QST Compares: The Radio Shack HTX-100 and Ranger Communications RCI-2950 10-Meter Mobile Transceivers

Reviewed by Bruce S. Hale, KB1MW, and Rus Healy, NJ2L

On any given day, you can tune around 10 meters and find all kinds of activity. For the last few years, worldwide DX has been an almost daily proposition; sporadic E spices up summertime operating, providing excellent coverage within a couple of thousand miles; and local nets use the band when it's not open for long-haul communications. Lots of folks have cut their ham-radio teeth on 10 meters, and since US Novice and Technician Class licensees can use SSB on this band, there's always a crop of enthusiastic new operators to pass the time with.

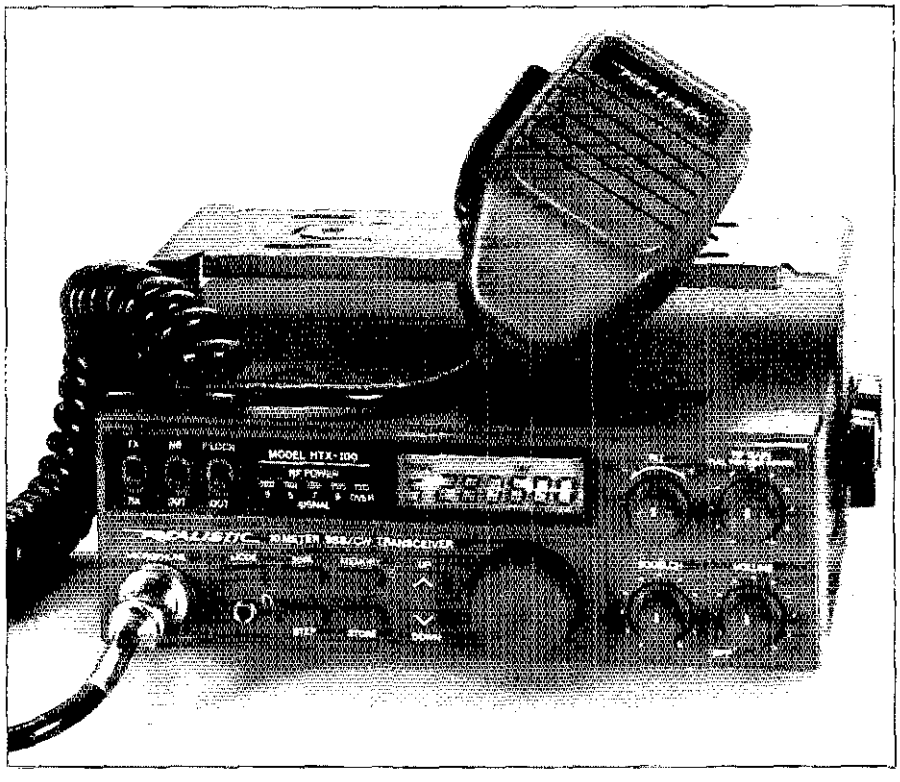
Several manufacturers have jumped into the 10-meter transceiver market since Novice Enhancement brought Novice and Technician operators to the band in 1987.

Table 3
Radio Shack HTX-100 10-Meter Transceiver, Serial # 95002006

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency coverage: 28-29.7 MHz.	As specified.
Modes of operation: CW, USB.	As specified.
Power requirement: 11.1-15.8 V dc.	Current drain at maximum audio output, 0.76 A; transmit low power, 2.7 A; transmit high power, 5.2 A.
Receiver	*Receiver Dynamic Testing*
Receiver sensitivity: CW and SSB, 0.25 μV (−119 dBm).	−136 dBm.
Receiver dynamic range: Not specified.	Blocking dynamic range (default bandwidth):† 98 dB.
	Two-tone, third-order intermodulation distortion dynamic range (default bandwidth):† 75 dB.
Third-order input intercept: Not specified.	−23.5 dBm.
S-meter sensitivity (for S9 reading): 100 μV.	As specified.
CW/SSB squelch sensitivity: Not specified.	−114 to −38 dBm.
Receiver audio output: 3 W nominal (distortion and load impedance not specified).	2.7 W at 10% total harmonic distortion (THD), 8-Ω load.
Transmitter	*Transmitter Dynamic Testing*
Transmitter power output: 25 W (high), 5 W (low).	27 W (high), 5.8 W (low).
Spurious-signal and harmonic suppression: −50 dBc	See Fig 4.
Third-order intermodulation distortion products: Not specified.	See Fig 5.
CW-keying waveform: Not specified.	See text and Fig 6.
Transmit-receive turnaround time (PTT release to 90% audio output): Not specified.	S1 Signal, 60 ms; S9 signal, 60 ms.

