Cooling System: Testing and Inspection
Component Tests

Cap

WARNING: Never remove the pressure relief cap under any conditions while the engine is operating. Failure to follow these instructions can result in damage to the cooling system or engine and/or personal injury. To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the pressure relief cap from a hot degas bottle. Wait until the engine has cooled, then wrap a thick cloth around the pressure relief cap and turn it slowly one turn (counterclockwise). Step back while the pressure is released from the cooling system. When certain all the pressure has been released, remove the pressure relief cap (still with a cloth).

1. Remove the pressure relief cap from the degas bottle.
2. Immerse the pressure relief cap in water and install it on the shallow filler neck of the Radiator/Heater Core Pressure Tester and the Radiator Cap Adapter, part of the Radiator/Heater Core Pressure Tester.
3. Immerse the filler neck seal in water and install it in the filler neck adapter.
4. Install the filler neck adapter with the filler neck seal to the Radiator Cap Adapter.
5. Connect the female quick-connect fitting of the pressure test pump to the male quick-connect fitting of the filler neck adapter.
6. **NOTE:** If the plunger of the pump is depressed too fast, an erroneous pressure reading will result.

   Slowly depress the plunger of the pressure test pump until the pressure gauge reading stops increasing and note the highest pressure reading obtained.
7. Release the pressure by turning the relief screw counterclockwise. Then tighten the pressure relief screw and repeat Step 6 (at least twice) to make sure the reading is repeatable within the specifications of the pressure relief cap.
8. If the pressure test gauge readings are not within specifications, install a new pressure relief cap. If the pressure test gauge readings are within specifications, carry out the cooling system Pressure Test. See: Pressure Test

Cooling Fan Motor and Shroud

1. Inspect the fan blade and shroud for any foreign materials. Clear the obstruction and continue the test procedure.
2. Rotate the fan to see if any contact between the shroud and blade exists. If contact is observed, install a new fan shroud assembly.
3. Rotate the fan by hand. The fan should rotate freely (no resistance should be felt, the fan will free-wheel with minimum effort). If any resistance is present, install a new fan assembly.

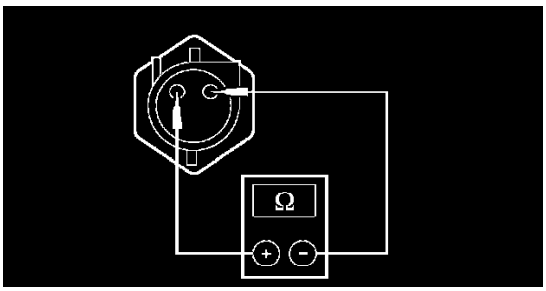
Pressure Test

1. Turn the engine OFF.
2. **WARNING: Never remove the pressure relief cap under any conditions while the engine is operating. Failure to follow these instructions can result in damage to the cooling system or engine and/or personal injury. To avoid having scalding hot coolant or steam blow out of the cooling system, never remove the pressure relief cap from a hot degas bottle. Wait until the engine has cooled, then wrap a thick cloth around the pressure relief cap and turn it slowly one turn (counterclockwise). Step back while the pressure is released from the cooling system. When certain all the pressure has been released, remove the pressure relief cap (still with a cloth).**

   Check the engine coolant level.
3. Connect the Radiator/Heater Core Pressure Tester to the degas bottle nipple and overflow hose. Install a pressure test pump to the quick-connect fitting of the test adapter.
4. **NOTE:** If the plunger of the pump is depressed too fast, an erroneous pressure reading will result.

   Slowly depress the plunger of the pressure test pump until the pressure gauge reading stops increasing and note the highest pressure reading obtained.
5. If the pressure relief cap does not hold pressure, remove and wash the pressure relief cap in clean water to dislodge all foreign particles from the gaskets. Check the sealing surface in the filler neck.
6. If **8-9 kPa (13 psi)** cannot be reached, carry out the pressure relief cap component test. If more than **12 kPa (18 psi)** shows on the gauge, install a new pressure relief cap.
7. **CAUTION:** If the pressure drops, check for leaks at the engine to heater core hoses, engine-to-radiator hoses, coolant valve hose (if applicable), radiator and heater core or other system components and connections. Any leaks which are found must be corrected and the system rechecked.

   Pressurize the engine cooling system as described in Step 4 (using a pressure relief cap that operates within the specified upper and lower pressure limits). Observe the gauge reading for approximately two minutes; Pressure should not drop during this time.
8. Release the system pressure by loosening the pressure relief cap. Check the engine coolant level and replenish, if necessary, with the correct engine coolant mixture.



Part 1 Of 2

Blower Motor Resistor Pins	Resistance
1 and 2	0.18 ohms

Part 2 Of 2

Radiator Leak Test, Removed From Vehicle

CAUTION: Never leak test an aluminum radiator in the same water that copper/brass radiators are tested in. Flux and caustic cleaners can be present in the cleaning tank and they will damage aluminum radiators.

NOTE: Always install plugs in the oil cooler fittings before leak testing or cleaning any radiator.

NOTE: Clean the radiator before leak testing to avoid contamination of the tank.

1. Leak test the radiator in clean water with **138 kPa (20 psi)** air pressure.

Thermostat

Thermostat

A new thermostat should be installed only after the electrical and mechanical tests have been carried out.

Thermostat-Electrical Test

NOTE: The electrical thermostat test is most accurate if carried out indoors at less than **37.8°C (100°F)** ambient air. This test can be carried out with or without the hood open and with the engine warm or cold.

1. Check the engine coolant level. Fill as needed.
2. With the ignition OFF, attach the Rotunda 73 Digital Multimeter to the cylinder head temperature **(CHT)** sensor. It may be used to monitor sensor voltage values between 0-5 volts.
3. **NOTE:** Running this test with the vehicle in gear or with the A C compressor clutch engaged (running) will cause incorrect diagnosis.

   Place the transmission in PARK (P) or NEUTRAL (N).

Coolant Temp °C (°F)	CHT Min (Volts)	CHT Nom (Volts)	CHT Max (Volts)
0 (32)	4.7714	4.8032	4.8723
25 (77)	4.3428	4.4148	4.4727
50 (122)	3.5354	3.6495	3.7473
80 (176)	2.3049	2.4201	2.5260
110 (230)	1.3021	1.3808	1.4562
140 (284)	0.6960	0.7414	0.7857
170 (338)	0.3784	0.4024	0.4261

4. Start the engine and allow the engine to idle throughout this test. Allow the engine to run for two minutes, then record the CHT voltage. Record the CHT voltage every 60 seconds. When the CHT voltage trend changes direction or only changes slightly (0.03 volt or less) from the previous reading, record this as the thermostat opening voltage. Use the voltage and corresponding coolant temperature chart listed.
5. If the thermostat opening temperatures is not above **82°C (180°F)** or the corresponding voltages shown on the chart, install a new thermostat.

6. If the thermostat opening temperatures and voltages are within the specified range, the thermostat is good and a new thermostat is not required. GO to the Symptom Chart. See: Diagnosis By Symptom