DV: Throttle Body Assembly Electronic Throttle Control (ETC)

DV: Introduction

DV1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Note: Diagnose and repair ETBTPS circuit DTCs before addressing DTC P0068.

Are DTCs P0068, P0121, P0122, P0123, P0221, P0222, P0223, P1124, P2100, P2101, P2107, P2111, P2112, or P2135 present?

Yes	No
For DTC P0068, GO to DV18. For DTCs P0121, P0122, P0123, P0221, P0222, P0223, P2101, P2111, or P2112, GO to DV3. For DTC P1124, GO to DV2. For DTC P2100, GO to DV25. For DTC P2107, GO to DV24. For Fusion and Milan with DTC P2135, GO to DV7. For Escape/Mariner with DTC P2135, GO to DV12. For F-150 4.6L 3V with DTC P2135, GO to DV8. For all others with DTC P2135, GO to DV11.	For all others, GO to Section 4, Diagnostic Trouble Code (DTC) Charts and Descriptions.

DV2 DTC P1124: REPEAT THE KOEO OR KOER SELF-TEST

Note: Make sure the accelerator pedal is not applied during the KOEO and KOER self-tests.

- Ignition ON, engine OFF.
- Carry out the PCM self-test.

Are any DTCs present other than P1124?

Yes	No
DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to Section 4, Diagnostic Trouble Code (DTC) Charts and Descriptions.	GO to DV3.

DV3 CHECK THE THROTTLE POSITION (TP) OPEN AND CLOSED VOLTAGES

Note: Certain failure mode effects management (FMEM) operating strategies maintain limited vehicle function in the event of a PCM, harness, or component concern and may prevent the throttle plate from

opening. If the throttle plate does not open, follow the NO answer.

- Ignition ON, engine OFF.
- Access the PCM and monitor the TP1 (VOLT) and TP2 (VOLT) PIDs.
- Press the accelerator pedal to the floor and release.

Electronic Throttle Control Throttle Position Sensor Signal Voltages

Accelerator Pedal Position	TP1	TP2
Pedal fully released	3.7 - 4.7	0.3 - 1.9
Pedal fully applied	0.7 - 2.9	4.1 - 4.7

Are both PIDs within the chart ranges?

Yes	No
For DTCs P1124, P2111 or P2112, GO to DV4 . For all others, GO to DV23 .	For DTCs P1124, P2111 or P2112, GO to DV4 . For all others, GO to DV5 .

DV4 CHECK FOR OBSTRUCTION OF THE THROTTLE BODY

WARNING: SUBSTANTIAL OPENING AND CLOSING TORQUE IS APPLIED BY THIS SYSTEM. TO PREVENT INJURY, BE CAREFUL TO KEEP FINGERS AWAY FROM THROTTLE MECHANISM WHEN ACTUATED. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

- Ignition OFF.
- Remove the inlet tube from the throttle body.
- Visually inspect for throttle plate obstructions or engine deposits.
- Slowly, push the throttle plate to wide open and release.

Is the throttle plate free of any visible obstruction or debris?

Yes	No
GO to DV5 .	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.

DV5 CHECK THE VREF VOLTAGE TO TP

Note: In the following measurement please take note of the polarity of the probes.

- ETBTPS connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) ETBTPS Connector, Harness Side	(-) ETBTPS Connector, Harness Side
ETCREF	ETCRTN

Is the voltage between 4 - 6 V?

Yes	No
GO to DV6 .	GO to Pinpoint Test C .

DV6 DTCS P2101 OR P2107: CHECK FOR DTCS

- Ignition OFF.
- ETBTPS connector connected.
- Ignition ON, engine OFF.
- Carry out the PCM self-test.

Are DTCs P2101 or P2107 present?

Yes	No
GO to DV15 .	For Fusion, and Milan, GO to DV7 . For F-150 4.6L 3V, GO to DV8 . For Escape / Mariner, GO to DV12 . For all others, GO to DV9 .

DV7 FUSION, MILAN: CHECK THE RESISTANCE OF THE ETBTPS

Note: Do not move the throttle plate during the resistance measurement. Measure the sensor resistance with the throttle plate at the default position.

