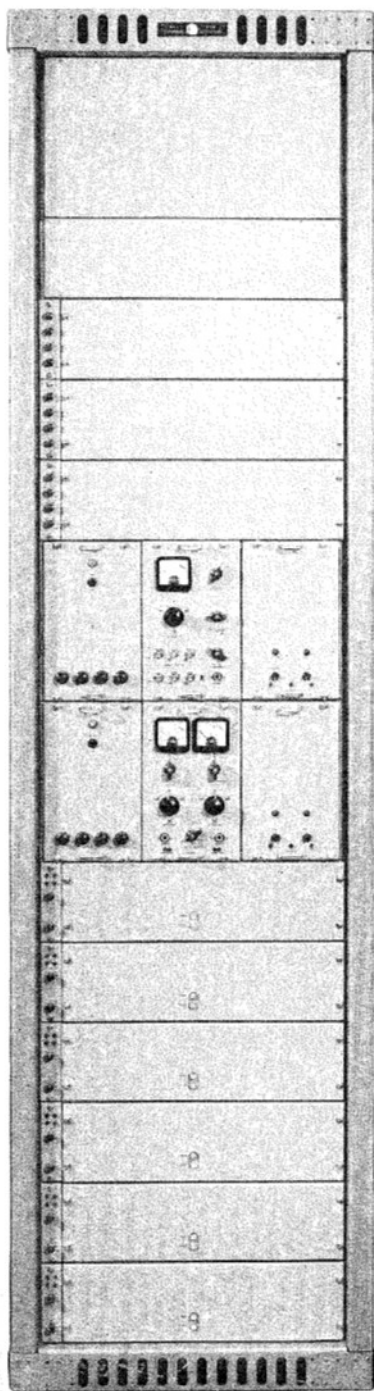




Transistorized V.F Telegraph Equipment

Type H 5000/H 5001



9701

THE H 5000/H 5001 is a fully transistorized voice-frequency telegraph system for h.f. radio circuits, available in a number of different versions. In the standard versions, two independent 6-channel or 12-channel transmit or receive terminals, or one transmit and one receive terminal, are mounted in one cabinet 7 ft 6 in. high. In the transportable versions, one terminal is accommodated in a smaller size cabinet suitable for installation in a vehicle or transportable shelter.

Standard versions

The standard versions provide a choice of two methods of keying:

(a) *two-tone*, in which two tones are allocated to each telegraph channel and are keyed on-off, one for mark and one for space; and

(b) *frequency modulation*, in which one tone is used per telegraph channel; its frequency being shifted by ± 42.5 c/s about its centre frequency. Using two-tone keying, the best possible performance is obtained under conditions of fading and interference, and 6 channels may be provided in a 3 kc/s bandwidth. With f.m. the channel capacity is increased to 12.

Any 12 tone frequencies, from 425 c/s to 2975 c/s in steps of 170 c/s, may be selected by plugging-in the required modules for each channel. Similarly, the terminal may easily be sub-equipped for less than the full number of channels by omitting plug-in modules. With two-tone keying, the separation between the marking and spacing tones may be chosen from various multiples of 170 c/s to give optimum frequency diversity.

Features

Flexibility. Provision for conversion from 6-channel two-tone to 12-channel f.m. operation by replacing plug-in units.

Compatibility with the greatest number of other v.f.t. systems results from this flexibility.

Two complete transmit or receive terminals, or one transmit and one receive terminal, may be accommodated in a single front-access cabinet.

No relays are used, electronic keying being provided for the d.c. outputs.

Automatic level adjustment when the number of operational channels is changed.

EQUIPMENT

The H 5000 transmitting terminal and the H 5001 receiving terminal are fully transistorized and use printed-wiring circuits in plug-in 'book' units.

The H 5001 receiving terminal is designed for space diversity reception. With two-tone keying there are thus four diversity paths, the signals in which are demodulated independently and then combined by addition. With f.m. keying, a method approximating to 'ratio-squared' combining is used to provide one output from the two paths.

Data Summary

Keying speed (per channel): 100 bauds optimum (130 bauds max.) on two-tone. 75 bauds optimum (100 bauds max.) on f.m.

Tone separation (on each two-tone channel): Adjustable in steps of 170 c/s.

