Computers and Control Systems: Pinpoint Tests
Test DH: Throttle Position (TP) Sensor

Throttle Position (TP) Sensor	DH

Note

This Pinpoint Test is intended to diagnose the following:

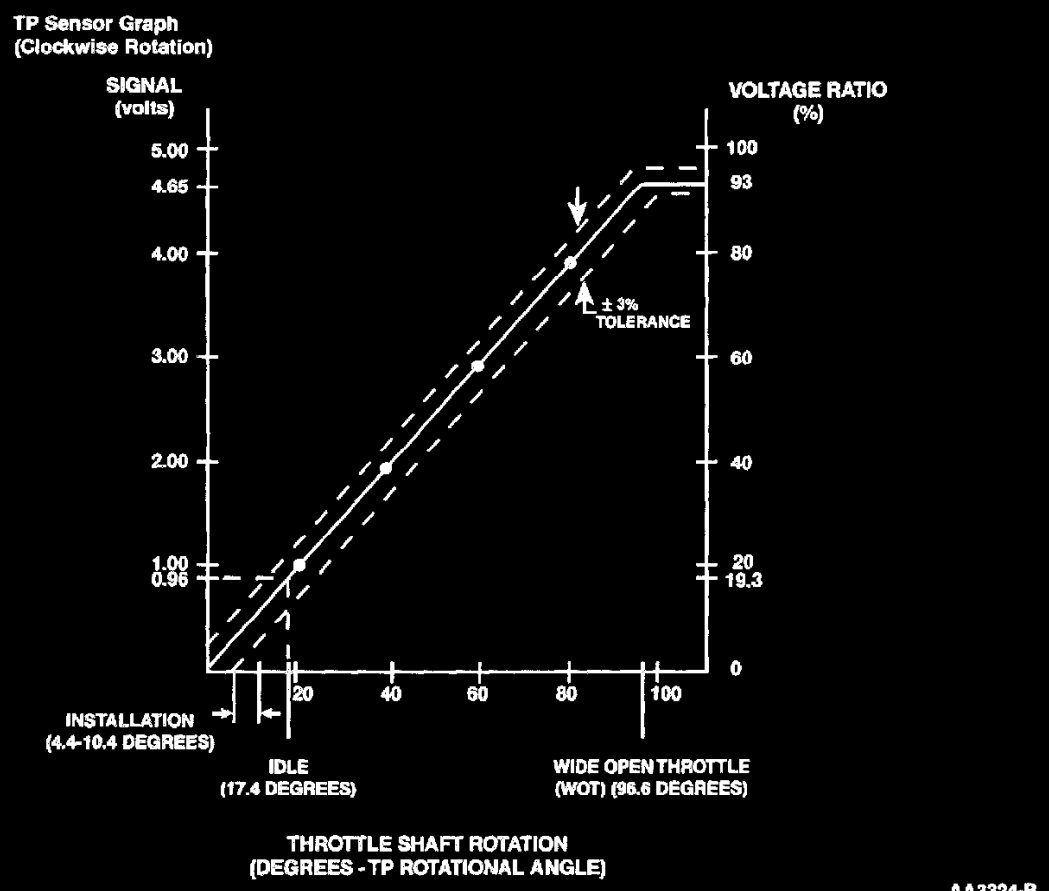
- Throttle Position (TP) Sensor (9B989)
- Binding and sticking Throttle Linkage
- Harness Circuits: TP, SIG RTN, VREF, Vehicle Power (VPWR), Power Ground (PWR GND)
- Powertrain Control Module (PCM) (12A650)

Graphs

Note: The normal range of the throttle angle measurement for the throttle position (TP) sensor is 0 to 96.6 degrees.

