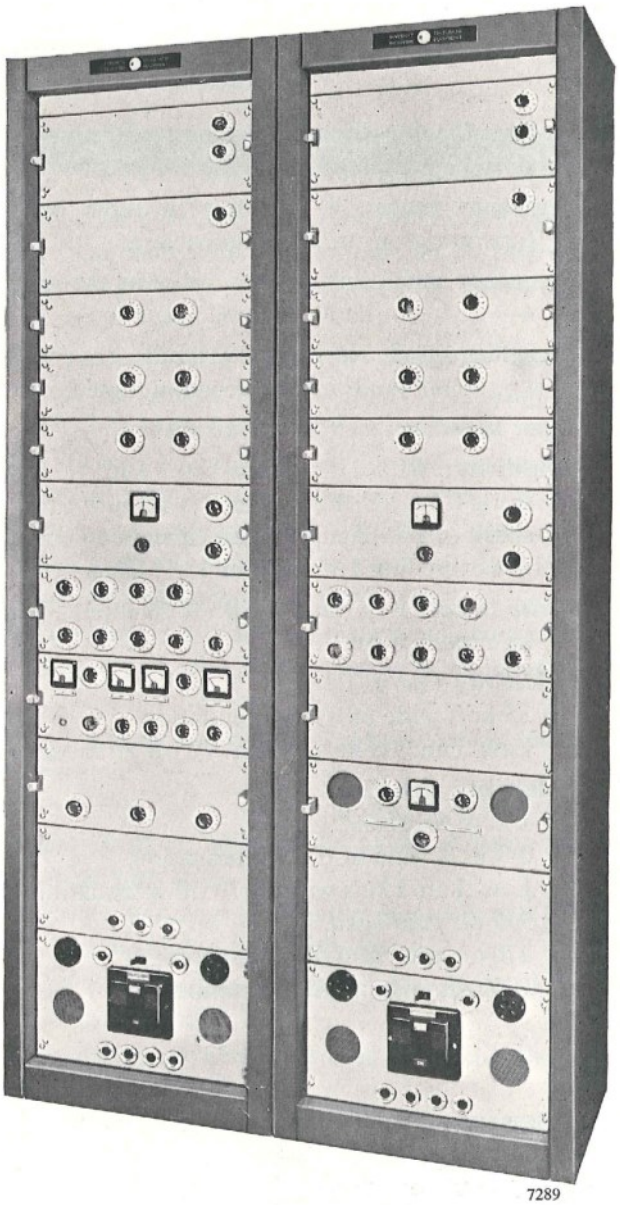
Double-Diversity VHF Receiver
Type HR 16

THE TYPE HR 16 EQUIPMENT is a radio-telegraph receiver specifically designed for the reception of ionospheric forward-scatter transmissions of frequency-shift keyed signals.



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FEATURES

Designed for space-diversity reception of telegraph signals with wide frequency shift, using separate 'mark' and 'space' receiving chains.

Double frequency-change superheterodyne circuit employed, with crystal-controlled first frequency change oscillator.

Optimum signal-to-noise ratio ensured by narrow pass-band crystal filters operating at 100 kc/s.

Automatic frequency correction circuits independently compensate for drifts of either 'mark' or 'space' frequencies, thus minimising the effects of drift in the transmitter primary oscillator, of any residual variation in the amount of frequency shift, and of drifts in the receiver first oscillators.

Change of frequency shift is accommodated simply by changing the crystal in one of the two first oscillators; no alteration to filters is necessary.

Outputs are provided for simultaneous operation of two undulators or teleprinters and a tone sender.

AGC intensity and time constant can be varied to obtain optimum performance under all propagation conditions.

Comprehensive monitoring and metering facilities are provided.

High reliability and minimum first cost are achieved by the use of standard units and components from established Marconi designs.

Access to all components without cable disconnection by withdrawing units on runners.

CIRCUIT

The receiver contains four separate chains of signal-frequency and intermediate-frequency stages, two forming the dual-diversity paths for the 'mark' frequency and two forming the dual-diversity paths for the space frequency. The two first oscillators differ in frequency by the amount of shift employed on the transmission.

Each receiving chain incorporates two frequency changers, giving a first IF of 5 Mc/s, a second IF of 100 kc/s for the 'mark' and 'space' signal chains.

The outputs at final frequency are taken to four detectors, two for each diversity path. The detected signals are then combined.

The DC stages consist of conventional amplifying, limiting and signal shaping circuits.

DATA SUMMARY

Service: Double-diversity reception of frequency-shift keyed telegraph transmissions.

Frequency range: 30–60 Mc/s in three bands (operating on pre-set frequencies).

Frequency shift: Any desired value in the range 4–9 kc/s can be accommodated.

Signalling speed: Normally 200 bauds, but speeds up to 400 bauds can be accommodated.

Input impedance: 75 Ω unbalanced.

Sensitivity: With 1 kc/s pass-band and 4·5 kc/s shift, 0·25 μV input signal is required for a speed of 100 bauds with an element error rate not exceeding 1 in 1000 at 15% distortion.

Noise factor: Less than 4 dB. With input filters in circuit, 6 dB.

Selectivity (1st IF):
35 kc/s wide at 3 dB attenuation.
Less than 200 kc/s wide at 70 dB attenuation.

Selectivity (2nd IF):
1 kc/s pass-band:
0·9 kc/s wide at 6 dB attenuation.
Less than 3 kc/s wide at 70 dB attenuation.
250 c/s pass-band:
270 c/s wide at 6 dB attenuation.
1000 c/s wide at 60 dB attenuation.

Image signal protection: Greater than 60 dB.

Automatic frequency correction: Frequency drifts up to ±3 kc/s are followed with a residual error of less than 10 c/s.

Automatic gain control: Not more than 15 dB change in output for an increase in input of 80 dB. Switch-selected time constants are: 20, 60 and 200 ms.

DC output: Two outputs of 30–0–30 mA into earthed loads not exceeding 2000 Ω. An output of 30–0–30 V at 10,000 Ω is simultaneously available for keying a tone-sender.

Power supply: 200–250 V, 50 c/s AC mains. Permissible variation: voltage ±6%, frequency ±4%.

Power consumption: 750 W (approx.)

Dimensions:

Height	Width	Depth	Weight
7 ft 0¼ in.	3 ft 11 in.	1 ft 10 in.	1000 lb approx.
(214 cm)	(119 cm)	(56 cm)	(454 kg)

Marconi

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