## SUBJECT
Engine Coolant Temperature

## DATE
April 2012

### Additions, Revisions, or Updates

<table>
<thead>
<tr>
<th>Publication Number / Title</th>
<th>Platform</th>
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<tr>
<td>DDC-SVC-MAN-0084</td>
<td>DD Platform</td>
<td>High Engine Coolant Temperature</td>
<td>Changed step 12 parts a-c to read &quot;less than&quot; and &quot;greater than&quot; as opposed to (&lt;) and (&gt;).</td>
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<td>Low Engine Coolant Temperature</td>
<td>Change step 1 pt. A to &quot;less than&quot;. Deleted step 2, oil temp and coolant temp cannot be compared while engine is warm. Additionally, the early DD15 did not have an oil temp sensor. Changed thermostat from opening correctly to closing correctly.</td>
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2 High Engine Coolant Temperature

Check as follows:

**NOTICE:**
The engine fan does not turn on until coolant temperature reaches 105°C (221°F).

1. Check for fault codes.
   a. If SPN 110 / FMI 0 is active, Refer to section "SPN 110/FMI 0 - ALL YEARS"
   b. If no fault codes are active, Go to step 2.
2. Check the condition of the fan and water pump belts. Refer to section "Inspection of the Belt Drive Tensioner System"
   a. If the belts are not in good condition, replace the belts.
   b. If the belts are OK, Go to step 3.
3. Check the condition of the belt tensioner. Refer to section "Inspection of the Belt Drive Tensioner System"
   a. If the belt tensioner is NOT in good condition, replace the belt tensioner. Refer to section "Removal of the Belt Tensioner"
   b. If the belt tensioner is in good condition, Go to step 4.
4. Check the condition of the idler and accessory drive pulleys.
   a. If the idler and accessory drive pulleys are damaged, replace and repair as necessary.
   b. If the idler and accessory drive pulleys are in good condition, Go to step 5.
5. Visually inspect the coolant level.
   a. If the coolant level is within an acceptable range, Go to step 6.
   b. If the coolant level is not within an acceptable range, fill coolant system to correct level.
6. Pressure test the radiator cap according to Original Equipment Manufacturer (OEM) procedure.
   a. If the radiator cap passes the test, Go to step 7.
   b. If the radiator cap fails the test, replace the radiator cap.
7. Pressure test the cooling system with a pressure tester according to OEM procedure.
   a. If cooling system passes, Go to step 8.
   b. If Cooling system fails, repair according to OEM procedure.
8. Visually examine the radiator and radiator shrouding.
9. Clean the exterior radiator of all clogging, debris, or excessive dirt; refer to OEM guidelines. Remove winter front (if equipped).
   a. If the radiator shrouding is damaged, incorrectly positioned, or inadequate, repair or replace damaged radiator shrouding; refer to OEM guidelines.
   b. If the radiator is absent of clogging, debris, and dirt, check the radiator shrouding for damage or incorrect positioning. If there is no damage or clogging to the radiator. Go to step 10.
10. Visually examine cooling system hoses; refer to OEM guidelines.
    a. If cooling system hoses are soft, deteriorated, or collapsed, remove and replace damaged or worn coolant hoses as necessary; refer to OEM instructions.
    b. If cooling system hoses are not soft, deteriorated, or collapsed. Go to step 11.
11. Test the cooling fan; refer to OEM guidelines.
    a. If the cooling fan is functioning correctly Go to step 12.
    b. If the cooling fan is not functioning correctly, replace inoperative cooling fan; refer to OEM guidelines.
12. Inspect thermostat for correct operation. Three different operating conditions occur due to the coolant inlet temperature:
    a. **Bypass mode:** When the coolant inlet temperature is less than 85°C (185°F) the circulating thermostat is closed. The coolant circulates in the engine and coolant can flow through the vehicle heating system.
    b. **Mixed mode:** For a coolant inlet temperature of greater than 85°C (185°F) to less than 95°C (203°F) the circulating thermostat opens partially and the coolant flows at the same time through the engine radiator and the short circuit line to the coolant thermostat.
    c. **Radiator operation:** When the coolant inlet temperature is greater than 95°C (203°F), the circulating thermostat is completely open. The coolant is freely flowing to the engine radiator.
d. If the thermostat is not opening correctly, remove the thermostat housing from the oil coolant module and replace the thermostat. Refer to section "Removal of the Engine Coolant Thermostat and Seal"
e. If the thermostat is operating correctly, Go to step 13.

13. Remove the water pump. Refer to section "Removal of the Water Pump"

14. Inspect the pulley, shaft, and impeller for damage.
   a. If damaged, replace the water pump. Refer to section "Removal of the Water Pump"
   b. If the water pump is OK, contact Customer Support Center for further instructions.
3 Low Engine Coolant Temperature

To determine if faulty thermostats are causing low engine coolant temperature, perform the following:

1. Inspect thermostat for correct operation. Three different operating conditions occur due to the coolant inlet temperature:
   a. **Bypass mode:** When the coolant inlet temperature is less than 85°C (185°F) the circulating thermostat is closed. The coolant circulates in the engine and coolant can flow through the vehicle heating heat exchange.
   b. **Mixed mode:** For a coolant inlet temperature of greater than 85°C (185°F) to less than 95°C (203°F) the circulating thermostat opens partially and the coolant flows at the same time through the engine radiator and the short circuit line to the coolant thermostat.
   c. **Radiator operation:** When the coolant inlet temperature greater than 95°C (203°F) the circulating thermostat is completely open. The coolant is freely flowing to the engine radiator.

2. If the thermostat is not closing correctly, remove the thermostat housing from the oil cooler and replace the thermostat. Refer to section "Removal of the Engine Coolant Thermostat and Seal"

   **WARNING: ENGINE EXHAUST**
   To avoid injury from inhaling engine exhaust, always operate the engine in a well-ventilated area. Engine exhaust is toxic.

   **WARNING: PERSONAL INJURY**
   To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.

3. Start and run the engine.
4. Run the engine through its operating range with no-load for approximately five minutes, allowing the engine coolant to reach normal operating range
   a. If the engine coolant temperature is 85-95°C (185-203°F), no further troubleshooting is required. Shut down the engine.
   b. If the engine coolant temperature is below 85-95°C (185-203°F), shut down the engine. Contact DDC Customer Support Center (800-445-1980).