General Service Bulletin (GSB):	6.0L Diesel Crank/No Start Supplement
GSB Overview:	This bulletin provides tips to assist the dealership when performing 6.0L diesel engine crank/no start diagnostics relative to the High Pressure Oil System found in the Powertrain Control/Emissions Diagnostic (PC/ED) Manual.
NOTE: This information is not intended to replace or supersede any warranty, parts and service policy, Work Shop Manual (WSM) procedures, PC/ED procedures or technical training or wiring diagram information.	

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Crank/No Start PID List

All 6.0L Diesel engine equipped vehicles experiencing a crank no start condition can be diagnosed by using procedures available in the PC/ED manual. The PIDs listed below are found in the individual steps of the PC/ED > Section 4: Diagnostic Subroutines > Hard Start/No Start diagnostics. This bulletin consolidates them here for quick reference. Reviewing them up front may help to determine which PC/ED test or tests to focus on.

To view the PIDs using the IDS, select Toolbox > Datalogger > Module > PCM. Then search for the appropriate PIDs from the PID list.

When cranking the engine, monitor the following:

- B+ (VOLT) should be at least 10.5 volts.
- VPWR (VOLT) at least 10.5 volts.
- FICM_LPWR (VOLT) should be at least 10.5 volts.
- FICM_VPWR (VOLT) should be at least 10.5 volts.
- FICM_MPWR (VOLT) should be at least 45 volts.
- SYNC (MODE) and FICMSYNC (MODE) should read YES.
- ICP (PRESS) needs to be at least 500 psi.
- ICP (VOLT) at KOEO .15-.35 volts, and during cranking over 1 volt.
- IPR (PER) should be less than 30%
- FUELPW (TIME) over 1 ms, fuel pressure at least 45 psi.
- EGRVP (VOLT) less than 1.2 volts KOEO and during cranking.
- RPM# (RPM) steady 160-190 RPM.

Refer to the specific step of the Hard Start/No Start diagnostics in the PCED for further testing.

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"Crank/No Start/Lack of Power" When Hot

Some vehicles equipped with a 6.0L diesel engine may exhibit a cranks/no start/lack of power concern only when hot, but when the engine cools down it starts normally. This concern may be accompanied by Injection Control Pressure (ICP) Diagnostic Trouble Codes (DTC) setting in the PCM. When this type of concern is present, small leaks in the high pressure (HP) oil system may be suspected and may only show up when oil viscosity is low. Use the supplied no start PID list to determine if the (HP) oil system needs further diagnosis.

Loss of ICP when Hot

A **Crank/No Start concern** with the High Pressure Oil System when hot can be confirmed by monitoring the ICP and IPR PIDs when the concern is present as outlined in the PC/ED > 4: Diagnostic Subroutines > 10e.

- ICP (PRESS) should be 500+ PSI
- IPR (PER) should be less than 30%
    - **Note:** If the IPR (PER) PID is greater than 30%, this indicates that the PCM is attempting to increase ICP by increasing the IPR duty cycle which may indicate a fault.

A **Lack of Power concern** due to a High Pressure Oil System fault that only occurs when hot may be identified by using the PCM PIDs ICP_A, and ICP_DSD. According to the PC/ED > 2: Diagnostic Methods > Parameter Identification, ICP_A is the "measured" ICP value, and ICP_DSD is the "desired" ICP value. If the ICP_A is significantly lower than the ICP_DSD, there is a potential for a high pressure oil leak in the higher ICP pressure ranges. Another potential concern could be related to the base oil system flow.

If there is a small leak from the high pressure oil system, diagnosis can be difficult when using the air pressure check from the PC/ED > Section 4: Diagnostic Subroutines. This is because shop air pressure is typically between 120-160 PSI and a small HP oil system leak may only be present in the higher pressure range of 200+ PSI. The shop air pressure is not enough to induce the leak in the system.

