

GROUP 14

ENGINE COOLING

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GENERAL DESCRIPTION

M1141000100401

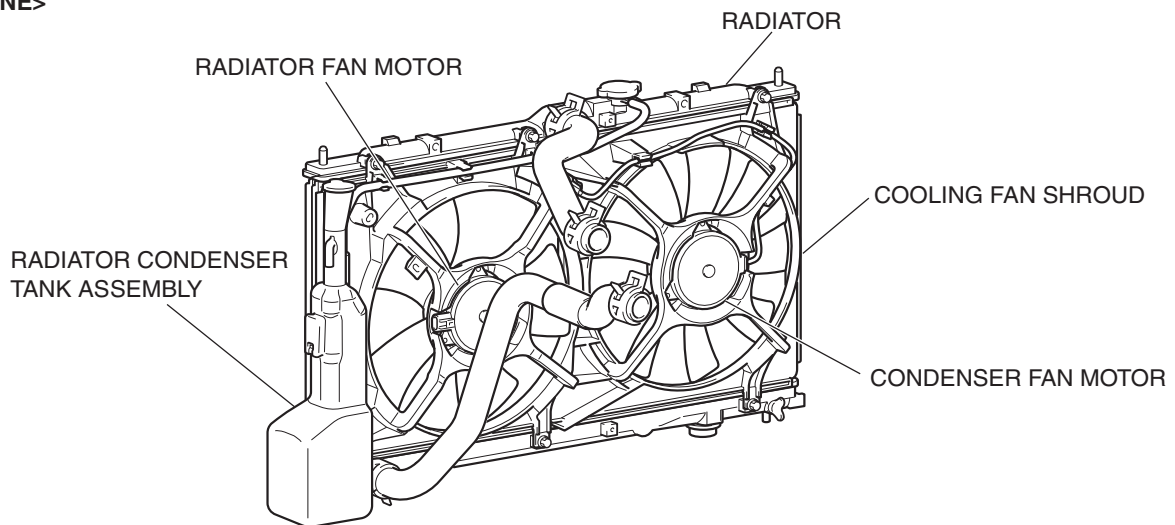
- The cooling system is designed to keep every part of the engine at appropriate temperature in whatever condition the engine may be operated. The cooling method is of the water-cooled, pressure forced circulation type in which the water pump pressurizes coolant and circulates it throughout the engine.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

radiator as well so that the heat absorbed by the coolant may be radiated into the air. The water pump is of the centrifugal type and is driven by the drive belt from the crankshaft. The radiator is the corrugated fin, down flow type.

- PremAir® direct ozone reduction (DOR) radiator has been adopted to vehicle for California emission regulation. A catalyst which depollutes ozone (O₃) in the air has been insufflated to the radiator core. <2.4L Engine>

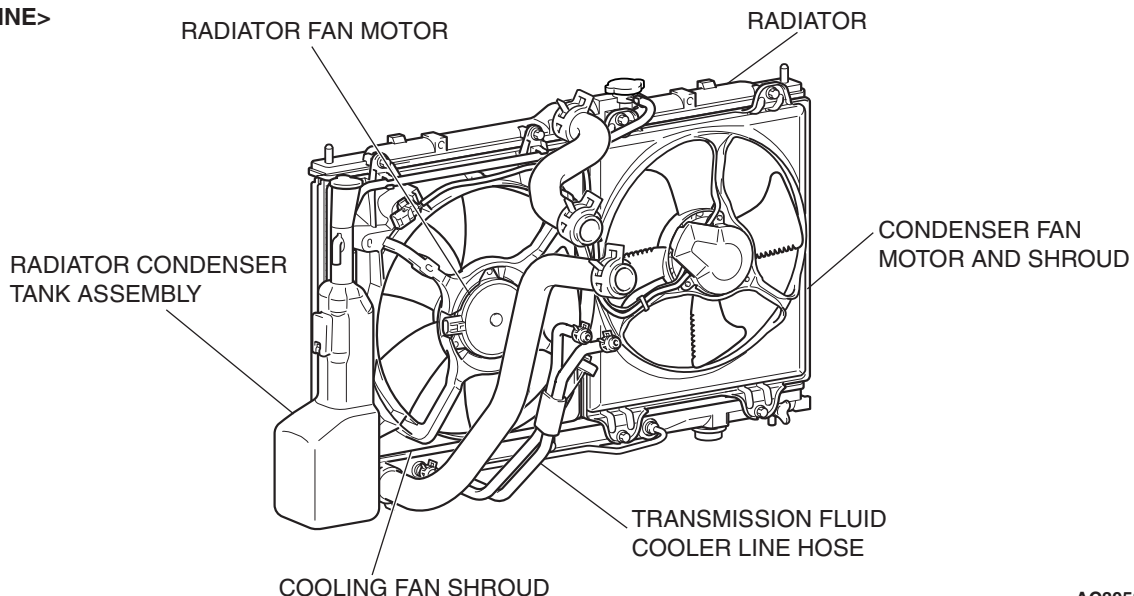
CONSTRUCTION DIAGRAM

<2.4L ENGINE>



AC305835AB

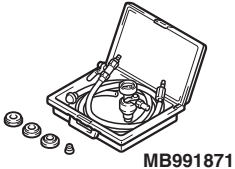
<3.8L ENGINE>



AC305836AB

SPECIAL TOOL

M1141000600279

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 MB991871	MB991871 LLC changer	General service tool	Coolant refilling

ENGINE COOLING DIAGNOSIS

INTRODUCTION

M1141005300347

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

M1141005200340

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

M1141005600393

SYMPTOM	INSPECTION PROCEDURE	REFERENCE PAGE
Coolant Leak	1	P.14-4
Engine Overheating	2	P.14-5

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

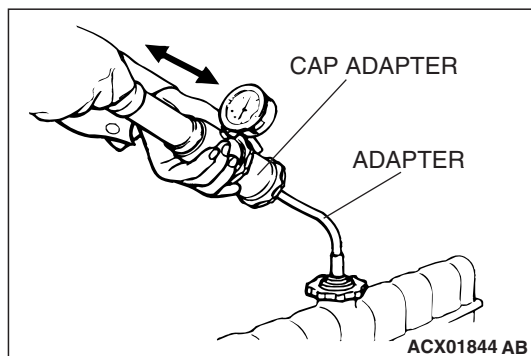
- Be sure to completely clean away any moisture from the places checked.
- When the tester is removed, be careful not to spill any coolant.
- When installing and removing the tester and when testing, be careful not to deform the filler neck of the radiator.

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.14-7](#).

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.

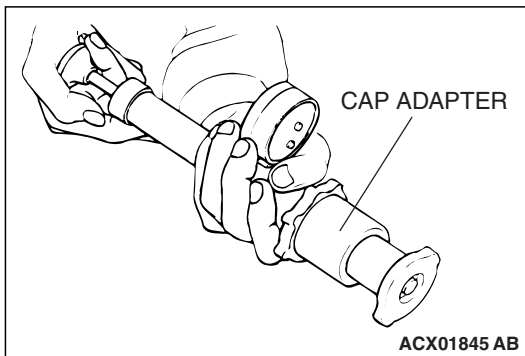
Minimum limit: 83 kPa (12 psi)

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.14-18](#).

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 Belts (Check Condition). <2.4L Engine>[P.00-49](#) , <3.8L Engine>[P.00-49](#) .

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.

ON-VEHICLE SERVICE

ENGINE COOLANT LEAK CHECK

M1141001000333

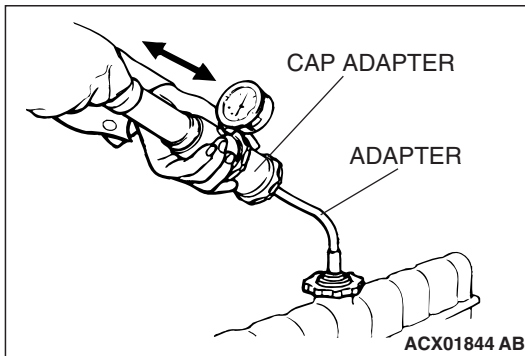
⚠ WARNING

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 PRESSURE CHECK

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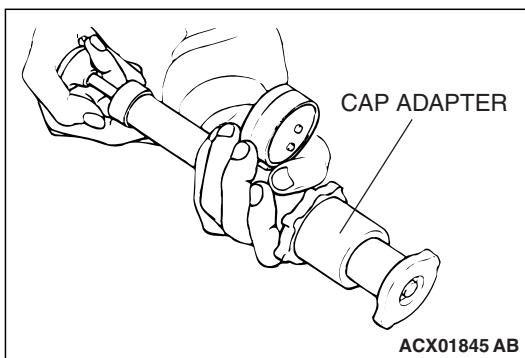
NOTE: Be sure that the cap is clean before testing. Rust or other foreign material on the cap seal will cause an improper reading.

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.



