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# ENGINE COOLING

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**GENERAL INFORMATION**

14100010286

The cooling system is designed to keep every part of the engine at appropriate temperature in whatever condition the engine may be operated. The cooling method is of the water-cooled, pressure forced circulation type in which the water pump pressurizes coolant and circulates it throughout the engine. If the coolant temperature exceeds the prescribed temperature, the thermostat opens to circulate the coolant through the radiator as well so that the heat absorbed by the coolant may be radiated into the air.

The water pump is of the centrifugal type and is driven by the drive belt from the crankshaft. The radiator is the corrugated fin, down flow type.

Items			Specifications
Radiator	Performance kJ/h	6G7	203,000
		4D5	230,200

**SERVICE SPECIFICATIONS**

14100030305

Items			Standard value	Limit
High pressure valve opening pressure of radiator cap kPa			74 – 103	64
Range of coolant antifreeze concentration of radiator %			30 – 60	–
Thermostat	Valve opening temperature of thermostat °C	6G7	88 ± 2.0	–
		4D5	82 ± 1.5	–
	Full-opening temperature of thermostat °C	6G7	100	–
		4D5	95	–
	Valve lift mm	6G7	10 or more	–
		4D5	8.5 or more	–

**LUBRICANT**

14100040209

Items		Quantity L
MITSUBISHI GENUINE COOLANT OR AN EQUIVALENT	6G7	9.0 (10.0)
	4D5	8.0 (9.0)

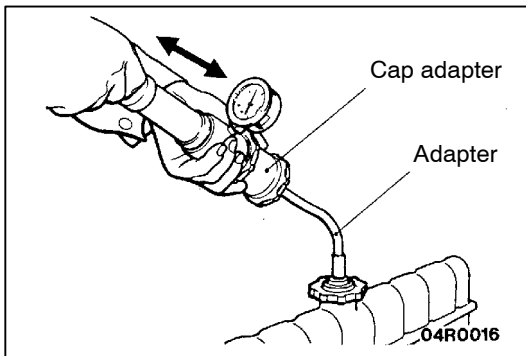
**NOTE**

( ) indicates figure for vehicles with rear heater.

**SEALANTS**

14100050226

Items	Specified sealant	Remarks
Cylinder block drain plug	3M Nut Locking Part No. 4171 or equivalent	Drying sealant



## ON-VEHICLE SERVICE

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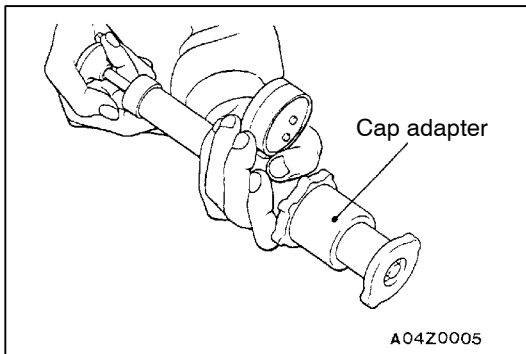
### ENGINE COOLANT LEAK CHECKING

1. Confirm that the coolant level is up to the filler neck. Install a radiator cap tester and apply 160 kPa pressure, and then check for leakage from the radiator hose or connections.

#### Caution

- (1) Be sure to completely clean away any moisture from the places checked.
- (2) When the tester is taken out, be careful not to spill any coolant from it.
- (3) Be careful, when installing and removing the tester and when testing, not to deform the filler neck of the radiator.

2. If there is leakage, repair or replace the appropriate part.



### RADIATOR CAP VALVE OPENING PRESSURE CHECK

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1. Use a cap adapter to attach the cap to the tester.
2. Increase the pressure until the indicator of the gauge stops moving.

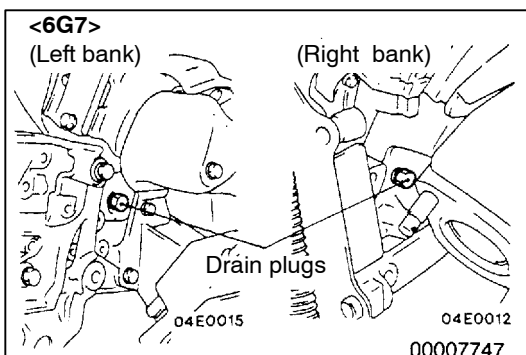
**Limit: 64 kPa**

**Standard value: 74 – 103 kPa**

3. Replace the radiator cap if the reading does not remain at or above the limit.

#### NOTE

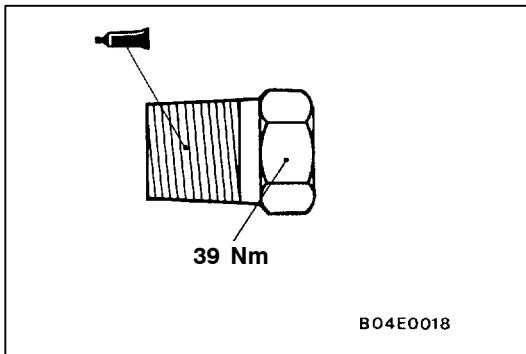
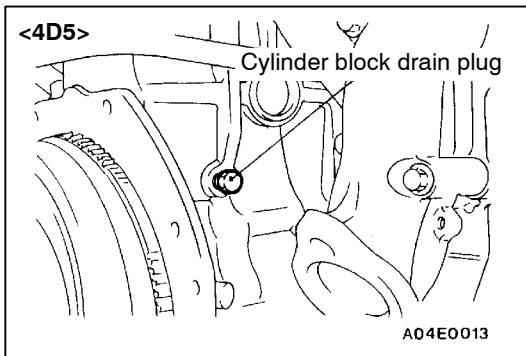
Be sure that the cap is clean before testing, since rust or other foreign material on the cap seal will cause an improper indication.



### ENGINE COOLANT REPLACEMENT

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1. Drain the engine coolant by removing the drain plug and then the radiator cap.
2. Remove the cylinder block drain plug from the cylinder block to drain the engine coolant.
3. Remove the reserve tank to drain the engine coolant.
4. When the engine coolant has drained, pour in water from the radiator cap to clean the engine coolant line.



