SECTION CO
ENGINE COOLING SYSTEM

CONTENTS

VQ35DE

PRECAUTION

PRECAUTIONS

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

INFOID:0000000005463364

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 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 3 minutes before performing any service.**

Precautions Necessary for Steering Wheel Rotation after Battery Disconnect (Early Production, With Electronic Steering Column Lock)

INFOID:0000000005885818

NOTE:

- Before removing and installing any control units, first turn the push-button ignition switch to the LOCK position, then disconnect both battery cables.
- After finishing work, confirm that all control unit connectors are connected properly, then re-connect both battery cables.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If a DTC is detected, perform trouble diagnosis according to self-diagnosis results.

This vehicle is equipped with a push-button ignition switch and a steering lock unit.
If the battery is disconnected or discharged, the steering wheel will lock and cannot be turned.
If turning the steering wheel is required with the battery disconnected or discharged, 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. Carry the Intelligent Key or insert it to the key slot and turn the push-button ignition switch to ACC position. (At this time, the steering lock will be released.)
3. Disconnect both battery cables. The steering lock will remain released with both battery cables disconnected and the steering wheel can be turned.
4. Perform the necessary repair operation.

5. When the repair work is completed, re-connect both battery cables. With the brake pedal released, turn the push-button ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the push-button ignition switch is turned to LOCK position.)
6. Perform self-diagnosis check of all control units using CONSULT-III.

Precaution for Liquid Gasket

INFOID:0000000005463366

REMOVAL OF LIQUID GASKET SEALING

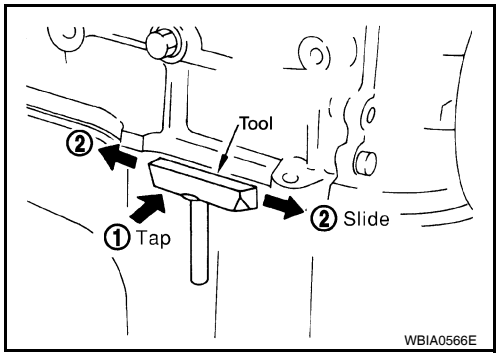
- After removing nuts and bolts, separate the mating surface using Tool and remove old liquid gasket sealing.

Tool number : KV10111100 (J-37228)

CAUTION:
Be careful not to damage the mating surfaces.

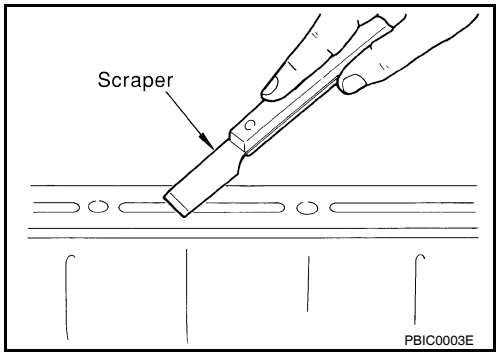
- Tap (1) Tool to insert it, and then slide it (2) by tapping on the side as shown.
- In areas where Tool is difficult to use, use plastic hammer to lightly tap the parts, to remove it.

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



LIQUID GASKET APPLICATION PROCEDURE

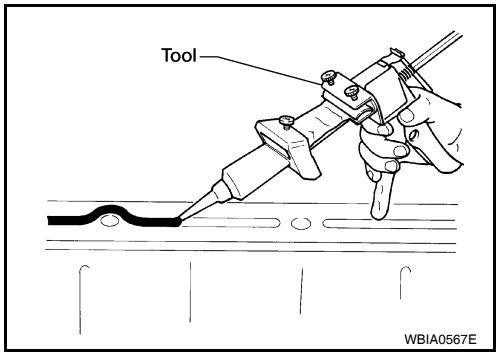
1. Remove old liquid gasket adhering to the liquid gasket application surface and the mating surface using scraper.
   - Remove liquid gasket completely from the groove of the liquid gasket application surface, bolts, and bolt holes.
2. Thoroughly clean the mating surfaces and remove adhering moisture, grease and foreign materials.



3. Attach liquid gasket tube to Tool.

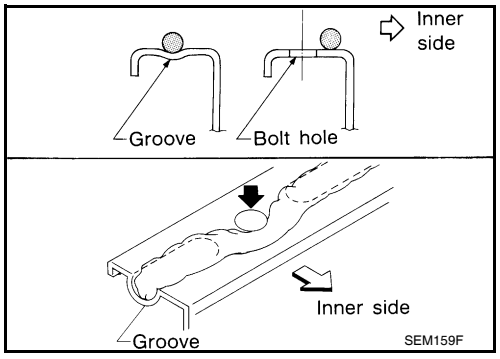
Tool number : WS39930000 (—)

Use Genuine RTV Silicone Sealant or equivalent. Refer to GI-15, "Recommended Chemical Products and Sealants".



4. Apply liquid gasket without breaks to the specified location with the specified dimensions.
   - If there is a groove for the liquid gasket application, apply liquid gasket to the groove.
   - As for the bolt holes, normally apply liquid gasket inside the holes. Occasionally, it should be applied outside the holes. Make sure to read the text of Service Manual.
   - Within five minutes of liquid gasket application, install the mating component.
   - If liquid gasket protrudes, wipe it off immediately.
   - Do not retighten nuts or bolts after the installation.
   - After 30 minutes or more have passed from the installation, fill engine oil and engine coolant.

CAUTION:



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

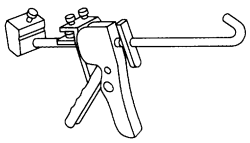
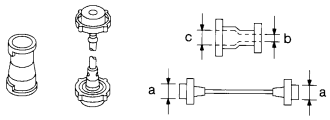
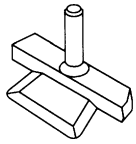
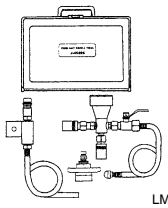
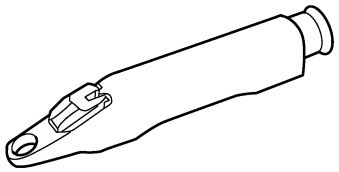
PREPARATION

PREPARATION

Special Service Tool

INFOID:0000000005463367

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

Tool number (Kent-Moore No.) Tool name	Description
WS39930000 (—) Tube pressure  S-NT052	Pressing the tube of liquid gasket
EG17650301 (J-33984-A) 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)
KV10111100 (J-37228) Seal cutter  NT046	Removing chain tensioner cover and water pump cover
KV991J0070 (J-45695) Coolant refill tool  LMA053	Refilling engine cooling system
— (J-23688) Engine coolant refractometer  WBIA0539E	Checking concentration of ethylene glycol in engine coolant

Commercial Service Tool

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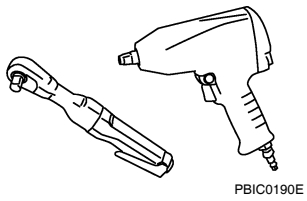
Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts

FUNCTION DIAGNOSIS

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:0000000005463369

	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	—	Radiator shroud	—
	Improper coolant mixture ratio	—	Coolant viscosity	—
	Poor coolant quality	—		—
	Insufficient coolant	Coolant leaks	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
			Radiator cap	Loose
				Poor sealing
			Radiator	O-ring for damage, deterioration or improper fitting
				Cracked radiator tank
				Cracked radiator core
			Reservoir tank	Cracked reservoir tank
		Overflowing reservoir tank	Exhaust gas leaks into cooling system	Cylinder head deterioration
				Cylinder head gasket deterioration

