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SECTION CO

ENGINE COOLING SYSTEM

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PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000006750560

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 SR 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 SR 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 WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Liquid Gasket

INFOID:000000006750562

REMOVAL OF LIQUID GASKET SEALANT

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

Tool number : KV10111100 (J-37228)

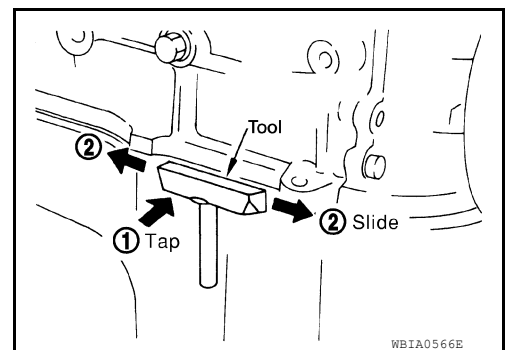
CAUTION:

Be careful not to damage the mating surfaces.

- Tap seal cutter to insert it (1), and then slide it by tapping on the side (2) as shown.
- In areas where Tool is difficult to use, use plastic hammer to lightly tap the part, to remove it.

CAUTION:

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



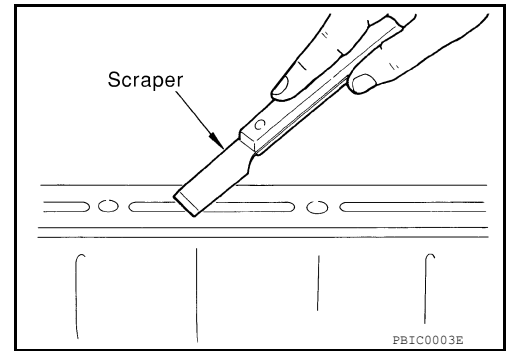
LIQUID GASKET APPLICATION PROCEDURE

PRECAUTIONS

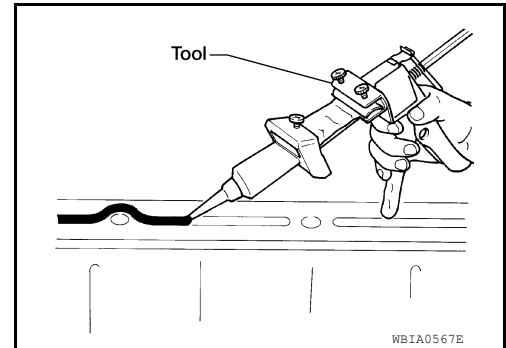
[VQ40DE]

< PRECAUTION >

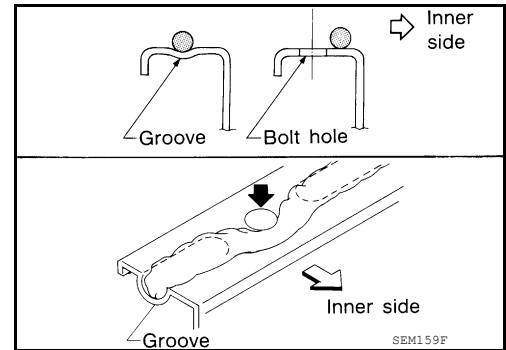
1. Remove the old liquid gasket adhering to the gasket application surface and the mating surface using suitable tool.
 - Remove liquid gasket completely from the groove of the gasket application surface, bolts, and bolt holes.
2. Thoroughly clean the mating surfaces and remove adhering moisture, grease and foreign materials.



3. Attach liquid gasket tube to the tool.
Use Genuine RTV Silicone Sealant or equivalent. Refer to MA-13, "Fluids and Lubricants".
4. Apply the liquid gasket without breaks to the specified location with the specified dimensions.



- If there is a groove for the liquid gasket application, apply the liquid gasket to the groove.
- Apply the liquid gasket to the inner side of the bolt holes. If specified in the procedure, it should also be applied outside the bolt holes.
- Install the mating component within five minutes of the liquid gasket application.
- If the liquid gasket protrudes wipe it off immediately.
- Do not retighten nuts or bolts after the installation.
- Wait 30 minutes or more after installation, before refilling the engine with engine oil and engine coolant.



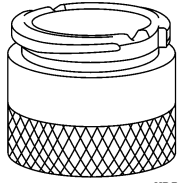
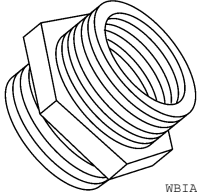
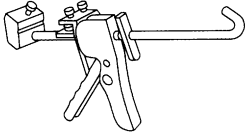
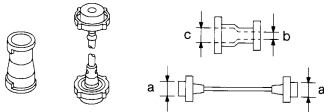
CAUTION:

Carefully follow all of the warnings, cautions, notes, and procedures contained in this manual.

PREPARATION

< PREPARATION >

[VQ40DE]

| Tool name | Description |
|---|---|
| <p>Coolant system tester adapter</p>  <p style="text-align: center;">WBIA0408E</p> | <p>Adapting radiator cap tester to reservoir filler neck</p> |
| <p>Coolant system tester adapter</p>  <p style="text-align: center;">WBIA0409E</p> | <p>Adapting radiator cap tester to reservoir cap</p> |
| <p>Tube presser</p>  <p style="text-align: center;">S-NT052</p> | <p>Pressing the tube of liquid gasket</p> |
| <p>Radiator cap tester adapter</p>  <p style="text-align: center;">S-NT564</p> | <p>Adapting radiator cap tester to radiator cap and radiator filler neck</p> <p>a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in)</p> |

COOLING SYSTEM

< SYSTEM DESCRIPTION >

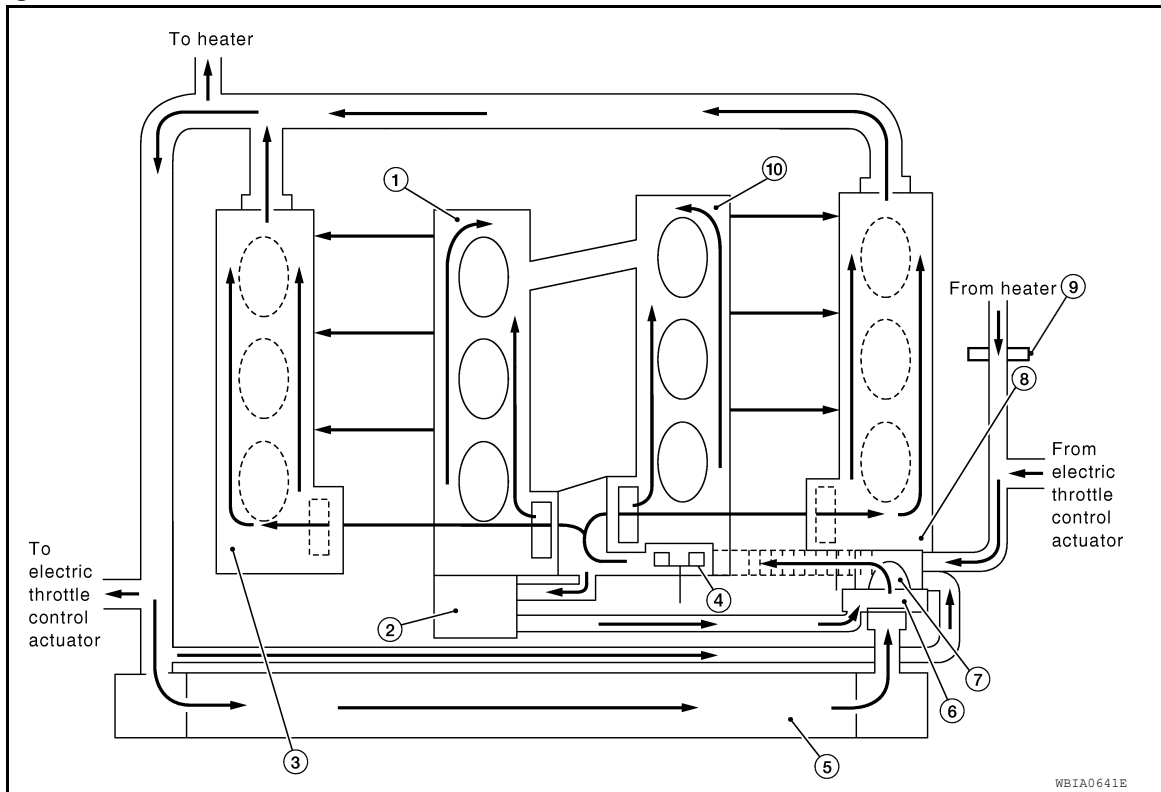
[VQ40DE]

SYSTEM DESCRIPTION

COOLING SYSTEM

Cooling Circuit

INFOID:000000006750565



- | | | |
|-------------------------|-----------------------|-----------------------|
| 1. Cylinder block (RH) | 2. Oil cooler | 3. Cylinder head (RH) |
| 4. Water pump | 5. Radiator | 6. Water inlet |
| 7. Thermostat | 8. Cylinder head (LH) | 9. Heater pump |
| 10. Cylinder block (LH) | | |

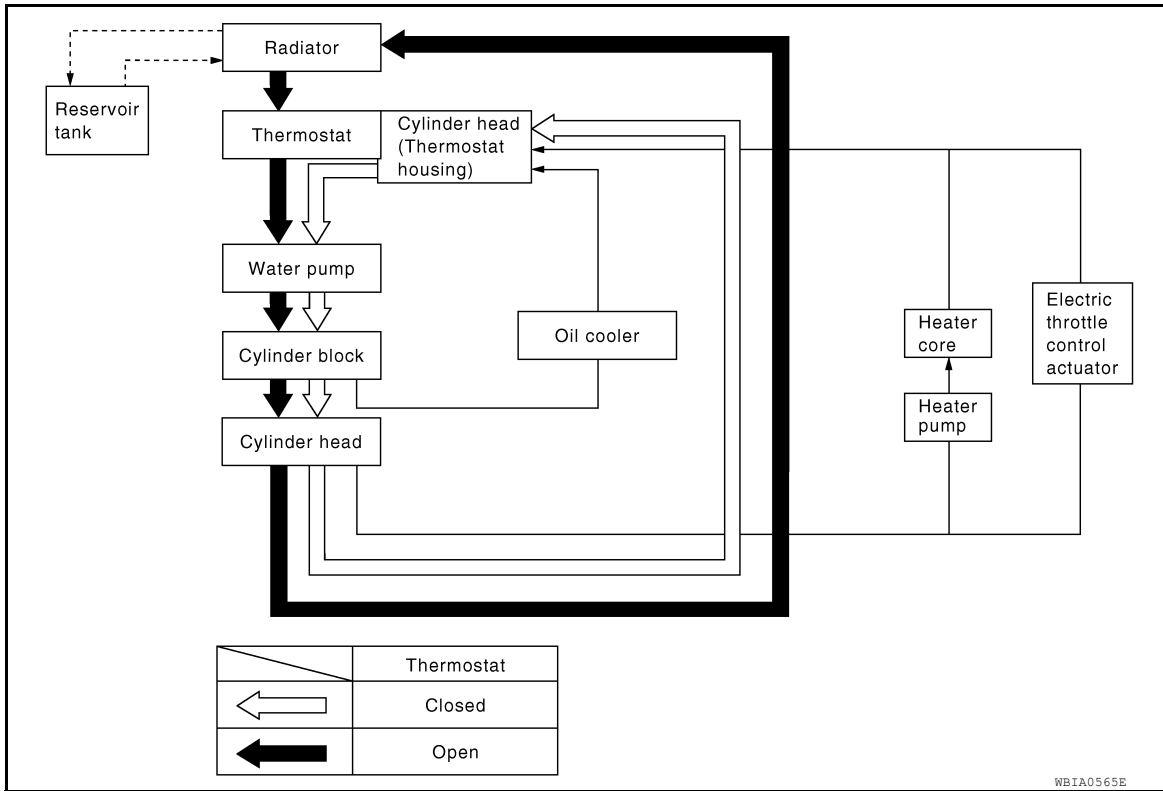
COOLING SYSTEM

< SYSTEM DESCRIPTION >

[VQ40DE]

Schematic

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OVERHEATING CAUSE ANALYSIS

< SYSTEM DESCRIPTION >

[VQ40DE]

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:000000006750567

| | | Symptom | Check items | |
|----------------------------------|---------------------------------------|------------------------------------|--|-----------------|
| Cooling system parts malfunction | Poor heat transfer | Water pump malfunction | Worn or loose drive belt | — |
| | | Coolant Circulation | Thermostat | |
| | | Damaged fins | Dust contamination or paper clogging | |
| | | | Physical damage | |
| | | Clogged radiator cooling tube | Excess foreign material (rust, dirt, sand, etc.) | |
| | Reduced airflow | Cooling fan does not operate | Fan assembly | — |
| | | High resistance to fan rotation | | |
| | | Damaged fan blades | | |
| | Damaged radiator shroud | — | Radiator shroud | — |
| | Improper engine coolant mixture ratio | — | Engine coolant viscosity | — |
| | Poor engine coolant quality | — | | — |
| | Insufficient engine coolant | Engine coolant leaks | Cooling hose | Loose clamp |
| | | | | Cracked hose |
| | | | Heater pump | Physical damage |
| | | | Water pump | Poor sealing |
| | | Radiator or reservoir cap | Loose | |
| | | | Poor sealing | |
| | | Radiator | O-ring for damage, deterioration or improper fitting | |
| | | | Cracked radiator tank | |
| | Cracked radiator core | | | |
| Reservoir tank | Cracked reservoir tank | | | |
| Overflow reservoir tank | Exhaust gas leaks into cooling system | Cylinder head deterioration | | |
| | | Cylinder head gasket deterioration | | |

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OVERHEATING CAUSE ANALYSIS

< SYSTEM DESCRIPTION >

[VQ40DE]

| | | 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 | | |
| | | | Improper size wheels and tires installed | | |
| | | | Dragging brakes | | |
| | Blocked or restricted airflow | Blocked or restricted airflow | Blocked bumper | Car brassiere installed | — |
| | | | Blocked radiator grille | Mud contamination or paper clogging | |
| | | | Blocked radiator | Blocked air flow | |
| | | | Blocked condenser | | |
| Installed large fog lamp | | | | | |

PERIODIC MAINTENANCE

ENGINE COOLANT

System Inspection

INFOID:000000006750568

WARNING:

- Do not remove the radiator/reservoir cap when the engine is hot. Serious burns could occur from high pressure fluid escaping from the radiator or reservoir.
- Wrap a thick cloth around the cap. Slowly push down and turn it a quarter-turn to allow built-up pressure to escape. Carefully remove the cap by turning it all the way.

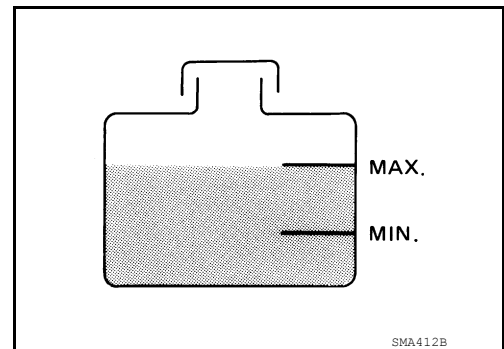
CHECKING COOLING SYSTEM HOSES

Check hoses for the following:

- Improper attachment
- Leaks
- Cracks
- Damage
- Loose connections
- Chafing
- Deterioration

CHECKING RESERVOIR LEVEL

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



CHECKING COOLING SYSTEM FOR LEAKS

WARNING:

- Do not remove the radiator/reservoir cap when the engine is hot. Serious burns could occur from high pressure fluid escaping from the radiator or reservoir.
- Wrap a thick cloth around the cap. Slowly push down and turn it a quarter-turn to allow built-up pressure to escape. Carefully remove the cap by turning it all the way.
- To check for leaks, apply pressure to the cooling system at the reservoir filler neck using suitable tool (A).

Testing pressure : Refer to [CO-34, "Standard and Limit"](#).

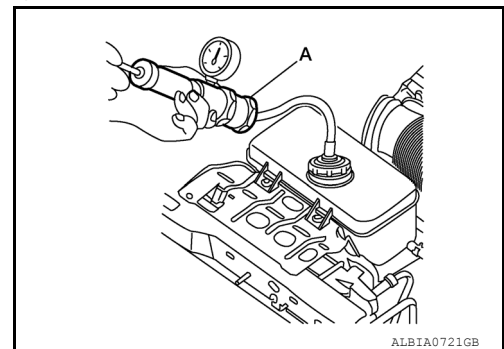
CAUTION:

Higher pressure than specified may cause radiator damage.

