Gamma Matched 6 Meter Ground Plane

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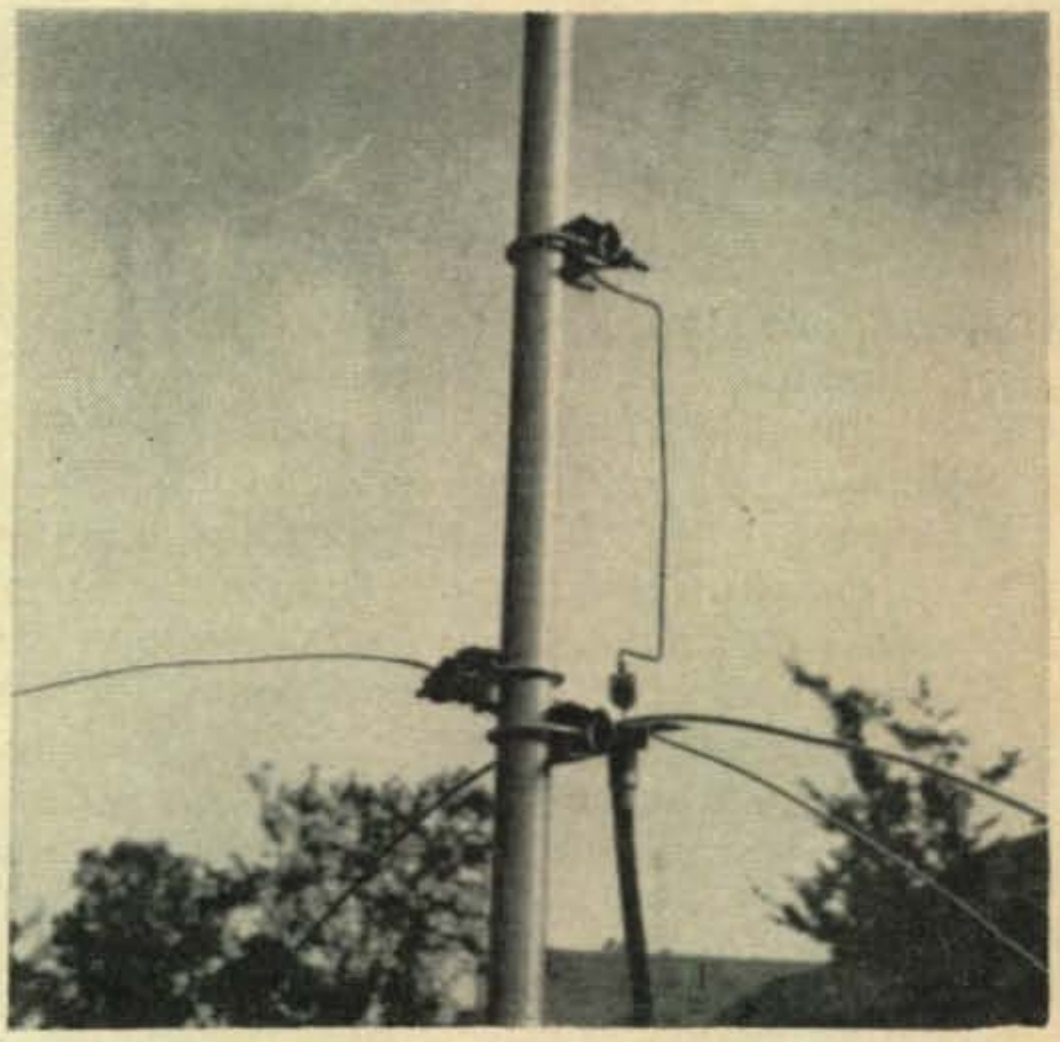
Ground plane type antennas have enjoyed considerable popularity in ham circles for many years. The only way in which the gamma matched ground plane differs from the conventional ground plane is in the method of impedance matching. While the antenna to be described is designed for 6 meters, the idea involved can be used in construction of ground plane antennas for other bands.

