Product Review & Short Takes Columns from *QST* Magazine

January, 2002

Product Reviews

WiNRADiO WR-1550i Computer-Based Communications Receiver
Yaesu VL-1000 Quadra Linear Amplifier

Short Takes

Two from IZ8BLY: Stream and Vox Recorder

WiNRADiO WR-1550i Computer-Based Communications Receiver

Reviewed by Rich Arland, K7SZ
QST *Contributing Columnist*

Shortwave radio has been part of my life since I was 9 years old. Dad's old Arvin console radio put the world at my fingertips. The excitement of hearing history in the making by listening to shortwave broadcasts was—and still is—quite a thrill.

Shortwave receivers have evolved tremendously since 1955. Vacuum tubes were replaced with transistors, which, in turn, gave way to integrated circuits and surface mount technology. The size of the receivers has shrunk dramatically. These days, you can tune in the world with tiny portable radios that are less than twice the size of a pack of playing cards!

Enter the WiNRADiO model WR-1550i. Just plug it into an empty ISA expansion slot on your computer's motherboard and hook up an antenna, and the WiNRADiO will transform your PC into a wide-range communications receiver. You'll have instant access to frequencies from 150 kHz to 1.5 GHz in the AM, narrow and wideband FM, CW and SSB modes—all at the click of a mouse. (WiNRADiO offers a wide variety of both internal "card" and external "black box" PC-based receivers. Visit **www.winradio.com** for details.)

With a WiNRADiO-equipped computer, you can catch up on news of local and world events delivered through the AM, FM and shortwave broadcast outlets; eavesdrop on military/civilian HF flight-following traffic and long-haul maritime ship-to-shore transmissions; monitor tactical FM frequencies used by fire, police, EMS and the US government; tune through most of the ham bands—and lots more. If a radio signal exists somewhere between 150 kHz and 1500 MHz, chances are you can receive it using the WiNRADiO system. The cellular telephone frequencies are blocked, of course. (We certainly wouldn't want to violate the Electronic Communications Privacy Act of 1986, would we?)

Installation and Set Up

The WR-1550i package includes a circuit card (the actual receiver unit), a 3.5-inch floppy installation disk, an indoor "test" antenna, a *User's Guide* and warranty information. The installation instructions are very concise and made the job of getting this radio up and running the proverbial "walk in the park."

Installation of the card was totally uneventful. The hardest part was getting the darned cover off the computer cabinet! I had two unused ISA expansion slots, so I put the card into the bottom-most slot. The factory default jumper setting for the I/O address (180) worked fine. I chose not to jumper the audio output of the radio card into the line input of my soundcard. Instead, I just plugged my computer speaker system directly into the single $^1/_8$-inch phono jack on the back of the board.

Just a few minutes after I had the computer case buttoned back up, I had the indoor test antenna connected to its BNC terminal, the speakers plugged in and the software loaded. I ran the indoor antenna over to my shack window and connected the end to a long-wire antenna I have up outside. A second or two after I double-clicked on the new WiNRADiO icon on my computer screen the speakers came alive with signals! There was some slight interference generated by my computer (as might be expected with this temporary indoor/outdoor antenna lashup) but it was not objectionable.

Bottom Line

Slip a WiNRADiO WR-1550i into an expansion slot in your PC and you'll instantly transform it into a sophisticated wide-range communications receiver.

I have a confession to make. I'm yet another one of those guys who don't like to spend a whole lot of time wading through the detailed operating instructions found in most manuals. I save that exercise for those times when I *really* can't figure out how a feature works. I've discovered that a little hands-on experience can substitute for page upon page of text.

The WiNRADiO receiver presented few challenges. It took me about 15 minutes of mousing around on the virtual front panel to master nearly all of the nuances of this receiver. To say that the layout of the controls and the organization of the drop-down menus make operating this rig easy would be an understatement. If you've got a little common sense, a bit of computer savvy and some basic radio operating knowledge—you'll quickly master this rig.

