



# **2010 MaxxForce® DT, 9 and 10 Diagnostics**

**Study Guide  
TMT-121131**

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# Introduction

Welcome to this engine-training course, 2010 MaxxForce® DT, 9, and 10 Diagnostics for Technicians. This course will introduce technicians to the diagnostic procedures used to solve starting and performance problems.

This program consists of this introduction and the following three modules: Hard-Start No-Start Required Tests Procedures, Hard-Start No-Start Special Test Procedures, and Performance Diagnostic Test Procedures.

Upon completion of this course, you will be able to identify the steps and procedures used to diagnose both starting and engine performance issues, and use ServiceMaxx™ to perform various engine tests.

This program refers to Engine Symptoms Diagnostics, Hard-Start No-Start Diagnostics, Performance Diagnostics, Electronic Control Systems Diagnostics, Performance Specifications, and the Diagnostic Trouble Code Index. Each of these refers to a section of the diagnostic manual on ISIS®.

The diagnostic manual on ISIS® includes both Hard-Start No-Start and Performance Diagnostic procedures.

## Objectives

**Upon completion of this course, you will be able to:**

- **Identify the steps and procedures used to diagnose both starting and engine performance issues.**
- **Use ServiceMaxx™ to perform various engine tests.**

***“Each of these refers to a section of the diagnostic manual on ISIS®.”***

This module will cover the required tests used to diagnose starting issues.

The two forms available when diagnosing these engines are Hard-Start No-Start Diagnostics and Performance Diagnostics. Both forms are found on ISIS® and can be used to avoid lost time and unnecessary repairs.

***“There are several tests used to identify the cause of a starting issue.”***

There are several tests used to identify the cause of a starting issue. These tests are divided into required tests and special system tests.

Always perform the required tests in sequence, and perform the special tests only when directed by the results of a required test.

If the cause of the problem is found when performing a required test, repair the fault and retest. If the problem was corrected, do not complete any remaining required tests. In addition, always use the latest service literature when servicing an engine.

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# Hard-Start No-Start Required Test Procedures

## Module 1

### Overview

This module will explain the required tests for Hard-Start and No-Start issues.

There are six required tests for starting issues. They are:

- Key-On Check
- Visual Inspection
- EST and Data
- Check for DTC's
- Engine Cranking
- Relative Compression

### Initial Key-ON Check

The first test is the Initial Key-ON Check.

Start by turning the ignition switch ON. Now, watch the instrument panel for a Water-In-Fuel message. The message will flash for 5 to 10 seconds and turn off. If the message stays on solid after 5 to 10 seconds, take a fuel sample from the filter module and check for water.

***“This module will explain the required tests for Hard-Start and No-Start issues.”***

***“If the message stays on solid after 5 to 10 seconds, take a fuel sample from the filter module and check for water.”***

## Visual Inspection

The second Required Test procedure is the Visual Inspection of the engine.

Start by checking the oil level and quality. If the oil level is low, inspect for leaks.

***“Low oil level or low oil pressure can affect the oil level in the high-pressure reservoir and prevent the injectors from operating.”***

Low oil level or low oil pressure can affect the oil level in the high-pressure reservoir and prevent the injectors from operating.

Ensure the oil is the proper viscosity and not contaminated with fuel or coolant. Contaminated oil will also prevent the injectors from operating correctly.

Inspect the fuel system. Check the fuel level in the tank and inspect the system for leaks.

Take a fuel sample from the filter module and check for water, sediment, gasoline, kerosene, waxing, and icing. If necessary, take a sample from the tank to determine if the fuel in the tank is contaminated.

Check the coolant level in the de-aeration tank. A low coolant level could indicate other engine problems. Also, check if the coolant is contaminated with oil. Oil in the coolant may be an indication of major engine failure.

Check the exhaust system. Leaks around the Exhaust Aftertreatment Assembly or dented pipes could be a sign of a high restriction that could prevent the engine from starting.

