SECTION CO
ENGINE COOLING SYSTEM

CONTENTS

PRECAUTION

PRECAUTIONS

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

INFOID:0000000011279693

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 SR and SB section 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 SR section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

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

WARNING:

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

PREPARATION

PREPARATION

Special Service Tool

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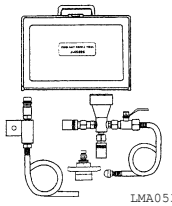
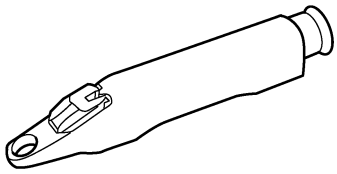
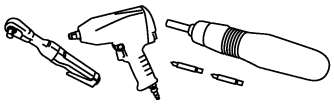
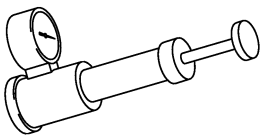
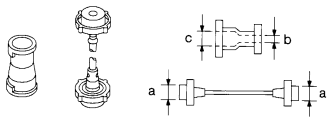
The actual shape of the tools may differ from those illustrated here.

Tool number (TechMate No.) Tool name	Description
KV991J0070 (J-45695-A) Coolant refill tool  LMA053	Refilling engine cooling system
KV991J0010 (J-23688) Engine coolant refractometer  WBIA0539E	Checking concentration of ethylene glycol in engine coolant

Commercial Service Tools

INFOID:0000000011279695

Tool name	Description
Power tool  PIIB1407E	Loosening nuts, screws and bolts
Radiator cap tester  PBIC1982E	Checking radiator and radiator cap
Radiator cap tester adapter  S-NT564	Adapting radiator cap tester to radiator cap and radiator pipe (upper) filler neck **a: 28 (1.10) diameter** **b: 31.4 (1.236) diameter** **c: 41.3 (1.626) diameter** Unit: mm (in)

SYSTEM DESCRIPTION

DESCRIPTION

Engine Cooling System

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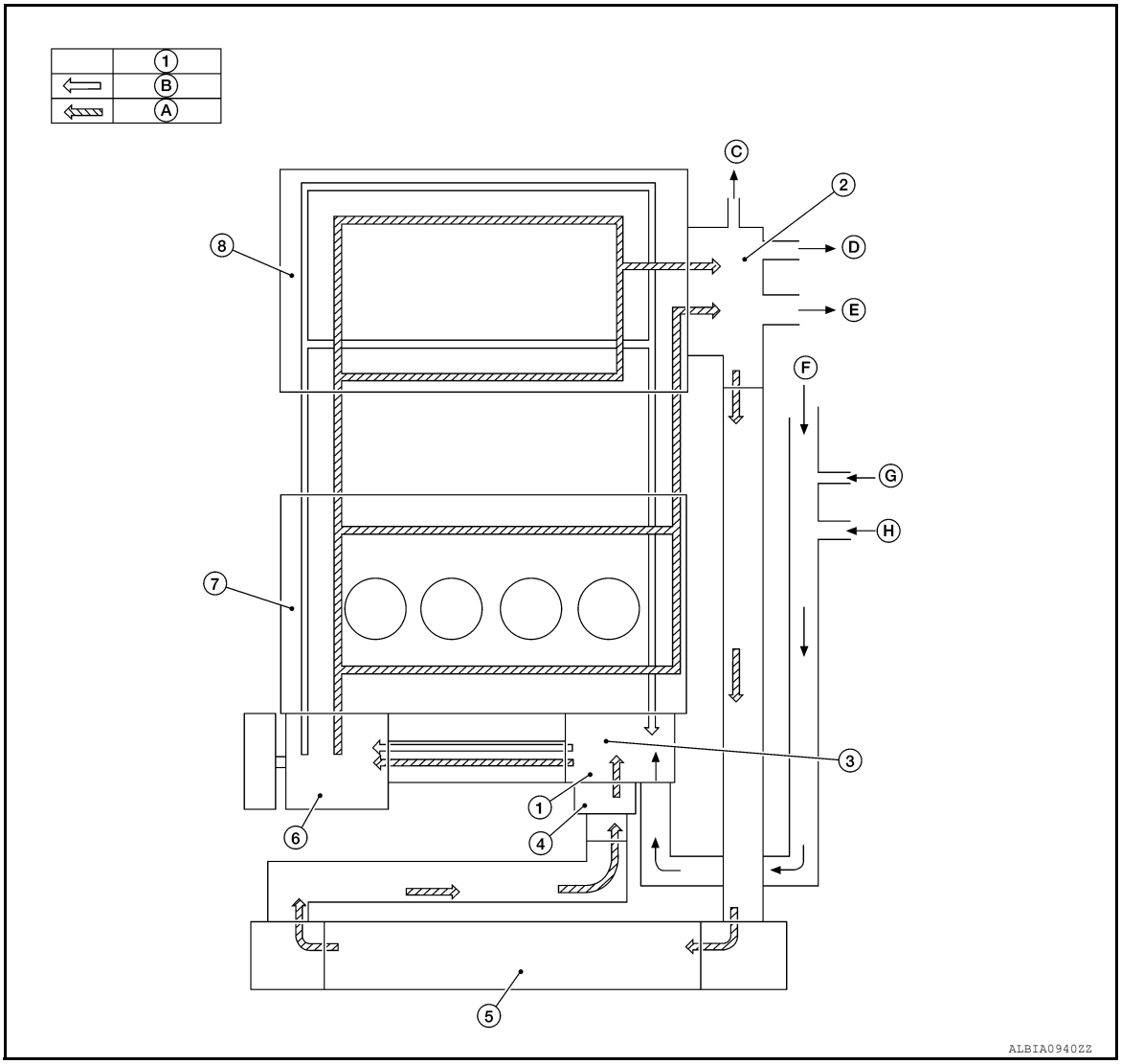

1. Thermostat
2. Water outlet
3. Cylinder block (Thermostat housing)
4. Water inlet
5. Radiator
6. Water pump
7. Cylinder block
8. Cylinder head
A. Open
B. Closed
C. To electric throttle control actuator
D. To oil cooler
E. To heater
F. From heater
G. From electric throttle control actuator
H. From oil cooler
I. To CVT oil warmer
J. From CVT oil warmer

