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SECTION CO

ENGINE COOLING SYSTEM

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PRECAUTIONS

PRECAUTIONS

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

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The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

Precautions for Liquid Gasket REMOVAL OF LIQUID GASKET SEALING

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

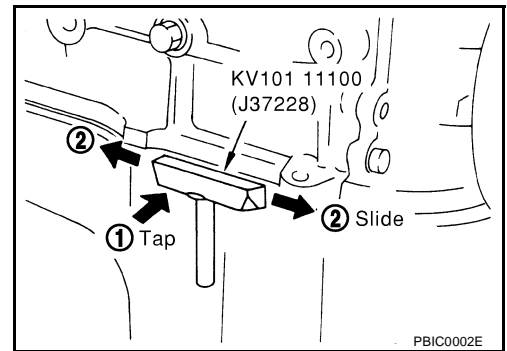
CAUTION:

Be careful not to damage the mating surfaces.

- In areas where seal cutter (SST) is difficult to use, use plastic hammer to lightly tap (1) seal cutter where liquid gasket is applied. Use plastic hammer to slide seal cutter (2) by tapping on the side.

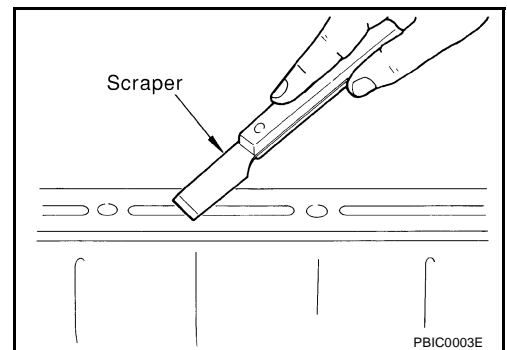
CAUTION:

If for some unavoidable reason tool such as flat-bladed 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.



PRECAUTIONS

3. Attach liquid gasket tube to tube presser [SST: WS39930000 (—)].

Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#) .

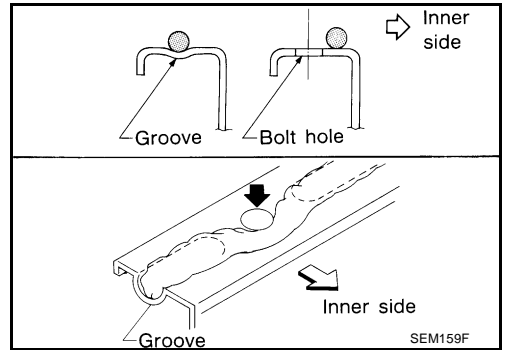
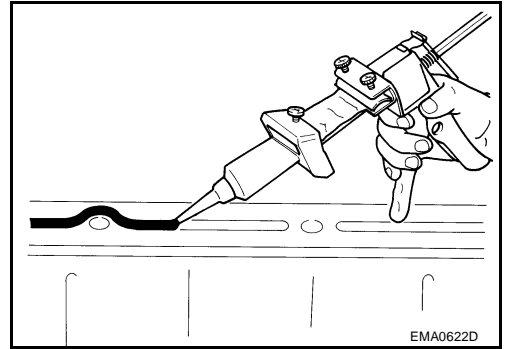
4. Apply liquid gasket without breaks to the specified location with the specified dimensions.

- If there is a groove for the liquid gasket application, apply liquid gasket to the groove.

- As for the bolt holes, normally apply liquid gasket inside the holes. Occasionally, it should be applied outside the holes. Make sure to read the text of service manual.
- Within five minutes of liquid gasket application, install the mating component.
- If liquid gasket protrudes, wipe it off immediately.
- Do not retighten 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.



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PREPARATION

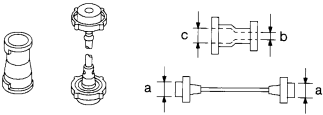


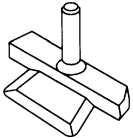
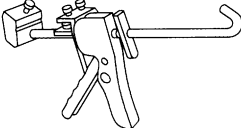
PREPARATION

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Special Service Tools

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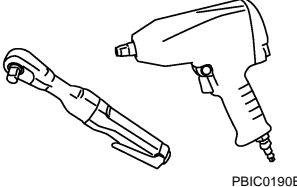
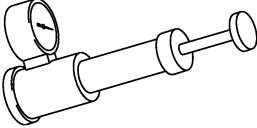
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
EG17650301 (J33984-A) Radiator cap tester adapter  <p style="text-align: center;">S-NT564</p>	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  <p style="text-align: center;">S-NT224</p>	Installing radiator upper and lower tanks
KV99103520 (-) Radiator plate pliers B  <p style="text-align: center;">S-NT225</p>	Removing radiator upper and lower tanks
KV10111100 (J37228) Seal cutter  <p style="text-align: center;">NT046</p>	Removing chain tensioner cover and water pump cover
WS39930000 (-) Tube presser  <p style="text-align: center;">S-NT052</p>	Pressing the tube of liquid gasket

PREPARATION

Commercial Service Tools

ABS0001G

Tool name	Description
<p>Power tool</p>  <p>PBIC0190E</p>	<p>Loosening bolts and nuts</p>
<p>Radiator cap tester</p>  <p>PBIC1982E</p>	<p>Checking radiator and radiator cap</p>

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OVERHEATING CAUSE ANALYSIS

OVERHEATING CAUSE ANALYSIS

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Troubleshooting Chart

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		Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—	
		Thermostat stuck closed	—		
		Damaged fins	Dust contamination or paper clogging		
			Physical damage		
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)		
	Reduced air flow	Cooling fan does not operate	Fan assembly	—	
		High resistance to fan rotation			
		Damaged fan blades			
		Damaged radiator shroud	—	—	—
		Improper engine coolant mixture ratio	—	—	—
		Poor engine coolant quality	—	Engine coolant viscosity	—
	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	A		
				Driving in low gear for extended time	CO		
				Driving at extremely high speed			
					Powertrain system malfunction	—	C
				Installed improper size wheels and tires	D		
				Dragging brakes			
		Improper ignition timing	E				
	Blocked or restricted air flow	Blocked bumper	—	—			
		Blocked radiator grille	Installed car brassiere		F		
			Mud contamination or paper clogging				
		Blocked radiator	—				
		Blocked condenser	Blocked air flow		G		
Installed large fog lamp							

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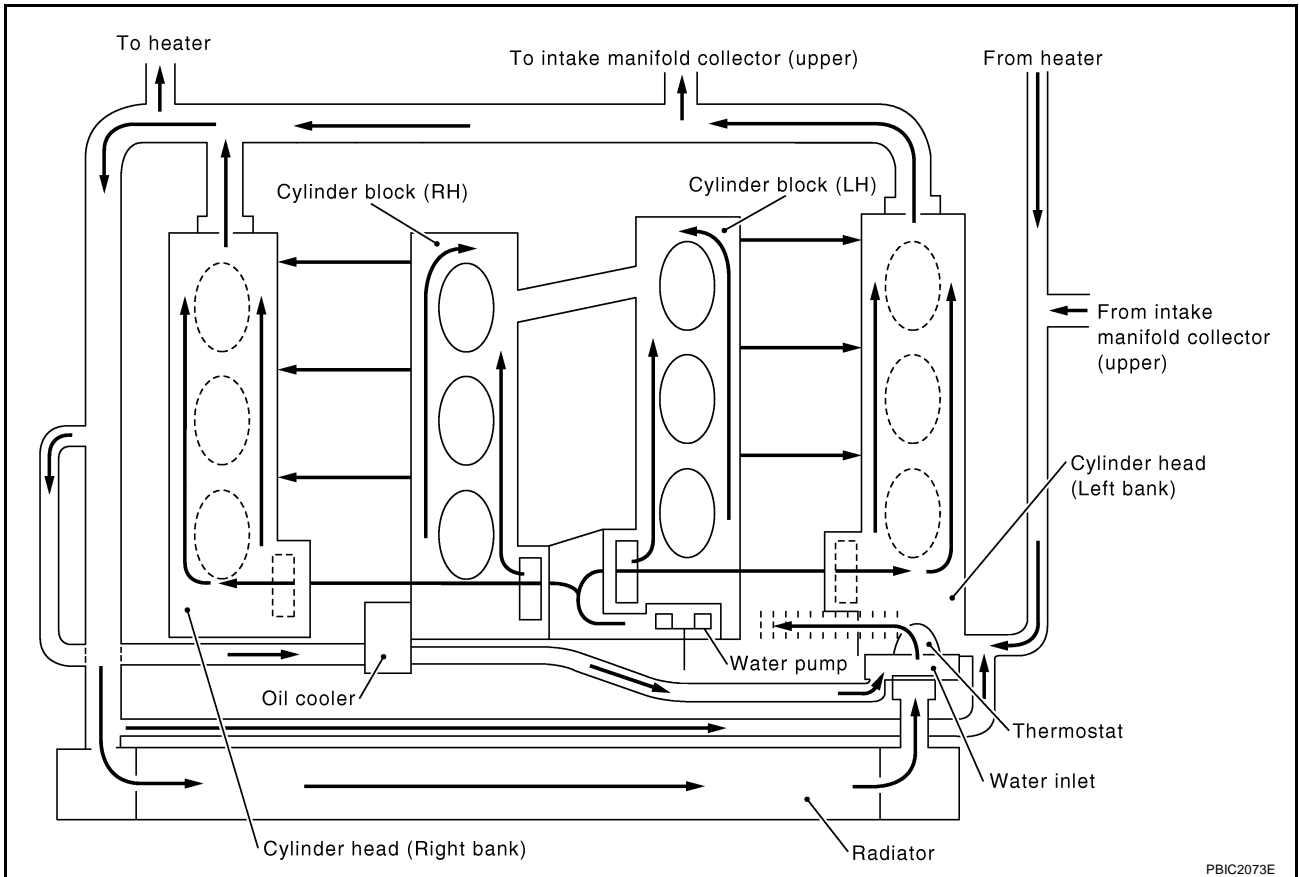
COOLING SYSTEM

