Dodge In-tank Pump Exposed

Glacier Diesel Power
2005

As Dodge owners one would think that by now lift pump problems would be a thing of the past. Owners of new Cummins powered Dodge trucks (’05+) and owners of older vehicles facing an in-tank conversion under warranty have expressed concern over the low pressures seen with the newest lift pump offering from Dodge. Hopefully this article will shed some light on the in-tank pumps design and function. This article is not meant to condemn or condone the new design but merely to show owners what’s being installed in their trucks. As fellow owners I’ll let you draw your own conclusions.

During my testing of the new in-tank pump I had the chance to examine an entire 2005 Dodge HPCR fuel system in the shop, everything from tank to CP-3. While looking over the new sending unit/fuel pump combo I found a few items that may be of interest to you, some good and some bad. I decided to test the system and see what owners were up against for pressure and flow with these new systems.

The first thing that I noticed was that pump was moving a lot of fuel but the majority of it was never making it out of the tank. Dodge has given us a solid VDO brand pump but added a bypass valve a mere 2” above the pump. This is the “H” shaped connector that you see between the pressure feed line and the return line in the following pictures. Thanks to this bypass the best we could muster out of the factory fuel system was a mere 10 psi. I have heard of trucks with the latest conversion achieving 12 psi when new but 9-10 psi seems to be closer to the norm. So I decided to delve a little further into the assembly.

The next thing I noticed was that the bottom of the fuel canister (when viewed from the inside) appeared to be solid and not the fine plastic mesh that was used in previous version. So how was the fuel getting into the bowl when the fuel level was below the lip? Read on and I’ll explain.

Upon removing the pump we found that there is a small plastic chamber attached to the bottom of the pump and under this chamber was a small rubber valve. We'll call this the "venturi chamber". Inside of the chamber is a plastic nozzle that directs a high speed jet of fuel to the other side creating a vacuum effect above the rubber flapper valve. This vacuum lifts up the rubber valve and draws more fuel into the bowl at the bottom of the sender. This action alone was taking a tremendous amount of the pumps output flow and creating a foamy vortex in the sender bowl when tank levels were low.

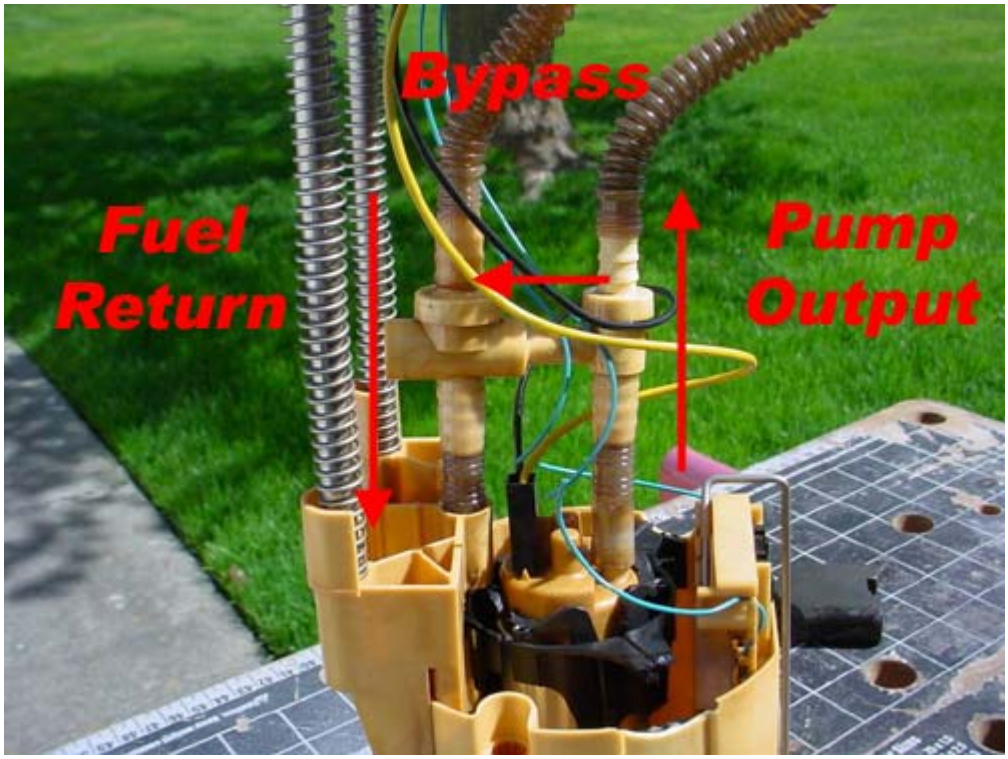
The pump actually has two outlets. Roughly half of the pumps flow is being directed out of the bottom of the pump and used just to open the rubber valve and keep the reservoir in the bottom of the sender full. The remaining flow (up to 10psi in this instance) is directed up to the top of the sender and on its way to the engine. Anything over 10 psi went straight across the bypass "H" and was dumped back into the reservoir of the sender via the return line without ever leaving the tank.

