GETTING OUT ON TOP BAND

AERIAL ARRANGEMENTS, AND THE FREQUENCY AREAS TO USE

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This article could be described as general guidance on "Top Band DX—and How to Work It." A large proportion of the active AT-station fraternity of the U.K. is interested in this subject, as a few listening sessions in the CW area of 160 metres would disclose. Within the normal amateur limitations, there is really no "best" aerial system for the purpose—it is just that the antenna should be made as good as possible, always with the main principle in mind—to get the current antinode into the clear, however that may be contrived. This will usually mean tailoring any arrangement of wires to the site. Much interesting and instructive work can be done to achieve the final "best possible result." Here our contributor has some useful practical suggestions to make about the popular and effective vertical antenna system.—Editor.

THERE are so many facets to this subject that it is difficult to know where to start. However, assuming that your shack is equipped with a reasonably selective and sensitive receiver, let us first consider the aerial system. Ideas about DX differ but it can be said that we are really interested in stations more than 1,000 miles distant so that it is essential to radiate as much as possible of the energy at angles less, or preferably much less, than 45 degrees to the horizontal plane.

To obtain such a characteristic from a horizontal antenna it must be at least half a wavelength above ground. This, for most of us, is a non-starter since trees or poles 250ft. high are hard to come by. However, it is surprising what can be done with a dipole at a reasonable height (say 60ft.): even a quarter wave with a good earth is of some use provided conditions are very good, though it will not normally perform too well.

For those who cannot put up a high dipole the vertical is probably the best. Even here there are snags because a quarter-wave Marconi is 132ft. high. If you can put up such a pole all well and good but much smaller efforts down to about 40ft. *can* be made to work by loading the system at the base, or near the top. Top-loading is to be preferred because it raises the radiation resistance and hence the efficiency, as well as getting the high-current carrying (current antinode) part of the antenna up high.

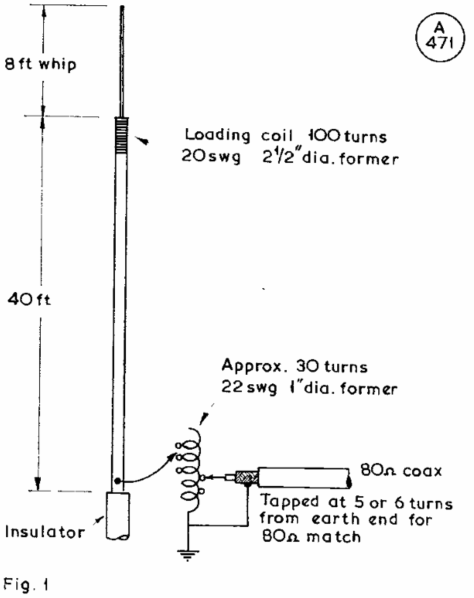

Fig. 1. Configuration for a top-loaded vertical system—see text.

The Approach

A suitable arrangement is shown in Fig. 1. With this sort of aerial a good earth system is essential and the best is a number of radials, like the spokes of a wheel, radiating from the base. A dozen radials each 30ft. long would be a start but the aim should be to make them longer and as numerous as possible. If you have only a small garden but you haven't done much in the way of cultivating it, try increasing the conductivity as shown in Fig. 2. This won't produce super plants but it should reduce your earth resistance.

Another way is to put out 200ft. or so of wire but to get the high-current carrying portion vertical (132ft. from the end remote from the transmitter). There are many possible configurations: Fig. 3 gives one. If you live at the bottom of a steep hill and can get a wire sloping up the hill this is yet another way of getting low-angle radiation—and if you can put up a half-wave (270ft.) you don't need to worry so much about the earth connection.

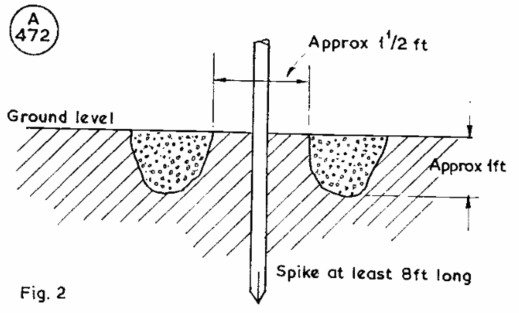

Fig. 2. To improve earth conductivity—of vital importance in installing an effective ground connection for a Top Band radiating system—fill the trench with rock salt or magnesium sulphate, then flood with water and cover with soil. Such an earth connection should be good for two or three years at least.

Resonating the System

Getting a vertical system to resonance can be a bit tricky. It is best to adjust the extra loading at the base so that a grid dip oscillator shows a deflection at about 2·2 mHz (or 1·9 if you don't intend to work above that frequency). When this has been done the input tap from the transmitter should be chosen for maximum antenna current. A meter of the diode-rectifier type (commonly called an SWR meter) between the transmitter and feed point is useful and much quicker.

