10 M Folded Ground-Plane:

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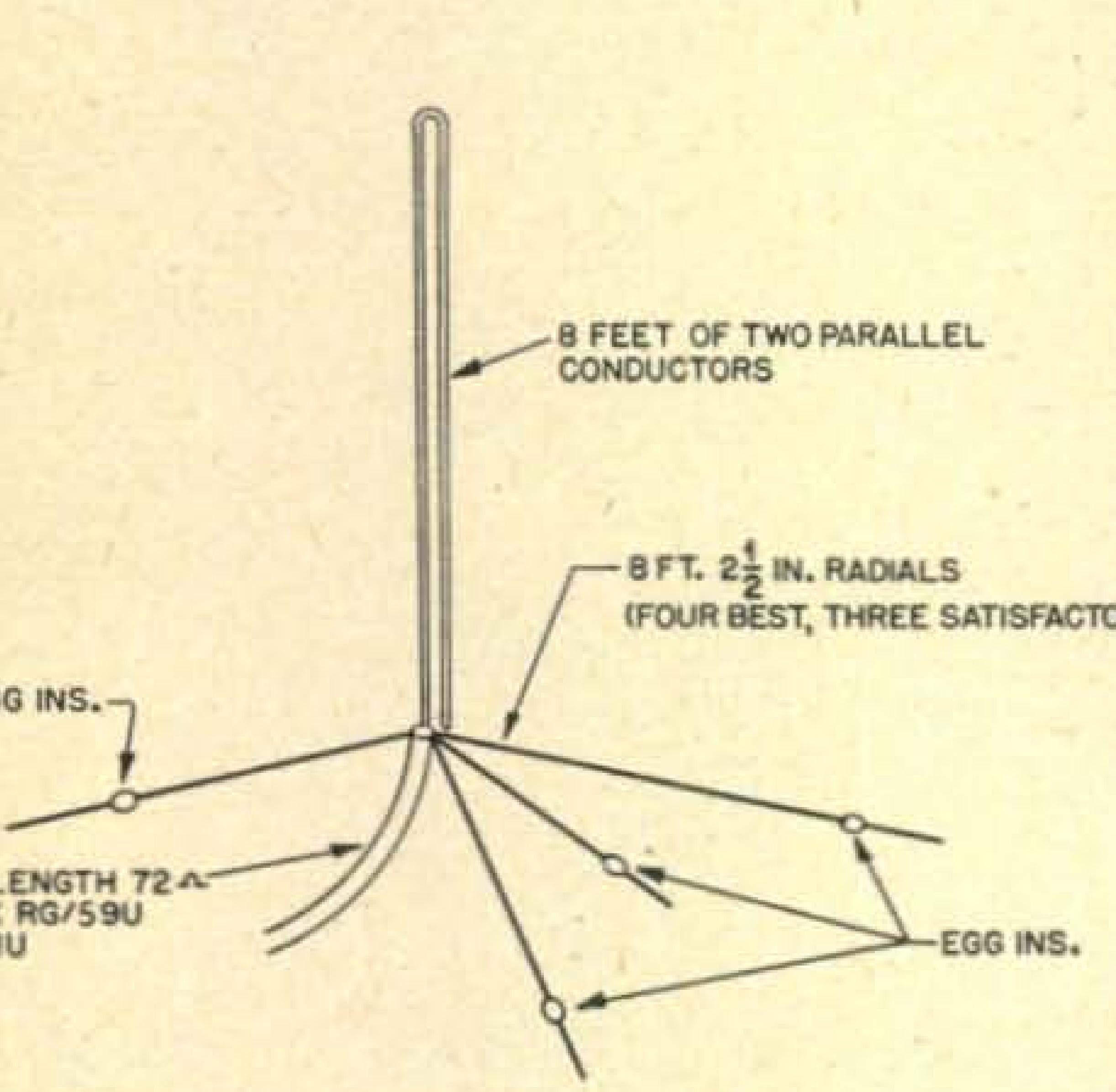
With ten meters on the upsurge again, an antenna which would give a good account of itself and in addition be both inexpensive and relatively inconspicuous was needed. Though a rotary array would be far and away the most efficient, it was ruled out on financial grounds as well as being too conspicuous.

A horizontal dipole was considered and rejected as being too wasteful of r.f., spraying too much skyward, and also because of the nulls off its ends. Some type of non-directional vertical with a low angle of radiation therefore seemed advisable and various types were given consideration. A vertical dipole could be erected, but to obtain the optimum angle of radiation, it should be but four feet off the ground, leaving it surrounded by buildings, definitely lowering its efficiency. A vertical "J" seemed awkward to put up, so a ground-plane looked best at this point.



