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# LUBRICATION

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E12AA--

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## GENERAL INFORMATION

### 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 footwear. 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.

## SPECIFICATIONS

## GENERAL SPECIFICATIONS

E12CA--

Items	6G72	6G74, 4D56
Engine oil cooler Performance J/h (kcal/h, BTU/h)	$12,976 \times 10^3$ (3,100, 12,301)	$26,790 \times 10^3$ (6,400, 25,396)

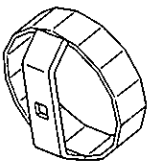
## LUBRICANTS

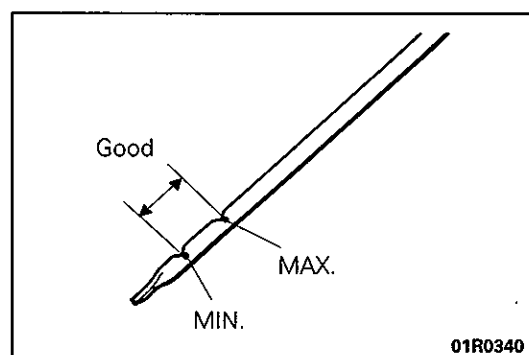
E12CD--

Items	Recommended lubricant	Quantity dm <sup>3</sup> (U.S.qts., Imp.qts.) (including volume inside oil filter and oil cooler)
Engine oil (API classification) <4G64, 6G72, 6G74> <4D56> <4M40>	SG or higher CD or higher CD or higher	4.9 (5.2, 4.3) 6.7 (7.1, 5.9) 7.8 (8.2, 6.9)

## SPECIAL TOOL

E11DA--

Tool	Number	Name	Use
	MH061590	Oil filter wrench	Replacement of oil filter <4M40>



## SERVICE ADJUSTMENT PROCEDURES

## ENGINE OIL INSPECTION

E12FCAC

1. Pull out the oil level gauge and remove oil adhered to the level gauge, wiping with clean cloth.
2. Insert the level gauge into the oil level gauge guide.
3. Pull out the level gauge slowly and check that the oil level is in the illustrated range.

## NOTE

1. For this inspection, place the vehicle on a level surface.
2. Check while the engine is stationary. If the engine has been started, stop it and allow for some time before inspection.

- If below the minimum level, supply with specified oil.

**Specified oil: (API classification)**

<4G64, 6G72, 6G74>

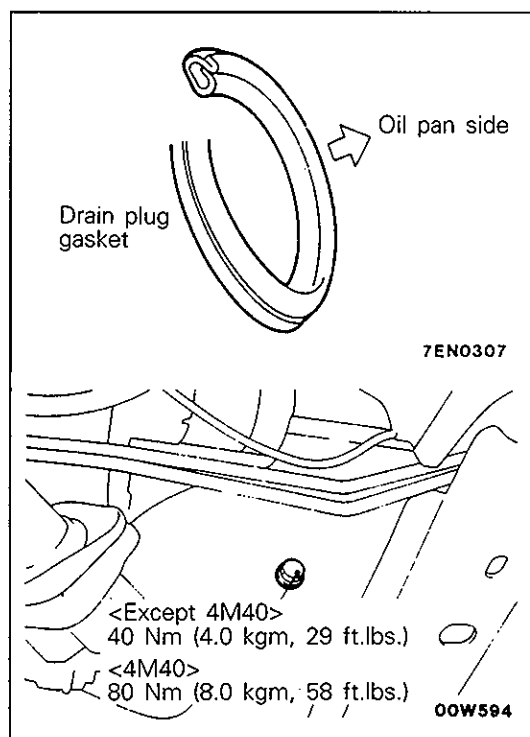
SG or higher

<4D56, 4M40>

CD or higher

**Caution**

Refilling beyond the maximum level has adverse effect on engine performance.



- Run the engine at idle and stop. Then allow some time and check oil level again to make sure it is within the specified range.
- Check that the engine oil is not excessively contaminated and not mixed with the coolant or petrol, and that it has proper viscosity.

