SECTION CO
ENGINE COOLING SYSTEM

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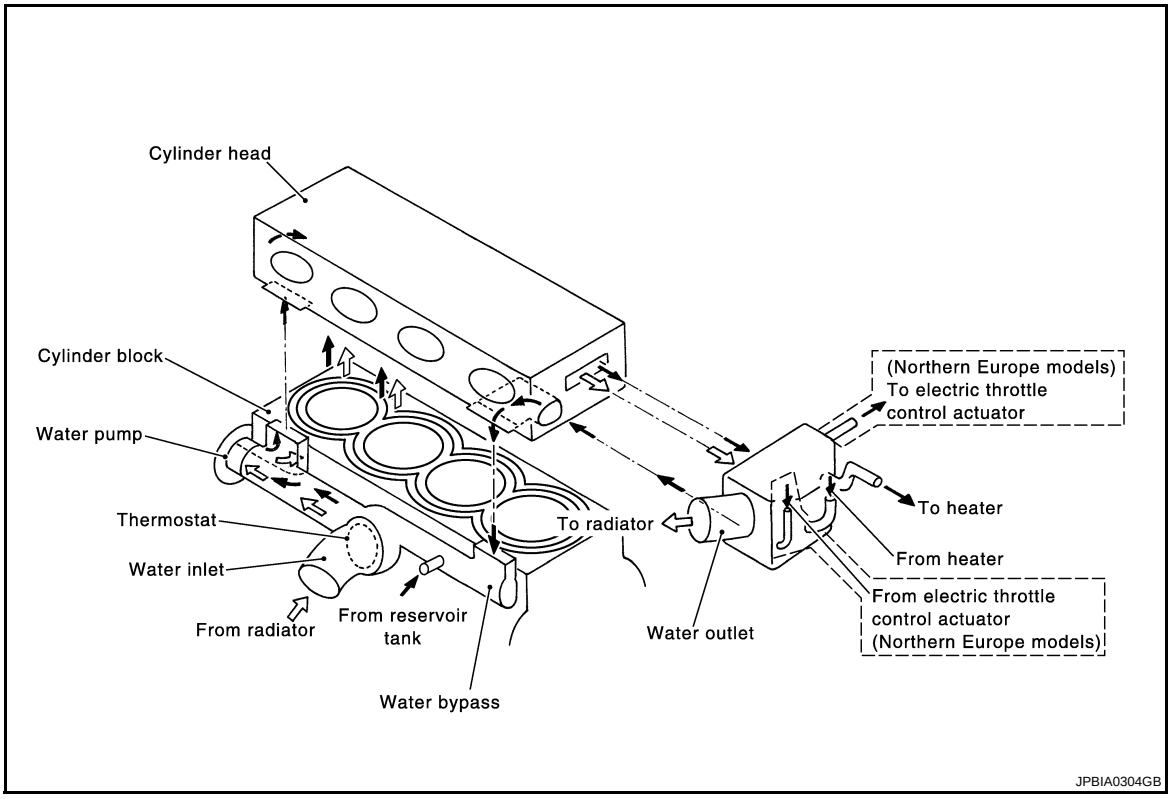
FUNCTION DIAGNOSIS

DESCRIPTION

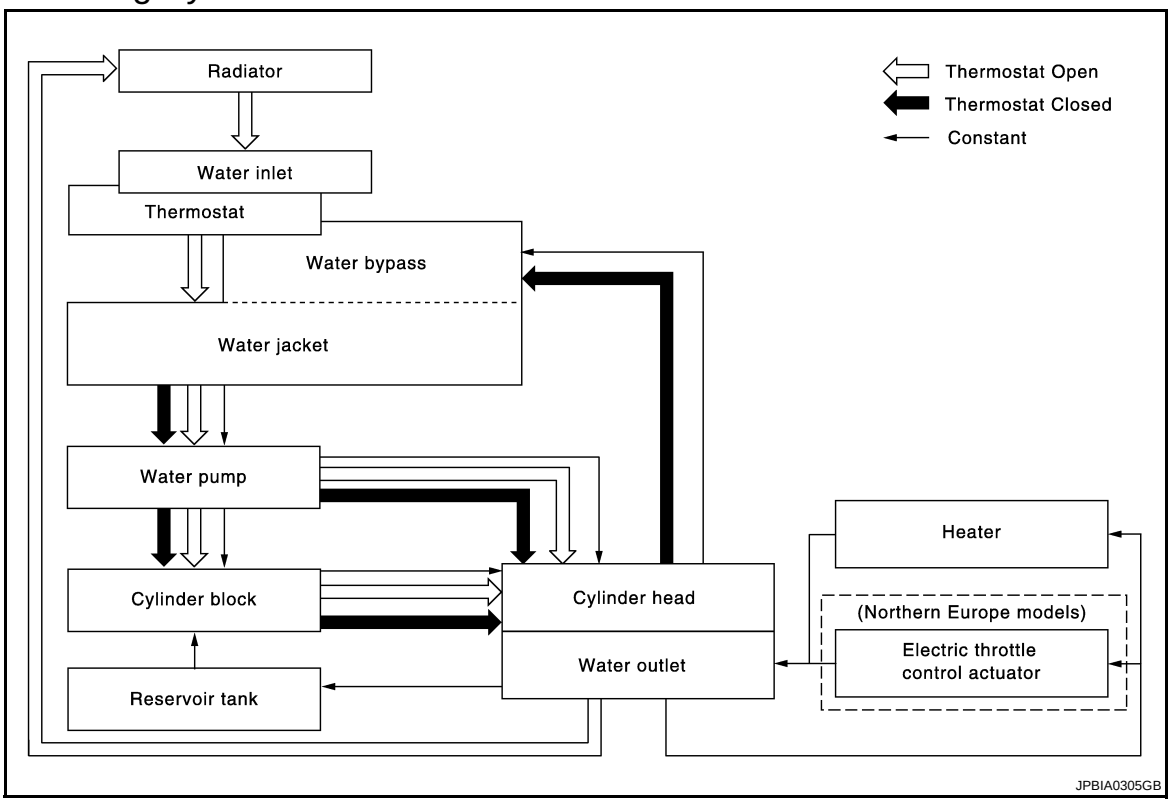
Engine Cooling System

INFOID:0000000001179184



Engine Cooling System Schematic

INFOID:0000000001179185



SYMPTOM DIAGNOSIS

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:0000000001179186

	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat stuck closed	—	
		Damaged fins	Dust contamination or paper clogging	
			Physical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	Fan assembly	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper engine coolant mixture ratio	—	—	—
	Poor engine coolant quality	—	Engine coolant viscosity	—
	Insufficient engine coolant	Engine coolant leaks	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 for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000001585909

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

WARNING:

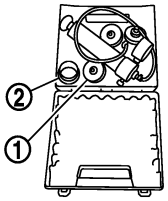
- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal 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:0000000001179188

Tool number (RENAULT tool number) Tool name	Description
— (M.S. 554-07) Reservoir tank cap tester 1. Adapter A — (M.S. 554-01) 2. Adapter B — (M.S. 554-06)  E1BIA0058ZZ	Checking radiator and reservoir tank cap

ON-VEHICLE MAINTENANCE

ENGINE COOLANT

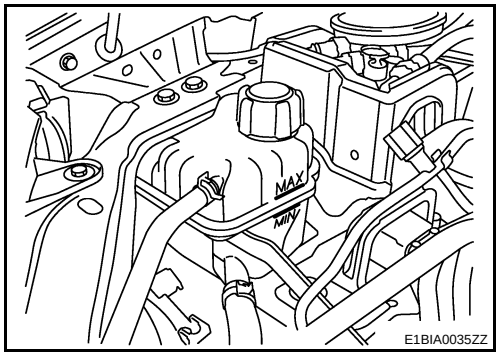
Inspection

INFOID:0000000001179189

LEVEL

- Check if the reservoir tank engine coolant level is within the “MIN” to “MAX” when the engine is cool.
- Adjust the engine coolant level as necessary.
- Check that the reservoir tank cap is tightened.

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

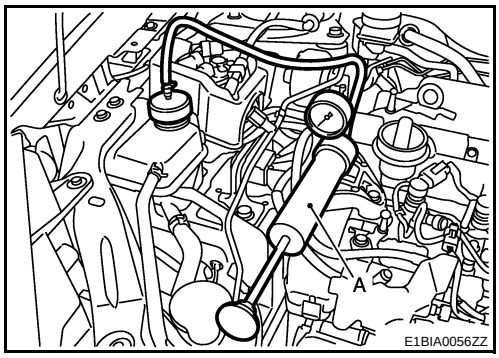


LEAKAGE

- To check for leakage, fit the adapter to the reservoir tank, and then connect it to the reservoir tank cap tester [SST: — (M.S.554-07)] (A) as shown.

Testing pressure: Refer to CO-23, "Radiator".

WARNING:
Never remove reservoir tank cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from reservoir tank.
CAUTION:
Higher test pressure than specified may cause radiator damage.



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

Draining

INFOID:0000000001179190

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

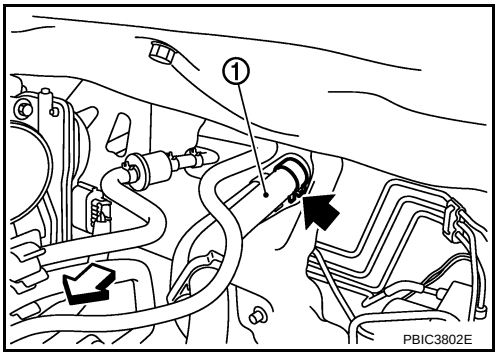
1. Disconnect radiator hose (lower) and reservoir tank cap.
   When draining all of engine coolant in the system, open water drain plugs on cylinder block. Refer to EM-94, "Exploded View".
   CAUTION:
   - **Perform this step when engine is cold.**
   - **Never spill engine coolant on drive belt.**
2. Remove reservoir tank if necessary, and drain engine coolant and clean reservoir tank before installing. Refer to CO-13, "Exploded View".
3. Check drained engine coolant for contaminants such as rust, corrosion or discoloration. If contaminated, flush the engine cooling system. Refer to CO-12, "RADIATOR : Inspection".

Refilling

INFOID:0000000001179191

1. Install reservoir tank if removed.
2. Connect radiator hose (lower).
   - If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-94, "Exploded View".
3. Make sure that each hose clamp has been firmly tightened.

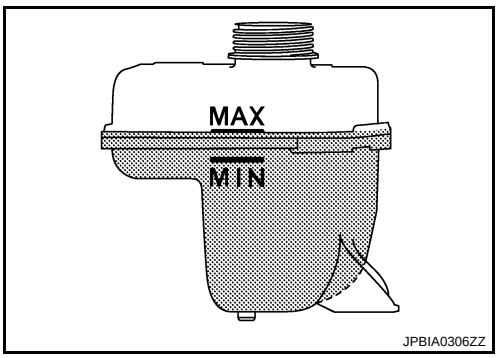
4. Disconnect heater hose (1) at position (⬅) in the figure.



⇦ : Vehicle front

- Enhance heater hose as high as possible, keeping heater hose end above reservoir tank MAX level.

5. Fill reservoir tank to specified level.
   - Pour coolant slowly of less than 2 ℓ (1-3/4 lmp qt) a minute to allow air in system to escape.
   - When coolant from heater unit starts to drain, connect heater hose and continue to fill up to reservoir tank MAX level.
   - Start engine without closing reservoir tank cap.
   - Keep engine racing at 1,500 rpm for about 2-3 minutes, filling reservoir tank up to MAX. Level, if necessary.
   - Use Genuine Nissan Engine Coolant or equivalent mixed with water (distilled or demineralized). Refer to MA-27, "Fluids and Lubricants".



Engine coolant capacity
(With reservoir tank at "MAX" level)
Refer to CO-23, "Periodical Maintenance Specification".

Reservoir tank engine coolant capacity
(At "MAX" level)
Refer to: CO-23, "Periodical Maintenance Specification".

6. Install reservoir tank cap.
7. Warm up engine until opening thermostat. Standard for warming-up time is approximately 10 minutes at 2,000 - 2,500 rpm.
   - Make sure thermostat opening condition by touching radiator hose (lower) to see a flow of warm water.

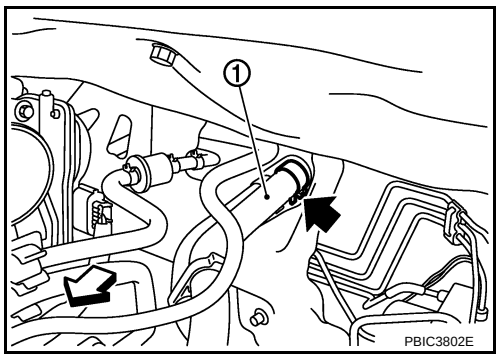
   CAUTION:
   Watch water temperature gauge so as not to overheat engine.
8. Stop the engine and cool down to less than approximately 50°C (122°F).
   - Cool down using fan to reduce the time.
9. Refill reservoir tank to "MAX" level line with engine coolant, if necessary.
10. Repeat steps 6 through 9 two or more times with reservoir tank cap installed until reservoir tank level no longer drops.
11. Check cooling system for leaks with engine running.
12. Warm up the engine, and check for sound of engine coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between "COOL" and "WARM".
    - Sound may be noticeable at heater unit.
13. Repeat step 12 three times.
14. If sound is heard, bleed air from cooling system by repeating step 6 through 9 until reservoir tank level no longer drops.
15. Check that the reservoir tank cap is tightened.

Flushing

INFOID:0000000001179192

1. Install reservoir tank if removed, and connect radiator hose (lower).
   If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-94, "Exploded View".

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



⇦ : Vehicle front

- Enhance heater hose as high as possible, keeping heater hose end above reservoir tank MAX level.

3. Fill reservoir tank with water.
   - When coolant from heater unit starts to drain, connect heater hose and continue to fill up to reservoir tank MAX level.
4. Install reservoir tank cap.
5. Run the engine and warm it up to normal operating temperature.
6. Rev the engine two or three times under no-load.
7. Stop the engine and wait until it cools down.
8. Drain water from the system. Refer to CO-9, "Draining".
9. Repeat steps 1 through 8 until clear water begins to drain from radiator.
10. Check that the reservoir tank cap is tightened.

RADIATOR

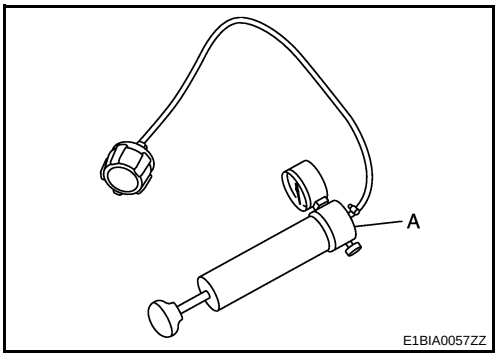
RESERVOIR TANK CAP

RESERVOIR TANK CAP : Inspection

INFOID:0000000001179193

- Fit the adapter to the reservoir tank cap tester [SST: — (M.S. 554-07)] (A) as shown.
- When connecting the reservoir tank cap to the reservoir tank cap tester, apply water or LLC to the reservoir tank cap seal part.
- Check reservoir tank cap relief pressure.

Standard: Refer to CO-23, "Radiator".



- Replace the reservoir tank cap if the engine coolant passes through it, or if any fur signs is detected.

CAUTION:

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

RADIATOR

RADIATOR : Inspection

INFOID:0000000001179194

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.**

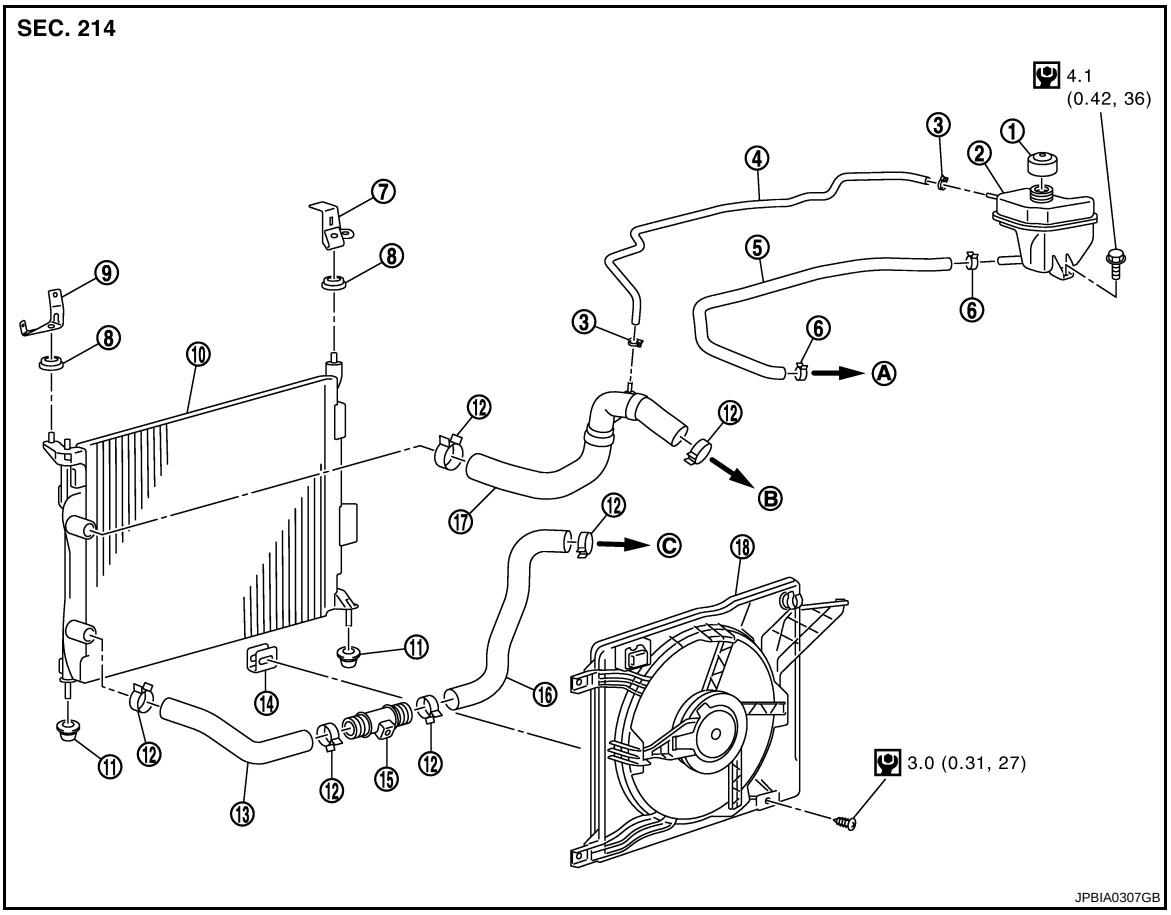
1. Apply water by hose to the back side of the radiator core vertically downward.
2. Apply water again to all radiator core surfaces once per minute.
3. Stop washing if any stains no longer flow out from radiator.
4. Blow air into the back side of radiator core vertically downward.
   - Use compressed air lower than 490 kPa (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:0000000001179195



1. Reservoir tank cap	2. Reservoir tank	3. Clamp
4. Reservoir tank hose	5. Reservoir tank hose	6. Clamp
7. Bracket	8. Mounting rubber (upper)	9. Bracket
10. Radiator	11. Mounting rubber (lower)	12. Clamp
13. Radiator hose (lower)	14. Clip	15. Radiator hose pipe
16. Radiator hose (lower)	17. Radiator hose (upper)	18. Cooling fan assembly
A. To cylinder block	B. To water outlet	C. To water inlet

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

Removal and Installation

INFOID:0000000001179196

REMOVAL

WARNING:

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

1. Drain engine coolant from radiator. Refer to CO-9, "Draining".
   CAUTION:
   - **Perform this step when the engine is cold.**
   - **Never spill engine coolant on drive belts.**

2. Remove air duct (inlet). Refer to EM-28, "Exploded View".
3. Remove reservoir tank hose at radiator hose (upper) side.
4. Disconnect connector from resistor and fan motor, and move harness to aside.
5. Remove cooling fan assembly. Refer to CO-15, "Exploded View".
   CAUTION:
   Be careful not to damage radiator core.
6. Remove radiator hose (upper and lower).
7. Remove liquid tank bracket mounting bolts. Refer to HA-39, "Exploded View".
8. Remove mounting bracket (upper).
9. Lift up the A/C condenser to disengage the radiator, and then remove the radiator.
   CAUTION:
   Be careful not to damage or scratch radiator and A/C condenser core.

INSTALLATION

Installation is the reverse order of removal.

Inspection

INFOID:0000000001179197

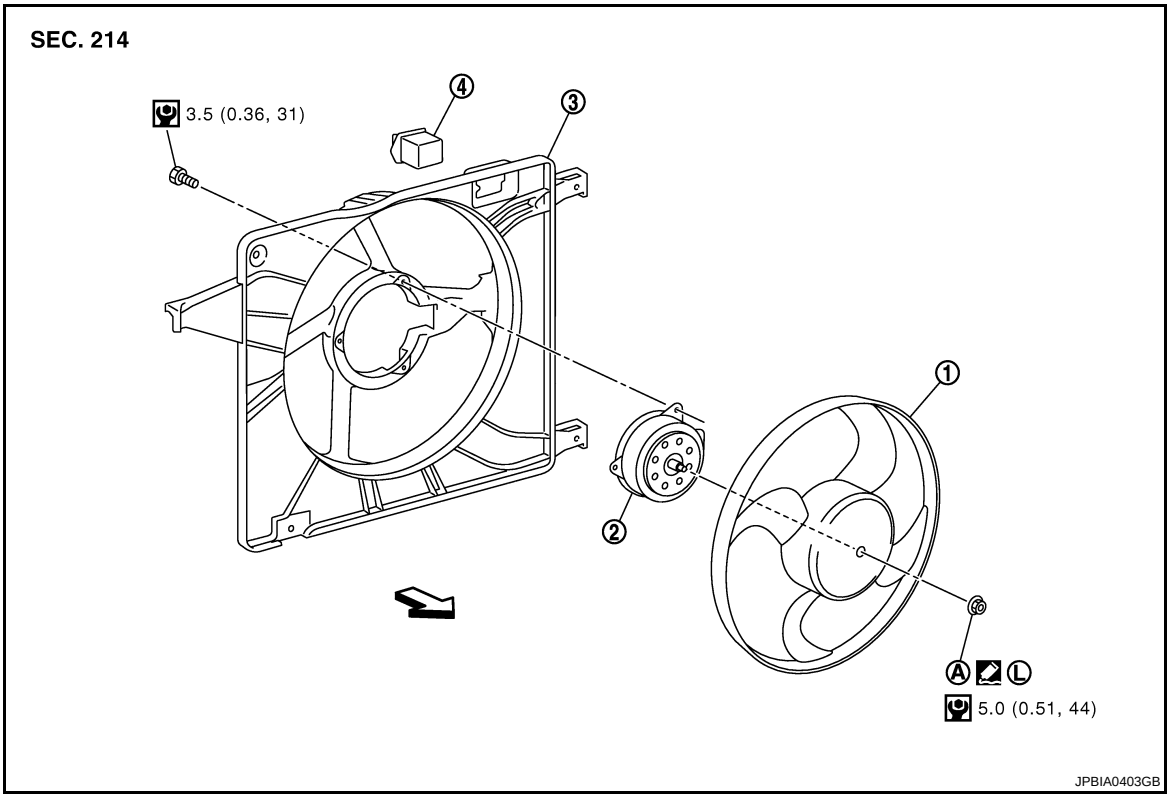
INSPECTION AFTER INSTALLATION

- Check that the reservoir tank cap is tightened.
- Check for leaks of engine coolant using the adapter and the reservoir tank cap tester [SST: — (M.S. 554-07). Refer to CO-9, "Inspection".
- Start and warm up the engine. Visually make sure that there is no leaks of engine coolant.

