Inexpensive & Easy-to-Build Directional Quad Antenna for 2M

by AA1PG May 2009

If you wish to use a low power radio, such as an HT, to communicate over many miles, a directional antenna is critical for effective communications. With the antenna shown below, if well-placed, you should be able to hit a repeater full-quieting 15+ miles away with 2 watts. Mount on TV mast or hang in tree. Point the smaller end toward the other station.

Parts List: 3 pieces ~1”x1” wood, 17”, 22”, 24”
plastic block ~3/16” thick
2 pieces #8 aluminum wire, 83” & 87.5” (try #10 or #12 copper)
sheetrock screws, small machine bolt and nut

A 144-MHz 2-Element Quad

The basic 2-element quad array for 144 MHz is shown in Fig 39. The supporting frame is 1 × 1-inch wood, of any kind suitable for outdoor use. Elements are no. 8 aluminum wire. The driven element is 1 λ (83 inches) long, and the reflector five percent longer (87 inches). Dimensions are not critical, as the quad is relatively broad in frequency response.

The driven element is open at the bottom, its ends fastened to a plastic block. The block is mounted at the bottom of the forward vertical support. The top portion of the element runs through the support and is held firmly by a screw running into the wood and then bearing on the aluminum wire. Feed is by means of 52-Ω coax, connected to the driven-element loop.

The reflector is a closed loop, its top and bottom portions running through the rear vertical support. It is held in position with screws at the top and bottom. The loop can be closed by fitting a length of tubing over the element ends, or by hammering them flat and bolting them together as shown in the sketch.

The elements in this model are not adjustable, though this can easily be done by the use of stubs. It would then be desirable to make the loops slightly smaller to compensate for the wire in the adjusting stubs. The driven element stub would be trimmed for length and the point of connection for the coax would be adjustable for best match. The reflector stub can be adjusted for maximum gain or maximum F/B ratio, depending on the builder's requirements.

In the model shown only the spacing is adjusted, and this is not particularly critical. If the wooden supports are made as shown, the spacing between the elements can be adjusted for best match, as indicated by an SWR meter connected in the coaxial line. The spacing has little effect on the gain (from 0.15 to 0.25 λ), so the variation in impedance with spacing can be used for matching. This also permits use of either 52 or 75-Ω coax for the transmission line.

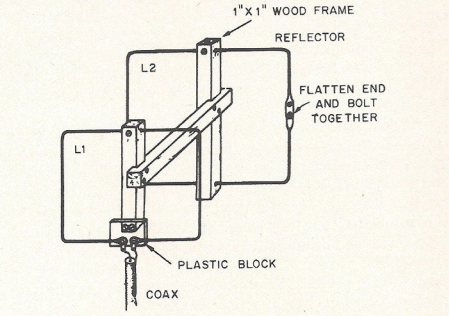
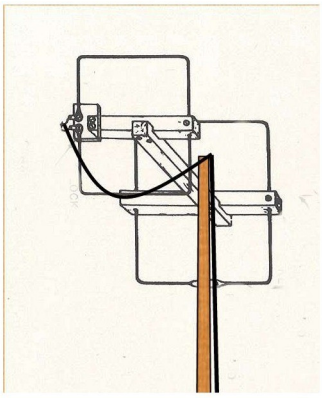


Fig 39—Mechanical details of a 2-element quad for 144 MHz. The driven element, L1, is one wavelength long; reflector L2 is 5% longer. With the transmission line connected as shown here, the resulting radiation is horizontally polarized. Sets of elements of this type can be stacked horizontally and vertically for high gain with broad frequency response. Recommended bay spacing is ½ λ between adjacent element sides. The example shown may be fed directly with 52-Ω coax.

Reproduced from the ARRL 1988 Antenna Book

Vertical polarization for FM use - very important. You can sacrifice 20dB power to the wrong poarization.



Spacing between the driven and reflector elements is about 16”