

RACAL

RA6830 Half-Rack HF Receiver With BITE!

Standard Features

- Frequency range from 100 kHz to 30 MHz.
- AM, FM, CW, USB, LSB Reception Modes.
- Eight digit LED frequency display readout resolution.
- Five selectable IF bandwidth filters.
- 455 kHz second IF output.
- Fully modular construction for simplified maintenance.
- BFO synthesized tuning range of ± 8 kHz in 10 Hz increments - pushbutton selection for immediate zero reference.
- Multiple tuning rates and keypad entry of frequency.
- Internal 5 MHz frequency standard ± 5 parts in 10^{-8} per 10°C increment over the temperature range 0°C to 50°C .
- Three selectable AGC time constants.
- Selectable 1, 5, or 10 MHz reference input

Unique Features

- BITE - Built-In Test Equipment finds and reports receiver operational status to the lowest replaceable unit (LRU) level with local and remote notification.

- Single loop digital LO Synthesizer.
- Frequency control in 1 Hz tuning increments
- 3rd Order Input Intercept Point greater than $+30$ dBm for exceptional signal handling capability.
- Microprocessor-based control of all receiver functions.
- Easy-to-read LED.
- Direct module replacement without realignment.
- Complete local and remote control of receiver functions.

Options

- Antenna Protection and Muting
- High Stability Reference Oscillator
- Wide Variety of Bandpass Filters
- Narrowband FM Demodulator, DC Coupled
- Wide Dynamic Range AM Demodulator, DC Coupled
- 120/240VAC Power Supply

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Functional Description

The frequency selection information, from the front panel keypad or the tuning wheel encoder, is brought through the digital control/display logic module to the first LO module. The output signal (with a range of 40.955 MHz to 70.455 MHz) is applied to the mixer to derive the first IF of 40.455 MHz. This output is filtered, amplified and combined in the second mixer with the second LO frequency of 40 MHz to derive the 455 kHz second IF.

The second mixer output is brought through the selected filter, amplified, and applied to the detector circuits. The selected detector output is brought through a cross-point switch which routes the desired signals to the output line amplifiers and phone for audio to the front panel PHONES jack and to the rear panel audio output connector. The second IF amplifier output is also applied to a 455 kHz output amplifier and to the AGC detector/control circuit.

The Filter/Detector/AGC selection commands from the front panel pushbuttons are brought through the digital control/display logic module and applied to the appropriate selection control circuits. If the receiver is operated from a remote control device, the optional digital I/O module receives the command word from the remote device and provides the required commands to the digital control/display logic module.

HF Receiver Series

The RA6830 Series has been developed and manufactured to meet the requirements for a digitally controlled state-of-the-art general purpose, low-cost HF receiver. The RA6830 Series is designed to provide HF receiver users with maximum flexibility for applications requiring search, collection, analysis, master/slave or DF receivers. Cost effectiveness and flexibility of configuration is accomplished by providing maximum commonality of modules, throughout

the receiver Series. Modular interchangeable units allow you custom tailoring to your specific HF receiver needs, while minimizing life-cycle costs. Rascal's technical excellence and rigid quality control assure you of outstanding HF receiver performance.

Technical Specifications

FREQUENCY RANGE
100 kHz to 30 MHz

FREQUENCY SELECTION
1 Hz increment

FREQUENCY TUNING
By keyboard entry or continuous tuning with selectable rates, FAST (100 Hz), SLOW (30 Hz) and FINE (1 Hz) increments; BFO continuous in 10 Hz increments. Fast Tuning Synthesizer: 5 mSec for any increment to 1 Hz accuracy.

FREQUENCY INDICATION
8 digit electronic readout of tuned frequency to 1 Hz; 3 digit and sign readout of BFO relative to IF center ± 8.0 kHz.

FREQUENCY STABILITY
 ± 5 parts in the 10^8 per 10°C temperature increment over the range 0°C to 50°C using internal 5 MHz reference oscillator. Provision for an external 1, 5 or 10 MHz reference input/output. 0 dBm nominal into 50 ohms.

