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SECTION CO

ENGINE COOLING SYSTEM

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SERVICE INFORMATION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000005349873

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SUPPLEMENTAL RESTRAINT SYSTEM" and "SEAT BELTS" of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SUPPLEMENTAL RESTRAINT SYSTEM".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Liquid Gasket

INFOID:000000005349874

REMOVAL OF LIQUID GASKET SEALING

- After removing mounting nuts and bolts, separate the mating surface using the seal cutter [SST: KV10111100 (J37228)] (A) and remove old liquid gasket sealing.

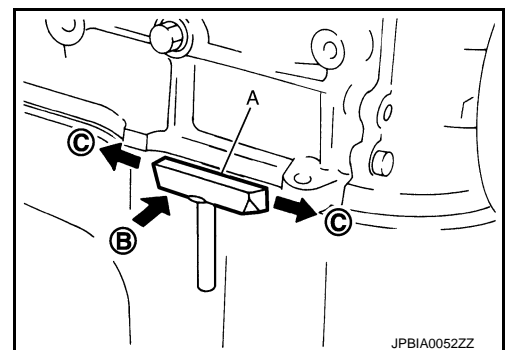
CAUTION:

Be careful not to damage the mating surfaces.

- Tap the seal cutter [SST: KV10111100 (J37228)] to insert it (B), and then slide (C) it by tapping on the side as shown in the figure.
- In areas where seal cutter [SST: KV10111100 (J37228)] is difficult to use, use a plastic hammer to lightly tap the parts, to remove it.

CAUTION:

If for some unavoidable reason tool such as a screwdriver is used, be careful not to damage the mating surfaces.



LIQUID GASKET APPLICATION PROCEDURE

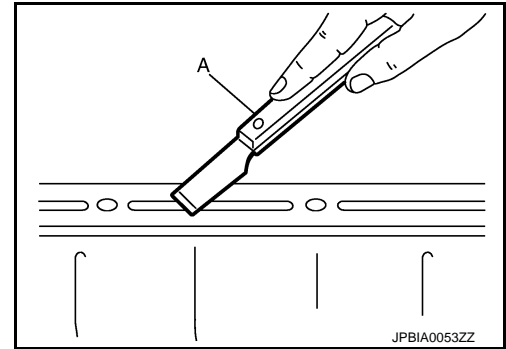
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PRECAUTIONS

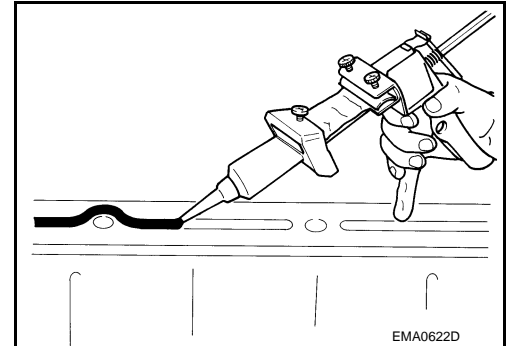
[VQ35HR]

< SERVICE INFORMATION >

1. Using a scraper (A), remove old liquid gasket adhering to the liquid gasket application surface and the mating surface.
 - Remove liquid gasket completely from the groove of the liquid gasket application surface, mounting bolts, and bolt holes.
2. Wipe the liquid gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.



3. Attach liquid gasket tube to the tube presser (commercial service tool).
Use Genuine RTV Silicone Sealant or equivalent. Refer to GI-46.
4. Apply liquid gasket without breaks to the specified location with the specified dimensions.
 - If there is a groove for the liquid gasket application, apply liquid gasket to the groove.

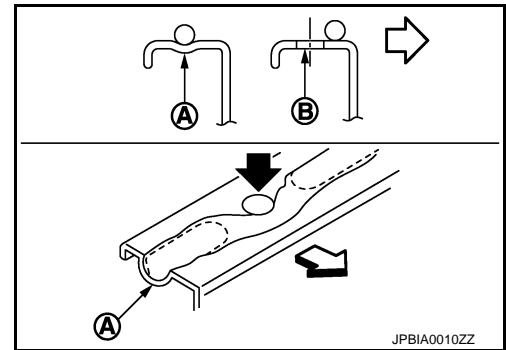


- As for the bolt holes (B), normally apply liquid gasket inside the holes. Occasionally, it should be applied outside the holes. Check to read the text of service manual.

A : Groove

⇐ : Inside

- Within five minutes of liquid gasket application, install the mating component.
- If liquid gasket protrudes, wipe it off immediately.
- Do not retighten after mounting bolts and nuts the installation.
- After 30 minutes or more have passed from the installation, fill engine oil and engine coolant.



CAUTION:

If there are specific instructions in this manual, observe them.

PREPARATION

< SERVICE INFORMATION >



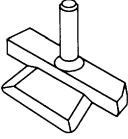
[VQ35HR]

PREPARATION

Special Service Tool

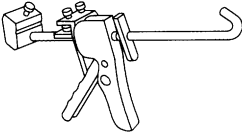
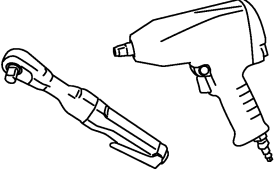
INFOID:000000005349875

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
KV99103510 (—) Radiator plate pliers A	 <p style="text-align: center; font-size: small;">S-NT224</p>	Installing radiator upper and lower tanks
KV99103520 (—) Radiator plate pliers B	 <p style="text-align: center; font-size: small;">S-NT225</p>	Removing radiator upper and lower tanks
KV10111100 (J37228) Seal cutter	 <p style="text-align: center; font-size: small;">NT046</p>	Removing chain tensioner cover and water pump cover

Commercial Service Tool

INFOID:000000005349876

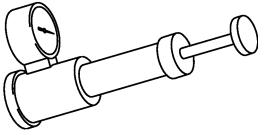
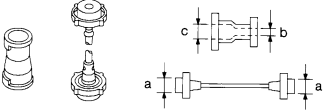
Tool name		Description
Tube presser	 <p style="text-align: center; font-size: small;">S-NT052</p>	Pressing the tube of liquid gasket
Power tool	 <p style="text-align: center; font-size: small;">PBIC0190E</p>	Loosening nuts and bolts

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PREPARATION

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[VQ35HR]

Tool name	Description
<p>Radiator cap tester</p>  <p>PBIC1982E</p>	<p>Checking radiator and radiator cap</p>
<p>Radiator cap tester adapter</p>  <p>S-NT564</p>	<p>Adapting radiator cap tester to radiator cap and radiator filler neck a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in)</p>

OVERHEATING CAUSE ANALYSIS

< SERVICE INFORMATION >

[VQ35HR]

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:000000005349877

		Symptom	Check items		
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—	
		Thermostat stuck closed	—		
		Damaged fins	Dust contamination or paper clogging		
			Physical damage		
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)		
	Reduced air flow	Cooling fan does not operate	Fan assembly	—	
		High resistance to fan rotation			
		Damaged fan blades			
		Damaged radiator shroud	—	—	
		Improper engine coolant mixture ratio	—	—	
		Poor engine coolant quality	—	Engine coolant density	—
	Insufficient engine coolant	Engine coolant leakage	Cooling hose	Loose clamp	
				Cracked hose	
			Water pump	Poor sealing	
			Radiator cap	Loose	
				Poor sealing	
			Radiator	O-ring for damage, deterioration or improper fitting	
		Cracked radiator tank			
Cracked radiator core					
	Reservoir tank	Cracked reservoir tank			
Overflowing reservoir tank	Exhaust gas leakage into cooling system	Cylinder head deterioration			
		Cylinder head gasket deterioration			

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OVERHEATING CAUSE ANALYSIS

< SERVICE INFORMATION >

[VQ35HR]

		Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load	—
				Driving in low gear for extended time	
				Driving at extremely high speed	
			Powertrain system malfunction		
			Installed improper size wheels and tires		
			Dragging brakes		
	Blocked or restricted air flow	Blocked or restricted air flow	Blocked bumper	—	—
			Blocked radiator grille	Installed car brassiere	
				Mud contamination or paper clogging	
			Blocked radiator	—	
			Blocked condenser	Blocked air flow	
			Installed large fog lamp		

COOLING SYSTEM

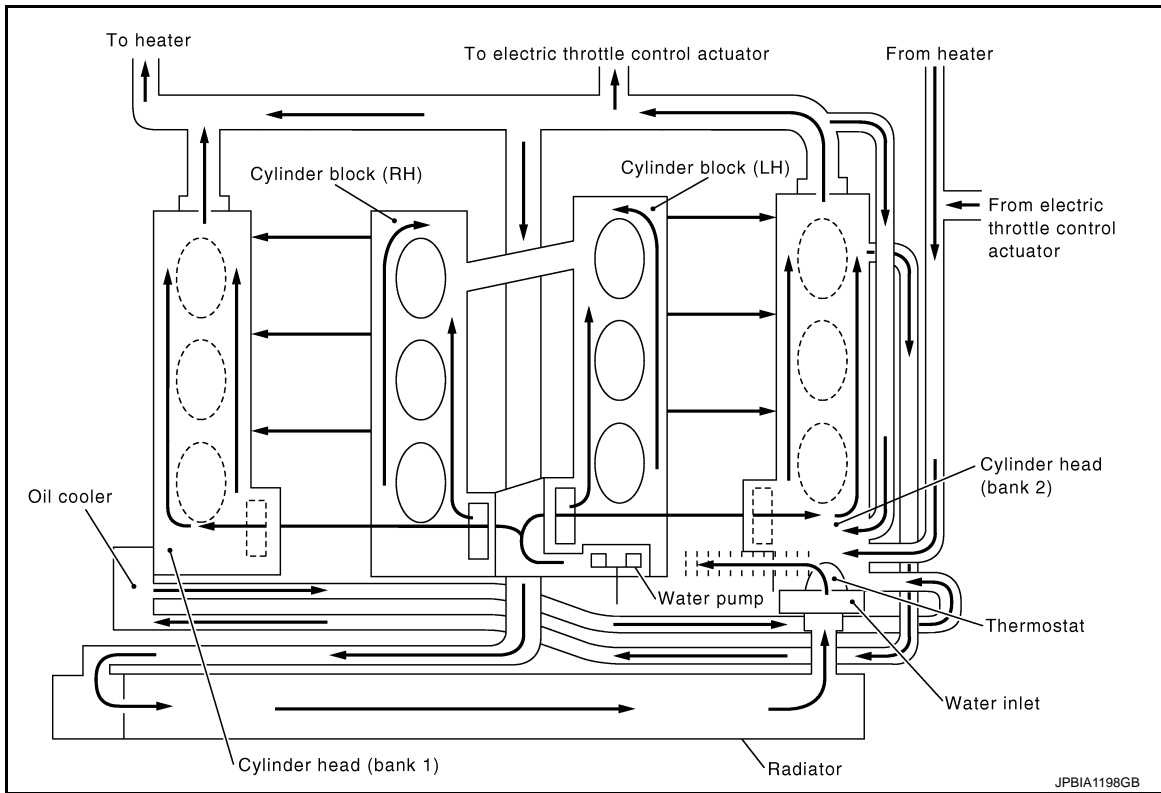
< SERVICE INFORMATION >

[VQ35HR]

COOLING SYSTEM

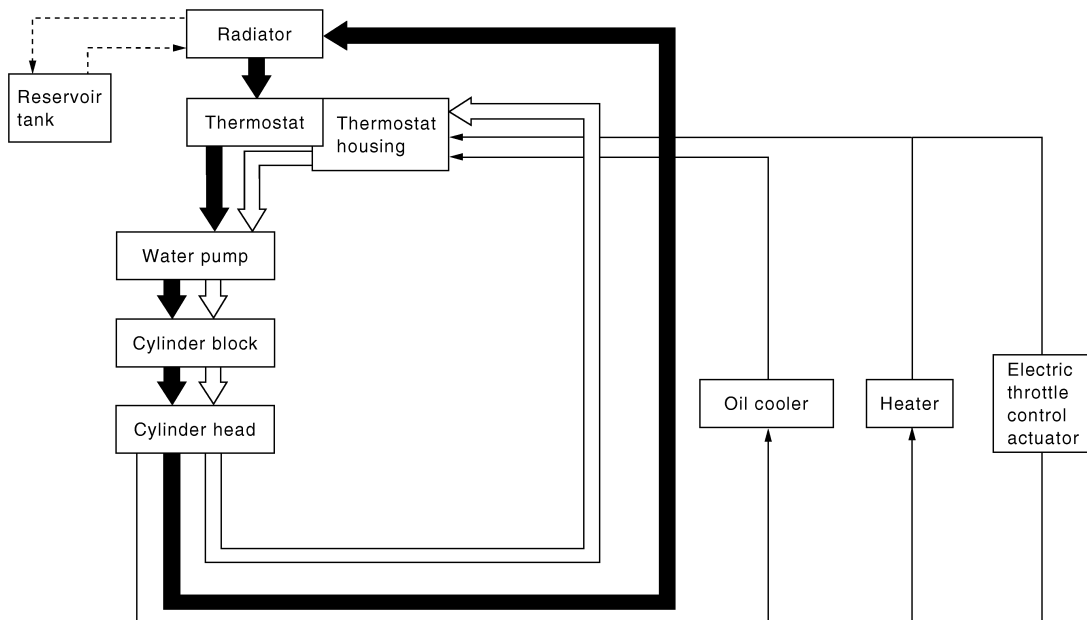
Cooling Circuit

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System Chart

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	Thermostat
	Closed
	Open

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ENGINE COOLANT

Inspection

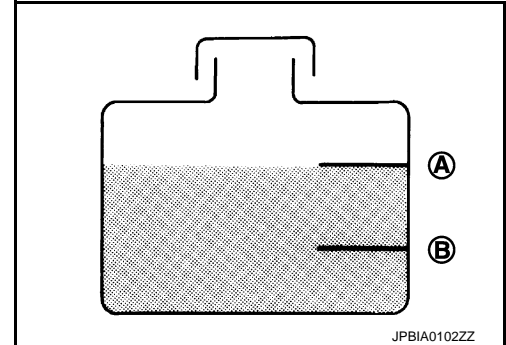
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LEVEL CHECK

- Check if the reservoir tank engine coolant level is within the "MIN" to "MAX" when the engine is cool.

A : MAX
B : MIN

- Adjust the engine coolant level if necessary.



LEAK CHECK

- To check for leakage, apply pressure to the cooling system with the radiator cap tester (commercial service tool) and radiator cap tester adapter (commercial service tool) (A).

Testing pressure

: 157 kPa (1.6 kg/cm², 23 psi)

WARNING:

Never remove radiator cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from radiator.

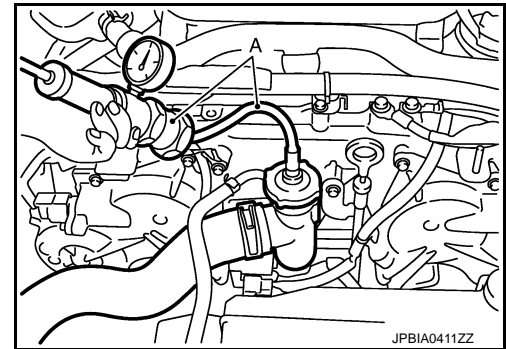
CAUTION:

Higher test pressure than specified may cause radiator damage.

NOTE:

In a case that engine coolant decreases, replenish radiator with engine coolant.

- If anything is found, repair or replace damaged parts.



Changing Engine Coolant

INFOID:000000005349881

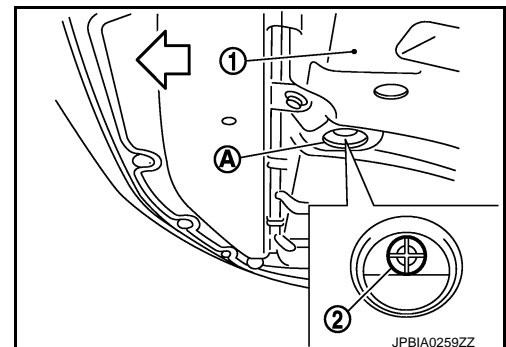
WARNING:

- To avoid being scalded, never change engine coolant when the engine is hot.
- Wrap a thick cloth around radiator cap and carefully remove radiator cap. First, turn radiator cap a quarter of a turn to release built-up pressure. Then turn radiator cap all the way.

DRAINING ENGINE COOLANT

1. Remove engine room cover (RH and LH). Refer to [EM-14, "Component"](#).
2. Remove air duct (inlet). Refer to [EM-17, "Component"](#).
3. Open radiator drain plug (2) at the bottom of radiator, and then remove radiator cap.

1 : Front engine under cover
A : Radiator drain plug hole
⇐ : Vehicle front



When draining all of engine coolant in the system, open water drain plugs on cylinder block. Refer to [EM-120, "Disassembly and Assembly"](#).

< SERVICE INFORMATION >

4. Remove reservoir tank if necessary, and drain engine coolant and clean reservoir tank before installing.
5. Check drained engine coolant for contaminants such as rust, corrosion or discoloration.
If contaminated, flush the engine cooling system. Refer to "FLUSHING COOLING SYSTEM".

REFILLING ENGINE COOLANT

1. Install reservoir tank if removed, and radiator drain plug.

CAUTION:

Be sure to clean drain plug and install with new O-ring.