Engine Cooling System Schematic

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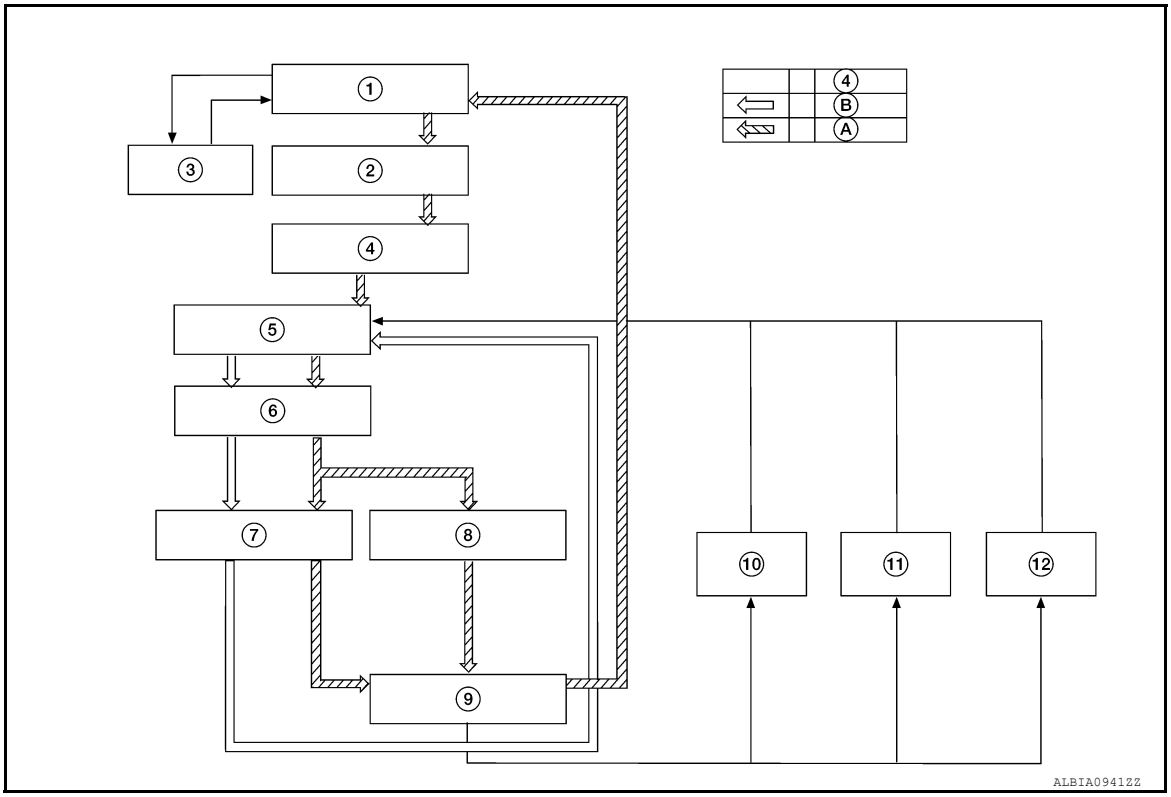

1. Radiator
2. Water inlet
3. Reservoir tank
4. Thermostat
5. Thermostat housing
6. Water pump
7. Cylinder head
8. Cylinder block
9. Water outlet
10. Heater
11. Oil cooler
12. Electric throttle control actuator

A. Open
B. Closed

SYMPTOM DIAGNOSIS

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:0000000011279698

	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		

PERIODIC MAINTENANCE

ENGINE COOLANT

Inspection

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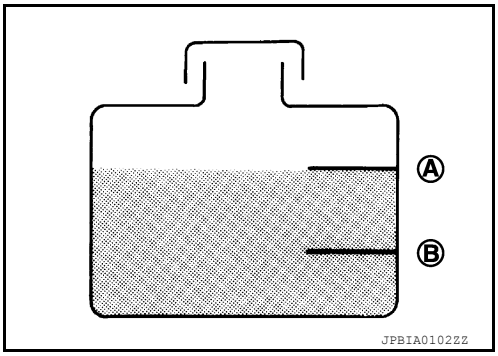
LEVEL

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



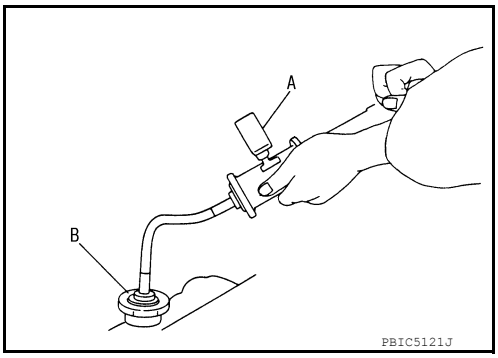
(A) : MAX
(B) : MIN

- Adjust the engine coolant level if necessary.

CAUTION:
Refill Genuine NISSAN Long Life Antifreeze/Coolant (blue) or equivalent in its quality mixed with water (distilled or demineralized). Refer to MA-11, "Fluids and Lubricants".

CHECKING COOLING SYSTEM FOR LEAKS

- To check for leaks, apply pressure to the cooling system using suitable tools (A/B).



Testing pressure : Refer to CO-25, "Radiator".

WARNING:
Do not remove the radiator cap when the engine is hot. Serious burns could occur from high-pressure engine coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly push down and turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by pushing it down and turning it all the way.

CAUTION:
- **Perform this step when the engine is cold.**
- **Do not spill engine coolant on drivebelt.**
- **Higher test pressure than specified may cause radiator damage.**

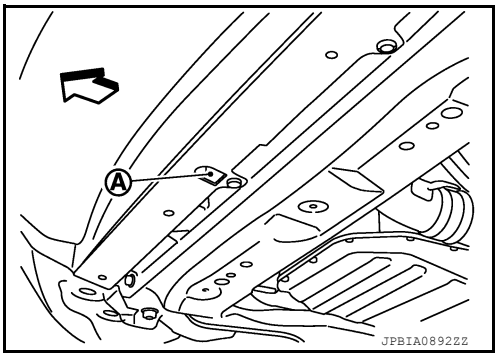
NOTE:
- If engine coolant decreases, replenish radiator with engine coolant. Refer to MA-11, "Fluids and Lubricants".
- If anything is found, repair or replace damaged parts.

Draining

INFOID:0000000011279700

WARNING:
Do not remove radiator cap when engine is hot. Serious burns could occur from high pressure engine coolant escaping the radiator. Wrap a thick cloth around the cap. Slowly push down and turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by pushing it down and turning it all the way.

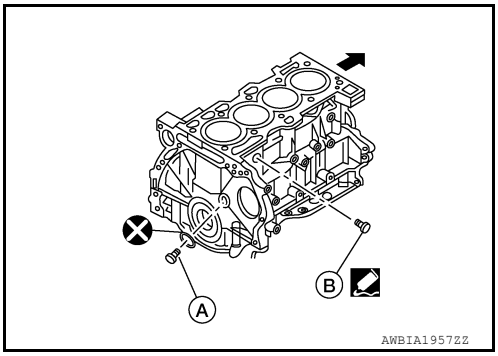
1. Open radiator drain plug at the bottom of radiator, and then remove radiator cap.



(A) : Radiator drain plug hole
⇦ : Vehicle front

CAUTION:
- **Do not allow engine coolant to contact the drive belt.**
- **Perform this step when the engine is cold.**

2. Follow this step for heater core removal/replacement only. Disconnect the upper heater hose at the engine side and apply moderate air pressure [103.46 kPa (1.055 kg/cm^2, 15 psi) maximum air pressure] into the hose for 30 seconds to blow the excess engine coolant out of the heater core.
3. When draining all of the engine coolant in the system, remove the reservoir tank and drain the engine coolant, then clean the reservoir tank before installation.
   CAUTION:
   - **Do not allow the engine coolant to contact the drive belt.**
   - **Perform this step when engine is cold.**
4. When draining all of the engine coolant in the system for engine removal or repair, remove the engine coolant drain plugs (A/B) from the cylinder block.



5. Check the drained engine coolant for contaminants such as rust, corrosion or discoloration.
   If the engine coolant is contaminated, flush the engine cooling system. Refer to CO-11, "Flushing".

