

## GENERAL INFORMATION

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.

Item			Specification
Radiator	Performance kJ/h	M/T	161,290
		A/T	181,800
A/T oil cooler	Performance kJ/h		5,651

## SERVICE SPECIFICATIONS

Item		Standard value	Limit
High pressure valve opening pressure of radiator cap kPa		93 – 123	83
Range of coolant antifreeze concentration of radiator %		30 – 60	–
Thermostat	Valve opening temperature of thermostat °C	82 ± 1.5	–
	Full-opening temperature of thermostat °C	95	–
	Valve lift mm	8.5 or more	–

## SEALANTS <4G94-MPI>

Item	Specified sealant	Remark
Water pump	Mitsubishi Genuine Parts No. MD970389 or equivalent	Semi-drying sealant
Thermostat case assembly		
Water outlet fitting		
Cylinder block drain plug		

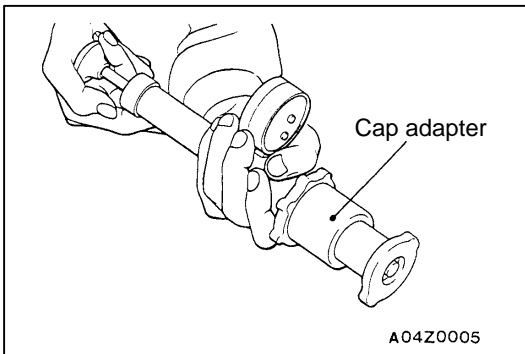
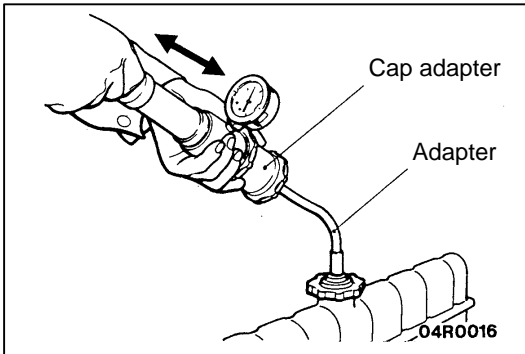
**ON-VEHICLE SERVICE****ENGINE COOLANT LEAK CHECKING**

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**

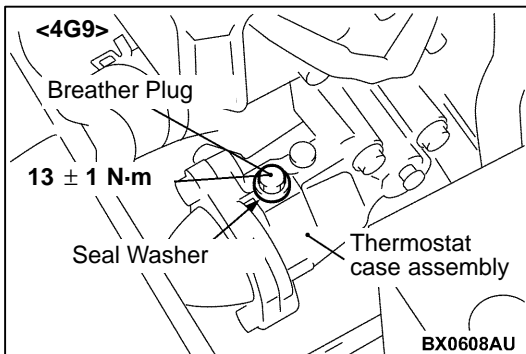
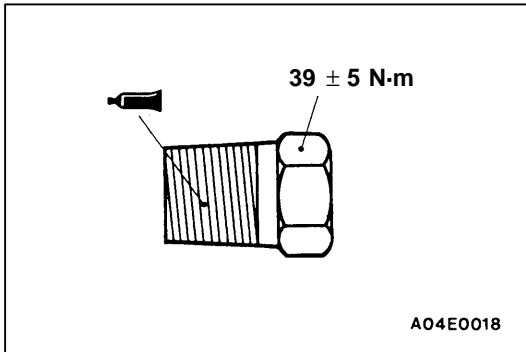
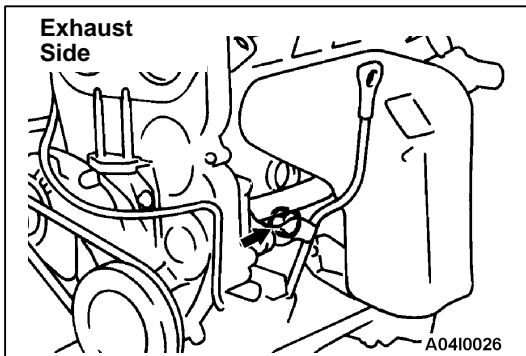
1. Use a cap adapter to attach the cap to the tester.
2. Increase the pressure until the indicator of the gauge stops moving.