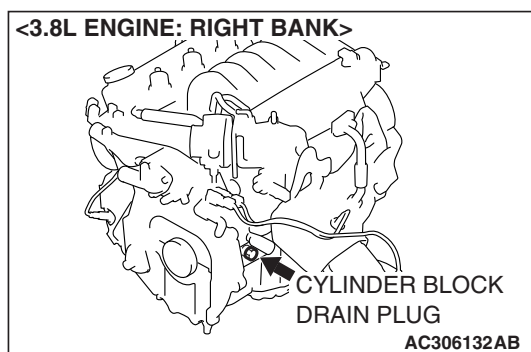
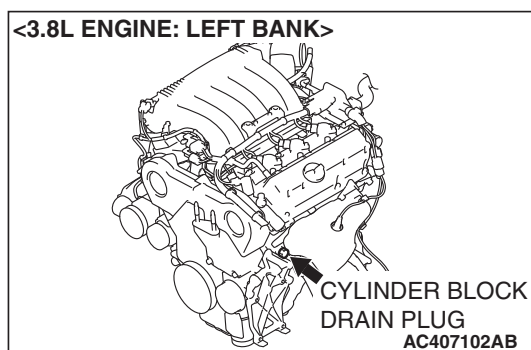
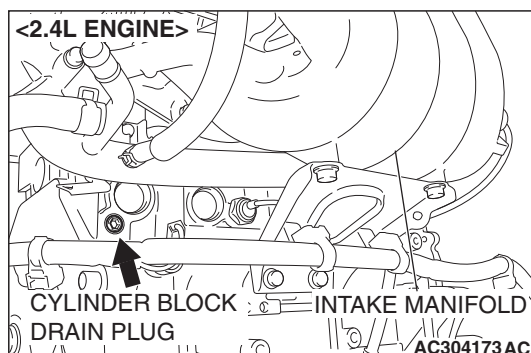
ENGINE COOLANT REPLACEMENT

M1141001202214

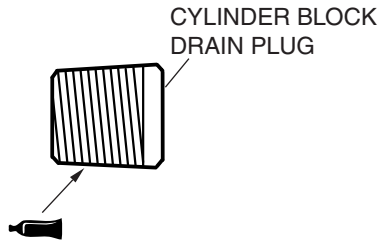
⚠ WARNING

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

1. Drain the water from the radiator, heater core and engine after unplugging the radiator drain plug and removing the radiator cap.
2. Drain the water in the water jacket by unplugging the drain plug of the cylinder block.
3. Remove the radiator condenser tank assembly and drain the coolant.
4. Drain the coolant then clean the path of the coolant by injecting water into the radiator from the radiator cap area.

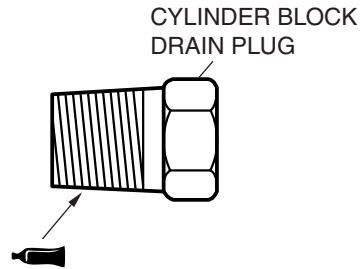


<2.4L ENGINE, 3.8L ENGINE: RIGHT BANK>

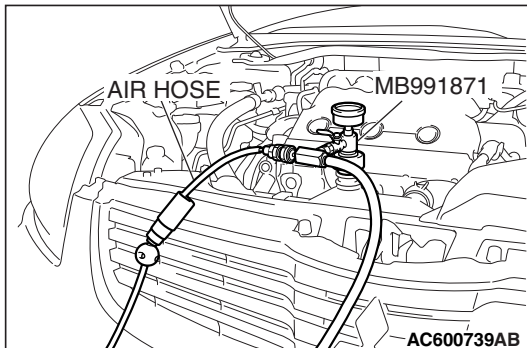


AC304677 AC

<3.8L ENGINE: LEFT BANK>



AC200625 AD



AC600739 AB

5. Apply the designated sealant to the screw area of the cylinder block drain plug.

Specified sealant: 3M™ AAD Part No.8731 or equivalent

NOTE: Install the cylinder block drain plug immediately after applying sealant.

⚠ CAUTION

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

6. Tighten the cylinder block drain plug to the specified torque.

Tightening torque:

<2.4L Engine> $44 \pm 5 \text{ N} \cdot \text{m}$ ($33 \pm 3 \text{ ft} \cdot \text{lb}$)

<3.8L Engine> $39 \pm 5 \text{ N} \cdot \text{m}$ ($29 \pm 3 \text{ ft} \cdot \text{lb}$)

7. Securely tighten the radiator drain plug.

8. 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.
 - If the coolant contact the PremAir® direct ozone reduction (DOR) radiator, wash it with water at once. <Vehicles for California emission regulation> (2.4L Engine)
9. By referring to the section on coolant, select an appropriate concentration for safe operating temperature within the range of 30 to 60 %. Use special tool MB991871 to refill the coolant. A convenient mixture is a 50 % water and 50 % antifreeze solution [freezing point: -31°C (-32.8°F)].

Recommended antifreeze: Long Life Antifreeze Coolant or an equivalent

Quantity:

<2.4L Engine> 8.0 dm^3 (8.5 quarts)

<3.8L Engine> 8.7 dm^3 (9.2 quarts)

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

10. Reinstall the radiator cap.
11. Start the engine and let it warm up until the thermostat opens.
12. After repeatedly revving the engine up to 3,000 r/min several times, stop the engine.
13. 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.

14. Add coolant to the radiator condenser tank assembly between the "F" and "L" mark if necessary.

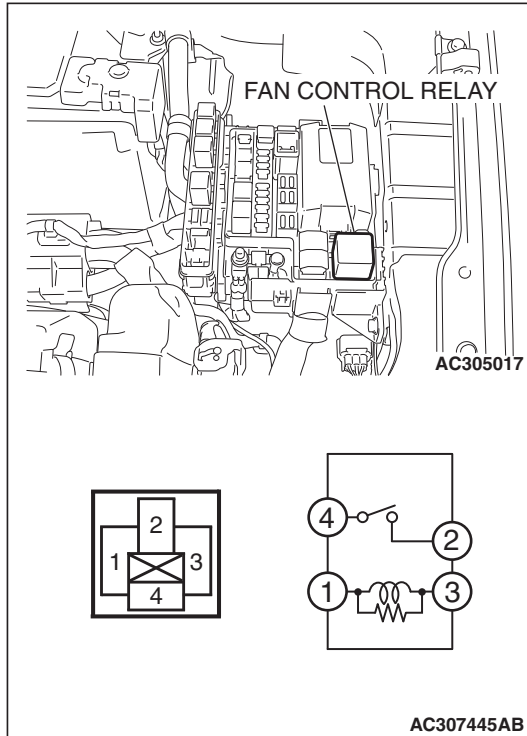
ENGINE COOLANT CONCENTRATION TEST

M1141001100396

Refer to GROUP 00, RECOMMENDED LUBRICANTS AND
LUBRICANT CAPACITIES TABLE [P.00-41](#).

FAN CONTROL RELAY CONTINUITY CHECK

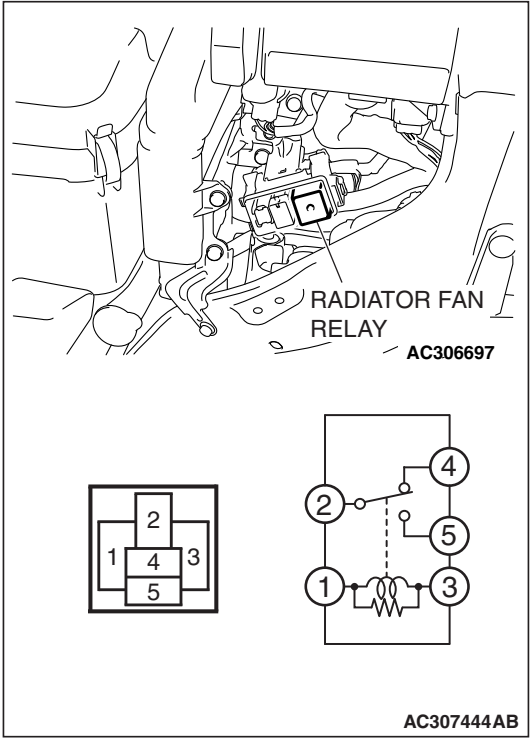
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BATTERY VOLTAGE	TERMINAL NO. TO BE CONNECTED TO TESTER	CONTINUITY TEST RESULTS
Not applied	4 -2	Open circuit
Connect terminal No.3 and battery (-) terminal. Connect terminal No.1 and battery (+) terminal.	4 -2	Continuity (Less than 2 ohms)

RADIATOR FAN RELAY CHECK

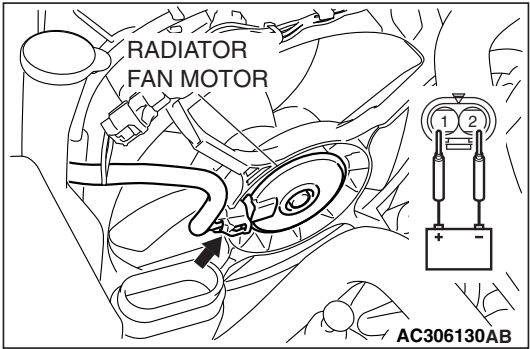
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BATTERY VOLTAGE	TERMINAL NO. TO BE CONNECTED TO TESTER	CONTINUITY TEST RESULTS
Not applied	2 -4	Continuity (Less than 2 ohms)
	2 -5	Open circuit
Connect terminal No.3 and battery (-) terminal. Connect terminal No.1 and battery (+) terminal.	2 -5	Continuity (Less than 2 ohms)

RADIATOR FAN MOTOR CHECK

M1141007100297



1. Remove the radiator fan motor connector.
2. Check to see that the fan motor of the radiator turns when applying battery power between the connector terminals of the radiator fan motor. Also check to see that there is no abnormal sound coming from the radiator fan motor at this time.
3. If the radiator fan motor is defective, replace it (Refer to [P.14-11](#)).

