

GROUP 14

ENGINE COOLING

CONTENTS

GENERAL INFORMATION	14-2	COOLING FAN MOTOR CHECK <2.0L ENGINE>	14-31
SERVICE SPECIFICATIONS	14-3	COOLING FAN MOTOR CHECK <2.4L ENGINE>	14-32
COOLANT	14-3	THERMOSTAT	14-34
SEALANT	14-4	REMOVAL AND INSTALLATION <2.0L ENGINE>	14-34
ENGINE COOLING DIAGNOSIS	14-4	REMOVAL AND INSTALLATION <2.4L ENGINE>	14-36
INTRODUCTION	14-4	INSPECTION	14-38
TROUBLESHOOTING STRATEGY	14-4	WATER PUMP	14-39
SYMPTOM CHART	14-4	REMOVAL AND INSTALLATION <2.0L ENGINE>	14-39
SYMPTOM PROCEDURES	14-5	REMOVAL AND INSTALLATION <2.4L ENGINE>	14-40
SPECIAL TOOLS	14-22	WATER HOSE AND WATER PIPE ..	14-41
ON-VEHICLE SERVICE	14-24	REMOVAL AND INSTALLATION <2.0L ENGINE>	14-41
ENGINE COOLANT LEAK CHECK	14-24	REMOVAL AND INSTALLATION <2.4L ENGINE>	14-46
RADIATOR CAP OPENING PRESSURE CHECK	14-24	INSPECTION	14-49
ENGINE COOLANT CHANGE <2.0L ENGINE>	14-24	RADIATOR	14-50
ENGINE COOLANT CHANGE <2.4L ENGINE>	14-26	REMOVAL AND INSTALLATION <2.0L ENGINE>	14-50
WATER PUMP COOLANT LEAK CHECK .	14-27	REMOVAL AND INSTALLATION <2.4L ENGINE>	14-53
ENGINE COOLANT CONCENTRATION TEST	14-28		
COOLING FAN RELAY CONTINUITY CHECK <2.0L ENGINE>	14-28		
COOLING FAN RELAY CONTINUITY CHECK <2.4L ENGINE>	14-30		

GENERAL INFORMATION

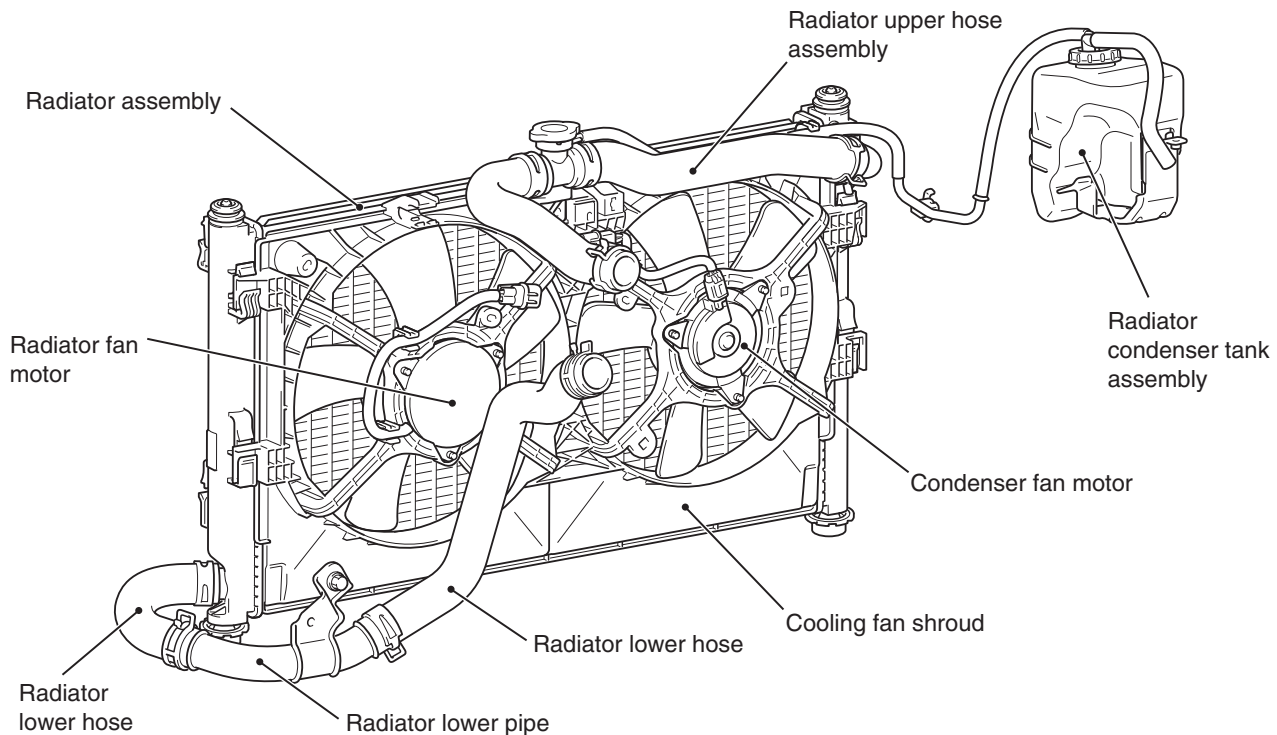
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The cooling system is designed to keep every part of the engine at appropriate temperature in whatever condition the engine may be operated. The cooling method is of the water-cooled, pressure forced circulation type in which the water pump pressurizes coolant and circulates it throughout the engine. If the coolant temperature exceeds the prescribed temper-

ature, the thermostat opens to circulate the coolant through the radiator as well so that the heat absorbed by the coolant may be radiated into the air. The water pump is of the centrifugal impeller type and is driven by the drive belt from the crankshaft. The radiator is the corrugated fin, cross flow type.

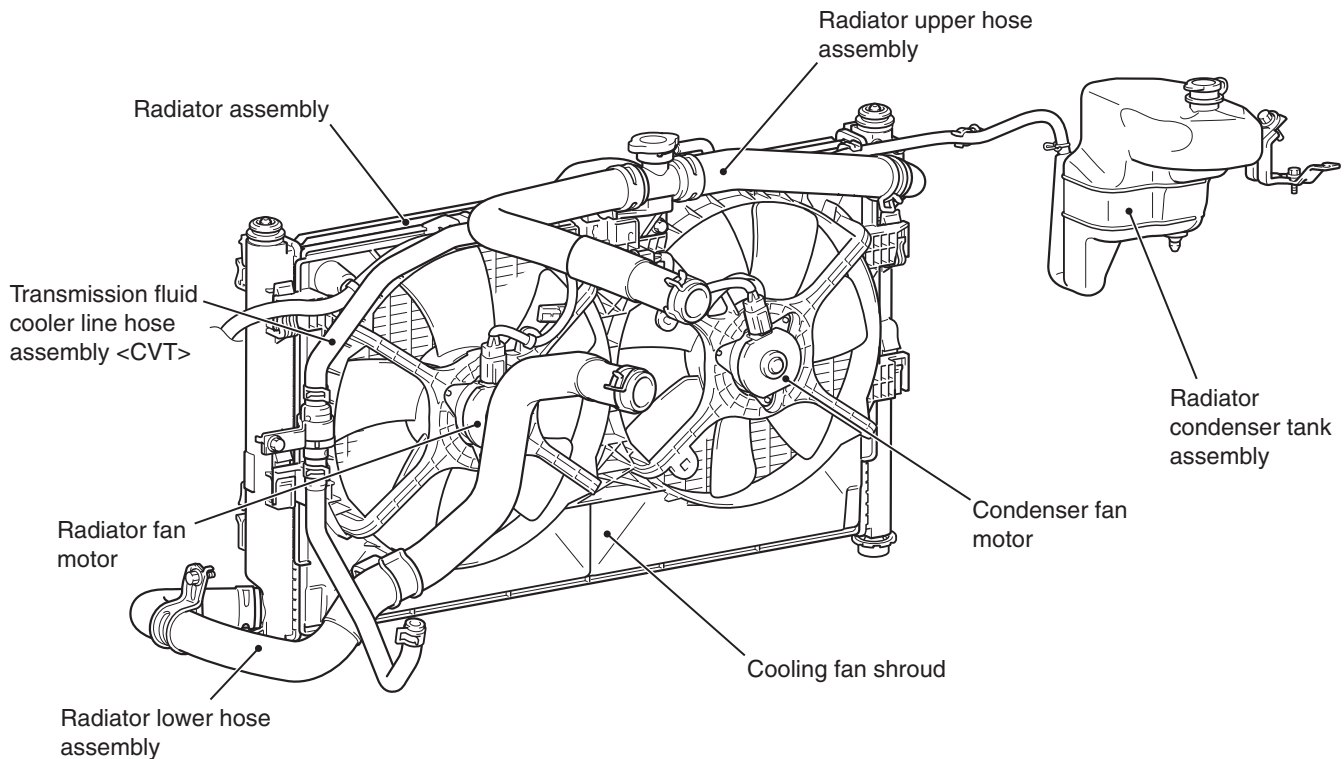
CONSTRUCTION DIAGRAM

<2.0L ENGINE>



AC705530AE

<2.4L ENGINE>



AC801857AC

SERVICE SPECIFICATIONS

M1141000301549

Item		Standard value	Limit
Valve opening pressure of radiator cap kPa (psi)		93 –123 (14 –18)	Minimum 83 (12)
Thermostat	Valve opening temperature °C (°F)	2.0L ENGINE	76.5 ± 1.5 (170 ± 3)
		2.4L ENGINE	82 ± 1.5 (180 ± 3)
	Full-opening temperature °C (°F)	2.0L ENGINE	90 (194)
		2.4L ENGINE	95 (203)
Valve lift mm (in)		8.5 (0.33) or more	–

COOLANT

M1141000401416

Item	Recommended antifreeze	Quantity dm ³ (qt)
Engine coolant [includes 0.65 dm ³ (0.63 qt) in the radiator condenser tank]	Long life antifreeze coolant or an equivalent	2.0L ENGINE
		2.4L ENGINE

SEALANT

M114100501394

Item	Specified sealant
Engine coolant temperature sensor	Three bond 1324N, LOCTITE 262 or equivalent

ENGINE COOLING DIAGNOSIS**INTRODUCTION**

M1141005300444

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, radiator fan, condenser fan. Possible faults include low coolant, contamination, belt loosening and component damage.

TROUBLESHOOTING STRATEGY

M1141005200436

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

M1141005600810

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 <2.0L ENGINE>	3	P.14-7
Radiator fan and condenser fan do not operate <2.4L 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

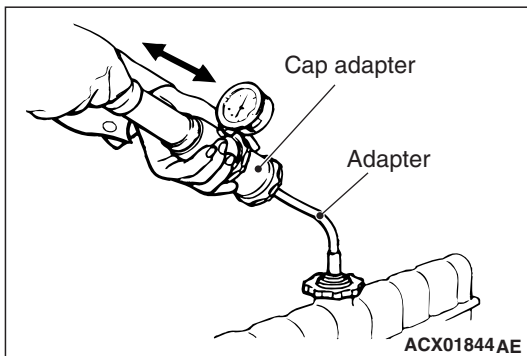
- Be sure to completely clean away any moisture from the places checked.
- When the tester is removed, be careful not to spill any coolant.
- When installing and removing the tester and when testing, be careful not to deform the filler neck of the radiator.

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: It 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.14-24](#) <2.0L ENGINE> or [P.14-26](#) <2.4L ENGINE>. Then go to Step 5.

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.

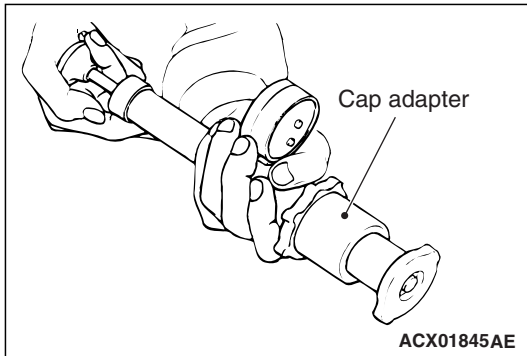
Minimum limit: 83 kPa (12 psi)

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 11A, On-vehicle Service –Drive Belt Tension Check [P.11A-9](#). <2.0L ENGINE>
- Refer to GROUP 11C, On-vehicle Service –Drive Belt Tension Check [P.11C-8](#). <2.4L ENGINE>

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.

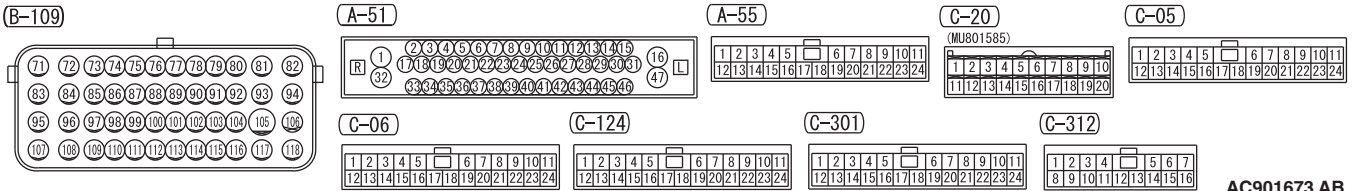
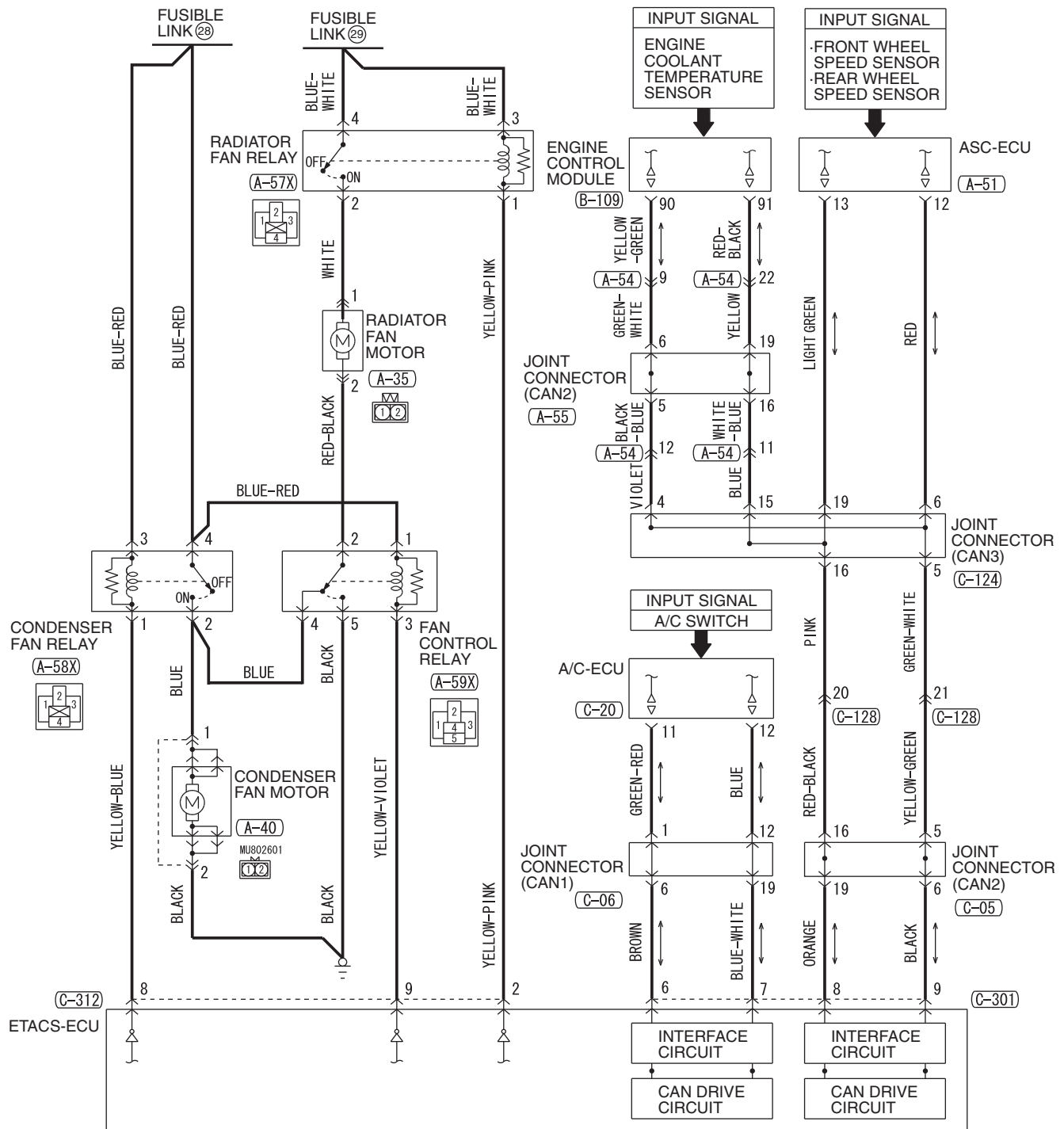
Q: Is the engine coolant temperature abnormally high?

