
ENGINE LUBRICATION

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GENERAL INFORMATION

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The lubrication method is a fully force-fed, full-flow filtration type.

The corrugate fin type of engine oil cooler have been adopted, and installed forward of the radiator. <4D5>

Items	6G7, 4D5
Oil pump type	Trochoid type
Drive method	Crankshaft

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.

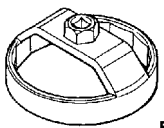
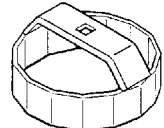
LUBRICANTS

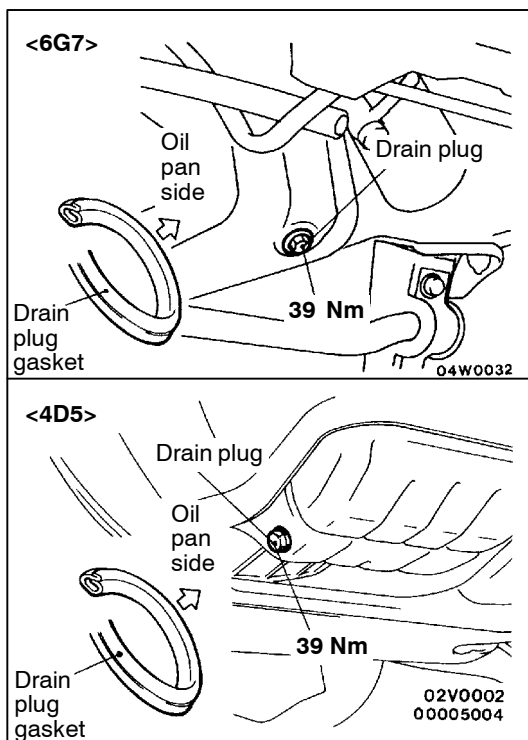
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Items		6G7	4D5
Engine oil API classification		SG or higher	CD or higher
Engine oil quantity L	Oil filter	0.3	0.8
	Oil cooler	–	0.4
	Total	4.5	6.5

SPECIAL TOOLS

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Tool	Number	Name	Use
 B991610	MB991610	Oil filter wrench	Removal and installation of engine oil filter (When using the oil filter of MD352626) <6G7>
 H061590	MH061590	Oil filter wrench	Removal and installation of engine oil filter (When using the oil filter of MD069782 or MD326489) <4D5>



ON-VEHICLE SERVICE

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ENGINE OIL CHECK

1. Check the engine oil using the oil level gauge.
2. Check that the oil is not excessively dirty, that there is no coolant or petrol mixed in, and that it has sufficient viscosity.

ENGINE OIL REPLACEMENT

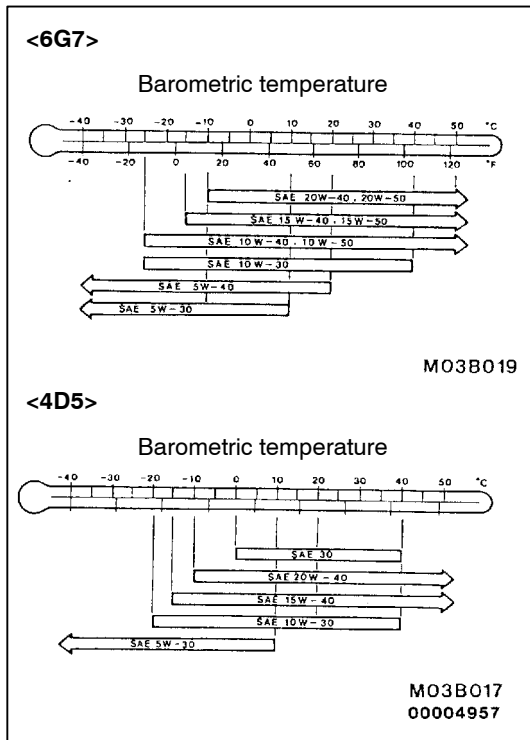
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1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C.
2. Remove the engine oil filler cap.
3. Remove the drain plug to drain oil.

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.