NOTE:

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

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



CHECKING RESERVOIR CAP

ENGINE COOLANT

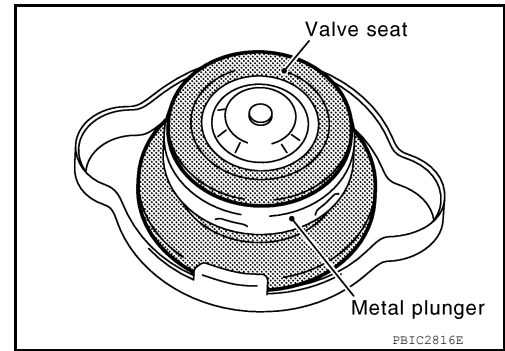
[VQ40DE]

< PERIODIC MAINTENANCE >

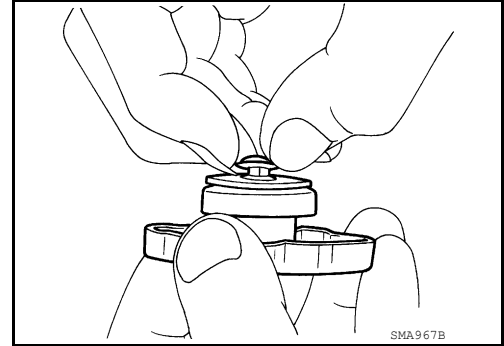
1. Inspect the reservoir cap.
 - Replace the cap if the metal plunger cannot be seen around the edge of the black rubber gasket.
 - Replace the cap if deposits of waxy residue or other foreign material are on the black rubber gasket or the metal retainer.

CAUTION:

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



2. Pull the negative-pressure valve to open it and check that it closes completely when released.
 - Check that there is no dirt or damage on the valve seat of the reservoir cap negative-pressure valve.
 - Check that there are no abnormalities in the opening and closing conditions of the negative-pressure valve.

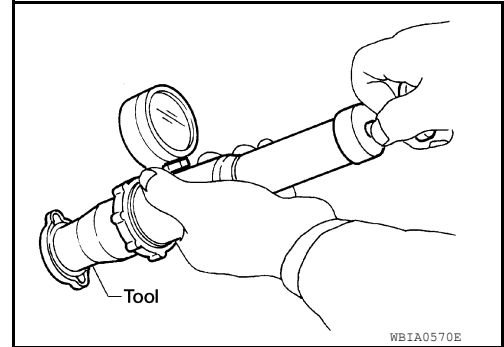


3. Check reservoir cap relief pressure using suitable tool.

Standard : Refer to [CO-34, "Standard and Limit"](#).

NOTE:

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



CHECKING RADIATOR CAP

Inspect the radiator cap.

CAUTION:

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

- Replace the radiator cap if deposits of waxy residue or other foreign materials are on the black rubber gasket or the metal retainer.

Changing Engine Coolant

INFOID:000000006750569

WARNING:

- **Do not remove the radiator or reservoir cap when the engine is hot. Serious burns could occur from high pressure fluid escaping from the radiator or reservoir.**
- **Wrap a thick cloth around the cap to carefully remove the cap. First, turn the cap a quarter of a turn to release any built-up pressure, then turn the cap all the way to remove it.**

DRAINING ENGINE COOLANT

1. Turn ignition switch ON and set temperature control lever all the way to HOT position or the highest temperature position. Wait 10 seconds and turn ignition switch OFF.

ENGINE COOLANT

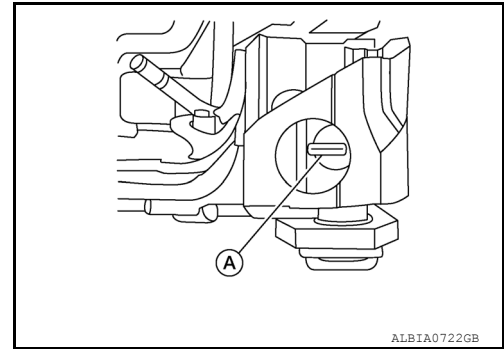
[VQ40DE]

< PERIODIC MAINTENANCE >

2. Open the radiator drain plug (A) at the bottom of the radiator, and remove the reservoir cap. This is the only step required when partially draining the cooling system.

CAUTION:

Do not allow the coolant to contact the drive belts.



3. If it is necessary to drain the cylinder block when draining all of the coolant in the system, complete the remaining steps.

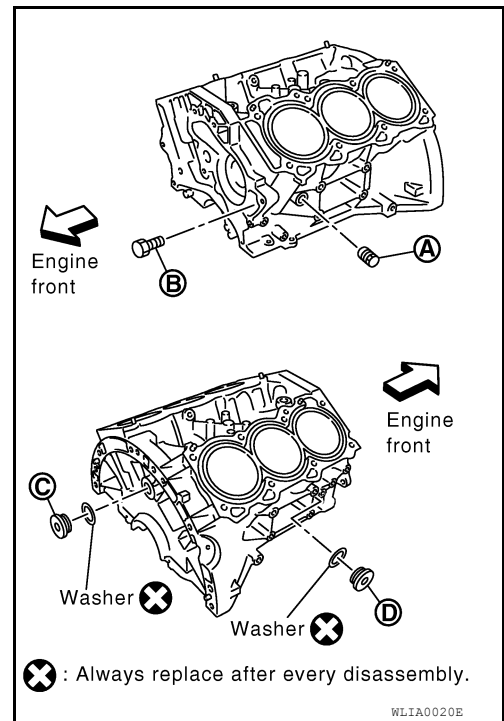
- a. Remove the front under cover using power tool. Refer to [EXT-38. "Removal and Installation"](#).
- b. Drain the cylinder block by removing the cylinder block drain plugs (A), (B), (C), (D) as shown and block heater, (if equipped).

NOTE:

For Canada, the drain plug (D) is replaced with a block heater.

CAUTION:

Do not reuse the copper sealing washers.



4. Remove the reservoir tank to drain the engine coolant, then clean the reservoir tank before installing it.
5. Check the drained coolant for contaminants such as rust, corrosion or discoloration. If the coolant is contaminated, flush the engine cooling system. Follow the "Flushing Cooling System" procedure.

REFILLING ENGINE COOLANT

ENGINE COOLANT

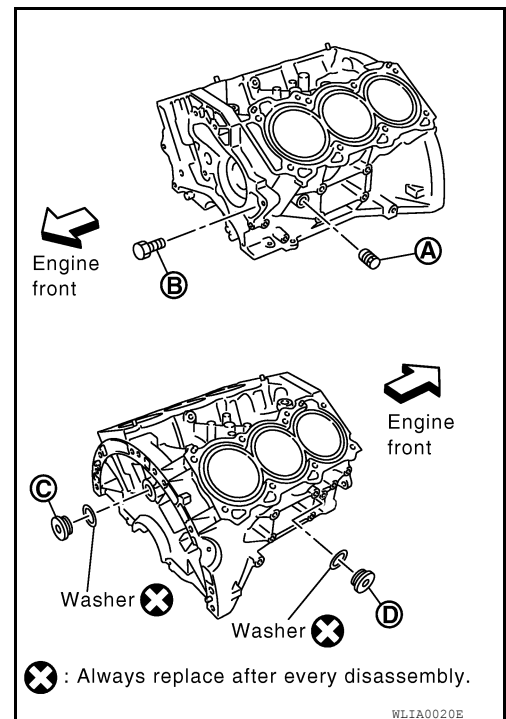
[VQ40DE]

< PERIODIC MAINTENANCE >

- Close the radiator drain plug. Install the reservoir tank, cylinder block drain plugs (A), (B), (C), (D) and block heater, (if equipped) if removed for a total system drain or for engine removal or repair.
 - The radiator must be completely empty of coolant and water.
 - Apply sealant to the thread of water drain plugs (A) and (B).
Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-17, "Recommended Chemical Products and Sealants"](#).
 - Apply sealant to the thread of plugs (C).
Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to [GI-17, "Recommended Chemical Products and Sealants"](#).
 - Apply sealant to the thread of plug (D).
Use Anaerobic Liquid Gasket or equivalent. Refer to [GI-17, "Recommended Chemical Products and Sealants"](#).
 - For Canada, the drain plug (D) is replaced with a block heater.
Use Three Bond TB1110B or equivalent. Refer to [GI-17, "Recommended Chemical Products and Sealants"](#).

CAUTION:

Do not reuse copper sealing washers.



Tighten each plug as specified below.

Block Plug and Block Heater Installation

| Part | Washer | Tightening Torque |
|------|--------------|-------------------------------|
| A | No | 19.6 N·m (2.0 kg-m, 14 ft-lb) |
| B | Reuse | 9.8 N·m (1.0 kg-m, 87 in-lb) |
| | New | 6.0 N·m (0.61 kg-m, 53 in-lb) |
| C | Yes | 116 N·m (12 kg-m, 86 ft-lb) |
| D | Plug | 62 N·m (6.3 kg-m, 46 ft-lb) |
| | Block heater | 73.5 N·m (7.5 kg-m, 54 ft-lb) |

- Set the vehicle heater controls to the full HOT and heater ON position. Turn the vehicle ignition ON with the engine OFF as necessary to activate the heater mode.
- Remove the vented reservoir cap and replace it with a non-vented reservoir cap before filling the cooling system.

ENGINE COOLANT

[VQ40DE]

< PERIODIC MAINTENANCE >

4. Install the Tool by installing the radiator cap adapter onto the radiator neck opening. Then attach the gauge body assembly with the refill tube and the venturi assembly to the radiator cap adapter.

Tool number : KV991J0070 (J-45695)

5. Insert the refill hose into the coolant mixture container that is placed at floor level. Make sure the ball valve is in the closed position.
 - Use recommended coolant or equivalent. Refer to [MA-13, "Fluids and Lubricants"](#).

CAUTION:

Do not use any cooling system additives such as radiator sealer. Additives may clog the cooling system and cause damage to the engine, transmission and/or cooling system.

Cooling system capacity (with reservoir at (MAX) line) : Refer to [MA-13, "Fluids and Lubricants"](#).

6. Install an air hose to the venturi assembly, the air pressure must be within specification.

Compressed air supply pressure : 549 - 824 kPa (5.6 - 8.4 kg/cm², 80 - 119 psi)

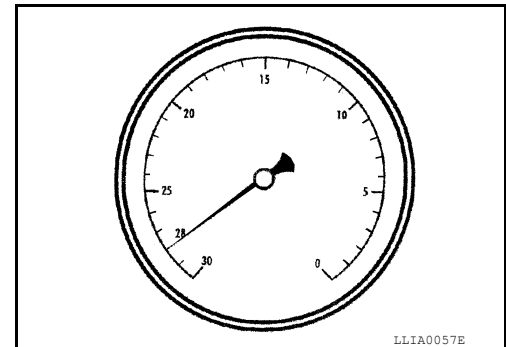
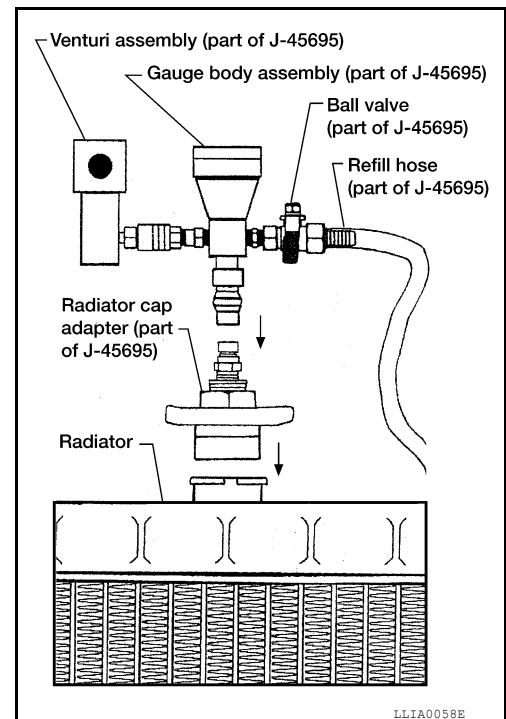
CAUTION:

The compressed air supply must be equipped with an air dryer.

7. The vacuum gauge will begin to rise and there will be an audible hissing noise. During this process open the ball valve on the refill hose slightly. Rising coolant will be visible in the refill hose. After the refill hose is full of coolant, close the ball valve. This will purge air trapped in the refill hose.

8. Continue to draw the vacuum until the gauge reaches 28 inches of vacuum. The gauge may not reach 28 inches in high altitude locations. Refer to the following table for expected vacuum readings.

| Altitude above sea level | Vacuum gauge reading |
|--------------------------|----------------------------|
| 0 - 100 m (328 ft) | : 28 inches of vacuum |
| 300 m (984 ft) | : 27 inches of vacuum |
| 500 m (1,641 ft) | : 26 inches of vacuum |
| 1,000 m (3,281 ft) | : 24 - 25 inches of vacuum |



9. When the vacuum gauge has reached the specified amount, disconnect the air hose and wait 20 seconds to see if the system loses vacuum. If the vacuum level drops, perform necessary repairs to the system and repeat steps 6 - 8 to bring the vacuum to the specified amount. Recheck for leaks.
10. Place the coolant container (with the refill hose inserted) at the same level as the top of the radiator. Then open the ball valve on the refill hose so the coolant will be drawn up to fill the cooling system. The cooling system is full when the vacuum gauge reads zero.

CAUTION:

Do not allow the coolant container to get too low when filling to avoid air from being drawn into the cooling system.

11. Remove the Tool from the radiator neck opening and install the radiator cap.
12. Remove the non-vented reservoir cap.
13. Fill the cooling system reservoir tank to the specified level. Run the engine to warm up the cooling system and top up the system as necessary before installing the vented reservoir cap.
14. Install the front under cover. Refer to [EXT-16, "Removal and Installation - Front Bumper"](#).

FLUSHING COOLING SYSTEM

1. Drain the water from the engine cooling system. Refer to [CO-12. "Changing Engine Coolant"](#).
2. Fill the radiator and the reservoir tank (to the (MAX) line), with water. Reinstall the radiator cap and leave the vented reservoir cap off.
3. Run the engine until it reaches normal operating temperature.
4. Press the engine accelerator two or three times under no-load.
5. Stop the engine and wait until it cools down.
6. Drain the water from the engine cooling system. Refer to [CO-12. "Changing Engine Coolant"](#).
7. Repeat steps 2 through 6 until clear water begins to drain from the radiator.

RADIATOR

Checking Radiator

INFOID:000000007166061

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

CAUTION:

- **Be careful not to bend or damage the radiator fins.**
 - **When radiator is cleaned without removal, remove all surrounding parts such as cooling fan shroud and horns. Then tape the harness and electrical connectors to prevent water from entering.**
1. Spray water to the back side of the radiator core using a side to side motion from the top down.
 2. Stop spraying when debris no longer flows from radiator core.
 3. Blow air into the back side of radiator core using a side to side motion from the top down.
 - Use compressed air lower than 490 kPa (5 kg/cm², 71 psi) and keep distance more than 30 cm (11.8 in).
 4. Continue to blow air until no water sprays out.
 5. Check for coolant leaks. Repair as necessary.

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RADIATOR

< REMOVAL AND INSTALLATION >

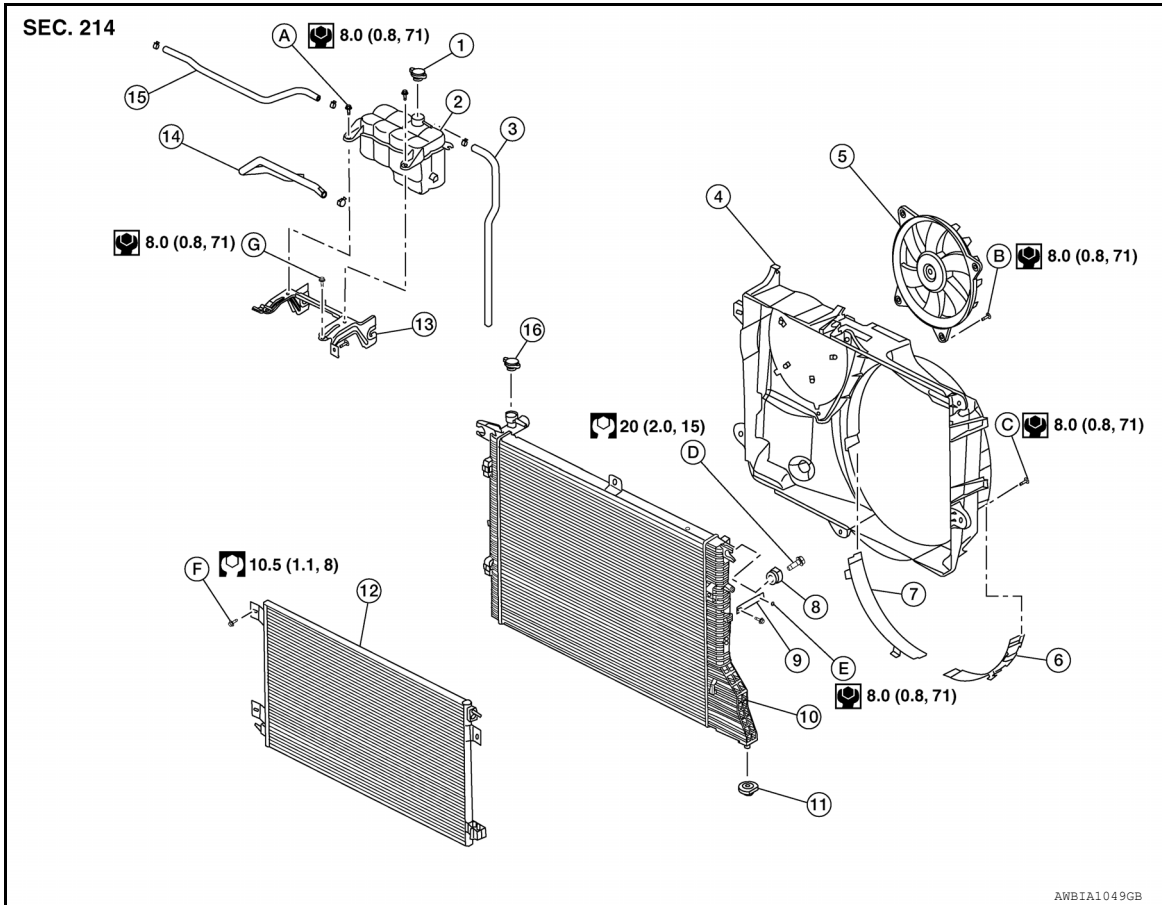
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REMOVAL AND INSTALLATION

RADIATOR

Exploded View

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- | | | |
|---------------------------------|-------------------------------------|-------------------------------|
| 1. Reservoir tank cap | 2. Reservoir tank | 3. Overflow hose |
| 4. Radiator shroud (upper) | 5. Cooling fan assembly | 6. Radiator shroud LH (lower) |
| 7. Radiator shroud RH (lower) | 8. Mounting rubber (upper) | 9. A/C tube bracket |
| 10. Radiator | 11. Mounting rubber (lower) | 12. A/C condenser |
| 13. Reservoir tank lift bracket | 14. Water hose | 15. Reservoir tank hose |
| 16. Radiator cap | A. Reservoir tank bolt | B. Cooling fan assembly bolt |
| C. Radiator shroud (upper) bolt | D. Radiator bolt | E. A/C tube bracket bolt |
| F. A/C condenser bolt | G. Reservoir tank lift bracket bolt | |

Removal and Installation

INFOID:000000006750571

WARNING:

Do not remove the radiator cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly turn it a quarter of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

1. Remove front under cover using power tool. Refer to [EXT-16, "Removal and Installation - Front Bumper"](#).
2. Drain engine coolant from radiator. Refer to [CO-12, "Changing Engine Coolant"](#).

