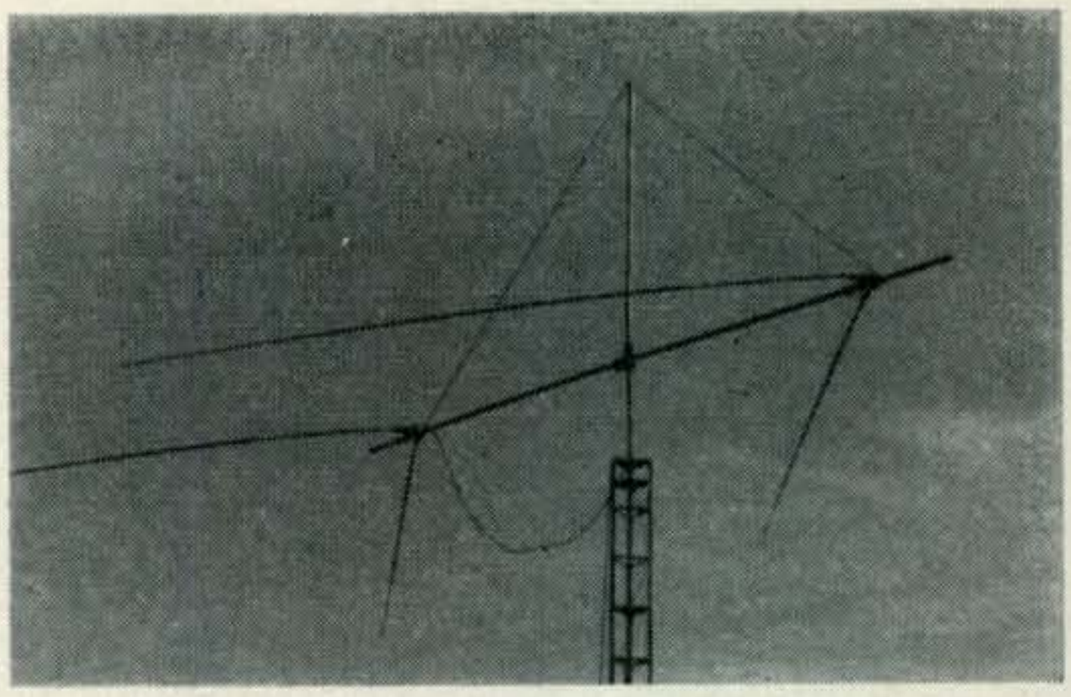

The directional V beam installed atop the author's tower. The vertical support keeps the ends from sagging.

A "V" Beam Antenna

BY RONALD LUMACHI,* WB2CQM

This V beam can be operated on one of several bands, 20-15-11 and 10 meters. The element lengths are varied by the use of carefully placed s.p.s.t. knife switches.

F.C.C. regulations are quite explicit concerning the maximum d.c. input to the final stage of the amateur and citizen band transmitter. As a consequence, the serious operator must turn toward the antenna radiation system for the necessary db gain in order to combat today's heavy QRM level.

In most instances space and money are prime factors that tend to govern an antenna's complexity. The majority of radio operators therefore gravitate toward the array that offers the most gain with the minimum cash outlay. With this firmly in mind, consideration might be given to this homebrew parasitic V wire beam boasting simplicity of construction and nominal costs for a compatible signal-to-expenditure ratio.

Design Theory

The driven (director) "V" element consists of two wires supported at a horizontal attitude by a dowl-fibreglass combination and fed at the apex with an r.f. current. Major radiation lobes from each leg combine in a manner to produce cancellation and reinforcement effects resulting in a radiated signal perpendicular to the plane of the array. The pattern of a single "V" is horizontally polarized and bisects the apex angle for a propagation pattern both to the front and rear of the array. It follows that the gain of this configuration is somewhat greater than a similar dipole. For example, a V antenna, one wavelength, with an apex angle of 90 degrees, boasts approximately a 2.1 power gain over the familiar isotropic standard. The addition of a second (reflector) element parasitically coupled boosts the gain of the system resulting in an array superior to a two element beam and comparable in performance to a three element yagi beam.