Radiator drain plug:

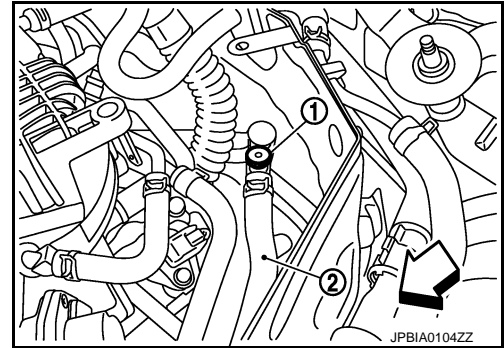
: 1.2 N·m (0.12 kg·m, 11 in·lb)

If water drain plugs on cylinder block are removed, close and tighten them. Refer to [EM-120, "Disassembly and Assembly"](#).

2. Check that each hose clamp has been firmly tightened.
3. Remove air relief plug (1) on heater hose.

2 : Heater hose

 : Vehicle front



4. Fill radiator, and reservoir tank if removed, to specified level.
 - Pour engine coolant through engine coolant filler neck slowly of less than 2 ℓ (2-1/8 US qt, 1-3/4 Imp qt) a minute to allow air in system to escape.
 - Use Genuine NISSAN Long Life Antifreeze/Coolant or equivalent mixed with water (distilled or demineralized). Refer to [MA-9](#).

Engine coolant capacity

(With reservoir tank at "MAX" level)

: Approximately 9.2 ℓ (9-6/8 US qt, 8-1/8 Imp qt)

Reservoir tank engine coolant capacity

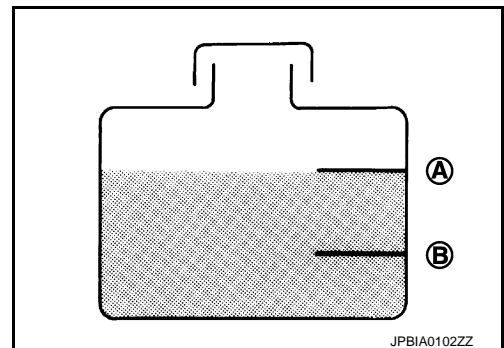
(At "MAX" level)

: 0.8 ℓ (7/8 US qt, 3/4 Imp qt)

A : MAX

B : MIN

5. When engine coolant overflows air relief hole on heater hose, install air relief plug with new O-ring.



Air relief plug:

: 1.2 N·m (0.12 kg·m, 11 in·lb)

6. Install radiator cap.
7. Warm up engine until opening thermostat. Standard for warming-up time is approximately 10 minutes at 3,000 rpm.
 - Check thermostat opening condition by touching radiator hose (lower) to see a flow of warm water.

CAUTION:

Watch water temperature gauge so as not to overheat engine.

ENGINE COOLANT

[VQ35HR]

< SERVICE INFORMATION >

8. Stop the engine and cool down to less than approximately 50°C (122°F).
 - Cool down using fan to reduce the time.
 - If necessary, refill radiator up to filler neck with engine coolant.
9. Refill reservoir tank to "MAX" level line with engine coolant.
10. Repeat steps 4 through 7 two or more times with radiator cap installed until engine coolant level no longer drops.
11. Check cooling system for leakage with engine running.
12. Warm up the engine, and check for sound of engine coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between "COOL" and "WARM".
 - Sound may be noticeable at heater unit.
13. Repeat step 11 three times.
14. If sound is heard, bleed air from cooling system by repeating step 4 through 7 until engine coolant level no longer drops.

FLUSHING COOLING SYSTEM

1. Install reservoir tank if removed, and radiator drain plug.

CAUTION:

Be sure to clean drain plug and install with new O-ring.

Radiator drain plug:

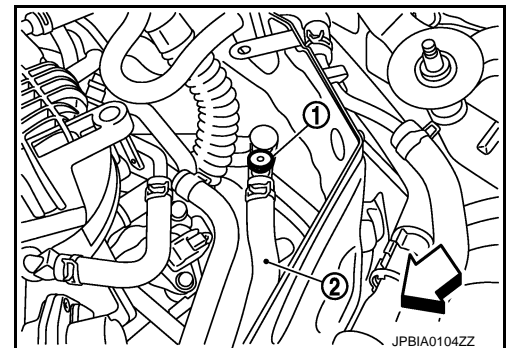
: 1.2 N·m (0.12 kg-m, 11 in-lb)

If water drain plugs on cylinder block are removed, close and tighten them. Refer to [EM-120. "Dis-assembly and Assembly"](#).

2. Remove air relief plug (1) on heater hose.

2 : Heater hose

← : Vehicle front



3. Fill radiator with water until water spills from the air relief hole, then close air relief plug. Fill radiator and reservoir tank with water and reinstall radiator cap.

Air relief plug:

: 1.2 N·m (0.12 kg-m, 11 in-lb)

4. Run the engine and warm it up to normal operating temperature.
5. Rev the engine two or three times under no-load.
6. Stop the engine and wait until it cools down.
7. Drain water from the system. Refer to "DRAINING ENGINE COOLANT".
8. Repeat steps 1 through 7 until clear water begins to drain from radiator.

RADIATOR

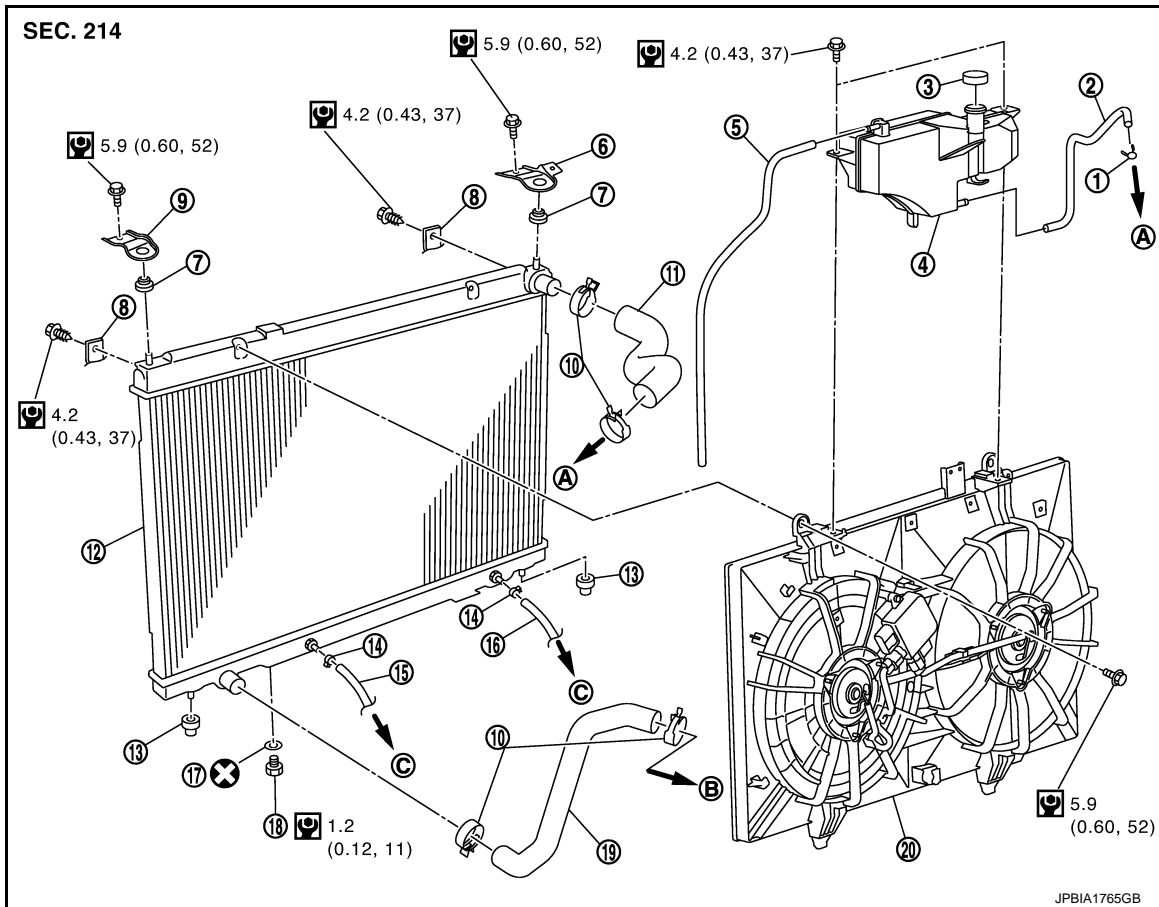
< SERVICE INFORMATION >

[VQ35HR]

RADIATOR

Component

INFOID:000000005349882



- | | | |
|-----------------------------|---------------------------|---------------------------|
| 1. Clamp | 2. Reservoir tank hose | 3. Reservoir tank cap |
| 4. Reservoir tank | 5. Reservoir tank hose | 6. Mounting bracket (RH) |
| 7. Mounting rubber (upper) | 8. A/C condenser | 9. Mounting bracket (LH) |
| 10. Clamp | 11. Radiator hose (upper) | 12. Radiator |
| 13. Mounting rubber (lower) | 14. Clamp | 15. A/T fluid cooler hose |
| 16. A/T fluid cooler hose | 17. O-ring | 18. Drain plug |
| 19. Radiator hose (lower) | 20. Cooling fan assembly | |
| A. To water outlet | B. To water inlet | C. To transmission |

• Refer to [GI-9, "Component"](#) for symbols in the figure.

Removal and Installation

INFOID:000000005349883

WARNING:

Never remove radiator cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from radiator. Wrap a thick cloth around the cap. Slowly turn it a quarter of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

REMOVAL

- Remove the following parts:
 - Front engine undercover (power tool)
 - Engine room cover (RH and LH): Refer to [EM-14, "Component"](#).
 - Air duct (inlet) and air cleaner case assembly: Refer to [EM-17, "Component"](#).
- Remove front grille and front grille support. Refer to [EI-27](#).

NOTE:

RADIATOR

[VQ35HR]

< SERVICE INFORMATION >

If stopping at the removal and installation of the cooling fan assembly, this procedure is not necessary.

3. Drain engine coolant from radiator. Refer to [CO-10, "Changing Engine Coolant"](#).

CAUTION:

- Perform this step when the engine is cold.
- Never spill engine coolant on drive belt.

4. Remove the A/C piping bracket from left side member, and then move the A/C piping out of the way.

5. Disconnect A/T fluid cooler hoses from radiator.

- Install blind plug to avoid leakage of A/T fluid.

6. Remove radiator hoses (upper and lower) and reservoir tank hose.

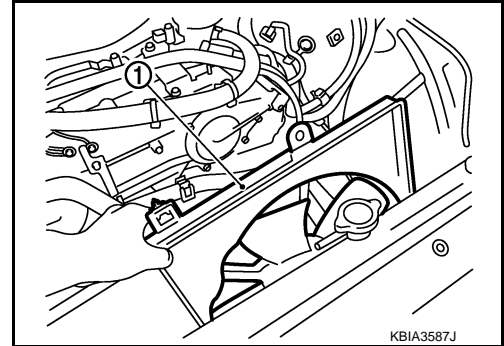
CAUTION:

Be careful not to allow engine coolant to contact drive belt.

7. Remove cooling fan assembly (1). Refer to [CO-21](#).

CAUTION:

Never damage or scratch radiator core when removing.



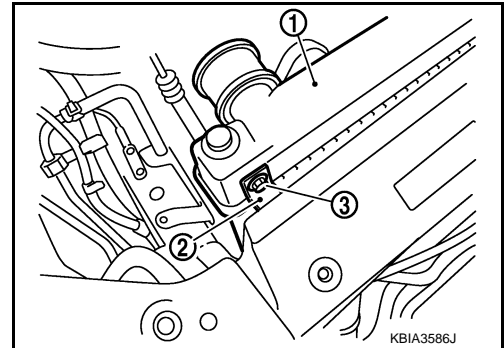
8. Remove radiator as follows:

- a. Remove mounting bracket (RH and LH).

- b. Pull the radiator (1) rearward from the vehicle, and then remove the mounting bolts (3) and A/C condenser (2).

NOTE:

Figure shows right side.



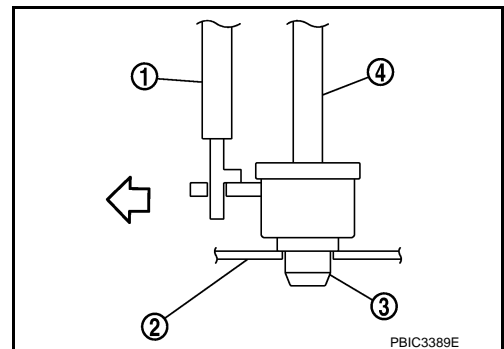
- c. Lift up and pull the radiator (4) rearward, and then remove the mounting rubber (lower) (3) from the radiator core support (2).

1 : A/C condenser

← : Vehicle front

CAUTION:

At this time, A/C condenser is on the lower end of radiator front surface. Minimize the movement to the rear side.



- d. Lift up the A/C condenser to disengage the lower end of front surface, and then remove the radiator.

CAUTION:

- Be careful not to damage radiator and A/C condenser core.
- Minimize the lift of A/C condenser to prevent load from being applied to A/C piping.

- e. After removing the radiator, place the A/C condenser on the radiator core support to prevent load from being applied to piping. And then, temporarily secure them using a rope to prevent them from being dropped.

INSTALLATION

< SERVICE INFORMATION >

Install in the reverse order of removal.

INSPECTION AFTER INSTALLATION

- Check for leakage of engine coolant using the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool). Refer to [CO-10, "Inspection"](#).
- Start and warm up the engine. Visually check that there is no leakage of engine coolant and A/T fluid.

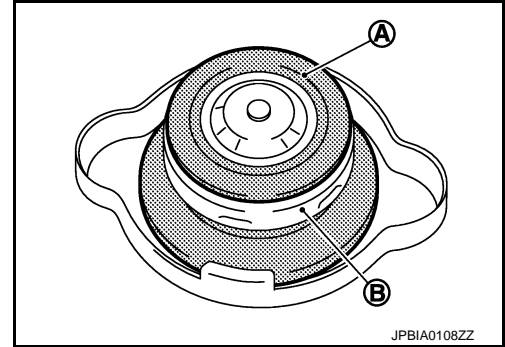
Checking Radiator Cap

INFOID:000000005349884

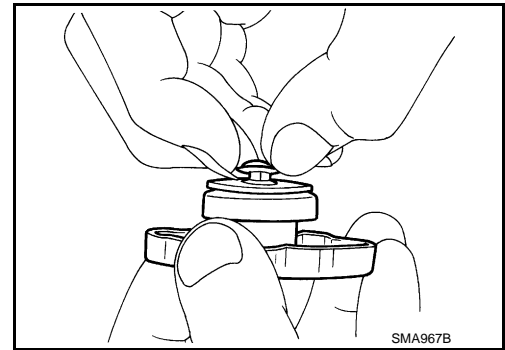
- Check valve seat (A) of radiator cap.

B : Metal plunger

- Check if valve seat is swollen to the extent that the edge of the plunger cannot be seen when watching it vertically from the top.
- Check if valve seat has no soil and damage.



- Pull negative-pressure valve to open it, and check that it close completely when released.
- Check that there is no dirt or damage on the valve seat of radiator cap negative-pressure valve.
- Check that there are no unusualness in the opening and closing conditions of negative-pressure valve.



- Check radiator cap relief pressure.

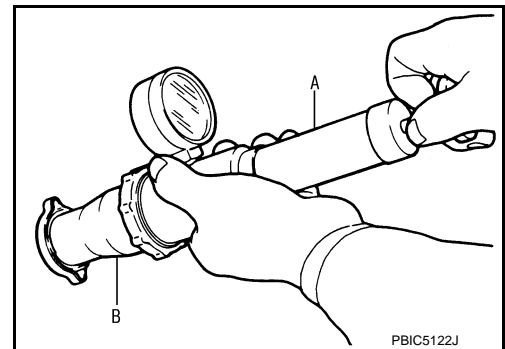
Standard:

108 - 127 kPa (1.1 - 1.3 kg/cm², 16 - 18 psi)

Limit:

88 kPa (0.9 kg/cm², 13 psi)

- When connecting radiator cap to the radiator cap tester (commercial service tool) (A) and the radiator cap tester adapter (commercial service tool) (B), apply engine coolant to the cap seal surface.



- Replace radiator cap if there is an unusualness related to the above three.

CAUTION:

When installing radiator cap, thoroughly wipe out the radiator filler neck to remove any waxy residue or foreign material.

Checking Radiator

INFOID:000000005349885

Check radiator for mud or clogging. If necessary, clean radiator as follows.

- Be careful not to bend or damage radiator fins.
 - When radiator is cleaned without removal, remove all surrounding parts such as radiator cooling fan assembly and horns. Then tape harness and connectors to prevent water from entering.
1. Apply water by hose to the back side of the radiator core vertically downward.
 2. Apply water again to all radiator core surfaces once per minute.
 3. Stop washing if any stains no longer flow out from radiator.

