

F-Series/Excursion Powerstroke 2003.25 6.0L Power Stroke Diesel Engine Diagnostic Guide	-NOTE- IF CONCERN IS FOUND, SERVICE AS REQUIRED. IF THIS CORRECTS THE CONDITION, IT IS NOT NECESSARY TO COMPLETE THE REMAINDER OF THE DIAGNOSTIC PROCEDURE.	CUSTOMER NAME	DEALER NAME	P & A CODE	1863 CLAIM NUMBER	DATE	
		MODEL YEAR	VEHICLE SERIAL NO.(VIN)	ENGINE SERIAL NUMBER	ODOMETER		TYPE OF SERVICE PERSONAL <input type="checkbox"/> COMMERCIAL <input type="checkbox"/>
		CHASSIS STYLE	VEHICLE GVW	TRANSMISSION	AMBIENT TEMPERATURE		

Customer Concerns (Please list in this box)

Hard Start/No Start Diagnostics

NOTE: A hard start/ No start concern with EOT Temp. below 60F perform step 10 first.

1. Visual Engine/Chassis Inspection

Fuel Oil Coolant Electrical Hoses Leaks
Method Check
Visual

2. Check Engine Oil Level

- Check for contaminants (fuel, coolant).
- Correct Grade/Viscosity.
- Miles/Hours on oil, correct level.

Method Check
Visual

3. Intake/Exhaust Restriction

- Inspect air filter and inlet ducts.
- Inspect exhaust system.
- Check if air filter minder indicator has been illuminated

Method Check
Visual

4. Sufficient Clean Fuel

- Check if the WATER IN FUEL lamp has been illuminated.
- After verifying that there is fuel in the tank, drain a sample from fuel control module.
- Cetane rating between 40-50 is recommended for optimum start.

Method Check
Visual

5. Electric Fuel Pump Pressure

- Verify that the fuel pump has voltage and gnd. At key on.
- Measure fuel pressure at engine fuel filter housing test port with a (0-160 PSI) gauge at key on.
- **Fuel pump runs for 20 sec. at key on and pressure falls after key off.**

Instrument Spec. Measurement		
0-160 PSI Gauge	45 PSI min.	

If pressure fails low go to next step to verify no restriction

6. Electric Fuel Pump Inlet Restriction

- Measure restriction at fuel pump inlet.

Instrument Spec. Measurement		
0-30 " Hg vacuum	6" Hg MAX	

- » If > 6" Hg restriction, check lines between pump and fuel tank.
- » If < 6" Hg, inspect both fuel filters. If filters are OK, check fuel regulator. If regulator and filters are OK, replace fuel pump.

7. Perform KOEO On-Demand Self Test

- Use scan tool. DTC's set during this test are current faults

Diagnostic Trouble Codes

8. Retrieve Continuous Trouble Codes

- Use the scan tool.
- DTC's retrieved during this test are historical faults.

Diagnostic Trouble Codes

9. KOEO Injector Electrical Self Test (Click Test)

- Use scan tool. Injector DTC's will be displayed at test end.
- All injectors will momentarily click, then each injector will click in sequence 1-8. Sequence repeats three times.

Injector Trouble Codes

» If self test codes are retrieved, go to appropriate PPT test.

10. Scan Tool - Data List Monitoring

- Scan tool may reset below 9.5 volts.
- Select the parameters indicated from the scan tool parameter list and monitor while cranking engine.

Parameter	Spec.	Measurement
V PWR		
FICMLPWR	8 volt min.	
FICMVPWR		
RPM	100 RPM minimum	
ICP	3.5 mPa min. (500 PSI)	
ICP volts	.80 V min.	
FUEL PW	500 uS - 2 mS	
FICMSYNC	Yes/No	

- A - V PWR - If low voltage condition is present, check battery, charging system, or power/gnd circuits to the PCM.
 - B - FICMLPWR - No/low voltage indicated could be caused by 12-way connector issue or logic power fuse. Refer to Pinpoint S for detailed 12-way conn. diagnostics
 - C - FICMVPWR - No or low voltage indicated could be caused by 12-way connector issues.
 - D - RPM - Low RPM can be caused by starting/charging system issues. No RPM indicated while cranking could be CMP or CKP faults.
 - E - ICP - A minimum of 500 PSI (3.5 mPa) is required for the injectors to be enabled. No or low oil in the system, system leakage, injector O-Rings, faulty IPR, or high pressure pump could cause low pressure. IPR duty cycle defaults to 14 % (300 PSI) w/o CKP signal.
 - F - ICP V - Voltage reading below spec indicates low ICP during crank.
 - G - FUEL PW - Pulse width defaults to 0 w/o CKP signal
 - H - FICMSYNC- No sync could be caused CMP or CKP faults.
- » Refer to PC/ED section 4 for detailed test procedures.

