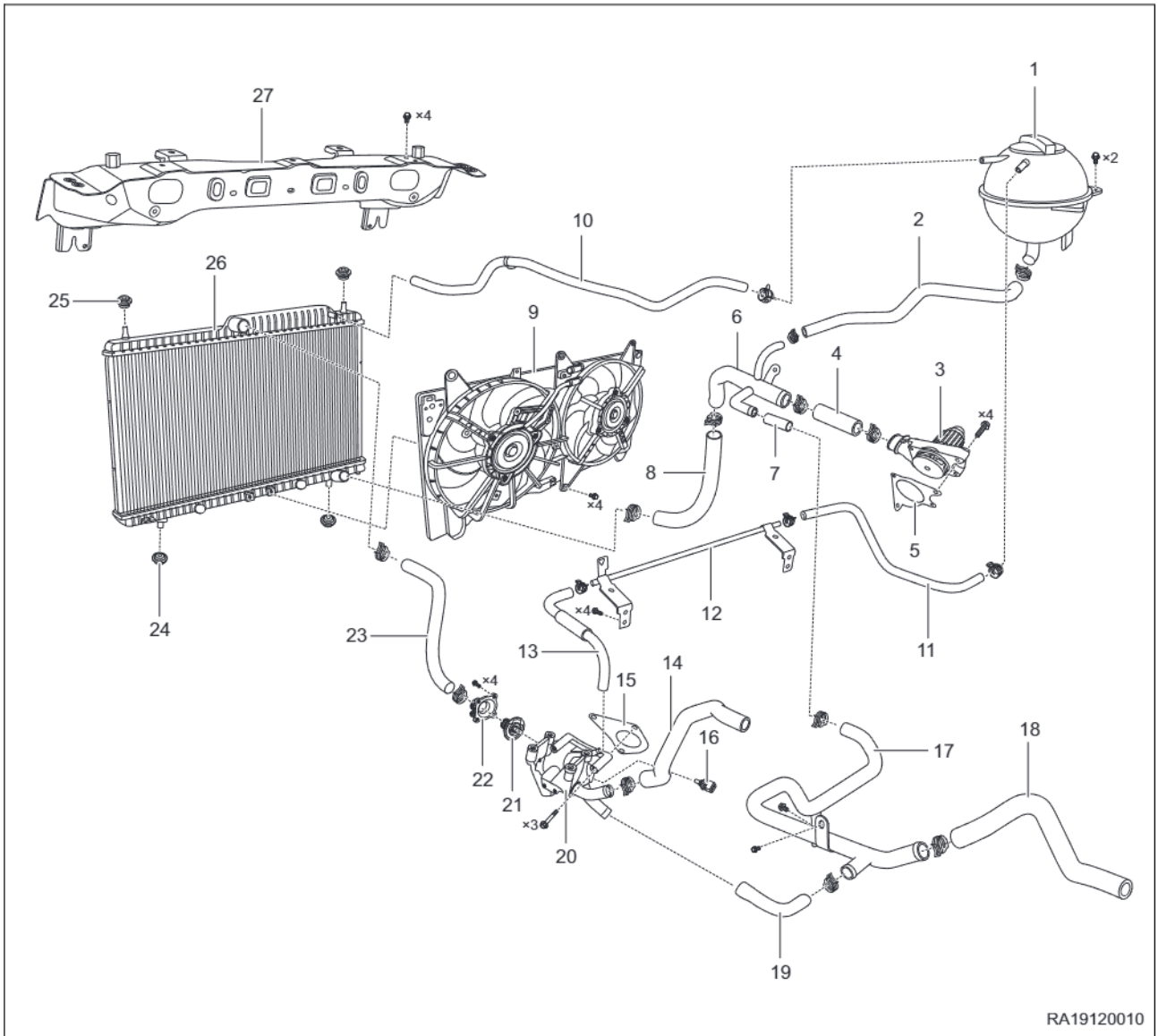


SQR477F COOLING SYSTEM

GENERAL INFORMATION	12-3	Thermostat	12-18
Description	12-3	Removal	12-18
Specifications	12-5	Inspection	12-19
Tools	12-6	Installation	12-20
Cooling System Operation Flowchart	12-7	Thermostat Seat	12-21
Circuit Diagram	12-9	Removal	12-21
DIAGNOSIS & TESTING	12-11	Installation	12-22
Problem Symptoms Table	12-11	Cooling Fan Assembly	12-23
Cooling System Pressure Test	12-12	On-vehicle Inspection	12-23
Coolant Concentration Test	12-13	Removal	12-24
ON-VEHICLE SERVICE	12-14	Installation	12-25
Coolant Replacement	12-14	Radiator	12-26
Coolant Draining	12-14	Removal	12-26
Coolant Adding	12-15	Installation	12-27
Expansion Tank	12-17	Water Pump	12-28
Removal	12-17	Removal	12-28
Installation	12-17	Inspection	12-29
		Installation	12-29

GENERAL INFORMATION

Description



12

1 - Expansion Tank	2 - Expansion Tank Outlet Hose
3 - Water Pump Assembly	4 - Water Pump Assembly Inlet Connecting Hose
5 - Water Pump Assembly Gasket	6 - Coolant Pipe (4-way)
7 - Small Circulation Water Pipe Connecting Hose	8 - Engine Inlet Pipe
9 - Cooling Fan Assembly	10 - Radiator Discharge Hose
11 - Discharge Hose	12 - Cooling Water Pipe Assembly
13 - Discharge Hose	14 - Heater Inlet Pipe
15 - Thermostat Seat Gasket	16 - Coolant Temperature Sensor
17 - Small Circulation Water Pipe	18 - Heater Outlet Pipe
19 - Small Circulation Hose	20 - Thermostat Seat
21 - Thermostat	22 - Thermostat Housing
23 - Engine Outlet Hose	24 - Rubber Cushion
25 - Rubber Bushing	26 - Radiator
27 - Radiator Upper Crossmember	

The engine cooling system adjusts the engine operating temperature by the flow of coolant and makes the engine operate normally under various operating conditions.

The engine cooling system is a forced circulation system, which supplies circulation pressure for the system by water pump and forces the coolant to circulate in the engine cylinder block, and distributes the excessive heat to the radiator by the flow of coolant, and radiates it to the air by the cooling fan. Also, the engine cooling system provides heat to the heater core in the cabin to improve the driving comfort.