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

COOLING SYSTEM

Cooling Circuit

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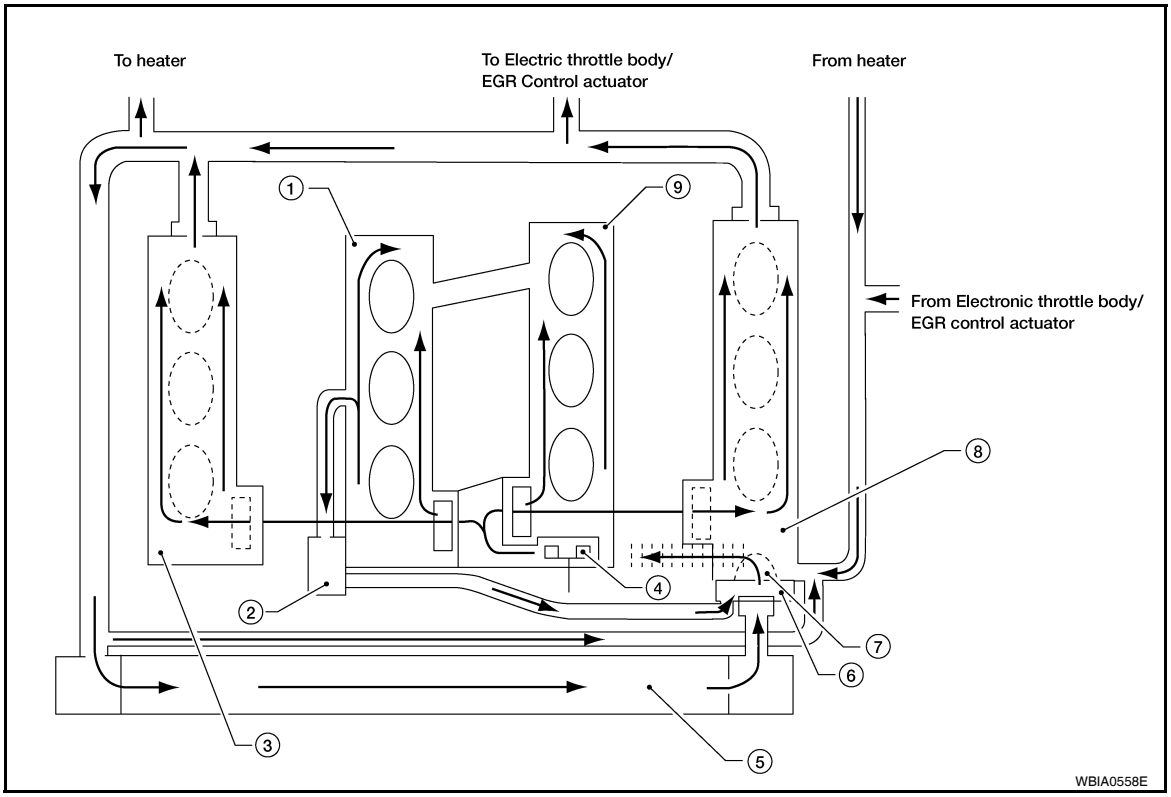

1. Cylinder block (RH)
2. Oil cooler
3. Cylinder head (RH)
4. Water pump
5. Radiator
6. Water inlet
7. Thermostat
8. Cylinder head (LH)
9. Cylinder block (LH)

Schematic

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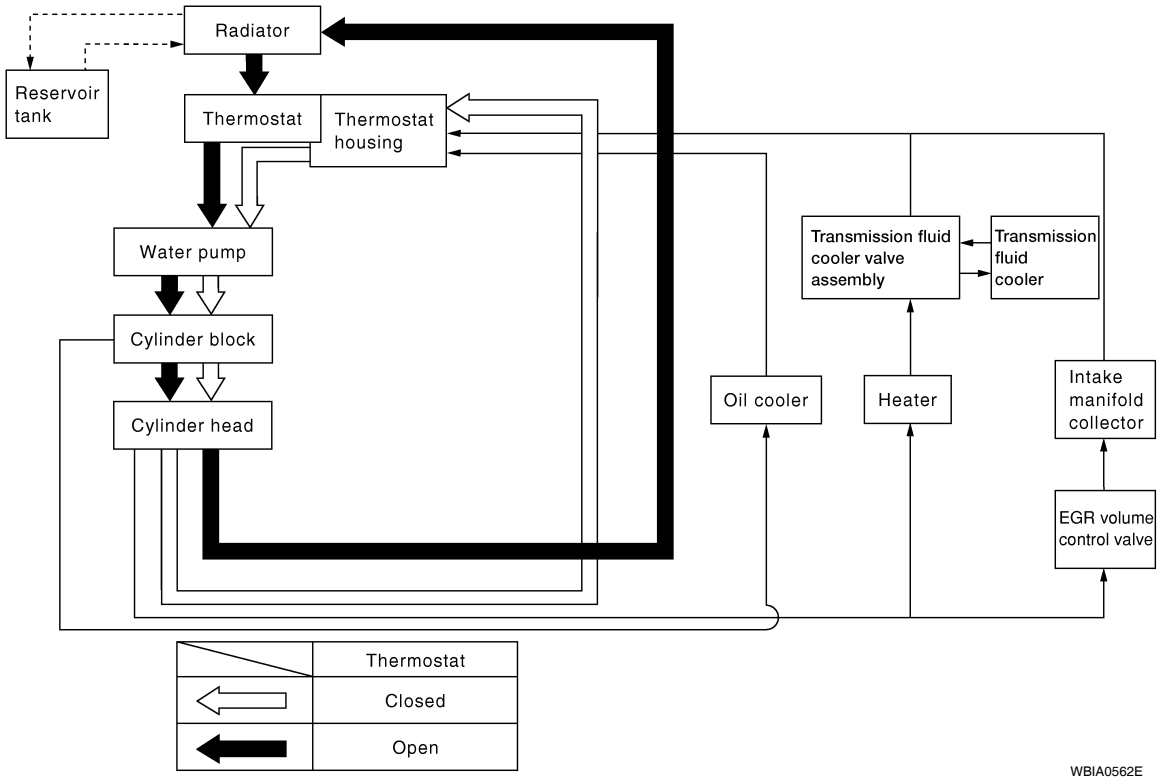

ON-VEHICLE MAINTENANCE

ENGINE COOLANT

System Inspection

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WARNING:

- **Never remove the radiator 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 push down and turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by pushing down and turning it all the way.**

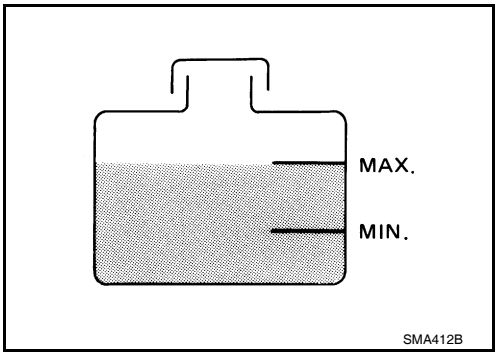
CHECKING COOLING SYSTEM HOSES

Check hoses for the following:

- Improper attachment
- Leaks
- Cracks
- Damage
- Loose connections
- Chafing
- Deterioration

CHECKING RESERVOIR LEVEL

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



CHECKING COOLING SYSTEM FOR LEAKS

To check for leaks, apply pressure to the cooling system using Tool.