COOLING SYSTEM

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Cooling Circuit

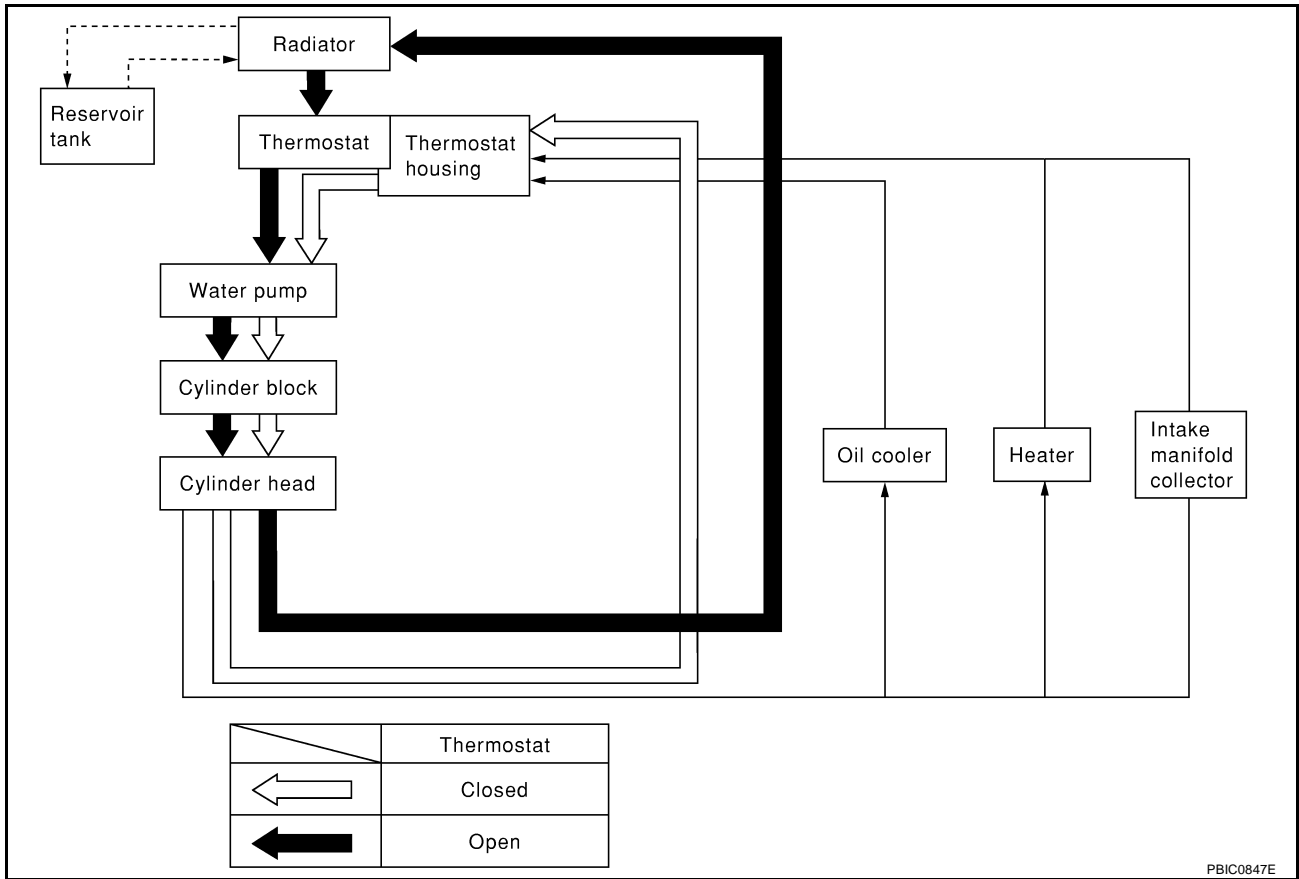
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COOLING SYSTEM

System Chart

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ENGINE COOLANT

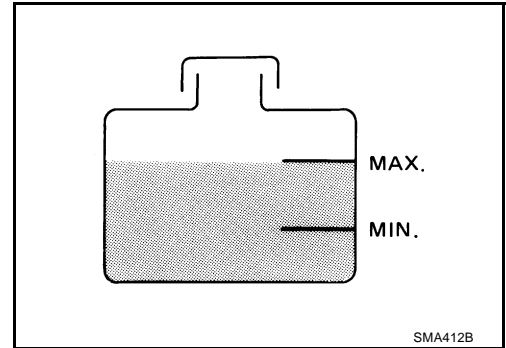
ENGINE COOLANT

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Inspection LEVEL CHECK

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



LEAK CHECK

- To check for leaks, apply pressure to the cooling system with radiator cap tester (commercial service tool) and radiator cap tester adapter (SST).

Testing pressure

: 157 kPa (1.6 kg/cm² , 23 psi)

WARNING:

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

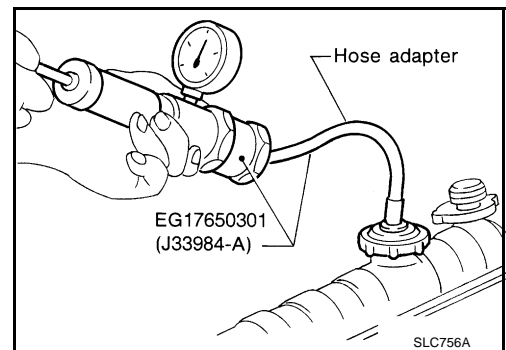
CAUTION:

Higher test pressure than specified may cause radiator damage.

NOTE:

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

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



Changing Engine Coolant

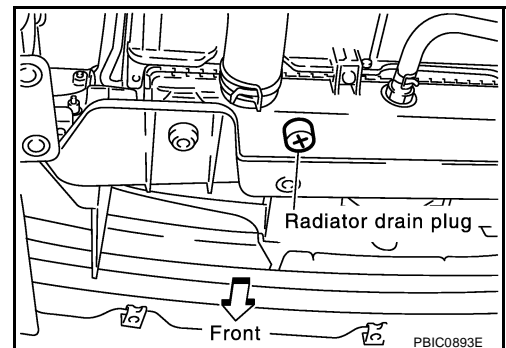
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WARNING:

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

DRAINING ENGINE COOLANT

1. Remove undercover with power tool.
2. Open radiator drain plug at the bottom of radiator, and then remove radiator cap.



When drain all of engine coolant in the system, open drain plugs on engine cylinder block. Refer to [EM-111, "DISASSEMBLY"](#) .

3. Remove reservoir tank, drain engine coolant and clean tank before installing.

ENGINE COOLANT

4. 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:

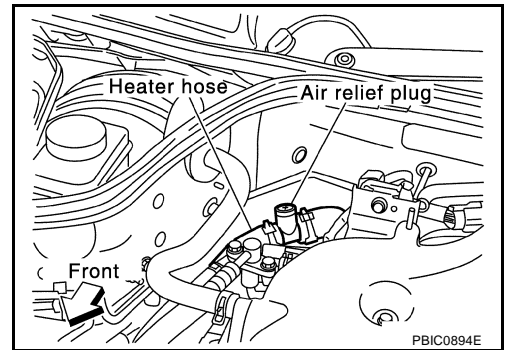
Be sure to clean drain plug and install with new O-ring.

Radiator drain plug:

: 0.78 - 1.6 N·m (0.08 - 0.16 kg-m, 7 - 14 in-lb)

If cylinder block drain plugs are removed, close and tighten them. Refer to [EM-116. "ASSEMBLY"](#).

2. Remove air relief plug on heater hose.



3. Fill radiator and reservoir tank to specified level.

- Pour engine coolant through engine coolant filler neck slowly of less than 2 ℓ (2-1/8 US qt, 1-3/4 Imp qt) a minute to allow air in system to escape.
- Use Genuine Nissan Long Life Antifreeze/ Coolant or equivalent mixed with water (distilled or demineralized). Refer to [GI-45. "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#).

Engine coolant capacity (Approximate) (with reservoir tank at "MAX" level)

: 8.5 ℓ (9 US qt, 7-1/2 Imp qt) for A/T models

: 8.7 ℓ (9-1/4 US qt, 7-5/8 Imp qt) for M/T models

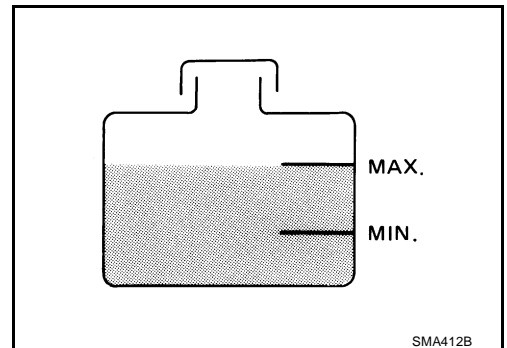
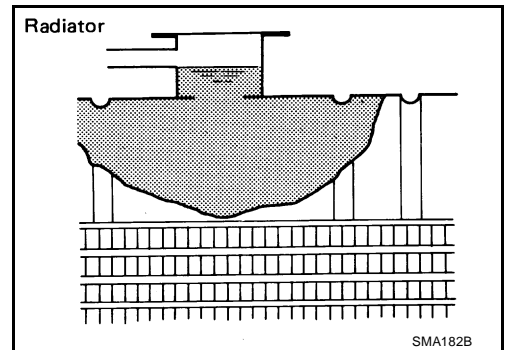
Reservoir tank capacity (at "MAX" level)

: 0.8 ℓ (7/8 US qt, 3/4 Imp qt)

- When engine coolant overflows air relief hole on heater hose, install air relief plug with new O-ring.

Air relief plug:

: 0.78 - 1.6 N·m (0.08 - 0.16 kg-m, 7 - 14 in-lb)



4. Warm up engine to normal operating temperature with radiator cap installed.
 5. Run engine at 3,000 rpm for 10 seconds and return to idle speed.
 - Repeat two or three times.
- ### CAUTION:
- Watch water 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 a fan to reduce the time.
 - If necessary, refill radiator up to filler neck with engine coolant.

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.
 - **Clean excess engine coolant from engine.**

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.
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.