Getting Results

Now we have our antenna—how do we find the real DX? It can be found—and worked—at almost any time of the year during darkness but there is no doubt that the best period is between September and April, and you should listen on about 1801 kHz when conditions are good. If you can hear *distant* Loran below 1900 kHz (usually on about 1850 kHz) this is a good sign; there are also " beacon " stations WCC (East) on 2036 and KPH (West) on 2045 kHz. These give a good indication of band conditions for the real DX.

But don't make the mistake of calling the DX on 1801 kHz. The U.K. calling frequency area is 1824-1830 and 1851-1861 kHz is also worth trying. The areas of Top Band normally used by various countries for DX are indicated in the diagram at Fig. 4, below.

As to time of day (well, night really) W stations are audible in good conditions as early as 2100 or 2200 GMT in mid-winter but reception is easier after midnight with less QRM. There is usually a peak in conditions when it is dusk or dawn at *one end* of the path while the path itself is otherwise in darkness.

So far as the receiver is concerned, the considerations are pretty much the same as for any other band. Needless

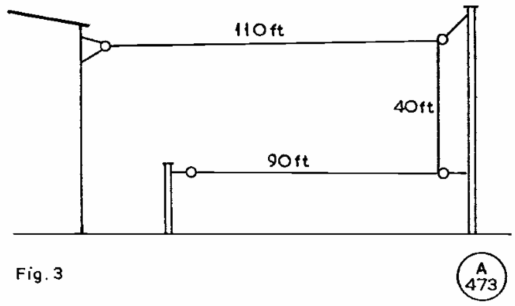

Fig. 3. Aerial configuration to get the high-current portion (the current antinode) into the vertical.

to say it must be stable, sensitive, not subject to cross-modulation and very selective, if possible to 50 Hz. A Q-multiplier will be a help if you are short of selectivity.

It is important to get as much of your ten watts as you can into the antenna. For efficient operation the PA must work in Class-C, which is bound to produce harmonics—and excess harmonics waste power as well as causing QRM if they reach the aerial. The answer is of course a compromise—keep the Q of the tank circuit at about 12; this will restrict harmonic generation and minimise losses. Keying should be well rounded—square waves not only bother the locals, they waste power.

The author would like to thank G3IGW, G3SED and G6HD for their very kind assistance in the compilation of this article. For further information on aerials and propagation, readers should consult *Radio Communication Handbook*, Chapter 13, and the ARRL *Antenna Handbook*, Chapters 2 and 7.

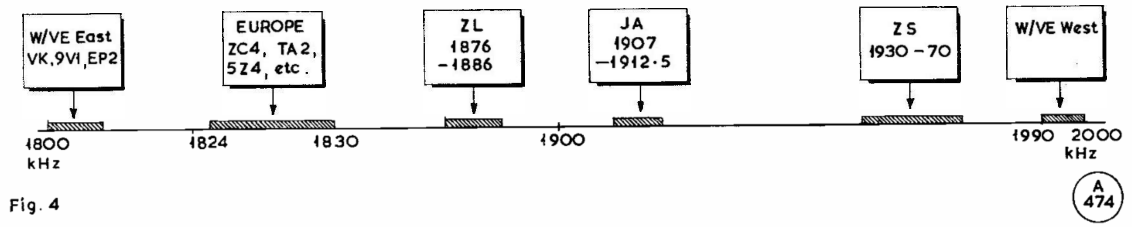

Fig. 4. The 160-metre band (Top Band) gives us a frequency coverage of 1,800-2,000 kHz. This diagram shows in which sectors of the Band signals from DX areas can be expected. See article for the propagation factors involved.

TROUBLE IN SPACE

It is reported that the *Instelstat III* satellite in synchronous (or " stationary ") orbit 22,300 miles out above the Indian Ocean has developed a fault in its tunnel-amplifier diode. The result is that the overall gain of the TV transponder has gone down by about 10 dB. As this is the satellite used by Goonhilly to run TV with Australia (Ceduna, 350 miles NW of Adelaide) some urgent work has been done on the Goonhilly Tx to push the power up to 4 kW—which is about ten times the input normally necessary to work the satellite.

NOTE ON ZS REGULATIONS

We were interested to see, from a recent issue of *Radio ZS*, that under their current regulations, neither portable nor mobile ZS amateurs may run more than 30w. DC input (80 watts p.e.p. output). This is a useful and sensible provision. And another ruling " An amateur shall not use *nor be in possession of* equipment capable of exceeding the limitations imposed on amateur stations," *i.e.*, more than 150w. DC input under any conditions of operation, and in the case of SSB transmitters 400w. p.e.p., with linearity preserved.