Computers and Control Systems: Pinpoint Tests
Test DV: Throttle Body Assembly Electronic Throttle Control (ETC)
PINPOINT TEST DV: THROTTLE BODY ASSEMBLY ELECTRONIC THROTTLE CONTROL (ETC)

Throttle Body Assembly Electronic Throttle Control (ETC)	DV

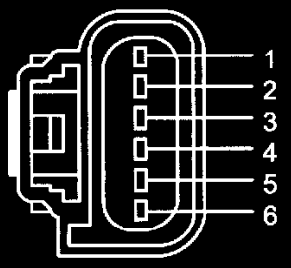
⚠ WARNING: Substantial opening and closing torque is applied by this system. To prevent injury, be careful to keep fingers away from throttle mechanism when actuated. Failure to follow these instructions may result in personal injury.

This pinpoint test is intended to diagnose the following:

- electronic throttle body (ETB) (9F991)
- harness circuits: ETCRTN, ETCREF, TP1, TP2, TACM+, and TACM-
- powertrain control module (PCM) (12A650)

Electronic Throttle Body Throttle Position Sensor (ETBTPS) Connector

A



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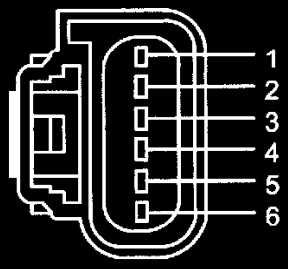

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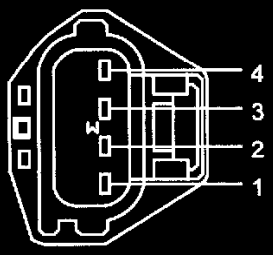

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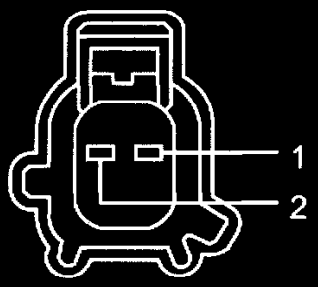
Warning And Electronic Throttle Body Throttle Position Sensor (ETBTPS) Connector

Throttle Body Assembly Electronic Throttle Control (ETC)

DV

Vehicle	Connector	Pin	Circuit
F-150 4.2L	A	5 6 4 1 2 3	TACM+ TACM- TP2 TP1 ETCRTN ETCREF
Five Hundred, Freestyle, Montego	B	1 2 6 3 4 5	TACM+ TACM- TP2 TP1 ETCRTN ETCREF
Fusion 2.3L, Milan 2.3L	B	1 2 4 6 3 5	TACM+ TACM- TP2 TP1 ETCRTN ETCREF
Fusion 3.0L, Milan 3.0L, Zephyr	B	2 1 6 3 4 5	TACM+ TACM- TP2 TP1 ETCRTN ETCREF
All other vehicles	C	1 4 3 2	TP2 TP1 ETCRTN ETCREF

Electronic Throttle Body Throttle Actuator Control Motor (ETBTACM) Connector



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Throttle Body Assembly Electronic Throttle Control (ETC)

DV

Pin	Circuit
2	TACM- (Throttle Actuator Control Motor -)
1	TACM+ (Throttle Actuator Control Motor +)

Powertrain Control Module (PCM) Connector

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

Vehicle	Connector	Pin	Circuit
E-Series 4.6L, E-Series 6.8L, E-Series 5.4L, F-Super Duty	170 Pin	B16, B4, E66 B18, B6, E59 B35 B47 E51 E34 E60 E61	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
Expedition, F-150, Mark LT, Navigator	190 Pin	B21, B28, E66 B58, B59, E59 B51 B67 E51 E34 E60 E61	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
Explorer, Mountaineer, Mustang	170 Pin	B24, B4, E66 B43, B6, E59 B35 B47 E51 E34 E60 E61	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
Fusion, Milan, Zephyr	140 Pin	B21, B28, E66 B59, B60, E59 B51 B67 E51 E34 E60 E61	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1

(Continued)

Electronic Throttle Body Throttle Actuator Control Motor (ETBTACM) Connector And Powertrain Control Module (PCM) Connector

Throttle Body Assembly Electronic Throttle Control (ETC)

