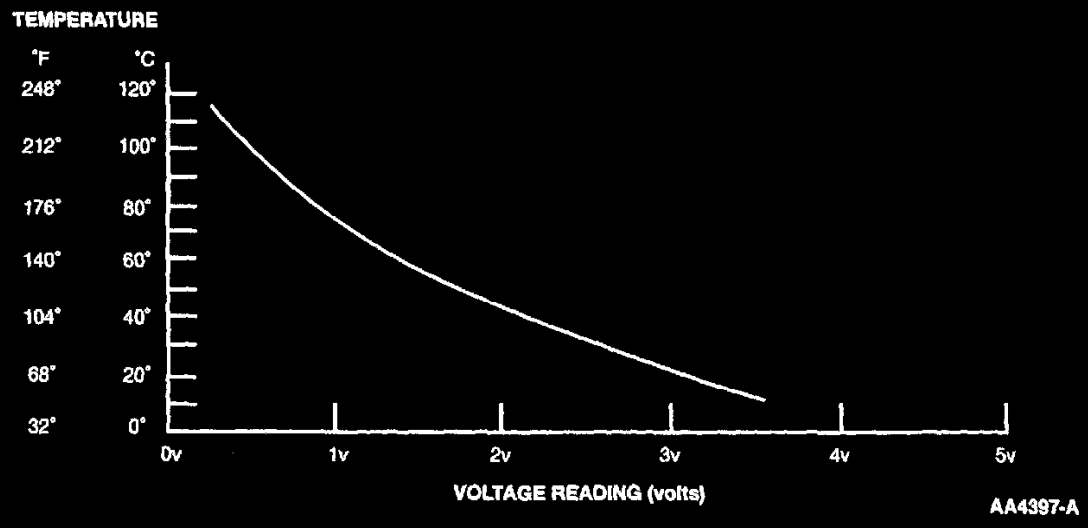
Computers and Control Systems: Pinpoint Tests
Test DA: Intake Air Temperature (IAT) Sensor
PINPOINT TEST DA: INTAKE AIR TEMPERATURE (IAT) SENSOR

Intake Air Temperature (IAT) Sensor	DA

This pinpoint test is intended to diagnose the following:

- integrated mass air flow/intake air temperature (MAF/IAT) sensor (12B579)
- harness circuits: IAT and SIGRTN
- powertrain control module (PCM) (12A650)

Voltage values calculated for VREF equal 5 volts. These values can vary by 15% due to sensor and VREF variations.



TEMPERATURE SENSOR VOLTAGE AND RESISTANCE SPECIFICATIONS

Temperature		Temperature Sensor Values	
°C	°F	Voltage	Resistance (K ohms)
120	248	0.28	1.18
110	230	0.36	1.55
100	212	0.47	2.07
90	194	0.61	2.80
80	176	0.80	3.84
70	158	1.05	5.37
60	140	1.37	7.70
50	122	1.77	10.97
40	104	2.23	16.15
30	86	2.74	24.27
20	68	3.26	37.30

(Continued)

Description, Graph And Temperature Sensor Voltage And Resistance Specifications

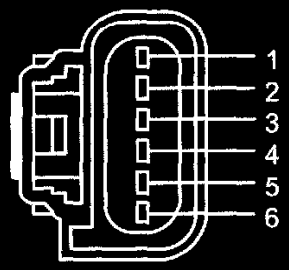
Intake Air Temperature (IAT) Sensor

DA

TEMPERATURE SENSOR VOLTAGE AND RESISTANCE SPECIFICATIONS

Temperature		Temperature Sensor Values	
°C	°F	Voltage	Resistance (K ohms)
10	50	3.73	58.75
0	32	4.14	95.85
-10	14	4.45	160.31

Mass Air Flow/Intake Air Temperature (MAF/IAT) Sensor Connector



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Pin	Circuit
4	MAF RTN (Mass Air Flow Return)
2	SIGRTN (Signal Return)
1	IAT (Intake Air Temperature)

Powertrain Control Module (PCM) Connector

For PCM connector views or reference values, refer to Reference Values.

