

Computers and Control Systems: Pinpoint Tests**Test HD: Misfire Detection Monitor**

PINPOINT TEST HD: MISFIRE DETECTION MONITOR

Misfire Detection Monitor**HD**

This pinpoint test is intended to diagnose the misfire detection monitor.

Clearing the PCM DTCs will erase any PCM recorded freeze frame data. Make sure to record any PCM freeze frame information before proceeding any further. REFER to Diagnostic Methods, Freeze Frame Data.

Powertrain Control Module (PCM) Connector

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

Vehicle	Connector	Circuit	Pin
Aviator, LS, Thunderbird	150 (60-32-58) Pin	CMP VPWR	E53 B32, B33
E-Series 4.6L, E-Series 5.4L 4R75E, Mustang	170 Pin	CMP VPWR	E45 B35, B36
E-Series 6.8L, E-Series 5.4L 5R100, F-Super Duty	170 Pin	CMP VPWR	E45 B35, B36, T39
Excursion, Explorer SportTrac, Freestar/Monterey, Ford GT, Ranger, Sable, Taurus	104 Pin	CMP VPWR	85 71, 97
Expedition, F-150, Navigator	190 Pin	CMP VPWR	E45 B51, B52, B53
All other vehicles	150 (50-50-50) Pin	CMP VPWR	E25 B35, B36

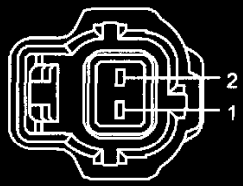
Note And Connector

Misfire Detection Monitor

HD

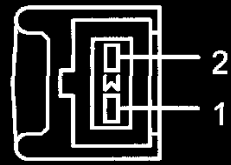
Camshaft Position (CMP) Sensor Connector

A



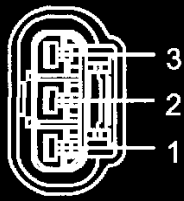
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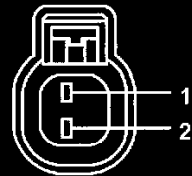
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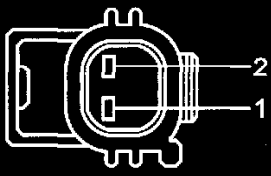
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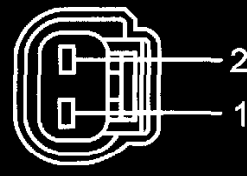
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Connector

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Vehicle	Connector	Circuit	Pin
Escape, Focus, Mariner	A	CMP	2
Explorer 4.0L, Explorer SportTrac 4.0L, Mountaineer 4.0L, Mustang 4.0L, Ranger 4.0L	B	CMP	1
F-150 4.2L	C	CMP	2
LS 3.0L	D	CMP	2
LS 3.9L, Thunderbird	E	CMP	2
All other vehicles	F	CMP	2

Test Step		Results / Action to Take
HD1	CHECK FOR ADAPTIVE FUEL MONITOR AND HEGO MONITOR DTCS (CONTINUOUS MEMORY)	
	<ul style="list-style-type: none"> Check the PCM for self-test DTCs: Are DTCs P0136, P0156, P0171, P0172, P0175, P2270, P2271, P2272 or P2273 present? 	Yes GO to HD3 . No GO to HD2 .
HD2	CHECK FOR OTHER NON-MISFIRE CONTINUOUS MEMORY DTCS	
	<ul style="list-style-type: none"> Are there any non-misfire continuous memory DTCs present? 	Yes DISREGARD the current diagnostic trouble code (DTC) at this time. ADDRESS the next DTC. GO to Diagnostic Trouble Code (DTC) Charts and Descriptions. No GO to HD3 .
HD3	VIEW THE PCM MISFIRE FREEZE FRAME DATA	
	<ul style="list-style-type: none"> The misfire freeze frame data may be used to determine the operating conditions when the misfire DTC was set. Retrieve and record any available misfire freeze frame data PID values from the PCM. Compare recorded freeze frame data PID values to the typical reference values in Reference Values. Are any values out of range? 	Yes For out of range PIDS REFER to the table in the pinpoint test Z to find corresponding circuit, and proceed with the intermittent diagnosis. GO to Pinpoint Test Z. No GO to HD4 .

