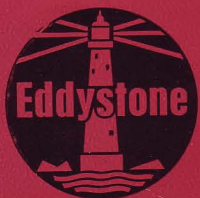


958

HIGH STABILITY
COMMUNICATION RECEIVER



EDDYSTONE RADIO LIMITED
BIRMINGHAM 31

Eddystone

958

HIGH STABILITY COMMUNICATION RECEIVER

The EDDYSTONE Model 958 is a solid-state high-stability communication receiver expressly designed for the professional user. Reception facilities cover all normal signal modes throughout the range 10 kHz—30 MHz. Operation is from any standard AC mains supply or from low-voltage DC with a small external converter. Controls have been kept to a minimum, consistent with optimum performance and ease of operation.

Circuit configuration changes with the frequency band selected. In the band 1.6—30 MHz, a triple-conversion circuit is employed utilising a drift-cancelling 1st oscillator loop, locked to harmonics of an oven-controlled quartz master oscillator with a long term stability of the order 1 part in 10^7 .

Conversion to the (fixed) 2nd intermediate frequency is by means of a variable frequency high-stability "incremental" oscillator which is incorporated in the drift-cancelling network. This oscillator allows the operator to tune the receiver over any range in the h.f. band in increments of 100 kHz with extremely accurate frequency read-out. The required 100 kHz segment is selected separately with the main tuning control, positive indication that the appropriate 0.1 MHz setting has been chosen correctly being by means of an illuminated panel indicator.

The drift-cancelling network can be disabled at the throw of a switch to permit continuous tuning over any range in the h.f. band using the main control only.

On frequencies below 1.6 MHz, the receiver functions as a conventional single or double-conversion superhet (with crystal-controlled 2nd oscillator in the double-conversion mode). The incremental facility is not available in this range and provision is therefore made for simple connection of an external synthesiser to control the 1st mixer if high-stability working is required.

Performance, particularly under two-signal conditions is extremely good throughout the entire frequency coverage. Careful design of the oscillator loop circuitry which features a very narrow noise-bandwidth (of the order 10 kHz), ensures that two-signal performance is of a high order in the h.f. band.

Five positions of selectivity are available at the final i.f. (100 kHz). These range from 400 Hz for narrow-band CW reception to 8 kHz for AM. All bandwidths are determined by L/C filters except in the case of SSB when a multi-pole crystal filter is employed. Bandwidths have been carefully chosen to be compatible with the various types of signal.

The panel mode switch permits direct selection of AM, CW/FSK and SSB. USB/LSB selection is handled by a separate switch, carrier re-insertion being derived from the master quartz reference oscillator. A tunable beat-oscillator (fitted with slow-motion tuning drive) is provided for CW reception.

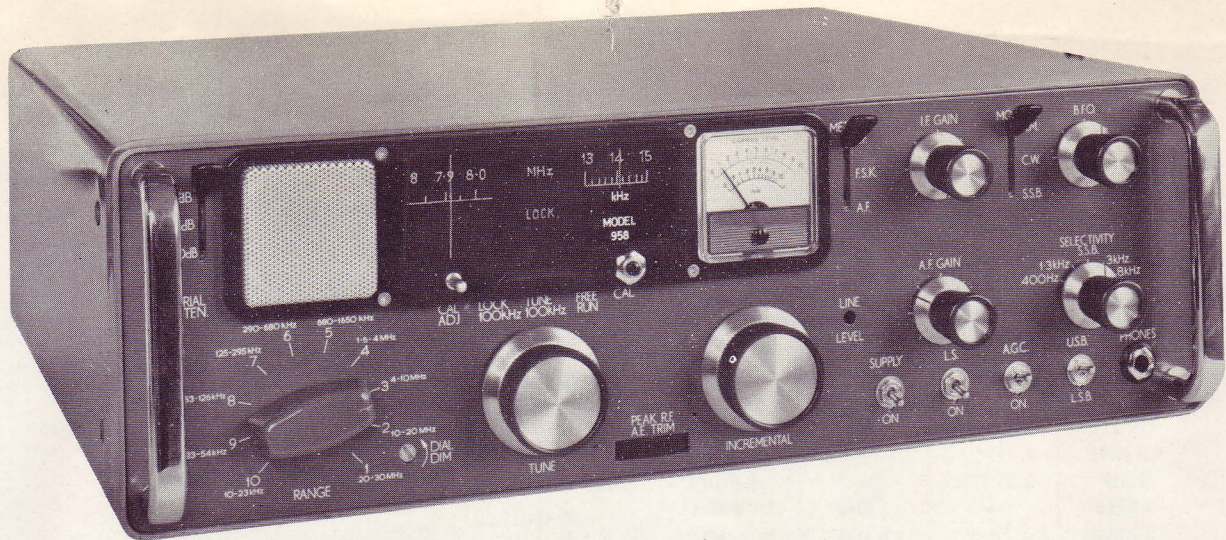
A transistorised FSK module is available as an optional extra and can be installed to special order. Relay keying is provided for speeds up to 200 bauds, connections being to a socket at the rear of the set. An external 80-0-80V supply is required.