DV

Vehicle	Connector	Pin	Circuit
LS	150 (60-32-58) Pin	B20, B23, E24 B17, B5, E15 B32 B24 E27 E35 E57 E32	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
All other vehicles	150 (50-50-50) Pin	B24, B4, E18 B41, B6, E7 B35 B47 E48 E47 E29 E19	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1

Test Step	Results / Action to Take
DV1 CHECK FOR DTCS	
• **Are DTCs P0068, P0121, P0122, P0123, P0221, P0222, P0223, P2100, P2101, P2107, P2111, P2112, or P2135 present?**	**Yes** For DTC P0068, GO to **DV14**. For DTCs P0121, P0122, P0123, P0221, P0222, P0223, P2111, or P2112, GO to **DV2**. For DTCs P2100 or P2107, GO to **DV20**. For DTC P2101, GO to **DV26**. For Fusion, Milan, and Zephyr with DTC P2135, GO to **DV5**. For all others with DTC P2135, GO to **DV6**. **No** For all others, GO to DTC Charts, Diagnostic Trouble Code (DTC) Charts and Descriptions.
DV2 CHECK THE TP OPEN AND CLOSED VOLTAGES	
• Key ON, engine OFF. • Access the PCM and monitor the TP1 and TP2 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** GO to **DV18**. **No** GO to **DV3**.

Powertrain Control Module (PCM) Connector And DV1-DV2

Throttle Body Assembly Electronic Throttle Control (ETC)

DV

Test Step	Results / Action to Take
DV3 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. **Note:** Moving the throttle plate manually may cause DTC P2106 to set during the self-test. • Key in OFF position. • Remove the inlet tube from the throttle body. • Visually inspect for throttle plate obstructions or sludge. • Slowly, push the throttle plate to wide open and release. • **Does the throttle plate move freely to wide open and back?**	**Yes** For continuous memory DTCs P0121, P0122, P0221, or P0222 alone or together, GO to **DV4**. For continuous memory DTCs P2100, P2101, P2107, P2111, or P2112 alone or together, GO to **DV20**. For Fusion, Milan, and Zephyr with all other DTCs, GO to **DV5**. For all others, GO to **DV6**. **No** ISOLATE and REPAIR the obstruction. CLEAR the DTCs. REPEAT the self-test.
DV4 CHECK THE VREF VOLTAGE TO TP	
• ETBTPS connector disconnected. • Key ON, engine OFF. • Measure the voltage between: (+) ETBTPS Connector, Harness Side: ETCREF (-) ETBTPS Connector, Harness Side: ETCRTN • **Is the voltage between 4 - 6 V?**	**Yes** For Fusion, Milan, and Zephyr, GO to **DV5**. For all others, GO to **DV6**. **No** GO to Pinpoint Test C.

Throttle Body Assembly Electronic Throttle Control (ETC)

DV

Test Step	Results / Action to Take
DV5 CHECK THE FUNCTIONALITY OF THE TP SENSOR • Key in OFF position. • 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, Milan 3.0L, and Zephyr:

(+) 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

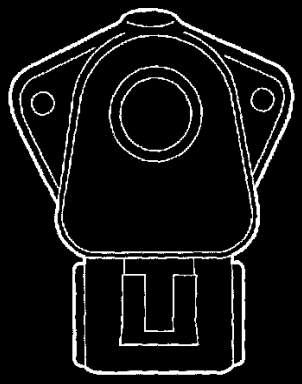
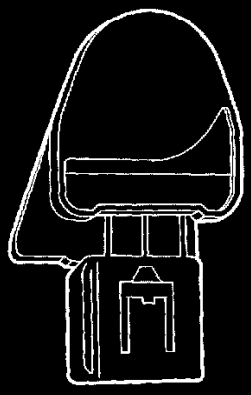
• **Are all the resistances within specifications?**

Yes
GO to **DV10**.

No
INSTALL a new ETB.
CLEAR the DTCs. REPEAT the self-test.

