SECTION CO
ENGINE COOLING SYSTEM

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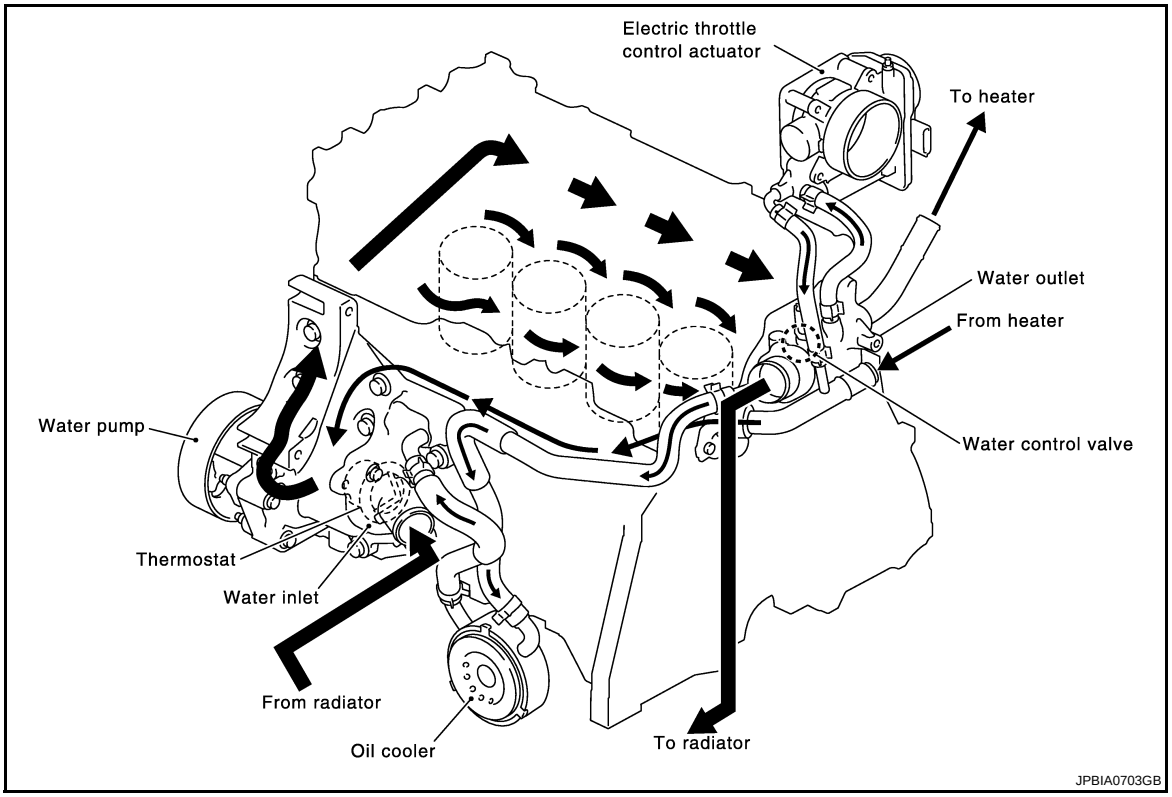
FUNCTION DIAGNOSIS

DESCRIPTION

M/T

M/T : Engine Cooling System

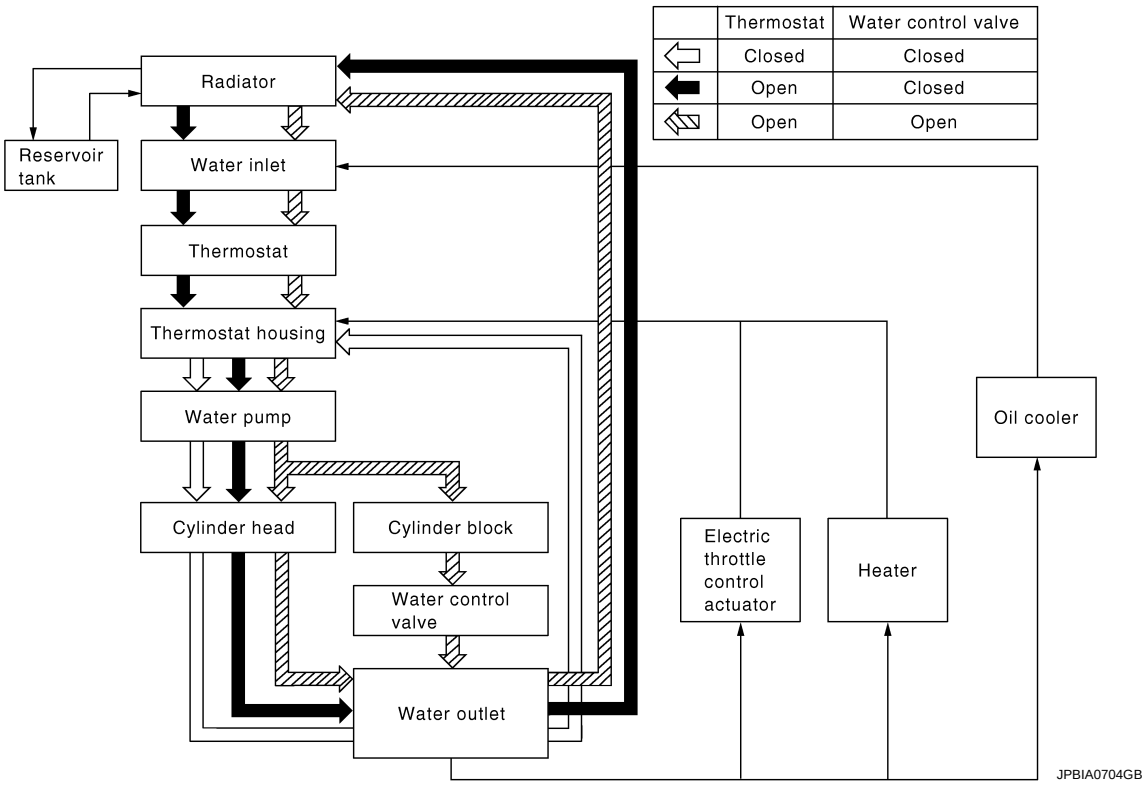
INFOID:0000000001160768



M/T : Engine Cooling System Schematic

INFOID:0000000001160769

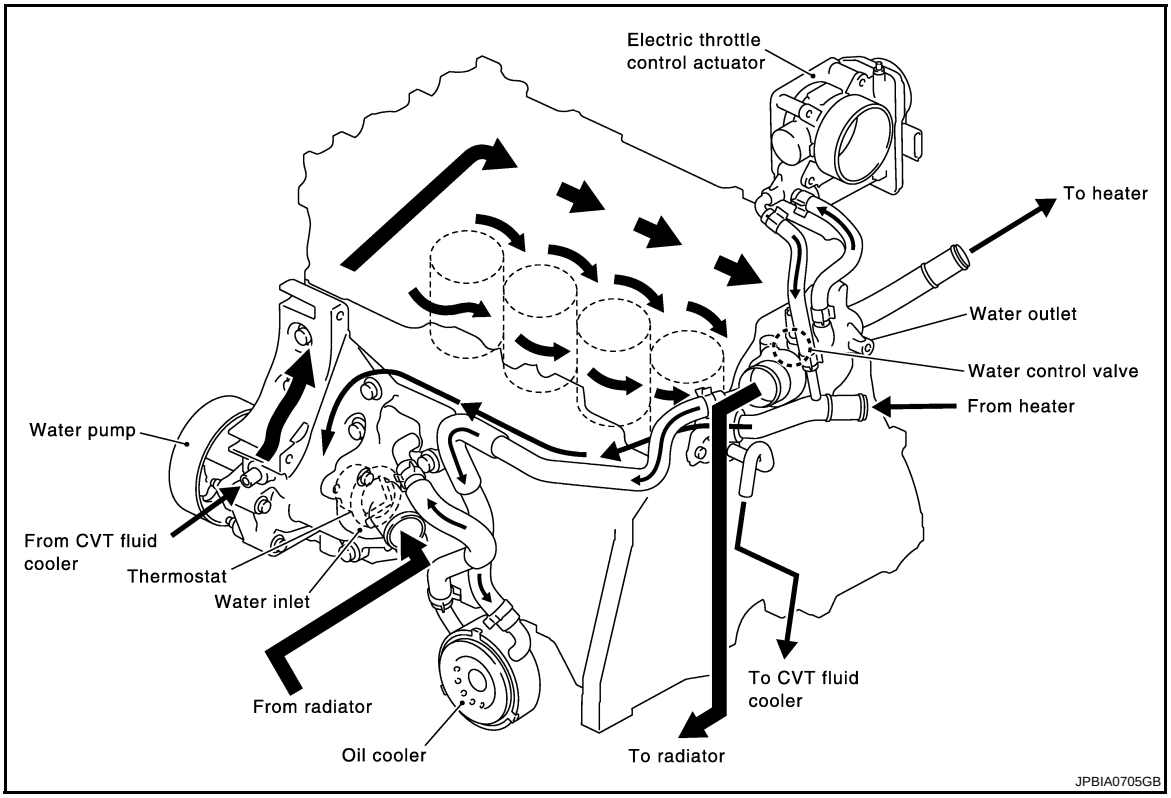
	Thermostat	Water control valve
⇦	Closed	Closed
⬅	Open	Closed
⇦	Open	Open



CVT

CVT : Engine Cooling System

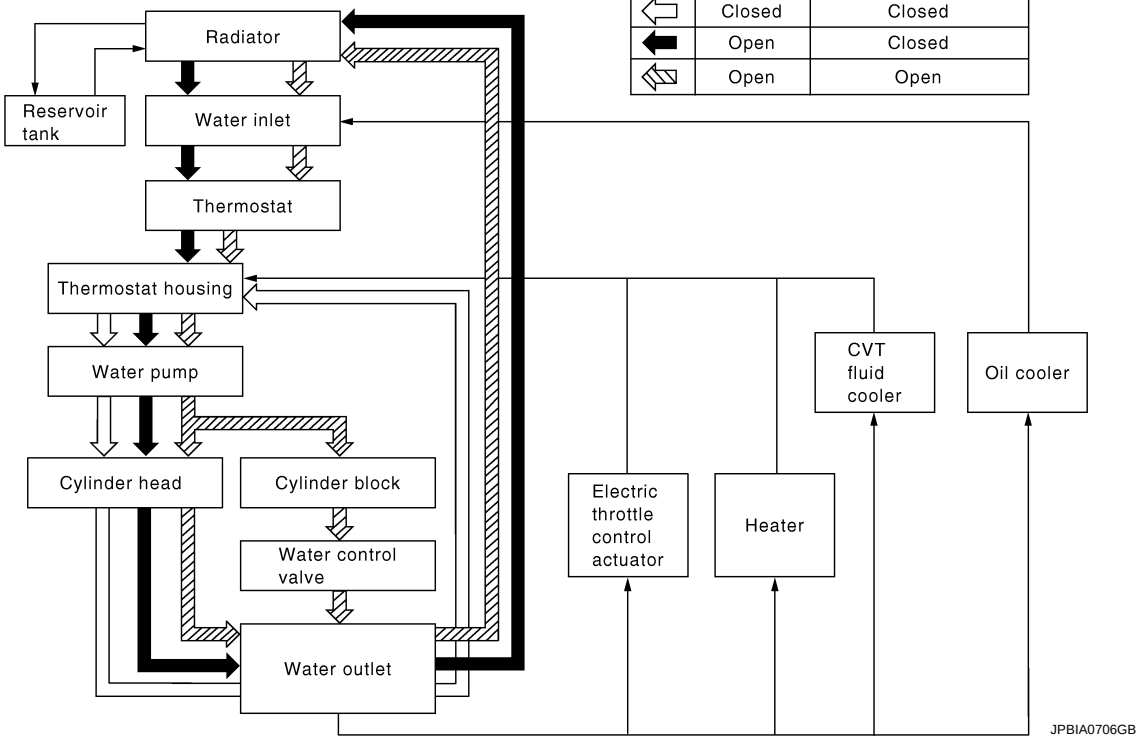
INFOID:0000000001160770



CVT : Engine Cooling System Schematic

INFOID:0000000001160771

	Thermostat	Water control valve
⇦	Closed	Closed
⬅	Open	Closed
⇦	Open	Open



SYMPTOM DIAGNOSIS

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:0000000001160772

	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 viscosity	—
	Insufficient engine coolant	Engine coolant leakage	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
			Reservoir tank 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 leaks into cooling system	Cylinder head deterioration
				Cylinder head gasket deterioration

	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
			Power train system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			Improper ignition timing	
	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		

PRECAUTION

PRECAUTIONS

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000001297938

NOTE:
- This Procedure is applied only to models with Intelligent Key system and NATS (NISSAN ANTI-THEFT SYSTEM).
- Remove and install all control units after disconnecting both battery cables with the ignition knob in the ″LOCK″ position.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.

For models equipped with the Intelligent Key system and NATS, an electrically controlled steering lock mechanism is adopted on the key cylinder.
For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.
If steering wheel rotation is required when battery power is interrupted, follow the procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both battery cables.
   NOTE:
   Supply power using jumper cables if battery is discharged.
2. Use the Intelligent Key or mechanical key to turn the ignition switch to the ″ACC″ position. At this time, the steering lock will be released.
3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.
4. Perform the necessary repair operation.
5. When the repair work is completed, return the ignition switch to the ″LOCK″ position before connecting the battery cables. (At this time, the steering lock mechanism will engage.)
6. Perform a self-diagnosis check of all control units using CONSULT-III.

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

INFOID:0000000001188559

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. Information necessary to service the system safely is included in the “SRS AIRBAG” and “SEAT BELT” of this Service Manual.

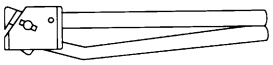
WARNING:
- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect 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 “SRS AIRBAG”.**
- **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.**

PREPARATION

PREPARATION

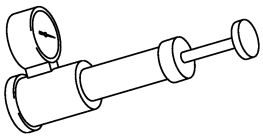
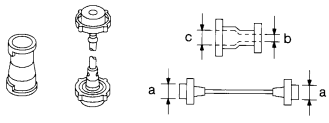
Special Service Tools

INFOID:0000000001160774

Tool number Tool name	Description
KV99103510 Radiator plate pliers A  S-NT224	Installing radiator upper and lower tanks
KV99103520 Radiator plate pliers B  S-NT225	Removing radiator upper and lower tanks

Commercial Service Tools

INFOID:0000000001189167

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

ON-VEHICLE MAINTENANCE

ENGINE COOLANT

Inspection

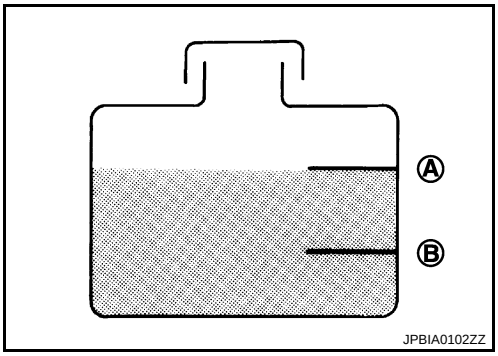
INFOID:0000000001160775

LEVEL

- Check that 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.



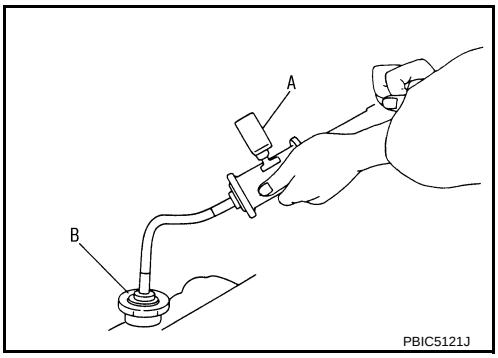
JPBIA0102ZZ

LEAKAGE

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

Testing pressure: Refer to CO-32, "Radiator".

WARNING:
Never remove radiator cap when engine is hot. Serious burns may 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.



PBIC5121J

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

Draining

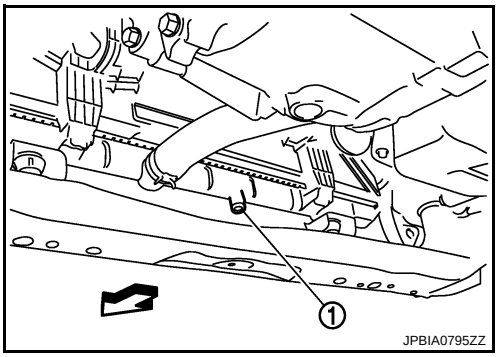
INFOID:0000000001160776

WARNING:
- **Never remove radiator cap when engine is hot. Serious burns may occur from high-pressure engine coolant escaping from radiator.**
- **Wrap a thick cloth around the radiator cap. Slowly turn it a quarter of a turn to release built-up pressure. Then turn it all the way.**

1. Remove engine under cover.
2. Open radiator drain plug (1) at the bottom of radiator, and then remove radiator cap.

⇦ : Vehicle front

CAUTION:
Perform this step when engine is cold.
- When draining all of engine coolant in the system, open water drain plugs on cylinder block. Refer to CO-16, "Exploded View".

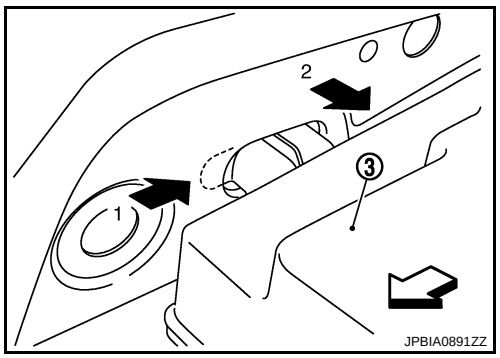


JPBIA0795ZZ

3. Remove reservoir tank if necessary, and drain engine coolant and clean reservoir tank before installing.
   - Removal of engine mounting insulator (RH) is necessary. Refer to EM-75, "M/T : Exploded View" (M/T models) or EM-81, "CVT : Exploded View" (CVT models).

- Move reservoir tank (3), and then remove it numerical order as shown in the figure.

⇦ : Vehicle front



4. Check drained engine coolant for contaminants such as rust, corrosion or discoloration. If contaminated, flush the engine cooling system. Refer to CO-12, "Flushing".

Refilling

INFOID:0000000001160777

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

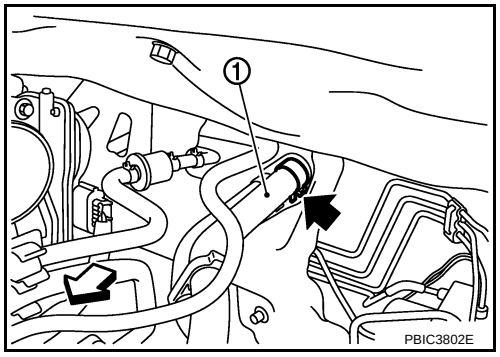
Radiator drain plug : Refer to CO-16, "Exploded View".

- If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-94, "Disassembly and Assembly".

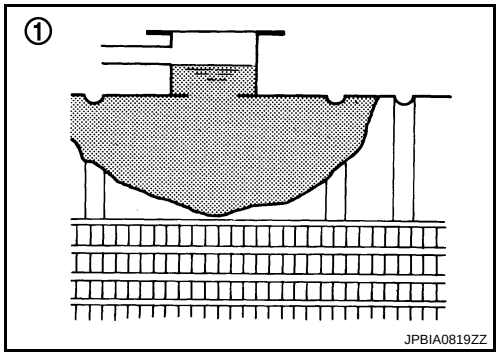
2. Check that each hose clamp has been firmly tightened.
3. Remove air duct and resonator assembly, and move electric throttle control actuator to aside. Refer to EM-25, "Exploded View" and EM-27, "Exploded View".
4. Disconnect heater hose (1) at position (⬅) in the figure.

⇦ : Vehicle front

- Enhance heater hose as high as possible.



5. Fill radiator (1) to specified level.
CAUTION:
Never adhere the engine coolant to electronic equipments (alternator etc.).
- Pour coolant slowly of less than 2 ℓ (1-3/4 Imp qt) a minute to allow air in system to escape.
- When coolant from heater unit starts to drain, connect heater hose and continue filling the engine coolant.
- Use Genuine NISSAN Engine Coolant or equivalent in its quality mixed with water (distilled or demineralized). Refer to MA-22, "Fluids and Lubricants".



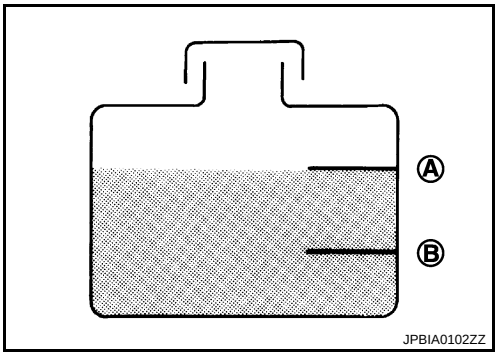
Engine coolant capacity
(With reservoir tank at "MAX" level)
Refer to CO-32, "Periodical Maintenance Specification".

6. Refill reservoir tank to “MAX” level line with engine coolant.

A : MAX
B : MIN

Reservoir tank engine coolant capacity (At “MAX” level)

Refer to CO-32, "Periodical Maintenance Specification".



7. Install radiator cap.
8. Install electric throttle control actuator and air duct and resonator assembly. Refer to EM-27, "Exploded View" and EM-25, "Exploded View".
9. 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.
10. 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.
    CAUTION:
    Never adhere the engine coolant to electronic equipments (alternator etc.).
11. Refill reservoir tank to “MAX” level line with engine coolant.
12. Repeat steps 5 through 10 two or more times with radiator cap installed until engine coolant level no longer drops.
13. Check cooling system for leakage with engine running.
14. 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.
15. Repeat step 14 three times.
16. If sound is heard, bleed air from cooling system by repeating step 5 through 10 until reservoir tank level no longer drops.

Flushing

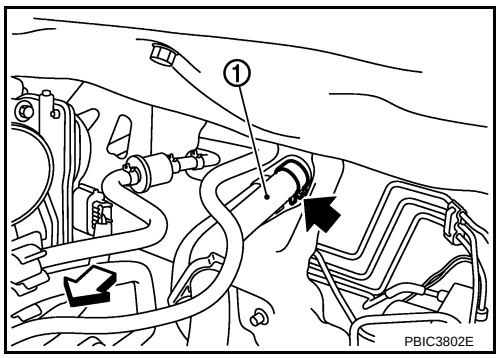
INFOID:0000000001160778

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 : Refer to CO-16, "Exploded View".

   • If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-94, "Disassembly and Assembly".
2. Remove air duct and resonator assembly and move electric throttle control actuator to aside. Refer to EM-25, "Exploded View" and EM-27, "Exploded View".

3. Disconnect heater hose (1) at position (⇦) in the figure.



⇦ : Vehicle front

- Enhance heater hose as high as possible.

4. Fill radiator and reservoir tank with water and reinstall radiator cap.
   - When engine coolant over flows disconnected heater hose, connect heater hose, and continue filling the engine coolant.
5. Install electric throttle control actuator and air duct and resonator assembly. Refer to EM-27, "Exploded View" and EM-25, "Exploded View".
6. Run the engine and warm it up to normal operating temperature.
7. Rev the engine two or three times under no-load.
8. Stop the engine and wait until it cools down.
9. Drain water from the system. Refer to CO-10, "Draining".
10. Repeat steps 1 through 9 until clear water begins to drain from radiator.

RADIATOR

RADIATOR CAP

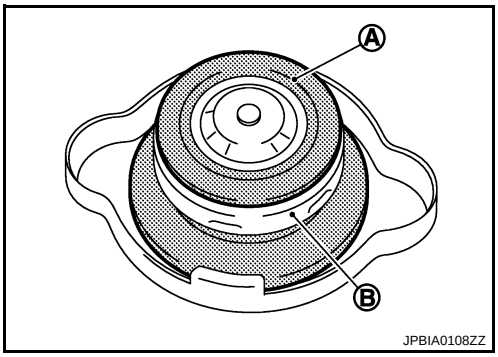
RADIATOR CAP : Inspection

INFOID:0000000001193706

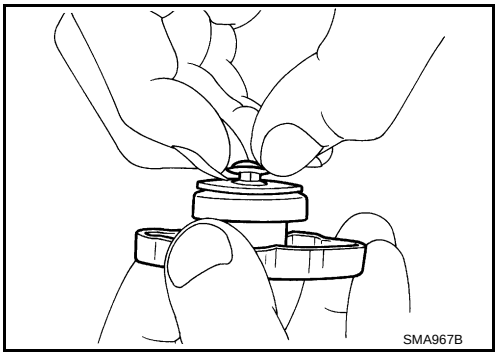
- Check valve seat of radiator cap.

A : Valve seat
B : Metal plunger

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



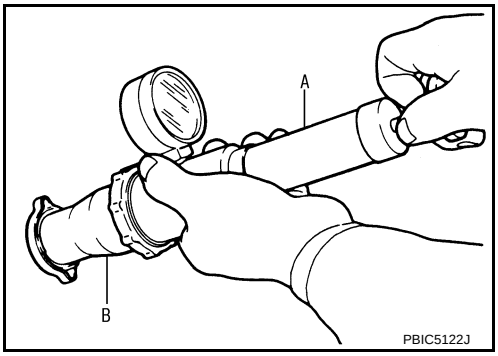
- Pull negative-pressure valve to open it, and check that it closes completely when released.
- Check that there is no dirt or damage on the valve seat of radiator cap negative-pressure valve.
- Check that there are no unusualness in the opening and closing conditions of negative-pressure valve.



- Check radiator cap relief pressure.

Standard and Limit : Refer to CO-32, "Radiator".

- 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.

RADIATOR

RADIATOR : Inspection

INFOID:0000000001160780

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

CAUTION:
- **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 harness 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.

