



42ft Diameter Radio Telescope Antennas

The Marconi Company has developed a 12.8m (42ft) diameter antenna on an Hour-Angle Declination mount for use as a radio telescope antenna. The design has been specifically intended for use in variable spacing interferometer arrays of the supersynthesis type. To this end, two variants of the antenna are available, either fixed or mounted on bogeys designed to run on a 8.5m (28ft) gauge rail track; a combination of a fixed and traversable antenna can therefore be used to form a variable spacing interferometer. Single fixed antennas may be used as high-surface accuracy general purpose radio astronomy antennas.

As an extension of the application in synthesis arrays, complete systems may be supplied consisting of antennas and a Marconi Myriad II computer (see page 323).

The computer is used:

- (1) to close the antenna servo-loop;

encoded positions from individual antennas are compared with the computed sky co-ordinates of a region of sky the system has been instructed to track, instructions then being sent to the antennas to minimize the error;

- (2) to control the path compensating cabling system used to equalize the phase of signals from the individual antennas;
- (3) to store the receiver output information as a function of time, and on completion of the observations, compute the Fourier inversion necessary to produce a map of radio sky brightness from the receiver information. This may be drawn out on a peripheral line-plotter.

Features

Cassegrain optics, with quasi-conic section reflecting surfaces for maximum efficiency.

12.8m (42ft) diameter high profile accuracy quasi-parabolic main reflector.

1.22m (4ft) quasi-hyperbolic sub-reflector.

Hour-angle/declination mount, permitting track of a celestial source by rotation about one axis only.

Feeds available for radio astronomy bands in the range 1.4–10.69GHz.

Motor-driven section enables the plane of polarization to be rotated under control from the computer, thus enabling interferometric polarization observations to be made.

Feed horns interchangeable.

Digital encoders for hour-angle and declination data measurement.

Speed range—hour angle: tracking at sidereal rate to slew of 15°/minute.
—declination: ¼°/minute to 15°/minute.

Antennas will withstand winds of up to 105 m.p.h at the zenith position without suffering permanent deformation or damage; higher survival windspeeds can be provided.

Data summary

Frequency range: Primarily intended for use in the radio astronomy frequency allocations between 1.4 and 10.69GHz; extended frequency capability can be provided.

Reflector: quasi-paraboloid, 3.7m (12ft) focal length. 1.22m (4ft) quasi-hyperboloid to form cassegrain reflector system.

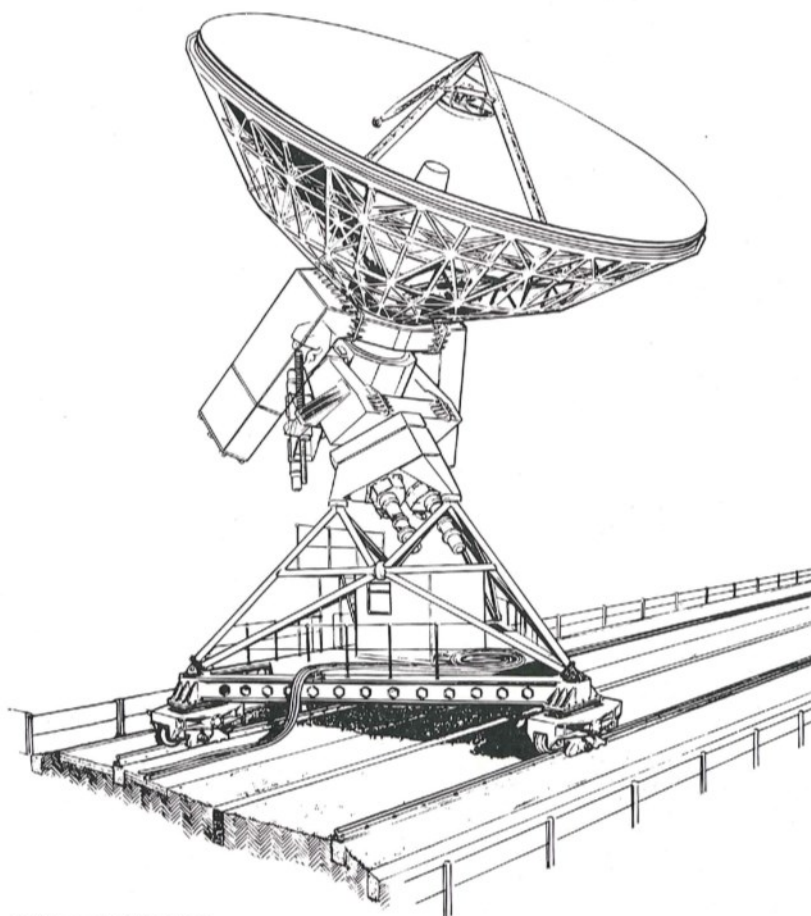
Feeds: rotatable polarization types available for frequencies in range 1.4–10.69GHz. Feeds for different frequencies are interchangeable in antenna.

Surface tolerance: 0.9mm (0.035in.) r.m.s overall.

Pointing accuracy: 2.5' arc, 3 sigma value in winds of 30 m.p.h gusting to 45 m.p.h.

Hour Angle movement: ±6 hours (180°).

Declination movement: up to 110°.



42ft traversable aerial