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Availability: ISIS, FleetISIS

Major System: COOLING

Current Language: English

Other Languages: NONE

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Author: Steven Bell

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Coding Information

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Title: Low Power No MIL Diagnostics

Applies To: 2010 MaxxForce 11, 13L Engine

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

Change Log

3/31/15- Removed N13 references from article. N13 Information is in the diagnostics manual. Reference the respective Fault Code Action Plan.
 11/3/14- Removed Signals to watch section- No longer relevant. Data can be reviewed in the performance snapshot.
 10/07/2014 - Fixed Video's
 09/03/2014 - Updated document to step based diagnostics. Added sample snapshots. Added SRT and Warranty coding. Added the information from IK0900060 - LTR (Low Temperature Radiator)

Description

Any complaint for low power, engine de-rate, or engine shutdown often with no service engine light (MIL). The diagnostics will require the CCV (Coolant Control Valve) and LTR (Low Temperature Radiator) to be inspected. This issue can also be very difficult to duplicate without a loaded trailer or hills to pull.

Diagnose and repair all other engine related fault codes before performing the below diagnostics. This article is only intended to repair low power issues with no service engine light.

The CCV consists of the CMV (Coolant Mixer Valve) and CFV (Coolant Flow Valve) and is located on the front of the engine, upper right side.

Symptoms

- Engine De-Rate with no warning lights in the cluster
- Warning Lamps in Cluster
- Fan Engages before the Programmed Temperature (Fan On Temp)

Possible Diagnostic Trouble Codes

SPN	FMI	Description
1173	16	TC2CIT Signal Above Desired (Interstage CAC Under Cooling)
27	0	EGRP Fault: Over Temperature
4076	0	ECT2 Above Critical (EWPS Programmable Limit)
4076	15	ECT2 Above Warning (EWPS Programmable Limit)

Overview



GOVERNMENT REGULATION: Engine fluids (oil, fuel, and coolant) may be a hazard to human health and the environment. Handle all fluids and other contaminated materials (e.g., filters rags) in accordance with applicable regulations. Recycle or dispose of engine fluids, filters, and other contaminated materials according to applicable regulations.

**WARNING:**

To prevent personal injury or death, make sure the engine has cooled before removing components.

**WARNING:**

To prevent personal injury or death, do not let engine fluids stay on your skin. Clean skin and nails using hand cleaner and wash with soap and water. Wash or discard clothing and rags contaminated with engine fluids.

DIAGNOSTIC PROCEDURE

Step	Action	Decision
1	Symptom Verification/ Data Acquisition Using EST, go to Sessions > Performance. Find an open stretch of road in order to perform Lug Down Test. When driving conditions are safe, select the record snapshot icon from the toolbar, and perform. Note: Engine must be at operating temperature before taking the snapshot. Lug Down procedure below: 1. Select a suitable high range gear (Example: In a 10 speed gearbox, select the 8th speed). 2. Allow engine speed to drop to 1000 rpm. 3. Press accelerator pedal fully to the floor, and accelerate to rated engine speed. After Lug Down Test is complete continue with a 2 minute cruise at 1500 rpm at highway speeds so coolant temps can be reviewed later.	Yes: Continue to Step 2A
		No: Continue to Step 2A

Step	Action	Decision
2A	Fuel Rail Pressure Verification Check for low fuel rail pressure. Using EST with ServiceMaxx™ software, use the playback feature and graph the following signal values from Lug Down Test: Signal Values: • Engine Speed • Fuel Rail Pressure (FRP) • Fuel Rail Pressure Desired (FRPD) Compare snapshot to Graph 3 and associated Graph Analysis Is FRP signal operating as per Graph 3 Graph Analysis?	Yes: Go to step 2B
		No: Diagnose and repair low fuel rail pressure (See Performance Diagnostics section in Engine Diagnostic Manual). After repairs are complete, go to step 1 and recheck.

