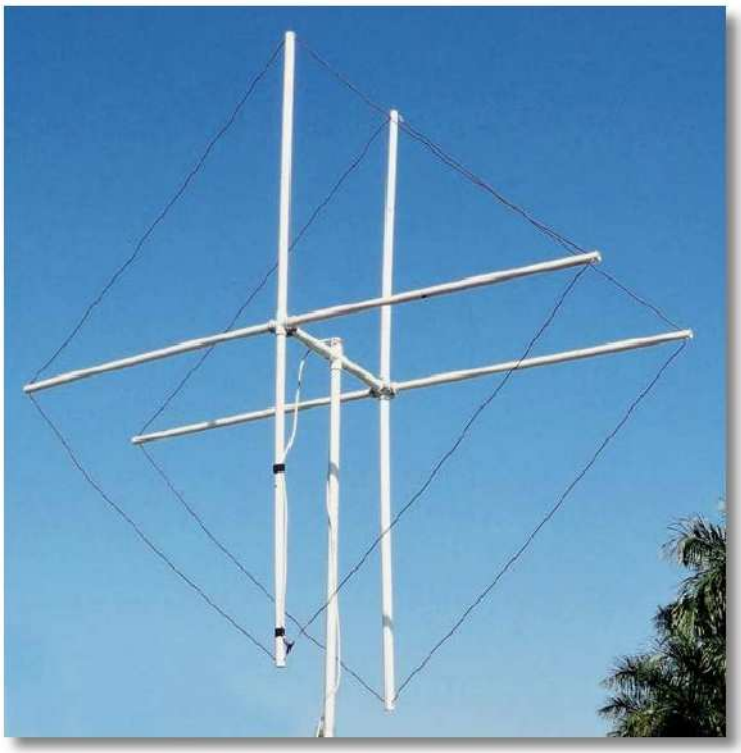
A Portable Two-Element 6 Meter Quad Antenna

Assemble or knock down this antenna in less than 5 minutes. Who says Field Day is only about HF?

Pete Rimmel, N8PR

Constructed from PVC tubing, this portable 6 meter antenna disassembles easily for storage, and is easy to assemble at an RV campground or Field Day site. I devised a unique way to lock the spreaders into the center PVC crosses using the antenna wires of the quad. This key feature allows me to tighten the wires so that they won't sag while in use, but lets me loosen them for disassembly and storage in a small space such as in my RV.



Construction

You can construct this quad from parts available at any home improvement store. The PVC dimensions are not critical, and can be within ¼ inch. The center crosses of ¾-inch pipe are compatible with 1-inch Ts that were split to create the boom connections. The inner diameter of the 1-inch T matches the outer diameter of the ¾-inch crosses with a bit of trimming or filing. This larger size PVC is more rigid and makes the antenna more stable.

I used #14 AWG stranded insulated wire for the antenna elements. For me, insulated wire is less troublesome to store in my RV, and won't snag or break while in storage.

Gathering Materials

Cut four 40-inch pieces of schedule 20 × ¾-inch PVC for the driven element spreaders, and four 41¼-inch pieces for the reflector spreaders. From a 10-foot section of schedule 20 × 1 inch PVC, cut two 11-inch pieces for the boom. Use the rest for the vertical mast.

You will also need two ¾-inch PVC crosses (these have four openings); two 1-inch PVC Ts (these have three openings, see Figure 1); one 1-inch PVC cross; and six 1¾-inch diameter stainless steel hose clamps. Cut an 18-foot, 10½-inch length of insulated #14 AWG stranded wire for the driven element and a 19-foot, 5¾-inch length for the reflector. Figure 2 shows the antenna disassembled, with the parts ready for storage.

You'll also need three 2-inch long pieces of ⅜-inch heat shrink tubing, coax sealant, black electrical tape, Velcro® or similar hook-and-loop fastener strips, and a length of 52 Ω coax to reach to your station.

Preparing the Boom

Cut two pieces of the 1-inch PVC pipe to 11 inches long. Place the 11-inch long 1-inch diameter PVC tubes into the 1-inch cross which also connects to the boom, as seen in the lead photo. The rest of the 1-inch PVC goes into the lower part of the T to form the mast.

