

HD: Misfire Detection Monitor

 **WARNING:** Crown Victoria Police Interceptor vehicles equipped with fire suppression system, refer to Section 419-03 for Important Safety Warnings. Failure to follow these instructions may result in personal injury.

Note: Mechanical noise caused by the front end accessory drive components, mechanically driven cooling fans, or rough roads at high RPM with light load conditions may produce a nonsymmetrical loss of cylinder acceleration, which may result in a misfire.

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 Section 2, [Freeze Frame Data](#).

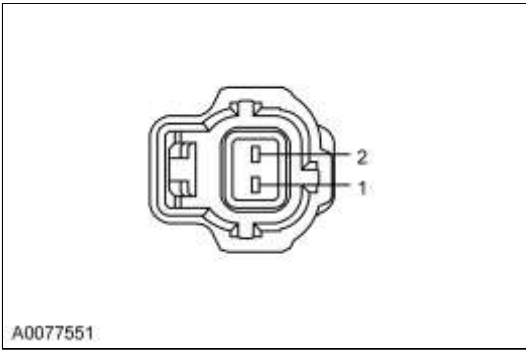
Powertrain Control Module (PCM) Connector

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

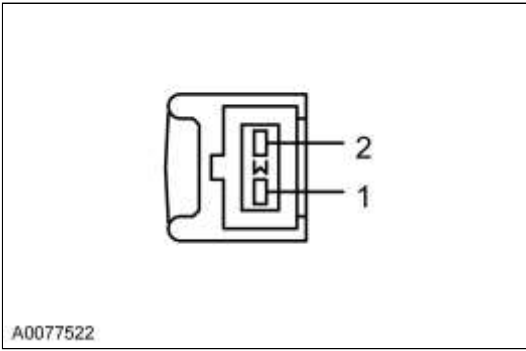
Vehicle	Connector	Pin	Circuit
Aviator, LS, Thunderbird	150 (60-32-58) Pin	B32, B33	VPWR
E-Series 4.6L, E-Series 5.4L 4R75E, Mustang	170 Pin	B35, B36	VPWR
E-Series 6.8L, E-Series 5.4L 5R100, F-Super Duty	170 Pin	B35, B36, T39	VPWR
Excursion, Explorer Sport Trac, Freestar/Monterey, Ford GT, Ranger, Sable,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

Camshaft Position (CMP) Sensor Connector

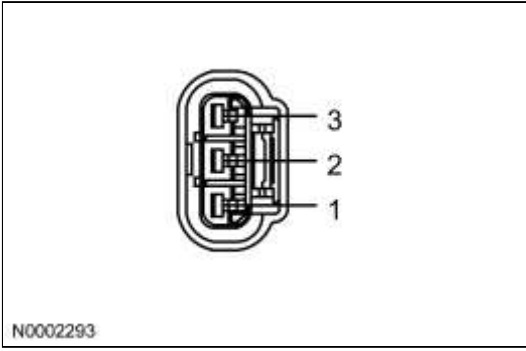
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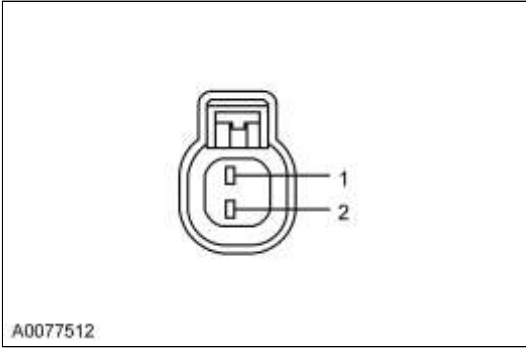
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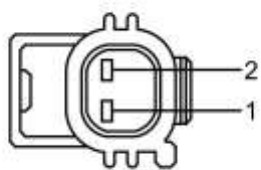
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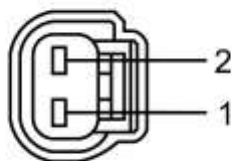


E



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

HD1 CHECK FOR ADAPTIVE FUEL MONITOR AND HEGO MONITOR DTCS (CONTINUOUS MEMORY)

- 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

Are there any non-misfire continuous memory DTCs present?

