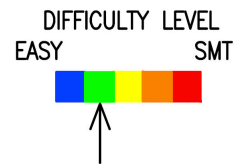


## QRPGuys 40-30-20m Portable Tri-Band Vertical Antenna



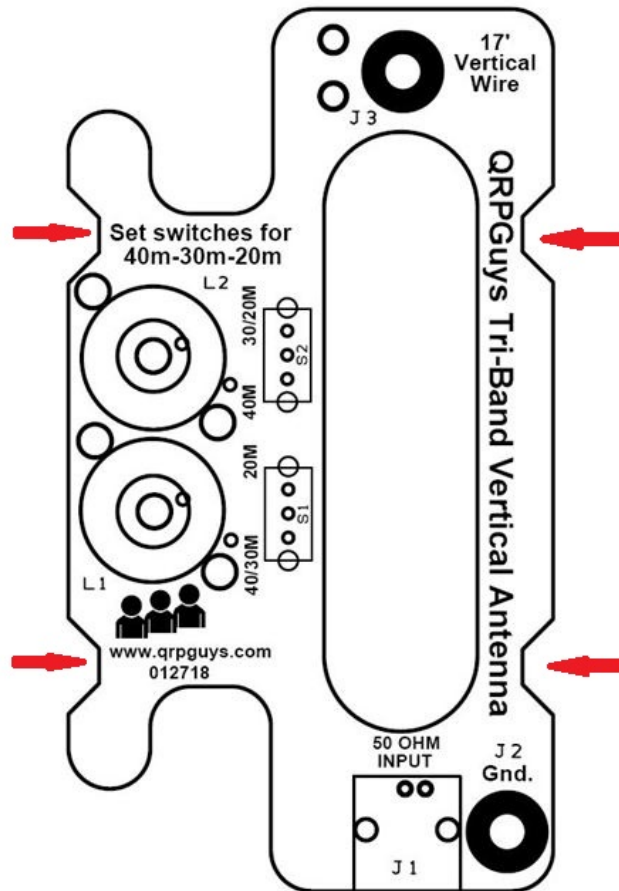
First, familiarize yourself with the parts and check for all the components. If a part is missing, please contact us and we will send one. To request a part, please use [qrpguys.parts@gmail.com](mailto:qrpguys.parts@gmail.com).

*Please read all the instructions before starting the assembly.*

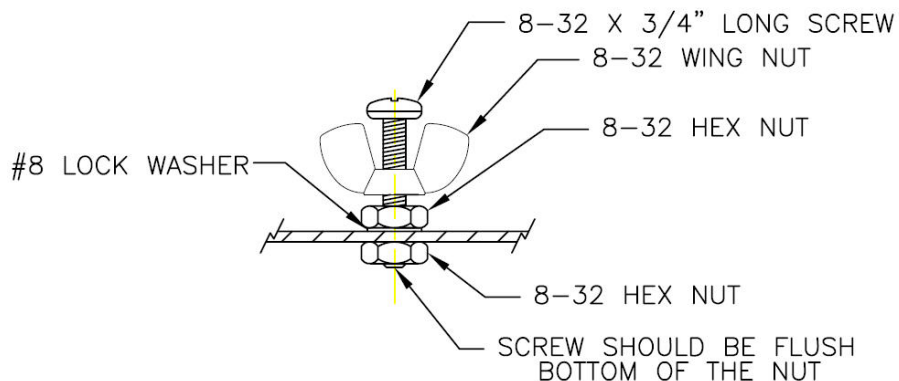
### **Parts List**

- 1 – QRPGuys TBV pcb
- 2 – L1,2 T68-2 toroid core (red)
- 1 – 72” of 24awg magnet wire
- 1 – BNC female horizontal connector
- 2 – S1,2, SPDT slide switch
- 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 tie wrap

Refer to the graphic below and the PCB silk screening for the placement of the components.



- [ ] With a file or emery paper, smooth the sharp edges of the two notches on each side of the pcb, otherwise if you attach the device to your vertical pole using rubber bands, the sharp edges can cut the rubber bands.
- [ ] Install S1,2, soldering all 5 pins on each.
- [ ] Install the horizontal BNC connector
- [ ] Install the hardware posts for the "Antenna" and "Gnd." as shown in the figure below. The post screw should be flush with the outside of the securing nut. Install the "Antenna" hardware with the wingnut on the front side. Install the "Gnd." hardware with the wingnut on the backside.

