Computers and Control Systems: Pinpoint Tests
Test DM: Manifold Absolute Pressure (MAP) Sensor
PINPOINT TEST DM: MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

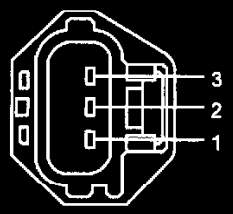
Manifold Absolute Pressure (MAP) Sensor	DM

This pinpoint test is intended to diagnose the following:

- Manifold Absolute Pressure (MAP) Sensor (9F479).
- Harness Circuits: MAP, SIGRTN, VREF.
- Powertrain control module (PCM) (12A650).

Manifold Absolute Pressure (MAP) Sensor Connector

A



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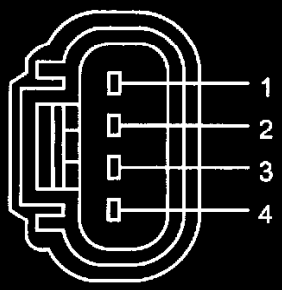

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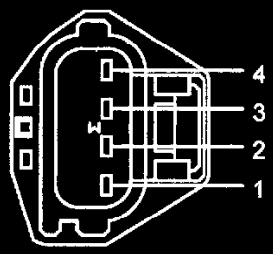

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Note, Connector

Manifold Absolute Pressure (MAP) Sensor

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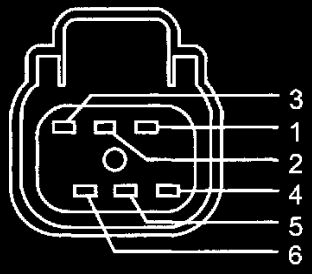
Vehicle	Connector	Circuit	Pin
Escape 3.0L	A	MAP SIGRTN VREF	2 3 1
Ford GT	B	MAP SIGRTN VREF	1 4 2
Ranger	C	MAP SIGRTN VREF	4 1 3
All other vehicles	C	MAP SIGRTN VREF	1 4 2

EGR System Module (ESM) Connector



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Circuit	Pin
VPWR (Power Supply)	4
MAP (Manifold Absolute Pressure)	3
SIGRTN (Signal return)	6
VREF (Reference Voltage)	2

Powertrain Control Module (PCM) Connector

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

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Vehicle	Connector	Circuit	Pin
Aviator	150 (60-32-58) Pin	SIGRTN MAP	E17 E59
E-Series, F-Super Duty	170 Pin	SIGRTN MAP	E58 E62
Focus 2.0L	150 (50-50-50) Pin	SIGRTN MAP	E41 E32
Freestar/Monterey	104 Pin	SIGRTN MAP	91 9
Ford GT	104 Pin	SIGRTN MAP	91 10
LS, Thunderbird	150 (60-32-58) Pin	SIGRTN MAP	E17 E23
Mustang	170 Pin	SIGRTN MAP	E33 E62
Ranger	104 Pin	SIGRTN MAP	91 63
All other vehicles	150 (50-50-50) Pin	SIGRTN MAP	E41 E23

Test Step		Results / Action to Take
DM1	**MONITOR THE MAP_V PID**	
• Key on engine running. • Carry out KOER self-test. • Access the PCM and monitor the MAP_V PID. • **Is the voltage between 0.05 V - 4.95 V?**		**Yes** VERIFY the PCM is at the latest calibration level. REPROGRAM if necessary. Otherwise, the fault is not present at this time. **No** Key in OFF position. GO to **DM2.**
DM2	**VERIFY HARNESS AND CONNECTOR INTEGRITY**	
• ESM connector disconnected. • Carry out a thorough visual inspection of the connector, pins and wires attaching to the pins. • ESM connector connected. • **Are there any concerns with the wiring or the ESM connection?**		**Yes** REPAIR as necessary. **No** GO to **DM3.**
DM3	**MONITOR THE MAP_V PID**	
• Key in ON position. • Access the PCM and monitor the MAP_V PID. • **Is the voltage between 0.05 V - 4.95 V?**		**Yes** The fault is not present at this time **No** GO to **DM4.**