Specifications

Torque Specifications

Description	Torque (N·m)
Expansion Tank Fixing Bolt	7 ± 1.5
Wire Harness Bracket Fixing Bolt	8 - 11
Thermostat Housing Fixing Bolt	8 - 11
Thermostat Seat Fixing Bolt	8 - 11
Coolant Temperature Sensor	11 - 16
Cooling Fan Assembly Fixing Bolt	7 ± 1.5
Radiator Upper Crossmember Fixing Bolt	10 ± 1
Radiator Upper Crossmember Fixing Nut	5 ± 1
Water Pump Fixing Bolt	11

Coolant Capacity

Item	Capacity (L)
Cooling System	7.5

Coolant Concentration

G11 Additive	Soft Water
50%	50%

12

Coolant Freezing Point

Item	Freezing Point Value (°C)
Coolant	-35

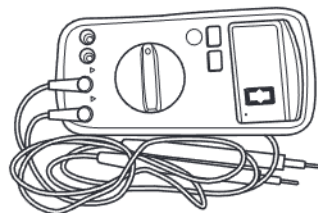
Cooling System Pressure

Item	System Pressure (bar)
Cooling System (Test Pressure)	1.3 ± 0.2

Tools

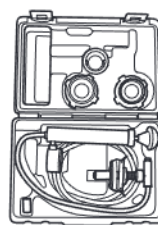
General Tools

Digital Multimeter



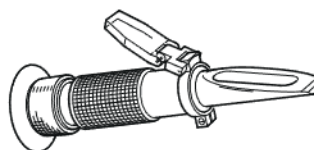
RCH0000002

Cooling System Pressure Tester



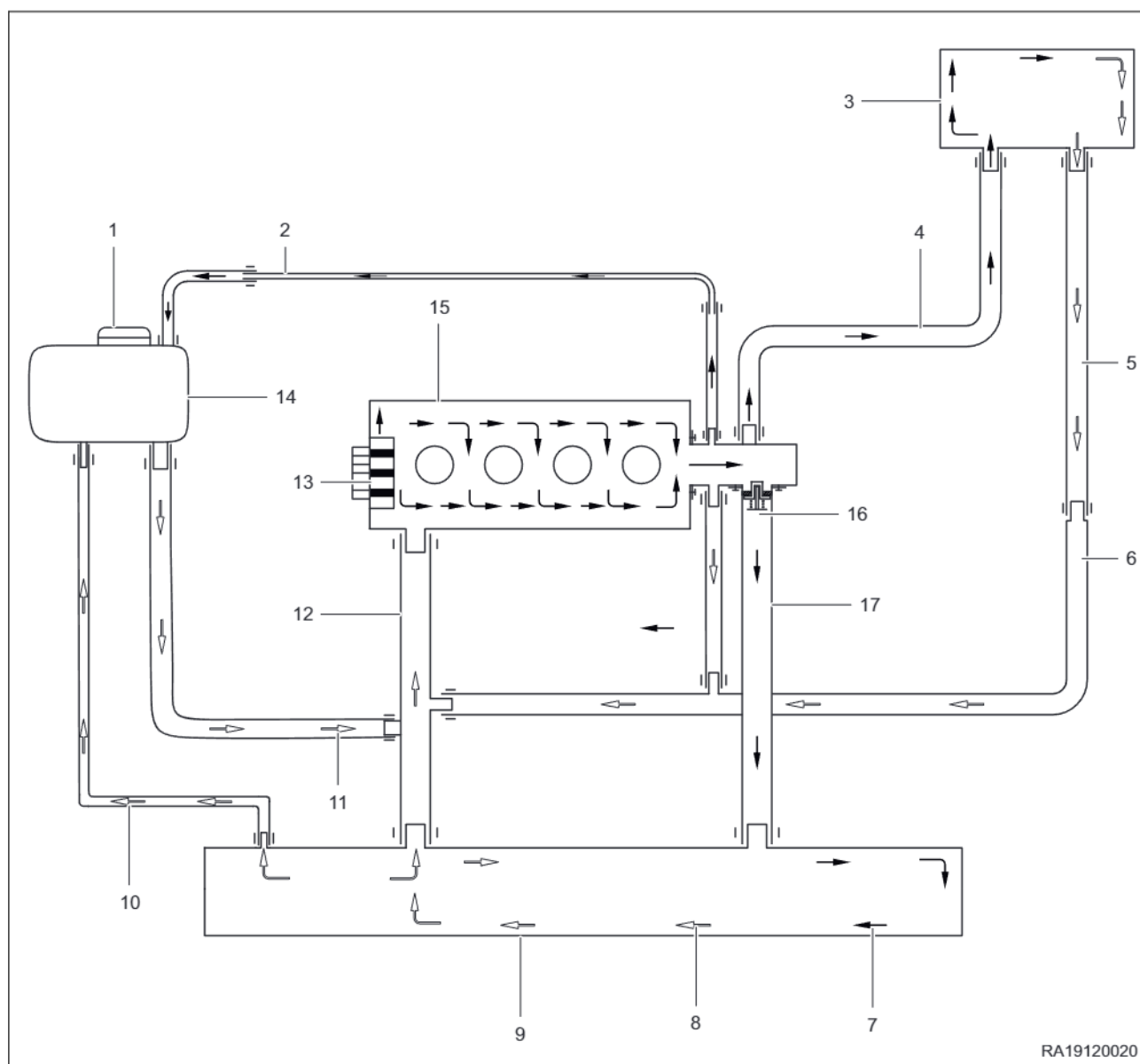
RCH0000055

Freezing Point Tester



RCH0000007

Cooling System Operation Flowchart



12

1 - Expansion Tank Cap	2 - Cylinder Block
3 - Heating Inlet Pipe	4 - Heater Core
5 - Heating Outlet Pipe	6 - Engine Outlet Pipe
7 - Black Solid Arrow (Indicates High Temperature Coolant)	8 - Hollow Arrow (Indicates Low Temperature Coolant)
9 - Radiator	10 - Engine Inlet Pipe
11 - Small Circulation Metal Tube	12 - Engine Return Pipe
13 - Radiator Discharge Hose	14 - Expansion Tank

Small circulation: when the coolant temperature is below $82 \pm 2^{\circ}\text{C}$, the thermostat closes. The coolant only circulates inside the cylinder block, and warms up other engine parts where need heat. The coolant, which flows out of the cylinder block, enters the water pump directly through the small circulation water pipe, and then enters the cylinder block through the water pump. The coolant does not radiate heat through the radiator.