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 HD3 .

HD3 VIEW THE PCM MISFIRE FREEZE FRAME DATA

- 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 Section 6.

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 .

HD4 CHECK THE IGNITION SYSTEM

- 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?

Yes	FOLLOW the ignition pinpoint test direction and REPAIR as necessary.
No	GO to HD5 .

HD5 CHECK FOR ANY OTHER KOEO SELF-TEST DTCS

Are any other KOEO DTCs present?

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. DIAGNOSE the next DTC. GO to Section 4, 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 .

HD6 CHECK FOR ANY OTHER CODES THAT MAY CAUSE A MISFIRE

- Check for self-test DTCs.

Are DTCs P1131, P1132, P1137, P1138, P1151, P1152, P1157 or P1158 present?

Yes	GO to HD8 .
No	GO to HD7 .

HD7 CHECK FOR ANY OTHER KOER DTCS

Are any other KOER DTCs present?

Yes	Key in OFF position. 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 HD8 .

HD8 CHECK THE INJECTOR DRIVER PIDS INJ1F THROUGH INJ10F

- Key ON, engine OFF.
- Access the appropriate INJxF PIDs for the suspect injector.

Are the PIDs status YES?

Yes	For Vehicles with FICM: GO to HL1 . For all others: GO to HD9 .
No	Key in OFF position. GO to HD10 .

HD9 CHECK THE FUEL INJECTORS AND HARNESS FOR AN OPEN

- PCM connector disconnected.
- Measure the resistance between:

(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side
VPWR	Suspect INJ

Is the resistance between 11 - 18 ohms?

Yes	INSTALL a new PCM. REFER to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM) .
No	GO to H41 .

HD10 CHECK THE FUEL PRESSURE

 **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.

 **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.

- 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)?

Yes	Key in OFF position. GO to HD11 .
No	REFER to the Workshop Manual Section 310-00, Fuel System - General Information to determine which area within the fuel system is at fault.

HD11 VERIFY THE FUEL SYSTEM HOLDS PRESSURE

- 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 the Workshop Manual Section 310-00, Fuel System - General Information to determine which area within the fuel system is at fault.

HD12 MONITOR DPFEGR SYSTEM RELATED PIDS

- 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 ON, engine OFF.
- Record the PID values with the engine off.
- Compare recorded PID values to the typical reference values in Section 6.

Are any values out of range?

Yes	GO to Pinpoint Test HE and diagnose the EGR system.
No	GO to HD15 .

HD13 MONITOR EEGR SYSTEM RELATED PIDS

- 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 ON, engine OFF.
- Record the PID values with the engine off.
- Compare recorded PID values to the typical reference values in Section 6.

Are any values out of range?

Yes	GO to Pinpoint Test KD and diagnose the EGR system.
No	GO to HD16 .

HD14 MONITOR ESM SYSTEM RELATED PIDS

- 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 ON, engine OFF.
- Record the PID values with the engine off.
- Compare recorded PID values to the typical reference values in Section 6.

Are any values out of range?

Yes	GO to Pinpoint Test HH and diagnose the EGR system.
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No	GO to HD17 .
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HD15 RECREATE THE MISFIRE SYMPTOM WITH DPFEGR SYSTEM DISABLED

Note: *The PCM may store EGR system related DTCs during this procedure.*

- 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.
- **Note:** *To recreate the original conditions that set the DTC or caused the symptom, the vehicle may require driving.*

Could the symptom be recreated?

Yes	CONNECT the EVR solenoid and CLEAR the PCM DTCs. GO to HD18 .
No	REMOVE and INSPECT the EGR valve for signs of contamination, unusual wear, carbon deposits, binding or other damage. REFER to the Workshop Manual Section 303-01, Engine for more EGR system information. REPAIR as necessary.

