
ENGINE 4J SERIES

SECTION 6B ENGINE COOLING

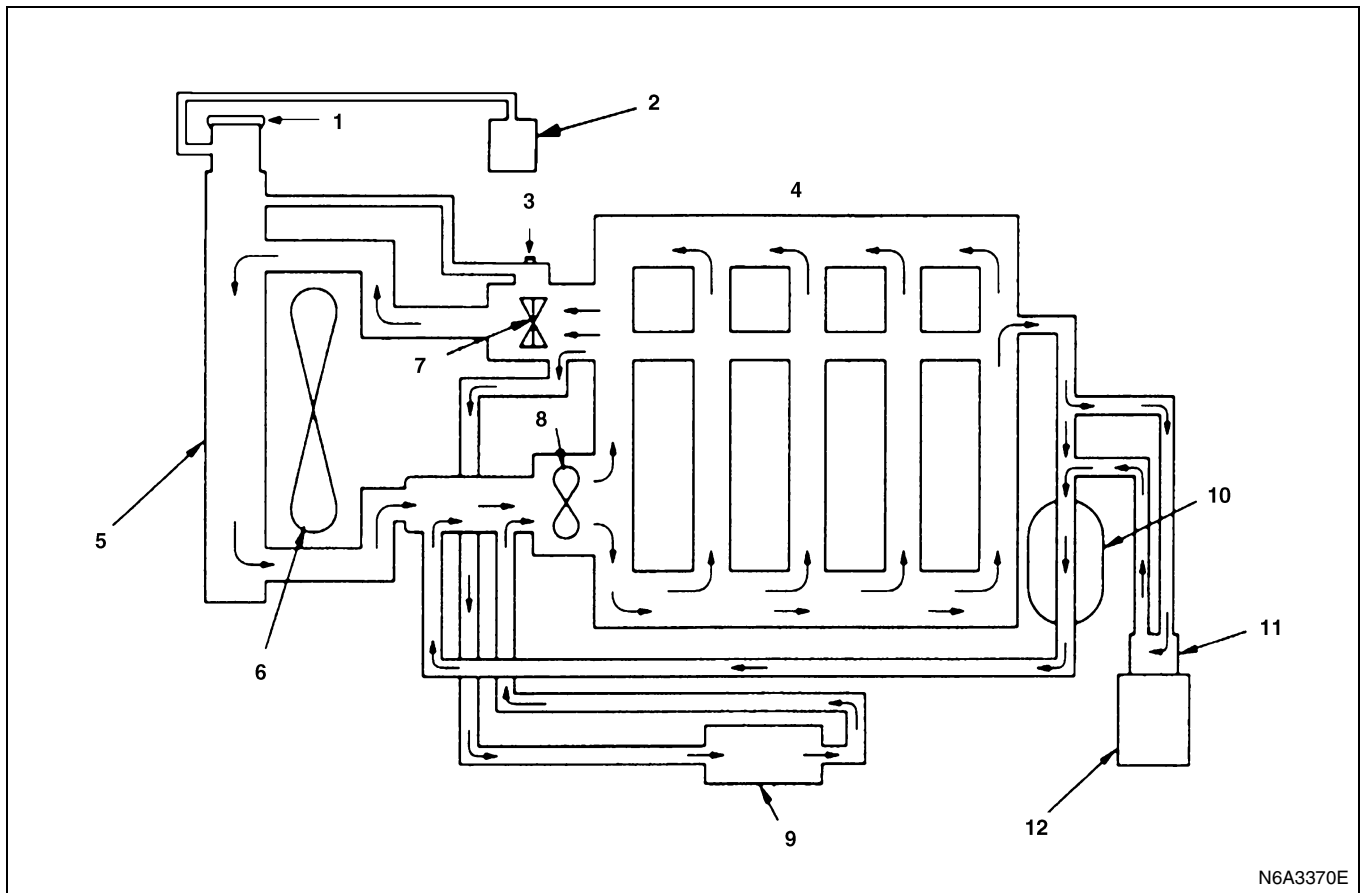
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GENERAL DESCRIPTION

Component

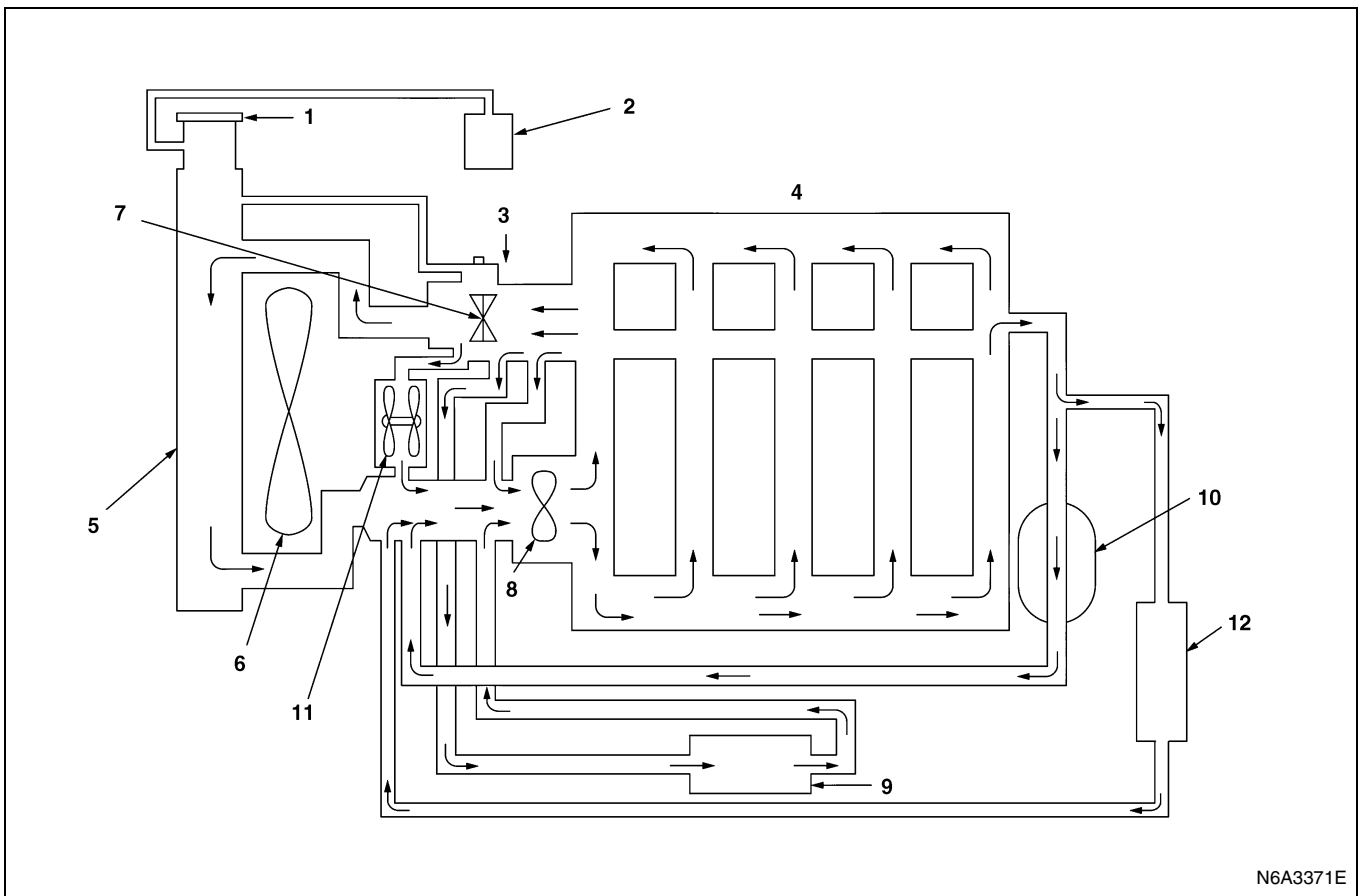
Coolant Flow



N6A3370E

Legend

- | | |
|----------------------|--------------------|
| 1. Radiator cap | 7. Thermostat |
| 2. Reservoir tank | 8. Water pump |
| 3. Air bleeding plug | 9. Car heater |
| 4. Cylinder head | 10. Oil cooler |
| 5. Radiator | 11. C.S.D |
| 6. Cooling fan | 12. Injection pump |

