

CO

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”

EBS00F4U

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

EBS00F4V

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

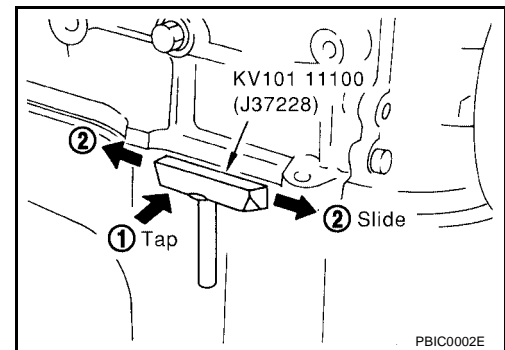
CAUTION:

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:

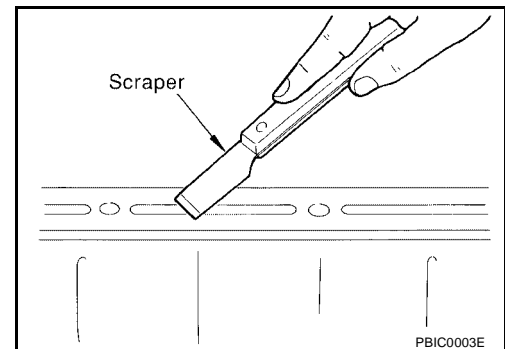
If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.



PBIC0002E

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, mounting 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 the tube presser.
 - Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-43, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#).

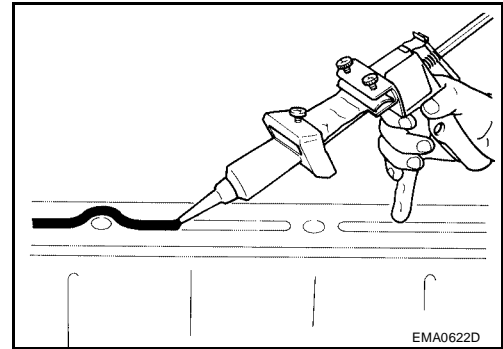


PBIC0003E

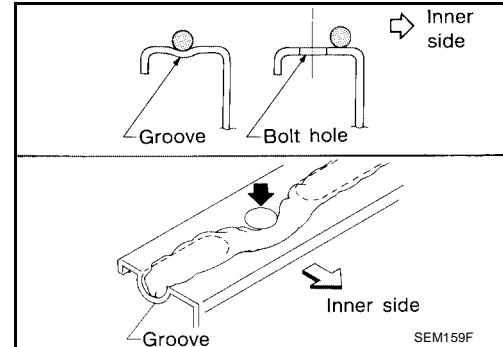
PRECAUTIONS

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

Tube presser : 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

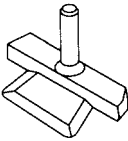
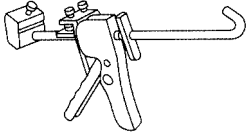
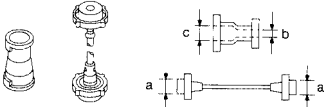


PREPARATION

PFP:00002

Special Service Tools

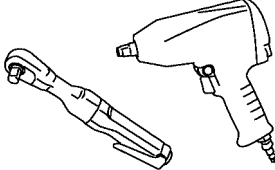
EBS00F4W

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

Tool number (Kent-Moore No.) Tool name	Description
KV10111100 (J-37228) Seal cutter	Removing oil pan and timing chain case  S-NT046
WS39930000 (-) Tube pressure	Pressing the tube of liquid gasket  S-NT052
EG17650301 (J33984-A) Radiator cap tester adapter	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)  S-NT564
KV99103510 (-) Radiator plate pliers A	Installing radiator upper and lower tanks  S-NT224
KV99103520 (-) Radiator plate pliers B	Removing radiator upper and lower tanks  S-NT225

Commercial Service Tools

EBS00F4X

Tool name	Description
Power tool	Loosening bolts and nuts  PBIC0190E

OVERHEATING CAUSE ANALYSIS

OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

EBS00G4S

	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat stuck closed	—	
		Damaged fins	Dust contamination or paper clogging	
			Physical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	Fan assembly	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper coolant mixture ratio	—	—	—
	Poor coolant quality	—	Coolant viscosity	—
	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