Refilling

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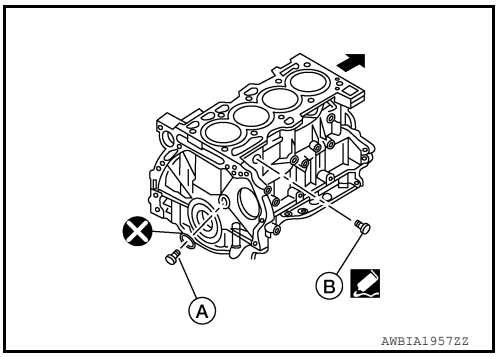
CAUTION:
- **Do not put additive such as waterleak preventive, since it may cause cooling waterway clogging.**
- **When refilling use Genuine NISSAN Long Life Antifreeze/Coolant (blue) or equivalent in its quality mixed with water (distilled or demineralized). Refer to MA-11, "Fluids and Lubricants".**

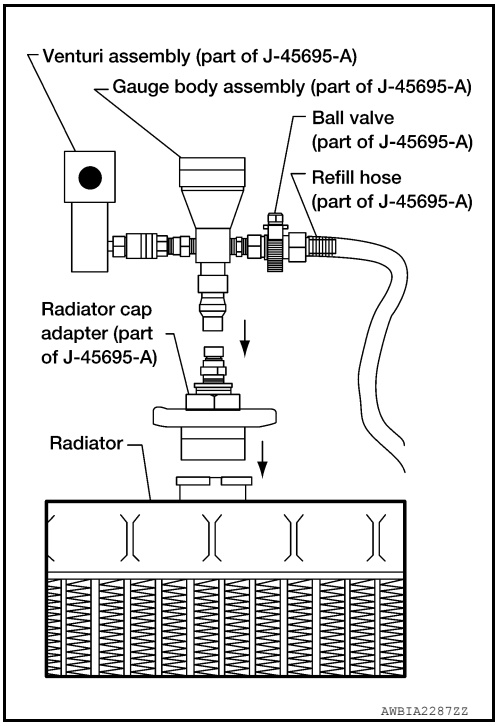
1. Install the radiator drain plug. Install the reservoir tank and cylinder block drain plug, if removed for a total system drain or for engine removal or repair.
   - **The radiator must be completely empty of coolant and water.**
   - **Apply sealant to the threads of the cylinder block drain plug.**
   - **Use recommended coolant or equivalent.**
     Refer to MA-11, "Fluids and Lubricants".



Radiator drain plug	**: Refer to CO-13, "Exploded View".**
Cylinder block drain plug (A)	**: 53.9 N·m (5.5 kg-m, 40 ft-lb)**
Cylinder block drain plug (B)	**: 9.8 N·m (1.0 kg-m, 87 in-lb)**

2. If disconnected, reattach the upper radiator hose at the engine side.
3. Set the vehicle heater controls to the full HOT and heater ON position. Turn the vehicle ignition ON with the engine OFF as necessary to activate the heater mode.

4. Install the Tool by installing the radiator cap adapter onto the radiator neck opening. Then attach the gauge body assembly with the refill tube and the venturi assembly to the radiator cap adapter.



Tool number : KV991J0070 (J-45695-A)

5. Insert the refill hose into the coolant mixture container that is placed at floor level. Make sure the ball valve is in the closed position.
   - **Use recommended coolant or equivalent.**
     Refer to MA-11, "Fluids and Lubricants".

Engine coolant capacity (with reservoir tank) : Refer to CO-25, "Periodical Maintenance Specification".

CAUTION:
Do not use any cooling system additives such as radiator sealer. Additives may clog the cooling system and cause damage to the engine, transmission and/or cooling system.

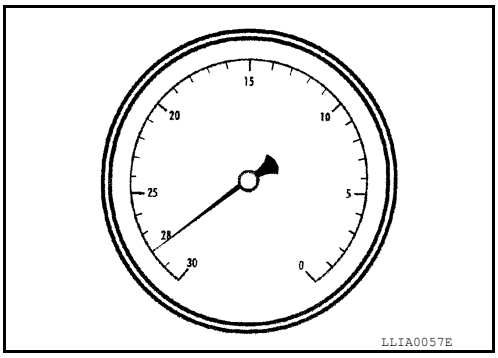
6. Install an air hose to the venturi assembly, the air pressure must be within specification.

Compressed air supply pressure : 549 - 824 kPa (5.6 - 8.4 kg/cm^2, 80 - 119 psi)

CAUTION:
The compressed air supply must be equipped with an air dryer.

7. The vacuum gauge will begin to rise and there will be an audible hissing noise. During this process open the ball valve on the refill hose slightly. Coolant will be visible rising in the refill hose. Once the refill hose is full of coolant, close the ball valve. This will purge any air trapped in the refill hose.

8. Continue to draw the vacuum until the gauge reaches 28 inches of vacuum. The gauge may not reach 28 inches in high altitude locations, use the vacuum specifications based on the altitude above sea level.



Altitude above sea level	Vacuum gauge reading
0 - 100 m (328 ft)	: 28 inches of vacuum
300 m (984 ft)	: 27 inches of vacuum
500 m (1,641 ft)	: 26 inches of vacuum
1,000 m (3,281 ft)	: 24 - 25 inches of vacuum

9. When the vacuum gauge has reached the specified amount, disconnect the air hose and wait 20 seconds to see if the system loses any vacuum. If the vacuum level drops, perform any necessary repairs to the system and repeat steps 6 - 8 to bring the vacuum to the specified amount. Recheck for any leaks.
10. Place the coolant container (with the refill hose inserted) at the same level as the top of the radiator. Then open the ball valve on the refill hose so the coolant will be drawn up to fill the cooling system. The cooling system is full when the vacuum gauge reads zero.
    CAUTION:
    Do not allow the coolant container to get too low when filling, to avoid air from being drawn into the cooling system.
11. Remove the Tool from the radiator neck opening.
12. Fill the cooling system reservoir tank to the specified level and install the radiator cap. Run the engine to warm up the cooling system and top up the system as necessary.

Flushing

INFOID:0000000011279702

1. Install reservoir tank, if removed, and radiator drain plug.
   CAUTION:
   - **Be sure to clean drain plug.**
   - **Do not reuse O-ring.**

   Radiator drain plug : Refer to CO-13, "Exploded View".

   - If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-97, "Exploded View".
2. Refill engine coolant. Refer to CO-9, "Refilling".
3. Run the engine and warm it up to normal operating temperature.
4. Rev the engine two or three times under no-load.
5. Stop the engine and wait until it cools down.
6. Drain water from the system. Refer to CO-8, "Draining".
7. Repeat steps 1 through 5 until clear water begins to drain from radiator.

RADIATOR

RADIATOR CAP

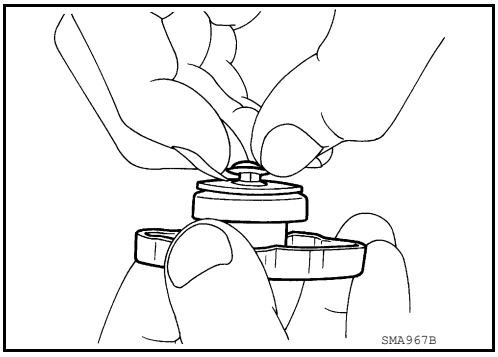
RADIATOR CAP : Inspection

INFOID:0000000011279703

CHECKING RADIATOR CAP

1. Inspect the radiator cap.
   - Replace the cap if the metal plunger cannot be seen around the edge of the black rubber gasket.
   - Replace the cap if deposits of waxy residue or other foreign material are on the black rubber gasket or the metal retainer.

