

# HOW YOU CAN DIAGNOSE A LIFT PUMP ISSUE

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If your truck "Bucks" under hard load or towing, this is an indication the engine is starving for fuel, due to either a restricted fuel filter or low lift pump pressure. A weak or failed lift pump or a plugged fuel filter will NOT give any other drivability issues OTHER than a skip, miss or buck at high load/high RPM operation. If you DO experience these symptoms, replace the fuel filter and if you can't bleed the system afterwards, or if changing the filter doesn't fix the problem, read on.....

To diagnose lift pump performance click the ignition key to the start function quickly, so the engine doesn't start, and let go, leaving the key in the run position; the lift pump should run 25 seconds. If you don't hear the lift pump, test for 12 volts going into the lift pump and if it doesn't run with 12 volts going into it, replace it. If you DO hear it run and it doesn't make at least 5 PSI at idle, replace the fuel filter. To test fuel pressure, install a fuel pressure gauge with a long hose on it AFTER the fuel filter and before the injection pump. The long hose allows you to drive the truck and watch the gauge at the same time! Or, if this is inconvenient for you to come by, you can install our "Low Fuel Pressure Warning Kit" and it will diagnose low fuel pressure for you. If, after changing the filter, it DOES make at least 5 PSI at idle, go DRIVE the truck UNDER LOAD, and determine if the pressure ever goes below 5 psi. If it doesn't make at least 5 PSI UNDER LOAD after changing the filter, then change the lift pump. Please realize that revving it up proves NOTHING, as it doesn't use the amount of fuel that a load does. We suggest installing our "Low Fuel Pressure Warning Kit" permanently anyway to constantly monitor fuel pressure, as a diagnostic tool and a future money saving tool. It will tell you when the restriction in the filter necessitates replacing the filter, which means you will change your filter by restriction rather than the seat of your pants and save replacement filter costs! It will also tell you if the lift pump fails mechanically or electrically. Go to the Products Page on our Home Page for more info about this money saving product.

## HERE IS AN INTERESTING SCENERIO YOU SHOULD KNOW!

If the engine WAS running BEFORE you CHANGED THE FUEL FILTER OR OPENED A FUEL LINE, AND IT HASN'T STARTED SINCE, or, it started and stalled after doing this, AND IT WON'T BLEED and restart, and you can hear the lift pump running, but it won't fill the filter bowl, you most likely have a bad electric lift pump. Please remember when you are doing this diagnosis that the ECM turns on the electrical power to the electric lift pump only for 4 seconds when the key is in

the “on” or “run” position. When the ECM sees the “start” signal from the ignition switch it runs the pump for 25 seconds, and when it sees idle RPM it runs continuously. If the electric lift pump doesn’t come on, or doesn’t pump fuel into the filter bowl when you click the key to the “start” and release it to the “run” position, you can bleed the system to get fuel to the VP44 and get the engine to run again, by pressurizing the fuel tank with air pressure, or diagnosing the electric lift pump. The reason this strange scenario happens, is because there is a mechanical lift pump built into the VP44 which works fine UNTIL air gets into the system. This explains why VP44 fueled engines don’t die on the side of the road when the electric lift pump fails.

## **MORE GOOD INFO ABOUT LIFT PUMPS**

We proved on a dynamometer, while testing our performance products, in 1998 that if you have 5 PSI, under load, you can make all the horsepower available from a VP44, and 5 psi will provide enough return fuel for pump lubrication. We now know that 15 psi, not more, is much better as the increased pressure provides much more return fuel and therefore much more cooling for the VP44 computer. Heat is the killer of computers on VP44s, so cooling is very important for the life expectancy of the injection pump.

The worst case scenario for these injection pumps is to be mounted on an engine that gets shut off many times in a day’s work! A truck that lives and works in hotter parts of the country has more problems than one that lives and works in cooler regions, and a truck that makes more horsepower through the use of a programmer type power enhancement device has more problems. This is because the more horsepower you make with a “programmer”, (a performance device that connects either temporarily or permanently into the data port under the dash), the hotter the injection pump gets. A programmer enhancing fuel holds the fuel solenoid closed longer, increasing the duty cycle, with commands from the software in the computer and therefore computer board, which creates much more heat on the injection pump computer board. “Fueling Boxes”, such as our “FMS”, dissipate the increased heat from the increased solenoid duty cycle in the box instead of on the computer board in the injection pump. I don’t know if it is just heat or heat cycles or both that kills the computers, but computers are 100% of our 2 % warranty failure rate with OUR injection pumps. This also proves to me that all of OUR mechanical upgrades are a winner. I am completely convinced nowadays that the best you can do to protect and prolong your injection pump’s life is to keep it as cool as possible.

