repair the leaky point if oil leakage exists.



MLU00011-00010

OIL PUMP COMPONENTS



MLU00012-00011

REMOVAL / INSTALLATION

NOTE:

- In order to remove/install the oil pump, it is necessary to remove the oil pan. For a reliable service, it is not recommended to perform this operation with the engine mounted on the vehicle. Therefore, this manual describes only for the operation that is to be performed after the engine has been removed from the vehicle.
- For the operations that precede the removal/installation of the oil pump, refer to the EM section of this manual.

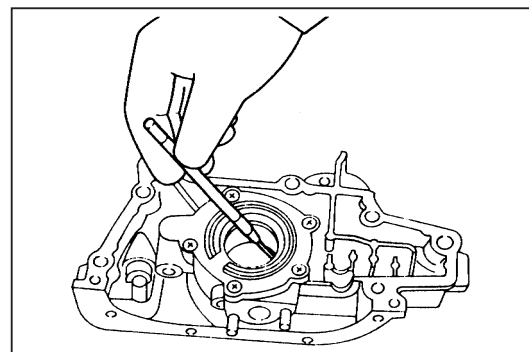
MLU00013-00000

DISASSEMBLY

1. Remove the type T oil seal from the oil pump body.

NOTE:

- Be very careful not to damage the oil pump during the removal.
- Never reuse the used oil seal.



MLU00014-00012

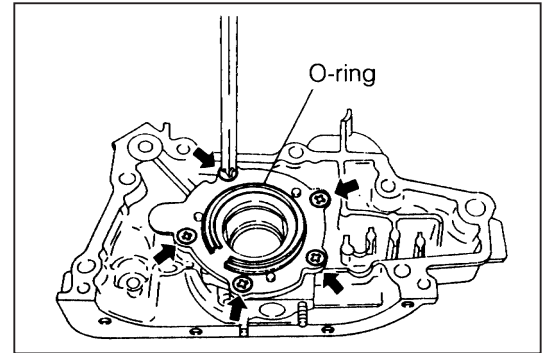
LU-6

2. Remove the O-ring.

NOTE:

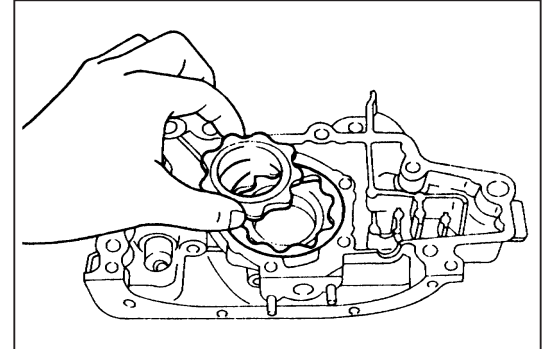
- Never reuse the used O-ring.

3. Detach the oil pump cover.



MLU00015-00013

4. Remove the oil pump drive gear.

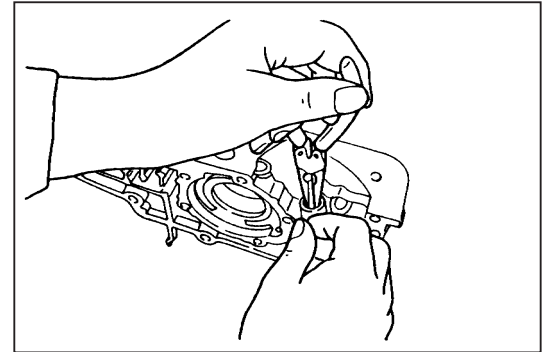


MLU00016-00014

5. Pull out the cotter pin, while pushing the spring retainer with nose pliers or the like.

NOTE:

- Put an appropriate cloth, etc. on the retainer spring so that it may not jump out.
- Never reuse the used cotter pin.

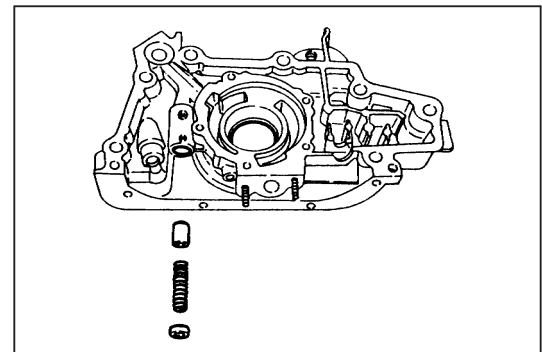


MLU00017-00015

6. Remove the oil pump relief valve spring retainer, compression spring and oil pump relief valve.

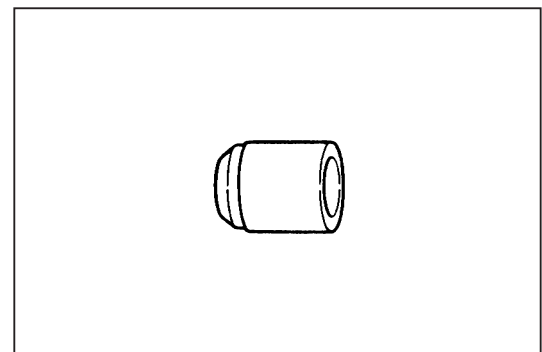
NOTE:

- Wash the disassembled parts in cleaning solvent.



