

Computers and Control Systems: Pinpoint Tests

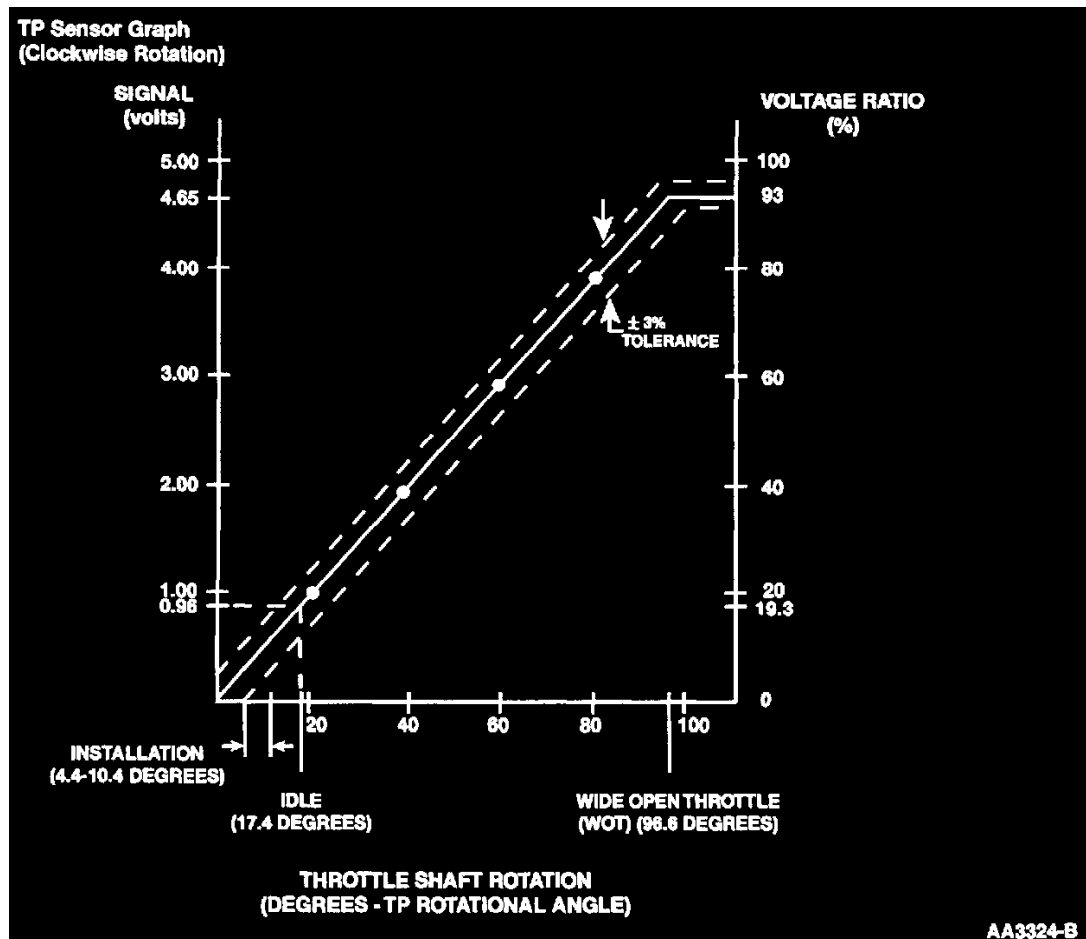
DH - Throttle Position (TP) Sensor

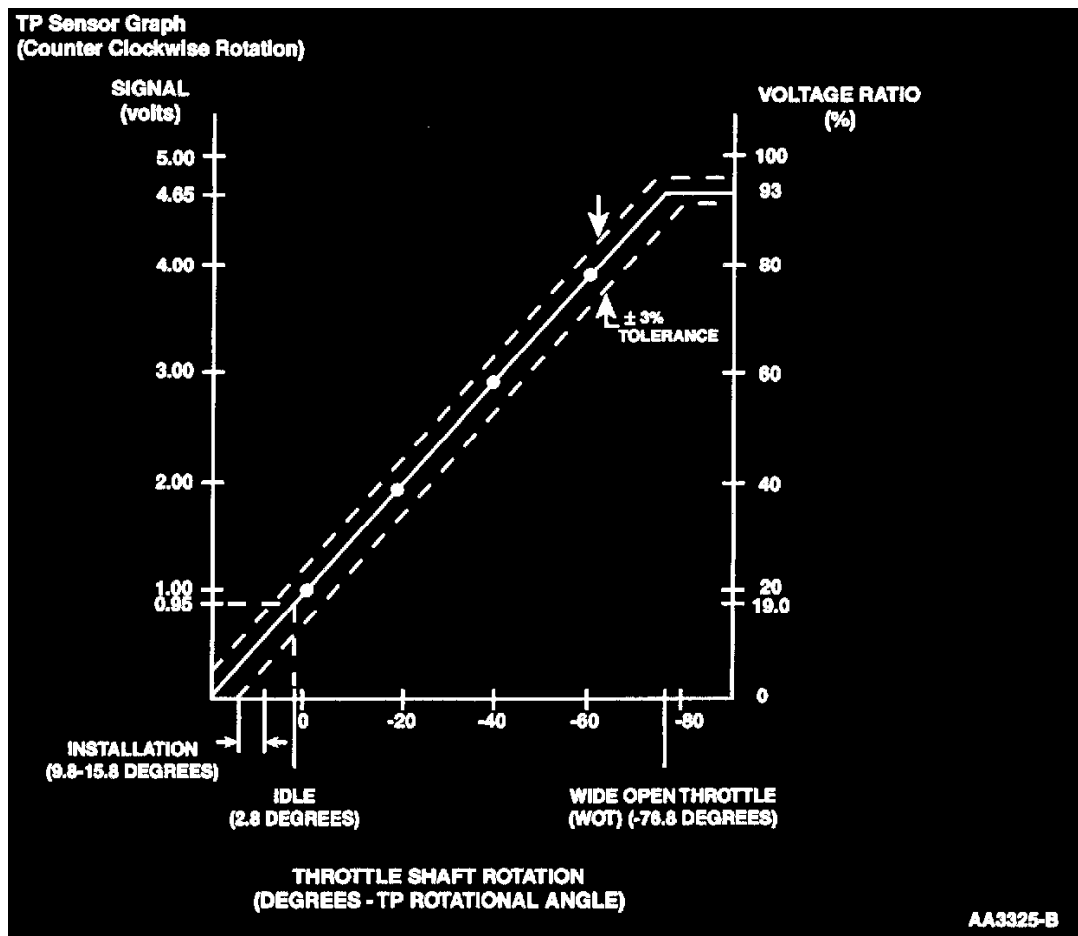
Test Notes

This Pinpoint Test is intended to diagnose the following:

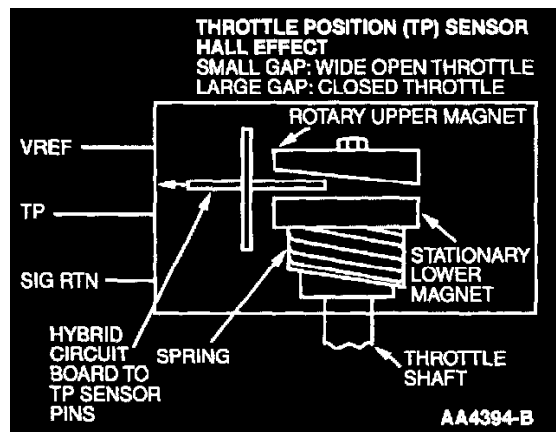
- Throttle Position (TP) Sensor
- Binding and sticking Throttle Linkage
- Harness Circuits: TP, SIG RTN, VREF, Vehicle Power (VPWR), Power Ground (PWR GND)
- Powertrain Control Module (PCM)

Tables and Graphs

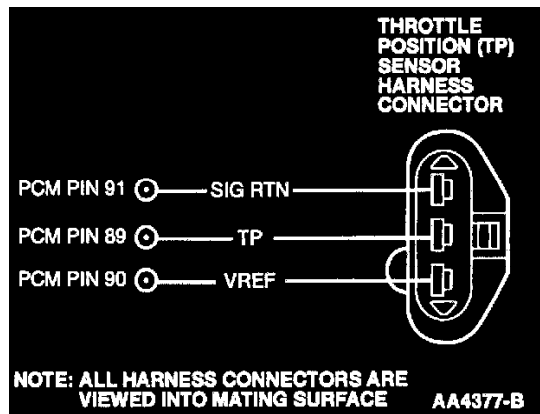




NOTE: The normal range of the throttle angle measurement for the Throttle Position (TP) sensor is 0 to 96.6 degrees.



