ICOM IC-2300H
2 Meter FM Transceiver

A worthy successor to the IC-2200H, a popular high power 2 meter mobile rig.

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Workhorse was the first word that came to mind as I tested ICOM's successor to its popular IC-2200H 2 meter FM radio, which in turn was the successor to its IC-2100 model. I've owned and operated the IC-2200H for several years now. It has been my main radio for FM voice, repeater and D-STAR applications. I have had nothing but excellent performance from it after figuring out some nuances for digital operation and D-STAR. The '2300H is smaller (shorter, but the same width as the '2200H — the same mounting bracket can be used), but retains the easy, simple user interface with few frills that made the IC-2200H so popular for FM voice operation.

To make the unit smaller, something had to give, and my guess is that it was the UT-118 digital board that plugged into the IC-2200H for D-STAR digital voice and data applications, an option not available for the IC-2300H. That was a bit of a surprise to me, as the popularity of D-STAR continues to grow, at least here in northern Florida and the southeastern US in general. There are other ICOM radios available for D-STAR operation, but the IC-2200H was a relatively inexpensive way of getting into it.

Overview

A first for me as I reviewed this radio was my use of a PC cable and software from RT Systems to program the memories. I had always thought that this was a bit of a gimmick, frankly, but I dutifully installed the software and plugged in the cable (USB connector on one end, and the speaker jack connector on the other — yes, the cable plugs into the speaker jack on the back of the radio) as I tried to keep an open mind.

The instruction manual is blissfully short and sweet, and I was programming memories and scan edges in no time at all. I was pleasantly surprised at how well the memory programming process worked.

The steps are simple: load the software, type in the disk's serial number, get data from the radio, type in your memory, scan and menu preferences, and then save and send the file to the radio. Disconnect the cable and you are good to go. To be honest, I had a lot of fun programming the radio using the software and it wasn't a chore. The screen looks a little like an *Excel* spreadsheet.

While we are on the topic of memory channels, one of the many things I like about this series of radios is the memory bank option. The user can program a set of memories in one of the memory banks for one location

and another set of memory frequencies for another location. For me, that meant a set of local repeater frequencies for my home locale in Daytona Beach, Florida in one bank, and another set of repeater frequencies in another bank for my cabin retreat out by the Suwannee River, with repeater activity centered on Lake City. This is quite handy.

Otherwise, the radio is set up similarly to its predecessor. A series of seven solid-feeling (not flimsy) buttons along the bottom of the front panel, with labels on the illuminated display, select the basic functions of the radio. The primary functions are SET (Set mode), MONI (monitor repeater input frequency), LOW (output power selection), TONE selection, M/CALL (select memory, call and weather channels) and V/MHz to select VFO mode. Secondary functions include LOCK, ANM (select channel names or numbers), DUP (select duplex offset or simplex), T-SCAN (scan for CTCSS tone in use by the repeater), PRIO (priority watch) and SCAN. These are functions that I use often. Lesser used functions and selections are found within the extensive menus, a standard of the industry nowadays.

Most of the primary control functions can be found on the HM-133V remote control microphone, which is provided as a standard accessory. I just can't recommend using the mic to program your radio while driving for the same reasons you shouldn't text and drive. While the owner will develop a preference for controlling the radio from the front panel or the microphone keypad, I liked the front panel method the best.

Putting the Radio to Work

I used the IC-2300H to solicit audio reports on local repeaters and also had a friend transmit with the radio so that I could actually hear the audio myself on my handheld

Bottom Line

The IC-2300H is a small, high power mobile or fixed station workhorse of a 2 meter FM radio, perfect for first line home fixed, mobile and field operations.

transceiver. All audio reports received (both repeater duplex and simplex — after all, the repeater itself processes and affects the audio) were fine. There is plenty of received volume to overcome just about any ambient noise, rendering the radio useful in high noise situations on busy city streets. Public service communication is my primary interest, and a high level of good, clean audio is especially helpful at disaster scene incident command posts where noisy generators, helicopters and emergency vehicles are coming and going constantly.

Speaking of suitability of the radio for deployment and use at demanding public service and even disaster sites, I found the IC-2300 to be extremely rugged. ICOM states that the radio is tested to the MIL-STD 810 G specifications, and "has passed the latest specifications including shock, vibration and temperature tests." Whatever, but it seems to me to be built like a tank.

