butternut

Instructions

Model HF5V

Butternut Electronics Co's Instruction Manual for:
Model HF5V — 1974

NOTE:
The HF5V Vertical antenna previously manufactured by Butternut Electronics Co. was discontinued in 1977. Parts are no longer available for these antennas. This instruction is made available as a reference.

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VI00812Z 101699

ASSEMBLY INSTRUCTIONS: MODEL HF5V TRAP VERTICAL ANTENNA

DURING ASSEMBLY, TAKE CARE TO AVOID CONTACTING POWER LINES WITH THE ANTENNA. DO NOT MOUNT THE ANTENNA IN ANY LOCATION WHERE IT MIGHT BLOW INTO OR FALL UPON POWER LINES.

Study the enclosed pictorial and proceed as follows:

1. Check to see that all parts are present. Note that the parts are labelled with small tags. You should have the following parts:

   A: Post assembly consisting of two fiberglass "T" posts glued together, three u-bolts with hardware--one of which holding a coax connector plate, one coil with bare grounding wire attached.
   B: One resonator support plate.
   C: One 1-1/8 inch diameter aluminum tube.
   D: One trap section with 10m, 15m, and 20m traps. (20m detached in packing)
   E: One 5/8 inch diameter aluminum tube.
   F: One 1/2 inch diameter aluminum tube.
   G: One 3/8 inch diameter aluminum tube.
   H: One resonator support clamp with 80m resonator assembly.
   I: One 80m resonator bottom clamp with sheet metal screw.
   J: One copper coil with bare wire attached.
   K: One small bolt with hardware at the base of section C.
   L: One bare wire attached to coil J.
   M: One 80m resonator tuning clamp (already attached to assembly).
   N: One roll of radial wire (not shown on the pictorial page).

2. Locate the mounting post (A). Plant it in a hole 1-1/2 feet deep so that the coax connector plate clears the ground by 4 inches. Pack the earth tightly around the post, making sure that it remains vertical. Concrete is recommended for more strength, especially in windy areas. Do not hammer the post into the ground as this will cause splintering.

3. Locate plate B. Remove the two nuts and lockwashers from the uppermost u-bolt on the post, leaving the steel u-bolt plate in position. Slide plate B onto the u-bolt, then secure it with a lockwasher and nut on each leg of the u-bolt.

4. Locate sections C, D, and the 20m trap (which has been detached from the trap section for shipping). Slide the 1 inch diameter end of D into the slotted end of C. Measure the distance between the bottom of section C and the bottom of the black plastic 10m trap. It should be set to 7 feet 7-1/2 inches. When the distance is correct, tighten the clamp. Measure the distance between the 10m and 15m traps. If it is not 21-1/4 inches, set it to the correct distance.

5. Slide the 1 inch diameter end of the 20m trap into the end of section D. Be sure that the distance between the bottom of the 20m trap and the top of the 15m trap is 39 inches. Tighten the clamp.

6. Locate section E. Slide the end with the two small holes into the end of the 20m trap and secure with two sheet metal screws. (The screws are shipped with the 20m trap.)

7. Locate section F. Slide the end without a screw into section E. Do not tighten the clamp yet.

8. Locate section G. Attach it to section F using the hardware on section F. Now measure the distance from the top of the 20m trap to the top of the antenna, setting it at 13 feet four inches.

9. Loosen the two uppermost u-bolts on the post to accomodate a 1-1/8 inch tube in the circle of the "u". Carefully (Remember the power lines!) raise the antenna and position it on the mounting post as shown. Tighten the u-bolts.

