DV: Throttle Body Assembly Electronic Throttle Control (ETC)

⚠**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)
- electronic throttle body throttle position sensor (ETBTPS) (9E928)
- harness circuits: ETCRTN, ETCREF, TP1, TP2, TACM+, and TACM-
- PCM (12A650)

Electronic Throttle Body Throttle Position Sensor (ETBTPS) Connector

A

B

C

D

Vehicle	Connector	Pin	Circuit
E-Series, Explorer GTDI 3.5L, F-650 / F-750, F-Series Super Duty 6.8L, Flex GTDI 3.5L, MKS 3.5L, MKT 3.5L, Motorhome / Stripped Chassis / Step Van, Taurus GTDI 3.5L	A	1 4 3 2	TP2 TP1 ETCRTN ETCREF
EcoSport 1.6L, KA 1.5L, Transit Connect 1.6L	B	4 1 2 6	TP2 TP1 ETCRTN ETCREF
EcoSport 2.0L	C	6 3 5 4	TP2 TP1 ETCRTN ETCREF
Escape/Kuga 1.6L	B	1 4 2 6	TP2 TP1 ETCRTN ETCREF
Fiesta 1.0L, Focus 1.0L, KA 1.0L	B	2 5 3 1	TP2 TP1 ETCRTN ETCREF
Fiesta 1.6L	D	4 1 2 6	TP2 TP1 ETCRTN ETCREF
Fusion 1.5L	B	5 2 3 1	TP2 TP1 ETCRTN ETCREF
All other vehicles	C	6 3 4 5	TP2 TP1 ETCRTN ETCREF

Electronic Throttle Body Throttle Actuator Control Motor (ETBTACM) Connector

A

B

C

D

Vehicle	Connector	Pin	Circuit
E-Series, Explorer GTDI 3.5L, F-650 / F-750, F-Series Super Duty 6.8L, Flex GTDI 3.5L, MKS 3.5L, MKT 3.5L, Motorhome / Stripped Chassis / Step Van, Taurus GTDI 3.5L	A	2 1	TACM- TACM+
EcoSport 1.6L, Escape/Kuga 1.6L, KA 1.5L, Transit Connect 1.6L	B	3 5	TACM- TACM+
Fiesta 1.0L, Focus 1.0L, Fusion 1.5L, KA 1.0L	B	4 6	TACM- TACM+
Fiesta 1.6L	C	3 5	TACM- TACM+
All other vehicles	D	2 1	TACM- TACM+

Powertrain Control Module (PCM) Connector

For PCM connector views or reference values, refer to Section 6, Reference Values.

Vehicle	Connector	Pin	Circuit
E-Series 5.4L	190-PIN	E59 E60 B30, B67, B68 B22, B50, B69, B70 E51 E34 E45 E44	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
E-Series 6.8L, Edge 3.5L, Explorer TiVCT 3.5L, Explorer 3.7L, F-150 TiVCT 3.5L, F-150 5.0L, F-650 / F-750, Flex TiVCT 3.5L, MKS 3.7L, MKT 3.7L, MKX 3.7L, Motorhome / Stripped Chassis / Step Van, Mustang 3.7L, Mustang 5.0L, Mustang 5.2L, Taurus TiVCT 3.5L, Taurus 3.7L, Transit 3.7L	198 PIN	E8 E23 B97, B99 B100, B102, B103, B5 E81 E82 E9 E10	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
EcoSport 2.0L Manual Transmission, EcoSport 1.6L	80 PIN	E78 E60 B2 B27, B28, B9 E71 E70 E56 E69	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
EcoSport 2.0L Automatic Transmission	128 PIN	E45 E21 B11, B12, B31 B35, B36, B47, B48, T1 E13 E1 E33 E22	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
Escape/Kuga 2.5L, Fusion 2.5L, MKZ 3.7L	190-PIN	E57 E61 B67, B68 B50, B69, B70 E51 E34 E58 E41	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
F-Series Super Duty	190-PIN	E9 E8 B67, B68 B69, B70 E67 E68 E10 E39	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
Fiesta GTDI 1.6L, Fiesta 1.0L	198 PIN	E5 E18 B101, B102, B103 B96, B97, B99 E89 E94 E34 E33	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
Fiesta TiVCT 1.6L	128 PIN	E28 E4 B11, B12, E13, E37 B35, B36, B47, B48 E36 E48 E27 E16	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
Focus 1.6L	128 PIN	E28 E4 B11, B12 B35, B36, B46, B47 E36 E48 E16 E27	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
Focus GDI 2.0L	154 PIN	E19 E58 B5, B6 B1, B2, B4 E50 E74 E81 E6	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
KA	128 PIN	T27 T19 B36, E24 B48, E12, T23, T31, T32 T15 T25	ETCREF ETCRTN VPWR PWRGND TACM- TP1
Transit Connect 2.5L	198 PIN	E8 E23 B97, B99 B100, B102, B103, B5 E49 E30 E9 E10	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1
All other vehicles	198 PIN	E7 E31 B101, B102, B103 B96, B97, B98, B99 E91 E86 E52 E68	ETCREF ETCRTN VPWR PWRGND TACM- TACM+ TP2 TP1