HD16 RECREATE THE MISFIRE SYMPTOM WITH EEGR SYSTEM DISABLED

Note: *The PCM may store EGR system related DTCs during this procedure.*

- 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.
- **Note:** *To recreate the original conditions that set the DTC or caused the symptom, the vehicle may require driving.*

Could the symptom be recreated?

Yes	CONNECT the EEGR assembly and CLEAR the PCM DTCs. GO to HD18 .
No	REMOVE and INSPECT the EEGR for signs of contamination, unusual wear, carbon deposits, binding or other damage. REFER to the Workshop Manual Section 303-01, Engine for more EGR system information. REPAIR as necessary.

HD17 RECREATE THE MISFIRE SYMPTOM WITH ESM SYSTEM DISABLED

Note: *The PCM may store EGR system related DTCs during this procedure.*

- 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.
- **Note:** *To recreate the original conditions that set the DTC or caused the symptom, the vehicle may require driving.*

Could the symptom be recreated?

Yes	CONNECT the ESM connector and CLEAR the PCM DTCs. GO to HD18 .
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No	REMOVE and INSPECT the ESM for signs of contamination, unusual wear, carbon deposits, binding or other damage. REFER to the Workshop Manual Section 303-01, Engine for more EGR system information. REPAIR as necessary.
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HD18 CHECK THE FUEL INJECTORS ABILITY TO DELIVER FUEL

Note: *The fuel delivery system is not likely to have caused the misfire DTC if the flow test is within specification.*

- 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?

Yes	GO to HD19 .
No	INSTALL a new Fuel Injector.

HD19 CHECK THE VACUUM SYSTEM

Note: *Some vacuum leaks can be heard.*

- 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?

Yes	GO to HD20 .
No	REPAIR the vacuum system.

HD20 CHECK THE DAMPER AND PULLEY ASSEMBLY

Note: *For engines that have damper mounted pulse rings, it may be necessary to remove the front cover or other components to observe the crank pulley.*

- 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?

Yes	INSTALL a new pulley or damper assembly. REFER to the Workshop Manual Section 303-00, Engine System. RESET the keep alive memory (KAM). REFER to Section 2, Resetting The Keep Alive Memory (KAM) . COMPLETE the Misfire and Fuel Monitors drive cycle procedure to learn the profile. Refer to Section 2, On Board Diagnostic (OBD) Drive Cycle . To verify the repair RECREATE the original conditions that set the misfire DTC or caused the symptom using the freeze frame data and customer information. MONITOR the cylinder misfire data in Mode 6 - On Board Test Results and VERIFY the misfire count is below 10. REFER to the scan tool manufacturer's manual for specific information on the Mode 6 - On Board Test Results.
No	GO to HD21 .

HD21 CHECK THE EVAPORATIVE EMISSION SYSTEM

- 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?

Yes	INSTALL a new EVAP canister.
No	GO to HD22 .

HD22 PRESSURE TEST THE EVAPORATIVE EMISSION SYSTEM

- 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?

Yes	GO to HD23 .
No	REPAIR as necessary.

HD23 CHECK VACUUM IN THE EVAPORATIVE EMISSION SYSTEM

- 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?

Yes	INSTALL a new vacuum hoses in place of the damaged hoses, or REMOVE the blockage/restrictions.
No	GO to HD24 .

HD24 CHECK THE EVAP CANISTER PURGE VALVE HOUSING LEAKS

- 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?

Yes	GO to HD25 .
No	REMOVE the vacuum pump. INSTALL a new EVAP canister purge valve.

HD25 CHECK FOR FILTER CONTAMINATION ON THE EVAP CANISTER PURGE VALVE

- 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 (14 - 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?

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 .

