

## A SIMPLE 2 ELEMENT QUAD FOR 2 METERS

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Here is a 2-element quad for 2m that is easy to build and does a good job. It works well for extending the range of an HT, transmitter hunting, SSB, or general use. When not in use it comes apart for storage. The SWR is quite low across the whole band without any tuning. For those who don't need detailed instructions, the critical dimensions are: driven element 82", reflector 88", spacing 13", fed through 1/4 wavelength of 75 ohm coax.

I'll describe one way to build it, and you are free to do it differently.

### PARTS LIST:

- 44" 1/2" thinwall PVC pipe
- 2 1/2" PVC 'T' connectors (slip-slip-thread)
- 1 3/4" PVC 'T' connector (slip-slip-slip)
- 1 12" long 1/2" diameter PVC nipple (threaded at both ends)
- 14" to 16" 75 ohm coax with connector (see text).
- 8' #12 or #14 ROMEX house wire, with or without ground  
(or ~16 feet of bare #8 to #14 solid wire)
- 2 1-1/2" diameter hose clamps
  
- ~4' 3/4" PVC pipe (as desired for mast)
- 1 broomstick, dowel or mop handle to fit inside mast (as desired)

1. Cut the 1/2" PVC pipe into 4 pieces each 11" long for the spreaders. Slip these into the ends of the 1/2" 'T' fittings. (Don't glue them yet.)

2. Choose one set for the reflector and mark the pipes 11" out from the centerline of the fitting. Drill a hole through the pipe at this point just large enough to pass your wire through. The holes should be at right angles to the threaded side of the 'T' connector.

3. If your wire has plastic insulation on it, you must remove it. To remove the outer sheath of ROMEX, put one end in a vice and slit it lengthwise with a sharp knife, then pull out the individual wires. To remove the insulation from a single wire, hold the knife as though you were going to whittle the wire and pull the wire across the blade, slicing off the top plastic. The rest of the insulation should pull right off.

4. Cut 89" of wire for the reflector. Measure in 7" from one end and make a right angle bend in the wire. Measure a further 22" and make another bend to form the wire into a 'J'. Pass the two ends through the holes in the reflector spreader. Make two more bends in the long end of 22" each to form a loop. Overlap the ends about 1" and check the dimensions all around - each side of the loop should be 11". I wrap some thin bare wire around the two ends to hold them while soldering them together.

Center the loop above and below the spreaders and secure the wires to keep them in place using glue, small bits of soldered wire, or simply by putting enough of a bend in the wire to keep it from slipping out of place.

5. Repeat step 4 for the driven element drilling the holes 10 1/4" out from the center of the PVC fitting, except that one spreader gets two sets of holes at 10" and 10 1/2". Start with 89" of wire again and make the first bend about 9" from the end, then 20 1/2" to the second bend. Pass the wires through the holes as before, but make sure the short end goes through one of the holes in the spreader with two sets of holes. Continue bending the square loop 20 1/2" on a side and pass the free end through the second set of holes in the spreader where you started. This becomes the feedpoint. When the last side that goes through the two sets of holes is adjusted to 20 1/2" there should be a few inches of extra wire on each end.

6. Instead of soldering the wires together, bend the end of each wire around the spreader and around itself where it enters the hole in the other side, and solder the joints. This secures the wires in place. Make sure you check the side length is 20 1/2" before soldering. Trim the wire ends.

7. The quad has a feedpoint impedance of about 110 ohms. To match this to 50 ohms requires 1/4 wavelength of 75 ohm coax. There are two basic types: RG-59 usually has a solid polyethylene dielectric with a velocity factor of 0.67. RG-6 has a foam dielectric with a velocity factor of 0.82. You can use either type, but the required lengths are different.

Before proceeding you also need to think of your antenna connector. There are standard BNC and PL-259 fittings for RG-59. If you have a piece of RG-6 with a type F connector you can get an adaptor to a BNC at Radio Shack. If you don't have a connector that fits your coax you can carefully splice it to some 50 ohm coax.

For RG-59 the 1/4 wave section will be 13" long. Or you can use a 3/4 wave section 40" long if that is more convenient.

For RG-6 the 1/4 wave section will be 16" long, or 49" for 3/4 wave.

If you don't know the velocity factor of your 75 ohm coax, use 15".

To optimize the antenna for SSB you can cut the matching section about 1" shorter than specified, but it really won't make much difference.

Allow at least 1" of extra on the cable to strip back the insulation and solder it to the feedpoint: shield to one wire, coax center to the other. An easy way to do this is to comb out the braid, split it into two bundles, and wrap each around the wire nearest to the 'T' connector, then solder the center conductor to the further wire.

8. Screw the two elements onto the ends of the PVC nipple (the boom.) The spacing between the elements should be 13" to 14".

9. To attach the antenna to the mast, cut the top half off of the 3/4" PVC 'T' connector. Lay the boom in the exposed portion of the fitting and secure it at each end with a hose clamp. This makes it easy to rotate the antenna to change the polarization.

10. Stick the mast (reinforced with the broomstick or dowel) into the free end of the 3/4" 'T' connector. To mount the antenna on a different type of mast, find some way to secure a short mast of 3/4" PVC pipe to it and stick the antenna on top.

11. Once you are happy with the antenna, weatherproof the coax connection with liquid electrical tape, hot melt glue, Coax Seal, etc. You can also glue the spreader joints.

To disassemble the antenna, just unscrew each end from the boom and the antenna will lay flat.