SECTION CO
ENGINE COOLING SYSTEM

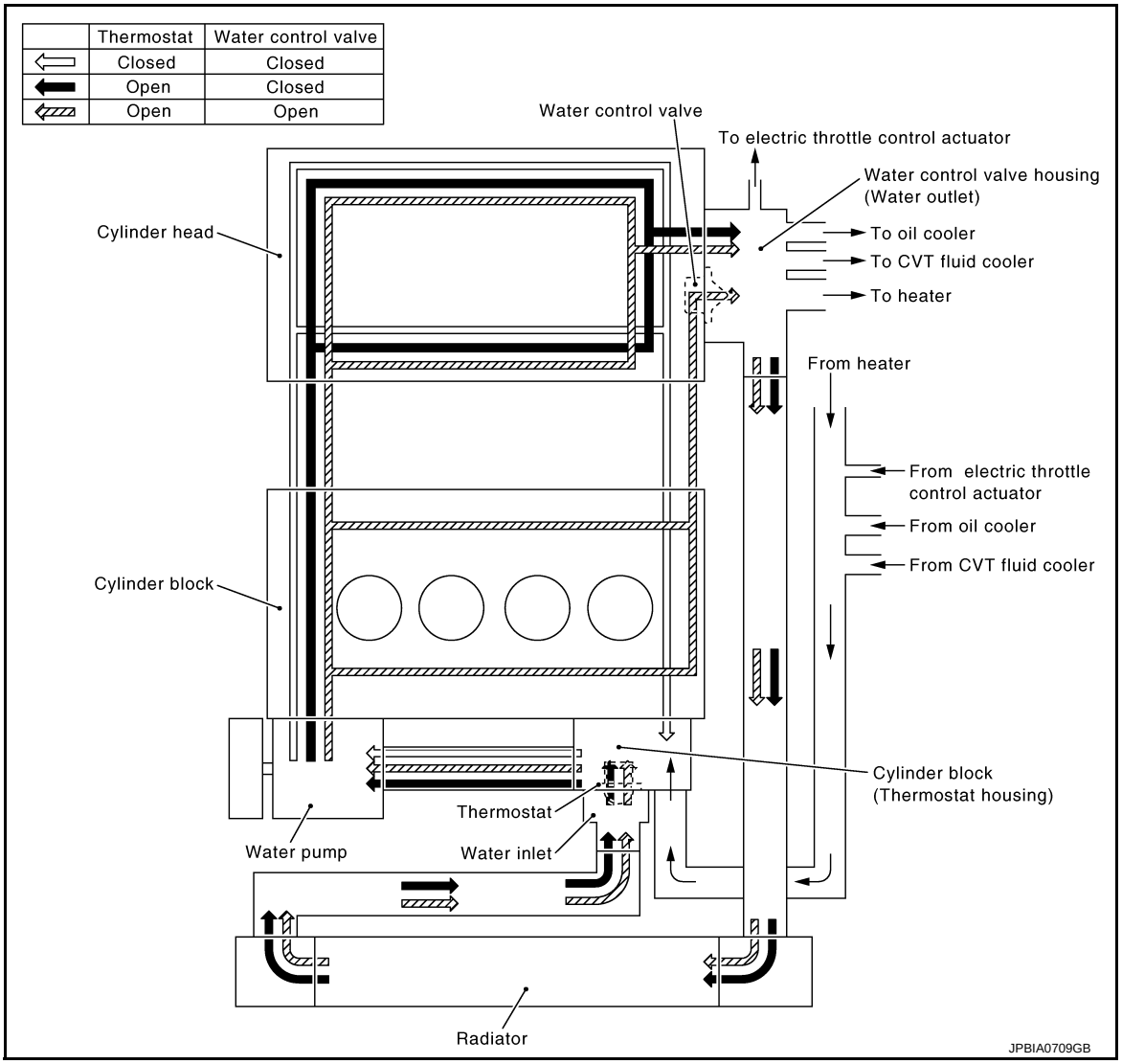
CONTENTS

SYSTEM DESCRIPTION

DESCRIPTION

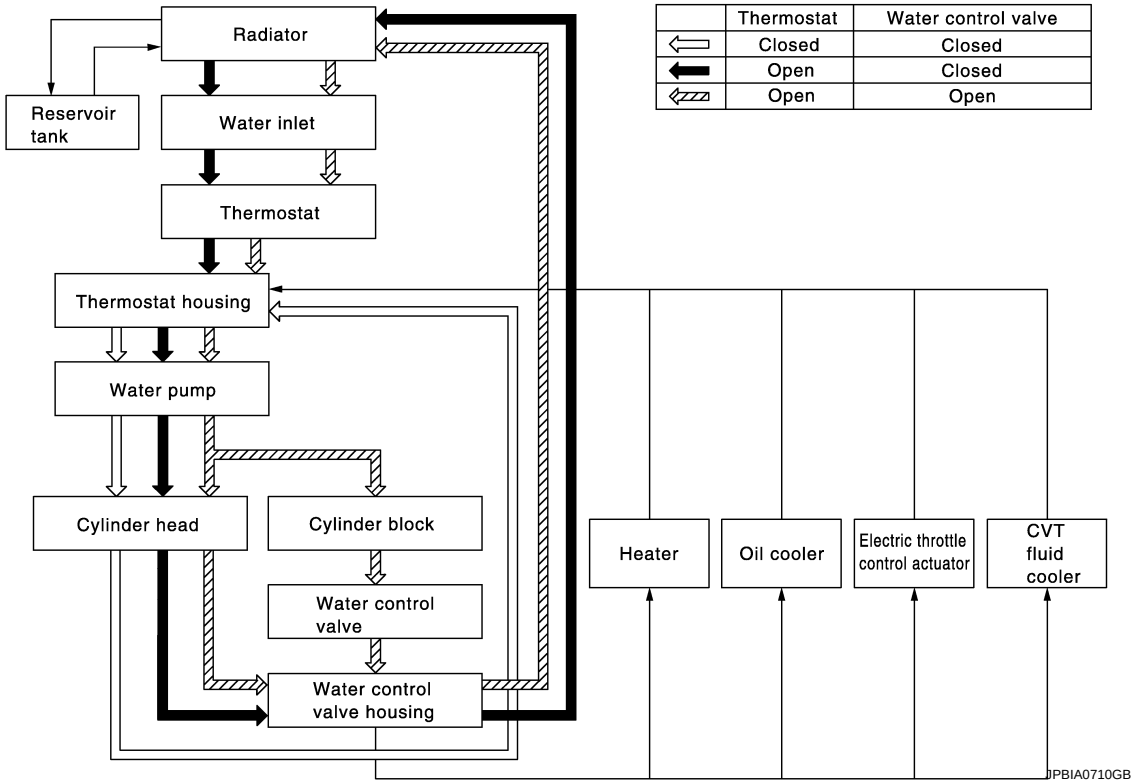
Engine Cooling System

INFOID:0000000007349945



Engine Cooling System Schematic

INFOID:0000000007349946



SYMPTOM DIAGNOSIS

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:0000000007349947

	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat and water control valve stuck closed	—	
		Damaged radiator fins	Dust contamination or paper clogging	
			Physical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	Fan assembly	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper engine coolant mixture ratio	—	—	—
	Poor engine coolant quality	—	Engine coolant density	—
	Insufficient engine coolant	Engine coolant leakage	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
			Radiator cap	Loose
				Poor sealing
			Radiator	O-ring for damage, deterioration or improper fitting
				Cracked radiator tank
				Cracked radiator core
			Reservoir tank	Cracked reservoir tank
		Overflowing reservoir tank	Exhaust gas 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
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			Improper ignition timing	
	Blocked or restricted air flow	Blocked bumper	—	—
		Blocked radiator grille	Installed car brassiere	
			Mud contamination or paper clogging	
		Blocked radiator	—	
		Blocked condenser	Blocked air flow	
		Installed large fog lamp		

PRECAUTION

PRECAUTIONS

FOR USA AND CANADA

FOR USA AND CANADA : Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000007349948

CAUTION:

Comply with the following cautions to prevent any error and malfunction.

- **This Procedure is applied only to models with Intelligent Key system and NVIS/IVIS (NISSAN/INFINITI VEHICLE IMMOBILIZER SYSTEM - NATS).**
- **Remove and install all control units after disconnecting both battery cables with the ignition switch in the LOCK position.**
- **Always use CONSULT to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.**

For models equipped with the Intelligent Key system and NVIS/IVIS, an electrically controlled steering lock mechanism is adopted on the key cylinder.

For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.

If steering wheel rotation is required when battery power is interrupted, follow the procedure below before starting the repair operation.

OPERATION PROCEDURE

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

FOR USA AND CANADA : Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000007349949

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 AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that 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 “SRS AIR BAG”.**
- **Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

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

WARNING:
Always observe the following items for preventing accidental activation.
- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

FOR MEXICO

FOR MEXICO : Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000007349950

CAUTION:
Comply with the following cautions to prevent any error and malfunction.
