length, but the deviation from a circle is less than ±3dB when the armlengths are between one-third and two-thirds of a wavelength. The vertical plane polar diagram is similar to that of a simple horizontal dipole, and it has the same dependence on height above ground.

A single h.f quadrant aerial requires three masts to support it, but four aerials covering different bands may be erected on four masts, and it is in this form that a set of quadrant aerials is usually supplied. At power levels above a few hundred watts it is recommended that the aerial should be regarded as a spot frequency radiator and matched to the 600Ω feed at the working frequency.

For general-purpose reception, the aerial can conveniently be used over a 2:1 frequency range, and a set of four aerials can be used to cover the complete high-frequency communications spectrum with adequate overlap.

For example:

2·5 to 5MHz.
4·5 to 9MHz.
8 to 16MHz.
14 to 28MHz.

It is frequently feasible to erect all four aerials at the same height. This is because the low-frequency aerials will generally be used for short-distance reception, for which the arrival angles are high, and the high-frequency aerials are used for long distance reception for which the arrival angles are low. Thus heights between 0·15 and 0·25 of a wavelength are appropriate for the low-frequency aerials, and heights of the order of 1·5 wavelength would be suitable for the highest frequencies.

### *Data summary*

**Frequency range:** 2·0–28Hz. For transmitting, the quadrant is spot matched on site to the working frequency and is preferably designed for desired polar diagrams as to length and height above ground. For receiving, a bandwidth of approx. 1·8:1 inside an s.w.r limit also depends on the height of the quadrant above ground.

**Input impedance:** Receiving and transmitting quadrants are designed to match into 600Ω feeder.

**Polarization:** Horizontal.

**Radiation pattern:** Horizontal (approaching circular).

**Power handling capacity:** Up to 20kW average.

**Maximum wind velocity:** 100 m.p.h wind velocity.

**Maximum gain:** Max. gain 6dB with respect to an isotropic source.

# Microwave Aerials for Communications

## Using 'Marconi-Surface' Construction

The Marconi Company has developed a range of horn-fed paraboloidal dish aerials manufactured from glass-fibre and wire mesh. To obtain maximum forward gain at any particular frequency, high illumination efficiency and extreme accuracy of reflecting surface are required.

This permits normal operation of the aerial up to a frequency of 11,500MHz and operation up to 20,000MHz with only a slight lossin illumination efficiency.

**Survival conditions:**

Max. mean hourly operational wind velocity, 145 km/h (90 mile/h).
Max. one-second gust survival wind velocity, 240 km/h (150 mile/h).
Temperature range, −50° to +50°C.
Surface temperature due to solar radiation, 70°C.
Ice load, mean over-all thickness 1·3cm (½in.).
Snow load, mean over-all thickness 30cm (12in.).

**Surface accuracy:** Within 0·75mm (0·030in.) r.m.s departure from true profile.

### *Features*

Low weight/stiffness ratio.

Independent panning in azimuth and elevation.

High degree of profile accuracy of the galvanized steel wire mesh, stabilized in the glass-fibre surface.

High front-to-back ratio by the use of a special diffraction ring.

Glass-fibre radomes available for protection against weather effects.

*A 4000MHz 10ft diameter aerial*

### *Data summary*

| *Type No.* | *J0010* | | *J0015* | |
|---|---|---|---|---|
| Diameter: | 305cm (10ft) | | 457cm (15ft) | |
| | 4000MHz | 8000MHz | 4000MHz | 8000MHz |
| Gain: | 39·9dB | 45·9dB | 43·4dB | 49·4dB |
| Beamwidth: | 1·4° | 0·9° | 1·2° | 0·6° |
| V.S.W.R: | Better than 1·01:1 | | Better than 1·05:1 | |
| Front/back ratio: | | | | |
| With diffraction ring | 61dB | 60dB | 65dB | 65dB |
| Without diffraction | 45dB | 52dB | 58dB | 55dB |
| Weight of reflector and horn feed | 227kg (500lb) | | 499kg (1100lb) | |