

GROUP 14

ENGINE COOLING

CONTENTS

GENERAL INFORMATION	14-2	FAN CONTROLLER CHECK	14-16
SERVICE SPECIFICATION	14-2	FAN CONTROL RELAY CONTINUITY CHECK	14-17
LUBRICANT	14-2	RADIATOR FAN MOTOR CHECK	14-17
SEALANT	14-2	THERMOSTAT	14-18
SPECIAL TOOL	14-3	REMOVAL AND INSTALLATION	14-18
TROUBLESHOOTING	14-3	INSPECTION	14-19
ON-VEHICLE SERVICE	14-15	WATER PUMP	14-20
ENGINE COOLANT LEAK CHECK	14-15	REMOVAL AND INSTALLATION	14-20
RADIATOR CAP VALVE OPENING PRESSURE CHECK	14-15	WATER HOSE AND WATER PIPE ..	14-21
ENGINE COOLANT REPLACEMENT	14-15	REMOVAL AND INSTALLATION	14-21
CONCENTRATION MEASUREMENT	14-16	INSPECTION	14-22
		RADIATOR	14-23
		REMOVAL AND INSTALLATION	14-23

GENERAL INFORMATION

M1141000100359

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	225,628

SERVICE SPECIFICATION

M1141000300364

Item		Standard value	Limit
High-pressure valve opening pressure of radiator cap kPa		93 – 123	Minimum 83
Range of coolant antifreez 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	-

LUBRICANT

M1141000400305

Item	Specified coolant	Quantity L
Engine coolant (including condense tank)	DIAQUEEN SUPER LONG LIFE COOLANT or an equivalent	7.0



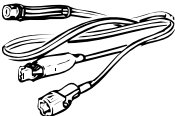
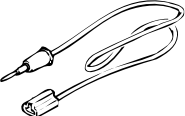

SEALANT

M1141000500302

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

SPECIAL TOOL

M1141000600224

Tool	Number	Name	Use
 MB991871	MB991871	LLC changer	Coolant refilling
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  MB991223AC	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe	Making voltage and resistance measurement during troubleshooting A: Connector pin contact pressure inspection B: Power circuit inspection C: Power circuit inspection D: Commercial tester connection

TROUBLESHOOTING

INSPECTION CHART FOR TROUBLE SYMPTOMS

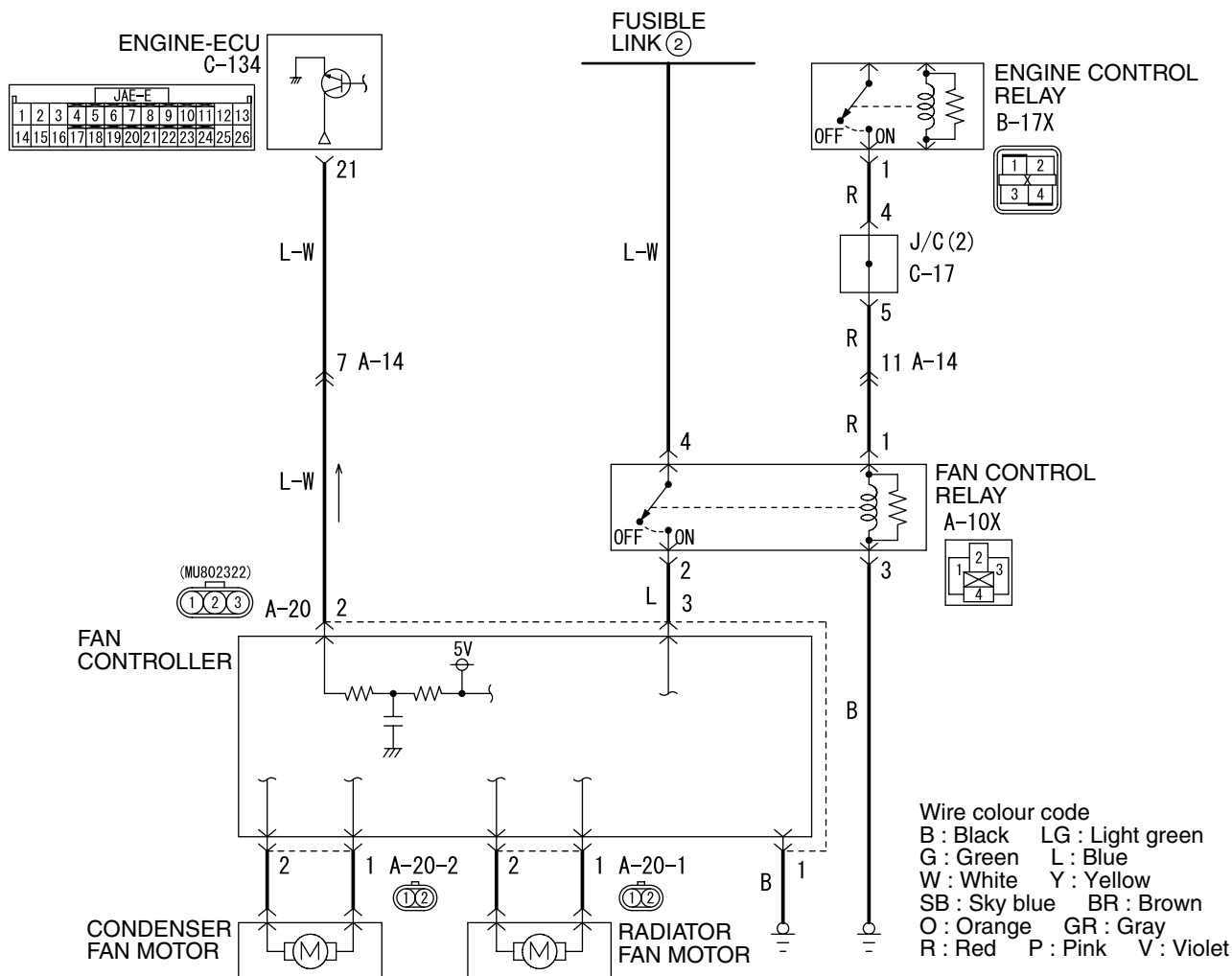
M1141005600337

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.14-10
Radiator fan does not operate	3	P.14-14
Condenser fan does not operate	4	P.14-14

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

INSPECTION PROCEDURE 1: Radiator Fan and Condenser Fan do not Operate

Radiator Fan and Condenser Fan Drive Circuit



W3Z12E01AA
 AC301898 AB

CIRCUIT OPERATION

- The fan controller is powered from fusible link (2).
- The engine-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-ECU controls the fan controller to activate the radiator 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-ECU.

TROUBLESHOOTING HINTS

- Malfunction of fusible link (2)
- Malfunction of fan control relay
- Malfunction of engine control relay
- Malfunction of fan controller

- Malfunction of radiator fan motor
- Malfunction of engine-ECU
- Damaged wiring harness or connector

DIAGNOSIS

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.14-17](#).

Q: Is the check result normal?

YES : Go to Step 3.

NO : Replace the fan control relay.

STEP 3. Check the radiator fan motor.

Refer to [P.14-17](#).

Q: Is the check result normal?

YES : Go to Step 4.

NO : Replace the radiator fan motor.

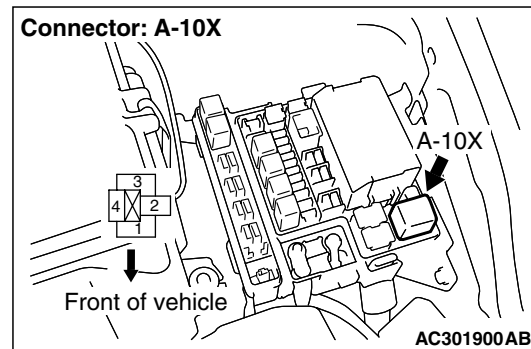
STEP 4. Check at fan control relay A-10X connector.

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 connector, and measure the voltage between terminal 4 and earth at the relay box side.