Chart, DM1-DM3

Manifold Absolute Pressure (MAP) Sensor

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Test Step	Results / Action to Take
DM4 **DETERMINE THE PRESENT MAP_V PID VOLTAGE** • Access the PCM and monitor the MAP_V PID. • **Is the voltage less than 0.05 V?**	**Yes** GO to **DM5**. **No** GO to **DM8**.
DM5 **KOEO AND KOER DTC P0107: CHECK THE VOLTAGE BETWEEN THE VREF AND SIGRTN AT THE ESM SENSOR** • ESM connector disconnected. • Key in ON position. • Measure the voltage between: (+) ESM Connector, Harness Side: VREF - Pin 2 (-) ESM Connector, Harness Side: SIGRTN - Pin 6 • **Is the voltage between 4 V - 5.5 V?**	**Yes** Key in OFF position. GO to **DM6**. **No** Key in OFF position. GO to **C1**.
DM6 **CHECK THE MAP CIRCUIT FOR A SHORT TO SIGRTN AND GND IN THE HARNESS** • PCM connector disconnected. • Measure the resistance between: (+) ESM Connector, Harness Side: MAP - Pin 3 (-): Ground • Measure the resistance between: (+) ESM Connector, Harness Side: MAP - Pin 3 (-) ESM Connector, Harness Side: SIGRTN - Pin 6 • **Is the resistance greater than 10K ohms?**	**Yes** GO to **DM7**. **No** REPAIR the short circuit.
DM7 **INDUCE THE OPPOSITE MAP SENSOR VOLTAGE TO SIMULATE HIGH CONDITION** • PCM connector connected. • Connect a 5 amp fused jumper wire between the following: Point A ESM Connector, Harness Side: MAP - Pin 3 Point B ESM Connector, Harness Side: VREF - Pin 2 • Key in ON position. • Access the PCM and monitor the MAP_V PID. • **Is the voltage greater than 4.6 V?**	**Yes** Key in OFF position. INSTALL a new ESM. CLEAR the DTCs and REPEAT the self-test. **No** Key in OFF position. INSTALL a new PCM. REFER to Diagnostic Methods, Flash Electrically Erasable Programmable Read Only Memory (EEPROM).

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Test Step		Results / Action to Take
DM8	**KOEO AND KOER DTC P0108: CHECK THE VOLTAGE BETWEEN THE VREF AND SIGRTN AT THE ESM SENSOR**	
	• ESM connector disconnected. • Key in ON position. • Measure the voltage between: (+) ESM Connector, Harness Side: VREF - Pin 2 (-) ESM Connector, Harness Side: SIGRTN - Pin 6 • **Is the voltage between 4 V - 5.5 V?**	**Yes** Key in OFF position. GO to **DM9.** **No** Key in OFF position. GO to **C1.**
DM9	**CHECK THE MAP AND SIGRTN CIRCUIT(S) FOR AN OPEN IN THE HARNESS**	
	• PCM connector disconnected. • Measure the resistance between: (+) PCM Connector, Harness Side: MAP (-) ESM Connector, Harness Side: MAP - Pin 3 (+) PCM Connector, Harness Side: SIGRTN (-) ESM Connector, Harness Side: SIGRTN - Pin 6 • **Are the resistances less than 5 ohms?**	**Yes** GO to **DM10.** **No** REPAIR the open circuit.
DM10	**CHECK THE MAP CIRCUIT FOR A SHORT TO VREF IN THE HARNESS**	
	• Measure the resistance between: (+) ESM Connector, Harness Side: MAP - Pin 3 (-) ESM Connector, Harness Side: VREF - Pin 2 • **Is the resistance greater than 10K ohms?**	**Yes** GO to **DM11.** **No** REPAIR the short circuit.
DM11	**CHECK THE MAP CIRCUIT FOR A SHORT TO VPWR IN THE HARNESS**	
	• Measure the resistance between: (+) ESM Connector, Harness Side: MAP - Pin 3 (-) ESM Connector, Harness Side: VPWR - Pin 4 • **Is the resistance greater than 10K ohms?**	**Yes** GO to **DM12.** **No** REPAIR the short circuit.

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Test Step	Results / Action to Take
DM12 INDUCE THE OPPOSITE MAP SENSOR VOLTAGE TO SIMULATE LOW CONDITION • PCM connector connected. • Connect a 5 amp fused jumper wire between the following: Point A ESM Connector, Harness Side: MAP - Pin 3 Point B ESM Connector, Harness Side: SIGRTN - Pin 6 • Key in ON position. • Access the PCM and monitor the MAP_V PID. • **Is the voltage less than 0.1 V?**	**Yes** Key in OFF position. INSTALL a new ESM. CLEAR the DTCs and REPEAT the self-test. **No** Key in OFF position. INSTALL a new PCM. REFER to Diagnostic Methods, Flash Electrically Erasable Programmable Read Only Memory (EEPROM).
DM13 DTCS P0107, P0108 AND P0109: CHECK THE MAP CIRCUIT(S) FOR INTERMITTENT CONCERNS • Key in ON position. • Access the PCM and monitor the MAP_V PID. • Carry out a thorough wiggle test on the ESM harness. Lightly tap on the ESM to simulate road shock. • **Does a sudden change in voltage occur while monitoring the PID.**	**Yes** ISOLATE the fault. REPAIR as necessary. **No** Key in OFF position. Unable to duplicate or identify the fault at this time. GO to **Z1**.
DM14 DTC P0106: MAP RANGE/PERFORMANCE **Note:** If MAP DTC(s) P0107, P0108 or P0109 are present, diagnose those DTC(s) first. If any Mass Air Flow (MAF) sensor related DTCs are present, diagnose those DTCs prior to diagnosing MAP DTC P0106. Disregard any DTC(s) generated as a result of this test. • Key in OFF position. • ESM connector disconnected. • Connect a 5 amp fused jumper wire between the following: Point A ESM Connector, Harness Side: VREF - Pin 2; SIGRTN - Pin 6 Point B ESM Connector, Component Side: VREF - Pin 2; SIGRTN - Pin 6 • Key on engine running. • Measure the voltage between: (+) ESM Connector, Component Side: MAP - Pin 3 (-) Vehicle Battery: Negative terminal • **Is the voltage between 1 V - 2 V?**	**Yes** Record the actual MAP voltage values at KOEO, idle, 1,000 and 2,000 RPM. You will use the values for comparison in the following test step. GO to **DM15**. **No** Key in OFF position. CHECK the MAP circuit in ESM harness for open and short circuits.

