Engine Controls - 4.3 L

Specifications

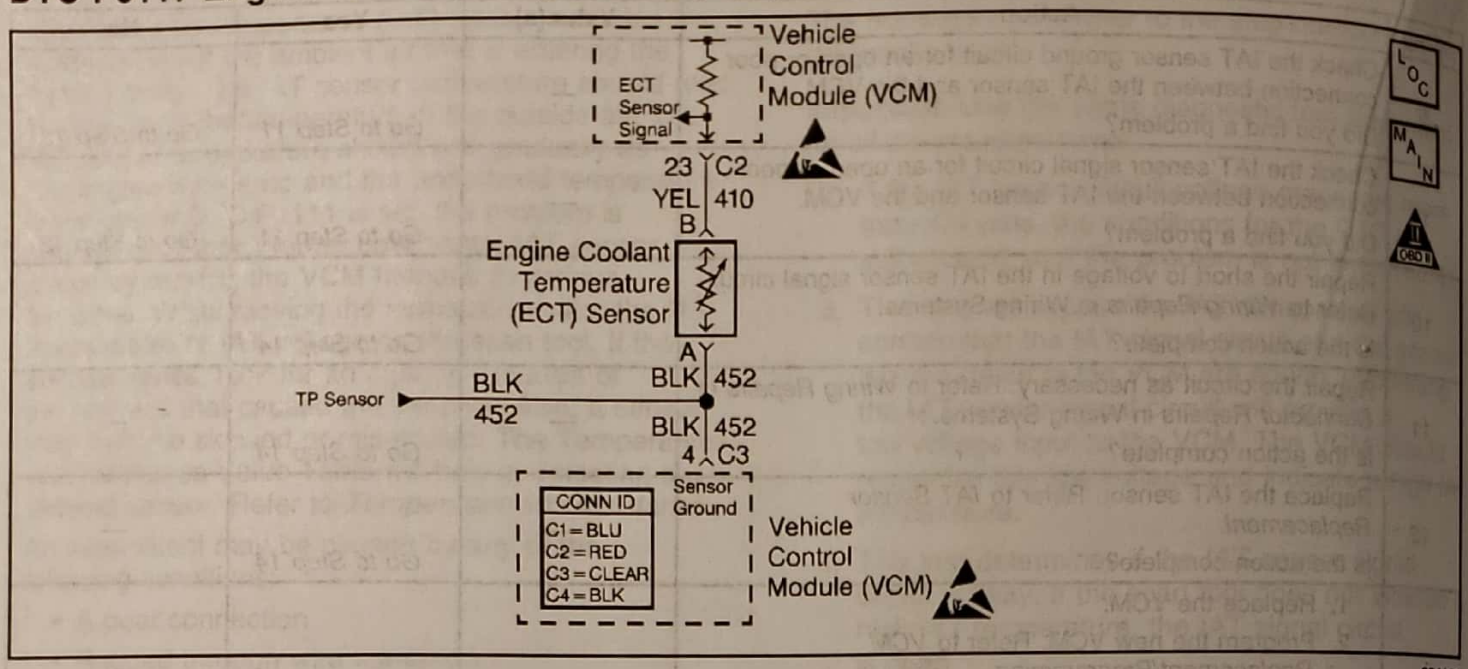
Temperature vs Resistance

°C	°F	OHMS
Temperature vs Resistance Values (Approximate)		
100	212	177
90	194	241
80	176	332
70	158	467
60	140	667
50	122	973
45	113	1188
40	104	1459
35	95	1802
30	86	2238
25	77	2796
20	68	3520
15	59	4450
10	50	5670
5	41	7280
0	32	9420
–5	23	12300
–10	14	16180
–15	5	21450
–20	–4	28680
–30	–22	52700
–40	–40	100700

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Accelerator Cable Bracket Bolt	25 N·m	18 lb ft
Accelerator Cable Bracket Nut	30 N·m	22 lb ft
Air Cleaner Outlet Duct Nut	2.5 N·m	22 lb in
Crankshaft Position Sensor Mounting Bolt	20 N·m	15 lb ft
Coolant Hose Nipple	17 N·m	13 lb ft
EGR Tube Retaining Bolt	25 N·m	18 lb ft
EGR Valve Attaching Bolts	25 N·m	18 lb ft
EVAP Canister Retainer Attaching Bolt	10 N·m	88 lb in
Fuel Pipe Clip Bolt	6 N·m	53 lb in
Fuel Pipe Attaching Nuts	27 N·m	20 lb ft
Fuel Pipe to Fuel Rail Retaining Screw	3 N·m	27 lb in
Fuel Pipe Return Line Nut	3 N·m	27 lb in
Fuel Pressure Regulator Bracket	3.5 N·m	31 lb in
Fuel Rail Attaching Bolts	10 N·m	88 lb in
Fuel Tank Bracket Strap	45 N·m	33 lb ft
Idle Air Control Valve Attaching Screws	3 N·m	27 lb in
Pressure Regulator Screw	9.5 N·m	84 lb in

