HOW TO DIAGNOSE VP44 FUEL SYSTEM ISSUES

From 15 years working on only Dodge Diesel Trucks I have acquired lots of experience diagnosing them. As my brother and I were the first to figure out how to enhance power from the VP44 pump AND acquired the only US patent for VP44 power enhancement, I feel qualified to help you. I have to admit I have learned a lot more since then too! I also have extensive experience with the same fuel system in Freightliner and Ford trucks with the ISB Cummins engine. I am happy to share this experience with you to make an accurate diagnosis of your truck's fuel system. Blue Chip Diesel offers for sale the most improved, most durable, most fuel efficient and most cost effective pumps and related parts to fix your problem. Honestly it is impossible to ACCURATELY diagnose VP44 injection pump and related fuel system problems by using *only* a scan tool, regardless of who makes it. I am really lucky to have had the pleasure of listening to over 2000 of you per year, for quite a few years, discussing and confirming the symptoms you have, and most often accurately diagnosing your fuel system. This "REAL WORLD" experience has allowed me to really find out what works and doesn't work for diagnosing the various issues accurately. I am so confident in what I am about to share with you that if you buy a product from me that I have diagnosed with you and it doesn't fix the problem, return it within a week and I will refund your money! PLEASE let me and my "Real World" experience help you make the right decision.

DTC CODES NOT MUCH HELP FOR MOST PROBLEMS

Reading codes can only accurately diagnose SOME of the problems with the VP44 fuel system. The easy way to read DTC codes, that works on most trucks, is to turn on the ignition switch three times and leave it in the "on" position and read the codes in the odometer. Of course a scan tool can do this AND clear codes. There are only three DTC codes that absolutely positively condemn the VP44. The 216 code tells you the pump is worn out mechanically, and can't attain full timing advance, but this failure won't cause any drivability issues and doesn't demand immediate VP44 replacement. Read about Lift Pumps elsewhere in this site for why the 216 code occurs. If the truck won't start, and you haven't opened any fuel lines, and you have either or both a 1688 and or a 1689 DTC code, the truck will never start until you replace the injection pump. This is MOST LIKELY because the computer on the top of the injection pump is not turning on the fueling in the VP44. Other causes are explained below. Other codes are explained in detail below, that accurately diagnose other parts of the

fuel system. Other circumstances like stray RF (radio interference) can cause false codes and therefore confuse or misdirect an accurate diagnosis. To prove the codes are relevant and or current codes, clear them with a scanner and see if they are reset when you try to start or drive the truck next. Disconnecting the batteries will NOT clear the 216 code and worse than that, some generic scanners won't either. To be sure the codes are cleared, READ them again after clearing them, BEFORE you attempt to start the truck, and if they are gone, then you really did clear them. If they are still there BEFORE trying to start the truck, you didn't clear them! If they come back when you try to start the truck, or drive the truck next, you can be sure they are relevant. Code 1693 only means there is at least one code in the other computer, the PCM, which has/have NOTHING to do with the fuel system. Codes in the ECM should be duly noted and COMBINED with the drivability SYMPTOMS and PROCEDURES described below, you CAN accurately diagnose what you have to do to fix your problem. Sometimes automatic transmission issues create drivability issues that appear to be a fuel issue. Call me for help here too.

TRIED AND TRUE WAY TO GET THE RIGHT ANSWERS

There are many components in the fuel system in a VP44 fueled truck. They are the ECM (Engine Control Module), Fuel Injectors, APPS (Accelerator Pedal Position Sensor), MAP Sensor (better known as a Boost Sensor), Camshaft Sensor, Crankshaft Sensor which you may or may not have depending on the year of your truck, Fuel Filter, Lift Pump and finally the VP44 Injection pump. The ECM and OEM Injectors and Cam Sensor never give any problem in my experience. In fact I have never even heard of these components being bad, even at crazy high mileages, so they don't need further consideration, unless this diagnostic sequence fails to cure your problem. The APPS and Crankshaft Sensor can be diagnosed accurately by reading the codes in the ECM. These components always set a DTC code if they fail for just a second. If they set a code replace them. If they don't set a code don't replace them! The MAP Sensor aka Boost Sensor may or may not be condemned by the code pertaining to it. Read "Truck is doggy on take off" below for complete diagnosis of this sensor. The Fuel Filter and Lift Pump have their own diagnostic page that can be accessed by clicking on the link at the bottom of this page. Last but not least, and almost always the source of the problem, is the VP44 Injection Pump.