RADIATOR

< SERVICE INFORMATION >

[VQ35HR]

-
4. Blow air into the back side of radiator core vertically downward.
 - Use compressed air lower than 490 kPa (5 kg/cm², 71 psi) and keep distance more than 30 cm (11.81 in).
 5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

RADIATOR (ALUMINUM TYPE)

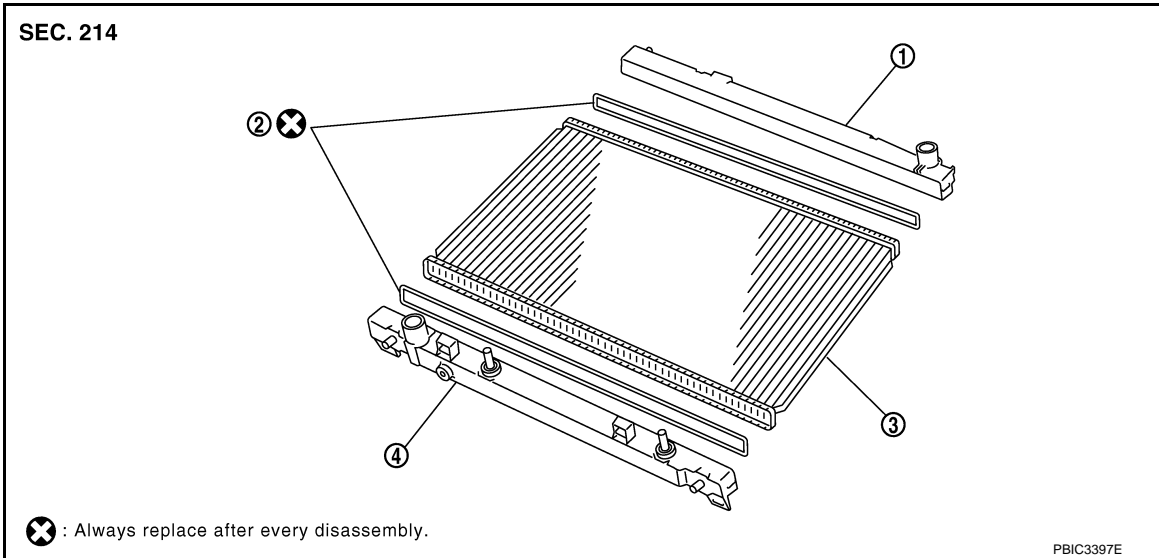
< SERVICE INFORMATION >

[VQ35HR]

RADIATOR (ALUMINUM TYPE)

Component

INFOID:000000005349886



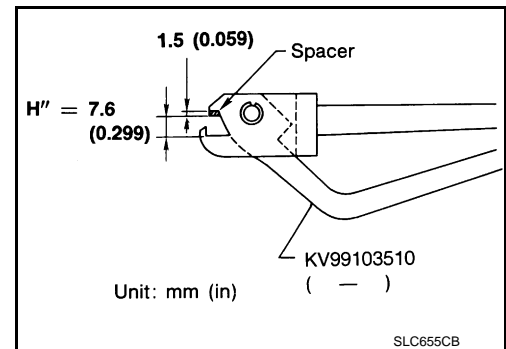
- 1. Upper tank
- 2. Sealing rubber
- 3. Core
- 4. Lower tank (with A/T fluid cooler)

Disassembly and Assembly

INFOID:000000005349887

PREPARATION

- Attach spacer to tip of the radiator plate pliers A (SST).
Spacer specification: 18 mm (0.71 in) wide × 8.5 mm (0.335 in) long × 1.5 mm (0.059 in) thick.



- Check that when the radiator plate pliers A [SST: KV99103510 (—)] are closed dimension H'' is approximately 7.6 mm (0.299 in).
- Adjust dimension H'' with spacer, if necessary.

DISASSEMBLY

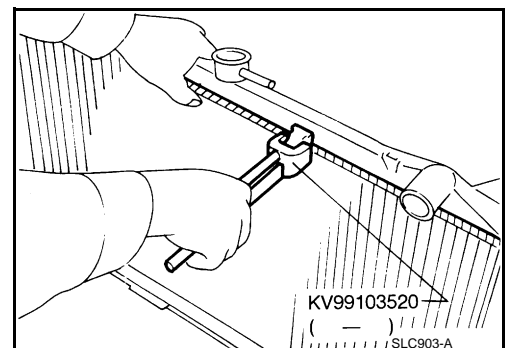
- Remove upper and lower tanks with the radiator plate pliers B (SST).

CAUTION:

Never disassemble lower tank and A/T fluid cooler.

NOTE:

Regard lower tank and A/T fluid cooler as an assembly.



RADIATOR (ALUMINUM TYPE)

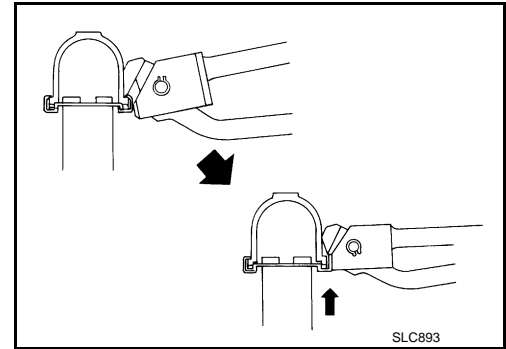
[VQ35HR]

< SERVICE INFORMATION >

- Grip the crimped edge and bend it upwards so that the radiator plate pliers B [SST: KV99103520 (—)] slips off.

CAUTION:

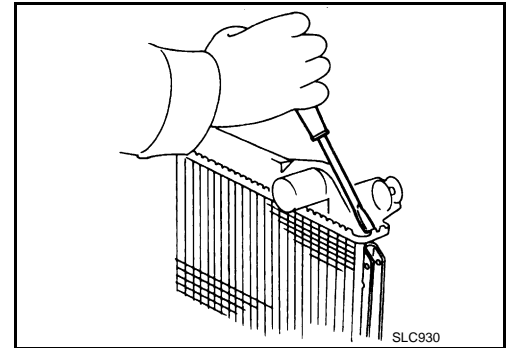
Never bend excessively.



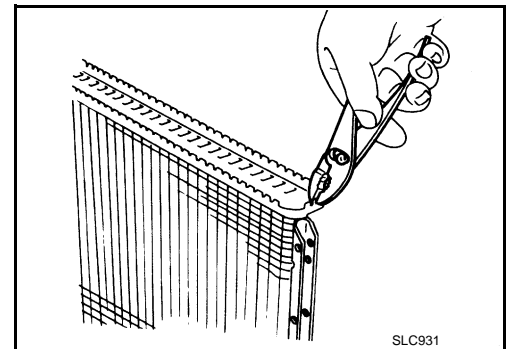
- In areas where the radiator plate pliers B [SST: KV99103520 (—)] cannot be used, use a screwdriver to bend the edge up.

CAUTION:

Be careful not to damage tank.

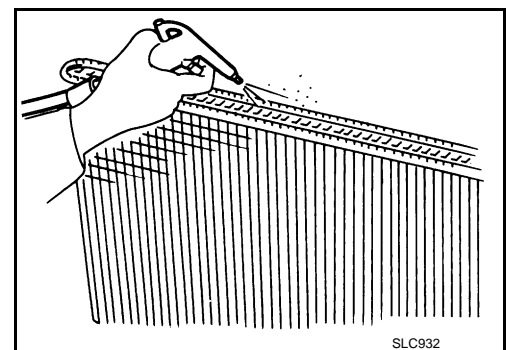


2. Remove sealing rubber.
3. Check the edge stands straight up.



ASSEMBLY

1. Clean contact portion of tank.



RADIATOR (ALUMINUM TYPE)

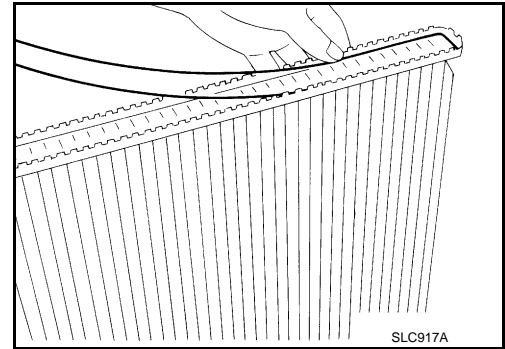
[VQ35HR]

< SERVICE INFORMATION >

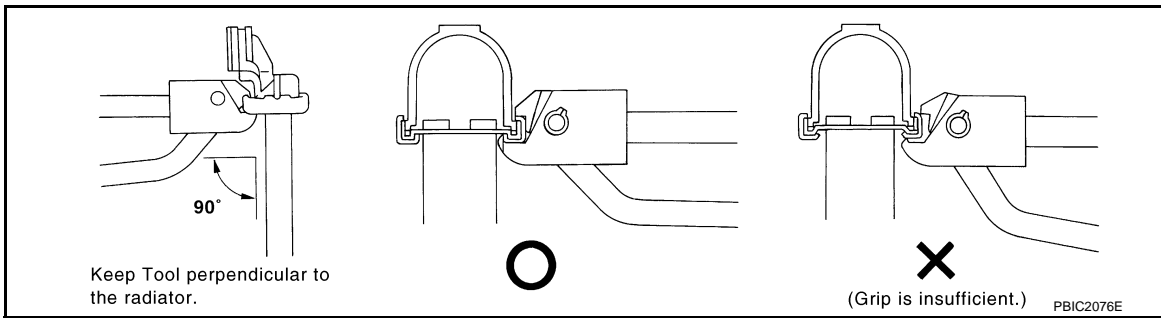
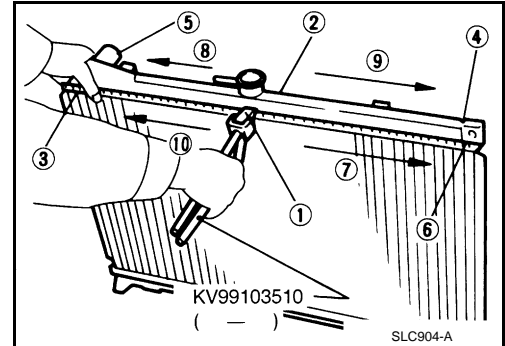
2. Install new sealing rubber while pushing it with fingers.

CAUTION:

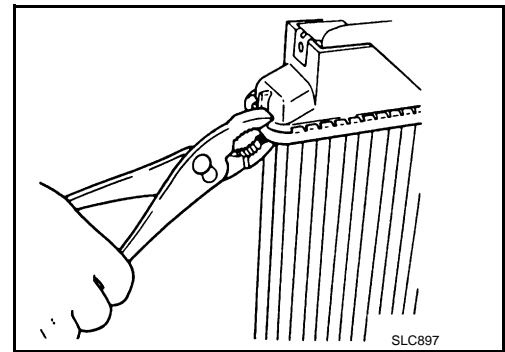
Be careful not to twist sealing rubber.



3. Caulk tank in numerical order as shown in the figure with the radiator plate pliers A (SST).

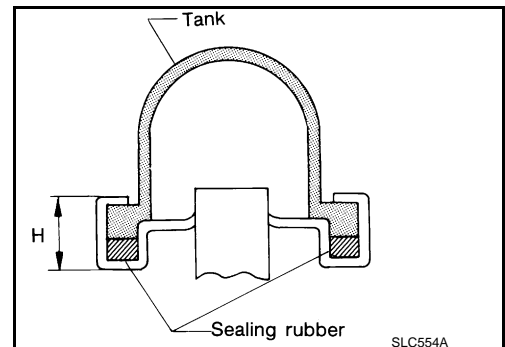


• Use pliers in the locations where the radiator plate pliers A [SST: KV99103510 (—)] cannot be used.



4. Check that the rim is completely crimped down.

Standard height "H" : 8.0 - 8.4 mm (0.315 - 0.331 in)



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RADIATOR (ALUMINUM TYPE)

[VQ35HR]

< SERVICE INFORMATION >

5. Check that there is no leakage. Refer to "INSPECTION".

INSPECTION

1. Apply pressure with the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool).

- provide used radiator and connect it to tested radiator using radiator hoses as shown in the figure.

NOTE:

The used radiator should be tested beforehand to confirm it has no leakage. If used one is not available, it is possible to use new service part as a radiator testing tool.

Testing pressure

: 157 kPa (1.6 kg/cm², 23 psi)

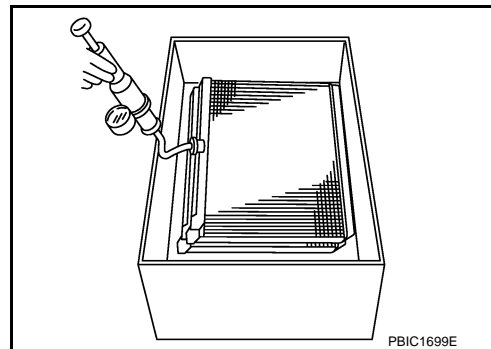
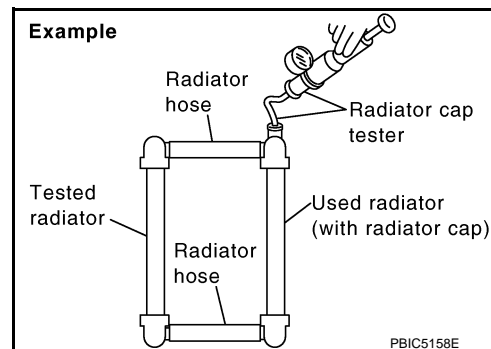
WARNING:

To prevent the risk of hose coming undone while under pressure, securely fasten it down with hose clamp.

CAUTION:

Attach hose to A/T fluid cooler to seal its inlet and outlet.

2. Check for leakage by soaking radiator in water container with the testing pressure applied.



COOLING FAN

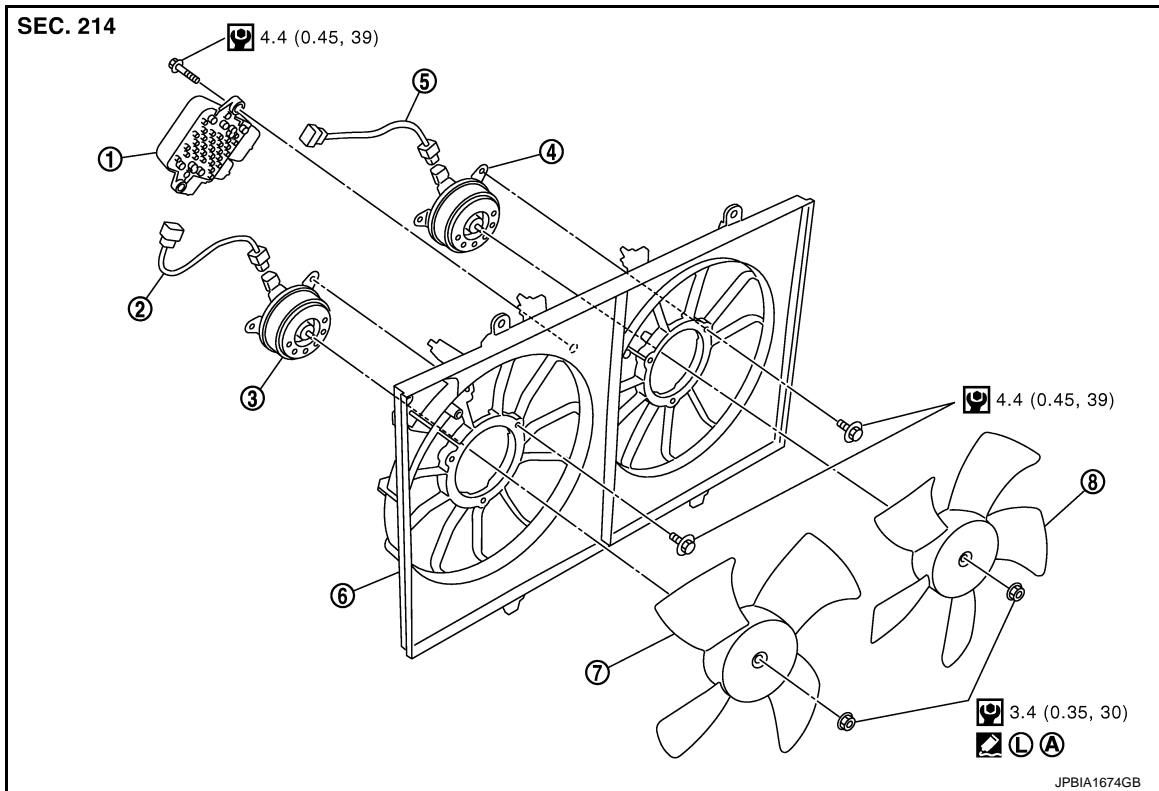
< SERVICE INFORMATION >

[VQ35HR]

COOLING FAN

Component

INFOID:000000005349888



- | | | |
|-------------------------------|---------------------|-------------------|
| 1. Cooling fan control module | 2. Sub-harness | 3. Fan motor (RH) |
| 4. Fan motor (LH) | 5. Sub-harness | 6. Fan shroud |
| 7. Cooling fan (RH) | 8. Cooling fan (LH) | |

A. Apply on fan motor shaft

L : Apply Genuine High Strength Thread Locking Sealant or equivalent.

• Refer to [GI-9. "Component"](#) for symbols not described on the above.

Removal and Installation

INFOID:000000005349889

REMOVAL

1. Remove engine room cover (RH and LH). Refer to [EM-14. "Component"](#).
2. Remove air duct (inlet) and air cleaner case assembly. Refer to [EM-17. "Component"](#).
3. Drain engine coolant from radiator. Refer to [CO-10](#).
4. Remove reservoir tank. Refer to [CO-13. "Component"](#).
5. Disconnect harness connector from cooling fan control module, and move harness to aside.
6. Remove radiator hose (upper). Refer to [CO-13](#).
7. Remove cooling fan assembly.

CAUTION:

Be careful not to damage or scratch on radiator core.

