DETROIT DIESEL

DDEC® VI Troubleshooting

NUMBER: 08 **DDEC VI**–49 **S.M. REF.:** 3.3 **ENGINE:** EPA07 Series 60 **DATE:** October 2008

SUBJECT: DDDL MULTIPLE CYLINDER CUTOUT ROUTINE

PUBLICATION: DDC-SVC-MAN-0009

The DDDL Multiple Cylinder Cutout Routine has been added to the faulty fuel injector troubleshooting.

3.3 FAULTY FUEL INJECTOR

To determine if a faulty fuel injector is causing the cylinder to misfire, use the DDDL 7.X Manual Cylinder Cutout Routine. This test can be used to direct the technician to a cylinder with a fault, such as a faulty injector or other mechanical damage (broken piston ring, perforated dome, scored cylinder, misadjusted valves, etc.).

NOTE:
Please be aware that the cylinder cutout test results will be inaccurate if the engine load changes during the test. Therefore, the engine fan, air compressor, air conditioning, and other sources of variable load must also remain stable throughout the test.

NOTE:
The cylinders are identified by position and not by firing order.

⚠ WARNING:
ENGINE EXHAUST

To avoid injury from inhaling engine exhaust, always operate the engine in a well-ventilated area. Engine exhaust is toxic.

1. Start the engine.
2. Ensure the engine is at operating temperature.
3. Connect the vehicle to DDDL 7.X.
4. Check for fault codes; if there are any fault codes repair them first.
5. Verify that A/C (front and rear, if equipped) and defrost is off.
6. Turn the Fan on using the dash-mounted fan switch, if equipped. If the vehicle does not have a dash-mounted fan switch, shut off the ignition, open the hood, and disconnect the fan control solenoid.

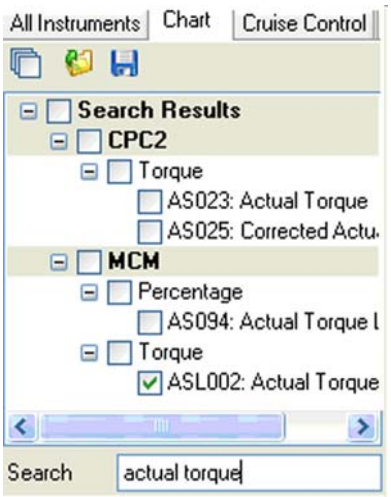
7. Choose “Cylinder Cutout Test (Manual)” from the “Service Routines” work window. Click the + to set the idle speed to 1000 RPM and click **Apply**.
8. Allow engine speed to stabilize.
9. Perform Dual Cylinder Cutouts.
   [a] Click **Off** for cylinders 1 and 6 and wait 15 seconds.
   [b] Click **Turn All Cylinders On** and wait 5 seconds.
   [c] Click **Off** for cylinders 2 and 5 and wait 15 seconds.
   [d] Click **Turn All Cylinders On** and wait 5 seconds.
   [e] Click **Off** for cylinders 3 and 4 and wait 15 seconds.
   [f] Click **Turn All Cylinders On** and wait 5 seconds.
10. Perform Triple Cylinder Cutouts.
   [a] Click **Off** for cylinders 1, 2 and 3 and wait 15 seconds.
   [b] Click **Turn All Cylinders On** and wait 5 seconds.
   [c] Click **Off** for cylinders 4, 5 and 6 and wait 15 seconds.
   [d] Click **Turn All Cylinders On**.
11. Reset engine idle speed back to 600 RPM by clicking **Reset**.
12. Allow engine speed to stabilize.
13. Close DDDL connections and turn ignition off.
14. Review data. Refer to section 3.3.1, “Reviewing Data.”

3.3.1 REVIEWING DATA

Review data as follows:

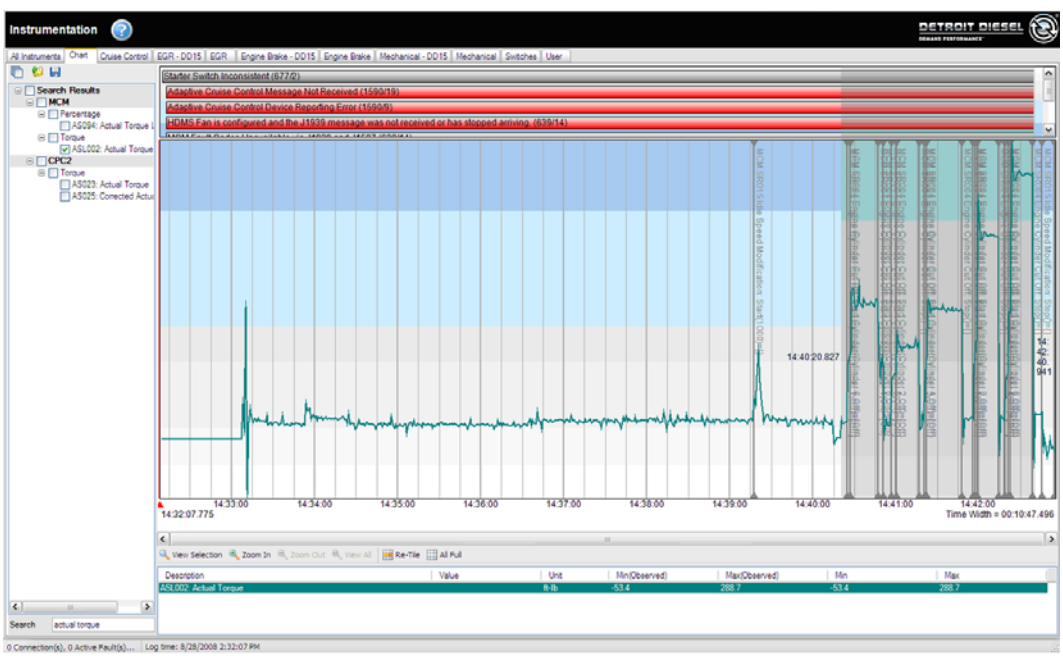
1. Open the log file.
2. Go to the “Instrumentation” work window and select the “Chart” tab.