Check the air-filter restriction-indicator. If the restriction is greater than 25 inches of water, or 6.2 kPa, replace the air filter and retest.

Inspect the charge-air system for leaks. Leaks in the charge-air piping will allow dirt and dust to enter the system.

Check the Electrical System for chaffed wiring or broken connections.

Inspect the camshaft position sensor, crankshaft position sensor, and the injection pressure regulator for proper electrical connection. When these components are disconnected, the engine will not start.

***“Leaks around the Exhaust Aftertreatment Assembly or dented pipes could be a sign of a high restriction that could prevent the engine from starting.”***

## **EST Connection and Data Recording**

The third Required test procedure is EST Connection and Data Recording. Start by establishing communication between the Electronic Service Tool, or EST, and the ECM.

If communication cannot be established, refer to “J1939 Data Link” in “Electronic Control System Diagnostics.”

***“Monitor the sensor values and record them on the diagnostic form.”***

Now check for biased sensors by recording their Key-On Engine Off values.

Monitor the sensor values and record them on the diagnostic form.

Compare these sensor values to specifications. Diagnose sensors that are out of spec by referring to “Electronic Control Systems Diagnostics.”

Next, run the high and low output state test and monitor the EGR Control and Engine Throttle Position values. If either value does not meet specifications, refer to Electronic Control Systems Diagnostics.

Finally, record the status of the Diesel Particulate Filter on the diagnostic form.

## **Checking for DTCs**

The fourth required test Procedure is to Check for DTCs.

***“Start by checking the engine for active and previously active diagnostic trouble codes.”***

Start by checking the engine for active and previously active diagnostic trouble codes.

2010 engines now use Suspect Parameter Number, or SPN, and a Failure Mode Indicator, or FMI to identify failure codes.

Refer to the “Diagnostic Trouble Code Index” to diagnose any active

codes before continuing. Evaluate any previously active DTCs that would have an effect on starting.

## Engine Cranking

The fifth required test procedure is Engine Cranking. This test allows you to analyze the engine's systems by monitoring specific sensor values while cranking.

Start by using an appropriate adapter to connect the fuel pressure gauge to the intake manifold.

Open the hard-start no-start session in ServiceMaxx™. Then, press the record button and crank the engine for a maximum of 10 seconds while monitoring the fuel pressure gauge.

After cranking the engine, look at the following values in the recorded snapshot: Switch Battery, Engine Speed, Injection Control Pressure, and Exhaust Back Pressure.

If Switch Battery drops below specification, see "ECM Power" in "Electronic Control Systems Diagnostics."

If the engine speed remains at 0 RPM, see "CKP and CMP" in "Electronic Control Systems Diagnostics."

***"The Engine Cranking test allows you to analyze the engine's systems by monitoring specific sensor values while cranking."***

***“If engine-cranking speed is below spec, check the starting and charging systems.”***

If engine-cranking speed is below spec, check the starting and charging systems.

If fuel delivery pressure is below specification, refer to the fuel system special test procedures.

If injection control pressure is below specification, perform the ICP Open Loop test in Special Test Procedures.

If EBP is above spec, check the position of the exhaust brake valve. The valve should be open while cranking the engine. If the valve is open, drop the exhaust before the Pre-DOC and monitor EBP during cranking. If the EBP is now within spec, check the exhaust system for restrictions.

***“The Relative Compression Test is used to determine if each cylinder is in good mechanical condition.”***

### **Relative Compression Test**

The sixth required test procedure is the Relative Compression Test. This test is used to determine if each cylinder is in good mechanical condition.

During this test, the ECM looks at the speed of each piston's approach to top-dead-center compression and then the speed of each piston's down-stroke after passing top-dead-center. The ECM compares the two speeds and calculates the difference.

Start by opening the Relative Compression Test in ServiceMaxx™.

A window will appear to guide you through the test procedure.

The test will begin and you'll be instructed to crank the engine. After several seconds, the on-screen instructions will tell you to stop cranking. ServiceMaxx™ will now gather the information from the test and tell you to review the results.