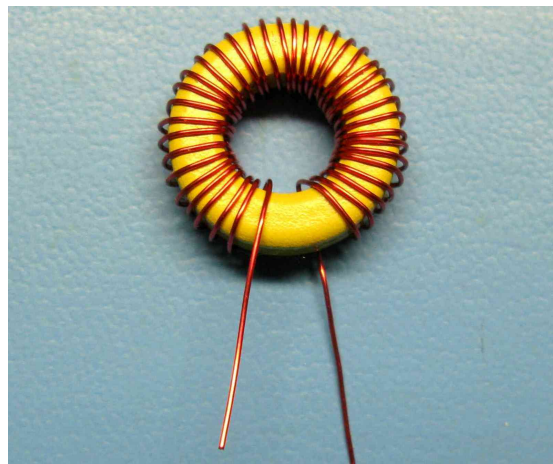


Next to install is L1 that must be wound as shown below in order for the wires to line up with the holes. Use 30" of wire and wind 24 turns. Remember every time the wire passes through the center of the core counts as one turn. Tin the wires before installing onto the pcb. Install the wound toroid flush with the top of the board. When the wires are bent down, they will align with the pcb holes.



Yellow core is shown for clarity.

Next to install is L2 that must be wound as shown below in order for the wires to line up with the holes. Use 36" of wire and wind 38 turns. Remember every time the wire passes through the center of the core counts as one turn. Tin the wires before installing onto the pcb. Install the wound toroid flush with the top of the board. When the wires are bent down, they will align with the pcb holes.



Yellow core is shown for clarity.

### Using the antenna:

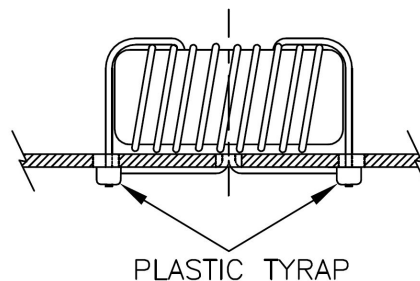
The QRPGuys Tri-Band Antenna covers 40-30-20m. The builder supplies the wire for the driven element and ground plane wires. You can use 22awg to 26awg depending what you have available for the wire. We have designed the device to mount on the base of a fiberglass telescopic 7.2m (5.4m/17.7' useable) fishing pole, available on eBay. However any non-metallic support may be used. The device is very lightweight and can be attached to the Ø1" base diameter of the fiberglass pole easily with rubber bands that align with the notches in the pcb. There is a BNC female connector for the input from your radio. Use four 10' counterpoise/ground wires attached to the ground wingnut that can just be laid on the ground radially from the base.

## Setting up the antenna for the first time

Use a 17' long piece of wire for the vertical element. Deploy the four 10' radials, set the switches for 20m and adjust the length of the driven element for 20m, folding back the wire for lowest SWR, ~2:1. When finished fold back the driven element on itself, and secure it. Our experience is that after tuning it for 20m, the antenna will be ~2:1 on the other two bands with the proper switch settings. You may need to squeeze or expand the turns on L1 for 30m and L2 for 40m to obtain these results. **Do not change the length of the radiating element.** If you want the SWR to be less or broader coverage, just use a tuner for the whole band.

We have found the inductance values and setup description the best compromise for all three bands and terrain variances. We encourage experimentation and if you use only one or two of the bands you may want to try different inductances and driven element lengths.

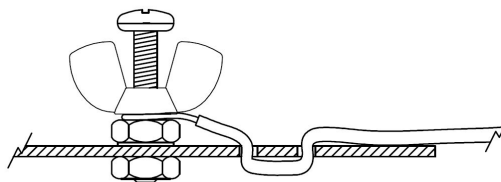
[ ] When you are finished tuning, retain L1 and L2 with the four nylon tie wraps as shown below.



### **See Doug's fine tuning procedure:**

1. Attach four 10 ft. Radials. The radials must be attached to setup antenna.
2. Set both switches to 20m position.
3. The resonator wire for 20 meters. I did mine for 14.100 MHz. You must get swr below 1.5:1. Start with 17' wire. Trim 3" at a time until you get close, then 1" at a time. Once you have this wire "set". DO NOT TOUCH AGAIN. If you do, you mess everything up.
4. Place top switch in 20/30 meter position. Place bottom switch in 30/40m position.
5. Check swr at 10.125 MHz. Spread or compress turns on bottom toroid to adjust resonant frequency. If you can't get it where you want, you may have to add or take off turns. If it resonates too low, then you will need to take off turns to raise frequency and add turns to lower frequency. **(Taking off turns lowers inductance, adding turns raises inductance.)** Do this one turn at a time. Once you have swr below 1.7:1, don't touch the toroid. I paint mine with clear nail polish to hold the turns while I add the cable ties to secure the toroid.
6. Place both switches in 40m position. Repeat step 5 for the 40 meter top toroid. You should be able to get less than 1.5:1.
7. Secure toroid with cable ties.

