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SECTION

ENGINE COOLING SYSTEM

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PRECAUTIONS

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EBS00G6E

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 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 SRS 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 for Liquid Gasket REMOVAL OF LIQUID GASKET SEALING

EBS00G6F

- After removing the bolts and nuts, separate the mating surface using the Tool and remove the sealant.

Tool number : KV10111100 (J-37228)

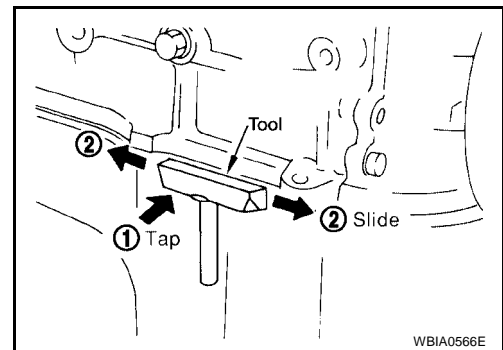
CAUTION:

Be careful not to damage the mating surfaces.

- In areas where the Tool is difficult to use, use a plastic hammer to lightly tap (1) the Tool where the sealant is applied. Use a plastic hammer to slide the Tool (2) by tapping on the side.

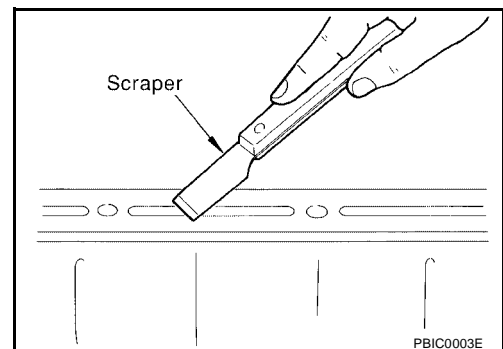
CAUTION:

If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.



LIQUID GASKET APPLICATION PROCEDURE

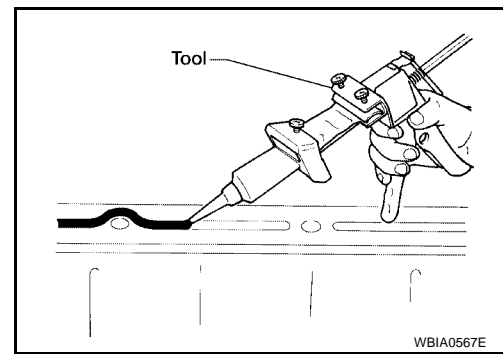
1. Using a scraper, remove the old sealant adhering to the mating surfaces.
 - Remove the sealant completely from the groove of the mating surfaces, bolts, and bolt holes.
2. Thoroughly clean the mating surfaces and remove all adhering moisture, grease and foreign material.
3. Attach the sealant tube to Tool.
 - Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-43. "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#).



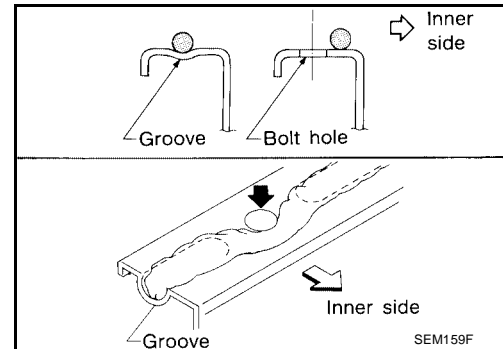
PRECAUTIONS

4. Apply the sealant without breaks to the specified location with the specified dimensions using Tool.

Tool number : WS39930000 (-)



- If there is a groove for the sealant application, apply the sealant to the groove.
- As for the bolt holes, normally apply the sealant inside the holes. If specified in the procedure, it should also be applied outside the holes.
- Within five minutes of sealant application, install the mating component.
- If the sealant protrudes, wipe it off immediately.
- Do not retighten after the installation.
- After 30 minutes or more have passed from the installation, fill the engine with the specified oil and coolant. Refer to [MA-10, "RECOMMENDED FLUIDS AND LUBRICANTS"](#).



CAUTION:

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

PREPARATION

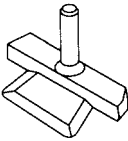
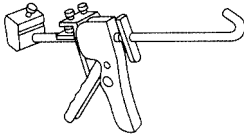
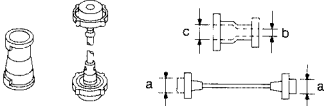
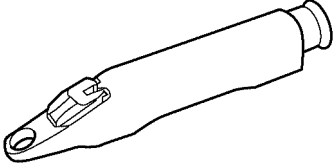
PFP:00002

PREPARATION

Special Service Tools

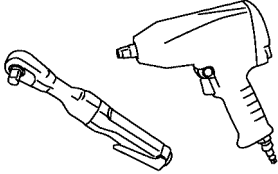
EBS00G6G

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

Tool number (Kent-Moore No.) Tool name		Description
KV10111100 (J-37228) Seal cutter	 S-NT046	Removing oil pan and timing chain case
WS39930000 () -) Tube presser	 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)
KV991J0010 (J-23688) Engine coolant refractometer	 WBIA0539E	Checking concentration of ethylene glycol in engine coolant

Commercial Service Tools

EBS00G6H

Tool name		Description
Power tool	 PBIC0190E	Loosening bolts and nuts

OVERHEATING CAUSE ANALYSIS

OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

EBS006I

		Symptom		Check items					
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—		CO			
		Thermostat stuck closed	Coolant circulation						
		Damaged fins	Dust contamination or paper clogging						
			Physical damage						
	Reduced air flow	Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	—		C			
		Cooling fan does not operate	Fan assembly						
		High resistance to fan rotation							
	Damaged fan blades								
	Damaged radiator shroud	—	Radiator shroud	—		D			
	Improper coolant mixture ratio	—	Coolant viscosity	—		E			
	Poor coolant quality	—		—		F			
	Insufficient coolant	Coolant leaks	Cooling hose	Loose clamp	—		G		
			Heater pump	Cracked hose					
			Water pump	Physical damage					
			Radiator cap	Poor sealing					
Radiator		O-ring for damage, deterioration or improper fitting	Cracked radiator tank	Cracked radiator core	—		H		
								Reservoir tank	Cracked reservoir tank
		Overflowing reservoir tank	Cylinder head gasket deterioration						
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load	—		I		
				Driving in low gear for extended time					
				Driving at extremely high speed					
			Powertrain system malfunction	—					
	Installed improper size wheels and tires								
	Dragging brakes								
	Blocked or restricted air flow	Blocked radiator grille	Blocked bumper	Blocked radiator	Blocked condenser	—		J	
Installed car brassiere									Mud contamination or paper clogging