YES : Return to Step 2.

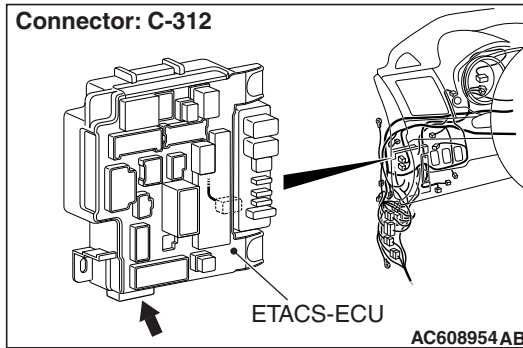
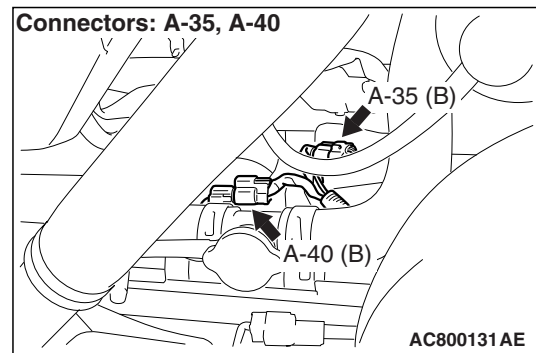
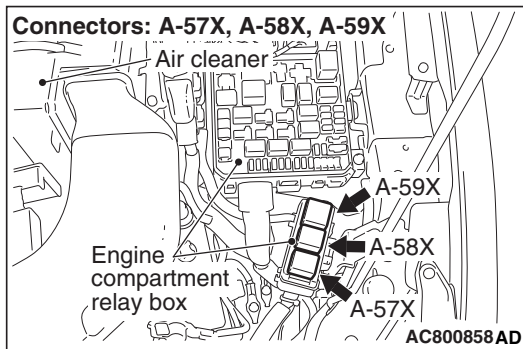
NO : The procedure is complete.

Inspection Procedure 3: Radiator Fan and Condenser Fan do not Operate <2.0L ENGINE>

Radiator Fan and Condenser Fan Drive Circuit



AC901673 AB



CIRCUIT OPERATION

- The engine control module (ECM) transmits the rotation signals of radiator fan and condenser fan, based on the engine coolant temperature signal from the engine coolant temperature sensor, the vehicle speed signal from the ASC-ECU, and the A/C switch signal from the A/C-ECU using the CAN bus line.
- The rotation signals of radiator fan and condenser fan, using the CAN bus line from ECM, turn ON/OFF of the radiator fan relay, condenser fan relay, and fan control relay via ETACS-ECU, to control the radiator fan and condenser fan rotation.

TECHNICAL DESCRIPTION

- When the radiator fan and condenser fan do not operate, the wiring harness/connector, fan motor, relay, and ETACS-ECU may have a failure.

- The radiator fan and condenser fan do not operate also when the CAN bus line, MFI system, or ETACS system have a failure.

TROUBLESHOOTING HINTS

- Malfunction of CAN bus line.
- Damaged wiring harness or connector.
- Malfunction of MFI system.
- Malfunction of ASC system.
- Malfunction of the A/C system.
- Malfunction of ETACS system.
- Malfunction of fusible link number 28.
- Malfunction of fusible link number 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 ETACS-ECU.
- Malfunction of ECM.

DIAGNOSIS 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 diagnostic trouble code (DTC) may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis [P.54C-9.](#))

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

Use scan tool to diagnose the CAN bus line (Refer to GROUP 54C, Explanation About The Scan Tool Can Bus Diagnostics [P.54C-9.](#))

Q: Is the diagnostic trouble code set?

YES : Go to Step 2.

NO : Repair the CAN bus line (Refer to GROUP 54C, Diagnosis –Can Bus Diagnostic Table [P.54C-16.](#))
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-10.](#))

- Item 14: Cooling fan
(Refer to GROUP 13A, MFI Diagnosis –Actuator Test Reference Table [P.13A-843.](#))

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-10.](#))

Q: Is any DTC set?

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

NO : Go to Step 4.

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

Using scan tool to read the ASC system DTC (Refer to GROUP 35C, Diagnosis –Diagnostic Function [P.35C-11.](#))

Q: Is any DTC set?

YES : Repair the ASC system (Refer to GROUP 35C, Diagnosis –Diagnostic Trouble Code Chart [P.35C-27.](#)) 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 55, Auto A/C Diagnosis –Diagnostic Function [P.55-6.](#))

Q: Is any DTC set?

YES : Repair the A/C system (Refer to GROUP 55, Auto A/C Diagnosis –Diagnostic Trouble Code Chart [P.55-9.](#)) 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 –Diagnostic Function [P.54A-671.](#))

Q: Is any DTC set?

YES : Repair the ETACS system (Refer to GROUP 54A, ETACS, Troubleshooting –Diagnostic Trouble Code Chart [P.54A-674.](#)) 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 front wiring 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, between ETACS-ECU connector C-312 terminal number 8 and body ground, and between ETACS-ECU connector C-312 terminal number 9 and body ground.

OK: Battery positive voltage

Q: Is the check result normal?

YES : Go to Step 13.

NO : Go to Step 8.

STEP 8. Check the radiator fan relay connector A-57X, condenser fan relay connector A-58X, fan control relay connector A-59X, 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: Is the connectors and terminals in good condition?

YES : Go to Step 9.

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

STEP 9. Check the harness wire between fusible link number 28 and condenser fan relay connector A-58X terminal number 3, between fusible link number 28 and condenser fan relay connector A-58X terminal number 4, between condenser fan relay connector A-58X terminal number 4 and fan control relay connector A-59X terminal number 1, and between fusible link number 29 and radiator fan relay connector A-57X terminal number 3, for damage.

- Check harness wire for open/short circuit and damage.

Q: Is 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-57X terminal number 1 and ETACS-ECU connector C-312 terminal number 2, between condenser fan relay connector A-58X terminal number 1 and ETACS-ECU connector C-312 terminal number 8, and between fan control relay connector A-59X terminal number 3 and ETACS-ECU connector C-312 terminal number 9, for damage.

- Check harness wire for open/short circuit and damage.

Q: Is 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, condenser fan relay, and fan control relay.

Refer to [P.14-28](#).

Q: Is the relay 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: Is the fusible link 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-57X, condenser fan relay connector A-58X, fan control relay connector A-59X, radiator fan motor connector A-35, and condenser fan motor connector A-40, for loose, corroded or damaged terminals, or terminals pushed back in the connector.

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

Q: Is the connectors and terminals in good condition?

YES : Go to Step 14.

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

STEP 14. Check the harness wire between fusible link number 28 and condenser fan relay connector A-58X terminal number 4, and between fusible link number 29 and radiator fan relay connector A-57X terminal number 4, for damage.

- Check harness wire for open/short circuit and damage.

Q: Is 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-57X terminal number 2 and radiator fan motor connector A-35 terminal number 1, and between condenser fan relay connector A-58X terminal number 2 and condenser fan motor connector A-40 terminal number 1, for damage.

- Check harness wire for open/short circuit and damage.

Q: Is 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-35 terminal number 2 and fan control relay connector A-59X terminal number 2, and between condenser fan motor connector A-40 terminal number 2 and body ground, for damage.

- Check harness wire for open/short circuit and damage.

Q: Is 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-59X terminal number 4 and condenser fan relay connector A-58X terminal number 2, and between fan control relay connector A-59X terminal number 5 and body ground, for damage.

- Check harness wire for open/short circuit and damage.

Q: Is 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, condenser fan relay, and fan control relay.

Refer to [P.14-28](#).

Q: Is the relay 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 condenser fan motor.

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

Q: Is the fan motor in good condition?

YES : Go to Step 20.

NO : Replace the damaged fan motor (Refer to [P.14-50](#).) 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-671](#).)

Q: Is any DTC set?

YES : Replace the ETACS-ECU (Refer to GROUP 54A, ETACS –ETACS-ECU [P.54A-769](#).) 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-10.](#))

- Item 14: Cooling fan
(Refer to GROUP 13A, MFI Diagnosis –Actuator Test Reference Table [P.13A-843.](#))

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-895.](#)] When the ECM is replaced, register the encrypted code (Refer to GROUP 42C, Diagnosis –ID Code Registration Judgment Table [P.42C-10.](#)) Then go to Step 23.

STEP 22. Check the symptoms.**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.00-13.](#))

NO : Replace the ECM [Refer to GROUP 13A, Engine Control Module (ECM) [P.13A-895.](#)] When the ECM is replaced, register the encrypted code (Refer to GROUP 42C, Diagnosis –ID Code Registration Judgment Table [P.42C-10.](#)) Then go to Step 23.

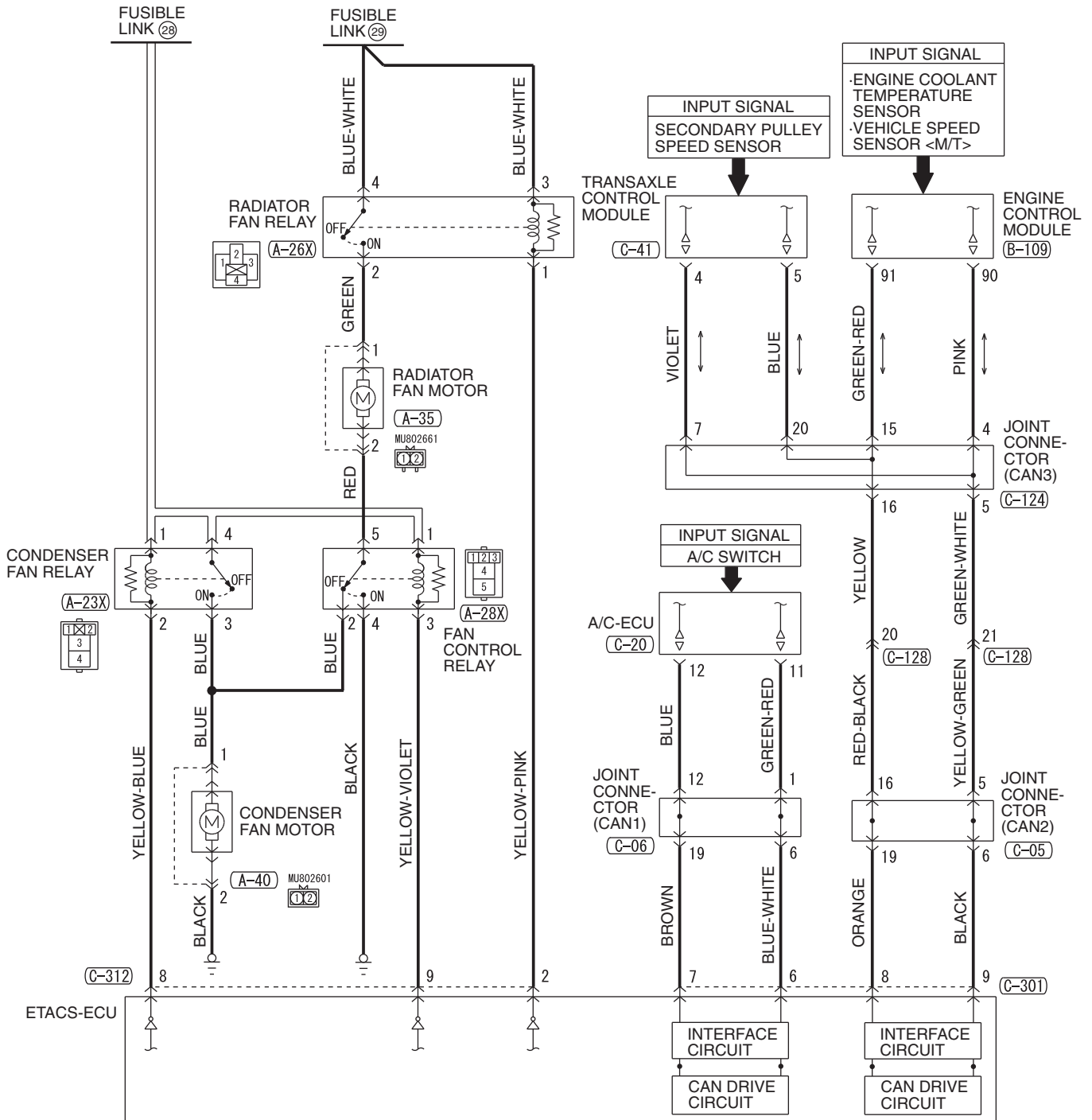
STEP 23. Check the symptoms.**Q: Does the radiator fan and condenser fan operate normal?**

YES : The procedure is complete.

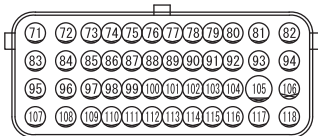
NO : Return to Step 1.

Inspection Procedure 4: Radiator Fan and Condenser Fan do not Operate <2.4L ENGINE>

Radiator Fan and Condenser Fan Drive Circuit



(B-109)



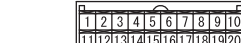
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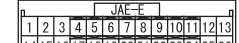
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(C-20)



(C-41)



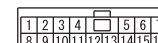
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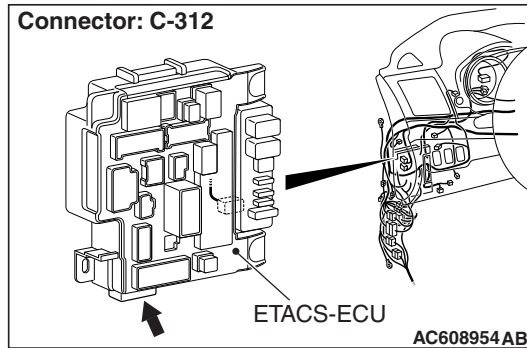
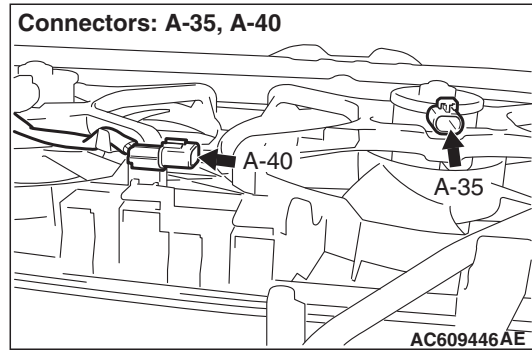
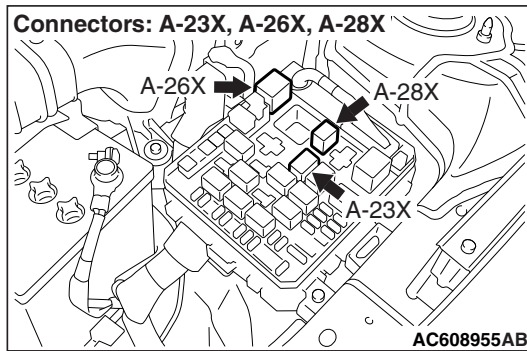


(C-301)



(C-312)





CIRCUIT OPERATION

- The engine control module (ECM) transmits the rotation signals of radiator fan and condenser fan, based on the engine coolant temperature signal from the engine coolant temperature sensor, the vehicle speed signal from the vehicle speed sensor <M/T> or the secondary pulley speed sensor from the transaxle control module (TCM) <CVT>, and the A/C switch signal from the A/C-ECU using the CAN bus line.
- The rotation signals of radiator fan and condenser fan, using the CAN bus line from ECM, turn ON/OFF of the radiator fan relay, condenser fan relay, and fan control relay via ETACS-ECU, to control the radiator fan and condenser fan rotation.

