

Product Review Column from QST Magazine

May 1999

Kenwood TS-570S(G) HF/6-Meter Transceiver

Yaesu VX-5R Tri-band H-T

ICOM IC-Q7A Dual-band H-T

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The Kenwood TS-570S(G) HF/6-Meter Transceiver

Reviewed by Joe Bottiglieri, AA1GW
Assistant Technical Editor

An evaluation of the Kenwood TS-570D HF transceiver appeared in a *QST* product review in January 1997. Since that time some additional refinements have been made to this series. Shortly after that issue of *QST* hit the streets, Kenwood released a second version—the TS-570S. The 'S' version of the radio was nearly identical to the 'D'—the only difference being the addition of all-mode capabilities on the 6-meter band.

Just a few months ago, Kenwood announced a second generation of this already popular transceiver series. These new units are now designated "G" versions. Two separate models are still available—the TS-570D(G) for the HF bands, and the TS-570S(G) covering both HF and 6 meters.

This time around we'll be concentrating primarily on the changes made in the G versions, and presenting lab measurement data and some operational details on the 6-meter capabilities of the TS-570S(G). The HF performance specifications of the new units remain virtually unchanged from those of the previous review's TS-570D. The lab data presented in Table 1 for all bands other than the 6-meter band is data taken directly from that review (spot checks of our new unit confirmed very similar HF performance).

If you're considering purchasing any radio in this series you'll definitely want to have a look at the earlier review. Members can view that article (or reviews on any equipment that we've covered in the *QST* product review column since January 1980 for that matter) and an Expanded Test Result Report free of charge on our Member's Only Web site.

Non-members, or members without Internet access, can order paper copies for a nominal fee through the ARRL Technical Information Service (860-594-0278 or reprints@arrl.org). Members receive a discount on these reprints. Additional lab test data on 6-meter band performance and the enhanced DSP capability of our product review '570S(G) is available as an Expanded Test Result Report.

Those who purchased the initial versions of these radios will be pleased to hear that the new capabilities offered in the G versions can be retrofitted to the earlier units by Kenwood's service facilities (currently \$125 plus shipping). 6 meters, however, can not be added to either the D or D(G) models.

6-Meter Capabilities

The TS-570S(G) provides 100 W all-



mode band coverage (25 W AM) from 160 through 6 meters and an extended general coverage receive range of 0.5 to 60 MHz. The built-in antenna tuner also works on 6 meters, and comes in very handy for matching a single 6-meter antenna across the relatively wide 4 MHz range between 50 and 54 MHz. The tuner is also effective for employing a number of antennas intended primarily for HF, such as 40 and 80-meter dipoles for example, on 6 as well.

Outputs are provided for two separate coax feedlines. Either can be assigned to any combination of bands—making it convenient to connect different antennas for HF and 6 meters.

For FM repeater operations, all versions of the '570 include CTCSS encode and decode built-in. Many of the repeaters on both 6 and 10 meters use CTCSS to control the interference between repeaters that commonly occurs when these bands are open. Operating frequencies for repeater inputs and outputs are entered independently using the same arrangement used for split VFO operation on the HF bands (not by setting offset and duplex as is common with the hand-helds and mobiles). CTCSS settings and repeater frequency pairs can be stored in any of the unit's memories. Independent CTCSS tones for transmit and receive on a single frequency or repeater pair, however, are not available.

As we mentioned in the earlier review, these transceivers have built-in features that

make them well suited for use as an IF with external VHF and UHF transverters. These include a display arrangement that corrects the frequency readout to indicate the resulting operating frequency for 6 and 2 meters and 70 cm, and a system that automatically reduces the transmitter power output to a more manageable 5 W.

Couple this with the 'S' version's 100 W all-mode 6-meter output and the radio's built-in digital signal processing, CW memory keyer (an optional voice recorder is also available) and compact size—and this unit could serve nicely as the backbone for a roving or hilltopping station for VHF/UHF contesters.

What's New?

I happened to have access to an early production unmodified TS-570S. This gave me the unique opportunity to set up the new G version side by side with a first generation unit.

The G version includes a handful of new abilities and improvements on some of the original features. One of the more notable changes is an enhancement of the NR1 DSP noise reduction feature, used primarily on SSB. In the earlier model, the SSB noise reduction works well, but imparts the typical watery audio quality common in most of the current DSP implementations. In the new G version, a menu item has been added that allows you to vary the amount of noise reduction employed. While on the earlier radio I often found myself leaving NR1 off except under extreme conditions, with this new flexibility I can strike a balance between the amount of noise reduction and the resulting reduction in the overall audio clarity. There's also an "auto" setting that varies the level of noise reduction based on the signal strength.

Bottom Line

The new G versions of the popular TS-570D and TS-570S add significant new features to these already nicely-equipped mid-priced transceivers.

Table 1**Kenwood TS-570S(G), serial number 00600059**

Unless otherwise noted, HF specifications and measurements were taken from an earlier review of a TS-570D, serial number 80600403 (see text).

Manufacturer's Claimed Specifications

Frequency coverage: Receive, 500 kHz–30 MHz; transmit, 1.8-2; 3.5-4; 7-7.3; 10.1-10.15; 14-14.35; 18.068-18.168; 21-21.45; 24.89-24.99; 28-29.7 MHz. TS-570S(G) adds 30–60 MHz on receive and 50–54 MHz on transmit.

Modes of operation: USB, LSB, CW, AM, FM, FSK.