Here are the symptoms listed in descending order of frequency of occurrence, so you may not have to read all of this to get an accurate diagnosis!

DEAD PEDAL

This is THE MOST COMMON DRIVABILITY COMPLAINT and is an intermittent one that usually happens when the truck is hot or working harder, such as towing or on a hotter day, but can occur when cold too. This symptom is rarely caused by a faulty APPS (Accelerator Pedal Position Sensor) and 99% of the time is a faulty computer on the top of VP44 injection pump. The best way to positively eliminate the APPS as the cause of the problem is to read the DTC codes in your truck to check for any pertaining to the APPS, such as code 121 or 122. If there are no DTC codes pertaining to the APPS you DON'T need an APPS. A bad APPS, ***always,*** in my experience, sets a code even if it misbehaves for just a second, so if there IS a pertinent DTC code, replace the APPS. A possible pitfall here is if someone turned the key on when the APPS plug was disconnected. This will set an APPS code, so if you think this could have happened, clear all the codes with a scanner, recheck for codes to be sure all codes were cleared, then drive the truck **until the drivability issue occurs** and see if the APPS code returns. If it does, replace the APPS. Even though you replace the APPS it may not solve ALL your drivability issues, because you may also have injection pump problems.

If you don’t have access to a scan tool, or can’t read the codes as explained in above paragraph about codes, and want to trust my experience, let me explain the difference in symptoms between a bad APPS and a bad computer on the injection pump. A bad APPS usually is just a flat spot at a certain throttle opening, usually 65-70 MPH, and smacking the pedal to the floor a few times, usually clears it up. If pushing the throttle just a bit more makes it take off, or if going back to a lesser throttle opening makes the engine run fine, then it is a bad APPS. This usually occurs most frequently, but not always, in cold and or wet conditions. I would say that the APPS is the culprit maybe one time out of 100 times, so replacing it without an accurate diagnosis is a waste of money and time. We now offer a reasonably priced APPS! Call for details.

If it is caused by the computer on the VP44, the "Dead Pedal" occurs at **ALL** throttle positions and will only reset and play again if you just wait, let the pedal go to idle for a brief time, or push the clutch in, or shut off and restart the engine. The "Dead Pedal" happens most often when hot or towing, but sometimes occurs shortly after start up when cold. There are no codes pertaining to "Dead Pedal" that will condemn the computer and therefore the VP44. If the truck has a proven good

APPS, and has an intermittent "Dead Pedal" and no codes other than a 216 and or a 1693, YOU NEED AN INJECTION PUMP! It really is this simple.

TRUCK DIES GOING DOWN THE ROAD

Another common VP44 failure is when the truck dies driving down the road for no apparent reason, or when you let off the throttle at high RPM, and the engine won't restart. This is usually a seized rotor in the injection pump and is most common on 1998 and 1999 trucks. The cause of this failure in these two years is a poorly "deburred" rotor, according to Bosch. This machining problem has been addressed and apparently solved in later years. If you run any rotary style pump like a VP44 out of fuel at high RPM or heavy load, you CAN seize the rotor because it runs out of lubrication! Dying for no apparent reason can also be due to contaminated fuel and corrosion on internal parts of the pump.

OR,,,,,,,,,,,,If your fuel gauge reads about one quarter tank, put 2-3 gallons of fuel in the tank as it is very common for Dodges to have bad tank sending units and the fuel gauge to lie, and the truck to be out of fuel. In my experience this occurs most often at about one quarter tank. After adding fuel, crack three lines at the valve cover and crank the engine to bleed system. If after a while of cranking with the lines open you get fuel out of all three lines, close them and start the truck. It will sound terrible but it is OK; it's just bleeding the air out of the system from running out of fuel. Then count your blessings that you didn't need a replacement injection pump and only a new tank sending unit.

NO START. DO I NEED A VP44 TO MAKE IT RUN?

First off, read previous paragraph to be sure truck isn't just out of fuel because of a failed tank sending unit.

Secondly, verify the injection pump is getting battery voltage. THE LAZY, SOMETIMES INNACURATE way to do this is to click the key to "start" and let it come back to the "run" position; you should hear the lift pump run for 20-25 seconds, indicating that the lift pump is getting electrical power. If you don't hear the lift pump, check fuse number 9 in the fuse box on the left side if the dash AND the "ASD" relay in the "PDC" (fuse box under the hood). Don't assume the injection pump is

getting battery voltage if you hear the lift pump running when you bump the key, just because the lift pump and injection pump BOTH run off the same ASD relay in the PDC. The lift pump needs 12 volt power from the ASD circuit AND the PCM to run. The lift pump doesn't run all the time because it is controlled by the PCM to prevent UNSAFE fuel delivery when the engine isn't running, such as fueling a fire in an accident, for instance. Once the engine is running the lift pump should run continuously.