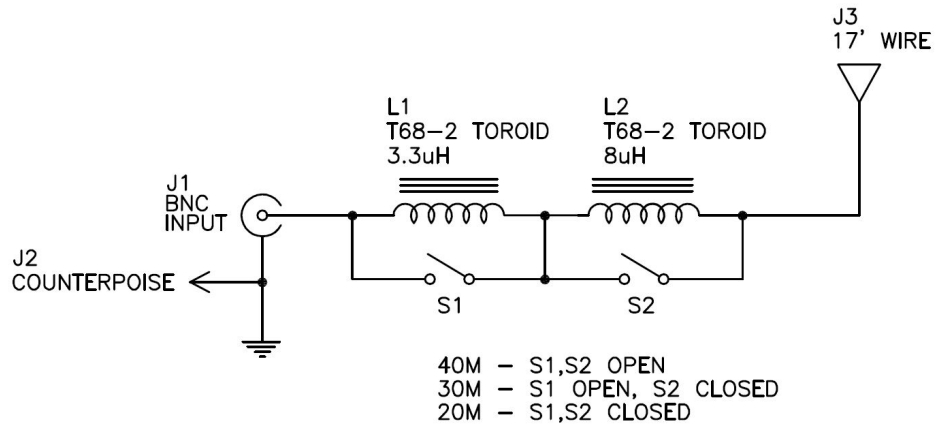
Shown below is the strain relief routing for the vertical antenna wire.



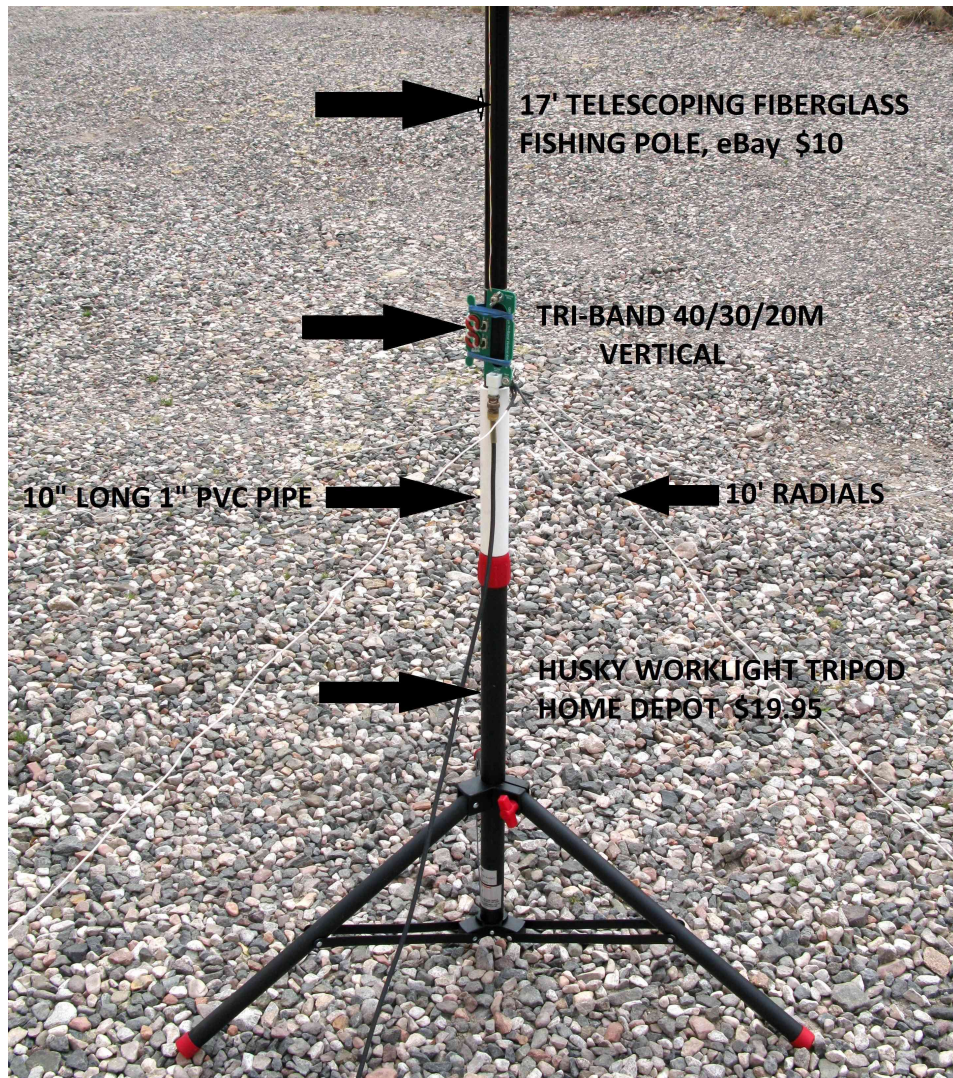
You can keep the vertical antenna wire attached to the J3 wingnut and wind around the pcb for compact storage.