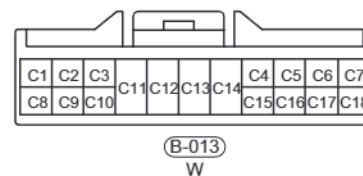
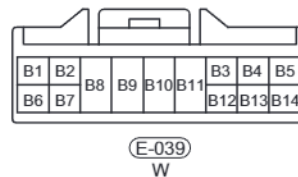
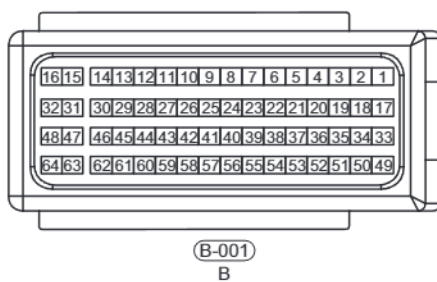
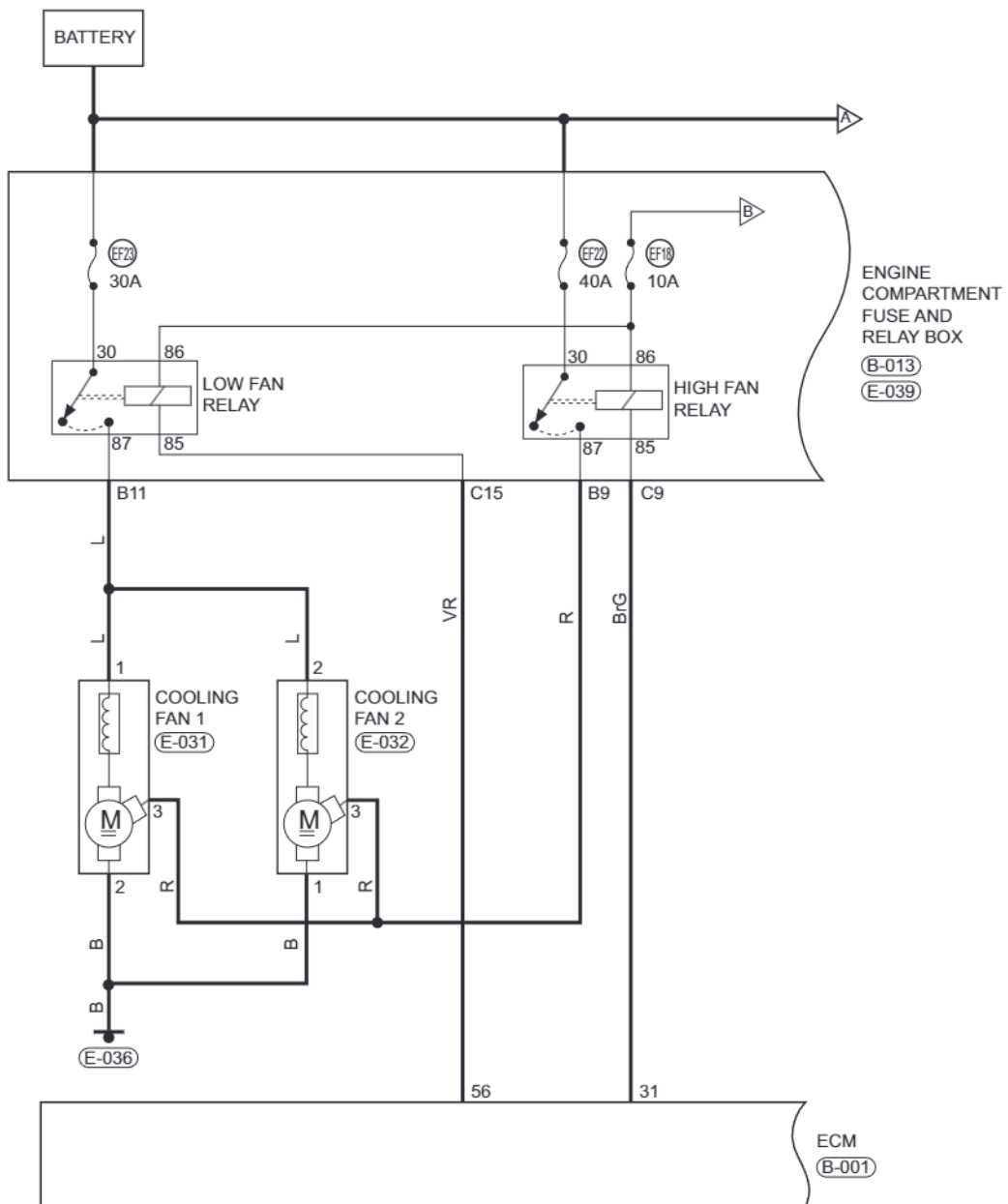
Large circulation: when the coolant temperature is higher than $103 \pm 1^{\circ}\text{C}$, the thermostat opens fully, and all the coolant, which flows out of the cylinder block, enters the radiator where coolant heat is lost, then, the heat-radiated coolant returns to the cylinder block for circulation by the pump. Due to the heat lost in the radiator, the engine coolant temperature decreases quickly to prevent the engine from overheating.

The cooling fan operates under the following conditions:

- a. When the coolant temperature is higher than 93.8°C , the cooling fan starts to operate at low speed;
- b. When the coolant temperature is higher than 96.8°C , the cooling fan starts to operate at high speed;
- c. When the coolant temperature is below 92.3°C , the cooling fan stops at high speed;
- d. When the coolant temperature is below 89.3°C , the cooling fan stops at low speed.

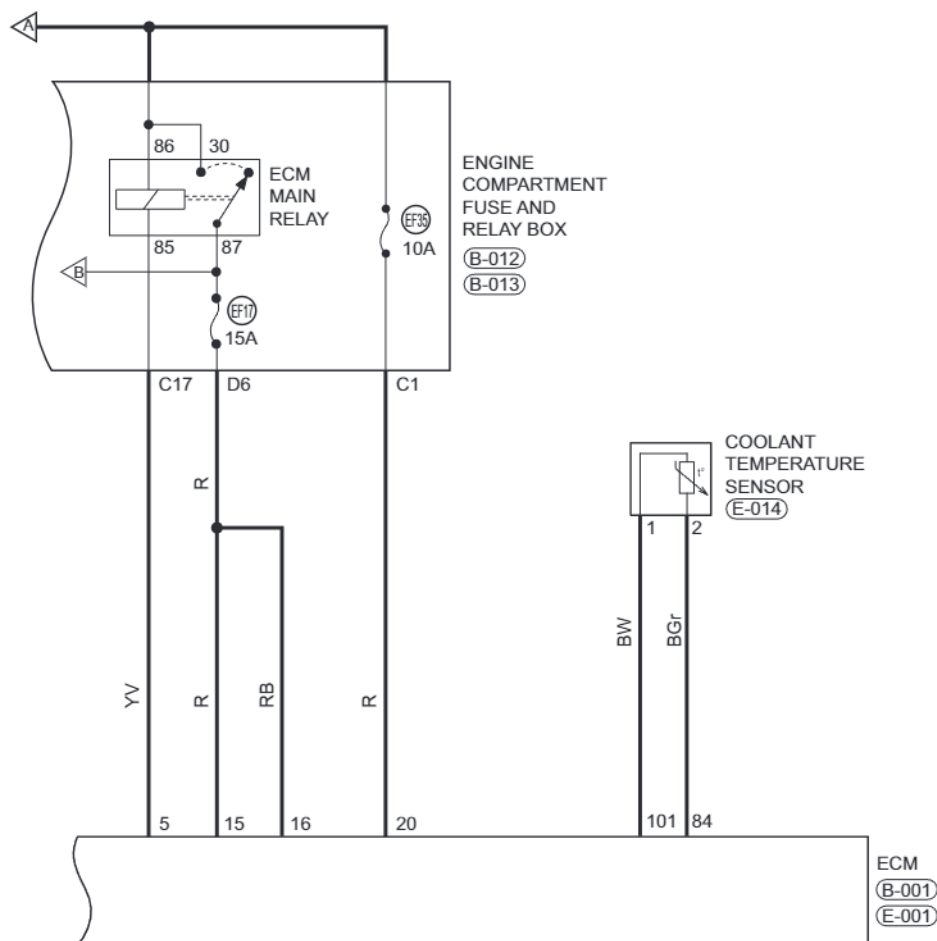
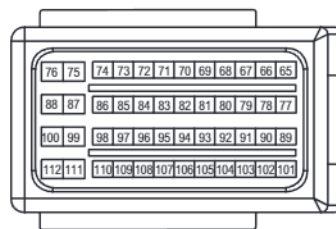
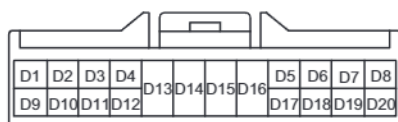
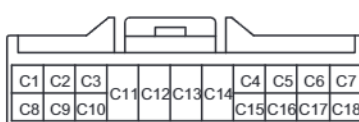
Circuit Diagram

Cooling System (Page 1 of 2)



EA19120010

Cooling System (Page 2 of 2)

(B-001)
B(E-001)
B(B-012)
W(B-013)
W(E-014)
B

EA19120020

DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:

Use the table below to help determine the cause of problem symptoms. Check each suspected area in sequence. Repair or replace the faulty components, or adjust them as necessary.