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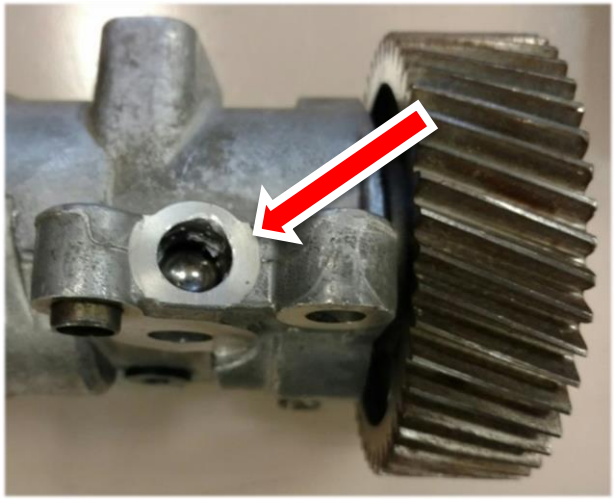
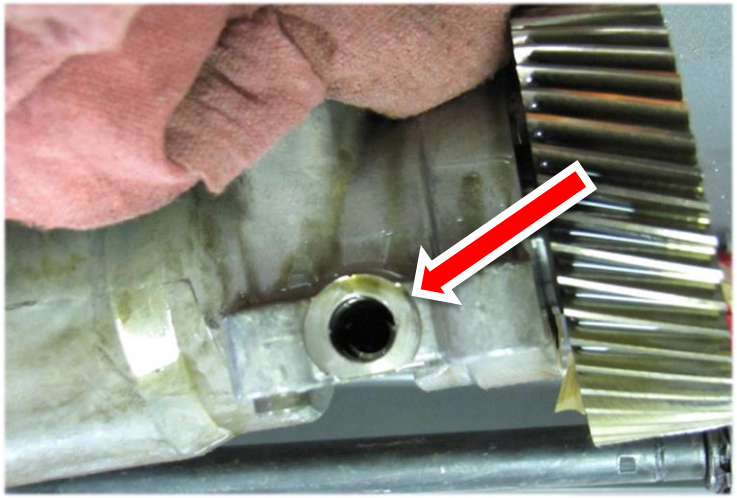
If a small high pressure oil leak is suspected, verify base oil pressure and flow by using other the WSM 303-01C > Diagnosis and Testing > Engine > Oil Pressure Test and other publication procedures. If base oil flow is acceptable but base oil pressure is too low, and if the vehicle was built before 1/10/2005, the ball bearing type seal in the High Pressure Oil Pump may have become dislodged. Vehicles built prior to 1/10/2005 used a Rex-Roth style high pressure oil pump that utilizes a ball bearing plug to seal the base oil pressure through the pump. The ball bearing plug is located on the mounting flange on the driver's side of the pump (when mounted in the vehicle) between the two bolt bores. If this plug is missing, the High Pressure Oil Pump should be replaced. The left image shows the plug in place and the right image shows the plug missing.





If base oil pressure and flow have been verified and are within specification, then it may be necessary to perform the High Pressure Oil Pump Test as outlined in the PC/ED > 4: Diagnostic Subroutines > Hard Start/No Start Diagnostic Procedures > 10g. If the concern is only present when hot, it may be necessary to remove all but 2 bolts from each valve cover so that they can remain in place while operating the vehicle to induce the fault. Once the fault is present, removal of the valve covers to perform the test can be done much quicker since there are only two bolts holding the covers in place.

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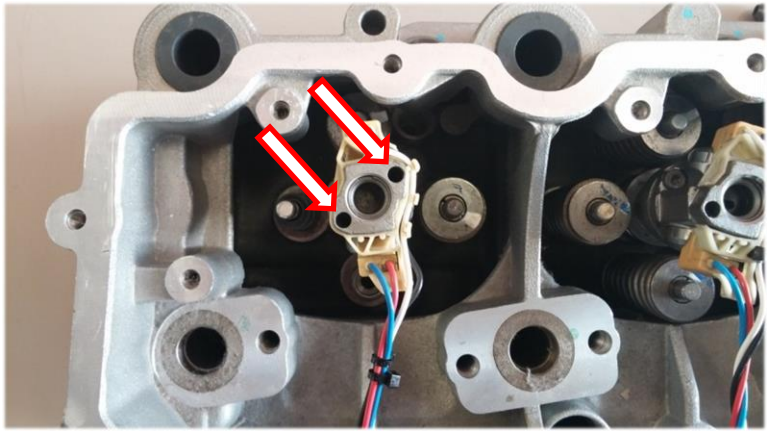
The **High Pressure Oil Pump Test** utilizes the IDS to command IPR to greater than 60% IPR with the High Pressure Oil Block-Off Tools installed to test the High Pressure Oil System for leaks. Refer to the PC/ED for more details. To test the entire High Pressure Oil System using oil pressure, it may be necessary to perform this test while full fielding the IPR (by providing direct power and ground for no longer than 2 minutes at a time) using the appropriate flex probe adapters as well as without the block off tools installed.

