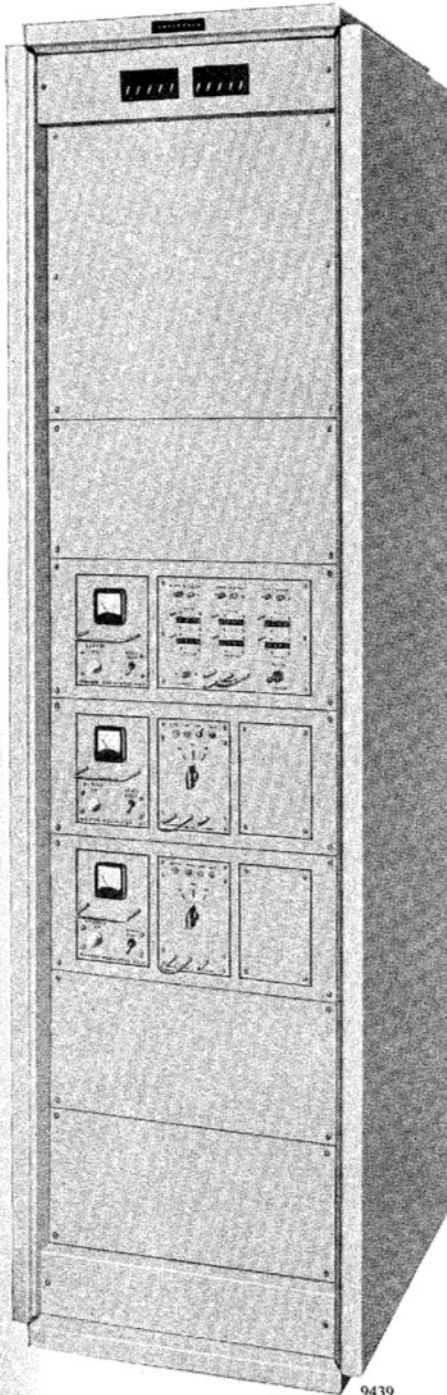




1 Mc/s Master Frequency Source Type H 1605



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THE H 1605 provides a number of duplicated outputs, of an extremely high order of reliability and frequency stability, to feed drive and monitoring equipment requiring a 1 Mc/s master frequency signal. It comprises three master oscillators Type H1501 whose output frequencies are continuously compared in a frequency comparator (Type H 1502). Any two master oscillators may be selected to act as 'main' and 'standby' oscillators.

The output from the 'main' oscillator feeds two distribution amplifiers (H 1504) each giving 16 1 Mc/s outputs. Failure of the main oscillator, or frequency-drift indicated by the frequency comparator, cause its output to be muted, while muting is removed from the output of the standby oscillator.

The 16 duplicated 1 Mc/s outputs are distributed to the drive and monitoring equipment in the station, where the duplicated signals are combined in a hybrid transformer. It is arranged that a difference in phase in the duplicated 1 Mc/s signals results in an effective phase difference of 120 degrees within the hybrid transformer so that if either 1 Mc/s signal path should fail there will be no change in the level of the output from the combining hybrid.

A long-wave frequency-monitoring receiver can be fitted in the rack if required. By monitoring v.l.f. constant-frequency transmissions, the long-term absolute accuracy of the master oscillators can be maintained at ± 1 part in 10^8 .

Alternative master oscillators are available giving a stability one or two orders better than the H 1501.

Features

High degree of reliability achieved by using three master oscillators, duplicated output distribution, and duplicated power units.

Frequency comparator displays difference in master oscillator frequencies on three mechanical counters.

Instantaneous automatic change-over from 'main' to 'standby' oscillator on loss of output or excessive frequency drift.

Data Summary

1 Mc/s outputs level: 200 mW into 75Ω .
Frequency stability: (As H1501 Master Oscillator, see next page.)

Power supply: 200-240 V, 35-65 c/s, single-phase, a.c.

Power consumption: 200 VA (total of 2 independent supplies).

Dimensions:

Height	Width	Depth
7 ft	2 ft	2 ft 6 in.
(213 cm)	(61 cm)	(76 cm)

Master Oscillator Type H 1501

The H 1501 comprises a temperature-stabilized, transistorized 5 Mc/s oscillator, a 5:1 frequency divider and a buffer amplifier, together with a stabilized power supply.

Features

Extremely high order of frequency stability over long periods of time.

Proportional control of crystal oven temperature eliminates periodic variations.

Extremely reliable performance in all climates ensured by use of silicon transistors.

Built-in meter for measuring unit output and oven heater current.

Construction

The unit is designed for mounting in a standard 19 in. (48 cm) rack-cabinet. It requires $7\frac{3}{4}$ in. (20 cm) of rack height, but only occupies one-third of the rack width.

The front panel carries a meter, meter switch and 'equipment-on' indicator lamp. The meter switch may be set to measure either the oscillator output or the crystal-oven heater current.