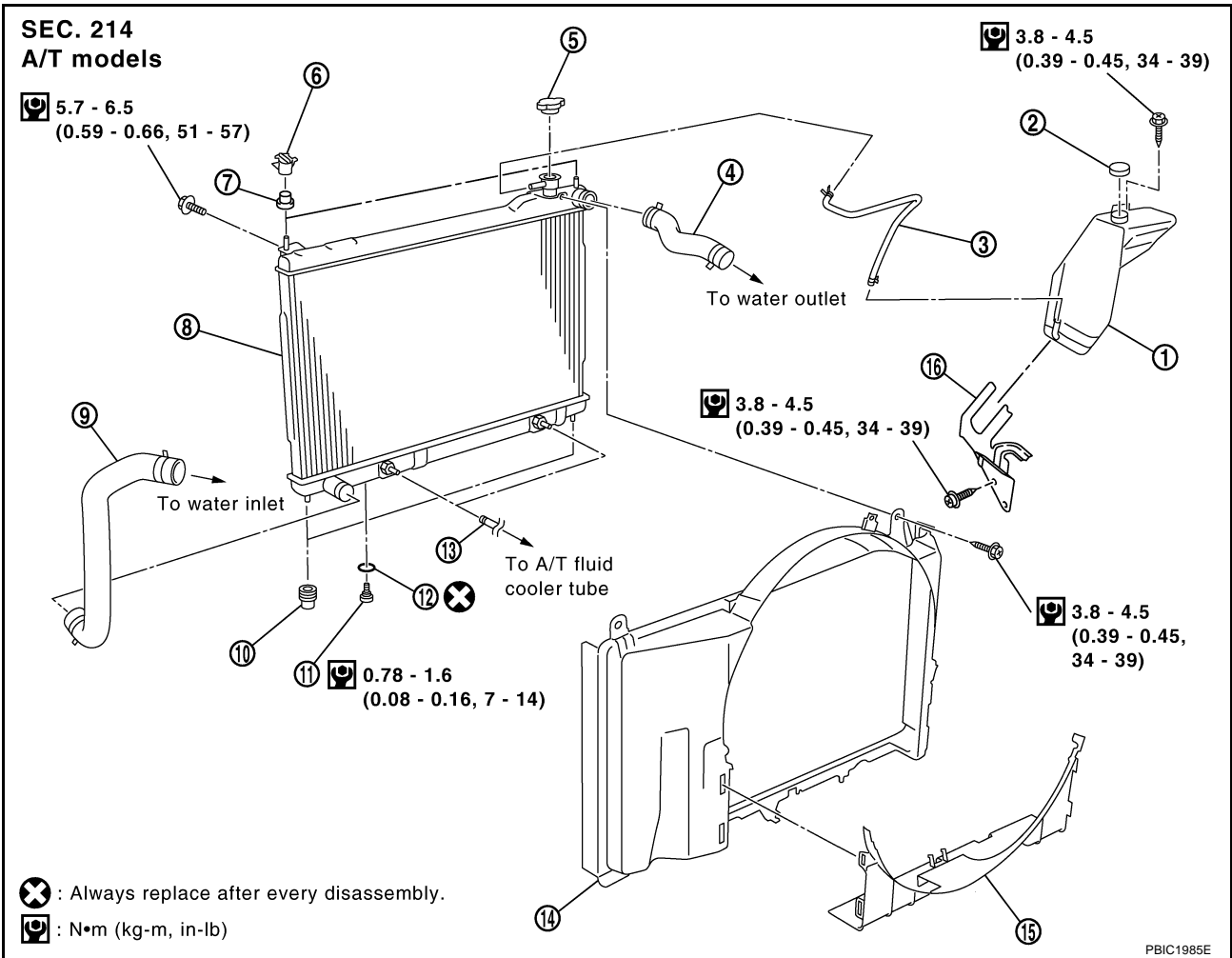
RADIATOR

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RADIATOR

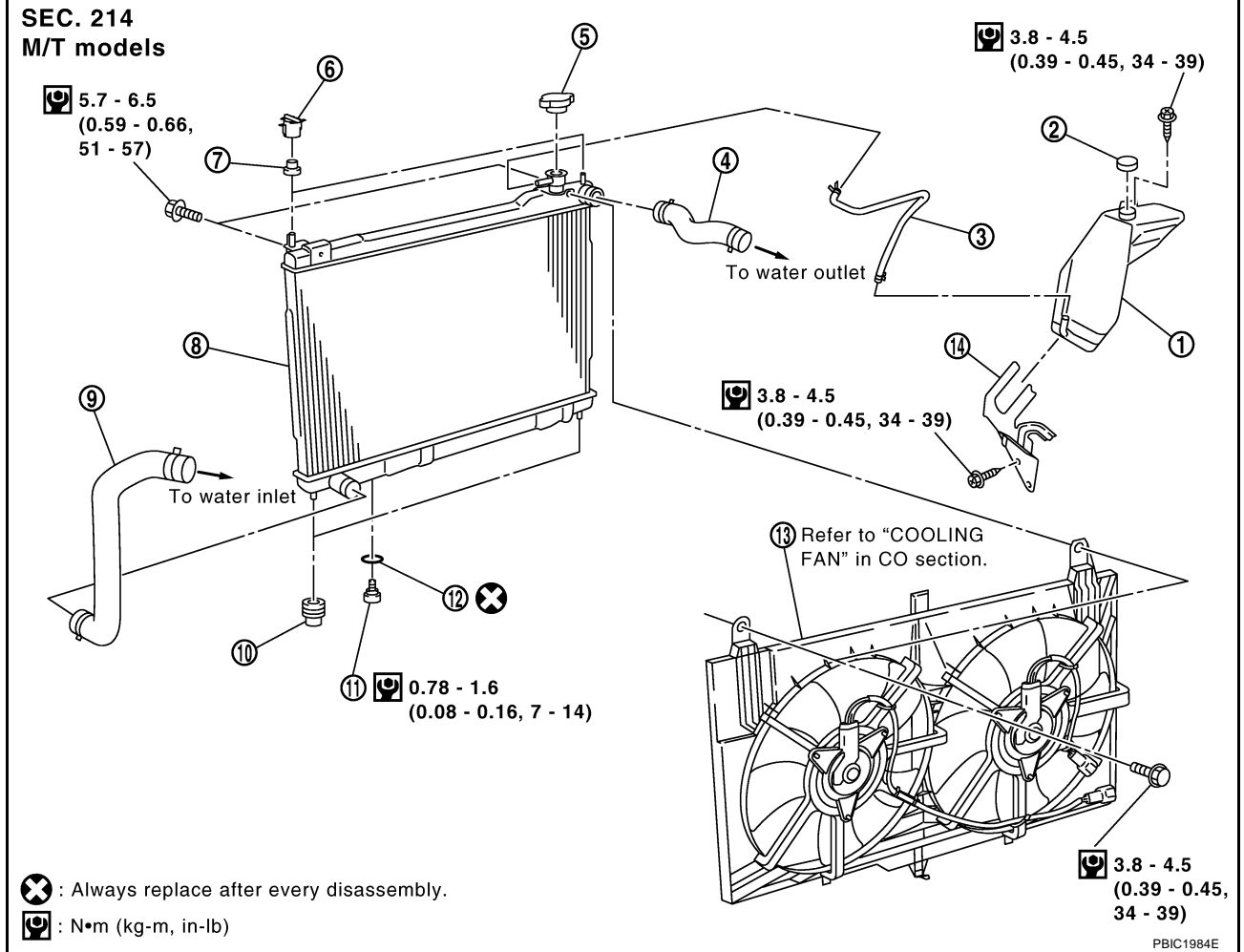
Removal and Installation



- | | | |
|-----------------------------|---------------------|-----------------------------|
| 1. Reservoir tank | 2. Cap | 3. Reservoir tank hose |
| 4. Radiator hose (upper) | 5. Radiator cap | 6. Upper mount bracket |
| 7. Mounting rubber (upper) | 8. Radiator | 9. Radiator hose (lower) |
| 10. Mounting rubber (lower) | 11. Drain plug | 12. O-ring |
| 13. A/T fluid cooler hose | 14. Radiator shroud | 15. Radiator shroud (lower) |
| 16. Bracket | | |

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RADIATOR



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|-----------------------------------|-----------------|--------------------------|
| 1. Reservoir tank | 2. Cap | 3. Reservoir tank hose |
| 4. Radiator hose (upper) | 5. Radiator cap | 6. Upper mount bracket |
| 7. Mounting rubber (upper) | 8. Radiator | 9. Radiator hose (lower) |
| 10. Mounting rubber (lower) | 11. Drain plug | 12. O-ring |
| 13. Radiator cooling fan assembly | 14. Bracket | |

WARNING:

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

REMOVAL

1. Remove engine cover with power tool. Refer to [EM-18, "INTAKE MANIFOLD COLLECTOR"](#).
2. Remove undercover with power tool.
3. Drain engine coolant from radiator. Refer to [CO-10, "Changing Engine Coolant"](#).

CAUTION:

Perform when the engine is cold.

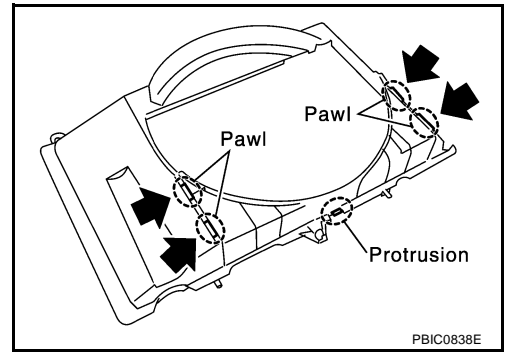
4. Disconnect A/T fluid cooler hoses. (A/T models)
 - Install blind plug to avoid leakage of A/T fluid.
5. Remove air duct (inlet) and air cleaner case. Refer to [EM-16, "AIR CLEANER AND AIR DUCT"](#).
6. Remove bracket mounting bolt for anchoring A/C piping from vehicle left side, so that A/C piping can be moved.
7. Remove reservoir tank and bracket.
8. Remove radiator hoses (upper and lower) and reservoir tank hose.

CAUTION:

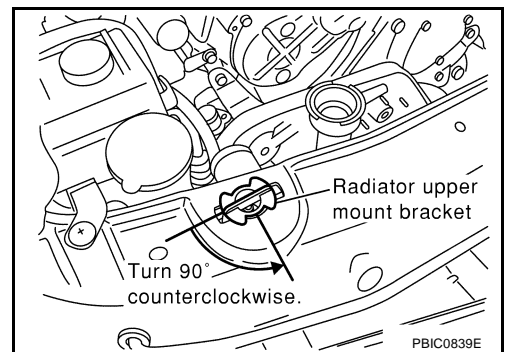
Be careful not to allow engine coolant to contact drive belts.

RADIATOR

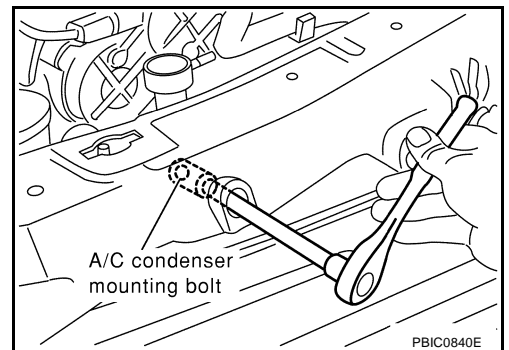
9. Remove radiator cooling fan assembly. Refer to [CO-24, "Removal and Installation \(Motor Driven\) \(M/T Models\)"](#). (M/T models)
10. Remove radiator shroud (lower). (A/T models)
 - While pressing left and right pawls in direction indicated by arrows, pull lower radiator shroud toward you to remove.



11. Remove radiator shroud. (A/T models)
12. Remove cooling fan. Refer to [CO-22, "Removal and Installation \(Crankshaft Driven Type\) \(A/T Models\)"](#). (A/T models)
13. Rotate two radiator upper mount brackets 90 degrees in the direction as shown in the figure, and remove them.



14. Remove two A/C condenser mounting bolts located in upper part of radiator.



15. Remove radiator as follows:

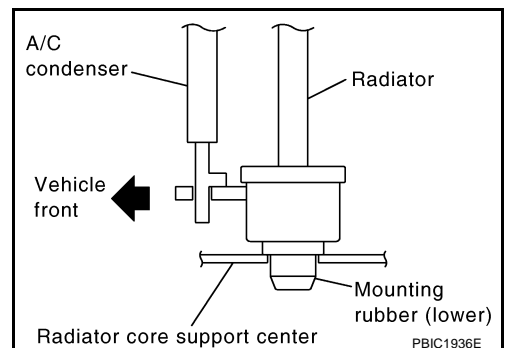
CAUTION:

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

- a. With lifting and pulling radiator in a rear direction, disassemble lower mount from radiator core support center.

