A Forty Meter Quad

BY DON MORGAN*, KØTAJ

Gain in a 40 meter antenna is easy to come by—if you've got the room. The average 40 m. yagi takes on monstrous proportions, but a quad, although still pretty hefty, is a lot more manageable and offers gain in addition to that all-important front-to-back ratio. Described below is KØTAJ's version.

How would you like a full sized forty meter quad for $100.00? The following are details for the construction of such a quad. The quad is in operation and has withstood 80 mile an hour winds and the DX is excellent due to the low angle of radiation and good front to back ratio.

With deteriorating conditions on the higher frequencies, a good antenna on 40 is going to be a benefit in the next few years. Anyone who has listened on 40 meters can certainly appreciate the advantages of side and back rejection of QRM.

Another feature on the plus side for this antenna is the comparitively low price for a full sized beam. Actually it isn't the monster that one might think. It doesn't take any more space to rotate than a full sized 20 meter beam.

Construction

Actual construction begins with the boom. Secure, from the lumber yard, one 24 foot straight grained 2″ × 4″ and one 14 foot 2″ × 2″. These are bolted together with 4 bolts to form the boom and painted with two coats of aluminum paint. The spider supports are made from 1½″ strap iron bent to fit over the end on the 2″ × 4″ beam, and back 6″ on top and bottom of the 2″ × 4″.

The cross supports for the spiders are made of ½″ angle iron, 24″ long, welded onto the end of the strap iron as shown in fig. 1. The ends of these are tied together with ¼″ steel rods. A three inch piece of ½″ conduit, or any pipe, is welded to the end of the strap. Two holes are drilled at right angles to each other in the conduit near the end. A ¼″ rod is passed through these holes and welded to the ends of the angle iron. A duplicate is made for the other end and these are both given a coat of aluminum paint.

Next, the spiders themselves are constructed. This antenna was designed for the middle of the phone band. The standard formula for computing the length of the sides of a quad was used.

$$\text{Length in feet} = \frac{251}{F(Mc)}$$

I found each side to be 34′ 7″. The problem then

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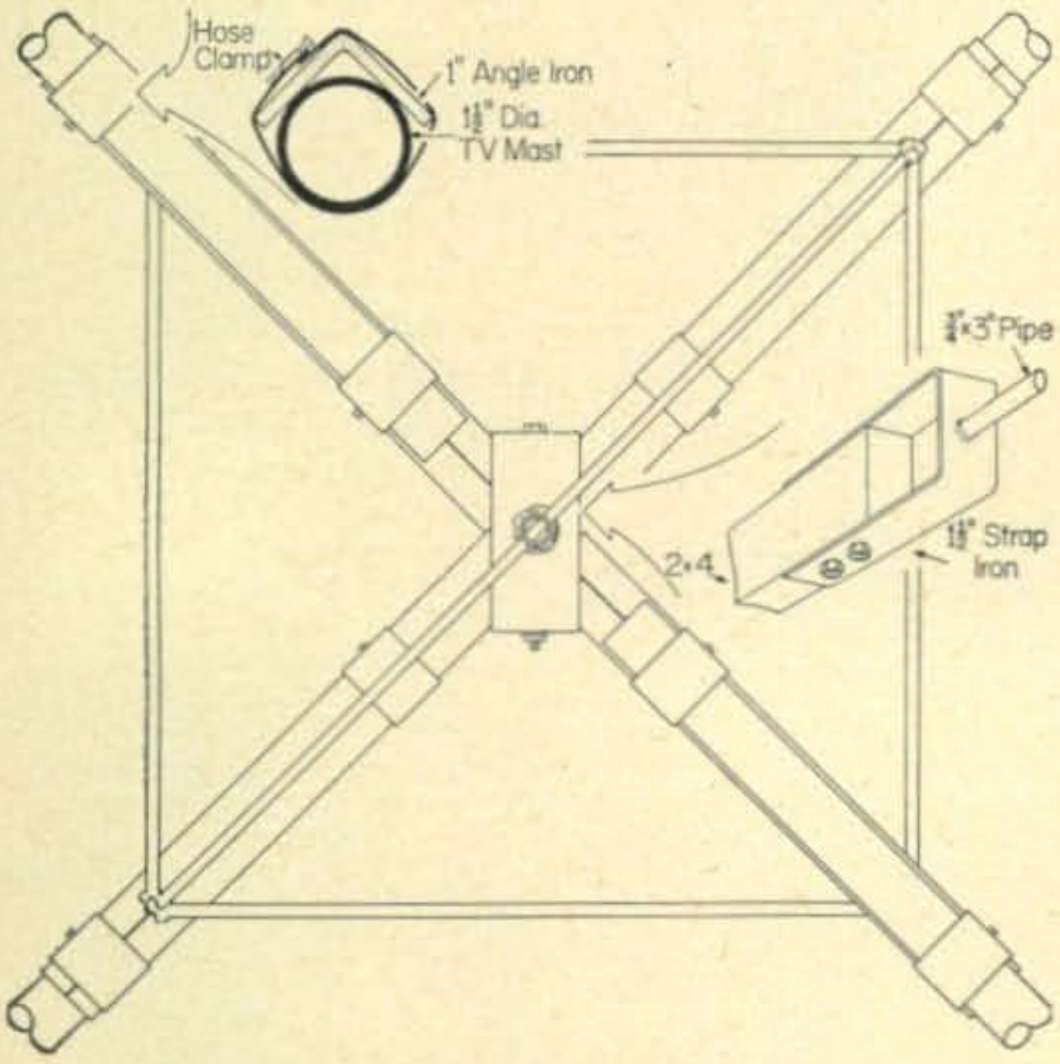


Fig. 1—Construction details for the center hub of the spider. Two are required. The details are discussed in the text.

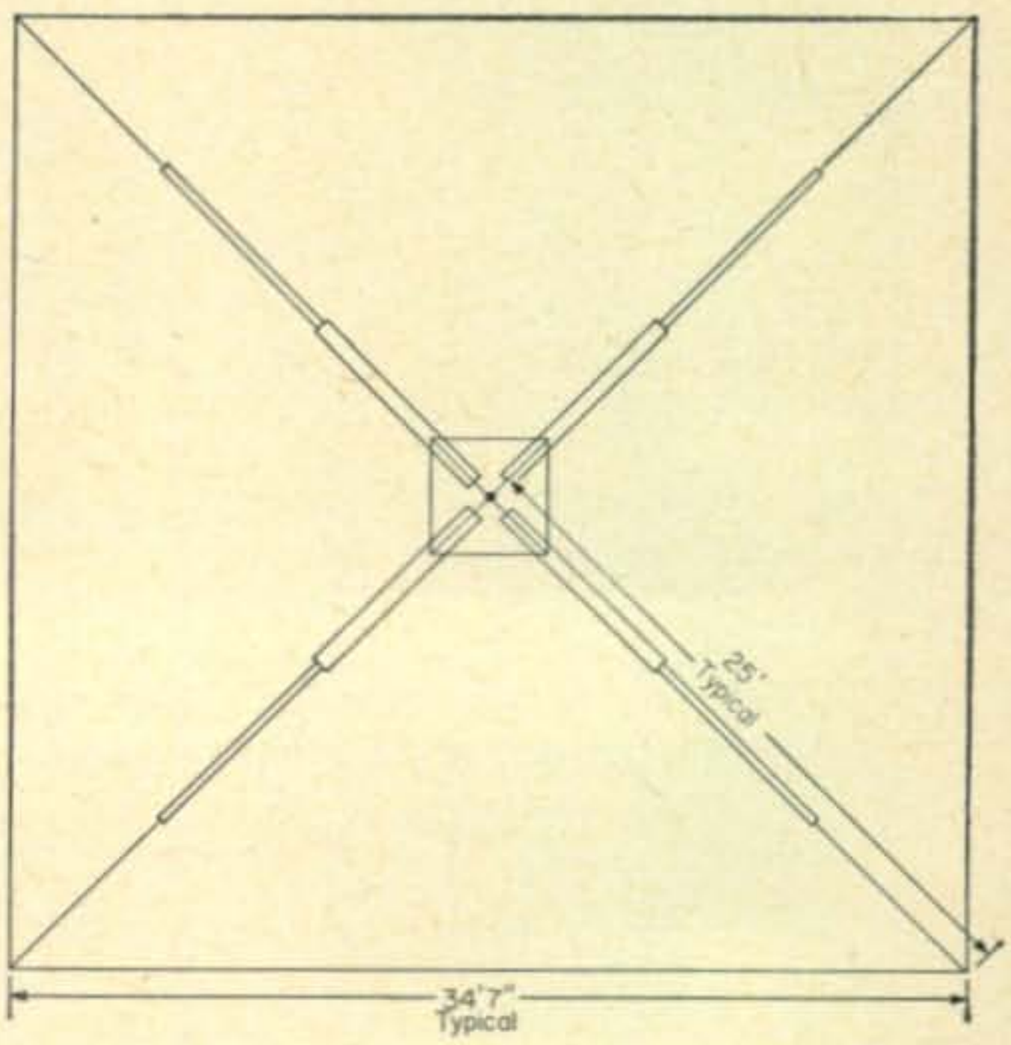


Fig. 2—Dimensions of the spider and driven element lines.

is to figure the length of the supporting spiders required to obtain 34′ 7″ on a side. A little high school geometry comes in handy here. In a right angle triangle the sum of the squares of the two sides is equal to the square of the hypotenuse. Thus $(34'7'')^2$ equals the total length of spider squared. This answer can be divided by two to obtain the length from the center. This comes out to 25 feet as shown in fig. 2.

The first 10 feet was made from T.V. masting of 1¼″ outside diameter. The last 15 feet is fiberglass. This was made from 20′ telescoping fishing poles.[1] The last five foot section was discarded. (This can be used for a mobile whip or a casting rod.) These telescoping rods are extended the full length and each section is taped with plastic tape to keep it extended. There is a tight fit anyway but this will assure them not pulling together in a heavy wind. The large end of these fiberglass poles will just fit comfortably inside the 1¼″ steel tubing. The end of the steel tubing is split back about four inches on four sides with a hack saw. The poles are wrapped with plastic tape to prevent chafing of the fiberglass and inserted into the steel tubes. A plated hose clamp is placed over the outside of the steel tube and clamped down tight to hold the fiberglass rod securely. This is done for all eight poles so that you end up with eight poles 25′ long.

Mounting and Stringing

I intended to mount this antenna on a 60′ Vesto tower. I have installed a pulley on the mast at the top of the tower through which a ½″ rope is passed and on down to the bottom of the tower. A small length of chain is secured to the middle of the boom. The rope is tied to the center of the chain. The other end of the rope is pulled until the boom is about 10″ off the ground. By standing on a small step ladder the large end of each pole can be fastened to the spider with two hose clamps.

When all eight poles are secured we start to fasten the wire to the ends of the spiders. The

[1]These were obtained from Hecters Inc., Waseca, Minn.

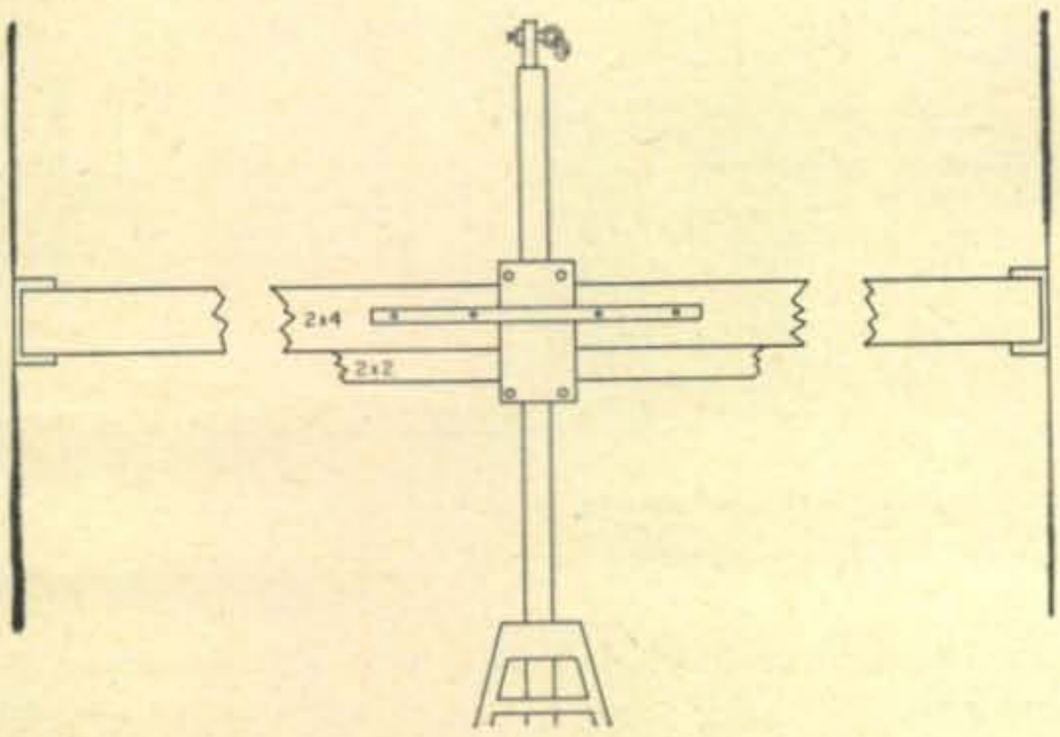
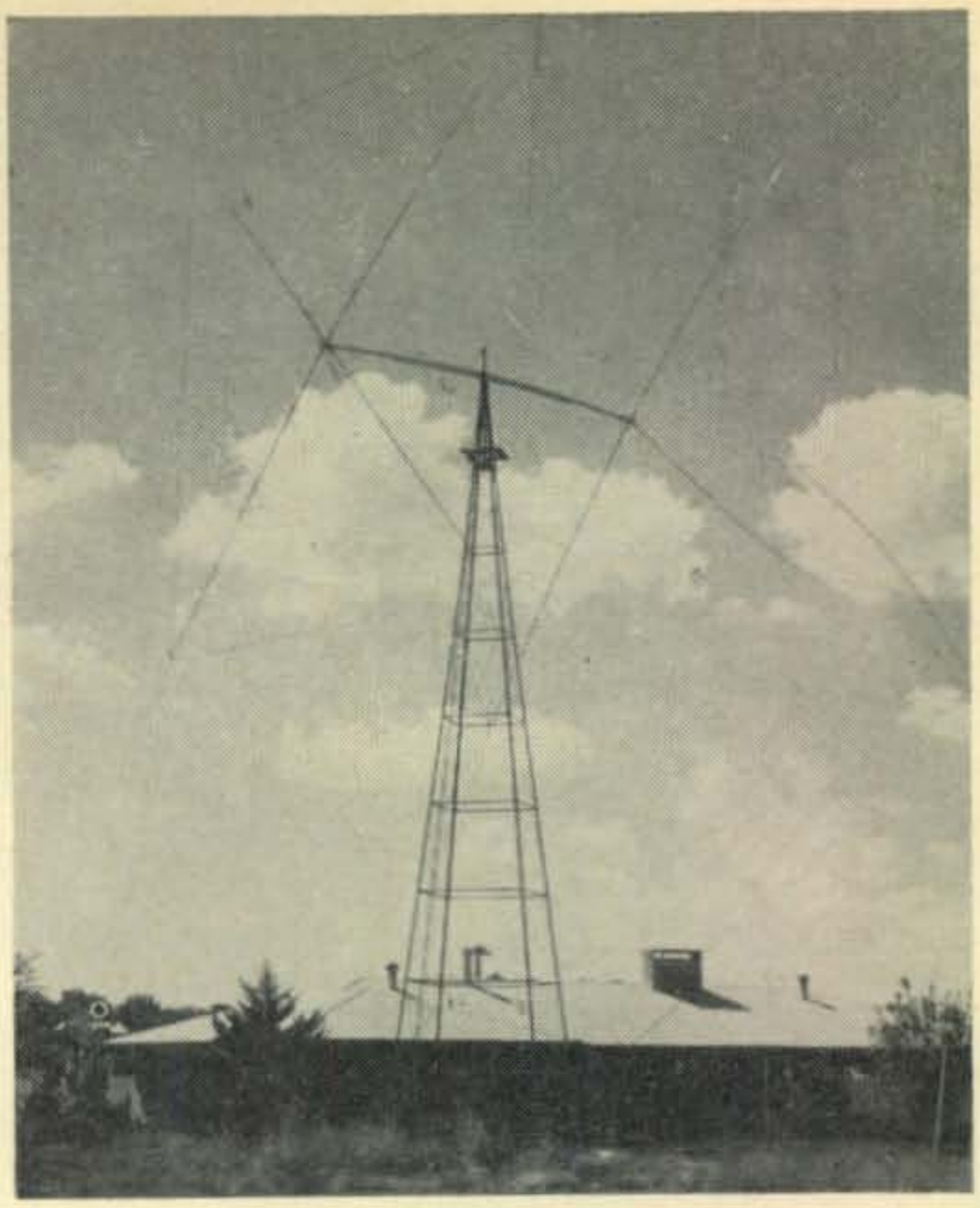


Fig. 3—Boom clamping details. The length of metal across the steel plate is the piece of iron bedstead mentioned in the text.



The forty meter quad mounted on a 50′ windmill tower.

end of the antenna wire is secured to the end of one of the bottom poles. The boom is rotated a quarter turn on its long axis to bring another end down where it can be reached from the ground and another 34′ 7″ length is secured to the ends of the poles. This process is continued until all the way around the quad on both the reflector and director.

At the corner of the driven element, where the two ends of the wire come together, fasten the coax, RG-58/U or RG-8/U. The center conductor is soldered to one end and the shield to the other end.[2] This is well covered with plastic tape. The coax is taped to the spider, led up to the boom and fastened to the boom over to the middle.

The reflector has six feet of extra wire added to each end. Plastic spacers are made three inches long. These are secured with tape to the spiders. A shorting bar is made and secured approximately five feet from the end of the poles.[3]

This completes the beam except for mounting. Two plates are made from ¼″ steel plating 7″ square. Holes are drilled for U bolts to hold the boom to the mast. Secure an old steel bed sted and cut off the ends. Bolt this to the middle of the boom to strengthen it. The boom is hoisted and bolted into position as shown in fig. 3. Good luck on forty. ■

[2]Feeding the beam in one corner will develop a polarization between horizontal (when fed from bottom or top) and vertical (when fed from either side) or about 45°. This may or may not be beneficial and can be determined only by operating results.—*Ed.*

[3]The location of the single stub in the corner of the reflector may cause unbalance, resulting in an offset beam pattern. The simplest solution might be to add the stub length and increase the overall size of the reflector.—*Ed.*