A graph of the results will appear once the test is complete. A cylinder with low compression is represented by a shorter bar on the graph. In this case, the speeds of the piston's approach and down-stroke have little difference. Repeat this test a total of three times and compare the results from each test.

This concludes the Hard-Start No-Start Required Test Procedures.

***“A cylinder with low compression is represented by a shorter bar on the graph.”***

## NOTES

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# Hard-Start No-Start Special Test Procedures

## Module 2

### Overview

This module explains the special test procedures for electrical diagnostics, fuel delivery diagnostics, and injection-control-pressure diagnostics.

Only perform these special procedures if directed by one of the six required tests.

### Electrical Diagnostics: Inlet Air Heater Amperage Draw

This section covers the amperage draw test used when diagnosing the Inlet Air Heater.

Start by installing an amp clamp around the Inlet Air Heater relay battery positive circuit.

Turn the ignition switch ON.

Now, use ServiceMaxx™ to perform the Intake Air Heater Test.

Observe the meter reading and record this information on the diagnostic form.

If the amperage draw does not meet specifications, refer to the Inlet Air Heater System in “Electronic Control System Diagnostics.”

***“Start by installing an amp clamp around the Inlet Air Heater relay battery positive circuit.”***

If the amperage draw meets specifications, the Inlet Air Heater is working correctly.

## **Fuel Delivery Pressure Diagnostics**

### **Overview**

This section covers the four tests used when diagnosing the Fuel Delivery System. These four tests will check for a faulty fuel pump, fuel aeration, high fuel inlet restriction, and a clogged filter.

### **Fuel Pump Electrical Check**

***“The Fuel Pump Electrical Check verifies that the fuel pump is receiving the correct voltage.”***

The first test is the Fuel Pump Electrical Check. This test verifies that the fuel pump is receiving the correct voltage.

Start by connecting Breakout Harness 6023 between the engine harness and the fuel pump. Turn the ignition switch ON. Measure the voltage between pins 1 and 4, then between 1 and 6. Record the measurement.

The fuel pump times out after 10 seconds unless engine speed is present. Wait 10 seconds between ignition switch cycles to reset the timer.

If the voltage does not fall between 9-12 volts, go to FPC in “Electronic Control System Diagnostics.”

## Aeration Check

The second test is the Aeration Test. This test will determine the cause of fuel aeration.

Start by connecting the Fuel Pressure Gauge to the test port on the front of the intake manifold. Route the end of the clear hose into a diesel fuel container.

Now turn the ignition switch ON. While the pump is running, open the gauge shut-off valve briefly to check for aeration.

If the fuel is not aerated, continue to the Fuel Filter Test.

If the fuel is aerated, continue to the next step.

Use the appropriate adapter to connect the clean fuel tank to the fuel filter-housing inlet, and then connect a fuel pressure gauge to the front of the intake manifold.

Now, turn the ignition switch ON. Open the shut-off valve to check for aeration.

If the fuel is still aerated with the clean fuel tank attached, replace the fuel filter housing.

If the fuel is not aerated, inspect and repair the fuel tank and lines as necessary.

***“Use the appropriate adapter to connect the clean fuel tank to the fuel filter-housing inlet.”***

## Fuel Filter Check

The third test is the Fuel Filter Check. This test allows you to determine if the fuel filter is restricted.

Connect the Fuel/Oil Pressure Test Coupler and the Fuel Pressure Gauge to the filter housing test port.

Turn the ignition switch ON. Record the gauge reading.

***“If the fuel pressure was below spec at the intake manifold test port, and is now within spec at the fuel filter housing test port, the filter is restricted.”***

If the fuel pressure was below spec at the intake manifold test port, and is now within spec at the fuel filter housing test port, the filter is restricted. Replace the filter and clean the strainer.

If the pressure is below specification at both test ports, the fuel pressure regulator may be the cause. To check this, disconnect the fuel return line from the Fuel Filter housing. With the return line disconnected, the check valve in the return fitting closes and deadheads the system. Turn the ignition switch On, and measure the fuel pressure.