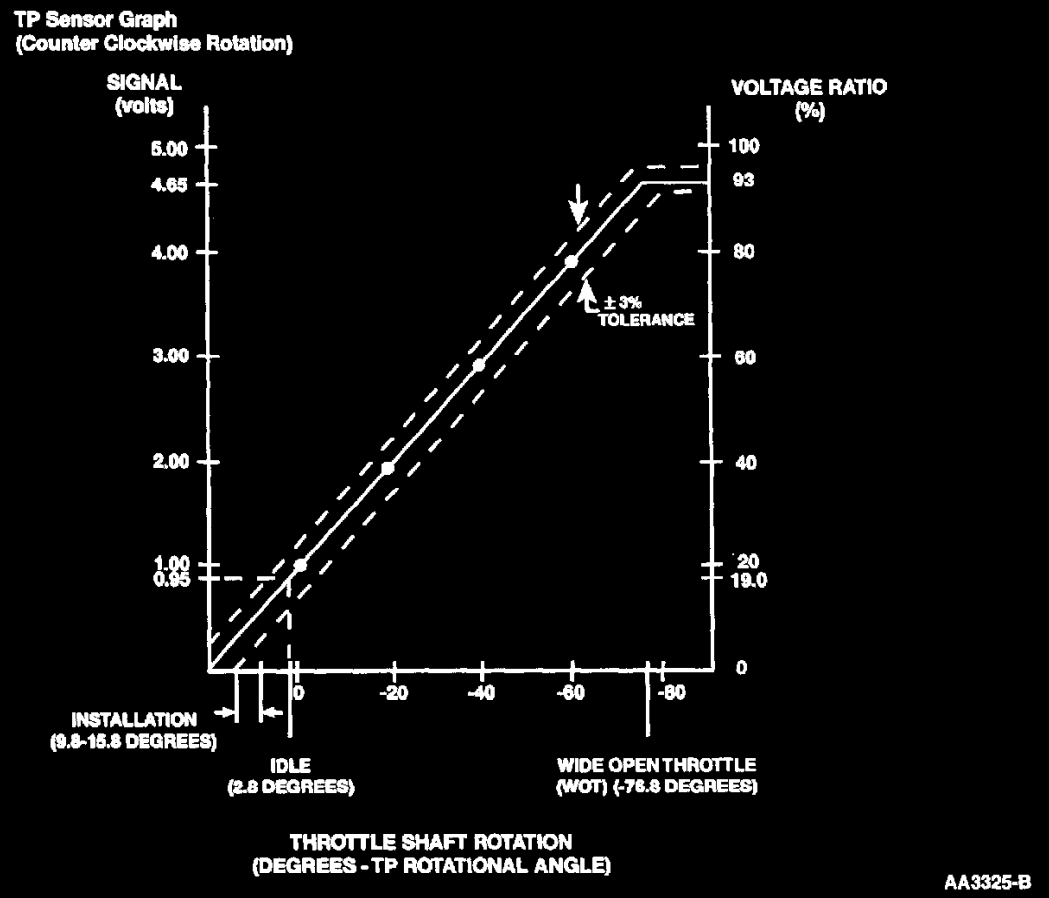
Test Note

Throttle Position (TP) Sensor	DH



Test Graph

Throttle Position (TP) Sensor	DH

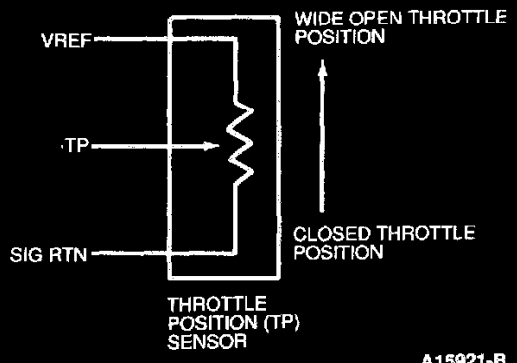


Test Graph

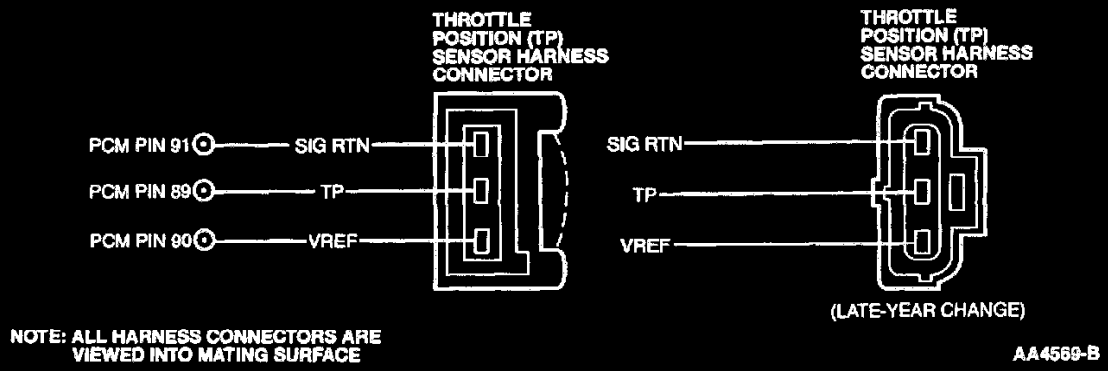
Throttle Position (TP) Sensor	DH

Pinpoint Test Schematics and Connectors

Contacting TP Sensor



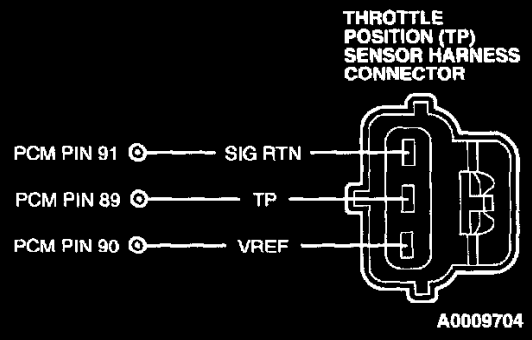
2.0L (4V) Escort, 2.0L Cougar



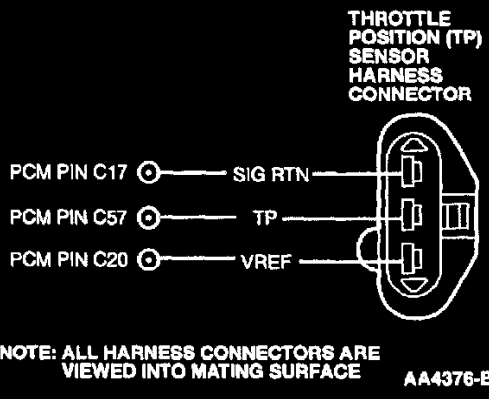
Schematics and Connectors

Throttle Position (TP) Sensor — DH

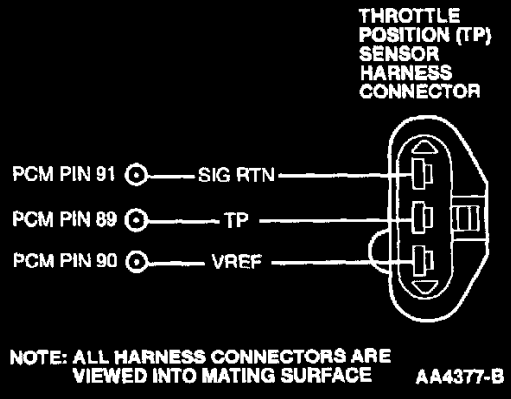
2.0L (4V) Focus, 2.3L Ranger



LS6/LS8, Thunderbird, Explorer/Mountaineer



All Others



Test Steps		Results →	Action to Take
DH1	KOEO AND KOER DTC P1124: CHECK FOR OTHER DTCS		
	• Check for DTC P1400 in KOEO or KOER Self-Test. • **Is KOEO or KOER DTC P1400 present with KOEO DTC P1124?**	Yes →	RETURN to Powertrain Diagnostic Trouble Code (DTC) Charts for DTC P1400.
		No →	KEY OFF. GO to **DH2**.
DH2	CHECK FOR STUCK THROTTLE PLATE OR LINKAGE		
	• Visually inspect the throttle linkage and throttle plate for binding or sticking. • Verify the throttle plate and linkage is at closed throttle position. • **Does the throttle move freely and return to closed throttle position?**	Yes →	Throttle plate and linkage are OK. GO to **DH8**.
		No →	REPAIR as necessary.

