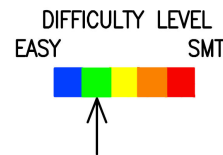
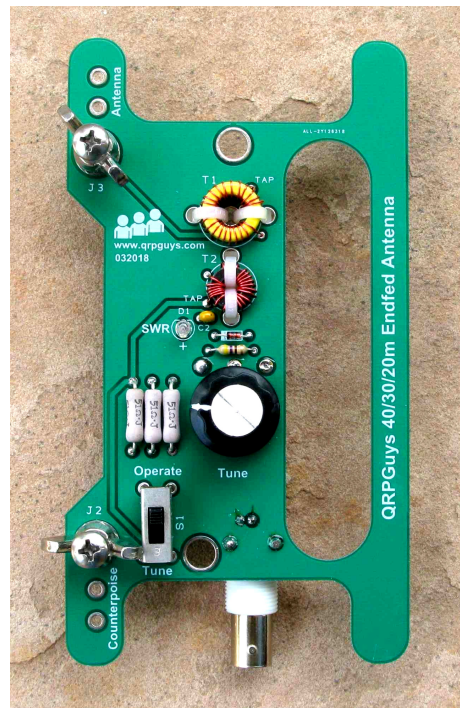




## QRPGuys Multi-Band End Fed Antenna Assembly Manual

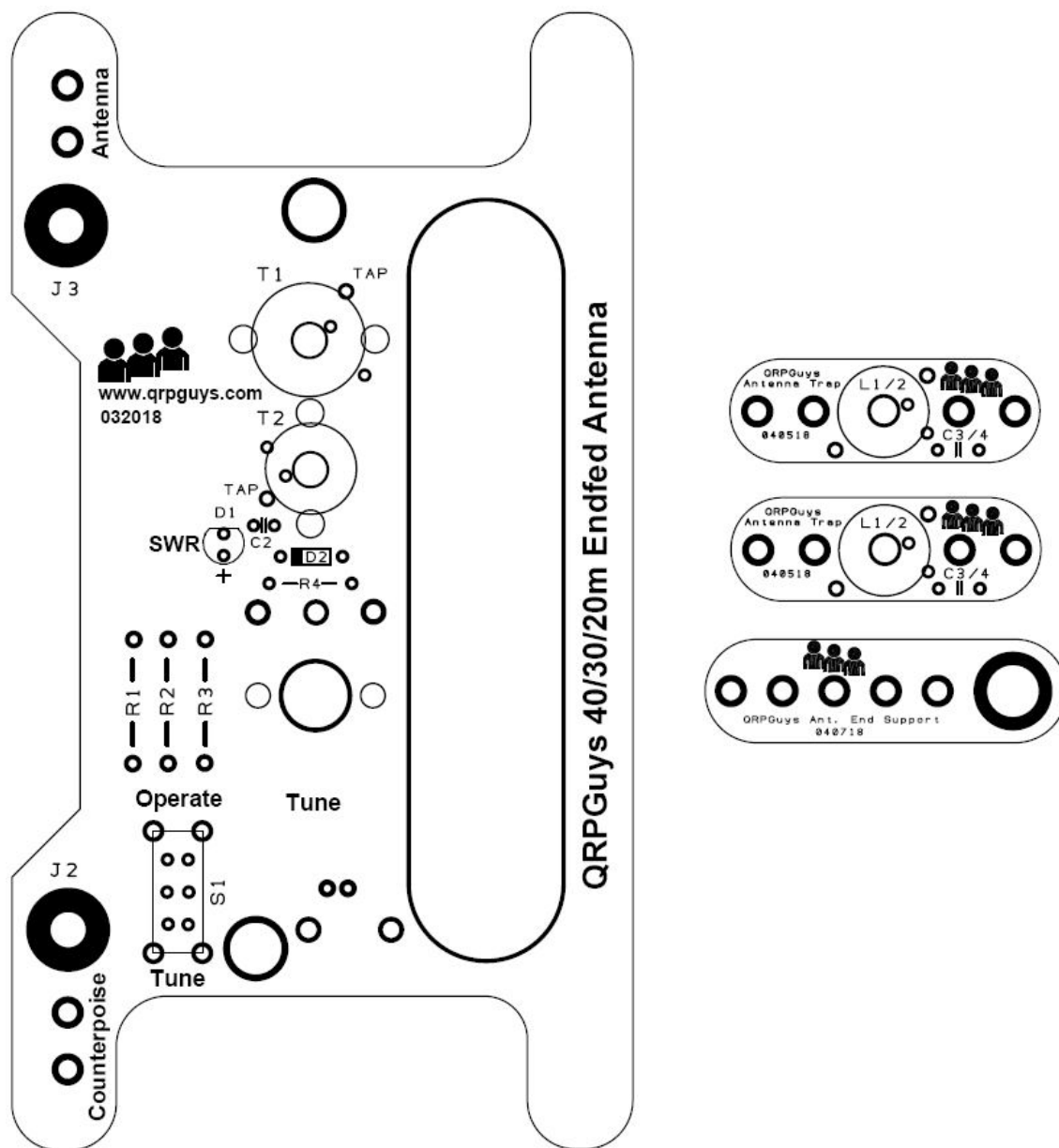


First, familiarize yourself with the parts and check for all the components. If a part is missing, please contact us and we will send one. To request a part, please use [qrpguys.parts@gmail.com](mailto:qrpguys.parts@gmail.com).

### Parts List

- 1 – Multi-Band End Fed Antenna pcb
- 2 - Antenna Trap pcb
- 1 – End Support pcb
- 1 – Slide switch – DPDT
- 1 – C1, poly-varicon, w/shaft and mtg. hardware, 1 long, 2 short metric screws, and nylon spacer 3/8"L
- 2 – T37-6 toroid core (yellow)
- 1 - T50-6 toroid core (yellow)
- 1 – FT37-43 toroid core (black)
- 1 – 72" 26AWG magnet wire
- 1 – Small control knob for poly-varicon