We decided to remove the bypass in the sender and plumb the pumps output straight to the top of the sender. The pump (sans bypass) was capable of 19 psi before it went over its own internal bypass and the fuel stopped flowing.

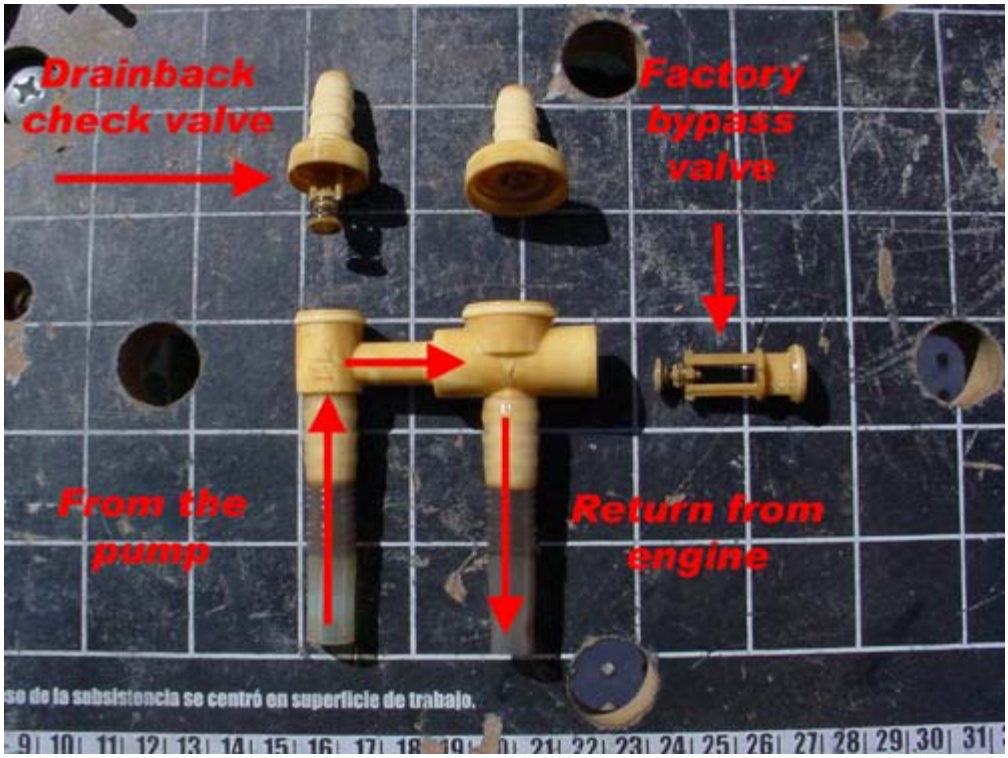
The following pictures should help illustrate the things that we've covered here.