Size (height, width, depth): 2.5 × 7.3 × 7.88 inches; weight, 4.2 lb.

†Blocking dynamic range and third-order IMD dynamic range measurements were made at the ARRL Lab standard signal spacing of 20 kHz.



(photo courtesy of Tandy Corp)

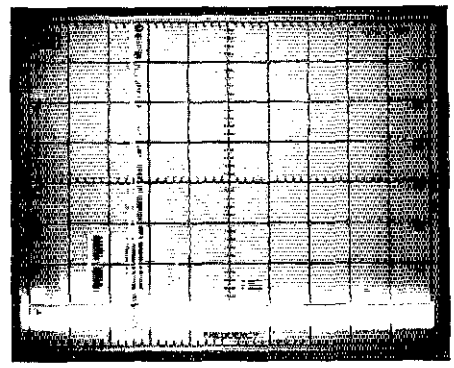


Fig 4—Radio Shack HTX-100 worst-case spectral display. Horizontal divisions are 10 MHz; vertical divisions are 10 dB. Output power is approximately 27 W at 28 MHz. All harmonics and spurious emissions are at least 53 dB below peak fundamental output. The HTX-100 complies with current FCC specifications for spectral purity for equipment in this power-output class and frequency range.

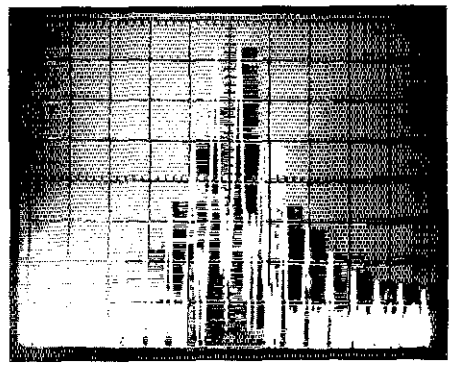


Fig 5—Worst-case spectral display of the HTX-100 transmitter during two-tone intermodulation distortion (IMD) testing. Third-order products are approximately 30 dB below PEP output, and fifth-order products are approximately 44 dB down. Vertical divisions are 10 dB; horizontal divisions are 2 kHz. The transceiver was being operated at 25 W PEP output at 28 MHz.

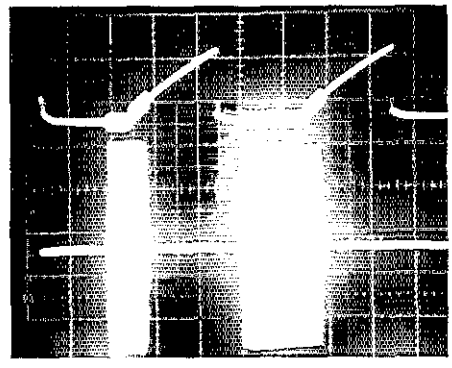


Fig 6—CW-keying waveforms for the Radio Shack HTX-100. The upper trace is the actual key closure; the lower trace is the RF envelope. Horizontal divisions are each 10 ms. The transceiver was being operated at 25 W output at 28 MHz.