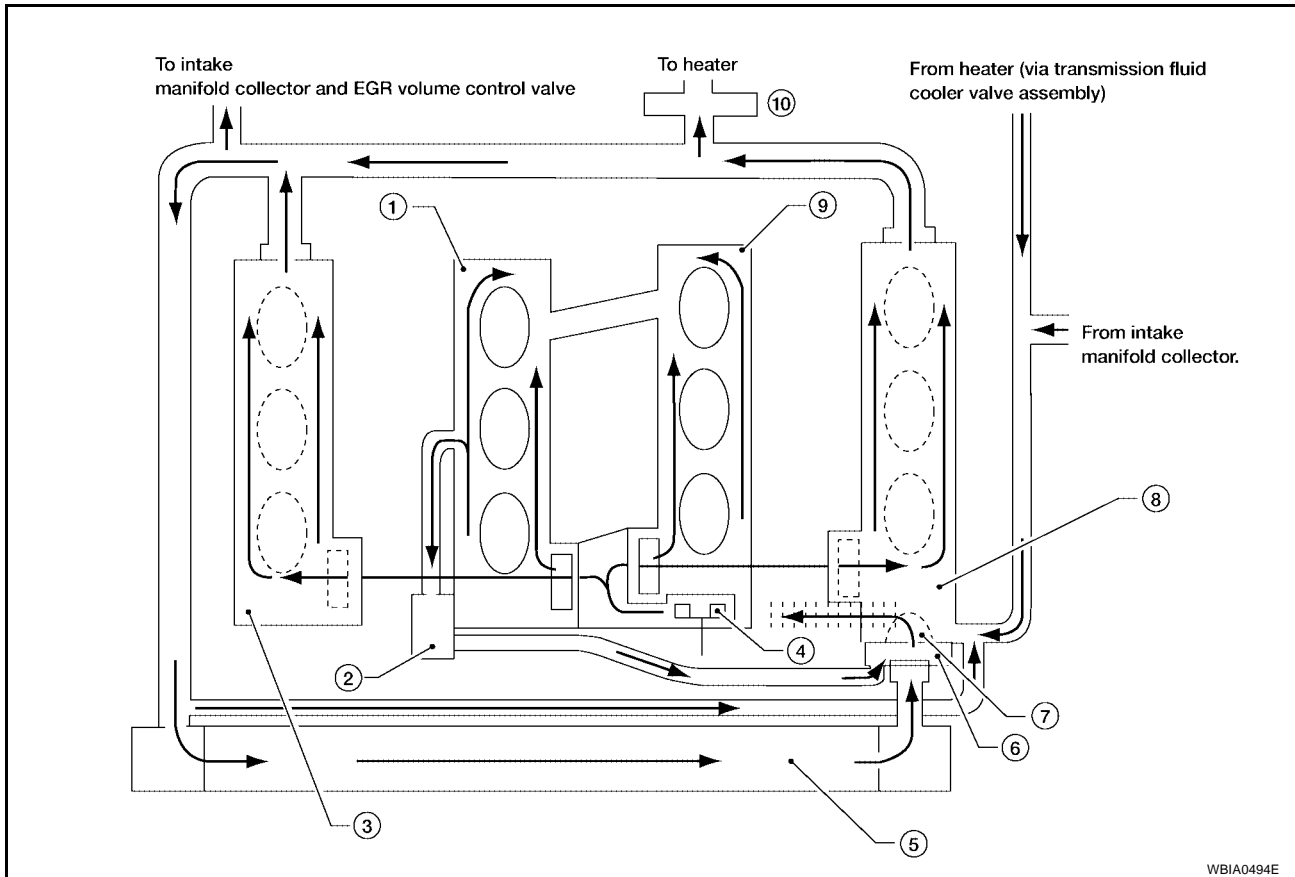
COOLING SYSTEM

COOLING SYSTEM

PFP:21020

Cooling Circuit

EBS00G6J



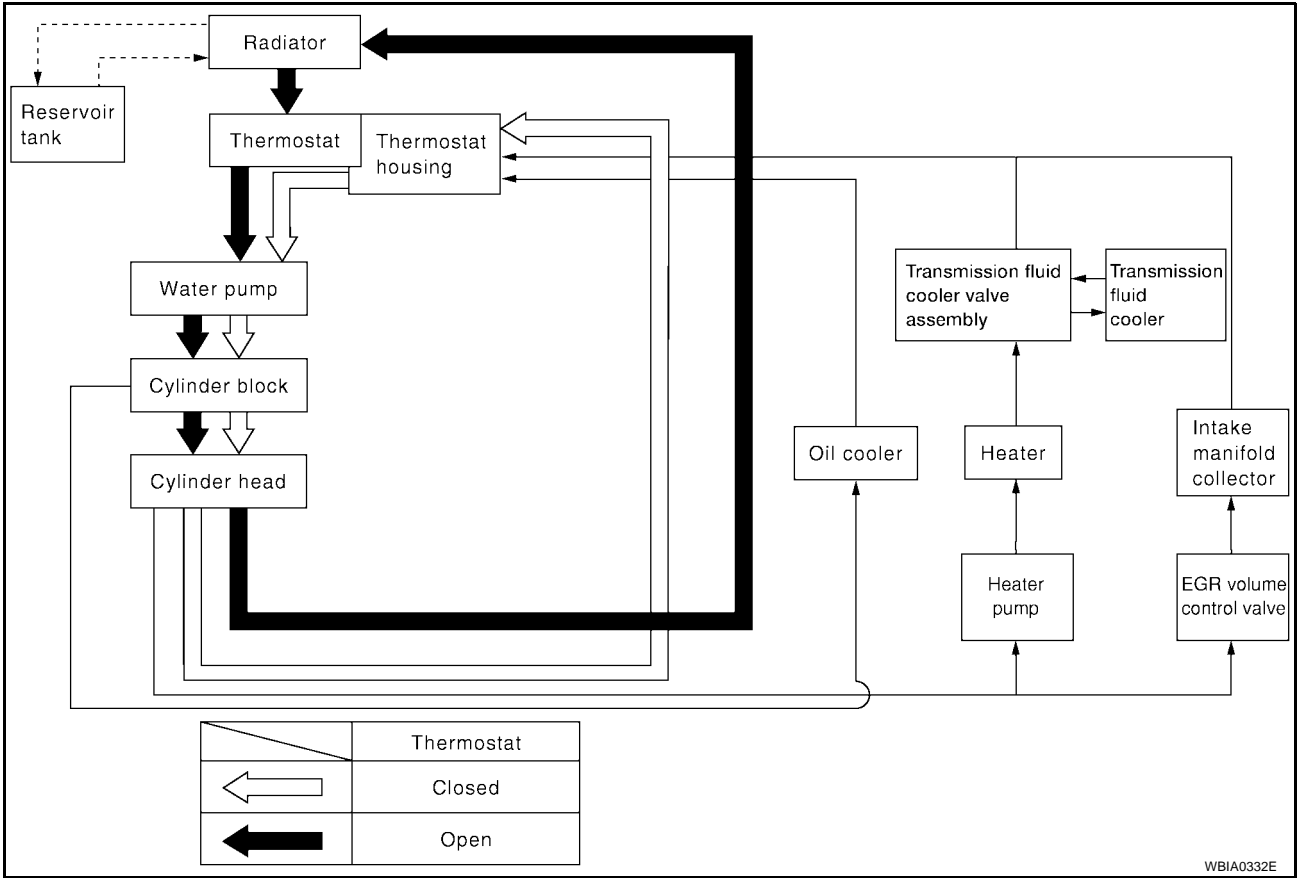
WBIA0494E

- | | | |
|------------------------|-----------------------|------------------------|
| 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) |
| 10. Heater pump | | |

COOLING SYSTEM

System Drawing

EBS00G00



WBJA0332E

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ENGINE COOLANT

PFK:KQ100

ENGINE COOLANT

System Check

EBS00G6K

WARNING:

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

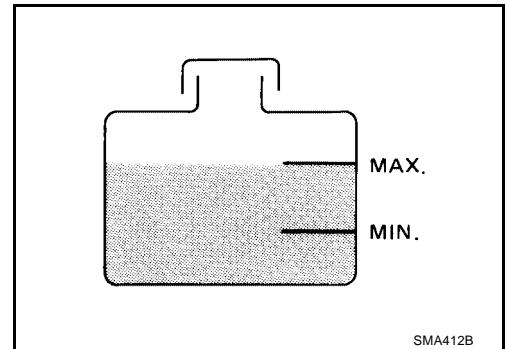
CHECKING COOLING SYSTEM HOSES

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 when the engine is cool.
- Adjust coolant level if it is too much or too little.



