
ENGINE LUBRICATION



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GENERAL INFORMATION

12100010114

The lubrication method is a fully force-fed, full-flow filtration type. The oil pump for 6A1 engines is a trochoid type which is directly mounted to the crankshaft, and the one for 4G6 and 4D6 engines is a gear type which is driven by the crankshaft

via the timing belt.

Furthermore, the oil level sensor is located in the oil pan, and a system is equipped whereby an indicator gives a warning when the oil level drops.

ENGINE OILS

Health Warning

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. Adequate means of skin protection and washing facilities must be provided.

Recommended Precautions

The most effective precaution is to adapt working practices which prevent, as far as practicable, the risk of skin contact with mineral oils, for example by using enclosed systems for handling used engine oil and by degreasing components, where practicable, before handling them.

Other precautions:

- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Avoid contaminating clothes, particularly underpants, with oil.
- Do not put oily rags in pockets, the use of overalls without pockets will avoid this.
- Do not wear heavily soiled clothing and oil-impregnated foot-wear. Overalls must be cleaned regularly and kept separate from personal clothing.

- Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided.
- Obtain First Aid treatment immediately for open cuts and wounds.
- Wash regularly with soap and water to ensure all oil is removed, especially before meals (skin cleansers and nail brushes will help). After cleaning, the application of preparations containing lanolin to replace the natural skin oils is advised.
- Do not use petrol, kerosine, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- Use barrier creams, applying them before each work period, to help the removal of oil from the skin after work.
- If skin disorders develop, obtain medical advice without delay.

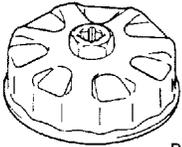
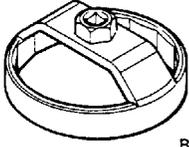
LUBRICANTS

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Items		4G6	6A1	4D6
Engine oil (API classification)		SG or higher	SG or higher	CD or higher
Engine oil quantity L	Oil filter	0.3	0.3	0.8
	Oil cooler	-	0.1	0.3
	Total	4.3	4.3	5.1

SPECIAL TOOLS

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Tool	Number	Name	Use
	MB991396	Oil filter wrench	Removal and installation of engine oil filter (When using the oil filter of MD135737) <4G6>
	MB991610	Oil filter wrench	Removal and installation of engine oil filter (When using the oil filter of MD136466) <6A1>

ON-VEHICLE SERVICE

12100090095

ENGINE OIL CHECK

1. Pull out the level gauge slowly and check that the oil level is in the illustrated range.
2. Check that the oil is not excessively dirty, that there is no coolant or gasoline mixed in, and that it has sufficient viscosity.

ENGINE OIL REPLACEMENT

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1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C.
2. Remove the engine oil filler cap.
3. Remove the drain plug to drain oil.

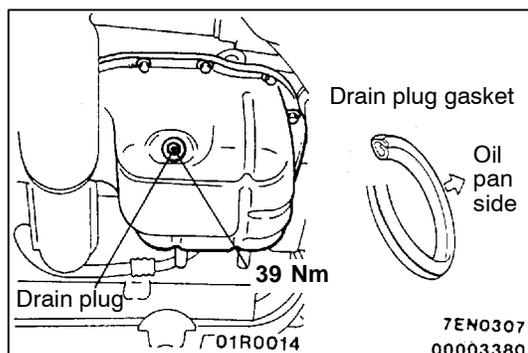
Caution

Use care as oil could be hot.

4. Install a new drain plug gasket so that it faces in the direction shown in the illustration, and then tighten the drain plug to the specified torque.

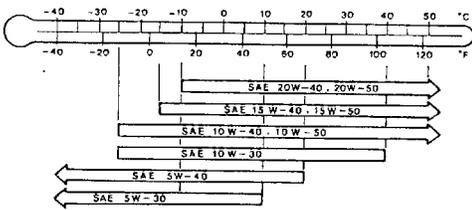
NOTE

Install the drain plug gasket so it faces in the direction shown in the illustration.