TECHNICAL DESCRIPTION

- When the radiator fan and condenser fan do not operate, the wiring harness/connector, fan motor, relay, and ETACS-ECU may have a failure.
- The radiator fan and condenser fan do not operate also when the CAN bus line, MFI system, or ETACS system have a failure.

TROUBLESHOOTING HINTS

- Malfunction of CAN bus system.
- Damaged wiring harness or connector.
- Malfunction of the MFI system.
- Malfunction of CVT system <CVT.>
- Malfunction of the A/C system.
- Malfunction of ETACS system.
- Malfunction of fusible link number 28.
- Malfunction of fusible link number 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 ETACS-ECU.
- Malfunction of ECM.

DIAGNOSIS 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 diagnostic trouble code (DTC) may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis [P.54C-9.](#))

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

Use scan tool to diagnose the CAN bus line (Refer to GROUP 54C, Explanation About The Scan Tool Can Bus Diagnostics [P.54C-9.](#))

Q: Is the check result satisfactory?

YES : Go to Step 2.

NO : Repair the CAN bus lines (Refer to GROUP 54C, Diagnosis –Can Bus Diagnostic Table [P.54C-16.](#))
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-12.](#))

- Item 14: Cooling fan
(Refer to GROUP 13B, MFI Diagnosis –Actuator Test Reference Table [P.13B-969.](#))

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-12.](#))

Q: Is any DTC set?

YES : Repair the MFI system (Refer to GROUP 13B, MFI Diagnosis –Diagnostic Trouble Code Chart [P.13B-51.](#)) Then go to Step 23.

NO : Go to Step 5 <M/T.>

NO : Go to Step 4 <CVT.>

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

Using scan tool to read the CVT system DTC (Refer to GROUP 23A, Diagnosis –Diagnostic Function [P.23A-13.](#))

Q: Is any DTC set?

YES : Repair the CVT system (Refer to GROUP 23A, Diagnosis –Diagnostic Trouble Code Chart [P.23A-26.](#)) 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 55, Auto A/C Diagnosis –Diagnostic Function [P.55-6](#).)

Q: Is any DTC set?

YES : Repair the A/C system (Refer to GROUP 55, Auto A/C Diagnosis –Diagnostic Trouble Code Chart [P.55-9](#).) 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 –Diagnostic Function [P.54A-671](#).)

Q: Is any DTC set?

YES : Repair the ETACS system (Refer to GROUP 54A, ETACS, Troubleshooting –Diagnosis Code Chart [P.54A-674](#).) 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 front wiring 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, between ETACS-ECU connector C-312 terminal number 8 and body ground, and between ETACS-ECU connector C-312 terminal number 9 and body ground.

OK: Battery positive voltage**Q: Is the check result normal?**

YES : Go to Step 13.

NO : Go to Step 8.

STEP 8. Check the condenser fan relay connector A-23X, radiator fan relay connector A-26X, fan control relay connector A-28X, 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: Is the connector and terminal in good condition?

YES : Go to Step 9.

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

STEP 9. Check the harness wire between fusible link number 28 and condenser fan relay connector A-23X terminal number 1, between fusible link number 28 and fan control relay connector A-28X terminal number 1, and between fusible link number 29 and radiator fan relay connector A-26X terminal number 3, for damage.

- Check harness wire for open/short circuit and damage.

Q: Is 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 condenser fan relay connector A-23X terminal number 2 and ETACS-ECU connector C-312 terminal number 8, between radiator fan relay connector A-26X terminal number 1 and ETACS-ECU connector C-312 terminal number 2, and between fan control relay connector A-28X terminal number 3 and ETACS-ECU connector C-312 terminal number 9, for damage.

- Check harness wire for open/short circuit and damage.

Q: Is 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, condenser fan relay, and fan control relay.

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

Q: Is the relay 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: Is the fusible link 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-23X, radiator fan relay connector A-26X, fan control relay connector A-28X, radiator fan motor connector A-35, and condenser fan motor connector A-40, for loose, corroded or damaged terminals, or terminals pushed back in the connector.

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

Q: Is the connector and terminal in good condition?

YES : Go to Step 14.

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

STEP 14. Check the harness wire between fusible link number 28 and condenser fan relay connector A-23X terminal number 4, and between fusible link number 29 and radiator fan relay connector A-26X terminal number 4, for damage.

- Check harness wire for open/short circuit and damage.

Q: Is 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 condenser fan relay connector A-23X terminal number 3 and condenser fan motor connector A-40 terminal number 1, and between radiator fan relay connector A-26X terminal number 2 and radiator fan motor connector A-35 terminal number 1, for damage.

- Check harness wire for open/short circuit and damage.

Q: Is 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-35 terminal number 2 and fan control relay connector A-28X terminal number 5, and between condenser fan motor connector A-40 terminal number 2 and body ground, for damage.

- Check harness wire for open/short circuit and damage.

Q: Is 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-28X terminal number 2 and condenser fan motor connector A-40 terminal number 1, and between fan control relay connector A-28X terminal number 4 and body ground, for damage.

- Check harness wire for open/short circuit and damage.

Q: Is 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, condenser fan relay, and fan control relay.

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

Q: Is the relay 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 condenser fan motor.

Refer to [P.14-32](#).

Q: Is the fan motor in good condition?

YES : Go to Step 20.

NO : Replace the damaged fan motor (Refer to [P.14-53](#).)
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-671](#).)

Q: Is any DTC set?

YES : Replace the ETACS-ECU (Refer to GROUP 54A, ETACS –ETACS-ECU [P.54A-769](#).) 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-12](#).)

- Item 14: Cooling fan
(Refer to GROUP 13B, MFI Diagnosis –Actuator Test Reference Table [P.13B-969](#).)

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-1022](#).] When the ECM is replaced, register the encrypted code (Refer to GROUP 42C, Diagnosis –ID Code Registration Judgment Table [P.42C-10](#).) Then go to Step 23 .

STEP 22. Check the symptoms.

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.00-13](#).)

NO : Replace the ECM [Refer to GROUP 13B, Engine Control Module (ECM) [P.13B-1022](#).] When the ECM is replaced, register the encrypted code (Refer to GROUP 42C, Diagnosis –ID Code Registration Judgment Table [P.42C-10](#).) Then go to Step 23 .

STEP 23. Check the symptoms.

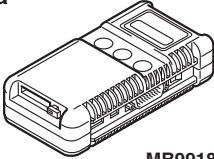

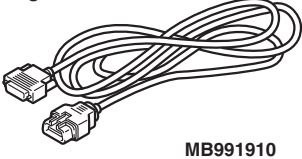
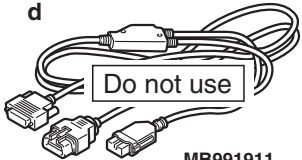
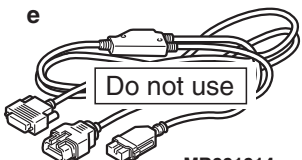
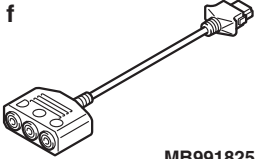
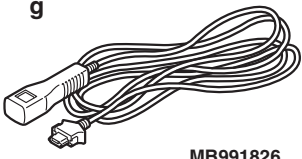
Q: Does the radiator fan and condenser fan operate normal?


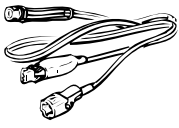
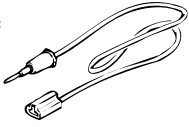

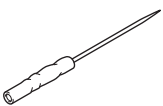
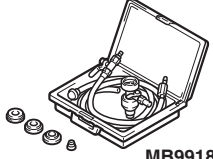
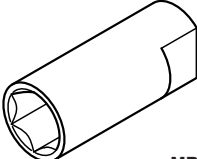
YES : The procedure is complete.

NO : Return to Step 1.

SPECIAL TOOLS

M1141000601379

Tool	Tool number and name	Supersession	Application
<p>a</p>  <p>MB991824</p> <p>b</p>  <p>MB991827</p> <p>c</p>  <p>MB991910</p> <p>d</p>  <p>MB991911</p> <p>e</p>  <p>MB991914</p> <p>f</p>  <p>MB991825</p> <p>g</p>  <p>MB991826 MB991958</p>	<p>MB991958 a: MB991824 b: MB991827 c: MB991910 d: MB991911 e: MB991914 f: MB991825 g: MB991826</p> <p>Scan tool (M.U.T.-III sub assembly)</p> <p>a: Vehicle communication interface (V. C. I.) b: M.U.T.-III USB cable c: M.U.T.-III main harness A (Vehicles with CAN communication system) d: M.U.T.-III main harness B (Vehicles without CAN communication system) e: M.U.T.-III main harness C (for Chrysler models only) f: M.U.T.-III measurement adapter g: M.U.T.-III trigger harness</p>	<p>MB991824-KIT</p> <p><i>NOTE: g: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.</i></p>	<p>CAUTION</p> <p>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 instead, the CAN communication does not function correctly.</p> <ul style="list-style-type: none"> • Checking diagnostic trouble code (DTC). • Checking actuator test.

Tool	Tool number and name	Supersession	Application
<p>a</p>  <p>b</p>  <p>c</p>  <p>d</p>  <p align="center">MB991223</p>	<p>MB991223 a: MB991219 b: MB991220 b: MB991221 d: MB991222 Harness set a: Test harness b: LED harness c: LED harness adaptor d: Probe</p>	<p>General service tools</p>	<p>Checking the continuity and measuring the voltage at the harness connector</p>
 <p align="center">MB992006</p>	<p>MB992006 Extra fine probe</p>	<p>General service tool</p>	<p>Continuity check and voltage measurement at harness wire or connector for loose, corroded or damaged terminals, or terminals pushed back in the connector.</p>
 <p align="center">MB991871</p>	<p>MB991871 LLC changer</p>	<p>General service tool</p>	<p>Coolant refilling</p>
 <p align="center">MB992042</p>	<p>MB992042 Water temp sensor wrench</p>	<p>MB992042-01</p>	<p>Removal and installation of engine coolant temperature sensor</p>

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

M1141001001013

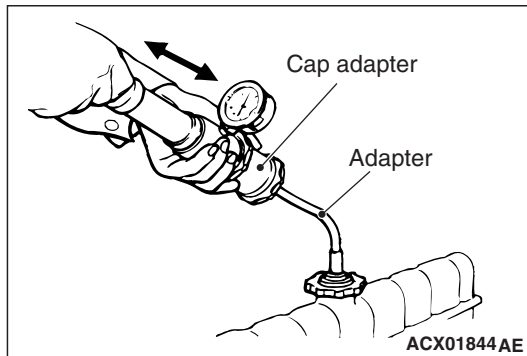
⚠ WARNING

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**

M1141001301218

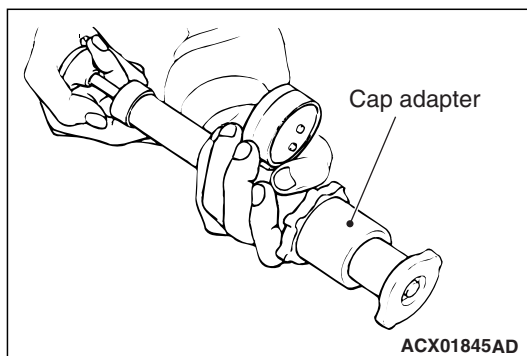
NOTE: Be sure that the radiator cap is clean before testing. Rust or other foreign material on the radiator cap seal will cause an improper reading.

1. Use a cap adapter to attach the radiator 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 <2.0L ENGINE>**

M1141001202010

Required Special Tool:

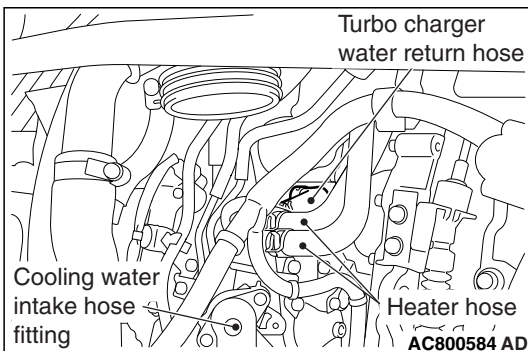
- MB991871: LLC changer

1. Remove the engine room under cover front A, B (Refer to GROUP 51, Under Cover [P.51-20.](#))

⚠ WARNING

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

2. Drain the engine coolant from the radiator, heater core and engine after unplugging the radiator drain plug and removing the radiator cap.
3. Remove the air cleaner to turbocharger duct (Refer to GROUP 15, Air Cleaner P.15-9.)
4. Disconnect the turbocharger water return hose and drain the engine coolant in the water jacket.
5. Remove the radiator condenser tank and drain the engine coolant.
6. Drain the engine coolant then clean the path of the engine coolant by injecting water into the radiator from the radiator cap area.
7. Connect the turbocharger water return hose.
8. Reinstall the air cleaner to turbocharger duct (Refer to GROUP 15, Air Cleaner P.15-9.)
9. Securely tighten the radiator drain plug.
10. Reinstall the radiator condenser tank.



⚠ CAUTION

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

11. By referring to the section on engine coolant, select an appropriate concentration for safe operating temperature within the range of 30 to 60%. Use special tool MB991871 to refill the engine coolant up to the top of the radiator port. A convenient mixture is a 50% water and 50% antifreeze solution [freezing point: -31° C (-23.8 ° F).]

Recommended antifreeze: Long Life Antifreeze Coolant or an equivalent

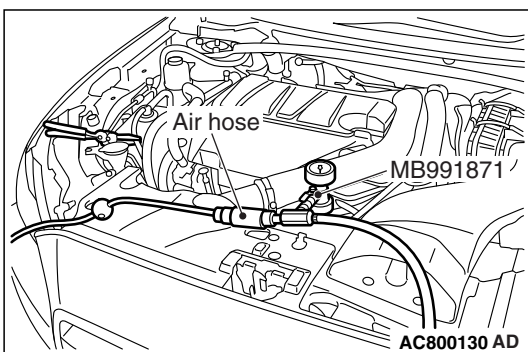
Quantity: 7.5 dm³ (7.9 quarts)

[includes 0.65 dm³ (0.63 quarts) in the radiator condenser tank]

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

12. Tighten the radiator cap securely.
13. Remove the radiator condenser tank cap, and add the engine coolant up to the "FULL" line.
14. Turn the A/C switch to OFF position to start the engine and warm up until the cooling fan operates.

NOTE: This step opens the thermostat fully.



15. Rev the engine several times and then stop it. Check that there are no engine coolant leaks.
16. Remove the radiator cap with the engine cool, and then refill the engine coolant up to the top of the radiator port.
17. Tighten the radiator cap securely.

⚠ CAUTION

Do not overfill the radiator condenser tank.

18. Remove the radiator condenser tank cap, and add the engine coolant up to the "FULL" line.
19. Reinstall the engine room under cover front A, B (Refer to GROUP 51, Under Cover [P.51-20.](#))

ENGINE COOLANT CHANGE <2.4L ENGINE>

M1141001202021

Required Special Tool:

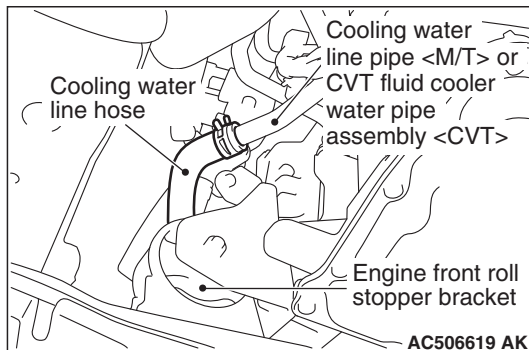
- MB991871: LLC changer

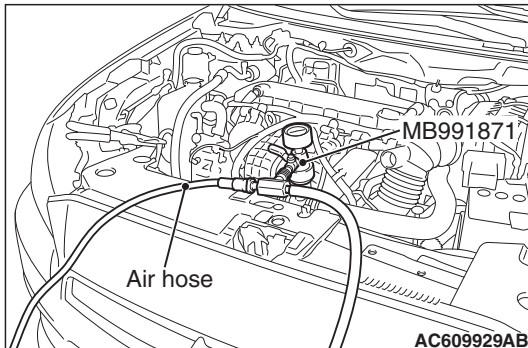
1. Remove the engine room under cover front A, B (Refer to GROUP 51, Under Cover [P.51-20.](#))

⚠ WARNING

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

2. Drain the engine coolant from the radiator, heater core and engine after unplugging the radiator drain plug and removing the radiator cap.
3. Disconnect the cooling water line hose and drain the engine coolant in the water jacket.
4. Remove the radiator condenser tank and drain the engine coolant.
5. Drain the engine coolant then clean the path of the engine coolant by injecting water into the radiator from the radiator cap area.
6. Connect the cooling water line hose.
7. Securely tighten the radiator drain plug.
8. Reinstall the radiator condenser tank.





