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 Major System: COOLING Created: 9/19/2013
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 Other Languages: NONE Author: Steven Bell
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Coding Information

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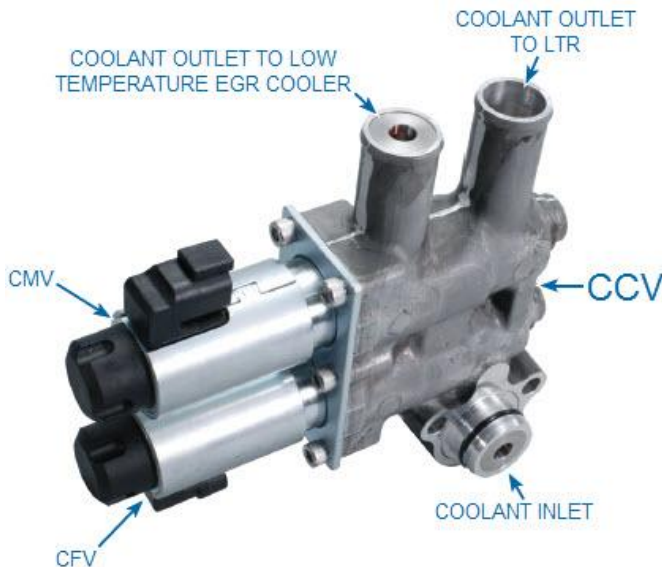
Title: Low Temperature Radiator Diagnostics

Applies To: Big Bore, ProStar, TranStar, WorkStar, LoneStar

DESCRIPTION

Any complaint for engine de-rate (loss of power) or engine shutdown when hot, loaded, or pulling hills 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.

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
- Engine Overheat
- 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

TROUBLESHOOTING

1. Bring the engine to operating temperature. Drive at highway speeds at operating temperature then cruise at 1500 rpm using cruise control and check the ECT1 and ECT2 temperatures. They should be separated by about 20°F to 40°F when the CCV starts directing coolant flow into the LTR. This may take a few minutes, it will not be an instant change, but will be a gradual separation of the temperatures. Be sure to capture this in a performance snapshot in case you need it later.
2. Run the CCV tests in ServiceMaxx with the engine at operating temperature. Look for a separation in the ECT1 and ECT2 temperatures. The valve will need to be actuated several times before you will start to see the difference in temps. If the valve is not working then check the connectors and terminals, ensuring they are fully seated in their connector and have not spread causing poor terminal tension. Perform the harness resistance test the circuits to check for any opens. Load test the wiring using a headlamp to make sure it is capable of handling a load.
3. Check the cooling system package for external plugging. Especially check for debris packed between the cooling system components. (Bug screen, a/c condenser, CAC, LTR and radiator)
4. Remove the LTR coolant inlet and outlet. Use a garden hose at the inlet and check the outlet for flow. Be sure to block off the aeration port on the LTR. If the flow is the same as the inlet then the radiator is not internally plugged. If the flow is less than the inlet then the LTR is plugged internally and needs to be replaced. If replacing the LTR be sure to also order p/n 2608109C91 (Phosphate Conditioner).
5. If the LTR is good and the CCV electrical circuits are checking good then replace the CCV and retest for any issues.