**Limit: 83 kPa****Standard value: 93 – 123 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

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 breather plug, and replace the seal washer with new one. <4G9>
9. Carefully pour the engine coolant from the inlet port of the radiator. When the coolant is flown out of the breather plug without air bubbles, tighten the breather plug to the specified torque. <4G9>
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 anti-freeze:

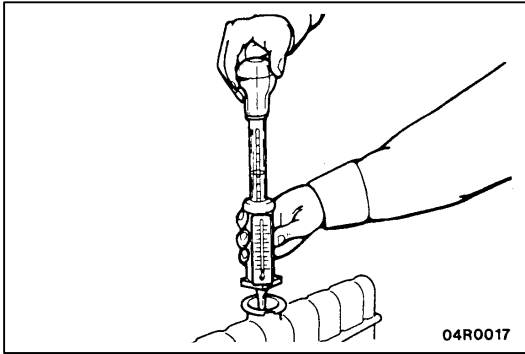
**MITUBISHI GENUINE COOLANT or equivalent**

**Quantity: 5.0 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 aluminium components.**

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**

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

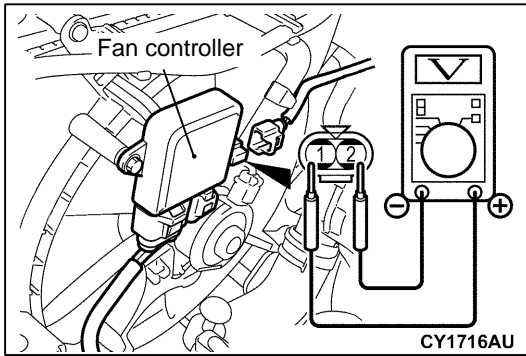
**Standard value: 30 – 60 % (allowable concentration range)**

**RECOMMENDED ANTI-FREEZE**

Antifreeze	Allowable concentration
MITSUBISHI GENUINE COOLANT or equivalent	30 – 60 %

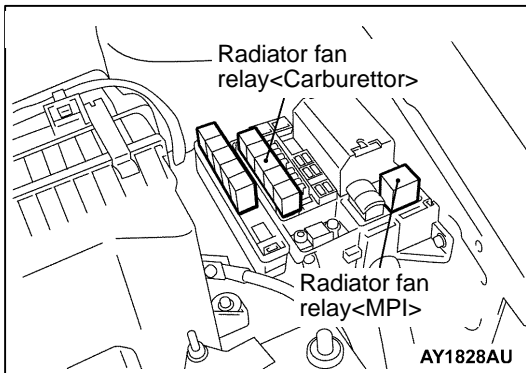
**Caution**

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.

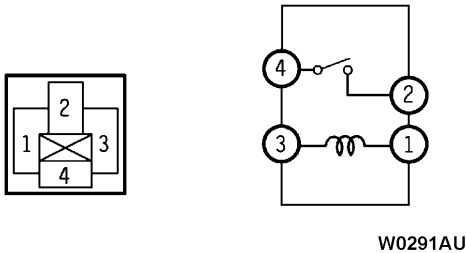


## FAN CONTROLLER CHECK

1. Disconnect the condenser fan motor connector.
2. Start the engine and run it at idle.
3. Turn the A/C switch to ON and maintain the coolant temperature at 80°C or less.
4. When measuring the voltage between the fan controller-side connector terminals, check that the value changes repeatedly as indicated by (1) – (3) below.
  - (1) 0 V
  - (2)  $8.2 \pm 2.6$  V
  - (3) Battery voltage  $\pm 2.6$  V
5. If the voltage does not repeatedly change as indicated, replace the radiator fan motor and the fan controller assembly.