DTC P0117 Engine Coolant Temperature (ECT) Sensor Circuit Low Voltage



Circuit Description

The Engine Coolant Temperature (ECT) sensor is a thermistor. The Control Module (PCM/VCM) supplies the ECT sensor with a reference voltage on the ECT signal circuit and a ground circuit. When the ECT sensor resistance is high (cold sensor), the ECT sensor signal voltage remains near the supplied voltage, and decreases the signal voltage as the ECT sensor resistance is low (warm sensor). The Control Module monitors the ECT sensor signal circuit voltage in order to calculate engine temperature.

This DTC is designed to detect an ECT sensor signal voltage lower than the possible range of a normally operating ECT sensor.

Conditions for Running the DTC

The engine run time is more than 5 seconds.

Conditions for Setting the DTC

The ECT sensor voltage is less than 0.25 volts for more than 20 seconds.

Action Taken When the DTC Sets

- The Control Module illuminates the Malfunction Indicator Lamp (MIL) if a failure is detected during 2 consecutive key cycles.
- The Control Module will set the DTC and records the operating conditions at the time the diagnostic fails. The Control Module stores the failure information in the scan tools Freeze Frame and/or the Failure Records.

Conditions for Clearing the MIL/DTC

- The Control Module turns OFF the MIL after 3 consecutive drive trips when the test has Run and Passed.
- A history DTC will clear if no fault conditions have been detected for 40 warm-up cycles (coolant temperature has risen 22°C (40°F) from the startup coolant temperature and the engine coolant temperature is more than 70°C (158°F) during the same ignition cycle).
- Use the scan tool Clear Information function.

Diagnostic Aids

After starting the engine, the ECT sensor temperature should rise steadily to about 90°C (194°F) then stabilize when the thermostat opens.

Check for an intermittent short to ground in the ECT sensor signal circuit. Move the VCM harness at various locations and monitor the ECT voltage on the scan tool. If the voltage varies, look for a short to ground in the area of the harness that caused the variance.

Use the Temperature vs. Resistance Value Table to test the coolant sensor at various temperature levels in order to evaluate the possibility of a skewed (mis-scaled) sensor. A skewed sensor could result in poor driveability concerns. Refer to *Temperature vs Resistance*.

An intermittent may be caused by any of the following conditions:

- A poor connection
- Rubbed through wire insulation
- A broken wire inside the insulation

Thoroughly check any circuitry that is suspected of causing the intermittent complaint. Refer to *Intermittents and Poor Connections Diagnosis* in Wiring Systems.

If a repair is necessary, refer to *Wiring Repairs* or *Connector Repairs* in Wiring Systems.

