A Broad Band, Coax, Folded Dipole

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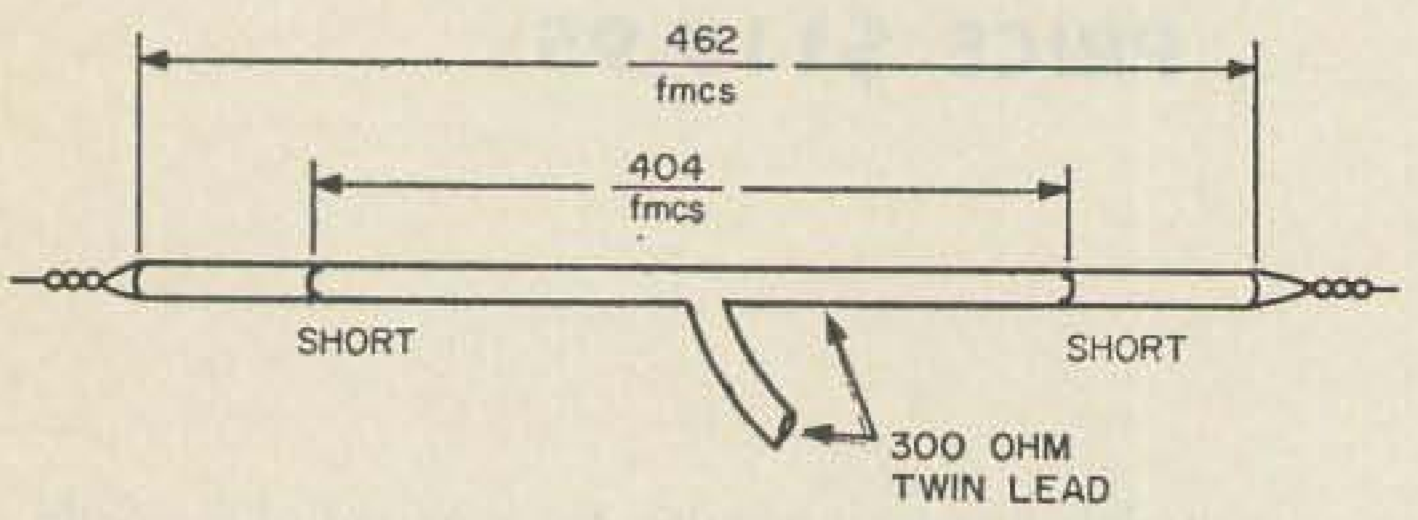
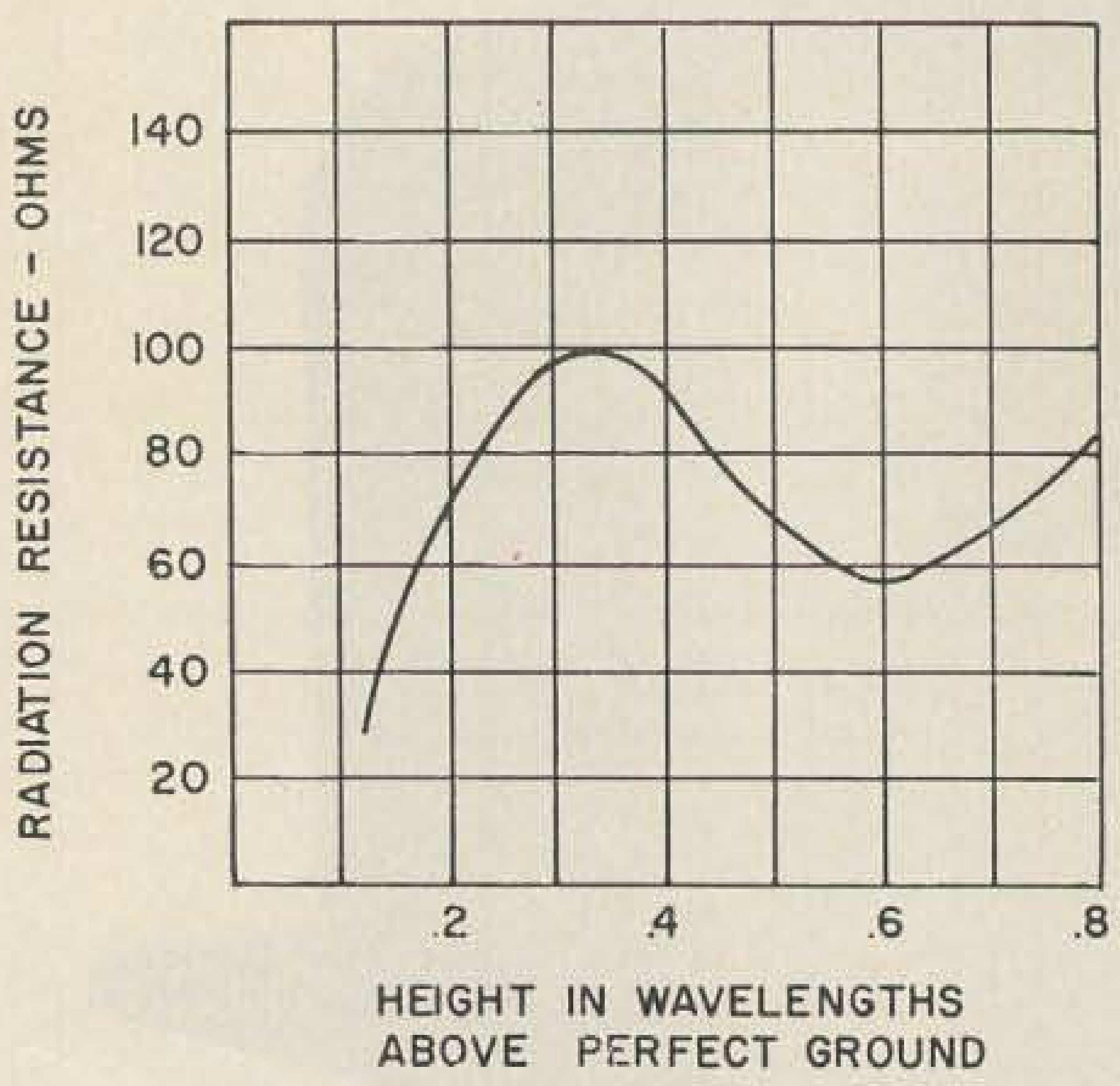
I have heard numerous comments on the bands lately such as, "Don't work any CW here on 80 meters because my antenna is tuned for the phone band and won't load up down there." "I can't talk to him because he works on 3810 and my antenna is cut for 3950." "I'm using an inverted V antenna and the apex angle is sharp causing the bandwidth to be narrow." "I want an antenna that will perform well with a low SWR across the whole 20 meter band." "I can't put up a low frequency dipole because I haven't got the room." This article is presented for these persons' benefit.

