Commentaries

A Department of Constructive Suggestions

How To Construct A Multi-Band Antenna

No graphs and no theory, but an antenna that *works* on 80, 40, 20 and 10 meters. I have often wondered why someone doesn't publish a handbook with antenna dimensions worked out. Most of the fellows want to put up an antenna without plowing through a lot of formulas and graphs.

Here is an antenna worked out by W5LFM* so that it can be fed on 80, 40, 20 and 10 meters with the 300-ohm point for the feeder at the same place for all bands. This lends itself to the use of 300 ohm twin lead.

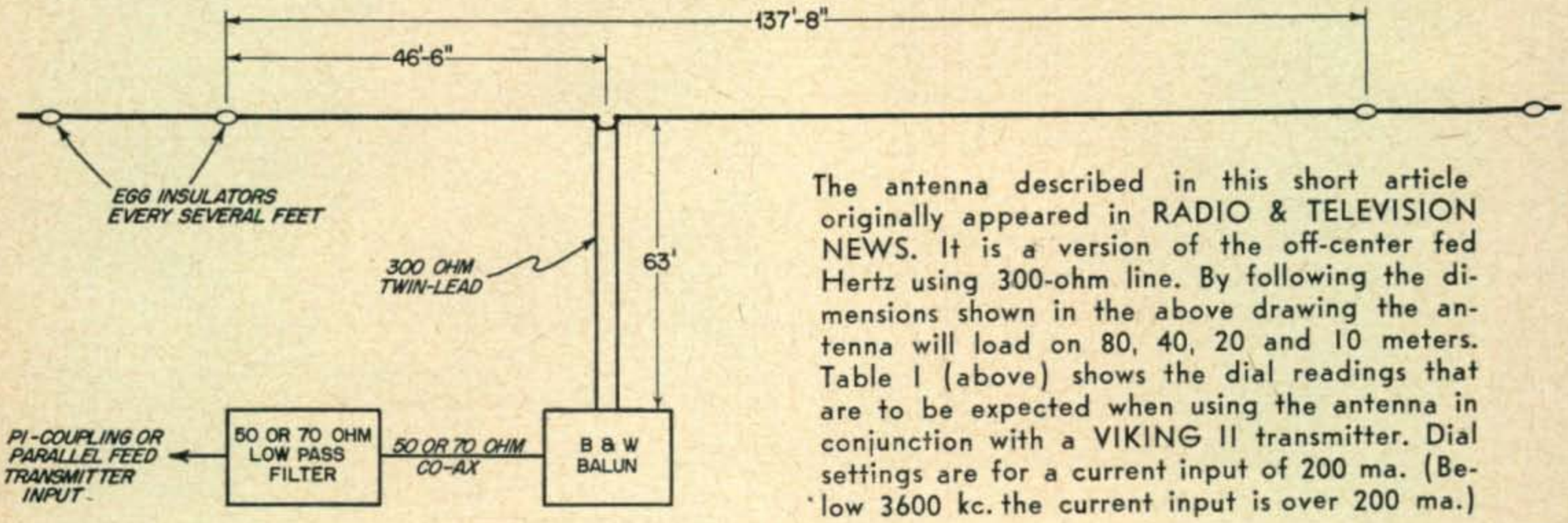
On 80 meters, the half-wave antenna has a high angle of radiation. This is good, as many readers are interested in 200-300 mile contacts. On 40, 20 and 10 meters the angle decreases and comes out about right for DX on each band.

This antenna is a version of the old single wire off-center fed Hertz. It is fed with 300-ohm twin-lead. The antenna must be cut as shown, 137 feet and 8 inches long. The antenna is fed at a point 46 feet and 6 inches from one end. An insulator is inserted and the 300-ohm twin-lead fastened and taped with electrical plastic tape. The antenna is made 137.7 feet specifically so that it falls in the middle of the ten-meter band at about 28.4 Mc., which is the most critical band. It is very broad tuning on all other bands.