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## RADIATOR FAN RELAY CONTINUITY CHECK

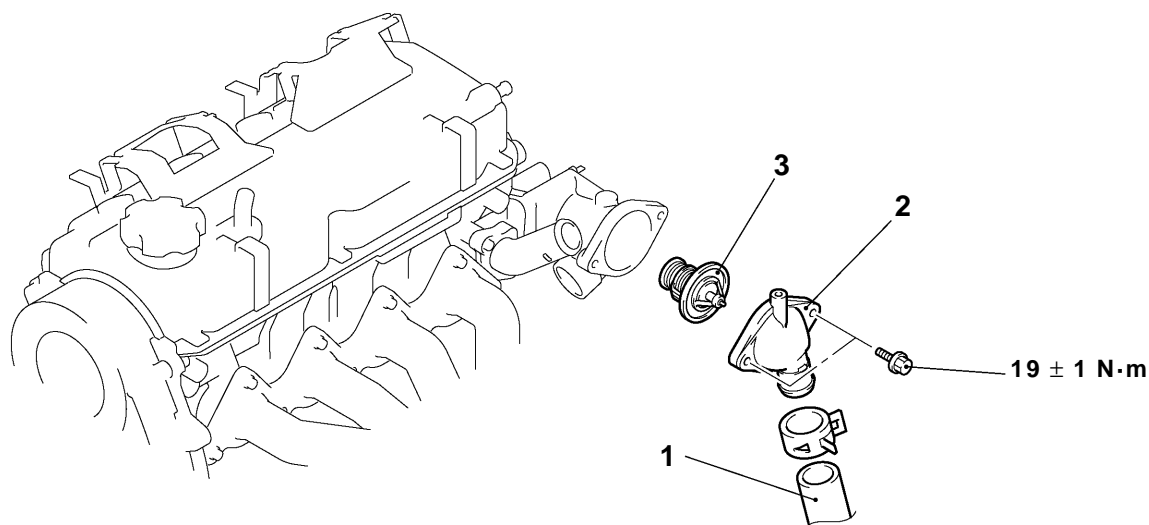
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Battery voltage	Terminal No.			
	1	2	3	4
When current is not supplied	○	—	○	
When current is supplied	⊕		⊖	○

## THERMOSTAT

## REMOVAL AND INSTALLATION &lt;4G94-MPI&gt;

**Pre-removal and Post-installation Operation**  
Engine Coolant Draining and Supplying



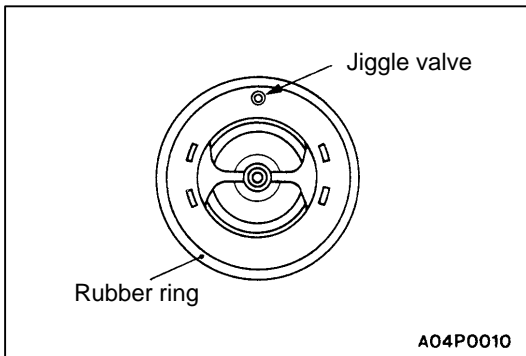
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**Removal steps**

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

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

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



## INSTALLATION SERVICE POINTS

### ►A◄ THERMOSTAT INSTALLATION

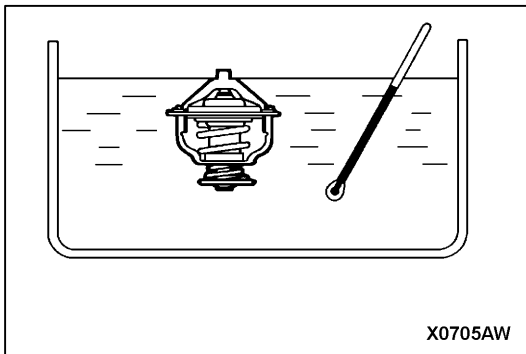
Install the thermostat so that the jiggle valve is facing straight up.