If fuel pressure is now above specification, replace the Fuel Pressure Regulator.

If fuel pressure is still below specification, go to the Alternative Fuel Supply Test.

## Alternative Fuel Supply Test

The fourth test is the Alternative Fuel Supply test. This test is used to verify that the fuel supply is not restricted.

Connect the fuel pressure gauge to the filter housing test port. Use the appropriate adapter to connect the clean fuel tank to the filter-housing inlet. Turn the ignition switch ON. Measure and record the fuel pressure.

If the fuel pressure is now within specification, the system was restricted. Inspect and repair the fuel tank and lines as necessary.

If fuel pressure is still below specification, replace the fuel pump.

## Injection Control Pressure Diagnostics

### Overview

This section covers the six tests used when diagnosing the Injection Control Pressure, or ICP System. These six tests will check for a Biased ICP Sensor, empty reservoir, Injection pressure regulator circuit faults, failed high-pressure oil pump, failed Injection Pressure Regulator valve, and under valve cover leaks.

***“The Alternative Fuel Supply test is used to verify that the fuel supply is not restricted.”***

***“If fuel pressure is still below specification, replace the fuel pump.”***

***“The ICP Open Loop Test checks for a biased ICP sensor or circuit.”***

### **ICP Open Loop Test**

The first test is the ICP Open Loop test. This test checks for a biased ICP sensor or circuit.

Start by disconnect the gray Under Valve Cover connector, or UVC 1, and then crank the engine for a maximum of 20 seconds. This test will set an ICP code. Ignore the code and clear it after UVC 1 is reconnected.

If the engine starts, see ICP Sensor in “Electronic Control System Diagnostics.”

If the engine does not start, perform the High-Pressure Pump Reservoir Inspection.

### **High-Pressure Pump Reservoir Inspection**

***“The High-Pressure Pump Reservoir Inspection checks the level of the oil in the high-pressure pump reservoir.”***

The second test is the High-Pressure Pump Reservoir Inspection. This test checks the level of the oil in the high-pressure pump reservoir.

Loosen the Engine Oil Temperature sensor. Watch for oil leaking around the sensor's threads.

If oil does not leak from around the threads, the reservoir is empty. See Lubrication System in “Engine Symptoms Diagnostics.”

If the reservoir is full, perform the IPR Control Test.

## IPR Control Test

The third test is the IPR Control Test. This test checks the Injection Pressure Regulator, or IPR, circuit.

Start by disconnecting the IPR connector and inspect it for damage or corrosion. Fix the connection if necessary.

Next, connect breakout harness ZTSE-4484 to the IPR valve, and leave the engine harness disconnected.

Now, energize the IPR valve by connecting battery positive and ground to the breakout harness.

Use ServiceMaxx™ to monitor ICP while cranking the engine.

If the ICP builds above 28 MPa, or 4000 psi, refer to IPR in “Electronic Control System Diagnostics.”

If the ICP does not build to 28 MPa, or 4000 psi, perform the High-Pressure Oil Pump Test.



## CAUTION

**Do not connect the test harness directly to the engine harness. Doing so will result in a blown fuse.**

## High-Pressure Oil Pump Test

The fourth test is High-Pressure Oil Pump Test. This test determines if the high-pressure oil-pump can provide maximum ICP.

### NOTE

**This test retains Breakout Harness ZTSE-4484 with B+ and ground connections from the IPR Control test.**

Start by removing the high-pressure hose from the cylinder head fitting. Install the Mechanical Gauge to the high-pressure hose. Now monitor the gauge while cranking the engine.

If ICP goes above 28 MPa, or 4000 psi, perform the High-Pressure Rail Leak Test.

If ICP does not go above 28 MPa, or 4000 psi, perform the IPR Block-Off Test.

## IPR Block-Off Test

The fifth test is the IPR Block-off Test. This test determines which of the following has failed: the high-pressure pump or the IPR valve.