Intake Air Temperature (IAT) Sensor — DA

Vehicle	Connector	Pin	Circuit
Crown Victoria, Grand Marquis, Town Car	170 Pin	T41 E22	SIGRTN IAT
Edge, MKX, Sable, Taurus, Taurus X	190 Pin	B58 B43	SIGRTN IAT
Escape/Mariner 3.0L	150 (50-50-50) Pin	B41 B20	SIGRTN IAT
Escape/Mariner 2.3L	150 (50-50-50) Pin	B41 B39	SIGRTN IAT
Expedition, Fusion, Milan, MKZ, Navigator	140 Pin	B58 B43	SIGRTN IAT
F-150, Mark LT	190 Pin	E58 E22	SIGRTN IAT
Focus	190 Pin	B58 B47	SIGRTN IAT
All other vehicles	170 Pin	E58 E22	SIGRTN IAT

Test Step	Results / Action to Take
DA1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)	
• **Are DTCs P0111, P0112, P0113, P0114, or P1112 present?**	**Yes** For DTC P0111, GO to **DA12**. For KOEO and KOER DTC P0112, GO to **DA6**. For KOEO and KOER DTC P0113, GO to **DA2**. For continuous memory DTCs P0112, P0113 or P1112, GO to **DA9**. For DTC P0114, GO to **DA9**. **No** For all others, GO to DTC Index, Diagnostic Trouble Code (DTC) Charts and Descriptions.

Intake Air Temperature (IAT) Sensor — DA

Test Step	Results / Action to Take
DA2 DTC P0113: CHECK THE IAT SIGNAL CIRCUIT **Note:** The DTC indicates the sensor signal is greater than the self-test maximum. • MAF/IAT Sensor connector disconnected. • Key ON, engine OFF. • Measure the voltage between: (+) MAF/IAT Sensor Connector, Harness Side: IAT - Pin 1; (-): Ground • **Is the voltage between 4.5 - 5.5 V?**	**Yes** GO to **DA3**. **No** GO to **DA4**.
DA3 CHECK THE IAT SENSOR RESISTANCE • Key in OFF position. • Measure the resistance between: (+) MAF/IAT Sensor Connector, Component Side: IAT - Pin 1; (-) MAF/IAT Sensor Connector, Component Side: SIGRTN - Pin 2 • **Is the resistance between 1K - 500K ohms?**	**Yes** GO to **DA4**. **No** INSTALL a new MAF/IAT sensor. CLEAR the DTCs. REPEAT the self-test.
DA4 CHECK THE SIGNAL AND SIGRTN CIRCUITS FOR AN OPEN IN THE HARNESS • PCM connector disconnected. • Measure the resistance between: (+) MAF/IAT Sensor Connector, Harness Side: IAT - Pin 1; (-) PCM Connector, Harness Side: IAT (+) MAF/IAT Sensor Connector, Harness Side: SIGRTN - Pin 2; (-) PCM Connector, Harness Side: SIGRTN • **Are the resistances less than 5 ohms?**	**Yes** GO to **DA5**. **No** REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.
DA5 CHECK THE SIGNAL FOR A SHORT TO VOLTAGE IN HARNESS • Key in OFF position. • PCM connector disconnected. • Key ON, engine OFF. • Measure the voltage between: (+) MAF/IAT Sensor Connector, Harness Side: IAT - Pin 1; (-): Ground • **Is the voltage greater than 1 V?**	**Yes** REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test. **No** GO to **DA14**.

Intake Air Temperature (IAT) Sensor — DA

Test Step	Results / Action to Take
DA6 **DTC P0112: SIMULATE AN OPPOSITE SIGNAL TO THE PCM** **Note:** The DTC indicates the sensor signal is less than the self-test minimum. • MAF/IAT Sensor connector disconnected. • Key ON, engine OFF. • Access the PCM and monitor the IAT PID. • **Is the voltage greater than 4.2 V?**	**Yes** INSTALL a new MAF/IAT sensor. CLEAR the DTCs. REPEAT the self-test. **No** GO to **DA7**.
DA7 **CHECK THE IAT CIRCUIT FOR A SHORT TO MAF RTN** • Key in OFF position. • PCM connector disconnected. • Measure the resistance between: (+) MAF/IAT Sensor Connector, Harness Side: IAT - Pin 1 (-) MAF/IAT Sensor Connector, Harness Side: MAF RTN - Pin 4 • **Is the resistance less than 5 ohms?**	**Yes** REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test. **No** GO to **DA8**.
DA8 **CHECK THE IAT CIRCUIT FOR A SHORT TO GROUND** • PCM connector disconnected. • Measure the resistance between: (+) PCM Connector, Harness Side: IAT (-) PCM Connector, Harness Side: SIGRTN • Measure the resistance between: (+) PCM Connector, Harness Side: IAT (-) 12 Volt Vehicle Battery: Negative terminal • **Is the resistance greater than 10K ohms?**	**Yes** GO to **DA14**. **No** REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