⚠ CAUTION

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

- By referring to the section on engine coolant, select an appropriate concentration for safe operating temperature within the range of 30 to 60%. Use special tool MB991871 to refill the engine coolant up to the top of the radiator port. A convenient mixture is a 50% water and 50% antifreeze solution [freezing point: -31° C (-23.8 °F).]

Recommended antifreeze: Long Life Antifreeze Coolant or an equivalent

Quantity: 7.0 dm³ (7.4 quarts)

[includes 0.65 dm³ (0.63 quarts) in the radiator condenser tank]

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

- Tighten the radiator cap securely.
- Remove the radiator condenser tank cap, and add the engine coolant up to the "FULL" line.
- Turn the A/C switch to OFF position to start the engine and warm up until the cooling fan operates.

NOTE: This step opens the thermostat fully.

- Rev the engine several times and then stop it. Check that there are no engine coolant leaks.
- Remove the radiator cap with the engine cool, and then refill the engine coolant up to the top of the radiator port.
- Tighten the radiator cap securely.

⚠ CAUTION

Do not overfill the radiator condenser tank.

- Remove the radiator condenser tank cap, and add the engine coolant up to the "FULL" line.
- Reinstall the engine room under cover front A, B (Refer to GROUP 51, Under Cover P.51-20.)

WATER PUMP COOLANT LEAK CHECK

M1141008600488

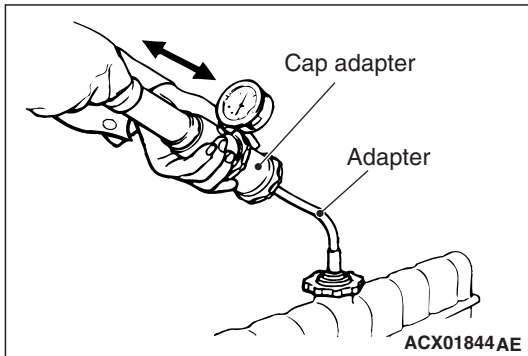
If a residue of the coolant draining is found on the drain hole, the vapor hole and the installation surface, check the water pump leakage by following method.

- 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.

- 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) <2.0L ENGINE> or (Refer to P.14-40) <2.4L ENGINE>.

ENGINE COOLANT CONCENTRATION TEST

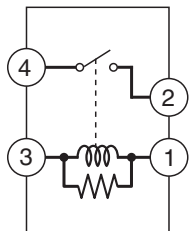
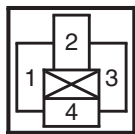
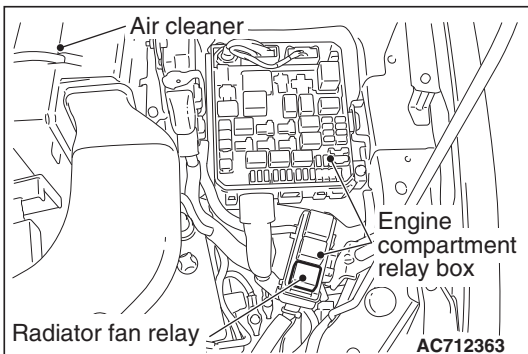
M1141001101203

Refer to GROUP 00, Recommended Lubricants and Lubricant Capacities Table P.00-54.

COOLING FAN RELAY CONTINUITY CHECK <2.0L ENGINE>

M1141006201487

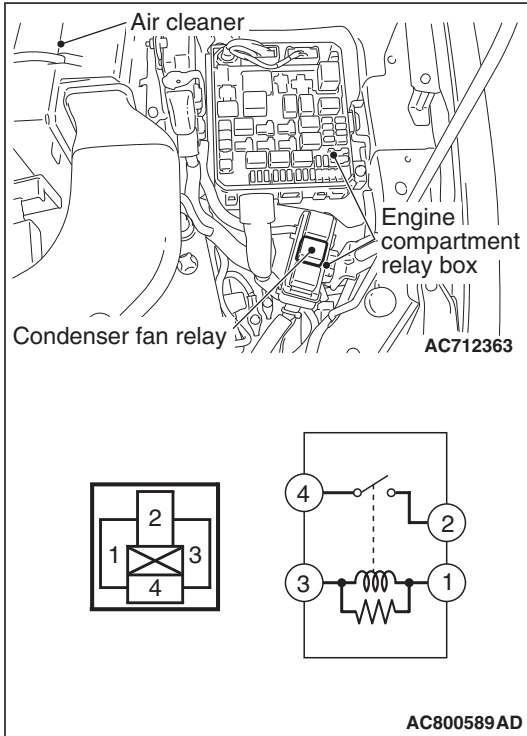
RADIATOR FAN RELAY CHECK



AC800588 AD

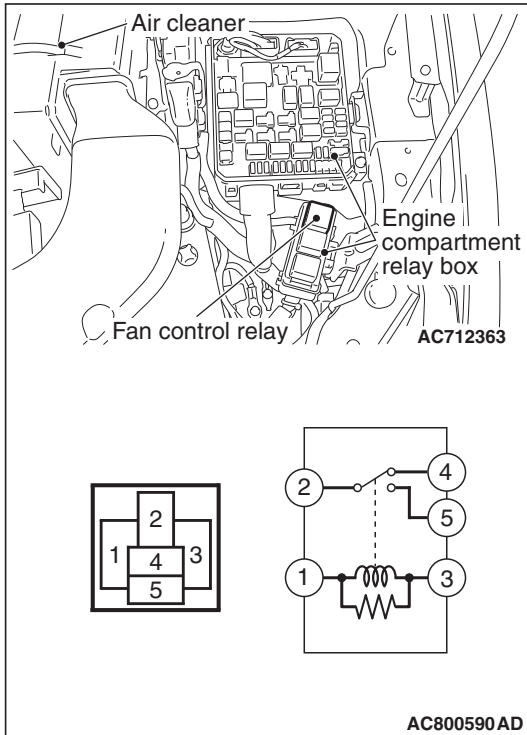
Battery voltage	Terminal number to be connected to tester	Continuity test results
Not applied	2 -4	Open circuit
Connect terminal number 1 and battery (-) terminal. Connect terminal number 3 and battery (+) terminal.		Continuity (Less than 2 ohms)

CONDENSER FAN RELAY CHECK



Battery voltage	Terminal number to be connected to tester	Continuity test results
Not applied	2 -4	Open circuit
Connect terminal number 1 and battery (-) terminal. Connect terminal number 3 and battery (+) terminal.		Continuity (Less than 2 ohms)

FAN CONTROL RELAY CHECK

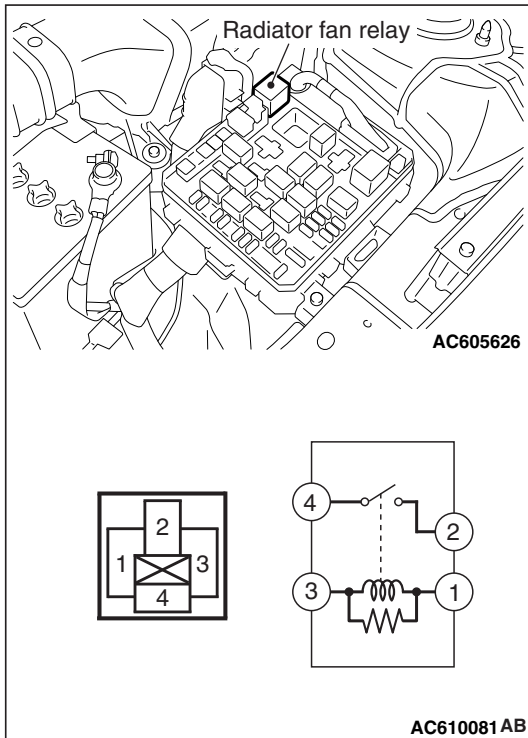


Battery voltage	Terminal number to be connected to tester	Continuity test results
Not applied	2 -4	Continuity (Less than 2 ohms)
	2 -5	Open circuit
Connect terminal number 1 and battery (+) terminal. Connect terminal number 3 and battery (-) terminal.	2 -4	Open circuit
	2 -5	Continuity (Less than 2 ohms)

COOLING FAN RELAY CONTINUITY CHECK <2.4L ENGINE>

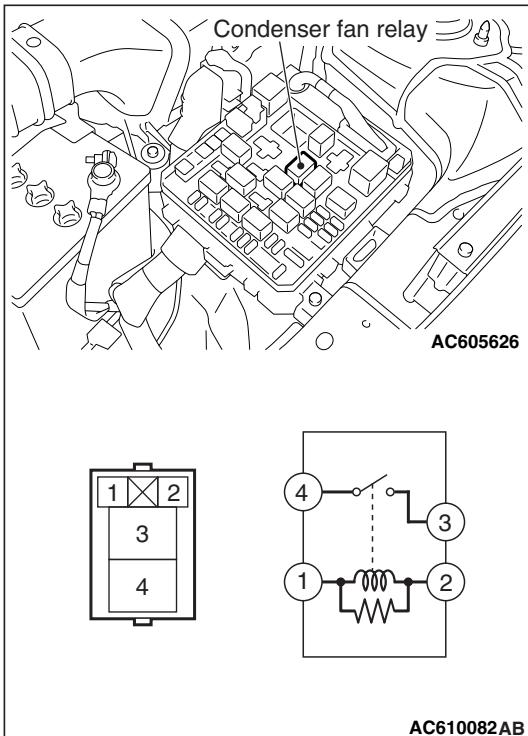
M1141006201498

RADIATOR FAN RELAY CHECK



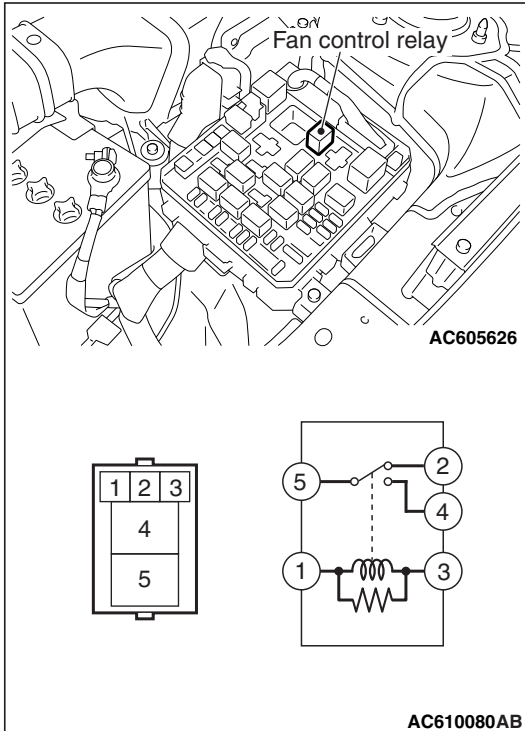
Battery voltage	Terminal number to be connected to tester	Continuity test results
Not applied	2 -4	Open circuit
Connect terminal number 1 and battery (-) terminal. Connect terminal number 3 and battery (+) terminal.		Continuity (Less than 2 ohms)

CONDENSER FAN RELAY CHECK



Battery voltage	Terminal number to be connected to tester	Continuity test results
Not applied	3 -4	Open circuit
Connect terminal number 1 and battery (+) terminal. Connect terminal number 2 and battery (-) terminal.		Continuity (Less than 2 ohms)

FAN CONTROL RELAY CHECK

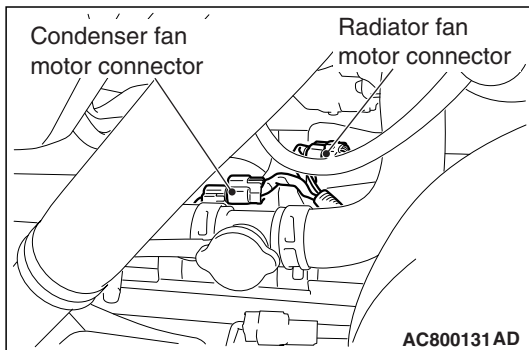


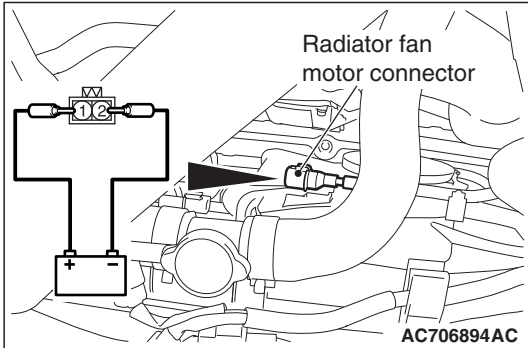
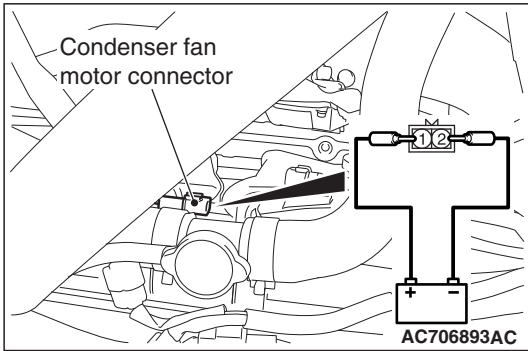
Battery voltage	Terminal number to be connected to tester	Continuity test results
Not applied	2 -5	Continuity (Less than 2 ohms)
	4 -5	Open circuit
Connect terminal number 1 and battery (+) terminal. Connect terminal number 3 and battery (-) terminal.	2 -5	Open circuit
	4 -5	Continuity (Less than 2 ohms)

COOLING FAN MOTOR CHECK <2.0L ENGINE>

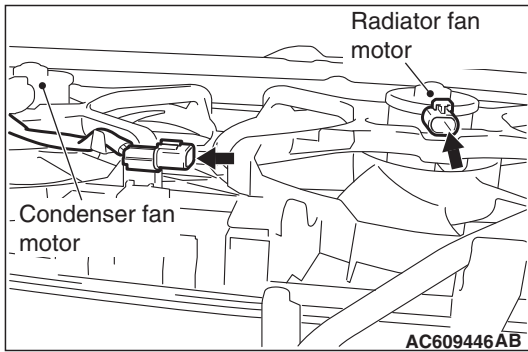
M1141007600537

1. Disconnect the fan motor connector.





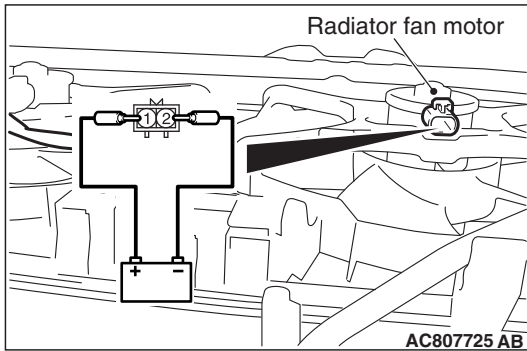
2. Check that the fan motor runs when a positive battery terminal is connected to the fan motor-side connector terminal number 1, and terminal number 2 is grounded. Also check to see that there is no abnormal sound emitted from the fan motor at this time.
3. If the fan motor is defective, replace it (Refer to P.14-50.)
4. Connect the fan motor connector.



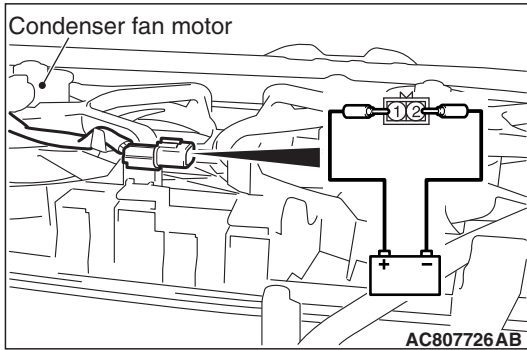
COOLING FAN MOTOR CHECK <2.4L ENGINE>

M1141007600548

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.14-53.](#))
4. Connect the fan motor connector.