COOLING FAN

Exploded View

INFOID:0000000001179198



1.	Cooling fan	2.	Fan motor	3.	Fan shroud
4.	Resistor				
A.	Reverse screw				

: Apply thread locking sealant.

: Vehicle front

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

Removal and Installation

INFOID:0000000001179199

REMOVAL

1. Remove air duct (inlet). Refer to EM-28, "Exploded View".
2. Disconnect harness connector from resistor and fan motor, and move harness to aside.
3. Remove cooling fan assembly.
   CAUTION:
   Be careful not to damage or scratch on radiator core.

INSTALLATION

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

CAUTION:

Only use genuine parts for 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 ECH-287, "Description".

Disassembly and Assembly

INFOID:0000000001179200

DISASSEMBLY

1. Remove resistor from fan shroud.
   CAUTION:
   Handle carefully to avoid dropping and shocks.
2. Remove cooling fan mounting nuts, and then remove the cooling fan.
   CAUTION:
   Reverse screw is used for the fan attachment nut. When removing or attaching, turn the screw the opposite way as for a normal screw.
3. Remove fan motor.

ASSEMBLY

Assembly is the reverse order of disassembly.
- Apply thread locking sealant on fan motor shaft.

Inspection

INFOID:0000000001179201

INSPECTION AFTER DISASSEMBLY

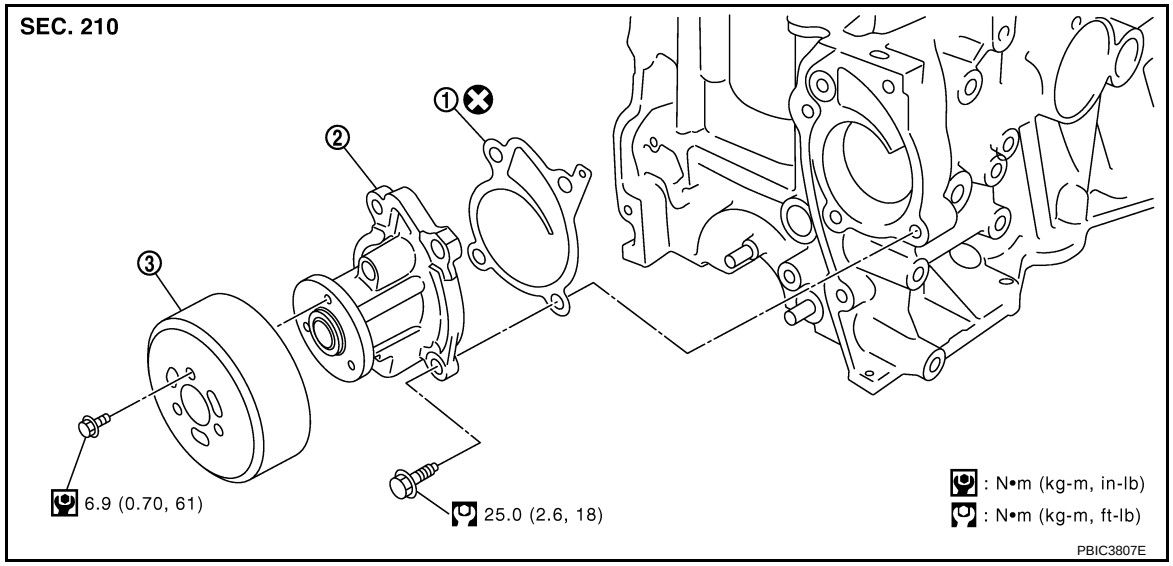
Cooling Fan

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

WATER PUMP

Exploded View

INFOID:0000000001179202



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

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

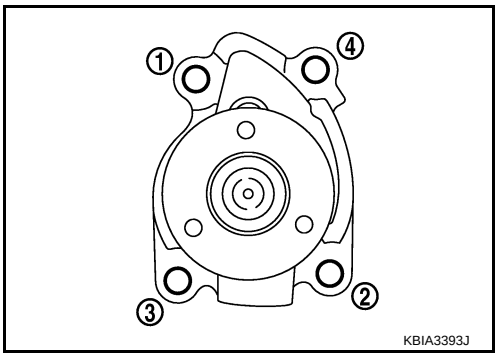
Removal and Installation

INFOID:0000000001179203

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-9, "Draining".
   CAUTION:
   - **Perform this step when the engine is cold.**
   - **Never spill engine coolant on drive belts.**
2. Steer front wheel to the right.
3. Remove front fender protector (RH). Refer to fender protector.
4. Loosen mounting bolts of water pump pulley before loosening belt tension of drive belt.
5. Remove drive belt. Refer to EM-17, "Removal and Installation".
6. Remove water pump pulley.
7. Remove water pump.
   - Loosen mounting bolts in reverse order as shown in the figure.
   - Engine coolant will leak 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 disassemble and should replaced as a unit.**

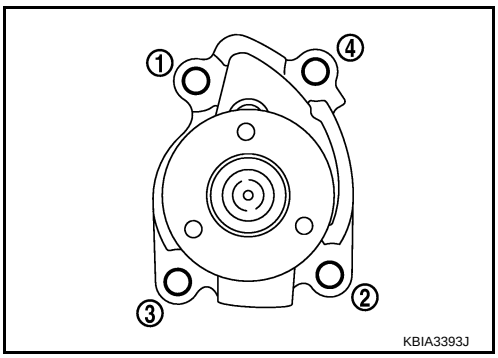


INSTALLATION

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

Water pump

- Tighten mounting bolts in numerical order as shown in the figure.

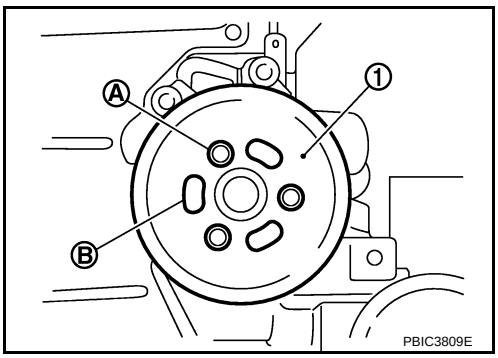


Water pump pulley

CAUTION:

Never install mounting bolts (A) to oblong holes (B).

1 : Water pump pulley

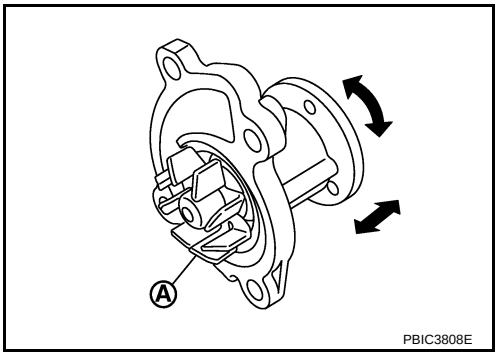


Inspection

INFOID:0000000001179204

INSPECTION AFTER REMOVAL

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



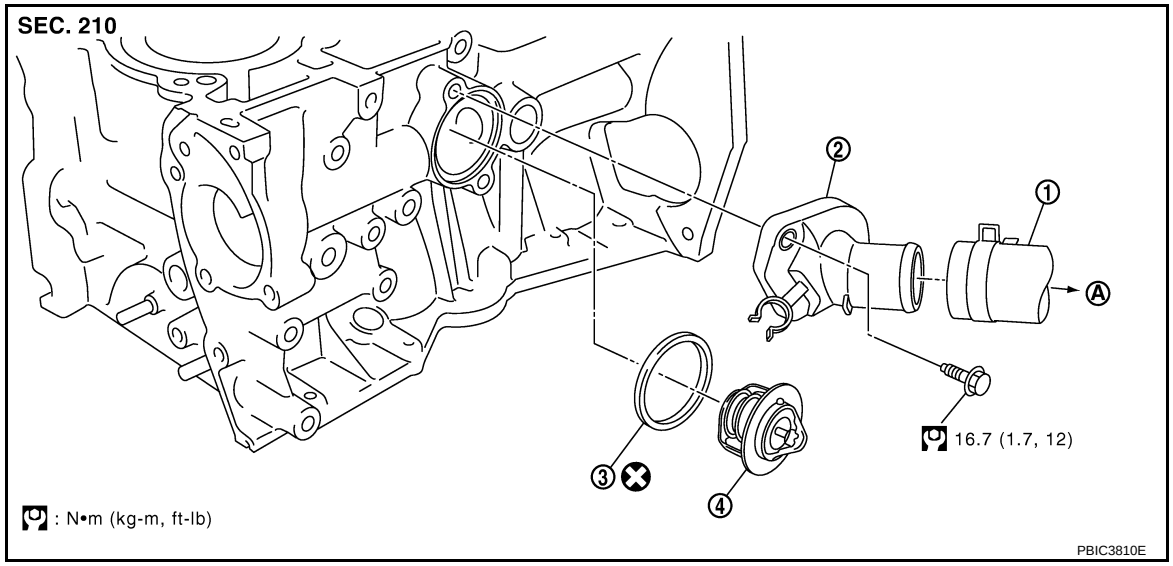
INSPECTION AFTER INSTALLATION

- Check that the reservoir tank cap is tightened.
- Check for leaks of engine coolant using the adapter and the reservoir tank cap tester [SST: — (M.S. 554-07). Refer to CO-9, "Inspection".
- Start and warm up the engine. Visually make sure that there is no leaks of engine coolant.

THERMOSTAT

Exploded View

INFOID:0000000001179205



1. Radiator hose (lower)
2. Water inlet
3. Rubber ring
4. Thermostat
A. To radiator

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

Removal and Installation

INFOID:0000000001179206

REMOVAL

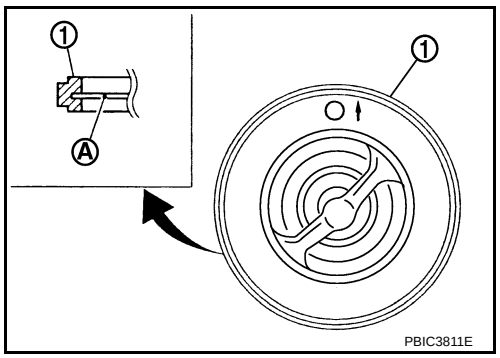
1. Drain engine coolant from radiator. Refer to CO-9, "Draining".
   CAUTION:
   - **Perform this step when engine is cold.**
   - **Never spill engine coolant on drive belt.**
2. Add paint mark, then disconnect radiator hose (lower) from water inlet. Refer to CO-13, "Exploded View".
3. Remove water inlet and thermostat.
   - 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.

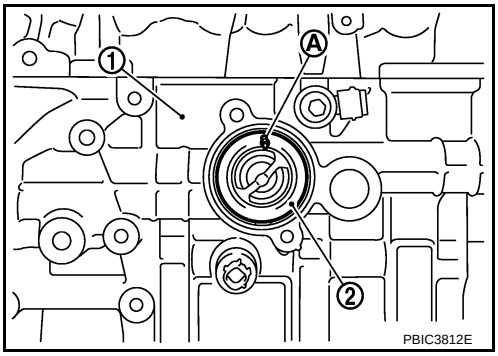
Thermostat

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



- Install thermostat (2) with jiggle valve (A) facing upwards.

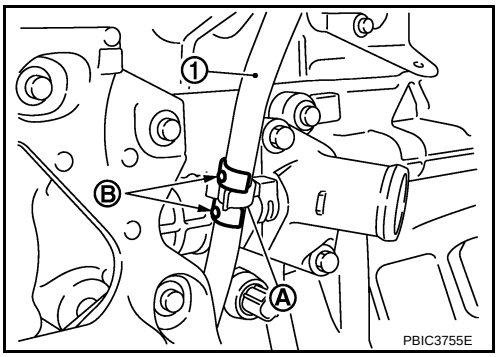
1 : Cylinder block



Water Inlet

After installation, fix water inlet clip (A) on the oil level gauge guide (1) as shown in the figure.

B : Positioning



Inspection

INFOID:0000000001179207

INSPECTION AFTER REMOVAL

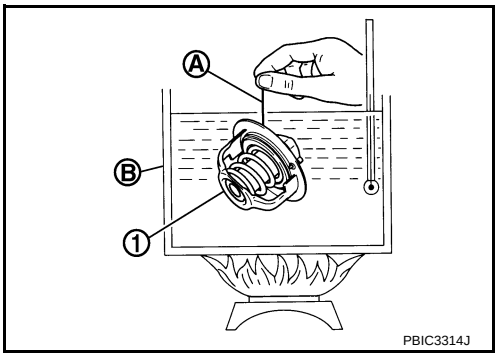
WARNING:

Use a protector to prevent a burn during the work.

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-23, "Thermostat".



- If out of the standard, replace thermostat.

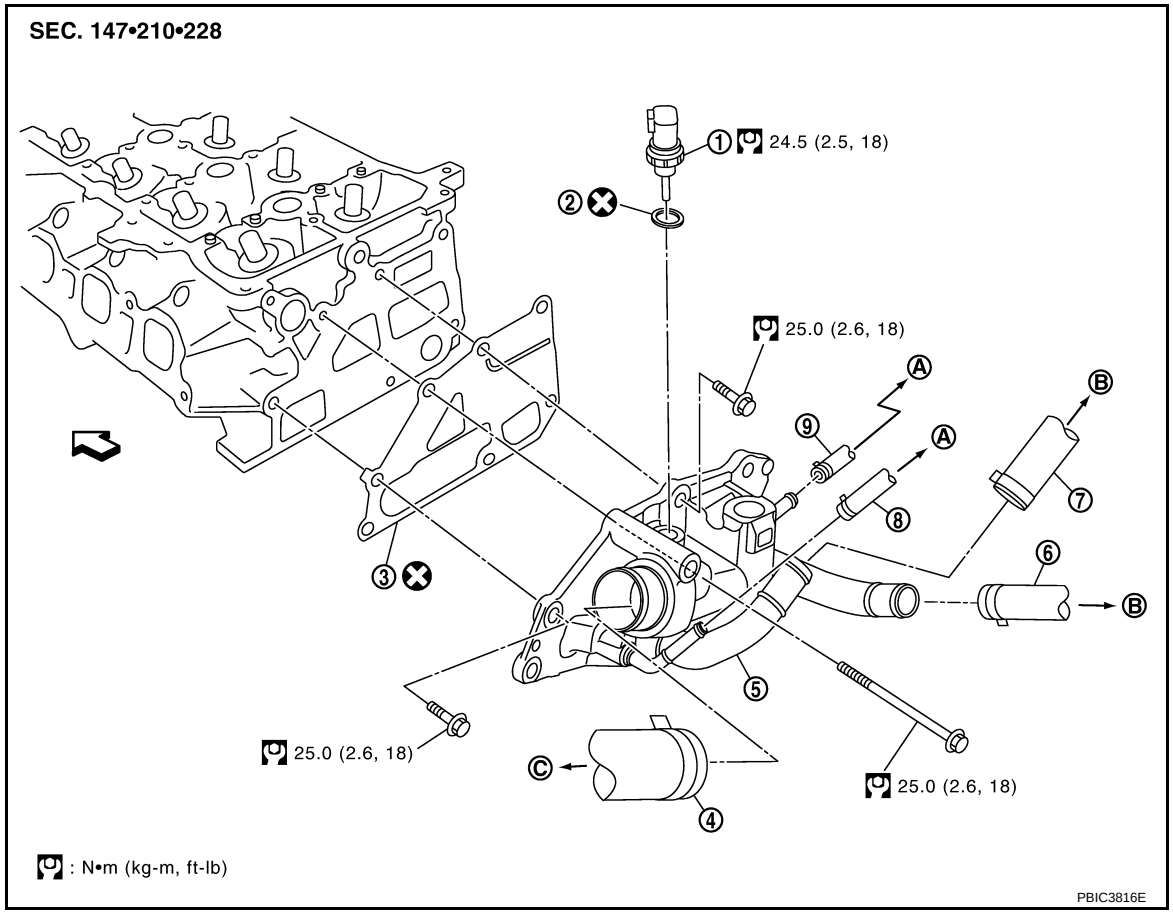
INSPECTION AFTER INSTALLATION

- Check that the reservoir tank cap is tightened.
- Check for leaks of engine coolant using the adapter and the reservoir tank cap tester [SST: — (M.S. 554-07). Refer to CO-9, "Inspection".
- Start and warm up the engine. Visually make sure that there is no leaks of engine coolant.

WATER OUTLET

Exploded View

INFOID:0000000001179208



1.	Engine coolant temperature sensor	2.	Washer	3.	Gasket
4.	Radiator hose (upper)	5.	Water outlet	6.	Heater hose
7.	Heater hose	8.	Water hose (Northern Europe models)	9.	Water hose (Northern Europe models)
A.	To electric throttle control actuator	B.	To heater core	C.	To radiator

⇦ : Engine front

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

Removal and Installation

INFOID:0000000001179209

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-9, "Draining".
   CAUTION:
   - **Perform this step when engine is cold.**
   - **Never spill engine coolant on drive belt.**
2. Disconnect radiator hose (upper). Refer to CO-13, "Exploded View".
3. Disconnect harness connector from engine coolant temperature sensor.
4. Remove water hoses (Northern Europe models).
5. Remove heater hoses.
6. Remove water outlet.
7. Remove engine coolant temperature sensor from water outlet, if necessary.

INSTALLATION

Installation is the reverse order of removal.

Inspection

INFOID:0000000001179210

INSPECTION AFTER INSTALLATION

- Check that the reservoir tank cap is tightened.
- Check for leaks of engine coolant using the adapter and the reservoir tank cap tester [SST: — (M.S. 554-07). Refer to CO-9, "Inspection".
- Start and warm up the engine. Visually make sure that there is no leaks of engine coolant.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Periodical Maintenance Specification

INFOID:0000000001179211

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (Imp qt)

Engine coolant capacity [With reservoir tank (“MAX” level)]	6.2 (5-1/2)
Reservoir tank engine coolant capacity (At “MAX” level)	0.78 (5/8)

Radiator

INFOID:0000000001179212

RESERVOIR TANK CAP

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

Cap relief pressure	Standard	130.2 - 149.8 (1.3 - 1.5, 1.3 - 1.5, 18.9 - 21.7)

RADIATOR

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

Leakage testing pressure	150 (1.5, 1.53, 21.75)

Thermostat

INFOID:0000000001179213

Thermostat	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)