The High Pressure Oil Pump (HPOP) should be able to produce 3,000- 4,000 PSI with the IPR full fielded. If the HP system does not generate 3,000- 4,000 PSI with the system sealed, then this confirms a high pressure oil system concern. If the high pressure oil system will generate 3000-4000 PSI during the High Pressure Oil Pump Test with the IPR full fielded, this indicates that the concern is with a weak HPOP. A weak HPOP is capable of supplying adequate ICP when the injectors are disabled, but cannot provide adequate volume when the injectors are functioning normally, resulting in a low ICP concern.

If the High Pressure Oil Pump Test is performed with the block off tools installed (as outlined in the PC/ED), the test will not find some under valve cover concerns such as leaks from the high pressure oil rail, injector external leaks, or internal injector faults such as "injector stiction" (stiction or internal injector faults can be determined by oil leaking out the injector spill spouts/oil return ports while testing).



The arrows are pointing to the injector spill spouts, which is how oil from the high pressure oil system is returned to the base oil system after the injector has been actuated.

6.0L High Pressure Oil System Testing Tools

There are three different types of High Pressure Oil System Block Off-Tools available depending on the build date of the vehicle. The different tools available are due to changes made in the High Pressure Oil System that are shown in the images below. The Block Off-Tools are used in the PC/ED Hard Start/No Start Diagnostics for the High Pressure Oil system. These tools are identified in the images on the following page.

In addition to the block off tools, 2004+ Model Years (built after 9-30-03) also utilize an ICP adapter/extension cable (ICP/EBC 418-D003, D94T-50-A or equivalent).

Disconnect tool quick release coupling 03-755 and injector plug release tool

High Pressure Stand Pipe Block Off Plugs 303-1071

- Build Date: 9/30/03 - 7/18/04

Oil pressure leak test plugs 303-756

- Build Date: Before 9/30/03

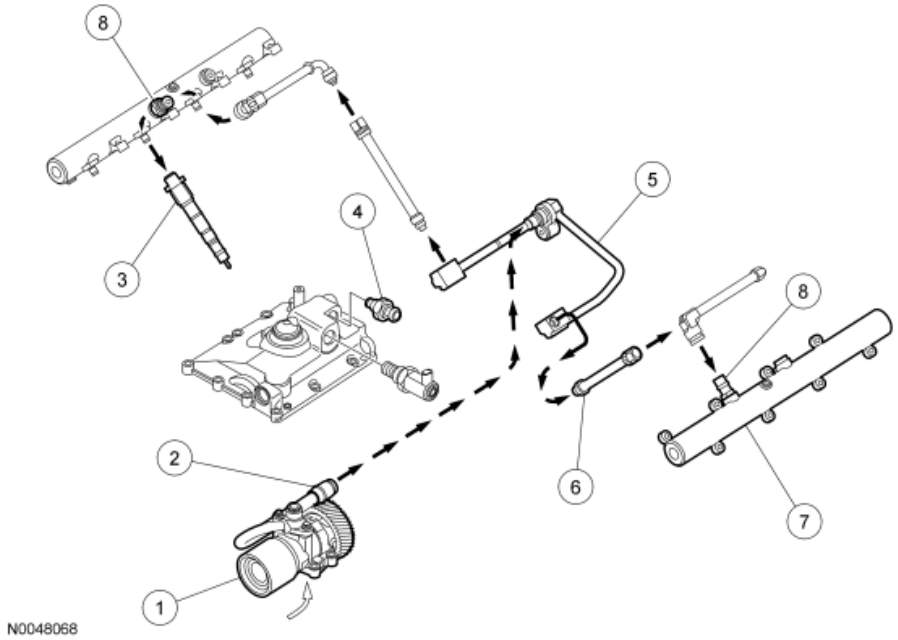
High Pressure Stand Pipe Block Off Plugs 303-1163 and Stand Pipe Removal Tool