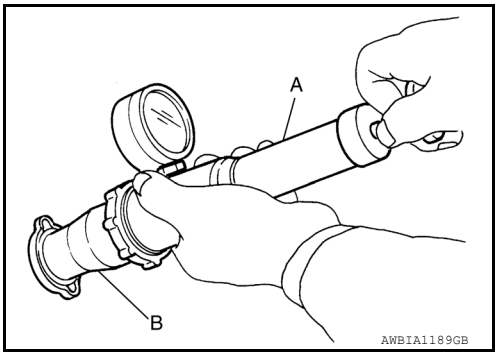
   NOTE:
   Thoroughly wipe out the radiator filler neck to remove any waxy residue or foreign material.
2. Pull the negative-pressure valve to open it and check that it closes completely when released.
   - Check that there is no dirt or damage on the valve seat of the radiator cap negative-pressure valve.
   - Check that there are no abnormalities in the opening and closing conditions of the negative-pressure valve.



3. Check radiator cap relief pressure using suitable tool (A/B).

   Standard : Refer to CO-25, "Radiator".

   - Apply water or engine coolant to the cap seal surface before connecting the radiator cap to the tester.
   - Replace the radiator cap if there is an abnormality in the negative-pressure valve, or if the open-valve pressure is outside of the standard values.



RADIATOR

RADIATOR : Inspection

INFOID:0000000011279704

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. Spray water to the back side of the radiator core using a side to side motion from the top down.
2. Stop spraying when debris no longer flows from radiator core.
3. Blow air into the back side of radiator core using a side to side motion from the top down.
   - Use compressed air lower than 490 kPa (5 kg/cm^2, 71 psi) and keep distance more than 30 cm (11.8 in).
4. Continue to blow air until no water sprays out.
5. Check for engine coolant leaks. Repair as necessary.

REMOVAL AND INSTALLATION

RADIATOR

Exploded View

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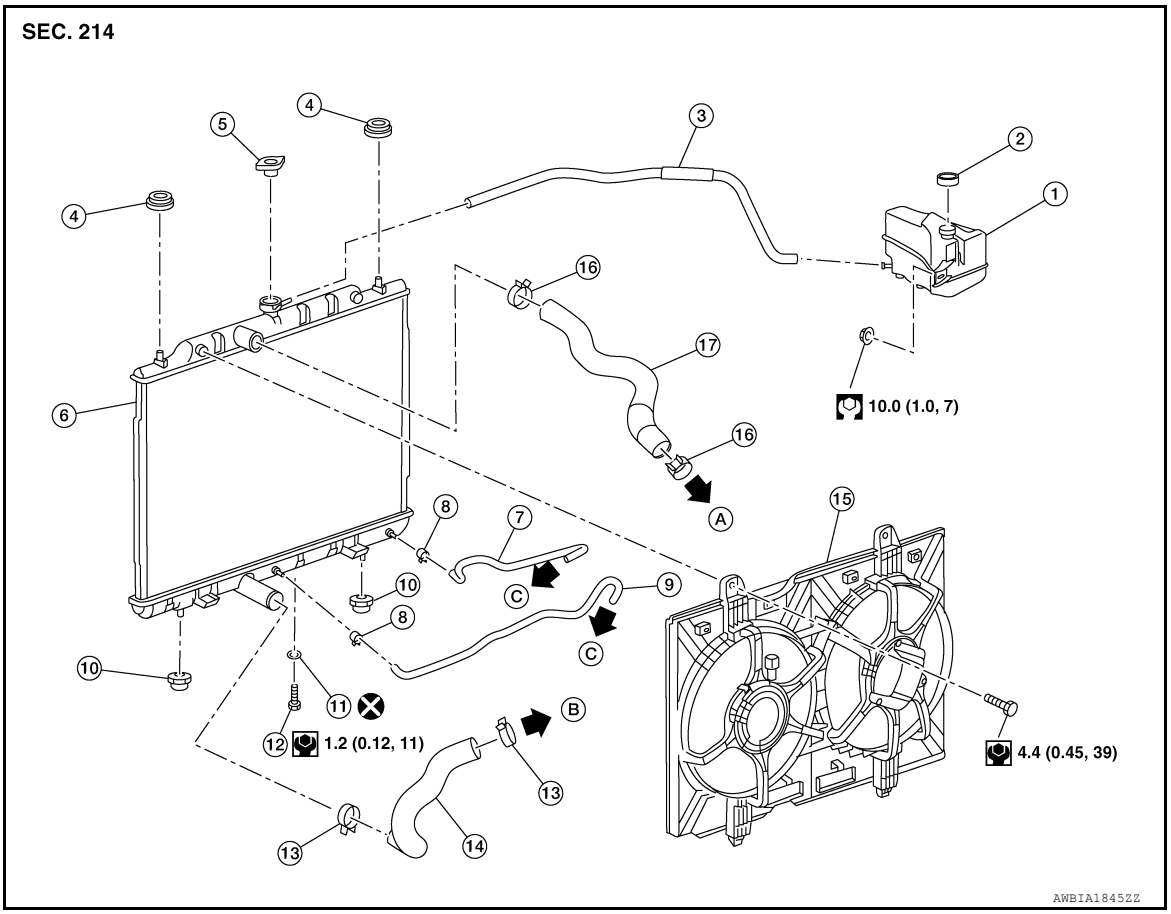
REMOVAL



1. Reservoir tank	2. Reservoir tank cap	3. Reservoir tank hose
4. Mounting rubber (upper)	5. Radiator cap	6. Radiator
7. CVT fluid cooler hose	8. Clamp	9. CVT fluid cooler hose
10. Mounting rubber (lower)	11. O-ring	12. Drain plug
13. Clamp	14. Radiator hose (lower)	15. Cooling fan assembly
16. Clamp	17. Radiator hose (upper)	A. To water outlet
B. To water inlet	C. To CVT fluid warmer	

Removal and Installation

INFOID:0000000011279706

REMOVAL

WARNING:

Do not remove the radiator cap when the engine is hot. Serious burns could occur from high-pressure engine coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly push down and turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by pushing it down and turning it all the way.

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

1. Disconnect battery negative terminal.

2. Disconnect battery positive terminal. Refer to PG-80, "Exploded View".
3. Depower SRS system. Refer to SR-2, "Service".
4. Drain engine coolant from radiator. Refer to CO-8, "Draining".
   CAUTION:
   - **Perform this step when the engine is cold.**
   - **Do not spill engine coolant on the drive belt.**
5. Remove engine under cover. Refer to EXT-37, "ENGINE UNDER COVER : Removal and Installation".
6. Remove over fender. Refer to EXT-30, "FRONT OVER FENDER : Removal and Installation".
7. Remove front air spoiler. Refer to EXT-16, "Exploded View".
8. Remove fender protector side cover. Refer to EXT-28, "FENDER PROTECTOR : Exploded View".
9. Remove radiator core upper support. Refer to DLK-244, "Exploded View" (with intelligent key system) and DLK-365, "Exploded View" (without intelligent key system).
10. Remove radiator hose (upper/lower) from radiator. Refer to CO-13, "Exploded View".
    CAUTION:
    Do not spill engine coolant on the drive belt.
11. Remove clamps from radiator hose (upper/lower), (if necessary).
    WARNING:
    Wear hand protection while applying heat to remove glue.
    NOTE:
    Radiator hoses have glued on clamps.
    - Apply heat gun at glued location, usually located on the underside of the radiator hose (upper/lower), a short distance from clamp.
    - While applying heat, simultaneously wiggle or pressure the clamp tab gently until it can be removed from the hose without damaging it.
12. Remove condenser. Refer to HA-37, "CONDENSER : Removal and Installation".
    CAUTION:
    Be careful not to damage the condenser.
13. Remove cooling fan assembly. Refer to CO-17, "Exploded View".
    CAUTION:
    Be careful not to damage the radiator.
14. Remove radiator.
    CAUTION:
    Be careful not to damage or scratch the radiator.