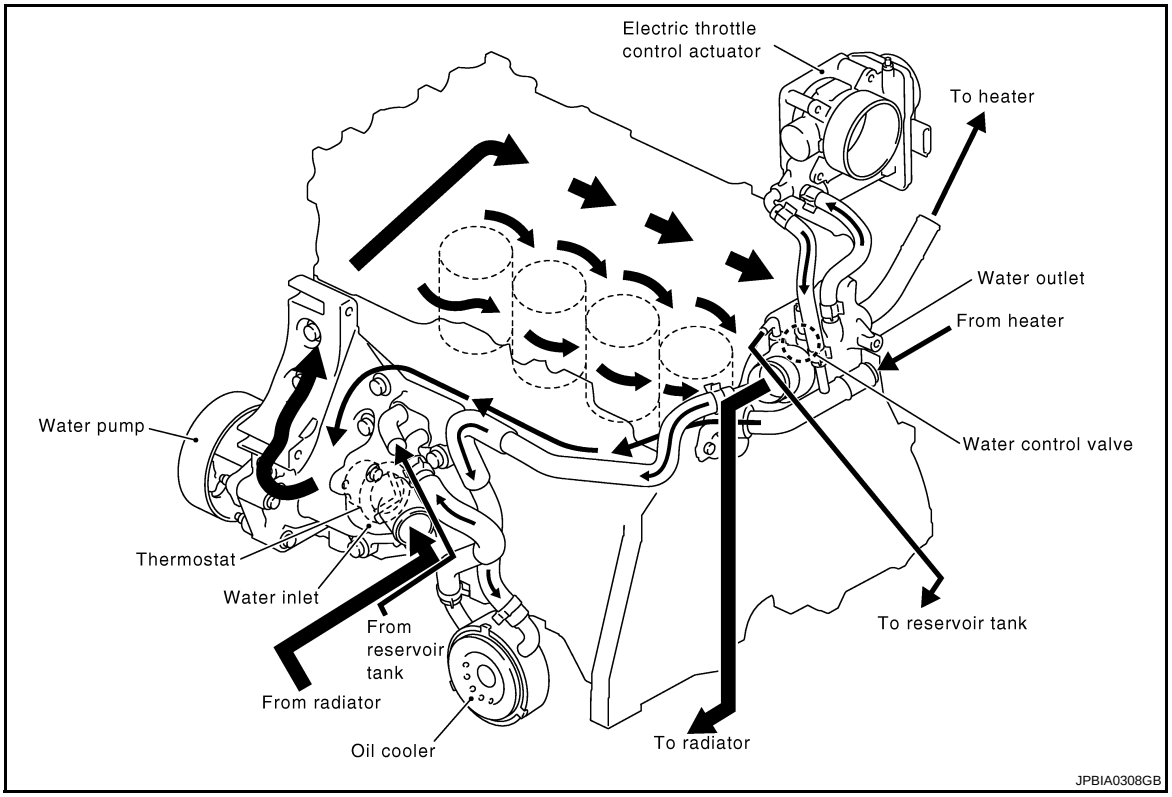
FUNCTION DIAGNOSIS

DESCRIPTION

M/T

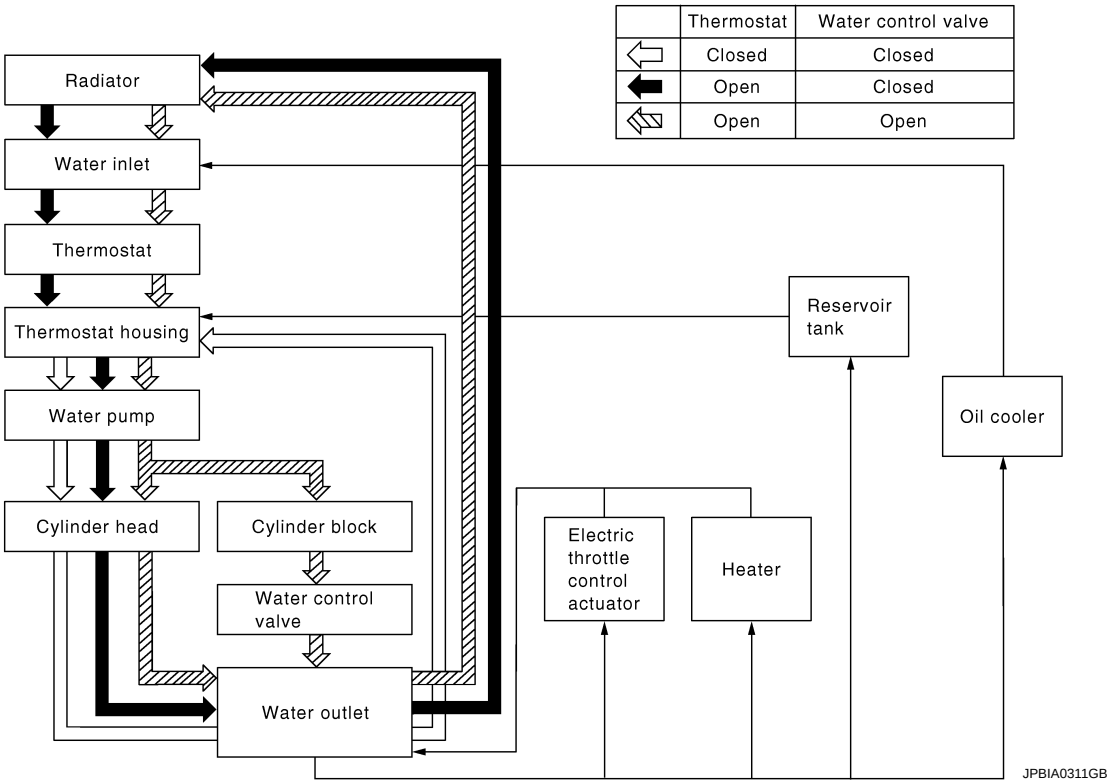
M/T : Engine Cooling System

INFOID:0000000001179214



M/T : Engine Cooling System Schematic

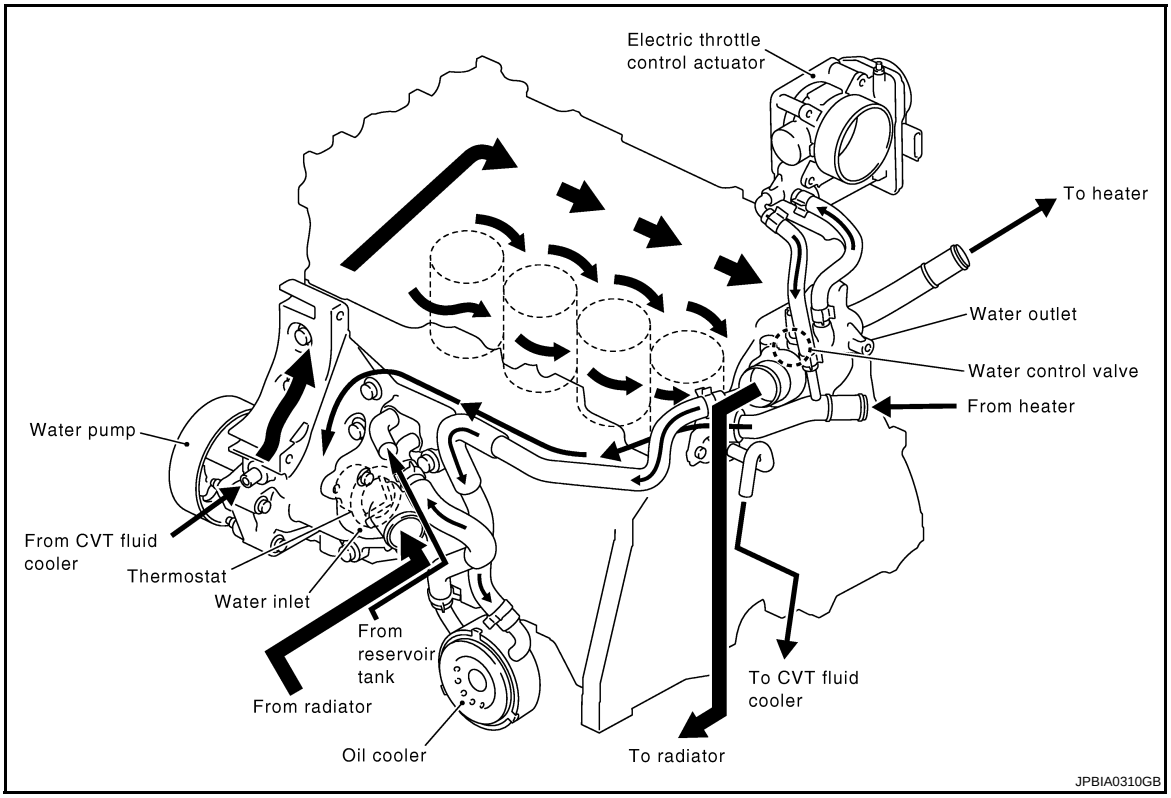
INFOID:0000000001179215



CVT

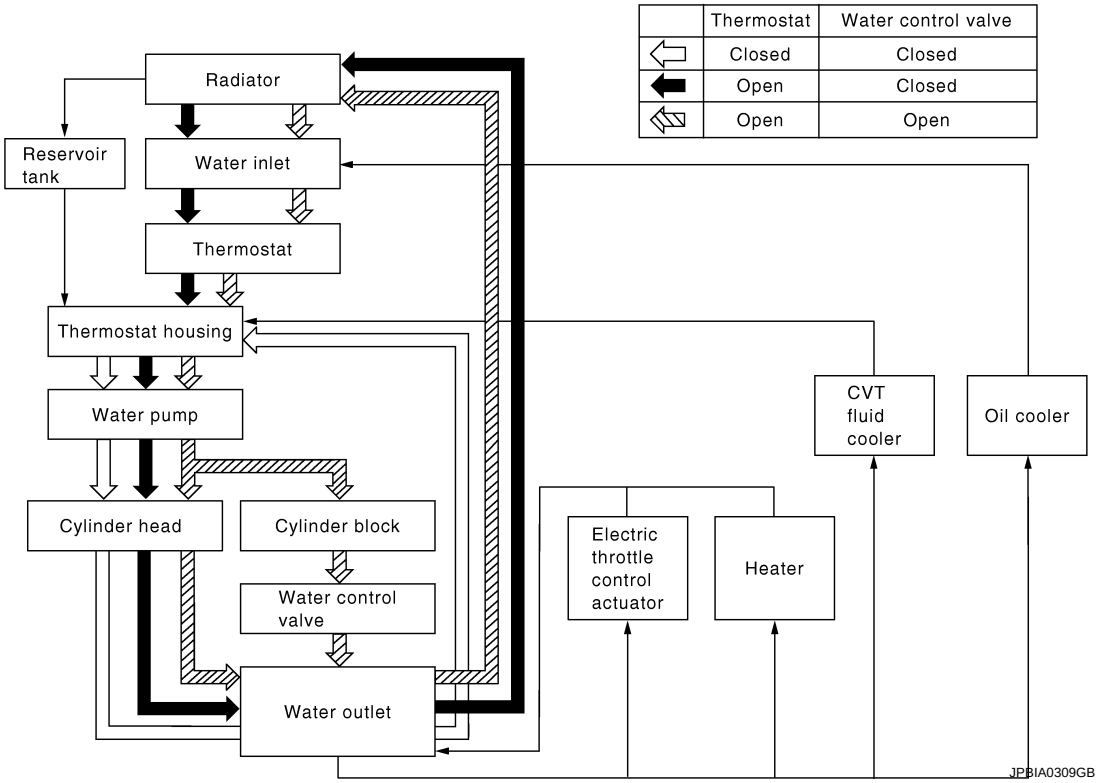
CVT : Engine Cooling System

INFOID:0000000001179216



CVT : Engine Cooling System Schematic

INFOID:0000000001179217



SYMPTOM DIAGNOSIS

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:0000000001179218

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

INFOID:0000000001585910

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

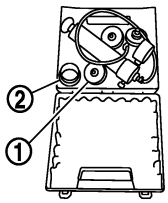
PREPARATION

PREPARATION

Special Service Tools

INFOID:0000000001179220

Tool number (RENAULT tool number) Tool name	Description
— (M.S. 554-07) Reservoir tank cap tester 1. Adapter A — (M.S. 554-01) 2. Adapter B — (M.S. 554-06)	Checking radiator and reservoir tank cap



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ON-VEHICLE MAINTENANCE

ENGINE COOLANT

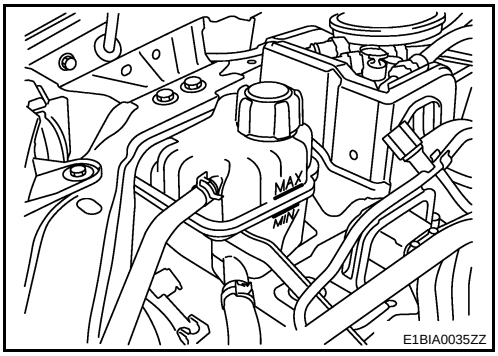
Inspection

INFOID:0000000001179221

LEVEL

- Check if the reservoir tank engine coolant level is within the “MIN” to “MAX” when the engine is cool.
- Adjust the engine coolant level as necessary.
- Check that the reservoir tank cap is tightened.

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

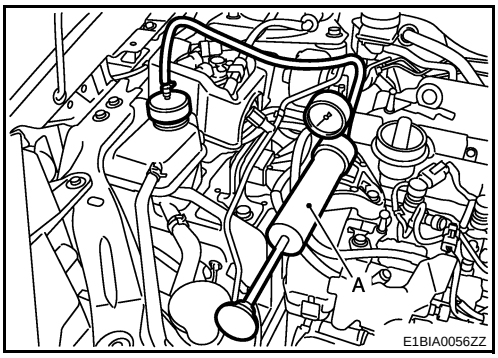


LEAKAGE

- To check for leakage, fit the adapter to the reservoir tank, and then connect it to the reservoir tank cap tester [SST: — (M.S.554-07)] (A) as shown.

Testing pressure: Refer to CO-46, "Radiator".

WARNING:
Never remove reservoir tank cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from reservoir tank.
CAUTION:
Higher test pressure than specified may cause radiator damage.



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

Draining

INFOID:0000000001179222

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

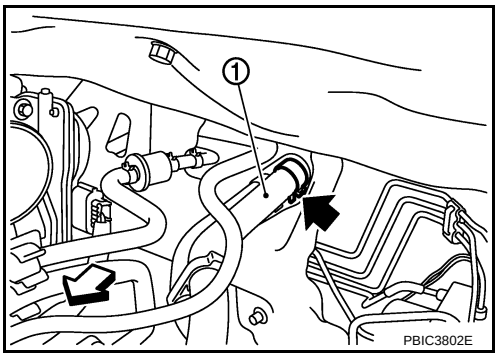
1. Disconnect radiator hose (lower) and reservoir tank cap.
   When draining all of engine coolant in the system, open water drain plugs on cylinder block. Refer to EM-211, "Exploded View".
   CAUTION:
   - **Perform this step when engine is cold.**
   - **Never spill engine coolant on drive belt.**
2. Remove reservoir tank if necessary, and drain engine coolant and clean reservoir tank before installing.
   - Remove of engine mounting insulator (RH) is necessary. Refer to EM-195, "M/T : Exploded View" (M/T models) or EM-200, "CVT : Exploded View" (CVT models).
3. Check drained engine coolant for contaminants such as rust, corrosion or discoloration. If contaminated, flush the engine cooling system. Refer to CO-33, "RADIATOR : Inspection".

Refilling

INFOID:0000000001179223

1. Install reservoir tank if removed.
2. Connect radiator hose (lower).
   If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-211, "Exploded View".

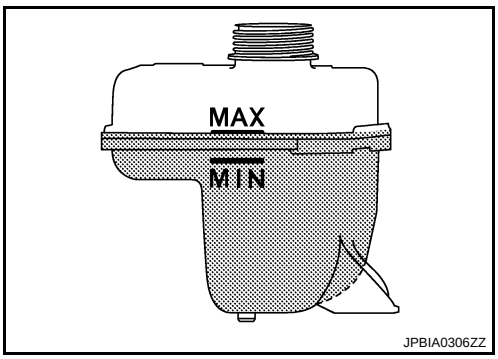
3. Make sure that each hose clamp has been firmly tightened.
4. Disconnect heater hose (1) at position (⇦) in the figure.



⇦ : Vehicle front

- Enhance heater hose as high as possible, keeping heater hose end above reservoir tank MAX level.

5. Fill reservoir tank to specified level.
   - Pour coolant slowly of less than 2 ℓ (1-3/4 lmp qt) a minute to allow air in system to escape.
   - When coolant from heater unit starts to drain, connect heater hose and continue to fill up to reservoir tank MAX level.
   - Start engine without closing reservoir tank cap.
   - Keep engine racing at 1,500 rpm for about 2-3 minutes, filling reservoir tank up to MAX. Level, if necessary.
   - Use Genuine Nissan Engine Coolant or equivalent mixed with water (distilled or demineralized). Refer to MA-27, "Fluids and Lubricants".



Engine coolant capacity
(With reservoir tank at “MAX” level)

Refer to :CO-46, "Periodical Maintenance Specification"

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

Refer to CO-46, "Periodical Maintenance Specification".

6. Install reservoir tank cap.
7. Warm up engine until opening thermostat. Standard for warming-up time is approximately 10 minutes at 2,000 - 2,500 rpm.
   - Make sure 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.
8. Stop the engine and cool down to less than approximately 50°C (122°F).
   - Cool down using fan to reduce the time.
9. Refill reservoir tank to “MAX” level line with engine coolant, if necessary.
10. Repeat steps 6 through 9 two or more times with reservoir tank cap installed until reservoir tank level no longer drops.
11. Check cooling system for leaks with engine running.
12. Warm up the engine, and check for sound of engine coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between “COOL” and “WARM”.
    - Sound may be noticeable at heater unit.
13. Repeat step 12 three times.
14. If sound is heard, bleed air from cooling system by repeating step 6 through 9 until reservoir tank level no longer drops.
15. Check that the reservoir tank cap is tightened.

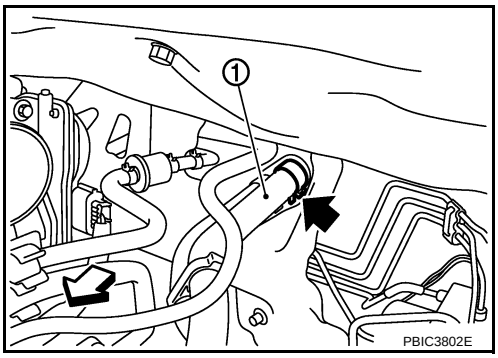
Flushing

INFOID:0000000001179224

1. Install reservoir tank if removed, and connect radiator hose (lower).

If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-211, "Exploded View".

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



⇦ : Vehicle front

- Enhance heater hose as high as possible, keeping heater hose end above reservoir tank MAX level.

3. Fill reservoir tank with water.
   - When coolant from heater unit starts to drain, connect heater hose and continue to fill up to reservoir tank MAX level.
4. Install reservoir tank cap.
5. Run the engine and warm it up to normal operating temperature.
6. Rev the engine two or three times under no-load.
7. Stop the engine and wait until it cools down.
8. Drain water from the system. Refer to CO-30, "Draining".
9. Repeat steps 1 through 8 until clear water begins to drain from radiator.
10. Check that the reservoir tank cap is tightened.

RADIATOR

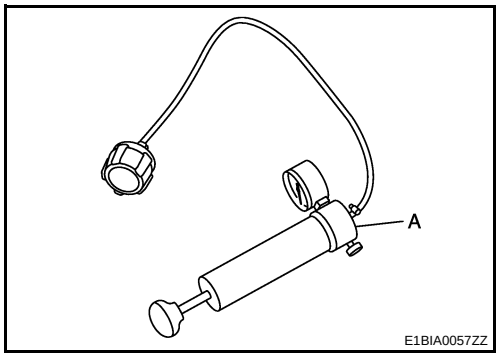
RESERVOIR TANK CAP

RESERVOIR TANK CAP : Inspection

INFOID:0000000001179225

- Fit the adapter to the reservoir tank cap tester [SST: — (M.S.554-07)] (A) as shown.
- When connecting the reservoir tank cap to the reservoir tank cap tester, apply water or LLC to the reservoir tank cap seal part.
- Check reservoir tank cap relief pressure.

Standard: Refer to CO-46, "Radiator".



- Replace the reservoir tank cap if the engine coolant passes through it, or if any fur signs is detected.

CAUTION:

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

RADIATOR

RADIATOR : Inspection

INFOID:0000000001179226

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 (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.

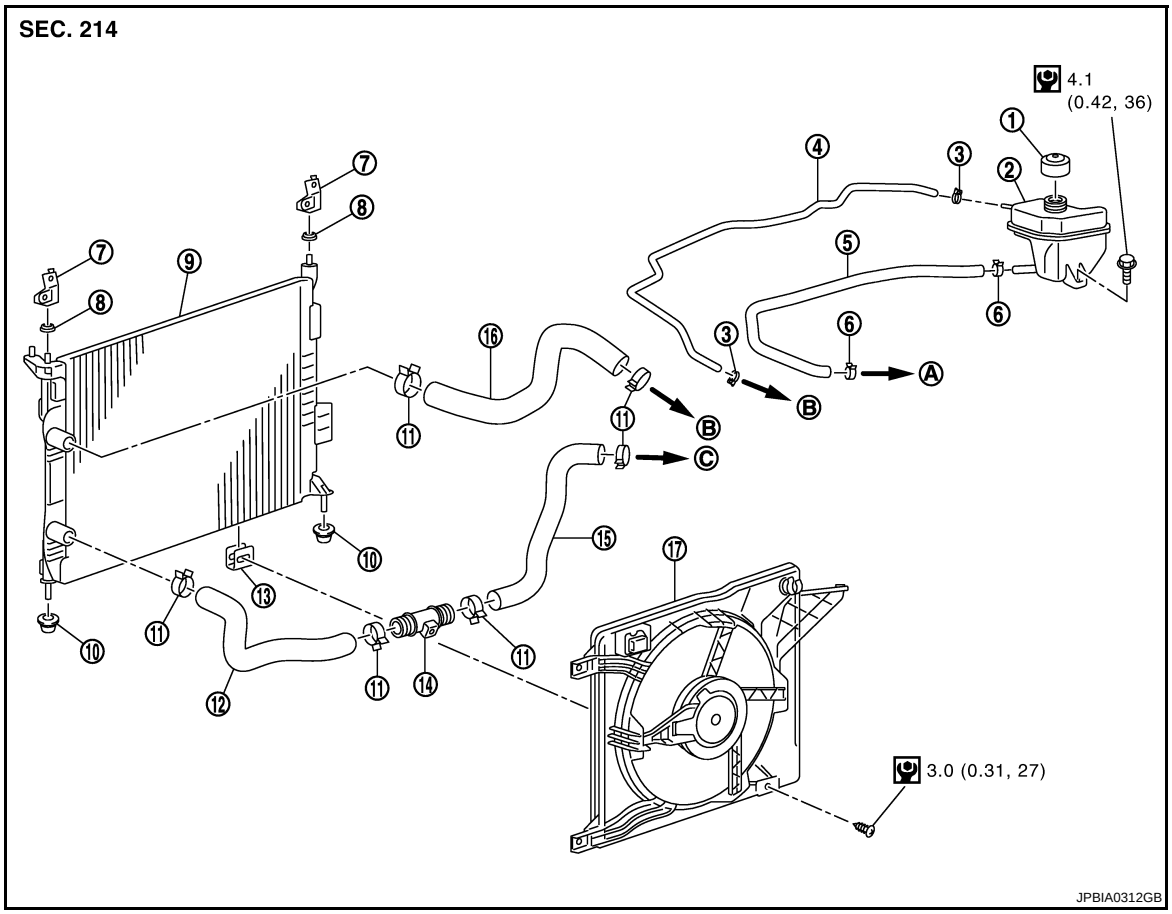
ON-VEHICLE REPAIR

RADIATOR

Exploded View

INFOID:0000000001179227

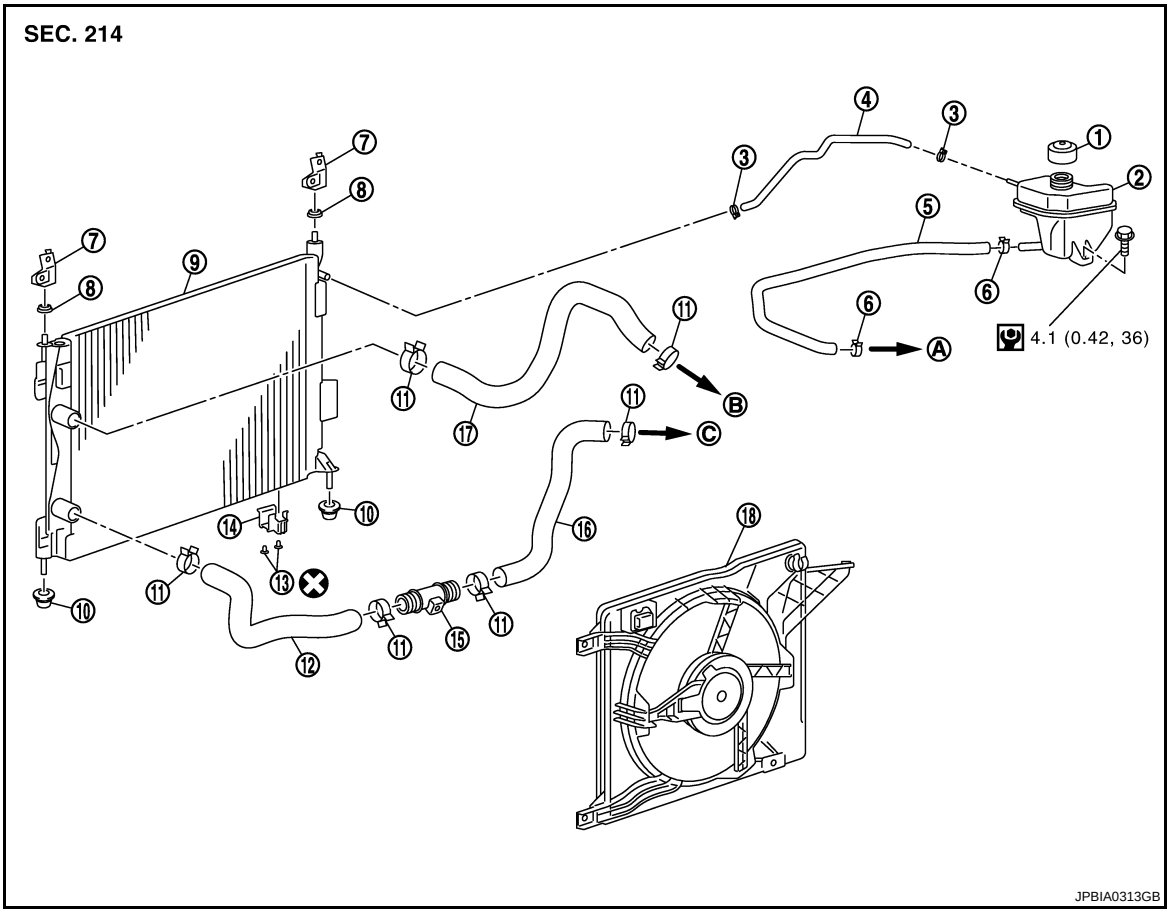
M/T models



1. Reservoir tank cap	2. Reservoir tank	3. Clamp
4. Reservoir tank hose	5. Reservoir tank hose	6. Clamp
7. Bracket	8. Mounting rubber (upper)	9. Radiator
10. Mounting rubber (lower)	11. Clamp	12. Radiator hose (lower)
13. Clip	14. Radiator hose pipe	15. Radiator hose (lower)
16. Radiator hose (upper)	17. Cooling fan assembly	
A. To thermostat housing	B. To water outlet	C. To water inlet