Below you will find the new in-tank lift pump and sending unit assembly.

The first thing that you may notice is the plastic connection between the pumps output line and the return line. This is the item that caught my attention.

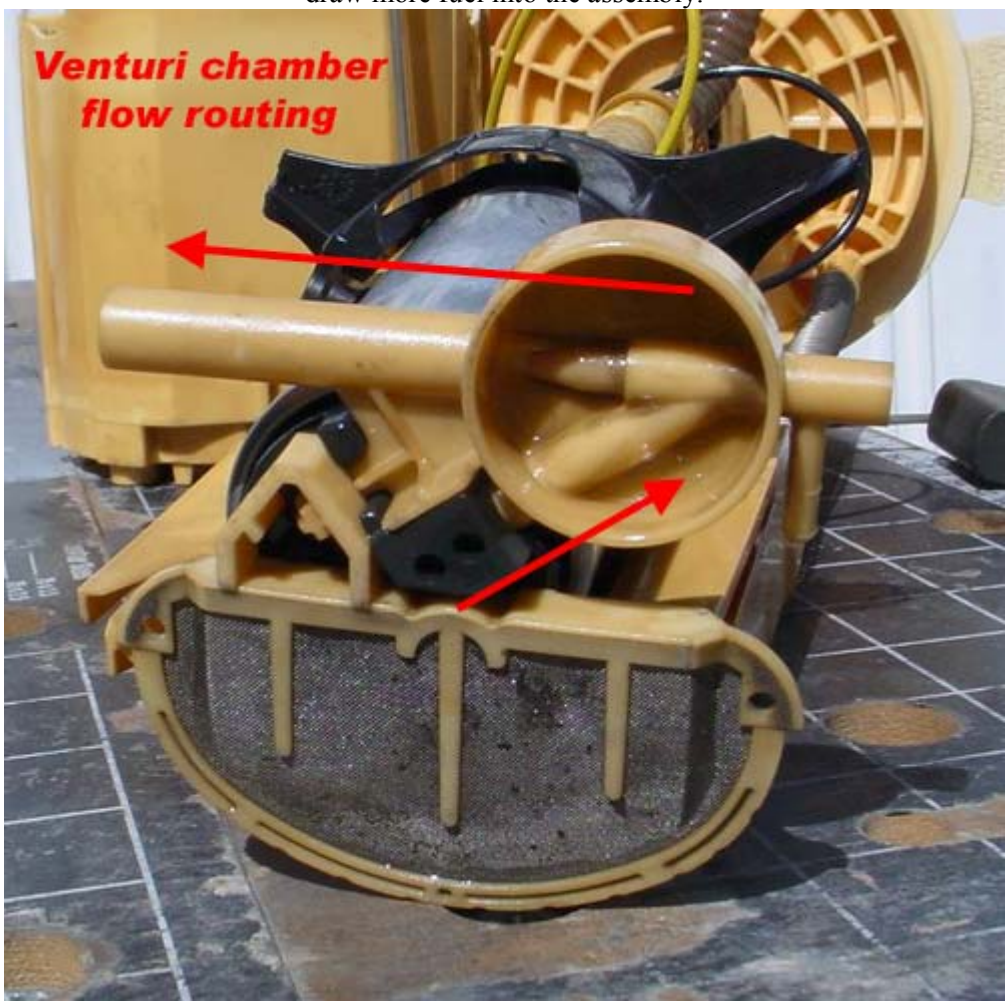


Below you can see the small bypass valve contained in the plastic “H” connection between the feed and return line.