5. Coat the thread of the cylinder block drain plug with the specified sealant and tighten to the specified torque.

**Specified sealant:**

**3M Nut Locking Part No. 4171 or equivalent**

6. Securely tighten the radiator drain plug.
7. Install the reserve tank.
8. Remove the air bleed bolt and replace the seal washer.
9. Fill the radiator until the engine coolant flows from the air bleed bolt section, and then close the air bleed bolt.
10. Slowly pour the engine coolant into the mouth of the radiator until the radiator is full, and pour also into the reserve tank up to the FULL line.

**Recommended antifreeze:**

**MITSUBISHI GENUINE COOLANT OR AN EQUIVALENT**

**Quantity:**

<6G7> 9.0 (10.0) L

<4D5> 8.0 (9.0) L

**Caution**

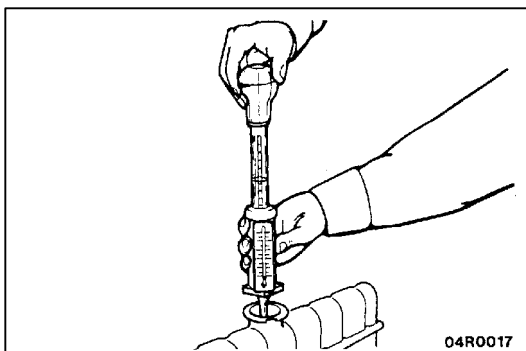
**Do not use alcohol or methanol anti-freeze or any engine coolants mixed with alcohol or methanol anti-freeze. The use of an improper anti-freeze can cause the corrosion of the aluminum components.**

**NOTE**

(1) ( ) indicates figure for vehicles with rear heater.

(2) For Norway, the non-amine type of antifreeze should be used.

11. Install the radiator cap securely.
12. Start the engine and warm the engine until the thermostat opens. (Touch the radiator hose with your hand to check that warm water is flowing.)
13. After the thermostat opens, race the engine several times, and then stop the engine.
14. Cool down the engine, and then pour engine coolant into the reserve tank until the level reaches the FULL line. If the level is low, repeat the operation from step 11.



**CONCENTRATION MEASUREMENT**

14100110146

Measure the temperature and specific gravity of the engine coolant to check the antifreeze concentration.

**Standard value: 30 – 60 % (allowable concentration range)**

**RECOMMENDED ANTIFREEZE**

Antifreeze	Allowable concentration
MITSUBISHI GENUINE COOLANT OR AN EQUIVALENT	30 – 60 %

**Caution**

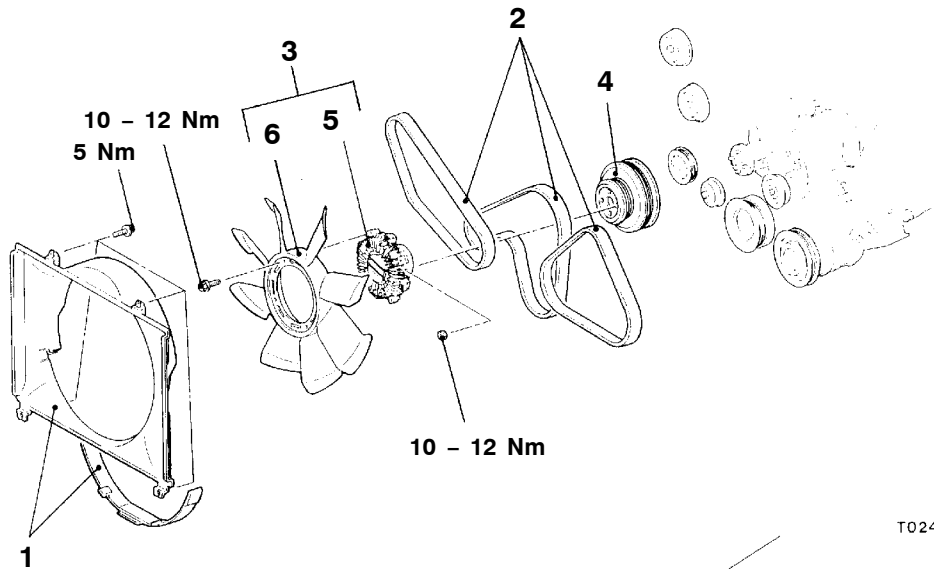
If the concentration of the anti-freeze is below 30 %, the anti-corrosion property will be adversely affected. In addition, if the concentration is above 60 %, both the anti-freezing and engine cooling properties will decrease, affecting the engine adversely. For these reasons, be sure to maintain the concentration level within the specified range.

# COOLING FAN

## REMOVAL AND INSTALLATION

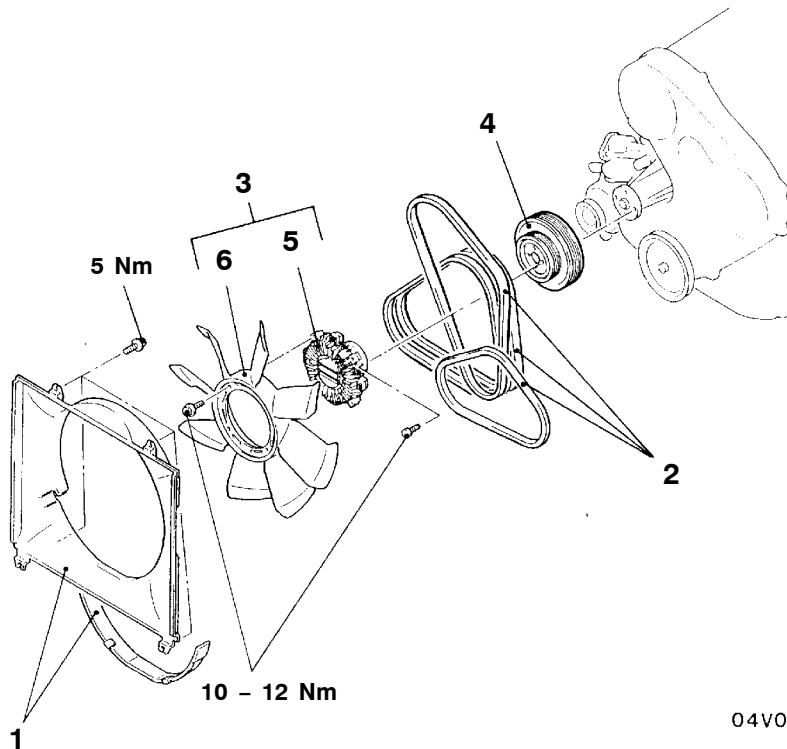
- Pre-removal and Post-installation Operation**
- Engine Coolant Draining and Supplying (Refer to P.14-3.)
  - Radiator Upper Hose Removal and Installation (Refer to P.14-12.)