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

CVT models



1. Reservoir tank cap	2. Reservoir tank	3. Clamp
4. Reservoir tank hose	5. Reservoir tank hose	6. Clamp
7. Bracket	8. Mounting rubber (upper)	9. Radiator
10. Mounting rubber (lower)	11. Clamp	12. Radiator hose (lower)
13. Rivet	14. Clip	15. Radiator hose pipe
16. Radiator hose (lower)	17. Radiator hose (upper)	18. Cooling fan assembly
A. To thermostat housing	B. To water outlet	C. To water inlet

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

Removal and Installation

INFOID:0000000001179228

REMOVAL

WARNING:

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

1. Drain engine coolant from radiator. Refer to CO-30, "Draining".
   CAUTION:
   - **Perform this step when the engine is cold.**
   - **Never spill engine coolant on drive belts.**
2. Remove air duct (inlet). Refer to EM-145, "Exploded View".
3. Remove reservoir tank hose at radiator side (CVT models).
4. Disconnect connector from resistor and fan motor, and move harness to aside.
5. Remove cooling fan assembly. Refer to CO-37, "Exploded View".
   CAUTION:
   Be careful not to damage radiator core.

6. Remove radiator hose (upper and lower).
7. Remove liquid tank bracket mounting bolts. Refer to HA-39, "Exploded View".
8. Remove mounting bracket (upper).
9. Lift up the A/C condenser to disengage the radiator, and then remove the radiator.
   CAUTION:
   Be careful not to damage or scratch radiator and A/C condenser core.

INSTALLATION

Installation is the reverse order of removal.

Inspection

INFOID:0000000001179229

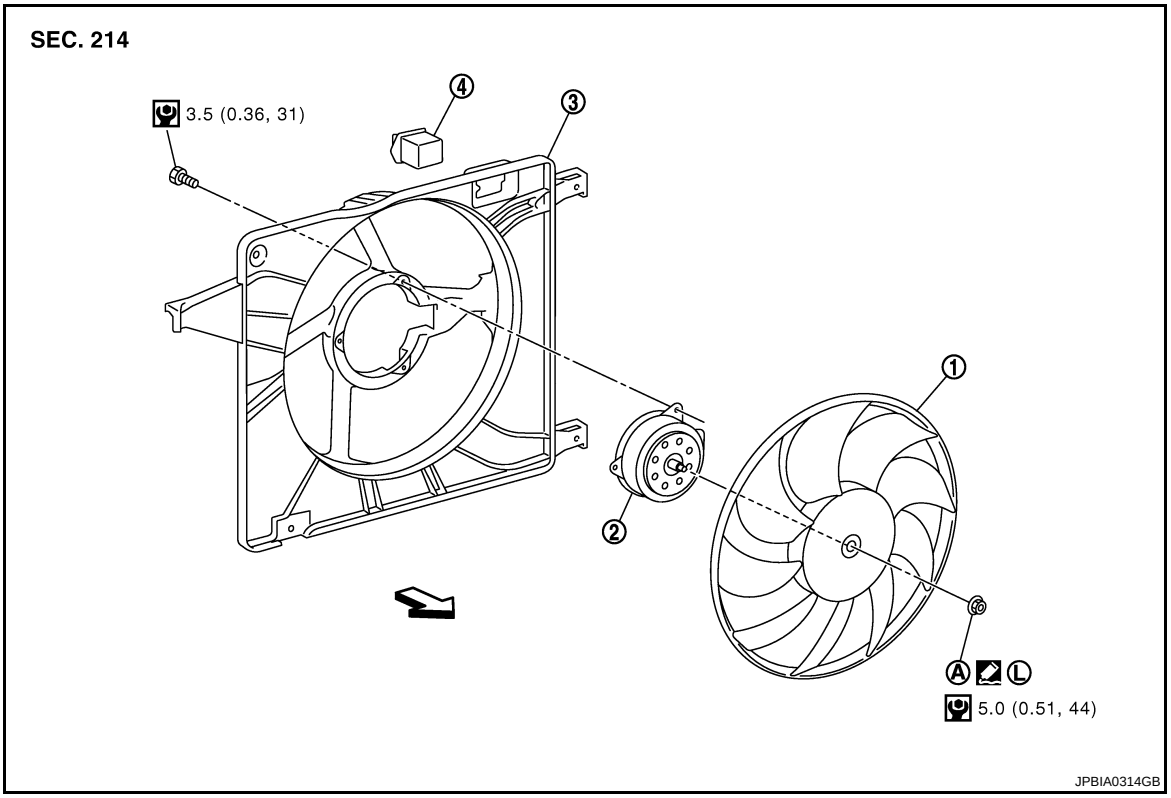
INSPECTION AFTER INSTALLATION

- Check that the reservoir tank cap is tightened.
- Check for leaks of engine coolant using the adapter and the reservoir tank cap tester [SST: — (M.S. 554-07). Refer to CO-30, "Inspection".
- Start and warm up the engine. Visually make sure that there is no leaks of engine coolant.

COOLING FAN

Exploded View

INFOID:0000000001179230



1.	Cooling fan	2.	Fan motor	3.	Fan shroud
4.	Resistor				
A.	Reverse screw				

: Apply thread locking sealant.

: Vehicle front

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

Removal and Installation

INFOID:0000000001179231

REMOVAL

1. Remove air duct (inlet). Refer to EM-145, "Exploded View".
2. Disconnect harness connector from resistor and fan motor, and move harness to aside.
3. Remove cooling fan assembly.
   CAUTION:
   Be careful not to damage or scratch on radiator core.

INSTALLATION

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

CAUTION:

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

NOTE:

Cooling fan is controlled by ECM. For details, refer to ECM-289, "Description".

Disassembly and Assembly

INFOID:0000000001179232

DISASSEMBLY

1. Remove resistor from fan shroud.
   CAUTION:
   Handle carefully to avoid dropping and shocks.
2. Remove cooling fan mounting nut, and then remove the cooling fan.
   CAUTION:
   Reverse screw is used for the fan attachment screw. When removing or attaching, turn the screw the opposite way as for a normal screw.
3. Remove fan motor.

ASSEMBLY

Assembly is the reverse order of disassembly.

- Apply thread locking sealant on fan motor shaft.

Inspection

INFOID:0000000001179233

INSPECTION AFTER DISASSEMBLY

Cooling Fan

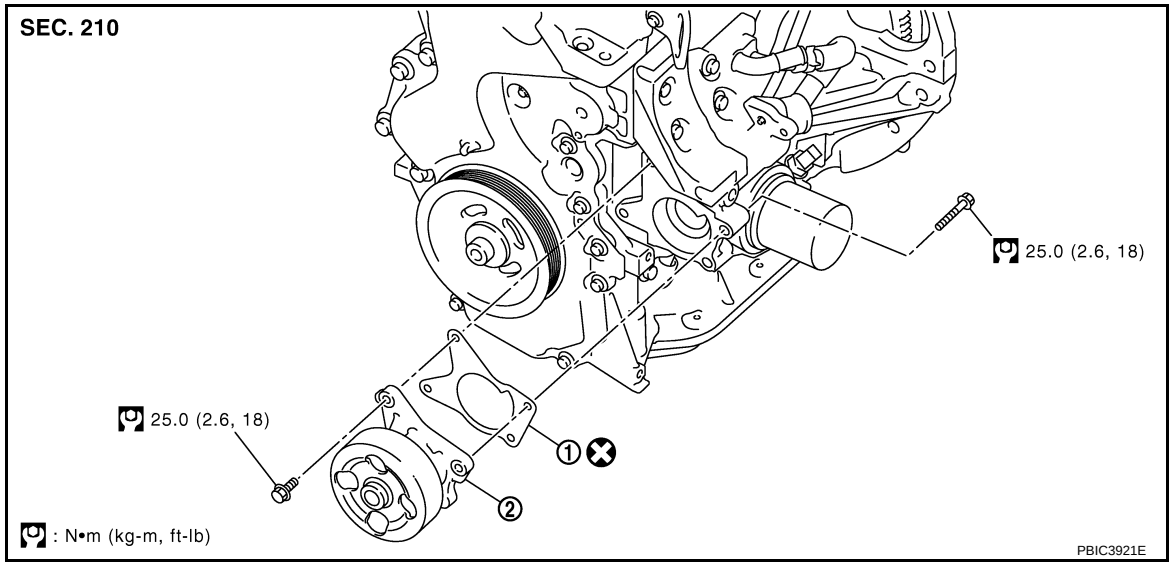
Inspect cooling fan for crack or unusual bend.

- If anything is found, replace cooling fan.

WATER PUMP

Exploded View

INFOID:0000000001179234



1. Gasket
2. Water pump

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

Removal and Installation

INFOID:0000000001179235

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-30, "Draining".
   CAUTION:
   - **Perform this step when the engine is cold.**
   - **Never spill engine coolant on drive belts.**
2. Remove front fender protector (RH). Refer to EXT-21, "Exploded View".
3. Remove drive belt. Refer to EM-144, "Removal and Installation".
4. Remove water pump.
   - Engine coolant will leak 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 disassemble and should replaced as a unit.**

INSTALLATION

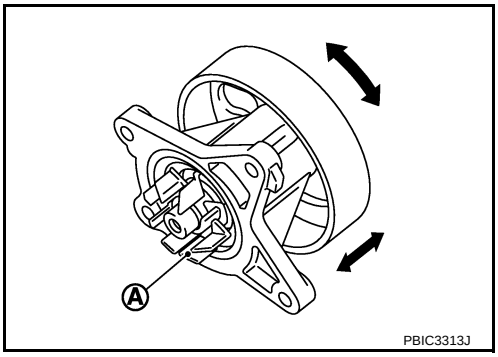
Install in the reverse order of removal.

Inspection

INFOID:0000000001179236

INSPECTION AFTER REMOVAL

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



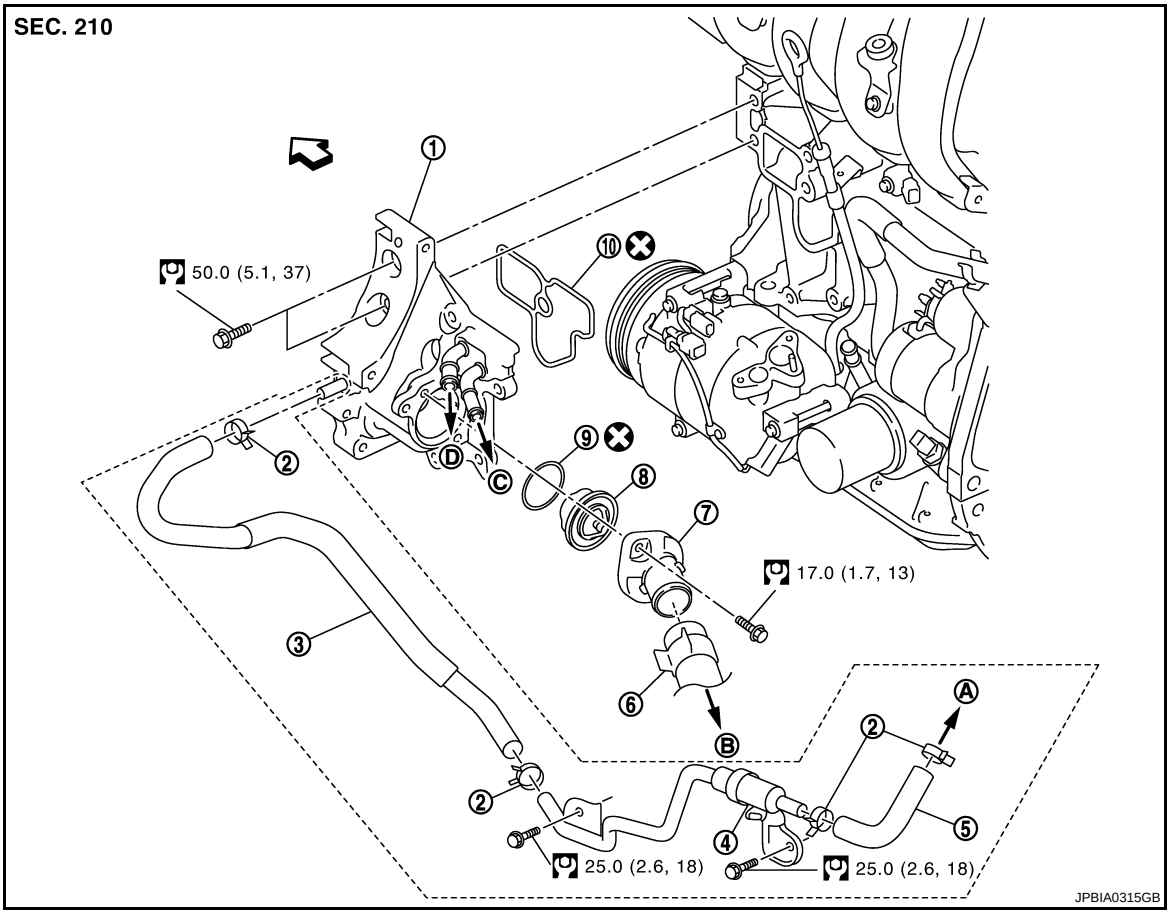
INSPECTION AFTER INSTALLATION

- Check that the reservoir tank cap is tightened.
- Check for leaks of engine coolant using the adapter and the reservoir tank cap tester [SST: — (M.S. 554-07). Refer to CO-30, "Inspection".
- Start and warm up the engine. Visually make sure that there is no leaks of engine coolant.

THERMOSTAT

Exploded View

INFOID:0000000001179237



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. Water inlet
8. Thermostat
9. Rubber ring
10. Gasket

A. To CVT fluid cooler
B. To radiator
C. To oil cooler
D. To reservoir tank

⇦ : Engine front

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

Removal and Installation

INFOID:0000000001179238

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-30, "Draining".
   CAUTION:
   - **Perform this step when engine is cold.**
   - **Never spill engine coolant on drive belt.**
2. Disconnect the battery cable from the negative terminal. Refer to PG-113, "Exploded View".
3. Add paint mark, then disconnect radiator hose (lower) from water inlet. Refer to CO-34, "Exploded View".
4. Remove water inlet and thermostat.
   - Engine coolant will leak from cylinder block, so have a receptacle ready below.
5. Remove thermostat housing with the following procedure:

a. Remove water pump. Refer to CO-39, "Exploded View".

b. Remove alternator. Refer to CHG-30, "MR20DE MODELS : Exploded View".

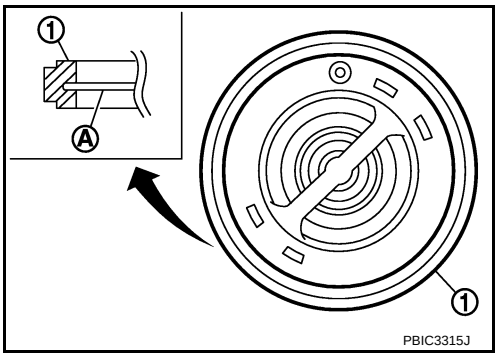
c. Disconnect water hoses.

INSTALLATION

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

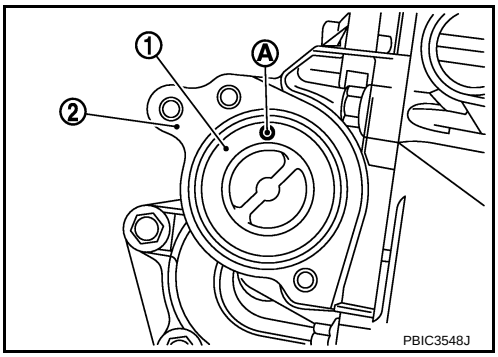
Thermostat

- 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 : Cylinder block



Inspection

INFOID:0000000001179239

INSPECTION AFTER REMOVAL

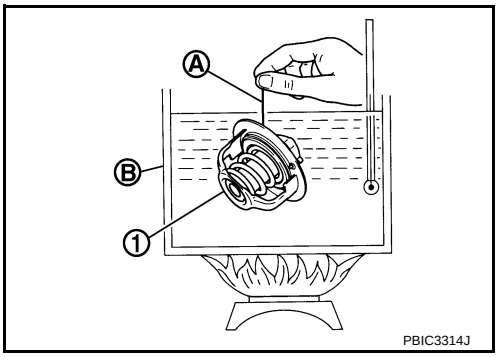
WARNING:

Use a protector to prevent a burn during the work.

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.

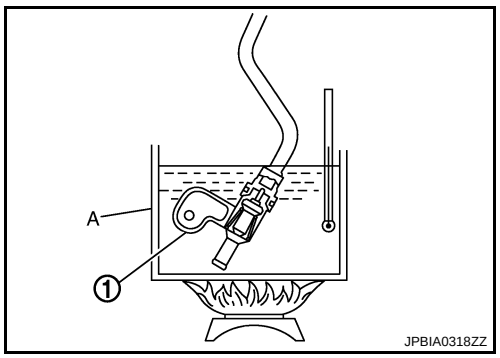
Standard: Refer to CO-46, "Thermostat".



- 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.

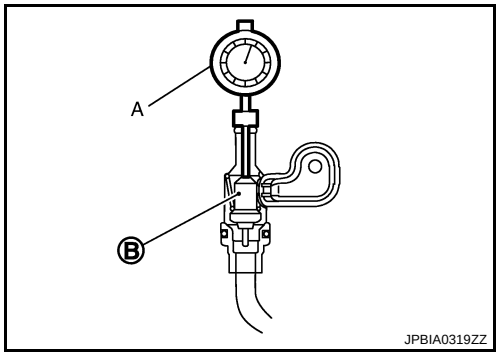


- Place dial indicator (A) on the pellet (B) and measure the elongation from the initial state.

Standard

: Refer to CO-46, "Heater Thermostat (CVT models)".

- If out of the standard, replace heater thermostat.



