



60 Watt HF SSB Transmitter/Receiver *Type HSR 21*

THE TYPE HSR 21 HF transmitter/receiver has been designed to provide communication over medium distances in under-developed and similar areas where reliable and easily installed HF radio communication facilities are essential. By the use of single-sideband transmission and reception a performance equivalent to that provided by conventional amplitude-modulated (AM) equipment of many times the power output may be obtained simply and at low cost. Other advantages resulting from SSB operation are much improved intelligibility during reception of signals subject to selective fading, and reduction in interference from other transmissions due to a narrower and more sharply defined receiver passband.

The equipment permits simplex operation on any one of four crystal-controlled spot frequencies. Channel selection is effected by one knob and the remaining controls can be operated by unskilled operators once the equipment has been set up on the working frequencies. The frequency stability is such that automatic frequency control is unnecessary, the lower sideband and no carrier being radiated when communication with existing AM stations is required. There is also provision for manually keyed CW or MCW transmission and reception.

A switch is provided to enable speech operation from any one of three remote desk sets, located up to approximately 100 yards away. For communication under difficult conditions speech clipping may be switched in which results in a greater average power output. The aerial system employed is a single quarter-wave wire.



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CONSTRUCTION

The equipment comprises two units mounted one above the other in a steel cabinet. Both units may be drawn forward and access to the RF unit for setting up the working frequencies is provided by a removeable top panel. A meter is included in the RF unit for monitoring and setting up.

CIRCUIT

The transmitter follows normal SSB design but has been simplified as far as possible. Speech signals pass through the microphone amplifier to the 100 kc/s balanced modulator. The lower sideband product is selected by a crystal filter and then shifted to 1.6 Mc/s in the second modulator.

After amplification at this frequency the signal is shifted to the radiated frequency in the third modulator. Two linear amplifiers follow and the output stage feeds *via* a π network to the aerial.

The receiver is a double superheterodyne using the same intermediate frequencies as the transmitter. A tuned RF stage is included and a crystal sideband filter identical with the transmitter filter is used to select the wanted sideband.

The 100 kc/s, 1.7 Mc/s and RF oscillators are crystal controlled and common to transmitter and receiver. Four switched crystals are used in the RF oscillator for channel selection and these, together with the 1.7 Mc/s crystal, are mounted in a thermostatically controlled oven in order to achieve sufficient frequency stability.

The power supply circuits are conventional and provide HT, LT and bias supplies for the equipment.

DATA SUMMARY

GENERAL

Frequency range: 3–15 Mc/s. Choice of four crystal controlled spot frequencies located as follows:

Channels 1 and 2, 3.0–6.7 Mc/s.

Channels 3 and 4, 6.7–15 Mc/s.

Service:

Telephony:

Single sideband, suppressed carrier, or single sideband with full carrier.

Telegraphy:

CW, ON/OFF Telegraphy (A1) or single sideband keyed tone.

DSB and MCW signals can also be received.

Power supply: 110–115 or 200–250 V, single phase, 50–60 c/s AC.

Power consumption: Receive: 130 W.
Transmit: 330 W.

Dimensions:

| Height | Width | Depth | Weight |
|---------|---------|---------|---------|
| 23 in. | 22 in. | 20 in. | 160 lb |
| (90 cm) | (87 cm) | (79 cm) | (75 kg) |

TRANSMITTER

Frequency tolerance: 3 parts in 10^6 .

Power output: 60 W PEP.

Non-linear distortion: Third order intermodulation products less than -26 dB relative to either of two equal testing tones.

Frequency response: Level within 3 dB from 350–3000 c/s.

RECEIVER

Signal/noise ratio: 12 dB minimum for $1 \mu\text{V}$ sideband signal.

Frequency response: Level within 3 dB from 350–3000 c/s.

Selectivity: Attenuation at 700 c/s outside 350–3000 c/s passband is greater than 60 dB.

AF output: 1.5 watt maximum into built-in loudspeaker.

Provision for headphones.



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