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Title: Diagnosing Cylinder Performance Related Symptoms Using the CPA Tool

Applies To: N9 & N10, 2010 & OBD Emissions MaxxForce® DT, 9 & 10, 2007 Emissions MaxxForce® DT, 9 & 10, 2004 Emissions DT466, DT570 & HT570

CHANGE LOG

Dealers: Please refer to the change log text box below for recent changes to this article:

03/30/2015- Removed 2010 fault list and referred readers to IK1201269
03/24/2015- Revised warning statement
01/13/2015 - Link updated to WPL 14-018G
8/26/2014 - Replacement Part Numbers were added

Description:

This article describes the CPA Tool and the procedure for diagnosing cylinder performance related symptoms using the CPA Tool.

The CPA Tool is a specialized tool that is capable of detecting cylinder performance concerns during hot idle, cold idle, and a road test. The CPA tool helps troubleshoot cylinder performance concerns, including intermittent issues.

The tool can also be used to analyze and interpret other engine sensor signal and actuator data with the assistance of Navistar Technical Services.

WARNING- The only engines that can have a CPA Tool Road test without the assistance of Navistar Technical Services are:
1) EPA 2004 DT
2) EPA 2007 & 2010 MaxxForce DT, 9, 10
3) MaxxForce N9 & N10.

The 2013 HD OBD MaxxForce DT, 9, 10 can only be road tested if the engine calibration is EER5 or later.

When testing an engine not listed above NEVER drive the vehicle with the CPA cables connected to the engine as the engine may stall without warning.

2013 OBD MaxxForce DT, 9, & 10 engines can be identified with ServiceMaxx engine diagnostic software or if engine serial number is 3500000 to 3999999

If the CPA Tool does not identify a weak cylinder (and the symptoms persist) then verify that there are no issues with the UVC connectors and proceed to the CPA HPOP test (no injector faults) or IK1201269 (if injector faults exist)

CPA Related Links

- CPA Tool Instructions (here)
- CPA Software installation (upgrade) IK2700062
- WPL14-018G - Warranty iApproval Requirements
- WIL2800061 CPA WAC explanation
  - Note: Road test is now an add-on as it is **not needed** if misfire is noticeable at idle or at no load.
- A CPA training course is offered on the LMS

Vehicle Symptoms:

• Engine Misfire

• Rough Running

Replacement Part Numbers:

Cylinder Performance Analyzer (CPA) entire kit - OE-11178
Camshaft Position (CMP) Sensor Tee Harness (yellow) - OE-11178-2
USB cable - OE-11178-1
Crankshaft Position Sensor Tee Harness (black) - OE-11178-3

Check for Diagnostic Trouble Codes (DTC):

• Are there any active or inactive DTCs related to the Code Groups identified below?

1. **Code Group 1**
   - If there are active or inactive codes from Code Group 1 then perform CPA Test
2. **Code Group 2**
   -If there are active or inactive codes from Code Group 2 then perform Condensed Performance Diagnostics

3. Misfire or rough running but no DTCs- perform Condensed Performance Diagnostics

• Any active DTCs not listed in Code Group 1 or 2 should be diagnosed per applicable Engine Diagnostic Manual:

CODE GROUP 1
(EPA 2010) MaxxForce DT, 9, 10:
- See IK1201269

(EPA 2007) MaxxForce DT, 9, 10:
- 8001-6, 8002-6, 8003-6, 8004-6, 8005-6, 8003-6-Injector Closed Coil-Open Circuit
- 8001-5, 8002-5, 8003-5, 8004-5, 8005-5, 8003-5-Injector Open Coil-Open Circuit
- 8001-4, 8002-4, 8003-4, 8004-4, 8005-4, 8003-4-Injector Open Coil-Short Circuit
- 8001-3, 8002-3, 8003-3, 8004-3, 8005-3, 8003-3-Injector Close Coil-Short Circuit
- 8151-5-Bank A Injector Open Coil Short
- 8151-6-Bank A Injector Close Coil Short
- 8152-5-Bank B injector Open Coil Short
- 8152-6-Bank B-Injector Close Coil Short

(EPA 2004) DT466, 570:
- 421-428-High Side to Low Side Open
- 431-436-Hgh Side Shorted to Low Side
- 451-456-High Side Shorted to Ground or Vbat
- 513-Low Side to Bank 1 Open
- 514-Low Side to Bank 2 Open
- 515-Bank 1 Low Side Short to Ground
- 521-Bank 2 Low side Short to Ground

CODE GROUP 2
(EPA 2010) MaxxForce DT, 9, 10:

- See IK1201269

(EPA 2007) MaxxForce DT, 9, 10:
- 8001, 8002, 8003, 8004, 8005, 8006-1-Cylinder Balance Below Minimum Limit
- 8001, 8002, 8003, 8004, 8005, 8006-0-Cylinder Balance Maximum Limit Exceeded

CPA Tool Steps:

NOTE:

'Signal Check' does not diagnose cylinders; it is part of the set up process and checks for a strong CMP and CKP signal. The 'Signal Check' will NOT issue a WAC

WARNING:

When testing a 2013 OBD MaxxForce DT, 9, & 10 the CPA Tool must only be connected when the vehicle is parked and the parking brake is set. NEVER DRIVE the vehicle with the CPA Tool (or its cables) connected to the engine on the 2013 OBD engine. The engine can stall without warning.

The only engine that can have CPA Tool road test without the assistance of Navistar Technical Services is the EPA 2004 DT, 2007 & 2010 MaxxForce DT, 9 &10.

1. Perform one of the following tests:
   a. 'Cold Idle' (perform Signal Check after running the Cold Idle test)
   b. 'Hot Idle' (Signal Check highly recommended first)

c. 'Perform Signal Check' (required in order to perform any road test)
d. 'Full Load to Highway Speed' (road test)- **DO NOT USE ON 2013 MaxxForce 9, 10 & DT OBD ENGINES**
e. 'User Defined' (Tech Services will instruct technicians as needed)
f. 'Recorder' (newly offered, no WAC provided. Enables "Sensor 3 &4" of the CPA Tool- Tech Service will instruct as needed)

2. If there is an issue with one or two cylinders, a WAC will be generated.

NOTE:

A WAC does not confirm a failed injector, but does confirm that the cylinder has a problem. Condensed Performance Diagnostics may point out other conditions such as a valve train or compression concerns.

Disregard the WAC if repairing the injector harness or connector corrects the performance complaint.

Attaching CPA Test Results to a Case File:

1. Create a Technical Service Case File and note in the issue description the details of the symptoms and test results.
2. Follow all of the diagnostic procedures as outlined in this article
3. Run the tests using the CPA Tool as outlined in this article.

Attaching Recorded Data To Case File:

When using the Cylinder Performance Analyzer, the data recorded must be attached to the Tech Services Case File. To attach the data to a Case File, follow the steps and screenshots below:

1. From case file home page, select 'Browse' (*Figure 3*).

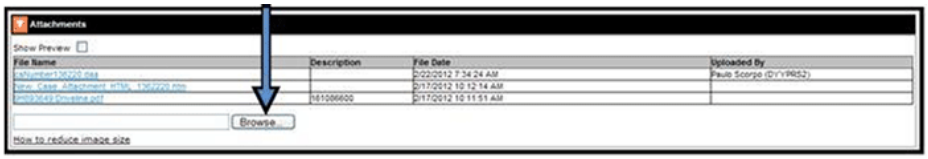

Figure 3

2. Select the 'Engine Cylinder Performance Analyzer' folder.
   - The folder is defaulted on the computer's desktop. (*Figure 4*).

