

GROUP 14

ENGINE COOLING

CONTENTS

GENERAL INFORMATION	14-2	THERMOSTAT	14-34
SERVICE SPECIFICATIONS	14-3	REMOVAL AND INSTALLATION	
COOLANT	14-3	<2.4L ENGINE>	14-34
SEALANT	14-4	REMOVAL AND INSTALLATION	
ENGINE COOLING DIAGNOSIS	14-4	<3.0L ENGINE>	14-36
INTRODUCTION	14-4	INSPECTION	14-38
TROUBLESHOOTING STRATEGY	14-4	WATER PUMP	14-39
SYMPTOM CHART	14-4	REMOVAL AND INSTALLATION	
SYMPTOM PROCEDURES	14-5	<2.4L ENGINE>	14-39
SPECIAL TOOLS	14-23	REMOVAL AND INSTALLATION	
ON-VEHICLE SERVICE	14-25	<3.0L ENGINE>	14-40
ENGINE COOLANT LEAK CHECK	14-25	WATER HOSE AND WATER PIPE ..	14-41
RADIATOR CAP OPENING PRESSURE		REMOVAL AND INSTALLATION	
CHECK	14-25	<2.4L ENGINE>	14-41
ENGINE COOLANT CHANGE	14-26	REMOVAL AND INSTALLATION	
WATER PUMP COOLANT LEAK CHECK .	14-28	<3.0L ENGINE>	14-45
ENGINE COOLANT CONCENTRATION		INSPECTION	14-48
TEST	14-29	RADIATOR	14-49
COOLING FAN RELAY CONTINUITY		REMOVAL AND INSTALLATION	
CHECK <2.4L ENGINE>	14-30	<2.4L ENGINE>	14-49
FAN CONTROL RELAY CONTINUITY		REMOVAL AND INSTALLATION	
CHECK <3.0L ENGINE>	14-31	<3.0L ENGINE>	14-52
COOLING FAN MOTOR CHECK	14-33		

GENERAL INFORMATION

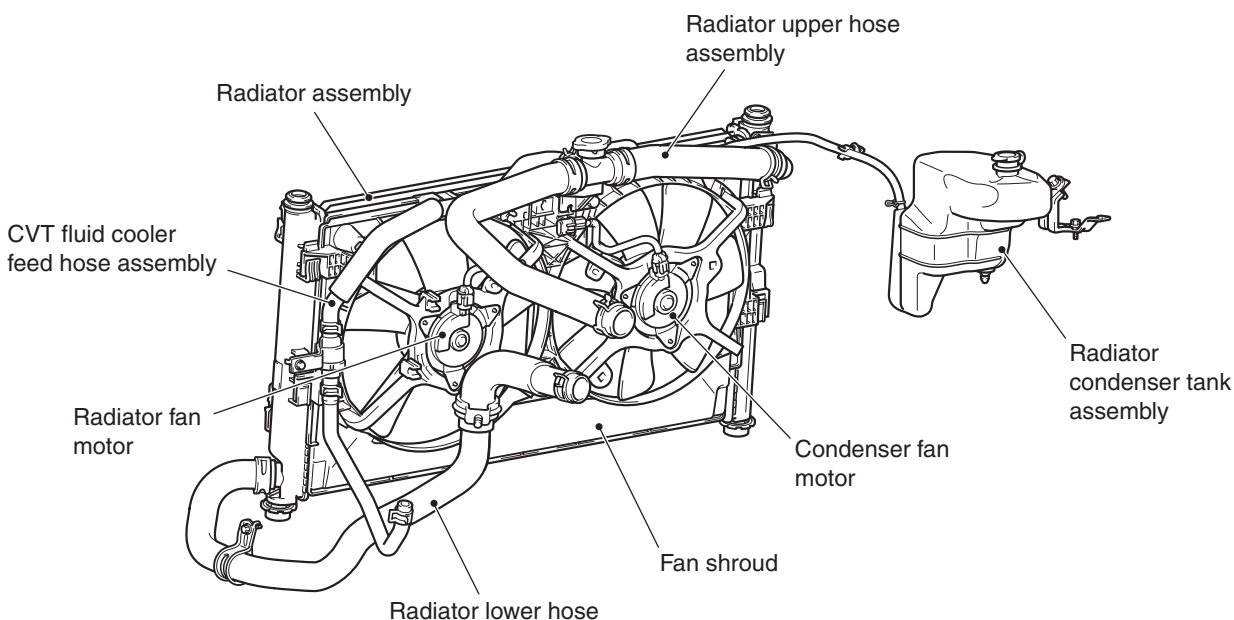
M1141000101750

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 impeller type and is driven by the drive belt from the crankshaft <2.4L ENGINE>. The water pump is of the centrifugal impeller type and is driven by the timing belt from the crankshaft <3.0L ENGINE>. The radiator is the corrugated fin, cross flow type.

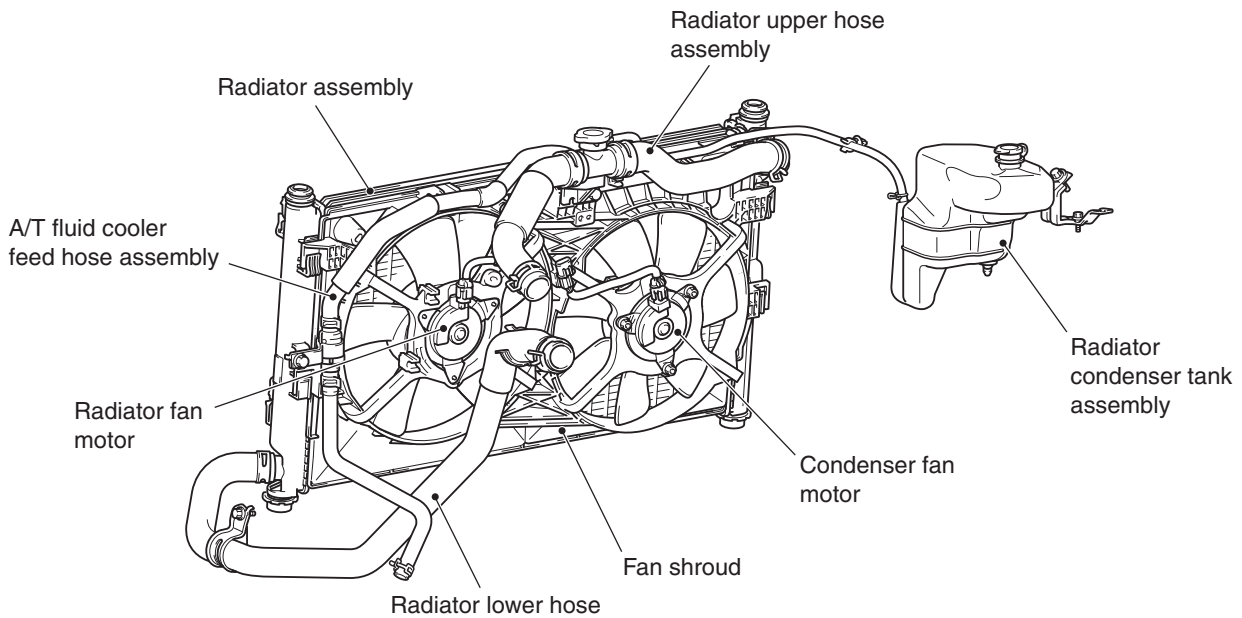
CONSTRUCTION DIAGRAM

<2.4L ENGINE>



AC808973AB

<3.0L ENGINE>



AC808975AB

SERVICE SPECIFICATIONS

M1141000302100

Item			Standard value	Limit
Valve opening pressure of radiator cap kPa (psi)			93 – 123 (14 – 18)	Minimum 83 (12)
Range of coolant antifreeze concentration of radiator %			30 – 60	-
Thermostat	Valve opening temperature of thermostat °C (°F)	2.4L ENGINE	87 ± 1.5 (189 $\pm$ 3)	-
		3.0L ENGINE	82 ± 1.5 (180 $\pm$ 3)	-
	Full-opening temperature of thermostat °C (°F)		95 (203)	-
	Valve lift mm (in)	2.4L ENGINE	8.5 (0.335) or more	-
		3.0L ENGINE	9.0 (0.354) or more	-

COOLANT

M1141000401955

Item		Recommended antifreeze	Quantity dm ³ (qt)
Engine coolant [includes 0.65 dm ³ (0.69 qt) in the radiator condenser tank]	Automatic transaxle	DIA QUEEN SUPER LONG LIFE COOLANT PREMIUM or equivalent*	9.5 (10.0)
	CVT		7.5 (7.9)

NOTE: *similar high quality ethylene glycol based non-silicate, non-amine, non-nitrate and non-borate coolant with long life hybrid organic acid technology.

SEALANT

M1141000501758

Item	Specified sealant
Engine coolant temperature sensor	ThreeBond 1324N, Loctite 262 or equivalent

ENGINE COOLING DIAGNOSIS

INTRODUCTION

M1141005300411

The system cools the engine so that it does not over-heat and maintains the engine at an optimum temperature. The system components are the radiator, water pump, thermostat, condenser fan assembly. Possible faults include low coolant, contamination, belt loosening and component damage.

TROUBLESHOOTING STRATEGY

M1141005200403

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure to find most of the engine cooling faults.

1. Gather information from the customer.

2. Verify that the condition described by the customer exists.
3. Find and repair the malfunction by following the SYMPTOM CHART.
4. Verify that the malfunction is eliminated.

SYMPTOM CHART

M1141005600694

Symptom	Inspection procedure	Reference page
Coolant leak	1	P.14-5
Engine overheating	2	P.14-6
Radiator fan and condenser fan do not operate <2.4L ENGINE>	3	P.14-7
Radiator fan and condenser fan do not operate <3.0L ENGINE>	4	P.14-15

SYMPTOM PROCEDURES

Inspection Procedure 1: Coolant Leak

DIAGNOSIS

STEP 1. Check for coolant leaks.

⚠ WARNING

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

⚠ CAUTION

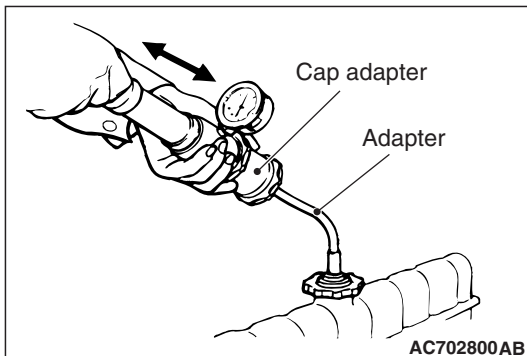
- Be sure to completely clean away any moisture from the places checked.
- When the tester is removed, be careful not to spill any coolant.
- When installing and removing the tester and when testing, be careful not to deform the filler neck of the radiator.

Check that the coolant level is up to the filler neck. Install a radiator tester and apply 160 kPa (23 psi) pressure, and then check for leakage from the radiator hose or connections.

Q: Is leakage present from the radiator hose or connections?

YES : Repair or replace the appropriate part, then go to Step 2.

NO : There is no action to be taken.



STEP 2. Retest the system.

Q: Is there still coolant leakage?

YES : Return to Step 1.

NO : The procedure is complete.

Inspection Procedure 2: Engine Overheating

DIAGNOSIS

STEP 1. Remove the radiator cap and check for coolant contamination.

Q: Is the coolant contaminated with rust and oil?

YES : Replace it. Refer to [P.14-26](#).

NO : There is no action to be taken. Go to Step 2.

STEP 2. Check the radiator cap valve opening pressure.

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 gauge indicator stops moving.

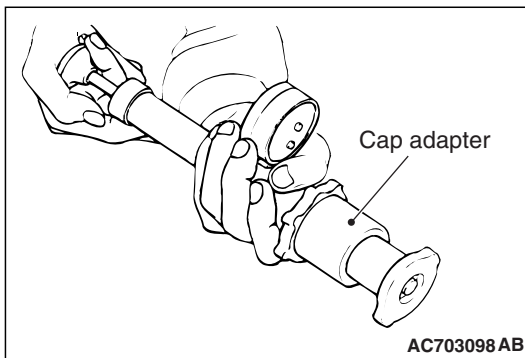
Minimum limit: 83 kPa (12 psi)

Standard value: 93 – 123 kPa (14 – 18 psi)

Q: Does the reading remain at or above the minimum limit?

YES : Go to Step 3.

NO : Replace the radiator cap. Then go to Step 5.



STEP 3. Check thermostat operation.

Refer to [P.14-38](#).

Q: Does the thermostat operate correctly?

YES : Go to Step 4.

NO : Replace the thermostat, then go to Step 5.

STEP 4. Check the drive belt for slippage or damage.

Refer to GROUP 00, Maintenance Service – Drive Belt (For The Generator, Water Pump and Power Steering Pump) (Check Condition) [P.00-74](#).

Q: Is the drive belt loose or damaged?

YES : Adjust or replace the drive belt, then go to Step 5.

NO : There is no action to be taken.

STEP 5. Retest the system.

Check the engine coolant temperature.

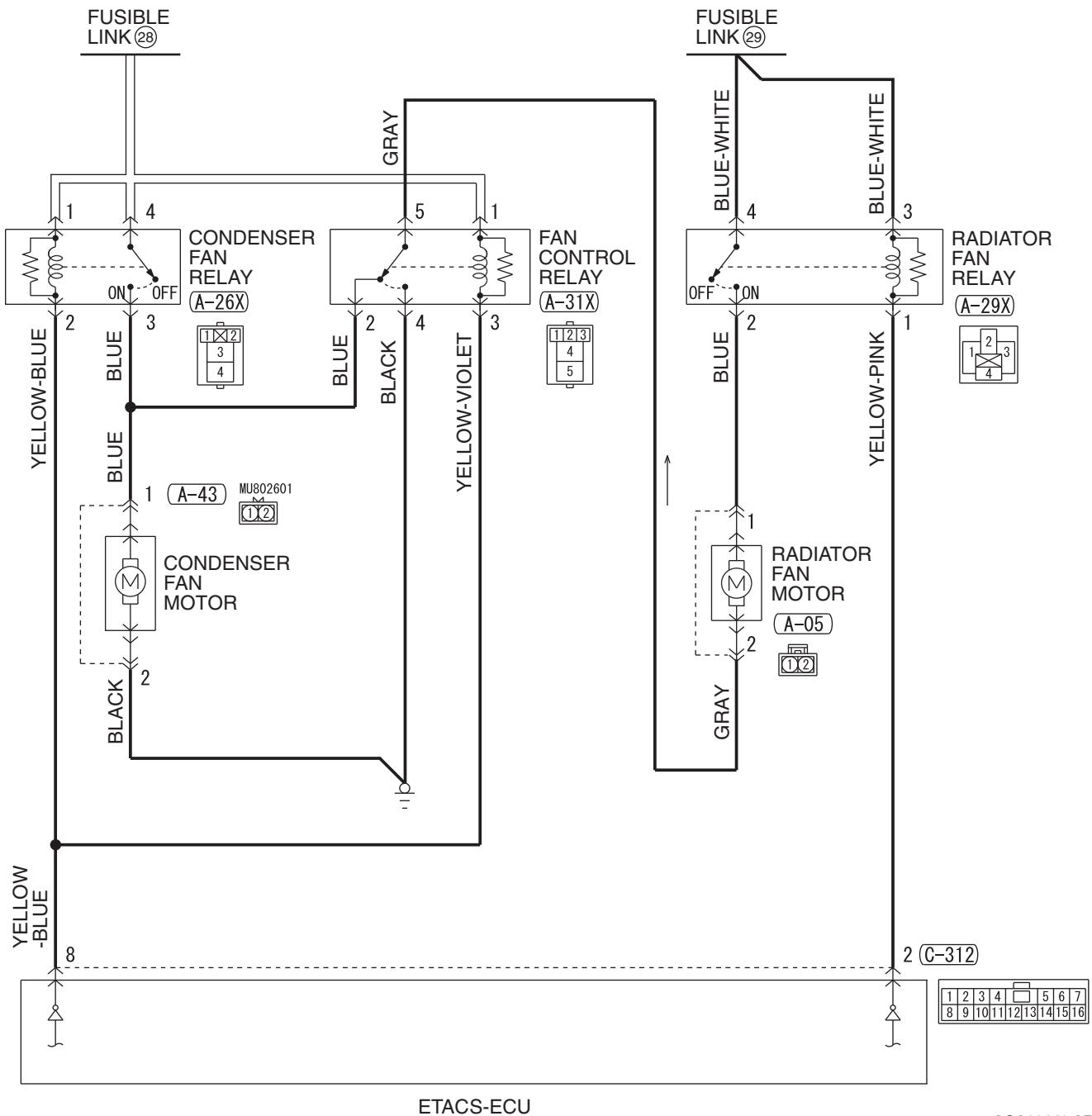
Q: Is the engine coolant temperature abnormally high?

YES : Return to Step 2.

