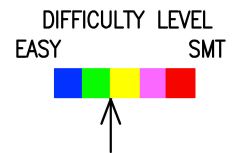




QRPBuilder QX1 40m, 20m-10m Portable Antenna kit



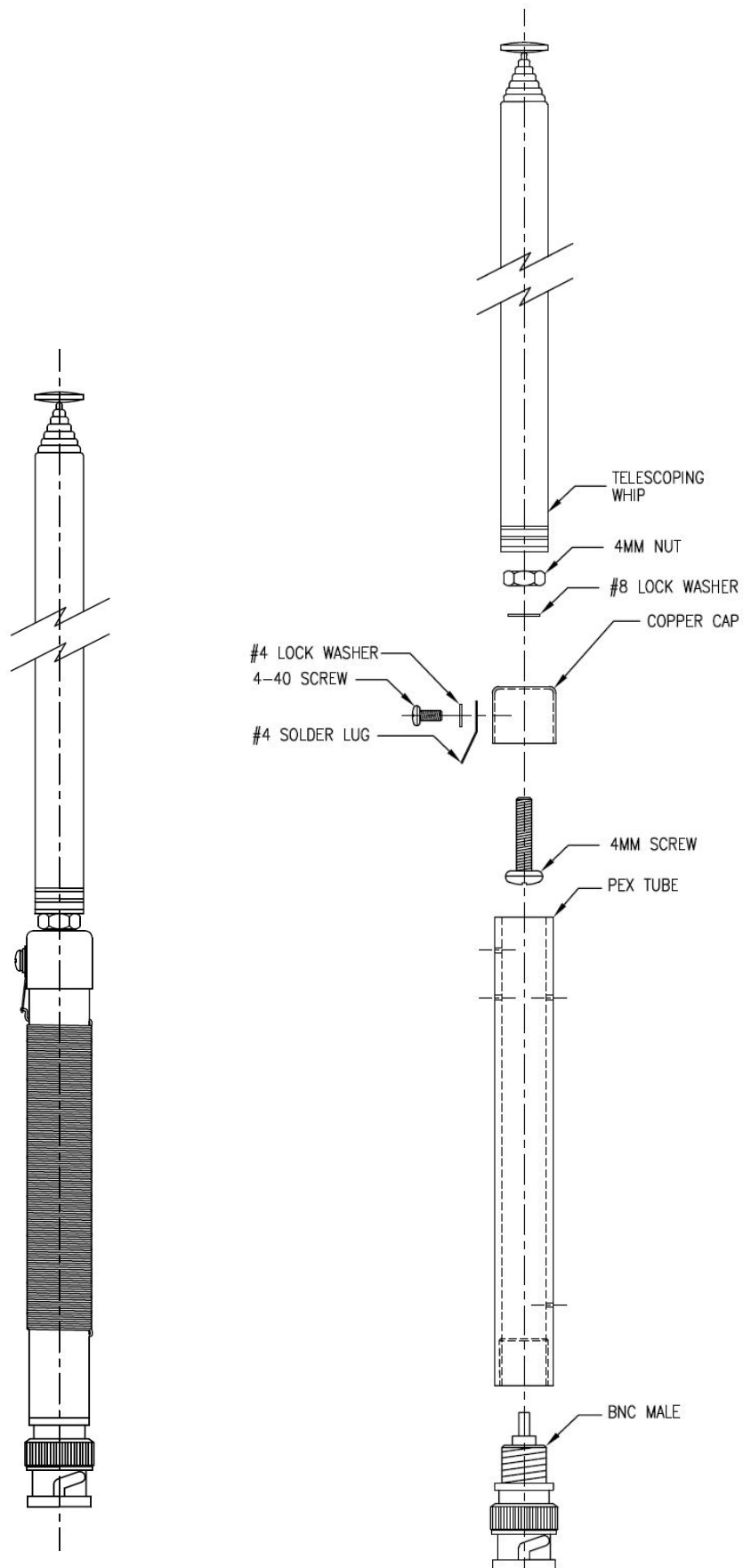
First, familiarize yourself with the parts and check for all the components. If a part is missing, please contact us and we will send one. Email qrpbuilder@gmail.com to request a part, or for any questions.

