# Product Review & Short Takes Columns from *QST* Magazine

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**Product Reviews**

Ten-Tec Model 526 6N2 Multimode VHF Transceiver

Ranger Communications RCI-2970DX 10/12-Meter Transceiver

**Short Takes**

SignaLink SL-1 Sound Card/Transceiver Interface

# Ranger Communications RCI-2970DX 10/12-Meter Transceiver

*Reviewed by Wayne Irwin, W1KI*
*Assistant to the ARRL VEC Manager*

Now that the code-less Technician class license has become the main entry gate for the Amateur Radio service, folks looking to progress along the upgrade path typically next set their sights on tackling the 5-WPM requirement. Suitably armed with "Technician with HF" privileges, most are then anxious to immediately get their hands on some gear for the bands below 6 meters.

While some—likely those already getting cozy with the General class exam question pool—decide to take the plunge and purchase full-blown multiband HF, HF/VHF or HF/VHF/UHF gear, a significant number look to the more affordable single-band 10-meter multimode transceivers.

Ranger, RadioShack, and a small number of other manufactures have recognized this market segment and have recently turned out some new products. Ranger—with the RCI-2970DX—has decided to entice these customers further by offering a rig that provides a little "room to grow"—capabilities on the popular 12-meter band as well.

Beyond its appeal to relative newcomers, the RCI-2970DX's 10- and 12-meter frequency coverage makes it an attractive choice for mobile installations or for those with limited space for setting up antennas at home. Efficient mobile antennas for these bands don't need to be particularly large, and the dimensions of simple fixed-station antennas for 10 and 12 lend themselves well to home construction techniques.

In addition to the extra band, the '2970DX entices prospective buyers with a few other features that you won't find in some of the competing transceivers. These include high RF output power: an advertised 150 W on SSB; all-mode operation: AM, FM, USB, LSB and CW; memory and VFO scan capabilities; and built-in SWR metering.

## The General Configuration

The RCI-2970DX's front panel is dominated by a large LCD display. Frequency digits, a vertical bargraph S/RF/SWR meter and over a dozen small feature icons appear as black segments on a light green field. Background illumination can be set to one of three different levels or shut off completely. The small main tuning knob is located on the left edge of faceplate, and has a detented tuning action. Just below this knob is a six-pin microphone connector. A hand mike is provided.

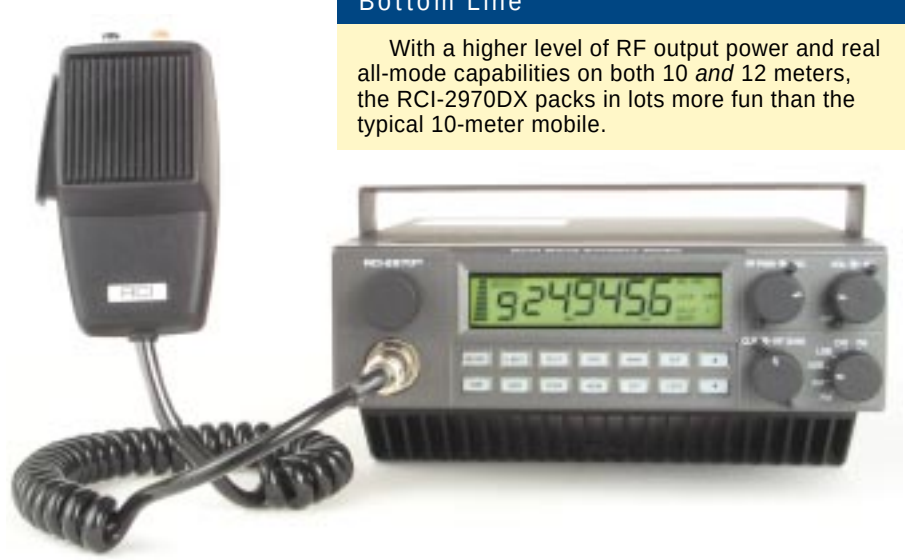
Four more knobs are located on the far right of the front panel. Three of these are concentric pairs that handle the volume and squelch; RF power and mike gain; and RIT (labeled CLR) and RF gain. The fourth is the mode switch, which includes positions for AM, USB, LSB, CW and PA (public address). These four controls are grouped close together. It can be difficult to change the settings of their outer rings without inadvertently disturbing the settings of their immediate neighbors.

