mounted at 180° to the first and connected to give the same binary output, within the accuracy limits.

All elements that may require servicing are designed to be readily interchanged.

A constant velocity anti-backlash coupling, having the required torque capacity, is available which maintains the through hole facility and enables the encoder to be 'plugged-in' to its driving shaft.

### *Data summary*

**16-Digit Optical Encoder**

**Code:** Cyclic permuted binary (Gray) or straight binary.

**Resolution:** 65,536 increments/revolution ($2^{16}$).

**Accuracy:** Changeovers to occur within ±1 increment of true position (i.e ±20 seconds arc.)

**Output:** Parallel, continuous.

**Output Levels:**
Binary 0+5V (±0·5V).
Binary 1+4·5V ±0·5V.

**Rotation for increasing count:** clockwise or counter clockwise.

**Ambient temperature limits:**
−40°C to +70°C with lamp brightness control.
41·25cm. dia.× 23cm. long (16·25in. dia.× 9in. long) (excluding lamp housing).

**Weight:** 34kg (75lb).

**Power supplies requried:** +5V ±5% 1A d.c − 15V. ±10% 250mA d.c.

**Lamp supply:** 10V. 4·0A d.c.

A second, completely independent optical unit may be mounted at 180° to give a fully redundant system.

# Synchro Control Equipment

In stations not requiring programme tracking facilities, sufficient accuracy for initial pointing commands prior to autotrack can be achieved by use of a synchro control system which replaces the Digital Data Processing Equipment. The equipment incorporates fine/coarse synchro position indicators mounted on the elevation and azimuth axes of the antenna. These replace the digital shaft encoders used with the digital system. An analogue drive voltage is derived from the difference in angular position indicated by the antenna mounted synchro and the synchro control dial assembly located on the station console. A dial type of readout is provided at the station control console to indicate antenna position. The accuracy of this system is ±4 minutes of arc which is adequate for initial positioning of an antenna prior to autotrack especially when used in conjunction with the limited space research facilities provided with all Marconi servo equipments.

# ANTENNA FEEDS FOR SATELLITE COMMUNICATIONS

## Mode Conversion Scan Feed

For use with antennae of 90ft diameter or greater.

The operation of the Marconi mode conversion feed is similar to the well-known conical scan system wherein the main antenna beam is slightly deflected, from the geometric axis of the antenna, and the feed rotated to produce a conical scan. The variations in signal level produced by the rotation are interpreted in the antenna tracking system to derive antenna steering information. The Marconi mode conversion system ensures that the beam is only deflected at the frequencies corresponding to the satellite beacon band, and variations of the transmitted signals, due to scanning, are therefore virtually eliminated. This is a great advance over conventional conical scan arrangements which transmit unwanted modulations to the satellite which may result in undesirable cross modulation products being produced.

For Intelsatt III conical scanning is arranged to occur only in the band 3930 to 3970MHz which corresponds to the band allocated for tracking beacons within the satellite.

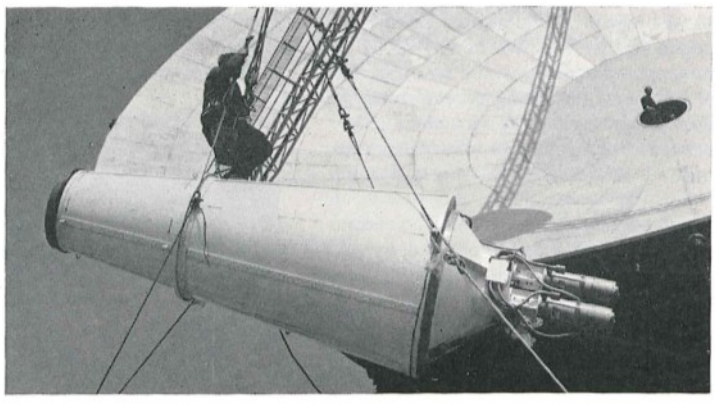
### *Data summary*

**Frequency band:**
Receive: 3700–4200MHz.
Transmit: 5925–6425MHz.

**Polarization:** Circular or variable linear.

**Gain:**
5925MHz 62·9dB (67% efficiency at horn aperture).
4000MHz 60·2dB (80% efficiency at horn aperture).

A mode conversion section at the throat of the horn provides beam off-set at beacon frequencies only. Horn rotation at up to 1000 r.p.m results in a conical scan at these frequencies.



*Single Horn mode conversion Scan Feed being fitted to 90ft antenna dish*