INSTALLATION

Note the following, and install in the reverse order of removal.

CAUTION:

Only use genuine parts for radiator shroud and cooling fan mounting bolt and observe the specified torque (to prevent radiator from being damaged).

COOLING FAN

[VQ35HR]

< SERVICE INFORMATION >

INSPECTION AFTER INSTALLATION

Check that fan motors operate normally.

NOTE:

Cooling fans are controlled by cooling fan control module. For details, refer to [EC-78, "System Diagram"](#).

Disassembly and Assembly

INFOID:000000005349890

DISASSEMBLY

1. Disconnect sub-harness from fan motor (RH and LH) and cooling fan control module.
2. Remove cooling fan control module from fan shroud.

CAUTION:

Handle carefully to avoid dropping and shocks.

3. Remove cooling fan mounting nuts, and then remove the cooling fan (RH and LH).
4. Remove fan motor (RH and LH).

INSPECTION AFTER DISASSEMBLY

Cooling Fan

Inspect cooling fan for crack or unusual bend.

- If anything is found, replace cooling fan.

ASSEMBLY

Note the following, and assemble in the reverse order of disassembly.

CAUTION:

RH and LH cooling fans are different. Be careful not to misassemble them.

- Install each fan in the following position.

Right side : 4 blades

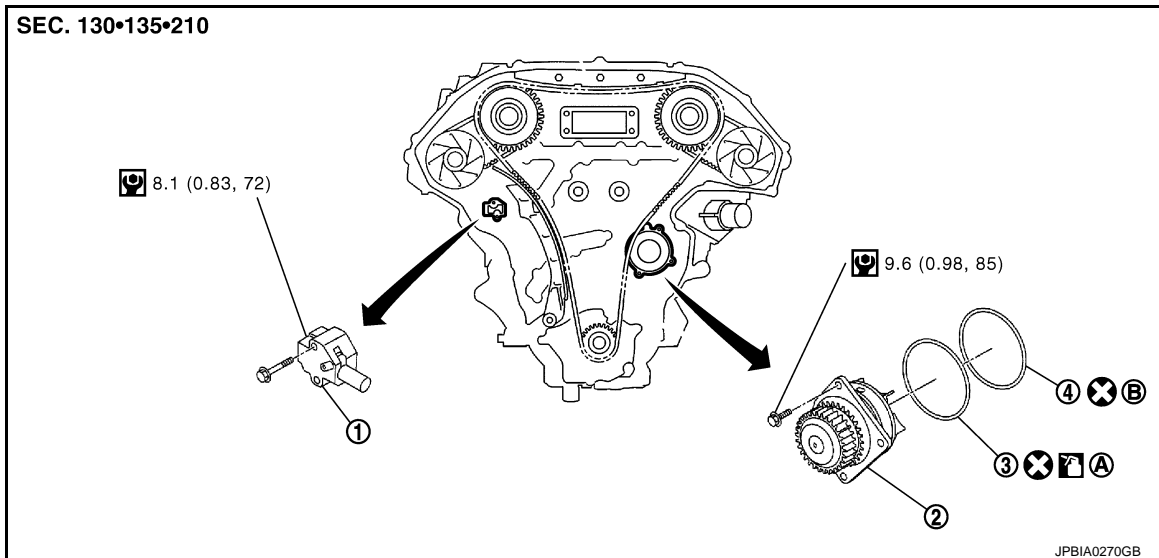
Left side : 5 blades

- Secure the sub-harness tightly to the fan shroud to prevent the fan rotation area from being loose.

WATER PUMP

Component

INFOID:000000005349891



- | | | |
|-------------------------------------|--|-----------|
| 1. Timing chain tensioner (primary) | 2. Water pump | 3. O-ring |
| 4. O-ring | | |
| A. Identify with yellow paint mark | B. Identify with light blue paint mark
Apply engine coolant | |

- Refer to [GI-9. "Component"](#) for symbols in the figure.

Removal and Installation

INFOID:000000005349892

CAUTION:

- When removing water pump assembly, be careful not to get engine coolant on drive belt.
- Water pump cannot be disassembled and should be replaced as a unit.
- After installing water pump, connect hose and clamp securely, then check for leakage using the radiator cap tester (commercial service tool) and the radiator cap tester adapter (commercial service tool).

REMOVAL

1. Remove engine room cover (RH and LH). Refer to [EM-14. "Component"](#).
2. Remove engine cover. Refer to [EM-19. "Removal and Installation"](#).
3. Release the fuel pressure. Refer to [EC-692. "Inspection"](#).
4. Disconnect the battery cable from the negative terminal.
5. Remove air duct and air cleaner case assembly (RH and LH). Refer to [EM-17. "Component"](#).
6. Remove reservoir tank. Refer to [CO-13. "Component"](#).
7. Separate engine harness removing their brackets from front timing chain case.
8. Remove front engine undercover with power tool.
9. Drain engine oil. Refer to [LU-7. "Changing Engine Oil"](#).
 - Perform this step when the engine is cold.
 - Never spill engine oil on drive belt.
10. Drain engine coolant from radiator. Refer to [CO-10. "Changing Engine Coolant"](#).
 - Perform this step when the engine is cold.
 - Never spill engine coolant on drive belt.
11. Remove cooling fan assembly. Refer to [CO-21. "Component"](#).

WATER PUMP

[VQ35HR]

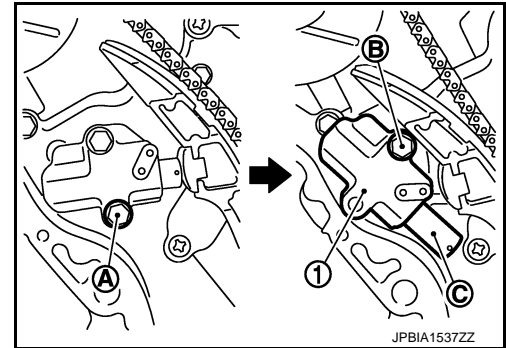
< SERVICE INFORMATION >

12. Remove radiator hose (upper and lower). Refer to [CO-13, "Component"](#).
13. Remove front timing chain case. Refer to [EM-49, "Removal and Installation"](#).
14. Remove timing chain tensioner (primary) as follows:

- a. Remove lower mounting bolt (A).
- b. Loosen upper mounting bolt (B) slowly, and then turn chain tensioner (primary) (1) on the upper mounting bolt so that plunger (C) is fully expanded.

NOTE:

Even if plunger is fully expanded, it is not dropped from the body of timing chain tensioner (primary).



- c. Remove upper mounting bolt, and then remove timing chain tensioner (primary).
15. Remove water pump as follows:

- a. Remove three water pump mounting bolts. Secure a gap between water pump gear and timing chain, by turning crankshaft counterclockwise until timing chain looseness on water pump sprocket becomes maximum.
- b. Screw M8 bolts (A) [pitch: 1.25 mm (0.0492 in) length: approximately 50 mm (1.97 in)] into water pumps upper and lower mounting bolt holes until they reach timing chain case. Then, alternately tighten each bolt for a half turn, and pull out water pump (1).

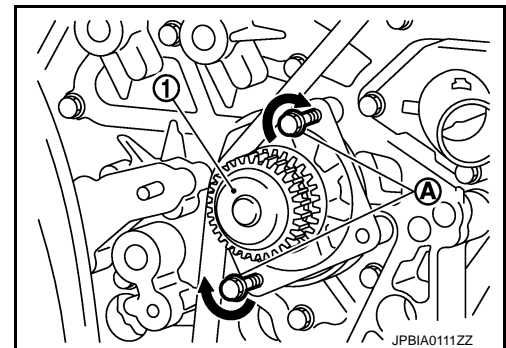
CAUTION:

- Pull straight out while preventing vane from contacting socket in installation area.
- Remove water pump without causing sprocket to contact timing chain.

- c. Remove M8 bolts and O-rings from water pump.

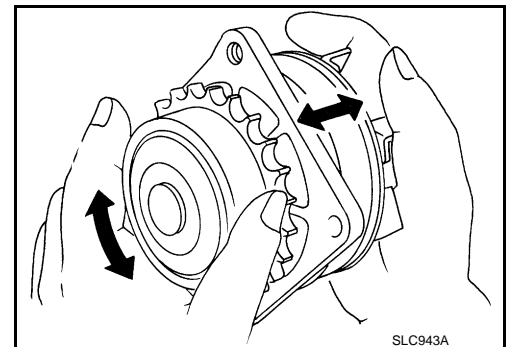
CAUTION:

Never disassemble water pump.



INSPECTION AFTER REMOVAL

- Check for badly rusted or corroded water pump body assembly.
- Check for rough operation due to excessive end play.
- If anything is found, replace water pump.



INSTALLATION

1. Install new O-rings to water pump.

WATER PUMP

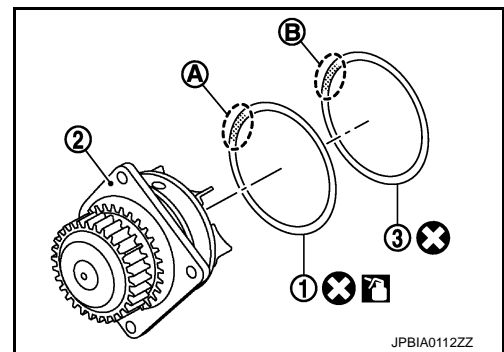
[VQ35HR]

< SERVICE INFORMATION >

- Apply engine oil to O-ring (1) and engine coolant to O-ring (3) as shown in the figure.

2 : Water pump

- Locate O-ring with yellow paint mark (A) to front side.
- Locate O-ring with light blue paint mark (B) to rear side.



2. Install water pump.

CAUTION:

Never allow cylinder block to nip O-rings when installing water pump.

- Check timing chain and water pump sprocket are engaged.
- Insert water pump by tightening mounting bolts alternately and evenly.

3. Install timing chain tensioner (primary) as follows:

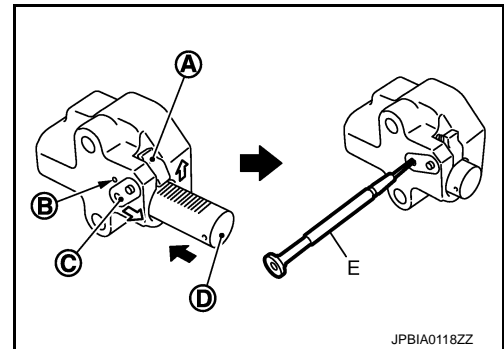
- a. Turn crankshaft clockwise so that timing chain on the timing chain tensioner (primary) side is loose.

- b. Pull plunger stopper tab (A) up (or turn lever downward) so as to remove plunger stopper tab from the ratchet of plunger (D).

NOTE:

Plunger stopper tab and lever (C) are synchronized.

- c. Push plunger into the inside of tensioner body.
- d. Hold plunger in the fully compressed position by engaging plunger stopper tab with the tip of ratchet.
- e. To secure lever, insert stopper pin (E) through hole of lever into tensioner body hole (B).
 - The lever parts and the tab are synchronized. Therefore, the plunger will be secured under this condition.



NOTE:

Figure shows the example of 1.2 mm (0.047 in) diameter thin screwdriver being used as the stopper pin.

- f. Install timing chain tensioner (primary).
 - Remove dust and foreign material completely from backside of timing chain tensioner (primary) and from installation area of rear timing chain case.

- g. Remove stopper pin.

- h. Check again that timing chain and water pump sprocket are engaged.

4. Install in the reverse order of removal for remaining parts.

- **After starting engine, let idle for three minutes, then rev engine up to 3,000 rpm under no load to purge air from the high-pressure chamber of chain tensioner. Engine may produce a rattling noise. This indicates that air still remains in the chamber and is not a matter of concern.**

INSPECTION AFTER INSTALLATION

- Check for leakage of engine coolant using the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool). Refer to [CO-10. "Inspection"](#).
- Start and warm up the engine. Visually check that there is no leakage of engine coolant.

WATER INLET AND THERMOSTAT ASSEMBLY

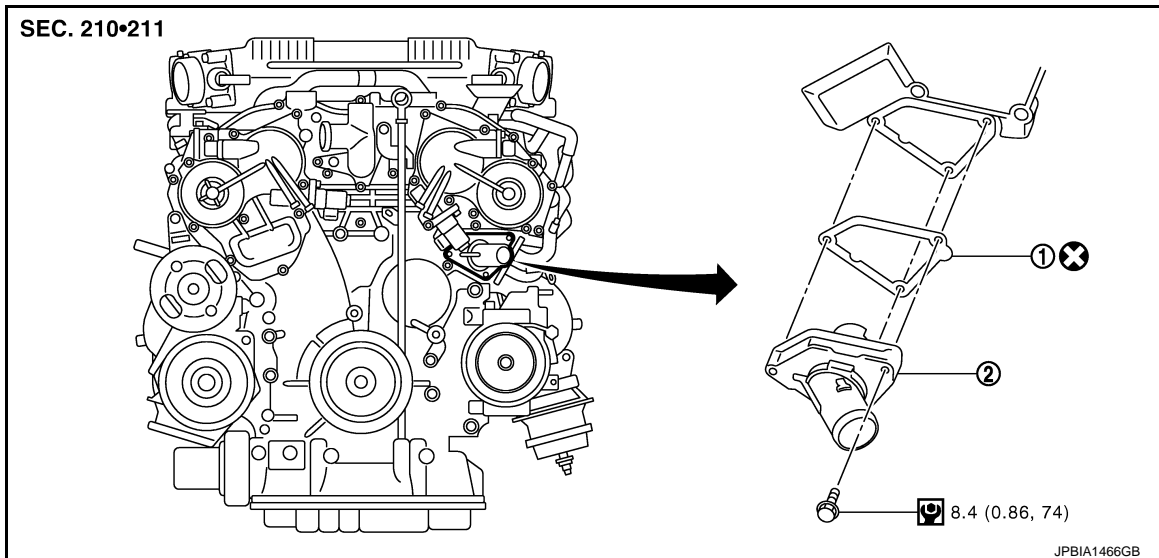
< SERVICE INFORMATION >

[VQ35HR]

WATER INLET AND THERMOSTAT ASSEMBLY

Component

INFOID:000000005349893



1. Gasket
2. Water inlet and thermostat assembly

- Refer to [GI-9, "Component"](#) for symbols in the figure.

Removal and Installation

INFOID:000000005349894

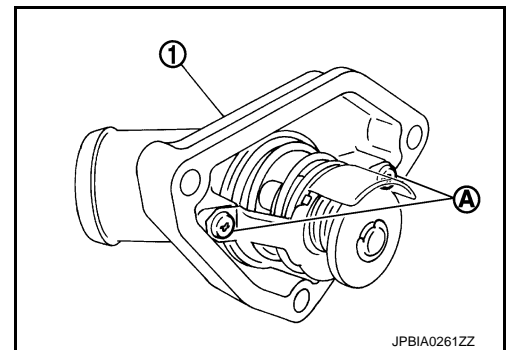
REMOVAL

1. Remove engine room cover (RH and LH). Refer to [EM-19, "Removal and Installation"](#).
 2. Remove air duct (inlet). Refer to [EM-17, "Component"](#).
 3. Remove front engine undercover with power tool.
 4. Drain engine coolant from radiator drain plug at the bottom of radiator, and from water drain plug at the front of cylinder block. Refer to [CO-10, "Changing Engine Coolant"](#) and [CO-23](#).
- CAUTION:**
- Perform this step when the engine is cold.
 - Never spill engine coolant on drive belt.
5. Disconnect radiator hose (lower) and oil cooler water hose from water inlet and thermostat assembly.
 6. Disconnect intake valve timing control solenoid valve harness connector (bank 2), and remove intake valve timing control solenoid valve (bank 2). Refer to [EM-59, "Component"](#).
 7. Remove water inlet and thermostat assembly (1).

A : Do not loose there screw.

CAUTION:

Never disassemble water inlet and thermostat assembly.
Replace them as a unit, if necessary.



INSPECTION AFTER REMOVAL

1. Check valve seating condition at ordinary room temperatures. It should seat tightly.

WATER INLET AND THERMOSTAT ASSEMBLY

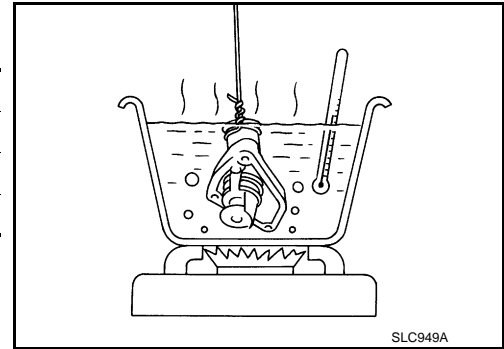
[VQ35HR]

< SERVICE INFORMATION >

2. Check valve operation.

Thermostat	Standard
Valve opening temperature	82°C (180°F)
Maximum valve lift	9.0 mm/95°C (0.354 in/203°F)
Valve closing temperature	77°C (171°F)

- If the malfunctioning condition, when valve seating at ordinary room temperature, or measured values are out of the standard, replace water inlet and thermostat assembly.



INSTALLATION

Note the following, and install in the reverse order of removal.

CAUTION:

Be careful not to spill engine coolant over engine room. Use rag to absorb engine coolant.

INSPECTION AFTER INSTALLATION

- Check for leakage of engine coolant using the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool). Refer to [CO-10. "Inspection"](#).
- Start and warm up the engine. Visually check that there is no leakage of engine coolant.