CHECKING COOLING SYSTEM FOR LEAKS

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

Tool number : EG17650301 (J-33984-A)

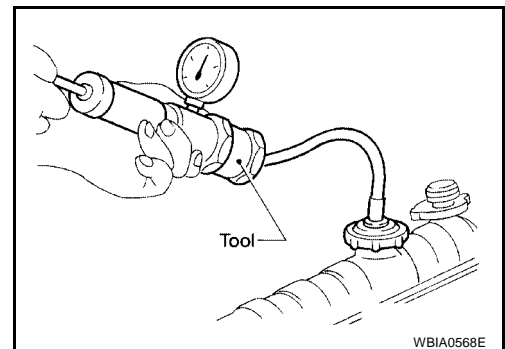
Testing pressure : 157 kPa (1.6 kg/cm² , 23 psi)

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

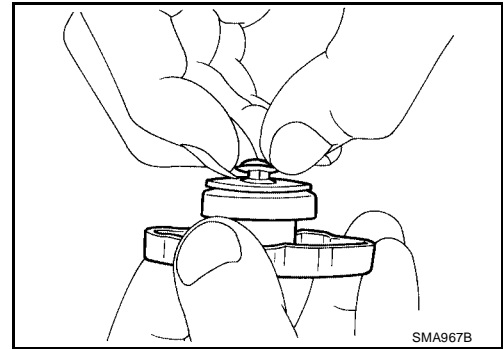
1. Inspect the radiator cap.
 - Replace the cap if the metal plunger cannot be seen around the edge of the black rubber gasket.
 - Replace the cap if deposits of waxy residue or other foreign material are on the black rubber gasket or the metal retainer.

NOTE:

Thoroughly wipe out the radiator filler neck to remove any waxy residue or foreign material.

ENGINE COOLANT

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.



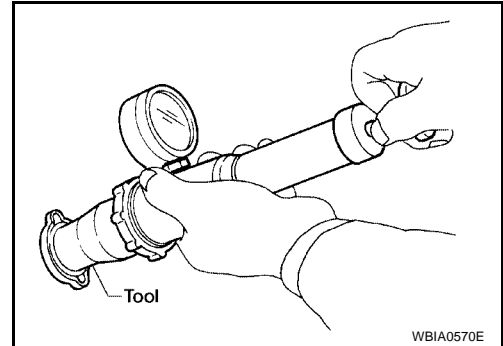
3. Check radiator cap relief pressure using Tool.

Tool number : EG17650301 (J-33984-A)

Standard: 78 – 98 kPa (0.8 – 1.0 kg/cm² , 11 – 14 psi)

Limit: 59 kPa (0.6 kg/cm² , 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 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 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 any stains no longer flow 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/cm² , 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.

Refilling Engine Coolant

EBS00G6L

Changing the engine coolant is part of the required maintenance of the engine. Refer to [MA-14, "Changing Engine Coolant"](#) .

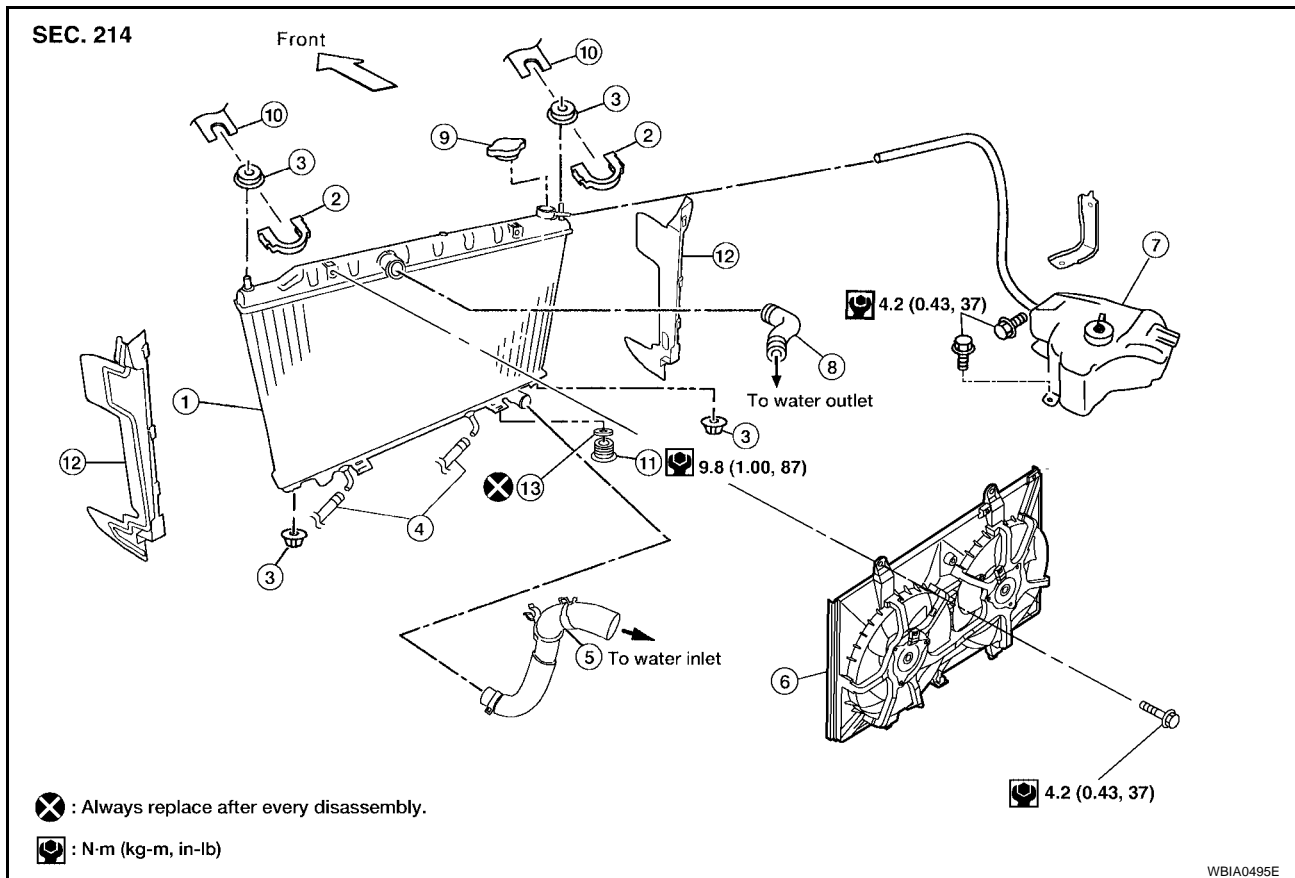
RADIATOR

PF21400

EBS00G6M

RADIATOR

Removal and Installation



- | | | |
|--|--------------------------|--------------------------|
| 1. Radiator | 2. Radiator upper clip | 3. Mounting rubber |
| 4. A/T fluid cooler hose (if equipped) | 5. Radiator hose (lower) | 6. Radiator fan assembly |
| 7. Engine coolant reservoir tank | 8. Radiator hose (upper) | 9. Radiator filler cap |
| 10. Radiator core connection | 11. Radiator drain plug | 12. Air guide |
| 13. O-ring | | |

WARNING:

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

REMOVAL

1. Drain the coolant from the radiator. Refer to [MA-14, "Changing Engine Coolant"](#).

CAUTION:

Perform when engine is cold.