A meter socket is provided so that, using an external meter, all major voltages and feeds can be speedily checked.

Circuit

The circuit comprises a 5 Mc/s silicon-transistor crystal oscillator and buffer amplifier, a five-to-one frequency divider circuit and a buffer output amplifier.

The crystal oscillator and associated buffer amplifier are contained within a

sealed plug-in oven unit. The temperature of the interior of the oven is maintained at approximately 70°C by a proportional control system using a thermistor as the sensing element. The thermistor is coupled via a d.c. amplifier to a power transistor which directly regulates the oven heater current. As the oven reaches the operating temperature the heater current is gradually tapered off to a value just sufficient to maintain the temperature without overshooting or cycling.

The output from the oscillator buffer stage is applied to a regenerative-modulator frequency divider circuit which produces the 1 Mc/s frequency for application to the buffer output stage.

Transistors are used throughout and the unit incorporates its own main power supply unit to provide the 26.5 V d.c. supply required.

In addition to the very close temperature control within the crystal oscillator unit, the temperature within the master oscillator box is maintained above 40°C. By this means, the range of ambient temperature to which the crystal oscillator unit is exposed is considerably reduced.

Data Summary

Frequency: 1 Mc/s.

Frequency tolerance:

(a) Short-term at constant ambient temperature and supply voltage, less than ± 1 part in 10^8 per day.

(b) For ambient temperature variations of $\pm 5^\circ\text{C}$ in the range 10 to 40°C, together with mains voltage variations of $\pm 6\%$: ± 1 part in 10^8 .

(c) Ultimate long-term ageing rate, less than +5 parts in 10^8 per month.

Frequency adjustment: Fine, 40 parts in 10^8 .
Coarse, 400 parts in 10^8 .

Output level: 8–16 mW (adjustable) into 75 Ω .

Harmonics: Better than -40 dB relative to output level.

Power supply: 100 V to 135 V or 200 to 260 V, 50–60 c/s, single-phase a.c. Regulation should be better than $\pm 10\%$.

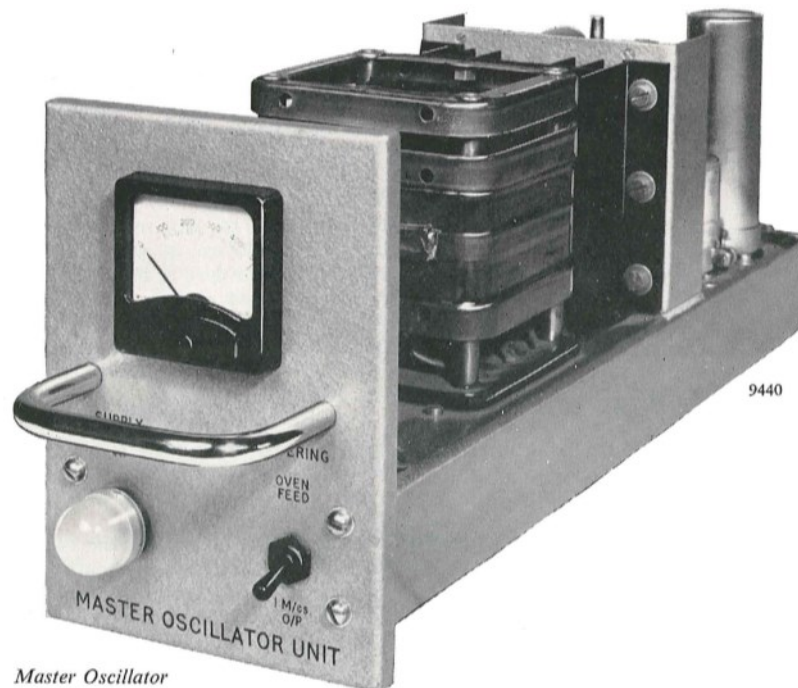
Power consumption: 80 W on warm-up. 20 W when running.

Dimensions:

Height	Width	Depth	Weight (approx.)
7 in.	5½ in.	17 in.	17 lb
(17.8 cm)	(13 cm)	(43.2 cm)	(7.7 kg)

Frequency Comparator Type H 1502

This unit continuously compares the frequencies of the three master oscillators and indicates frequency differences of 2:10 and 1:10; by means of lamps on the front panel. If required these indications can be extended to a panel on the station control and state indication equipment Type H 1800. The H 1502 also initiates a change-over from the main to the standby master oscillator if the frequency of the main oscillator should drift by 1 part in 10^8 .



Master Oscillator
Type H 1501.

1 Mc Distribution Amplifier Type H 1504

Two H 1504's are used in the H 1605 master frequency source; in conjunction with hybrid distribution units mounted in the base of the cabinet, they provide 16 duplicated 1 Mc/s outputs at a level of 200 mW into 75 Ω .



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