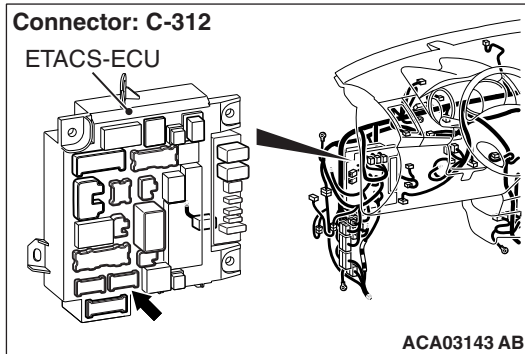
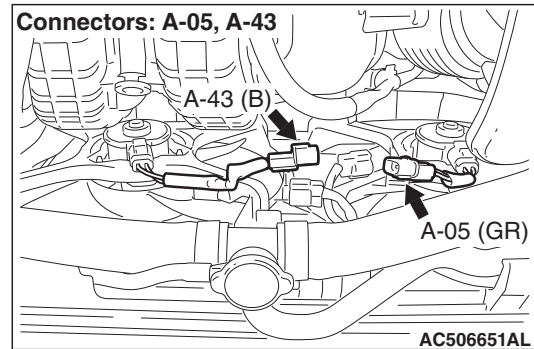
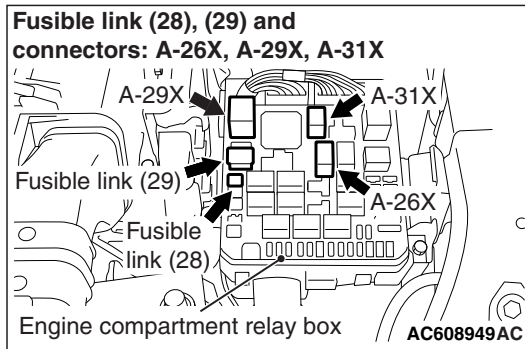
NO : The procedure is complete.

Inspection Procedure 3: Radiator Fan and Condenser Fan do not Operate <2.4L ENGINE>.

Radiator Fan and Condenser Fan Drive Circuit



ACA03142 AB



CIRCUIT OPERATION

- Based on the signal from the engine coolant temperature sensor and the signal from the secondary pulley speed sensor signal (vehicle speed signal) from the transaxle control module (TCM), and the A/C switch signal from the A/C-ECU, the engine control module (ECM) sends the radiator fan and condenser fan control signal to the ETACS-ECU via CAN bus line.
- Based on the radiator fan and condenser fan control signal from the ECM, the ETACS-ECU turns ON/OFF the radiator fan relay, condenser fan relay, and the fan control relay to control the rotation of the radiator fan motor and condenser fan motor.

TECHNICAL DESCRIPTION

- If the radiator fan and condenser fan do not operate, the radiator fan motor, the condenser fan motor, the radiator fan relay, the condenser fan relay, the fan control relay, the ETACS-ECU may be defective.
- The CAN bus line, ETACS-ECU, CVT system, A/C system, or MFI system may also be defective.

TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CASE:)

- Malfunction of CAN bus system.
- Damaged harness or connector.
- Malfunction of the MFI system.
- Malfunction of the CVT system.
- Malfunction of the A/C system.
- Malfunction of fusible link No. 28.
- Malfunction of fusible link No. 29.
- Malfunction of radiator fan relay.
- Malfunction of condenser fan relay.
- Malfunction of fan control relay.
- Malfunction of radiator fan motor.
- Malfunction of condenser fan motor.
- Malfunction of engine compartment relay box.
- Malfunction of ETACS-ECU.
- Malfunction of ECM.

DIAGNOSTIC PROCEDURE

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991223: Harness Set
- MB992006: Extra Fine Probe

CAUTION

If there is any problem in the CAN bus lines, an incorrect DTC may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis [P.54C-10](#).)

STEP 1. Using scan tool MB991958, check the CAN bus line diagnostics.

Use scan tool to diagnose the CAN bus line (Refer to GROUP 54C, Explanation About The Scan Tool Can Bus Diagnostics [P.54C-10](#)).

Q: Is the check result satisfactory?

YES : Go to Step 2.

NO : Repair the CAN bus lines (Refer to GROUP 54C, Troubleshooting – CAN Bus Diagnostic Table [P.54C-17](#)). Then go to Step 23.

STEP 2. Using scan tool MB991958, check the MFI system actuator test.

Using scan tool to check the MFI system actuator test (Refer to GROUP 13A, MFI Diagnosis – Diagnostic Function [P.13A-11](#)).

- Item 14: Cooling fan
(Refer to GROUP 13A, MFI Diagnosis – Actuator Test Reference Table [P.13A-850](#))

Q: Is the check result normal?

YES : Go to Step 22.

NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read the MFI system DTC.

Using scan tool to read the MFI system DTC (Refer to GROUP 13A, MFI Diagnosis – Diagnostic Function [P.13A-11](#)).

Q: Is any DTC set?

YES : Repair the MFI system (Refer to GROUP 13A, MFI Diagnosis – Diagnostic Trouble Code Chart [P.13A-49](#)). Then go to Step 23.

NO : Go to Step 4.

STEP 4. Using scan tool MB991958, read the CVT system DTC.

Using scan tool to read the CVT system DTC (Refer to GROUP 23A, Troubleshooting – Diagnosis Function [P.23A-14](#)).

Q: Is any DTC set?

YES : Repair the CVT system (Refer to GROUP 23A, Troubleshooting – Diagnostic Trouble Code Chart [P.23A-29](#)). Then go to Step 23.

NO : Go to Step 5.

STEP 5. Using scan tool MB991958, read the A/C system DTC.

Using scan tool to read the A/C system DTC (Refer to GROUP 55A, Manual A/C Diagnosis – Diagnosis Function [P.55A-7](#)).

Q: Is any DTC set?

YES : Repair the A/C system (Refer to GROUP 55A, Manual A/C Diagnosis – Diagnostic Trouble Code Chart [P.55A-11](#)). Then go to Step 23.

NO : Go to Step 6.

STEP 6. Using scan tool MB991958, read the ETACS system DTC.

Using scan tool to read the ETACS system DTC (Refer to GROUP 54A, ETACS, Troubleshooting – Diagnosis Function [P.54A-729](#)).

Q: Is any DTC set?

YES : Repair the ETACS system (Refer to GROUP 54A, ETACS, Troubleshooting – Diagnostic Trouble Code Chart [P.54A-732](#)). Then go to Step 23.

NO : Go to Step 7.

STEP 7. Measure the terminal voltage at ETACS-ECU connector C-312.

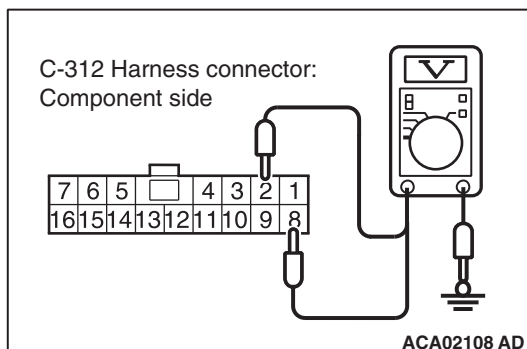
- (1) Disconnect the ETACS-ECU connector C-312 and measure at the harness connector side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the terminal voltage between ETACS-ECU connector C-312 terminal number 2 and body ground, and between ETACS-ECU connector C-312 terminal number 8 and body ground.

OK: Battery positive voltage.

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 13.

NO : Go to Step 8.



STEP 8. Check the condenser fan relay connector A-26X, radiator fan relay connector A-29X, fan control relay connector A-31X, and ETACS-ECU connector C-312, for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#).

Q: Are the connectors and terminals in good condition?

YES : Go to Step 9.

NO : Repair or replace the damaged connectors or replace the relay box. Then go to Step 23.

STEP 9. Check the harness wire between fusible link number 28 and condenser fan relay connector A-26X terminal number 1, between fusible link number 28 and fan control relay connector A-31X terminal number 1, and between fusible link number 29 and radiator fan relay connector A-29X terminal number 3, for damage.

Check harness wire for open/short circuit and damage.

Q: Are the harness wires in good condition?

YES : Go to Step 10.

NO : Repair or replace the damaged harness wire or replace the relay box. Then go to Step 23.

STEP 10. Check the harness wire between condenser fan relay connector A-26X terminal number 2 and ETACS-ECU connector C-312 terminal number 8, between radiator fan relay connector A-29X terminal number 1 and ETACS-ECU connector C-312 terminal number 2, and between fan control relay connector A-31X terminal number 3 and ETACS-ECU connector C-312 terminal number 8, for damage.

Check harness wire for open/short circuit and damage.

Q: Are the harness wires in good condition?

YES : Go to Step 11.

NO : Repair or replace the damaged harness wire. Then go to Step 23.

STEP 11. Check the radiator fan relay, the condenser fan relay and the fan control relay.

Refer to [P.14-30](#).

Q: Are the relays in good condition?

YES : Go to Step 12.

NO : Replace the damaged relay. Then go to Step 23.

STEP 12. Check the fusible link number 28 and fusible link number 29.

Q: Are the fusible links in good condition?

YES : Go to Step 20.

NO : Replace the damaged fusible link. Then go to Step 23.

STEP 13. Check the condenser fan relay connector A-26X, radiator fan relay connector A-29X, fan control relay connector A-31X, radiator fan motor connector A-05, and condenser fan motor connector A-43, for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#).

Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.

NO : Repair or replace the damaged connectors or replace the relay box. Then go to Step 23.

STEP 14. Check the harness wire between fusible link number 28 and condenser fan relay connector A-26X terminal number 4, and between fusible link number 29 and radiator fan relay connector A-29X terminal number 4, for damage.

Check harness wire for open/short circuit and damage.

Q: Are the harness wires in good condition?

YES : Go to Step 15.

NO : Repair or replace the damaged harness wire or replace the relay box. Then go to Step 23.

STEP 15. Check the harness wire between condenser fan relay connector A-26X terminal number 3 and condenser fan motor connector A-43 terminal number 1, and between radiator fan relay connector A-29X terminal number 2 and radiator fan motor connector A-05 terminal number 1, for damage.

Check harness wire for open/short circuit and damage.

Q: Are the harness wires in good condition?

YES : Go to Step 16.

NO : Repair or replace the damaged harness wire. Then go to Step 23.

STEP 16. Check the harness wire between radiator fan motor connector A-05 terminal number 2 and fan control relay connector A-31X terminal number 5, and between condenser fan motor connector A-43 terminal number 2 and body ground, for damage.

Check harness wire for open/short circuit and damage.

Q: Are the harness wires in good condition?

YES : Go to Step 17.

NO : Repair or replace the damaged harness wire. Then go to Step 23.

STEP 17. Check the harness wire between fan control relay connector A-31X terminal number 2 and condenser fan motor connector A-43 terminal number 1, and between fan control relay connector A-31X terminal number 4 and body ground, for damage.

Check harness wire for open/short circuit and damage.

Q: Are the harness wires in good condition?

YES : Go to Step 18.

NO : Repair or replace the damaged harness wire. Then go to Step 23.

STEP 18. Check the radiator fan relay, the condenser fan relay and the fan control relay.

Refer to [P.14-30](#).

Q: Are the relays in good condition?

YES : Go to Step 19.

NO : Replace the damaged relay. Then go to Step 23.

STEP 19. Check the radiator fan motor and the condenser fan motor.

Refer to [P.14-33](#).

Q: Are the fan motors in good condition?

YES : Go to Step 20.

NO : Replace the damaged fan motor (Refer to [P.14-49](#)). Then go to Step 23.

STEP 20. Using scan tool MB991958, read the ETACS system DTC.

Using scan tool to read the ETACS system DTC (Refer to GROUP 54A, ETACS, Troubleshooting – Diagnostic Function [P.54A-729](#)).

Q: Is any DTC set?

YES : Replace the ETACS-ECU (Refer to GROUP 54A, ETACS – ETACS-ECU [P.54A-825](#)). Then go to Step 23.

NO : Go to Step 21.

STEP 21. Using scan tool MB991958, check the MFI system actuator test.

Using scan tool to check the MFI system actuator test (Refer to GROUP 13A, MFI Diagnosis – Diagnostic Function [P.13A-11](#)).

- Item 14: Cooling fan
(Refer to GROUP 13A, MFI Diagnosis – Actuator Test Reference Table [P.13A-850](#))

Q: Is the check result normal?

YES : Go to Step 22.

NO : Replace the ECM [Refer to GROUP 13A, Engine Control Module (ECM) [P.13A-899](#)]. Then go to Step 23.

STEP 22. Check the symptom.

Q: Does the radiator fan and condenser fan operate normal?

YES : An intermittent malfunction is suspected (Refer to GROUP 00, How to use troubleshooting – How to Cope with Intermittent Malfunction [P.00-15](#)).

NO : Replace the ECM [Refer to GROUP 13A, Engine Control Module (ECM) [P.13A-899](#)]. Then go to Step 23.

STEP 23. Check the symptom.

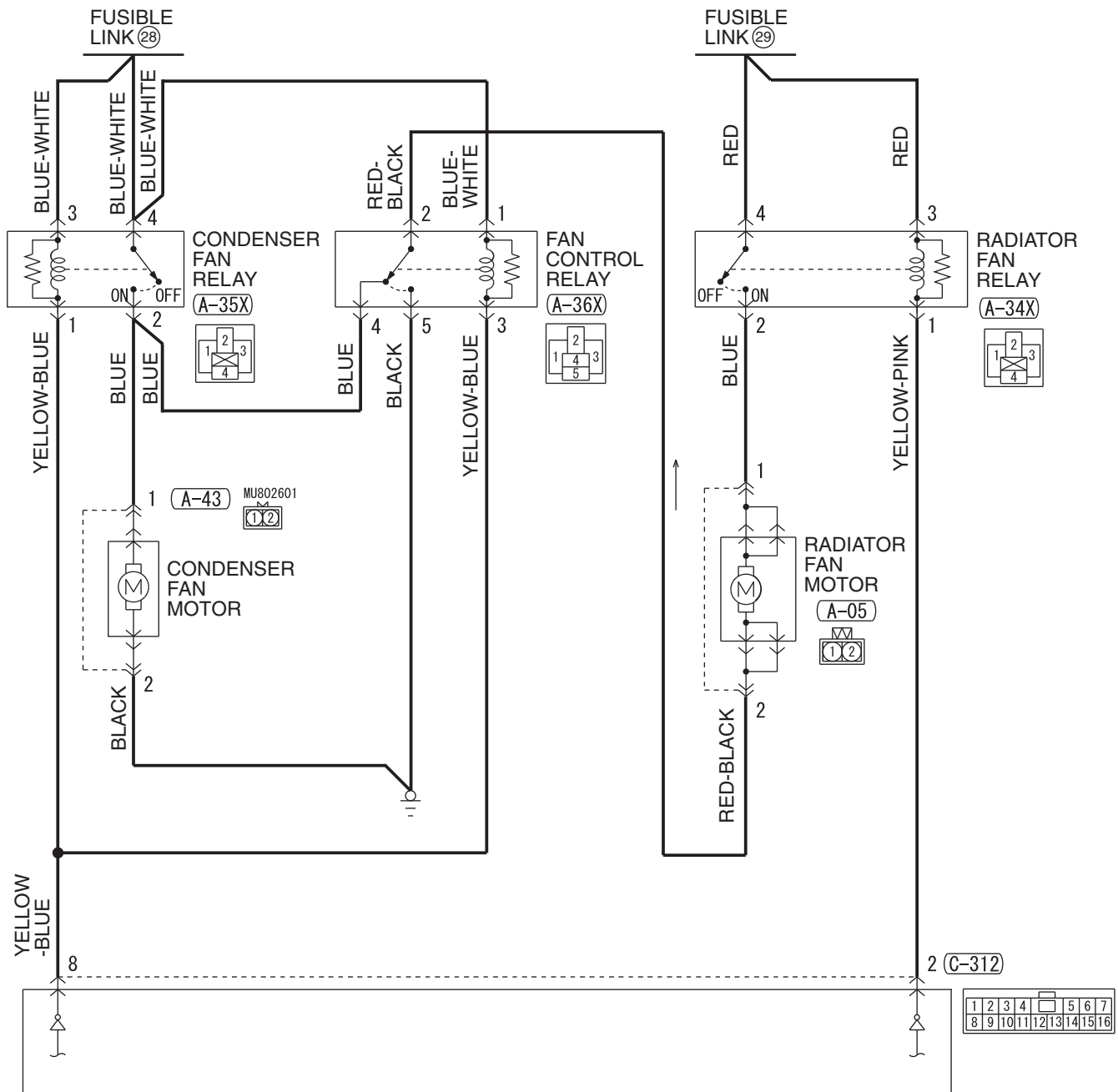
Q: Does the radiator fan and condenser fan operate normal?

YES : The procedure is complete.

NO : Return to Step 1.