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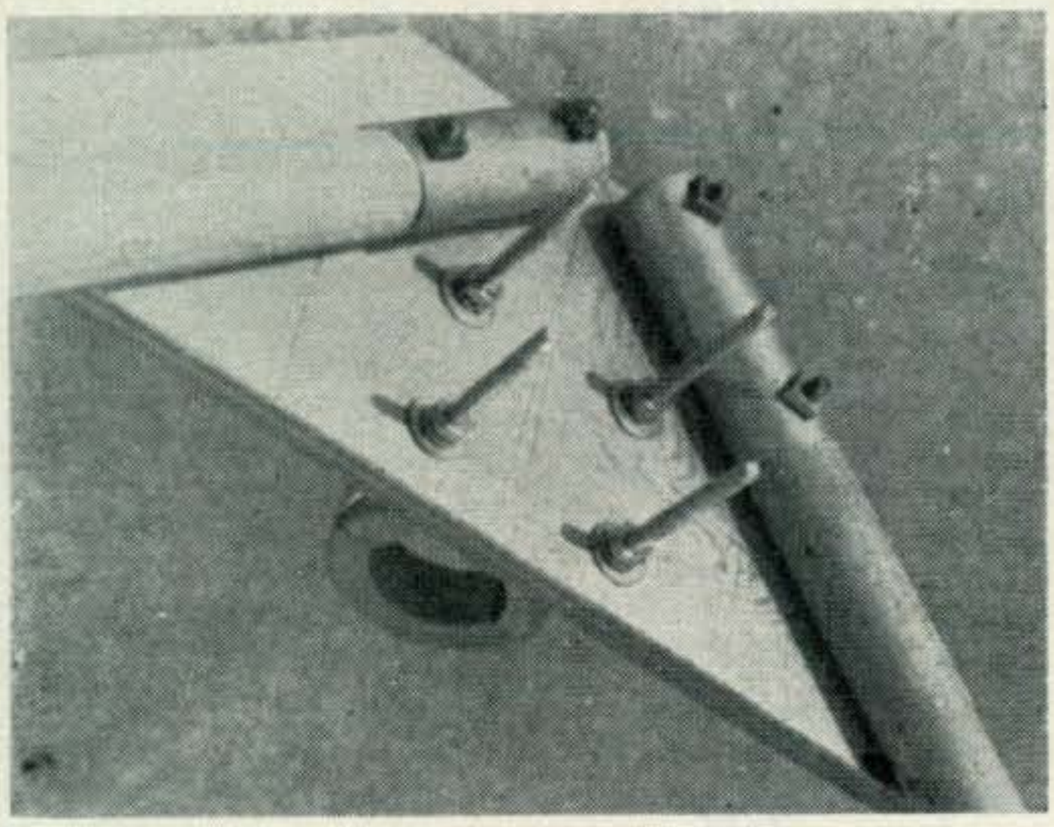
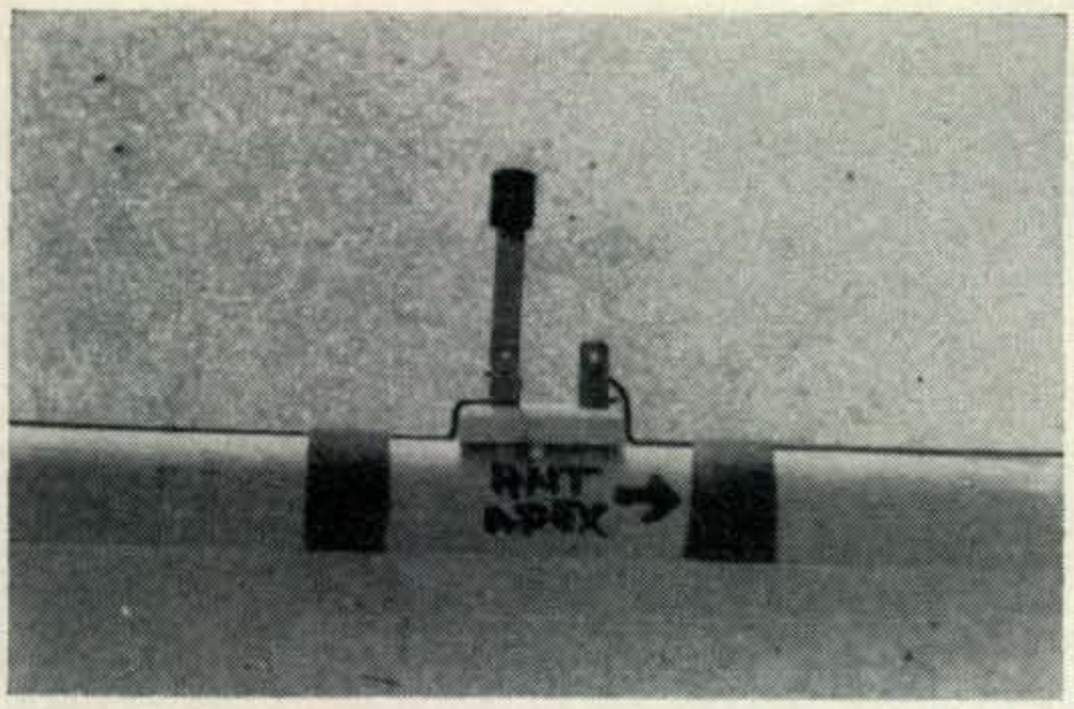