11. Glow Plug System Operation

GPCM Operation

- Glow Plug ON time is dependent on oil temperature and altitude. The Glow Plug Control Module (GPCM) comes on between 1 and 120 sec., and does not come on at all if oil temp is above 131 F.
- Using a scan tool, check Continuous and KOEO DTC's. If codes are present go to Pinpoint Test AF.
- Verify B+ voltage is being supplied to GPCM.

- Using the scan tool GPCTM and EOT pids, verify glow plug "on" time.
- Turn key to run position, measure voltage ("on" time)

(Dependent on oil temperature and altitude)

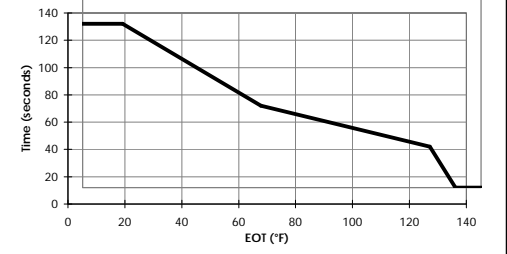
Relay on time	Spec.	Measurement
1 to 120 seconds	B +	

Wait to Start Lamp "on" time is independent from g/p "on" time

Glow Plug Resistance

- Disconnect the 4-pin connector at front of valve cover
- Measure each Glow Plug resistance to Bat. ground.
- Measure engine harness resistance to GPCM

Glow Plug Number	Glow Plug to Ground .1 to 2 ohms	Harness to GPCM connector 0 to 1 ohms
#1		
#3		
#5		
#7		
#2		
#4		
#6		
#8		



- Add 5 seconds to glow plug on time when above 7000 feet in altitude, but not to exceed 120 seconds.

Performance Diagnostics

1. Visual Engine/Chassis Inspection

- Verify that there are no fluid or pressure leaks.
- Inspect all wire connections for damage.
- Inspect MAP hose, intercooler hose, and manifolds for leaks.

Fuel Oil Coolant Electrical Hoses Leaks
Method Check
Visual

2. Sufficient Clean Fuel

- Check if WATER IN FUEL indicator has been illuminated.
- Drain sample from fuel control module housing.
- Cetane rating between 40-50 is recommended for optimum performance

Method Check
Visual

3. Check Engine Oil Level

- Check for contaminants (fuel, coolant).
- Correct Grade/Viscosity.
- Miles/hours on oil, correct level.

Method Check
Visual

4. Perform KOEO On Demand Test

- Use the scan tool.
- DTC's set during this test are current faults.

Diagnostic Trouble Codes

5. Retrieve Continuous DTC's

- Use the scan tool.
- DTC's retrieved during this test are historical faults.

Diagnostic Trouble Codes

6. KOEO Injector Electrical Self-Test

- Use the scan tool.
- All injectors will momentarily click, then individual injectors will click in sequence 1 through 8.

Injector Trouble Codes

» If self test codes are retrieved, go to appropriate PPT.

7. Intake Restriction

- Check filter minder switch/indicator.
- Measure vacuum on clean side of air inlet system at WOT with magnehelic gauge.

Instrument Spec. Check		
Magnehelic/Filter Minder	2"-25" H ₂ O	

8. EGR Position

- Perform with key on, engine off.
- Use scan tool to command Output State Control for EGR.
- Monitor EGR position sensor PID and calculate travel..

Instrument	Spec. Percent	Actual Percent
Scan tool	0% (0.6-1.2 V) Closed	_____ Closed
	90% - 100% (4.0-4.52 V) Open	_____ Open
	90% and 3.2 V Travel	_____ Travel

» Repair issue causing out of spec. values before continuing.

9. Exhaust Restriction

- Visually inspect exhaust system for damage
- Monitor EP with the scan tool with the engine temperature at 70° C (170° F) minimum at 3,800 RPM in park/neutral.