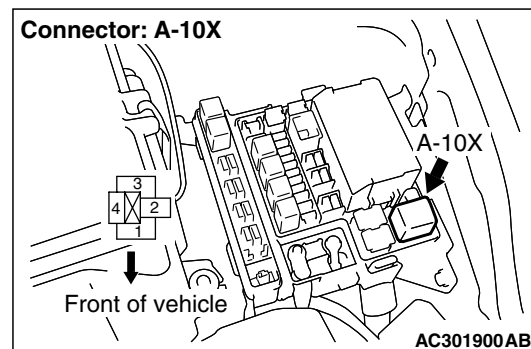
OK: System voltage

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 connector, and measure the voltage between terminal 1 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.

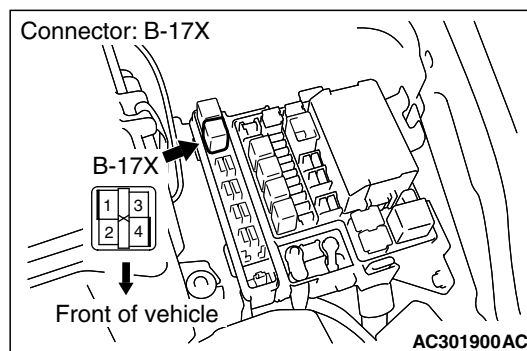
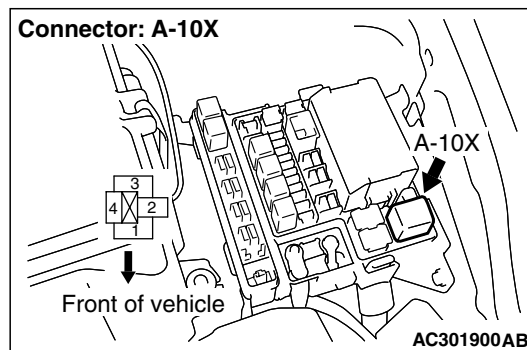
STEP 7. Check continuity at engine control relay B-17X.

Refer to [P.13A-312](#).

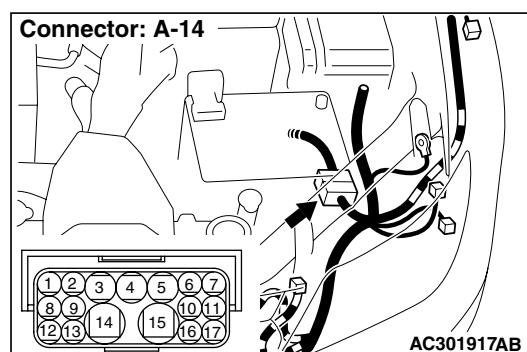
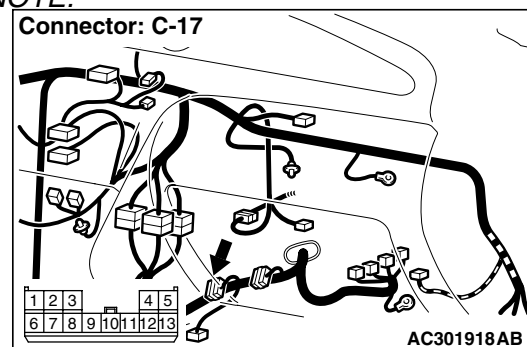
Q: Is the check result normal?

YES : Go to Step 8.

NO : Replace the engine control relay.

STEP 8. Check at engine control relay A-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 1) and engine control relay A-17X (terminal 1).**

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

NOTE:

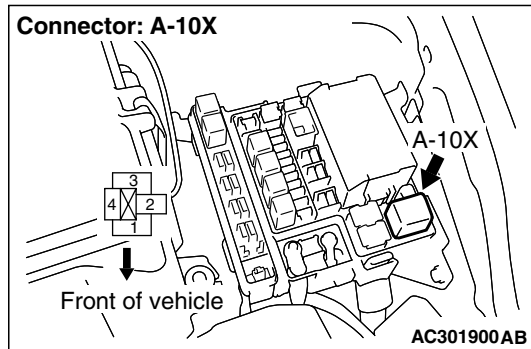
Prior to the wiring harness inspection, check joint connector C-17 and front wiring harness (LH) and control wiring harness combination connector A-14, and repair if necessary.

Q: Is the check result normal?

YES : Go to Step 10.

NO : Check the wiring harness between fan control relay A-10X (terminal 1) and engine control relay A-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 connector, and measure the resistance between terminal 3 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 3) and body earth, and repair if necessary.

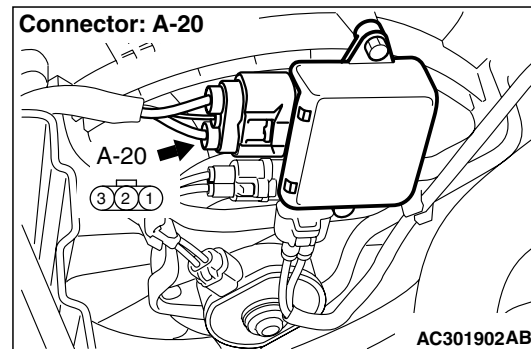
STEP 11. Check fan controller connector A-20.

Q: Is the check result normal?

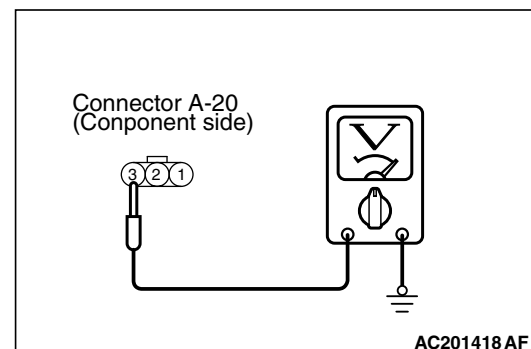
YES : Go to Step 12.

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.

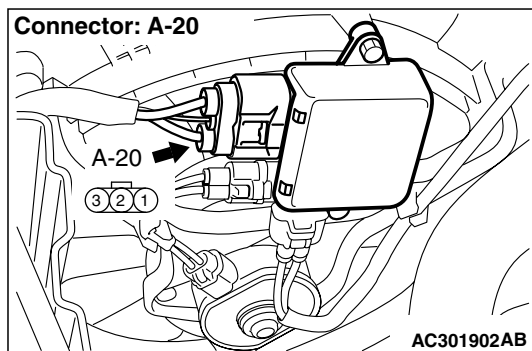
- Turn the ignition switch to the ON position.

OK: System voltage

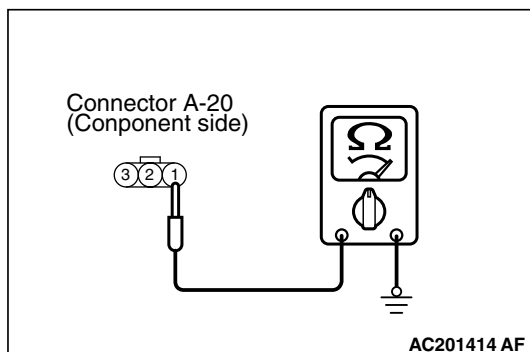
Q: Is the check result normal?

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.



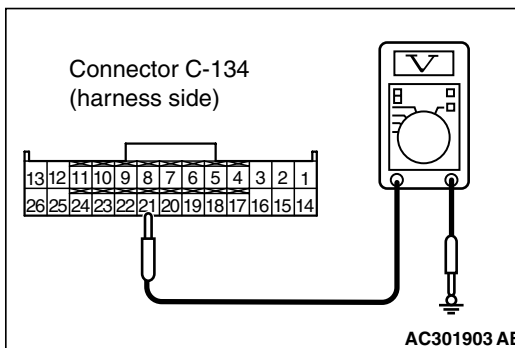
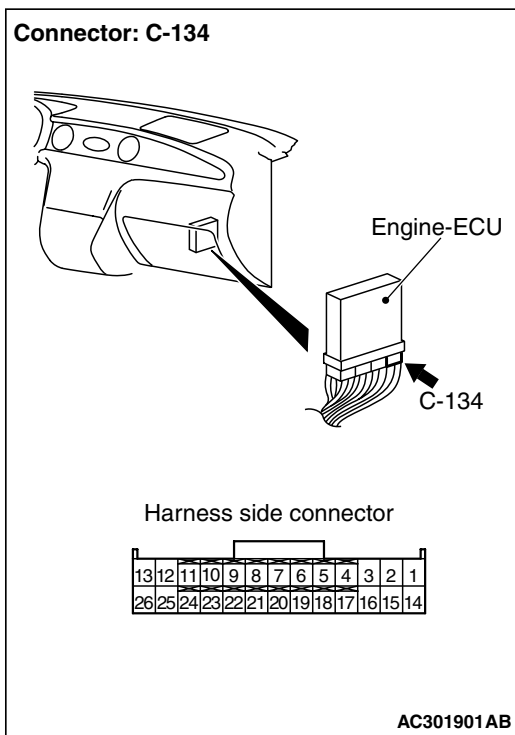
(2) Disconnect the fan controller connector, and measure the resistance between terminal 1 and body earth at the wiring harness side.