- **This Procedure is applied only to models with Intelligent Key system and NVIS/IVIS (NISSAN/INFINITI VEHICLE IMMOBILIZER SYSTEM - NATS).**
- **Remove and install all control units after disconnecting both battery cables with the ignition switch in the LOCK position.**
- **Always use CONSULT to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.**

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

OPERATION PROCEDURE

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

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

INFOID:0000000007349951

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:
Always observe the following items for preventing accidental activation.
- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that 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 “SRS AIR BAG”.**
- **Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

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

WARNING:

Always observe the following items for preventing accidental activation.

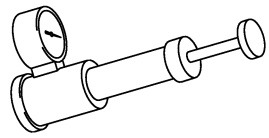
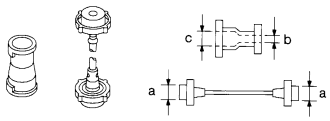
- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

PREPARATION

PREPARATION

Commercial Service Tools

INFOID:0000000007349953

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

PERIODIC MAINTENANCE

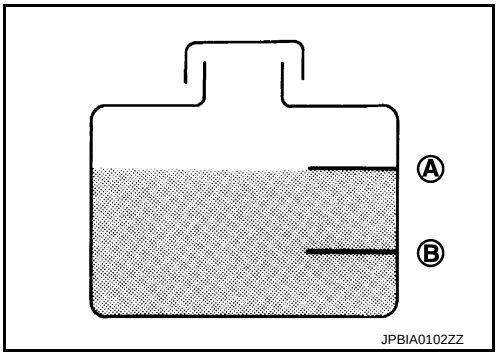
ENGINE COOLANT

Inspection

INFOID:0000000007349954

LEVEL

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



JPBIA0102ZZ

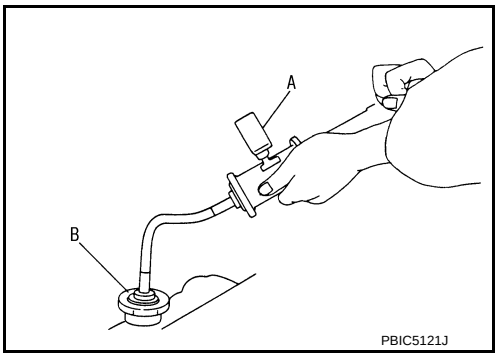
A : MAX
B : MIN

- Adjust the engine coolant level if necessary.

CAUTION:
Refill Genuine NISSAN Long Life Antifreeze/Coolant (blue) or equivalent in its quality mixed with water (distilled or demineralized). Refer to MA-15, "FOR NORTH AMERICA : Fluids and Lubricants" (For North America). or MA-16, "FOR MEXICO : Fluids and Lubricants" (For Mexico)

LEAKAGE

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



PBIC5121J

Testing pressure: Refer to CO-28, "Radiator".

WARNING:
Never remove radiator cap when engine is hot. Serious burns may occur from high-pressure engine coolant escaping from radiator.
CAUTION:
Higher test pressure than specified may cause radiator damage.
NOTE:
In a case that engine coolant decreases, replenish radiator with engine coolant.

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

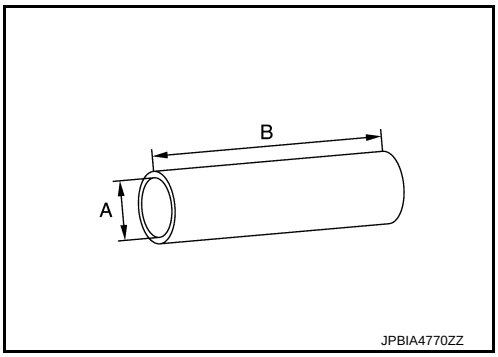
Draining

INFOID:0000000007349955

WARNING:

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

1. Remove engine under cover.
2. Connect drain hose. (Vehicle with no drain hose)
   NOTE:
   Use a general-purpose hose with the dimensions shown in the figure.



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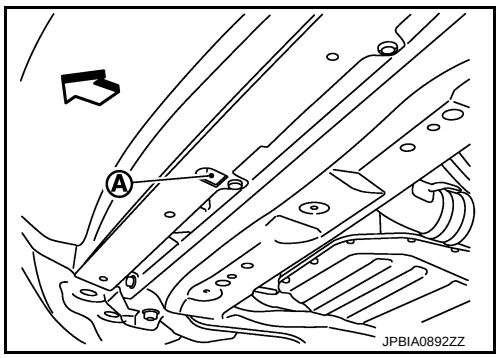
A : ϕ 15 – 16 mm
B : 145 mm

3. Open radiator drain plug at the bottom of radiator, and then remove radiator cap.

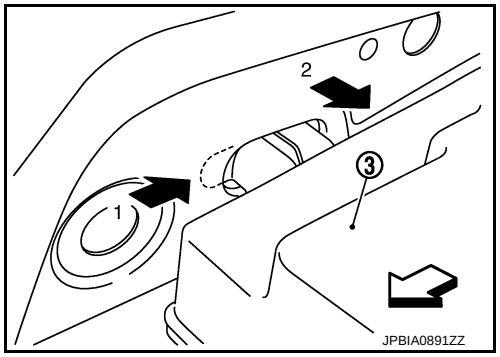


A : Radiator drain plug hole

⇦ : Vehicle front

CAUTION:
Perform this step when engine is cold.
- When draining all of engine coolant in the system, open water drain plugs on cylinder block. Refer to EM-93, "Exploded View".