RADIATOR

< REMOVAL AND INSTALLATION >

[VQ40DE]

CAUTION:

- Perform this step when engine is cold.
- Do not spill engine coolant on drive belts.

- Remove air duct and resonator assembly. Refer to [EM-24. "Removal and Installation"](#).
- Remove reservoir tank hose and water hose.
- Unclip the reservoir overflow hose from the radiator shroud.
- Remove the reservoir tank bracket and reservoir tank.
- Unclip the transmission lines from the radiator shroud.
- Disconnect the motor driven cooling fan connector.
- Remove the RH and LH radiator shrouds (lower).
 - Release the tabs, pull RH and LH radiator shrouds (lower) rearward and down to remove.
- Remove the radiator shroud (upper) bolts and remove the radiator shroud (upper).
- Remove radiator hoses (upper and lower).

CAUTION:

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

- Disconnect A/T fluid cooler hoses.
- Remove front grille. Refer to [EXT-28. "Removal and Installation"](#).
- Remove A/T oil cooler bolts and oil cooler from radiator and position aside.
- Remove the radiator as follows:

CAUTION:

Do not damage or scratch air conditioner condenser, A/T oil cooler or radiator core when removing.

- Remove the radiator upper mount bracket bolts.
- Lift and pull radiator rearward to disengage the rubber mounting (lower) from the radiator core support center.
- Remove radiator by lifting up.

INSTALLATION

Installation is in the reverse order of removal.

- Refill the radiator with the specified coolant. Refer to [CO-12. "Changing Engine Coolant"](#).

INSPECTION AFTER INSTALLATION

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to [MA-13. "Fluids and Lubricants"](#).
- Use procedure below to check for fuel leakage.
- Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
- Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.

NOTE:

If hydraulic pressure inside timing chain tensioner drops after removal and installation, slack in the guide may generate a pounding noise during and just after engine start. However, this is normal. Noise will stop after hydraulic pressure rises.

- Warm up engine thoroughly to make sure there is no leakage of fuel, exhaust gas, or any oils/fluids including engine oil and engine coolant.
- Bleed air from passages in lines and hoses, such as in cooling system.
- After cooling down engine, again check oil/fluid levels including engine oil and engine coolant. Refill to specified level, if necessary.
- Summary of the inspection items:

| Item | | Before starting engine | Engine running | After engine stopped |
|----------------------------------|--------------------|------------------------|----------------|----------------------|
| Engine coolant | | Level | Leakage | Level |
| Engine oil | | Level | Leakage | Level |
| Transmission/ transaxle fluid | A/T and CVT Models | Leakage | Level/Leakage | Leakage |
| | M/T Models | Level/Leakage | Leakage | Level/Leakage |
| Other oils and fluids* | | Level | Leakage | Level |

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RADIATOR

< REMOVAL AND INSTALLATION >

[VQ40DE]

| Item | Before starting engine | Engine running | After engine stopped |
|-------------|------------------------|----------------|----------------------|
| Fuel | Leakage | Leakage | Leakage |
| Exhaust gas | — | Leakage | — |

*Power steering fluid, brake fluid, etc.

ENGINE COOLING FAN

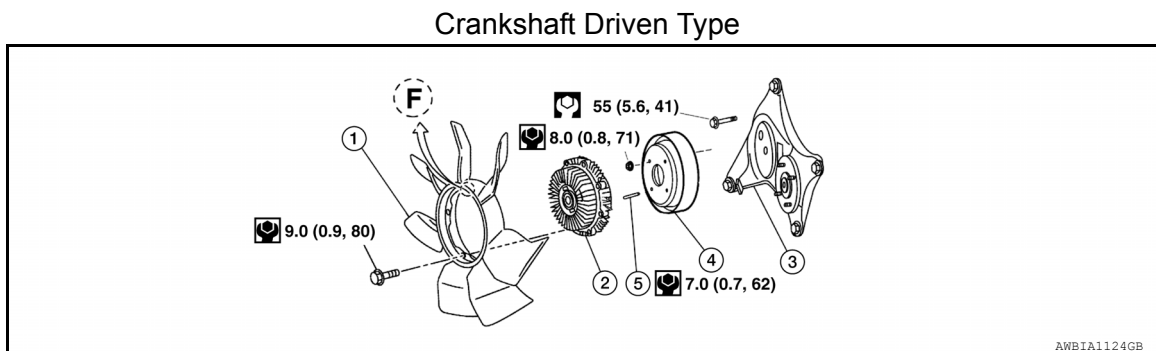
< REMOVAL AND INSTALLATION >

[VQ40DE]

ENGINE COOLING FAN

Exploded View

INFOID:000000006750573



- | | | |
|-----------------------|-----------------|----------------|
| 1. Cooling fan | 2. Fan coupling | 3. Fan bracket |
| 4. Cooling fan pulley | 5. Stud | F. Front mark |

Removal and Installation (Crankshaft driven type)

INFOID:000000006750574

WARNING:

Do not remove the radiator cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly turn it a quarter of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

1. Remove front under cover using power tool. Refer to [EXT-16, "Removal and Installation - Front Bumper"](#).
 2. Partially drain engine coolant from radiator. Refer to [CO-12, "Changing Engine Coolant"](#).
- CAUTION:**
- Perform this step when engine is cold.
 - Do not spill engine coolant on drive belts.
3. Remove air duct and resonator assembly. Refer to [EM-24, "Removal and Installation"](#).
 4. Remove reservoir tank hose and water hose.
 5. Unclip the reservoir overflow hose from the radiator shroud.
 6. Remove the reservoir tank bracket and reservoir tank.
 7. Unclip the transmission lines from the radiator shroud.
 8. Disconnect the motor driven cooling fan connector.
 9. Remove the RH and LH radiator shrouds (lower).
 - Release the tabs, pull RH and LH radiator shrouds (lower) rearward and down to remove.
 10. Remove the radiator shroud (upper) bolts and remove the radiator shroud (upper).
 11. Remove radiator hose (upper).
 12. Remove the drive belt. Refer to [EM-13, "Removal and Installation"](#).
 13. Remove the cooling fan blade assembly.
 14. Remove the cooling fan pulley, if necessary.
 15. Remove the cooling fan from the fan coupling, if necessary.

INSPECTION AFTER REMOVAL

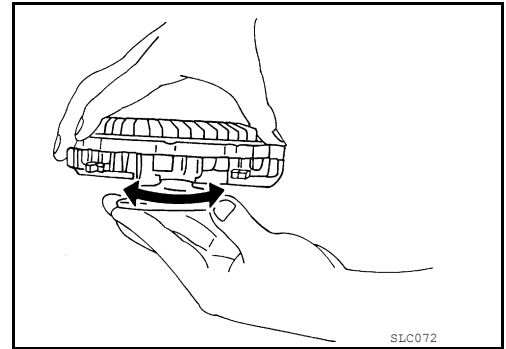
Fan Coupling

ENGINE COOLING FAN

[VQ40DE]

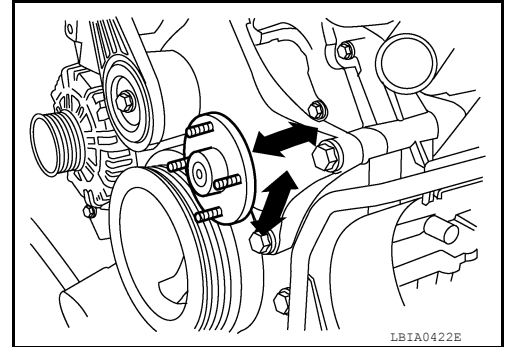
< REMOVAL AND INSTALLATION >

- Inspect fan coupling for oil leaks and bi-metal corrosion conditions.
- If there are any concerns replace the fan coupling.



Fan Bracket

- Check that the fan bracket shaft turns smoothly by hand and is not excessively loose.
- Replace the fan bracket assembly if necessary.



INSTALLATION

Installation is in the reverse order of removal.

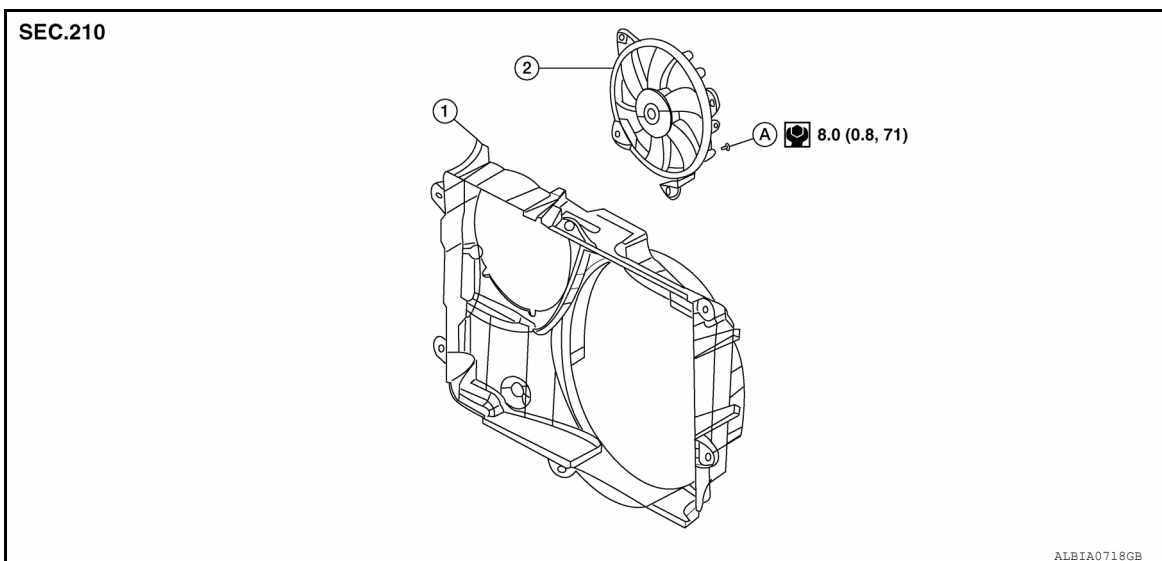
- Install cooling fan with its front mark "F" facing front of engine.

INSPECTION AFTER INSTALLATION

- Check for engine coolant leaks. Refer to [CO-11, "System Inspection"](#).

Removal and Installation (Motor driven type)

INFOID:000000006750575



1. Fan shroud (upper)

2. Motor driven engine cooling fan

A. Motor driven engine cooling fan bolts

REMOVAL

1. Remove air duct and resonator assembly. Refer to [EM-24, "Removal and Installation"](#).
2. Disconnect harness connector from fan motor.
3. Remove the motor driven engine cooling fan bolts.
4. Remove the motor driven engine cooling fan.

ENGINE COOLING FAN

< REMOVAL AND INSTALLATION >

[VQ40DE]

INSTALLATION

Installation is in the reverse order of removal.

- Cooling fan is controlled by ECM. For details, refer to [EC-407, "Component Function Check"](#).

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WATER PUMP

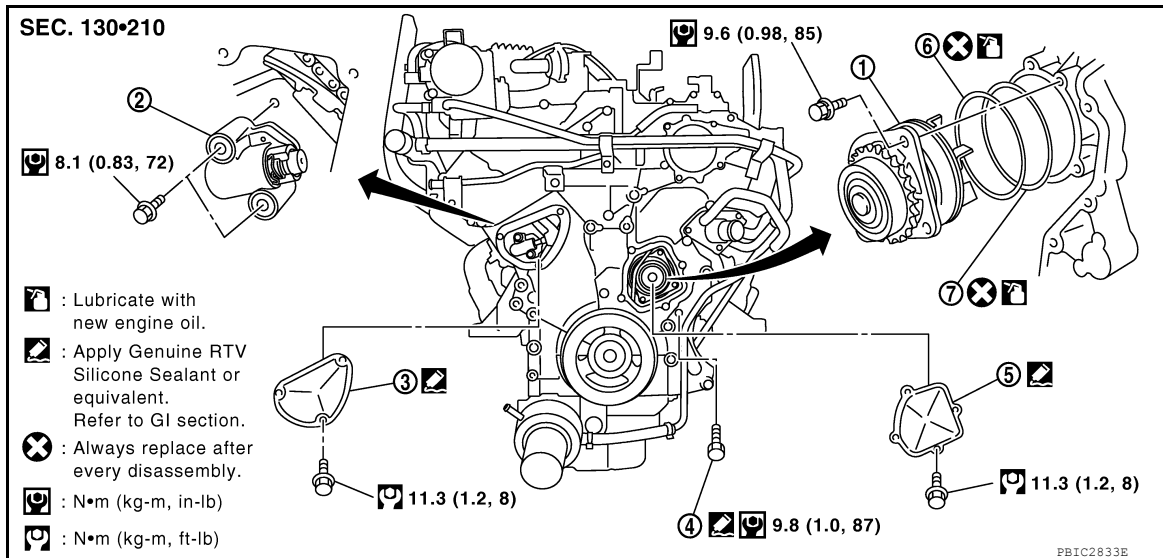
< REMOVAL AND INSTALLATION >

[VQ40DE]

WATER PUMP

Exploded View

INFOID:000000006750576



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

Removal and Installation

INFOID:000000006750577

WARNING:

Do not remove the radiator cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly turn it a quarter of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

CAUTION:

- Be careful not to get engine coolant on the timing chain or drive belt when removing the water pump assembly.
- Do not disassemble the water pump. Replace it as a unit.
- Check for leaks after installing the water pump and connecting the hoses and clamps securely.

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug opening to prevent fluid from spilling.

REMOVAL

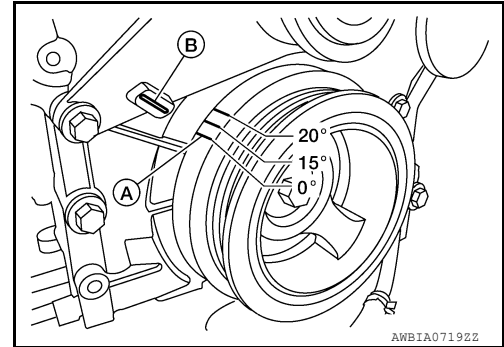
1. Remove front under cover using power tool. Refer to [EXT-16, "Removal and Installation - Front Bumper"](#).
2. Drain engine coolant from radiator. Refer to [CO-12, "Changing Engine Coolant"](#).
CAUTION:
 - Perform this step when engine is cold.
 - Do not spill engine coolant on drive belts.
3. Remove air duct and resonator assembly. Refer to [EM-24, "Removal and Installation"](#).
4. Remove reservoir tank hose and water hose.
5. Unclip the reservoir overflow hose from the radiator shroud.
6. Remove the reservoir tank bracket and reservoir tank.
7. Unclip the transmission lines from the radiator shroud.
8. Disconnect the motor driven cooling fan connector.
9. Remove the LH and RH radiator shrouds (lower).
 - Release the tabs, pull LH and RH radiator shrouds (lower) rearward and down to remove.
10. Remove the radiator shroud (upper) bolts and remove the radiator shroud (upper).

WATER PUMP

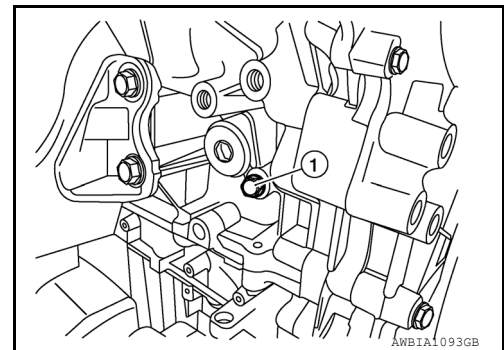
< REMOVAL AND INSTALLATION >

[VQ40DE]

11. Remove radiator hose (upper).
12. Remove the drive belt. Refer to [EM-13, "Removal and Installation"](#).
13. Remove cooling fan blade assembly and fan pulley.(Crankshaft driven type).
14. Set No. 1 cylinder at TDC.
 - Rotate crankshaft pulley clockwise to align timing mark (A) (grooved line without color) with timing indicator (B).

