The Big Loopy Skywire

Cheap and simple, with a bodacious signal.

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When the Loop Skywire is mentioned, most amateurs immediately think of acres of property with no antenna height restrictions. But such conclusions are misconceptions when it comes to putting up a Big Loopy, and generating the "Big Signal." For the Big Loopy, a full-wave loop in the horizontal plane, the area needed, and the best height, are all pretty much dictated by the frequency of the *lowest* amateur band on which operation is desired.

Loop size depends on frequency

For 80 meters, you need 1005/3.75 MHz = 268 feet of wire which would be 268/4 = 67 feet on a side if the antenna is square; but a Big Loopy on 10 meters would require 1005/28.4 MHz = 35.4 feet of wire. That is, 8.85 feet on a square side, and it might as well be hung vertically as a true quad loop. However, there is a point where a vertical loop becomes impractically large to erect: a vertical loop for 40 meters would be 1005/7.15/4 = 35 feet per side, out of the question for most amateurs. But since the radiation from a full-wave loop is not all perpendicular to the plane of the loop, a large loop strung horizontally does work.

My experience, and that of others who have put up a full-wave loop for 80 meters, is that the loop radiation goes up at high angles, which is great for propagation out to about 1,100 miles and multiples of this distance. Upon reflections, the signal comes down "hard." The very first night I tried the Big Loopy, I managed to communicate with the radio operator on an oil tanker in the Caribbean (5,500 miles distant from my QTH in Hawaii) on 80 meters. Although I was running 400 watts I was told that my signal was obnoxiously loud.

The Big Loopy

My Big Loopy measures 285 feet around, and it is not at all round or square, but as seen from above, has the outline of a necktie (see Fig. 1).

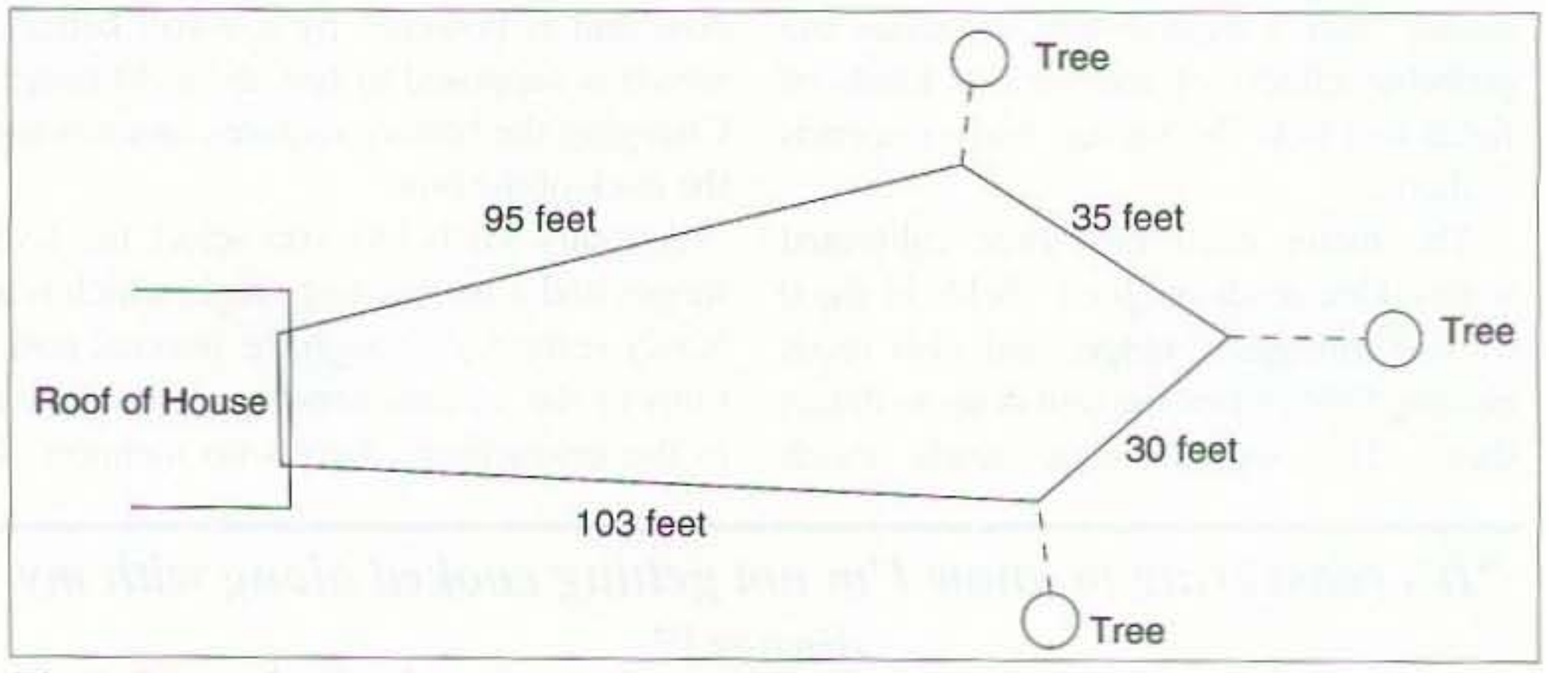

Fig. 1. *Layout details of the Big Loopy.*

Although the *Handbooks* recommend 272 feet for the loop on 80–10 meters, I chose this length of wire based on the following calculations:

1005/285 = 3.526 MHz

and multiples of this frequency are

7.053, 10.579, 14.105, 17.632, 21.158, 24.684, and 28.211 MHz

which multiples more or less match my preferred regions of operation on the HF bands. Had a 272-foot length been chosen, all frequencies for lowest SWR given above (for a length of 285 feet) would be shifted higher by a factor of

285/272 = 1.048

e.g., 7.053 MHz would have been 7.39 MHz, *out of band*. Also, the bands for which 285 feet of wire will not quite be on resonance (for which there would be some reactance), are handled by a simple Inductance/Capacitance (L/C) tuner, or "Matchbox," at the shack.