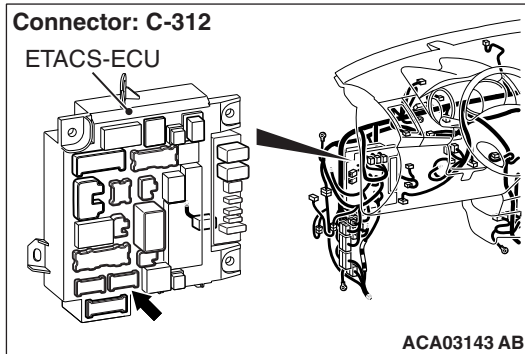
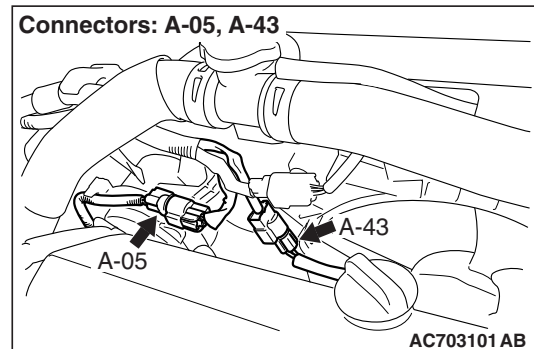
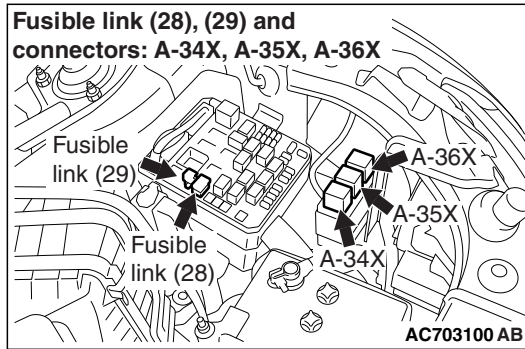
Inspection Procedure 4: Radiator Fan and Condenser Fan do not Operate <3.0L ENGINE>.

Radiator Fan and Condenser Fan Drive Circuit



ETACS-ECU

ACA03153 AB



CIRCUIT OPERATION

- Based on the signal from the engine coolant temperature sensor and the output shaft speed sensor signal (vehicle speed signal) from the transaxle control module (TCM), and the A/C switch signal from the A/C-ECU, the engine control module (ECM) sends the radiator fan and condenser fan control signal to the ETACS-ECU via CAN bus line.
- Based on the radiator fan and condenser fan control signal from the ECM, the ETACS-ECU turns ON/OFF the radiator fan relay, condenser fan relay, and the fan control relay to control the rotation of the radiator fan motor and condenser fan motor.

TECHNICAL DESCRIPTION

- If the radiator fan and condenser fan do not operate, the radiator fan motor, the condenser fan motor, the radiator fan relay, the condenser fan relay, the fan control relay, the ETACS-ECU may be defective.
- The CAN bus line, ETACS-ECU, A/T system, A/C system, or MFI system may also be defective.

TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CASE:)

- Malfunction of CAN bus system.
- Damaged harness or connector.
- Malfunction of the MFI system.
- Malfunction of the A/T system.
- Malfunction of the A/C system.
- Malfunction of fusible link No. 28.
- Malfunction of fusible link No. 29.
- Malfunction of radiator fan relay.
- Malfunction of condenser fan relay.
- Malfunction of fan control relay.
- Malfunction of radiator fan motor.
- Malfunction of condenser fan motor.
- Malfunction of engine compartment relay box.
- Malfunction of ETACS-ECU.
- Malfunction of engine control module.

DIAGNOSTIC PROCEDURE

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A
- MB991223: Harness Set
- MB992006: Extra Fine Probe

CAUTION

If there is any problem in the CAN bus lines, an incorrect DTC may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis [P.54C-10](#).)

STEP 1. Using scan tool MB991958, check the CAN bus line diagnostics.

Use scan tool to diagnose the CAN bus line (Refer to GROUP 54C, Explanation About The Scan Tool Can Bus Diagnostics [P.54C-10](#)).

Q: Is the check result satisfactory?

YES : Go to Step 2.

NO : Repair the CAN bus lines (Refer to GROUP 54C, Troubleshooting – CAN Bus Diagnostic Table [P.54C-17](#)). Then go to Step 23.

STEP 2. Using scan tool MB991958, check the MFI system actuator test.

Using scan tool to check the MFI system actuator test (Refer to GROUP 13B, MFI Diagnosis – Diagnostic Function [P.13B-11](#)).

- Item 14: Cooling fan
(Refer to GROUP 13B, MFI Diagnosis – Actuator Test Reference Table [P.13B-858](#))

Q: Is the check result normal?

YES : Go to Step 22.

NO : Go to Step 3.

STEP 3. Using scan tool MB991958, read the MFI system DTC.

Using scan tool to read the MFI system DTC (Refer to GROUP 13B, MFI Diagnosis – Diagnostic Function [P.13B-11](#)).

Q: Is any DTC set?

YES : Repair the MFI system (Refer to GROUP 13B, MFI Diagnosis – Diagnostic Trouble Code Chart [P.13B-50](#)). Then go to Step 23.

NO : Go to Step 4.

STEP 4. Using scan tool MB991958, read the A/T system DTC.

Using scan tool to read the A/T system DTC (Refer to GROUP 23C, Troubleshooting – Diagnosis Function [P.23C-18](#)).

Q: Is any DTC set?

YES : Repair the A/T system (Refer to GROUP 23C, Troubleshooting – Diagnostic Trouble Code Chart [P.23C-164](#)). Then go to Step 23.

NO : Go to Step 5.

STEP 5. Using scan tool MB991958, read the A/C system DTC.

Using scan tool to read the A/C system DTC (Refer to GROUP 55A, Manual A/C Diagnosis – Diagnosis Function [P.55A-7](#)) <vehicles with manual A/C> or (Refer to GROUP 55B, Automatic A/C Diagnosis – Diagnosis Function [P.55B-4](#)) <vehicles with automatic A/C>.

Q: Is any DTC set?

YES : Repair the A/C system (Refer to GROUP 55A, Manual A/C Diagnosis – Diagnostic Trouble Code Chart [P.55A-11](#)) <vehicles with manual A/C> or (Refer to GROUP 55B, Automatic A/C Diagnosis – Diagnostic Trouble Code Chart [P.55B-8](#)) <vehicles with automatic A/C>. Then go to Step 23.

NO : Go to Step 6.

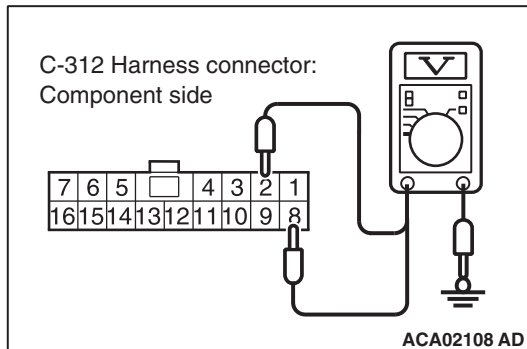
STEP 6. Using scan tool MB991958, read the ETACS system DTC.

Using scan tool to read the ETACS system DTC (Refer to GROUP 54A, ETACS, Troubleshooting – Diagnosis Function [P.54A-729](#)).

Q: Is any DTC set?

YES : Repair the ETACS system (Refer to GROUP 54A, ETACS, Troubleshooting – Diagnostic Trouble Code Chart [P.54A-732](#)). Then go to Step 23.

NO : Go to Step 7.



STEP 7. Measure the terminal voltage at ETACS-ECU connector C-312.

- (1) Disconnect the ETACS-ECU connector C-312 and measure at the harness connector side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the terminal voltage between ETACS-ECU connector C-312 terminal number 2 and body ground, and between ETACS-ECU connector C-312 terminal number 8 and body ground.

OK: Battery positive voltage.

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 13.

NO : Go to Step 8.

STEP 8. Check the radiator fan relay connector A-34X, condenser fan relay connector A-35X, fan control relay connector A-36X, and ETACS-ECU connector C-312, for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#).

Q: Are the connectors and terminals in good condition?

YES : Go to Step 9.

NO : Repair or replace the damaged connectors or replace the relay box. Then go to Step 23.

STEP 9. Check the harness wire between fusible link number 28 and condenser fan relay connector A-35X terminal number 3, between fusible link number 28 and condenser fan relay connector A-35X terminal number 4, between condenser fan relay connector A-35X terminal number 4 and fan control relay connector A-36X terminal number 1, and between fusible link number 29 and radiator fan relay connector A-34X terminal number 3, for damage. Check harness wire for open/short circuit and damage.

Q: Are the harness wires in good condition?

YES : Go to Step 10.

NO : Repair or replace the damaged harness wire. Then go to Step 23.

STEP 10. Check the harness wire between radiator fan relay connector A-34X terminal number 1 and ETACS-ECU connector C-312 terminal number 2, between condenser fan relay connector A-35X terminal number 1 and ETACS-ECU connector C-312 terminal number 8, and between fan control relay connector A-36X terminal number 3 and ETACS-ECU connector C-312 terminal number 8, for damage.

Check harness wire for open/short circuit and damage.

Q: Are the harness wires in good condition?

YES : Go to Step 11.

NO : Repair or replace the damaged harness wire. Then go to Step 23.

STEP 11. Check the radiator fan relay, the condenser fan relay and the fan control relay.

Refer to [P.14-31](#).

Q: Are the relays in good condition?

YES : Go to Step 12.

NO : Replace the damaged relay. Then go to Step 23.

STEP 12. Check the fusible link number 28 and fusible link number 29.

Q: Are the fusible links in good condition?

YES : Go to Step 20.

NO : Replace the damaged fusible link. Then go to Step 23.

STEP 13. Check the radiator fan relay connector A-34X, condenser fan relay connector A-35X, fan control relay connector A-36X, radiator fan motor connector A-05, and condenser fan motor connector A-43, for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#).

Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.

NO : Repair or replace the damaged connectors or replace the relay box. Then go to Step 23.

STEP 14. Check the harness wire between fusible link number 28 and condenser fan relay connector A-35X terminal number 4, and between fusible link number 29 and radiator fan relay connector A-34X terminal number 4, for damage.

Check harness wire for open/short circuit and damage.

Q: Are the harness wires in good condition?

YES : Go to Step 15.

NO : Repair or replace the damaged harness wire. Then go to Step 23.

STEP 15. Check the harness wire between radiator fan relay connector A-34X terminal number 2 and radiator fan motor connector A-05 terminal number 1, and between condenser fan relay connector A-35X terminal number 2 and condenser fan motor connector A-43 terminal number 1, for damage.

Check harness wire for open/short circuit and damage.

Q: Are the harness wires in good condition?

YES : Go to Step 16.

NO : Repair or replace the damaged harness wire. Then go to Step 23.

STEP 16. Check the harness wire between radiator fan motor connector A-05 terminal number 2 and fan control relay connector A-36X terminal number 2, and between condenser fan motor connector A-43 terminal number 2 and body ground, for damage.

Check harness wire for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 17.

NO : Repair or replace the damaged harness wire. Then go to Step 23.

STEP 17. Check the harness wire between fan control relay connector A-36X terminal number 4 and condenser fan relay connector A-35X terminal number 2, and between fan control relay connector A-36X terminal number 5 and body ground, for damage.

Check harness wire for open/short circuit and damage.

Q: Are the harness wires in good condition?

YES : Go to Step 18.

NO : Repair or replace the damaged harness wire. Then go to Step 23.

STEP 18. Check the radiator fan relay, the condenser fan relay and the fan control relay.

Refer to [P.14-31](#).

Q: Are the relays in good condition?

YES : Go to Step 19.

NO : Replace the damaged relay. Then go to Step 23.

STEP 19. Check the radiator fan motor and the condenser fan motor.

Refer to [P.14-33](#).

Q: Are the fan motors in good condition?

YES : Go to Step 20.

NO : Replace the damaged fan motor (Refer to [P.14-52](#)). Then go to Step 23.

STEP 20. Using scan tool MB991958, read the ETACS system DTC.

Using scan tool to read the ETACS system DTC (Refer to GROUP 54A, ETACS, Troubleshooting – Diagnostic Function [P.54A-729](#)).

Q: Is any DTC set?

YES : Replace the ETACS-ECU (Refer to GROUP 54A, ETACS – ETACS-ECU [P.54A-825](#)). Then go to Step 23.

NO : Go to Step 21.

STEP 21. Using scan tool MB991958, check the MFI system actuator test.

Using scan tool to check the MFI system actuator test (Refer to GROUP 13B, MFI Diagnosis – Diagnostic Function [P.13B-11](#)).

- Item 14: Cooling fan
(Refer to GROUP 13B, MFI Diagnosis – Actuator Test Reference Table [P.13B-858](#))

Q: Is the check result normal?

YES : Go to Step 22.

NO : Replace the ECM [Refer to GROUP 13B, Engine Control Module (ECM) [P.13B-903](#)]. Then go to Step 23.

STEP 22. Check the symptom.**Q: Does the radiator fan and condenser fan operate normal?**

YES : An intermittent malfunction is suspected (Refer to GROUP 00, How to use troubleshooting – How to Cope with Intermittent Malfunction [P.00-15](#)).

NO : Replace the ECM [Refer to GROUP 13B, Engine Control Module (ECM) [P.13B-903](#)]. Then go to Step 23.

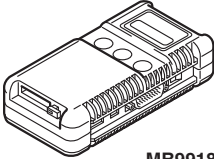
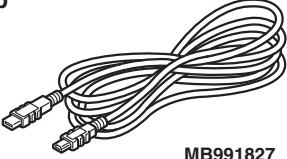
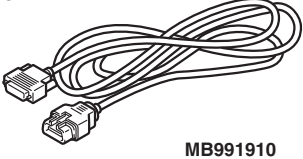
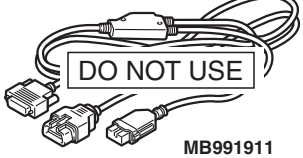
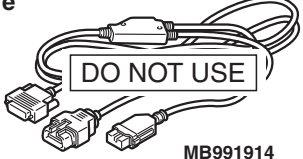
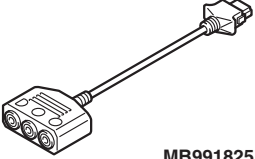
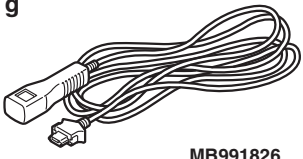
STEP 23. Check the symptom.**Q: Does the radiator fan and condenser fan operate normal?**

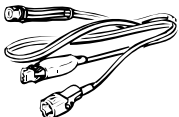
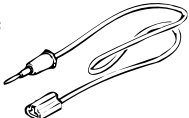
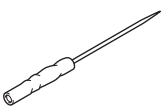
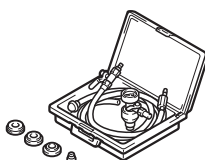
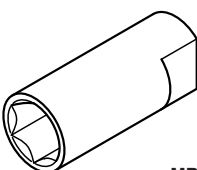
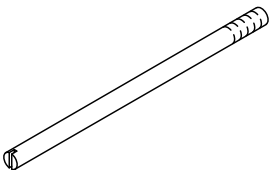
YES : The procedure is complete.

NO : Return to Step 1.

SPECIAL TOOLS

M1141000601700

Tool	Tool number and name	Supersession	Application
a  MB991824 b  MB991827 c  MB991910 d  MB991911 e  MB991914 f  MB991825 g  MB991826 MB991958	MB991958 Scan tool (M.U.T.-III sub assembly) a: MB991824 Vehicle communication interface (V.C.I.) b: MB991827 M.U.T.-III USB cable c: MB991910 M.U.T.-III main harness A (Vehicles with CAN communication system) d: MB991911 M.U.T.-III main harness B (Vehicles without CAN communication system) e: MB991914 M.U.T.-III main harness C (for Chrysler models only) f: MB991825 M.U.T.-III adapter harness g: MB991826 M.U.T.-III trigger harness	MB991824-KIT <i>NOTE: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.</i>	CAUTION For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B or C instead, the CAN communication does not function correctly. Reading diagnostic trouble codes

Tool	Tool number and name	Supersession	Application
a  b  c  d  MB991223	MB991223 a: MB991219 b: MB991220 c: MB991221 d: MB991222 Harness set a: Test harness b: LED harness c: LED harness adaptor d: Probe	General service tools	Checking the continuity and measuring the voltage at the harness connector
 MB992006	MB992006 Extra fine probe	General service tool	Continuity check and voltage measurement at harness wire or connector for loose, corroded or damaged terminals, or terminals pushed back in the connector.
 MB991871	MB991871 LLC changer	General service tool	Coolant refilling
 MB992042	MB992042 Water temperature sensor wrench	MB992042-01	Engine coolant temperature sensor removal and installation
	MD998412 Guide	-	Thermostat housing and gasket installation

ON-VEHICLE SERVICE

ENGINE COOLANT LEAK CHECK

M1141001000786

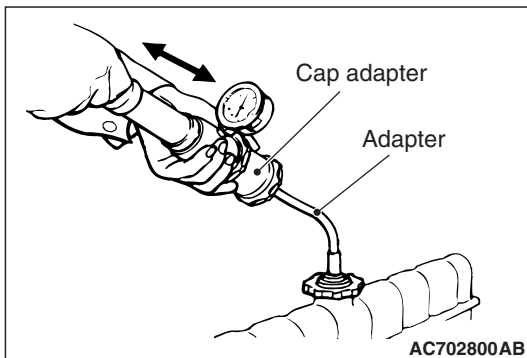
WARNING

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 (23 psi) 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 OPENING PRESSURE CHECK

M1141001301069

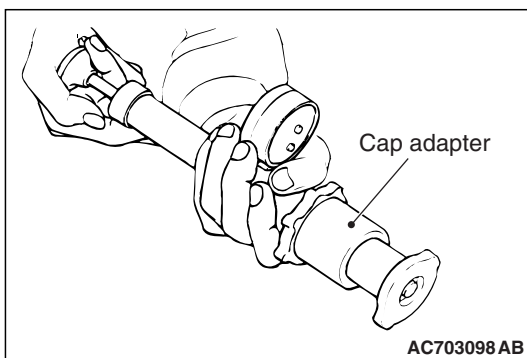
NOTE: Be sure that the cap is clean before testing. Rust or other foreign material on the cap seal will cause an improper reading.

