It's hard to think of a simpler way, or even a more frugal way, of getting up an antenna. If you have limited funds or limited space, check out this solution offered by W8TYX.

A Horizontal Loop Antenna For 40 Meters

BY H.H. HUNTER*, W8TYX

When my only antenna (a roof-mounted vertical for 7 MHz) failed during the winter, I was not able to repair it because of the cold weather. I needed a replacement, but no trees, towers, or tall buildings were available as supports. After some experimentation I arrived at a (more or less) horizontal loop antenna which has performed surprisingly well.

Fig. 1 shows the general layout of the loop antenna. It is a closed loop with a total electrical length of about one wavelength at 7 MHz. I used No. 20 copper wire because that is what I had; the size of the wire is not important. The loop begins under the house eave about 8 feet above the ground and continues to the corner of the house about 24 feet away. The loop continues from the corner of the house to the corner of the garage about 24 feet further. The corner of the garage is about 7 feet above the ground. From there the loop continues to the peak of the garage roof about 11 feet; this is the highest part of the loop and is about 11 feet above the ground. The loop then continues to the far corner of the garage, about 19 feet and at a height of about 7 feet. From there the loop goes to the eave under another corner of the house, a distance of about 25 feet; height here is about 8 feet. The loop then goes vertically down the side of the house about 5 feet; the purpose of this "jog" in the loop is to add length and make the antenna resonant at the desired frequency in the 7 MHz band. The loop then goes horizontally for a distance of about 7 feet, and then more or less vertically back up to the eave, and horizontally for a distance of 6 feet back to the starting point.

The loop is fed at the starting point with RG-8 coaxial cable. One end of the loop is connected to the center conductor of the coaxial cable, and the other end of the loop is connected to the shield.

The "jog" in the loop, described above,

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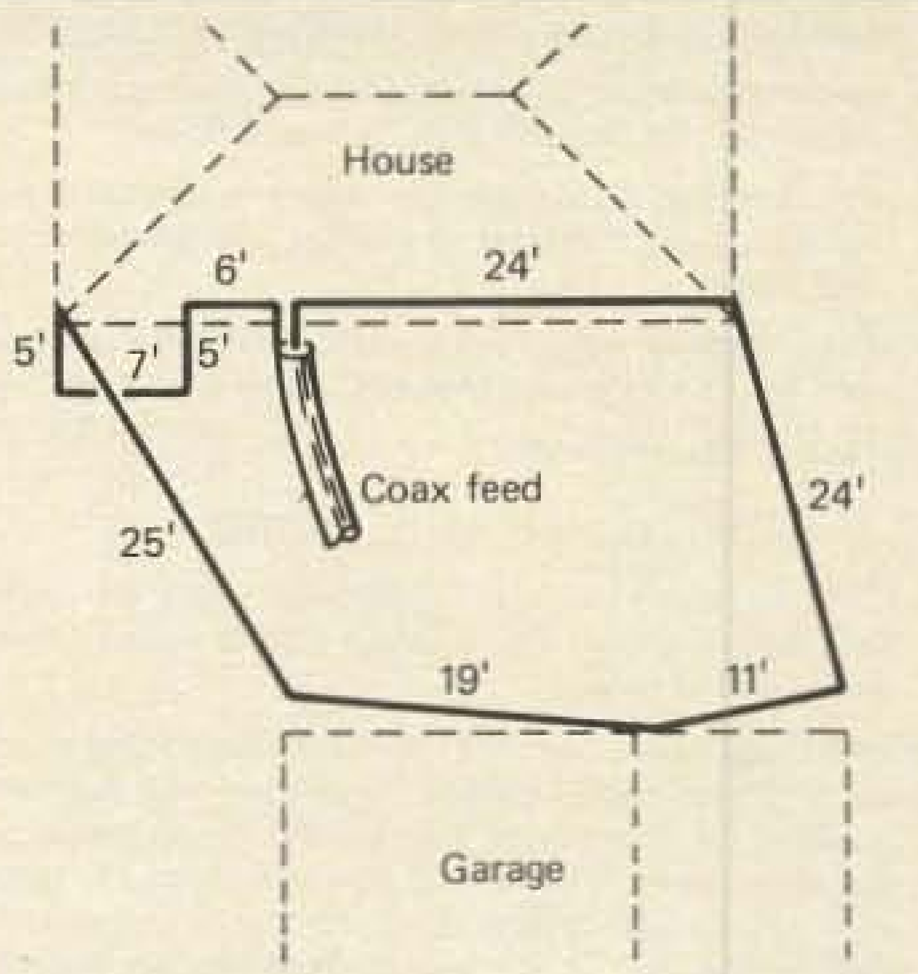

Fig. 1– The general layout for the loop antenna. Later on the author shortened it to take advantage of the 30 meter band.

was not in the original version of the antenna; it was added after measurements with a noise bridge showed that the resonant frequency of the antenna was too high. The dimensions cited above were not "designed." Rather, I used the space and the supports that were available and then adjusted the overall length of the loop to make it resonant at the desired frequency near the low end of the 40 meter band.

If you build a similar antenna, use what you have in the way of space and supports and start with a total length of the loop equal to about one wavelength at the desired operating frequency. A wavelength is given by the expression:

$$\lambda = \frac{935}{f}$$

where: λ = wavelength in feet
f = frequency in megaHertz

After you have erected the loop with the calculated total length, measure its resonant frequency using a grid-dip meter, an s.w.r. bridge, or a noise bridge. The calculated length is just a starting point. The resonant frequency of the antenna will be affected by the presence of nearby objects and the height above the ground. Adjust the length of the loop to obtain the desired resonant frequency. An increase in length will decrease the resonant frequency while a decrease in length will increase it.

