

Silver Soldering Hints

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Several years ago, I built a cross section model. It had a mast and I created the deadeyes and chain plates for it, rigged the shrouds, and then tied the ratlines. All well and fine until I noticed that the shrouds had, in a couple of places, gone a bit slack. How did that happen? I looked carefully and saw that several of my soldered joints in the chain plates had broken and the tension was now off. ARRRGGHHH!!!

Why did those joints break? They were soft soldered using a soldering iron. Once they were tugged on a bit to get the shrouds properly tensioned, a few of those chain plates parted and left me with sloppy looking shrouds. I had been warned. Fellow ship modeler Bob Craig had been at me for a while to try silver soldering. He had sent me pics of his work with the torch and it was one of those things I said I would learn. Eventually. Well, the experience with the sloppy shrouds did it. No more broken joints for me. I received a soldering torch as a Christmas gift and I put the lessons I had learned to work. It took a bit of practice and some further advice, but I got into the habit of making reasonably passable looking joints. The main thing was that the joints were now completely solid. Although I am by no means an expert, I can solder what I need for a ship model and the model's finished appearance and longevity are that much better for my having learned a bit about this particular skill. I am still learning and challenging myself with more complicated soldering projects.

Silver soldering, also known as hard soldering, is not difficult to learn. One must put in some practice to get over a small learning curve, but it is not difficult. It is not expensive either. For about \$40-50, you can buy the torch and enough solder to last you several years. Silver soldering can be used in any number of applications in ship modeling. Hooks, shackles, eyebolts, chain plates, anchors, yard trusses, depending on the era and type of ship, the list could go on a bit.

My soldering torch came from Micromark. My soldering paste came from Stan Rubensteins Associates. They are a jeweler's supply house, but any good jeweler's supply house will have solder. Make sure you get the kind that is cadmium free. Cadmium is bad for you so avoid it. Aside from a pencil style torch and pre fluxed soldering paste, you need something to hold the work while



Left to right: Soldering torch, self-locking tweezers, soldering paste, various files, nippers and needle nosed pliers

you are soldering it. I use a cheap pair of cross locking tweezers. You can also use hemostats. For trimming the metal, you can use a \$2 pair of end nippers or electrician's dikes. For bending the metal, there are the trusty needle nosed pliers. To get better tools, you can spend a bit more money, but these will do. For cleaning up the metal, I use two sets of files, one a set of larger 7" long files, and then the smaller 4" jeweler's files. These I use on metal and wood for all sorts of shaping.

For metal, the most popular type is brass strip, sheet, or wire. It works well for this sort of thing. You can also use stranded copper wire found in power cords and blackened annealed steel wire. All of these will silver solder and they can be chemically blackened or otherwise painted. I have made hooks and eyebolts out of the thin copper wire down to very small sizes, some hooks as small as about 3/32" long. The blackened steel wire is readily available in very small gauges and is quite good for soldered hooks etc in 1/96 scale and larger.

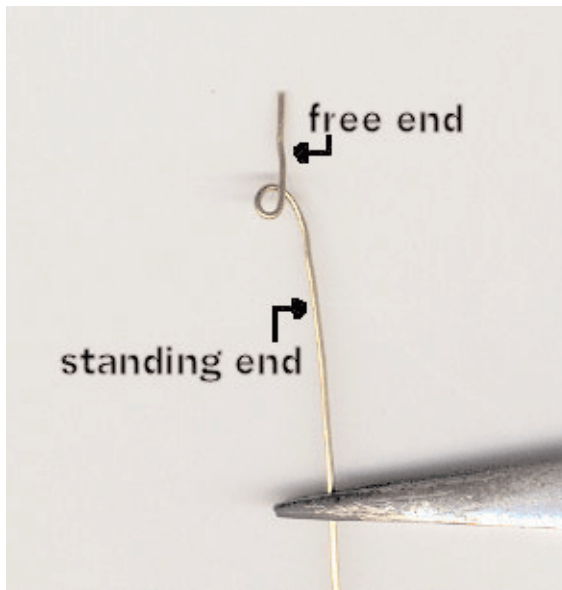
Rather than try to show you how to make every joint that you might find useful in ship modeling, I think it would be better if I showed you some basic tips on how to make "a" joint. If you can make a simple joint, then you can make any joint. In my experience, there are two keys to a good hard soldered joint. First, the pieces to be joined must be clean and bright. Second, the two pieces must be in perfect contact for the joint to be completed. I know I have said these things so often it sounds like a broken record, but that is the long and short of it.

