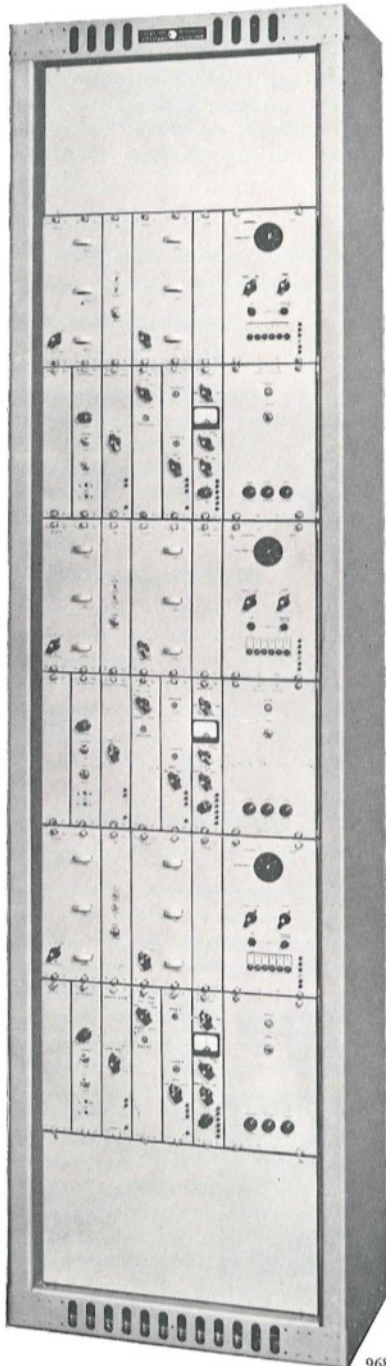




Self-Tuning H.F Receivers H 2002 Series



9681

THESE self-tuning receivers for high-grade h.f. communication services are designed to provide the greatest possible economy in terms of operating and maintenance staff and in terms of floor space and building requirements.

Using frequency synthesizers with decade dials for frequency selection, and an automatic self-tuning system for tuning the signal frequency circuits, they enable a receiving station to be entirely controlled by one man from a central control room or, with additional remote control equipment, from a remote site. Any receiver can be tuned to any frequency in the h.f. band in steps of 100 c/s and the accuracy and frequency stability are superior to those obtained with conventional crystal controlled receivers.

The H 2002 series of receivers is fully transistorized and two or three receivers may be housed in one cabinet. The synthesizers and associated display and control panels are normally mounted separately from the receivers in the station control room. Since operational access to the receivers is not required, full advantage can be taken of the small size and low heat dissipation, which result from modular construction and the use of transistors and printed-circuit boards. Building costs are therefore reduced or more receivers may be accommodated in an existing building.

Features

Synthesizer control for simple operation, high stability and accurate frequency selection.

Transistors and modular construction for small size, low heat dissipation, reliability and easy maintenance.

No a.f.c. required on stable and accurate received signals.

Fully automatic tuning of receiver in less than 24 seconds.

One-man control of entire receiving station, either from station control room or by full remote control from a distant point.

Dual-Diversity Telegraph Receiver Type H 2002

The H 2002 is suitable for diversity reception of f.s.k or four-frequency duplex signals. Diversity path combining is carried out at the outputs of two signal discriminators, controlled by the input signal levels. The output is electronically keyed by a transistor circuit which eliminates the need for a mechanical relay requiring frequent adjustments.

Up to three H 2002 receivers can be accommodated in one cabinet (7 ft 6 in. high) to which front access only is required.

DATA SUMMARY

Frequency range: 2.5–27.5 Mc/s in steps of 100 c/s (continuous coverage is given when a.f.c. is used).

Overall stability: better than ± 1.5 c/s per day at any frequency (with H 1501 master oscillator).

Noise factor: Better than 8 dB.

Image protection: Better than 65 dB.

Services: f.s.k (F1) with total shifts of 140, 200, 400 or 500 c/s.

(NOTE: An edition is available for receiving four-frequency duplex (F6) signals using 1200 c/s total shift and keyed according to C.C.I.R. Recommendation No.346 (Geneva, 1963))

Bandwidths: Filters available for 2 kc/s, 1 kc/s, 500 c/s or 250 c/s.

Low-pass filters: Switch selected for 50, 100 or 200 bauds.

D.C. output: Double-current; 10 V, 10 mA using internal supply or up to 80 V 50 mA using external supply.

A.F.C. capture range: $\pm 40\%$ of frequency shift.

A.F.C. following range: ± 200 c/s.

A.F.C. residual error: Less than $\pm 10\%$ of frequency shift.

A.G.C. system: Less than 4 dB output variation when input signal increases from $3 \mu\text{V}$ to 10 mV in series with 75Ω . Time constant 24 m.sec.

Power supply: 100–125 V or 200–250 V ($\pm 6\%$), 45–65 c/s, single-phase a.c.

Power consumption: 25 W for one receiver unit.

Dimensions of standard cabinet (accommodating up to 3 H 2002 receivers):

Height	Width	Depth
7 ft 6 in. (229 cm)	1 ft 11½ in. (60 cm)	1 ft (30.5 cm)

Dual-diversity I.S.B./S.S.B Receiver Type H 2102

Single-path I.S.B./S.S.B Receiver Type H 2112

These receivers are available in editions for i.s.b and s.s.b, and for 3 kc/s and 6 kc/s sideband bandwidths. The dual diversity receiver, the H 2102, is intended for receiving i.s.b or s.s.b transmissions which include multichannel v.f telegraph signals. Both receivers will operate with full carrier, reduced carrier or fully suppressed carrier signals.