Connector And HD1-HD3

Misfire Detection Monitor



HD

Test Step		Results / Action to Take
HD4	CHECK THE IGNITION SYSTEM	Yes FOLLOW the ignition pinpoint test direction and REPAIR as necessary. No GO to HD5 .
	<ul style="list-style-type: none"> For coil-on-plug (COP) equipped vehicles GO to Pinpoint Test JB and follow the Pinpoint Test direction. For ignition coil pack equipped vehicles GO to Pinpoint Test JC and follow the Pinpoint Test direction. Is an ignition related concern present? 	
HD5	CHECK FOR ANY OTHER KOEO SELF-TEST DTCS	Yes (If misfire or coil DTCs are present, and WDS or an equivalent tool is available, use the scope function to verify the suspect coil.) DISREGARD the current diagnostic trouble code (DTC) at this time. ADDRESS the next DTC. GO to Diagnostic Trouble Code (DTC) Charts and Descriptions. No Key in OFF position. For spark plug wires that are OK: GO to HD6 . For spark plug wires that need evaluation: GO to JB1 .
	<ul style="list-style-type: none"> Are any other KOEO DTCs present? 	
HD6	CHECK FOR ANY OTHER CODES THAT MAY CAUSE A MISFIRE	Yes GO to HD8 . No GO to HD7 .
	<ul style="list-style-type: none"> Check for self-test DTCs: Are DTCs P1131, P1132, P1137, P1138, P1151, P1152, P1157 or P1158 present? 	
HD7	CHECK FOR ANY OTHER KOER DTCS	Yes Key in OFF position. DISREGARD the current diagnostic trouble code (DTC) at this time. ADDRESS the next DTC. GO to Diagnostic Trouble Code (DTC) Charts and Descriptions. No GO to HD8 .
	<ul style="list-style-type: none"> Are any other KOER DTCs present? 	

HD4-HD7

Misfire Detection Monitor

HD

Test Step		Results / Action to Take				
HD8	CHECK THE INJECTOR DRIVER PIDS INJ1F THROUGH INJ10F					
	<ul style="list-style-type: none"> Key in ON position. Access the appropriate INJxF PIDs for the suspect injector. Are the PIDs status YES? 	<p>Yes For Vehicles with FICM: GO to HL1. For all others: GO to HD9.</p> <p>No Key in OFF position. GO to HD10.</p>				
HD9	CHECK THE FUEL INJECTORS AND HARNESS FOR AN OPEN					
	<ul style="list-style-type: none"> PCM connector disconnected. Measure the resistance between: <table border="1"> <tr> <td>(+) PCM Connector, Harness Side</td> <td>(-) PCM Connector, Harness Side</td> </tr> <tr> <td>VPWR</td> <td>Suspect INJ</td> </tr> </table> <ul style="list-style-type: none"> Is the resistance between 11 ohms - 18 ohms? 	(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side	VPWR	Suspect INJ	<p>Yes INSTALL a new PCM. REFER to Diagnostic Methods, Flash Electrically Erasable Programmable Read Only Memory (EEPROM).</p> <p>No GO to H35.</p>
(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side					
VPWR	Suspect INJ					
HD10	CHECK THE FUEL PRESSURE					
	<p> WARNING: Before servicing or replacing any components in the fuel system, reduce the possibility of injury or fire by following the warning, caution, and handling directions in pinpoint test HC.</p> <p> WARNING: The fuel system remains pressurized when the engine is not running. To prevent injury or fire, use caution when working on the fuel system.</p> <ul style="list-style-type: none"> Fuel pressure gauge connected. Start and run engine at idle, check and record the fuel pressure. Increase the engine speed to a minimum of 2,000 RPM and maintain for 2 minutes. Note and compare the fuel pressure. Is the fuel pressure within specification (refer to the fuel pressure chart in Pinpoint Test HC)? 	<p>Yes Key in OFF position. GO to HD11.</p> <p>No REFER to Fuel Delivery and Air Induction to determine which area within the fuel system is at fault.</p>				