2. Partially drain the A/T fluid. Refer to [MA-23, "Changing A/T Fluid"](#).
3. Remove fresh air duct. Refer to [EM-17, "Removal and Installation"](#).
4. Disconnect radiator upper and lower hoses.
5. Disconnect the A/T fluid cooler hoses.

NOTE:

Plug hoses to avoid leakage of A/T fluid.

6. Disconnect the engine coolant reservoir tank hose.

RADIATOR

- Remove the radiator upper clips by pulling the tabs outside to release the lock, as shown.

CAUTION:

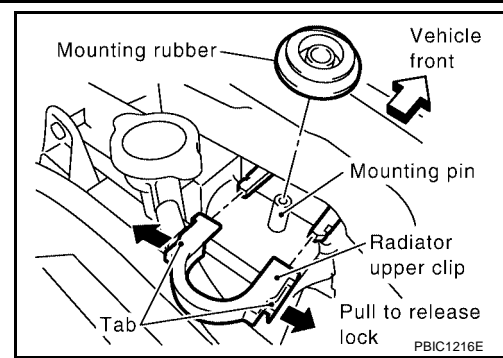
To prevent damage, do not pull lock tabs excessively.

- Disconnect fan electrical connectors.
- Remove the radiator fan assembly.

CAUTION:

Do not damage or scratch A/C condenser and radiator core when removing.

- If necessary, remove the radiator fan assembly from the radiator. Refer to [CO-12, "Disassembly and Assembly of Radiator Fan"](#).
- If necessary, remove the mounting rubber from the radiator.



INSPECTION AFTER REMOVAL

- Apply pressure using Tool.

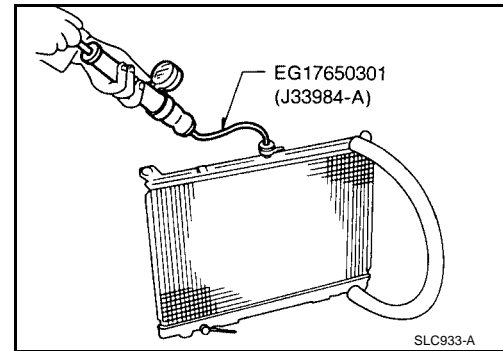
Tool number : EG17650301 (J-33984-A)

WARNING:

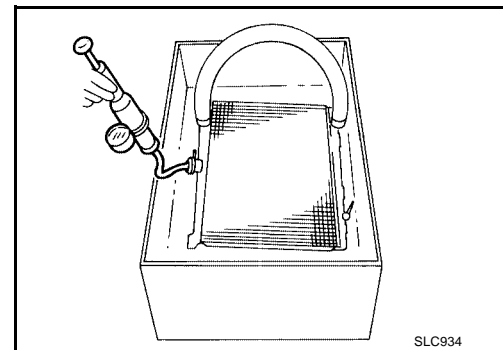
To prevent the risk of the hose coming undone while under pressure, securely fasten it down with a hose clamp.

CAUTION:

Attach a hose to the A/T fluid cooler as well.



- Place radiator in water filled tank and check for leakage.



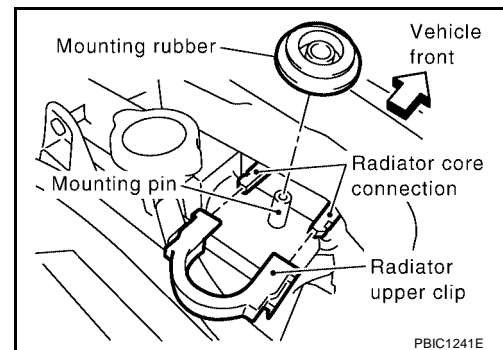
INSTALLATION

Installation is in the reverse order of removal, paying attention to the following:

- Fill the radiator with coolant. Refer to [MA-14, "Changing Engine Coolant"](#).

Installation of Radiator Upper Clip

- Install the rubber on mounting pin of radiator core.
- Align the radiator upper clip with the radiator core connector, then insert the radiator upper clip straight into the radiator core connections until a click is heard.
- After connecting the radiator upper clip, use the following method to make sure it is fully connected.
 - Visually confirm that the two radiator upper clips are connected to the radiator core connections.
 - Move the radiator upper clip and the radiator core forward and backward to make sure they are securely connected.



INSPECTION AFTER INSTALLATION

- Check for engine coolant leaks. Refer to [CO-8, "CHECKING COOLING SYSTEM FOR LEAKS"](#).
- Start and warm up the engine. Visually make sure that there are no engine coolant leaks or A/T fluid leaks.

COOLING FAN

PF21140

EBS00J22

COOLING FAN

Removal and Installation REMOVAL

1. Remove radiator. Refer to [CO-10, "REMOVAL"](#) .

CAUTION:

Perform this step when engine is cold.

INSTALLATION

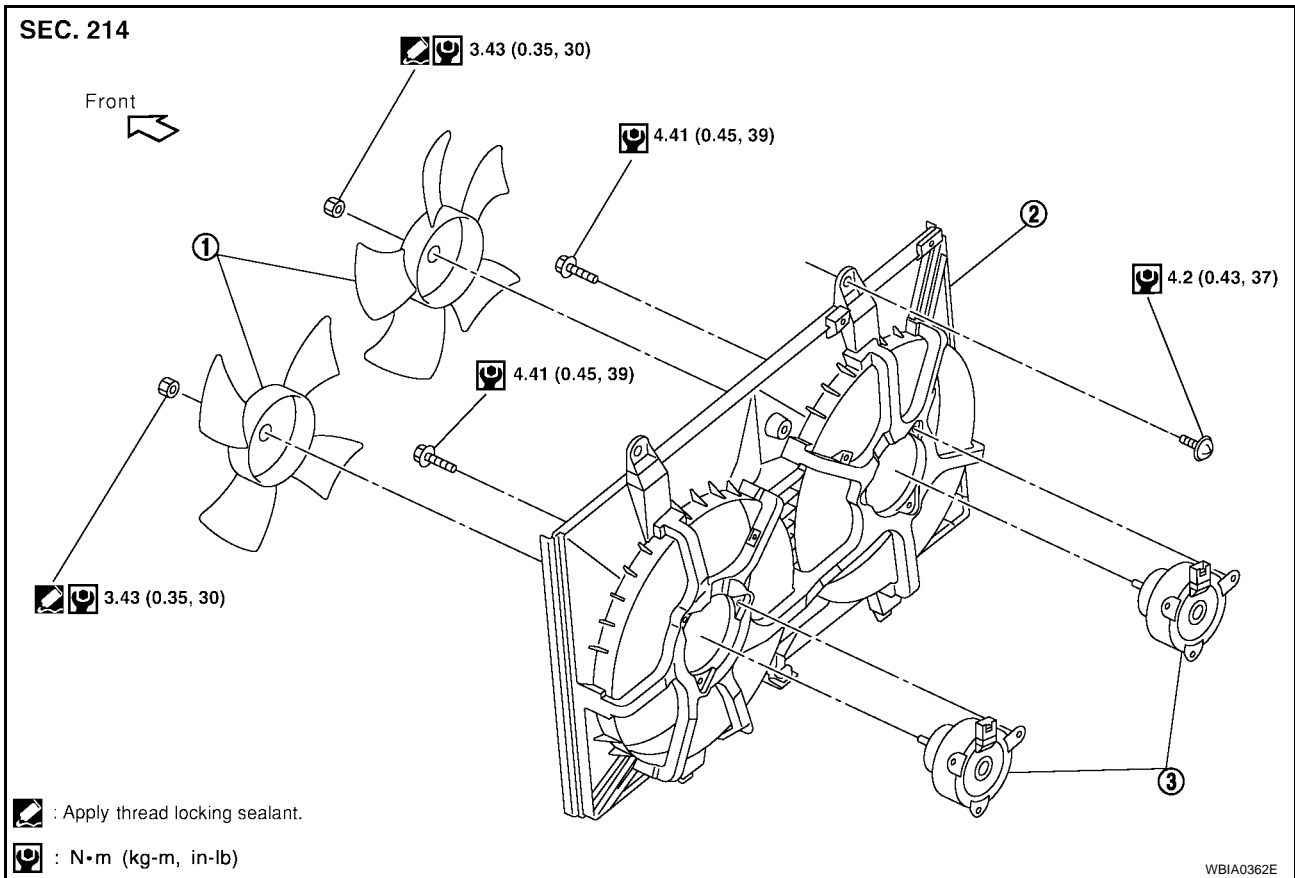
Installation is in the reverse order of removal. Refer to [CO-11, "INSTALLATION"](#) .