<6G7>



T0241AA

<4D5>



04V0037

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**Removal steps**

1. Shroud assembly
2. Drive belts
3. Cooling fan and fan clutch assembly

4. Pulley
5. Fan clutch
6. Cooling fan

**INSPECTION**

14100220023

**COOLING FAN CHECK**

- Check blades for damage and cracks.
- Check for cracks and damage around bolt holes in fan hub.
- If any portion of fan is damaged or cracked, replace cooling fan.

**FAN CLUTCH CHECK**

- Check to ensure that fluid in fan clutch is not leaking at case joint and seals. If fluid quantity decreases due to leakage, fan speed will decrease and engine overheating might result.
- When a fan attached to an engine is turned by hand, lightly, it is faulty.
- Check bimetal strip for damage.

THERMOSTAT

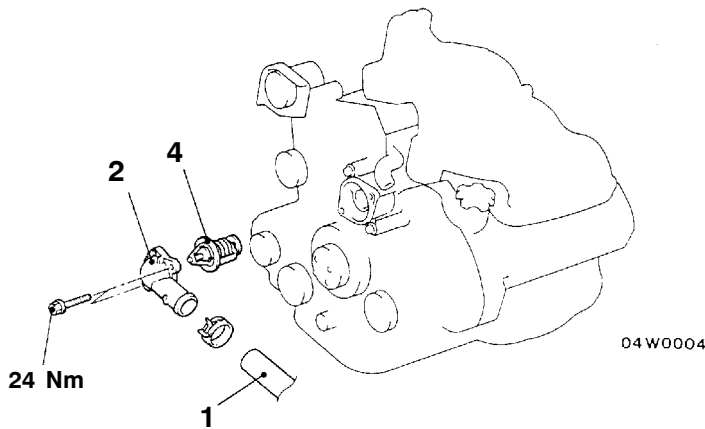
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REMOVAL AND INSTALLATION

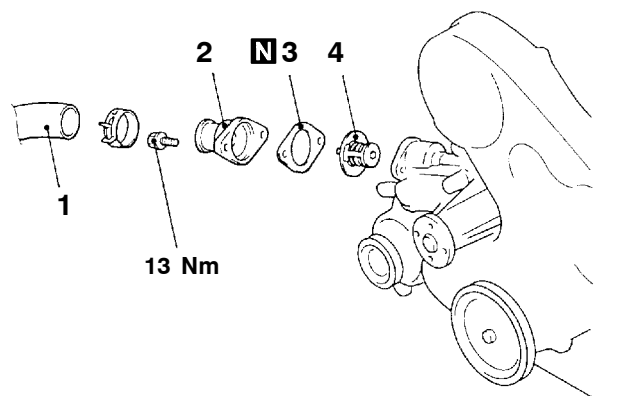
Pre-removal and Post-installation Operation

- Engine Coolant Draining and Supplying (Refer to P.14-3.)

<6G7>



<4D5>



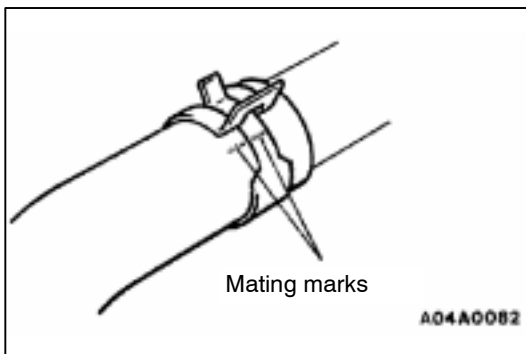
04W0007

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Removal steps

- ◀A▶ ▶B▶
1. Radiator lower hose connection
  2. Water inlet fitting

- ▶A▶
3. Water inlet fitting gasket <4D5>
  4. Thermostat

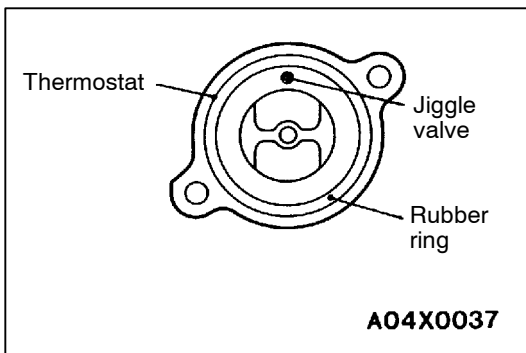


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REMOVAL SERVICE POINT

◀A▶ RADIATOR LOWER HOSE DISCONNECTION

After making mating marks on the radiator hose and the hose clamp, disconnect the radiator hose.



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INSTALLATION SERVICE POINT

▶A▶ THERMOSTAT INSTALLATION

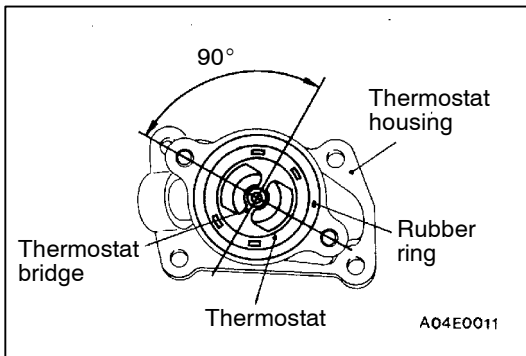
<6G7>

Install the thermostat so that the jiggle valve is facing straight up, while being careful not to fold over or scratch the rubber ring.