Symptom	Suspected Area	See page
Insufficient coolant	Coolant pipe (deteriorated and leaked)	-
	Expansion tank (leaked)	12-17
	Radiator (leaked)	12-26
	Water pump (bearing loose and leaked)	12-28
	Engine cylinder head gasket (damaged)	07-47
	Engine cylinder head (water jacket leaked)	07-47
	Engine block (water jacket leaked)	07-67
Engine overheating	Low coolant level	12-12
	Air resistance exists in pipe	-
	Expansion tank cap (damaged)	-
	Cooling fan assembly	12-23
	Radiator	12-26
	Thermostat	12-18
	Leakage in engine	-
Unable to reach normal engine temperature	Cooling fan (constantly operating)	12-23
	Thermostat	12-18
Cooling fan does not operate or abnormal air speed	Open in fuse	-
	Relay failure	-
	Cooling fan assembly	12-23
	Wire harness	-
	ECM (Engine Control Module) failure	-

Cooling System Pressure Test

WARNING

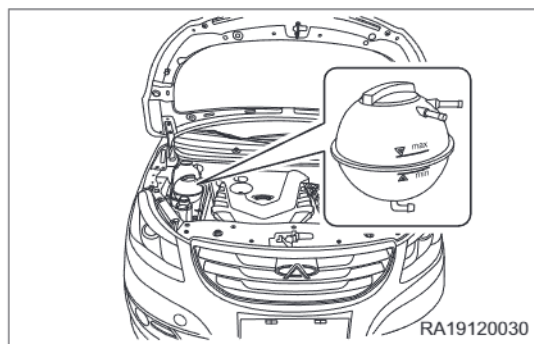
- Always make sure the engine is cold before operating the cooling system.
- Never open the expansion tank cap or remove the drain cock plug when the engine is operating or the cooling system overheats. The overheated engine coolant and steam with high-pressure may flow out and cause serious personal injury.

CAUTION

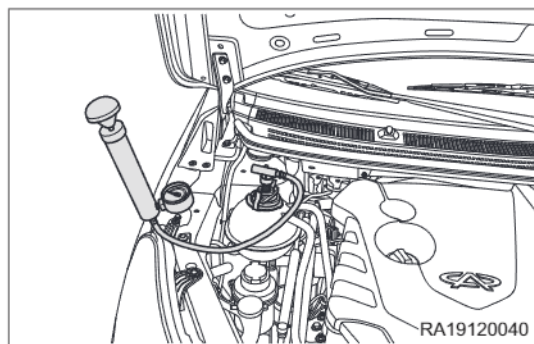
- When testing the cooling system, please pressurize the system to the specified pressure. Otherwise, it may damage the system components.
- Before testing the cooling system, do not perform operation until the coolant temperature drops to the normal level. Otherwise, it may cause scald.

Test Procedures

1. Turn off all the electrical equipment and ignition switch.
2. Check if the coolant level is between "MAX" and "MIN" lines. If the coolant level is below "MIN" line, add coolant.



3. Connect the cooling system pressure tester to the coolant pressure release cap opening (expansion tank cap opening) and tighten it slowly.



CAUTION

- Make sure there is no leakage in the connecting part of coolant system pressure tester, in order to avoid pressure leakage during test.

- Pressurize the cooling system to 1.3 ± 0.2 bar with the cooling system pressure tester, and then observe the pressure changes. If the system pressure does not drop within 2 minutes, it indicates there is no leakage in the system. If the pressure changes greatly, it indicates that there is a leakage in the system; find the leaking area and perform troubleshooting.

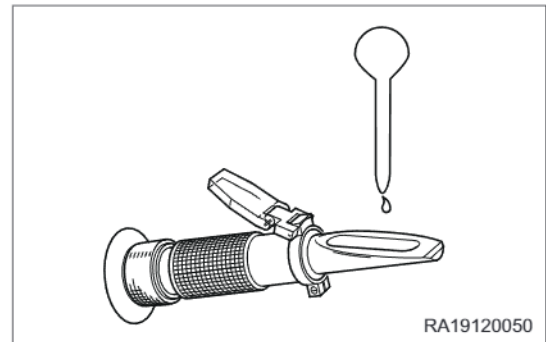
Coolant Concentration Test

CAUTION

- DO NOT mix different colors or types of coolant.
- Please select coolant which is suitable for local climate in different areas.
- Please read the measured value at the scale line. In order to distinguish the scale line more clearly, drip a drop of water on the glass of freezing point tester with a pipette, then the scale line can be clearly distinguished via "waterline".

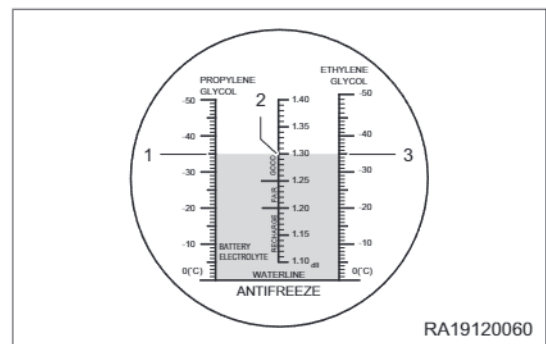
Test Procedures

- As shown in the illustration, drip a drop of coolant on the glass of freezing point tester with a pipette, and then observe the freezing point value of coolant.



12

- As shown in the illustration, observe the scale 3 of freezing point tester to read the ethylene glycol coolant freezing point value. The freezing point value must be kept at -35°C or lower.



If the freezing point is beyond the specified value, replace the coolant.

HINT:

Scale 1 is used to measure the freezing point value of propylene glycol coolant, and scale 2 is used to measure the battery electrolyte concentration.

ON-VEHICLE SERVICE

Coolant Replacement

Coolant Draining

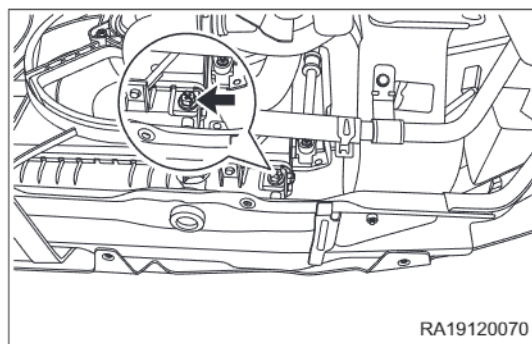
⚠ WARNING

- Always make sure the engine is cold before operating the cooling system.
- Never open the expansion tank cap or remove the drain cock plug when the engine is operating or the cooling system overheats. The overheated engine coolant and steam with high-pressure may flow out and cause serious personal injury.

1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the expansion tank cap when the engine temperature and radiator temperature are low.
4. Remove lower right deflector ([See page 46-20](#)).
5. Put a coolant collector under the vehicle, rotate the radiator drain cock plug (arrow) and drain the coolant in the radiator and expansion tank.

HINT:

Put a drainage device or similar tool at the radiator outlet, so that the coolant can flow into the collector smoothly.



6. After the coolant stops flowing, retighten the radiator drain cock plug.

👁 CAUTION

- Tighten the drain cock plug to prevent leakage.

