

GROUP 14

ENGINE COOLING

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GENERAL INFORMATION

M1141000100746

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 temper-

ature, 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	208,800
Built-in A/T oil cooler	Performance kJ/h	5,700

SERVICE SPECIFICATIONS

M1141000300676

Item		Standard value	Limit
Radiator cap pressure kPa		93 – 123	Minimum 83
Range of coolant antifreeze concentration of radiator %		30 – 60	-
Fan controller input voltage V	Ignition switch: "ON"	System voltage	-
Fan controller output voltage V	A/C switch: "OFF"	1 or less	-
	A/C switch: "ON"	Repeat steps 1) and 2). 1) 8.2 ± 2.6 2) System voltage ± 2.6	-
Thermostat	Valve opening temperature of thermostat °C	82 ± 1.5	-
	Full-opening temperature of thermostat °C	95	-
	Valve lift mm	8.5 or more	-

LUBRICANT

M1141000400509

Item	Specified coolant	Quantity L
Engine coolant (including radiator condenser tank)	DIA QUEEN SUPER LONG LIFE COOLANT or equivalent	7.0


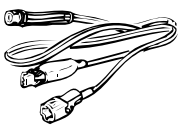
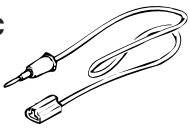

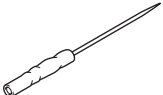
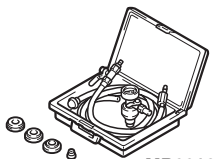
SEALANTS

M1141000500636

Item	Specified sealant
Thermostat case, Water outlet fitting	MITSUBISHI GENUINE Part No.MD970389 or equivalent
Thermostat case assembly bolt	3M Stud Locking 4170 or equivalent
Cylinder block drain plug	3M Nut Locking Part No.4171 or equivalent

SPECIAL TOOLS

M1141000600547

Tool	Number	Name	Use
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  <p>MB991223AZ</p>	<p>MB991223</p> <p>A: MB991219</p> <p>B: MB991220</p> <p>C: MB991221</p> <p>D: MB991222</p>	<p>Harness set</p> <p>A: Test harness</p> <p>B: LED harness</p> <p>C: LED harness adapter</p> <p>D: Probe</p>	<p>Making voltage and resistance measurement during troubleshooting</p> <p>A: Connector pin contact pressure inspection</p> <p>B: Power circuit inspection</p> <p>C: Power circuit inspection</p> <p>D: Commercial tester connection</p>
 <p>MB992006</p>	MB992006	Extra fine probe	Making voltage and resistance measurement during troubleshooting
 <p>MB991871</p>	MB991871	LLC changer	Coolant refilling

TROUBLESHOOTING

INSPECTION CHART FOR TROUBLE SYMPTOMS

M1141005600423

Trouble symptom	Inspection procedure No.	Reference page
Radiator fan and condenser fan do not operate	1	P.14-4
Radiator fan and condenser fan do not change speed or stop	2	P.14-6
Radiator fan does not operate	3	P.14-8
Condenser fan does not operate	4	P.14-9

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection Procedure 1: Radiator Fan and Condenser Fan do not Operate

CIRCUIT OPERATION

- The fan controller is powered from fusible link (2).
- The engine-A/T-ECU uses input signals from the A/C switch, the engine coolant temperature sensor and the output shaft speed sensor to control the speed of the radiator fan motor and condenser fan motor.
- The engine-A/T-ECU controls the fan controller to activate the cooling fan motor and the condenser fan motor.

TECHNICAL DESCRIPTION

- The cause could be a malfunction of the fan controller power supply or earth circuit.
- The cause could also be a malfunction of the fan controller or the engine-A/T-ECU.

TROUBLESHOOTING HINTS

- Malfunction of fusible link (2)
- Malfunction of fan control relay
- Malfunction of engine control relay
- Malfunction of fan controller
- Malfunction of cooling fan motor
- Malfunction of engine-A/T-ECU
- Damaged wiring harness or connector

DIAGNOSIS PROCEDURE

STEP 1. Check fusible link (2).

Q: Is the check result normal?**YES :** Go to Step 2.**NO :** Replace fusible link (2).

STEP 2. Check continuity at fan control relay A-10X.

Refer to [P.14-12](#).**Q: Is the check result normal?****YES :** Go to Step 3.**NO :** Replace the fan control relay.

STEP 3. Check the cooling fan motor.

Refer to [P.14-12](#).**Q: Is the check result normal?****YES :** Go to Step 4.**NO :** Replace the cooling fan motor.

STEP 4. Check at fan control relay A-10X connector.

Q: Is the check result normal?**YES :** Go to Step 5.**NO :** Repair or replace the fan control relay.

STEP 5. Measure at fan control relay A-10X connector.

- (1) Check the power supply line for short or open circuit.
- (2) Disconnect the fan control relay, and measure the voltage between terminal 4 and earth at the relay box side.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6.

NO : Check the wiring harness between fan control relay A-10X (terminal 4) and fusible link (2), and repair if necessary.

STEP 6. Measure at fan control relay A-10X connector.

- (1) Disconnect the fan control relay, and measure the voltage between terminal 3 and earth at the relay box side.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 10.

NO : Go to Step 7.

STEP 7. Check continuity at engine control relay B-17X.

<4G64> Refer to GROUP 13A, On-vehicle service - Engine control relay continuity check [P.13A-286](#).

<4G69> Refer to GROUP 13B, On-vehicle service - Engine control relay continuity check [P.13B-407](#).

Q: Is the check result normal?

YES : Go to Step 8.

NO : Replace the engine control relay.

STEP 8. Check at engine control relay B-17X connector.

Q: Is the check result normal?

YES : Go to Step 9.

NO : Repair or replace the engine control relay.

STEP 9. Check the wiring harness between fan control relay A-10X (terminal 3) and engine control relay B-17X (terminal 1).

- (1) Check the power supply line for short or open circuit.

NOTE: Prior to the wiring harness inspection, check joint connector C-17 and front wiring harness (LH) and control wiring harness combination connector A-14, and repair if necessary.

Q: Is the check result normal?

YES : Go to Step 10.

NO : Check the wiring harness between fan control relay A-10X (terminal 3) and engine control relay B-17X (terminal 1), and repair if necessary.

STEP 10. Measure at fan control relay A-10X connector.

- (1) Check the earth line for open circuit.
- (2) Disconnect the fan control relay, and measure the resistance between terminal 1 and earth at the relay box side.

OK: Continuity exists.

Q: Is the check result normal?

YES : Go to Step 11.

NO : Check the wiring harness between fan control relay A-10X (terminal 1) and body earth, and repair if necessary.

STEP 11. Check fan controller connector A-20.

Q: Is the check result normal?

YES : Go to Step 12.

NO : Repair the fan controller connector.

STEP 12. Measure at fan controller connector A-20.

- (1) Check the power supply line for short or open circuit.
- (2) Disconnect the fan controller connector, and measure the voltage between terminal 3 and earth at the wiring harness side.
 - Turn the ignition switch to the ON position.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 13.

NO : Check the wiring harness between fan controller A-20 (terminal 3) and fan control relay A-10X (terminal 2), and repair if necessary.

STEP 13. Measure at fan controller connector A-20.

- (1) Check the earth line for open circuit.
- (2) Disconnect the fan controller connector, and measure the resistance between terminal 1 and body earth at the wiring harness side.

OK: Continuity exists.

Q: Is the check result normal?

YES : Go to Step 14.

NO : Check the wiring harness between fan controller A-20 (terminal 1) and body earth, and repair if necessary.

STEP 14. Measure at engine-A/T-ECU connector C-112 <4G64> or C-134 <4G69>.

- (1) Connect the engine-A/T-ECU connector, and measure the voltage between terminal 18 <4G64>, 17 <4G69> and body earth.
 - Engine: Idling
 - A/C switch: ON

OK: 0.7 V or more (A/C compressor is working)

Q: Is the check result normal?

YES : Go to Step 17.

NO : Go to Step 15.

STEP 15. Check engine-A/T-ECU connector C-112 <4G64> or C-134 <4G69>.

Q: Is the check result normal?

YES : Go to Step 16.

NO : . Repair the engine-A/T-ECU connector.

STEP 16. Check the wiring harness between fan controller A-20 (terminal 2) and engine-A/T-ECU C-112 (terminal 18) <4G64> or C-134 (terminal 17) <4G69>.

- (1) Check the output line for short or open circuit.

NOTE: Prior to the wiring harness inspection, check front wiring harness (LH) and control wiring harness combination connector A-14, and repair if necessary.

Q: Is the check result normal?

YES : Go to Step 17.

NO : Check the wiring harness between fan controller A-20 (terminal 2) and engine-A/T-ECU C-112 (terminal 18) <4G64> or C-134 (terminal 17) <4G69>, and repair if necessary.

STEP 17. Verify that the condition described by the customer exists.

Q: Does a malfunction take place again?

YES : An intermittent malfunction is suspected (Refer to GROUP 00, How to cope with intermittent malfunctions [P.00-5](#)).

NO : Replace the engine-A/T-ECU.

Inspection Procedure 2: Radiator Fan and Condenser Fan do not Change Speed or Stop**CIRCUIT OPERATION**

- The fan controller is powered from fusible link (2).
- The engine-A/T-ECU uses input signals from the A/C switch, the engine coolant temperature sensor and the output shaft speed sensor to control the speed of the cooling fan motor and condenser fan motor.
- The engine-A/T-ECU controls the fan controller to activate the radiator fan motor and the condenser fan motor.

TECHNICAL DESCRIPTION

The fan controller has variable control of the radiator fan motor and the condenser fan motor speeds using signals transmitted from the engine-A/T-ECU.