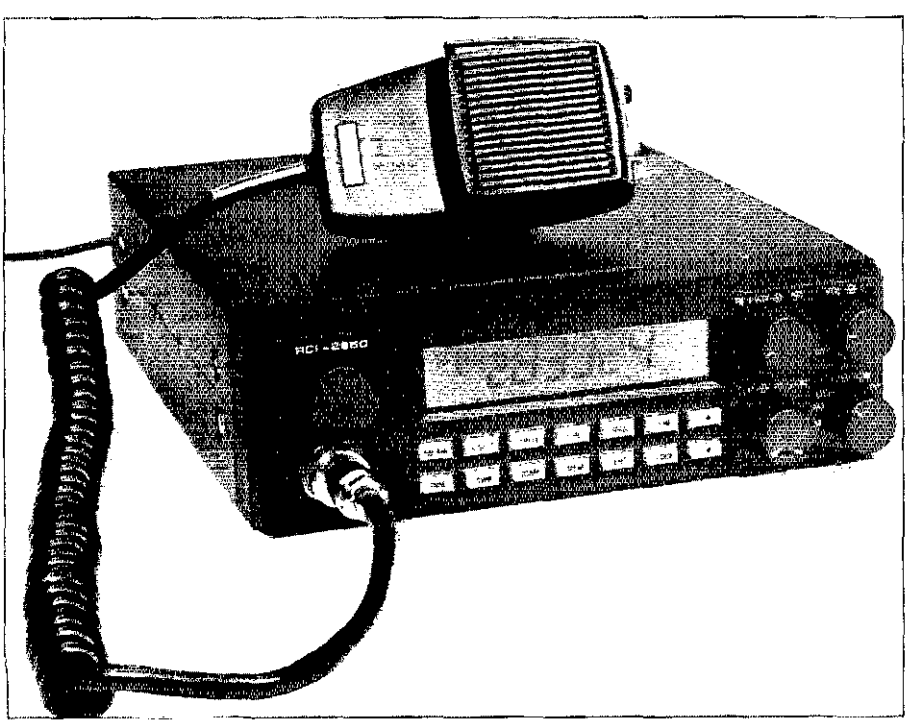
Table 4

Ranger Communications RCI-2950 10-Meter Transceiver, Serial #108455

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency coverage: 28-29.7 MHz.	As specified.
Modes of operation: AM, CW, FM, LSB, USB.	As specified.
Power requirement: 13.8 V dc.	Current drain at minimum output, 2 A; maximum output, 5 A.
Receiver	*Receiver Dynamic Testing*
Receiver sensitivity: CW and SSB, 0.3 μV (−117 dBm); AM, 1 μV (−107 dBm) for 10 dB S+N/N; FM, 1 μV (−107 dBm) for 20 dB S+N/N.	CW and SSB, −130 dBm; AM, −121 dBm for 10 dB S+N/N; S+N/N; FM, −109 dBm for 10 dB quieting.
Receiver dynamic range: Not specified.	Blocking dynamic range (default bandwidth):† 80 dB.
	Two-tone, third-order intermodulation distortion dynamic range (default bandwidth):† 62 dB.
Third-order input intercept: Not specified.	−37 dBm.
S-meter sensitivity (for S9 reading): Not specified.	5 LCD bars, 20 μV.
Squelch sensitivity: Not specified.	−112 to −70 dBm.
Receiver audio output: 2.5 W at 10% distortion with an 8-Ω load.	3 W at 10% total harmonic distortion (THD) with an 8-Ω load.
Transmitter	*Transmitter Dynamic Testing*
Transmitter power output: SSB, 25 W max; CW, 12 W max; AM and FM, 8 W.	CW, AM and FM, 7 W; SSB, 25 W.
Spurious-signal and harmonic suppression: −50 dBc or better.	As specified. See Fig 7.
Third-order intermodulation distortion products: Not specified.	See Fig 8.
CW-keying waveform: Not specified.	See Fig 9.
Transmit-receive turnaround time (PTT release to 90% audio output): Not specified.	S1 signal, 140 ms; S9 signal, 140 ms.

Size (height, width, depth): 2.4 × 7.8 × 10.9 inches; weight, 4 lb.

†Blocking dynamic range and third-order IMD dynamic range measurements were made at the ARRL Lab standard signal spacing of 20 kHz.



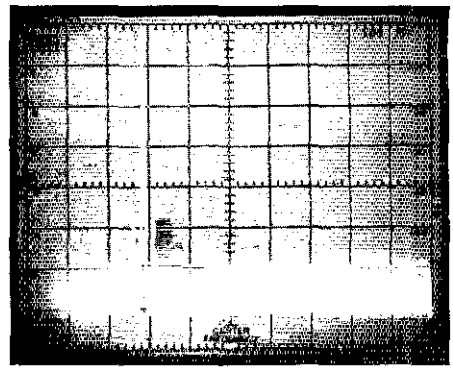


Fig 7—Ranger Communications RCI-2950 worst-case spectral display. Horizontal divisions are 10 MHz; vertical divisions are 10 dB. Output power is approximately 7.3 W at 28 MHz. All harmonics and spurious emissions are at least 47 dB below peak fundamental output. The RCI-2950 complies with current FCC specifications for spectral purity for equipment in this power-output class and frequency range.