HD26 CHECK FOR BASE ENGINE CONCERNS

Note: *The engine temperature may affect the results.*

- This step determines if there are any base engine concerns that may have caused the Misfire DTC or drive concern.
- Key in OFF position.
- Carry out the following tests in order to evaluate base engine integrity:
 - For vehicles equipped with mechanically driven cooling fans only, rotate the cooling fan by hand. The cooling fan should rotate freely, with no abnormal binding or interference. If binding or interference is present, remove any foreign materials or repair the cooling fan as necessary.
 - Check drive belt, tensioner and pulleys for obvious signs of mechanical damage. Refer to the Workshop Manual Section 303-05, Accessory Drive.
 - Carry out engine compression and leakdown tests. Refer to the Workshop Manual Section 303-00, Engine System
 - Carry out valve train analysis. Refer to the Workshop Manual Section 303-00, Engine System
 - Check the positive crankcase ventilation (PCV) system. Refer to the Workshop Manual Section 303-00, Engine System
 - Check possible leakage points. Refer to the Workshop Manual Section 303-00, Engine System

Is any repair required?

Yes	REPAIR as necessary. REFER to the Workshop Manual Section 303-00, Engine System.
No	GO to Z1 . If unable to identify the fault in Pinpoint Test Z, GO to HD27 .

HD27 CHECK Z1 TO IDENTIFY A FAULT
Did Pinpoint Test Z find a fault?

Yes	Test Complete.
No	GO to HD28 .

HD28 CHECK FOR ADDITIONAL MISFIRE DTCS

- 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
Are other continuous memory DTCS present?

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 HD30 .

HD30 IDENTIFY THE CAMSHAFT POSITION (CMP) SENSOR TYPE

- 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 .

HD31 CHECK THE CMP SENSOR LOW RANGE OUTPUT WITH THE PCM DISCONNECTED

Note: DTCs P1309 and P1336 indicate the misfire monitor is not enabled.

- 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:

(+) CMP Sensor Connector, Harness Side	(-) 12 Volt Vehicle Battery
CMP	Negative terminal

Is the voltage less than 2 V?

Yes	A Hall-type CMP that is installed out of synchronization produces a DTC. To verify the correct installation, REFER to the Workshop Manual Section 303-00, Engine System - General Information. If the CMP is installed properly, INSTALL a new PCM. REFER to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM) . GO to DK1 .
No	INSTALL a new CMP sensor.

HD32 CHECK THE CMP SENSOR OUTPUT VOLTAGE

Note: *Diagnostic trouble code P1309 indicates the misfire detection monitor is not enabled.*

- Key in OFF position.
- PCM connector connected.
- CMP Sensor connector disconnected.
- Digital multimeter on low voltage AC scale.
- Key ON, engine running.
- Measure the voltage between:

(+) CMP Sensor Connector, Component Side	(-) CMP Sensor Connector, Component Side
CMP	SIGRTN

- Run the engine at approximately 2,500 RPM.

Is the voltage greater than 0.25 V?

Yes	INSTALL a new PCM. REFER to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM) .
No	INSTALL a new CMP sensor.

HD33 DTC P0315: CHECK THE PHYSICAL CONDITION OF THE CRANKSHAFT PULSE WHEEL

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).*

- 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?

Yes	If the CKP is installed properly, INSTALL a new PCM. REFER to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM) .
No	REPAIR as necessary. REFER to the Workshop Manual Section 303-00, Engine System - General Information to check for correct crankshaft position (CKP) sensor installation. RESET the keep alive memory (KAM). REFER to Section 2, Resetting The Keep Alive Memory (KAM) . COMPLETE the Misfire and Fuel Monitors drive cycle procedure to learn the profile. Refer to Section 2, On Board Diagnostic (OBD) Drive Cycle . To verify the repair RECREATE the original conditions that set the misfire DTC or caused the symptom using the freeze frame data and customer information. MONITOR the cylinder misfire data in Mode 6 - On Board Test Results and VERIFY the misfire count is below 10. REFER to the scan tool manufacturer's manual for specific information on the Mode 6 - On Board Test Results.

