Theory of Operation

The Charge Air Cooler Temperature Sensor (CAC) and the Boost Pressure Sensor are combined in one sensor and are located near the EGR Airflow Throttle Control Valve. The Powertrain Control Module (PCM) provides a 5-Volt reference.
voltage to the sensor. The PCM monitors the temperature of the air entering the intake using the CAC Temperature Sensor. At key-on after an eight hour cold soak, the CAC Temperature Sensor is compared to the EGR Orifice Temperature Sensor and Coolant Temperature Sensor readings. If the temperatures differ more than a calibrated amount, a DTC is recorded. In the case that all four sensor values are distributed over a range of temperatures this diagnostic will not run. A block heater is one possible cause of such a condition. The key on monitor is disabled for ambient temperatures below 20°F. The rationality check looks at the temperature reading from the CAC Temperature Sensor over time and ensures that it changes. This monitor is used to verify the sensor is responding with temperature change. Both the key-on and rationality errors require that the diagnostic fails in two consecutive drive cycles before the MIL lamp is lit. The PCM turns off the MIL lamp when the diagnostic runs and passes in four consecutive drive cycles.

- **When Monitored:**

  With ignition on and battery voltage greater than 10.4 Volts.

- **Set Condition:**

  The circuit voltage to the PCM is above 4.78 Volts for five seconds.

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Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

1. **ACTIVE DTC**

   **NOTE:** If there are any 5-Volt supply DTCs present, repair those DTCs before proceeding with this test.

   1. Turn the ignition on.
   2. With the scan tool, record all Freeze frame data.
   3. With the scan tool, erase DTCs.
   4. Turn the ignition off for 75 seconds.
   5. Turn the ignition on.
   6. With the scan tool, read DTCs.

   **Did the DTC reset?**

   **Yes**
   - Go To 2

   **No**
   - Perform the INTERMITTENT CONDITION diagnostic procedure. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).
2. **CHECK THE (K735) CHARGE AIR COOLER TEMPERATURE SENSOR SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE**

1. Ignition on.
2. Disconnect the Charge Air Cooler Temperature Sensor harness connector.

**NOTE:** Check connectors - Clean/repair as necessary.

3. With a volt meter connected to ground, measure the voltage of the (K735) Charge Air Cooler Temperature Sensor Signal circuit at the harness connector.

**Is there any voltage present?**

- **Yes**
  - Repair the (K735) CAC Temperature Sensor Signal circuit for a short to voltage.
  - Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

- **No**
  - Go To 3

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3. **CHECK THE (K735) CHARGE AIR COOLER TEMPERATURE SENSOR SIGNAL CIRCUIT FOR AN OPEN/HIGH RESISTANCE**

1. Turn the ignition off.
2. Disconnect the PCM C1 harness connector.
3. Measure the resistance of the (K735) CAC Temperature Sensor Signal circuit between the CAC Temperature Sensor harness connector and the PCM C1 harness connector.

**Is the resistance below 5.0 Ohms?**

- **Yes**
  - Go To 4

- **No**
  - Repair the (K735) CAC Temperature Sensor Signal circuit for an open or high resistance.
  - Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).
4. CHECK THE (K916) SENSOR GROUNDCIRCUIT FOR AN OPEN/HIGH RESISTANCE

1. Measure the resistance of the (K916) Sensor Ground circuit between the CAC Temperature Sensor harness connector and the PCM C1 harness connector.

   **Is the resistance below 5.0 Ohms?**

   Yes  •  Go To  5

   No  •  Repair the (K916) Sensor Ground circuit for an open or high resistance.

   •  Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

5. CHECK THE CHARGE AIR COOLER TEMP SENSOR

1. Reconnect the PCM C1 harness connector.

2. Turn the ignition on.

3. With the scan tool, erase DTCs.

4. While monitoring with scan tool, use a jumper wire and connect the (K735) CAC Temperature Sensor Signal circuit to the (K916) CAC Temperature Sensor Return circuit at the CAC harness connector.

   **Did the DTC P007C set?**

   Yes  •  Replace the CAC/Boost Pressure Sensor in accordance with the service information.

   •  Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

   No  •  Replace the Powertrain Control Module in accordance with the service information.

   •  Perform the POWERTRAIN VERIFICATION TEST - 6.7L. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).