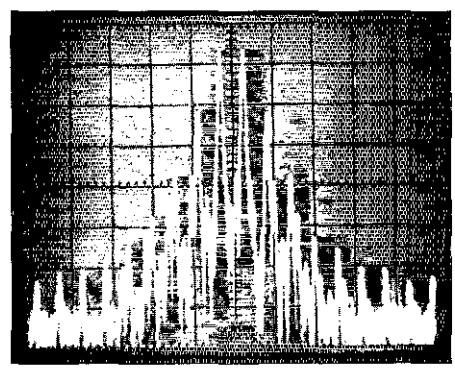


Fig 8—Worst-case spectral display of the RCI-2950 transmitter during two-tone intermodulation distortion (IMD) testing. Third-order products are approximately 21 dB below PEP output, and fifth-order products are approximately 37 dB down. Vertical divisions are 10 dB; horizontal divisions are 2 kHz. The transceiver was being operated at 25 W PEP output at 28 MHz.

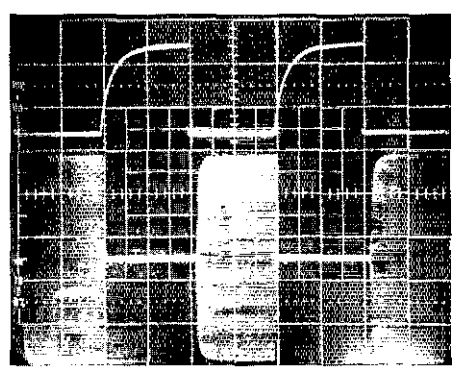


Fig 9—CW-keying waveforms for the RCI-2950. The upper trace is the actual key closure; the lower trace is the RF envelopes. Horizontal divisions are 20 ms. The transceiver was being operated at 7.3 W output at 28 MHz.

At least four makers have done so with mobile transceivers: Clear Channel Communications, Uniden, Radio Shack and Ranger Communications, Inc. In separate earlier reviews, we covered models made by Clear Channel Communications[3] and Uniden.[4] Here's a look at two of the other current models in this class.

Overview, Displays and Controls

Both the HTX-100 and '2950 look a bit like overgrown CB radios (not surprisingly, because they're manufactured offshore by companies that also make CBs). The '2950 even has a PA (public address) mode—not a common feature in mobile ham gear, but one you'll find on most CBs.

The '2950 has a large, variable-brightness backlit liquid-crystal display (LCD) and a two-row array of front-panel switches (14 buttons altogether). Four knobs to the right of the frequency display control RF power/microphone gain, AF gain/squelch, RF gain/receiver offset ("clarifier," usually called *receiver incremental tuning*, or *RIT*), and the radio's mode (CW, USB, LSB, AM or FM). (The former three are concentric control pairs.)

The HTX-100's front-panel layout is more straightforward and uses more intuitive control labels. Its fixed-brightness, green-backlit LCD (which shows frequency, memory channel and mode [CW or USB]) is smaller than the '2950's, but is still quite easy to read under a variety of lighting conditions. The main-tuning knob is centrally located and clear of other controls. The HTX-100's front panel also contains four knobs to the right of the display; they control RIT (center-detented), RF gain/transmit low power, squelch and AF gain/power. These are smaller, nonconcentric controls, so they're easier to operate than the RCI-2950's. The HTX-100's controls also have a smoother, more solid feel than the '2950's. Like the RCI-2950, the HTX-100 has push-button controls below the display (but only half as many as the '2950). Three other switches occupy the area to the left of the HTX-100's five-segment LED RF output/received-signal-strength meter. One particularly noteworthy front-panel feature on the HTX-100 is its headphone jack; the RCI-2950 has *no* headphone jack (although it does contain a rear-panel external-speaker jack, as does the HTX-100).

