

# Refitting the C320 Primary Fuel Filter

*by David C. Veeneman (2020-08-13)*

The Catalina 320 is a great boat, and I like most things about it. But there are a couple of glaring exceptions. One is the placement of the shore power receptacle, but that's a story for another day. Another is the placement of the primary fuel filter, and that's what this article is about.

## Problems with the Stock Racor

My boat is *Adelante*, a 1994 C320, Hull #131. It's an early 320 with a Perkins engine, and its primary fuel filter is a Racor 220 series 'spin-on' filter. The fuel filter is located in the engine compartment in the aft berth, and it is mounted low, below the level of the aft berth sole. And it drives me crazy. Or, at least, it drove me crazy until I replaced it with a new Racor 500 unit and relocated the new unit to the lazarette.

Here are the problems with the stock Racor unit on the C320. First, the unit is a 'spin on' filter. That means the actual filter is encased in a cylindrical metal case that screws onto the filter mount, much like the secondary fuel filter on the engine. However, the filtration unit contains a clear plastic bowl, which in turn screws onto the bottom of the filter.

The plastic bowl is supposed to be used to monitor the level of water that has been separated from the engine's diesel fuel, and it also shows any large fungal solids that the filter has blocked. The fungus comes from the bottom of the boat's fuel tank.

Water can collect in the bottom of the fuel tank from bad diesel fuel, or from simple moisture in the air. Water tends to collect when a boat sits in a dock for an extended period of time and, when it collects, fungus can grow in the bottom of a tank. *Adelante* had sat in a dock for years before we bought her, with the result that a veritable fungal garden was growing in the bottom of the tank.

During the first year we had *Adelante*, I had to change the Racor filter a half dozen times, due to fungal gunk in the fuel line. Changing the filter drove me crazy every time I had to do it. In order to change the filter, one needs to unscrew the filter from the unit, and then unscrew the bowl from the filter. It's almost impossible to do without spilling diesel in the bilge.

Theoretically, I should have been able to drain the plastic bowl to get at least some of the gunk out. However, the unit was mounted too low to even see the bowl, and there wasn't enough room below the bowl to put anything other than a plastic bag as a catch-basin. Still, I hung in there.

Things came to a head earlier this year when I replaced my old fuel tank with a new one that contained an inspection port for cleaning the tank. After completing that project, I discovered diesel fuel in my bilge, which I assumed had come from the fuel tank. But all my fittings were secure, and it took a while to determine that the Racor bowl had developed a leak, probably as a result of the number of times I'd had to remove it to replace the filter.

Fortunately, most C320 owners hardly ever have to fool with the Racor. Most US marinas have pretty clean fuel, and a Racor filter will generally last a year, or even more, between changes. So, the upgrade that I performed isn't necessary for everybody. But, if you like to keep an eye on your fuel quality, or if you are prone to getting water in your fuel tank, the upgrade makes life a lot easier.

## Advantages of the Racor 500

The Racor 500 provides several advantages over the Racor 220 Series units shipped on C320s.:

- It has a higher fuel flow capacity, a minor benefit, given that the 200 series fuel flow rate is adequate for a sailboat the size of a C320.
- The collection bowl is permanently affixed to the bottom of the unit, resulting in less wear and tear.
- The fuel filter element is a drop-in item, rather than a spin-on. Filters are less expensive and easier to change.

For all these reasons, I decided to upgrade the Racor to a Model 500.

## Refitting the Primary Fuel Filter

My immediate problem was a crack in the plastic bowl that attaches to the filter. My first

thought was to simply replace the bowl, but I'd been fuming for a couple of weeks about the location of the filter, so I decided to replace the bowl and relocate the entire Racor unit to a more convenient location. Then I realized I could upgrade the unit to a Racor 500 unit for relatively little cost, and the plan was set.

I chose the lazarette, on the forward bulkhead (between the lazarette and the aft berth) for the Racor's new location. This site offered two advantages:

- It would allow me to mount the new Racor next to the fuel tank, at the same level as the fuel pickup fitting. The hose between the pickup fitting and the Racor input fitting would be a straight, level run of about a foot.. As a result, there would be no 'lift' involved in



getting fuel to and through the Racor on its way to the fuel line. And that means less work for the fuel pump. The mounting location is about a foot starboard of the access hatch between the aft berth and the lazarette, meaning that I could check on the Racor without climbing down into the lazarette.

I ordered the Racor 500 and a fitting for the output side, but not the input side. The reason is that I planned to mount my fuel shutoff valve on the input side of the Racor. It had been attached to the fuel pickup on the tank, but in that location, I could only get to it by climbing down into the lazarette. With the cutoff mounted on the Racor, I could reach it easily from the access hatch in the aft berth.

## Installing the Racor 500

The Racor 500 installation is rather straightforward. It mounts to a bulkhead with two screws. I used 5/16" x 1 1/4" machine screws which worked nicely. The forward lazarette bulkhead is a bit thin, so I debated whether to fabricate a wood backing plate for the other side of the bulkhead. In the end I decided to forgo the backing plate in favor of washers on the machine screws, which is holding up nicely.

Attaching the hoses was easy enough. My hull uses 3/8" fuel line, so I simply cut an eight-inch run of hose between the fuel pickup on the tank and the fuel shutoff on the Racor. Note that the Racor 500 does not take standard 1/4" fittings like the 220 series; its fittings are larger. I





needed an adapter attach the fuel shutoff valve to the Racor, which I found at my local chandlery.

The main fuel line is not quite long enough to reach the output fitting on the Racor, but that was solved by extending the hose using a double-hose-barb fitting (also known as a 'splice fitting'). The fuel lines are difficult to attach with the Racor mounted to the bulkhead, so I dismantled the Racor, attached the lines, then remounted the unit.

## Priming the System

Any diesel fuel system needs to be primed after it has been opened up, in order to advance fuel to the engine and to bleed any air from the system. The Racor 220 has a small, built-in primer pump, but the 500 does not. That's just as well, since the 500 is located relatively far from the engine.

Priming involves opening a small bleed valve on the engine and pumping fuel to the engine. When fuel reaches the engine, it will leak out of the bleed valve. Initially, when a combination of fuel and air is being pumped, the fuel will bubble out. Once all of the air has been bled from the system, it will stream out. At that point, the bleed valve can be shut, and the engine is ready to start.



So, I needed some way to prime the fuel system from a position next to the engine. The old location of the stock Racor provided a suitable location, and a 3/8" bulb primer from West Marine fit nicely in the gap in the fuel line left by the removal of the old Racor.

The Racor 500 is primed in two steps. First, the unit has to be filled with diesel fuel, then the system is primed in the usual manner. I suppose it would be possible to fill the Racor 500 by pumping on the priming bulb, but it takes about a quart of diesel fuel to fill the unit, which would mean a lot of pumping on the bulb. So, I used a drill pump to transfer a quart of diesel from the fuel tank to the Racor.

Once the Racor was filled, I primed the system from the bulb. It took a bit of priming to get all the air out of the system, but once it was done, the engine started right up.

## Conclusion

The installation looks neat and professional from the aft berth—only two screws in the lazarette bulkhead. The Racor is more easily accessible than it was before and easier to maintain. And the upgrade to Model 500 reduces the risk that I'll have another episode where the bowl cracks and I end up with diesel in the bilge.

*Many thanks to Jack Brennan, who did this refit before me and provided much worthwhile advice and recommendations during this project.*