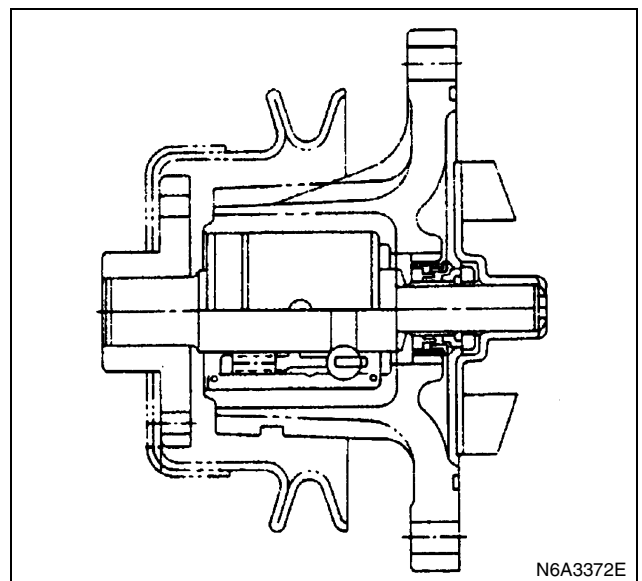
Coolant Flow (4JH1-TC)**Legend**

- | | |
|----------------------|-------------------|
| 1. Radiator cap | 5. Thermostat |
| 2. Reservoir tank | 8. Water pump |
| 3. Air bleeding plug | 9. Car heater |
| 4. Cylinder head | 10. Oil cooler |
| 5. Radiator | 11. Turbo charger |
| 6. Cooling fan | 12. EGR Cooler |

The cooling system is a pressurized coolant forced circulation type which consists of water pump, thermostat cooling fan, radiator and other components. The circulating coolant cools the lubricating oil in the oil filter and turbocharger.

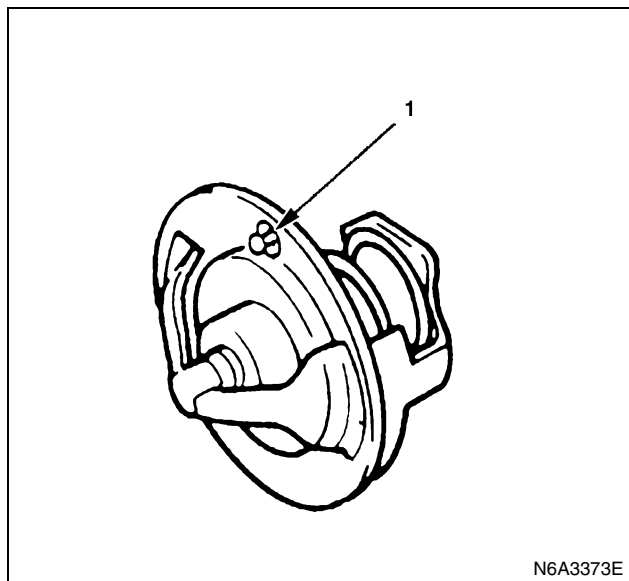
Water Pump

The coolant pump is a centrifugal impeller type and is driven by V type drive belt. The water pump is not disassembled type.



Thermostat

The thermostat is a wax pellet type with a juggle valve and is installed in the thermostat housing.

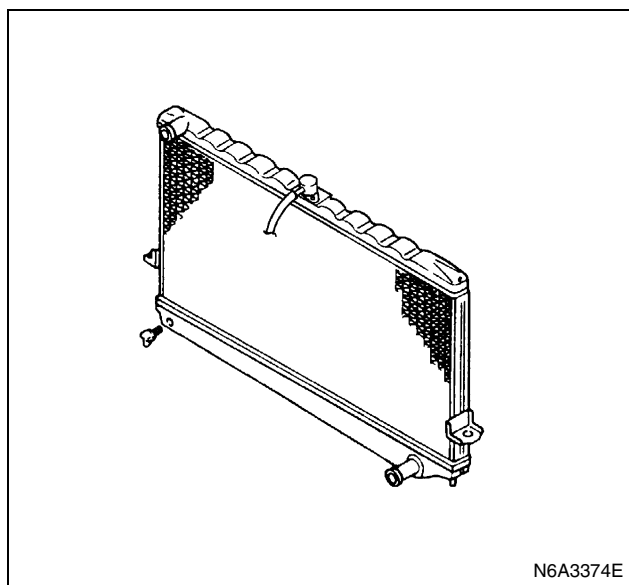


Legend

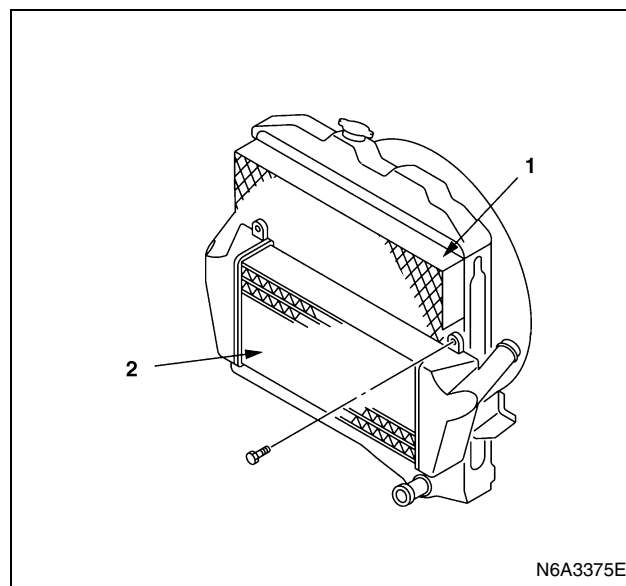
1. Juggle valve

Radiator

The radiator is a tube type with corrugated fins. In order to raise the boiling point of coolant, the radiator is adjusted through a valve fitted to the upper tank to a pressure range of 93 — 123 kPa (0.95 — 1.25 kg/cm²). The cap fitted to the cylinder head thermostat housing has only a water supply function.



The 4JH1-TC engine is equipped with the intercooler.



Legend

1. Radiator
2. Charge air cooler

Engine Coolant Change Procedure

1. To change engine coolant, make sure that the engine is cool.

WARNING:

WHEN THE COOLANT IS HEATED TO A HIGH TEMPERATURE, BE SURE NOT TO LOOSEN OR REMOVE THE RADIATOR CAP.

OTHERWISE YOU MIGHT GET SCALDED BY HOT VAPOR OR BOILING WATER. TO OPEN THE RADIATOR CAP, PUT A PIECE OF THICK CLOTH ON THE CAP AND LOOSEN THE CAP SLOWLY TO REDUCE THE PRESSURE WHEN THE COOLANT HAS BECOME COOLER.

2. Open radiator cap and drain the cooling system by loosening the drain valve on the radiator and on the cylinder body.

Notice:

For best result it is suggested that the engine cooling system be flushed at least once a year. It is advisable to flush the interior of the cooling system including the radiator before using specified coolant.

Replace damaged rubber hoses as the engine specified coolant. Coolant is liable to leak out even minor cracks. Isuzu recommends to use Isuzu genuine specified coolant or equivalent, for the cooling system and not add any inhibitors or additives.

Caution:

A failure to correctly fill the engine cooling system in changing or topping up coolant may sometimes cause the coolant to overflow from the filler neck even before the engine and radiator are completely full.