HD8-HD10

Misfire Detection Monitor

HD

	Test Step	Results / Action to Take
HD11	VERIFY THE FUEL SYSTEM HOLDS PRESSURE <ul style="list-style-type: none"> • Key on engine running. • Check the fuel pressure. • Increase the engine speed to a minimum of 2,000 RPM and maintain for 2 minutes. • Check for fuel leaking at the fuel injector O-ring, fuel pressure regulator, and the fuel lines to the fuel charging assembly. • Did the fuel pressure remain within 34 kPa (5 psi) for 60 seconds? 	Yes Key in OFF position. For vehicles equipped with differential pressure feedback EGR system, GO to HD12 . For vehicles equipped with electric EGR (EEGR) system, GO to HD13 . For vehicles equipped with EGR system module (ESM) EGR system, GO to HD14 . For all others, GO to HD18 . No REFER to Fuel Delivery and Air Induction to determine which area within the fuel system is at fault.
HD12	MONITOR DPFEGR SYSTEM RELATED PIDS <ul style="list-style-type: none"> • Key on engine running. • Bring the engine to normal operating temperature. • Access the PCM and monitor the DPFEGR and EGRVR PIDs. • Record the PID values with the engine idling. • Key in ON position. • Record the PID values with the engine off. • Compare recorded PID values to the typical reference values in Reference Values. • Are any values out of range? 	Yes GO to Pinpoint Test HE and diagnose the EGR system. No GO to HD15 .
HD13	MONITOR EGR SYSTEM RELATED PIDS <ul style="list-style-type: none"> • Key on engine running. • Bring the engine to normal operating temperature. • Access the PCM and monitor the EGRMC1, EGRMC2, EGRMC3, EGRMC4 and MAP_V PIDs. • Record the PID values with the engine idling. • Key in ON position. • Record the PID values with the engine off. • Compare recorded PID values to the typical reference values in Reference Values. • Are any values out of range? 	Yes GO to Pinpoint Test KD and diagnose the EGR system. No GO to HD16 .

HD11-HD13

Misfire Detection Monitor

HD

Test Step		Results / Action to Take
HD14	MONITOR ESM SYSTEM RELATED PIDS	
	<ul style="list-style-type: none"> • Key on engine running. • Bring the engine to normal operating temperature. • Access the PCM and monitor the DPFEGR, EGRVR and MAP_V PIDs. • Record the PID values with the engine idling. • Key in ON position. • Record the PID values with the engine off. • Compare recorded PID values to the typical reference values in Reference Values. • Are any values out of range? 	<p>Yes GO to Pinpoint Test HH and diagnose the EGR system.</p> <p>No GO to HD17.</p>
HD15	RECREATE THE MISFIRE SYMPTOM WITH DPFEGR SYSTEM DISABLED	
	<p>Note: The PCM may store EGR system related DTCs during this procedure.</p> <ul style="list-style-type: none"> • Key in OFF position. • EVR Solenoid connector disconnected. • Access the misfire freeze frame data (if available) and record the DTC malfunction conditions. • Obtain information from the customer information worksheet or any other available data from the customer. • Recreate the misfire symptom using freeze frame and customer information. <p>Note: To recreate the original conditions that set the DTC or caused the symptom, the vehicle may require driving.</p> <ul style="list-style-type: none"> • Could the symptom be recreated? 	<p>Yes CONNECT the EVR solenoid and CLEAR the PCM DTCs. GO to HD18.</p> <p>No REMOVE and INSPECT the EGR valve for signs of contamination, unusual wear, carbon deposits, binding or other damage.</p> <p>REFER to Engine for more EGR system information.</p> <p>REPAIR as necessary.</p>
HD16	RECREATE THE MISFIRE SYMPTOM WITH EEGR SYSTEM DISABLED	
	<p>Note: The PCM may store EGR system related DTCs during this procedure.</p> <ul style="list-style-type: none"> • Key in OFF position. • EEGR Assembly connector disconnected. • Access the misfire freeze frame data (if available) and record the DTC malfunction conditions. • Obtain information from the customer information worksheet or any other available data from the customer. • Recreate the misfire symptom using freeze frame and customer information. <p>Note: To recreate the original conditions that set the DTC or caused the symptom, the vehicle may require driving.</p> <ul style="list-style-type: none"> • Could the symptom be recreated? 	<p>Yes CONNECT the EEGR assembly and CLEAR the PCM DTCs. GO to HD18.</p> <p>No REMOVE and INSPECT the EEGR for signs of contamination, unusual wear, carbon deposits, binding or other damage.</p> <p>REFER to Engine for more EGR system information.</p> <p>REPAIR as necessary.</p>