Many oldtimers who have used the folded dipole antenna will recall that shorting the two wires of the ribbon a distance out from the center equal to the velocity factor of the ribbon times a free space quarter wavelength, see Fig. 1, will cause the antenna to have a more constant impedance match over a wider range of frequencies thereby giving better bandwidth characteristics. This is the theory on which the material presented here is based with minor variations to suit one's need and fancy.

Since most new commercial transmitters have a relatively small variation in output impedance, 52 ohm coax is a natural choice for a transmission line. When connected to an ordinary wire dipole antenna, coax will match adequately over a relatively narrow range of frequencies provided the dipole is at the proper height





above good conducting ground, see Fig. 2, and effects from surrounding objects is held to a minimum (get it out of those trees and above the house roof). The antenna described here will perform over a comparatively wider range of frequencies than the conventional dipole.

Basically the antenna is a folded dipole made from coax cable. The flat top portion of the antenna is constructed of coax cable (of the same impedance as the feedline) with the end extensions made either of coax, copper wire or twinlead. The end extensions can be fanned or dropped, see Fig. 3, depending on how large your lot is. Fanning the ends (either horizontal or vertical) is desirable in that the Q of the antenna is lowered more by further decreasing the effective length to diameter ratio, hence the antenna bandwidth is increased. This type of construction is very effective on 80 meters especially if the fanned wires are coax cable. It must be kept in mind that fanning the ends of a dipole will shorten its resonant length. The factor depending upon the degree of fanning.

The total length of the shorted center portion which should be made with RG-8U coax (RG58 will work OK with decreased results) is;

$$L_T = \frac{492 \times .66}{f_{mcs}}$$

L_T = Length in feet of center part
f_{mcs} = Mean frequency of operation (megs.)
The length of the end extensions would then be;

$$L_E = \frac{231 - L_T}{2 \text{ x } f_{mcs}}$$

L_E = Length in feet of one end extension
f_{mcs} = Mean frequency of operation (megs.)