Caution

Make absolutely sure that no oil adheres to the rubber ring of the thermostat. Also be careful not to fold over or scratch the rubber ring when inserting.



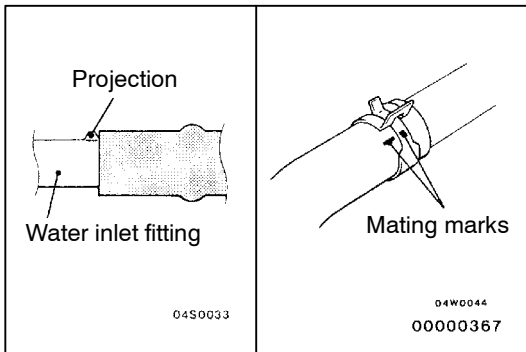


<4D5>

Hold the thermostat at the angle shown in the illustration, and install it while being careful not to wrinkle or damage the rubber ring.

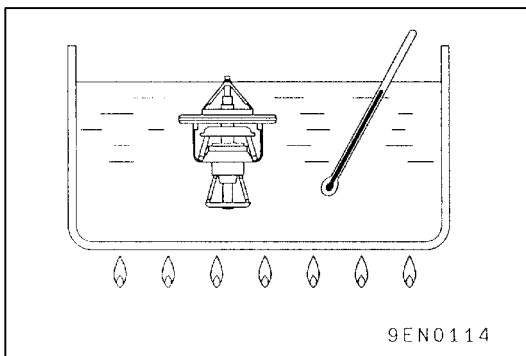
**Caution**

**Do not apply any oil or grease to the rubber ring of the thermostat under any circumstances.**



►B◀ **RADIATOR LOWER HOSE CONNECTION**

1. Insert each hose as far as the projection of the water outlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.



**INSPECTION**

14100250374

**THERMOSTAT CHECK**

1. Immerse the thermostat in water, and heat the water while stirring. Check the thermostat valve opening temperature.

**Standard value:**

**Valve opening temperature:**

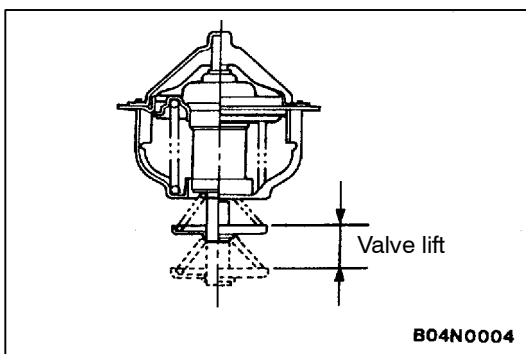
<6G7>  $88 \pm 2.0^{\circ}\text{C}$

<4D5>  $82 \pm 1.5^{\circ}\text{C}$

2. Check that the amount of valve lift is at the standard value when the water is at the full-opening temperature.

**Standard value:**

Items	6G7	4D5
Full-opening temperature °C	100	95
Amount of valve lift mm	10.0 or more	8.5 or more



**NOTE**

Measure the valve height when the thermostat is fully closed, and use this measurement to calculate the valve height when the thermostat is fully open.

**WATER PUMP**

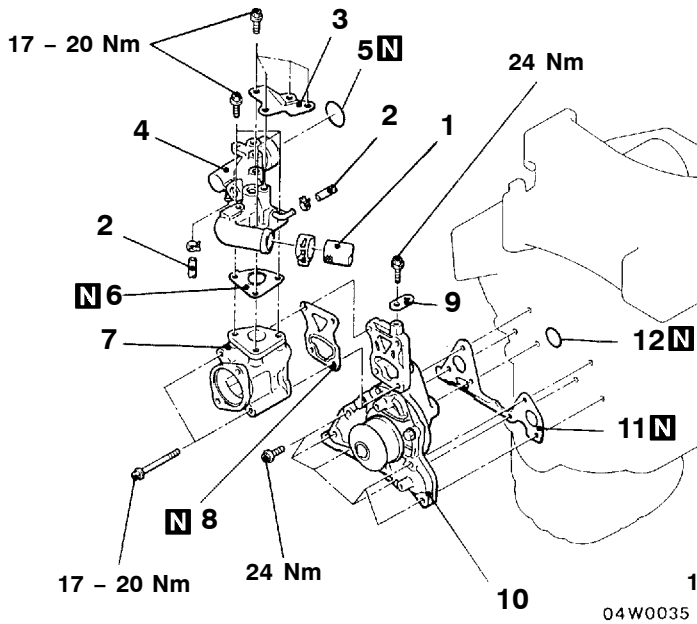
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**REMOVAL AND INSTALLATION**

**Pre-removal and Post-installation Operation**

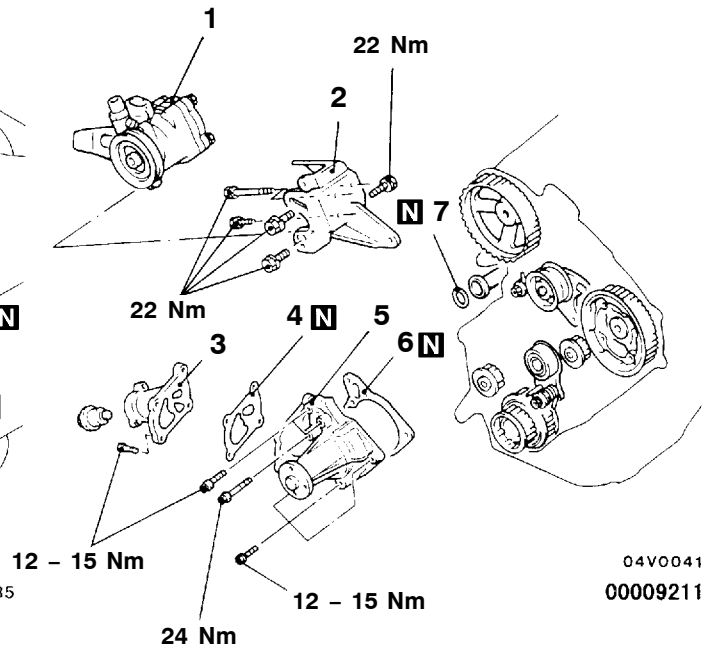
- Engine Coolant Draining and Supplying (Refer to P.14-3.)
- Timing Belt Removal and Installation (Refer to GROUP 11.)
- Thermostat Removal and Installation (Refer to P.14-7.)