RADIATOR

REMOVAL AND INSTALLATION

M1141001503058

<2.4L ENGINE>

CAUTION

<Vehicles for California emission regulation>

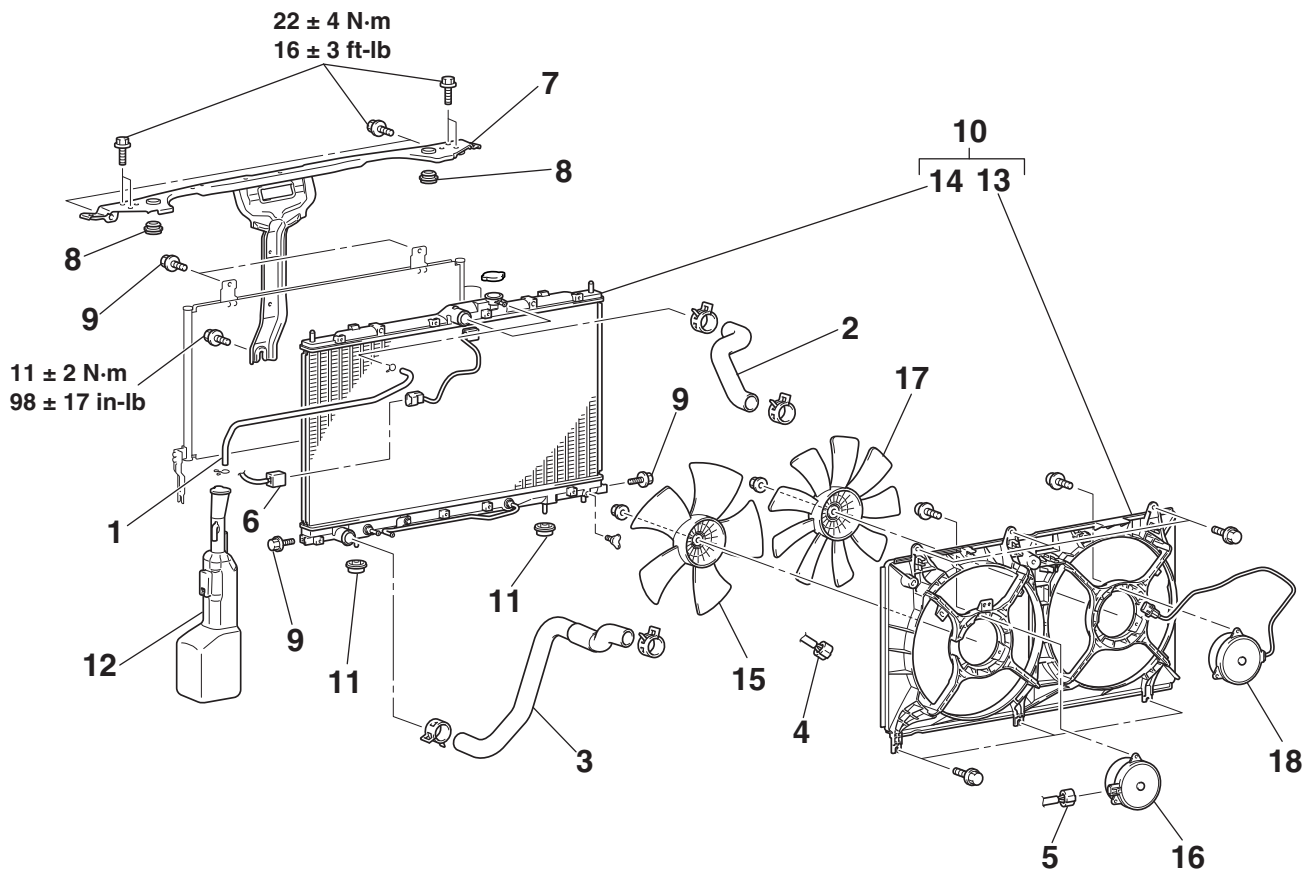
- Never remove the radiator sensor from the radiator because it cannot be disassembled. When replacing the radiator sensor, replace it with the radiator as a set. When the radiator sensor is removed from the radiator, the powertrain control module (PCM) detects an error and sets a diagnostic trouble code.
- Never replace the DOR radiator with the NON-DOR radiator.
- Never clean the DOR radiator with a high concentration of alkaline cleaner.

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-7).
- Air Cleaner Removal (Refer to GROUP 15, Air Cleaner P.15-4).

Post-installation Operation

- Air Cleaner Installation (Refer to GROUP 15, Air Cleaner P.15-4).
- Engine Coolant Refilling and Level Check (Refer to P.14-7).



AC600703AB

RADIATOR REMOVAL STEPS

1. RADIATOR CONDENSER TANK HOSE
2. RADIATOR UPPER HOSE
3. RADIATOR LOWER HOSE
4. CONDENSER FAN MOTOR CONNECTOR

RADIATOR REMOVAL STEPS

5. RADIATOR FAN MOTOR CONNECTOR
6. RADIATOR SENSOR CONNECTOR <DOR RADIATOR>
 - HOOD LATCH (REFER TO GROUP 42, HOOD P.42-8).
7. FRONT END STRUCTURE BAR

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

RADIATOR REMOVAL STEPS

8. UPPER INSULATOR
9. CONDENSER BOLTS
10. RADIATOR ASSEMBLY
11. LOWER INSULATOR
12. RADIATOR CONDENSER TANK ASSEMBLY
13. SHROUD ASSEMBLY
14. RADIATOR

FAN MOTOR REMOVAL STEPS

1. RADIATOR CONDENSER TANK HOSE
2. RADIATOR UPPER HOSE
4. CONDENSER FAN MOTOR CONNECTOR
5. RADIATOR FAN MOTOR CONNECTOR
6. RADIATOR SENSOR CONNECTOR <DOR RADIATOR>
12. RADIATOR CONDENSER TANK ASSEMBLY
13. SHROUD ASSEMBLY
15. RADIATOR FAN
16. RADIATOR FAN MOTOR
17. CONDENSER FAN
18. CONDENSER FAN MOTOR

RADIATOR CONDENSER TANK REMOVAL STEPS

- UNDER COVER (LH)
 - AIR INTAKE DUCT (REFER TO GROUP 15, AIR CLEANER [P.15-4](#)).
1. RADIATOR CONDENSER TANK HOSE
 4. CONDENSER FAN MOTOR CONNECTOR
 5. RADIATOR FAN MOTOR CONNECTOR
 6. RADIATOR SENSOR CONNECTOR <DOR RADIATOR>
 12. RADIATOR CONDENSER TANK ASSEMBLY

