Dr. Ken Jenkins WB6MMV/7
1801 Cedar Street
Newberg OR 97132

Triband Dual Delta

— here's an attic antenna that works

One of the nicest things about amateur radio is that one often can obtain excellent performance from simple antennas. I recently moved into a new house which depleted my bank account beyond my wildest nightmares. I had hoped to be able to find a triband beam antenna that would fit my financial situation, but it did not take long for reality to ruin my dreams of a cheap, effective beam antenna. Consequently, I decided to homebrew the most effective triband antenna that I could for the least amount of money.

After much searching and experimenting, the type of antenna I finally settled on covered 20, 15, and 10 meters, and was cheap, reasonably effective, and, as a bonus, was completely hidden from view. The antenna I chose was a delta-loop antenna, using the driven element of a delta-loop beam mounted horizontally *inside* the attic of my new house.

Construction

The formula for the length of the driven element of a delta loop is $1005/f_{MHz}$. Since I was bound to need some extra wire at the ends, I cut the antenna to 71 feet overall in length for a 20-meter loop. I mounted the antenna to the rafters inside the attic, using screw hooks and ceramic insulators to hold the wire at three corners.

I used #14 solid, Formvar-insulated wire simply because it was cheap and available; you could use smaller wire if cost considerations were important, however. Try to select a section of the attic that doesn't have a lot of metal ductwork or plumbing lines that could detract from the performance of the delta loop. Also, make sure that the wire isn't touching any wood or metal inside the attic.

I initially fed the antenna with a random length of 50-Ohm coaxial cable and a 1:1 balun. However, I found out that the swr was substantially higher than I wished. I measured the antenna with a noise bridge and found out that an impedance-matching device would be necessary to use the antenna on 20 meters. Rather than changing the length of the antenna, using a length of 72-Ohm coaxial cable to match the impedance, or using a gamma match, I chose to substitute a 4:1 balun for the 1:1 balun already on the antenna. I was rewarded with an swr of 1.3 to 1 across almost all of the 20-meter band. The broadband characteristics of the antenna were helpful with respect to swr, although overall efficiency suffered due to the relatively low Q. As a bonus, the antenna worked very well on the entire 10-meter band also, with an swr of 1.8 to 1 on the entire band.

For a total investment of $25, I had a 20- and 10-meter antenna that had a theoretical gain of 2 dB over a dipole and, best of all, it was completely invisible to the neighbors.

Not happy with missing out on the action on 15 meters, however, I added a second delta loop inside

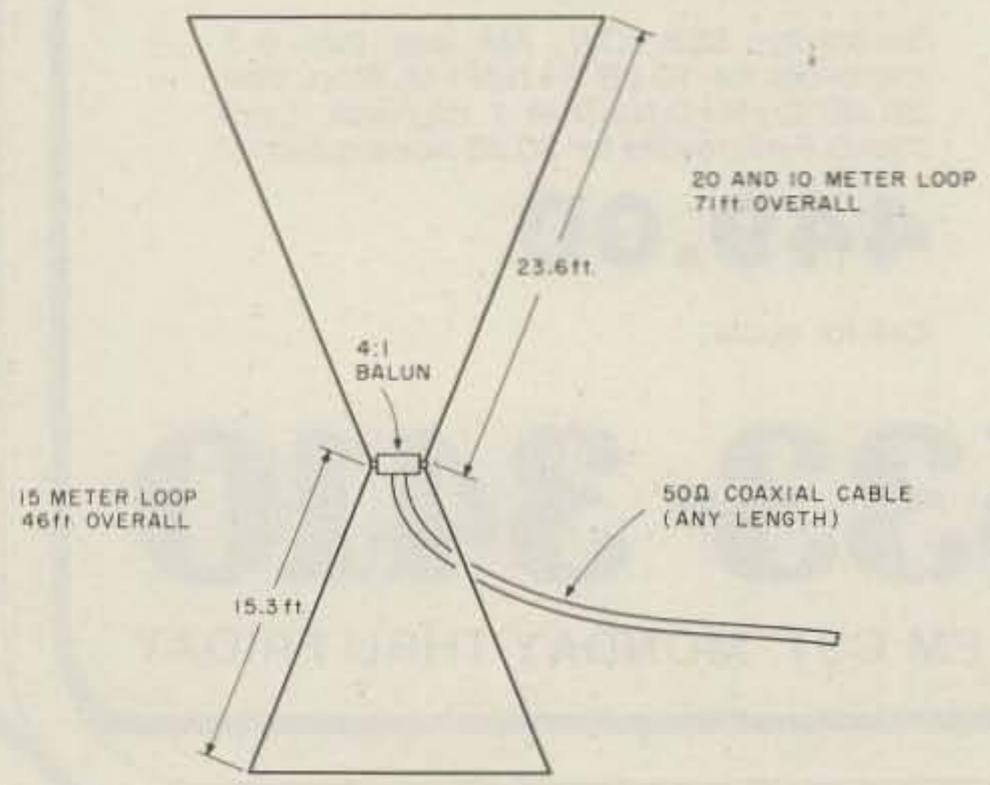

Fig. 1. Top view of the dual delta loop.

the first loop. The second loop was cut to 46 feet and also was laid out in the form of an equilateral triangle. The 15-meter loop was soldered to the 4:1 balun at the same point that the 20- and 10-meter loop was soldered.

Needless to say, adding the 15-meter loop increased the swr of the 20- and 10-meter loop to over 2.5 to 1 on both bands. Since I wasn't ready to give up yet, I took the 15-meter loop and rotated it 180 degrees so that the balun was now at the apex of two delta loops (see Fig. 1). This variation was a winner, with the swr on 20 and 10 returning to its original values and the 15-meter loop giving a 2.1 to 1 swr across the entire band.

Performance

While I would like to say that I worked some exotic DX while running barefoot with 3 Watts on sideband, I can't say that the performance of my dual delta loop is equal to that of a beam, but it will provide a bit better performance than a longwire or a dipole, and with an acceptable swr on 20, 15, and 10 meters.

The antenna appears to be omnidirectional, although ductwork inside the attic might affect the radiation pattern somewhat. Needless to say, mounting the dual delta loop outside and much higher than the 10-foot height of mine will provide some increase in performance.

The low price ($30) and unobtrusive nature of the dual delta loop make it attractive to hams who are faced with restrictive covenants regarding towers and antennas. Try the dual delta loop; you can't beat it for performance, price, and simplicity. It really beats a dipole! ■