

Alpine Fuel Tank Cleaning & Sealing

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I have a series V with the dual fuel tanks in the wings. This is the same setup as used in the series III and IV.

The black paint inside the tanks was peeling and getting caught by my fuel filter. Time to remove, clean, seal, and reinstall the fuel tanks

Removal & Installation

I followed the instructions in the excellent write-up here:

<http://sunbeamalpine.org/wp-content/uploads/2017/02/S3-SV-Fuel-Tank-Installation-Tips.pdf>

Some additional thoughts on the installation beyond what is in the article:

Vent hose:

The 3/8" ID vent hose is 72" long. I did buy J30R9 spec fuel injection hose to ensure it handles ethanol. I did not pull a string through and then use the string to pull a new hose through. I just taped the new hose to the old hose and used the old hose to pull the new hose through.

Fuel hose connection clamps:

The newer 1.75" ID fuel hose joints from Sunbeam Specialties are slightly larger diameter than the original hoses. As the article indicated, there are two different length screws on the original double wire clamps. There is no difference in the double wire clamps themselves, only the screw lengths differ. Four have 1.5" long screws and four have 1.75" long screws. I was able to fit the clamps with the 1.75" long screws onto the new hoses. I could not get the clamps with the 1.5" long screws to fit. It turns out the screws are #2 British Association, which are not common. I was able to order 2" long #2 BA stainless screws from British Tools & Fasteners (Lyons, NY). They have cheeseheads instead of the original round heads. (Their web site lists regular steel 2" round head screws, but they were not available when I ordered.) They have slightly smaller heads than original, so I used #10 stainless washers under the heads. I used these new cheesehead screws on the clamps behind the trim panels, where they are normally hidden from view. I'm sure I could have found proper round heads (and probably 1.75" long screws) if I was willing to order from the UK. (And yes, I could have used new clamps behind these panels, since they are hidden, but I wanted to use the original clamps.)





Sliding the fuel hoses onto the pipes:

The hoses from Sunbeam Specialties indicated made in Taiwan. I found that they slid half-way onto the pipes without much effort. I mounted them dry - no soap or lubricant. Now when I had to mount the last hose fully onto the crossover pipe, it was a real struggle to get it fully onto the pipe. I couldn't rotate it by hand once it was fully mounted. Initially, my crossover pipe was about 40 degrees and the fuel hose was 68 degrees. I thought a cold pipe with a warmer hose would allow the hose to rotate more freely on the pipe. I was wrong. I called it quits for the day and came back the next day. The pipe and rubber hose were now both 40 degrees. I was able to rotate the fuel hose easily with my hands and worked the hose into place. My conclusion is the cold rubber having less friction more than offsets the change in size due to temperature expansion / contraction. If folks are doing this job when it is warm and struggling with the fuel hoses, try chilling the rubber hoses in the fridge before installation.

Cleaning

There are companies that will clean and seal the tanks, but they appear to either drill holes to sand blast and then patch the holes, or cut the tanks open and then re-weld. I didn't want holes or welding, so I went the DIY path.

The interior paint has to be removed before sealing.

I messed around with muriatic acid, liquid paint remover, electrolysis, and eventually distilled white vinegar. A nasty, long process.

If I had to repeat the process again, I'd probably start with Simple Green as a degreaser. Then the liquid paint remover. Then the vinegar. The vinegar can be left in a tank for a week without issue.

The muriatic acid is too caustic. You worry about injuring yourself, and you worry about good metal being eaten. Electrolysis is good for rust removal, but that isn't the issue with the tank. Paint removal is the issue.



PVC caps and the original rubber pieces were useful to seal holes during the cleaning process.



Eventually I got to clean bare metal. The photo below was prior to the final vinegar soak.