#### Caution

**Make absolutely sure that no oil is adhering to the rubber ring of the thermostat. In addition, be careful not to fold over or scratch the rubber ring when inserting. If the rubber ring is damaged, replace the thermostat.**

### ►B◄ RADIATOR LOWER 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.



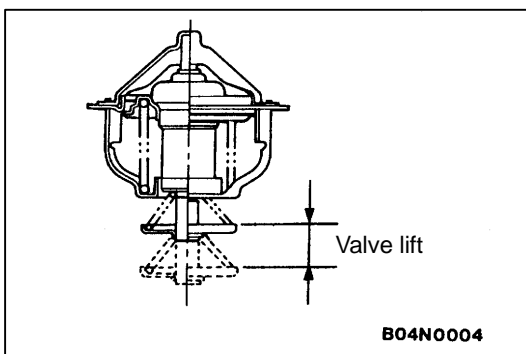
## INSPECTION

### 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:  $82 \pm 1.5^{\circ}\text{C}$**



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

**Standard value:**

**Full-opening temperature:  $95^{\circ}\text{C}$**

**Amount of valve lift: 8.5mm or more**

#### NOTE

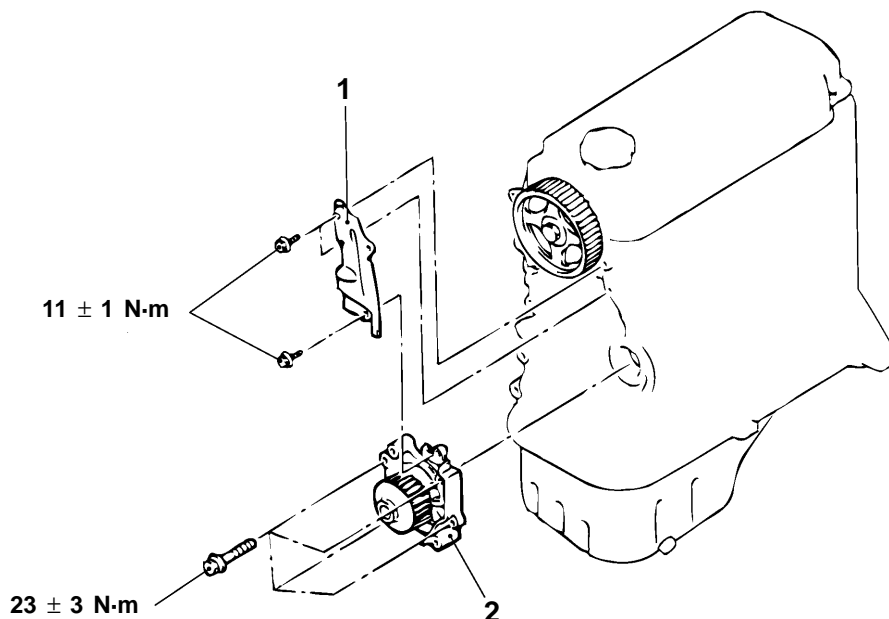
Measure the valve height when the thermostat is fully closed, and use this measurement to calculate the valve height when the thermostat is fully open.

## WATER PUMP &lt;4G94-MPI&gt;

## REMOVAL AND INSTALLATION

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

- Engine Coolant Draining and Supplying
- Timing Belt Removal and Installation



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**Removal steps**

1. Timing belt rear upper cover connection
- ▶A◀ 2. Water pump

**INSTALLATION SERVICE POINT****▶A◀ WATER PUMP INSTALLATION**

1. Use a gasket scraper or wire brush to completely eliminate the residual objects attached on the gasket mounting surface.
2. Apply a series of the specified sealant.