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WATER OUTLET AND WATER PIPING

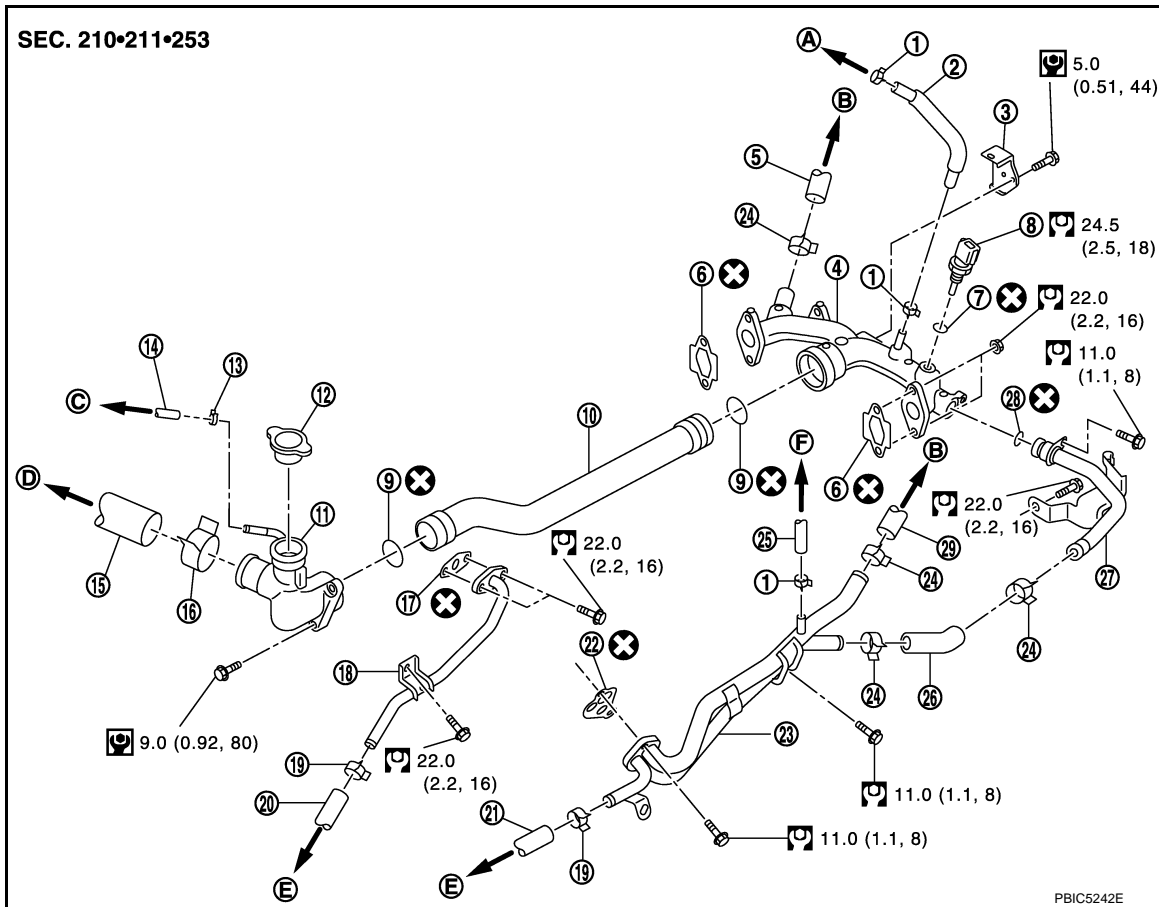
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[VQ35HR]

WATER OUTLET AND WATER PIPING

Component

INFOID:000000005349895



- | | | |
|------------------------|--------------------------------------|--|
| 1. Clamp | 2. Water hose | 3. Harness bracket |
| 4. Water outlet (rear) | 5. Heater hose | 6. Gasket |
| 7. Washer | 8. Engine coolant temperature sensor | 9. O-ring |
| 10. Water outlet pipe | 11. Water outlet (front) | 12. Radiator cap |
| 13. Clamp | 14. Reservoir tank hose | 15. Radiator hose (upper) |
| 16. Clamp | 17. Gasket | 18. Water pipe |
| 19. Clamp | 20. Water hose | 21. Water hose |
| 22. Gasket | 23. Heater pipe | 24. Clamp |
| 25. Water hose | 26. Water hose | 27. Water bypass pipe |
| 28. O-ring | 29. Heater hose | |
| A. To EVAP piping | B. To heater core | C. To reservoir tank |
| D. To radiator | E. To oil cooler | F. To electric throttle control actuator |

- Refer to [GI-9, "Component"](#) for symbols in the figure.

Removal and Installation

INFOID:000000005349896

REMOVAL

1. Remove engine room cover (RH and LH). Refer to [EM-14, "Component"](#).
2. Remove engine cover with power tool. Refer to [EM-19, "Removal and Installation"](#).
3. Remove air duct (inlet) and air cleaner case assembly. Refer to [EM-17, "Component"](#).
4. Remove front engine undercover with power tool.

WATER OUTLET AND WATER PIPING

[VQ35HR]

< SERVICE INFORMATION >

5. Drain engine coolant from radiator drain plug at the bottom of radiator, and from water drain plug at the front of cylinder block. Refer to [CO-10, "Changing Engine Coolant"](#) and [CO-23](#).
CAUTION:
 - **Perform this step when the engine is cold.**
 - **Never spill engine coolant on drive belt.**
6. Remove radiator hose (upper) and heater hose.
7. Remove the following parts, when remove water outlet (rear).
 - A/T fluid charging pipe: Refer to [AT-243](#).
 - Intake manifold collectors (upper and lower): Refer to [EM-19, "Component"](#).
8. Remove engine coolant temperature sensor if necessary.
CAUTION:
Be careful not to damage engine coolant temperature sensor.
9. Remove heater pipe, water bypass hoses and water pipe.

INSTALLATION

Note the following, and install in the reverse order of removal.

- Securely insert each hose, and install clamp at a position where it does not interfere with the pipe bulge.
- When inserting water pipe into water outlet, apply neutral detergent to O-ring.

INSPECTION AFTER INSTALLATION

- Check for leakage of engine coolant using the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool). Refer to [CO-10, "Inspection"](#).
- Start and warm up the engine. Visually check that there is no leakage of engine coolant.

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SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

[VQ35HR]

SERVICE DATA AND SPECIFICATIONS (SDS)

Standard and Limit

INFOID:000000005349897

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Engine coolant capacity [With reservoir tank ("MAX" level)]	9.2 (9-6/8, 8-1/8)
Reservoir tank engine coolant capacity (At "MAX" level)	0.8 (7/8, 3/4)

RADIATOR

Unit: kPa (kg/cm², psi)

Radiator cap relief pressure	Standard	108 - 127 (1.1 - 1.3, 16 - 18)
	Limit	88 (0.9, 13)
Leakage testing pressure		157 (1.6, 23)

THERMOSTAT

Thermostat	Standard
Valve opening temperature	82°C (180°F)
Maximum valve lift	9.0 mm/95°C (0.354 in/203°F)
Valve closing temperature	77°C (171°F)

SERVICE INFORMATION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000005349898

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SUPPLEMENTAL RESTRAINT SYSTEM" and "SEAT BELTS" of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SUPPLEMENTAL RESTRAINT SYSTEM".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

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PREPARATION

< SERVICE INFORMATION >

[VK45DE]

PREPARATION

Special Service Tool

INFOID:000000005349899

The actual shapes of Kent-Moore tools may from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV99103510 (—) Radiator plate pliers A	Installing radiator upper and lower tanks
<p>S-NT224</p>	
KV99103520 (—) Radiator plate pliers B	Removing radiator upper and lower tanks
<p>S-NT225</p>	

Commercial Service Tool

INFOID:000000005349900

Tool name	Description
Power tool	Loosening nuts and bolts
<p>PBIC0190E</p>	
Radiator cap tester	Checking radiator and radiator cap
<p>PBIC1982E</p>	
Radiator cap tester adapter	Adapting radiator cap tester to radiator cap and thermostat housing filler neck a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in)
<p>S-NT564</p>	

OVERHEATING CAUSE ANALYSIS

< SERVICE INFORMATION >

[VK45DE]

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:000000005349901

Symptom		Check items		
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat and water control valve stuck closed	—	
		Damaged fins	Dust contamination or paper clogging	
			Physical damage	
	Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)		
	Reduced air flow	Cooling fan does not operate	Fan assembly	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper engine coolant mixture ratio	—	—	—
	Poor engine coolant quality	—	Engine coolant density	—
	Insufficient engine coolant	Engine coolant leakage	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
				Radiator cap
Poor sealing				
Radiator		O-ring for damage, deterioration or improper fitting		
		Cracked radiator tank		
		Cracked radiator core		
Reservoir tank	Cracked reservoir tank			
Overflowing reservoir tank	Exhaust gas leakage into cooling system	Cylinder head deterioration		
		Cylinder head gasket deterioration		

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OVERHEATING CAUSE ANALYSIS

< SERVICE INFORMATION >

[VK45DE]

		Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load	—
				Driving in low gear for extended time	
				Driving at extremely high speed	
			Powertrain system malfunction		
			Installed improper size wheels and tires		
			Dragging brakes		
	Blocked or restricted air flow	Blocked or restricted air flow	Blocked bumper	—	—
			Blocked radiator grille	Installed car brassiere	
				Mud contamination or paper clogging	
			Blocked radiator	—	
Blocked condenser			Blocked air flow		
Installed large fog lamp					

COOLING SYSTEM

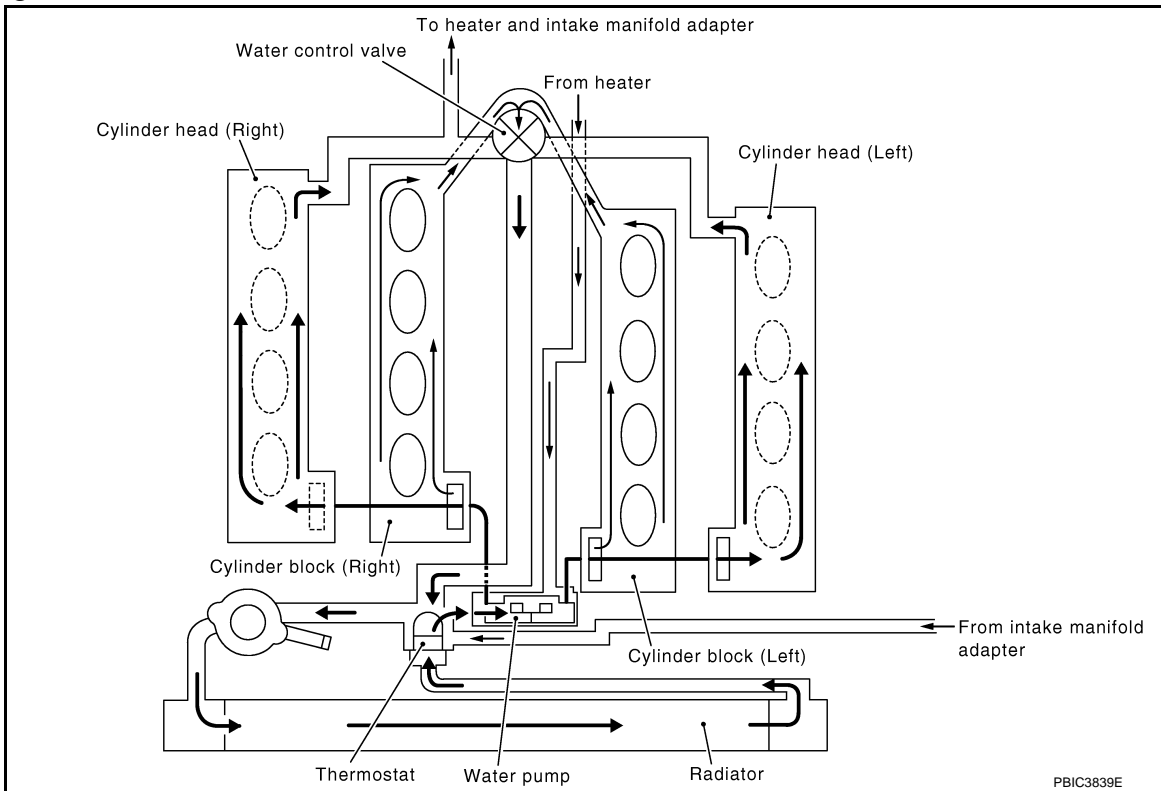
< SERVICE INFORMATION >

[VK45DE]

COOLING SYSTEM

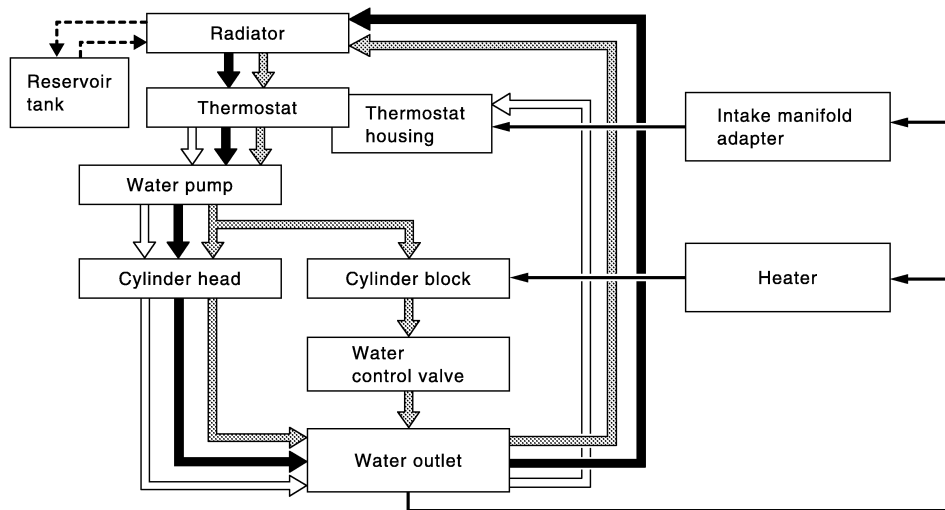
Cooling Circuit

INFOID:000000005349902



System Chart

INFOID:000000005349903



	Thermostat	Water control valve
	Closed	Closed
	Open	Closed
	Open	Open

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ENGINE COOLANT

Inspection

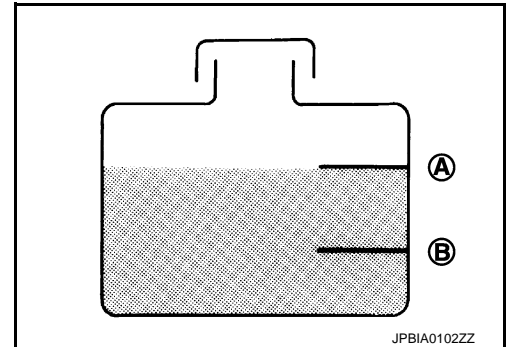
INFOID:000000005349904

LEVEL CHECK

- Check if the reservoir tank engine coolant level is within the "MIN" to "MAX" when engine is cool.

A : MAX
B : MIX

- Adjust the engine coolant level if necessary.



LEAK CHECK

- To check for leakage, apply pressure to the cooling system with radiator cap tester (commercial service tool) and radiator cap tester adapter (commercial service tool) (A).

Testing pressure: 157 kPa (1.6 kg/cm², 23 psi)

WARNING:

Never remove radiator cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from thermostat housing.

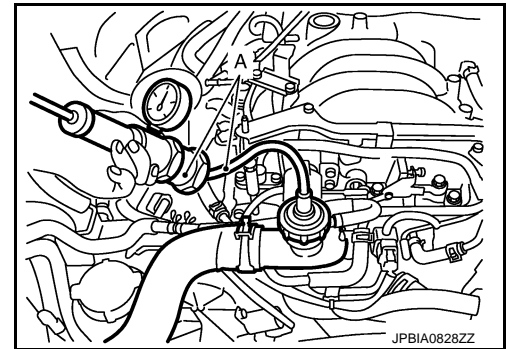
CAUTION:

Higher testing pressure than specified may cause radiator damage.

NOTE:

In a case engine coolant decreases, replenish radiator with engine coolant.

- If anything is found, repair or replace damaged parts.



Changing Engine Coolant

INFOID:000000005349905

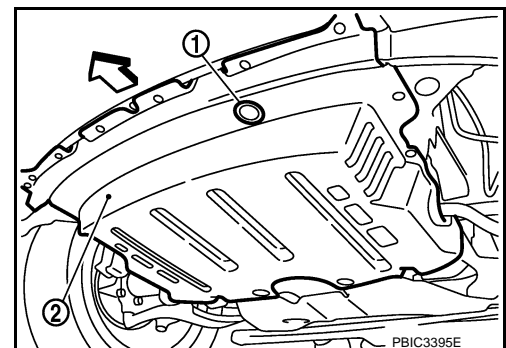
WARNING:

- To avoid being scalded, never change engine coolant when engine is hot.
- Wrap a thick cloth around radiator cap and carefully remove radiator cap. First, turn radiator cap a quarter of a turn to release built-up pressure. Then turn radiator cap all the way.

DRAINING ENGINE COOLANT

1. Remove engine room cover (RH and LH). Refer to [EM-168](#).
2. Remove engine cover with power tool. Refer to [EM-175. "Removal and Installation"](#).
3. Open radiator drain plug at the bottom of radiator, and then remove radiator cap.

