
ENGINE LUBRICATION

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ENGINE LUBRICATION

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GENERAL INFORMATION

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

An oil cooler with high cooling performance and which is built into the crankcase has been adopted.
<4M4>

Items	6G7	4D5	4M4
Oil pump type	Trochoid type	External gear type	External gear type
Drive method	Crankshaft	Crankshaft gear	Crankshaft gear

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.

SERVICE SPECIFICATIONS

Item			Standard value	Limit
Oil pressure kPa	6G7, 4D5	at idle	29 or more	-
		at 3,500 r/min	294 - 686	-
	4M4	During minimum engine speed with no load	145 or more	49 or more
		During maximum engine speed with no load	295 - 490	195

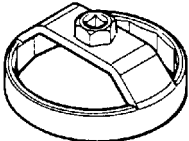
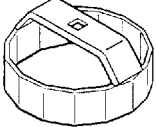
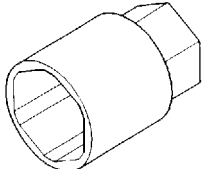
SEALANT

Item	Specified sealant	Remark
Oil pressure switch	3M ATD Part No. 8660 or equivalent	-

LUBRICANTS

Items		6G7	4D5	4M4
Engine oil API classification		SG or higher	CD or higher	CD or higher
Engine oil quantity litre	Oil filter	0.3	0.8	1.0
	Oil cooler	-	0.4	1.3
	Total	4.6	6.5	9.8

SPECIAL TOOLS

Tool	Number	Name	Use
 B991610	MB991610	Oil filter wrench	Removal and installation of engine oil filter (When using the oil filter of MD352626)
 H061590	MH061590	Oil filter wrench	Removal and installation of engine oil filter (When using the oil filter of MD069782 or MD326489 or ME013307)
	MD998054 <6G7, 4D5> MD998012 <4M4>	Oil pressure switch wrench	Removal and installation of oil pressure switch

ON-VEHICLE SERVICE

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 petrol mixed in, and that it has sufficient viscosity.

ENGINE OIL REPLACEMENT

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.

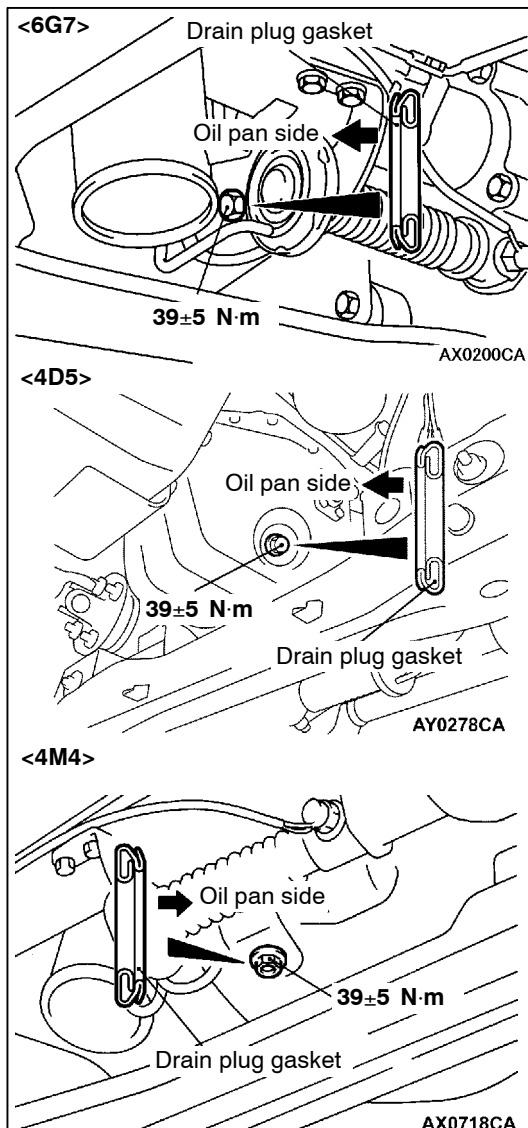
Caution

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.