INSPECTION AFTER INSTALLATION

- Check for engine coolant leaks. Refer to [CO-8, "CHECKING COOLING SYSTEM FOR LEAKS"](#) .
- Start and warm up engine. Visually inspect that there are no engine coolant or A/T fluid leaks.

Disassembly and Assembly of Radiator Fan

EBS00J23



DISASSEMBLY

1. Remove fan blade.
2. Remove fan motor from fan shroud.

ASSEMBLY

Assembly is in the reverse order of disassembly.

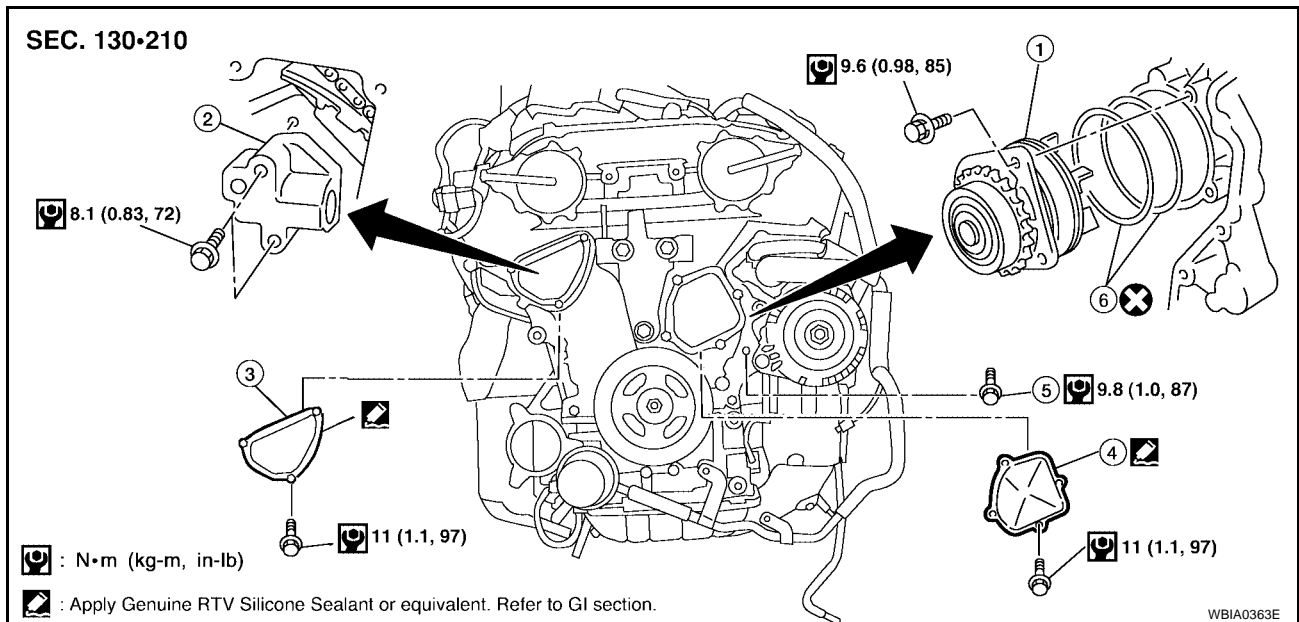
WATER PUMP

PFP:21020

EBS00G6P

WATER PUMP

Removal and Installation



1. Water pump
2. Timing chain tensioner
3. Chain tensioner cover
4. Water pump cover
5. Water drain plug
6. O-rings

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.

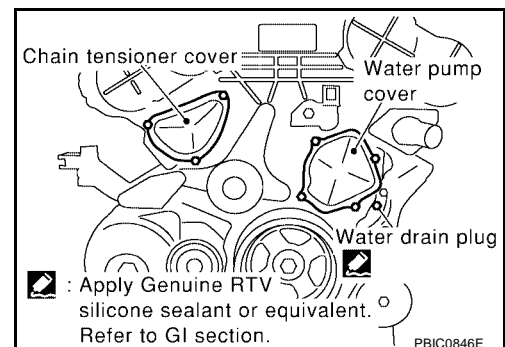
REMOVAL

1. Drain coolant. Refer to [MA-14, "Changing Engine Coolant"](#) .

CAUTION:

Perform when the engine is cold.

2. Remove engine coolant reservoir tank. Refer to [CO-10, "Removal and Installation"](#) .
3. Remove IPDM E/R bolts and position aside. Refer to [PG-29, "Removal and Installation of IPDM E/R"](#) .
4. Remove right-hand wheel and tire assembly using power tool.
5. Remove splash shield.
6. Remove drive belts. Refer to [EM-16, "Removal and Installation"](#) .
7. Remove idler pulley and idler pulley bracket.
8. Support engine at lower oil pan with a transmission jack and remove front engine insulator and bracket. Refer to [EM-134, "Removal and Installation"](#) .
9. Remove water drain plug on water pump side of cylinder block.
10. Remove chain tensioner cover and water pump cover.

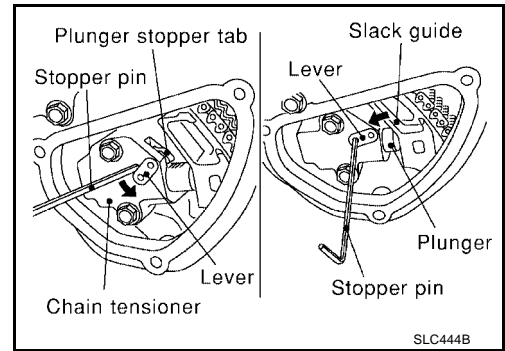


WATER PUMP

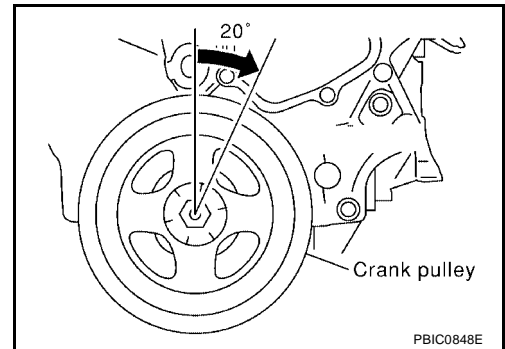
11. Remove the chain tensioner assembly.
 - a. Pull the lever down and release the plunger stopper tab.
 - b. Insert the stopper pin into the tensioner body hole to hold the lever and keep the stopper tab released.