Test Description

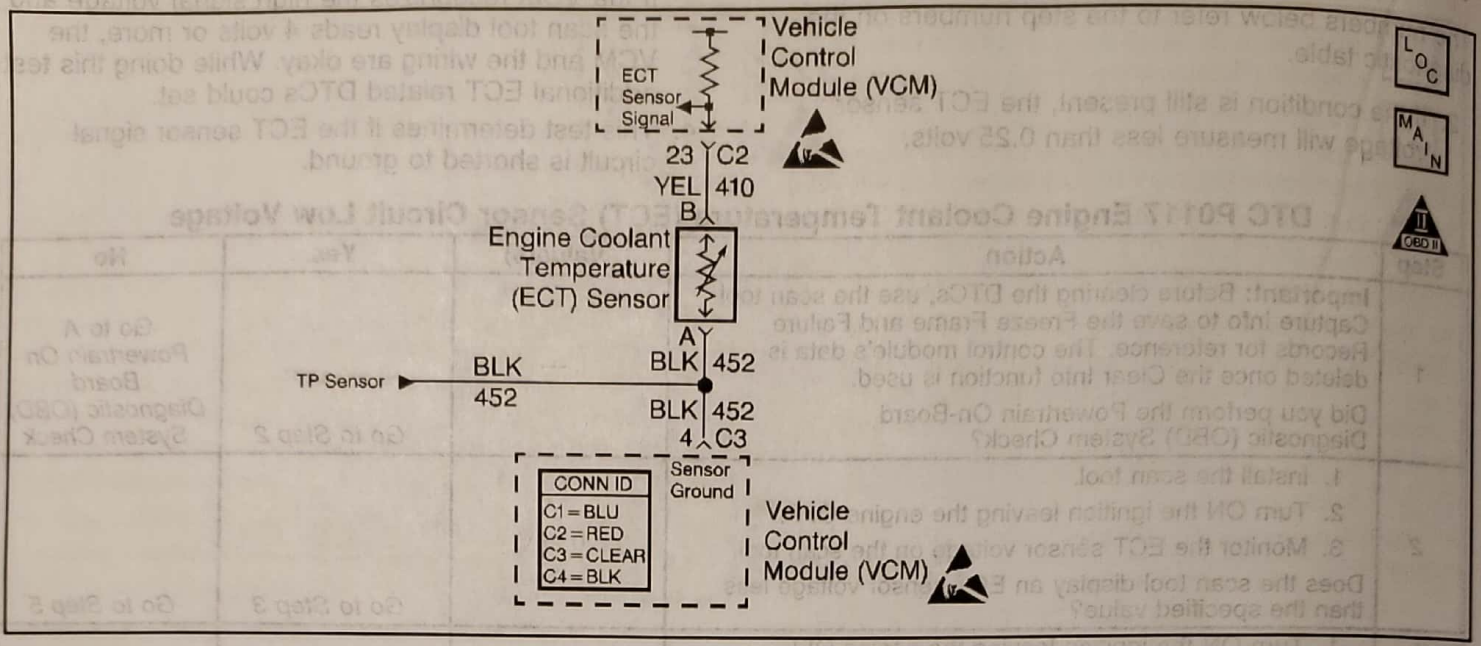
The numbers below refer to the step numbers on the diagnostic table.

2. If the condition is still present, the ECT sensor voltage will measure less than 0.25 volts.
3. This test simulates a high signal voltage condition. If the VCM recognizes the high signal voltage and the scan tool display reads 4 volts or more, the VCM and the wiring are okay. While doing this test additional ECT related DTCs could set.
4. This test determines if the ECT sensor signal circuit is shorted to ground.

DTC P0117 Engine Coolant Temperature (ECT) Sensor Circuit Low Voltage

Step	Action	Value(s)	Yes	No
1	**Important:** Before clearing the DTCs, use the scan tool Capture Info to save the Freeze Frame and Failure Records for reference. The control module's data is deleted once the Clear Info function is used. Did you perform the Powertrain On-Board Diagnostic (OBD) System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check*
2	1. Install the scan tool. 2. Turn ON the ignition leaving the engine OFF. 3. Monitor the ECT sensor voltage on the scan tool. Does the scan tool display an ECT sensor voltage less than the specified value?	0.25V	*Go to Step 3*	*Go to Step 5*
3	1. Turn ON the ignition leaving the engine OFF. 2. Disconnect the ECT sensor harness connector. Does the scan tool display an ECT sensor voltage more than the specified value?	4.0V	*Go to Step 7*	*Go to Step 4*
4	1. Turn OFF the ignition. 2. Disconnect the VCM C2 connector. 3. Check for a short to ground on the ECT sensor signal circuit. Did you find a problem?	—	*Go to Step 6*	*Go to Step 8*
5	The DTC is intermittent. Are any additional DTCs set?	—	Go to the applicable DTC table	Go to Diagnostic Aids
6	Repair the short to ground in the ECT sensor signal circuit. Refer to *Wiring Repairs* in Wiring Systems. Is the action complete?	—	*Go to Step 9*	—
7	Replace the ECT sensor. Refer to *ECT Sensor Replacement.* Is the action complete?	—	*Go to Step 9*	—
8	1. Replace the VCM. 2. Program the new VCM. Refer to *VCM Replacement/Programming.* 3. Perform the Passlock Reprogramming Procedure. Refer to *PASSLOCK Reprogramming Seed and Key* in Theft Deterrent. 4. Perform the CKP System Variation Learn Procedure. Refer to *CKP System Variation Learn Procedure.* Is the action complete?	—	*Go to Step 9*	—
9	1. Using the scan tool, clear the DTCs. 2. Start the engine. 3. Allow the engine to idle until the engine reaches normal operating temperature. 4. Select the DTC and the Specific DTC function. 5. Enter the DTC number that was set. 6. Operate the vehicle, within the Conditions for Setting this DTC, until the scan tool indicates the diagnostic Ran. Does the scan tool indicate the diagnostic Passed?	—	*Go to Step 10*	*Go to Step 2*
10	Does the scan tool display any additional undiagnosed DTCs?	—	Go to the applicable DTC table	System OK

