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The Half Square: A Great "New," Old Antenna Design

Lately ham radio operators have been giving a lot of attention to a small antenna known as the "half-square beam" (fig. 1A). And with good reason; this beam is a great DX performer, costs very little for parts, is easy to erect, and can fit into most back yards!

I became aware of the growing popularity of the half square when a friend, Tom Parks, W7EGN, gave a talk about it at our local ham club. He really piqued my interest with claims that, when a band was just opening, the antenna often put him into many foreign countries ahead of other hams using yagi beams and quad beams (unless those beams were on a really tall mast). I was even more intrigued when he mentioned that his transmitter power was only 100 watts as compared to 1000 to 1500 watts used by some of the other hams.

The reason that the half square is an excellent DX antenna is its strong low-angle radiation and reception (R&R) patterning. The pattern responds less well to closer-in (non-DX) signals; this reduces the amount of interference received from these closer-in signals.

The half-square is actually a full wavelength of wire folded into the shape of an inverted letter "U" (fig. 1A). It is relatively narrow-banded, so design it for the frequency where you want it to perform. The antenna is fed at a low-impedance point on the antenna, and functions somewhat as an upside-down groundplane beam. The horizontal portion contributes little to the antenna's R&R pattern, just as the groundplane's radials contribute little to its patterning.

The R&R pattern is a broad, bi-directional figure eight (fig. 1B). Because of this you can build two of them, set at right angles to each other, and pretty well cover the globe. Add to all these features the fact that these antennas seem to be very quiet in terms of noise pickup, and you've got a winning DX antenna.

■ Let's Make One

The half-square antenna is simple to make. Here's how:

1. Two pieces of wire are required: a vertical quarter wavelength piece (240/f in fig. 1), and a three-quarters wavelength piece which is composed of one vertical quarter wavelength section (240/f) and the horizontal half wavelength section (492/f).

Cut these wires a few inches longer than the equations indicate so as to have extra length to wrap into the insulator (or socket, see step 2) where the two sections join. If you use insulators at the bottom end of the vertical wires (see step 6 below) leave a few inches for connecting them, too.

2. Connect the antenna's two lengths of wire together with an insulator, or with a feedline socket mounted on a piece of plastic as in fig. 1A. The center conductor of the coax connects to the horizontal section, and the vertical section connects to the coax shield. When the antenna is hung, this insulator (or socket) will be at one corner of the antenna (fig. 1A). Seal the coax or socket against weather with coax sealant or plastic tape.

3. Slip the half wavelength section of wire through one end of an insulator. This insulator will support one corner of the antenna when the antenna is hung up (fig. 1A).

4. Erect the antenna, the higher the better. But the low ends of the antenna can come almost to ground level if that's the highest you can get it.

5. Lead the feedline away from the antenna horizontally as far as practical (see fig. 1A).

6. To keep the downward-hanging ends of the antenna's quarterwave vertical elements pointing downward, you can attach some light weights to them or put stakes into the ground beneath them and tether them with heavy cords. If you use cords it is probably best to add an insulator between the antenna ends and the cord (which may conduct when damp).

7. Don't forget lightning-induced damage protection. The simplest type is never use an outdoor antenna during weather likely to produce lightning, and disconnect and ground the antenna when it is not in use.

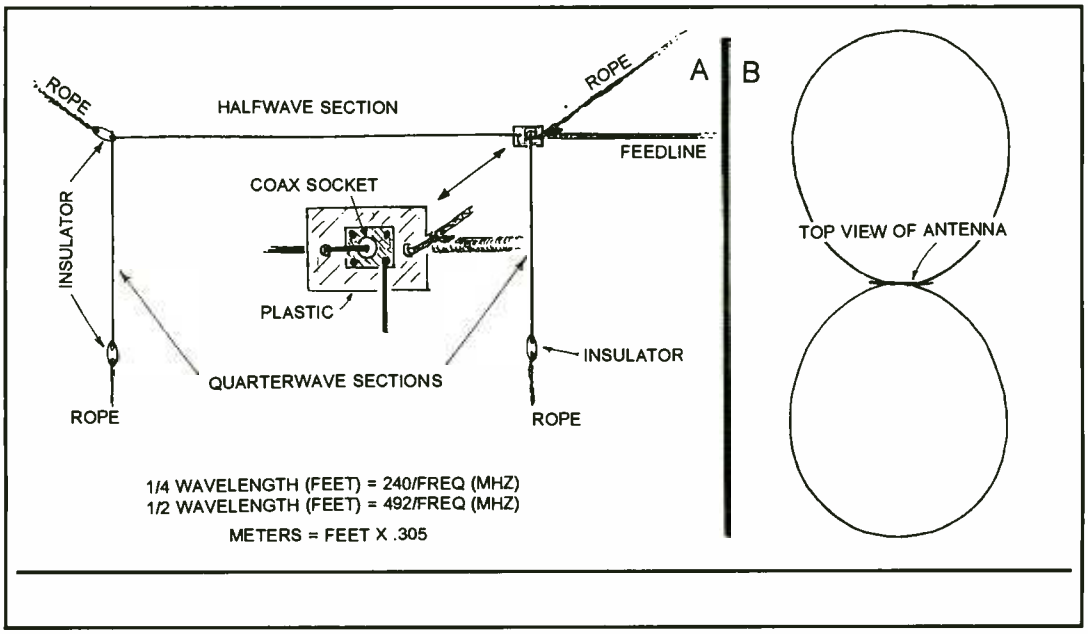

FIG. 1. *A half-square beam antenna (A). The antenna's horizontal radiation-reception pattern (B).*

If you'd like more info on this antenna, check the web with a search engine (Tom recommends "dejanews"). There's a good bit there on the half square.

Happy DXing!

■ An Excellent Book for Your Radio-Communications Library

Antennas and Techniques for Low-Band DXing (by John Devoldere, $20.00 plus postage from ARRL, 225 Main St., Newington CT, 06111) contains