Tool number : EG17650301 (J-33984-A)

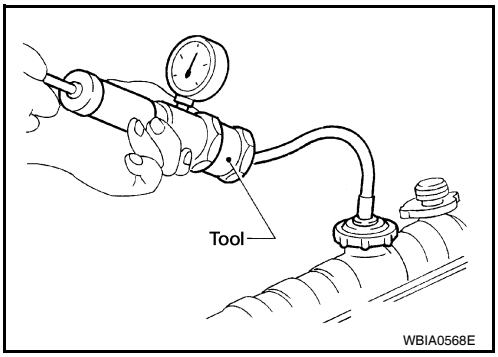
Testing pressure : 157 kPa (1.6 kg/cm^2, 23 psi)

WARNING:

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

CAUTION:

Higher pressure than specified may cause radiator damage.



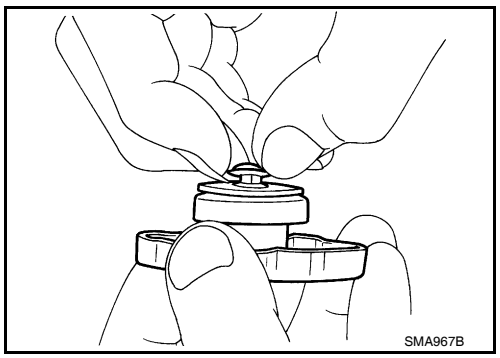
CHECKING RADIATOR CAP

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.



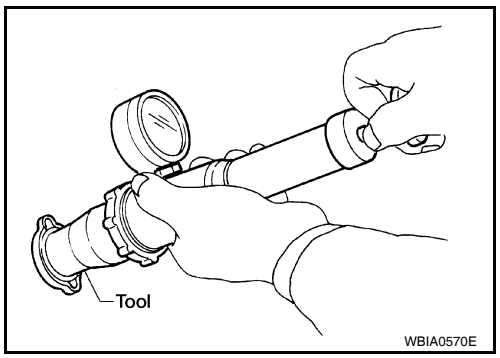
3. Check radiator cap relief pressure using Tool.

   Tool number : EG17650301 (J-33984-A)

   Standard: 78 – 98 kPa (0.8 – 1.0 kg/cm^2, 11 – 14 psi)

   Limit: 59 kPa (0.6 kg/cm^2, 9 psi)

   - When connecting the radiator cap to the tester, apply water or coolant to the cap seal surface.
   - 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.



CHECKING RADIATOR

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

1. Apply water by hose to the back side of the radiator core, with the hose pointed vertically downward.
2. Apply water again to all radiator core surfaces once per minute.
3. Stop washing if dirt no longer rinses out from the radiator.
4. Blow air into the back side of radiator core, with the air hose pointed 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.
6. Check for leaks.

Changing Engine Coolant

INFOID:0000000005463373

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.**

DRAINING ENGINE COOLANT

1. Open radiator drain plug at the bottom of radiator and remove the radiator filler cap. This is the only step required for a partial cooling system drain.
2. If removing the heater core, remove the upper heater hose from the engine coolant outlet and apply moderate air pressure of 15 psi (103.46 kPa, 1.055 kg-cm^2) maximum for 30 seconds into the hose to blow out excess coolant from the core.
3. For a complete cooling system drain, remove the reservoir tank and drain the coolant, and then clean the reservoir tank before installation.
   - Do not allow coolant to spill on the drive belts.
4. When performing a complete cooling system drain (to remove the engine or for engine repair), remove the cylinder block front drain plug and the cylinder block RH drain plug.
5. Check the drained coolant for contaminants such as rust, corrosion or discoloration.

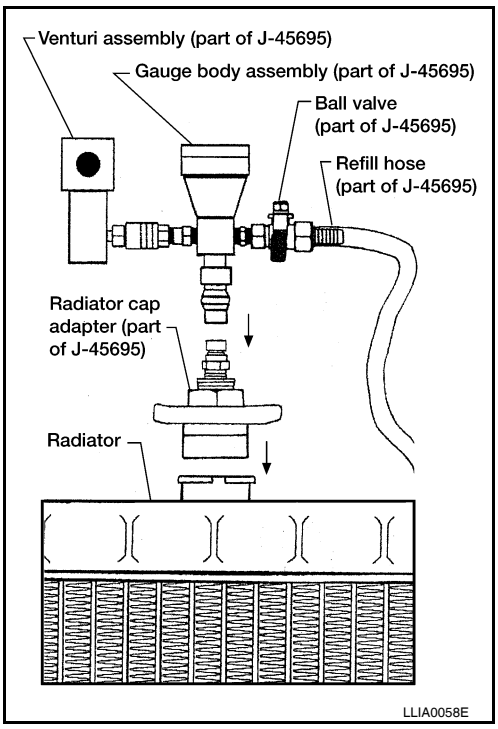
- If contaminated, flush the engine cooling system.

REFILLING ENGINE COOLANT

1. Install the radiator drain plug. If the cooling system was drained completely, install the reservoir tank and the cylinder block drain plugs.
   - The radiator must be completely empty of coolant and water.
   - Apply sealant to the threads of the cylinder block drain plugs. Use Genuine High Performance Thread Sealant or equivalent. Refer to GI-15, "Recommended Chemical Products and Sealants".

Radiator drain plug	**: Refer to CO-14, "Removal and Installation".**
Cylinder block front drain plug	**: Refer to EM-99, "Disassembly and Assembly".**
Cylinder block RH drain plug	**: Refer to EM-99, "Disassembly and Assembly".**

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)

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 Genuine NISSAN Engine Coolant or equivalent, mixed 50/50 with distilled water or demineralized water. Refer to MA-18, "FOR NORTH AMERICA : Engine Oil Recommendation" or MA-20, "FOR MEXICO : Engine Oil Recommendation".

Engine coolant capacity (with reservoir tank)	**: Refer to MA-18, "FOR NORTH AMERICA : Fluids and Lubricants" or MA-19, "FOR MEXICO : Fluids and Lubricants"**

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

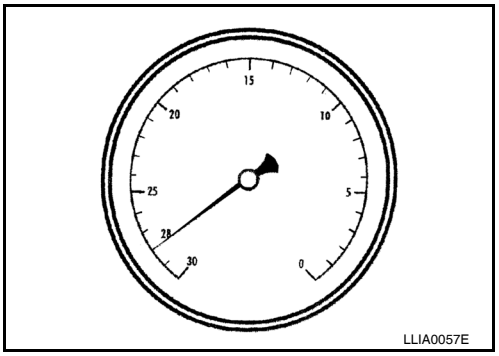
Compressed air supply pressure	**: 5.7 - 8.5 kPa (5.6 - 8.4 kg/cm^2 , 80 - 120 psi)**

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 COOLING SYSTEM

1. Fill the radiator from the filler neck above the radiator upper hose and reservoir tank with clean water and reinstall radiator filler cap.
2. Run the engine and warm it up to normal operating temperature.
3. Rev the engine two or three times under no-load.
4. Stop the engine and wait until it cools down.
5. Drain the water from the system. Refer to CO-11, "Changing Engine Coolant".
6. Repeat steps 1 through 5 until clear water begins to drain from the radiator.

