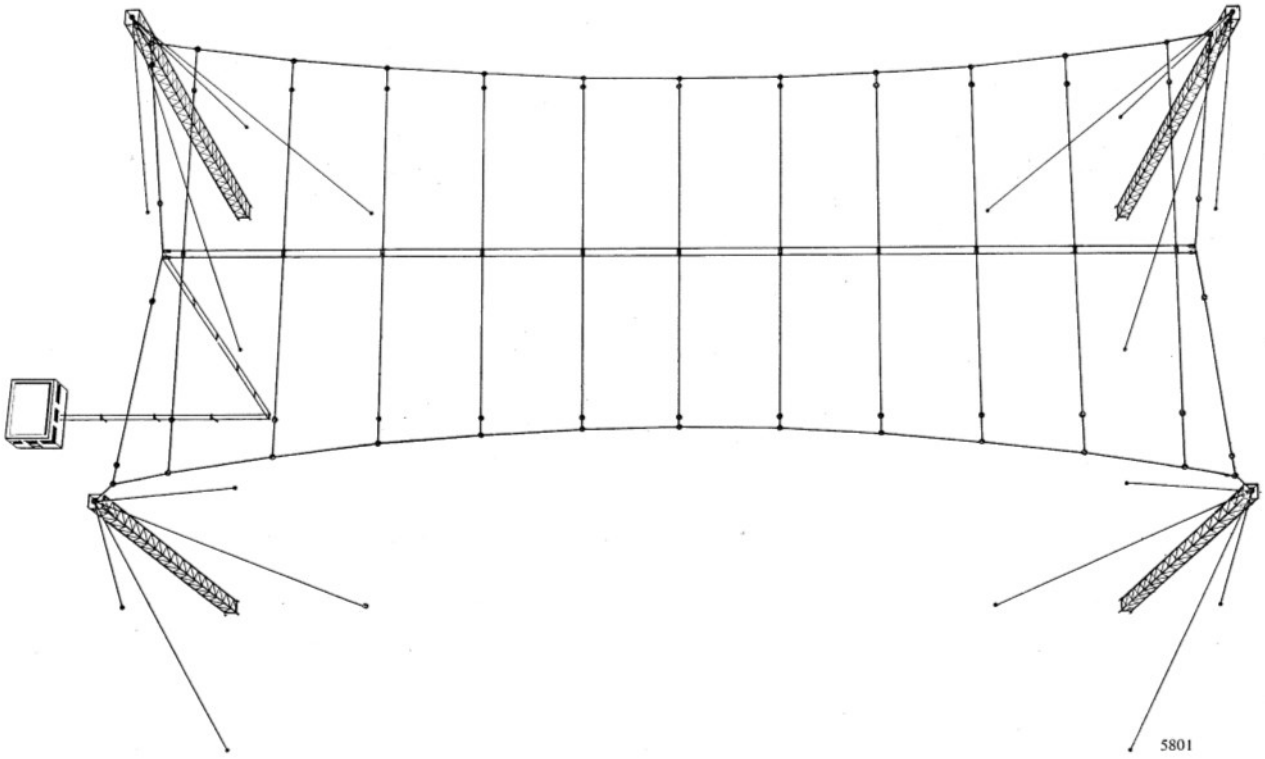
Horizontal Array of Dipole Receiving Aerials



THIS IS AN OUTSTANDING ARRAY for directional reception, eminently suited for long distance point-to-point radio links. Its high forward gain and low side-lobe sensitivity result in a good signal-to-noise ratio. It gives rise to negligible re-radiation and is insensitive to shadow effect.

The array consists of a series of centre-fed dipoles spaced one behind the other and suspended at the required height to meet the vertical angle of arrival of the received wave. The dipoles are linked by a feeder running along the axis of reception. An advancing wave front induces a voltage in each dipole in turn, and the effect produced in the feeder is the vector sum of the voltages induced in the various dipoles. Owing to the angle of arrival of the incident wave and the reduced velocity in the feeder, the wave in the feeder due to the first dipole will lag on that due to the second. This effect is cumulative, the resultant being the vector sum of the dipole voltages.

It has been determined that the optimum of

efficiency and directivity is obtained with 10 dipoles forming an element, and therefore two standard HAD aerial systems are supplied, the Single 10-Dipole Array and the Double 10-Dipole Array. The latter consists of two bays arranged side by side, each of 10 dipoles, with the feeders lying along the axis of reception. The single feeder of the former type of aerial and the two feeders of the latter are matched into a single 75 Ω coaxial cable lead-in.

The single array aerial system is supported by four lattice steel masts 100 ft (30 m) high, and the double array uses 80 ft (24 m) masts, disposed in both cases in a square.

For unidirectional reception each bay feeder is terminated with a 600 Ω resistance at the end towards the direction of reception. Bi-directional reception can be achieved using aerial transformers at each end of the bay feeders.

The performance of an HAD receiving aerial of the double 10-dipole array type may be summarised as follows:

(1) The forward gain is 18 db on a half-wave vertical.

(2) The front/back ratio is 15 db.

(3) The polar diagram is $\pm 13°$ at -1 db.

(4) The frequency tolerance is $\pm 22\%$ at -2 db

(5) The array may be arranged for bi-directional reception with no deterioration of service compared with unidirectional use.

(6) There is inappreciable re-radiation; another HAD of the same wavelength built right alongside, in no way affects performance.

(7) Two arrays spaced 10λ broadside or in line give a diversity gain of 8 db.