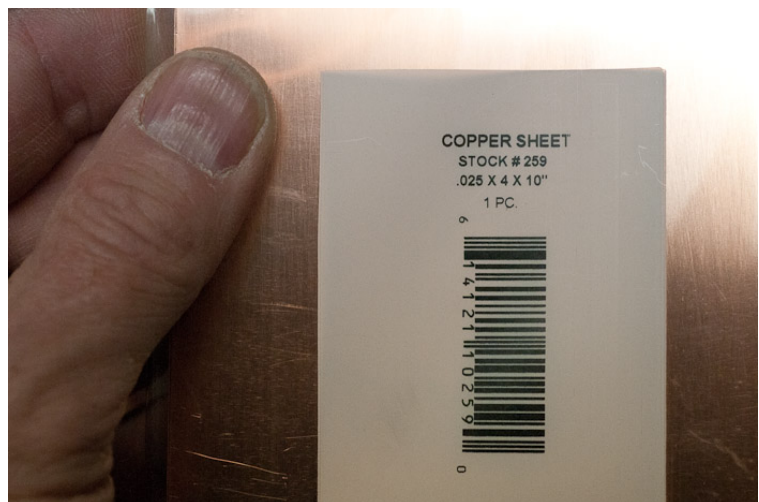


This is a description of how to make “8” neckerchief slides for Scouts who earn First Class rank in Troop 8. The procedure for making “8” slides for adult leaders is identical, except the material for the “8” is sheet brass of the same gauge as the copper used for the youth slides.

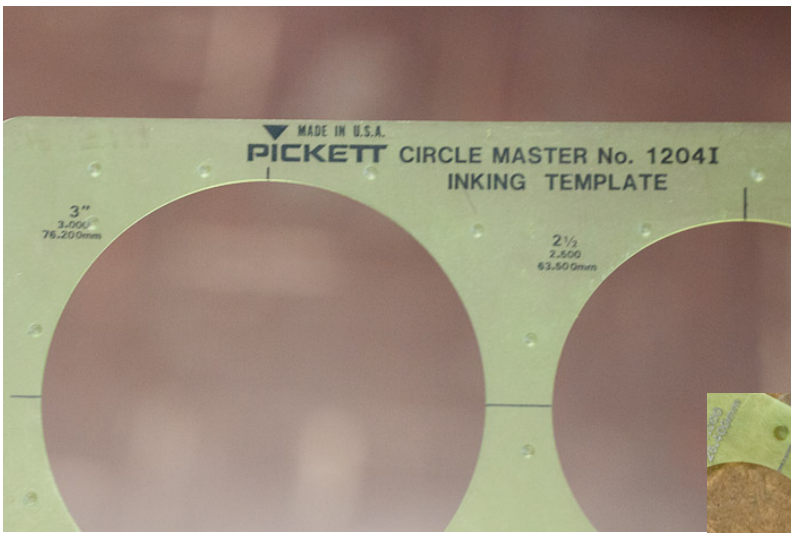


The material from which the “8” is made is shown here. The K&S brand of sheet copper (or brass) can be bought in most hardware stores or hobby shops. Anything similar will work.

The .025 thickness is best for the “8” - thinner material gives a result that bends too easily, and the next thicker sheet is substantially more difficult to work.

