(**Fig 4C and D**) change the radiating pattern to three lobes and reduces the angle to 20° at a full wavelength height.

It goes to show that once the aerial is at a half wave length above ground or more, there is an increase in the number of energy lobes and a decrease in the lowest radiating angle. However, after a height of one wavelength above ground, the lowest radiating angle tends to remain unchanged at 20°.

So how does all this affect the average sort of aerial set-up that is put onto a tower or mast? The most popular aerials that are mounted as towers or masts are 'directional beams' for the HF, VHF and UHF bands. Due to the limitation of physical size, 20 meters is about the lowest frequency for which people use directional beam aerials. These are generally of the three band variety covering 20, 15 and 10 meters mostly with two to four elements. The purpose of these directional aerials is of course to direct the radiating energy in one designed direction mainly for long distance or DX working. When working DX stations, the angle of radiation of the signal is instrumental in how far the signal goes. Very high angles of radiation means a 'shortened' range where as a low angle of radiation means a longer range. Bear in mind of course that very low angle radiations at high frequencies can be adversely effected by ground effects. In practice taking angles of approximately 10° to 30° are satisfactory and preferable.

TABLE 1 HEIGHTS IN WAVELENGTHS

		¼ λ / 45°	½ λ / 30°	¾ λ / 25°	1 λ / 20°
14MHz	20m	16.7′	33.4′	50.1′	66.80′
21MHz	15m	11.14′	22.28′	33.4′	44.56′
28MHz	10m	8.35′	16.7′	25′	33.4′
70MHz	4m	3.34′	6.68′	10′	13.36′
144MHz	2m	1.62′	3.25′	4.87′	6.49′

SHOWS HEIGHTS IN WAVELENGTHS WITH APPROXIMATE RADIATING ANGLES FOR THE MAIN LOBES OF A HALF WAVE HORIZONTAL AERIAL.

At VHF and UHF frequencies, the picture changes because the surrounding terrain such as hills or highrise buildings will have the major effect on the radiating, or incoming signals.

Since the wavelengths at VHF and UHF are physically short, even a modest height of 30ft can represent several wavelengths at VHF, thus minimise any 'ground effects'. However, getting over the top of terrain or high buildings is quite difficult and more often than not only a compromise is possible, unless you can afford the Eiffel Tower! In these circumstances, the only practical solution to get the aerial as high as you can 'afford' to go, bearing in mind the neighbours and local authority as well as your pocket.

As you will see from Table 1, at a height of 34ft, a 20m aerial will be at half wavelength, a 15m aerial at ¾ wavelength and a 10m aerial at a full wavelength. A 4m VHF aerial would be at 2.5 wavelengths and a 2m aerial at roughly 5.2 wavelengths above ground.

Another important factor to take into account when deciding on a suitable height for your aerial system is the length of co-axial feeder you are going to be using. Long runs of co-axial feeder cable can be quite lossy and will reduce the amount of power that finally reaches the aerial. At VHF and UHF frequencies, the reductions can be quite considerable and could become unacceptable.

Part 2 next month

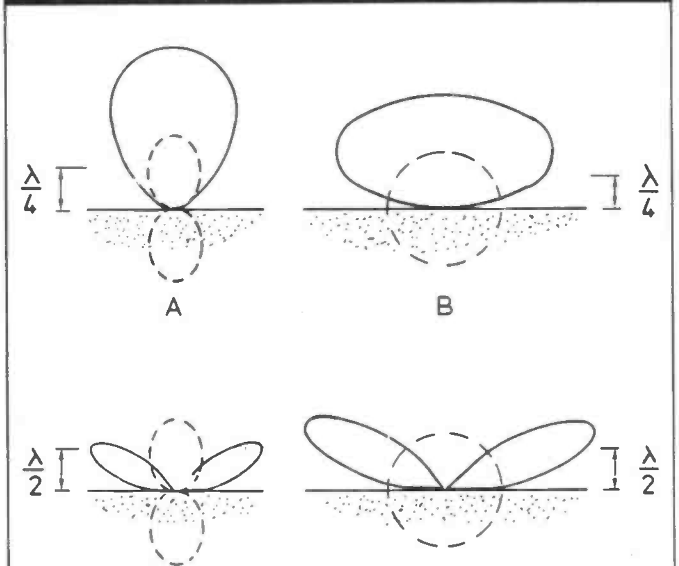

FIG. 3

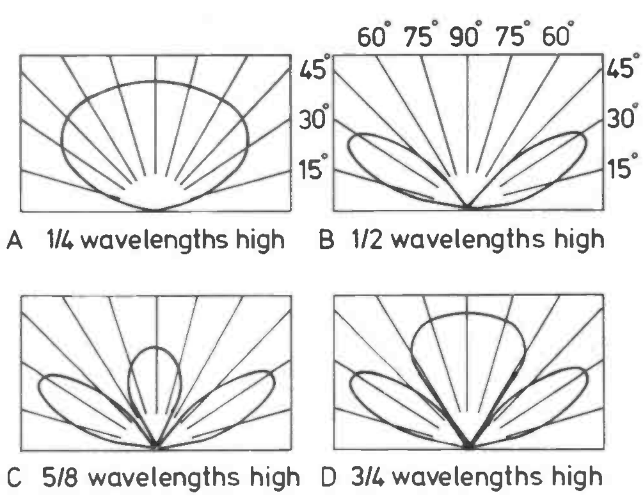

FIG. 4