INSTALLATION

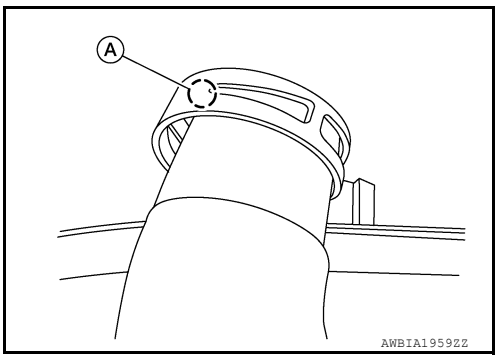
Installation is in the reverse order of removal.

- After installation, refill coolant and check for leaks. Refer to CO-9, "Refilling" and CO-8, "Inspection".
  CAUTION:
  Do not spill coolant in engine compartment. Use a shop cloth to absorb coolant.

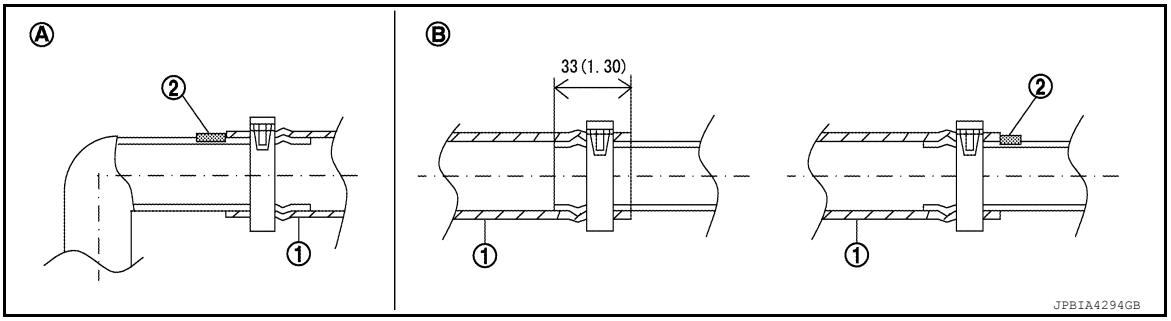
Radiator hose

NOTE:

- Once hose clamp has been placed into position, place a small amount of glue between the hose and the clamp (A).



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



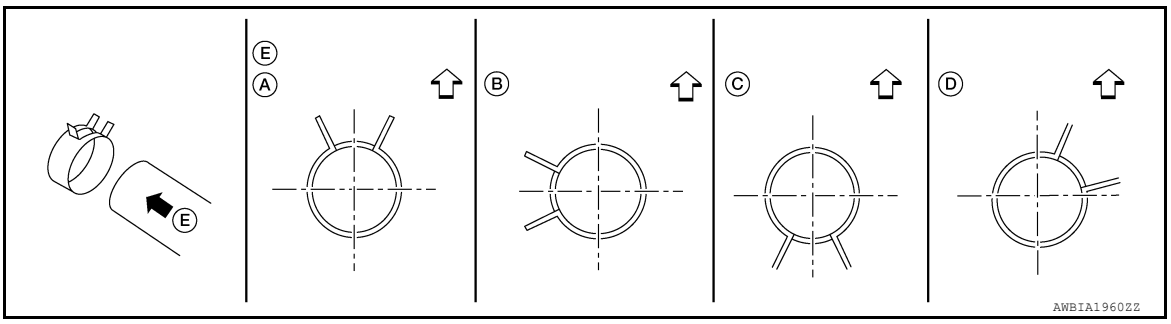
Unit: mm (in)

A. Radiator side B. Engine side

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

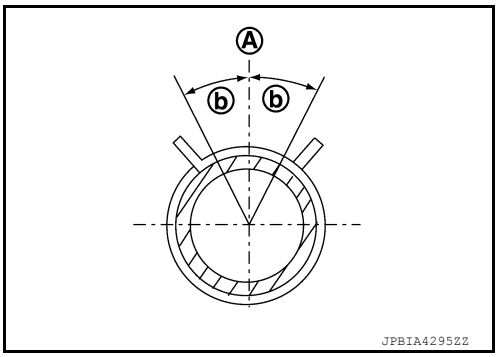
Radiator hose	Hose end	Paint mark	Position of hose clamp*
Radiator hose (upper)	Radiator side	Upper	A
	Engine side	Upper	D
Radiator hose (lower)	Radiator side	Upper	C
	Engine side	Side	B
CVT fluid cooler hoses	Radiator side	Lower	C

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



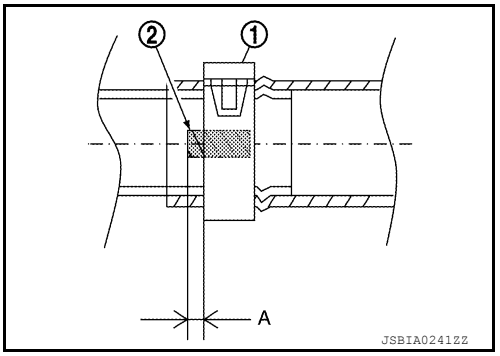
E. View E ⇦ : Vehicle upper ⬅ : Vehicle back side

- The angle (b) created by the hose clamp pawl and the specified line (A) must be within ±30 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 (2) to the hose clamp is within the reference value.

Dimension "A" : (-3) – (+3) mm [(-0.12) – (+0.12) in]