Make a pair of "five opening fixtures" for connecting the four cross pieces to each end of the boom as follows. Make two "half-Ts" by cutting the long side of

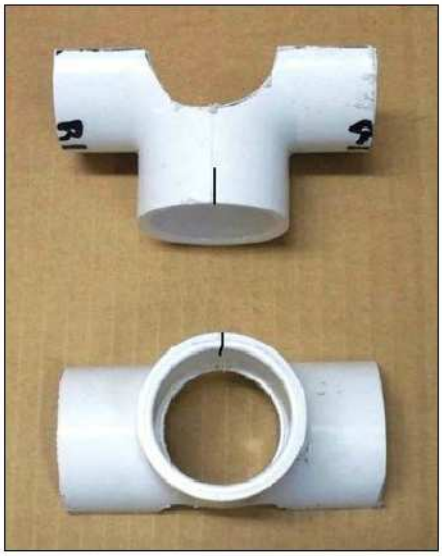


Figure 1 — Split a PVC T and file away material so that with a four-way PVC cross you have a fixture with five openings.

Figure 2 — Easy-to-stow disassembled antenna components.

a 1-inch T with a hacksaw as in Figure 1. Cut a slit in the round part of this fitting. Shape the cut area, and remove a half-circle of material using a rasp or file so that it will fit snugly over the ¾ inch cross. Use two hose clamps to fit each half-T to each PVC cross (see Figure 3). The hose clamps should pull the T snug to the smaller cross without deforming it. A third hose clamp compresses the slit and holds the element on the boom.

Making the Spreaders

Drill 5⁄64-inch holes ½ inch from the end of each of the eight spreader pieces, going through both walls of the pipe. Take care to center these holes so the wire will go straight through the center of the spreader. Cut J-shaped openings in three of the 40-inch long spreaders and all four of the 41¼-inch spreaders. Following the progression of Figure 4 from left to right, drill a second hole in each spreader at about a 30° rotation and about 1¼ inches in from the end. Again, be sure to drill straight through both walls of the pipe. Draw some guidelines on each of the seven pieces of PVC. Drill a series of holes to form an upside down J on both sides of each tube. Be sure to leave PVC in the gap between the holes on the right and the single hole on the left so that the wire can lock in two positions. Carefully "connect the dots" with a drill, and remove all the material between the holes. This forms the unique adjustable J feature of the wire guide on seven spreaders.

Assemble the Reflector

Strip 1 inch of insulation from each end of the longer #14 AWG wire (19 ft 5¾ in) and twist the stranded wire to keep it neat. Thread the wire through the eight J holes of the four 41¼-inch spreaders. Place a 2-inch piece of heat shrink tubing over one end of the wire. Overlap the two ends by 1 inch, twist and solder them together. Slide the heat shrink over the soldered connection and heat it to waterproof the connection. You now have a loop with the wire going through the four outer ends of the spreaders. Position the wire in the inner part of the J on all four spreaders.

Insert the four spreaders into one of the two ¾-inch crosses. After you seat the pieces snugly into the crosses, move the wire to the outer part of the J to tension the wire element. You might not need to tension the wire on all four spreaders. Twist the pipes so that the holes line up and the wire lies in a flat loop when assembled. Your reflector is now completed.

Assemble the Driven Element

Strip 1 inch of insulation from each end of the insulated 18 foot, 10½-inch long #14 AWG wire. Prepare a length of 52 Ω coax (RG8-X, RG-58, or RG 213) by stripping the outer jacket back about 1½ inches. Comb the braid out so that it can be separated from the center conductor and twist the braid into a single strand. Cut it to a 1-inch length. Strip ¾ inch of the insulation away from the center conductor. These dimensions contribute to the overall length of the driven element.

Figure 3 — The five-opening fixture ties the boom end to the four spreaders.

Thread the insulated #14 AWG wire through the holes in the four 40-inch spreaders. Be sure that the bare ends of the wire are near the spreader without the J cut into the end. This is where you connect the coax. Slide a 2-inch piece of shrink tube over each end of the #14 AWG wire. Carefully wrap the center conductor of the coax to one stripped end of wire and solder it. Do not overheat. Wrap the other wire around the braid of the coax and solder it in place. Slide the two pieces of shrink wrap over the soldered connections and heat them. Seal the remaining area of the coax braid with a small amount of coax sealant and cover with black tape to completely waterproof the connection (see Figure 5). Use some loops of Velcro (or black tape) to secure the coax to the PVC tubes. Assemble the driven element by placing the four spreaders into a ¾-inch cross, and place the wires in the J cuts to tension the wire and rotate so that the loop is flat.