Start by removing the IPR valve from the high-pressure oil pump. Install the IPR Plug Tester. Now monitor the gauge while cranking the engine.

If ICP goes above 28 MPa, or 4000 psi, replace the IPR valve.

If ICP does not go above 28 MPa, or 4000 psi, replace the high-pressure pump.

### NOTE

**This test retains the mechanical gauge from the High-Pressure Oil Pump Test.**



## High-Pressure Oil Rail Leak Test

The sixth test is the High-Pressure Oil Rail Leak Test. This test locates the cause of oil leaks under the valve cover.

Start by reconnecting the high-pressure hose. Remove the valve cover and disconnect the injector connectors. Connect the breakout harness ZTSE-4484 to the IPR valve. Next, energize the IPR valve by connecting battery positive and ground to the breakout harness.

Now, inspect the high-pressure oil rail for leaks while cranking the engine.

If oil is leaking from the Engine Compression Brake valve, replace the valve.

If oil is leaking from the o-ring between the cylinder head and rail, remove the rail and replace the O-ring.

If any of the oil inlet adapters are leaking excessively, remove the rail and replace the failed inlet adapter.

If the ICP sensor is leaking, replace the sensor and o-ring.

This concludes the Hard-Start No-Start Special Test Procedures.

### NOTE

**Perform this test only if directed here from the High-pressure Oil Pump Test.**

## NOTES

[illegible]

# Performance Diagnostics

## Module 3

### Overview

This module explains the test procedures for diagnosing a performance issue.

The 18 tests in Performance diagnostics are shown here. Five of those are identical to tests covered in Hard-Start No-Start required tests.

In this module, we will only cover the thirteen tests that are unique to Performance Diagnostics.

### KOER Standard Test

Tests one through four, Initial Key-On Check, Visual Inspection, EST Connection and Data Recording, and Checking for DTCs were covered in Hard-Start No-Start required tests.

The fifth test is the Key On Engine Running Standard Test. This test checks the ability of the ICP system to create the proper pressure.

Start by selecting the KOER Standard Test in ServiceMaxx™.

The ECM controls the engine speed while commanding maximum ICP pressure. The Test then returns the engine to idle and lowers ICP to the normal pressure.

***“This module explains the test procedures for diagnosing a performance issue.”***

***“The KOER Standard Test checks the ability of the ICP system to create the proper pressure.”***

If a code sets during the test, go to “Diagnostic Trouble Code Index.”

## **Fuel Aeration Check**

***“The Fuel Aeration Check checks for aerated fuel.”***

The sixth test is the Fuel Aeration Check. This test checks for aerated fuel.

Start by connecting the Fuel Pressure Gauge to the intake manifold test port. Route the clear hose of the gauge into a clean fuel container.

Now, turn the ignition switch ON and open the gauge shut-off valve. Watch the clear hose to check for aeration.

If the fuel is aerated, perform the fuel delivery system procedures in Hard-Start No-Start Special Tests.

If the fuel is not aerated, perform the engine low idle to high idle test.

## **Engine Low Idle to High Idle Test**

***“The Engine Low Idle to High Idle Test monitors engine performance throughout the RPM range.”***

The seventh test is the Engine Low Idle to High Idle Test. This test monitors engine performance throughout the RPM range.

Start by selecting the Performance Session in ServiceMaxx™. Press the record button and wait five seconds.

Now, monitor the Accelerator Pedal Position signal, as you press the

accelerator pedal fully to the floor. If the signal does not go from 0% to 99.6% see APP in the “Electronic Control Systems Diagnostics.”

Next, start the engine and idle for 20 seconds. Then press the accelerator pedal completely to the floor for 20 seconds. Now, return to low idle.

Open the snapshot file and compare Fuel Delivery Pressure, Injection Control Pressure, Exhaust Back Pressure, Diesel Particulate filter differential pressure, and Intake Manifold Pressure to both high idle and low idle specifications.

If Fuel Delivery pressure is out of spec, see fuel system in Hard-Start No-Start Diagnostics.