## ENGINE OIL REPLACEMENT

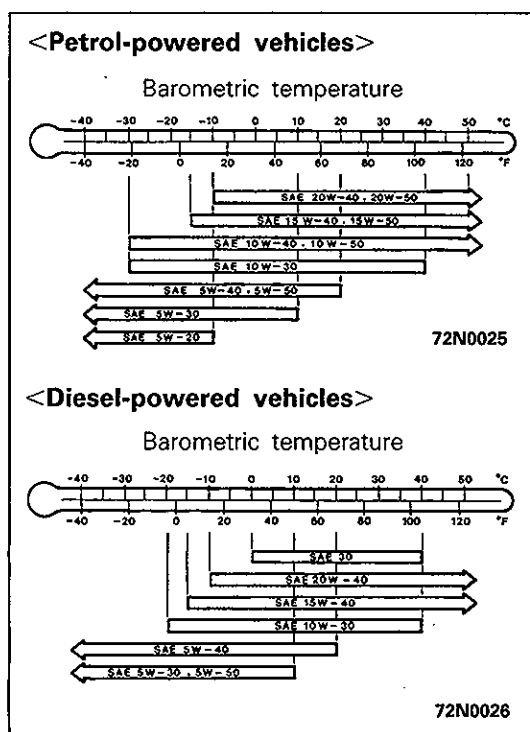
E12FAAD

- Warm up the engine.
- Drain the engine oil by removing the filler cap and then removing the drain plug.

**Caution**

Use care as oil could be hot.

- Replace the drain plug gasket and install so it faces in the direction shown in the illustration. Then tighten the drain plug to the specified torque.



- Fill with new engine oil.

**Specified oil: (API classification)**

<4G64, 6G72, 6G74>

SG or higher

<4D56, 4M40>

CD or higher

**Oil quantity:**

<4G64> 4.5 dm<sup>3</sup> (4.8 U.S. qts., 4.0 Imp. qts.)

<6G72> 4.3 dm<sup>3</sup> (4.5 U.S. qts., 3.8 Imp. qts.)

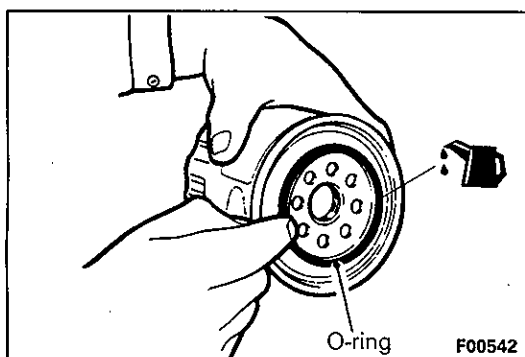
<6G74> 4.3 dm<sup>3</sup> (4.5 U.S. qts., 3.8 Imp. qts.)

<4D56> 5.5 dm<sup>3</sup> (5.8 U.S. qts., 4.8 Imp. qts.)

<4M40> 5.5 dm<sup>3</sup> (5.8 U.S. qts., 4.8 Imp. qts.)

[excluding volume of oil in the oil filter and oil cooler]

- Run the engine for a few minutes.
- Stop the engine and check the oil level with a level gauge.

**OIL FILTER REPLACEMENT**

E12FBAE

1. Warm up the engine.
2. Remove the engine oil drain plug to drain the engine oil.
3. Remove the air intake hose, and cover the alternator with a rag so that oil will not get on the alternator <4D56>.
4. Use an oil filter wrench to remove the engine oil filter.
5. Clean the mounting surface of the filter bracket.
6. Apply a small amount of engine oil to the O-ring of the new oil filter.  
<4G64, 6G72, 4D56>
7. Install the oil filter by hand.

**Tightening torque:****11 – 13 Nm (1.1 – 1.3 kgm, 8 – 9 ft.lbs.) <4G64, 6G72>****20 Nm (2.0 kgm, 14 ft.lbs.) <4D56>**

8. <6G74>  
Screw in the oil filter by hand, and after the O-ring contacts the flange surface, tighten it another 3/4 turns with a filter wrench, etc. [approx. 14 Nm (1.4 kgm, 10 ft.lbs.)]
9. <4M40>  
Screw in the oil filter by hand, and after the O-ring contacts the flange surface, tighten it another 5/8 turns with a filter wrench, etc. [approx. 20 Nm (2.0 kgm, 14 ft.lbs.)]
10. Pour in the engine oil.
11. Race the engine 2 or 3 times and check that no oil leaks from the mounting section of the oil filter.

