HD: Misfire Detection Monitor

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 non-symmetrical loss of cylinder acceleration, which may result in a misfire.*

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

Clearing the powertrain control module (PCM) diagnostic trouble codes (DTCs) erases any PCM recorded freeze frame data. Make sure to record any PCM freeze frame information before proceeding. Refer to Section 2, Freeze Frame Data.

HD1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Are DTCs P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P0309, P0310, P0313, P0315, P0316 or P1336 present?

Yes	For DTC P0315, GO to HD21. For DTC P1336, GO to HD18. For all others, GO to HD2.
No	RETURN to Section 3, Symptom Charts for further direction.

HD2 VIEW THE PCM MISFIRE FREEZE FRAME DATA

Note: *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, Reference Values.

Are any values out of range?

Yes	REFER to the table in Pinpoint Test Z to find corresponding circuit, and PROCEED with the intermittent diagnosis. GO to Pinpoint Test Z.
No	GO to HD3.

HD3 RELATIVE COMPRESSION TEST

Note: *The IDS test referenced in this step may not be available on all vehicles. Follow the YES answer if the IDS test is not available.*

- Carry out the Relative Compression Test. Refer to the instruction manual provided by the scan tool manufacturer.

Do all cylinders pass the test?

Yes	GO to HD4.
No	CARRY OUT a cylinder compression test on the suspected cylinder. REFER to the Workshop Manual Section 303-00, Engine System - General Information to diagnose the non contributing cylinder concern.

HD4 CHECK FOR OTHER NON-MISFIRE CONTINUOUS MEMORY DTCS

- Retrieve the PCM 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 HD5.

HD5 CHECK FOR ANY KOEO SELF-TEST DTCS

- Carry out the PCM KOEO self-test.

Are any KOEO 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 HD6.

HD6 CHECK FOR ANY KOER DTCS

- Carry out the PCM KOER self-test.

Are any KOER 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 HD7.

HD7 CYLINDER POWER BALANCE TEST

Note: *The IDS test referenced in this step may not be available on all vehicles. Follow the YES answer if the IDS test is not available.*

- Carry out the Power Balance Test. Refer to the instruction manual provided by the scan tool manufacturer.

Are all cylinders contributing correctly during the power balance test?

Yes	GO to HD9.
No	GO to HD8.

HD8 CHECK THE IGNITION SYSTEM FOR CONCERNS

- For ignition coil on plug (COP) equipped vehicles, GO to JB4 and follow the pinpoint test direction.
- For ignition coil pack equipped vehicles, GO to JC4 and follow the pinpoint test direction.

Is an ignition related concern present?

Yes	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.
No	GO to HD9.

HD9 RELATIVE INJECTOR FLOW TEST

Note: *The IDS test referenced in this step may not be available on all vehicles. Follow the YES answer if the IDS test is not available.*

- Carry out the Relative Injector Flow Test. Refer to the instruction manual provided by the scan tool manufacturer.

Are all injectors flowing correctly?

Yes	GO to HD10.
No	CHECK for a loose connection, and damaged or corroded terminals. REPAIR as necessary. GO to HD10.

HD10 CHECK THE FUEL SYSTEM FOR CONCERNS

- GO to Pinpoint Test HC and follow the pinpoint test direction.

Is a fuel system related concern present?

Yes	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.
No	GO to HD11.

HD11 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	For Escape 2.5L, Fusion 2.5L, and Transit Connect 2.5L, GO to HD12. For E-Series 4.6L, and Mustang 5.8L, GO to HD13. For all others, GO to HD16.
No	REPAIR the vacuum system. Clear the PCM DTCs. REPEAT the self-test.

HD12 MONITOR THE EEGR SYSTEM RELATED PIDS

- Ignition ON, engine running.
- Bring the engine to normal operating temperature.
- Access the PCM and monitor the EGRMC1F (MODE), EGRMC2F (MODE), EGRMC3F (MODE) and EGRMC4F (MODE) PIDs.
- Access the PCM and monitor the MAP (PRESS) PID.
- Record the PID values with the engine idling.
- Ignition ON, engine OFF.
- Record the PID values with the engine off.
- Compare the recorded PID values to the typical reference values in Section 6, Reference Values.

Are any values out of range?

Yes	GO to Pinpoint Test KD and DIAGNOSE the EGR system.
No	GO to HD14.

HD13 MONITOR THE ESM SYSTEM RELATED PIDS

- Ignition ON, engine running.
- Bring the engine to normal operating temperature.
- Access the PCM and monitor the DPFEGR (VOLT) PID.
- For E-Series with 4.6L 2V engine,
- Access the PCM and monitor the EGRPCT (PER) PID.
- For all others,
- Access the PCM and monitor the MAP (PRESS) PID.
- Record the PID values with the engine idling.
- Ignition ON, engine OFF.
- Record the PID values with the engine off.
- Compare the recorded PID values to the typical reference values in Section 6, Reference Values.

Are any values out of range?

Yes	GO to Pinpoint Test HH and DIAGNOSE the EGR system.
No	GO to HD15.

HD14 RECREATE THE MISFIRE SYMPTOM WITH EEGR SYSTEM DISABLED

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

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

- Ignition OFF.
- EEGR Assembly connector disconnected.
- Access the misfire freeze frame data (if available) and record the operating conditions.
- Obtain information from the customer information worksheet or any other available data from the customer.
- Recreate the misfire symptom using the freeze frame and customer information.

Can the symptom be recreated?

Yes	GO to HD16.
No	REMOVE and INSPECT the EEGR for signs of contamination, unusual wear, carbon deposits, binding or other damage. REFER to the Workshop Manual Section 303-08, Engine Emission Control for more EGR system information. REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.

