



Aerials, Aerial Feeders and Ancillaries for Low-Power HF Radio Communications

IN ORDER to make firm recommendations concerning types of aerials an adequate knowledge of the actual routes and general scheme of communication is necessary.

The Marconi Company maintains systems planning sections whose engineers are available to assist and advise customers on the choice of aerials for particular systems.

The following are general notes on the aerials most commonly supplied:

Inverted-L and sloping-wire or whip aerials

These are the simplest forms of aerial. The inverted L is used for frequencies in the range 3–10 Mc/s and the sloping wire, or whip, for frequencies above 10 Mc/s.

Rhombic aerials

For point-to-point working over distances of the order of 625 miles (1000 km) or more, rhombic aerials have a number of advantages. They are comparatively simple to erect, have wide bandwidth and are easily matched.

Typical frequency ranges over which single rhombics are operated are 3½–8 Mc/s, 8–16 Mc/s and 12–24 Mc/s. Complete frequency coverage for twenty-four hour working usually requires the use of double rhombics. Frequencies of 12 Mc/s and 8 Mc/s have been adopted as convenient change-over points for long and short-distance routes, respectively.

In azimuth, the rhombic can be used to work on circuits within a total included angle of up to 8° with little loss of gain.

The aerials are normally supported from four lattice-steel masts of the order of 100 ft (30 m) high. Double rhombic aerials can be supported on the same set of four masts.

Half-wave folded-top dipoles

For distances of hundreds of miles this type of aerial is suitable. The propagation pattern is almost omni-directional especially for the shorter distances. For longer routes it is sometimes advantageous to add reflectors to diminish radiation in undesired

directions or to provide receiver protection by reducing interference coming from the rear of the aerial. Some increase in gain also results.

Horizontal array of dipoles (HAD)

This type of aerial may be used for reception and has a gain similar to that of a rhombic. The array consists of two rows of half-wave dipoles – each dipole being parallel to the ground with a spacing between dipoles of a quarter wavelength. The arrangement is strongly directional and has a low vertical angle of reception, making it suitable for the longer circuits.

Quadrant aerials

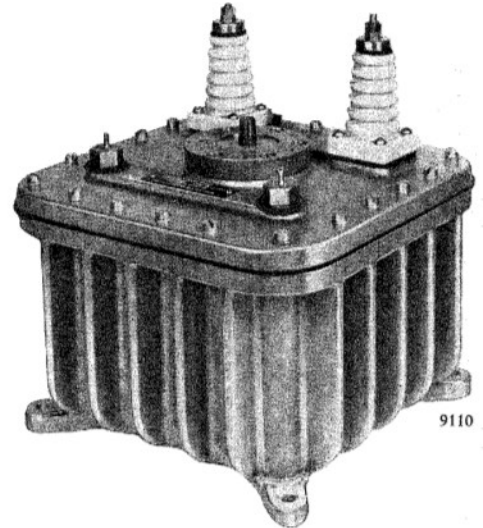
This type may be used for transmitting and receiving, and can have omni-directional or directional properties. It is suitable for medium-distance working.

Double-diversity reception

For high-speed telegraphy double diversity receivers and aerials are essential to obtain a reliable circuit in the face of fading, which is a characteristic of HF transmission. Normally pairs of dipoles or rhombics are used, the two aerials being spaced some 5–10 wavelengths apart. Where space is at a premium it may be more convenient to employ polarization diversity reception. This is obtained by supporting two dipoles at right angles to each other in the vertical plane. If the dipoles are constructed in the form of a fan there is the added advantage of a greater bandwidth compared with the standard-type half-wave dipole.

Aerial feeders and ancillaries

It is usual practice to employ 600 Ω open-turn wire for transmitting and 72 Ω (nominal) unbalanced coaxial cable (either over or underground) for reception. In the case of receiving aerials, connection to the feeder can be achieved using Type HA 10 or HA 20 series of matching transformers described on page 242.



9110

Transmitting Aerial Matching Transformer Type HA 111 (see also page 240).

The output from the transmitter can be either 600 Ω balanced or 50 Ω unbalanced. Matching transformers are available to match one impedance of 50 Ω unbalanced to another of 600 Ω balanced or vice versa. The Type HA 111A (see page 240) caters for powers up to 1 kW.

Harmonic Filters Type F 1295 are available for inclusion in each line of a 600-ohm feeder to prevent harmonics (from transmissions in the range 4 to 27.5 Mc/s) from causing interference with television reception in the range 40 to 70 Mc/s.

NOTE Matching transformers and coaxial switching systems are available for output powers up to 30 kW p.e.p., see page 240.

Marconi

Marconi's Wireless Telegraph Company Limited
Marconi House, Chelmsford, Essex
Telephone: Chelmsford 3221 · Telex: 1953
Telegrams: Expanse Chelmsford Telex