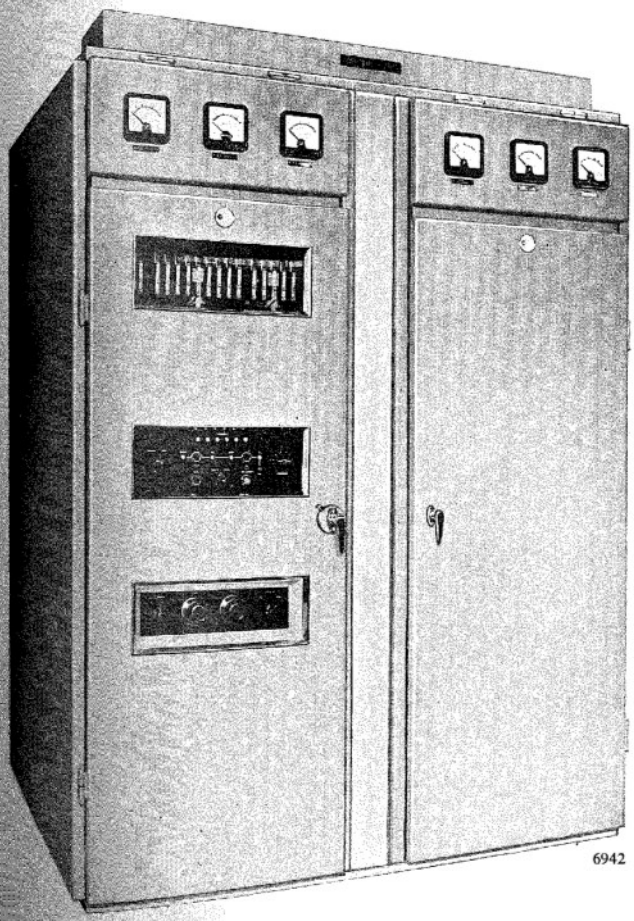
3·5 kW HF ISB Transmitters
Types HS 31 and HS 32

THESE MEDIUM-POWER HF transmitters are intended for independent sideband and VF telegraph operation, or for telegraphy with CW on/off keying or frequency-shift keying. The equipment embodies many advanced design features and combines a high standard of performance with modest overall dimensions.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The transmitter stages may be continuously tuned over the entire frequency range without change of components beyond padding capacitor switching in the final stage. This is made possible by the special design of the final stage anode tuning circuit which includes a continuously variable inductance coil mounted on the valve anode assembly.

Although the transmitter itself has continuous tuning it will usually be operated from a separate RF crystal drive source providing one of six predetermined frequencies (see page 321). Manual frequency selection is employed in the Type HS 31, whereas the Type HS 32 has automatic control and automatic 6-way frequency selection.

The transmitter assembly is housed in an enclosure formed of two unit sections, one containing the compact transmitting equipment, the other enclosing the rectifier and control gear. Air cooling is employed for all valves, the air-cooling suction fan being normally mounted in the base of the RF unit. Provision is made for mounting the fan externally if required. Double screening of the power stages serves to minimise indirect RF radiation. All stages of the transmitter are readily accessible with front and rear doors on each unit and withdrawable sub-units forming the low-power stages. Doors giving access to the interior are interlocked with the supply circuits for safety. The filaments of all valves except the penultimate stage are heated with alternating current.

The ISB drive equipment is separate from the transmitter proper and thus can be mounted in any convenient position. Facilities for monitoring the signal at various points in the transmitter may be provided in the ISB drive equipment. (See pages 315 and 317.) A modulator is available for DSB operation.

The FSK drive unit is also external to the transmitter and provides a 3·1 Mc/s keyed signal (see page 323).

By the addition of suitable amplifier units this transmitter can be up-rated to 10 kW when it is known as the Type HS 71 (see page 287).

CIRCUITS

Drive is obtained from an external crystal oscillator and applied, *via* a harmonic generator to a balanced mixer stage. The balanced mixer also accepts a 3·1 Mc/s modulated signal from the ISB drive equipment, or a 3·1 Mc/s keyed signal from the drive keying unit, and converts this to the radiated frequency. The mixer is followed by two stages of RF amplification.

The output from the low-power stages is amplified by two tetrode stages, each comprising two valves in parallel followed by the final stage which utilises a single triode valve connected as a grounded-grid amplifier. The final stage is inductively coupled to a balanced feeder circuit or may be matched to a coaxial feeder if required via a suitable external wideband transformer.

DATA SUMMARY

Nominal power output (to aerial feeder):
On ISB, FSK and CW service:
3·5 kW from 4–21 Mc/s.
2·5 kW from 21–27·5 Mc/s.
On DSB telephony:
1·5 kW carrier from 4–21 Mc/s.
1·0 kW carrier from 2–27·5 Mc/s.

Frequency range: 4·0–27·5 Mc/s.

Alternative version: 2·5–20 Mc/s.

Output impedance: Normally 600 Ω balanced twin wire. 190 Ω balanced or 75 Ω unbalanced, using external transformer.

Harmonic radiation: Less than 20 mW.

Noise level: Better than −50 dB (relative to peak envelope power on ISB).

Non-linear distortion (ISB): Third order intermodulation product not greater than −36 dB relative to either of two equal testing tones for any power level up to full PEP.

Input level: Nominal 0·1 W from primary drive and 0·25 W from ISB or keyed telegraph drive (3·1 Mc/s).

Carrier compression: Less than 1·5 dB for any level of single-frequency signal up to −6 dB relative to peak sideband power.

Power supply: 380–440 V, three-phase, 50 c/s AC mains, normally four-wire. Voltage regulation ±6%, frequency tolerance ±2½%. Arrangements can be made for operation from 60 c/s.

Power consumption (at 0·9 power factor):
CW mark 9 kW, space 3·6 kW.
FSK 9 kW.
ISB 7 kW with two-tone modulation.

Dimensions (overall):

Height	Width	Depth
7 ft 6 in.	5 ft 6 in.	3 ft 9 in.
(2·28 m)	(1·68 m)	(1·14 m)

Overall performance on ISB telephony using Type HD 51 and Type HD 21 drive equipment:

Frequency tolerance: 10 parts in 10^6 over the temperature range 10–40°C, ambient.

Frequency response: Level within 2 dB from 100–6000 c/s.

Overall performance on telegraphy using HD 20 series drive equipment:

Frequency tolerance: 10 parts in 10^6 over the temperature range 10–40°C, ambient.

Maximum keying speed: 200 bauds.

Keying potentials: ±10 V into 2000 Ω.

Frequency shift: 200–1000 c/s.

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