Where there is a will there is a way. WD6DJT proves once again that amateurs are innovative when it comes to building antennas.

A Penny-Pinching 10 Meter Apartment Antenna

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Like many apartment-dwelling radio amateurs, I have been faced with a supreme challenge of diplomacy: erecting an outdoor antenna system with management's permission. There are often many restrictions, and sometimes even the most tactful attempts at persuasion can leave the radio enthusiast with no antenna. With this problem in mind, I decided to design an indoor antenna system that was so simple that even I could build it.

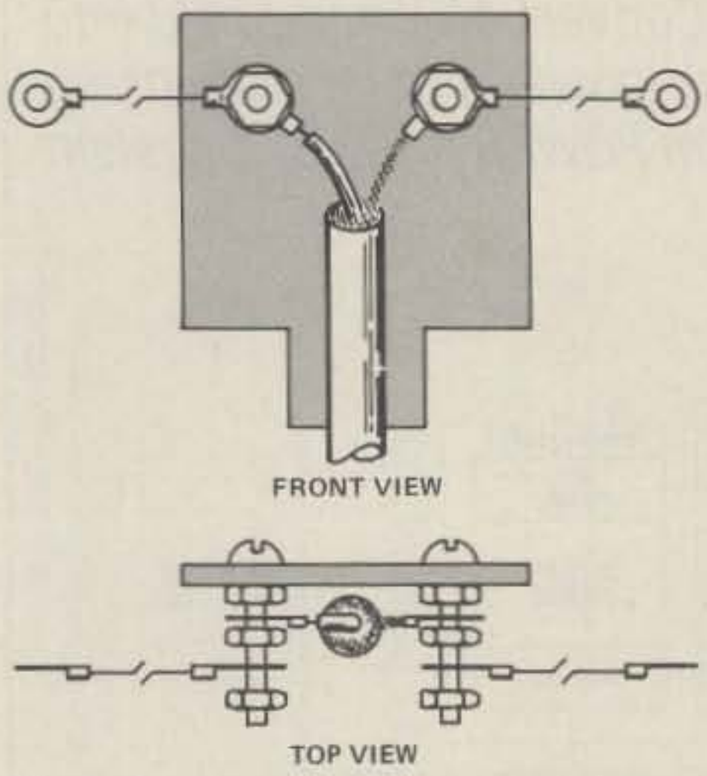

Fig. 1– Front and top mechanical views of the indoor antenna.

The Design

In designing my indoor antenna, at least one constraint was immediately obvious. The system needed to have dimensions that allowed it to fit in a small space. This question of proper size influences the potential range of usable resonant frequencies. In addition to size was the choice of antenna type. An indoor Yagi seemed impractical and a quad seemed absurd. That left the very simple half-wave dipole. It would be easy to design and easy to construct.

Using the equation

$$\frac{492}{f\ (MHz)} = \text{length (feet)}$$

I found that only a 10 meter half-wave dipole could fit comfortably into a small room without loading coils. I proceeded to find the exact theoretical length of my antenna with a resonant frequency of 28.500 MHz. I used the above equation once again and calculated the total length as 17.26 feet. Notice that the numerator of the equation is 492 and not the standard 468. This is because no insulators were to be used and, therefore, end effects would be negligible.

Now that I had decided on a 10 meter half-wave dipole and found the desired length, the question of using a balun remained. A little research told me that a 1:1 balun could be used between the feedline and antenna, but that it was not critical. Without the balun, transmitted signal pattern irregularities would be minimal.

Construction

My goal was to create something easy to build, but I also wanted to keep the cost down. For this reason I chose clear acrylic as the central wiring block. It is inexpensive and blends with most wall decor. Other necessary parts included 6 solderless terminals, 1 tube of instant glue, 1 coaxial cable (52 ohms), 2 machine screws, 6 steel hex machine screw nuts, 1 solderless coaxial male connector, and 20 feet of uninsulated narrow gauge wire.

Once the acrylic block had been cut to the shape shown in fig. 1 and the two holes drilled (they should be about 2 inches apart), I inserted a machine screw into both holes and secured them using hex nuts. I then stripped about 1½ inches of insulation off one end of the coaxial cable. The exposed shielding was unwrapped from around the center conductor and twisted into a single wire. On the end of the center conductor and the shielding wire, I clamped solderless connectors. These leads were connected to opposite posts on the acrylic block and were retained with hex nuts. On the other end of the coaxial cable, I attached the solderless male connector.

Now comes the only tricky part of the job. Using my dimensions, I cut the narrow gauge wire to a length of 17 feet 3 inches. Then from the same wire, I cut off a length equal to the distance between the posts on the acrylic block. That done, I cut the remaining wire into two equal lengths and clamped solderless connectors onto the four ends. Each element was then connected to an opposite post and secured by hex nuts.

To finish the job, I instant-glued the section of insulated coaxial cable just below the machine screw posts to the acrylic. I then tied some fishing line to the ends of the antenna wires. The fishing line insulates each element from the apartment wall upon installation.

Operation

Be sure to orient the antenna as shown in fig. 2. If the acrylic block is located above the transceiver, radio frequency feedback may cause problems on single sideband. Also, since the antenna is indoors, standing wave ratio can be excessive. With a tuner, I can keep the s.w.r. under 1.5:1 over a range of 500 kHz.

Unless the antenna is used in a room with a high ceiling, its height will probably be well below a half-wavelength off the ground. This theoretically increases the angle of radiation and decreases potential long-distance communications. However, even with my low 7 foot ceiling I have regularly made contacts beyond 3000 miles.

Conclusion

Other than long-wire antennas, this system is perhaps the simplest to design and build. The technique is age-old and I certainly cannot take credit for it. However, I have shown that a useful antenna is possible for under $10.00.

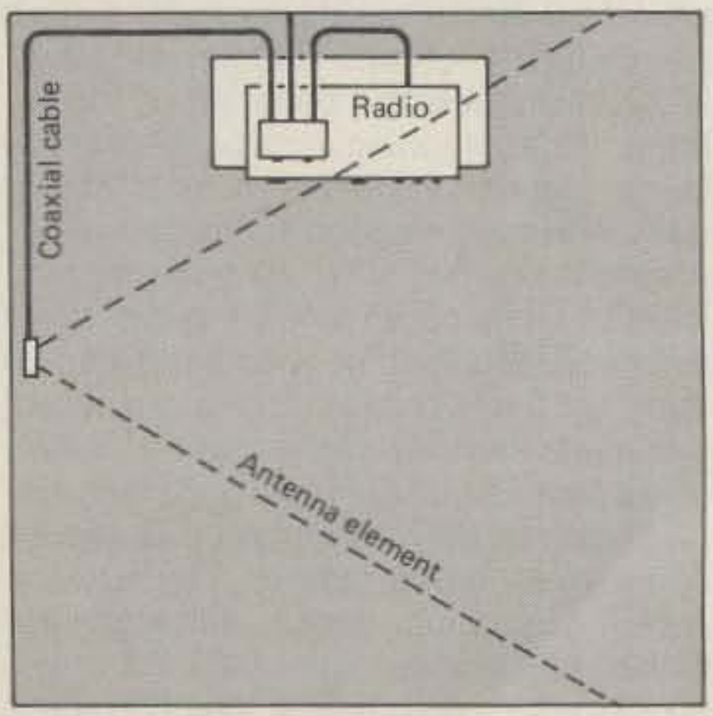

Fig. 2– Top view of the room showing the proper orientation of the antenna.

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