TROUBLESHOOTING HINTS

- Malfunction of fan control relay
- Malfunction of fan controller
- Malfunction of engine-A/T-ECU

DIAGNOSIS PROCEDURE**STEP 1. Check continuity at fan control relay A-10X.**

Refer to [P.14-12](#).

Q: Is the check result normal?

YES : Go to Step 2.

NO : Replace the fan control relay.

STEP 2. Check at fan control relay A-10X connector.

Q: Is the check result normal?

YES : Go to Step 3.

NO : Repair or replace the fan control relay.

STEP 3. Measure at fan control relay A-10X connector.

- (1) Check the power supply line for short or open circuit.
- (2) Disconnect the fan control relay, and measure the voltage between terminal 4 and earth at the relay box side.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 4.

NO : Check the wiring harness between fan control relay A-10X (terminal 4) and fusible link (2), and repair if necessary.

STEP 4. Measure at fan control relay A-10X connector.

- (1) Disconnect the fan control relay, and measure the voltage between terminal 3 and earth at the relay box side.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6.

NO : Go to Step 5.

STEP 5. Check the wiring harness between fan control relay A-10X (terminal 3) and engine control relay B-17X (terminal 1).

- (1) Check the power supply line for short or open circuit.

NOTE: Prior to the wiring harness inspection, check joint connector C-17 and front wiring harness (LH) and control wiring harness combination connector A-14, and repair if necessary.

Q: Is the check result normal?

YES : Go to Step 6.

NO : Check the wiring harness between fan control relay A-10X (terminal 3) and engine control relay B-17X (terminal 1), and repair if necessary.

STEP 6. Measure at fan control relay A-10X connector.

- (1) Check the earth line for open circuit.
- (2) Disconnect the fan control relay, and measure the resistance between terminal 1 and earth at the relay box side.

OK: Continuity exists.

Q: Is the check result normal?

YES : Go to Step 7.

NO : Check the wiring harness between fan control relay A-10X (terminal 1) and body earth, and repair if necessary.

STEP 7. Check fan controller connector A-20.

Q: Is the check result normal?

YES : Go to Step 8.

NO : Repair the fan controller connector.

STEP 8. Measure at fan controller connector A-20.

- (1) Check the power supply line for short or open circuit.
- (2) Disconnect the fan controller connector, and measure the voltage between terminal 3 and earth at the wiring harness side.
 - Turn the ignition switch to the ON position.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 9.

NO : Check the wiring harness between fan controller A-20 (terminal 3) and fan control relay A-10X (terminal 2), and repair if necessary.

STEP 9. Measure at fan controller connector A-20.

- (1) Check the earth line for open circuit.
- (2) Disconnect the fan controller connector, and measure the resistance between terminal 1 and body earth at the wiring harness side.

OK: Continuity exists.

Q: Is the check result normal?

YES : Go to Step 10.

NO : Check the wiring harness between fan controller A-20 (terminal 1) and body earth, and repair if necessary.

STEP 10. Measure at engine-A/T-ECU connector C-112 <4G64> or C-134 <4G69>.

(1) Connect the engine-A/T-ECU connector, and measure the voltage between terminal 18 <4G64>, 17 <4G69> and body earth.

- Engine: Idling
- A/C switch: ON

OK: 0.7 V or more (A/C compressor is working)

Q: Is the check result normal?

YES : Go to Step 12.

NO : Go to Step 11.

STEP 11. Check engine-A/T-ECU connector C-112 <4G64> or C-134 <4G69>.

Q: Is the check result normal?

YES : Go to Step 12.

NO : Repair the engine-A/T-ECU connector.

STEP 12. Check the wiring harness between fan controller A-20 (terminal 2) and engine-A/T-ECU C-112 (terminal 18) <4G64> or C-134 (terminal 17) <4G69>.

(1) Check the output line for short or open circuit.

NOTE: Prior to the wiring harness inspection, check front wiring harness (LH) and control wiring harness combination connector A-14, and repair if necessary.

Q: Is the check result normal?

YES : Go to Step 13.

NO : Check the wiring harness between fan controller A-20 (terminal 2) and engine-A/T-ECU C-112 (terminal 18) <4G64> or C-134 (terminal 17) <4G69>, and repair if necessary.

STEP 13. Verify that the condition described by the customer exists.

Q: Does a malfunction take place again?

YES : An intermittent malfunction is suspected (Refer to GROUP 00, How to cope with intermittent malfunctions [P.00-5](#)).

NO : Replace the engine-A/T-ECU.

Inspection Procedure 3: Radiator Fan does not Operate**TECHNICAL DESCRIPTION**

The cause could be a malfunction of the radiator fan motor or an open circuit between the fan controller and the cooling fan motor.

TROUBLESHOOTING HINTS

Malfunction of cooling fan motor

DIAGNOSIS PROCEDURE**STEP 1. Check the cooling fan motor.**

Refer to [P.14-12](#).

Q: Is the cooling fan motor in good condition?

YES : Go to Step 2.

NO : Replace the cooling fan motor.

STEP 2. Check the fan controller

Refer to [P.14-11](#).

Q: Is the fan controller in good condition?

YES : Go to Step 3.

NO : Replace the fan controller.

STEP 3. Verify that the condition described by the customer exists.

Q: Does a malfunction take place again?

YES : An intermittent malfunction is suspected (Refer to GROUP 00, How to cope with intermittent malfunctions [P.00-5](#)).

NO : Return to Step 1.

Inspection Procedure 4: Condenser Fan does not Operate

CIRCUIT OPERATION

- The fan controller is powered from fusible link (2).
- The engine-A/T-ECU judges the required revolution speed of radiator fan motor and condenser fan motor using the input signals transmitted from A/C switch, automatic compressor controller, vehicle speed sensor and engine coolant temperature sensor. The engine-A/T-ECU activates the fan controller to drive the cooling fan motor and condenser fan motor.

TECHNICAL DESCRIPTION

The cause could be a malfunction of the condenser fan motor or fan controller.

TROUBLESHOOTING HINTS

- Malfunction of condenser fan motor
- Malfunction of fan controller

DIAGNOSIS PROCEDURE

STEP 1. Check the condenser fan motor.

Refer to GROUP 55A, Condenser and Condenser Fan Motor [P.55A-50](#).

Q: Is the condenser fan motor in good condition?

YES : Go to Step 2.

NO : Replace the condenser fan motor, then go to Step 3.

STEP 2. Check the fan controller.

Refer to [P.14-11](#).

Q: Is the fan controller in good condition?

YES : Go to Step 3.

NO : Replace the fan controller, then go to Step 3.

STEP 3. Check the symptoms.

Q: Does the condenser fan operate correctly?

YES : The procedure is complete.

NO : Return to Step 1.

ON-VEHICLE SERVICE

ENGINE COOLANT LEAK CHECK

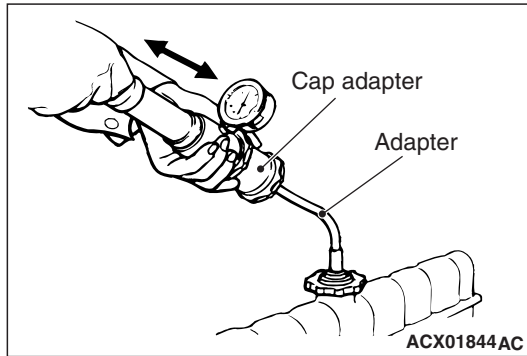
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⚠ WARNING

When pressure testing the cooling system, slowly release cooling system pressure to avoid getting burned by hot coolant.

⚠ CAUTION

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

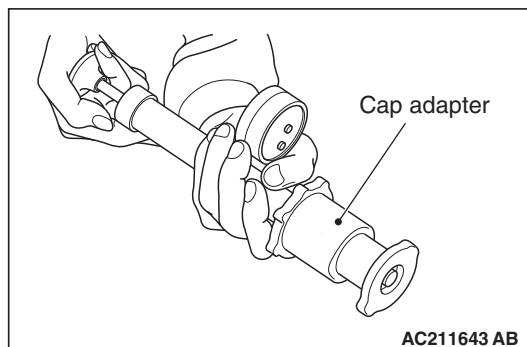


1. Check that the coolant level is up to the filler neck. Install a radiator tester and apply 160 kPa pressure, and then check for leakage from the radiator hose or connections.
2. If there is leakage, repair or replace the appropriate part.

RADIATOR CAP VALVE OPENING
PRESSURE CHECK

M1141001300442

NOTE: Be sure that the cap is clean before testing. Rust or other foreign material on the cap seal will cause an improper reading.



1. Use a cap adapter to attach the cap to the tester.

2. Increase the pressure until the indicator of the gauge stops moving.

Minimum limit: 83 kPa

Standard value: 93 – 123 kPa

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

ENGINE COOLANT REPLACEMENT

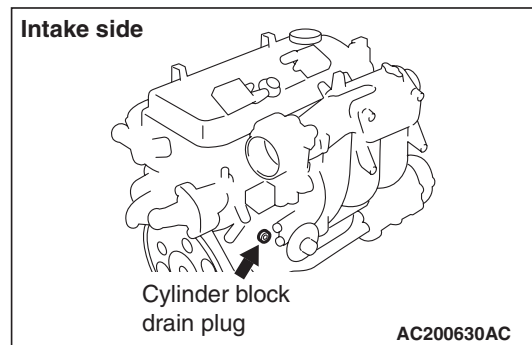
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⚠ WARNING

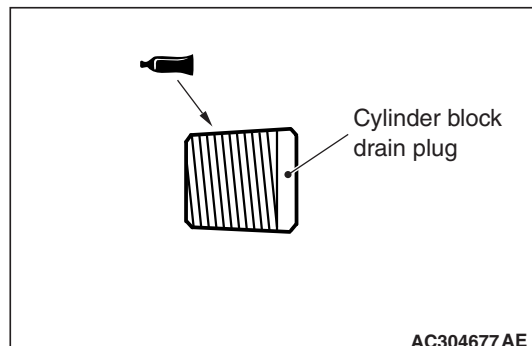
When removing the radiator cap, use care to avoid contact with hot coolant or steam.