Test Schematic, Test DH1 - DH2

Throttle Position (TP) Sensor — DH

Test Steps	Results →	Action to Take
DH3 DTC P1120: CHECK TP CIRCUIT FOR FRAYED WIRES OR CORROSION ON CONNECTORS		
• Key off. • Complete a visual inspection of pins on harness connector at the TP sensor for corrosion. • Complete a visual inspection of the harness wires between the TP sensor and the PCM for insulation fraying and corrosion. • **Is a fault present?**	Yes → No →	REPAIR as necessary. GO to **DH4**.
DH4 CHECK FOR STUCK TP SENSOR		
• Key on, engine off. • Access TP PID (TP V PID). • Slowly move throttle from closed throttle position to wide open throttle position and observe the TP PID (TP V PID). • **While opening the throttle, is the TP PID (TPV PID) reading below 9.85% (0.49 volt)?**	Yes → No →	KEY OFF. GO to **DH5**. GO to **DH20**.
DH5 CHECK VOLTAGE BETWEEN VREF AND SIG RTN CIRCUITS TO TP SENSOR		
• Disconnect TP sensor. • Key on, engine off. • Measure voltage between VREF and SIG RTN circuits at the TP sensor harness connector. • **Is voltage between 4.0 and 6.0 volts?**	Yes → No →	KEY OFF. GO to **DH6**. GO to **C1**.
DH6 CHECK TP CIRCUIT FOR OPEN IN HARNESS		
Note: Refer to the PCM connector pin numbers in the beginning of this pinpoint test. • Disconnect PCM. • Measure resistance of TP circuit between PCM harness connector pin and TP harness connector. • **Is resistance less than 5.0 ohms?**	Yes → No →	GO to **DH7**. REPAIR open circuit.
DH7 CHECK TP SENSOR VOLTAGE TO PCM		
• Reconnect PCM and TP sensor. • Start engine and idle for 2 minutes. • Access TP PID (TP V PID). • Slowly open the throttle from closed position and observe PID(s). • **Is TP PID (TP V PID) reading at any time between 3.42-9.85% (0.17-0.49 volt)?**	Yes → No →	REPLACE TP sensor. If DTC P1120 is still present, GO to **DH20**.

Throttle Position (TP) Sensor — DH

Test Steps		Results →	Action to Take
DH8	DTC P0123 OR P1124: ATTEMPT TO GENERATE THE OPPOSITE THROTTLE POSITION ANGLE (VOLTAGE) PID READING		
	• Disconnect TP sensor. • Key on, engine off. • Access TP PID (TP V PID). • **Is TP PID (TP V PID) less than 3.42% (0.17 volt)?**	Yes → No →	GO to **DH9**. KEY OFF. GO to **DH10**.
DH9	CHECK VOLTAGE BETWEEN VREF AND SIG RTN CIRCUITS AT TP SENSOR		
	• Key on, engine off. • Measure voltage between VREF and SIG RTN circuits at the TP sensor harness connector. • **Is voltage between 4.0 and 6.0 volts?**	Yes → No →	REPLACE TP sensor. GO to **C1**.
DH10	CHECK TP CIRCUIT FOR SHORT TO VREF OR VPWR IN HARNESS		
	Note: Refer to the PCM connector pin numbers in the beginning of this pinpoint test. • Disconnect PCM. • Measure resistance between TP and VPWR circuits at the PCM harness connector. • Measure resistance between TP and VREF circuits at the PCM harness connector. (For 150PIN PCM, measure to both VREF pins.) • **Is each resistance greater than 10,000 ohms?**	Yes → No →	REPLACE PCM (refer to Diagnostic Methods, Flash Electrically Erasable Programmable Read Only Memory (EEPROM)). REPAIR short circuit.
DH11	DTC P0122: ATTEMPT TO GENERATE THE OPPOSITE THROTTLE POSITION ANGLE (VOLTAGE) PID READING		
	Note: An intermittent fault can cause a Continuous Memory DTC P0122. If a Continuous Memory DTC P0122 is still present after DH11 through DH14, GO to **Z1**. • Disconnect TP sensor. • Jumper VREF circuit to TP circuit at the TP sensor harness connector. • Key on, engine off. Note: If any scan tool communication concern exists, remove jumper and GO to **DH14**. • Access TP PID (TP V PID). • **Is TP PID (TP V PID) greater than 93% (4.65 volts)?**	Yes → No →	REPLACE TP sensor. REMOVE jumper. GO to **DH12**.
DH12	CHECK VOLTAGE BETWEEN VREF AND SIG RTN CIRCUITS		
	• Key on, engine off. • Measure voltage between VREF and SIG RTN circuits at the TP sensor harness connector. • **Is voltage between 4.0 and 6.0 volts?**	Yes → No →	KEY OFF. GO to **DH13**. GO to **C1**.

