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Model Year: 2007	Model: Camry	Doc ID: RM000000PFB017X
Title: 2GR-FE ENGINE CONTROL SYSTEM: SFI SYSTEM: P0116: Engine Coolant Temperature Circuit Range / Performance Problem (2007 Camry)		

DTC	P0116	Engine Coolant Temperature Circuit Range / Performance Problem
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DESCRIPTION

A thermistor is built into the Engine Coolant Temperature (ECT) sensor, of which the resistance value varies according to the ECT.

The structure of the sensor and its connection to the ECM are the same as those of the Intake Air Temperature (IAT) sensor.

DTC NO.	DTC DETECTION CONDITION	TROUBLE AREA
P0116	<ul style="list-style-type: none"> • ECTs as listed below are nearly same (2 trip detection logic): <ul style="list-style-type: none"> • ECT when engine is started at lower than 60°C (140°F) of ECT • ECT when engine is warmed up 	<ul style="list-style-type: none"> • Thermostat • ECT sensor
	<ul style="list-style-type: none"> • ECTs as listed below are nearly same when engine is started at higher than 60°C (140°F) of ECT (2 trip detection logic) <ul style="list-style-type: none"> • ECT when engine is stopped after driving • ECT when engine is started at lower than 60°C (140°F) of ECT 	

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 drops, the resistance of the thermistor increases. When the temperature rises, the resistance drops. These variations in the resistance are reflected in the output voltage from the ECT sensor.

The ECM monitors the sensor voltage and uses this value to calculate the ECT. If the sensor output voltage deviates from the normal operating range, the ECM interprets this deviation as a malfunction in the ECT sensor and sets the DTC.

Examples:

- i. 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 remains within 3°C (5.4°F) of the starting temperature, the DTC is set (2 trip detection logic).
- ii. Upon starting the engine, the ECT is over 60°C (140°F). If, after driving for 250 seconds, the ECM remains 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 rationality (ECT sensor cold start monitor) P0116: Engine coolant temperature sensor rationality (ECT sensor soak monitor)
Required Sensors/Components (Main)	Engine coolant temperature (ECT) sensor
Required Sensors/Components (Sub)	-
Frequency of Operation	Once per driving cycle
Duration	10
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	P0100 - P0103 (MAF sensor)
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ECT sensor cold start monitor:

Battery voltage	10.5 V or more
Time after engine start	1 second or more
ECT at engine start	Less than 60°C (140°F)
IAT sensor circuit	OK
Soak time	5 hours
Accumulated MAF	1,056.06 g or more
Engine	Running

Fuel cut	OFF
Difference between ECT at engine start and IAT	Less than 40°C (104°F)

ECT sensor soak monitor:

Battery voltage	10.5 V or more
Engine	Running
Soak time	5 hours or more
ECT at engine start	60°C (140°F) or more
Accumulated MAF	2,101.98 times or more

TYPICAL MALFUNCTION THRESHOLDS**ECT sensor cold start monitor:**

ECT sensor value change	Less than 5°C (9°F)
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ECT sensor soak monitor:

Difference between current ECT sensor value and previous ECT sensor value when engine stopped	Less than 5°C (9°F)
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COMPONENT OPERATING RANGE

Engine coolant temperature	Varies with actual engine coolant temperature
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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 the intelligent tester. 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  .

PROCEDURE

1.

CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0116)