NOTE:

An allen wrench [2.5 mm (0.098 in)] is used for a stopper pin as an example.



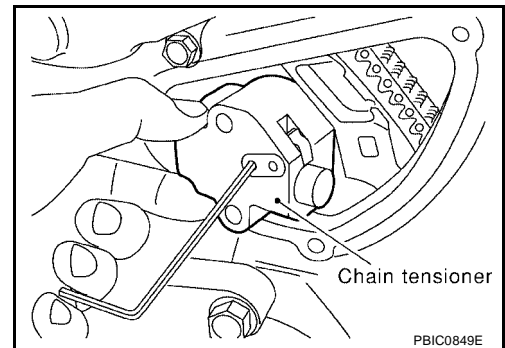
- c. Insert the plunger into the tensioner body by pressing the timing chain slack guide.
- d. Keep the slack guide pressed and hold the plunger in by pushing the stopper pin deeper through the lever and into the tensioner body hole.
- e. Make a gap between water pump gear and timing chain by turning the crankshaft pulley approximately 20° clockwise.



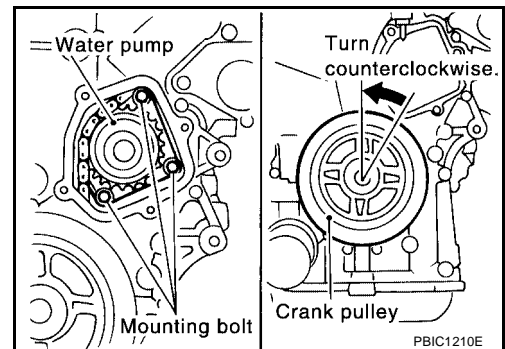
12. Remove chain tensioner.

CAUTION:

Be careful not to drop chain tensioner bolts inside front timing chain case.

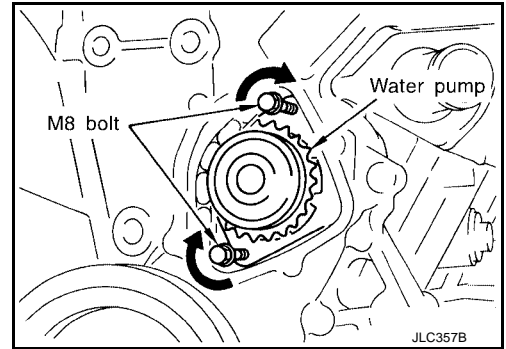


13. Remove the three water pump bolts. Make a maximum gap between water pump gear and timing chain by turning crankshaft pulley counterclockwise until timing chain loosens on water pump sprocket.



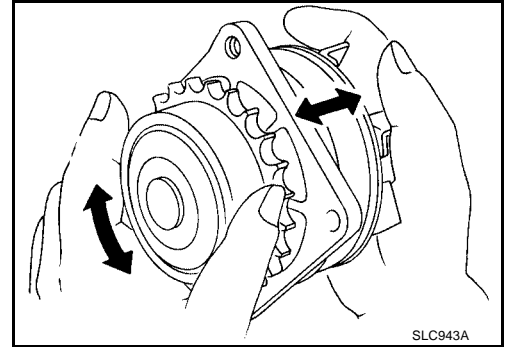
WATER PUMP

- Screw M8 bolts [pitch: 1.25 mm (0.49 in) length: approx. 50 mm (1.97 in)] into water pump's upper and lower bolt holes until they reach the timing chain case. Then, alternately tighten each bolt for a half turn, and pull out the water pump.
 - Pull straight out while preventing vane from contacting socket in installation area.
 - Remove water pump without causing sprocket to contact timing chain.
- Remove M8 bolts and O-rings from water pump.



INSPECTION AFTER REMOVAL

- Check for badly rusted or corroded water pump body assembly.
- Check for rough operation due to excessive end play.

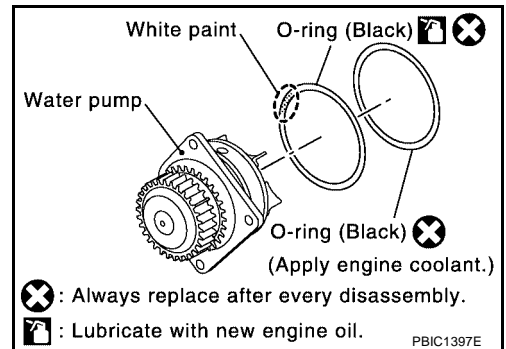


INSTALLATION

- Install new O-rings to water pump.
- Apply engine oil and engine coolant to the O-rings as shown.

NOTE:

Locate the O-ring with white paint mark to engine front side.



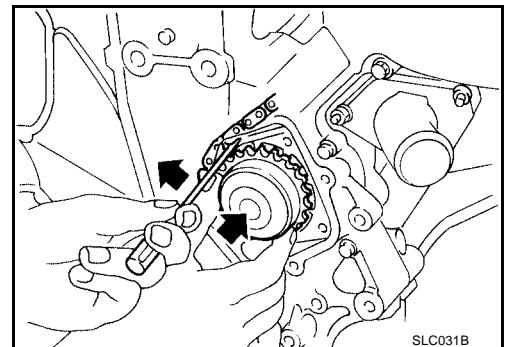
- Install the water pump.

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.
- Insert water pump by tightening bolts alternately and evenly.

Water pump bolts 9.6 N·m (0.98 kg·m, 85 in-lb)



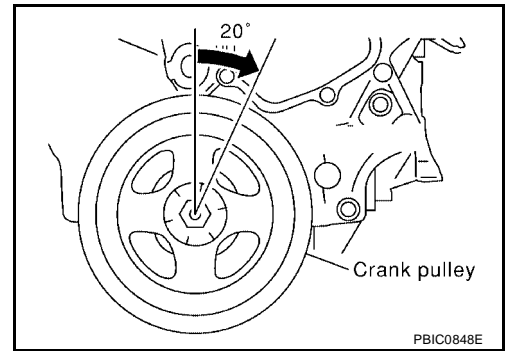
- Remove dust and foreign material completely from back side of chain tensioner and from installation area of rear timing chain case.

WATER PUMP

5. Turn the crankshaft pulley approximately 20° clockwise so that the timing chain on the timing chain tensioner side is loose.

NOTE:

When installing the timing chain tensioner, engine oil should be applied to the oil hole and tensioner.



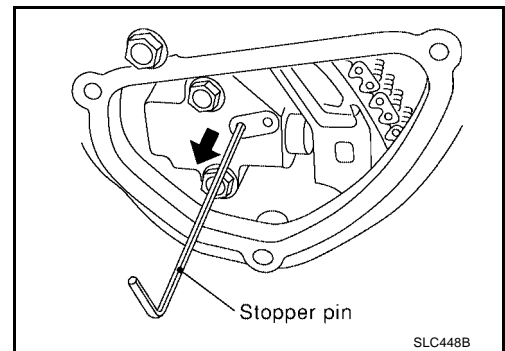
6. Install the timing chain tensioner.