- Ignition OFF.
- ETBTPS connector disconnected.
- For Fusion 2.3L and Milan 2.3L, measure the resistance between:

(+) ETBTPS Connector, Component Side	(-) ETBTPS Connector, Component Side	Minimum Resistance (ohms)	Maximum Resistance (ohms)
ETCREF	ETCRTN	2,000	4,000

- For Fusion 3.0L and Milan 3.0L, measure the resistance between:

(+) ETBTPS Connector, Component Side	(-) ETBTPS Connector, Component Side	Minimum Resistance (ohms)	Maximum Resistance (ohms)
TP1	ETCREF	380	987
TP1	ETCRTN	665	1,890
TP2	ETCREF	608	1,932
TP2	ETCRTN	390	1,187
ETCREF	ETCRTN	475	1,365

Are all the resistances within specifications?

Yes	No
GO to DV14 .	INSTALL a new ETB. REFER to the Workshop Manual Section 303-04, Fuel Charging and Controls to INSTALL a new throttle body.

	Clear the PCM DTCs. REPEAT the self-test.

DV8 F-150 4.6L 3V: CHECK THE RESISTANCE OF THE ETBTPS

Note: Do not move the throttle plate during the resistance measurement. Measure the sensor resistance with the throttle plate at the default position.

- Ignition OFF.
- ETBTPS connector disconnected.
- Measure the resistance between:

(+) ETBTPS Connector, Component Side	(-) ETBTPS Connector, Component Side
TP1	ETCREF
TP1	ETCRTN
TP2	ETCREF
TP2	ETCRTN

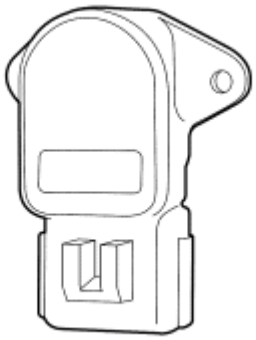
Are the resistances between 10 - 200 ohms?

Yes	No
GO to DV14 .	INSTALL a new ETB. REFER to the Workshop Manual Section 303-04, Fuel Charging and Controls to INSTALL a new throttle body. Clear the PCM DTCs. REPEAT the self-test.

DV9 DETERMINE THE TYPE OF ETBTPS ON THE VEHICLE

Note: There are 2 types of ETBTPS available for the vehicle. Compare the sensor housing of the ETBTPS on the vehicle to the illustrations. The illustrations for the 4-pin Type II ETBTPS and 6-pin Type II ETBTPS are in this step. The illustrations for the 4-pin Type III ETBTPS and 6-pin Type III ETBTPS are in the next step.

- Ignition OFF.
- Determine if the vehicle is equipped with one of the Type II ETBTPS shown below.



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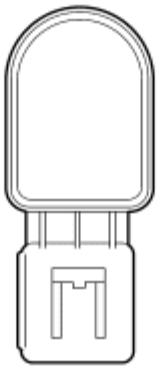


N0027692

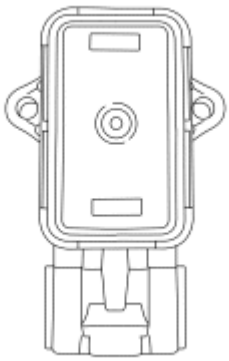
Is the vehicle equipped with a Type II ETBTPS?

Yes	No
GO to DV11 .	GO to DV10 .

DV10 CHECK FOR A TYPE III ETBTPS

Note: There are 2 types of ETBTPS available for the vehicle. Compare the sensor housing of the ETBTPS on the vehicle to the illustrations. The illustrations for the 4-pin Type III ETBTPS and 6-pin Type III ETBTPS are in this step. The illustrations for the 4-pin Type II ETBTPS and 6-pin Type II ETBTPS are in the previous step.

- Determine if the vehicle is equipped with one of the Type III ETBTPS shown below.



N0073243

N0073242

Is the vehicle equipped with a Type III ETBTPS?

Yes	No
GO to DV12 .	GO to DV9 .

DV11 CHECK THE RESISTANCE OF TYPE II ETBTPS

Note: Do not move the throttle plate during the resistance measurement. Measure the sensor resistance with the throttle plate at the default position.

- ETBTPS connector disconnected.
- Measure the resistance between:

(+) ETBTPS Connector, Component Side	(-) ETBTPS Connector, Component Side	Minimum Resistance (ohms)	Maximum Resistance (ohms)
TP1	ETCREF	700	1,800
TP1	ETCRTN	1,300	2,800
TP2	ETCREF	1,000	2,400
TP2	ETCRTN	500	1,500
ETCREF	ETCRTN	700	2,100

Are all the resistances within the specifications?