Power requirement: Receive, 2 A (no signal); transmit, 20.5 A, at 13.8 V.

Size (HWD): 3.8×10.6×10.6 inches; weight, ≈15 lb.

Receiver

SSB/CW/FSK sensitivity (bandwidth not specified, 10 dB [S+N]/N): 0.5-1.7 MHz, 4 μV; 1.7-24.5 MHz, 0.2 μV; 24.5-30 MHz, 0.13 μV; TS-570S(G) only, 50-54 MHz, 0.13 μV.

AM sensitivity (bandwidth not specified, 10 dB [S+N]/N):

0.5-1.7 MHz, 31.6 μV; 1.7-24.5 MHz, 2 μV; 24.5-30 MHz, 1.3 μV; TS-570S(G), 50-54 MHz, 1.3 μV.

FM sensitivity: For 12-dB SINAD, 28-30 MHz, 0.25 μV; TS-570S(G), 50-54 MHz, 0.25 μV

Blocking dynamic range: Not specified.

Two-tone, third-order IMD dynamic range: Not specified.

Third-order input intercept point: Not specified.

Second-order intercept point: Not specified.

FM adjacent channel rejection: Not specified.

Measured in the ARRL Lab

Receive, 0.3–30 MHz (0.3-60 MHz for TS-570S(G)); transmit, as specified.

As specified.

Receive, 0.8 A (max volume, no signal);

transmit, 18 A (max), tested at 13.8 V.

Receiver Dynamic Testing

Minimum discernible signal (500-Hz filter):

	<i>Preamp off</i>	<i>Preamp on</i>
1.0 MHz	−113 dBm	−121 dBm
3.5 MHz	−132 dBm	−140 dBm
14 MHz	−130 dBm	−139 dBm
50 MHz	−128 dBm	−141 dBm

10 dB (S+N)/N, signal 30% modulated with a 1-kHz tone:

	<i>Preamp off</i>	<i>Preamp on</i>
1.0 MHz	8.4 μV	3.3 μV
3.8 MHz	1.05 μV	0.4 μV
53 MHz	1.43 μV	0.38 μV

For 12-dB SINAD: preamp off, 29 MHz, 0.6 μV; 52 MHz, 0.79 μV; preamp on, 29 MHz, 0.15 μV; 52 MHz, 0.19 μV.

Blocking dynamic range (500-Hz IF filter):

	<i>Preamp off</i>	<i>Preamp on</i>
1.0 MHz	114 dB*	115 dB
3.5 MHz	114 dB*	119 dB*
14 MHz	115 dB*	115 dB*
50 MHz	108 dB*	106 dB*

Two-tone, third-order IMD dynamic range (500-Hz IF filter):

	<i>Preamp off</i>	<i>Preamp on</i>
1.0 MHz	86 dB	91 dB
3.5 MHz	99 dB	99 dB
14 MHz	98 dB*	97 dB*
50 MHz	98 dB*	88 dB

	<i>Preamp off</i>	<i>Preamp on</i>
1.0 MHz	+19.5 dBm	+19.5 dBm
3.5 MHz	+17 dBm	+9.4 dBm
14 MHz	+21.7 dBm	+9.6 dBm
50 MHz	+21.0 dBm	−9.5 dBm

14 MHz, preamp off, +60 dBm; preamp on, +59 dBm.

Preamp on, 29 MHz, 68 dB; 52 MHz, 66 dB

The manual settings worked best for me.

All versions include a menu item that allows you to tailor the transmit audio characteristics. Settings include flat (or “off”), high boost, formant pass, bass boost and “conventional.” A separate variable speech processor is also included. These are nice capabilities—the only problem is that with the earlier '570s, you can't listen to the resulting audio without a second receiver!

The G version now includes a transmit audio monitor. You can switch this on and vary the monitor audio output level through a menu setting. A sample of your transmit audio can now be monitored through the speaker or by using headphones. This feature is also very convenient for evaluating the performance of accessory microphones.

Curiously, the transmit audio equalizer menu item on the G now also includes a setting titled “U.” The manual refers to this setting only as “Not *currently* available.” Hmm...

Another nice addition in the G is a receive audio equalizer. This allows you to perform the same types of audio shaping on received audio. Anyone who has spent extended periods of time operating, during contests for

example, will appreciate the ability to vary the audio tone of the receiver occasionally. This can go a long way toward reducing fatigue as the hours roll on! This menu item also includes the mysterious “U” setting.

Just for the CW Operators

The G models have also added some new features particularly of interest to CW operators.

There's a new setting that allows you to manually adjust the CW weighting. The earlier versions have auto weighting—the ratio automatically tracks the keying speed. With auto weighting disabled, the previous models would default to 3.0:1. The new versions allow you to use the auto weighting *or* to manually adjust the weighting to your own preferences—16 ratios between 2.5:1 and 4.0:1 are available.

One of the most innovative features included in all the '570s is “CW Zero-Beat.” Tune close to a CW signal, press the **CW TUNE** button, and the radio automatically tunes to and zero-beats the signal. The system works very well with all but the weakest signals or busiest band conditions.

In the G versions, the **CW TUNE** button can also be used to automatically set an RIT offset. A menu setting can unlock the transmit and receive frequencies of the “Auto Zero-Beat” system, allowing you to retune to CW signals without changing your transmit frequency, a very handy capability for net or roundtable operations.