Construction

Figure 1 shows a 10 foot length of unpainted aluminum or galvanized steel TV mast section used as the vertical staff. Ground plane elements are attached 5 feet from the top of the staff using TV type U bolt assemblies. Aluminum or galvanized clothes line wire is used for the drooping ground plane elements. The ground plane elements should droop about 45 degrees and be 5 feet long on each leg. An L-shaped bracket to support the chassis type coaxial fitting should be secured to one of the U-bolt assemblies which support the ground plane elements. Another U-bolt assembly is secured to the staff 12 inches above the U-bolt assemblies which support the ground plane elements. The gamma impedance matching device is made of number 10 copper wire 15 inches long. A 90 degree bend is made 4 inches from one end of the 15 inch length of copper wire. The end which is closer to the 90 degree bend is secured to the U-bolt assembly which is 12 inches above the ground plane. The other end of the copper wire should point down toward the coaxial fitting. This lower end should be soldered to one side of a 5-50 mmf trimmer capacitor. The other side of the trimmer should be soldered to the center conductor of the coaxial fitting. Dimensions given are for use with 50 ohm coaxial cable transmission line.

Although the discussion above indicates a continuous staff, the antenna can be constructed using a 4 foot automobile whip above the junction of the gamma tap and staff. For any given height the use of a whip will make a lighter antenna. U-bolts can be used to secure the whip to the mast section. The author's first attempt at construction of the gamma matched ground plane utilized a whip in this manner as can be seen in the photographs.

[*Continued on page 109*]