If the engine does not accelerate smoothly or feels like it is misfiring, perform the relative compression and cylinder cut out tests.

If ICP is below spec, perform the ICP tests in Hard-Start No-Start Diagnostics.

If EBP is above specification, inspect for turbocharger damage.

If the Diesel Particulate Filter Differential Pressure is above spec, refer to the Aftertreatment system in “Electronic Control System Diagnostics.”

***“If Fuel Delivery pressure is out of spec, see fuel system in Hard-Start No-Start Diagnostics.”***

If Intake Manifold Pressure is below spec, check the charge air cooling system for leaks and perform the crankcase pressure test.

If the values are within spec, continue to the Torque converter stall test.

***“The Torque Converter Stall Test checks engine performance under load when equipped with an automatic transmission.”***

## **Torque Converter Stall Test**

The eighth test is the Torque Converter Stall Test. This test checks engine performance under load when equipped with an automatic transmission.

Start by setting the parking brake and apply the service brakes. Then open the Performance Session in ServiceMaxx™.

Start the engine and shift to drive. Press the record button. Wait five seconds and push the accelerator firmly to the floor. Record the number of seconds it takes to reach the stall RPM.

If the stall test results are within spec, there are no performance issues.

If the stall test results are out of spec, proceed to the IPR Circuit Test.

## **IPR Circuit Test**

The ninth test is the IPR Circuit Test. This test determines if the Injection Control Pressure system is producing stable pressure.

Begin by opening the Performance Session and starting the engine. Wiggle the IPR connector while monitoring the ICP signal. If the engine stumbles, check the IPR connector and repair as necessary.

***“If the engine stumbles, check the IPR connector and repair as necessary.”***

Next, press the accelerator pedal to the floor and hold for 30 seconds. If the injection control pressure surges more than 1000 psi, stop the engine and disconnect UVC 1. Restart the engine and run the test again.

If the surge is still present, replace the IPR valve.

If the surge is not present, replace the ICP sensor.

## **KOER Air Management Test**

The tenth test is the Key On Engine Running Air Management Test. This test checks the operation of the EGR system.

Begin by Starting the engine and selecting the Air Management Test.

During this test, the ECM raises engine speed and measures mass airflow. With the airflow calculated, the ECM commands the EGR valve open, and looks for a change in mass airflow.

If a DTC sets during the test, refer to the “Diagnostic Trouble Code Index.”

***“The Key On Engine Running Air Management Test checks the operation of the EGR system.”***

***“The Turbocharger 2 Wastegate Control Operational test verifies that the turbocharger wastegate is operating properly.”***

## **Turbocharger 2 Wastegate Control Operational Test**

The eleventh test is the Turbocharger 2 Wastegate Control Operational test. This test verifies that the turbocharger wastegate is operating properly.

Begin by turning the pressure regulator knob of special tool ZTSE-4409 counterclockwise to the lowest setting. Connect shop air to the pressure regulator.

Next, use the proper hose and adapter to connect the regulated air source to the solenoid supply hose at the engine throttle valve.

Now, set the regulator to apply 21.5 psi, or 148.2 kPa, to the supply hose.

If the actuator rod moves smoothly through its range, perform the Turbocharger Wastegate 2 Control Solenoid Test.

If the rod doesn't move, or if it sticks, then perform the Isolated Actuator Test.

## **Turbocharger 2 Wastegate Control Solenoid Test**

The twelfth test is the Turbocharger 2 Wastegate Control Solenoid Test. This test determines if the solenoid is working correctly.



Begin with the set-up from the operational-test and 21.5 psi or 148.2 kPa applied to the supply hose. Using ServiceMaxx™, run the KOEO Output State Tests High and Low.

If the actuator does not move, refer to TC2WC in “Electronic Control Systems Diagnostics.”

If the actuator cycles open and closed, the turbo control is working correctly.

## Isolated Actuator Test

The 13th test is the Isolated Actuator Test. This test checks the operation of the wastegate actuator.