All '570s use DSP to provide a wide range of CW filter bandwidths (optional conventional CW filters for 500 or 270 Hz are also available). The new units have even improved on this slightly. The originals included DSP-based bandwidths of 50, 100, 200, 300, 400 and 600 Hz and 1.0 and 2.0 kHz. The G versions add some welcome additional bandwidths of 80, 150 and 500 Hz.

Computer Controllability

As we mentioned in the earlier review, the 570 series radios include a built-in level converter for easy connection to your computer. Since that time, Kenwood has made available a very impressive *Windows*-based software package. You can download this free from Kenwood's Web site: <http://www.kenwood.net>. Download the software,

Manufacturer's Claimed Specifications

FM two-tone, third-order IMD dynamic range: Not specified

Noise reduction: Not specified.

Beat cancel attenuation: Not specified.

S-meter sensitivity: Not specified.

Squelch sensitivity: SSB, CW, FSK, AM, 0.5-1.7 MHz, 20 μ V or less; 1.7-30 MHz, 2 μ V or less; FM, 28-30, 50-54 MHz, 0.25 μ V or less.

Receiver audio output: 1.5 W at 10% THD into 8 Ω .

IF/audio response: Not specified.

IF rejection: 70 dB.

Image rejection: 70 dB.

Transmitter

Power output: SSB, CW, FM, FSK, 5-100 W; AM, 5-25 W.

Spurious-signal and harmonic suppression: 50 dB.

SSB carrier suppression: 40 dB or greater.

Undesired sideband suppression: 40 dB or greater.

Third-order intermodulation distortion (IMD) products:

CW keyer speed range: Not specified.

Transmit-receive turnaround time (PTT release to 50% audio output): Not specified.

Receive-transmit turnaround time ("tx delay"): Not specified.

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.

install a common computer interconnect cable between the male DB-9 connector on the back of the transceiver and the COM port on your computer, load the software and you're ready to go—no additional interface hardware is required.

The software displays a virtual representation of the front panel (see Figure 2). While under computer control, you can use either the actual front panel switches and knobs or the mouse and virtual front panel to operate nearly any control on the radio—even the rotary controls such as the volume, squelch and DSP slope settings for example.

The presently available version of the software was designed for the earlier radios. It does not yet include the program modifications necessary to operate the expanded features in the G versions.

The Future?

The improvements made in the new G versions of the TS-570s are subtle but significant—those who purchased the earlier radios will certainly want to consider sending them in for updating.

Kenwood's willingness and ability to

Measured in the ARRL Lab

Preamp on, 20 kHz spacing, 29 MHz, 67 dB; 52 MHz, 62 dB; 10 MHz spacing, 52 MHz, 96 dB.

NR1, \approx 10 dB; NR2, \approx 20 dB (at default 20 ms setting). 50 dB or greater notch.

S9 signal at 14 MHz: preamp off, 94 μ V; preamp on, 25 μ V. 52 MHz: preamp off, 90 μ V; preamp on, 12 μ V.

FM, at threshold, 29 MHz, 0.04 μ V; 52 MHz, 0.04 μ V; SSB, at threshold, 14 MHz, preamp on, 0.4 μ V.

2.1 W at 3.7% THD into 8 Ω .

Range at -6 dB points, (bandwidth):

CW (500-Hz IF/600-Hz DSP): 258-769 Hz (511 Hz)

CW (500-Hz IF/100-Hz DSP): 443-557 Hz (114 Hz)

CW (500-Hz IF/50-Hz DSP): 470-530 Hz (60 Hz)

USB wide: 286-2433 Hz (2147 Hz)

USB narrow (DSP controls at 12 o'clock): 404-1633 Hz (1229 Hz)

LSB wide: 287-2428 Hz (2141 Hz)

LSB narrow (DSP controls at 12 o'clock): 404-1626 Hz (1222 Hz)

AM wide: 115-2670 Hz (2555 Hz)

AM narrow: 113-1270 Hz (1157 Hz)

115 dB.

109 dB.

Transmitter Dynamic Testing

SSB, 5-115 W; CW, 5-108 W (varies slightly from band to band); AM, 5-23 W; FM, 5-109 W.

As specified. Meets FCC requirements for spectral purity.

As specified.

As specified.

See Figure 1.

Approximately 10-75 wpm.

S9 signal, 50 ms.

SSB, 18 ms; FM, 14 ms.

Expanded Product Review Report Available

The ARRL Laboratory offers a detailed test result report on the Kenwood TS-570S(G) that gives in-depth, technical data on the transceiver's performance. Request the TS-570S(G) Test Result Report from the ARRL Technical Department, 860-594-0278; e-mail mlevesque@arrl.org. Members can see this on-line on our Member's Only Web site.

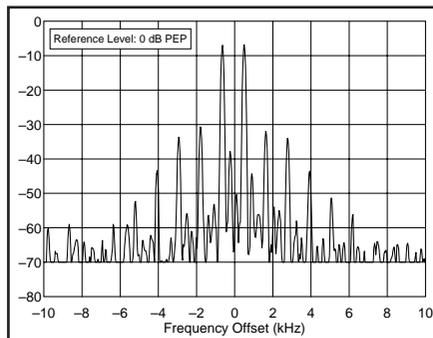


Figure 1—Spectral display of the TS-570S(G) transmitter during two-tone intermodulation distortion (IMD) testing on 6 meters. The worst-case third-order product is approximately 32 dB below PEP output, and the worst-case fifth-order product is approximately 35 dB down. The transceiver was being operated at 100 W output at 50.2 MHz.