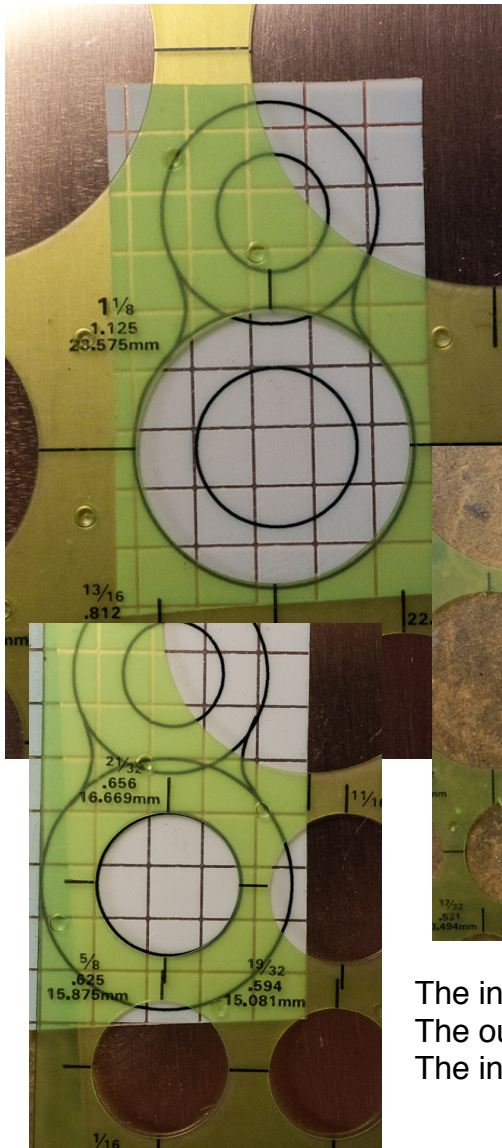


I created a stencil for the “8” as a size standard. This is not critical, for in a moment I will list the sizes used for each of the four circles.



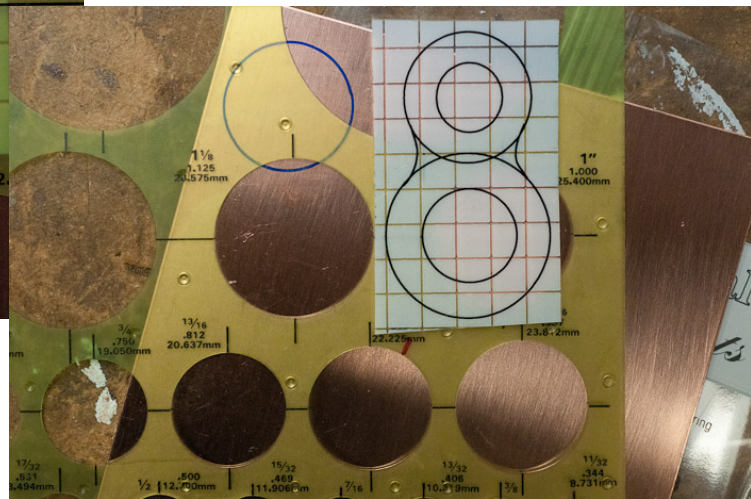
Get yourself one of these - a circle template.

Get a micro-tip Sharpie in a dark color  
You'll be following the lines with the  
scroll saw blade.

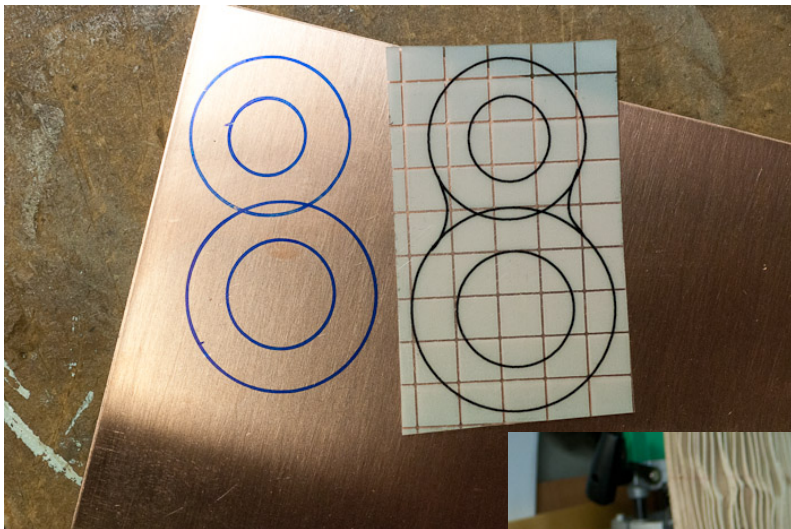


The outside circle of the bottom of the "8" is  
1 1/8

Mark it on the copper with the Sharpie. The  
stencil is not important for this process.