The cleaning part of it can be done with chemical pre cleaners, but for my work I have never used them. I have always been able to file up the pieces until they are clean and bright and that has been enough. I know several very fine and experienced modelers who swear by the pre cleaners so I will leave that to each modeler to decide.

Getting the pieces in perfect contact sometimes requires some thought. The best advice I can give is to try and let the tension in the metal work for you. This is accomplished by over bending the pieces and then springing them back so they are forced, by their own tension, to touch each other. That is much easier than trying to force them together when their tension wants to hold them apart. Even with brass that has been annealed, it is often difficult to simply bend the two pieces towards each other and have them make perfect contact. The best way is to over bend the pieces and then spring both pieces back so they will be forced against each other.

Well, let's make a simple joint. We will make a loop such as is needed for an eyebolt, shackle, or a hook. There are two reasons for using this simple joint to illustrate the process of hard soldering. One, they say it is best to walk before you run. This simple joint is a good starting point for soldering. Two, this simple joint has everything in it that any other joint will have. If you can make this soldered joint, you can make any soldered joint.

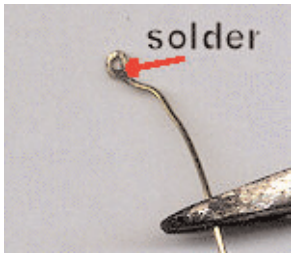
We will begin with a roll of 24 gauge brass wire. Snip off a piece about 6 inches long. Holding it in a pair of cross locking tweezers or your pliers, anneal the piece. I use my trusty kitchen stove. Light the burner and hold the end of the piece in the flame until it glows red. Once it does, remove it. After it cools, use your pliers to bend the end of the piece back across itself. Place the pliers about 1 inch back from the end and bend that outer leg so it crosses over the wire. You can use the shank of a drill bit as a former for the loop you want to make. Now, you have the free end of the wire crossed over the standing part of the wire that you are holding. With the looped formed, pry the free end of the wire out a bit from the standing end of the wire so you can use your end nippers to cut off the excess part of the free end. Again, over bend here just a bit so after you snip off the excess, you can pull the free end of the wire back a bit and have it close up against the standing part of the wire.



Before you close up the free end of the wire, square up the very end of the wire with a file. Even end nippers will leave an angled cut on the end and you need to get that end surface squared up. I use a 7 inch file for this along with some head mounted magnifiers to make sure I can see what I am doing.

When the free end of the wire is squared up, close up the joint. Hold the piece up to the light and look carefully to make sure there is no light coming through the joint. You may have to work with this joint a bit the first few times around. Do not worry though. This forming and checking is where the joint is made. In this operation, preparation is everything. That may sound like hyperbole, but it is not. Use your pliers to make sure the free end is snug against the standing part and that everything is lined up along the line of the wire as well. What you should have is the standing part of the wire with a loop in the end where the free end of the loop is coming into the standing part at close to a 90 degree angle. With the brass softened through annealing, this will be no problem.

Once you have the pieces in contact, you can apply the solder. I use pre fluxed solder in my work. I like it because it is easy to control. It is a paste and it will stick to the metal somewhat so you do not have to worry too much about it wandering once it is applied. What is even better is that you only need a small speck of it. On the example I created here, I probably overdid it a bit so you could actually see the solder on the joint. I applied it with a toothpick but if you have something with an even smaller point, so much the better. The solder should sit right on one side of the joint where the two pieces meet.



It is time to fire up the torch. Before we do that, let me say a few words about safety. Make sure the work area is clear and you have a nice flat area to set the torch when you are not using it. Always turn the torch off after you use it and before you set it down. Do not set it down while it is still lit. Make sure there are no other flammable chemicals nearby when you use a torch. Watch your hands when using the torch. Above all else, please please please be careful. Think carefully about the workspace, what you are doing, and any possible problems that may arise from the use of an open flame.