Timing chain tensioner 8.1 N-m (0.83 kg-m, 72 in-lb) bolts

7. Remove the stopper pin.

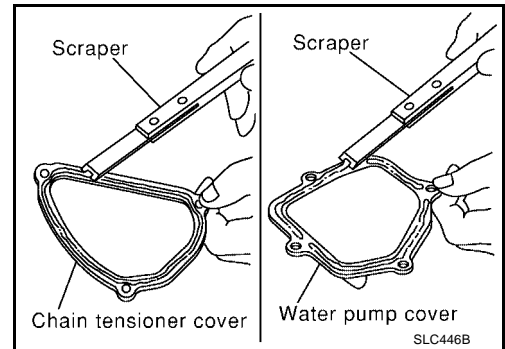
NOTE:

An allen wrench [2.5 mm (0.098 in)] is used for a stopper pin as an example.

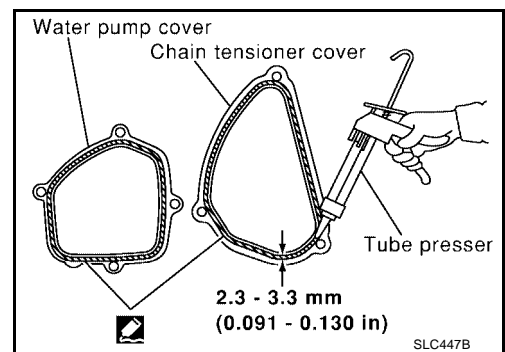


8. Install chain tensioner and water pump cover.

- a. Before installing, remove all traces of sealant from mating surface of water pump cover and chain tensioner cover using a scraper. Also remove traces of sealant from the mating surface of the front cover.



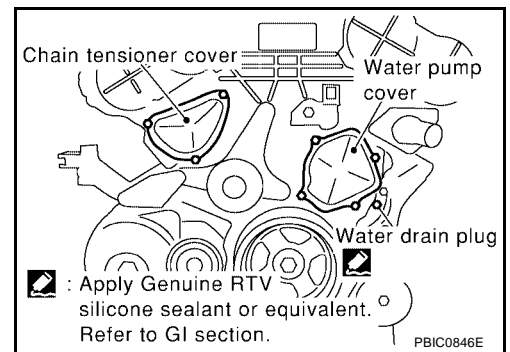
- b. Apply a continuous bead of RTV Silicone Sealant, or equivalent, to mating surface of chain tensioner cover and water pump cover. Refer to [GI-43, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#).



WATER PUMP

9. Install water drain plug on water pump side of cylinder block.

Water drain plug : 9.5 N-m (0.97 kg-m, 76 in-lb)



10. Tighten idler pulley bolts.

Idler pulley bolts : 34.8 N-m (3.5 kg-m, 26 ft-lb)

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

- Refill engine coolant. Refer to [MA-15, "REFILLING ENGINE 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.

INSPECTION AFTER INSTALLATION

- Check for engine coolant leaks. Refer to [CO-8, "CHECKING COOLING SYSTEM FOR LEAKS"](#).
- Start and warm up the engine. Visually make sure that there are no engine coolant leaks or A/T fluid leaks.

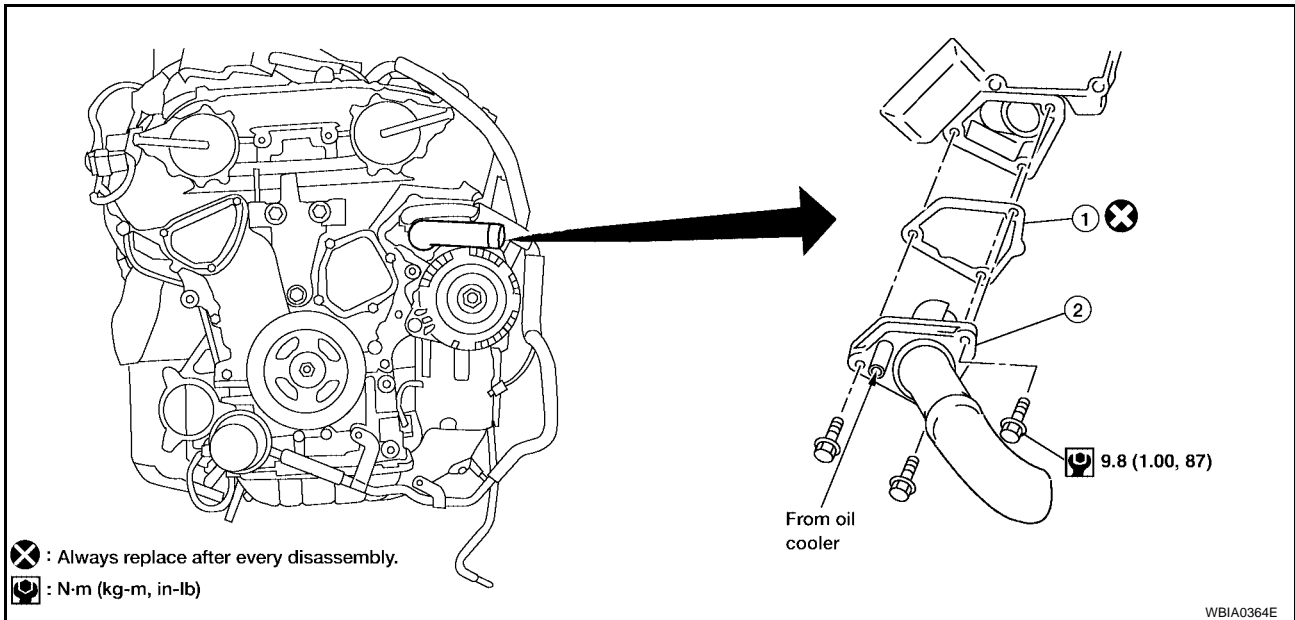
THERMOSTAT AND THERMOSTAT HOUSING

PF2:21200

THERMOSTAT AND THERMOSTAT HOUSING

Removal and Installation

EBS00G60



1. Gasket
2. Engine coolant inlet and thermostat assembly

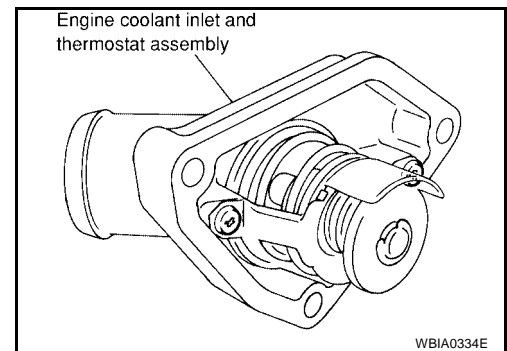
REMOVAL

1. Drain coolant. Refer to [MA-14, "Changing Engine Coolant"](#).

CAUTION:

Perform when engine is cool.

2. Remove IPDM E/R bolts and position aside. Refer to [PG-29, "Removal and Installation of IPDM E/R"](#).
3. Disconnect lower radiator hose.
4. Disconnect oil cooler line.
5. Remove engine coolant inlet and thermostat assembly.
 - Do not disassemble engine coolant inlet and thermostat assembly. Replace them as a unit, if necessary.