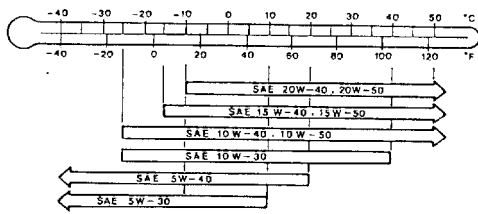
NOTE

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



<6G7>

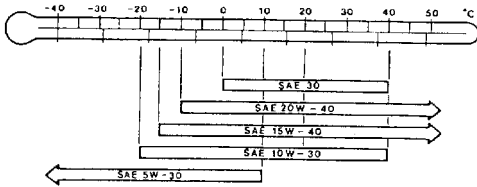
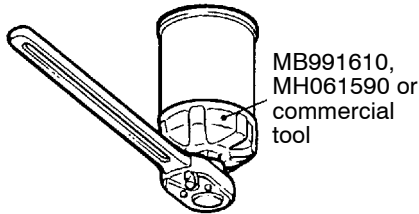
Barometric temperature



M03B019

<4D5, 4M4>

Barometric temperature

M03B017
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A04Z0002

5. Refill with specified quantity of oil.

Specified Engine Oil (API classification):

<6G7> SG or higher

<4D5, 4M4> CD or higher

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

<6G7> 4.6 litre

<4D5> 6.5 litre

<4M4> 9.8 litre

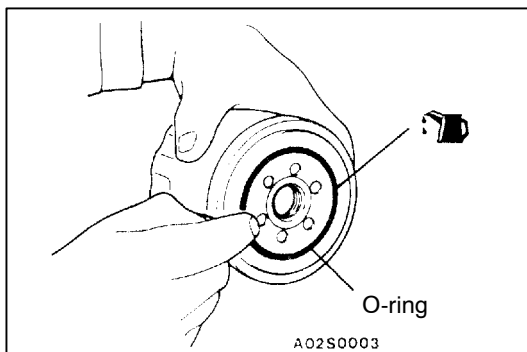
6. Install the engine oil filler cap.
7. Check oil level.

OIL FILTER REPLACEMENT

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.**

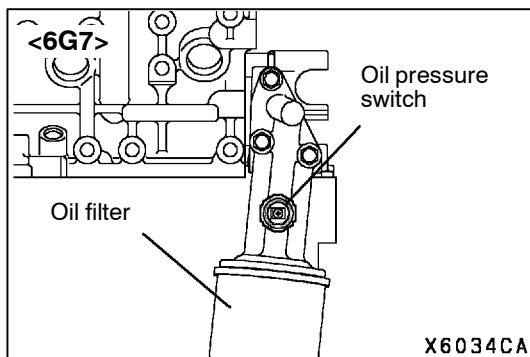
4. Remove the under cover.
5. Use the respective tool in the following table to remove the engine oil filter.
6. Clean the filter bracket side mounting surface.



7. Apply a small amount of engine oil to the O-ring of the new oil filter.
8. 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.
9. Install the drain plug and refill the engine oil. (Refer to Engine Oil Replacement P.12-4.)

10. Race the engine 2-3 times, and check to be sure that no engine oil leaks from installation section of the oil filter.

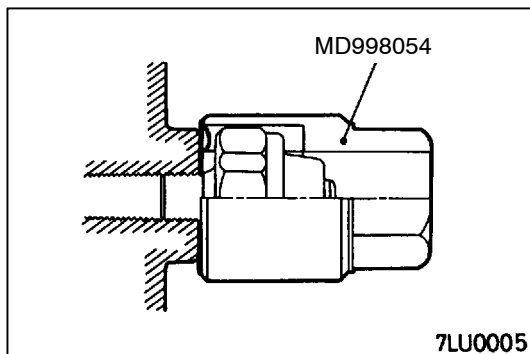
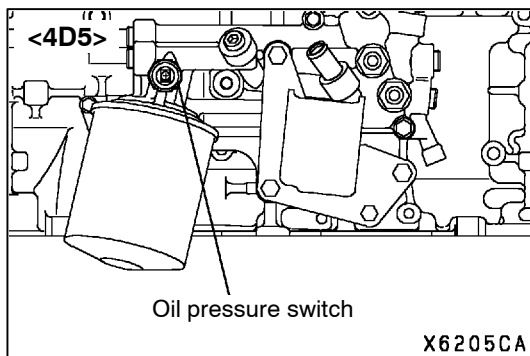
Number	Tool	Tightening torque
MD352626	MB991610 or equivalent tool	Approx. 3/4 turn (14±2 N·m)
ME013307	MH061590 or equivalent tool	Approx. 3/4 turn (20±2 N·m)
MD069782	MH061590 or equivalent tool	Approx. 5/8 turn (20±2 N·m)



