



DD15™ Fuel System Technician's Guide

NUMBER: 08 FSTG-16 S.M. REF.: 4.2 ENGINE: EPA07 DD15 DATE: December 2008

SUBJECT: HARD START (LONGER THAN NORMAL CRANK TIMES)

PUBLICATION: DDC-SVC-MAN-0037

Hard Start (Longer Than Normal Crank Times) has been added.

HARD START (LONGER THAN NORMAL CRANK TIMES)

Engine cranking time depends on battery voltage, cranking speed, engine temperature, ambient air temperature, fuel type, and oil viscosity. Typical cranking times range from two to five seconds. If crank times are extended out of this range in normal conditions, there may be a fuel system issue that may need to be addressed.

 WARNING: BODILY INJURY
To avoid injury from an explosion, do not use ether or starting fluid on engines equipped with a manifold (grid) heater.

NOTICE:
To avoid engine damage, do not use ether or starting fluid on engines equipped with a manifold (grid) heater.

Check as follows:

1. Use DDDL to check for stored or active codes and repair as necessary.

Stored or Active Codes
Stored or Active codes: _____

NOTE: Write any apparent stored or active codes in this table.

2. Did the symptom appear after a fuel filter service, fuel system repair or when the truck was delivered from the factory?
 - [a] Yes, refer to section "Fuel System Priming" in the *DD13/DD15 Troubleshooting Guide* (DDC-SVC-MAN-0029).
 - [b] No, go to next step.

 **WARNING:**
FIRE

To avoid injury from fire, keep all potential ignition sources away from diesel fuel, including open flames, sparks, and electrical resistance heating elements. Do not smoke when refueling.

3. Check the fuel level in both fuel tanks to verify sufficient fuel supply.
 - [a] If fuel level is low, add fuel until the fuel level is at least 3 inches over the pickup tubes in the fuel tank. Run the engine for 3 minutes at 1800 RPM to clear any air out of the fuel system and retest.
 - [b] Fuel level OK, go to next step.

Fuel Tank Levels	
Fuel Tank 1: _____	Fuel Tank 2: _____

NOTE: Write tank 1 and tank 2 fuel levels in this table.

4. Use DDDL to insure that cranking speed is over 150 RPM.
 - [a] Cranking speed is over 150 RPM, go to next step.
 - [b] Cranking speed is under 150 RPM, refer to section "Starting Difficulty" in the *DD13/DD15 Troubleshooting Guide* (DDC-SVC-MAN-0029) to determine the cause of low crank speed.
5. Does crank time change based on the time that the engine has been shut down?
 - [a] Yes, go to the next step.
 - [b] No, check for internal engine issues; battery voltage, crank speed, low compression, or poor fuel quality.

How long does the engine need to sit? _____
List internal engine issues (if any). _____

NOTE: Write the information in this table.

6. Measure the low pressure fuel system pressures. Refer to section "Monitoring Low Pressure Fuel System Leaks" in the *DD13/DD15 Troubleshooting Guide* (DDC-SVC-MAN-0029).
 - [a] If low pressure fuel system pressures are OK, go to the next step.

[b] If low pressure fuel system pressures are NOT OK, repair as necessary.

Low Pressure Fuel System Pressures		
	600 RPM	1800 RPM
Low pressure fuel pump in:		
Low pressure fuel pump out:		
High pressure fuel pump in:		
High pressure fuel pump out:		
Priming Port Pressure:		

NOTE: List low pressure fuel system pressures in this table

7. Check for internal or external low pressure fuel system leaks. Refer to section "Internal and External Low Pressure Fuel System Leaks" in the *DD13/DD15 Troubleshooting Guide* (DDC-SVC-MAN-0029).

[a] If NO leaks are found, go to the next step.

[b] If leaks are found, repair as necessary.

Leaking YES: _____	Leaking NO: _____
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NOTE: List if there are leaks in this table

8. Check for aerated fuel. Refer to section 5.4 "Aerated Fuel."

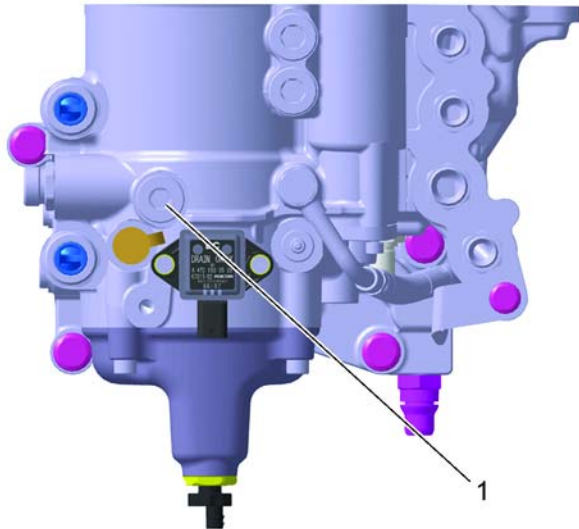
[a] If fuel is aerated, repair as necessary.

[b] If fuel is NOT aerated, go to next step.