- 1 - BNC female PCB connector
- 2 – 8-32 x 3/4"L SS Phillips pan head screw
- 4 – 8-32 SS nut
- 2 – #8 internal tooth SS lock washer
- 2 – 8-32 SS wing nut
- 4 – Nylon zip tie
- 1 – C2, .1uF mono capacitor, marked 104
- 1 – C3 - 68pF capacitor, marked 68
- 1 – C4 - 150pF capacitor, marked 150
- 1 – D1, Red LED w/clear lens
- 1 – R4, 470 ohm resistor (yellow-violet-brown-gold)
- 3 – R1-3, 51 ohm 2W power resistor (green-brown-black-gold, or value is printed on the component)
- 1 – D2, 1N4148 signal diode, sm. glass, w/black band on one end
- 1 – Ø1/2" x 4" heat shrink tubing

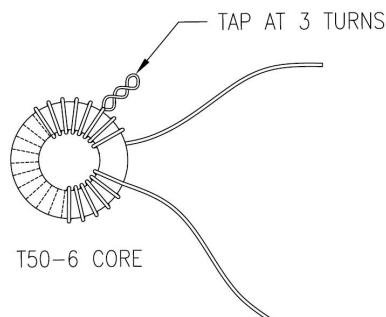
You will assemble the smallest components first. **Not all components are on the same side of the board.** The poly-varicon and BNC connector mount on the back side. All the others on the front side.



