**Powertrain Control/Emissions Diagnosis Manual** Section 5: Pinpoint Tests 2016 Gasoline Engines Procedure revision date: 09/04/2018

## RPM with light load conditions may produce a non-symmetrical loss of cylinder acceleration, which may result in a misfire.

Note: Mechanical noise caused by the front end accessory drive components, mechanically driven cooling fans, or rough roads at high

**HD: Misfire Detection Monitor** 

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

Clearing the PCM 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.

For DTC P1336, GO to **HD16**. For all others, GO to HD2.

For DTC P0315, GO to HD19. Yes

**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?

HD2 VIEW THE PCM MISFIRE FREEZE FRAME DATA

RETURN to Section 3, Symptom Charts for further direction. No

Are any values out of range?

**HD3 RELATIVE COMPRESSION TEST** 

Are any KOEO DTCs present?

Are any KOER DTCs present?

GO to HD6.

HD7 CYLINDER POWER BALANCE TEST

GO to HD8.

Are all injectors flowing correctly?

Yes

Yes

No

HD10 CHECK THE FUEL SYSTEM FOR CONCERNS

REPAIR as necessary.

For Escape/Kuga 2.5L,

Transit Connect 2.5L, GO to HD12.

For all others, GO to HD14.

REPAIR the vacuum system.

Bring the engine to normal operating temperature.

Record the PID values with the engine idling.

Access the PCM and monitor the MAP (PRESS) PID.

Fusion 2.5L, and

**HD11 CHECK THE VACUUM SYSTEM** 

Note: Some vacuum leaks can be heard.

Is the vehicle vacuum system OK?

Clear the PCM DTCs. REPEAT the self-test.

HD8 CHECK THE IGNITION SYSTEM FOR CONCERNS

Clear the PCM DTCs. REPEAT the self-test.

Yes

No

Yes

No

Yes

**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.

GO to Pinpoint Test Z. GO to HD3. No

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.

REFER to the table in Pinpoint Test Z to find corresponding circuit, and PROCEED with the intermittent diagnosis.

 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. CARRY OUT a Cylinder Leakage Detection test on the suspected cylinder. REFER to the Workshop Manual Section No

303-00, Engine System to diagnose the cylinder concern. If the Cylinder Leakage Detection test passes, CARRY OUT a Compression Test on the suspected cylinder. REFER to the Workshop Manual Section 303-00, Engine System to diagnose the 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?

DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to Section 4, Yes 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.

**Diagnostic Trouble Code (DTC) Charts and Descriptions.** 

HD6 CHECK FOR ANY KOER DTCS Carry out the PCM KOER self-test.

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. GO to HD7. No

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.

• 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.

DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to Section 4,

Are all cylinders contributing correctly during the power balance test? GO to HD9. Yes

Is an ignition related concern present? REPAIR as necessary. Yes

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.

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

• GO to Pinpoint Test **HC** and follow the pinpoint test direction. Is a fuel system related concern present?

GO to **HD11**. No

• Visually inspect the vacuum hoses for signs of damage or deterioration. A collapsed vacuum hose may cause a restriction to one of the

various actuators or sensors. If a restriction is found remove the restriction or install new parts as necessary.

• Ignition ON, engine running.

Are any values out of range?

GO to **HD13**.

Can the symptom be recreated?

Yes

No

GO to HD14.

HD14 CHECK FOR BASE ENGINE CONCERNS

cooling fan as necessary.

Detection.

Is a concern present?

HD15 CHECK FUEL INJECTORS

Command the suspect injector OFF.

GO to **HD17**.

HD16 CHECK THE CMP SENSOR

GO to **HD17**.

GO to **HD17**.

• Monitor the generator for an audible electric noise.

• Generator/regulator B+ connector disconnected.

REPAIR as necessary.

spacing (the allowable correction tolerances are exceeded).

Inspect the crankshaft pulse wheel for damaged teeth.

• Inspect the crankshaft pulse wheel for wobble.

• Check for a loose crankshaft pulse wheel.

GO to **HD20**.

For Edge,

Fiesta 1.0L,

Mustang, and

crankshaft

camshaft flexplate

flywheel

Yes

No

crankshaft pulley

pistons or connecting rods

For Edge,

Fiesta 1.0L,

Fiesta 1.6L GTDI,

F-150,

Focus,

front end accessory drive components

Fiesta 1.6L GTDI,

F-150,

Alive Memory (KAM).