CAUTION:

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



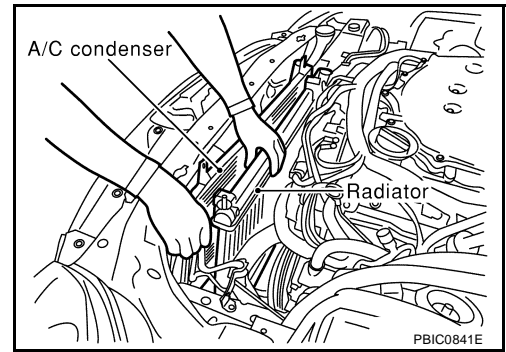
RADIATOR

- b. Lift A/C condenser up and remove radiator after disengaging the fitting as front-bottom surface.

CAUTION:

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

- c. After removing radiator, put A/C condenser on radiator core support center to prevent a load to A/C piping, and temporarily fix it with a rope or similar means.



INSTALLATION

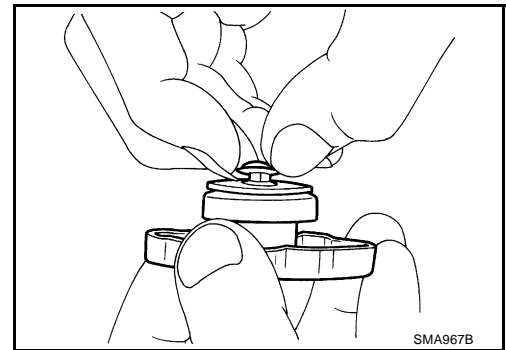
Install in the reverse order of removal.

INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using radiator cap tester adapter [SST: EG17650301 (J33984-A)] and radiator cap tester (commercial service tool). Refer to [CO-10, "LEAK CHECK"](#).
- Start and warm up engine. Visually make sure that there is no leaks of engine coolant and A/T fluid (A/T models).

Checking Radiator Cap

1. Pull negative-pressure valve to open it and make sure that it closes completely 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 the negative-pressure valve.



2. Check radiator cap relief pressure.

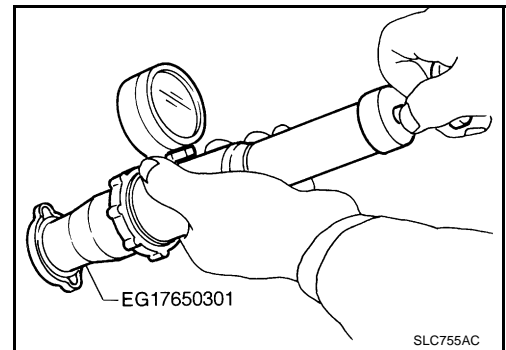
Standard:

78 - 98 kPa (0.8 - 1.0 kg/cm² , 11 - 14 psi)

Limit:

59 kPa (0.6 kg/cm² , 9 psi)

- When connecting radiator cap to radiator cap tester (commercial service tool) and radiator cap tester adapter (SST), apply engine coolant to the cap seal surface.
- Replace radiator cap if there is an unusualness in negative-pressure valve, or if the relief pressure exceed the limit.



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 electrical connectors to prevent water from entering.
1. Apply water by hose to the back side of radiator core vertically downward.
 2. Apply water again to all radiator core surface once per minute.
 3. Stop washing if any stains no longer flow out from radiator.
 4. Blow air into the back side of radiator core vertically downward.

RADIATOR

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- Use compressed air lower than 490 kPa (5 kg/cm² , 71 psi) and keep distance more than 30 cm (11.8 in).
5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

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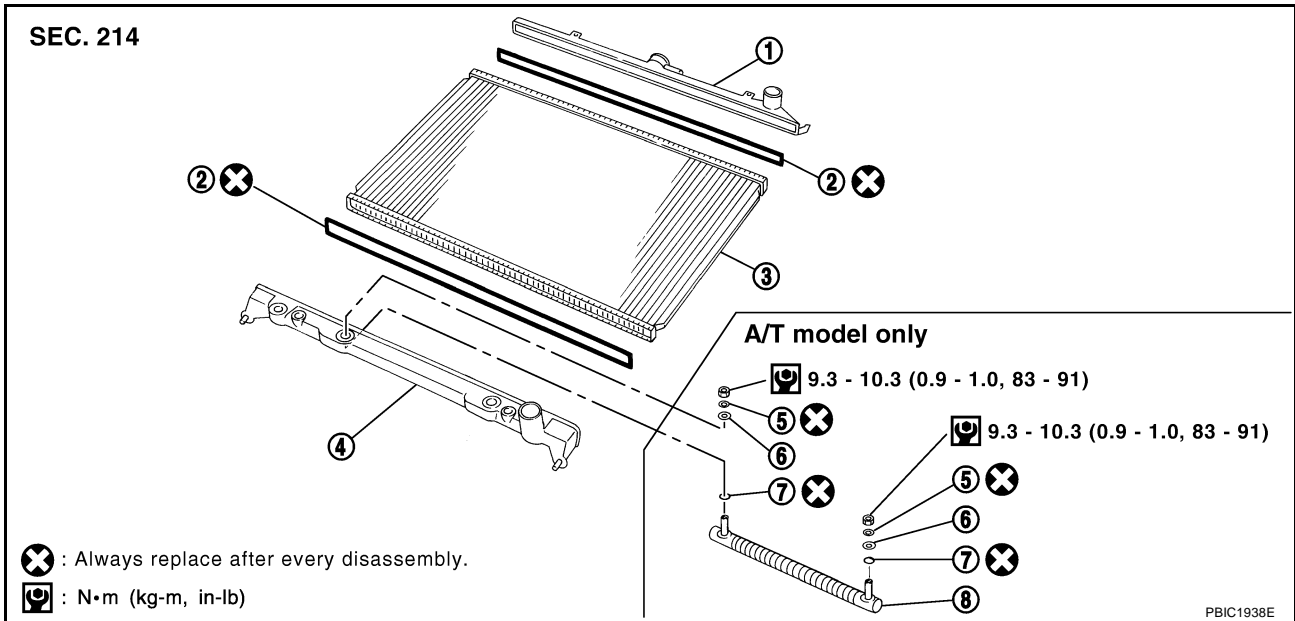
RADIATOR (ALUMINUM TYPE)

PFP:21460

ABS0099Z

RADIATOR (ALUMINUM TYPE)

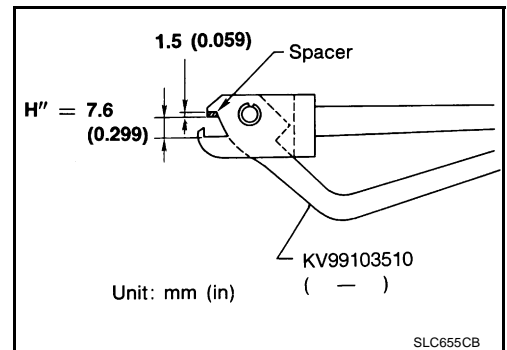
Disassembly and Assembly



- | | | |
|---------------|---------------------|-----------|
| 1. Upper tank | 2. Sealing rubber | 3. Core |
| 4. Lower tank | 5. Conical washer | 6. Washer |
| 7. O-ring | 8. A/T fluid cooler | |

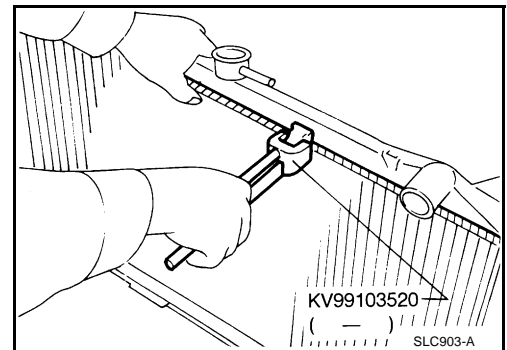
PREPARATION

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



DISASSEMBLY

- Remove upper and lower tanks with radiator plate pliers B (SST).

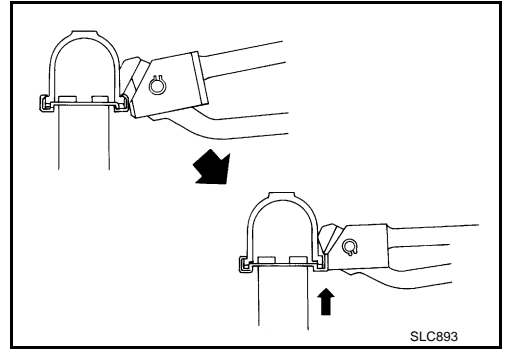


RADIATOR (ALUMINUM TYPE)

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

CAUTION:

Do not bend excessively.

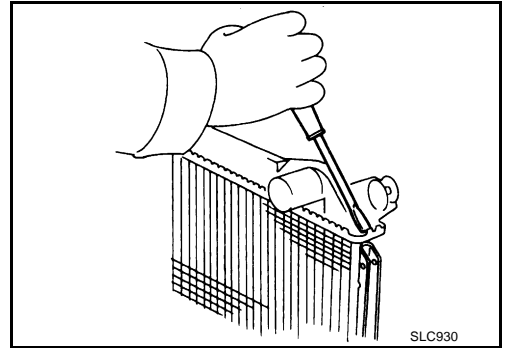


- In areas where radiator plate pliers B cannot be used, use flat-bladed screwdriver to bend the edge up.

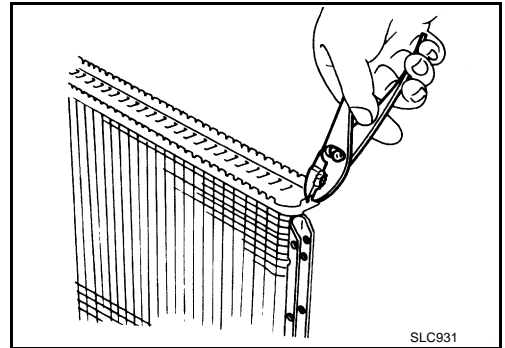
CAUTION:

Be careful not to damage tank.