OIL PRESSURE CHECK

<6G7, 4D5>

1. Check engine oil quantity.
2. Remove the oil pressure switch terminal.



3. Use the special tool (oil pressure switch wrench) to remove the oil pressure switch.

Caution

Since sealant is applied to the thread of oil pressure switch, take care not to damage the oil pressure switch when removing it.

4. Install the oil pressure gauge.

NOTE

Use a adapter of PT 1/8 thread.

5. Run the engine to warm it.
6. After the engine has been warmed up, check that oil pressure is within the standard value.

Standard value:

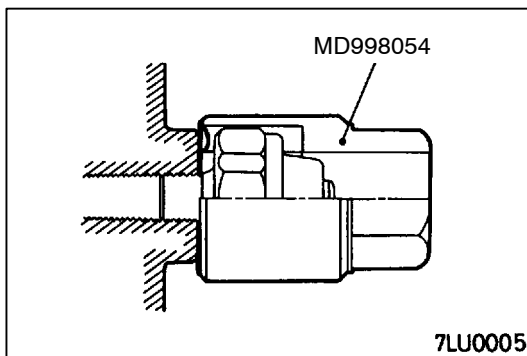
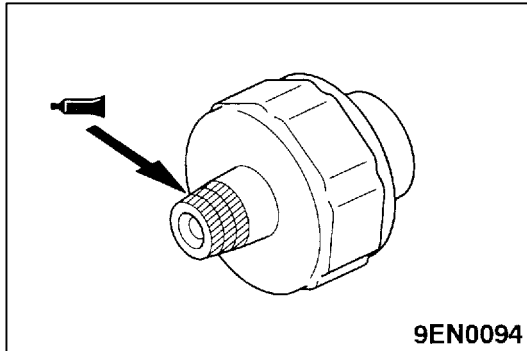
At idle: 29 kPa or more

At 3,500 r/min: 294 - 686 kPa

7. Remove the oil pressure gauge.

8. Apply the specified sealant to the thread of oil pressure switch.

Specified sealant: 3M ATD Part No. 8660 or equivalent



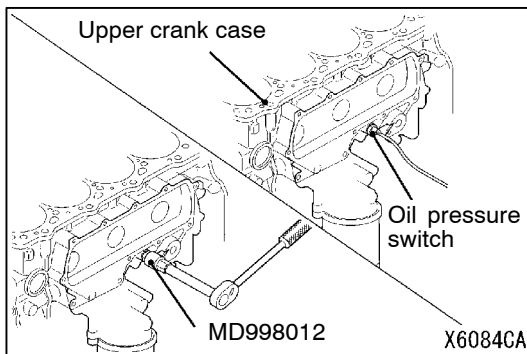
9. Use the special tool to tighten the oil pressure switch to the specified torque.

Tightening torque: 10 N·m

Caution

Do not start the engine within one hour after the oil pressure switch has been installed.