MODES OF OPERATION
CW/A1 Continuous Wave; CW/A2 Modulated Continuous Wave; USB/LSB (upper/lower sideband) A3A A3H, A3J, A2A, A2H, A2J; AM/A3 Amplitude Modulation; A4 (Facsimile) ISB/A3B Independent Sideband (optional); FM/F3 Telephony.

INPUT IMPEDANCE
50 ohms nominal, 2:1 VSWR Type N Connector or Type BNC

NOISE FIGURE
<13 dB from 500 kHz to 30 MHz
<19 dB from 100 kHz to 500 kHz

Technical Specifications (Cont.)

SENSITIVITY (500 kHz to 30 MHz)*

1. SSB - 113 dBm(0.5 uV) for 10 dB(S+N)/N Ratio
2. AM - 99 dBm(2.5 uV) for 10 dB(S+N)/N Ratio in a 6 kHz bandwidth.

*Below 500 kHz these units will degrade by up to 12 dB down to 100 kHz.

OVERALL SELECTIVITY

A wide variety of mechanical and crystal filters is available for optional requirements such as general purpose, low ripple, low shape factor, controlled delay, or linear phase. The standard range of filters providing 5 bandwidths is tabulated below.

The five bandwidths are symmetrical:

	-3 dB	-60 dB
BW1	>300 Hz	<2 kHz
BW2	>1 kHz	<4.5 kHz
BW3 (LSB, USB using BFO offset)	>3.2 kHz	<4.3 kHz
BW4	>6 kHz	<14 kHz
BW5	>20 kHz	<80 kHz

DYNAMIC RANGE

1. RF: >180 dB/Hz
2. Instantaneous: >105 dB/Hz

AGC
Control Range: An increase of 110 dB above AGC threshold will result in a change of output of less than 3 dB.
Threshold Range (preset): -113 dBm to -100 dBm

Time Constants:

Attack:	20 mSecs
Decay:	Short <30 mSecs
	Medium 200 +100 mSecs
	Long 3.75 secs. <u>+1.25</u> secs.

MANUAL/AUTOMATIC GAIN CONTROL

Provision is made on the front panel to select, and by use of the RF Gain Control, to manually control the AGC threshold anywhere within the range of 110 dB above the preset AGC threshold level.

INTERMODULATION (Out of Band)*

For signal 100 kHz or more from receiver tuned frequency the third order intercept point is greater than +30 dBm. Second order intercept point is greater than +60 dBm.

*Below 1.5 MHz these limits may be exceeded.

INTERMODULATION (In Band)

Better than -50 dB for two -10 dBm input signals within the IF passband when measured at the IF or line AF output.

CROSS MODULATION

The level of a 30% modulated signal, 50 kHz off-tune, necessary to cross modulate an on-tune carrier to a depth of 3% is greater than +21 dBm (2.5 volts).

BLOCKING

1. On Tune: Less than 10% distortion for +13 dBm (1 Volt) 30% Modulated AM input signals.
2. Off Tune: No blocking effect is discernible on a 30% modulated on-tune signal when in the presence of a +23 dBm (3 Volt) unmodulated carrier, 50 kHz off-tune.

RECIPROCAL MIXING

The apparent noise appearing at the receiver input when in a 3 kHz bandwidth, caused by a 0 dBm signal 100 kHz off tune is less than -100 dBm.

IMAGE AND SPURIOUS REJECTION

Greater than 80 dB, for signals at least +50 kHz from tuned frequency.

INTERNAL SPURIOUS RESPONSES

<-124 dBm.

OUTPUTS

1. IF: Frequency 455 kHz, Impedance 50 ohms. Level -10 dBm mon. Connector BNC.
2. Following outputs available at rear panel audio connector (25 pin Type D). AF: 100 Hz to 16 kHz for -3 dB.
 - a. 1W nominal into 8 ohm load. Distortion <3% at 500 mW.
 - b. Monitor: Metered AF line output, 1mW, 600 ohms balanced <2% distortion. All receiver modes selectable at front panel.
 - c. Line 1. AF line output. 1mW, 600 ohms balanced <2% distortion. Operable only with ISB option. All modes selectable at front panel except LSB.
 - d. Line 2. AF line output. 1 mW, 600 ohms balanced <2% distortion. Operable only with ISB option, LSB mode.