2. Remove sealing rubber.



3. Make sure the edge stands straight up.
4. Remove A/T fluid cooler from tank. (A/T models)

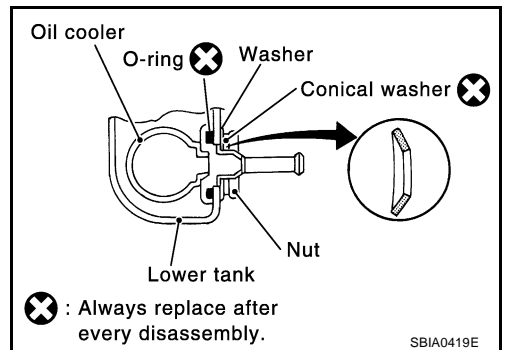


ASSEMBLY

1. Install A/T fluid cooler. (A/T models)

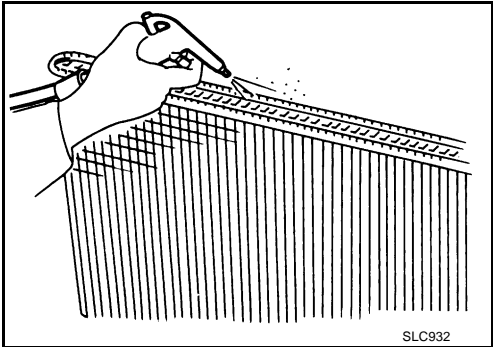
CAUTION:

Pay attention to direction of conical washer.



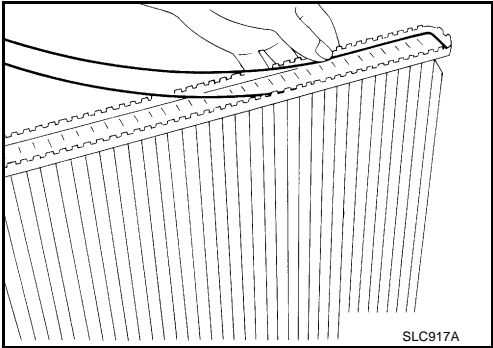
RADIATOR (ALUMINUM TYPE)

2. Clean contact portion of tank.

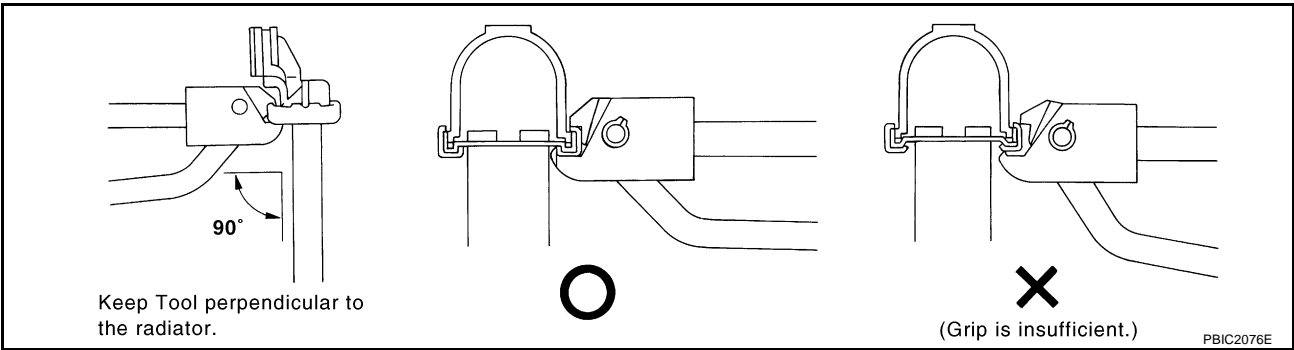
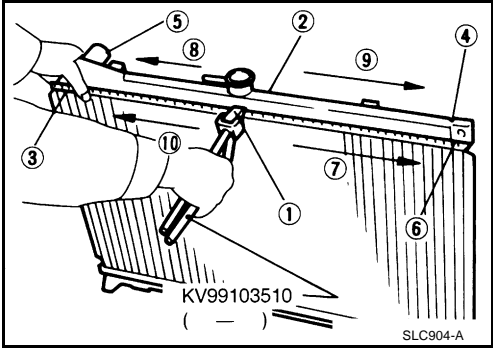


3. Install sealing rubber while pushing it with fingers.

CAUTION:
Be careful not to twist sealing rubber.

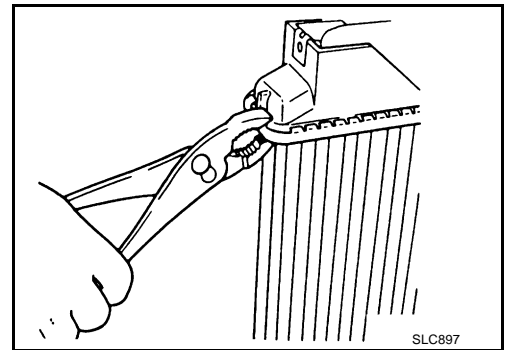


4. Caulk tank in numerical order as shown in the figure with radiator plate pliers A (SST).



RADIATOR (ALUMINUM TYPE)

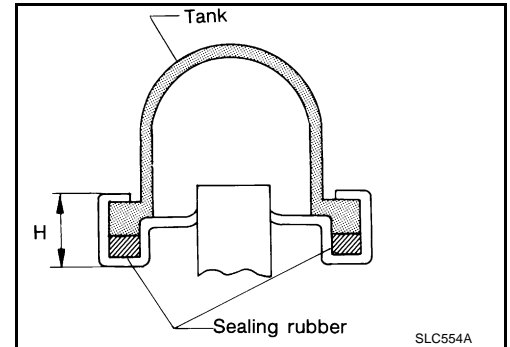
- Use pliers in the locations where radiator plate pliers A cannot be used.



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

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

6. Make sure that there is no leakage.
Refer to [CO-21, "INSPECTION"](#) .



INSPECTION

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

Testing pressure

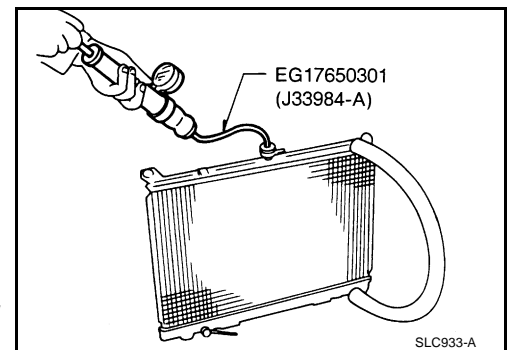
: 157 kPa (1.6 kg/cm² , 23 psi)

WARNING:

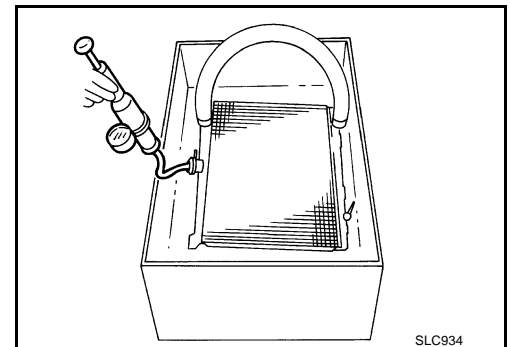
To prevent the risk of hose coming undone while under pressure, securely fasten it down with hose clamp.

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.



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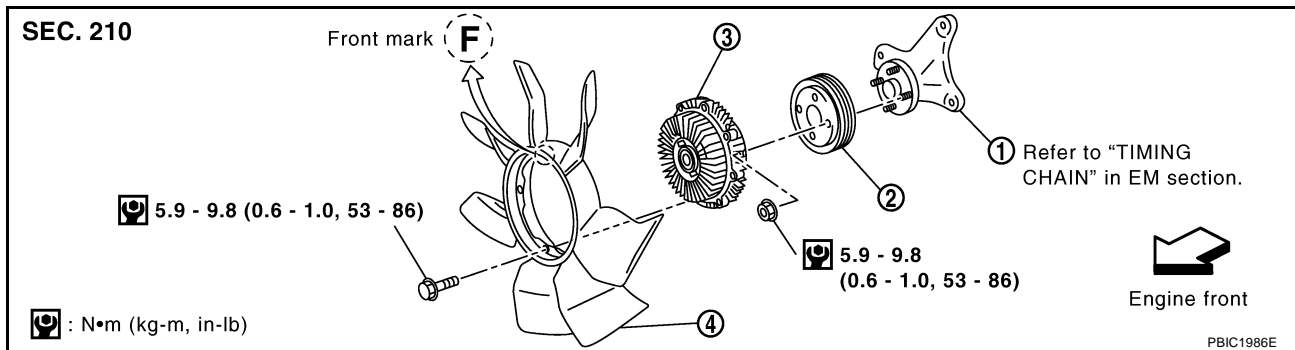
COOLING FAN

PFP:21140

COOLING FAN

Removal and Installation (Crankshaft Driven Type) (A/T Models)

ABS000JP



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

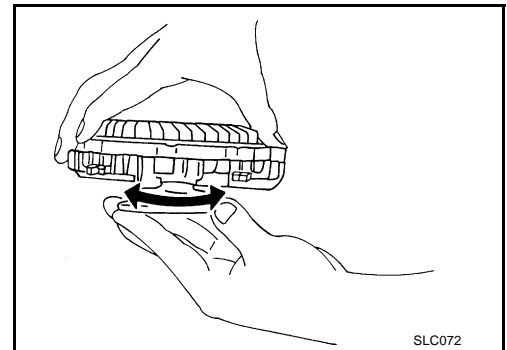
REMOVAL

1. Remove air duct. Refer to [EM-16, "AIR CLEANER AND AIR DUCT"](#) .
2. Remove undercover with power tool.
3. Disconnect radiator hose (lower) and A/T fluid cooler hoses. Refer to [CO-13, "RADIATOR"](#) .
4. Remove radiator shroud (lower). Refer to [CO-13, "RADIATOR"](#) .
5. Remove drive belts. Refer to [EM-13, "DRIVE BELTS"](#) .
6. Remove cooling fan.

INSPECTION AFTER REMOVAL

Inspect fan coupling for oil leakage and bimetal conditions.

- If anything is found, replace fan coupling.



INSTALLATION

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

- Install cooling fan with its front mark "F" facing front of engine. Refer to "Component Parts Illustration" [CO-22, "Removal and Installation \(Crankshaft Driven Type\) \(A/T Models\)"](#) .

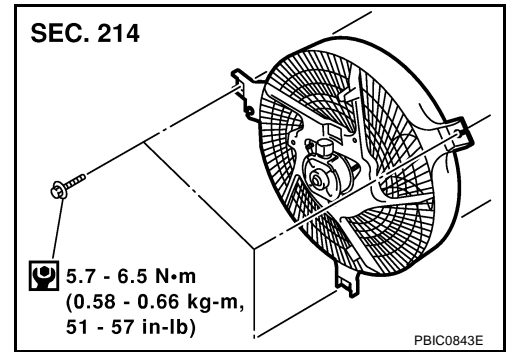
COOLING FAN

Removal and Installation (Motor Driven Type) (A/T Models)

ABS000JO

REMOVAL

1. Remove front grille. Refer to [EI-20, "FRONT GRILLE"](#).
2. Remove under cover with power tool.
3. Disconnect harness connector from fan motor.
4. Remove cooling fan assembly.

