

Replacing the C320 Fuel Tank

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I have just finished replacing the fuel tank on my Catalina 320, *Adelante*, a 1994 model with hull number 131. I want to share the advice I received and the procedure I followed in replacing the tank. Thanks to the C320 International Association, whose members guided me through the process of deciding whether to replace the tank, and the process of performing the replacement.

My Fuel System Problems

Adelante appears to have sat in a slip for about ten years before I bought her, with very little use. During an extended period of inactivity, water can accumulate in the fuel tank. In this case, the water is thought to result from the condensation of atmospheric moisture introduced into the fuel tank via the tank vent.

Since water is heavier than diesel fuel, it settles to the bottom of the tank, where algae can grow. Over time, this growth develops into a black sludge that will foul the fuel system and clog the secondary filter (generally a Racor water separator filter), leading to periodic engine failures. The failures can generally be resolved by replacing the Racor filter.

In my case, the failures occurred once every couple of months or so, as a result of which I ran through five Racor filters in the course of my first year owning *Adelante*. A Racor will normally last a year, and many last longer. I clearly had a problem with the fuel system.

Engine failures were usually precipitated by a long cruise in choppy seas. In retrospect, I believe these bumpy trips were knocking sludge loose from the bottom of the tank. This gunk made its way to the fuel pickup in the tank and into the fuel lines.

My first countermeasure was to add a biocide (fuel stabilizer) to my fuel. While this step may have prevented the development of new sludge, it did nothing to ameliorate the existing sludge. Pumping out the tank and replacing the contaminated fuel with new diesel also failed to resolve the problem.

My next step was to have the existing fuel tank cleaned. While looking into that, I made a nasty discovery: The original-equipment fuel tank on a Catalina 320 does not have an inspection port—a removable cover that provides access to the inside of the tank for cleaning.

To compound the problem, the tank is baffled. That means that if I added an inspection port to the tank, I would have to add two, one on each side of the baffle. Since add-on inspection ports run about \$200 each, that solution would be fairly expensive.

Should I Replace My Fuel Tank?

I turned to the Catalina 320 International Association online forum for advice and found a strong consensus that replacing the existing tank would be preferable to adding inspection ports to the old tank.

The reasoning behind the advice was simple. My tank was 25 years old, which put it close to the end of its useful life. At some point, I could expect a leak in the tank that would require either a replacement or an expensive repair. The cost of add-on inspection ports for the existing tank was over half the cost of a new tank.

Given that a replacement tank would contain a built-in inspection port and no baffling, replacing my old tank should solve my current problem, prevent any near-term problems with tank leaks, and provide access to the tank should it need cleaning down the road. That reasoning persuaded me to replace the tank.

The Replacement Tank

Ezell Industries produces a replacement tank for the Catalina 320 that it sells direct, and that is also available through Catalina Direct. The tank also works with Catalina 27 and 28 models. The tank has a 19 gallon capacity. Ezell also makes a larger tank that has a 28-gallon capacity, but this tank does not fit all Catalina 320 hulls, and Ezell recommends measuring carefully before ordering the larger tank. I opted for the 19-gallon model.

The tank has five ports, in addition to its inspection port:

- A large fuel filler port, which is welded to the top of the tank;
- A smaller vent port, which is also welded to the top of the tank;
- A fuel pickup port, which is a 90° fitting screwed into the top of the tank;
- A fuel return port, which is also a 90° fitting screwed into the top of the tank; and
- A ‘sender’ port, which is a hole in the top of the tank designed to receive the fuel-level sensor for the tank.

I purchased my tank from Catalina Direct, and it arrived with a new sender unit already installed in the sender port. The two 90° ports are tapped for 3/8” fittings. Typically, 3/8” barbs are attached to the 90° ports for attaching hoses to the tank.

Draining the Old Tank

Before you can remove the old fuel tank, you will need to drain any fuel from it. There are several ways this can be done; I chose to use a Jabsco drill pump. My original plan was to pump the fuel out to five-gallon buckets lined with contractor-grade garbage bags. I purchased a funnel with a built-in fuel filter that would trap gunk and water. I had hoped to put the polished fuel back into the new tank once the replacement was done.

Draining my tank took the better part of a morning, mainly because I had trouble connecting the pump to the tank. My first thought was to insert the pump’s intake hose into the fuel tank’s filler port. Unfortunately there is a sharp 90° turn where the filler port meets the tank, and I couldn’t get the intake hose around that turn.

My next thought was to connect the intake hose to the fuel line, where it connects to the Raycor pump. In my C320, the connection is in the engine compartment and it accessed via the aft cabin. Unfortunately, that approach didn’t work for me—I never did figure out why.

Instead, I decided to connect the Jabsco pump's intake hose directly to the old tank's pickup port. The only problem I ran into here is that the pickup port normally connects to the fuel line, which has a 3/8" inside diameter, and the jabsco intake hose has an inside diameter of 1/2". I improvised a solution by wrapping electrical tape around the pickup port's barb on the old tank to build it from 3/8" to 1/2" and attached the Jabsco intake to it with a hose clamp.

Accessing the Fuel Tank

In my Catalina 320, the fuel tank sits at the bottom of the starboard side of the lazarette. There is a two-part shelf that sits above the tank; this shelf must be removed to get to the fuel tank. The shelf removes with a few screws, and disassembles with a few screws across its middle.

It sounds easy, and once you actually get down into the lazarette, it isn't too difficult. The tough part is actually getting down into the lazarette, which requires some bending and contorting. I climbed down into mine from the port side. It helps to have someone who can pass tools down to you and take them back up, so that you aren't constantly climbing into and out of the lazarette.