OR.....the best way to be sure the VP 44 is getting battery voltage, is to verify that there is battery voltage to the removable plug on the injection pump. Position 7 in the plug should be battery voltage and position 6 in the plug should be ground. Be sure to verify voltage during the "start" function of the ignition switch as well as the "run" position.

An interesting fact to note is, IF THE INJECTION PUMP HAS ***ONLY*** BATTERY POWER AND A GROUND, THE ENGINE SHOULD START AND IDLE, which means it does NOT need any sensor like an APPS, MAP Sensor, Crankshaft Sensor, Cam Sensor or even an ECM or a PCM to make it start, AS LONG AS THERE HAS BEEN NO AIR INTRODUCED INTO THE FUEL SUPPLY LINE! As there is a mechanical lift pump built into the front of the injection pump the electric lift pump need not run to make the truck start. This helps us a lot in diagnosing a hard or no start VP44 equipped truck, doesn't it!

If you are confident that you have electrical power and fuel to the injection pump, loosen three injector lines at the valve cover. Crank the engine a few times for 30 seconds each time, and if fuel only comes out of one line this indicates a seized rotor. When I say "fuel comes out of one line" I mean enough to put a puddle on the ground in 30 seconds. The important thing to note here is whether you are getting only lift pump pressure moving fuel through the lines or is it high pressure fuel. The volume will indicate the answer. We proved that you can not put this pump in a hydraulic lock as the rotor turns, so therefore fuel HAS to come out of one injection line even if the rotor is not turning. If fuel doesn't come out of any of the open lines, the rotor may be stuck at a closed line, or you have a computer that has failed and won't turn on the high pressure fuel to pop off the injectors and make the engine start, or you have a mechanical reason for the pump not producing high pressure fuel. ***To get the engine to start you would have to see high pressure fuel coming from all the open lines.*** NO high pressure fuel out of ALL the open lines, positively

means you need an injection pump to get the truck to start and run, if you have done all the previous tests.

If the rotor IS turning and the fuel solenoid pintle valve is stuck in either the open or closed position or the pistons are stuck in the rotor, due to fuel contamination or corrosion, you won't get high pressure fuel out of any line and the engine will NOT run, because the pistons in the rotor can't compress and develop high pressure and therefore operate the injectors to start the engine. If you have only a feeble fuel flow, this is due to having only lift pump pressure moving fuel through the line, and the VP44 is not creating high enough pressure to pop off the injectors. Low fuel pressure coming from the injector lines is caused by either a computer electrical issue or a mechanical issue. As YOU can't fix either cause of no high pressure fuel it confirms that the engine will not start until you replace the VP44.

If your truck won't start and you DIDN'T JUST change the fuel filter, or if you are sure you don't have air in the lines, the above test works fine. EVEN IF THE LIFT PUMP IS BAD, AND YOU DON'T HAVE AIR IN THE LINES, THE TRUCK SHOULD START! This is because there is another vane pump in the front section of the VP44 that will keep enough fuel flowing to start and run the truck, albeit at slightly lower than normal power, and it probably will have a high speed or high load miss. This is why trucks don't die on the side of the road when they have a bad or weak lift pump.

If the truck *WAS* ***running before you replaced the fuel filter*** and IT HASN'T STARTED SINCE, or started and stalled and won't restart AND you can't bleed the lines at the valve cover and get HIGH PRESSURE fuel to the injectors to get the truck to start, you have two choices. You can bleed the system by pressurizing the fuel tank, or, you can replace the lift pump, which is the culprit! You must have very little or no air in the lines to make the truck start after opening the fuel system or fuel lines, which you of course do when changing a fuel filter.

If you get adequate high pressure fuel from all three lines, close them and crank the engine until it starts. Then you have to figure out why it ran out of fuel. Don't forget about the bad tank sending unit deal explained above, if this happens to you.

HARD START HOT OR COLD

Other complaints with the VP44 trucks are frequent OR intermittent hard start hot or hard start cold. If, after either of these problems are observed, when the engine starts does the engine run rough for a few seconds and then clear up and run smooth, or does it immediately run smoothly? If the truck runs rough for a while this indicates a fuel delivery problem, such as fuel drainback or air getting into the fuel supply line. If you have rough running briefly after start you probably do NOT have an injection pump issue.

