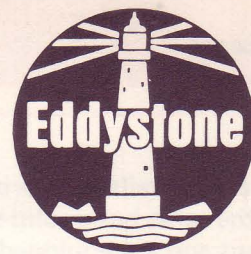


## Eddystone Radio Limited

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# Crystal Controlled Communication Receivers

# EC964 Series

**General Description** There are three main versions of the EC964 Receiver, two of which are specifically tailored to the requirements of the maritime service for use either as shipborne equipment or in coastal radio stations. Both carry British Post Office approval to the relevant sections of Specifications TSC102 and/or TSC105. The third version is also suitable for marine use but is primarily intended for more general applications in the HF communications field. All three variants have been designed for optimum reliability and with special emphasis on simplicity of operation. Modular construction is used extensively for ease of servicing.

The two basic marine receivers are designated Models EC964/1 and EC964/3, the former being equipped for reception on up to 52 pre-set crystal-controlled channels within the maritime frequency allocations 1.6–27.5MHz. Model EC964/3 provides 28 channels in the band 1.6–4.5MHz (Marine IF Band). Both receivers are equipped for 2182kHz reception, all other channels being set to customers' requirements.

The general-purpose version (Model EC964/4) has continuous cover 1.6–30MHz with a maximum of 12 channels, one of which would normally be adjusted to 2182kHz when supplied for marine use. An additional feature common to the EC964/4 only is that it can be operated from a remote listening position when used with the associated Remote Control Unit Type ERC974/1.

All EC964 variants have reception facilities for DSB/USB telephony (A3, A3A, A3H and A3J): A1 and A2 telegraphy can also be received. Operation is from any standard 40–60Hz supply, or 12/24V DC using an external DC/AC Converter (Eddystone Types 978/12 and 978/24, B.P.O. approved and suitable for installations with positive or negative earthing). Model EC964/4 can also be operated directly from 24V DC without need for the external Converter.

Special versions of the EC964 have been produced to meet various non-standard requirements and enquiries are invited for other variants with the proviso that economical quantities are involved.

**12, 28 or 52-channel versions**

**Crystal-control for high-stability**

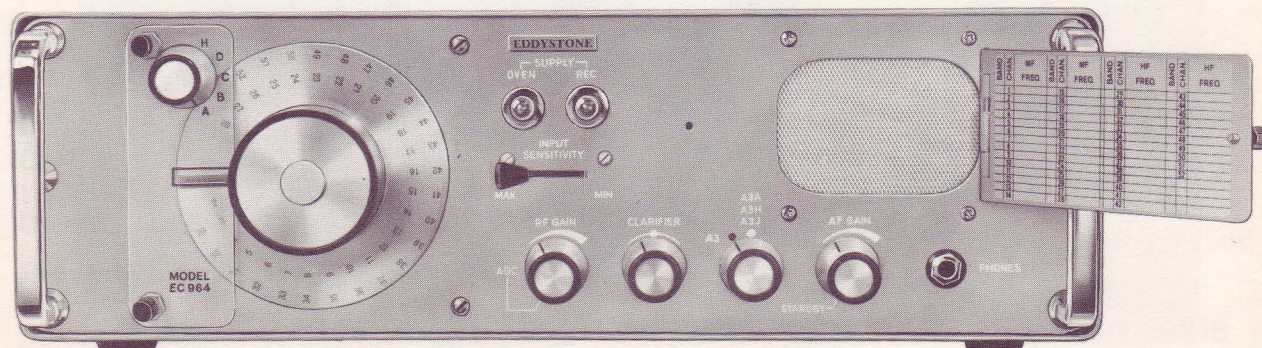
**Simple operation with rapid channel selection**

**British Post Office approved (TSC102/105)**

**Protected MOSFET front-end**

**AC or 12/24V DC operation**

*52-Channel Version. Model EC964/1*



**Brief Circuit Details** All variants of the EC964 employ the same basic solid-state, dual-conversion circuit and are equipped with a complement of 1st Oscillator crystals chosen to suit the channel frequencies required. Intermediate frequencies of 1.2MHz and 100kHz are used in all models.

Differences between the three main variants are confined to the front-end stages and are governed by the number of channels provided. The 12-channel version for example, employs conventional switching techniques for channel selection whereas the 28- and 52-channel receivers utilise an advanced form of printed circuit turret selector which is more suited to the greater number of channels involved.