**Specified Sealant:**

**Mitsubishi Genuine Parts No. MD970389 or equivalent**

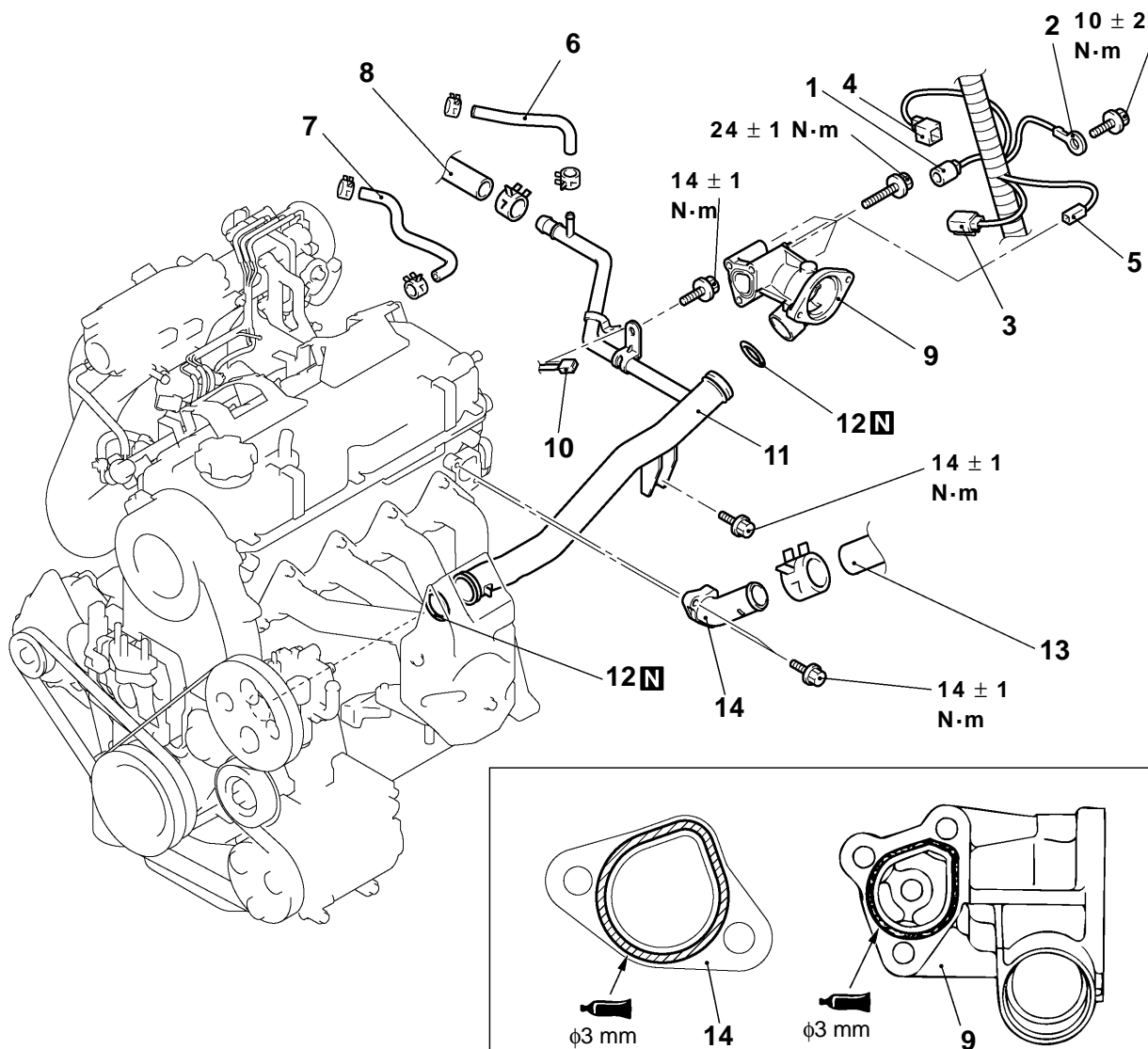
3. With the sealant still wet (within 15 minutes after the sealant applied), install the water pump.  
Do not apply the sealant in an area more than the required.