Step	Action	Decision
2B	TC1 Turbine Outlet Pressure Verification Verify aftertreatment system is free of restrictions. Using EST, use the playback feature and graph the following signal values from Lug Down Test: Signal Values: • Engine Speed • Turbocharger 1 Turbine Outlet Pressure (TC1TOP)	Yes: Go to Step 2C
		No: Repair TC1TOP issue (See Electronic Control

	Compare snapshot to Graph 4 and associated Graph Analysis Is TC1TOP signal operating as per Graph 4 Graph Analysis?	Systems Diagnostics in Engine Diagnostic Manual). After repairs are complete, go to step 1 and recheck.
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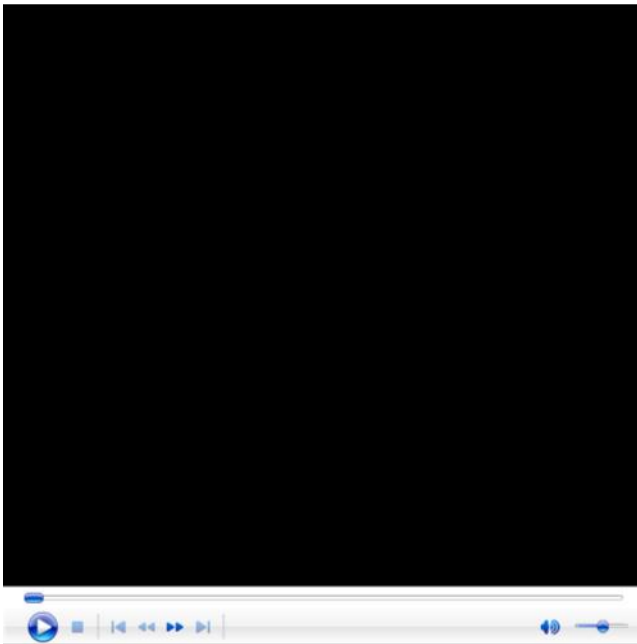
Step	Action	Decision
2C	Intake Manifold Pressure Verification Check for an Intake Manifold Pressure (IMP) issue. Use the playback feature in ServiceMaxx™, and graph the following signal values from Lug Down Test: Signal Values: • Engine Speed • Intake Manifold Pressure (IMP) • Accelerator Pedal Position 1 (APP1) • Vehicle Speed Compare snapshot to Graph 5 and associated Graph Analysis. Is IMP operating as per Graph 5 Graph Analysis?	Yes: Go to Step 3
		No: Diagnose and repair IMP issue (See Performance Diagnostics section in Engine Diagnostic Manual). After repairs are complete, go to step 1 and recheck.

Step	Action	Decision
3	Cooling package Inspection Check the cooling system package for external plugging. Especially check for debris packed between the cooling system components. (Bug screen, A/C Condenser, HP CAC, LTR, and the radiator) Is the Cooling Package free of debris?	Yes: Continue to Step 4
		No: Clean and Retest

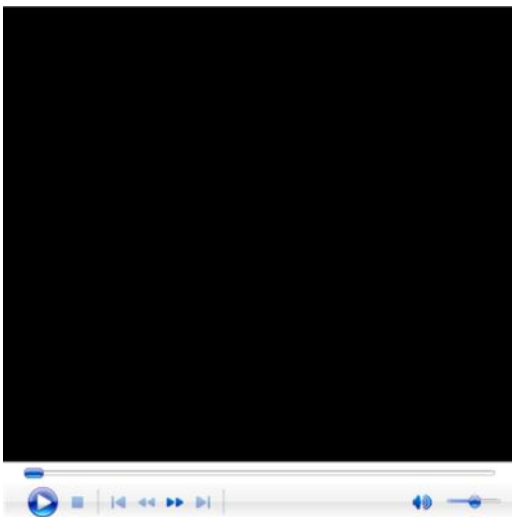
Step	Action	Decision
4	LTR Internal Flow Remove the inlet and outlet of the LTR. Using a garden hose at the inlet, make sure the flow coming out of the LTR is consistent with the flow going in. Is the LTR flowing properly? See Video 1 below for an example of a plugged LTR. See Video 2 below for an example of a clean LTR.	Yes: Replace the CCV
		No: Replace the LTR. Add Phosphate conditioner p/n 2611268C1 in cooling system when replacing the LTR.

The below videos are examples only and not a determination of the flow spec for the LTR.