Output power levels are 65, 25, 10 and 5 W for the High, Mid, Mid-Low and Low levels, respectively. You will need a robust power supply to support the higher power outputs. The dc power cable is fine, but I would like to see all manufacturers employ the Anderson Powerpole connectors that are now the standard for applications in ARES field operations for portability and compatibility among users. Just a thought.

Tones and Scanning

Subaudible tones are programmed via the menus, and a repeater output can be scanned for the tone in use from the front panel of the radio. DTMF tones for autopatch and repeater control functions are available and can be programmed into 10 DTMF memory channels. The radio has 207 memory channels, which includes six scan edge memory channels (three pairs) and one CALL channel (the frequency most used by the operator). There are multiple ways in which memory channels can be programmed, including by personal computer with the special software and cable as described earlier.

Memory channels and the CALL channel can be programmed with an alphanumeric name, but I like to just have the repeater frequency displayed. To me, a repeater's frequency is its name.

Scan types include a full scan of the entire frequency range of the radio (136 to 174 MHz), programmed frequency ranges (up to three), and a memory scan function in which just the memories are scanned, except for the memory channels that the user

has programmed to be skipped. There are 11 scan pause options and seven timer options selectable! Wow, that seems a bit over the top!
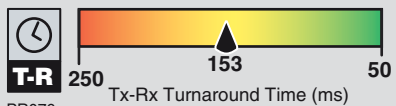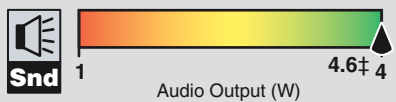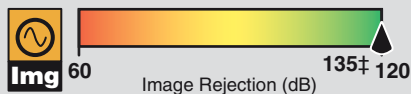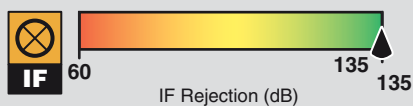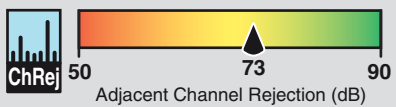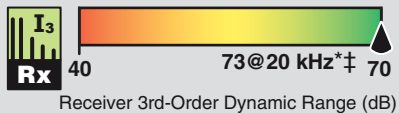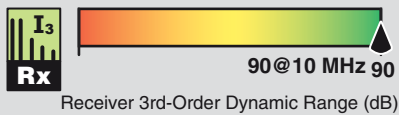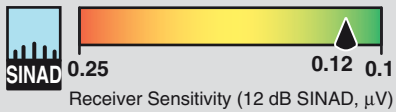
The PRIORITY WATCH function checks a static memory channel selected by the user every 5 seconds, even when a contact is in process, so that activity on that channel is brought to the almost immediate attention of the user. The function also can be programmed to scan each memory channel, including the call channel, in turn.

DTMF codes can be programmed for autopatch or for controlling other radios or repeaters. A "pocket beep" function uses

subaudible tones as a common pager to inform the user that someone has called. When a signal with the matching tone is received, beep tones sound. A tone/DTCS squelch system is handy if the user wants to talk with, or receive a specific station or stations, and the involved radios are programmed with a tone or digital code that opens the squelch of the user's radio. Conversely, the user can program the radio to close the squelch when a specific tone or code from another station is acquired — for example, if he/she is not interested in listening to the banal conversation of a particular operator.

A tone scan function (front panel selectable)