ON-VEHICLE REPAIR

RADIATOR

Removal and Installation

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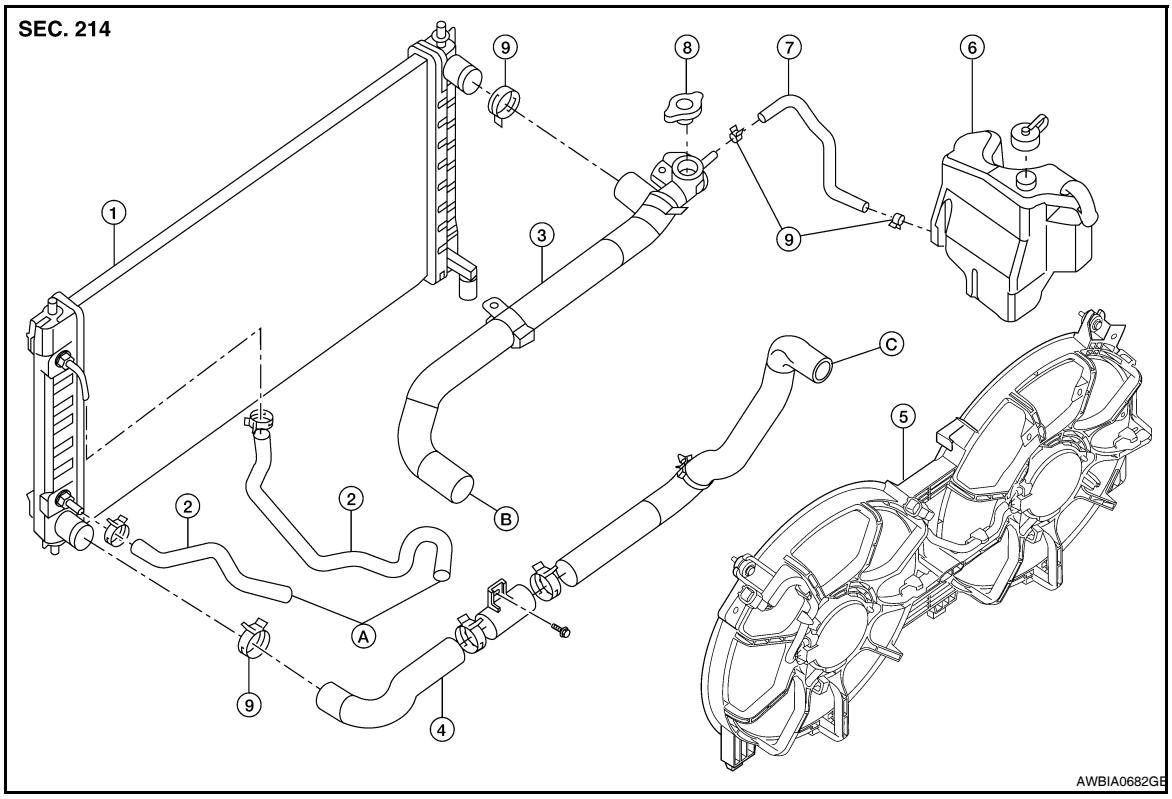


1. Radiator	2. CVT oil cooler hose	3. Radiator hose (upper)
4. Radiator hose (lower)	5. Cooling fan	6. Reservoir tank
7. Reservoir hose	8. Radiator filler cap	9. Clamps
A. To CVT	B. To water outlet	C. To water inlet

WARNING:

Never remove the radiator 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. Drain coolant. Refer to CO-11, "Changing Engine Coolant".
2. Remove hoodledge covers (RH and LH).
3. Remove engine room cover.
4. Remove battery. Refer to PG-65, "Removal and Installation (Battery)".
5. Remove transmission control module (TCM). Refer to TM-163, "Removal and Installation".
6. Remove ECM and bracket.
7. Remove battery tray. Refer to PG-66, "Removal and Installation (Battery Tray)".
8. Remove air cleaner assembly. Refer to EM-23, "Removal and Installation".
9. Disconnect coolant reservoir hose.
10. Disconnect radiator upper hose and lower hose.
11. Remove front bumper fascia. Refer to EXT-14, "Removal and Installation".
12. Remove A/C condenser. Refer to HA-51, "CONDENSER : Removal and Installation for Condenser".
13. Disconnect the CVT oil cooler hoses. Plug the hoses to prevent CVT oil loss.

14. Remove radiator.

CAUTION:

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

INSTALLATION

Installation is in the reverse order of removal.

INSPECTION

Radiator

1. 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 cooling fan, radiator shroud and horns. Then tape the harness and electrical connectors to prevent water from entering.

a. Apply water by hose to the back side of the radiator core, point the hose vertically downward.

b. Apply water again to all radiator core surfaces once per minute.

c. Stop washing when no more dirt flows off the radiator.

d. Blow air into the back side of radiator core, point the air hose 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).

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

2. Inspect radiator for leaks as follows:

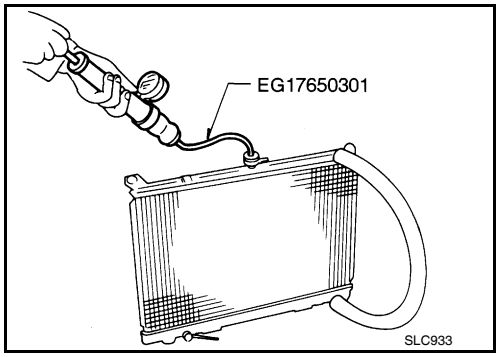
a. Apply pressure using Tool.

Tool number : EG17650301 (J-33984-A)

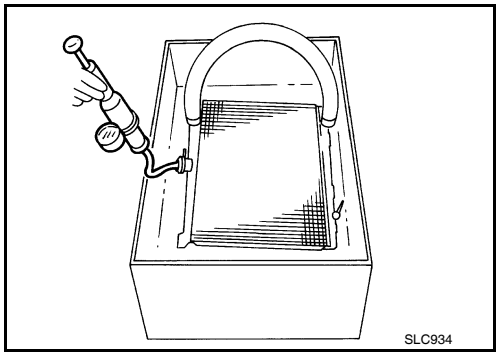
Specified pressure value : 157 kPa (1.6 kg/cm^2, 23 psi)

WARNING:

To prevent the risk of the hose coming undone while under pressure, securely fasten it down with a hose clamp. Attach a hose to the oil cooler as well.



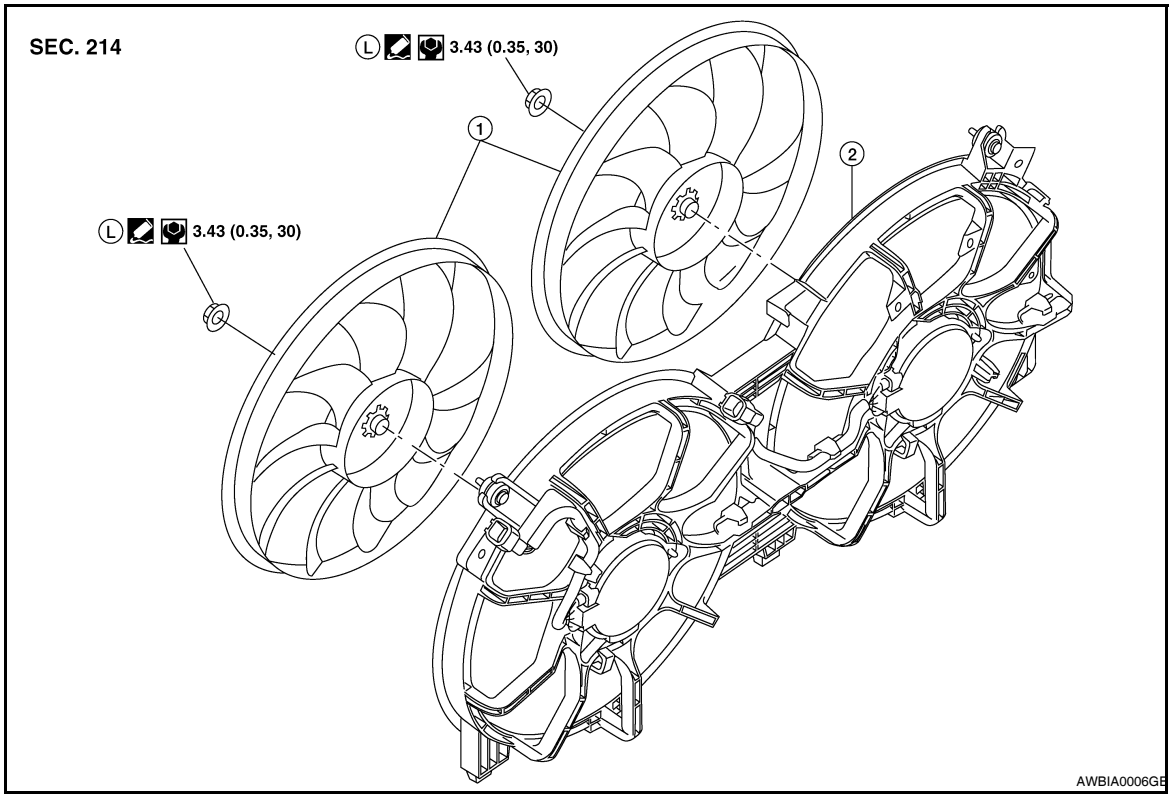
b. Check for leakage.



