SECTION CO
ENGINE COOLING SYSTEM

CONTENTS

VQ

YD

PRECAUTIONS

PFP:00001

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

GBS001UY

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the 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

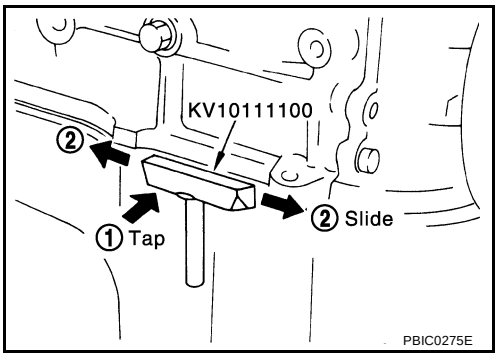
GBS000F4

REMOVAL OF LIQUID GASKET SEALING

- After removing mounting nuts and bolts, separate the mating surface using seal cutter [SST] and remove old liquid gasket sealing.

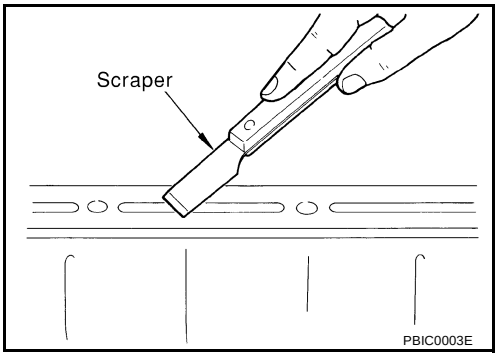
  CAUTION:
  Be careful not to damage the mating surfaces.
- Tap seal cutter to insert it, and then slide it by tapping on the side as shown in the figure.
- In areas where seal cutter [SST] is difficult to use, use plastic hammer to lightly tap the parts, to remove it.

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

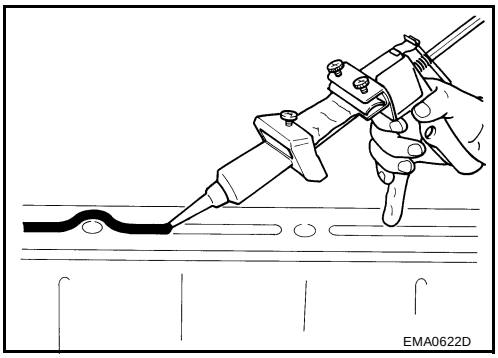


LIQUID GASKET APPLICATION PROCEDURE

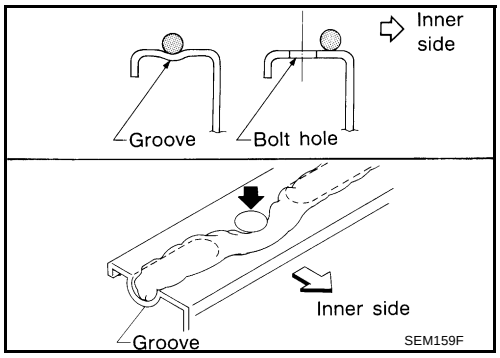
1. Using scraper, remove old liquid gasket adhering to the liquid gasket application surface and the mating surface.
   - Remove liquid gasket completely from the groove of the liquid gasket application surface, mounting bolts, and bolt holes.
2. Wipe the liquid gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.



3. Attach liquid gasket tube to tube presser [SST: WS39930000].
   Use Genuine Liquid Gasket or equivalent.
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 mounting bolts or nuts after the installation.
- After 30 minutes or more have passed from the installation, fill engine oil and engine coolant.



CAUTION:

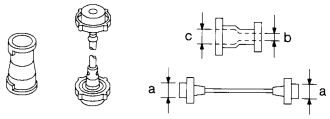
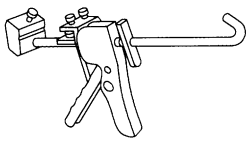
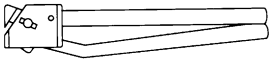
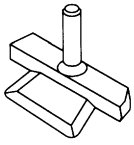
If there are specific instructions in this manual, observe them.

PREPARATION

PFP:00002

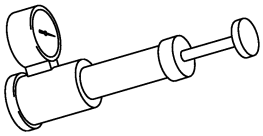
Special Service Tools

GBS000EO

Tool number Tool name	Description
EG17650301 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)
WS39930000 Tube presser  S-NT052	Pressing the tube of liquid gasket
KV99103510 Radiator plate pliers A  S-NT224	Installing radiator upper and lower tanks
KV99103520 Radiator plate pliers B  S-NT225	Removing radiator upper and lower tanks
KV10111100 Seal cutter  NT046	Removing chain tensioner cover and water pump cover

Commercial Service Tools

GBS000EP

Tool name	Description
Radiator cap tester  PBIC1982E	Checking radiator and radiator cap

OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

GBS000EQ

	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	Refer to EC-351, "DTC P1217 ENGINE OVER TEMPERATURE" (models for Australia) or EC-789, "DTC P1217 ENGINE OVER TEMPERATURE" (models except for Australia)	—
		High resistance to fan rotation	Fan assembly	
		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

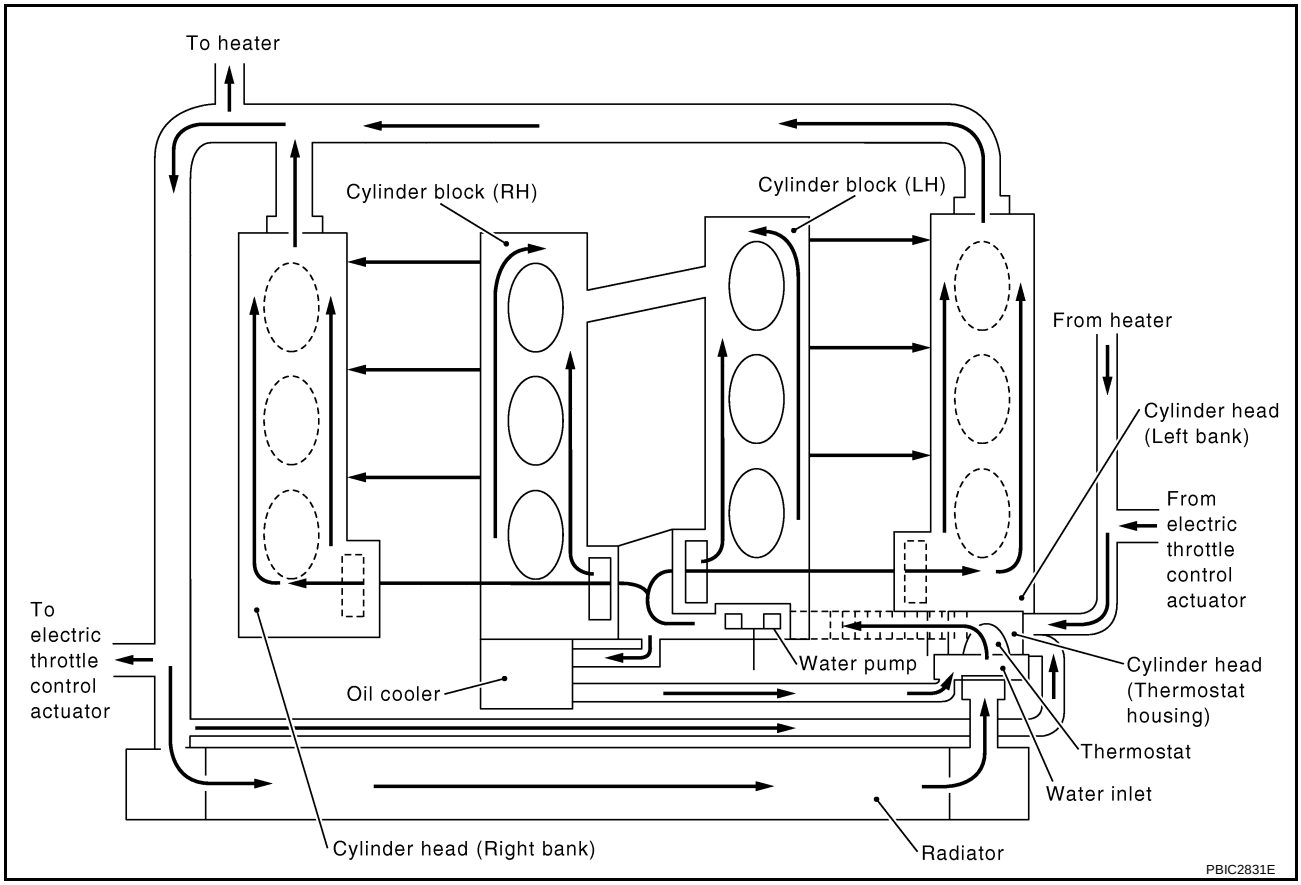
	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes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

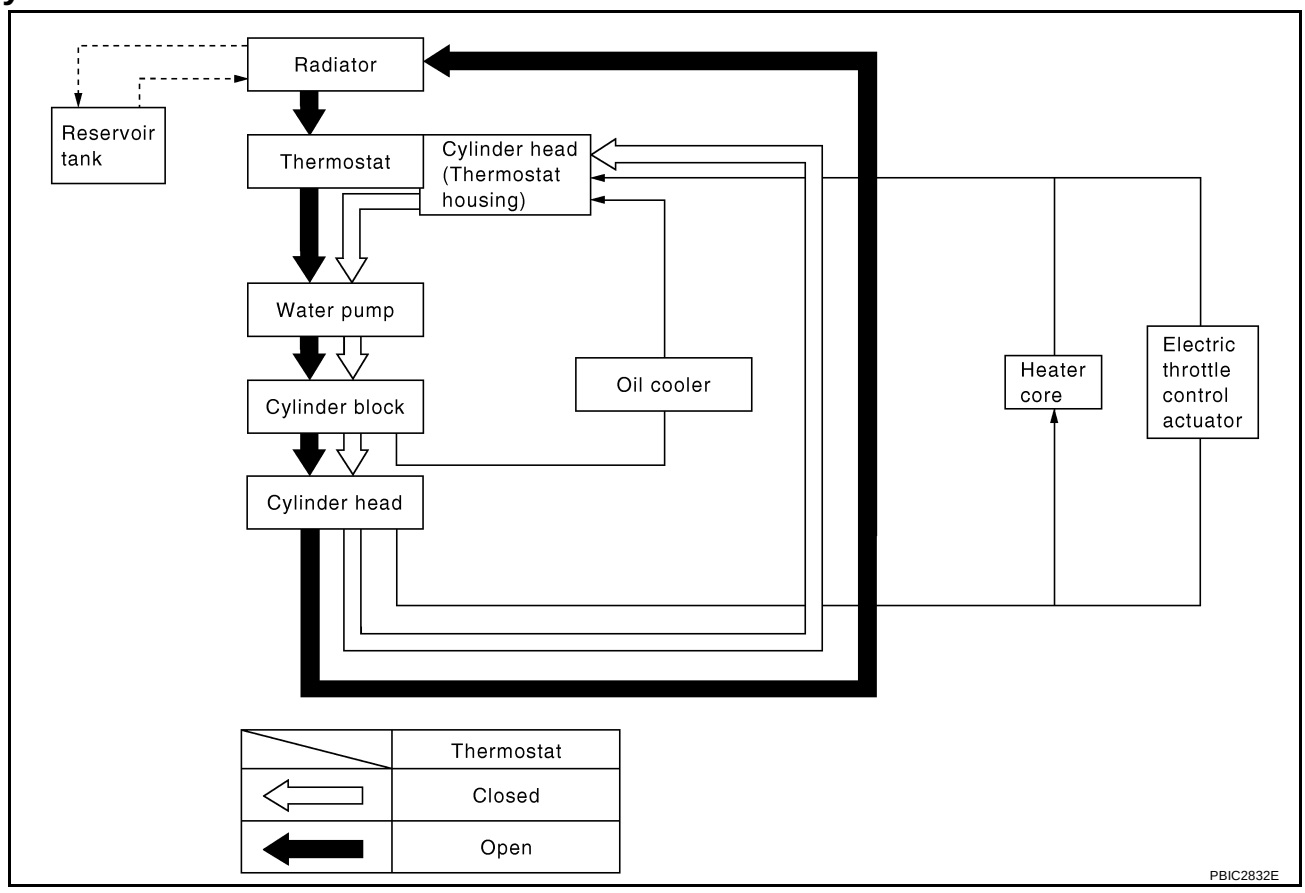
Cooling Circuit

GBS000F5



System Chart

GBS000F6



ENGINE COOLANT

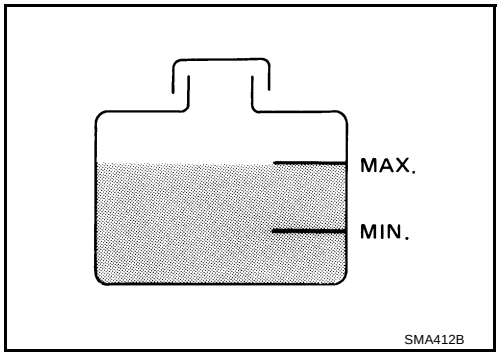
PFP:KQ100

Inspection

GBS000ER

LEVEL CHECK

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



CHECKING RADIATOR SYSTEM FOR LEAKS

- To check for leaks of cooling system, apply pressure to the reservoir tank (1) with the radiator cap tester (commercial service tool) (A) and the radiator cap tester adapter (B) [SST: EG17650301].

  Testing pressure

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

  WARNING:

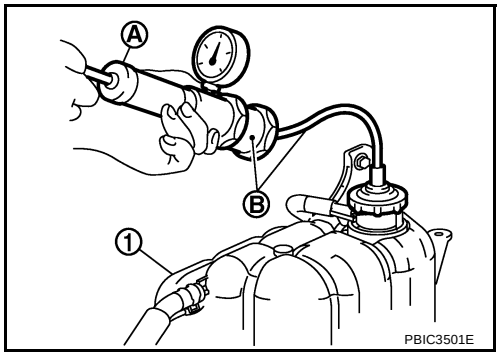
  Do not remove reservoir tank and/or radiator cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from reservoir tank and/or radiator.

  CAUTION:

  Higher testing pressure than specified may cause cooling system damage.

  NOTE:

  In a case engine coolant decreases, replenish radiator and reservoir tank with engine coolant.



- If anything is found, repair or replace damaged parts.

Changing Engine Coolant

GBS000ES

WARNING:

- **To avoid being scalded, do not change engine coolant when engine is hot.**
- **Wrap a thick cloth around cap and carefully remove cap. First, turn cap a quarter of a turn to release built-up pressure. Then turn cap all the way.**
- **Be careful not to allow engine coolant to contact drive belts.**

DRAINING ENGINE COOLANT

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

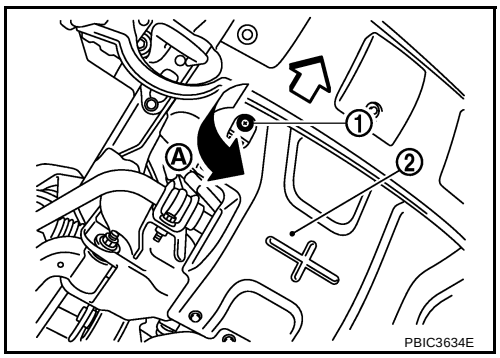
   2 : Engine under cover (front)

   A : Loosen.

   ⇦ : Vehicle front

   CAUTION:

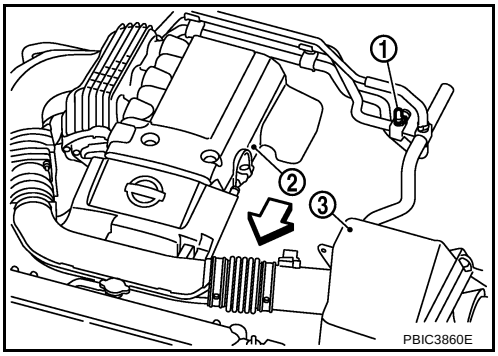
   Be careful not to allow engine coolant to contact drive belts.



When drain all of engine coolant in the system, also performing the following steps.

2. Remove air relief plug (1) on heater feed tube.

2 : Engine cover
3 : Air cleaner case
⇦ : Vehicle front



3. Open cylinder block drain plug. Refer to EM-107, "CYLINDER BLOCK" .
4. Remove reservoir tank, drain engine coolant, then clean reservoir tank.
5. Check drained engine coolant for contaminants such as rust, corrosion or discoloration.
   If contaminated, flush the engine cooling system. Refer to CO-12, "FLUSHING COOLING SYSTEM" .

REFILLING ENGINE COOLANT

1. Install reservoir tank, and radiator drain plug.

CAUTION:
Be sure to clean radiator drain plug and install with new O-ring.

