

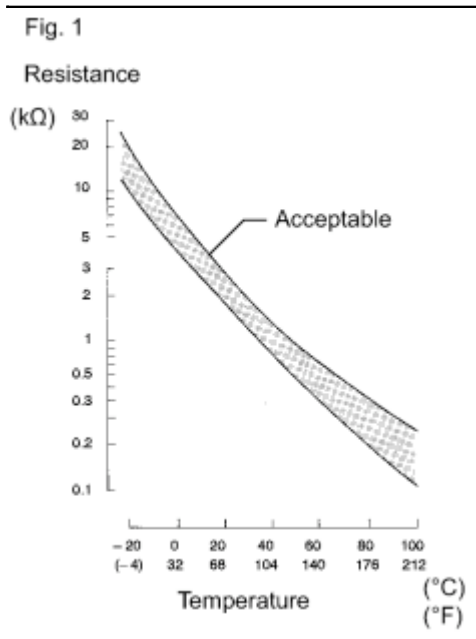
<b>Last Modified:</b> 6-2-2008	5.1 C	<b>From:</b> 200601
<b>Model Year:</b> 2007	<b>Model:</b> Camry	<b>Doc ID:</b> RM000000PF301AX
<b>Title:</b> 2GR-FE ENGINE CONTROL SYSTEM: SFI SYSTEM: P0110: Intake Air Temperature Circuit Malfunction (2007 Camry)		

<b>DTC</b>	<b>P0110</b>	<b>Intake Air Temperature Circuit Malfunction</b>
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<b>DTC</b>	<b>P0112</b>	<b>Intake Air Temperature Circuit Low Input</b>
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<b>DTC</b>	<b>P0113</b>	<b>Intake Air Temperature Circuit High Input</b>
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## DESCRIPTION



The Intake Air Temperature (IAT) sensor, mounted on the Mass Air Flow (MAF) meter, monitors the IAT. The IAT sensor has a built-in thermistor with a resistance that varies according to the temperature of the intake air. When the IAT drops, the resistance of the thermistor increases. When the temperature rises, the resistance drops. These variations in resistance are transmitted to the ECM as voltage changes (See Fig. 1).

The IAT sensor is powered by a 5 V supply from the THA terminal of the ECM, via resistor R.

Resistor R and the IAT sensor are connected in series. When the resistance value of the IAT sensor changes, according to changes in the IAT, the voltage at terminal THA also varies. Based on this signal, the ECM increases the fuel injection volume when the engine is cold to improve driveability.

**When any of DTCs P0110, P0112 and P0113 are set, the ECM enters fail-safe mode. During fail-safe mode, the IAT is estimated to be 20°C (68°F) by the ECM. Fail-safe mode continues until a pass condition is detected.**

DTC NO.	PROCEED TO	DTC DETECTION CONDITION	TROUBLE AREA
P0110	Step 1	Open or short in Intake Air Temperature (IAT) sensor circuit for 0.5 seconds (1 trip detection logic)	<ul style="list-style-type: none"> <li>• Open or short in IAT sensor circuit</li> <li>• IAT sensor (built into MAF meter)</li> <li>• ECM</li> </ul>
P0112	Step 4	Short in Intake Air Temperature (IAT) sensor circuit for 0.5 seconds (1 trip detection logic)	<ul style="list-style-type: none"> <li>• Short in IAT sensor circuit</li> <li>• IAT sensor (built into MAF meter)</li> <li>• ECM</li> </ul>
P0113	Step 2	Open in Intake Air Temperature (IAT) sensor circuit for 0.5 seconds (1 trip detection logic)	<ul style="list-style-type: none"> <li>• Open in IAT sensor circuit</li> <li>• IAT sensor (built into MAF meter)</li> <li>• ECM</li> </ul>

**When any of these DTCs are set, check the IAT by entering the following menus on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.**

TEMPERATURE DISPLAYED	MALFUNCTION
-40°C (-40°F)	Open circuit
140°C (284°F) or higher	Short circuit

## **MONITOR DESCRIPTION**

The ECM monitors the sensor voltage and uses this value to calculate the Intake Air Temperature (IAT). When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a

malfunction in the IAT sensor and sets a DTC.