<<A>> >>A<<

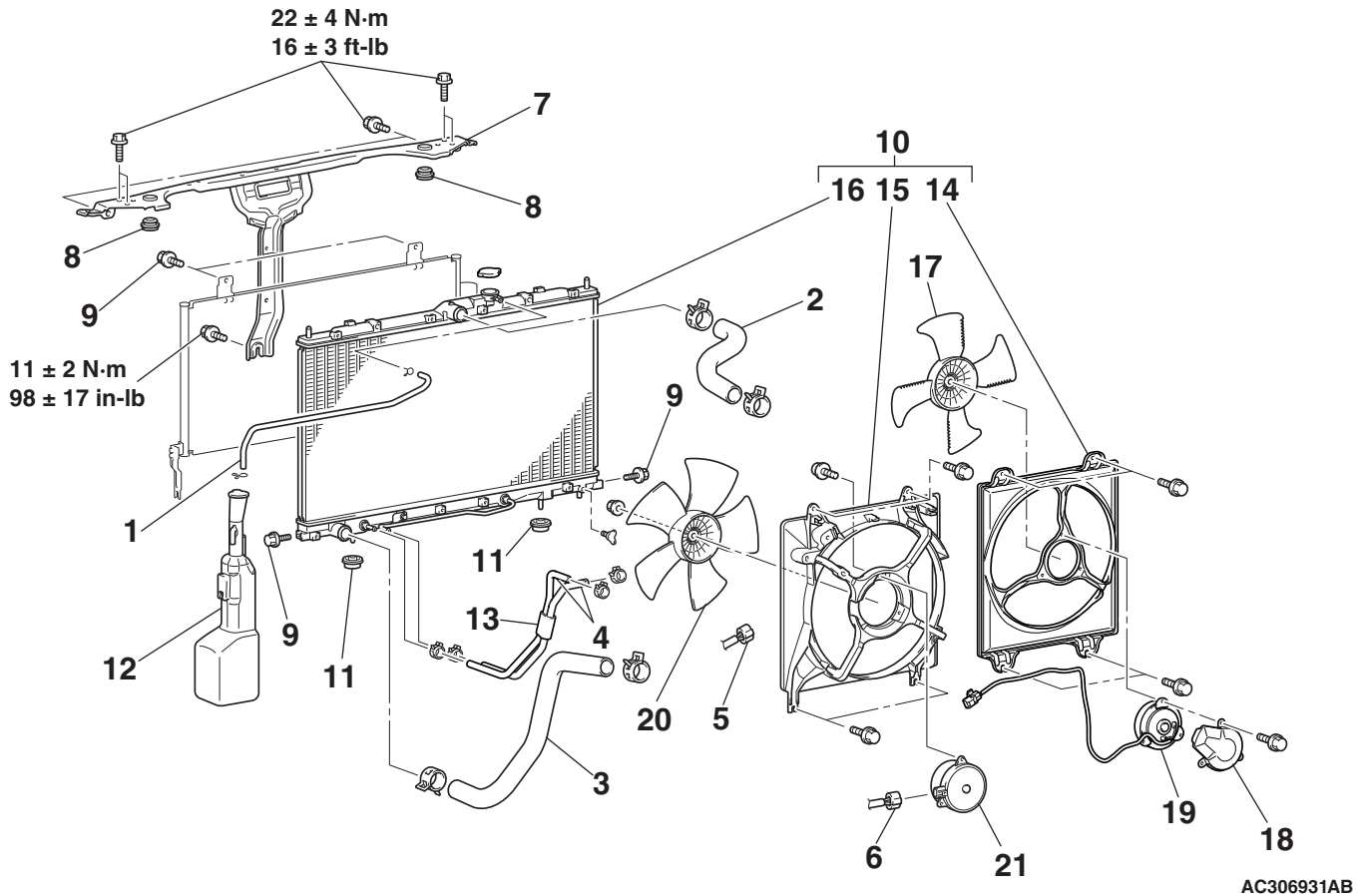
<3.8L ENGINE>

Pre-removal Operation

- Engine Coolant Draining (Refer to P.14-7).
- Air Cleaner Removal (Refer to GROUP 15, Air Cleaner P.15-4).

Post-installation Operation

- Air Cleaner Installation (Refer to GROUP 15, Air Cleaner P.15-4).
- Engine Coolant Refilling and Level Check (Refer to P.14-7).
- A/T Fluid Refilling and Level Check (Refer to GROUP 00, Maintenance Service P.00-52).



AC306931AB

RADIATOR REMOVAL STEPS

- <<A>> >>A<<
<<A>> >>A<<
<>
1. RADIATOR CONDENSER TANK HOSE
 2. RADIATOR UPPER HOSE
 3. RADIATOR LOWER HOSE
 4. A/T OIL COOLER HOSE CONNECTION
 5. CONDENSER FAN MOTOR CONNECTOR
 6. RADIATOR FAN MOTOR CONNECTOR
 - HOOD LATCH (REFER TO GROUP 42, HOOD P.42-8).
 7. FRONT END STRUCTURE BAR
 8. UPPER INSULATOR
 9. CONDENSER BOLTS
 10. RADIATOR ASSEMBLY
 11. LOWER INSULATOR
 12. RADIATOR CONDENSER TANK ASSEMBLY
 13. A/T OIL COOLER HOSE

RADIATOR REMOVAL STEPS

14. CONDENSER FAN SHROUD ASSEMBLY
 15. COOLING FAN SHROUD ASSEMBLY
 16. RADIATOR
- FAN MOTOR REMOVAL STEPS**
1. RADIATOR CONDENSER TANK HOSE
 2. RADIATOR UPPER HOSE
 5. CONDENSER FAN MOTOR CONNECTOR
 6. RADIATOR FAN MOTOR CONNECTOR
 12. RADIATOR CONDENSER TANK ASSEMBLY
 14. CONDENSER FAN SHROUD ASSEMBLY
 15. COOLING FAN SHROUD ASSEMBLY
 17. CONDENSER FAN

FAN MOTOR REMOVAL STEPS

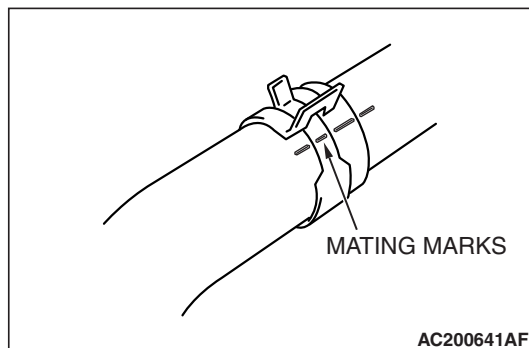
18. HEAT PROTECTOR
19. CONDENSER FAN MOTOR
20. RADIATOR FAN
21. RADIATOR FAN MOTOR

**RADIATOR CONDENSER TANK
REMOVAL STEPS**

- UNDER COVER (LH)
 - AIR INTAKE DUCT (REFER TO GROUP 15, AIR CLEANER P.15-4).
1. RADIATOR CONDENSER TANK HOSE
 5. CONDENSER FAN MOTOR CONNECTOR
 6. RADIATOR FAN MOTOR CONNECTOR
 12. RADIATOR CONDENSER TANK ASSEMBLY

REMOVAL SERVICE POINTS**<<A>> RADIATOR HOSE REMOVAL**

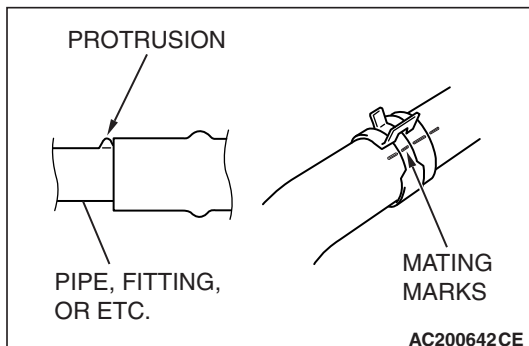
Make mating marks on the radiator hose and the hose clip as shown to install them in the original position. Disconnect the radiator hose.

**<> A/T OIL COOLER HOSE REMOVAL**

After removing the hose from the radiator, plug the hose and the radiator nipple to prevent dust or foreign particles from getting in.

INSTALLATION SERVICE POINT**>>A<< RADIATOR HOSE INSTALLATION**

1. Insert radiator hose as far as the protrusion of the pipe.
2. Align the mating marks on the radiator hose and hose clip, and then connect the radiator hose.



THERMOSTAT

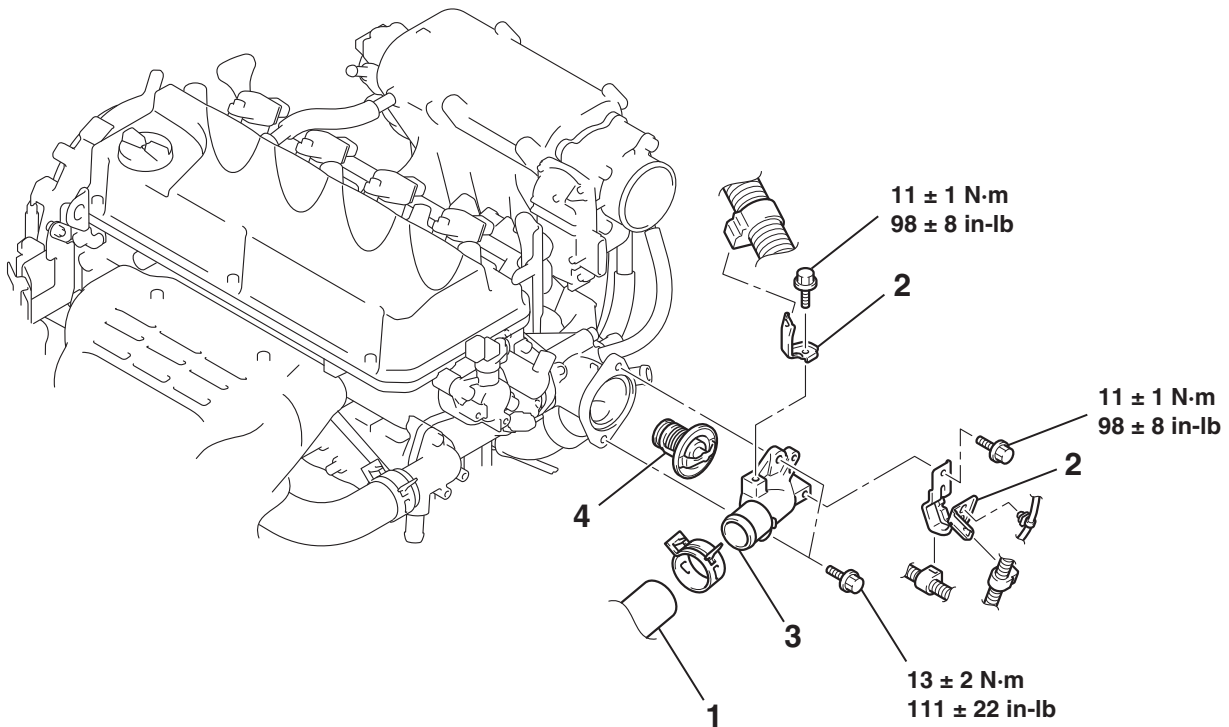
REMOVAL AND INSTALLATION

M1141002402620

<2.4L ENGINE>

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Refilling (Refer to [P.14-7](#)).
- Powertrain Control Module (PCM) Removal and Installation (Refer to GROUP 13A, Powertrain Control Module (PCM) [P.13A-1236](#)).
- Air Cleaner Cover and Air Intake Hose Removal and Installation (Refer to GROUP 15, Air Cleaner [P.15-4](#)).
- Battery and Battery Tray Removal and Installation.