Place a shop towel over the cap and turn the cap anticlockwise a little to let the pressure escape through the vinyl tube. After relieving the steam pressure, remove the cap by slowly turning it anticlockwise.

1. Drain the water from the radiator, heater core and engine after unplugging the radiator drain plug and removing the radiator cap.



2. Drain the water in the water jacket by unplugging the drain plug of the cylinder block.
3. Remove the radiator condenser tank and drain the coolant.
4. Drain the coolant then clean the path of the coolant by injecting water into the radiator from the radiator cap area.



5. Apply the designated sealant to the screw area of the cylinder block drain plug, and then tighten to the standard torque.

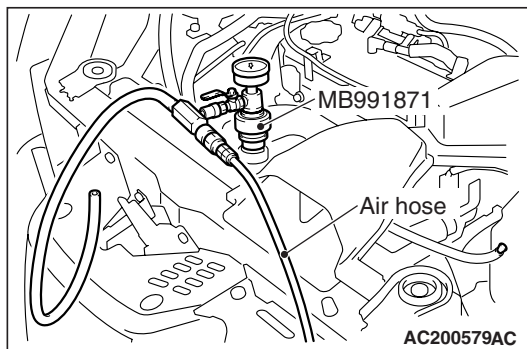
Specified sealant: 3M Nut Locking Part No. 4171 or equivalent

Tightening torque: 44 ± 5 N·m

6. Securely tighten the drain plug of the radiator.
7. Assemble the radiator condenser tank.

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 corrosion of the aluminium components.



8. By referring to the section on coolant, select an appropriate concentration for safe operating temperature within the range of 30 to 60 %. Use special tool LLC changer (MB991871) to refill the coolant. A convenient mixture is a 50 % water and 50 % antifreeze solution (freezing point: -31°C).

Recommended antifreeze: DIA QUEEN SUPER LONG LIFE COOLANT or equivalent

Quantity: 7.0 L

NOTE: For how to use special tool MB991871, refer to its manufacturer's instructions.

9. Reinstall the radiator cap.
10. Start the engine and let it warm up until the thermostat opens.
11. After repeatedly revving the engine up to 3,000 r/min several times, then stop the engine.
12. Remove the radiator cap after the engine has become cold, and pour in coolant up to the brim. Reinstall the cap.

CAUTION

Do not overfill the radiator condenser tank.

13. Add coolant to the radiator condenser tank between the "FULL" and "LOW" mark if necessary.

CONCENTRATION MEASUREMENT

M1141001100437

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

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

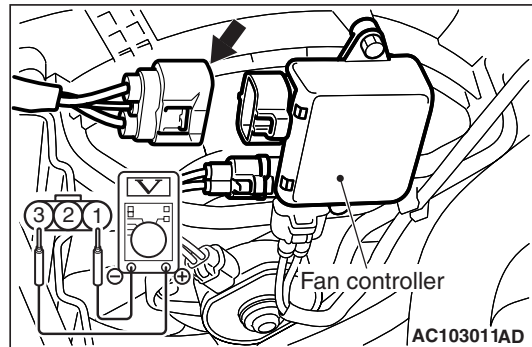
Recommended antifreeze: DIA QUEEN SUPER LONG LIFE COOLANT or equivalent

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.

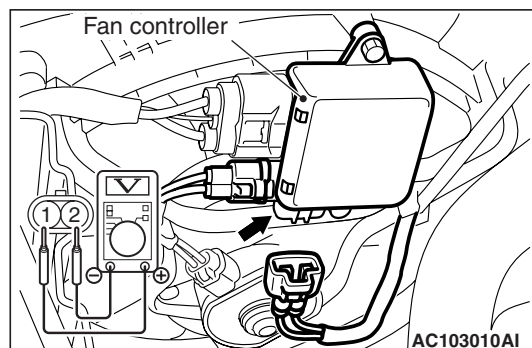
FAN CONTROLLER CHECK

M1141007400157



1. Remove the fan controller connector.
2. Turn the ignition switch to the "ON" position, and measure the voltage between the harness-side connector terminals.

Standard value: System voltage



3. Connect the fan controller connector, and disconnect the condenser fan motor connector.
4. Ensure that the A/C switch is off, and start the engine and run it at idle.
5. Measure the voltage between the fan controller-side connector terminals.

Standard value: 1V or less

⚠ WARNING

Stay clear of the fan when the fan starts running.

6. Turn the A/C switch to the "ON" position.
7. Measure the voltage between the fan controller-side connector terminals while the fan is running. The voltage should repeat the values below.

Standard value:

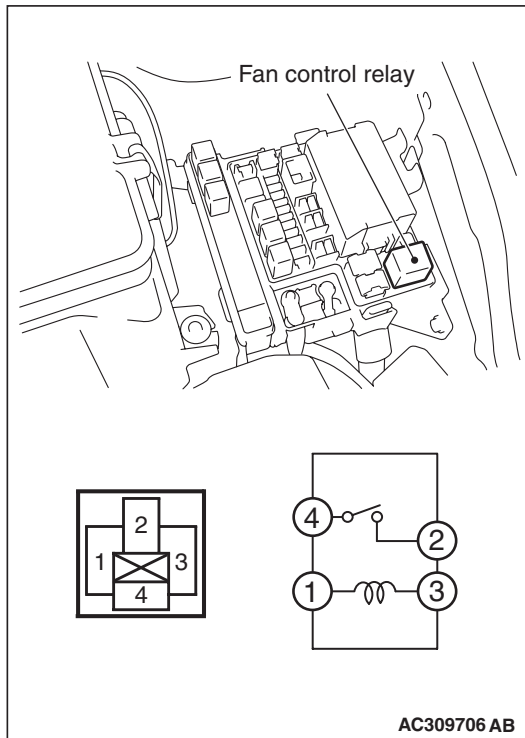
$8.2 \pm 2.6 \text{ V}$

System voltage $\pm 2.6 \text{ V}$

8. If the voltage does not repeatedly change as indicated, replace the fan controller.

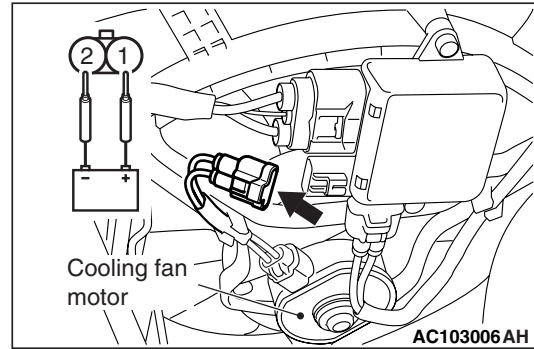
FAN CONTROL RELAY CONTINUITY CHECK

M1141006200547



COOLING FAN MOTOR CHECK

M1141007100208



1. Remove the cooling fan motor connector.
2. Check to see that the fan motor of the radiator turns when applying battery power between the connector terminals of the cooling fan motor. Also check to see that there is no abnormal sound coming from the cooling fan motor at this time.
3. If the cooling fan motor is defective, replace it.

Battery voltage	Terminal No. to be connected to tester	Continuity test results
Not applied	4 – 2	Open circuit
Connect terminal No.3 and battery (+) terminal. Connect terminal No.1 and battery (–) terminal.	4 – 2	Less than 2 ohms

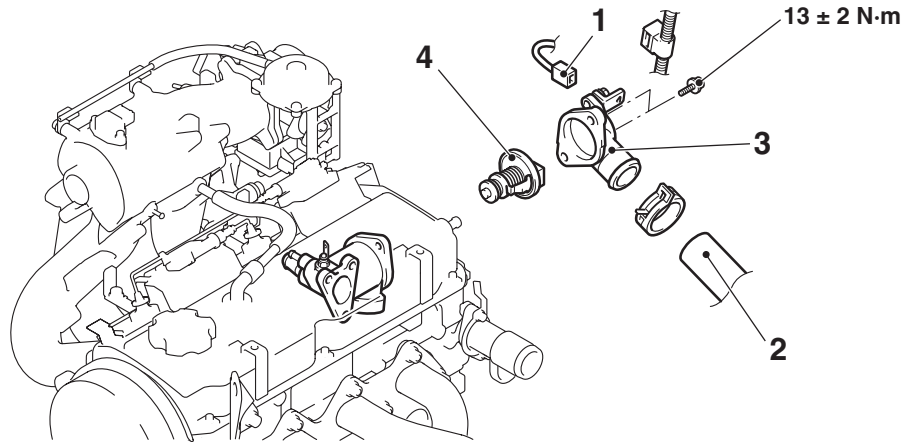
THERMOSTAT

REMOVAL AND INSTALLATION <4G64>

M1141002400851

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Refilling (Refer to P.14-10).
- Air Cleaner Removal and Installation (Refer to GROUP 15, Air Cleaner P.15-3).
- Battery Removal and Installation



AC200126 AC

Removal steps

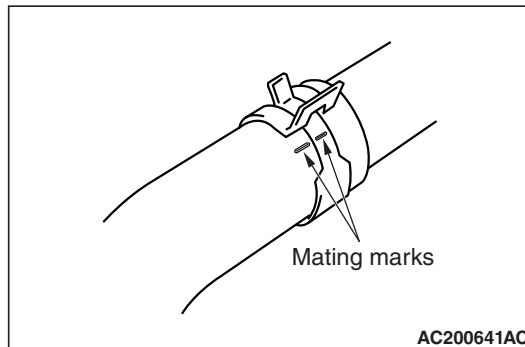
- <<A>> >>B<<
1. Capacitor connector
 2. Radiator lower hose connection

Removal steps (Continued)

- >>A<<
3. Water inlet fitting
 4. Thermostat

REMOVAL SERVICE POINT

<<A>> RADIATOR LOWER HOSE DIS-CONNECTION



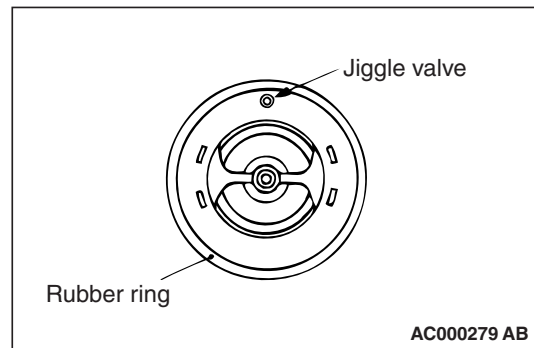
Make mating marks on the radiator hose and the hose clamp. Disconnect the radiator hose.