COOLING FAN

Removal and Installation

INFOID:0000000005463375



1. Fan blade
2. Fan shroud and motor assembly

REMOVAL

1. Partially drain engine coolant from radiator. Refer to CO-11, "Changing Engine Coolant".
   CAUTION:
   Perform when engine is cold.
2. Remove engine room cover.
3. Remove ECM and transmission control module. Refer to TM-163, "Removal and Installation".
4. Remove battery tray. Refer to PG-66, "Removal and Installation (Battery Tray)".
5. Remove air cleaner assembly. Refer to EM-23, "Removal and Installation".
6. Disconnect radiator upper hose.
7. Disconnect fan motor connectors.
8. Remove radiator cooling fan assembly.

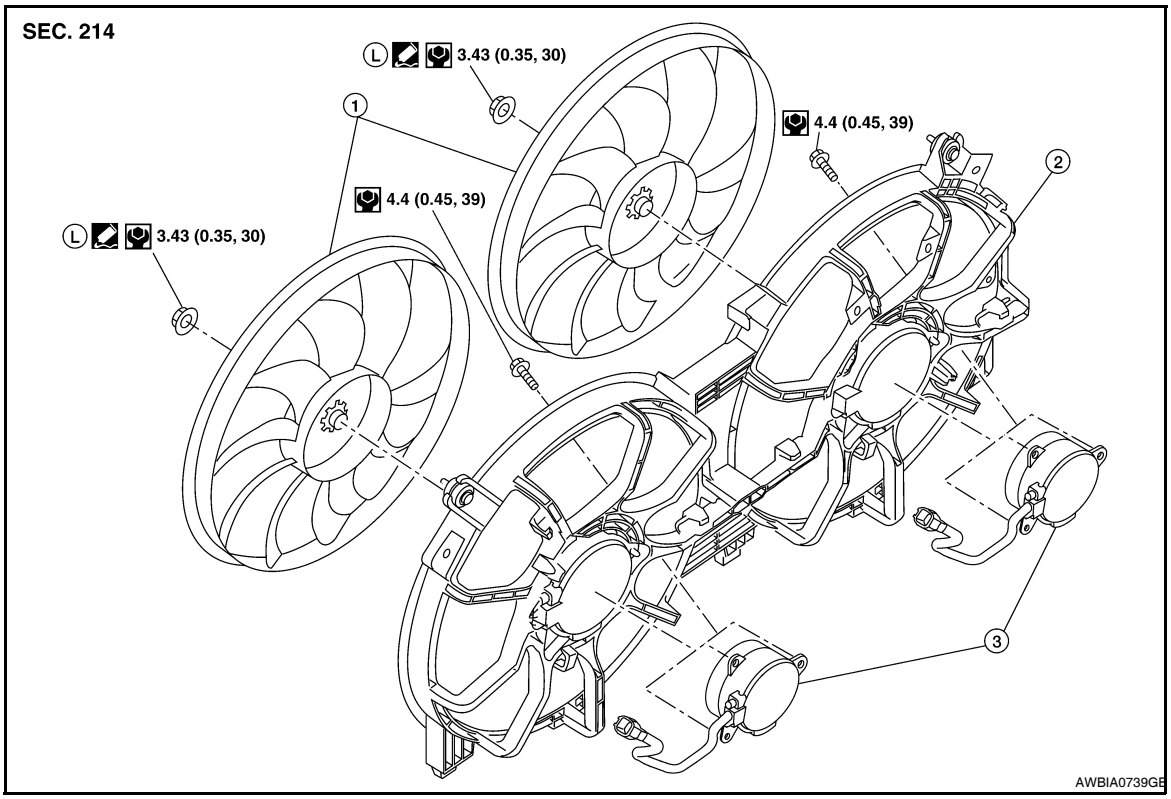
INSTALLATION

Installation is in the reverse order of removal.

- Cooling fans are controlled by ECM. For details, refer to EC-466, "Description".

Disassembly and Assembly of Cooling Fan

INFOID:0000000005463376



1. Fan blade
2. Fan shroud
3. Fan motor

DISASSEMBLY

1. Remove fan blade nut.
2. Remove fan blade from fan motor.
3. remove fan motor bolts and remove fan motor from fan shroud.

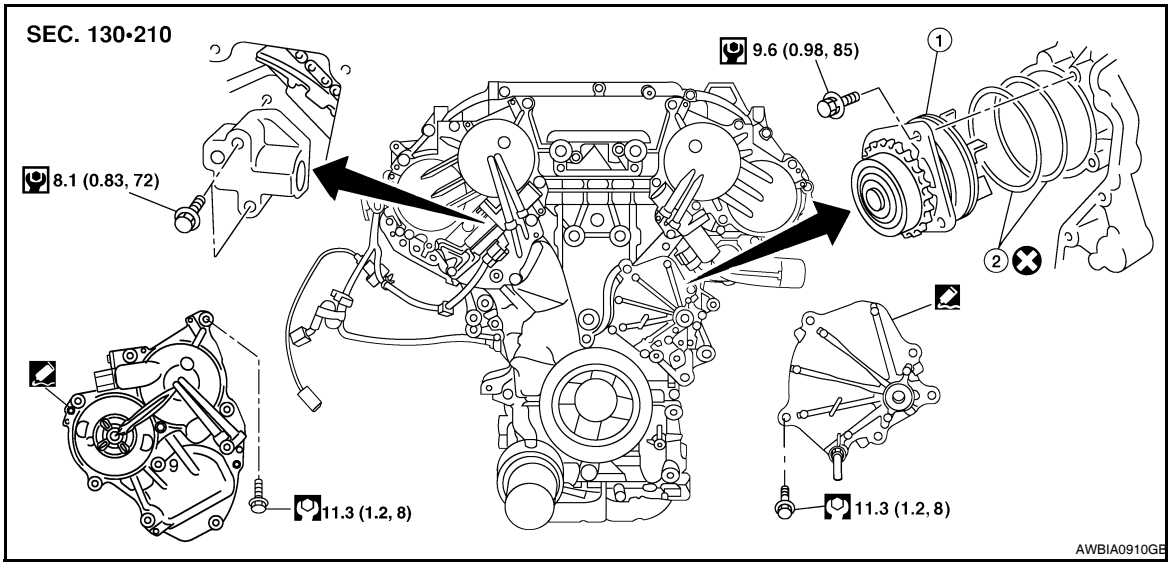
ASSEMBLY

Assembly is in the reverse order of disassembly.