4. Remove reservoir tank if necessary, and drain engine coolant and clean reservoir tank before installing.
- Move reservoir tank (3), and then remove it numerical order as shown in the figure.



⇦ : Vehicle front

5. Check drained engine coolant for contaminants such as rust, corrosion or discoloration.
If contaminated, flush the engine cooling system. Refer to CO-13, "Flushing".

Refilling

INFOID:0000000007349956

CAUTION:
- **Before start working, turn off the automatic air conditioner and the blower motor.**
- **Do not put additive such as waterleak preventive, since it may cause cooling waterway clogging.**
- **When refilling use Genuine NISSAN Long Life Antifreeze/Coolant (blue) or equivalent in its quality mixed with water (distilled or demineralized). Refer to MA-15, "FOR NORTH AMERICA : Fluids and Lubricants" (For North America) or MA-16, "FOR MEXICO : Fluids and Lubricants" (For Mexico.)**

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

Radiator drain plug: Refer to CO-17, "Exploded View".

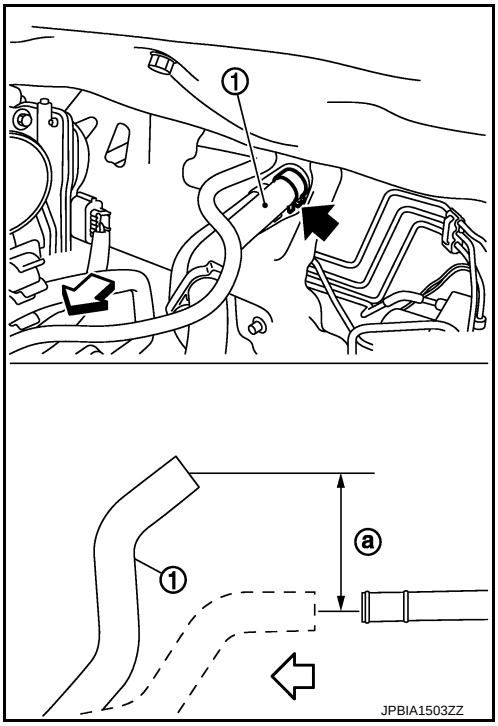
- If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-93, "Exploded View".

2. Check that each hose clamp has been firmly tightened.
3. Remove air duct assembly, and move electric throttle control actuator to aside. Refer to EM-29, "Exploded View" and EM-31, "Exploded View".

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

⇦ : Vehicle front

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



5. Fill radiator (1) to specified level.

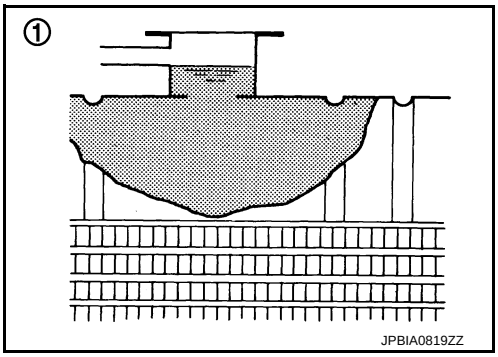
CAUTION:

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

- Pour engine coolant through engine coolant filler neck slowly of less than 2 ℓ (2-1/8 US qt, 1-3/4 lmp qt) a minute to allow air in system to escape.
- When engine coolant overflows disconnected heater hose, connect heater hose, and continue filling the engine coolant.

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

Refer to CO-28, "Periodical Maintenance Specification".

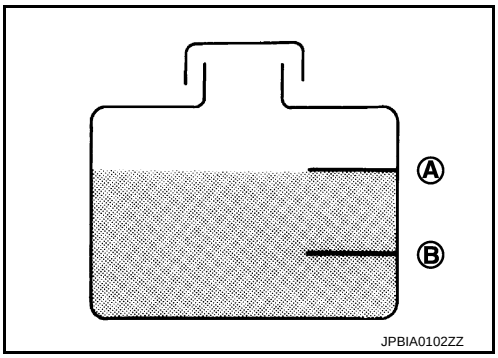


6. Refill reservoir tank to “MAX” level line with engine coolant.

A : MAX
B : MIN

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

Refer to CO-28, "Periodical Maintenance Specification".



7. Install radiator cap.
8. Install air duct assembly and electric throttle control actuator. Refer to EM-29, "Exploded View" and EM-31, "Exploded View".
9. Warm up engine until opening thermostat. Standard for warming-up time is approximately 10 minutes at 3,000 rpm.
   - Check thermostat opening condition by touching radiator hose (lower) to see a flow of warm water.

   CAUTION:

   Watch water temperature gauge so as not to overheat engine.
10. Stop the engine and cool down to less than approximately 50°C (122°F).
    - Cool down using fan to reduce the time.
    - If necessary, refill radiator up to filler neck with engine coolant.

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

11. Refill reservoir tank to “MAX” level line with engine coolant.
12. Repeat steps 5 through 10 two or more times with radiator cap installed until engine coolant level no longer drops.
13. Check cooling system for leakage with engine running.
14. Warm up the engine, and check for sound of engine coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between “COOL” and “WARM”.
    - Sound may be noticeable at heater unit.
15. Repeat step 14 three times.
16. If sound is heard, bleed air from cooling system by repeating step 5 through 10 until engine coolant level no longer drops.

Flushing

INFOID:0000000007349957

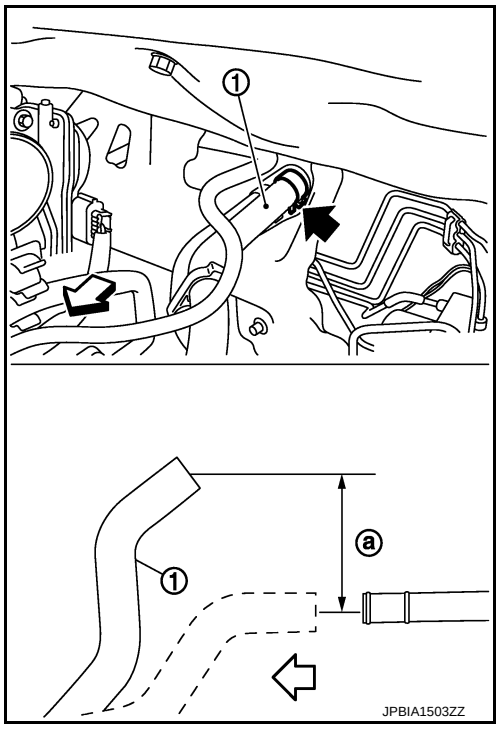
1. Install reservoir tank if removed and radiator drain plug.
   CAUTION:
   Be sure to clean drain plug and install with new O-ring.

