SECTION CO

ENGINE COOLING SYSTEM

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PRECAUTIONS

PFP:00001

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

EBS00J8V

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.**

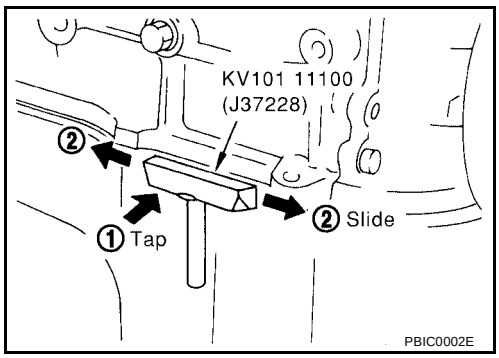
Precautions for Liquid Gasket

EBS00J8W

REMOVAL OF LIQUID GASKET SEALING

- 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.

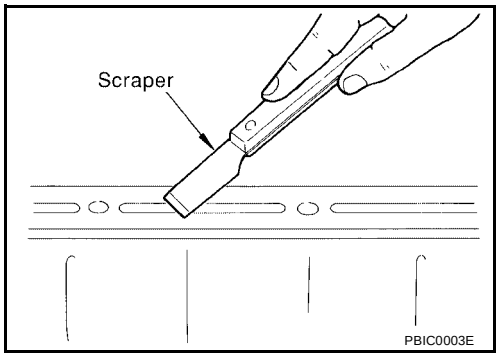
- In areas where the Tool is difficult to use, use a plastic hammer to lightly tap (1) the Tool where the sealant is applied. Use a plastic hammer to slide the Tool (2) by tapping on the side.

CAUTION:

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

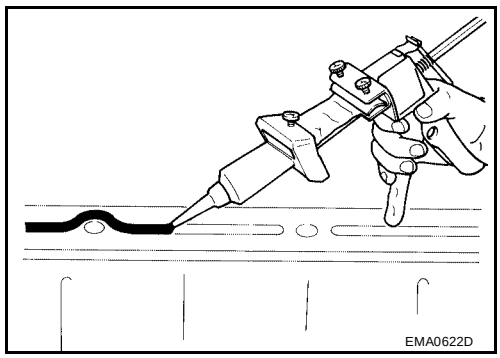
LIQUID GASKET APPLICATION PROCEDURE

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-45, "Recommended Chemical Products and Sealants" .

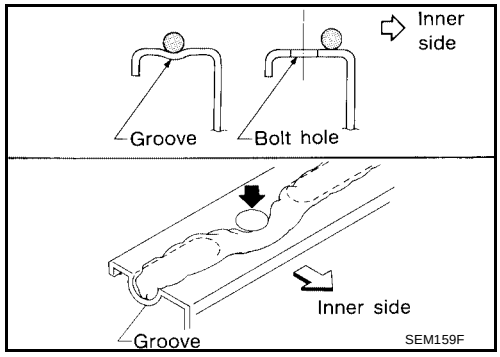


4. Apply the sealant without breaks to the specified location with the specified dimensions using Tool.

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 GI-45, "Recommended Chemical Products and Sealants" .



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

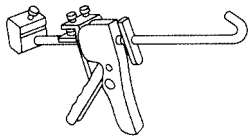
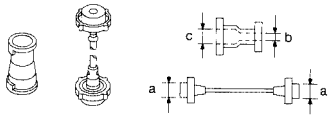
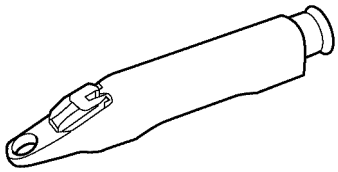
PREPARATION

PFP:00002

Special Service Tools

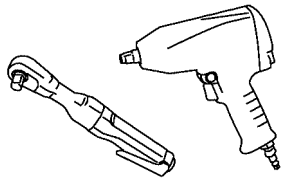
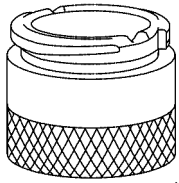
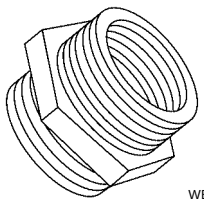
EBS00J9G

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)
— (J-23688) Engine coolant refractometer  WBIA0539E	Checking concentration of ethylene glycol in engine coolant

Commercial Service Tools

EBS00J9H

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts
Coolant system tester adapter  WBIA0408E	Adapting radiator cap tester to reservoir filler neck
Coolant system tester adapter  WBIA0409E	Adapting radiator cap tester to reservoir cap

OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

EBS00J8Z

	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.)	
		Water cut valve malfunction	Excess foreign material (rust, dirt, sand, etc.), physical damage	
	Reduced air flow	Cooling fan does not operate	Fan assembly	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper engine coolant mixture ratio	—	—	—
	Poor engine coolant quality	—	Engine coolant density	—
	Insufficient engine coolant	Engine coolant 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