Assembling the Antenna in the Field

It is easy to field-assemble and disassemble the antenna; see also the *QST* in Depth web

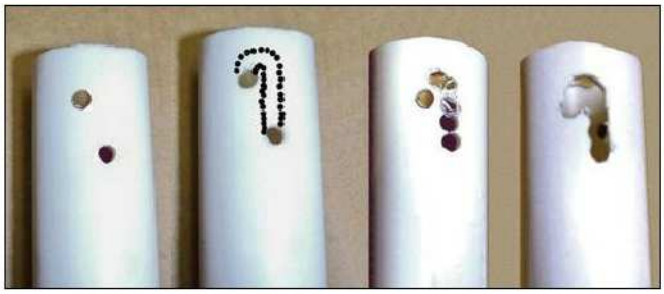


Figure 4 — Steps for making the J holes.

page.[1] Separate the two elements and lay the reflector parts on the ground. Be sure that the wire is in the long part of the J holes. Place the four elements into the cross. Move the wires into the shorter part of the J holes to tension the wire and keep the spreaders from dropping out of the cross. Slide the director onto the boom and partially tighten the hose clamp over the slit in the "half-T" to secure the element to the boom. Assemble the driven element as you did the reflector and mount it onto the boom using another hose clamp. Be sure to orient the elements in the polarization you want before tightening the hose clamps completely. Route the coax along the element and boom to the mast using Velcro loops to keep it in place.

When you take the antenna apart, leave the cross piece attached to one of the four spreaders for storage. Wrap the element wires around the four spreaders to keep them in a neat package.

[1]www.arrl.org/qst-in-depth

Figure 5 — Detail of the coax feed line connection.

Final Comments

You can easily choose the polarization you want. For vertical polarization, place the driven element so that the coax is on a horizontal spreader, and the antenna is in a "diamond" configuration. For horizontal polarization, place the diamond shape so that the coax is at the bottom of the element. You can also orient the elements for 45° polarization.

This antenna is designed to resonate at 50.1 MHz. The VSWR should be less than 1.5:1 from 50.0 to 50.6 MHz. The element spacing is designed to give a 50 Ω match.

Photos by the author.

Amateur Extra class licensee Pete Rimmel, N8PR, was first licensed in 1960 as KN8UNP in Cleveland, Ohio. He is a Life Member of ARRL and QCWA, holds DXCC #1, 10 Band DXCC, and 5 Band WAZ. Pete is President of Local Chapter #69 of QCWA and served as officer and director of the South Florida DX Association. He earned a BSChE from the University of Cincinnati, and is a retired USCG Master of Passenger Vessels. He recently retired as an NFPA Certified Marine Chemist. Pete enjoys DXing and contesting on 160 to 2 meters, satellite operation, and EME. Other hobbies include sailing, scuba diving, and folk singing. You can reach Pete at **n8pr@bellsouth.net**.

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New Products

RemoteShack Client Microphone Interface

The RemoteShack RBC-CMI-1 Client Microphone Interface works together with the RemoteShack remote base controller to provide a standard push-to-talk noise canceling microphone to control your cell phone, laptop, or tablet. It will work when making a direct-dialed call to the RemoteShack base or with any smartphone, laptop, or tablet running *Skype* over the Internet. The RBC-CMI-1 also has a speaker output for a larger portable speaker for better quality reception. It comes with a microphone and can interface to most iPhone and

Android devices via the four-pole, 3.5-mm common jack. In addition, the RBC-CMI-1 automatically "keeps alive" the link to the RemoteShack host controller. Price: $249.95. For more information, visit **www.mfjenterprises.com**.

HamCall Adds Call Sign Listings from 1921

Buckmaster's HamCall call sign database now includes all 10,796 US call signs from the year 1921. Included are various pioneers such as 1AF (Harvard Wireless Club), 1AW (H.P. Maxim), and 6BB (University of California Radio Club.) All 1921 data is searchable by name, street, city, state, and by specifying the call sign and year (for example, 1AW:1921). These 1921 archives are in addition to the 1954, 1960, 1969, 1983, 1995, 2000, 2005, 2010, and current data already available on HamCall. Price: HamCall DVD with more than 9.8 million call signs, $50, including 6 months of updates and **HamCall.net** website access, or $80 for 12 months of updates and **HamCall.net** access. For more information, visit **hamcall.net**.

Lightweight Antenna Tuner from SOTAbeams

The Hi-Tee Tuner from SOTAbeams has been optimized for portable operation, but could be used in home stations as well. It uses an air-core coil and includes space on the front to fill in the settings for each band. The tuner weighs 5.3 oz, covers 60 – 10 meters, and is rated for up to 20 W. Price: about $68 (without tax for US/Canada). For more information and ordering details, visit **www.sotabeams.co.uk**.