P0128 Engine Coolant Temperature (ECT) Below Thermostat Regulating Temperature

Circuit Description

The engine control module (ECM) monitors the temperature of the engine coolant for engine control and as an enabling criteria for some diagnostics. The amount of air flow into an engine is proportional to the amount of heat an engine generates. The ECM monitors the amount of air flow into the engine to calculate engine coolant temperature (ECT). The ECM uses the calculated temperature to determine if the engine has warmed up to the thermostat regulating temperature. If the coolant temperature does not increase normally or does not reach regulating temperature of the thermostat, diagnostics that use the ECT as enabling criteria, may not run when expected. If the engine coolant temperature fails to reach the thermostat regulating temperature, before a predetermined amount of air flow enters the engine, this DTC sets.

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DTC Descriptor

This diagnostic procedure supports the following DTC. DTC P0128 Engine Coolant Temperature (ECT) Below Thermostat Regulating Temperature

Conditions for Running the DTC

- DTCs P0101, P0102, P0103, P0112, P0113, P0117, P0118, or P0700 are not set.
- The engine off time is more than 120 minutes.
- The engine speed is more than 960 RPM.
- The ECT is less than 71°C (160°F) at start up.
- The calculated ambient air temperature is more than 11°C (12°F) and less than 45°C (113°F).
- The vehicle speed is more than 15 km/h (9 mph).
- The fuel system is not in fuel cut-off.
- The air flow coming into the engine has accumulated to more than 2,000 grams.
- The engine block heater input has not been detected.

Conditions for Setting the DTC

The ECM detects that the actual coolant temperature is 10°C (50°F) less than the calculated coolant temperature.

Action Taken When the DTC Sets

- The control module illuminates the malfunction indicator lamp (MIL) on the second consecutive ignition cycle that the diagnostic runs and fails.
- The control module records the operating conditions at the time the diagnostic fails. The first time the diagnostic fails, the control module stores this information in the Failure Records. If the diagnostic reports a failure on the second consecutive ignition cycle, the control module records the operating conditions at the time of the failure. The control module writes the operating conditions to the Freeze Frame and updates the Failure Records.

Conditions for Clearing the MIL/DTC

- The control module turns OFF the malfunction indicator lamp (MIL) after 4 consecutive ignition cycles that the diagnostic runs and does not fail.
- A current DTC, Last Test Failed, clears when the diagnostic runs and passes.
- A history DTC clears after 40 consecutive warm-up cycles, if no failures are reported by this or any other emission related diagnostic.
- Clear the MIL and the DTC with a scan tool.

Diagnostic Aids

- Use the J 35616-C Connector Test Adapter Kit for any test that requires probing the ECM harness connector or a component harness connector.
- The lower connector of the ECM is connector C1 and the upper connector of the ECM is connector C2. Refer to Engine Controls Component Views on page 6-1209.
- An engine that soaks for about 8 hours will help diagnose the condition. After the cold soak,operate the vehicle at highway speeds for 20 minutes while monitoring the Calculated ECT - Thermostat parameter with a scan tool. If there is a condition, the calculated temperature will be 10°C (50°F) more then the actual engine coolant temperature.
- For an intermittent condition, refer to Intermittent Conditions

Test Description

The numbers below refer to the step numbers on the diagnostic table.

7. This step tests for excessive resistance in the ECT circuit.
8. This step isolates the condition. If the temperature changes, test for a condition in the low reference circuit. If the temperature remains the same test the signal circuit for a condition.

DTC P0128

Step	Action	Values	Yes	No
Schematic Reference: Engine Controls Schematics Connector End View Reference: Engine Control Module (ECM) Connector End Views or Engine Controls Connector End Views				
1	Did you perform the Diagnostic System Check–Engine Controls?	—	Go to Step 2	Go to Diagnostic System Check -Engine Controls
2	Is the engine cooling system low on coolant?	—	Go to Loss of Coolant in Engine Cooling	Go to Step 3
3	Is the customer's concern that the engine does not reach operating temperature or that the heater output is low?	—	Go to Thermostat Diagnosis in Engine Cooling	Go to Step 4

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Step	Action	Values	Yes	No
4	1. Operate the vehicle within the Conditions for Running the DTC. 2. Observe the ECT sensor parameter and the Calculated ECT -Thermostat parameter with a scan tool. Is the Calculated ECT -Thermostat parameter more than the specified value of the ECT sensor parameter?	10°C (50°F)	Go to Step 6	Go to Step 5
5	1. Observe the Freeze Frame/Failure Records for this DTC. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	—	Go to Step 6	Go to Diagnostic Aids
6	**Important: Return to this diagnostic procedure after you** complete the thermostat diagnosis. Test for the correct operation of the thermostat. Did you find and correct the condition?	—	Go to Step 15	Go to Step 7
7	1. Turn OFF the ignition. 2. Disconnect the engine coolant temperature (ECT) sensor. 3. Connect a 3-amp fused jumper wire between the signal circuit and the low reference circuit of the ECT sensor. 4. Turn ON the ignition, with the engine OFF. 5. Observe the ECT sensor parameter with a scan tool. Is the temperature more than the specified value?	139°C (282°F)	Go to Step 11	Go to Step 8

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Step	Action	Values	Yes	No
8	1. Connect a 3-amp fused jumper between the signal circuit of the ECT sensor and the engine control module (ECM) housing. 2. Observe the ECT sensor parameter with a scan tool. Is the temperature more than the specified value?	139°C (282°F)	Go to Step 9	Go to Step 10
9	Test the low reference circuit of the ECT sensor for high resistance. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 15	Go to Step 12
10	Test the signal circuit of the ECT sensor for high resistance. Refer to Circuit Testing and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 15	Go to Step 12
11	Test for shorted terminals and poor connections at the ECT sensor. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 15	Go to Step 13
12	Test for shorted terminals and poor connections at the ECM. Refer to Testing for Intermittent and Poor Connections and Connector Repairs in Wiring Systems. Did you find and correct the condition?	—	Go to Step 15	Go to Step 14
13	Replace the ECT sensor. Refer to Engine Coolant Temperature (ECT) Sensor Replacement. Did you complete the replacement?	—	Go to Step 15	—
14	Replace the ECM. Refer to Engine Control Module (ECM) Replacement. Did you complete the replacement?	—	Go to Step 15	—

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Step	Action	Values	Yes	No
15	1. Clear the DTCs with a scan tool. 2. Turn OFF the ignition for 30 seconds. 3. Start the engine. 4. Operate the vehicle within the Conditions for Running the DTC. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records. Did the DTC fail this ignition?	—	Go to Step 2	Go to Step 16
16	Observe the Capture Info with a scan tool. Are there any DTCs that have not been diagnosed?	—	Go to Diagnostic Trouble Code (DTC) List	System OK

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