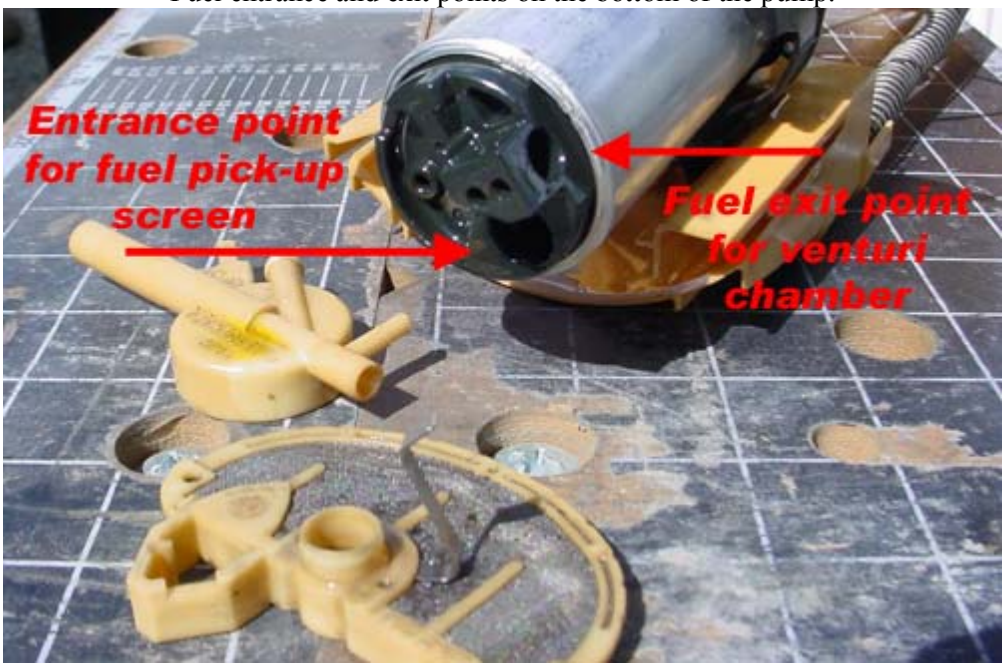


Here is a close-up shot of the bypass valve.

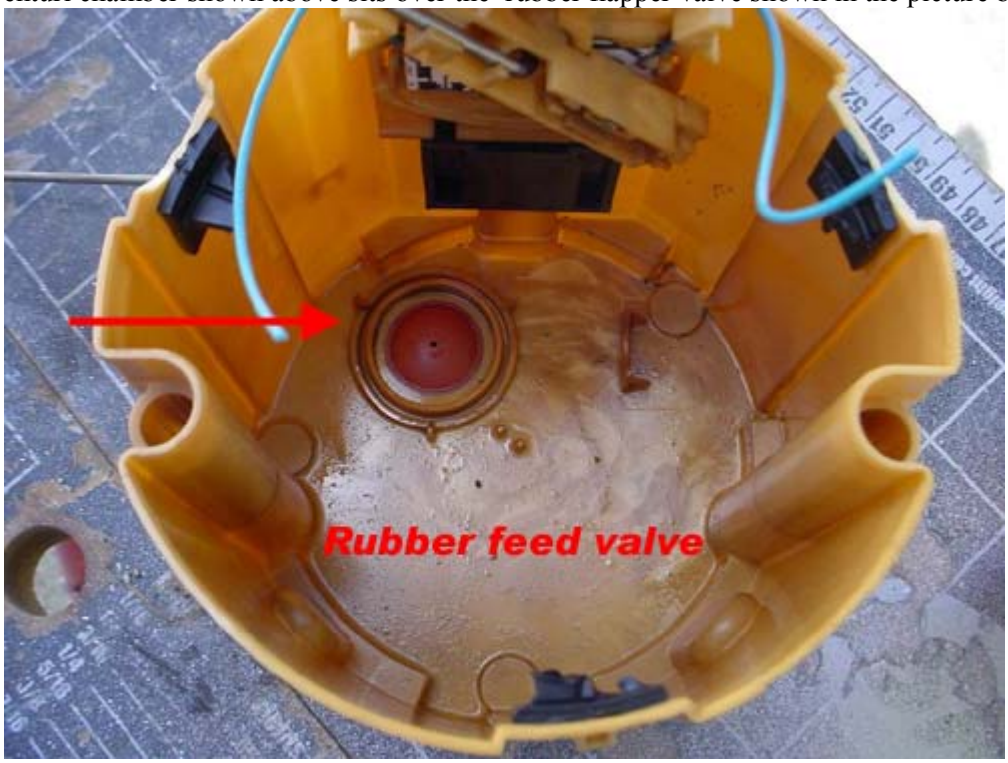
Pick-up screen and venturi system used to open the flapper valve in the bottom of the sender and draw more fuel into the assembly.