4. Blow air into the back side of radiator core vertically downward.
   - Use compressed air lower than 490 kPa (4.9 bar, 5 kg/cm^2, 71 psi) and keep distance more than 30 cm (11.8 in).
5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

ON-VEHICLE REPAIR

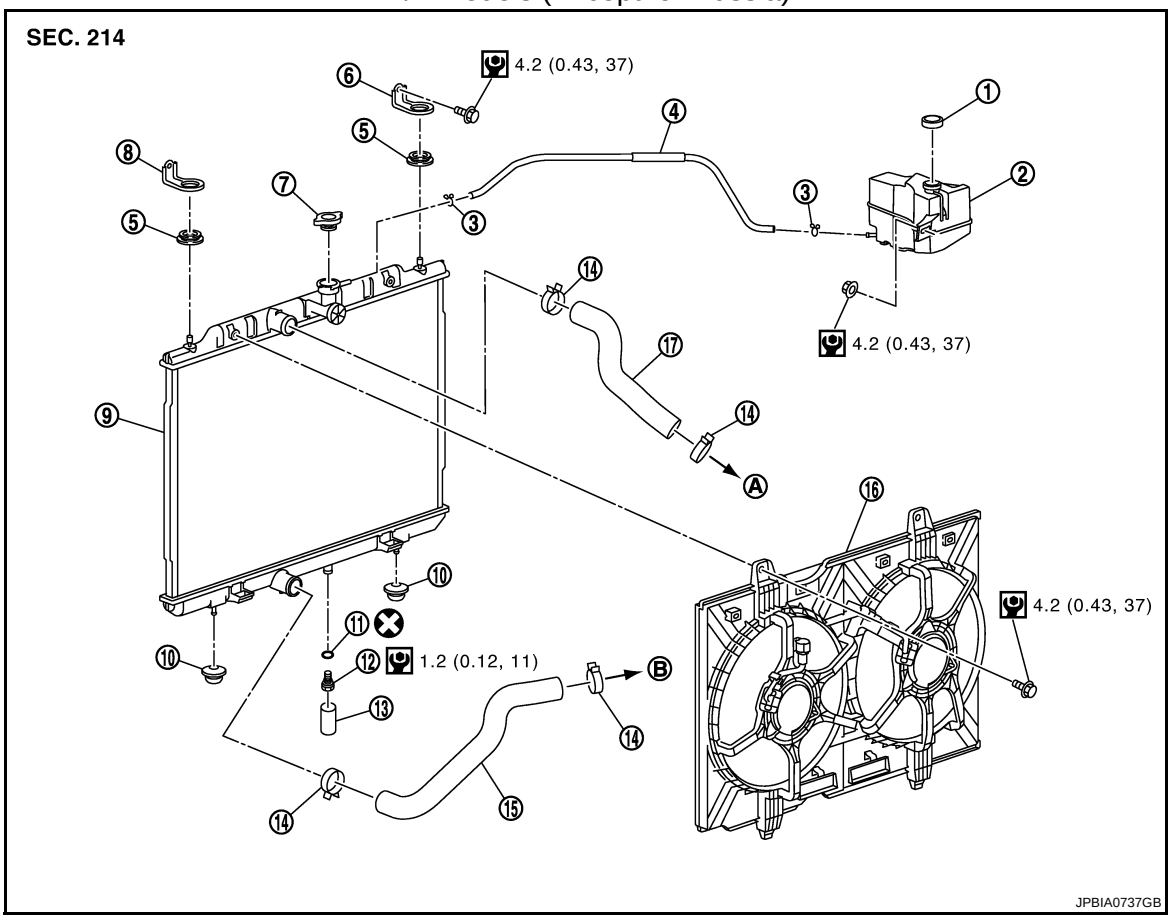
RADIATOR

Exploded View

INFOID:0000000001160781

REMOVAL

M/T models (Except for Russia)

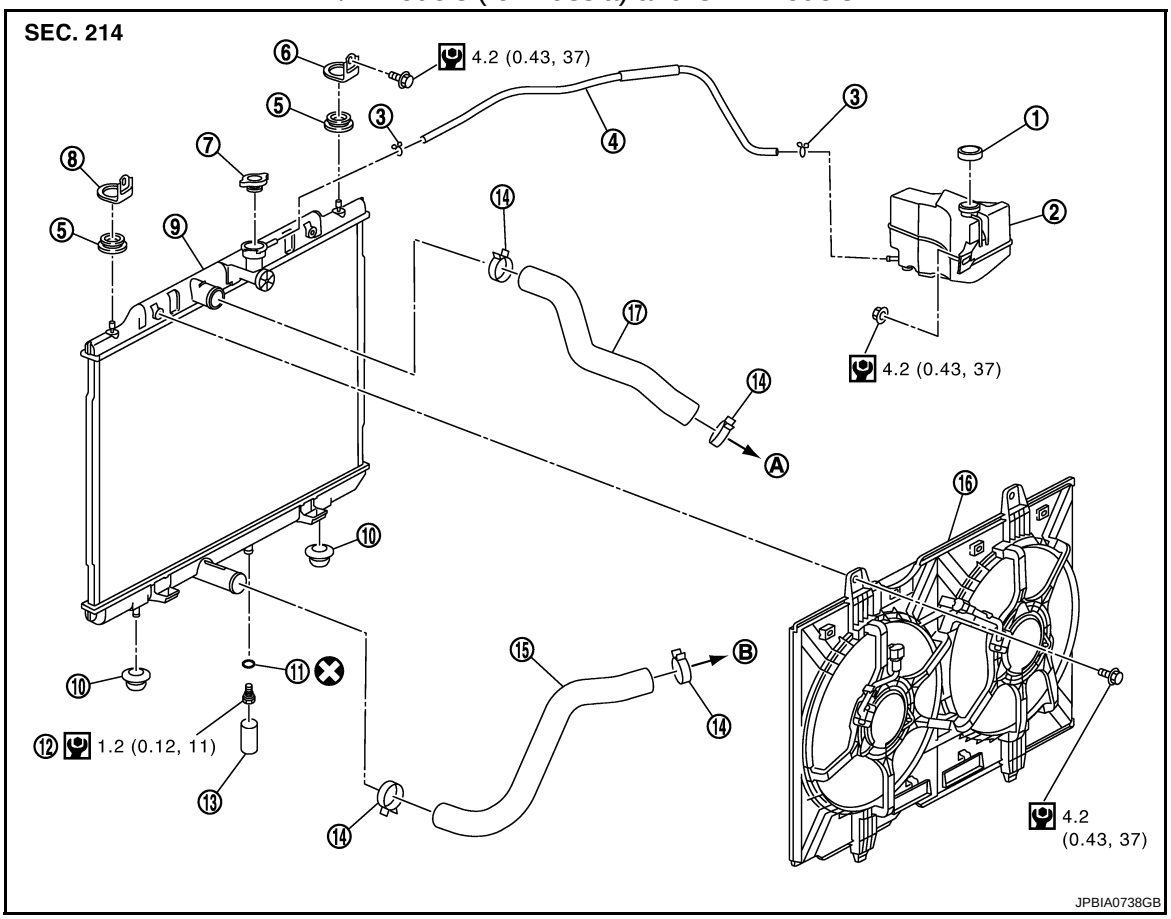


1. Reservoir tank cap
2. Reservoir tank
3. Clamp
4. Reservoir tank hose
5. Mounting rubber (upper)
6. Mounting bracket (RH)
7. Radiator cap
8. Mounting bracket (LH)
9. Radiator
10. Mounting rubber (lower)
11. O-ring
12. Drain plug
13. Water drain hose
14. Clamp
15. Radiator hose (lower)
16. Cooling fan assembly
17. Radiator hose (upper)

A. To water outlet
B. To water inlet

Refer to GI-4, "Components" for symbols in the figure.

M/T models (for Russia) and CVT models

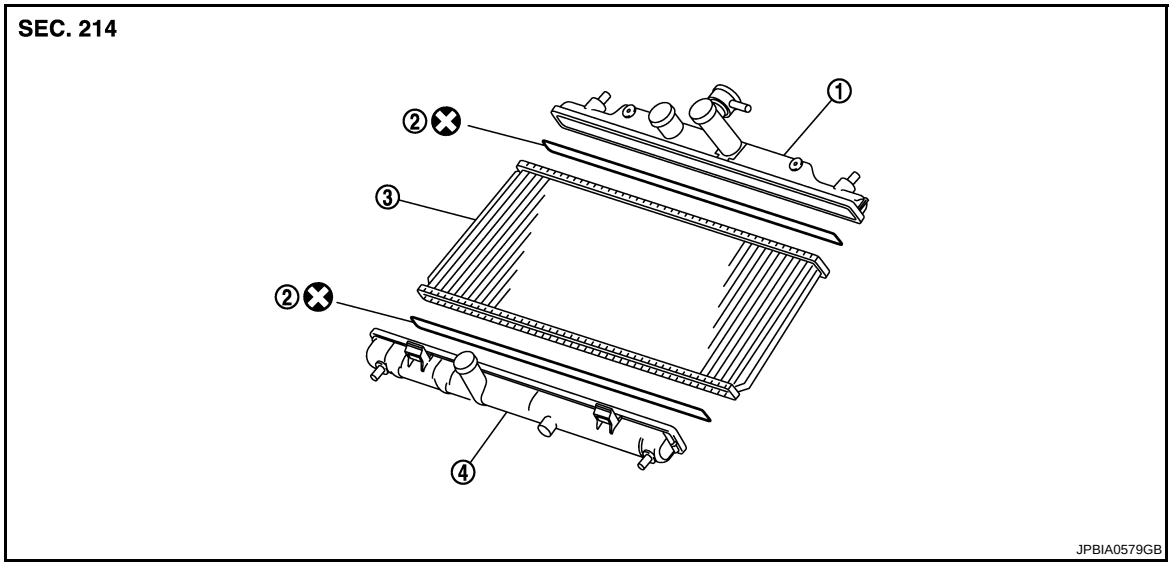


1. Reservoir tank cap
2. Reservoir tank
3. Clamp
4. Reservoir tank hose
5. Mounting rubber (upper)
6. Mounting bracket (RH)
7. Radiator cap
8. Mounting bracket (LH)
9. Radiator
10. Mounting rubber (lower)
11. O-ring
12. Drain plug
13. Water drain hose
14. Clamp
15. Radiator hose (lower)
16. Cooling fan assembly
17. Radiator hose (upper)

A. To water outlet
B. To water inlet

Refer to GI-4, "Components" for symbols in the figure.

DISASSEMBLY



1. Upper tank
2. Sealing rubber
3. Core
4. Lower tank

Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

INFOID:0000000001160782

REMOVAL

WARNING:

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

1. Remove engine under cover.
2. Drain engine coolant from radiator. Refer to CO-10, "Draining".
   CAUTION:
   Perform this step when the engine is cold.
3. Remove air duct (inlet). Refer to EM-25, "Exploded View".
4. Remove air guide (upper). Refer to HA-59, "MR20DE (M/T) : Exploded View". (M/T models)
5. Disconnect harness connector from fan motor, and move harness to aside.
6. Remove radiator hose (upper) and reservoir tank hose.
7. Remove mounting bracket (RH and LH) and mounting rubber (upper) to tilt radiator frontward.
8. Remove radiator hose (lower).
9. Remove radiator and cooling fan assembly/
   CAUTION:
   Be careful not to damage or scratch radiator core.
10. Remove cooling fan assembly from radiator.
    CAUTION:
    Be careful not to damage radiator core when removing.

INSTALLATION

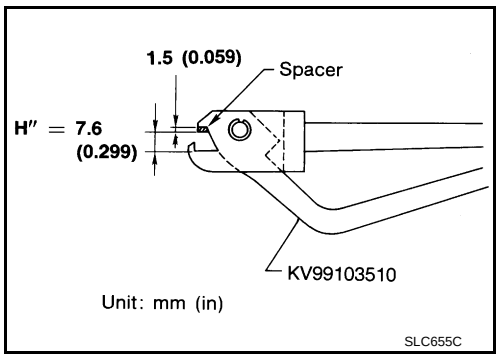
Installation is the reverse order of removal.

Disassembly and Assembly

INFOID:0000000001197047

PREPARATION

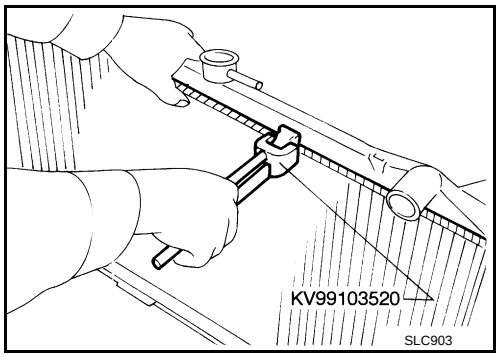
1. Attach the spacer to the tip of radiator plate pliers A (SST).
Spacer specification: 1.5 mm (0.059 in) thick × 18 mm (0.71 in) wide × 8.5 mm (0.335 in) long.



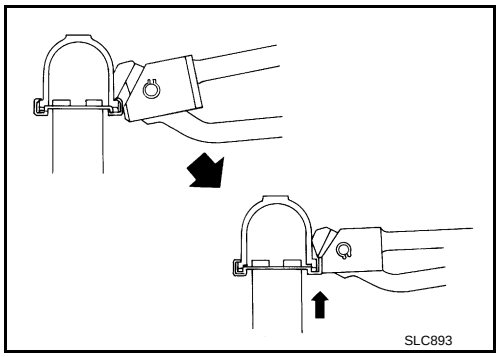
2. Check that when radiator plate pliers A [SST: KV99103510] are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer thickness, if necessary.

DISASSEMBLY

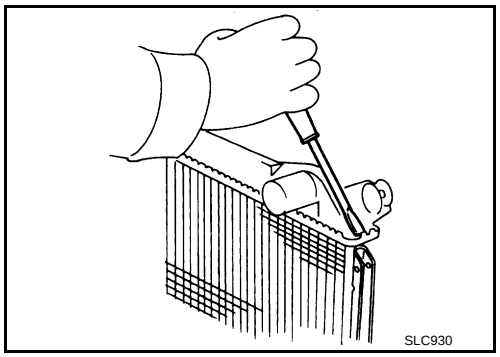
1. Remove upper and lower tanks with a radiator plate pliers B (SST).



- Grip the crimped edge and bend it upwards so that radiator plate pliers B [SST: KV99103520] slips off.
CAUTION:
Never bend excessively.

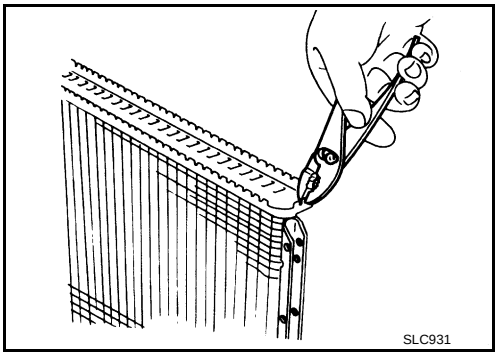


- In areas where radiator plate pliers B [SST: KV99103520] cannot be used, use screwdriver to bend the edge up.
CAUTION:
Be careful not to damage tank.



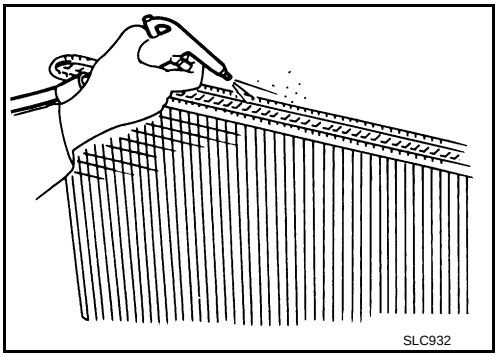
2. Remove sealing rubber.

3. Check the edge stands straight up.

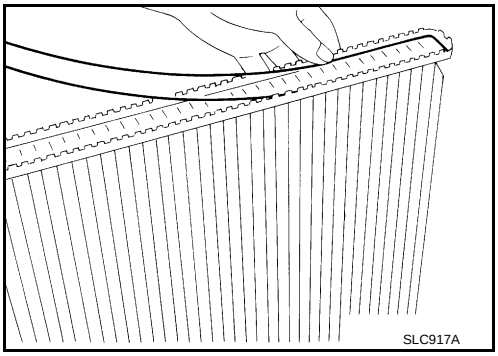


ASSEMBLY

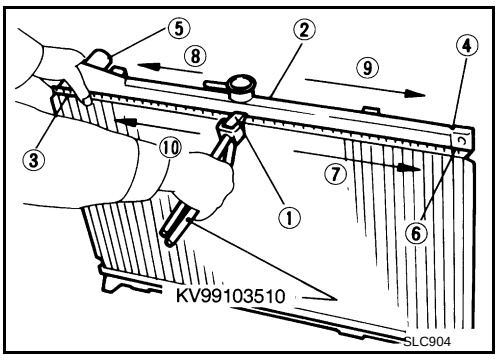
1. Clean contact portion of tank.

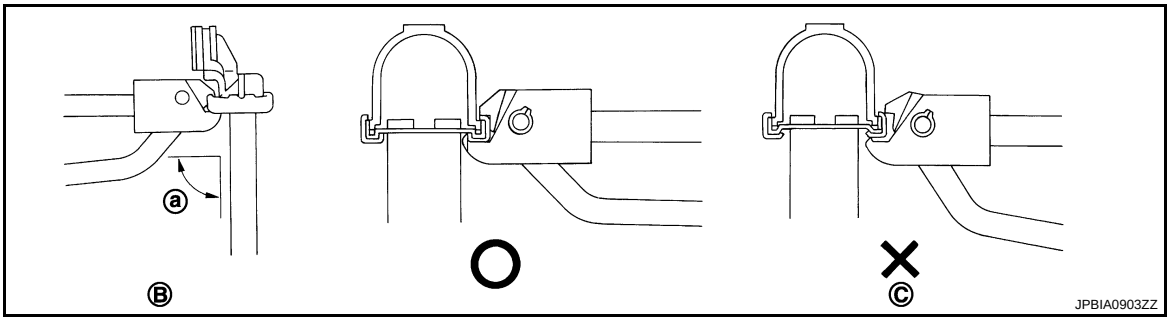


2. Install sealing rubber while pressing it in with fingers.
CAUTION:
Be careful not to twist sealing rubber.



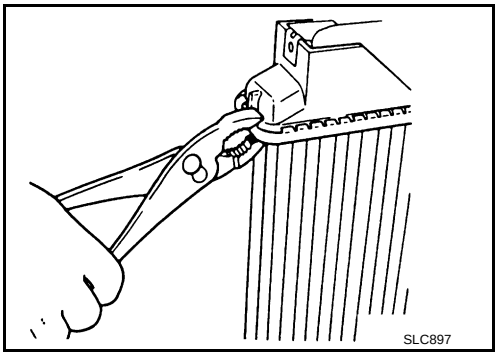
3. Caulk tank in numerical order as shown in the figure with radiator plate pliers A (SST).





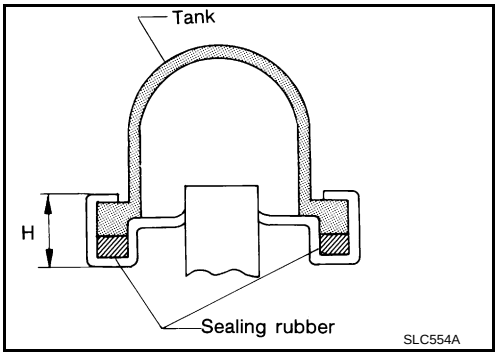
B. Keep tool perpendicular to the radiator C. Grip is insufficient
a. 90°

- 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)



5. Check that there is no leakage.
Refer to CO-21, "Inspection".

Inspection

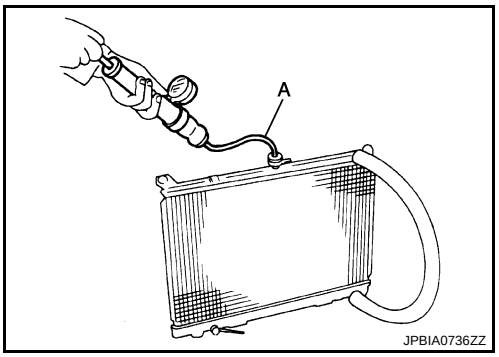
INFOID:0000000001197048

INSPECTION AFTER ASSEMBLY

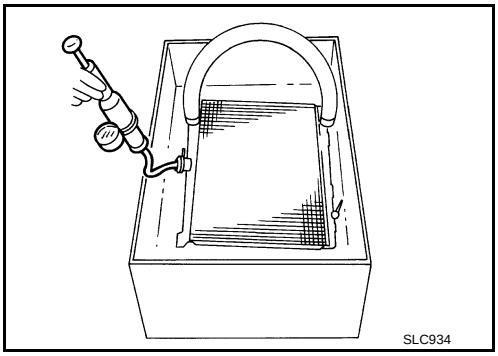
1. Apply pressure with the radiator cap tester adapter (commercial service tool) (A) and the radiator cap tester (commercial service tool).

Testing pressure: Refer to CO-32, "Radiator".

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



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



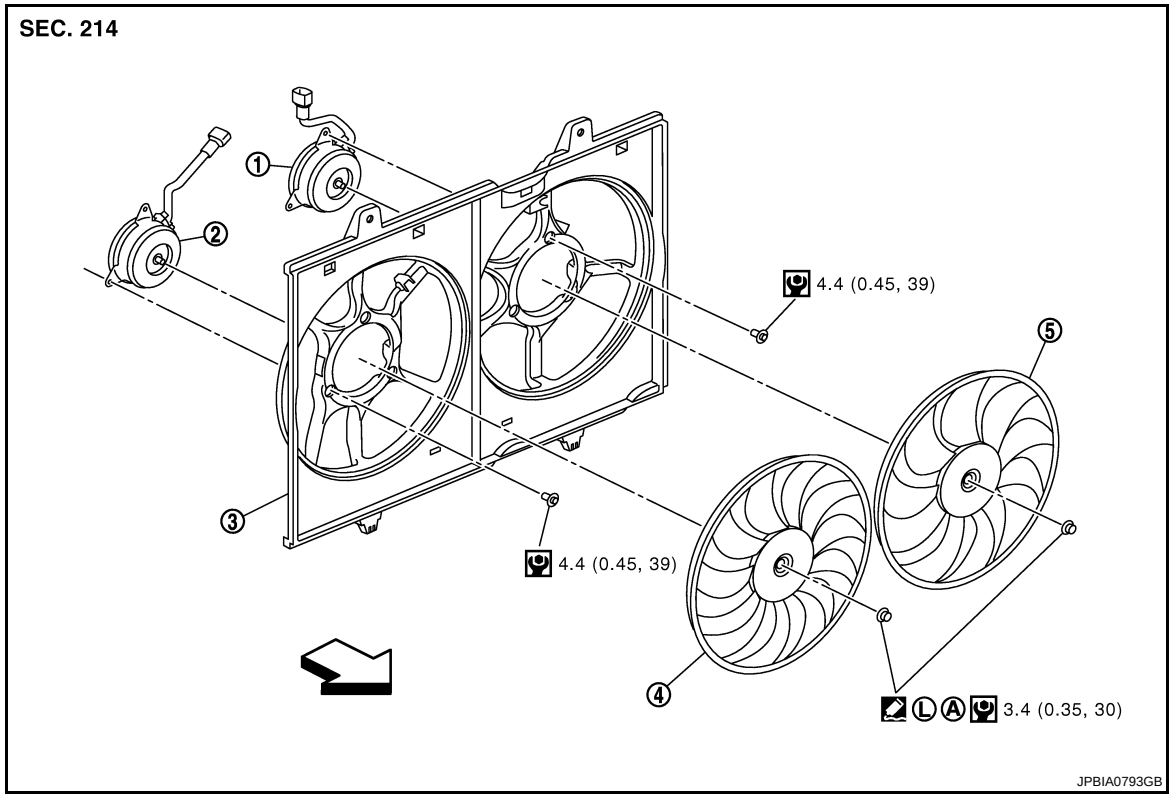
INSPECTION AFTER INSTALLATION

- 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. Check visually that there is no leakage of engine coolant.

COOLING FAN

Exploded View

INFOID:0000000001160784



1.	Fan motor (LH)	2.	Fan motor (RH)	3.	Fan shroud
4.	Cooling fan (RH)	5.	Cooling fan (LH)		
A.	Apply on fan motor shaft				

: Apply thread locking sealant.

: Vehicle front

Refer to GI-4, "Components" for symbols not described on the above.

Removal and Installation

INFOID:0000000001160785

REMOVAL

1. Remove engine under cover.
2. Drain engine coolant from radiator. Refer to CO-10, "Draining".
   CAUTION:
   Perform this step when the engine is cold.
3. Remove air duct (inlet). Refer to EM-25, "Exploded View".
4. Remove air guide upper. Refer to HA-59, "MR20DE (M/T) : Exploded View". (M/T models)
5. Disconnect harness connector from resistor and fan motor, and move harness to aside.
6. Remove radiator hose (upper) and reservoir tank hose. Refer to CO-16, "Exploded View".
7. Remove mounting bracket (RH and LH) and mounting rubber (upper) to tilt radiator frontward. Refer to CO-16, "Exploded View".
8. Remove cooling fan assembly.
   CAUTION:
   Be careful not to damage or scratch on radiator core when removing.

INSTALLATION

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

CAUTION:
Only use genuine parts for fan shroud mounting bolt and observe the specified torque (to prevent radiator from being damaged).
NOTE:
Cooling fan is controlled by ECM. For details, refer to ECM-287, "Description".

Disassembly and Assembly

INFOID:0000000001160786

DISASSEMBLY

1. Remove cooling fan mounting nuts, and then remove the cooling fans (RH and LH).
2. Remove fan motors (RH and LH).

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 : 11 blades
Left side : 9 blades

- Apply thread locking sealant on fan motor shaft.

Inspection

INFOID:0000000001160787

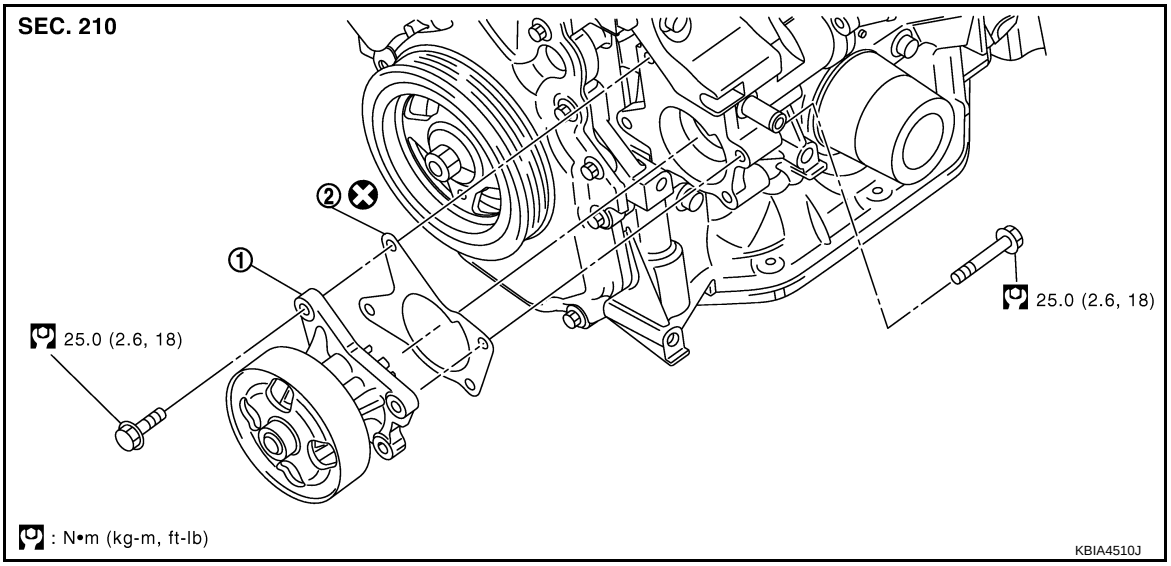
INSPECTION AFTER DISASSEMBLY

Cooling Fan
Inspect cooling fan for crack or unusual bend.
- If anything is found, replace cooling fan.

