The 40-Meter Triangle

Hams like to experiment with antennas. Here's one that should pique your interest!

By Byron Self,* WB6UFW

Are you looking for a good DX antenna for 40 meters that doesn't cost a fortune? One that is simple to make? Well, that's what I have and, with so many requests for information about the system, I decided to write an article about it. The antenna is a triangular-shaped full-wavelength loop, similar to an inverted Delta Loop element. The triangle measures one-third wavelength on each side, making it an equilateral triangle.

I had been using an inverted V, so all that was necessary to convert that antenna to a full-wavelength loop was to add another half-wavelength wire and to move the feed point to the bottom of the loop, at the center (see Fig. 1): The former feed point at the top of the inverted V was shorted together to make the full-wavelength loop.

The apex height of the inverted V and triangle was the same — 35 feet — and I immediately noted a difference in the performance of the triangle compared to that of the inverted V. The triangle was much better! This antenna is similar to a quad loop, and, of course, the quad has some gain over a half-wavelength dipole. Another advantage of the triangle is that only one support is required. This article provides information on making the antenna, plus an installation method that I found very satisfactory.

Construction

The first step is to measure the antenna wire. Use the formula: $1000 \div f$ (MHz) to obtain the overall wire length. Next, find the center of the total length by temporarily securing both ends a couple of feet apart. Then, while keeping the wire from becoming tangled, lay out both wires so they meet at the farthest end. Mark this place by forming a small bend in the wire. Next, slide the apex insulator (Fig. 2) onto one end of the wire and along the wire until it comes to the bend in the wire. By rotating the insulator, the wire will twist together and secure the insulator at the desired point. Calculate one-third wavelength using the formula in Fig. 1. Then measure this length from the apex insulator toward the ends of both wires. Attach insulators at these points, using the same twisting method as described previously. Solder both ends of the wire together to complete the loop. The ends can be twisted together, then soldered to provide additional strength at the connection.

Installation

Many hams have a tower that the antenna can be installed on, but others may wish to use a homemade mast installed against the side of the house, as I have done. The mast I used was a 20-foot length of 2-inch OD galvanized steel pipe, with a 20-foot telescoping mast inside. At the top, a 10-foot length of 7/8-inch conduit is installed. Figs. 2 and 3 show most of the mounting

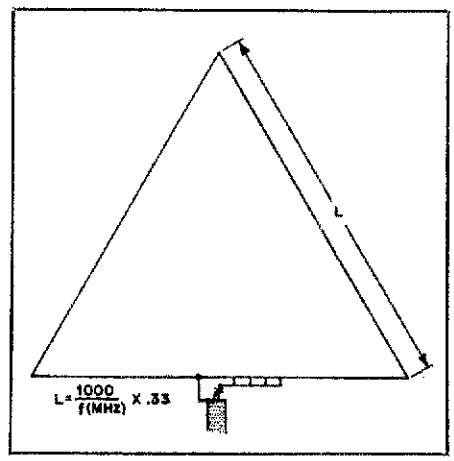
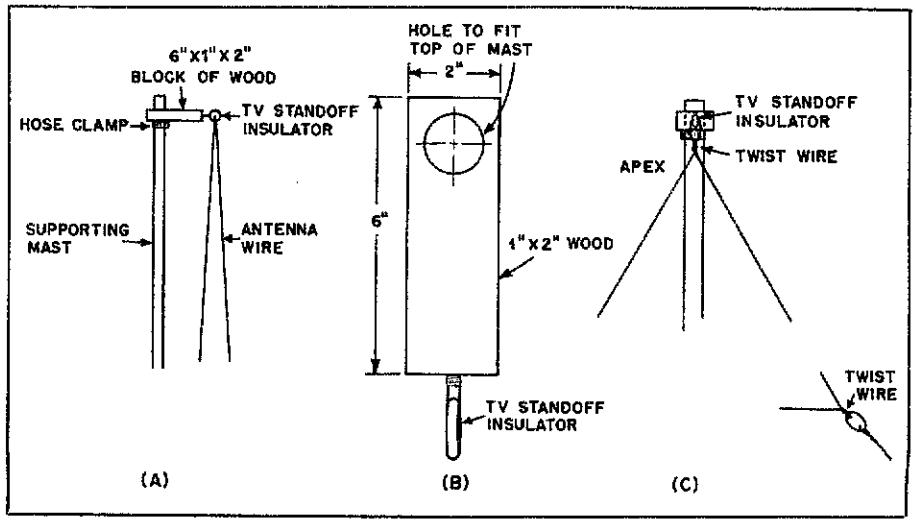


Fig. 1 — The 40-meter triangle or Delta Loop. The length of one side L, is equal to:

$$\frac{1000}{f\,(\text{MHz})} \times 0.33$$

Fig. 2 — Details of the apex insulator.



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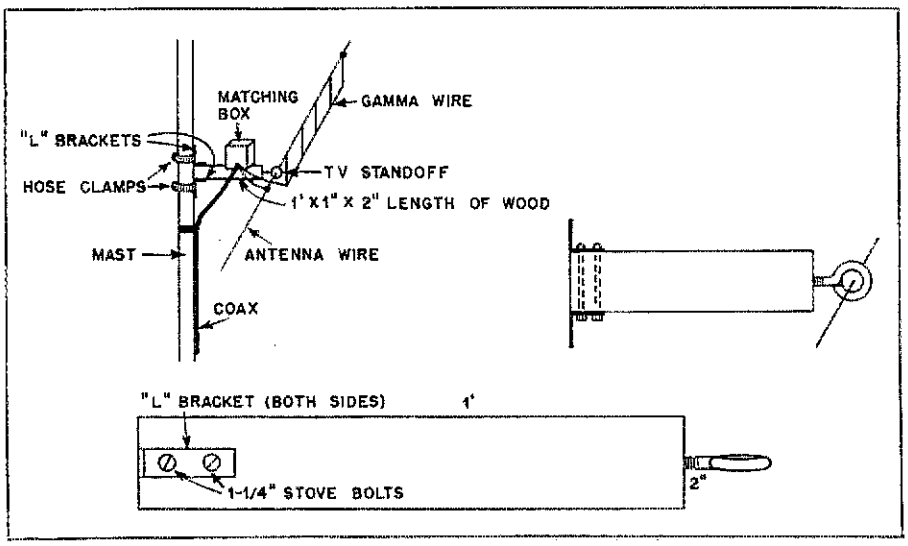