   Radiator drain plug : Refer to CO-17, "Exploded View".

   - If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-93, "Exploded View".
2. Remove air duct assembly and move electric throttle control actuator to aside. Refer to EM-29, "Exploded View" and EM-31, "Exploded View".
3. Disconnect heater hose (1) at the position (⇦) in the figure.

   ⇦ : Vehicle front

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



4. Fill radiator and reservoir tank with water and reinstall radiator cap.
   - When engine coolant overflows disconnected heater hose, connect heater hose, and continue filling the engine coolant.
5. Install air duct assembly and electric throttle control actuator. Refer to EM-29, "Exploded View" and EM-31, "Exploded View".
6. Run the engine and warm it up to normal operating temperature.
7. Rev the engine two or three times under no-load.
8. Stop the engine and wait until it cools down.
9. Drain water from the system. Refer to CO-10, "Draining".

10. Repeat steps 1 through 9 until clear water begins to drain from radiator.

RADIATOR

RADIATOR CAP

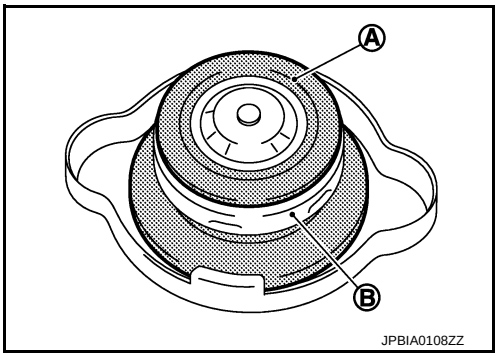
RADIATOR CAP : Inspection

INFOID:0000000007349958

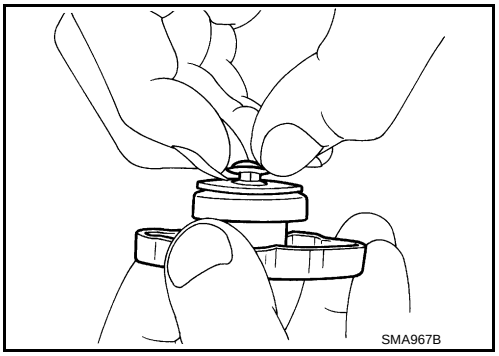
- Check valve seat of radiator cap.

A : Valve seat
B : Metal plunger

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



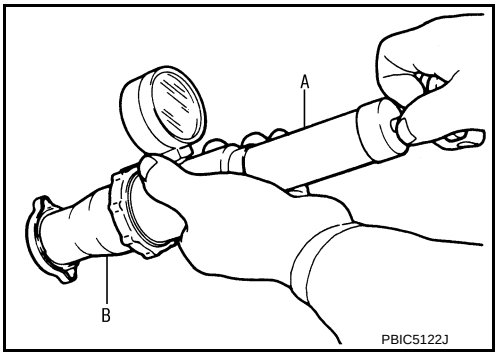
- Pull negative-pressure valve to open it, and check that it close completely when released.
- Check that there is no dirt or damage on the valve seat of radiator cap negative-pressure valve.
- Check that there are no unusualness in the opening and closing conditions of negative-pressure valve.



- Check radiator cap relief pressure.

Standard and Limit: Refer to CO-28, "Radiator".

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



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

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

RADIATOR

RADIATOR : Inspection

INFOID:0000000007349959

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

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

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

4. Blow air into the back side of radiator core vertically downward.
   - Use compressed air lower than 490 kPa (5 kg/cm^2, 71 psi) and keep distance more than 30 cm (11.81 in).
5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

