

IC-91A

VHF/UHF Dual Band Handheld Transceiver

QST Product Review

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ICOM IC-91A Dual Band Handheld Transceiver

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ARRL Regulatory Information Specialist

The IC-91 comes in two flavors. The model reviewed is the IC-91A, a traditional analog dual band handheld FM transceiver with 5 W of power on transmit, a wideband receiver and a host of other features. ICOM also offers the IC-91AD, which incorporates D-STAR digital voice and data features. An IC-91A can be upgraded to a D-STAR capable 'AD version with the optional UT-121 digital unit. See the June 2005 Product Review column for more information on the D-STAR system.³

Charge it Up

Like most modern handhelds, the IC-91A uses a compact, high capacity lithium-ion battery pack. A full charge for the 7.4 V, 1300 mAh battery pack takes about 6 hours with the included BC-167A/D wall charger. If you want something quicker, try the optional BC-139 drop-in charger for a full charge in about 2.5 hours. The battery also charges whenever the radio is connected to a 10 to 16 V dc source, and ICOM offers several optional cigarette lighter adapters and dc power supply cables.

The IC-91A operates at 5 W on high power and 0.5 W on low power and incorporates several features to conserve battery life. Radio specs call for approximately 5 hours of battery life during normal analog operation on VHF and 4.5 hours on UHF. Subtract about half an

hour for the D-STAR version. Those figures are based on 10% high power transmit, 10% receive and 80% standby and will vary with actual operating habits.

The N1ND Reality Test

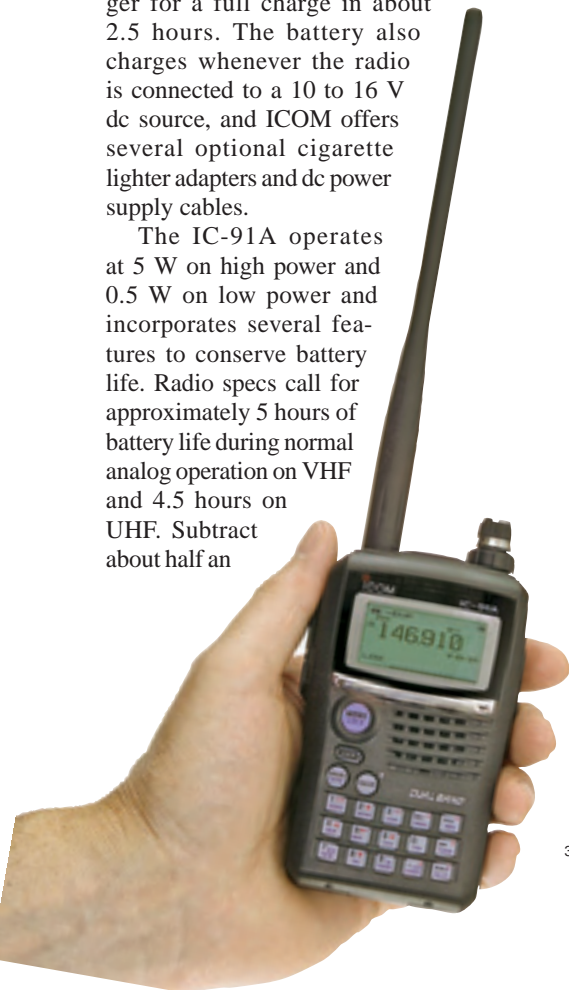
As noted in previous reviews, my very first "reality test" for a new radio is "how quickly can I get on the air with it and have some fun?" Options and features are nice, but the bottom line for any radio is the ease with which you can use it to communicate.

The IC-91A has the usual assortment of function keys that allow you to program and operate the radio. There's a dual function knob on top of the unit and PTT and squelch buttons on the left side. Even for basic operation you will want to spend some time familiarizing yourself with the most commonly used buttons and combinations.

After spending a couple of minutes reviewing the manual, I powered up the radio and set out to access a local repeater. First, I selected 144 MHz as my active VFO by pushing the MAIN button located directly beneath the PWR button until the main display showed the desired band. Then I used the larger dial on top of the radio, turning it until the desired frequency was displayed. A quick adjustment of the VOL control (a real knob that turns instead of up and down push buttons) and I was ready to give the IC-91A what my Elmer jokingly referred to as "the smoke test."

I keyed the mike, gave my call sign and waited for a reply. As you would hope, I got a quick response and enjoyed a brief chat with a friend who gave the audio good marks. After the initial operation on 2 meters, I tried 70 cm with similar results. I was pleased with the received audio of the radio. The quality of the audio was solid — very acceptable for a small speaker built into a handheld.