install these added capabilities into the earlier existing TS-570D and S models is certainly noteworthy. These changes do not reflect corrections of significant operational defects in the original units—they are simply improvements that further refine an already well-designed product. Will the time come when the processors or internal control and applications software included in most amateur transceivers

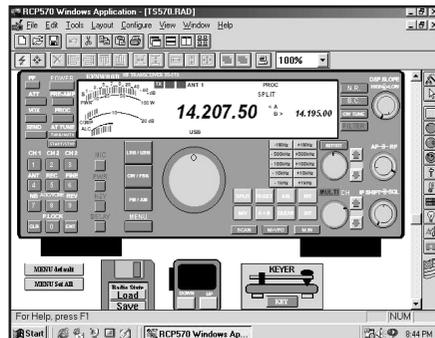


Figure 2—The Kenwood RCP570 control software displays a virtual front panel nearly identical to that of the actual transceiver. Extensive documentation in the owner's manual and the software package should be very helpful to those interested in developing their own control software.

become user updateable?—Perhaps.

Modern electronics and computer-based products continue to evolve rapidly. What a great time to be a Ham!

Manufacturer: Kenwood Communications Corp, 2201 E Dominguez St, Long Beach, CA 90801; tel 310-639-5300, fax 310-537-8235; <http://www.kenwood.net>. Manufacturer's suggested retail price, \$2070. Typical current street price, \$1400.

The Yaesu VX-5R Tri-band H-T

Reviewed by Jay Mabey, NU0X
Assistant Contest Manager

Its small size and rugged construction struck me the minute I unpacked this little radio. Leafing through the documentation revealed an impressive range of features. The VX-5R is a tri-band transceiver covering 6 meters, 2 meters and 70 cm. In addition, it receives AM broadcast, AM shortwave broadcast (up to 16 MHz), FM broadcast, AM aircraft, a couple of additional ham bands, public service and television audio. This translates to 0.5 to 16 MHz, 48 to 729 MHz and 800 to 999 MHz (cellular blocked, of course).

The VX-5R's 220 regular memories, 3 home channels, 10 sets of band-edge memories and five 24-channel memory groups allow plenty of memory storage and provide a very good measure of scanning flexibility. All this is squeezed into a chassis that could hide behind a deck of playing cards.

While several very small H-Ts—some including expanded receive capability—have hit the market in the last couple of years, these typically sacrifice the convenience of a full DTMF pad and have reduced output power levels. With the VX-5R, Yaesu splits the size gap between the subcompacts and the typical compact dual-banders—and tosses in full power output, a DTMF pad and 6-meters to boot!

Packing all this (and lots more) into a transceiver this size, of course, comes at a price. The hefty 72-page well-written manual is a "must read." The 20 buttons and the rotary encoder knob are the epitome of multitasking. Nearly every key has several duties, and the encoder dial is used to vary a wide variety of settings.

The cabinet construction is diecast aluminum. Here's a little radio that could potentially do more damage to an object it was dropped on than to the unit itself. I definitely would not want to fumble it onto an exposed toe! This transceiver is ready to rough it on the trail, pull active public service duty or discreetly hitch along on a trip to the local mall.

Though the keypad buttons are understandably small, their shape and spacing makes radio operation and programming reasonably easy. Even with the full keypad, this unit still uses a huge menu—45 selections in all—to control most features and settings. Each menu item is alphanumerically titled with up to 15 characters for easy identification.

The unit uses a dot-matrix LCD display. Active features are indicated by 12 icons in a single row along the bottom edge of the window. Display characters can be set to "large" (for us aging baby-boomers) or "small." In the small mode you can display VFO A and B frequencies simultaneously. You can customize the display with an extensive selection of icons. Alphanumeric memory naming, up to 8 characters in length, is also available, and tagged memories show fre-



quency, memory channel number and name simultaneously.

The keypad and display panel is backlit in "red"—very cool—and easy on night vision, too. One problem I encountered during nighttime use, especially as I was becoming more familiar with the various programming sequences, was that in the default mode the backlighting only remains on for 5 seconds after you press any key or turn the encoder. Fumble-fingered Jay had some trouble pushing the key sequences rapidly enough to complete the necessary steps in time! This was remedied by changing a menu selection that allowed me to toggle the backlighting on or off with each press of the lamp button. A third option lets you activate the lighting for 5 seconds only when the lamp button is pressed (conserving battery power).

The VX-5R has several features intended to extend battery life. These include commonly employed methods such as four power output settings (with a setting as low as 0.3 W), a receive battery saver, a transmit time-out timer and automatic power-off. Some of the more innovative arrangements include a menu setting to turn off the top mounted red/green transmit/receive LED and a transmit battery saver which will automatically reduce the power output of the transceiver if the signal last received was very strong. There is also an automatic power-on feature that can turn the unit on after a programmed time interval (up to 24 hours). You can activate a display that indicates the total receive and transmit time since the transceiver was last turned on. Battery voltage can

Bottom Line

With the VX-5R, Yaesu has managed to pack three bands, full power and extremely expanded receive coverage into a compact package that's rugged enough to meet the challenges of your active lifestyle.

be directly displayed, and a two-stage low battery icon comes up when the battery is nearly depleted. The manual includes a table outlining approximate operating times with the Lithium-Ion or optional FBA-23 alkaline cell pack—averaging about 6½ hours. These estimates are based on a duty cycle of 6 seconds transmitting, 6 seconds receiving and 48 seconds in squelched standby.

