K3WBH comes up with another multi-purpose antenna guaranteed to impress your neighbors.

A Multi-Band, Multi-Purpose Helix Antenna

BY T.E. WHITE*, K3WBH

Recently, I received a request from a reader. He asked, "Can you come up with a multi-purpose antenna I can use not only for 3/4 meter hamming, but also to monitor public service stations in the 450-512 band, and receive some of those upper u.h.f. TV channels out here in California?"

Yes, I thought to myself, it is possible to build an antenna that will cover all bases. And furthermore, some TV broadcasters are converting even now to circular polarization.

Cross-polarized yagis are rather cumbersome and require an awful lot of hole-drilling. Why not a helix? Wind it for right-hand circularity and make it easily constructible using fiberglass quad spreaders as supports.

The helix can cover a bandwidth of about 1.8 × its base design frequency. Make the latter 420 MHz and it

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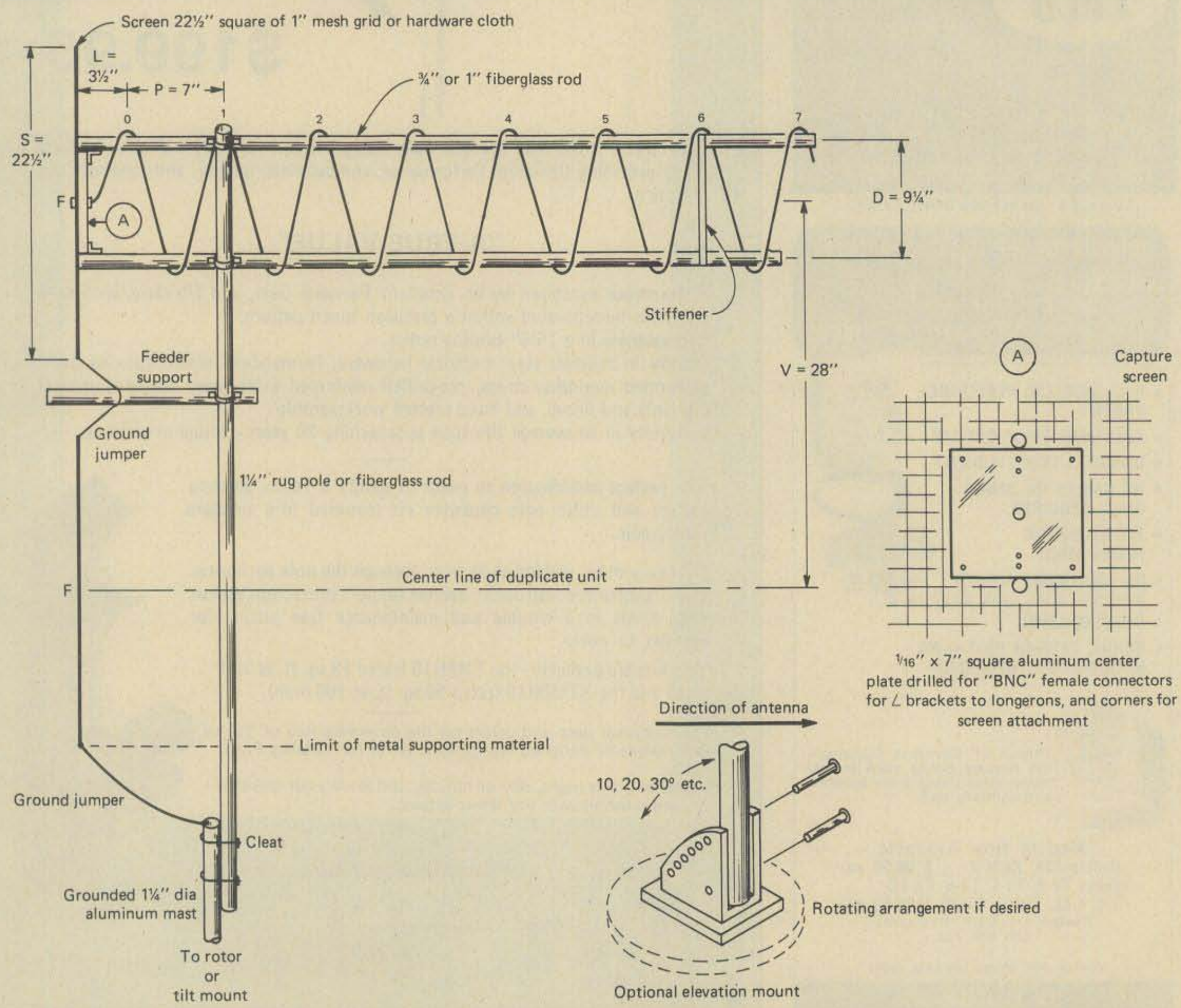
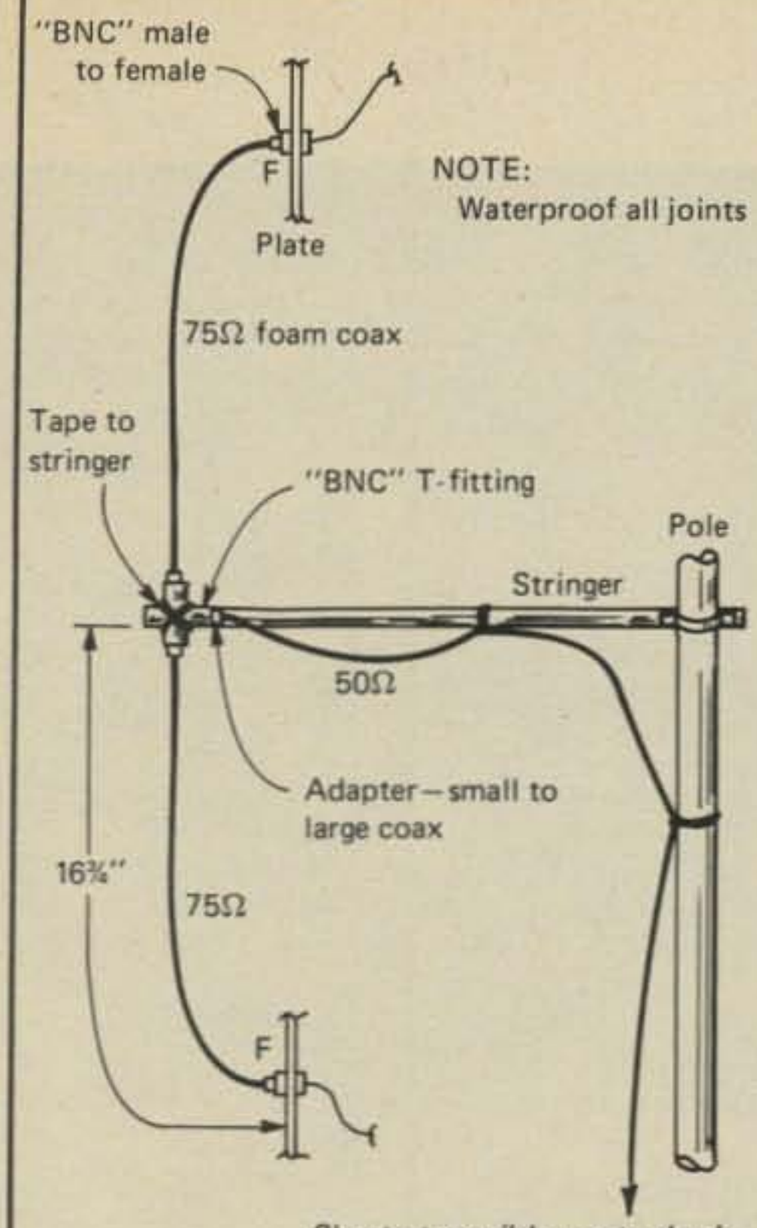


Fig. 1- Mechanical diagram for the helix antenna. It should be noted that it bears no relation to the other double helix by Watson and Crick.