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Test Step		Results / Action to Take
DM15	**COMPARE ACTUAL MAP VOLTAGE TO MAP_V PID VOLTAGE**	
	• Key in ON position. • Access the PCM and monitor the MAP_V PID. • Note the MAP_V PID voltage. • Key on engine running. • Note the MAP_V PID voltage. • Increase engine speed to 1,000 RPM. Note the MAP_V PID voltage. • Increase engine speed to 2,000 RPM. Note the MAP_V PID voltage. • **Does the MAP_V PID voltage stay within 0.5 volt of the actual MAP voltage?**	**Yes** The fault is not present at this time. CLEAR the DTCs and REPEAT the self-test. **No** INSTALL a new ESM. CLEAR the DTCs and REPEAT the self-test.
DM16	**KOEO AND KOER DTCS P0106, P0107 AND P0108: CHECK THE VOLTAGE BETWEEN VREF AND SIGRTN AT THE MAP SENSOR**	
	• MAP Sensor connector disconnected. • Key in ON position. • Measure the voltage between: **(+) MAP Sensor Connector, Harness Side**: VREF **(-) MAP Sensor Connector, Harness Side**: SIGRTN • **Is the voltage between 4.5 V - 5.5 V?**	**Yes** GO to **DM18.** **No** GO to **DM17.**
DM17	**CHECK FOR VREF VOLTAGE AT SENSOR**	
	• Measure the voltage between: **(+) MAP Sensor Connector, Harness Side**: VREF **(-) Vehicle Battery**: Negative terminal • **Is the voltage between 4.5 V - 5.5 V?**	**Yes** Key in OFF position. REPAIR open SIGRTN circuit. **No** Key in OFF position. GO to **C1.**
DM18	**CHECK MAP SIGNAL VOLTAGE AT SENSOR**	
	• Measure the voltage between: **(+) MAP Sensor Connector, Harness Side**: MAP **(-) MAP Sensor Connector, Harness Side**: SIGRTN • **Is the voltage between 4.5 V - 5.5 V?**	**Yes** GO to **DM19.** **No** Key in OFF position. GO to **DM20.**

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Test Step	Results / Action to Take
DM19 INDUCE OPPOSITE SIGNAL • Connect a 5 amp fused jumper wire between the following: **Point A MAP Sensor Connector, Harness Side**: MAP **Point B MAP Sensor Connector, Harness Side**: SIGRTN • Access the PCM and monitor the MAP_V PID. • **Is the voltage less than 0.1 V?**	**Yes** INSTALL a new MAP sensor. CLEAR the DTCs and REPEAT the self-test. **No** Key in OFF position. GO to **DM21.**
DM20 CHECK THE MAP CIRCUIT(S) FOR AN OPEN IN THE HARNESS • PCM connector disconnected. • Measure the resistance between: **(+) MAP Sensor Connector, Harness Side**: MAP **(-) MAP Sensor Connector, Harness Side**: MAP • **Is the resistance less than 5 ohms?**	**Yes** GO to **DM21.** **No** REPAIR the open circuit.
DM21 CHECK THE MAP CIRCUIT FOR A SHORT TO VREF OR SIGRTN IN THE HARNESS • PCM connector disconnected. • Measure the resistance between: **(+) MAP Sensor Connector, Harness Side**: MAP **(-) MAP Sensor Connector, Harness Side**: VREF MAP: SIGRTN • **Are the resistances greater than 10K ohms?**	**Yes** Key in OFF position. INSTALL a new PCM. REFER to Diagnostic Methods, Flash Electrically Erasable Programmable Read Only Memory (EEPROM). **No** REPAIR the short circuit.
DM22 DTCS P0107, P0108 AND P0109: CHECK THE MAP CIRCUIT(S) FOR INTERMITTENT CONCERNS • Key in ON position. • Access the PCM and monitor the MAP_V PID. • Carry out a thorough wiggle test on the MAP harness. Lightly tap on the MAP to simulate road shock. • **Did a sudden change in voltage occur while monitoring the PID?**	**Yes** GO to **DM16.** **No** Key in OFF position. Unable to duplicate or identify the fault at this time. GO to **Z1.**