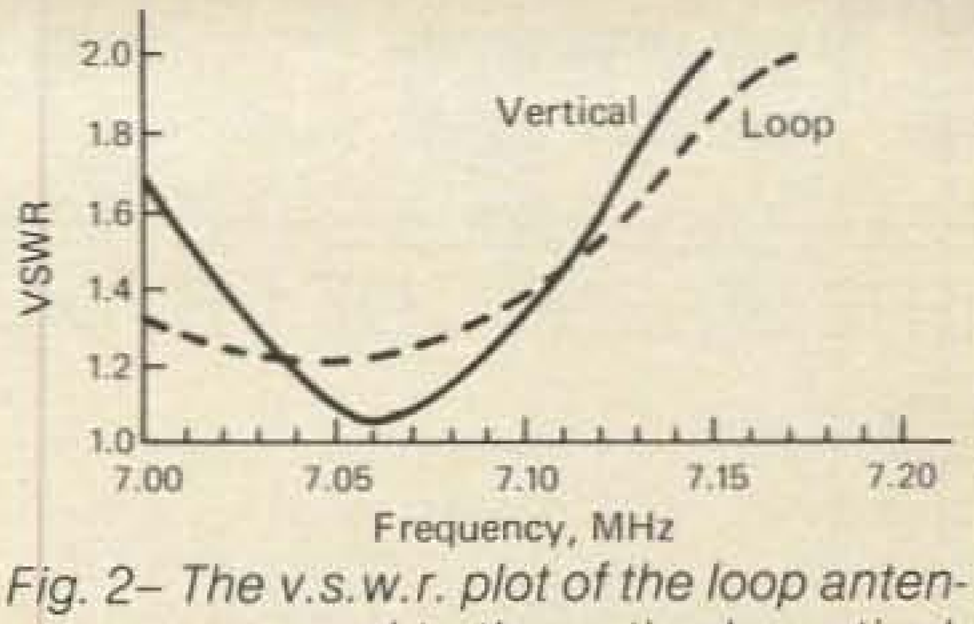

Fig. 2– The v.s.w.r. plot of the loop antenna as compared to the author's vertical.

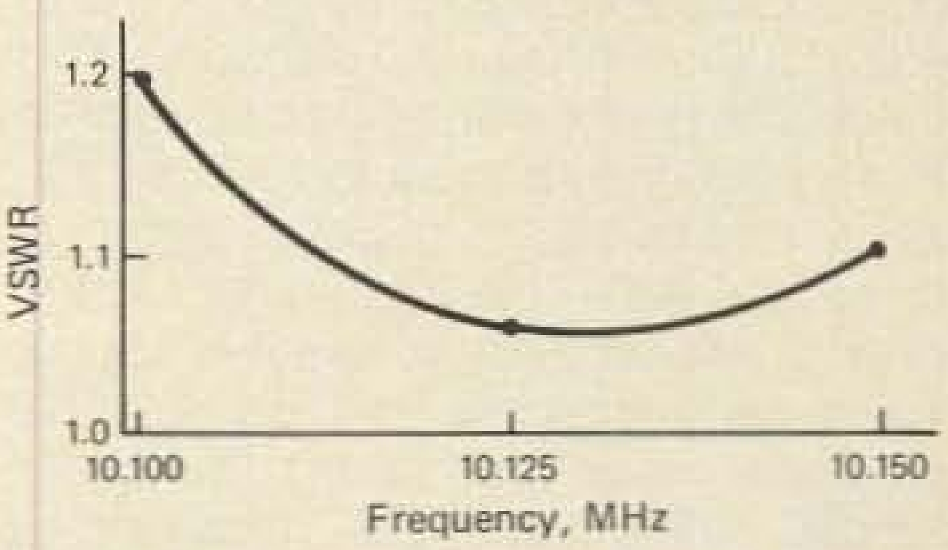

Fig. 3–The v.s.w.r. plot of the antenna when modified for 30 meters.

Fig. 2 shows the v.s.w.r. of the completed loop as a function of frequency for the 40 meter band. These measurements were made at the far end of a 50 foot length of RG-8 coaxial cable which was connected to the loop. The bandwidth for a reasonable v.s.w.r. covers most of the c.w. portion of the 40 meter band. I do not have equipment to measure the impedance of the antenna, but the minimum v.s.w.r. of 1.2 to 1 indicates that the driving impedance at resonance is a reasonable match for the 50 ohm impedance of the coaxial feedline. Measurements of my (repaired) vertical antenna are shown for comparison.

A horizontal loop antenna radiates most of its energy at high angles with respect to the earth. Therefore, this is not a low-angle DX antenna. However, on 7 MHz it performed well on short hops out to a few hundred miles. The best DX I worked using this antenna was OK1APV in Czechoslovakia, but band conditions were good that night. It consistently performed well with stations out to about 500 miles; beyond that distance my vertical antenna did better.

After the 10 MHz band opened, I shortened the overall length of the loop and made it resonant for that band. Fig. 3 shows the v.s.w.r. of that loop across the 30 meter band; it is less than 1.2 to 1 over the entire band. I have worked VK3AGW twice using this simple antenna.

If you are stuck without an antenna, or just want to try a different type of antenna, give this horizontal loop a try. It's not a world beater for DX, but it is simple, easy to put up and adjust, and works reasonably well—a good combination.