WATER PUMP

Exploded View

INFOID:0000000001160788



1. Water pump
2. Gasket

Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

INFOID:0000000001160789

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-10, "Draining".
   CAUTION:
   Perform this step when the engine is cold.
2. Remove front fender protector (RH). Refer to EXT-21, "Exploded View".
3. Remove drive belt. Refer to EM-15, "Removal and Installation".
4. Remove water pump.
   - Engine coolant leaks from cylinder block, so have a receptacle ready below.

   CAUTION:
   - **Handle water pump vane so that it does not contact any other parts.**
   - **Water pump cannot be disassembled and should be replaced as a unit.**

INSTALLATION

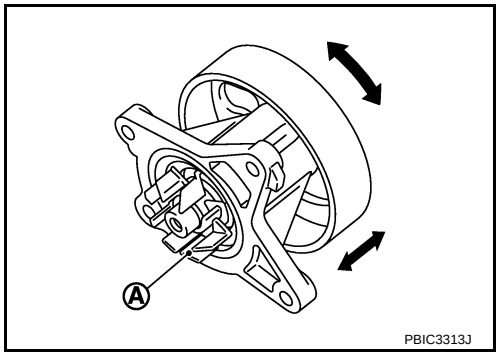
Install in the reverse order of removal.

Inspection

INFOID:0000000001160790

INSPECTION AFTER REMOVAL

- Check visually that there is no significant dirt or rusting on water pump body and vane (A).
- Check that there is no looseness in vane shaft, and that it turns smoothly when rotated by hand.
- Replace water pump, if necessary.



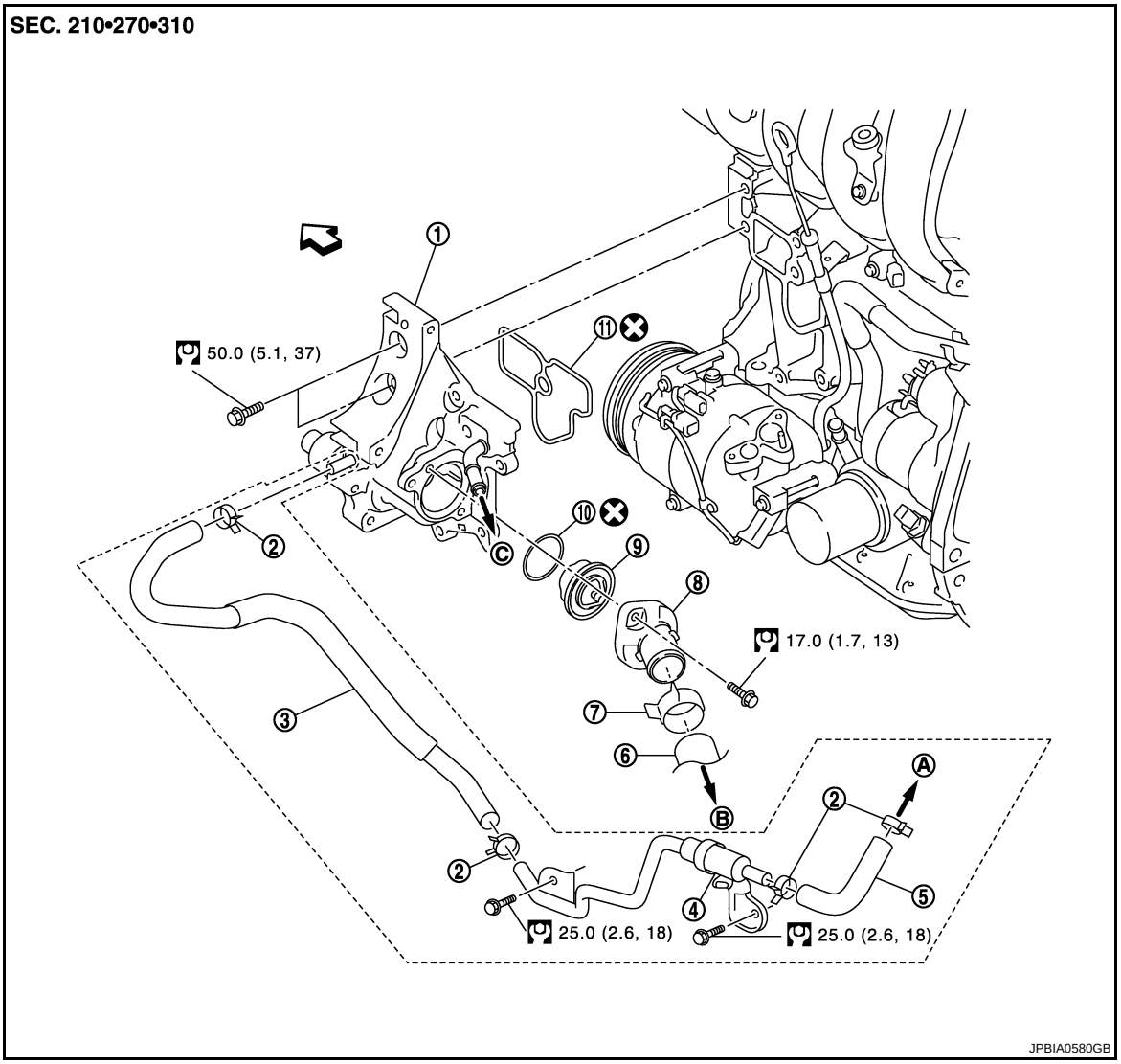
INSPECTION AFTER INSTALLATION

- 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. Check visually that there is no leakage of engine coolant.

THERMOSTAT

Exploded View

INFOID:0000000001160791



1. Thermostat housing
2. Clamp (CVT models)
3. Water hose (CVT models)
4. Heater thermostat (CVT models)
5. Water hose (CVT models)
6. Radiator hose (lower)
7. Clamp
8. Water inlet
9. Thermostat
10. Rubber ring
11. Gasket
- A. To CVT fluid cooler
- B. To radiator
- C. To oil cooler
- ⇦ : Engine front

Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

INFOID:0000000001160792

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-10, "Draining".
   CAUTION:
   Perform this step when engine is cold.
2. Disconnect the battery cable from the negative terminal. Refer to PG-133, "Exploded View".
3. Add paint mark, then disconnect radiator hose (lower) from water inlet. Refer to CO-16, "Exploded View".

4. Remove water inlet and thermostat.
   • Engine coolant leaks from cylinder block, so have a receptacle ready below.
5. Remove thermostat housing with the following procedure:

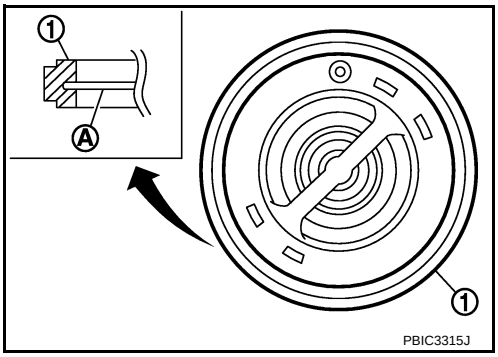
a. Remove water pump. Refer to CO-25, "Exploded View".
b. Remove alternator. Refer to CHG-27, "MR20DE MODELS : Exploded View".
c. Disconnect water hoses.

INSTALLATION

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

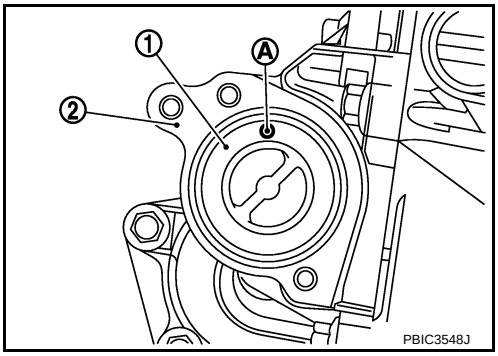
Thermostat

• Install thermostat with making rubber ring (1) groove fit to thermostat flange (A) with the whole circumference.



• Install thermostat (1) with jiggle valve (A) facing upwards.

2 : Thermostat housing



Inspection

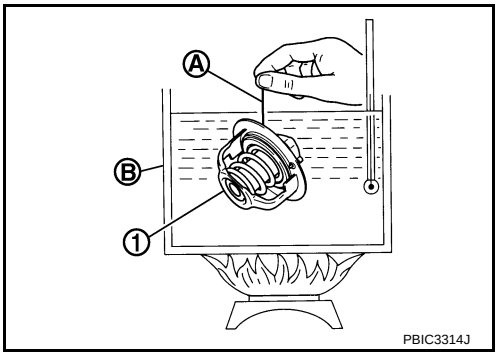
INFOID:0000000001160793

INSPECTION AFTER REMOVAL

Thermostat

• Place a thread (A) so that it is caught in the valves of thermostat (1). Immerse fully in a container (B) filled with water. Heat while stirring.
• The valve opening temperature is the temperature at which the valve opens and falls from the thread.
• Continue heating. Check the full open valve lift amount.
• After checking the maximum valve lift amount, lower the water temperature and check the valve closing temperature.

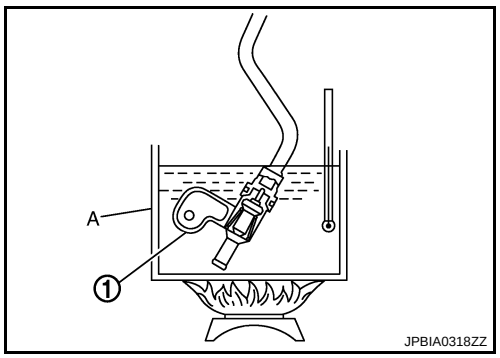
Standard: Refer to CO-32, "Thermostat".



• If out of the standard, replace thermostat.

Heater Thermostat (CVT models)

- Fully immerse the heater thermostat (1) in a container (A) filled with water. Continue heating the water while stirring.
- Continue heating the heater thermostat for 5 minutes or more after bringing the water to a boil.
- Quickly take the heater thermostat out of the hot water, measure the heater thermostat within 10 seconds.

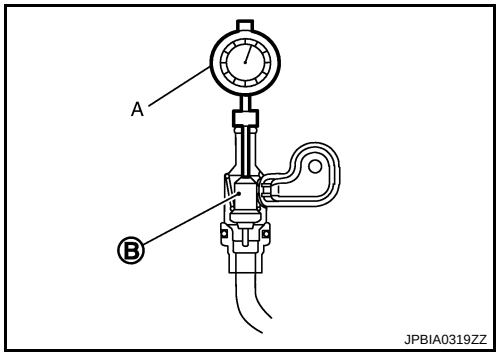


- Place dial indicator (A) on the pellet (B) and measure the elongation from the initial state.

Standard

: Refer to CO-32, "Heater Thermostat (CVT models)".

- If out of the standard, replace heater thermostat.



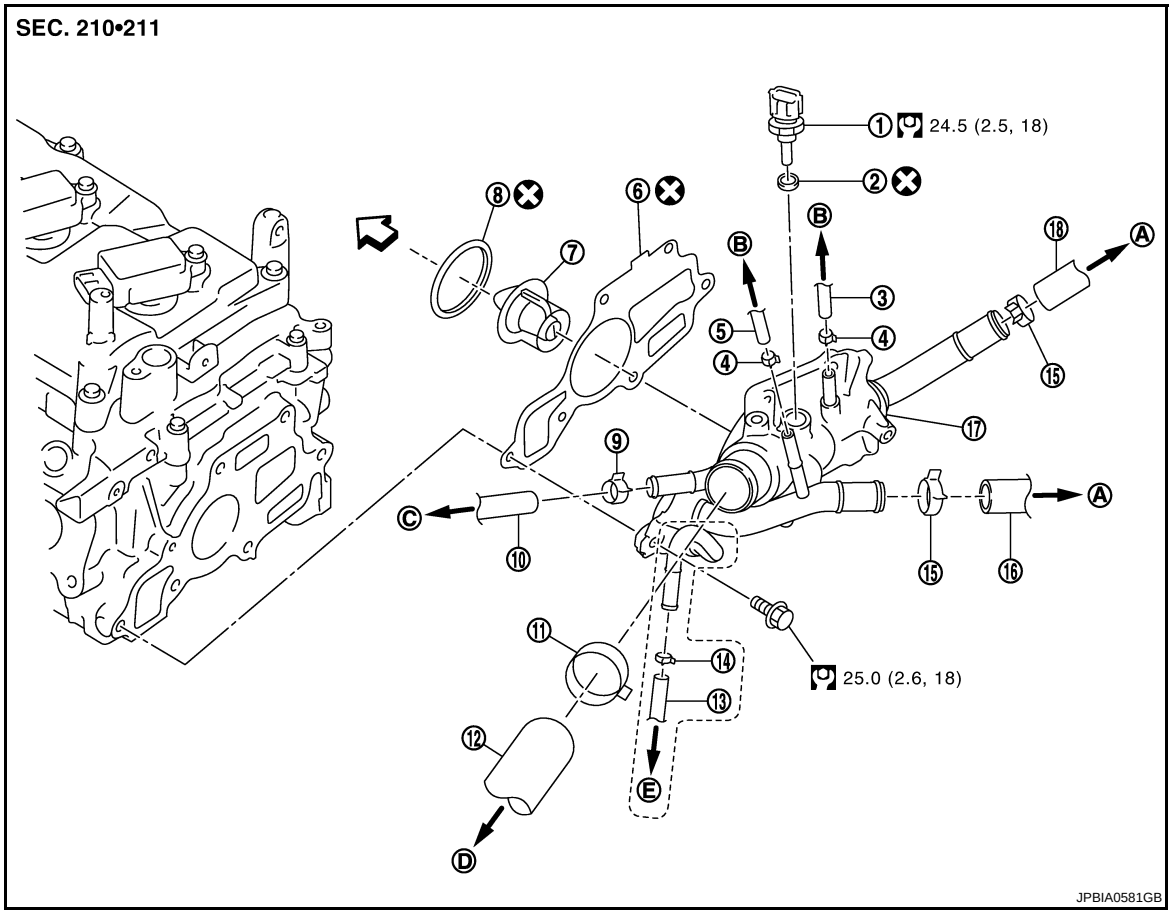
INSPECTION AFTER INSTALLATION

- 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. Check visually that there is no leakage of engine coolant.

WATER OUTLET

Exploded View

INFOID:0000000001160794



1.	Engine coolant temperature sensor	2.	Washer	3.	Water hose
4.	Clamp	5.	Water hose	6.	Gasket
7.	Water control valve	8.	Rubber ring	9.	Clamp
10.	Water hose	11.	Clamp	12.	Radiator hose (upper)
13.	Water hose (CVT models)	14.	Clamp (CVT models)	15.	Clamp
16.	Heater hose	17.	Water outlet	18.	Heater hose
A.	To heater	B.	To electric throttle control actuator	C.	To oil cooler
D.	To radiator	E.	To CVT fluid cooler		

⇦ : Engine front

Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

INFOID:0000000001160795

REMOVAL

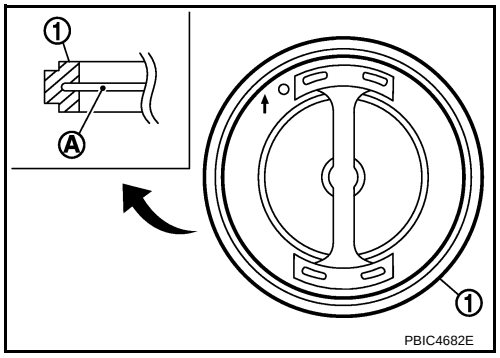
1. Drain engine coolant from radiator. Refer to CO-10, "Draining".
   CAUTION:
   Perform this step when engine is cold.
2. Disconnect radiator hose (upper). Refer to CO-16, "Exploded View".
3. Disconnect harness connector from engine coolant temperature sensor.
4. Remove water hoses and heater hoses.
5. Remove water outlet.
6. Remove engine coolant temperature sensor from water outlet, if necessary.

INSTALLATION

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

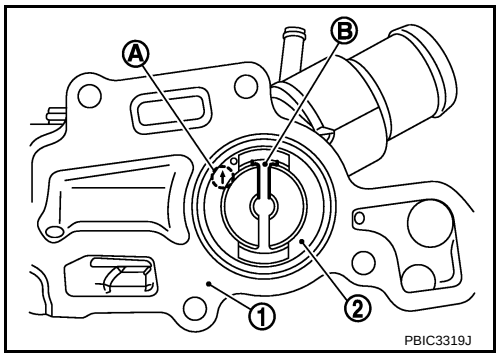
Water Control Valve

- Install water control valve with making rubber ring (1) groove fit to water control valve flange (A) with the whole circumference.



- Install water control valve (2) with the arrow (A) facing up and the frame center part (B) facing upwards.

1 : Water outlet



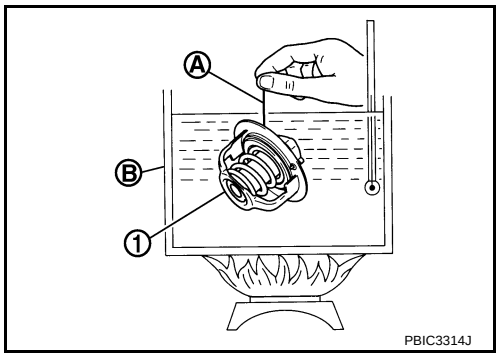
Inspection

INFOID:0000000001160796

INSPECTION AFTER REMOVAL

Water Control Valve

- Place a thread (A) so that it is caught in the valves of water control valve (1). Immerse fully in a container (B) filled with water. Heat while stirring.
- The valve opening temperature is the temperature at which the valve opens and falls from the thread.
- Continue heating. Check the continuous valve lifting toward maximum valve lift.
  NOTE:
  The maximum valve lift amount standard temperature for water control valve is the reference value.
- After checking the maximum valve lift amount, lower the water temperature and check the valve closing temperature.



Standard: **Refer to CO-32, "Water Control Valve".**

- If out of the standard, replace water control valve.

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. Check visually that there is no leakage of engine coolant.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Periodical Maintenance Specification

INFOID:0000000001160797

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (Imp qt)

Engine coolant capacity (With reservoir tank at “MAX” level)	M/T models (2WD)	7.0 (6 - 1/8)
	M/T models (4WD)	7.1 (6 - 1/4)
	CVT models	7.4 (6 - 1/2)
Reservoir tank engine coolant capacity (At “MAX” level)		0.75 (5/8)

Radiator

INFOID:0000000001160798

Unit: kPa (bar, kg/cm^2, psi)

Cap relief pressure	Standard	78.4 - 98.0 (0.78 - 0.98, 0.80 - 1.00, 11.4 - 14.2)
	Limit	59 (0.59, 0.60, 8.6)
Leakage testing pressure		157 (1.57, 1.60, 22.8)

Thermostat

INFOID:0000000001160799

Standard

Valve opening temperature	80.5 - 83.5°C (177 - 182°F)
Maximum valve lift	8.0 mm/95°C (0.315 in/203°F)
Valve closing temperature	77°C (171°F)

Heater Thermostat (CVT models)

INFOID:0000000001160800

Standard

Valve lift	More than 4.5 mm (0.177 in)

Reference value

Valve opening temperature	82°C (180°F)
Maximum valve lift	5.0 mm/95°C (0.197 in/203°F)

Water Control Valve

INFOID:0000000001160801

Standard

Valve opening temperature	93.5 - 96.5°C (200 - 206°F)
Maximum valve lift	8.0 mm/108°C (0.315 in/226°F)
Valve closing temperature	90°C (194°F)

FUNCTION DIAGNOSIS

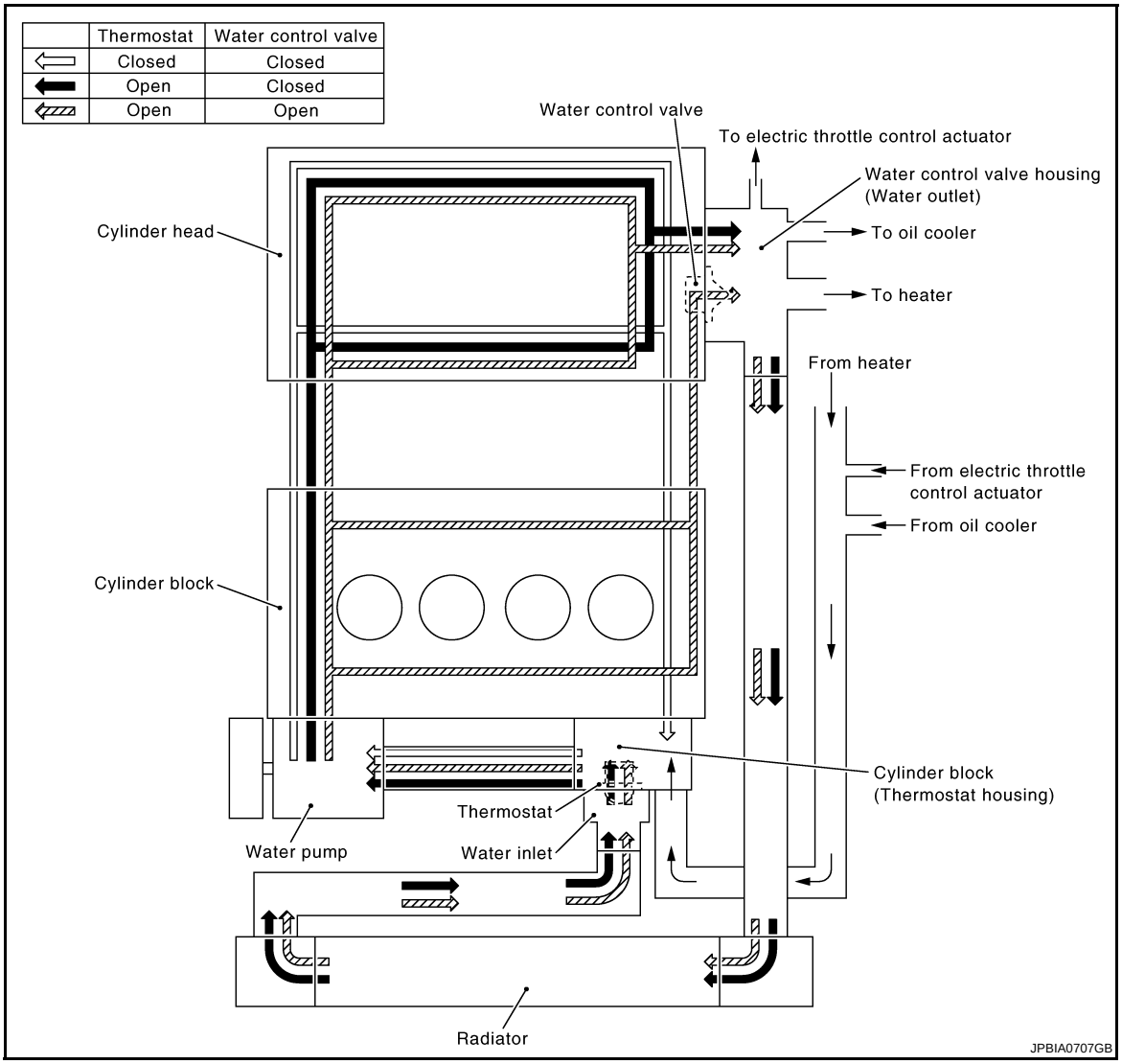
DESCRIPTION

M/T

M/T : Engine Cooling System

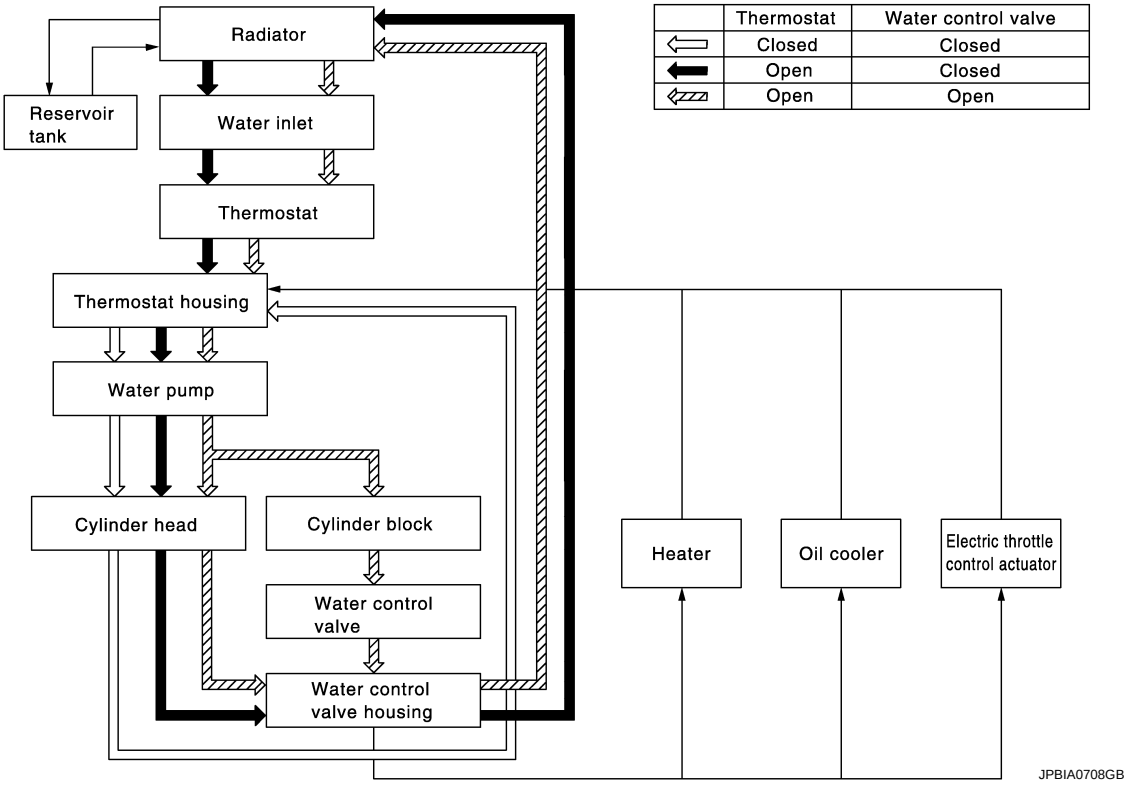
INFOID:0000000001202913

	Thermostat	Water control valve
⇦	Closed	Closed
⬅	Open	Closed
⇦ (hatched)	Open	Open