In the case of the 52-channel version, two front-end circuits of similar design cover the MF and HF Bands separately, the MF coverage being in four ranges with no restriction on the number of channels fitted in any one range. On the HF Band, eight ranges are employed with channels allocated three to each range. 1st Oscillator crystals are ovened at frequencies higher than 4.0MHz.

The 28-channel receiver is basically identical to the 52-channel model, but with the HF front-end and crystal oven omitted. The

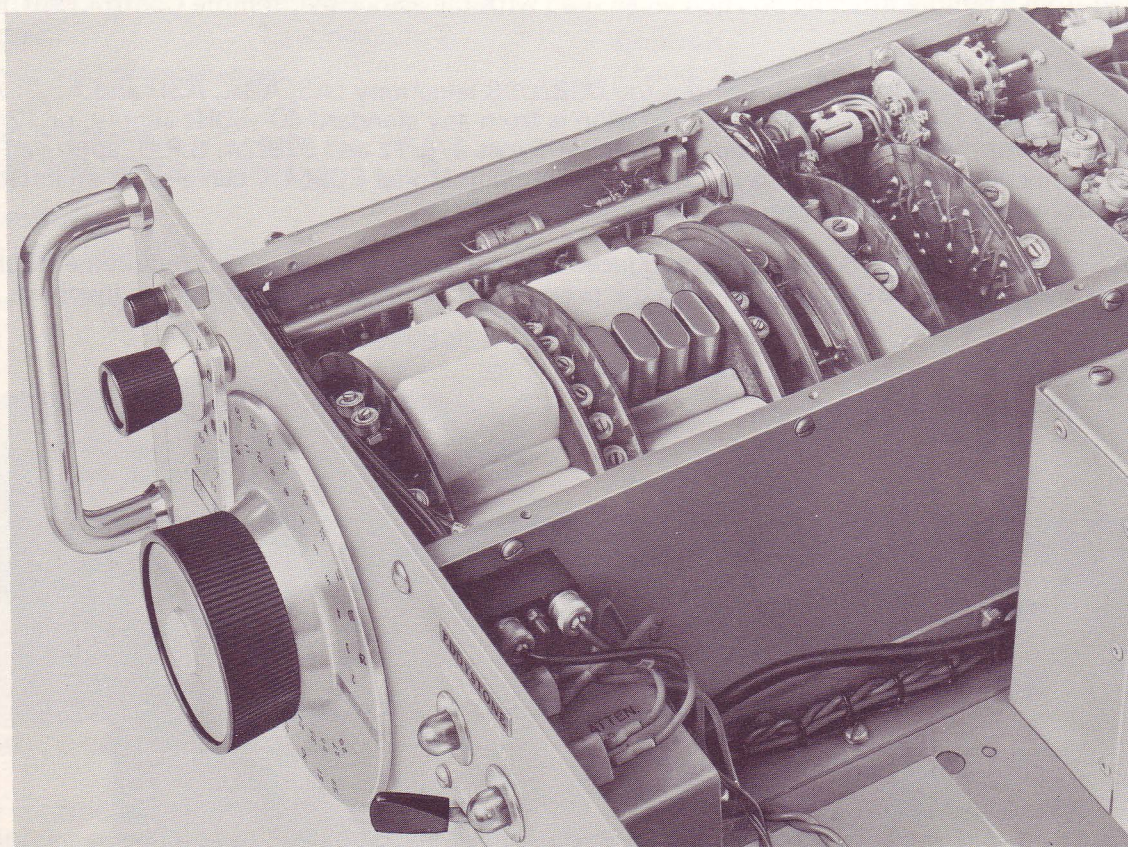
*Internal view showing crystal turret – Model EC964/1*

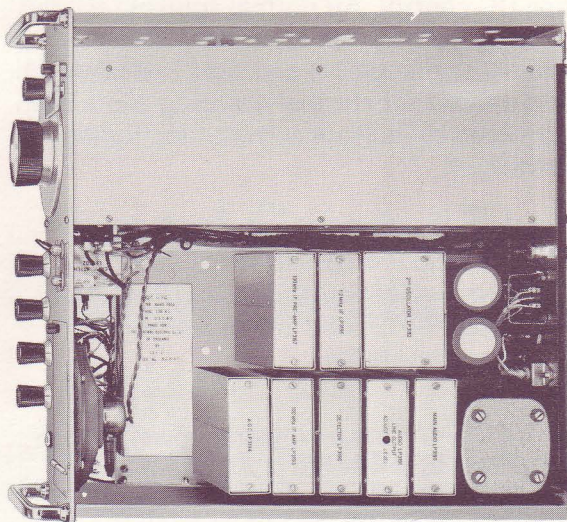
general-coverage 12-channel version has six frequency ranges and can be supplied with 1st Oscillator crystals ovened when greatest stability is required. Ledex switching is used for remote operation.