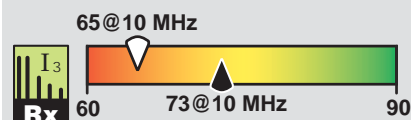
I was struck by how comfortable the IC-91A felt to operate. Some of the handhelds on the market have an almost too-delicate feel, almost like razor-thin cell phones. Others really seem bulky in my hand, similar to the handhelds of decades ago. This radio fit nicely into my hand



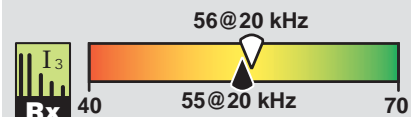
Key Measurements



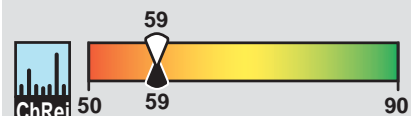
Receiver Sensitivity (12 dB SINAD, μ V)



Receiver 3rd-Order Dynamic Range (dB)



Receiver 3rd-Order Dynamic Range (dB)



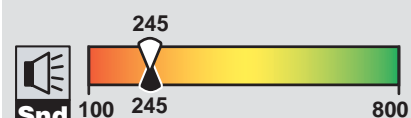
Adjacent Channel Rejection (dB)



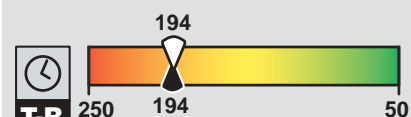
IF Rejection (dB)



Image Rejection (dB)



Audio Output (mW)



pr014 Tx-Rx Turnaround Time (ms)

Key: 70 cm
† Off Scale
2 M

Bottom Line

The ICOM IC-91A handheld transceiver packs good performance, ease of operation, wide receive coverage and optional digital voice in a convenient package.

³W. Silver, "D-STAR Digital Voice and Data — An Overview," Product Review, QST, Jun 2005, pp 67-69. This column also includes testing of the UT-118 digital voice module with an ICOM 2 meter handheld. QST Product Reviews are available on the Web at www.arri.org/members-only/prodrev/.

without an awkward feeling. With the belt clip attached, its light weight didn't leave me needing to hitch up my pants frequently.

The IC-91A passed the initial test with flying colors and it was time to move on to examining the more detailed operations of the radio.

Digging Deeper

Most modern handhelds in a particular category offer nearly identical "bells and whistles." That said, the ease of selecting and using the particular features important to the user becomes a key component in choosing the right radio.

One thing I look for is the ease with which I can navigate not only the radio, but also the instruction manual. ICOM does an excellent job of presenting the information in its 124 page manual, along with clear illustrations and good step-by-step instructions. The only addition I would make is an index. A PDF version of the manual is available for free download from www.icomamerica.com and is worth a look to understand all that this radio offers.

ICOM has included a useful and intuitive on-screen programming system for accessing the special features in the IC-91A. It takes more effort to explain the process than it does to actually select and set up the features from the MENU screen.

DTMF and tone squelch (CTCSS/DTCS), once considered an option in VHF/UHF FM transceivers, are now the norm. More and more repeaters require a tone for access to reduce interference and to allow frequency coordinators to accommodate more repeaters in an already tightly packed spectrum. The IC-91A makes programming these subaudible tones easy using the on-screen MENU function.

You needn't worry about having enough channels for memory storage, as you have some 1300 available. Memory channels can be sorted into banks for ease of use. In each memory channel, you can store everything needed to use a specific repeater — frequency, mode, duplex direction and offset, any required subaudible tones for encoding or squelch, assignment to a specific memory bank for scanning and even a memory name.