The inside bottom circle is 21/32.  
The outside top circle is 15/16.  
The inside top circle is 15/32



This is what you end up with. The exact dimensions were interpreted to look decent. Vary to taste. This is the shape you are going to cut on the scroll saw.

This is the scroll saw I used. It's primary function is cutting wood, but with the right blade, it will cut sheet metal of the thickness necessary for the "8". If you are an experienced metal-worker, you might take a different approach. This worked for me.

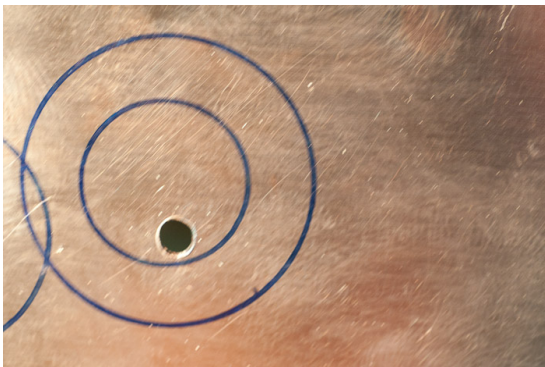


I used DeWalt DW3947 Spiral scroll saw blades . These have teeth wrapped around the central axis of the blade, and so cut equally well when fed from any direction. This is useful when you are trying to cut something like the "8". Though these are designed to be wood-cutting blades, they will work on copper and brass sheet, though they will break periodically. Alternatively, you can use blades designed for working silver (Pike is a good brand). They are harder and last longer, but are more expensive and harder to find.



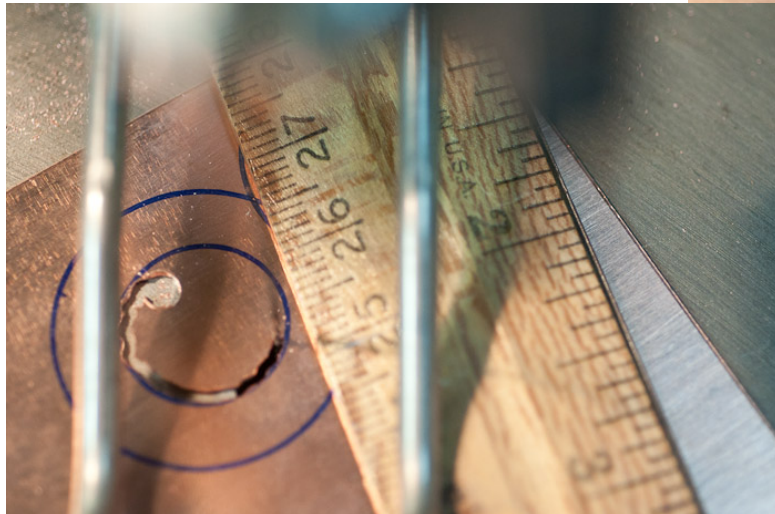


Now you are going to drill a hole in each of the inside circles, through which you will feed the scroll saw blade to cut out the inside circumferences of the top and bottom of the "8". Use a sharp bit and a solid backing block to drill into. Otherwise you will end up with holes that have lots of burrs, and this is a pain because you need the sheet to be absolutely flat for the scroll saw cutting.



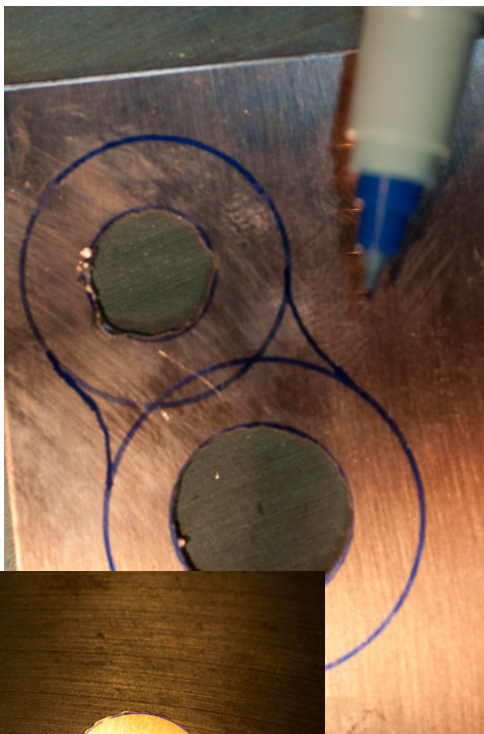
Here is a representative hole. Drill clearly inside the circle you have marked - you can cut out to the line with the scroll saw. If the hole didn't come out cleanly, carefully remove the burrs with a file or Dremel bit. But DO NOT grind or file onto the surface of what will constitute the final "8" because deep cuts on the surface are nearly impossible to grind or buff out. Save yourself the trouble - use a new, sharp drill bit. The hole only need be large enough to fit the spiral cut blade through.