Throttle Position (TP) Sensor — DH

Test Steps		Results →	Action to Take
DH13	CHECK TP SENSOR CIRCUIT FOR OPEN IN HARNESS		
	Note: Refer to the PCM connector pin numbers in the beginning of this pinpoint test. • Disconnect PCM. • Measure resistance of TP circuit between PCM harness connector pin and TP sensor harness connector. • **Is resistance less than 5.0 ohms?**	Yes → No →	GO to **DH14**. REPAIR open circuit.
DH14	CHECK TP CIRCUIT FOR SHORT TO PWR GND OR SIG RTN IN HARNESS		
	• Disconnect PCM. • Disconnect scan tool from DLC. • Measure resistance between TP and PWR GND circuits at the PCM harness connector. • Measure resistance between TP and SIG RTN circuits at the PCM harness connector. • **Are both resistances greater than 10,000 ohms?**	Yes → No →	REPLACE PCM (refer to Diagnostic Methods, Flash Electrically Erasable Programmable Read Only Memory (EEPROM)). REPAIR short circuit.
DH15	DTC P1121: CHECK RATIONALITY OPERATION BETWEEN TP AND MAF SENSORS		
	• Attempt to start engine. • **Does the engine run?**	Yes → No →	GO to **DH16**. CHECK for major leaks, cracks, and openings between MAF sensor and throttle body. If OK, GO to **A1**.
DH16	CHECK MECHANICAL OPERATION OF TP SENSOR		
	• Key on, engine off. • Access TP PID (TP V PID). • Slowly move throttle from closed throttle position to wide open throttle position. • Observe and record the TP PID (TP V PID). • **While opening and closing the throttle, is there a change in the TP PID (TP V PID) between 9.85% and 93% (0.49 and 4.65 volts)?**	Yes → No →	GO to **DH17**. REPLACE TP sensor. VERIFY a symptom no longer exists.
DH17	CHECK TP SENSOR SIGNAL HIGH VERSUS THE ENGINE LOAD WHILE DRIVING VEHICLE		
	• Key on, engine running. • Drive vehicle, exercising the throttle and TP sensor while accessing PIDS. • Access TP PID (TP V PID) and LOAD PID and record readings. • **Is TP PID (TP V PID) greater than 49.02% (2.44 volts) and the LOAD PID reading less than 30%?**	Yes → No →	LISTEN for air noise around MAF sensor and throttle body while engine is running. REPAIR if necessary. Otherwise, GO to **HU1** for air restriction. If OK, REPLACE the TP sensor. GO to **DH18**.