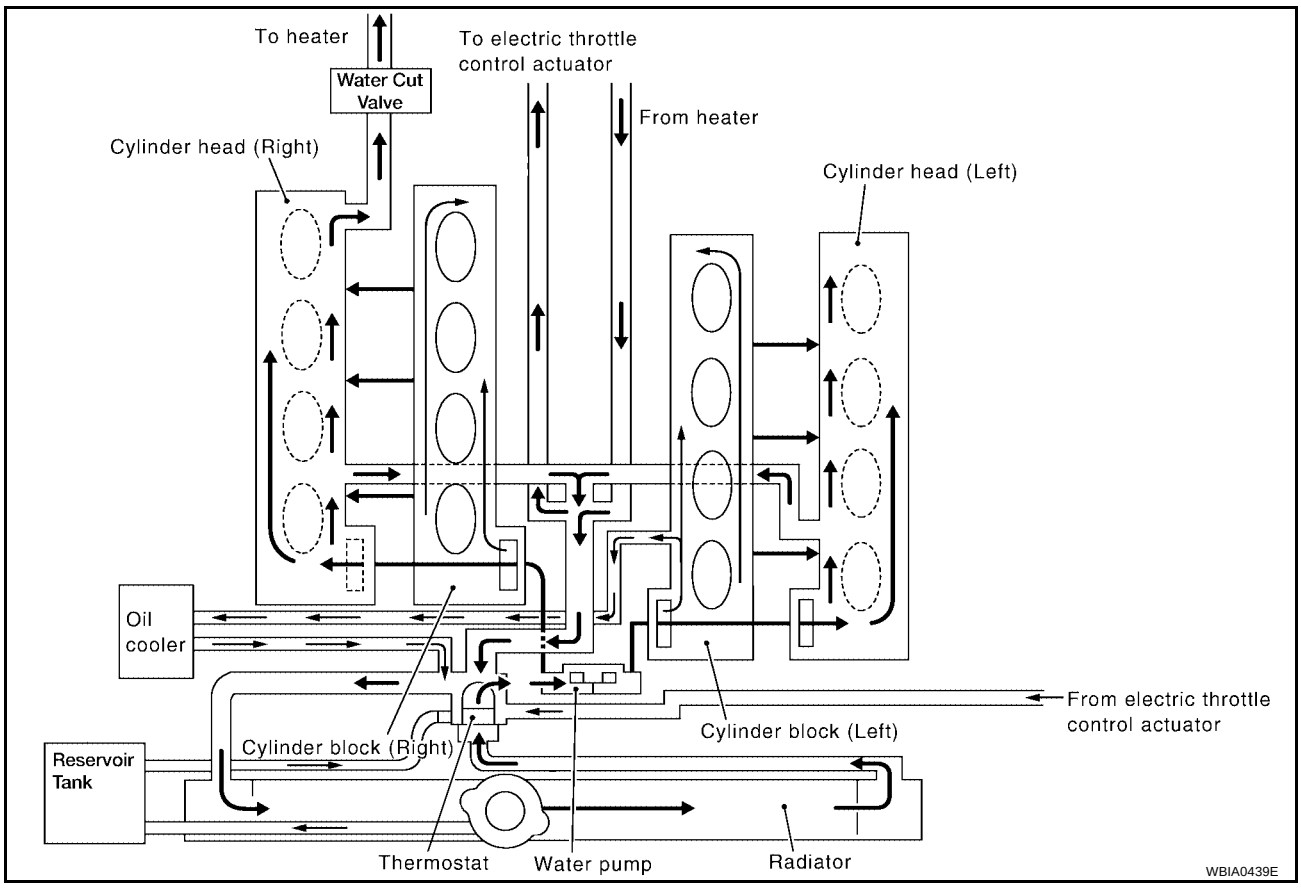
	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			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