THERMOSTAT

REMOVAL AND INSTALLATION <2.0L ENGINE>

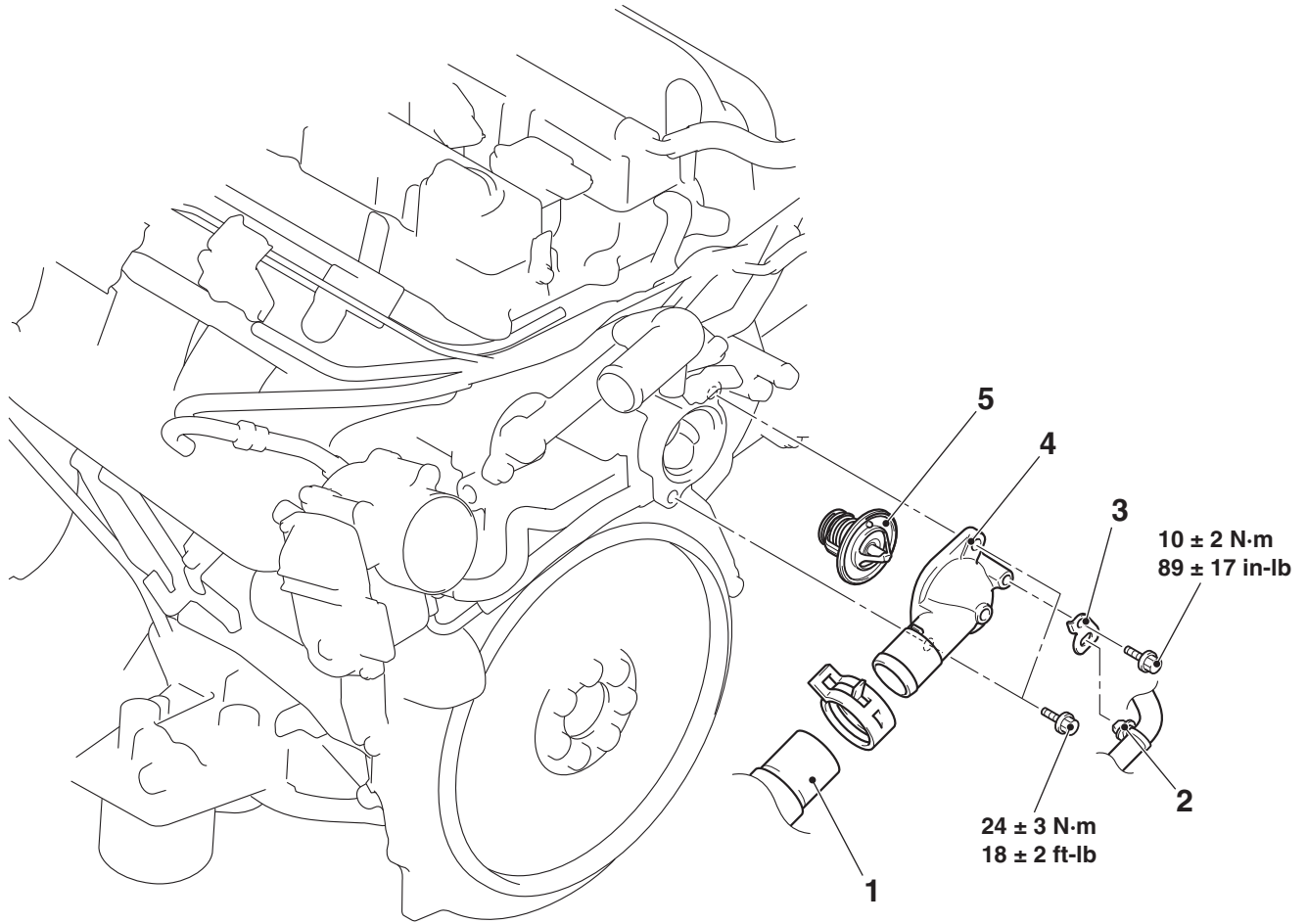
M1141002402675

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-24.)
- Air Cleaner Intake Duct and Air Cleaner Body Removal (Refer to GROUP 15, Air Cleaner P.15-9.)
- Battery and Battery Tray Removal (Refer to GROUP 54A, Battery P.54A-10.)

Post-installation Operation

- Battery and Battery Tray Installation (Refer to GROUP 54A, Battery P.54A-10.)
- Air Cleaner Intake Duct and Air Cleaner Body Installation (Refer to GROUP 15, Air Cleaner P.15-9.)
- Engine Coolant Refilling (Refer to P.14-24.)



AC800605 AD

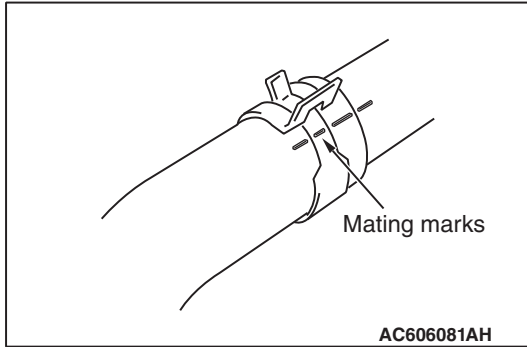
- <<A>> >>B<<
- Removal steps**
1. Radiator lower hose connection
 2. Control wiring harness clamp connection

- Removal steps (Continued)**
3. Harness bracket
 4. Cooling water inlet hose fitting
 5. Thermostat
- >>A<<

REMOVAL SERVICE POINT

<<A>> RADIATOR LOWER HOSE DISCONNECTION

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



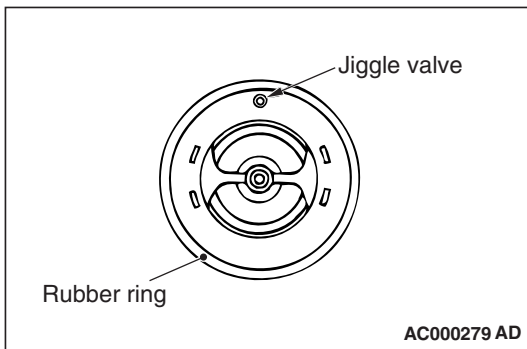
INSTALLATION SERVICE POINTS

>>A<< THERMOSTAT INSTALLATION

⚠ CAUTION

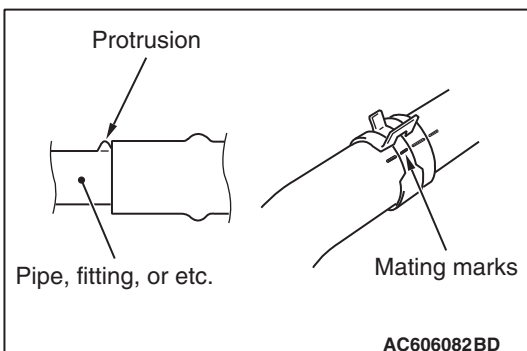
Make absolutely sure that no oil adheres to the rubber ring of the thermostat. Also do not fold or scratch the rubber ring during installation.

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



REMOVAL AND INSTALLATION <2.4L ENGINE>

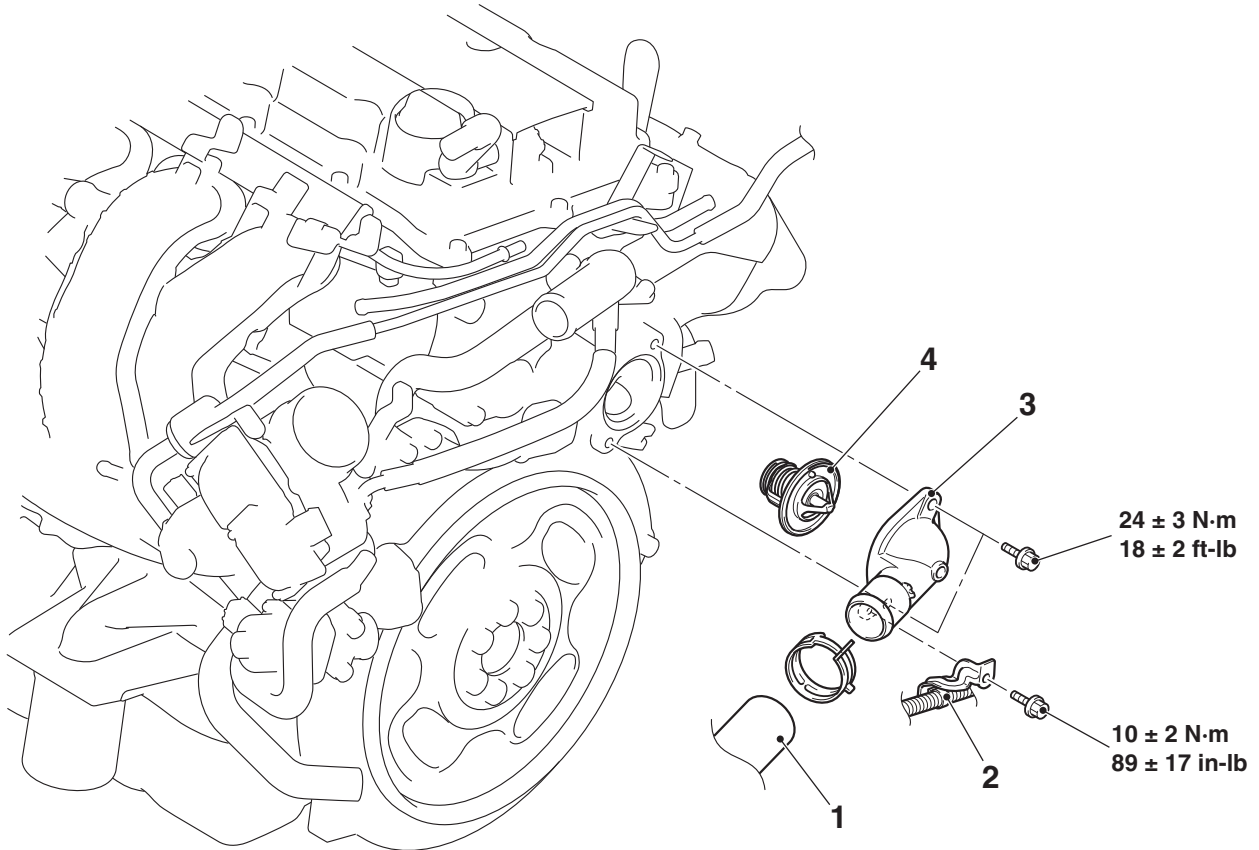
M1141002402686

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-26.)
- Engine Upper Cover Removal (Refer to GROUP 11C, Camshaft P.11C-24.)
- Air Cleaner Assembly Removal (Refer to GROUP 15, Air Cleaner P.15-10.)

Post-installation Operation

- Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner P.15-10.)
- Engine Upper Cover Installation (Refer to GROUP 11C, Camshaft P.11C-24.)
- Engine Coolant Refilling (Refer to P.14-26.)



AC506788 AC

<<A>> >>B<<

- Removal steps**
1. Radiator lower hose connection
 2. Control wiring harness clamp connection <CVT>

>>A<<

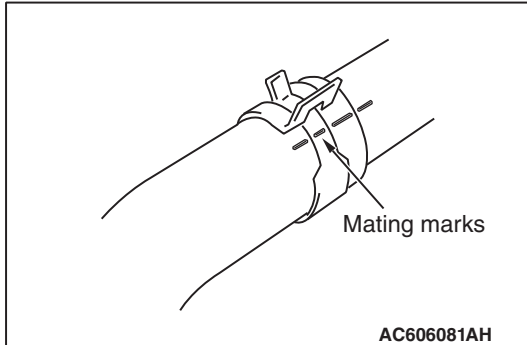
Removal steps (Continued)

3. Cooling water inlet hose fitting
4. Thermostat

REMOVAL SERVICE POINT

<<A>> RADIATOR LOWER HOSE DISCONNECTION

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



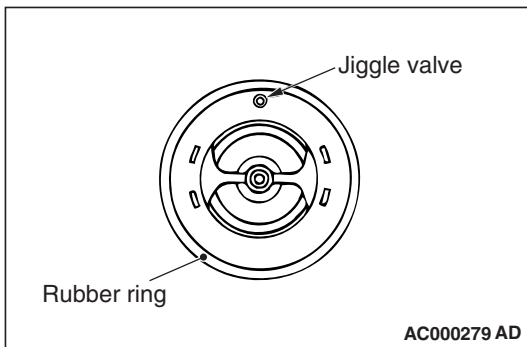
INSTALLATION SERVICE POINTS

>>A<< THERMOSTAT INSTALLATION

⚠ CAUTION

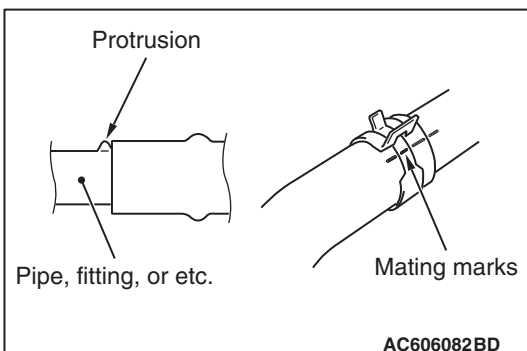
Make absolutely sure that no oil adheres to the rubber ring of the thermostat. Also do not fold or scratch the rubber ring during installation.

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

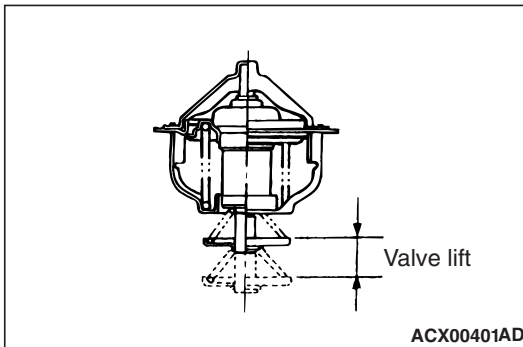
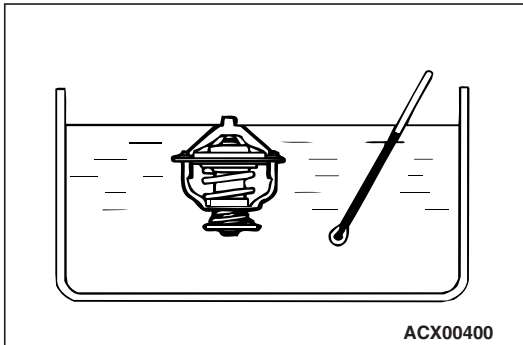


INSPECTION

M1141002501420

THERMOSTAT CHECK

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

Standard value:**76.5 ± 1.5° C (170 ± 3° F) <2.0L ENGINE>****82 ± 1.5° C (180 ± 3° F) <2.4L 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:****90° C (194° F) <2.0L ENGINE>****95° C (203° F) <2.4L ENGINE>****Amount of valve lift: 8.5 mm (0.33 inch) or more**