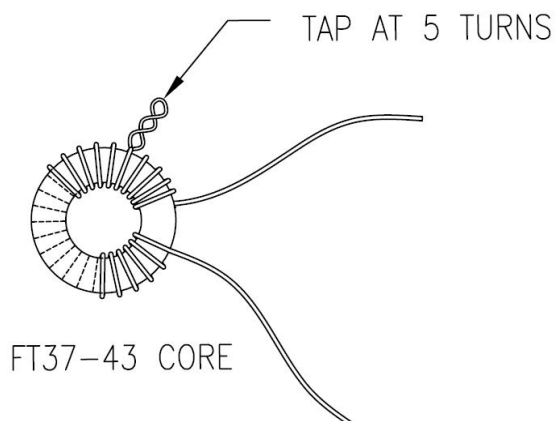
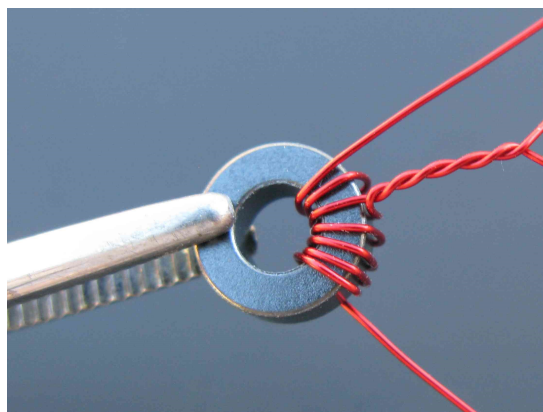
- [ ] Install D1, the clear lens LED. The polarity must be correct. The long lead is “positive” and must match the silkscreened “+”. There is also a very small flat indicating the negative side of the led, and an outline indicating the flat on the board. Seat the LED flush with the surface of the board.
- [ ] Install C2, .1uF, marked 104
- [ ] Install D2, 1N4148 signal diode, observing the black polarity band (cathode) matching the silkscreen.
- [ ] Install R4, 470 ohm resistor (yellow-violet-brown-gold)
- [ ] Install R1,2,3, 51 ohm, 2W, power resistor

- [ ] For L1, use the T50-6 (yellow) core and 24" of the supplied magnet wire. You are winding a total of **23** turns, with a tap at **3** turns from the beginning of winding. The picture, and figure below shows the beginning of winding and the twisted technique for the tap.

**Note:** Now is a good time to mention a good way for counting the turns on your toroids. Many times on toroids with a lot of turns, you lose track going around, as some are quite small. A good trick is to take a digital picture of it and blow it up on your computer screen. Counting is clearly a lot easier.



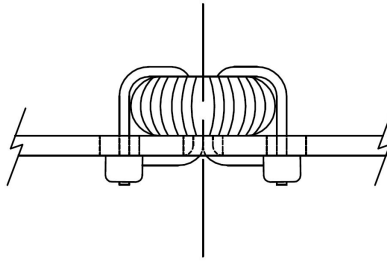
- [ ] For L2, use the FT37-43 (black) core and 24" of the supplied magnet wire. You are winding a total of **25** turns, with a tap at **5** turns from the beginning of winding. Remember, every time the wire goes through the center of the core, it counts as one turn. Use the same twisted technique for the tap as L1. The total of 25 turns will completely fill the toroid. If you wind the toroid as shown the wires will align with the pcb holes.



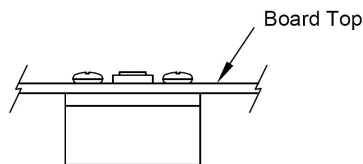
- [ ] Next, bend the leads as shown below, trim to 1/4" long, and tin the leads prior to soldering them to the backside of the board. The magnet wire supplied is Thermaleze® brand and will tin easily with a soldering iron. Always tin the leads before trying to solder them in place and you will greatly eliminate any continuity problems. If you wind the toroid as shown the wires will align with the pcb holes.



