

I recently repainted the Vixen 55 mm fluorite optical tube assembly that I bought in early April, 1998. Refinishing a small refractor is not hard, and since I have now done three, I may have made enough mistakes to warrant warning you about them. Anyhow, I have decided to report on my projects.

My reasons for refinishing have been two: Thermal control and whimsey. Where I observe, white tubes don't get as hot by day as dark-colored ones, and don't collect as much dew by nights. Thus I refinished a Vixen 102 mm f/9.8 conventional refractor (originally black), and a Vixen 90 mm f/9 fluorite refractor (also black), to a titanium-dioxide or "refrigerator" white. The little Vixen 55 is small enough to cool quickly, and it was originally white, but I was in an odd mood when I wandered through the paint department of my local hardware store, so I did something different with it.

It can be a challenge figuring out how to take a telescope apart. All the Vixens I have disassembled have had a dew cap that either screwed or lightly pressed on, a threaded cell that screwed to the main tube, a threaded tailpiece, incorporating the focuser, that screwed to the other end of the main tube, and a finder bracket that attached with machine screws or nuts and bolts. There were some gotchas, like setscrews tightened against the threads after screwing the tailpiece to the main tube. Failure to find and remove them -- and they were often painted over before final assembly -- could have stripped threads. Furthermore, it was sometimes not obvious until things were partly apart, just how the finder bracket attached.

In any case, the first disassembly step was to take the telescope apart into major subassemblies: Dew cap, objective in cell, main tube, tailpiece with focuser, finder and bracket, and tube rings.

At that point, I covered the objective and cell with something to keep them free of dust, and put them in a box in the back of my sock drawer, far from the rest of the project. I usually did not repaint the objective cell, or remove the objective from the cell. My cats do not often get into the sock drawer, and when they do, the socks are distraction enough to keep them away from whatever else is there.

Next I took apart the finder and bracket. Assemblies varied, but usually the bracket detached from the finder in some obvious way, and the finder's objective/cell assembly and eyepiece unscrewed, leaving the finder tube by itself. Some finders mount to their brackets with o-rings -- large hardware stores often stock replacements.

The Vixen focusers all had a thin metal plate held to the bottom by four screws. I removed these, and the shaft that has knobs at the ends and a pinion gear in the middle, fell into my hand. Then all else came apart simply. I was careful to capture pieces of plastic and setscrews that adjusted focusing tension, and to note the bits of

fibrous tape -- looked like strapping tape -- used as shims to hold the focuser shaft in place.

I usually didn't paint the objective cell, or the cell for the finder objective, or the finder eyepiece, or the moving tubes of the focuser. I usually also did not bother refinishing the inside surfaces of parts, though I touched up the black, with a magic marker, a small brush and flat black paint, or a spray can of flat black.

The next step was to mask threads and openings. A couple of turns of ordinary masking tape sealed exposed threads tightly, and with masking tape in wide widths, I first taped clumsily over the ends of tubes, and then added more tape for a tighter seal. It helped to stuff or tape a wad of paper towel into a tube before doing so -- it gave something to push against when sealing the tape across the ends.

I made sure to tape over the insides of any screw holes, as well.

It was a tough choice wondering whether to use chemical paint removers that ruin my lungs, or powered brushes and grinders that ruin my hearing. I have noise-damping ear protectors, safety goggles, and respirator, and I am not confident I can keep paint removers out of sealed spaces, and I never listen to anybody anyway, so I generally used alternate doses of rotary abrasive brush, chucked in a drill motor, and either sandpaper or emery cloth, to strip parts to bare metal. Sometimes I needed a file or a small knife for convoluted areas of cast parts. This procedure was time-consuming, but worth it in terms of final appearance, particularly when I was refinishing a dark colored tube to a lighter shade. I wrapped up paint removal by rubbing with medium emery cloth.

With paint off, I double-checked the masking tape, and filled any noticeable voids in the surfaces of cast parts with epoxy putty. I sanded off loose epoxy, and got everything clean again. Where those taped-over small holes had threads, I put in a long screw to keep the threads free of paint. I was careful that the screw head did not cause a shadow -- an area paint can't get to.

One very useful trick was to get a couple of tin cans and paint them first. That way I got the feel of my paint stuff, and learned how much paint to apply, and how long to wait between coats, before working on what counted. I also found out what the colors were like.

Paints are a bit transparent, so primer color makes a difference. I knew I would have no luck applying light finish over dark primer, but the appearance and depth of colored finishes also depends on the primer color. I used generic white spray primer (Orchard Supply Hardware's house brand) surfaces intended white. The manufacturer of the colored paint I used on the 55 mm Vixen recommended white primer for maximum brilliance of its specialty finish. After experimenting

with several colors of primer on tin cans, I agreed. But I have sometimes preferred colored primers under a colored finish.