♻ ENVIRONMENTAL PROTECTION

- The wasted coolant should be handled by the specialized department according to local laws and regulations. Never discard it at will.

Coolant Adding

Only use coolant that meets Chery specifications.

Coolant Capacity

Item	Capacity (L)
Cooling System	7.5

Coolant Concentration

G11 Additive	Soft Water
50%	50%

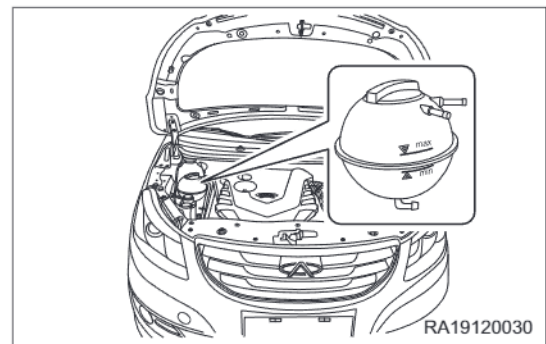
WARNING

- If it is necessary to add coolant when the engine is hot, loosen the expansion tank cap slightly first to release the internal pressure and loosen the cover completely after waiting for a while, and then add coolant.
- If your body contacts the coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

CAUTION

- DO NOT use inferior coolant.
- DO NOT mix different colors or types of coolant.
- Be careful when adding coolant; avoid spilling the coolant on any area of engine.

1. Open the expansion tank cap and add coolant until the coolant level reaches the "MAX" line.



2. Tighten the expansion tank cap, start and run the engine. Maintain the engine speed between 2000 and 2500 rpm to warm up the engine until the cooling fan operates.

CAUTION

- If there is no coolant in the expansion tank after the engine just starts, perform the followings:
 - Stop the engine;
 - Wait until the coolant cools down;
 - Add coolant to the "MAX" line on expansion tank.
 - Run the engine at 2500 rpm until the coolant level becomes stable.
3. Stop the engine and wait until the coolant temperature drops to the ambient temperature. Check that the coolant level is between "MAX" and "MIN" lines. If the coolant level is below the "MIN" line, repeat all the above procedures. If the coolant level is above the "MAX" line, drain the coolant until the level is between "MAX" and "MIN" lines.

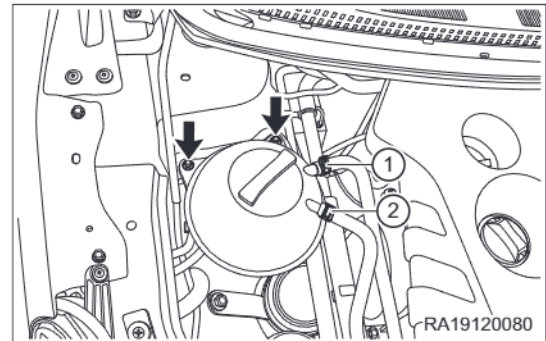
Expansion Tank

Removal

WARNING

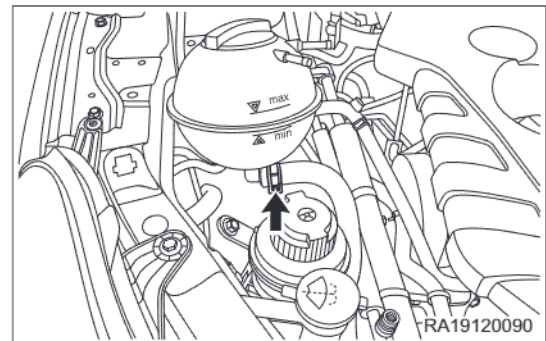
- Always make sure the engine is cold before operating the cooling system.
- Never open the expansion tank cap or remove the drain cock plug when the engine is operating or the cooling system overheats. The overheated engine coolant and steam with high-pressure may flow out and cause serious personal injury.

1. Turn off all the electrical equipment and ignition switch.
2. Drain the coolant (See page 12-14).
3. Remove the expansion tank.
 - a. Loosen the elastic clamp (1) and disconnect the connection between expansion tank and discharge hose.
 - b. Loosen the elastic clamp (2) and disconnect the connection between expansion tank and radiator discharge hose.
 - c. Remove 2 fixing bolts (arrow) from the expansion tank.
(Tightening torque: $7 \pm 1.5 \text{ N}\cdot\text{m}$)



12

- d. Pull out the expansion tank upward, loosen the elastic clamp (arrow) and disconnect the connection between expansion tank and expansion tank outlet hose.



- e. Remove the expansion tank.

Installation

Installation is in the reverse order of removal.

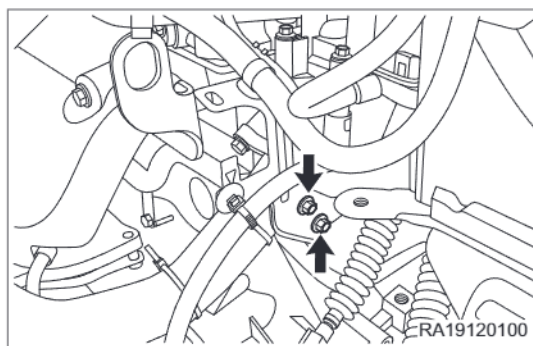
Thermostat

Removal

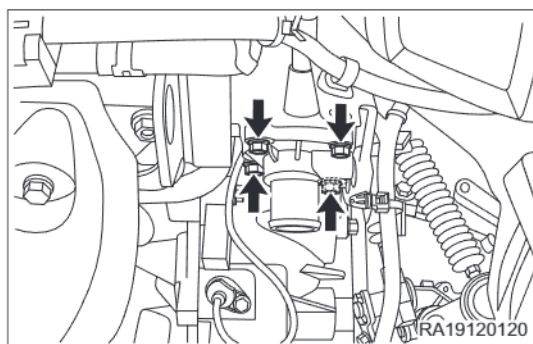
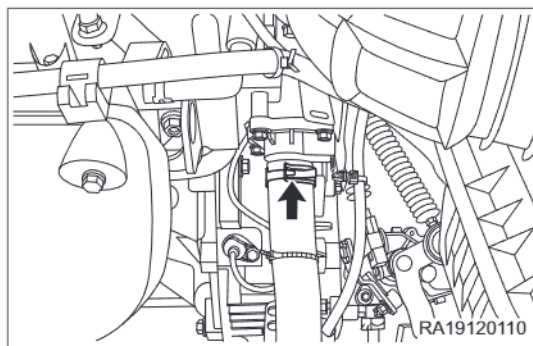
WARNING

- Always make sure the engine is cold before operating the cooling system.
- Never open the expansion tank cap or remove the drain cock plug when the engine is operating or the cooling system overheats. The overheated engine coolant and steam with high-pressure may flow out and cause serious personal injury.