OVERHEATING CAUSE ANALYSIS

	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		

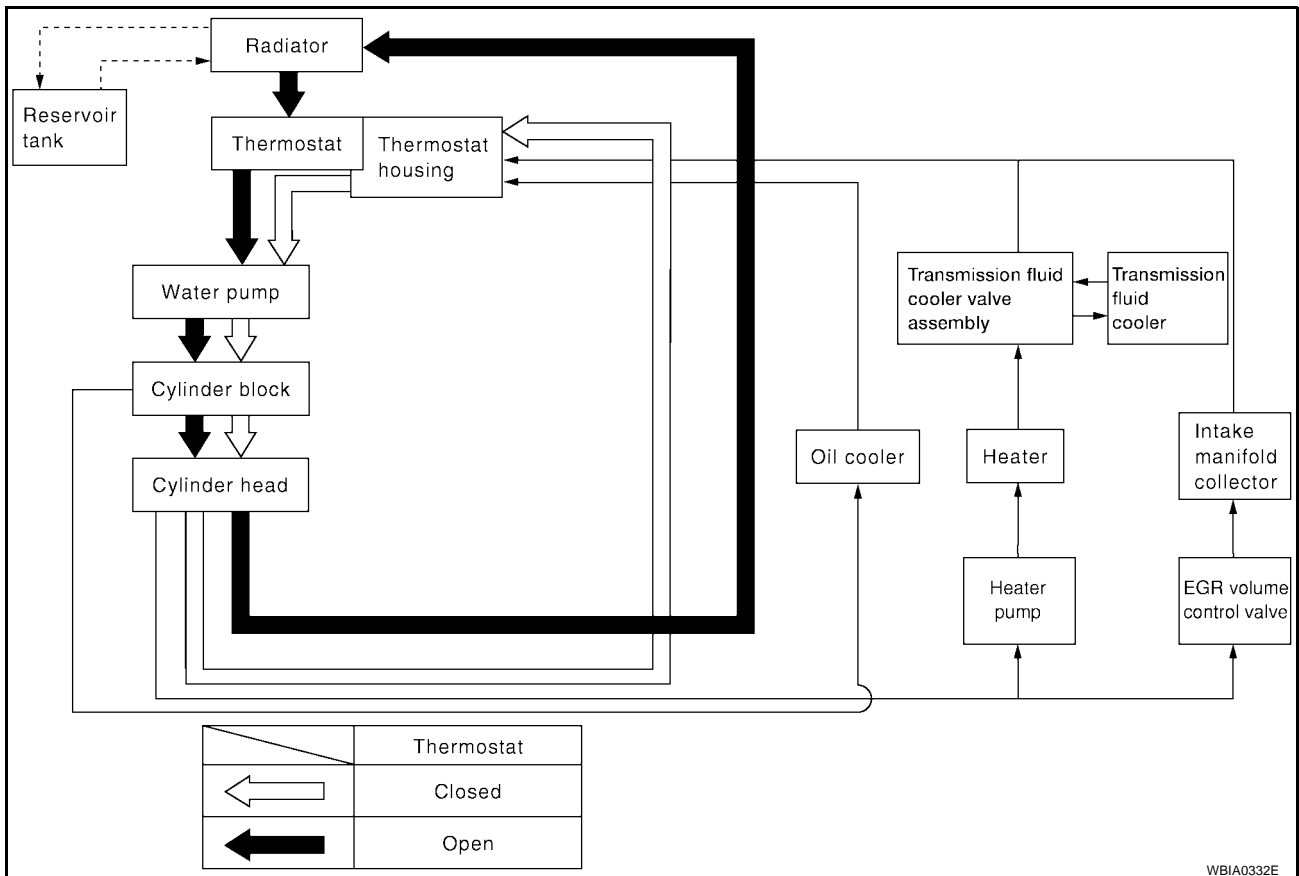
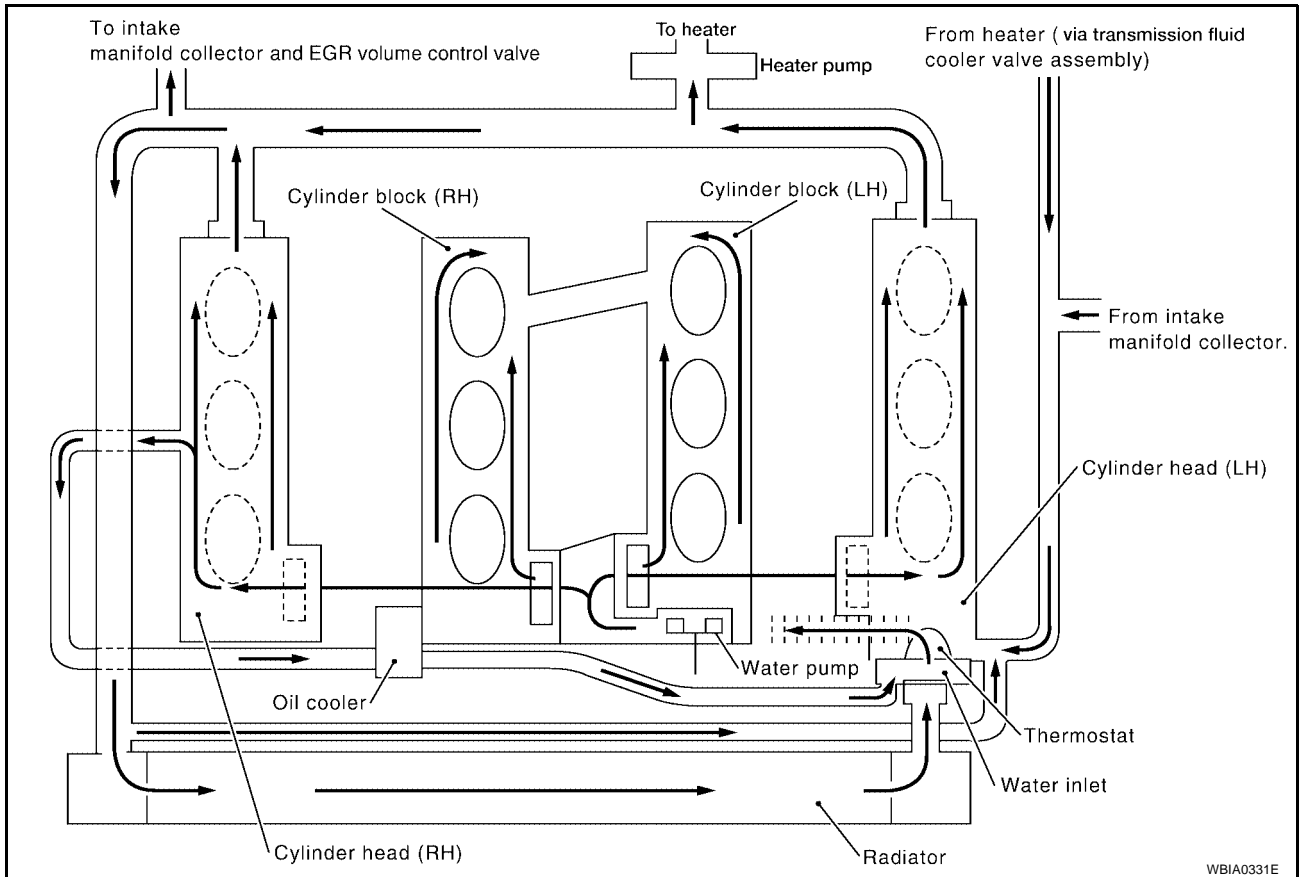
COOLING SYSTEM

COOLING SYSTEM

PFP:21020

Cooling Circuit

EBS00F4Z



ENGINE COOLANT

PFP:KQ100

System Check

EBS00F50

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.

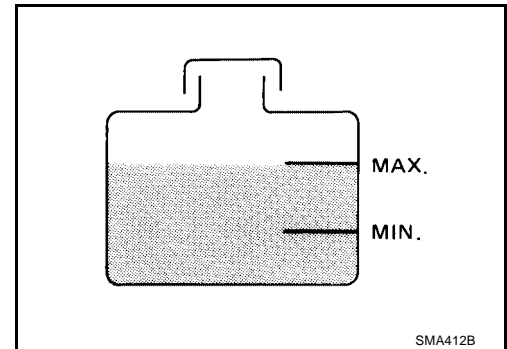
CHECKING COOLING SYSTEM HOSES

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.

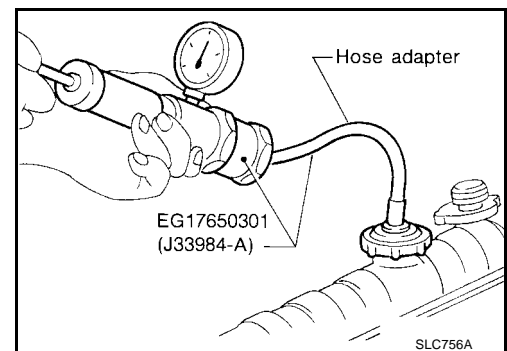
Testing pressure : 157 kPa (1.6 kg/cm² , 23 psi)

WARNING:

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

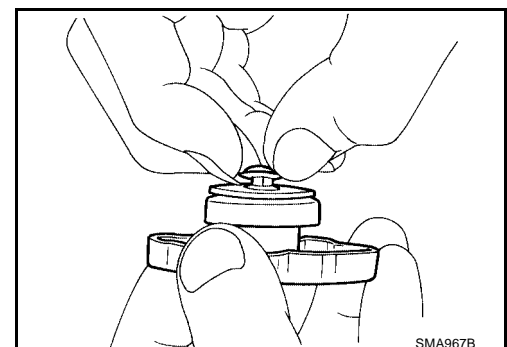
CAUTION:

Higher pressure than specified may cause radiator damage.



CHECKING RADIATOR CAP

1. 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.