**12-4-2**

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**NOTES**

**OIL LEVEL WARNING SYSTEM INSPECTION** E12FDAA

- (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.

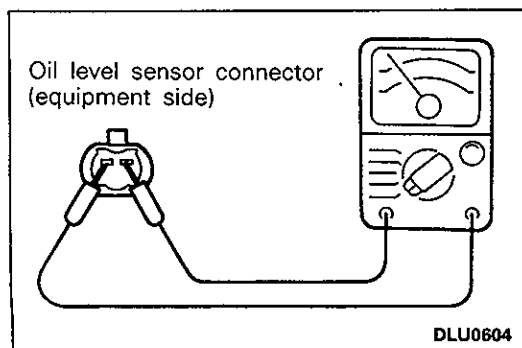
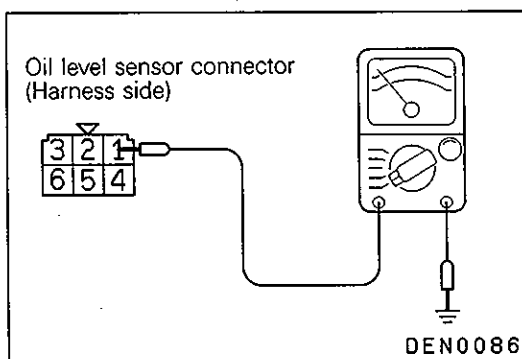
If the oil level warning lamp will not go out, disconnect the connector of the oil level relay and measure the voltage of the No. 1 terminal on the harness side of the connector while idling the engine in order to confirm that it is the same as the battery voltage.

**NOTE**

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. 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 20 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 40°C (104°F) or lower	Normal (proper volume)	Continuity
	Low (drained)	Continuity
At 70°C (158°F) or higher	Normal (proper volume)	Continuity
	Low (drained)	No continuity