You have all probably heard the basic rules about painting, and you may well all have to make the mistakes of not obeying them for your own selves, just as I did, but I will repeat anyway:

If the surface is poorly prepared, it's not worth painting.

Many thin coats are better than few thick ones.

Allow adequate drying time between coats.

Cleanliness is next to godliness (and a lot more common).

I sprayed three or four coats of primer, each so light that after a coat or two I could still see the gleam of metal through the paint. Persons with a better touch could probably apply thicker coats, but all that got me was runny paint.

I sprayed with most surfaces vertical -- usually the masked tube was standing upright on something. Some pieces needed paint on all sides. For each, I tried to plan where I was going to put it to dry before I began painting: It feels silly standing there with a wet finder bracket in a multicolored hand, wondering what to do next. I put wire loops through holes, or taped them to masking-tape dams that sealed openings, so I could hang these pieces up.

Drying times are funny. Many paint cans say something like "let dry for ____ minutes, then recoat either within ____ minutes or after ____ days". I worked outdoors on warm days, so could recoat fairly soon, but -- as hinted in the rules -- too soon made a mess. I find I can put on two or three thin coats per hour, with most of that time for drying. I get lots of gardening done while waiting, and so what if my neighbors think I am painting the roses red.

After priming, I used a spray white epoxy paint for surfaces intended white. It took three or four coats till I was satisfied. The paint was technically a gloss, but the spray process did not create an automobile-like level of surface smoothness. Rather, the surface came out finely textured, perhaps like fine cement, or the back of a ceramic tile. Each bump of the textured surface was coated with glossy paint, so there was lots of shine, but I could not see my face in the surface, as with a car or a major appliance. Just as well.

The fancy colored enamel I used for the 55 mm fluorite went on almost as easily, and with similar results. It took six or eight coats to get all the dash and dazzle out of it that the Aervoe company had put in. I finished the Vixen with a couple of coats of a clear gloss spray acrylic overcoat, which added to the shine.

There was another step to the Vixen 55. I decided to leave the cell, finder bracket, focuser and tube rings black, but their original flat finish did not look right with the bright, glossy tubes. So I got a bottle of Krylon gloss black enamel and a brush, and painted the black parts by hand, using skills from childhood construction of plastic scale models. I did not strip these parts before finishing -- most had a crackle finish, and I guessed correctly that putting a gloss coat over the crackle would create an aesthetic effect more nearly compatible with the fine glossy texture of the tubes.

Yes, I did paint the cell with the objective in it, but I only had to paint those parts which were visible with the cell screwed on and the dew cap in place, and all of them were far from the optical surfaces. I painted the finder cell and eyepiece with optics in them, too, which was much less nerve-wracking.

With all the painting done, I put everything in a warm place for a few weeks to let the paint dry. Enamel never dries "completely" -- its finish gets tougher and more durable as time goes by. One mistake I made in an early refinishing projects was to start putting things back together too soon, when the paint was still easily damaged. Now I put things on shelf over a hall door near the space heater, where it is nice and toasty, and enough out of the way that I am not tempted to fuss with things before their time. It's also the one place in the house the cats can't reach. Besides, they prefer the sock drawer.

After a couple of weeks of drying, I reassembled. I had masked carefully enough that the tape came up with no damage to the paint. I retouched the black interiors again, and let the touch-up dry before reinstalling the optics.

I applied a couple of coats of an automotive "wax" to the Vixen 55, which further heightened its gloss. Actually, I did not use a true wax, rather a newer, wax-free product of the wipe-on and wipe-off variety, called "Nu-Finish". It took a little buffing to make it work best, but work it did. I used a painted tin can to test it on.

I was careful about rethreading parts -- with clean surfaces the threads like to catch and tear. A hint of white lithium grease minimized that problem.

Some times, there was last-minute fixing to be done. Once I had to replace a damaged finder cross-hair, and did so first by the classic and time-honored method of persuading a spider to part with some silk -- I get ATM points for that, but not as many as if I had used a Black Widow. But spider silk was too fine to see on a dark night. I switched to plastic bristles from a small paintbrush.

With everything back together, I sat smugly back and enjoyed my

handy work, and looked forward to the comments at the next observing session. My white tubes have in fact drawn admiration at star parties, and I expect the Vixen 55 will not cause too much light pollution as long as we are spared nearby supernovae and no one brings an ultraviolet lamp.

Actually, I picked the color for the 55 because of the telescope's new name, which in turn was inspired by a book I recently read about another aspect of natural science in which I am interested. I hope that paleontologist Robert Bakker doesn't mind my adapting his title, and if I should happen to meet any sickle-clawed predators I will apologize in great haste, but until then, my fluorescent 55 mm Vixen fluorite is known as ... <ta-da> ... "Refractor Red".

Now if I can just remember to bring my sunglasses to star parties...