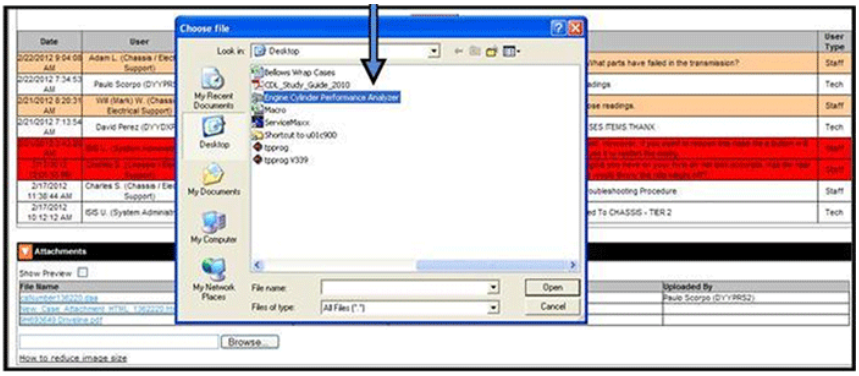

Figure 4

3. Select the WinZip File(s) from the appropriate test recording(s) (*Figure 5*).

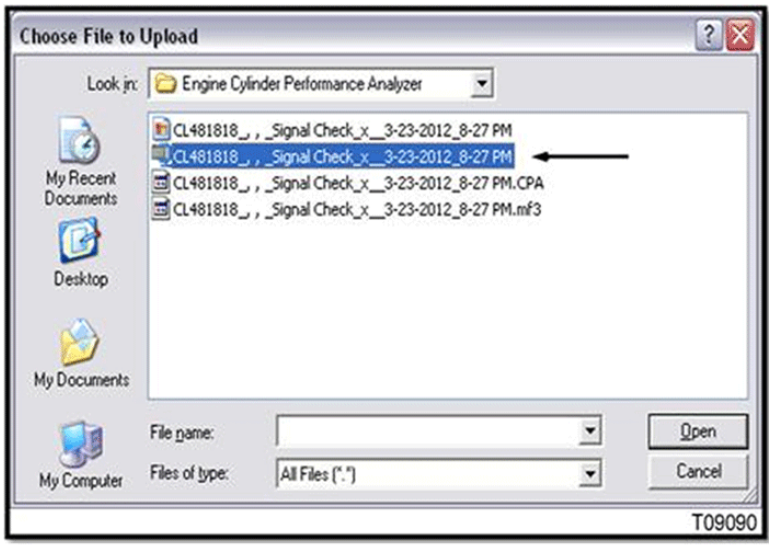

Figure 5

NOTE:
When a CPA test is conducted, the program automatically saves four files into the Engine Cylinder Performance Analyzer desktop folder. The four files are a: CPA File, MF3 File, JPEG File, and a WinZip File. The ONLY file that needs to be uploaded onto the case file is the WinZip File.

4. Verify the WinZip File is under the Attachments section of the case file home screen.

Condensed Performance Diagnostics:

Condensed Performance Diagnostics steps are required prior to using CPA Tool if no injector DTC's are present

A. (EPA 2010 & OBD) Based on 0000001624 (steps):

1. Initial Key ON Check
2. Visual Inspection
3. Electronic Service Tool (EST) Connection and Data Recording
4. Check for Diagnostic Trouble Codes (DTCs)
   - Example of SRT for this is KL12-2135T Steps 1-4 for 2010 MaxxForce DT in 4400 (.5 hours)

8. IPR Circuit Test
   - Example of SRT for this is KL12-2118T Step 8 for 2010 MaxxForce DT in 4400 (.1 hours)

14. CPA Tool test
   - Example of SRT for this is KL12-2126T Step 14 for 2010 MaxxForce DT in 4400 (.7 hours)

If problem is not found with CPA test then proceed with steps 5, 6, 7, 9, 10, 11, 13, 12

B. (EPA 2007) Based on EGED380 (steps):

1. Visual Inspection
2.1 Fuel Quality
2.2 Fuel Pressure and Aeration
3. Sensor compare
4. Check for Diagnostic Trouble Codes (DTCs)
   - Example of SRT for this is K12-2240K Steps 1-4 for 2007 MaxxForce DT in 4300 (.8 hours)

-IPR Circuit Test: wiggle IPR connector with engine idling & listen for stumble (not cited in EGED380)
-Run CPA Tool test

C. (EPA 2004 DT466, 570) Based on EGED290-1 (steps):

1. Diagnostic Trouble Codes
2. KOEO Standard Test
3. KOEO Injector Test
4. Engine Oil

5. Fuel
6. Fuel Pressure and Aerated Fuel
12. Relative Compression

-IPR Circuit Test: wiggle IPR connector with engine idling & listen for stumble (not cited in EGED380)
-Run CPA Tool test

Cylinder Performance Analyzer Test:
The CPA test analyzes the crankshaft and camshaft speed signals to determine cylinder performance. The data is processed by the CPA tool and indicates which cylinder(s) has a performance issue. The CPA tool assists the technician in the evaluation of performance concerns.

1. Launch the CPA tool from ServiceMaxx and follow the instructions for the CPA tool.
2. Connect CMP and CKP breakout cables to the sensors and CPA tool. Rotate both knobs (POT) fully clockwise +(right).
3. Select appropriate test
   - -Cold Idle test (perform Signal Check after running the Cold Idle test)
   - -Hot Idle test (complete Signal Check first)
   - -Signal Check (Signal Check is required before a road test)
   - -Full Load to Highway Speed test (road test).

If the CPA Tool generates a WAC Code, inspect for mechanical damage and inspect the injector wiring and all related connectors. Otherwise, replace the failed injector.

Contact Information
If you would like to order additional Tools, have questions, concerns, feedback, or need replacement parts, please contacts the Navistar Service Tool Support Center.

Phone: 1-800-365-0088 (Toll Free) or 630-985-4171 **OR** Submit a Service Tool IKNow Case

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