WATER PUMP

REMOVAL AND INSTALLATION <2.0L ENGINE>

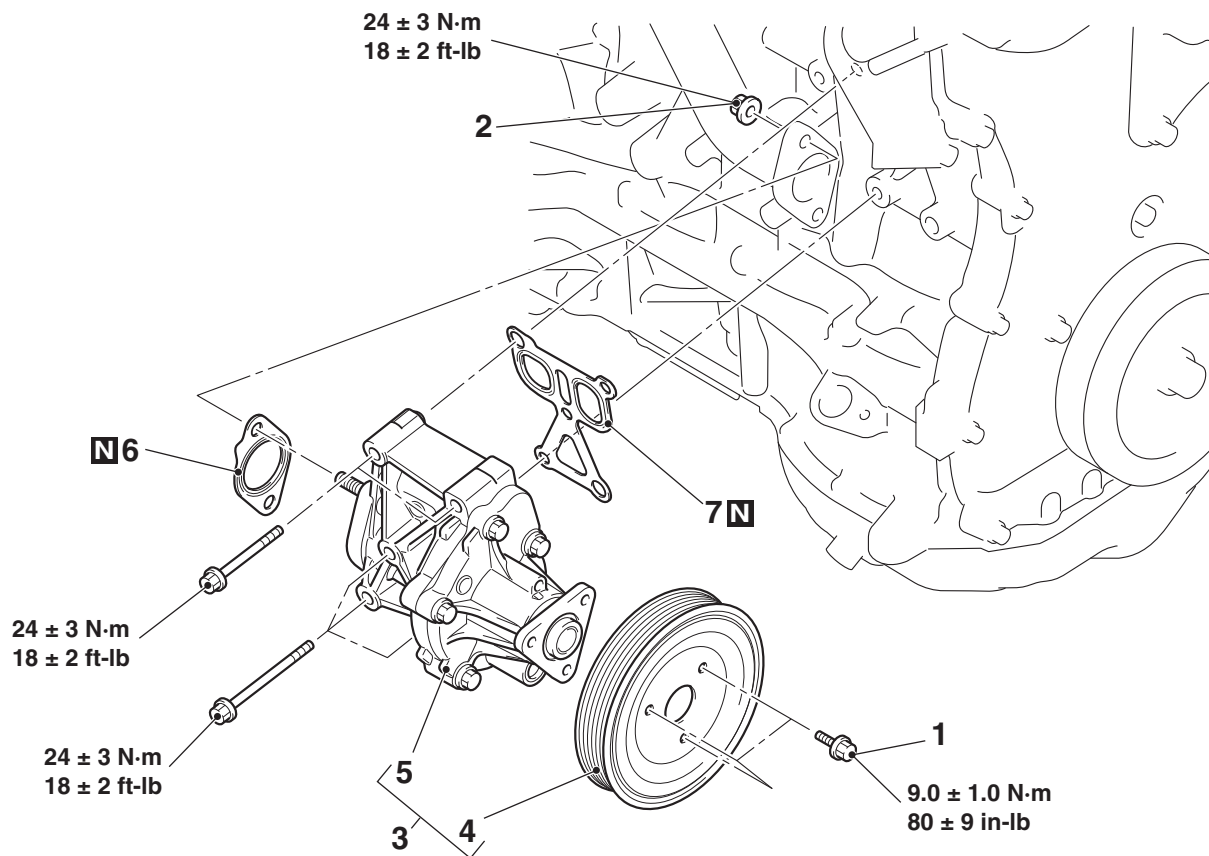
M1141002702427

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-24.)
- Drive Belt Removal (Refer to GROUP 11A, Crankshaft Pulley P.11A-22.)
- Strut Tower Bar Removal (Refer to GROUP 42A, Strut Tower Bar P.42A-15.)
- Engine Upper Cover Removal (Refer to GROUP 16, Ignition System –Ignition Coil P.16-50.)
- Exhaust Manifold Cover Removal (Refer to GROUP 15, Exhaust Manifold and Turbocharger P.15-20.)

Post-installation Operation

- Exhaust Manifold Cover Installation (Refer to GROUP 15, Exhaust Manifold and Turbocharger P.15-20.)
- Engine Upper Cover Installation (Refer to GROUP 16, Ignition System –Ignition Coil P.16-50.)
- Strut Tower Bar Installation (Refer to GROUP 42A, Strut Tower Bar P.42A-15.)
- Drive Belt Installation (Refer to GROUP 11A, Crankshaft Pulley P.11A-22.)
- 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.14-24.)



AC705835AC

Removal steps

1. Water pump pulley mounting bolt
2. Water pump inlet pipe mounting nut
3. Water pump pulley and water pump assembly

Removal steps (Continued)

4. Water pump pulley
5. Water pump
6. Cooling water line gasket
7. Water pump gasket

REMOVAL AND INSTALLATION <2.4L ENGINE>

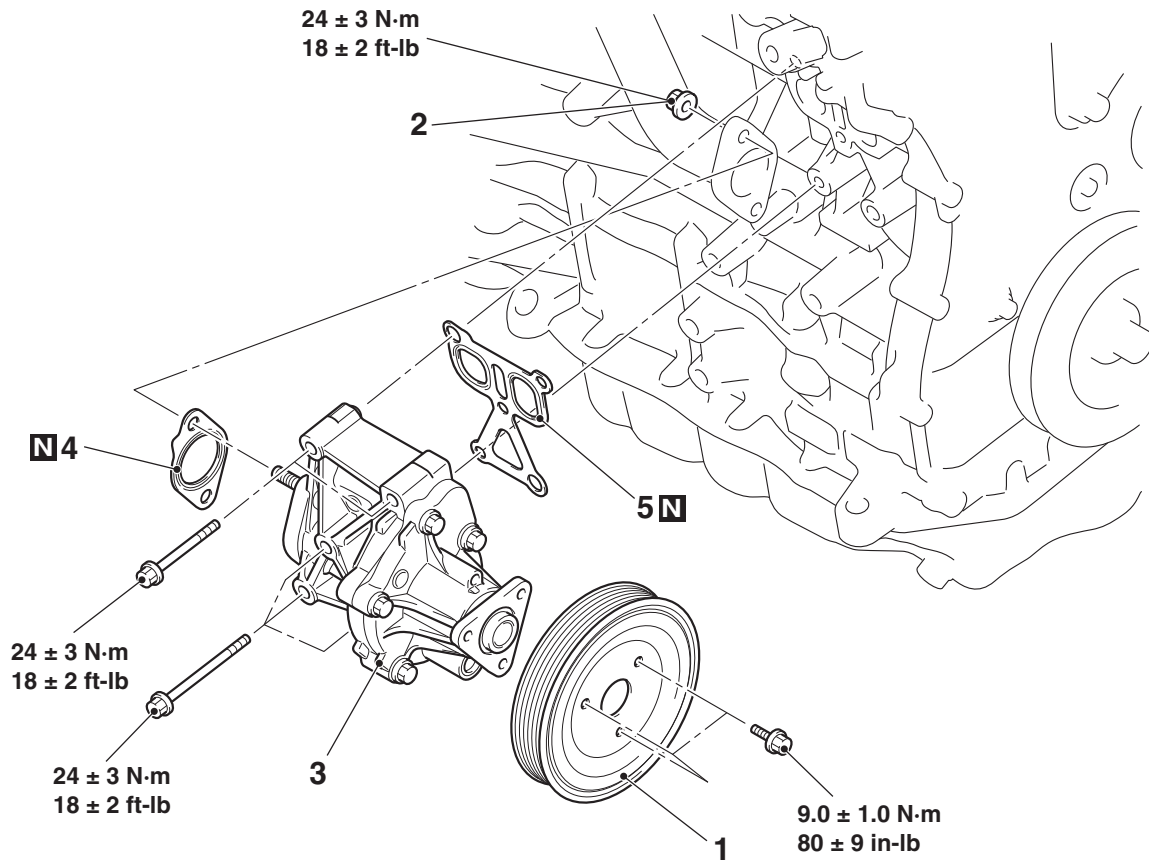
M1141002702449

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-26.)
- Drive Belt Removal (Refer to GROUP 11C, Crankshaft Pulley P.11C-19.)

Post-installation Operation

- Drive Belt Installation (Refer to GROUP 11C, Crankshaft Pulley P.11C-19.)
- Drive Belt Tension Check (Refer to GROUP 11C, On-vehicle Service –Drive Belt Tension Check and Adjustment P.11C-8.)
- Engine Coolant Refilling (Refer to P.14-26.)



AC509330AC

Removal steps

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

Removal steps (Continued)

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

WATER HOSE AND WATER PIPE

REMOVAL AND INSTALLATION <2.0L ENGINE>

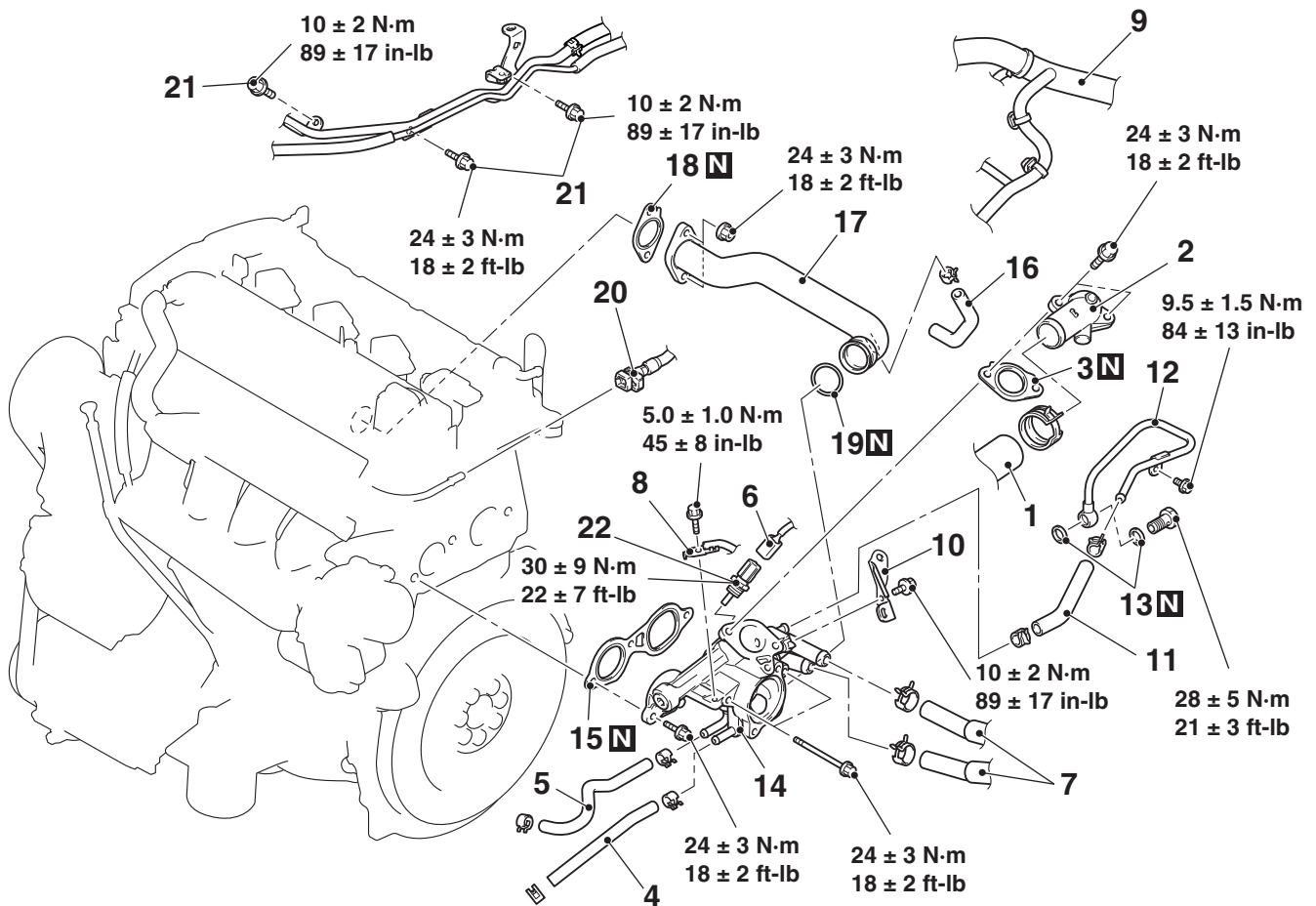
M1141003303276

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-24.)
- Engine Upper Cover Removal (Refer to GROUP 16, Ignition System -Ignition Coil P.16-50.)
- Air Cleaner Assembly Removal (Refer to GROUP 15, Air Cleaner P.15-9.)
- Battery and Battery Tray Removal (Refer to GROUP 54A, Battery P.54A-10.)
- Thermostat Removal (Refer to P.14-34.)

Post-installation Operation

- Thermostat Installation (Refer to P.14-34.)
- Battery and Battery Tray Installation (Refer to GROUP 54A, Battery P.54A-10.)
- Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner P.15-9.)
- Engine Upper Cover Installation (Refer to GROUP 16, Ignition System -Ignition Coil P.16-50.)
- Engine Coolant Refilling (Refer to P.14-24.)



AC802426 AD

Thermostat case removal steps

- <<A>> >>D<<
1. Radiator upper hose
 2. Cooling water outlet hose fitting
 3. Cooling water outlet hose fitting gasket
 4. Cooling water line hose
 5. Cooling water line hose
 6. Engine coolant temperature sensor connector connection
 7. Heater hose connection
 8. Ground cable connection
 9. Control wiring harness connection

Thermostat case removal steps (Continued)

10. Harness bracket
 11. Turbocharger water feed hose
 12. Turbocharger water feed pipe
 13. Gasket
 14. Thermostat case
 15. Thermostat case gasket
- ### Water pump inlet pipe removal steps
14. Thermostat case
 15. Thermostat case gasket

Water pump inlet pipe removal steps (Continued)

- Turbocharger assembly (Refer to GROUP 15, Exhaust Manifold and Turbocharger Assembly [P.15-20](#))
- 16. Turbocharger water return hose
- 17. Water pump inlet pipe
- 18. Cooling water line gasket
- 19. O-ring

<> >>B<<

<<C>> >>A<<

Engine coolant temperature sensor removal steps

- Fuel injector return pipe (Refer to GROUP 13A, Injector [P.13A-887](#))
- 20. Fuel high-pressure hose connection
- 21. Emission control vacuum hose and pipe assembly mounting bolts
- 6. Engine coolant temperature sensor connector
- 22. Engine coolant temperature sensor

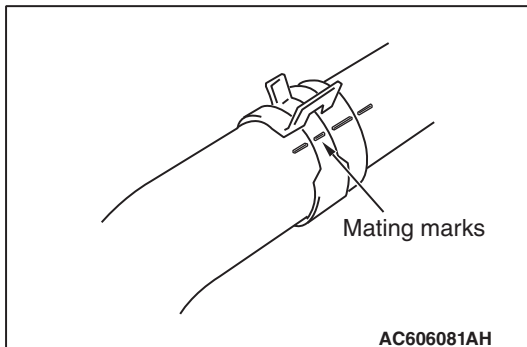
Required Special Tool:

- MB992042: Water Temp Sensor Wrench

REMOVAL SERVICE POINTS

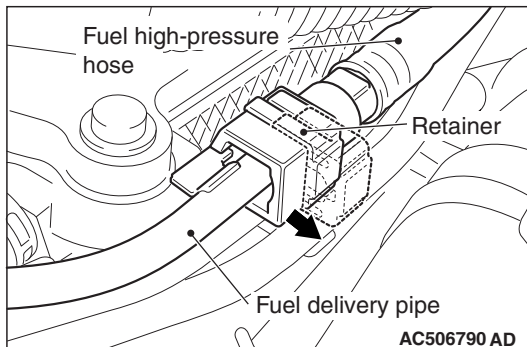
<<A>> RADIATOR UPPER HOSE DISCONNECTION

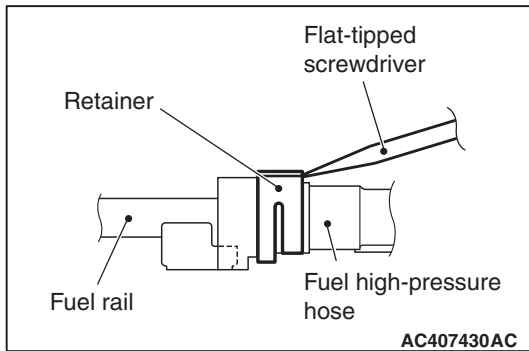
Make mating marks on the radiator upper hose and the hose clamp as shown to install them in the original position. Then, remove them.



<> FUEL HIGH-PRESSURE HOSE DISCONNECTION

1. Follow the steps below to unlock the fuel high-pressure hose connector.

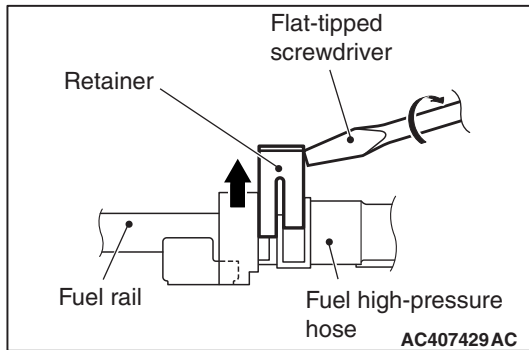




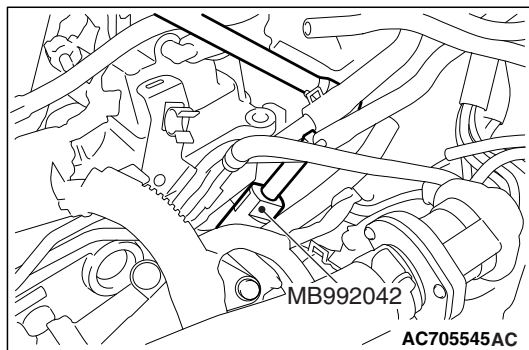
- (1) Insert a flat-tipped screwdriver [6 mm (0.24 inch) wide and 1 mm (0.04inch) thick] into the retainer of the fuel high-pressure hose connector.