Radiator drain plug:

: 1.2 N·m (0.12 kg-m, 11 in-lb)

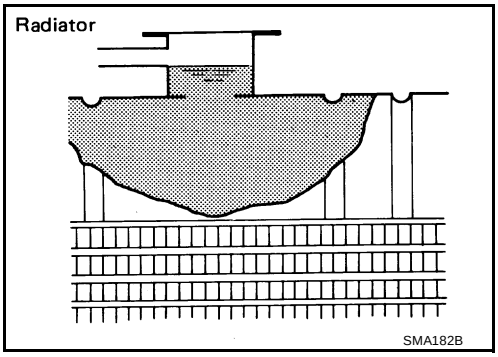
- **If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-107, "CYLINDER BLOCK" .**

2. Make sure that each hose clamp has been firmly tightened.
3. Fill radiator and reservoir tank to the specified level.

- **Pour engine coolant through engine coolant filler neck slowly of less than 2 ℓ (1-3/4 lmp qt) a minute to allow air in system to escape.**
- **Use Genuine Nissan Antifreeze Coolant or equivalent mixed with water (distilled or demineralized). Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS".**

Engine coolant capacity
(with reservoir tank at “MAX” level)

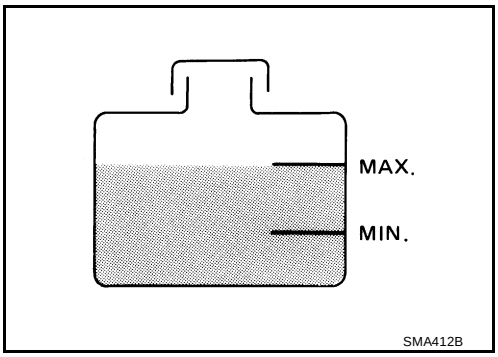
: Approx. 10.3 ℓ (9-1/8 lmp qt)



Reservoir tank capacity (at “MAX” level)

: 0.8 ℓ (3/4 lmp qt)

- When engine coolant overflows air relief hole, install air relief plug.



4. Warm up engine to normal operating temperature without radiator cap and reservoir tank cap installed.
   - **If engine coolant overflows radiator filler hole and reservoir tank filler hole, install radiator cap and reservoir tank cap.**
5. Run engine at 3,000 rpm for 10 seconds and return to idle speed with radiator cap installed.
   - Repeat two or three times.

CAUTION:
Watch engine coolant temperature gauge so as not to overheat engine.

6. Stop engine and cool down to less than approximately 50°C (122°F).
   - Cool down using fan to reduce the time.
   - If necessary, refill radiator up to filler neck with engine coolant.
7. Refill reservoir tank to MAX level line with engine coolant.
8. Repeat steps 3 through 6 two or more times with radiator cap installed until engine coolant level no longer drops.
9. Check cooling system for leaks with engine running.
10. Warm up engine, and check for sound of engine coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between COOL and WARM.
    - Sound may be noticeable at heater unit.
11. Repeat step 10 three times.
12. If sound is heard, bleed air from cooling system by repeating step 3 through 6 until engine coolant level no longer drops.

FLUSHING COOLING SYSTEM

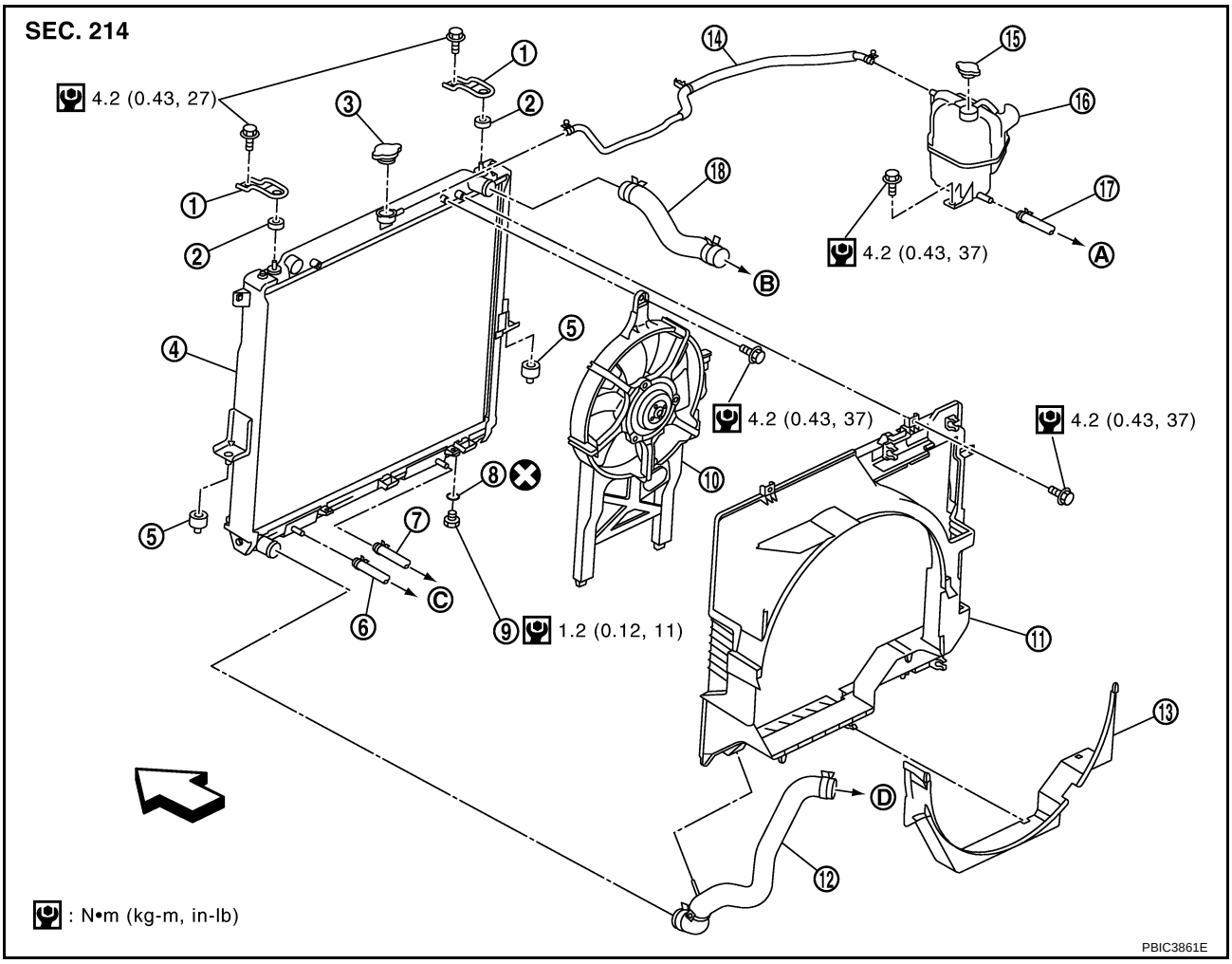
1. Fill radiator with water until water spills from the air relief hole, then close air relief plug. Fill radiator and reservoir tank with water and reinstall radiator cap and reservoir tank cap.
2. Run engine and warm it up to normal operating temperature.
3. Rev engine two or three times under no-load.
4. Stop engine and wait until it cools down.
5. Drain water from the system. Refer to CO-10, "DRAINING ENGINE COOLANT" .
6. Repeat steps 1 through 5 until clear water begins to drain from radiator.

RADIATOR

PFP:21400

Components

GBS000ET



1. Radiator mounting bracket	2. Mounting rubber (upper)	3. Radiator cap
4. Radiator	5. Mounting rubber (lower)	6. A/T fluid cooler hose (A/T models)
7. A/T fluid cooler hose (A/T models)	8. O-ring	9. Drain plug
10. Cooling fan assembly	11. Radiator shroud (upper)	12. Radiator hose (lower)
13. Radiator shroud (lower)	14. Reservoir tank hose	15. Reservoir tank cap
16. Reservoir tank	17. Water hose	18. Radiator hose (upper)
A. To heater return tube	B. To water pipe	C. To A/T fluid cooler tube (A/T models)
D. To water inlet and thermostat assembly	⇦ Vehicle front	

- Refer to GI-10, "Components" for symbol marks except in the above.

Removal and Installation

GBS000EU

WARNING:

Do not remove radiator cap and/or reservoir tank cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from radiator and/or reservoir tank.

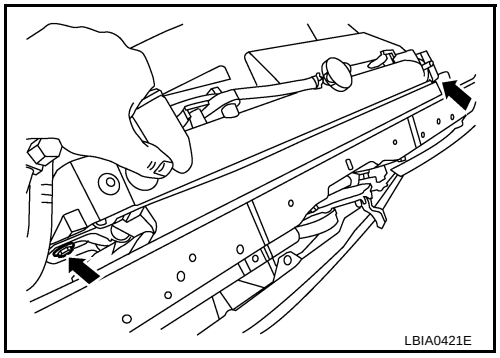
REMOVAL

1. Drain engine coolant from radiator. Refer to CO-10, "Changing Engine Coolant" .

   CAUTION:
   - **Perform this step when engine is cold.**
   - **Do not spill engine coolant on drive belts.**
2. Remove battery. Refer to SC-5, "BATTERY" .

3. Remove engine cover. Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .
4. Remove air duct and air cleaner case assembly. Refer to EM-17, "AIR CLEANER AND AIR DUCT" .
5. Disconnect radiator hose (upper and lower) and reservoir tank hose.

   CAUTION:
   Be careful not to allow engine coolant to contact drive belts.
6. Remove reservoir tank.
7. Remove cooling fans (crankshaft driven type and motor driven type) and radiator shrouds (upper and lower). Refer to CO-21, "COOLING FAN" .
8. Disconnect A/T fluid cooler hoses (A/T models).
   - Install blind plug to avoid leakage of A/T fluid.
9. Remove radiator mounting brackets.
10. Remove the two A/C condenser bolts. (models with A/C)



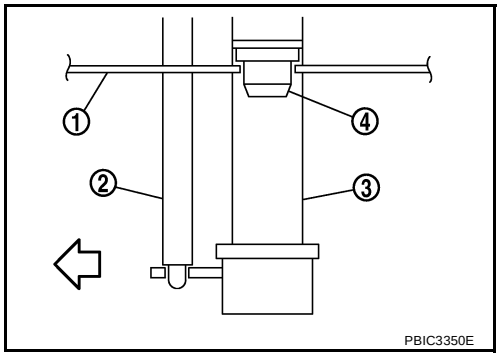
11. Remove radiator as follows:

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

a. With lifting and pulling radiator (3) in a rear direction, remove radiator lower mount (4) from radiator core support (1).

   ⇦ : Vehicle front

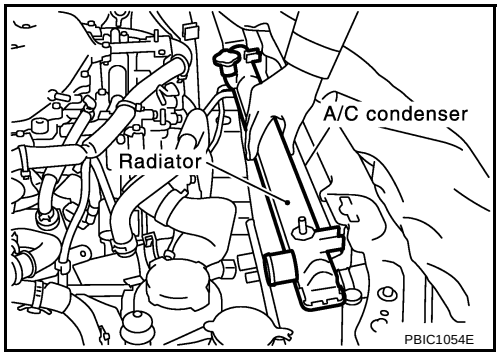
   CAUTION:
   Because A/C condenser (2) is onto the front-lower portion of radiator (3), moving to rear direction should be at minimum.



b. Lift A/C condenser up and remove radiator.

   CAUTION:
   Lifting A/C condenser should be minimum to prevent a load to A/C piping.

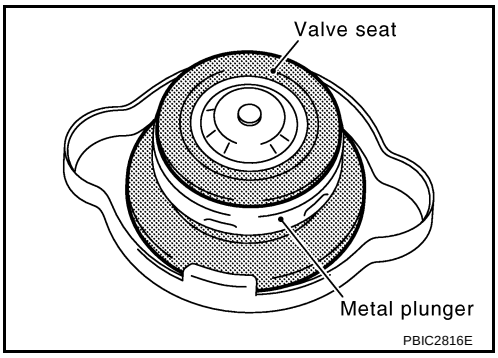
c. After removing radiator, temporarily secure it with rope or similar means to prevent a load to A/C piping.



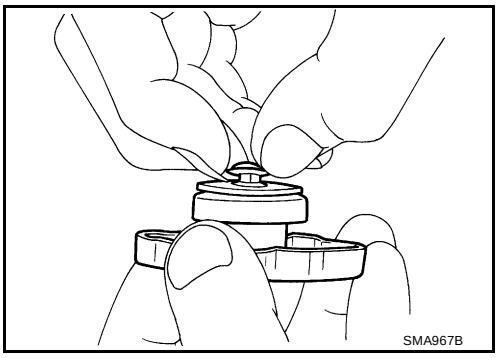
INSPECTION AFTER REMOVAL

Checking Reservoir Tank Cap

- Inspect valve seat of reservoir tank cap.
  - Check if valve seat is swollen to the extent that the edge of the plunger cannot be seen when watching it vertically from the top.
  - Check if valve seat has no soil and damage.



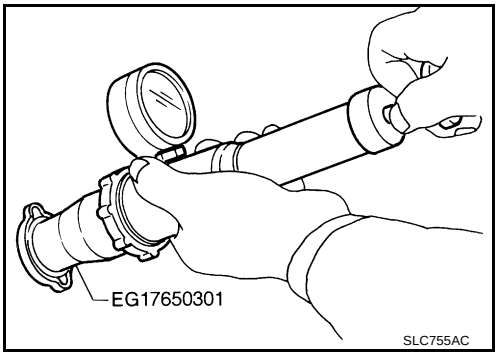
- Pull negative-pressure valve to open it, and make sure that it is completely closed when released.
  - Make sure that there is no dirt or damage on the valve seat of radiator cap negative-pressure valve.
  - Make sure that there are no unusualness in the opening and closing conditions of negative-pressure valve.



- Check reservoir tank cap relief pressure.

  Standard : 98.2 - 117.8 kPa (0.98 - 1.18 bar, 1.0 - 1.2 kg/cm^2 , 14 - 17 psi)

  Limit : 59 kPa (0.59 bar, 0.6 kg/cm^2 , 9 psi)
  - When connecting reservoir tank cap to the radiator cap tester adapter (SST) and the radiator cap tester (Commercial service tool), apply engine coolant to the cap seal surface.



- Replace reservoir tank cap if there is an unusualness.

CAUTION:
When installing a radiator cap and reservoir tank cap, thoroughly wipe out the radiator and reservoir tank filler neck to remove any waxy residue or foreign material.

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

1. Apply water by hose to the back side of the radiator core vertically downwards.
2. Apply water again to all radiator core surface 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 vertically downwards.
   - Use compressed air lower than 490 kPa (4.9 bar, 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 surface once per minute until no water sprays out.

INSTALLATION

Installation is the reverse order of removal.

INSPECTION AFTER INSTALLATION

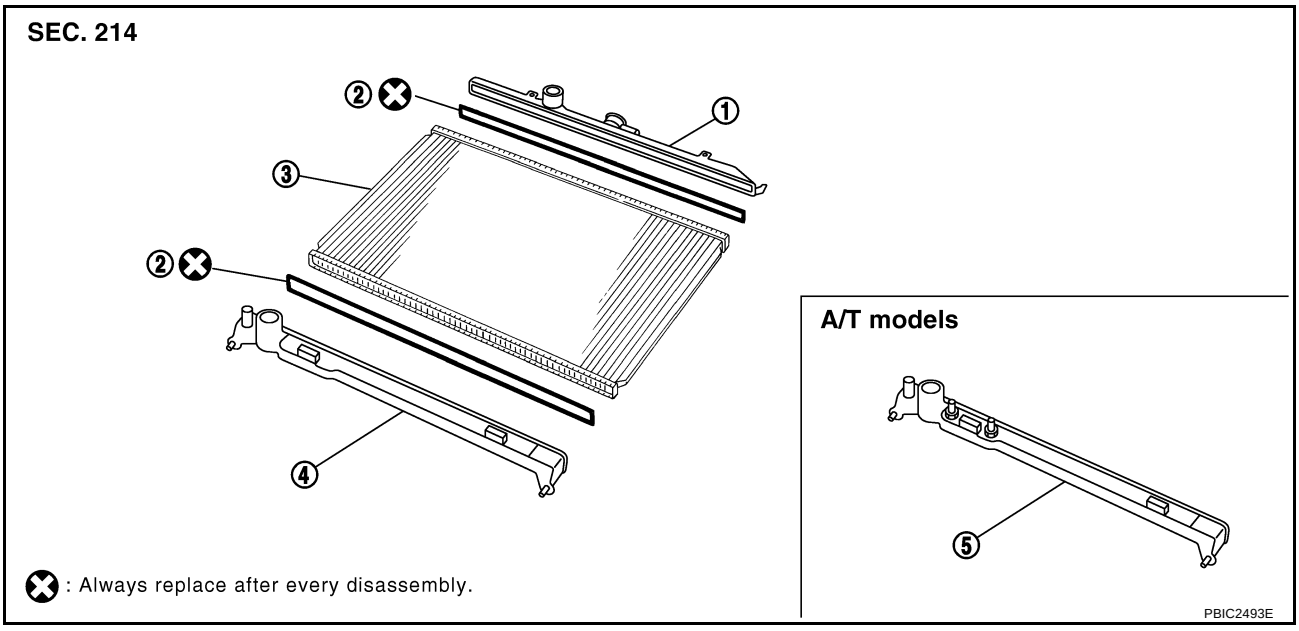
- Check for leaks of engine coolant using the radiator cap tester adapter [SST: EG17650301] and the radiator cap tester (commercial service tool). Refer to CO-10, "CHECKING RADIATOR SYSTEM FOR LEAKS".
- Start and warm up engine. Visually check if there is no leaks of engine coolant.

RADIATOR (ALUMINUM TYPE)

PFP:21460

Components

GBS000EV



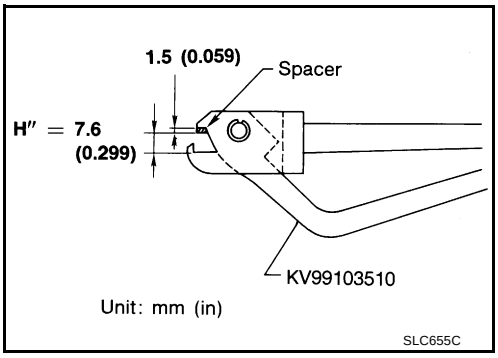
1. Upper tank
2. Sealing rubber
3. Core
4. Lower tank
5. Lower tank (with A/T fluid cooler)

Disassembly and Assembly

GBS000EW

PREPARATION

1. Attach the spacer to the tip of the radiator plate pliers A [SST]. Spacer specification: 18 mm (0.71 in) wide × 8.5 mm (0.335 in) long × 1.5 mm (0.059 in) thick.
2. Make sure that when radiator plate pliers A [SST] are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer, if necessary.