MLU00018-00016

- (1) Check the oil pump relief valve for damage. Replace the relief valve if it exhibits damage. Also, check to see if any damage is present at the relief valve installation hole of the oil pump body.

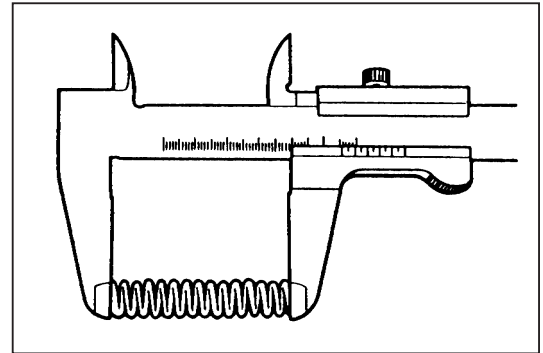


MLU00019-00017

- (2) Check the compression spring for damage. Also, measure its free length.

Specified Free Length: 35.5 mm

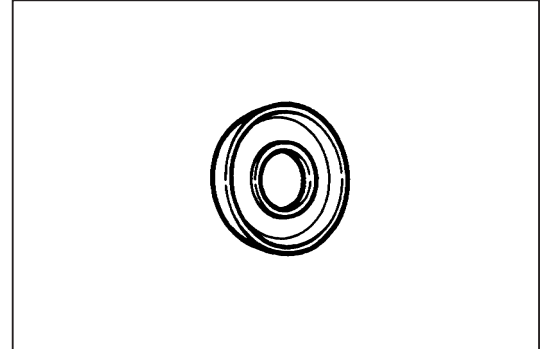
Replace the compression spring if it exhibits damage or the free length is less than the specified value.



MLU00020-00018

- (3) Check the oil pump relief valve spring retainer for damage.

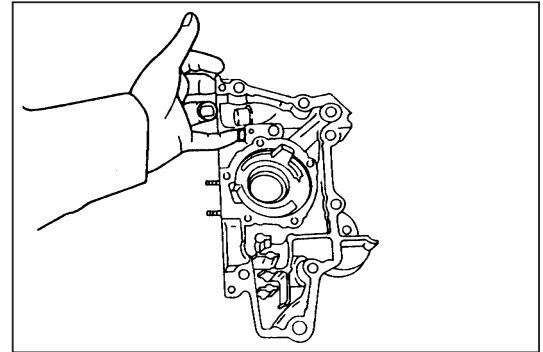
Replace the retainer if it exhibits damage.



MLU00021-00019

- (4) Apply engine oil to the oil pump relief valve. Insert the oil pump relief valve into the oil pump body. Check to see if the valve slides smoothly.

Replace the oil pump body if the valve fails to slide smoothly.

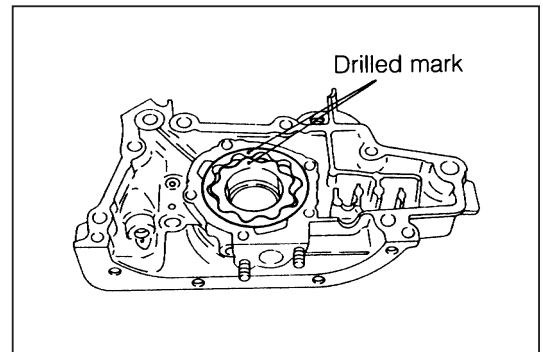


MLU00022-00020

7. Measurement of body clearance, tip clearance and side clearance

- (1) Apply a thin film of engine oil to the oil pump drive gear mate surface of the oil pump body as well as to the rotor set.

Assemble the oil pump drive gear in the oil pump body in such a way that the drilled mark may be seen from the outside.