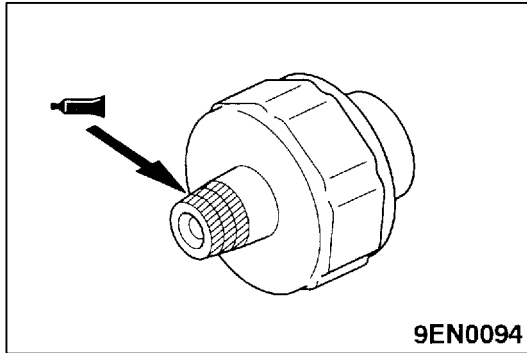
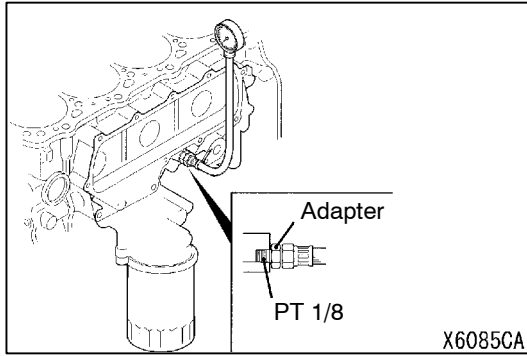
10. Install the oil pressure switch terminal.

**<4M4>**

1. Check engine oil quantity.
2. Remove the oil pressure switch terminal.
3. Use the special tool (oil pressure switch wrench) to remove the oil pressure switch.

Caution

Since sealant is applied to the thread of oil pressure switch, take care not to damage the oil pressure switch when removing it.



4. Install the oil pressure gauge.

NOTE

Use a adapter of PT 1/8 thread.

5. Run the engine to warm it.
6. After the engine has been warmed up, check that oil pressure is within the standard value.

Standard value:

During minimum engine speed with no load: 145 kPa or more

During maximum engine speed with no load: 295 - 490 kPa

Limit:

During minimum engine speed with no load: 49 kPa or more

During maximum engine speed with no load: 195 kPa

7. Remove the oil pressure gauge.
8. Apply the specified sealant to the thread of oil pressure switch.

Specified sealant: 3M ATD Part No. 8660 or equivalent

9. Use the special tool to tighten the oil pressure switch to the specified torque.

Tightening torque: 12 N·m

Caution

Do not start the engine within one hour after the oil pressure switch has been installed.