DISASSEMBLY

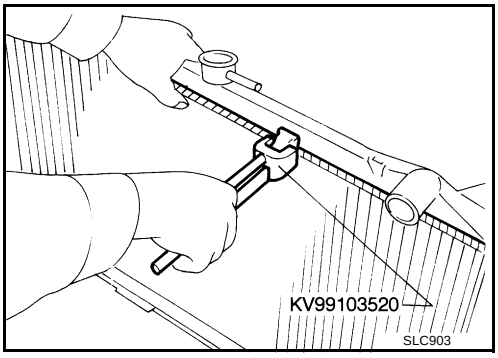
1. Remove upper and lower tanks with radiator plate pliers B [SST].

CAUTION:

Do not disassemble lower tank and A/T fluid cooler. (A/T models)

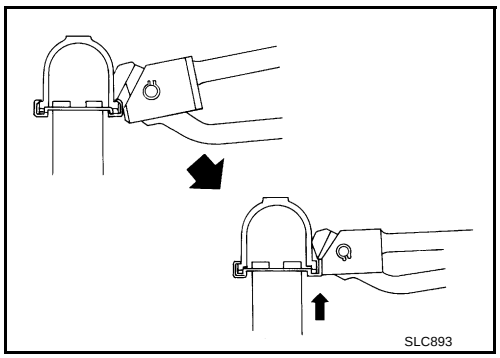
NOTE:

Regard lower tank and A/T fluid cooler as an assembly.



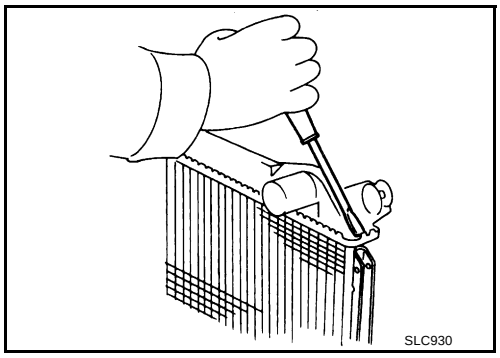
- Grip the crimped edge and bend it upwards so that radiator plate pliers B slips off.

  CAUTION:
  Do not bend excessively.

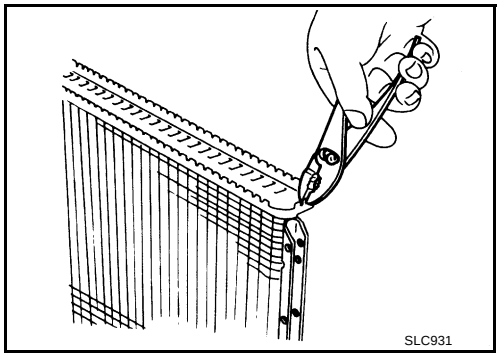


- In areas where radiator plate pliers B cannot be used, use a screwdriver to bend the edge up.

  CAUTION:
  Be careful not to damage tank.

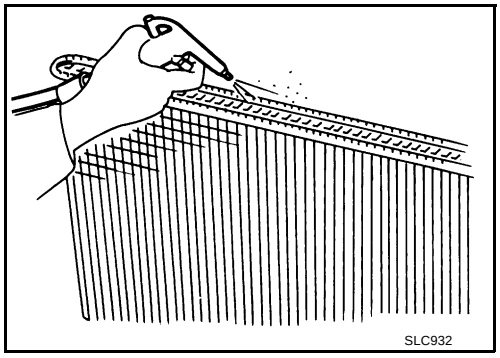


2. Remove sealing rubber.
3. Make sure the edge stands straight up.



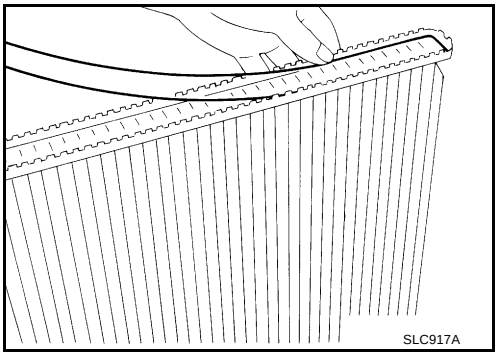
ASSEMBLY

1. Clean contact portion of tank.

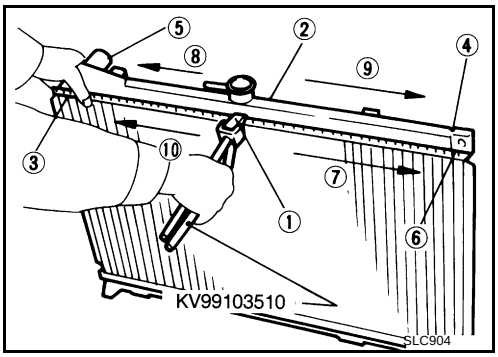


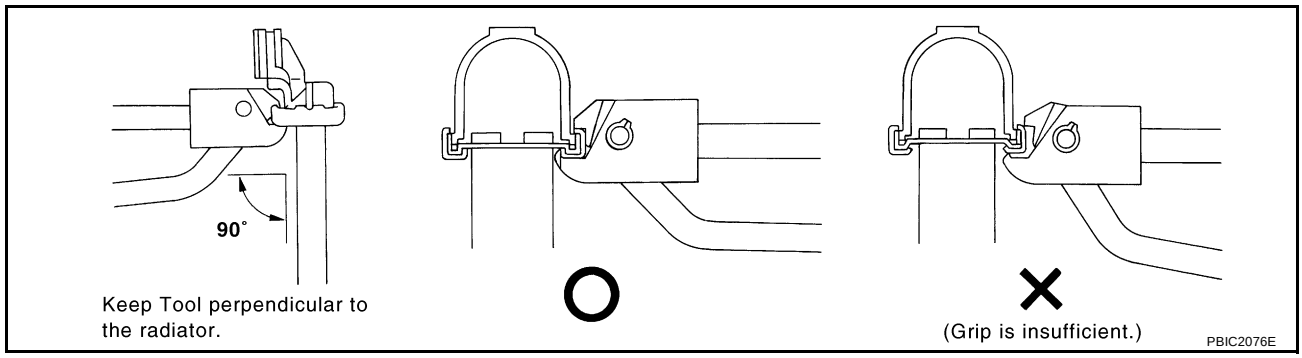
2. Install sealing rubber while pushing it with fingers.

CAUTION:
Be careful not to twist sealing rubber.

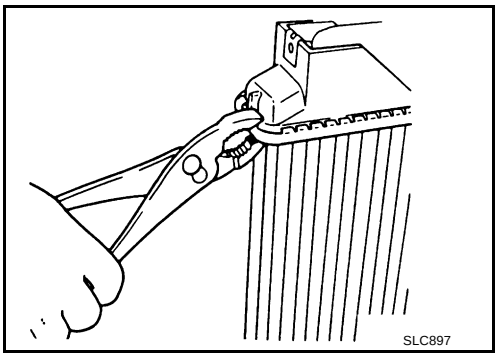


3. Caulk tank in numerical order as shown in the figure with radiator plate pliers A [SST].



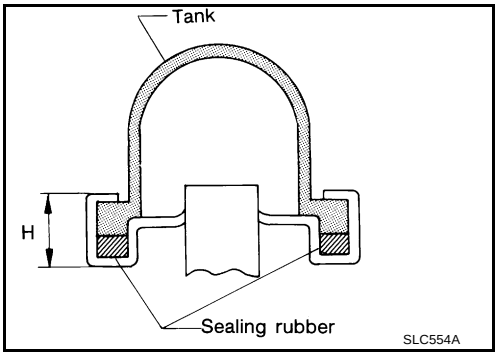


- Use pliers in the locations where radiator plate pliers A cannot be used.



4. Make sure that the rim is completely crimped down.

Standard height "H" : 8.0 - 8.4 mm (0.315 - 0.331 in)



5. Make sure that there is no leakage.
Refer to CO-20, "INSPECTION" .

INSPECTION

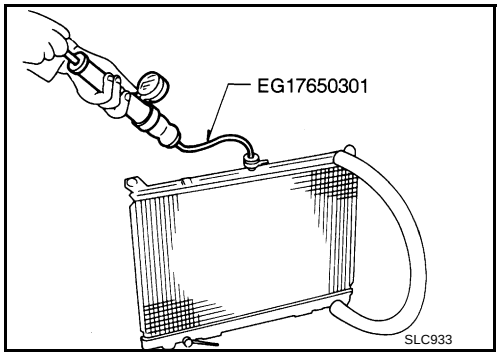
1. Apply pressure with the radiator cap tester adapter [SST] and the radiator cap tester (commercial service tool).

Testing pressure

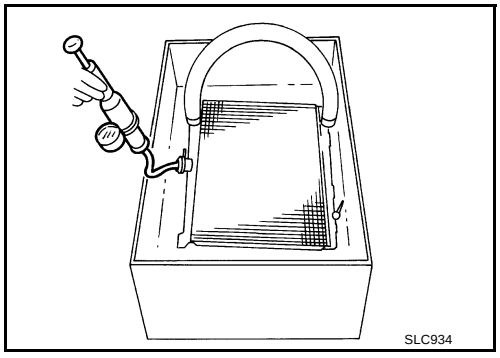
: 157 kPa (1.6 kg/cm^2 , 23 psi)

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

CAUTION:
Attach hose to A/T fluid cooler to seal its inlet and outlet (A/T models).



2. Check for leakage by soaking radiator in water container with the testing pressure applied.

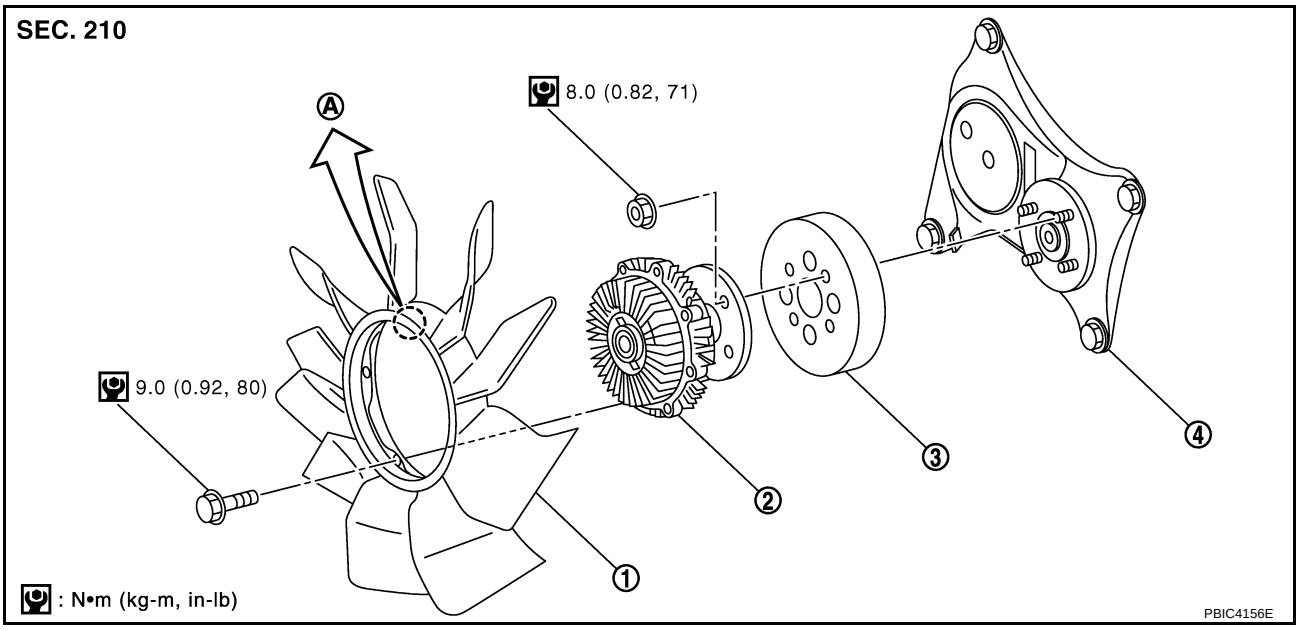


COOLING FAN

PFP:21140

Components (Crankshaft Driven Type)

GBS000EX



1. Cooling fan
2. Fan coupling
3. Cooling fan pulley
4. Fan bracket
A. Front mark “FRONT”

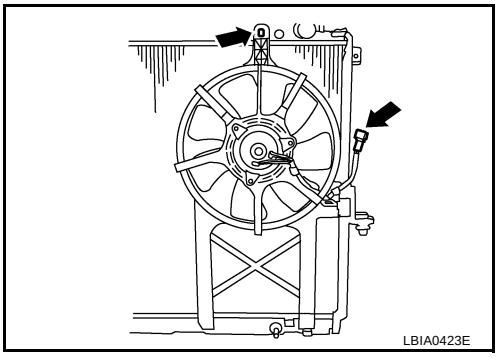
Removal and Installation (Crankshaft Driven Type)

GBS000EY

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-10, "Changing Engine Coolant" .

   CAUTION:
   - **Perform this step when engine is cold.**
   - **Do not spill engine coolant on drive belts.**
2. Remove air cleaner case and air duct. Refer to EM-17, "AIR CLEANER AND AIR DUCT" .
3. Remove front engine undercover. Refer to EI-15, "FRONT BUMPER" .
4. Disconnect harness connector from fan motor, and move it aside.
5. Disconnect radiator hose (upper) at radiator side. Refer to CO-13, "RADIATOR" .
6. Remove radiator shrouds (upper and lower) and cooling fan (motor driven type). Refer to CO-13, "RADIATOR" .

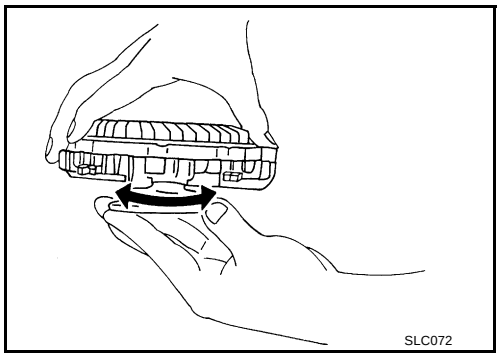


7. Remove drive belt. Refer to EM-14, "DRIVE BELTS" .
8. Remove cooling fan (crankshaft driven type), fan coupling, cooling fan pulley, and fan bracket. Refer to EM-53, "TIMING CHAIN" .

INSPECTION AFTER REMOVAL

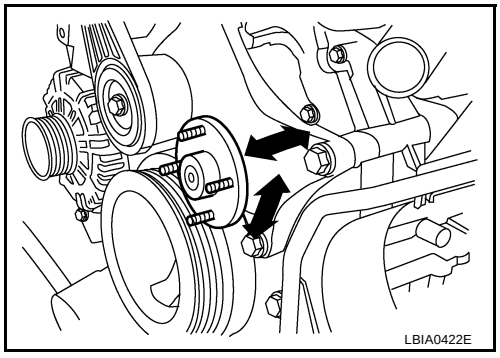
Fan Coupling

Check fan coupling for rough operation, wobbling, oil leakage or bent bimetal.



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 fan bracket.



INSTALLATION

Install in the reverse order of removal.

- If stud bolts were removed, install them and tighten to the specified torque below.

: **7.0 N·m, (0.71 kg-m, 62 in-lb)**

- Install cooling fan with its front mark “FRONT” facing front of engine.

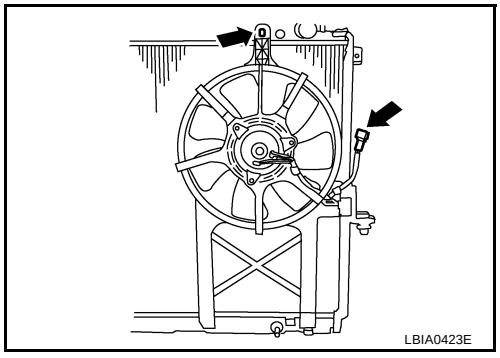
Removal and Installation (Motor Driven Type)

GBS000EZ

REMOVAL

1. Remove radiator shrouds (upper and lower). Refer to CO-13, "RADIATOR" .
2. Disconnect harness connector from fan motor.
3. Loosen mounting bolt and remove cooling fan assembly.

CAUTION:
Be careful not to damage or scratch on radiator core.



INSTALLATION

Installation is the reverse order of removal.