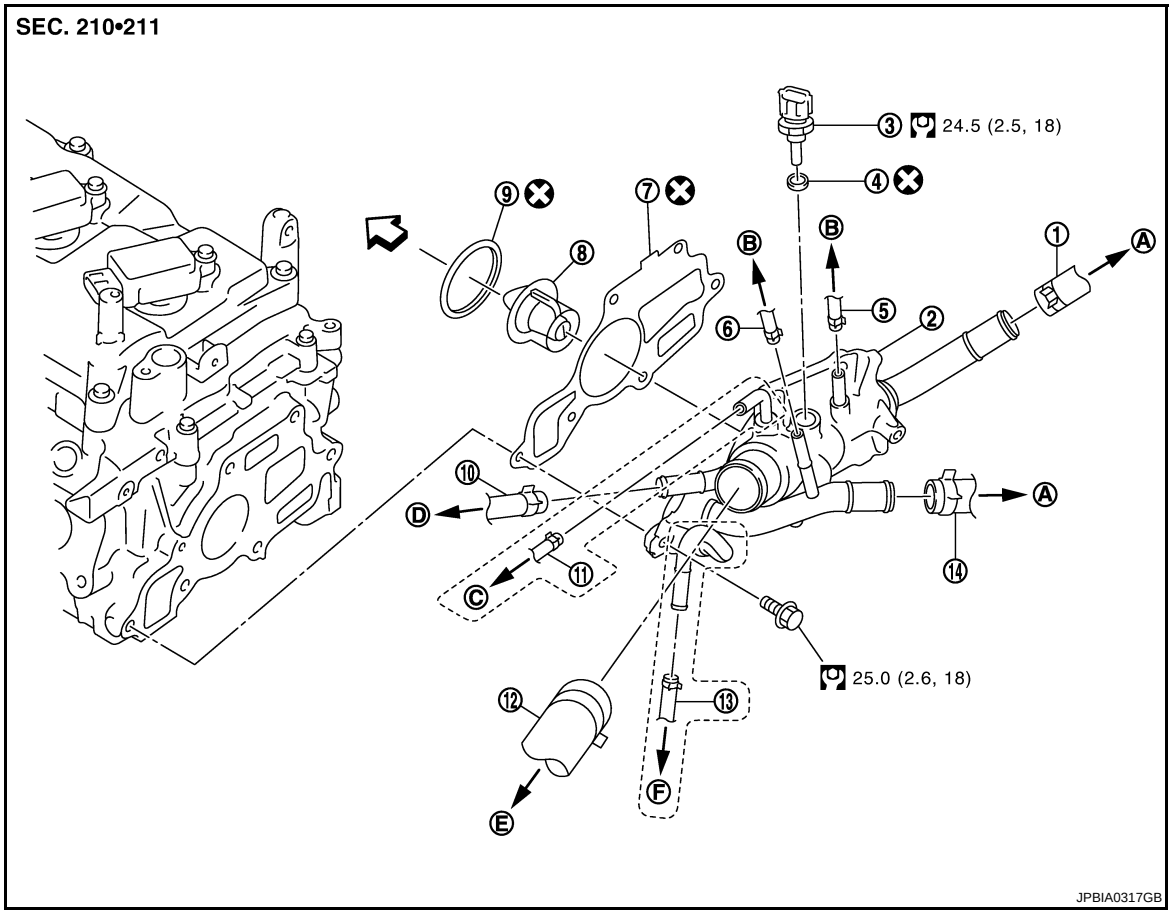
INSPECTION AFTER INSTALLATION

- Check that the reservoir tank cap is tightened.
- Check for leaks of engine coolant using the adapter and the reservoir tank cap tester [SST: — (M.S. 554-07). Refer to CO-30, "Inspection".
- Start and warm up the engine. Visually make sure that there is no leaks of engine coolant.

WATER OUTLET

Exploded View

INFOID:0000000001179240



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

⇦ : Engine front

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

Removal and Installation

INFOID:0000000001179241

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-30, "Draining".
   CAUTION:
   - **Perform this step when engine is cold.**
   - **Never spill engine coolant on drive belt.**
2. Disconnect radiator hose (upper). Refer to CO-34, "Exploded View".
3. Disconnect harness connector from engine coolant temperature sensor.
4. Remove reservoir tank hose (M/T models). Refer to CO-34, "Exploded View".
5. Remove water hoses and heater hoses.
6. Remove water outlet.

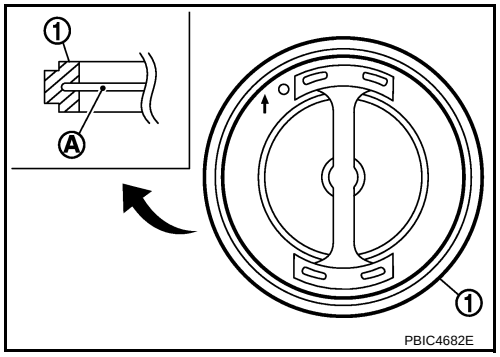
7. Remove engine coolant temperature sensor from water outlet, if necessary.

INSTALLATION

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

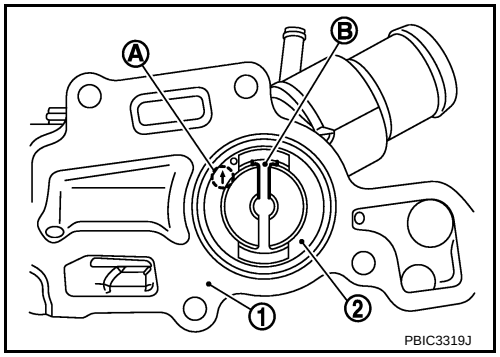
Water Control Valve

- 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:0000000001179242

INSPECTION AFTER REMOVAL

WARNING:

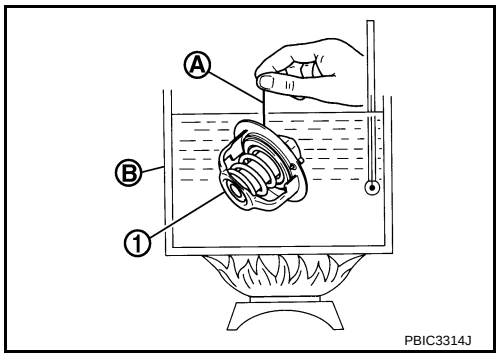
Use a protector to prevent a burn during the work.

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-46, "Water Control Valve".**

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

INSPECTION AFTER INSTALLATION

- Check that the reservoir tank cap is tightened.
- Check for leaks of engine coolant using the adapter and the reservoir tank cap tester [SST: — (M.S. 554-07). Refer to CO-30, "Inspection".
- Start and warm up the engine. Visually make sure that there is no leaks of engine coolant.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Periodical Maintenance Specification

INFOID:0000000001179243

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (Imp qt)

Engine coolant capacity (With reservoir tank at “MAX” level)	M/T models	6.8 (6)
	CVT models	8.2 (7-1/4)
Reservoir tank engine coolant capacity (At “MAX” level)		0.78 (5/8)

Radiator

INFOID:0000000001179244

RESERVOIR TANK CAP

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

Reservoir tank cap relief pressure	Standard	130.2 - 149.8 (1.3 - 1.5, 1.3 - 1.5, 18.9 - 21.7)

RADIATOR

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

Leakage testing pressure	150 (1.5, 1.53, 21.75)

Thermostat

INFOID:0000000001179245

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:0000000001179246

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:0000000001179247

Standard

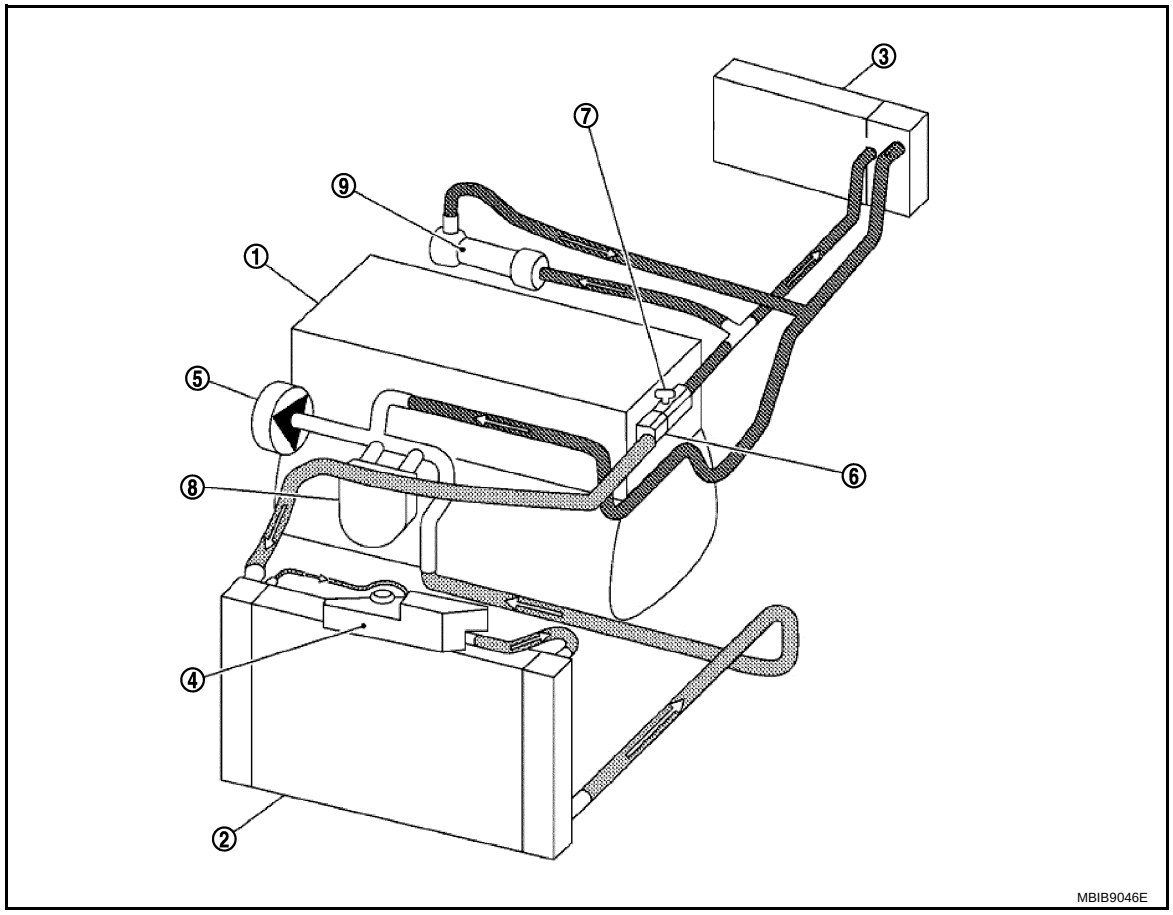
Valve opening temperature	93.5 - 96.5°C (200 - 206°F)
Maximum valve lift	8.0 mm/108°C (0.315 in/226°F)
Valve closing temperature	90°C (194°F)

FUNCTION DIAGNOSIS

DESCRIPTION

Engine Cooling System

INFOID:0000000001179248



1. Engine
2. Radiator
3. Heater core
4. Reservoir tank
5. Water pump
6. Thermostat
7. Air relief plug
8. Oil cooler
9. EGR cooler

SYMPTOM DIAGNOSIS

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:0000000001179249

	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn timing belt	—
		Thermostat stuck closed	—	
		Damaged fins	Dust contamination or paper clogging	
			Mechanical 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 coolant mixture ratio	—	—	—
	Poor coolant quality	—	—	—
	Insufficient coolant	Coolant leaks	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
			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	—	
		Installed large fog lamp		

PRECAUTION

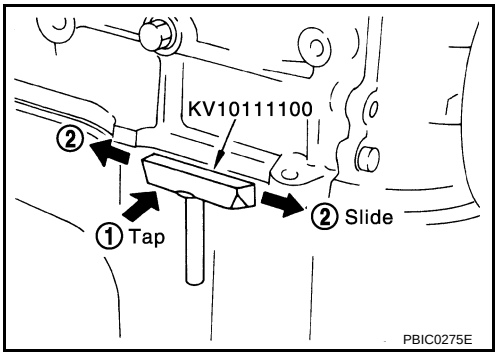
PRECAUTIONS

Precaution for Liquid Gasket

INFOID:0000000001179250

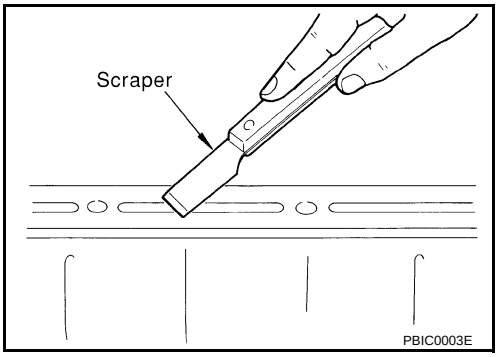
REMOVAL OF LIQUID GASKET

- After removing the mounting bolts and nuts, separate the mating surface using a seal cutter and remove the liquid gasket.
  CAUTION:
  Be careful not to damage the mating surfaces.
- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap the gasket applied area.
  CAUTION:
  If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.

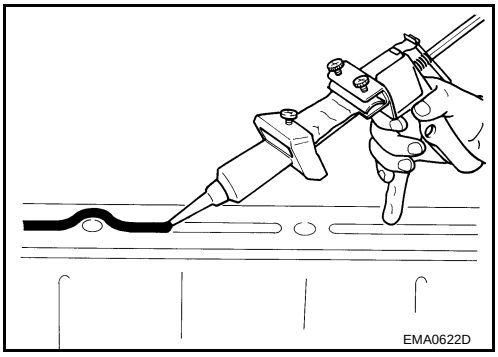


LIQUID GASKET APPLICATION PROCEDURE

1. Using a scraper, remove the old liquid gasket adhering to the gasket application surface and the mating surface.
   - Remove the liquid gasket completely from the groove of the gasket application surface, mounting bolts and bolt holes.
2. Wipe the gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.
3. Attach the liquid gasket to the tube presser.
   Use Genuine Liquid Gasket or equivalent.

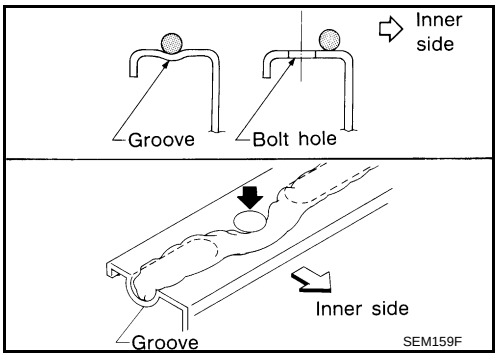


4. Apply the gasket without breaks to the specified location with the specified dimensions.
   - If there is a groove for the liquid gasket application, apply the gasket to the groove.



   - As for the bolt holes, normally apply the gasket inside the holes. If specified, it should be applied outside the holes. Make sure to read the instruction in this manual.
   - Within five minutes of gasket application, install the mating component.
   - If the liquid gasket protrudes, wipe it off immediately.
   - Do not retighten after the installation.
   - After 30 minutes or more have passed from the installation, fill the engine oil and coolant.

   CAUTION:
   If there are instructions in this manual, observe them.

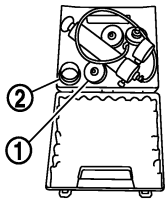


PREPARATION

PREPARATION

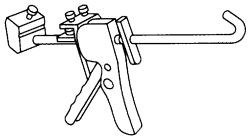
Special Service Tools

INFOID:0000000001179251

NISSAN tool number (RENAULT tool number) Tool name		Description
— (M.S. 554-07) Reservoir tank cap tester 1. Adapter A — (M.S. 554-01) 2. Adapter B — (M.S. 554-06)	 E1BIA0058ZZ	Leak checking Checking reservoir tank cap

Commercial Service Tools

INFOID:0000000001179252

NISSAN tool number Tool name		Description
WS39930000 Tube pressure	 S-NT052	Pressing the tube of liquid gasket

ON-VEHICLE MAINTENANCE

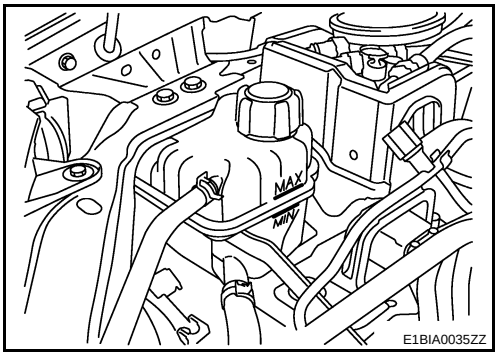
ENGINE COOLANT

Inspection

INFOID:0000000001179253

LEVEL

1. Check if the reservoir tank coolant level is within MIN to MAX when engine is cool.
2. Adjust coolant if too much or too little.

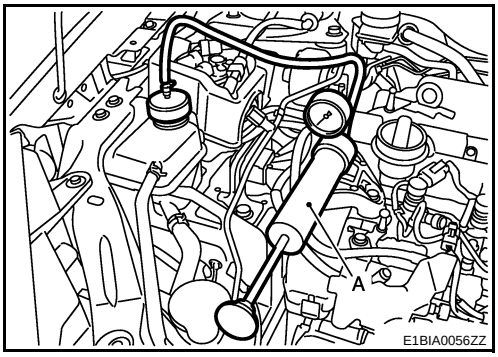


LEAKAGE

- To check for leakage, fit the adapter to the reservoir tank, and then connect it to the tester [SST: — (M.S. 554-07)] (A) as shown.
- Warm up the engine and turn it off.
- To check for leaks, apply pressure to the cooling system with the radiator cap tester and radiator reservoir cap tester adapter.

Testing pressure : Refer to CO-64, "Radiator".

- If the pressure drops, look for leakage.
- Unscrew slowly the adapter from the reservoir tank to reduce the pressure in cooling system, and install the reservoir tank cap.



WARNING:

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

CAUTION:

Higher pressure than specified may cause radiator damage.

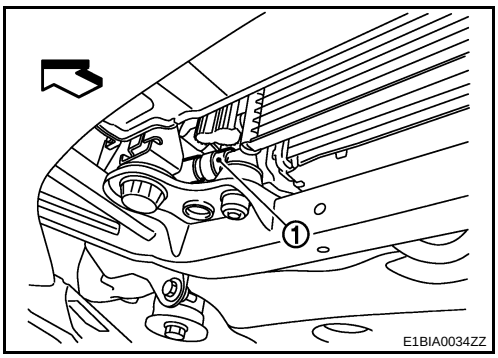
Draining

INFOID:0000000001179254

WARNING:

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

1. Remove engine undercover.
2. Disconnect reservoir tank hose (lower) (1) from radiator and remove reservoir tank cap.
3. Remove air relief plug from water outlet. Refer to CO-62, "Exploded View".
4. Remove reservoir tank, then clean reservoir tank.
5. Check drained coolant for contaminants such as rust, corrosion or discoloration.
   If contaminated, flush engine cooling system. Refer to CO-53, "Flushing".

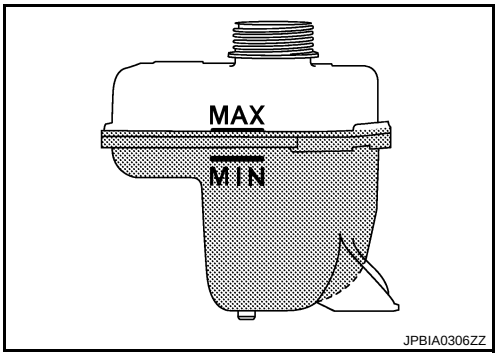


Refilling

INFOID:0000000001179255

- **Before start working, turn off the automatic air conditioner and the blower motor.**

1. Install reservoir tank, lower radiator hose and air relief plug.
2. Fill reservoir tank slowly with coolant until coolant spills from the air relief hole. Refer to CO-62, "Exploded View".
   - **Put a cloth under the air relief plug to prevent engine coolant to dampen the crankshaft position sensor.**
   - Pour coolant to the MAX level line of the reservoir tank at a rate of 2 liter (1-3/4 lmp qt)/min or lower.
3. Close the air relief plug.
   CAUTION:
   If the filling rate is too fast, this could lead to air being mixed in the coolant. Be sure to fill the coolant slowly according to the rate indicated above.
   Use Genuine NISSAN Engine Coolant or equivalent in its quality mixed with water (distilled or demineralized). Refer to MA-29, "Engine Coolant Mixture Ratio".



Engine coolant capacity (With reservoir tank)	**: Refer to CO-64, "Periodical Maintenance Specification".**
Reservoir tank capacity	**: Refer to CO-64, "Periodical Maintenance Specification".**

4. Start engine without closing reservoir tank cap and keep engine racing at 1,500 rpm for about 2-3 minutes. If necessary, pour engine coolant up to MAX level.
   - **If coolant overflows reservoir tank hole, install filler cap.**
   - **Watch engine coolant temperature gauge so as not overheat the engine during all of the operation.**

   WARNING:
   - **Be careful not be scaled with hot engine coolant or vacuum pump when operating.**
   - **Radiator fan blade can start at any time and make personal injuries.**
5. Turn off the engine and loose air relief plug until coolant spills from air relief hole.
6. Close the air relief plug and run the engine at 2,000 rpm until the upper hose comes hot and radiator fan operates. Let the engine running approximately 5 minutes at idle speed and check for sound of coolant flow while running engine from idle up to 3,000 rpm.
   - Sound may be noticeable at heater water cock.
7. If sound is heard, bleed air from cooling system by repeating steps 4 to 6 until coolant lever no longer drops.
   - Check the radiator lower hose for any signs of leakage.
8. Turn off the engine and let it cool down.
   - Cool down using a fan to reduce the time.
9. After cooling period, loose the air relief plug and check if coolant spills from the air relief hole. In other case, remove the air relief plug until the coolant spills, and then close the relief air plug. Bleed air from cooling system by repeating steps 6 to 10 until the coolant spills immediately.
10. Check the engine coolant level when engine is cool and refill to MAX level line if the level is lower.
    - Clean excess coolant from engine.
11. Check that the reservoir tank cap is tightened.

Flushing

INFOID:0000000001179256

1. Fill reservoir tank with water until water spills from the air relief hole, then close air relief plug. Reinstall reservoir tank cap.
2. Run engine and warm it up to normal operating temperature.
3. Rev engine two or three times under no-load.
4. Stop engine and wait until it cools down.
5. Drain water.
6. Repeat steps 1 through 5 until clear water begins to drain from radiator.

7. Blow compressed air into cooling circuit through the reservoir tank valve hole to drain all the water.

RADIATOR

RADIATOR CAP

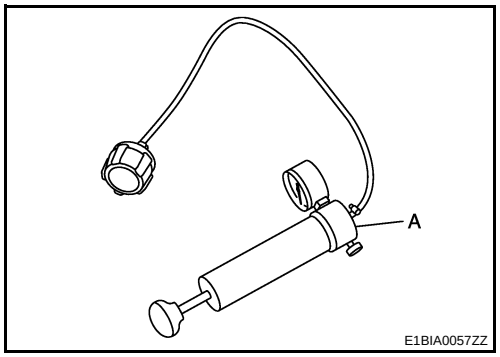
RADIATOR CAP : Inspection

INFOID:0000000001179257

- Fit the adapter to the tester as shown.
- When connecting the reservoir tank cap to the tester [SST: — (M.S. 554-07)] (A), apply water or LLC to the cap seal part.
- Check reservoir tank cap relief pressure.

Standard : Refer to CO-64, "Radiator".

- Replace the reservoir tank cap if the engine coolant passes through it, or if any fur signs is detected.



