The V.H.F. Conical Monopole Antenna

BY WALTER L. HARNISH,* WA8IHF

Simple construction for an efficient broadband antenna with low s.w.r. over a 4:1 frequency range.

THE original article that appeared in *CQ* describing the conical monopole stirred up considerable interest and an attempt was made to scale it down for v.h.f. operation.[1] The results were good and the entire range, from 50 to 220 mc, was covered with the s.w.r. less than 2:1 at all times.

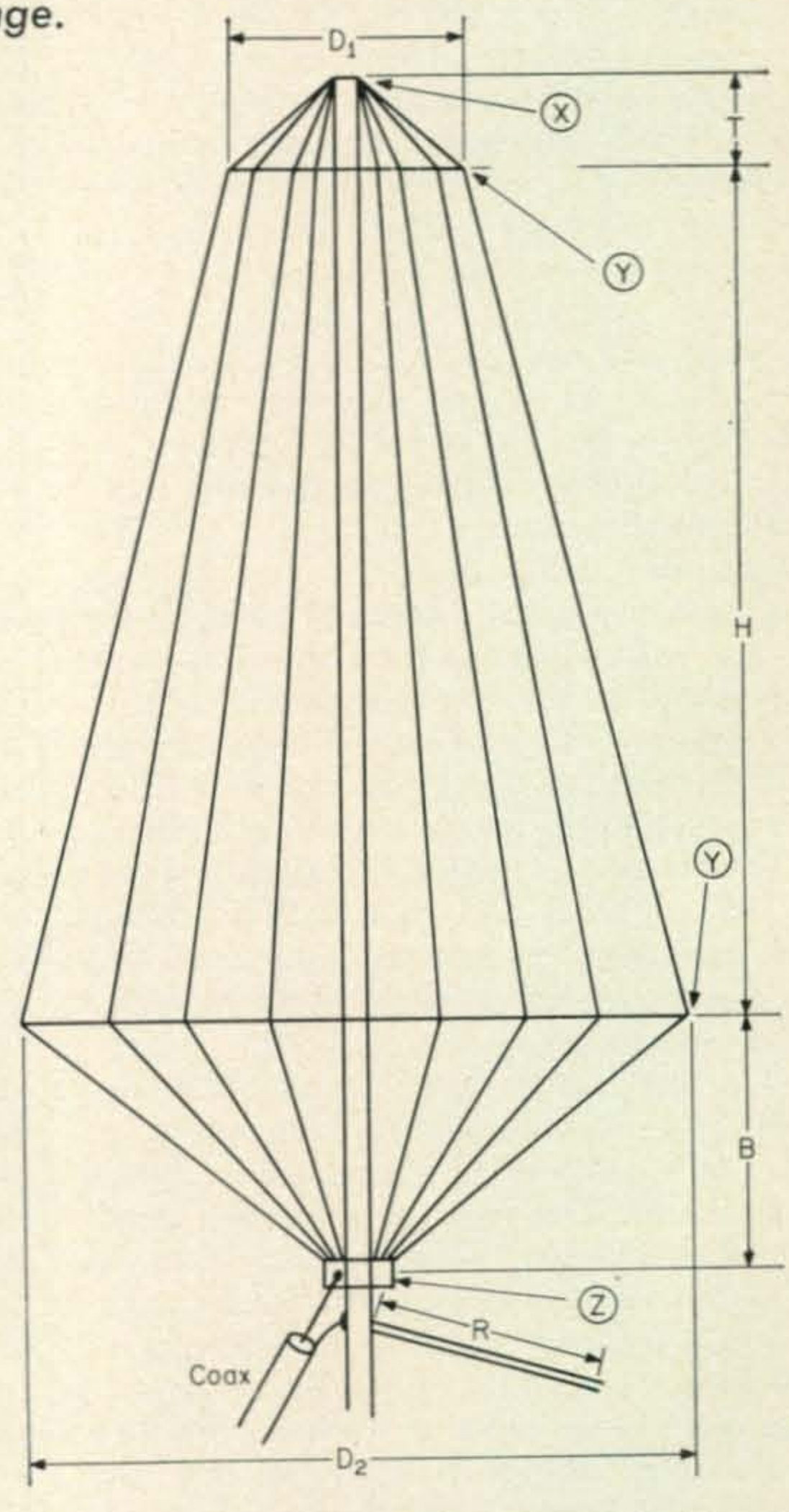
The construction of the v.h.f. model differs from the original. The two rings, shown in fig. 1, are hoops (*D1* and *D2*). The wires are fastened from the top of the mast to the top hoop, down to the bottom hoop and then to the collector ring. Only the collector ring is insulated from the mast. At least twelve wires should be strung in this manner, (I used sixteen), and they should be equally spaced.

The alternate method, crossarms, used in the original article, is suitable for lower frequencies as the hoop sizes become unwieldy. Three or more crossarms may be used with the wire stretched around the ends. Two wires are run from the top over the ends of each crossarm and spaced a minimum distance "*S*" as given in the dimension chart in fig. 1.

The antenna should be fed with 52 ohm coax, the center conductor connected to the collector ring and the shield to the mast. The match may be adjusted very carefully by setting the droop of the radials. This can only be done for the two small antennas because the larger radials are rather unmanageable.

The performance of the larger antennas may be improved by the use of counterpoises, or radial wires. The suggested lengths for these are shown in the chart in fig. 1, as R.

While the antenna is called the conical monopole, the name "periodic halo" would more properly describe it. The main cone, when wired as illustrated in fig. 1, is in effect a solid cone at the frequencies used. The circumference, at some point, is resonant to the frequency to which the transmitter is tuned. All other circumferences have high reactances, As you shift frequency, the active part of the antenna shifts to a new location which is resonant to the new frequency. Therefore, if the transmission line is properly matched to the antenna, a low s.w.r. will result (less than 2:1). ■



Range	D_1	D_2	T	H	B	R	S
6–1¼M	8"	24"	3"	30"	9"	56"	
10–2M	12"	40"	4.5"	45"	15"	8'	
20–6M	20"	60"	8"	79"	23"	57"	1"
40–10M	38"	9'6"	12"	13'	33"	9'	2"
80–20M	5'10"	17'8"	26"	24'	6'8"	16'10"	3"
160–40M	13'	39'	4'9"	53'4"	14'8"	37'	9"

Fig. 1—Construction technique and dimensions for the v.h.f. Conical Monopole. Wires are connected to the mast at "X", and to the metallic "hoop" spreader at points "Y." The hoops must be securely grounded to the mast. Point "Z" is a collector ring connecting the bottom ends of the wires, and is insulated from ground. Dimension "S" in the table is the spacing between pairs of wires (used only on the low frequency model.) As many radials ("R") should be used as space permits.

*1055 College Ave. N.E. Grand Rapids, Michigan.

[1]Stroup, L. A., "The Conical Monopole," *CQ*, Jan. 1966, p. 59.