Once the shelf is removed from the starboard side, you'll see the fuel tank. It's rectangular and slanted on the bottom to match the contour of the hull. It's held in position by a plastic



band similar to those used to hold large packages together. Mine cut easily with a pair of scissors.

There are hoses mounted to the forward bulkhead in the lazarette that prevent getting access to the fuel pick up port, and that will impede removal of the fuel tank. These hoses are held in place by screw-down zip ties. You can remove the screws and preserve the existing zip ties, but I found it much easier to simply cut the ties and replace them at the end of the job.

Once you have removed the zip ties, you can access all of the ports on the fuel tank. The filler port and vent port are pretty obvious and are located amidships. The pick-up port is located on the forward edge of the tank on the port side. The return port is located toward the aft end of the tank on the port side.

Pumping Out

The fuel line was the first one I disconnected from the old tank, because I needed to use the pickup port to drain the tank. My wife sat in the cockpit with the output hose from the Jabsco pump and several lined, five-gallon buckets.

The pump worked well from my end. It started pumping fuel almost immediately, and it had no trouble pumping from the lazarette up to the cockpit. Unfortunately, my wife's end of the process wasn't going as smoothly. The fuel coming out of the old tank was so filthy that the filter in the funnel began clogging almost immediately, slowing the process to a trickle.

After a couple of attempts at clearing the filter, we gave up on that approach and decided to simply pump out the tank and dispose of the old fuel. From there, the pumpout took about fifteen minutes, at the end of which we had three buckets full of old fuel. The first bucket's contents were almost black, but the second and third buckets were much better. So, I saved the best bucket for the end of the job and drove the other two buckets over to the fuel dock in my car for disposal.

Removing the Old Tank

Once the old tank was drained, removing it wasn't particularly difficult. It was a matter of disconnecting the rest of the hoses, and disconnecting the wires from the sender unit on the tank. The sender unit is the sensor that controls the fuel gauge at the helm, and it disconnects with two wires.

Once the hoses and wires were disconnected, the tank came out of its cradle easily. I had hoped to be able to lift the tank out through the port-side lazarette hatch, but the tank turned out to be about an inch too wide. After an hour or so of frustration, I decided to go the tried and true route and remove it through the aft berth.

There is a hatch to the lazarette on the port side of the aft cabin. Four screws on the cabin side hold the hatch in place. Remove these screws, and the hatch lifts away, and once that's done, the fuel tank slides easily through the opening. From there it's a simple matter to haul it up to the deck.



Prepping the New Tank

It's important to put risers of some sort on the bottom of the new tank, to keep it off the hull. Without risers, the tank can trap water, which will cause deterioration of the welded seams and shorten the life of the tank.

When I removed the old tank, I saw that they had used plastic threshold insulators (long, raised plastic strips) as risers. The threshold strips were in pretty good shape, so I decided to reuse them. They had been secured to the old tank with masking tape, so it was a simple matter of peeling them off and cleaning them up.

I secured the risers to the new tank with a water-resistant, heavy-duty duct tape. There were three of them, and they run the width of the tank, allowing any water to run under the tank to the bilge.

Some Catalina 320 owners have taken further steps to protect the tank. One owner painted the bottom and sides of his new tank with truck-bed paint, which involves additional work but provides additional protection. In my case, I went with the risers only.

Installing the New Tank

The new tank went in the same way the old tank came out—through the aft cabin hatch to the lazarette. The new Ezell tank was nearly identical to the old tank in size and shape, so installing it presented no great challenges. I wasn't able to find a plastic strap like the one around the old tank, so I substituted a nylon webbing strap.

Connecting the New Tank

By and large, connecting the new tank is pretty straightforward, but in my case, I ran into a few hurdles. First, the pick-up and return port fittings faced the wrong direction, away from the hoses to which they needed to connect. As noted above, these fittings are screwed onto the tank, so the solution was simply turning the fittings 1/2 and 3/4 of a turn, respectively.

The second problem was that the fuel pick-up fitting did not allow enough vertical clearance to install a fuel shut-off valve. I considered installing a shut-off valve inline with the fuel line, using a short piece of hose. However, I had previously installed a fuel shut-off in the fuel line at the Racor filter, so a second inline fuel shutoff seemed superfluous, and I decided to leave it off.

The next problem I encountered was that the fuel pickup port on the new tank was several inches farther from the port side edge of the tank than the old pickup. As a result, the fuel line was not several inches too short to reach the pickup port. I solved this problem by extending the fuel line with a 3/8" double-barb fitting, a short length of 3/8" hose, and some hose clamps.

Similarly, the wiring coming from the ship's wiring harness didn't quite reach far enough to connect the wires from the new sender. I fixed this by extending the wires using crimp connectors.

Finishing the Job

As I mentioned above, I saved the best bucket of fuel to put in the new tank. The filter/funnel worked well for polishing the fuel, and it was a pretty short matter to get five gallons of fuel into the tank. That fuel was enough to fire up the engine, run it for a half-hour or so to test the installation, and finally, to get me to my local fuel dock to fill the tank with fresh fuel.

I note that it took a long time to bleed the fuel system after the installation was done. I was using the bleed pump on my Racor 220 series filter; at the best of times, a fuel system bleed using this method is a fairly laborious process. As I pumped the Racor for what seemed like an eternity, I was concerned that I might not be getting any fuel flow from the new tank, but finally, I started getting flow from the secondary fuel filter bleed port, and all was well.

Conclusion

I don't have a whole lot of mechanical experience, but as a retiree, I have plenty of time. I probably spent about twelve hours total replacing my fuel tank, and about a quarter of that involved the trial-and-error steps described above. I would think that anyone reasonably mechanically-minded could do the job in less time. If I had to do it again, I think I could get the job done in about eight hours.