⚠ CAUTION

When pushing up the retainer of the fuel high-pressure hose connector, pay attention to avoid damage to the retainer.



- (2) Turn the flat-tipped screwdriver inserted into the retainer by 90 degrees angle to push up the retainer and unlock the fuel high-pressure hose connector.
2. Disconnect the fuel high-pressure hose.



<<C>> ENGINE COOLANT TEMPERATURE SENSOR REMOVAL

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

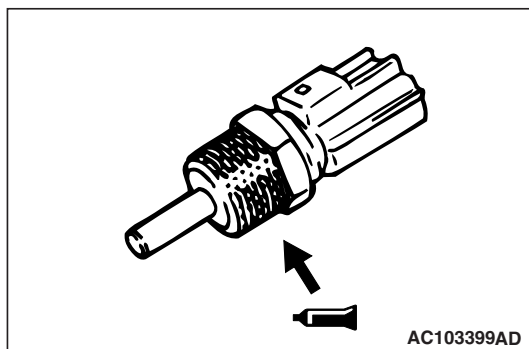
INSTALLATION SERVICE POINTS

>>A<< ENGINE COOLANT TEMPERATURE SENSOR INSTALLATION

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

Specified sealant: Three bond 1324N or equivalent

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

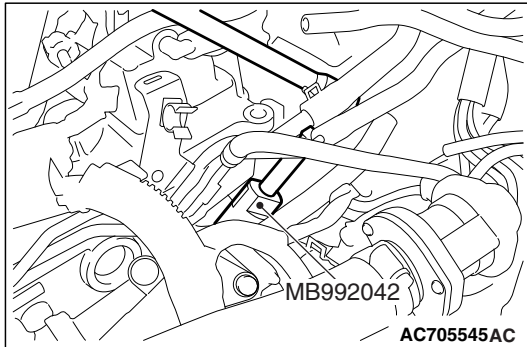


⚠ CAUTION

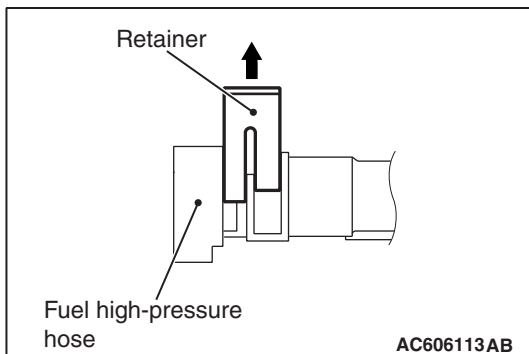
After the installation, until a sufficient period of time (one hour or more) elapses, do not apply the oil or water to the sealant application area or start the engine.

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)

**>>B<< FUEL HIGH-PRESSURE HOSE CONNECTION**

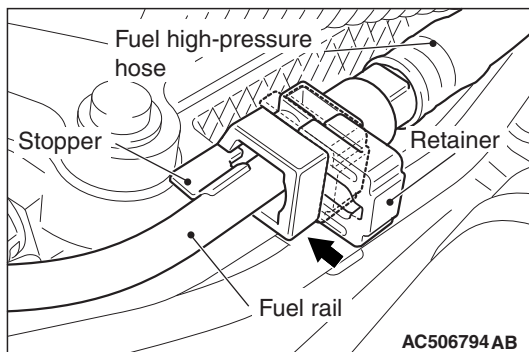
1. Pull up the retainer of fuel high-pressure hose to unlock before installing.



2. Securely insert the fuel rail stopper into the fuel high-pressure hose connector groove to install the fuel high-pressure hose to the fuel rail.

⚠ CAUTION

- When pushing in the retainer of the fuel high-pressure hose connector, pay attention to avoid damage to the retainer.
 - After the installation of the fuel high-pressure hose, slightly pull the fuel high-pressure hose to check that it is connected securely. At this time, also check that there is approximately 1 mm (0.04inch) play.
3. Push in the retainer of the fuel high-pressure hose connector to lock the fuel high-pressure hose and fuel rail.

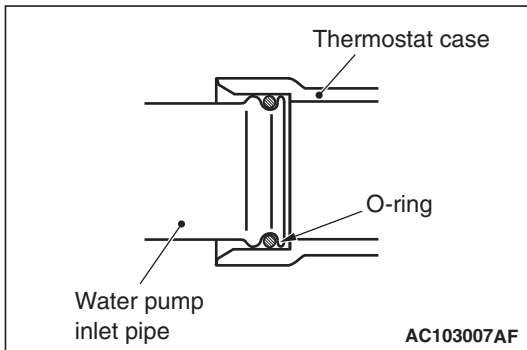


>>C<< O-RING INSTALLATION

⚠ CAUTION

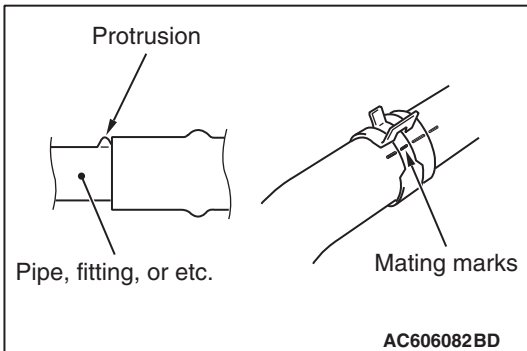
Avoid adhesion of engine oil or grease to the O-ring.

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



>>D<< RADIATOR UPPER HOSE CONNECTION

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



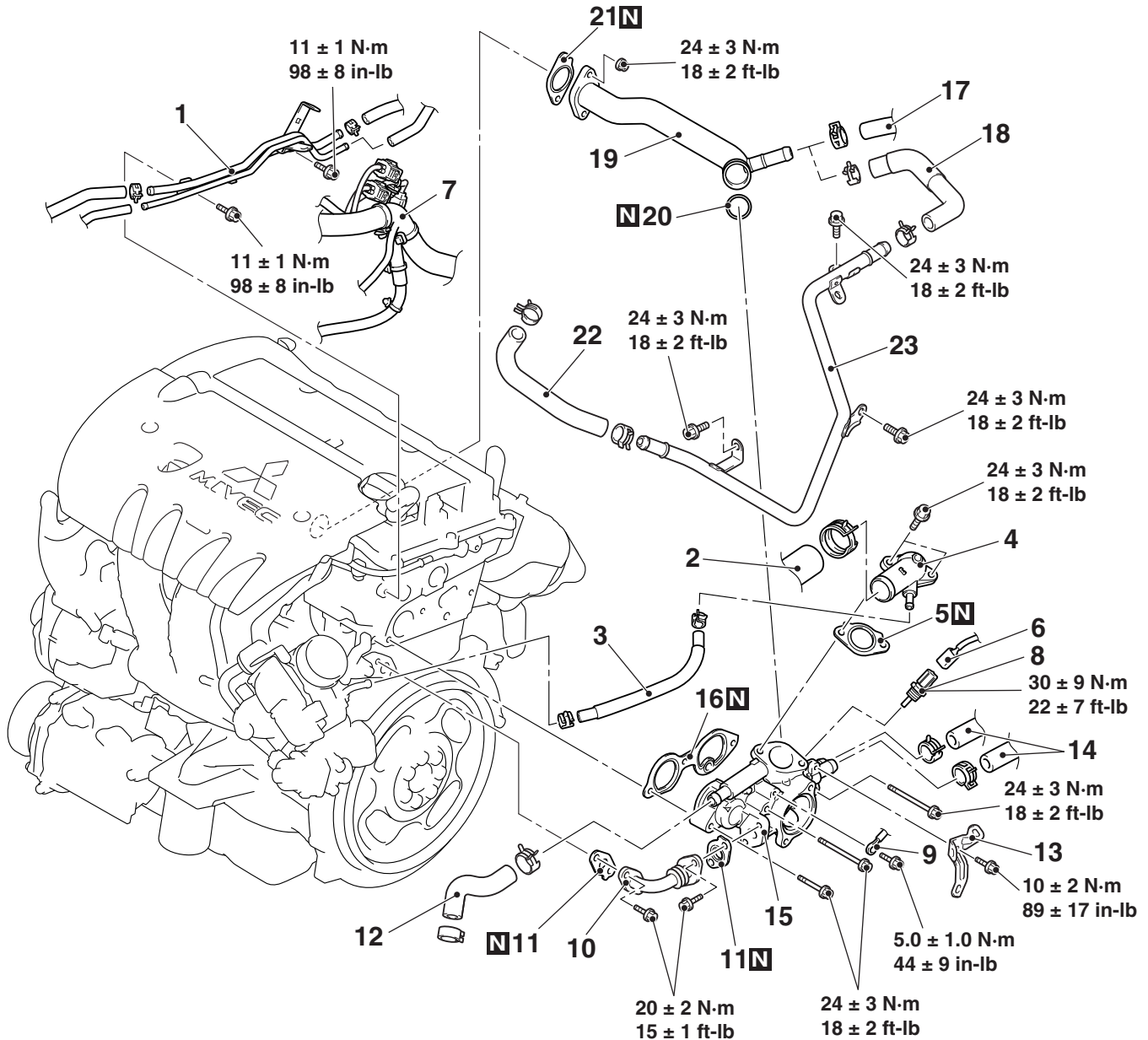
REMOVAL AND INSTALLATION <2.4L ENGINE>

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-26.)
- Engine Upper Cover Removal (Refer to GROUP 11C, Camshaft P.11C-24.)
- Air Cleaner Assembly Removal (Refer to GROUP 15, Air Cleaner P.15-10.)
- Thermostat Removal (Refer to P.14-36.)

Post-installation Operation

- Thermostat Installation (Refer to P.14-36.)
- Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner P.15-10.)
- Engine Upper Cover Installation (Refer to GROUP 11C, Camshaft P.11C-24.)
- Engine Coolant Refilling (Refer to P.14-26.)



AC807686AB

Removal steps

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

Removal steps (Continued)

- <> >>B<<
7. Control wiring harness connection
 8. Engine coolant temperature sensor
 9. Ground cable connection
 10. EGR valve pipe
 11. EGR pipe gasket
 12. Cooling water line hose

Removal steps (Continued)

13. Wiring harness bracket
14. Heater hose connection
15. Thermostat case
16. Thermostat case gasket
17. CVT fluid cooler water return hose B connection <CVT>
18. Cooling water line hose <M/T>
19. Water pump inlet pipe
- >>A<< 20. O-ring
21. Cooling water line gasket
22. Cooling water line hose <M/T>
23. Cooling water line pipe <M/T>

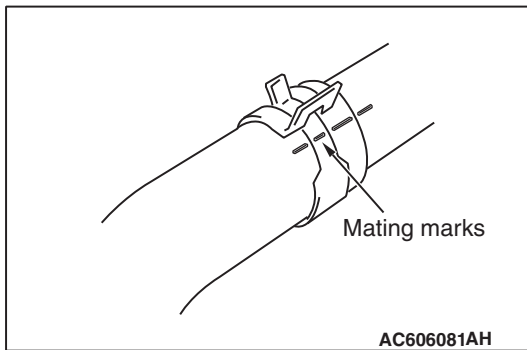
Required Special Tool:

- MB992042: Water Temp Sensor Wrench

REMOVAL SERVICE POINTS

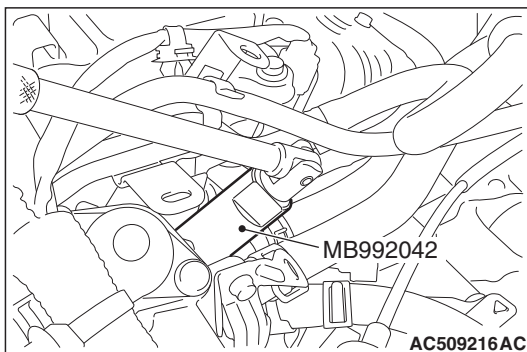
<<A>> RADIATOR UPPER HOSE DISCONNECTION

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



<> ENGINE COOLANT TEMPERATURE SENSOR REMOVAL

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



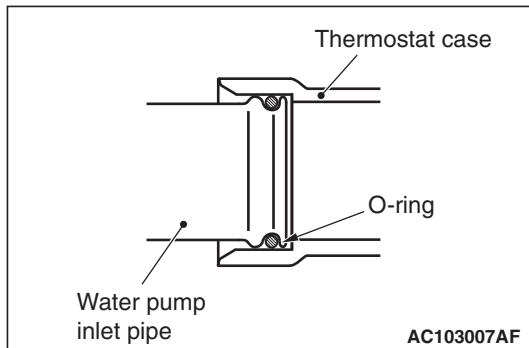
INSTALLATION SERVICE POINTS

>>A<< O-RING INSTALLATION

⚠ CAUTION

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

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

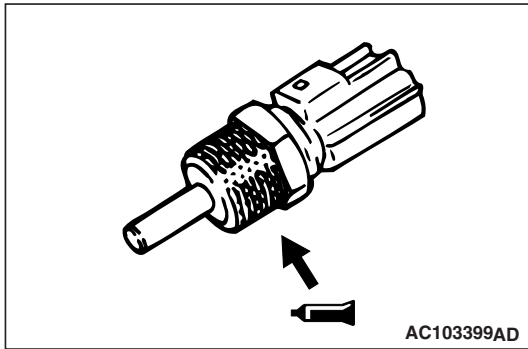


>>B<< ENGINE COOLANT TEMPERATURE SENSOR INSTALLATION

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

Specified sealant: Three bond 1324N or equivalent

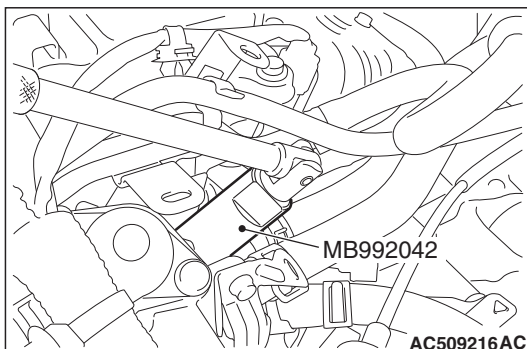
NOTE: Install the engine coolant temperature sensor immediately after applying sealant.

**⚠ 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.

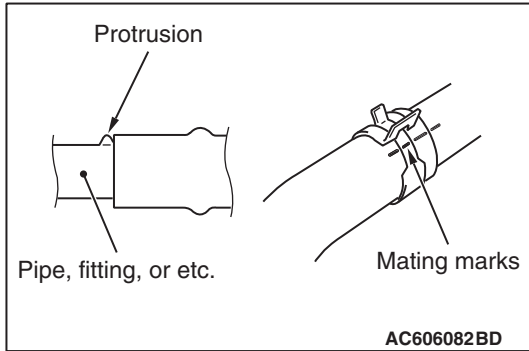
2. Use special tool MB992042 to tighten the engine coolant temperature sensor to the specified torque.