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-ECU connector C-134.

(1) Connect the engine-ECU connector, and measure the voltage between terminal 21 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.

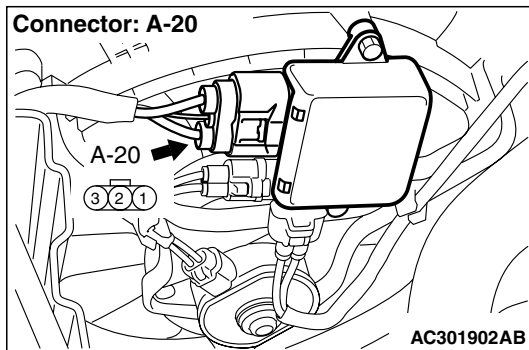
STEP 15. Check engine-ECU connector C-134.

Q: Is the check result normal?

YES : Go to Step 16.

NO : Repair the engine-ECU connector.

STEP 16. Check the wiring harness between fan controller A-20 (terminal 2) and engine-ECU C-134 (terminal 21).



Q: Is the check result normal?

YES : Go to Step 17.

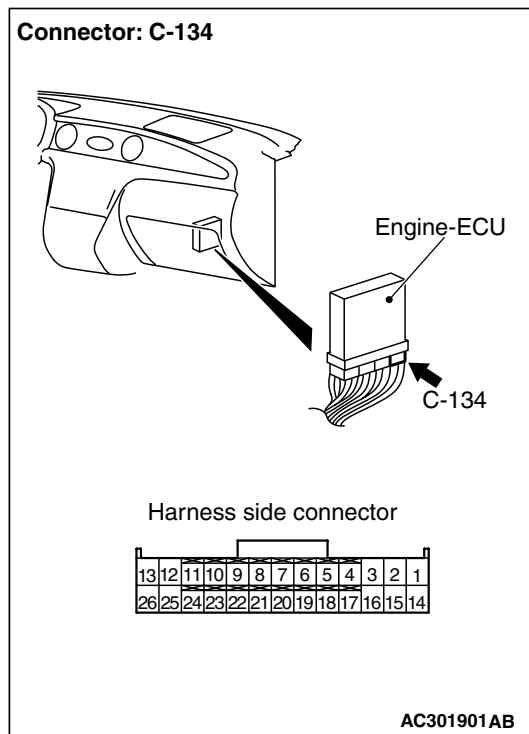
NO : Check the wiring harness between fan controller A-20 (terminal 2) and engine-ECU C-134 (terminal 21), and repair if necessary.

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

Q: Does a malfunction take place again?

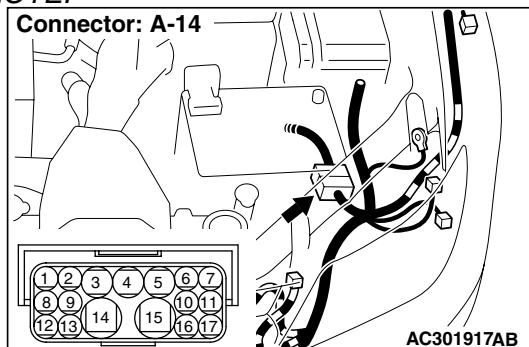
YES : An intermittent malfunction is suspected (Refer to GROUP 00, How to cope with intermittent malfunctions [P.00-6](#)).

NO : Replace the engine-ECU.



(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.

INSPECTION PROCEDURE 2: Radiator Fan and Condenser Fan do not Change Speed or Stop**Radiator Fan and Condenser Fan Drive Circuit**

Refer to P.14-4.

CIRCUIT OPERATION

- The fan controller is powered from fusible link (2).
- The engine-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-ECU controls the fan controller to activate the radiator fan motor and the condenser fan motor.

TECHNICAL DESCRIPTION

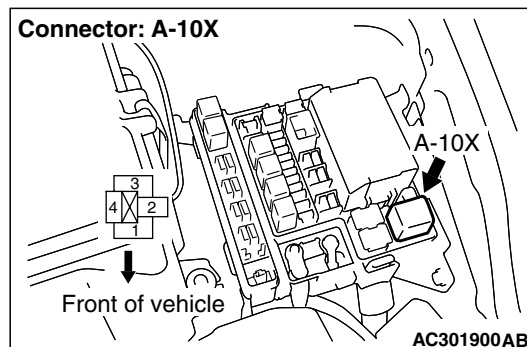
The fan controller has variable control of the radiator fan motor and the condenser fan motor speeds using signals transmitted from the engine-ECU.

TROUBLESHOOTING HINTS

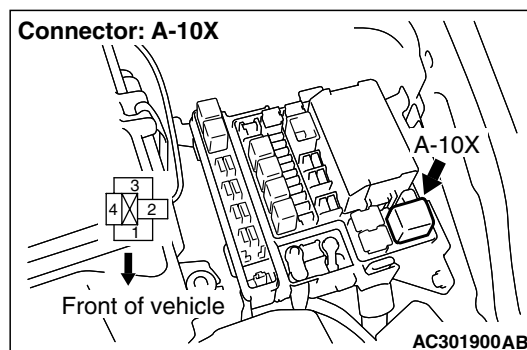
- Malfunction of fan control relay
- Malfunction of fan controller
- Malfunction of engine-ECU

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

Refer to P.14-17.

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.**

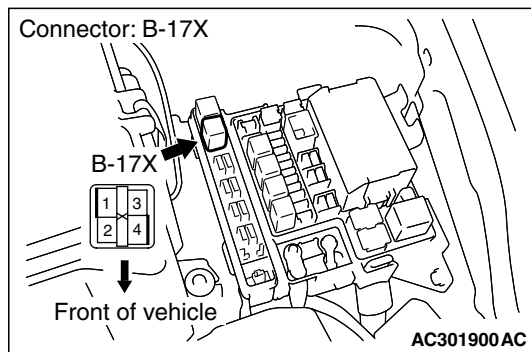
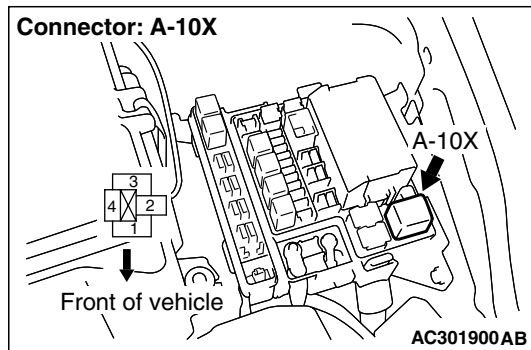
- (1) Check the power supply line for short or open circuit.
- (2) Disconnect the fan control connector, and measure the voltage between terminal 4 and earth at the relay box side.

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 connector, and measure the voltage between terminal 1 and earth at the relay box side.