<Petrol-powered vehicles>

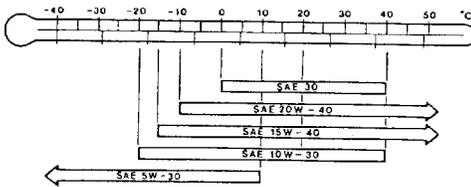
Barometric temperature



M03B019

<Diesel-powered vehicles>

Barometric temperature

M03B017
00004957

5. Refill with specified quantity of oil.

Specified Engine Oil (API classification):

<4G6, 6A1> SG or higher
<4D6> CD or higher

Total quantity (Includes volume inside oil filter and oil cooler):

<4G6, 6A1> 4.3 L
<4D6> 5.1 L

6. Install the engine oil filler cap.
7. Check oil level.

OIL FILTER REPLACEMENT

12100110159

1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C.
2. Remove the engine oil filler cap.
3. Remove the drain plug to drain oil.

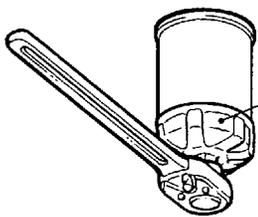
Caution**Use care as oil could be hot.**

4. Use the respective tool in the following table to remove the engine oil filter.

Caution

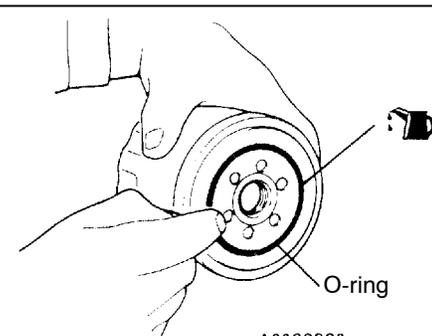
For vehicles with 6A1 engine, the oil which is still inside the oil filter may overflow from the oil guide groove and get onto the starter motor. To prevent this, the oil inside the filter should be gradually removed while removing the oil filter.

5. Clean the filter bracket side mounting surface.



MB991396,
MB991610
or commercially-avail-
able tool

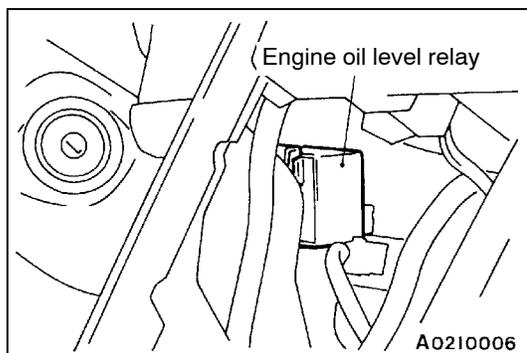
A04Z0002



A02S0003

6. Apply a small amount of engine oil to the O-ring of the new oil filter.
7. Once the O-ring of the oil filter is touching the flange, use the respective tool in the following table to tighten to the specified torque.
8. Install the drain plug and refill engine oil. (Refer to Engine Oil Replacement on P.12-3.)
9. Race the engine 2 - 3 times, and check to be sure that no engine oil leaks from installation section of the oil filter.

Number	Engine	Tool	Tightening torque
MD135737	4G6	MB991396 or equivalent tool	Approx. 1 turn (14 Nm)
MD136466	6A1	MB991610 or equivalent tool	Approx. 3/4 turn (17 Nm)
MD336080	4D6	Commercially-available tool	Approx. 1-1/8 turns (20 Nm)

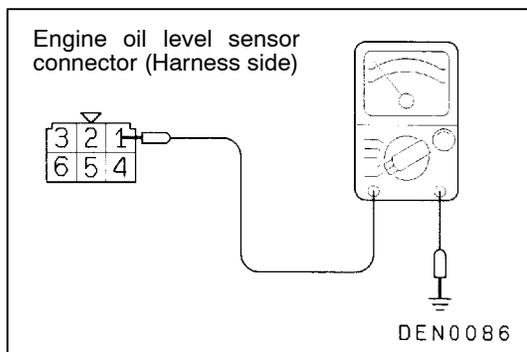


OIL LEVEL WARNING SYSTEM CHECK 12100200047

1. Check that the proper amount of oil has been filled.
2. When the ignition switch is turned to ON (do not start the engine), check that the oil level warning lamp illuminates.

NOTE

If the oil level warning lamp does not illuminate, the cause is probably a blown lamp, or a malfunction in the relay.