- Build Date 7/19/04 and up

High Pressure Oil System Model Year Changes and General Images

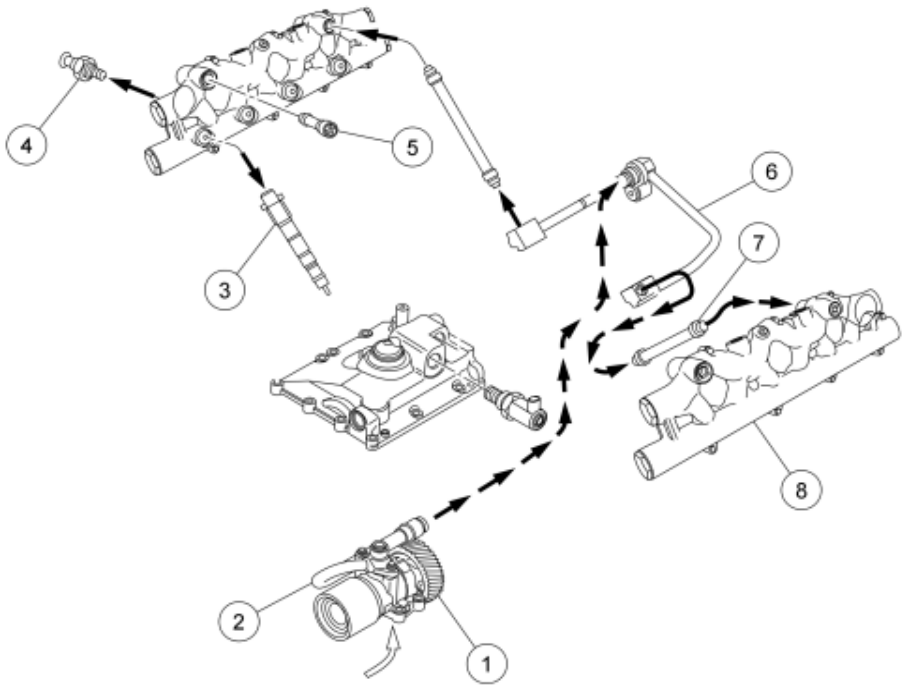
Figures 1-3: Reference PC/ED > 4: Diagnostic Subroutines > Hard Start/No Start Diagnostic Procedures > 10f: High Pressure Oil System Air Pressure Check

Figure 1: High Pressure Oil System (built on or before 9-29-03)



Item	Number	Description
1	—	High Pressure Oil Pump
2	—	Discharge Tube
3	—	Injector
4	—	ICP Sensor
5	—	Rear Engine Tube Assembly
6	—	High Pressure Stand Pipe
7	—	High Pressure Oil Rail
8	—	Check Valve and Fitting

Figure 2: High Pressure Oil System (2004 Model Year, built on or after 9-30-03)