PFP:21020

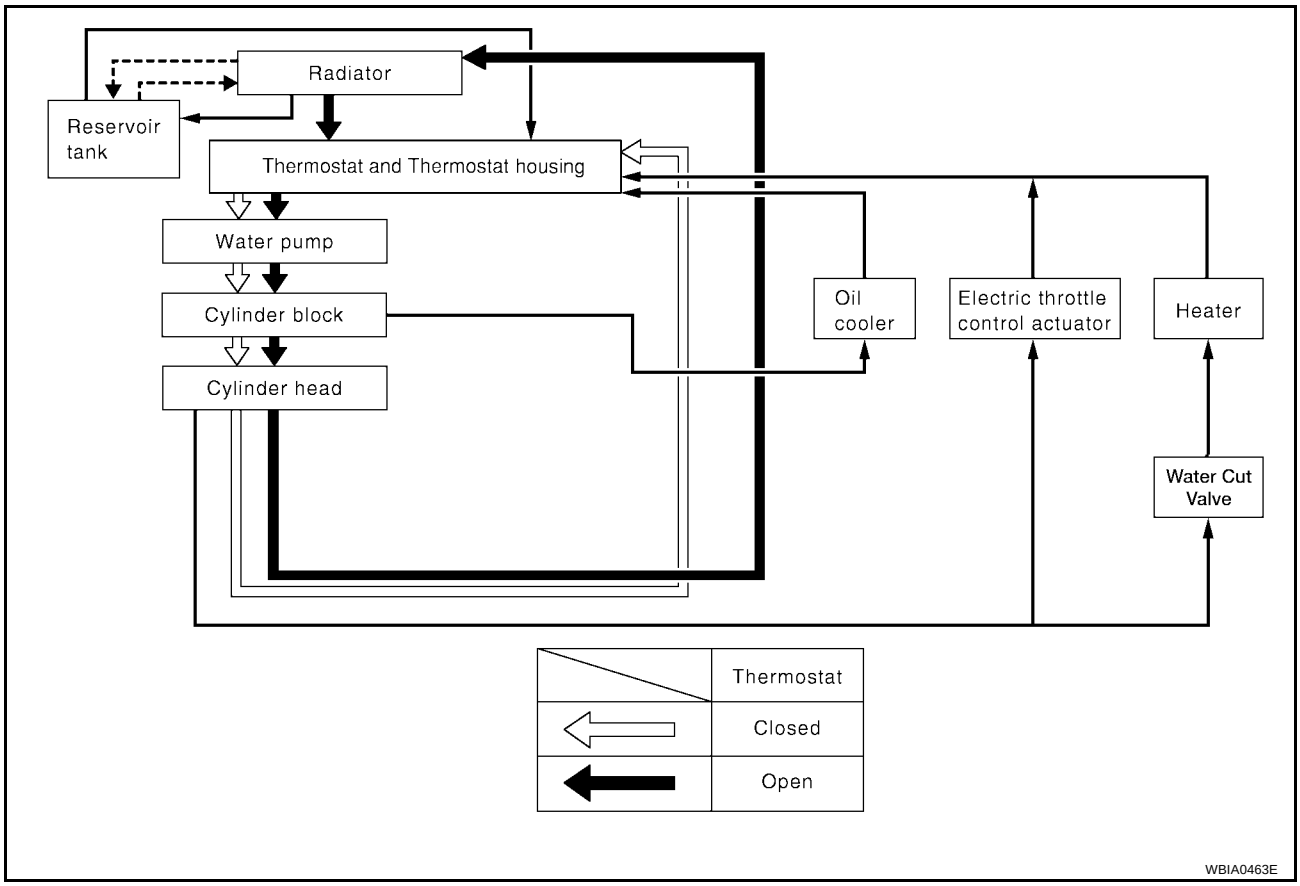
Cooling Circuit

EBS00J90



System Drawing

EBS00J91



ENGINE COOLANT

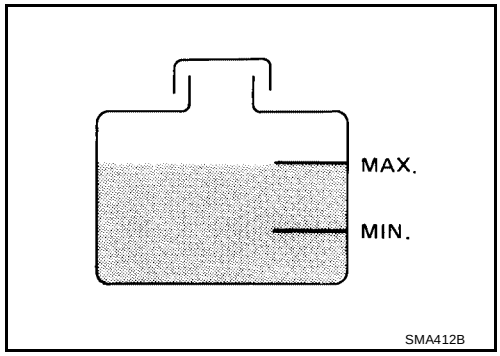
PFP:KQ100

Inspection

EBS00J92

LEVEL CHECK

- Check if the engine coolant reservoir tank level is within MIN to MAX level when engine is cool.
- Adjust engine coolant level as necessary.



CHECKING COOLING SYSTEM FOR LEAKS

WARNING:

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

- To check for leakage, using suitable tool apply pressure to the cooling system and reservoir cap.

Reservoir cap testing pressure	**Testing pressure: 137 kPa (1.4 kg/cm, 20 psi)**

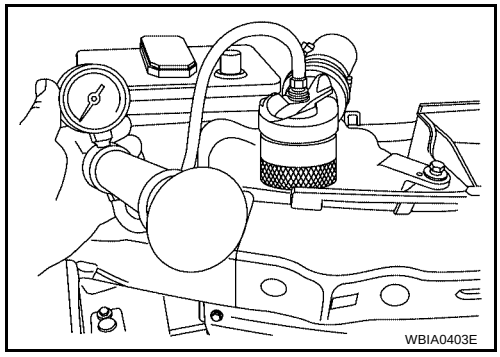
CAUTION:

Higher pressure than specified may cause radiator damage.

NOTE:

In case that engine coolant decreases, replenish cooling system with engine coolant.

- If any concerns are found, repair or replace damaged parts.



Changing Engine Coolant

EBS00J93

Refer to MA-12, "Changing Engine Coolant" .

DRAINING ENGINE COOLANT

Refer to MA-12, "DRAINING ENGINE COOLANT" .

REFILLING ENGINE COOLANT

Refer to MA-13, "REFILLING ENGINE COOLANT" .