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 (12 psi)

Standard value: 93 – 123 kPa (14 – 18 psi)

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



ENGINE COOLANT CHANGE

M1141001202883

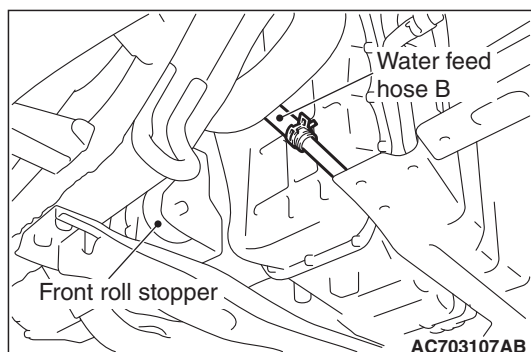
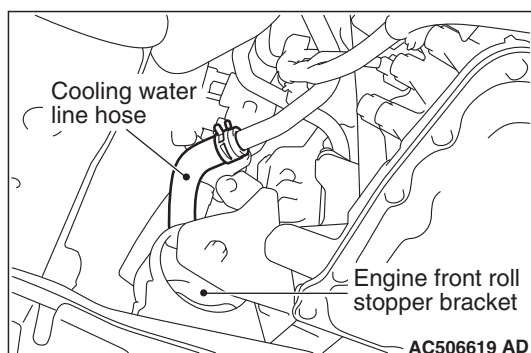
Required Special Tool:

- MB991871: LLC Changer

⚠ WARNING

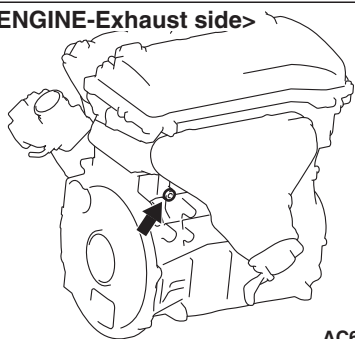
When removing the radiator cap, use care to avoid contact with hot coolant or steam. Place a shop towel over the cap and turn the cap counterclockwise a little to let the pressure escape through the vinyl tube. After relieving the steam pressure, remove the cap by slowly turning it counterclockwise.

1. Drain the water from the radiator, heater core and engine after unplugging the radiator drain plug and removing the radiator cap.
2. Disconnect the cooling water line hose and drain the coolant in the water jacket. <2.4L ENGINE>



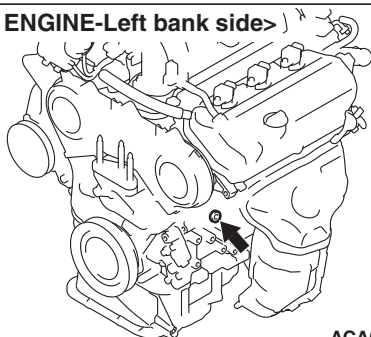
3. Disconnect the water feed hose B and drain the coolant in the water jacket. <3.0L ENGINE>

<2.4L ENGINE-Exhaust side>



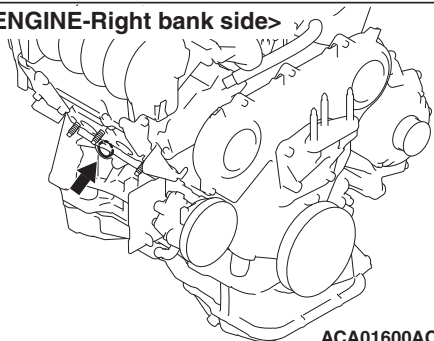
AC612051AE

<3.0L ENGINE-Left bank side>

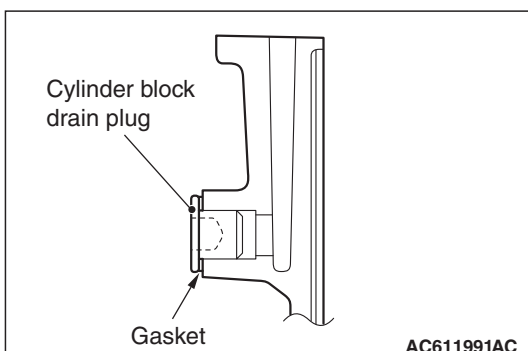


ACA01599AC

<3.0L ENGINE-Right bank side>



ACA01600AC



AC611991AC

4. Drain the water in the water jacket by unplugging the drain plug of the cylinder block.
5. Remove the radiator condenser tank assembly and drain the coolant.
6. Connect the cooling water line hose. <2.4L ENGINE>
7. Connect the water feed hose B. <3.0L ENGINE>

8. Replace the cylinder block drain plug gasket, and tighten the drain plug to the specified torque.

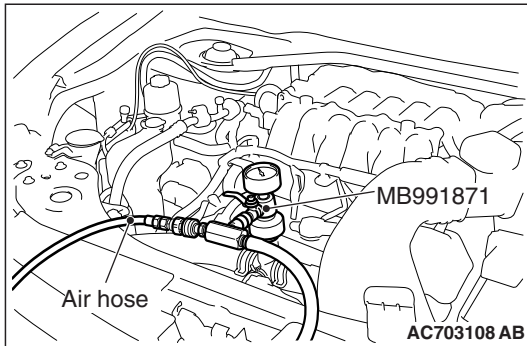
Tightening torque:

$39 \pm 3 \text{ N}\cdot\text{m}$ <2.4L ENGINE>

$29 \pm 5 \text{ N}\cdot\text{m}$ <3.0L ENGINE-Left bank side>

$140 \pm 5 \text{ N}\cdot\text{m}$ <3.0L ENGINE-Right bank side>

9. Install the radiator condenser tank assembly.
10. Securely tighten the radiator drain plug.
11. Assemble the radiator condenser tank assembly.

**⚠ 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 aluminum components.

12. Use special tool MB991871 to refill the engine coolant up to the top of the radiator port.

Recommended antifreeze: DIA QUEEN SUPER LONG LIFE COOLANT PREMIUM or equivalent*

***: similar high quality ethylene glycol based non-silicate, non-amine, non-nitrate and non-borate coolant with long life hybrid organic acid technology**

Quantity:

9.5 dm³ (10.0 quarts) <Automatic transaxle>

7.5 dm³ (7.9 quarts) <CVT>

[includes 0.65 dm³ (0.69 quarts) in the radiator condenser tank]

13. Reinstall the radiator cap.

14. Start the engine and let it warm up until the thermostat opens.

15. After repeatedly revving the engine up to 3,000 r/min several times, stop the engine.

16. Remove the radiator cap after the engine has cooled, and pour in coolant up to the brim. Reinstall the cap.

⚠ CAUTION

Do not overfill the radiator condenser tank assembly.

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

WATER PUMP COOLANT LEAK CHECK

M1141008600284

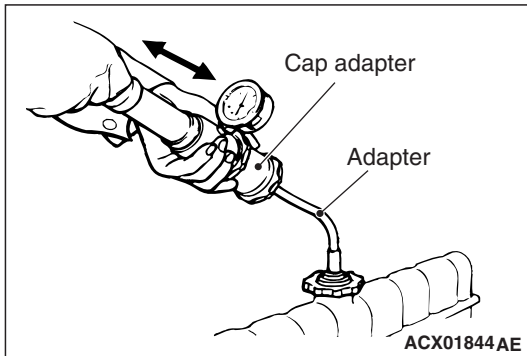
If a residue of the coolant draining is found on the drain hole, the vapor hole and the installation surface, check the water pump leakage by following method.

1. Wipe off the residue of the coolant draining on the water pump.

⚠ WARNING

Make sure that the coolant is cold when removing the radiator cap.

2. Remove the radiator cap.



⚠ CAUTION

Do not pressures 100 kPa (15 psi) or more.

3. Install the radiator tester and pressures at 100 kPa (15 psi).
4. Hold the pressurized state for 20 minutes, and check that the water leakage from the drain hole, the vapor hole or the installation surface of the water pump.
5. Remove the radiator tester, and install the radiator cap.
6. Warm up the engine, let it idle for 20 minutes and stop it.
7. After stopping the engine, and check that the water leakage from the drain hole, the vapor hole or the installation surface of the water pump.
8. If the water leakage is found in step 4 or 7, replace the water pump. (Refer to [P.14-39](#) <2.4L Engine>, [P.14-40](#) <3.0L Engine>).

ENGINE COOLANT CONCENTRATION TEST

M1141001101548

⚠ CAUTION

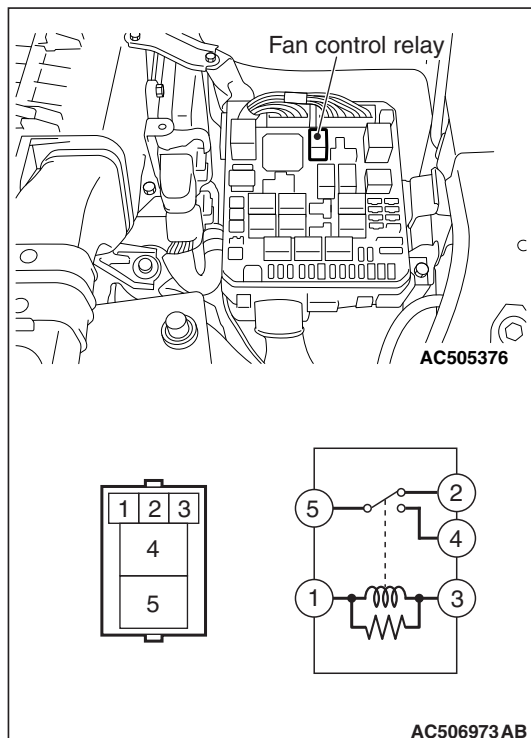
- Engine coolant of less than 30% concentration has a less rust-proof effect. In a concentration of over 60%, the antifreeze effect and engine cooling performance of the engine coolant are deteriorated, causing a detrimental effect on the engine. Therefore, observe the service concentration range without fail.
- Use the Dia Queen Super Long Life Coolant Premium without adding water because the concentration is pre-adjusted to 50%.

Using a hydrometer, check if the engine coolant concentration is within the standard value range.

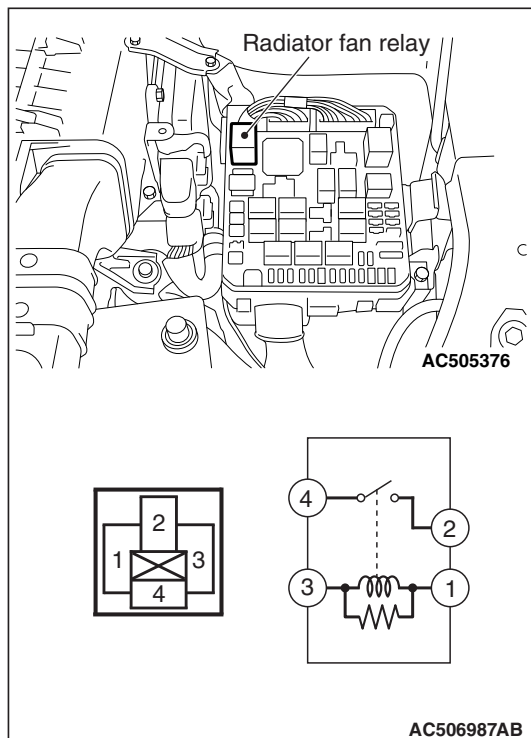
Standard value: 30 to 60% (service concentration range)

**COOLING FAN RELAY CONTINUITY CHECK
<2.4L ENGINE>**

M1141006201335

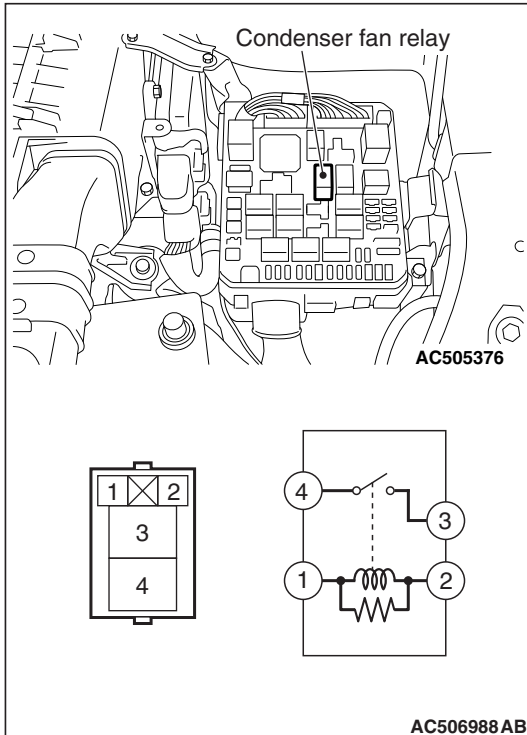
FAN CONTROL RELAY CHECK

Battery voltage	Terminal No. to be connected to tester	Continuity test results
Not applied	2 – 5	Continuity (Less than 2 ohms)
	4 – 5	Open circuit
Connect terminal No. 1 and battery (+) terminal. Connect terminal No. 3 and battery (–) terminal.	2 – 5	Open circuit
	4 – 5	Continuity (Less than 2 ohms)

RADIATOR FAN RELAY CHECK

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

CONDENSER FAN RELAY CHECK

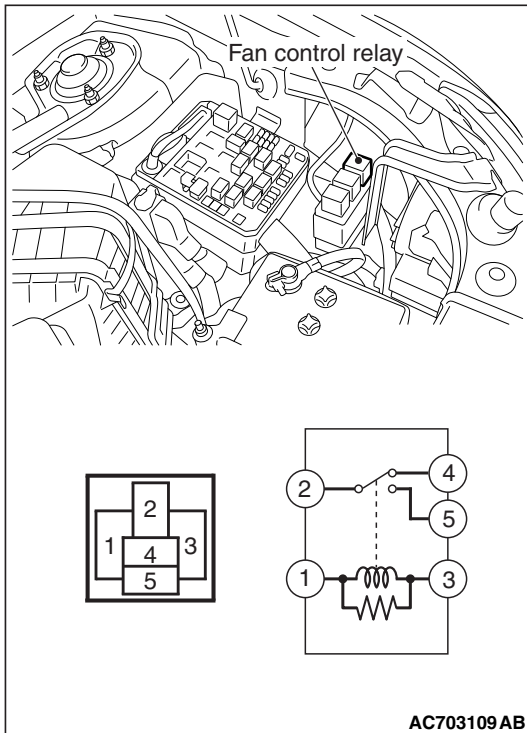


Battery voltage	Terminal No. to be connected to tester	Continuity test results
Not applied	3 – 4	Open circuit
Connect terminal No.1 and battery (+) terminal. Connect terminal No.2 and battery (-) terminal.		Continuity (Less than 2 ohms)

FAN CONTROL RELAY CONTINUITY CHECK <3.0L ENGINE>

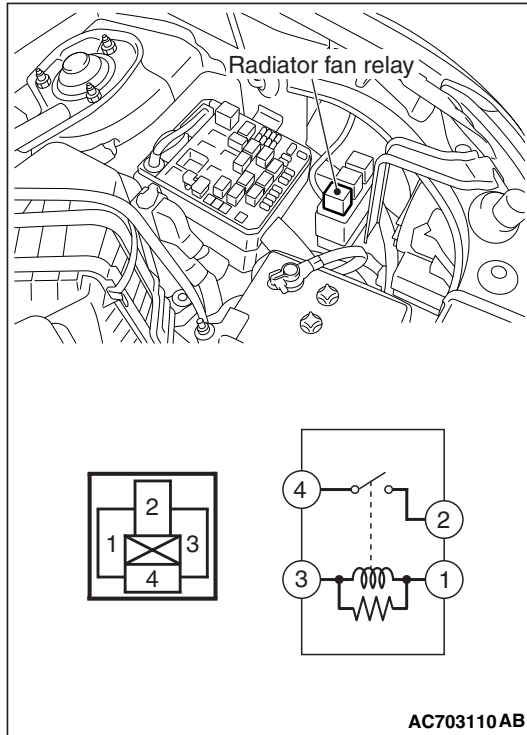
M1141006201197

FAN CONTROL RELAY CONTINUITY CHECK



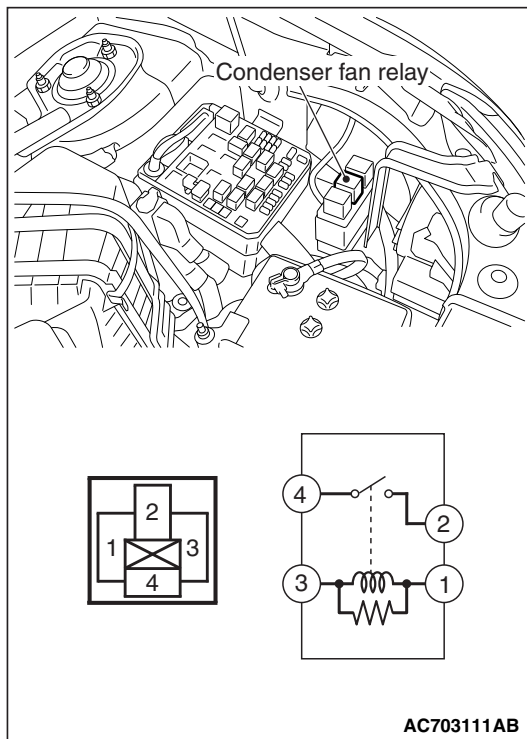
Battery voltage	Terminal No. to be connected to tester	Continuity test results
Not applied	2 – 4	Continuity (less than 2 ohms)
Not applied	2 – 5	Open circuit
Connect terminal No.3 and battery (-) terminal. Connect terminal No.1 and battery (+) terminal.		Continuity (less than 2 ohms)

