Reduced size slot

Another and more compact slot aerial, which has been called the "Abe Lincoln", is claimed to have an almost circular radiation pattern.

In this form it is suitable for both mobile and fixed station operation, but if used on the roof of a car, the open slot and top should be filled in with suitable insulating material, such as perspex, to prevent noise produced by windage.

Although in the design illustrated, a metal base has been fitted, this is not essential, but it makes a mechanically stable unit. If the base is omitted then the bottom of the slot must be shorted with a suitably thick metal strap. Matching the feeder into the slot should be done with sliding contacts and the help of a swr bridge.

The discone

This aerial has not found too much favour with amateurs in the past, though frequently used for commercial and military purposes. Unlike many other types this aerial is not only omnidirectional but also has wideband characteristics. It is capable of covering, say, the 70, 144 and 432MHz bands or 144, 432 and 1,296MHz, although there will of course be some variation of the swr over such a wide range.

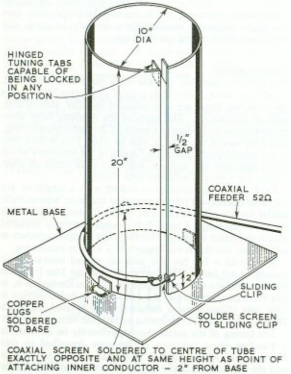

Fig 7.58. Constructional details of the "Abe Lincoln" mobile aerial for 144MHz

Also, since the aerial operates over roughly a ten to one frequency range, it will more readily radiate any harmonics present in the transmitter output. It is therefore important to use a suitable filter to adequately attenuate the harmonic outputs.

The Discone consists of a disc mounted above a cone, and ideally should be constructed from sheet material. Many amateurs would find this impossible to realize, but with

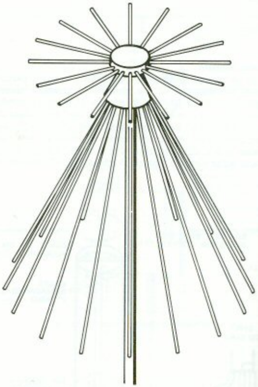

Fig 7.59. General arrangement of skeleton form of Discone aerial

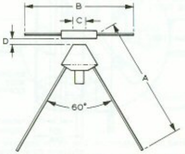

Fig 7.60. Primary dimensions of Discone aerial

little loss the components may be made of rods or tubes as illustrated in Fig 7.59 with a minimum number of rods of eight or preferably 16. Of course, open mesh may be used as an alternative, bearing in mind the windage increase.

The important dimensions are the end diameter of the cone and the spacing of this from the centre of the disc, so that the terminating impedance is correct, eg 50Ω.

The primary parameters are shown in Fig 7.60 with dimensions as follows:

- **A** the length of the cone elements, these are $\lambda/4$ at the lowest operating frequency, or $\frac{2{,}952}{f(\text{MHz})}$ in.
- **B** the overall disc diameter, this should be 70 per cent of $\lambda/4$.
- **C** the diameter of the top of the cone, this will be decided to some extent by the diameter of the coaxial cable, but for most purposes 0·5in will be suitable.
- **D** the spacing of the centre of the top disc to the cone top, this is 20 per cent of C, or 0·1in for 50Ω.

The detail given in Fig 7.61 of the hub construction will be suitable for any design using a 50Ω cable feed and may be taken as an example. There is likely to be some problem in producing a suitable insulator which may be made of a potting resin or turned from ptfe or other stable low loss material.

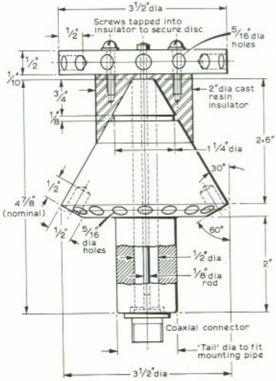

Fig 7.61. Details of a hub assembly

Halo aerials

These types are popular for mobile work, as they are light, easily made, and have an almost circular polar diagram. In fact there is a point of minimum signal in the direction of the side opposite to the gap.

Construction

The design is based on standard coaxial plugs and sockets which are readily obtainable on the surplus market. It is convenient to mount the halo on a coaxial plug, so that the whole assembly can be screwed on to a coaxial socket, which provides both the electrical connection and the mechanical support.

The general construction is illustrated in Fig 7.62 and to preserve mechanical rigidity at the weakest point of the aerial, ie in the centre of the radiating element, use is made of the gamma match for 70Ω impedance, this permits the radiating dipole to be made in one complete length. The conventional series capacitor in the arm of the matching stub has been omitted on the grounds of mechanical simplicity. Mobile aerials are usually fed by a comparatively short feeder from the transmitter, and the slight increase in swr resulting from the residual reactance of the matching stub, does not introduce any further appreciable loss in radiated signal level.

The dipole proper is formed from a 39in length of ¼in 22swg brass tube. This is normally supplied hard drawn and should be annealed before bending as follows: heat the tube to a dull red with a blowlamp and quench it immediately in cold water. It is important to anneal the tube uniformly along its length, otherwise it will not be possible to obtain a smooth bend when the circle is formed. The annealed length of tube should be bent round a mandrel approximately 12in in diameter.

When finished, the ends of the tube are approximately 2in apart. The insulating spacer is formed from a 3in length of round polythene taken from a piece of ½in diameter coaxial cable. The centre conductor is removed and the ends are drilled ½in deep with a ¼in diameter drill. The ends of the brass tube are pushed into these holes, and due to the elasticity of the polythene, are gripped firmly without the need for any further clamping.

The main support for the halo is provided by a brass block (Fig 7.63), which has a hole drilled through its centre into which is brazed the back nut of a coaxial plug type PL259. The brass tube of the circle is cut diametrically opposite the polythene spacer and the ends are brazed into

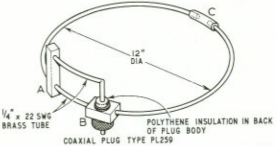

Fig 7.62. Drawing showing the general construction of the halo aerial