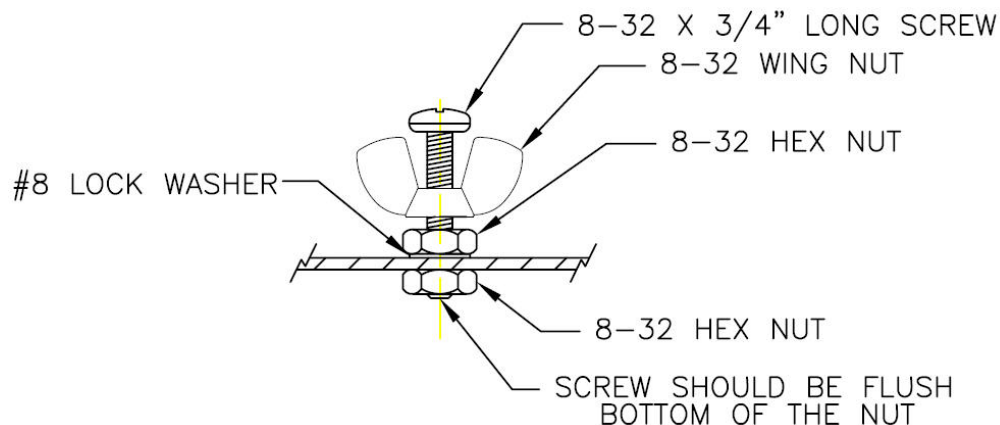
- [ ] Solder L1 where indicated on the PCB, and centered on the silkscreen outline. You will notice the tap hole is indicated, and is slightly larger in diameter to accept the double twisted wire. Install the toroid flush with the board. **Do not elevate it off the board.** We will be securing it two tyraps as shown below.



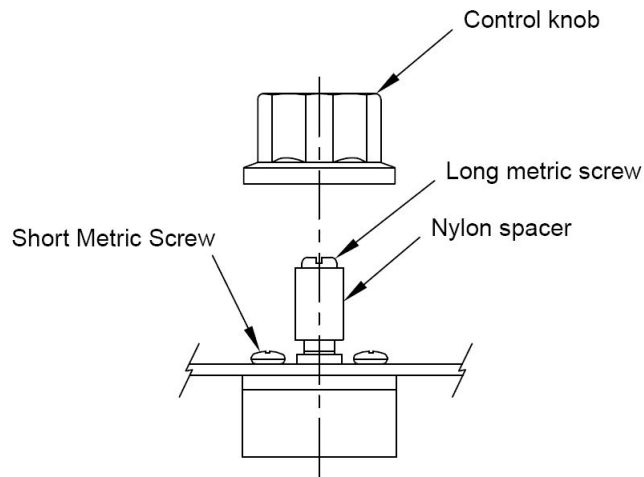
- [ ] Solder L2 where indicated on the PCB, and centered on the silkscreen outline. You will notice the tap hole is indicated, and is slightly larger in diameter to accept the double twisted wire. Install the toroid flush with the backside of the board. **Do not elevate it off the board.** Secure it the nylon tyraps as shown above.
- [ ] Install J1, the BNC connector flush with the **"BACK"** side of the board, and solder the two locating pins and two electrical connections.
- [ ] Install the polyvaricon capacitor on the **"BACK"** side of the board by carefully bending the three leads towards the shaft end of the capacitor. Feed the three leads through the board and secure it with the two short metric Phillips screws from the top. Solder and clip the three leads flush.



- [ ] Install the slide switch on the side of the board, soldering all four corners and electrical pins.
- [ ] Install J2,3 the hardware posts on the **"FRONT"** for the antenna and counterpoise wires, as Shown in the figure below. The post screw should be flush with the outside of the securing nut on the back side.