Ovening is also employed in the 2nd Oscillator which, although crystal-controlled, is variable within small limits to provide a 'clarifier' fine tuning facility. DC control is used for this function to facilitate remote tuning in the case of the EC964/4.

Overall selectivity is determined at the 100kHz IF using an L/C filter for AM reception and multi-pole crystal filter for SSB. Separate detection circuits are employed for each mode with crystal controlled carrier insertion when receiving SSB signals. Independent AGC systems control the RF and IF Stages and provision is made for manual control on all variants including the EC964/4. Desensitizing facilities are provided for local operation when using the receiver in conjunction with an associated transmitter.

Separate audio channels feed the panel loudspeaker and 600Ω line output, the latter having an independent pre-set gain control. Telephones can also be connected, in which case the speaker is automatically muted.





Internal view showing modular construction — Model EC964/1

**GENERAL SPECIFICATION**

**Frequency Coverage**

*Model EC964/1*

\*MF Band: Continuous cover 1.6–4.5MHz in 4 ranges (28 channels including 2182kHz)

HF Band: Marine allocations 4.0–27.5MHz in 8 ranges (24 channels, 3 in each range)

- Range 1 4.0–4.45MHz
- Range 2 6.2–6.525MHz
- Range 3 8.15–8.85MHz
- Range 4 12.3–13.25MHz
- Range 5 16.4–17.4MHz
- Range 6 22.0–22.72MHz
- Range 7 25.01–25.6MHz
- Range 8 26.1–27.5MHz

NB: Also available to special order with standard MF cover and HF Ranges 1–6 only, 4 channels in each range.

*Model EC964/3*

\*MF Band: Continuous cover 1.6–4.5MHz in 4 ranges (28 channels including 2182kHz)  
No HF cover on this version

*Model EC964/4*

Continuous cover 1.6 –30 MHz (12 channels)

(\*) Maritime IF Band.

**Intermediate Frequencies**

- 1st IF :: 1.2MHz
- 2nd IF :: 100kHz

**Clarifier**

± 300Hz (variable crystal-controlled 2nd Oscillator)

**Reception Modes**

A3 (DSB); A3A, A3H and A3J (upper side-band); A1 and A2 telegraphy

**Aerial Input**

50Ω unbalanced

**Controls**

Channel Selector, Bandswitch, Clarifier, Mode Switch, AF Gain/Standby Switch, RF Gain/AGC Switch, Aerial Attenuator\*; Line Level (located internally)

(\*) Not fitted on EC964/4

**Operational Temperature Rating**

0°C to +40°C

**Power Supplies**

- AC :: 100/125V or 200/250V (40–60Hz). Consumption of the order 45 watts.
- DC :: 12 or 24V (Eddystone Power Units Type 978/12 and 978/24). Consumption of the order 55 watts.

Model EC964/4 also operable direct from 24V DC supply (any source including floating battery)

**Mounting Styles**

Available for bench-mounting, rack-mounting and with anti-vibration mounts for mobile use.

**Dimensions and Weight**

- Panel (bench-mounting) : 426 x 134mm (16.75 x 5.25in)
- (rack-mounting) : 483 x 134mm (19 x 5.25in)
- Height (with feet) : 146mm (5.75in)
- (with A/V mounts) : 154mm (6.0625in)
- Depth (overall) : 441mm (17.375in)
- (intrusion in rack) : 403mm (15.875in)
- Weight (EC964/1) : 15.2kg (33.5lb)

**TYPICAL PERFORMANCE†**

**Sensitivity**

- DSB (AM) : 5μV for 12dB S/N (6kHz B/W)
- SSB : 1μV for 12dB S/N (2.4kHz B/W)

**IF Selectivity** (filter response)

- DSB (AM) : 6kHz B/W at -6dB, 30kHz B/W at -60dB
- SSB\* : 2.4kHz B/W at -3dB, 60dB points at +400Hz and -3.5kHz

(\*) Filter passes lower sideband to accommodate inversion in 1st Mixer.