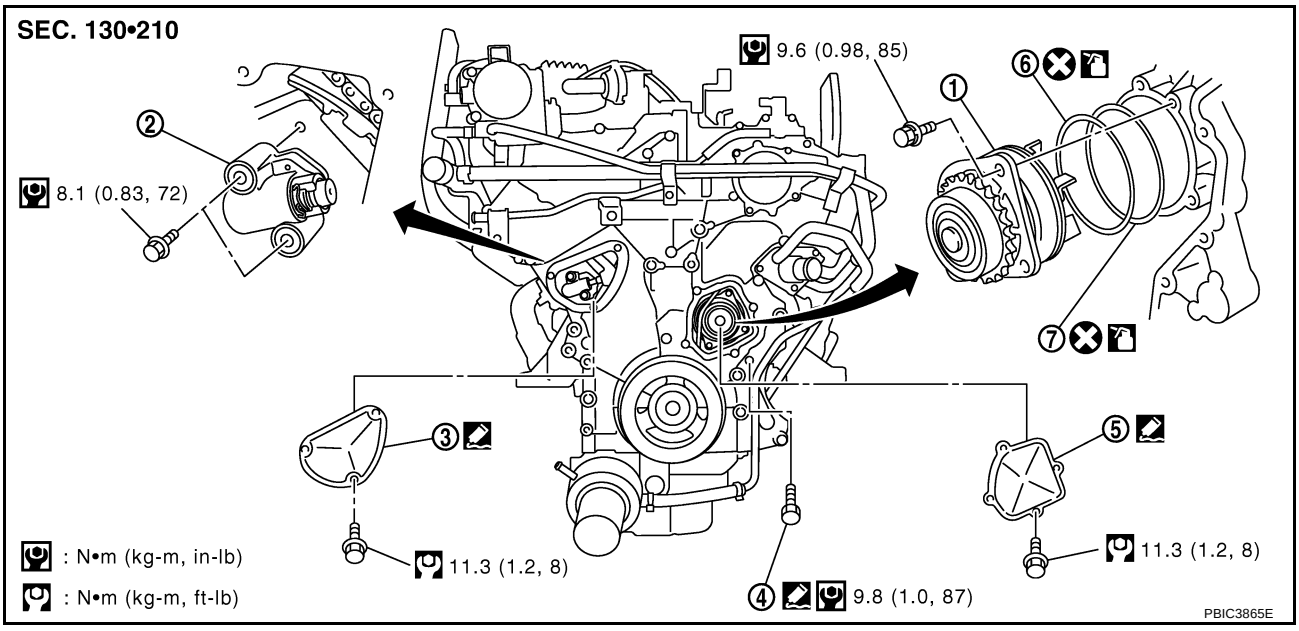
- Cooling fans are controlled by ECM. For details, refer to EC-351, "DTC P1217 ENGINE OVER TEMPERATURE" (models for Australia) or EC-789, "DTC P1217 ENGINE OVER TEMPERATURE" (models except for Australia).

WATER PUMP

PFP:21020

Components

GBS000F7



1. Water pump
2. Timing chain tensioner (primary)
3. Chain tensioner cover
4. Water drain plug (front)
5. Water pump cover
6. O-ring
7. O-ring

- Refer to GI-10, "Components" for symbol marks in the figure.

Removal and Installation

GBS000F8

WARNING:

Do not remove radiator cap and/or reservoir tank cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator and/or the reservoir tank.

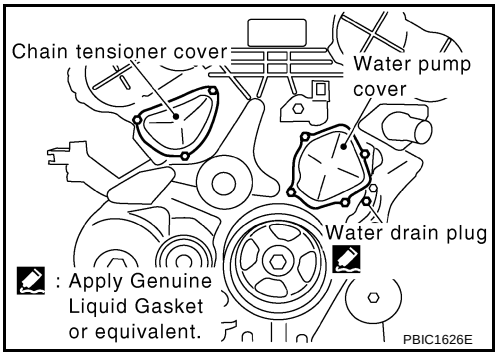
CAUTION:

- **When removing water pump assembly, be careful not to get engine coolant on drive belts.**
- **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 (commercial service tool) and radiator cap tester adapter [SST: EG17650301].**

REMOVAL

1. Remove front engine undercover. Refer to EI-15, "FRONT BUMPER" .
2. Remove drive belts. Refer to EM-14, "DRIVE BELTS" .
3. Drain engine coolant from radiator. Refer to CO-10, "Changing Engine Coolant" .

   CAUTION:
   - **Perform this step when engine is cold.**
   - **Do not spill engine coolant on drive belts.**
4. Remove radiator hoses (upper and lower) and cooling fan assembly. Refer to CO-21, "COOLING FAN" .
5. Remove water drain plug (front) on water pump side of cylinder block to drain engine coolant from engine inside.
6. Remove chain tensioner cover and water pump cover from front timing chain case.
   - Use seal cutter [SST: KV10111100] to cut liquid gasket for removal.

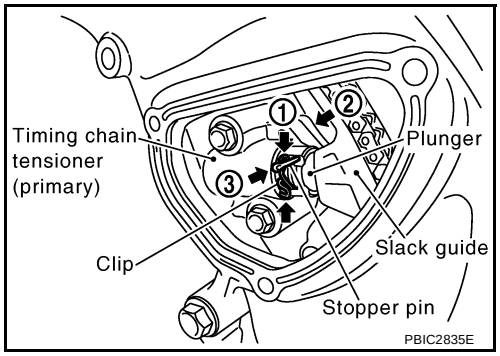


7. Remove timing chain tensioner (primary) as follows:

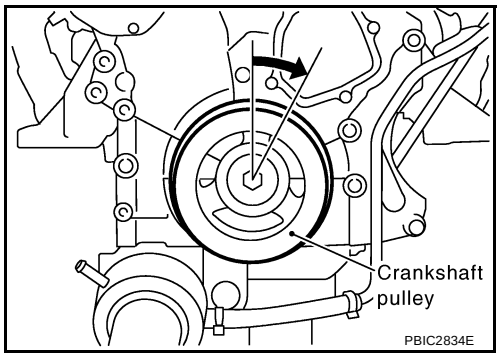
a. Loosen clip of timing chain tensioner (primary), and release plunger stopper. (1)

b. Insert plunger into tensioner body by pressing slack guide. (2)

c. Keep slack guide pressed and hold plunger in by pushing stopper pin through the tensioner body hole and plunger groove. (3)



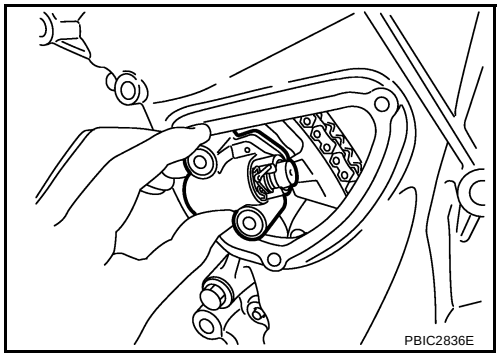
d. Turn crankshaft pulley clockwise so that timing chain on the timing chain tensioner (primary) side is loose.



e. Remove mounting bolts and remove timing chain tensioner (primary).

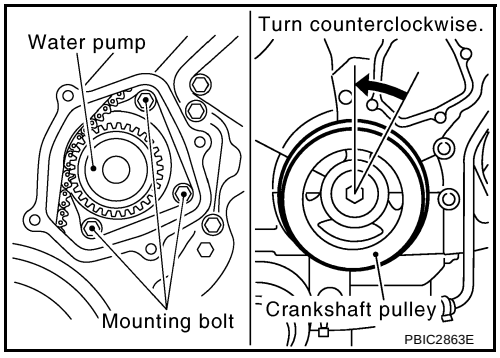
CAUTION:

Be careful not to drop mounting bolts inside timing chain case.

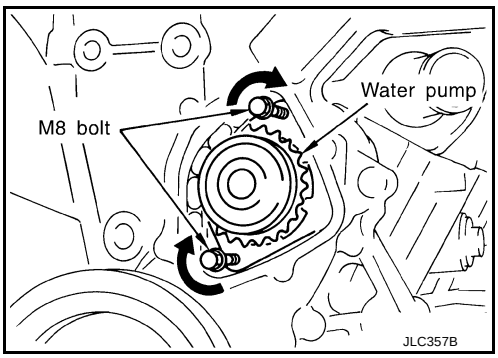


8. Remove water pump as follows:

a. Remove three water pump mounting bolts. Secure a gap between water pump gear and timing chain, by turning crankshaft pulley counterclockwise until timing chain looseness on water pump sprocket becomes maximum.



b. Screw M8 bolts [pitch: 1.25 mm (0.049 in) length: approx. 50 mm (1.97 in)] into water pumps upper and lower mounting bolt holes until they reach timing chain case. Then, alternately tighten each bolt for a half turn, and pull out water pump.



CAUTION:

- **Pull straight out while preventing vane from contacting socket in installation area.**
- **Remove water pump without causing sprocket to contact timing chain.**

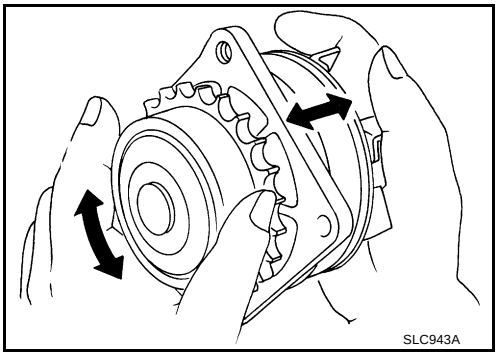
c. Remove M8 bolts and O-rings from water pump.

CAUTION:

- **Handle the water pump vane so that it does not contact any other parts.**
- **Water pump cannot be disassembled and should be replaced as a unit.**

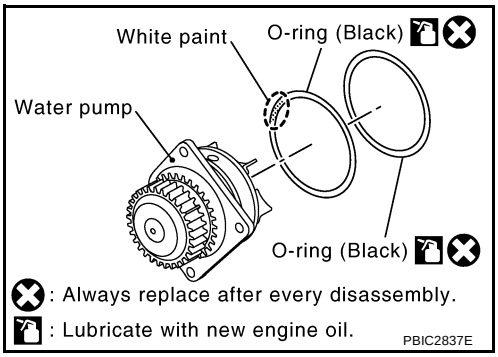
INSPECTION AFTER REMOVAL

- Check for badly rusted or corroded water pump body assembly.
- Check for rough operation due to excessive end play.
- If there are any unusualness, replace water pump assembly as necessary.



INSTALLATION

1. Install new O-rings to water pump.
   - Apply engine oil to O-rings.
   - Locate O-ring with white paint mark to engine front side.

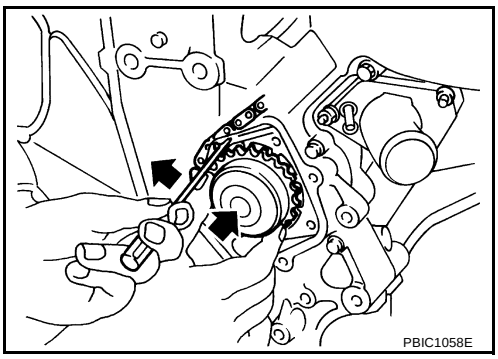


2. Install water pump.

CAUTION:

Do not allow timing chain case to nip O-rings when install water pump.

- Make sure that timing chain and water pump sprocket are engaged.
- Insert water pump by tightening mounting bolts alternately and evenly.



3. Install timing chain tensioner (primary) as follows:

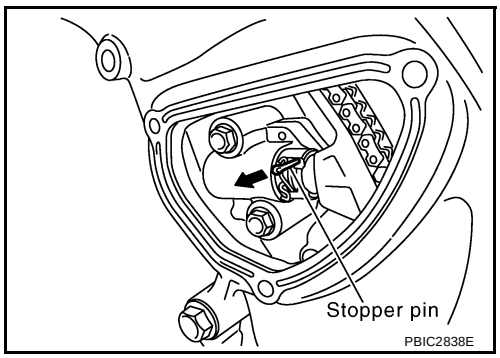
a. Remove dust and foreign material completely from backside of timing chain tensioner (primary) and from installation area of rear timing chain case.

b. Turn crankshaft pulley clockwise so that timing chain on the timing chain tensioner (primary) side is loose.

c. Install timing chain tensioner (primary) with its stopper pin attached.

CAUTION:
Be careful not to drop mounting bolts inside timing chain case.

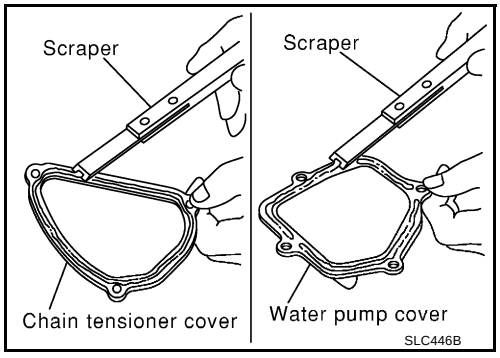
d. Remove stopper pin.



e. Make sure again that timing chain and water pump sprocket are engaged.

4. Install chain tensioner cover and water pump cover as follows:

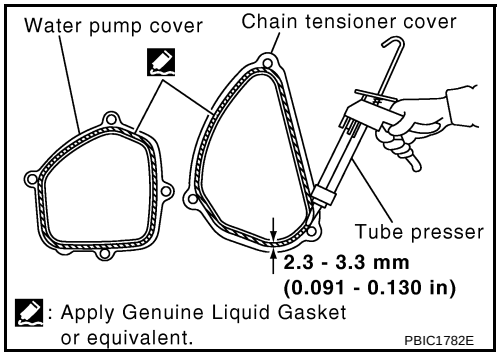
a. Before installing, remove all traces of old liquid gasket from mating surface of water pump cover and chain tensioner cover using scraper. Also remove traces of old liquid gasket from the mating surface of front timing chain case.



b. Apply a continuous bead of liquid gasket with tube presser [SST: WS39930000] to mating surface of chain tensioner cover and water pump cover.
Use Genuine Liquid Gasket or equivalent.

CAUTION:
Attaching should be done within 5 minutes after coating.

c. Tighten mounting bolts to specified torque.



5. Install water drain plug (front) on water pump side of cylinder block.
   - Apply liquid gasket to the thread of water drain plug (front).
     Use Genuine Liquid Gasket or equivalent.

6. Install in the reverse order of removal after this step.
   - **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 chain tensioner. 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

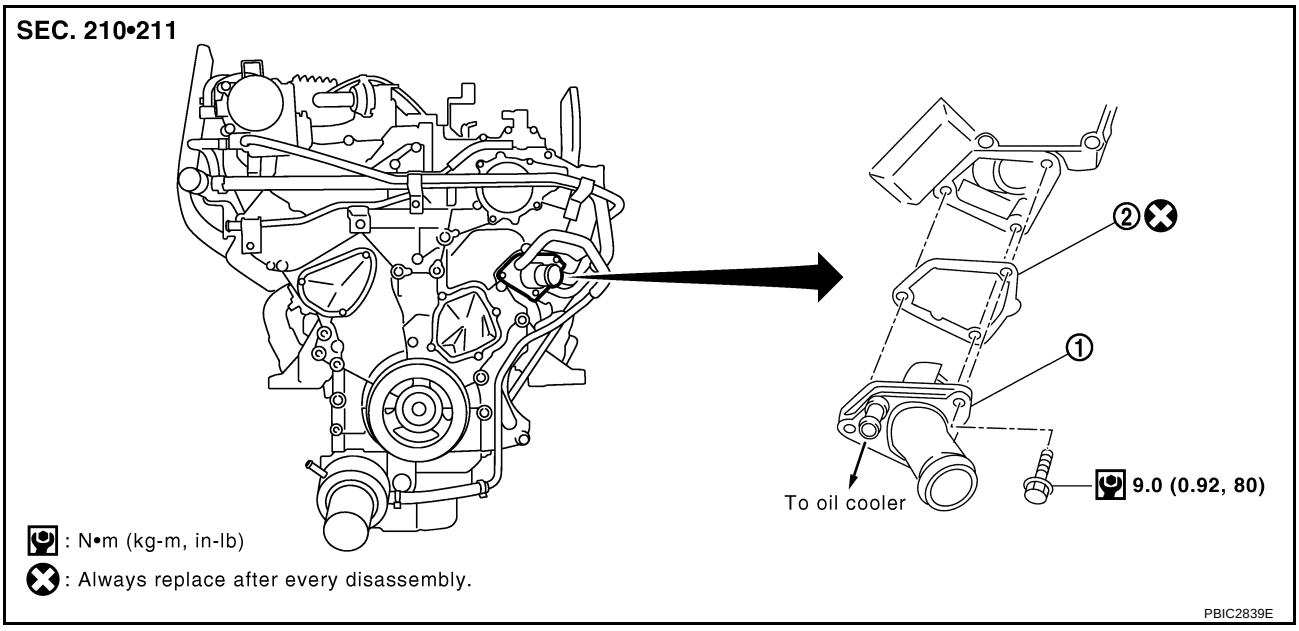
- Check for leaks of engine coolant using the radiator cap tester adapter [SST: EG17650301] and the radiator cap tester (commercial service tool). Refer to CO-10, "CHECKING RADIATOR SYSTEM FOR LEAKS".
- Start and warm up engine. Visually check if there is no leaks of engine coolant.

WATER INLET AND THERMOSTAT ASSEMBLY

PFP:21200

Removal and Installation

GBS000F0



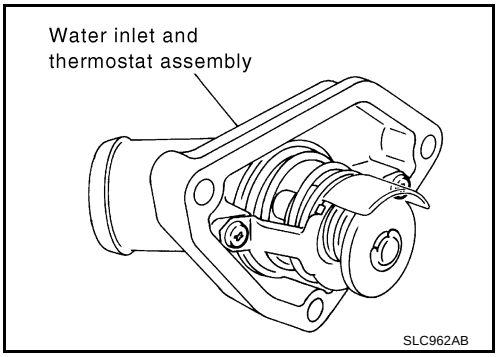
1. Water inlet and thermostat assembly 2. Gasket

REMOVAL

1. Remove front engine undercover. Refer to EI-15, "FRONT BUMPER" .
2. Drain engine coolant from radiator drain plug at the bottom of radiator, and from water drain plug at the front of cylinder block. Refer to CO-10, "Changing Engine Coolant" and CO-23, "WATER PUMP" .