DTC P0118 Engine Coolant Temperature (ECT) Sensor Circuit High Voltage



Circuit Description

The Engine Coolant Temperature (ECT) sensor is a thermistor. The Control Module (PCM/VCM) supplies the ECT sensor with a reference voltage on the ECT signal circuit and a ground circuit. When the ECT sensor resistance is high (cold sensor), the ECT sensor signal voltage remains near the supplied voltage, and decreases the signal voltage as the ECT sensor resistance is low (warm sensor). The Control Module monitors the ECT sensor signal circuit voltage in order to calculate engine temperature.

This DTC is designed to detect an ECT sensor signal voltage higher than the possible range of a normally operating ECT sensor.

Conditions for Running the DTC

The engine has been running for more than 5 seconds.

Conditions for Setting the DTC

The ECT sensor voltage is more than 4.9 volts for more than 20 seconds.

Action Taken When the DTC Sets

- The Control Module illuminates the Malfunction Indicator Lamp (MIL) if a failure is detected during 2 consecutive key cycles.
- The Control Module will set the DTC and records the operating conditions at the time the diagnostic fails. The Control Module stores the failure information in the scan tools Freeze Frame and/or the Failure Records.

Conditions for Clearing the MIL/DTC

- The Control Module turns OFF the MIL after 3 consecutive drive trips when the test has Run and Passed.
- A history DTC will clear if no fault conditions have been detected for 40 warm-up cycles (coolant temperature has risen 22°C (40°F) from the startup coolant temperature and the engine coolant temperature is more than 70°C (158°F) during the same ignition cycle).
- Use the scan tool Clear Information function.

Diagnostic Aids

After starting the engine, the ECT sensor temperature should rise steadily to about 90°C (194°F) then stabilize when the thermostat opens.

Check for an intermittent open or a short to battery voltage in the ECT sensor signal circuit. Move the VCM harness at various locations and monitor the ECT temperature and voltage on the scan tool. If the voltage varies, look for a short to ground in the area of the harness that caused the variance.

Use the Temperature vs. Resistance Value Table to test the ECT sensor at various temperature levels in order to evaluate the possibility of a skewed (mis-scaled) sensor. A skewed sensor could result in poor driveability concerns. Refer to *Temperature vs Resistance*.

An intermittent may be caused by any of the following conditions:

- A poor connection
- Rubbed through wire insulation
- A broken wire inside the insulation

Thoroughly check any circuitry that is suspected of causing the intermittent complaint. Refer to *Intermittents and Poor Connections Diagnosis* in Wiring Systems.

If a repair is necessary, refer to *Wiring Repairs* or *Connector Repairs* in Wiring Systems.

Test Description

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

2. If the condition is present, the ECT sensor voltage measures more than 4.9 volts.
3. This test simulates the conditions for a DTC P0117. If the VCM recognizes the grounded circuit (low voltage) and displays a low voltage message, the VCM and the wiring are okay.
4. This test checks for an open or grounded ECT sensor signal circuit. Also being checked are the ECT sensor ground circuit and the VCM.
5. This test checks for a short to voltage on the ECT sensor signal circuit.
12. After repairing a short to voltage, it is necessary to recheck the operation of the ECT sensor.

