Ten Tec RX-350 Receiver

By Bob Grove

Slowly but surely, manufacturers are acknowledging the future of radio equipment design. In spite of the reluctance to change, computer control has invaded technology on a permanent basis.

The first company to make a permanent mark was WiNRADiO with their continually-expanding catalog of computer-hosted receivers. ICOM made a brilliant entry with their PCR-1000, and Ten-Tec has entered the foray as well with their software-based transceivers and receivers.

But the new Ten-Tec RX-350 is in a class by itself. Abandoning the contemporary methodology of building an all-electronic receiver and simply manipulating its functions with a computer, this triple-conversion receiver (45 MHz, 455 kHz, 12 kHz) takes it one step further by replacing the usual analog final IF stage with digital signal processing (DSP).

This technique allows a level of signal processing not previously possible; instead of working with detected audio or filtering an IF signal and attempting to correct its aberrations for better reception, the signal itself is converted into a digital stream and massaged for maximum intelligence, a procedure which results in enormous improvements in signal-to-noise ratio while preserving modulation integrity.

Ten-Tec wisely took the best features of their successful product line and incorporated them into a basic receiver, then left the final tuning up to software; this way, the receiver can be updated periodically in software without ever touching the circuit components. It's a proven method established by WiNRADiO, but that product line requires a host computer. The RX-350 can be operated as a conventional, stand-alone receiver without even attaching a computer.

It's a large receiver, measuring 12 inches wide by 5-1/2 inches high by 12 inches deep, not including knobs and connectors, and it weighs 12 pounds. Its internal 3-inch speaker is top-mounted toward the right front edge. The rear panel is alive with various jacks for mute, squelch, timer, line output, external speaker, remote control, power, and antenna. A serial interface allows the receiver to be entirely operated from a host computer via an ASCII command set.

Four plastic bumper feet prevent marring of the tabletop surface and a bail hinge can be swung into place to elevate the receiver toward the user.

Basic Specs

Operating from 120 VAC, 240 VAC (optional cord), or 12 VDC (cable provided), the RX-350 is a full-function receiver which tunes the 100 kHz-30 MHz spectrum. It offers an excellent, back-lit LCD which sports a giant, 3/4 inch frequency readout and announces other panel settings as well as date and time. An on-screen menu allows the operator to set preferences for the receiver's various functions. An alphanumeric tag invites custom identification of memorized frequencies.

Detection modes include AM, synchronous AM (with selectable sideband), FM (15 kHz for communications), USB, LSB, CW, and digital, with appropriate offsets.

Favorite frequencies and settings may be stored in 1024 scannable memory channels divided into eight banks. Antenna connections are provided for unbalanced coaxial cable (SO-239, 50 ohms nom.) and random wire (push terminals, 450 ohm nom). Sensitivity is rated at 0.35 microvolts for 10 dB S+N/N at 3 kHz bandwidth in the SSB mode.

Selectivity provided by the DSP scheme is exceptional; there are 34 built-in filter bandwidths from 300-8000 Hz, each with a shape factor (-6 and –60 dB) of 1.5:1 or better. Utilizing this feature alone is an exceptional experience, and coupled with the passband tuning (adjustable +/-2 kHz) really enhances single-signal reception.

Dynamic range is spurious free for 90 dB, with a third-order intercept point (intermodulation) of +10 dB.

The Listening Experience

The basic operation of the RX-350 is quite intuitive; plug it in and follow the panel legends. A single rotary encoder control is used for both audio and RF gain by pressing the appropriate RF or AF button above it. The multi-turn operation of this control gives it a fine-tune feel, and a bar graph on the display informs you of the percentage of full scale you have rotated it.

AGC timing may be selected as fast, medium, or slow for optimum reception of AM, SSB, and CW signals without pumping. The autoscan/search routine stepped at a rapid 60 channels per second. The adjustable squelch function worked smoothly on all modes. Synchronous detection of AM signals, however, was not working on our loaner, so we can't report on that function.

A large, two-inch, skirted tuning knob is used for frequency slewing of the two VFOs. There is no numeric keypad, so direct frequency entry is not possible. Instead, up/down keys are used for rapid step excursions across the spectrum. An optional model 302 remote keypad with tuning knob, user-assignable controls, and a six-foot interconnect cable is available.

The receiver offers a nice spectrum display option, sweeping a span from as narrow as 240 Hz up to 2.4 MHz wide and showing active frequencies as on-screen spikes in less than one second. The receiver's tuned frequency is indicated by a cursor that can be moved through the spectrum display to identify signals.

While the bar graph S-meter is calibrated for the conventional 50 microvolt signal equaling S-9, the entire meter is compressed into a one-inch space, with each 1/8-inch reticle division representing nearly 4 S-units (20-24 dB) of signal level change. While an adjacent numeric readout in 1/8-inch characters is provided, it is distracting to have to refer constantly to a changing number to get a fix on relative signal strengths. But it does provide reference levels.

