ICOM IC-R75 Communications Receiver

By Rick Lindquist, N1RL
Senior News Editor

If you've ever thought it might be great to have an extra set of ears in the shack, you'd be wise to consider this latest "communications receiver" from ICOM. Let's face it: Hams, as a rule, do not find much use these days for standalone receivers. Most of the boxes we buy also contain the requisite transmitting circuitry; being able to fit that capability into the IC-R75 box (an IC-*TR*-75?) would make an especially attractive package. But even as a "mere" receiver the IC-R75 is a terrific complement for the typical ham shack.

A Receiver in the Shack?

A dwindling number of us still remember the days when a discrete receiver was standard equipment in every ham shack. Today, that's the exception, of course. Most hams will claim they have no use for a separate receiver—they've got a general-coverage receiver in their transceiver box.

Maybe so, but few "transceiver" receivers are designed for the primary function of listening—something a few of us enjoy doing when the blush is off the latest contest or DXpedition feeding frenzy. For the SWL or BCL, of course, listening is the *only* game.

The IC-R75 is definitely designed for listening—which is, of course, as it should be. An all-mode receiver, it also offers things like synchronous AM detection to enhance AM broadcast enjoyment by ameliorating the effects of multipathing and fading. It also incorporates superb dual passband tuning to combat interfering signals, plus the possibility to add optional crystal filters for enhanced selectivity. Simply push the **FIL** button to set the narrow filter for the mode you've selected (if installed).

You'll find CW, CW-R (reverse) and RTTY mode settings. Another nice touch: it offers adjustable CW pitch, via the menu.

This triple conversion design has IFs at 69 MHz, 9 MHz and 455 kHz. While it only draws about 1 A at full volume, the AF stage delivers a healthy 2 W or so to the front-firing speaker.

The LF capabilities of this receiver are something to keep in mind in terms of the pending request by the ARRL to allocate bands at 136 kHz and at 160-190 kHz. Experimenters and QRP enthusiasts who enjoy building transmitters might find an able companion for their endeavors in the R75.

But from my point of view, the coolest feature of the IC-R75 is its ability to truly integrate itself into a ham shack. Own an IC-706 or one of the other later-model ICOM transceivers with a computer **REMOTE** jack? With a simple connecting cable you can make up yourself, the IC-R75 becomes a main or auxiliary receiver—each unit controlling the other and letting you share the best features of each.

Hook it up to your '706 and you can share the IC-R75's ability to punch in frequencies on the keypad or even the receiver's stored memories. For ham radio use, you'll need to add a T/R switching system. It's a great opportunity to resurrect that old Dow-Key relay you've got in the junk box from your "separate-receiver" Novice days.

An Accessible Receiver

The IC-R75 suggests a cross between the IC-706 and IC-746 transceivers—a bit closer to the latter in terms of size, styling, and front-panel layout, but more compact and without the large LCD screen. The R75's sizeable display offers big numbers (or channel names—it's your call) and yellow-orange backlighting. There's a multi-segment LED S meter that reads out up to

60 dB over S9. Numerals almost as large as the frequency display tell you which memory you've got dialed up. Other important icons are clear and prominent.

Like the "original" IC-706, there's no band switch. You can directly enter a new frequency or set the tuning step to the correct display digit and dial away. Up and down buttons let you page swiftly through memories—all 99 of them.

The front-panel layout is sensible and accessible. This is a piece of gear you literally can get your hands on without your fingers getting in the way of what you're trying to do. There's a nice large knob with a decently sized dimple on it. The knob incorporates a rubber grip ring. It has a nice "feel" to it. The drag is adjustable.

You can lock the settings with a push of the **LOCK** button on the front panel. A metal bail is easily deployed from the bottom of the set to angle up the front panel for better viewing.

The right-hand frequency keypad (which also functions to enter memory channel names) is terrific. All buttons and knobs are substantial and clearly labeled. There's a $1/4$-inch phone jack on the front panel. Much of being able to operate this little receiver I learned from my experiences with other ICOM gear.

You can connect two separate antennas to the IC-R75 and select either from a front panel button. I'd have preferred to see two 50-Ω SO-239 connectors, but the IC-R75 offers an SO-239 for **ANT 1** and snap-on connectors for **ANT 2** to wire a 500-Ω (or other high impedance) antenna, such as a longwire.