Non-Contacting TPS



Test Step		Result	Action to Take
DH1	KOEO AND KOER DTC P1124: CHECK FOR OTHER DTCS		
	<ul style="list-style-type: none"> ● Check for DTC P1400 in KOEO or KOER Self-Test. ● Is KOEO or KOER DTC P1400 present with KOEO DTC P1124? 	<p>Yes</p> <p>No</p>	<p>▶ RETURN to Diagnostic Trouble Code Charts for DTC P1400. FOLLOW diagnostics for the DTC P1400.</p> <p>▶ KEY OFF. GO to DH2.</p>
DH2	CHECK FOR STUCK THROTTLE PLATE OR LINKAGE		
	<ul style="list-style-type: none"> ● 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? 	<p>Yes</p> <p>No</p>	<p>▶ Throttle plate and linkage are OK. GO to DH3.</p> <p>▶ REPAIR as necessary.</p>
DH3	DTC P1120: CHECK TP CIRCUIT FOR FRAYED WIRES OR CORROSION ON CONNECTORS		
	<ul style="list-style-type: none"> ● 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? 	<p>Yes</p> <p>No</p>	<p>▶ REPAIR as necessary.</p> <p>▶ GO to DH4.</p>

Test Step		Result	Action to Take
DH4	CHECK FOR STUCK TP SENSOR		
	<ul style="list-style-type: none"> ● 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		
	<ul style="list-style-type: none"> ● 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 Pinpoint Test Step C1 .
DH6	CHECK TP CIRCUIT FOR OPEN IN HARNESS		
	NOTE: Refer to the PCM connector pin numbers in the beginning of this pinpoint test. <ul style="list-style-type: none"> ● 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		
	<ul style="list-style-type: none"> ● 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 .
DH8	DTC P0123 OR P1124: ATTEMPT TO GENERATE THE OPPOSITE THROTTLE POSITION ANGLE (VOLTAGE) PID READING		
	<ul style="list-style-type: none"> ● 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 TO TP SENSOR		
	<ul style="list-style-type: none"> ● 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 Pinpoint Test Step C1 .

Test Step		Result	Action to Take
DH10	CHECK TP CIRCUIT FOR SHORT TO VREF OR VPWR IN HARNESS		
	<p>NOTE: Refer to the PCM connector pin numbers in the beginning of this pinpoint test.</p> <ul style="list-style-type: none"> ● 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 LS6/LS8 measure to both VREF pins.) ● Is each resistance greater than 10,000 ohms? 	<p>Yes</p> <p>No</p>	<p>▶ REPLACE PCM.</p> <p>▶ REPAIR short circuit.</p>
DH11	DTC P0122: ATTEMPT TO GENERATE THE OPPOSITE THROTTLE POSITION ANGLE (VOLTAGE) PID READING		
	<p>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 DH20.</p> <ul style="list-style-type: none"> ● 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. <p>Access TP PID (TP V PID).</p> <ul style="list-style-type: none"> ● Is TP PID (TP V PID) greater than 93% (4.65 volts)? 	<p>Yes</p> <p>No</p>	<p>▶ REPLACE TP sensor.</p> <p>▶ REMOVE jumper. GO to DH12.</p>
DH12	CHECK VOLTAGE BETWEEN VREF AND SIG RTN CIRCUITS		
	<ul style="list-style-type: none"> ● 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? 	<p>Yes</p> <p>No</p>	<p>▶ KEY OFF. GO to DH13.</p> <p>▶ GO to Pinpoint Test Step C1.</p>
DH13	CHECK TP SENSOR CIRCUIT FOR OPEN IN HARNESS		
	<p>NOTE: Refer to the PCM connector pin numbers in the beginning of this pinpoint test.</p> <ul style="list-style-type: none"> ● Disconnect PCM. ● Measure resistance of TP circuit between PCM harness connector pin and TP sensor harness connector. ● Is resistance less than 5.0 ohms? 	<p>Yes</p> <p>No</p>	<p>▶ GO to DH14.</p> <p>▶ REPAIR open circuit.</p>