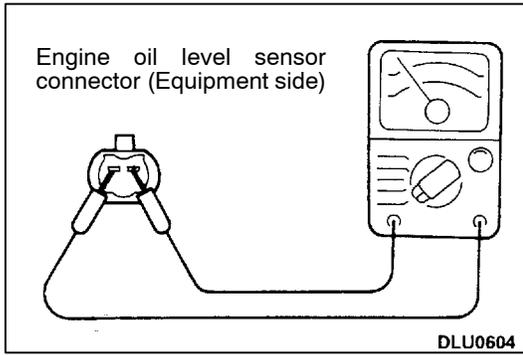


3. When the engine is started, check that the oil level warning lamp turns off.

If the oil level warning lamp will not go out, disconnect the connector of the oil level relay and measure the voltage of the No.1 terminal on the harness side of the connector while idling the engine in order to confirm that it is the same as the battery voltage.

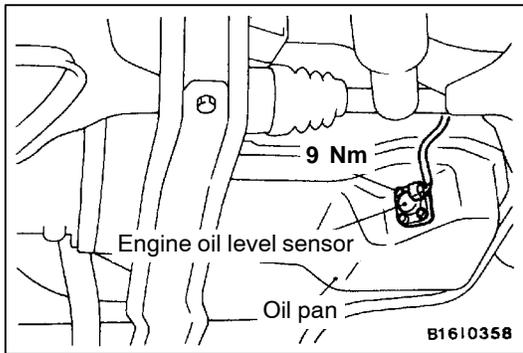
NOTE

- (1) If the voltage at the connector is the same as the battery voltage, the problem is probably a malfunction of either the oil level relay or the oil level sensor.
 - (2) If the voltage at the connector is lower than the battery voltage, the problem is probably a malfunction of either the alternator or the wiring harness.
4. Disconnect the oil level sensor connector. Check that the oil level warning lamp illuminates after approximately 40 seconds.
If the oil level warning lamp does not illuminate, replace the oil level relay.



5. Check the continuity between the oil level sensor terminals.

Engine oil temperature	Oil level	Continuity
At 50°C or lower	Normal (proper volume)	Continuity
	Low (drained)	Continuity
At 60°C or higher	Normal (proper volume)	Continuity
	Low (drained)	No continuity



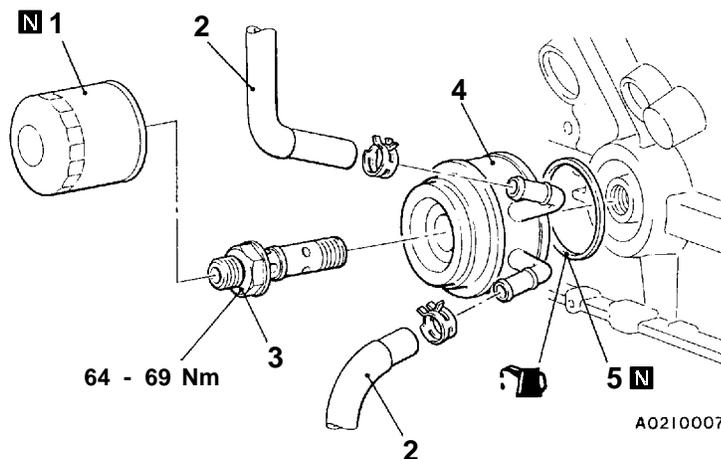
6. If there is a defect, replace the oil level sensor.

ENGINE OIL COOLER <6A1>

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REMOVAL AND INSTALLATION

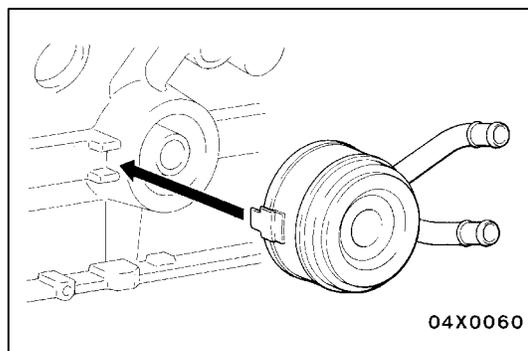
Pre-removal and Post-installation Operation
 Engine Coolant Draining and Supplying
 (Refer to GROUP 14 - On-vehicle Service.)

**Removal steps**

1. Oil filter (Refer to P.12-4.)
2. Water hose connection
3. Oil cooler bolt



4. Engine oil cooler
5. O-ring

**INSTALLATION SERVICE POINT****▶A◀ ENGINE OIL COOLER INSTALLATION**

Insert the engine oil cooler positioning tab into the cylinder block rib, and tighten it with the oil cooler bolt.