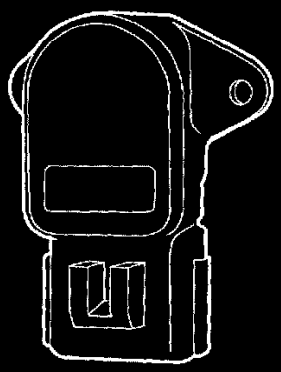
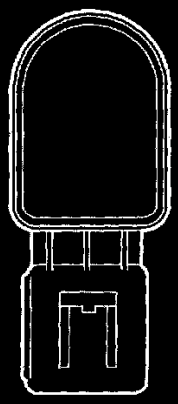
Throttle Body Assembly Electronic Throttle Control (ETC)

DV

Test Step	Results / Action to Take
DV6 **DETERMINE THE TYPE OF ETBTPS ON THE VEHICLE** **Note:** There are 2 types of ETBTPS available. Compare the sensor housing of the ETBTPS on the vehicle to the illustrations. • Key in OFF position. • Determine if the vehicle is equipped with a Type I ETBTPS.  N0027685  N0027687 • **Is the vehicle equipped with a Type I ETBTPS?**	**Yes** GO to **DV8.** **No** GO to **DV7.**

Throttle Body Assembly Electronic Throttle Control (ETC)

DV

Test Step		Results / Action to Take
DV7	**CHECK FOR A TYPE II ETBTPS**	
	Note: There are 2 types of ETBTPS available. Compare the sensor housing of the ETBTPS on the vehicle to the illustrations. • Determine if the vehicle is equipped with a Type II ETBTPS.  N0027686  N0027692 • **Is the vehicle equipped with a Type II ETBTPS?**	**Yes** GO to **DV9**. **No** GO to **DV6**.

Throttle Body Assembly Electronic Throttle Control (ETC)

DV

Test Step	Results / Action to Take
DV8 CHECK THE RESISTANCE OF THE TYPE I ETBTPS • ETBTPS connector disconnected. • Measure the resistance between: **Type I** (+) ETBTPS Connector, Component Side / (-) ETBTPS Connector, Component Side / Minimum Resistance (ohms) / Maximum Resistance (ohms) TP1 / ETCREF / 1,100 / 3,500 TP1 / ETCRTN / 2,500 / 5,900 TP2 / ETCREF / 1,800 / 4,900 TP2 / ETCRTN / 800 / 2,800 ETCREF / ETCRTN / 1,800 / 4,900 • **Are all the resistances within the specifications?**	**Yes** GO to **DV10**. **No** For Five Hundred, Freestyle, Montego, and F-150 4.2L, INSTALL a new ETB. CLEAR the DTCs.REPEAT the self-test. For all others, INSTALL a new ETBTPS. CLEAR the DTCs. REPEAT the self-test.
DV9 CHECK THE RESISTANCE OF THE TYPE II ETBTPS • ETBTPS connector disconnected. • Measure the resistance between: **Type II** (+) 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** GO to **DV10**. **No** For Five Hundred, Freestyle, Montego, and F-150 4.2L, INSTALL a new ETB. CLEAR the DTCs.REPEAT the self-test. For all others, INSTALL a new ETBTPS. CLEAR the DTCs. REPEAT the self-test.
DV10 CHECK THE TP1 AND TP2 CIRCUITS FOR A SHORT TO VOLTAGE IN THE HARNESS • PCM connector disconnected. • Key ON, engine OFF. • Measure the voltage between: (+) ETBTPS Connector, Harness Side / (-) TP1 / Ground TP2 / Ground • **Is any voltage present?**	**Yes** REPAIR the short circuit to PWR. CLEAR the DTCs. REPEAT the self-test. **No** GO to **DV11**.

Throttle Body Assembly Electronic Throttle Control (ETC)