The '2950's display includes a bar-graph meter that shows transmitted signal level, received signal strength and SWR. A front-panel switch controls the meter. The SWR meter is handy for antenna tuning. Because the display shows transmitter power output, the meter doubles as what the manual calls a "modulation meter" on single sideband. The HTX-100 duplicates this display capability, except that it has no SWR-measurement capability.

Both radios are supplied with instruction manuals, mobile-mounting brackets, fused power cords and matching microphones. Interestingly, both rigs use the same three-conductor power connector.

Tuning

Both radios use similar tuning schemes. The '2950's **SHF** (shift) key, like the HTX-100's **STEP** key, moves an indicator on the display one digit to the right each time you press the key. The up and down arrows on the front panels and microphones then change the frequency by the selected digit. (With the pointer at the *4* in 28472.0 kHz, the arrow keys move the frequency up or down in 100-kHz steps.) Only the RCI-2950 lets you tune directly in 100-kHz steps; the HTX-100's largest normal tuning step is 10 kHz, although it does include a 500-kHz-up control that the '2950 doesn't.

Holding down one of the microphone buttons causes the '2950 to tune continuously, but it tunes very slowly; the HTX-100 picks up speed after you hold the appropriate button down for about half a second. Of course, you can also tune with either radios' main-tuning knob. Each click to the right or left moves the frequency in the selected step.

Oddly, the RCI-2950's knob can be tuned faster than the frequency synthesizer can keep up, so the receiver blanks if you spin the knob too fast—and that's not very fast. You must tune the '2950 very slowly to make it sound like a "real" radio; the HTX-100 exhibits no such ills.

The RCI-2950 can scan up or down in frequency. Scanning starts when you press the **SCAN** button when the squelch is closed. Any signal that breaks the squelch stops the scanning until the signal disappears. The radio can store 10 frequencies in memory—any single memory frequency can be recalled, or you can scan through the memories. You cannot store mode or split information in the frequency memories, although the radio is capable of split-frequency operation (for use with FM repeaters).

The HTX-100 scans only when its frequency up/down buttons are held down. It, too, has ten memories that store only frequencies. The HTX-100's memory scheme is generally easier to use than the '2950's.

Operation

The '2950's tuning knob and microphone jack are located on the left side of its front panel. Using the main-tuning knob is difficult because the knob is quite small and is mounted just above the microphone jack. The radio's concentric controls on the right side of the front panel are also difficult to use because of their size and placement.

The '2950's variable RF output control is a handy feature. The HTX-100 has high- and low-power settings; its high-power RF output is about 25 watts (as is the '2950's), and its low-power setting gives about 5 watts output.

The '2950 includes an end-of-transmission beeper. Although this is useful to NASA astronauts, many hams find it rather obnoxious.

Basic Performance

Even though these radios are in the same price class, they clearly differ in basic receiver performance. The RCI-2950 can be tuned in 10-kHz steps without missing even moderately strong signals; in fact, strong signals up to 100 kHz from your listening frequency overload the receiver, reducing receiver gain (*blocking*). This isn't usually a problem with a mobile whip or other low-gain antenna, but when you connect the radio to a multielement triband or monoband antenna, it's sometimes quite difficult to copy even relatively strong desired signals as the receiver blocks in response to strong off-frequency signals. Switching the receiver from SSB to CW for receiving helps somewhat because of the radio's narrower CW passband, but it's too much trouble to switch modes to work someone in this fashion. On the transmit side, the RCI-2950's signal is positively *terrible* at the radio's rated output: Its third-order IMD products are down only 22 dB relative to its single-tone PEP output! Reducing its output to 18 W brings the rig's third-order IMD products down to an acceptable 30 dB.

The HTX-100, on the other hand, is more robust on crowded bands than you might expect. Although its passband is wider than that of even low-end multiband SSB/CW ham transceivers, it's quite pleasant to use—even with gain antennas.

On CW, the '2950 is almost unusable. Its sidetone is too loud and very high-pitched. No external controls modify either the pitch or the sidetone level. The sidetone is generated by a three-gate IC oscillator that looks easy to modify for different frequencies and levels, but we didn't attempt this. The receiver's CW selectivity is also very wide—wider than the HTX-100's SSB selectivity. It seems clear that CW was an afterthought in the 2950.