RADIATOR FAN RELAY CONTINUITY CHECK



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	Continuity (less than 2 ohms)

CONDENSER FAN RELAY CONTINUITY CHECK

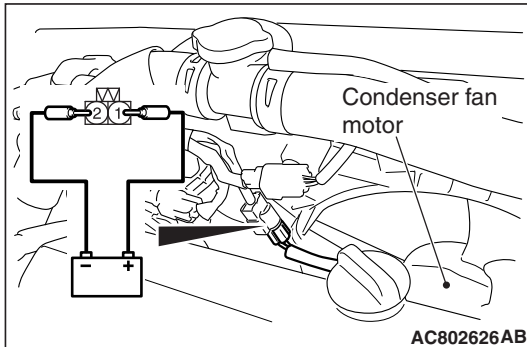
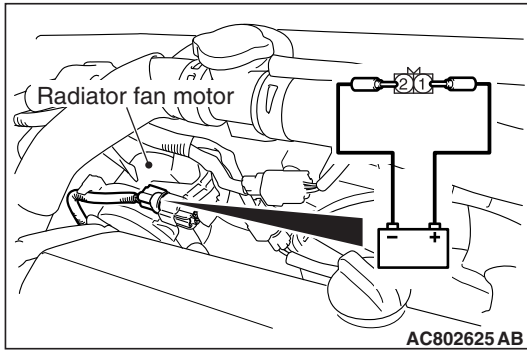


Battery voltage	Terminal No. to be connected to tester	Continuity test results
Not applied	4 – 2	Open circuit
Connect terminal No.3 and battery (+) terminal. Connect terminal No.1 and battery (–) terminal.	4 – 2	Continuity (less than 2 ohms)

M1141007600429

COOLING FAN MOTOR CHECK

1. Disconnect the fan motor connector.
2. Check that the fan motor runs when a positive battery terminal is connected to the fan motor-side connector terminal number 1, and terminal number 2 is grounded. Also check to see that there is no abnormal sound emitted from the fan motor at this time.
3. If the fan motor is defective, replace it (Refer to [P.14-49](#) <2.4L Engine>, [P.14-52](#) <3.0L Engine>).



THERMOSTAT

REMOVAL AND INSTALLATION <2.4L ENGINE>

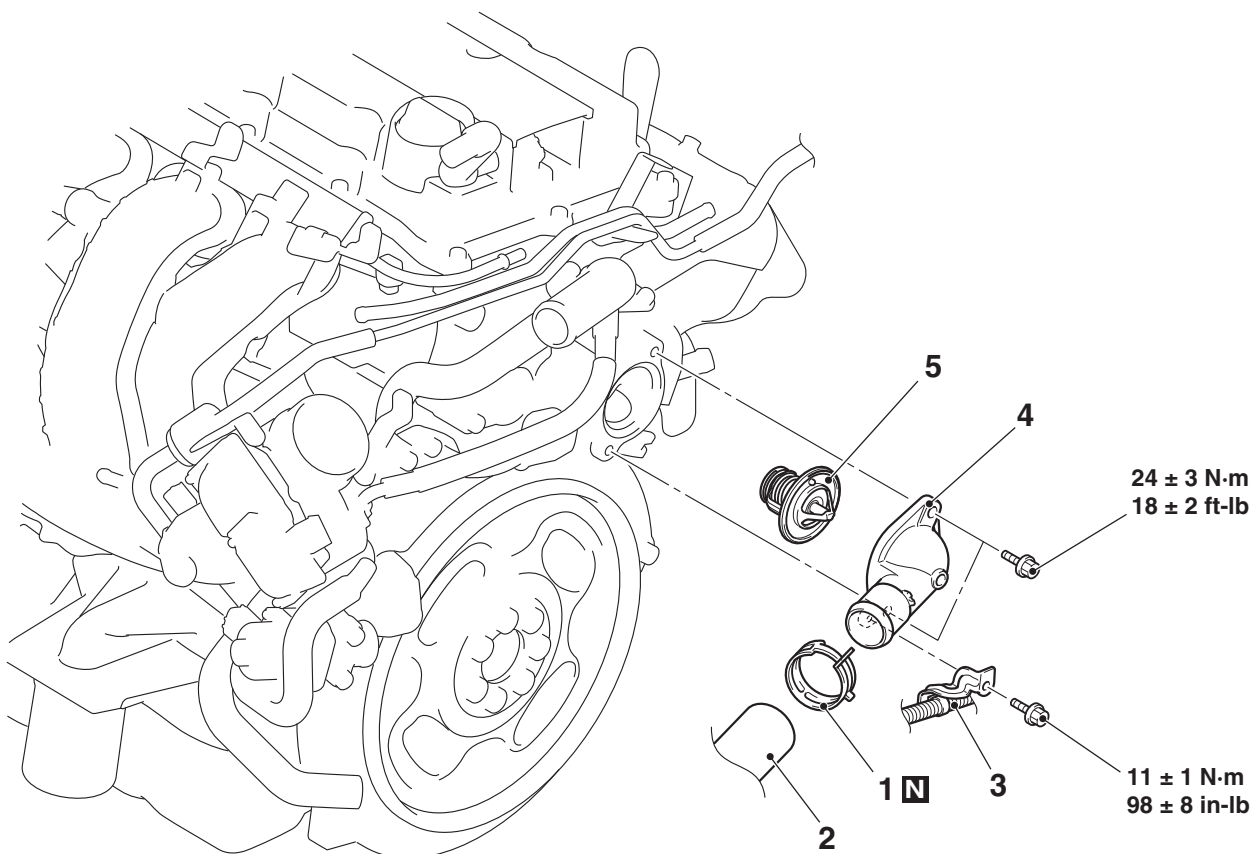
M1141002403151

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-26).
- Engine Upper Cover Removal (Refer to GROUP 11A, Camshaft P.11A-26).
- Air Cleaner Assembly Removal (Refer to GROUP 15, Air Cleaner P.15-4).

Post-installation Operation

- Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner P.15-4).
- Engine Upper Cover Installation (Refer to GROUP 11A, Camshaft P.11A-26).
- Engine Coolant Refilling (Refer to P.14-26).



AC506788AF

Removal steps

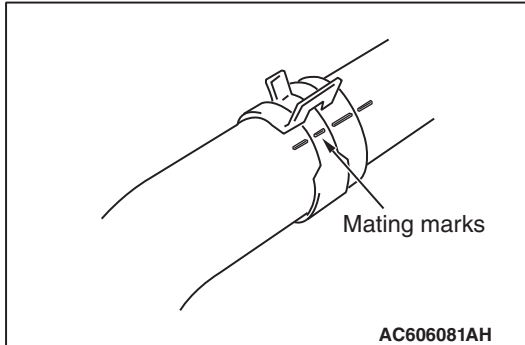
- <<A>> >>B<< 1. Hose clip
<<A>> >>B<< 2. Radiator lower hose connection
3. Control wiring harness clamp connection

Removal steps (Continued)

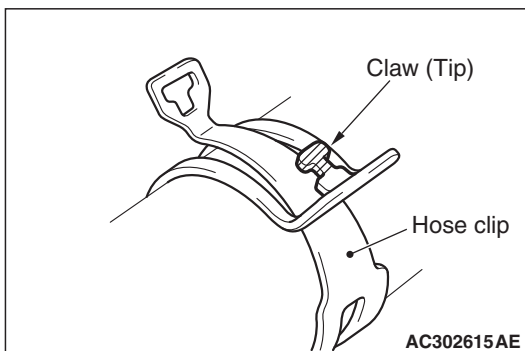
- >>A<< 4. Water inlet fitting
5. Thermostat

REMOVAL SERVICE POINT

<<A>> HOSE CLIP/RADIATOR LOWER HOSE DIS-CONNECTION



1. Make mating marks on the radiator hose and the hose clamp as shown to install them in the original position. Then, remove them.



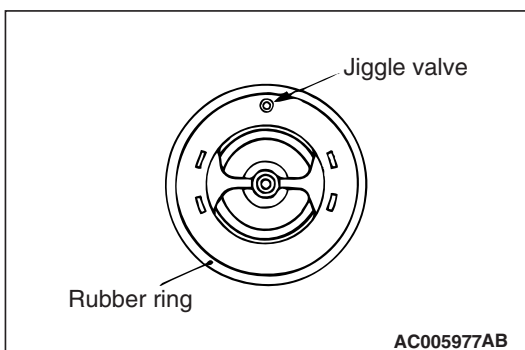
2. Break off the tip of hose clip claw and spread out the hose clip.
NOTE: If there is a hose clip claw, the hose clip cannot spread to capacity because the claw contacts the hose clip.
3. Disconnect the radiator lower hose.

INSTALLATION SERVICE POINTS

>>A<< THERMOSTAT INSTALLATION

⚠ CAUTION

Avoid adhesion of grease to the rubber ring of the thermostat. If the rubber ring is damaged, replace the thermostat. Install the thermostat with care to avoid peeling or damage to the rubber ring. When installing the thermostat, face the jiggle valve of the thermostat upward.

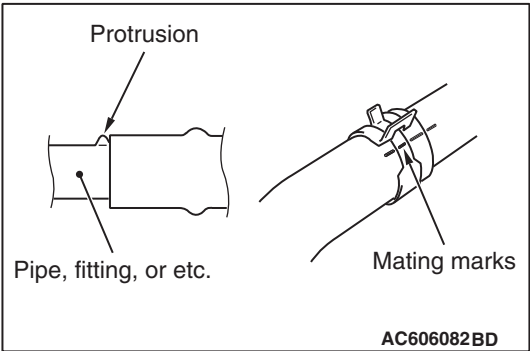


>>B<< HOSE CLIP/RADIATOR LOWER HOSE CONNECTION

⚠ CAUTION

Never reuse the hose clip whose claw is broken off to prevent the rusting.

1. Make mating mark on a new hose clip in the same position as the remove one.



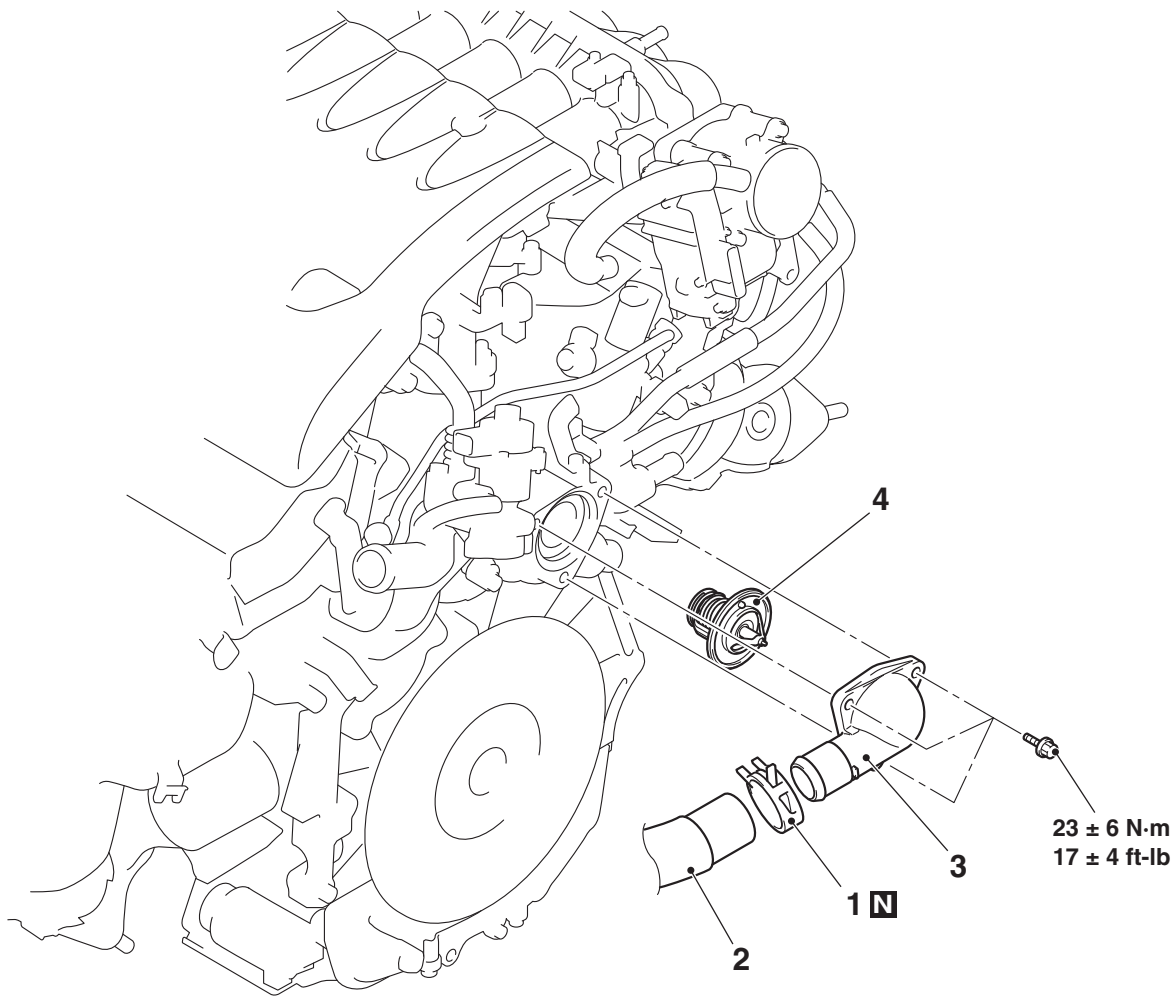
2. Insert the radiator hose until the protrusion of the water inlet fitting.
3. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.
4. Remove the hose clip claw to tighten the radiator hose.

REMOVAL AND INSTALLATION <3.0L ENGINE>

M1141002403162

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Refilling (Refer to P.14-26).
- Air Cleaner Removal and Installation (Refer to GROUP 15, Air Cleaner P.15-4).
- Battery and Battery Tray Removal and Installation (Refer to GROUP 54A, Battery P.54A-11).



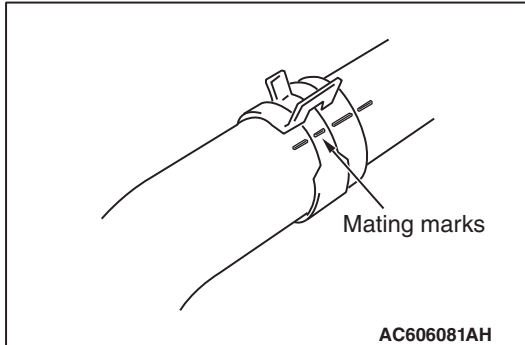
AC703114AD

- <<A>> >>B<< 1. Hose clip
<<A>> >>B<< 2. Radiator lower hose connection

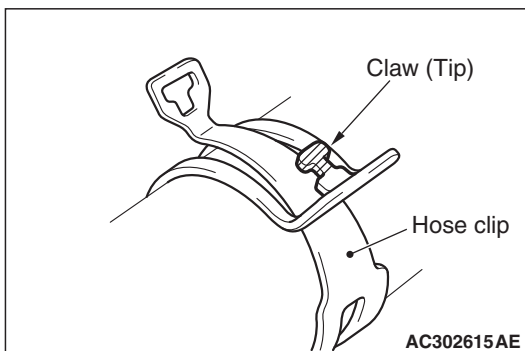
- >>A<< 3. Water inlet fitting
>>A<< 4. Thermostat

REMOVAL SERVICE POINT

<<A>> HOSE CLIP/RADIATOR LOWER HOSE DIS-CONNECTION



1. Make mating marks on the radiator hose and the hose clamp as shown to install them in the original position. Then, remove them.



2. Break off the tip of hose clip claw and spread out the hose clip.
NOTE: If there is a hose clip claw, the hose clip cannot spread to capacity because the claw contacts the hose clip.
3. Disconnect the radiator hose.