The crossover pipes were soaked in vinegar as well. Then a long handled brass 1-3/4" brush was used to clean the interiors of the pipes. You insert a rod through the loop on the end of the brush to crank it while you insert and remove the brush. The pipe insides will come clean. Here's the info for the brush I used: Brush Research Manufacturing, Series 84, brass, 1-3/4", .012 filament. Part # 84B1750. The brush total length is 18". The brushes are sold as a set of 3.



Sealing

I purchased a single POR-15 "Fuel Tank Repair Kit" (directly from the POR-15 company). There was more than enough sealant to do both fuel tanks and the 3 crossover pipes.

To make the sealant process easier, I taped together both fuel tanks using painters tape and then duct tape and taped together the ends of the crossover pipes to form a single pipe. That left me with 3 things to seal. (I used the painters tape under the duct tape on the fuel tanks to avoid duct tape residue getting on the tank exterior.)

I divided up the sealant, using 13 oz per tank, and 6 oz on the the pipes. I measured out the 3 amounts into 3 Solo cups. I first used a Sharpie marker to mark two cups with a 13 oz line. I poured out the 13 oz amounts, and the remainder I poured into a 3rd cup. After measuring into 3 cups, I quickly did the pouring. Then I closed the open hole with duct tape and started rotating the parts. Note that the sealant will eat through the Solo cups pretty quickly. So maybe try to find another material. I was able to pour out the sealant before it ate through the cups.

I used some old scrap telephone wire to hang the tanks (and pipes) on a wooden broom stick handle attached to a portable workbench to allow the sealant to drain out. I did a dry run with hanging and angling the items to make sure I had a good setup.