WATER PUMP

Exploded View

INFOID:0000000005899663



1. Water pump
2. O-rings

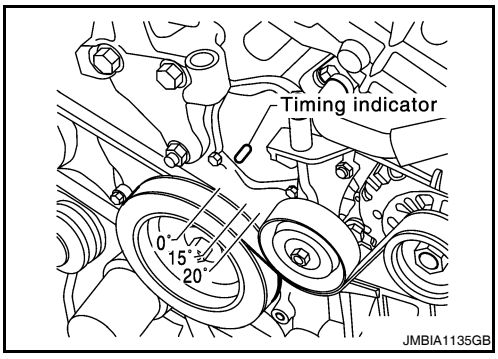
Removal and Installation

INFOID:0000000005463377

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.
CAUTION:
- **When removing water pump assembly, be careful not to get coolant on drive belt.**
- **Water pump cannot be disassembled and should be replaced as a unit.**
- **After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester.**

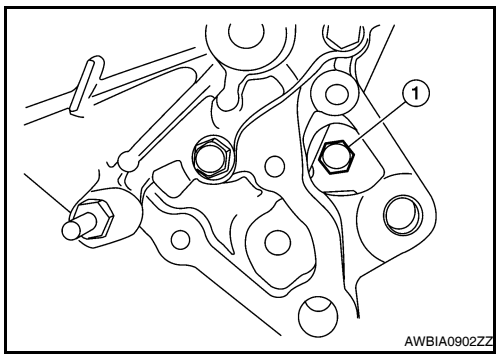
REMOVAL

1. Drain engine coolant from the radiator. Refer to CO-11, "Changing Engine Coolant".
   CAUTION:
   Perform when the engine is cold.
2. Remove RH wheel and tire. Refer to WT-63, "Adjustment".
3. Remove the fender protector side cover (RH). Refer to EXT-19, "Exploded View".
4. Set No. 1 cylinder at TDC on its compression stroke.
   - Align pointer with TDC mark on crankshaft pulley.



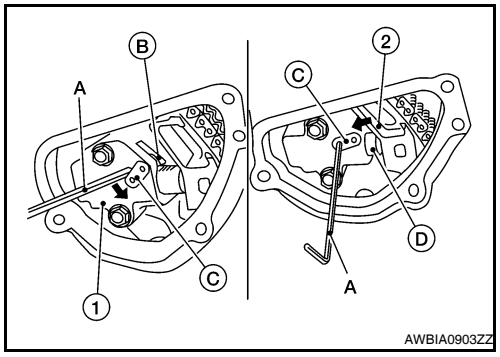
5. Remove drive belt. Refer to EM-14, "Removal and Installation".
6. Remove the idler pulley and the A/C idler pulley. Refer to EM-15, "Removal and Installation of Drive Belt Auto-tensioner".
7. Remove hoodledge cover (RH).

8. Remove water drain plug (front) (1) on water pump side of cylinder block to drain engine coolant from engine.



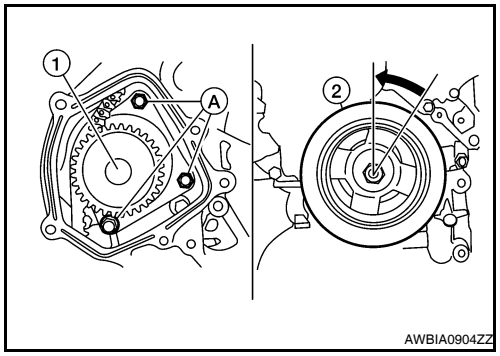
9. Support engine and remove the front engine insulator and bracket. Refer to EM-95, "Removal and Installation".
10. Disconnect RH valve timing control connectors and remove RH IVT control valve cover. Refer to EM-49, "Exploded View".
11. Remove water pump cover. Refer to EM-49, "Exploded View".
12. Remove the timing chain tensioner assembly as follows:

a. Pull the lever (C) down to release the plunger stopper tab (B).
b. Insert the stopper pin A into the tensioner body hole to hold the lever (C) and keep the plunger stopper tab (B) released.
NOTE:
An allen wrench [(1.2 mm (0.047 in)] is used for a stopper pin A as an example.
c. Compress the plunger (D) into the tensioner body (1) by pressing the slack guide (2).
d. Keep the slack guide (2) pressed and lock the plunger (D) in by pushing the stopper pin A through the lever (C) and into the chain tensioner body hole.

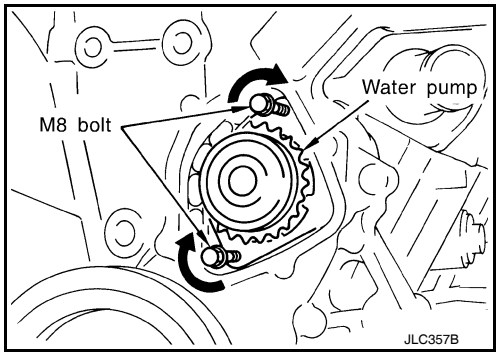


e. Remove timing chain tensioner bolts and then remove the timing chain tensioner.
CAUTION:
Be careful not to drop timing chain tensioner bolts inside timing chain case.

13. Remove the three water pump bolts (A). Make a gap between water pump sprocket (1) and timing chain, by carefully turning crankshaft pulley (2) counterclockwise until timing chain loosens on water pump sprocket (1).



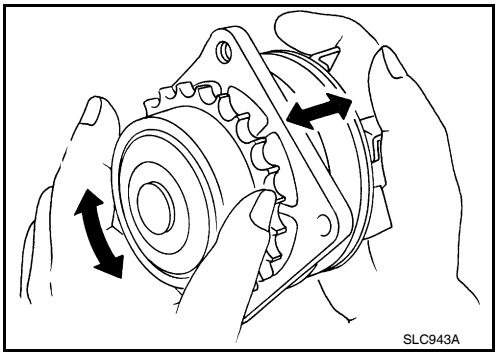
14. Screw M8 bolts [pitch: 1.25 mm (0.49 in) length: approx. 50 mm (1.97 in)] into water pumps upper and lower bolt holes until they reach the timing chain case. Remove water pump.
CAUTION:
- **Place a suitable shop cloth below the water pump housing to prevent any engine coolant from dripping into the timing chain case.**
- **Pull water pump straight out while preventing vane from contacting socket in installation area.**
- **Remove water pump without causing sprocket to contact timing chain.**



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

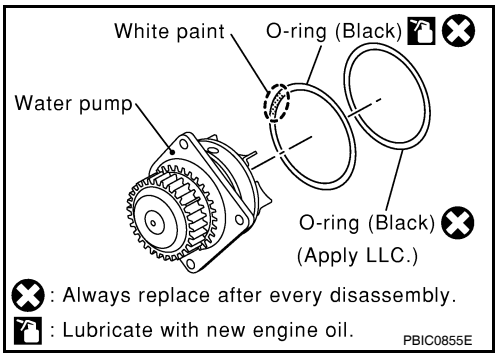
INSPECTION AFTER REMOVAL

- Visually check that there is no significant dirt or rusting on the water pump body and vane.
- Check that there is no looseness in the vane shaft, and that it turns smoothly when rotated by hand.
- If the water pump does not perform properly, replace the water pump assembly.