   CAUTION:
   - **Perform this step when engine is cold.**
   - **Do not spill engine coolant on drive belts.**
3. Remove air duct and air cleaner case. Refer to EM-17, "AIR CLEANER AND AIR DUCT" .
4. Remove water drain plug on water pump side of cylinder block.
5. Disconnect radiator hose (lower) and oil cooler hose from water inlet and thermostat assembly.
6. Remove water inlet and thermostat assembly.

   CAUTION:
   Do not disassemble water inlet and thermostat assembly. Replace them as a unit, if necessary.



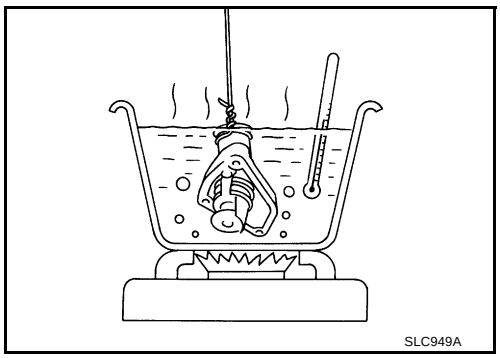
INSPECTION AFTER REMOVAL

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

2. Check valve operation.

Thermostat	Standard
Valve opening temperature	80.5 - 83.5°C (177 - 182°F)
Maximum valve lift	8.6 mm / 95°C (0.339 in / 203°F)
Valve closing temperature	77°C (171°F)

- If the malfunctioning condition, when valve seating at ordinary room temperature, or measured values are out of the standard, replace water inlet and thermostat assembly.



INSTALLATION

Note the following, and install in the reverse order of removal.

- **Be careful not to spill engine coolant over engine room. Use rag to absorb engine coolant.**

INSPECTION AFTER INSTALLATION

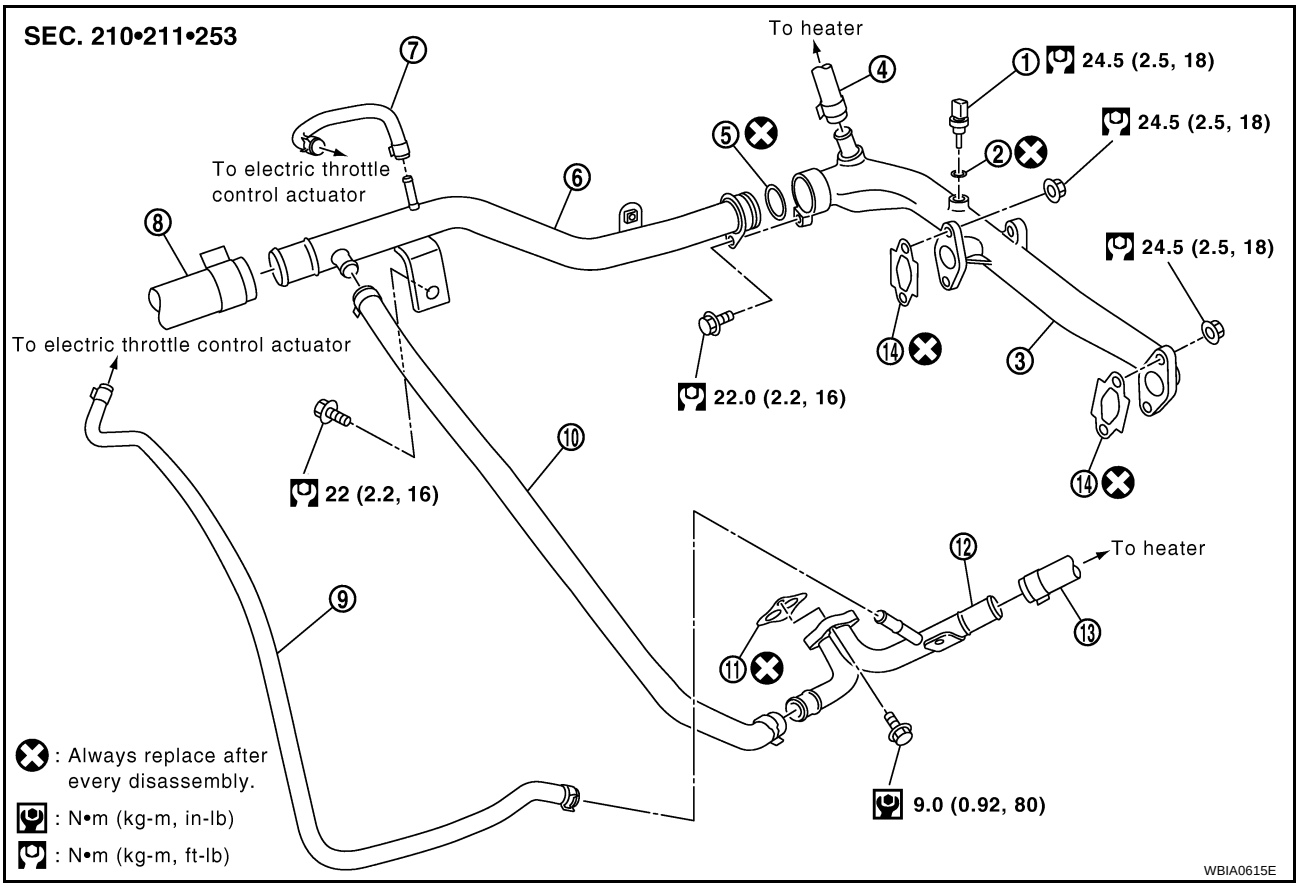
- Check for leaks of engine coolant using radiator cap tester adapter [SST: EG17650301] and radiator cap tester (commercial service tool). Refer to CO-10, "CHECKING RADIATOR SYSTEM FOR LEAKS" .
- Start and warm up engine. Visually check if there is no leaks of engine coolant.

WATER OUTLET AND WATER PIPING

PFP:11060

Components

GBS000F1



1.	Engine coolant temperature sensor	2.	Washer	3.	Water outlet
4.	Heater hose	5.	O-ring	6.	Water pipe
7.	Water hose	8.	Radiator hose (upper)	9.	Water hose
10.	Water hose	11.	Gasket	12.	Heater pipe
13.	Heater hose	14.	Gasket		

Removal and Installation

GBS000F2

WARNING:

Do not remove radiator cap and/or reservoir tank cap when engine is hot. Serious burns could occur from high pressure engine coolant escaping from radiator and/or reservoir tank.

REMOVAL

1. Remove front engine undercover and middle engine undercover. Refer to EI-15, "FRONT BUMPER" .
2. Drain engine coolant from radiator drain plug at the bottom of radiator, and from water drain plug at the front of cylinder block. Refer to CO-10, "Changing Engine Coolant" and CO-23, "WATER PUMP" .

   CAUTION:
   - **Perform this step when engine is cold.**
   - **Do not spill engine coolant on drive belts.**
3. Remove engine cover. Refer to EM-18, "INTAKE MANIFOLD COLLECTOR" .
4. Remove air duct and air cleaner case. Refer to EM-17, "AIR CLEANER AND AIR DUCT" .
5. Disconnect radiator hose (upper) and heater hose.
6. Remove the following parts, when remove water outlet.
   - A/T fluid charging pipe; Refer to AT-254, "TRANSMISSION ASSEMBLY" .
   - Rocker cover (right bank). Refer to EM-41, "ROCKER COVER" .
7. Remove engine coolant temperature sensor as necessary.

CAUTION:
Be careful not to damage engine coolant temperature sensor.

8. Remove water outlet, heater pipe, water bypass hoses and water pipe.

INSTALLATION

Note the following, and install in the reverse order of removal.

- Securely insert each hose, and install clamp at a position where it does not interfere with the pipe bulge.
- When inserting water pipe into water outlet, apply neutral detergent to O-ring.

INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using radiator cap tester adapter [SST: EG17650301] and radiator cap tester (commercial service tool). Refer to CO-10, "CHECKING RADIATOR SYSTEM FOR LEAKS" .
- Start and warm up engine. Visually check if there is no leaks of engine coolant.

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00100

Standard and Limit

GBS000F3

ENGINE COOLANT CAPACITY

Unit: ℓ (Imp qt)

Engine coolant capacity (With reservoir tank at “MAX” level)	Approx. 10.3 (9-1/8)
Reservoir tank (at “MAX” level)	0.8 (3/4)

THERMOSTAT

Valve opening temperature	80.5 - 83.5°C (177 - 182°F)
Maximum valve lift	8.6 mm / 95°C (0.339 in / 203°F)
valve closing temperature	77°C (171°F)

RESERVOIR TANK

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

Cap relief pressure	Standard	98.2 - 117.8 (0.98 - 1.18, 1.0 - 1.2, 14 - 17)
	Limit	59 (0.59, 0.6, 9)
Leakage test pressure		157 (1.6, 1.6, 23)

PRECAUTIONS

PFP:00001

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

GBS001UZ

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

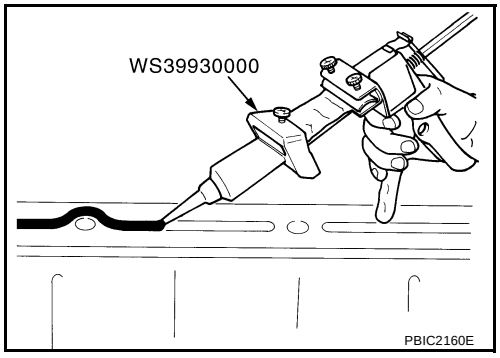
- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal 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

GBS00024

LIQUID GASKET APPLICATION PROCEDURE

1. Remove old liquid gasket adhering to the liquid gasket application surface and the mating surface.
   - Remove liquid gasket completely from the liquid gasket application surface, mounting bolts, and bolt holes.
2. Wipe the liquid gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.
3. Attach liquid gasket tube to the tube presser [SST].
   Use Genuine Liquid Gasket or equivalent.
   - Within five minutes of liquid gasket application, install the mating component.
   - If liquid gasket protrudes, wipe it off immediately.
   - Do not retighten mounting bolts or nuts after the installation.
   - After 30 minutes or more have passed from the installation, fill engine oil and engine coolant.

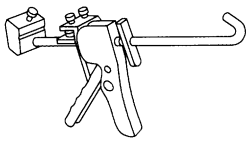
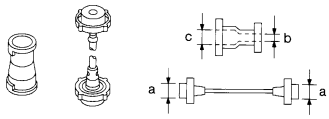
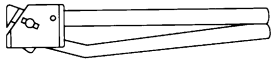


PREPARATION

PFP:00002

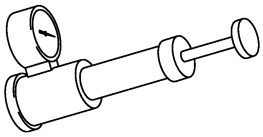
Special Service Tools

GBS00025

Tool number Tool name	Description
WS39930000 Tube presser  S-NT052	Pressing the tube of liquid gasket
EG17650301 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)
KV99103510 Radiator plate pliers A  S-NT224	Installing radiator upper and lower tanks
KV99103520 Radiator plate pliers B  S-NT225	Removing radiator upper and lower tanks

Commercial Service Tools

GBS00026

Tool name	Description
Radiator cap tester  PBIC1982E	Checking radiator and reservoir tank cap

OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

GBS00027

	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	Refer to EC-1120, "DTC P0217 ENGINE OVER TEMPERATURE"	—
		High resistance to fan rotation	Fan assembly	
		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

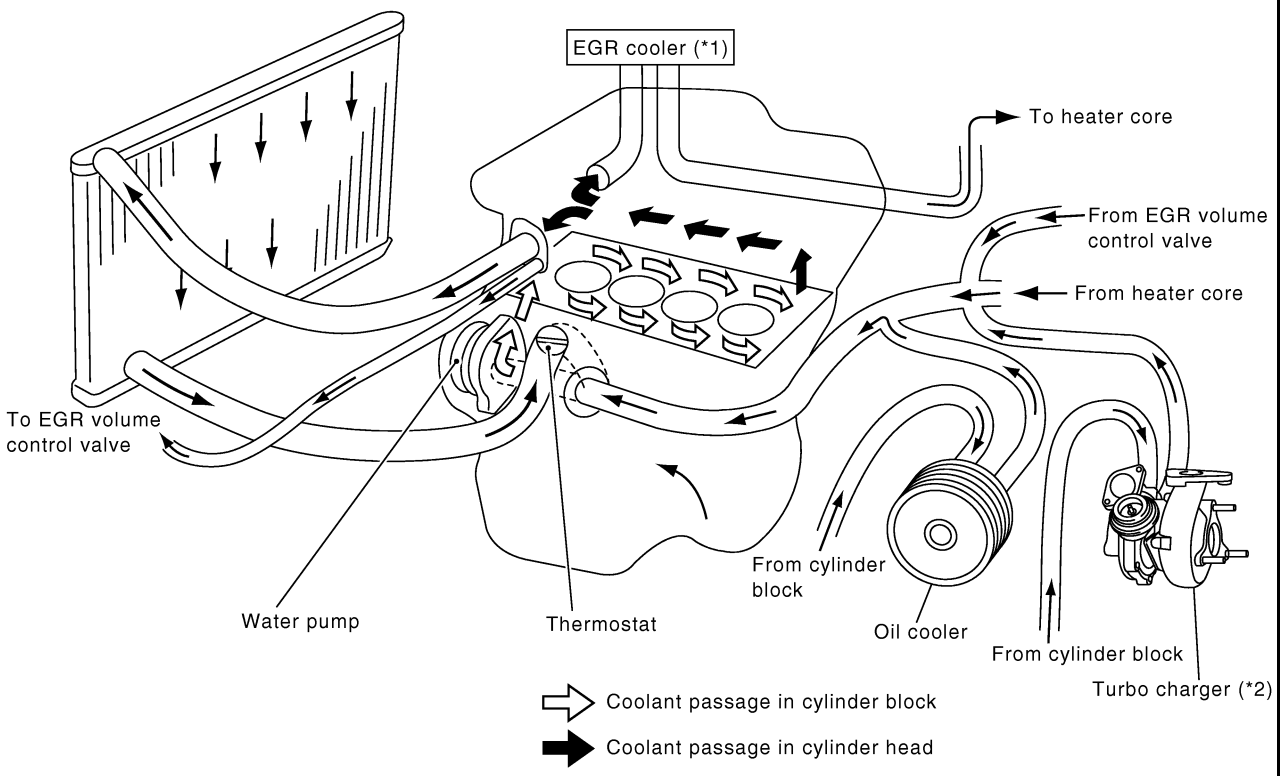
	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes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

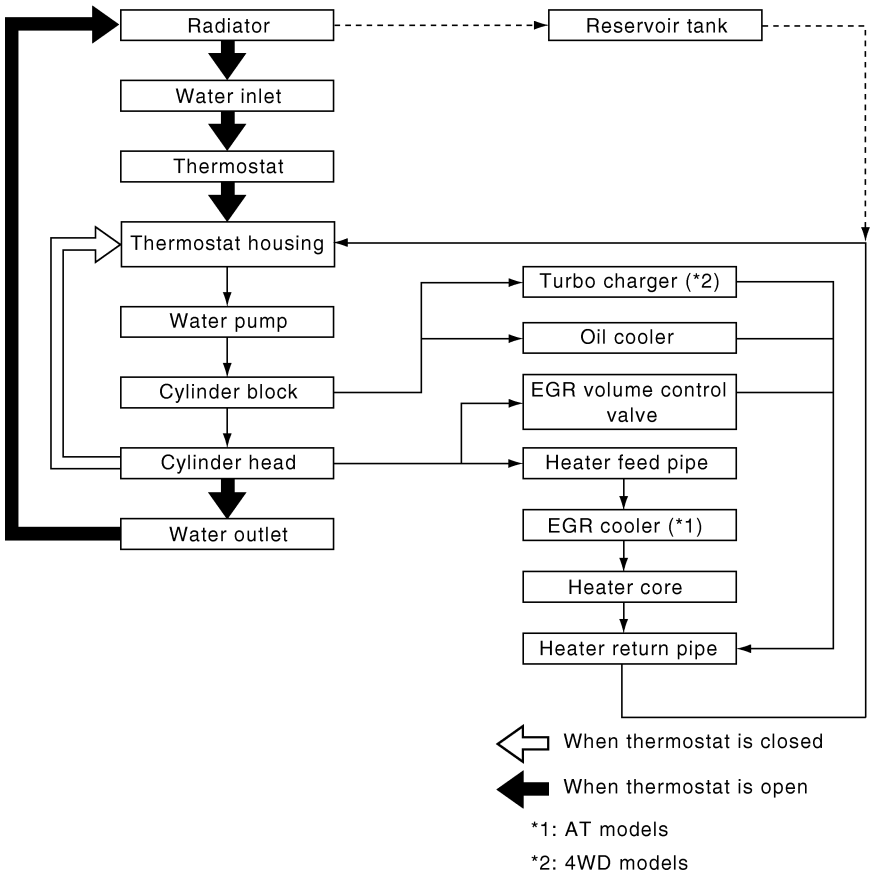
COOLING SYSTEM

PFP:21020

Cooling Circuit

GBS00028





PBIC4099E

ENGINE COOLANT

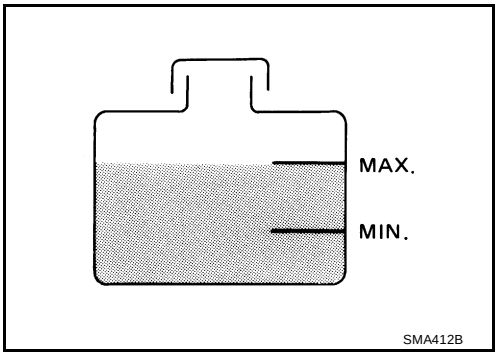
PFP:KQ100

Inspection

GBS00029

LEVEL CHECK

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



CHECKING RADIATOR SYSTEM FOR LEAKS

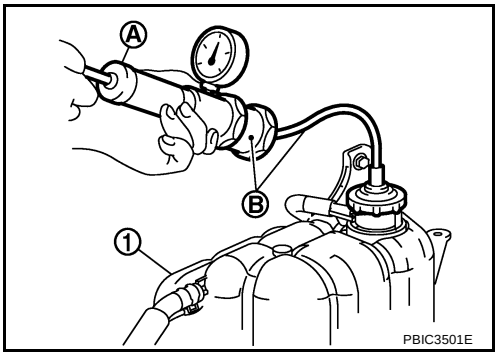
- To check for leaks of cooling system, apply pressure to the reservoir tank (1) with the radiator cap tester (commercial service tool) (A) and the radiator cap tester adapter (B) [SST: EG17650301].