Test Step		Result	Action to Take
DH14	CHECK TP CIRCUIT FOR SHORT TO PWR GND OR SIG RTN IN HARNESS		
	<ul style="list-style-type: none"> ● 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? 	<p>Yes ▶</p> <p>No ▶</p>	<p>REPLACE PCM.</p> <p>REPAIR short circuit.</p>
DH15	DTC P1121: CHECK RATIONALITY OPERATION BETWEEN TP AND MAF SENSORS		
	<ul style="list-style-type: none"> ● Attempt to start engine. ● Does the engine run? 	<p>Yes ▶</p> <p>No ▶</p>	<p>GO to DH16.</p> <p>CHECK for major leaks, cracks, and openings between MAF sensor and throttle body. If OK, GO to Pinpoint Test Step A1.</p>
DH16	CHECK MECHANICAL OPERATION OF TP SENSOR		
	<ul style="list-style-type: none"> ● 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)? 	<p>Yes ▶</p> <p>No ▶</p>	<p>GO to DH17.</p> <p>REPLACE TP sensor. VERIFY a symptom no longer exists.</p>
DH17	CHECK TP SENSOR SIGNAL HIGH VERSUS THE ENGINE LOAD WHILE DRIVING VEHICLE		
	<ul style="list-style-type: none"> ● 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%? 	<p>Yes ▶</p> <p>No ▶</p>	<p>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.</p> <p>GO to DH18.</p>

	Test Step	Result	Action to Take
DH18	<p>CHECK TP SENSOR SIGNAL LOW VERSUS THE ENGINE LOAD WHILE DRIVING VEHICLE</p> <p>NOTE: If the vehicle is a no start, go to Pinpoint Test Step A1.</p> <ul style="list-style-type: none"> 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%? 	<p>Yes</p> <p>No</p>	<p>TIGHTEN TP sensor to throttle body if necessary. CLEAR Continuous Memory DTCs. DRIVE vehicle exercising the throttle. If Continuous Memory P 1121 is now present, REPLACE MAF sensor.</p> <p>Unable to identify the fault at this time. If vehicle is still a No Start, GO to Pinpoint Test Step A1.</p>
DH20	<p>CONTINUOUS MEMORY DTCS P 1120 OR P 1125: CHECK FOR TP CIRCUIT INTERMITTENT SIGNAL</p> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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)? 	<p>Yes</p> <p>No</p>	<p>INSPECT the TP sensor connector. If OK, REPLACE the TP sensor.</p> <p>KEY OFF. GO to DH21.</p>
DH21	<p>CHECK TP SENSOR HARNESS FOR INTERMITTENT OPENS OR SHORTS</p> <ul style="list-style-type: none"> Again access the TP PID (TP V PID). Key on, engine off. Complete the following: <ul style="list-style-type: none"> 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)? 	<p>Yes</p> <p>No</p>	<p>ISOLATE and REPAIR as necessary.</p> <p>Unable to duplicate or identify fault at this time. GO to Pinpoint Test Step Z1.</p>
DH22	<p>DTC P0121: CHECK FOR KOER SELF-TEST COMPLETION</p> <ul style="list-style-type: none"> Start engine, bring to idle (throttle closed). Activate Key On Engine Running (KOER) Self-Test. Is DTC P0121 present or does KOER Self-Test fail to terminate? 	<p>Yes</p> <p>No</p>	<p>GO to DH23.</p> <p>VERIFY a symptom no longer exists.</p>

Test Step		Result	Action to Take
DH23	ATTEMPT TO RECREATE DTC P0121 OR DRIVEABILITY SYMPTOM		
	<p>NOTE: If KOER Self-Test terminates when placing the transmission range selector lever in gear (DRIVE or REVERSE), GO to DH24 directly.</p> <ul style="list-style-type: none"> ● 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? 	<p>Yes</p> <p>No</p>	<p>KEY OFF. GO to DH24.</p> <p>VERIFY a symptom no longer exists.</p>
DH24	CHECK TP AND SIG RTN CIRCUITS FOR OPEN IN HARNESS		
	<p>NOTE: Refer to the PCM connector pin numbers in the beginning of this pinpoint test.</p> <ul style="list-style-type: none"> ● Disconnect PCM and TP sensor. ● 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 5.0 ohms? 	<p>Yes</p> <p>No</p>	<p>REPLACE TP sensor. VERIFY a symptom no longer exists.</p> <p>REPAIR open circuit. VERIFY a symptom no longer exists.</p>