1 : Radiator drain plug hole
2 : Front engine undercover
⇐ : Vehicle front



When draining all of engine coolant in the system, open water drain plugs on cylinder block. Refer to [EM-247, "Disassembly and Assembly"](#).

ENGINE COOLANT

[VK45DE]

< SERVICE INFORMATION >

4. Remove reservoir tank if necessary, and drain engine coolant and clean reservoir tank before installing.
5. Check drained engine coolant for contaminants such as rust, corrosion or discoloration. If contaminated, flush the engine cooling system. Refer to "FLUSHING COOLING SYSTEM".

REFILLING ENGINE COOLANT

1. Install reservoir tank if removed and radiator drain plug.

CAUTION:


Be sure to clean radiator drain plug and install with new O-ring.

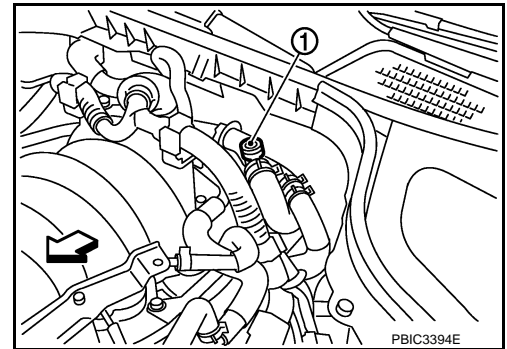
Radiator drain plug:

: 1.2 N·m (0.12 kg·m, 11 in·lb)

If water drain plugs on cylinder block are removed, close and tighten them. Refer to [EM-247, "Disassembly and Assembly"](#).

2. Check that each hose clamp has been firmly tightened.
3. Remove air relief plug (1) on heater hose.

 : Engine front



4. Fill thermostat housing and reservoir tank to specified level.
 - Refill engine coolant up to filler neck of thermostat housing.
 - Pour engine coolant through engine coolant filler neck slowly of less than 2 ℓ (2-1/8 US qt, 1-3/4 Imp qt) a minute to allow air in system to escape.
 - Use Genuine NISSAN Long Life Antifreeze/Coolant or equivalent mixed with water (distilled or demineralized). Refer to [MA-9](#).

Engine coolant capacity

(With reservoir tank at "MAX" level):

Approximately 10.4 ℓ (11 US qt, 9-1/8 Imp qt)

Reservoir tank engine coolant capacity

(At "MAX" level):

0.8 ℓ (7/8 US qt, 3/4 Imp qt)

A : MAX

B : MIN

- When engine coolant overflows air relief hole on heater hose, install air relief plug.

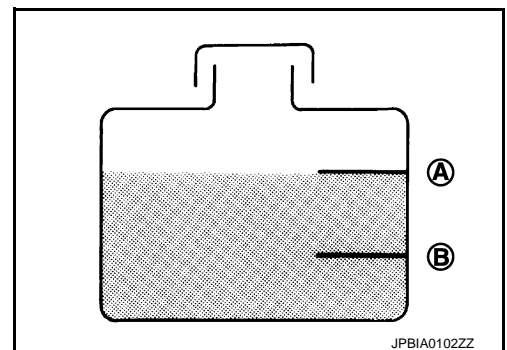
Air relief plug:

: 1.2 N·m (0.12 kg·m, 11 in·lb)

5. Install radiator cap.
6. Warm up until opening thermostat. Standard for warming-up time is approximately 10 minutes at 3,000 rpm.
 - Check thermostat opening condition by touching radiator hose (lower) to see a flow of warm water.

CAUTION:

Watch water temperature gauge so as not to overheat engine.



ENGINE COOLANT

[VK45DE]

< SERVICE INFORMATION >

7. Stop engine and cool down to less than approximately 50°C (122°F).
 - Cool down using a fan to reduce the time.
 - If necessary, refill engine coolant up to filler neck of thermostat housing.
8. Refill reservoir tank to "MAX" level line with engine coolant.
9. Repeat steps 4 through 7 two or more times with radiator cap installed until engine coolant level no longer drops.
10. Check cooling system for leakage with engine running.
11. Warm up engine, and check for sound of engine coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between "COOL" and "WARM".
 - Sound may be noticeable at heater unit.
12. Repeat step 11 three times.
13. If sound is heard, bleed air from cooling system by repeating steps 4 through 7 until engine coolant level no longer drops.

FLUSHING COOLING SYSTEM


1. Install reservoir tank if removed and radiator drain plug.
CAUTION:
Be sure to clean drain plug and install with new O-ring.

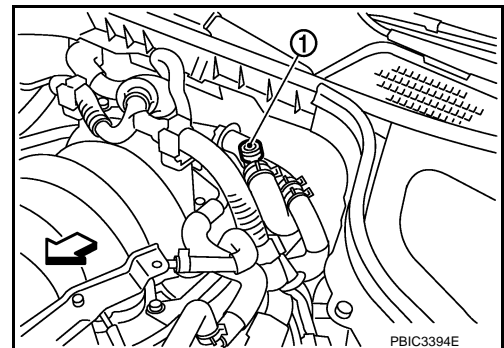
Radiator drain plug:

: 1.2 N·m (0.12 kg·m, 11 in·lb)

If water drain plugs on cylinder block are removed, close and tighten them. Refer to [EM-247. "Dis-assembly and Assembly"](#).

2. Remove air relief plug (1) on heater hose.

 : Engine front



3. Fill thermostat housing with water until water spills from the air relief hole, then close air relief plug. Fill thermostat housing and reservoir tank with water and reinstall radiator cap.

Air relief plug:

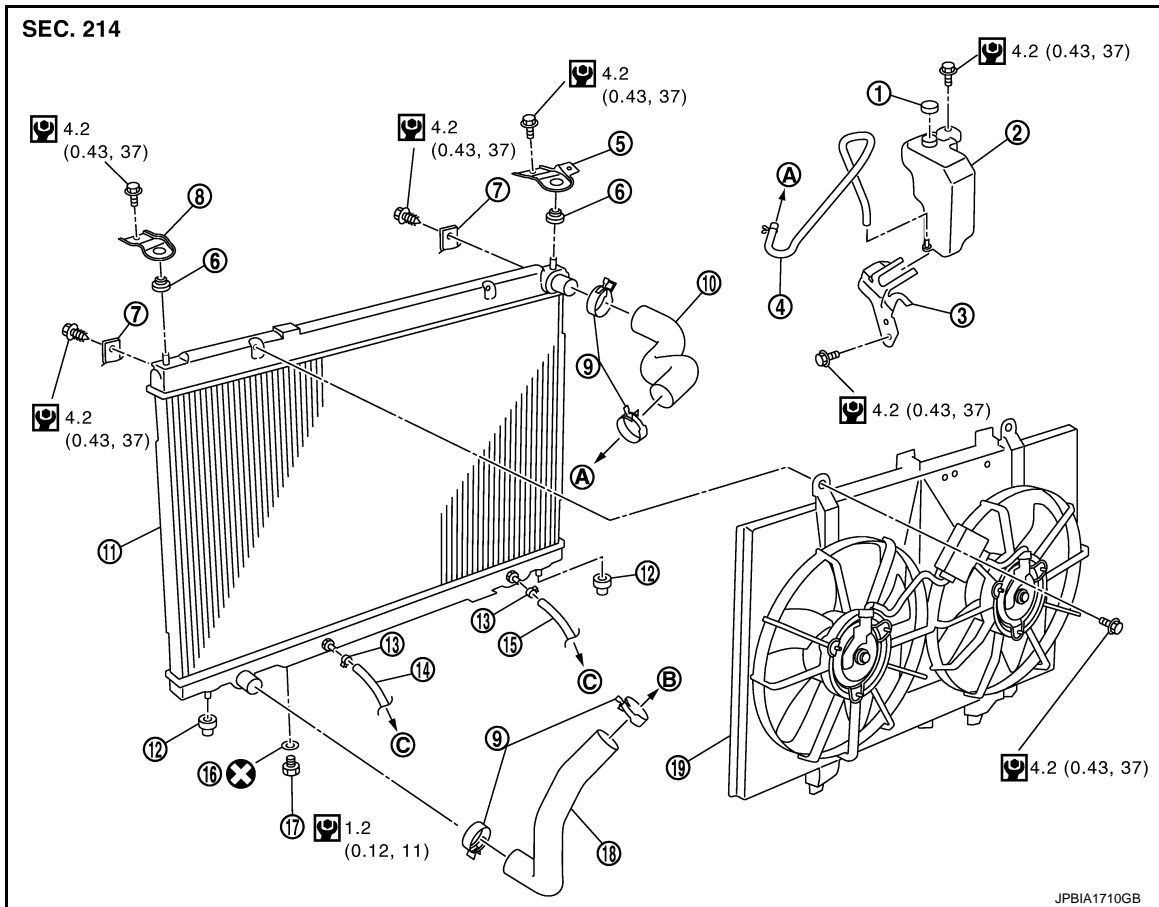
: 1.2 N·m (0.12 kg·m, 11 in·lb)

4. Run engine and warm it up to normal operating temperature.
5. Rev engine two or three times under no-load.
6. Stop engine and wait until it cools down.
7. Drain water from the system. Refer to "DRAINING ENGINE COOLANT".
8. Repeat steps 1 through 7 until clear water begins to drain from radiator.

RADIATOR

Component

INFOID:000000005349906



- | | | |
|---------------------------|---------------------------|-----------------------------|
| 1. Reservoir tank cap | 2. Reservoir tank | 3. Reservoir tank bracket |
| 4. Reservoir tank hose | 5. Mounting bracket (RH) | 6. Mounting rubber (upper) |
| 7. A/C condenser | 8. Mounting bracket (LH) | 9. Clamp |
| 10. Radiator hose (upper) | 11. Radiator | 12. Mounting rubber (lower) |
| 13. Clamp | 14. A/T fluid cooler hose | 15. A/T fluid cooler hose |
| 16. O-ring | 17. Drain plug | 18. Radiator hose (lower) |
| 19. Cooling fan assembly | | |
| A. To thermostat housing | B. To water suction pipe | C. To transmission |

• Refer to [GI-9, "Component"](#) for symbols in the figure.

Removal and Installation

INFOID:000000005349907

WARNING:

Never remove radiator cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from thermostat housing. Wrap a thick cloth around radiator cap. Slowly turn it a quarter of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

REMOVAL

- Remove the following parts:
 - Front engine undercover (power tool)
 - Engine room cover (RH and LH): Refer to [EM-168](#).
 - Air duct (inlet) and air cleaner case assembly: Refer to [EM-172](#).
- Remove front grille and front grille support. Refer to [EI-27](#).

RADIATOR

[VK45DE]

< SERVICE INFORMATION >

3. Drain engine coolant from radiator. Refer to [CO-36](#).

CAUTION:

- Perform this step when the engine is cold.
- Never spill engine coolant on drive belts.

4. Remove the A/C piping bracket from left side member, and then move the A/C piping out of the way.

5. Disconnect A/T fluid cooler hoses from radiator.

- Install blind plug to avoid leakage of A/T fluid.

6. Remove radiator hoses (upper and lower) and reservoir tank hose.

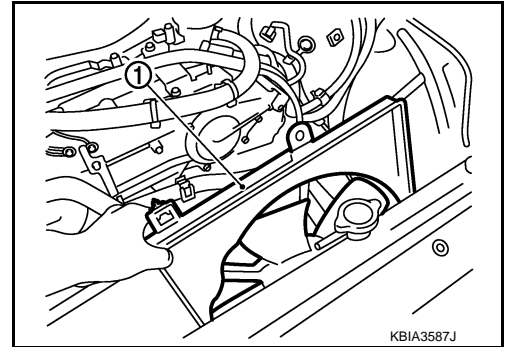
CAUTION:

Be careful not to allow engine coolant to contact drive belts.

7. Remove cooling fan assembly (1). Refer to [CO-47](#).

CAUTION:

Never damage or scratch radiator core when removing.



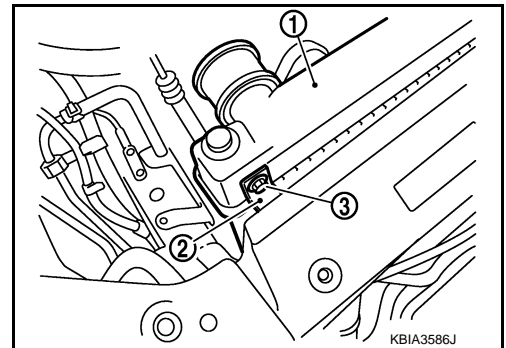
8. Remove radiator as follows:

- a. Remove mounting bracket (RH and LH).

- b. Pull the radiator (1) rearward from the vehicle, and then remove the mounting bolts (3) and A/C condenser (2).

NOTE:

Figure shows right side.



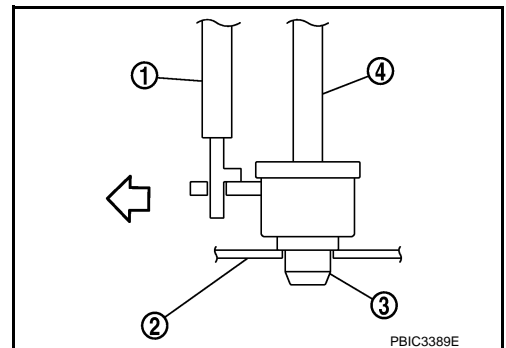
- c. Lift up and pull the radiator (4) rearward, and then remove the mounting rubber (lower) (3) from the radiator core support (2).

1 : A/C condenser

⇐ : Engine front

CAUTION:

At this time, A/C condenser is on the lower end of radiator front surface. Minimize the movement to the rear side.



- d. Lift up the A/C condenser to disengage the lower end of front surface, and then remove the radiator.

CAUTION:

- Be careful not to damage radiator and A/C condenser core.
- Minimize the lift of A/C condenser to prevent load from being applied to A/C piping.

- e. After removing the radiator, place the A/C condenser on the radiator core support to prevent load from being applied to piping. And then, temporarily secure them using a rope to prevent them from being dropped.

INSTALLATION

Install in the reverse order of removal.

INSPECTION AFTER INSTALLATION

- Check for leakage of engine coolant using radiator cap tester adapter (commercial service tool) and radiator cap tester (commercial service tool). Refer to [CO-36, "Inspection"](#).
- Start and warm up engine. Visually check if there is no leakage of engine coolant and A/T fluid.

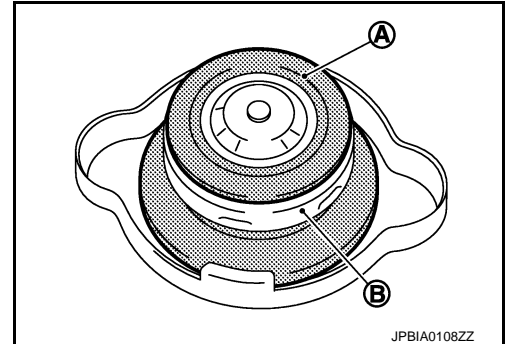
Checking Radiator Cap

INFOID:000000005349908

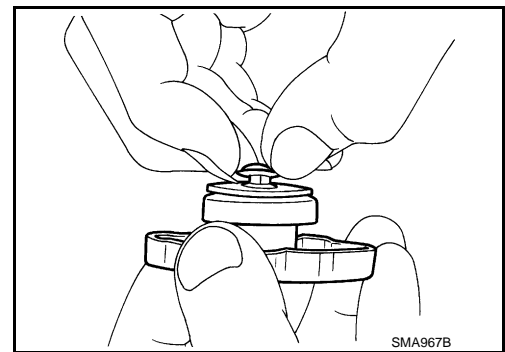
- Check valve seat (A) of radiator cap.

B : Metal plunger

- Check if valve seat is swollen to the extent that the edge of the plunger cannot be seen when watching it vertically from the top.
- Check if valve seat has no soil and damage.



- Pull negative-pressure valve to open it, and check that it close completely when released.
- Check that there is no dirt or damage on the valve seat of radiator cap negative-pressure valve.
- Check that there are no unusualness in the opening and closing conditions of negative-pressure valve.

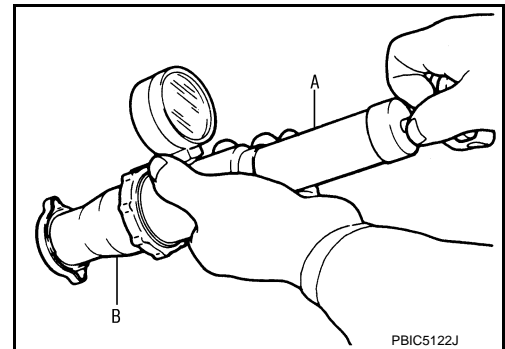


- Check radiator cap relief pressure.

Standard : 78.2 - 98.8 kPa (0.8 - 1.0 kg/cm², 11 - 14 psi)

Limit : 59 kPa (0.6 kg/cm², 9 psi)

- When connecting radiator cap to the radiator cap tester adapter (commercial service tool) (B) and the radiator cap tester (commercial service tool) (A), apply engine coolant to the cap seal surface.



- Replace radiator cap if there is an unusualness.

CAUTION:

When installing a radiator cap, thoroughly wipe out the radiator filler neck to remove any waxy residue or foreign material.