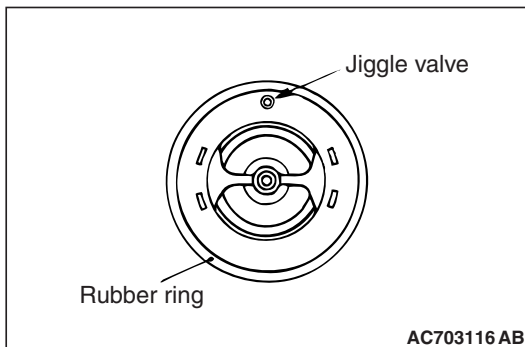
INSTALLATION SERVICE POINTS

>>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.

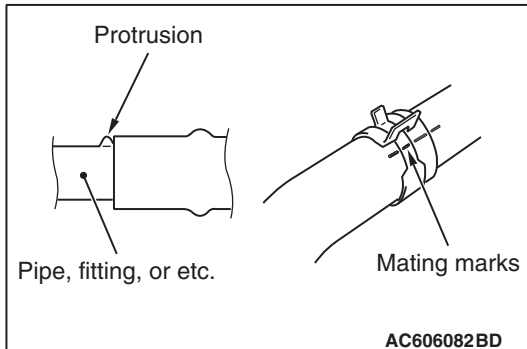
Install the thermostat so that the jiggle valve is facing straight up. Be careful not to fold or scratch the rubber ring.



>>B<< HOSE CLIP/RADIATOR LOWER HOSE
INSTALLATION**⚠ CAUTION**

Never reuse the hose clip whose claw is broken off to prevent the rusting.

1. Make mating mark on a new hose clip in the same position as the remove one.
2. Insert the radiator hose until the protrusion of the water inlet fitting.
3. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.
4. Remove the hose clip claw to tighten the radiator hose.

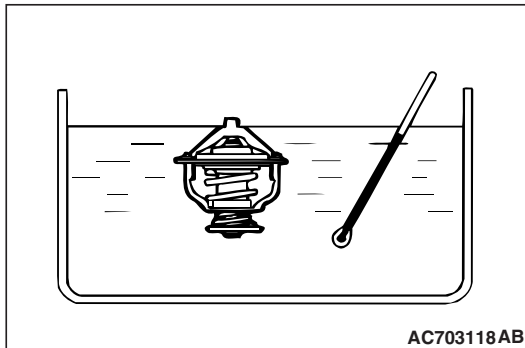


INSPECTION

M1141002501884

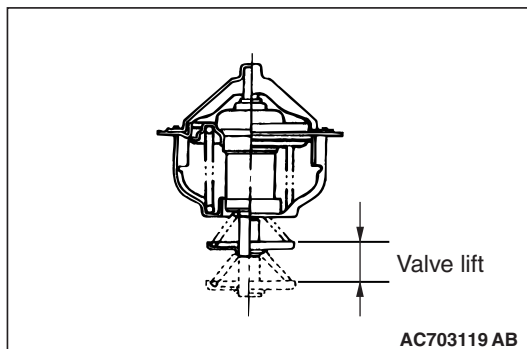
Thermostat Check

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

Standard value:**Valve opening temperature:****87 ± 1.5°C (189 ± 3°F) <2.4L ENGINE>****82 ± 1.5°C (180 ± 3°F) <3.0L ENGINE>**

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 (203°F)****Amount of valve lift:****8.5 mm (0.335 inch) or more <2.4L ENGINE>****9.0 mm (0.354 inch) or more <3.0L ENGINE>**

WATER PUMP

REMOVAL AND INSTALLATION <2.4L ENGINE>

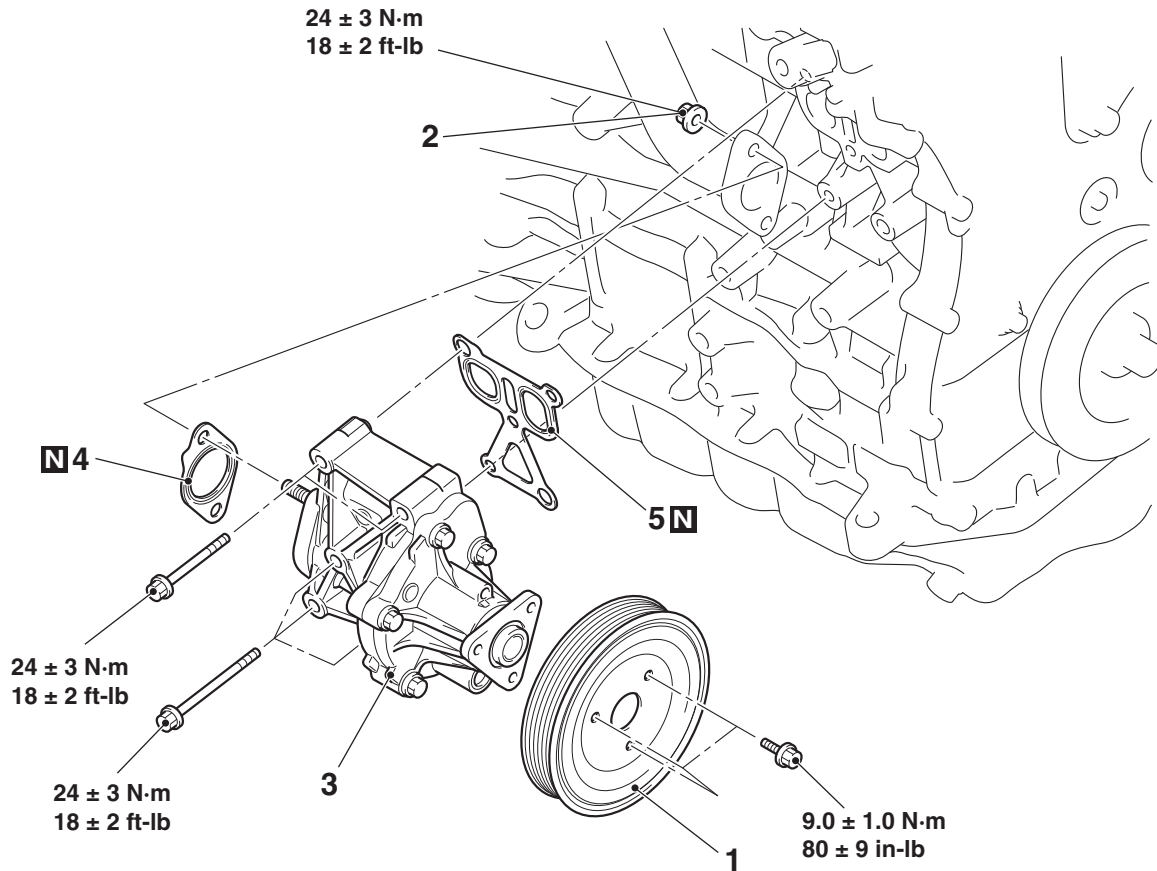
M1141002702182

Pre-removal Operation

- Engine Coolant Draining (Refer to [P.14-26](#)).
- Drive Belt Removal (Refer to GROUP 11A, Crankshaft Pulley [P.11A-21](#)).

Post-installation Operation

- Drive Belt Installation (Refer to GROUP 11A, Crankshaft Pulley [P.11A-21](#)).
- Drive Belt Tension Check (Refer to GROUP 11A, On-vehicle Service – Drive Belt Tension Check and Adjustment [P.11A-9](#)).
- Engine Coolant Refilling (Refer to [P.14-26](#)).



AC509330 AB

Removal steps

1. Water pump pulley
2. Water pump inlet pipe mounting nuts

Removal steps (Continued)

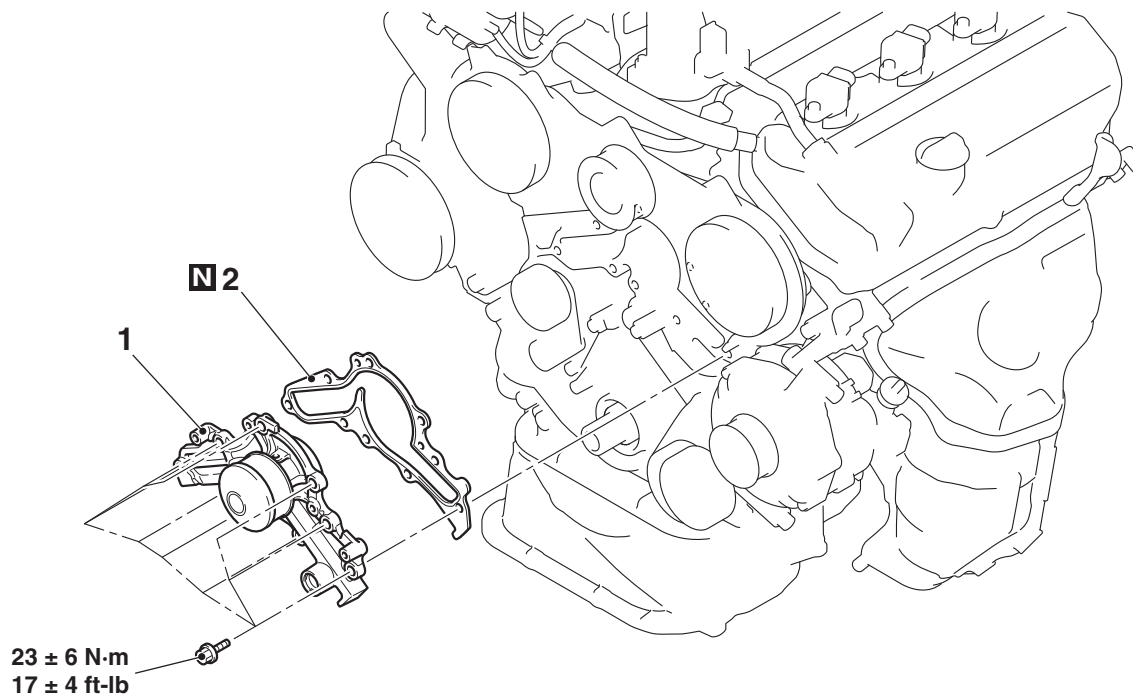
3. Water pump
4. Cooling water line gasket
5. Water pump gasket

REMOVAL AND INSTALLATION <3.0L ENGINE>

M1141002701888

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Refilling (Refer to [P.14-26](#)).
- Timing Belt Removal and Installation (Refer to GROUP 11C, Timing Belt [P.11C-55](#)).



AC703120AB

Removal steps

1. Water pump
2. Water pump gasket

WATER HOSE AND WATER PIPE

REMOVAL AND INSTALLATION <2.4L ENGINE>

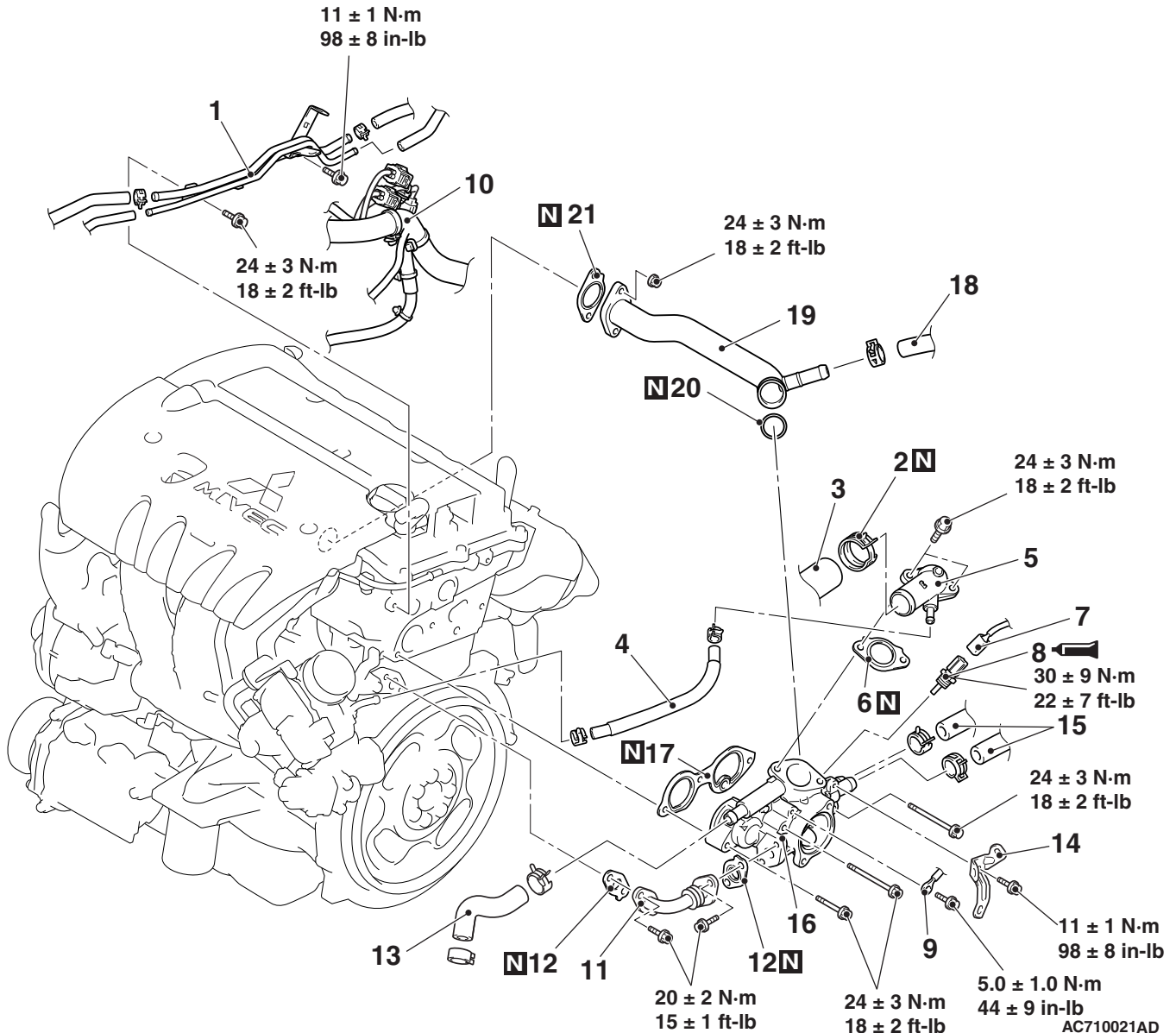
M1141003304042

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-26).
- Engine Upper Cover Removal (Refer to GROUP 11A, Camshaft P.11A-26).
- Air Cleaner Assembly Removal (Refer to GROUP 15, Air Cleaner P.15-4).
- Thermostat Removal (Refer to P.14-34).

Post-installation Operation

- Thermostat Installation (Refer to P.14-34).
- Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner P.15-4).
- Engine Upper Cover Installation (Refer to GROUP 11A, Camshaft P.11A-26).
- Engine Coolant Refilling (Refer to P.14-26).



Removal steps

- <<A>> >>C<<
<<A>> >>C<<
1. Vacuum pipe assembly
 2. Hose clip
 3. Radiator upper hose connection
 4. Throttle body water feed hose
 5. Water outlet fitting
 6. Water outlet fitting gasket
 7. Engine coolant temperature sensor connector connection

<> >>B<<

Removal steps (Continued)

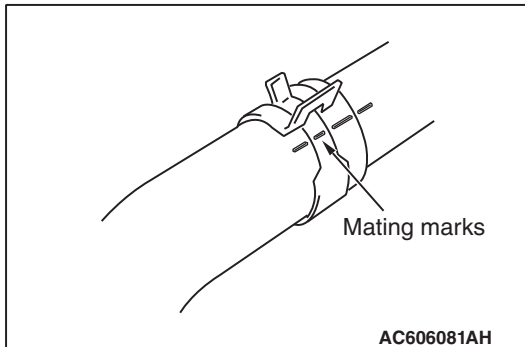
8. Engine coolant temperature sensor
9. Ground cable connection
10. Control wiring harness connection
11. EGR valve pipe
12. EGR pipe gasket
13. Water hose

Removal steps (Continued)

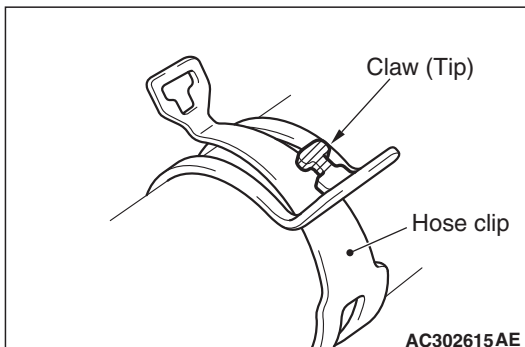
- 14. Wiring harness bracket
- 15. Heater hose connection
- 16. Thermostat case
- 17. Thermostat case gasket
- 18. Transmission fluid cooler hose connection
- 19. Water inlet pipe
- >>A<< 20. O-ring
- 21. Water pipe gasket

Required Special Tool:

- MB992042: Water Temperature Sensor Wrench

REMOVAL SERVICE POINTS**<<A>> HOSE CLIP/RADIATOR UPPER HOSE DIS-CONNECTION**

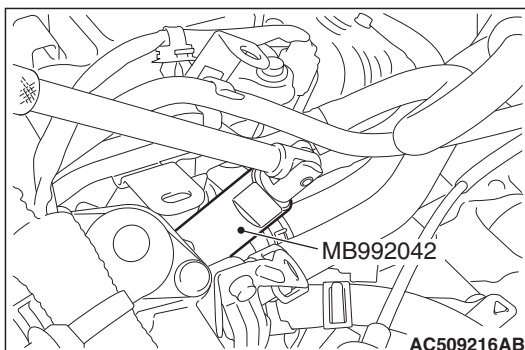
1. Make mating marks on the radiator hose and the hose clamp as shown to install them in the original position. Then, remove them.



