A Gain Antenna for 28 MHz

Give your 10-meter signal a boost with this simple antenna.

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NEW HAM COMPANION

Although in coming years the 10-meter band won't provide the excitement it did at the peak of sunspot cycle 22, DX openings will still occur, especially during spring and fall. And who knows? With the large number of 10-meter operators and wide availability of inexpensive, single-band radios, the band may be the hangout for local ragchews that it was before the advent of 2-meter FM.

I'd like to present a simple antenna for 10 meters that provides gain over a dipole or inverted **V**. Similar designs have been published before, but because I never hear them on the air, I think they must not be fully appreciated. The antenna is a resonant, rectangular loop with a particular shape. It provides 2.1 dB gain over a dipole at low radiation angles when mounted well above ground. This represents a power increase of 62%. The antenna is simple to feed—no matching network is necessary. When fed with 50-Ω coax, SWR is close to 1:1 at the design frequency. SWR is less than 2:1 from 28.0 to 28.8 MHz for an antenna resonant at 28.4 MHz.

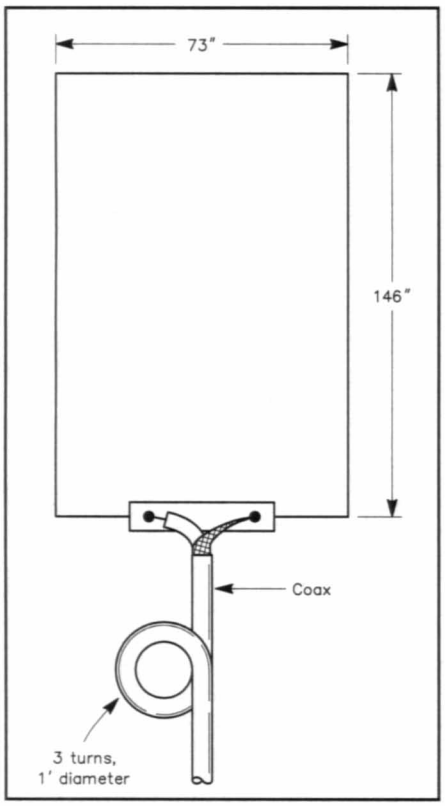

Figure 1—Construction details of the 10-meter rectangular loop antenna.

The antenna is made from #12 wire (see Figure 1). For horizontal polarization at 28.4 MHz, the loop is 73 inches wide and 146 inches high (just larger than 6×12 feet). Feed the antenna at the center of the lower wire. Coil the coax into a few turns near the feedpoint to provide a simple balun. A coil diameter of about a foot will work fine. You can support the antenna on a mast with spreaders made of bamboo, fiberglass, wood, PVC, or other nonconducting material. You can use aluminum tubing both for support and conductors, but you'll have to readjust antenna dimensions for resonance.

This rectangular loop has two advantages over a resonant square loop. First, a square loop has just 1.1 dB gain over a dipole. This is a power increase of only 29%. Second, the input impedance of a square loop is about 125 Ω. You must use a matching network to feed a square loop with 50-Ω coax. The rectangular loop achieves gain by compressing its radiation pattern in the elevation plane. The azimuth pattern is slightly wider than that of a dipole (it's about the same as that of an inverted **V**). A broad pattern is an advantage for a general-purpose, fixed antenna. The rectangular loop provides bidirectional gain over a broad azimuth region.

You should mount the loop as high as possible. To provide 1.7 dB gain at low angles over an inverted **V**, the top wire must be at least 30 feet high. The loop will work at lower heights, but its gain advantage disappears. For example, at 20 feet the loop provides the same gain at low angles as an inverted **V**.

A small, 3-element Yagi can provide 6 dB gain over a dipole and great rejection of signals to the rear. If you can install a beam and rotor, you'll find it much more effective than a loop. But for a simple, cheap, gain antenna that can be thrown together quickly, the rectangular loop is hard to beat.

Note: I used the AO 6.0 Antenna Optimizer program to automatically optimize the dimensions of a rectangular loop for maximum forward gain and unity SWR. I used NEC/Wires 1.5 to verify the design with the Numerical Electromagnetics Code. QST

Radio Tips:

The Trusty Slingshot

Trees make excellent supports for wire antennas, but how do youy get a rope over tall branches? Some hams use bows and arrows with good success, but I prefer my trusty slingshot. All you need is some high-strength fishing line and a couple of fishing weights (sinkers). Attach the weights to the l;ine and launch them with your slingshot. If your aim is true, the weights will carry the line over the branches. Tie your rope to the line, find the other end, and then slowly, carefully, pull the rope through the tree!—*WB8IMY*