Checking Radiator

INFOID:000000005349909

Check radiator for mud or clogging. If necessary, clean radiator as follows:

CAUTION:

- **Be careful not to bend or damage the radiator fins.**
- **When radiator is cleaned without removal, remove all surrounding parts such as cooling fan, radiator shroud and horns. Then tape the harness and electrical connectors to prevent water from entering.**

1. Apply water by hose to the back side of the radiator core vertically downward.
2. Apply water again to all radiator core surface once per minute.
3. Stop washing if any stains no longer flow out from radiator.

RADIATOR

< SERVICE INFORMATION >

[VK45DE]

4. Blow air into the back side of radiator core vertically downward.
 - Use compressed air lower than 490 kPa (5 kg/cm², 71 psi) and keep distance more than 30 cm (11.81 in).
5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

RADIATOR (ALUMINUM TYPE)

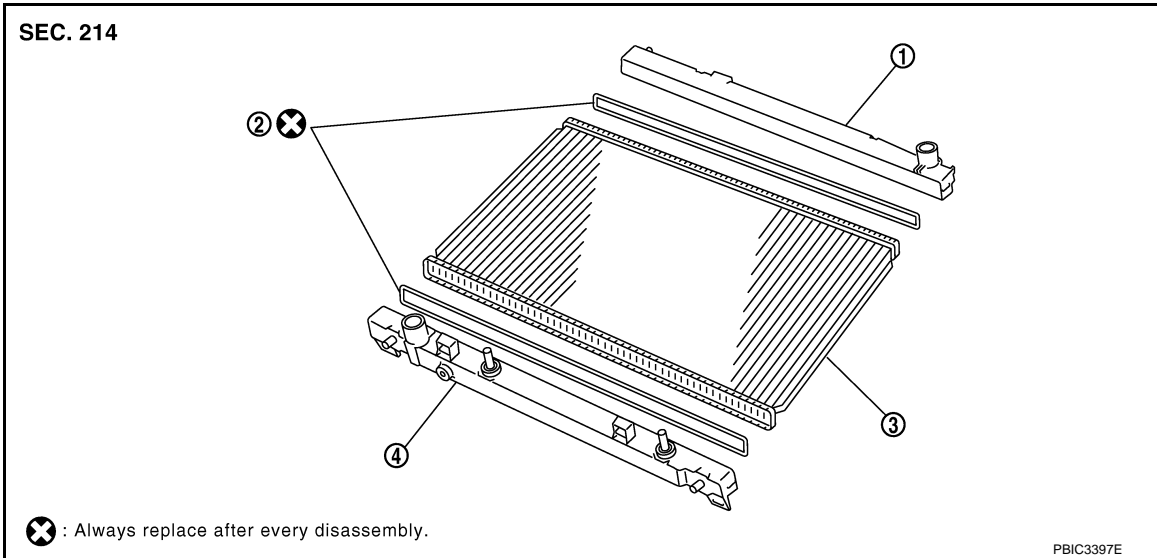
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[VK45DE]

RADIATOR (ALUMINUM TYPE)

Component

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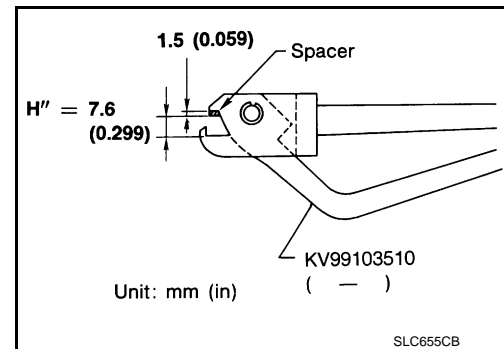
- 1. Upper tank
- 2. Sealing rubber
- 3. Core
- 4. Lower tank (with A/T fluid cooler)

Disassembly and Assembly

INFOID:000000005349911

PREPARATION

- Attach spacer to tip of radiator plate pliers A (SST).
Spacer specification: 18 mm (0.71 in) wide × 8.5 mm (0.335 in) long × 1.5 mm (0.059 in) thick.



- Check that when radiator plate pliers A [SST: KV99103510 (—)] are closed dimension H'' is approximately 7.6 mm (0.299 in).
- Adjust dimension H'' with spacer, if necessary.

DISASSEMBLY

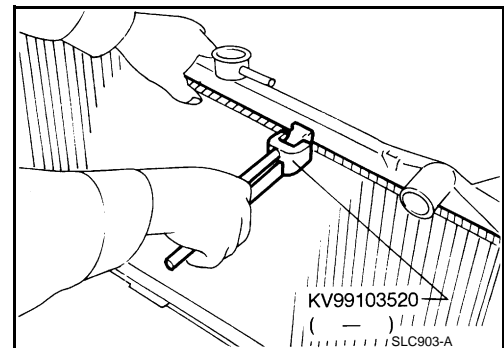
- Remove upper and lower tanks with radiator plate pliers B (SST).

CAUTION:

Never disassemble lower tank and A/T fluid cooler.

NOTE:

Regard lower tank and A/T fluid cooler as an assembly.



RADIATOR (ALUMINUM TYPE)

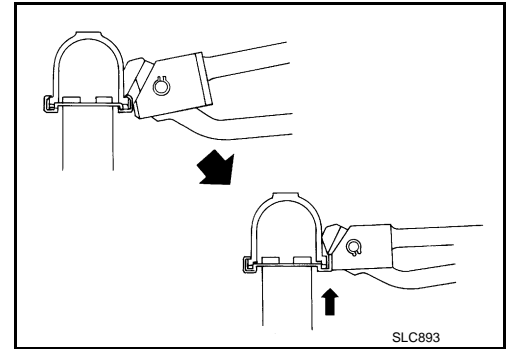
[VK45DE]

< SERVICE INFORMATION >

- Grip the crimped edge and bend it upwards so that radiator plate pliers B [SST: KV99103520 (—)] slips off.

CAUTION:

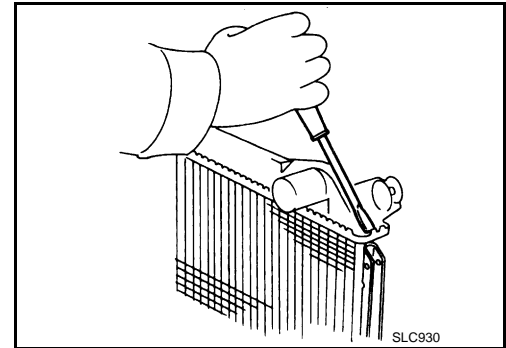
Never bend excessively.



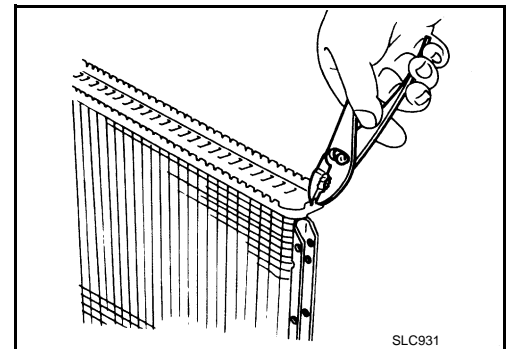
- In areas where radiator plate pliers B [SST: KV99103520 (—)] cannot be used, use flat-blade screwdriver to bend the edge up.

CAUTION:

Be careful not to damage tank.

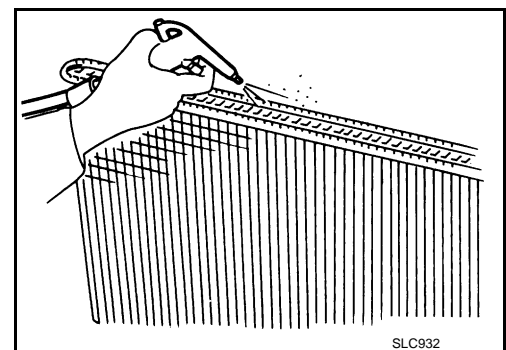


2. Remove sealing rubber.
3. Check the edge stands straight up.



ASSEMBLY

1. Clean contact portion of tank.



RADIATOR (ALUMINUM TYPE)

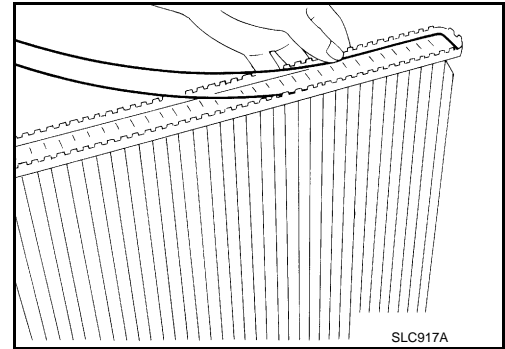
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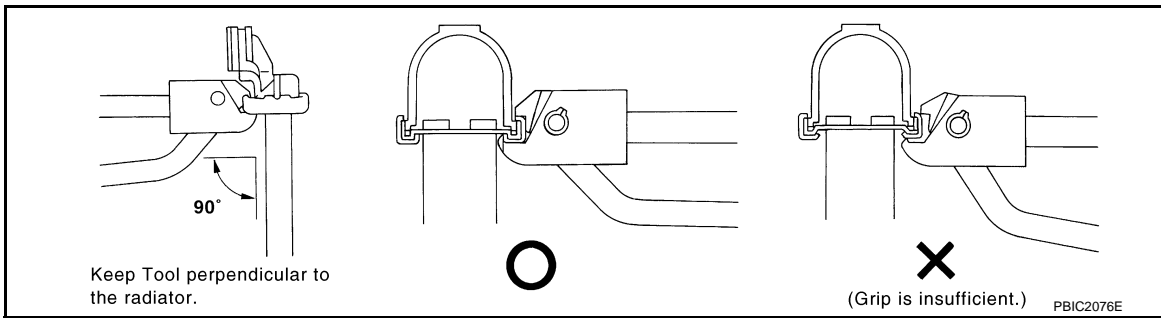
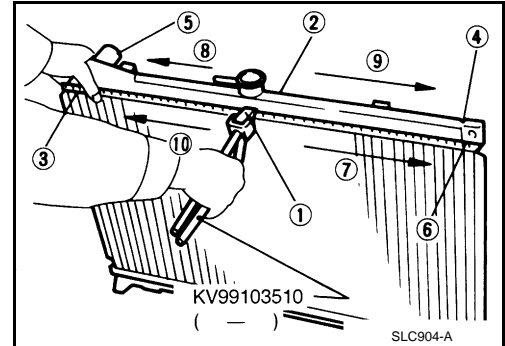
2. Install new sealing rubber while pushing it with fingers.

CAUTION:

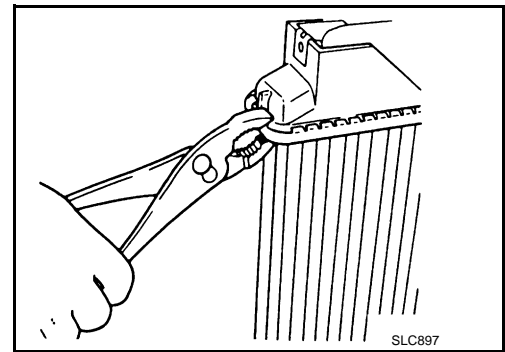
Be careful not to twist sealing rubber.



3. Caulk tank in numerical order as shown in the figure with radiator plate pliers A (SST).

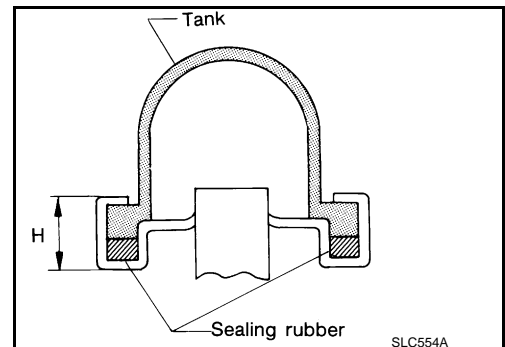


• Use pliers in the locations where radiator plate pliers A [SST: KV99103510 (-)] cannot be used.



4. Check that the rim is completely crimped down.

Standard height "H" : 8.0 - 8.4 mm (0.315 - 0.331 in)



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RADIATOR (ALUMINUM TYPE)

[VK45DE]

< SERVICE INFORMATION >

5. Check that there is no leakage. Refer to "INSPECTION".

INSPECTION

1. Apply pressure with radiator cap tester adapter (commercial service tool) and radiator cap tester (commercial service tool).
 - provide used radiator and connect it to tested radiator using radiator hoses as shown in the figure.

NOTE:

The used radiator should be tested beforehand to confirm it has no leakage. If used one is not available, it is possible to use new service part as a radiator testing tool.

Testing pressure

: 157 kPa (1.6 kg/cm², 23 psi)

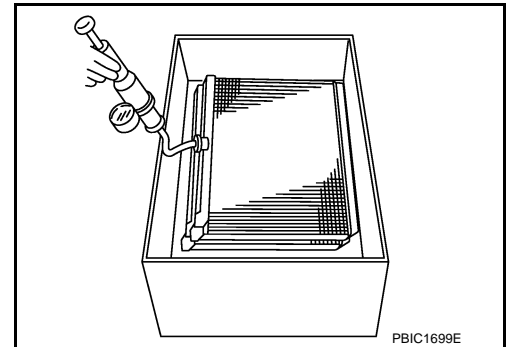
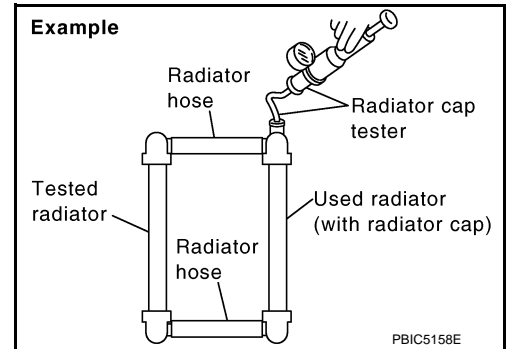
WARNING:

To prevent the risk of hose coming undone while under pressure, securely fasten it down with hose clamp.

CAUTION:

Attach hose to A/T fluid cooler to seal its inlet and outlet.

2. Check for leakage by soaking radiator in water container with the testing pressure applied.



COOLING FAN

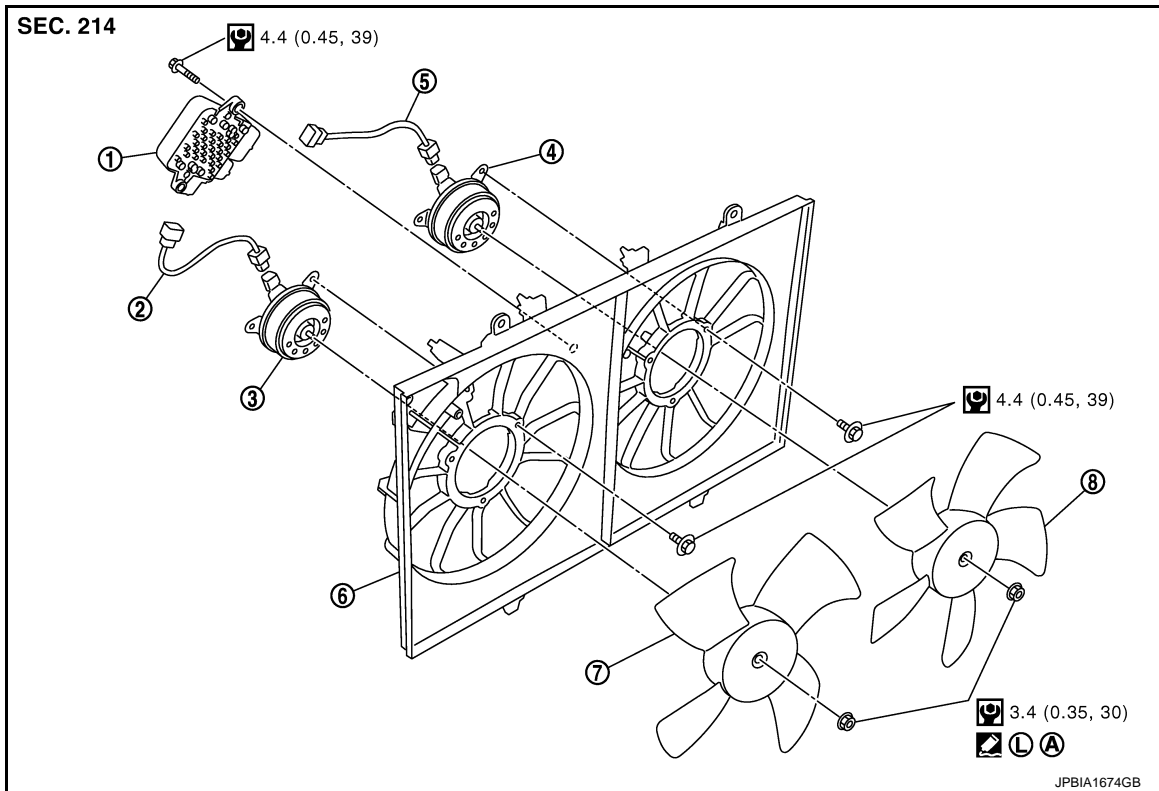
< SERVICE INFORMATION >

[VK45DE]

COOLING FAN

Component

INFOID:000000005349912



- | | | |
|-------------------------------|---------------------|-------------------|
| 1. Cooling fan control module | 2. Sub-harness | 3. Fan motor (RH) |
| 4. Fan motor (LH) | 5. Sub-harness | 6. Fan shroud |
| 7. Cooling fan (RH) | 8. Cooling fan (LH) | |

A. Apply on fan motor shaft

(L) : Apply Genuine High Strength Thread Locking Sealant or equivalent.