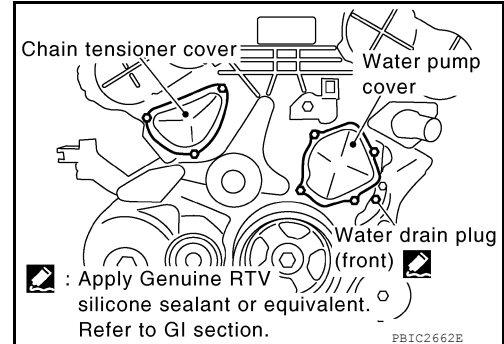


15. Remove water drain plug (front) (1).

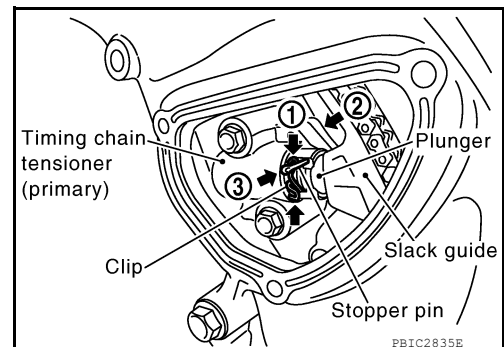


16. Remove the RH chain tensioner cover and water pump cover from front timing chain case, using Tool.

Tool number : KV10111100 (J-37228)



17. Remove timing chain tensioner (primary) as follows:
 - a. Loosen clip of timing chain tensioner (primary), and release plunger stopper (1).
 - b. Depress plunger into tensioner body by pressing slack guide (2).
 - c. Keep slack guide pressed and insert stopper pin through the tensioner body hole and plunger groove (3) to hold plunger in.



WATER PUMP

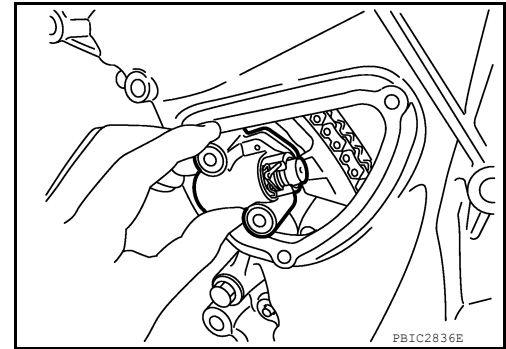
[VQ40DE]

< REMOVAL AND INSTALLATION >

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

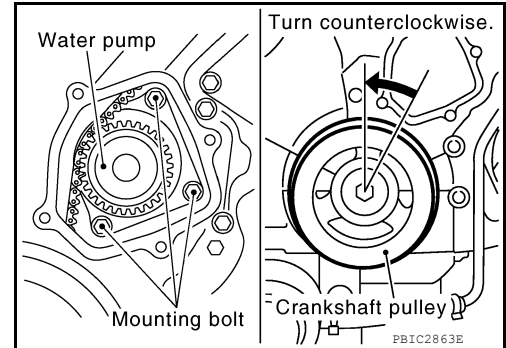
CAUTION:

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



18. Remove water pump as follows:

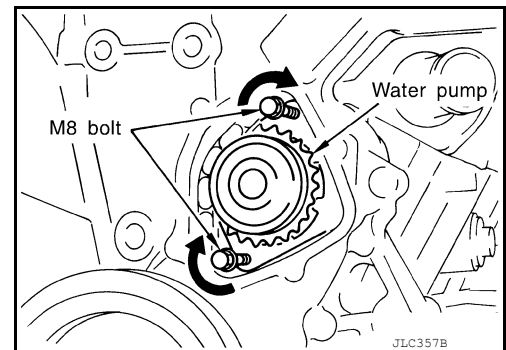
- a. Make a gap between water pump sprocket and timing chain, by carefully turning crankshaft pulley counterclockwise until timing chain loosens on water pump sprocket. Remove three water pump bolts.



- b. Screw M8 bolts [pitch: 1.25 mm (0.049 in) length: approx. 50 mm (1.97 in)] into water pump upper and lower bolt holes until they reach timing chain case. Remove water pump.

CAUTION:

- Place a suitable shop cloth below the water pump housing to prevent engine coolant from dripping into the timing chain case.
- Pull water pump straight out while preventing vane from contacting socket in installation area.
- Remove water pump without causing sprocket to contact timing chain.



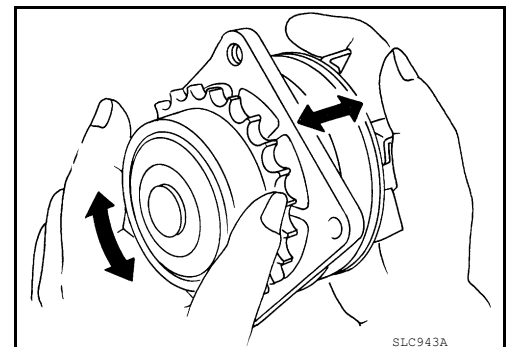
- c. Remove M8 bolts and O-rings from water pump.

CAUTION:

- Do not disassemble water pump.
- Do not reuse O-rings.

INSPECTION AFTER REMOVAL

- Visually check for significant dirt or rust on the water pump body and vane.
- Check that the vane shaft turns smoothly by hand and is not excessively loose.
- Replace the water pump assembly if the water pump does not perform properly.



INSTALLATION

1. Install new O-rings on water pump.

CAUTION:

Do not reuse O-rings.

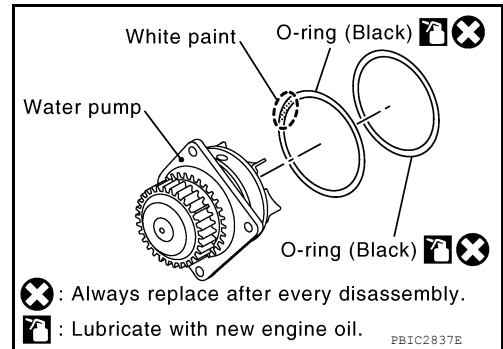
NOTE:

WATER PUMP

[VQ40DE]

< REMOVAL AND INSTALLATION >

- Apply engine oil to O-rings.
- Locate O-ring with white paint mark to engine front side.

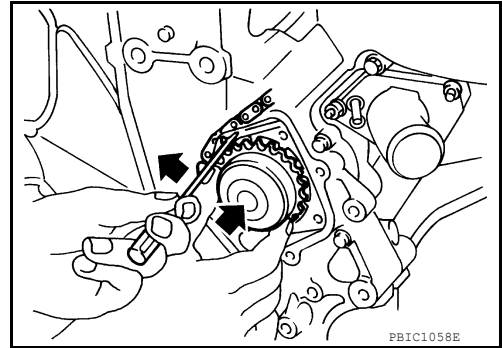


2. Hold timing chain to the side (←) and install water pump (←).

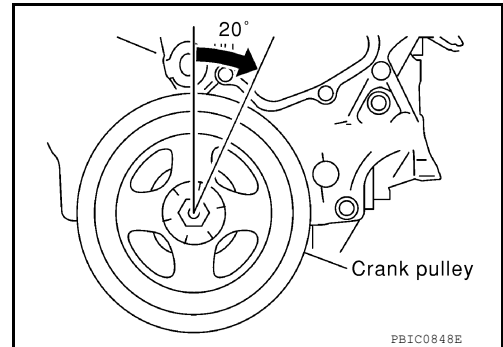
CAUTION:

Do not allow timing chain case to pinch O-rings when installing water pump.

- Make sure that timing chain and water pump sprocket are engaged.
- Tighten water pump bolts alternately and evenly to specification.



3. Remove dust and foreign material completely from installation area of timing chain tensioner (primary) and rear timing chain case.
4. Turn crankshaft pulley approximately 20° clockwise so that timing chain on the timing chain tensioner (primary) side is loose.

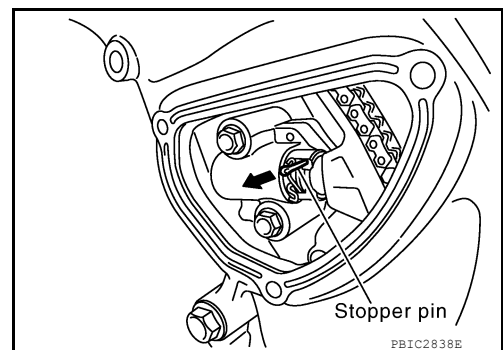


5. Install timing chain tensioner (primary) with its stopper pin inserted.

CAUTION:

Be careful not to drop bolts inside timing chain case.

6. Remove stopper pin.
- Make sure again that timing chain and water pump sprocket are engaged.



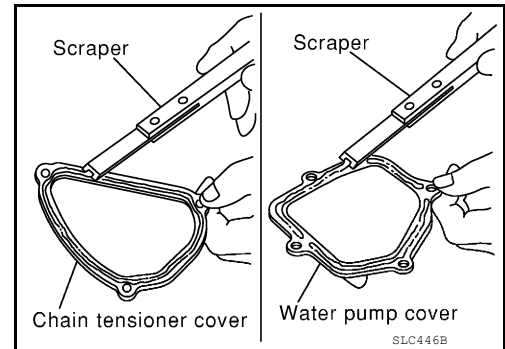
7. Install chain tensioner cover and water pump cover.

WATER PUMP

[VQ40DE]

< REMOVAL AND INSTALLATION >

- 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.

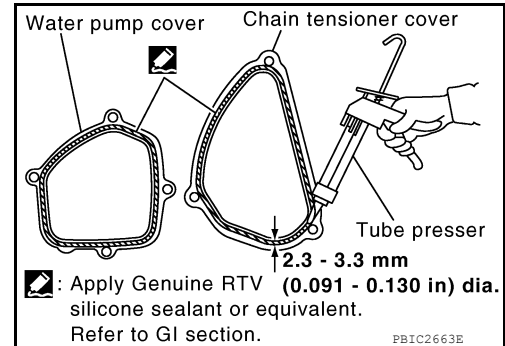


- b. Apply a continuous bead of liquid gasket to mating surface of chain tensioner and water pump cover using suitable tool.
Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-17, "Recommended Chemical Products and Sealants"](#).

CAUTION:

Attaching should be done within 5 minutes after coating.

- c. Tighten bolts to specified torque. Refer to [EM-52, "Exploded View"](#).

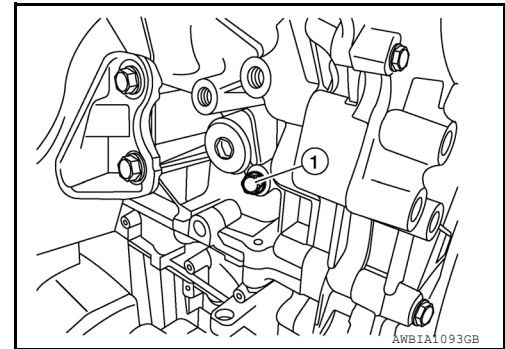


8. Install water drain plug (front) (1) on water pump side of cylinder block.

- Apply liquid gasket to the thread of water drain plug (front).

Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-17, "Recommended Chemical Products and Sealants"](#).

Water drain plug (front) : 9.8 N·m (1.0 kg·m, 87 in·lb)



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

- After installation refill engine coolant and check for leaks. Refer to [CO-12, "Changing Engine Coolant"](#) and [CO-11, "System Inspection"](#).

CAUTION:

Do not spill coolant in the engine compartment. Use a shop cloth to absorb coolant.

- After starting engine, let idle for three minutes, then rev engine up to 3,000 rpm under no load to purge air from the high-pressure chamber of the chain tensioner. The engine may produce a rattling noise. This indicates that air still remains in the chamber and is not a matter of concern.

INSPECTION AFTER INSTALLATION

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to [MA-13, "Fluids and Lubricants"](#).
- Use procedure below to check for fuel leakage.
- Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
- Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.

NOTE:

If hydraulic pressure inside timing chain tensioner drops after removal and installation, slack in the guide may generate a pounding noise during and just after engine start. However, this is normal. Noise will stop after hydraulic pressure rises.

- Warm up engine thoroughly to make sure there is no leakage of fuel, exhaust gas, or any oils/fluids including engine oil and engine coolant.
- Bleed air from passages in lines and hoses, such as in cooling system.

WATER PUMP

< REMOVAL AND INSTALLATION >

[VQ40DE]

- After cooling down engine, again check oil/fluid levels including engine oil and engine coolant. Refill to specified level, if necessary.
- Summary of the inspection items:

| Item | | Before starting engine | Engine running | After engine stopped |
|----------------------------------|--------------------|------------------------|----------------|----------------------|
| Engine coolant | | Level | Leakage | Level |
| Engine oil | | Level | Leakage | Level |
| Transmission/ transaxle fluid | A/T and CVT Models | Leakage | Level/Leakage | Leakage |
| | M/T Models | Level/Leakage | Leakage | Level/Leakage |
| Other oils and fluids* | | Level | Leakage | Level |
| Fuel | | Leakage | Leakage | Leakage |
| Exhaust gas | | — | Leakage | — |

*Power steering fluid, brake fluid, etc.

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WATER INLET AND THERMOSTAT ASSEMBLY

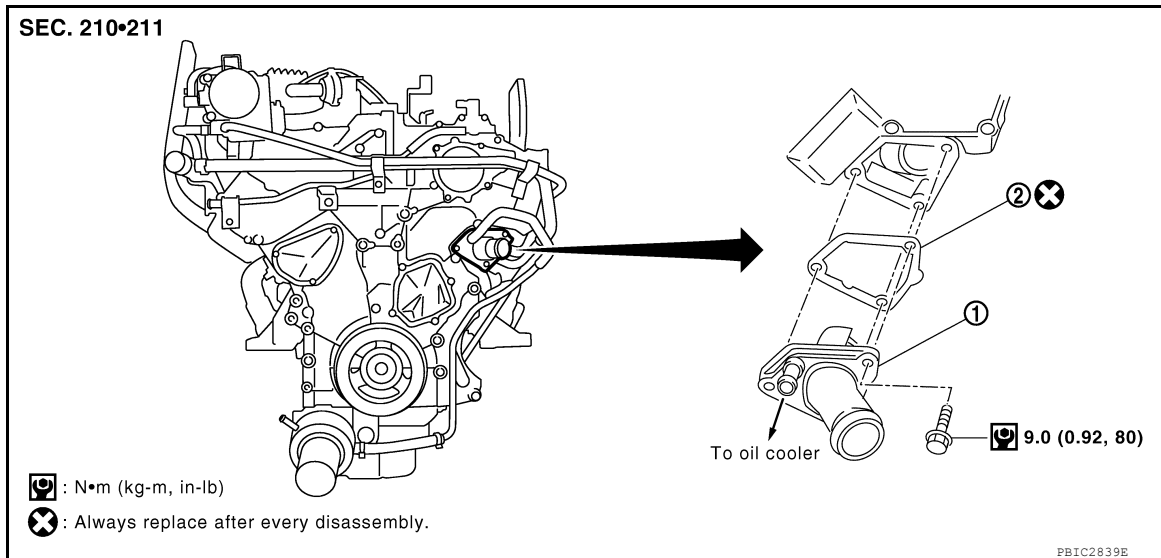
< REMOVAL AND INSTALLATION >

[VQ40DE]

WATER INLET AND THERMOSTAT ASSEMBLY

Exploded View

INFOID:000000006750578



1. Water inlet and thermostat assembly
2. Gasket

Removal and Installation

INFOID:000000006750579

WARNING:

Do not remove the radiator cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly turn it a quarter of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

1. Remove the front under cover using power tool. Refer to [EXT-16. "Removal and Installation - Front Bumper"](#).
2. Partially drain engine coolant from the radiator. Refer to [CO-12. "Changing Engine Coolant"](#).

CAUTION:

- Perform this step when engine is cold.
- Do not spill engine coolant on drive belts.

3. Remove air duct and resonator assembly. Refer to [EM-24. "Removal and Installation"](#).
4. Remove reservoir tank hose and water hose.
5. Unclip the reservoir overflow hose from the radiator shroud.
6. Remove the reservoir tank bracket and reservoir tank.
7. Unclip the transmission lines from the radiator shroud.
8. Disconnect the motor driven cooling fan connector.
9. Remove the RH and LH radiator shrouds (lower). Refer to [CO-18. "Exploded View"](#).
 - Release the tabs, pull RH and LH radiator shrouds (lower) rearward and down to remove.
10. Remove the radiator shroud (upper) bolts and remove the radiator shroud (upper).
11. Remove the radiator hose (upper) from the radiator.
12. Disconnect radiator hose (lower) and oil cooler hose from water inlet and thermostat assembly.