RADIATOR

RADIATOR : Inspection

INFOID:0000000001179258

Check radiator for mud or clogging. If necessary, clean radiator as follows.
- Be careful not to bend or damage the radiator fins.
- When radiator is cleaned without removal, remove all surrounding parts such as radiator fan, radiator shroud and horns. Then tape the harness and connectors to prevent water from entering.

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

- Use compressed air lower than 490 kPa (4.9 bar 5 kg/cm^2, 71psi) and keep distance more than 30 cm (11.8 in).

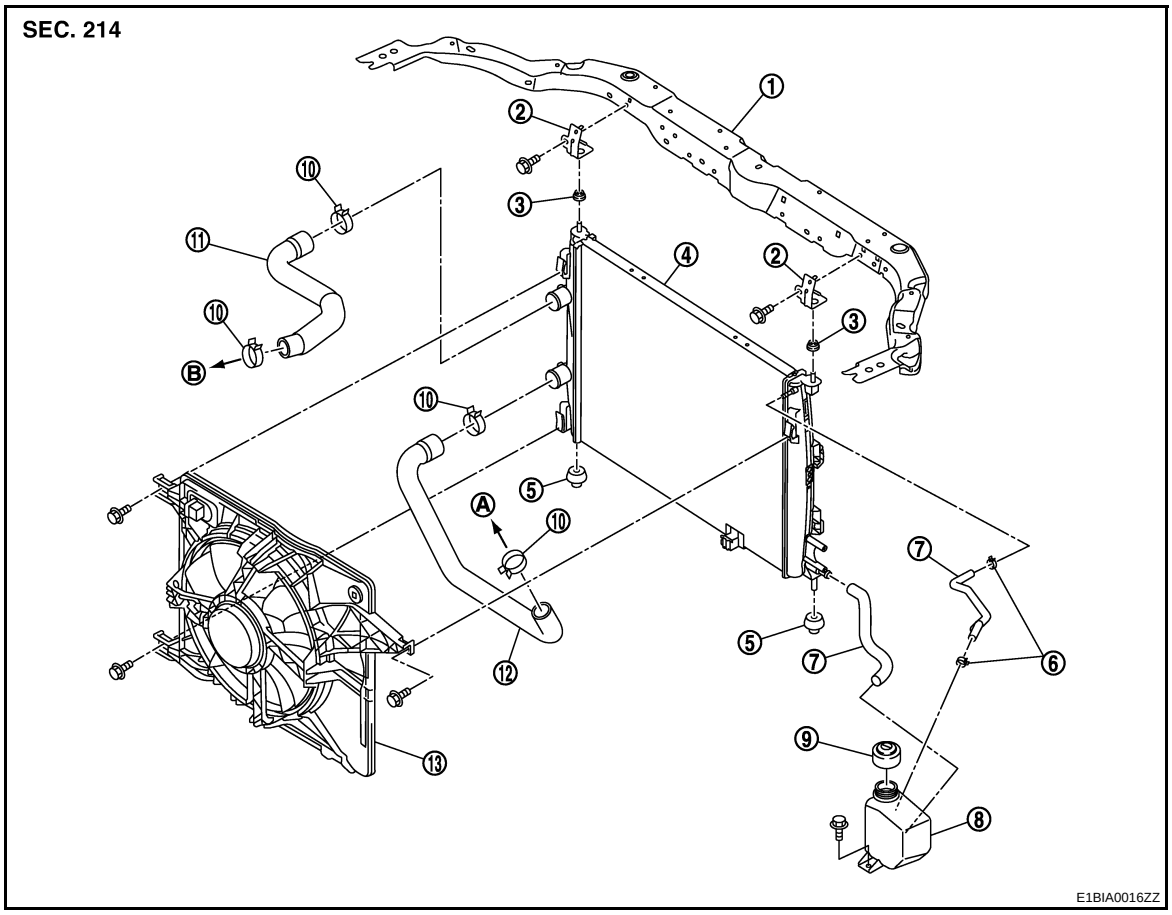
5. Blow air again into all the radiator core surface once per minute until no water sprays out.

ON-VEHICLE REPAIR

RADIATOR

Exploded View

INFOID:0000000001179259



1. Radiator core support
2. Mounting bracket
3. Mounting rubber (upper)
4. Radiator
5. Mounting rubber (lower)
6. Clamp
7. Reservoir tank hose
8. Reservoir tank
9. Reservoir tank cap
10. Clamp
11. Radiator hose (upper)
12. Radiator hose (lower)
13. Cooling fan assembly

A. To water inlet
B. To water outlet

Removal and Installation

INFOID:0000000001179260

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

REMOVAL

1. Remove engine cover. Refer to EM-267, "Removal and Installation".
2. Remove air cleaner case and air duct (inlet). Refer to EM-266, "Removal and Installation".
3. Remove reservoir tank hose bracket bolt from radiator upper mounting bracket (RH side).
4. Remove radiator fan motor harnesses.
5. Remove engine undercover.
6. Drain engine coolant. Refer to CO-52, "Draining".

CAUTION:
Perform when engine is cold.

7. Disconnect radiator upper hose, reservoir tank hose and mounting bracket.
8. Release charge air cooler from the radiator. Refer to EM-267, "Removal and Installation".
9. Remove radiator and radiator fan assembly.
   NOTE:
   Remove radiator and condenser assembly. Refer to HA-104, "Removal and Installation" and HA-261, "Removal and Installation".

CAUTION:
- **Do not damage or scratch radiator core when removing.**

INSTALLATION
- Reinstall any parts removed in reverse order of removal.
- Check for engine coolant leaks. Refer to CO-52, "Inspection".

Inspection

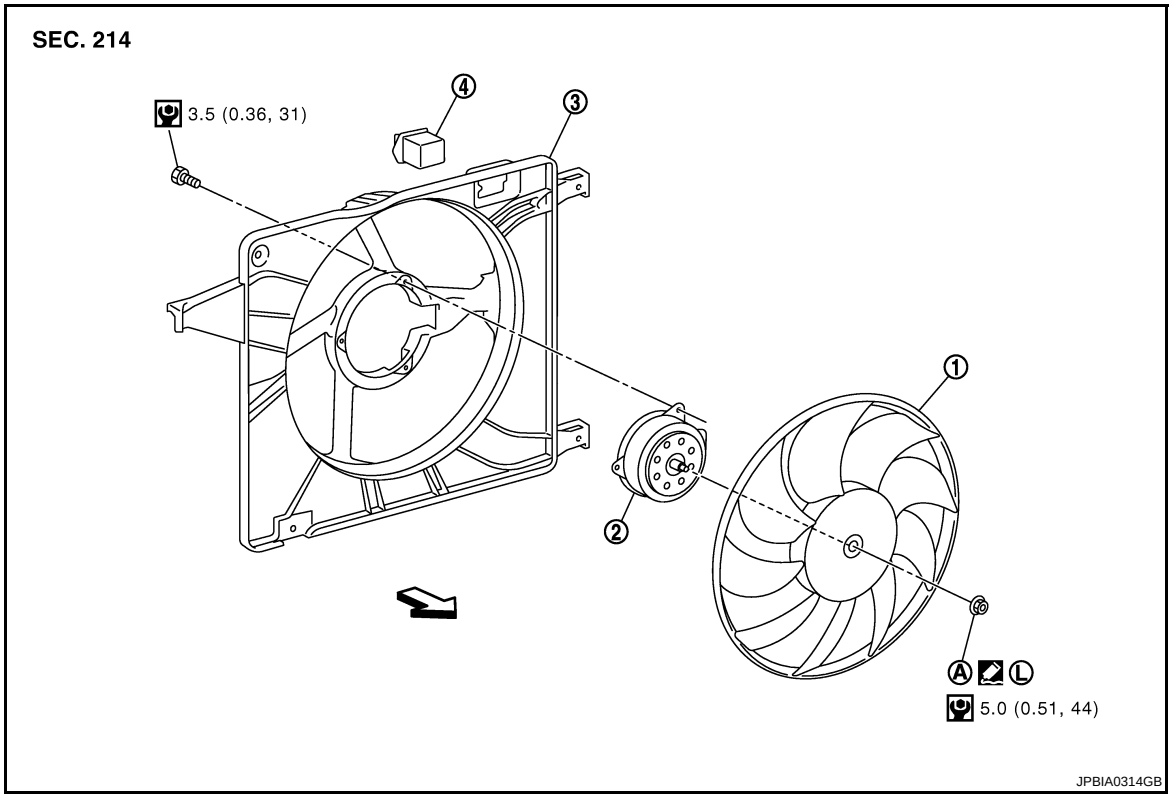
INFOID:0000000001179261

INSPECTION AFTER INSTALLATION
- Check for engine coolant leaks using reservoir tank cap tester. Refer to CO-52, "Inspection".

COOLING FAN

Exploded View

INFOID:0000000001179262



1.	Cooling fan	2.	Fan motor	3.	Fan shroud
4.	Resistor				
A.	Reverse screw				

: Apply thread locking sealant.

: Vehicle front

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

Removal and Installation

INFOID:0000000001179263

REMOVAL

1. Remove air duct (inlet). Refer to EM-266, "Exploded View".
2. Disconnect harness connector from resistor and fan motor, and move harness to aside.
3. Remove cooling fan assembly.
   CAUTION:
   Be careful not to damage or scratch on radiator core.

INSTALLATION

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

CAUTION:

Only use genuine parts for 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 ECK-57, "System Description".

Disassembly and Assembly

INFOID:0000000001179264

DISASSEMBLY

1. Remove resistor from fan shroud.
   CAUTION:
   Handle carefully to avoid dropping and shocks.
2. Remove cooling fan mounting nut, and then remove the cooling fan.
   CAUTION:
   Reverse screw is used for the fan attachment screw. When removing or attaching, turn the screw the opposite way as for a normal screw.
3. Remove fan motor.

ASSEMBLY

Assembly is the reverse order of disassembly.

- Apply thread locking sealant on fan motor shaft.

Inspection

INFOID:0000000001179265

INSPECTION AFTER DISASSEMBLY

Cooling Fan

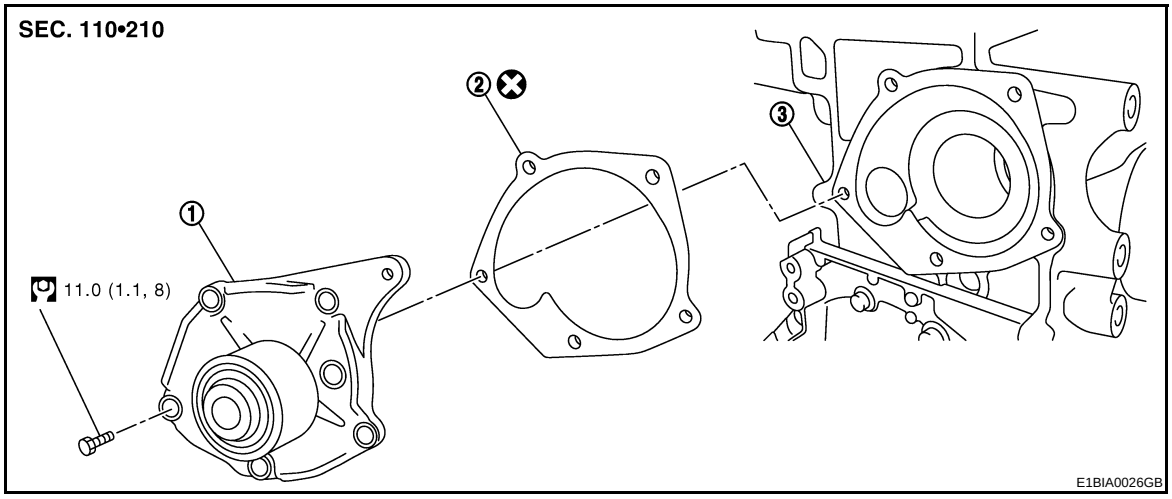
Inspect cooling fan for crack or unusual bend.

- If anything is found, replace cooling fan.

WATER PUMP

Exploded View

INFOID:0000000001179266



1. Water pump
2. Gasket
3. Cylinder block

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

Removal and Installation

INFOID:0000000001179267

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

REMOVAL

1. Remove the following parts.
   - Battery ground cable
   - Undercover
   - RH front wheel
2. Remove right side splash cover.
3. Remove drive belt. Refer to EM-260, "Removal and Installation".
4. Drain engine coolant. Refer to CO-52, "Draining".
   CAUTION:
   Perform when engine is cold.
5. Remove timing belt and inner cover. Refer to EM-288, "Removal and Installation".
6. Remove the water pump.
   - Coolant will leak from the cylinder block, so have a receptacle ready below.

   CAUTION:
   - **Handle the 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

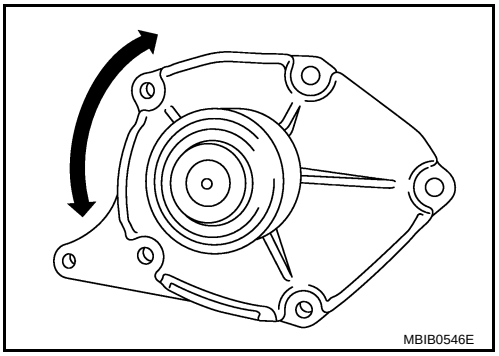
Install in the reverse order of removal.

Inspection

INFOID:0000000001179268

INSPECTION AFTER REMOVAL

- Visually make sure there is no significant dirt or rusting on the water pump body and vane.
- Make sure there is no looseness in the vane shaft, and that it turns smoothly when rotated by hand.
- If there are any unusualness, replace the water pump assembly.



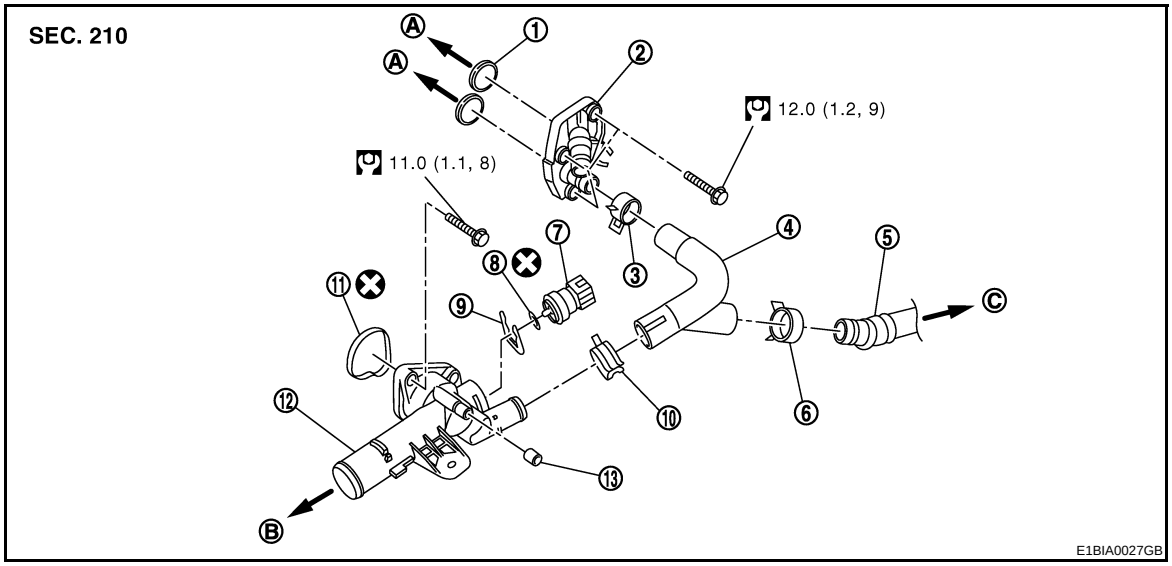
INSPECTION AFTER INSTALLATION

- Check for engine coolant leaks using reservoir tank cap tester. Refer to CO-52, "Inspection".

WATER OUTLET AND THERMOSTAT ASSEMBLY

Exploded View

INFOID:0000000001179269



1. O-ring
2. EGR cooler cover
3. Clamp
4. Water pipe
5. Heater hose
6. Clamp
7. Engine coolant temperature sensor
8. O-ring
9. Lock plate
10. Clamp
11. Gasket
12. Water outlet and thermostat assembly
13. Air relief plug

A. To EGR volume control valve housing
B. To radiator hose (upper)
C. To heater core

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

Removal and Installation

INFOID:0000000001179270

REMOVAL

1. Remove engine cover. Refer to EM-267, "Removal and Installation".
2. Remove air cleaner case and air duct (inlet). Refer to EM-266, "Removal and Installation".
3. Remove rear engine slinger. Refer to EM-303, "Exploded View".
4. Remove vacuum hose.
5. Remove vacuum pump. Refer to EM-277, "Removal and Installation".
6. Drain engine coolant. Refer to CO-52, "Draining".
   CAUTION:
   Perform when engine is cold.
7. Remove radiator upper hose. Refer to CO-56, "Exploded View".
8. Remove heater hose.
9. Disconnect reservoir tank hose. Refer to CO-56, "Exploded View".
10. Remove water outlet.

INSTALLATION

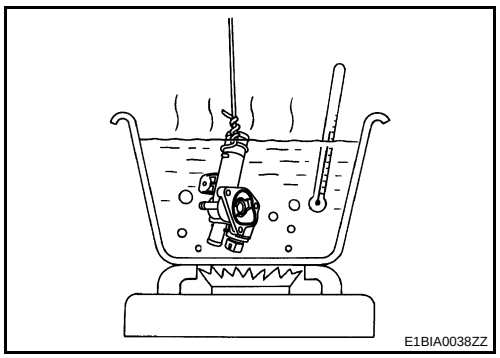
Install in the reverse order of removal.

Inspection

INFOID:0000000001179271

INSPECTION AFTER REMOVAL

- Place a thread so that it is caught in the valves of the thermostat. Immerse fully in a container filled with water. Heat while stirring. (The example in the figure shows the thermostat.)
- The valve opening temperature is the temperature at which the valve opens and falls from the thread.
- Continue heating. Check the full-open lift amount.
- After checking the full-open lift amount, lower the water temperature and check the valve closing temperature.
- If the measured value is out of the standard value or unusual valve seating condition is found, replace water inlet and thermostat assembly.



	Temperature °C (°F)
Start of opening	89 (192)
End of opening	97 - 101 (207 - 214)

INSPECTION AFTER INSTALLATION

- Check for engine coolant leaks using reservoir tank cap tester. Refer to CO-52, "Inspection".

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Periodical Maintenance Specification

INFOID:0000000001179272

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (Imp qt)

Engine coolant capacity [With reservoir tank (“MAX” level)]	7.0 (6-1/8)
Reservoir tank engine coolant capacity (At “MAX” level)	0.8 (3/4)

Radiator

INFOID:0000000001179273

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

Reservoir tank cap relief pressure	130 - 150 (1.33 - 1.53, 18.9 - 21.8, 1.3 - 1.5)
Leakage testing pressure	10 (0.10, 1.5, 0.1)

Thermostat

INFOID:0000000001179274

Unit: °C (°F)

Temperature of start opening	89 (192)
Temperature of end opening	97 - 101 (207 - 214)