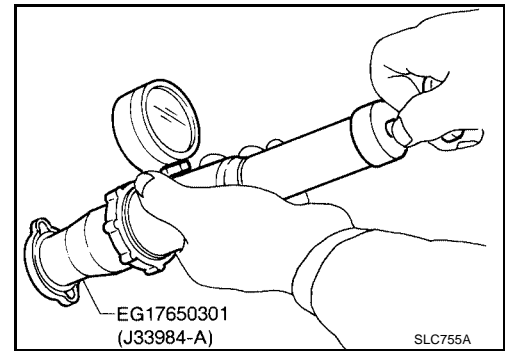
ENGINE COOLANT

2. Check radiator cap relief pressure using Tool.

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

EBS00F51

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

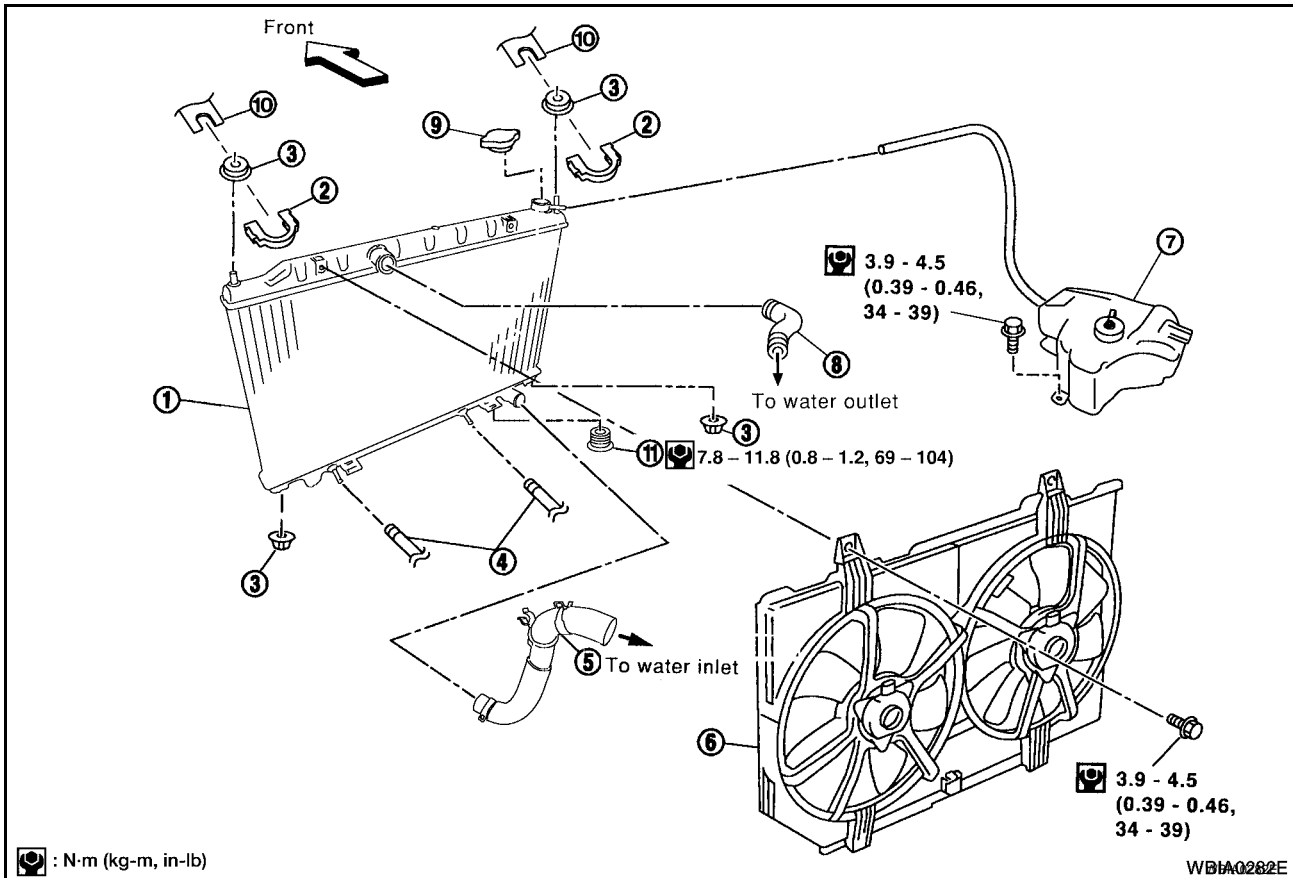
RADIATOR

PFP:21400

EBS00F52

RADIATOR

Removal and Installation



WARNING:

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

REMOVAL

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

CAUTION:

Perform when engine is cold.

3. Remove fresh air duct. Refer to [EM-15, "Removal and Installation"](#).
4. Remove IPDM E/R mounting bolts and position aside. Refer to [PG-26, "Removal and Installation of IPDM E/R"](#).
5. Disconnect radiator upper and lower hoses.
6. Remove the A/T fluid cooler hoses, if equipped.
 - Plug hoses to avoid leakage of A/T fluid.
7. Disconnect the reservoir tank hose.

RADIATOR

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

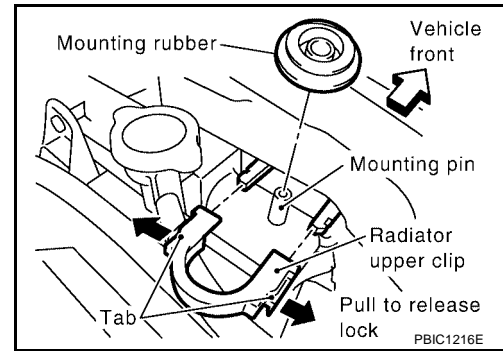
CAUTION:

To prevent damage, do not pull lock tabs excessively.

9. Disconnect fan electrical connectors.
10. Remove the radiator and radiator fan assembly.

CAUTION:

Do not damage or scratch air conditioner condenser and radiator core when removing.



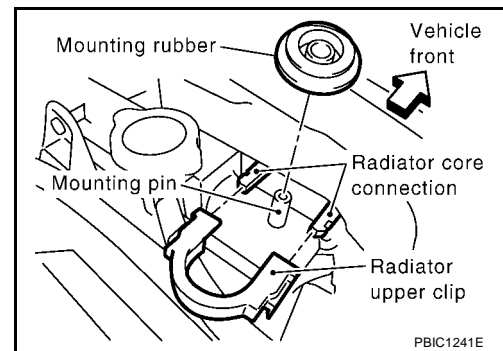
INSTALLATION

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"](#).

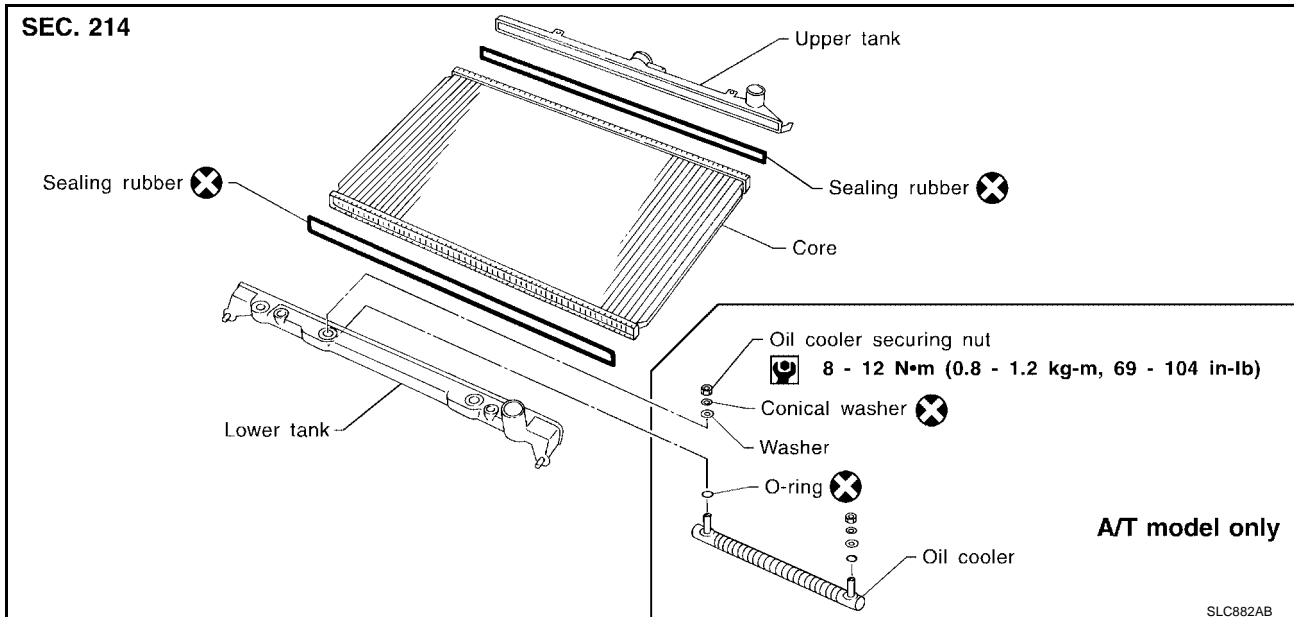
Installation of Radiator Upper Clip

- Install radiator upper clip on radiator core connection with the following procedure:
 1. Install the rubber on mounting pin of radiator core.
 2. 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.
 3. 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.



