

Recycled TV Beam to 2 Meters for \$2

Use an old TV antenna for this inexpensive, two-hour project.

by Marty Gammel KAØNAN

Last spring I was asked to supply a 2 meter beam for our local radio club's Field Day satellite contacts. Not having an extra beam, I found an old TV antenna someone had given me. There were many elements and the square boom was 92" long, perfect for the 11 dB gain needed.

Construction

First, I had to clean the boom of all elements and hardware. To do this, I used an electric drill to remove the rivets. Then I used a Scotch-Brite pad to clean any rust or

corrosion from the now empty boom and the removed aluminum elements.

I looked in a few antenna books for dimensions, settling on closely-spaced dimensions based on the NBS standard yagi design. There are many good books for finding workable spacing and element lengths. Using the *ARRL Antenna Handbook*, I developed the dimensions in Table 1 after reworking the spacing guidelines to come up with a seven-element beam that could be used in either vertical or horizontal polarization.

These measurements and spacing should give, in theory, over 11 dB gain, with a front-to-back ratio of 20-25 dB and good side rejection. Bandwidth for 1.5 SWR edges goes from 144.5 MHz to 147.750 MHz with 1.01 SWR at 146.250 to 146.5 MHz. If the beam is to be dedicated to SSB operation only, increase element lengths by 3/16" per MHz to shift the center frequency of operation down toward the bottom of the band.

There should be enough material to make all the elements from the material that you

strip off the boom. With all the material I had left, all I had to do was start measuring, marking and cutting. Take great care to drill all the holes square. The elements may be mounted either all on the boom or all through the boom. Mounting the elements through the boom will make a stronger, long-lasting beam, with less chance of elements working loose in the wind. I used stainless steel screws for mounting all of the elements.

Matching

You will need to make a matching network for this yagi. I chose a gamma match made from a piece of 3/8" aluminum tubing 7" long with a piece of RG-8 coax 7.75" long. I used the regular RG-8 coax; if you use RG-8 poly-foam coax you may need to change the length of coax for the gamma match.

To duplicate my gamma match, find a rubber or plastic cap that fits tightly over the end of the gamma tube (see Photo C). Strip the outer jacket and shield from the RG-8

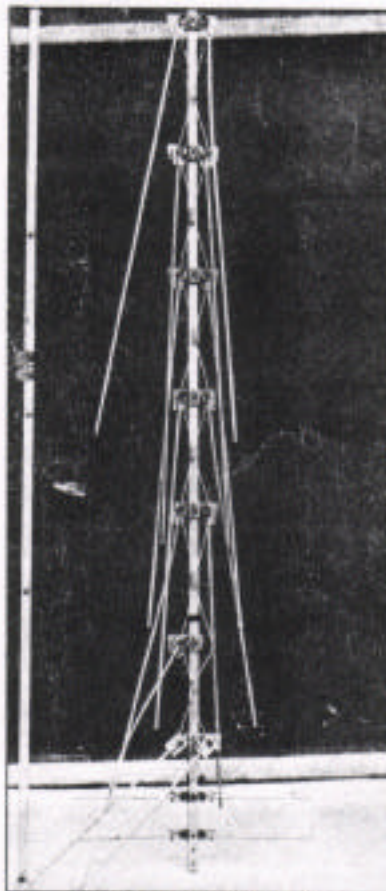


Photo A. The raw materials.

Table 1.	
Reflector length 40"	Spacing to driven element 15.75"
Driven element length 38.125"	Spacing to 1st director 11"
1st director length 36.875"	Spacing to 2nd director 15.25"
2nd director length 36.75"	Spacing to 3rd director 15.25"
3rd director length 36.25"	Spacing to 4th director 15.25"
4th director length 35.875"	Spacing to 5th director 15.25"
5th director length 35.675"	

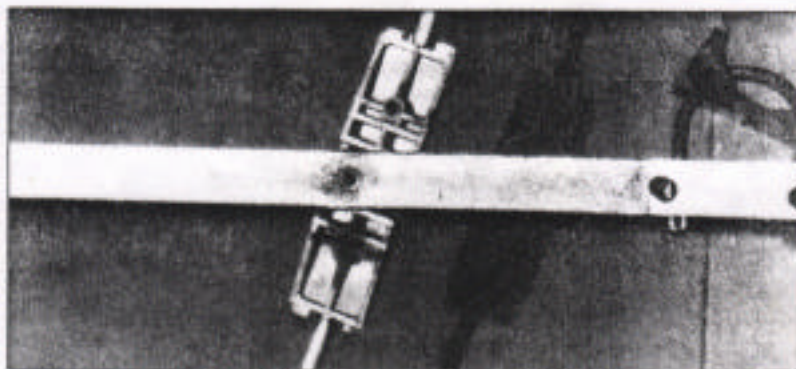


Photo B. Drilling out rivets to clean off the boom.