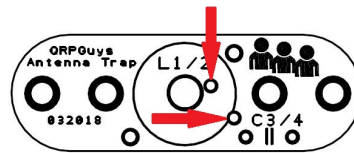
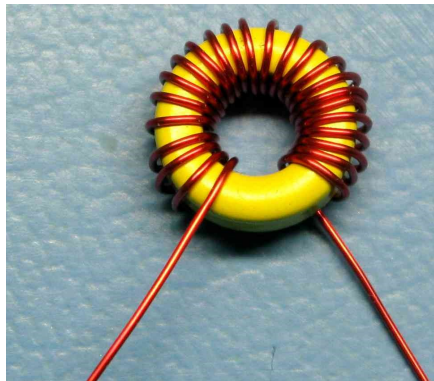
[ ] Install the nylon spacer shaft, retaining screw, and control knob onto the polyvaricon as shown.



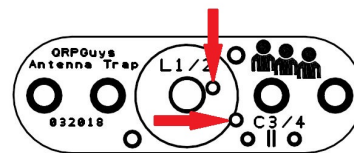
### **Trap assembly**

Two traps are required for the antenna, referred to as “Trap A” and Trap B”. Trap “A” should be resonant just below the 20m band, and trap “B” just below the 30m band. If you have the necessary equipment you can tweak the traps by spreading or compressing the turns on the toroids to achieve ideal resonance.

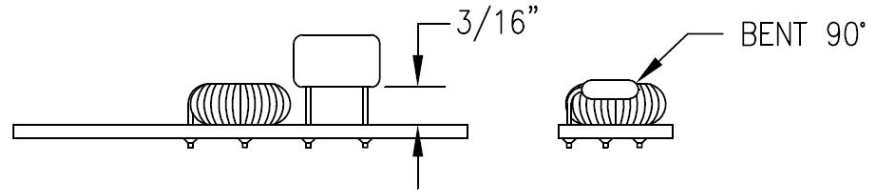
**Trap “A”** uses a T37-6 (yellow) core wound with 25 turns for “L1” as shown below, with C3, 68pF capacitor. Wind it like the graphic, tin the leads and when bent down the leads will align with the pcb. Theoretical inductance is 1.9uH for 14.000MHz.



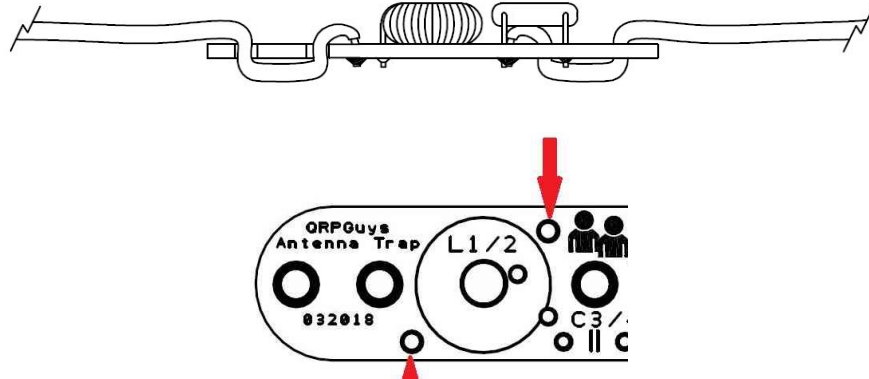
**Trap “B”** uses a T37-6 (yellow) core wound with 24 turns for “L2” as shown below, with C4, 150pF capacitor. Wind it like the graphic, tin the leads and when bent down the leads will align with the pcb. Theoretical inductance is 1.70uH for 10.000MHz.