Now feed the spiral cut blade through the hole you have drilled. In this photo you can see the hold-down attachment on the saw. I use a ruler, levered against this hold-down, to pin the copper sheet down tightly as close as possible to the point of blade entry. The blade will pull the sheet up on the upward stroke, and that force will be greater the faster

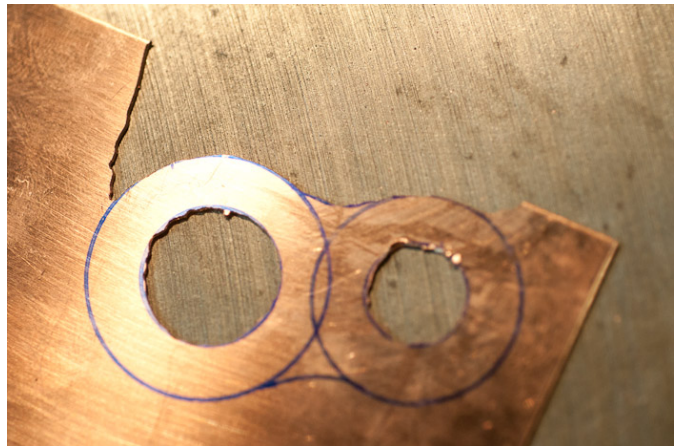


you make the cut. Take your time. After a while, as the blade dulls, the upward force will become tedious to manage. Replace the blade.

To the right is the result of having cut out both centers. The edges can be quite uneven and yet lead to a good result. It is important that you err to the inside, rather than to the outside. The irregularities are easy to grind out, but rounding the circle if you cut outside the mark can take quite a bit longer. Scroll sawing on sheet metal takes some practice, but if you take your time and err in the right direction, you need not waste work pieces.



Now it's time to cut the outside of the "8". I forgot to mark the curves connecting the top and bottom circles, so I do so now. Then start cutting the outside edge, again taking your time and letting the blade do the work. I occasionally cut away the scrap surrounding the "8", because otherwise it becomes hard to manage.



Eventually you end up with the fully-cut "8". The edges may be ragged, but you will deal with that in the next steps.



You need a Dremel tool and a selection of grinding attachments. I use them roughly in the order shown left-to-right, although this is a fiddly process in which you will find yourself going back and forth between grinding heads to get the result you want. Using the left-most head, it is simple to take the “teeth” off the circumference of both the inside and outside circles.

This leaves a heavily textured edge and a ridge burr of raised copper, but you then use the finer heads to smooth the edges and remove the burr.



Here is a goof you want to avoid - the abrasive head slipped while I was smoothing the inside circumference, and has cut a notch in the body of the “8” that will be impossible to buff out later. I am now consigned to using the other side as the forward-facing part of the “8”. Be careful!



Here is the ridge burr I referred to. You don't have to fully chamfer the edge - using a fine Dremel head at a slight angle will do. The head third from the left above has a groove in it from my work to remove these ridge burrs.



Now you have an “8” with nice shape and edges. Don’t let the perfect be the enemy of the good. Each of these “8”s is slightly different, to which you can ascribe craft and charm value. You can see that the surface is marked with countless small scratches and imperfections, and several deeper ones (e.g. the long scratch near the top right).