• Inspect the crank pulley for wobble.

• Check the CKP sensor for damage.

GO to **HD19**.

GO to **HD18**.

Ignition ON, engine running.

Is a concern present?

No

• Ignition OFF.

Yes

No

Is a concern present?

Yes

No

Yes

No

• Ignition ON, engine running.

• Ignition ON, engine running.

Does the engine RPM change?

Yes

No

Ignition ON, engine running.

Yes

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

information. REPAIR as necessary.

Clear the PCM DTCs. REPEAT the self-test.

Yes

No

Clear the PCM DTCs. REPEAT the self-test. HD12 MONITOR THE EEGR SYSTEM RELATED PIDS

• 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.

REMOVE and INSPECT the EEGR for signs of contamination, unusual wear, carbon deposits, binding or other

freely, with no abnormal binding or interference. If binding or interference is present, remove any foreign materials or repair the

CHECK the suspect fuel injector connector and pins for damage, corrosion or an incorrect connection. If no concerns

REFER to the Workshop Manual Section 414-00, Charging System, and DIAGNOSE the generator is noisy symptom.

Note: DTC P0315 is set when the PCM is unable to learn and correct for the mechanical variations in the crankshaft pulse wheel tooth

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

For all others, COMPLETE the Misfire and Fuel Monitors drive cycle procedure to learn the profile. REFER to Section

To verify the repair, RECREATE the original conditions that set the misfire DTC or caused the symptom using the

REFER to the scan tool manufacturers manual for specific information on the Mode 6 - On Board Test Results.

freeze frame data and customer information. MONITOR the cylinder misfire data in Mode 6 - On Board Test Results

Transit, COMPLETE the Misfire Monitor Neutral Profile Correction procedure using the scan tool.

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:

• 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 Valve Train Analysis.

REPAIR as necessary. REFER to the Workshop Manual Section 303-00, Engine System.

Refer to the Workshop Manual Section 303-00, Engine System and carry out the Compression Test and Cylinder Leakage

damage. REFER to the Workshop Manual Section 303-08, Engine Emission Control for more EGR system

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

• Access the PCM and monitor the EGRMC1F (MODE), EGRMC2F (MODE), EGRMC3F (MODE) and EGRMC4F (MODE) PIDs.

 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.

HD13 RECREATE THE MISFIRE SYMPTOM WITH EEGR SYSTEM DISABLED

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

GO to Pinpoint Test **KD** and DIAGNOSE the EGR system.

• 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

 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. • For vehicles equipped with an intake manifold runner control (IMRC) system, inspect the IMRC for any disconnected or damaged linkages. Disconnect the IMRC linkage and inspect the linkage for restriction. Spring tension in one direction is normal. Rotate the

IMRC plate to fully open and to fully closed, contacting both limits.

Clear the PCM DTCs. REPEAT the self-test.

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

Access the PCM and control the suspect INJ\_OFF (MODE) PID.

are present, INSTALL a new Fuel Injector.

Access the PCM and monitor the SYNC (MODE) PID.

Clear the PCM DTCs. REPEAT the self-test.

No For DTCs P0300 or P0316, GO to **HD17**. For all others, GO to HD15.

A CMP sensor that is installed out of synchronization may set a DTC. Yes To verify the correct CMP sensor installation, REFER to the Workshop Manual Section 303-14, Electronic Engine Controls.

HD17 CHECK THE GENERATOR FOR EXCESSIVE ELECTRICAL NOISE

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

If the CMP sensor is installed correctly,

• With the engine running, determine if the generator is still noisy.

HD18 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.

Clear the PCM DTCs. REPEAT the self-test.

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

HD19 CHECK THE PHYSICAL CONDITION OF THE CRANKSHAFT PULSE WHEEL

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

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

Focus, KA, MKC,

2, On Board Diagnostic (OBD) Drive Cycle.

and VERIFY the misfire count is below 10.

HD20 CHECK THE RECENT VEHICLE REPAIR HISTORY

KA, MKC, Mustang, and Transit, 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.

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

GO to **HD21**. HD21 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?

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