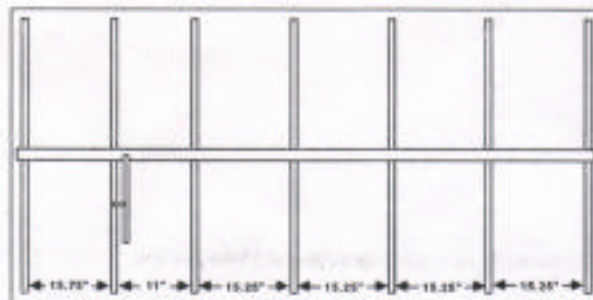


Figure 1. KAONAN's 7-element 2 meter beam.

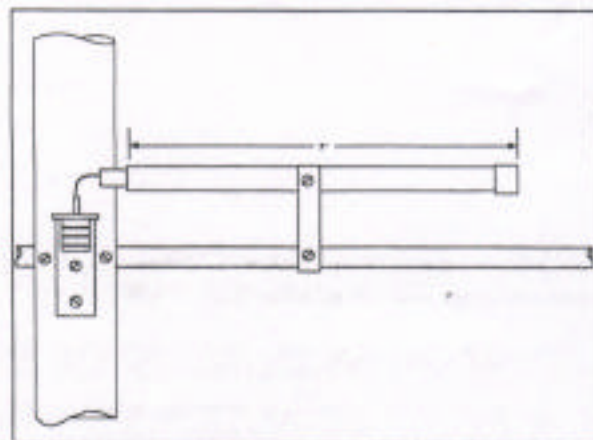


Figure 2. Gamma detail.

section of coax. Mount the center conductor and dielectric with a 1/2"-wide strip of aluminum or copper formed around the middle of the 3/8" tubing (see Photos C and D). Then mount an SO-239 panel mount connector to the boom with a piece of aluminum or copper perforated strapping. I was lucky enough to have some copper pipe hanger straps in my junk box to use for this.

Matching a gamma is fairly easy once you have the beam assembled. Mount the completed antenna on the mast about 7 to 8 feet above the ground. Set your radio to the center frequency that you designed for, place an SWR bridge between the radio and the antenna, then apply low power for your test transmission. Carefully note the SWR reading and slide the gamma in or out of the



Photo E. The completed beam.



Photo C. Gamma parts.



Photo D. View of the gamma.

gamma tube until you find the best match. Tighten the gamma to the driven element and you will be ready to install the antenna permanently.

Elements mounted out of alignment will distort the pattern and reduce the gain of the antenna.

Decide if you are going to mount the beam vertically or horizontally before drilling the element holes so that you can have the holes for clamping the boom to your mast in the proper plane. When the beam is to be vertical, you need to use a non-conducting mast to avoid detuning the beam and skewing the pattern.

I hope you enjoy using this beam and make many contacts with it. This project should take only a couple of hours from start to finish, once you have all the materials on hand.

Many thanks to John Berglund KØUBA for his help in editing this article. **71**

Builder's Notes

A 1/4" drill bit should work well for drilling out the rivets holding the old elements to the boom. If you can get more than one old TV antenna to use as an element source, grab it—you can always use the extra materials for your next antenna project. When drilling the holes for elements, be sure that the elements fit snugly to help maintain squareness with the boom. You can cut the elements to length with a hacksaw, but file the rough-cut end smooth to ease the assembly of the beam. For the mounting screw holes I used a 1/16" drill bit; the screws should fit snugly.

Take your time when drilling and installing the elements to make sure that they are all centered and square to the boom.

Parts List

- Old TV antennas
- Electric drill or drill press
- 1/4" drill bit
- 1/16" drill bit
- Tape measure
- SO-239 panel mount fitting
- 1/2"-wide metal for gamma hanger
- Stainless steel screws (3/16" #4 self-tapping)
- RG-8 coax (short piece)
- Soldering iron
- Screwdriver
- Hacksaw
- Metal file
- Scotch-Brite pad
- 7" piece of 3/8" aluminum tubing
- Rubber or plastic cap for the gamma
- Marking pen or scribe (to mark measurements on metal)