INSTALLATION SERVICE POINTS

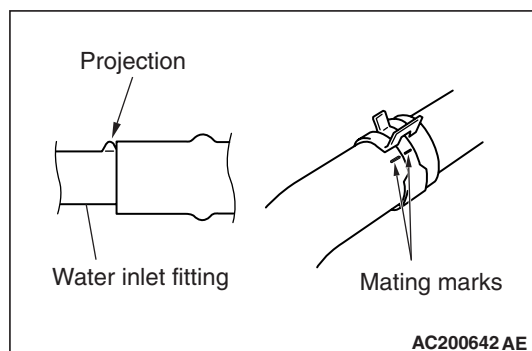
>>A<< THERMOSTAT INSTALLATION

⚠ CAUTION

Make absolutely sure that no oil adheres to the rubber ring of the thermostat. Also do not fold or scratch the rubber ring during installation.



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

>>B<< RADIATOR LOWER HOSE
CONNECTION

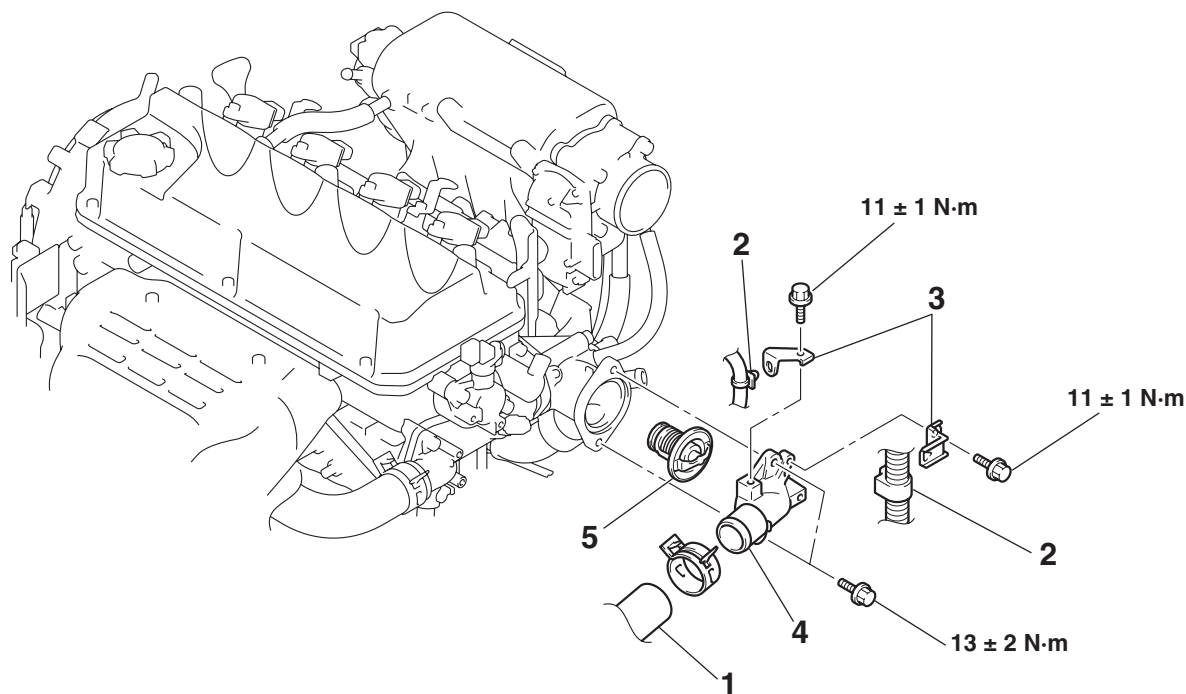
1. Insert each hose as far as the projection of the water inlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

REMOVAL AND INSTALLATION <4G69>

M1141002400862

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Refilling (Refer to [P.14-10](#)).
- Air Cleaner Removal and Installation (Refer to GROUP 15, Air Cleaner [P.15-4](#)).
- Battery Removal and Installation



AC309324AB

<<A>> >>B<<

Removal steps

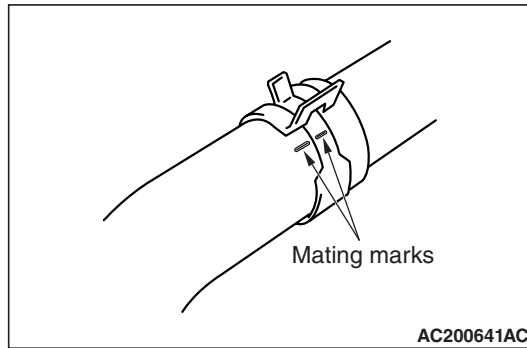
1. Radiator lower hose connection
2. Control wiring harness connection
3. Control wiring harness connection bracket

Removal steps (Continued)

4. Water inlet fitting
5. Thermostat

REMOVAL SERVICE POINT

<<A>> RADIATOR LOWER HOSE DIS- CONNECTION



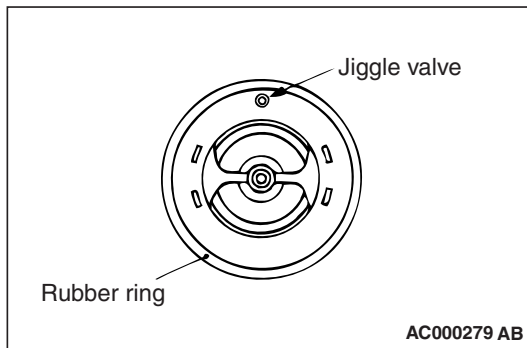
Make mating marks on the radiator hose and the hose clamp. Disconnect the radiator hose.

INSTALLATION SERVICE POINTS

>>A<< THERMOSTAT INSTALLATION

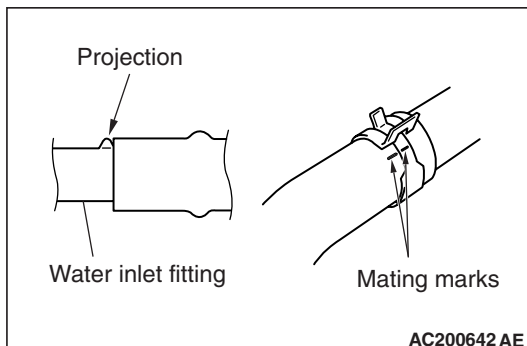
⚠ CAUTION

Make absolutely sure that no oil adheres to the rubber ring of the thermostat. Also do not fold or scratch the rubber ring during installation.



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

>>B<< RADIATOR LOWER HOSE CONNECTION



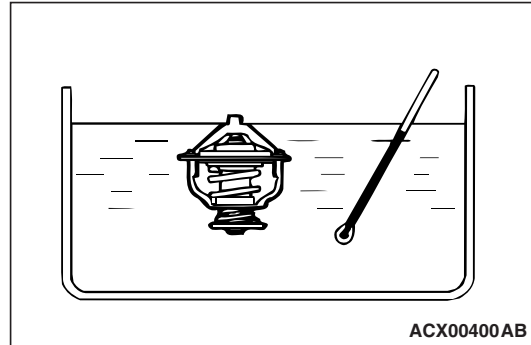
1. Insert each hose as far as the projection of the water inlet fitting.

2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

INSPECTION

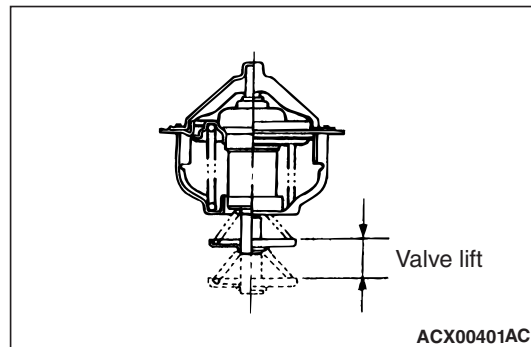
THERMOSTAT CHECK

M1141002500546



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

Standard value: $82 \pm 1.5^{\circ}\text{C}$



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

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

Standard value:

Full-opening temperature: 95°C

Amount of valve lift: 8.5 mm or more

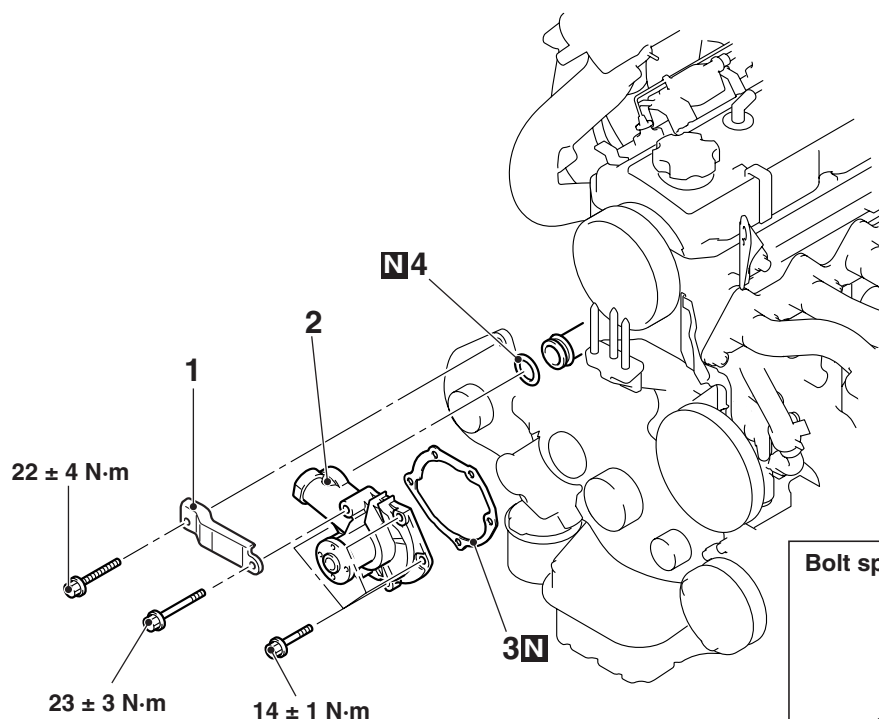
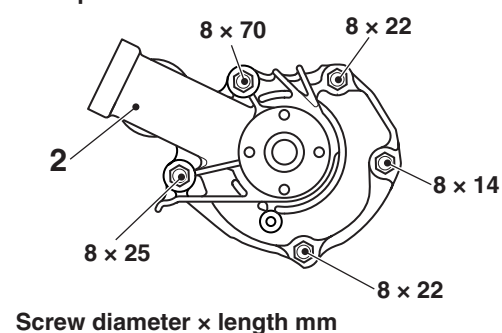
WATER PUMP

REMOVAL AND INSTALLATION <4G64>

M1141002700971

Pre-removal and Post-installation Operation

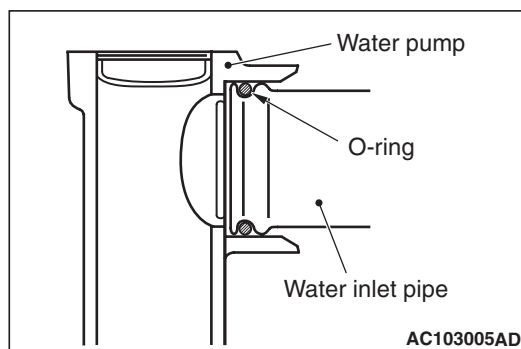
- Engine Coolant Draining and Supplying (Refer to [P.14-10](#)).
- Timing Belt Removal and Installation (Refer to GROUP 11A, Timing Belt [P.11A-36](#)).

**Bolt specifications**

AC309659 AB

Removal steps

1. Alternator brace
 2. Water pump
 3. Water pump gasket
 4. O-ring
- >>A<<

INSTALLATION SERVICE POINT**>>A<< O-RING INSTALLATION**

Fit the O-ring to the groove in the water inlet pipe. Then lubricate the O-ring and the inside of the water pump with water, and then insert the pipe to the water pump.

REMOVAL AND INSTALLATION <4G69>

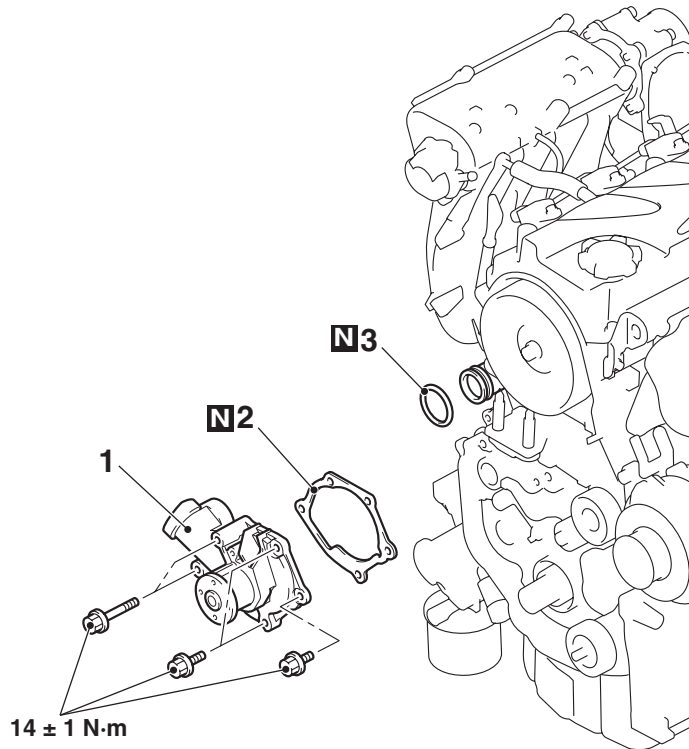
M1141002700982

Pre-removal Operation

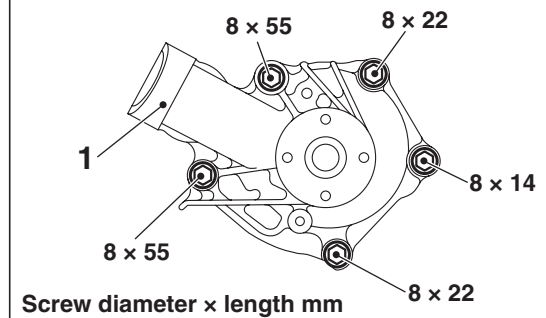
- Engine Coolant Draining (Refer to P.14-10).
- Timing Belt Removal (Refer to GROUP 11C, Timing Belt P.11C-36).

Post-installation Operation

- Timing Belt Installation (Refer to GROUP 11C, Timing Belt P.11C-36).
- Engine Coolant Refilling (Refer to P.14-10).



Bolt specifications



AC309459 AB

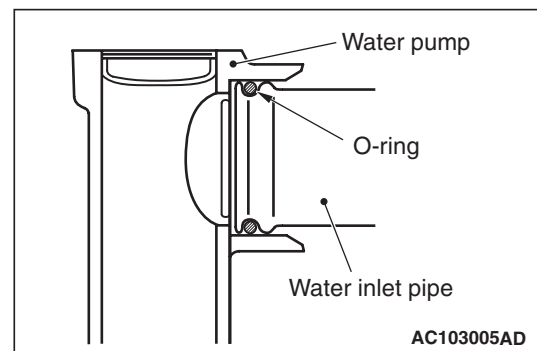
Removal steps

1. Water pump
2. Water pump gasket
3. O-ring

>>A<<

INSTALLATION SERVICE POINT

>>A<< O-RING INSTALLATION



Fit the O-ring to the groove in the water inlet pipe. Then lubricate the O-ring and the inside of the water pump with water, and then insert the pipe to the water pump.

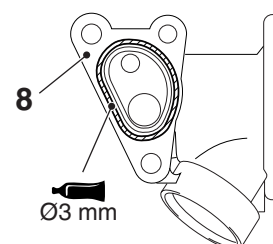
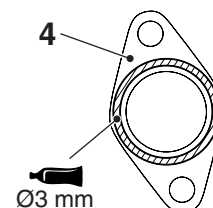
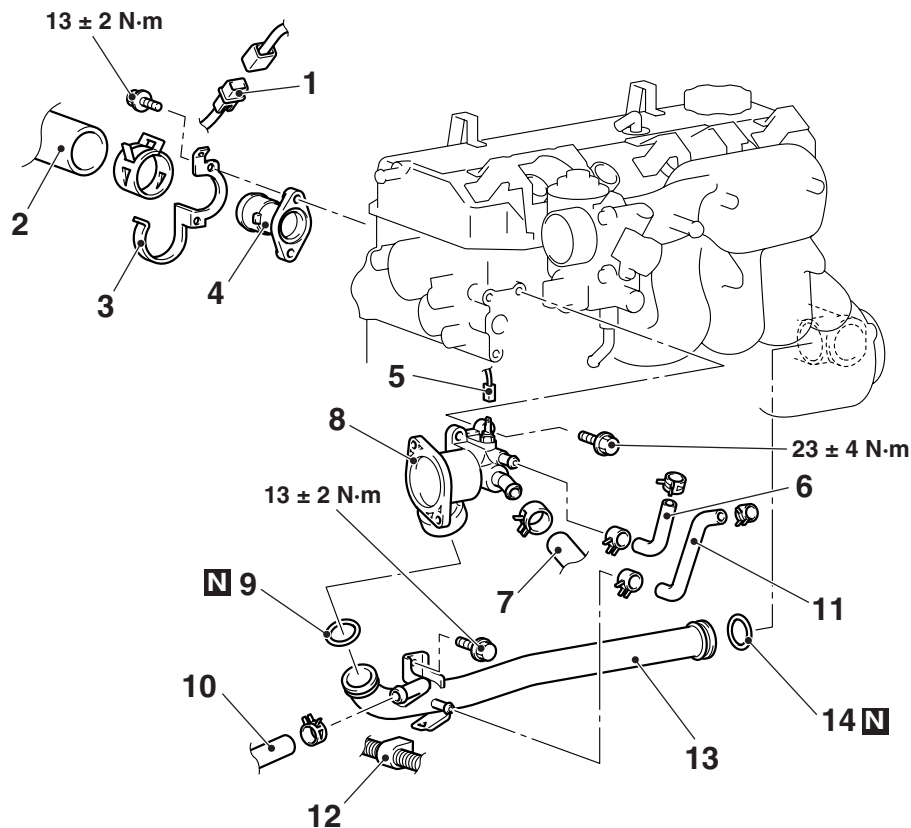
WATER HOSE AND WATER PIPE

REMOVAL AND INSTALLATION <4G64>

M1141003301032

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Supplying (Refer to P.14-10).
- Air Cleaner Removal and Installation (Refer to GROUP 15, Air Cleaner P.15-3).
- Thermostat Removal and Installation (Refer to P.14-13).