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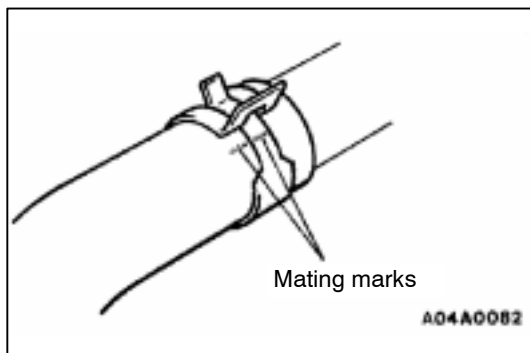
**Removal steps**

<6G7>

- ◀A▶ ▶C▶ 1. Radiator upper hose connection
- 2. Water hose connection
- 3. Water outlet fitting bracket
- 4. Water outlet fitting assembly
- ▶A▶ 5. O-ring
- 6. Gasket
- 7. Thermostat case
- 8. Gasket
- 9. Water pump bracket
- ▶B▶ 10. Water pump assembly
- 11. Gasket
- ▶A▶ 12. O-ring

<4D5>

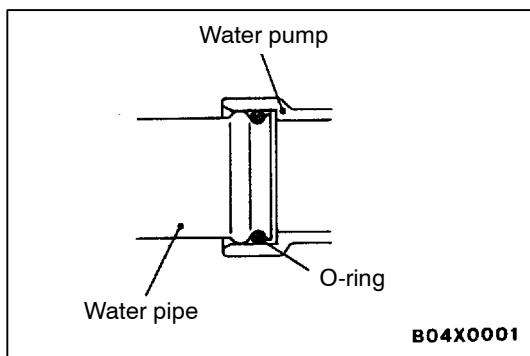
- Air intake hose (Refer to GROUP 15 – Air Cleaner.)
- ◀B▶ 1. Power steering oil pump
- 2. Power steering oil pump bracket
- 3. Thermostat housing
- 4. Thermostat housing gasket
- ▶B▶ 5. Water pump assembly
- 6. Gasket
- ▶A▶ 7. O-ring

**REMOVAL SERVICE POINT****◀A▶ RADIATOR UPPER HOSE/RADIATOR LOWER HOSE DISCONNECTION**

After making mating marks on the radiator hose and the hose clamp, disconnect the radiator hose.

**◀B▶ POWER STEERING OIL PUMP REMOVAL**

1. Remove the power steering oil pump from the bracket with the hose still attached.
2. Place the power steering oil pump somewhere where it will not be a hindrance to working, being careful not to put too much strain on the hose.

**INSTALLATION SERVICE POINTS****▶A◀ O-RING INSTALLATION**

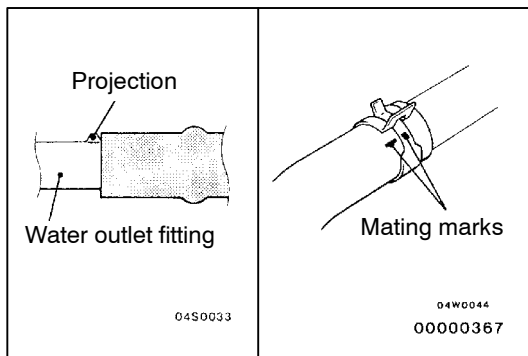
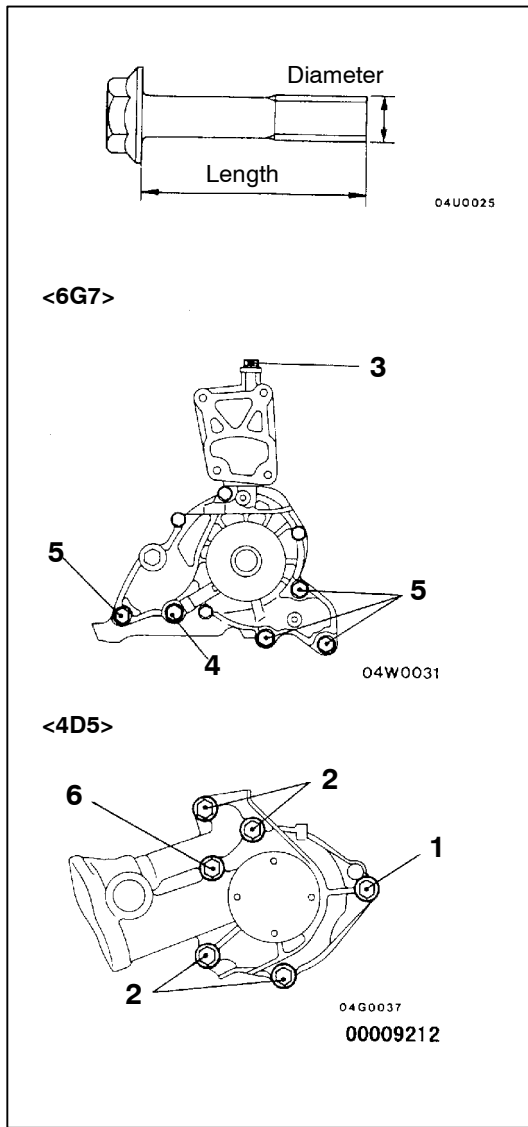
Rinse the mounting location of the O-ring and water pipe with water, and install the O-ring and water pipe.