If the engine runs under this condition, shortage of coolant may possibly result in engine overheating. To avoid such trouble, the following precautions should be taken in filling the system.

3. To refill engine coolant, pour coolant up to filler neck using a filling hose which is smaller in outside diameter of the filler neck.
Otherwise air between the filler neck and the filling hose will block entry, preventing the system from completely filling up.
4. Keep a filling rate of 9 liter/min. or less. Filling over this maximum rate may force air inside the engine and radiator.
And also, the coolant overflow will increase, making it difficult to determine, whether or not the system is completely full.
5. After filling the system to the full, pull out the filling hose and check to see if air trapped in the system is dislodged and the coolant level goes down. Should the coolant level go down, repeat topping-up until there is no more drop in the coolant level.
6. After directly filling the radiator, fill the reservoir to the maximum level.
7. Install and tighten radiator cap and start the engine. After idling for 2 to 3 minutes, stop the engine and reopen radiator cap. If the water level is lower, replenish.

WARNING:

WHEN THE COOLANT IS HEATED TO A HIGH TEMPERATURE, BE SURE NOT TO LOOSEN OR REMOVE THE RADIATOR CAP.

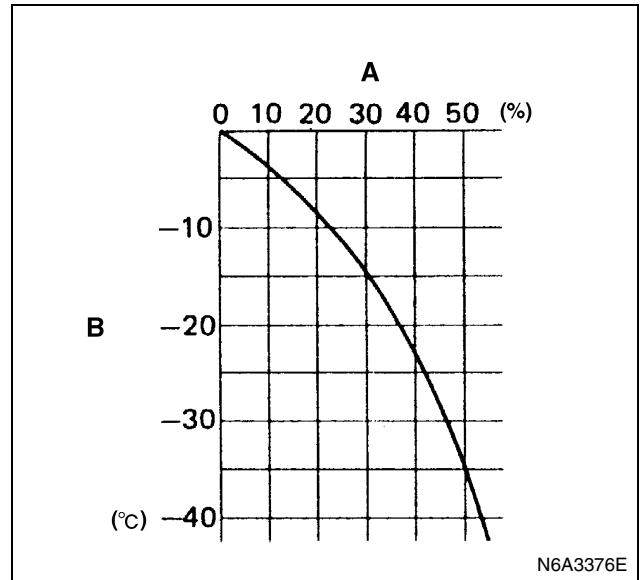
OTHERWISE YOU MIGHT GET SCALDED BY HOT VAPOR OR BOILING WATER. TO OPEN THE RADIATOR CAP, PUT A PIECE OF THICK CLOTH ON THE CAP AND LOOSEN THE CAP SLOWLY TO REDUCE THE PRESSURE WHEN THE COOLANT HAS BECOME COOLER.

8. After tightening radiator cap, warm up the engine at about 2,000 rpm.
Set heater adjustment to the highest temperature position, and let the coolant circulate also into heater water system.
9. Check to see the thermostat has opened through the needle position of water thermometer, conduct a 5 minutes idling again and stop the engine.
10. When the engine has been cooled, check filler neck for water level and replenish if required. Should extreme shortage of coolant is found, check the coolant system and reservoir tank hose for leakage.
11. Fill the coolant into the reservoir tank up to "MAX" line.

Specified Coolant Solution

- Relation between Mixing ratio and Freezing point
Freezing temperature of the engine coolant varies with the ratio of specified coolant solution in water.

Proper mixing ratio can be determined by referring to the chart. Supplemental inhibitors or additives claiming to increase cooling capability that have not been specifically approved by Isuzu are not recommended for addition to the cooling system.



Legend

- A. Mixing ratio
- B. Freezing point

- Calculation of mixing ratio

Mixing ratio

$$\text{Mixing ratio} = \frac{\text{Specified coolant solution (Lit/qt.)}}{\text{Specified coolant solution (Lit/qt.)} + \text{Water (Lit/qt.)}}$$

Notice:

Specified coolant solution + Water = 10 lit

Total cooling system capacity.

In case of 6.8 lit total cooling system capacity

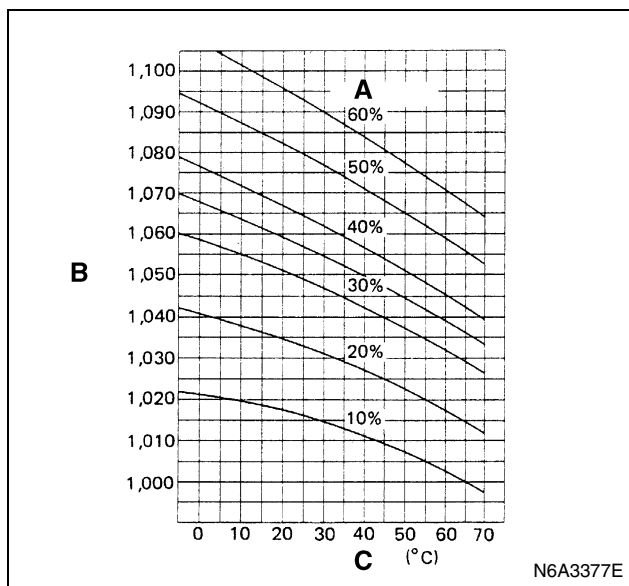
Mixing ratio (%)	Specified coolant solution: lit. (imp. qt./U.S. qt)		Water: lit. (imp. qt./U.S. qt)	
0	0	0	10	(8.80/10.57)
5	0.5	(0.44/0.53)	9.5	(8.36/10.04)
10	1.0	(0.88/1.06)	9.0	(7.92/9.51)
15	1.5	(1.32/1.59)	8.5	(7.48/8.98)
20	2.0	(1.76/2.11)	8.0	(7.04/8.45)
25	2.5	(2.20/2.64)	7.5	(6.60/7.93)
30	3.0	(2.64/3.17)	7.0	(6.16/7.40)
35	3.5	(3.08/3.70)	6.5	(5.72/6.87)
40	4.0	(3.52/4.23)	6.0	(5.28/6.34)
45	4.5	(3.96/4.76)	5.5	(4.84/5.81)

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Mixing ratio (%)	Specified coolant solution: lit. (imp. qt./U.S. qt)	Water: lit. (imp. qt/U.S. qt)
50	5.0 (4.40/5.28)	5.0 (4.40/5.28)

- **Mixing ratio**

Check the specific gravity of engine coolant in the cooling system in temperature ranges from 0° to 50°C using a suction type hydrometer, then determine the mixing ratio of the coolant by referring to the table.