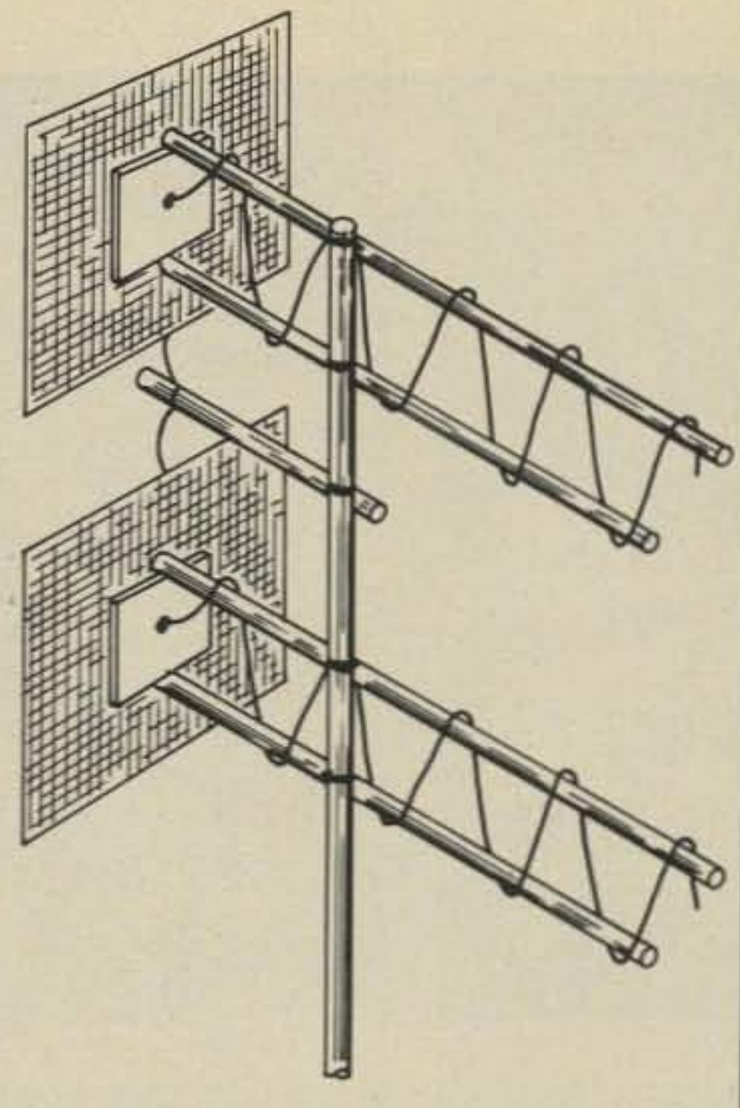


Fig. 2- The feed system for the helix antenna.

will perform well up to 750. A pair of 7-turners will show 16 dB (40 × power) gain when receiving the same-hand circular emissions, and 13 dB (20 ×) on either vertical or horizontal signals. No dimension need be greater than 50″, so it will be easy to support. Fading and Faraday rotation effects will be minimized.

Fig. 1 shows the basic parameters of the helix. Frequency coverage may be altered if the following factors are observed:

P Pitch (dist. btwn. turns) = 1/4 λ
D Diameter of coil = 1/3 λ
S Sides of screen = 4/5 λ
L Screen to turn zero = 1/8 λ
V Stacking, coil c to c′ = 1 λ

. . . at the lowest desired frequency Coil material is #12 copper (don't try "Copperweld"). Screen is 1″ mesh hardware cloth. All structural pieces within area of antenna must be non-metallic. This includes the mast.

The helix is shown mounted parallel to earth. For low angle terrestrial "band opening" type work it should be left this way. For "sat-trak" or extra-terrestrial work, an elevation mount having settings at 10, 20, and 30 degrees can be made as shown. This requires mounting the antenna on a flat or slight-peak roof for easy access. There are, of course, commercial remote elevation drives available.

Great height is not important for the antenna. What is important is a clear "take-off" field out in front of the array for many wavelengths in any desired direction—no foliage, no metal or even non-metal objects. 73