Two rows of seven backlit translucent buttons are located just below the display window. Their assignments are printed directly on the surface of each key. Nearly all of these keys perform just one particular task. This makes operating the transceiver fairly easy and intuitive. No "function key" combinations are required to access secondary key operations, so you won't find yourself straining to read unlit secondary assignment labels (which are typically printed directly on the faceplate of most other transceivers).

The rear panel is the epitome of simplicity. There are three $^{1}/_{8}$-inch phone jacks—for a CW key, external speaker

**Bottom Line**

With a higher level of RF output power and real all-mode capabilities on both 10 *and* 12 meters, the RCI-2970DX packs in lots more fun than the typical 10-meter mobile.



## Table 2
## Ranger Communications RCI-2970DX, serial number T1M00426

| *Manufacturer's Claimed Specifications* | *Measured in the ARRL Lab* |
|---|---|
| Frequency coverage: receive and transmit, 24.89-24.99, 28-29.7 MHz. | Receive and transmit, as specified. |
| Modes of operation: CW, USB, LSB, FM, AM. | As specified. |
| Power requirements: 13.8 V dc; current consumption not specified. | Receive, 0.35 A; transmit, 18 A, tested at 13.8 V. |
| Size (HWD): 3.9×7.8×9.3 inches; weight, 7.4 lb. | |
| ***Receiver*** | ***Receiver Dynamic Testing*** |
| SSB/CW/AM Sensitivity, 10 dB (S+N)/N: 0.5 μV. | Noise floor (MDS)[1]:<br>24.9 MHz –136 dBm<br>28 MHz –132 dBm<br>AM, 10 dB (S+N)/N, 1-kHz tone, 30% modulation:<br>29 MHz 0.42 μV |
| FM sensitivity, 12 dB (S+N)/N: 0.25 μV. | For 12-dB SINAD:<br>29 MHz 0.31 μV |
| Blocking dynamic range: Not specified. | Blocking dynamic range, 20-kHz spacing:[1]<br>24.9 MHz 81 dB<br>28 MHz 75 dB |
| Two-tone, third-order IMD dynamic range: Not specified. | Two-tone, third-order IMD dynamic range:[1]<br>24.9 MHz 66 dB<br>28 MHz 61 dB |
| Third-order intercept: Not specified. | Intercept: 24.9 MHz, –37 dBm; 28 MHz, –41 dBm.[2] |
| FM adjacent channel rejection: Not specified. | 20-kHz offset from 29 MHz, 77 dB. |
| FM two-tone, third-order IMD dynamic range: Not specified. | 20-kHz channel spacing, 29 MHz, 53 dB. |
| Spurious response: IF rejection, 65 dB, image rejection: Not specified. | IF rejection: 105 dB; image rejection, 72 dB. |
| Squelch sensitivity: Not specified. | 0.12 μV at threshold. |
| Audio power output: 2.5 W, THD and load unspecified. | 3.0 W at 10% THD into 8 Ω. |
| ***Transmitter*** | ***Transmitter Dynamic Testing*** |
| Power output: CW, FM, AM, 50 W; SSB, 150 W. | AM, CW, typically 51 W; FM, typically 60 W; SSB, typically 115 W.[3] |
| Spurious signal and harmonic suppression: 50 dB. | 53 dB. Meets FCC requirements for spectral purity. |
| SSB carrier suppression: 50 dB. | 46 dB. |
| Undesired sideband suppression: Not specified. | 39 dB. |
| Third-order intermodulation distortion (IMD) products: | See Figures 6 and 7. |
| CW keying characteristics: Not specified. | See Figure 8. |
| Transmit-receive turn-around time (PTT release to 50% of full audio output): Not specified. | Squelch on, S9 signal, 200 ms.<br>Unit is not suitable for use on AMTOR. |
| Receive-transmit turn-around time ("tx delay"): Not specified. | SSB, <1 ms; FM, <1 ms. |
| Composite transmitted noise: Not specified. | See Figures 9 and 10. |

All dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.
[1]500-Hz bandwidth filter not available. Bandwidth on CW is approximately 1900 Hz. See text.
[2]Intercept points calculated using noise floor method.
[3]See text.

and public address speaker—a chassis mounted SO-239 antenna jack and a six-pin rectangular dc power jack. A headphone jack is not provided. The dc power connector is physically the same as the one found on the vast majority of modern HF transceivers, but beware: the wiring configuration is different. The included dc power cable is about 10 feet long and is fused in both leads.