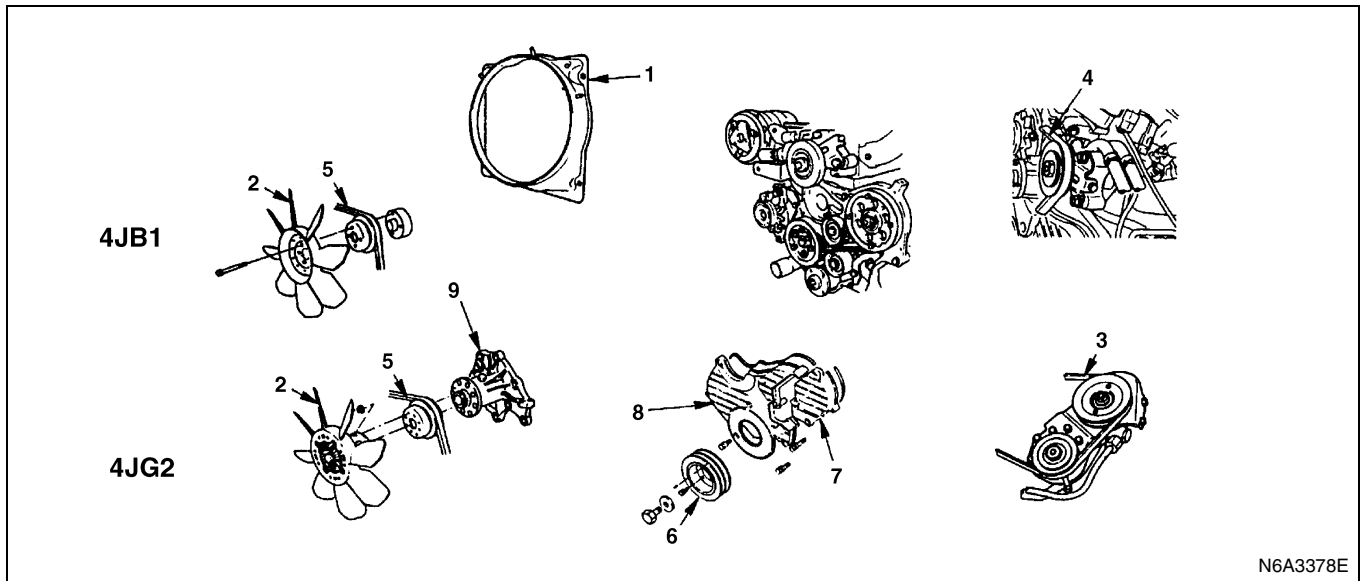


Legend

- A. Mixing ratio
- B. Specific gravity
- C. Coolant temperature

WATER PUMP

Component



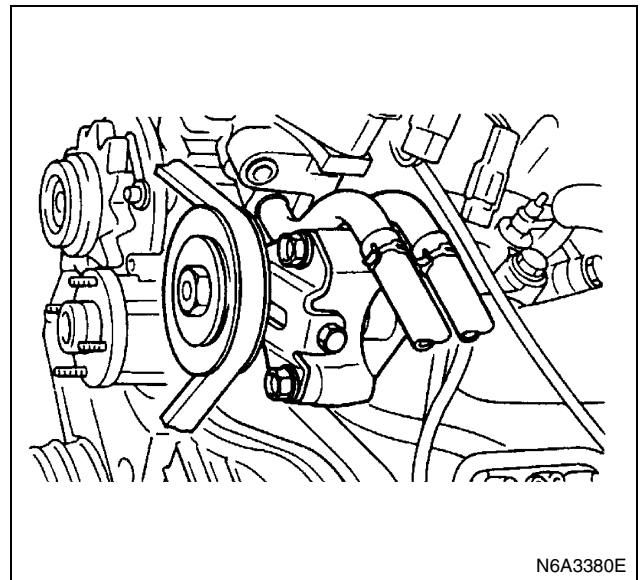
Legend

- | | |
|-----------------------------------|------------------------------|
| 1. Fan shroud | 6. Crankshaft damper pulley |
| 2. Cooling fan assembly | 7. Timing pulley upper cover |
| 3. Power steering pump drive belt | 8. Timing pulley lower cover |
| 4. A/C compressor drive belt | 9. Water pump assembly |
| 5. AC generator drive belt | |

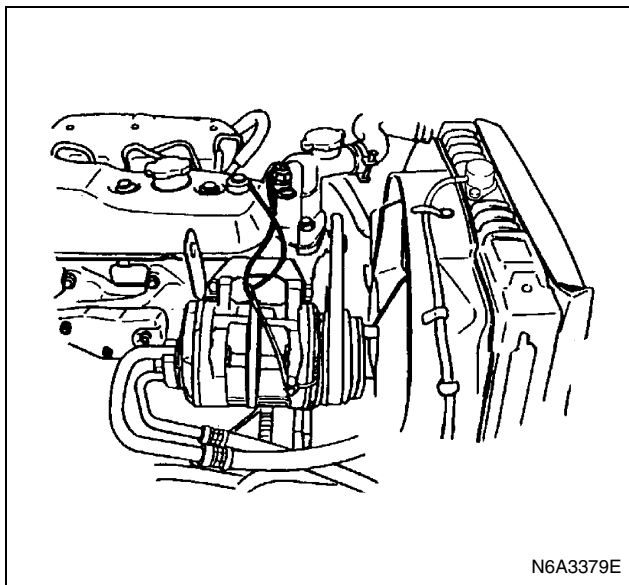
Removal

Preparation:

- Disconnect battery ground cable.
 - Drain coolant.
1. Fan Shroud
 - Remove the reservoir tank hose, bypass hose and fan guide.
 2. Cooling Fan Assembly
 - Remove lock nut and take out cooling fan assembly.
 3. Power Steering Pump Drive Belt
 - Loosen the idler pulley lock nut and loosen adjust bolt, and remove the drive belt.

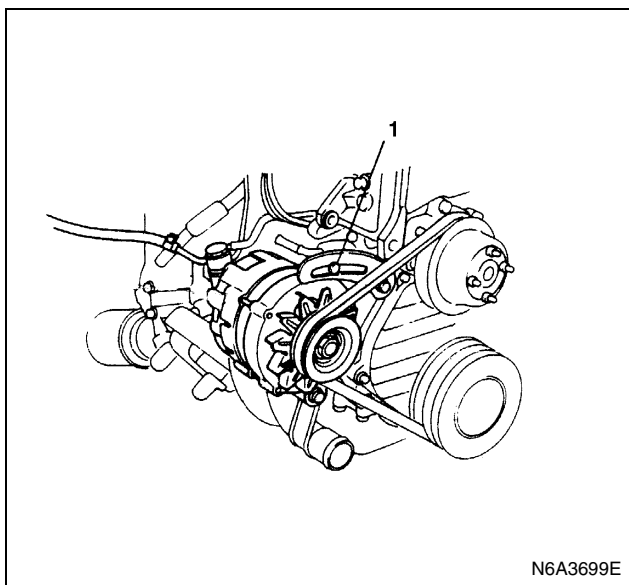


4. A/C Compressor Drive Belt
 - Loosen A/C compressor idler pulley lock nut and adjust bolt and remove the drive belt.



5. AC Generator Drive Belt

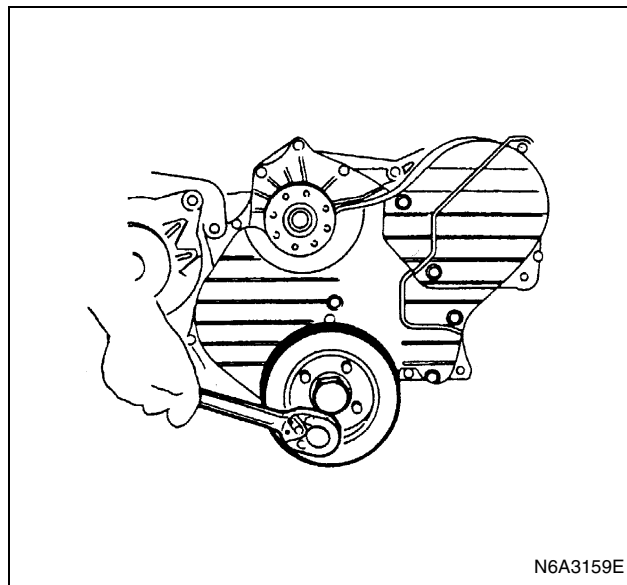
- Loosen AC Generator mounting bolt (under side) and adjust plate lock bolt, and remove the drive belt.