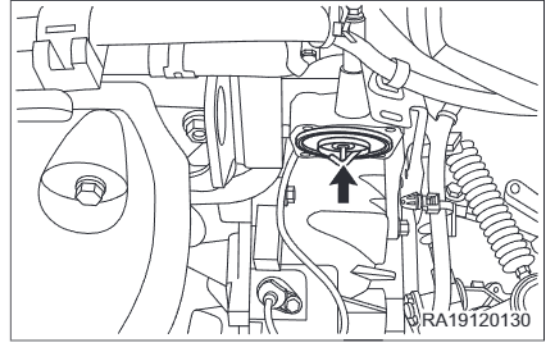
1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Drain the coolant ([See page 12-14](#)).
5. Move away the wire harness bracket.
 - a. Remove 2 fixing bolts (arrow) from the wire harness bracket, and move the wire harness bracket to one side.
(Tightening torque: $8 \pm 1 \text{ N}\cdot\text{m}$)



6. Remove the thermostat housing.
 - a. Loosen the engine outlet hose elastic clamp (arrow), and disconnect the connection between engine inlet hose and thermostat housing.
 - b. Remove 4 fixing bolts (arrow) from the thermostat housing.
(Tightening torque: $8 - 11 \text{ N}\cdot\text{m}$)



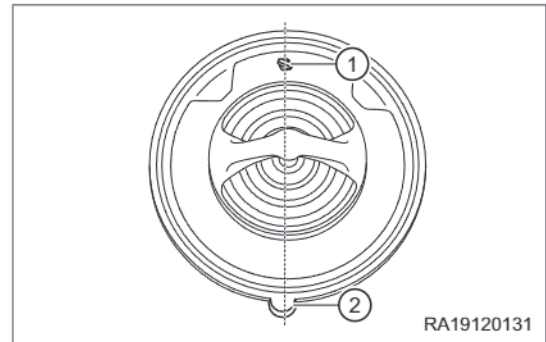
- c. Remove the thermostat housing.
7. Remove the thermostat.
 - a. Take out the thermostat (arrow) from the thermostat seat.



Inspection

1. As show in the illustration, check if the protrusion (2) of thermostat grommet and chock (1) of thermostat are installed at an angle of 180°.

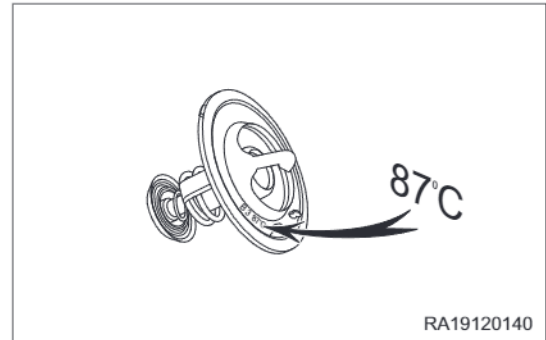
If the result is not as specified, adjust the thermostat grommet to the specified position or replace the thermostat with a new one.



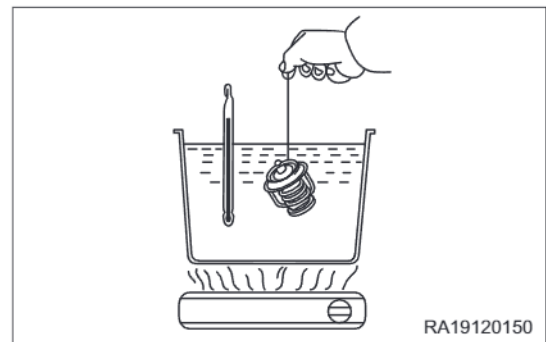
2. Check the opening temperature and maximum lift of thermostat.

HINT:

The valve opening temperature is engraved in the thermostat.



- a. Soak the thermostat in water, heat the water gradually and perform inspection.



- The opening temperature of thermostat is $87 \pm 2^{\circ}\text{C}$.
- The maximum lift of thermostat is no less than 8 mm.
- The temperature is $103 \pm 1^{\circ}\text{C}$ when the thermostat opens fully.

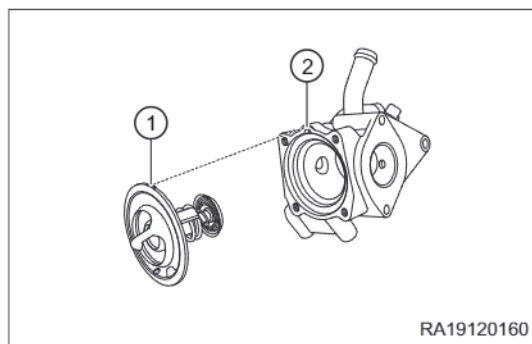
- b. Check that the thermostat closes when the temperature is low (5°C lower than the opening temperature).
- c. If the above conditions are not met, replace the thermostat.

Installation

Installation is in the reverse order of removal.

CAUTION

- As shown in the illustration, align the protrusion (1) of thermostat grommet and groove (2) of thermostat seat during installation.
- Check that the coolant has been added to the specified level after installation.



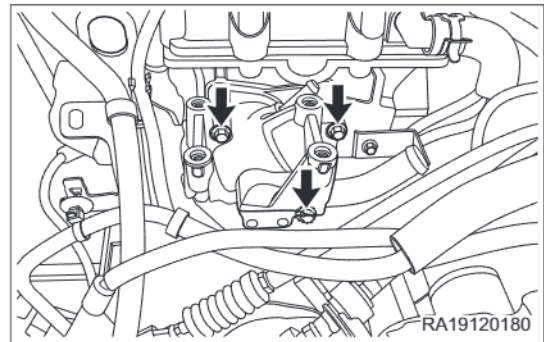
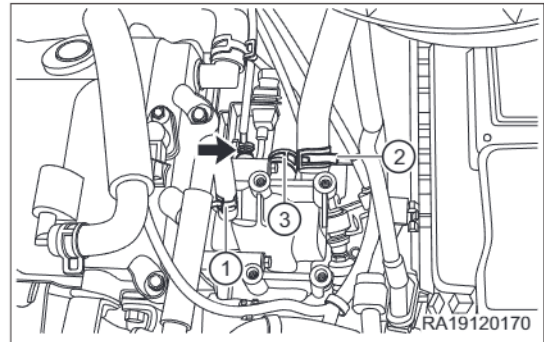
Thermostat Seat

Removal

WARNING

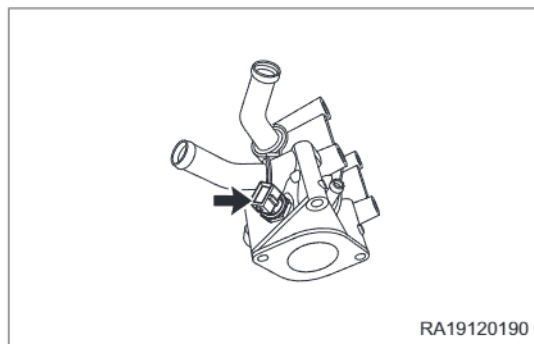
- Always make sure the engine is cold before operating the cooling system.
- Never open the expansion tank cap or remove the drain cock plug when the engine is operating or the cooling system overheats. The overheated engine coolant and steam with high-pressure may flow out and cause serious personal injury.

1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Drain the coolant ([See page 12-14](#)).
5. Remove the ignition coil ([See page 14-10](#)).
6. Remove the thermostat ([See page 12-18](#)).
7. Remove the thermostat seat.
 - a. Disconnect the coolant temperature sensor connector (arrow).
 - b. Loosen the elastic clamp (1) and disconnect the connection between thermostat seat and engine discharge hose.
 - c. Loosen the elastic clamp (2) and disconnect the connection between thermostat seat and heater inlet pipe.
 - d. Loosen the elastic clamp (3) and disconnect the connection between thermostat seat and small circulation hose.
 - e. Remove the engine wire harness fixing bolt, and disconnect the engine wire harness.
 - f. Remove 3 fixing bolts (arrow) from the thermostat seat.
(Tightening torque: 8 - 11 N·m)



- g. Remove the thermostat seat and thermostat seat shim.

