

RACAL

COMMUNICATIONS, INC.

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

- Wide Variety of Bandpass Filters
- Narrowband FM Demodulator, DC Coupled
- Wide Dynamic Range AM Demodulator, DC Coupled
- Independent Sideband
- RS-232C or IEEE488 Remote Interface, others to customer specification.

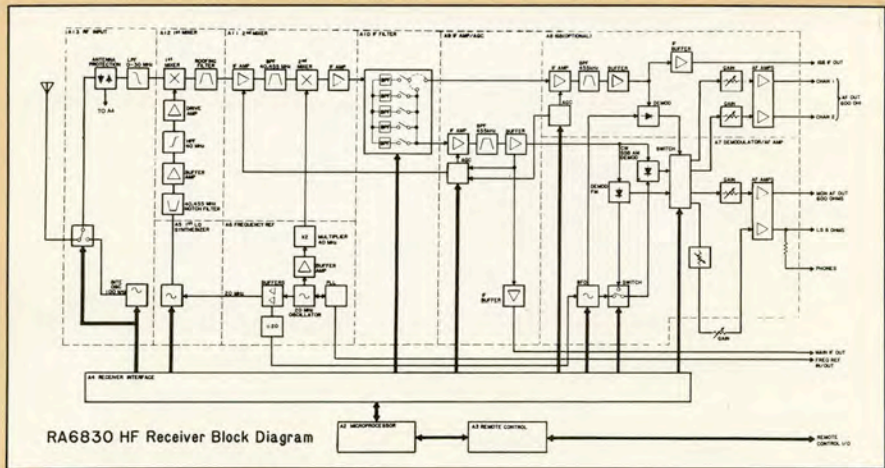
Functional Description

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 40.655 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 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 push-buttons 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.



RA6830 HF Receiver Block Diagram

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 10^8 per 10°C over the temperature range of 0°C to 50°C using internal 5 MHz reference oscillator. Selectable 1, 5 or 10 MHz reference input or 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 or Type BNC connector.

NOISE FIGURE

<14 dB from 500 kHz to 30 MHz
<16 dB from 100 kHz to 500 kHz

Technical Specifications (Cont.)

SENSITIVITY (500 kHz to 30 MHz)*

- SSB - 113 dBm (0.5 μ V) for 10 dB (S+N)/N Ratio.
- AM - 99 dBm (2.5 μ V) for 10 dB (S+N)/N Ratio in a 6 kHz Bandwidth.

* Below 500 kHz sensitivity will gradually degrade by up to 12 dB.

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

AGC

Control Range: An increase of 120 dB above AGC threshold will result in an output change of less than 1 dB. Total AGC Range is typically 130 dB above threshold

Time Constants:

Attack: 20 mSecs

Decay: Short <30 ms

Medium 200 \pm 100 ms

Long 3.75 secs. \pm 1.25 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 signals 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

- On Tune: Less than 10% distortion for +13 dBm (1 Volt) 30% Modulated AM input signals.
- 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 \pm 50 kHz from tuned frequency.

INTERNAL SPURIOUS RESPONSES

<-124 dBm.

OUTPUTS

- IF: Frequency 455 kHz, Impedance 50 Ohms, Level -10 dBm nominal, Connector BNC.
- AF: The following outputs are available at the rear panel audio connector (25 pin Type D). The -3 dB bandwidth is 100 Hz to 16 kHz.
 - .05W into 8 Ohm load. Distortion <3%.
 - Monitor: Metered AF line output. 1 mW, 600 ohms balanced <2% distortion for:
 - Standard Receiver: All AF outputs.
 - ISB Option: Switchable to LSB or USB in ISB mode (with meter, phones and rear panel LS), or monitors all AF outputs in non ISB modes.
 - Line 1. AF line output. 1 mW, 600 ohms balanced <2% distortion. Operable only in USB mode.
 - Line 2. AF Line output 1 mW, 600 ohms balanced <2% distortion. Operable only with ISB option, LSB mode.

NOTE: C & D available only with ISB option.

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

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

- 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.

Technical Specifications (Cont.)

FRONT PANEL CONTROLS AND INDICATORS

Frequency control keyboard; 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 Submode 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. Fungus: Fungi identified in MIL-STD-810, Method 508.1, Procedure I.

PRIMARY POWER

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

POWER CONSUMPTION

40 Watts (nominal)

DIMENSIONS

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

Height: 5¼ in. (13.33 cm)

Width: 8.5 in. (21.6 cm)

Depth: 22 in. (56 cm)

WEIGHT (Approx.)

20 lbs. (9.1 kg)

ALL SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTIFICATION

RACAL

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