Begin by applying 21.5 psi or 148.2 kPa directly to the wastegate actuator.

If the actuator rod moves smoothly through its range, but did not during the operational test, check for a leak or blockage in the hose or solenoid.

If the actuator rod does not move, remove the rod from the turbocharger wastegate arm. Check if the wastegate valve moves freely.

If the valve moves freely, replace the actuator.

If the valve does not move freely, replace the turbocharger.

### NOTE

**When checking wastegate movement, mark the inner nut so the wastegate lever can be reinstalled in the same position.**

***“The Oil Breather Separator Test determines if the separator is functioning correctly.”***

## **Oil Breather Separator Test**

The 14th test is the Oil Breather Separator Test. This test determines if the separator is functioning correctly.

Start the engine and place a stethoscope on the Separator housing. Shut the engine off and quickly monitor for rotational noise.

If no noise is heard, replace the centrifugal breather.

If noise is heard, the breather is functioning correctly.

***“The Crankcase Pressure Test determines if the engine has excessive crankcase pressure.”***

## **Crankcase Pressure Test**

The 15th test is the Crankcase Pressure Test. This test determines if the engine has excessive crankcase pressure.

Begin the test by disconnecting the breather outlet tube at the oil separator. Use a bolt to block the tube going to the turbo inlet duct.

Connect special tool ZTSE-4039 to the oil separator elbow and connect the tool to a monometer.

Next, start the engine and hold the accelerator to the floor. Wait until the monometer reading stabilizes. Now, record the pressure.

If the pressure is above spec, refer to Performance Diagnostics for further steps.

If the pressure is within spec, perform the relative compression test.

## **Relative Compression Test**

The 16th test is the Relative Compression Test. This test was covered earlier in the Hard-Start No-Start Required Test Procedures.

## **Cylinder Cut Out Test**

The 17th test is the Cylinder Cut Out Test. This procedure pinpoints an inactive cylinder by disabling one injector at a time.

Start by opening the Cylinder Cutout test session and start the engine. Allow the engine to idle for five seconds.

Now, disable an injector. Monitor the engine load and fuel rate while listening for engine tone changes. Repeat this process for each injector.

Compare the results for a disabled injector to the baseline values for engine fuel rate and engine load. If the engine load and fuel rate did not increase when an injector was disabled, that cylinder is not contributing to engine performance.

***“The Cylinder Cut Out Test pinpoints an inactive cylinder by disabling one injector at a time.”***

If the engine load and fuel rate did increase when an injector was disabled, that cylinder is contributing to engine performance. No action is required.

## **Road Test**

***“The Road Test checks the engine’s performance at full load and rated speed.”***

The last test is the Road Test. This procedure checks the engine’s performance at full load and rated speed.

Start by turning the ignition switch ON and load the Performance session.

Now, start the engine and drive to an open stretch of road. When conditions are safe, start recording.

Select a suitable gear, and press the accelerator pedal fully to the floor and accelerate to rated speed at 100% load.

***“When the road test is complete, stop recording and review the results.”***

When the road test is complete, stop recording and review the results.

If Fuel Delivery pressure is out of spec, see fuel system in Hard-Start No-Start diagnostics.

If the engine does not accelerate smoothly or feels like it is misfiring, perform the relative compression and cylinder cut out tests.

If ICP is below spec, perform the ICP tests in Hard-Start No-Start Diagnostics.

If EBP is above specification, inspect for turbocharger damage.

If Intake Manifold Pressure is below spec, check the charge air cooling system for leaks and perform the crankcase pressure test.

If the values are within spec, there is no performance issue.

***“If the values are within spec, there is no performance issue.”***

## NOTES

This image shows a full page of blank handwriting practice paper. It features evenly spaced horizontal blue lines across the entire page, providing a guide for letter height and placement. There are no margins, text, or other markings present.

# Conclusion

This concludes the 2010 MaxxForce® DT, 9, and 10 Engine Diagnostics training program.

Thanks for your participation.

You are now required to take a post-test.

## NOTES

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