Intake Air Temperature (IAT) Sensor — DA

Test Step		Results / Action to Take
DA9	**SELF-TEST DTCS P0112, P0113, P0114 OR P1112: INTERMITTENT CHECK**	
	• Key ON, engine OFF. • Access the PCM and monitor the IAT PID. • While observing the PID, carry out the following: — Tap on the sensor to simulate road shock — Wiggle the sensor connector • **Is there a large change in the voltage reading?**	**Yes** DISCONNECT and INSPECT the connector. If OK, INSTALL a new MAF/IAT sensor. CLEAR the DTCs. REPEAT the self-test. **No** GO to **DA10**.
DA10	**CHECK THE ELECTRONIC ENGINE CONTROL (EEC) WIRING HARNESS**	
	• Access the PCM and monitor the IAT PID. • While observing the PID, wiggle, shake, and bend small sections of the wiring harness while working from the sensor to the PCM. • **Is there a large change in the voltage reading?**	**Yes** ISOLATE the concern. REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test. **No** GO to **DA11**.
DA11	**CHECK THE PCM AND VEHICLE HARNESS CONNECTORS**	
	• Key in OFF position. • PCM connector disconnected. • MAF/IAT Sensor connector disconnected. • **Are the connectors and terminals OK?**	**Yes** The concern is not present at this time. DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to DTC Index, Diagnostic Trouble Code (DTC) Charts and Descriptions. **No** REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.

Intake Air Temperature (IAT) Sensor — DA

Test Step		Results / Action to Take
DA12	**DTC P0111: CHECK THE RESISTANCE OF THE IAT SENSOR WITH THE ENGINE OFF**	
	Note: Verify the engine temperature is at ambient temperature before continuing with this test. • Key in OFF position. • IAT Sensor connector disconnected. • Measure the resistance between: (+) IAT Sensor Connector, Component Side: IAT (-) IAT Sensor Connector, Component Side: SIGRTN • Refer to the chart at the beginning of this test for the resistance specifications. • **Is the resistance within specification?**	**Yes** GO to **DA13**. **No** INSTALL a new IAT sensor. CLEAR the DTCs. REPEAT the self-test.
DA13	**DTC P0111: CHECK THE RESISTANCE OF THE IAT SENSOR**	
	Note: Verify the engine is at operating temperature before taking the IAT reading. • IAT Sensor connector connected. • Run the engine until the engine temperature stabilizes. • Key in OFF position. • IAT Sensor connector disconnected. • Measure the resistance between: (+) IAT Sensor Connector, Component Side: IAT (-) IAT Sensor Connector, Component Side: SIGRTN • Refer to the chart at the beginning of this test for the resistance specifications. • **Is the resistance within specification?**	**Yes** The concern is not present at this time. CARRY OUT the OBD drive cycle to determine if fuel, HO2S, catalyst and misfire monitors can be executed. REFER to Diagnostic Methods, On Board Diagnostic (OBD) Drive Cycle. REPEAT the PCM self-test if necessary. **No** INSTALL a new IAT sensor. CLEAR the DTCs. REPEAT the self-test.
DA14	**CHECK FOR CORRECT PCM OPERATION**	
	• Disconnect all the PCM connectors. • Visually inspect for: — pushed out pins — corrosion • Connect all the PCM connectors and make sure they seat correctly. • Carry out the PCM self-test and verify the concern is still present. • **Is the concern still present?**	**Yes** INSTALL a new PCM. REFER to Diagnostic Methods, Flash Electrically Erasable Programmable Read Only Memory (EEPROM), Programming the VID Block for a Replacement PCM. **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.