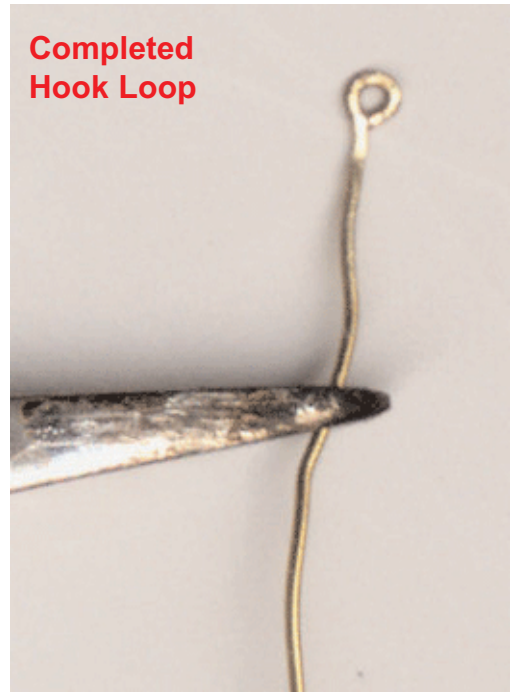
I use a lit candle in a homemade base to light my torch. The base is a block of wood with a hole drilled into it to hold the candle. It is large enough so it will sit nice and safe on my work bench. Well, here we go. I light the candle and then open the valve on the torch and hold the end of the torch in the flame. The butane ignites and the torch is lit. I have my brass wire held in the cross locking

Soldered joint



tweezers with the solder paste applied to the joint. I hold the tweezers in the left hand and the torch in my right. I put the flame to the joint. After about two seconds, I see the solder flash and bubble. The solder runs along the joint. I remove the flame, place the tweezers back on the bench so they will hold the wire up off the work surface, turn off the torch and set it down carefully. I blow out the candle as well so all the flames are gone.

Completed Hook Loop



Picking up the tweezers, I examine the joint using my magnifiers. Perfect. It is a nice solid joint. Note in the photograph that the joint still looks a bit scary. That is normal in a freshly soldered joint. It needs to be cleaned up a bit. This can be done by soaking the piece in a small cap lid of household vinegar. I have heard of this from older more experienced modelers so I am sure it works. I have never done it myself. I like to use a file to clean up the joint. Basically just make the brass look clean and bright. If the joint needs a little tune up, this can be done now either with the pliers used to reshape the piece slightly or with the files used to work down the joint. To reshape the loop, I just used the pliers to bend the loop itself so it was coming right off the end of the wire rather than bent in at 90 degrees. With a hard soldered joint this is very easy to do. By the by, if you are at all uncertain about whether or not the joint is solid, this process of cleaning and fine tuning the shape will answer that question. If the joint is solid, you can work it quite easily with no problems. If not, it will come apart.

What you see at this point is an eyebolt only wanting the stem snipped off to proper length. If you wish to make a hook like I did, take the standing end of the brass wire and bend it over towards the loop. I used the pliers to squeeze the hook part slightly while pulling outward on the end of the wire that will be the end of the hook. Snip off the end and you will have a nicely formed hook, very realistic. Twist the loop so it at 90 degrees to the hook.



Completed hook



That's it. It is finished. To make this simple joint took me about 10 minutes, all except two seconds of which were used in preparing the joint and cleaning it afterwards. As I said, preparation is every-

thing. It takes a bit of time, patience, and practice, but the time spent is worth it. That joint will never fail. Also, I can now blacken the piece and once I do, it will look every bit like iron on the model. Well, as I said, it takes some time. Not much in tools or materials, but time. If you are worried about how long something will take or if you are so eager to get on to the next phase of your model, then this skill may not be for you. If you are interested in creating good looking metal work that will stand the test of time and help you create a better looking and better made model, then you should really consider giving hard soldering a try.

This simple joint is like any other you will make in the process of ship modeling. Rely on it that if you can make this soldered joint, you can make any soldered joint. Other, more complicated joints take some practice to make, but once you get into the habit of using clean metal with perfectly touching joints, hard soldering will become a joy to do and you will never want to use any other kind of solder. So, gather your tools and materials, and begin practicing making some of these simple joints. The more you practice, the better you will become at soldering and the more enjoyment you will get out of metal work.