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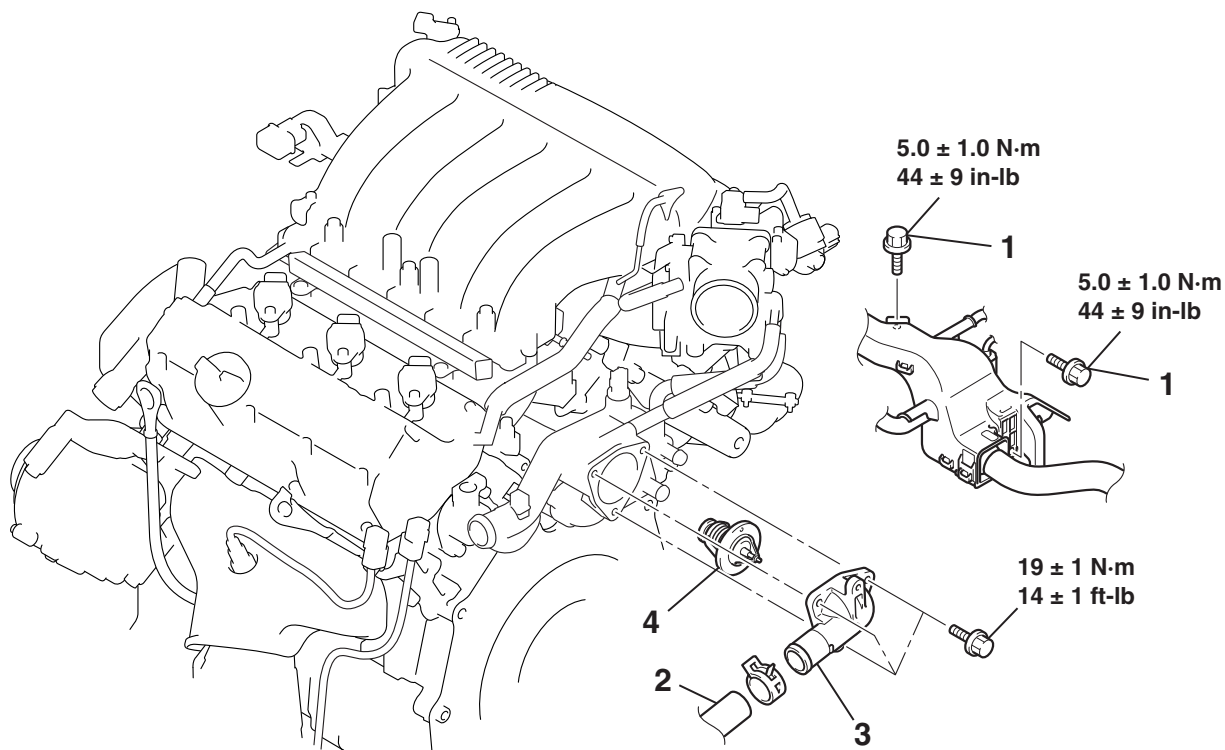
- <<A>> >>B<<
- REMOVAL STEPS**
1. RADIATOR LOWER HOSE CONNECTION
 2. HARNESS BRACKET

- >>A<<
- REMOVAL STEPS (Continued)**
3. WATER INLET FITTING
 4. THERMOSTAT

<3.8L ENGINE>

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Refilling (Refer to [P.14-7](#)).
- Engine Cover Removal and Installation (Refer to GROUP 11E, Engine Assembly [P.11E-22](#)).
- Powertrain Control Module (PCM) Removal and Installation (Refer to GROUP 13B, Powertrain Control Module (PCM) [P.13B-1264](#)).
- Air Cleaner Removal and Installation (Refer to GROUP 15, Air Cleaner [P.15-4](#)).
- Strut Tower Bar Removal and Installation (Refer to GROUP 42, Strut Tower Bar [P.42-14](#)).
- Battery and Battery Tray Removal and Installation



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REMOVAL STEPS

- <<A>> >>B<<
1. HARNESS CONNECTION BOLTS
 2. RADIATOR LOWER HOSE CONNECTION

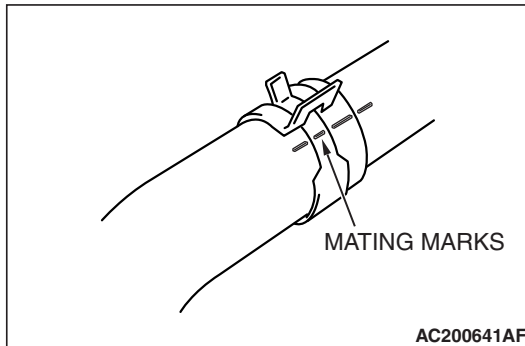
REMOVAL STEPS (Continued)

- >>A<<
3. WATER INLET FITTING
 4. THERMOSTAT

REMOVAL SERVICE POINT

<<A>> RADIATOR LOWER HOSE DISCONNECTION

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



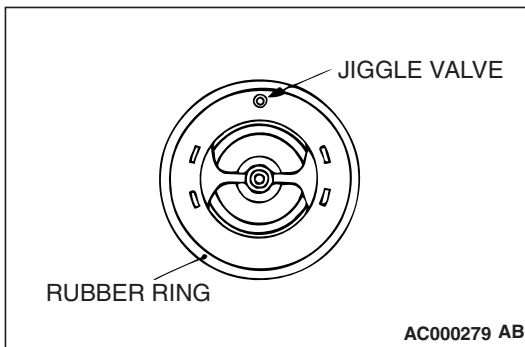
INSTALLATION SERVICE POINTS

>>A<< THERMOSTAT INSTALLATION

CAUTION

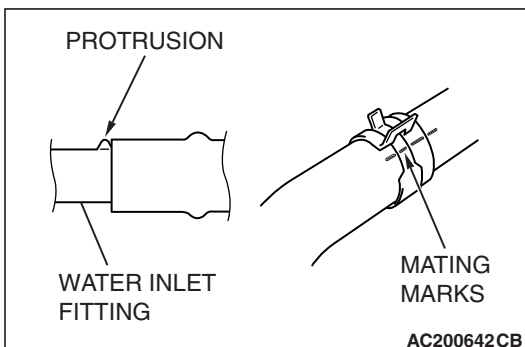
Make absolutely sure that no oil adheres to the rubber ring of the thermostat. Also do not fold or scratch the rubber ring during installation.

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



>>B<< RADIATOR LOWER HOSE CONNECTION

1. Insert radiator lower hose as far as the protrusion of the water inlet fitting.
2. Align the mating marks on the radiator lower hose and hose clip, and then connect the radiator lower hose.

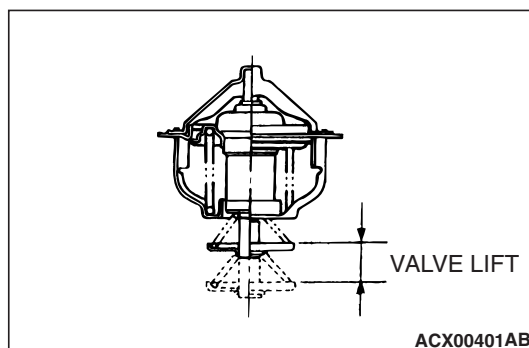
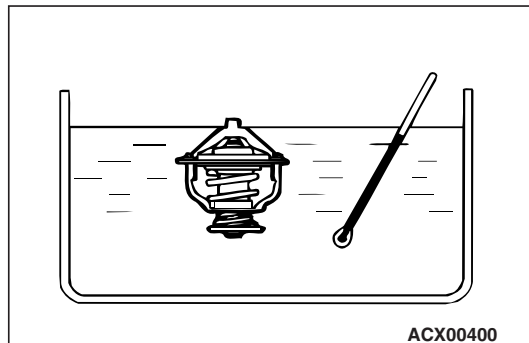


INSPECTION

M1141002501516

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:**<2.4L Engine> $87 \pm 1.5^{\circ}\text{C}$ ($189 \pm 3^{\circ}\text{F}$)<3.8L Engine> $88 \pm 1.5^{\circ}\text{C}$ ($190 \pm 3^{\circ}\text{F}$)

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:**<2.4L Engine> 95°C (203°F)<3.8L Engine> 100°C (212°F)**Amount of valve lift:**

<2.4L Engine> 8.5 mm (0.33 inch) or more

<3.8L Engine> 9.0 mm (0.35 inch) or more

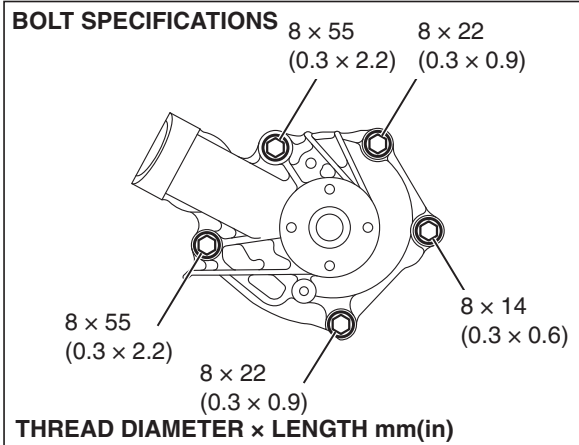
WATER PUMP

REMOVAL AND INSTALLATION <2.4L ENGINE>

M1141002700487

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Refilling (Refer to [P.14-7](#)).
- Timing Belt Removal and Installation (Refer to GROUP 11A, Timing Belt [P.11A-51](#)).