There are several ways to couple the antenna into the transmitter. If a parallel tank is used, adjustment can be made by simply moving the link in and out. If a 50 or 70-ohm low-pass filter is used it will be necessary to add a set up *B&W* Balun coils to match to the 300-ohm line

* Graf, "A Multi-Band, Constant Impedance Antenna," **Radio and Television News**, Sept., 1953, p. 72.

FREQUENCY (KCS)	FINAL DIAL	MIN. & MAX.	FINE DIAL
3,600*	11.5	1	0
3,650	12	2	0
3,700	12.5	3	0
3,750	12.5	4	0
3,800	13	4	20
3,850	13	5	0
3,900	13	5	36
3,950	13	5	68
4,000	16	5	68
7,000	53	1	0
7,050	53	1	0
7,100	52.5	2	0
7,150	52.5	2	10
7,200	52.5	3	0
7,250	52.5	3	16
7,300	52.5	3	54
14,000	76	5	84
14,025	76	5	84
14,050	76	5	84
14,100	75	6	0
14,150	75	6	0
14,200	75	6	0
14,250	76	6	10
14,300	76	6	20
14,350	76	6	20
28,000	93	4	0
28,100	93	4	0
28,200	93	4	0
28,300	93.5	4	0
28,400	94	4	0
28,500	94	4	0
28,600	94	4	0
28,700	94	4	12
28,800	94	4	32
28,900	94	4	40
29,000	95	4	30
29,100	95	4	24
29,200	95	4	24
29,300	95	4	28
29,400	95	4	30
29,500	95	4	38
29,600	95	4	44
29,700	95	4	48



The antenna described in this short article originally appeared in RADIO & TELEVISION NEWS. It is a version of the off-center fed Hertz using 300-ohm line. By following the dimensions shown in the above drawing the antenna will load on 80, 40, 20 and 10 meters. Table I (above) shows the dial readings that are to be expected when using the antenna in conjunction with a VIKING II transmitter. Dial settings are for a current input of 200 ma. (Below 3600 kc. the current input is over 200 ma.)

as shown in *Fig. 1.* This system works fine with the *Viking* and *Collins* transmitters, and no antenna tuner is necessary.

I have found that with this antenna there is less TVI than when using end-fed Zepps where there is a large circulating current in the feeders.

Near the ocean it is best to use #12 plastic house wire for the antenna. This solves antenna wire corrosion problems. The antenna will last much longer than when using enameled covered wires.

Table 1 shows experimental settings, using a *Viking II* transmitter as a source. This shows how the loading dials (minimum, maximum and fine adjustments) vary with frequency change. These settings will change if the feeder length is other than 63 feet. This will give the constructor using a *Viking* an approximate dial setting during the initial test.

Do not use rope to support the antenna or you will wake up some morning and find the twin-lead wrapped around the antenna due to the shrinkage of the rope. A swivel does not help very much. It is best to use wire to support the antenna and bring the wire right up to the pulley. The supporting wires should be broken every several feet with egg insulators so as not to unbalance the antenna.