Yes	No
GO to DV14 .	For E-Series 4.6L, Edge, F-150 4.6L, Flex, Focus, MKS, MKX, MKZ, Sable, Taurus, and Taurus X, INSTALL a new ETB. REFER to the Workshop Manual Section 303-04, Fuel Charging and Controls to INSTALL a new throttle body. Clear the PCM DTCs. REPEAT the self-test. For all others, INSTALL a new ETBTPS. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls to INSTALL a new TP sensor. Clear the PCM DTCs. REPEAT the self-test.

DV12 CHECK THE RESISTANCE OF THE TYPE III ETBTPS

Note: Do not move the throttle plate during the resistance measurement. Measure the sensor resistance with the throttle plate at the default position.

- Ignition OFF.
- ETBTPS connector disconnected.
- Measure the resistance between:

(+) ETBTPS Connector, Component Side	(-) ETBTPS Connector, Component Side
TP1	ETCREF
TP2	ETCRTN

Are the resistances between 9K - 11K ohms?

Yes	No
GO to DV13 .	For E-Series 4.6L, Edge, F-150 4.6L, Flex, Focus, MKS, MKX, MKZ, Sable, Taurus, and Taurus X, INSTALL a new ETB. REFER to the Workshop Manual Section 303-04, Fuel Charging and Controls to INSTALL a new throttle body. Clear the PCM DTCs. REPEAT the self-test. For all others, INSTALL a new ETBTPS. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls to INSTALL a new TP sensor. Clear the PCM DTCs. REPEAT the self-test.

DV13 CHECK THE DIODE INTERNAL TO THE TYPE III ETBTPS

Note: Make sure the positive test lead is on the ETCRTN circuit to measure the forward bias of the diode.

- Select diode test on the digital multimeter (DMM).
- Measure the voltage between:

(+) ETBTPS Connector, Component Side	(-) ETBTPS Connector, Component Side
ETCRTN	TP1
ETCRTN	TP2

Are the voltages between 0.2 - 0.9 V?

Yes	No

GO to DV14 .	For E-Series 4.6L, Edge, F-150 4.6L, Flex, Focus, MKS, MKX, MKZ, Sable, Taurus, and Taurus X, INSTALL a new ETB. REFER to the Workshop Manual Section 303-04, Fuel Charging and Controls to INSTALL a new throttle body. Clear the PCM DTCs. REPEAT the self-test. For all others, INSTALL a new ETBTPS. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls to INSTALL a new TP sensor. Clear the PCM DTCs. REPEAT the self-test.

DV14 CHECK THE TP1 AND TP2 CIRCUITS FOR A SHORT TO VOLTAGE IN THE HARNESS

- PCM connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) ETBTPS Connector, Harness Side	(-)
TP1	Ground
TP2	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to DV15 .

DV15 CHECK THE TP1 AND TP2 CIRCUITS FOR AN OPEN OR CROSSED SENSOR WIRES IN THE HARNESS

- Ignition OFF.
- Measure the resistance between:

(+) ETBTPS Connector, Harness Side	(-) PCM Connector, Harness Side

TP1	TP1
TP2	TP2

Are the resistances less than 5 ohms?

Yes	No
For DTCs P2101 or P2107, GO to DV25 . For all others, GO to DV16 .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DV16 CHECK THE TP1 AND TP2 CIRCUITS FOR A SHORT TO GROUND IN THE HARNESS

- Measure the resistance between:

(+) ETBTPS Connector, Harness Side	(-) Vehicle Battery
TP1	Negative terminal
TP2	Negative terminal

Are the resistances greater than 10K ohms?

Yes	No
GO to DV17 .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DV17 CHECK THE TP CIRCUITS FOR A SHORT TOGETHER

- Measure the resistance between:

(+) ETBTPS Connector, Harness Side	(-) ETBTPS Connector, Harness Side
TP1	TP2
TP1	ETCREF
TP1	ETCRTN
TP2	ETCREF
TP2	ETCRTN

Are the resistances greater than 10K ohms?

Yes	No
GO to DV23 .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DV18 DTC P0068: CHECK FOR DTCS

- Carry out the PCM self-test.