The aerospace industry, among many others, has made much mention of how the federally mandated lead free solder has drastically reduced the life expectancy of circuit boards that have to perform in high heat applications. I think this explains all the issues we are experiencing with computer circuit boards, and therefore computer related problems with VP44 injection pumps. WE have exhausted many options trying to figure out a way to keep the computer cool, from fans, cooling plates, remote mounting of the computer, to insulating the computer, etc., etc., all of which were not a viable solution to the heat problem for one reason or another.

We were not really surprised to figure out that the hottest these pumps get is 20 minutes after the engine is shut off, because of heat soak from the latent heat in the engine. We thought this issue could be a simple fix. We would just make a control box that ran the lift pump for half an hour after shutting down the engine. During our research and development for this product we were really surprised to learn that there is no return fuel and therefore no cooling effect for the injection pump unless the shaft of it is turning!

That stopped us dead in our tracks, so our best advice now is to use the best lift pump you can find, to provide the most flow and therefore the best job of cooling while the engine is running to get the best life out of injection pumps. The common sense theory here is the cooler the pump is when you shut off the engine the less hot it gets from heat soak.

Here's my reasoning for this. If you pump fuel through a supply line at 5 PSI, which is a normal/reasonable operating pressure for the OEM Carter lift pump, a certain volume will flow, creating a certain amount of cooling for the computer. If you pump fuel through the same size line at 15 PSI, more fuel will flow and therefore offer more cooling, right??? So, our idea was to use 15 PSI or so, all the time to see if repeat failures were diminished or eliminated. We are convinced from our experience and testing that this works to some degree, depending on operating environment, and therefore worth sharing with the world. We have done extensive tests to prove that 15 psi is not too much for other components in the injection pump to deal with.

We now offer a REALLY good electric lift pump that puts out a constant 15 psi all the time, so the injection pump will be as cool as it can be when shut off. This pump is the tried and true and well respected Air Dog Raptor Pump made to mount where the OEM one was, originally mounted on the engine, making it convenient and easy to install, and this location protects it from salt and road debris. It is DESIGNED to provide excellent service when mounted in this location. It provides 100 gallons per hour, the most flow of any pump made that mounts in the OEM location, therefore providing the most cooling possible and more than enough flow for all performance modifications. The manufacturer, Pure Flow, calls it the FRRP, which stands for "Factory Replacement Raptor Pump". We like it more than the Fass DDRP as it puts out MORE VOLUME, and doesn't require or need an inlet filter which has been a nightmare problem with

the DDRP Fass unit. The FRRP is not a vane pump, as is the DDRP, and therefore does not share the problems associated with that design. Best of all, the FRRP has an EXTERNAL adjustable pressure regulator to fine tune the pressure desired! It also comes with a refreshingly stand up FOUR YEAR WARRANTY, which tells you what a quality product it is. It is great when you discover a really superior product, like the FRRP, that does a superior job and offers exceptional value. This is why we recommend and prefer to sell this product over all others.

If you have the REALLY bad lift pump in the fuel tank, it SHOULD BE removed from the fuel system before it dies and creates a restriction for the replacement pump you just installed. It is really easy to do the removal. Remove the fuel tank sending unit assembly, cut off the electrical wires going to the in-tank pump and cut the motor off the plastic pickup pipe with a hacksaw. Replace what you cut off with an appropriate length of REINFORCED rubber fuel hose. My recommendation is to NOT reuse the sock at the bottom of the tube, as this can only bring trouble later on. Why not find the crap in the fuel filter, rather than having to remove the tank to find the sock plugged, in the future? This is another good reason to use the FRRP, as it doesn't care about crap going through it like a vane pump does.

Thanks for reading,

Chip Fisher, owner of Blue Chip Diesel Performance