Disassembly and Assembly

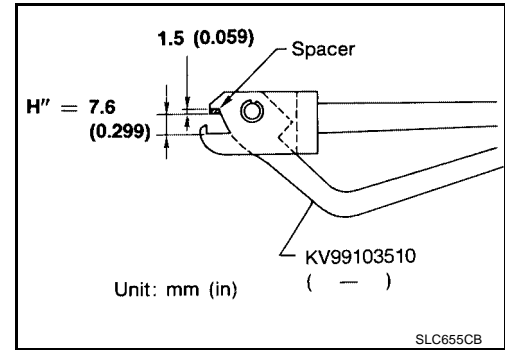
EBS00F53



RADIATOR

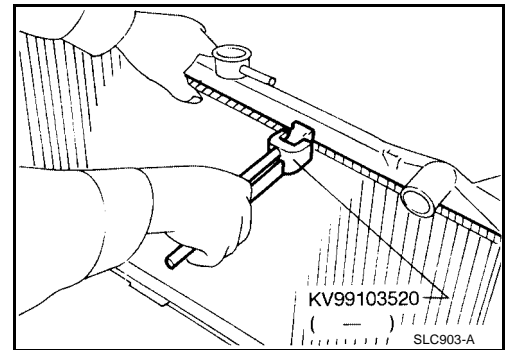
PREPARATION

1. Attach the spacer to the tip of the Tool.
Spacer specification: 1.5 mm (0.059 in) thick x 18 mm (0.71 in) wide x 8.5 mm (0.335 in) long.
2. Make sure that when Tool is closed dimension H'' is approx. 7.6 mm (0.299 in).
3. Adjust dimension H'' with the spacer, if necessary.



DISASSEMBLY

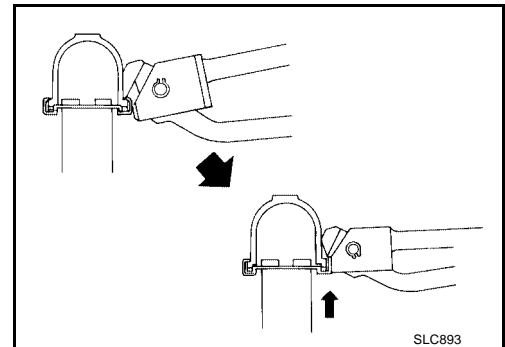
1. Remove the tank using Tool.



- Grip the crimped edge and bend it upwards so that Tool slips off.

CAUTION:

Do not bend excessively.

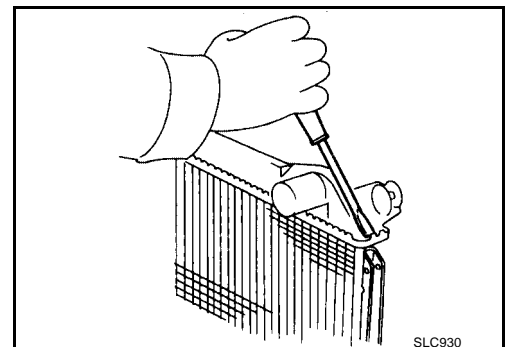


- In areas where the Tool cannot be used, use a screwdriver to bend the edge up.

CAUTION:

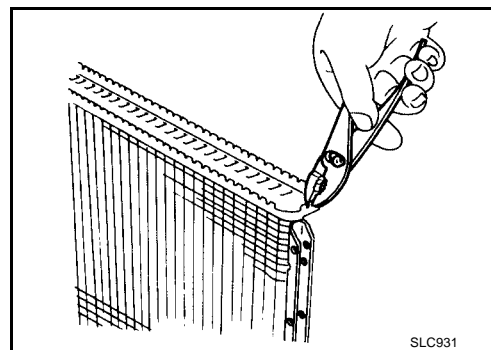
Be careful not to damage tank.

2. Remove sealing rubber.



RADIATOR

- Using pliers, make sure the edge stands straight up.
- Remove oil cooler from tank (if equipped).

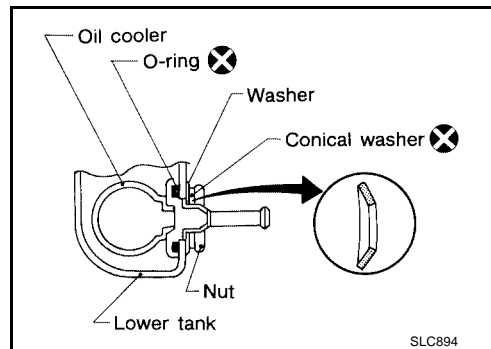


ASSEMBLY

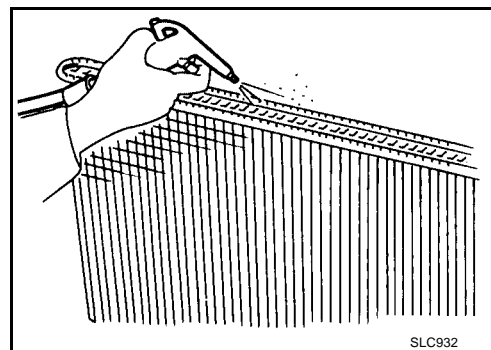
- Install the oil cooler (if equipped).

NOTE:

Pay attention to direction of conical washer.



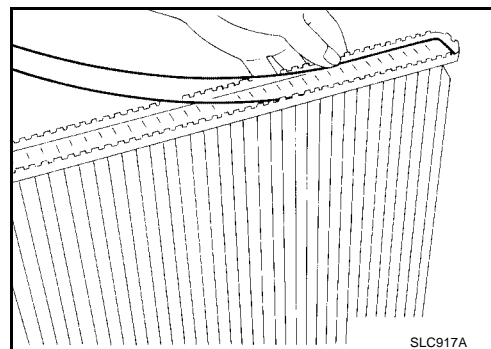
- Clean the contact portion of the tank.



- Install sealing rubber by pushing it in with your fingers.

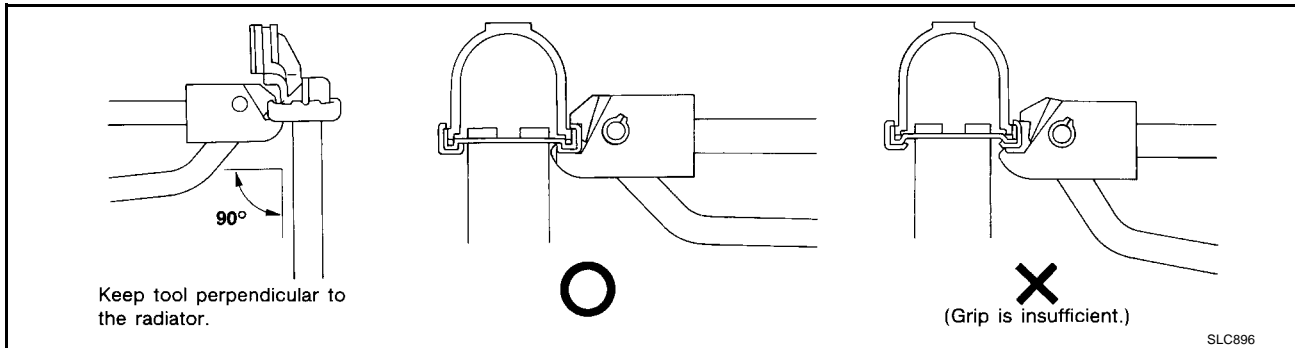
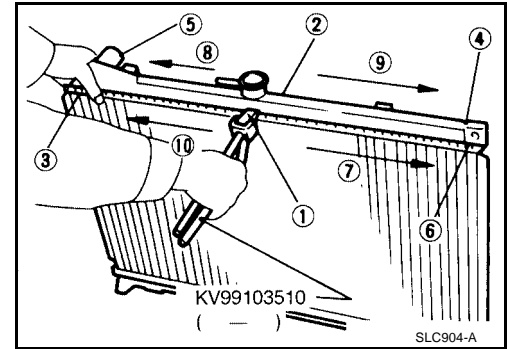
CAUTION:

Be careful not to twist sealing rubber gasket.

