

# RA6790 MF/HF Receiver



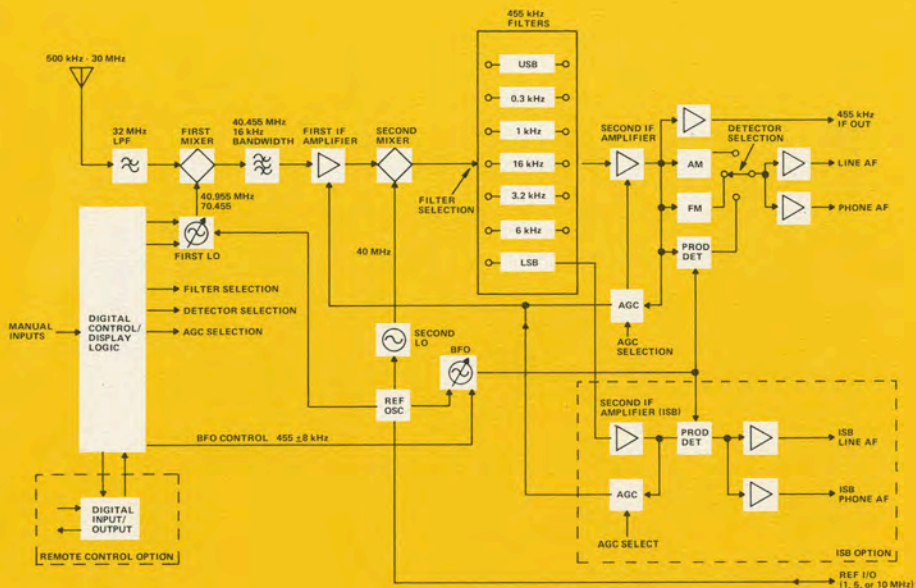
The RA6790 represents a new generation of communications/surveillance receivers. This receiver combines Racal's excellent and time proven rf technology with microprocessor based control of all receiver functions and a patented single loop digital LO Synthesizer. The resulting receiver provides excellent performance characteristics in addition to the ability to tune from 500 kHz to 30 MHz in 1 Hz increments either from the numeric keypad, tuning shaft encoder, or from a remote controller.

- Easy-to-read liquid crystal display
- BFO tuning range of  $\pm 8$  kHz in 10 Hz increments — pushbutton for immediate zero reference
- Front panel pushbutton selection of all receiver functions
- Six selectable bandwidth filters plus wideband (16 kHz) filter
- Three selectable AGC time constants
- Fully modular construction for simplified maintenance
- Direct module replacement without realignment

## Features

- Frequency range from 500 kHz to 30 MHz
- 1 Hz tuning increments
- AM, FM, CW, USB, LSB reception modes standard; ISB optional
- 455 kHz second IF output
- Internal 5 MHz frequency standard ( $\pm 1$  part in  $10^6$ )
- Selectable 1, 5, or 10 MHz reference input or output
- All receiver functions may be remotely controlled—Serial or parallel, EIA or MIL interface

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## Functional Description

The simplified block diagram illustrates the principal circuits contained in the RA6790 Receiver. The frequency selection information, from the front panel keypad or the tuning shaft encoder, is brought through the digital control/display logic module to the first LO module. The output signal (with a range of 40.955 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 two separate

output amplifiers and applied to the front panel headphone jack and to the rear panel audio output connector. The second IF amplifier output is also applied to the 455 kHz output amplifier and to the AGC detector/control circuit.

The filter/detector/and 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. When 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.

# Technical Specifications

## Frequency Range

500 kHz to 30 MHz.

## Frequency Selection

1 Hz increment.

## Frequency Tuning

By keyboard entry or continuous tuning with selectable rates, FAST (100 Hz), SLOW (10 Hz), and FINE (1 Hz) increments. BFO continuous in 10 Hz increments.

## Frequency Indication

- 8 digit electronic readout of tuned frequency to 1 Hz.
- 3 digit and sign readout of BFO relative to IF center  $\pm 8$  kHz.

## Frequency Stability

$\pm 1$  part in  $10^6$  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

USB/A3J Upper Side Band; LSB/A3J Lower Side Band; ISB/A3B Independent Side Band (optional); CW/A1 Continuous Wave; AM/A3 Amplitude Modulation; FM Frequency Modulation.

## Selectivity

- SSB/ISB: (3.24 kHz bandwidth)  
>250 to 3200 Hz @ -6 dB  
<400 to 4300 Hz @ -60 dB
- CW1: >300 Hz @ -3dB  
<3000 Hz @ -60 dB
- CW2: >1000 Hz @ -3 dB  
<6000 Hz @ -60 dB
- AM1: >3.2 kHz @ -3 dB  
<12 kHz @ -60 dB
- AM2: >6.0 kHz @ -3 dB  
<20 kHz @ -60 dB
- AM3: >16 kHz @ -3 dB  
<50 kHz @ -60 dB

## Input Impedance

50 ohms nominal, 2.1 VSWR; Type BNC Connector.

## AGC

Range: An increase in input of 120 dB above 2 microvolts will produce an output change of less than 3 dB. Time Constants Attack: < 20 msec. Decay: Short < 30 msec; Med 200  $\pm$  50 msec; Long 4  $\pm$  1 sec.

## Dynamic Range

130 dB minimum.