HD14-HD16

Misfire Detection Monitor

HD

Test Step		Results / Action to Take
HD17	RECREATE THE MISFIRE SYMPTOM WITH ESM SYSTEM DISABLED	
	<p>Note: The PCM may store EGR system related DTCs during this procedure.</p> <ul style="list-style-type: none"> • Key in OFF position. • ESM connector disconnected. • Access the misfire freeze frame data (if available) and record the DTC malfunction conditions. • Obtain information from the customer information worksheet or any other available data from the customer. • Recreate the misfire symptom using freeze frame and customer information. <p>Note: To recreate the original conditions that set the DTC or caused the symptom, the vehicle may require driving.</p> <ul style="list-style-type: none"> • Could the symptom be recreated? 	<p>Yes CONNECT the ESM connector and CLEAR the PCM DTCs. GO to HD18.</p> <p>No REMOVE and INSPECT the ESM for signs of contamination, unusual wear, carbon deposits, binding or other damage. REFER to Engine for more EGR system information. REPAIR as necessary.</p>
HD18	CHECK THE FUEL INJECTORS ABILITY TO DELIVER FUEL	
	<p>Note: The fuel delivery system is not likely to have caused the misfire DTC if the flow test is within specification.</p> <ul style="list-style-type: none"> • Go to Pinpoint Test HC for reference to the warning, caution, and handling to prevent accident. • Verify the flow rate for each injector is within specification. Use the injector flow tester. • Is the flow rate for each injector within specification? 	<p>Yes GO to HD19.</p> <p>No INSTALL a new Fuel Injector.</p>
HD19	CHECK THE VACUUM SYSTEM	
	<p>Note: Some vacuum leaks can be heard.</p> <ul style="list-style-type: none"> • Visually inspect the vacuum hoses for signs of damage or deterioration. A collapsed vacuum hose may cause a blockage to one of the various actuators or sensors. If a blockage is found remove the blockage or install new parts as necessary. • Is the vehicle vacuum system OK? 	<p>Yes GO to HD20.</p> <p>No REPAIR the vacuum system.</p>
HD20	CHECK THE DAMPER AND PULLEY ASSEMBLY	
	<p>Note: This step is for engines that have damper mounted pulse rings. Remove the front cover if necessary to observe the crank pulley.</p> <ul style="list-style-type: none"> • Observe the crank pulley for wobble. • Examine the EI pulse ring fastened to the harmonic dampener. • Does the crank pulley wobble or is the pulse ring loose or damaged? 	<p>Yes DISCONNECT the battery for 5 minutes to allow the PCM to learn the new profile. INSTALL a new pulley or damper assembly.</p> <p>No GO to HD21.</p>