The Big Loopy is fed with 52 ohm coax, as the feed point impedance is between 50 and 100 ohms. Air RF choke baluns are used at both the feed point end and at the shack, to help suppress any RF currents induced on the outer braid of the coax (unbalanced feed line) from the loop radiation. A 1:1 balun at the feed point could be used. And an open ladder-line feed system would probably be best, but up to 700 watts, on all bands through 80 meters, I have not experienced RF.

The feed point is 30 feet up, at the rear end of the house, 70 feet from the shack. The elongated, but not quite folded, dipole outline of the Big Loopy is 40 feet off the ground at its highest point, and the low point is 25 feet high. The long axis orientation is east-west.

As Fig. 1 shows, one end of the wire of the Loopy is connected to the coax center conductor, while the other end returns to the feed point braid. The corners are attached to their respective tie-down points with nylon line. The wire is #12 A.W.G PVC covered solid copper. Note that the east end of Big Loopy is triangular, sloping down, and buried in the forest behind the fence of the property line.

Theoretical considerations suggest that nowhere in the loop should the wire double back on itself; you should try to keep all corners or "turning points" less than or equal to 90° so you don't suffer from signal cancellation. For the strongest signal, you want to make the loop as "open" (covering as much area) as possible. The facts that the loop is neither circular nor square, and is not very high, all result in some increased angle of radiation and reduction in signal strength, but these effects are not as bad as one might guess. The ideal loop would, of course, be circular. With 285 feet taken as the circumference of a circle, this would result in a $285/\pi$ = 90.72 foot diameter circle of 45.35-foot radius, which gives an area of $(45.35)^2 \times \pi$ = 6464 square feet. A square loop in comparison would have sides 285/4 = 71.25 feet, or an area of $(71.25)^2$ = 5077 square feet. The ratio of areas is a measure of radiated signal strength: 5077/6464 = 0.785; dB = 10 log (0.785 = -1 dB. The square loop would be "down" in signal strength from that of a circle's by about 1 dB. As configured, my Big Loopy suffers about 1.5 dB compared to the radiation from a circular loop of the same length wire. However, when you consider that a full-wave loop shows 2 to 3 dB gain over a dipole, at least on 80 meters, I'm still ahead. And on 40 meters, where a full wave 80 meter loop is 2 waves, the Big Loopy has 2x3 = 6 - 1.5 = +4.5 dBd, calculated on the conservative side, or 3x3 = 9 - 1.5 = +7.5 dBd if one is optimistic. Necessarily, doubling the wire, e.g., doubling the number of full waves on the wire at a given frequency, adds about 3 dB of signal strength. On 20 meters, where the Big Loopy is four full waves, then at worst, the gain is 4x3 = 12 - 1.5 = +10.5 dBd. No wonder I am told by hams on the mainland that the Big Loopy produces the "Bodacious Signal."

Furthermore, the Big Loopy is hard to beat when used on 40 and 80 meters, inter-island. I run 10-20 watts, and usually am 59 or "in the red" on the outer islands (Kauai, Maui, Hawaii).

So if you are fortunate enough to have a bit of area, put up a Big Loopy, even if you can only manage 71 feet of wire or so, about 17 to 18 feet on a side, for 20 meters. This will give you 2 waves on 10 meters, and 1-1/2 on 15 meters; the 12 and 17 meter bands being tunable via an ATU or matchbox. Don't worry if your antenna is not exactly square or level or very high. Just put one up and give it a try. You'll put out *some* signal which will go *somewhere*, and you might be pleasantly surprised. And then you can enjoy the fun of tilting a side or an end of Big Loopy to put a lobe where you want. Or you might try loading two sides with about 360 ohms of inductive reactance to create a "Big Baby Loopy" to achieve more gain in a desired direction (see *73 Amateur Radio Today*, November 1992; "Baby Loopy"). 73

The TriField Meter

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other words, you are free to interpret and worry as you please.

It is important to note that the magnetic field sensors capture only AC fields—you can't use this thing to see how far your speaker magnet's field extends. It is possible to measure steady-state magnetic fields, but it requires a more sophisticated type of measurement device called a magnetometer, which the TriField meter does not contain. As health studies do not currently indict steady-state fields, Alphalab apparently saw no reason to increase the unit's cost to make it possible to measure them.

If you're worried about what your gadgets' fields might be doing to you, the TriField meter will help you find the best placement for your devices and yourself, so that you can minimize your exposure. The price is very reasonable for what it does. It's an interesting and unique product. It's available from Alphalab, Inc., 1280 South Third West, Salt Lake City UT 84101. For additional information contact David at 503-543-6545. 73