| DTC | P0116 | Engine Coolant Temperature Circuit Range / Performance Problem |
|---|---|---|

## DESCRIPTION

Refer to DTC P0115 (See page ES-87).

| DTC No. | DTC Detection Conditions | Trouble Areas |
|---|---|---|
| P0116 | Case 1:<br>Engine Coolant Temperature (ECT) is between 35°C and 60°C (95°F and 140°F) when engine started, and conditions (a) and (b) are met (2 trip detection logic):<br>(a) Vehicle driven at varying speeds (accelerated and decelerated)<br>(b) ECT change is within 3°C (5.4°F) of initial ECT<br>Case 2:<br>ECT is more than 60°C (140°F) when engine started, and conditions (a) and (b) are met (6 trip detection logic):<br>(a) Vehicle driven at varying speeds (accelerated and decelerated<br>(b) ECT measurements change is within 1°C (1.8°F) of initial ECT on 6 successive occasions | ECT sensor |

ES

## MONITOR DESCRIPTION

The ECT sensor is used to monitor the ECT. The ECT sensor has a built-in thermistor with a resistance that varies according to the temperature of the engine coolant. When the ECT is low, the resistance of the thermistor increases. When the temperature is high, the resistance drops. These variations in the resistance are reflected in the voltage output from the ECT sensor.
The ECM monitors the sensor voltage and uses this value to calculate the ECT. If the sensor voltage output deviates from the normal operating range, the ECM interprets this deviation as a malfunction in the ECT sensor and sets the DTC.
Examples:

- Upon starting the engine, the ECT is between 35°C and 60°C (95°F and 140°F). If, after driving for 250 seconds, the ECT change is within 3°C (5.4°F) of the staring temperature, the DTC is set (2 trip detection logic).
- Upon starting the engine, the ECT is over 60°C (140°F). If, after driving for 250 seconds, the ECM change is within 1°C (1.8°F) of the starting temperature, the DTC is set (6 trip detection logic).

## MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0116: Engine coolant temperature sensor output stuck at low engine coolant temperature<br>P0116: Engine coolant temperature sensor output stuck at high engine coolant temperature |
| Required Sensors/Components (Main) | Engine Coolant Temperature (ECT) sensor |
| Required Sensors/Components (Related) | Crankshaft position sensor, intake air temperature sensor and mass air flow meter |
| Frequency of Operation | Continuous |
| Duration | 10 seconds or more |
| MIL Operation | 2 driving cycles:<br>ECT sensor output stuck at low engine coolant temperature |
| Sequence of Operation | None |

## TYPICAL ENABLING CONDITIONS

### Engine Coolant Temperature Sensor Output Stuck at Low Engine Coolant Temperature:

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | P0100, P0102, P0103 (MAF sensor) |

| | |
|---|---|
| Battery voltage | 10.5 V |
| Time after engine start | 1 second |
| ECT at engine start | Less than 60°C (140°F) |
| IAT sensor circuit | Not detected |
| Soak time | 0 second |
| Accumulated MAF | 712 g or more (A/T), 765 g or more (M/T) |
| Engine | Running |
| Fuel cut | OFF |
| Difference between ECT at engine start and IAT | Less than 40°C (72°F) |

**Engine Coolant Temperature Sensor Output Stuck at High Engine Coolant Temperature:**



| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | P0100, P0102, P0103 (MAF sensor) |
| Battery voltage | 10.5 V |
| ECT at engine start | 60°C (140°F) or more |
| Battery voltage | 10.5 V or more |
| Engine | Running |
| Soak time | 18000 seconds |
| Accumulated MAF | 765 g or more (A/T), 1220 g or more (M/T) |

*1: Vehicle is stopped for 20 seconds or more and accelerated to more than 43.5 mph (70 km/h) within 40 seconds.
*2: Following these steps: 1) vehicle is driven at 40.4 mph (65 km/h) or more for 30 seconds or more and the vehicle speed reaches 43.5 mph (70 km/h); 2) vehicle is decelerated from 40.4 mph (65 km/h) to 1.86 mph (3 km/h) or less within 35 seconds; and 3) vehicle is stopped for 10 seconds.

## TYPICAL MALFUNCTION THRESHOLDS

**Engine Coolant Temperature Sensor Output Stuck at Low Engine Coolant Temperature:**

| | |
|---|---|
| Variation of engine coolant temperature | Less than 3°C (5.4°F) |

**Engine Coolant Temperature Sensor Output Stuck at High Engine Coolant Temperature:**

| | |
|---|---|
| Variation of engine coolant temperature | 1°C (1.8°F) or less |

## COMPONENT OPERATING RANGE

| | |
|---|---|
| Engine coolant temperature | Varies with actual engine coolant temperature |

## INSPECTION PROCEDURE

HINT:
- If any of DTCs P0115, P0117, P0118 or P0125 are set simultaneously with DTC P0116, the ECT sensor may have an open or a short circuit. Troubleshoot those DTCs first.
- Read freeze frame data using an intelligent tester or OBD II scan tool. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

| 1 | REPLACE ENGINE COOLANT TEMPERATURE SENSOR |
|---|---|

(a) Replace the engine coolant temperature sensor (See page EM-93).

NEXT

END