

# Marconi Radio Telephone Terminal Type H 5510

The Radio Telephone Terminal Type H 5510 provides the interconnection between an h.f. radio circuit and the telephone network, maintaining acceptable telephone communication despite wide variations in propagation conditions.

The primary functions of the equipment are:

- (a) to connect the two-wire telephone network and the four-wire radio system, without circuit loop instability due to feedback from radio receive path to radio transmit path;
- (b) to counter variations in telephone speech level, maintaining radio transmitter modulation level fairly constant;
- (c) to reduce the effects of radio receiver signal fading and high noise level, characteristic of h.f. propagation;
- (d) to provide a supervisory position, with signalling and speech facilities over the radio link and with the local exchange and radio sites if required.

In addition the following optional facilities may be provided

- (a) Tape recorder for test or station identity transmissions;
- (b) Three-position cordless exchange panel;
- (c) Speech channel displacement and restoration;
- (d) Transmission security using either simple inversion or five-band privacy.

## Features

Solid-state circuitry.  
Plug-in circuit cards for easy servicing.  
Flexible arrangement of panels and facilities.

## General Design

Control panels and shelves, which house plug-in printed cards, fit standard 19 in. rack. Normally a 5 ft (152 cm) rack-side is enclosed in the H 5510 console. This accommodates up to four radio telephones terminal Type H 5511.

Various editions may include five-band privacy Type H 5513, channel displacement and restoration Type H 5512 and channel inversion Type H 5514; these are constructionally similar to the terminal, replacing one or more channel positions in the console. Where four-channel capacity is required with these additional facilities, a cabinet with 19 in. panel capacity accommodates the extra shelves.

Radio telephone terminal Type H 5515 is a desk-top version for single-channel operation without privacy or displacement.

The control panels on the front of the console, or the front section of the desk-top

terminal, can be hinged forward to give easy access for maintenance.

Dimensions:	H 5510	H 5515
Height	5 ft 3 in. (160 cm)	9 in. (23 cm)
Width	2 ft 4 in. (70 cm)	1 ft 11 in. (58 cm)
Depth	3 ft (90 cm) max	1 ft 10 in. (55 cm)

## Radio-Telephone Channel Type H 5511

This is the main supervisory and control equipment which is normally assembled into a Type H 5510 console arrangement or alternatively into a small desk-top cabinet.

The telephone circuits are normally connected to the exchange on two-wire lines and to the radio equipment on four-wire circuits.

The speech signals in the transmit path are processed to provide the constant level output required for radio transmission. Electronic attenuator pads automatically control the gain, giving rapid reduction in gain when high-levels are applied, a more gradual increase in gain for low levels and no change in gain when the signal is removed. Pauses in conversation are thus allowed for.

A manually-controlled amplifier may be

switched in tandem with, or in place of the transmit constant-level amplifier.

In the receive path a constant volume amplifier accommodates the rapid changes of level experienced over a radio link and provides a substantially constant output level.

Singing suppressor circuits in both transmit and receive paths prevent high-gain loops (leading to instability in the radio circuit) from being established.

Signalling over the radio path is provided by a 500/20 Hz or 1000/20 Hz ringing generator. A ringing receiver detects either the 500 Hz or 1000 Hz tone and is virtually immune from speech interference. An 800 Hz test-tone oscillator is provided for routine checking and alignment. For maximum flexibility, each H 5511 shelf contains its own power supply.

## Data Summary

**Impedance:** 600  $\Omega$  at all access points.

**Terminations:** Exchange side, 2 or 4 wire  
Radio side, 4 wire.

### Levels:

Exchange side	Four wire	Two wire
Transmit path	-40 to 0 dBm	-36 to 0 dBm
Receive path	-5 to +5 dBm	-9 to 0 dBm

### Radio side

Transmit path -5 to -2 dBm.

Receive path -20 to -5 dBm.

**Frequency response:** Overall ripple less than 2 dB between 250 Hz and 3 KHz.

**Signalling:** 17 Hz, 25 Hz, 50 Hz or 50 V to exchange. 500/200 Hz or 1000/20 Hz radio link.

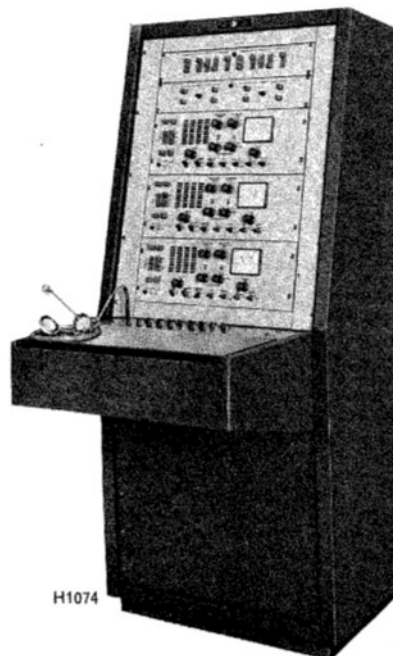
**Power supply:** 80-140 V or 190-250 V 50-60 Hz, single-phase a.c.

### Dimensions:

	Shelf	Panel
Height	7 in. (177 mm)	7 in. (177 mm)
Width	19 in. (485 mm)	19 in. (485 mm)
Depth	10½ in. (268 mm)	5 in. (127 mm)

## Channel Displacing and Restoring Equipment Type H 5512

An i.s.b. radio circuit can carry up to one telephone channels. The H 5512 provides one channel from 250-3000 Hz to 3000 Hz, this channel being combined with an unshifted channel to form a 6 kHz channel. One displacer and one restorer are provided control panel width, plus a restorer (shared with inversion circuits and power supply).