M/T : Engine Cooling System Schematic

INFOID:0000000001202914

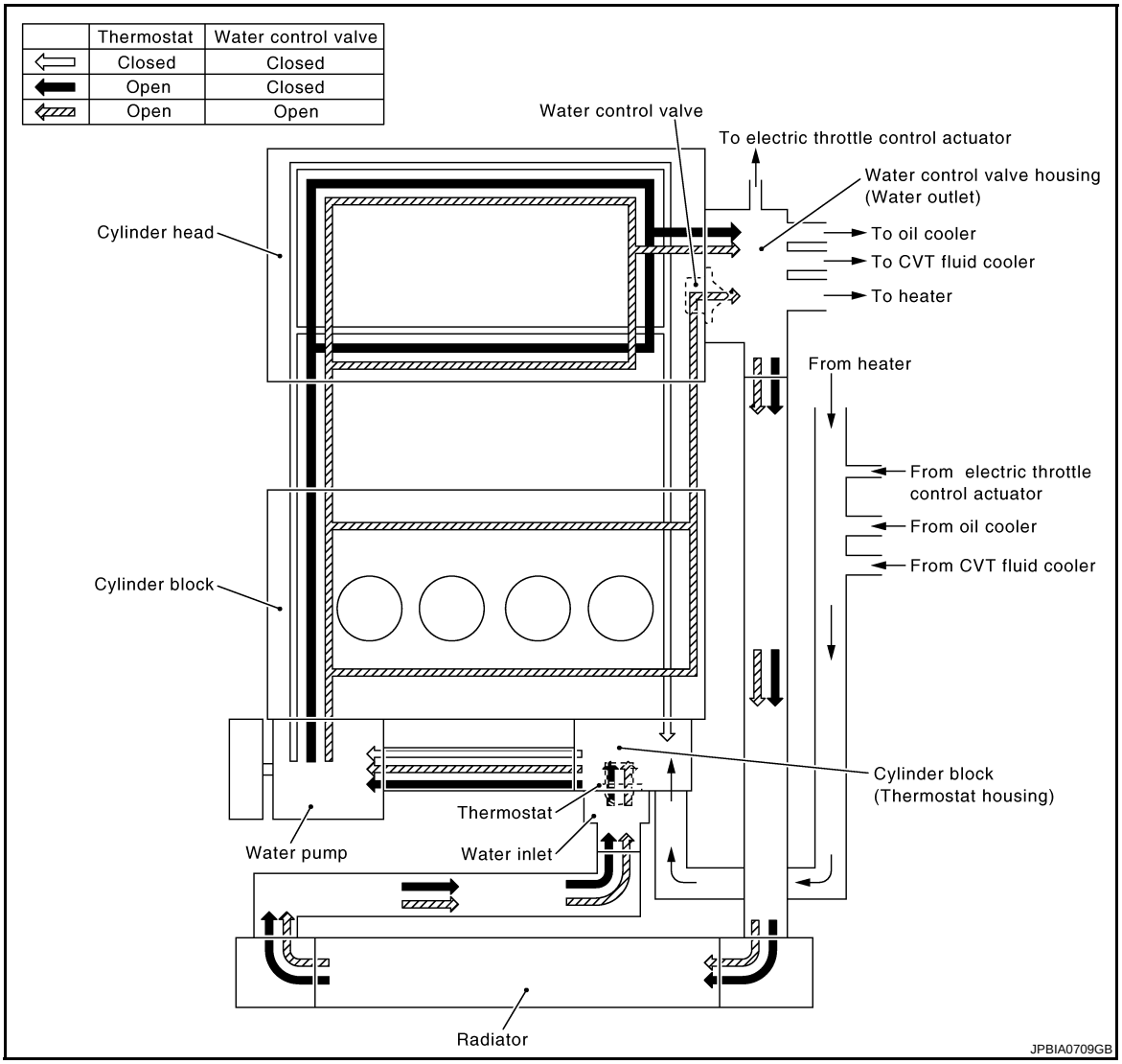


	Thermostat	Water control valve
⇦	Closed	Closed
⬅	Open	Closed
⇦	Open	Open

CVT

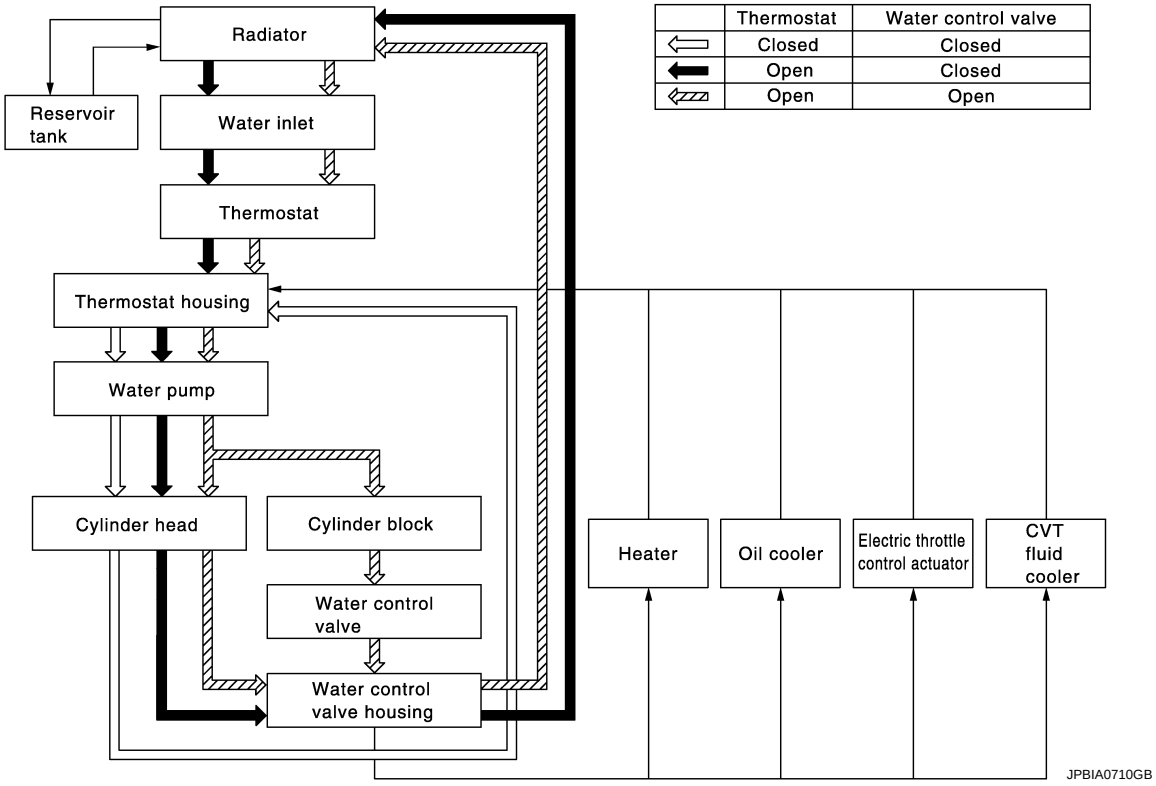
CVT : Engine Cooling System

INFOID:0000000001202915



CVT : Engine Cooling System Schematic

INFOID:0000000001202916



SYMPTOM DIAGNOSIS

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:0000000001160729

	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 radiator 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 leaks into cooling system	Cylinder head deterioration
				Cylinder head gasket deterioration

	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	
			Improper ignition timing	
	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		

PRECAUTION

PRECAUTIONS

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000001570494

NOTE:
- This Procedure is applied only to models with Intelligent Key system and NATS (NISSAN ANTI-THEFT SYSTEM).
- Remove and install all control units after disconnecting both battery cables with the ignition knob in the ″LOCK″ position.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.

For models equipped with the Intelligent Key system and NATS, an electrically controlled steering lock mechanism is adopted on the key cylinder.
For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.
If steering wheel rotation is required when battery power is interrupted, follow the procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both battery cables.
   NOTE:
   Supply power using jumper cables if battery is discharged.
2. Use the Intelligent Key or mechanical key to turn the ignition switch to the ″ACC″ position. At this time, the steering lock will be released.
3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.
4. Perform the necessary repair operation.
5. When the repair work is completed, return the ignition switch to the ″LOCK″ position before connecting the battery cables. (At this time, the steering lock mechanism will engage.)
6. Perform a self-diagnosis check of all control units using CONSULT-III.

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

INFOID:0000000001569909

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. Information necessary to service the system safely is included in the “SRS AIRBAG” and “SEAT BELT” of this Service Manual.

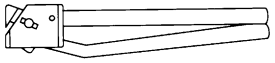
WARNING:
- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect 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 “SRS AIRBAG”.**
- **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.**

PREPARATION

PREPARATION

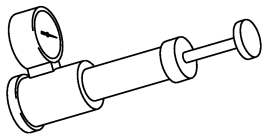
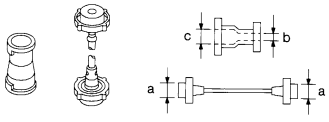
Special Service Tools

INFOID:0000000001160725

Tool number Tool name	Description
KV99103510 Radiator plate pliers A  S-NT224	Installing radiator upper and lower tanks
KV99103520 Radiator plate pliers B  S-NT225	Removing radiator upper and lower tanks

Commercial Service Tools

INFOID:0000000001160726

Tool name	Description
Radiator cap tester  PBIC1982E	Checking radiator and radiator cap
Radiator cap tester adapter  S-NT564	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)

ON-VEHICLE MAINTENANCE

ENGINE COOLANT

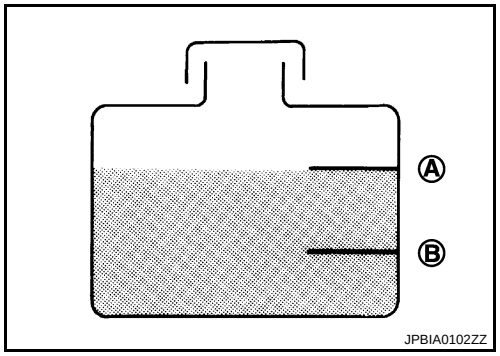
Inspection

INFOID:0000000001160730

LEVEL

- Check that the reservoir tank engine coolant level is within the “MIN” to “MAX” when the engine is cool.

A : MAX
B : MIN

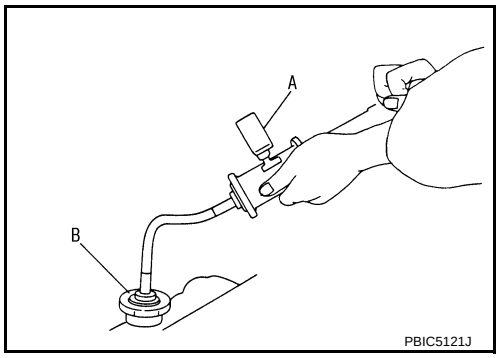


- Adjust the engine coolant level if necessary.

LEAKAGE

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

Testing pressure: Refer to CO-61, "Radiator".



WARNING:
Never remove radiator cap when engine is hot. Serious burns may 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.

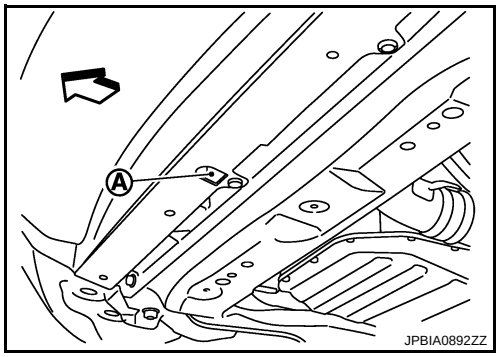
Draining

INFOID:0000000001160731

WARNING:
- **Never remove radiator cap when engine is hot. Serious burns may occur from high-pressure engine coolant escaping from radiator.**
- **Wrap a thick cloth around the radiator cap. Slowly turn it a quarter of a turn to release built-up pressure. Then turn it all the way.**

1. Remove engine under cover.
2. Open radiator drain plug at the bottom of radiator, and then remove radiator cap.

A : Radiator drain plug hole
⇦ : Vehicle front

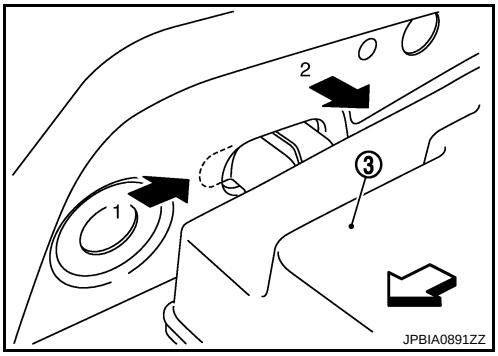


CAUTION:
Perform this step when engine is cold.
- When draining all of engine coolant in the system, open water drain plugs on cylinder block. Refer to EM-210, "Exploded View".

3. Remove reservoir tank if necessary, and drain engine coolant and clean reservoir tank before installing.

- Move reservoir tank (3), and then remove it numerical order as shown in the figure.

⇦ : Vehicle front



4. Check drained engine coolant for contaminants such as rust, corrosion or discoloration. If contaminated, flush the engine cooling system. Refer to CO-43, "Flushing".

Refilling

INFOID:0000000001160732

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: Refer to CO-47, "Exploded View".

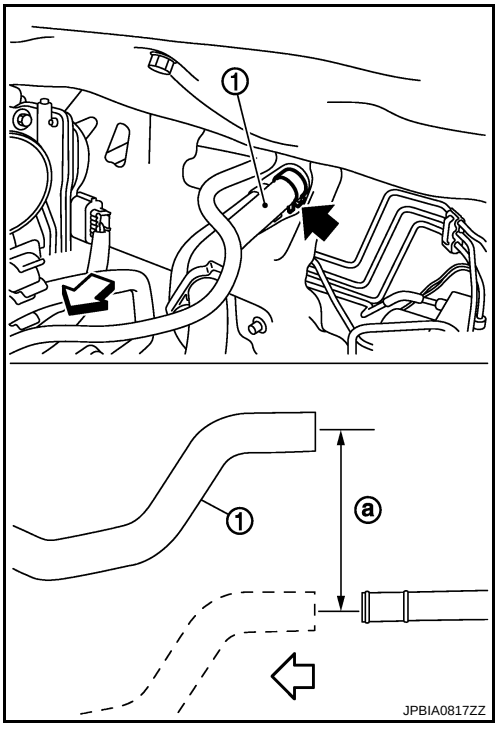
- If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-210, "Exploded View".

2. Check that each hose clamp has been firmly tightened.
3. Remove air duct assembly, and move electric throttle control actuator to aside. Refer to EM-150, "Exploded View" and EM-152, "Exploded View".

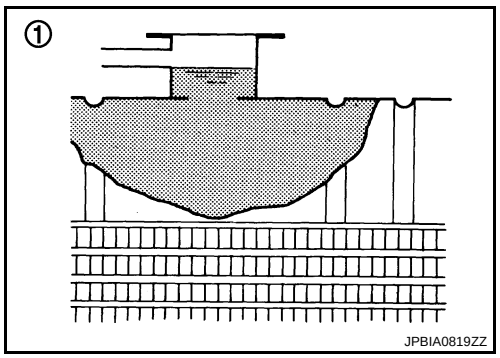
4. Disconnect heater hose (1) at the position (⬅) in the figure.

⇦ : Vehicle front

- Lift up the heater hose end approximately 100 mm (3.94 in) (a) higher than the height at installation.



5. Fill radiator (1) to specified level.
CAUTION:
Never adhere the engine coolant to electronic equipments (alternator etc.).
- Pour engine coolant through engine coolant filler neck slowly of less than 2 ℓ (2-1/8 US qt, 1-3/4 lmp qt) a minute to allow air in system to escape.
- When engine coolant overflows disconnected heater hose, connect heater hose, and continue filling the engine coolant.
- Use Genuine NISSAN Engine Coolant or equivalent in its quality mixed with water (distilled or demineralized). Refer to MA-22, "Fluids and Lubricants".

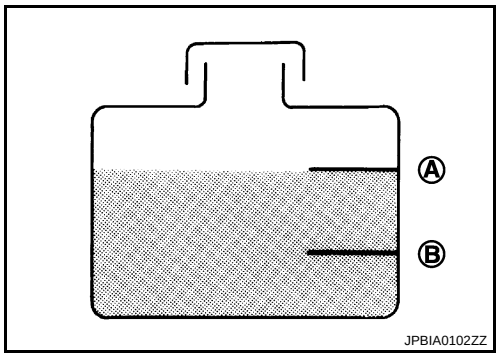


Engine coolant capacity
(With reservoir tank at “MAX” level)
Refer to CO-61, "Periodical Maintenance Specification".

6. Refill reservoir tank to “MAX” level line with engine coolant.

A : MAX
B : MIN

Reservoir tank engine coolant capacity
(At “MAX” level)
Refer to CO-61, "Periodical Maintenance Specification".



7. Install radiator cap.
8. Install air duct assembly and electric throttle control actuator. Refer to EM-150, "Exploded View" and EM-152, "Exploded View".
9. 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.

10. 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.

CAUTION:
Never adhere the engine coolant to electronic equipments (alternator etc.).

11. Refill reservoir tank to “MAX” level line with engine coolant.
12. Repeat steps 5 through 10 two or more times with radiator cap installed until engine coolant level no longer drops.
13. Check cooling system for leakage with engine running.
14. 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.

15. Repeat step 14 three times.
16. If sound is heard, bleed air from cooling system by repeating step 5 through 10 until engine coolant level no longer drops.

Flushing

INFOID:0000000001160733

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

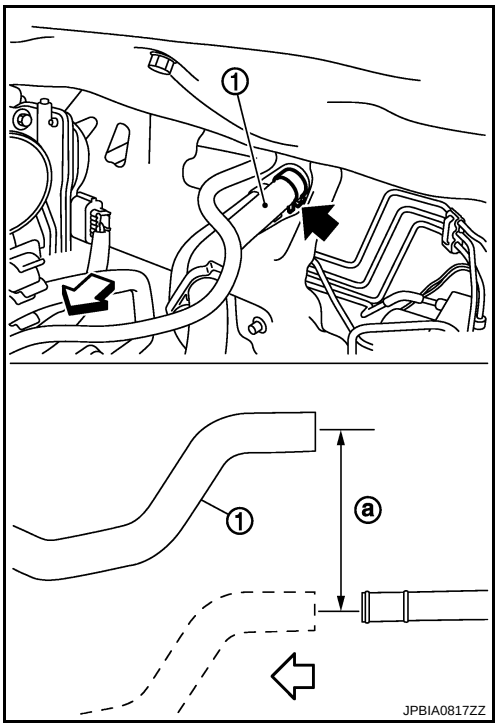
Radiator drain plug : Refer to CO-47, "Exploded View".

- If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-210, "Exploded View".

2. Remove air duct assembly and move electric throttle control actuator to aside. Refer to EM-150, "Exploded View" and EM-152, "Exploded View".
3. Disconnect heater hose (1) at the position (⇦) in the figure.

   ⇦ : Vehicle front

   - Lift up the heater hose end approximately 100 mm (3.94 in) (a) higher than the height at installation.



4. Fill radiator and reservoir tank with water and reinstall radiator cap.
   - When engine coolant overflows disconnected heater hose, connect heater hose, and continue filling the engine coolant.
5. Install air duct assembly and electric throttle control actuator. Refer to EM-150, "Exploded View" and EM-152, "Exploded View".
6. Run the engine and warm it up to normal operating temperature.
7. Rev the engine two or three times under no-load.
8. Stop the engine and wait until it cools down.
9. Drain water from the system. Refer to CO-41, "Draining".
10. Repeat steps 1 through 9 until clear water begins to drain from radiator.

RADIATOR

RADIATOR CAP

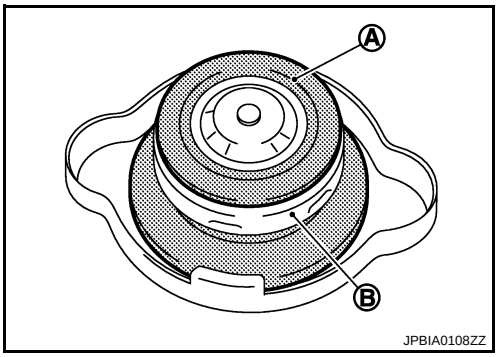
RADIATOR CAP : Inspection

INFOID:0000000001160734

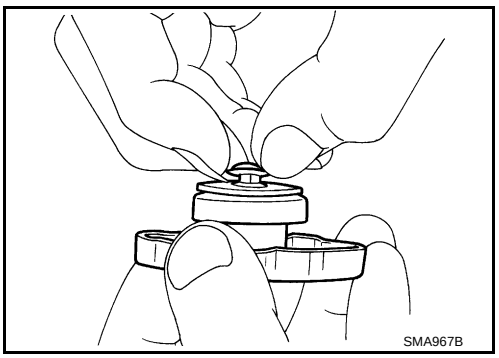
- Check valve seat of radiator cap.

A : Valve seat
B : Metal plunger

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



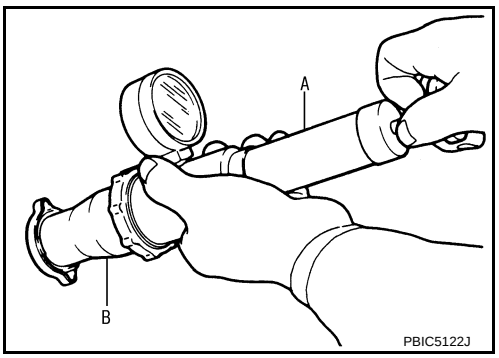
- Pull negative-pressure valve to open it, and check that it close completely when released.
- Check that there is no dirt or damage on the valve seat of radiator cap negative-pressure valve.
- Check that there are no unusualness in the opening and closing conditions of negative-pressure valve.



- Check radiator cap relief pressure.

Standard and Limit: Refer to CO-61, "Radiator".

- 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.

RADIATOR

RADIATOR : Inspection

INFOID:0000000001160735

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

CAUTION:
- **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 harness 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.

4. Blow air into the back side of radiator core vertically downward.
   - Use compressed air lower than 490 kPa (4.9 bar, 5 kg/cm^2, 71 psi) and keep distance more than 30 cm (11.8 in).
5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

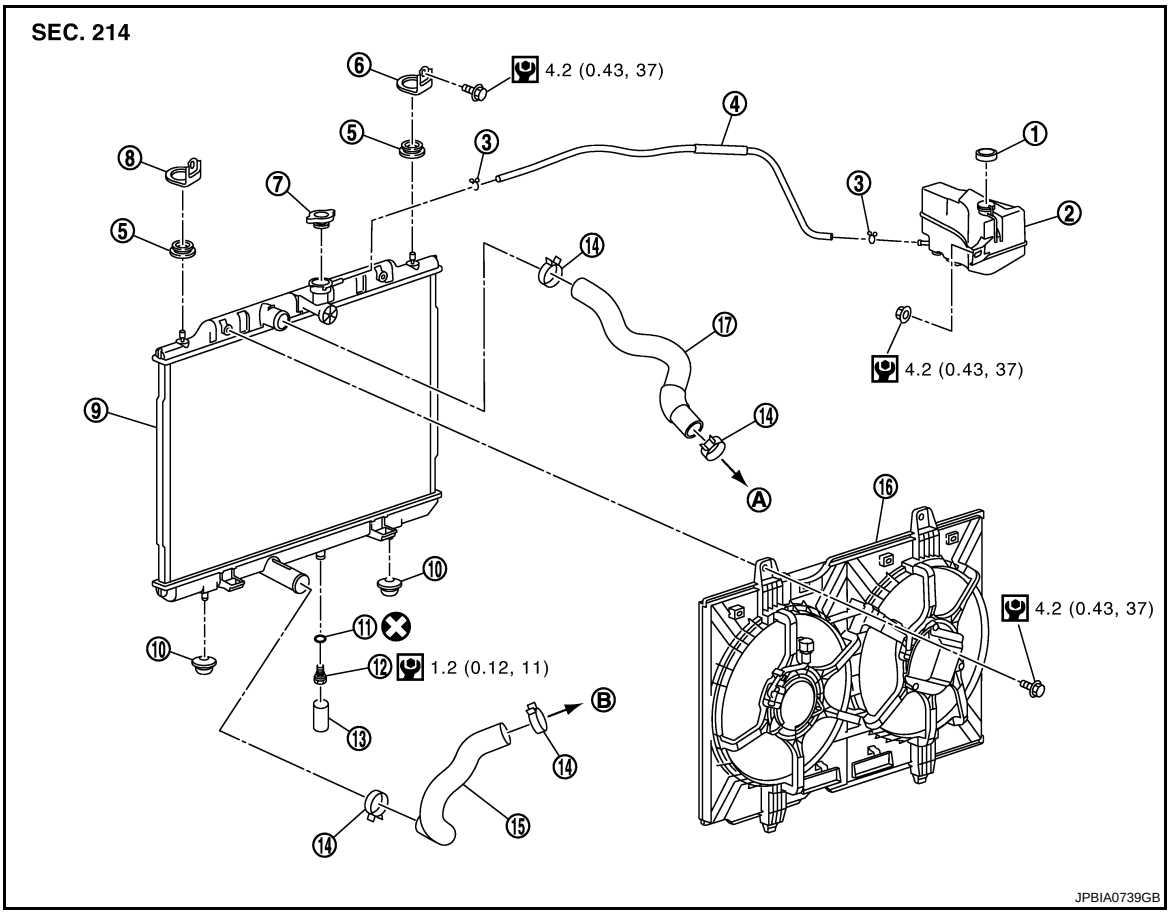
ON-VEHICLE REPAIR

RADIATOR

Exploded View

INFOID:0000000001160736

REMOVAL

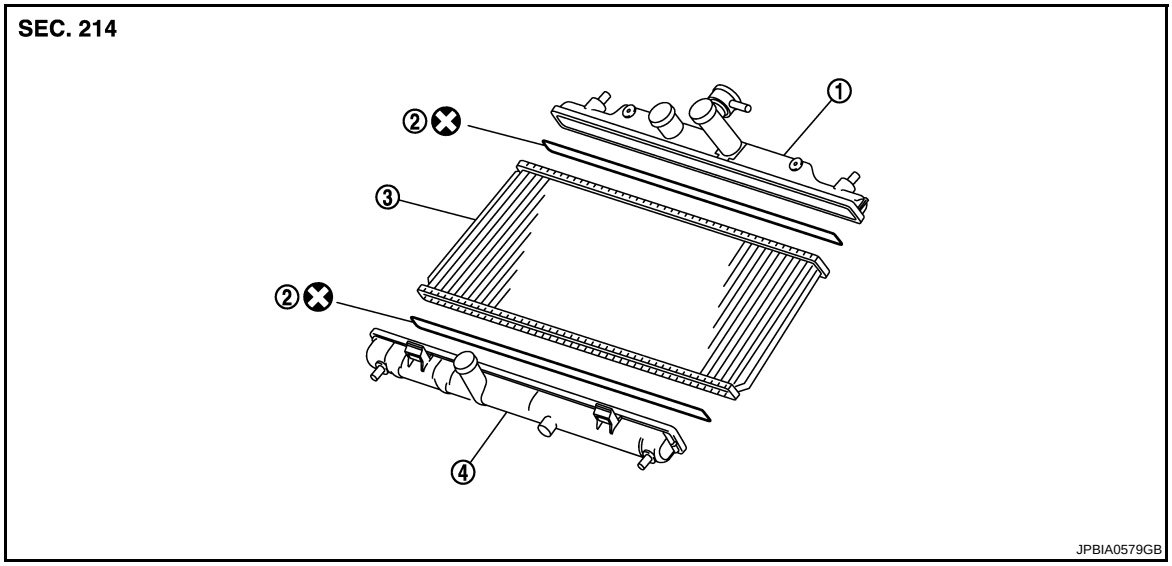


1. Reservoir tank cap
2. Reservoir tank
3. Clamp
4. Reservoir tank hose
5. Mounting rubber (upper)
6. Mounting bracket (RH)
7. Radiator cap
8. Mounting bracket (LH)
9. Radiator
10. Mounting rubber (lower)
11. O-ring
12. Drain plug
13. Water drain hose
14. Clamp
15. Radiator hose (lower)
16. Cooling fan assembly
17. Radiator hose (upper)

A. To water outlet
B. To water inlet

Refer to GI-4, "Components" for symbols in the figure.