In eBay, search for "telescoping fishing pole". You will need a plain one, without any eyes, and an expanded length of at least 17'. The best useable one is advertised as 7.2m long (useable length is 5.4m/17.7'). Collapsed length is only about 65cm/25.6". They are referred to as fiberglass construction. Typically ~\$10 USD delivered.

**Schematic:**



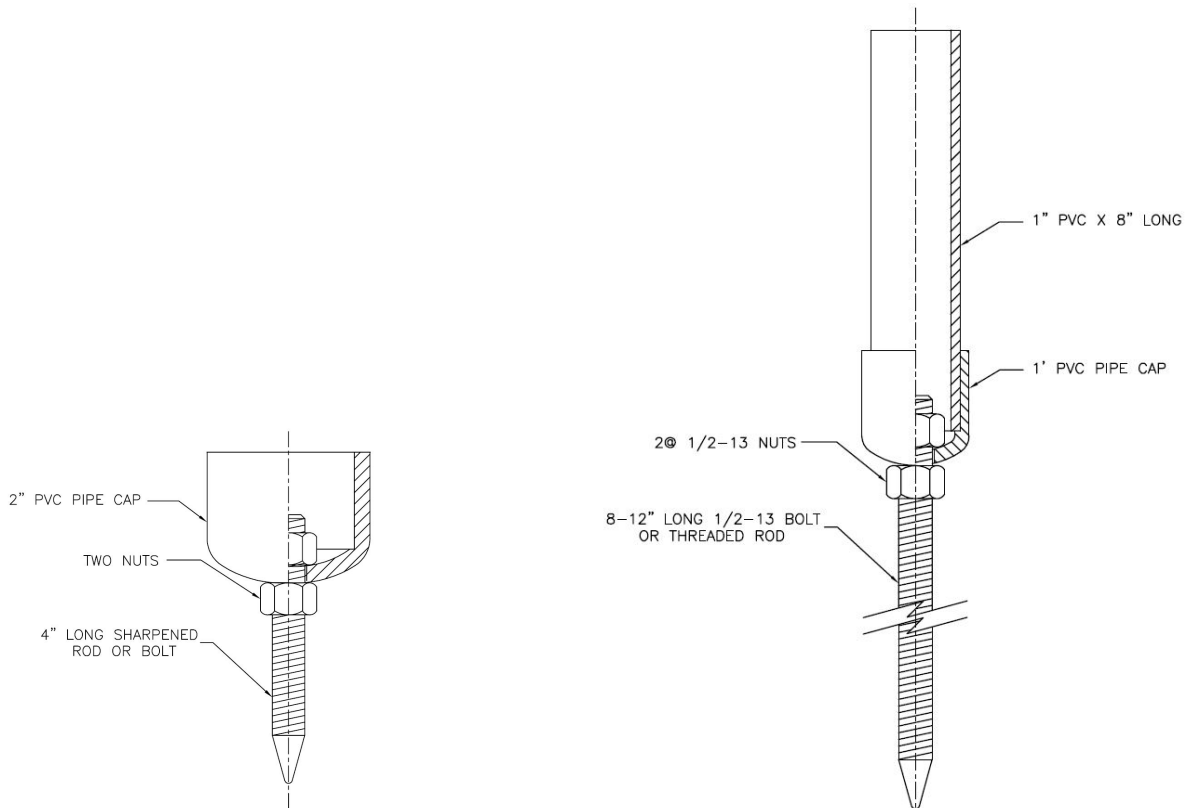
**Possible Setup**



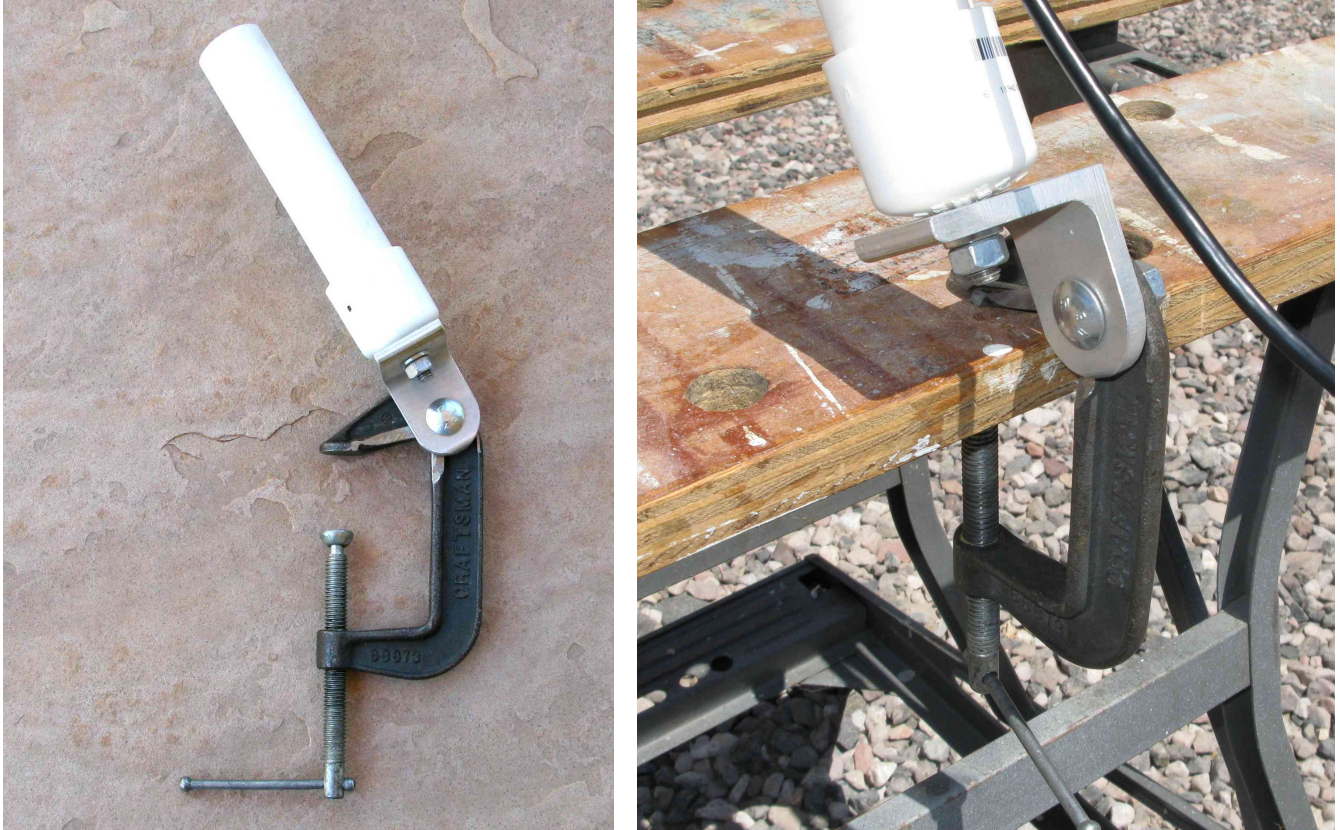


On the right is a simple device to hold the fiberglass fishing pole is shown below, or you can opt for the \$19.95 Husky® Work Light Tripod from Home depot. If your particular fiberglass pole is larger in diameter at the bottom, and will not slide into Ø1" pvc, just make it out of the next size up, Ø1 1/4" pvc pipe.

On the left is a simple device for a guyed "Jackite" pole to keep the wind from kicking out the bottom.



This is another clamping variation I made that could be used for a picnic table or apartment balcony railing. It can be adjusted for vertical, or on an angle to miss an overhang or roof eave. I used the same pvc components, a small piece of aluminum angle, and a garage sale c-clamp.



Shown below, the Tri-Band Antenna, 10' radials, above PVC holder, 17' telescoping fiberglass fishing rod, 26"(.66m) collapsed.





**Notes:**

---

---

---

---

---

---

---

---

---

---