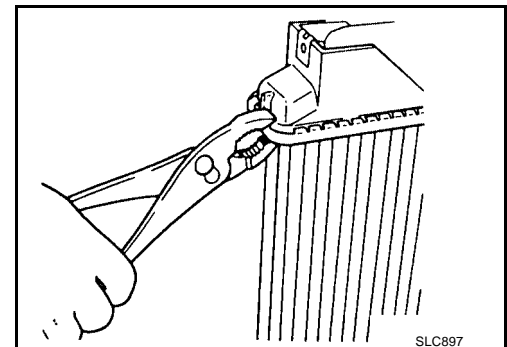


RADIATOR

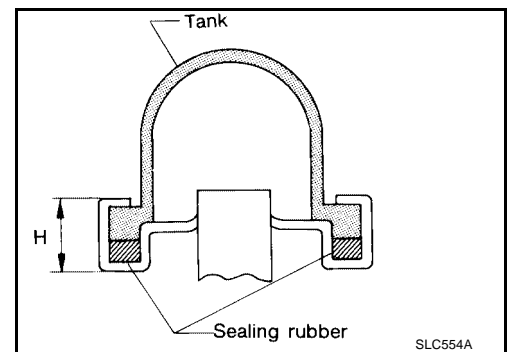
4. Crimp tank in specified sequence using Tool.



- Use pliers in the locations where Tool cannot be used.



5. Make sure that the rim is completely crimped down.
Standard height "H" : 8.0 – 8.4 mm (0.315 – 0.331 in)
6. Confirm that there is no leakage.
Refer to [CO-15, "INSPECTION"](#).



RADIATOR

INSPECTION

1. Apply pressure using Tool.

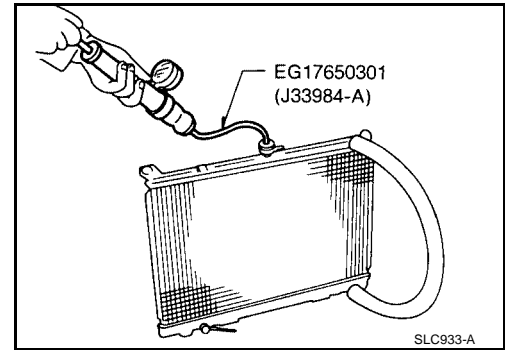
Specified pressure value : 157 kPa (1.6 kg/cm² , 23 psi)

WARNING:

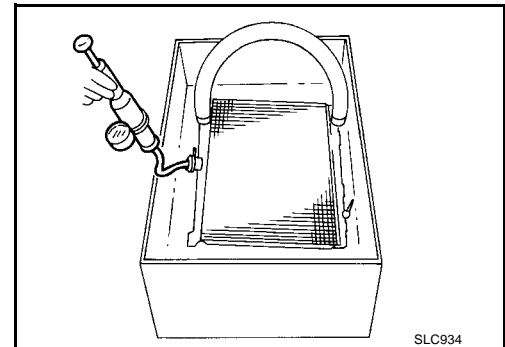
To prevent the risk of the hose coming undone while under pressure, securely fasten it down with a hose clamp.

CAUTION:

Attach a hose to the oil cooler as well (if equipped).

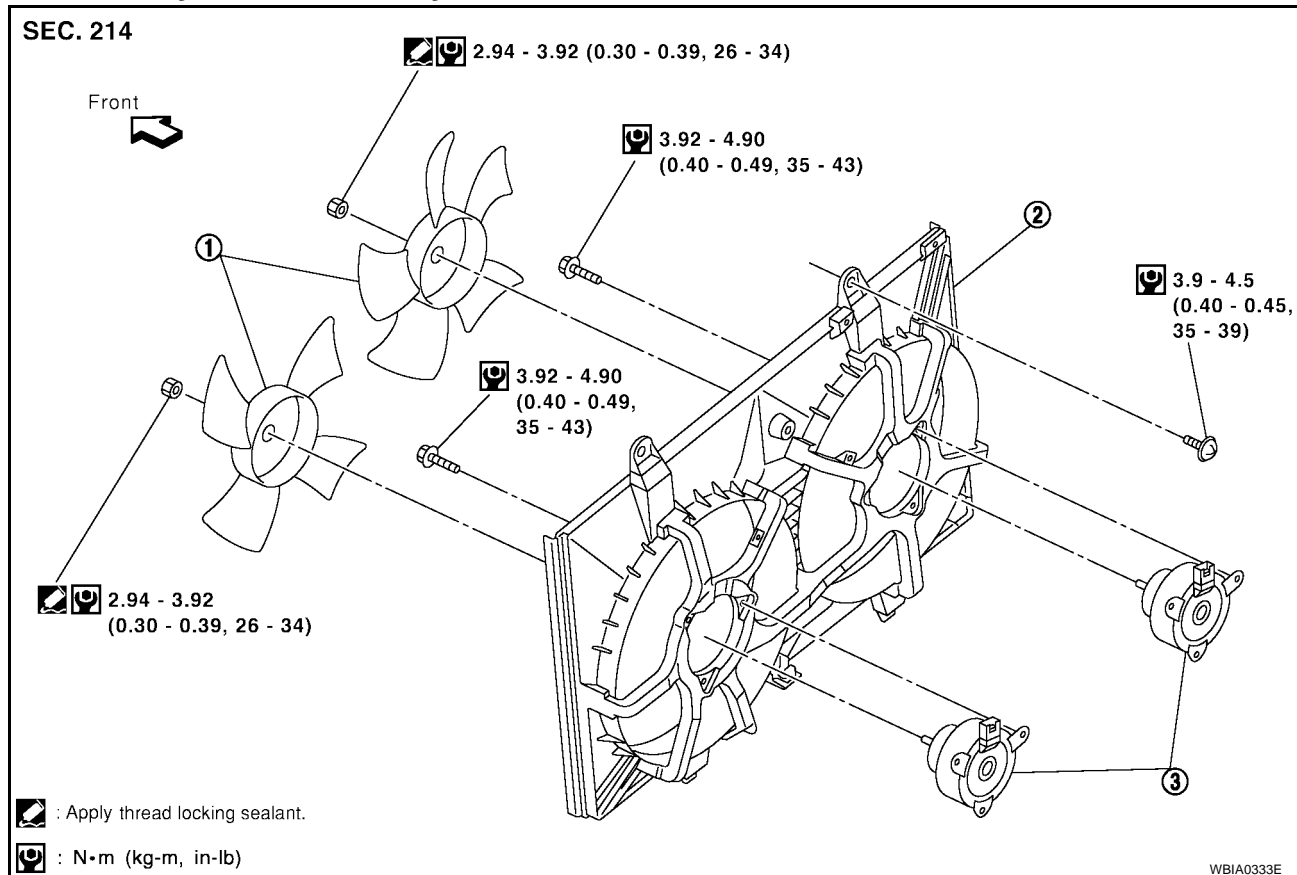


2. Place radiator in water filled tank and check for leakage.



Disassembly and Assembly of Radiator Fan

EBS00F54



DISASSEMBLY

1. Remove fan blade.

RADIATOR

2. Remove fan motor from fan shroud.

ASSEMBLY

- Assemble in the reverse order of disassembly.