The receiver powers from 13.8 V dc via

Bottom Line

A versatile HF/6-meter receiver that offers a good measure of performance in a compact package. All mode capability for the ham and utility listeners and synchronous AM for the SWLs should make the IC-R75 a popular choice for a wide variety of radio enthusiasts.

Joe Bottiglieri, AA1GW ♦ Assistant Technical Editor

Table 1
ICOM IC-R75, serial number 01206

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*		
Frequency coverage: 0.03-60 MHz.	As specified[1].		
Power requirement: 1.1 A, 11.7-15.9 V dc. (An ac power supply is provided)	2 A. Tested at 13.8 V.		
Modes of operation: SSB, CW, AM, S-AM, FM, AFSK.	As specified.		

Receiver	*Receiver Dynamic Testing*		
SSB/CW sensitivity, bandwidth not specified, 10 dB S/N: 0.1-1.8 MHz, <2.0 µV; 1.8-28 MHz, <0.16 mV; 28-30 MHz, <0.18 mV; 50-54 MHz, <0.13 µV.	Noise floor (mds), 500 Hz filter:		
	Preamp off	*Preamp one*	*Preamp two*
	1.0 MHz −130 dBm	−137 dBm	−140 dBm
	3.5 MHz −133 dBm	−141 dBm	−143 dBm
	14 MHz −132 dBm	−138 dBm	−142 dBm
	50 MHz −127 dBm	−136 dBm	−140 dBm
AM sensitivity, 10 dB S/N: 0.1-1.8 MHz, <5.6 µV; 1.8-30 MHz, <1.6 mV; 50-54 MHz, <1 µV.	10 dB (S+N)/N, 1-kHz tone, 30% modulation:		
	Preamp off	*Preamp one*	*Preamp two*
	1.0 MHz 1.7 µV	0.8 µV	0.6 µV
	3.8 MHz 1.2 µV	0.6 µV	0.4 µV
	53 MHz 2.4 µV	1.0 µV	0.5 µV
FM sensitivity, 12 dB SINAD: 28-30 MHz, <0.22 µV; 50-54 MHz, <1 µV.	For 12 dB SINAD:		
	Preamp off	*Preamp one*	*Preamp two*
	29 MHz 0.5 µV	0.2 µV	0.2 µV
	52 MHz 1.0 µV	0.4 µV	0.2 µV
Blocking dynamic range: Not specified.	Blocking dynamic range, 500 Hz filter:		
	Preamp off	*Preamp one*	*Preamp two*
	3.5 MHz 122 dB	120 dB	115 dB
	14 MHz 122 dB	120 dB	113 dB
	50 MHz 119 dB*	119 dB*	111 dB*
Two-tone, third-order IMD dynamic range: Not specified.	Two-tone, third-order IMD dynamic range, 500 Hz filter:		
	Preamp off	*Preamp one*	*Preamp two*
	3.5 MHz 91 dB	89 dB	87 dB
	14 MHz 88 dB*	86 dB	87 dB
	50 MHz 88 dB*	86 dB*	84 dB*
Third-order intercept: Not specified.	*Preamp off*	*Preamp one*	*Preamp two*
	3.5 MHz +3.6 dBm	−7.7 dBm	−13 dBm
	14 MHz −0.3 dBm	−9.1 dBm	−17 dBm
	50 MHz +4.9 dBm	−7.1 dBm	−14 dBm
Second-order intercept: Not specified.	Preamp off, +60 dBm; preamp one, +65 dBm; preamp two, +51 dBm.		
FM adjacent channel rejection: Not specified.	20 kHz channel spacing, both preamps on: 29 MHz, 67 dB; 52 MHz, 60 dB.		
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz channel spacing, both preamps on: 29 MHz, 67 dB*; 52 MHz, 70 dB*; 10 MHz channel spacing, both preamps on, 52 MHz, 106 dB.		
S-meter sensitivity: Not specified.	S9 signal at 14.2 MHz: preamp off, 82 µV; preamp one, 31 µV; preamp two, 9.5 µV; 50 MHz, preamp off, 178 µV; preamp one, 60 µV; preamp two, 20 µV.		
Squelch sensitivity: SSB, CW, RTTY, <5.6 µV; FM, <0.32 µV.	At threshold, both preamps on: SSB, 16 µV; FM, 29 MHz, 0.08 µV; 52 MHz, 0.2 µV.		
Receiver audio output: 2 W at 10% THD into 8 Ω.	2.3 W at 10% THD into 8 Ω.		
IF/audio response: Not specified.	Range at −6dB points, (bandwidth): CW-N (500 Hz filter): 221-972 Hz (751 Hz); CW-W: 67-2625 Hz (2558 Hz); USB-W: 87-2591 Hz (2504 Hz); LSB-W: 64-2597 Hz (2533 Hz); AM: 66-2510 Hz (2444 Hz).		
Spurious and image rejection (except IF rejection on 50 MHz): 70 dB.	First IF rejection, 14 MHz, 81 dB; image rejection, 14 MHz, 72 dB.		
Size (hwd): 3.7×9.5×9 inches; weight, 6.6 pounds.			