A massive heat sink is fastened to the underside of the enclosure. The radio does not employ a cooling fan. My operating experiences indicate that the cooling system is sufficient; I didn't encounter any instances where the heat sink became particularly hot.

The U-shaped mobile mounting bracket that's packed with the rig can only be attached toward the upper side of the enclosure. This allows you to mount the radio *under* a dashboard or shelf—not above. An extended bracket that fits below the radio is available as an optional accessory. Four thumbscrews are provided for securing the mobile mounting bracket to the chassis. Some additional mounting hardware and a microphone hanger are also included.

### Documentation

The small 18-page *Owner's Manual* is adequate, though not overflowing with

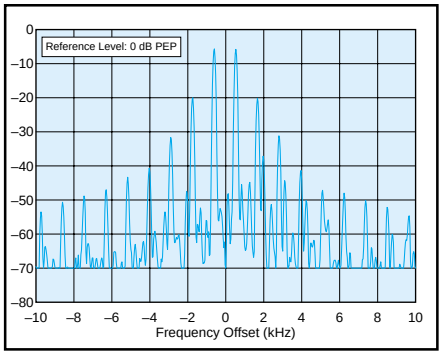



**Figure 6—Spectral display of the RCI-2970DX transmitter during two-tone intermodulation distortion (IMD) testing on 10 meters. The worst-case third-order product is approximately 21 dB below PEP output, and the worst-case fifth-order product is down approximately 32 dB. The transceiver was being operated at 100 W PEP output at 28.35 MHz.**

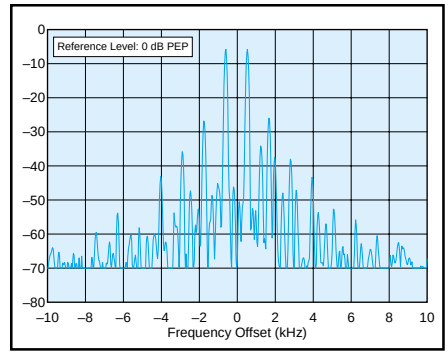



**Figure 7—Spectral display of the RCI-2970DX transmitter during two-tone intermodulation distortion (IMD) testing on 12 meters. The worst-case third-order product is approximately 27 dB below PEP output, and the worst-case fifth-order product is down approximately 37 dB. The transceiver was being operated at 100 W PEP output at 24.95 MHz.**

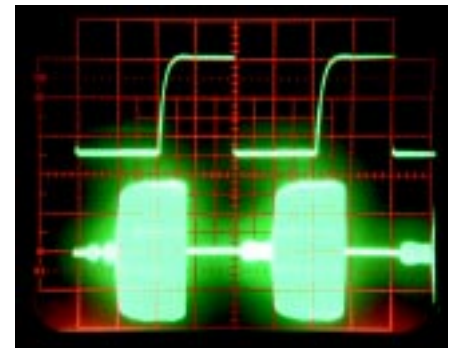


**Figure 8—CW keying waveform for the RCI-2970DX showing the first two dits using external keying. Equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. The transceiver was being operated at 50 W output at 28.02 MHz.**

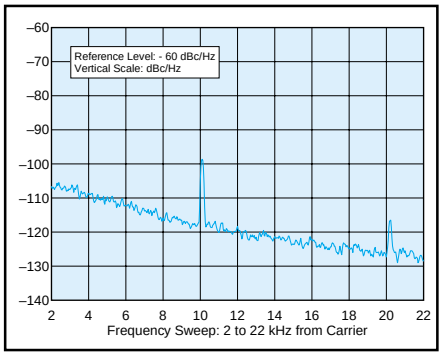



**Figure 9—Spectral display of the RCI-2970DX transmitter output during composite-noise testing at 28.02 MHz. Power output is 50 W. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier.**