9. Remove the bypass valve (1) from the fuel module, inspect the valve for debris. See Figure 1.

[a] If debris is found, clean or replace the valve.

[b] If no debris is found, reinstall the valve and go to the next step.



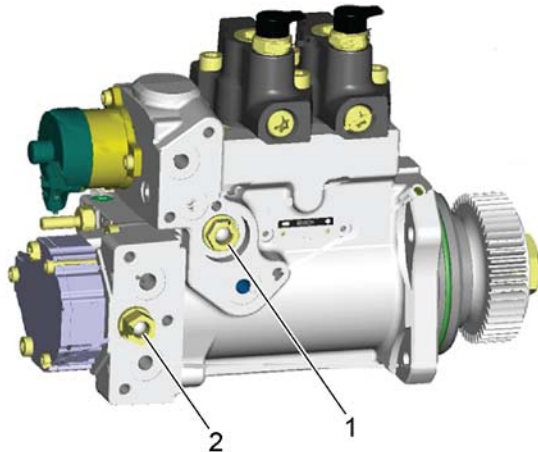
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1. Bypass Valve

Figure 1 Bypass Valve

10. Remove the two-stage valve (1) from the high pressure pump and inspect for debris, check if the valve is stuck open. See Figure 2.
 - [a] If debris is found or if the valve is stuck open, replace the high pressure fuel pump. Refer to section 35.1 "High Pressure Fuel Pump."

[b] If no debris is found, reinstall the valve and go to the next step.



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1. Two-Stage Valve

2. Relief Valve

Figure 2 Two-Stage Valve and Relief Valve

11. Remove the relief valve (2) from the high pressure fuel pump and inspect for debris, check if the valve is stuck open.
 - [a] If debris is found or if the valve is stuck open, replace the high pressure fuel pump. Refer to section 35.1 "High Pressure Fuel Pump."
 - [b] If no debris is found, reinstall the valve and go to the next step.

WARNING:
ENGINE EXHAUST

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

12. Start the engine. Perform a Rail Pressure Bleed Off test (RPBO) using DDDL. Refer to section "Rail Pressure Bleed Off test" in the *DD13/DD15 Troubleshooting Guide* (DDC-SVC-MAN-0029).
 - [a] If the RPBO test passes, go to step 5.

[b] If the RPBO test fails, go to next step.

RPBO Time
RPBO Time: _____

NOTE: Write the RPBO time in this table.

13. Check for internal and external high pressure fuel system leakage. Refer to section "High Pressure System Fuel Leak Test" in the *DD13/DD15 Troubleshooting Guide* (DDC-SVC-MAN-0029).

[a] If leak(s) are found, repair leak(s) and prime the fuel system. Start the engine and verify repair.

[b] If no leak(s) are found, go to the next step.

Leaking From
Where are the leaks coming from? _____

NOTE: Write where the fuel system is leaking from in this table.

14. Check the ISB values. Refer to section "ISB Values" in the *DD13/DD15 Troubleshooting Guide* (DDC-SVC-MAN-0029).

[a] If there are NO cylinders above 70% or below -70%, go to the next step.

[b] If there IS a cylinder above 70% or below -70%, remove that injector line and cap off the rail with J-48704. Run the RPBO test again. If the RPBO test passes, change the injector that is capped off and verify repairs.

ISB Values	
Cylinder 1%: _____	Cylinder 4%: _____
Cylinder 2%: _____	Cylinder 5%: _____
Cylinder 3%: _____	Cylinder 6%: _____

NOTE: Write ISB values in this table.

15. Check for leakage from the Pressure Limiting Valve (PLV). Refer to section "Pressure Limiting Valve" in the *DD13/DD15 Troubleshooting Guide* (DDC-SVC-MAN-0029).

[a] If the PLV is leaking, replace the PLV and verify repairs.

[b] If the PLV is not leaking, replace the high pressure fuel pump and verify repair. Refer to section 35.1 "High Pressure Fuel Pump."

Leaking From
Where are the leaks coming from? _____

NOTE: Write where the PLV is leaking from in this table.

16. Install a priming port gauge and start the engine. Turn the engine OFF and watch for fuel pressure to drop when the engine is shut down.
- [a] If the pressure drops to 0 within 3 seconds after engine shut down, inspect the check ball under the pre-screen filter for proper seating. If the check ball is missing or is not seating properly, repair or replace the fuel filter module.
 - [b] If the pressure DOES NOT drop to 0 within 3 seconds, go to the next step.

How many seconds is the bleed down? _____

NOTE: Write bleed down seconds in this table

17. Remove the needle return line and fitting from the fuel filter module. Inspect the check valve in the fitting for debris.
- [a] If there is debris, clean or replace the check valve.
 - [b] If there is no problem with the check valve, replace the high pressure fuel pump and verify repairs. Refer to section 35.1 "High Pressure Fuel Pump."

ADDITIONAL SERVICE INFORMATION

Additional service information is available in the Detroit Diesel EPA07 DD15 *Fuel System Technicians Guide*, (DDC-SVC-MAN-0037). The next revision to this manual will include the revised information.

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