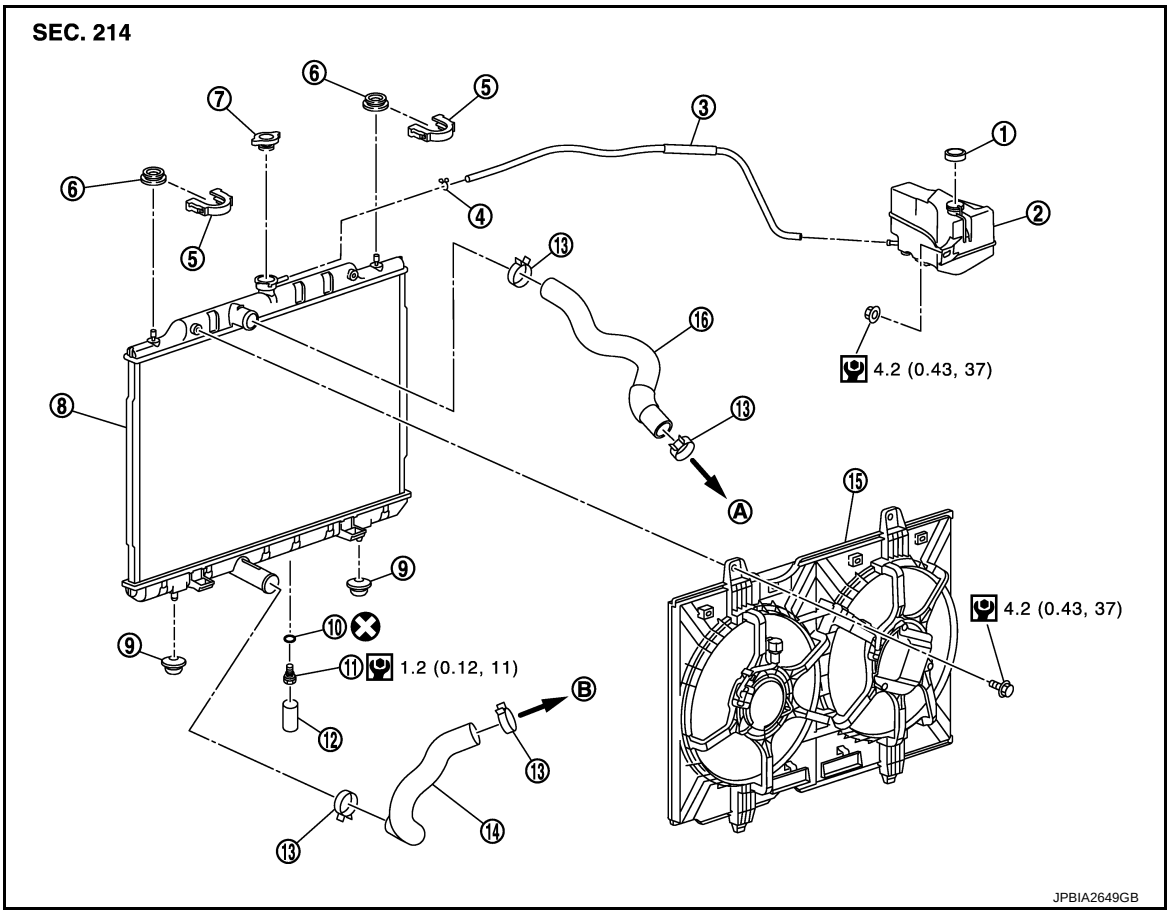
REMOVAL AND INSTALLATION

RADIATOR

Exploded View

INFOID:0000000007349960

REMOVAL



1. Reservoir tank cap	2. Reservoir tank	3. Reservoir tank hose
4. Clamp	5. Radiator upper clip	6. Mounting rubber (upper)
7. Radiator cap	8. Radiator	9. Mounting rubber (lower)
10. O-ring	11. Drain plug	12. Water drain hose
13. Clamp	14. Radiator hose (lower)	15. Cooling fan assembly
16. Radiator hose (upper)		
A. To water outlet	B. To water inlet	

: Always replace after every disassembly.

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000007349961

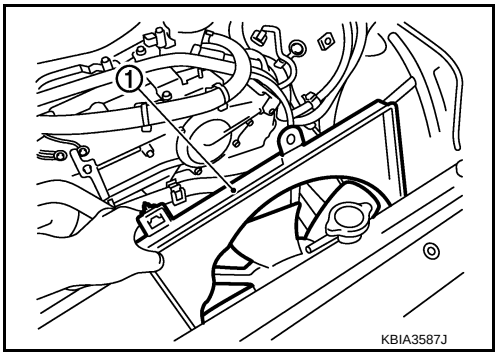
REMOVAL

WARNING:

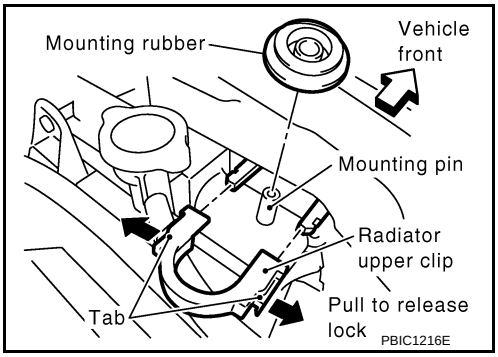
- **Never remove radiator cap when engine is hot. Serious burns may occur from high-pressure engine coolant escaping from radiator.**
- **Wrap a thick cloth around the radiator cap. Slowly turn it a quarter of a turn to release built-up pressure. Then turn it all the way.**

1. Remove engine under cover.

2. Drain engine coolant from radiator. Refer to CO-10, "Draining".
   CAUTION:
   Perform this step when the engine is cold.
3. Remove air duct (inlet). Refer to EM-29, "Exploded View".
4. Remove radiator hose (upper) and reservoir tank hose.
5. Disconnect harness connector from fan motor, and move it aside.
6. Remove cooling fan assembly (1).
   CAUTION:
   Be careful not to damage radiator core when removing.



7. Removal radiator hose (lower).
8. Remove radiator upper clips by pulling the tabs outside to release the lock.
   CAUTION:
   Never pull the tabs outside excessively to prevent it from damaging.



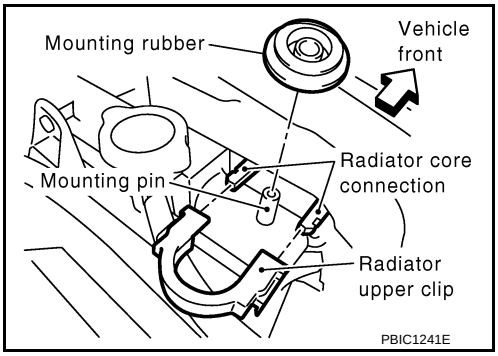
9. Remove radiator.
   CAUTION:
   Be careful not to damage or scratch radiator core.

INSTALLATION

CAUTION:
Do not reuse O-ring.
Note the following, and install in the reverse order of removal.

Radiator Upper Clip
Install radiator upper clip on radiator core connection as follows:

1. Install mounting rubbers (upper) on mounting pins of radiator.



2. Align radiator upper clip with radiator core connection, then insert radiator upper clip straight into radiator core connections until a click is heard.
3. After connecting radiator upper clip, use the following method to check it is fully connected.
   - Visually confirm that two radiator upper clips are connected to radiator core connections.
   - Move radiator upper clip and the radiator forward and backward to check they are securely connected.

Radiator

NOTE:

When installing radiator core support (upper), check that both upper and lower mounts of radiator and air conditioner condenser are inserted in the mounting holes of radiator core support (upper, lower).

CAUTION:

Use genuine mounting bolts for the cooling fan assembly and strictly observe the tightening torque. (Breakage prevention for radiator)

Reservoir tank

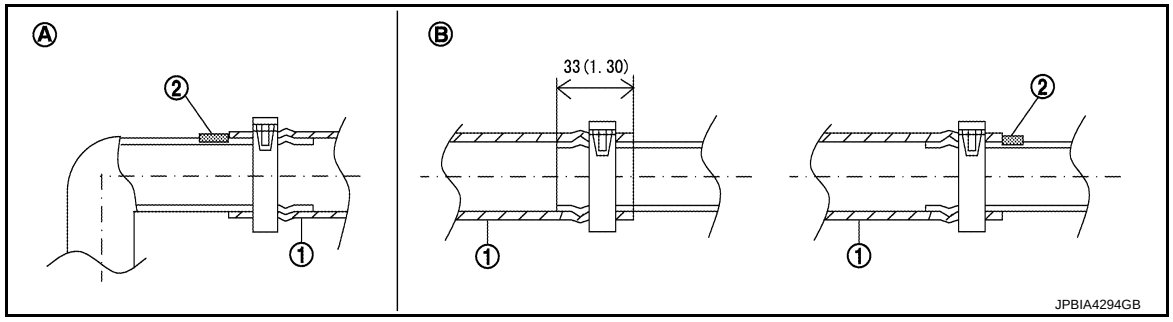
NOTE:

- Insert reservoir tank straight into the mounting location and check by the feel that the pawl is securely fastened.
- Pull reservoir tank upward to check that it does not come off.

Radiator hose

NOTE:

Insert the radiator hose (1) all the way to the stopper (2) or by 33 mm (1.30 in) (hose without a stopper).