**ENGINE OIL COOLER <6G72-12 VALVE>****REMOVAL AND INSTALLATION**

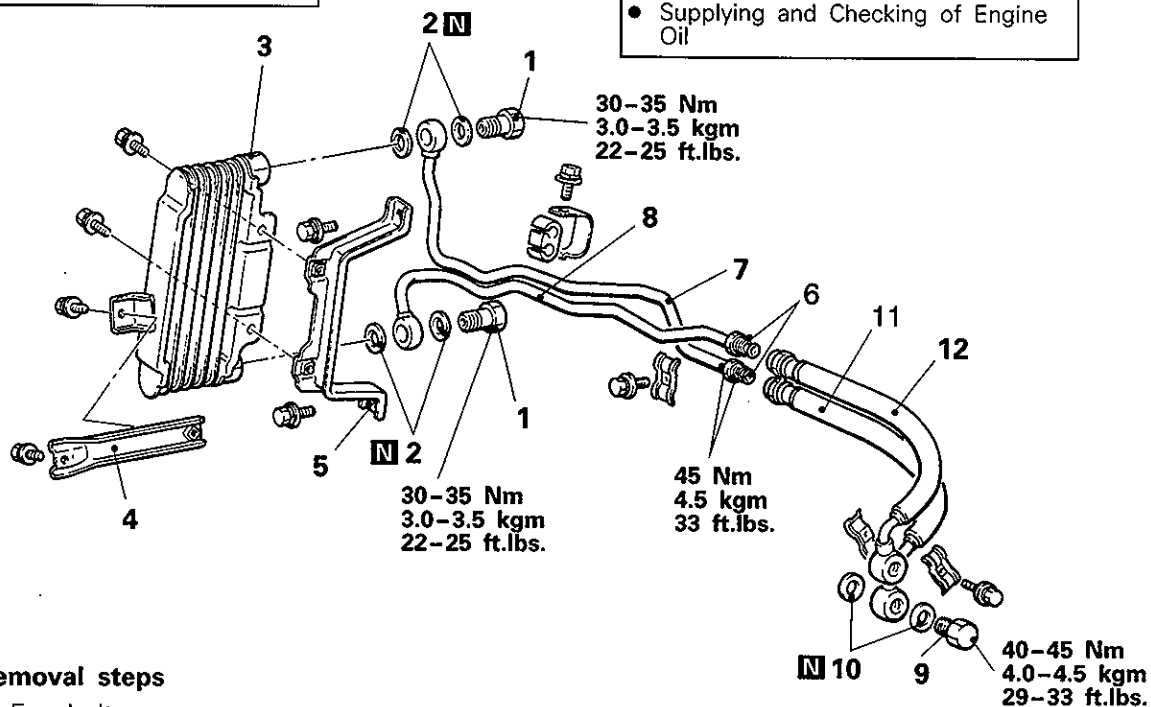
E12JA--

**Pre-removal Operation**

- Removal of the Radiator Grille

**Post-installation Operation**

- Installation of the Radiator Grille
- Supplying and Checking of Engine Oil

**Removal steps**

1. Eye bolts
2. Gaskets
3. Engine oil cooler
4. Stay
5. Bracket
6. Engine oil cooler pipe connection

7. Return pipe
8. Feed pipe
9. Eye bolts
10. Gaskets
11. Return hose
12. Feed hose

04E0002

**SERVICE POINT OF REMOVAL**

E12JBAH

**1. REMOVAL OF EYE BOLTS****Caution**

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

**INSPECTION**

E12JCAF

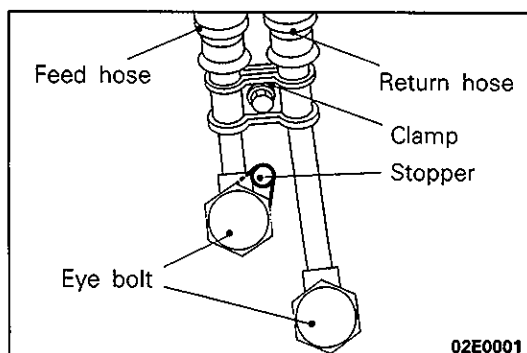
- Check for foreign material between oil cooler fins.
- Check the oil cooler fins for bend or damage.
- Check the oil cooler pipes for crack, damage, clogging or deterioration.

**SERVICE POINTS OF INSTALLATION**

E12JDAH

**12. INSTALLATION OF FEED HOSE/11. RETURN HOSE/9. EYE BOLTS (ENGINE SIDE)**

- (1) Provisionally tighten the eye bolts, and install the clamp so that it touches the crimps on the hoses.
- (2) Fully tighten the eye bolt on the return hose.
- (3) Place the feed hose against the stopper, and fully tighten the eye bolt on the feed hose.