  Testing pressure:

  157 kPa (1.57 bar, 1.6 kg/cm^2 , 23 psi)

  WARNING:

  Do not remove reservoir tank cap and/or radiator cap when engine is hot. Serious burns could occur from high pressure engine coolant escaping from reservoir tank and/or radiator.



  CAUTION:

  Higher test pressure than specified may cause cooling system damage.

  NOTE:

  In a case that engine coolant decreases, replenish radiator and reservoir tank with engine coolant.

- If anything is found, repair or replace damaged parts.

Changing Engine Coolant

GBS0002A

WARNING:

- **To avoid being scalded, do not change engine coolant when engine is hot.**
- **Wrap a thick cloth around cap and carefully remove cap. First, turn cap a quarter of a turn to release built-up pressure. Then turn cap all the way.**
- **Be careful not to allow engine coolant to contact drive belts.**

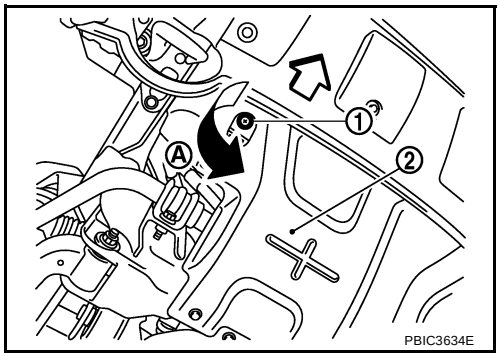
DRAINING ENGINE COOLANT

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

   2 : Engine under cover (front)

   A : Loosen.

   ⇦ : Vehicle front



CAUTION:

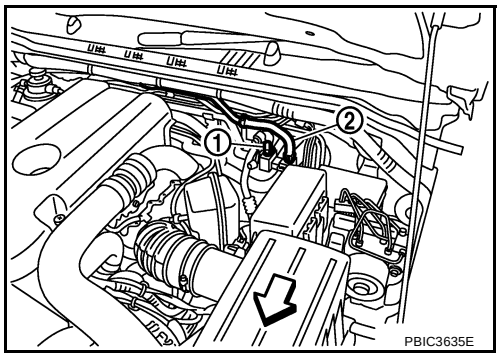
Be careful not to allow engine coolant to contact drive belts.

When draining all engine coolant in the system, also perform the following steps.

2. Remove air relief plug (1) on heater feed tube.

   2 : Water hose (from reservoir tank)

   ⇦ : Vehicle front



3. Open cylinder block drain plug. Refer to EM-254, "CYLINDER BLOCK" .
4. Remove reservoir tank, drain engine coolant, then clean reservoir tank.
5. Check drained engine coolant for contaminants such as rust, corrosion or discoloration.
   If contaminated, flush engine cooling system. Refer to CO-39, "FLUSHING COOLING SYSTEM" .

REFILLING ENGINE COOLANT

1. Install reservoir tank, and radiator drain plug.

   CAUTION:

   Be sure to clean radiator drain plug and install with new O-ring.

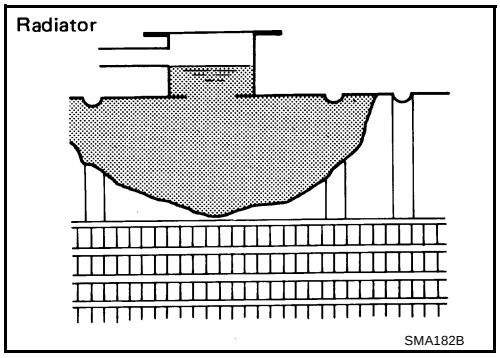
   Radiator drain plug:

   : 1.2 N·m (0.12 kg-m, 11 in-lb)

   - **If water drain plugs on cylinder block are removed, close and tighten them. Refer to EM-254, "CYLINDER BLOCK" .**
2. Make sure that each hose clamp has been firmly tightened.
3. Fill radiator and reservoir tank to the specified level.
   - **Pour engine coolant through engine coolant filler neck slowly of less than 2 ℓ (1-3/4 lmp qt) a minute to allow air in system to escape.**
   - **Use Genuine Nissan Anti-freeze Coolant (L250) or equivalent in its quality. Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS".**

   Engine coolant capacity
   (with reservoir tank at “MAX” level)

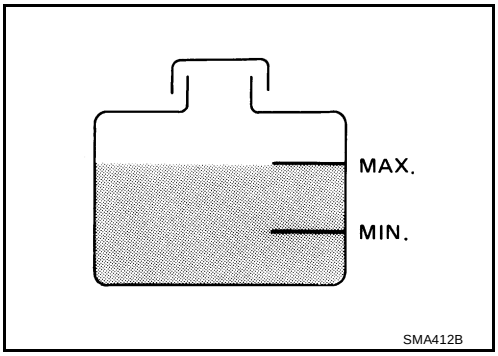
   : Approx. 10.2 ℓ (9 lmp qt)



Reservoir tank capacity (at "MAX" level)

: 0.8 ℓ (3/4 Imp qt)

- When engine coolant overflows air relief hole, install air relief plug.



4. Warm up engine to normal operating temperature without radiator cap and reservoir tank cap installed.
   - **If engine coolant overflows radiator filler hole and reservoir tank filler hole, install radiator cap and reservoir tank cap.**
5. Run engine at 3,000 rpm for 10 seconds and return to idle speed with radiator cap installed.
   - Repeat two or three times.

CAUTION:

Watch engine coolant temperature gauge so as not to overheat the engine.

6. Stop engine and cool down to less than approximately 50°C (122°F).
   - Cool down using a fan to reduce the time.
   - If necessary, refill radiator up to filler neck with engine coolant.
7. Refill reservoir tank to MAX level line with engine coolant.
8. Repeat steps 3 through 6 two or more times with radiator cap installed until engine coolant level no longer drops.
9. Check cooling system for leaks with engine running.
10. Warm up engine, and check for sound of engine coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between COOL and WARM.
    - Sound may be noticeable at heater unit.
11. Repeat step 10 three times.
12. If sound is heard, bleed air from cooling system by repeating steps 3 through 6 until engine coolant level no longer drops.

FLUSHING COOLING SYSTEM

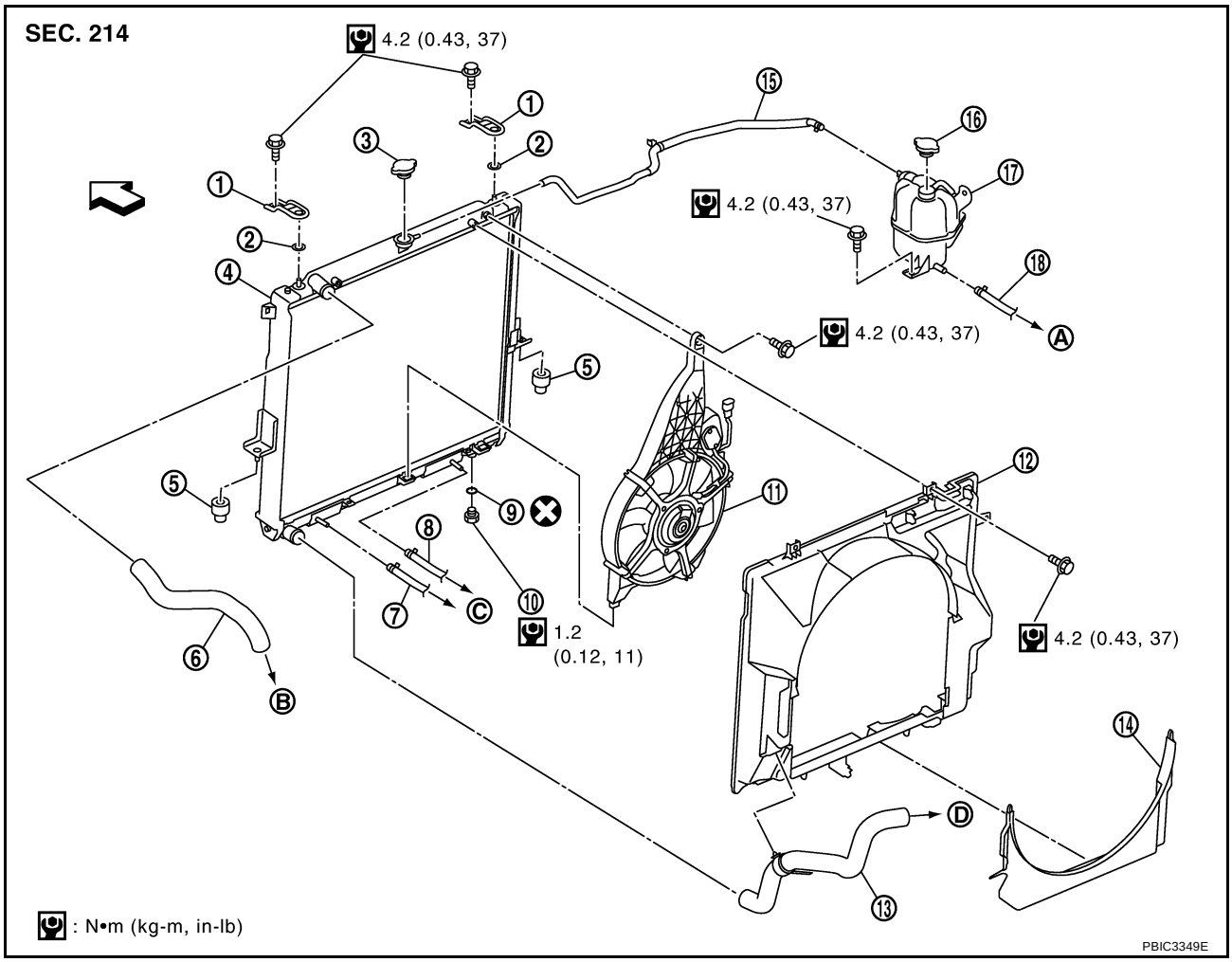
1. Fill radiator with water until water spills from the air relief hole, then close air relief plug. Fill radiator and reservoir tank with water and reinstall radiator cap and reservoir tank cap.
2. Run engine and warm it up to normal operating temperature.
3. Rev engine two or three times under no-load.
4. Stop engine and wait until it cools down.
5. Drain water from the system. Refer to CO-38, "DRAINING ENGINE COOLANT" .
6. Repeat steps 1 through 5 until clear water begins to drain from radiator.

RADIATOR

PFP:21400

Components

GBS0002B



1. Radiator mounting bracket	2. Mounting rubber (upper)	3. Radiator cap
4. Radiator	5. Mounting rubber (lower)	6. Radiator hose (upper)
7. A/T fluid cooler hose	8. A/T fluid cooler hose	9. O-ring
10. Drain plug	11. Cooling fan assembly (models with A/C)	12. Radiator shroud (upper)
13. Radiator hose (lower)	14. Radiator shroud (lower)	15. Reservoir tank hose
16. Reservoir tank cap	17. Reservoir tank	18. Water hose
A. To heater return tube	B. To water outlet	C. To A/T fluid cooler tube
D. To water inlet	⇦ Vehicle front	

- Refer to GI-10, "Components" for symbol marks except in the above.

Removal and Installation

GBS0002C

WARNING:

Do not remove radiator cap and/or reservoir tank cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from radiator and/or reservoir tank.

REMOVAL

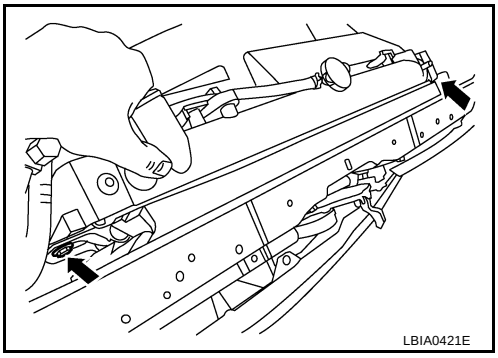
1. Drain engine coolant from radiator. Refer to CO-38, "DRAINING ENGINE COOLANT" .

   CAUTION:
   - **Perform this step when engine is cold.**
   - **Do not spill engine coolant on drive belts.**
2. Remove battery. Refer to SC-5, "BATTERY" .

3. Remove engine cover. Refer to EM-164, "INTAKE MANIFOLD" .
4. Remove air inlet hoses between engine to charge air cooler. Refer to EM-162, "CHARGE AIR COOLER" .
5. Disconnect radiator hose (upper and lower) and reservoir tank hose.

CAUTION:
Be careful not to allow engine coolant to contact drive belts.

6. Remove reservoir tank.
7. Remove cooling fans (crankshaft driven type and motor driven type) and radiator shrouds (upper and lower). Refer to CO-48, "COOLING FAN" .
8. Disconnect A/T fluid cooler hoses. (A/T models)
   - Install blind plug to avoid leakage of A/T fluid.
9. Remove radiator mounting brackets.
10. Remove the two A/C condenser bolts. (models with A/C)



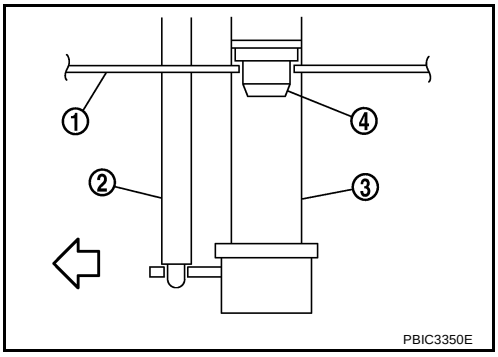
11. Remove radiator.
Remove radiator as follows (models with A/C):

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

a. With lifting and pulling radiator (3) in a rear direction, remove radiator lower mount (4) from radiator core support (1).

⇦ : Vehicle front

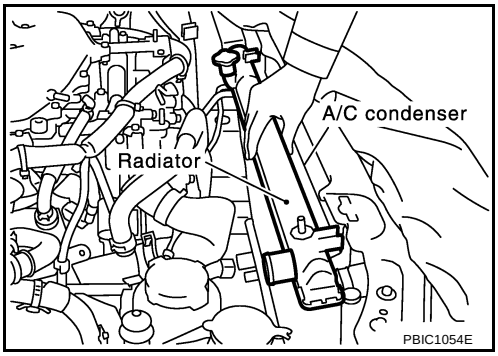
CAUTION:
Because A/C condenser (2) is onto the front-lower portion of radiator (3), moving to rear direction should be at minimum.



b. Lift A/C condenser up and remove radiator.

CAUTION:
Lifting A/C condenser should be minimum to prevent a load to A/C piping.

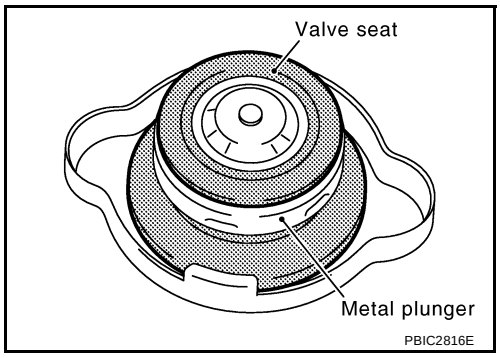
c. After removing radiator, temporarily secure it with rope or similar means to prevent a load to A/C piping.



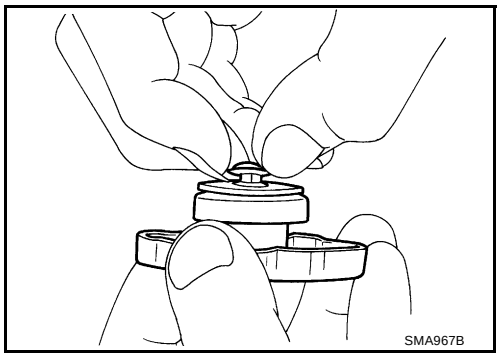
INSPECTION AFTER REMOVAL

Checking Reservoir Tank Cap

- Inspect valve seat of reservoir tank cap.
  - Check if valve seat is swollen to the extent that the edge of the plunger cannot be seen when watching it vertically from the top.
  - Check if valve seat has no soil and damage.



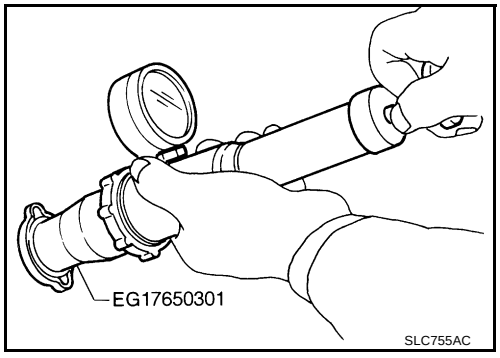
- Pull negative-pressure valve to open it, and make sure that it is completely closed when released.
  - Make sure that there is no dirt or damage on the valve seat of radiator cap negative-pressure valve.
  - Make sure that there are no unusualness in the opening and closing conditions of negative-pressure valve.