Example:

If the sensor output voltage is -40°C (-40°F) for 0.5 seconds or more, the ECM determines that there is an open in the IAT sensor circuit, and sets DTC P0113. Conversely, if the output voltage is more than 140°C (284°F) for 0.5 seconds or more, the ECM determines that there is a short in the sensor circuit, and sets DTC P0112.

If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

## MONITOR STRATEGY

Related DTCs	P0110: Intake air temperature sensor open/short (Fluctuating) P0112: Intake air temperature sensor short (Low electrical resistance) P0113: Intake air temperature sensor open (High electrical resistance)
Required Sensors/Components (Main)	Intake Air Temperature (IAT) sensor
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

## TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
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## TYPICAL MALFUNCTION THRESHOLDS

### **P0110:**

Intake air temperature sensor voltage	Less than 0.18 V, or more than 4.91 V
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### **P0112:**

Intake air temperature sensor voltage	Less than 0.18 V
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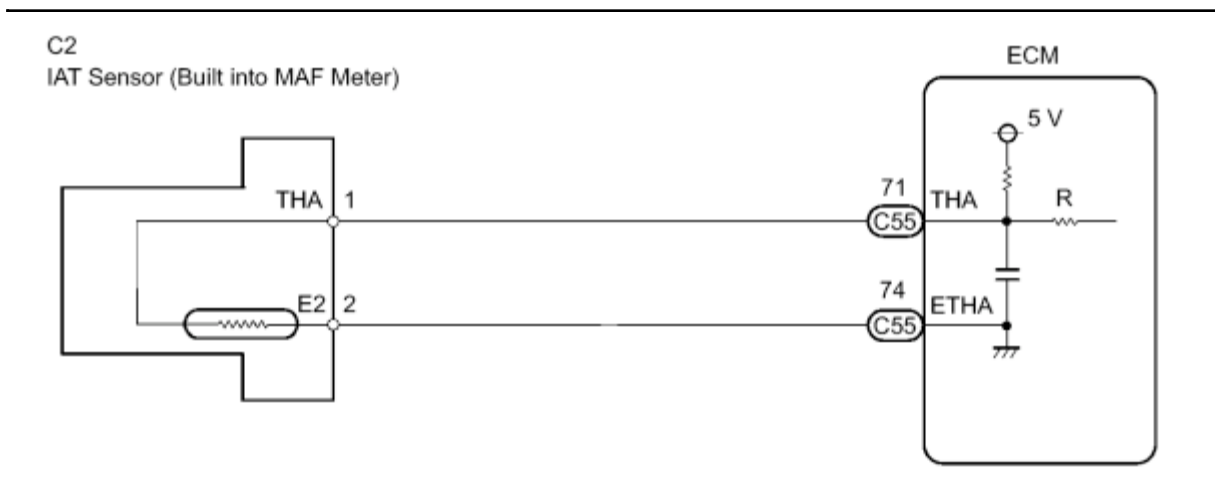
**P0113:**

Intake air temperature sensor voltage	More than 4.91 V
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**COMPONENT OPERATING RANGE**

Intake air temperature sensor resistance	98.5 $\Omega$ to 156 k $\Omega$ [-40 to 140°C (-40 to 284°F)]
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**WIRING DIAGRAM**



**INSPECTION PROCEDURE**

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 INFO.

**PROCEDURE**

<b>1.</b>	<b>CHECK DTC OUTPUT</b>
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- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch on (IG).

- (c) Turn the intelligent tester on.
- (d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
- (e) Read the DTCs.

Result:

DISPLAY (DTC OUTPUT)	PROCEED TO
P0110	A
P0112	B
P0113	C

**C** ▶ CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)

**B** ▶ CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER- ECM)

**A**



<b>2.</b>	<b>READ VALUE USING INTAKE AIR TEMPERATURE SENSOR (INTAKE AIR)</b>
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- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch on (IG).
- (c) Turn the tester on.
- (d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
- (e) Read the value displayed on the tester.

Standard:

Same as actual Intake Air Temperature (IAT).

Result:

TEMPERATURE DISPLAYED	PROCEED TO
-40°C (-40°F)	A
140°C (284°F) or higher	B
Same as actual IAT	C