WATER INLET AND THERMOSTAT ASSEMBLY

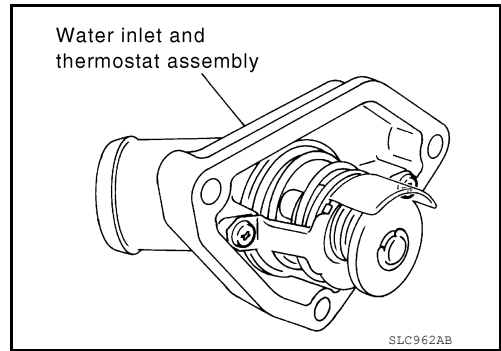
[VQ40DE]

< REMOVAL AND INSTALLATION >

13. Remove water inlet and thermostat assembly.

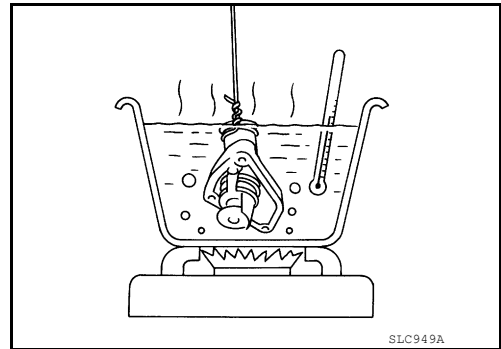
CAUTION:

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



INSPECTION AFTER REMOVAL

1. Check valve seating condition at room temperature. It should seat tightly.
2. Check valve operation.
 - Place a thread so that it is caught in the valve of the thermostat. Immerse fully in a container filled with water. Heat while stirring.
 - The valve opening temperature is the temperature at which the valve opens and falls from the thread.
 - Continue heating. Check the full-open lift amount.
 - After checking the full-open lift amount, lower the water temperature and check the valve closing temperature.



| Thermostat | Standard |
|---------------------------|--|
| Valve opening temperature | Refer to CO-34. "Standard and Limit" |
| Full-open lift amount | Refer to CO-34. "Standard and Limit" |
| Valve closing temperature | Refer to CO-34. "Standard and Limit" |

Replace water inlet and thermostat assembly if valve opening and closing values are out of specifications.

INSTALLATION

Installation is in the reverse order of removal.

NOTE:

Do not spill engine coolant in engine room. Use a rag to absorb engine coolant.

INSPECTION AFTER INSTALLATION

- Check for coolant leaks. Refer to [CO-11. "System Inspection"](#).
- Start and warm up engine. Check for coolant leaks. Repair as necessary.

WATER OUTLET AND WATER PIPING

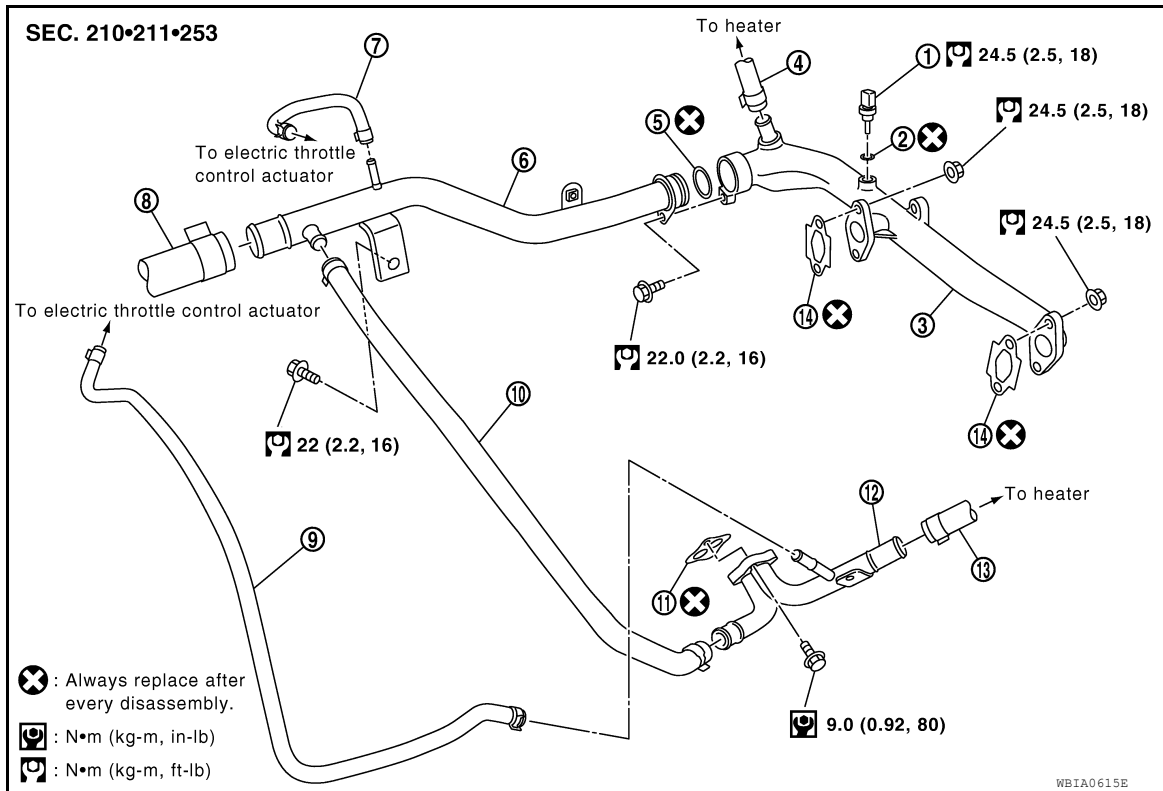
< REMOVAL AND INSTALLATION >

[VQ40DE]

WATER OUTLET AND WATER PIPING

Exploded View

INFOID:000000006750580



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

INFOID:000000006750581

WARNING:

Do not remove the radiator cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly turn it a quarter of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

1. Drain engine coolant from radiator. Refer to [CO-12, "Changing Engine Coolant"](#).

CAUTION:

- Perform this step when engine is cold.
- Do not spill engine coolant on drive belts.

2. Remove the intake manifold collector. Refer to [EM-25, "Removal and Installation"](#).
3. Remove oil level gauge and oil level tube.
4. Remove engine coolant temperature sensor as necessary.

CAUTION:

Be careful not to damage engine coolant temperature sensor.

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

WATER OUTLET AND WATER PIPING

< REMOVAL AND INSTALLATION >

[VQ40DE]

CAUTION:

Do not reuse O-rings.

A

INSTALLATION

Installation is in the reverse order of removal.

- Securely insert each hose.
- Install clamps in a position where it does not interfere with the pipe bulge.
- Before inserting water pipe into water outlet, apply mild soap to O-ring.

CO

CAUTION:

Do not reuse O-rings.

C

INSPECTION AFTER INSTALLATION

- Check for coolant leaks. Refer to [CO-11. "System Inspection"](#).
- Start and warm up engine. Check for coolant leaks. Repair as necessary.

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SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[VQ40DE]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Standard and Limit

INFOID:000000006750582

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

| | |
|--|-----------------------|
| Engine coolant capacity with reservoir tank at (MAX) level | 12.7 (13-3/8, 11-1/8) |
|--|-----------------------|

RADIATOR

Unit: kPa (kg/cm², psi)

| | | |
|-------------------------------|----------|-------------------|
| Reservoir cap relief pressure | Standard | 117.5 (1.2, 17) |
| Leakage testing pressure | | 127.5 (1.3, 18.5) |

THERMOSTAT

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

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000006750583

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 SR 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 SR 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 WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Liquid Gasket

INFOID:000000006750584

REMOVAL OF LIQUID GASKET SEALANT

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

Tool number : KV10111100 (J-37228)

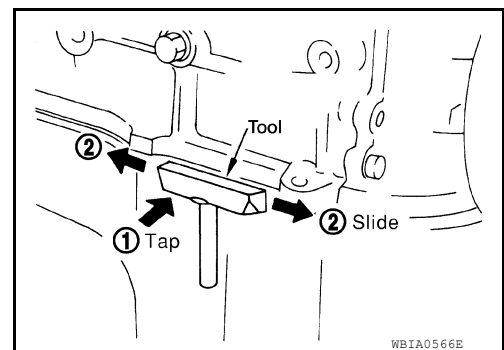
CAUTION:

Be careful not to damage the mating surfaces.

- Tap seal cutter to insert it (1), and then slide it by tapping on the side (2) as shown.
- In areas where Tool is difficult to use, use plastic hammer to lightly tap the part, to remove it.

CAUTION:

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



WBIA0566E

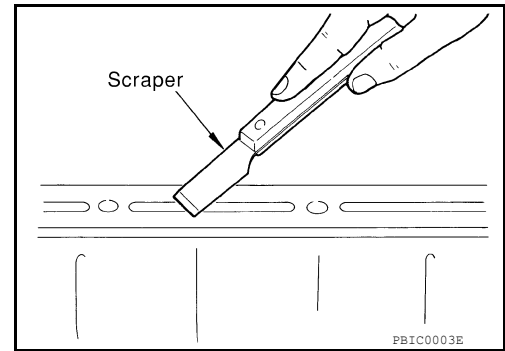
LIQUID GASKET APPLICATION PROCEDURE

PRECAUTIONS

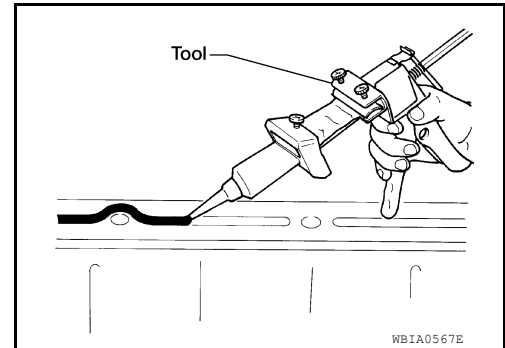
[VK56DE]

< PRECAUTION >

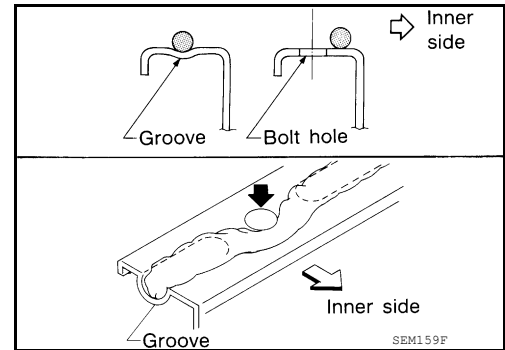
1. Remove the old liquid gasket adhering to the gasket application surface and the mating surface using suitable tool.
 - Remove the liquid gasket completely from the groove of the liquid gasket application surface, bolts, and bolt holes.
2. Thoroughly clean the mating surfaces and remove adhering moisture, grease and foreign material.



3. Attach the liquid gasket tube to the suitable tool.
Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-17, "Recommended Chemical Products and Sealants"](#).
4. Apply the liquid gasket without breaks to the specified location with the specified dimensions.



- If there is a groove for the liquid gasket application, apply the liquid gasket to the groove.
- Apply the liquid gasket to the inner side of the bolt holes. If specified in the procedure, it should also be applied outside the bolt holes.
- Install the mating component within five minutes of the liquid gasket application.
- If the liquid gasket protrudes, wipe it off immediately.
- Do not retighten after the installation.
- Wait 30 minutes or more after installation before refilling the engine with engine oil and engine coolant.



CAUTION:

Carefully follow all of the warnings, cautions, notes, and procedures contained in this manual.

PREPARATION

< PREPARATION >

[VK56DE]

PREPARATION

PREPARATION

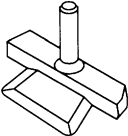
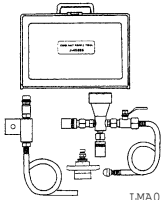
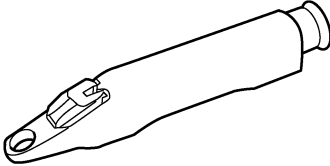
Special Service Tool

INFOID:000000006750585

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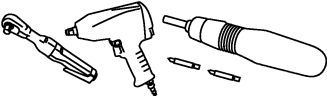
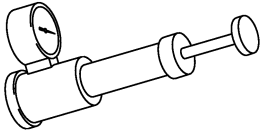
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

| Tool number (Kent-Moore No.) Tool name | Description |
|---|--|
| KV10111100 (J-37228) Seal cutter  NT046 | Removing steel oil pan and rear timing chain case D E |
| KV991J0070 (J-45695) Coolant refill tool  LMA053 | For refilling engine cooling system F G |
| KV991J0010 (J-23688) Engine coolant refractometer  WBIA0539E | Checking concentration of ethylene glycol in engine coolant H I J |

Commercial Service Tool

INFOID:000000006750586

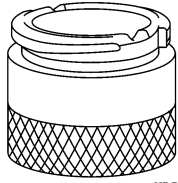
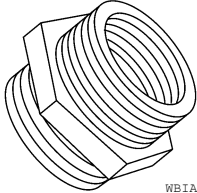
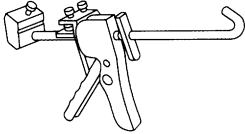
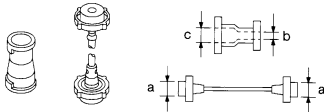
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| Tool name | Description |
|---|---|
| Power tool  PIIB1407E | Loosening nuts, screws and bolts L M |
| Radiator cap tester  FBIC1982E | Checking radiator and radiator cap N O P |

PREPARATION

< PREPARATION >

[VK56DE]

| Tool name | Description |
|--|---|
| <p>Coolant system tester adapter</p>  <p style="text-align: right; font-size: small;">WBIA0408E</p> | <p>Adapting radiator cap tester to radiator filler neck</p> |
| <p>Coolant system tester adapter</p>  <p style="text-align: right; font-size: small;">WBIA0409E</p> | <p>Adapting radiator cap tester to reservoir cap</p> |
| <p>Tube presser</p>  <p style="text-align: right; font-size: small;">S-NT052</p> | <p>Pressing the tube of liquid gasket</p> |
| <p>Radiator cap tester adapter</p>  <p style="text-align: right; font-size: small;">S-NT564</p> | <p>Adapting radiator cap tester to radiator cap and radiator filler neck</p> <p>a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in)</p> |

COOLING SYSTEM

< SYSTEM DESCRIPTION >

[VK56DE]

SYSTEM DESCRIPTION

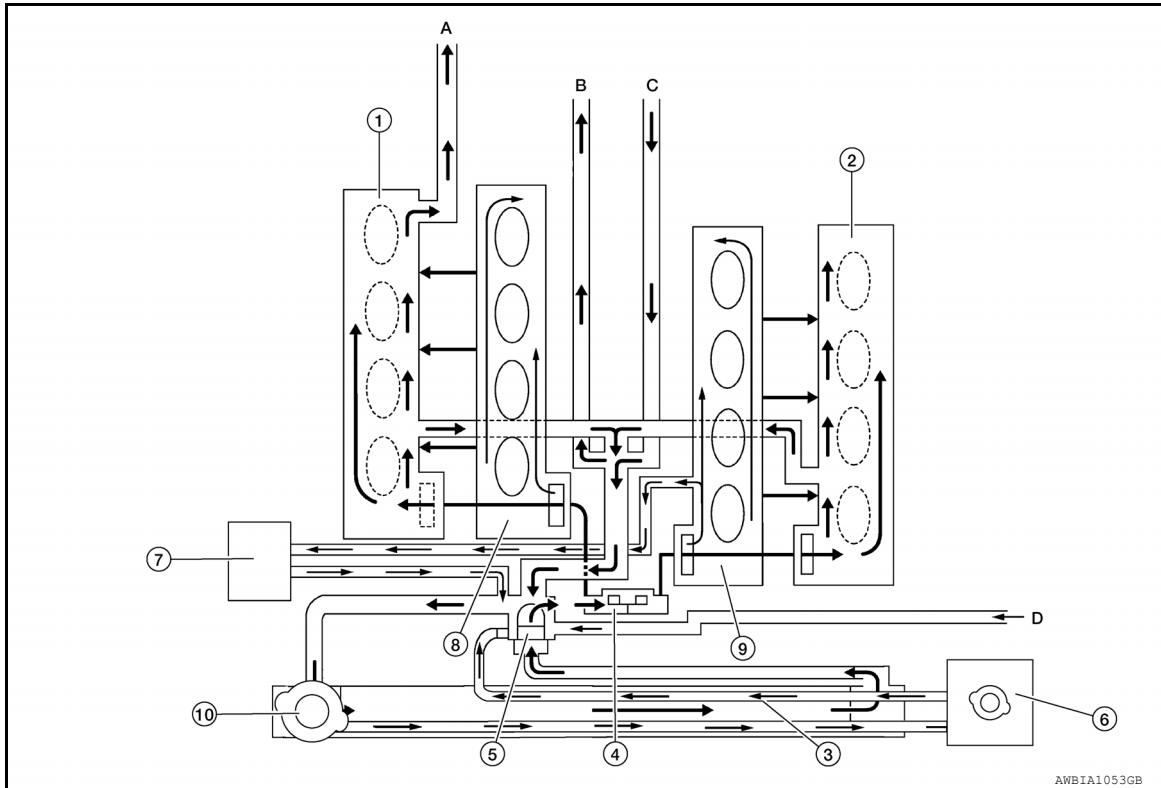
COOLING SYSTEM

Cooling Circuit

INFOID:000000006750587

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| 1. Cylinder head (RH) | 2. Cylinder head (LH) | 3. Radiator |
| 4. Water pump | 5. Thermostat | 6. Coolant reservoir tank |
| 7. Oil cooler | 8. Cylinder block (RH) | 9. Cylinder block (LH) |
| 10. Radiator cap | A. To heater | B. To electric throttle control actuator |
| C. From heater | D. From electric throttle control actuator | |