Parts List

- 1 – PEX tubing, drilled and tapped with copper end cap
- 1 – Telescoping antenna whip
- 1 – BNC male bulkhead connector
- 1 – 4-40 x 1/4" SS pan head screw
- 1 - #4 SS lock washer
- 1 - #4 solder lug
- 1 – M4 x 12mm SS pan head screw
- 1 – M4 SS nut
- 1 - #8 internal tooth SS lock washer
- 1 – 3/4" dia. clear heat shrink tubing
- 1 – 22awg magnet wire
- 1 – Product decal

The tools required are: Phillips screwdriver, forceps, or small needle nosed pliers, wire cutters, soldering iron, some rosin core solder. The instructions below will insure a successful outcome. Please read them all carefully before proceeding. Open the parts bag carefully; small parts are difficult to find in the carpet.

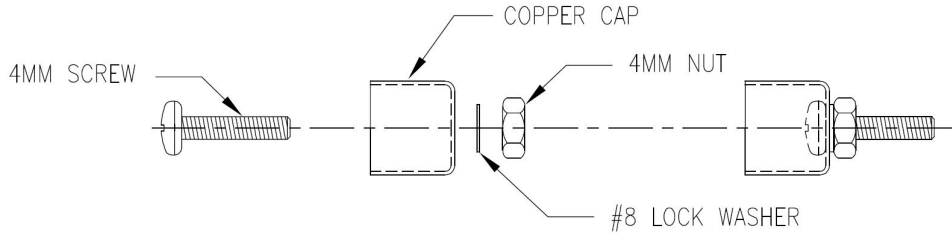
The graphic below shows the scope of this project.



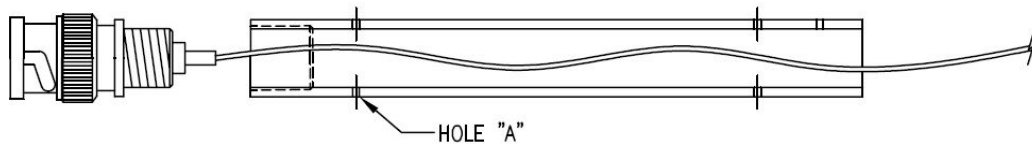
It is important that the coil be wound as described or the antenna will not work as designed. Read and follow the instructions carefully. The design of the antenna is such that it is resonant on the whole 40m band with only adjustments to the whip length. Frequencies from 20m to 10m require a tuner.

Assembly:

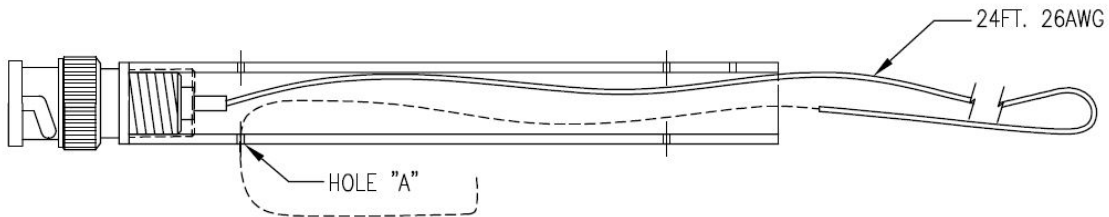
- [] Assemble the copper cap and hardware as shown below.



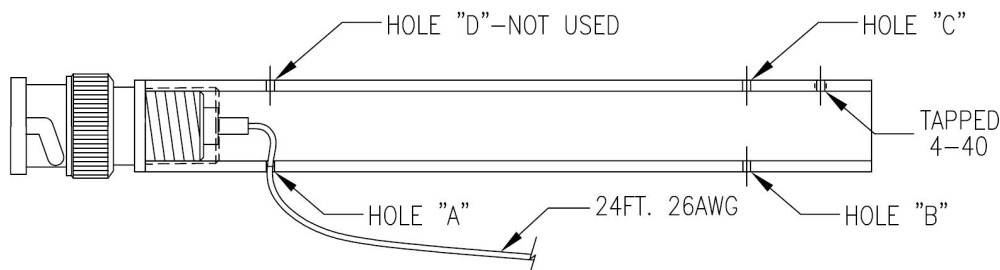
- [] The tube and cap is pre-drilled and tapped for assembly. One end of the tube is threaded for the BNC male connector, the other end for the cap and retaining 4-40 screw. Clean out the tube if there are any chips remaining from the drilling and tapping.
- [] Wire management will be important, so unwind the 26awg magnet wire in one long piece. Make sure there are no kinks or knots.
- [] Scrape about 1/4" of the enamel off one end of the magnet wire and pass it through the end of the PEX tube *without* the internal thread for the BNC connector.
- [] *Remove the nut, lock washer, and solder lug, if present* from the Male BNC connector, as they will not be used. Solder the magnet wire to the center pin, and then thread the male BNC connector into the PEX tube and secure with small needle nose pliers. It just needs to be snug. Do not over tighten or you may strip the threads in the PEX tubing.