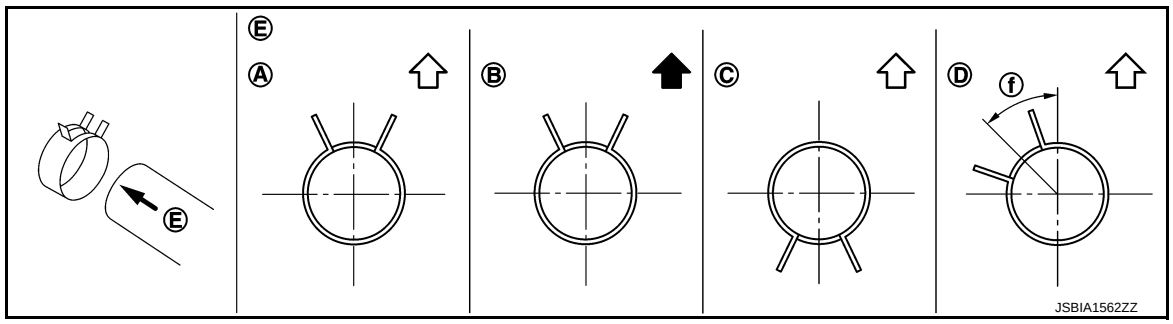
Unit: mm (in)

A. Radiator side B. Engine side

- For the orientation of the hose clamp pawl, refer to the figure.

Radiator hose	Hose end	Paint mark	Position of hose clamp*
Radiator hose (upper)	Radiator side	Right side	C
	Radiator pipe (Radiator side)	—	B
	Radiator pipe (Engine side)	—	C
	Engine side	Upper	B
Radiator hose (lower)	Radiator side	Upper	A
	Engine side	Upper	D

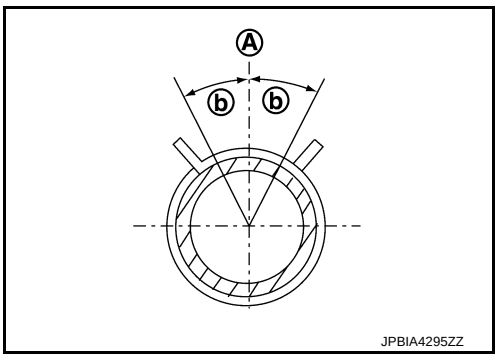
*: Refer to the illustrations for the specific position each hose clamp tab.



E. View E f. 45°

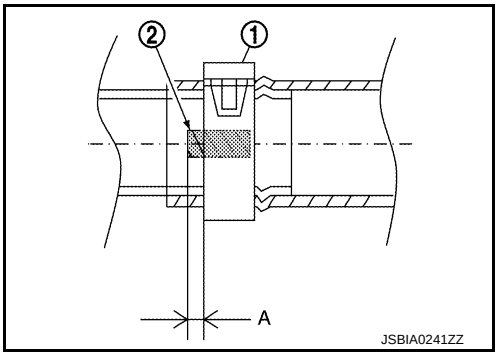
⇦ : Vehicle upper ⬅ : Vehicle back side

- The angle (b) created by the hose clamp pawl and the specified line (A) must be within ±15 as shown in the figure.



- To install hose clamps (1), check that the dimension (A) from the end of the hose clamp on the radiator hose to the hose clamp is within the reference value.

Dimension "A" : (-1) – (+1) mm [(-0.04) – (+0.04) in]



Inspection

INFOID:0000000007349963

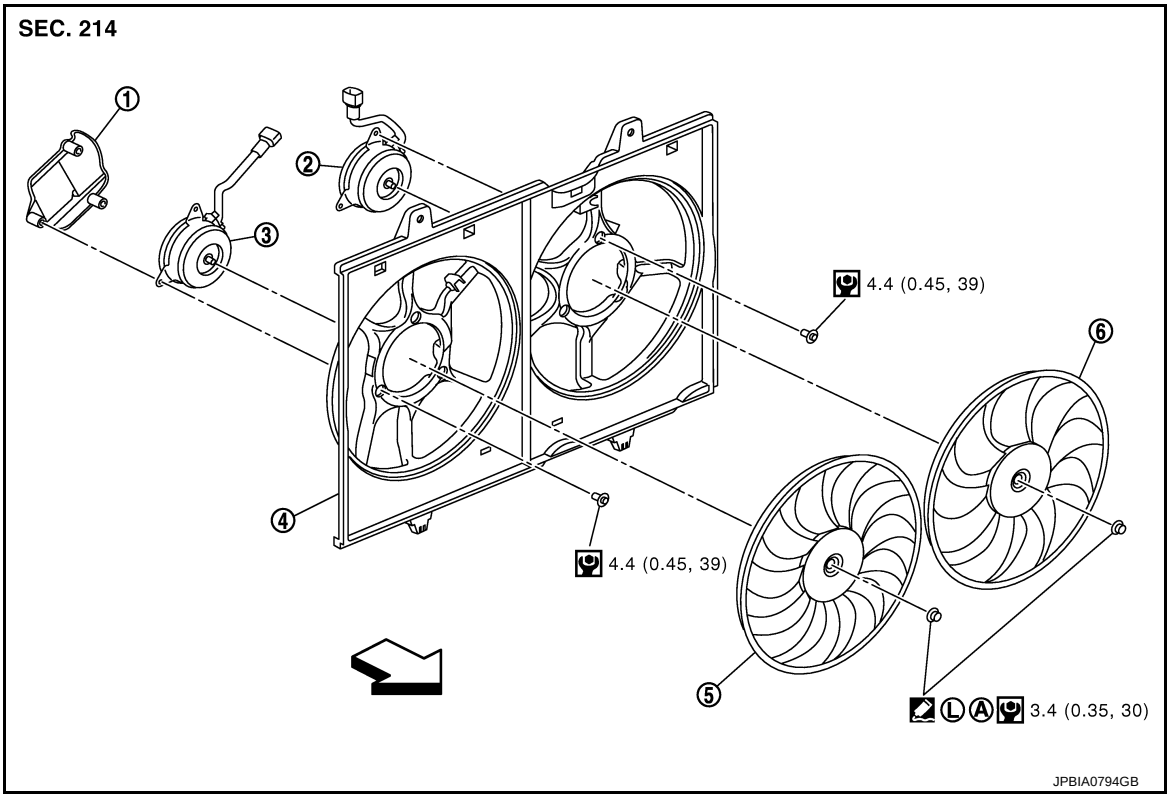
INSPECTION AFTER INSTALLATION

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

COOLING FAN

Exploded View

INFOID:0000000007349964



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

A. Apply on fan motor shaft.

⇦ : Vehicle front

Ⓛ : Apply genuine high strength thread locking sealant or equivalent.

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000007349965

REMOVAL

1. Remove engine under cover.
2. Drain engine coolant from radiator. Refer to CO-10, "Draining".
   CAUTION:
   Perform this step when the engine is cold.
3. Remove air duct (inlet). Refer to EM-29, "Exploded View".
4. Remove radiator hose (upper) and reservoir tank hose. Refer to CO-17, "Exploded View".
5. Disconnect harness connector from fan motor, and move harness to aside.
6. Remove cooling fan assembly.
   CAUTION:
   Be careful not to damage or scratch on radiator core when removing.