14 ± 1 N·m
120 ± 13 in-lb

1

N 2

N 3

14 ± 1 N·m
120 ± 13 in-lb

AC306675AB

REMOVAL STEPS

1. WATER PUMP

REMOVAL STEPS (Continued)

2. WATER PUMP GASKET
 3. O-RING
- >>A<<

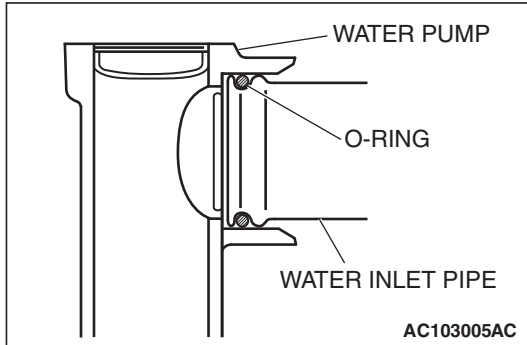
INSTALLATION SERVICE POINT

>>A<< O-RING INSTALLATION

⚠ CAUTION

Do not let the O-ring get contaminated with grease or engine oil.

Fit an O-ring into the O-ring groove located at the end of the water inlet pipe and apply water or coolant to the O-ring or the inside of the mounting surface of the water pump for insertion.

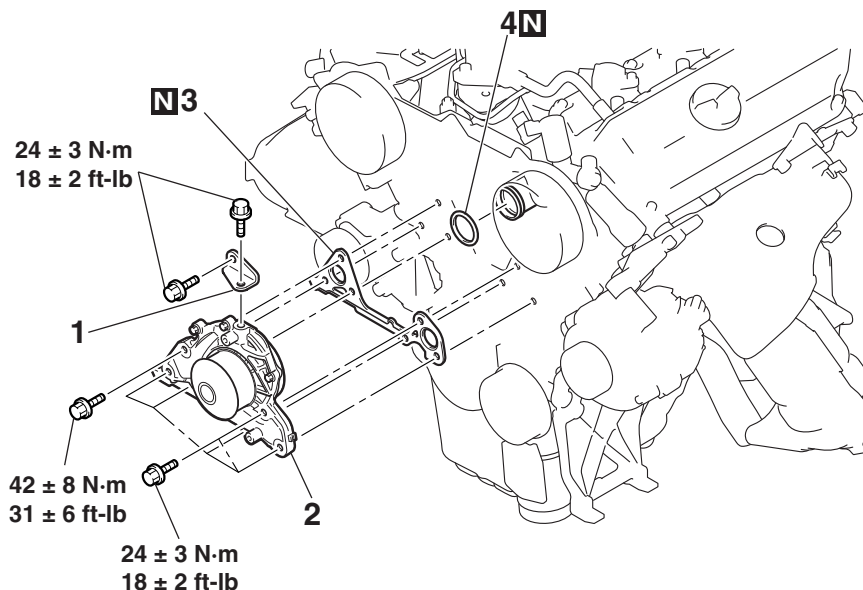


REMOVAL AND INSTALLATION <3.8L ENGINE>

M1141002702579

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Refilling (Refer to P.14-7).
- Timing Belt Removal and Installation (Refer to GROUP 11E, Timing Belt P.11E-58).
- Crankshaft Position Sensor Removal and Installation (Refer to GROUP 16, Crankshaft Position Sensor P.16-44).

**REMOVAL STEPS**

1. WATER PUMP BRACKET
2. WATER PUMP

BOLT SPECIFICATIONS

10 × 38
(0.4 × 1.5)

8 × 25
(0.3 × 1.0)

8 × 25
(0.3 × 1.0) 8 × 20
(0.3 × 0.8)

THREAD DIAMETER × LENGTH mm (in)

AC406186AB

REMOVAL STEPS (Continued)

3. WATER PUMP GASKET
- >>A<< 4. O-RING

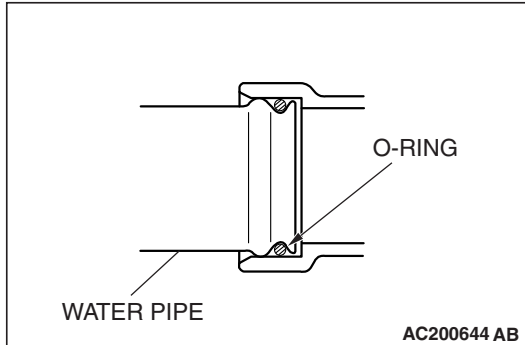
INSTALLATION SERVICE POINT

>>A<< O-RING INSTALLATION

⚠ CAUTION

Do not let the O-ring get contaminated with grease or engine oil.

Fit the O-ring into the groove of the water pipe ends, and apply water or coolant to the circumference of the O-ring and the pipe bores to insert the pipe assembly.



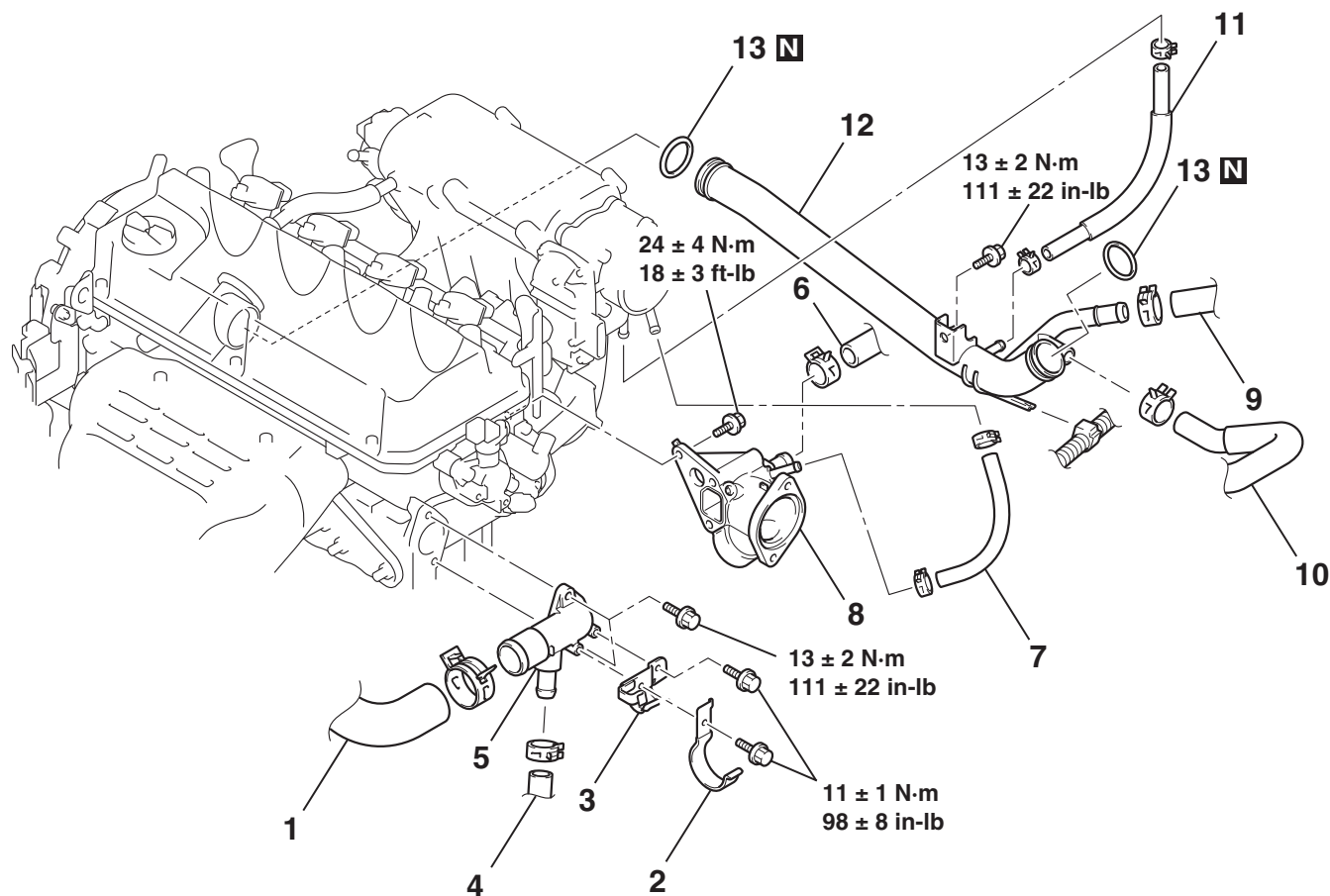
WATER HOSE AND WATER PIPE

REMOVAL AND INSTALLATION <2.4L ENGINE>

M1141003303232

Pre-removal and Post-installation Operation

- Engine Coolant Draining and Refilling (Refer to P.14-7).
- Powertrain Control Module (PCM) Removal and Installation (Refer to GROUP 13A, Powertrain Control Module (PCM) P.13A-1236).
- Air Cleaner Removal and Installation (Refer to GROUP 15, Air Cleaner P.15-4).
- Thermostat Removal and Installation (Refer to P.14-15).