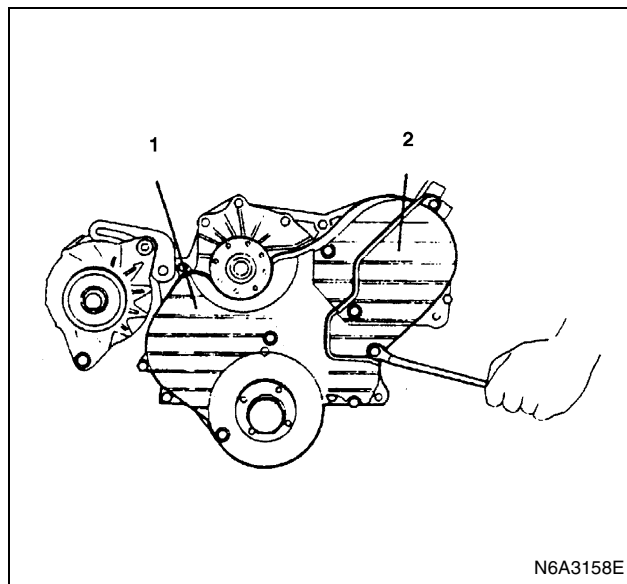
Legend

- Lock bolt

6. Crankshaft Damper Pulley



7. Timing Pulley Upper Cover



Legend

- Lower cover
- Upper cover

8. Timing Pulley Lower Cover

9. Water Pump Assembly

- Remove the O-ring.

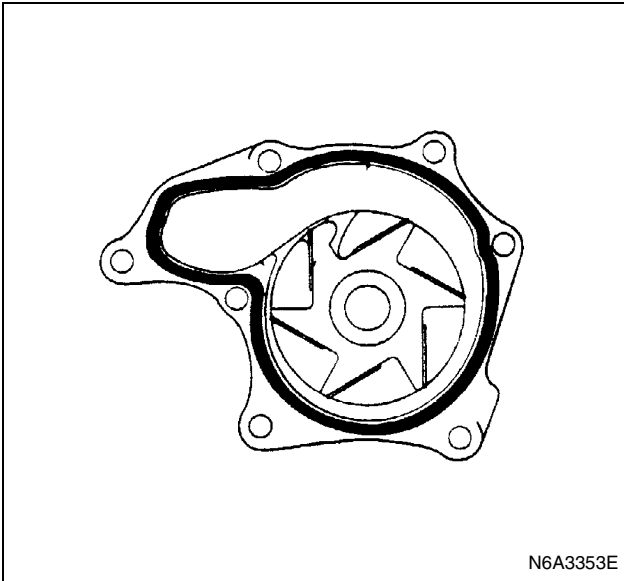
Inspection

Make necessary parts replacement if extreme wear or damage is found during inspection. Should any of the following problems occur, the entire water pump assembly must be replaced.

- Cracks in the coolant pump body
- Coolant leakage from the seal unit
- Play or abnormal noise in the bearing
- Cracks or corrosion in the impeller

Installation

1. Water Pump Assembly
 - Set O-ring in water pump body groove.



- Install water pump assembly, and tighten to specified torque.

Tighten:

Pump Fixing Bolt to 20 N·m (2 kg·m/14 lb·ft)

2. Timing Pulley Lower Cover
 - Install timing pulley lower cover, and tighten to specified torque.

Tighten:

Cover Fixing Bolts to 8 N·m (0.8 kg·m/69 lb·in)

3. Timing Pulley Upper Cover
 - Install timing pulley upper cover, and tighten to specified torque.

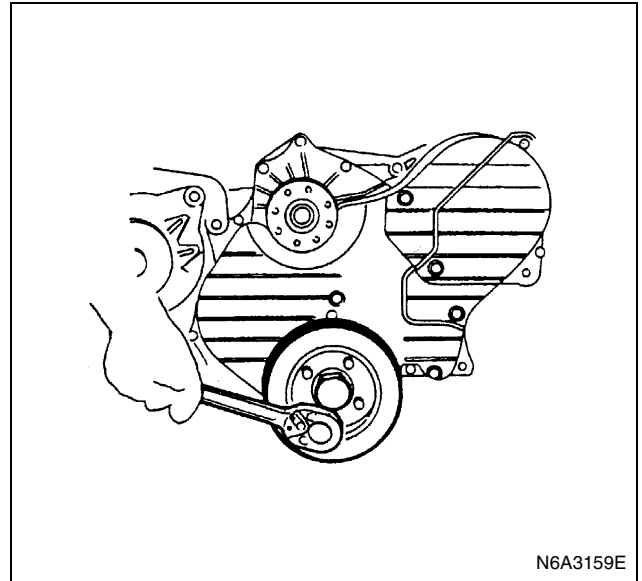
Tighten:

Cover Fixing Bolts to 8 N·m (0.8 kg·m/69 lb·in)

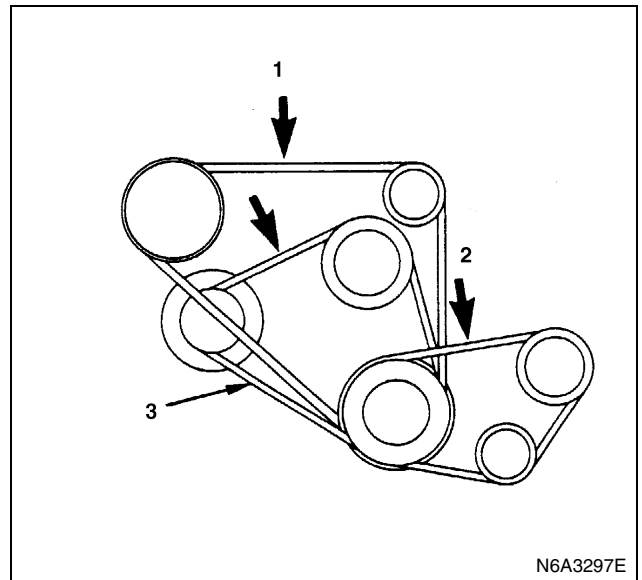
4. Crankshaft Damper Pulley
 - Install crankshaft damper pulley, and tighten to specified torque.

Tighten:

Pulley Bolt to 19 N·m (1.9 kg·m/14 lb·in)



4JG2



Legend

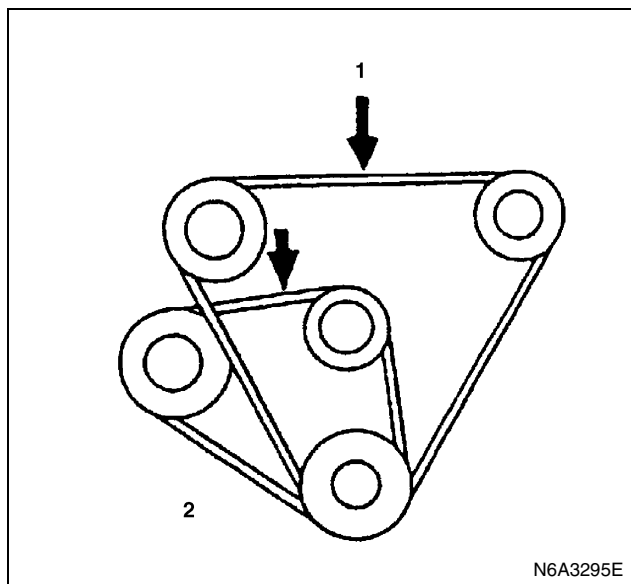
1. A/C compressor drive belt
2. P/S oil pump drive belt
3. AC generator & cooling fan drive belt

5. AC Generator Drive Belt
6. A/C Compressor Drive Belt
7. Power Steering Pump Drive Belt
 - Install the drive belts and adjust belt. Check drive belts for wear or damage, and replace with new ones as necessary. Check belts for tension, and adjust as necessary.
 - Push the middle of belts with a force of 98 N (10 kg/ 22 lb) and check each bolt for deflection.
 - Standard deflection

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	mm (in)
	Initial tension
AC Generator drive belt	8 — 12
A/C compressor drive belt	(0.31 — 0.47)
Power Steering pump drive belt	

4JB1



Legend

1. A/C compressor drive belt & P/S pump drive belt
2. AC generator & fan pulley drive belt

Tighten:

- Generator Fixing Belt to 40 N·m (4.1 kg·m/30 lb·ft)
- Adjust Plate Fixing Belt to 19 N·m (1.9 kg·m/14 lb·ft)
- A/C Idler Pulley Lock Nut to 27 N·m (2.8 kg·m/20 lb·ft)
- P/S Idler Pulley Lock Nut to 27 N·m (2.8 kg·m/20 lb·ft)