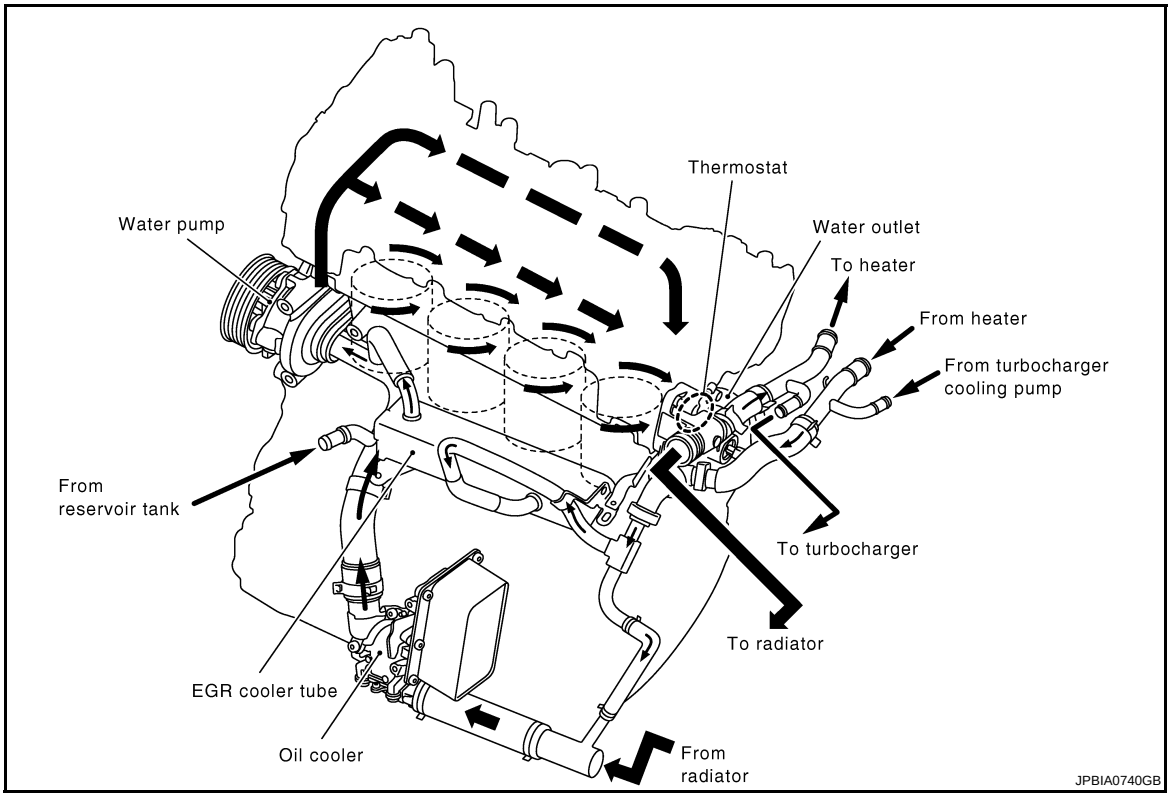
FUNCTION DIAGNOSIS

DESCRIPTION

M/T

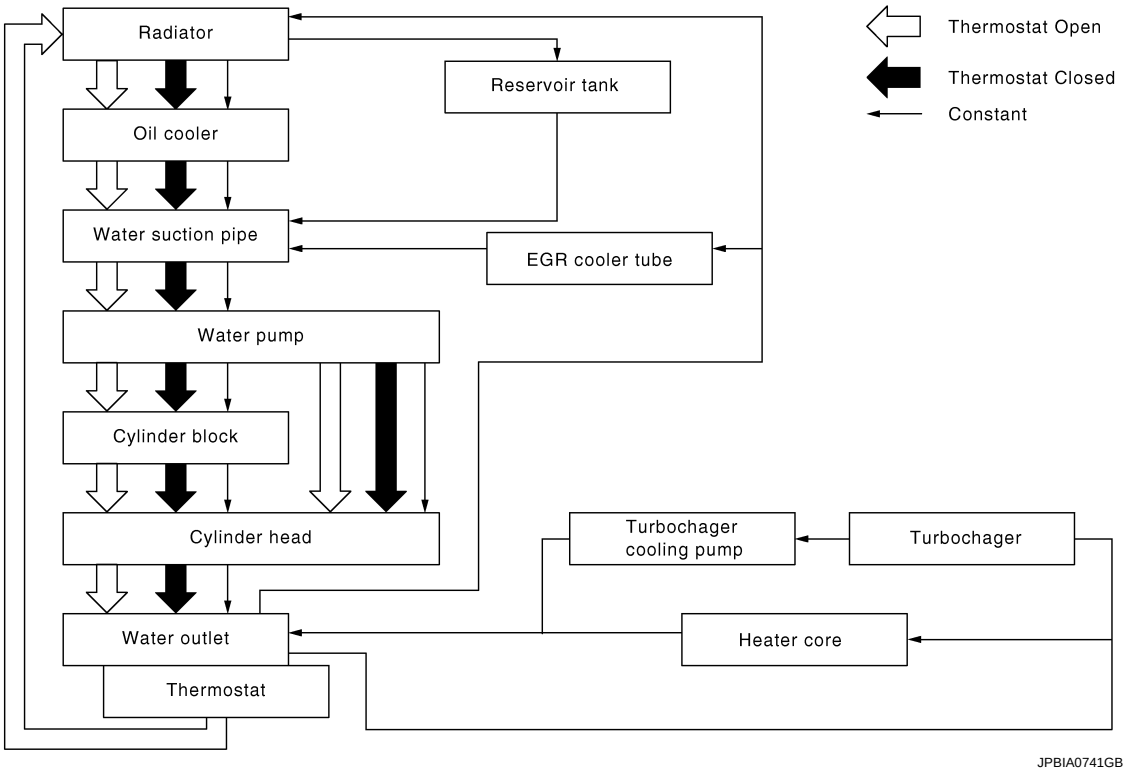
M/T : Engine Cooling System

INFOID:0000000001366157



M/T : Engine Cooling System Schematic

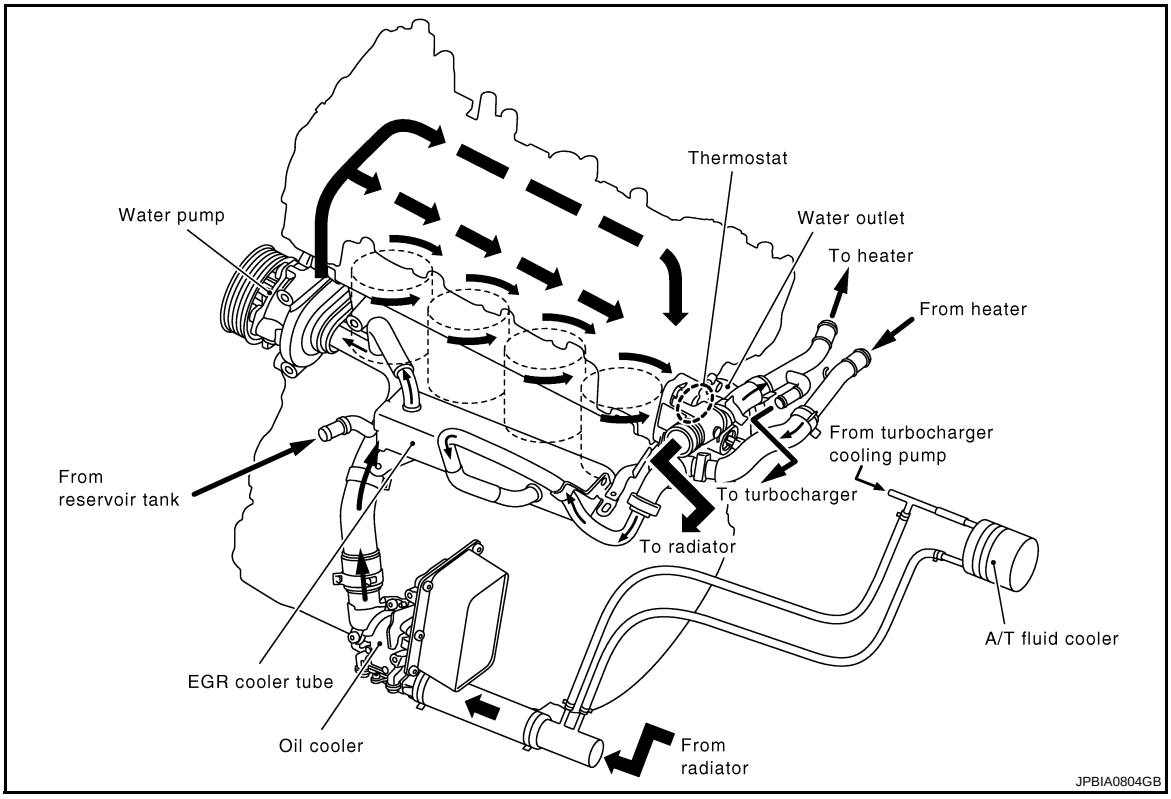
INFOID:0000000001366158



A/T

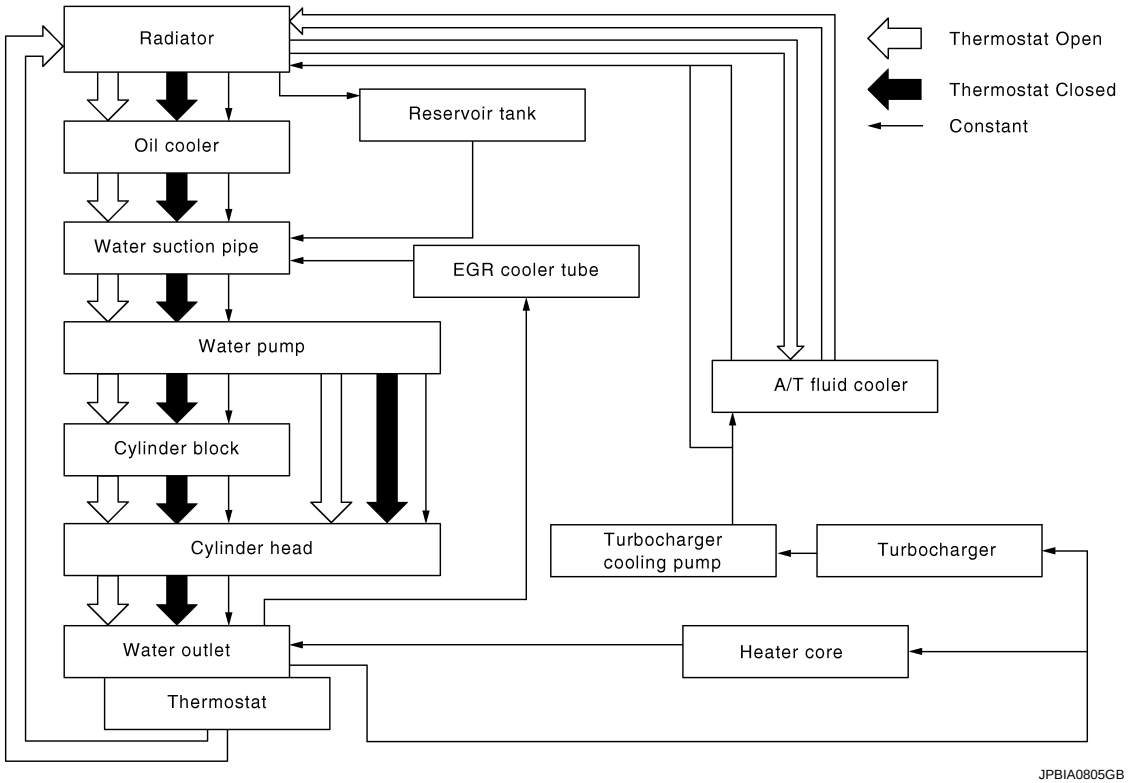
A/T : Engine Cooling System

INFOID:0000000001603587



A/T : Engine Cooling System Schematic

INFOID:0000000001603588



SYMPTOM DIAGNOSIS

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:0000000001366161

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

INFOID:0000000001585911

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

WARNING:

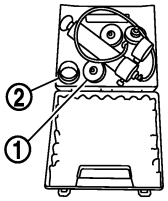
- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal 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:0000000001366164

Tool number (RENAULT tool number) Tool name	Description
— (M.S. 554-07) Reservoir tank cap tester 1. Adapter A — (M.S. 554-01) 2. Adapter B — (M.S. 554-06)  E1BIA0058ZZ	Checking radiator and reservoir tank cap

ON-VEHICLE MAINTENANCE

ENGINE COOLANT

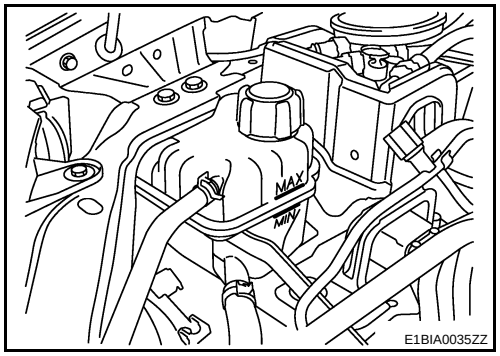
Inspection

INFOID:0000000001542688

LEVEL

- Check if the reservoir tank engine coolant level is within the “MIN” to “MAX” when the engine is cool.
- Adjust the engine coolant level as necessary.
- Check that the reservoir tank cap is tightened.

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

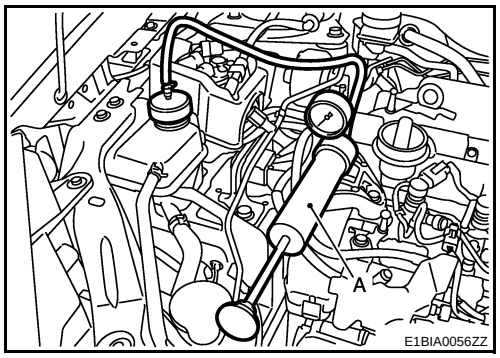


LEAKAGE

- To check for leakage, fit the adapter to the reservoir tank, and then connect it to the reservoir tank cap tester [SST: — (M.S.554-07)] (A) as shown.

Testing pressure: Refer to CO-86, "Radiator".

WARNING:
Never remove reservoir tank cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from reservoir tank.
CAUTION:
Higher test pressure than specified may cause radiator damage.



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

Draining

INFOID:0000000001366167

WARNING:
- **Never remove 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.**

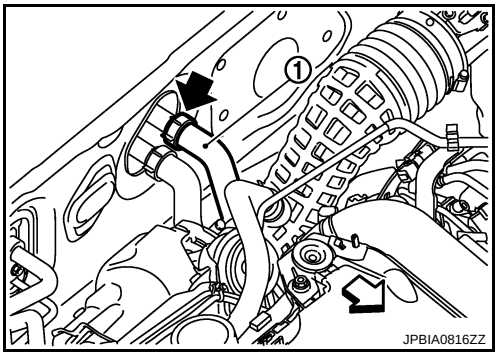
1. Remove engine undercover.
2. Disconnect radiator hose (lower), and then remove reservoir tank cap. Refer to CO-75, "Exploded View".
   CAUTION:
   Perform this step when engine is cold.
3. Remove reservoir tank if necessary, and drain engine coolant and clean reservoir tank before installing.
   - Removal of engine mounting insulator (RH) is necessary. Refer to EM-403, "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-72, "Flushing".

Refilling

INFOID:0000000001542689

1. Install reservoir tank if removed.
2. Connect radiator hose (lower). Refer to CO-75, "Exploded View".
3. Make sure that each hose clamp has been firmly tightened.

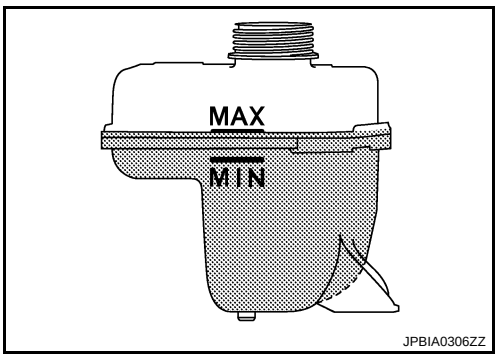
4. Disconnect heater hose (1) at position (⬅) in the figure.



⇦ : Vehicle front

- Enhance heater hose as high as possible, keeping heater hose end above reservoir tank MAX level.

5. Fill reservoir tank to specified level.
   - Pour coolant slowly of less than 2 ℓ (1-3/4 lmp qt) a minute to allow air in system to escape.
   - When coolant from heater unit starts to drain, connect heater hose and continue to fill up to reservoir tank MAX level.
   - Start engine without closing reservoir tank cap.
   - Keep engine racing at 1,500 rpm for about 2-3 minutes, filling reservoir tank up to MAX. Level, if necessary.
   - Use Genuine Nissan Engine Coolant or equivalent mixed with water (distilled or demineralized). Refer to MA-27, "Fluids and Lubricants".



Engine coolant capacity
(With reservoir tank at “MAX” level)
Refer to CO-86, "Periodical Maintenance Specification".

Reservoir tank engine coolant capacity
(At “MAX” level)
Refer to: CO-86, "Periodical Maintenance Specification".

6. Install reservoir tank cap.
7. Warm up engine until opening thermostat. Standard for warming-up time is approximately 10 minutes at 2,000 - 2,500 rpm.
   - Make sure 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.
8. Stop the engine and cool down to less than approximately 50°C (122°F).
   - Cool down using fan to reduce the time.
9. Refill reservoir tank to “MAX” level line with engine coolant, if necessary.
10. Repeat steps 6 through 9 two or more times with reservoir tank cap installed until reservoir tank level no longer drops.
11. Check cooling system for leaks with engine running.
12. Warm up the engine, and check for sound of engine coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between “COOL” and “WARM”.
    - Sound may be noticeable at heater unit.
13. Repeat step 12 three times.
14. If sound is heard, bleed air from cooling system by repeating step 6 through 9 until reservoir tank level no longer drops.
15. Check that the reservoir tank cap is tightened.

Flushing

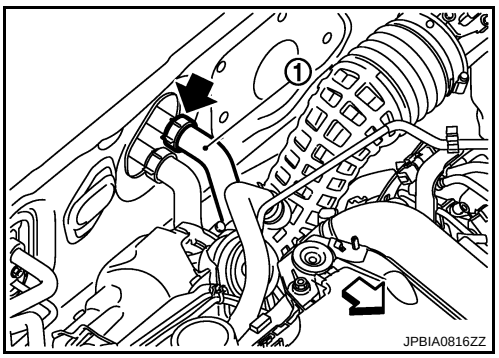
INFOID:0000000001542690

1. Install reservoir tank if removed.
2. Connect radiator hose (lower). Refer to CO-75, "Exploded View".

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

⇦ : Vehicle front

- Enhance heater hose as high as possible, keeping heater hose end above reservoir tank MAX level.



4. Fill reservoir tank with water.
   - When coolant from heater unit starts to drain, connect heater hose and continue to fill up to reservoir tank MAX level.
5. Install reservoir tank cap.
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-71, "Draining".
10. Repeat steps 1 through 9 until clear water begins to drain from radiator.
11. Check that the reservoir tank cap is tightened.

RADIATOR

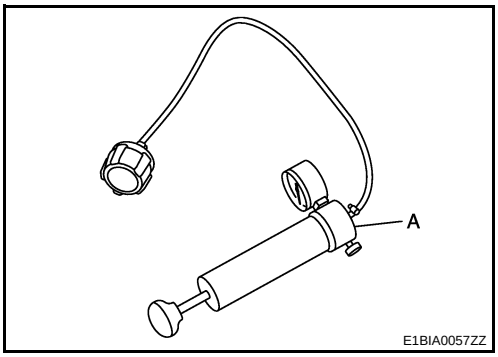
RESERVOIR TANK CAP

RESERVOIR TANK CAP : Inspection

INFOID:0000000001542699

- Fit the adapter to the reservoir tank cap tester [SST: — (M.S. 554-07)] (A) as shown.
- When connecting the reservoir tank cap to the reservoir tank cap tester, apply water or LLC to the reservoir tank cap seal part.
- Check reservoir tank cap relief pressure.

Standard: Refer to CO-86, "Radiator".



- Replace the reservoir tank cap if the engine coolant passes through it, or if any fur signs is detected.

CAUTION:

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

RADIATOR

RADIATOR : Inspection

INFOID:0000000001366171

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.

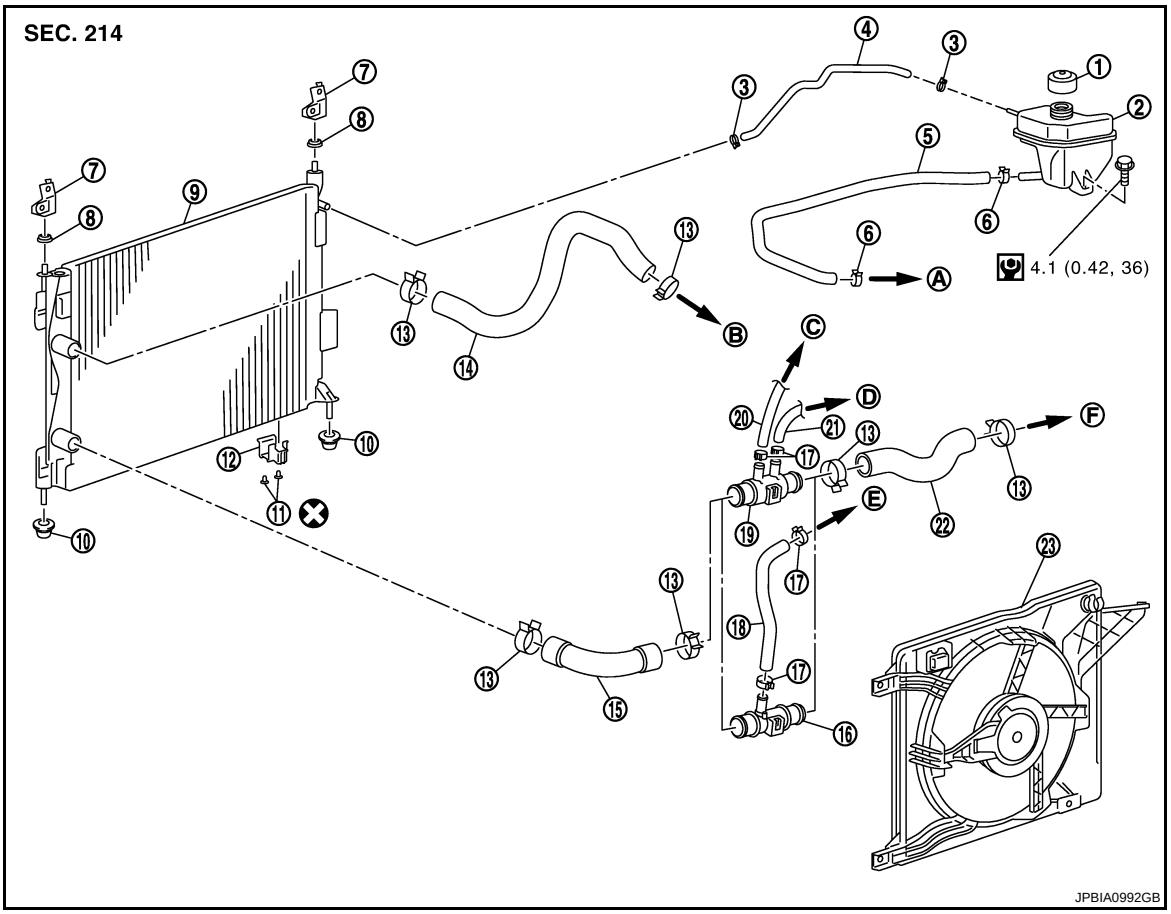
ON-VEHICLE REPAIR

RADIATOR

Exploded View

INFOID:0000000001495999

REMOVAL



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

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

Removal and Installation

INFOID:0000000001496000

REMOVAL

WARNING:

- **Never remove 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-71, "Draining".
   CAUTION:
   Perform this step when the engine is cold.
3. Remove air duct (inlet). Refer to EM-354, "Exploded View".
4. Remove front grille and air guide. Refer to EXT-17, "Exploded View".
5. Remove air inlet hose, air inlet pipe and bracket. Refer to EM-357, "Exploded View".
6. Remove liquid tank pipe fixing screw from radiator right side. Refer to HA-315, "Exploded View".
7. Remove mounting bracket and mounting rubber (upper).
8. Disconnect harness connector from resistor and fan motors, and move harness to aside.
9. Disconnect radiator hose (upper).
10. Remove cooling fan assembly.
    CAUTION:
    Be careful not to damage radiator core when removing.
11. Disconnect reservoir tank hose (upper) from radiator.
12. Disconnect radiator hose (lower).
13. Remove radiator.
    CAUTION:
    Be careful not to damage or scratch radiator core.

INSTALLATION

Installation is the reverse order of removal.