Inspection

INFOID:0000000011279707

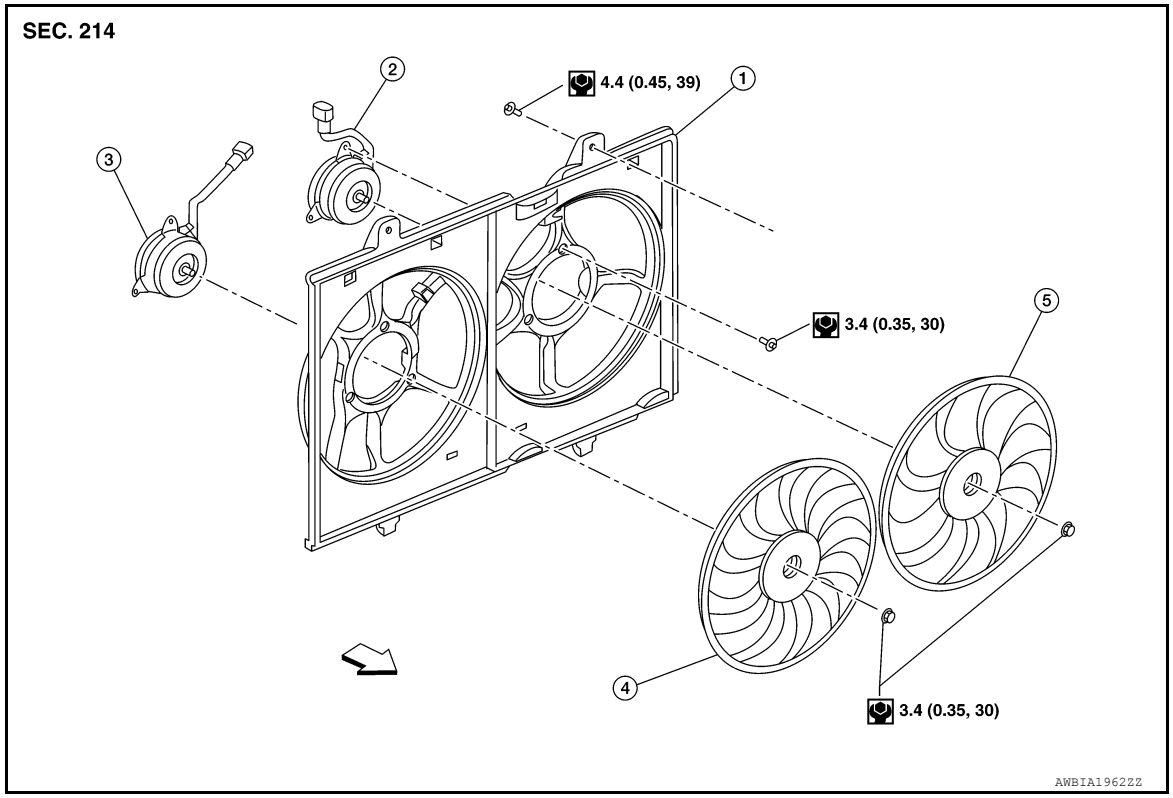
INSPECTION AFTER INSTALLATION

- Start and warm up the engine. Check visually and verify that there are no engine coolant leaks, if engine coolant leaks are found perform inspection. Refer to CO-8, "Inspection".

COOLING FAN

Exploded View

INFOID:0000000011279708



1.	Fan shroud	2.	Fan motor (LH)	3.	Fan motor (RH)
4.	Cooling fan (RH)	5.	Cooling fan (LH)	⇦	Front

Removal and Installation

INFOID:0000000011279709

REMOVAL

WARNING:

Do not remove the radiator cap when the engine is hot. Serious burns could occur from high pressure engine 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.

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

1. Disconnect battery negative terminal.
2. Disconnect battery positive terminal. Refer to PG-80, "Exploded View".
3. Depower SRS system. Refer to SR-2, "Service".
4. Drain engine coolant from radiator. Refer to CO-8, "Draining".
   CAUTION:
   - **Perform this step when the engine is cold.**
   - **Do not spill engine coolant on the drive belt.**
5. Remove engine under cover. Refer to EXT-37, "ENGINE UNDER COVER : Removal and Installation".
6. Remove front air spoiler. Refer to EXT-16, "Exploded View".
7. Remove fender protector side cover. Refer to EXT-28, "FENDER PROTECTOR : Exploded View".
8. Remove air duct (inlet). Refer to EM-26, "Exploded View".
9. Remove radiator core support (upper). Refer to DLK-244, "Removal and Installation" (WITH INTELLIGENT KEY SYSTEM), DLK-365, "Removal and Installation" (WITHOUT INTELLIGENT KEY SYSTEM).

10. Remove radiator hose (upper) from radiator. Refer to CO-13, "Exploded View".
    CAUTION:
    Do not spill engine coolant on the drive belt.
11. Disconnect harness connector from cooling fan controller.
12. Remove harness retainers from fan shroud.
13. Remove CVT cooler hose retainers from fan shroud.
14. Remove reservoir tank hose from fan shroud. Refer to CO-13, "Exploded View".
15. Remove fan shroud. Refer to CO-17, "Exploded View".
    CAUTION:
    Be careful not to damage the radiator.

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

Do not spill engine coolant in the engine compartment. Use a shop cloth to absorb engine coolant.

NOTE:

Cooling fan is controlled by ECM. For details, refer to EC-66, "On Board Diagnosis Function".

Disassembly and Assembly

INFOID:0000000011279710

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

Assembly is in the reverse order of disassembly.

CAUTION:

Apply high thread locking sealant to cooling fan motor shaft.

Inspection

INFOID:0000000011279711

INSPECTION AFTER DISASSEMBLY

Cooling Fan

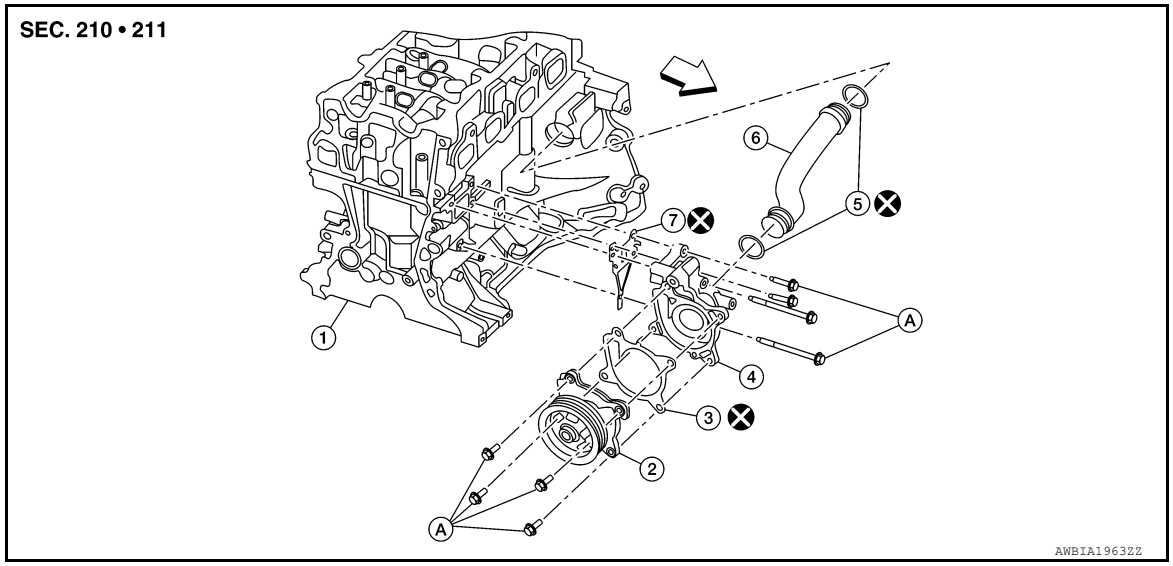
Inspect cooling fan for cracks or unusual bends.

- If anything is found, replace cooling fan.

WATER PUMP

Exploded View

INFOID:0000000011279712



1. Cylinder block	2. Water pump	3. Water pump gasket
4. Water pump housing	5. O-ring	6. Water pipe
7. Water pump housing gasket	A. Refer to INSTALLATION	⇦ Front

Removal and Installation

INFOID:0000000011279713

REMOVAL

1. Drain engine coolant. Refer to CO-8, "Draining".

   WARNING:
   Do not remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.
   CAUTION:
   - **Perform this step when the engine is cold.**
   - **Do not spill engine coolant on the drive belt.**
2. Remove the generator. Rafer to CHG-20, "Removal and Installation".
3. Remove water pump.
   - Engine coolant will leak from the cylinder block.