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**ENGINE OIL COOLER <6G74>****REMOVAL AND INSTALLATION**

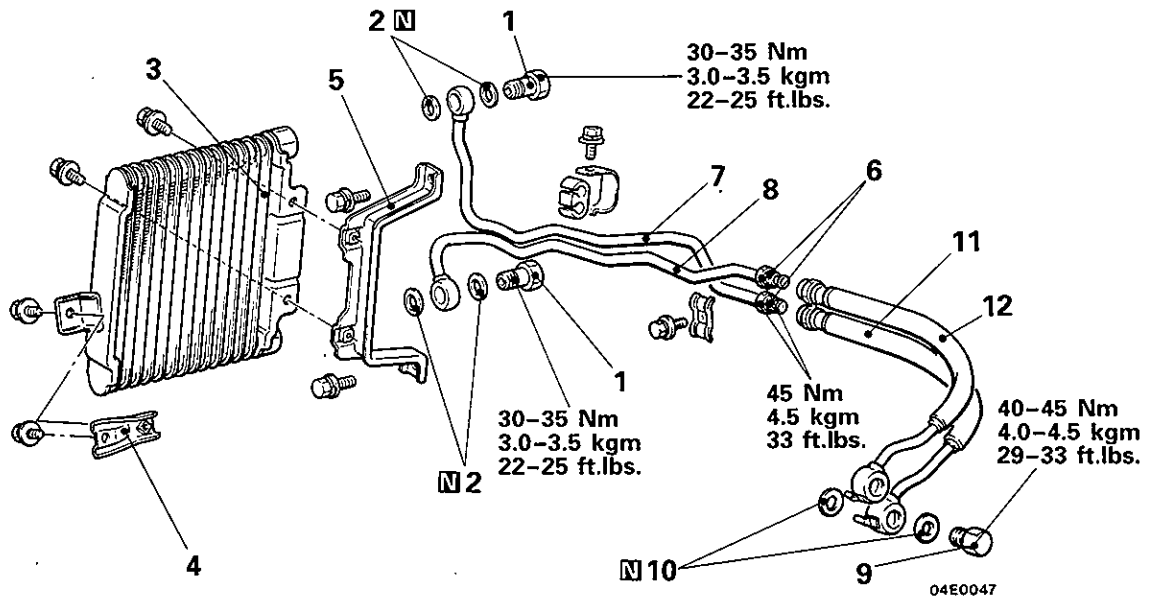
M11MA--

**Pre-removal Operation**

- Removal of the Radiator Grille

**Post-installation Operation**

- Installation of the Radiator Grille
- Supplying and Checking of Engine Oil

**Removal steps**

1. Eye bolts
2. Gaskets
3. Engine oil cooler
4. Stay
5. Bracket
6. Engine oil cooler pipe connection

7. Return pipe
8. Feed pipe
9. Eye bolts
10. Gaskets
11. Return hose
12. Feed hose

**SERVICE POINT OF REMOVAL**

M11MBAC

**1. REMOVAL OF EYE BOLTS****Caution**

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

**INSPECTION**

M11MCAC

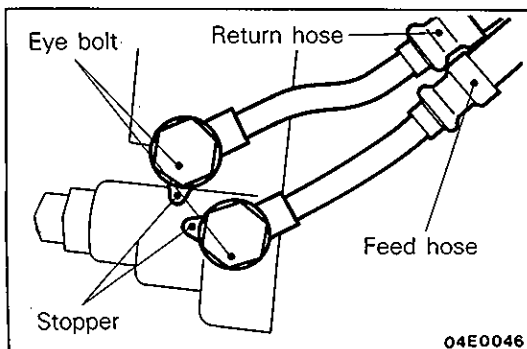
- Check for foreign material between oil cooler fins.
- Check the oil cooler fins for bend or damage.
- Check the oil cooler pipes for crack, damage, clogging or deterioration.

**SERVICE POINTS OF INSTALLATION**

M11MDAA

**12. INSTALLATION OF FEED HOSE/11. RETURN HOSE /9. EYE BOLTS (ENGINE SIDE)**

- (1) Provisionally tighten the eye bolts, and install the clamp so that it touches the crimps on the hoses.
- (2) Fully tighten the eye bolt on the return hose.
- (3) Place the feed hose against the stopper, and fully tighten the eye bolt on the feed hose.