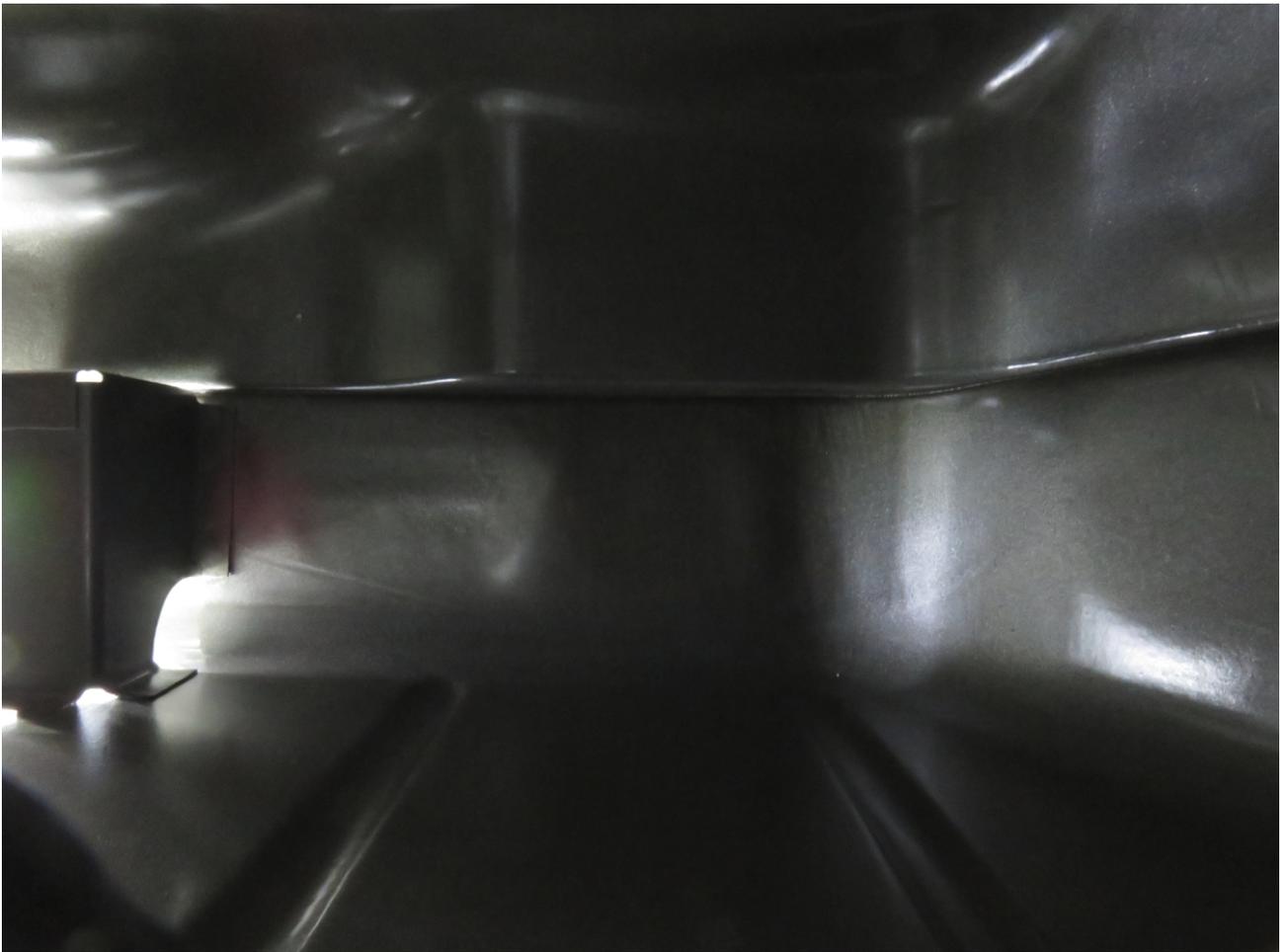


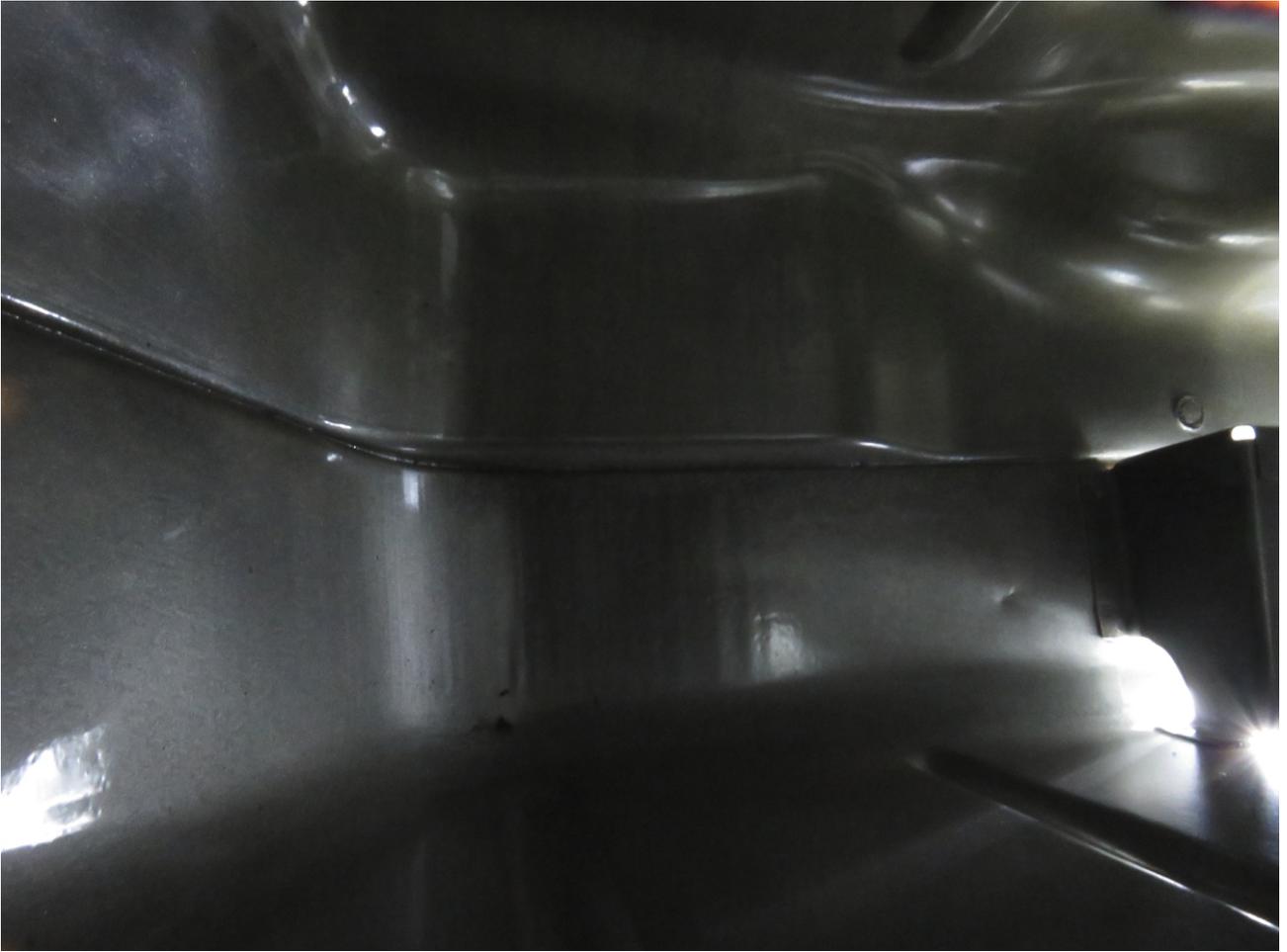
Once I was ready to drain the sealant, I hung the tanks using the wires, and then cut the tape joining the tanks, and then set the angle to drain the sealant.