3. Graph the MCM parameter by typing “actual torque” in the search field and select the MCM parameter – ASL002: Actual Torque.



4. Click on **View All** to contract the time scale so that the complete chart from beginning to end is visible.

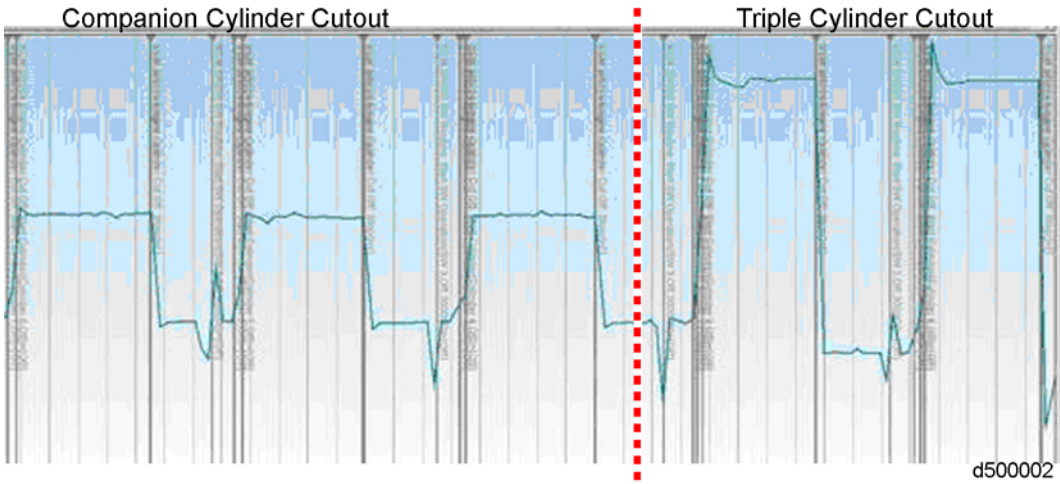
5. Highlight the Cylinder Cutout Test by clicking on the chart where the first set of companion cylinders are cut and drag the mouse to the end of the test.



6. Click on **View Selection** and only the time you selected will be visible.
7. Analyze the companion cylinder cutout graph to determine a low power or over-fueling condition.

3.3.2 ANALYZING CYLINDER CUTOUT TEST RESULTS

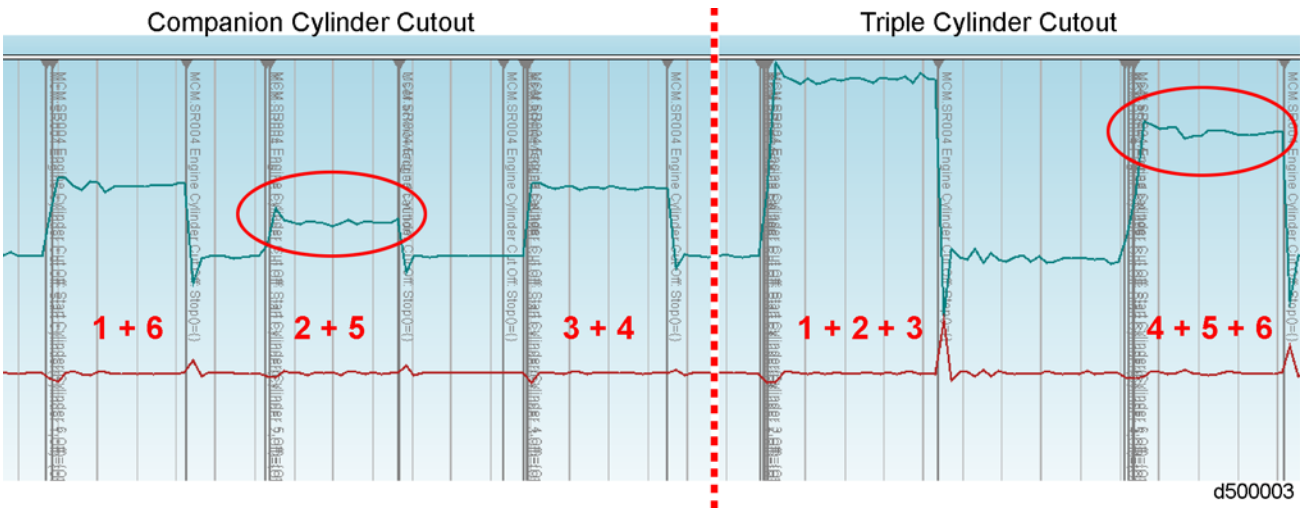
A “Normal Condition” will show all companion cylinder cutouts with equal torque values. Both triple cylinder cutouts show equal torque values as well.