10. Install the oil pressure switch terminal.

ENGINE OIL COOLER

REMOVAL AND INSTALLATION

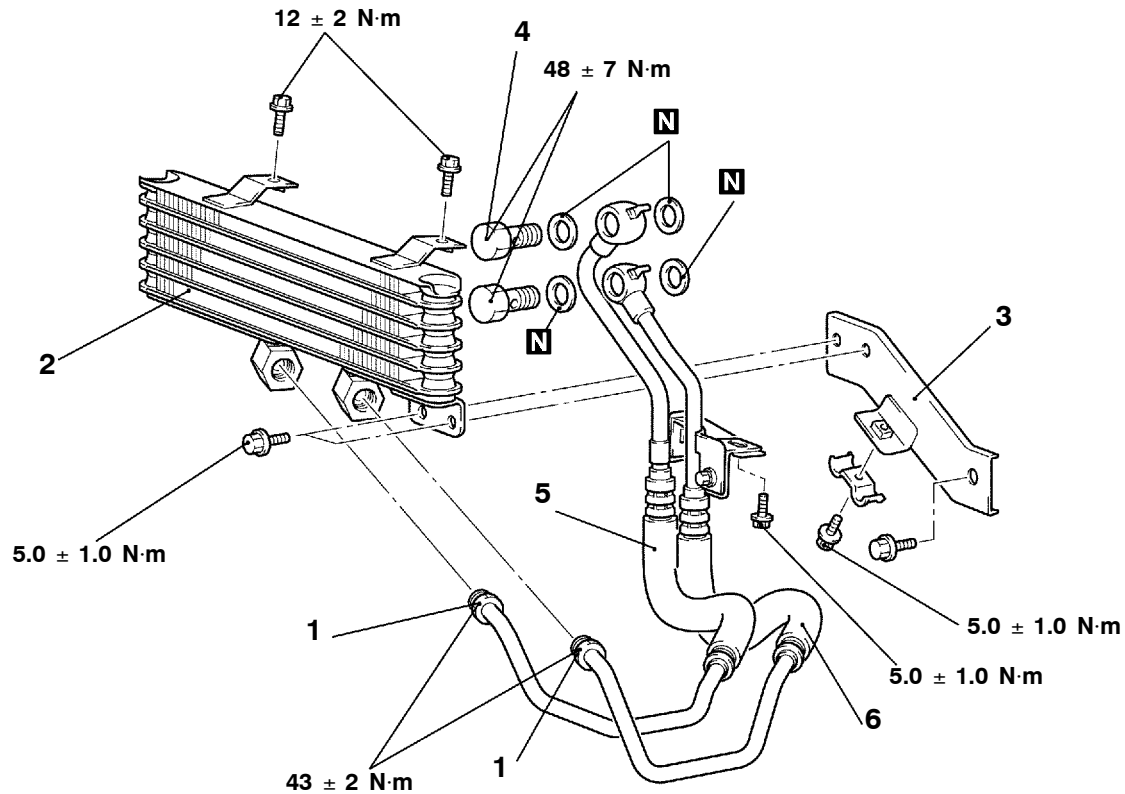
<6G7>

Pre-removal Operation

- Skid Plate and Under Cover Removal
- Radiator Shroud Lower Cover Removal (Refer to GROUP 14 - Radiator.)

Post-installation Operation

- Skid Plate and Under Cover Installation
- Radiator Shroud Lower Cover Installation (Refer to GROUP 14 - Radiator.)
- Engine Oil Refilling and Level Check (Refer to P.12-4.)