2. Break off the tip of hose clip claw and spread out the hose clip.
NOTE: If there is a hose clip claw, the hose clip cannot spread to capacity because the claw contacts the hose clip.
3. Disconnect the radiator lower hose.

<> ENGINE COOLANT TEMPERATURE SENSOR REMOVAL

Use special tool MB992042 to remove the engine coolant temperature sensor.



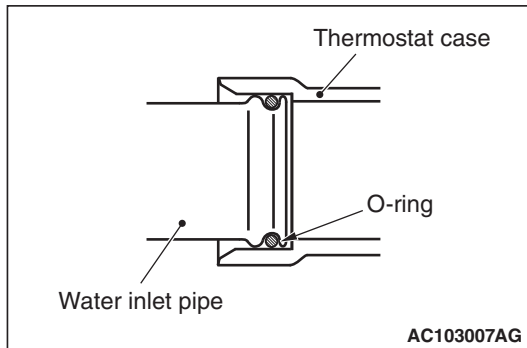
INSTALLATION SERVICE POINTS

>>A<< O-RING INSTALLATION

CAUTION

Avoid adhesion of engine oil or grease to the O-ring.

Fit the O-ring in the water inlet pipe groove, wet the O-ring circumference or the pipe mounting area inner wall, and then insert the O-ring.



>>B<< ENGINE COOLANT TEMPERATURE SENSOR INSTALLATION

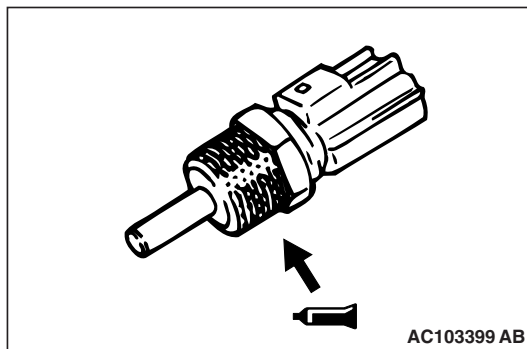
1. Apply the specified sealant to the thread of the engine coolant temperature sensor.

Specified Sealant: ThreeBond 1324N or equivalent

NOTE: Install the engine coolant temperature sensor immediately after applying sealant.

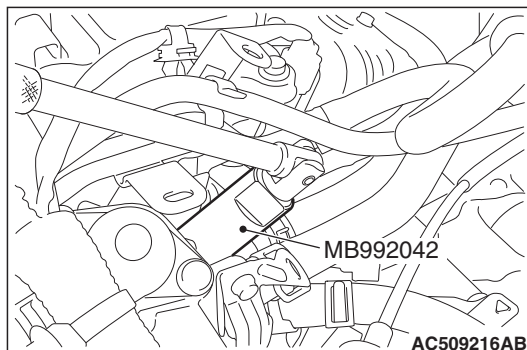
CAUTION

After the installation, until a sufficient period of time (one hour or more) elapses, do not apply the oil or water to the sealant application area or start the engine.



2. Use special tool MB992042 to tighten the engine coolant temperature sensor to the specified torque.

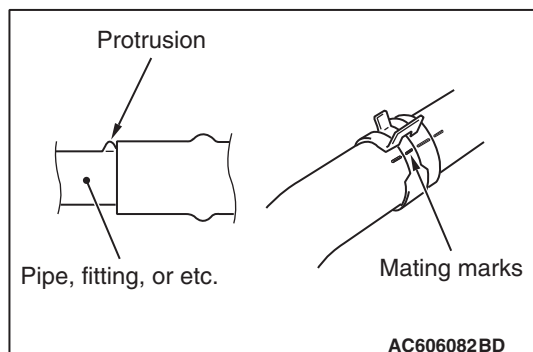
Tightening torque: 30 ± 9 N·m (22 ± 7 ft-lb)



>>C<< HOSE CLIP/RADIATOR UPPER HOSE
CONNECTION **CAUTION**

Never reuse the hose clip whose claw is broken off to prevent the rusting.

1. Make mating mark on a new hose clip in the same position as the remove one.
2. Insert the radiator hose until the protrusion of the water outlet fitting.
3. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.
4. Remove the hose clip claw to tighten the radiator hose.



REMOVAL AND INSTALLATION <3.0L ENGINE>

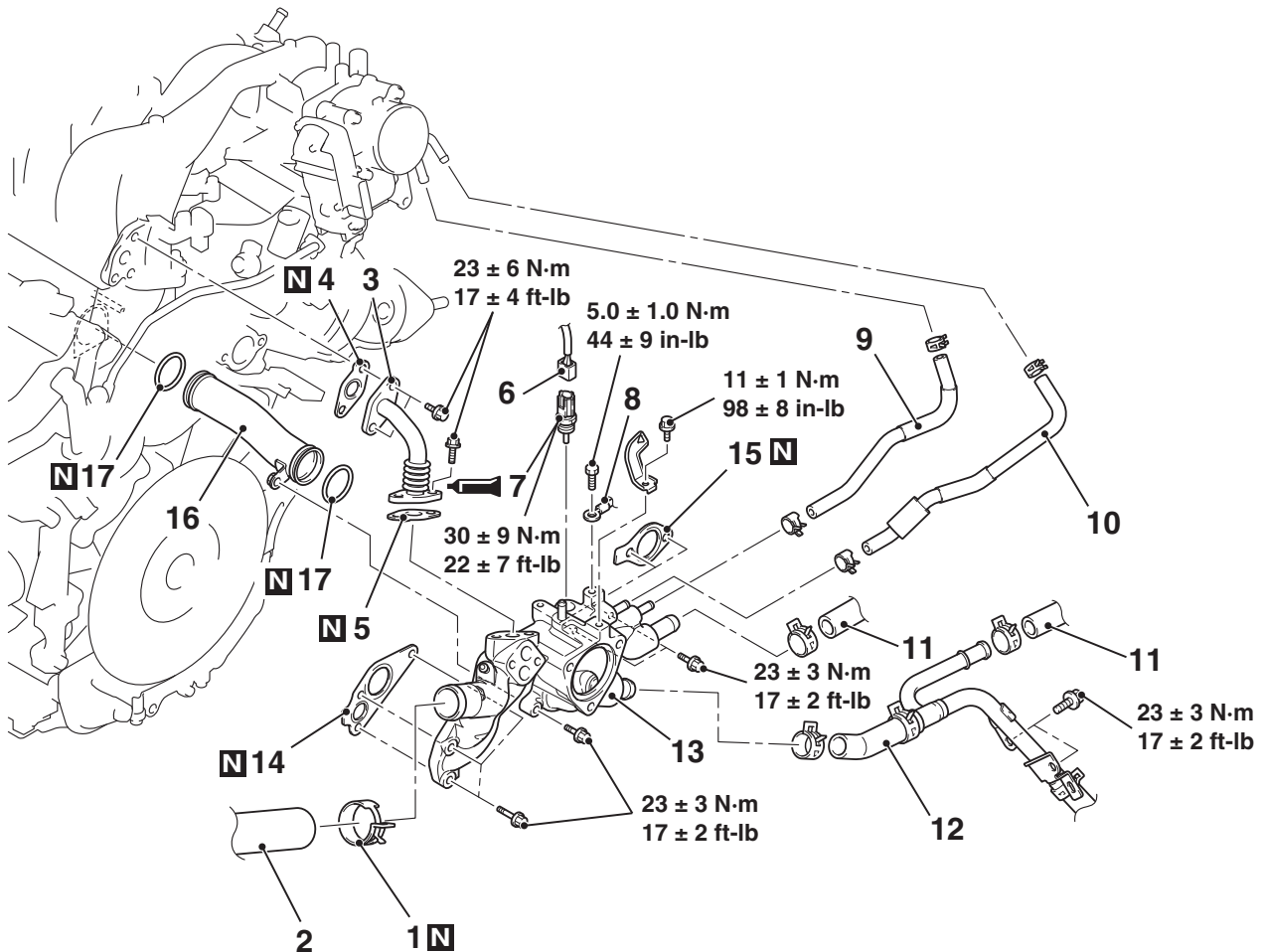
M1141003304053

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-26).
- Air Cleaner Assembly Removal (Refer to GROUP 15, Air Cleaner P.15-5).
- Battery and Battery Tray Removal (Refer to GROUP 54A, Battery P.54A-11).
- Thermostat Removal (Refer to P.14-36).

Post-installation Operation

- Thermostat Installation (Refer to P.14-36).
- Battery and Battery Tray Installation (Refer to GROUP 54A, Battery P.54A-11).
- Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner P.15-5).
- Engine Coolant Refilling (Refer to P.14-26).



AC809031AD

Removal steps

- EGR valve (Refer to GROUP 17, Emission Control – EGR Valve P.17-86)

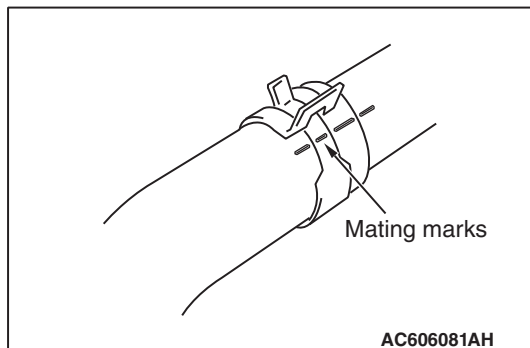
- <<A>> >>D<< 1. Hose clip
- <<A>> >>D<< 2. Radiator upper hose connection
3. EGR valve pipe
4. EGR valve pipe gasket
5. EGR valve pipe gasket
6. Engine coolant temperature sensor connector
- <> >>C<< 7. Engine coolant temperature sensor
8. Ground cable connection

Removal steps (Continued)

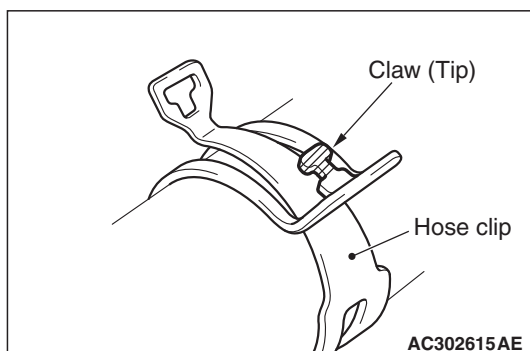
9. Water hose
10. Water hose
11. Heater hose connection
12. A/T fluid cooler water return hose and pipe assembly connection
- Oil pipe clamp bolt (Refer to GROUP 11C, Cylinder Head Gasket P.11C-51)
- <<C>> >>B<< 13. Thermostat housing
- >>B<< 14. Thermostat housing gasket
- >>B<< 15. Thermostat housing gasket
- >>A<< 16. Water inlet pipe
- >>A<< 17. O-ring

Required Special Tools:

- MB992042: Water Temperature Sensor Wrench
- MD998412: Guide

REMOVAL SERVICE POINTS**<<A>> HOSE CLIP/RADIATOR UPPER HOSE DIS-CONNECTION**

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



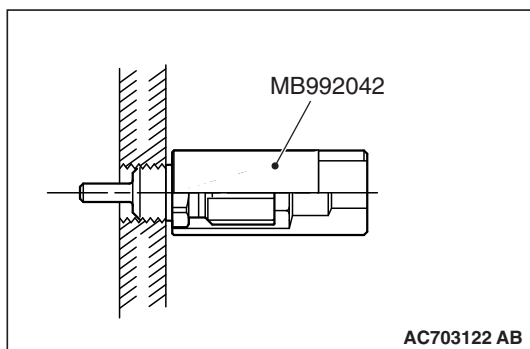
2. Break off the tip of hose clip claw and spread out the hose clip.

NOTE: If there is a hose clip claw, the hose clip cannot spread to capacity because the claw contacts the hose clip.

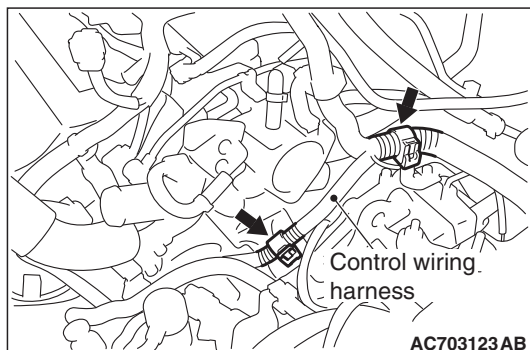
3. Disconnect the radiator upper hose.

<> ENGINE COOLANT TEMPERATURE SENSOR REMOVAL

Use special tool MB992042 to remove the engine coolant temperature sensor.

**<<C>> THERMOSTAT HOUSING REMOVAL**

Remove the two control wiring harness clamps, and remove the thermostat housing.



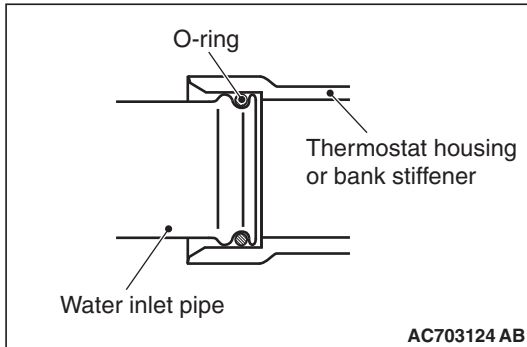
INSTALLATION SERVICE POINTS

>>A<< O-RING INSTALLATION

CAUTION

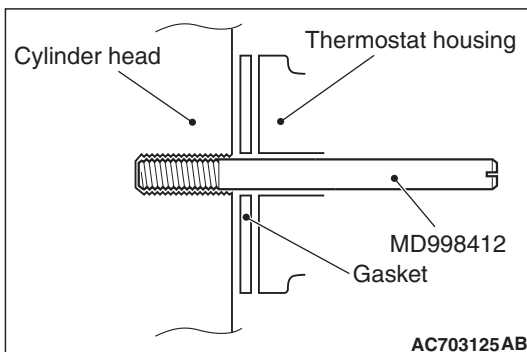
Do not allow engine oil or other grease to adhere to the O-ring

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



>>B<< GASKET/THERMOSTAT HOUSING INSTALLATION

Using the special tool MD998412, install the thermostat housing while supporting the gasket.

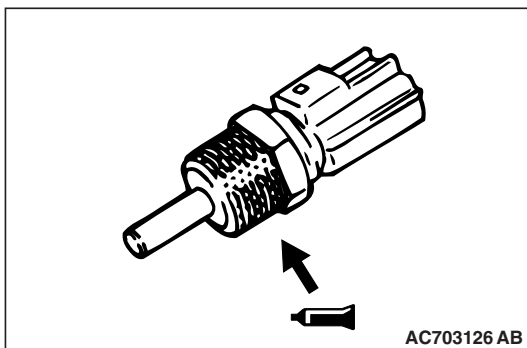


>>C<< ENGINE COOLANT TEMPERATURE SENSOR INSTALLATION

1. Apply the specified sealant to the thread of the engine coolant temperature sensor.

Specified Sealant: ThreeBond 1324N or equivalent

NOTE: Install the engine coolant temperature sensor immediately after applying sealant.

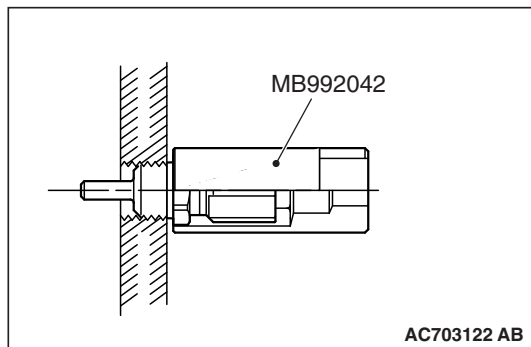


⚠ CAUTION

After the installation, until a sufficient period of time (one hour or more) elapses, do not apply the oil or water to the sealant application area or start the engine.

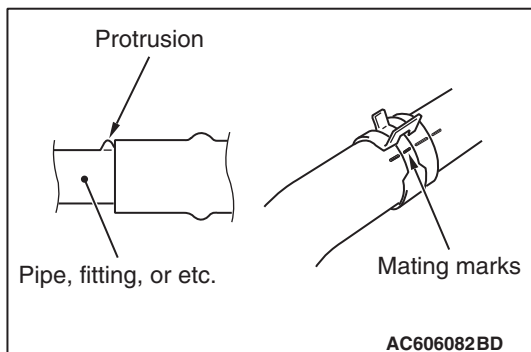
2. Use special tool MB992042 to tighten the engine coolant temperature sensor to the specified torque.

Tightening torque: 30 ± 9 N·m (22 ± 7 ft-lb)

**>>D<< HOSE CLIP/RADIATOR UPPER HOSE INSTALLATION****⚠ CAUTION**

Never reuse the hose clip whose claw is broken off to prevent the rusting.

