

The 2 meter Hentenna

(No Tuning Required!)

While browsing through my new copy of Simple and Fun Antennas for Hams one day in the Spring of 2003, I discovered an interesting looking design, with an interesting name - the Hentenna. The versions described were made of wire and cut for 6 meters, although it was suggested that the design could be used on other bands as well. I was looking for a 2 meter antenna to use for a second rig, and I thought I could adapt this design to 2 meters easily.

Some Hentenna Background

The Hentenna is a loop style antenna developed by Mr. Tadashi Okubo JH1FCZ, Mr. Someya, JE1DEU and others in Japan in the 70's. It was first described in the US in a Feb 1982 QST article by Koji Sugihara, JJ1UMS and Shirow Kinashita, JF6DEA/KE1EO wrote about it in the ARRL Antenna Compendium Vol. 5.

The gain is approx. equal to a 3 element tri-bander, JH1FCZ reported 5.1 dBd in 1972, yet it is small compared to a beam.



It looked like the type of antenna I wanted to try on 2 meters, small and with some gain. However it also looked like it was a little complex to build for what I had in mind.

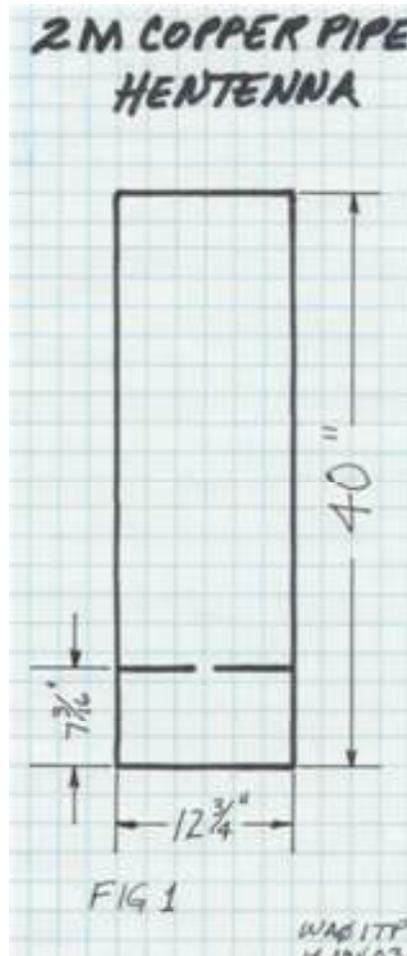
DESIGN GOALS

*I wanted it to be very easy to build, broad banded and inexpensive. **All good ham radio attributes.*** It looked like a good candidate for a “plumbers delight” copper pipe project. A major consideration was to build it so it required no tuning of the feed point. So I scaled the dimensions for 2 meters and began to experiment.

Several prototypes were constructed of ½” copper water pipe and fittings purchased at the local hardware store, empirically arriving at the final dimensions below.

BUILDING IT

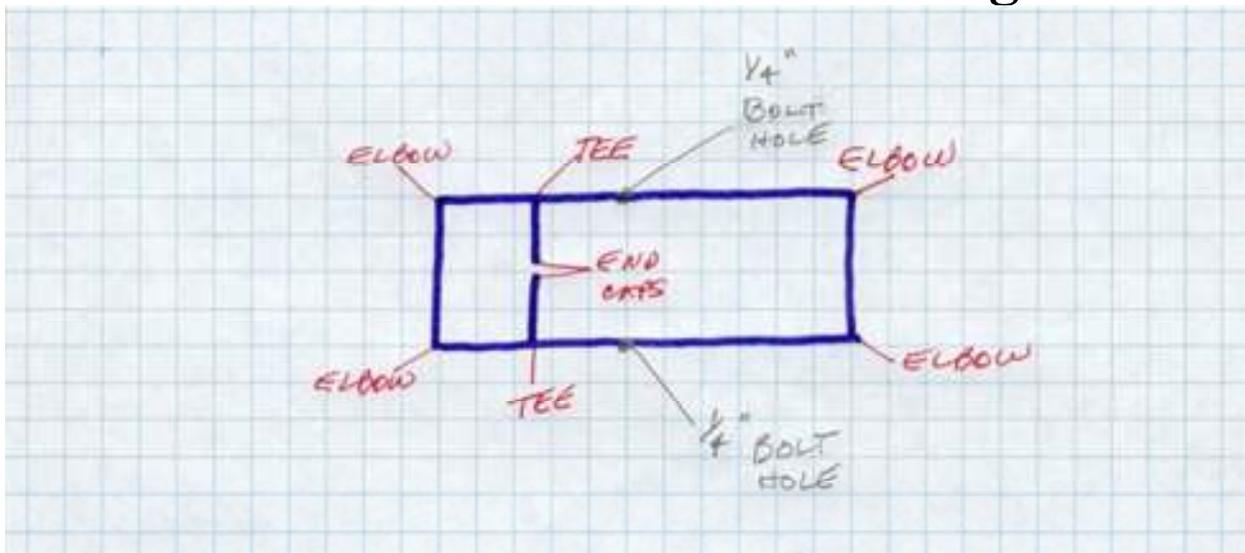
I recommend building the ½” copper pipe 2 meter Hentenna to the following dimensions:



Overall length = 40 inches Overall width = 12 3/4” Feed point = 7 3/16” to center line of T connector.

You'll need one 10' piece of ½" copper pipe, four right angle elbows, two tee's, and two end caps from the hardware store, total cost about \$20. With the dimensions below you can just jam it all together, apply the heat and solder and it will work just fine.

Or you can be a little fussier and adjust the dimensions perfectly before soldering. I used a tubing type cutter; it's much easier and more precise than a hacksaw. Use a propane torch and apply the heat to the fittings so the solder wicks into the joint, sometimes referred to as "sweat soldering".



Cut the pipe EXACTLY as follows:

2 pieces 31 13/16" for the long side pieces above the Tee's

2 pieces 6 1/16" for the short side pieces below the Tee's

2 pieces 11 1/2" for the two end pieces

2 pieces 5" for the feed points.

Use lead/tin rosin core solder, and shine up the ends of the pipe and the insides of the fittings before soldering. I just laid it out on the garage floor to keep it flat and applied the heat. *Be sure to wear safety goggles since concrete may "pop off" little pieces when overheated.*

The caps go on the end of the feed tubes and the distance between them will be around 3/4". Solder the coax braid to one cap and the inner conductor to the other; just tack them on, ugly style. Another option is to use hose clamps to secure the coax to each cap. *Just remember to use plenty of liquid electrical tape to keep the weather out of your coax!* There's no tuning involved; the position of the tees takes care of it for you!

INSTALLING IT

Here are several things to consider when installing this antenna.

1. *Use a non-conductor for the mast.* I used 1 1/4" schedule 40 PVC pipe.
2. For the vertically polarized version, tape or cable tie the coax to the middle of the end piece nearest the feed point, NOT the mast. Let it hang over the end some then attach it to the mast below the antenna. Side mounting the antenna may be a better option.
3. *Use non-conducting hardware to attach it to the mast.* Steel or brass hardware has a really detrimental effect on the match. I've used nylon bolts, tape, cable ties, and wood dowels.
4. For a vertically polarized signal for repeater use, the 40" dimension must be horizontal to the Earth. The signal is perpendicular to the axis of the feedline. See the picture on the right.
5. For a horizontally polarized signal for ssb, the 40" dimension must be vertical to the Earth. See the picture directly below.

The swr will be close to 1.0 at 146, and about 1.3 at both 144 and 148. The 2:1 bandwidth is amazing, about 10 MHz, and it's not a dummy load as some super broad antennas can be.

PERFORMANCE

On the air performance has been gratifying. WAØMWW and I conducted a performance test between our qth's, we're 12 miles apart. We used 146.52 simplex and adjusting my power levels and his antenna orientations to get a noisy signal from me. The Hentenna proved superior to a 5/8-wave ground plane at the same height, 15' up. This was a "switch the coax" comparison so as to minimize propagation differences between tests. We evaluated both vertical and horizontal polarization and the Hentenna signal was better in all cases, sometimes by as much as two S units.

The antenna does act like a beam, but is bidirectional.

I can easily bring up 2 repeaters, both about 20 miles distant off the sides of the antenna, using only 5 watts. So the pattern isn't too sharp for general use. WAØMWW and I have also used a repeater that is 45 miles away with 50 watts; a little noisy but very Q5 copy.

Original document found on the internet at: <http://www.wa0itp.com/hentenna.html>

Compiled and converted to .pdf format by Earl Oaks - N4ZFA on 7-27-2012