FLUSHING COOLING SYSTEM

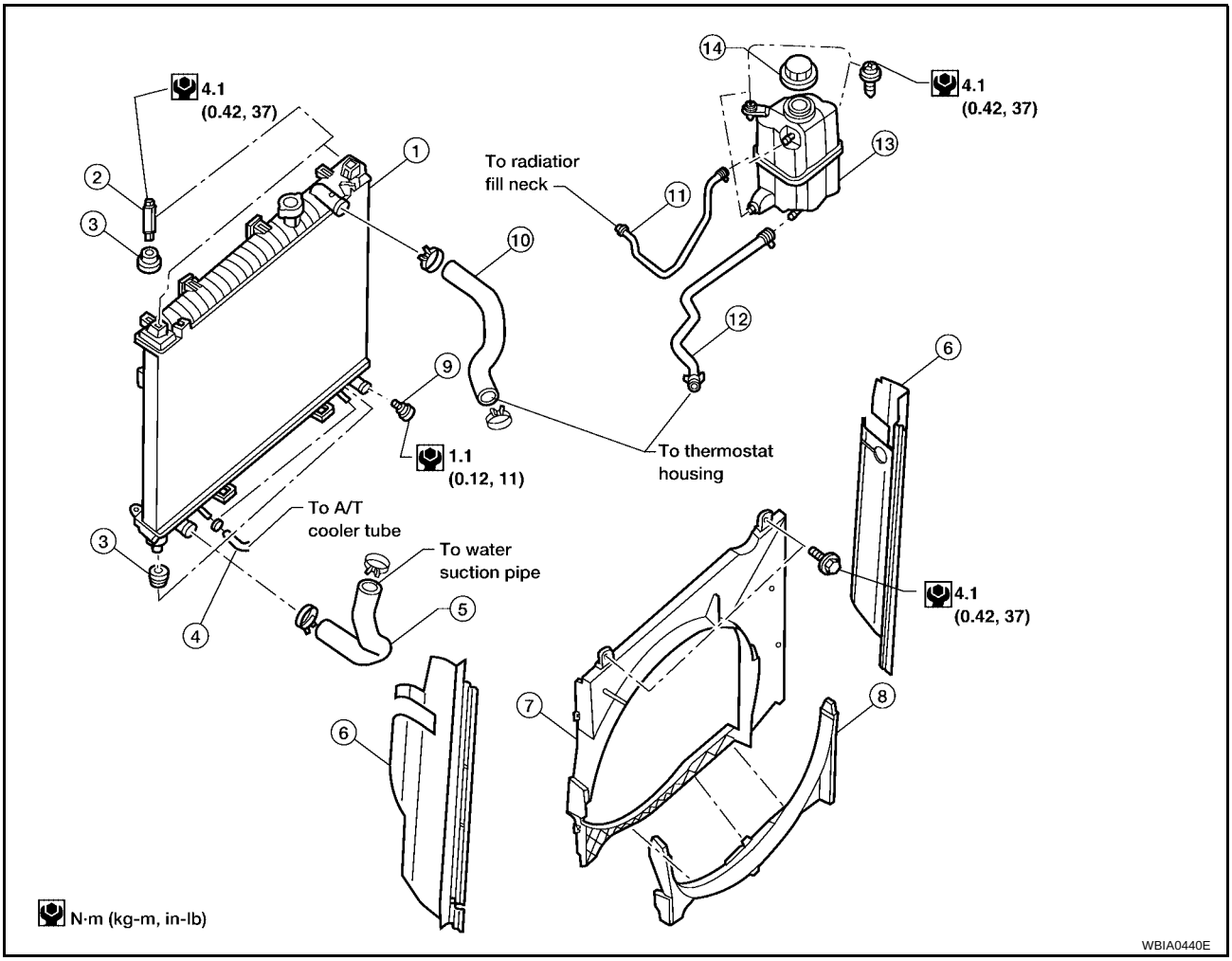
Refer to MA-14, "FLUSHING COOLING SYSTEM" .

RADIATOR

PFP:21400

Removal and Installation

EBS00J94



1. Radiator
2. Mounting bolt
3. Mounting rubber
4. A/T fluid cooler hose
5. Radiator hose (lower)
6. Flaps
7. Radiator shroud (upper)
8. Radiator shroud (lower)
9. Drain plug
10. Radiator hose (upper)
11. Reservoir tank hose
12. By-pass hose
13. Reservoir tank
14. Reservoir tank cap

WARNING:

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

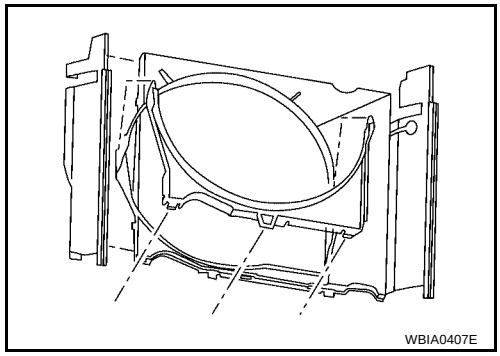
REMOVAL

CAUTION:

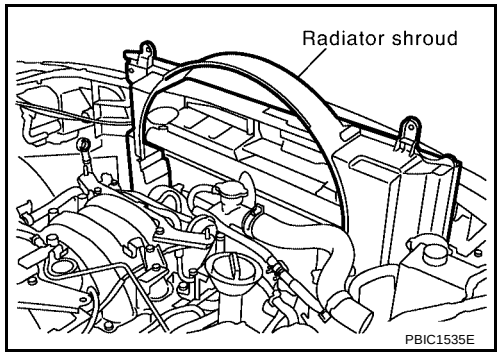
Perform when the engine is cold.

1. Remove air cleaner and air duct assembly. Refer to EM-14, "REMOVAL" .
2. Drain engine coolant from the radiator. Refer to MA-12, "DRAINING ENGINE COOLANT" .
3. Disconnect A/T fluid cooler hoses.
   - Install blind plug to avoid leakage of A/T fluid.
4. Disconnect radiator upper and lower hoses from radiator.

5. Remove the lower radiator shroud.
   - Release the tabs, pull lower radiator shroud rearwards and down to remove.


WBIA0407E

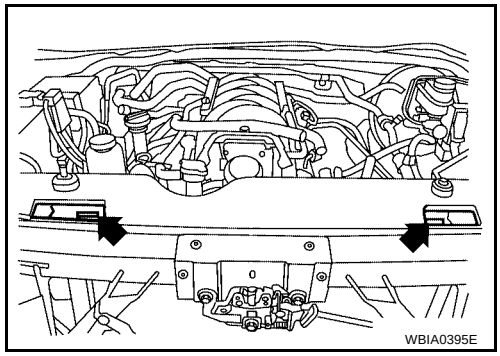
6. Remove the radiator shroud upper bolts and remove the radiator shroud upper.