On the trail the VX-5R can literally be a life saving device. The unit comes with a built-in thermometer and you can add an optional altimeter/barometer sensor. For hiking in the mountains, this radio would allow you to monitor your favorite SW, NOAA weather radio (10 preprogrammed channels) and broadcast AM, FM and TV frequencies (*search continues for local man lost in state park—film at 11!*). In addition, you could communicate using simplex or through repeaters—and personally keep track of changing terrain and local weather conditions. One limitation—the indicated temperature (in Celsius only) is a read-out of the internal case temperature of the VX-5R. You would probably want to leave the unit off and exposed for a while for a meaningful reading of atmospheric temperature.

I didn't use it in the White Mountains, but I did take it along on a day hike near a local reservoir and found it a useful accessory—kind of the electronic equivalent of a Swiss army knife. Alas, the product review VX-5R did not include the barometer/altimeter (SU-1) option. It would have been fun to take along a topographic chart and see if the altimeter feature would be useful for helping determine location. If Yaesu could add a flashlight, a compass and a flint to this thing I could rid myself of my daypack!

I used the VX-5R from home, while hiking and mobile. For mobile operations I picked up an SMA to BNC adapter (available as a Yaesu option or from various connector suppliers) and used my VHF/UHF mobile antenna. On 6 meters I was limited to using the supplied antenna. In all cases the radio received fine reports with no transmit audio distortion indicated no matter how close I spoke to the built-in microphone. Audio output is surprising loud for a unit this size and the receiver's sound quality is decent through most of the range of the volume control.

With the ability to crank out high power and its generously sized antenna the VX-5R never failed to turn in good signal reports. As might be expected, extended transmissions on high power do result in some considerable hand warming. The Lithium-Ion battery supplies very adequate operating time between charges. A rapid charger is included, and you can also charge the batteries or operate the radio using an optional car cord. A battery case for alkaline batteries is available as an accessory—certainly a useful alternative to the rechargeable battery if you intend to take this guy for an extended trip on the trails.

The incredible expanded receive coverage offers plenty of entertainment potential. AM broadcast receive is definitely limited by the compromise antenna, but was adequate for listening to several local stations.

Table 2

Yaesu VX-5R, serial number 8L010699

Manufacturer's Specifications

Frequency Coverage: Receive, 0.5-16.0 (AM), 48-59 MHz, 59-108 MHz (WFM), 108-137 MHz (AM), 137-174, 174-222 (WFM), 222-420 MHz,¹ 420-470 MHz, 470-729 (WFM), 800-999 MHz (cell blocked); transmit, 50-54, 144-148, 430-450 MHz.

Power requirements: 10.0-16.0 V dc;² receive, 0.15 A; transmit, 1.9 A (max, high power).

Size (HWD): 3.5x2.3x1.1 inches; weight, 9.0 ounces.

Receiver

Sensitivity: AM, 10 dB S/N, 0.5-16 MHz, 0.5 μ V; WFM, 12 dB SINAD, 76-108, 174-222, 470-729 MHz, 0.9 μ V; NFM, 12 dB SINAD, 50-54, 144-148 MHz, 0.16 μ V; 430-450 MHz, 0.18 μ V.

Two-tone, third-order IMD dynamic range: Not specified.

Adjacent-channel rejection: Not specified.

Spurious response: Not specified.

Squelch sensitivity: Not specified.

Audio output: 400 mW at 10% THD into 8 Ω .

Transmitter

Power Output: VHF, 5.0 W; UHF, 4.5 W; medium, low unspecified.

Spurious signal and harmonic suppression: 60 dB.

Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.

Receive-transmit turnaround time ("tx delay"): Not specified.

*Measurement was noise limited at the value indicated.

¹Action Band 1"—mode varies with frequency range within this segment.

²External dc. Battery is 7.2 V.

³Sensitivity (both AM and FM) is generally good across all ranges. Figures reported here are worst case.

⁴For 52 MHz. IF rejection on 146 and 440 MHz was 79 and 75 dB, respectively.

⁵For 440 MHz. Image rejection on 52 and 146 MHz was 147 and 54 dB, respectively.

Measured in ARRL Lab

Receive and transmit, as specified.

Receive, 0.48 A (max volume, no signal); transmit, 1.5 A, tested at 13.8 V.

Receiver Dynamic Testing

AM, 10 dB S+N/N, 0.5-16 MHz, 2.1 μ V; WFM, 12 dB SINAD, 4.1 μ V; NFM, 12 dB SINAD, VHF, 0.15 μ V; UHF, 0.17 μ V.³

20 kHz offset from 52 MHz, 55 dB, 10 MHz offset from 52 MHz, 82 dB.

20 kHz offset from 146 MHz, 61 dB, 10 MHz offset from 146 MHz, 66 dB.

20 kHz offset from 440 MHz, 58 dB*, 10 MHz offset from 440 MHz, 65 dB.

20 kHz offset from 52 MHz, 66 dB. 20 kHz offset from 146 MHz, 65 dB.

20 kHz offset from 440 MHz, 58 dB.

IF rejection, 21 dB;⁴ image rejection, 52 dB.⁵

At threshold, VHF, 0.10 μ V; UHF, 0.11 μ V.

661 mW at 10% THD into 8 Ω .

Transmitter Dynamic Testing

52 MHz, 5.3 / 2.3 / 0.88 W; 146 MHz, 4.4 / 2.1 / 0.9 W; 440 MHz, 4.3 / 1.9 / 0.74 W.

VHF, 66 dB; UHF, 65 dB. Meets FCC requirements for spectral purity.

Squelch on, S9 signal, VHF and UHF, 80 ms.