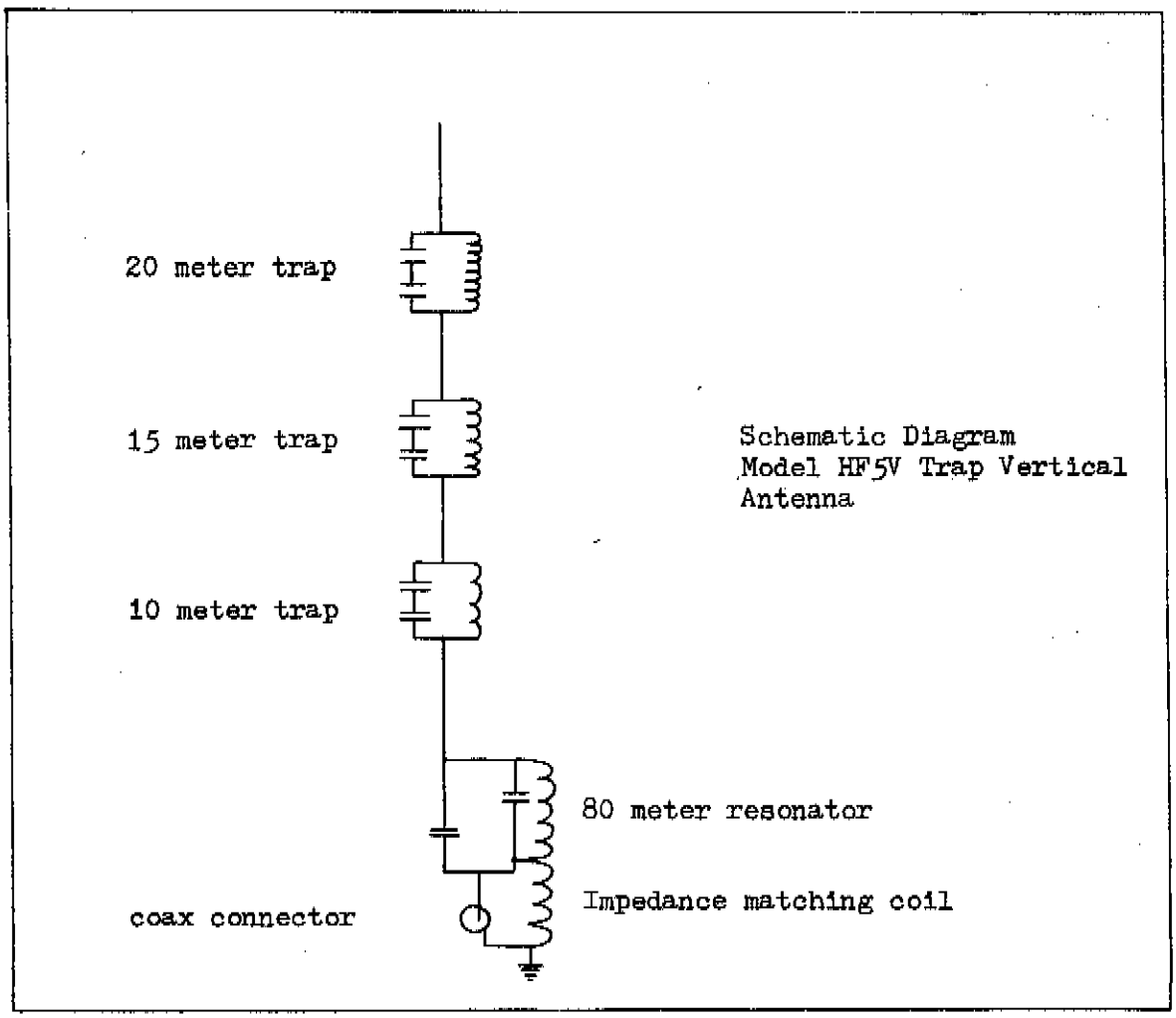
10. Locate clamp H on the 80m resonator assembly. Using the hardware on the clamp, attach the assembly to plate B as shown in the pictorial detail.

11. Locate screw I at the bottom of the resonator assembly and the lug on the end of coil J. (Two wires should come from the lug.) Attach the lug to the resonator using screw I.

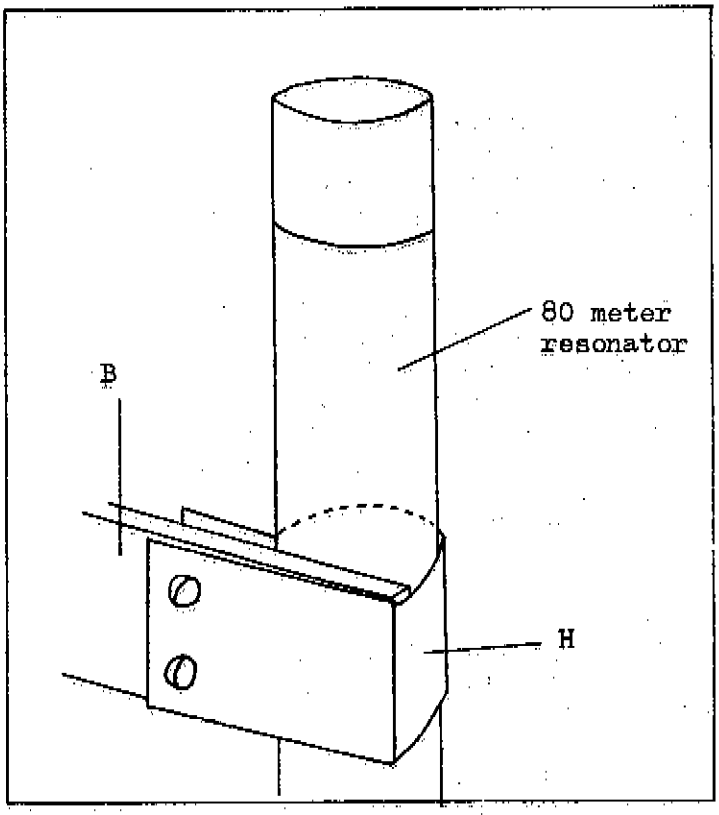
12. Connect the other wire coming from the center of the coax connector to bolt K, using the lug and hardware provided.