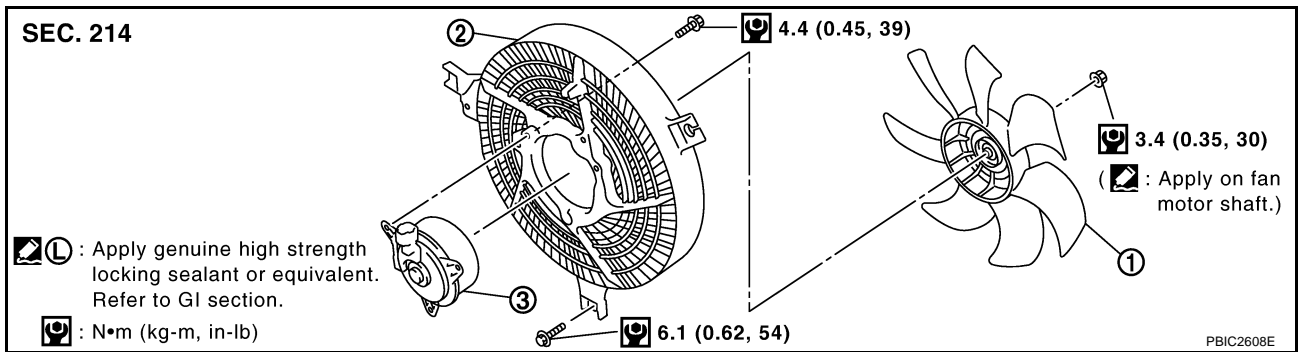


INSTALLATION

Install in the reverse order of removal.

- Cooling fan is controlled by ECM. For details, refer to [EC-466, "DTC P1217 ENGINE OVER TEMPERATURE \(FOR A/T MODELS\)"](#).

DISASSEMBLY AND ASSEMBLY



1. Cooling fan

2. Fan grille

3. Fan motor

Disassembly

1. Remove cooling fan from fan motor.
2. Remove fan motor from fan grille.

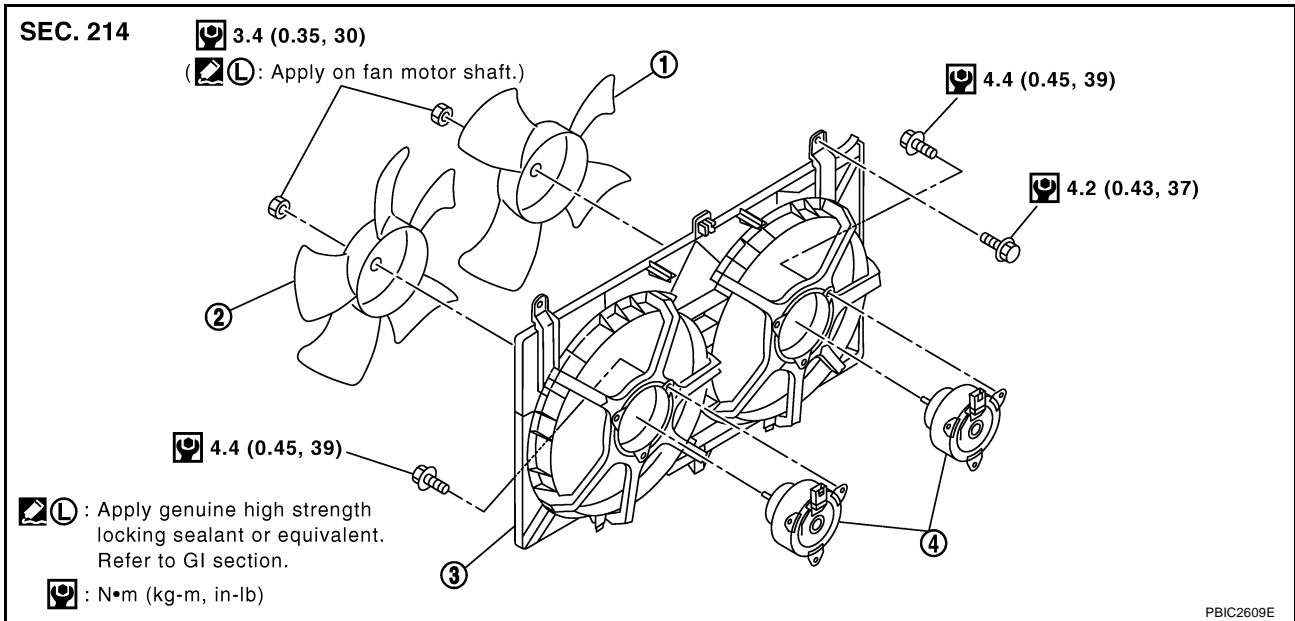
Assembly

Assemble in the reverse order of disassembly.

COOLING FAN

Removal and Installation (Motor Driven) (M/T Models)

ABS008GO



1. Cooling fan (RH)
2. Cooling fan (LH)
3. Fan shroud
4. Fan motor

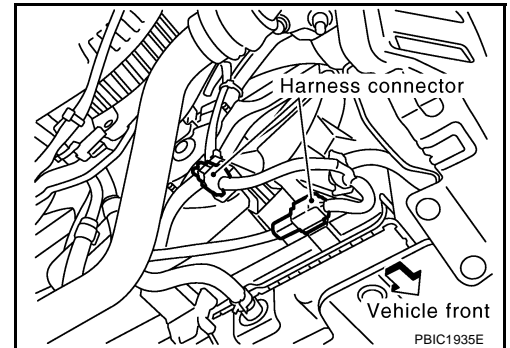
REMOVAL

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 duct (inlet) and air cleaner case. Refer to [EM-16, "AIR CLEANER AND AIR DUCT"](#).
3. Disconnect radiator hose (upper) at radiator side.
4. Disconnect fan motor harness connectors at the right-lower portion of fan shroud.



5. Remove radiator cooling fan assembly.

CAUTION:

Be careful not to damage or scratch on radiator core.

INSTALLATION

Install in the reverse order of removal.

- Cooling fans are controlled by ECM. For details, refer to [EC-478, "DTC P1217 ENGINE OVER TEMPERATURE \(FOR M/T MODELS\)"](#).

COOLING FAN

DISASSEMBLY AND ASSEMBLY

Disassembly

1. Remove cooling fans from fan motors.
2. Remove fan motors from fan shroud.

Assembly

Assemble in the reverse order of disassembly.

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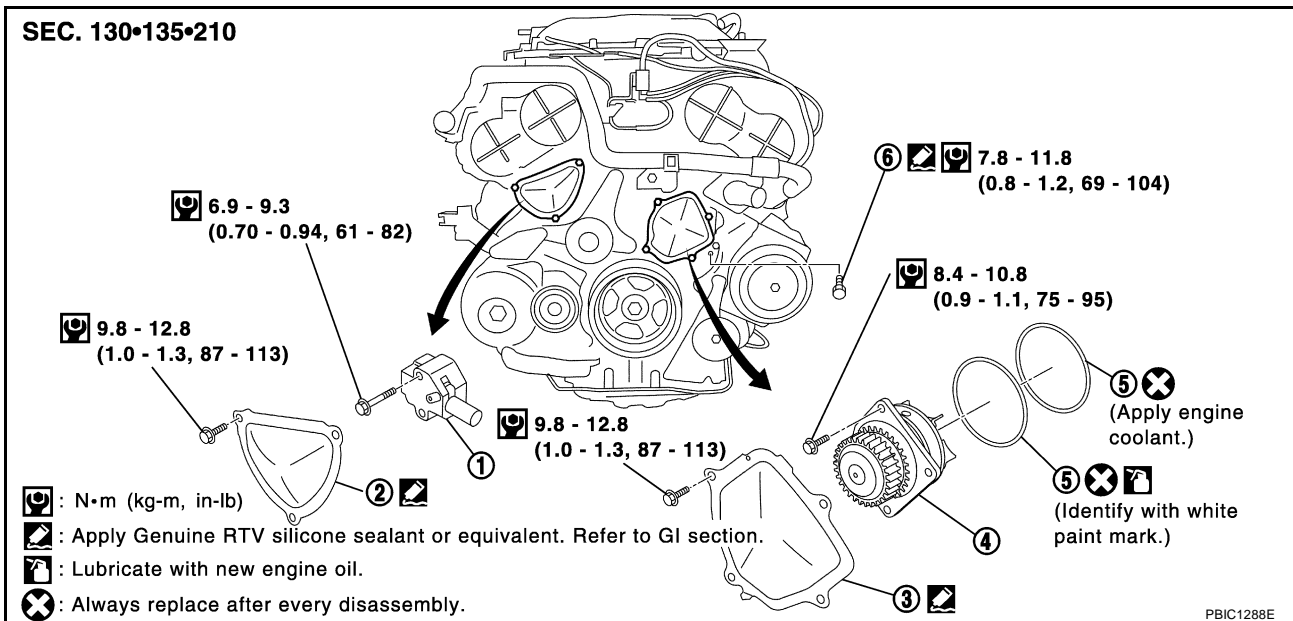
WATER PUMP

WATER PUMP

PFP:21020

Removal and Installation

ABS009A0



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

CAUTION:

- When removing water pump assembly, be careful not to get engine coolant on drive belt.
- Water pump cannot be disassembled and should be replaced as a unit.
- After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester (commercial service tool) and radiator cap tester adapter [SST: EG17650301 (J33984-A)].

REMOVAL

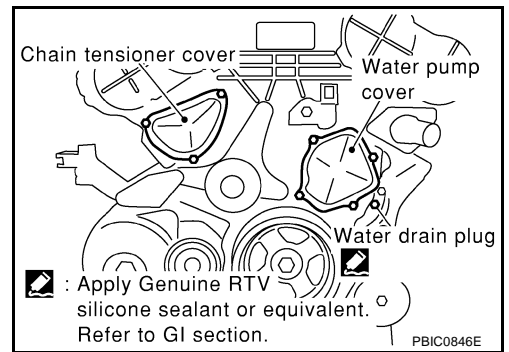
1. Remove undercover with power tool.
2. Remove drive belts. Refer to [EM-13, "DRIVE BELTS"](#) .
3. Drain engine coolant from radiator. Refer to [CO-10, "Changing Engine Coolant"](#) .

CAUTION:

- Perform this step when engine is cold.
 - Do not spill engine coolant on drive belts.
4. Remove air duct. Refer to [EM-16, "AIR CLEANER AND AIR DUCT"](#) .
 5. Remove radiator hoses (upper and lower). Refer to [CO-13, "RADIATOR"](#) .
 6. Remove radiator shrouds. (A/T models) Refer to [CO-13, "RADIATOR"](#) .
 7. Remove cooling fan. Refer to [CO-22, "Removal and Installation \(Crankshaft Driven Type\) \(A/T Models\)"](#) (A/T models).
 8. Remove radiator cooling fan assembly. Refer to [CO-24, "Removal and Installation \(Motor Driven\) \(M/T Models\)"](#) (M/T models).

WATER PUMP

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



10. Remove chain tensioner cover and water pump cover from front timing chain case.
- Use seal cutter [SST: KV10111100 (J37228)] or equivalent tool to cut liquid gasket for remove.

