

More Really Cheap Antennas

If you enjoyed Kent's August column on cheap Yagis (and many of you did), you'll love this month's installment, with dimensions for "rolling your own" on 2 meters and 222 MHz.

We've been discussing how to make a high-performance Yagi antenna out of readily available materials and how to do it simply and cheaply. In the last column, we went over the background of these really cheap Yagis; this month, we'll talk about 144-MHz and 222-MHz versions of the Cheap Yagi.

Self-Matching Antennas

The simplified feed uses the structure of the antenna itself for impedance matching. So the design started with the driven element and the other elements were built around it. Impedance matching is accomplished through the loading effect of the other elements, so Gamma, Delta, T, and other impedance matching methods and their complex parts are not needed. Design compromises for the feed impedance, asymmetrical feed, simple measurements, wide bandwidth, the ability to grow with the same spacing, and trade offs for a very clean pattern cost about $1/2$ dB of gain. But you can build these antennas for about \$5! When it comes to dBs per dollar, you'll find these designs hard to beat!

The antennas were designed with YagiMax, tweaked in NEC, and the driven element experimentally determined on the antenna range. Typically, the three-element version measures 8 dBi gain with a little over 20-dB Front-to-Back ratio. The four-element Yagi measures 9 dBi with 30-dB Front-to-Back, and the six-element beam gives you 11 dBi gain with 35 dB Front-to-Back. These figures are the same for both the 2-meter and the 222-MHz versions.

You can go longer than six elements—W5UN has had good luck with 16-foot-

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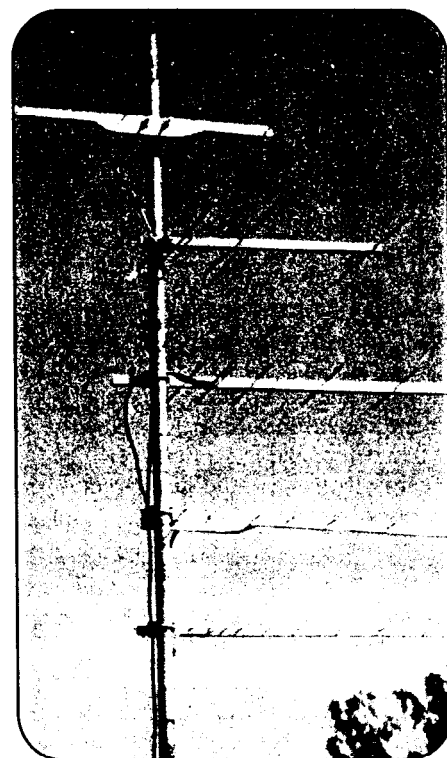
long wood boom Yagis in the past—but I felt that a 6-foot-long, six-element version was about the limit for rover operations and $3/4$ -inch diameter booms.

Building the Antennas

For the 2-meter and 222-MHz versions of the Cheap Yagi, I used a boom made from $3/4$ -inch square wood. A drop of Super Glue (or RTV) is used to hold the elements in place. Figure 1 provides the details of attaching your feedline to the driven element, and Figure 2 gives you the details on the 2-meter driven element. Other dimensions and element spacings for the 2-meter version are in Table 1. These measurements provide the best match in the single sideband portion of the band (around 144.200 MHz). To optimize the antenna for the FM portion of 2 meters, simply shorten each element .5 inches.

The dimensional details for 222 MHz are found in Figure 3 and Table 2. Like the 2-meter version, this antenna is peaked for SSB use at 222.1 MHz, but performance is barely changed at 223.5 MHz, the national FM simplex frequency. Actually, the gain is slightly higher at 223.5 MHz, but the pattern is not quite as clean.

My three- and four-element versions are end-mounted (see Photo) and I have two sets of holes drilled in the boom so I



Yes, you've seen this photo before...this time, though, we're interested in the top two antennas on the stack (144 and 222 MHz) instead of the middle one (432 MHz).

can mount the antenna either horizontally for SSB or vertically for FM.

As I mentioned the last time, a coat of spar varnish or polyurethane will help these antennas last for years. After portable or rover use, I just store the antennas in the garage, and they still look fine after six years.

Other Materials

The question of using other materials for the boom has been asked by many

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