DISASSEMBLY



1. Upper tank
2. Sealing rubber
3. Core
4. Lower tank

Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

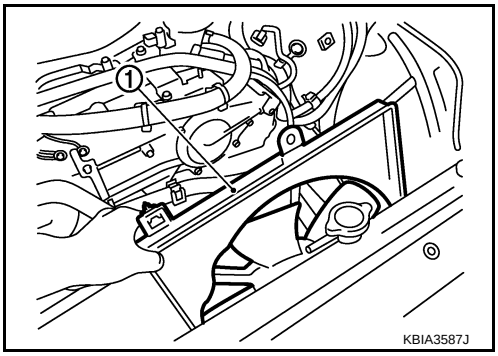
INFOID:0000000001160737

REMOVAL

WARNING:

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

1. Remove engine under cover.
2. Drain engine coolant from radiator. Refer to CO-41, "Draining".
   CAUTION:
   Perform this step when the engine is cold.
3. Remove air duct (inlet). Refer to EM-150, "Exploded View".
4. Disconnect harness connector from fan motor, and move it aside.
5. Remove radiator hose (upper) and reservoir tank hose.
6. Remove mounting bracket (RH and LH) and mounting rubber (upper) to tilt radiator frontward.
7. Remove cooling fan assembly (1). Refer to CO-53, "Exploded View".
   CAUTION:
   Be careful not to damage radiator core when removing.



8. Removal radiator hose (lower).
9. Remove radiator.
   CAUTION:
   Be careful not to damage or scratch radiator core.

INSTALLATION

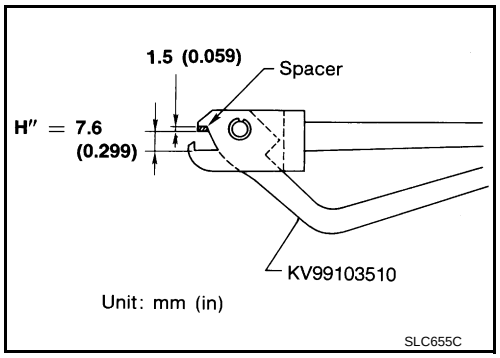
Installation is the reverse order of removal.

Disassembly and Assembly

INFOID:0000000001185527

PREPARATION

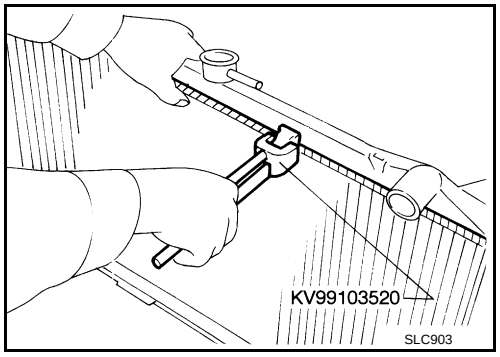
1. Attach spacer to tip of the radiator plate pliers A (SST).
   Spacer specification: 1.5 mm (0.059 in) thick × 18 mm (0.71 in) wide × 8.5 mm (0.335 in) long.



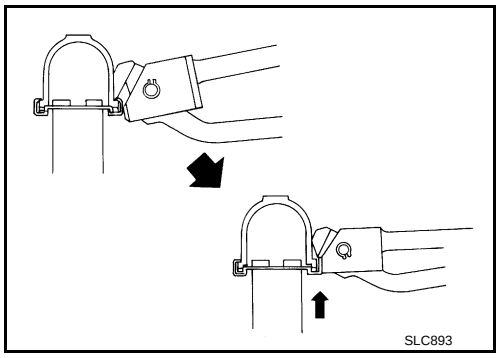
2. Check that when the radiator plate pliers A [SST: KV99103510] are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with spacer, if necessary.

DISASSEMBLY

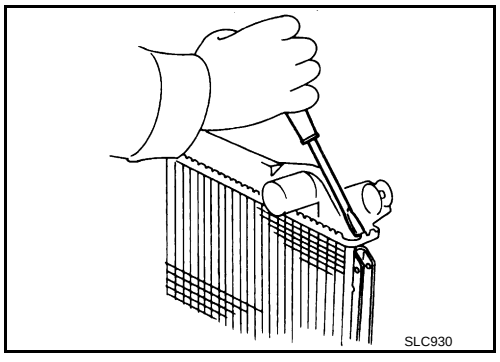
1. Remove upper and lower tanks with the radiator plate pliers B (SST).



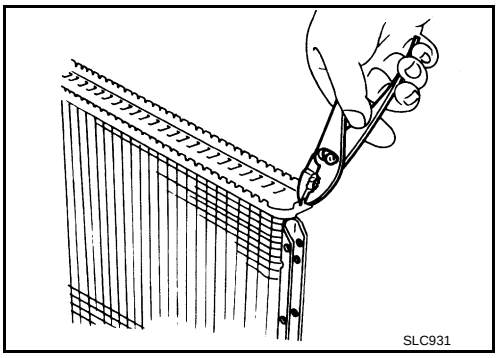
- Grip the crimped edge and bend it upwards so that the radiator plate pliers B [SST: KV99103520] slips off.
  CAUTION:
  Never bend excessively.



- 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.

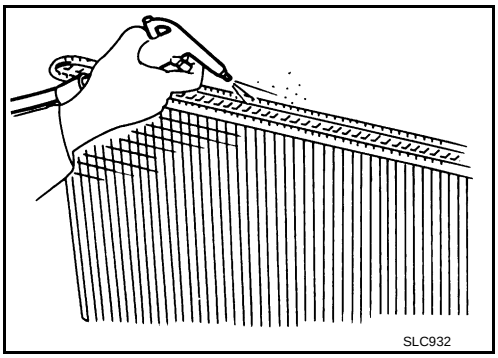


2. Remove sealing rubber.
3. Check the edge stands straight up.

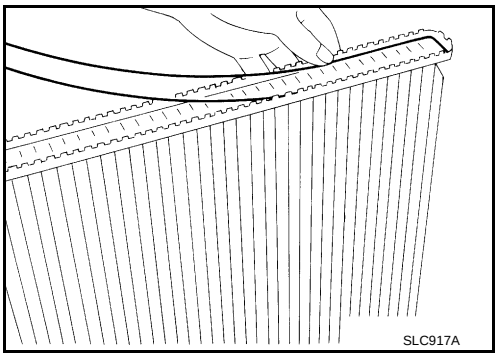


ASSEMBLY

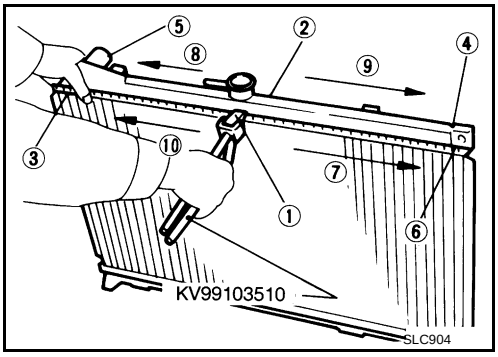
1. Clean contact portion of tank.

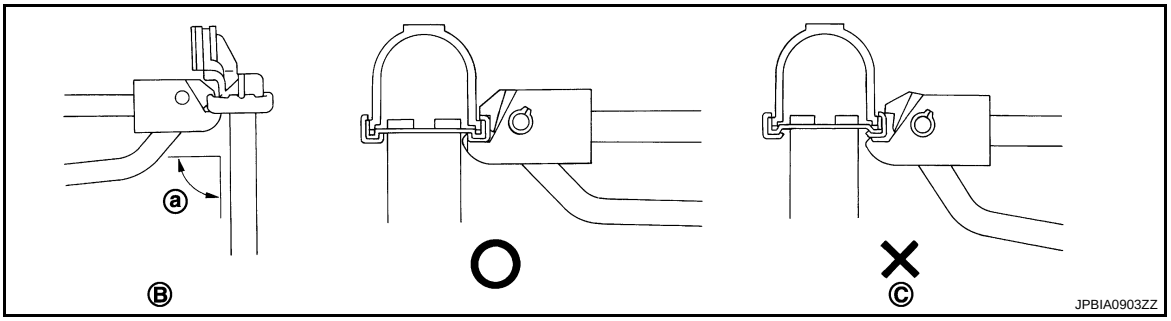


2. Install new sealing rubber while pressing it with fingers.
   CAUTION:
   Be careful not to twist sealing rubber.



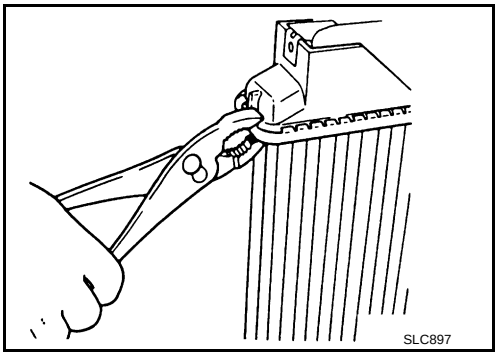
3. Caulk tank in numerical order as shown in the figure with the radiator plate pliers A (SST).





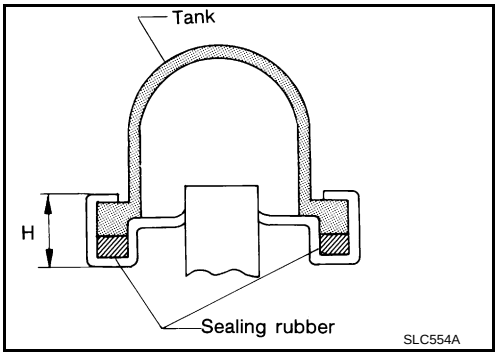
B. Keep tool perpendicular to the radiator C. Grip is insufficient
a. 90°

- 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)



5. Check that there is no leakage. Refer to CO-51, "Inspection".

Inspection

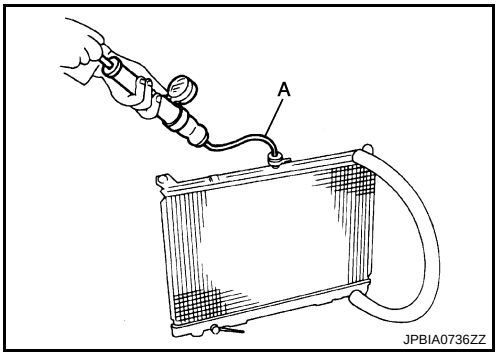
INFOID:0000000001160760

INSPECTION AFTER ASSEMBLY

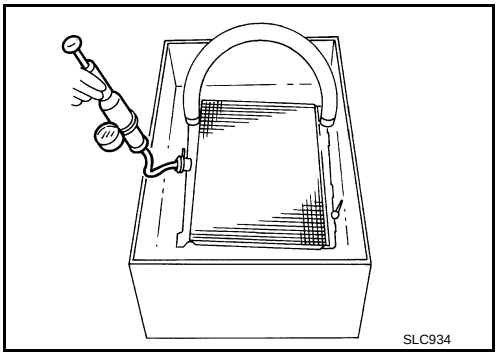
1. Apply pressure with the radiator cap tester adapter (commercial service tool) (A) and the radiator cap tester (commercial service tool).

Testing pressure: Refer to CO-61, "Radiator".

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



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



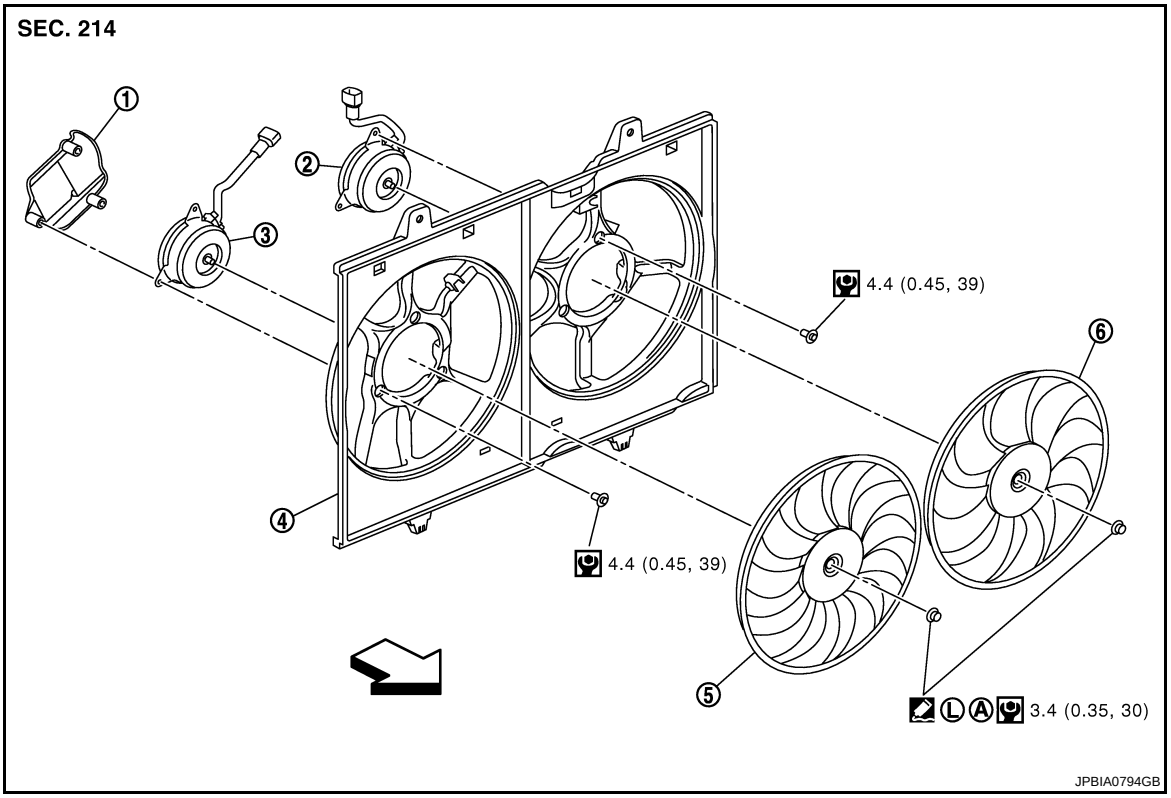
INSPECTION AFTER INSTALLATION

- 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-41, "Inspection".
- Start and warm up the engine. Check visually that there is no leakage of engine coolant.

COOLING FAN

Exploded View

INFOID:0000000001160740



1.	Fan motor cover	2.	Fan motor (LH)	3.	Fan motor (RH)
4.	Fan shroud	5.	Cooling fan (RH)	6.	Cooling fan (LH)

A. Apply on fan motor shaft.

: Apply thread locking sealant.

: Vehicle front

Removal and Installation

INFOID:0000000001160741

REMOVAL

1. Remove engine under cover.
2. Drain engine coolant from radiator. Refer to CO-41, "Draining".
   CAUTION:
   Perform this step when the engine is cold.
3. Remove air duct (inlet). Refer to EM-150, "Exploded View".
4. Disconnect harness connector from fan motor, and move harness to aside.
5. Remove radiator hose (upper) and reservoir tank hose. Refer to CO-47, "Exploded View".
6. Remove mounting bracket (RH and LH) and mounting rubber (upper) to tilt radiator frontward. Refer to CO-47, "Exploded View".
7. Remove cooling fan assembly.
   CAUTION:
   Be careful not to damage or scratch on radiator core when removing.

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).
NOTE:
Cooling fan is controlled by ECM. For details, refer to ECO-300, "Description".

Disassembly and Assembly

INFOID:0000000001160762

DISASSEMBLY

1. Remove cooling fan mounting nuts, and then remove the cooling fans (RH and LH).
2. Remove fan motor cover and fan motors (RH and LH).

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 : 11 blades
Left side : 9 blades

- Apply thread locking sealant on fan motor shaft.

Inspection

INFOID:0000000001160764

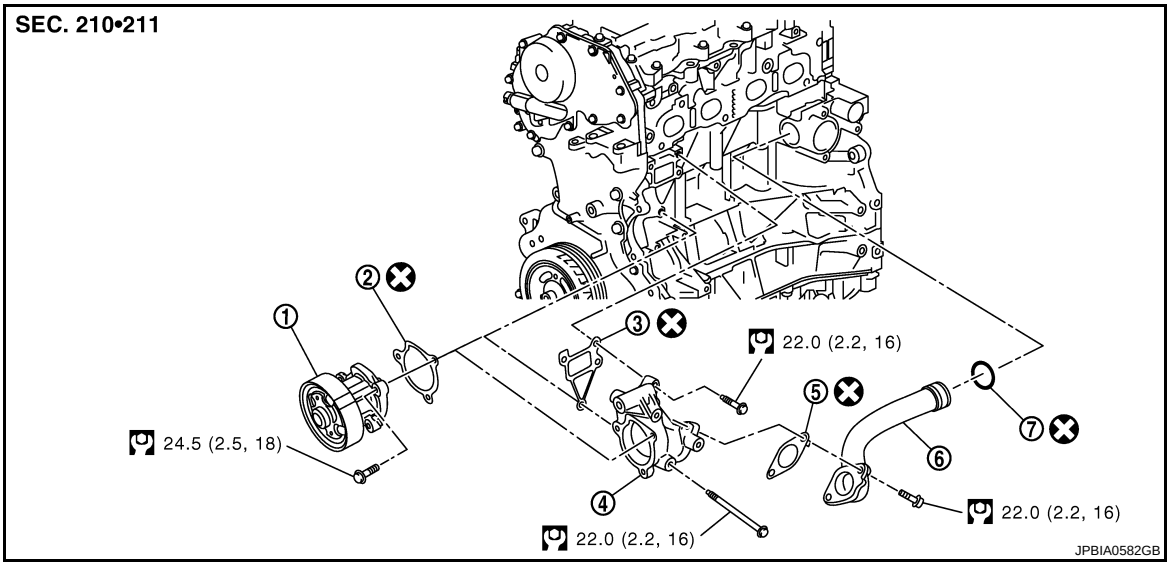
INSPECTION AFTER DISASSEMBLY

Cooling Fan
Inspect cooling fan for crack or unusual bend.
- If anything is found, replace cooling fan.

WATER PUMP

Exploded View

INFOID:0000000001203532



1. Water pump
2. Gasket
3. Gasket
4. Water pump housing
5. Gasket
6. Water pipe
7. O-ring

Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

INFOID:0000000001203546

REMOVAL

1. Drain engine coolant. Refer to CO-41, "Draining".
   CAUTION:
   Perform this step when engine is cold.
2. Remove the following parts.
   - Drive belt: Refer to EM-138, "Removal and Installation".
   - Drive belt auto-tensioner: Refer to EM-148, "Exploded View".
   - Alternator: Refer to CHG-30, "QR25DE MODELS : Exploded View".
3. Remove water pump.
   - Engine coolant leaks from cylinder block, so have a receptacle ready below.

   CAUTION:
   - **Handle water pump vane so that it does not contact any other parts.**
   - **Water pump cannot be disassembled and should be replaced as a unit.**
4. Remove water pump housing with the following procedure:

a. Remove exhaust manifold cover. Refer to EM-155, "Exploded View".

b. Remove oil level gauge and oil level gauge guide. Refer to EM-161, "Exploded View".
   CAUTION:
   Plug the oil level gauge guide opening to prevent oil pan from entering foreign materials.

c. Remove mounting bolts for water pipe.

d. Remove water pump housing.

5. Remove exhaust manifold and three way catalyst assembly. Refer to EM-155, "Exploded View".
6. Remove water pipe.

INSTALLATION

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

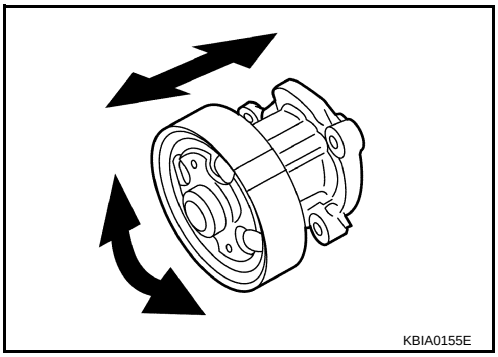
- When inserting water pipe end into cylinder block, apply a neutral detergent to O-ring. Then insert it immediately.

Inspection

INFOID:0000000001203533

INSPECTION AFTER REMOVAL

- Check visually that there is no significant dirt or rusting on water pump body and vane.
- Check that there is no looseness in vane shaft, and that it turns smoothly when rotated by hand.
- Replace water pump, if necessary.


KBIA0155E

INSPECTION AFTER INSTALLATION

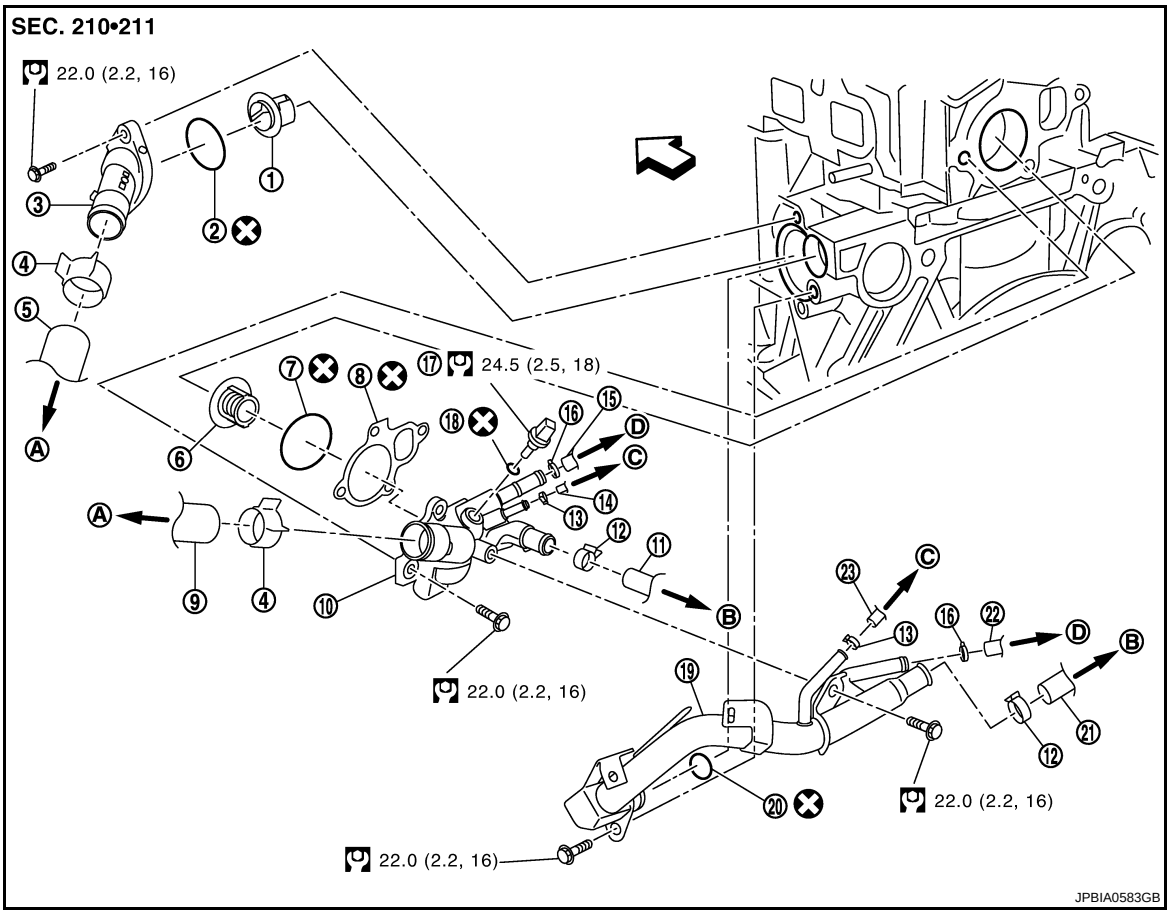
- Check for leakage of engine coolant using the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool). Refer to CO-41, "Inspection".
- Start and warm up engine. Check visually that there is no leakage of engine coolant.