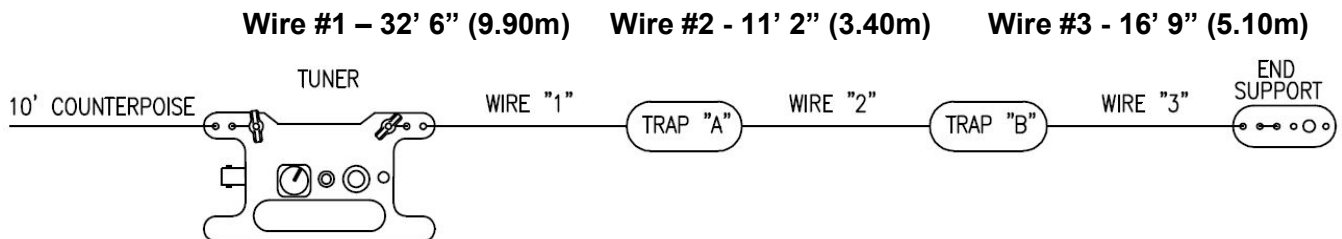
Install the two toroids centered on the silkscreen, flush with the pcb, and appropriate capacitors 3/16" off the surface of the board. Bend them 90° towards the center of the board so the shrink wrap tubing will fit over the trap



Before you use the heat shrink tubing to protect the trap, it is necessary to install the lengths of wire through the strain relief holes and solder where indicated below.

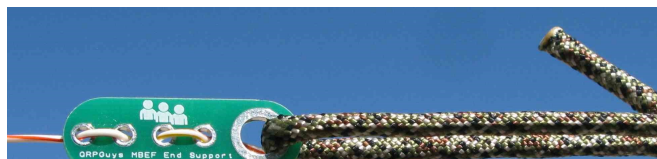
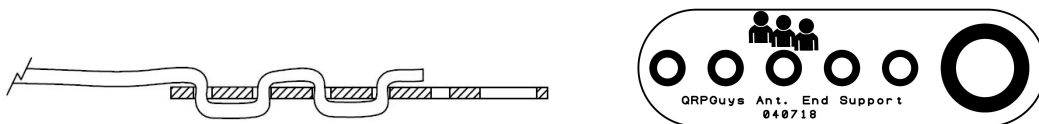


The user supplies the three wires for the driven element. We recommend stranded #22-24 AWG for this purpose. The lengths shown below are the lengths we tested and work for most locations and deployment schemes. **Don't mix up the traps.** Trap "A" has the 68pF cap. and trap "B" the 150pF cap.

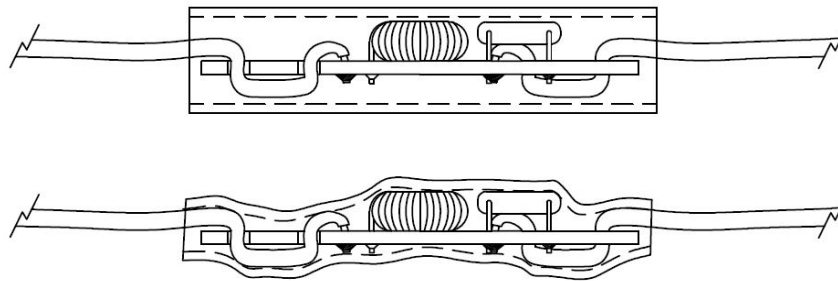


It is best to test the lengths and traps so if adjustments are necessary you don't have to cut off the tubing. *Be careful not to damage the traps during this process.*

Route and terminate the end wire as shown below with the supplied End Support.

