economical beam for ten meters

Improving the "Wonderbar" antenna for effective DX work

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You've heard this old saw many times, but it bears repeating: without a beam antenna, it's futile to compete seriously for S/X. I was listening to everybody working all the goodies on ten meters recently and recalled the antenna I used in the mid-fifties during the last sunspot cycle peak. It was a simple piece of plumbing that allowed you to get on ten meters in a hurry. In its basic form, it's called a Wonderbar, or bow-tie antenna. Why not try it again, only this time crank some gain into it?

For those who may have forgotten, or who have recently joined the ham fraternity, I'll describe the procedure I used to adapt the original design[1] into an inexpensive beam for ten meters.

construction

The main source of material was an old biconical tv antenna. My beam was modeled after the original Wonderbar design using these materials and some hardware from my junkbox. The basic Wonderbar antenna that resulted in shown in **fig. 1.**

I dismantled the tv antenna completely. I cut two 30-inch crossbars from the old elements. Each end of the crossbar was flattened and drilled to accept 3/16-inch machine screws (I used a 13/64-inch drill). Next, the crossbars were attached to the open ends of each of the two elements. This forms a couple of isosceles triangles, or wing-shaped elements.

I used a handy piece of 3/4-inch pine board, 13-inches long by 10-inches wide, for the base. Any material can be used that's sufficiently rigid to hold the assembly. Standoff insulators, female coax connectors, and a length of 5/8-inch OD heavy-wall plastic tubing (for spacers) were produced from my junkbox.

assembly

Place the wing-shaped elements on the floor over the base. Space them about three inches apart. Drill six 13/64-inch holes **(fig. 1)** through the elements and completely through the base. (This will ensure alignment during final assembly.) Mount the female coax receptacle as

shown near the top of the base. Place the standoff insulators and spacers as shown, and assemble them loosely with 3/16-inch machine screws. Don't tighten the screws on the standoff insulator where the coil will be attached.

the loading coil

If you don't have a B&W 3013 miniductor handy, it's easy to wind your own coil. I used what was available: number 16 insulated solid copper wire. Considerable latitude can be used here. Just make sure the coil is sufficiently rigid to be self supporting. I wound my loading coil around a 1-inch dowel, using 12 turns, close spaced. Then I removed the dowel and stretched the coil until it was about 3 inches long. Next I wound 2 turns of number 12 solid copper wire around a 1-3/4-inch form for the primary. This coil was removed from the form and slipped over the loading coil.

Attach the loading coil to the elements by securing each lead to the screws at the apex of the V formed by each element. Place a solder lug between the head of the screw and the element. Now solder the primary coil leads to the coax connector. Tighten all machine screws.