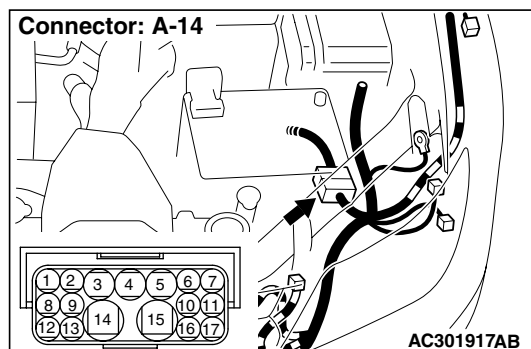
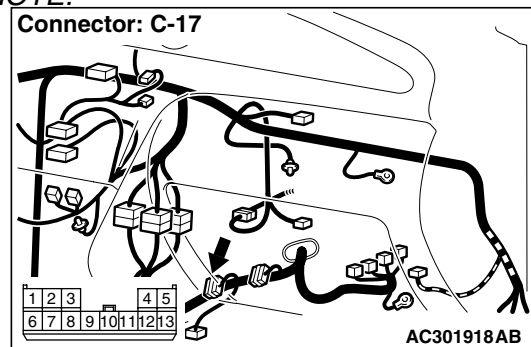
OK: System voltage**Q: Is the check result normal?****YES :** Go to Step 6.**NO :** Go to Step 5.

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



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

NOTE:



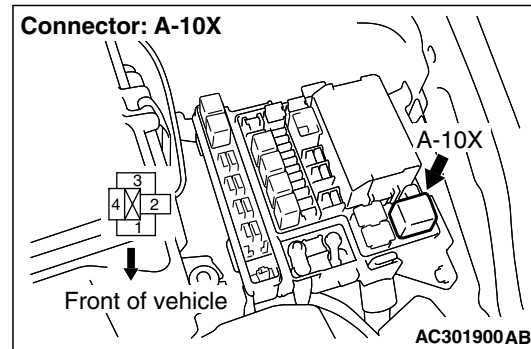
Prior to the wiring harness inspection, check joint connector C-17 and front wiring harness (LH) and control wiring harness combination connector A-14, and repair if necessary.

Q: Is the check result normal?

YES : Go to Step 6.

NO : Check the wiring harness between fan control relay A-10X (terminal 1) and engine control relay A-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 controller connector, and measure the resistance between terminal 3 and earth at the relay box side.

OK: Continuity exists.

Q: Is the check result normal?

YES : Go to Step 7.

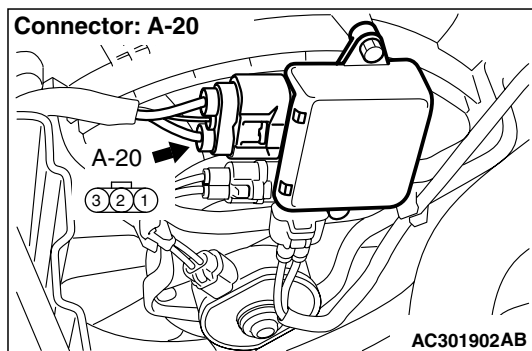
NO : Check the wiring harness between fan control relay A-10X (terminal 3) and body earth, and repair if necessary.

STEP 7. Check fan controller connector A-20.

Q: Is the check result normal?

YES : Go to Step 8.

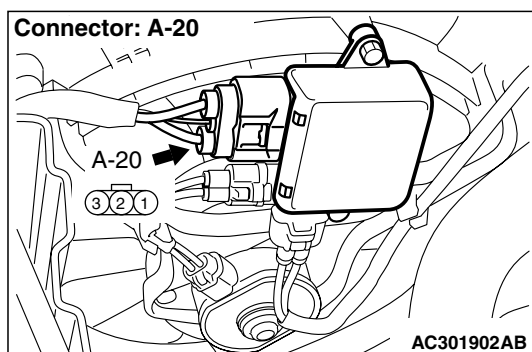
NO : Repair the fan controller connector.

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.

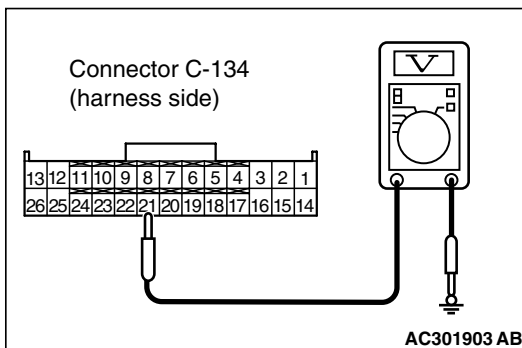
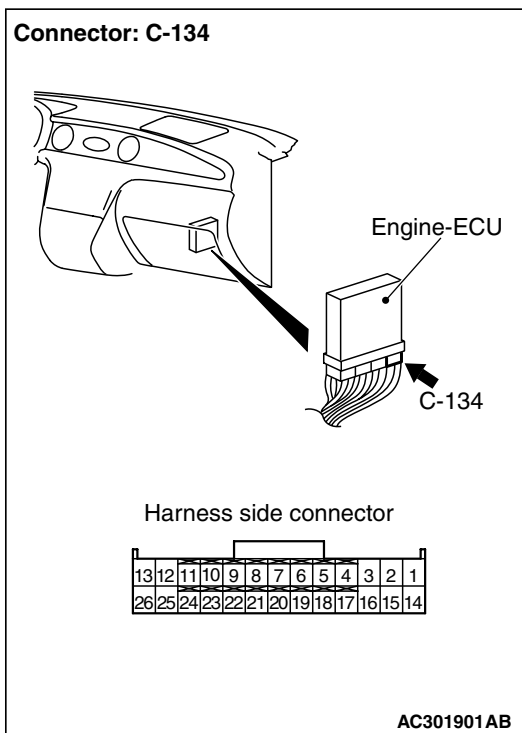
NO : Check the wiring harness between fan controller A-20 (terminal 3) and fan control relay A-10X (terminal 2), and repair if necessary.

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.

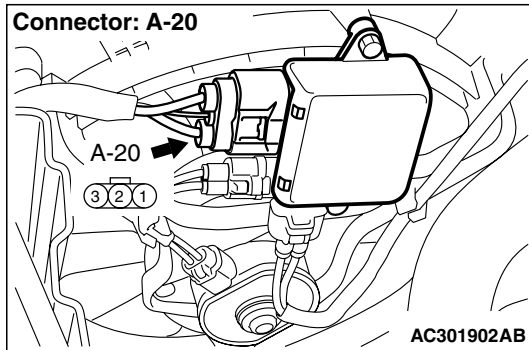
STEP 10. Measure at engine-ECU connector C-134.

- (1) Connect the engine-ECU connector, and measure the voltage between terminal 21 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-ECU connector C-134.****Q: Is the check result normal?****YES :** Go to Step 12.**NO :** Repair the engine-ECU connector.

STEP 12. Check the wiring harness between fan controller A-20 (terminal 2) and engine-ECU C-134 (terminal 21).



Q: Is the check result normal?

YES : Go to Step 13.

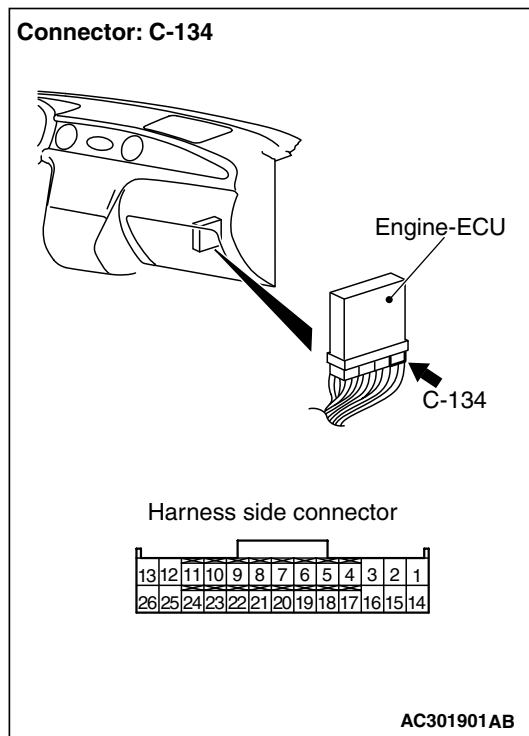
NO : Check the wiring harness between fan controller A-20 (terminal 2) and engine-ECU C-134 (terminal 21), and repair if necessary.

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

Q: Does a malfunction take place again?