Fig. 3 — Gamma-match box mounting information.

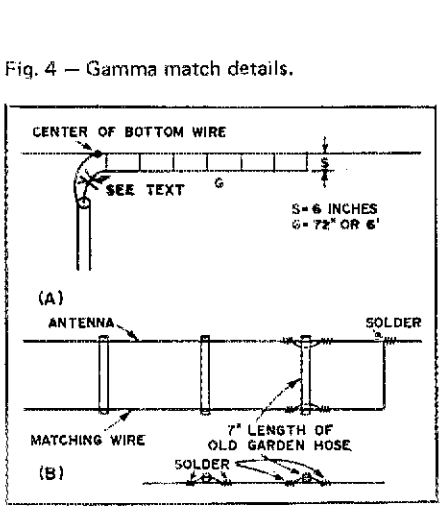
details. First, slide a hose clamp over the top of the mast and tighten it in a position about 3 or 4 inches from the top of the mast. Put the apex insulator over the top of the mast so that it rests on the hose clamp. The mast can now be raised and mounted permanently to the side of the house. I used a homemade bracket at the peak of the roof to secure my mast.

Nylon cord or a heavy grade of nylon fishing line can be used at the lower corner insulators. These lines should be tied off as taut as possible to prevent sag at the bottom of the antenna. Mount the bottom center insulator on the mast, (Fig. 3) and attach the antenna wire to the insulator.

The Gamma Match

Next, the gamma match can be installed on the antenna. Refer to Fig. 4 for electrical details of the matching section. I mounted the gamma capacitor in a waterproof container (such as a plastic refrigerator box). The capacitor I used was a variable 365-pF broadcast-type plate which does not arc with my 100 watts. For higher powers, at least .025-inch plate spacing should be used. A gamma-matching system requires about 7 pF per meter, so 40 meters requires about 280 pF. Mount the gamma box on the bottom center insulator by means of a couple of screws. Solder the outer conductor of the coaxial feed line to the center of the bottom wire of the antenna. Solder the center conductor of the coaxial line to one side of the capacitor and the gamma wire to the other side of the capacitor.

Fig. 4 — Gamma match details.



Matching

Matching the antenna to the line isn't difficult. All that is needed is an SWR indicator and a helper to adjust the capacitor while you operate the transmitter and observe the SWR indicator. Feed enough power into the feed line to get a reading on the SWR indicator. Then adjust the gamma capacitor to the lowest reflected SWR reading.

Evaluation

This antenna has been effective while working DX. I have contacted with my 100 watts, EA8, FP8, KP6, FWØ, and lots more on 40 meters from here on the West Coast. Many of these QSOs were in pile-ups, and I was always the first to fifth station called.

Of course the triangle can be built for any band. Also, with two supports and a line strung between them, it would be possible to use the triangle as a fixed-direction parasitic array. I suggest using the standard quad formulas for directors or reflectors. One last point: This has been a very inexpensive antenna. I made mine from galvanized bailing wire that sells for about one-half cent a foot. QST

50 Years Ago

May, 1926

□ The synchronous rectifier often produces more hash than carrier, so *QST* hasn't encouraged it much; but now some new schemes are outlined by Technical Editor Kruse to stop the sparking. The treatise makes good use of others' ideas, including some from Bob Morris, 2CQZ.

□ "When the craving for DX reaches the proportions of an obsession, when it blinds its possessor to the realization that there are other forms of amateur activity, it is just as bad as any other form of intemperance," says the Editor. 'Twas ever thus.

□ Readers who started the "how to become" transmitter last issue can now finish up the job with a power supply including a 15-jar lead-aluminum rectifier. Couple the rig to 130 feet of antenna and counterpoise and you're ready to go.

□ Lou Hatry says a single-tube reflex circuit doesn't save much, but the four-tuber he describes represents a real saving in tube cost and battery consumption.

□ The crystal-control rig can be highly temperamental, but Stan McMinn shows us an orderly procedure for adjustment to achieve good results.

25 Years Ago

May, 1951

□ Technical Editor Grammer says double-sideband, reduced-carrier transmission doesn't quite match s.s.b. efficiency, but is a good step in that direction and a great improvement over a.m. His treatise explains why.

□ The mysteries of ground resistance and how to measure it are tackled by K2BZ, with the conclusion that 8 feet of ground rod is an optimum depth, and that a series of such rods connected by bus achieves minimum resistance.

□ "There are many rewards in amateur radio," says staffer W1IKE, who then proceeds to describe the various ARRL and other awards for achievement in amateur operating.

□ Now that we have new civilian defense rules, W1HDQ has come up with a four-pound, 6-meter portable unit which National Emergency Coordinator W1NJM demonstrates on no less a place than the cover.

□ The BC-610 is big in war surplus, but also in interference to TV, so W4CVO details a number of remedies to keep signals out of the neighbor's picture.

W1RW