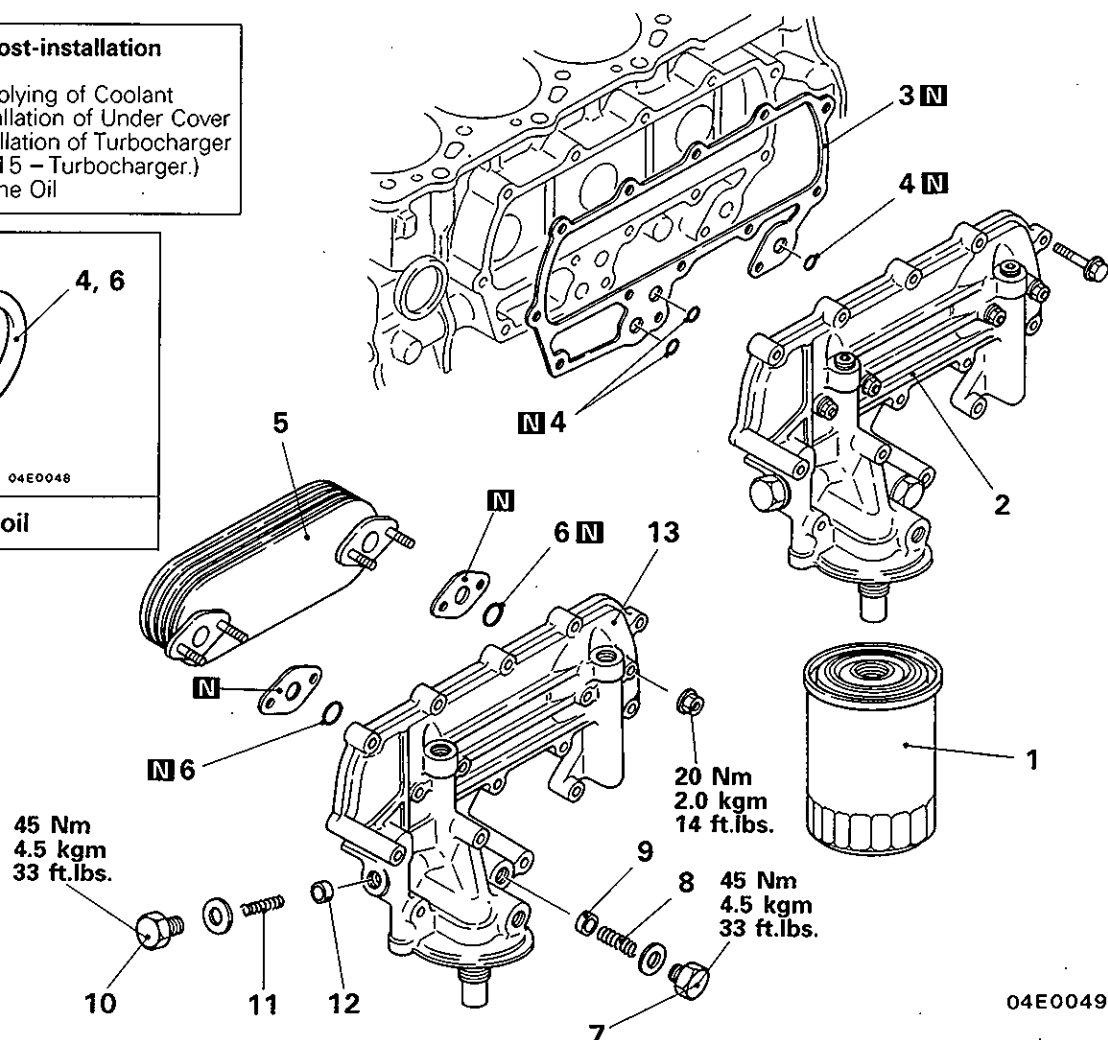
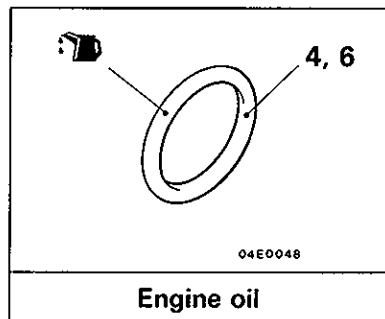


## ENGINE OIL COOLER &lt;4M40&gt;

## REMOVAL AND INSTALLATION

## Pre-removal and Post-installation Operations

- Draining and Supplying of Coolant
- Removal and Installation of Under Cover
- Removal and Installation of Turbocharger (Refer to GROUP 15 – Turbocharger.)
- Supplying of Engine Oil



## Removal steps

1. Oil filter (Refer to P.12-2.)
2. Oil cooler assembly
3. Gasket
4. O-ring
5. Oil cooler element
6. O-ring
7. Plug
8. Bypass valve spring
9. Plunger
10. Plug
11. Regulator valve spring
12. Plunger
13. Oil cooler body

Symbol	Head mark	d × ℓmm (in.)	Remarks
1	7T	8 × 32 (0.31 × 1.26)	
2	7T	8 × 75 (0.31 × 2.95)	
3	7T	10 × 80 (0.39 × 3.15)	

## INSPECTION

- Check the oil cooler fins for bend or damage.