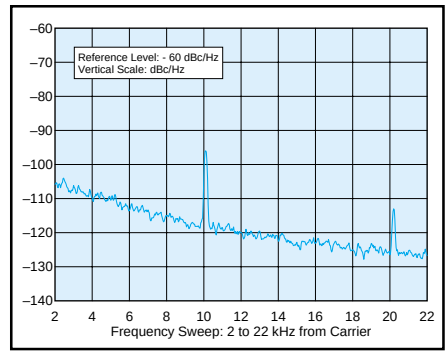



**Figure 10—Spectral display of the RCI-2970DX transmitter output during composite-noise testing at 24.92 MHz. Power output is 50 W. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier.**

information. A brief description of each of the controls and jacks is provided. Most operators should have little, if any, difficulty with installation and proper operation using the information provided, however. The majority of the control functions are apparent from the labels on or near the controls. After I negotiated the short learning curve, I found the radio to be relatively user friendly. Stern warnings about the consequences of unlicensed operation on the Amateur Bands are included on the carton, in the manual and on a label affixed to the top cover of the radio.

No schematic or other service information is included in the manual, but a diagram of the mike connector pin out is presented for those that want to use a microphone other than the supplied hand mike or to wire the rig up for digital mode operation. Factory service manuals are available.

## Tuning

There are several different ways to set the operating frequency. The main tuning knob is perhaps the most obvious method, but you can also employ a pair of CHANNEL buttons located on the top of the microphone or ▲ and ▼ buttons on the front panel. The smallest tuning step is 10 Hz. Finer receive tuning is accomplished by use of the receive incremental tuning knob—labeled CLR (for "clarifier")—on the front panel.

The main tuning knob or buttons can be used to change the frequencies in 10 Hz; 1, 10 or 100 kHz; or 1 MHz steps. This feat is accomplished by using the radio's SHF button to move the position a small arrow icon under the digit that you wish to change. The tuning knob or keys are then employed to tune by the selected digit.

Band changing is a bit unusual. While you can move from 12 meters to 10 meters by placing the arrow under the 1 MHz digit and tuning, in order to move from 10 to 12, you've got to place the arrow under the 100 kHz digit and tune above or below the 10-meter band limits.

When the radio is in the memory mode, a MEMORY icon and the channel number appear in the display just to the left of the operating frequency. Ten memories are available and are selected using any of the same three controls that are used for VFO tuning. The memories are not "tuneable."

## SSB Operation

The majority of operators will probably use this radio for single sideband operation. Let's take a look at this type of operation first.

The '2970DX supports both upper and lower sideband (lower sideband is handy for those who might want to operate RTTY). There are separate controls for the microphone gain and RF power output. VOX operation is not supported.

When I initially got on the air in this mode, I received a report from an operator in the Midwest that my transmit audio sounded distorted. After a minute or so of head scratching, I discovered that I had the microphone gain control set too high. There's no ALC level indicator on the radio, so it takes some experimentation to find the setting that works best for your particular voice characteristics. I set the knob at about mid rotation, and subsequent reports verified that the audio sounded fine.

Information on split frequency operation in the SSB mode is not included in the manual, but the radio does have this capability. Rare DX and DXpeditions

will use split frequency operation as a pileup management tool, so this can be an important feature (see "Working Split: What's the Secret?" by Duane Traver, WV2B, *QST*, May 2001). Set this up using the instructions in the manual given for FM repeater operation. Adjust the "repeater" offset value somewhere in the range that the DX is "listening up"—typically 5 or 10 kHz—and activate a positive split. On transmit, the radio should display the higher frequency. (This trick will also work in the CW mode.) While this arrangement is not as flexible as split operation on a radio that features dual VFOs, it is most definitely workable!

### FM Operation

In the FM mode, the '2970DX will generate about 50 W of RF power, and the transmit audio reports were universally positive. The offset and split features that I just discussed are intended primarily for FM repeater operation. Most 10-meter FM repeaters are set up for a –100 kHz offset. One minor annoyance is that this offset information and the operating mode is not retained in the memories. If you choose to program FM repeater frequencies into the memories, you'll have to remember to switch to the FM mode and activate the split manually when you dial them up.