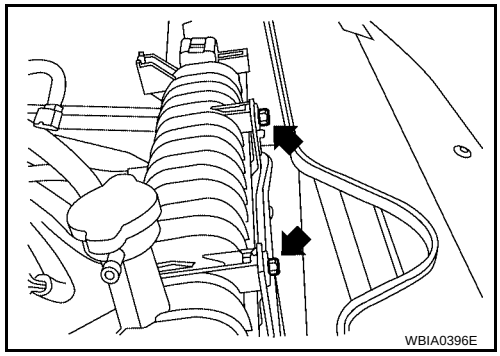
PBIC1535E

7. Remove the A/C condenser bolts and brackets.

   NOTE:
   Lift A/C condenser up and forward to remove from radiator.

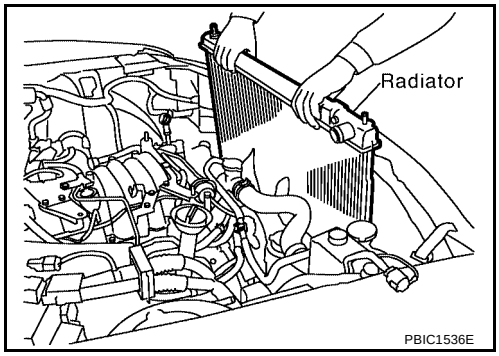

WBIA0395E

8. Remove A/T oil cooler bolts and oil cooler from radiator and position aside.


WBIA0396E

9. Lift up and remove the radiator.

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



INSTALLATION

Installation is in the reverse order of removal.

INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using tool. Refer to CO-9, "CHECKING COOLING SYSTEM FOR LEAKS" .
- Start and warm up the engine. Visually make sure that there is no leaks of the engine coolant.

Checking Reservoir Cap

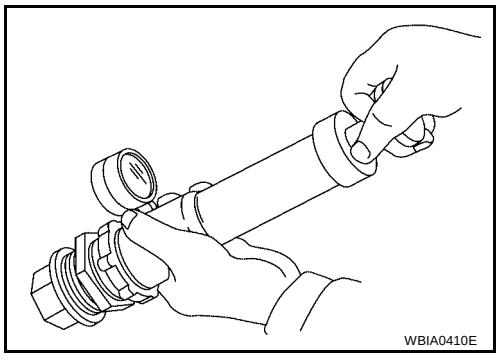
EBS00J95

1. Check reservoir cap relief pressure. Using Tool

Tool Number : EG17650301 (J-33984-A)

Standard: 95 - 125 kPa (0.97 - 1.28 kg/cm^2 , 14 - 18 psi)

- **NOTE:**
  Apply engine coolant to the cap seal.
- Replace the reservoir cap if there is any damage in the negative-pressure valve, or if the open-valve pressure is outside of the limit.



Checking Radiator

EBS00J96

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

CAUTION:

- **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.**

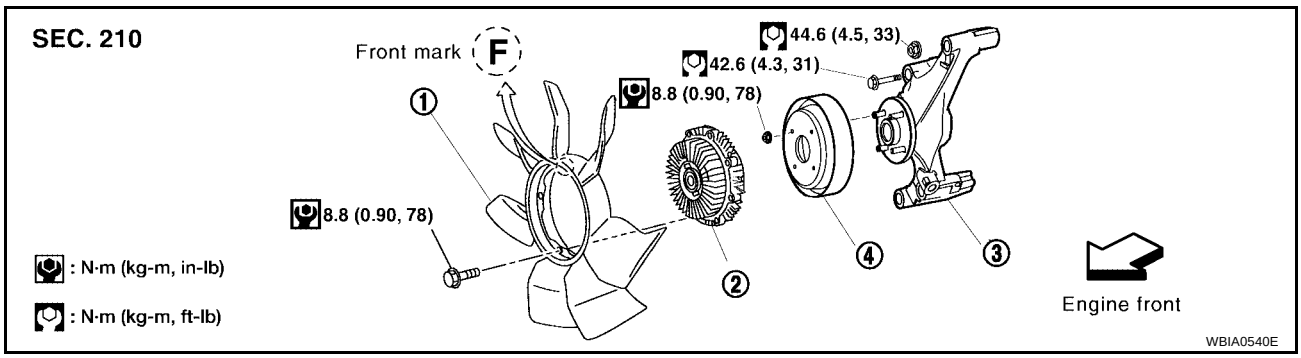
1. Apply water by hose to the back side of the radiator core vertically downward.
2. Apply water again to all radiator core surfaces once per minute.
3. Stop washing when stains no longer flow out from the radiator.
4. Blow air into the back side of radiator core vertically downward.
   - Use compressed air lower than 490 kPa (5 kg/cm^2 , 71 psi) and keep distance more than 30 cm (11.8 in).
5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

ENGINE COOLING FAN

PFP:21140

Removal and Installation (Crankshaft driven type)

EBS00J9I



1. Cooling fan
2. Fan coupling
3. Fan bracket
4. Cooling fan pulley

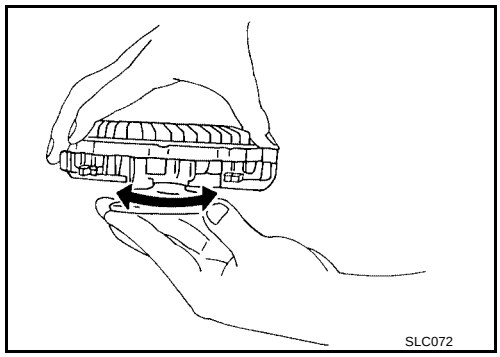
REMOVAL

1. Remove air duct. Refer to EM-14, "REMOVAL" .
2. Remove the engine front undercover.
3. Remove the radiator shroud (lower). Refer to CO-10, "REMOVAL" .
4. Remove drive belts. Refer to EM-12, "Removal" .
5. Remove cooling fan.