## WATER HOSE AND WATER PIPE &lt;4G94-MPI&gt;

## REMOVAL AND INSTALLATION

## Pre-removal and Post-installation Operation

- Engine Coolant Draining and Supplying
- [Air Cleaner Removal and Installation](#)



## Removal steps

1. Engine coolant temperature sensor connector
2. Ground cable
3. Knock sensor connector
4. Camshaft position sensor connector
5. Engine coolant temperature gauge unit connector
6. Water hose

7. Water hose
8. Heater hose connection
9. Thermostat case assembly
10. Knock sensor connector
11. Water inlet pipe assembly
12. O-ring
13. Radiator upper hose connection
14. Water outlet fitting

▶C◀

▶B◀  
▶A◀

## REMOVAL SERVICE POINT

### ◀A▶ RADIATOR UPPER HOSE DISCONNECTION

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

## INSTALLATION SERVICE POINTS

### ▶A◀ RADIATOR UPPER HOSE CONNECTION

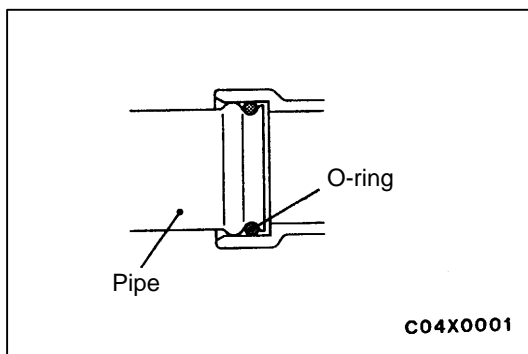
1. Insert each hose as far as the projection of the water inlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

### ▶B◀ O-RING INSTALLATION

Insert the O-ring to pipe, and coat the outer circumference of the O-ring with water.

#### Caution

Care must be taken not to permit engine oil or other greases to adhere to the o-ring.



### ►C◄ THERMOSTAT CASE ASSEMBLY INSTALLATION

1. Use a gasket scraper or wire brush to completely eliminate the residual objects attached on the gasket mounting surface.
2. Apply a series of the specified sealant.

#### **Specified Sealant:**

**Mitsubishi Genuine Parts No. MD970389 or equivalent**

3. With the sealant still wet (within 15 minutes after the sealant applied), install the thermostat case.  
Do not apply the sealant in an area more than the required.

### **INSPECTION**

#### **WATER PIPE AND HOSE CHECK**

Check the water pipe and hose for cracks, damage, clog and replace them if necessary.