DV1 CHECK FOR DTCS

Note: *If DTC P0068 is present, diagnose all other DTCs first.*

Are DTCs P0068, P0121, P0122, P0123, P0221, P0222, P0223, P1584, P1588, P2100, P2101, P2107, P2109, P2111, P2112, P2118, P2119, P2135, P2163 or P2176 present?

Yes	For DTC P0068, GO to DV3. For DTCs P2100 or P2107, GO to DV2. For all others, GO to DV5.
No	RETURN to Section 3, Symptom Charts for further direction.

DV2 REPEAT THE KOEO OR KOER SELF-TEST

Note: *DTC P2107 may set when a failure mode effects management (FMEM) action is taken.*

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

Are any DTCs present other than P2100 or P2107?

Yes	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**.
No	GO to DV5.

DV3 CHECK FOR LEAKS

- Inspect the entire intake air system from the air cleaner housing to the intake manifold for leaks such as:
  - loose connections on the intake air tube at the air cleaner housing or throttle body
  - cracked or punctured intake air tube
  - hoses connecting to the intake air tube
  - hoses connecting to the throttle body
  - obstructions, restrictions, or damage
- Inspect the entire length of all the vacuum hoses for:
  - correct connections
  - damage or cracks
  - damaged or cracked vacuum tees
- Inspect the intake manifold or gasket for leaks.
- Verify the integrity of the positive crankcase ventilation (PCV) system.

Is a concern present?

Yes	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.
No	GO to DV4.

DV4 CHECK FOR INTAKE AIR LEAKS

- Ignition ON, engine running.
- Listen for air noise around the mass airflow (MAF) sensor (if equipped) and throttle body assembly.

Is a concern present?

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

DV5 CHECK 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.**

Note: *Make sure the ETB harness connector is connected correctly.*

- Ignition OFF.
- Remove the inlet tube from the throttle body.
- Visually inspect the air induction system for obstructions.
- Visually inspect for throttle plate obstructions or engine deposits.
- Check the ETB harness and connectors for the following:
  - damaged connectors
  - crossed TACM circuits
  - pushed out pins
  - corrosion
  - incorrect connections

Is a concern present?

Yes	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.
No	For DTC P0068, GO to DV11. For all others, GO to DV6.

DV6 CHECK THE VREF VOLTAGE TO TP

Note: *In the following measurement note the polarity of the probes.*

- Ignition OFF.
- 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 4.5 - 5.5 V?

Yes	GO to DV7.
No	GO to Pinpoint Test C.

DV7 CHECK THE TP1 AND TP2 CIRCUITS FOR AN OPEN OR CROSSED SENSOR WIRES

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

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

Are the resistances less than 5 ohms?

Yes	GO to DV8.
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DV8 CHECK THE TP1 AND TP2 CIRCUITS FOR A SHORT TO GROUND

- Measure the resistance between:

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

Are the resistances greater than 10K ohms?

Yes	GO to DV9.
No	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DV9 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	GO to DV10.
No	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DV10 CHECK THE TP1 AND TP2 CIRCUITS FOR A SHORT TO VOLTAGE

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

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

Is any voltage present?

Yes	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.
No	GO to DV11.

DV11 CHECK THE THROTTLE POSITION (TP) OPEN AND CLOSED VOLTAGES

⚠**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: *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.*

Note: *Make sure the accelerator pedal is not applied during the fully released voltage measurements.*

- Ignition OFF.
- ETBTPS connector connected.
- PCM connector connected.
- 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 (Ecosport 1.6L Manual Transmission and Ecosport 2.0L Manual Transmission, manually push the throttle plate wide open and release).