Hence the total length of "shorted" coax in the flat top portion for 80 meters would be 86.6 ft. and the length of each end extension would be 19.2 ft. making the overall length of the antenna 125 ft. At each end of the coax in the center of the flat top portion the braid is shorted to the center conductor by stripping the insulation, pushing the braid back, stripping the polyethylene and twisting the two conductors together. At this point the end extension wires can be twisted together with the "short" and the connection soldered. Make sure this connection is substantial both electrically and mechanically because these connections support the weight of the antenna. The feedline is fastened at the center by cutting the braid exactly at the center of the flat top portion without disturbing the center conductor and its insulation. The braid is then separated not more than 1½" and pigtailed so the feedline can be soldered to it, see Fig. 4. When soldering the feedline to the parted braid use long nose pliers to conduct heat away from the polyethylene to prevent excessive heat damage. The completed connection is then taped sufficiently to prevent

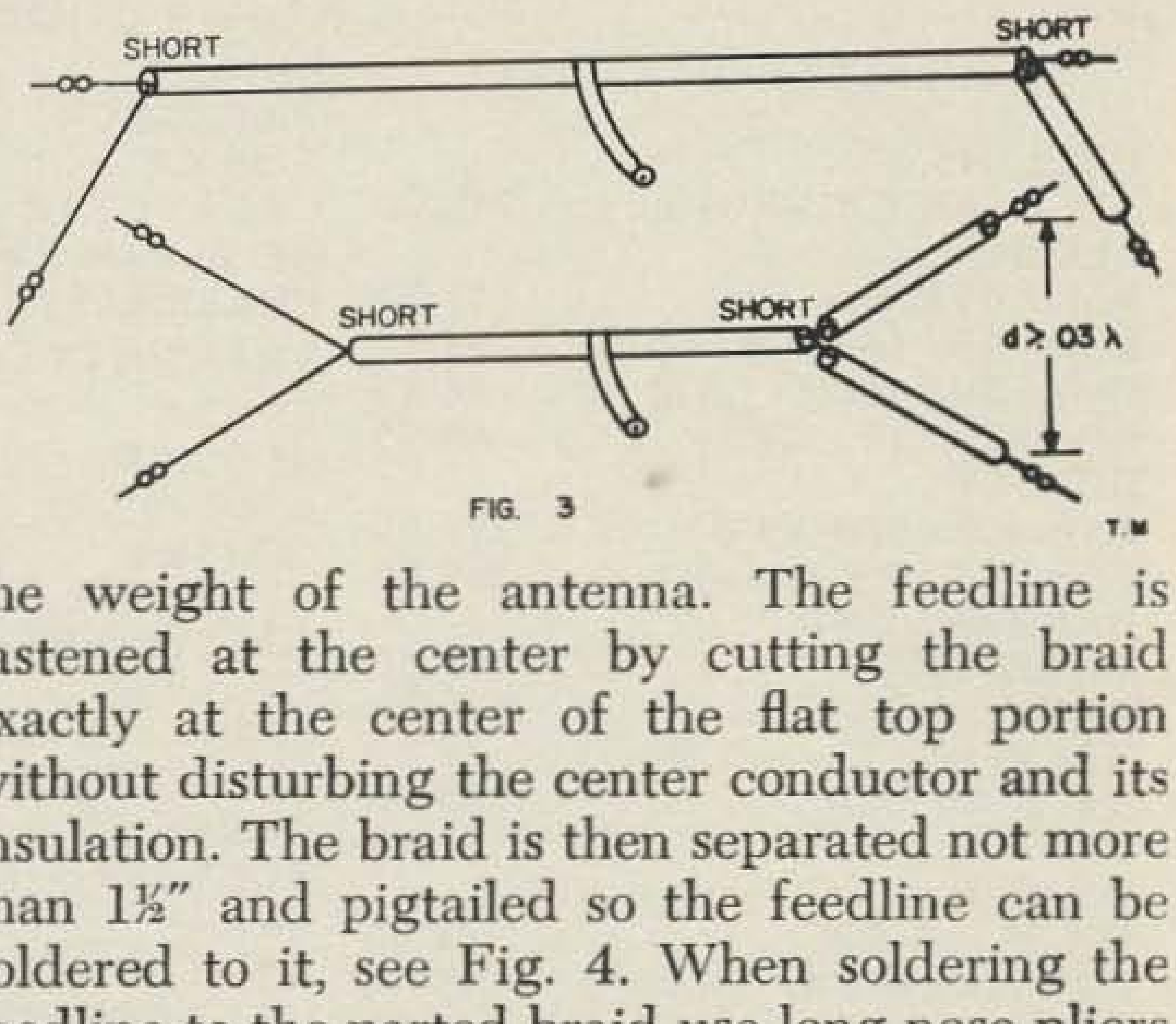
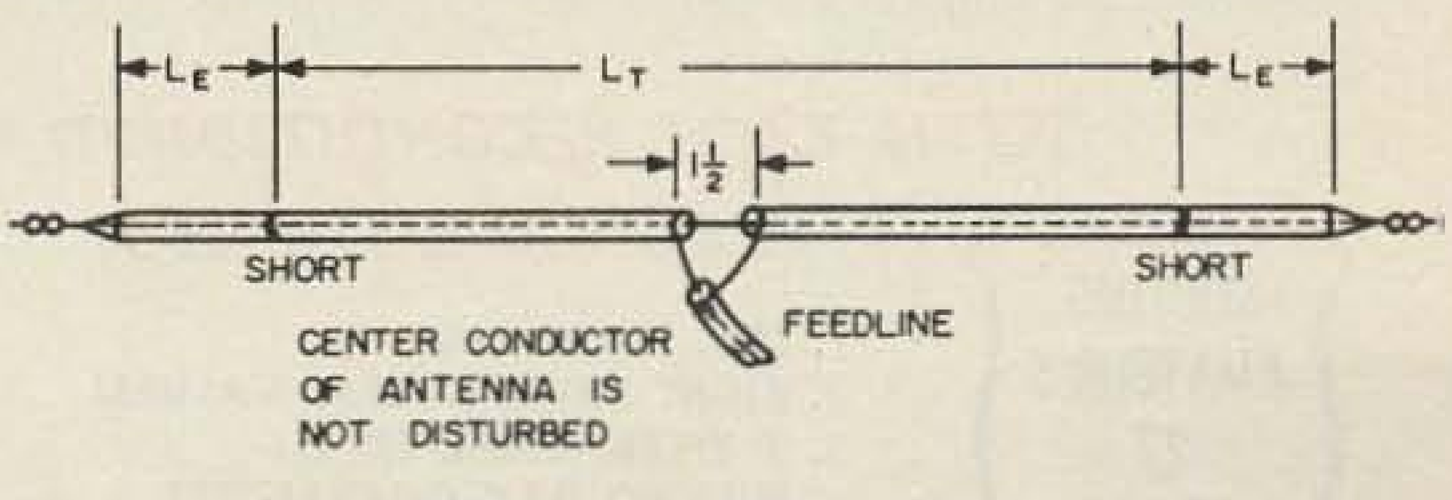