Note: Unless otherwise noted, all dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.
*Measurement was noise-limited at the value indicated.
[1]Sensitivity reduced below 0.06 MHz.

the supplied—and sizeable—ac adapter. Fortunately, it's wired with a plug on the end of a cord so you don't have to figure out where to plug in the hefty cube.

A Capable Receiver

The R75 packs a lot of performance into its compact frame. Keep in mind that ICOM was able to concentrate on simply producing a decent-performing receiver here; they

didn't have to worry about what was happening on the transmitter side.

With the R75, you've got a receiver that not only covers a huge chunk of the known HF spectrum plus the low end of the VHF (the only thing that would have made it better would be to have included coverage comparable to the IC-706, but that's for the next version), but also has ample sensitivity over its coverage range. ARRL Lab test-

ing showed the preamp-off sensitivity hovered around −130 dBm—right up there with the big boys—but it includes two preamp stages to boost sensitivity by as much as 10 dB. These really can come in handy!

A few words on dynamic range: This is an aspect of receivers that, while important, often gets less than a full discussion in the typical transceiver review. It's also something that many amateurs are still unfamil-

iar with—at least as it pertains to receiver performance. In fact, outstanding receiver performance largely hinges on outstanding dynamic range, which defines a receiver's ability to distinguish weaker signals in the presence of nearby, stronger ones.

In the ARRL Lab, we measure dynamic range for SSB and CW in the CW mode with the narrowest filter employed and injecting "interfering" signals 20 kHz away from the signal we're trying to listen to. The R75 is no slacker in this regard. The two-tone third-order IMD dynamic range of the R75 is more than merely respectable—in the vicinity of 90 dB on HF through 50 MHz. This is in a league with the receivers in many mid-priced transceivers.

As it does even on more expensive receivers, the two-tone third-order IMD degrades slightly with the application of the preamplifier. In this case, it's no big deal—only a couple of dB or so (see Table 1). The presence of the preamps is a big boost—pun intended.

A lot of people look at the third-order intercept number as a "measure of quality" for a receiver. This is an indication of how the receiver handles strong signals overall. While not outstanding in this regard, the receiver is in the "plus" numbers on 3.5 and 50 MHz, and it breaks even on 14 MHz. This is good.

In very practical terms, this means that you can take this receiver out on a busy HF band during a contest weekend and—under optimal selectivity conditions—the front end won't fold up when the neighborhood bully is bellowing down the band with his "killerwatt." For "problem" situations, though, the R75's twin passband tuning can be a huge plus. The radio also has an attenuator that comes in handy when too much gain becomes an issue. There's plenty of sensitivity to go around in most cases.

Up until now, we've been talking about CW and SSB performance by and large. Of course, with a receiver like this you'll want to know how it does on AM and FM. Again, the sensitivity numbers are respectable or better—especially with the preamp engaged. I happen to enjoy listening to AM broadcasts, so this is a big plus. In fact, while checking out the R75, the local Public Radio station was "begging," so the incentive was even greater to listen elsewhere.

An even bigger plus is the inclusion of synchronous AM detection on the R75. On certain signals it can make all the difference between enjoyable and annoying listening. Simply push and hold the **AM** button once you've tuned in your station—it will switch to AM-S—and you're in business.