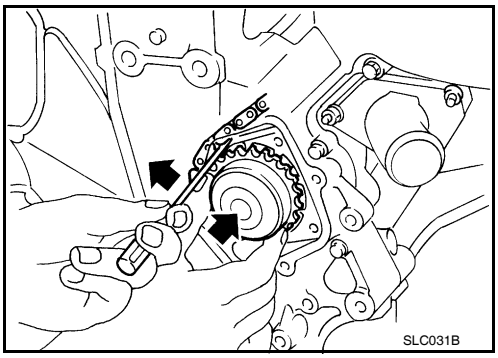


INSTALLATION

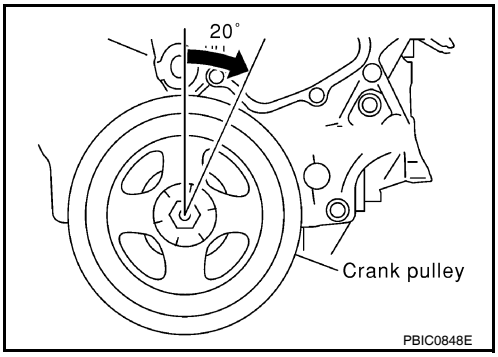
1. Install new O-rings to water pump.
2. Apply engine oil and coolant to the O-rings as shown.
   - Locate the O-ring with white paint mark to engine front side.



3. Hold timing chain to the side (⬅) and install the water pump (⬅).
   CAUTION:
   Do not allow cylinder block to interfere with the O-rings when installing the water pump.
   - Check that timing chain and water pump sprocket are engaged.
   - Tighten water pump bolts alternately and evenly.

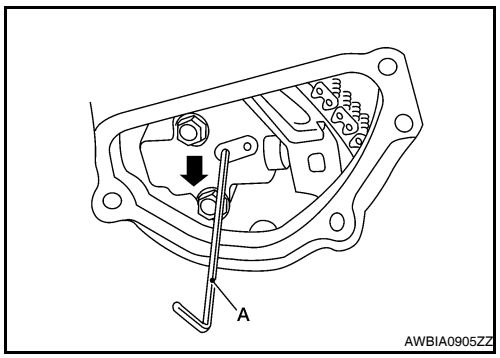


4. Remove dust and foreign material completely from installation area of timing chain tensioner and rear timing chain case.
5. Turn the crankshaft pulley approximately 20° clockwise so that the timing chain on the timing chain tensioner side is loose.



6. Apply engine oil to the oil feed hole and timing chain tensioner and install the timing chain tensioner.

7. Remove the stopper pin A.



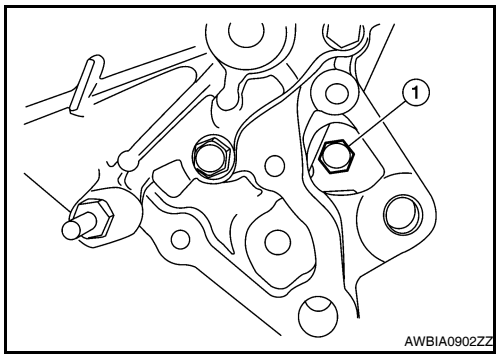
8. Install IVT control valve cover and water pump cover.

a. Before installing, remove all traces of liquid gasket from mating surface of water pump cover and IVT control valve cover using a scraper.
Also remove traces of liquid gasket from the mating surface of the front cover.

b. Apply a continuous bead of liquid gasket to mating surface of IVT control valve cover and water pump cover. **Use Genuine RTV Silicone Sealant or equivalent. Refer to GI-15, "Recommended Chemical Products and Sealants".**

9. Install water drain plug (front) (1) on water pump side of cylinder block.
   - Apply liquid gasket to the threads of water drain plug (front).
     Use Genuine RTV Silicone Sealant or equivalent. Refer to GI-15, "Recommended Chemical Products and Sealants".

     Water drain plug (front) : 9.8 N·m (1.0 kg-m, 87 in-lb)

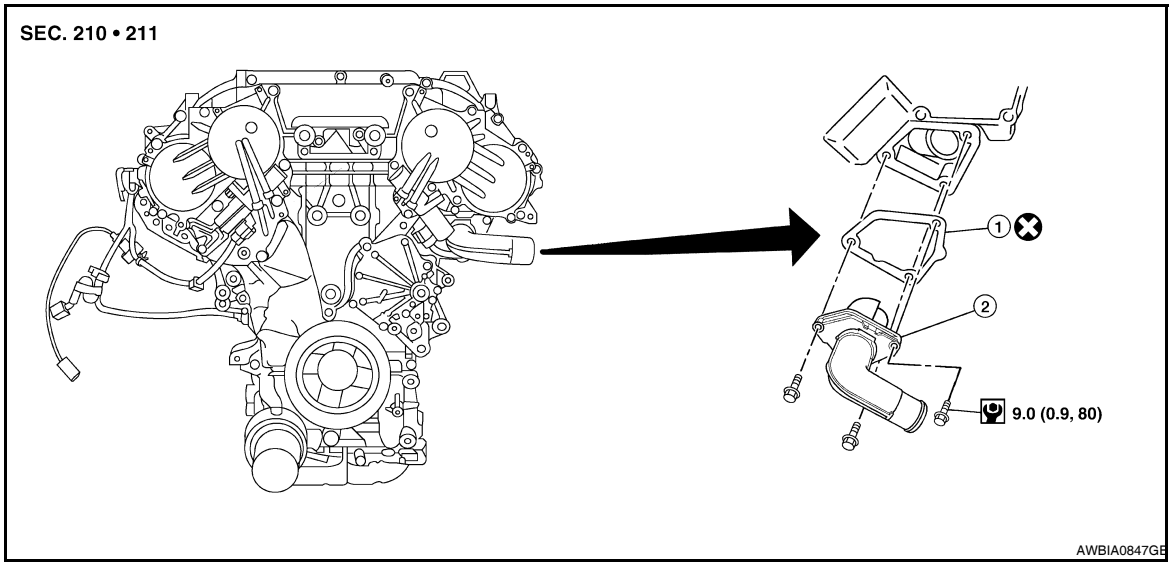


10. Installation of remaining components is in the reverse order of removal.
    - After installation refill engine coolant and check for leaks. Refer to CO-11, "Changing Engine Coolant" and CO-10, "System Inspection".
      CAUTION:
      Do not spill coolant in engine compartment. Use a shop cloth to absorb coolant.
    - After starting engine, let idle for three minutes, then rev engine up to 3,000 rpm under no load to purge air from the high-pressure chamber of the chain tensioner. The engine may produce a rattling noise. This indicates that air still remains in the chamber and is not a matter of concern.

