

## Take It To The Field Special:

Icom's newest multimode HF / VHF / UHF QRP portable transceiver has caught the attention of low-power and portable operating enthusiasts alike (as well work-high-power-from-home hams impressed by its many features). QRP Editor KA8SMA took the radio to the field to put it through its paces.

# CQ Reviews: ICOM IC-705 HF/VHF/UHF QRP Portable Transceiver

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What do you get when you mix the Icom IC-7300 (160- to 6-meter transceiver) with the IC-9700 (VHF / UHF / 1.2-GHz transceiver) and package it for the QRP operator "on the go?" The IC-705, of course! The IC-705 (*Photo A*) is Icom's newest low-power radio and has turned the head of nearly every QRP operator in the world since its release in 2020. Its base station performance, coupled with an array of features, has even drawn the attention of some QRO operators. As a dedicated QRP operator since the early 1990s who has used a variety of QRP transceivers over the years, I was delighted when I learned Icom was sending me an IC-705 to review. After using the radio for a couple of months and taking it on several field excursions, I will cover many of this transceiver's features, discuss its performance, and of course, my likes and dislikes.

### Basic Features and Layout

The IC-705 is an all-mode portable HF, VHF, and UHF transceiver that covers 160 through 6 meters, plus 144 and 430 MHz. To say it is a complete shack in a box is an understatement as it also contains a variety of features such as GPS and Bluetooth® technology that is not seen in other QRP transceivers. The receiver covers 30 kHz through 200 MHz, and 400 to 470 MHz, which provides complete coverage of the short-wave, AM, and FM broadcast bands,

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Photo A. The IC-705 — A miniature IC-7300!

and air bands, in addition to the ham bands. The receiver uses an RF direct-sampling system that directly converts RF signals to digital data which is read by a signal processor. This technology simplifies circuit construction (fewer components and stages in the circuit) which helps reduce internal noise that masks weak signals. The transmitter is capable of 10 watts output on all bands and modes (except AM) when connected to a 13.8-volt DC supply and 5-watts output when using the supplied

BP-272 battery pack. Maximum AM output is either 2.5 watts or 1.25 watts, depending on the power source.

Those who are familiar with the IC-7300 or IC-9700 will have a short learning curve in mastering the menu structure of the IC-705 as the menus are nearly identical except for a few additions [i.e., GPS, Bluetooth®, and wireless LAN (WiFi)]. The front of the radio (*Photo A*) has a similar layout to the IC-7300 / IC-9700 and contains the same 4.3-inch color touch-screen display that



*Photo B. The right and left sides of the radio contain multiple jacks for the mic, key, external power, etc. Note rubber plugs that seal the jacks when not in use.*

is the main focal point of each of these radios. Many of the IC-705's settings and functions (i.e. band of operation, mode, filters, etc.) are displayed on and accessed by the touch screen. The screen can also be set up to show several visual aids such as SWR, S-meter, band scope / waterfall, etc. The transceiver has a total of four knobs including a Digital Passband Tuning (PBT) control that helps reject interference, a volume / RF gain / squelch control, Multi-Function control (adjusts menu values such as power output), and the main dial for changing operating frequency. Three push buttons (keys) to the left side of the touch screen control power (on/off), VOX-break-in settings, and memories / call channels. A power indicator (LED) is also present. To the right of the touch screen are keys that control receiver and transmitter incremental tuning (RIT / XIT), a transmit frequency check key (XFC) which, when pressed, monitors the transmit frequency, a memo pad key (MPD) for temporarily memorizing a frequency (such as a pileup for a DX station) that you may want to return to later, and a scan key that, when pressed, triggers the receiver to scan a pre-selected set of frequencies. On the far-right side of the front panel is a built-in speaker.

Below the touch screen is a menu activation key, a Function key that controls several settings (AGC, notch, noise blank, split operation, speech compressor, etc.), a key for displaying the Mini Scope (waterfall), a Quick key for accessing select menu settings, and an Exit key for easily exiting a menu. Although the menu structure is not difficult to learn, newcomers to the IC-705 will appreciate the Exit key until they have mastered the menus.