Radio Telephone Terminal H 5510

### Data Summary

**Impedance:** 600  $\Omega$  at access points.  
**Insertion gain:** 0 dB  $\pm$  1 dB on all channels, transmit and receive, at -5 dBm.  
**Frequency response:** Overall ripple less than 1 dB for unshifted channel, 2.5 dB for shifted channel, each for 300-2800 Hz input.  
**Oscillator:** 6.25 kHz  $\pm$  1 Hz, crystal controlled.  
**25 kHz Suppression:** At least 55 dB (< -50 dBm leakage).  
**Power supply:** As H 5511.  
**Dimensions:**  
 Height 7 in. (177 mm) 3 1/2 in. (88 mm)  
 Width 19 in. (485 mm) 19 in. (485 mm)  
 Depth 10 1/2 in. (268 mm) 5 in. (130 mm)

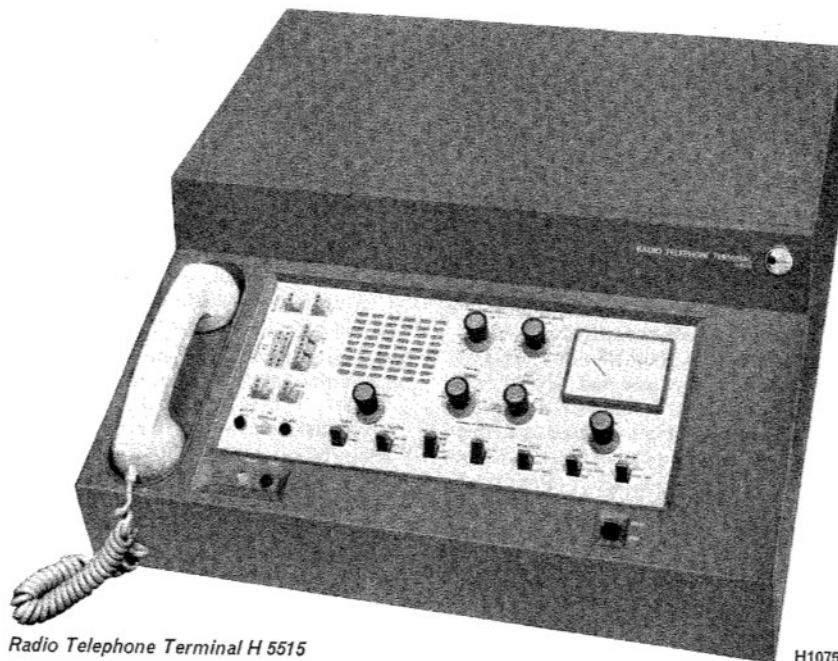
### Five-band Privacy Equipment Type H 5513

Where maximum security is required, the H 5513 ensures that the 'scrambled' signal transmitted is completely unintelligible until resolved at the receiver, where the combination used must be known. The speech spectrum of 250-3000 Hz is divided into five bands of 500 Hz each, which are then re-arranged and/or inverted to give a signal with bandwidth the same as for plain speech but secure against interception. At the receiver the procedure is reversed to restore the original speech signal.

Two six-position switches allow independent selection of scrambling combinations for transmit and receive paths, plug-in cards with soldered links determining the combinations thus available. Additional prepared cards may be stored in the console for substitution if required.

### Data Summary

**Impedance:** 600  $\Omega$  at all access points.  
**Insertion gain:** 0 dB  $\pm$  0.5 dB in the middle of each band, transmit and receive, at -5 dBm.  
**Frequency response:** Overall ripple less than 2.5 dB for  $\pm$ 190 Hz from centre of each band. Less than 5 dB insertion loss at  $\pm$  225 Hz. At least 10 dB insertion loss at  $\pm$  250 Hz (limit of band). Roll-off is steeper between 2750 Hz and 3000 Hz.  
**Oscillators:** 4050 Hz, 4600 Hz, 5150 Hz, 5700 Hz and 6300 Hz for band translation; 7050 Hz for band inversion; all  $\pm$  1 Hz crystal controlled.  
**Leakage:** < -50 dBm.  
**Power supply:** As H 5511.  
**Dimensions:** As H 5512.



Radio Telephone Terminal H 5515

H1075

### Channel Inverter Type H 5514

For a simple security system, inversion of the frequency spectrum of a channel may be adequate. Two H 5514 inverters may share a common shelf and power supply with a displacer/restorer, and occupy one control panel.

### Data Summary

**Impedance:** 600  $\Omega$  at all access points.  
**Insertion gain:** 0 dB  $\pm$  0.5 dB, transmit and receive, at -5 dBm.  
**Frequency response:** Overall ripple less than 2.5 dB for input between 250 Hz and 2650 Hz.  
**Oscillator:** 3 kHz  $\pm$  1 Hz, crystal controlled.  
**Power supply:** Two inverters share with H 5512 on same shelf.  
**Panel Dimensions:** As H 5512 panel, containing one or two inverters.

### THE MARCONI COMPANY LIMITED Radio Communications Division

Marconi House, Chelmsford, Essex  
 Telephone: Chelmsford 53221. Telex: 99201  
 Telegrams: Expanse Chelmsford Telex