Outstanding Signal Processing

Perhaps most astounding of all is the noise blanker feature, pruned to near perfection by Ten-Tec's years of communications experience in commercial and military radio design. In any mode experiencing noise interference, a simple press of the noise reduction key virtually eliminates background hiss and noise on weak signals, allowing the recovered audio to seem suspended in near silence. And, if there's a residual whistle or heterodyne interference, a press of the automatic notch filter attenuates that as well.

The internal speaker is capable of more than enough room-filling audio with low distortion while driven by its 1 watt amplifier. Admittedly, a 3-inch speaker can't provide outstanding audio; highs are brilliant at full 8 kHz bandwidth, and can be attenuated by reducing the bandwidth, but nothing can help the missing bass, so several alternatives are provided.

Stereo or mono headphones can be plugged into the front-panel phone jack; an external recorder or amplified sound system may be plugged into the adjacent line-out jack or a rear-panel jack; or an external speaker can be plugged into the rear-panel jack assigned for overall improved sound.

The Bottom Line

We were favorably impressed with the new Ten-Tec RX350 receiver. It offers an excellent array of cutting-edge features, considerable applications flexibility, and performance to justify its $1199 price tag. The RX-350 is available from Ten-Tec, Inc., Sevierville, TN 37862. For more information, visit their web site at **http://www.tentec.com**.

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"All the communications training and monitoring has helped me in many ways," Elena continued. "I'm confident in most every situation and I'm very aware of my surroundings. I can verbally communicate what I need and what I'm thinking, both in professional and personal situations."

Regarding her musical performances, the technical side of scanning has also been a benefit. Elena has a thorough knowledge of vocal frequencies, microphones, and recording systems. Audio elements such as frequency response, harmonic distortion, and sound compression are discussed equally with keyalities, tonalities, harmonies, ranges and tempos.

Elena's interests are a whirlwind of technology and talent. Her tour of life is filled with ever-changing adventures, locations, people and performances. But, it's just another mission for our singing-modeling-flying-shooting-designing-computing-scanning soldier of diversity, Elena Machado.

Video Scanning

In the May issue of *The Scanning Report*, Gil Young said he'd be willing to purchase an Icom IC-R3 if frequencies and video reception at NASCAR events can be confirmed. Well, we now have the frequencies. Doug Smith responded with the following detailed message:

"Before a recent race at the new Nashville SuperSpeedway (in Lebanon, TN) we were advised that the car cameras would be using all seven 2 GHz broadcast auxiliary frequencies. From 47CFR74.602 (U.S. Code of Federal Regulations), the frequencies in question are:

1990-2008 MHz (1999.0 center, channel 1)
2008-2025 MHz (2016.5 center, channel 2)
2025-2042 MHz (2033.5 center, channel 3)
2042-2059 MHz (2050.5 center, channel 4)
2059-2076 MHz (2067.5 center, channel 5)
2076-2093 MHz (2084.5 center, channel 6)
2093-2110 MHz (2101.5 center, channel 7)

"There is also a 2.5 GHz band they might use. There are three channels in this band:
2450-2467 MHz (2458.50 center, channel 8)
2467-2483.5 MHz (2475.25 center, channel 9)
2483.5-2500 MHz (2491.75 center, channel 10)

"Most equipment treats this as an extension of the 1990-2110 MHz band. I am not 100 percent certain of the parameters of channel 10…it doesn't appear in my copy of the FCC regulations…but definitely exists on the equipment.

"You are likely to hear references to these channel numbers on the voice-only Broadcast Auxiliary channels (450-451 and 455-456 MHz, especially) while remote broadcasts are being 'lined up.'I suppose that's the reason they don't have a camera in every car…there just aren't enough frequencies!

"These are the same frequencies used for most terrestrial TV live remotes for remotes during newscasts, etc. Channels 8, 9 and 10 are in an unlicensed 'ISM' band (Industrial – Scientific – Medical) and are subject to interference from…microwave ovens, wireless computer networking gear, along with cordless phones and who knows what else. Because of the interference these channels are rarely used.

"I have also seen black-and-white surveillance cameras operating in these channels. They appear to be operated by some branch of the Metro Nashville government as they show various well-known public buildings.

"Some of the 1990-2110 MHz band is being re-farmed for other use. Eventually these channels will be narrowed and broadcasters switched from FM to digital transmission. (In some cities, digital transmission is already in use.)

"One of our truck operators has an IC-R3 and has received his truck on it. He did say some kind of trick was necessary…I'm afraid I don't recall exactly what he did. Might have had to tune to the image rather than directly to the center frequency."

Thanks, Doug, for another outstanding contribution. IC-R3 owners, please send me your reception reports, tips and tricks concerning "video scanning."

On the Keyboard

Please send your spring and summer monitoring stories, frequency lists and tips. I'm especially interested in IC-R3 stories and your summertime travel adventures.

Links of interest from this column:

Doug Smith's webpage:
http://www.w9wi.com
The Alley Cats, America's Premier Doo-Wop Group:
http://www.thealleycats.com
Miami-Dade County Fair and Exposition:
http://www.fairexpo.com
Shure Wireless Microphones:
http://www.shure.com/wireless/default.asp
Conklin Shows:
http://www.conklinshows.com
National Independent Concessionaires Association, Inc.:
http://www.nicainc.org
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http://www.biscaynehelicopters.com/