The next step is to polish the outward facing side of the “8” to get rid of these imperfections. I use the Dremel No 421 polishing compound on a hard cotton polishing wheel, but there are many combinations that will work just as well. I start with high speed to get out deeper scratches, and eventually move to slower speeds to remove the “dappled” look that high speed polishing can cause. Keep polishing until you are satisfied. Every so often I stop to hand polish with Brasso, removing the hard paste polishing compound so I can see what’s really going on. Get the polishing as close to perfect as you can, because it easiest to do this step while the “8” is still flat (you are going to put a radius on it shortly). As you polish, the “8” will get quite hot. You may find yourself pausing occasionally to let it cool. I use a small block of wood to hold the “8” down while I work.



Eventually, you’ll be satisfied with the smoothness and shine. I haven’t made a perfect one yet. Given where Scouts throw these between meetings, it isn’t strictly necessary.

Next I put a slight radius of curvature in the long axis of the "8". This seems to be the traditional configuration, and it also yields a larger surface area for the ring to be attached behind the middle of the "8". I put the polished "8" in a vise, pinched between a 3/4 inch diameter copper pipe (the same stock from which the ring will be cut) and a plastic piece that keeps the teeth of the vise from scratching the surface of the "8" that I just went to so much trouble polishing. A slight radius is all you need. I use a plastic-headed persuader. You could almost do this by hand, but I find that I get a more precise result by bending using the pipe as backing



The result is shown to the left.

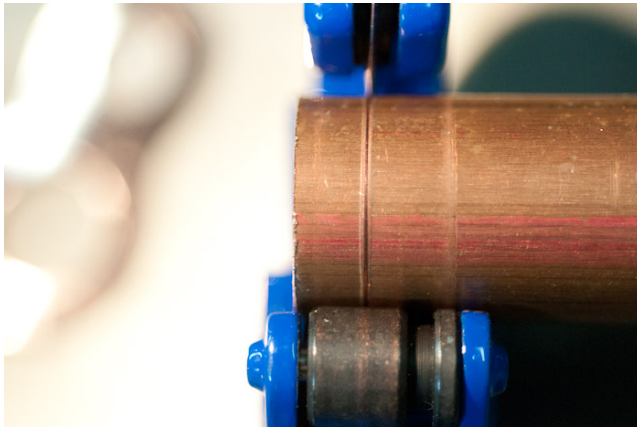
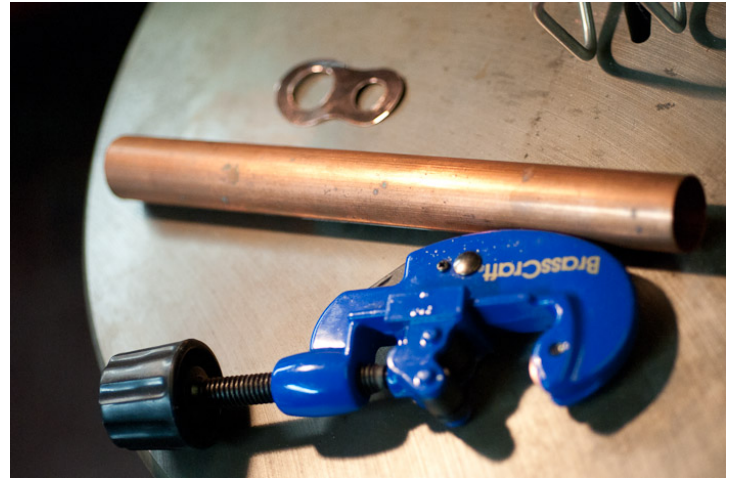
Now you cut the ring through which the neckerchief will pass. Long experience by generations before me has shown that 3/4 inch is the best diameter, not too big, not too small...

The result is shown to the left.