**ENGINE OIL COOLER <4D56>****REMOVAL AND INSTALLATION**

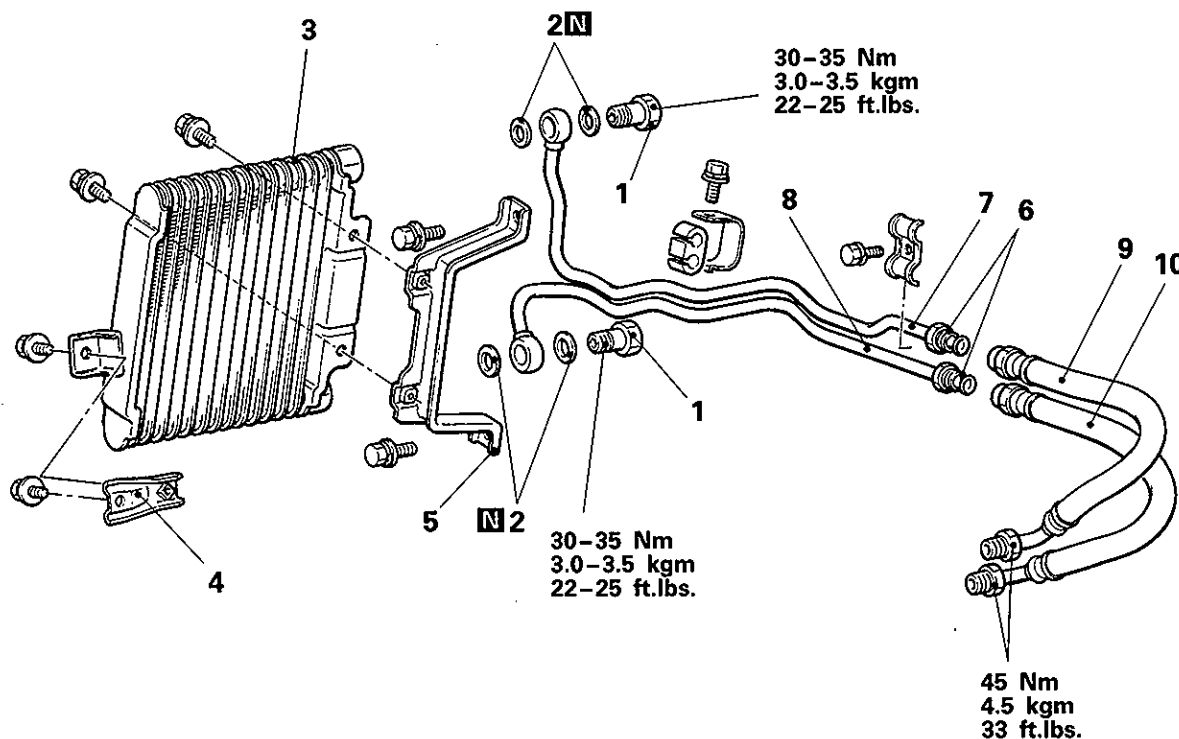
E12JA--

**Pre-removal Operation**

- (1) Removal of the Radiator Grille
- (2) Removal of the Oil Filter  
(Refer to P.12-4.)
- (3) Removal of the Brake Master  
Cylinder Heat Protector

**Post-installation Operation**

- (1) Installation of the Brake Master  
Cylinder Heat Protector
- (2) Installation of the Oil Filter  
(Refer to P.12-4.)
- (3) Installation of the Radiator Grille
- (4) Supplying and Checking of Engine  
Oil



04E0001

**Removal steps**

1. Eye bolts
2. Gaskets
3. Engine oil cooler
4. Stay
5. Bracket
6. Engine oil cooler pipe connection
7. Return pipe
8. Feed pipe