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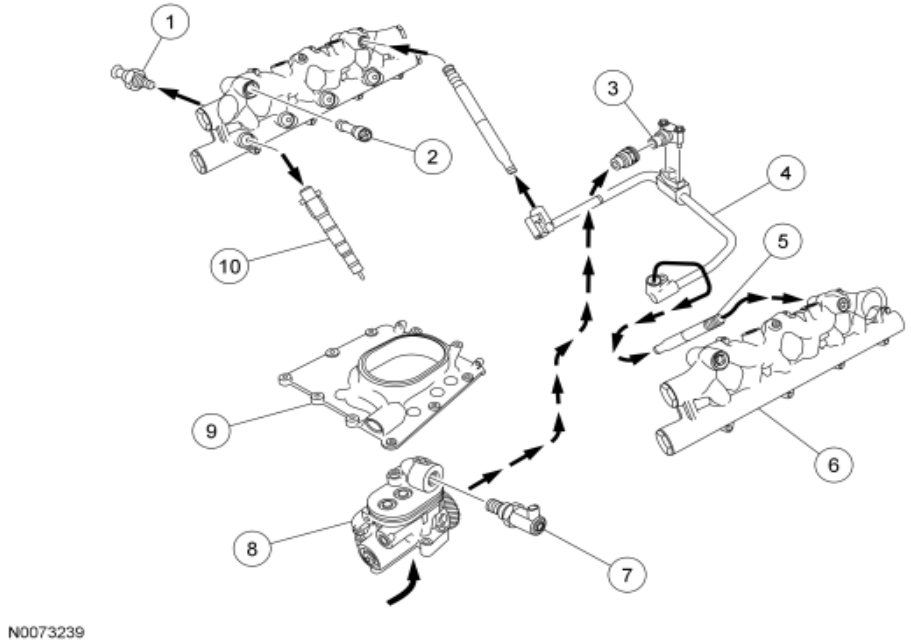
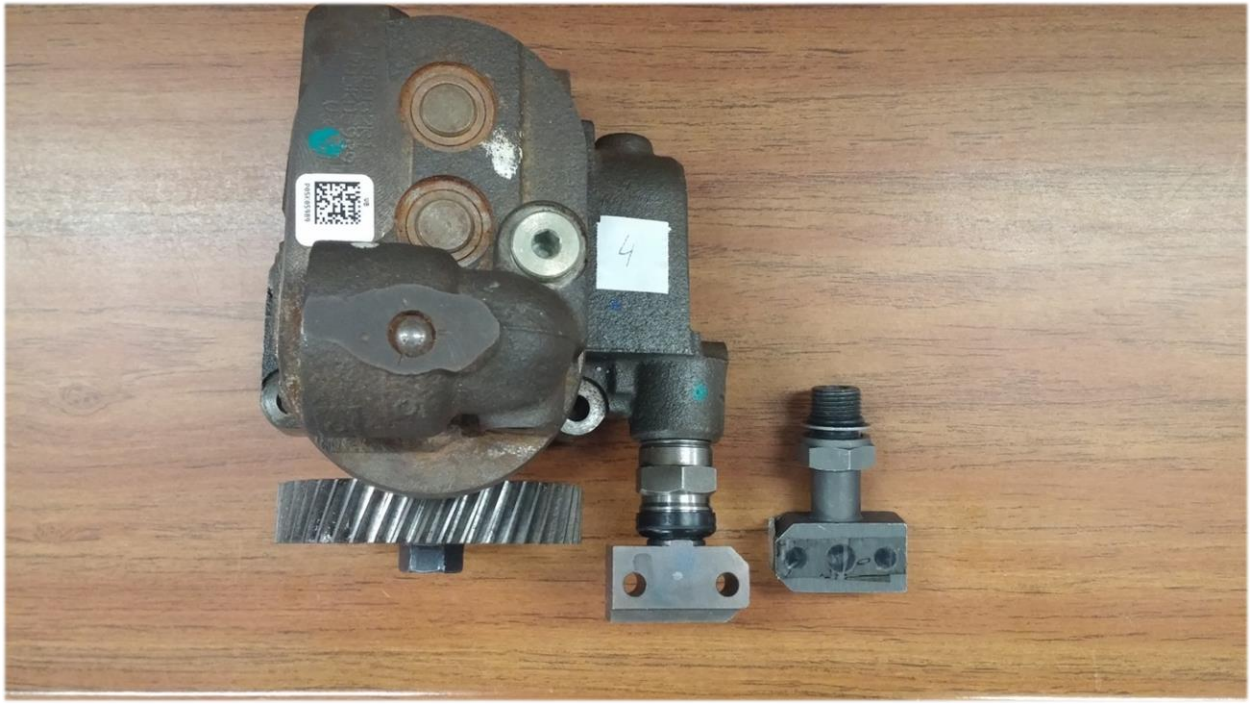
Item	Number	Description
1	—	High Pressure Pump
2	—	Discharge Tube
3	—	Injector
4	—	ICP Sensor
5	—	High Pressure Oil Rail Plug
6	—	Rear Engine Tube Assembly
7	—	High Pressure Stand Pipe
8	—	High Pressure Oil Rail

Figure 3: High Pressure Oil System (2005+ Model Years)



Item	Part number	Description
1	—	ICP Sensor
2	—	High Pressure Oil Rail Plug
3	—	High Pressure Oil Branch Tube Adapter
4	—	High Pressure Oil Branch Tube
5	—	High Pressure Stand Pipe
6	—	High Pressure Oil Rail
7	—	IPR Valve
8	—	High Pressure Pump
9	—	High Pressure Pump Cover
10	—	Injector

Figure 4: Updated Snap-to-Connect Fitting



- Original Snap-To-Connect (STC) fitting (on the pump)
- Revised thread in style (on the right)