The radio is not equipped with a CTCSS encoder. Internal provisions, however, are made to facilitate wiring in aftermarket tone boards—such as those offered by Communications Specialists. Inclusion of this feature would have greatly enhanced the viability of this radio for the 10-meter FM enthusiast. Due to the DX propagation characteristics of 10 meters, many of these repeaters are CTCSS tone protected so as to reduce interference between repeater systems that share the same frequency pairs.

### CW Operation

Ranger Communications has not completely forsaken the CW operator in the design of the RCI-2970DX (as was the case with one 10-meter monobander that we recently reviewed), although this transceiver would not be the radio of choice for a serious CW aficionado.

A narrow CW filter is not provided—nor is one available as an option—and the receiver's CW bandwidth is in the "barn door" category: about 1900 Hz. This can make copying a desired signal under even moderately busy band conditions an exercise in concentration!

A single CW signal will also appear on both sides of zero beat. (You can, however, verify that you've got a CW signal properly tuned by taking a quick listen for the signal in the LSB mode. If it's there, you're tuned correctly.)

A straight key or an external keyer connects via an $^1/_8$-inch phone jack on the rear panel. Keying is semi break-in. The CW sidetone level and pitch is fixed, and sounds to be about 1200 Hz. Power output on CW is limited to about 50 W.

### So What are the Other Mode Switch Positions For?

The RCI-2970DX is also capable of operation in the AM mode. You'll find a moderate amount of 10-meter AM activity between 29.0 and 29.3 MHz. Maximum RF output power in this mode is around 50 W.

The bandswitch also includes a PA position. This activates a "public address" system. In this "mode" the transmitter is disabled and amplified microphone audio is available at an independent external speaker jack on the rear panel. (Keep in mind that the use of public address systems in vehicles may be subject to local restrictions.) This feature might also come in handy as a means of checking the sound of the transmit audio when testing alternative microphones or setting levels for digital operation. When testing microphones, keep careful tabs on the volume setting though, or feedback will result.

### Lab Test Results

When looking over the receiver performance data that appears in Table 2, it's important to note that the numbers for the noise floor, blocking dynamic range and two-tone third-order IMD dynamic range are at the minimum CW bandwidth available (1900 Hz in this instance). Whenever possible, the Lab makes these measurements at 500-Hz bandwidth. Consequently, you shouldn't use these figures to make direct comparisons to the numbers we've reported for others units that were taken at the 500-Hz bandwidth. While the radio does exhibit blocking when subjected to strong, close in signals, it's not quite as bad as numbers in this range would typically indicate.

One rather poor performance characteristic that does merit attention is the transmitter IMD performance on 10 meters, as depicted by Figure 6. The second-order IMD products are down only 21 dB.

The power output that we measured on SSB fell short of the 150 W figure that's specified for this parameter. Ranger Communications reports that this was due to improper final adjustment at the manufacturer, and that they have taken steps to ensure that current production units will meet this specification. A second unit that we looked at (provided by Ranger) measured 156 W on 10 meters and 146 W on 12. Our original product review unit also slightly missed its specification for SSB carrier suppression.

### Conclusion

So where does the RCI-2970DX fit in today's market? On the positive side, I think it can carve out a unique place for itself. With its 150 W of RF output, it is certainly much more powerful than any of its competitors. It can be used on all common modes. Its SSB power output can be throttled down to few watts, so it doesn't have to be a power hog (PSK-31 anyone?).

If your main interest is casual operation in the upper HF spectrum, it might fit the bill as your primary station rig. With its limited receiver dynamic range though, you'll probably want to avoid connecting it to high gain antennas or diving into the fray under crowded contest conditions. For general rag chewing and casual CW operation on 10 or 12 meters, and for the majority of mobile operations, the RCI-2970DX has what it takes to get the job done.

*Manufacturer*: Ranger Communications Inc, 401 W 35th St—Suite B, National City, CA 91950; 877-536-0772, fax 702-262-0780; **rci@rangerusa.com**; **www.rangerusa.com**. Price: $430.

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