I could prepare an entire standalone article on just the IC-705's menu settings; however, the Basic Manual which is supplied with the radio does a good job of describing all the menu settings and the radio's bells and whistles. An Advanced Manual is available as a downloadable .pdf from Icom's website <<https://tinyurl.com/5n953bw8>>.

Like several other QRP transceivers, there are jacks / connectors on both the left and right sides of the radio (*Photo B*). On the right side are the external DC power jack (13.8-volt

DC), an ALC output jack (for a non-Icom linear amplifier), a CW key jack (3.5-millimeter stereo plug) for connecting a straight key, paddle or an external electronic keyer, and a micro-USB (Type B) port for connecting the radio to an external power source or another USB device. The left side of the radio includes a 50-ohm BNC antenna connector, the input for the supplied HM-243 speaker / microphone (3.5-millimeter speaker and 2.5-millimeter mic jacks), a ground terminal, and a slot for installing a microSD card. The microSD card is useful for saving data such as the transceiver's settings, audio for the voice transmit function, repeater listings, etc.

The underside of the radio (*Photo C*) has four screw holes and one 1/4-inch diameter screw hole to accept a variety of third-party mounts including stands, tripods, and mounting brackets. The backside of the radio (*Photo D*) is where the battery pack (BP-272) attaches. The battery pack provides 2,000 mAh of power at 7.4-volt DC and can remain attached at all times, even when an external 13.8-volt DC power source is connected. A display showing battery status is shown on the touch screen when the radio is first turned on. The icon showing battery status is located near the upper left corner of the touch screen when the radio is on. Touching the battery icon on the screen displays the voltage for both the battery pack and an external power source, if connected. Charging the battery pack is as simple as attaching a USB cable to the radio's USB port (3-hour charge time) or connecting the radio to a DC power supply with the supplied power cord (2-hour charge time).

The IC-705 weighs 2.4 pounds (with the BP-272 battery pack attached) measures 7.9 inches in length, 3.3 inches in height, and is 3.2 inches deep. Four rubber feet (cushions) that attach to the bottom of the radio prevent it from sliding when placed on a flat surface are supplied.

## General Setup for CW and SSB Operation

The IC-705 comes "ready to operate" out of the box with few, if any, adjustments that need to be made. CW settings such as keyer speed (adjustable from 6 to 48 words per minute), audio pitch, and side tone are adjusted by pressing the Multi-function knob, touching the display to choose the setting, and rotating the Multi-function knob to the desired value. Choosing semi break-in or full break-in keying is done by pressing the break-in / VOX key to the left of the touch display and selecting the mode of choice. If you select semi break-in keying and hold the key in for one second a display will appear on the touch screen to adjust the desired keying delay. Full break-in keying immediately returns to receive after keying.

Other keyer settings such as paddle polarity, key type (straight, bug, or paddle), dot / dash ratio, among others, can be made by pressing the Menu button below the touch screen, touching the keyer icon and choosing the edit icon on the right side of the screen. There are also eight programmable keyer memories that can be setup for contesting or a message of your choice.

Like CW, SSB adjustments are made by using the Multi-function knob in concert with a touch screen menu. Mic gain adjustments and speech compressor settings are simple to make. A monitor function which enables you to monitor and adjust your transmit audio to its clearest output is also available. I played a bit with this feature but found the factory default setting provided the clearest audio.

The receiver's three selectable IF filters (FIL 1, FIL 2, and FIL 3) are shown in the upper left corner of the touch screen. Touching the filter icon selects between the three settings. Touching the icon for one second allows you to reset the fil-



*Photo C. The underside of the radio contains screw holes for a tripod or other types of mounting devices. The radio does not include a fold-down stand (one of my very few gripes).*

ter's default settings (change the pass-band width) and select the IF filter shape (sharp or soft), which helps to filter out signals outside the passband and decrease noise components. The IF filter is adjustable for all modes of operation.

The PBT control is a helpful feature in rejecting interference by narrowing the IF passband width by shifting the IF frequency. Pushing the PBT control knob opens a display on the touch screen and rotating the knob adjusts the shift value. Pressing the knob for one second clears the PBT setting.