Fuel entrance and exit points on the bottom of the pump.

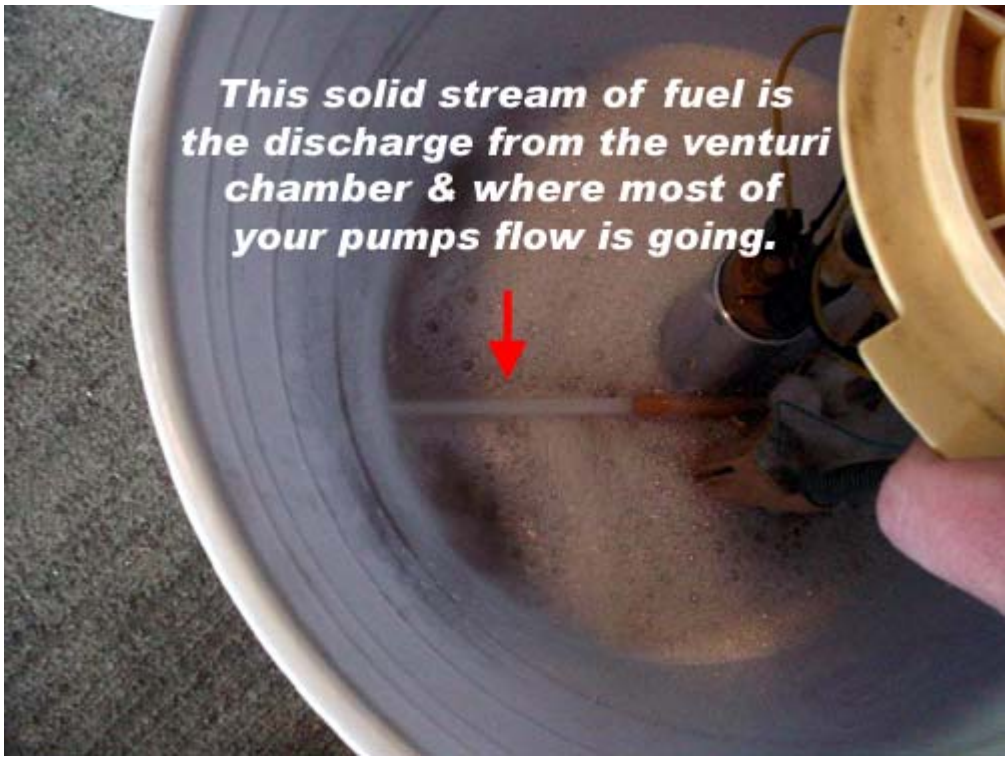


The venturi chamber shown above sits over the rubber flapper valve shown in the picture below.



Shown below are the feed holes covered by the rubber valve.

The picture below illustrates where most of your new pumps flow is going. The majority is used just to create a vacuum in the venturi chamber and draw more fuel into the fuel bowl when your tank levels are low.



In closing, the new pump appears to be a robust and capable design but its true potential is hindered by the design of the sender and bypass assembly that connect it to the rest of the fuel system.

The best advice we can give you is to keep your tank above 1/4 full whenever possible. It won't help the pumps overall output but it will keep the sending units base full at all times and keep the pump well supplied with fresh, cool fuel.

Feel free to contact us should you have any questions regarding this article.

Richard Martin
Glacier Diesel Power