8. Remove the coolant temperature sensor (arrow) from the thermostat seat.
(Tightening torque: 11 - 16 N·m)



Installation

Installation is in the reverse order of removal.

CAUTION

- Check that the coolant has been added to the specified level after installation.
- Replace the thermostat seat shim with a new one during installation, and the removed shim cannot be reused.

Cooling Fan Assembly

On-vehicle Inspection

1. Measure the cooling fan resistance with a digital multimeter.

a. Cooling fan I

Multimeter Connection	Condition	Specification (Ω)
Terminal 1 - Terminal 2	Normal temperature	1.8
Terminal 3 - Terminal 2	Normal temperature	2.5

If the inspection result is not as specified, replace the cooling fan assembly.

b. Cooling fan II

Multimeter Connection	Condition	Specification (Ω)
Terminal 2 - Terminal 1	Normal temperature	1.8
Terminal 3 - Terminal 1	Normal temperature	2.5

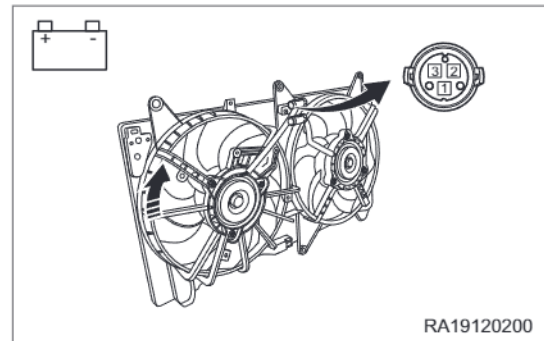
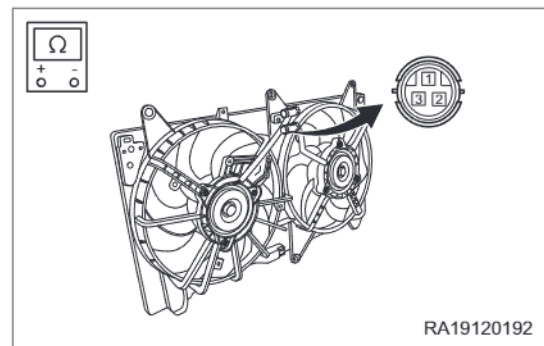
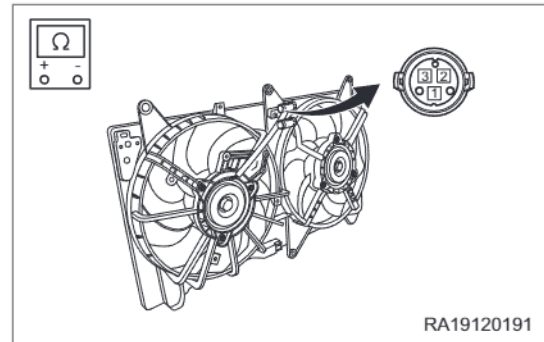
If the inspection result is not as specified, replace the cooling fan assembly.

2. Apply the battery voltage to the specified connector terminals of cooling fan respectively according to the table below, and check that the cooling fan operates smoothly when applying the battery voltage.

a. Cooling fan I

Multimeter Connection	Condition	Specified Condition
Battery positive (+) - Terminal 1 Battery negative (-) - Terminal 2	Always	Operates smoothly at low speed
Battery positive (+) - Terminal 3 Battery negative (-) - Terminal 2	Always	Operates smoothly at high speed

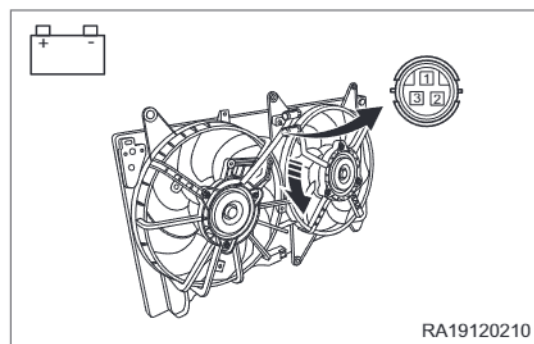
If the inspection result is not as specified, replace the cooling fan assembly.



b. Cooling fan II

Measurement Condition	Condition	Specified Condition
Battery positive (+) - Terminal 2 Battery negative (-) - Terminal 1	Always	Operates smoothly at low speed
Battery positive (+) - Terminal 3 Battery negative (-) - Terminal 1	Always	Operates smoothly at high speed

If the inspection result is not as specified, replace the cooling fan assembly.



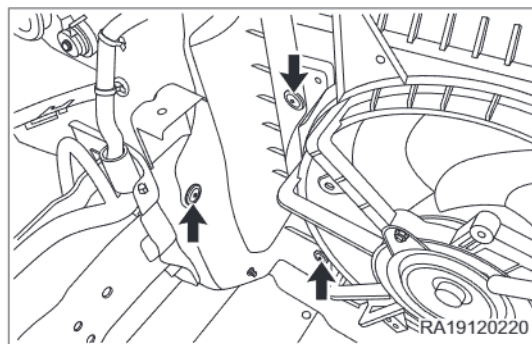
Removal

⚠ WARNING

- Always make sure the engine is cold before operating the cooling system.
- Never open the expansion tank cap or remove the drain cock plug when the engine is operating or the cooling system overheats. The overheated engine coolant and steam with high-pressure may flow out and cause serious personal injury.

12

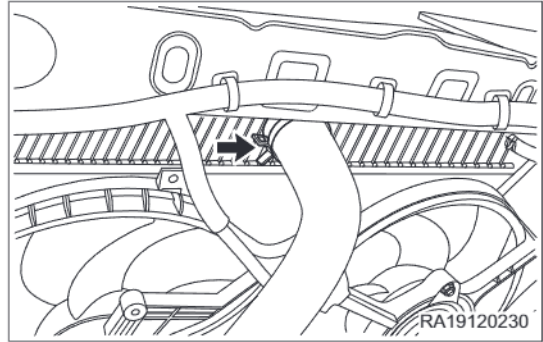
1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Drain the coolant ([See page 12-14](#)).
5. Remove the air filter ([See page 10-10](#)).
6. Remove the condenser left deflector.
 - a. Remove 3 plastic clamps (arrow) from the condenser left deflector.



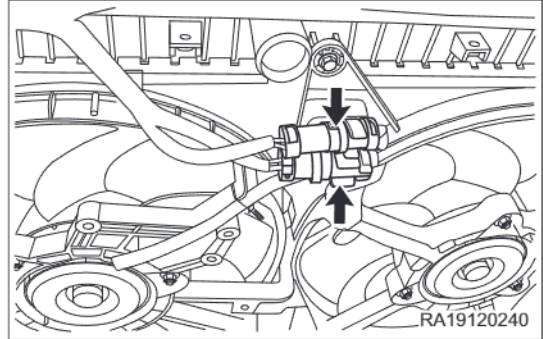
- b. Remove the condenser left deflector.