INSTALLATION

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

CAUTION:

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

NOTE:
Cooling fan is controlled by ECM. For details, refer to EC-514, "System Diagram" (for Mexico) or EC-73, "System Diagram" (Except for Mexico).

Disassembly and Assembly

INFOID:0000000007349966

DISASSEMBLY

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

ASSEMBLY

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

CAUTION:

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

- Install each fan in the following position.

Right side : 11 blades

Left side : 9 blades

- Apply genuine high strength thread locking sealant or equivalent on fan motor shaft.

Inspection

INFOID:0000000007349967

INSPECTION AFTER DISASSEMBLY

Cooling Fan

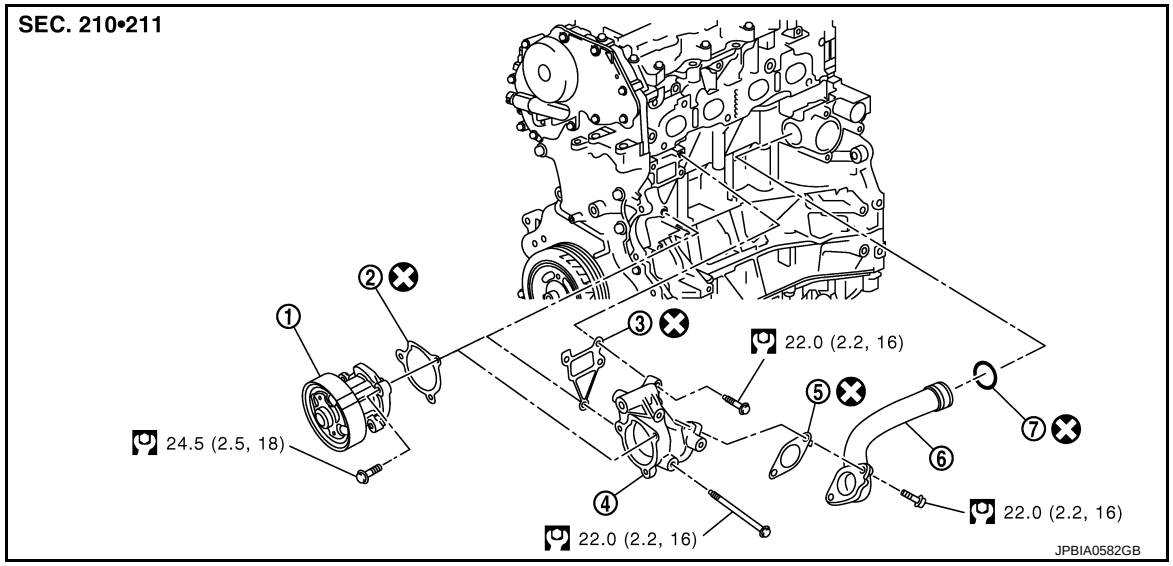
Inspect cooling fan for crack or unusual bend.

- If anything is found, replace cooling fan.

WATER PUMP

Exploded View

INFOID:0000000007349968



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

: Always replace after every disassembly.

: N·m (kg-m, ft-lb)

Removal and Installation

INFOID:0000000007349969

REMOVAL

1. Drain engine coolant. Refer to CO-10, "Draining".
   CAUTION:
   Perform this step when engine is cold.
2. Remove the following parts.
   - Drive belt: Refer to EM-16, "Removal and Installation".
   - Drive belt auto-tensioner: Refer to EM-27, "Exploded View".
   - Alternator: Refer to CHG-22, "Exploded View".
3. Remove water pump.
   - Engine coolant leakage from cylinder block, so have a receptacle ready below.

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

a. Remove exhaust manifold cover. Refer to EM-34, "Exploded View".

b. Remove oil level gauge and oil level gauge guide. Refer to EM-37, "Exploded View".
   CAUTION:
   Plug the oil level gauge guide opening to prevent oil pan from entering foreign materials.

c. Remove mounting bolts for water pipe.

d. Remove water pump housing.

5. Remove exhaust manifold and three way catalyst assembly. Refer to EM-34, "Exploded View".
6. Remove water pipe.

INSTALLATION

CAUTION:

Do not reuse O-ring.

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

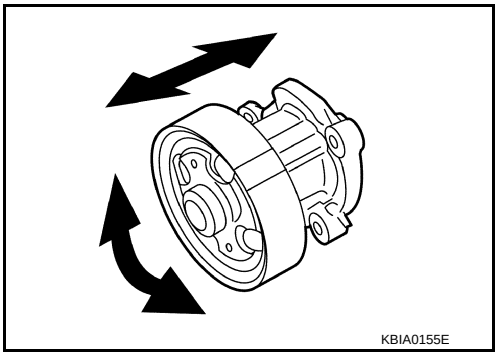
- When inserting water pipe end into cylinder block, apply a neutral detergent to O-ring. Then insert it immediately.