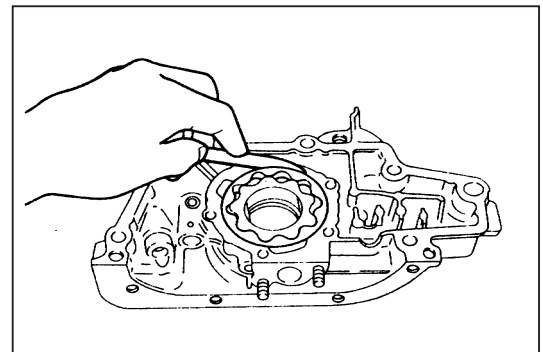
MLU00023-00021

- (2) Measure the body clearance between the oil pump body and the outer rotor, using a thickness gauge.

Body Clearance: 0.10 - 0.185 mm

Maximum Limit: 0.25 mm

Replace the oil pump if the body clearance exceeds the specified value.



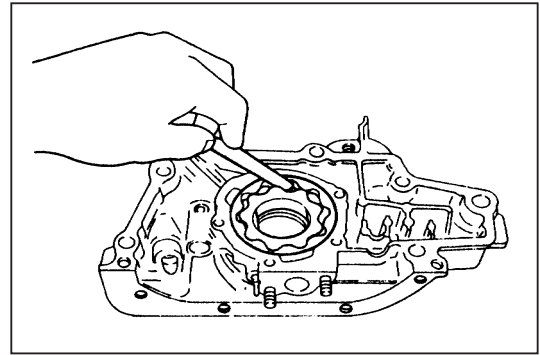
MLU00024-00022

- (3) Measure the tip clearance of the oil pump drive gear, using a thickness gauge.

Tip Clearance: 0.17 - 0.24 mm

Maximum Limit: 0.35 mm

Replace the oil pump drive gear if the tip clearance exceeds the specified value.



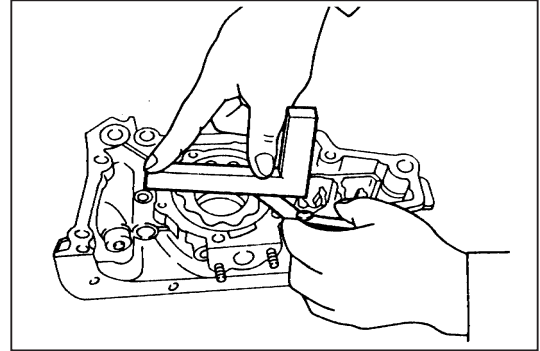
MLU00025-00023

- (4) Measure the side clearance between the oil pump body and the oil pump drive gear, using a straight-edge and a thickness gauge.

Side Clearance: 0.035 - 0.070 mm

Maximum Limit: 0.15 mm

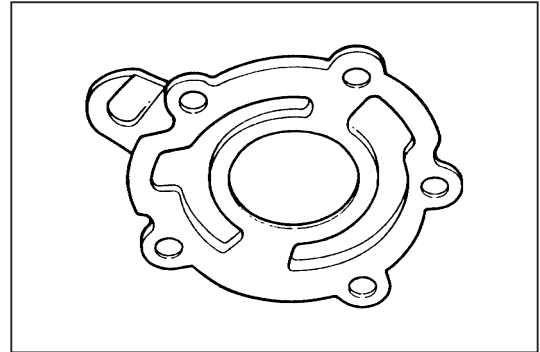
Replace the oil pump if the side clearance exceeds the specified value.



MLU00026-00024

8. Check to see if any wear is present at the oil pump drive gear mate surface of the pump cover.

Replace the oil pump cover if it exhibits wear.



MLU00027-00025

ASSEMBLY

WARNING:

- When you use compressed air, be sure to protect your eyes, wearing safety goggles.

NOTE:

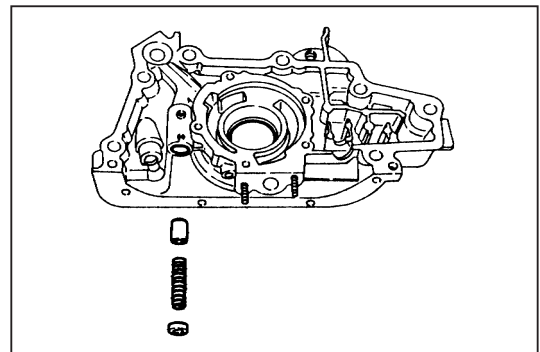
- Wash those parts to be assembled in cleaning solvent. Dry them using compressed air.

MLU00028-00000

1. Apply engine oil to the relief valve. Then, insert the relief valve into the oil pump body.
2. Insert the compression spring and retainer into the oil pump body.