Electronic Throttle Control Throttle Position Sensor Signal Voltages

Vehicle	Accelerator Pedal Position	TP1	TP2
Escape/Kuga 1.6L, Fiesta 1.6L, Focus 1.6L, KA 1.5L, Transit Connect 1.6L	Pedal fully released	3.76 - 4.84	0.19 - 1.19
Escape/Kuga 1.6L, Fiesta 1.6L, Focus 1.6L, KA 1.5L, Transit Connect 1.6L	Pedal fully applied	0.16 - 1.24	3.76 - 4.84
EcoSport 1.6L	Pedal fully released	3.8 - 4.8	0.2 - 1.2
EcoSport 1.6L	Pedal fully applied	0.2 - 1.2	3.8 - 4.8
Edge 2.0L, Edge 2.7L, Escape/Kuga 2.0L, Explorer 2.3L, F-150 2.7L, Focus 2.0L, Focus 2.3L, Fusion 2.0L, MKC, MKX 2.0L, MKX 2.7L, MKZ 2.0L, Mustang 2.3L	Pedal fully released	3.7 - 4.7	0.3 - 1.16
Edge 2.0L, Edge 2.7L, Escape/Kuga 2.0L, Explorer 2.3L, F-150 2.7L, Focus 2.0L, Focus 2.3L, Fusion 2.0L, MKC, MKX 2.0L, MKX 2.7L, MKZ 2.0L, Mustang 2.3L	Pedal fully applied	0.3 - 1.0	4.0 - 4.7
EcoSport 2.0L manual transmission	Pedal fully released	4.0 - 4.7	0.3 - 1.4
EcoSport 2.0L manual transmission	Pedal fully applied	0.5 - 1.4	4.0 - 4.7
F-150 5.0L, F-Series Super Duty 6.2L, Mustang 5.0L	Pedal fully released	3.95 - 4.4	0.6 - 1.05
F-150 5.0L, F-Series Super Duty 6.2L, Mustang 5.0L	Pedal fully applied	0.35 - 0.7	4.3 - 4.65
Fiesta 1.0L, Focus 1.0L, Fusion 1.5L, KA 1.0L	Pedal fully released	3.5 - 4.6	0.4 - 1.5
Fiesta 1.0L, Focus 1.0L, Fusion 1.5L, KA 1.0L	Pedal fully applied	0.9 - 1.6	3.4 - 4.1
MKT 2.0L, Taurus 2.0L	Pedal fully released	3.84 - 4.54	0.46 - 1.16
MKT 2.0L, Taurus 2.0L	Pedal fully applied	0.3 - 1.0	4.1 - 4.7
Mustang 5.2L	Pedal fully released	3.2 - 3.67	1.34 - 1.81
Mustang 5.2L	Pedal fully applied	0.20 - 0.36	4.40 - 4.64
All others	Pedal fully released	3.7 - 4.7	0.3 - 1.9
All others	Pedal fully applied	0.7 - 2.9	4.1 - 4.7

Are both PIDs within the chart ranges?

Yes	For DTC P0068, GO to DV15. For DTCs P1584, P2100, P2101 or P2107, GO to DV16. For all others, GO to DV12.
No	GO to DV13.

DV12 CHECK THE REPAIR THROUGH PROCEDURE

- 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	For DTCs P0121, P0122, P0123, P0221, P0222, P0223 or P2135, GO to DV14. For all others, GO to DV16.
No	Unable to duplicate or identify the concern at this time. GO to Pinpoint Test Z.

DV13 CHECK FOR AN INTERMITTENT CONCERN

- 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.

Do the TP1 and TP2 PID voltages change?

Yes	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.
No	GO to DV14.

DV14 CHECK THE TP SIGNAL

Note: *Certain failure mode effects management (FMEM) operating strategies may limit vehicle function in the event of a harness or component concern and may prevent the throttle body from operating correctly.*

- Ignition ON, engine OFF.
- Clear the PCM DTCs.
- Access the PCM and monitor the TP1 (VOLT) and TP2 (VOLT) PIDs.
- Monitor the TP1 and TP2 PID voltages while disconnecting the ETBTPS connector.
- ETBTPS connector disconnected.

Do the TP1 and TP2 PID voltages change?

Yes	GO to Pinpoint Test Z.
No	For DTC P1584, GO to DV16. For all others, GO to DV21.

DV15 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.
- Retrieve the continuous memory DTCs.

Is DTC P0068 present?

Yes	CHECK the MAF sensor and connector for damage and corrosion. REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.
No	Unable to duplicate or identify the concern at this time. GO to Pinpoint Test Z.

DV16 CHECK THE TACM FOR A SHORT OR OPEN

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

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

Is the resistance between 1 - 90 ohms (Ecosport 1.6L, Escape/Kuga 1.6L, Fiesta 1.6L, Focus 1.6L, KA 1.5L, and Transit Connect 1.6L) or 1 - 900 ohms (all others)?

Yes	GO to DV17.
No	INSTALL a new ETB. REFER to the Workshop Manual Section 303-04, Fuel Charging and Controls. Clear the PCM DTCs. REPEAT the self-test.

DV17 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	GO to DV18.
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DV18 CHECK THE TACM+ AND TACM- CIRCUITS FOR A SHORT TO GROUND

- Measure the resistance between:

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

Are the resistances greater than 10K ohms?

Yes	GO to DV19.
No	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DV19 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