**Caution**

1. **Care must be taken not to permit engine oil or other greases to adhere to the O-ring.**
2. **When inserting the pipe, check to be sure that there is no sand, dirt, etc. on its inner surface.**

►B◄ WATER PUMP ASSEMBLY INSTALLATION

No.	Hardness category (head mark)	Bolt diameter x length mm
1	4T	8 x 25
2		8 x 40
3	7T	8 x 14
4		8 x 20
5		8 x 25
6		8 x 70



►C◄ RADIATOR UPPER HOSE CONNECTION

1. Insert each hose as far as the projection of the water outlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

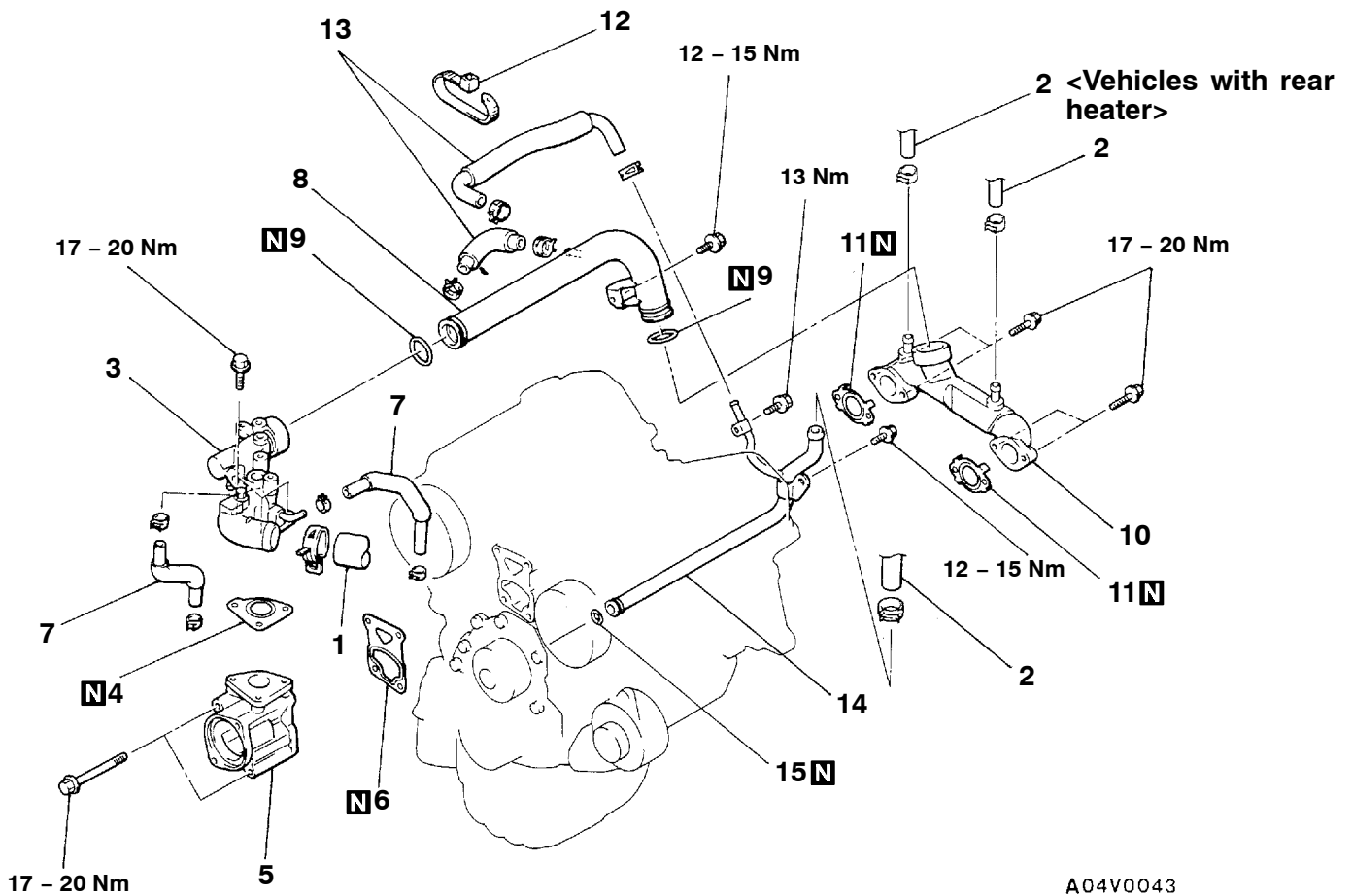
# WATER HOSE AND WATER PIPE

## REMOVAL AND INSTALLATION

<6G7>

**Pre-removal and Post-installation Operation**

- Engine Coolant Draining and Supplying (Refer to P.14-3.)
- Front Exhaust Pipe and Heat Protector Removal and Installation (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Intake Manifold Removal and Installation (Refer to GROUP 15 – Intake Manifold.)
- Thermostat Removal and Installation (Refer to P.14-7.)



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**Removal steps**

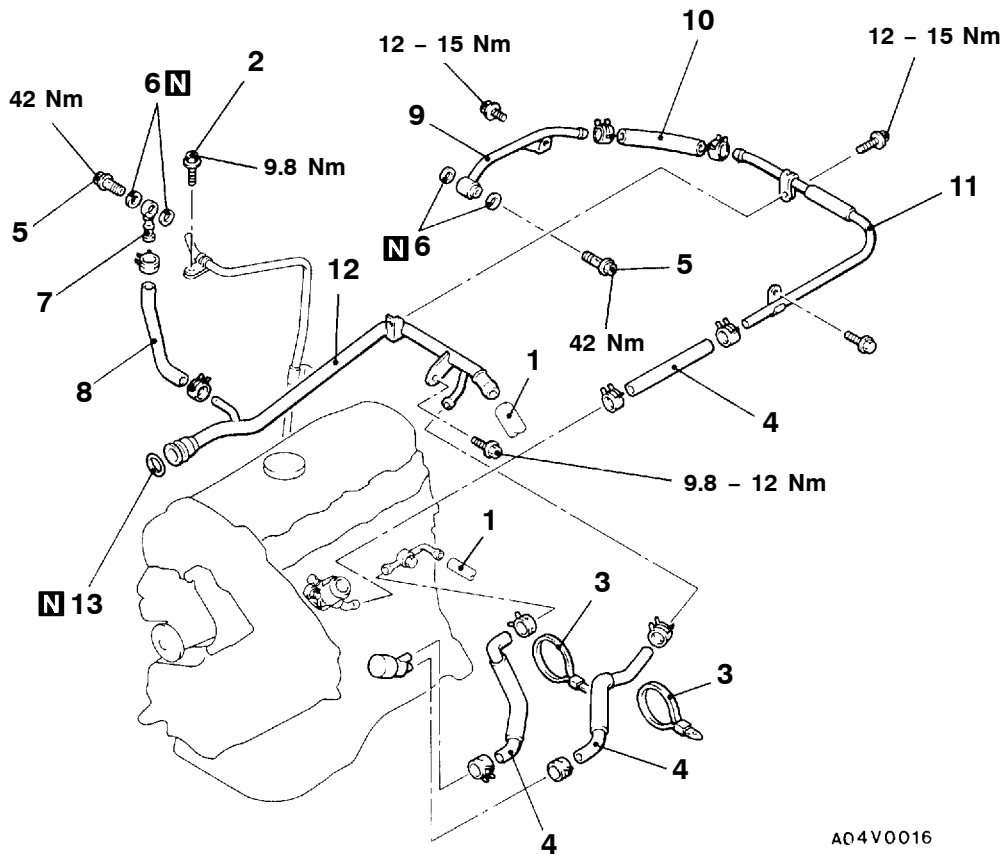
- ◀A▶ ▶D▶ 1. Radiator upper hose connection
- 2. Heater hose connection
- 3. Water outlet fitting assembly
- 4. Gasket
- 5. Thermostat case
- 6. Gasket
- 7. Water hose
- 8. Water outlet pipe assembly