If the truck runs instantly perfectly when it finally starts or shows white smoke on start up, your problem is a faulty computer on the top of the injection pump. This component cannot be replaced in the field as it has to be programmed and calibrated to the mechanical part of the VP44 on the fancy test stand made just for VP44 pumps. You have to buy a replacement VP44 injection pump to correct this problem.

HIGH SPEED HIGH LOAD MISS

This symptom does not indicate an injection pump failure typically. A weak or failed Lift Pump or a partially plugged Fuel Filter will NOT give any drivability issues OTHER than a skip, miss or buck at high load or high RPM operation. If you have these symptoms after changing the injection pump it is because the new injection pump is using more fuel to make more power than the old one, and the lift pump can’t provide enough fuel. If you DO experience these symptoms, replace the fuel filter and if that doesn’t fix the problem, go to "How to Diagnose a Lift Pump" at the bottom of this page and proceed from there.

Most importantly, be sure that you have at least 5 PSI Lift Pump pressure UNDER LOAD at all times, to be sure you aren’t causing any harm to the Injection Pump Diaphragm, or preventing full power from being attained. We strongly suggest installing our "Low Lift Pump Pressure Warning Kit" to monitor fuel pressure and therefore maximize fuel filter and injection pump life. It will save more than its initial cost because you will be changing your filter by restriction rather than by mileage or time. It is a great diagnostic tool too, especially for so little money. Go to our Product List and or Product Pricing on the left side of this page for more info about this inexpensive money saving product. Our replacement lift pumps have a bypass circuit in them so they can’t do damage to the diaphragm in the VP44 injection pump, if they ever fail to make enough pressure.

ROUGH IDLE/MISS AT LIGHT THROTTLE

This is almost always the computer on the top of the injection pump, as long as there is appropriate lift pump pressure, no air in the fuel lines and no codes pertaining to Crankshaft or Camshaft sensors. By now you know what a bad computer means; REPLACE THE VP44!

TRUCK IS DOGGY ON TAKEOFF

This one is rare AND tricky. If this is the ONLY drivability complaint and the following test is done and the voltages are right, then YOU NEED AN INJECTION PUMP! If it isn't the only drivability issue then you probably have condemned the VP44 pump already, from another test. Either with a scan tool, or voltmeter on the signal wire of the MAP sensor, verify the MAP signal voltage at .5 volt for 98, 99 and 2000 trucks at idle or "key on" only. This should be 1.0 volt on 01 and 02 trucks. When the truck is driven, monitor this voltage on take off and if the voltage stays low and then jumps higher and then the truck takes off, you probably need a MAP Sensor. If the voltage rises almost immediately and the truck is still doggy, YOU NEED AN INJECTION PUMP! If the signal voltage is low to start with, and or the truck has a fuel enhancing device on it that attaches to the MAP Sensor signal wire, call to find out how to give the MAP Sensor an enema to fix the delayed fueling without replacing it.

CONTAMINATED FUEL AND ALTERNATE FUELS

Lastly is the issue of WVO, Biodiesel and or contaminated fuel. If water, condensation or a corrosive situation gets inside the injection pump because of either poor quality diesel fuel or alternate fuel use, some of the close tolerance parts inside the VP44 will stick and affect engine performance and cause drivability complaints, such as a high speed skip, low power or no start. These problems can rarely be cured by some sort of fuel treatment being put in the fuel after the truck starts skipping or stops running. The sad truth is corrosion never gets better and a stuck internal part rarely fixes itself. These corrosion problems are the most common reason Bosch denies a warranty claim. Contaminated fuel rusts or corrodes, and therefore destroys, the internal components in these high pressure style rotary pumps. Generally if there are drivability issues due to contaminated fuel, ALL the expensive internal parts of the injection pump will be ruined and

have to be thrown out, which renders the pump junk and not worth rebuilding. This is especially hard to take because typically you won't know about contaminated fuel damage until too late, such as when we open the pump for warranty consideration, failure diagnosis, or repair.

If you think you might need an injection pump, or a lift pump, but aren't sure enough in your diagnosis, give me a call and I'll happily verify a diagnosis with you. Click on "Upgraded VP44 Injection Pump" below to learn why our pumps are the best value and check out the rest of our website for more fuel system related info.

Thanks for reading,

Chip Fisher, Owner Blue Chip Diesel Performance

888-ISB- PERF or 888-472-7373 MON-FRI 9-5 Eastern Time

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