A 40-Meter Quad, the EZ Way†

Are you a "little pistol" on 40? Hankering to compete with the "big guns"? This quad may be the answer. Build it for less than $20!

By Anthony W. (Tony) DePrato,* WA4JQS

When I decided to try my hand at 40-meter DXing, I soon found that the inverted-V antenna just did not compete. Using a kilowatt amplifier, I could do a fair job of holding my own, until I found myself in a pile-up with the "big guns."

Enter the Quad

What I needed was an antenna with gain and directivity, but it had to be inexpensive and present low wind loading. A standard Yagi beam was out of the question! I decided on a fixed-direction quad. Since I have two towers, on the east and west end of my lot, I chose to string the quad between these supports.

My first try was a driven element only. In addition to improving the signal to the north and south, it decreased the QRM from European broadcast stations. Even though I was impressed with the results, I wanted something better. I wanted to add a reflector element, but I had trouble imagining how to do it, since I had only two supports.

Then I had an inspiration! Since the 1/8-wavelength element spacing of a 40-meter quad is approximately 17 feet,[1] why not use horizontally mounted lengths of wood two-by-fours? Shortly thereafter, I made a trip to the lumber yard and procured two 20-ft-long two-by-fours.

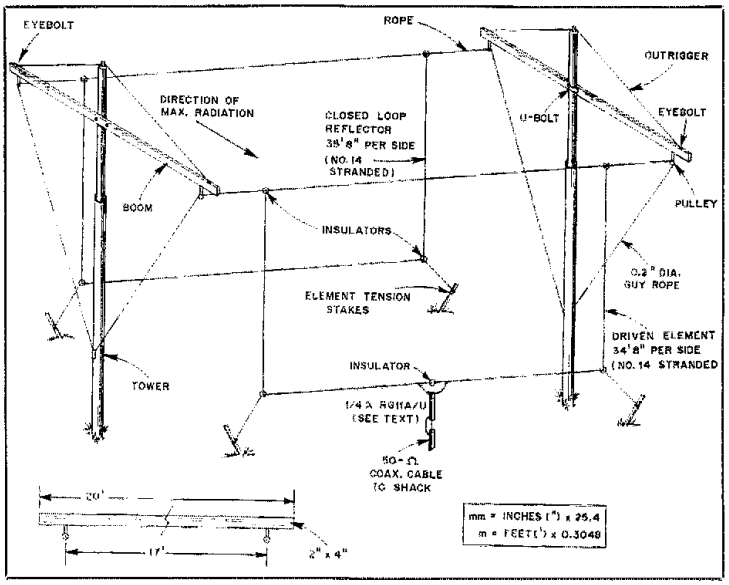

Fig. 1 — Construction details for the 40-meter quad. The quad could be erected in a diamond configuration, but this would require some structural alterations.

Construction

My design is shown in Fig. 1. The length of the driven element can be found with the formula

$$L = \frac{1005}{f} \qquad \text{(Eq. 1)}$$

where L is the length in feet, and f is the frequency in MHz. The reflector should be cut approximately 5% longer. For resonance at 7.2 MHz, the length of the driven element is 139 feet, 5 inches, or 34 feet, 8 inches, per side.

After cutting the wire for the driven element and reflector, I installed four insulators on the reflector so that each side was of equal length (35 feet, 8 inches). I used five insulators on the driven element — one at each corner and a fifth one at the feed point.

[1]m = feet × 0.3048; mm = inches × 25.4.

†Adapted from an article of the same title appearing in September 1981 *Radio ZS* (South African Radio League).

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Before mounting the two-by-fours to the tower with U bolts, I drilled holes 17 feet apart in each. After installing eye bolts with pulleys in each hole, I weatherproofed the wood with spar varnish. With an adequate supply of rope in each pulley, I hoisted the two-by-fours to the tops of the towers and attached them with U bolts. The outrigger system, which had been attached previously to the wood with eye bolts, was then secured and pulled taut. Finally, I raised the elements into place and tied off the bottom insulators with rope to stakes.

The feed-point impedance of a 2-element quad will vary somewhat with element spacing, but will usually be in the vicinity of 100 ohms, so the mismatch to 75-ohm coaxial cable should not be prohibitive. The impedance can be matched more closely by means of a gamma-matching section or, more simply, by using a quarter-wavelength transformer. For a feed-line impedance of 50 ohms, this transformer may consist of a section of RG-11/U (75 ohms) cut to the formula

$$L = \frac{246\ V}{f} \qquad \text{(Eq. 2)}$$

where

L = length in feet of the matching section,
V = velocity factor of the cable used as the transformer, and
f = frequency in MHz

Using coaxial cable with a velocity factor of 0.66, the length of the matching section for my quad is 22 feet, 5-1/2 inches.