- ▶A◀ 9. O-ring
- ▶C◀ 10. Water passage assembly
- ▶B◀ 11. Gasket
- ▶A◀ 12. Cable band
- ▶B◀ 13. Water hose
- ▶A◀ 14. Water pipe assembly
- ▶A◀ 15. O-ring

<4D5>

**Pre-removal and Post-installation Operation**

- Engine Coolant Draining and Supplying  
(Refer to P.14-3.)
- Injection Pipe Removal and Installation  
(Refer to GROUP 13E – Injection Nozzle.)
- Intake, Exhaust Manifold Removal and Installation  
(Refer to GROUP 15.)

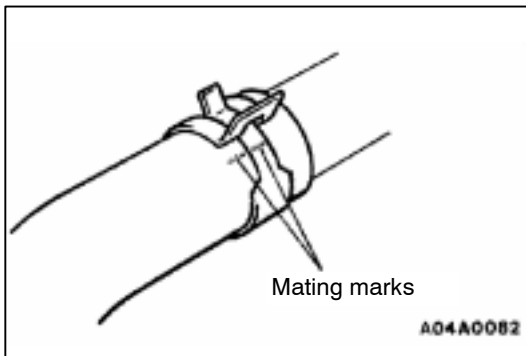


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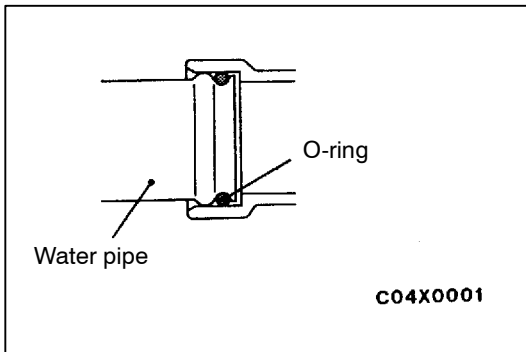
**Removal steps**

- |                                  |                           |
|----------------------------------|---------------------------|
| 1. Heater hose connection        | 8. Water hose             |
| 2. Vacuum pipe installation bolt | 9. Water pipe assembly B  |
| 3. Cable band                    | 10. Water hose            |
| 4. Water hose                    | 11. Water pipe assembly C |
| 5. Eye bolt                      | 12. Water pipe assembly   |
| 6. Gasket                        | 13. O-ring                |
| 7. Water pipe assembly A         |                           |

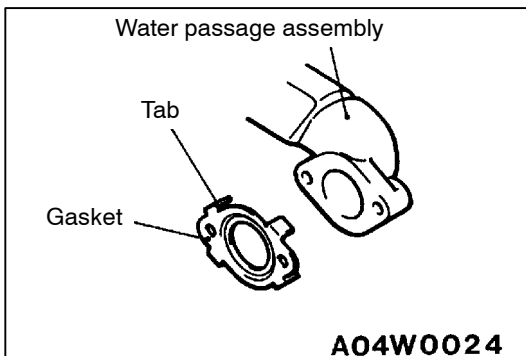


**REMOVAL SERVICE POINT****◀A▶ RADIATOR UPPER HOSE DISCONNECTION**

After making mating marks on the radiator hose and hose clamp, disconnect the radiator hose.

**INSTALLATION SERVICE POINTS****▶A◀ O-RING INSTALLATION****Caution**

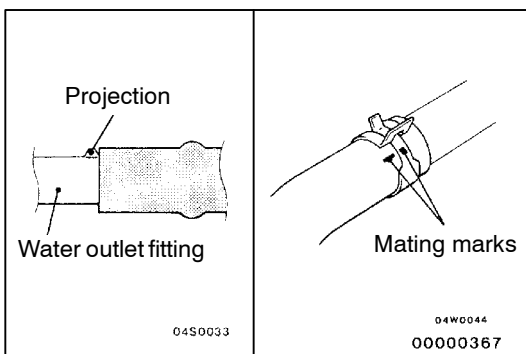
1. Care must be taken not to permit engine oil or other greases to adhere to the O-ring.
2. When inserting the pipe, check to be sure that there is no sand, dirt, etc. on its inner surface.

**▶B◀ WATER HOSE CONNECTION**

To reuse the water hose, align the mating marks that were made during removal, and then install the hose clamp.

**▶C◀ GASKET INSTALLATION**

Bend over the tabs to secure the gasket to the water passage assembly.