   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.**

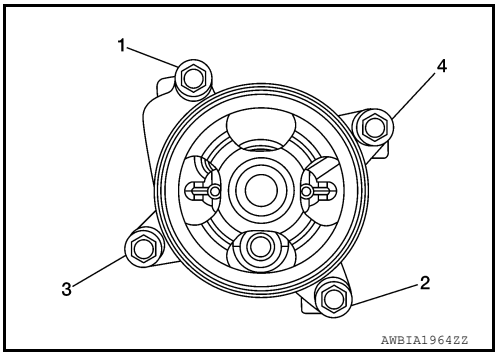
INSTALLATION

1. Tighten water pump bolts in sequence to specification.

   CAUTION:

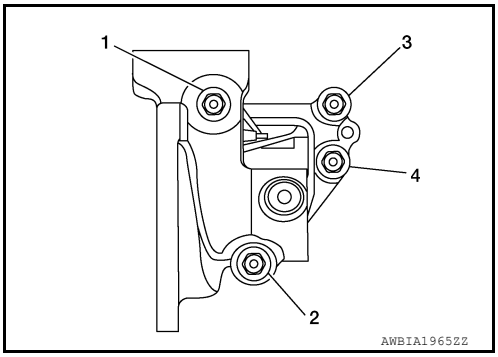
Do not reuse water pump gasket.

25 N·m (2.6 kg-m, 18 ft-lb)



2. Tighten water pump housing bolts in sequence to specification.
CAUTION:
Do not reuse water pump housing gasket.

22 N·m (2.2 kg-m, 16 ft-lb)



Installation of remaining components is in the reverse order of removal.
- After installation, refill coolant and check for leaks. Refer to CO-9, "Refilling" and CO-8, "Inspection".

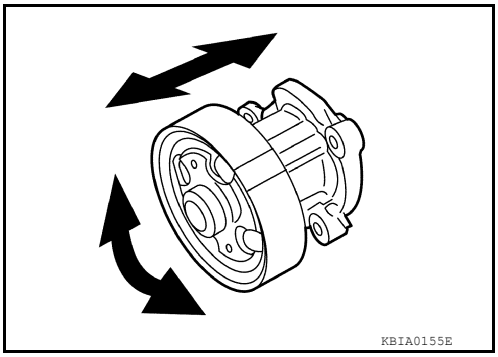
CAUTION:
- **Do not spill coolant in engine compartment. Use a shop cloth to absorb coolant.**
- **Do not reuse water pump gasket.**
- **Do not reuse water pump housing gasket.**

Inspection

INFOID:0000000011279714

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.



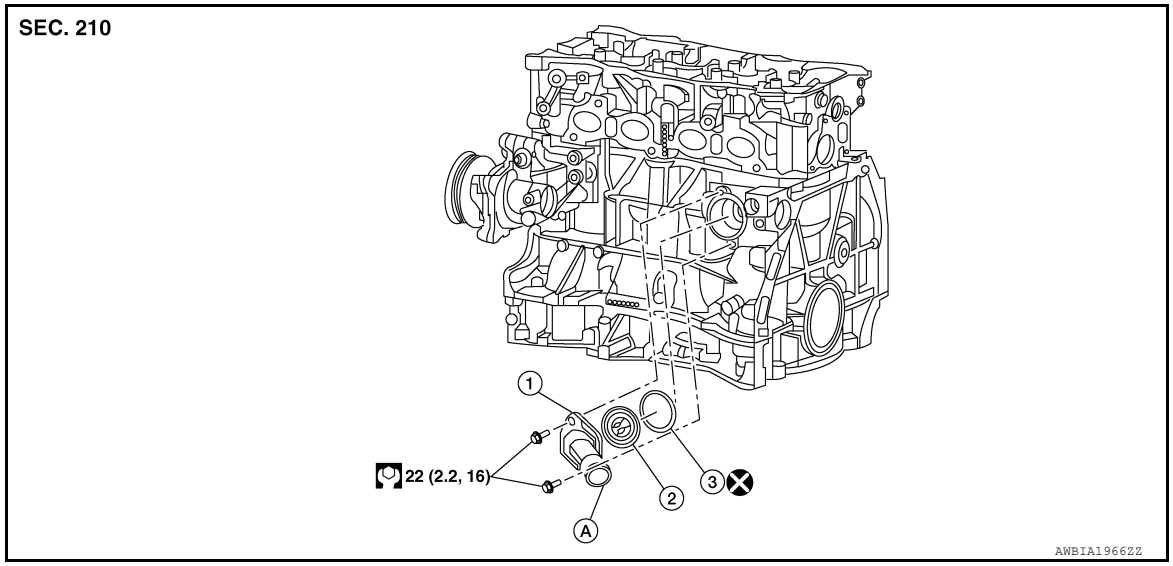
INSPECTION AFTER INSTALLATION

- 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-8, "Inspection".
- Start and warm up engine. Check visually that there is no leakage of engine coolant.

THERMOSTAT AND WATER CONTROL VALVE

Exploded View

INFOID:0000000011279715



1. Water inlet
2. Thermostat
3. Rubber ring

A. To radiator hose (lower)

NOTE:
When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

Removal and Installation

INFOID:0000000011279716

WARNING:
Do not remove the radiator cap when the engine is hot. Serious burns could occur from high-pressure engine coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly push down and turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by pushing it down and turning it all the way.

REMOVAL

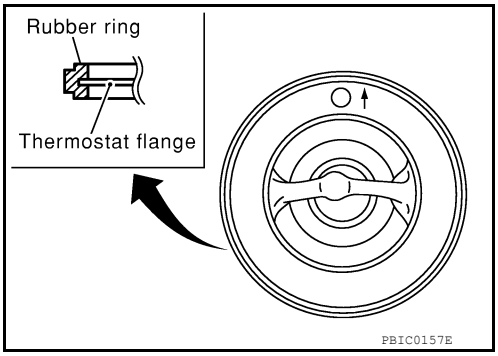
1. Drain engine coolant from the radiator. Refer to CO-8, "Draining".
   CAUTION:
   - **Perform this step when the engine is cold.**
   - **Do not spill coolant on drive belt.**
2. Remove engine under cover. Refer to EXT-37, "ENGINE UNDER COVER : Removal and Installation".
3. Remove radiator hose (lower) from the water inlet side.
4. Remove exhaust manifold heat shield. Refer to EM-32, "Exploded View".
5. Remove water inlet and thermostat.

INSTALLATION

Installation is in the reverse order of removal.

- Install the thermostat with the whole circumference of the flange fitting securely inside the rubber ring.
  CAUTION:
  - **Do not reuse rubber ring.**
  - **Ensure thermostat rubber ring mounting surface is free from dents or flaws.**

- Install the thermostat with the jiggle valve facing upwards. The position deviation may be within the range of ±20°.
- After installation, refill coolant and check for leaks. Refer to CO-9, "Refilling" and CO-8, "Inspection".

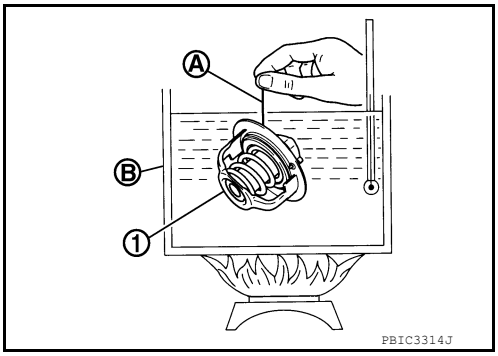


Inspection

INFOID:0000000011279717

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-25, "Thermostat".