8. Cooling Fan Assembly

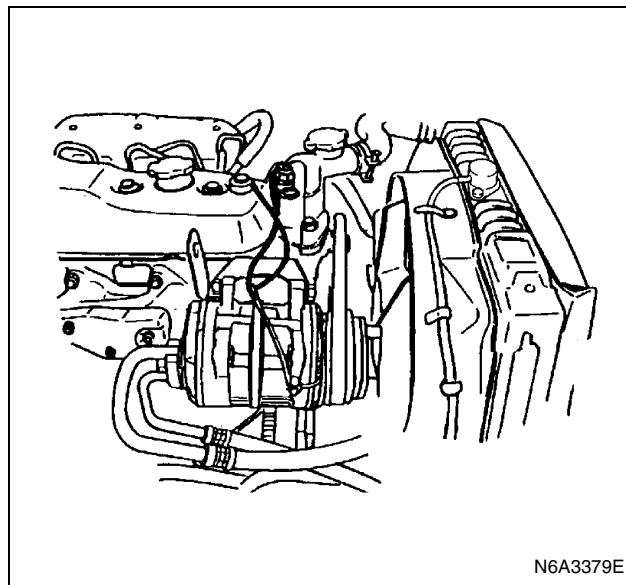
- Mount fan pulley and cooling fan assembly on the water pump and tighten to the specified torque.

Tighten:

Fan Pulley Nut to 8 N·m (0.8 kg·m/69 lb·in)

9. Fan Shroud

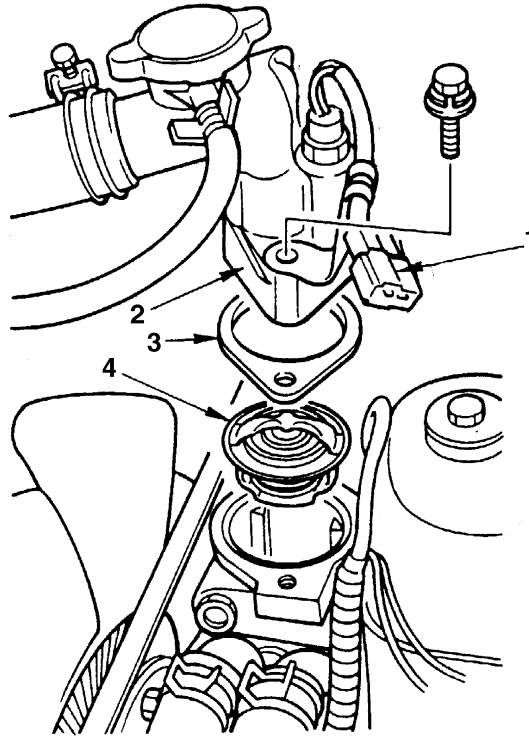
- Install the fan shroud and reservoir tank hose and bypass hose.



- Connect the battery ground cable.
- Pour coolant.
- Start the engine and check coolant leakage.

THERMOSTAT

Component



N6A3385E

Legend

- | | |
|-------------------|---------------|
| 1. Switch harness | 3. Gasket |
| 2. Outlet pipe | 4. Thermostat |

Removal

Preparation:

- Disconnect battery ground cable.
- Drain coolant from the radiator and engine.

1. Switch Harness
2. Outlet Pipe
 - Remove mounting bolt and remove outlet pipe together with radiator hose.
3. Gasket
4. Thermostat

Valve Opening Temperature	°C(°F)
82 (180)	

- Make sure that secondary valve opens fully at the specified temperature.

Valve Full Open Temperature	°C(°F)
95 (203)	

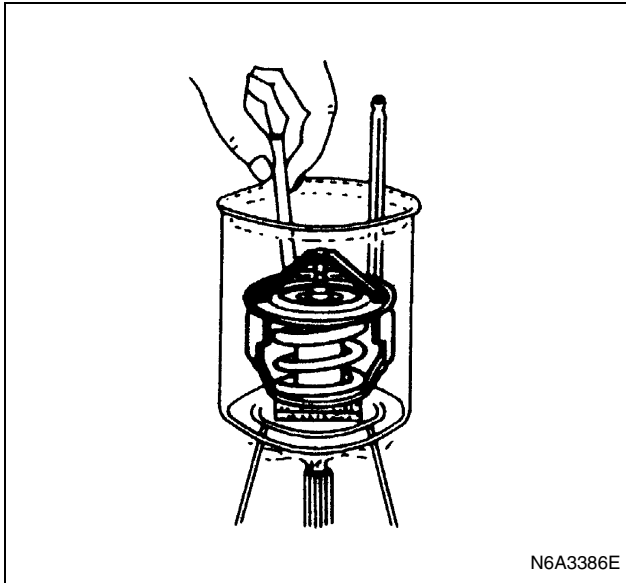
Inspection

Submerge the thermostat assembly in the water.
Place wooden blocks on the bottom of the water container.

Not to directly heat the thermostat.

Gradually increase the water temperature. Stir the water so that the entire water is same temperature.

- Make sure that primary valve begins to open at the specified temperature.



Make necessary repair and parts replacement if extreme wear or damage is found during inspection.

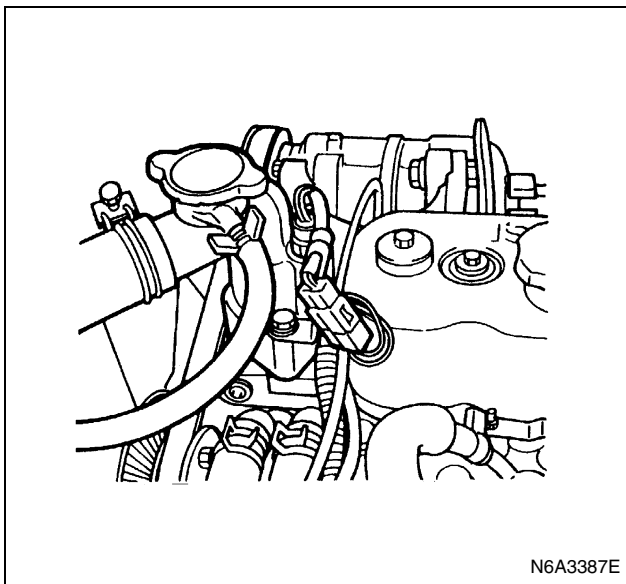
Installation

1. Thermostat
2. Gasket
3. Outlet Pipe
 - Connect outlet pipe and tighten bolts to the specified torque.

Tighten:

19 N·m (1.9 kg·m/14 lb·ft)

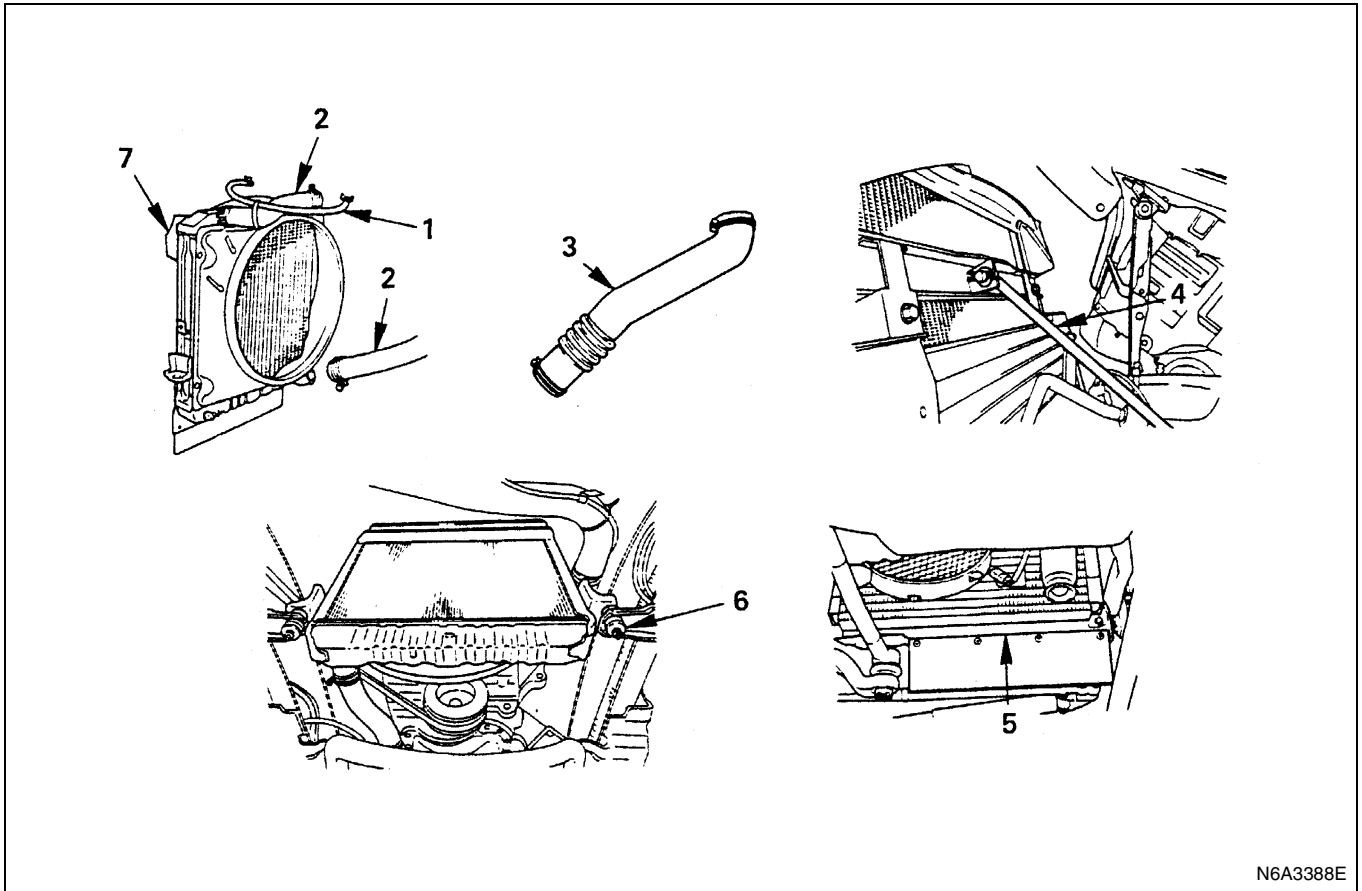
4. Switch Harness
 - Install switch harness.



- Install battery ground cable.
- Pour coolant.
- Start the engine and check coolant leakage.

RADIATOR

Component



Legend

- | | |
|--------------------------------------|----------------------|
| 1. Reservoir tank hose & Bypass hose | 5. Condenser |
| 2. Radiator hose | 6. Cushion rubber |
| 3. Air intake duct | 7. Radiator assembly |
| 4. Radiator stay | |

Removal

Preparation:

- Disconnect battery ground cable.
 - Loosen drain plug to drain coolant.
1. Reservoir Tank Hose & Bypass Hose
 - Disconnect the hose from radiator.
 2. Radiator Hose
 - Disconnect lower hose and upper hose from the engine.
 3. Air Intake Duct
 4. Radiator Stay
 5. Condenser
 - Remove the condenser from radiator and temporarily tighten the condenser to cab body front side, use the wire.
 6. Cushion Rubber

- Remove cushion rubbers on both sides of the bottom.
- 7. Radiator Assembly
 - Remove upward the radiator assembly with hose, taking care not to damage the radiator core by fan blade.

Inspection

Radiator Valve

- Apply air pressure from filler neck using radiator cap tester and check the opening pressure of radiator valve. If the valve opening pressure is out of the standard value range, replace with a new radiator valve.

Radiator valve opening pressure	kPa (kg/cm ² /psi)
93 — 123 (0.95 — 1.25/13.5 — 17.8)	

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- Remove the radiator valve and check a negative pressure valve as the center of the valve seat side. If the negative pressure valve does not work smoothly, clean or replace the radiator valve.

Tighten:

Radiator valve to 6 N·m (0.6 kg·m/4 lb·ft)

- Conduct cooling system leakage check after re-installing the radiator valve.

Radiator Core

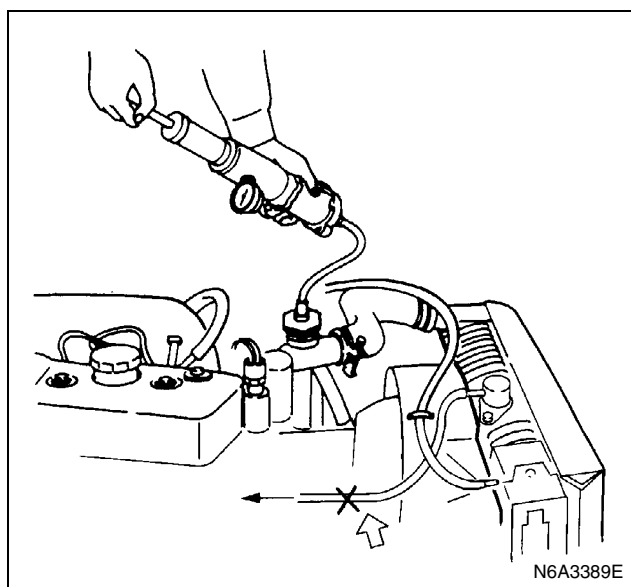
- Deformed radiator fins could reduce radiation effects, resulting in overheat. Straighten the fins. In such a case, take care not to damage the fin roots.
- Remove dust and other foreign materials.

Flushing the Radiator

- Wash the inside of radiator and the coolant passage with water and neutral detergent. Remove all scales and rust.

Checking for Coolant Leakage

- Clog up the reservoir tank hose carefully and check the cooling system for leakage with a radiator cap tester by applying an air pressure of 147 kPa (1.5 kg/cm² /21 psi) from filler neck to inside the radiator.



- As the radiator upper tank is provided with a valve, the pressure fails to rise higher than the valve opening pressure unless the hose is clogged up.

Installation

1. Radiator Assembly
 - Install the radiator.
2. Cushion Rubber
 - Install cushion rubbers on both sides of radiator bottom.
 - Install radiator assembly with hose, taking care not to damage the radiator core by a fan blade.
3. Condenser
4. Radiator Stay

5. Air Intake Duct

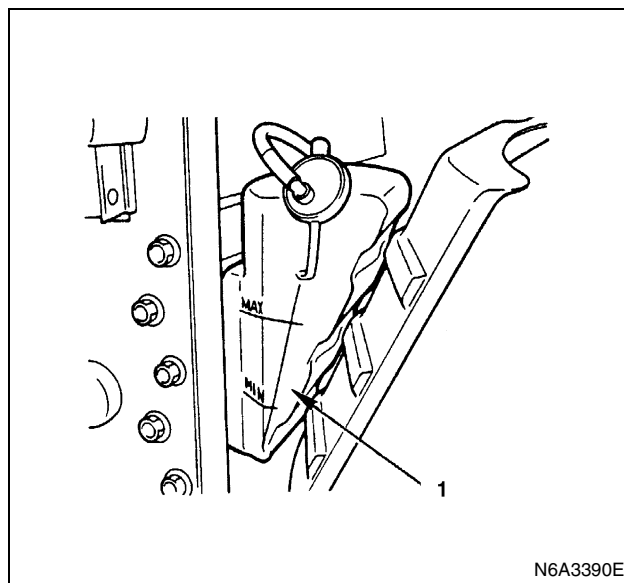
- Connect the duct and tighten clip securely.