INSPECTION AFTER REMOVAL

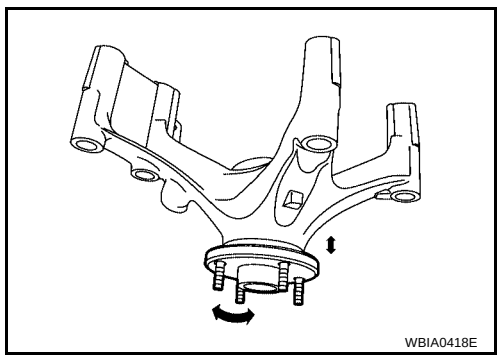
Fan Coupling

Inspect fan coupling for oil leakage and bimetal conditions.



Fan Bracket

- Visually check that there is no significant looseness in the fan bracket shaft, and that it turns smoothly by hand.
- If there are any unusual concerns, replace the water pump assembly.



INSTALLATION

Installation is in the reverse order of removal.

- Install cooling fan with its front mark “F” facing front of engine. Refer to CO-13, "Removal and Installation (Crankshaft driven type)" .

INSPECTION AFTER INSTALLATION

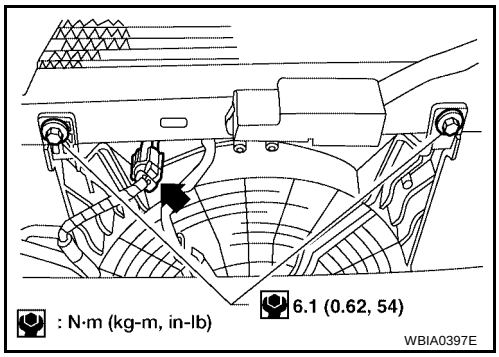
- Check for leaks of the engine coolant using tool. Refer to CO-9, "CHECKING COOLING SYSTEM FOR LEAKS" .
- Start and warm up the engine. Visually make sure that there are no leaks of the engine coolant.

Removal and Installation (Motor driven type)

EBS00J9J

REMOVAL

1. Remove front grille. Refer to EI-20, "Removal and Installation" .
2. Disconnect harness connector from fan motor.
3. Remove the three bolts and remove the fan grille and motor assembly.



INSTALLATION

Installation is in the reverse order of removal.

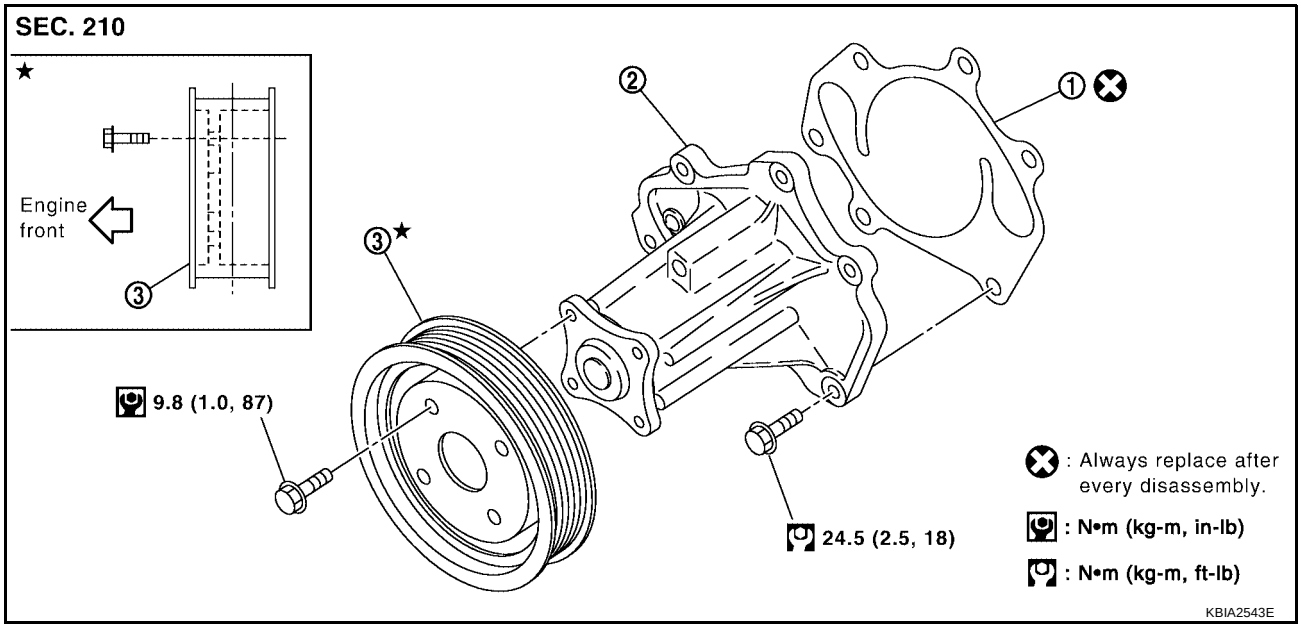
- Cooling fan is controlled by ECM. For details, refer to EC-409, "Cooling Fan Operation" .

