The Horizontal EWE Antenna

The original EWE shepherd goes in a new direction for low noise reception.

Floyd Koontz, WA2WVL

This antenna was designed to solve a major reception problem at this location by maximizing the received signal to noise ratio (SNR) of 75 meter phone signals coming from Europe.

Background

In 1999 I had up a six element switchable vertical array hung from some of the many 100 foot pine trees in my yard. The array appeared to have good directivity but never received the good signal reports I expected. Eventually I put a dipole between trees at 80 feet elevation as a reference antenna. On nearly every contact the dipole was 10 dB better than the 6 element array. Even though the vertical array wires were 20 feet or more from the trees, the trees seemed to be absorbing the signal. In northern locations, the trees drop their sap to the roots in the winter (DX season on the low HF bands) and many stations have good luck with verticals hung from trees. Here in Florida the sap stays up all year round and the trees are quite conductive (and longer than λ/4 at 75 meters). Vertical polarization simply doesn't seem to work in my yard.

Recently I decided to look at the EWE antenna[1] in a horizontal plane and discovered that it worked very well. With vertical EWEs, a single element has a deep null off the back. A single horizontal EWE, on the other hand, would have that null at 0° elevation instead. Over real ground, the single horizontal EWE has a front to back ratio (F/B) on 75 meters as shown in Figure 1 for 30° elevation. The low angle gain increases with height above ground, as with most horizontal antennas, but the pattern remains nearly the same at 10 to 30 foot heights. The size can be chosen to fit the available space but four supports (trees, towers, house, etc) are needed to hold up the corners.

Of the different sizes and shapes that can be used, one is optimum. It is a square, λ/8 on a side (a total of λ/2 around). For this size (30 × 30 feet for 75 meters), the feed is nonreactive and can be matched with a simple broadband transformer. The calculated feed impedance was 1337 Ω and was matched with a 26:5 two-winding transformer. The F/B was more than 11 dB on 75 meters and 15 dB on 160 meters.

Two Element Design

As noted, a single EWE antenna gives a modified cardioid pattern with a usable, but not dramatic, front to back ratio. The front to side ratio is only about 4 dB so a two element design was established to improve the back and side rejection. Available trees allowed a spacing of 100 feet. Figure 2 shows the layout of this array including the location of the feed points and terminations. Figure 3 is the modeled pattern of the two element array, again at 3.8 MHz and 30° elevation. As is evident, the two element array resulted in a sharpened beamwidth and a significantly improved F/B. While the pattern for 30° elevation is shown, it is similar with lower output at lower elevations.

The antenna was to be 25 feet off the ground. This was determined to be the maximum height that I could safely reach from my 24 foot extension ladder. Vinyl insulated

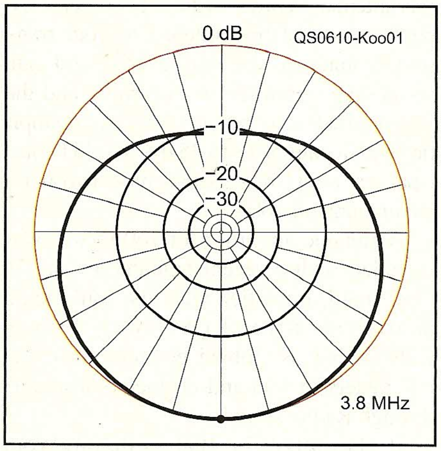

Figure 1 — *EZNEC* modeled pattern of a single element horizontal EWE at 3.8 MHz and 30° elevation.

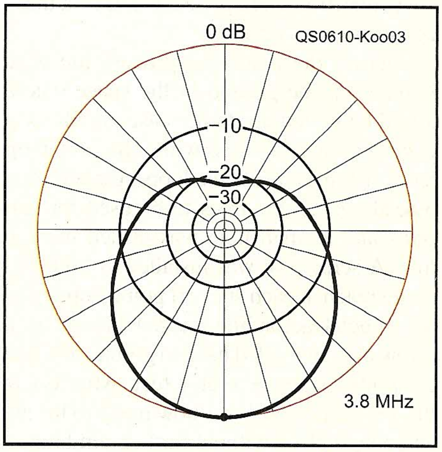

Figure 3 — *EZNEC* modeled pattern of a two element horizontal EWE configured as in Figure 2 at 3.8 MHz and 30° elevation.

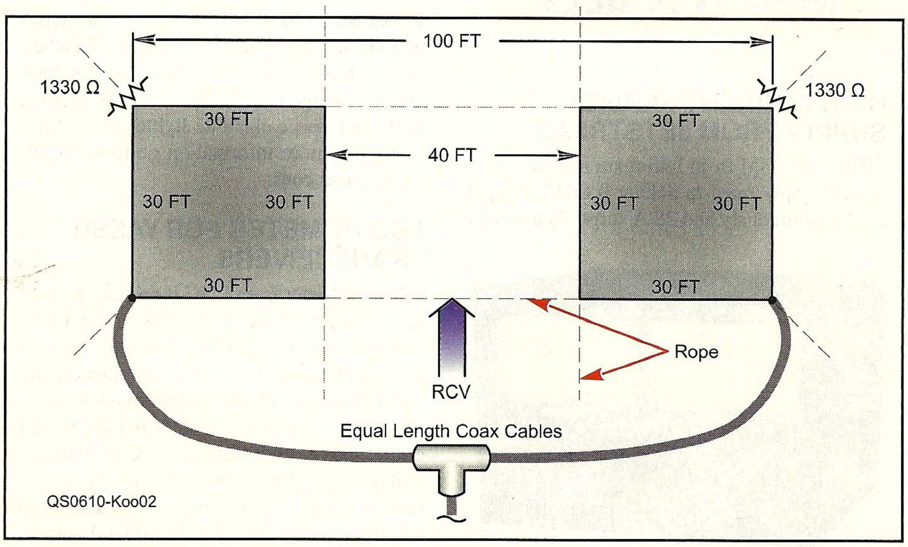

Figure 2 — Orientation of the two element horizontal EWE antenna array.

[1]Notes appear on page 38.