One 7 ft 6 in. (229 cm) high will accommodate one or two diversity receivers. Front access only is required.

DATA SUMMARY

Frequency range: 2.5–27.5 Mc/s in steps of 100 c/s; continuous coverage when a.f.c is used.

Overall stability: Better than ± 1.5 c/s per day at any frequency (with H 1501 master oscillator).

Noise factor: Better than 8 dB.

Image protection: Better than 65 dB.

Services: I.S.B. or s.s.b with full carrier, reduced carrier or suppressed carrier.

Overall frequency response:

3 kc/s bandwidth: 300–3000 c/s, ± 1 dB; 250–3100 c/s, ± 1.5 dB.

6 kc/s bandwidth: 300–5900 c/s, ± 1.5 dB; 250–6000 c/s, ± 2 dB.

A.F. output: +10 dBm (maximum) into 600 Ω balanced load.

A.F.C capture range: ± 50 c/s.

A.F.C following range: ± 200 c/s.

A.F.C residual error: $< \pm 1$ c/s.

A.G.C with full carrier or reduced carrier signals: Less than 4 dB output variation when input signal increases from 1 μ V to 1 mV in series with 75 Ω ; time constants 2 seconds 'on' and 20 seconds 'off'.

Power supply: 100–125 V or 200–250 V ($\pm 6\%$), 45–65 c/s, single-phase a.c.

Power consumption: 50 W for one H 2102 receiver; 35 W for one H 2112 receiver.

Dimensions (of standard cabinet accommodating up to two H 2102 or H 2112 receivers):

Height	Width	Depth
7 ft 6 in. (229 cm)	1 ft 11½ in. (60 cm)	1 ft (30.5 cm)

Synthesizers and Display and Control Units

Up to three synthesizers and display and control panels can be mounted in one 7 ft-high cabinet (together with a 1 Mc/s master oscillator). The synthesizer used is the H 1500E covering the frequency range 3.000 to 30.999 Mc/s. It provides the high-stability first oscillator input to the receiver and a 100 kc/s signal used for carrier reinsertion and for generating the second oscillator signal where a.f.c is not used.

Frequency Synthesizer Type H 1500E

This fully transistorized synthesizer covers the band 3.0000 to 30.9999 Mc/s.

The required frequency may be selected in a matter of seconds by adjusting a series of decade controls designated Mc/s, 100 kc/s, 10 kc/s, 1 kc/s and 100 c/s, the decade dials indicating the output frequency.

DATA SUMMARY

Frequency stability: This is dependent upon the stability of the 1 Mc/s source employed.

A typical performance, when using the Master Oscillator Type H 1501, will be: Spot frequencies at 1 kc/s intervals: Short-term, ± 1 part in 10^8 (per day).

Long-term ageing, less than +5 parts in 10^8 (per month).

Temperature coefficient: Over the range -15 to $+55^\circ\text{C}$, ± 3 parts in 10^8 .

100 c/s interpolations: Short-term, $\pm \frac{1}{2}$ c/s (per day). Long-term, ± 3 c/s (per month).

Temperature coefficient: Over the range -15 to $+55^\circ\text{C}$, ± 3 c/s.

Overall instability per day (with 10°C ambient temperature range): 100 c/s steps, less than $\pm 1\frac{1}{2}$ c/s at 27.5 Mc/s.

Frequency ranges: 3.0000 to 30.9999 Mc/s.

Auxiliary output frequencies: 100 kc/s from standard-frequencies generator.

Standard input frequency: 1 Mc/s at a level of 0.5 to 1 V in 75 Ω .

Output levels: Main output, 5–20 mW. Auxiliary output not less than 10 mW.

Output impedance: 75 Ω unbalanced.

Spurious components: No spurious component (other than harmonics) exceeds -65 dB relative to the wanted output.

Harmonics: Relative to level of wanted output:

-25 dB at frequencies below 2.5 Mc/s.
 -30 dB at frequencies between 2.5 and 3.5 Mc/s.

-36 dB at frequencies between 3.5 and 5.0 Mc/s.

-40 dB at frequencies above 5.0 Mc/s.

Noise: Noise and hum modulation of output not greater than -60 dB relative to carrier.

Power supplies: 100–125 V or 200–240 V 50–60 c/s a.c. mains.

Dimensions:

Height	Width	Depth
7¾ in. (19.7 cm)	17½ in. (44.5 cm)	21 in. (53.3 cm)

(19.7 cm) (44.5 cm) (53.3 cm)

Front panel

19 in. (48.3 cm)	8¾ in. (22.3 cm)
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Display and Control Unit

The front panel of this small unit carries the controls and indicators needed for extended operation of a receiver, and labels are provided for recording the identity of the controlled receiver, the service or signal being received, the aerials in use and the line, v.f.t or other channel connecting the receiver output to the central terminal station.

The controls enable the control operator to initiate the self-tuning process, adjust the amount of attenuation at the input to the receiver, select one of three available aerials, switch the a.f.c system, and select the path monitored by headphones.

Signal lamps indicate the position of the aerial input attenuator, supply failures, drift to the limits of effective a.f.c control and fading below threshold of the received signal on either path.

Master Frequency Source Type H 1605

The synthesizer requires a 1 Mc/s master-frequency signal of high accuracy and stability which can be provided by the master frequency source Type H 1605 described on page 231. Other master frequency sources with even higher standards of frequency stability are available.



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