HD15 RECREATE THE MISFIRE SYMPTOM WITH THE ESM SYSTEM DISABLED

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

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

- Ignition OFF.
- ESM connector disconnected.
- Access the misfire freeze frame data (if available) and record the operating conditions.
- Obtain information from the customer information worksheet or any other available data from the customer.
- Recreate the misfire symptom using the freeze frame and customer information.

Can the symptom be recreated?

Yes	GO to HD16.
No	REMOVE and INSPECT the ESM for signs of contamination, unusual wear, carbon deposits, binding or other damage. REFER to the Workshop Manual Section 303-08, Engine Emission Control for more EGR system information. REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.

HD16 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.
- Ignition OFF.
- 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.
  - Refer to the Workshop Manual Section 303-05, Accessory Drive and carry out checks in the Visual Inspection Chart.
  - Refer to the Workshop Manual Section 303-00, Engine System and carry out the Compression Test and Cylinder Leakage Detection.
  - Refer to the Workshop Manual Section 303-00, Engine System and carry out the Valve Train Analysis.
  - Visually inspect the positive crankcase ventilation (PCV) valve and tube for leaks.
  - Refer to the Workshop Manual Section 303-00, Engine System and carry out Component Tests.

Is a concern present?

Yes	REPAIR as necessary. REFER to the Workshop Manual Section 303-00, Engine System. Clear the PCM DTCs. REPEAT the self-test.
No	For DTCs P0300 or P0316, GO to HD19. For all others, GO to HD17.

HD17 CHECK FUEL INJECTORS

Note: *For vehicles without the injector disable PIDs, follow the Yes answer.*

- Ignition ON, engine running.
- Access the PCM and control the suspect INJ_OFF (MODE) PID.
- Command the suspect injector OFF.

Does the engine RPM change?

Yes	GO to HD19.
No	CHECK the suspect fuel injector connector and pins for damage, corrosion or an incorrect connection. If no concerns are present, INSTALL a new Suspect Fuel Injector. Clear the PCM DTCs. REPEAT the self-test.

HD18 CHECK THE CMP SENSOR

- Ignition ON, engine running.
- Access the PCM and monitor the SYNC (MODE) PID.

Is a concern present?

Yes	A CMP sensor that is installed out of synchronization may set a DTC. To verify the correct CMP sensor installation, REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. If the CMP sensor is installed correctly, GO to HD19.
No	GO to HD19.

HD19 CHECK THE GENERATOR FOR EXCESSIVE ELECTRICAL NOISE

Note: *If the generator/regulator is electrically noisy, the noise decreases when the B+ connector is disconnected.*

- Ignition ON, engine running.
- Monitor the generator for an audible electric noise.
- Ignition OFF.
- Generator/regulator B+ connector disconnected.
- Ignition ON, engine running.
- With the engine running, determine if the generator is still noisy.

Does the noise remain constant when the B+ connector is disconnected?

Yes	GO to HD20.
No	REFER to the Workshop Manual Section 414-00, Charging System, and DIAGNOSE the generator is noisy symptom.

HD20 CHECK THE CKP HARNESS FOR INTERMITTENT CONCERNS

Note: *Damaged CKP wires or other physical damage to the harness may cause an intermittent short in the CKP circuit.*

- Ignition OFF.
- Visually check for damaged CKP wires or other physical damage to the CKP harness.

Is a concern present?

Yes	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.
No	GO to HD21.

HD21 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 pulse wheel for wobble.
- Inspect the crank pulley for wobble.
- Check for a loose crankshaft pulse wheel.
- Check the CKP sensor for damage.

Are the CKP sensor, crankshaft pulse wheel and the crank shaft pulley OK?

Yes	GO to HD22.
No	REPAIR as necessary. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls and check for correct CKP sensor installation. RESET the keep alive memory (KAM). REFER to Section 2, Resetting The Keep Alive Memory (KAM). For F-150 5.0L, Fiesta 1.0L, Fiesta 1.6L GTDI, Focus 2.0L GTDI, Mustang 3.7L, Mustang 5.0L, and Mustang 5.8L, COMPLETE the Misfire Monitor Neutral Profile Correction procedure using the scan tool. For all others, 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 manufacturers manual for specific information on the Mode 6 - On Board Test Results.

HD22 CHECK THE RECENT VEHICLE REPAIR HISTORY

Note: *Misfire Profiles stored in non-volatile memory may need to be relearned if major engine work is done.*

- Check the recent vehicle repair history to determine if any rotational components have been replaced such as:
  - crankshaft
  - crankshaft pulley
  - camshaft
  - flexplate
  - flywheel
  - pistons or connecting rods
  - front end accessory drive components

Does the vehicle repair history indicate any engine repairs for rotational components?

Yes	For F-150 5.0L, Fiesta 1.0L, Fiesta 1.6L GTDI, Focus 2.0L GTDI, Mustang 3.7L, Mustang 5.0L, and Mustang 5.8L, COMPLETE the Misfire Monitor Neutral Profile Correction procedure USING the scan tool. For all others, 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 manufacturers manual for specific information on the Mode 6 - On Board Test Results.
No	GO to HD23.

HD23 CHECK FOR CORRECT PCM OPERATION

- Disconnect all the PCM connectors.
- Visually inspect for:
  - pushed out pins
  - corrosion
- Connect all the PCM connectors and make sure they seat correctly.
- Carry out the PCM self-test.
- Verify the concern is still present.

Is the concern still present?

Yes	INSTALL a new PCM. REFER to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM), Programming the VID Block for a Replacement PCM.
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.