THERMOSTAT AND THERMOSTAT HOUSING

Removal and Installation

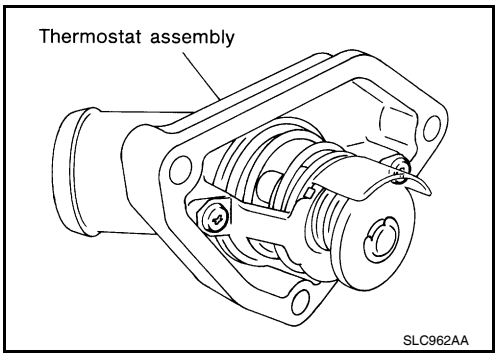
INFOID:0000000005463378



1. Gasket
2. Thermostat assembly

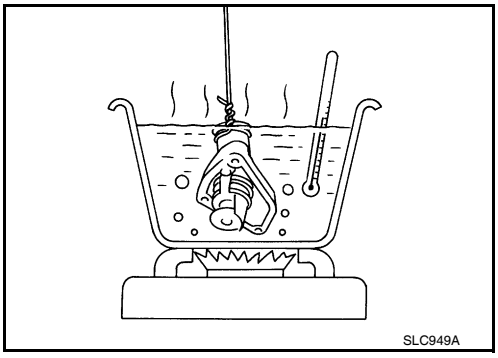
REMOVAL

1. Drain coolant from radiator. Refer to CO-11, "Changing Engine Coolant".
   CAUTION:
   Perform when engine is cool.
2. Remove coolant reservoir tank.
3. Disconnect LH VTC solenoid harness connector.
4. Remove water drain plug on water pump side of the engine. Refer to EM-99, "Disassembly and Assembly".
5. Disconnect lower radiator hose.
6. Remove engine coolant inlet and thermostat assembly.
   - **Do not disassemble engine coolant inlet and thermostat. Replace them as a unit, if necessary.**



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 valve opening temperature is the temperature at which the valve opens and the falls from the thread.
- Continue heating. Check the full-open lift amount.
  NOTE:
  The full-open lift amount standard temperature for the thermostat is the reference value.
- After checking the full-open lift amount, lower the water temperature and check the valve closing temperature.



Thermostat	Standard Values
Valve opening temperature	82°C (180°F)
Full-open lift amount	8.6 mm / 95°C (0.339 in / 203°F)
Valve closing temperature	77°C (171°F)

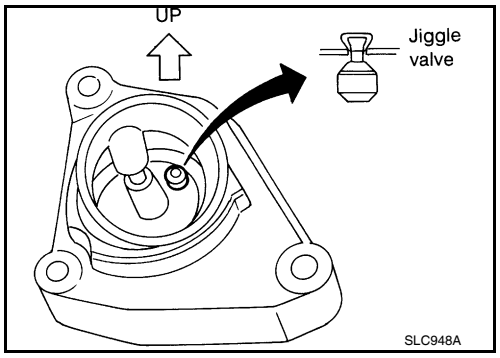
INSTALLATION

Installation is in the reverse order of removal.

- Install thermostat with jiggle valve facing upward.
- After installation refill engine coolant and check for leaks. Refer to CO-11, "Changing Engine Coolant" and CO-10, "System Inspection".

CAUTION:

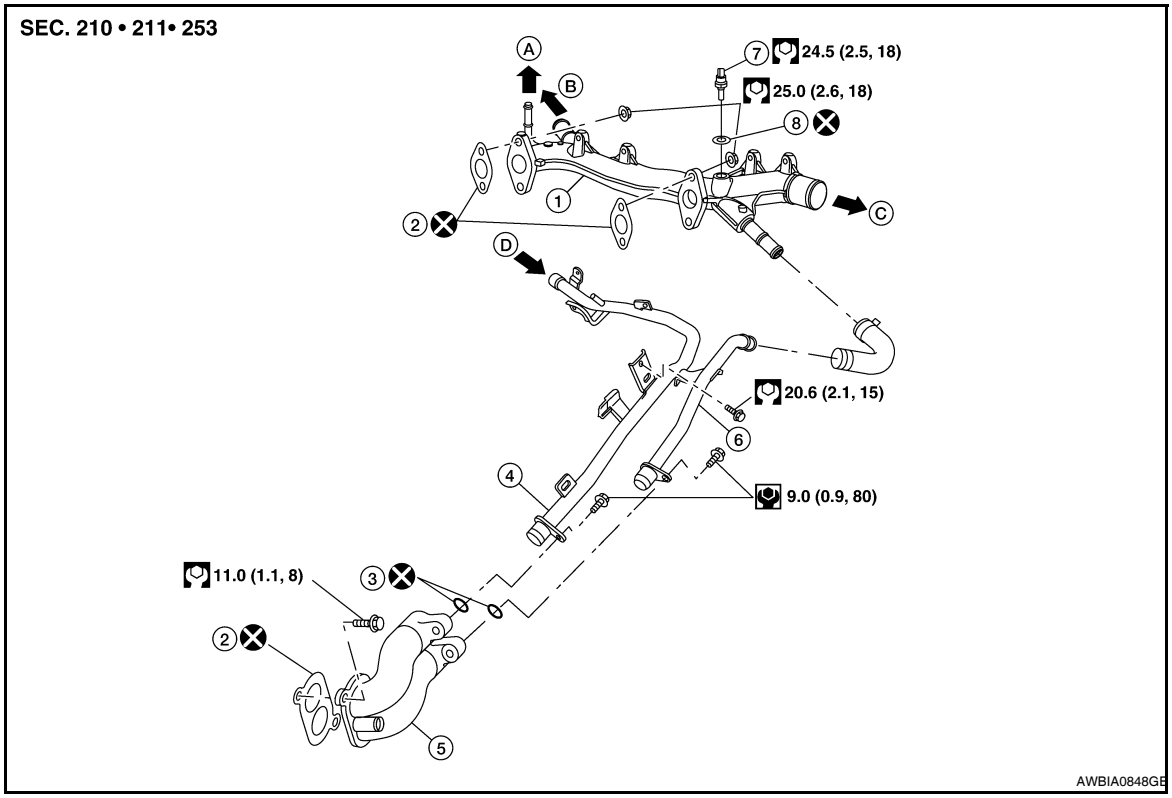
Do not spill coolant in engine compartment. Use a shop cloth to absorb coolant.



WATER OUTLET AND WATER PIPING

Removal and Installation

INFOID:0000000005463379



1.	Water outlet	2.	Gasket	3.	O-ring
4.	Heater pipe	5.	Water connector	6.	Water bypass pipe
7.	Engine coolant temperature sensor	8.	Washer	A.	To electric throttle control actuator
B.	To heater	C.	To radiator	D.	From heater

REMOVAL

1. Drain coolant from drain plugs on radiator and both sides of cylinder block. Refer to CO-11, "Changing Engine Coolant".
   CAUTION:
   Perform when the engine is cold.
2. Remove engine side undercover.
3. Remove engine cover using power tool. Refer to EM-22, "Removal and Installation".
4. Remove front air duct and air duct hose. Refer to EM-23, "Removal and Installation".
5. Remove radiator upper hose and heater hose.
6. Disconnect electric throttle control actuator hoses.
7. Remove connector(s) from heater pipe.
8. Disconnect engine coolant temperature sensor electrical connector on water outlet.
9. Remove water outlet, heater pipe, water connector, and water bypass pipe nuts and bolts.

INSTALLATION

1. Installation is in the reverse order of removal.
   • Securely insert each hose, and install a clamp at a position where it does not interfere with the pipe bulge.
   CAUTION:
   Use new gasket for installation

- When inserting heater pipe and water bypass pipe into water connector, apply neutral detergent to new O-rings.
  CAUTION:
  Use new O-rings for installation
- Refill engine coolant. Refer to CO-11, "Changing Engine Coolant".

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Capacity

INFOID:0000000005463380

ℓ (US qt , Imp qt)

Coolant capacity (With reservoir tank at MAX level)	8.2 (8 5/8, 7 1/4)

Thermostat

INFOID:0000000005463381

Valve opening temperature	82°C (180°F)
Full-open lift amount	8.6 mm / 95°C (0.339 in / 203°F)
Valve closing temperature	77°C (171°F)

Radiator

INFOID:0000000005463382

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

Cap relief pressure	Standard	78 – 98 (0.8 – 1.0, 11 – 14)
	Limit	59 (0.6, 9)
Leakage test pressure		157 (1.6, 23)