Less impressive was the two-tone third-order dynamic range on FM. It was in the

60 dB range, worst case, on HF and VHF (again, see Table 1). This number typically is comparable to FM adjacent channel rejection. Some VHF mobiles have better DR and adjacent channel numbers. This could impact the receiver's ability to avoid interference from nearby signals. At wider spacings, the DR was much improved—106 dB at 50 MHz.

Filters and DSP

Digital signal processing is an option in this receiver, and it's something I'd highly recommend (the IC-R75 accepts the same UT-106 DSP board as the later models of the IC-706). (ICOM is now including this as "standard equipment."—*Ed.*) The DSP board adds audio-frequency level noise reduction and auto notch. It works in all modes, and it sure helps to make things easier on the ears when noise starts to get the best of the signals. The noise reduction level is adjustable via the menu. There's also a noise blanker to minimize pulse-type noise.

As with most upper-tier receivers, the IC-R75 lets you add a filter at the second and third IFs. The IC-R75 offers quite a few choices here. We added a 500-Hz CW filter at the higher IF, which is a real plus if you're into CW. Real serious CW listeners will want a narrow CW filter at the lower IF too. ICOM offers CW filters at 250, 350 (CW/RTTY) and 500 Hz for the 9 MHz IF and 250 and 500 Hz at the 455-kHz IF. SSB filters are available at 1.9 and 2.8 kHz for the 9 MHz IF and 1.8, 2.8 and 3.3 kHz at the lower IF.

A Versatile Receiver

You can do a lot with the IC-R75, and within the performance limitations we've already outlined (and which are spelled out in detail in Table 1), the R75 provides lots of listening fun. Aside from its all-mode capabilities, the R75 gives you lots of scanning possibilities, and it's easy to set up scanning. Programmed, memory, selective memory scans all are possible. There are two band-edge memories. A nifty inclusion is the auto memory write scan that automatically puts signals it encounters during a scan into a sequestered set of channels—19 in all—for later review. There's also a priority watch that will automatically keep an ear on a selected memory channel and go to it the instant it becomes active.

I especially liked the ability to name memories, but I found the memory-naming method a bit out of the ordinary. To name a memory you input the character you want by pushing different keys on the keypad one or more times. For example, the **[2]** key inputs the numeral two and letters A, B and C, the **[3]** key the numeral 3 and the letters

D, E, and F, and so forth. The appropriate letters are marked on the keys, just like a telephone keypad except the Q and Z are on the **[0]** key. The upside of this scheme is that it takes less time to input a name than systems that force you to scroll or step through all numbers and letters till you find the one you want.

Memory names can be up to eight alphanumeric characters each. The IC-R75 lets you choose to display either the memory name or the frequency that it represents.

Listeners often find they want to record some of the signals they hear. The IC-R75 accommodates recording by making line level audio available at a rear-panel jack. There's also a **REC REMOTE** jack to turn your machine on and off.

There's a 24-hour clock built-in. For unattended listening, you can take advantage of the IC-R75's timer and remote tape recorder hookups to automatically start your recorder either when the receiver hits a signal while scanning or at the appointed hour you've set on the timer.

Computer Control

Icing on the cake is the ability to control the IC-R75 via a genuine RS-232C connector on the rear panel to permit a serial connection to a PC. In addition, as already mentioned, the **REMOTE** jack on the rear panel allows connection with another similarly equipped ICOM receiver or transceiver or of up to four ICOM receivers to a PC for command control via an optional CT-17 CI-V level converter. The *Instruction Manual* provides details on commands. Computer control software, RS R75, has just become available.

Menus

The IC-R75 menu—accessible by simply pressing the front panel **SET** button—makes available a host of user-settable items ranging from the level of the "confirmation beep" that sounds when a button has been pressed to CW pitch, backlighting level, auto tuning speed, and front-panel display backlighting.

The Last Word

The IC-R75 stands ready to extend the listening capabilities of the average ham shack. If you enjoy listening to LF and HF, you'll appreciate the IC-R75.

Manufacturer: ICOM America, 2380 116th Ave NE, Bellevue, WA 98004, 425-454-8155; fax: 425-454-1509; **http://www. icomamerica.com**. Manufacturer's suggested retail price: IC-R75, $949. Typical current street price, $800. FL-100 500 Hz CW/RTTY filter, $133; RS R75 software, $80.