

TV TO 2-METER ANTENNA CONVERSION

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As a very new ham, licensed for just a month, I found the idea of building a 2-meter antenna rather intimidating. However, my XYM (Ex-Young-Man) said that if I wanted one, it was up to me to build it. Thus challenged, I set to work.

I had originally planned a simple three-element beam, but because I find it impossible to keep anything simple, the antenna grew to five elements before I was out of the planning stage. It's an amazingly simple antenna to build — even for a rookie. All you need is three free hours, a scavenged TV antenna, some stainless steel hardware (nuts, bolts, flat and lockwashers, and two solder lugs), 7 feet of RG-58/U coax, a PL-259 coax connector, and a few strips of flat metal or wire (for the beta match).

This is also an inexpensive antenna to build, though the actual cost will depend on your scavenging ability. In my case, it only cost me \$3.00 for some hardware I couldn't find in my husband's junkboxes. I garnered my TV antenna by climbing up on our shed and unbolting an unused antenna abandoned by the previous owners. My husband realized he had created a monster when I dragged it into the dining room to begin work on my creation! The fruits of my labor are shown in **Photo A**.

Selecting the antenna

You can use almost any TV antenna of the Yagi or log-periodic type, provided that it's in fair-to-good condition. Insulate the driven element from the boom. Don't use a folded dipole without a matching transformer.

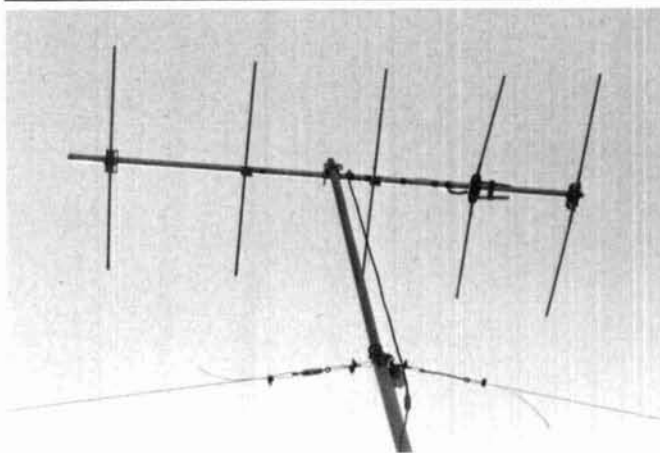
Make sure the TV antenna you choose has at least 71" of boom. Any excess length may be either left alone or cut off; it makes no difference in the performance of your antenna. You'll need to salvage five elements of about 40" each for the elements of your 2-meter antenna.

Disassembling the antenna

Once you've rounded up the TV antenna, the next step is to take it apart. Before you start taking the elements off the boom, look at **Figure 1**. It shows you the finished lengths of the elements and their spacing on the antenna. If possible, leave the first element (the longest one) of your TV antenna in place. This becomes the reflector of your antenna. Simply cut off the ends of the element to obtain the desired length (39" tip to tip). It doesn't matter if the element is attached to the boom with a metal bracket; all the elements except the driven element are grounded to the boom, anyway.

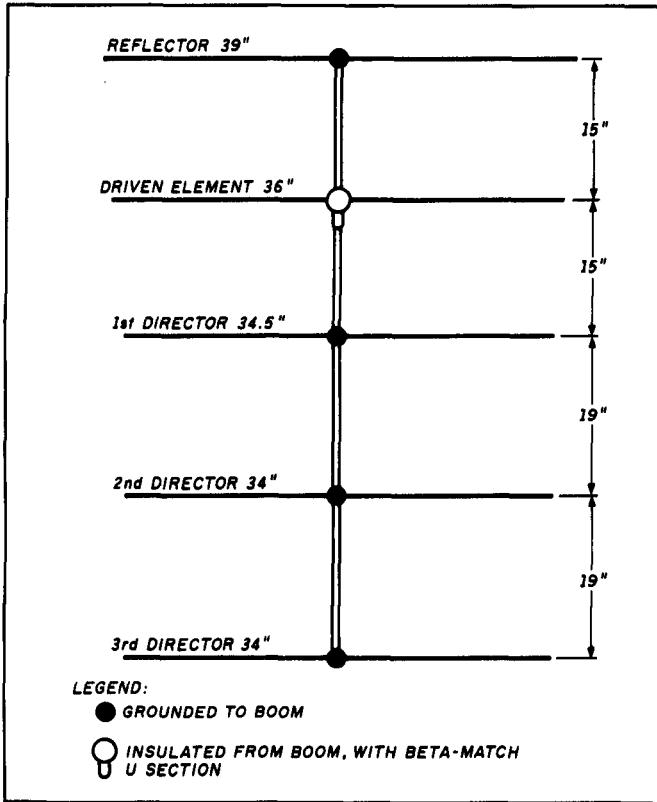
Now remove the remaining elements from the TV antenna. Save all the brackets and hardware that you can and reuse it where possible during reassembly. You may have to drill out rivets to disassemble the TV antenna. Be careful not to damage the brackets when you do this, as they are hard to find and quite expensive.

