

## Product Review

# Icom IC-V3500 FM VHF Transceiver

Reviewed by Rick Palm, K1CE  
k1ce@arrl.net

The Icom IC-V3500 is a basic but multi-featured, high-power, compact (1.6 × 5.5 × 4.6 inches), simple-to-operate FM VHF transceiver that has a large heatsink on the bottom and back panel that helps ensure stable output during high-power transmissions (see Table 1 and Figure 1). Power settings are switchable: 65, 25, 10, and 5 W. While the IC-V3500 transmits from 144 – 148 MHz, the receiver covers 136 – 174 MHz, home to a variety of other radio services — such as aeronautical, satellite, and space services, as well as the marine channels.



The radio features 207 alphanumeric memory channels, which include 200 regular channels, one call channel, and three pairs of scan edge memories (1 A/B, 2 A/B, and 3 A/B).

The Icom IC-V3500 radio is built and tested to US military specifications, MIL-STD 810G. For more information about the method and procedure, you can download the product brochure at [www.icomamerica.com/en/downloads/DownloadDocument.aspx?Document=1132](http://www.icomamerica.com/en/downloads/DownloadDocument.aspx?Document=1132).

Out of the box, the front panel features a white, easy-to-read, uncluttered LCD screen, with large characters. Radio function labels along the bottom of the screen create identifiers for the front panel function pushbuttons in low light and during nighttime operation.

AF output is about 4.5 W to a top-firing loudspeaker. The manufacturer's literature states that both the frequency response and opening slits have been improved from similar models. It also states that setup presets exist to raise, lower, or mute the radio for those who like precise audio levels.

A safety alert is an emergency call function to send beeps and hot microphone audio to others. While the emergency call function is active, the speaker will amplify messages to notify others within range.

Other features include built-in CTCSS and DTCS encoders/decoders for repeaters and simplex access;

a bank link scan function to scan all memory channels in a series of selected banks; up to 16 DTMF autodial memory channels; a priority watch function; wide/narrow channel settings, and a power supply voltage display.

Most critical functions can be conveniently changed with the keypad on the handheld microphone.

### Basic Operation

The primary function buttons for programming the various features of the radio are found along the bottom of the radio's front panel, with corresponding labels just above, on the display screen. There are six rectangular buttons and labels, plus a small round button at the seven o'clock position under the large round dial knob. The small round button is for **BANK OPT**, which is pushed to select a specific bank of memory channels and other functions, such as the emergency alert system (more on this function later). The

### Bottom Line

The Icom IC-V3500 is a basic but multi-featured, high-power (65 W), compact, simple-to-operate FM VHF transceiver. It's built to support high-power transmission, and with its high-output speaker, it's an ideal radio for public event and emergency communications.

six main buttons are positioned left to right — the first is the SET LOCK button, which is pushed to enter the SET mode, with various selectable operating parameters such as the repeater tone frequency (most repeaters seem to use the easy-to-remember sub-audible 123 Hz tone frequency to open the repeater to the user's transmission).

There are 19 selectable parameters on the SET mode list, including ones for tone squelch operation and frequency offset (which sometimes can be a non-standard offset between the transmit and receive frequencies, such as 1 MHz; usual offset is 600 kHz). Other adjustable parameters include the memory channel skip function, which is helpful during a memory scan to eliminate a usually busy, but not desired channel, for efficient monitoring. A transmit permission parameter inhibits transmission (for example, an operator with young children who may accidentally gain access to the radio cannot transmit). The weather alert parameter can be switched off or on.

There is an initial SET mode, which contains the 15 “set and forget” parameters that generally do not get changed as often as the regular SET mode functions. I like the voltage display initial SET function to be on, which allows me a quick, initial check of my battery's voltage. The BANK OPT parameter assigns one of three functions to the BANK OPT key, which is usually set to allow selection of the various programmed memory banks.

The IC-V3500 features two basic modes of operation: the VFO mode and the memory mode. Briefly push the V/MHZ SCAN button several times to select the VFO mode, and turn the dial knob to select a frequency. The frequency changes according to the selected tuning step. The 144 – 148 MHz 2-meter band allows for transmission/reception, as it is the amateur band; extended range, where transmission is inhibited, is 136 – 174 MHz, which covers, among other services, some aviation