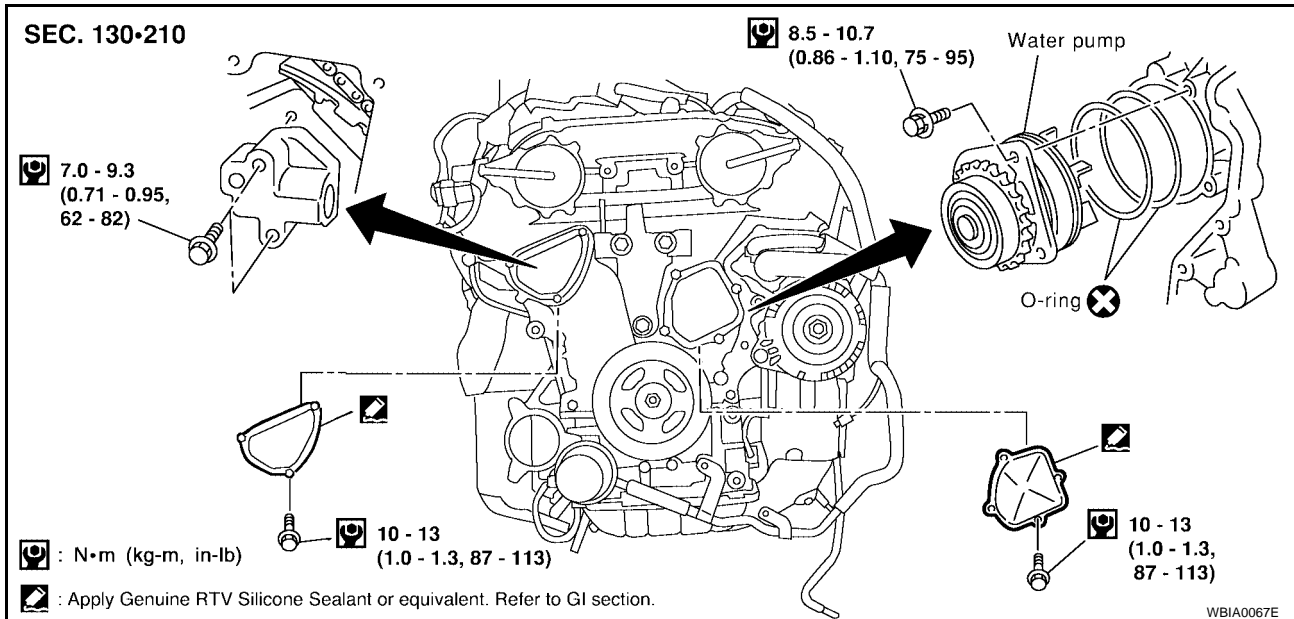
WATER PUMP

WATER PUMP

PFP:21020

Removal and Installation

EBS00F55



CAUTION:

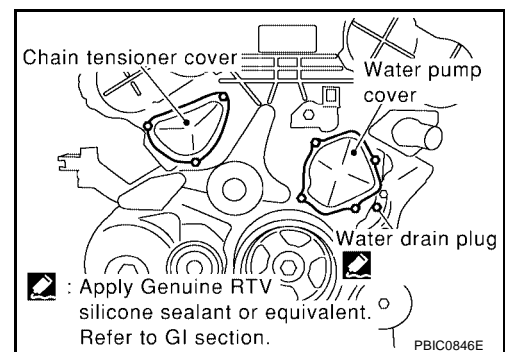
- When removing water pump assembly, be careful not to get coolant on drive belt.
- Water pump cannot be disassembled and should be replaced as a unit.
- After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester.

REMOVAL

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

CAUTION:

Perform when the engine is cold.



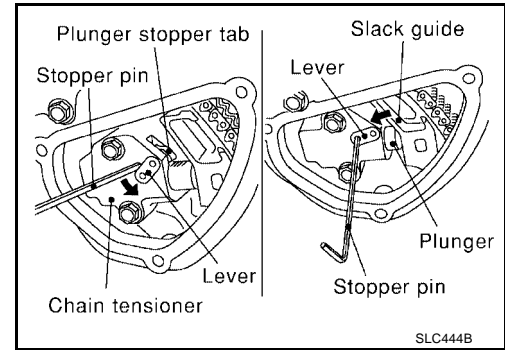
3. Remove right-hand side engine cover.
4. Remove coolant reservoir. Refer to [CO-10, "Removal and Installation"](#).
5. Remove IPDM E/R mounting bolts and position aside. Refer to [PG-26, "Removal and Installation of IPDM E/R"](#).
6. Remove right-hand tire and splash shield.
7. Remove drive belts. Refer to [EM-14, "Removal and Installation"](#).
8. Remove idler pulley, then power steering and generator adjusting bars.
9. Support engine and remove front engine insulator and bracket. Refer to [EM-116, "Removal and Installation"](#).
10. Remove water drain plug on water pump side of cylinder block.
11. Remove chain tensioner cover and water pump cover.
12. Remove the chain tensioner assembly.

WATER PUMP

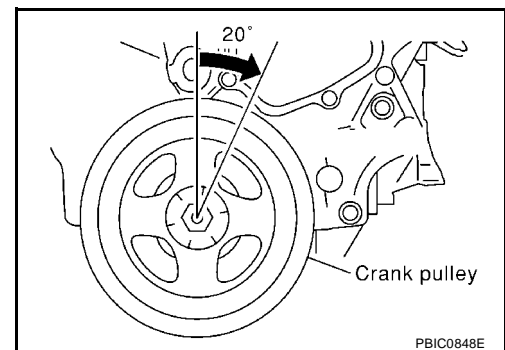
- a. Pull the lever down and release the plunger stopper tab.
- b. Insert the stopper pin into the tensioner body hole to hold the lever and keep the stopper tab released.

NOTE:

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



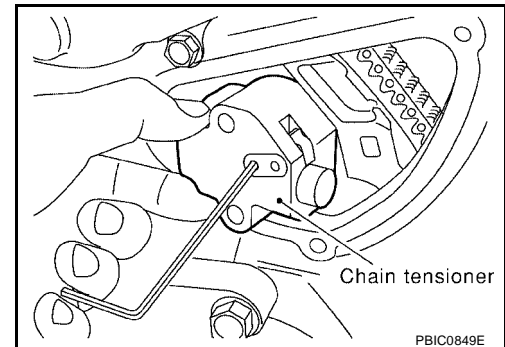
- c. Insert the plunger into the tensioner body by pressing the timing chain slack guide.
- d. Keep the slack guide pressed and hold the plunger in by pushing the stopper pin deeper through the lever and into the tensioner body hole.
- e. Make a gap between water pump gear and timing chain, by turning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



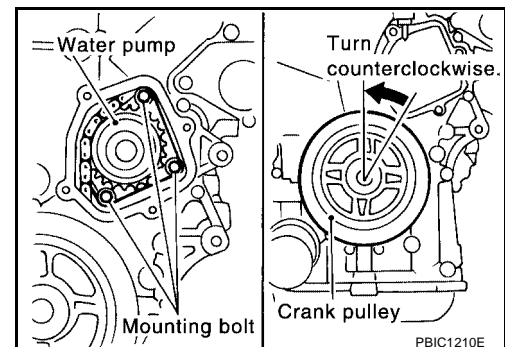
13. Remove chain tensioner.

CAUTION:

Be careful not to drop mounting bolts inside chain case.

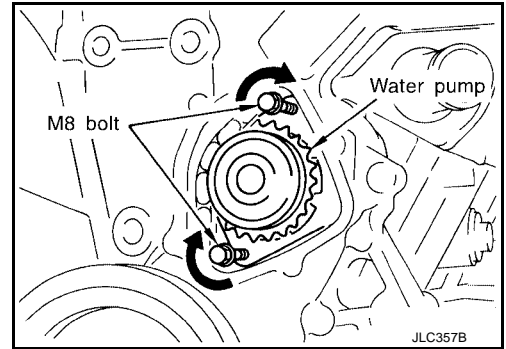


14. Remove the three water pump mounting bolts. Make a maximum gap between water pump gear and timing chain, by turning crankshaft pulley counterclockwise until timing chain loosens on water pump sprocket.