AGC: Diversity Connection with ground which provides dc voltage 10 volts to 4V to signal levels between threshold and +110 dB. Similar connection for ISB channel when fitted.

Technical Specifications (Cont.)

Fault: Indication of fault condition is available at the rear panel.

3. Phone: 30 mW into 600 ohm load. Distortion <3% at 10 mW.

Connector: Front Panel Phone Jack.

STATUS INDICATION

Front panel indication of status under local and remote control, remote indication of status under local and remote control; BITE (Built-In Test Equipment) finds and reports receiver operational status to the lowest replaceable unit level (LRU) with both local and remote notification.

FRONT PANEL CONTROLS AND INDICATORS

Frequency control keypad. Main Tuning control (rotary shaft encoder); TUNE RATE control (fast, slow, fine); LOCK control (disable frequency tuning); BFO, BFO CENTER; ENTER control (frequency); LOCAL/REMOTE control; AM, CW, USB, LSB, FM, ISB U/L. IF BW (5 filter selectors); METER RF/AF select MAN (manual gain control); SHORT, MED, LONG (AGC TIME CONSTANTS); IF Gain control; AF Gain control; POWER, On/Off.

INDICATORS - MODE AND NUMERIC READOUT

FREQUENCY MHz (8 digits); BFO kHz (3 digits, ± sign); RF Meter indication; AF Meter Indication; Bandwidth display; AGC display; Mode display; tuning Rate display; BFO tune indication; Remote indications; Fault indicator (LED).

All Functions Controlled by Mode and Sub-mode Keypad Controls:

BFO, BFO CENTER, AM, CW, USB, LSB, FM, ISB U/L. IF BW, METER RF/AF select, SHORT, MED, LONG.

REAR PANEL CONNECTORS

Antenna Input Connector (Type BNC or Type N); IF Output Connector (BNC); Power Input Connector; Digital Input/Output Connector - optional; REF Input/Output Connector (BNC); Ground Terminal/Audio Output Connector (Type D). First Lo Output optional.

REMOTE CONTROL (Optional)

Full remote control of all receiver parameters by either:

1. Serial asynchronous, ASCII character oriented with strap selectable baud rate of 50 baud to 19.2 kilobaud, selectable MIL-STD-188C or EIA standard RS-232-C/RS-422/RS-323 compatible, 2 byte-serial.
2. Byte-serial bit-parallel IEEE standard 488C-1978 compatible, or
3. other, user specified, interface formats.

ENVIRONMENTAL

1. Operating Temperature: 0°C to 50°C
2. Operating Humidity: 10% to 95% non-condensing.
3. Altitude: Operation to 15,000 ft.
4. Bench Handling: MIL-STD-810C, Method 516.2 Procedure V.
5. Vibration: MIL-STD-810C, Method 514.2, Procedure X.
6. Storage Conditions:
 - a. Temperature Range: -40°C to +70°C
 - b. Relative Humidity: 10% to 95% non-condensing.
 - c. Altitude: Up to 40,000 feet
- d. Fungis: Fungi identified in MIL-STD-810, Method 508.1, Procedure I.

PRIMARY POWER

115/230 V \pm 10%, 48 Hz to 420 Hz, single phase.

POWER CONSUMPTION

40 Watts (nominal)

DIMENSIONS 1/2 RACK SIZE

Suitable for 19 inch (48.3 cm) rack or desk top console mounting: (2 RA6830 per common carrier)

Height: 5-1/4 in. (13.33 cm)

Width: 8.5 in (21.6 cm)

Depth: 22 in. (56 cm)

WEIGHT (approx.)

20 lbs (9.1 kg)

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