**Image Rejection**

Below 15MHz >60dB, Above 15MHz >45dB

**IF Rejection**

Below 4MHz >80dB, Above 4MHz >90dB

**Frequency Stability**

- ± 100Hz change in tune frequency for ambient variation of 0°C to +40°C.
- ± 20Hz in any 15-min period with constant ambient and supply variation of 10%

**Cross Modulation**

Interference from unwanted signal 20kHz off-tune, 90dB above 1μV is 30dB below standard output (wanted signal 60dB above 1μV, DSB with 30% mod.)

**Blocking**

Unwanted carrier 20kHz off-tune, 100dB above 1μV affects output by <3dB (wanted signal 60dB above 1μV)

**Intermodulation**

3rd order products will be 30dB below level of signals at carrier +1kHz and carrier +1.6kHz

**Overall Response**

Within 6dB over range 350Hz to 2.4kHz (SSB)

**AGC Characteristic**

<6dB output level increase when input is raised 90dB from 1μV

**Radiation**

Less than 400pW (typically 20pW)

**Audio Output**

- Integral speaker (25Ω) : 2W max, 1.5W at < 5% distortion
  - Line (600Ω\*) : 10mW (adjustable)
  - Headset : Low/medium-Z
- (\* ) balanced or unbalanced.

**Audio Response**

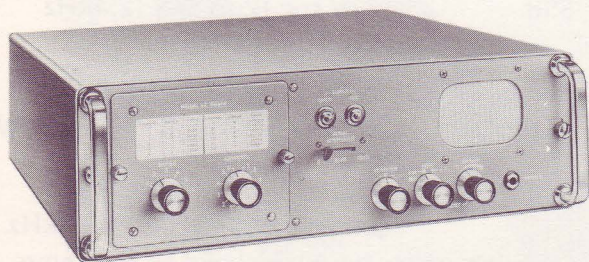
Within 3dB, 300Hz to 3kHz

**Desensitizing**

Gain reduction of 120dB

(†) Not to be interpreted as a Test Specification.

ing 2182kHz)



General-purpose version — Model EC964/4

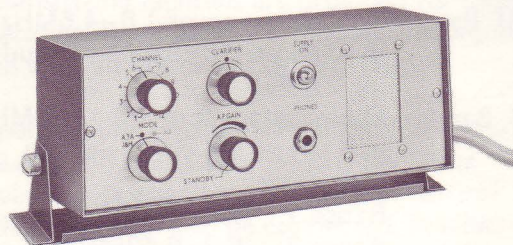
**REMOTE CONTROL UNIT TYPE ERC974/1**

This controller can be used to operate an EC964/4 receiver over a 10-pair cable link

using DC control. All normal control facilities including 'clarifier' and mode switching are available at the remote position. Ledex switching is utilised for channel changing and a lamp is provided to indicate correct functioning of the selector.

Direct control is possible at distances up to 1,000 metres. The details of the remote switching requirements for the EC964/4 can be provided on request where radio link facilities are available.

The ERC974/1 has an integral power unit to suit all standard 40–60Hz AC supplies and can also be operated from low-voltage DC. It is equipped with a built-in monitor speaker and connections for an ordinary telephone headset. The cabinet is of small dimensions suitable for bench or bulkhead mounting. A special version can also be supplied for rack installation.



Remote Controller ERC974/1

**DATA SUMMARY**

**Controls**

Channel Selector (12-positions), Clarifier, Mode Switch, AF Gain/Standby Switch, RF Gain/AGC Switch, Muting Level.

**Audio Input**

600Ω (-20dBm to +10dBm)

**Audio Output**

- Integral loudspeaker : 100mW at less than 5% distortion
- Telephones : Low/medium-Z
- Response : Within 3dB, 300Hz to 3kHz

**Power Supplies**

- AC :: 100/125V or 200/250V (40–60Hz).
- DC :: 12V or 24V.
- Consumption of the order 15 watts

**Dimensions**

- Width : 245mm (9.625in)
- Height (excluding stand) : 94mm (3.687in)
- Depth (excluding control projection) : 82mm (3.25in)

N.B. Illustrations on this page show early versions of the EC964/4 and ERC974/1.