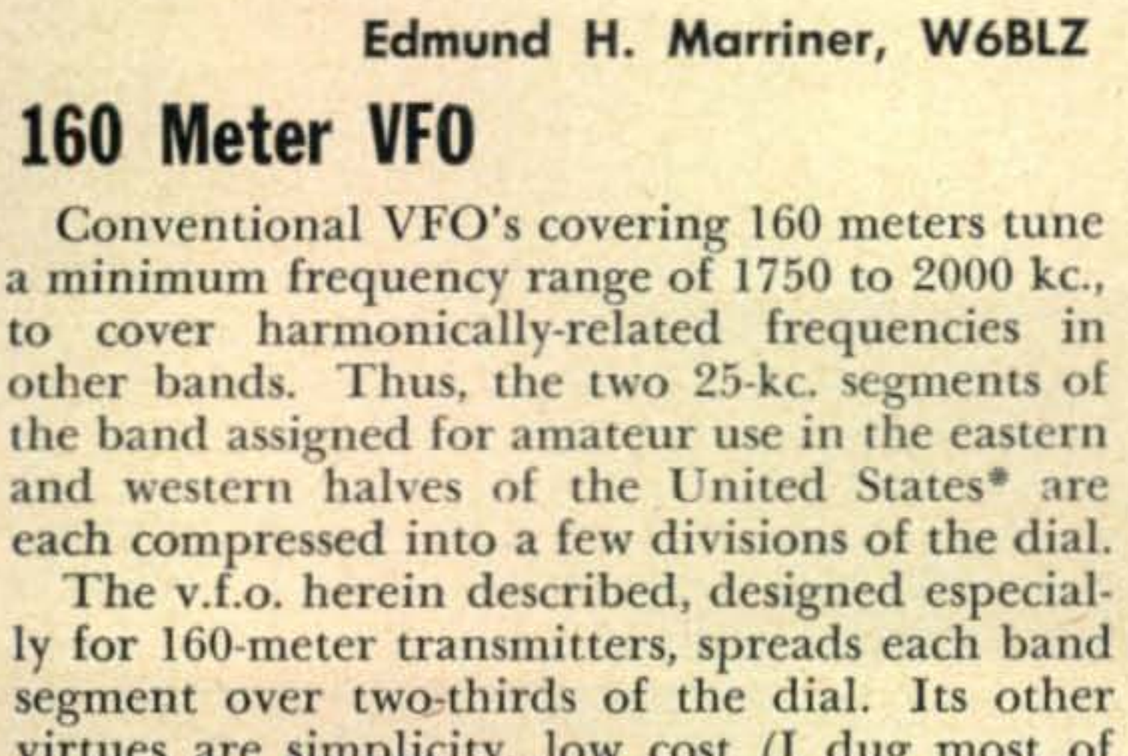
Edmund H. Marriner, W6BLZ

160 Meter VFO

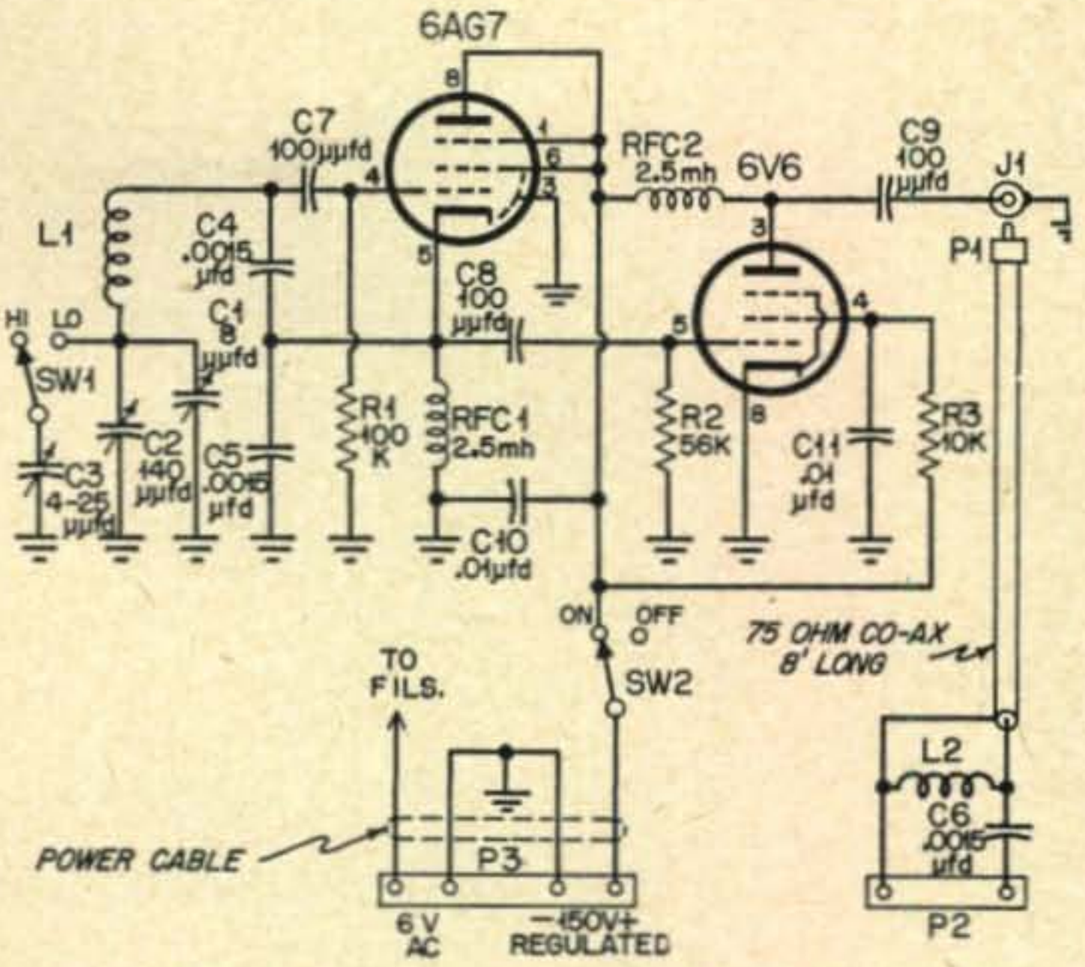
Conventional VFO's covering 160 meters tune a minimum frequency range of 1750 to 2000 kc., to cover harmonically-related frequencies in other bands. Thus, the two 25-kc. segments of the band assigned for amateur use in the eastern and western halves of the United States* are each compressed into a few divisions of the dial.