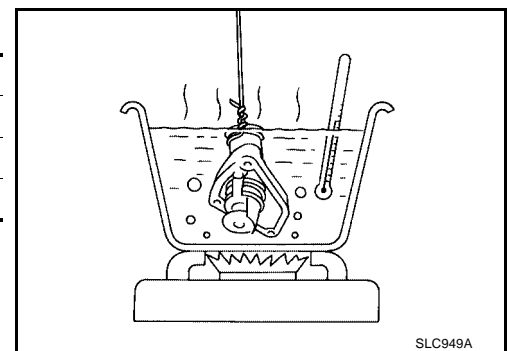


WBIA0334E

INSPECTION AFTER REMOVAL

1. Check valve seating condition at ordinary room temperatures. It should seat tightly.
2. Check valve opening temperature and maximum valve lift.

Thermostat	Standard Values
Valve opening temperature	80 – 84°C (176 – 183°F)
Valve lift	8.6 mm / 95°C (0.339 in / 203°F)
Valve closing temperature	77°C (171°F) or lower



SLC949A

THERMOSTAT AND THERMOSTAT HOUSING

INSTALLATION

1. Installation is in the reverse order of removal paying attention to the following.
 - Refill engine coolant. Refer to [MA-14, "Changing Engine Coolant"](#) .
 - Be careful not to spill coolant over engine compartment. Use a rag to absorb coolant.

INSPECTION AFTER INSTALLATION

- Check for engine coolant leaks. Refer to [CO-8, "CHECKING COOLING SYSTEM FOR LEAKS"](#) .
- Start and warm up the engine. Visually make sure that there are no engine coolant leaks or A/T fluid leaks.

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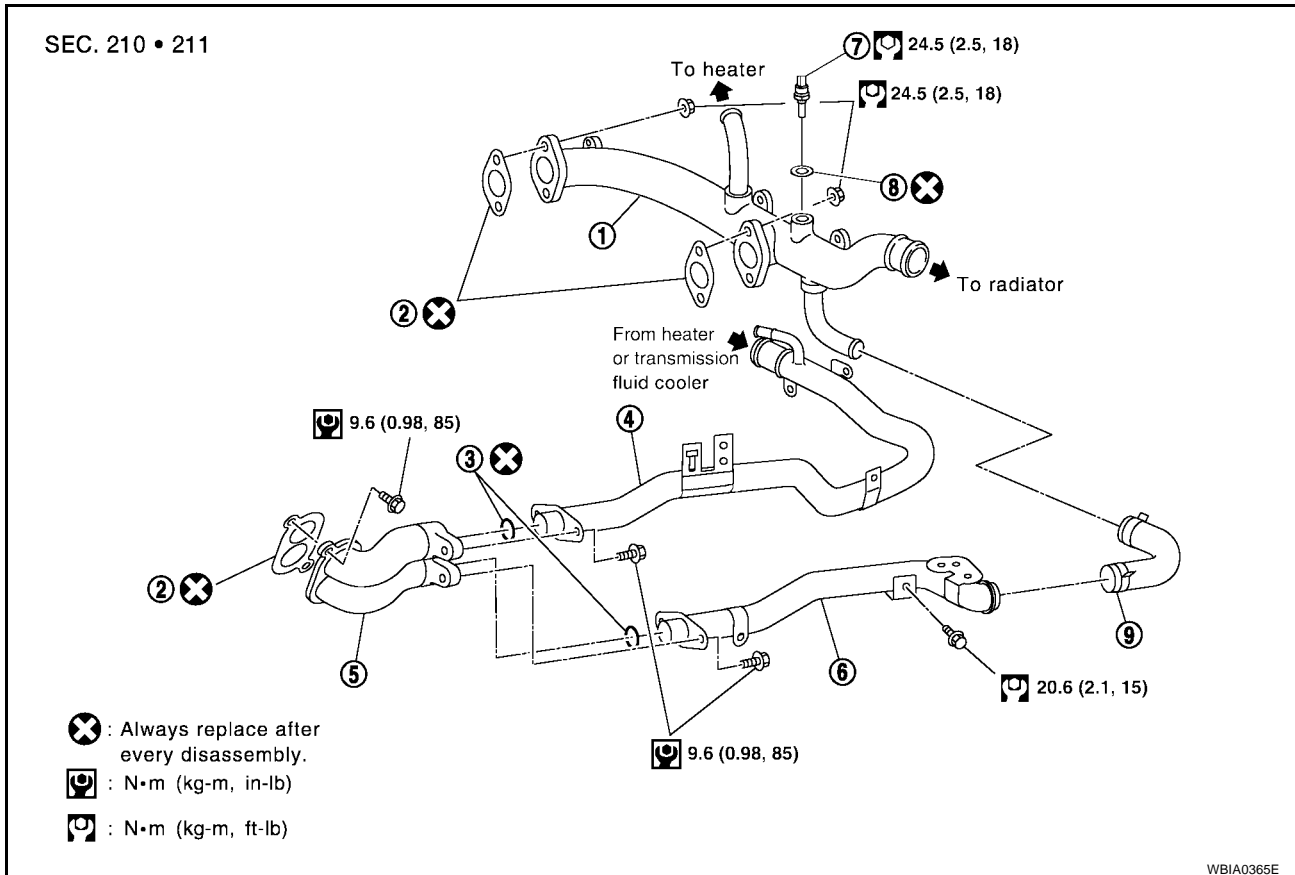
WATER OUTLET AND WATER PIPING

PF1:11060

WATER OUTLET AND WATER PIPING

Removal and Installation

EBS00G6R



- | | | |
|--------------------------------------|--------------------|----------------------|
| 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 | 9. Water bypass hose |

REMOVAL

1. Drain coolant from radiator and drain plugs on both sides of cylinder block. Refer to [MA-14, "Changing Engine Coolant"](#).

CAUTION:

Perform when the engine is cold.

2. Remove fresh air duct, air cleaner to electric throttle control actuator tube, mass air flow sensor and upper air cleaner case as an assembly. Refer to [EM-17, "Removal and Installation"](#).
3. Remove radiator upper hose and heater hose.
4. Remove connector(s) from heater pipe.
5. Disconnect engine coolant temperature sensor electrical connector.
6. Remove water outlet, heater pipe, water connector, and water bypass pipe nuts and bolts.

INSTALLATION

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.
- When inserting a water pipe into water connector, apply neutral detergent to O-ring.
- Refill engine coolant. Refer to [MA-15, "REFILLING ENGINE COOLANT"](#).

INSPECTION AFTER INSTALLATION

- Check for engine coolant leaks. Refer to [CO-8, "CHECKING COOLING SYSTEM FOR LEAKS"](#).
- Start and warm up the engine. Visually make sure that there are no engine coolant leaks or A/T fluid leaks.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PF0:00030

Standard and Limit ENGINE COOLANT CAPACITY (APPROXIMATE)

EBS00G6S

Unit: ℓ (US gal, Imp gal)

Coolant capacity (With reservoir tank at MAX level)	10.5 (2 3/4, 2 3/8)
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THERMOSTAT

Valve opening temperature	80 – 84°C (176 – 183°F)
Valve lift	8.6 mm / 95°C (0.339 in / 203°F)
Valve closing temperature	77°C (171°F) or lower

RADIATOR

Unit: kPa (kg/cm², 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)

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SERVICE DATA AND SPECIFICATIONS (SDS)