Table 1
ICOM IC-2300H, serial number 05001694

Manufacturer's Specifications	Measured in ARRL Lab
Frequency coverage: Receive: 136-174 MHz; transmit: 144-148 MHz.	As specified.
Mode: FM.	As specified.
Power requirements: Receive: 0.4 A (standby), 1.5 A (max audio); transmit: 11 A (65 W out) at 13.8 V dc ±15%.	Receive: 460 mA (max volume, lights on, no signal), 261 mA (standby, lights on). Transmit: 9.45 A (high), 5.9 A (mid), 3.92 A (mid-low), 2.81 A (low) at 13.8 V dc. Operation confirmed at 11.7 V dc (52 W output).
Receiver	**Receiver Dynamic Testing**
FM sensitivity: 12 dB SINAD, < 0.18 µV.	For 12 dB SINAD, 0.12 µV; at 146 MHz and 162 MHz.
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: 73 dB*; 10 MHz offset: 90 dB.
FM two-tone, second-order IMD dynamic range: Not specified.	83 dB.
Adjacent channel rejection: Not specified.	20 kHz offset: 73 dB.
Spurious response: Not specified.	IF rejection: >135 dB; image rejection: >135 dB.
Squelch sensitivity: <0.13 µV (threshold).	At threshold: 0.1 µV (min), 0.2 µV (max).
S meter sensitivity: Not specified.	2.98 µV for S9 indication.
Audio output: >3.5 W at 10% THD into 4 Ω.	4.6 W at 10% THD into 4 Ω. THD at 1 V RMS, 0.95%.
Transmitter	**Transmitter Dynamic Testing**
Power output: 65 W (high), 25 W (mid), 10 W (mid-low), 5 W (low) at 13.8 V dc ±15%.	65 W (high), 24 W (mid), 9.8 W (mid-low) 4.6 W (low) at 13.8 V dc.
Spurious signal and harmonic suppression: >60 dB.	>70 dB, meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, 153 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	65 ms.
Size (height, width, depth): 1.6 × 5.5 × 6.4 inches (w/o knobs). Weight: 2.4 lbs.	
Price: $260.	

*Measurement was noise limited at the value indicated.

can determine the tone frequency in use by the various repeater and other station operations employing tones. An excellent article on the evolution of tone use for repeater and other operations appeared in September 2012 *QST*.[1] Don't miss it.

Other Features

There are numerous and sundry other functions and settings associated with this radio. A transmit inhibit function prevents children in the home from accidentally transmitting when they inevitably play with Dad's or Mom's cool radio. A weather alert is included and is obviously a useful function. NOAA weather channels can be monitored, too, of course. Another nice little function (the first one the operator sees) occurs as the radio is first turned on. The output voltage of the power supply is displayed briefly — a quick check on power supply health.

Frequency range on receive is 136-

[1]S. Ford, WB8IMY, "Tone Magic," *QST*, Sep 2012, pp 33-35.

174 MHz. The SO-239 UHF ANTENNA socket is hard-mounted on the back panel, reversing a trend of a few years back that had manufacturers put the connector on the end of a short cable coming out of the back panel. That cable was prone to failure due to cutting and abrasion in vehicles or in the field.

In Summary

I was happy to review this unit, as I've owned and operated my IC-2200H with pleasure for years and was eager to learn about its successor. ICOM did another fine job, although the D-STAR and digital mode option was not included this time around. The IC-2300H is rugged, powerful and offers a handsome and simple front panel user interface for the most important functions. I was able to easily navigate the menu system for the lesser used functions and settings as well. This radio is highly recommended by this reviewer.

US distributor: ICOM America, 2380 116th Ave NE, Bellevue, WA 98004; **www.icom america.com**.
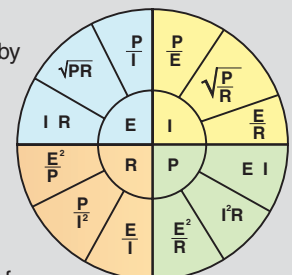
See the Digital Edition of *QST* for a video overview of the ICOM IC-2300H transceiver.

QST Tip

Ohm's Law and Power Circle

During the first semester of my *Electrical Power Technology* program, one of the first challenges issued by our dedicated instructor — Roger Crerie — to his new freshman students was to identify and develop 12 equations or formulas that could be used to determine voltage, current, resistance and power. Ohm's Law is expressed as $R = E / I$ and it provided three of these equation forms while the basic equation relating power to current and voltage ($P = I \times E$) accounted for another three. With six known equations, it was just a matter of applying mathematical substitution for his students to develop the remaining six. Together, these 12 equations compose the *circle* or *wheel* of voltage (E), current (I), resistance (R) and power (P) shown in the accompanying figure. Just as Roger's previous students had learned at the Worcester Industrial Technical Institute (Worcester, Massachusetts), our Class of '82 now held the basic electrical formulas needed to proceed in our studies or professions. As can be seen in the figure, we can determine any one of these four electrical quantities by knowing the value of any two others. — *Dana G. Reed, W1LC*

Electrical formulas.