THERMOSTAT AND WATER CONTROL VALVE

Exploded View

INFOID:0000000001203575

M/T models

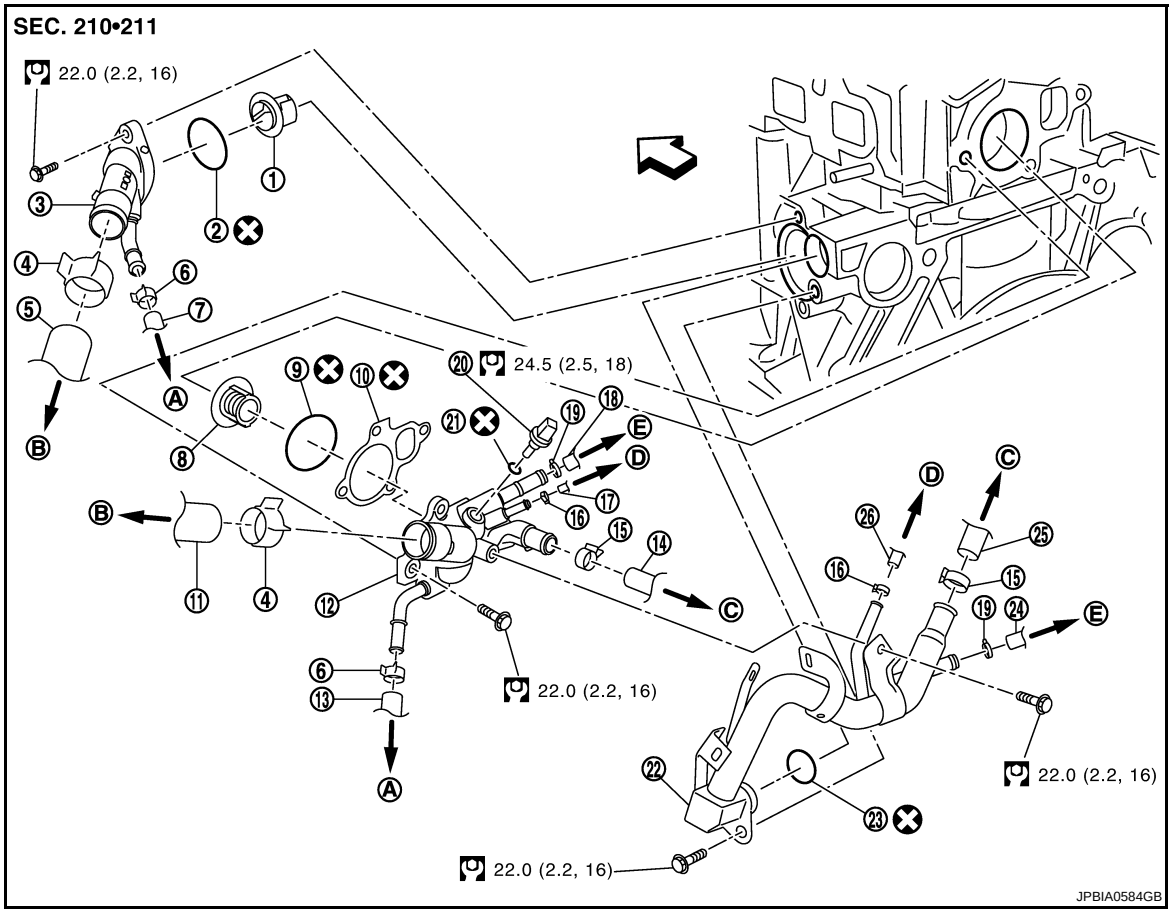


1.	Thermostat	2.	O-ring	3.	Water inlet
4.	Clamp	5.	Radiator hose (lower)	6.	Water control valve
7.	O-ring	8.	Gasket	9.	Radiator hose (upper)
10.	Water control valve housing (water outlet)	11.	Heater hose	12.	Clamp
13.	Clamp	14.	Water hose	15.	Water hose
16.	Clamp	17.	Engine coolant temperature sensor	18.	Washer
19.	Heater pipe	20.	O-ring	21.	Heater hose
22.	Water hose	23.	Water hose		
A.	To radiator	B.	To heater	C.	To electric throttle control actuator
D.	To oil cooler				

⇦ : Engine front

Refer to GI-4, "Components" for symbols in the figure.

CVT models



1.	Thermostat	2.	O-ring	3.	Water inlet
4.	Clamp	5.	Radiator hose (lower)	6.	Clamp
7.	Water hose	8.	Water control valve	9.	O-ring
10.	Gasket	11.	Radiator hose (upper)	12.	Water control valve housing (water outlet)
13.	Water hose	14.	Heater hose	15.	Clamp
16.	Clamp	17.	Water hose	18.	Water hose
19.	Clamp	20.	Engine coolant temperature sensor	21.	Washer
22.	Heater pipe	23.	O-ring	24.	Water hose
25.	Heater hose	26.	Water hose		
A.	To CVT fluid cooler	B.	To radiator	C.	To heater
D.	To electric throttle control actuator	E.	To oil cooler		

⇦ : Engine front

Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

INFOID:0000000001203577

REMOVAL

1. Remove battery. Refer to PG-133, "Exploded View".
2. Disconnect engine room harness connectors at unit sides TCM and ECM, and then move it to aside.
3. Remove battery tray.
4. Remove air duct and air cleaner case assembly. Refer to EM-150, "Exploded View".
5. Drain engine coolant. Refer to CO-41, "Draining".

CAUTION:
Perform this step when engine is cold.

6. Disconnect radiator hose (lower) at water inlet side. Refer to CO-47, "Exploded View".
7. Disconnect water hose at water inlet side. (CVT models)
8. Remove water inlet and thermostat.
9. Remove water control valve with the following procedure:

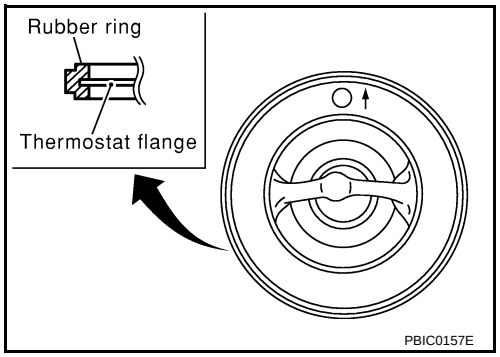
a. Disconnect radiator hose (upper) at water control valve housing (water outlet) side.
b. Disconnect harness connector from engine coolant temperature sensor.
c. Remove CVT fluid level gauge and CVT fluid charging pipe. Refer to TM-550, "QR25DE : Exploded View". (CVT models)
d. Disconnect water hoses.
e. Disconnect heated oxygen sensor harness connectors, and remove harness clips from heater pipe.
f. Remove heater pipe and heater hose.
g. After removing water control valve housing (water outlet), remove water control valve.

INSTALLATION

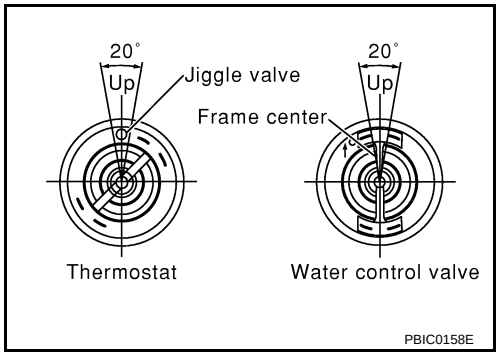
Note the following, and install in the reverse order of removal.

Thermostat and Water Control Valve

- Install thermostat and water control valve with making rubber ring groove fit to thermostat flange and water control valve flange with the whole circumference. (The example in the figure shows thermostat.)
  NOTE:
  Same procedure is applied for installation of water control valve.



- Install thermostat with jiggle valve facing upwards. (The position deviation may be within the range of 20 degrees as shown in the figure.)
- Install water control valve with the arrow facing up and the frame center part facing upwards. (The position deviation may be within the range of 20 degrees as shown in the figure.)



Heater Pipe Installation

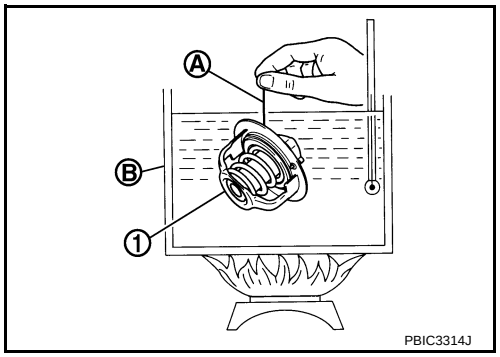
Apply a neutral detergent to O-ring, then quickly insert the insertion part of heater pipe into cylinder block.

Inspection

INFOID:0000000001203576

INSPECTION AFTER REMOVAL

- Place a thread (A) so that it is caught in the valves of 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 amount.
  NOTE:
  The maximum valve lift amount standard temperature for water control valve is the reference value.



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

Standard

Thermostat **: Refer to CO-61, "Thermostat".**

Water control valve **: Refer to CO-61, "Water control valve".**

- If out of the standard, replace either or both thermostat and water control valve.

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-41, "Inspection".
- Start and warm up engine. Check visually that there is no leakage of engine coolant.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Periodical Maintenance Specification

INFOID:0000000001204229

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (lmp qt)

Engine coolant capacity (With reservoir tank at “MAX” level)	M/T models	6.8 (6)
	CVT models	7.1 (6 - 1/4)
Reservoir tank	0.75 (5/8)	

Radiator

INFOID:0000000001204236

Unit: kPa (bar, kg/cm^2, psi)

Cap relief pressure	Standard	78.4 - 98.0 (0.78 - 0.98, 0.8 - 1.0, 11- 14)
	Limit	59 (0.59, 0.6, 9)
Leakage test pressure		157 (1.57, 1.60, 22.8)

Thermostat

INFOID:0000000001303608

Standard

Valve opening temperature	80.5 - 83.5°C (177 - 182°F)
Maximum valve lift	8 mm/95°C (0.315 in/203°F)
Valve closing temperature	77°C (171°F)

Water control valve

INFOID:0000000001303609

Standard

Valve opening temperature	93.5 - 96.5°C (200 - 206°F)
Maximum valve lift	8 mm/108°C (0.315 in/226°F)*
Valve closing temperature	90°C (194°F)

*: Reference data

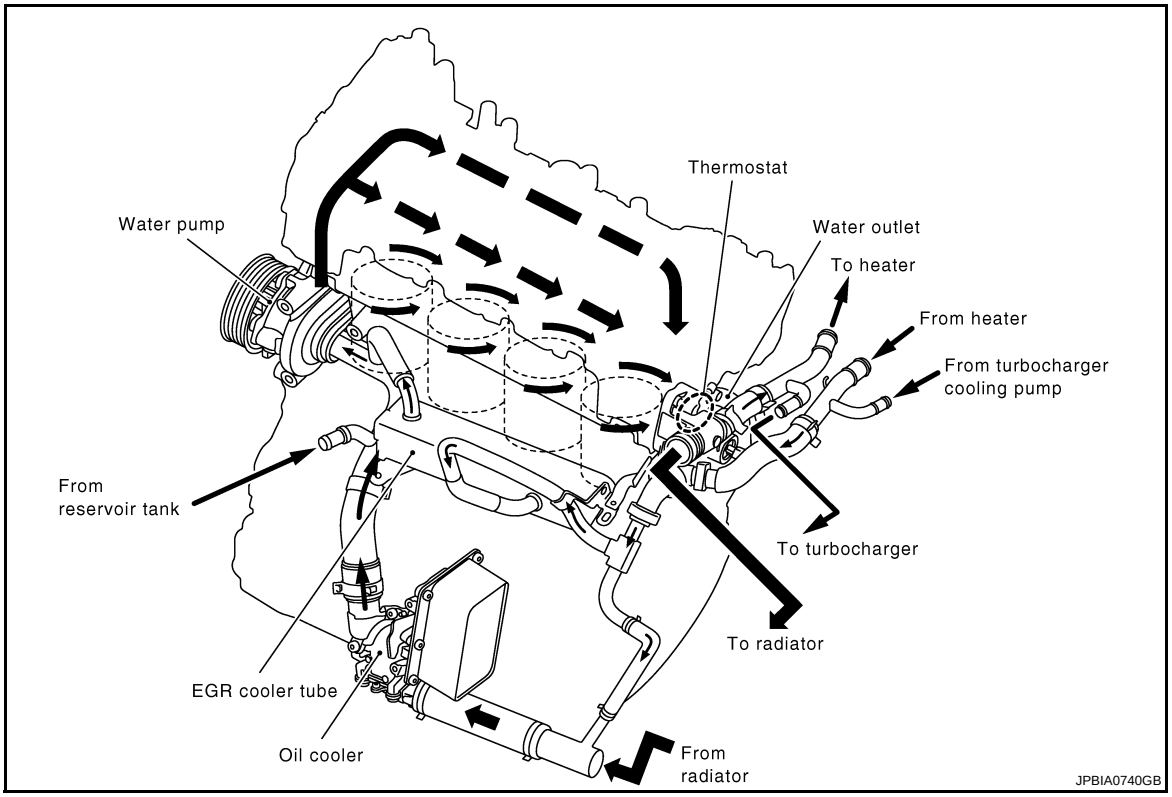
FUNCTION DIAGNOSIS

DESCRIPTION

M/T

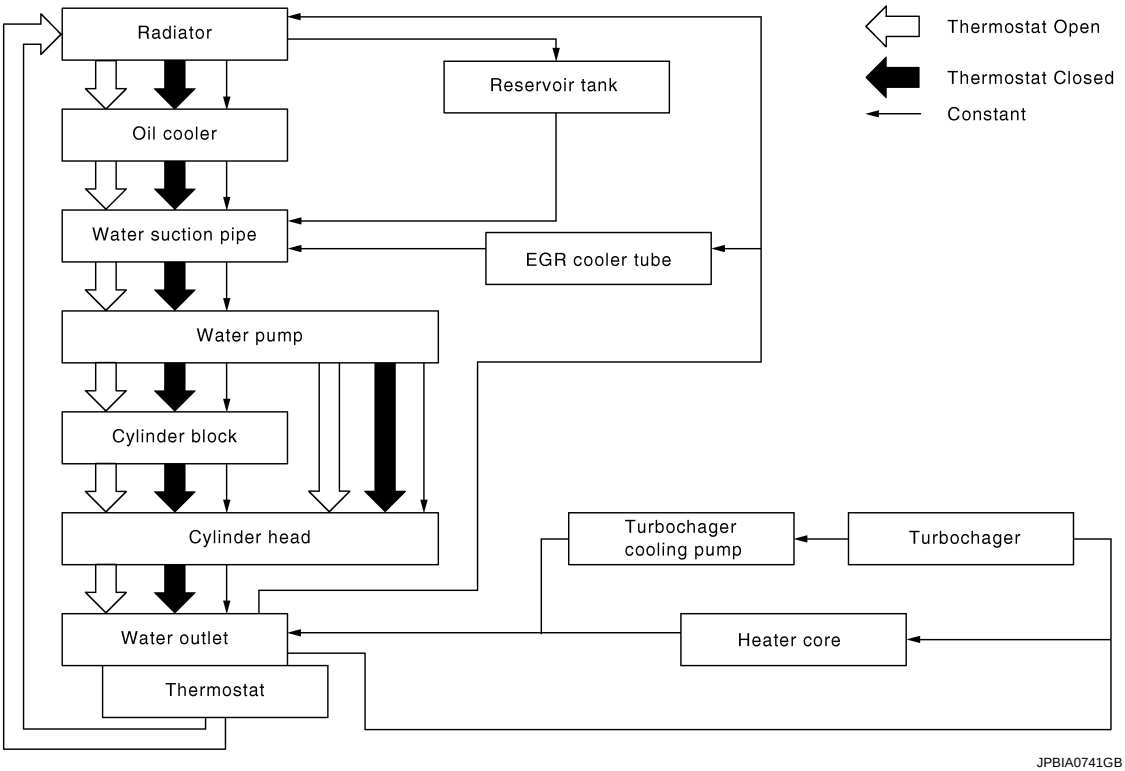
M/T : Engine Cooling System

INFOID:0000000001308708



M/T : Engine Cooling System Schematic

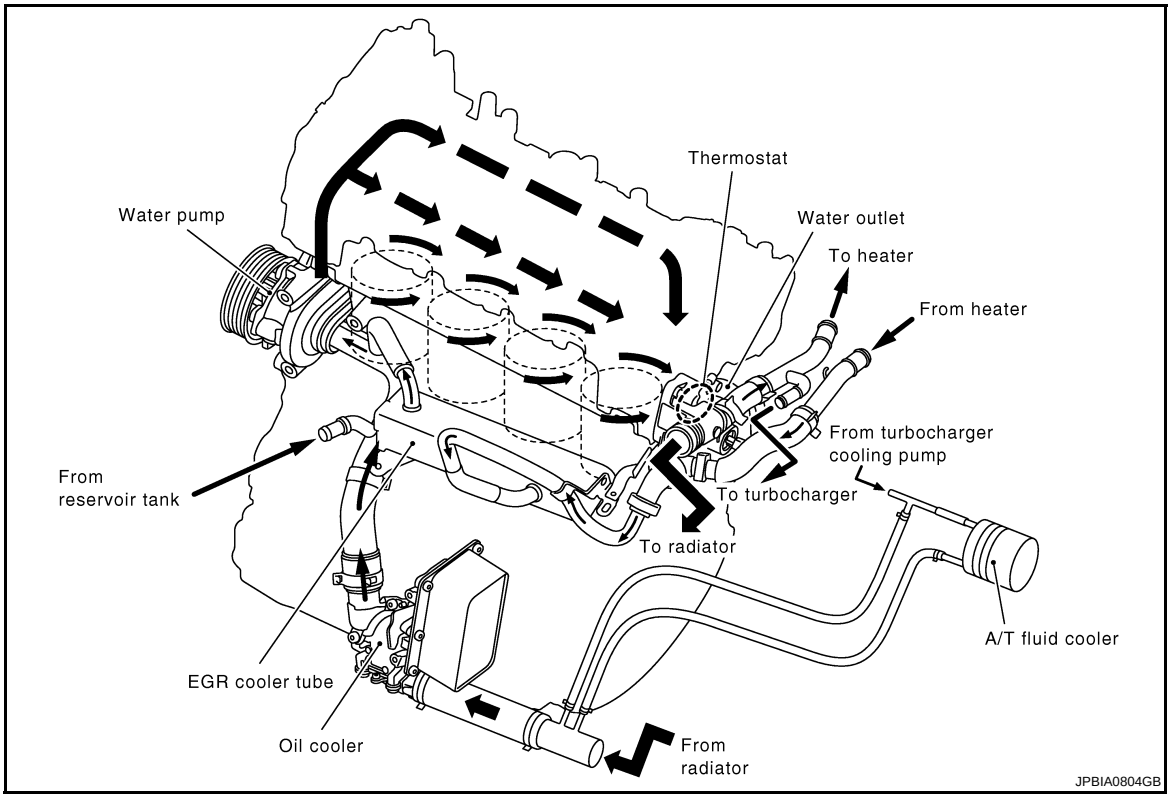
INFOID:0000000001308709



A/T

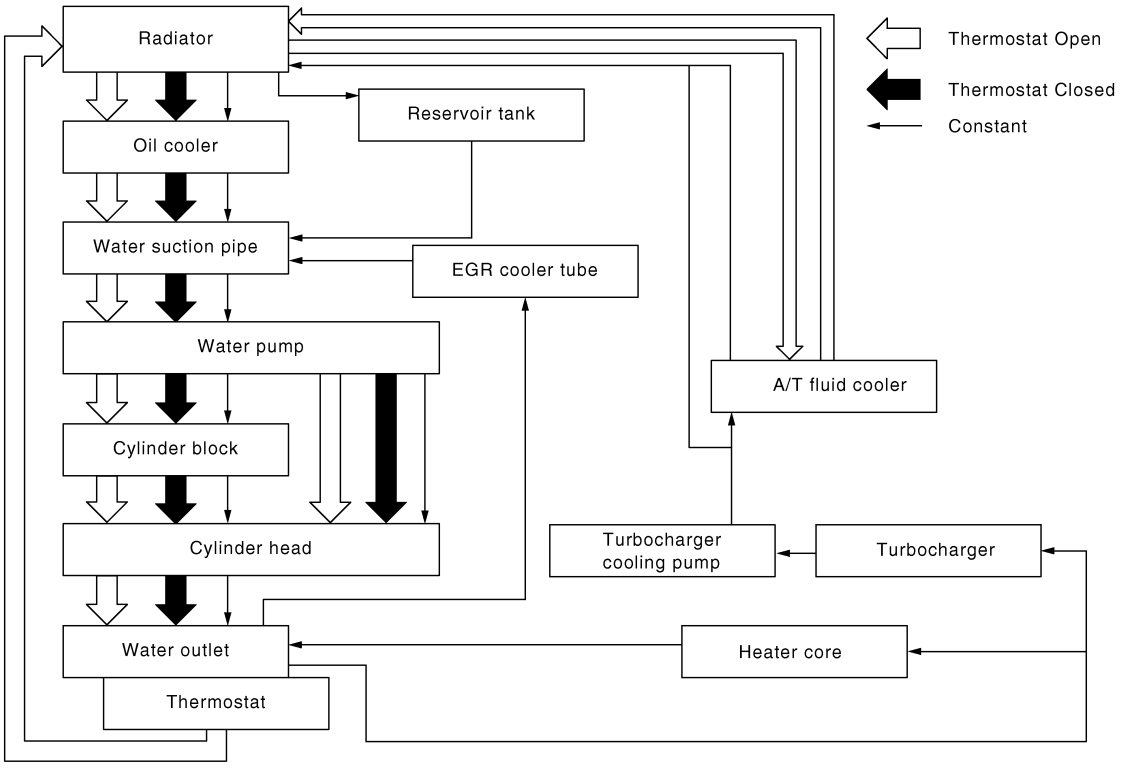
A/T : Engine Cooling System

INFOID:0000000001308710



A/T : Engine Cooling System Schematic

INFOID:0000000001308711



SYMPTOM DIAGNOSIS

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:0000000001308712

	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat stuck closed	—	
		Damaged radiator 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 viscosity	—
	Insufficient engine coolant	Engine coolant leakage	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
			Reservoir tank 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

	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
			Power train system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			Improper ignition timing	
	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		

PRECAUTION

PRECAUTIONS

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000001308749

NOTE:
- This Procedure is applied only to models with Intelligent Key system and NATS (NISSAN ANTI-THEFT SYSTEM).
- Remove and install all control units after disconnecting both battery cables with the ignition knob in the ″LOCK″ position.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.

For models equipped with the Intelligent Key system and NATS, an electrically controlled steering lock mechanism is adopted on the key cylinder.
For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.
If steering wheel rotation is required when battery power is interrupted, follow the procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both battery cables.
   NOTE:
   Supply power using jumper cables if battery is discharged.
2. Use the Intelligent Key or mechanical key to turn the ignition switch to the ″ACC″ position. At this time, the steering lock will be released.
3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.
4. Perform the necessary repair operation.
5. When the repair work is completed, return the ignition switch to the ″LOCK″ position before connecting the battery cables. (At this time, the steering lock mechanism will engage.)
6. Perform a self-diagnosis check of all control units using CONSULT-III.

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

INFOID:0000000001308750

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. Information necessary to service the system safely is included in the “SRS AIRBAG” and “SEAT BELT” of this Service Manual.

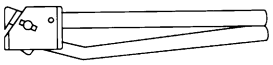
WARNING:
- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect 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 “SRS AIRBAG”.**
- **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.**

PREPARATION

PREPARATION

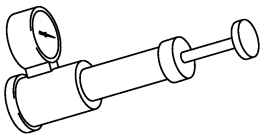
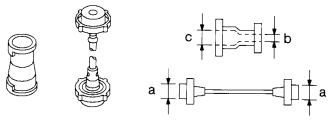
Special Service Tools

INFOID:0000000001308715

Tool number Tool name	Description
KV99103510 Radiator plate pliers A  S-NT224	Installing radiator upper and lower tanks
KV99103520 Radiator plate pliers B  S-NT225	Removing radiator upper and lower tanks

Commercial Service Tools

INFOID:0000000001308716

Tool name	Description
Radiator cap tester  PBIC1982E	Checking radiator and reservoir tank cap
Radiator cap tester adapter  S-NT564	Adapting radiator cap tester to reservoir tank 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)

ON-VEHICLE MAINTENANCE

ENGINE COOLANT

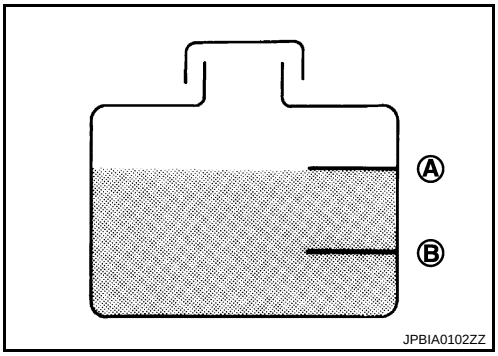
Inspection

INFOID:0000000001308717

LEVEL

- Check that the reservoir tank engine coolant level is within the “MIN” to “MAX” when the engine is cool.

A : MAX
B : MIN

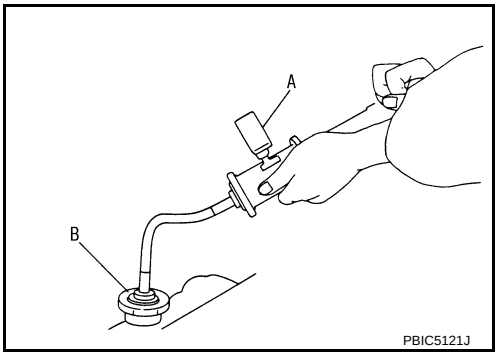


- Regarding engine coolant level check, perform it with engine at idle.
  NOTE:
  Engine coolant level rises approximately 15 mm (0.59 in) in the engine stop.
- Adjust the engine coolant level if necessary.

WARNING:
Never remove radiator cap and reservoir tank cap when engine is hot. Serious burns may occur from high-pressure engine coolant escaping from radiator and reservoir tank.

LEAKAGE

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



Testing pressure: Refer to CO-88, "Radiator".

WARNING:
Never remove radiator cap and reservoir tank cap when engine is hot. Serious burns may occur from high-pressure engine coolant escaping from radiator and reservoir tank.
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.

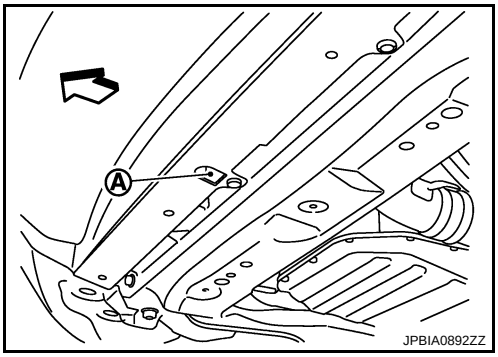
Draining

INFOID:0000000001308718

WARNING:
- **Never remove radiator cap and reservoir tank cap when engine is hot. Serious burns may occur from high-pressure engine coolant escaping from radiator and reservoir tank.**
- **Wrap a thick cloth around the caps. Slowly turn it a quarter of a turn to release built-up pressure. Then turn it all the way.**

1. Remove engine undercover.
2. Open radiator drain plug at the bottom of radiator, and then remove reservoir tank cap.

A : Radiator drain plug hole
⇦ : Vehicle front



CAUTION:
Perform this step when engine is cold.