Inspection

INFOID:0000000001603889

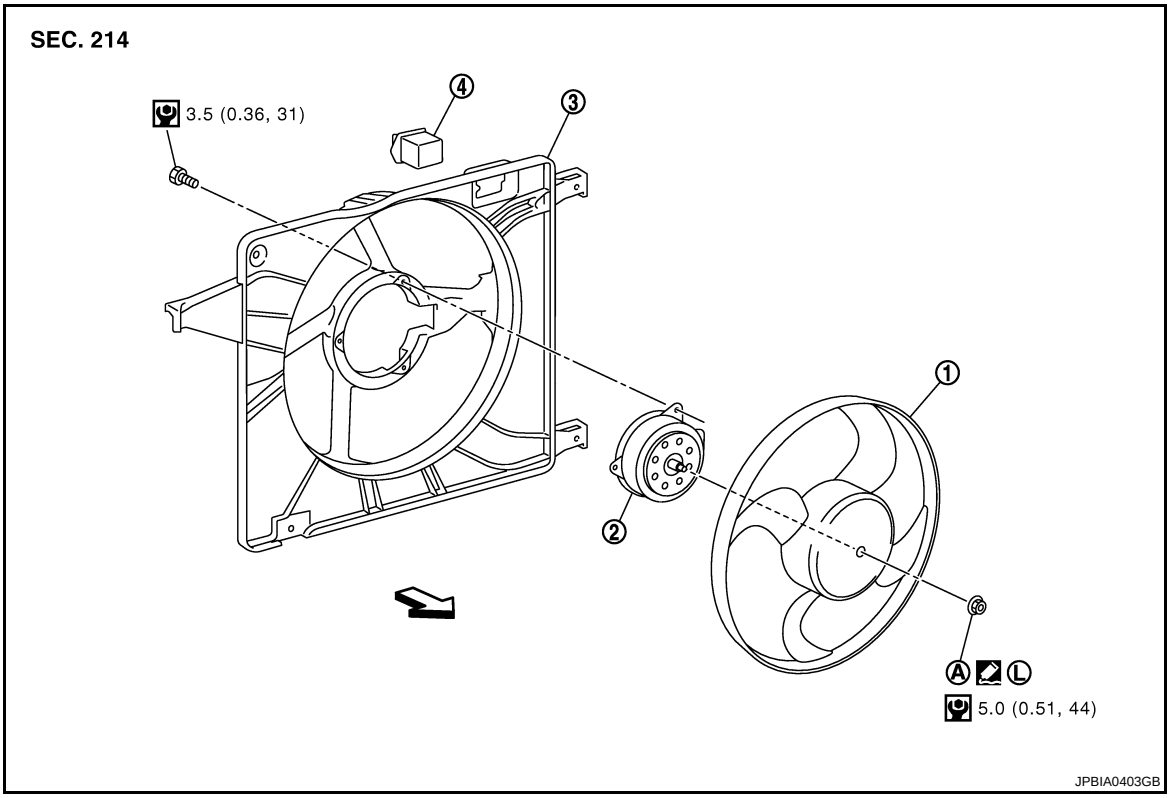
INSPECTION AFTER INSTALLATION

- Check that the reservoir tank cap is tightened.
- Check for leaks of engine coolant using the adapter and the reservoir tank cap tester [SST: — (M.S. 554-07). Refer to CO-71, "Inspection".
- Start and warm up the engine. Visually make sure that there is no leaks of engine coolant.

COOLING FAN

Exploded View

INFOID:0000000001542710



1.	Cooling fan	2.	Fan motor	3.	Fan shroud
4.	Resistor				
A.	Reverse screw				

: Apply thread locking sealant.

: Vehicle front

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

Removal and Installation

INFOID:0000000001366178

REMOVAL

1. Remove engine undercover.
2. Drain engine coolant from radiator. Refer to CO-71, "Draining".
   CAUTION:
   Perform this step when the engine is cold.
3. Remove air duct (inlet). Refer to EM-354, "Exploded View".
4. Remove air inlet hose, air inlet pipe and bracket. Refer to EM-357, "Exploded View".
5. Remove mounting bracket and mounting rubber (upper).
6. Disconnect harness connector from resistor and 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-283, "Description".

Disassembly and Assembly

INFOID:0000000001542712

DISASSEMBLY

1. Remove resistor from fan shroud.
   CAUTION:
   Handle carefully to avoid dropping and shocks.
2. Remove cooling fan mounting nuts, and then remove the cooling fan.
   CAUTION:
   Reverse screw is used for the fan attachment nut. When removing or attaching, turn the screw the opposite way as for a normal screw.
3. Remove fan motor.

ASSEMBLY

Assembly is the reverse order of disassembly.
- Apply thread locking sealant on fan motor shaft.

Inspection

INFOID:0000000001603890

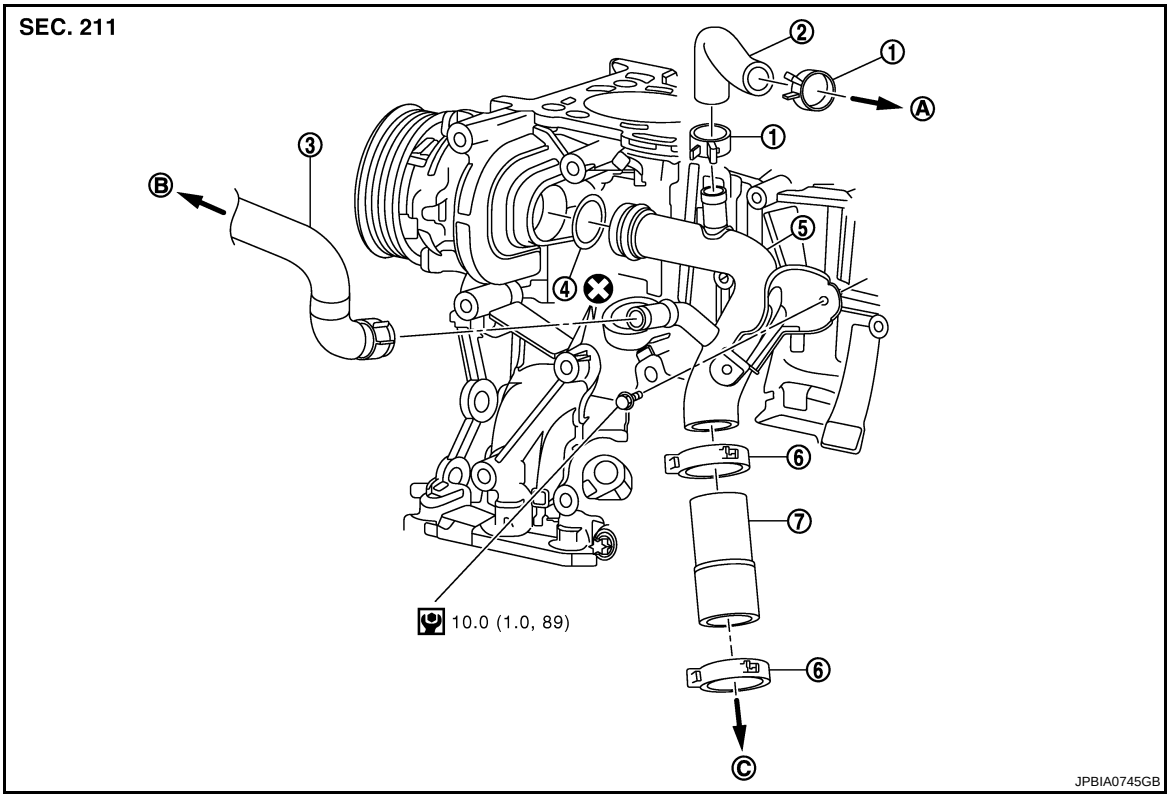
INSPECTION AFTER DISASSEMBLY

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

WATER PIPING

Exploded View

INFOID:0000000001366181



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:0000000001366182

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-71, "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-359, "Exploded View".
4. Remove multifunction support bracket. Refer to EM-352, "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:0000000001603897

INSPECTION AFTER INSTALLATION

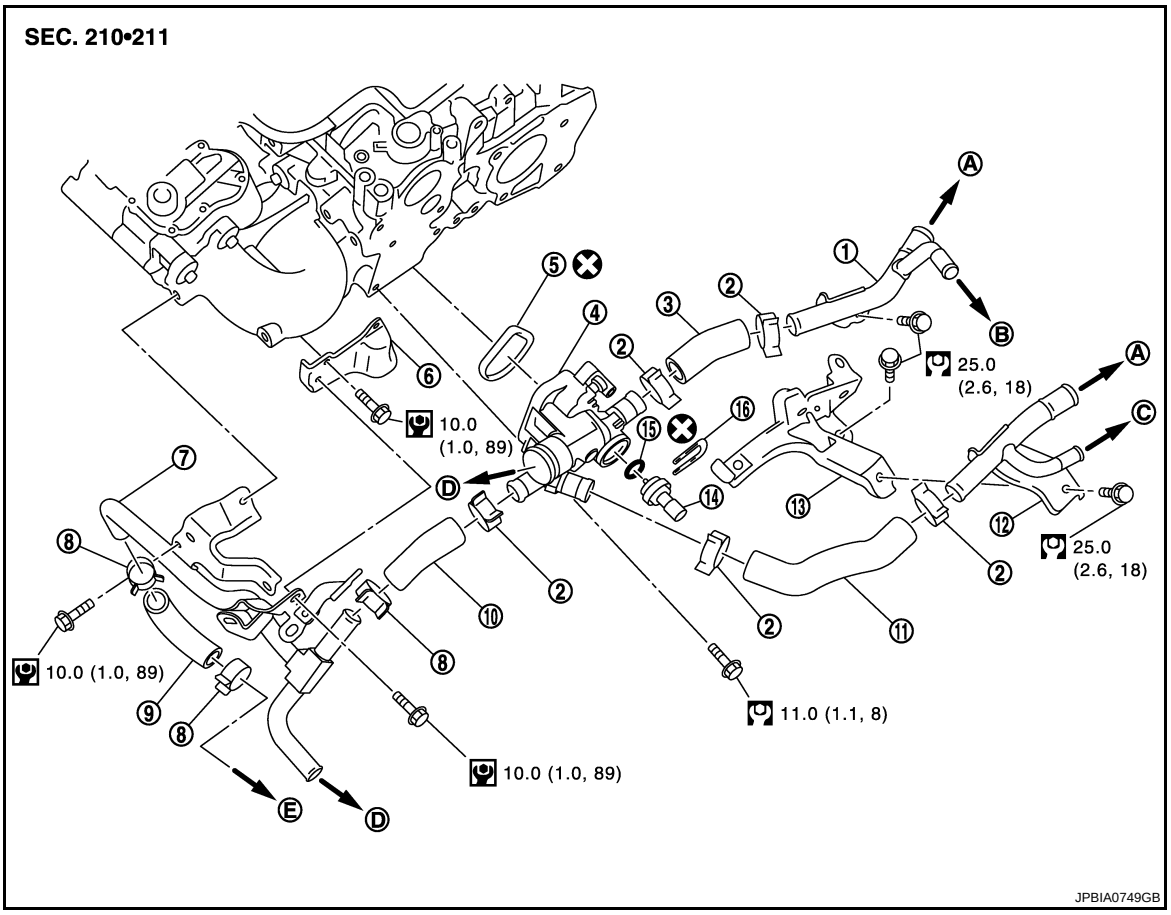
- Check that the reservoir tank cap is tightened.
- Check for leaks of engine coolant using the adapter and the reservoir tank cap tester [SST: — (M.S. 554-07). Refer to CO-71, "Inspection".
- Start and warm up the engine. Visually make sure that there is no leaks of engine coolant.

WATER OUTLET AND THERMOSTAT ASSEMBLY

Exploded View

INFOID:0000000001366184

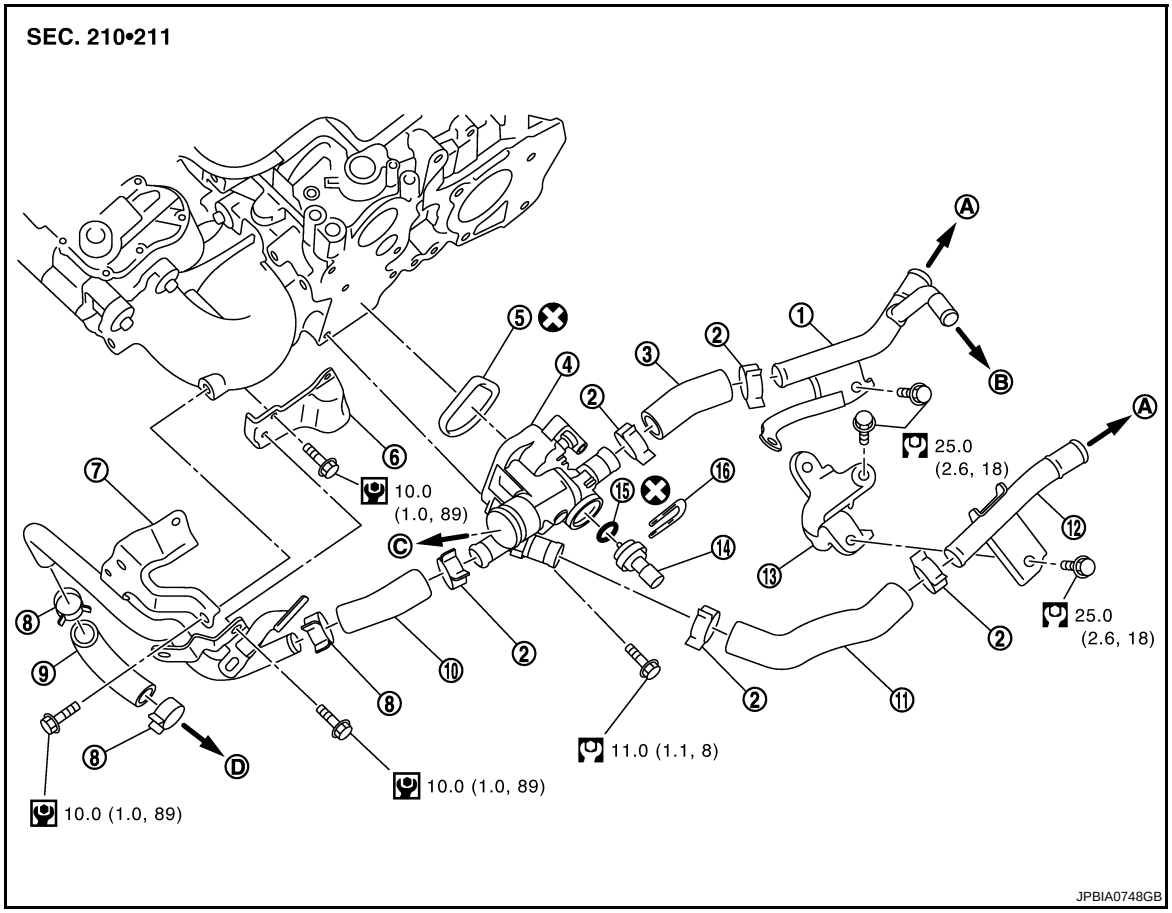
M/T models



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:0000000001366185

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-71, "Draining".
   CAUTION:
   Perform this step when engine is cold.
2. Remove battery. Refer to PG-113, "Exploded View".
3. Remove air duct assembly and air cleaner case. Refer to EM-354, "Exploded View".
4. Disconnect radiator hose (upper). Refer to CO-75, "Exploded View".
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.

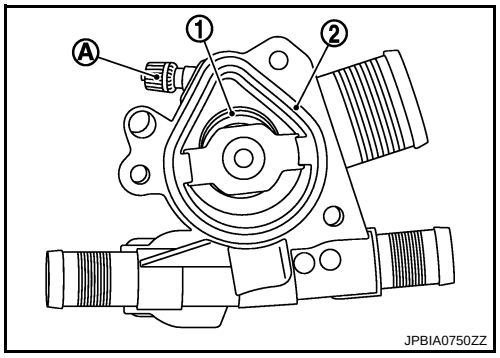
INSTALLATION

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:0000000001603896

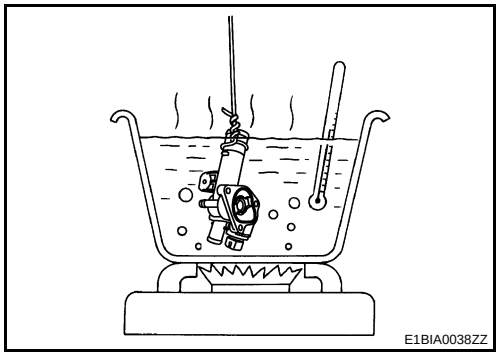
INSPECTION AFTER REMOVAL

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-86, "Water Outlet and Thermostat Assembly".



INSPECTION AFTER INSTALLATION

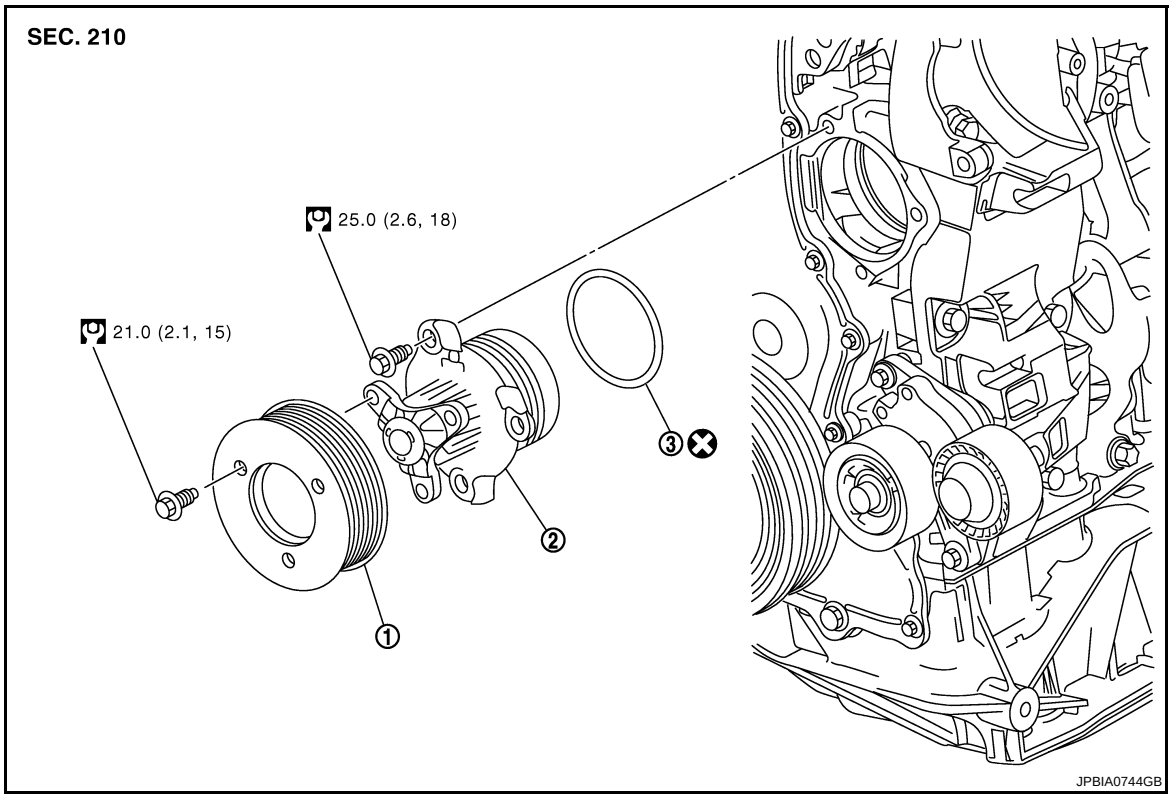
- Check that the reservoir tank cap is tightened.
- Check for leaks of engine coolant using the adapter and the reservoir tank cap tester [SST: — (M.S. 554-07). Refer to CO-71, "Inspection".
- Start and warm up the engine. Visually make sure that there is no leaks of engine coolant.

DISASSEMBLY AND ASSEMBLY

WATER PUMP

Exploded View

INFOID:0000000001366187



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

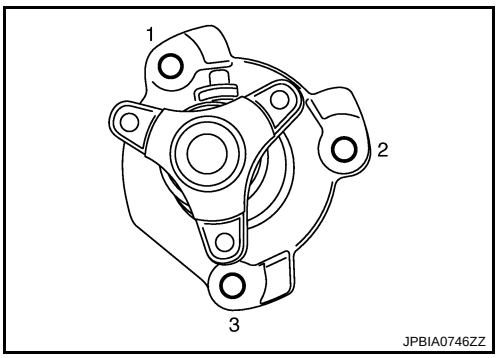
Refer to GI-4, "Components" for symbols in the figure.

Disassembly and Assembly

INFOID:0000000001366188

REMOVAL

1. Remove engine assembly. Refer to EM-403, "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.**

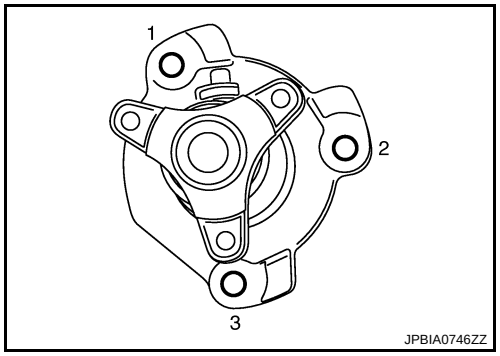


INSTALLATION

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.

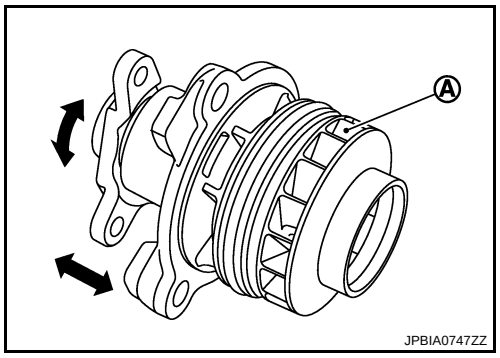


Inspection

INFOID:0000000001603895

INSPECTION AFTER DISASSEMBLY

- 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.



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Periodical Maintenance Specification

INFOID:0000000001366190

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (Imp qt)

Engine coolant capacity (With reservoir tank at “MAX” level)	M/T models	8.0 (7)
	A/T models	8.4 (7-3/8)
Reservoir tank engine coolant capacity (At “MAX” level)		0.78 (5/8)

Radiator

INFOID:0000000001366191

RESERVOIR TANK CAP

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

Cap relief pressure	Standard	130.2 - 149.8 (1.3 - 1.5, 1.3 - 1.5, 18.9 - 21.7)

RADIATOR

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

Leakage testing pressure	150 (1.5, 1.53, 21.75)

Water Outlet and Thermostat Assembly

INFOID:0000000001585912

Standard

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