PHOTO A



Completed 2-meter antenna. (Dimensions shown are for 146.50 MHz.)

FIGURE 1



Driven element details.

Assembling the antenna

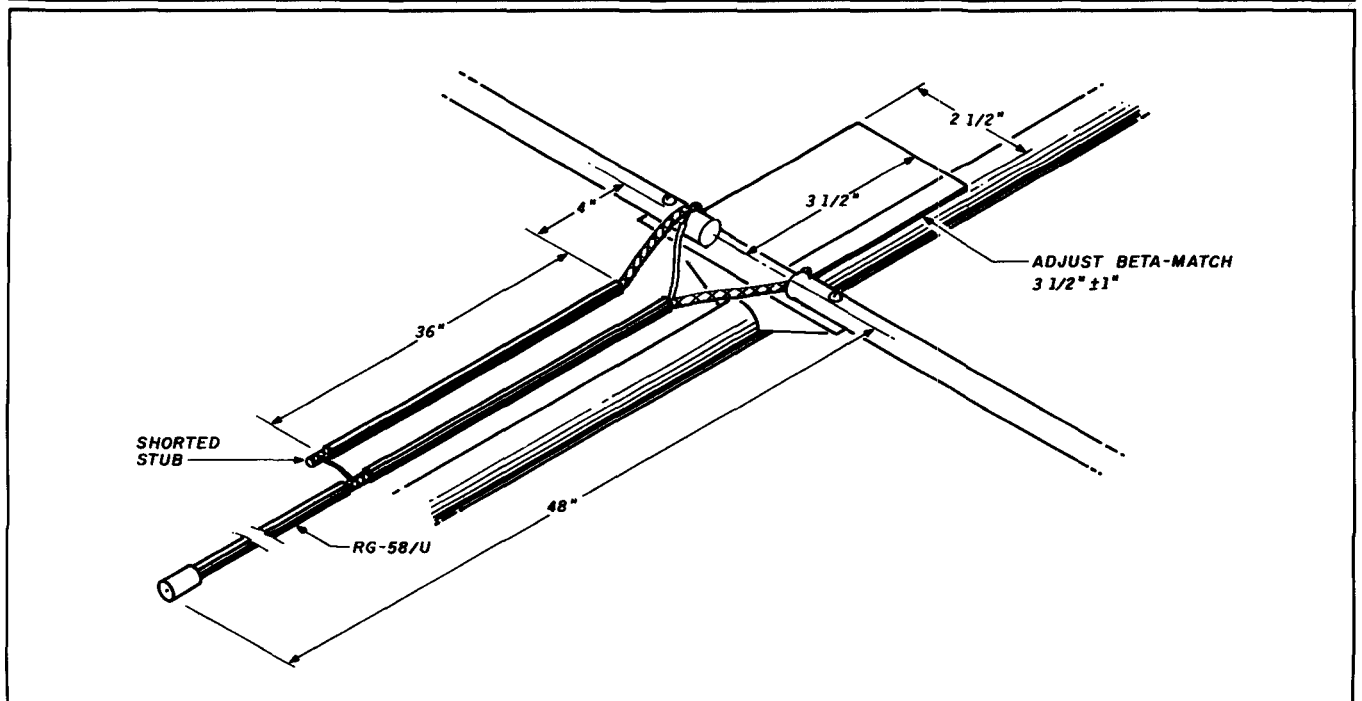
You now have a pile of salvaged elements and hardware, and a boom with one element attached. So far, so good. You're ready to put everything back together. If possible, use stainless steel hardware when reassembling your antenna; it's much more wear and corrosion resistant.