Channel frequency separation (f.m.): 170 c/s.

Frequency shift (f.m.): 85 c/s.

Transmitter input: ± 20 to ± 80 V double-current. Keying polarity can be reversed. Inputs ± 3 to ± 10 V also catered for, so that operation on the new ± 6 V standard for transistor equipment is possible.

Transmitter frequency stability: Better than ± 3 c/s for $\pm 10\%$ mains voltage variation and ambient conditions specified below.

Sideband spread: The restrictions on sideband spread result in sine-wave keying at 100 bauds.

Transmitter output: 0 dBm to $+10$ dBm adjustable in 1 dB steps, into 600 Ω . Level within 0.25 dB for $\pm 10\%$ mains variation and $\pm 10^\circ\text{C}$ ambient temperature change.

Return loss: Better than 20 dB.

Out-of-band components: Signals out of occupied band (250–3000 c/s) lower than -40 dB relative to any wanted signal tone.

Receiver input: Gain controls cater for variations in median signal level of $+5$ to -15 dBm. Slide-back circuits cater for 30 dB range of fading.

Receiver output: The telegraph output is equivalent to a source e.m.f. of ± 10 V. Alternatively an external source of up to ± 80 V can be keyed; maximum current 30 mA.

Ambient conditions: 0 to 40°C with up to 95% rel. humidity; -10 to $+50^\circ\text{C}$ in dry air.

Power supplies: 100–120 or 200–250 V ($\pm 10\%$), 40–60 c/s, single-phase a.c.

Dimensions (standard transmitter and receiver rack, each):

Height	Width	Depth	Weight
7 ft 6 in.	1 ft 11½ in.	1 ft 1½ in.	250 lb
2.3 m	(60 cm)	(34 cm)	(114 kg)

Transportable versions

The transportable versions use two-tone modulation in which two on-off keyed tones, one for mark and one for space, are allocated to each telegraph channel. One two-channel transmit or receive terminal is accommodated in a cabinet 2 ft 2½ in. high and a transmit or receive terminal equipped for three or more channels can be accommodated in a cabinet 3 ft 3 in. high.

The transportable versions use the same method of construction as the standard versions and generally use the same transistorized, printed-wiring modules. A special feature of the transportable versions is the provision of an a.f.c. voltage for controlling the tuning of a suitable receiver such as the HR 28 (see page 268); this voltage is derived from the detector circuits for the mark signal on one of the telegraph channels and for the space signal on another, and ensures that the receiver is tuned to the incoming s.s.b signal with the degree of accuracy which is required for multichannel v.f.t working.

The receiving equipment provides for space diversity reception giving four diversity paths with combination by addition.

Features

- No mechanical telegraph relays.
- Small size and robust construction for transportable applications.
- Compatible with standard two-tone v.f.t systems used in fixed networks.
- Provides automatic frequency control of associated receiver.

Data Summary

Transmitter input: ± 20 to ± 80 V double-current. Keying polarity can be reversed. Inputs ± 3 to ± 10 V also catered for, so that operation on the new ± 6 V standard for transistor equipment is possible.

Transmitter frequency stability: Less than ± 3 c/s change.

Sideband spread: The restrictions on sideband spread result in sine-wave keying at 100 bauds.

Transmitter output: 0 dBm to +10 dBm, adjustable in 1 dB steps, into 600 Ω . Level

within 0.25 dB for $\pm 10\%$ mains variation and $\pm 10^\circ\text{C}$ ambient temp. change.

Keying speed (per channel): 100 bauds optimum (130 bauds max.).

Tone separation (on each two-tone channel): 340 c/s.

Return loss: Better than 20 dB.

Out-of-band components: Signals out of occupied band (250–3000 c/s) lower than –40 dB relative to any wanted signal tone.

Receiver input: Gain controls cater for variations in median signal level of ± 5 to –15 dBm. Slide-back circuits cater for 30 dB range of fading.

Receiver output: The telegraph output is equivalent to a source e.m.f. of ± 10 V. Alternatively an external source of up to ± 80 V can be keyed; max. current 30 mA.

Ambient conditions: 0–40°C up to 95% rel. humidity.

Power supplies: 100–120 or 200–250 V ($\pm 10\%$), 40–60 c/s, single-phase a.c.

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