HD17-HD20

Misfire Detection Monitor

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Test Step		Results / Action to Take
HD21	CHECK THE EVAPORATIVE EMISSION SYSTEM	Yes INSTALL a new EVAP canister. No GO to HD22.
	<ul style="list-style-type: none"> The misfire monitor can be influenced by the evaporative emission system. The next 5 pinpoint test steps diagnose the evaporative emission system. Check the EVAP canister for fuel saturation. Is there an excess amount of liquid fuel present in the canister? 	
HD22	PRESSURE TEST THE EVAPORATIVE EMISSION SYSTEM	Yes GO to HD23. No REPAIR as necessary.
	<ul style="list-style-type: none"> Install the Rotunda Evaporative Emission System Tester, or equivalent, at the EVAP test port, then at the fuel filler cap. Follow the test instructions from the tester kit. Is the evaporative emission system holding pressure? 	
HD23	CHECK VACUUM IN THE EVAPORATIVE EMISSION SYSTEM	Yes INSTALL a new vacuum hoses in place of the damaged hoses, or REMOVE the blockage/restrictions. No GO to HD24.
	<ul style="list-style-type: none"> Check the vacuum system between the engine vacuum port and the EVAP canister. Check the EVAP system lines/hoses (check for proper connections, damage or blockage). Check for blockage in the fuel tank vent system. Is there a fault indicated? 	
HD24	CHECK THE EVAP CANISTER PURGE VALVE HOUSING LEAKS	Yes GO to HD25. No REMOVE the vacuum pump. INSTALL a new EVAP canister purge valve.
	<ul style="list-style-type: none"> The EVAP canister purge valve is electrically connected. Install a hand vacuum pump to the fuel vapor port from the EVAP canister on the EVAP canister purge vacuum valve at the line. Apply 53 kPa (16 in-Hg) of vacuum with the vacuum pump. Does the EVAP canister purge valve hold vacuum at room temperature? 	
HD25	CHECK FOR FILTER CONTAMINATION ON THE EVAP CANISTER PURGE VALVE	Yes REPAIR the EVAP canister purge valve filter. If unable to clean the filter or remove blockage to the filter, INSTALL a NEW EVAP canister purge valve. No GO to HD26.
	<ul style="list-style-type: none"> The vacuum line from the input vacuum port to the intake manifold on the EVAP canister purge valve (the control vacuum solenoid part of the valve) is removed. Install a hand vacuum to the open vacuum port on the EVAP canister purge valve. Apply 48 - 52 kPa (10 - 15 in-Hg) of vacuum to the canister purge valve. Does the EVAP canister purge valve hold vacuum, or is the valve very slow to release vacuum to the atmosphere? 	

HD21-HD25

Misfire Detection Monitor

HD

Test Step		Results / Action to Take
HD26	CHECK FOR BASE ENGINE CONCERNS <ul style="list-style-type: none"> • This step determines if there are any base engine concerns that may have caused the Misfire DTC or drive concern. Note: The engine temperature may affect the results. • Carry out the following tests in order to evaluate base engine integrity: <ul style="list-style-type: none"> — Carry out engine compression and leakdown tests. Refer to Engine. — Carry out valve train analysis. Refer to Engine. — Check the positive crankcase ventilation (PCV) system. Refer to Engine. — Check possible leakage points. Refer to Engine. • Is any repair required? 	Yes REPAIR as necessary. REFER to Engine. No GO to Z1. If unable to identify the fault in Pinpoint Test Z, GO to HD27.
HD27	CHECK Z1 TO IDENTIFY A FAULT <ul style="list-style-type: none"> • Did Pinpoint Test Z find a fault? 	Yes Test Complete No GO to HD28.
HD28	CHECK FOR ADDITIONAL MISFIRE DTCS <ul style="list-style-type: none"> • Diagnostic trouble code P0300 indicates multiple cylinders are misfiring or the PCM cannot identify which cylinder is misfiring. • Are any other misfire DTCs present? 	Yes GO to HD1. No GO to HD29.
HD29	CHECK FOR OTHER NON-MISFIRE CONTINUOUS MEMORY DTCS <ul style="list-style-type: none"> • Are other continuous memory DTCs present? 	Yes DISREGARD the current diagnostic trouble code (DTC) at this time. ADDRESS the next DTC. GO to Diagnostic Trouble Code (DTC) Charts and Descriptions . No GO to HD30.
HD30	IDENTIFY THE CAMSHAFT POSITION (CMP) SENSOR TYPE <ul style="list-style-type: none"> • Identify which type of CMP sensor the vehicle uses. • Does the vehicle use a Hall-effect sensor? 	Yes GO to HD31. No GO to HD32.