## Image/Spurious Rejection

80 dB, 20 kHz or more removed from tuned frequency.

## Internal Spurious Responses

Not greater than 3 dB above noise level in a 3 kHz bandwidth.

## 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 shall be less than 1.0  $\mu$ V (-107 dBm).

## Sensitivity (500 kHz to 30 MHz)

SSB. 0.5  $\mu$ V (-113 dBm) for 10 dB S + N/N ratio.  
AM. 2.5  $\mu$ V (-99 dBm) 30% modulated for 10 dB S + N/N ratio in 8 kHz bandwidth.

## Intermodulation (In Band)

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

## Intermodulation (Out of Band)\*

Third order intercept point greater than +35 dBm.  
Second order intercept point greater than +60 dBm.

\*Below 1.5 MHz these limits may be exceeded.

## 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% shall be greater than 2.5 volts (+21 dBm).

## Blocking

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

## Outputs

IF Output:  
455 kHz, -10dBm nominal into 50 Ohm load.

## AF Output:

- Rear Panel Connectors: 1 watt, Output Impedance 8 ohms nominal. Distortion 1%.
- Phone Jack: 10 mW into 600 ohms, Distortion 1%.
- Line Output at Rear Panel Connector: 1 mW independently adjustable  $\pm 10$  dB. Output Impedance 800 ohms  $\pm 10\%$  balanced. Distortion 0.3%.

## Rear Panel Connectors

Antenna Input Connector (BNC). IF Output Connector (BNC). REF Input/Output Connector (BNC). 1, 5, or 10 MHz. Power Input Connector. Ground Terminal. Digital I/O Connector. TB 1-AF outputs. TB 2-ISB AF outputs.

### Remote Control (Optional)

Full remote control of all receiver parameters by either (1) serial asynchronous, character oriented data at 9.6 or 19.2 kilobauds, selectable MIL-STD-188C or EIA Standard RS 232-C compatible, (2) byte-serial bit-parallel IEEE Standard 488-1975 compatible, or (3) other, user specified, interface formats.

### Status Indication

Front panel indication of status under local and remote control, remote indication of status under local or remote control.

### Front Panel Controls and Indicators

Frequency control keyboard. kHz/BFO frequency control (rotary). Tuning selector key (FAST/SLOW/FINE), LOCK and BFO with LCD indicators. MHz/kHz 8 digit decimal display. BFO 3 digit decimal display with sign. AGC selector key, SHORT, MEDIUM, and LONG with LCD indicators. MODE selector key USB, LSB, ISB, CW, AM and FM with LCD indicators. FILTER selector key 0.3, 1.0, 3.2, 6, and 16 kHz with LCD indicator. LOCAL/REMOTE Key with LCD indicator. AF GAIN control. RF GAIN control. METER Switch AF/RF AF Level Line level pre-set control. PHONES jack. POWER switch.

### Environmental

- (a) Operating Temperature:  $0^{\circ}$  to  $+50^{\circ}\text{C}$
- (b) Storage Temperature:  $-40^{\circ}$  to  $+71^{\circ}\text{C}$
- (c) Humidity: 10% to 95% at  $40^{\circ}\text{C}$
- (d) Bench Handling: MIL-T-4807, Method 4A.
- (e) Vibration: MIL-T-4807 - MIL-STD-810B, Method 514, Procedure X1, Part 1.
- (f) Altitude: Operation to 10,000 ft.

### Primary Power

115/240 volts,  $\pm 10\%$ , 48 - 420 Hz, single phase.

### Power Consumption

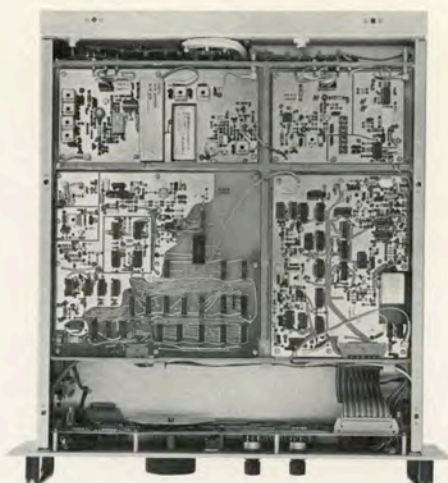
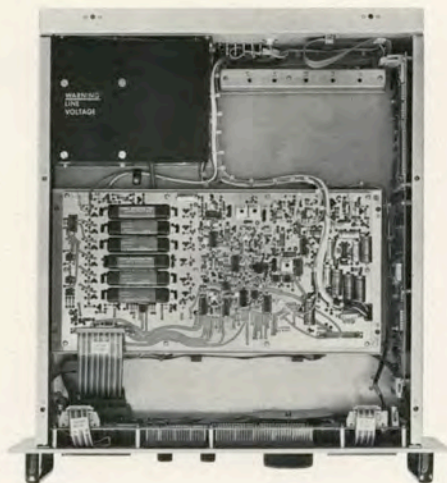
50 watts (nominal).

### Dimensions

Suitable for 19 in. (48.3 cm) rack or desk top console mounting. Height: 5-1/4 in. (13.33 cm); Width: 19 in. (48.3 cm); Depth: 18.75 in. (47.6 cm).

### Weight (Approx.)

30 lbs. (13.5 kg.)



*Modular construction simplifies maintenance procedures. Top view is shown on left; bottom view on right.*

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