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Removal steps

1. Oil cooler hose connection at cooler side
2. Oil cooler assembly
3. Bracket

4. Eye bolts
5. Oil cooler return hose
6. Oil cooler feed hose

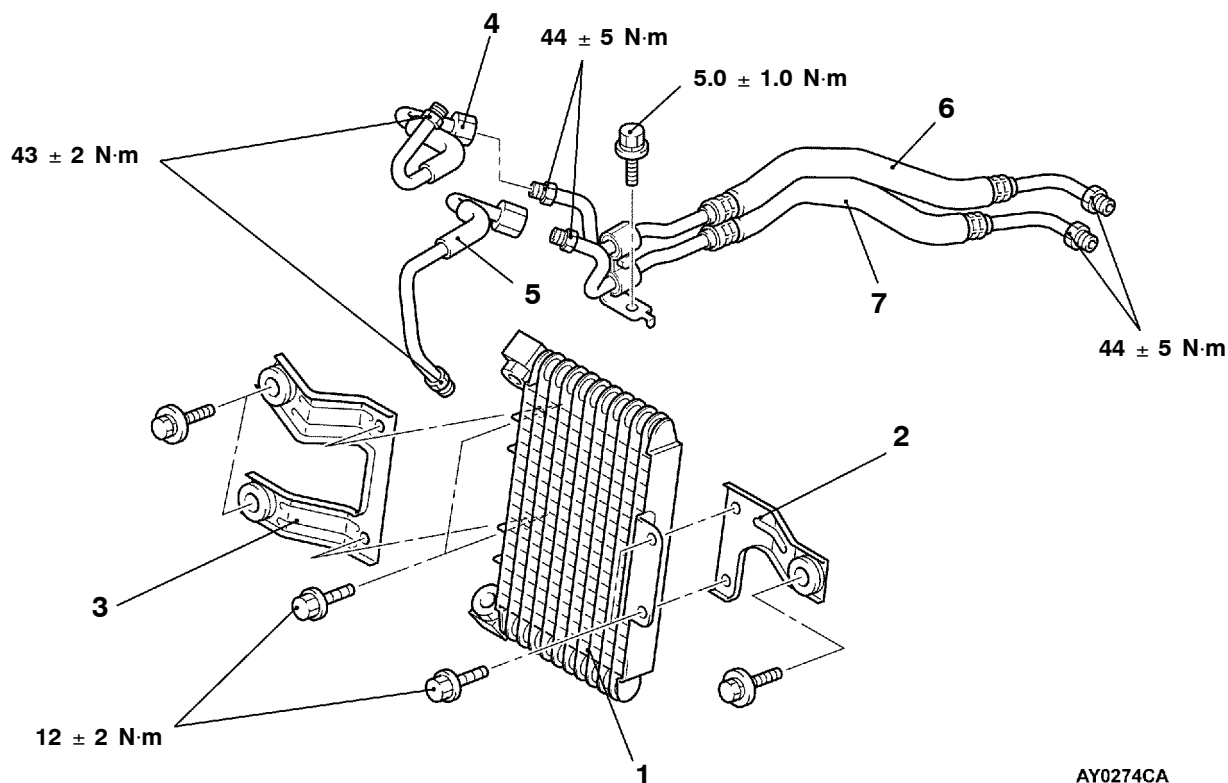
<4D5>

Pre-removal Operation

- Oil Reservoir Removal
- Air Cleaner Removal (Refer to GROUP 15 - Air Cleaner.)

Post-installation Operation

- Oil Reservoir Installation
- Air Cleaner Installation (Refer to GROUP 15 - Air Cleaner.)
- Engine Oil Refilling and Level Check (Refer to P.12-4.)



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Removal steps

- Radiator grille (Refer to GROUP 51.)
- 1. Oil cooler assembly
- 2. Bracket
- Headlamp (Refer to GROUP 54A.)
- 3. Bracket
- Intercooler air pipe (Refer to GROUP 15.)
- 4. Oil cooler return tube
- 5. Oil cooler feed tube
- 6. Oil cooler return hose
- 7. Oil cooler feed hose

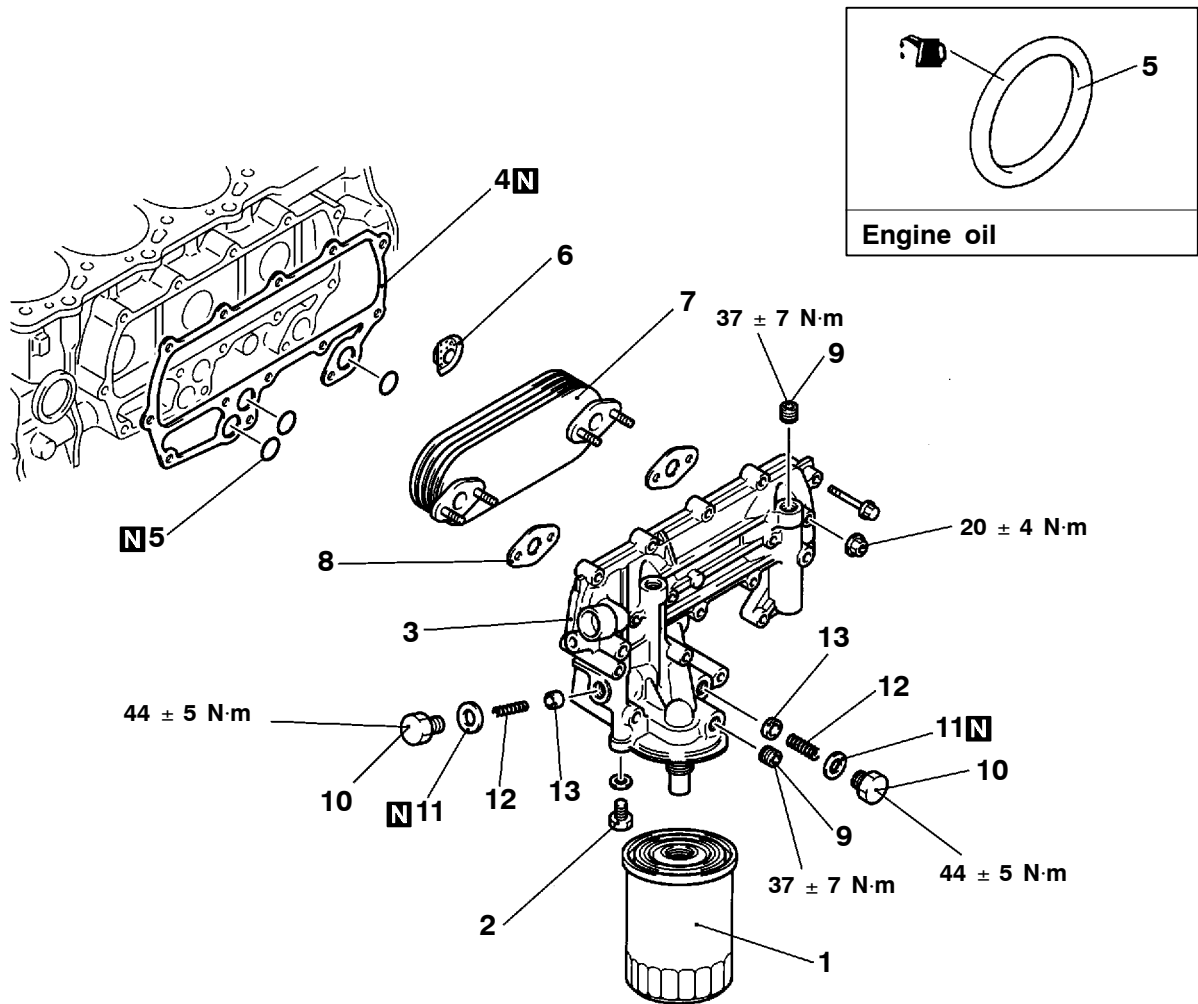
<4M4>

Pre-removal Operation

- Coolant Draining (Refer to GROUP 14 - On-vehicle Service.)
- Turbocharger Removal (Refer to GROUP 33A.)

Post-installation Operation

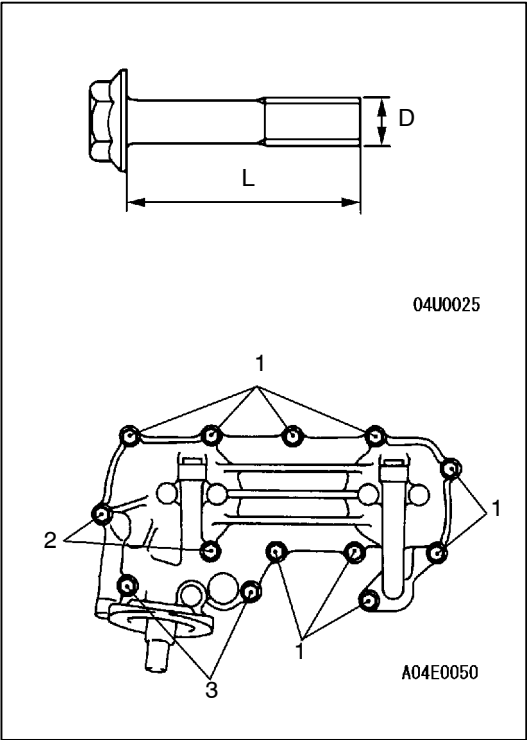
- Turbocharger Installation (Refer to GROUP 15.)
- Coolant Refilling (Refer to GROUP 14 - On-vehicle Service.)
- Engine Oil Refilling and Level Check (Refer to P.12-4.)



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Removal steps

- A◄
1. Oil filter (Refer to P.12-5.)
 2. Water drain plug
 3. Oil cooler assembly
 4. Gasket
 5. O ring
 6. Water separator
 7. Oil cooler element
 8. Gasket
 9. Plug
 10. Plug
 11. Gasket
 12. Spring
 13. Valve
- Engine oil draining (Refer to P.12-4.)



INSTALLATION SERVICE POINT

►A◄ OIL COOLER ASSEMBLY INSTALLATION

Symbol	Head mark	D×L mm
1	7T	8×32
2		8×75
3		10×80

GROUP 12

ENGINE LUBRICATION

GENERAL

OUTLINE OF CHANGE

- The engine oil quantity has been changed as variable geometry (VG) turbocharger has been used.

LUBRICANT

Items		4D5
Engine oil quantity L	Oil filter	0.8
	Oil cooler	0.4
	Total	7.5