Sealant: Mitsubishi Genuine
Part No. MD970389 or
equivalent

AC200291 AC

Removal steps

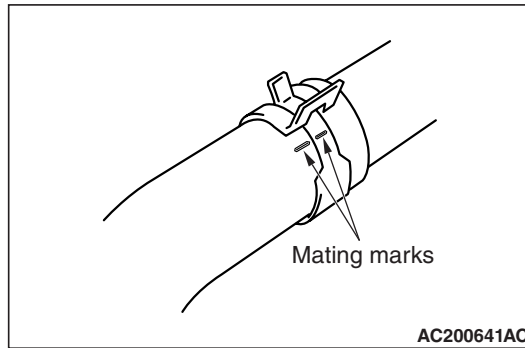
- <<A>> >>C<<
1. Oxygen sensor connector
 2. Radiator upper hose connection
 3. Radiator clamp
- >>B<<
4. Water outlet fitting
 5. Water temperature gauge unit connector
 6. Water feed hose
 7. Heater hose connection

Removal steps (Continued)

- >>B<<
8. Thermostat case assembly
- >>A<<
9. O-ring
 10. Heater hose connection
 11. Water return hose
 12. Harness clamp
 13. Water inlet pipe assembly
- >>A<<
14. O-ring

REMOVAL SERVICE POINT

<<A>> RADIATOR UPPER HOSE DISCONNECTION

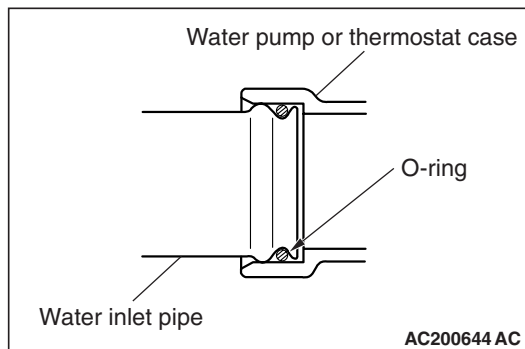


After making mating marks on the radiator hose and hose clamp, disconnect the radiator hose.

INSTALLATION SERVICE POINTS

>>A<< O-RING INSTALLATION

⚠ CAUTION



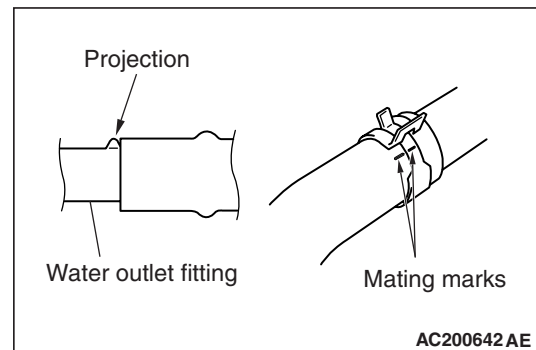
Do not allow engine oil or other grease to adhere to the O-ring

Insert the O-ring to the water pipe, and coat the outer portion of the O-ring with water or engine coolant.

>>B<< THERMOSTAT CASE ASSEMBLY/WATER OUTLET FITTING INSTALLATION

1. Use a gasket scraper or wire brush to completely eliminate all gasket material on the gasket mounting surface.
2. Apply a bead of the specified sealant.
Specified Sealant: MITSUBISHI GENUINE PART No. MD970389 or equivalent
3. With the sealant still wet (within 15 minutes after the sealant is applied), install the thermostat case or water outlet fitting. Do not apply the sealant in an area more than the required.

>>C<< RADIATOR UPPER HOSE CONNECTION



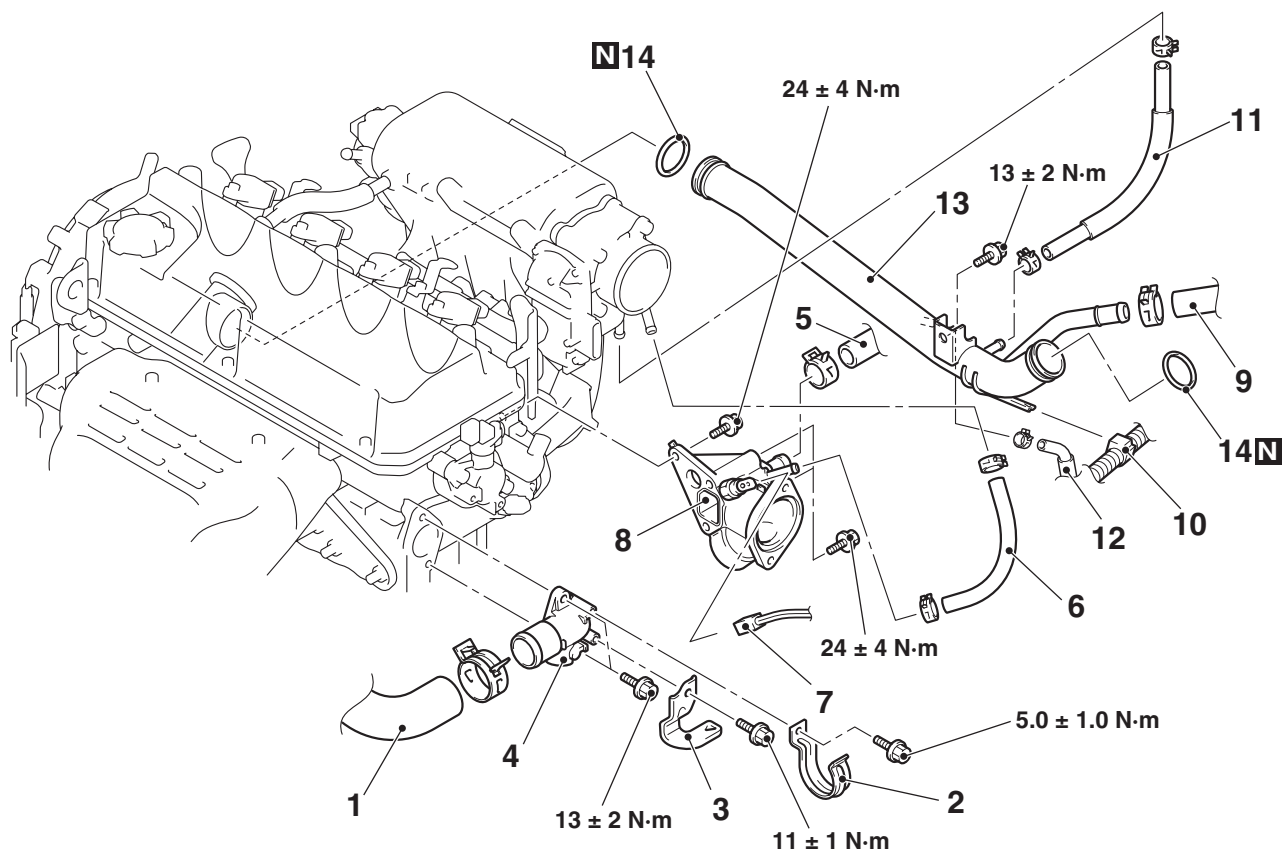
1. Insert each hose as far as the projection of the water outlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

REMOVAL AND INSTALLATION <4G69>

M1141003301043

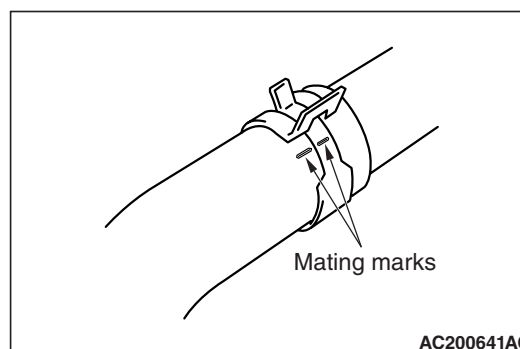
Pre-removal and Post-installation Operation

- Engine Coolant Draining and Supplying (Refer to [P.14-10](#)).
- Air Cleaner Removal and Installation (Refer to GROUP 15, Air Cleaner [P.15-4](#)).
- Thermostat Removal and Installation (Refer to [P.14-14](#)).



AC309470 AB

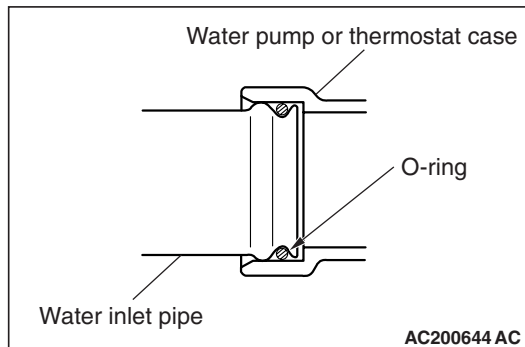
- Removal steps**
- <<A>> >>C<< 1. Radiator upper hose connection
2. Radiator hose clamp
3. Control wiring harness connection bracket
- >>B<< 4. Water outlet fitting
5. Heater hose connection
6. Water return hose
7. Engine coolant temperature gauge unit connector
- >>B<< 8. Thermostat case assembly
9. Heater hose connection
10. Harness clamp
11. Water feed hose
12. Transfer water return hose connection
- >>A<< 13. Water inlet pipe assembly
14. O-ring

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



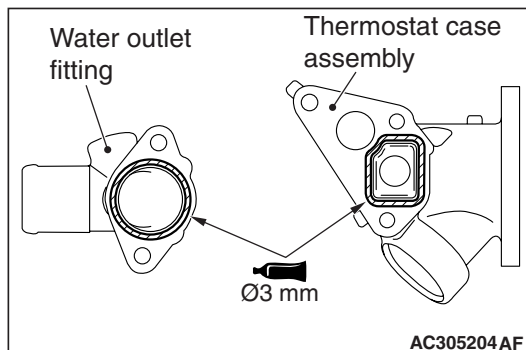
CAUTION

Do not allow engine oil or other grease to adhere to the O-ring

Insert the O-ring to the water pipe, and coat the outer portion of the O-ring with water or engine coolant.