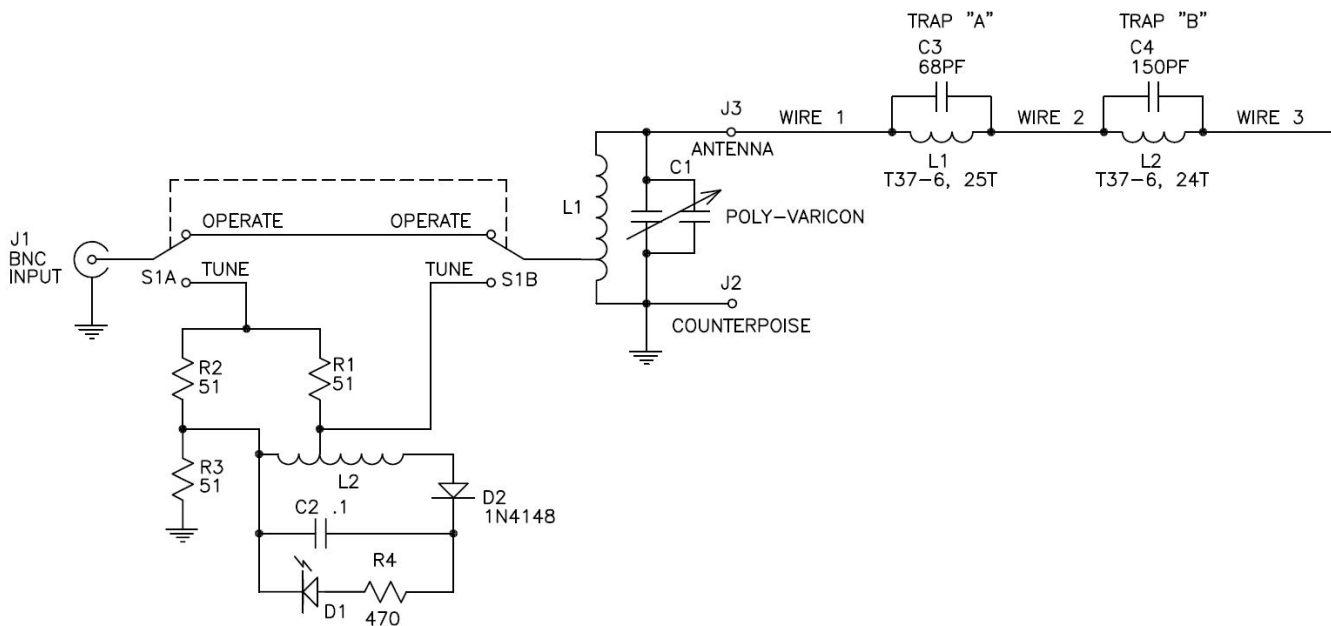


When you are satisfied with the performance, cut a 1.75" long piece of the Ø1/2" heat shrink tubing, remove the End Support, slide the heat shrink onto the end of the wire, center it on the trap, and shrink it to the assembly, as shown below. It will not be waterproof, but it is designed to protect the trap from mechanical damage in the field. Replace the end support.



This completes the electrical and mechanical assembly.

### Schematic:



### Tuner usage

The tuner is rated at 5W CW, 10 watts PEP max. and incorporates the N7VE LED absorption bridge circuit for sensing SWR. In the TUNE position, you cannot damage your transmitter caused by a high SWR. The worst your transmitter is looking at is a maximum of 2:1 SWR in the TUNE position. The LED is only showing reflected power. At full brilliance your SWR is 4:1 or greater, at half brilliance your SWR is approximately 2:1, and the LED will completely extinguish at 1:1. *Tip from Dan...If your led does not go out at 1:1 there may be a little too much gain on L2, the indicator transformer. Just reduce the turns on the high side (side with the most turns) of the tap by a turn or two.*

**Use all the normal cautions throwing wires up in the air near power lines.**

How the deployed wire is configured depends greatly what you have to work with in terms of support trees and structures. The simplest configuration is the "Sloper", where the active element runs from the antenna connection of the tuner, up to a tree branch, or top of a tree.