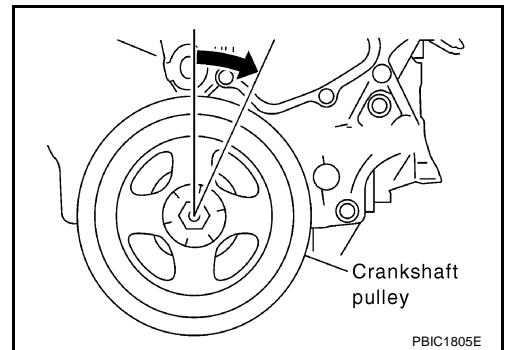
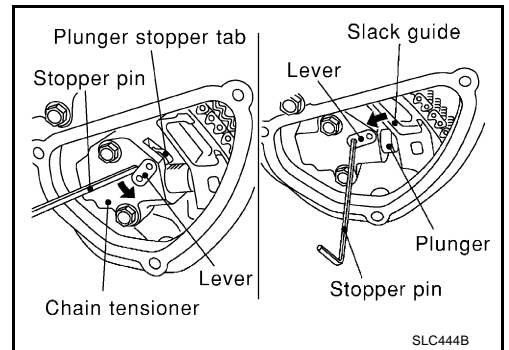
11. Remove timing chain tensioner (primary) as follows:

- a. Pull lever down and release plunger stopper tab.
- Plunger stopper tab can be pushed up to release (coaxial structure with lever).
- b. Insert stopper pin into tensioner body hole to hold lever, and keep tab released.

NOTE:

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

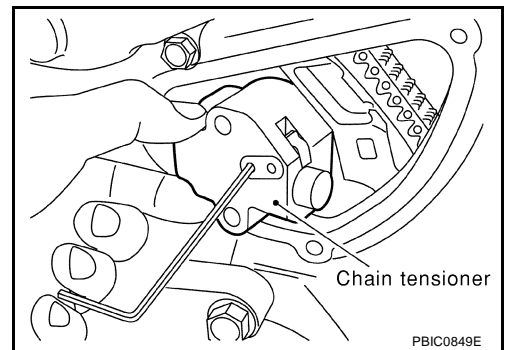
- c. Insert plunger into tensioner body by pressing slack guide.
- d. Keep slack guide pressed and hold it by pushing stopper pin through the lever hole and body hole.
- e. Turn crankshaft pulley clockwise so that timing chain on the timing chain tensioner (primary) side is loose.



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

CAUTION:

Be careful not to drop mounting bolts inside chain case.

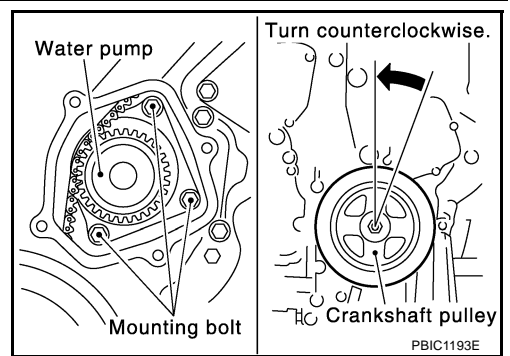


12. Remove water pump as follows:

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WATER PUMP

- 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 rear timing chain case. Then, alternately tighten each bolt for a half turn, and pull out water pump.

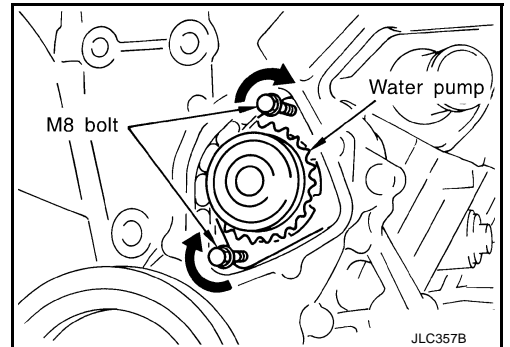
CAUTION:

- 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.

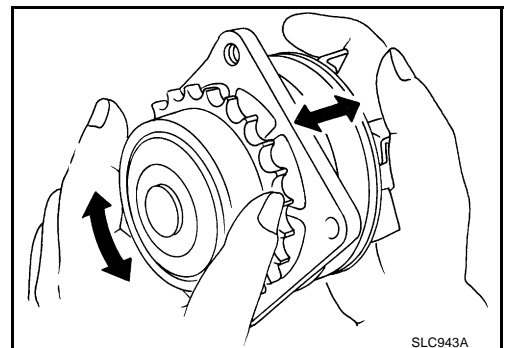
CAUTION:

Do not disassemble water pump.



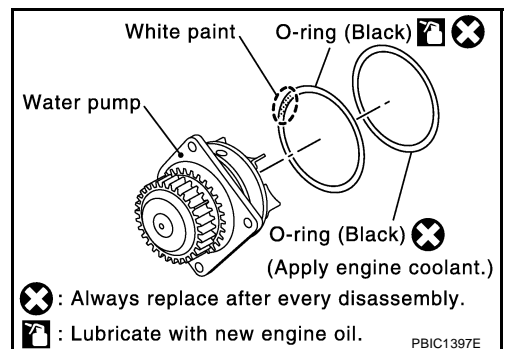
INSPECTION AFTER REMOVAL

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



INSTALLATION

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



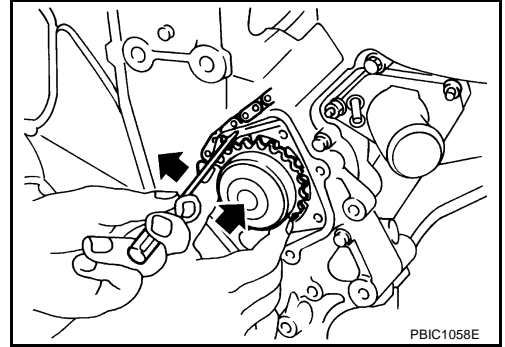
WATER PUMP

2. Install water pump.

CAUTION:

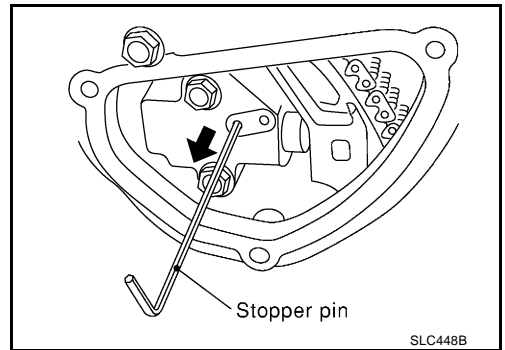
Do not allow cylinder block to nip O-rings when install water pump.

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



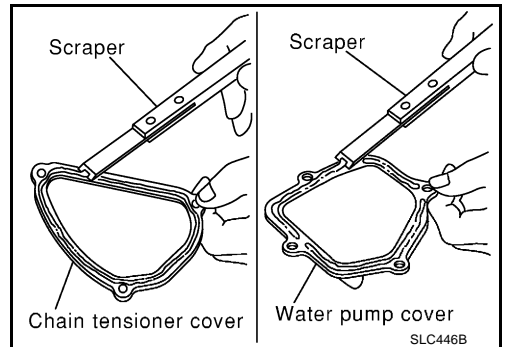
3. Install timing chain tensioner (primary) as follows:

- 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).
- d. Remove stopper pin.



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

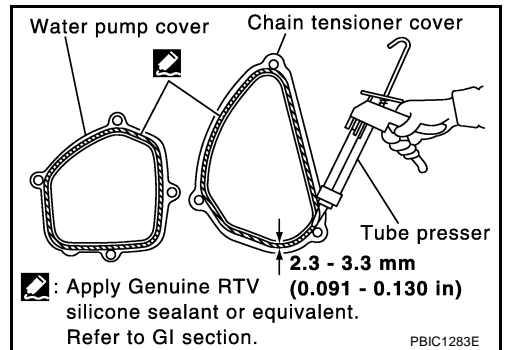
- a. Before installing, remove all traces of old liquid gasket from mating surface of water pump cover and chain tensioner cover using scraper. Also remove traces of old liquid gasket from the mating surface of front timing chain case.



- b. Apply a continuous bead of liquid gasket using tube presser [SST: WS39930000 (—)], to mating surface of chain tensioner cover and water pump cover.

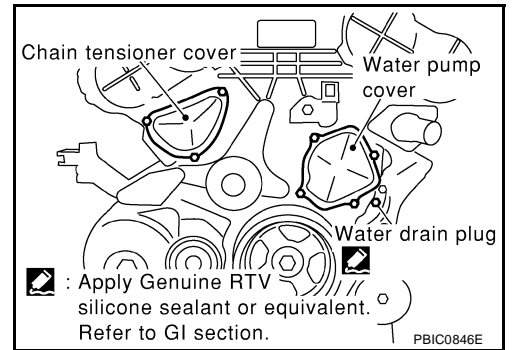
Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#).

- c. Tighten mounting bolts.



WATER PUMP

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



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 timing chain tensioner (primary). Engine may produce a rattling noise. This indicates that air still remains in the chamber and is not a matter of concern.**

WATER PUMP

INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using radiator cap tester adapter [SST: EG17650301 (J33984-A)] and radiator cap tester (commercial service tool). Refer to [CO-10, "LEAK CHECK"](#) .
- Start and warm up engine. Visually make sure that there is no leaks of engine coolant and A/T fluid (A/T models).

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WATER INLET AND THERMOSTAT ASSEMBLY

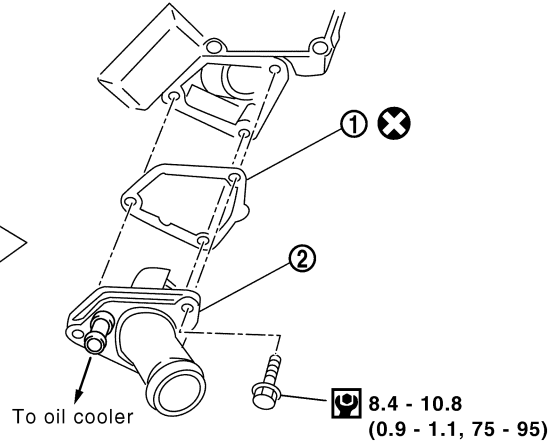
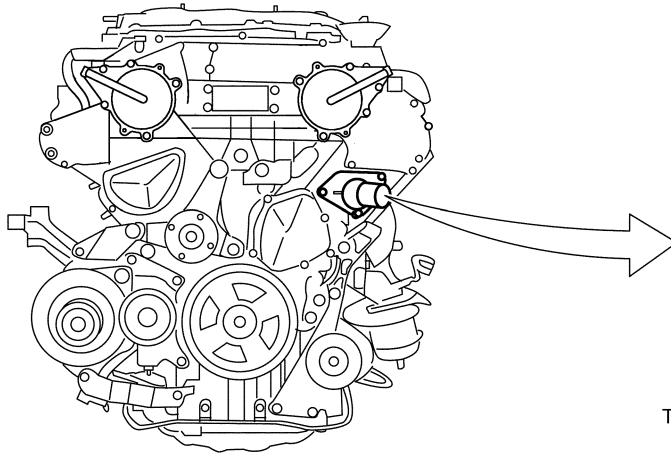
WATER INLET AND THERMOSTAT ASSEMBLY

PFP:21200

Removal and Installation

ABS009A1

SEC. 210•211



: N·m (kg-m, in-lb)

: Always replace after every disassembly.