**▶D◀ RADIATOR UPPER HOSE CONNECTION**

1. Insert each hose as far as the projection of the water outlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

**INSPECTION**

14100340132

**WATER PIPE AND HOSE CHECK**

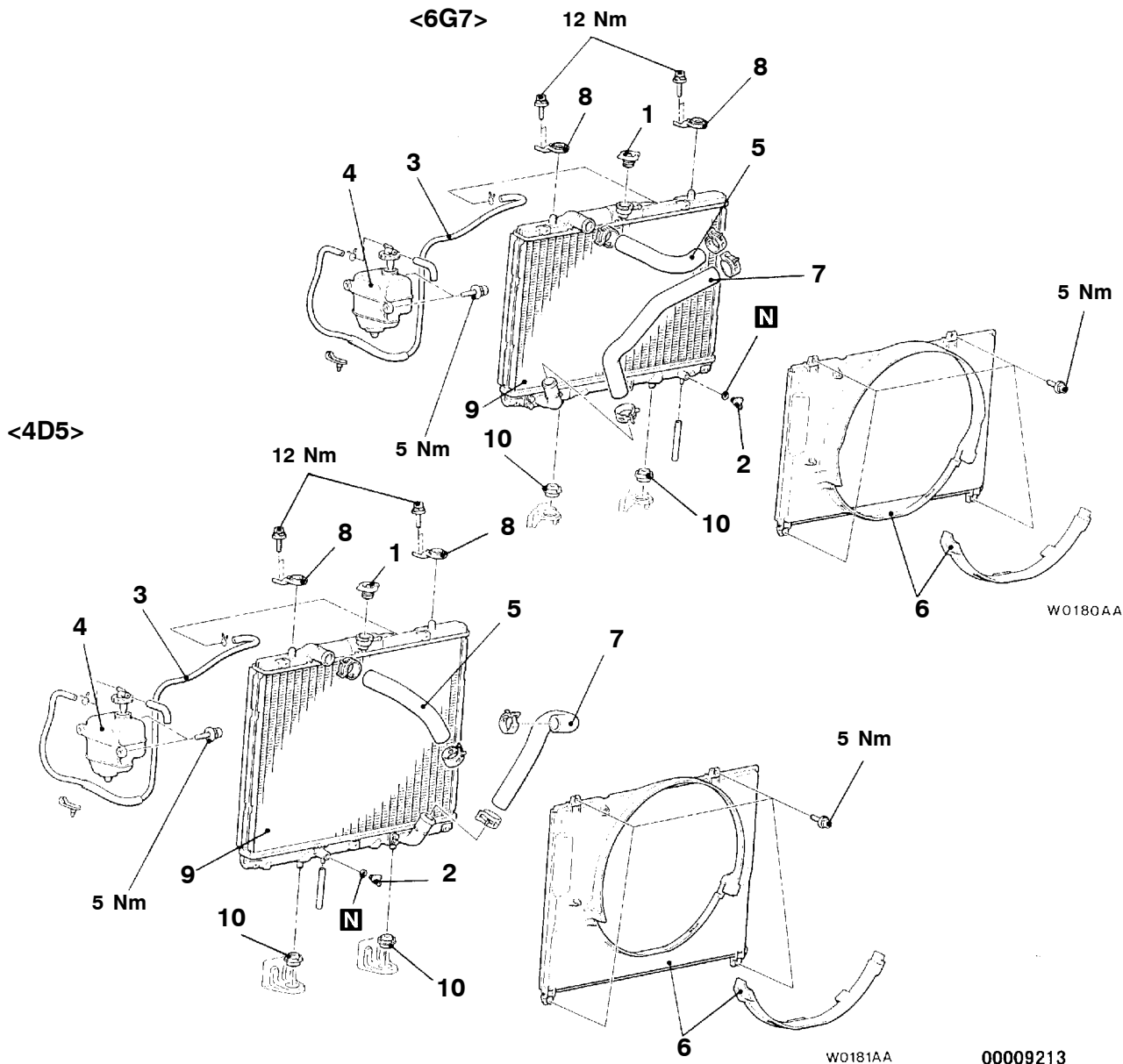
Check the water pipe and hose for cracks, damage and clogs. Replace them if necessary.

# RADIATOR

## REMOVAL AND INSTALLATION

**Pre-removal and Post-installation Operation**

- Under Cover and Skid Plate Removal and Installation
- Engine Coolant Draining and Supplying (Refer to P.14-3)
- Intercooler Removal and Installation <4D56> (Refer to GROUP 15 – Intercooler)



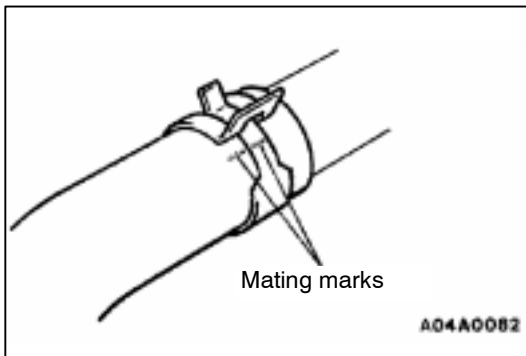
**Removal steps**

1. Radiator cap
2. Drain plug
3. Rubber hose connection
4. Reserve tank assembly
5. Radiator upper hose

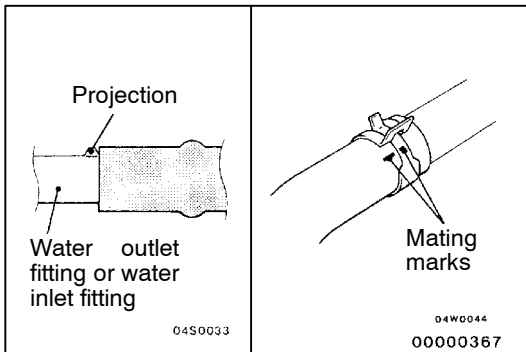
6. Shroud assembly
7. Radiator lower hose
8. Radiator support
9. Radiator
10. Lower insulator





**REMOVAL SERVICE POINTS****◀A▶ RADIATOR UPPER HOSE/RADIATOR LOWER HOSE DISCONNECTION**

After making mating marks on the radiator hose and the hose clamp, disconnect the radiator hose.

**INSTALLATION SERVICE POINT****▶A◀ RADIATOR LOWER HOSE/RADIATOR UPPER HOSE CONNECTION**

1. Insert each hose as far as the projection of the water inlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

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## NOTES