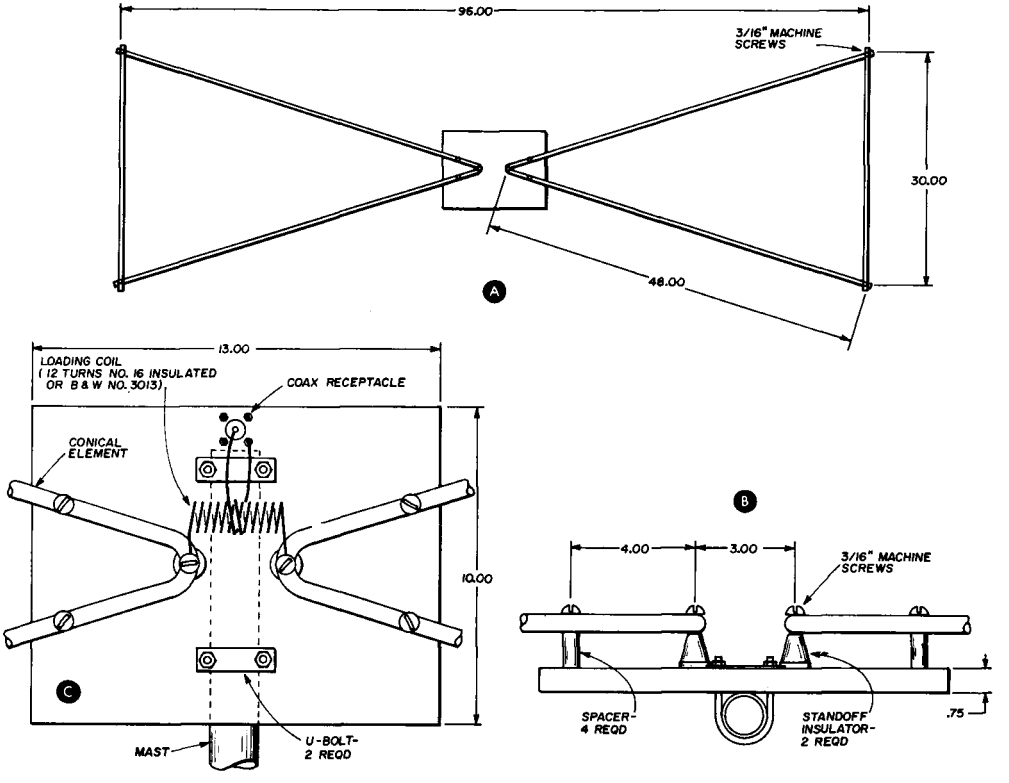

fig. 1. Dimensions, A, and mounting details, B, of the Wonderbar beam driven element. Mounting base is a simple pine board.

mast mount

Four holes are drilled to accept U bolts, which will secure the antenna to the mast. I used 5/16-inch holes, positioned over the centerline of the base. The first two were immediately below the coax connector, and the second two were about one-half inch from the bottom of the base. Use your own ideas here to fit your available hardware.

preliminary tests

I attached a ten-foot piece of 1-1/4-inch conduit to my antenna for initial tune-up. I raised this assembly, with a piece of RG-8/U coax attached, in a vertical position and firmly lashed it to a picnic table. I found the best loading by tapping down on the loading coil; 10-1/2 turns seemed to be optimum. I made a permanent connection at this point by soldering. The lowest standing wave ratio (about 1.4:1) occurred at about 28.95 MHz.

With 65 watts input, I made contacts with two WØ stations, and got 5-9 plus reports. The next day, I worked a KV4 and a couple of G's. This simple antenna did indeed put out a good signal. But I wanted it to put out a better signal, so I added a reflector.

the wonderbar beam

At this point you can enjoy this inexpensive antenna without further embellishments. It will provide a good signal on ten meters, it doesn't cost much, and you'll work some DX. However, if you like to experiment a little, as I do, you'll want to improve its performance. A simple reflector placed behind the Wonderbar antenna will produce from 3 to 5 dB gain over a reference dipole. This will effectively double your radiated power over the Wonderbar alone.

"I'll go over in a couple of days and see how the beam held up..."

Handbook data showed that the shortest spacing for a reflector to improve performance was 0.15 wavelength (a little more than 4 feet on ten meters). This meant I could use the boom from the old tv antenna by merely adding a short extension. I decided to depart a bit from convention, for ease of assembly, and attached the boom and reflector immediately below the point where the Wonderbar was attached.

I made the boom extension about 5 inches longer than required. Then I put a bend of approximately 110 degrees radius in the extension about 4 inches from the end. I drilled two holes through the shorter leg of the boom extension and through the mast. This made an easy means of attachment. You could use the more conventional method of attaching the driven element and reflector at opposite ends of a one-piece boom. It would look prettier, perhaps, but wouldn't work any better. I wanted to use the materials on hand, so I used a short extension on the old tv boom.

the reflector

This element is simplicity itself. I cut my reflector from the remaining pieces of the old tv antenna tubing. It is 98 inches long **(fig. 2)**. I used a pair of sheet metal cross braces I'd stripped previously from the tv antenna boom to attach the reflector.

how far, wonderbar?

That's it. A simple, low-cost beam antenna made from materials on hand. The whole thing cost less than ten dollars. Results; I've worked fifteen different countries, many of them several times, including a ZS6. All this was done with a 60-watt a-m transmitter and my Wonderbar beam only twenty feet above ground.

references

1. E.T. Bishop, K60FM, "The Wonderbar Antenna," QST, November, 1956.

ham radio