PBIC1937E

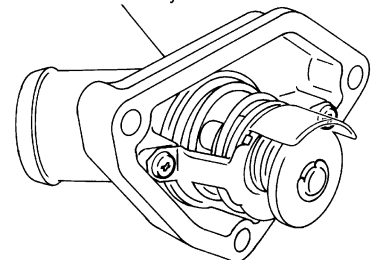
1. Gasket

2. Water inlet and thermostat assembly

REMOVAL

1. Remove undercover with power tool.
2. Drain engine coolant from radiator. Refer to [CO-10, "Changing Engine Coolant"](#) .
3. Remove air duct and air cleaner case. Refer to [EM-16, "AIR CLEANER AND AIR DUCT"](#) .
4. Remove water drain plug (front) on water pump side of cylinder block. Refer to [CO-26, "WATER PUMP"](#) .
5. Disconnect radiator hose (lower) and oil cooler hose from water inlet and thermostat assembly.
6. Remove water inlet and thermostat assembly.
 - **Do not disassemble water inlet and thermostat assembly. Replace them as a unit, if necessary.**

Water inlet and thermostat assembly



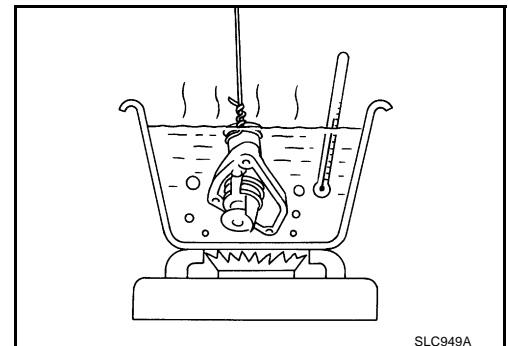
SLC962AB

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	A/T	82°C (180°F)
	M/T	76.5°C (170°F)
Full open valve lift	A/T	more than 8.6 mm / 95°C (0.339 in / 203°F)
	M/T	more than 8.6 mm / 90°C (0.339 in / 194°F)

3. Then check if valve closes at 5°C (9°F) below valve opening temperature.



SLC949A

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 (J33984-A)] and radiator cap tester (commercial service tool). Refer to [CO-10, "LEAK CHECK"](#) .
- Start and warm up engine. Visually make sure that there is no leaks of engine coolant and A/T fluid (A/T models).

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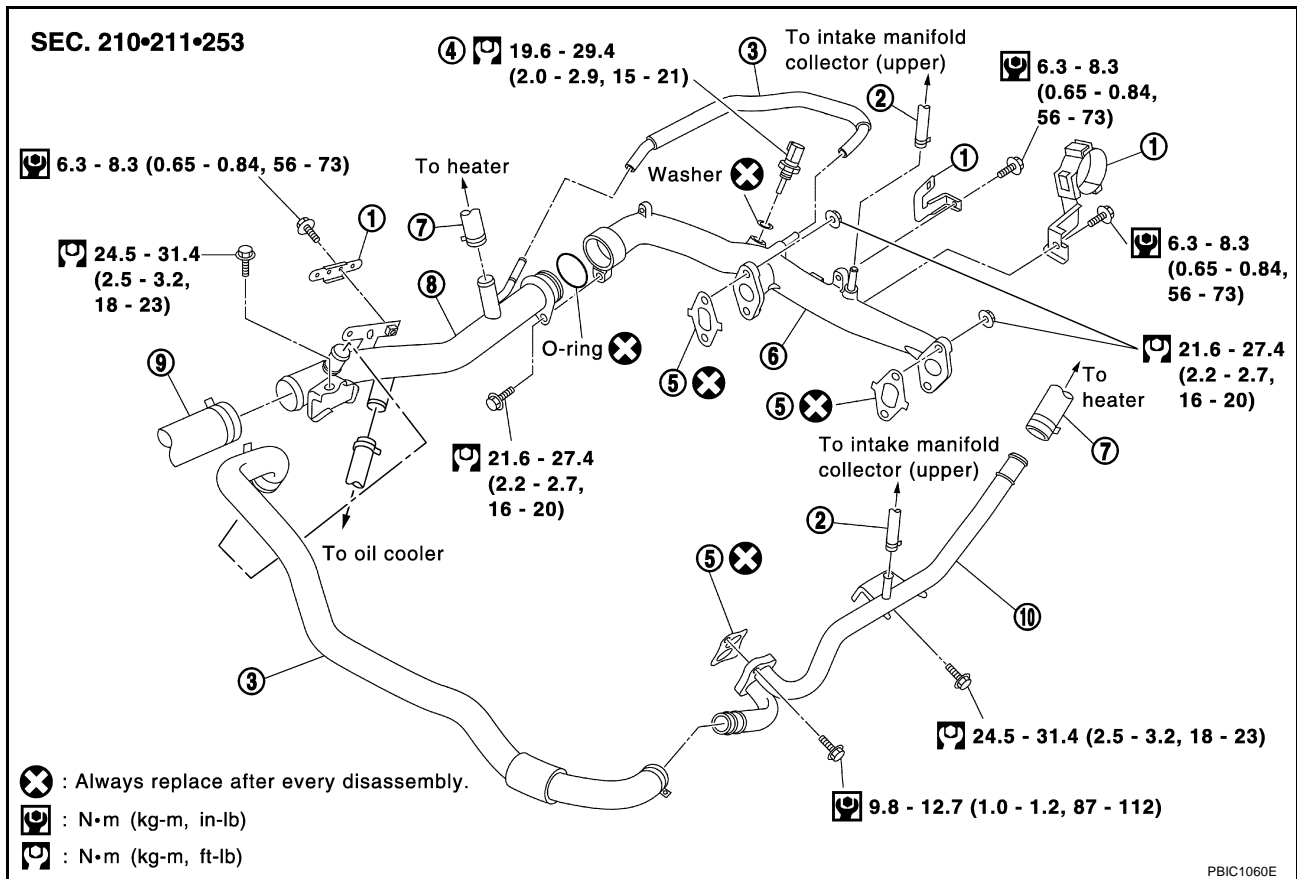
WATER OUTLET AND WATER PIPING

PFP:11060

WATER OUTLET AND WATER PIPING

Removal and Installation

ABS009A2



- | | | |
|--------------------------------------|---------------|------------------------|
| 1. Harness bracket | 2. Water hose | 3. Water bypass hose |
| 4. Engine coolant temperature sensor | 5. Gasket | 6. Water outlet |
| 7. Heater hose | 8. Water pipe | 9. Radiator upper hose |
| 10. Heater pipe | | |

REMOVAL

1. Remove undercover with power tool.
2. Drain engine coolant from drain plugs on radiator and both sides of cylinder block. Refer to [CO-10, "Changing Engine Coolant"](#) and [EM-111, "DISASSEMBLY"](#).
3. Remove engine cover with power tool. Refer to [EM-18, "INTAKE MANIFOLD COLLECTOR"](#).
4. Remove air duct and air cleaner case. Refer to [EM-16, "AIR CLEANER AND AIR DUCT"](#).
5. Remove radiator hose (upper) and heater hose.
6. Remove the following parts, when remove water outlet.
 - A/T fluid charging pipe (A/T models). Refer to [AT-314, "TRANSMISSION ASSEMBLY"](#).
 - Intake manifold collectors (upper and lower). Refer to [EM-18, "INTAKE MANIFOLD COLLECTOR"](#).
 - Rocker cover (right bank). Refer to [EM-44, "ROCKER COVER"](#).

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.

WATER OUTLET AND WATER PIPING

INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using radiator cap tester adapter [SST: EG17650301 (J33984-A)] and radiator cap tester (commercial service tool). Refer to [CO-10, "LEAK CHECK"](#) .
- Start and warm up engine. Visually make sure that there is no leaks of engine coolant and A/T fluid (A/T models).

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SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00100

Engine Coolant Capacity (Approximate)

ABS009A3

Engine coolant capacity (With reservoir tank at MAX level)	A/T	8.5 ℓ (9 US qt, 7- 1/2 Imp qt)
	M/T	8.7 ℓ (9-1/4 US qt, 7-5/8 Imp qt)
Reservoir tank engine coolant capacity (at MAX level)		0.8 ℓ (7/8 US qt, 3/4 Imp qt)

Radiator

ABS009A4

Unit: kPa (kg/cm² , psi)

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

Thermostat

ABS009A5

Valve opening temperature	A/T	82°C (180°F)
	M/T	76.5°C (170°F)
Full open valve lift	A/T	more than 8.6 mm / 95°C (0.339 in / 203°F)
	M/T	more than 8.6 mm / 90°C (0.339 in / 194°F)

Tightening Torque

ABS009A6

Unit: N·m (kg-m, ft-lb)
Unit: N·m (kg-m, in-lb)*

Air relief plug	0.78 - 1.6 (0.08 - 0.16, 7 - 14)*
Radiator drain plug	0.78 - 1.6 (0.08 - 0.16, 7 - 14)*
Fan shroud (A/T models)	3.8 - 4.5 (0.39 - 0.45, 34 - 39)*
Reservoir tank	3.8 - 4.5 (0.39 - 0.45, 34 - 39)*
Radiator cooling fan assembly (M/T models)	3.8 - 4.5 (0.39 - 0.45, 34 - 39)*
Cooling fan (crankshaft driven) (A/T models)	5.9 - 9.8 (0.6 - 1.0, 53 - 86)*
Fan coupling (A/T models)	5.9 - 9.8 (0.6 - 1.0, 53 - 86)*
Cooling fan (motor driven)	3.4 (0.35, 30)*
Cooling fan assembly (A/T models)	6.1 (0.62, 54)*
Fan motor	4.4 (0.45, 39)*
Water drain plug (front)	9.8 (1.0, 87)*
Water pump cover	9.8 - 12.8 (1.0 - 1.3, 87 - 113)*
Water pump	8.4 - 10.8 (0.9 - 1.1, 75 - 95)*
Chain tensioner cover	9.8 - 12.8 (1.0 - 1.3, 87 - 113)*
Timing chain tensioner (primary)	6.9 - 9.3 (0.70 - 0.94, 61 - 82)*
Water inlet and thermostat assembly	8.4 - 10.8 (0.9 - 1.1, 75 - 95)*
Water outlet	21.6 - 27.4 (2.2 - 2.7, 16 - 20)
Engine coolant temperature sensor	19.6 - 29.4 (2.0 - 2.9, 15 - 21)