Are DTCs P0121, P0122, P0123, P0221, P0222, P0223 or P2135 present?

Yes	No

For DTCs P0121, P0122, P0123, P0221, P0222, and P0223, GO to DV3. For Fusion and Milan with DTC P2135, GO to DV7. For Escape/Mariner with DTC P2135, GO to DV12. For F-150 4.6L 3V with DTC P2135, GO to DV8.	GO to DV19.

DV19 CHECK FOR INTAKE AIR LEAKS

- Check the intake air system for leaks.
- Listen for air noise around the mass air flow (MAF) sensor and throttle body while the engine is running.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to DV20.

DV20 CHECK FOR A TP2 SIGNAL HIGH VERSUS LOAD WHILE DRIVING THE VEHICLE

- ETBTPS connector connected.
- PCM connector connected.
- Ignition ON, engine running.
- Access the PCM and monitor the TP2 (VOLT) PID.
- Access the PCM and monitor the LOAD (PER) PID.
- Drive the vehicle while exercising the throttle and ETCTP sensor and accessing the PIDS.

Is the TP2 PID greater than 2.44 volts and the LOAD PID less than 30%?

Yes	No
GO to DC5.	GO to DV21.

DV21 CHECK FOR A TP2 SIGNAL LOW VERSUS LOAD WHILE DRIVING THE VEHICLE

- Ignition ON, engine running.
- Access the PCM and monitor the TP2 (VOLT) PID.
- Access the PCM and monitor the LOAD (PER) PID.
- Drive the vehicle while exercising the throttle and ETCTP sensor and accessing the PIDS.

Is the TP2 PID less than 0.24 volt and the LOAD PID greater than 55%?

Yes	No
GO to DV22.	GO to DV23.

DV22 CHECK FOR SELF-TEST DTCS

Note: After retrieving the continuous memory DTCs, diagnose any non-ETC related DTCs before continuing.

- Ignition ON, engine OFF.
- Clear the PCM DTCs.
- Drive the vehicle while exercising the throttle.
- Carry out the PCM self-test.

Are any DTCs present?

Yes	No
For continuous memory DTC P0068, CHECK the MAF sensor and connector for damage and corrosion. REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test. For all others, GO to DV23 .	Unable to duplicate or identify the concern at this time. GO to Pinpoint Test Z .

DV23 CHECK THE TP CIRCUITS FOR AN INTERMITTENT CONCERN

- ETBTPS connector connected.
- PCM connector connected.
- Access the PCM and monitor the TP1 (VOLT) and TP2 (VOLT) PIDs.
- Wiggle, shake, and bend the harness from the TP to the PCM.

Are the voltages between 0.49 - 4.65 V?

Yes	No
For DTCs P1124, P2111, or P2112, INSTALL a new ETB. REFER to the Workshop Manual Section 303-04, Fuel Charging and Controls to INSTALL a new throttle body. Clear the PCM DTCs. REPEAT the self-test. For E-Series 4.6L, Escape, Edge, F-150 4.6L, Flex, Focus, Fusion, Mariner, Milan, MKS, MKX, MKZ, Sable, Taurus, and Taurus X with DTC P2135, INSTALL a new ETB. REFER to the Workshop Manual Section 303-04, Fuel Charging and Controls to INSTALL a new throttle body. Clear the PCM DTCs. REPEAT the self-test. For all others with DTC P2135, INSTALL a new ETBTPS. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls to INSTALL a new TP sensor. Clear the PCM DTCs. REPEAT the self-test. For all others, GO to DV35 .	REPAIR as necessary. If DTC P2100 or P2101 is present, GO to DV25 .

DV24 DTC P2107: CHECK FOR OTHER SELF-TEST DTCS

Note: The DTC P2107 may set when a failure mode effects management (FMEM) action is taken. If the FMEM DTC P2110 is present with other DTCs, diagnose the other DTCs before diagnosing DTC P2110.

- Ignition ON, engine OFF.
- Carry out the PCM self-test.

Are any DTCs present other than P2107 and P2110?

Yes	No
DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to Section 4, Diagnostic Trouble Code (DTC) Charts and Descriptions .	For DTC P2110, GO to Section 4, Diagnostic Trouble Code (DTC) Charts and Descriptions and DIAGNOSE the DTC. For DTC P2107, GO to DV29 .

DV25 VISUALLY INSPECT THE ETB

Note: Make sure the ETB harness connector is properly connected.