After I had installed the antenna and pruned it while using a noise bridge, I conducted SWR and bandwidth checks. Running full legal amateur power, I had 1 watt of reflected power at 7.200 MHz and less than 3-watts reflected at the band edges. Nice! On-the-air tests have proven that the antenna performs excellently. The quad is fixed to the south-southwest; my reports from VK and ZL stations have consistently been S9 plus. I've received S9-plus-40-dB reports from Antarctica and S9 from Japan (long path). Can you beat that for less than $20?

References

Hall, J., ed., *The ARRL Antenna Book*, 13th ed. (Newington, CT: ARRL, 1978).

Orr, W., *Radio Handbook*, 21st ed. (Indianapolis, IN: Editors and Engineers, 1978), p. 29-12.

Orr, W. and S. Cowan, *All About Cubical Quad Antennas*, seventh printing (Wilton, CT: Radio Publications, Inc.).

New Books

☐ *Secrets of Ham Radio DXing*, by Dave Ingram, K4TWJ. Published by TAB Books Inc., Blue Ridge Summit, PA 17214. Softbound, 8-1/4 inches, 176 pages (including title pages and index), $7.95.

The DXer, whether he or she is one country from the coveted DXCC Honor Roll or having just made that first transatlantic QSO, is one who is willing to take the time to study the "science" of DXing and learn all that can be learned in order to snag that next elusive country. It's on that premise that author Dave Ingram has chosen to pass on his *Secrets of Ham Radio DXing*.

Ingram does his best to make interesting reading from what could be "dull, instructional text." Once you've read the book, you'll have to admit that he carries out his task with enthusiasm and style. The writing is clear and concise — easy to read and to enjoy.

After the obligatory definition of terms and goals, the reader is treated to a dandy, if all too short, six-page history of DXing from 1915 through the present. Shades of jumping sparks and scents of ozone!

Although specialty and exotic modes such as uhf/vhf, SSTV, and satellite DXing are briefly touched upon, the main thrust of the book is aimed at the low-band (160- through 10-meter) DXer. There are excellent sections on strategy for working DX and on setting up your station, as well as ways of dealing with such distractions as line noise and rf feedback — FB! The reader will also find useful parts of the book that offer "tips" on antennas and propagation, QSLing, DXC contesting as a way to run up the old country totals, DX aids, and descriptions of several of the major awards of interest to DXers.

Because of the ever-changing world situation — new countries emerging from old, new call-sign allocations, etc., the prefix/country/beam-heading charts in this book are a little out of date. DXers would be well advised to check the latest ARRL DXCC Countries List before turning their beams to work a 7G1 in the Republic of Guinea (now 3X) or waiting to work a KZ5, Canal Zone (now a "deleted country") as their last country on 40 meters for the 5 Band DXCC Award.

As icing on the cake, there is an entire chapter on DXpeditioning. Ingram presents some thoughts on the absolute basics of planning a simple DXpediton and a short discussion of some effective operating techniques. This chapter really comes in to its own with brief descriptions of a couple of major DXpeditions and DXpeditioneers of the past. What amateur who claims to be a DXer could not imagine being halfway around the world mashing giant cockroaches and working the pile-ups with Gus Browning, W4BPD? What DXer does not share that twinge of excitement of taking hostile gunfire with K1MM and the gang of IS1DX while looking for an operating spot in the Spratly Island Group?

The only disappointment with *Secrets* comes not with the editorial content, but with the graphics in the book. Photograpic quality throughout the book is generally poor, while the figures (drawings) are unlabelled and practically worthless. Most of the photos are reproduced in such a way that they are dark, "grainy" and not pleasant to look at. Antenna diagrams have arrows and markings on the major components, but no labels. Photo captions are generally well done and explain the photos better than the photos themselves. (Perhaps one picture is *not* worth a thousand words, but rather one picture is worthless without a thousand words.) Hopefully, this situation will be corrected in subsequent printings of this otherwise useful book.

If you've got an extra $7.95 in the kitty and an evening of free time, *Secrets of Ham Radio DXing* might prove an entertaining diversion as well as providing a little help for your trip up the DXCC standings. — *Bill Jennings, K1WJ*