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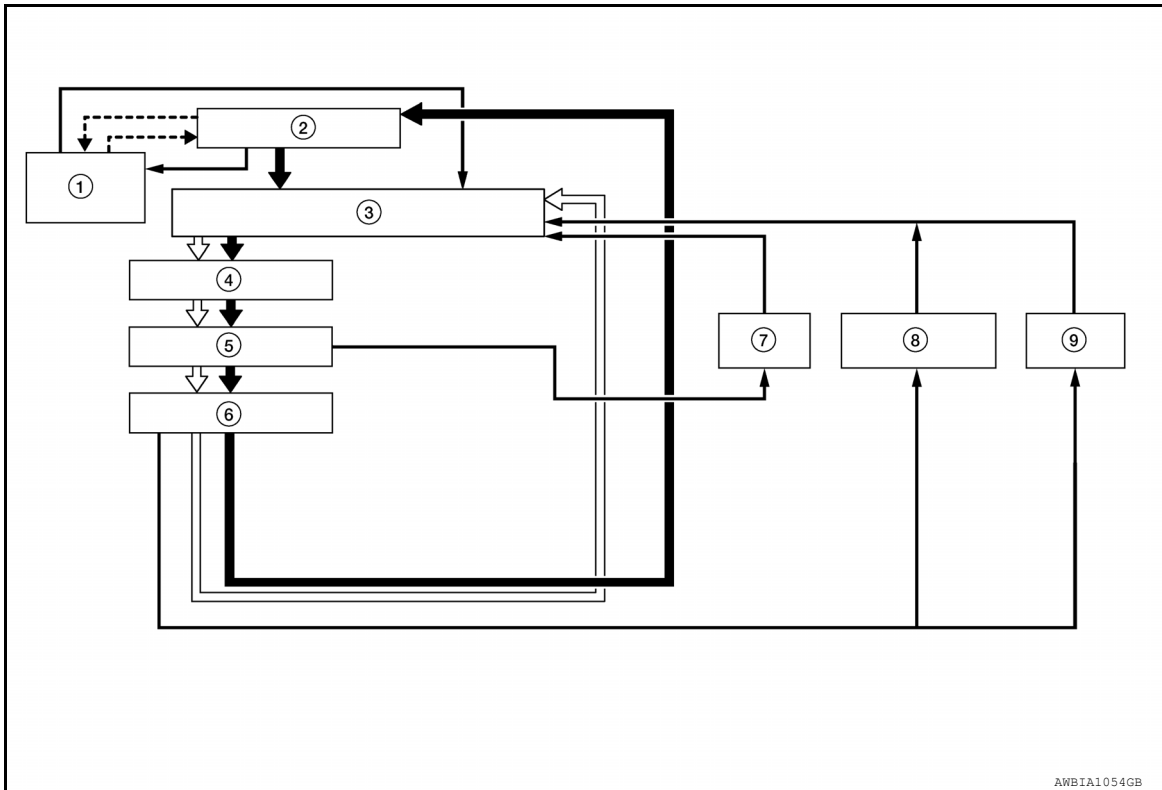
COOLING SYSTEM

< SYSTEM DESCRIPTION >

[VK56DE]

Schematic

INFOID:000000006750588



- | | | |
|---------------------------|---------------------------------------|--------------------------------------|
| 1. Coolant reservoir tank | 2. Radiator | 3. Thermostat and thermostat housing |
| 4. Water pump | 5. Cylinder block | 6. Cylinder head |
| 7. Oil cooler | 8. Electric throttle control actuator | 9. Heater |
| ◁ Thermostat closed | ◼ Thermostat open | |

OVERHEATING CAUSE ANALYSIS

< SYSTEM DESCRIPTION >

[VK56DE]

OVERHEATING CAUSE ANALYSIS

Troubleshooting Chart

INFOID:000000006750589

| | | Symptom | Check items | | |
|----------------------------------|---------------------------------------|---------------------------------------|--|------------------------|---|
| Cooling system parts malfunction | Poor heat transfer | Water pump malfunction | Worn or loose drive belt | — | |
| | | Coolant circulation | Thermostat | | |
| | | Damaged fins | Dust contamination or paper clogging | | |
| | | | Physical damage | | |
| | | Clogged radiator cooling tube | Excess foreign material (rust, dirt, sand, etc.) | | |
| | Reduced airflow | Cooling fan does not operate | Fan assembly | — | |
| | | High resistance to fan rotation | | | |
| | | Damaged fan blades | | | |
| | | Damaged radiator shroud | — | Radiator shroud | — |
| | | Improper engine coolant mixture ratio | — | Coolant viscosity | — |
| | | Poor engine coolant quality | — | Engine coolant density | — |
| | Insufficient engine coolant | Engine coolant leaks | Cooling hose | Loose clamp | |
| | | | | Cracked hose | |
| | | | Water pump | Poor sealing | |
| | | | Radiator or reservoir cap | Loose | |
| Poor sealing | | | | | |
| Radiator | | | O-ring for damage, deterioration or improper fitting | | |
| | | Cracked radiator tank | | | |
| | | Cracked radiator core | | | |
| | Reservoir tank | Cracked reservoir tank | | | |
| Coolant reservoir tank | Exhaust gas leaks into cooling system | Cylinder head deterioration | | | |
| | | Cylinder head gasket deterioration | | | |

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OVERHEATING CAUSE ANALYSIS

< SYSTEM DESCRIPTION >

[VK56DE]

| | 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 | — |
| | | | | | Improper size wheels and tires installed | |
| | | | | | Dragging brakes | |
| | | | Improper ignition timing | | | |
| | Blocked or restricted airflow | | Blocked radiator grille | Car brassiere installed | — | |
| | | | Blocked bumper | Mud contamination or paper clogging | | |
| | | | Blocked radiator | | | |
| | | Blocked condenser | Blocked air flow | | | |
| | | Large fog lamp installed | | | | |

PERIODIC MAINTENANCE

ENGINE COOLANT

Inspection

INFOID:000000006750590

WARNING:

- Do not remove the radiator/reservoir cap when the engine is hot. Serious burns could occur from high pressure fluid escaping from the radiator or reservoir.
- Wrap a thick cloth around the cap. Slowly push down and turn it a quarter-turn to allow built-up pressure to escape. Carefully remove the cap by turning it all the way.

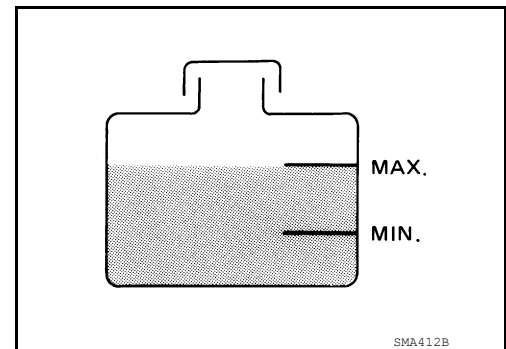
CHECKING COOLING SYSTEM HOSES

Check hoses for the following:

- Improper attachment
- Leaks
- Cracks
- Damage
- Loose connections
- Chafing
- Deterioration

LEVEL CHECK

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



CHECKING COOLING SYSTEM FOR LEAKS

WARNING:

- Do not remove the radiator/reservoir cap when the engine is hot. Serious burns could occur from high pressure fluid escaping from the radiator or reservoir.
- Wrap a thick cloth around the cap. Slowly push down and turn it a quarter-turn to allow built-up pressure to escape. Carefully remove the cap by turning it all the way.
- To check for leaks, apply pressure to the cooling system at the reservoir filler neck using suitable tool (A).

Testing pressure : Refer to [CO-59, "Standard and Limit"](#).

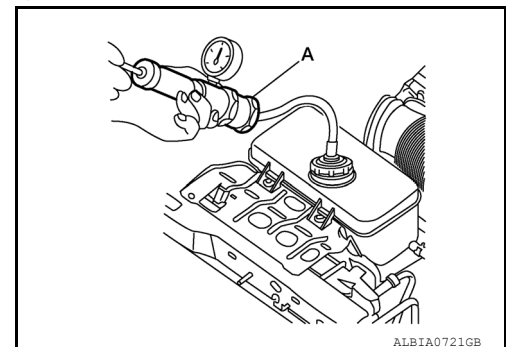
CAUTION:

Higher pressure than specified may cause radiator damage.

NOTE:

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

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



CHECKING RESERVOIR CAP

ENGINE COOLANT

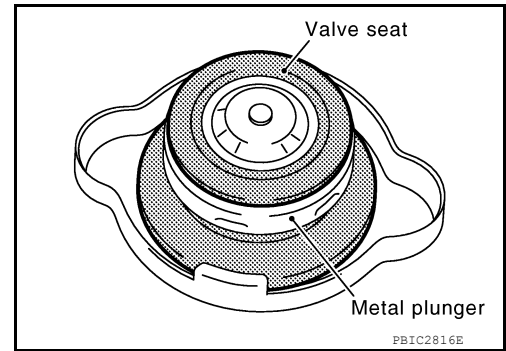
[VK56DE]

< PERIODIC MAINTENANCE >

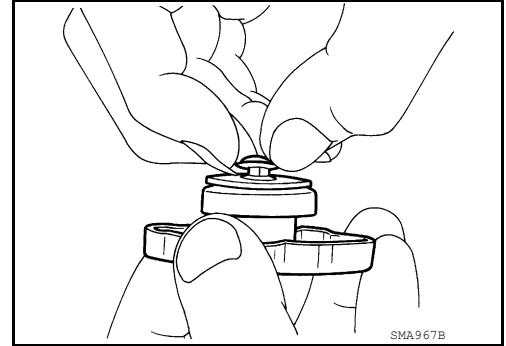
1. Inspect the reservoir cap.
 - Replace the cap if the metal plunger cannot be seen around the edge of the black rubber gasket.
 - Replace the cap if deposits of waxy residue or other foreign material are on the black rubber gasket or the metal retainer.

CAUTION:

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



2. Pull the negative-pressure valve to open it and check that it closes completely when released.
 - Check that there is no dirt or damage on the valve seat of the reservoir cap negative-pressure valve.
 - Check that there are no abnormalities in the opening and closing conditions of the negative-pressure valve.

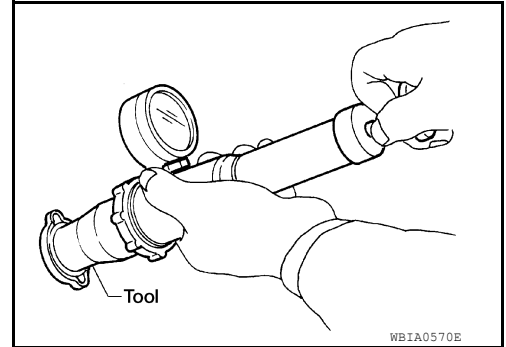


3. Check reservoir cap relief pressure using suitable tool.

Standard : Refer to [CO-59, "Standard and Limit"](#).

NOTE:

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



CHECKING RADIATOR CAP

Inspect the radiator cap.

CAUTION:

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

- Replace the radiator cap if deposits of waxy residue or foreign materials are on the black rubber gasket or the metal retainer.

Changing Engine Coolant

INFOID:000000006750591

WARNING:

- **Do not remove the radiator cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator.**
- **Wrap a thick cloth around the cap to carefully remove the cap. First, turn the cap a quarter of a turn to release any built-up pressure, then turn the cap all the way to remove it.**

DRAINING ENGINE COOLANT

1. Turn ignition switch ON and set temperature control lever all the way to HOT position or the highest temperature position. Wait 10 seconds and turn ignition switch OFF.

ENGINE COOLANT

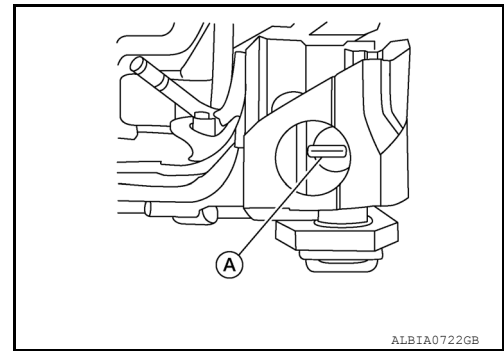
[VK56DE]

< PERIODIC MAINTENANCE >

2. Open the radiator drain plug (A) at the bottom of the radiator, and remove the reservoir cap. This is the only step required when partially draining the cooling system.

CAUTION:

Do not allow the coolant to contact the drive belts.



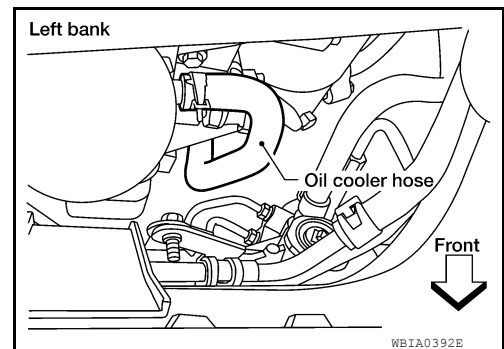
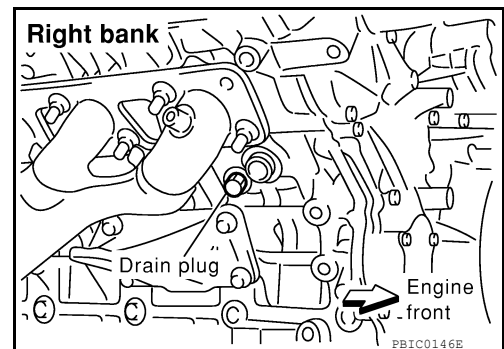
3. If it is necessary to drain the cylinder block when draining all of the coolant in the system, complete the remaining steps.
 - a. Remove the front under cover using power tool. Refer to [EXT-16. "Removal and Installation - Front Bumper"](#).
 - b. Remove the RH cylinder block drain plug to drain the right bank and the oil cooler hose to drain the left bank as shown.

NOTE:

For Canada, the drain plug as shown is replaced with a block heater.

CAUTION:

Do not reuse the copper sealing washers.



5. Remove the reservoir tank to drain the engine coolant, then clean the reservoir tank before installing it.
6. Check the drained coolant for contaminants such as rust, corrosion or discoloration. If the coolant is contaminated, flush the engine cooling system. Follow the "Flushing Cooling System" procedure.

REFILLING ENGINE COOLANT

1. Close the radiator drain plug. Install the reservoir tank, cylinder block drain plug and the oil cooler hose, if removed for a total system drain. Refer to [EM-228. "Exploded View"](#).
 - The radiator must be completely empty of coolant and water.
 - Apply sealant to the threads of the cylinder block drain plug. Use Genuine High Performance Thread Sealant or equivalent. Refer to [GI-17. "Recommended Chemical Products and Sealants"](#).

CAUTION:

Do not reuse the copper sealing washers.

2. Set the vehicle heater controls to the full HOT and heater ON position. Turn the vehicle ignition ON with the engine OFF as necessary to activate the heater mode.
3. Remove the vented reservoir cap and replace it with a non-vented reservoir cap before filling the cooling system.

ENGINE COOLANT

[VK56DE]

< PERIODIC MAINTENANCE >

4. Install the Tool by installing the radiator cap adapter onto the radiator neck opening. Then attach the gauge body assembly with the refill tube and the venturi assembly to the radiator cap adapter.

Tool number : KV991J0070 (J-45695)

5. Insert the refill hose into the coolant mixture container that is placed at floor level. Make sure the ball valve is in the closed position.
 - Use recommended coolant or equivalent. Refer to [MA-13, "Fluids and Lubricants"](#).

CAUTION:

Do not use any cooling system additives such as radiator sealer. Additives may clog the cooling system and cause damage to the engine, transmission and/or cooling system.

Cooling system capacity (with reservoir at (MAX) line) : Refer to [CO-59, "Standard and Limit"](#).

6. Install an air hose to the venturi assembly. The air pressure must be within specification.

Compressed air supply pressure : 549 - 824 kPa (5.6 - 8.4 kg/cm², 80 - 119 psi)

CAUTION:

The compressed air supply must be equipped with an air dryer.

7. The vacuum gauge will begin to rise and there will be an audible hissing noise. During this process, open the ball valve on the refill hose slightly. Rising coolant will be visible in the refill hose. After the refill hose is full of coolant, close the ball valve. This will purge any air trapped in the refill hose.