VHF, 15 ms; UHF, 3 ms.

Expanded Product Review Report Available

The ARRL Laboratory offers a detailed test result report on the Yaesu VX-5R that gives in-depth, technical data on the transceiver's performance. Request the *VX-5R Test Result Report* from the ARRL Technical Department, 860-594-0278; e-mail mlevesque@arrrl.org. Members can see this on-line on our Member's Only Web site.

Shortwave reception—especially in the evening—was great fun! The included antenna is good for listening to the major broadcasters—49 meters yielded a particularly wide selection. WWV broadcasts on 5, 10 and 15 MHz were typically readable—depending on propagation, of course. I added a few feet of wire, attaching it between sections of the antenna that thread together (more on this later). This increased signal strengths considerably and added even more new stations to explore. I couldn't help but tune through the HF ham bands, and soon found myself wishing for SSB and CW reception capabilities and considerably smaller tuning steps.

FM broadcast receive works well. Reception is about equal to the FM radio in my "Walkman." AM aircraft receive seems good, but I was close to the airport when I ran this check. Tuning around and listening to television audio, public service, commercial and ham communications kept me pleasantly occupied for hours!

The VX-5R is equipped with an automatic range transponder system. This allows like-equipped radios to "poll" one another—keeping track of (and alerting the user) when the radios move out of range of each other. This could be a useful feature for hunting and hiking trips or search and rescue operations. You can program a CW ID function that will

identify these automatic transmissions with your call sign at 10-minute intervals. (Had to bring up good ol' FCC Part 97 somewhere...)

The transceiver can automatically set the repeater offsets for the 2-meter and 70-cm bands—very handy if your region maintains "standard" offsets. Odd splits and crossband splits can be entered and memorized. CTCSS and digital coded squelch (DCS) encode and decode is built in. Provisions for using independent tones or codes for transmit and receive on a single frequency or duplex pair are not included. Tone and code scan, for determining the CTCSS or DCS setting on a received signal, is available.

Some of the very early production VX-5Rs, including our product review unit, have a problem with the tone decode feature. While it works fine in most applications, if you are scanning through memories that include CTCSS tone squelch information, the scan fails to detect any activity on those frequencies. Yaesu is aware of the problem and will repair these units under the terms of their warranty. VX-5Rs presently shipped to stocking dealers are free of this defect.

The '5R also has a built in spectrum analyzer. It can display relative signal strength on five frequency steps above and five below the selected VFO frequency. You can set it up to make a single sweep and stop, or to scan continuously. In continuous mode, you can

use the encoder knob to move the center frequency of the sweep up or down the band. Receive audio is muted when the unit is sweeping. Center the display on a signal peak, touch the PTT, and the sweep will stop. You'll be ready to operate on the active frequency.

Yaesu's "Smart Search" feature is also included. Activate this one and the radio will sweep the selected band above and below your center frequency and automatically program up to 31 active frequencies in memories set aside specifically for this purpose. This could be very useful for hams visiting a new area, or for scanner buffs "mining" a band in search of undiscovered activity.

In the area of construction I can offer but two complaints. The first was the plastic belt clip. It doesn't seem nearly sturdy enough to do justice to the overall rugged design of the VX-5R. While I didn't encounter any instances where the radio actually slipped off my belt, for my active lifestyle I would prefer a considerably beefier arrangement—something with gripping teeth and a bear-trap grade spring. The last thing I want to do is look down at my side and find the radio missing! (Especially one this small.)

My second gripe is the antenna. To use the VX-5R on all of its bands you must "adjust" the flexible rubber covered antenna. For 6-meter operation and to improve reception

on the lower frequencies, you unscrew a 1-inch long tip off the end of the 2-meter/70-cm SMA terminated antenna and screw on a 3¹/₂-inch loading coil. Yaesu calls this "feature" an "innovative multi-section antenna." It seems unlikely that I'd be able to keep track of all these pieces for very long. My solution was to use a small padded zippered pouch as a radio jump-kit. I kept all the parts and accessories—and the manual—in the

pouch when not in use. The only advantage of the screw-on coil design was that it makes it convenient to attach a few feet of wire for improved low frequency reception.

My overall impression of this radio?—I would buy one myself. I do a lot of coastal kayaking, hiking and other outdoor activities, and such a multi-talented (and very size conscious) radio would certainly be a welcome addition to my extremely limited "must

take along" parcel of goodies. Once an overall familiarity with the manual and the well-named menu titles is achieved the VX-5R is a full featured, rugged, dependable and easy to use communications tool.

Manufacturer: Yaesu USA, 17210 Edwards Rd, Cerritos, CA 90703; tel 562-404-2700, <http://www.yaesu.com>. Manufacturer's suggested retail price, \$429. Typical current street price, \$350.

The ICOM IC-Q7A Dual-band H-T

*Reviewed by Joe Bottiglieri, AA1GW
Assistant Technical Editor*

Pocket-sized electronic devices are all the rage these days. Hand-held cellular telephones, personal data assistants, pagers—even entertainment devices, such as portable FM radios and various types of recorded media players—are shrinking at an alarming rate. We are seeing the same revolution in microelectronics that drives this trend affecting the products that appear in the Amateur Radio market.

Standard, with the introduction of their compact C108 H-T a few years back, helped prove that very low power transceivers could still be effective for local simplex and repeater use. Alinco—with its credit card sized DJ-C5T—has certainly secured the distinction of producing the smallest dual-band Amateur FM transceiver yet. Yaesu has further refined the subcompact concept with its VX-1R—adding considerably expanded receive frequency range, making their little radio an attractive product to the significant number of hams who also enjoy scanner and broadcast listening.