Inspection

INFOID:0000000007349970

INSPECTION AFTER REMOVAL

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



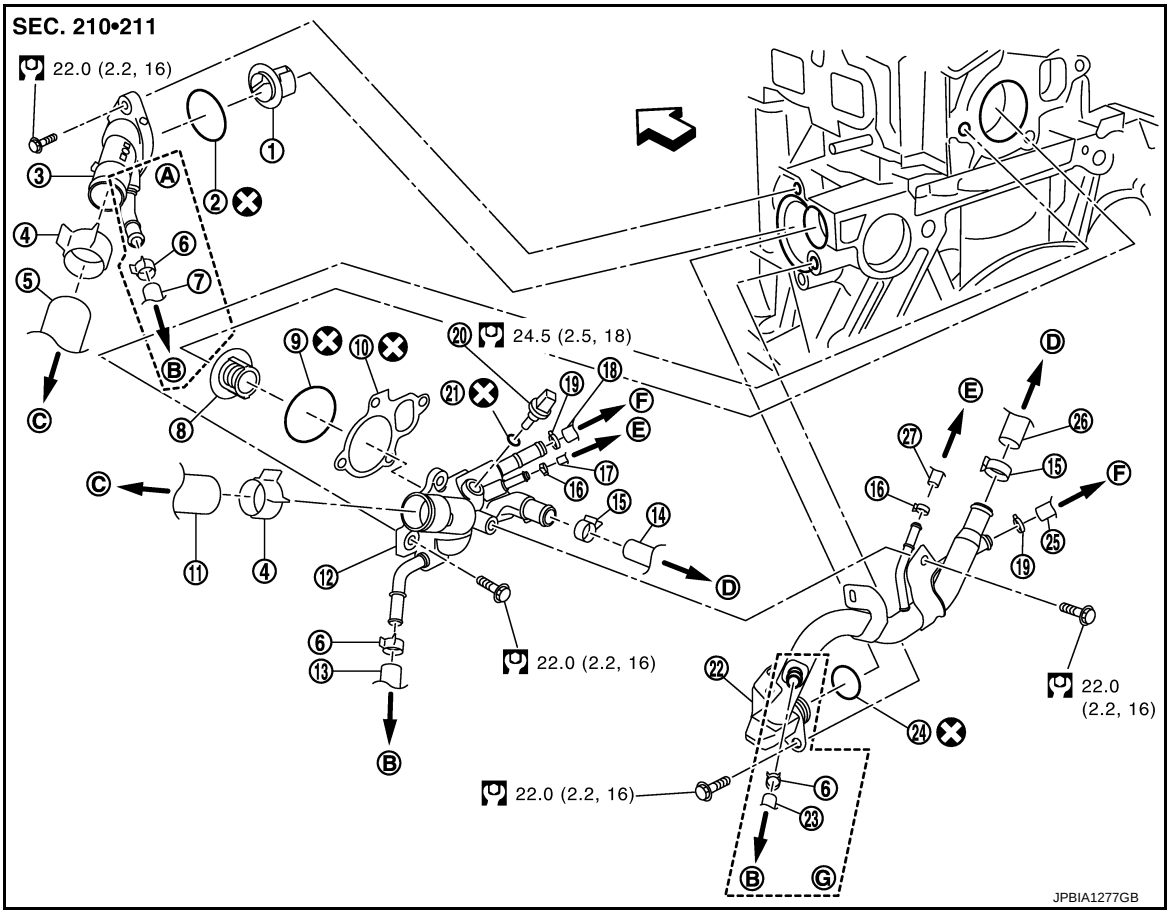
INSPECTION AFTER INSTALLATION

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

THERMOSTAT AND WATER CONTROL VALVE

Exploded View

INFOID:0000000007349971



1.	Thermostat	2.	O-ring	3.	Water inlet
4.	Clamp	5.	Radiator hose (lower)	6.	Clamp
7.	Water hose	8.	Water control valve	9.	O-ring
10.	Gasket	11.	Radiator hose (upper)	12.	Water control valve housing (water outlet)
13.	Water hose	14.	Heater hose	15.	Clamp
16.	Clamp	17.	Water hose	18.	Water hose
19.	Clamp	20.	Engine coolant temperature sensor	21.	Washer
22.	Heater pipe	23.	Water hose	24.	O-ring
25.	Water hose	26.	Heater hose	27.	Water hose
A.	Type 1	B.	To CVT fluid cooler	C.	To radiator
D.	To heater	E.	To electric throttle control actuator	F.	To oil cooler
G.	Type 2				

⇦ : Engine front

⊗ : Always replace after every disassembly.

: N·m (kg-m, ft-lb)

Removal and Installation

INFOID:0000000007349972

REMOVAL

1. Remove battery. Refer to PG-102, "Exploded View".

2. Disconnect engine room harness connectors at unit sides TCM and ECM, and then move it to aside.
3. Remove battery tray.
4. Remove air duct and resonator assembly and air cleaner case assembly. Refer to EM-29, "Exploded View".
5. Drain engine coolant. Refer to CO-10, "Draining".
   CAUTION:
   Perform this step when engine is cold.
6. Disconnect radiator hose (lower) at water inlet side. Refer to CO-17, "Exploded View".
7. Disconnect water hose at water inlet side. (Type 1)
8. Remove water inlet and thermostat.
9. Remove water control valve with the following procedure:

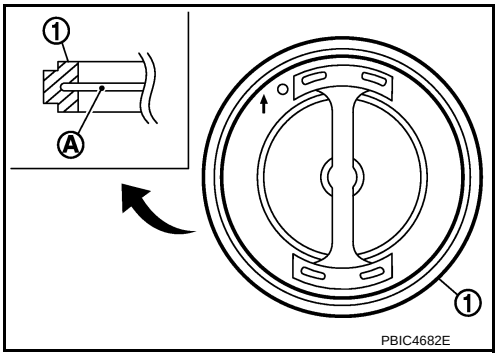
a. Disconnect radiator hose (upper) at water control valve housing (water outlet) side.
b. Disconnect harness connector from engine coolant temperature sensor.
c. Remove CVT fluid level gauge and CVT fluid charging pipe. Refer to TM-209, "2WD : Exploded View" (2WD models) or TM-213, "AWD : Exploded View" (AWD models).
d. Disconnect water hoses.
e. Disconnect air fuel ratio sensor 1 and heated oxygen sensor 2 harness connectors, and remove harness clips from heater pipe.
f. Remove heater pipe and heater hose.
g. After removing water control valve housing (water outlet), remove water control valve.

INSTALLATION

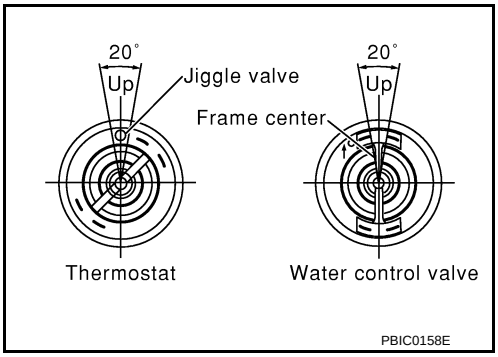
CAUTION:
Do not reuse O-rings.
Note the following, and install in the reverse order of removal.

Thermostat and Water Control Valve

- Install thermostat and water control valve with making rubber ring (1) groove fit to thermostat flange and water control valve flange (A) with the whole circumference. (The example in the figure shows water control valve.)
  NOTE:
  Same procedure is applied for installation of thermostat.



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



Heater Pipe Installation

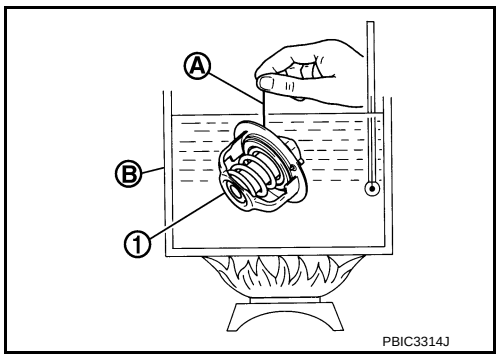
Apply a neutral detergent to O-ring, then quickly insert the insertion part of heater pipe into cylinder block.

Inspection

INFOID:0000000007349973

INSPECTION AFTER REMOVAL

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



Standard

Thermostat **: Refer to CO-28, "Thermostat".**

Water control valve **: Refer to CO-28, "Water control valve".**

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

INSPECTION AFTER INSTALLATION

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

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Periodical Maintenance Specification

INFOID:0000000007349974

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Engine coolant capacity (With reservoir tank at “MAX” level)	7.3 (7-3/4, 6-3/8)
Reservoir tank	0.75 (3/4, 5/8)

Radiator

INFOID:0000000007349975

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

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

Thermostat

INFOID:0000000007349976

Standard

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

Water control valve

INFOID:0000000007349977

Standard

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

*: Reference data