- Check reservoir tank cap relief pressure.

  Standard : 98.2 - 117.8 kPa (0.98 - 1.18 bar, 1.0 - 1.2 kg/cm^2 , 14 - 17 psi)

  Limit : 59 kPa (0.59 bar, 0.6 kg/cm^2 , 9 psi)
  - When connecting reservoir tank cap to the radiator cap tester adapter [SST] and the radiator cap tester (Commercial service tool), apply engine coolant to the cap seal surface.



- Replace reservoir tank cap if there is an unusualness in negative pressure valve, or if the relief pressure falls below the limit.

CAUTION:

When installing a radiator cap and reservoir tank cap, thoroughly wipe out the radiator and reservoir tank filler neck to remove any waxy residue or foreign material.

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

1. Apply water by hose to the back side of the radiator core vertically downwards.
2. Apply water again to all radiator core surface 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 vertically downwards.
   - Use compressed air lower than 490 kPa (4.9 bar, 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 surface once per minute until no water sprays out.

INSTALLATION

Installation is the reverse order of removal.

INSPECTION AFTER INSTALLATION

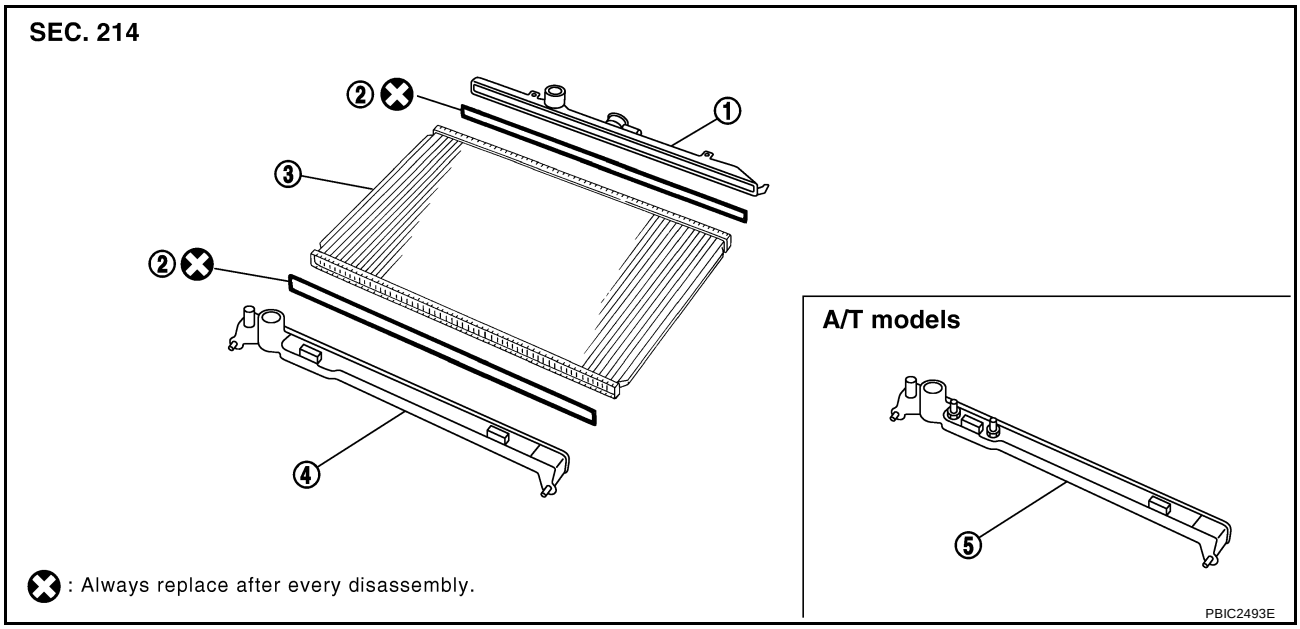
- Check for leaks of engine coolant using the radiator cap tester adapter [SST: EG17650301] and the radiator cap tester (commercial service tool). Refer to CO-37, "CHECKING RADIATOR SYSTEM FOR LEAKS".
- Start and warm up engine. Visually check if there is no leaks of engine coolant.

RADIATOR (ALUMINUM TYPE)

PFP:21460

Components

GBS0002D



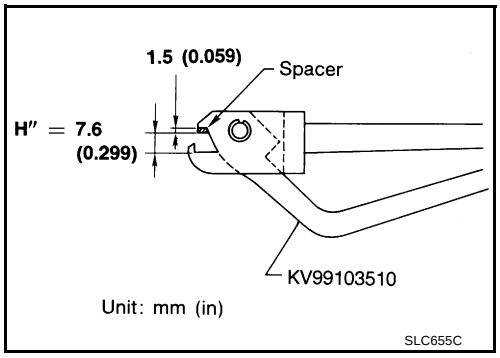
1. Upper tank
2. Sealing rubber
3. Core
4. Lower tank
5. Lower tank (with A/T fluid cooler)

Disassembly and Assembly

GBS0002E

PREPARATION

1. Attach the spacer to the tip of the radiator plate pliers A [SST]. Spacer specification: 18 mm (0.71 in) wide x 8.5 mm (0.335 in) long x 1.5 mm (0.059 in) thick.
2. Make sure that when radiator plate pliers A [SST] are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer, if necessary.



DISASSEMBLY

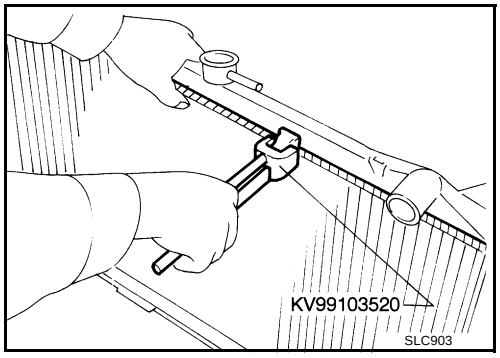
1. Remove upper and lower tanks with radiator plate pliers B [SST].

CAUTION:

Do not disassemble lower tank and A/T fluid cooler. (A/T models)

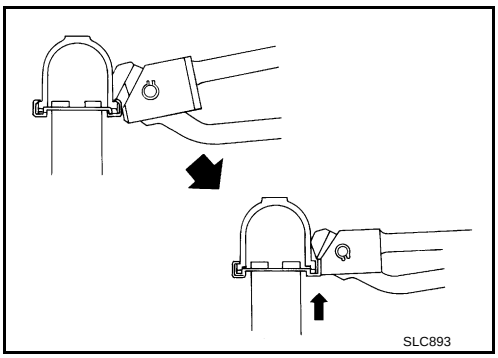
NOTE:

Regard lower tank and A/T fluid cooler as an assembly.



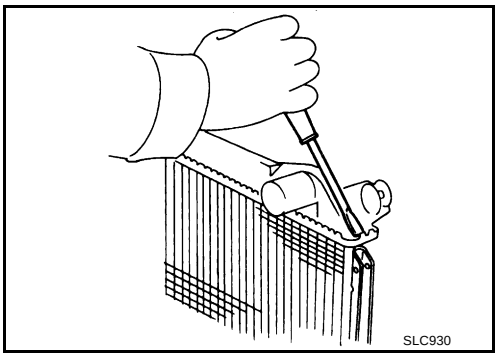
- Grip the crimped edge and bend it upwards so that radiator plate pliers B slips off.

  CAUTION:
  Do not bend excessively.

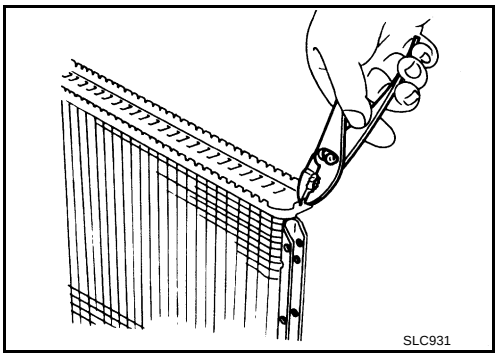


- In areas where radiator plate pliers B cannot be used, use a screwdriver to bend the edge up.

  CAUTION:
  Be careful not to damage tank.

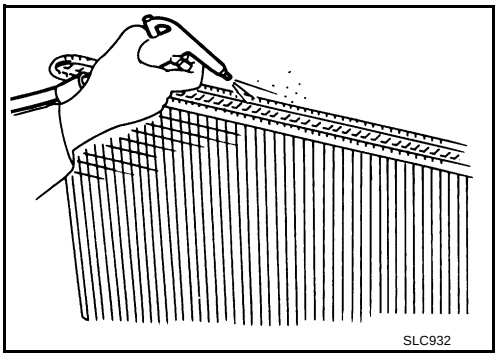


2. Remove sealing rubber.
3. Make sure the edge stands straight up.



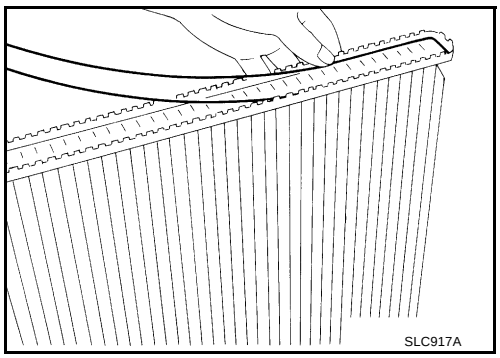
ASSEMBLY

1. Clean contact portion of tank.

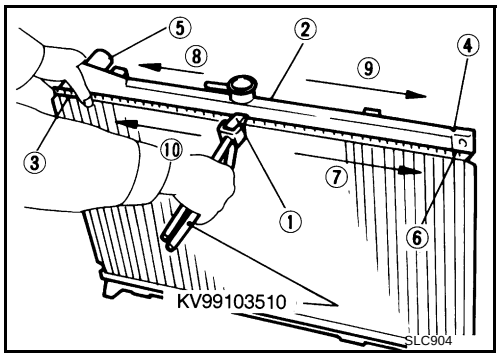


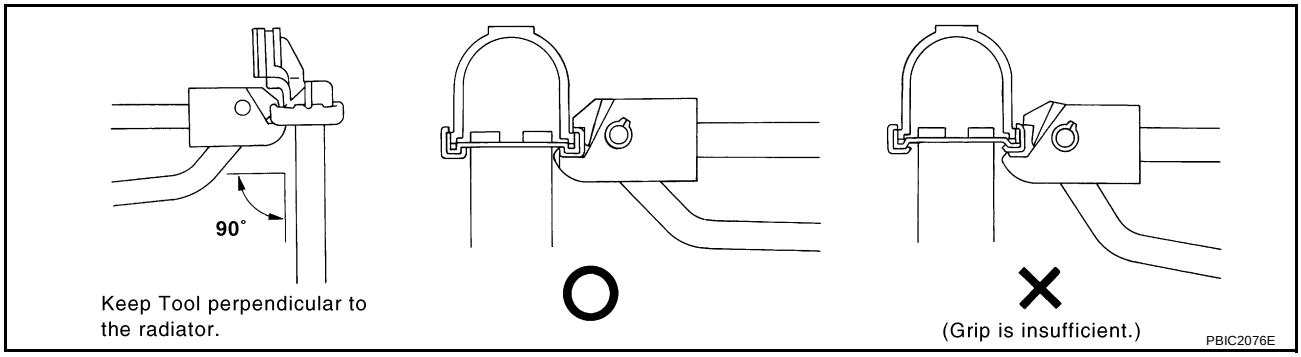
2. Install sealing rubber while pushing it with fingers.

CAUTION:
Be careful not to twist sealing rubber.

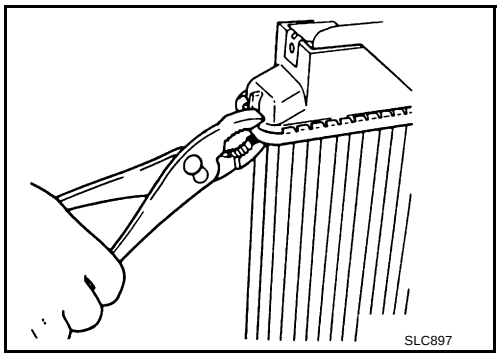


3. Caulk tank in numerical order as shown in the figure with radiator plate pliers A [SST].



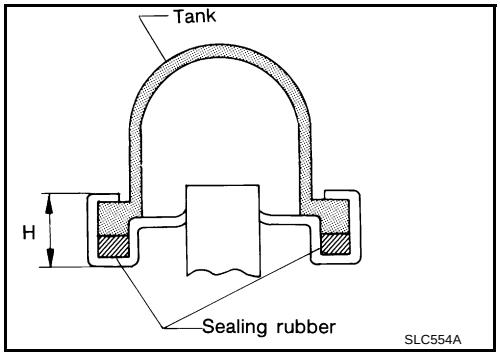


- Use pliers in the locations where radiator plate pliers A cannot be used.



4. Make sure that the rim is completely crimped down.

Standard height “H”: 8.0 - 8.4 mm (0.315 - 0.331 in)



5. Make sure that there is no leakage.
Refer to CO-47, "INSPECTION" .

INSPECTION

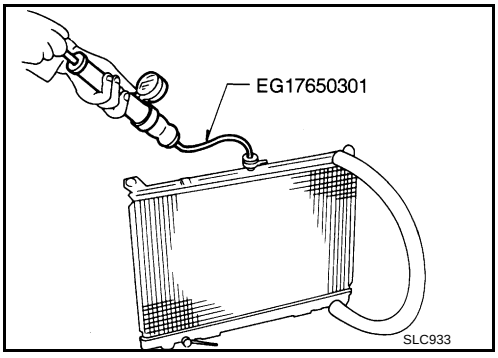
1. Apply pressure with the radiator cap tester adapter [SST] and the radiator cap tester (commercial service tool).

Testing pressure

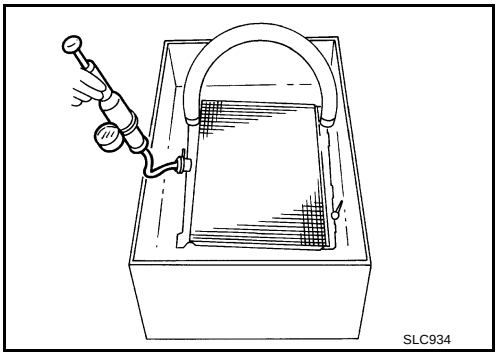
: 157 kPa (1.57 bar, 1.6 kg/cm^2 , 23 psi)

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

CAUTION:
Attach hose to A/T fluid cooler to seal its inlet and outlet. (A/T models)



2. Check for leakage by soaking radiator in water container with the testing pressure applied.

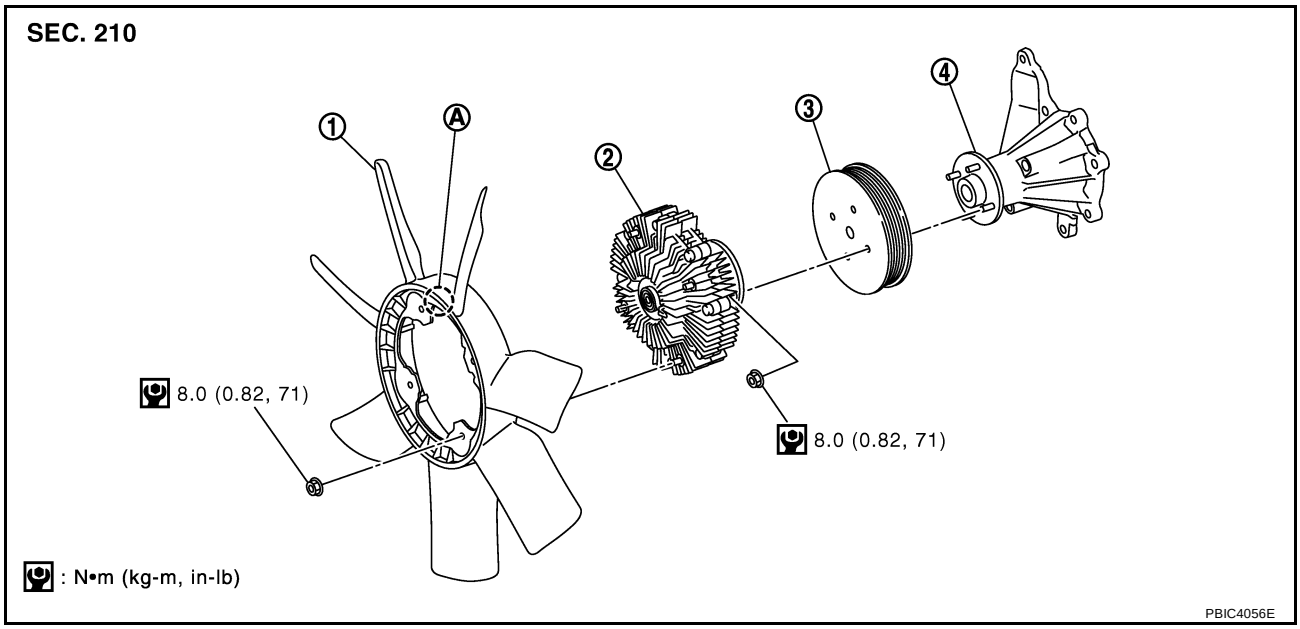


COOLING FAN

PFP:21140

Components (Crankshaft Driven Type)

GBS0002F



1. Cooling fan
2. Fan coupling
3. Water pump pulley
4. Water pump
A. Front mark “AISIN”

Removal and Installation

GBS0002G

REMOVAL

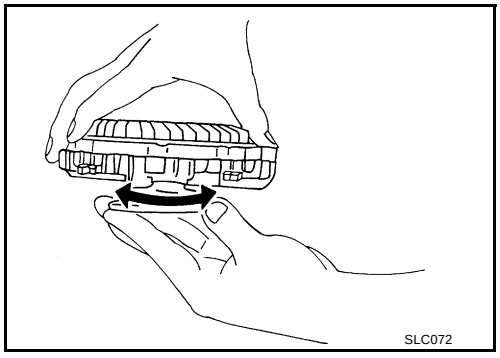
1. Remove engine cover. Refer to EM-164, "INTAKE MANIFOLD" .
2. Remove drive belts. Refer to EM-156, "DRIVE BELTS" .
3. Loosen and remove radiator shroud (upper) mounting bolts. Refer to CO-40, "RADIATOR" .
4. Move radiator shroud (upper) toward engine, and remove cooling fan (crankshaft driven type).