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

INSPECTION AFTER INSTALLATION

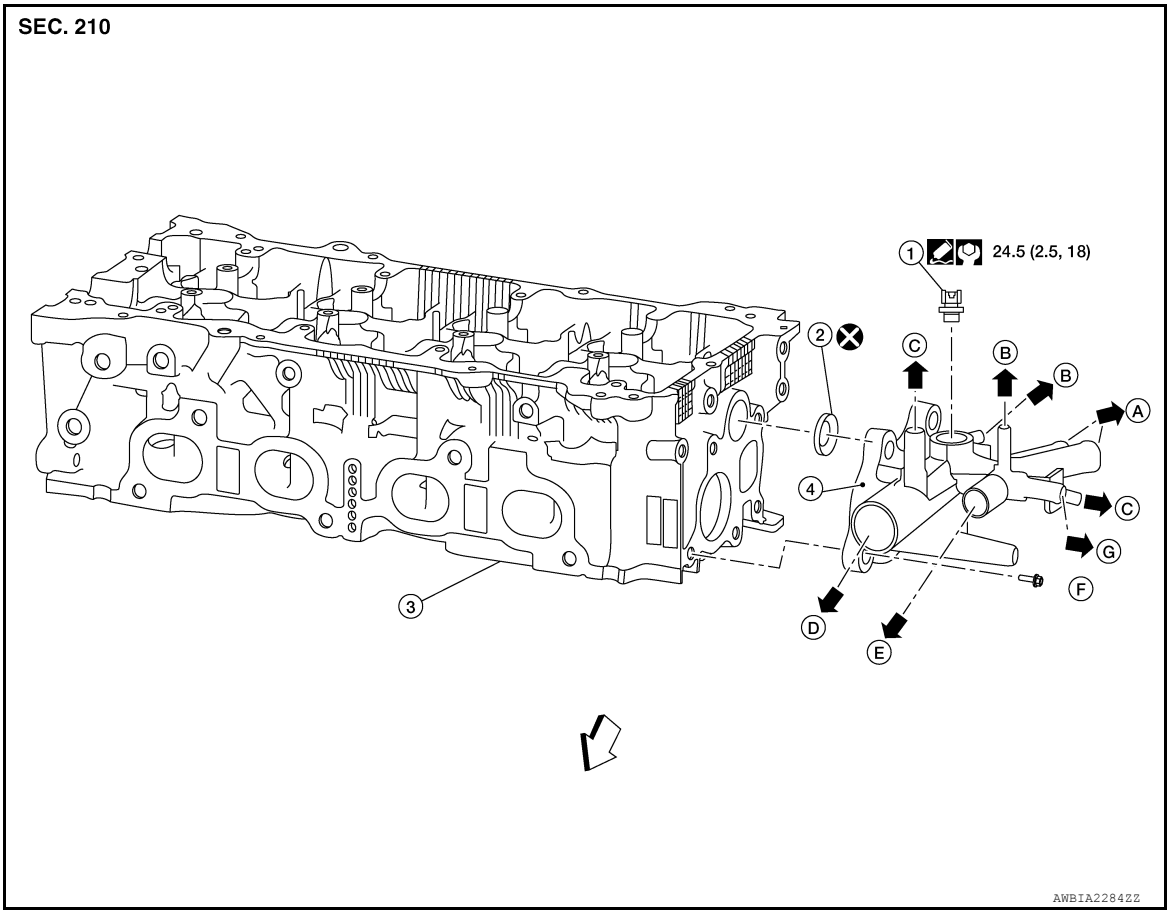
- Check for leakage of engine coolant using the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool). Refer to CO-8, "Inspection".
- Start and warm up engine. Check visually that there is no leakage of engine coolant.

WATER OUTLET AND WATER PIPING

Exploded View

INFOID:0000000011279718

SEC. 210



1.	Water temperature sensor	2.	Water outlet O-ring	3.	Cylinder head
4.	Water outlet	A.	To heater core	B.	To electric throttle control actuator
C.	Oil cooler	D.	To radiator hose (upper)	E.	To cylinder block
F.	Refer to INSTALLATION	G.	To CVT oil warmer		

Removal and Installation

INFOID:0000000011279719

WARNING:
Do not remove the radiator cap when the engine is hot. Serious burns could occur from high-pressure engine coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly push down and turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by pushing it down and turning it all the way.
NOTE:
When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.
CAUTION:
Perform when the engine cold.

REMOVAL

1. Drain engine coolant from the radiator. Refer to CO-8, "Draining".
2. Remove air duct assembly. Refer to EM-26, "Exploded View".
3. Remove battery tray. Refer to PG-79, "Removal and Installation (Battery Tray)".
4. Remove ECM/TCM bracket.

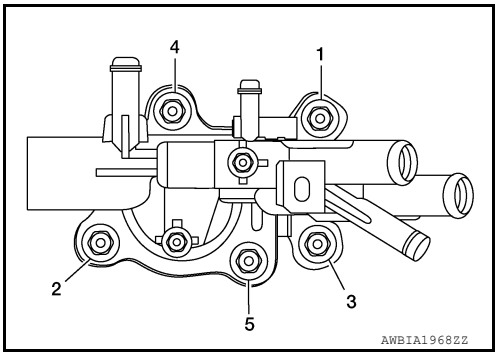
5. Remove the upper radiator hose from water outlet.
6. Disconnect harness connector from water temperature sensor.
7. Remove water temperature sensor from water outlet, (if necessary).
8. Remove heater hoses from water outlet.
   NOTE:
   Note location of heater hoses prior to removal to serve as an installation aid.
9. Remove water hoses from water outlet.
   NOTE:
   Note location of heater hoses prior to removal to serve as an installation aid.
10. Remove water hoses from electric throttle control actuator.
11. Remove the water outlet.

INSTALLATION

Installation of remaining components is in the reverse order of removal.

1. Tighten water outlet bolts in sequence to specification.

22 N·m (2.2 kg-m, 16 ft-lb)



CAUTION:
- **Do not reuse heater pipe O-ring.**
- **Do not reuse water outlet O-ring.**
- **To install heater pipe, first apply a mild soap to the O-ring and quickly insert the heater pipe into the housing.**
- **Do not spill coolant in engine compartment. Use a shop cloth to absorb coolant.**

2. After installation, refill coolant and check for leaks. Refer to CO-9, "Refilling" and CO-8, "Inspection".
3. Perform the “Throttle Valve Closed Position Learning” when harness connector of electric throttle control actuator is disconnected. Refer to EC-143, "Work Procedure".
4. Perform the “Accelerator Pedal Released Position Learning” when harness connector of electric throttle control actuator is disconnected. Refer to EC-142, "Work Procedure".

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Periodical Maintenance Specification

INFOID:0000000011279720

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Engine coolant capacity (With reservoir tank at “MAX” level)	8.1 (8-5/8, 7-1/8)
Reservoir tank	0.61 (5/8, 1/2)

Radiator

INFOID:0000000011279721

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

Cap relief pressure	Standard	78.2 - 97.8 (0.8 - 1.0, 11 - 14)
	Limit	59 (0.6, 9)
Minimum seal pressure		118 (1.20, 17.1)

Thermostat

INFOID:0000000011279722

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)