The following material was extracted from earlier versions of the *ARRL Handbook*. Figure and equation sequence references are those from the 2012 edition.

Project: Vertical Loop Antenna for 28 MHz

This simple antenna provides gain over a dipole or inverted-V. Its size makes it an excellent antenna with which to experiment. The antenna can easily be scaled to lower (and higher) frequencies: Multiply each dimension by 28.4 / f (MHz), where f is the desired operating frequency in MHz.

The shape of the loop is such that it develops 2.1 dB gain over a dipole at low radiation angles with the top mounted one wavelength or more above ground. The antenna is simple to feed — no matching network is necessary. When fed with 50-Ω coax, the SWR is close to 1:1 at the design frequency, and is less than 2:1 from 28.0-28.8 MHz for an antenna resonant at 28.4 MHz. (If the loop is scaled to resonate at lower frequencies, the effects of ground will affect the antenna's resonant frequency and feed point impedance, but not drastically — be prepared to adjust the dimensions.)

The antenna is made from #12 AWG wire (see **Fig 21.88**) and is fed at the center of the bottom wire. Coil the coax into a few turns near the feed point to provide a simple choke balun. (see the **Transmission Lines** chapter for more information on choke baluns.) 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 non-conducting material. You can also use aluminum tubing both for support and conductors, but you may have to readjust the 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 — 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. This happens because the top and bottom of the loop (where the current maxima are located) are farther apart than for a square loop. The antenna's beamwidth is slightly higher 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 a bidirectional gain over a wide range of directions.

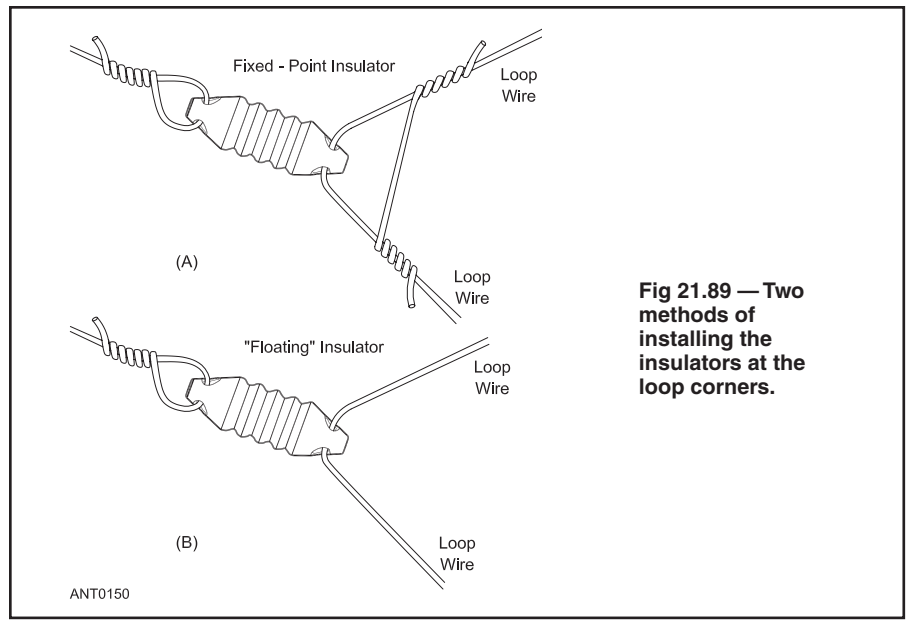

Fig 21.89 — Two methods of installing the insulators at the loop corners.

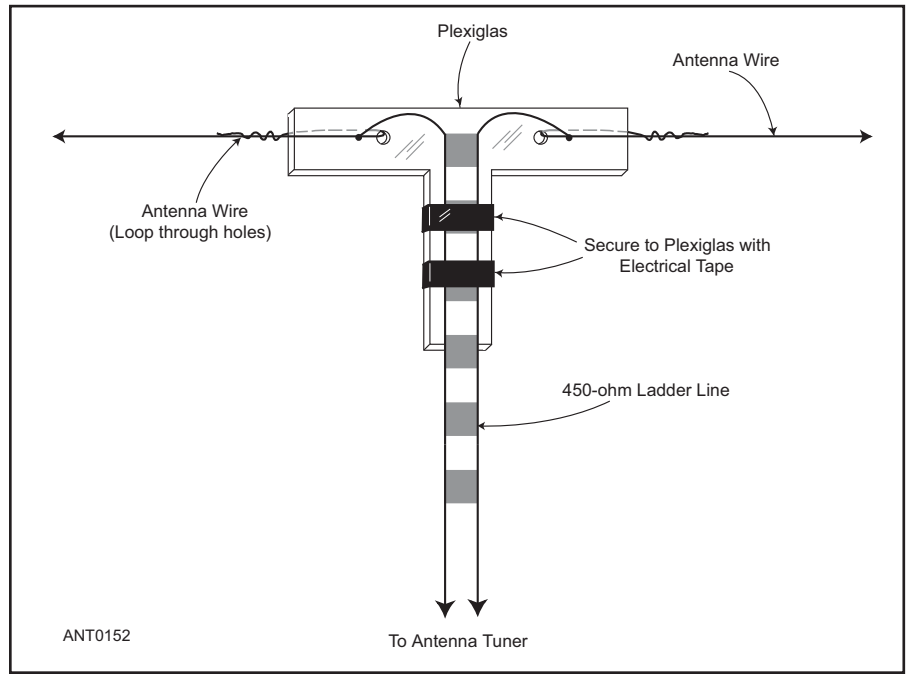

Fig 21.90 — One possible method of constructing a feed point insulator for use with open-wire line.

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 ft high (about one wavelength). The loop will work at lower heights, but its gain advantage disappears. For example, at 20 ft the loop provides the same gain at low angles as an inverted-V.