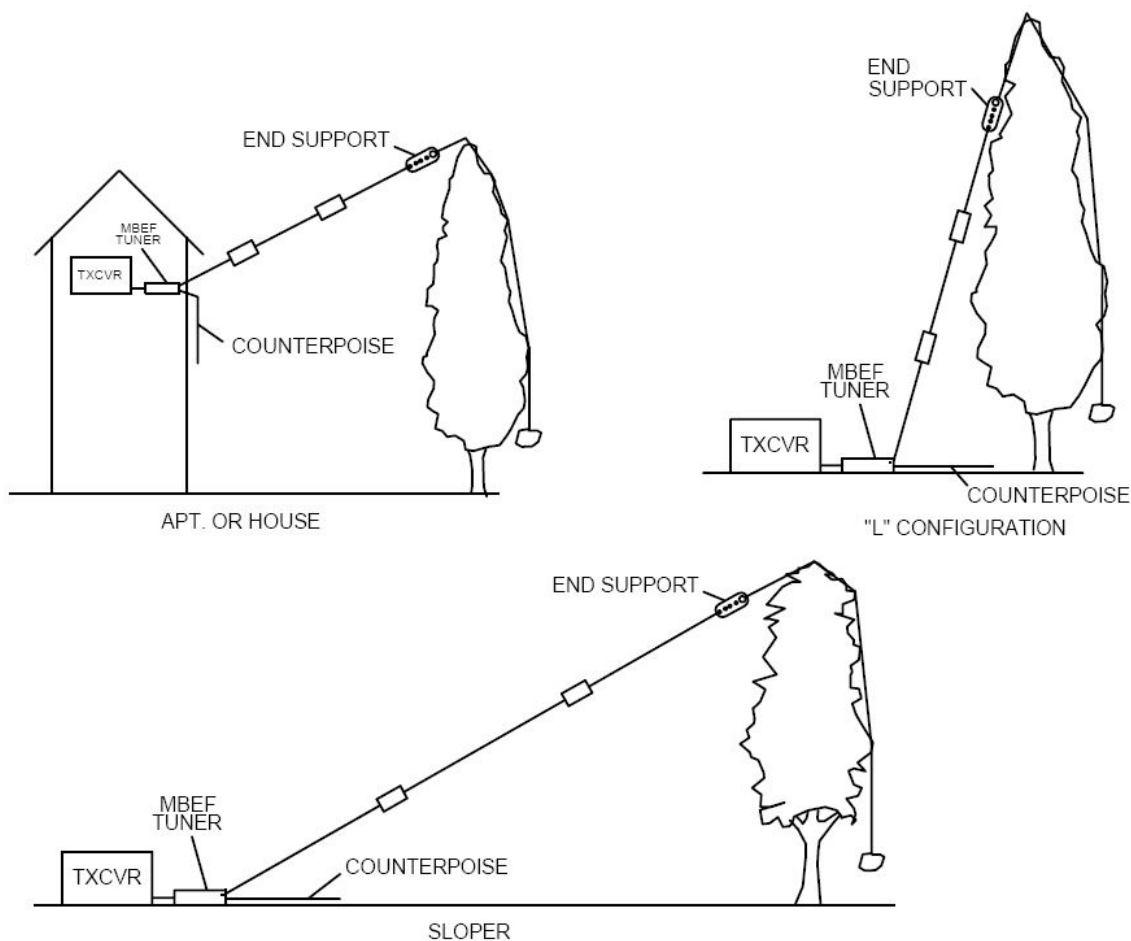
An "L" configuration may work well if you can get the part of the wire from the tuner up to the tree as vertical as possible.

Use a counterpoise, try to lay it out in a straight line, when possible. A 10-20' length counterpoise will be helpful, plus the coax from the transmitter acts as a counterpoise as well.

Our tests showed these results in a sloper configuration with 10' counterpoise, and we recorded the SWR readings with a MFJ-259B as follows:

Wire #1 – 32' 6" (9.90m)      Wire #2 - 11' 2" (3.40m)      Wire #3 - 16' 9" (5.10m)

7.050 – 1.1:1  
7.300 – 1.2:1  
10.100 – 1.1:1  
14.050 – 1:1  
14.300 – 1:1



Additionally, after the antenna is tuned up, keeping the bridge in the circuit (Tune position) will reduce the power by a factor of four to a matched antenna. This can occasionally be useful when trying to bring a 3w QRP transmitter to under the 1w level for certain sub-one watt contest multipliers.

## This image shows a single sheet of white paper with horizontal black ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.