9. Return hose
10. Feed hose

**SERVICE POINT OF REMOVAL**

E12JBAI

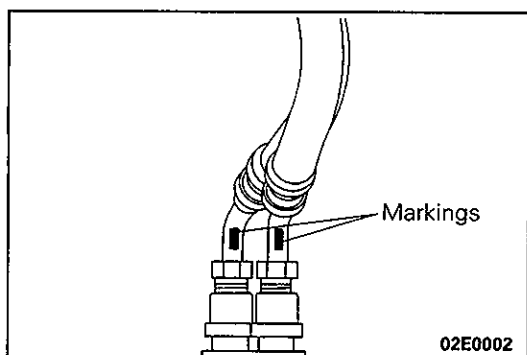
**1. REMOVAL OF EYE BOLTS****Caution**

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

**INSPECTION**

E12JCAF

- Check for foreign material between oil cooler fins.
- Check the oil cooler fins for bend or damage.
- Check the oil cooler pipes for crack, damage, clogging or deterioration.

**SERVICE POINT OF INSTALLATION**

E12JDAI

**10. INSTALLATION OF FEED HOSE/9. RETURN HOSE (ENGINE SIDE)**

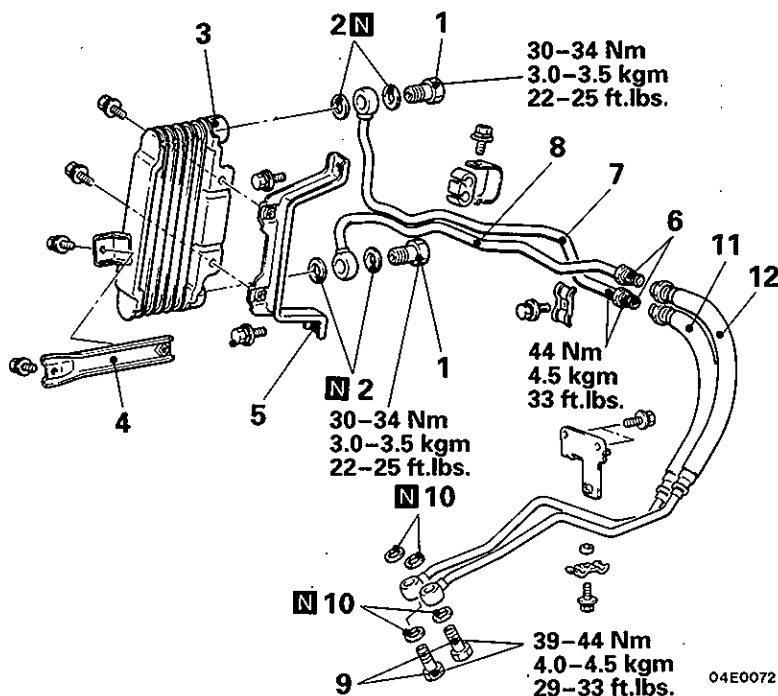
Install the return hose and the feed hose with the markings facing upwards.

**ENGINE OIL COOLER <6G72-24 VALVE>****REMOVAL AND INSTALLATION****Pre-removal Operation**

- Removal of Radiator Grille

**Post-installation Operation**

- Installation of Radiator Grille
- Supplying and Checking of Engine Oil

**Removal steps**

- |                                      |                 |
|--------------------------------------|-----------------|
| 1. Eye bolts                         | 7. Return pipe  |
| 2. Gaskets                           | 8. Feed pipe    |
| 3. Engine oil cooler                 | 9. Eye bolts    |
| 4. Stay                              | 10. Gaskets     |
| 5. Bracket                           | 11. Return hose |
| 6. Engine oil cooler pipe connection | 12. Feed hose   |

**SERVICE POINT OF REMOVAL****1. REMOVAL OF EYE BOLTS****Caution**

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

**INSPECTION**

- Check for foreign material between the oil cooler fins.
- Check the oil cooler fins for bends or damage.
- Check the oil cooler pipes for cracks, damage, clogging or deterioration.

**12-10**

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**NOTES**