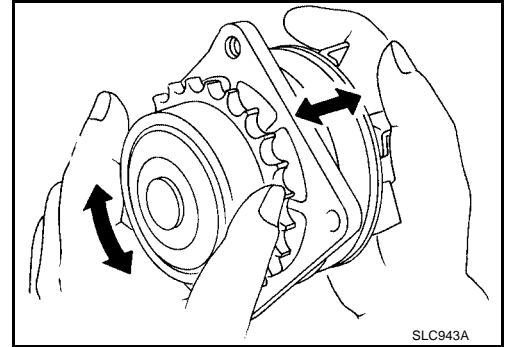
WATER PUMP

15. Screw M8 bolts [pitch: 1.25 mm (0.49 in) length: approx. 50 mm (1.97 in)] into water pumps upper and lower mounting 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.
16. Remove M8 bolts and O-rings from water pump.



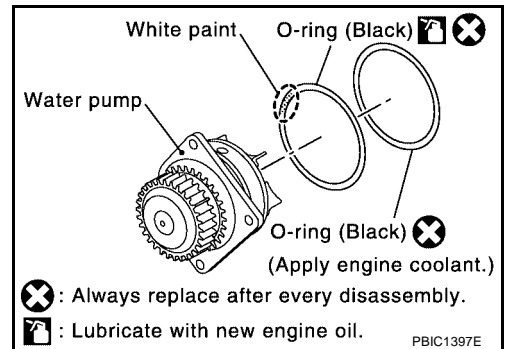
INSPECTION AFTER REMOVAL

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



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.



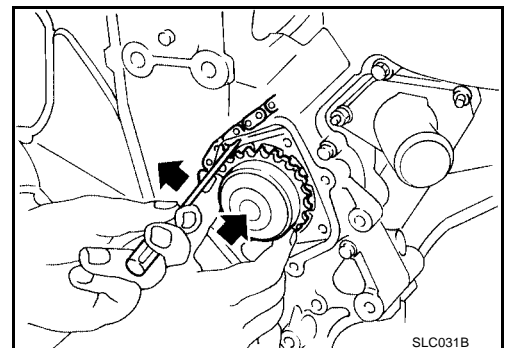
3. Install the water pump.

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 mounting bolts alternately and evenly.

Water pump mounting bolts **8.5 – 10.7 N·m (0.86 – 1.10 kg·m, 75 – 95 in·lb)**



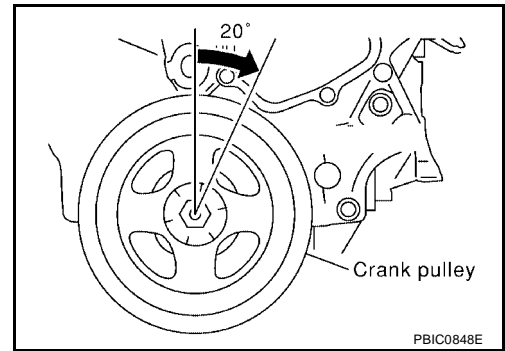
4. Remove dust and foreign material completely from backside of chain tensioner and from installation area of rear timing chain case.

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.



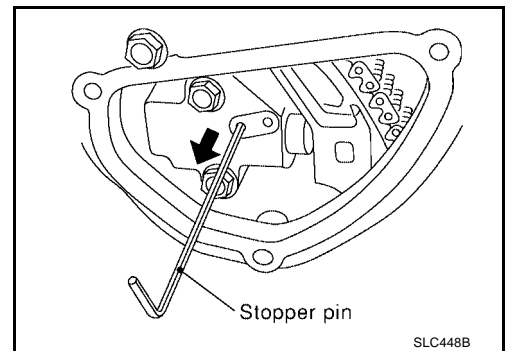
6. Install the timing chain tensioner.

Timing chain tensioner mounting bolts **7.0 – 9.3 N·m (0.71 – 0.95 kg-m, 62 – 82 in-lb)**

7. Remove the stopper pin.

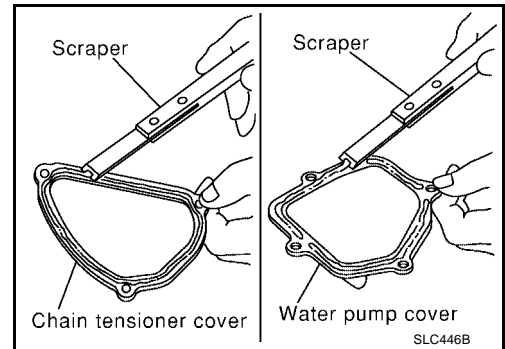
NOTE:

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

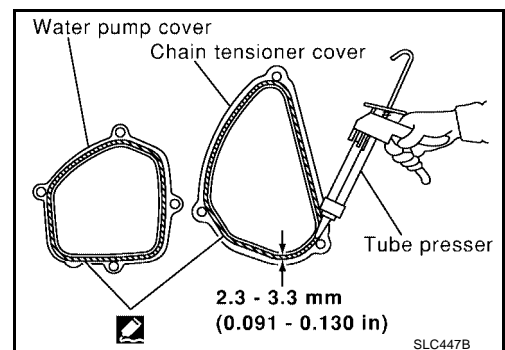


8. Install chain tensioner and water pump cover.

- 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"](#).



9. Install water drain plug on water pump side of cylinder block. Refer to [MA-14, "Changing Engine Coolant"](#).
10. Tighten idler pulley mounting bolts to specification.

Idler pulley mounting bolts **: 25 – 31 N·m (2.5 – 3.2 kg-m, 18 – 23 ft-lb)**

WATER PUMP

11. Installation of remaining components is in the reverse order of removal.
- Refill engine coolant. Refer to [MA-14, "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.

A

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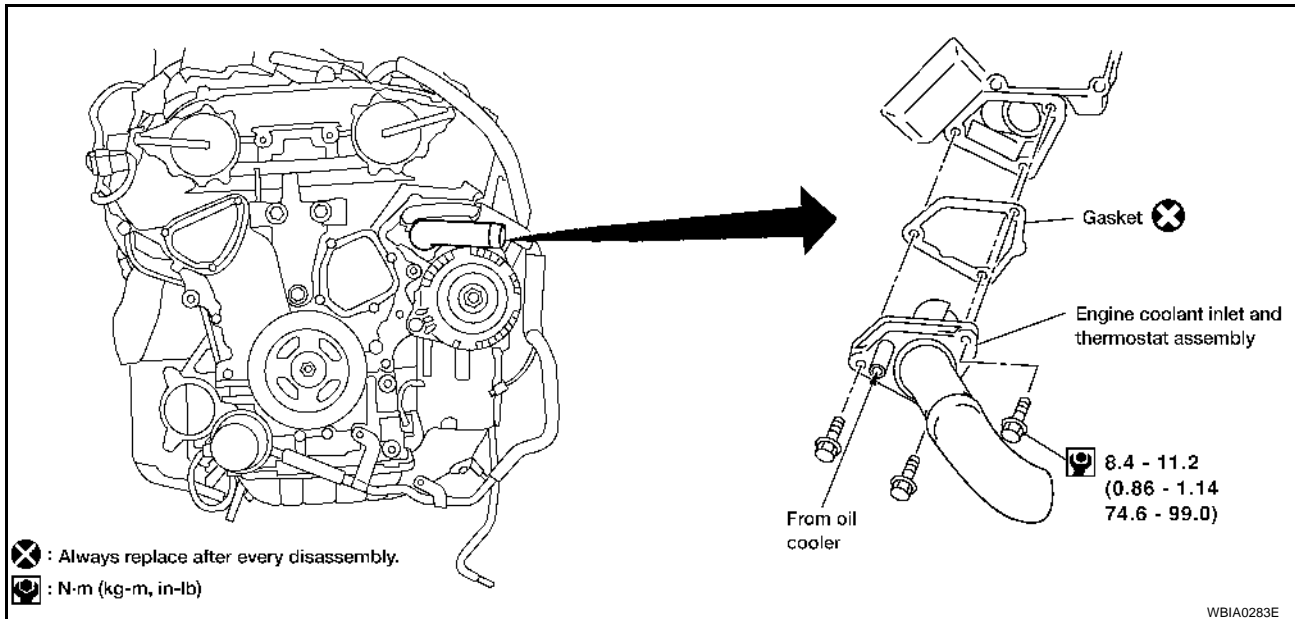
THERMOSTAT AND THERMOSTAT HOUSING