HD26-HD30

Misfire Detection Monitor

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Test Step		Results / Action to Take				
HD31	CHECK THE CMP SENSOR LOW RANGE OUTPUT WITH THE PCM DISCONNECTED Note: DTCS P1309, P1336, and or P0606 indicate the misfire monitor is not enabled. <ul style="list-style-type: none"> PCM connector disconnected. Connect the digital multimeter. Bump the engine with a short burst from the starter, without starting the engine for at least 10 engine revolutions. Measure the voltage between: <table border="1"> <tr> <td>(+) CMP Sensor Connector, Harness Side</td> <td>(-) 12 Volt Vehicle Battery</td> </tr> <tr> <td>CMP</td> <td>Negative terminal</td> </tr> </table> <ul style="list-style-type: none"> Is the voltage less than 2 V? 	(+) CMP Sensor Connector, Harness Side	(-) 12 Volt Vehicle Battery	CMP	Negative terminal	Yes If DTC P0606 is present in an electronic throttle control equipped vehicle, GO to DK1 . A Hall-type CMP that is installed out of synchronization produces a DTC. To verify the correct installation, REFER to Engine. If the CMP is installed properly, INSTALL a new PCM. REFER to Diagnostic Methods, Flash Electrically Erasable Programmable Read Only Memory (EEPROM). GO to DK1.
(+) CMP Sensor Connector, Harness Side	(-) 12 Volt Vehicle Battery					
CMP	Negative terminal					
HD32	CHECK THE CMP SENSOR HIGH RANGE OUTPUT VOLTAGE <ul style="list-style-type: none"> Key in OFF position. PCM connector connected. CMP Sensor connector disconnected. Note: Diagnostic trouble code P1309 indicates the misfire detection monitor is not enabled. <ul style="list-style-type: none"> Digital multimeter on low voltage AC scale. Key on engine running. Measure the voltage between: <table border="1"> <tr> <td>(+) PCM Connector, Harness Side</td> <td>(-) 12 Volt Vehicle Battery</td> </tr> <tr> <td>CMP</td> <td>Negative terminal</td> </tr> </table> <ul style="list-style-type: none"> Is the voltage greater than 0.25 V? 	(+) PCM Connector, Harness Side	(-) 12 Volt Vehicle Battery	CMP	Negative terminal	Yes INSTALL a new PCM. REFER to Diagnostic Methods, Flash Electrically Erasable Programmable Read Only Memory (EEPROM). No INSTALL a new CMP sensor.
(+) PCM Connector, Harness Side	(-) 12 Volt Vehicle Battery					
CMP	Negative terminal					

HD31-HD32

Misfire Detection Monitor

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Test Step		Results / Action to Take
HD33	CHECK THE PHYSICAL CONDITION OF THE CRANKSHAFT PULSE WHEEL	
	<p>Note: DTC P0315 is set when the PCM is unable to learn and correct for the mechanical variations in the crankshaft pulse wheel tooth spacing (the allowable correction tolerances are exceeded).</p> <ul style="list-style-type: none"> • Inspect the crankshaft pulse wheel for damaged teeth. • Inspect the crankshaft pulsewheel for wobble. • Check for a loose crankshaft pulse wheel. • Check the CKP sensor for damage. • Are the CKP sensor and crankshaft pulse wheel OK? 	<p>Yes If the CKP is installed properly, INSTALL a new PCM. REFER to Diagnostic Methods, Flash Electrically Erasable Programmable Read Only Memory (EEPROM).</p> <p>No REPAIR as necessary. REFER to Engine to check for correct crankshaft position (CKP) sensor installation.</p> <p>RESET the keep alive memory (KAM). REFER to Diagnostic Methods, Resetting The Keep Alive Memory (KAM).</p>

HD33