The v.f.o. herein described, designed especially for 160-meter transmitters, spreads each band segment over two-thirds of the dial. Its other virtues are simplicity, low cost (I dug most of the parts out of my "junk box"), and stability.

* East of the Mississippi, 1800-1825 Kc. and 1875-1900 Kc. West of the Mississippi, 1900-1925 Kc. and 1975-2000 Kc.



Front panel view of the W4TSM v.f.o.



C1—Two-plate, midget variable condenser, (approx. 8 μμfd.).
C2—140-μμfd., APC type air padding condenser.
C3—4.5 to 25 μμfd., ceramic padding condenser, zero temp. coeff.
C4, C5, C6—.0015-μfd., "silver mica" preferred.
C7, C8, C9—100 μfd., mica.
C10, C11—.01 μfd., mica or disc ceramic.
L1, L2—See coil table.
R1—100K, ½w.
R2—56K ½w.
R3—10K, 1w.
RFC1, RFC2—2.5-mh., r-f chokes.
Sw1—Single-pole, two-position, ceramic wafer switch.
Sw2—SPST toggle switch.
J1—Output jack, coaxial type.
P1—Plug to fit J1.
P2—Plug to fit crystal socket of transmitter.
P3—Four-terminal power plug.

Circuit schematic and parts list.

The pictures and the diagram tell most of the story. A 6AG7 Clapp oscillator is cathode coupled to a fixed-tuned, 6V6 amplifier. I housed the unit in a 4x5x6-inch metal box that had previously contained an electric timer, bending a 1½-inch deep chassis to fit it. However, commercial "utility" boxes of the same dimensions with chassis attached to the panel are available *(ICA-3821, etc.)*. The dial mechanism came from the junk box, but is similar to the *National MCN* midget vernier dial.

The major precaution required in building a unit of this type is that of mounting all parts firmly and using stiff conductors in wiring, thus insuring good mechanical stability. *C1*, the main tuning condenser, is a 15-μμfd. midget variable cut down to two plates, while *C2* is a 140-μμfd. midget variable. It is supported by one of the screws of the dial mechanism. *C3*, the low-band segment padder, is positioned between *C1* and *Sw1*, which is mounted in the upper left-hand corner of the panel. It is adjustable with a screwdriver through a hole in the top of the case.

Coil Specifications

1800-1825 kc. and 1875-2000 kc.
L1—68 turns #28 enam., close wound on 1" form.
L2—71 turns #28 enam., close wound on ⅝" form*.
1900-1925 kc. and 1975-2000 kc.
L1—65 turns #28 enam., close wound on 1" form.
L2—68 turns #28 enam., close wound on ⅝" form*.
*** Exact number of turns dependent on length and capacity of coupling cable. See text.**