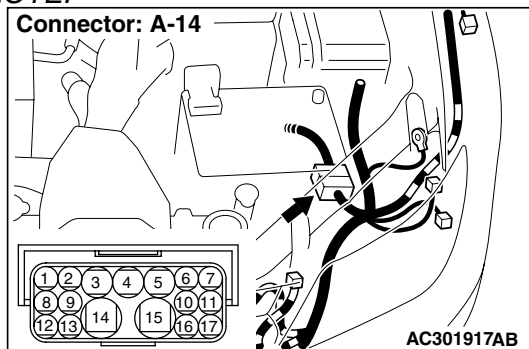
YES : An intermittent malfunction is suspected (Refer to GROUP 00, How to cope with intermittent malfunctions [P.00-6](#)).

NO : Replace the engine-ECU.



(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.

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 radiator fan motor.

TROUBLESHOOTING HINTS

Malfunction of radiator fan motor

DIAGNOSIS

STEP 1. Check the radiator fan motor.

Refer to [P.14-17](#).

Q: Is the radiator fan motor in good condition?

YES : Go to Step 2.

NO : Replace the radiator fan motor.

STEP 2. Check the fan controller

Refer to [P.14-16](#).

Q: Is the fan controller in good condition?

YES : Go to Step 3.

NO : Replace the radiator 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.00-6](#)).

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-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-ECU activates the fan controller to drive the radiator 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

STEP 1. Check the condenser fan motor.

Refer to GROUP 55, Condenser and Condenser Fan Motor [P.55A-73](#).

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.14-16](#).

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

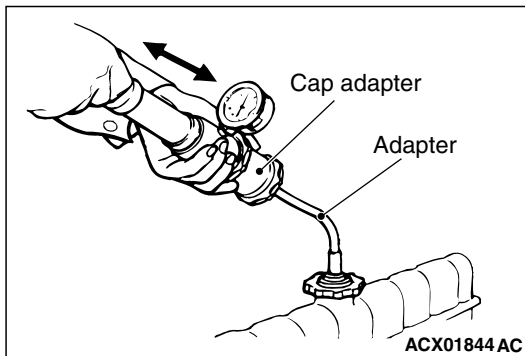
M1141001000281

⚠ 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.

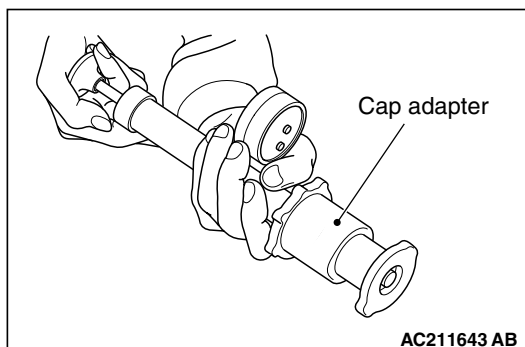


1. Check that the coolant level is up to the filler neck. Install a radiator tester and apply 160 kPa pressure, and then check for leakage from the radiator hose or connections.
2. If there is leakage, repair or replace the appropriate part.

RADIATOR CAP VALVE OPENING PRESSURE CHECK

M1141001300356

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.

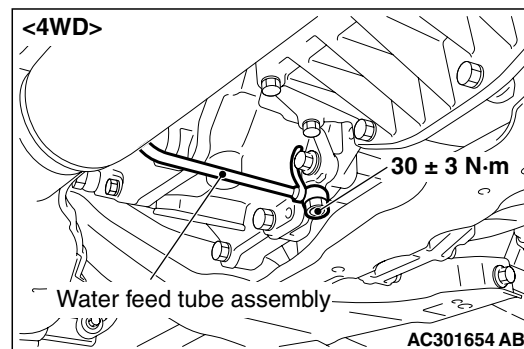
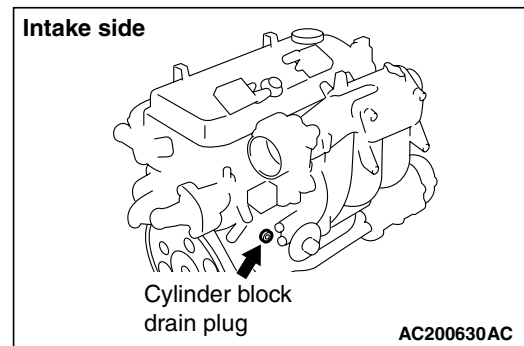
ENGINE COOLANT REPLACEMENT

M1141001200401

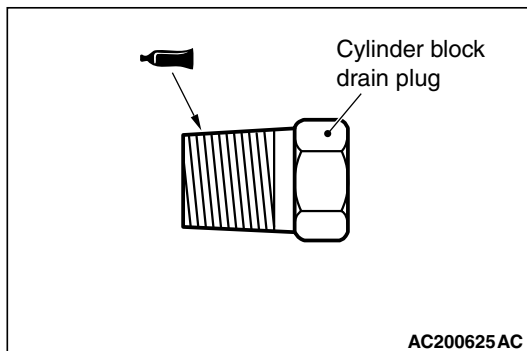
⚠ WARNING

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 counterclockwise a little to let the pressure escape through the vinyl tube. After relieving the steam pressure, remove the cap by slowly turning it counterclockwise.

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. On 4WD, drain engine coolant from the water feed tube assembly of the transfer.
3. Remove the reserve 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.

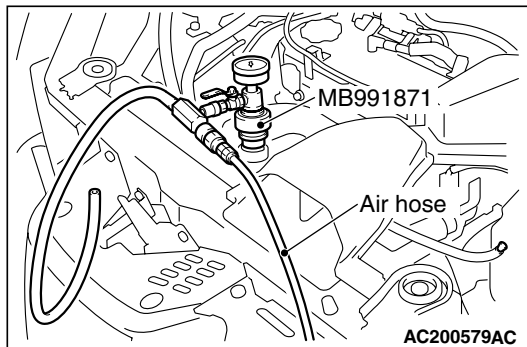
Specified sealant: 3M Nut Locking Part No.4171 or equivalent

Tightening torque: 44 ± 5 N·m

6. Securely tighten the drain plug of the radiator.
7. Assemble the reserve 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: DIAQUEEN 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 reserve tank.

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

CONCENTRATION MEASUREMENT

M1141001100330

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

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

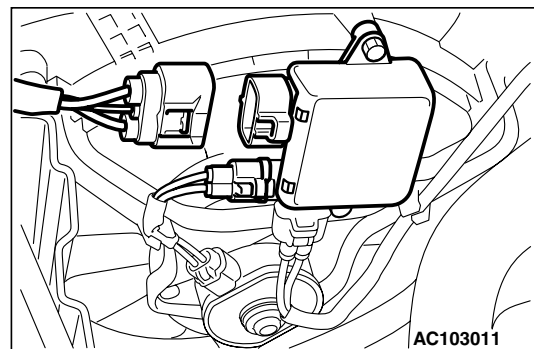
Recommended antifreeze: DIAQUEEN SUPER LONG LIFE COOLANT or equivalent

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.