A “Low Power Condition” will produce the lowest amount of torque increase when a faulty cylinder is manually cutout.

The engine will produce the greatest amount of torque increase when a fully contributing cylinder is manually cutout.

A “Low Power Condition,” verified by the dual cylinder cutouts, will cause the triple cylinder cutouts to show relatively low actual torque when the suspect cylinder is cut. The common cylinder with the lowest actual torque in both the dual and triple cylinder (bank) cutouts will contain the suspect fault.



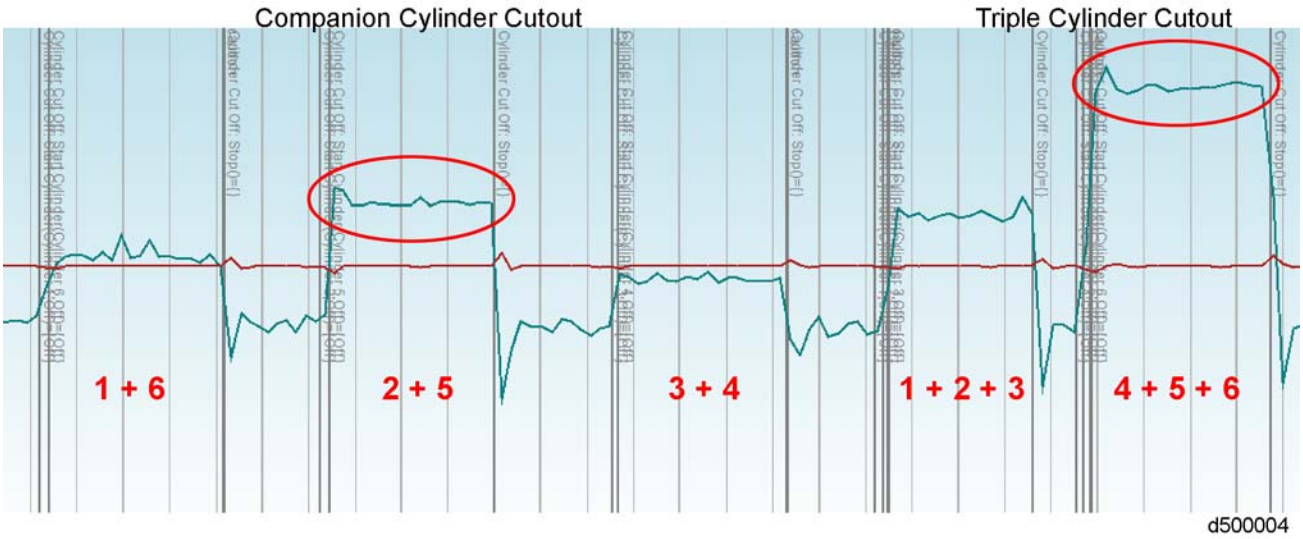
The low power cylinder here would be cylinder 5.

Remove and replace injector assembly whose value is lower than the other five injectors. Refer to section “Removal of E3 Electronic Unit Injector” in the “Fuel System” chapter of the *EPA07 Series 60 Service Manual* (DDC-SVC-MAN-0005). If disconnected, reconnect the fan control solenoid. Verify replaced injector assembly and clear the fault codes.

An “Over Fueling Condition” will produce the greatest amount of torque increase when a faulty cylinder is manually cutout.

The engine will produce the lowest amount of torque increase when a properly fueling cylinder is manually cutout.

An over-fueling condition, verified by the dual cylinder cutouts, will cause the triple cylinder cutouts to show relatively high actual torque when the suspect cylinder is cut. The common cylinder with the highest actual torque in both the dual and triple cylinder (bank) cutouts will contain the suspect fault.



Cylinder 5 would be suspect for over-fueling.

Remove and replace injector assembly whose value is higher than the other five injectors. Refer to section “Removal of E3 Electronic Unit Injector” in the “Fuel System” chapter of the *EPA07 Series 60 Service Manual* (DDC-SVC-MAN-0005). If disconnected, reconnect the fan control solenoid. Verify replaced injector assembly and clear the fault codes.

ADDITIONAL SERVICE INFORMATION

Additional service information is available in the *EPA07 Series 60 Troubleshooting Guide* (DDC-SVC-MAN-0009) The next printed revision to this manual will include this information.

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