Separate audio outputs are available for speaker, headset and lines, the latter being totally independent with pre-set level control. A built-in monitor speaker is provided for convenience, especially in rack mounted-installations.

Other facilities include a built-in meter (switchable to monitor carrier or line level and also usable as a tuning monitor for FSK working); an aerial attenuator switch (0-10-20dB); a low-level output at 100 kHz to drive external ancillaries; an efficient AGC system with carefully tailored time constants; provision for diversity working (with common oscillator control); muting relay operable from external control circuit; remote fine tuning control.

All components have been carefully chosen to ensure optimum reliability. Silicon semiconductors are employed for all functions with FET's in certain stages, particularly in the signal frequency section of the receiver. Integrated circuits are used to further improve reliability. Modular construction ensures ease of access for servicing.

Rugged light-weight construction is employed throughout, appearance is in keeping with current trends and dimensions are both compact and convenient. The standard bench-mounting version can be easily adapted for rack-installation.



PROVISIONAL SPECIFICATION GENERAL

Frequency Coverage

10 kHz to 30 MHz in ten overlapping ranges. At frequencies above 1.6 MHz, facilities are provided for either continuous tuning within the selected range or incremental tuning in steps of 100 kHz.

Range 1	20 — 30 MHz
Range 2	10 — 20 MHz
Range 3	4 — 10 MHz
Range 4	1.6 — 4 MHz
Range 5	680 — 1650 kHz
Range 6	290 — 680 kHz
Range 7	125 — 295 kHz
Range 8	53 — 126 kHz
Range 9	23 — 54 kHz
Range 10	10 — 23 kHz

Intermediate Frequencies

1st IF	1335 kHz (nominal).
		Tunable 1235—1335 kHz to provide incremental facility above 1.6 MHz.
2nd IF	250 kHz.
3rd IF	100 kHz.

Reception Facilities

CW, MCW, AM (DSB) and SSB in A3A, A3H and A3J modes, upper or lower sideband. FSK facilities are available when optional module is fitted. Keying speeds of up to 200 bauds with shifts of 85—850 Hz can be accommodated.

Power Supplies

Single-phase AC mains 100/125 and 200/250V (40—60 Hz) or 12/24V DC using small external converter. Consumption of the order 35 watts.

Input and Output Impedances

Aerial Input:	75 Ω unbalanced throughout entire range. Additional 600 Ω input (balanced or unbalanced) available below 1.6 MHz.
Synthesiser Input:	Low impedance (to 1st Signal Mixer).

Incremental Oscillator: Low impedance (to provide common oscillator facility for diversity working above 1.6 MHz).

Input/Output: Low impedance (to drive external ancillaries).

Audio Output: Loudspeaker: 3 Ω .
Lines: 150 Ω unbalanced, 600 Ω balanced or unbalanced).
Headset: Low impedance.

Controls

Range Switch, Main Tuning, Incremental Tuning, Aerial Trimmer, Aerial Attenuator (0-10-20dB), Mode Switch (AM-CW/FSK-SSB), Selectivity Switch (5-posns), Sideband Selection Switch (USB/LSB), High Stability/Continuous Tune Switch, IF and AF Gains, Meter Switch (RF/AF/FSK), Line Level (pre-set), BFO Pitch (variable \pm 5 kHz with reduction drive), AGC Switch, Speaker Switch, Supply Switch.

Meter

Switched to read signal level or line level, and biased to centre-zero for use as FSK tuning monitor.

Muting Facilities

Single-pole double-throw relay is arranged to open the aerial circuit and short down the receiver input when an associated transmitter is in operation. The aerial circuit is also protected against damage due to high induced aerial voltages.