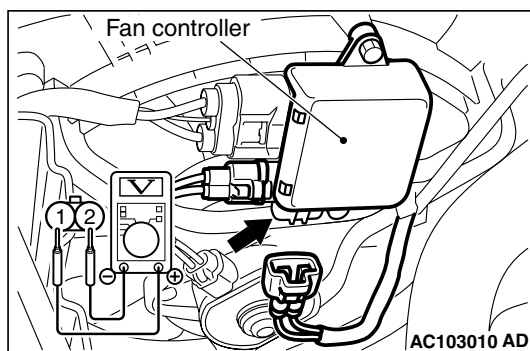
FAN CONTROLLER CHECK

M1141007400038



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:

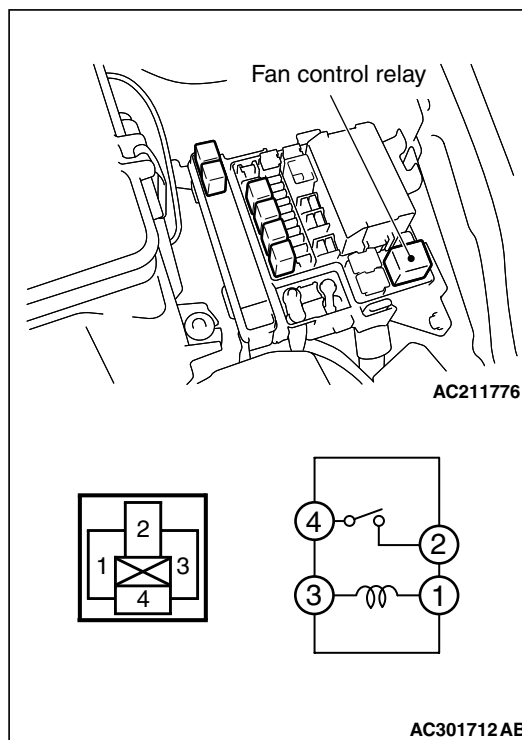
8.2 ± 2.6 V

System voltage ± 2.6 V

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

FAN CONTROL RELAY CONTINUITY CHECK

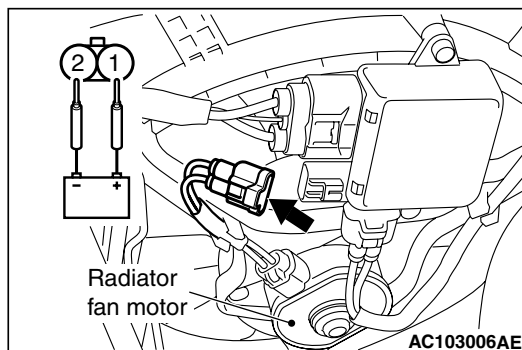
M1141006200257



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

RADIATOR FAN MOTOR CHECK

M1141007100059



1. Remove the radiator 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 radiator fan motor. Also check to see that there is no abnormal sound coming from the radiator fan motor at this time.
3. If the radiator fan motor is defective, replace it.

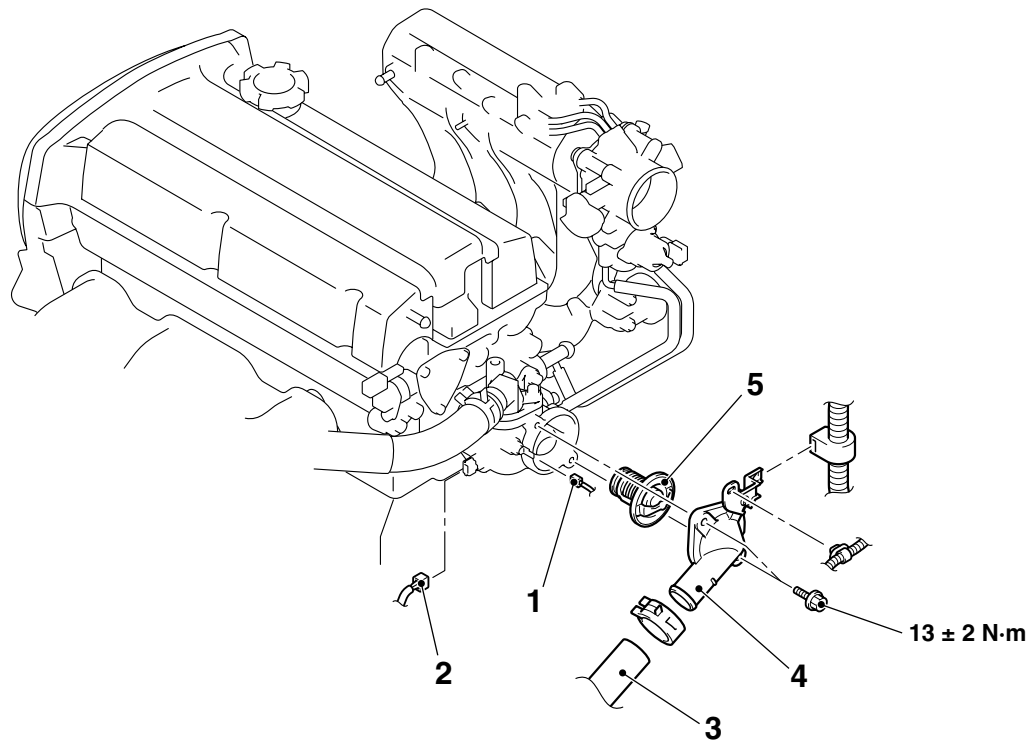
THERMOSTAT

REMOVAL AND INSTALLATION

M1141002400378

Pre-removal and Post-installation Operation

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

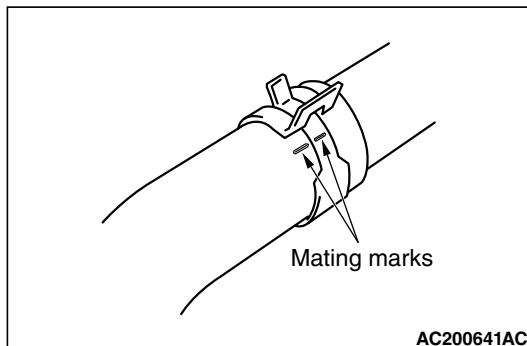


AC301429 AB

- | Removal steps | | Removal steps (Continued) | |
|---------------|---|---------------------------|-----------------------------------|
| 1. | Engine coolant temperature gauge unit connector | <<A>> | 3. Radiator lower hose connection |
| 2. | Engine coolant temperature sensor connector | >>A<< | 4. Water inlet fitting |
| | | | 5. Thermostat |

REMOVAL SERVICE POINT

<<A>> RADIATOR LOWER HOSE DISCONNECTION



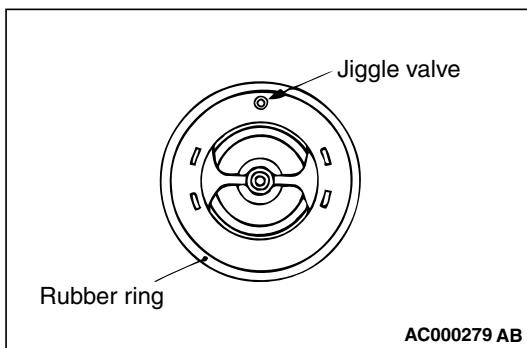
Make mating marks on the radiator hose and the hose clamp. Disconnect the radiator hose.

INSTALLATION SERVICE POINTS

>>A<< THERMOSTAT INSTALLATION

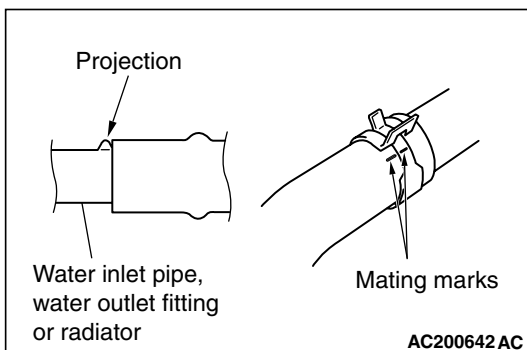
CAUTION

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



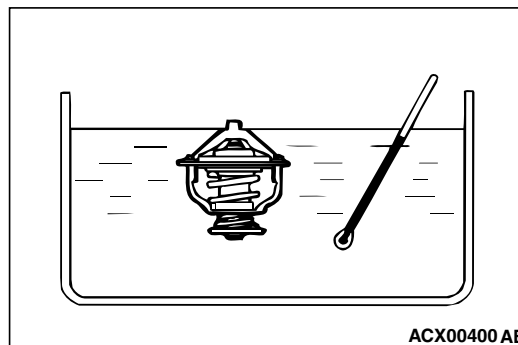
1. Insert each hose as far as the projection of the water inlet fitting.

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

INSPECTION

THERMOSTAT CHECK

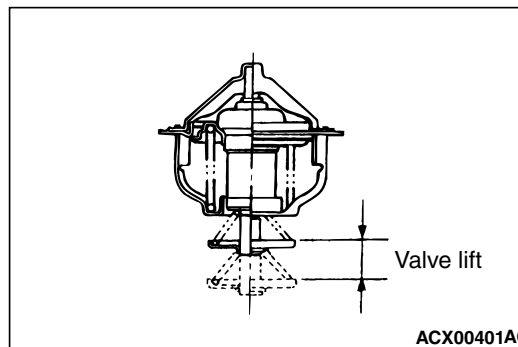
M1141002500364



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.