- Ignition OFF.
- Inspect the ETB for damaged housing, harness connector, and harness.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to DV26 .

DV26 CHECK THE TACM FOR A SHORT OR OPEN

- ETBTACM connector disconnected.
- Measure the resistance between:

(+) ETBTACM Connector, Component Side	(-) ETBTACM Connector, Component Side
TACM+	TACM-

Is the resistance between 1 - 900 ohms?

Yes	No
GO to DV27 .	INSTALL a new ETB. REFER to the Workshop Manual Section 303-04, Fuel Charging and Controls to INSTALL a new throttle body. Clear the PCM DTCs. REPEAT the self-test.

DV27 CHECK THE TACM HARNESS FOR AN OPEN

- PCM connector disconnected.
- Measure the resistance between:

(+) ETBTACM Connector, Harness Side	(-) PCM Connector, Harness Side
TACM+	TACM+
TACM-	TACM-

Are the resistances less than 5 ohms?

Yes	No
GO to DV28 .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DV28 CHECK THE TACM+ AND TACM- CIRCUITS FOR A SHORT TO GROUND IN THE HARNESS

- Measure the resistance between:

(+) ETBTACM Connector, Harness Side	(-)
TACM+	Ground
TACM-	Ground

Are the resistances greater than 10K ohms?

Yes	No
GO to DV29 .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DV29 CHECK THE HARNESS FOR A SHORT TO GND, PWR, ETCREF, AND ETCRTN

- Measure the resistance between:

(+) ETBTACM Connector, Harness Side	(-) PCM Connector, Harness Side
TACM+	PWRGND
TACM+	VPWR
TACM+	ETCRTN
TACM+	ETCREF
TACM-	PWRGND
TACM-	ETCRTN
TACM-	VPWR
TACM-	ETCREF

Are the resistances greater than 10K ohms?

Yes	No
GO to DV30 .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DV30 CHECK FOR TACM HARNESS CIRCUITS SHORTED TOGETHER

- Measure the resistance between:

(+) ETBTACM Connector, Harness Side	(-) ETBTACM Connector, Harness Side
TACM+	TACM-

Is the resistance greater than 10K ohms?

Yes	No
For DTCs P2111 or P2112, GO to DV31 . For all others, GO to DV32 .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DV31 CHECK FOR AN INTERMITTENT CONCERN

- ETBTACM connector connected.
- PCM connector connected.
- Ignition ON, engine OFF.
- Access the PCM and monitor the TP1 (VOLT) and TP2 (VOLT) PIDs.
- Wiggle, shake, and bend the harness from the TP to the PCM.

Are the voltages between 0.49 - 4.65 V?

Yes	No
GO to DV32 .	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.

DV32 CHECK FOR SELF-TEST CODES

- ETBTACM connector connected.
- PCM connector connected.
- Ignition ON, engine OFF.
- Carry out the PCM self-test.

Is DTC P2101 present?

Yes	No
GO to DV33 .	GO to DV35 .

DV33 CHECK FOR PROPER TACM+ WIRING IN THE HARNESS CONNECTOR

- Ignition OFF.
- ETBTACM connector disconnected.
- PCM connector disconnected.
- Measure the resistance between:

(+) ETBTACM Connector, Harness Side	(-) PCM Connector, Harness Side
TACM+	TACM+

Is the resistance less than 5 ohms?

Yes	No
GO to DV34 .	REPAIR the open circuit. WIRE the TACM harness connector per the TACM and PCM connector diagrams. Clear the PCM DTCs. REPEAT the self-test.

DV34 CHECK FOR PROPER TACM- WIRING IN THE HARNESS CONNECTOR

- Measure the resistance between:

(+) ETBTACM Connector, Harness Side	(-) PCM Connector, Harness Side
TACM-	TACM-

Is the resistance less than 5 ohms?

Yes	No
GO to DV36 .	GO to DV35 .

DV35 CHECK THE REPAIR THROUGH PROCEDURE

- Ignition ON, engine OFF.
- Clear the PCM DTCs.
- Ignition ON, engine OFF.
- Cycle the accelerator pedal to the floor and back several times.
- Carry out the PCM self-test.

Are any ETC system related DTCs present?

Yes	No
GO to DV36 .	GO to Pinpoint Test Z .

DV36 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.
- Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.