6. Radiator Hose

- Connect inlet hose and outlet hose to the engine.
- Connect battery ground cable.
- Pour coolant up to filler neck of radiator, and up to MAX mark of reservoir tank.

7. Reservoir Tank Hose & Bypass Hose

- Start engine to warm up, and check for coolant level.

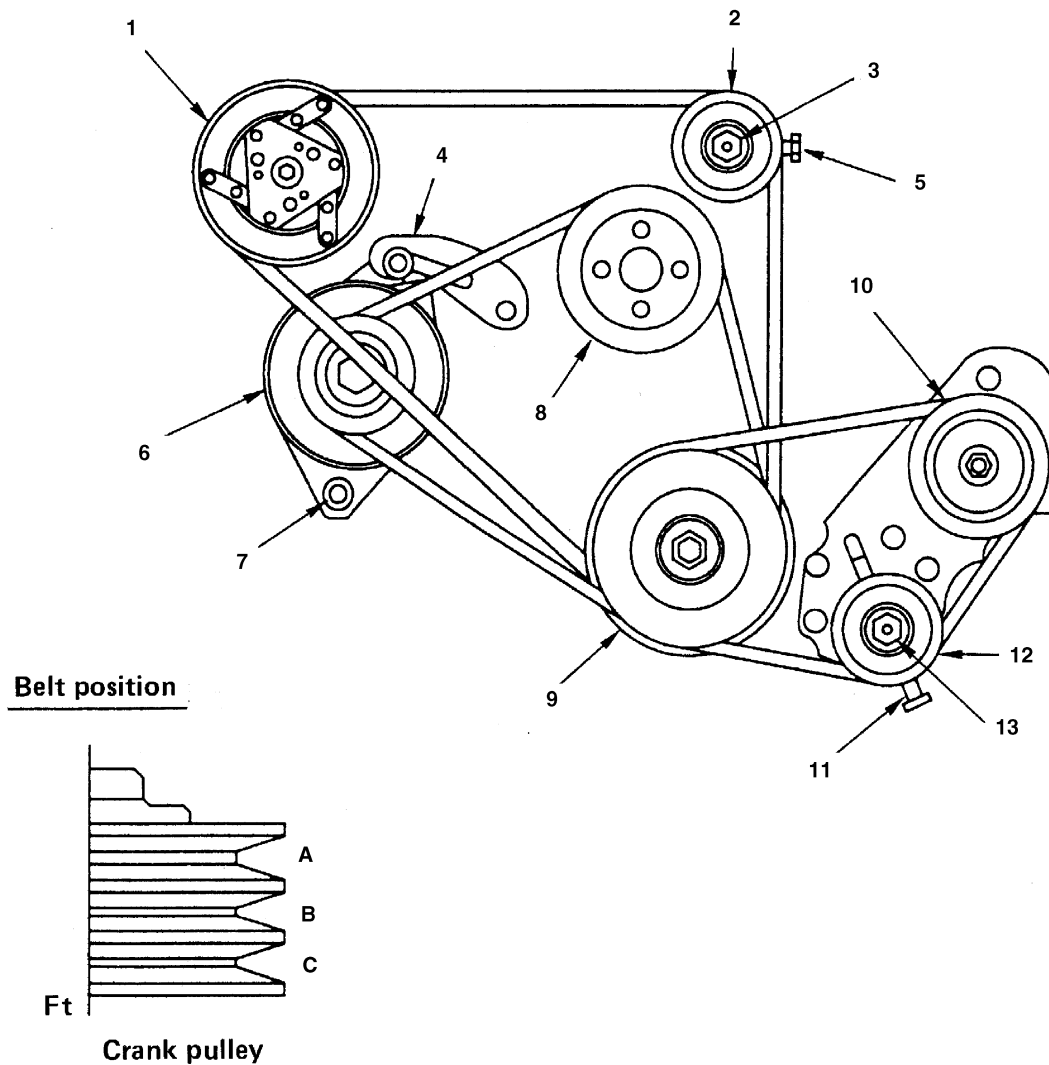


Legend

1. Reservoir tank

DRIVE BELT ADJUSTMENT

Component



N6A3391E

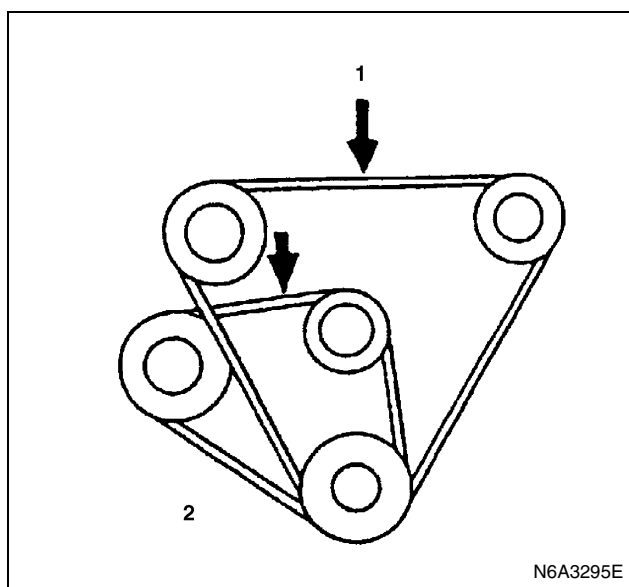
Inspection

Check drive belts for wear or damage, and replace with new ones as necessary. Check belts for tension, and adjust as necessary.

- Check drive belts tension.
- Push the middle of belts with a force of 98 N (10 kg/ 22 lb) and check each belt for deflection.
- Standard deflection

	mm (in)
	Tension at readjustment
AC generator & fan pulley drive belt A/C compressor drive belt P/S pump drive belt	8 — 12 (0.31 — 0.47)

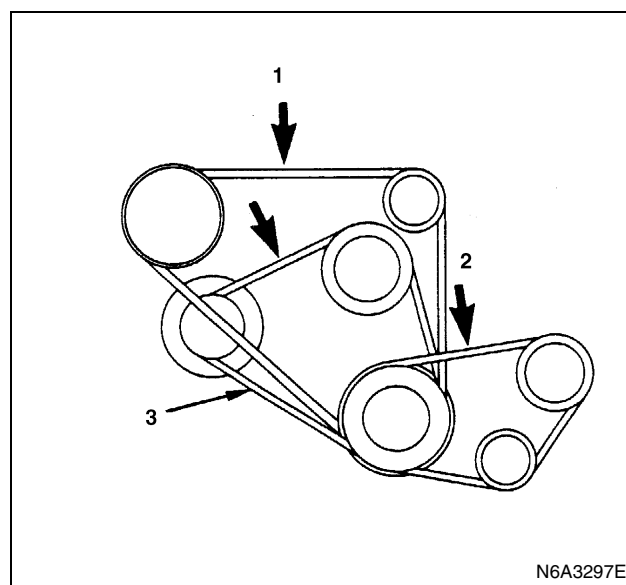
4JB1



Legend

1. A/C compressor drive belt & P/S pump drive belt
2. AC generator & fan pulley drive belt

4JG2



Legend

1. A/C compressor drive belt
2. P/S pump drive belt
3. AC generator & cooling fan drive belt

Tension Adjustment

1. Cooling Fan Pulley Belt

- With AC Generator mounting and lock bolts loose, adjust belt tension with adjuster's adjust bolt. Tighten bolt to the specified torque.

Tighten:

- Generator Fixing Bolt to 40 N·m (4.1 kg·m/30 lb·ft)
- Adjust Plate Fixing Bolt to 19 N·m (1.9 kg·m/14 lb·ft)

2. P/S Oil Pump and A/C Compressor Pulley Belt

- With P/S pump lock bolt loose, adjust belt tension with adjust belt. Tighten lock nut to the specified torque.

Tighten:

Lock Nut to 27 N·m (2.8 kg·m/20 lb·ft)