   CAUTION:
   Be careful not to damage or scratch on radiator core.
5. Remove fan coupling and water pump pulley.

INSPECTION AFTER REMOVAL

Fan Coupling

Check fan coupling for rough operation, wobbling, oil leakage or bent bimetal.



INSTALLATION

Installation is the reverse order of removal.

- Install cooling fan with its front mark “AISIN” facing front of engine.

Removal and Installation (Motor Driven Type) (Models with A/C)

GBS0002H

REMOVAL

1. Remove engine cover. Refer to EM-164, "INTAKE MANIFOLD" .

2. Disconnect harness connector from fan motor, and move it to aside.
3. Loosen and remove radiator shroud (upper) mounting bolts. Refer to CO-40, "RADIATOR" .
4. Move radiator shroud (upper) toward engine, and remove cooling fan (motor driven type). Refer to CO-40, "RADIATOR" .

CAUTION:
Be careful not to damage or scratch on radiator core.

INSTALLATION

Installation is the reverse order of removal.

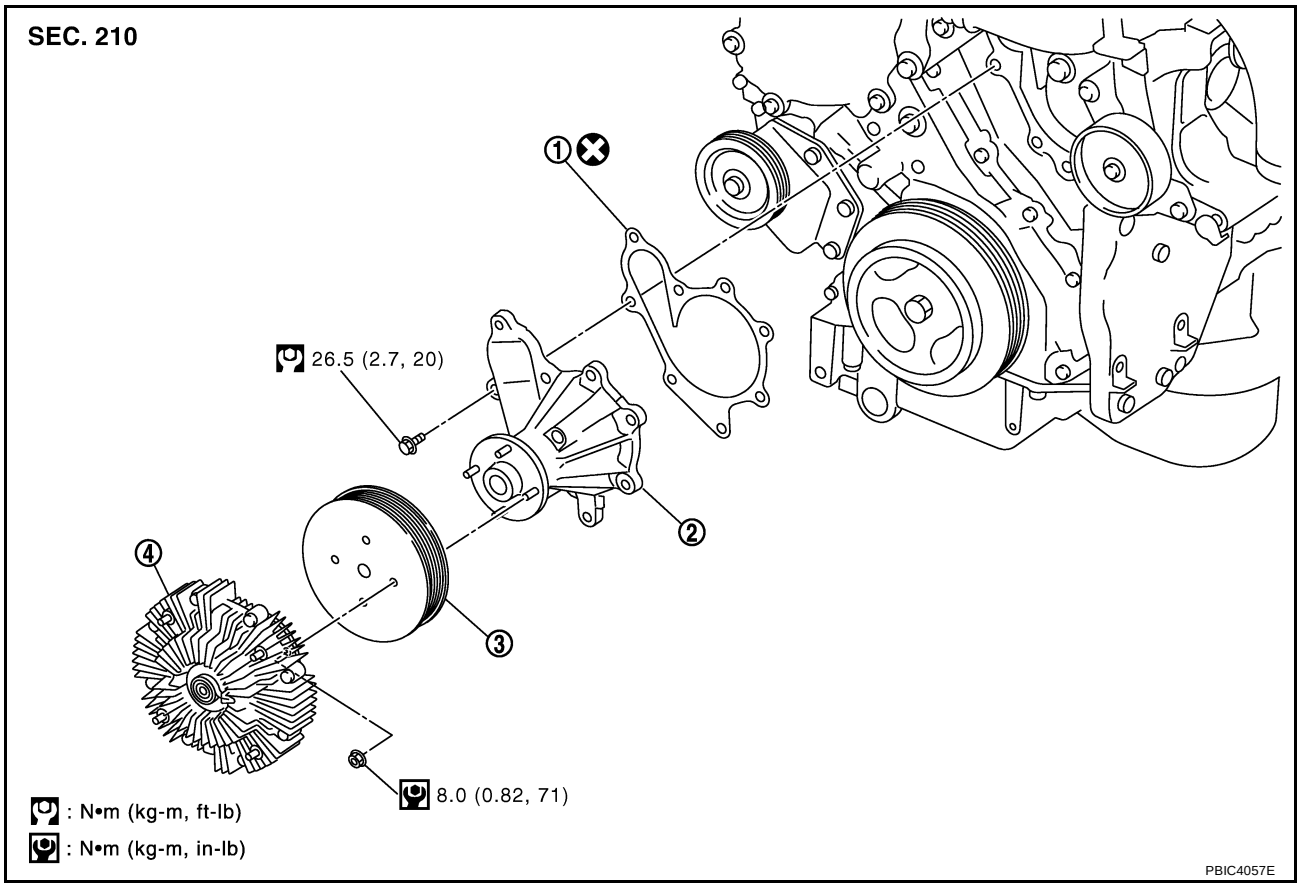
- Cooling fan (motor driven type) is controlled by ECM. For details, refer to EC-1120, "DTC P0217 ENGINE OVER TEMPERATURE" .

WATER PUMP

PFP:21020

Components

GBS0002I



1. Gasket
2. Water pump
3. Water pump pulley
4. Fan coupling

- Refer to GI-10, "Components" for symbol marks in the figure.

Removal and Installation

GBS0002J

WARNING:

Do not remove radiator cap and/or reservoir tank cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator and/or the reservoir tank.

CAUTION:

- **When removing water pump assembly, be careful not to get engine coolant on drive belts.**
- **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 (commercial service tool) and radiator cap tester adapter [SST: EG17650301].**

REMOVAL

1. Remove front engine undercover. Refer to EI-15, "FRONT BUMPER" .
2. Drain engine coolant. Refer to CO-38, "DRAINING ENGINE COOLANT" .

   CAUTION:

   - **Perform this step when engine is cold.**
   - **Do not spill engine coolant on drive belts.**
3. Remove engine cover. Refer to EM-164, "INTAKE MANIFOLD" .
4. Remove drive belts. Refer to EM-156, "DRIVE BELTS" .
5. Remove water pump pulley. Refer to CO-48, "Removal and Installation" .
   - Loosen the pulley bolts after fixing the pulley using a screwdriver etc.
6. Remove water pump.

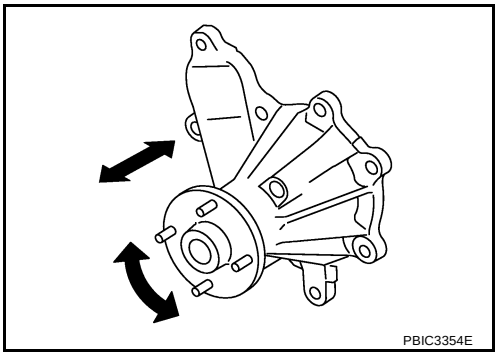
- Engine coolant will leak from cylinder block, so have a receptacle ready below.

CAUTION:

- **Handle the water pump vane so that it does not contact any other parts.**
- **Water pump cannot be disassembled and should be replaced as a unit.**

INSPECTION AFTER REMOVAL

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


PBIC3354E

INSTALLATION

- Install in the reverse order of removal.
- Install cooling fan (crankshaft driven type) with the front mark “AISIN” facing the front of engine. Refer to CO-48, "Removal and Installation" .

INSPECTION AFTER INSTALLATION

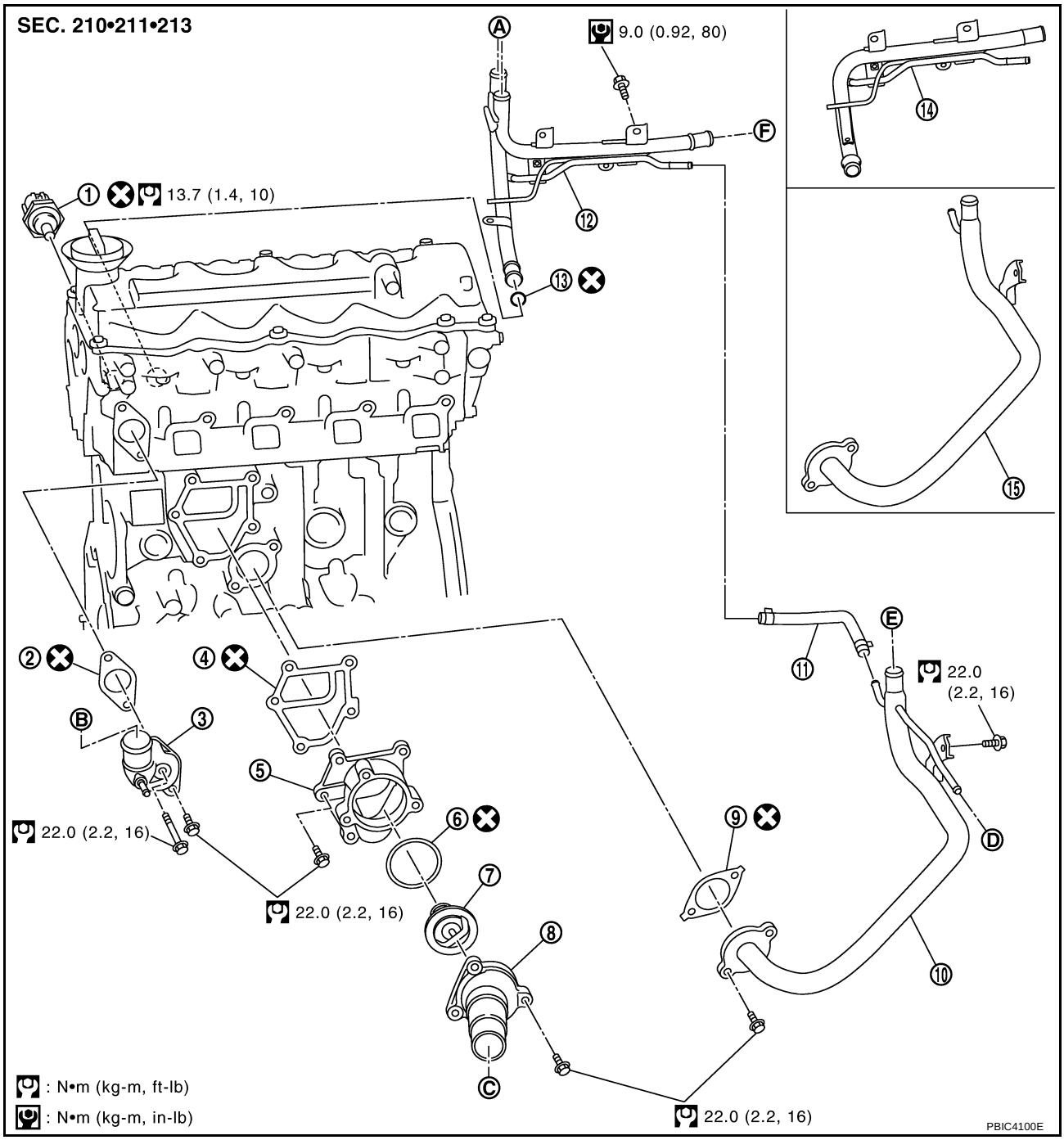
- Check for leaks of engine coolant using the radiator cap tester adapter [SST: EG17650301] and the radiator cap tester (commercial service tool). Refer to CO-37, "CHECKING RADIATOR SYSTEM FOR LEAKS" .
- Start and warm up engine. Visually check if there is no leaks of engine coolant.

THERMOSTAT AND WATER PIPING

PFP:21200

Components

GBS0002K



1.	Engine coolant temperature sensor	2.	Gasket	3.	Water outlet
4.	Gasket	5.	Thermostat housing	6.	Rubber ring
7.	Thermostat	8.	Water inlet	9.	Gasket
10.	Heater return pipe (4WD models)	11.	Water hose	12.	Heater feed pipe (A/T models)
13.	O-ring	14.	Heater feed pipe (M/T models)	15.	Heater return pipe (2WD models)
A.	To EGR cooler	B.	To radiator upper hose	C.	To radiator lower hose
D.	To turbocharger	E.	To heater return hose	F.	To heater feed hose

- Refer to GI-10, "Components" for symbol marks in the figure.

Removal and Installation

GBS0002L

WARNING:
Do not remove radiator cap and/or reservoir tank cap when engine is hot. Serious burns could occur from high pressure engine coolant escaping from radiator and/or reservoir tank.

REMOVAL

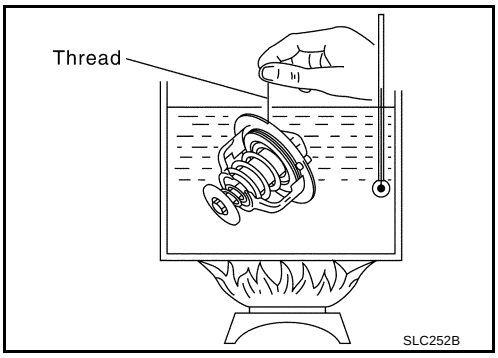
1. Remove front engine undercover and middle engine undercover. Refer to EI-15, "FRONT BUMPER" .
2. Drain engine coolant from radiator drain plug at the bottom of radiator, and from water drain plug at the side of cylinder block. Refer to CO-37, "Changing Engine Coolant" and EM-254, "CYLINDER BLOCK" .

   CAUTION:
   Perform this step when engine is cold.
3. Remove engine cover. Refer to EM-164, "INTAKE MANIFOLD" .
4. Disconnect radiator hoses (upper and lower) from engine side. Refer to CO-40, "RADIATOR" .
5. Remove air inlet pipe and air duct between air cleaner case and turbocharger. Refer to EM-159, "AIR CLEANER AND AIR DUCT" and EM-172, "TURBO CHARGER" .
6. Remove water outlet, water inlet and thermostat.
7. Remove thermostat housing.
8. Disconnect heater return hose and water hoses at heater return pipe side, and remove heater return pipe.
9. Remove oil level gauge guide mounting bolt, vacuum hoses (to turbocharger boost control solenoid valve) and spill hose. Refer toEM-180, "OIL PAN AND OIL STRAINER" ,EM-164, "INTAKE MANIFOLD" and EM-188, "INJECTION TUBE AND FUEL INJECTOR" .
10. Disconnect water hoses (to EGR cooler) (A/T models), vacuum hoses and heater feed hose at heater feed pipe side, and remove heater feed pipe. Refer to EM-164, "INTAKE MANIFOLD" .

INSPECTION AFTER REMOVAL

Thermostat

- Place a string 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 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

Item	Thermostat
Valve opening temperature	80.5 - 83.5°C (177 - 182° F)
Full-open lift amount	More than 9 mm/ 95°C (0.35 in/ 203 °F)
Valve closing temperature	More than 77°C (171°F)

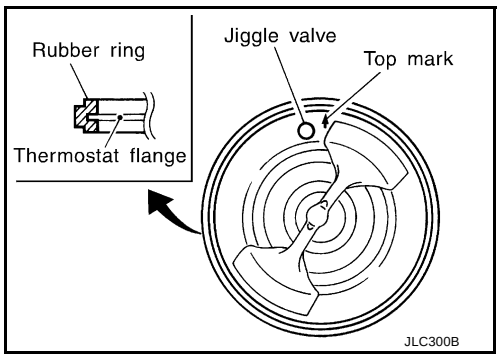
- If out of the standard, replace thermostat.

INSTALLATION

Note the following, and install in the reverse order of removal.

- Securely insert each hose, and install clamp at a position where it does not interfere with the pipe bulge.
- When inserting heater feed pipe end into cylinder head, apply a neutral detergent to O-ring. Then insert it immediately.

- Install the thermostat with the whole circumference of each flange part fit securely inside the rubber ring.
- Install the thermostat with the jiggle valve facing upwards.



INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using the radiator cap tester adapter [SST: EG17650301] and the radiator cap tester (commercial service tool). Refer to CO-37, "CHECKING RADIATOR SYSTEM FOR LEAKS" .
- Start and warm up engine. Visually check if there is no leaks of engine coolant.

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Standard and Limit

GBS0002M

ENGINE COOLANT CAPACITY

Unit: ℓ (Imp qt)

Engine coolant capacity (With reservoir tank at “MAX” level)	Approx. 10.2 (9)
Reservoir tank (at “MAX” level)	0.8 (3/4)

THERMOSTAT

Valve opening temperature	80.5 - 83.5°C (177 - 182°F)
Full open lift amount	More than 9 mm/ 95°C (0.35 in/203°F)
Valve closing temperature	More than 77°C (171°F)

RESERVOIR TANK

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

Cap relief pressure	Standard	98.2 - 117.8 (0.98 - 1.18, 1.0 - 1.2, 14 - 17)
	Limit	59 (0.59, 0.6, 9)
Leakage test pressure		157 (1.57, 1.6, 23)