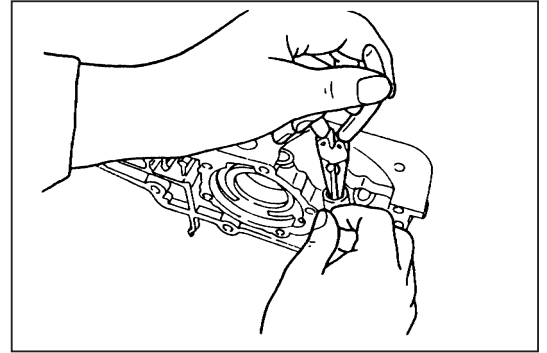
NOTE:

- Install the retainer in such a direction that its projected side may come at the compression spring side.



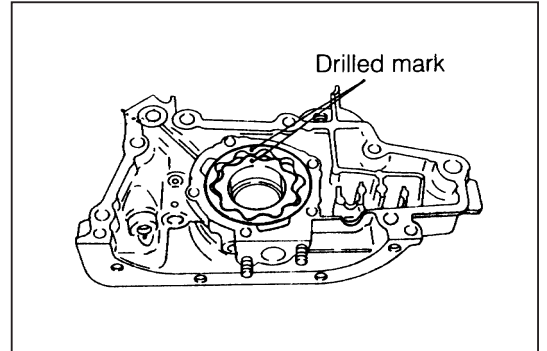
MLU00029-00026

3. Insert a new cotter pin into the retainer while the retainer is being compressed with pliers, etc. Split the end of the cotter pin to form an anchor-like shape.



MLU00030-00027

4. Apply engine oil to the oil pump drive gear. Assemble the oil pump drive gear in the pump body in such a direction that the drilled mark of the rotor may be seen from the outside.

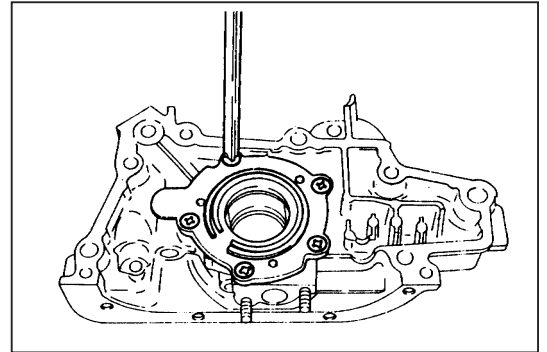


MLU00031-00028

5. Install the oil pump cover. Tighten the cover to the specified torque.

Tightening Torque: 7.8 - 12.7 N·m

6. Install a new O-ring.



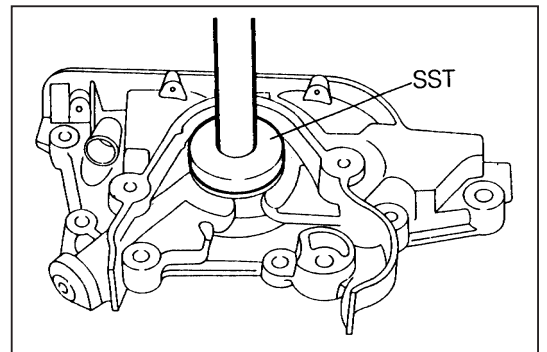
MLU00032-00029

7. Drive a new oil seal into position, using the following SST.

SST: 09608-87302-000

NOTE:

- Be very careful not to damage the oil pump during the installation.
- Make sure that the oil seal is not driven into position in a tilted state.



MLU00033-00030

SERVICE SPECIFICATIONS

	Grade	Capacity
Engine oil	SG or higher	With oil filter 2.3 r Without oil filter 2.1 r
Oil pump	Compression spring free length	35.5 mm
	Body clearance	0.10 - 0.185 mm
	Tip clearance	0.17 - 0.24 mm
	Side clearance	0.035 - 0.070 mm
	Oil pressure at 1000 rpm	147 kPa (1.5kgf/cm ²)
	at 4000 rpm	343 kPa (3.5kgf/cm ²)

MLU00036-00000

SST

Shape	Part No.	Part name	Remarks
	09228-87201-000	Oil filter wrench	
	09990-87702-000	Oil pressure gauge	
	09608-87302-000	Axle hub & drive pinion bearing tool set	

MLU00034-00031

TIGHTENING TORQUE

Components	N·m	kgf-m
Drain plug	24.0 ± 4.8	2.5 ± 0.5
Oil pressure switch × cylinder block	13.5 ± 4.0	1.4 ± 0.4
Oil pump cover × oil pump body	7.8 – 12.7	0.8 – 1.3
Oil pump cover × oil strainer	6.4 – 9.6	0.65 – 0.98

MLU00035-00000