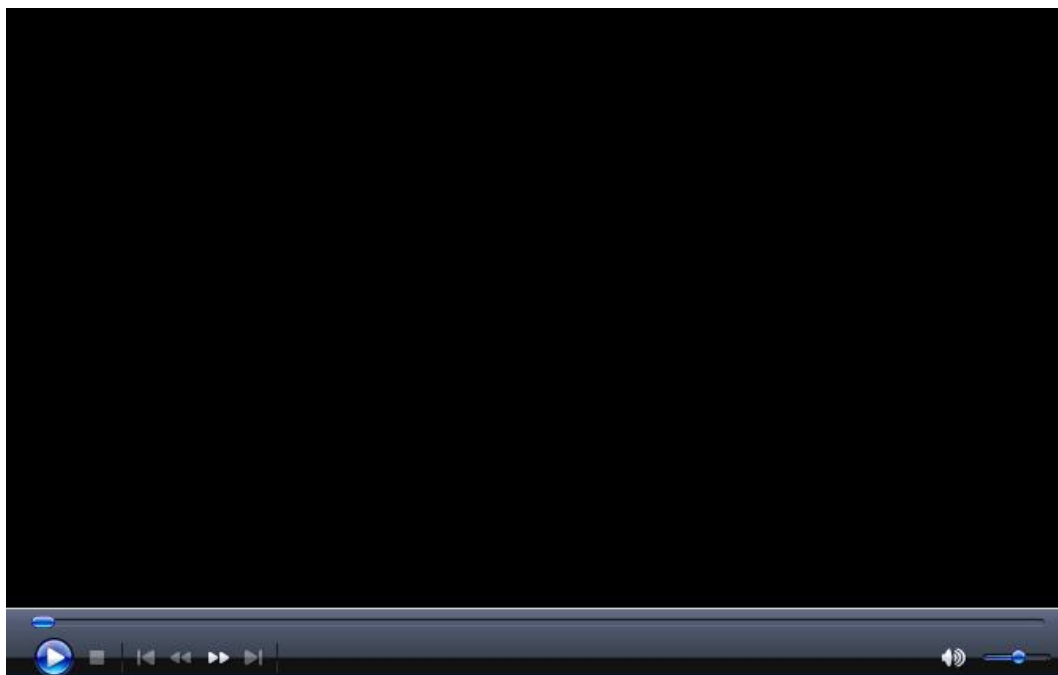
NOTE:

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

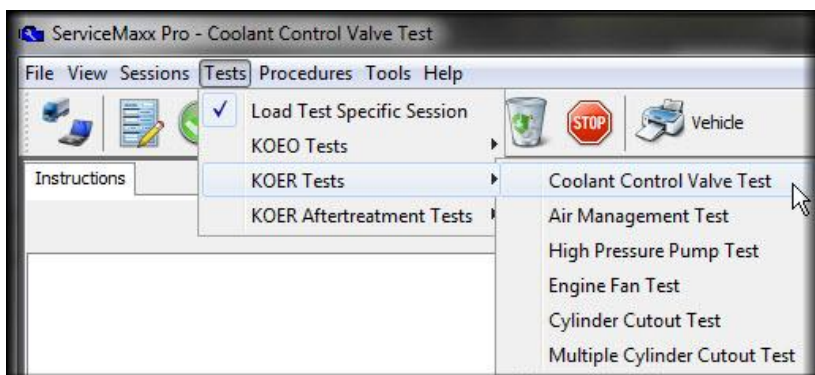
Below is an example of a plugged LTR flow



Below is an example of a new LTR Flow



SIGNALS TO WATCH



Coolant Valve Test Lock

Entry conditions:

- Engine Coolant Temp (Above 160 F)
- Brake Switch (Released)
- Accel Pedal Position (0 %)
- Vehicle Speed (0 MPH)

Use this test to validate the performance of the coolant control valves and cooler.

NOTE: Actuator control will only actuate 5 seconds per cycle. You will need to run the test over and over to see it's effect on ECT2. Later calibrations will allow longer run time.

* The Coolant Mixer Valve controlled to 95% will by-pass the low temperature radiator to help engine warm up. Controlling the valve to 5% will cool the coolant going to the EGR Cooler.

- 1) Run engine up to normal operating temperature.
- 2) With either valve at (95%) ECT1 and ECT2 should be within 5 degree F of each other.
- 3) With Coolant Mixer Valve at (5%) ECT2 and TC2CIT should cool 30 degree F lower than ECT1.

Temperature signals

Y	Name	Value	Units
	Engine Coolant Temp 1	.....	F
	Engine Coolant Temp 2	.....	F
	TC2 Comp. Inlet Temp	.....	F

Coolant Control Valves

Actuator: Coolant Flow Va...

On (95% Duty Cycle)

Off (5% Duty Cycle)

Test Inhibitors

Y	Name	Value	Units
	Accel Pedal Position 1	.....	percent
	Brake Switch	.....
	Vehicle Speed	.....	mph

Control Signals Other signals

Y	Name	Value	Units
	Coolant Flow Valve	.....	percent
	Coolant Mixer Valve	.....	percent

ADDITIONAL RESOURCES

- [Coolant Flow Valve Troubleshooting](#)
- [Coolant Mixer Valve Troubleshooting](#)
- [0000001741](#) - MaxxForce 11 and 13 Engine Diagnostic Manual (EPA 10) 2013 HD-OBD
- [0000002161](#) - 2013 N13 Engine Diagnostic Manual with SCR HD-OBD (EPA 10)
- [Master Service Information Page](#)

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