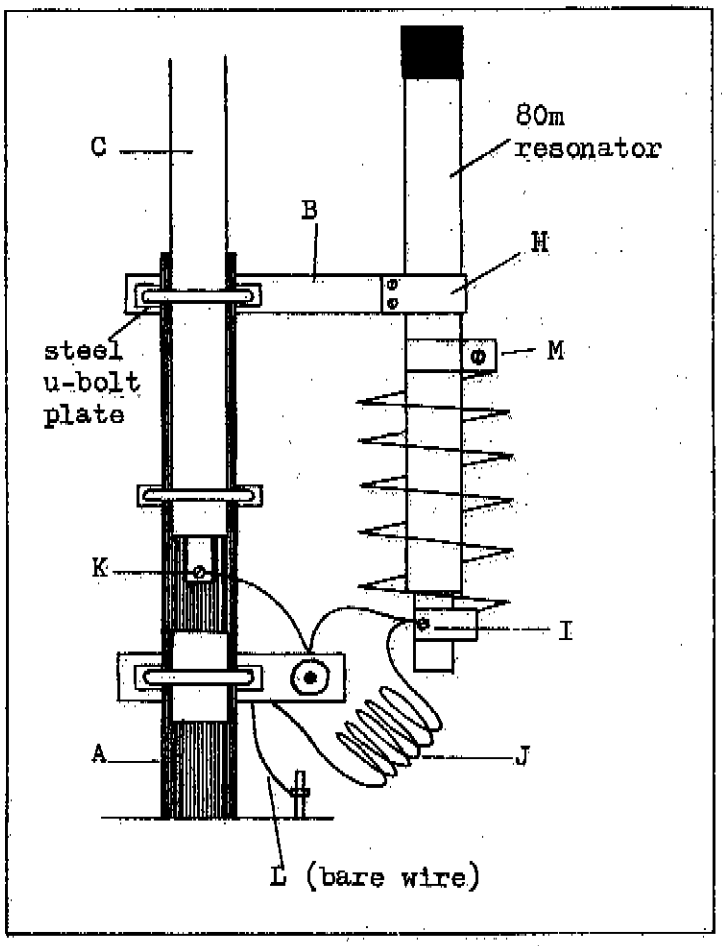
13. Connect the bare wire to a ground rod, using no more wire than necessary.

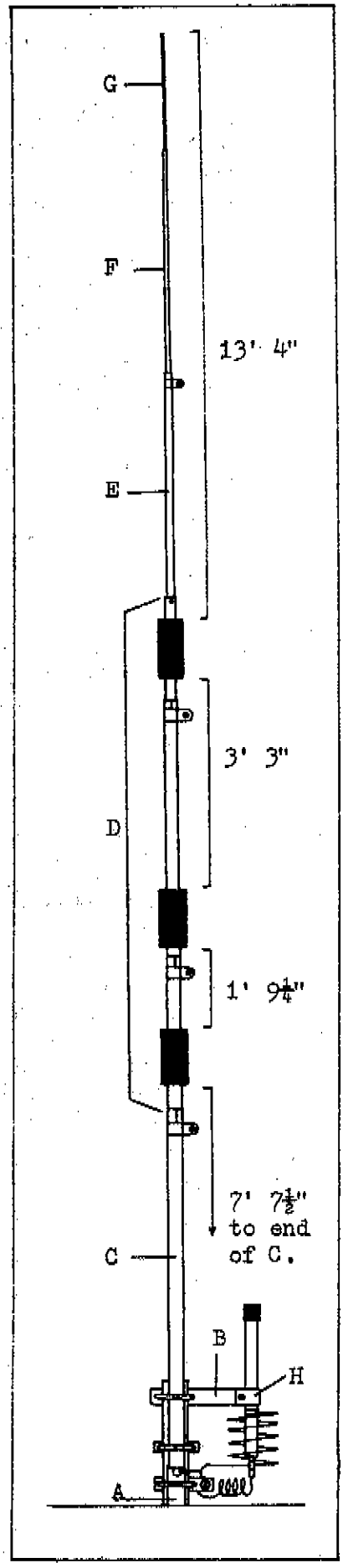
14. Feed the antenna with 50-52 ohm coax.