5. Refill with specified quantity of oil.

Specified Engine Oil (API classification):

- <6G7> SG or higher
- <4D5> CD or higher

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

- <6G7> 4.5 L
- <4D5> 6.5 L

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

OIL FILTER REPLACEMENT

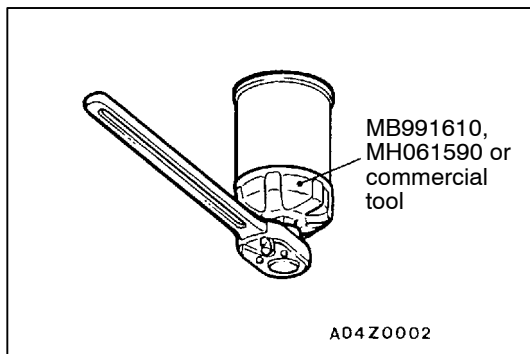
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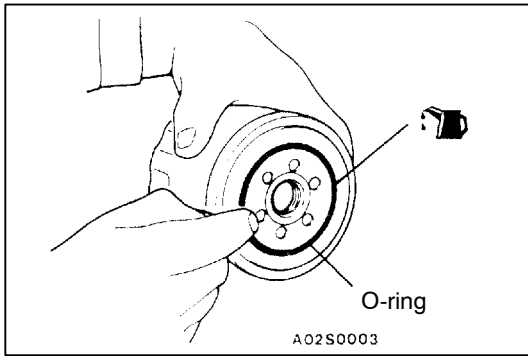
1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C.
2. Remove the engine oil filler cap.
3. Remove the under cover.
4. Remove the drain plug to drain oil.

Caution

Use care as oil could be hot.

5. Remove the air cleaner, and cover the alternator with a rag so that oil will not get on the alternator. <4D56>
6. Use the respective tool in the following table to remove the engine oil filter.
7. Clean the filter bracket side mounting surface and ensure the old O-ring has been removed.





8. Apply a small amount of engine oil to the O-ring of the new oil filter.
9. 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.
10. Install the drain plug and refill the engine oil. (Refer to P.12-3, Engine Oil Replacement.)

Specified Engine Oil (API classification):

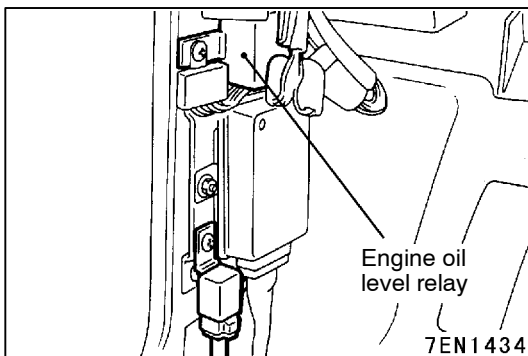
- <6G7> SG or higher
- <4D5> CD or higher

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

- <6G7> 4.5 L
- <4D5> 6.5 L

11. Race the engine a few times, and check to be sure that no engine oil leaks from the installation section of the oil filter.

Number	Engine	Tool	Tightening torque
MD352626	6G7	MB991610 or equivalent tool	Approx. 3/4 turn (14 Nm)
MD069782	4D5	MH061590 or equivalent tool	Approx. 5/8 turn (20 Nm)
MD326489			Approx. 3/4 turn (22 Nm)

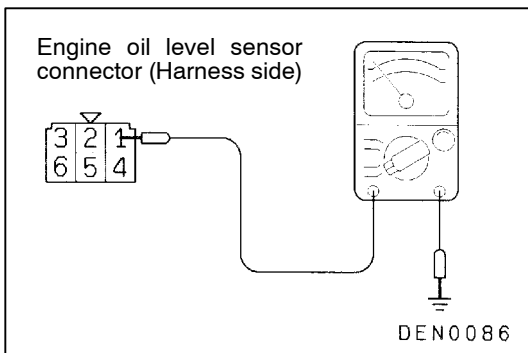


OIL LEVEL WARNING SYSTEM CHECK 12100200054

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.



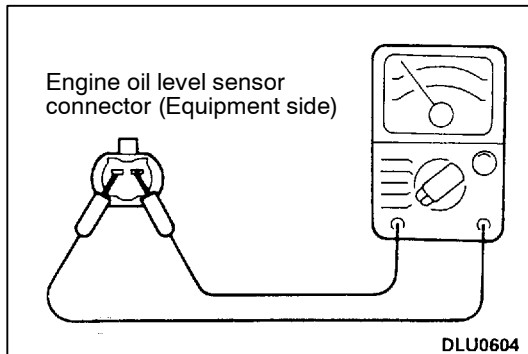
3. When the engine is started, check that the oil level warning lamp turns off.

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

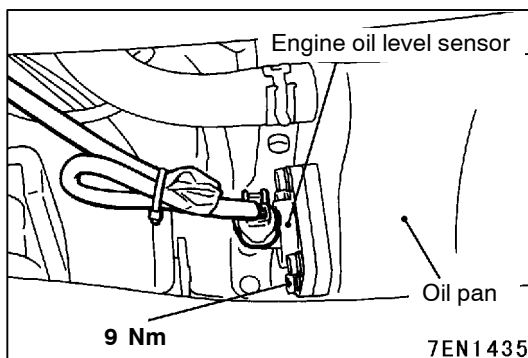
- (1) If the voltage at the connector is the same as the battery voltage, the problem is probably a malfunction of either the oil level relay or the oil level sensor.