INSPECTION

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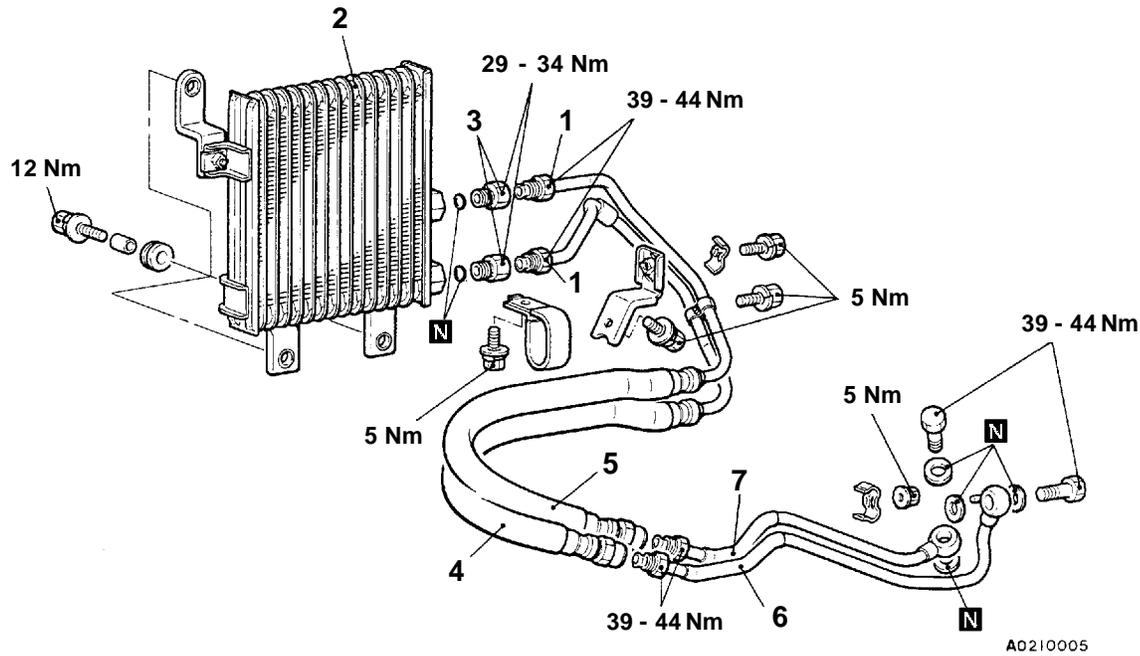
- Check the water hoses for crack, damage, clogging or deterioration.
- Check the oil cooler bolt for clogging or deformation.

ENGINE OIL COOLER <4D6>

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

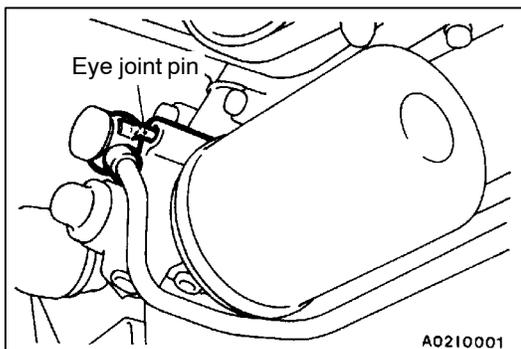
- Engine Oil Draining and Supplying (Refer to P.12-3.)
- Front Bumper Removal and Installation (Refer to GROUP 51.)
- Air Guide Panel Removal and Installation

**Removal steps**

1. Hose assembly and joint connection
2. Engine oil cooler
3. Joint



4. Return hose assembly
5. Feed hose assembly
6. Return tube assembly
7. Feed tube assembly

**INSTALLATION SERVICE POINT****▶A◀RETURN TUBE ASSEMBLY INSTALLATION**

Insert the eye joint pin into the oil filter bracket hole and install the return tube assembly.

INSPECTION

12100140127

- Check for foreign material between oil cooler fins.
- Check the oil cooler fins for bend or damage.
- Check the oil cooler hoses for crack, damage, clogging or deterioration.
- Check the eye bolts for clogging or deformation.

NOTES