Video 1

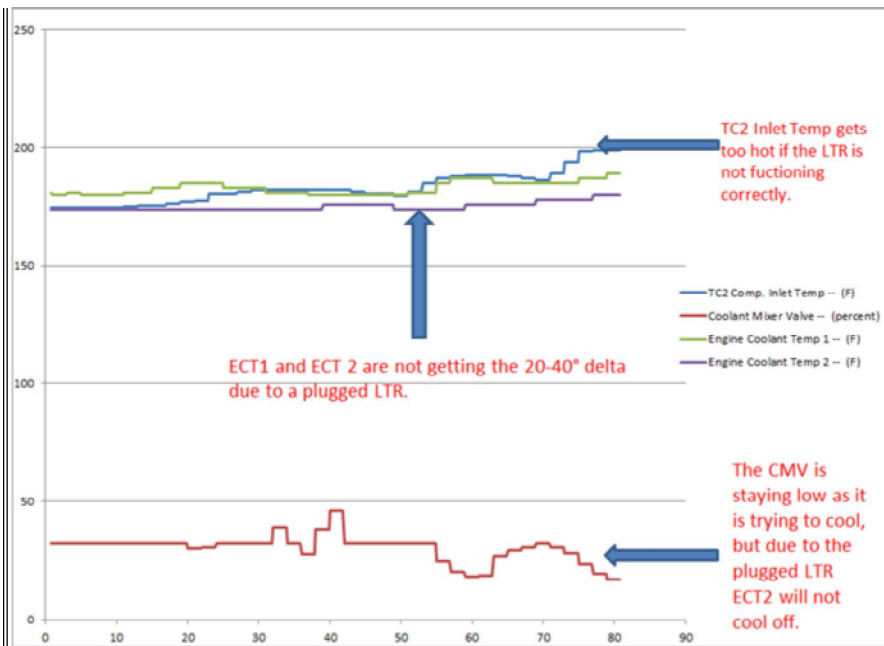


Flow of a Plugged LTR

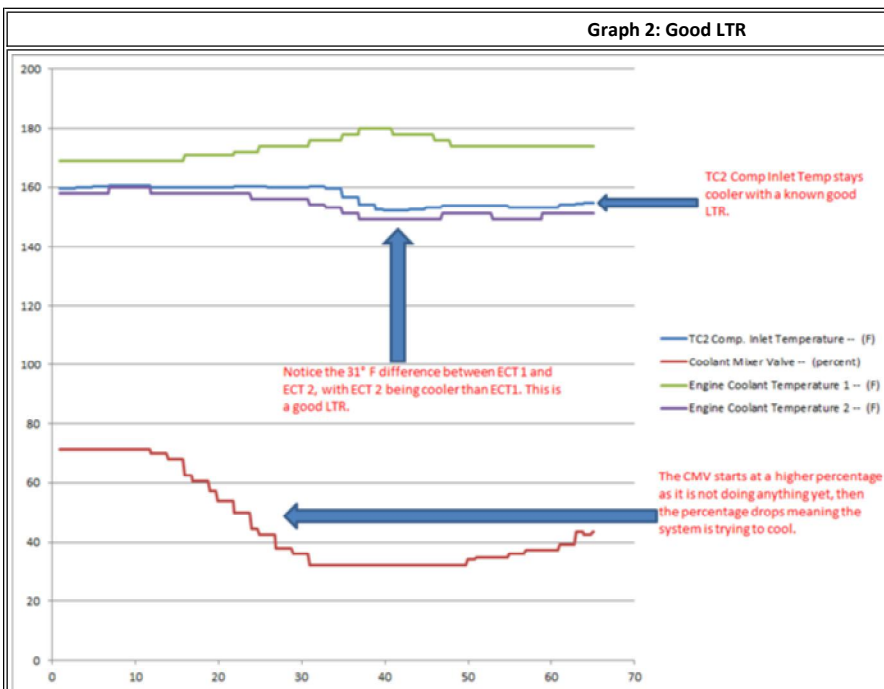
Video 2

Flow of a Clean LTR

Example Snapshot(s)**Graph 1: Plugged LTR**

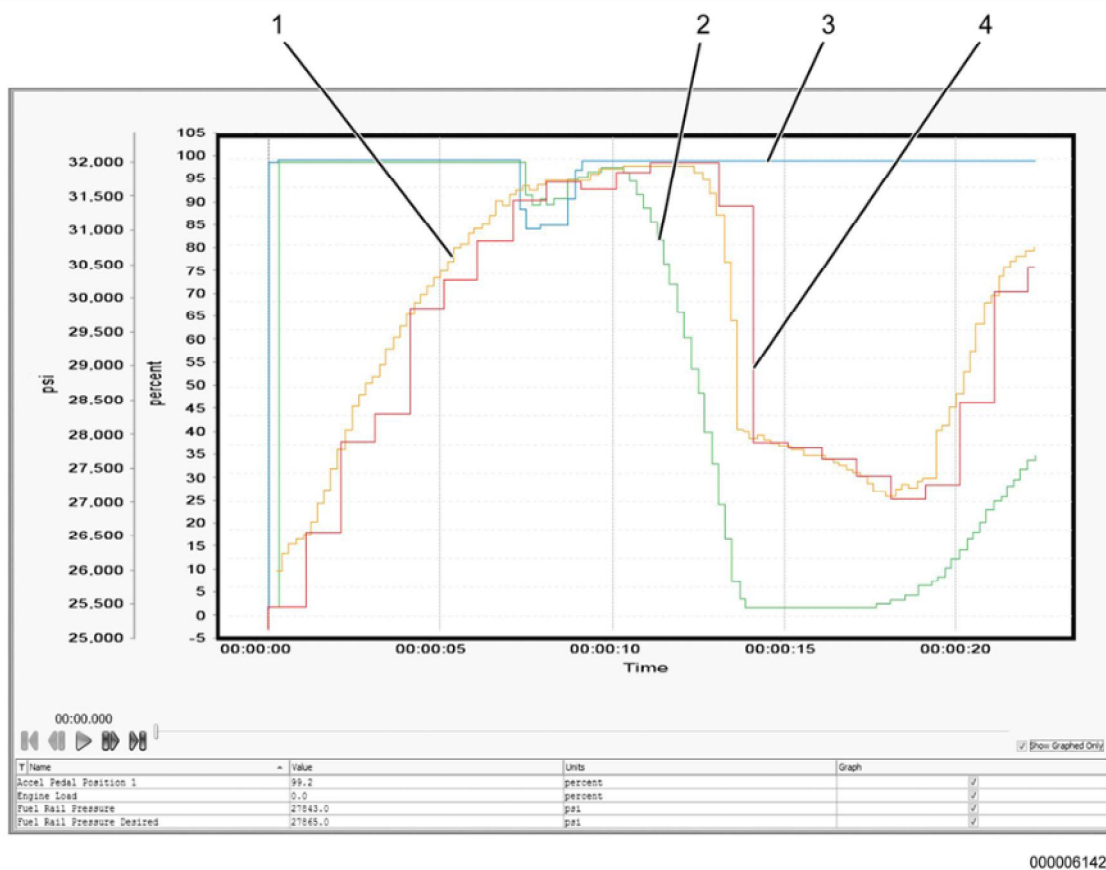


Snapshot of a Plugged LTR



Snapshot of a Clean LTR

Graph 3: Lug Down test (Engine Speed, FRP, and FRPD)

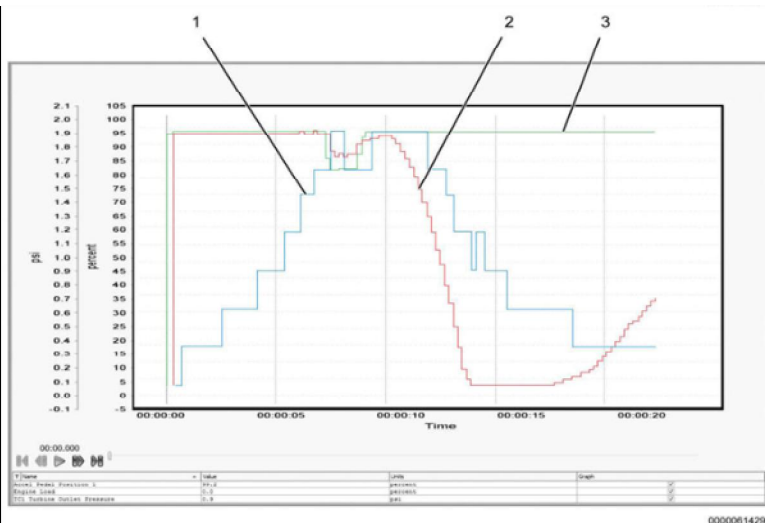


1. Fuel Rail Pressure Desired (FRPD) (psi) [Orange]
2. Engine load (percent) [Green]
3. Accelerator Pedal Position 1 (APP1) (percent) [Blue]
4. Fuel Rail Pressure (FRP) (psi) [Red]

Graph Analysis:

This graph shows a fuel management system operating as designed. This test does not give pass or fail results. It only allows the user to validate Fuel Rail Pressure (FRP) and Fuel Rail Pressure Desired (FRPD) signal values under load. As engine rpm increases, Fuel Rail Pressure (FRP) should steadily increase. Low FRP will cause low Intake Manifold Pressure (IMP). Diagnose low FRP concerns before diagnosing low IMP concerns.