It is important to note the receiver is equipped with a preamp to improve signal-to-noise ratio and sensitivity. There are two preamp options for HF and 50 MHz. Preamp 1 (P.AMP 1) is a wide dynamic preamplifier designed for use on the lower HF bands and Preamp 2 (P.AMP 2) is a high-gain preamplifier that is most effective on the higher HF bands. There are no preamplifier choices for 144 MHz and 430 MHz other than turning it on or off. Preamplifier settings are made by pressing the Function key (beneath the touch screen) and touching the prompts on the display.

I have only scratched the surface in terms of the IC-705's bells and whistles. There is a lot to this transceiver, and one may never use all its features. Although the Basic Manual does a good job in covering all of the transceiver's basic functions, I think spending time toggling through its various menus and settings may be the best method for learning the radio. It is important to remember that the Exit key below the touch screen is your friend when exploring its menus and features. Also, I rec-

ommend downloading the Advanced Manual (218 pages) from Icom's website and printing a copy so you can make notes in margins and tab pages for future reference. The Advanced Manual provides a complete overview of the radio's functions including recording and playing back QSOs, how to input and scan memories (up to 500 channels can be stored in 100 memory channel groups), Bluetooth® operation, using the built-in RTTY decoder, and much, much more. The Advanced Manual also provides information on how to operate D-STAR, a digital communication system that supports a repeater system linked through the internet that allows contacts with other stations on this network.

### **On the Air with the IC-705**

My first outing with the IC-705 was in late January for Winter Field Day (WFD). Prior to my departure, I read in the Basic Manual that a built-in battery protection function automatically sets the transceiver's power output to 0.5 watts when the temperature is around 32° Fahrenheit. This was a bit concerning since I live in northern Michigan and was planning to operate WFD for 24 hours from a makeshift tent setup in the woods (see QRP column, April 2022 CQ, p. 61). Fortunately, I was able to keep my working temperature above freezing and had no problem maintaining a power output of 5 watts (my preferred power level).

The IC-705 was a dream on CW. To put it to the test, I took my Bencher paddle (my go-to for working CW) with me for WFD as I wanted to get a first-hand feel for operating CW. The electronic

keyer was easy to setup and the semi break-in keying was smooth. The IC-705 has a relay that switches between transmit and receive when sending CW; however, the clicks are soft and not loud. Working CW with the IC-705 was not any different than my IC-7300 with the exception I was operating from the middle of a state forest. After making several CW contacts, I switched to 40-meter SSB. Since the band was full of WFD activity, I opted to use the speech compressor for a little extra punch. Adjusting the speech compressor for an appropriate output was a snap and I scored a contact on my second call. While making contacts, I occasionally asked for audio reports and was told I sounded excellent each time. As contacts began to slow down around 0200 UTC, I called CQ and had a nice QSO with a ham who provided feedback as I played with the transmitter's filter width (wide, mid and narrow), bass, and treble settings. In the end I was told the radio's default settings sounded best.

Since I was spending the night at my WFD site, just before bedtime I tuned in a few shortwave stations which added a little clatter to the still of the woods. The internal speaker was surprisingly loud considering it is rated at just over 0.5 watts. While cooking breakfast the next morning I listened to NOAA weather for the day's forecast. The radio was approximately 25 feet from where I was cooking and I had no problem hearing the radio over the sound of a propane stove and sausage sizzling. Before getting back on HF for a few more WFD contacts, I keyed up a local repeater on 2 meters and had a quick QSO with a local ham. I put the radio through all the tests and was told it sounded great on VHF.

I have also taken the IC-705 on a few Parks on the Air (POTA) activations. During sunny days, the touch screen is clear and bright and easily read. I have learned the BP-272 battery pack will last several hours with the transmitter set at 5 watts output; however, this is dependent on several factors including duty cycle (percent time transmitting versus receiving), audio output, etc. At the end of one POTA activation the battery icon was showing a status of 2 out of 3 bars after making 58 SSB contacts in 52 minutes. This was a surprise as I drove the transceiver relatively hard for nearly an hour and expected the battery to be nearly drained.