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

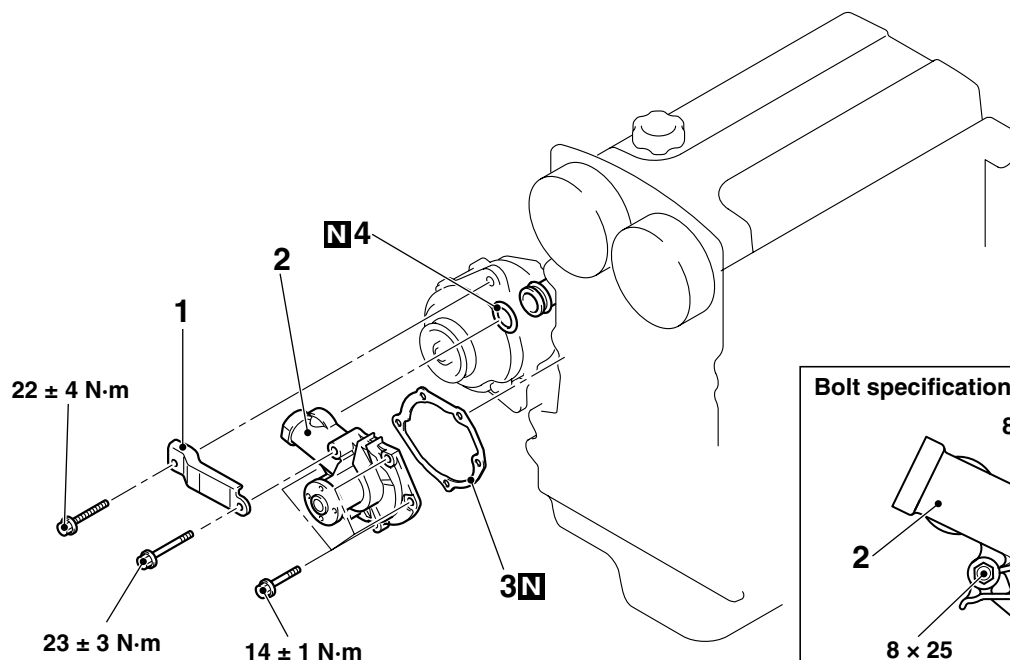
M1141002700391

Pre-removal Operation

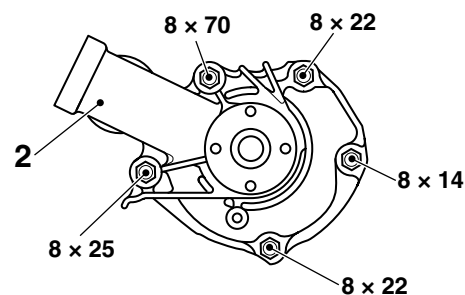
- Engine Coolant Draining (Refer to [P.14-15](#)).
- Timing Belt Removal (Refer to GROUP 11A, Timing Belt [P.11A-35](#)).

Post-installation Operation

- Timing Belt Installation (Refer to GROUP 11A, Timing Belt [P.11A-35](#)).
- Engine Coolant Refilling (Refer to [P.14-15](#)).

**Removal steps**

1. Alternator brace
2. Water pump

Bolt specifications

Screw diameter x length mm

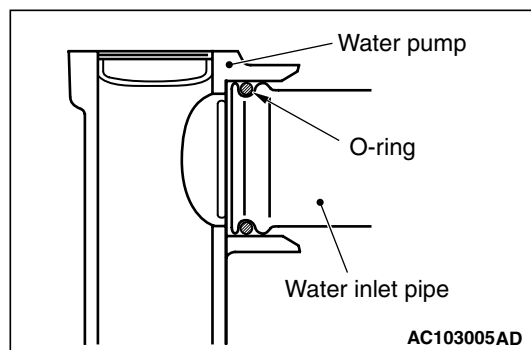
AC301467AB

Removal steps (Continued)

3. Water pump gasket
4. O-ring

INSTALLATION SERVICE POINT

>>A<< O-RING INSTALLATION



AC103005AD

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.

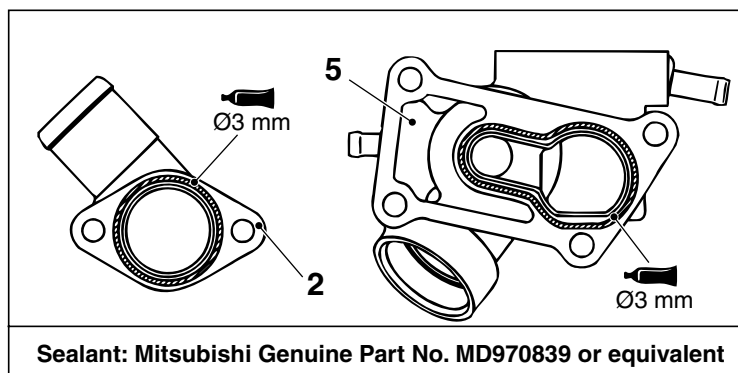
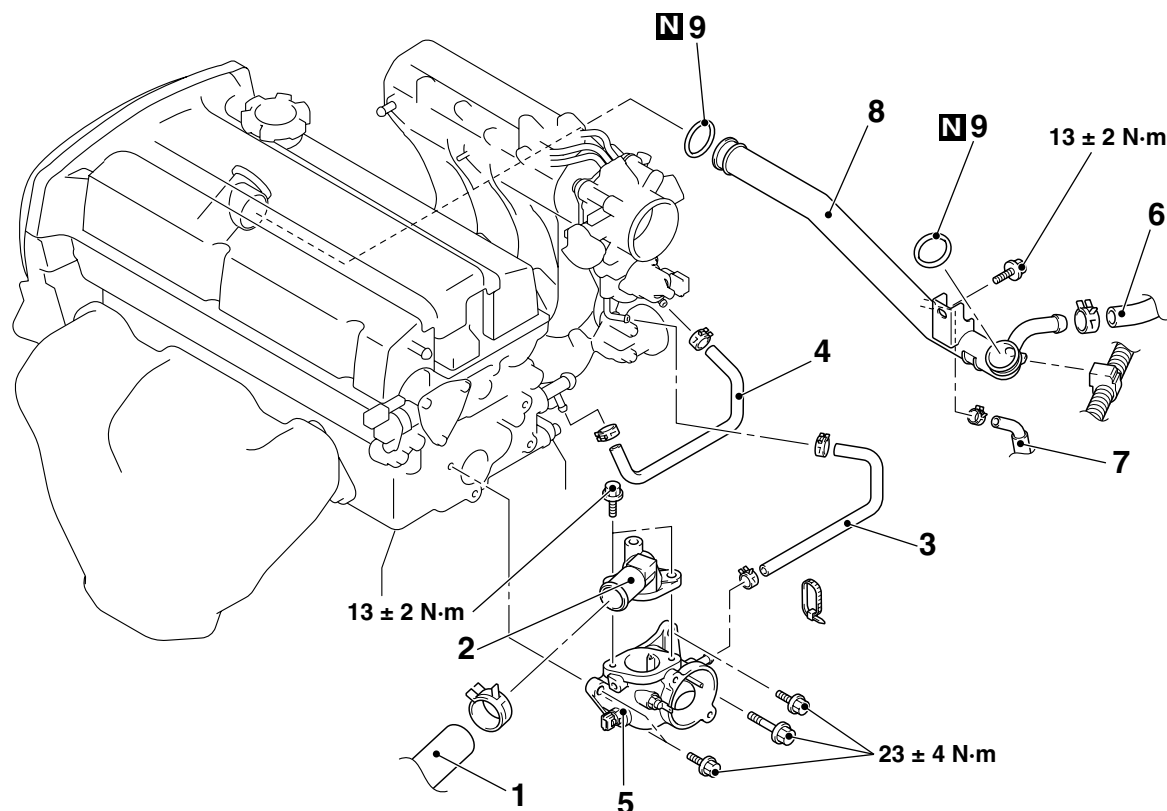
WATER HOSE AND WATER PIPE

REMOVAL AND INSTALLATION

M1141003300385

Pre-removal and Post-installation Operation

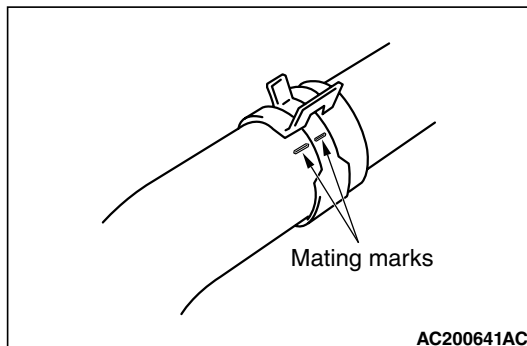
- Engine Coolant Draining and Supplying (Refer to P.14-15).
- Air Cleaner Removal and Installation (Refer to GROUP 15, Air Cleaner P.15-3).
- Thermostat Removal and Installation (Refer to P.14-18).