Throttle Position (TP) Sensor — DH

Test Steps		Results →	Action to Take
DH18	CHECK TP SENSOR SIGNAL LOW VERSUS THE ENGINE LOAD WHILE DRIVING VEHICLE		
	Note: If the vehicle is a no start, GO to **A1**. • Drive vehicle exercising the throttle and TP sensor near higher gears (preferably overdrive) while accessing PIDS. • Access TP PID (TP V PID) and LOAD PID. • **Is TP PID (TP V PID) reading less than 4.82% (0.24 volts) and the LOAD PID reading greater than 55%?**	Yes →	TIGHTEN TP sensor to throttle body if necessary. CLEAR Continuous Memory DTCs. DRIVE vehicle exercising the throttle. If Continuous Memory P1121 is now present, REPLACE MAF sensor.
		No →	Unable to identify the fault at this time. If vehicle is still a No Start, GO to **A1**.
DH20	CONTINUOUS MEMORY DTCS P1120 OR P1125: CHECK FOR TP CIRCUIT INTERMITTENT SIGNAL		
	• Start engine and bring to idle. • Run throttle up to 1500 rpm for 5 seconds. • Access TP PID (TP V PID) for a fault indication while completing the following: — Lightly tap on TP sensor and wiggle harness connector to simulate road shock. • **Is TP PID (TP V PID) changing below the minimum 9.85% (0.49 volt) or above the maximum 93% (4.65 volts)?**	Yes →	INSPECT the TP sensor connector. If OK, REPLACE the TP sensor.
		No →	KEY OFF. GO to **DH21**.
DH21	CHECK TP SENSOR HARNESS FOR INTERMITTENT OPENS OR SHORTS		
	• Again access the TP PID (TP V PID). • Key on, engine off. • Complete the following: — Grasp the vehicle harness closest to the TP sensor connector. — Shake and bend a small section of the harness all the way to the dash panel. — Wiggle, shake and bend the harness from the dash panel to the PCM. • **Is TP PID (TP V PID) reading changing below the minimum 9.85% (0.49 volt) or above the maximum 93% (4.65 volts)?**	Yes →	ISOLATE and REPAIR as necessary.
		No →	Unable to duplicate or identify fault at this time. GO to **Z1**.

Throttle Position (TP) Sensor — DH

Test Steps		Results →	Action to Take
DH22	DTC P0121: CHECK FOR KOER SELF-TEST COMPLETION		
	Note: If KOER Self-Test terminates when placing the transmission range selector lever in gear (DRIVE or REVERSE), GO to **DH25** directly. • Start engine, bring to idle (throttle closed). • Activate Key On Engine Running (KOER) Self-Test. • Attempt to drive vehicle, while still in Key On Engine Running Self-Test. • Key off, wait 15 seconds. • Start engine again. • Activate KOER Self-Test. • **Is DTC P0121 still present or does KOER Self-Test again fail to terminate?**	Yes → No →	KEY OFF. GO to **DH23**. VERIFY a symptom no longer exists.
DH23	ISOLATE BINDING OR STICKING CONCERN		
	• Disconnect accelerator cable and speed control cable from throttle body linkage. **CAUTION: Do not attempt to clean the throttle bore and plate area. Cleaning will damage the throttle body assembly.** Note: Sticking or binding condition can either appear within cables or throttle body assembly. • Rotate throttle body linkage. • **Does the throttle body rotate freely without a sticking, binding or grabbing condition?**	Yes → No →	REPAIR cable(s) causing concern. RERUN Quick Test. If the DTC P0121 is still present, GO to **DH24**. REPLACE throttle body assembly.
DH24	CHECK FUNCTIONALITY OF THE THROTTLE POSITION SENSOR		
	• Key on. • Access TP V PID. • From closed throttle, slowly begin to press accelerator to wide open throttle. • **Did the TP V PID display a smooth reading during accelerator movement?**	Yes → No →	VERIFY a symptom no longer exists. KEY OFF. REPLACE TP sensor.
DH25	CHECK TP AND SIG RTN CIRCUITS FOR OPEN IN HARNESS		
	Note: Refer to the PCM connector pin numbers in the beginning of this pinpoint test. • Disconnect PCM and TP sensor. • Key off. • Measure resistance of TP circuit between PCM harness connector and TP sensor harness connector. • Measure resistance of SIG RTN circuit between PCM harness connector and TP sensor harness connector. • **Is each resistance less than 0.5 ohms?**	Yes → No →	REPLACE TP sensor. VERIFY a symptom no longer exists. REPAIR open ciruit. VERIFY a symptom no longer exists.