3. Remove reservoir tank if necessary, and drain engine coolant and clean reservoir tank before installing.
   • Removal of fuel filter is necessary. Refer to FL-16, "Exploded View".
4. Check drained engine coolant for contaminants such as rust, corrosion or discoloration. If contaminated, flush the engine cooling system. Refer to CO-70, "Flushing".

Refilling

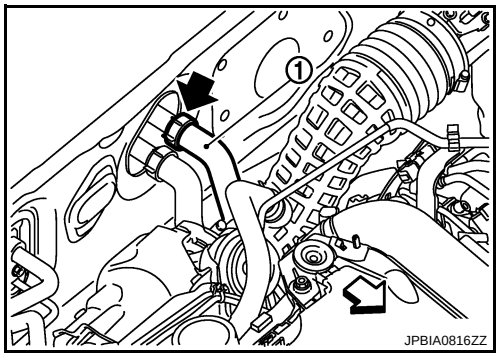
INFOID:0000000001308719

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

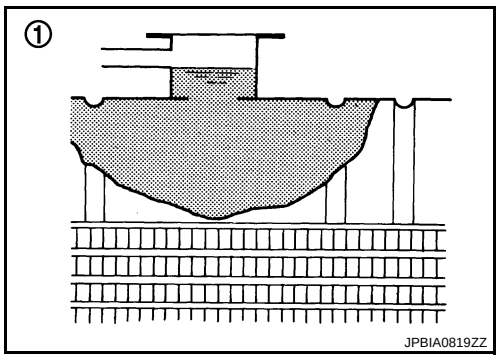
   Radiator drain plug: Refer to CO-73, "Exploded View".
2. Check that each hose clamp has been firmly tightened.
3. Remove air duct assembly. Refer to EM-263, "Exploded View".
4. Disconnect heater hose (1) at position (⇦) in the figure.

   ⇦ : Vehicle front

   • Enhance heater hose as high as possible.



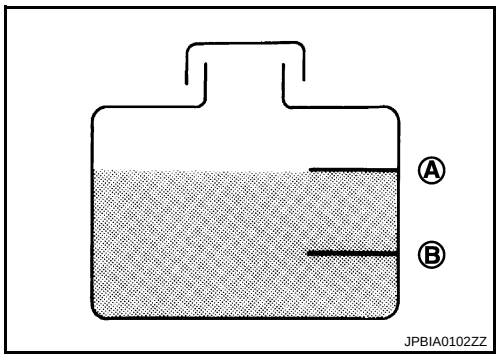
5. When engine coolant from heater hose starts to drain, install heater hose, and continue filling with engine coolant until radiator (1) gets full.
   CAUTION:
   • **Prevent engine coolant overflowing from reservoir tank.**
   • **Never adhere the engine coolant to electronic equipments. (alternator etc.)**
   • Pour coolant slowly of less than 2 ℓ (1-3/4 Imp qt) a minute to allow air in system to escape.
   • Start engine without closing reservoir tank cap. Keep engine racing at 1,500 rpm for about 2-3 minutes.
   • Use Genuine NISSAN Engine Coolant or equivalent in its quality mixed with water (distilled or demineralized). Refer to MA-22, "Fluids and Lubricants"



   Engine coolant capacity
   (With reservoir tank at “MAX” level)
   Refer to :CO-88, "Periodical Maintenance Specification".
6. Install radiator cap.
7. Fill the reservoir tank approximately 15 mm (0.59 in) above the “MAX” level of engine coolant.

   A : MAX
   B : MIN

   NOTE:
   Engine coolant level rises approximately 15 mm (0.59 in) in the engine stop.



   Reservoir tank engine coolant capacity
   (At “MAX” level)
   Refer to CO-88, "Periodical Maintenance Specification".

8. Install air duct assembly. Refer to EM-263, "Exploded View".
9. 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 (upper) to see a flow of warm water.
   CAUTION:
   Watch water temperature gauge so as not to overheat engine.
10. 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.
    CAUTION:
    Never adhere the engine coolant to electronic equipments. (alternator etc.)
11. Fill the reservoir tank approximately 15 mm (0.59 in) above the “MAX” level of engine coolant.
    NOTE:
    Engine coolant level rises approximately 15 mm (0.59 in) in the engine stop.
12. Repeat steps 5 through 10 two or more times with cap (radiator and reservoir tank) installed until engine coolant level no longer drops.
13. Check cooling system for leakage with engine running.
14. 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.
15. Repeat step 14 three times.
16. If sound is heard, bleed air from cooling system by repeating step 5 through 10 until reservoir tank level no longer drops.

Flushing

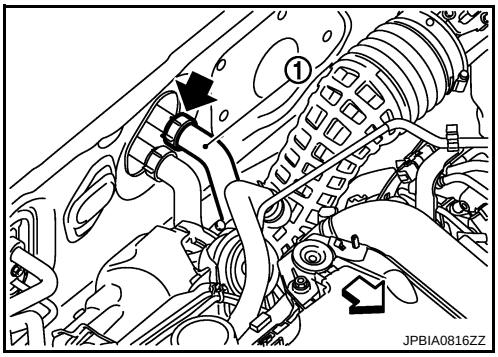
INFOID:0000000001308720

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: Refer to CO-73, "Exploded View".
2. Remove air duct assembly. Refer to EM-263, "Exploded View".
3. Disconnect heater hose (1) at position (⬅) in the figure.

   ⇦ : Vehicle front

   • Enhance heater hose as high as possible.



4. Fill radiator and reservoir tank with water and reinstall radiator cap and reservoir tank cap.
   • When engine coolant over flows disconnected heater hose, connect heater hose, and continue filling the engine coolant.
5. Install air duct assembly. Refer to EM-263, "Exploded View".
6. Run the engine and warm it up to normal operating temperature.
7. Rev the engine two or three times under no-load.
8. Stop the engine and wait until it cools down.
9. Drain water from the system. Refer to CO-68, "Draining".
10. Repeat steps 1 through 9 until clear water begins to drain from radiator.

RADIATOR

RESERVOIR TANK CAP

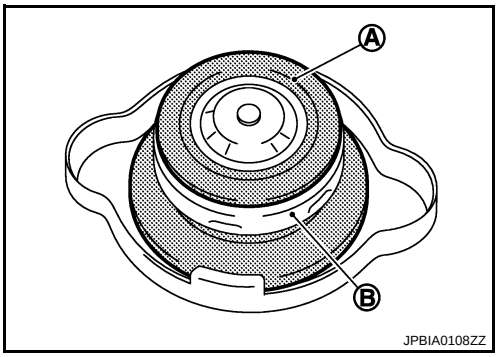
RESERVOIR TANK CAP : Inspection

INFOID:0000000001308721

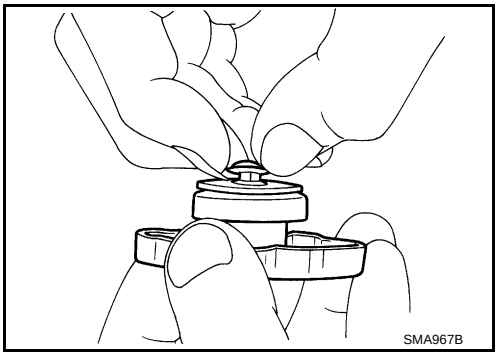
- Check valve seat of reservoir tank cap.

A : Valve seat
B : Metal plunger

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



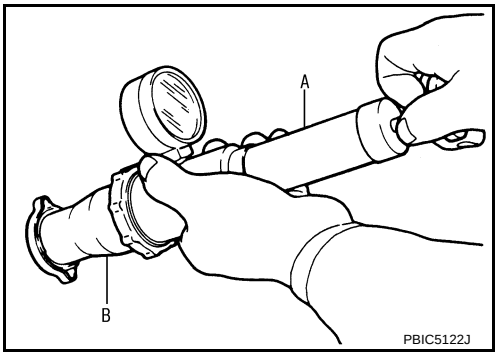
- Pull negative-pressure valve to open it, and check that it closes completely when released.
- Check that there is no dirt or damage on the valve seat of reservoir tank cap negative-pressure valve.
- Check that there are no unusualness in the opening and closing conditions of negative-pressure valve.



- Check reservoir tank cap relief pressure.

Standard and Limit : Refer to CO-88, "Radiator".

- When connecting reservoir tank 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 reservoir tank cap if there is an unusualness related to the above three.

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

RADIATOR

RADIATOR : Inspection

INFOID:0000000001308722

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

CAUTION:
- **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.

4. Blow air into the back side of radiator core vertically downward.
   - Use compressed air lower than 490 kPa (4.9 bar, 5 kg/cm^2, 71 psi) and keep distance more than 30 cm (11.8 in).
5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

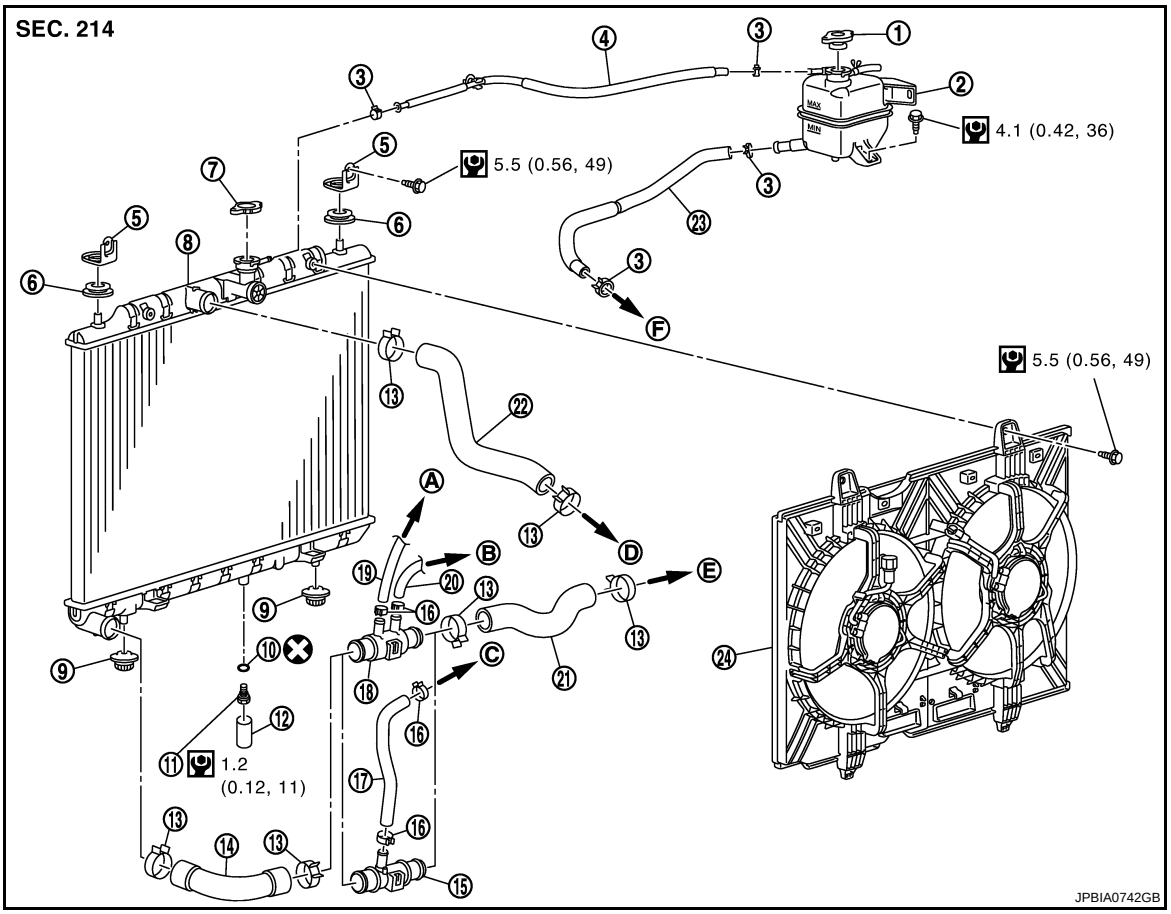
ON-VEHICLE REPAIR

RADIATOR

Exploded View

INFOID:0000000001308723

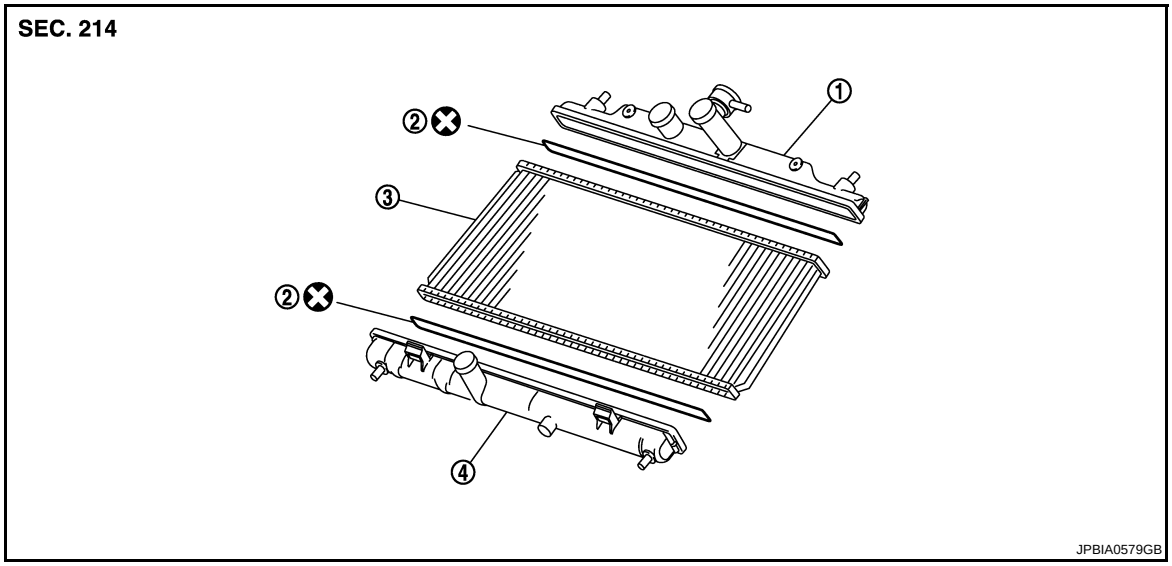
REMOVAL



1. Reservoir tank cap	2. Reservoir tank	3. Clamp
4. Reservoir tank hose (upper)	5. Mounting bracket	6. Mounting rubber (upper)
7. Radiator cap	8. Radiator	9. Mounting rubber (lower)
10. O-ring	11. Radiator drain plug	12. Water drain hose
13. Clamp	14. Radiator hose (lower)	15. Radiator hose pipe (M/T models)
16. Clamp	17. Water hose (M/T models)	18. Radiator hose pipe (A/T models)
19. Water hose (A/T models)	20. Water hose (A/T models)	21. Radiator hose (lower)
22. Radiator hose (upper)	23. Reservoir tank hose (lower)	24. Cooling fan assembly
A. To A/T fluid cooler	B. To turbocharger cooling pump	C. To EGR cooler tube
D. To water outlet	E. To oil cooler	F. To water suction pipe

Refer to GI-4, "Components" for symbols in the figure.

DISASSENBLY



1. Upper tank
2. Sealing rubber
3. Core
4. Lower tank

Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

INFOID:0000000001308724

REMOVAL

WARNING:

- **Never remove radiator cap and reservoir tank cap when engine is hot. Serious burns may occur from high-pressure engine coolant escaping from radiator and reservoir tank.**
- **Wrap a thick cloth around the caps. Slowly turn it a quarter of a turn to release built-up pressure. Then turn it all the way.**

1. Remove engine undercover.
2. Drain engine coolant from radiator. Refer to CO-68, "Draining".
   CAUTION:
   Perform this step when the engine is cold.
3. Remove air duct (inlet). Refer to EM-263, "Exploded View".
4. Remove air inlet hose, air inlet pipe and bracket. Refer to EM-266, "Exploded View".
5. Remove mounting bracket and mounting rubber (upper).
6. Disconnect harness connector from fan motors, and move harness to aside.
7. Disconnect radiator hose (upper).
8. Remove cooling fan assembly.
   CAUTION:
   Be careful not to damage radiator core when removing.
9. Disconnect reservoir tank hose (upper) from radiator.
10. Disconnect radiator hose (lower).
11. Remove radiator.
    CAUTION:
    Be careful not to damage or scratch radiator core.

INSTALLATION

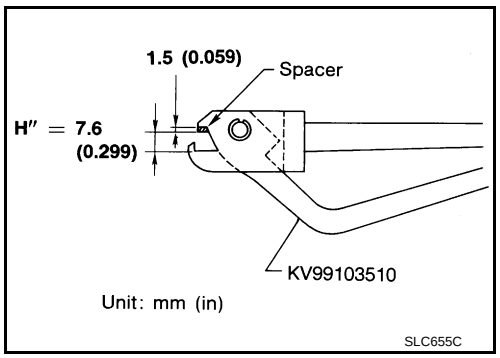
Installation is the reverse order of removal.

Disassembly and Assembly

INFOID:0000000001308726

PREPARATION

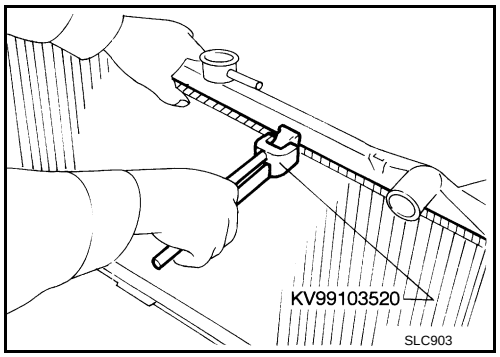
1. Attach the spacer to the tip of radiator plate pliers A (SST).
Spacer specification: 1.5 mm (0.059 in) thick × 18 mm (0.71 in) wide × 8.5 mm (0.335 in) long.



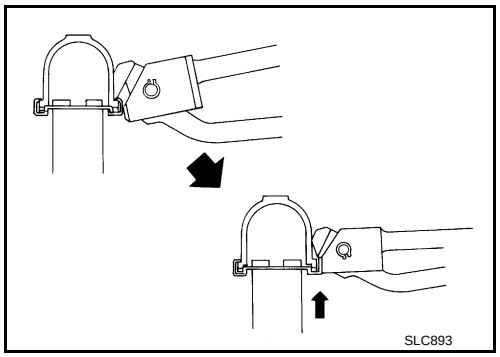
2. Check that when radiator plate pliers A [SST: KV99103510] are closed dimension H″ is approximately 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer thickness, if necessary.

DISASSEMBLY

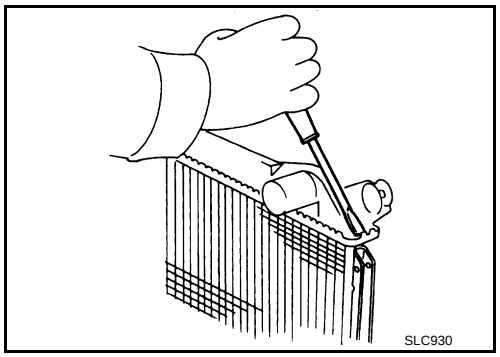
1. Remove upper and lower tanks with a radiator plate pliers B (SST).



- Grip the crimped edge and bend it upwards so that radiator plate pliers B [SST: KV99103520] slips off.
CAUTION:
Never bend excessively.

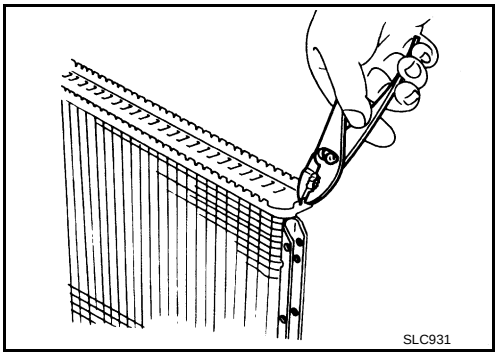


- In areas where radiator plate pliers B [SST: KV99103520] cannot be used, use screwdriver to bend the edge up.
CAUTION:
Be careful not to damage tank.



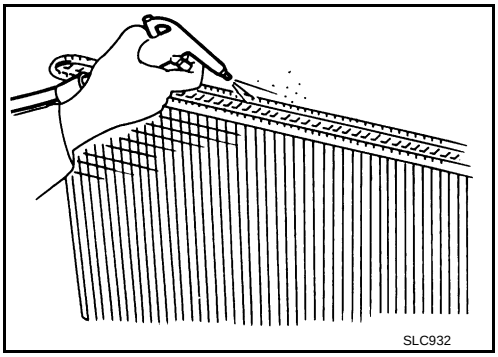
2. Remove sealing rubber.

3. Check the edge stands straight up.

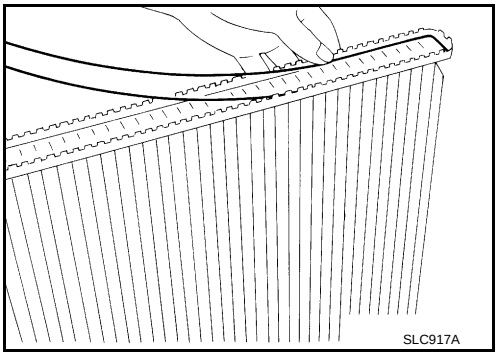


ASSEMBLY

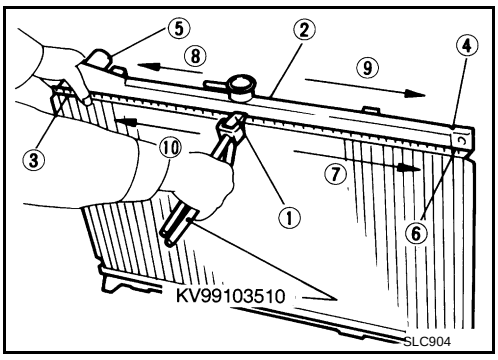
1. Clean contact portion of tank.

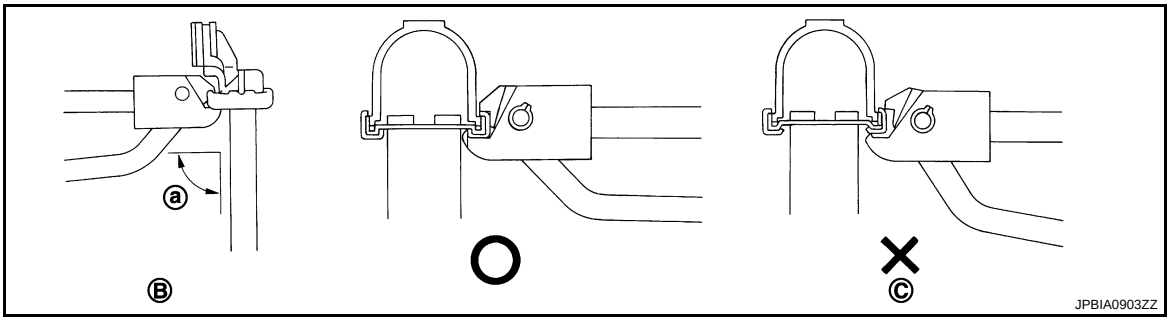


2. Install sealing rubber while pressing it in with fingers.
CAUTION:
Be careful not to twist sealing rubber.



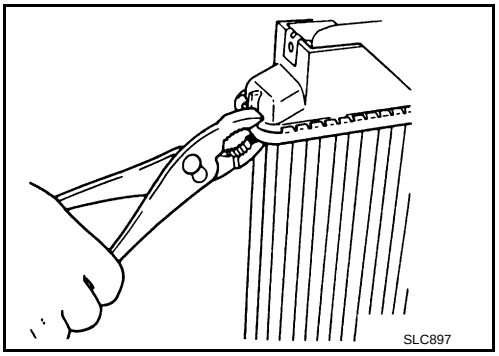
3. Caulk tank in numerical order as shown in the figure with radiator plate pliers A (SST).





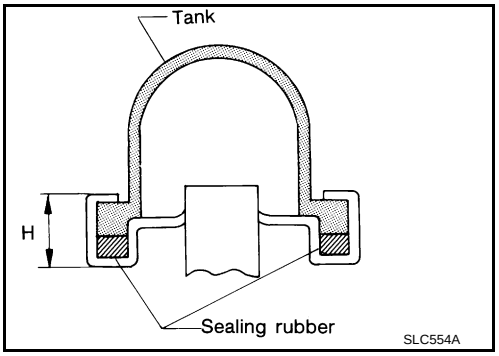
B. Keep tool perpendicular to the radiator C. Grip is insufficient
a. 90°

- 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)



5. Check that there is no leakage. Refer to CO-68, "Inspection".

Inspection

INFOID:0000000001308727

INSPECTION AFTER INSTALLATION

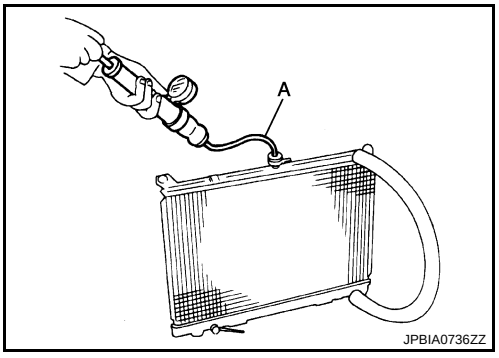
- Check for leakage of engine coolant using the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool). Refer to CO-68, "Inspection".
- Start and warm up the engine. Visually check that there is no leakage of engine coolant.

INSPECTION AFTER ASSEMBLY

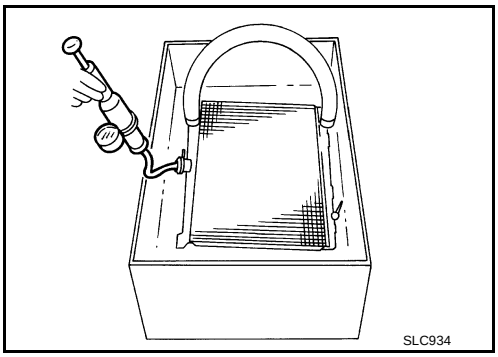
1. Apply pressure with the radiator cap tester adapter (commercial service tool) (A) and the radiator cap tester (commercial service tool).