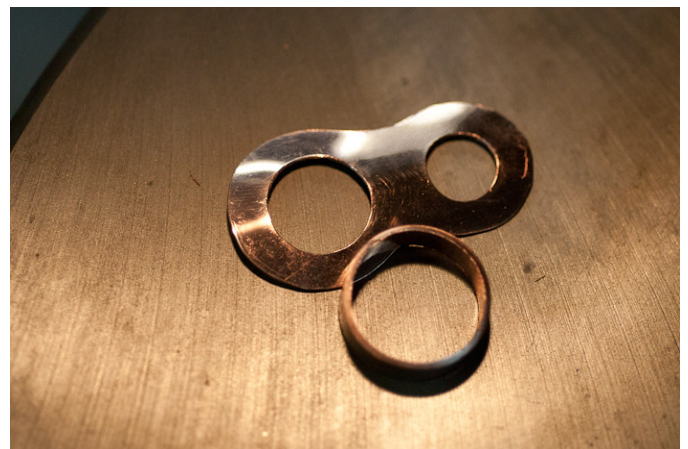


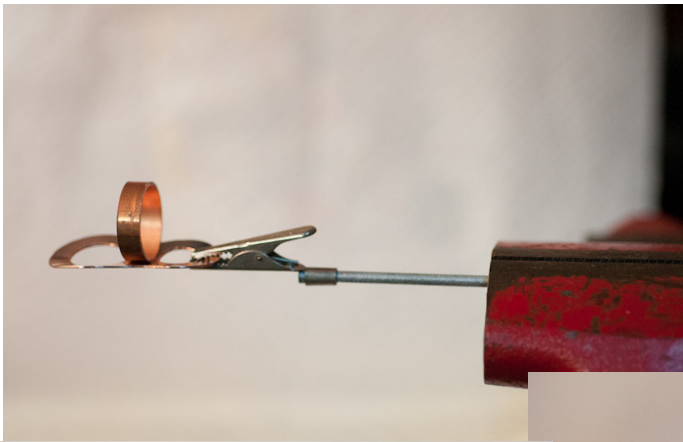
I use a pipe cutter that is available in any hardware store. I won't tutor you on using a pipe cutter. I used a smaller, cheaper one for a while, but found that the guide axles opposite the cutter wheel were too small to give a repeatable result, so I bought the bigger one shown here. I have also used a band saw to cut the ring, but that leaves edges that need more polishing. The pipe cutter leaves an edge that requires much less after-work smoothing.



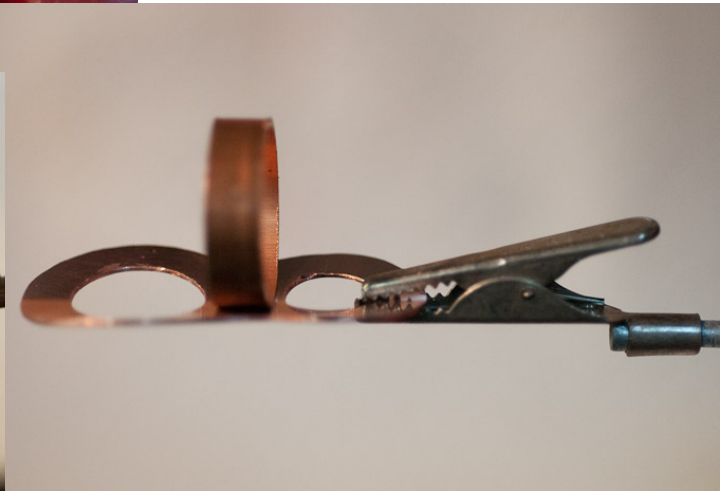
The "thickness" of the ring (the dimension along the axis of the pipe) is 1/4 inch. A little variation here doesn't make any difference, but don't make the ring so large that it spans the distance between the two inner circles on the "8".

Polish the edges of the ring, bearing in mind that a cloth neckerchief will be pulled through at least twice a week for (hopefully) many years. It should be smooth. The quality of the surface of the ring doesn't matter so much, given it is out of sight. If I inadvertently score the surface while grinding the edges, I just throw it away and start again. Now I'm ready to solder the two parts together.