ICOM now enters the fray with the IC-Q7A, a 2-meter/70-cm low-power lightweight shirt pocket transceiver that also receives from 30 to 1310 MHz (less cellular 'phone frequencies—*jeppers, I'm tired of adding this!*—Ed.).

Selectable receive modes—FM, WFM or AM—are available throughout the entire range. You can listen in on broadcast FM, television, AM aircraft (including the military AM air frequencies), public service, commercial and four additional ham bands (50, 220, 900 and 1200 MHz) just to name a few. For those who enjoy radio listening, the 'Q7A is a veritable pocket-sized entertainment center!

This unit, as with most of the other subcompact H-Ts, uses a small number of controls and an extensive menu system to access the various operations. The front panel has a raised area on the left side that sports three uniquely shaped rubberized push buttons. The primary functions of these buttons are stepping through the bands and increasing or decreasing the volume. Four additional buttons on the front panel are labeled **CALL**, **LOCK**, **V/M**, **SQL** and **POWER**. The only other buttons are the **PTT** and **FUNC** buttons located on the left side of the chassis.

A generously sized top-mounted knob

serves as a frequency encoder/channel selector. The same knob adjusts the squelch level when used in conjunction with the **SQL** button, and scrolls through menu topics and changes settings in the set mode. A jack for a single pin four-section 3.5 mm plug for an external speaker/mike and a female SMA antenna connector are also located on the top panel.

In spite of the lack of direct keypad frequency entry, the tuning scheme for moving around in this unit's vast frequency landscape is really quite nicely implemented. The **BAND** button allows you to select seven different ranges. These are approximately 30-90 MHz; 90-142 MHz; 142-255 MHz; 255-383 MHz; 383-770 MHz; 770-940 MHz (please refer to the earlier editor's note) and 940-1310 MHz. Band stacking registers retain your last used VFO frequency in each band as you step through the others. Press and hold the side-mounted function button and each click of the encoder will step in your choice of 100 kHz, 1 MHz or 10 MHz increments. You can set the tuning dial rotation to be speed sensitive. As you spin the knob more rapidly, the tuning rate will automatically accelerate. Ten different tuning step sizes,

ranging from 5 kHz to 100 kHz—including a 6.25 kHz setting—are independently selectable for each band. An RIT function for use above 835 MHz is also included.

Entering the set mode brings up an alpha-numerically tagged menu of the various settings parameters and their present states. The particular items that appear on the menu vary depending on whether the radio is in the memory or VFO mode. Additional seldom-needed settings are contained in a separate "expanded" section. All of the menu titles are easy to relate to their intended application—"TONE," "SKIP," "STEP," "OFF-SET," "LIGHT" for example.

The radio is powered by two AA batteries. A pair of AA NiCds and a charging unit are included. The batteries must be removed from the transceiver and inserted into holders in the wall charger for recharging. The wall unit has slots for charging up to two pairs of batteries at the same time. Charging time for a pair of batteries is about 7 hours; two pairs take about 9 hours. One advantage of this arrangement is that it allows you to use common AA alkaline batteries without requiring the purchase of an accessory dry-cell battery case. Slip some alternative AAs into the radio and you can continue to use it while the NiCd batteries are charging. Additional or replacement NiCds—or disposable batteries for that matter—are relatively inexpensive and readily available. An icon in the display, appropriately shaped like a little battery, indicates full or half charge and will flash when the batteries are nearly exhausted. The transceiver does not include provisions for connecting to power from an external dc source—no optional car cord is available.

CTCSS tone encode, decode, tone scan and pocket beep are included. Independent transmit and receive CTCSS tones can be programmed on a single frequency or duplex pair. The 'Q7 offers an expanded selection of tones—50 as opposed to the usual 38. The tone scan feature allows you to listen to receive audio as the unit is searching for the proper tone. Most tone scan systems mute the audio while determining the tone. This lets you easily verify that there's a signal available for tone scanning.

DTMF capabilities for autopatch or remote control applications are not available. The unit is also incapable of crossband split frequency operation.

The documentation that's packed with the

Bottom Line

With its light weight, subcompact size and wide range of scanning and broadcast band receive capabilities, the IC-Q7A VHF/UHF FM transceiver is always a welcome and entertaining companion—at home, at work or on the go.



Table 3**ICOM IC-Q7A, serial number 02103****Manufacturer's Specifications**

Frequency Coverage: Receive, 30.0-1310.0 (cell blocked); transmit, 144-148, 430-450 MHz.

Power requirements: 3.0 V dc; receive, 0.17 A; transmit, 0.44 A (max, high power).

Size (HWD): 3.4x2.3x1.1 inches; weight, 6.0 ounces.

Receiver

Sensitivity: AM, 10 dB S/N, 118-136 MHz, 0.56 μ V; 222-247 MHz, 0.79 μ V; 247-330 MHz, 1.4 μ V; WFM, 12 dB SINAD, 76-108, 175-222 MHz, 1.0 μ V; 470-770 MHz, 5.6 μ V; NFM, 12 dB SINAD, 30-118 MHz, 118-175 MHz, 0.16 μ V; 175-247 MHz, 0.22 μ V; 247-330 MHz, 0.4 μ V; 330-380 MHz, 0.32 μ V; 380-470 MHz, 0.18 μ V; 470-750 MHz, 1.0 μ V; 750-1000 MHz (cell blocked), 0.32 μ V; 1000-1200 MHz, 0.79 μ V; 1200-1300 MHz, 0.5 μ V.