7. Remove the cooling fan assembly.

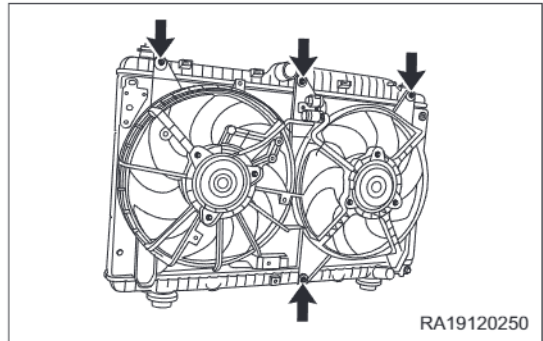
- a. Loosen the elastic clamp (1) and disconnect the connection between engine outlet hose and radiator assembly.



- b. Disconnect the cooling fan assembly connectors (arrow).



- c. Remove 4 fixing bolts (arrow) from the cooling fan assembly.
(Tightening torque: $7 \pm 1.5 \text{ N}\cdot\text{m}$)



- d. Remove the cooling fan assembly from the radiator assembly.

12

Installation

Installation is in the reverse order of removal.

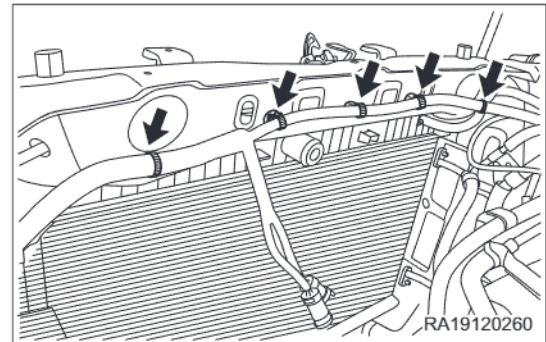
Radiator

Removal

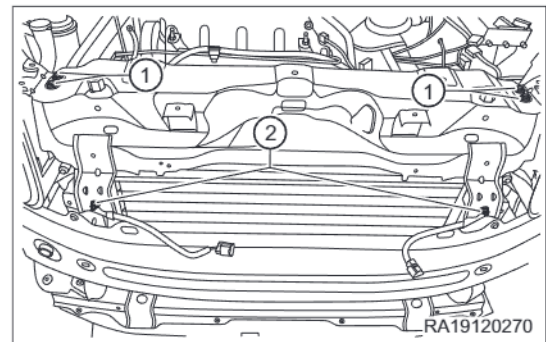
⚠ WARNING

- Always make sure the engine is cold before operating the cooling system.
- Never open the expansion tank cap or remove the drain cock plug when the engine is operating or the cooling system overheats. The overheated engine coolant and steam with high-pressure may flow out and cause serious personal injury.

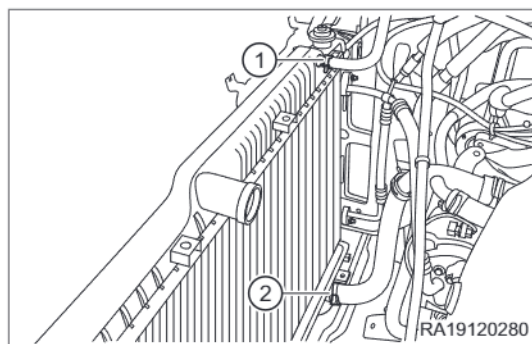
1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the air filter ([See page 10-10](#)).
5. Remove the front bumper assembly ([See page 46-7](#)).
6. Drain the coolant ([See page 12-14](#)).
7. Remove the cooling fan assembly ([See page 12-23](#)).
8. Remove the radiator upper crossmember.
 - a. Remove 5 joint clips (arrow) between engine compartment wire harness and radiator upper crossmember.



- b. Remove the engine hood lock ([See page 45-15](#)).
- c. Remove the horn ([See page 39-15](#)).
- d. Remove 4 fixing bolts (1) from the radiator upper crossmember.
(Tightening torque: $10 \pm 1 \text{ N}\cdot\text{m}$)
- e. Remove 2 fixing nuts (2) from the radiator upper crossmember.
(Tightening torque: $5 \pm 1 \text{ N}\cdot\text{m}$)



9. Remove the radiator.
 - a. Loosen the elastic clamp (1) and disconnect the connection between radiator discharge hose and radiator assembly.
 - b. Loosen the elastic clamp (2) and disconnect the connection between engine inlet pipe and radiator assembly.



- c. Remove the radiator.

Installation

Installation is in the reverse order of removal.

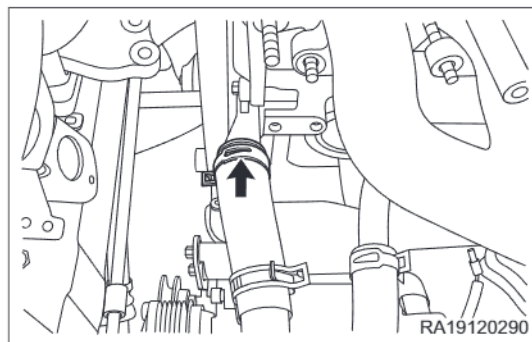
Water Pump

Removal

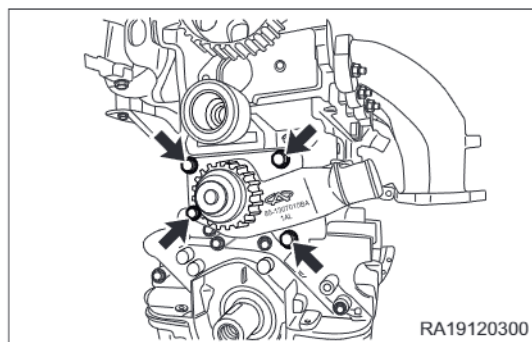
⚠ WARNING

- Always make sure the engine is cold before operating the cooling system.
- Never open the expansion tank cap or remove the drain cock plug when the engine is operating or the cooling system overheats. The overheated engine coolant and steam with high-pressure may flow out and cause serious personal injury.

1. Turn off all the electrical equipment and ignition switch.
2. Disconnect the negative battery cable.
3. Drain the coolant ([See page 12-14](#)).
4. Remove the drive belt ([See page 07-21](#)).
5. Remove the generator and generator bracket ([See page 16-9](#)).
6. Remove the engine timing belt ([See page 07-28](#)).
7. Remove the water pump.
 - a. Loosen the elastic clamp (arrow) and disconnect the connection between water pump assembly inlet hose and water pump.



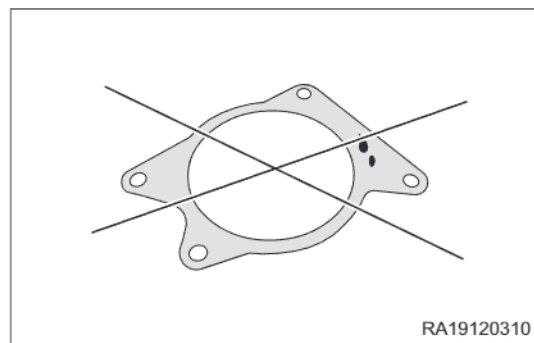
- b. Remove the water pump fixing bolts (arrow).
(Tightening torque: 11 N·m)



- c. Remove the water pump and gasket.

Inspection

1. Check the water pump gasket for wear or bent. If wear or bent is found, replace the gasket.



2. Check if the water pump bearing is loose. If it is loose, replace the water pump assembly.

Installation

Installation is in the reverse order of removal.

CAUTION

- If the water pump is damaged, replace it, rather than attempt to repair it.
- Check that the coolant has been added to the specified level after installation.

