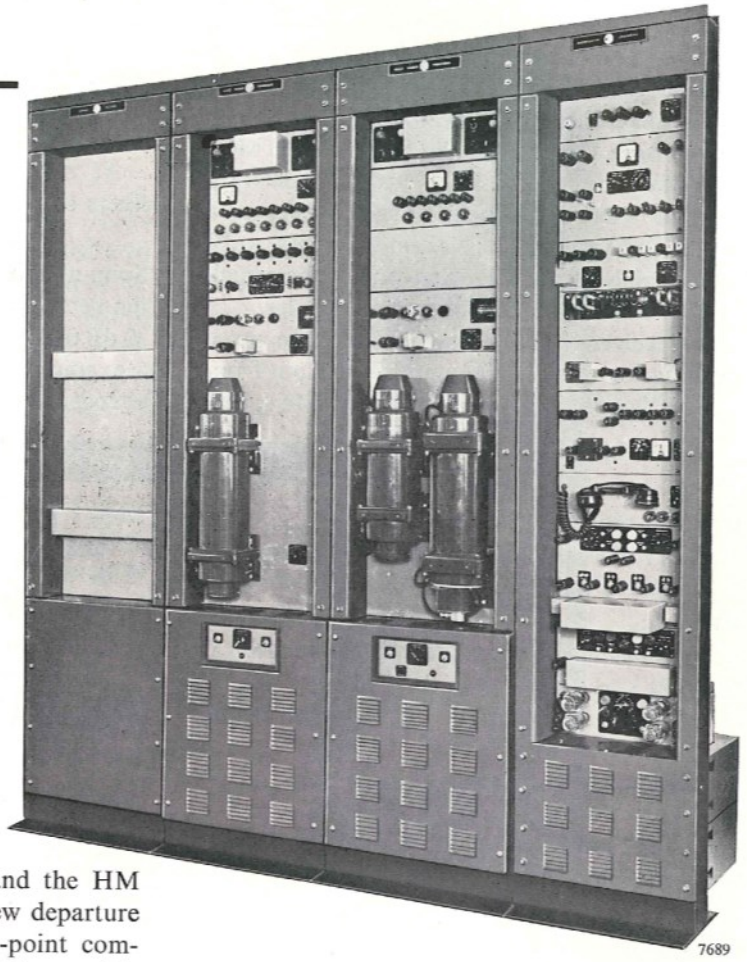
UHF Wide-Band Radio Link Equipment *HM 200 and 250 Series*



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THE HM 200 SERIES TERMINALS and the HM 250 Series Repeaters represent a new departure in the field of microwave point-to-point communication. They have been designed to provide main trunk routes with an ultimate capacity of 600 telephone channels or, alternatively, one high-definition television channel. The aim has been to produce a radio equipment having a performance that enables the telephone channels to meet CCIF requirements, over a distance of 2500 km, assuming sound route planning and suitable associated channelling equipment.

The equipment operates in the frequency band 1750 to 2300 Mc/s. Common aerials are employed for transmitting and receiving.

A common terminal modem (modulator/demodulator) equipment is available for television or multi-channel telephone services.

In addition to Engineers' Order Wire, supervisory and radio fault alarm facilities, provision can also be made for certain non-radio fault alarms (*e.g.* fire, unauthorised entry etc.) to be extended from repeater stations to terminals. A loop-test system enables the performance of individual repeaters to be checked from either terminal. Links can be arranged for standby operation

on the twin-path system, with automatic change-over and systems having up to six radio channels in parallel can be provided.

CIRCUITS

Terminal. The traffic signal from the channelling equipment (together with any EOW signal) or the television signal is amplified in a wide-band amplifier, and used to modulate a 70 Mc/s oscillator. This IF of 70 Mc/s is then mixed, in a crystal mixer stage, with a carrier frequency (derived from a crystal oscillator) in the 2000 Mc/s band. The modulated UHF signal is taken from the mixer stage through a band-pass filter to a travelling-wave tube. This intermediate tube drives a high-power travelling-wave tube which delivers 10–15 W output to the aerial feeder.

The received signal is taken to a low-noise travelling-wave tube. The amplified output from this tube is converted to an IF of 70 Mc/s, and after further amplification is demodulated to the base-band frequency.

Repeater. Travelling-wave tubes make it possible to employ frequency-changing repeaters without conversion to IF. The incoming signal is taken through a low-noise and an intermediate travelling-wave tube, and is mixed with the output of a 213 Mc/s oscillator to produce the frequency to be retransmitted. The signal at the new frequency is then taken through two stages of travelling-wave tube amplification before radiation.

At both terminals and repeaters band-pass filters between the tubes ensure selectivity.

AERIALS

Spun-aluminium paraboloid aerials of 10 ft (3 m) diameter are used, each having a nominal gain of 30 dB over a half-wave dipole. Waveguide feeders are employed and these are pressurised with nitrogen.

DATA SUMMARY

Frequency range: 1750–2300 Mc/s.

Frequency tolerance: 100 parts in 10^6 over the temperature range 0–50°C.

Deviation:

Multi-channel. Channel test tone deviation is 200 kc/s RMS.

Television. From tip of sync. to peak white, 6 Mc/s sweep.

Modulation frequency range:

300 c/s–3·4 kc/s for EOW and supervisory.
60–1052 kc/s for 240 channels.
60–2540 kc/s for 600 channels.
25 c/s–5 Mc/s for video signal.

Modem levels (per channel):

Input: −52 to −0 dBm
Output: −45 to −10 dBm.

Modem levels (television):

Input: +6 to −3 dB ref. 1V DAP.
Output: +5 to −5 dB ref. 1V DAP.

Modem impedances: 75 Ω unbalanced.

Overall transmission characteristic:

60–1052 kc/s within 1 dB.

Noise: The max. channel noise (including cross-talk) laid down by CCIR (Warsaw) Doc. 947 is not exceeded, under the white-noise test conditions given in CCIR Doc. 811, for a 240-channel system for the reference circuit of 1500 miles (2500 km).

Transmitter power output: 10–15 W.

Receiver noise factor: 10 dB.

Power supplies: 200–250 V, 45–65 c/s single-phase AC supply. Permissible variation, voltage ±2%, frequency ±2·5%.

Power consumption: Terminal 1·1 kVA, repeater 2 kVA, blower (1 per station) 0·75 kVA.

Dimensions:

	Height	Width	Depth	Weight
Normal single-path terminal	7 ft 6 in. (228 cm)	6 ft 10 in. (208 cm)	1 ft 6 in. (46 cm)	1232 lb (560 kg)
Basic two-way repeater	7 ft 6 in. (228 cm)	10 ft 3 in. (312 cm)	1 ft 6 in. (46 cm)	1960 lb (890 kg)

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