8. Continue to draw the vacuum until the gauge reaches 28 inches of vacuum. The gauge may not reach 28 inches in high altitude locations. Refer to the following table for expected vacuum reading.

| Altitude above sea level | Vacuum gauge reading |
|--------------------------|----------------------------|
| 0 - 100 m (328 ft) | : 28 inches of vacuum |
| 300 m (984 ft) | : 27 inches of vacuum |
| 500 m (1,641 ft) | : 26 inches of vacuum |
| 1,000 m (3,281 ft) | : 24 - 25 inches of vacuum |

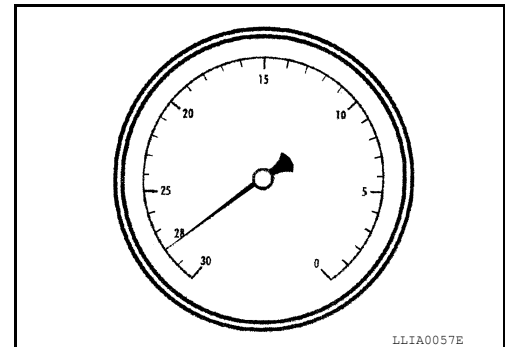
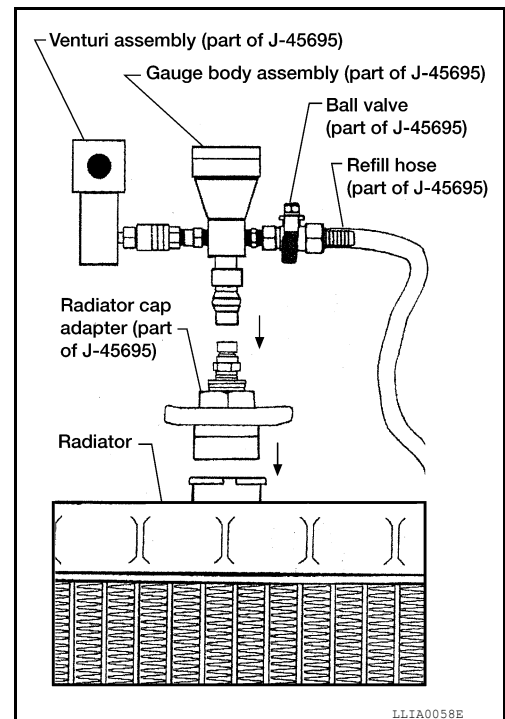
9. When the vacuum gauge has reached the specified amount, disconnect the air hose and wait 20 seconds to see if the system loses any vacuum. If the vacuum level drops, perform any necessary repairs to the system and repeat steps 6 - 8 to bring the vacuum to the specified amount. Recheck for leaks.

10. Place the coolant container (with the refill hose inserted) at the same level as the top of the radiator. Then open the ball valve on the refill hose so the coolant will be drawn up to fill the cooling system. The cooling system is full when the vacuum gauge reads zero.

CAUTION:

Do not allow the coolant container to get too low when filling to avoid air from being drawn into the cooling system.

11. Remove the Tool from the radiator neck opening and install the radiator cap.
12. Remove the non-vented reservoir cap.
13. Fill the cooling system reservoir tank to the specified level. Run the engine to warm up the cooling system and top up the system as necessary before installing the vented reservoir cap.
14. Install the front under cover. Refer to [EXT-16, "Removal and Installation - Front Bumper"](#).



ENGINE COOLANT

[VK56DE]

< PERIODIC MAINTENANCE >

FLUSHING COOLING SYSTEM

1. Drain the water from the engine cooling system. Refer to [CO-44, "Changing Engine Coolant"](#).
2. Fill the radiator and the reservoir tank (to the (MAX) line), with water. Reinstall the radiator cap and leave the vented reservoir cap off.
3. Run the engine until it reaches normal operating temperature.
4. Press the engine accelerator two or three times under no-load.
5. Stop the engine and wait until it cools down.
6. Drain the water from the engine cooling system. Refer to [CO-44, "Changing Engine Coolant"](#).
7. Repeat steps 2 through 6 until clear water begins to drain from the radiator.

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RADIATOR

Checking Radiator

INFOID:000000006750592

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

CAUTION:

- **Be careful not to bend or damage the radiator fins.**
 - **When radiator is cleaned without removal, remove all the surrounding parts such as cooling fan shroud and horns. Then tape the harness and electrical connectors to prevent water from entering.**
1. Spray water to the back side of the radiator core using a side-to-side motion from the top down.
 2. Stop spraying when debris no longer flows from radiator core.
 3. Blow air into the back side of radiator core using a side-to-side motion from the top down.
 - Use compressed air lower than 490 kPa (5 kg/cm², 71 psi) and keep distance more than 30 cm (11.8 in).
 4. Continue to blow air until no water sprays out.
 5. Check for coolant leaks. Repair as necessary.

RADIATOR

< REMOVAL AND INSTALLATION >

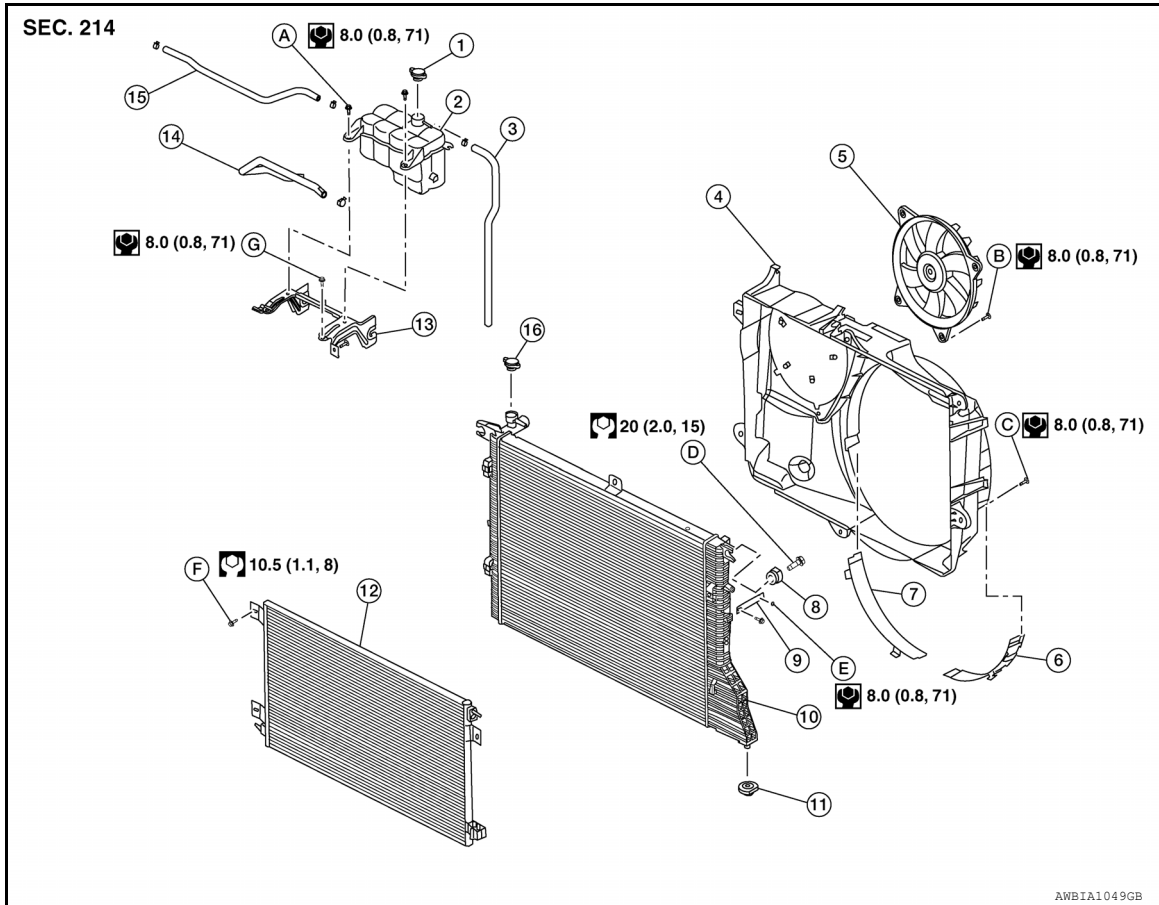
[VK56DE]

REMOVAL AND INSTALLATION

RADIATOR

Exploded View

INFOID:000000006750593



- | | | |
|------------------------------------|--|---|
| 1. Coolant reservoir cap | 2. Coolant reservoir tank | 3. Coolant reservoir overflow hose |
| 4. Radiator shroud (upper) | 5. Engine cooling fan (motor driven) | 6. Radiator shroud LH (lower) |
| 7. Radiator shroud RH (lower) | 8. Mounting rubber (upper) | 9. A/C bracket |
| 10. Radiator | 11. Mounting rubber (lower) | 12. A/C condenser |
| 13. Coolant reservoir tank bracket | 14. Water hose | 15. Coolant reservoir tank hose |
| 16. Radiator cap | A. Reservoir tank bolt | B. Engine cooling fan (motor driven) bolt |
| C. Radiator shroud (upper) bolt | D. Radiator bolt | E. A/C bracket bolt |
| F. A/C condenser bolt | G. Coolant reservoir tank bracket bolt | |

Removal and Installation

INFOID:000000006750594

WARNING:

Do not remove the radiator cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly turn it a quarter of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

1. Remove front under cover using power tool. Refer to [EXT-16. "Removal and Installation - Front Bumper"](#).
2. Drain engine coolant from the radiator. Refer to [CO-44. "Changing Engine Coolant"](#).

RADIATOR

[VK56DE]

< REMOVAL AND INSTALLATION >

CAUTION:

- Perform this step when engine is cold.
- Do not spill engine coolant on drive belts.

3. Remove air duct and resonator assembly. Refer to [EM-164. "Removal and Installation"](#).
4. Remove reservoir tank hose and water hose.
5. Unclip the reservoir overflow hose from the radiator shroud.
6. Remove the reservoir tank bracket and reservoir tank.
7. Unclip the transmission lines from the radiator shroud.
8. Disconnect the motor driven cooling fan connector.
9. Remove the RH and LH radiator shrouds (lower).
 - Release the tabs, pull RH and LH radiator shrouds (lower) rearward and down to remove.
10. Remove the radiator shroud (upper) bolts and remove the radiator shroud (upper).
11. Remove radiator hoses (upper and lower).

CAUTION:

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

12. Disconnect A/T fluid cooler hoses.
13. Remove front grille. Refer to [EXT-28. "Removal and Installation"](#).
14. Remove the radiator as follows:

CAUTION:

Do not damage or scratch air conditioner condenser, A/T oil cooler or radiator core when removing.

- a. Remove the radiator upper mount bracket bolts.
- b. Lift and pull radiator rearward to disengage the rubber mounting (lower) from the radiator core support center.
- c. Remove the radiator by lifting up.

INSTALLATION

Installation is in the reverse order of removal.

INSPECTION AFTER INSTALLATION

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to [MA-13. "Fluids and Lubricants"](#).
- Use procedure below to check for fuel leakage.
- Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
- Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.

NOTE:

If hydraulic pressure inside timing chain tensioner drops after removal and installation, slack in the guide may generate a pounding noise during and just after engine start. However, this is normal. Noise will stop after hydraulic pressure rises.

- Warm up engine thoroughly to make sure there is no leakage of fuel, exhaust gas, or any oils/fluids including engine oil and engine coolant.
- Bleed air from passages in lines and hoses, such as in cooling system.
- After cooling down engine, again check oil/fluid levels including engine oil and engine coolant. Refill to specified level, if necessary.
- Summary of the inspection items:

| Item | | Before starting engine | Engine running | After engine stopped |
|----------------------------------|--------------------|------------------------|----------------|----------------------|
| Engine coolant | | Level | Leakage | Level |
| Engine oil | | Level | Leakage | Level |
| Transmission/ transaxle fluid | A/T and CVT Models | Leakage | Level/Leakage | Leakage |
| | M/T Models | Level/Leakage | Leakage | Level/Leakage |
| Other oils and fluids* | | Level | Leakage | Level |

RADIATOR

< REMOVAL AND INSTALLATION >

[VK56DE]

| Item | Before starting engine | Engine running | After engine stopped |
|-------------|------------------------|----------------|----------------------|
| Fuel | Leakage | Leakage | Leakage |
| Exhaust gas | — | Leakage | — |

*Power steering fluid, brake fluid, etc.

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ENGINE COOLING FAN

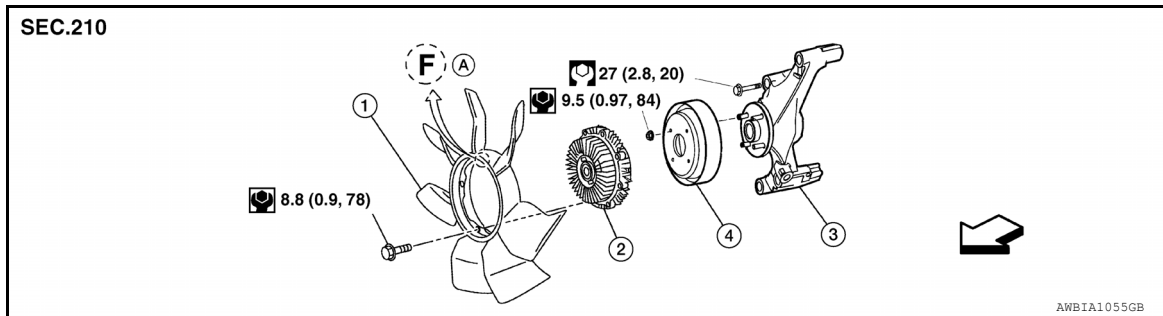
< REMOVAL AND INSTALLATION >

[VK56DE]

ENGINE COOLING FAN

Exploded View

INFOID:000000006750595



- | | | |
|-----------------------|-----------------|----------------|
| 1. Cooling fan | 2. Fan coupling | 3. Fan bracket |
| 4. Cooling fan pulley | A. Front mark | ← Engine front |

Removal and Installation (Crankshaft Driven Type)

INFOID:000000006750596

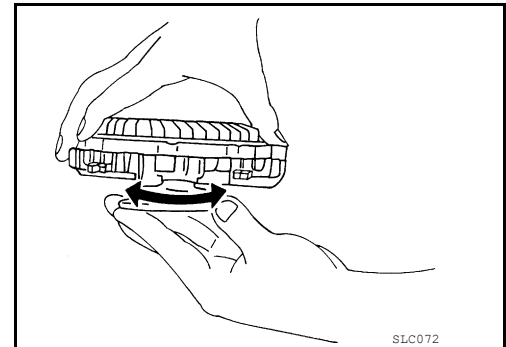
REMOVAL

1. Remove front under cover using power tool. Refer to [EXT-16, "Removal and Installation - Front Bumper"](#).
2. Remove air duct and resonator assembly. Refer to [EM-164, "Removal and Installation"](#).
3. Remove the RH and LH radiator shrouds (lower).
 - Release the tabs, pull RH and LH radiator shrouds (lower) rearward and down to remove.
4. Remove the cooling fan blade assembly.
5. Remove the cooling fan from the fan coupling, if necessary.

INSPECTION AFTER REMOVAL

Fan Coupling

- Inspect fan coupling for oil leaks and corrosion.
- Replace the fan coupling if necessary.

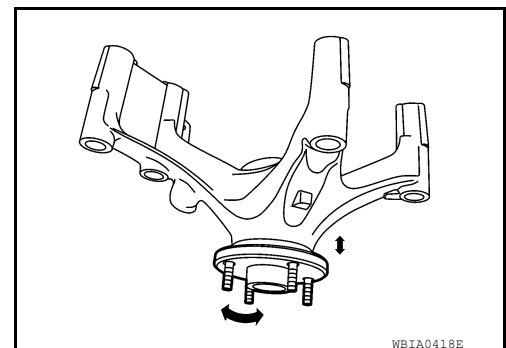


Fan Bracket

- Check that the vane shaft turns smoothly by hand and is not excessively loose.
- Replace the fan bracket assembly if necessary.
- Inspect the studs. Replace if necessary.

NOTE:

If the studs are removed or replaced tighten the studs until they bottom out in the fan bracket flange.



Cooling Fan Pulley

- Inspect cooling fan pulley.

ENGINE COOLING FAN

[VK56DE]

< REMOVAL AND INSTALLATION >

- Replace the cooling fan pulley if necessary.

INSTALLATION

Installation is in the reverse order of removal.

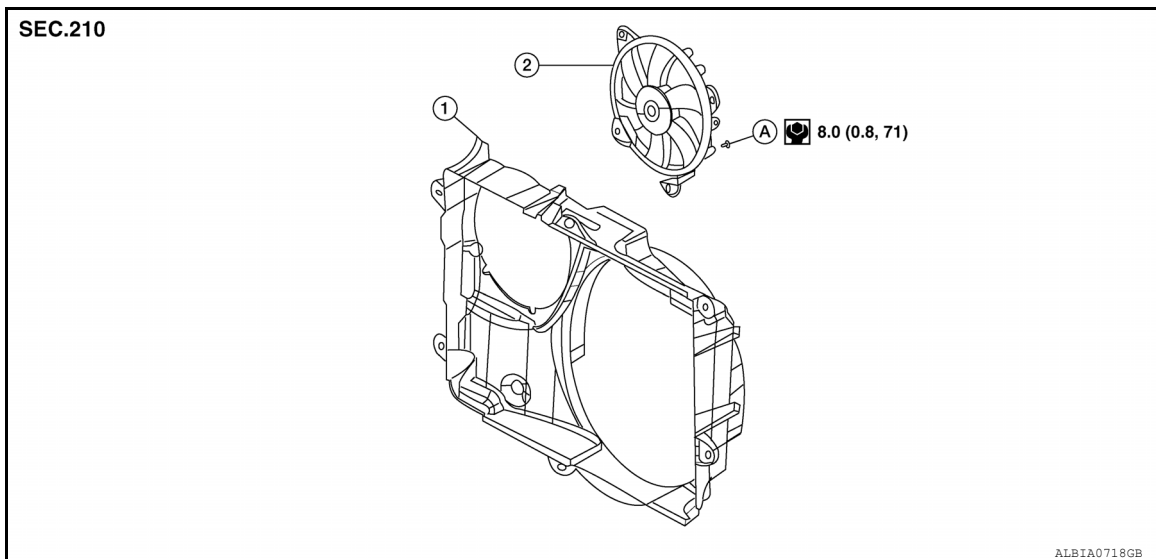
- Install cooling fan with its front mark "F" facing front of engine.