PICTORIAL: MODEL HF5V TRAP VERTICAL ANTENNA







CHECKOUT AND ADJUSTMENT PROCEDURE: MODEL HF5V

The dimensions given in the instructions should yield mid-band resonances on 40 through 10 meters, and the 80/75 m resonator is preset for resonance at approximately 3700 khz. Inasmuch as some variation may be expected, the following procedure may be used to adjust the antenna for minimum SWR at any point in each of the five bands:

1. Determine the frequency of lowest SWR on 80/75 m. Adjustment may be made by loosening clamp M on the 80 m resonator and compressing or expanding the coil length to lower or raise the resonant frequency, respectively. Approximately ½ inch travel is required per 100 khz change in frequency. When the proper coil setting has been found for minimum SWR at the desired frequency, tighten clamp M and adjust coil J for even lower SWR by squeezing the turns closer together or spreading them farther apart. Adjustment of coil J for 80/75 m has only a slight effect on the other bands which will be compensated for in the following adjustments.

2. Determine the frequency of lowest SWR on 10m. Resonant frequency (or point of lowest SWR) may be raised by shortening the length beneath the 10m trap or lowered by increasing it. A change in length of one inch should change the resonant frequency by approximately 100 khz.

3. Determine the frequency of lowest SWR on 15m. Adjustment for 15m may be made as in the preceding step by changing the length of the antenna between the 10m and the 15m traps.

4. Determine the frequency of lowest SWR on 20m. This may be adjusted as in the preceding steps by changing the length between the 15m and 20m traps.

5. Determine the frequency of lowest SWR on 40m. This may be adjusted by sliding section F in or out of section E. Bandwidth between the 2:1 SWR points is narrower than on the higher-frequency bands, so several adjustments may be necessary if operation at both band edges with less than 2:1 SWR is desired.

5. Check to make sure that the 80/75m adjustment has not changed. In general, adjustments in 40m through 10m tuning have only a negligible effect on previous 80/75m adjustments. On the other hand, a major readjustment for 80/75m will have a noticeable effect on 40m and 20m adjustments already completed. For example, Readjustment of the 80m resonator from the low end of the c.w. band to the high end of the phone band will raise the 40m resonant frequency by almost 100 khz and the 20m resonant frequency by approximately 50 khz.

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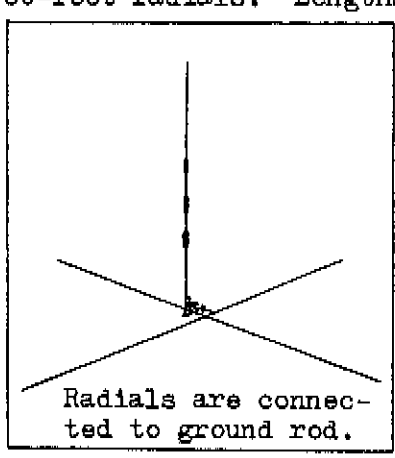
THEORY OF OPERATION: MODEL HF5V

The HF5V operates on 40m through 10m with automatic bandswitching by means of parallel resonant "traps" which offer a very high impedance to the flow of current at and near the frequencies to which they are tuned. On 10m, for example, only the length below the 10m trap radiates as the trap effectively blocks the flow of 28 mhz energy to the rest of the length. During operation on other bands, the 10m trap offers a low impedance to r.f. energy and provides a certain amount of "loading." There is no trap for 40m, as the overall length of the antenna plus the inductive reactances of the higher frequency traps provide resonance on that band.

80/75m operation is made possible by the base resonator, which is a high-C parallel circuit that produces the inductive reactance required for resonance on this band. The capacitance of this circuit consists of the tubular capacitor around which the coil is wound and, the capacitor formed by the lower part of antenna section C and a smaller tube inserted therein.

At higher frequencies the base resonator produces capacitive reactance which is cancelled out by slightly longer than usual antenna lengths in each radiating section.

Radials and Ground System: Although it is possible to operate the HF5V without radials, this is not recommended as considerable loss will result. It should be noted that a single ground rod at the base of the antenna will probably be sufficient to establish resonance on all bands, but it is practically worthless for reducing ground losses at r.f. The purpose of the ground rod is to place the antenna at d.c. ground and to provide a tie point for radials which may be placed directly on the ground or buried an inch or so below. They need not be the same length. Since ground losses are greatest near the base of the antenna, a large number of short radials will be more effective than a few longer ones. For example, the 120 feet of wire provided would be better employed as six 20-foot than as two 60-foot radials. Lengths may be varied to suit the location. If the antenna is to be mounted above ground, a resonant radial system will be necessary. Such a system would use 4 radials for 40m, 4 for 20m, and 4 for 10m--a separate set for 15m would not be required. The lengths for each set of radials may be calculated from the formula



Radials are connected to ground rod.

$$\text{Length (ft.)} = \frac{240}{\text{Freq. in Mhz}}$$

This same radial system would also provide enough capacity to ground to permit resonant operation on 80/75m at moderate heights above ground. High r.f. voltage will appear at the ends of the radial wires, so use good end insulators. Care should be taken to keep the radials away from metallic objects which might cause detuning.