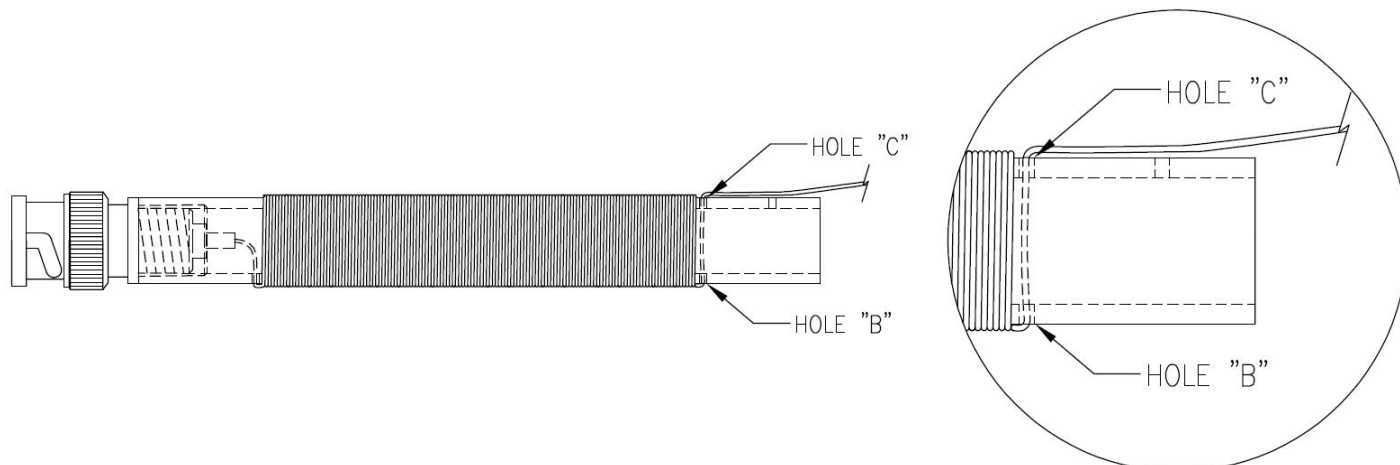
- [] The far end of the magnet wire must enter the un-threaded end of the PEX tube and exit through hole "A". If you bend 1/4" of the end at 90° it will be easier to hit the hole from the inside.



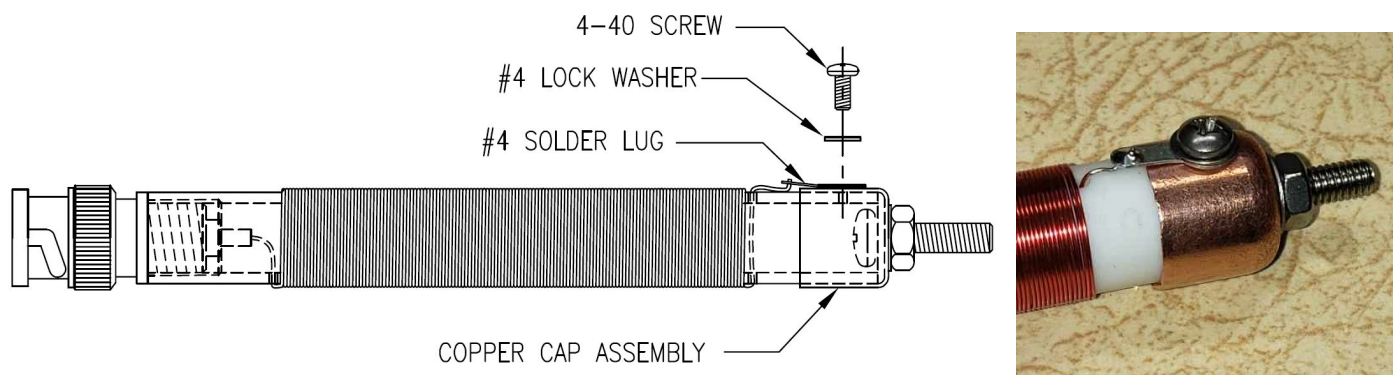
- [] Gently pull the whole length of the magnet wire through hole "A", and straighten out any kinks or knots.