DV

Test Step		Results / Action to Take
DV11	**CHECK THE TP1 AND TP2 CIRCUITS FOR AN OPEN IN THE HARNESS**	
	• Key in OFF position. • Measure the resistance between: (+) ETBTPS Connector, Harness Side: TP1 — (-) PCM Connector, Harness Side: TP1 (+) ETBTPS Connector, Harness Side: TP2 — (-) PCM Connector, Harness Side: TP2 • **Are the resistances less than 5 ohms?**	**Yes** GO to **DV12**. **No** REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.
DV12	**CHECK THE TP1 AND TP2 CIRCUITS FOR A SHORT TO GROUND IN THE HARNESS**	
	• Measure the resistance between: (+) ETBTPS Connector, Harness Side: TP1 — (-) Vehicle Battery: Negative terminal (+) ETBTPS Connector, Harness Side: TP2 — (-) Vehicle Battery: Negative terminal • **Are the resistances greater than 10K ohms?**	**Yes** GO to **DV13**. **No** REPAIR the short circuit to GND. CLEAR the DTCs. REPEAT the self-test.
DV13	**CHECK THE TPS CIRCUIT FOR A SHORT TOGETHER**	
	• Measure the resistance between: (+) ETBTPS Connector, Harness Side: TP1 — (-) ETBTPS Connector, Harness Side: TP2 TP1 — ETCREF TP1 — ETCRTN TP2 — ETCREF TP2 — ETCRTN • **Are the resistances greater than 10K ohms?**	**Yes** GO to **DV14**. **No** REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.
DV14	**CHECK FOR A TP2 SIGNAL HIGH VERSUS LOAD WHILE DRIVING THE VEHICLE**	
	• ETBTPS connector connected. • PCM connector connected. • Key ON, engine running. • Access the PCM and monitor the TP2 and LOAD PIDs. • 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** GO to **DV15**. **No** GO to **DV16**.

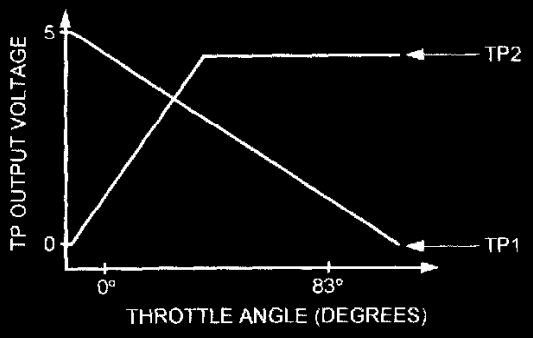
Throttle Body Assembly Electronic Throttle Control (ETC)

DV

Test Step		Results / Action to Take
DV15	**CHECK FOR INLET AIR LEAKS**	
	• Check the air inlet system for leaks. • Listen for air noise around the MAF sensor and throttle body while the engine is running. • **Is a concern present?**	**Yes** REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test. **No** GO to **DV16**.
DV16	**CHECK FOR A TP2 SIGNAL LOW VERSUS LOAD WHILE DRIVING THE VEHICLE**	
	• Key ON, engine running. • Access the PCM and monitor the TP2 and LOAD PIDs. • 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** GO to **DV17**. **No** GO to **DV18**.
DV17	**CHECK FOR SELF-TEST DTCS**	
	• Key ON, engine OFF. • Clear the DTCs. • Drive the vehicle while exercising the throttle. • Retrieve the continuous memory DTCs. • **Are any DTCs present?**	**Yes** GO to **DV18**. **No** Unable to duplicate or identify the concern at this time. GO to Pinpoint Test Z.

Throttle Body Assembly Electronic Throttle Control (ETC)

DV

Test Step	Results / Action to Take
DV18 CHECK THE TP SENSOR OPERATION	
• Key ON, engine OFF. • Access the PCM and monitor the TP1 and TP2 PIDs. • Slowly press the accelerator pedal from fully released to fully applied while observing the voltage readings. • Use the chart as a reference. **TP1 and TP2 Sensor Output Voltages**  A0096020 • **Do all signal values smoothly change when the accelerator is pressed?**	**Yes** For continuous memory DTC P0068, CHECK the mass air flow (MAF) and manifold absolute pressure (MAP) sensors and connectors for damage and corrosion. REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test. For all others, GO to **DV19**. **No** For Five Hundred, Freestyle, Montego, and F-150 4.2L with DTC P2135, INSTALL a new ETB. CLEAR the DTCs. REPEAT the self-test. For all others with DTC P2135, INSTALL a new ETBTPS. CLEAR the DTCs. REPEAT the self-test. For all others without DTC P2135, GO to **DV29**.
DV19 CHECK THE TPS CIRCUIT FOR AN INTERMITTENT CONCERN	
• Access the PCM and monitor the TP1 and TP2 PIDs. • Wiggle, shake, and bend the harness from the TP to the PCM. • **Are the voltages between 0.49 - 4.65 V?**	**Yes** GO to **DV28**. **No** REPAIR as necessary. If DTC P2100 or P2101 is present, GO to **DV20**.
DV20 CHECK THE TACM MOTOR VISUALLY	
Note: Make sure the TACM harness connector is properly connected. • Key in OFF position. • Inspect the TACM for damaged housing, harness connector, and harness. • **Are there any concerns with the TACM hardware?**	**Yes** INSTALL a new ETB. CLEAR the DTCs. REPEAT the self-test. **No** GO to **DV21**.

Throttle Body Assembly Electronic Throttle Control (ETC)

DV

Test Step	Results / Action to Take
DV21 **CHECK THE TACM FOR A SHORT OR OPEN** • ETBTACM connector disconnected. • Measure the resistance between: (+) ETBTACM Connector, Component Side: TACM+ - Pin 1 (-) ETBTACM Connector, Component Side: TACM- - Pin 2 • **Is the resistance between 1 ohm - 900 ohms?**	**Yes** GO to **DV22**. **No** INSTALL a new ETB. CLEAR the DTCs. REPEAT the self-test.
DV22 **CHECK THE TACM HARNESS FOR AN OPEN** • PCM connector disconnected. • Measure the resistance between: (+) ETBTACM Connector, Harness Side: TACM+ - Pin 1 (-) PCM Connector, Harness Side: TACM+ (+) ETBTACM Connector, Harness Side: TACM- - Pin 2 (-) PCM Connector, Harness Side: TACM- • **Are the resistances less than 5 ohms?**	**Yes** GO to **DV23**. **No** REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.
DV23 **CHECK THE HARNESS FOR A SHORT TO GND, PWR, ETCREF, AND ETCRTN** • Measure the resistance between: (+) ETBTACM Connector, Harness Side: TACM+ - Pin 1 / (-) PCM Connector, Harness Side: PWRGND TACM+ - Pin 1 / VPWR TACM+ - Pin 1 / ETCRTN TACM+ - Pin 1 / ETCREF TACM- - Pin 2 / PWRGND TACM- - Pin 2 / ETCRTN TACM- - Pin 2 / VPWR TACM- - Pin 2 / ETCREF • **Are the resistances greater than 10K ohms?**	**Yes** GO to **DV24**. **No** REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.
DV24 **CHECK FOR TACM HARNESS CIRCUITS SHORTED TOGETHER** • Measure the resistance between: (+) ETBTACM Connector, Harness Side: TACM+ - Pin 1 (-) ETBTACM Connector, Harness Side: TACM- - Pin 2 • **Is the resistance greater than 10K ohms?**	**Yes** GO to **DV25**. **No** REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

Throttle Body Assembly Electronic Throttle Control (ETC)

DV

Test Step	Results / Action to Take
DV25 CHECK FOR SELF-TEST CODES • ETBTACM connector connected. • PCM connector connected. • Key ON, engine OFF. • Carry out the self-test. • **Is DTC P2101 present?**	**Yes** GO to **DV26.** **No** GO to **DV28.**
DV26 CHECK FOR PROPER TACM+ WIRING IN THE HARNESS CONNECTOR • Key in OFF position. • ETBTACM connector disconnected. • PCM connector disconnected. • Measure the resistance between: (+) ETBTACM Connector, Harness Side: TACM+ - Pin 1 (-) PCM Connector, Harness Side: TACM+ • **Is the resistance less than 5 ohms?**	**Yes** GO to **DV27.** **No** REPAIR the open circuit. WIRE the TACM harness connector per the TACM and PCM connector diagrams. CLEAR the DTCs. REPEAT the self-test.
DV27 CHECK FOR PROPER TACM- WIRING IN THE HARNESS CONNECTOR • Measure the resistance between: (+) ETBTACM Connector, Harness Side: TACM- - Pin 2 (-) PCM Connector, Harness Side: TACM- • **Is the resistance less than 5 ohms?**	**Yes** GO to **DV29.** **No** GO to **DV28.**
DV28 CHECK THE REPAIR THROUGH PROCEDURE • Key ON, engine OFF. • Record and clear the DTCs. • Cycle the accelerator pedal to the floor and back several times. • Check for self-test DTCs. • **Are any ETC system related DTCs present?**	**Yes** GO to **DV29.** **No** GO to Pinpoint Test Z.
DV29 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). **No** The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.