WATER PUMP

PFP:21020

Removal and Installation

EBS00J9K



1. Gasket
2. Water pump
3. Water pump pulley

CAUTION:

- **When removing water pump, be careful not to get engine coolant on drive belt.**
- **Water pump cannot be disassembled and should be replaced as a unit.**

REMOVAL

1. Drain engine coolant so that no engine coolant comes out from water pump fitting hole. Refer to MA-12, "DRAINING ENGINE COOLANT" .

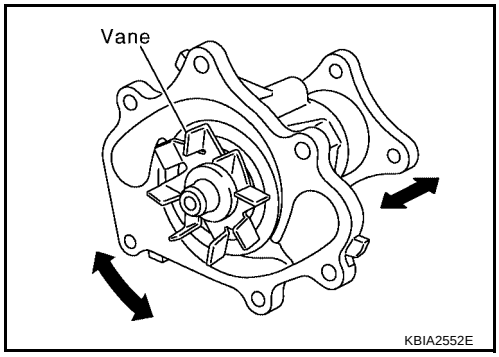
   CAUTION:
   Perform when the engine is cold.
2. Remove following parts.
   - Engine front undercover using power tool.
   - Air duct (inlet); refer to EM-14, "REMOVAL" .
   - Generator, water pump and A/C compressor belt; refer to SC-27, "REMOVAL" , CO-15, "REMOVAL" , EM-12, "Removal" .

   CAUTION:
   Leave auto tensioner pulley in its fixed position when removing drive belt.
3. Remove water pump pulley.
4. Remove water pump.
   - Engine coolant will leak from the cylinder block, so have a receptacle ready below.

   CAUTION:
   Handle water pump vane so that it does not contact any other parts.

INSPECTION AFTER REMOVAL

- Visually check that there is no significant dirt or rusting on the water pump body and vane.
- Make sure there is no looseness in the vane shaft, and that it turns smoothly when rotated by hand.
- If there are any unusual concerns, replace the water pump assembly.



INSTALLATION

Installation is in the reverse order of removal.

- For bleeding the air from the cooling system, refer to MA-13, "REFILLING ENGINE COOLANT" .

INSPECTION AFTER INSTALLATION

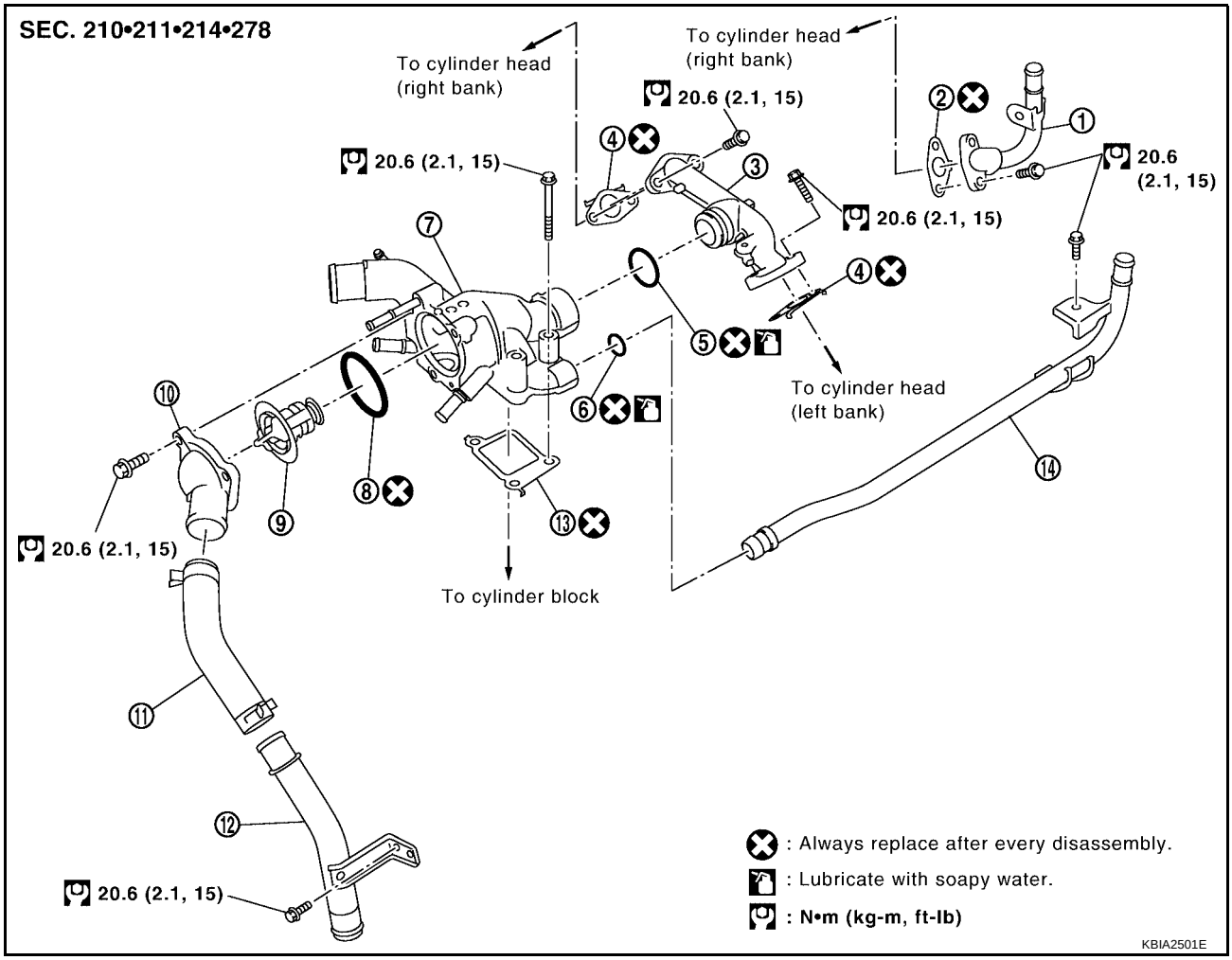
- Check for leaks of engine coolant using tool. Refer to CO-9, "CHECKING COOLING SYSTEM FOR LEAKS" .
- Start and warm up engine. Visually make sure that there are no leaks of engine coolant.