• Refer to [GI-9, "Component"](#) for symbols not described on the above.

Removal and Installation

INFOID:000000005349913

REMOVAL

1. Remove engine room cover (RH and LH). Refer to [EM-168](#).
2. Remove air duct (inlet) and air cleaner case assembly. Refer to [EM-172](#).
3. Drain engine coolant from radiator. Refer to [CO-36](#).
4. Disconnect harness connector from cooling fan control module, and move harness to aside.
5. Remove radiator hose (upper). Refer to [CO-39](#).
6. Remove cooling fan assembly.

CAUTION:

Be careful not to damage or scratch on radiator core.

INSTALLATION

Note the following, and Install in the reverse order of removal.

CAUTION:

Only use genuine parts for radiator shroud and cooling fan mounting bolt and observe the specified torque (to prevent radiator from being damaged).

INSPECTION AFTER INSTALLATION

COOLING FAN

[VK45DE]

< SERVICE INFORMATION >

Check that fan motors operate normally.

NOTE:

Cooling fans are controlled by cooling fan control module. For details. Refer to [EC-1142](#).

Disassembly and Assembly

INFOID:000000005349914

DISASSEMBLY

1. Disconnect sub-harness from fan motor (RH and LH) and cooling fan control module.
2. Remove cooling fan control module from fan shroud.
CAUTION:
Handle carefully to avoid dropping and shocks.
3. Remove cooling fan mounting nuts, and then remove the cooling fan (RH and LH).
4. Remove fan motor (RH and LH).

INSPECTION AFTER DISASSEMBLY

Cooling Fan

Inspect cooling fan for crack or unusual bend.

- If anything is found, replace cooling fan.

ASSEMBLY

Note the following, and assemble in the reverse order of disassembly.

CAUTION:

RH and LH cooling fans are different. Be careful not to misassemble them.

- Install each fan in the following position.

Right side : 4 blades

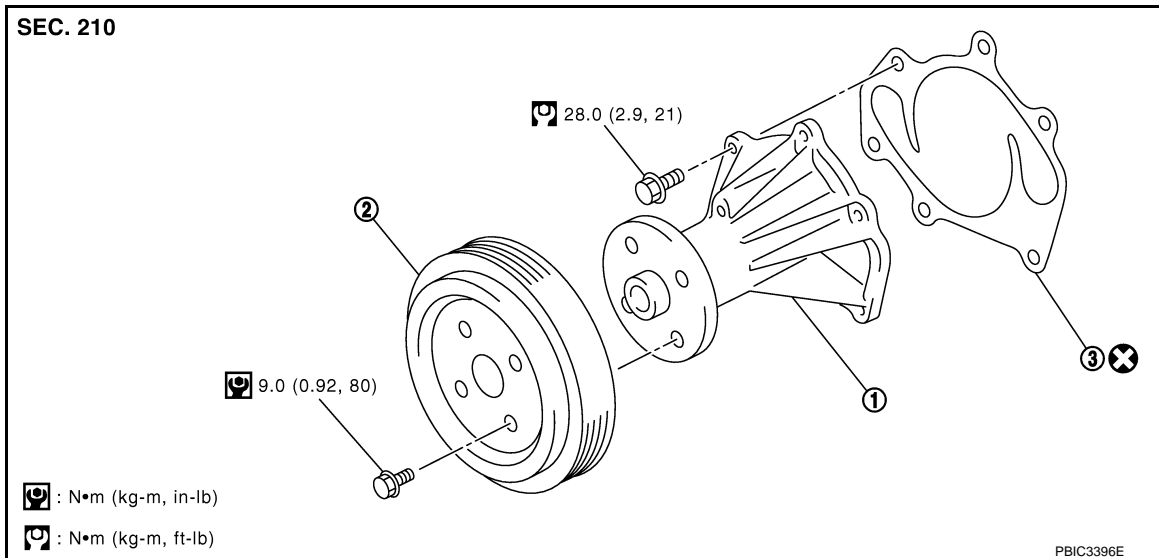
Left side : 5 blades

- Secure the sub-harness tightly to the fan shroud to prevent the fan rotation area from being loose.

WATER PUMP

Component

INFOID:000000005349915



1. Water pump 2. Water pump pulley 3. Gasket

- Refer to [GI-9, "Component"](#) for symbols in the figure.

Removal and Installation

INFOID:000000005349916

CAUTION:

- When removing water pump, be careful not to get engine coolant on drive belts.
- Water pump can not be disassembled and should be replaced as a unit.
- After installing water pump, connect hose and clamp securely, then check for leakage using radiator cap tester (commercial service tool) and radiator cap tester adapter (commercial service tool).

REMOVAL

- Remove following parts:
 - Front engine undercover (power tool)
 - Engine cover: Refer to [EM-175, "Removal and Installation"](#).
 - Engine room cover (RH and LH): Refer to [EM-168](#).
 - Air duct (inlet): Refer to [EM-172](#).
 - Alternator, water pump and A/C compressor belt: Refer to [EM-169](#).
- Drain engine coolant from drain plugs on radiator and both side of cylinder block. Refer to [CO-36, "Charging Engine Coolant"](#) and [EM-247, "Disassembly and Assembly"](#).

CAUTION:

- Perform this step when engine is cold.
 - Never spill engine coolant on drive belts.
- Remove water pump pulley.
 - Remove water pump.
 - Engine coolant will leakage from cylinder block, so have a receptacle ready under vehicle.

CAUTION:

- Handle the water pump vane so that it never contact any other parts.
- Never disassemble water pump.

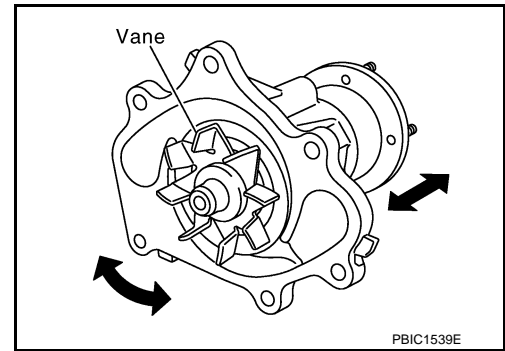
INSPECTION AFTER REMOVAL

WATER PUMP

[VK45DE]

< SERVICE INFORMATION >

- Visually check that there is no significant dirt or rusting on water pump body and vane.
- Check there is no looseness in vane shaft, and that it turns smoothly when rotated by hand.
- If anything is found, replace water pump.



INSTALLATION

Install in the reverse order of removal.

INSPECTION AFTER INSTALLATION

- Check for leakage of engine coolant using radiator cap tester adapter (commercial service tool) and radiator cap tester (commercial service tool). Refer to [CO-36, "Inspection"](#).
- Start and warm up engine. Visually check if there is no leakage of engine coolant.

THERMOSTAT AND WATER CONTROL VALVE

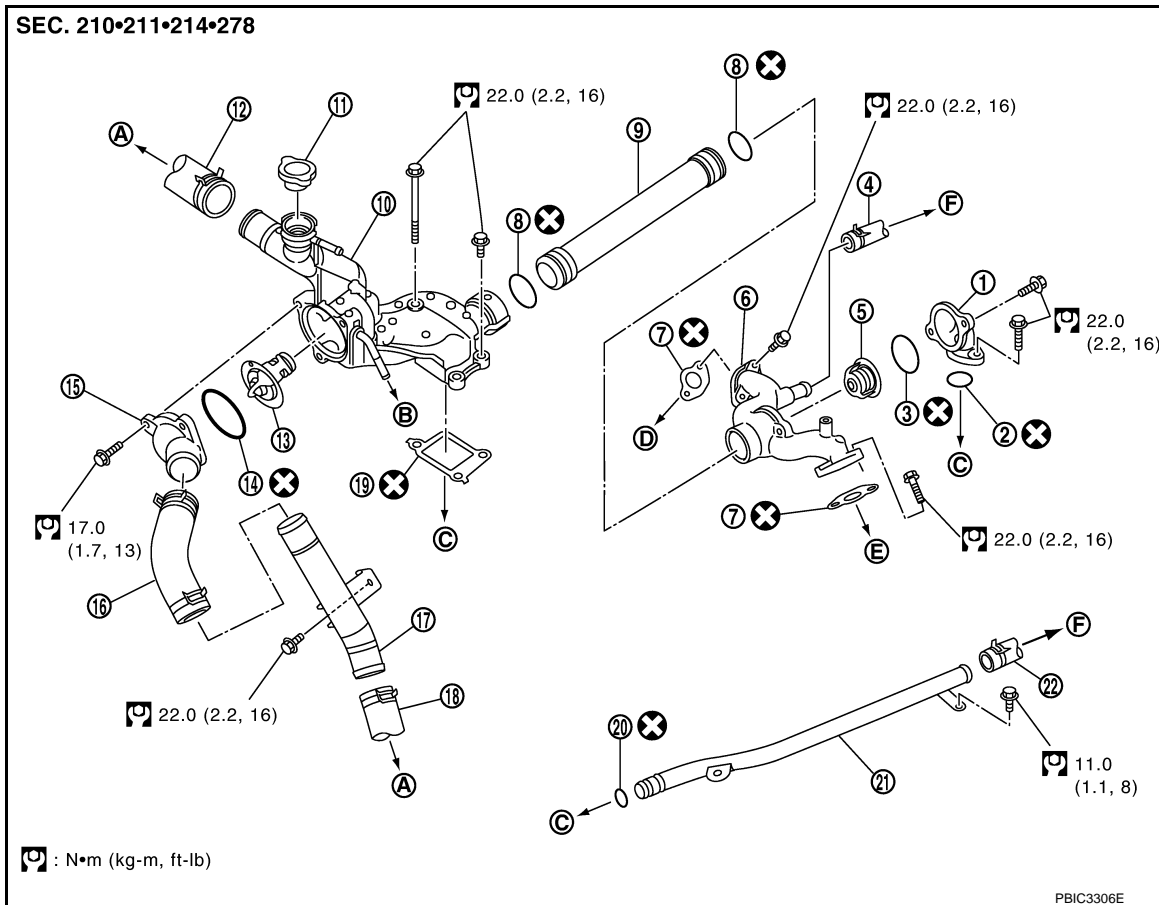
< SERVICE INFORMATION >

[VK45DE]

THERMOSTAT AND WATER CONTROL VALVE

Component

INFOID:000000005349917



- | | | |
|----------------------------------|---------------------------------|---------------------------|
| 1. Water connector | 2. O-ring | 3. Rubber ring |
| 4. Heater hose | 5. Water control valve | 6. Water outlet |
| 7. Gasket | 8. O-ring | 9. Water outlet pipe |
| 10. Thermostat housing | 11. Radiator cap | 12. Radiator hose (upper) |
| 13. Thermostat | 14. Rubber ring | 15. Water inlet |
| 16. Water suction hose | 17. Water suction pipe | 18. Radiator hose (lower) |
| 19. Gasket | 20. O-ring | 21. Heater pipe |
| 22. Heater hose | | |
| A. To radiator | B. To intake manifold adapter | C. To cylinder block |
| D. To cylinder head (right bank) | E. To cylinder head (left bank) | F. To heater core |

- Refer to [GI-9, "Component"](#) for symbols in the figure.

Removal and Installation

INFOID:000000005349918

REMOVAL

1. Remove engine room cover (RH and LH). Refer to [EM-168](#).
2. Remove engine cover with power tool. Refer to [EM-168, "Component"](#).
3. Remove air duct (inlet). Refer to [EM-172](#).
4. Drain engine coolant from drain plugs on radiator and both side of cylinder block. Refer to [CO-36, "Changing Engine Coolant"](#) and [EM-247, "Disassembly and Assembly"](#).

CAUTION:

- Perform this step when engine is cold.

THERMOSTAT AND WATER CONTROL VALVE

[VK45DE]

< SERVICE INFORMATION >

- **Never spill engine coolant on drive belts.**

5. Disconnect water suction hose from water inlet.
6. Remove water inlet and thermostat.

CAUTION:

Never disassemble thermostat.

7. Remove intake manifolds (upper and lower). Refer to [EM-174, "Component"](#).
8. Disconnect radiator hose (upper) from thermostat housing.
9. Disconnect heater hoses from water outlet and heater pipe.
10. Remove thermostat housing, water outlet pipe, water connector, water control valve, water outlet, and heater pipe.

CAUTION:

Never disassemble water control valve.

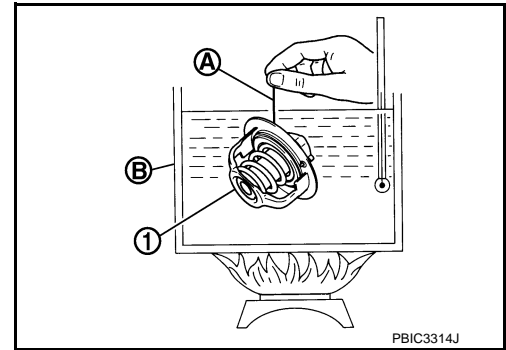
INSPECTION AFTER REMOVAL

- Check that valves both in thermostat and water control valve are completely closing at normal temperature.
- Place a thread (A) so that it is caught in the valves of the thermostat (1) and water control valve. Immerse fully in a container (B) filled with water. Heat while stirring. (The example in the figure shows thermostat.)
- The valve opening temperature is the temperature at which the valve opens and falls from the thread.
- Continue heating. Check the maximum valve lift.

NOTE:

The maximum valve lift standard temperature for water control valve is the reference value.

- After checking the maximum valve lift, lower the water temperature and check the valve closing temperature.



Standard values:

	Thermostat	Water control valve
Valve opening temperature	80 - 84°C (176 - 183°F)	93.5 - 96.5°C (200 - 206°F)
Maximum valve lift	More than 10 mm/95°C (0.39 in/203°F)	More than 8 mm/108°C (0.31 in/226°F)
Valve closing temperature	77°C (171°F)	90°C (194°F)

- If the malfunctioning condition, when closing valve at normal temperature, or measured values are out of the standard, replace thermostat and/or water control valve.

INSTALLATION

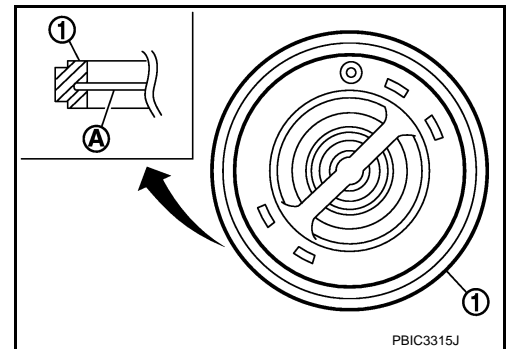
Note the following, and install in the reverse order of removal.

CAUTION:

Be careful not to spill engine coolant over engine room. Use rag to absorb engine coolant.

Thermostat and Water Control Valve

- Install thermostat and water control valve with the whole circumference of each flange (A) part fit securely inside rubber ring (1). (The example in the figure shows thermostat.)

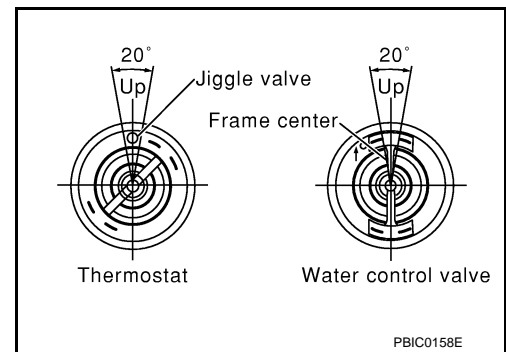


THERMOSTAT AND WATER CONTROL VALVE

[VK45DE]

< SERVICE INFORMATION >

- Install thermostat with jiggle valve facing upwards. (The position deviation may be within the range of ± 10 degrees)
- Install water control valve with the up-mark facing up and the frame center part facing upwards. (The position deviation may be within the range of ± 10 degrees)



Water Outlet Pipe and Heater Pipe

First apply a neutral detergent to O-rings, then quickly insert the insertion parts of the water outlet pipe and heater pipe into the installation holes.

INSPECTION AFTER INSTALLATION

- Check for leakage of engine coolant using radiator cap tester adapter (commercial service tool) and radiator cap tester (commercial service tool). Refer to [CO-36, "Inspection"](#).
- Start and warm up engine. Visually check if there is no leakage of engine coolant.

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SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

[VK45DE]

SERVICE DATA AND SPECIFICATIONS (SDS)

Standard and Limit

INFOID:000000005349919

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Engine coolant capacity (With reservoir tank at "MAX" level)	10.4 (11, 9-1/8)
Reservoir tank engine coolant capacity (at "MAX" level)	0.8 (7/8, 3/4)

RADIATOR

Unit: kPa (kg/cm², psi)

Radiator cap relief pressure	Standard	78.2 - 98.8 (0.8 - 1.0, 11 - 14)
	Limit	59 (0.6, 9)
Leakage testing pressure		157 (1.6, 23)

THERMOSTAT

Thermostat	Standard
Valve opening temperature	80 - 84°C (176 - 183°F)
Maximum valve lift	More than 10 mm/95°C (0.39 in/203°F)
Valve closing temperature	77°C (171°F)

WATER CONTROL VALVE

Water control valve	Standard
Valve opening temperature	93.5 - 96.5°C (200 - 206°F)
Maximum valve lift	More than 8 mm/108°C (0.31 in/226°F)
Valve closing temperature	90°C (194°F)