**Table 1**

**Icom IC-V3500, serial number 65001140, FCC ID# AFJ325110**

<b>Manufacturer's Specifications</b>	<b>Measured in the ARRL Lab</b>
Frequency coverage: Receive, 136 – 174 MHz; transmit, 144 – 148.	As specified.
Modes: FM, FM-Narrow (FM-N).	As specified.
Power requirements: Transmit, 11 A at 65 W RF output; receive, 0.4 – 1.5 A at 13.8 V dc; power supply, 13.8 V dc ± 15%.	At 13.8 V dc: Receive, no signal, maximum; audio and backlights, 670 mA; lights at minimum, 650 mA. Power off, 0 mA transmit (high/mid/mid low/low): 9.6/5.9/3.8/2.8 A.
<b>Receiver</b> Sensitivity: FM 12 dB SINAD: 136 – 174 MHz, 0.18 μV.	<b>Receiver Dynamic Testing*</b> –125 dBm / 0.13 μV.
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: 72 dB;† 10 MHz offset: 83 dB.
FM two-tone, second-order IMD dynamic range: Not specified.	84 dB.
Adjacent-channel rejection: Not specified.	20 kHz offset: 72 dB.†
Squelch sensitivity: Not specified.	At threshold: 0.08 μV; at maximum: 4.1 μV.
S-meter sensitivity: Not specified.	S-9: 2.8 μV.
Audio output power: At least 3.5 W, 4.5 W typical into 4 Ω at 10% THD.	4.4 W at 10% THD; THD at 1 V <sub>RMS</sub> , 0.9%.
<b>Transmitter</b> Power output: High/medium/low power, 65/25/10/5 W. Spurious-signal and harmonic suppression: ≥60 dB.	<b>Transmitter Dynamic Testing</b> As specified.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	>68 dB. Meets FCC requirements.
Receive-transmit turnaround time (TX delay): Not specified.	Squelch on, S-9 signal: 95 ms.
Size (height, width, depth): 1.6 × 5.5 × 4.6 inches.	
Weight: 2.4 pounds (radio body, control head, and control cable).	

\*Test results shown are for standard FM mode. Sensitivity, adjacent channel rejection, and dynamic range increased by 1 dB in FM narrow mode.  
†Measurement was noise limited at the value indicated.

channels, marine channels, etc. Push the V/MHZ SCAN button several times to select the frequency step from 10 MHz to 1 MHz.

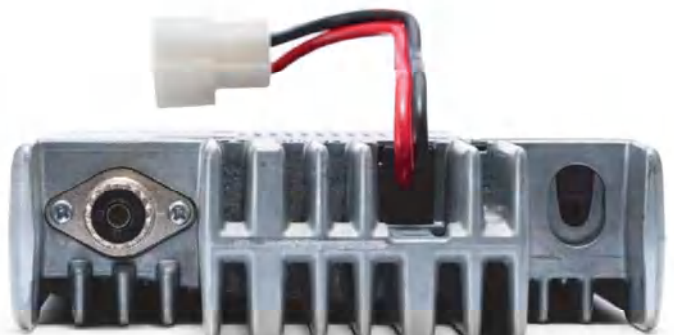


Figure 1 — The Icom IC-V3500 rear panel.

For scanning purposes, select the tuning step to match the repeater channel scheme for your area, which is usually 15 kHz. Push the SET LOCK button to enter the set mode, and push it again repeatedly until "TS" is displayed on the screen. Turn the dial knob to select the desired tuning step for scanning purposes; it should match the repeater outputs band plan for the area of operation. To reset the set mode items to their factory default values, a partial reset can be performed that also retains the memory channel contents that were set by the operator.

The call channel is set to the user's preference — for example, the local, most frequently used repeater, or the most used simplex frequency per local custom. Once programmed, simply push the M/CALL PRIO button to cycle through the programmed memory channel, and the programmed (loudest) WX channel (in the 162 MHz range), to get to the call channel. While operating on a VFO frequency, the priority watch searches for signals on a selected frequency every 5 seconds. For example, if an operator is monitoring a major local repeater for a possible ARES® activation, enabling the priority watch function will cause the radio to momentarily check for any signals on a frequency of secondary importance, programmed or selected by the operator.

To enable a monitor function to listen to weak signals or to manually open the squelch, push the MONI ANM PA button to turn it on or off. For a repeater pair, the function monitors the repeater's input frequency.

A lock function is used to prevent accidental changes in channel, frequency, or functions.

When turned on in the initial parameters set, the squelch attenuator uses the squelch knob to effect up to 20 dB of attenuation when the squelch knob is turned all the way up.

An S-meter squelch function disables the radio's audio output when the received signal is weaker than the specified S-meter squelch level. The operator rotates the squelch knob clockwise past the twelve o'clock position to turn on the function. Please note that you can download an advanced manual from the Icom website (see [www.icomjapan.com/support/manual/3572](http://www.icomjapan.com/support/manual/3572)).

## Scanning Operations

To prepare for scanning, set the scan resume option to the desired level (i.e., the number of seconds of holding on a busy channel prior to resumption of the scan).

To stop the resumption of a scan, simply key the mic briefly. For a full (all frequencies) scan, or a partial scan (programmed into the register by the user by setting the lower and upper edges of the spectrum desired), push the V/MHZ SCAN button to select the VFO mode. To scan the memory channels, push the M/CALL PRIO button to select the memory mode. For a bank scan, push the small round BANK OPT button at the seven o'clock position of the dial knob, and then rotate the dial to select the desired bank of memory channels. Finally, hold down the V/MHZ SCAN button for a second to start the scan.

