

HD: Misfire Detection Monitor

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HD1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

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

Yes	No
For DTCs P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P0309, P0310 or P0316, GO to HD2 .	For all others, GO to Section 4, Diagnostic Trouble Code (DTC) Charts and Descriptions .
For DTC P0315, GO to HD21 .	

HD2 DTCS P0300 THROUGH P0310 AND P0316: 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](#).

Are any values out of range?

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

HD3 CHECK FOR OTHER NON-MISFIRE CONTINUOUS MEMORY DTCS

- Retrieve all continuous memory DTCs.

Are there any non-misfire continuous memory DTCs present?

Yes	No
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 HD4 .

HD4 CHECK FOR ANY KOEO SELF-TEST DTCS

- Carry out the KOEO self-test.

Are any KOEO DTCs present?

Yes	No
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 HD5 .

HD5 CHECK FOR ANY KOER DTCS

- Carry out the KOER self-test.

Are any KOER DTCs present?

Yes	No
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 HD6 .

HD6 CHECK THE IGNITION SYSTEM FOR CONCERNS

- For ignition 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	No
REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.	GO to HD7 .

HD7 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	No
REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.	GO to HD8 .

HD8 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	No
<p>For vehicles equipped with a differential pressure feedback EGR system, GO to HD9.</p> <p>For vehicles equipped with an electric EGR (EEGR) system, GO to HD10.</p> <p>For vehicles equipped with an EGR system module (ESM) EGR system, GO to HD11.</p> <p>For all others, GO to HD15.</p>	<p>REPAIR the vacuum system.</p> <p>CLEAR the DTCs. REPEAT the self-test.</p>

HD9 MONITOR THE DIFFERENTIAL PRESSURE FEEDBACK EGR SYSTEM RELATED PIDS

- Ignition ON, engine running.
- Bring the engine to normal operating temperature.
- Access the PCM and monitor the DPFEGR PID.
- Access the PCM and monitor the EGRVR 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](#).

Are any values out of range?

Yes	No
GO to Pinpoint Test HE and DIAGNOSE the EGR system.	GO to HD12 .

HD10 MONITOR THE EEGR SYSTEM RELATED PIDS

- Ignition ON, engine running.
- Bring the engine to normal operating temperature.
- Access the PCM and monitor the EGRMC1F, EGRMC2F, EGRMC3F and EGRMC4F PIDs.
- Access the PCM and monitor the MAP 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](#).

Are any values out of range?

Yes	No
GO to Pinpoint Test KD and DIAGNOSE the EGR system.	GO to HD13 .

HD11 MONITOR THE ESM SYSTEM RELATED PIDS

- Ignition ON, engine running.
- Bring the engine to normal operating temperature.

- Access the PCM and monitor the DPFEGR PID.
- For E-Series and F-150 with 4.6L 2V engine,
- Access the PCM and monitor the EGRPCT PID.
- For all others,
- Access the PCM and monitor the EGRVR PID.
- Access the PCM and monitor the MAP 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](#).

Are any values out of range?

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

HD12 RECREATE THE MISFIRE SYMPTOM WITH THE DIFFERENTIAL PRESSURE FEEDBACK EGR 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.
- EGR Vacuum Regulator Solenoid 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	No
GO to HD15 .	REMOVE and INSPECT the EGR valve for signs of contamination, unusual wear, carbon deposits, binding or other damage. REFER to the Workshop Manual Section 303-08, Engine Emission Control for more EGR system information. REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.

HD13 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	No
GO to HD15 .	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 DTCs. REPEAT the self-test.

HD14 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	No
GO to HD15 .	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 DTCs. REPEAT the self-test.

HD15 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	No
REPAIR as necessary. REFER to the Workshop Manual Section 303-00, Engine System. CLEAR the DTCs. REPEAT the self-test.	GO to HD19 .

HD16 DTC P1336: IDENTIFY THE CMP SENSOR TYPE

Note: The variable reluctance (VR) sensors have 2-wire connectors, Hall-effect sensors have 3-wire connectors.

- Identify which type of CMP sensor the vehicle uses.

Does the vehicle use a Hall-effect sensor?

Yes	No
GO to HD17 .	GO to HD18 .

HD17 CHECK THE CMP SENSOR LOW RANGE OUTPUT VOLTAGE

- Ignition OFF.
- CMP Sensor connector disconnected.
- Connect a 5 amp fused jumper wire between the following:

Point A CMP Sensor Connector, Harness Side	Point B CMP Sensor Connector, Component Side
VPWR	VPWR
PWRGND	PWRGND

- Ignition ON, engine running.
- Digital multimeter (DMM) on low voltage DC scale.
- Measure the voltage between:

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

Does the voltage switch between LOW (less than 2 volts DC) and HIGH (greater than 8 volts DC)?

Yes	No
A Hall-effect CMP sensor that is installed out of synchronization may produce a DTC. To verify the correct CMP sensor installation, REFER to the Workshop Manual Section 303-14, Electronic Engine Control, Engine Synchronizer. If the CMP sensor is installed properly, GO to HD19 .	INSTALL a new CMP sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. CLEAR the DTCs. REPEAT the self-test.

HD18 CHECK THE CMP SENSOR OUTPUT VOLTAGE

- Ignition OFF.
- PCM connector connected.
- CMP Sensor connector disconnected.
- DMM on low voltage AC scale.
- Ignition 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	No
GO to HD19 .	INSTALL a new CMP sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. CLEAR the DTCs. REPEAT the self-test.

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	No
GO to HD20 .	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	No

REPAIR as necessary.

CLEAR the DTCs. REPEAT the self-test.

GO to [HD21](#).

HD21 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 pulse wheel 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	No
If the CKP is installed properly, GO to HD22 .	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) . 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.

HD22 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 electronic ignition (EI) pulse ring fastened to the harmonic dampener.

Does the crank pulley wobble or is the pulse ring loose or damaged?

Yes	No
INSTALL a new pulley or damper assembly. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. 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.	GO to HD23 .

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.

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 and verify the concern is still present.

Is the concern still present?

Yes	No
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.
