

Wire-Wrap on a Budget

—home-brew your tools

For building many integrated circuit projects, a printed circuit board is considered essential. The alternative is to make many connections in very limited space, and point-to-point soldering techniques are most tedious. One alternative to these wire techniques is wire-wrapping, where each connection is made by wrapping a square post with no. 28 to 30 wire—no solder is required. One limitation to starting wire-wrap construction is the cost of the tool—\$6.00 (minimum)—and many people are reluctant to get the starting tools. If your budget is limited and you want to experiment with wire-wrap,

here is a no-cost way to begin.

Almost all of us have a few dozen ballpoint pens that refuse to write. Inside many, the refill is a metal tube. These are the type you need; get at least two of them. Some of the more expensive refills have larger upper reservoirs which also make good handles, but any metal ones will suffice. First, clean the remaining ink out of each one. The metal plug containing the ballpoint should be carefully removed to clean it. Be sure to save the end piece! Cleaning is the hard part and is a little messy. Soapy water and a few pipe cleaners help.

Next, look at Fig. 1 and see how to file the notch in the side of the plug. This is the groove in which the wire will be placed, so make the V-shaped groove large enough for a #30 wire or a little larger so the insulation can also slide in if you prefer the first turn to be of insulated wire. Do not cut the pen end off before you file the groove. It is easier to hold it by that end while you file, and it's small enough anyway. (I lost the first one somewhere in my shop.)

After you have finished

the groove, carefully cut off the small end of the plug flush with the large diameter. You may insert this almost all the way into the refill tube now and check to see if a wire will pass through the groove satisfactorily. The center hole should be just the right size to fit over a standard .025 x .025 pin. You may wish to file a groove across the diameter end of the plug, connecting the groove and center hole. This aids in causing the very end of the wire to be wrapped against the pin, but is not essential.

Another optional feature is a small hole, just above the groove in the plug, in the wall of the refill tube. This allows you to see the wire pass through the groove. If you look into the hole and cannot see the wire, it went into the center hole, which is wrong. Again, this is an option—drill as small a hole as possible. A no. 80 is large enough, but few of us have that small a drill. A hand grinder with a no. 1/2 dental burr will cut a nice groove and also drill a small hole, if you have access to one.

This completes the wire-wrap tool. Try it out. With a little practice, you can do as well with it as with

any professional model. You will find that more time is spent cutting and stripping wire (if you do not buy the prestripped lengths) and inserting the wire than is spent in wrapping, so that manual tools are only a slight bit slower than motor-driven ones.

Now for the eraser for your mistakes! You need an unwrap tool, too, because you will want to remove wires to make tests, make changes, and correct errors. Since you may wrap a wire in either a clockwise or a counterclockwise direction, you want a tool that works in both directions. Look at Fig. 2. This time, the plug is put into the tube, the small end cut off and filed flush, and the plug is filed back to form a sharp edge which will pick up the end of the wire and unwind it. A triangular file or jeweler's file will help here to get the undercut edge. The edge should be beveled somewhat, as shown in Fig. 2(c). Grooving below the outside edge of the tool is optional. This makes it pick up the wire a little more easily sometimes. Try it on a few of your wraps to see how it works.

Now you are all set to wire-wrap your next IC project. All you need is wire, sockets, and a stripper. A cheap stripper which works well on no. 30 Kynar insulated wire-wrap wire is hard to find. Try using a good double-V stripper set carefully to not nick the wire. ■

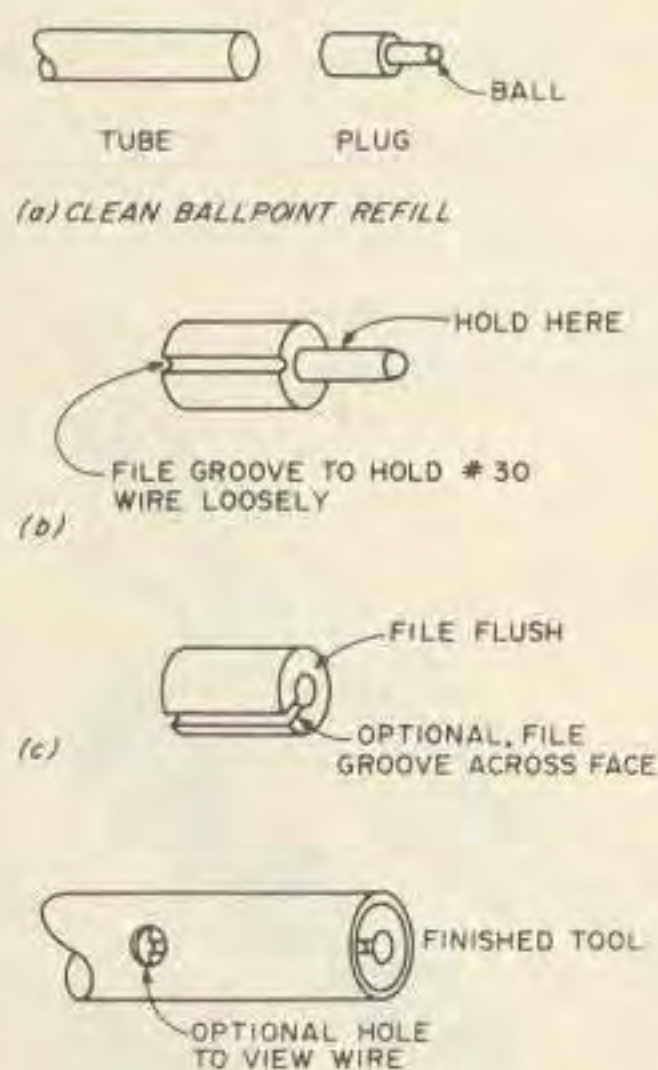


Fig. 1. Wire-wrap tool construction.

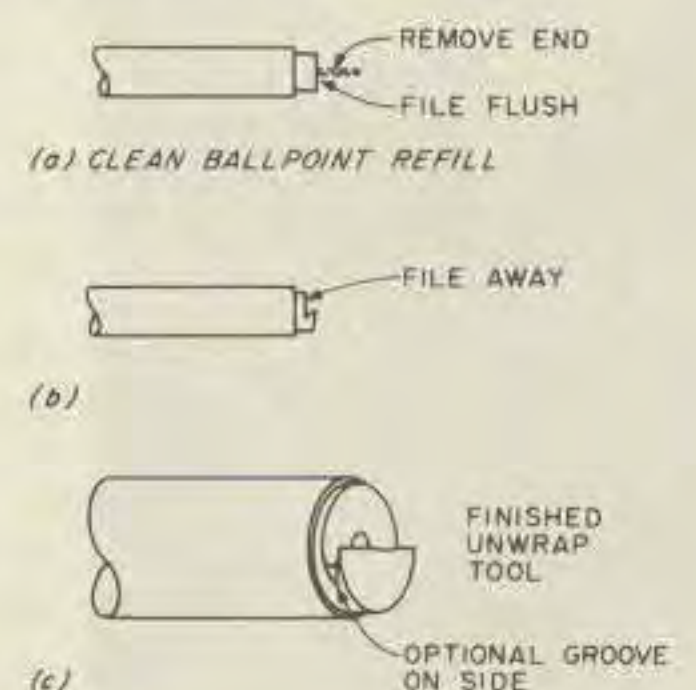


Fig. 2. Unwrap tool construction.