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



>>C<< RADIATOR UPPER HOSE CONNECTION

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



INSPECTION

M1141003400791

Water Pipe and Hose Check

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

RADIATOR

REMOVAL AND INSTALLATION <2.0L ENGINE>

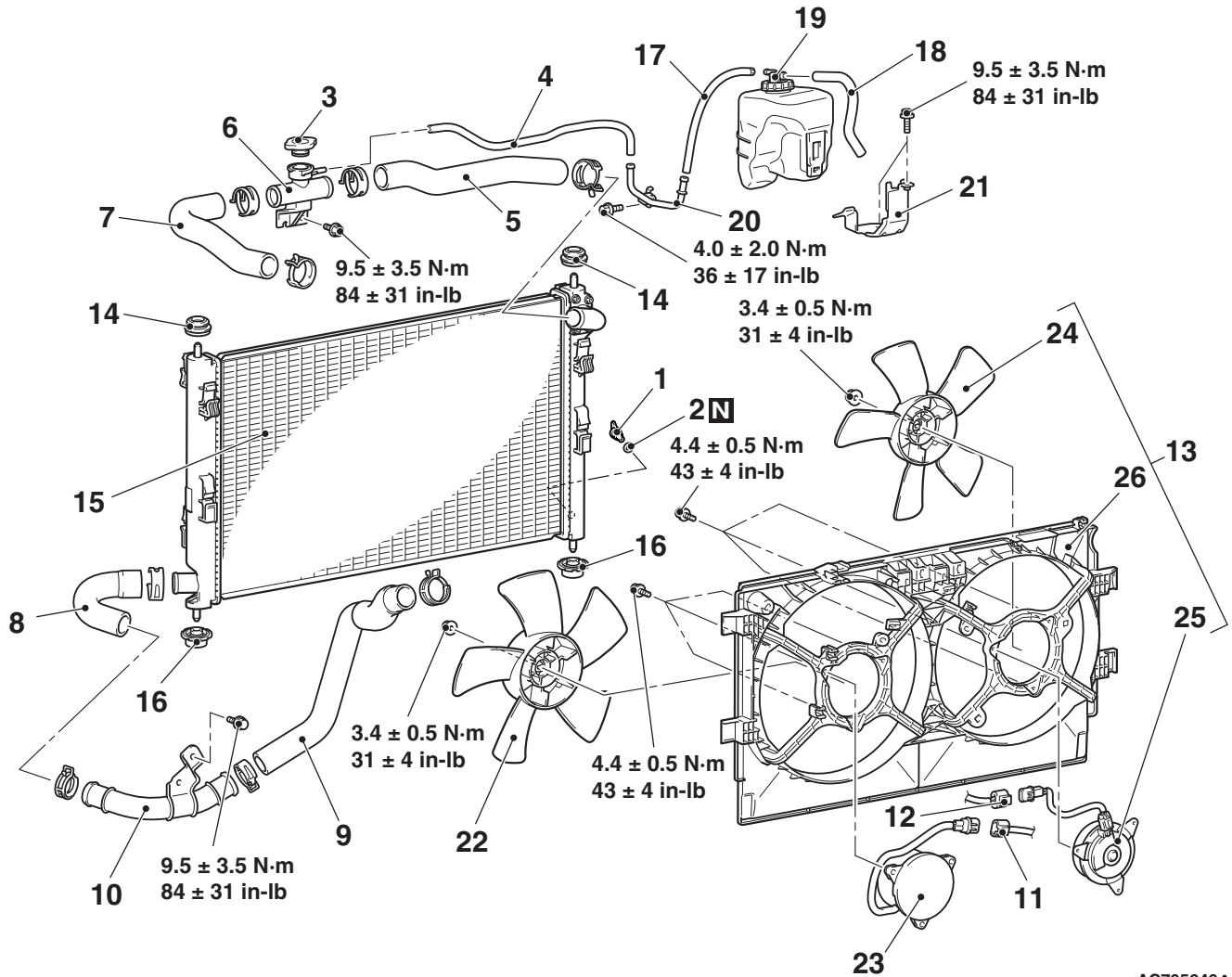
M1141001503133

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-24.)
- Charge Air Cooler Intake Air Hose A and Charge Air Cooler Intake Air Pipe B Removal (Refer to GROUP 15, Charge Air Cooler P.15-11.)

Post-installation Operation

- Charge Air Cooler Intake Air Hose A and Charge Air Cooler Intake Air Pipe B Installation (Refer to GROUP 15, Charge Air Cooler P.15-11.)
- Engine Coolant Refilling and Check (Refer to P.14-24.)



AC705646AC

Radiator removal steps

1. Radiator drain plug
2. O-ring
3. Radiator cap
4. Radiator condenser tank hose <>
5. Radiator upper hose
6. Radiator cap assembly
7. Radiator upper hose
8. Radiator lower hose
9. Radiator lower hose
10. Radiator lower pipe assembly
11. Radiator fan motor connector connection
12. Condenser fan motor connector connection

Radiator removal steps

- Front end upper bar (Refer to GROUP 42A, Loose Panel P.42A-221)
- 13. Fan, fan motor and cooling fan shroud assembly
- 14. Support upper insulator
- 15. Radiator assembly
- 16. Support lower insulator
- 17. Radiator condenser tank hose
- 18. Radiator condenser tank hose
- 19. Radiator condenser tank
- 20. Radiator condenser tank pipe
- 21. Radiator condenser tank bracket

<<A>> >>A<<

<<A>> >>A<<

<<A>> >>A<<

<<A>> >>A<<

Cooling fan shroud removal steps

<<A>> >>A<<

4. Radiator condenser tank hose
5. Radiator upper hose
6. Radiator cap assembly
11. Radiator fan motor connector connection
12. Condenser fan motor connector connection

<>

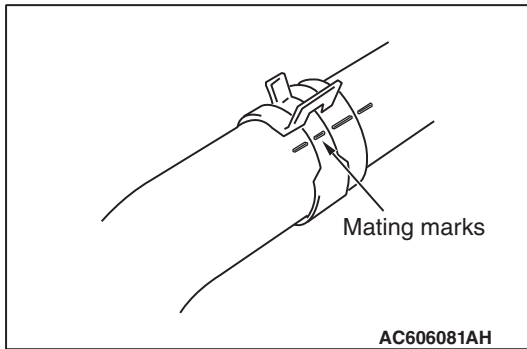
Cooling fan shroud removal steps (Continued)

- Front end upper bar (Refer to GROUP 42A, Loose Panel P.42A-221)
- 13. Fan, fan motor and cooling fan shroud assembly
- 22. Radiator fan
- 23. Radiator fan motor
- 24. Condenser fan
- 25. Condenser fan motor
- 26. Cooling fan shroud

REMOVAL SERVICE POINTS

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

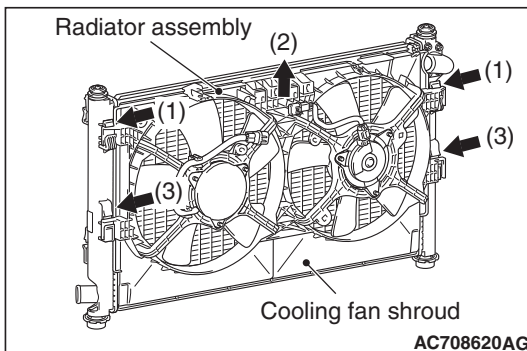
Make mating marks on the radiator hose and the hose clamp as shown to install them in the original position. Then, remove them.

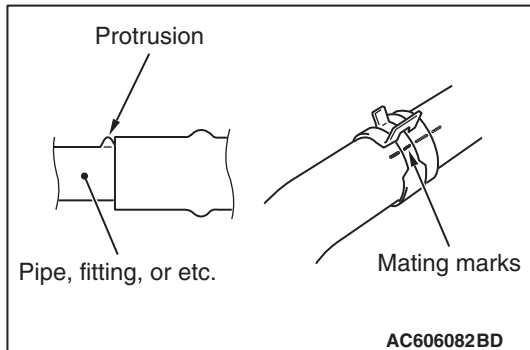


<> FAN, FAN MOTOR AND COOLING FAN SHROUD ASSEMBLY REMOVAL

Remove the fan, fan motor and cooling fan shroud assembly from the radiator assembly according to the following procedure.

1. Release the upper locks of the radiator assembly from the fan, fan motor and cooling fan shroud assembly.
2. Slightly raise the fan, fan motor and cooling fan shroud assembly.
3. Release the lower locks of the radiator assembly from the fan, fan motor and cooling fan shroud assembly, and remove the fan, fan motor and cooling fan shroud assembly from the radiator assembly.



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

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

REMOVAL AND INSTALLATION <2.4L ENGINE>

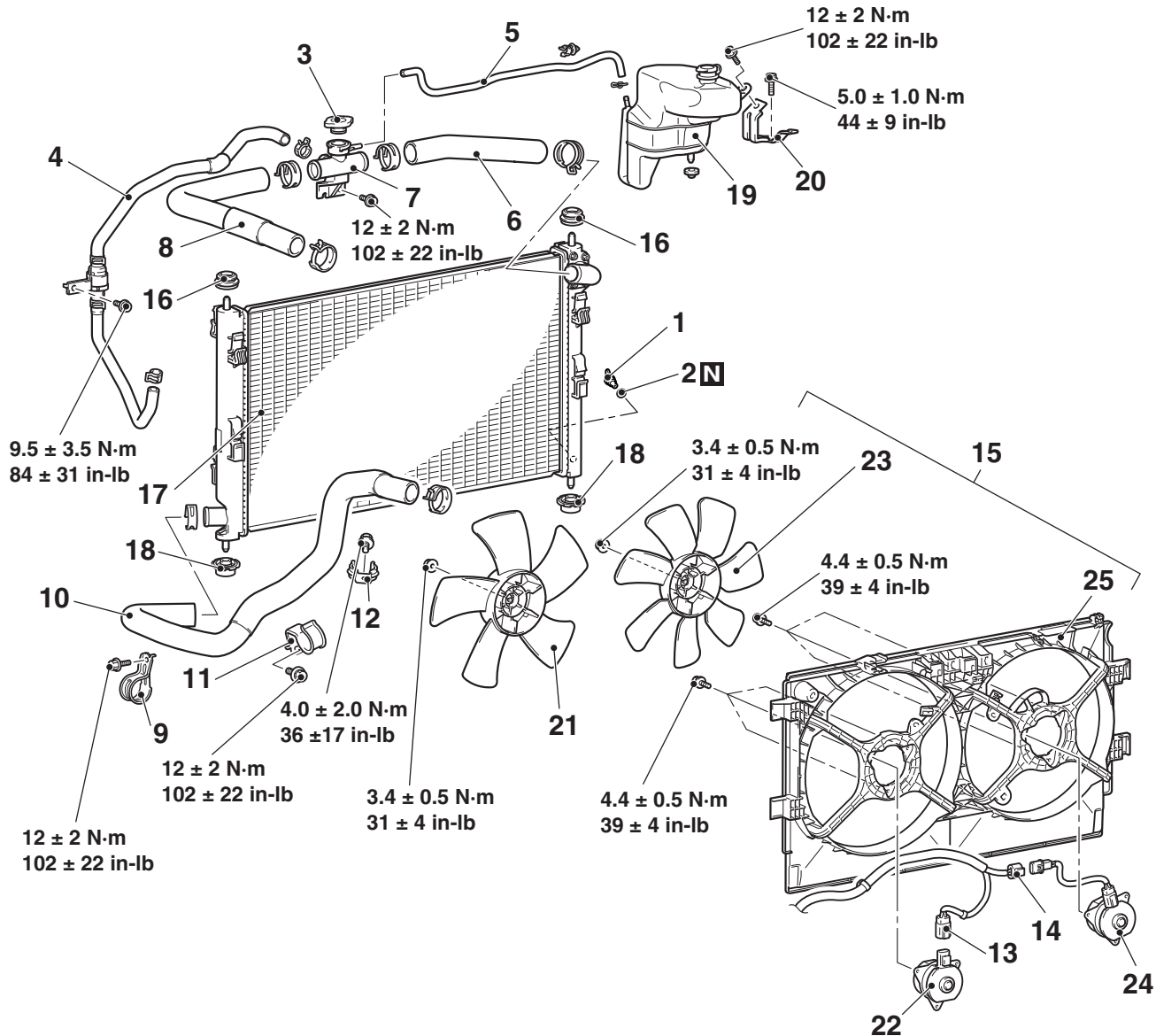
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Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-26.)
- Air Cleaner Assembly Removal (Refer to GROUP 15, Air Cleaner P.15-10.)

Post-installation Operation

- Air Cleaner Assembly Installation (Refer to GROUP 15, Air Cleaner P.15-10.)
- Engine Coolant Refilling and Check (Refer to P.14-26.)



AC901841AB

Radiator removal steps

- Engine Room Under Cover Front A, B (Refer to GROUP 51, Under Cover P.51-20)
1. Radiator drain plug
 2. O-ring
 3. Radiator cap
 4. CVT fluid cooler water feed hose assembly <CVT>
 5. Radiator condenser tank hose
 6. Radiator upper hose
 7. Radiator cap assembly
 8. Radiator upper hose

Radiator removal steps

9. Radiator hose clamp
 10. Radiator lower hose
 11. Radiator hose bracket <M/T>
 12. Radiator hose support <CVT>
 13. Radiator fan motor connector connection
 14. Condenser fan motor connector connection
- Headlight support panel cover (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-5)

<<A>> >>A<<

<<A>> >>A<<

Radiator removal steps

- Hood latch and hood lock release cable (Refer to GROUP 42A, Hood P.42A-7)
- Front impact sensor (Refer to GROUP 52B, Front Impact Sensors P.52B-408)
- Front end upper bar (Refer to GROUP 42A, Loose Panel P.42A-221)

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15. Fan, fan motor and cooling fan shroud assembly
16. Support upper insulator
17. Radiator assembly
18. Support lower insulator
19. Radiator condenser tank
20. Radiator condenser tank bracket

Cooling fan shroud removal steps

4. CVT fluid cooler water feed hose <> assembly <CVT>
5. Radiator condenser tank hose
6. Radiator upper hose
7. Radiator cap assembly

<<A>> >>A<<

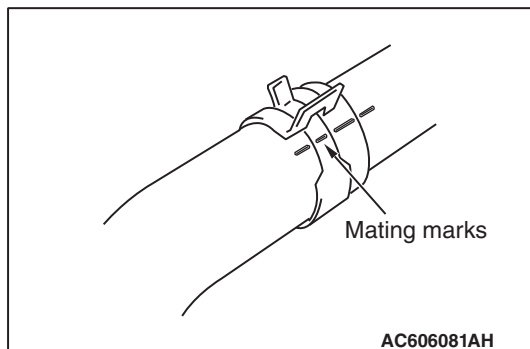
Cooling fan shroud removal steps (Continued)

13. Radiator fan motor connector connection
14. Condenser fan motor connector connection
 - Headlight support panel cover (Refer to GROUP 51, Front Bumper Assembly and Radiator Grille P.51-5)
 - Hood latch and hood lock release cable (Refer to GROUP 42A, Hood P.42A-7)
 - Front impact sensor (Refer to GROUP 52B, Front Impact Sensors P.52B-408)
 - Front end upper bar (Refer to GROUP 42A, Loose Panel P.42A-221)
15. Fan, fan motor and cooling fan shroud assembly
21. Radiator fan
22. Radiator fan motor
23. Condenser fan
24. Condenser fan motor
25. Cooling fan shroud

REMOVAL SERVICE POINTS

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

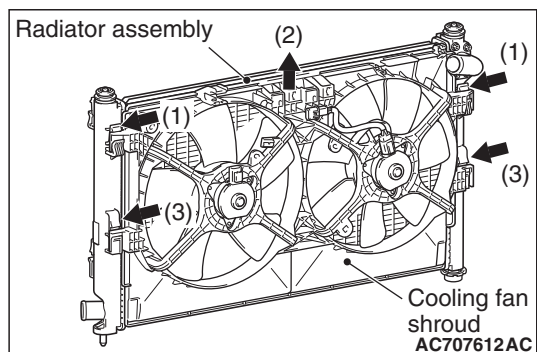
Make mating marks on the radiator hose and the hose clamp as shown to install them in the original position. Then, remove them.



<> FAN, FAN MOTOR AND COOLING FAN SHROUD ASSEMBLY REMOVAL

Remove the fan, fan motor and cooling fan shroud assembly from the radiator assembly according to the following procedure.

1. Release the upper locks of the radiator assembly from the fan, fan motor and cooling fan shroud assembly.
2. Slightly raise the fan, fan motor and cooling fan shroud assembly.

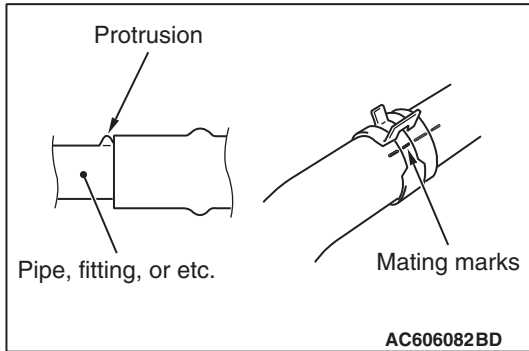


3. Release the lower locks of the radiator assembly from the fan, fan motor and cooling fan shroud assembly, and remove the fan, fan motor and cooling fan shroud assembly from the radiator assembly.

INSTALLATION SERVICE POINT

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

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



NOTES