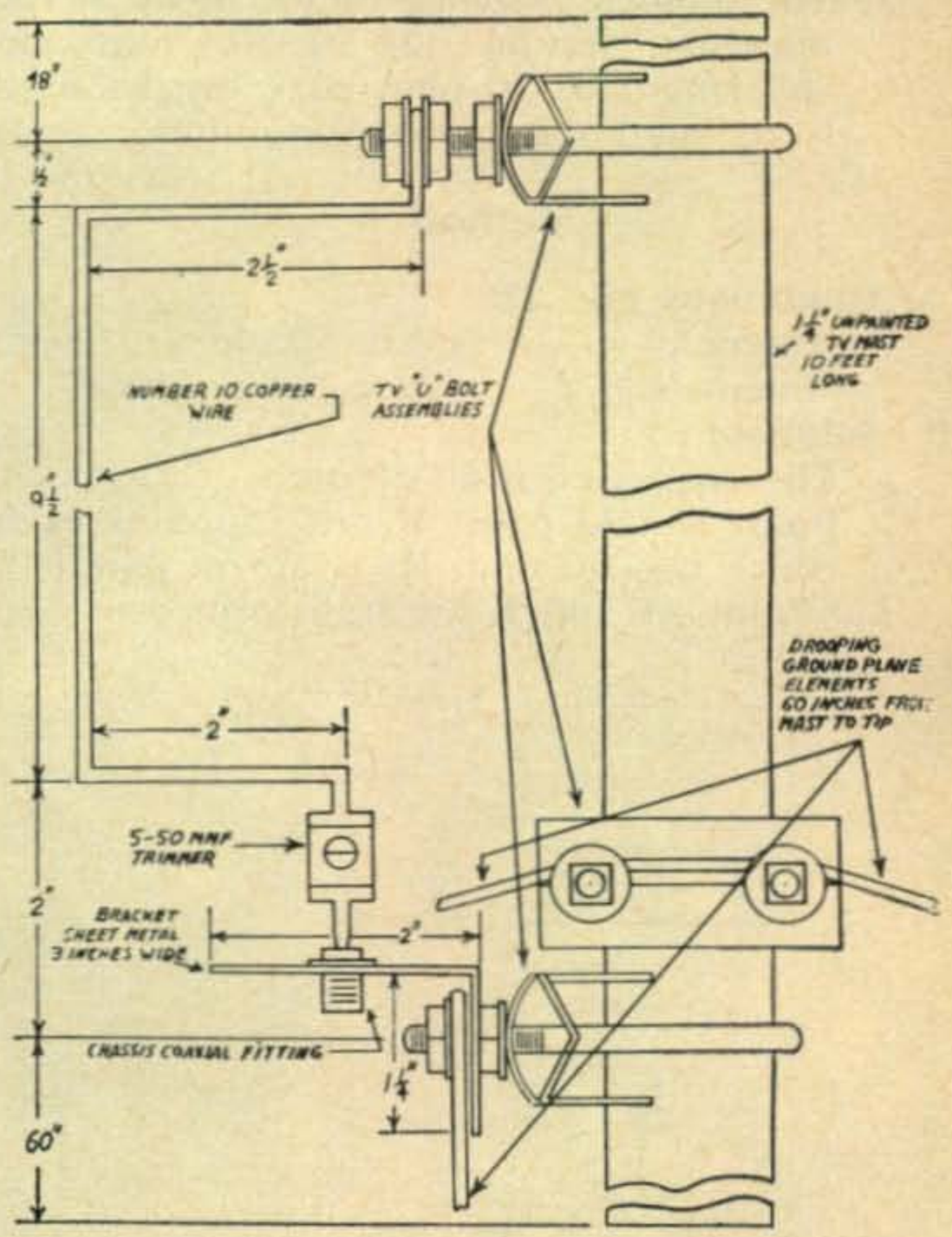


Fig. 1—Details of the positioning of the drooping ground planes and the gamma impedance matching device.

it."—W5UXW, Opal.

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STACKED BEAMS *[from page 56]*

The stacking of beams vertically will not have much effect on the horizontal pattern. Adding beams on a horizontal plane will decrease the horizontally radiated pattern width of the array. Anything that is done to increase directivity from an array will help to minimize QRM on a crowded band and for every 3 *db* increase in effective radiated power, a 25% increase in ground wave coverage can be expected. ■

6 MTR GROUND PLANE *[from page 55]*

Adjustment

Adjustment of the gamma matched ground plane is not critical. However for optimum performance the antenna should be adjusted for minimum *vswr*. In the absence of a reflectometer or impedance bridge the antenna can be adjusted for satisfactory operation by adjusting the trimmer for proper load on the transmitter. Should a reflectometer be available it should be inserted in the transmission line between the transmitter and antenna. First adjust the trimmer capacitor for proper load on transmitter. Slide the gamma impedance tap about the 12 inch mark to obtain minimum *vswr*. Readjust the trimmer for minimum *vswr*. Repeat the above steps until the *vswr* can no longer be reduced. A *vswr* of about 1.2 to 1 should be obtainable.

After the antenna has been adjusted it will be necessary to weather-proof the coaxial fitting and trimmer capacitor. The author has found plastic asphalt roofing compound to be satisfactory for this purpose. The plastic compound will cause a slight detuning so it will be necessary to readjust only the trimmer capacitor for minimum *vswr*. All metal parts associated with the gamma matching section should be given a coat of aluminum paint.

Conclusion

Ground plane antennas which are gamma matched provide many advantages over the conventional ground plane. The vertical mast section is in one piece and 10 feet long with as many sections under it as are necessary to reach the desired height. No insulator is required and the mast is completely grounded for lightning protection purposes. When the antenna is to be mounted on a chimney a suitable ground system should be provided.

The gamma matching section provides a poor impedance match for signals outside the design frequency band. This characteristic provides considerable attenuation of signals outside the band, thus reducing converter feedthrough. Construction of the gamma matched ground plane requires about 2 hours and somewhat less than $5.00. ■

ANT. SWITCH [*from page 54*]

clear only 4-40 hardware as supplied. Use a 9/64 drill for this latter operation. This procedure will result in perfect alignment of all mounting holes. Be sure to use lock washers under the heads of the screws as the nuts on the inside of the can are almost impossible to grasp with any tool.

On the exact center of the bottom of the can, drill a ½" hole for the shaft of the switch. Carefully position the switch to line up its contacts with the connectors. Now center punch four holes in which to fasten the switch. Do this with a thin nail. Drill the holes and mount the switch with 6-32 hardware, solder the contacts to the connectors with thin strips of copper strap or heavy buss wire, add a pointer knob, and you're ready to go.

Fig. 2—Hold coax jack in place with pliers and drill the four mounting holes for 4-40 screws.