Graph 4: Lug Down Test (Engine Speed and TC1TOP)



1. Turbocharger 1 Turbine Outlet Pressure (TC1TOP) (psi) [Blue]
2. Engine Load (Percent) [Red]
3. Accelerator Pedal Position 1 (APP1) (Percent) [Green]

Graph Analysis:

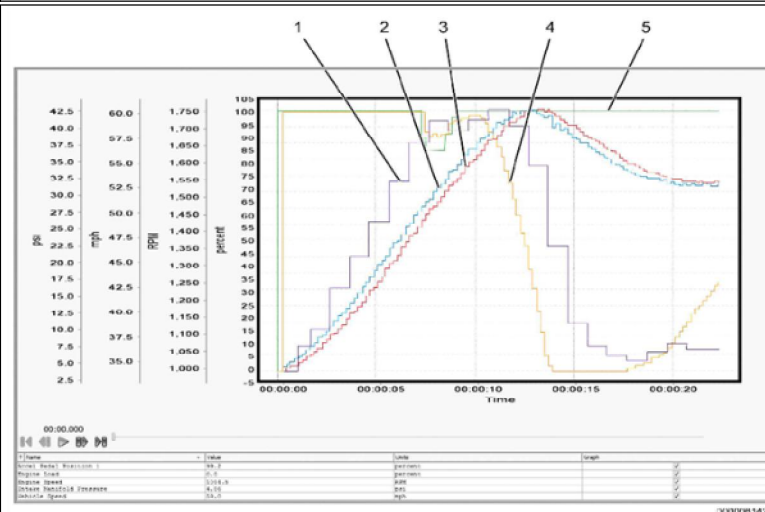
This graph shows an exhaust aftertreatment system operating as designed (unrestricted). This test does not give pass or fail results. It only allows the user to validate Turbocharger 1 Turbine Outlet Pressure (TC1TOP) signal value under load. High TC1TOP will cause low Intake Manifold Pressure (IMP). Diagnose high TC1TOP concerns before diagnosing low IMP concerns.

Actions:

1. Verify TC1TOP signal value is less than 5 psi (34 kPa) during Lug Down Test.

NOTE – Analyze Lug Down Test signal values only during engine acceleration, and not deceleration or shifting.

Graph 5: Lug Down Test (Engine Speed, APP1, Vehicle Speed, and IMP)



1. Intake Manifold Pressure (IMP) (psi) [Purple]
2. Engine speed (rpm) [Blue]
3. Vehicle speed (mph) [Red]
4. Engine load (percent) [Orange]
5. Accelerator Pedal Position 1 (APP1) (percent) [Green]

Graph Analysis:

This graph shows the Intake Manifold Pressure (IMP) signal value responding as designed. This test does not give pass or fail results. It only allows the user to validate IMP signal value under load. Engine power band is typically between 1300 to 1700 rpm with peak power occurring around 1600 rpm. Anything outside of this power band drops boost and power significantly. Accelerator Pedal Position 1 (APP1) signal value must be 99.6% to successfully reach peak boost during this test. Low IMP can be the result of low Fuel Rail Pressure (FRP), or high Turbocharger 1 Turbine Outlet Pressure (TC1TOP). Diagnose low FRP concerns first, high TC1TOP concerns second, and low IMP concerns third.

Service Part(s) Information

Part #	Description	Qty
2604297C92	LTR- ProStar	1
2611076C91	LTR- 8600	1
2612897C92	LTR- LoneStar	1
2609670C91	LTR O-Ring Kit	1
3008066C93	CCV	1
2611268C1	Phosphate Conditioner	1

Warranty Information

Warranty Claim Coding:

Group	09009 - Radiators
Noun	022 - Core

Diagnostics:

Action	SRT Code	Hours
LTR Internal Flow Check	T-time	0.3
External Radiator Cleaning	T-time	0.5

LTR Replacement:

Model	SRT Code	Hours
8600	Q09-1022U-20	2.1
ProStar	R09-1022U-20	1.9
5000	T09-1022U-20	2.1
Cat CT 660	TC09-1022U-20	1.6

Other Resources

- [Coolant Flow Valve Troubleshooting](#)
- [Coolant Mixer Valve Troubleshooting](#)
- [0000001741](#) - MaxxForce 11 and 13 Engine Diagnostic Manual (EPA 10) 2013 HD-OB
- [Master Service Information Page](#)

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