



SYMPTOM: Appears that fuel pump has failed on 2011 Common Rail Diesel (CRD) Nissan Patrol ZD30 with only 43,000km. Fault code P1089 (Fuel pump) has logged in the computer.



Electrical faults can occur in common rail diesels because the system is electrically actuated and sensed, but many mechanics and auto electricians overlook is that the hydraulic system is a mechanical shift of force relying on pressure. To make pressure you must have a restriction passage to pass fluid through.

The vehicle I am referring to in my diagnosis is the Nissan Patrol Y61 Wagon & U61 Utility year build- 2007- 2012 engine- ZD30DDTi fitted with Bosch CRD.

The km's of the vehicles varies anywhere from 43k up to 250k. This particular fault has been popular amongst many manufacturers and not specific to the Nissan Patrol. The symptoms are intermittently loses power under load, hard to start hot, fault codes P1089 Fuel pump, P0087 pressure too low, P0088 pressure too high, P0089 pressure regulator 1 performance, P0093 Fuel System Leak Detected- large leak, P0093 small leak detected.



ZD30DDTi Common Rail Diesel Engine

Y61 Patrol Wagon
UY61 Cab Chassis

2007- 2012 engine- ZD30DDTi fitted with Bosch CRD.

This particular fault has been so popular, that I use the actual failed component from this vehicle as a demo in my diesel diagnostic training courses and it is not the fuel pump which many replace because the fault code displays this. The failed component I am referring to is the actual rail itself.

The rail stores fuel and distributes fuel to the injectors. These rails vary in design on different manufacturers. All rails have the main pressure sensor fitted and some designs have a pressure relief valve which can be electronic operated or mechanically and there are rails fitted with pressure regulators. For the correct diagnostics to take place, you must be aware and knowledgeable of the systems design you are diagnosing.

High pressure accumulator (common rail)

Fuel is supplied to the common rail at high pressure from the high pressure pump.

The rail stores the fuel and distributes it to the individual injectors.



It also damps pressure vibrations caused by the high pressure pump and injection processes.

Typical volume of fuel held in common rail: 16 – 20cm³.

2 from more than 50 designs of rails.

Often after the high pressure pump and rail sensor has been replaced, the vehicle will be referred to the auto electrician. Hundreds of hours can be wasted checking wiring and computers. This is the reason I average at least 1 auto sparky attending my training, because even these guys are left scratching their heads.

There are many components which can fail and log similar faults. In this edition I am going to focus on diagnosing a failed rail.

I will explain how it is possible to diagnose the failed component with some very simple testing using items found in your workshop and your local hardware store without relying completely on the scan tool. The scan tool must be used to read rail pressure but remember it is reading the entire system, therefore without knowing how to isolate one component, you may still end up replacing a good working component and still have the same fault.

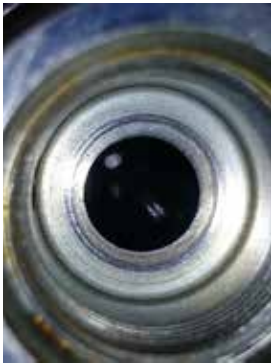
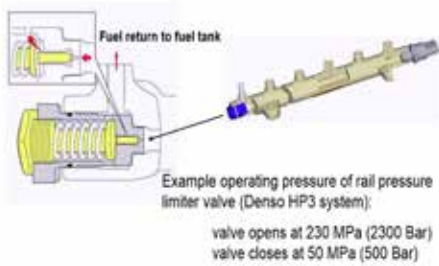
Often this fault would frequently occur in the warmer climate or when the vehicle has been driving for a few hours. This is because the fuel viscosity is less and the CRD system relies on hydraulic ability to operate correctly. Symptoms include hard to start where the engine would crank considerably longer than usual. The engine would have an improved re-start after being sat for more than an hour but still be evident of a delay. Intermittent loss of power would occur sometimes under extreme load like off-road driving or some highway use uphill or towing.

Check for fault codes first. Record then clear them and if possible take the vehicle for a test drive and experience the fault yourself. Using your scan tool, go to rail pressure data and note pressure when cranking. If pressure is less than 200 bar or it takes more than 5 seconds of cranking the engine to build to the required minimum pressure then there is a loss of fuel pressure in system.

Often mechanics have gone straight to replacing the pressure relief valve at the end of the rail and not long after the fault re-occurs. What mechanics do not realise is that this valve must not be removed and refitted without being tested without the appropriate equipment. The only sealing for this valve is the knife edge seal between that of the rail and valve. Once that seal is broken (undoing the valve) there is no guarantee. The vehicle will be taken for a short 30 minute test drive and it may take up to a couple of weeks of until it occurs again- when your client is way out in the middle of nowhere- an expensive towing fee.

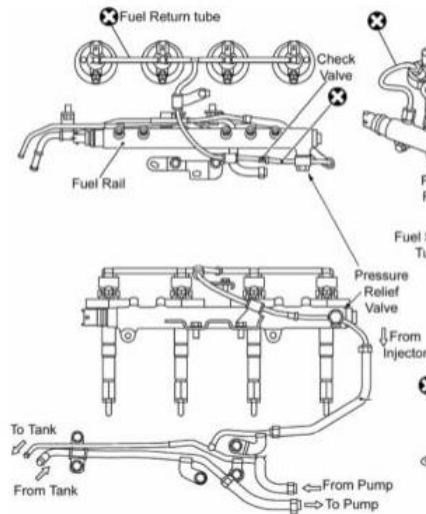


Rail pressure limiter valve



The only sure way to rectify the fault is to replace the entire rail and first we must test it to make sure we are replacing a \$1000 rail for the right reason. Looking at the rail located on the drivers side (right hand of engine). It is not difficult to see the rail once the engine cover and intercooler has been removed and you will see 4 pipes from the rail to the injectors. If you're lost here then you should not be working on this vehicle. At the front end of the rail (front of engine is the drive belt end), you

will locate a banjo bolt with banjo fitting. There is one small diameter hose from the injector return feeding in and then a larger hose returns to the tank.



We are looking for is a large leak from this fitting. This valve does not release until approx 1640 bar. You may find both or only one of the faults occurring-

1. Hard starting hot
2. Intermittent loss of performance under load.

Before removing any fuel components ensure that the area has been thoroughly cleaned with brake clean and blown

off with compressed air. Make sure all exposed fuel pipes are capped immediately to avoid contamination. If the vehicle has only a starting issue, remove the banjo fitting and cranking the engine look for any fuel leaking out of the rail. There should not be any fuel present at this low cranking speed. If there is then BINGO! You have successfully diagnosed the fault and the rail must be replaced.

If the vehicle is experiencing the loss of performance only, then it will be necessary to replace the existing black fuel hose from the return with some clear hose. Make sure you still run the return back to the existing route. You will have to run a long enough hose to run outside the engine bay for you to inspect any early dumping of the fuel under load whilst driving. If this occurs either just before the fault appears or at the same time, BINGO! You have successfully diagnosed the fault and the rail must be replaced. The rail comes complete with a sensor and valve. On the Nissan Patrol it only takes about ½ an hour to replace.



For more great tips and fixes, book in today to attend one of my Australia-wide Training Courses, or register for Diesel Help membership. Visit my website www.dieseldoat.com or give me a call on 0432 738003.