A side-by-side comparison between the IC-705 and my IC-7300 at the home QTH identified that both receivers are neck and neck, with the IC-705 being a bit superior in detecting weaker signals.



Photo D. The rear of the radio with the BP-272 battery pack.



Photo E. Rubber bands slipped onto the IC-705 solve the slippery surface issue. See text for details.

When I connected the IC-705 to my horizontal skyloop I had no problem in working DX on 15 and 20 meters (CW and SSB).

### My Likes and Dislikes

I have a long list of likes and to list them all would be well beyond my word limit for this review. In order to save space to discuss where I believe Icom fell short of providing a truly exceptional portable field transceiver, I am only highlighting my top two likes.

My top like about the IC-705 is that it is a complete shack in a box. If I want to operate portable at a moment's notice, all I need to grab is the IC-705, mic and/or key, and my end-fed halfwave antenna. No external power supply, power cords, or an external speaker are necessary. I like simple, and nothing is easier than getting the IC-705 on the air!

Another like is the IC-705 covers HF, VHF, UHF, digital modes, etc. I live in northern Michigan and often set up portable operations in areas that have poor or no cellular phone coverage. My

destination for WFD had poor to nonexistent cellular coverage; however, this was not a concern for me since I could easily hit a local repeater or contact someone via another mode in the event of an emergency. One special feature that sets the IC-705 apart from other QRP transceivers is GPS. With a push of a button or two my exact position (latitude and longitude) is displayed on the IC-705's touch screen. If a person is in unfamiliar surroundings and becomes injured or needs help, this option alone makes the IC-705 a valuable field radio.

No review is ever complete without noting a few dislikes. The lack of a built-in fold-down stand is at the top of my list. Why Icom did not include a simple fold-down stand, like that in my IC-7300, puzzles me. A fold-down stand would complement the angled shape of the radio's bottom which provides the perfect angle for viewing the touch screen when the radio is sitting on a surface. Tripods and mounting stands can be purchased from third parties. However, this adds bulk and weight to the radio, as well as one more item to pack and

carry. During my review, I used a roll of electrical tape to raise the front of the radio since the radio does not support itself on its angled bottom.

On more than one occasion, the IC-705 nearly slipped from my hands when I picked it up. I attribute this to its smooth plastic case. A strip of rubber along the top and sides of the radio would help provide a grippable surface for picking up and handling the radio. I solved this problem using two half-inch wide industrial grade rubber bands that I placed around the radio (*Photo E*). If you choose this hack and don't like the look of the bands, a black Sharpie® marker would quickly color them black and make a more appealing match to the radio.

Although the radio is designed for portable use, each time I take the radio into the field I am concerned the touch screen may get scratched or cracked. A cover or face plate that attaches to the front of the radio would have been a nice feature to help protect the screen. To lessen my worries, I use a large mail pouch lined with bubble wrap and place the radio inside the pouch before placing it in a backpack or carrying bag for transport.

My last dislike about the IC-705 is that the supplied speaker/mic is too small and difficult to hold. On numerous occasions I have inadvertently released the PTT while transmitting because the speaker / mic is difficult to grasp and hold in your hand. A larger speaker / mic would solve this problem.

Not a like or dislike for me, but something worth mentioning is that the IC-705 does not have an internal antenna tuner. I typically deploy tuned antennas or use an external tuner, so the lack of an internal antenna tuner is not a concern for me, but may be for some. Considering the cost of this transceiver, I am surprised Icom did not include one.

### Final Thoughts

Icom has done a fabulous job in creating a radio that offers the feel and functions of a base station in the form of a compact, portable transceiver. For me, working portable with the IC-705 is like taking my IC-7300 in the field, but with less bulk. For the QRPer, this could be your one and only transceiver as it does it all! For the non-QRPer, this transceiver can be used in concert with an amplifier to give that extra boost of power, if desired. Packed with versatility, the IC-705 should be near the top of every ham's list who is looking for big performance in a small package. At the time of this review the IC-705 sells for around \$1,350 (U.S. dollars).