THERMOSTAT AND WATER PIPING

PFP:21200

Removal and Installation

EBS00J9M



1. Heater pipe	2. Gasket	3. Water outlet
4. Gasket	5. O-ring	6. O-ring
7. Thermostat housing	8. Rubber ring	9. Thermostat
10. Water inlet	11. Water suction hose	12. Water suction pipe
13. Gasket	14. Heater pipe	

REMOVAL

Removal of Thermostat

1. Drain engine coolant from the radiator. Refer to MA-12, "DRAINING ENGINE COOLANT" .
   CAUTION:
   Perform when engine is cold.
2. Remove air duct (inlet). Refer to EM-14, "REMOVAL" .
3. Remove engine room cover using power tools.
4. Disconnect water suction hose from water inlet.
5. Remove water inlet and thermostat.

Removal of Thermostat Housing, Water Outlet and Heater Pipe

1. Remove Intake manifold. Refer to EM-15, "REMOVAL" .
2. Remove thermostat housing, water outlet and heater pipe.

Removal of Water Cut Valve

1. Drain engine coolant from the radiator. Refer to MA-12, "DRAINING ENGINE COOLANT" .

   CAUTION:
   Perform when the engine is cold.
2. Disconnect heater hoses.
3. Disconnect water valve eletrical connector.
4. Remove the water cut valve.

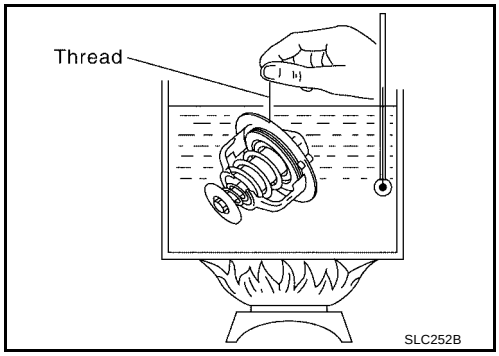
Installation of water cut valve

Installation is in the reverse order of removal.

- Check for leaks of the engine coolant using suitable tool. Refer to CO-9, "CHECKING COOLING SYSTEM FOR LEAKS" .
- Start and warm up the engine. Visually make sure that there is no leaks of the engine coolant.

INSPECTION AFTER REMOVAL

- Place a thread so that it is caught in the valve 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 falls from the thread.
- Continue heating. Check the full-open lift amount.
- After checking the full-open lift amount, lower the water temperature and check the valve closing temperature.



Standard values:

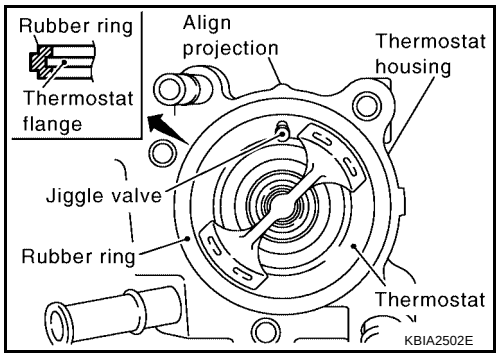
	Thermostat
Valve opening temperature	80 - 84°C (176 - 183° F)
Full-open lift amount	More than 10 mm/ 95°C (0.39 in/ 203°F)
Valve closing temperature	77°C (171°F) or lower

INSTALLATION

Installation is in the reverse order of removal.

Installation of thermostat

- Install the thermostat with the whole circumference of each flange part fit securely inside the rubber ring. (The example in the figure shows the thermostat.)



- Install the thermostat with the jiggle valve facing upwards.

Installation of water outlet pipe and heater pipe

First apply a neutral detergent to the O-rings, then quickly insert the insertion parts of the water outlet pipe and heater pipe into the installation holes.

INSPECTION AFTER INSTALLATION

- Check for leaks of the engine coolant using tool. Refer to CO-9, "CHECKING COOLING SYSTEM FOR LEAKS" .

- Start and warm up the engine. Visually make sure that there is no leaks of the engine coolant.

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Standard and Limit

EBS00J9B

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (US gal, Imp gal)

Engine coolant capacity with reservoir (“MAX” level)	12.2 (3 1/4, 2 5/8)

THERMOSTAT

Valve opening temperature	80° - 84°C (176° - 183°F)
Maximum valve lift	More than 10 mm at 95°C (0.39 in at 203°F)
Valve closing temperature	77°C (171°F) or lower

RADIATOR

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

Reservoir cap relief pressure	Standard	95 - 125 (0.97- 1.28, 14 - 18)
Leakage test pressure		137 (1.4, 20)