I use a jig made from a nail and an alligator clip. The objective is to firmly hold the "8" flat so I can solder the ring to the back using a propane torch. Orient the "8" until

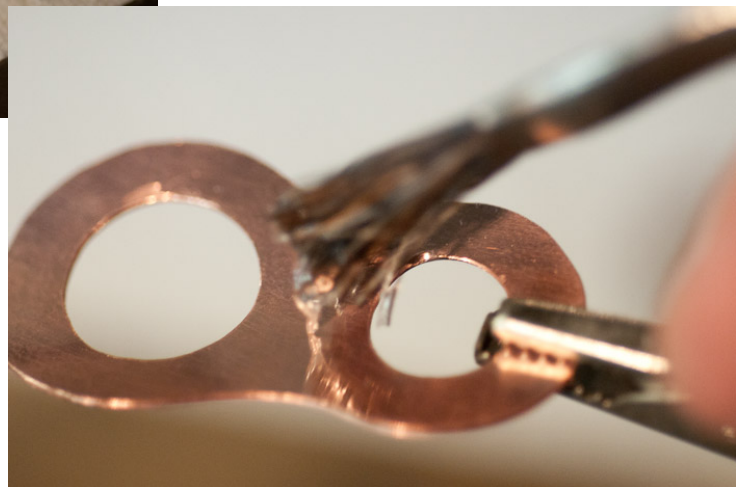


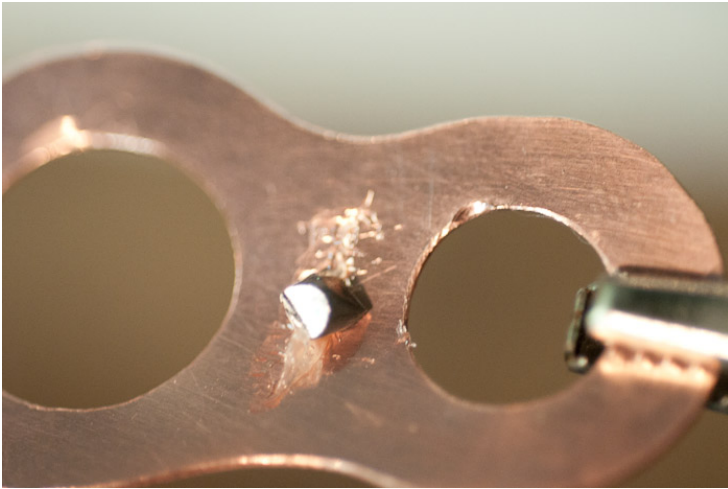
the ring will sit squarely on the back, and extend an equal distance on each side of the middle of the body of the "8".



You need soldering materials as shown here. You can probably also use a resin core solder used for electronics, but I find it simpler to use solid solder wire and a separate past flux. Also show here is a brush for applying flux to that portion of the "8" where the ring will mate.

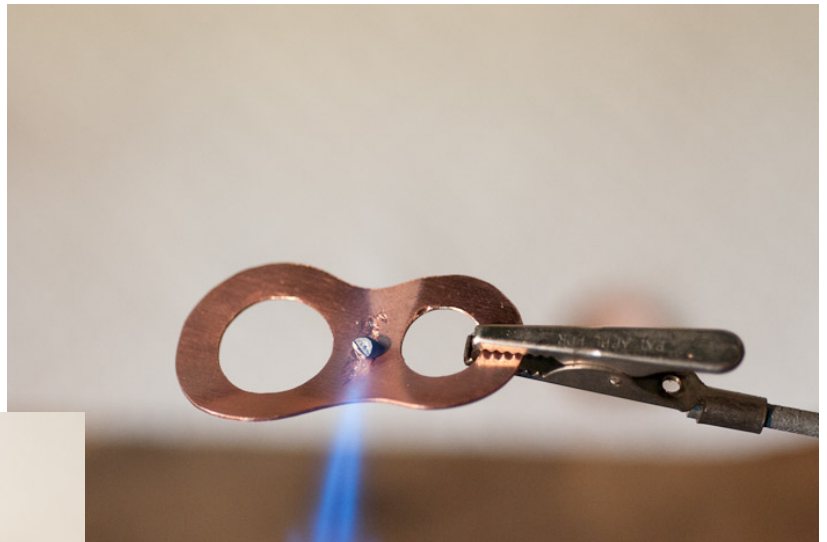
Put a dab of flux paste on the middle of the "8". You don't need much.