INSPECTION AFTER INSTALLATION

- Check for coolant leaks. Refer to [CO-43. "Inspection"](#).

Removal and Installation (Motor driven type)

INFOID:000000007064125



1. Fan shroud (upper)

2. Motor driven engine cooling fan

A. Motor driven engine cooling fan bolts

REMOVAL

1. Remove air duct and resonator assembly. Refer to [EM-24. "Removal and Installation"](#).
2. Disconnect harness connector from fan motor.
3. Remove the motor driven engine cooling fan bolts.
4. Remove the motor driven engine cooling fan.

INSTALLATION

Installation is in the reverse order of removal.

- Cooling fan is controlled by ECM. For details, refer to [EC-850. "Component Function Check"](#).

WATER PUMP

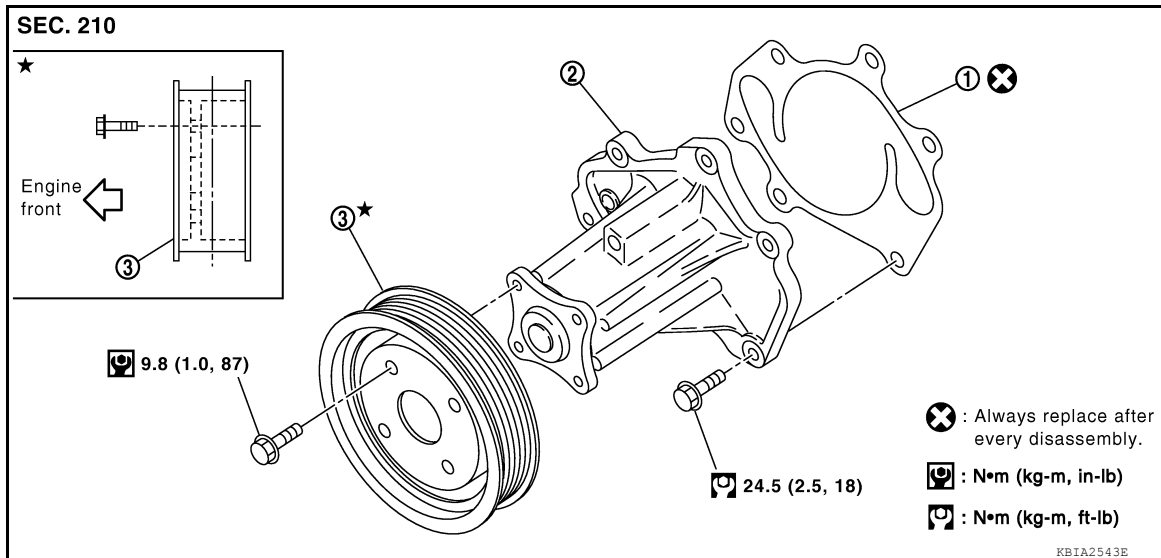
< REMOVAL AND INSTALLATION >

[VK56DE]

WATER PUMP

Exploded View

INFOID:000000006750597



1. Gasket

2. Water pump

3. Water pump pulley

Removal and Installation

INFOID:000000006750598

WARNING:

Do not remove the radiator cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly turn it a quarter of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

CAUTION:

- Be careful not to get engine coolant on the timing chain or drive belt when removing the water pump assembly.
- Do not disassemble the water pump. Replace it as a unit.
- Check for leaks after installing the water pump and connecting the hoses and clamps securely.

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

1. Remove front under cover using power tool. Refer to [EXT-16, "Removal and Installation - Front Bumper"](#).
2. Drain engine coolant from the radiator. Refer to [CO-44, "Changing Engine Coolant"](#).

CAUTION:

- Perform this step when engine is cold.
 - Do not spill engine coolant on drive belts.
3. Remove air duct and resonator assembly. Refer to [EM-164, "Removal and Installation"](#).
 4. Remove reservoir tank hose and water hose.
 5. Unclip the reservoir overflow hose from the radiator shroud.
 6. Remove the reservoir tank bracket and reservoir tank.
 7. Disconnect the motor driven cooling fan connector.
 8. Remove the RH and LH radiator shrouds (lower).
 - Release the tabs, pull RH and LH radiator shrouds (lower) rearward and down to remove.
 9. Remove the radiator shroud (upper) bolts and remove the radiator shroud (upper).
 10. Remove the water pump pulley.
 11. Remove the water pump.
 - Engine coolant will leak from the cylinder block, so have a receptacle ready below.

WATER PUMP

< REMOVAL AND INSTALLATION >

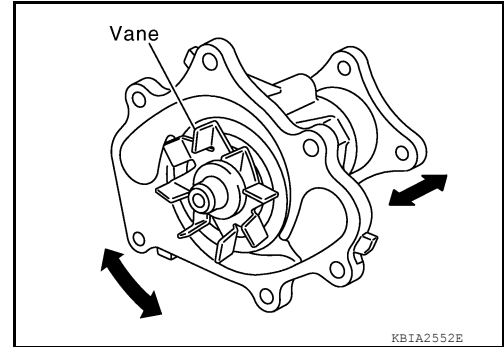
[VK56DE]

CAUTION:

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

INSPECTION AFTER REMOVAL

- Visually check for significant dirt or rust on the water pump body and vane.
- Check that the vane shaft turns smoothly by hand and is not excessively loose.
- Replace the water pump assembly if the water pump does not perform properly.



INSTALLATION

Installation is in the reverse order of removal.

- After installation bleed the air from the cooling system. Refer to [CO-44, "Changing Engine Coolant"](#).

INSPECTION AFTER INSTALLATION

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to [MA-13, "Fluids and Lubricants"](#).
- Use procedure below to check for fuel leakage.
- Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
- Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.

NOTE:

If hydraulic pressure inside timing chain tensioner drops after removal and installation, slack in the guide may generate a pounding noise during and just after engine start. However, this is normal. Noise will stop after hydraulic pressure rises.

- Warm up engine thoroughly to make sure there is no leakage of fuel, exhaust gas, or any oils/fluids including engine oil and engine coolant.
- Bleed air from passages in lines and hoses, such as in cooling system.
- After cooling down engine, again check oil/fluid levels including engine oil and engine coolant. Refill to specified level, if necessary.
- Summary of the inspection items:

| Item | | Before starting engine | Engine running | After engine stopped |
|----------------------------------|--------------------|------------------------|----------------|----------------------|
| Engine coolant | | Level | Leakage | Level |
| Engine oil | | Level | Leakage | Level |
| Transmission/ transaxle fluid | A/T and CVT Models | Leakage | Level/Leakage | Leakage |
| | M/T Models | Level/Leakage | Leakage | Level/Leakage |
| Other oils and fluids* | | Level | Leakage | Level |
| Fuel | | Leakage | Leakage | Leakage |
| Exhaust gas | | — | Leakage | — |

*Power steering fluid, brake fluid, etc.

THERMOSTAT AND WATER PIPING

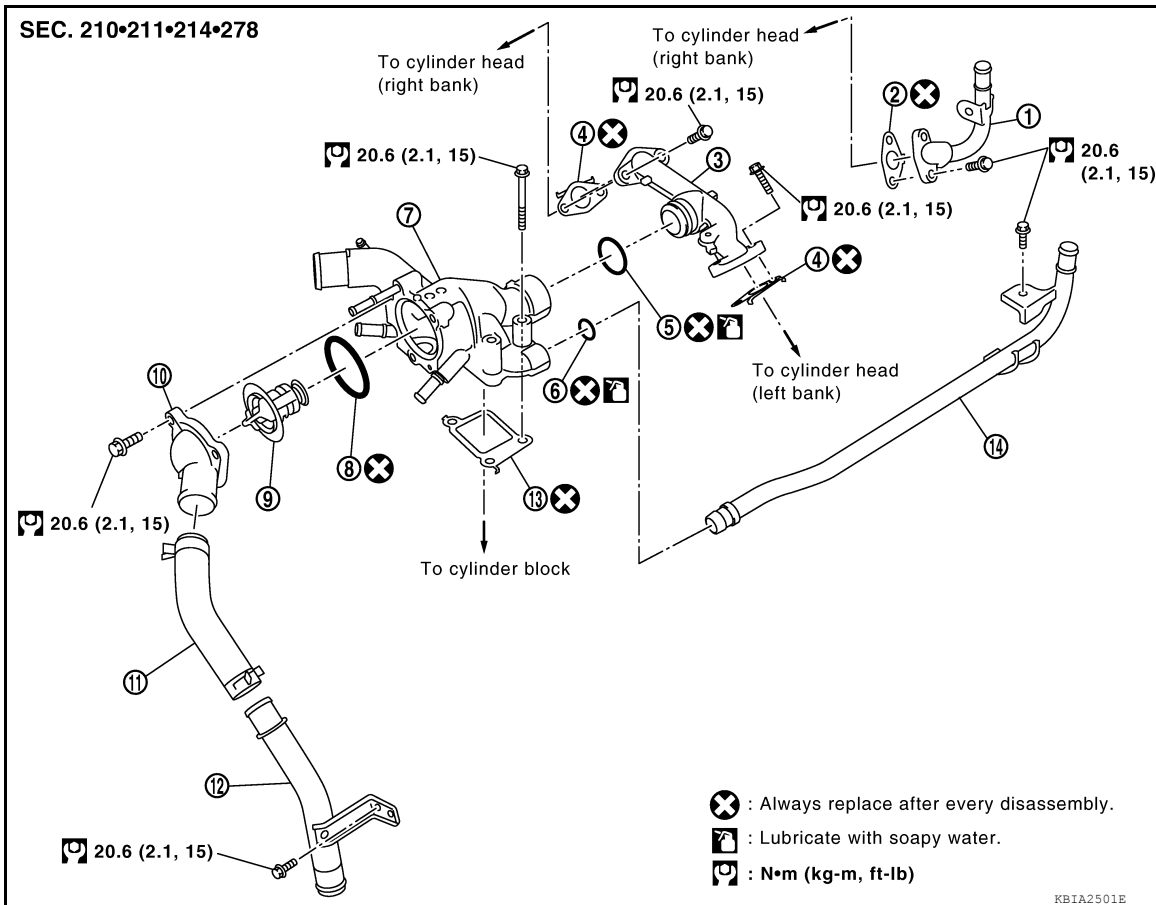
< REMOVAL AND INSTALLATION >

[VK56DE]

THERMOSTAT AND WATER PIPING

Exploded View

INFOID:000000006750599



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

Removal and Installation

INFOID:000000006750600

WARNING:

Do not remove the radiator cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly turn it a quarter of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

CAUTION:

- When removing thermostat or thermostat housing be careful not to get coolant on the drive belt.
- After installing thermostat or thermostat housing connect hoses and clamps securely and then check for leaks.

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

Removal of Thermostat

1. Partially drain engine coolant from the radiator. Refer to [CO-44, "Changing Engine Coolant"](#).

CAUTION:

THERMOSTAT AND WATER PIPING

[VK56DE]

< REMOVAL AND INSTALLATION >

- **Perform this step when the engine is cold.**
 - **Do not spill engine coolant on drive belts.**
2. Remove the air duct assembly and the crankcase ventilation hose.
 3. Remove reservoir tank hose and water hose.
 4. Unclip the reservoir overflow hose from the radiator shroud.
 5. Remove the coolant reservoir bracket and reservoir.
 6. Remove the upper radiator hose from the engine.
 7. Disconnect the water suction hose from the water inlet.
 8. Remove the water inlet, thermostat and rubber O-ring.

CAUTION:

Do not reuse O-rings.

Removal of Thermostat Housing, Water Outlet and Heater Pipe

1. Remove the intake manifold and gasket. Refer to [EM-165, "Removal and Installation"](#).
2. Remove front under cover using power tool. Refer to [EXT-16, "Removal and Installation - Front Bumper"](#).
3. Drain engine coolant from the radiator. Refer to [CO-44, "Changing Engine Coolant"](#).

CAUTION:

- **Perform this step when engine is cold.**
- **Do not spill engine coolant on drive belts.**

4. Remove air duct and resonator assembly. Refer to [EM-164, "Removal and Installation"](#).
5. Remove reservoir tank hose and water hose.
6. Unclip the reservoir overflow hose from the radiator shroud.
7. Remove the reservoir tank bracket and reservoir tank.
8. Unclip the transmission lines from the radiator shroud.
9. Disconnect the motor driven cooling fan connector.
10. Remove the RH and LH radiator shrouds (lower).
 - Release the tabs, pull RH and LH radiator shrouds (lower) rearward and down to remove.
11. Remove the radiator shroud (upper) bolts and remove the radiator shroud (upper).
12. Remove radiator hoses (upper and lower).

CAUTION:

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

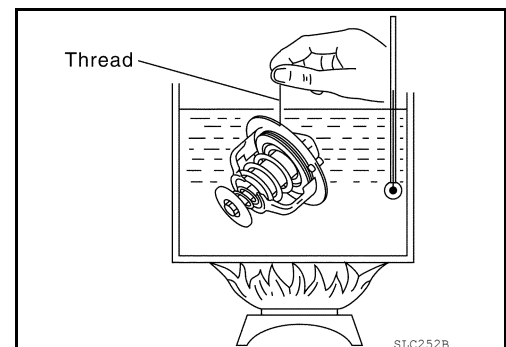
13. Remove radiator hose (lower) hose and pipe assembly.
14. Remove the water suction hoses and pipes, if necessary.
15. Remove the thermostat and O-ring.
16. Remove the thermostat housing, water outlet, heater pipe and O-rings.

CAUTION:

Do not reuse O-rings.

INSPECTION AFTER REMOVAL

- Place a thread so that it is caught in the valve of the thermostat. Immerse fully in a container filled with water. Heat while stirring.
- The valve opening temperature is the temperature at which the valve opens and falls from the thread.
- Continue heating. Check the full-open lift amount.
- After checking the full-open lift amount, lower the water temperature and check the valve closing temperature.



THERMOSTAT AND WATER PIPING

< REMOVAL AND INSTALLATION >

[VK56DE]

| | |
|---------------------------|--|
| Thermostat | Standard |
| Valve opening temperature | Refer to CO-59, "Standard and Limit" |
| Full-open lift amount | Refer to CO-59, "Standard and Limit" |
| Valve closing temperature | Refer to CO-59, "Standard and Limit" |

Replace thermostat assembly if valve opening and closing values are out of specifications.

INSTALLATION

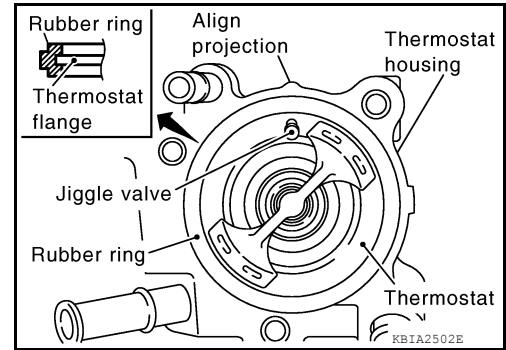
Installation is in the reverse order of removal.

Installation of Thermostat

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

CAUTION:

Do not reuse O-rings.



Installation of Water Outlet Pipe and Heater Pipe

Apply a mild soap to the O-rings before inserting the water outlet or heater pipe.

CAUTION:

Do not reuse O-rings.

INSPECTION AFTER INSTALLATION

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to [MA-13, "Fluids and Lubricants"](#).
- Use procedure below to check for fuel leakage.
- Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
- Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.

NOTE:

If hydraulic pressure inside timing chain tensioner drops after removal and installation, slack in the guide may generate a pounding noise during and just after engine start. However, this is normal. Noise will stop after hydraulic pressure rises.

- Warm up engine thoroughly to make sure there is no leakage of fuel, exhaust gas, or any oils/fluids including engine oil and engine coolant.
- Bleed air from passages in lines and hoses, such as in cooling system.
- After cooling down engine, again check oil/fluid levels including engine oil and engine coolant. Refill to specified level, if necessary.
- Summary of the inspection items:

| Item | | Before starting engine | Engine running | After engine stopped |
|----------------------------------|--------------------|------------------------|----------------|----------------------|
| Engine coolant | | Level | Leakage | Level |
| Engine oil | | Level | Leakage | Level |
| Transmission/ transaxle fluid | A/T and CVT Models | Leakage | Level/Leakage | Leakage |
| | M/T Models | Level/Leakage | Leakage | Level/Leakage |
| Other oils and fluids* | | Level | Leakage | Level |
| Fuel | | Leakage | Leakage | Leakage |
| Exhaust gas | | — | Leakage | — |

*Power steering fluid, brake fluid, etc.

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[VK56DE]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Standard and Limit

INFOID:000000006750601

A

CO

ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

C

| | |
|--|-----------------------|
| Engine coolant capacity with reservoir tank at (MAX) level | 12.7 (13-3/8, 11-1/8) |
|--|-----------------------|

THERMOSTAT

D

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

E

RADIATOR

Unit: kPa (kg/cm², psi)

F

| | | |
|-------------------------------|----------|-------------------|
| Reservoir cap relief pressure | Standard | 117.5 (1.2, 17) |
| Leakage testing pressure | | 127.5 (1.3, 18.5) |

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