Fan dipoles

Experiments using one or more dipoles with a common feeder were tried next and an arrangement as in **Fig. 2** was gradually evolved. It consists of a half-wave dipole for 80 metres, a half-wave dipole for 40 metres, a 1½ wavelength long dipole for 20 metres and a 1½ wavelength dipole for 10 metres. For 15 metres, the 40 metres ½ wave dipole behaves near enough as 1½ wavelengths centre fed. The aerial was assembled as in **Fig. 2** and initially the dipoles were cut to length using the standard formula

$$\tfrac{1}{2}\text{-wave dipole length (ft.)} = \frac{468}{f(\text{MHz})}$$

Table 2 gives the dimensions to cut each dipole element, to start with a certain amount of pruning of each dipole will be needed, cutting an equal amount from either end of the dipole in question. Observations should be made of the VSWR at various frequencies across each band. Aim at getting the VSWR down to its lowest at your favourite part of the band ie. Phone or CW. The reason for the dipoles not working out at the exact, calculated lengths, is due to capacitance between the various dipoles and nearby objects. Always put the aerial back to its full height before attempting to measure VSWR as the height of the aerial above ground has a significant effect on VSWR. **Fig. 4A** shows a diagram of the feed arrangement used during setting up. However once set up I prefer to use a balanced output ATU, replacing the 1:1 balun with an ATU (See **Fig. 4B**). This helps to reduce any harmonics present in the transmitter output being fed to the aerial system. As this is a multiband aerial system, any harmonics present will be effectively radiated unless you do use some method of reduction of the harmonic level, so the ATU is really a must. This is of course true of any multiband aerial system!

The aerial described in **Fig. 2**, having been constructed and tuned, was compared as previously described against reference dipoles for the different hands, using one reference dipole at a time. The results of the tests may also be seen in **Table 1.** Although there are some slight changes to the basic aerial which was tested (the 'dipole' for 40 metres was cut to be 1½ wavelengths long for that band and an extra 1½ wavelength dipole added for 21MHz and 80 metres left out, the aerial in **Fig. 2** *has* been constructed exactly as drawn. The only difference in performance was noted on 7MHz where it performed exactly as the reference dipole, and as a consequence seemed down in performance on DX. The same is true of 80 metres.

Why go to all the trouble of cutting and tuning several dipoles? It is possible to put up a 132ft dipole and centre-feed it with tuned feeders, and most of the text books show some really pretty polar diagrams. But, what most of the books don't (or won't) show is the vertical angle of some of the lobes being radiated. On the higher hands particularly, some of these lobes turn out to be at almost uselessly high angles for working DX. Fine for setting fire to your neighbours gardens.

In short I have found the following advantages of the aerial in **Fig. 2.**

1. Low impedance feed.
2. Works DX.
3. Costs virtually nothing except an hour or so of your time, and a few feet of wire.
4. No nasty heavy traps dangling in mid-air, getting hot with your precious RF.
5. Low angle of radiation.

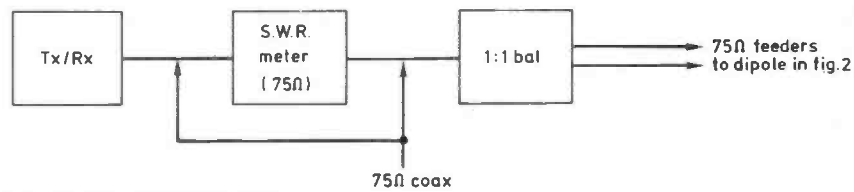

FIG. 4A. Set up for initial tuning

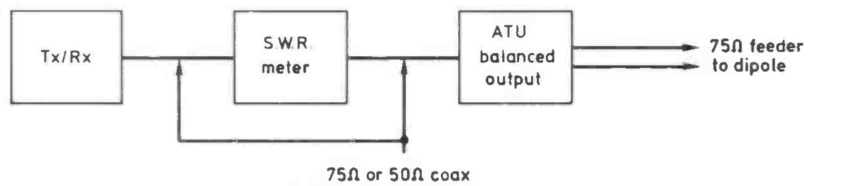

FIG. 4B. Shows final arrangement. Note use of ATU

Fig. 4B. Shows final arrangement. Note use of ATU

Table 2. Dipole Dimensions for multi-band aerial of Fig. 2.

DIPOLE	MODE OF OPERATION	LENGTH IN FEET	TUNED AT
A	½ wave 80 metre dipole (also approximates to 1½ wavelengths centre fed on 10MHz band)	131.83 feet*	3.55MHz
B	½ wavelength on 40 metres 1½ wavelengths on 15 metres	66.38 feet	7.050MHz
C	1½ wavelengths on 20 metres	99.92 feet	14.050MHz
D	1½ wavelengths on 10 metres	50.05 feet	28.050MHz

*NOTE: I actually cut mine to 134ft. and accepted a slight mis-match on 80 to improve SWR at 10MHz.