- (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 <4D5>

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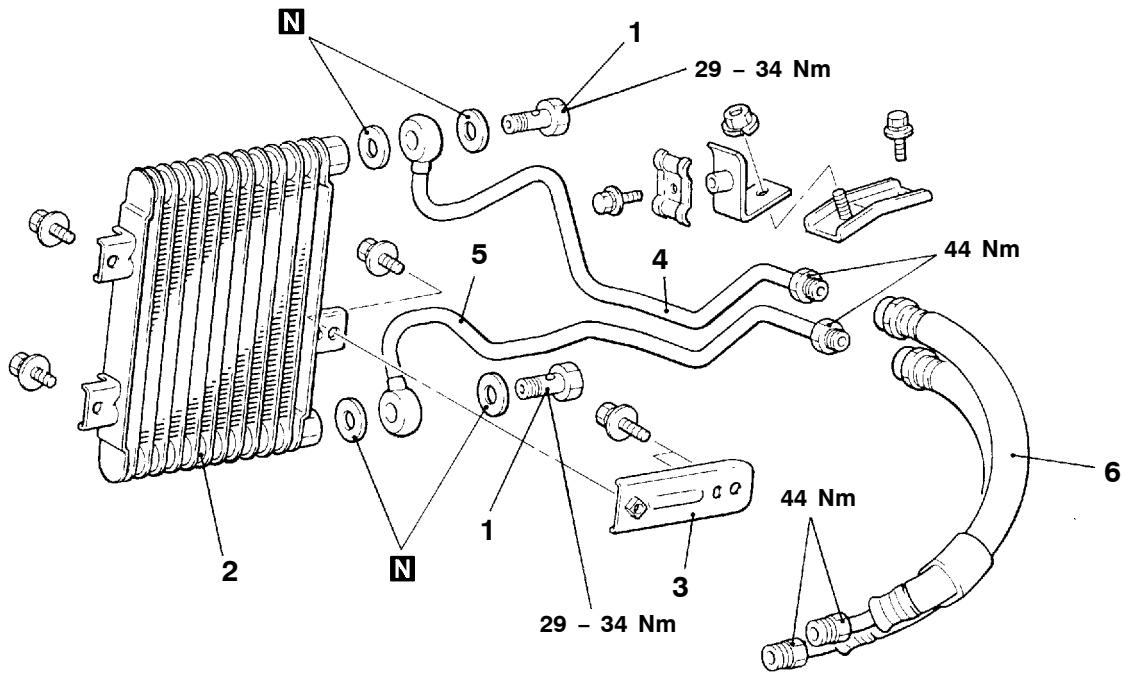
REMOVAL AND INSTALLATION

Pre-removal Operation

- Radiator Grille Removal

Post-installation Operation

- Radiator Grille Installation
- Engine Oil Checking and Supplying (Refer to P.12-3.)



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Oil cooler removal steps



1. Eye bolts
2. Oil cooler assembly
3. Stay

Oil cooler tube and hose removal steps



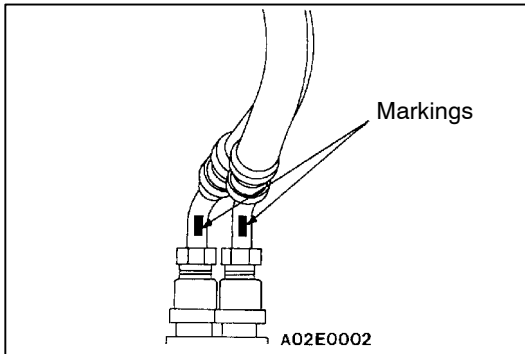
1. Eye bolts
 4. Oil return tube
 5. Oil feed tube
 - Engine oil filter (Refer to P.12-4.)
- ▶A◀ 6. Oil cooler hose assembly

REMOVAL SERVICE POINT

◀A▶ **EYE BOLTS REMOVAL**

Caution

Be sure to hold the weld nut of the oil cooler while loosening the eye bolt.



INSTALLATION SERVICE POINTS

►A◄ OIL COOLER HOSE ASSEMBLY (ENGINE SIDE) INSTALLATION

Install the oil cooler hose assembly with the markings facing upwards.

►B◄ EYE BOLT INSTALLATION

1. Provisionally tighten the eye bolt.
2. Align the white markings of the oil feed tube and oil return tube with the clamps, and then tighten them provisionally.
3. Tighten eye bolt to the specified torque.

Caution

Be sure to hold the weld nut of the oil cooler while tightening the eye bolt.

4. Tighten the clamp mounting bolt securely.