

## Fixing the Low-Oil-Pressure Fuel Shutdown on Yanmar L100 & Chinese 186F 10HP Diesel Engine Generators

by Gordon Gibby KX4Z  
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Yanmar is a very respected diesel engine and tractor manufacturer, with a very famous line of small air-cooled single cylinder diesel engines, the L100. So well-respected in fact that the Chinese have copied their engine, and it is known as the 186F, available for under \$400 on Amazon:

<https://www.amazon.com/Diesel-Cylinder-Cooling-Agricultural-Machinery/dp/B088D4Z491>

Manufacturers mate this capable 10hp fuel-sipping engine *without any spark plug ignition noise*, to an alternator head, set the engine to 3600 RPM and let the mechanical governor keep it there, despite heavy loads. You get a noisy, but very fuel-efficient generator. For ham and emergency emcomm, the huge advantage is there is no need for an electronic voltage regulator or inverter -- and hence near ZERO RFI. Commercial 5kW diesel generators built on this arrangement generally sell for \$4,000. The actual Yanmar engine should run for hundreds and hundreds of hours (I had 3,000 hours on one tractor) with proper care; the longevity of the Chinese knockoff is debatable, but it is cheap!

A sampling of generators using this engine:

- <https://www.absolutegenerators.com/yanmar-portable-diesel-generator-ydg5500w-6ei-5500-watt-9-1-hp-120-240-volt-tier-iv-final>
- <https://www.electricgeneratorsdirect.com/Generac-6864-Portable-Generator/p50700.html>
- <https://www.maxflow.co.uk/generators/diesel-engine/elite50yantf>
- <https://www.pramac.com/product?product=10457&folder=66>

Our 2nd-hand generator left over from the USS Cole repair, was an earlier version of the Italian Pramac diesel generator. It had the low-pressure oil switch, but it wasn't hooked up, nor was the starter motor! Apparently the Navy relied on sailor muscle power for starting! I wired all of that up with an aftermarket ignition switch and key-- and had a **key-start 5kw diesel generator**.



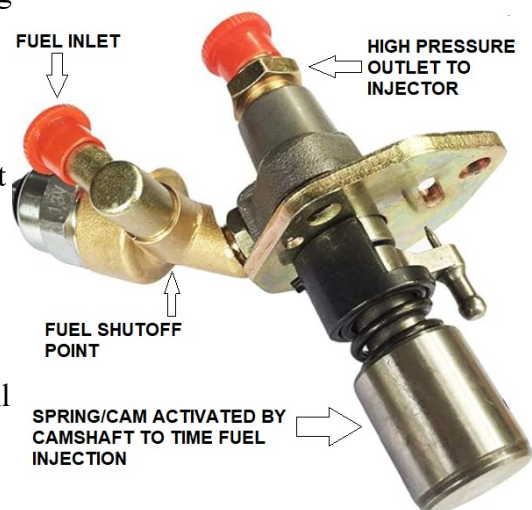
### **Low Oil Pressure Protection**

The low-pressure oil switch drives an electric fuel shutoff. The typical Yanmar L100 uses a 12-volt solenoid to block fuel delivery to the diesel high pressure pump, such as this \$28 model: <https://www.amazon.com/labwork-parts-Injector-Solenoid-Yanmar-Generator/dp/B07KT14KVQ> (See photo.) This exact same solenoid is used for a fuel shutoff in the ALH-series of VW TDI diesel engines, and in some Volvo's as well. It has a rubber tip affixed to the end of the solenoid. An internal spring automatically forces the plunger OUT, and pinches off the fuel deliver just right before it enters the high pressure, cam-driven pump. When 12V is applied to the solenoid, the electromagnet tries to retract the plunger, re-opening the fuel supply.

### All is not well...

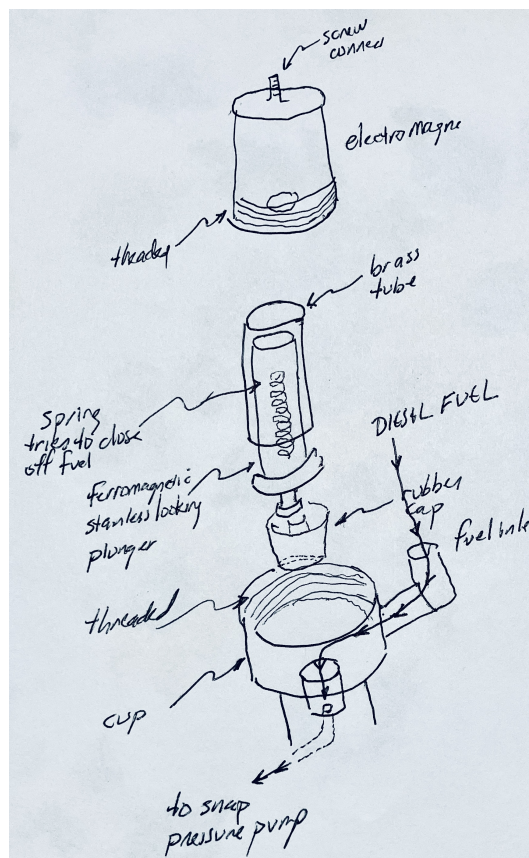
Unexpectedly, I ran into a very significant problem: Turning off the key switch nicely removed 12V from the solenoid, and the spring nicely forced the plunger out and shut off the fuel. But if the engine had run for a while, often the solenoid wasn't able to pull the plunger back in for some reason! Once you shut fuel off....you couldn't reliably get it to restart for hours or days!

And we NEED that electric solenoid, because replacing the fuel shutoff with a manual valve would remove any way for the low-pressure oil switch to protectively shut down the engine if the oil ran low. (It used maybe a quarter cup of oil in 30 hours of running during all of Field Day)



### What Is Going On?

A lot of head-scratching suggested that just possibly, the very powerful high pressure pump might be drawing a **partial vacuum against that rubber tip** and just like a suction cup Florid Sun Pass, it was vacuum-stuck, with no means of easing the vacuum if the fuel system had no leaks...



Nothing we tried seemed to fix this problem. If you stopped the generator to refill it, you could count on NOT being able to restart it anytime soon... It was so bad that one of our crew did something VERY DANGEROUS to refill that generator during Field Day -- we all shuddered to think about the possibilities.....

When I disassembled it for the most recent time, indeed the plunger came clear out of the electromagnetic housing and appeared stuck to the outlet hole. I had to physically grab it and pull, to get it freed up (suggesting it was vacuum-stuck). Yet then it went in and out of the recess quite easily and didn't seem stuck at all! The vacuum-stuck idea seemed to explain this reasonably!

Somewhat in desperation, I removed the rubber tip and tested whether the little protuberance left underneath would work. It does! Pressed by the internal spring, it very nicely closed off the fuel enough to stop the engine or prevent it from starting, and yet did NOT get physically stuck anywhere. Would it pass the acid test?

So I put it all back together without the rubber tip, and it seems to be a solution. I ran the generator for 2 hours, and

after shutting down with the key, it easily restarted, and after stopping it again, again it restarted. It would not do this before. **Success!!**

Alternative possible solutions for those who might not want to take off the tip include

- Use a knife to cut a slice across the business end of the rubber tip, allowing a tiny leak, which would be enough to release the vacuum, but not keep the engine running.
- Find a tip that is not cup-shaped, but more flat or rounded
- Drill a tiny hole in the tip to potentially allow a tiny leak.