FIG. 3



L_T - TOTAL LENGTH OR SHORTED PORTION
L_E - LENGTH OF EACH END EXTENTION

FIG. 4

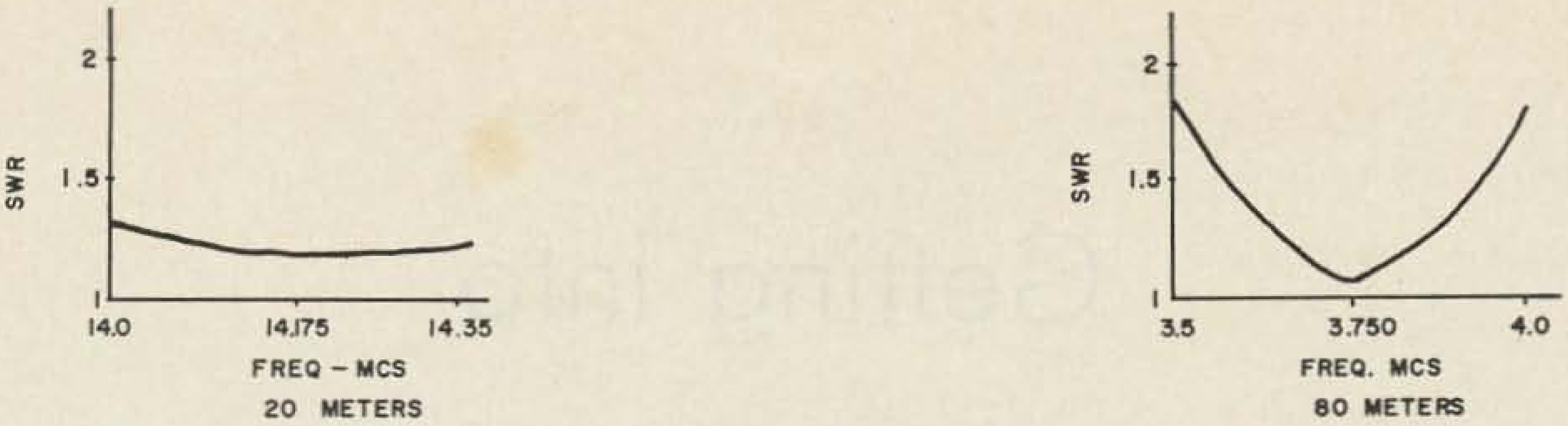


FIG. 5

water from entering the coax. (Note: this connection when made properly is sufficient to support the heavy coax feedline.)

Halyards can be fastened at the feedpoint and ends to raise the dipole and provide a means of adjustment of feedpoint impedance by adjusting the height of the antenna while observing the SWR at the design frequency. Since coax is heavy, end insulators with sufficient strength should be used to support the antenna. It is desirable to support the center of the antenna as high as possible and adjust the ends for lowest SWR at the design frequency. The reason for this is because most of the radiation takes place from the center part of the antenna. The antenna lends itself to be used as an inverted "V" very nicely with an increase in bandwidth over the usual wire inverted "V" which generally has a narrow bandwidth due to a sharp apex angle.

Two of the described antennas have been constructed at this QTH with results as presented, see Fig. 5. No gain or fantastic increase in signal strength is claimed with this antenna as it is still only a dipole but the improvement in operation at frequencies far from design resonance is advantageous and noticeable. This improvement could be considered as a gain. Many hams throughout Michigan, Indiana and Ohio are using this antenna on 75 meters with variations in construction as shown with similar results as presented.

Homebrew Exposed

W5HJV

We never cease to be amazed at the homebrew construction articles in the ham radio magazines. You know, the ones where the chassis doesn't have a single extra hole, and is all decked out with store boughten parts.

Down about the third paragraph, the author casually mentions that part number F-1 (Multi-Frammis Snickafoo Filter) can be special ordered from Shifting Sands Electronics Corporation for only $75. And of course old Charlie down at the machine shop was happy to make the gears for the dial drive for $25.

Needless to say, this is enough to make the average amateur return to stamp collecting. One must inevitably conclude that the amateur builder must be either a fabulously wealthy eccentric, or a bright young engineer with sticky fingers.

Fortunately, fellow amateurs, such is not the case . . . and in support of this statement the following parts list, complete with translation, is respectfully submitted.

Parts List	Translation
19″ x 12″ Chassis	Any size available. Check kitchen for suitable cake pans, etc.
350 mmfd variable (Raunchy Radio Co. Part. #QQ-4X4)	Tuning condenser removed from XYL's clock radio.
1 mfd 400V tubulan	This is for the key-click filter, stupid . . . leave it out.
16 mfd 700V electrolytic	Any electrolytic in the junk box which will handle the voltage. Check possibility of using assorted sizes in series.
Inductor, 9½T. #20, 1″ O.D., 4 T.P.I.	Any size wire wound around varnished toilet paper tube. Cut and try for resonance.
750 uh RFC) 2.5 mh RFC)	Two rf chokes from junk box . . . inductance unknown.
26,000 Ohm, 2W resistor	Any combination of junk box resistors which hits within 5000 Ohms.
50,000 Ohm, 4W potentiometer	Grid drive control removed from front panel of brother-in-law's rig.
Fused Line Plug	No fuse necessary. Use cord and plug from XYL's hair dryer.
900VCT 200 ma power xfmr	Cannibalized from stand by rig if within 300V either way.
8 Henry 300 ma filter choke	Secure from K5BNK's garage. Flashlight and sneakers are strongly recommended for this operation.