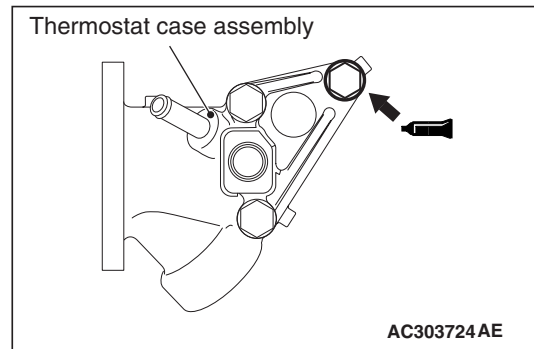
>>B<< THERMOSTAT CASE ASSEMBLY/WATER OUTLET FITTING INSTALLATION

1. Use a gasket scraper or wire brush to completely eliminate all gasket material on the gasket mounting surface.



2. Apply a bead of the sealant to the cylinder head mating surface of the thermostat case as shown.

Specified Sealant: Mitsubishi Genuine Part No.MD970389 or equivalent

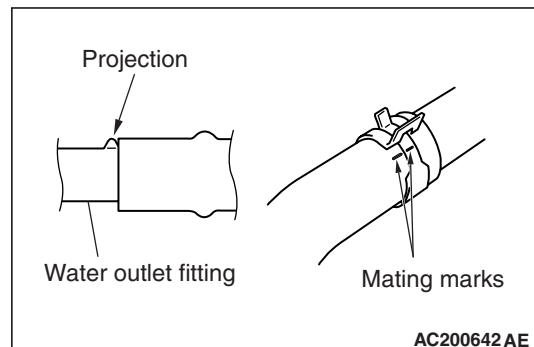


3. Apply sealant to the thread of the thermostat case assembly bolts as shown.

Specified Sealant: 3M Stud Locking 4170 or equivalent

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

>>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.

INSPECTION

M1141003400401

WATER PIPE AND HOSE CHECK

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

RADIATOR

REMOVAL AND INSTALLATION <4G64>

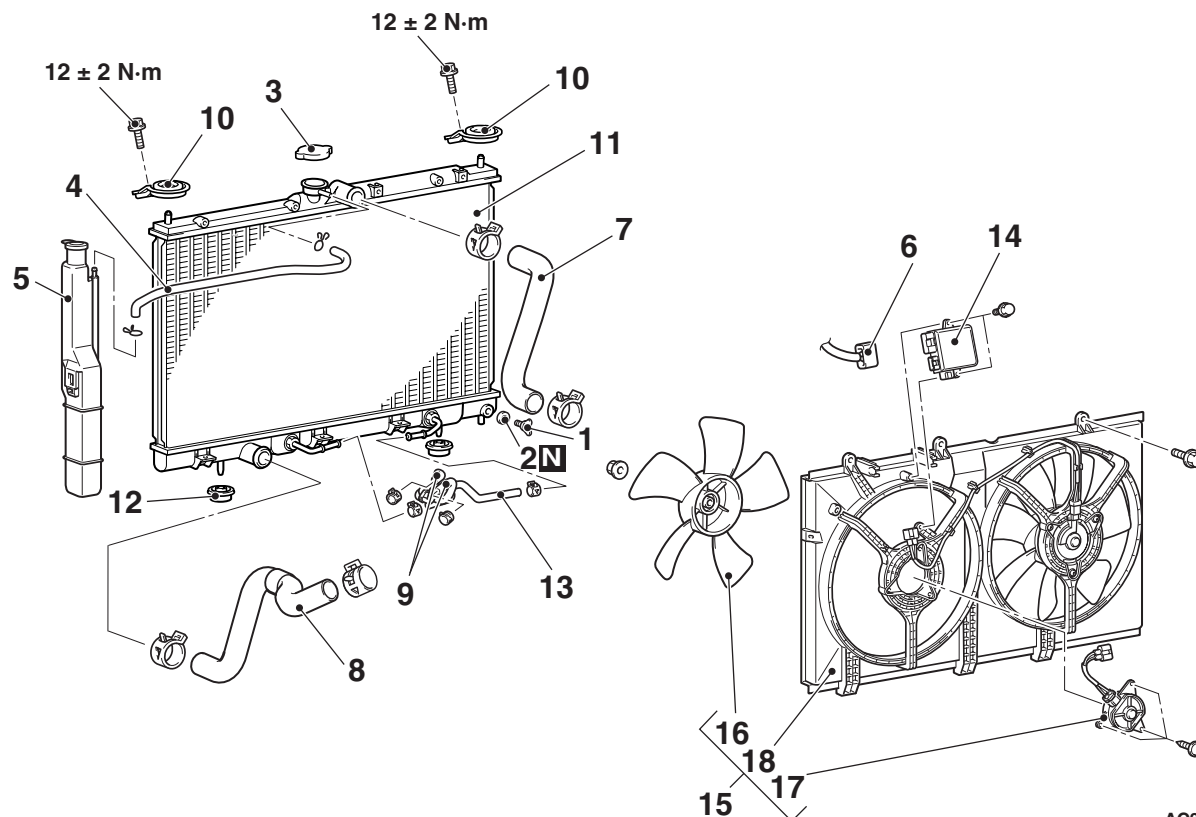
M1141001501148

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-10).
- Air Cleaner Removal (Refer to GROUP 15, Air Cleaner P.15-3).

Post-installation Operation

- Air Cleaner Installation (Refer to GROUP 15, Air Cleaner P.15-3).
- Engine Coolant Refilling and Level Check (Refer to P.14-10).



AC309661 AB

Radiator removal steps

1. Drain plug
2. O-ring
3. Radiator cap
4. Radiator reserve tank hose
5. Radiator reserve tank assembly
6. Fan controller connector
7. Radiator upper hose
8. Radiator lower hose
9. A/T fluid cooler hose connection
10. Upper insulator
11. Radiator assembly
12. Lower insulator
13. A/T fluid cooler hose assembly

<<A>> >>A<<
<<A>> >>A<<
<>

Radiator removal steps

14. Fan controller
15. Cooling fan motor and shroud assembly

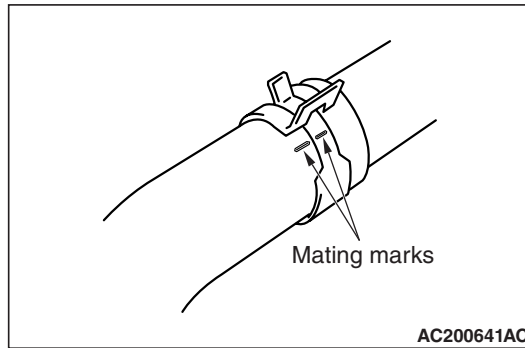
Cooling fan motor removal steps

4. Radiator condenser tank hose
6. Fan controller connector
7. Radiator upper hose
15. Cooling fan motor and shroud assembly
16. Cooling fan
17. Cooling fan motor
18. Cooling fan shroud

<<A>> >>A<<

REMOVAL SERVICE POINTS

<<A>> RADIATOR UPPER HOSE/RADIATOR LOWER HOSE DISCONNECTION



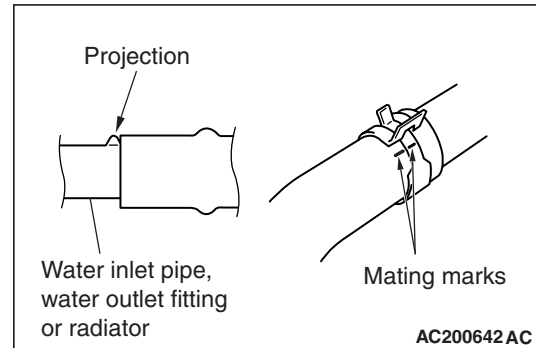
Make mating marks on the radiator hose and the hose clamp. Disconnect the radiator hose.