Parameter Spec. Measurement		
EP	234 kPa (34 PSI) MAX @ 3800 RPM	

10a. Electric Fuel Pump Pressure

- Measure fuel pressure at engine filter housing test port.
- Road Test- engine at full load condition

Instrument Spec. Measurement		
0-1.1 Mpa (0-160 PSI) Gauge	310-379 kPa (45-55 PSI) min.	

- » If fuel pressure fails low, Go to step10b.
- » If pressure is above spec, check fuel return lines for restriction.
- If no restriction is present, replace fuel pressure regulator valve.

10b. Electric Fuel Pump Inlet Restriction

- Measure restriction at fuel pump inlet.

Instrument Spec. Measurement		
0-30 " Hg vacuum	6" Hg MAX	

- » If > 6" Hg restriction, check lines between pump and fuel tank.
- » If < 6" Hg, inspect both fuel filters. If filters are OK, check fuel regulator. If regulator and filters are OK, replace fuel pump.

10c. Fuel Aeration Test

- Install clear hose on fuel return line at fuel control module.
- Refer to shop manual for approved procedure.
- Run at WOT for 2 min. Return fuel should be free of bubbles.

Method Check
Visual

» If air is present in return fuel, inspect fuel system for leaks.

11. Perform KOER On Demand Test

- This will test the ICP, EGR and VGT performance.

KOER DTC

12a. Low Idle Stability (ICP Pressure)

- Check at low idle, EOT above 70° C (170° F)
- Monitor ICP and RPM with scan tool.

Parameter Spec. @ 670 RPM Measurement		
ICP	4.5-5.5 Mpa ± .3MPa (650-800 PSI ± 45 PSI)	

- Take reading before disconnecting ICP
- If engine RPM is unstable, disconnect ICP sensor (ICP will default).
- » If RPM is still unstable, re-connect sensor and go to 12b.
- » If RPM smoothes out, the ICP sensor is at fault.

12b. Injection Pressure Regulator Test

- Check at low idle, EOT above 70° C (170° F)
- Monitor IPR with scan tool.

Parameter Spec. @ 670 RPM Measurement		
IPR	30% MAX	

- » If duty cycle is below MAX spec go to next step.
- » If duty cycle is above MAX spec, check for system leak with procedure in Hard Start/No Start section. Test 10c.

13. Boost Pressure Test

- Carefully inspect intercooler tubes/connections, turbocharger connections, and MAP hose for signs of damage or leaks.
- Perform boost test at 3300 RPM.
- Monitor MGP and RPM with scan tool.
- Road Test - select appropriate gear to obtain desired engine speed and full load on engine climbing hill or loaded truck..

3300 RPM		
Parameter Spec. PSI G Measurement		
MGP	22 PSIG MIN	

» If test fails low, inspect turbo blades for damage.

14. Crankcase Pressure Test

- Measure at oil fill tube with 6.0L Crankcase Pressure Tester p/n 303-758, with engine at 70° C (170° F) minimum.
- Block breather tube on left valve cover.
- Measure at WOT with no load at 3,000 RPM.

Instrument Spec. Measurement		
(0-60" H ₂ O) Magnehelic	8" H ₂ O MAX	

If more than 8" H₂O, refer to base engine in Shop Manual

15. Oil Aeration Test

- Run engine at 3000 RPM for 1 minute.
- Take oil sample from the Oil Pressure Switch port at idle.
- Inspect sample for presence of air bubbles.

Method Check
Visual

» Excessive oil aeration can be caused by depleted oil additives, pick-up tube leak, front cover seal leak, or upper pan seal leak.

Note: If performance concern still exists, refer to Enhanced Injector Diagnostics in this section.

See PC/ED manual, Section 4 for more detail on all of the above test steps.

When troubleshooting a Hard Start / No Start or Performance concern, this form must be filled out to the point of repair and returned, to receive warranty credit for diagnostic time for the parts listed below.

Fuel Injectors (9E527), regulator-injection control pressure (9C968), pump assembly-high pressure oil (9A543), turbo charger assembly (6K682), fuel control module (9G282), FICM (12B599), PCM (12A650), EGR valve (9P452), CKP sensor (6C315), CMP sensor (12K073), GPCM (12B533), and Glow Plugs (12A342).

Some labor operations are listed in more than one test step. Those operations include time for all occurrences and can be claimed only once.

What problems were found and what repairs were performed?

List Part Name, Number and Serial Number of parts replaced.