The next element, the driven element, must be insulated from the boom as it is "hot." The TV antenna I used had plastic brackets attaching three of the elements, so I simply used one of those. If your antenna doesn't have any plastic brackets, rummage in the junkbox or make one out of a piece of plastic or Lucite™. Measure 15" along the boom from the center of the reflector and drill a hole through the boom. Attach the plastic bracket to the boom, and any two element pieces to the bracket, with long stainless steel bolts, nuts, and lockwashers. Include two no. 10 stainless steel solder lugs when you affix the driven element, and tighten this piece just a bit for now. The solder lugs are used for connecting the coax line later. The beta match will also be attached at this point. Now cut this element to measure 36" total, tip to tip.

The last three elements — the first, second, and third directors — are virtually identical. Refer to **Figure 1** for spacing and element lengths. Simply drill a hole through the boom and mount a piece of element with stainless steel hardware and scavenged metal brackets. Then trim the elements to the correct lengths.

I think a few words are called for here regarding the accuracy of your measurements. Relax! Precision to the second and third decimal points isn't necessary, though the formulas in most antenna handbooks would seem to indicate

FIGURE 2



Two-meter antenna made from salvaged TV antenna, assembled and ready to roll.

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otherwise. Stay as close as you can to the recommended lengths, but remember that a slight variance of 1/8" or so here or there isn't going to ruin your antenna. After I had cut and attached all the elements, I discovered that my old and frayed tape measure gave a slightly different reading each time I measured the same piece of metal. My husband, responding to the wails of distress emanating from the dining room, assured this panic-stricken rookie that everything would be okay — but I didn't really believe him at this point.

Matching network

The last order of business is the construction of the beta match and coaxial balun shown in Figure 2. The beta match is nothing more than a U-shaped conductor bridging the gap across the driven element. I used some flat pieces of metal 1/2" wide by 1/8" thick scavenged from the TV antenna and secured in a U shape 2-1/2" wide by 3-1/2" long. However you make the beta match, be sure that you can adjust its length (from 2-1/2" to 4-1/2" overall) for the best VSWR.

Now construct the coaxial balun as shown in Figure 2. Attach a PL-259 connector to one end of a 4' length of RG-58/U coax. At the other end of this 4' length of coax, separate about 4" of shield and center conductor. Measure back 36" from the point where the shield and center conductor divide, and expose about an inch of the shield by removing the outer insulation all the way around the coax. Cut another 36" piece of coax; solder one end of this to the exposed shield of the feedline and the other end to the center conductor (yes, center conductor!) of the feedline. Cover all solder joints, braid, and the center conductor with tape or heatshrink tubing to keep moisture out and to keep the sun from cracking the exposed center insulation. Attach this completed feedline to the solder lugs on the driven element, tighten the hardware, and tape the cable securely to the boom. I know this sounds like one big short circuit, but it works!

Adjusting the antenna

Now it's time to test your craftsmanship. Attach the feedline from your station to the PL-259 connector on the antenna feedline and check the VSWR. Through some blessed combination of skill and beginner's luck, my antenna came up at 1.2:1 VSWR at 146.97 MHz with very distinct front-to-back ratio the first time I tried it. (My XYM wanted to tinker with it, but I threatened him with bodily harm!) If you're not as fortunate, use the following steps to adjust the antenna:

- Adjust the driven element length for the lowest VSWR at your preferred operating frequency.
- Adjust the length of the U-shaped beta match until the VSWR at this frequency is minimum. You should have no trouble bringing it below 1.5:1.
- If you are a purist, repeat the two steps above, as there may be some iteration.

Summary

Mount your antenna any way you prefer. Now fire up the rig and have some fun! This antenna gives excellent performance, is lightweight, rugged, and has survived three Navy moves. It was a great confidence-building project for a rookie ham. **hr**

BIBLIOGRAPHY

1. The ARRL Antenna Book, 14th Edition, ARRL, Newington, Connecticut, 1982, pages 11-5 to 11-9.