# RADIATOR

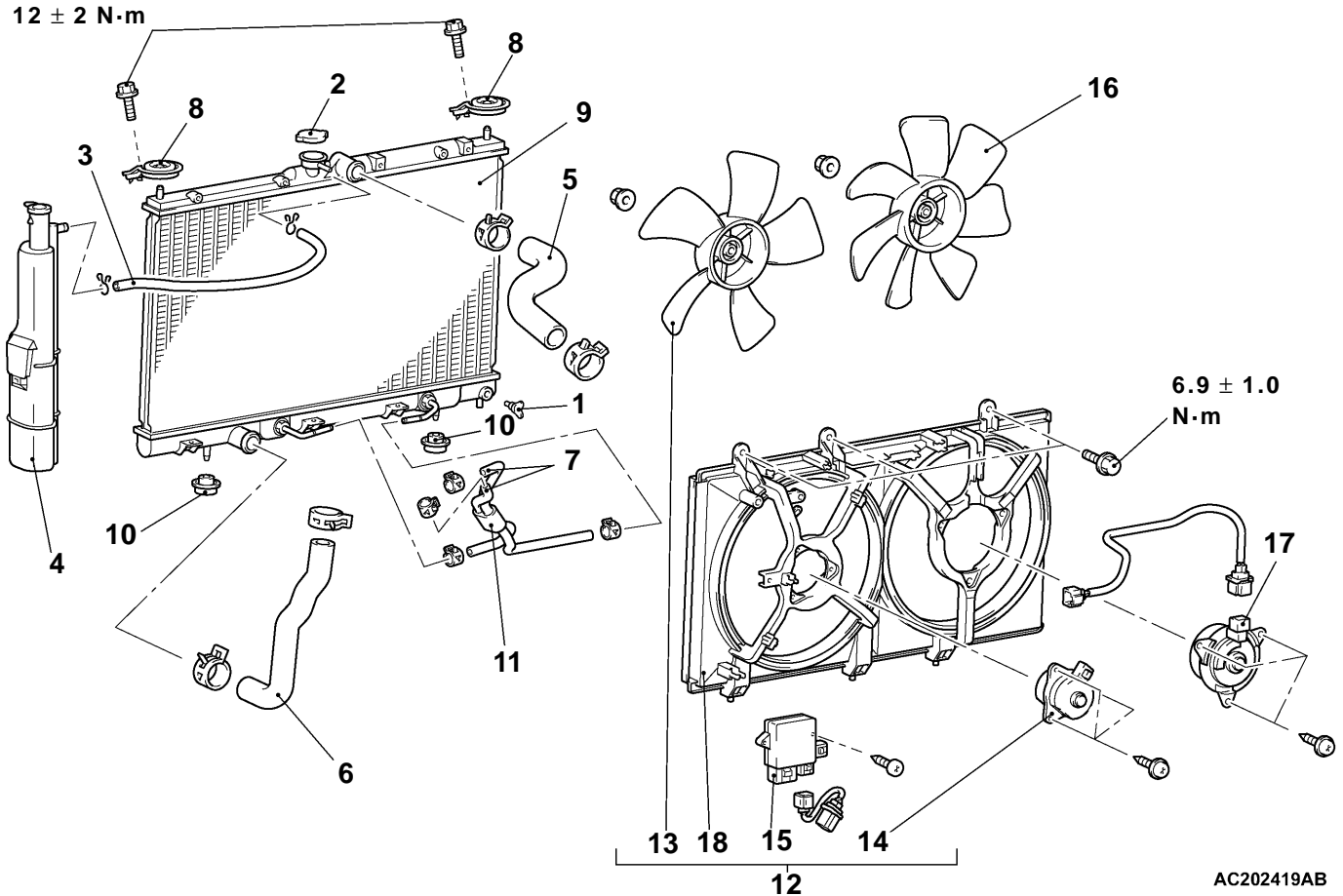
## REMOVAL AND INSTALLATION

### Pre-removal Operation

- Engine Coolant Draining
- Air Intake Duct Removal

### Post-installation Operation

- Air Intake Duct Removal
- Engine Coolant Supplying
- A/T Fluid Supplying and Checking



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### Radiator removal steps

1. Radiator drain plug
2. Radiator cap
3. Rubber hose
4. Reserve tank assembly
5. Radiator upper hose
6. Radiator lower hose
7. Transmission fluid cooler hose connection
8. Upper insulator
9. Radiator assembly
10. Lower insulator
11. Transmission fluid cooler hose assembly

12. Radiator fan motor assembly

### Radiator fan motor and radiator fan controller removal steps

3. Rubber hose
5. Radiator upper hose
12. Radiator fan motor assembly
13. Radiator fan
14. Radiator fan motor
15. Fan controller
16. Condenser fan
17. Condenser fan motor
18. Shroud

### 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.

#### ◀B▶ TRANSMISSION FLUID COOLER HOSE CONNECTION

After disconnecting the hose, plug it to avoid dust or foreign material.

### INSTALLATION SERVICE POINT

#### ▶A◀ RADIATOR UPPER HOSE/RADIATOR LOWER HOSE CONNECTION

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