<> A/T FLUID COOLER HOSE DISCONNECTION

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

INSTALLATION SERVICE POINT

>>A<< RADIATOR LOWER HOSE/RADIATOR UPPER HOSE CONNECTION



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

REMOVAL AND INSTALLATION <4G69>

M1141001501159

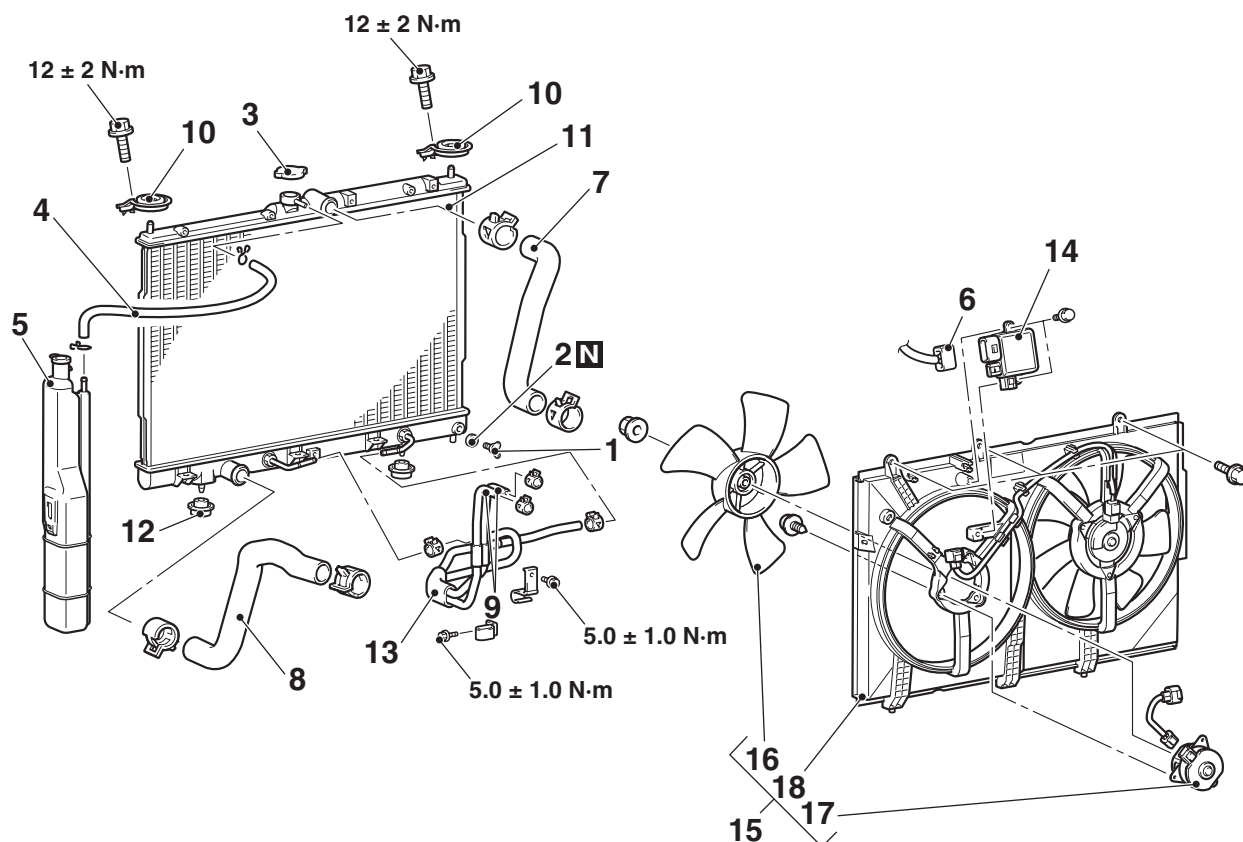
Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-10).
- Air Cleaner Removal (Refer to GROUP 15, Air Cleaner P.15-4).

Post-installation Operation

- Air Cleaner Installation (Refer to GROUP 15, Air Cleaner P.15-4).
- Engine Coolant Refilling and Level Check (Refer to P.14-10).

<Except vehicles for Australia and New Zealand>



AC504332AB

Radiator removal steps

1. Drain plug
2. O-ring
3. Radiator cap
4. Radiator reserve tank hose
5. Radiator reserve tank assembly
6. Fan controller connector
7. Radiator upper hose
8. Radiator lower hose
9. A/T fluid cooler hose connection
10. Upper insulator
11. Radiator assembly
12. Lower insulator
13. A/T fluid cooler hose assembly

<<A>> >>A<<
 <<A>> >>A<<
 <>

Radiator removal steps

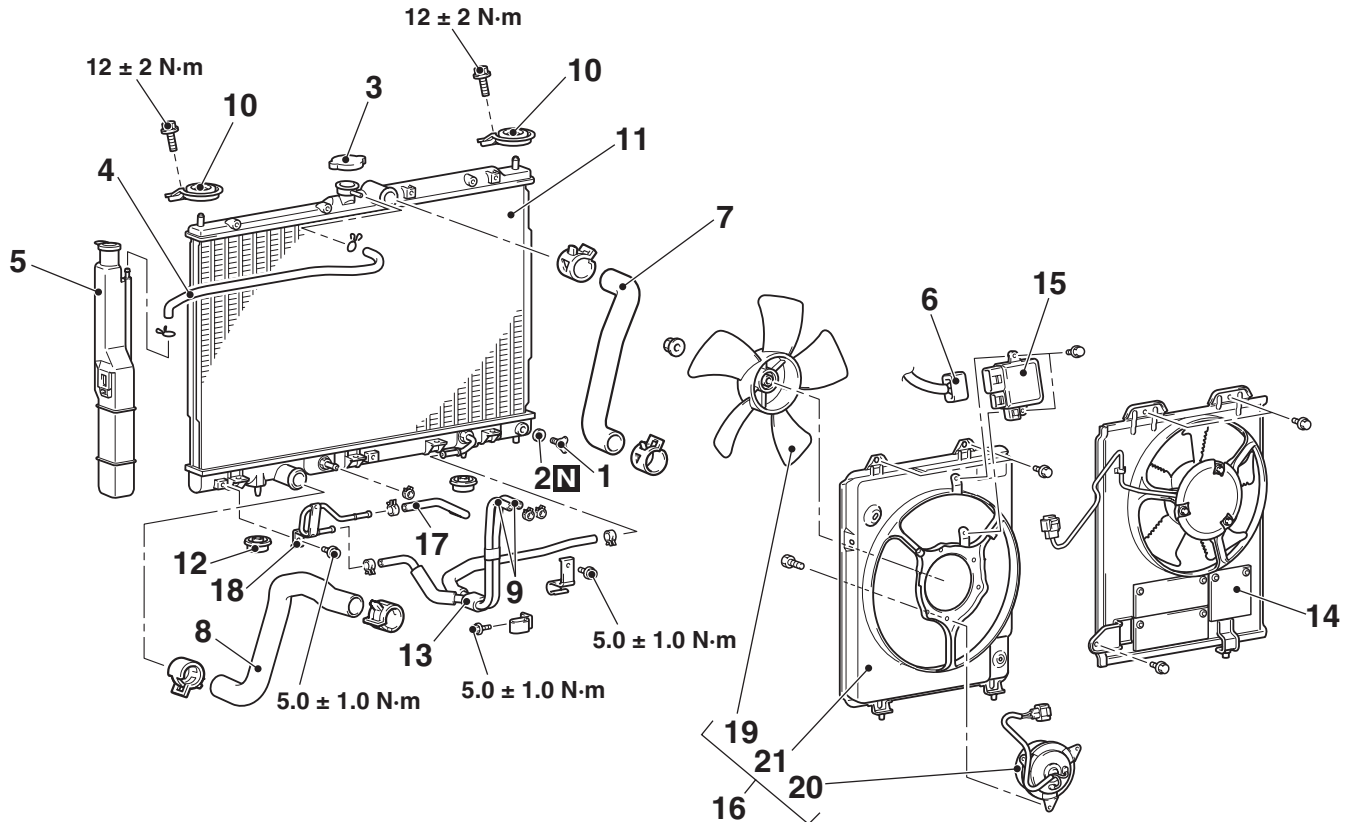
14. Fan controller
15. Cooling fan motor and shroud assembly

Cooling fan motor removal steps

4. Radiator condenser tank hose
6. Fan controller connector
7. Radiator upper hose
15. Cooling fan motor and shroud assembly
16. Cooling fan
17. Cooling fan motor
18. Cooling fan shroud

<<A>> >>A<<

<Vehicles for Australia and New Zealand>



AC504333AB

Radiator removal steps

1. Drain plug
2. O-ring
3. Radiator cap
4. Radiator reserve tank hose
5. Radiator reserve tank assembly
6. Fan controller connector
7. Radiator upper hose
8. Radiator lower hose
9. A/T fluid cooler hose connection
10. Upper insulator
11. Radiator assembly
12. Lower insulator
13. A/T fluid cooler hose assembly
14. Condenser fan assembly
15. Fan controller

Radiator removal steps

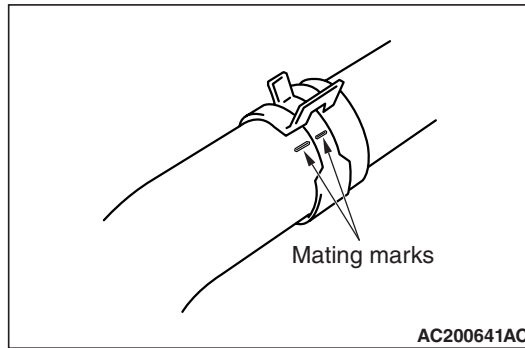
16. Cooling fan motor and shroud assembly
17. A/T fluid cooler hose
18. A/T fluid cooler tube assembly

Cooling fan motor removal steps

4. Radiator reserve tank hose
6. Fan controller connector
7. Radiator upper hose
14. Condenser fan assembly
15. Fan controller
16. Cooling fan motor and shroud assembly
19. Cooling fan
20. Cooling fan motor
21. Cooling fan shroud

<<A>> >>A<<
<<A>> >>A<<
<>

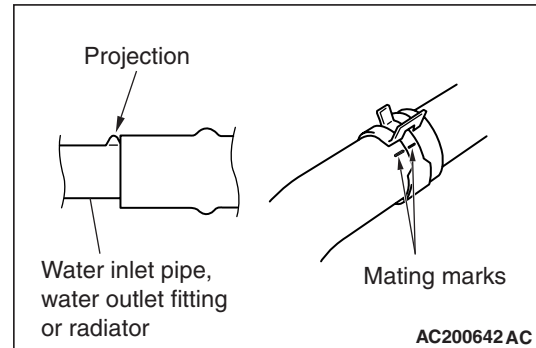
<<A>> >>A<<

REMOVAL SERVICE POINTS**<<A>> RADIATOR UPPER HOSE/RADIATOR LOWER HOSE DISCONNECTION**

Make mating marks on the radiator hose and the hose clamp. Disconnect the radiator hose.

<> A/T FLUID COOLER HOSE DISCONNECTION

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

INSTALLATION SERVICE POINT**>>A<< RADIATOR LOWER HOSE/RADIATOR UPPER HOSE CONNECTION**

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