



## Triple-Diversity ISB Receiver Type HR 23

WHERE LONG-DISTANCE HF independent-sideband radio-telephone circuits need diversity reception to counter the effects of fading the Type HR 23 receiver will meet the requirement. It can be used for the reception of telephony, multi-channel voice-frequency telegraphy or facsimile signals and also for double-sideband signals.

The receiver incorporates specially designed circuits to select the best diversity path for the reconditioned carrier as well as for each sideband.

The equipment is housed in two cabinets 7 ft high fitted with full-length doors at the rear giving access to all units. Large clear tuning dials are used, directly calibrated in signal frequency.

### FEATURES

Rapid selection of any one of six crystal-controlled spot frequencies.

High-stability LC oscillator calibrated directly in signal frequency gives complete range coverage.

Crystal filters of 6 kc/s bandwidth are normally supplied but may be replaced by 3.5 kc/s filters.

Electro-mechanical automatic frequency correction reduces errors of up to 3 kc/s to substantially zero mistune.

Reconditioned or local carrier may be used for demodulation.

Units may be withdrawn on runners to give access to all components without cable disconnection.

Full metering and monitoring facilities provided.

Circuit-breakers afford complete protection of apparatus against overloads.



### CIRCUITS

Each of the three aerial inputs is taken *via* a 0-40 dB attenuator to a two-stage signal frequency amplifier and thence to a first frequency changer. The first frequency changer may be fed either by the crystal local oscillator, with its

choice of any one of six pre-set frequencies, or by the LC oscillator.

Each first frequency changer is followed by two stages of IF amplification at 2600 kc/s. Each path signal is fed to a second frequency changer which derives its heterodyne voltage from the second oscillator, controlled by the AFC motor. Frequency correction is effected by comparing the second IF carrier output with that of a 100 kc/s reference oscillator, and using the beat frequency signal to drive the correction motor.

One stage of amplification at 100 kc/s follows each second frequency-changer. Each output is then split up by filters into carrier and upper and lower sideband paths. A carrier selector is employed so that the carrier supplied to the AFC,

AGC and sideband demodulation circuits is, at any instant, derived from only one path.

Each sideband in each path passes through a 6 kc/s or 3.5 kc/s crystal filter and three stages of amplification, and is then fed to a balanced demodulator.

Reconditioned or locally-generated carrier can be used for demodulation. The output of each demodulator is fed to a two-stage line amplifier.

The outputs from the three upper and three lower sideband paths may be passed separately to line, or combining circuits may be used to provide a single output for each sideband. In conjunction with the combining circuits of each sideband the two path signals which are weakest at any instant are suppressed.

## DATA SUMMARY

**Frequency range:** 3–27.5 Mc/s in four bands.

**Inputs:** Three, each 75  $\Omega$  coaxial.

**Sensitivity:** For 20 dB signal/noise ratio with 6 kc/s passband, 1.4  $\mu$ V at 3 Mc/s, 2  $\mu$ V at 27.5 Mc/s.

**Noise factor:** 4 dB at 3 Mc/s.  
7 dB at 27.5 Mc/s.

**Image signal protection:** 110 dB at 3 Mc/s.  
60 dB at 27.5 Mc/s.

**Selectivity (First IF):**  
 $\pm 9$  kc/s at 2 dB attenuation.  
 $\pm 38$  kc/s at 30 dB attenuation.

**Selectivity (Second IF):** The discrimination against frequencies which are more than 520 c/s outside the passband is greater than 75 dB.

**Basic oscillator stability:**  
Variable first oscillator: 15 in  $10^6$  per  $^{\circ}$ C.  
Crystal first oscillator: 1 in  $10^6$  per  $^{\circ}$ C.  
Second oscillator: 15 in  $10^6$  per  $^{\circ}$ C.

**AFC:** Capable of following, with zero residual mistune, frequency drifts of up to  $\pm 3$  kc/s.

**AGC:** Output does not rise by more than 5 dB when the input signal is raised by 80 dB.

**Overall frequency response:**  
6 kc/s passband—less than 5 dB total variation from 100 c/s to 6000 c/s.  
3.5 kc/s passband—less than 5 dB total variation from 100 c/s to 3500 c/s.

**Output:** 40 mW maximum in 600  $\Omega$  for separate path outputs, 2.5 mW for combined path outputs.

**Harmonic distortion:** At maximum output, 2nd harmonic distortion less than 1.5%, 3rd harmonic distortion less than 1%.

**Crosstalk (Intelligible):** Lower than -60 dB.

**Power supply:** 200–250 V, 50 c/s single-phase AC mains. Permissible voltage variation,  $\pm 6\%$ .

**Power consumption:** 600 W approximately.

**Dimensions:**

Height	Width	Depth	Weight
7 ft 0 $\frac{1}{4}$ in.	3 ft 11 in.	1 ft 10 in.	1000 lb
(214 cm)	(119 cm)	(56 cm)	(454 kg)

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