Another fairly standard feature is the

Table 2
ICOM IC-91A, serial number 2501359

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency coverage: Receive, 0.5-999 MHz (cell blocked), transmit, 144-148, 420-450 MHz.	Receive and transmit, as specified.
Modes: FM, AM (receive only), WFM (receive only), DV (with optional module).	As specified.
Power requirements: 10-16 V dc; receive, 0.34 A; transmit, 2.2 A (max, high power).	Receive (max vol, no signal), 0.23 A, 0.34 A when charging the battery; transmit, 2.0 A (13.8 V dc and batt).
Receiver	
AM sensitivity: 10 dB S/N, 0.5-5 MHz, 1.3 μ V, 5-30 MHz, 0.56 μ V, 118-137 MHz, 0.5 μ V, 222-247 MHz, 0.79 μ V, 247-330 MHz, 1.0 μ V.	Receiver Dynamic Testing 10 dB S+N/N, 1-kHz tone, 30% mod: 1 MHz, 0.42 μ V; 3.9 MHz, 0.41 μ V; 14 MHz, 0.43 μ V; 53 MHz, 0.45 μ V; 120 MHz, 0.47 μ V; 146 MHz, 0.33 μ V; 440 MHz, 0.43 μ V.
FM sensitivity: 12 dB SINAD, 1.6-30 MHz, 0.4 μ V, 30-118 MHz, 0.25 μ V, 118-174 MHz, 0.18 μ V, 174-350, 470-600 MHz, 0.32 μ V, 350-470 MHz, 0.22 μ V, 600-999 MHz, 0.56 μ V; WFM, 76-108 MHz, 1 μ V, 175-222 MHz, 1.8 μ V; 470-770 MHz, 2.5 μ V.	For 12 dB SINAD, 29 MHz, 0.16 μ V; 52 MHz, 0.18 μ V; 146 MHz, 0.12 μ V; 222 MHz, 0.19 μ V; 440 MHz, 0.14 μ V; 902 MHz, 0.23 μ V; WFM, 100 MHz, 0.85 μ V.
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: 29 MHz, 54 dB; 52 MHz, 57 dB*; 146 and 222 MHz, 55 dB; 440 MHz, 56 dB; 902 MHz, 52 dB*. 10 MHz offset: 146 MHz, 73 dB; 440 MHz, 65 dB.
FM two-tone, second-order IMD dynamic range: Not specified.	146 MHz, 67 dB.
FM adjacent-channel rejection: Not specified.	20 kHz offset: 29 MHz, 60 dB; 52 MHz, 57 dB; 146 MHz, 59 dB; 222 MHz, 61 dB; 440 MHz, 59 dB; 902 MHz, 52 dB.
Spurious response: VHF, 60 dB; UHF, 50 dB.	IF rejection, 52 MHz, 34 dB; 146 MHz, 101 dB; 440 MHz, 119 dB; 902 MHz, 100 dB. Image rejection, 52 MHz, 86 dB; 146 MHz, 95 dB; 440 MHz, 94 dB; 902 MHz, 6 dB.
Squelch sensitivity: Not specified.	At threshold, VHF, 0.35 μ V; UHF, 0.4 μ V.
Audio output: 200 mW at 10% THD into 8 Ω .	245 mW at 10% THD into 8 Ω .
Transmitter	
Power output: VHF and UHF, 5.0 W high; 0.5 W low.	Transmitter Dynamic Testing With battery pack, VHF, 5.1 / 0.6 W; UHF, 4.5 / 0.5 W; with 13.8 V dc: VHF, 5.0 / 0.5 W; UHF, 5.2 / 0.4 W.
Spurious signal and harmonic suppression: 60 dB.	VHF, 67 dB; UHF, 72 dB. Meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, VHF and UHF, 194 ms.
Receive-transmit turnaround time (tx delay): Not specified.	VHF, 123 ms; UHF, 92 ms.
Size (height, width, depth): 4.1 x 2.3 x 1.3 inches; weight, 10.6 ounces.	
*Measurement was noise limited.	
Typical retail price: IC-91A, \$369; IC-91AD, \$525, UT-121, UT-121, \$199.	



ability to transfer (“clone”) settings and memories from one radio to another. With the IC-91A this is easily accomplished using the optional OPC-474 cloning cable. ICOM’s optional RS-91 *Windows* software handles memory management and remote transceiver operation. It also provides for low-speed data communication if your radio includes the digital module.

An Amateur Band Receiver Plus...

The IC-91A receiver has two “bands.” With the “A” band you can transmit on the 2 meter and 70 cm amateur bands. Receive range is really wide. You can listen to FM on the ham bands through 902 MHz, AM shortwave broadcasts, AM and FM broadcast bands, VHF aircraft band and NOAA weather channels, plus the usual VHF/UHF services. As shown in Table 2, receiver sensitivity is good across most of the range. The “B” band is more for ham radio, with transmit coverage on 2 meters and 70 cm and receive coverage from 118 to 174 and 350 to 470 MHz. With

the DUAL WATCH function enabled, you can monitor two frequencies simultaneously (they can be on different bands).

The IC-91A makes it simple to access the 10 preprogrammed NOAA weather channels. It’s also easy to set up the radio to monitor the weather channel in the background and notify you when NOAA issues a weather alert.

Digital Capable

While the review radio did not include the optional UT-121 digital module, I did have an opportunity see and briefly use an IC-91AD with digital capability. The module allows the radio to use digital voice and data communication through D-STAR system repeaters being marketed by ICOM. Although D-STAR repeaters are growing in popularity in many parts of the country, I’m not aware of any 2 meter or 70 cm D-STAR repeater systems in central Connecticut and didn’t have an opportunity to fully explore the digital additions to the radio.

In addition to digital voice, the UT-121

adds the capability to interface with a GPS receiver so position data can be transmitted and received. It adds a digital recorder that can capture 30 seconds of receive audio. With the digital recorder, you can preprogram automatic responses for your radio, such as your call sign and information messages. You can also use the UT-121 module to do the equivalent of low-speed text messaging using the D-STAR protocols.

Thumbs Up

I found the ICOM IC-91A to be an exceptional dual band Amateur Radio handheld. It is relatively intuitive to program and use. It will meet most needs of the newcomer or experienced amateur looking for reliable local communications on 2 meters and 70 cm, and the wide receiver coverage allows you to listen to a variety of bands and services.

Manufacturer: ICOM America, 2380 116th Ave NE, Bellevue, WA 98004, tel 425-454-8155; www.icomamerica.com.