AC301428 AB

- <<A>> >>C<< 1. Radiator upper hose connection
 >>B<< 2. Water outlet fitting
 3. Water hose
 4. Water hose
 >>B<< 5. Thermostat case assembly

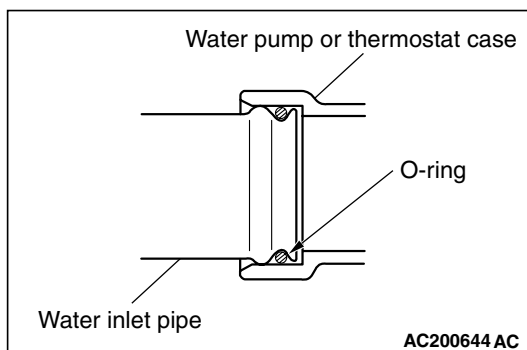
- Removal steps (Continued)**
 6. Heater hose connection
 7. Transfer water return hose connection <4WD>
 8. Water inlet pipe assembly
 >>A<< 9. O-ring

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

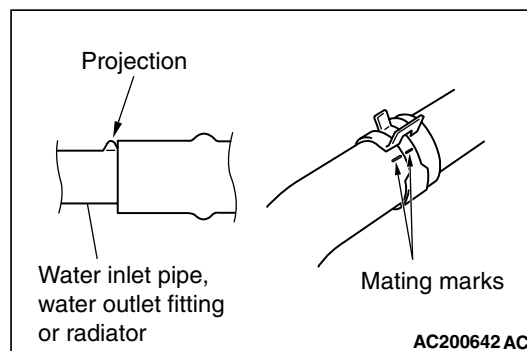
Insert the O-ring to the water pipe, and coat the outer portion of the O-ring with water or engine coolant.

>>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.

INSPECTION**WATER PIPE AND HOSE CHECK**

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

M1141003400274

RADIATOR

REMOVAL AND INSTALLATION

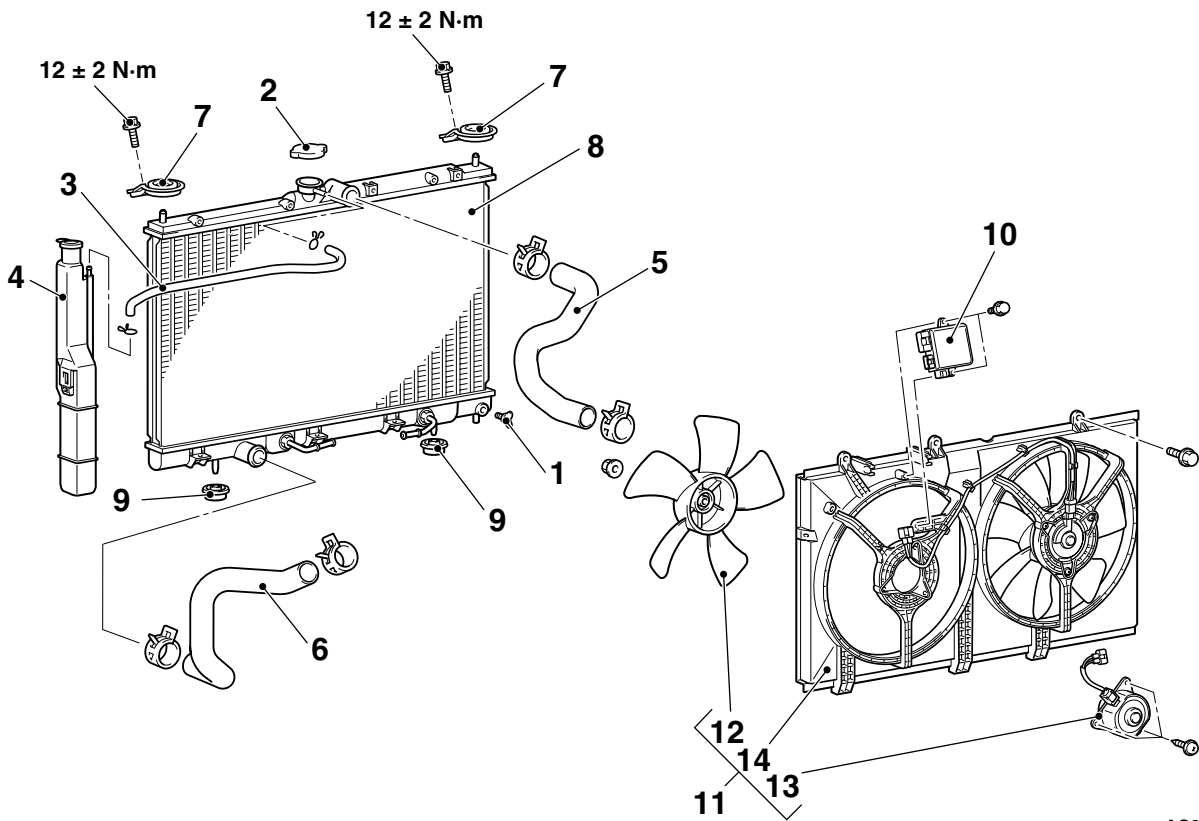
M1141001500424

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-15).
- 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.14-15).



AC301650 AB

Radiator removal steps

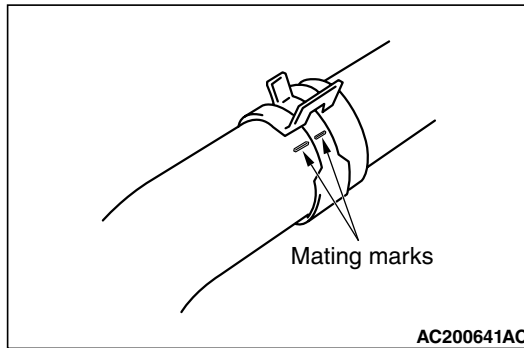
1. Drain plug
2. Radiator cap
3. Rubber hose
4. Reserve tank assembly
5. Radiator upper hose
6. Radiator lower hose
7. Upper insulator
8. Radiator assembly
9. Lower insulator

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

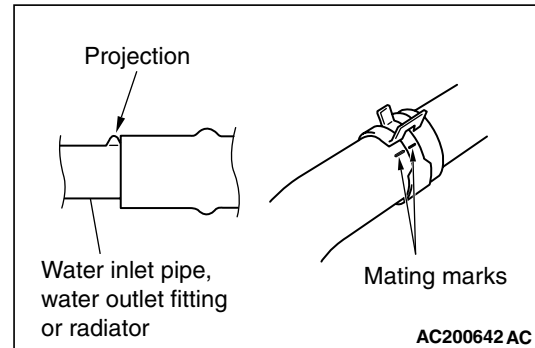
Radiator removal steps

10. Fan controller
 11. Cooling fan assembly
- Radiator fan motor removal steps**
3. Rubber hose
 5. Radiator upper hose
 11. Cooling fan assembly
 12. Radiator fan
 13. Radiator fan motor
 14. Shroud assembly

<<A>> >>A<<

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

Make 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.