AC306676AB

REMOVAL STEPS

- <<A>> >>C<<
1. RADIATOR UPPER HOSE CONNECTION
 2. RADIATOR LOWER HOSE CLAMP
 3. WATER HOSE CLAMP
 4. WATER COOLER HOSE CONNECTION
- >>B<<
5. WATER OUTLET FITTING
 6. HEATER WATER HOSE CONNECTION

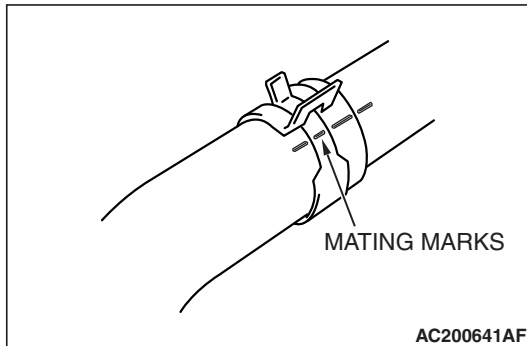
REMOVAL STEPS (Continued)

- >>B<<
7. WATER HOSE
 8. THERMOSTAT CASE
 9. HEATER WATER HOSE CONNECTION
 10. WATER COOLER HOSE CONNECTION
 11. WATER HOSE
 12. WATER INLET PIPE
- >>A<<
13. O-RING

REMOVAL SERVICE POINT

<<A>> RADIATOR UPPER HOSE DISCONNECTION

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



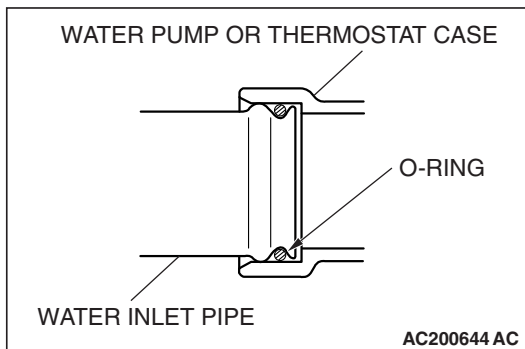
INSTALLATION SERVICE POINTS

>>A<< O-RINGS INSTALLATION

CAUTION

Do not let the O-ring get contaminated with grease or engine oil.

Fit an O-ring into the groove of the water inlet pipe and apply water or coolant to the circumference of the O-ring or the inside of the mounting surface of the water pump or thermostat case for insertion.

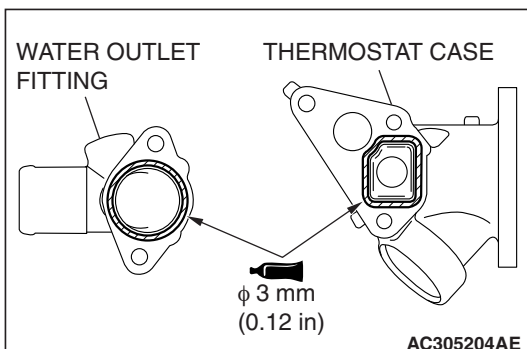


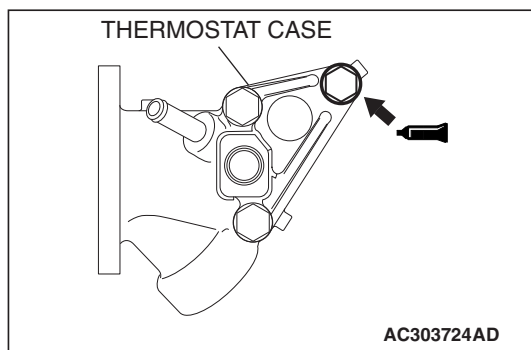
>>B<< THERMOSTAT CASE/WATER OUTLET FITTING INSTALLATION

1. Use a gasket scraper or wire brush to completely eliminate all gasket material on the gasket mounting surface.
2. Apply a bead of the sealant to the cylinder head mating surface of the thermostat case or water outlet fitting as shown.

Specified sealant: 3M™ AAD Part No.8672, 3M™ AAD Part No.8679/8678 or equivalent

NOTE: Install the thermostat case or water outlet fitting immediately after applying sealant.





3. Apply sealant to the thread of the thermostat case mounting bolt as shown.

Specified sealant: 3M™ AAD Part No.8730, 8731 or equivalent

NOTE: Install the thermostat case mounting bolt immediately after applying sealant.

⚠ CAUTION

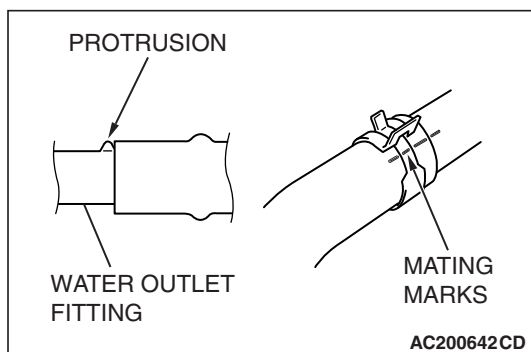
After the installation, until a sufficient period of time (one hour or more) elapses, do not apply the engine oil or water to the sealant application area or start the engine.

4. Tighten the mounting bolts to the specified torque.

Tightening torque:

<Thermostat case> $24 \pm 4 \text{ N} \cdot \text{m}$ ($18 \pm 3 \text{ ft-lb}$)

<Water outlet fitting> $13 \pm 2 \text{ N} \cdot \text{m}$ ($111 \pm 22 \text{ in-lb}$)



