

Shay - Painting Miscellaneous Parts

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This page shows how some of the pile of smaller parts were painted.

One of the first small parts tackled was the reversing gear. The reversing gear does triple duty in that it supports one end of the shelf over the rear cylinder and also the atomizer regulator. The reversing gear bracket also supports the air input plumbing and the air/steam manifold that supplies the atomizer and blower. Hence, it was important to get the reversing gear in place as soon as the boiler was painted and bolted down.

The reversing gear and also the throttle don't lend themselves to painting or powder coating since the paint would clog up the teeth of the racks and the sliding latches. Bluing and the black oxide on some machine screws were considered. An Internet search lead to several suppliers of small kits to do black oxide finish on mild steel at room temperature. The chemicals won't work on tool steel or stainless or non ferrous metals. A black oxide kit was purchased from [Caswell Plating](#).

Black Oxide Kit: The kit contains the two gallon plastic bucket, 1 pint of *black oxide concentrate* (empty bottle on right) and two quarts of *penetrating sealer* (metal cans) shown in the photo. The black oxide concentrate is mixed with 9 pints of distilled water (purchased locally) in the plastic bucket.



The parts must be free of corrosion and free of grease or oil. The photo shows the reversing gear and throttle parts. All the parts were put in the hot pickling bath for about 15 minutes, washed off, blown dry and then bead blasted. The wires were given the same treatment so as not to contaminate the solution.



This photo shows the parts in the black oxide solution. (When the distilled water was added to the concentrate, soap like bubbles formed indicating the presence of detergent --- probably to serve as a wetting agent.) The solution works at 70 degrees but does a little better at 80 degrees so it was warmed a bit and the parts immersed for about 7 minutes.

After the parts were removed, they were rinsed in cold water, shook dry and then placed in the penetrating sealer for about 10 minutes. Part of the handles stuck out of the cans so sealer was brushed on those parts every couple minutes.



After the parts were removed from the sealer, excess sealer was shaken off and the parts were suspended by the wires to dry. The sealer seems to be a very light oil. The parts have a flat black finish after the sealer dries.

The photo shows the assembled reversing gear and the throttle.



Update: After some use it was found that the oxide coated parts are prone to rust. However, a light coat of oil both minimizes the rust and restores the black finish.

Painting The Plumbing: Excepting the engine and cab, most the remaining parts were plumbing related. The powder coat works quite well on the brass and copper. The parts were pickled about 10 minutes in the warm sulfuric acid solution normally used for steel. That removed most the grease. The pieces were then bead blasted. The photo shows a group of pipes just after the powder coat was cured. Tees were screwed on the ends of the pipes and hanging wires then threaded through the tees and then the tees were masked. The masking tape was removed while the parts were still very hot. The same cleaning process could be used if spray painting.



This shows the backhead with many of the parts mounted. Note that the valve stems and valve wheels were not painted. Painting the pipes makes them more subdued and less noticeable while leaving the valve stems and wheels unpainted makes them stand out and adds a bit of color. The valve stems were removed during the pickling and blasting but screwed in place and masked off for the painting. The threads between the stem and valve body are very fine and you don't want to get paint on them (Mr. Experience speaking here). The unions also have very fine threads and were joined before painting.



This shows the right side water feed at the boiler. The check valve top was also not painted. The paint sticks pretty well even on the unions that were taken apart for the plumbing reassembly. It helps to use a correct size wrench (12 mm for the 1/4" unions).



Blower Pipe: The blower pipe runs down the left side of the boiler to the side of the smoke box. The photo on right shows the blower pipe on Cass 5. That is an air line quick connect below the valve. They use compressed air to provide draft when starting the fire.



Recall that the blower pipe on the model runs down one of the stay tubes. The fake external pipe shown here was installed to make the appearance correct. The tee is configured different than on Cass 5 so that the pipe is a little lower to pass under the air compressor mount. There will be a plug in the lower opening on the tee.

The photo also shows the water feed pipe to the pump. The pipe position had to be changed to pass above the boiler mount clamp.



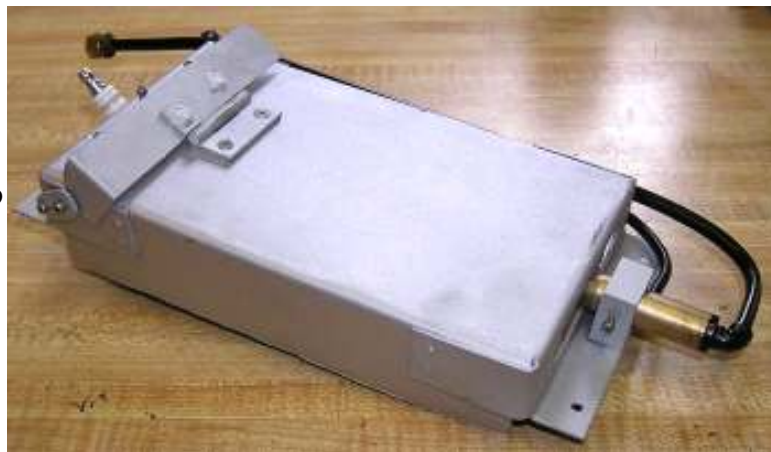
This shows the blower pipe and the pump input pipe after they were powder coated. That long black thing isn't an over cooked giant bratwurst ----- it's the whistle.



Painting The Pump: The pump was completely disassembled and all internal parts including the O-Rings and Teflon valves removed. It was then pickled, reassembled (one screw holding each section together) and then blasted. The pump was completely disassembled after the powder coating, blind holes drilled out to remove any beads and then and all threads were cleaned with taps or dies.



Painting The Fire Pan: The fire pan was powder coated with very high temperature powder. Not sure if this paint will hold up in the heat but it is the only thing that I found would hold up on exhaust manifolds. Probably the paint will hold up but will be cover with soot making it look like burned paint.



This photo shows the cab area with all the plumbing installed except the burner plumbing



The cab interior with cab floor, sides and roof temporarily in position.



The left side



The right side..... with the engine missing.



This is a good point to stop this page. The next steps are:

- Make burner spark relighting arrangement.
- Paint the engine.
- Install the engine.

After those steps are completed it will be ready for a real test on the rails.

The final items include:

- Install cab windows.
- Paint cab.
- Remake the smoke box door clips ---- using a smaller design.
- Paint the smoke box front.
- Finish & install the domes.
- Install handrails.
- Make & install headlight.
- Make and install sanders and ladder on the back of tender.
- Make generator.
- Make & install cab steps.

That is the list of excuses to be used when asked to do landscaping, etc.

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