## Memory Channel Usage

As mentioned previously, the radio has a total of 207 channels available for saving regularly used frequencies and repeater settings, such as the repeater's CTCSS tone, six scan edges (upper and lower limits) for three programmed scans, etc. To program the memory channel(s), push the S. MW MW button directly under the radio on/off button in the upper left corner of the radio's front panel, and then rotate the dial knob on the right side to the desired memory channel. Finally, hold down the S. MW MW button for 1 second to write the frequency and select parameters to the channel. To recall a memory channel on which to operate, simply push the M/CALL PRIO button and rotate the dial to the desired channel.

## Functions Selectable by the Microphone Keypad

If the radio comes with an HM-133V handheld microphone, many functions, including secondary functions, can be turned on or off, or adjusted, by pushing the buttons on the keypad.

An emergency call function can be used to transmit an emergency alert set of tones (the "wee woo" alert sound) in an emergency situation. When the function is turned on — three settings in the initial set of parameters must be set to enable the EMR function — an emergency signal is transmitted to let other stations on the frequency know that you require assistance, and an alarm sounds from the internal speaker. You can also receive the emergency signal from other stations. You can set a specific alert volume level between 0 and 32. Once BANK OPT is pushed, the volume level is changed to the set value.

Say you're the sole radio communicator at a remote checkpoint on a mountain rally course, and you suddenly suffer extreme chest pain and feel like you're about to pass out. If your radio is preset for the emer-

gency alert function, you can hold down the **BANK OPT** button for 3 seconds until six short countdown beeps and one long beep sound, and then the channel will change to the one preset as the emergency frequency. The “wee woo” tones will be transmitted at the volume level preset by the operator. After transmitting the signal for 10 seconds, audio from the immediate area is picked up from the microphone and automatically transmitted for 10 seconds. Even if you are lying on the floor, you can talk and explain your emergency issue.

The temporary volume function allows the operator to set a specific volume level between 0 and 32, and when the **BANK OPT** button is pushed, the audio output volume is changed to the selected volume level. Push the button again, and the original volume level is reinstated. For example, if you are working in the radio room of your county EOC, and the emergency manager comes in to give you an emergency message to send, you can simply push the **BANK OPT** key to immediately reduce the volume level of the radio so that you can listen to the manager giving you the message. Push the **BANK OPT** button again to return to the original volume setting.

### Using the IC-V3500

The radio is easy to program and use. The set modes, including the initial set mode, are straightforward and easy to program. The initial set mode (entered by turning off the radio, holding down the **SET LOCK** button, and pushing the on/off button) is for parameters of the “set and forget” type, while the regular set mode items are changed more often (for example, the repeater tone frequency for CTCSS-enabled repeater systems).

The front panel buttons (the bottom buttons match their function descriptions above, on the easy-to-read display) are mostly intuitive, and positioned for quick access and usability. On the air, received signal reports were all good.

The supplied HM-133V handheld mic has a keypad on the reverse side with pushbutton keys for most of the major functions of the radio: squelch control, scanning, priority watch, output power selection, audio volume, entry to the set mode, tone scan, and numerous others.

I had no difficulty using the customary functions, such as scanning (I easily programmed in a scan of the repeater output frequencies at 145.200 – 147.400 MHz), memory channel programming with organization by the banks (10 frequency banks are available), a priority channel that I programmed with

the marine channel 16 distress frequency (156.800 MHz), and other functions that I had never heard of before (the squelch attenuator and the S-meter squelch).

RF attenuation of up to approximately 20 dB is adjustable by the squelch knob. From the initial set mode, set the **SQL** item to **AT**, and exit the set mode. Then, turn the squelch knob clockwise past the twelve o'clock position to turn on the attenuator; continue rotating the knob for deeper attenuation, with the deepest attenuation at the end (five o'clock position). I experimented with this function and found it helpful when, for example, another nearby transceiver was transmitting on the same frequency at high power.

I also tried the S-meter squelch function, selectable from the initial set mode; it disables the radio's audio output when the received signal is weaker than the user-selected S-meter squelch level. Turn the squelch knob clockwise past the twelve o'clock position to turn it on.

The radio can be programmed with the free software (CS-V3500) available for download on the Icom website ([www.icomjapan.com/support/firmware\\_driver/3596](http://www.icomjapan.com/support/firmware_driver/3596)). Please note that the optional OPC-478UC programming cable is required.

### Conclusion

The primary assets of this radio include high power (65 W) and compactness, two parameters that work against each other thermodynamically. I held the **PTT** button down for more than 3 minutes at high power, and while the large heatsink certainly warmed up, it never felt too hot. It would, however, be a good idea to mount the radio away from heat sources and tight spaces, such as in a vehicle. The goal is to provide appropriate ventilation to the heatsink.

The radio also puts out a high level of audio from the top-firing loudspeaker.

The radio's high audio output, small size, and high RF power output would render it very useful in public event communications tents or trailers, and at disaster areas where operating space is at a premium and ambient noise levels are high. Lastly, and importantly, I enjoyed operating it. I will probably add one to my ever-increasing inventory of 2-meter FM rigs, and I've owned dozens of them over the years.

**Manufacturer:** Icom America, 12421 Willows Road NE, Kirkland, WA 98034, [www.icomamerica.com](http://www.icomamerica.com). **Price:** \$240.