Previous experience with a ground-plane on the 20 meter band had been good, but it was evident that changing the operating frequency from one end of the band to the other resulted in a considerable rise in the SWR since the antenna was sharply self resonant. The ten meter band is almost two megacycles in width, and eleven meter operation was also contemplated. An antenna with a broader self resonance was desired and a little research disclosed that a folded unipole has all of the desirable characteristics of a ground-plane and in addition has the broader self resonance. It also has a higher input impedance than the ground-plane and is thus easier to match to commonly used coax transmission lines. The entire array is at d-c potential, affording some degree of lightning protection and picking up less random noise.

The Andrew Co., a manufacturer of commercial antennas, had advertised this type of antenna in *CQ* during 1945 and published performance graphs which looked very good. There also was a drawing of the commercial version, a trombone-like vertical radiator with self supporting radials.

The ground-plane already in use on the lower band has drooping radials of #12 copper-enameled wire, which also serve as guys. The amateur version of the folded unipole was similarly constructed. The folded unipole is only slightly more complex than a ground-plane, having a second conductor in parallel to the vertical radiator. This conductor is connected to the radiator at the top and also to the simulated ground at the junction of the radials and the coax shield at the bottom of the vertical portion of the antenna. It can be considered as half of a folded dipole vertically positioned and working against a ground. It has the higher input impedance and broader self resonance characteristics of the folded dipole.

In the version used at this location it was not practical to duplicate the trombone shaped vertical, so a single 8 foot copper pipe and a similar length of /12 wire were used for the radiating portion. Two small standoffs were attached to the pipe to keep the wire spaced away from it in strong winds.

The dimensions used for ten meters were standard for a ground-plane: an 8 foot vertical with slightly longer, 8′2½″ radials, for still further broadband response. A 72 ohm feeder is a better match than 52 ohm, but if the latter is on hand, and used, little loss should result.

Another version used by a friend who wanted to try out the antenna at his QTH was made of a length of 300 ohm line attached to a wood mast. The conductors were soldered together at the top and connected to the inner and outer conductors of the coax shield at the bottom. It performed about as well as the more elaborate original. The dimensions and spacing of the verticals do not seem to be critical. Two columns of beer cans soldered together would probably do as well or better, but the basic materials were not on hand and it will be left for a more enterprising (hic!) amateur to try this one.

The effectiveness of this broadband "cousin" of the ground-plane would be realized to an even greater extent on higher frequencies such as six or two meters. This is due to the greater

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losses at these higher frequencies if a mismatched transmission line occurs. The smaller versions likewise would be even easier to construct.

On the lower frequencies simpler versions could be used. For example, a 60 foot length of 300 ohm ribbon worked against a good ground should theoretically perform satisfactorily on 75 meters, even if the entire radiating portion could not be supported vertically. However on the ten meter band and on the higher frequencies it is best to mount the antenna as high and in the clear as possible.

As for results, reports have been very good. DX from the East coast to Africa, Europe, South America and the Pacific has been worked, and stateside and local contacts have been easily made and maintained. The final tuning changes but little over the band and performance seems about equal for any portion of the band. It also works quite well on eleven meters. ■

Scope Calibrator [*from page 45*]

Adjustment of the circuit is simple, requiring only an accurate voltmeter and a source of AC voltage. A 60 cycle voltage is fine unless the response of the scope amplifier droops at that frequency. In that case, a higher frequency, in the mid-frequency region of the amplifier's response, should be used instead. The voltage source should be connected to the scope vertical input and also to the voltmeter. Then the vertical gain and centering controls should be adjusted to place the pattern just between two lines on the graph screen, with S4 set to "signal." Be sure the amplifier is not overloaded, as this would cause inaccuracy. Then, leaving the gain control alone, the calibrator should be set for a voltage equal to the *peak-to-peak* amplitude of the AC voltage source. (Remember that peak-to-peak voltage is 2.82 times RMS voltage for a sine wave.) Then adjust R3 so that the calibration pattern is also just between the same two lines. If necessary, the vertical centering control can be adjusted to center the pattern properly. When this operation is complete the calibrator is ready for use. To get the peak-to-peak amplitude of any waveform, merely set the calibrator without disturbing the gain controls so that the calibrator pattern is the same height as the waveform under study, and read the voltage off the calibrator dials. If the waveform under study has any very low or very high frequency components, account should be taken of any droop in the response curve of the scope amplifier. ■