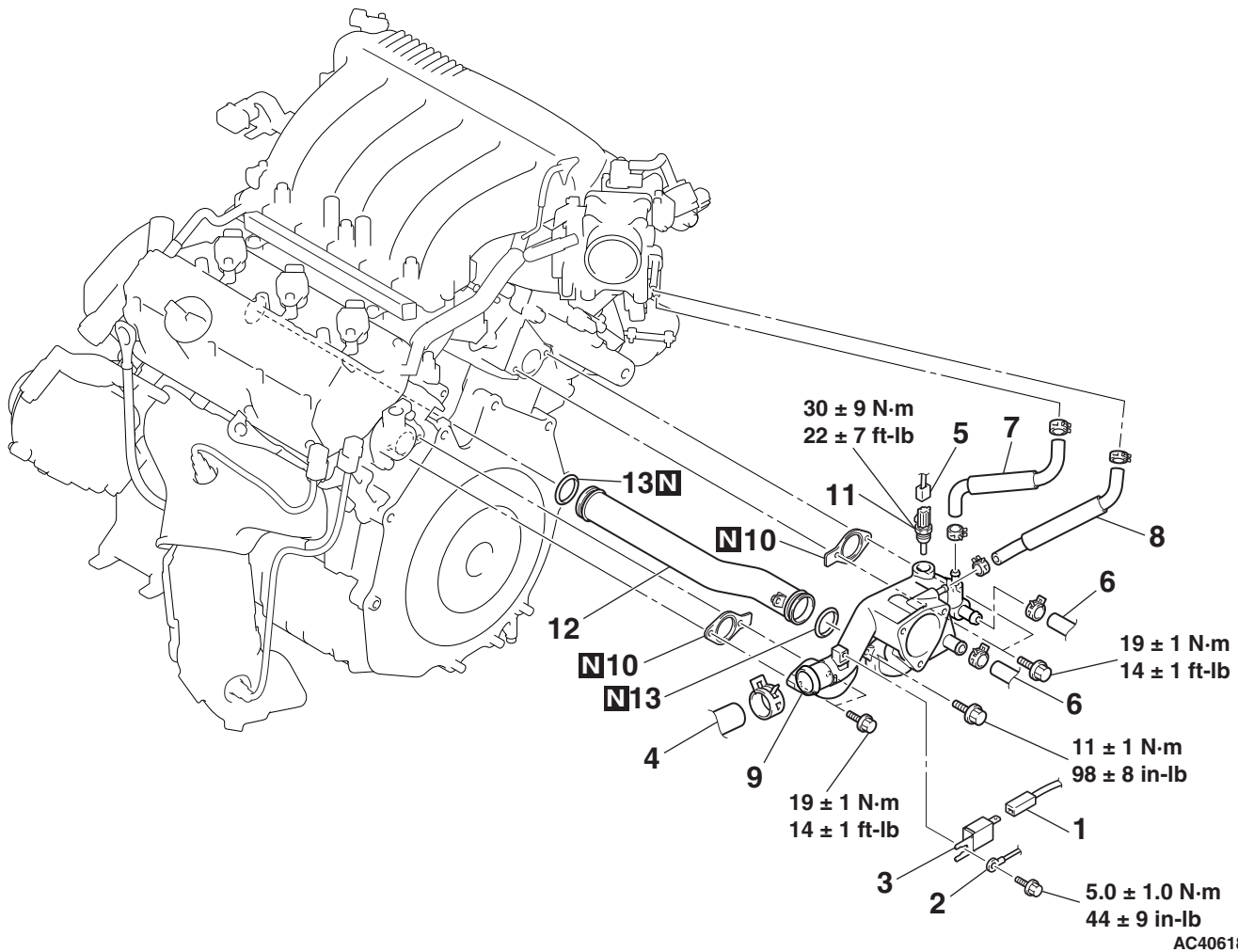
>>C<< RADIATOR UPPER HOSE CONNECTION

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

REMOVAL AND INSTALLATION <3.8L ENGINE>

M1141003303243

Pre-removal and Post-installation Operation
Thermostat Removal and Installation (Refer to P.14-15).



AC406187AB

REMOVAL STEPS

- <<A>> >>C<<
1. CAPACITOR CONNECTOR
 2. GROUNDING CONNECTION
 3. CAPACITOR
 4. RADIATOR UPPER HOSE CONNECTION
 5. ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR
 6. HEATER HOSE CONNECTION

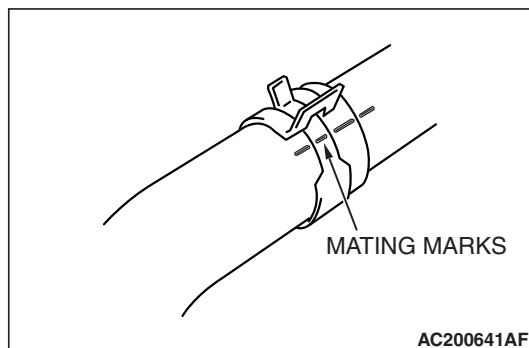
REMOVAL STEPS (Continued)

- >>B<<
7. THROTTLE BODY WATER FEED HOSE
 8. THROTTLE BODY WATER RETURN HOSE
 9. THERMOSTAT HOUSING
 10. GASKET
 11. ENGINE COOLANT TEMPERATURE SENSOR
 12. WATER INLET PIPE
 13. O-RING
- >>A<<

REMOVAL SERVICE POINT

<<A>> RADIATOR UPPER HOSE DISCONNECTION

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



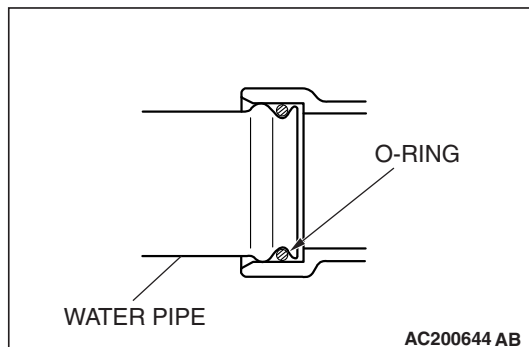
INSTALLATION SERVICE POINTS

>>A<< O-RING INSTALLATION

CAUTION

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

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



>>B<< ENGINE COOLANT TEMPERATURE SENSOR INSTALLATION

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

Specified sealant: 3M™ AAD Part No. 8731 or equivalent

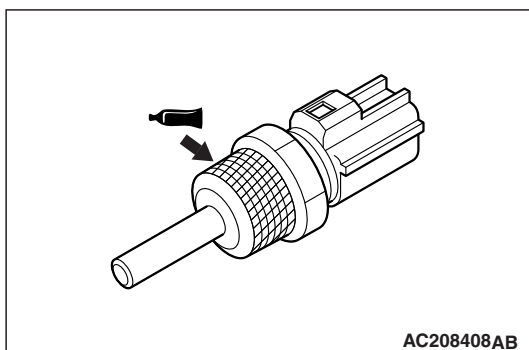
NOTE: Install the engine coolant temperature sensor immediately after applying sealant.

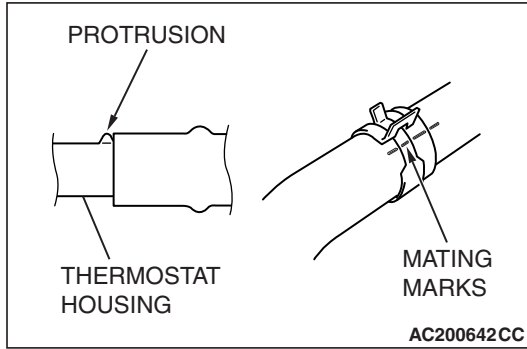
CAUTION

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

2. 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 far as the protrusion of the thermostat housing.
2. Align the mating marks on the radiator upper hose and hose clip, and then connect the radiator upper hose.

INSPECTION

M1141003400337

Water Pipe and Hose Check

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

SPECIFICATIONS**FASTENER TIGHTENING SPECIFICATIONS**

M1141005000421

ITEM		SPECIFICATION
Cylinder block drain plug <2.4L Engine>		44 ± 5 N· m (33 ± 3 ft-lb)
Cylinder block drain plug <3.8L Engine>		39 ± 5 N· m (29 ± 3 ft-lb)
Radiator		
Front end structure bar bolt	M8 × 10	11 ± 2 N· m (98 ± 17 in-lb)
	M8 × 20	22 ± 4 N· m (16 ± 3 ft-lb)
Thermostat <2.4L ENGINE>		
Harness bracket bolt		11 ± 1 N· m (98 ± 8 in-lb)
Water inlet fitting bolt		13 ± 2 N· m (111 ± 22 in-lb)
Thermostat <3.8L ENGINE>		
Control harness bolt		5.0 ± 1.0 N· m (44 ± 9 in-lb)
Water inlet fitting bolt		19 ± 1 N· m (14 ± 1 ft-lb)
Water hose and water pipe <2.4L ENGINE>		
Radiator lower hose clamp bolt		11 ± 1 N· m (98 ± 8 in-lb)
Thermostat case bolt		24 ± 4 N· m (18 ± 3 ft-lb)
Water hose clamp bolt		11 ± 1 N· m (98 ± 8 in-lb)
Water inlet pipe bolt		13 ± 2 N· m (111 ± 22 in-lb)
Water outlet fitting bolt		13 ± 2 N· m (111 ± 22 in-lb)
Water hose and water pipe <3.8L ENGINE>		
Capacitor bolt		5.0 ± 1.0 N· m (44 ± 9 in-lb)
Engine coolant temperature sensor		30 ± 9 N· m (22 ± 7 ft-lb)
Thermostat housing bolt		19 ± 1 N· m (14 ± 1 ft-lb)

ITEM		SPECIFICATION
Water pump inlet pipe		11 ± 1 N·m (98 ± 8 in-lb)
Water pump <2.4L ENGINE>		
Water pump bolt		14 ± 1 N·m (120 ± 13 in-lb)
Water pump <3.8L ENGINE>		
Water pump bolt	M8	24 ± 3 N·m (18 ± 2 ft-lb)
	M10	42 ± 8 N·m (31 ± 6 ft-lb)
Water pump bracket bolt		24 ± 3 N·m (18 ± 2 ft-lb)

SERVICE SPECIFICATIONS

M1141000301602

ITEM				STANDARD VALUE	LIMIT
Valve opening pressure of radiator cap kPa (psi)				93 – 123 (14 – 18)	Minimum 83 (12)
Thermostat	Valve opening temperature of thermostat °C (°F)	2.4L Engine		87 ± 1.5 (189 ± 3)	-
		3.8L Engine		88 ± 1.5 (190 ± 3)	-
	Full-opening temperature of thermostat °C (°F)	2.4L Engine		95 (203)	-
		3.8L Engine		100 (212)	-
	Valve lift mm (in)	2.4L Engine		8.5 (0.33) or more	-
		3.8L Engine		9.0 (0.35) or more	-

CAPACITIES

M1141005100161

ITEM		QUANTITY dm ³ (qt)
Long life antifreeze coolant or an equivalent	2.4L Engine	8.0 (8.5)
	3.8L Engine	8.7 (9.2)

SEALANTS

M1141000500368

<2.4L ENGINE>

ITEM	SPECIFIED SEALANT
Cylinder block drain plug	3M™ AAD Part No.8731 or equivalent
Thermostat case	3M™ AAD Part No.8672, 3M™ AAD Part No.8679/8678 or equivalent
Water outlet fitting	
Thermostat case bolt	3M™ AAD Part No. 8730, 8731 or equivalent

<3.8L ENGINE>

ITEM	SPECIFIED SEALANT
Cylinder block drain plug	3M™ AAD Part No.8731 or equivalent
Engine coolant temperature sensor	