

ICOM IC-R8500 Revisited

Let me tell you about an old friend, my ICOM IC-R8500 receiver. I first reviewed the IC-R8500 in January 1997 and have been using one ever since.

The reasons I prize the IC-R8500 include its wide frequency coverage, strong front end performance, variety of modes and bandwidths, and ease of computer control. It also interfaces nicely with accessory equipment.

I have reviewed other wide band, table top receivers, including AOR's AR-5000, AR8600, AR8600Mk2, and Yaesu's VR-5000. What struck me most about the IC-R8500 was its intermod immunity and build quality. Most radios which try to serve as both a shortwave receiver and VHF/UHF scanner are disappointing performers at one of the tasks. The IC-R8500 and AR-5000 I tested are two exceptions.

Wide Frequency Coverage

The IC-R8500 tunes 100 kHz up to 2000 MHz, but the USA consumer version skips the cellular phone ranges.

Several step increments from 10 Hz through 1 MHz are provided as standard and there is one programmable step of 0.5 - 199.5 kHz in 100 Hz graduations.

Modes and Selectivity

The IC-R8500 provides more modes and bandwidths than ordinary scanners or dedicated shortwave receivers. There are three bandwidths available for FM detection: 150, 12, and 5.5 kHz. The widest FM mode is used to receive broadcast stations and the other FM modes are appropriate for land mobile communications. The narrow 5.5 kHz FM bandwidth provides extra selectivity and audio recovery for narrow band signals, including the new 7.5 kHz VHF-high band channels and Family Radio Service. Satellite fans wish for a 40 kHz FM bandwidth, missing from the IC-R8500 and other receivers.

There is only one bandwidth for SSB, 2.2 kHz, and the same bandwidth is used for CW. I installed ICOM's extra cost 500 Hz CW filter, which is engaged in the CW Narrow position. The narrow filter makes it possible to monitor a single CW station nestled among others.

The IC-R8500 supports three different bandwidths for AM reception: 12, 5.5, and 2.2 kHz. Some AM foreign broadcast listeners value a selectable side band synchronous detector, a feature not found in the IC-R8500. Truth be told, I don't miss it for AM broadcast band monitoring.

A tunable audio peak filter provides audio selectivity with two bandwidths.



Memory, Scanning, and Searching

The IC-R8500's 1000 channels are initially organized into 20 banks of 40 channels each. A 100 channel skip bank is used to store frequencies to ignore during limit searches. Another 100 channel bank is reserved for finding active frequencies during auto searches.

You can change the number of channels in each bank by reallocating channels to and from a free pool. The skip and auto banks can be adjusted, too, a capability not documented in the user manual.

Each memory channel has flags for skip (lockout) and select, which are pertinent to scanning. An 8 character text label can be programmed for each memory channel and a 5 character label for each bank. Memory contents are retained in EEPROM so no backup battery is required. My IC-R8500 maintains its memory faithfully.

As covered in the original review, the IC-R8500 supports memory scanning. Though the memory banks are variable size, you can only scan one bank at a time. There are 10 pairs of frequency limits which can be used for limit searches, but you cannot chain search banks together.

An auto store facility automatically stores active frequencies found during a search into a special memory bank.

Accessory Jacks

As one would expect from a top of the line model, the IC-R8500 has jacks for accessories. I've used Hewlett-Packard spectrum analyzers connected to the 10.7 MHz IF output jack to view portions of the radio spectrum.

The bandwidth at the IF output jack is wide when the IC-R8500 is tuned above 30 MHz. I measured the frequency response at the IF output jack and graphed the results. The re-

sponse is within about 3 dB for 10 MHz wide window (5 MHz on either side of the center frequency). The IF circuitry attenuates signals further away, but affords a usable spectrum sample up to about 16 MHz wide.

The effect of the IC-R8500's AGC (automatic gain control) is visible on the spectrum display when the radio is tuned to, or past a strong signal. The AGC throttles back the receiver's sensitivity and attenuates all signals visible on a spectrum display. The same effect is true for ICOM's earlier IC-R7000 and IC-R7100A.

When observing weak signals across a band segment on a spectrum display, I make sure the IC-R8500 is tuned to a clear frequency. This prevents the AGC from reducing the radio's sensitivity.