- [] Close wind **139 turns** of the 26awg wire, and route the loose end of the wire into hole "B" straight through the PEX tube and exit at hole "C".

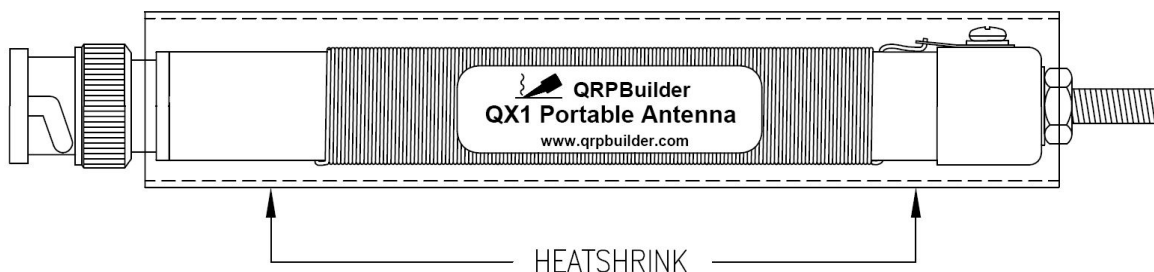


- [] Trim a little beyond the solder lug, and remove the enamel on the magnet wire. Solder the magnet wire to the #4 solder lug. Ensure that the tapped hole in the cap aligns with the tube hole and secure the lug to the copper cap with the lock washer as shown below.



Test the antenna *outdoors* before installing the decal and heat shrink tubing, as testing indoors may skew any results due to interaction of house wiring etc. Try to test using the mounting technique you feel you will use in the field. To check the operation of the antenna, mount it on a tripod or a temporary bracket, *install the counterpoise*, and extend the whip close to the dimensions noted below, depending on frequency. Some whip length adjustments are necessary to accommodate any variables in construction or environment. *If you are using coax to the antenna and not getting a good swr reading you may have feedline radiation on your feedline. Look at the note on the next page.* Remember, 20m-10m use requires a tuner.

- [] The last step is to stick on stick on the product decal on the coil then shrink wrap the coil to protect it from nicks and abrasion.



This completes the assembly.

Setup and usage:

The results above were taken using our BNC Antenna Mount/Adapter attached to a patio chair.



The table below shows how to use the length of the whip to fine tune for your conditions and construction variations. In this particular situation, I used a 30 ft. feed line of RG-174 with a clamp on ferrite to eliminate any feedline radiation (a few turns through a mix 31 ferrite), a 20 ft. counterpoise, and no tuner, making small adjustments to the whip (~1/2" increments). It was mounted outdoors about 34" off the ground. The whip length is measured from the top of the whip end copper cap to the tip of the whip end.

These results were measured with my NanoVNA. Your results may have whip lengths different due to construction and environment variables:

	<u>Freq.</u>	<u>Whip Length</u>	<u>VSWR</u>
40m	7.060 MHz	43 5/8"	1.05
	7.175 MHz	41 3/4"	1.05

Note: One point I would like to emphasize, even at QRP levels, anytime you are getting strange SWR readings, make sure you aren't getting feedline radiation. It can interfere greatly with resonance, SWR readings, and performance. A clamp-on ferrite, like shown below, right at the antenna to coax connection usually solves this problem. I use RG174 with a few turns through a good sized clamp-on ferrite, mix 31, right at the antenna feedline just for this purpose on all my small portable antennas. In my experience the Amidon #2X316451P2 works well. Mouser suitable part# 623-0431164181, 623-0431176451 should also.

Also from the antenna gurus:

Feed line radiation refers to the phenomenon where the transmission line connected to an antenna radiates energy, which can cause interference and affect the performance of the antenna system. This radiation can occur when the feed line becomes part of the radiating system. It is important to minimize feed line radiation to ensure efficient transmission and reception. Techniques such as using a 1:1 balun or feed line choke can help minimize this effect.



Troubleshooting:

Double check the turn count on the coil. It is easy to miss or add an extra turns. Take a sharp close-up picture and print it. It's a lot easier to count.

Make sure you use a counterpoise wire and do not have any feedline radiation from your coax.

Notes:
