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The Quickie Quad:

More Gain-per-Element than a Yagi-Uda

It is not without good reason that the cubical quad antenna is one of the favorite beam antennas of amateur radio operators everywhere. Element for element, you usually get more signal gain from a quad than from the ever-popular Yagi-Uda type antennas. And the quad may be made using wire for the elements, whereas most configurations of the Yagi-Uda require that you use tubing for the elements.

Often the frame of the quad is made of long bamboo poles or fiberglass arms, giving the antenna an appearance something like a giant spider sitting atop a pole. But it is quite possible to construct the quad in an even easier manner by supporting its wire elements with ropes, somewhat as you do a long wire antenna (see Figure 1).

Of course, this means that the antenna will be fixed to point in just one direction, so you must be sure to point it toward the direction in which you want to use it.

If you have never used a beam antenna, I think you will be pleasantly surprised at the improvement in signal level a good beam can give you on weak signals. Also, with a beam such as the one described here, it is often surprising how much attenuation there is to signals not in the beam of the antenna! This is a great help in eliminating interference from undesired stations at times.

And, happily enough, this month's antenna is not too difficult to construct and erect. So why not give it a try and see for yourself what a beam antenna can do for your weak-signal reception?

LET'S BUILD ONE!

To build this antenna you need enough wire for two full-wavelength sized loops. The wire can be any good insulated or noninsulated copper or aluminum wire that is strong enough to serve. Probably you will want somewhere around number 14 size or larger, although smaller sizes will work if they are strong enough to hold up.

You will also need a lead-in cable made of 50 to 75 ohm coax. Add some guy ropes, a center insulator, eight strain insulators for the corners, some coax-type sealer and you're ready to start.

1. Determine the length for the reflector loop, the driven element loop, and the inter-element spacing from the formulas given in Figure 1.

2. Add four inches to the length found for the reflector loop in step one and cut one piece of wire to this length. This piece of wire will be made into the reflector loop.

3. Take the reflector-loop wire and, using a knife edge, scrape the ends bright for three inches from each end. Thread four strain insulators onto the wire and then wrap the bright three-inch ends around one another and solder them together to complete the loop (see Figure 1).

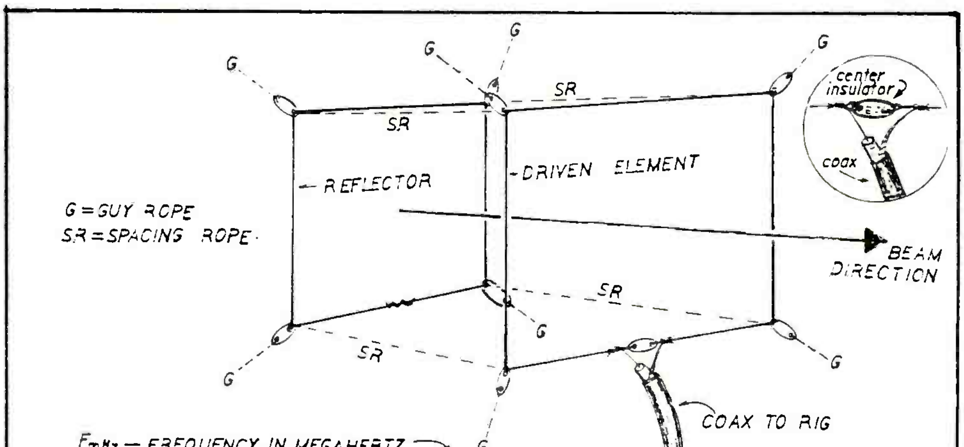
4. Measure the distance between the holes of your center insulator. This distance should be on the order of three inches or less, probably less. Whatever this distance is, subtract it from the length found for the driven element loop in step one. Now add four inches to this adjusted driven element length. This will give you the length to which you must cut the wire for the driven-element loop.

5. Cut the driven-element loop wire to length and scrape each of its ends bright for four inches. Thread four strain insulators onto this wire. Then attach one end of the loop to each end of the center insulator. Do this by slipping a brightened end of wire through the hole at one end of the insulator for two inches.

   Then bend the end of the wire back around the insulator end and wrap it around the remaining exposed brightened wire and solder them together.

   Repeat this for the other end of the wire in the other end of the insulator. When you are finished, the loop circumference will be the appropriate length for a driven element loop as determined in step 1.

6. Now take the coaxial cable and separate the braid and center conductor on one end (the other end should have a male plug to fit your receiver). Wrap and solder the coax center conductor to the brightened wire on one side of the driven-element loop at the center insulator, and the braid to the brightened



LENGTH IN FEET	DRIVEN ELEMENT = $996/F_{mHz}$ REFLECTOR = $1032/F_{mHz}$ SPACING = $120/F_{mHz}$	LENGTH IN METERS	DRIVEN ELEMENT = $304/F_{mHz}$ REFLECTOR = $315/F_{mHz}$ SPACING = $36.6/F_{mHz}$

FIG. 1. A CUBICAL QUAD ANTENNA SUPPORTED WITH GUY ROPES. THE WIRE ELEMENTS AND SPACING-ROPES FORM THE OUTLINE OF A CUBE.

wire on the other side (see inset circle, Figure 1). Seal the cable end against weather with coax-type sealer.

7. Cut light 1/8 inch diameter nylon or plastic guy ropes with sufficient length to separate the two wire loops by the spacing determined in step 1. Insert one end of one of these ropes into each of the strain insulators which you have sliding free on the loop. The rope is attached through the same insulator holes as the loop wires. Now tie these spacing ropes onto the insulators so that they space the insulators appropriately as shown in Figure 1.

   Attach a guy rope to the remaining hole on each strain insulator. The length of these guy ropes will be determined by where your mounting points (poles, trees, towers, ground stakes, or whatever) are. Now you can give a box shape to the antenna by pulling out on these eight guy ropes simultaneously.

8. So, using these last mentioned eight guy ropes, install the antenna so that it has its characteristic box shape. Or, omit one strain insulator per loop, and shape the loops as triangles with the peaks pointing upwards. The higher you can mount the antenna, the better; but if you can't elevate it, it will even work okay near the ground. Remember to aim it in the direction from which you wish to receive signals (see Figure 1).

   When orienting your beam, you should keep in mind that you can't determine true direction to distant points on the globe from an ordinary flat map. You must either use a globe (be as precise as possible, it's tricky), a great-circle map, or one of the computer programs designed for giving you great circle bearings. Great circle maps for receiving locations in the USA can be found in the *ARRL Antenna Book*.

9. As always, don't forget lightning protection if you live in lightning country. The minimum protection you should practice is never using an antenna during a storm, and disconnecting and grounding it when it is not in use.

10. Plug the lead-in into your rig and enjoy reception of some formerly-uncopyable DX signals!

Need an easy and inexpensive antenna mast?

For testing last month's groundplane antenna, I built a version of an old-time wooden mast. It proved to be strong, works great, and the cost is moderate. The height can be made from very short on up to 40 feet or so. My 20 foot version, made of one inch by two inch softwood, has now withstood several winter storms using only three small nylon guy ropes for support!

If you'd like plans for this type of mast, send me a stamped, self-addressed business size envelope.

RADIO RIDDLES

Last Month: I asked you to give the adjective commonly used for describing antennas which resemble objects or letters which have fallen down.

Well, if we see a friend lying down too often, we may think of him/her as lazy, and that's just what we think of antennas too! Antennas which resemble objects or letters which are lying down from their normal position are called "lazy" antennas.

Examples of this are the "lazy-H," which looks like an "H" on its side, the "lazy quad," an antenna with a single loop like the driven element of the cubical quad. But with the lazy quad, the loop has "fallen over" and has all its sides parallel to the ground.

Come to think of it, since the lazy quad is best for short-haul contacts while the cubical quad described above is great for long-haul DX, it may just be that the horizontal quad picks up mainly the nearby circuits because it actually is a bit lazy after all!

This Month: What relationship is there, if any, between the cubical quad beam and the Yagi-Uda beam? Get the answer to this and much more in next month's *Monitoring Times*. Till then, Peace, DX, and 73.

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