1. Make mating mark on a new hose clip in the same position as the remove one.
2. Insert the radiator hose until the protrusion of the thermostat housing.
3. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.
4. Remove the hose clip claw to tighten the radiator hose.

**INSPECTION**

M1141003400627

Water Pipe and Hose Check

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

RADIATOR

REMOVAL AND INSTALLATION <2.4L ENGINE>

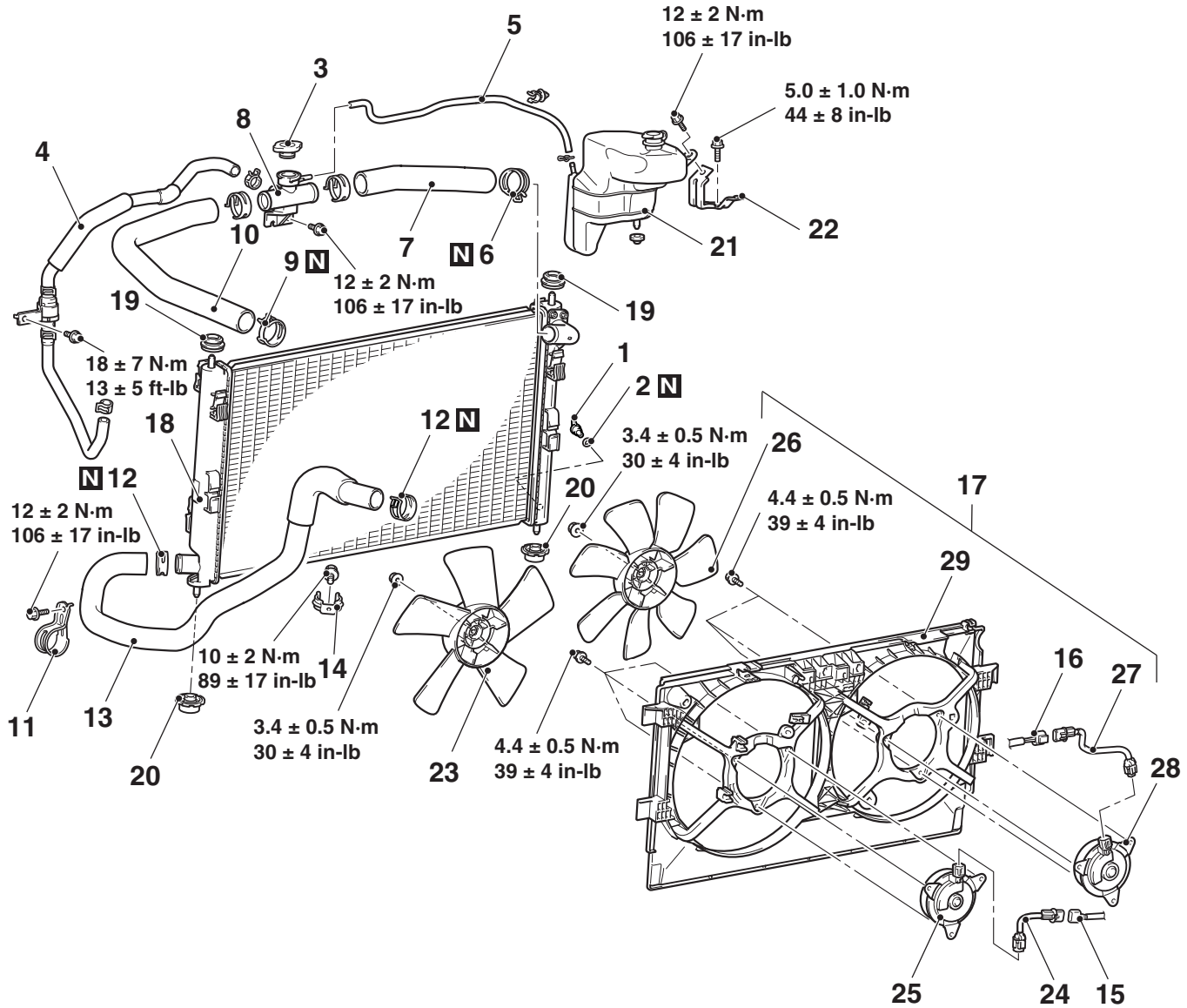
M1141001502895

Pre-removal operation

- Engine coolant Draining (Refer to [P.14-26](#)).
- Air Cleaner Assembly Removal (Refer to GROUP 15, Air Cleaner [P.15-4](#)).

Post-installation operation

- Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner [P.15-4](#)).
- Engine Coolant Refilling and Check (Refer to [P.14-26](#)).



AC901422 AB

Radiator removal steps

- Engine room under cover front (Refer to GROUP 51 – Under Cover [P.51-22](#)).
1. Radiator drain plug
 2. O-ring
 3. Radiator cap
 4. CVT fluid cooler feed hose assembly
 5. Radiator condenser tank hose
 6. Hose clip
 7. Radiator upper hose

Radiator removal steps

8. Radiator cap assembly
9. Hose clip
10. Radiator upper hose
11. Radiator hose clamp
12. Hose clip
13. Radiator lower hose
14. Radiator hose support
15. Radiator fan motor connector
16. Condenser fan motor connector
17. Fan, fan motor and fan shroud assembly

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

TSB Revision

Radiator removal steps

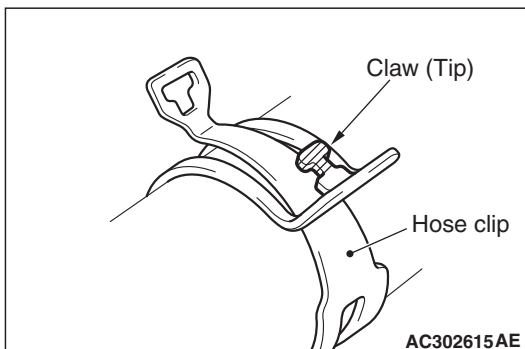
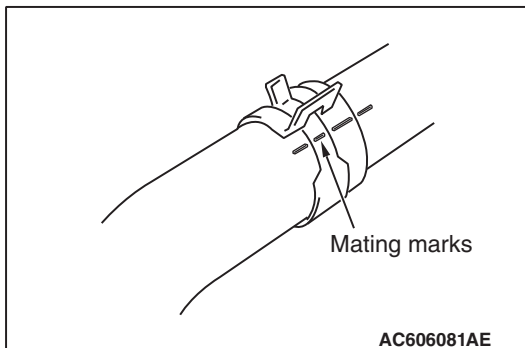
- Headlight support upper panel
(Refer to GROUP 42A – Loose
Panel [P.42A-222](#)).
- 18. Radiator assembly
- 19. Support upper insulator
- 20. Support lower insulator
- 21. Radiator condenser tank
- 22. Radiator condenser tank bracket

Fan shroud removal steps

- 4. CVT fluid cooler feed hose
assembly
- 5. Radiator condenser tank hose
- <<A>> >>A<< 6. Hose clip
- <<A>> >>A<< 7. Radiator upper hose
- 8. Radiator cap assembly
- 15. Radiator fan motor connector
- 16. Condenser fan motor connector
- 17. Fan, fan motor and fan shroud
assembly
- 23. Radiator fan
- 24. Radiator fan motor harness
- 25. Radiator fan motor
- 26. Condenser fan
- 27. Condenser fan motor harness
- 28. Condenser fan motor
- 29. Fan shroud

REMOVAL SERVICE POINT**<<A>> HOSE CLIP/RADIATOR HOSE REMOVAL**

1. Make mating marks on the radiator hose and the hose clip as shown to install them in the original position.



2. Break off the tip of hose clip claw and spread out the hose clip, then disconnect the radiator hose.

NOTE: If there is a hose clip claw, the hose clip cannot spread to capacity because the claw contacts the hose clip.

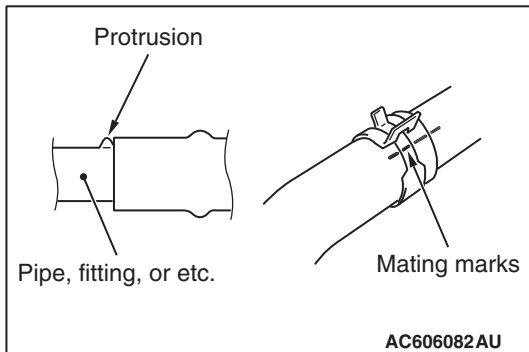
INSTALLATION SERVICE POINT

>>A<< RADIATOR HOSE/HOSE CLIP INSTALLATION

⚠ CAUTION

Never reuse the hose clip whose claw is broken off to prevent the rusting.

1. Make mating mark on a new hose clip in the same position as the remove one.
2. Insert the radiator hose until the protrusion of the pipe.
3. Align the mating marks on the radiator hose and hose clip.
4. Remove the hose clip claw and shorten the hose clip, then install the radiator hose.



REMOVAL AND INSTALLATION <3.0L ENGINE>

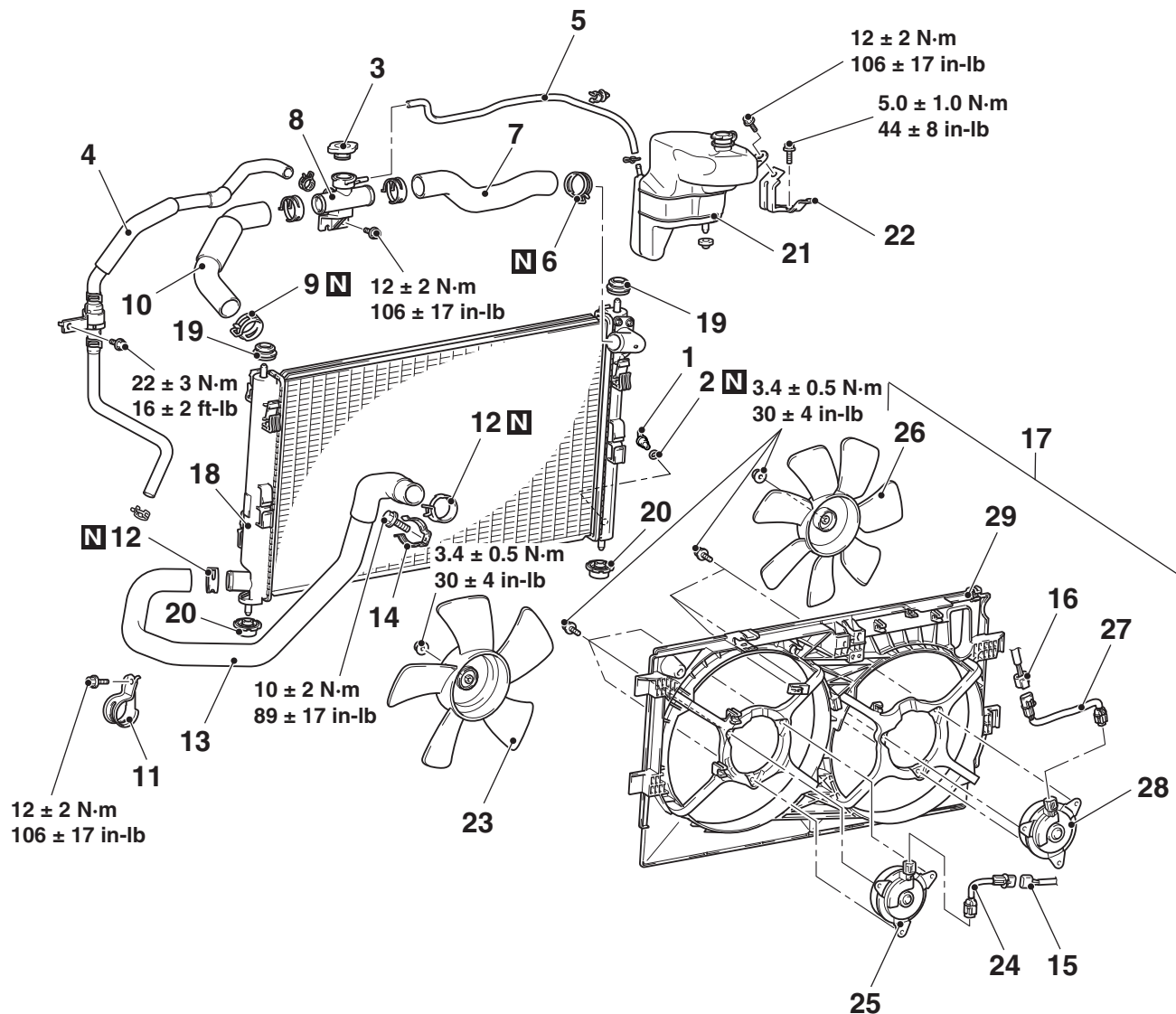
M1141001502903

Pre-removal operation

- Engine coolant Draining (Refer to [P.14-26](#)).
- Air Cleaner Assembly Removal (Refer to GROUP 15, Air Cleaner [P.15-5](#)).

Post-installation operation

- Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner [P.15-5](#)).
- Engine Coolant Refilling and Check (Refer to [P.14-26](#)).



AC808978 AB

Radiator removal steps

- Engine room under cover front (Refer to GROUP 51 – Under Cover [P.51-22](#)).
1. Radiator drain plug
 2. O-ring
 3. Radiator cap
 4. A/T fluid cooler feed hose assembly
 5. Radiator condenser tank hose
 6. Hose clip
 7. Radiator upper hose
 8. Radiator cap assembly
 9. Hose clip
 10. Radiator upper hose
 11. Radiator hose clamp

Radiator removal steps

12. Hose clip
13. Radiator lower hose
14. Radiator hose support
15. Radiator fan motor connector
16. Condenser fan motor connector
17. Fan, fan motor and fan shroud assembly
- Headlight support upper panel (Refer to GROUP 42A – Loose Panel [P.42A-222](#)).
18. Radiator assembly
19. Support upper insulator
20. Support lower insulator

Radiator removal steps

21. Radiator condenser tank
22. Radiator condenser tank bracket

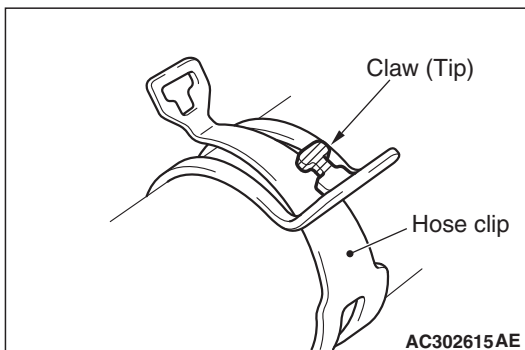
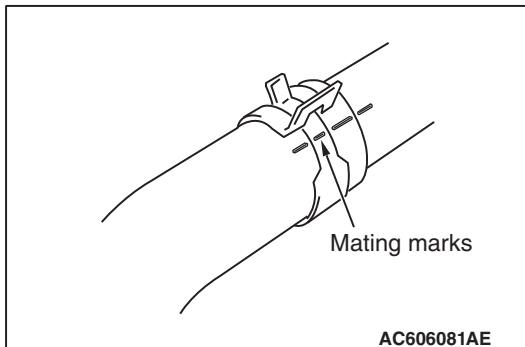
Fan shroud removal steps

5. Radiator condenser tank hose
- <<A>> >>A<< 6. Hose clip
- <<A>> >>A<< 7. Radiator upper hose
8. Radiator cap assembly
15. Radiator fan motor connector
16. Condenser fan motor connector
17. Fan, fan motor and fan shroud assembly
23. Radiator fan
24. Radiator fan motor harness
25. Radiator fan motor
26. Condenser fan
27. Condenser fan motor harness
28. Condenser fan motor
29. Fan shroud

REMOVAL SERVICE POINT

<<A>> HOSE CLIP/RADIATOR HOSE REMOVAL

1. Make mating marks on the radiator hose and the hose clip as shown to install them in the original position.



2. Break off the tip of hose clip claw and spread out the hose clip, then disconnect the radiator hose.

NOTE: If there is a hose clip claw, the hose clip cannot spread to capacity because the claw contacts the hose clip.

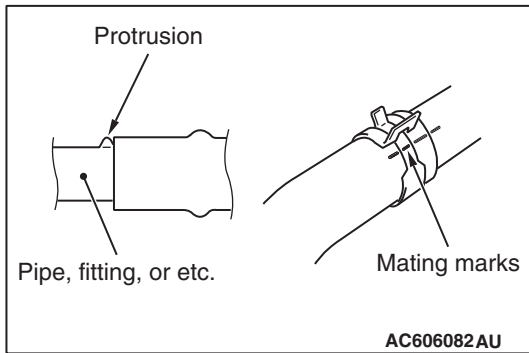
INSTALLATION SERVICE POINT

>>A<< RADIATOR HOSE/HOSE CLIP INSTALLATION

⚠ CAUTION

Never reuse the hose clip whose claw is broken off to prevent the rusting.

1. Make mating mark on a new hose clip in the same position as the remove one.



2. Insert the radiator hose until the protrusion of the pipe.
3. Align the mating marks on the radiator hose and hose clip.
4. Remove the hose clip claw and shorten the hose clip, then install the radiator hose.