Dimensions and Weight

Panel size	(1) Arranged for bench-mounting 16 $\frac{3}{4}$ " \times 5 $\frac{1}{4}$ " (42.6 \times 13.4 cm). (2) Arranged for rack-mounting 19" \times 5 $\frac{1}{4}$ " (48.3 \times 13.4 cm).
Overall height	(1) With rubber mounting feet 5 $\frac{3}{8}$ " (14.6 cm). (2) With anti-vibration mounting 6 $\frac{1}{16}$ " (15.4 cm).
Depth*	(1) Bench-mtg. (including frontal projn.) 15 $\frac{1}{2}$ " (39.3 cm). (2) Rack-mtg. (from mounting brackets) 13 $\frac{2}{3}$ " (34.8 cm).
Weight	Approximately 42 lb (19 kg).

*Excluding projections at rear

PERFORMANCE

Sensitivity

AM 3 μ V for 10 dB s/n ratio. (Bandwidth 3 kHz).
 CW/SSB: 1 μ V for 10 dB s/n ratio.

IF Selectivity

The tunable IF and 250 kHz IF have a fixed bandwidth of the order 10 kHz.

Five selectable bandwidths are provided at the 100 kHz IF.

Position	Overall Bandwidth*		
	-3dB	-6dB	-60dB
400 Hz	—	400 Hz	2.4 kHz
1.3 kHz	—	1.3 kHz	4.5 kHz
SSB	2.65 kHz	—	4.2 kHz
3 kHz	—	3 kHz	12 kHz
8 kHz	—	8 kHz	18 kHz

*Relative to 98.325 kHz in SSB position, 100 kHz all others.

Image Rejection

In excess of 70 dB at frequencies up to 18 MHz and better than 50 dB to 30 MHz.

IF Breakthrough

Greater than 90 dB down at frequencies above 1.6 MHz, greater than 60 dB down in the range 10 kHz to 1.6 MHz.

Frequency Stability

The figures quoted in the following Table are indicative of the frequency stability achieved on the low, medium and high-frequency bands. The h.f. figures are quoted for high-stability working in which mode a supply voltage change of $\pm 10\%$ does not change the tune frequency by more than 10 Hz.

Frequency Band	Total frequency change after 30-min. warm-up	
	With constant ambient	With 5°C change in ambient
1.6 MHz – 30 MHz	Less than 20 Hz. (long term)	Less than 20 Hz.
160 kHz – 1.6 MHz	Less than 1 part in 10 ⁴ . in any 5 min. period	Less than 5 parts in 10 ⁴ .
10 kHz – 160 kHz	Less than 50 Hz in any 5-min. period	Less than 150 Hz

Cross Modulation

With a wanted signal 60 dB above 1 μ V, the interference produced by an unwanted signal 10 kHz off-tune and of level 90 dB above 1 μ V will be more than 30 dB below standard output.

Blocking

With a wanted signal 60 dB above 1 μ V, an unwanted carrier 10 kHz off-tune must be of a level exceeding 100 dB above 1 μ V to affect the output by 3 dB.

Intermodulation

The level of third-order intermodulation products given by two signals of equal strength lying at *carrier + 1 kHz* and *carrier + 1.6 kHz* will be at least 30 dB below the level of either signal.

With a wanted signal of 30 dB above 1 μ V, two unwanted signals whose sum or difference frequency equals that of the wanted signal, must each be of a level 100 dB above 1 μ V to produce standard output.

AGC Characteristic

Output is maintained within 6 dB for a change in input of 90 dB from 3 μ V reference.

Fast charge and slow discharge time constants are provided permitting optimum operating conditions for each mode of reception.

Audio Output

1W in 3 Ω at 5% distortion. (Low-level o/p also available from small built-in monitor speaker).

10 mW in 600 Ω with independent pre-set level control.

Line output can be monitored on built-in meter calibrated directly in milliwatts.

Audio Response

Level within 3 dB over the range 300 Hz to 4 kHz.

IF Output

20 mV in 75 Ω for 3 μ V carrier at aerial input.

Radiation

Does not exceed 400 μ W.

Operational Temperature Rating

0–50°C.

Scale Resolution

Frequency can be read to 200 Hz on High-Freq. ranges when using incremental tuning.

Remote Fine Tuning

100 Hz above and below local tune frequency. This facility is available on Ranges 1–4 only.

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