DTC P0118 Engine Coolant Temperature (ECT) Sensor Circuit High Voltage

Step	Action	Value(s)	Yes	No
1	**Important:** Before clearing the DTCs, use the scan tool Capture Info to save the Freeze Frame and Failure Records for reference. The control module's data is deleted once the Clear Info function is used. Did you perform the Powertrain On-Board Diagnostic (OBD) System Check?	—	*Go to Step 2*	Go to *A Powertrain On Board Diagnostic (OBD) System Check*
2	1. Install the scan tool. 2. Start the engine. 3. Monitor the ECT sensor voltage. Does the scan tool display an ECT sensor voltage more than the specified value?	4.9 V	*Go to Step 3*	*Go to Step 6*
3	1. Turn OFF the engine. 2. Disconnect the ECT sensor harness connector. 3. Jumper the ECT sensor harness terminals together. 4. Turn ON the ignition leaving the engine OFF. Does the scan tool display an ECT sensor voltage less than the specified value?	0.82 V	*Go to Step 5*	*Go to Step 4*
4	Jumper the ECT sensor signal circuit to a ground. Does the scan tool display an ECT sensor voltage less than the specified value?	0.82 V	*Go to Step 8*	*Go to Step 9*
5	1. Disconnect the jumper. 2. Check the voltage between the ECT sensor signal circuit and a ground using a *J 39200* DMM. Is the voltage more than the specified value?	5.20 V	*Go to Step 10*	*Go to Step 7*
6	The DTC is intermittent. Are any additional DTCs stored?	—	Go to the applicable DTC table	Go to Diagnostic Aids
7	Check the ECT sensor harness connector and the VCM connector for a poor connection. Did you find a problem?	—	*Go to Step 11*	*Go to Step 13*
8	Check the ECT sensor ground circuit for an open or poor connection between the ECT sensor and the VCM. Did you find a problem?	—	*Go to Step 11*	*Go to Step 14*

DTC P0118 Engine Coolant Temperature (ECT) Sensor Circuit High Voltage (cont'd)

Step	Action	Value(s)	Yes	No
9	Check the ECT sensor signal circuit for an open or poor connection between the ECT sensor and the VCM. Did you find a problem?	—	*Go to Step 11*	*Go to Step 14*
10	Repair the short to voltage in the ECT sensor signal circuit. Refer to *Wiring Repairs* in Wiring Systems. Is the action complete?	—	*Go to Step 12*	—
11	Repair the circuit as necessary. Refer to *Wiring Repairs* or *Connector Repairs* in Wiring Systems. Is the action complete?	—	*Go to Step 15*	—
12	1. Reconnect the ECT sensor harness. 2. Start the engine. 3. Monitor the ECT sensor voltage. Does the scan tool display an ECT sensor voltage less than the specified value?	4.9 V	*Go to Step 15*	*Go to Step 13*
13	Replace the ECT sensor. Refer to *ECT Sensor Replacement.* Is the action complete?	—	*Go to Step 15*	—
14	1. Replace the VCM. 2. Program the new VCM. Refer to *VCM Replacement/Programming.* 3. Perform the Passlock Reprogramming Procedure. Refer to *PASSLOCK Reprogramming Seed and Key* in Theft Deterrent. 4. Perform the CKP System Variation Learn Procedure. Refer to *CKP System Variation Learn Procedure.* Is the action complete?	—	*Go to Step 15*	—
15	1. Using the scan tool, clear the DTCs. 2. Start the engine. 3. Allow the engine to idle until the engine reaches normal operating temperature. 4. Select DTC and the Specific DTC function. 5. Enter the DTC number which was set. 6. Operate the vehicle, with the Conditions for Setting this DTC, until the scan tool indicates the diagnostic Ran. Does the scan tool indicate the diagnostic Passed?	—	*Go to Step 16*	*Go to Step 2*
16	Does the scan tool display any additional undiagnosed DTCs?	—	Go to the applicable DTC table	System OK

Engine Coolant Temperature Gauge Inaccurate or Inoperative

Step	Action	Value(s)	Yes	No
1	Did you perform the Instrument Cluster System Check?	—	Go to *Step 2*	Go to *Instrument Cluster System Check*
2	1. Turn the ignition switch to the ON position. 2. Ensure that the engine is running. 3. Install the scan tool. 4. Select the displayed coolant temperature display on the scan tool. 5. Compare the displayed coolant temperature data on the scan tool to the temperature gauge reading on the cluster. Are the temperatures approximately equal or within 25°?	87°C (190°F)	Go to *Step 3*	Go to *Step 6*
3	Read the monitored coolant temperature from the scan tool. Is the monitored coolant temperature reading within the specified range?	38–127°C 100–260°F)	Go to *Step 4*	Go to *Step 5*
4	Compare the monitored coolant temperature with the displayed coolant temperature. Are the temperatures approximately equal or within 11°C (25°F)?	—	Go to *Step 5*	Go to *Step 6*
5	• If the monitored coolant temperature is less than 38°C (100°F), the gauge should be at or near the lowest reading. • If the monitored coolant temperature is greater than 127°C (260°F), the gauge should be at or near the maximum reading. Is the gauge reading correct?	—	Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls - 2.2L Go to *A Powertrain On Board Diagnostic (OBD) System Check* in Engine Controls - 4.3L	Go to *Step 6*
6	Replace the IP cluster. Refer to *IP Cluster Replacement*. Is the repair complete?	—	Go to *Instrument Cluster System Check*	—