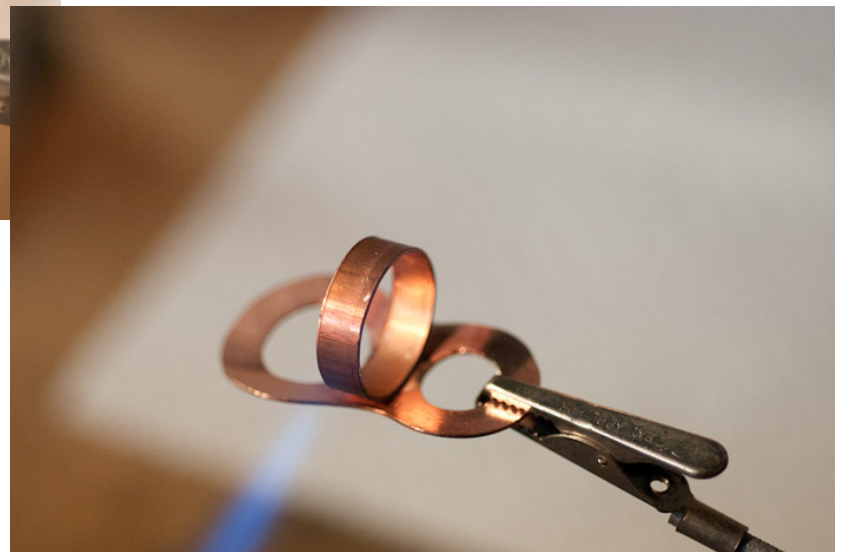


Snip a small bit of solder and put it on the paste. Be careful not to use too much solder. A little goes a long way.

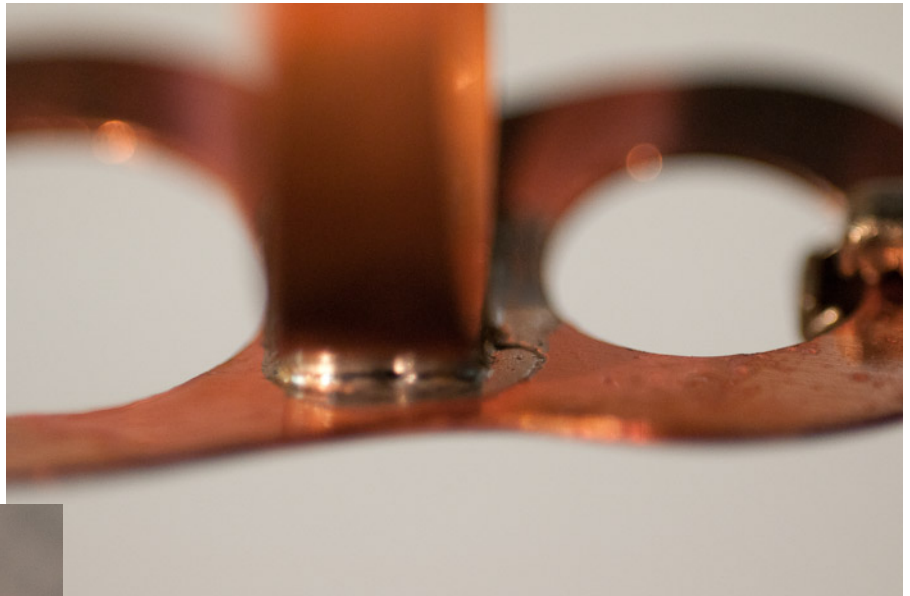
Heat the solder joint until the solder melts and pools on the back of the "8". It should look like the photo below. Too much solder will run all over the place and be impossible to get rid of. Let it harden.



Finally, perch the ring on the solder joint (flux in contact with solder) and re-heat until the solder melts again. The ring will settle into the solder. It usually will move a bit and settle at an angle. I use a screwdriver to nudge the ring into the right orientation while the solder is still molten.



The joint will look like this. It is physically quite rigid, and should stand up well to Scout abuse.



Here is the finished result. I now use an engraver to score the ring with the name of the Scout and the date he earned First Class rank.

I forgot to mention earlier that throughout this process I am using a head loupe like the one shown below so that I can examine the work in detail as I do the marking, sawing, grinding, and polishing.

Have fun!