Two-tone, third-order IMD dynamic range: Not specified.

Adjacent-channel rejection: Not specified.

Spurious response: 60 dB.

Squelch sensitivity: Not specified.

Audio output: 100 mW at 10% THD into 8 Ω .

Transmitter

Power Output: VHF, 350 mW; UHF, 300 mW.

Spurious signal and harmonic suppression: 40 dB for spectral purity.

Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.

Receive-transmit turnaround time ("tx delay"): Not specified.

*Measurement was noise limited at the value indicated.

¹Sensitivity does not meet specification in the range of 1000-1200 MHz. Typical sensitivity for that range was 1.0 μ V.

²Volume increments in digital steps. Audio output at 8% THD was 88 mW.

Measured in ARRL Lab

Receive and transmit, as specified.

Receive, 0.19 A (max volume, no signal); transmit, 0.47 A.

Receiver Dynamic Testing

AM, 10 dB S+N/N, 120 MHz, 0.52 μ V;
WFM, 12 dB SINAD, 100 MHz, 0.98 μ V;
NFM, 12 dB SINAD, VHF, 0.16 μ V;
UHF, 0.19 μ V.¹

20 kHz offset from 146 MHz, 43 dB, 10 MHz offset from 146 MHz, 59 dB.
20 kHz offset from 440 MHz, 57 dB*, 10 MHz offset from 440 MHz, 65 dB.

20 kHz offset from 146 MHz, 51 dB. 20 kHz offset from 440 MHz, 62 dB.

IF rejection, VHF, 78 dB; UHF, 65 dB; image rejection, VHF, 96 dB; UHF, >134 dB.

At threshold, VHF, 0.21 μ V; UHF, 0.35 μ V.

101 mW at 17% THD into 8 Ω .²

Transmitter Dynamic Testing

146 MHz, 370 mW; 440 MHz, 260 mW.

VHF, 63 dB; UHF, 64 dB. Meets FCC requirements.

Squelch on, S9 signal, VHF, 160 ms; UHF, 150 ms.

VHF and UHF, 116 ms.

radio includes a 38-page instruction manual and a small 4-page pocket-sized operating guide. The manual instructions are clear and easy to follow. Information is logically arranged and well indexed. The convenient pocket guide—though obviously not as detailed as the complete manual—covers all the important programming operations. ICOM does not include a schematic diagram, details on the wiring of the speaker/microphone jack or information on the connection requirements for packet operation.

Amateurs who are also scanning enthusiasts are treated to a wide range of capabilities that make this small unit an attractive alternative to a stand-alone hand-held scanner. In spite of its subcompact size, the IC-Q7A offers 200 memories in two selectable banks, six different scan configurations, three priority watch types and a system that can memorize unwanted active frequencies and skip them when scanning through a range of frequencies. The time duration that the scan will pause after activity ends can be varied between 2 and 20 seconds.

ARRL lab testing (see Table 3) confirms the very respectable published sensitivity specifications. While most transceivers with widely expanded receive have marginal performance on some bands, the 'Q7 turns in good numbers on all the ham bands in its range—and still manages to exhibit very nice sensitivity on the VHF, UHF and

800 MHz frequency ranges particularly important to the scanner fans. The unit meets or exceeds its published sensitivity specifications with the exception of the range between 1000 and 1200 MHz. The 1.0 μ V we measured there still represents very good performance. 10 MHz two-tone, third-order IMD dynamic range measurements for 146 MHz indicate that this unit may experience problems with intermodulation. While I didn't observe any significant problems with intermod during my field testing, I would not recommend using this radio with high-gain base or mobile antennas.

On the air, the IC-Q7A works very well for short-range simplex and nearby repeater use. A couple of local repeaters were consistently workable from my living room couch. Transmit audio reports were very good—most were surprised to hear that I wasn't operating my usual ham shack transceiver. Receive audio is a bit anemic. While it's fine for couch potato operation if the TV volume is not up too high, using the radio outdoors or from the car I often found myself holding it up nearer to my ear rather than cranking up the volume and suffering the resulting distortion. The volume level was plenty adequate for casual ham and broadcast listening at my desk in our relatively quiet office area.

One particular operational annoyance is the force required to press the PTT and func-

tion buttons. Some advanced operations require that you press and hold the function button while using another control—this always required two hands.

The small size and light weight of the IC-Q7A makes it very convenient to drop it in a pocket and take it along—especially to those places where wearing a belt mounted transceiver may feel a bit conspicuous. The plastic belt clip is slightly curved and seems to do an excellent job of gripping the average belt. It snaps on and off the radio easily, making removal for when you intend to carry the transceiver in your pocket a simple operation. The included antenna may seem a bit long (at about 7 inches), but effective low-power operation requires decent antenna performance. Several of the aftermarket antenna manufacturers are now offering alternative antennas for SMA equipped radios.

Do you enjoy scanner and broadcast listening and desire a very small unit that's easy to take along? Do you find yourself often wishing you had a VHF/UHF transceiver with you on a more regular basis? Perhaps an IC-Q7A should be taking up permanent residence in one of your pockets.

Manufacturer: ICOM America Inc, 2380 116th Ave NE, Bellevue WA 98004; tel 425-454-8155, <http://www.icomamerica.com>. Manufacturer's suggested retail price, \$239. Current typical street price, \$205. 