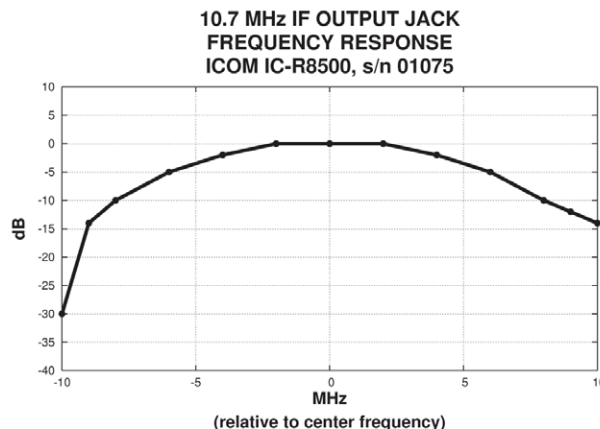
The IC-R8500 rear panel includes a discriminator output jack, so there's no need to add one. I've used it with the CSI CD-1, CSI Flex Series, Optoelectronics DC440 and other CTCSS/DCS/DTMF displays.

Construction

I remain impressed with the IC-R8500's build quality. A rugged, cast aluminum chassis is used to hold and shield the circuit boards. The boards contain additional shielded compartments. The attention to shielding helps reduce birdies, i.e., spurious signals produced within the receiver itself.

The radio remains cool during long periods of operation because ICOM furnishes an external power supply.

The main tuning knob is large and padded with rubber. The rubber keys are easy to operate and the lettering has not worn off after seven years of use.



Performance

I measured an IC-R8500's sensitivity and graphed the results in the original January 1997 review. The radio is quite sensitive below 1400 MHz.

I purposely hunt for birdies, intermod, and signs of front end overload when testing receivers. Early on, my IC-R8500 was freer from spurious signals than the other radios I tried.

The difference in front end performance became even more obvious after the National Weather Service installed a new 162.4 MHz transmitter in the county. Strong NWR signals interfered with reception in several places in the VHF-high band with many of the review radios, but not the IC-R8500.

My IC-R8500 does receive some spurious signals above 1000 MHz, which I suspect is due to ICOM's implementation of a wide band converter for 1000+ MHz reception.

My IC-R8500's FM squelch action leaves room for improvement. The 50 millisecond long squelch tail is a little noisier than the shorter tail found some of the GRE-manufactured scanners, e.g., the PRO-2006 and PRO-2067.

When scanning, there is a brief delay before my IC-R8500 recognizes a signal present.

ICOM RS-8500 Software

Those who wish to control or configure their IC-R8500 using a computer now have several choices. Most of the software offerings require a computer running Microsoft Windows.

ICOM's own software, named RS-8500, works well, is simple to install and has excellent

graphics. It displays information in several separate windows, and the main window is a replica of the radio's front panel (March 1999 *MT*).

RS-8500's Band Scope window is a graphical portrayal of activity above and below the current frequency. Receiver audio is muted as the band scope sweeps. You can position the mouse over any part of the band scope and the IC-R8500 tunes instantly to the corresponding frequency.

RS-8500 software hoards user data. There is no print option and RS-8500 provides no way to import or export memory channels from a text or CSV (comma-separated values) file.

Free Tk8500 Software

I wrote tk8500 free, open source software for the IC-R8500 (April 2002 *MT*) after I switched from running Windows to Linux. Tk8500 runs on Linux, BSD, MacOS X, Windows, and other operating systems.

Tk8500 enables you to scan combinations of memory banks, overcoming the radio's limitation of single bank scanning. Memory data can be imported from and exported to CSV files, overcoming another limitation of the original ICOM RS-8500 software. Tk8500 may be downloaded freely from <http://parnass.com>.

Summary

The IC-R8500 is a flexible, wide coverage receiver with an outstanding front end. I have used it as both a monitor receiver and as a test instrument when repairing and aligning other radios. It snoops into corners of the spectrum that

simple scanners miss. I've even used it in SSB mode to monitor VHF ACSB conventional and trunked systems.

Though the IC-R8500 is not a trunk tracker, it has the most important features I need and is one of the few radios which performs well on both shortwave and VHF/UHF.

If I were forced to move to a tiny apartment and give up all receivers in my listening post except for one, the well-built IC-R8500 would stay.

Uniden Documents Computer Commands

Those who want to write receiver control software need to understand the computer interface commands supported by the receiver. It makes sense for a manufacturer to release this information to encourage software development, because a wide choice of software makes a receiver more attractive.

In a positive development, Uniden recently documented the computer interface commands (i.e. "control codes") for several model scanners. The command code documents may be downloaded as PDF files from <http://uniden.com>. The spoiler is that you must agree to the restrictions set forth in Uniden's six-page EULA (end user license agreement) before downloading the documentation from Uniden's web site.

In contrast, ICOM, Ten-Tec, and R. L. Drake document the interface commands for their tabletop receivers without a restrictive EULA.

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