THERMOSTAT AND THERMOSTAT HOUSING

PFP:21200

Removal and Installation

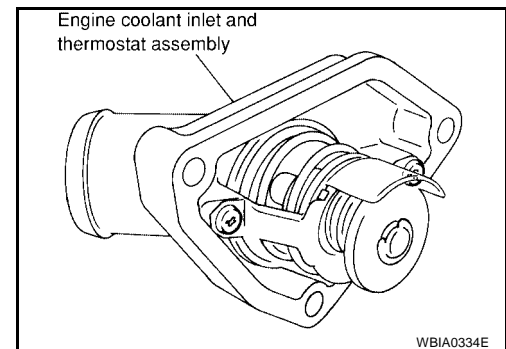
EBS00F56



WBIA0283E

REMOVAL

1. Remove undercover.
 2. Drain coolant from radiator. Refer to [MA-14, "Changing Engine Coolant"](#).
- CAUTION:**
Perform when engine is cool.
3. Remove drive belts. Refer to [EM-14, "Removal and Installation"](#).
 4. Remove water drain plug on water pump side of the engine.
 5. Remove right-hand side engine cover.
 6. Remove coolant reservoir. Refer to [CO-10, "Removal and Installation"](#).
 7. Remove IPDM E/R mounting bolts and position aside. Refer to [PG-26, "Removal and Installation of IPDM E/R"](#).
 8. Disconnect lower radiator hose.
 9. Disconnect oil cooler line.
 10. Remove engine coolant inlet and thermostat assembly.
 - Do not disassemble engine coolant inlet and thermostat assembly. Replace them as a unit, if necessary.



WBIA0334E

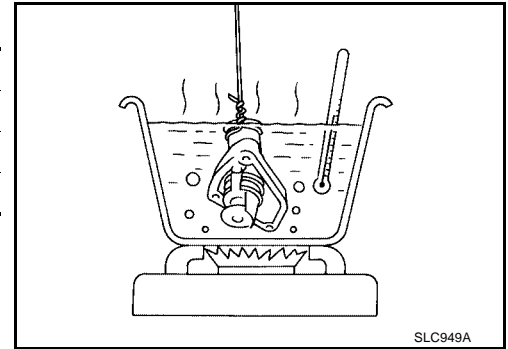
INSPECTION AFTER REMOVAL

1. Check valve seating condition at ordinary room temperatures. It should seat tightly.

THERMOSTAT AND THERMOSTAT HOUSING

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 higher



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.
 - After installation, run engine for a few minutes, and check for leaks.

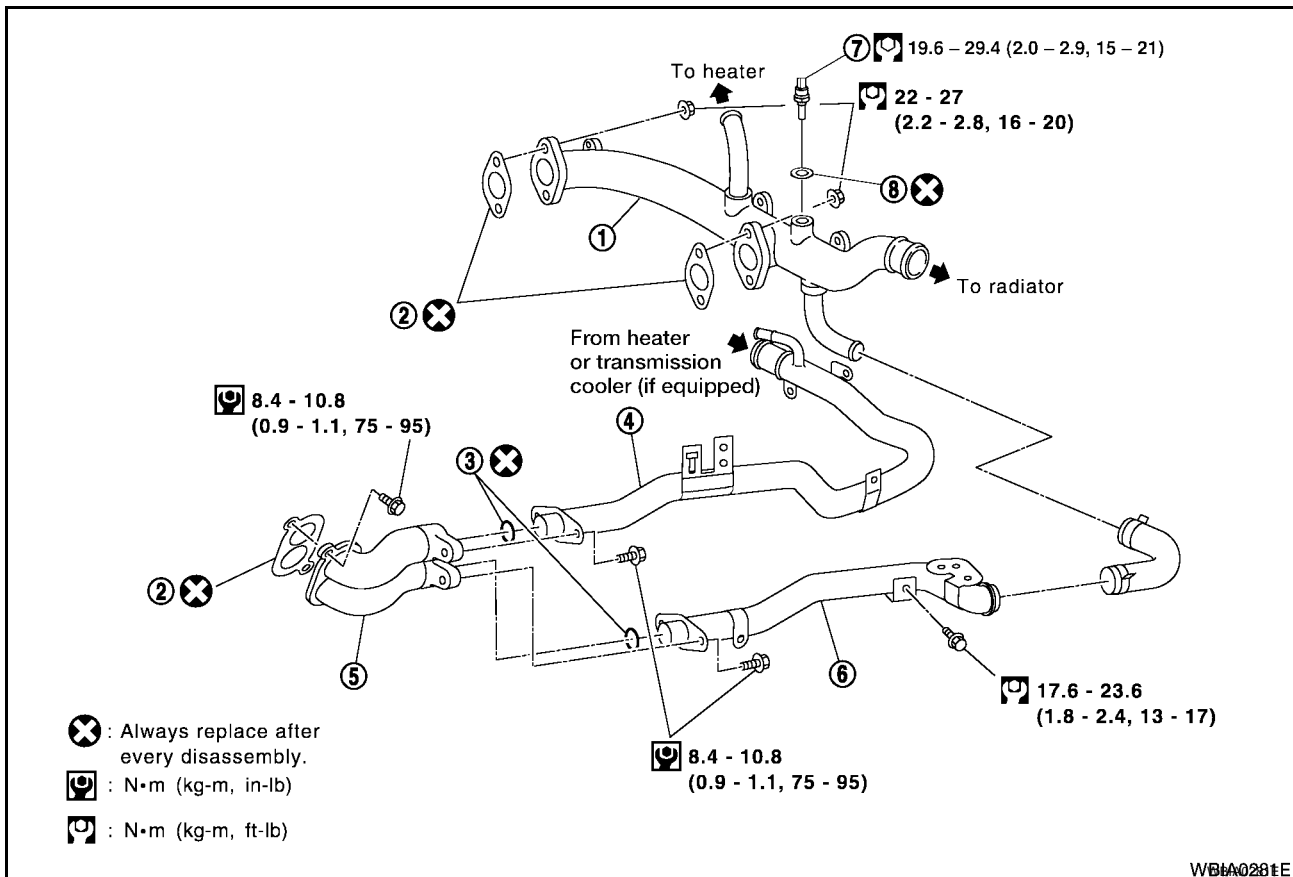
WATER OUTLET AND WATER PIPING

WATER OUTLET AND WATER PIPING

PFP:11060

Removal and Installation

EBS00G4P



- | | | |
|--------------------------------------|--------------------|----------------------|
| 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 | |

REMOVAL

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

CAUTION:

Perform when the engine is cold.

3. Remove engine cover using power tool.
4. Remove air duct and air cleaner case assembly. Refer to [EM-15, "Removal and Installation"](#).
5. Remove radiator upper hose and heater hose.
6. Remove connector(s) from heater pipe.
7. Disconnect engine coolant temperature sensor electrical connector on water outlet.
8. Remove water outlet, heater pipe, water connector, and water bypass pipe mounting nuts and bolts.

INSTALLATION

1. Install 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-14, "REFILLING ENGINE COOLANT"](#).

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Standard and Limit

EBS00G4W

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Coolant capacity (With reservoir tank at MAX level)	7.5 (7 7/8, 6 5/8)
Reservoir tank coolant capacity (at MAX level)	0.7 (3/4, 5/8)

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 higher

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)

SERVICE DATA AND SPECIFICATIONS (SDS)