Close up of the V beam apex assembly for 20, 15, 11 or 10 meter operation. Construction details are given in the text.

Construction

Construction was rather simple and from the photograph of the "V" support platform the part's layout can be seen. Half inch plywood was chosen for its inherent strength and non-warping characteristics. However, a coating of creasote preservative solution, purchased from a hardware store, was an absolute necessity. A Cesco clamp (or the more common TV "U" clamp) was used to secure the platform to the boom. For adequate support, two clamps per platform were utilized. A 90 degree angle was drawn on the platform in heavy crayon for proper orientation. Secure two lengths of 5' wooden pole (1⅛") to the platform by drilling two ¼" holes through the platform and poles utilizing the drawn lines as angle guides. Fasten securely with 2" × ¼" stove bolts. To prevent burrowing use large washers or half "shells" cut from a length of TV masting. Under two bolt heads of the driven element install a ¼" solder lug. To maintain an absolute weight minimum four 13' hollow fibreglass poles were purchased. (12' × ¾" dowel might be easily substituted at a substantial price saving but sacrifice in weight.)



Knife switches placed in series with the elements permit manual change of length for shifting of bands (10-15-11 or 10 meters).

The inside diameter at the fiberglass bases were measured at 1⅛" and slipped easily over the dowels forming the V angle for a force fit. All that remained was the installation of #12 or #14 wire along the dowel-fiberglass length to complete the assembly.

The reflector was cut from one length of wire measuring 35' 9" to resonate in the 20 meter band. The driven element was composed of two lengths of wire each 16' 5" in length and terminated in the solder lug at the driven element apex angle. The coax cable was also soldered at these lugs for completion of a monoband installation. Tape the wire along the element lengths at reasonable intervals.

For manual switching multiband operation a s.p.s.t. knife switch was placed in series with each antenna leg at the resonant points indicated by the enclosed chart. Insure that the terminal with the knife arm attached is placed away from the driven apex. If the knife's arm position were reversed, several inches would be added to the wire thereby lowering the resonant frequency. (see photo)

A boom of metal (or wood) measuring 8' and a diameter of 1⅝" supported the entire system. The Q or bandwidth of the wire beam was somewhat high hence major moves from the resonant point must be made within the tolerances dictated by the s.w.r. bridge. A 50 ohm coaxial transmission line provided a suitable match between the transmitter and antenna with a tolerable ratio of reflected power.

Resonant Frequency	Driven Element	Reflector Element
14.27 mc	32' 10"	35' 9"
21.30 mc	22'	23' 1"
27.10 mc	17' 3"	17' 11"
28.90 mc	16' 2"	16' 10"

Parts List

4—fibreglass poles 13' long[1] (12' × ¾" dowel can be substituted).
2—5' lengths of wooden pole 1⅛".
2—pieces of ½" plywood 1' × 2' approx.
4—Cesco or TV type U bolts.
4—stove bolts 2" ×¼" with nuts and washers.
70' #12 or #14 enameled wire.
S.p.s.t. knife switches (two for each additional band).
2—¼" solder lugs.

Performance

On the air performance netted a front-to-side ratio in excess of 30 db. Front-to-back ratio was a comfortable 18-20 db with the gain equal to a three element yagi. Increased performance figures can be achieved by adding parasitic elements and/or designing the system for monoband operation with a maximum spacing between elements. ■

[1]Available from U.S. Fiberglass Co., 5101 NW 36 Ave. Miami, Fla. $5.50 ea.

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