Using the HTX-100 on CW, on the other hand, is actually fun. Its CW selectivity, although much wider than that of any multiband transceiver's narrow filters, is adequate for all but contest operation. The manuals state that both the HTX-100 and the RCI-2950 take about ½ second to return to receive when operated in their keyed-VOX modes on CW. Our review HTX-100 behaved somewhat differently: It returns to receive almost instantaneously after the CW key is opened. An earlier HTX-100 behaves as described in the manual, though. A discussion with an

[3]Leslie Bartoloth, KA1MJP, reviewed the Clear Channel Communications Ranger AR3300 in June 1987 *QST*.

[4]Kirk Kleinschmidt, NTØZ, reviewed the Uniden HR2510 in May 1989 *QST*.

engineer at Radio Shack's Fort Worth headquarters yielded the conclusion that our review radio may contain an incorrect component; Radio Shack has made no production changes to the HTX-100, and other current-production radios that Radio Shack tested behave as the manual says they should. The only practical limitation of this difference in our review rig is that operating at CW speeds of more than 20 WPM or so truncates keyed elements, as you can see in Fig 6 (which was taken as the rig was being keyed at approximately 50 WPM).

In its FM mode, the RCI-2950 can operate split-frequency for repeater operation. The frequency split is fixed, however, and the manual does not specify it (it's 100 kHz). The frequency display does not change to indicate the split, but the display does indicate **SPLIT** + or −.

Noise Blankers

Using the two radios side by side clearly shows that the HTX-100's noise blanker is much more effective than the '2950's. In fact, using the radios at the ARRL Headquarters club station, W1INF, where power-line noise has plagued us for years, the HTX-100's noise blanker made some signals copiable whereas the '2950 was useless. The '2950 has an automatic noise limiter (ANL) circuit that had no perceptible effect on this noise.[5]

[5]ANL is suitable mainly for *AM* reception—another suggestion of this rig's CB heritage.

The Manuals

At only eight pages, the RCI-2950 manual is a bit too brief. It's not well written, either: The explanation for the radio's **MIC GAIN** control, for example, says that this control can "increase talk power." With a description like that, what unsuspecting operator would ever use the radio with the "talk power" at anything less than maximum? The manual does briefly cover the switches and controls on the radio, but if you're used to Yaesu, ICOM, Ten-Tec or Kenwood operating manuals, you'll be disappointed by the '2950 manual.

On the other hand, the HTX-100 manual is clearly written and complete. It contains detailed mobile, marine and fixed-station installation instructions. Each control is clearly explained. The manual also has an introduction to Amateur Radio and ARRL, cautions about using the radio without a valid Amateur Radio license, and so on. Wrapping up, it includes a short section on troubleshooting, a brief discussion of digital communications on 10 meters, the ARRL 10-meter band plan, and sections on maintenance and eliminating ignition noise.

Both manuals include complete schematics. This is an unexpected nice touch for radios in this class.

Conclusions

We were generally disappointed with the RCI-2950. It includes a few features not included in the HTX-100—the SWR meter, continuous power control, FM operation and scanning are the most notable—but the others not on the Radio Shack radio, such as the "roger beep" circuit, the PA feature and lower-sideband operation, aren't significant. Almost no one uses AM or LSB on 10 meters (AM is illegal for Novices and Technicians on 10, for instance), so they're nearly useless on the '2950.

If you're looking for an inexpensive way to get on 10-meter SSB from your car, the Radio Shack HTX-100 is clearly a better choice than the RCI-2950. As new radios go, their prices are downright cheap (around $250), whereas new multiband, multimode transceivers start at around $700.

If, on the other hand, you're adding 10 meters to your home station and you don't already have a transceiver, look for a good used Kenwood, Yaesu, ICOM or similar transceiver. For another $100-$200, you'll typically get 100 watts of 10-meter SSB and all the other bands—a big plus if you're a Novice or Technician who aspires to a higher class of license.

Thanks to Mark Wilson, AA2Z, for his contribution to this review.

Manufacturers: Radio Shack, Fort Worth, TX 76102; Ranger Communications, Inc, 3377 Carmel Mountain Rd, San Diego, CA 92121. Manufacturers' suggested retail prices: HTX-100, $259.95; RCI-2950, $259.95.