After the sealant hardened, there was a little excess sealant on the outside of the pipe connections. I filed that off. The rubber hoses can be hard to slide on the pipe joints, so you don't want excess sealant there to make it any harder.

Photos of the interiors.





The black speck is an insect. It entered during the drying period. I blew it out.



Exterior Painting

After all the work to clean and seal the interiors of the tanks, the exteriors were now a mix of some original paint and some surface rust.

My first approach to removing the residual paint from the tank exteriors was to use a wire brush wheel and a drill. I was worried about the wire brush friction overheating the metal and damaging the POR-15 coating inside. The POR-15 site indicates a test was done where the coating was heated to 450F for 10 hours and the coating remained hard and bonded. So it appeared the POR-15 coating could take some heat. However, I was still worried about heating the metal and damaging the POR-15 coating. I only did short, quick bursts of contact with the wire brush to minimize any heat generation.

Most of the paint came off the first tank using the wire brush wheel. Now to deal with the rust. To remove the rust I used white vinegar. I bought a large plastic tub and 9 gallons of vinegar. I was unsure if the vinegar might be a problem for the POR-15 coating. Probably not, but no reason to find out the hard way. So I plugged the holes in the tank the same way I had when cleaning the interiors of the tank – used the original rubber hoses, PVC caps, and hose clamps. Of course the tank now wanted to float in the vinegar in the plastic tub, so I placed a piece of wood on top of the tank and piled a bunch of bricks on top. I only submerged the tank slightly more than 50% of its

height. After a couple of days, I rinsed the vinegar, dried the tank, then flipped it over and re-submerged the other half in the vinegar. A couple of days later I removed the tank and rinsed off the vinegar.



On the second tank, I skipped the step of removing paint using a wire brush wheel and drill. I just soaked the tank in vinegar for multiple days. The paint then came off very easily using a hand-held wire brush.

Now at this point there was a tad of flash rust on the surface of both tank's exteriors. I used the POR-15 Metal Prep to remove the flash rust and leave a layer of zinc phosphate. I placed the tank in a plastic tub and poured Metal Prep over the tank once per minute for 20 minutes. Then a quick rinse with the garden hose and dried off using a towel.

At this point the tanks were ready for paint.



I used rattle cans to apply primer layers and top coats. Make sure you use a primer paint that is compatible with galvanized metal.