Testing pressure: Refer to CO-88, "Radiator".

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



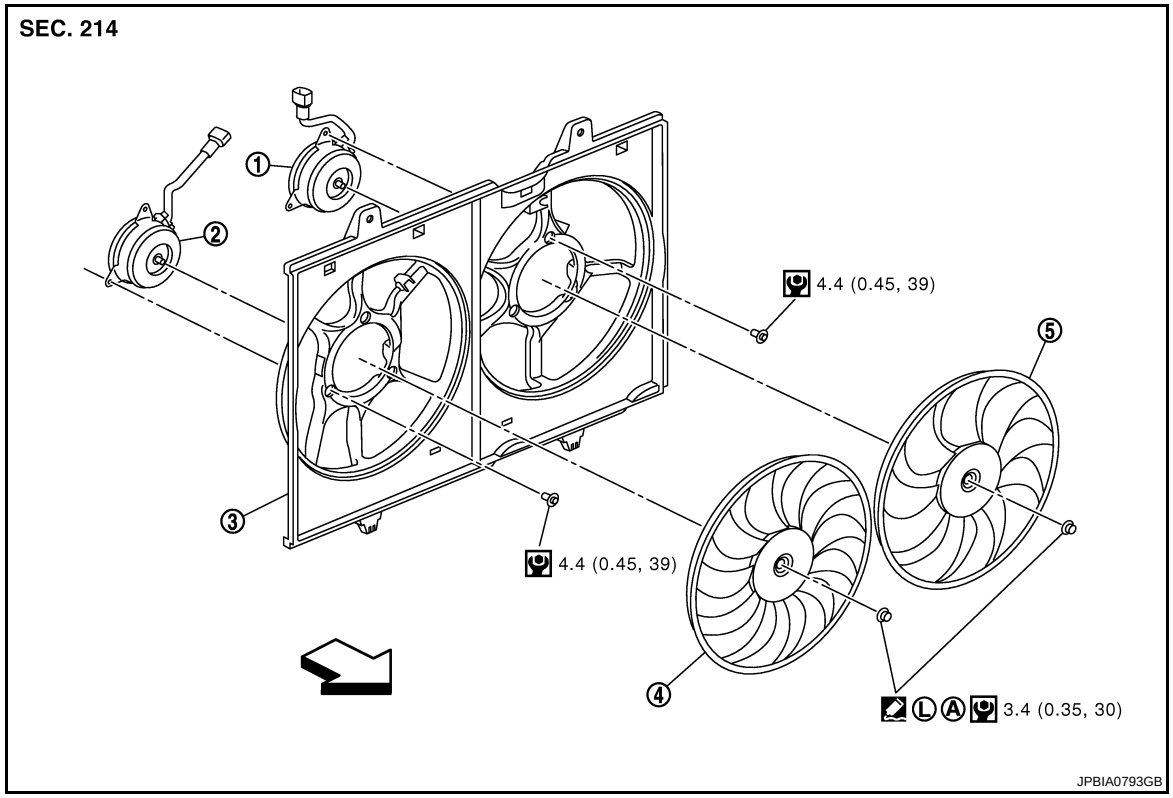
2. Check for leakage by soaking radiator in water container with the testing pressure applied.



COOLING FAN

Exploded View

INFOID:0000000001308728



1.	Fan motor (LH)	2.	Fan motor (RH)	3.	Fan shroud
4.	Cooling fan (RH)	5.	Cooling fan (LH)		
A.	Apply on fan motor shaft.				

: Apply thread locking sealant.

: Vehicle front

Refer to GI-4, "Components" for symbols not described on the above.

Removal and Installation

INFOID:0000000001308729

REMOVAL

1. Remove engine undercover.
2. Drain engine coolant from radiator. Refer to CO-68, "Draining".
   CAUTION:
   Perform this step when the engine is cold.
3. Remove air duct (inlet). Refer to EM-263, "Exploded View".
4. Remove air inlet hose, air inlet pipe and bracket. Refer to EM-266, "Exploded View".
5. Remove mounting bracket and mounting rubber (upper).
6. Disconnect harness connector from fan motors, and move harness to aside.
7. Disconnect radiator hose (upper).
8. Remove cooling fan assembly.
   CAUTION:
   Be careful not to damage radiator core when removing.

INSTALLATION

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

CAUTION:

Only use genuine parts for fan shroud mounting bolt and observe the specified torque (to prevent radiator from being damaged).
NOTE:
Cooling fan is controlled by ECM. For details, refer to ECR-284, "Description".

Disassembly and Assembly

INFOID:0000000001308730

DISASSEMBLY

1. Remove cooling fan mounting nuts, and then remove the cooling fans (RH and LH).
2. Remove fan motors (RH and LH).

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 : 11 blades
Left side : 9 blades

- Apply thread locking sealant on fan motor shaft.

Inspection

INFOID:0000000001308731

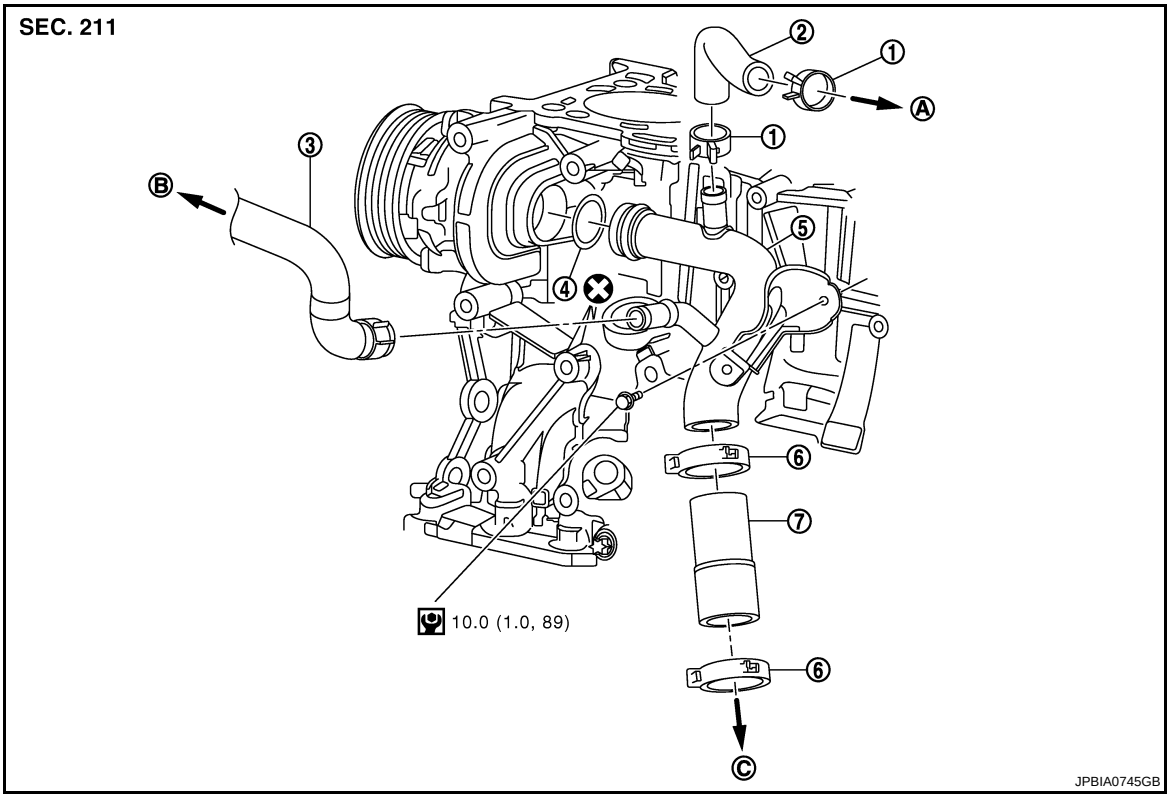
INSPECTION AFTER DISASSEMBLY

Cooling Fan
Inspect cooling fan for crack or unusual bend.
- If anything is found, replace cooling fan.

WATER PIPING

Exploded View

INFOID:0000000001308735



1.	Clamp	2.	Water hose	3.	Reservoir tank hose (lower)
4.	O-ring	5.	Water suction pipe	6.	Clamp
7.	Water hose				
A.	To EGR cooler tube	B.	To reservoir tank	C.	To oil cooler

Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

INFOID:0000000001308736

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-68, "Draining".
   CAUTION:
   Perform this step when engine is cold.
2. Disconnect water hoses and reservoir tank hose (lower).
   CAUTION:
   Never adhere the engine coolant to electronic equipments. (alternator etc.)
3. Remove EGR cooler tube. Refer to EM-268, "Exploded View".
4. Remove multifunction support bracket. Refer to EM-261, "Exploded View".
5. Remove water suction pipe.
   - Engine coolant will leak from cylinder block, so have a receptacle ready below.

INSTALLATION

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

- When inserting water suction pipe end into cylinder block, apply a neutral detergent to O-ring. Then insert it immediately.

Inspection

INFOID:0000000001308737

INSPECTION AFTER INSTALLATION

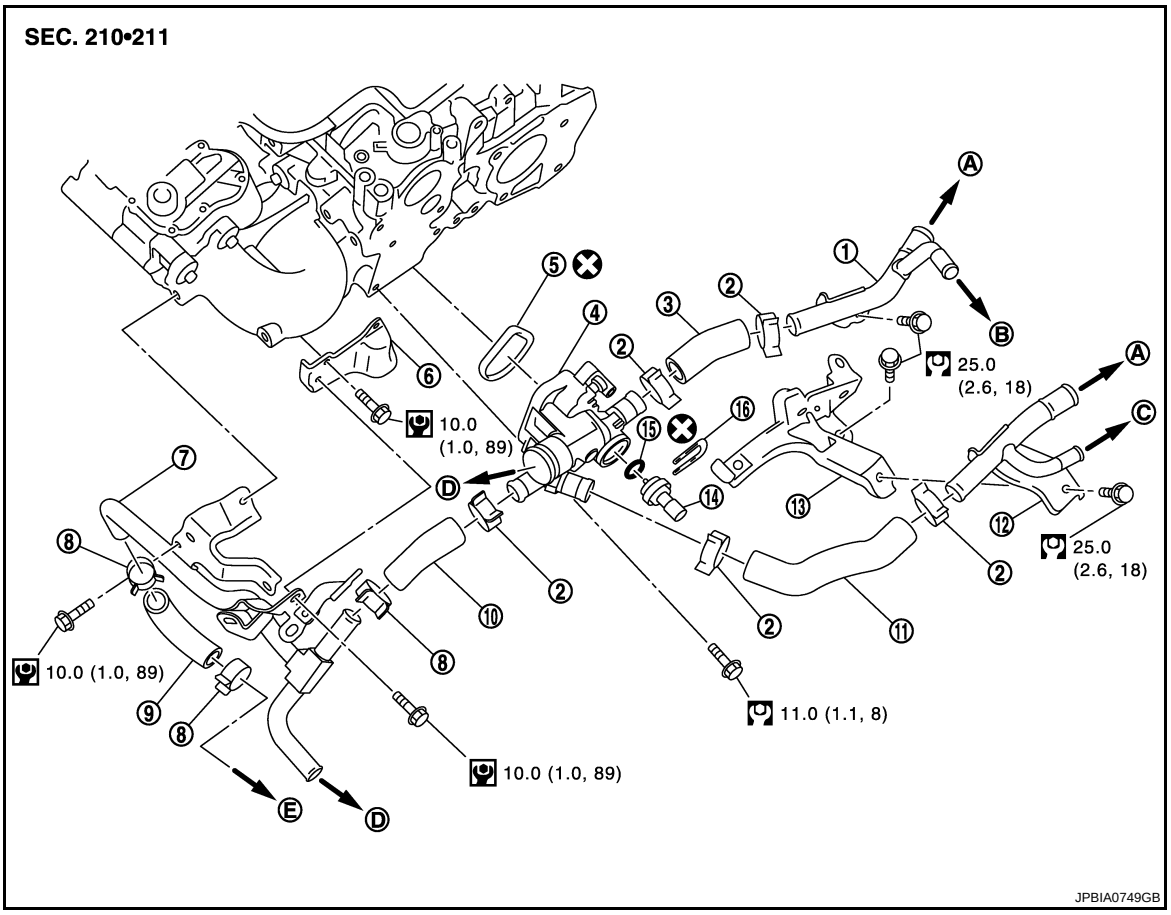
- Check for leakage of engine coolant using the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool). Refer to CO-68, "Inspection".
- Start and warm up the engine. Visually check that there is no leakage of engine coolant.

WATER OUTLET AND THERMOSTAT ASSEMBLY

Exploded View

INFOID:0000000001308738

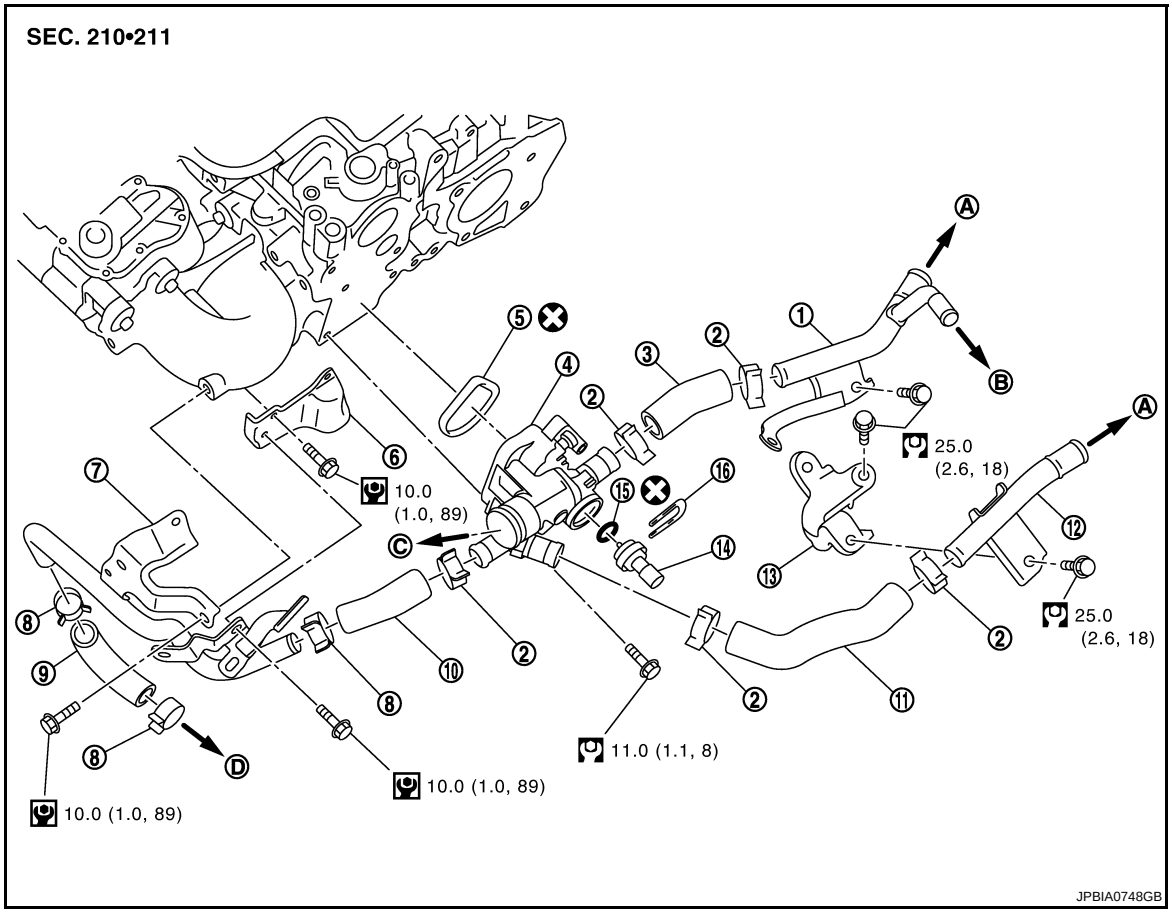
M/T models



1.	Heater pipe	2.	Clamp	3.	Heater hose
4.	Water outlet and thermostat assembly	5.	Rubber ring	6.	Bracket
7.	Water pipe	8.	Clamp	9.	Water hose
10.	Water hose	11.	Heater hose	12.	Heater pipe
13.	Mounting bracket	14.	Engine coolant temperature sensor	15.	O-ring
16.	Clip				
A.	To heater core	B.	To turbocharger	C.	To turbocharger cooling pump
D.	To radiator	E.	To EGR cooler tube		

Refer to GI-4, "Components" for symbols in the figure.

A/T models



1.	Heater pipe	2.	Clamp	3.	Heater hose
4.	Water outlet and thermostat assembly	5.	Rubber ring	6.	Bracket
7.	Water pipe	8.	Clamp	9.	Water hose
10.	Water hose	11.	Heater hose	12.	Heater pipe
13.	Mounting bracket	14.	Engine coolant temperature sensor	15.	O-ring
16.	Clip				
A.	To heater core	B.	To turbocharger	C.	To radiator
D.	To EGR cooler tube				

Refer to GI-4, "Components" for symbols in the figure.

Removal and Installation

INFOID:0000000001308739

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-68, "Draining".
   CAUTION:
   Perform this step when engine is cold.
2. Remove battery. Refer to PG-133, "Exploded View".
3. Remove air duct assembly and air cleaner case. Refer to EM-263, "Exploded View".
4. Disconnect radiator hose (upper). Refer to CO-74, "Removal and Installation".
5. Disconnect harness connector from engine coolant temperature sensor.
6. Disconnect water hoses and heater hoses.
7. Remove heater pipes.
8. Remove water outlet and thermostat assembly.
9. Remove engine coolant temperature sensor from water outlet and thermostat assembly, if necessary.
   CAUTION:
   Handle carefully to avoid any shock to engine coolant temperature sensor.

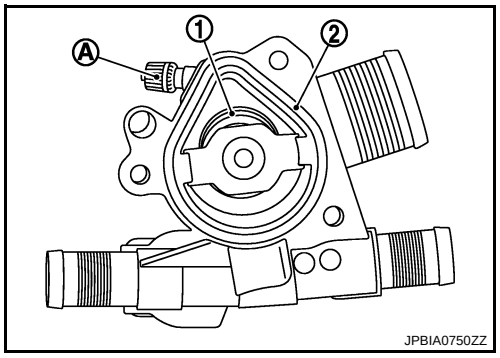
INSTALLATION

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

Water outlet and thermostat assembly

- Check that installation of the thermostat (1) and the rubber ring (2) to the cylinder head.

A : Air relief plug



Inspection

INFOID:0000000001308740

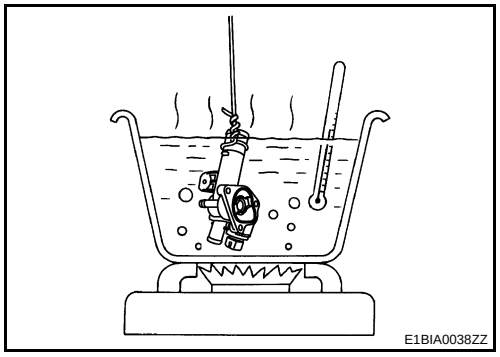
INSPECTION AFTER REMOVAL

Water outlet and thermostat assembly

1. Check valve seating condition at ordinary room temperatures. It should seat tightly.
2. Check valve operation.
   - If the malfunctioning condition, when valve seating at ordinary room temperature, or measured values are out of the standard, replace water outlet and thermostat assembly.

Standard:

Refer to CO-88, "Water Outlet and Thermostat Assembly".



INSPECTION AFTER INSTALLATION

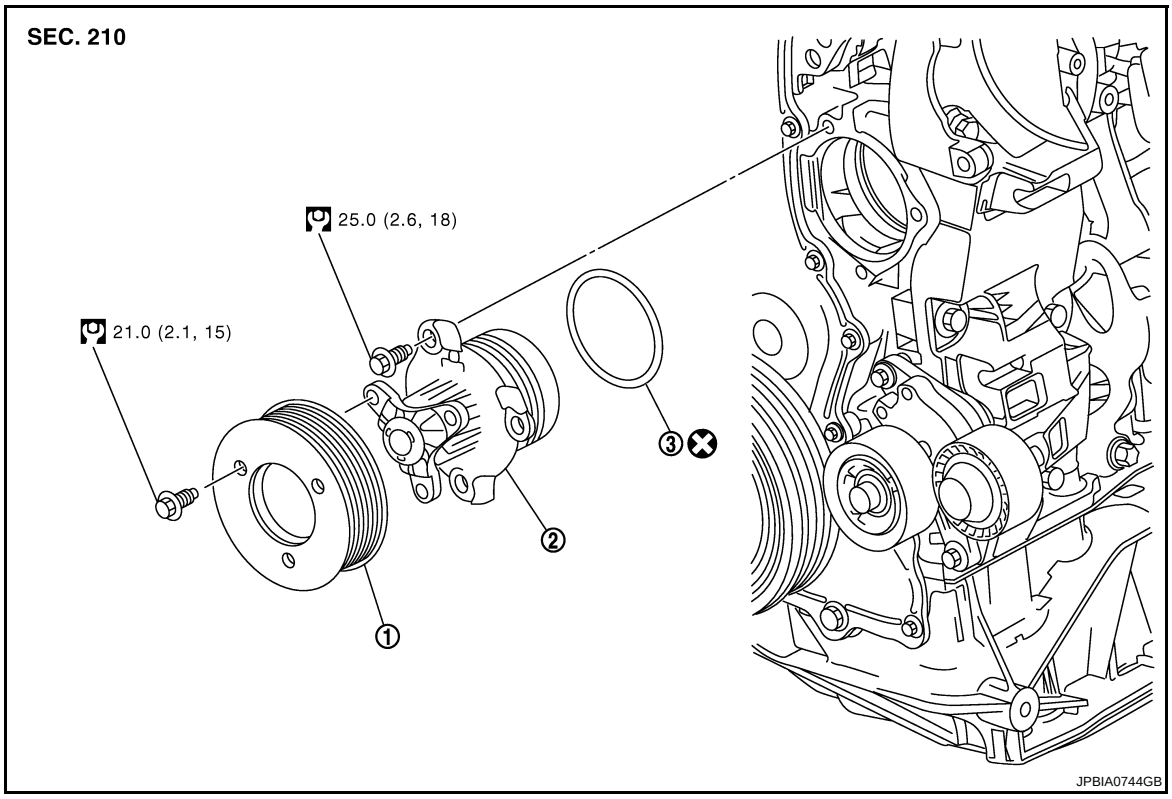
- Check for leakage of engine coolant using the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool). Refer to CO-68, "Inspection".
- Start and warm up the engine. Visually check that there is no leakage of engine coolant.

DISASSEMBLY AND ASSEMBLY

WATER PUMP

Exploded View

INFOID:0000000001308732



1. Water pump pulley
2. Water pump
3. O-ring

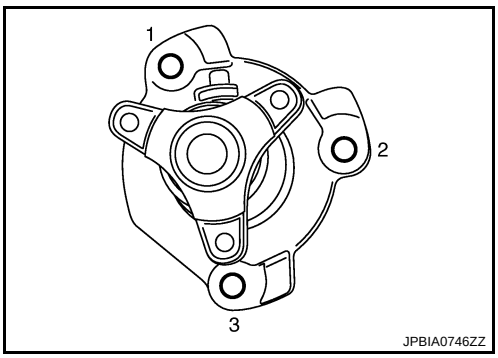
Refer to GI-4, "Components" for symbols in the figure.

Disassembly and Assembly

INFOID:0000000001308733

REMOVAL

1. Remove engine assembly. Refer to EM-312, "Exploded View".
   NOTE:
   Water pump cannot be removed with an onboard condition.
2. Remove water pump pulley.
3. Remove water pump.
   • Loosen mounting bolts in reverse order as shown in the figure.
   CAUTION:
   • **Handle water pump vane so that it does not contact any other parts.**
   • **Water pump cannot be disassembled and should be replaced as a unit.**

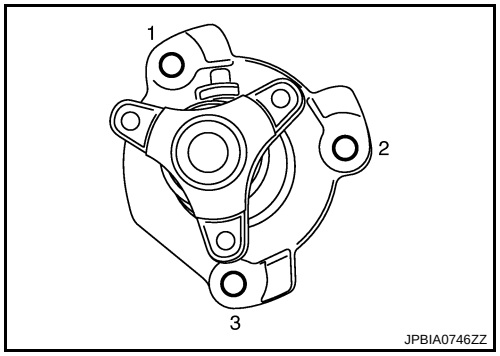


INSTALLATION

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

Water pump

- Tighten mounting bolts in numerical order as shown in the figure.
- When inserting water pump end into cylinder block, apply a neutral detergent to O-ring. Then insert it immediately.

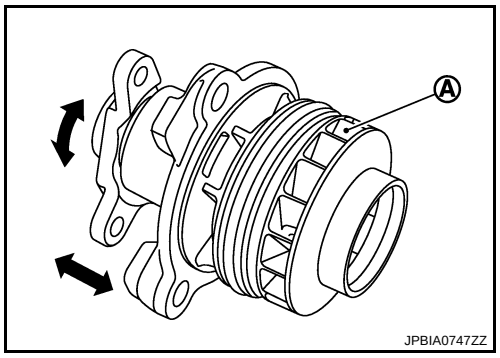


Inspection

INFOID:0000000001308734

INSPECTION AFTER REMOVAL

- Visually check if there is no significant dirt or rusting on water pump body and vane (A).
- Check that there is no looseness in vane shaft, and that it turns smoothly when rotated by hand.
- Replace water pump, if necessary.



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-68, "Inspection".
- Start and warm up the engine. Visually check that there is no leakage of engine coolant.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Periodical Maintenance Specification

INFOID:0000000001308741

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (Imp qt)

Engine coolant capacity (With reservoir tank at “MAX” level)	M/T models	8.4 (7-3/8)
	A/T models	8.9 (7-7/8)
Reservoir tank engine coolant capacity (At “MAX” level)		0.7 (5/8)

Radiator

INFOID:0000000001308742

RESERVOIR TANK CAP

Unit: kPa (bar, kg/cm^2, psi)

Cap relief pressure	Standard	127 - 147 (1.27 - 1.47, 1.3 - 1.5, 18.5 - 21.3)
	Limit	108 (1.08, 1.1, 15.6)

RADIATOR

Unit: kPa (bar, kg/cm^2, psi)

Leakage testing pressure	157 (1.57, 1.6, 22.8)

Water Outlet and Thermostat Assembly

INFOID:0000000001308743

Standard

Valve opening temperature	86 - 89°C (187 - 192°F)
Maximum valve lift	8.5 mm/101°C (0.335 in/214°F)