The *User's Guide* outlines all of the various control operations in excruciating detail, but a quick glance at the uncluttered front panel that appears on the monitor screen will immediately convey

Joe Bottiglieri, AA1GW ♦ Assistant Technical Editor

Table 1
WiNRADiO WR-1550i, serial number 107620

Manufacturer's Claimed Specifications	Measured in the ARRL Lab
Frequency coverage: 0.15-1500 MHz (cell blocked).	0.15-1600 MHz, cell blocked.[1]
Modes of operation: FM, WFM, AM, USB, LSB, CW.	As specified.
Size (HWD): 4.5×0.7×11.4 inches; weight, 20.2 oz.	
CW/SSB sensitivity (10 dB S/N): 0.5-1.8 MHz, 2.0 μV; 1.8-30 MHz, 0.3 μV; 30-1000 MHz, 0.3 μV; 1000-1500 MHz, 0.4 μV.	Noise floor (MDS): 1.0 MHz, –101 dBm; 3.5 MHz, –132 dBm; 14 MHz, –128 dBm; 50 MHz, –118 dBm; 144 MHz, –113 dBm; 222 MHz, –124 dBm; 432 MHz, –120 dBm; 902 MHz, –120 dBm; 1240 MHz, –114 dBm.
AM sensitivity (10 dB S/N): 0.5-1.8 MHz, 10.0 μV; 1.8-30 MHz, 1.0 μV; 30-1000 MHz, 1.5 μV; 1000-1500 MHz, 1.9 μV.	AM narrow, test signal modulated 30% with a 1-kHz tone, 10 dB (S+N)/N: 1.0 MHz, 20 μV; 3.8 MHz, 0.6 μV; 53 MHz, 2.6 μV; 120 MHz, 2.3 μV; 146 MHz, 2.5 μV; 440 MHz, 1.8 μV.
FM narrow sensitivity (12 dB SINAD): 0.5-1.8 MHz, 2.5 μV; 1.8-30 MHz, 0.4 μV; 30-1000 MHz, 0.4 μV; 1000-1500 MHz, 0.6 μV.	FM narrow, 12 dB SINAD: 29 MHz, 0.75 μV; 52 MHz, 1.1 μV; 146 MHz, 0.83 μV; 222 MHz, 0.44 μV; 440 MHz, 0.69 μV; 906 MHz, 0.84 μV; 1296 MHz, 1.7 μV.
FM wide sensitivity (12 dB SINAD): 30-1000 MHz, 1.5 μV; 1000-1500 MHz, 2.5 μV.	100 MHz, 6.1 μV.
Blocking dynamic range: Not specified.	CW mode: 3.8 MHz, 49 dB; 14 MHz, 45 dB; 50 MHz, 35 dB; 144 MHz, 34 dB; 222 MHz, 52 dB; 432 MHz, 26 dB; 902 MHz, 26 dB; 1240 MHz, 39 dB.
Two-tone, third-order IMD dynamic range: Not specified.	CW mode dynamic range and third-order intercept point *Frequency (MHz)* / *Dynamic Range (dB)* / *Intercept Point[2] (dBm)* 3.8 / 53 / –53 14 / 50 / –53 50 / 50 / –43 144 / 51* / –36 432 / 51 / –43 902 / n/a[3] / n/a[3] 1240 / 49 / –40
Second-order intercept point: Not specified.	–14 dBm.
FM adjacent channel rejection: Not specified.	20 kHz channel spacing: 29 MHz, 45 dB; 52 MHz, 46 dB; 146 MHz, 33 dB; 440 MHz, 37 dB; 906 MHz, 53 dB; 1296 MHz, 41 dB.
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz channel spacing: 29 MHz, 45 dB*; 52 MHz, 46 dB*; 146 MHz, 33 dB*; 440 MHz, 37 dB*; 906 MHz, 48 dB; 1296 MHz, 41 dB*; 10 MHz channel spacing: 52 MHz, 59 dB; 146 MHz, 67 dB; 440 MHz, 55 dB.
Squelch sensitivity (threshold): Not specified.	At threshold: SSB, 14 MHz, 25 μV; FM, 29 MHz, 1.1 μV; 52 MHz, 0.62 μV; 146 MHz, 1.3 μV; 440 MHz, 0.43 μV; 906 MHz, 0.42 μV; 1296 MHz, 1.4 μV.
S-meter sensitivity: Not specified.	"45" indication[4]: 14 MHz, 23 μV; 50 MHz, 97 μV; 144 MHz, 266 μV; 430 MHz, 85 μV; 902 MHz, 14 μV; 1240 MHz, 26 μV.
Audio output: 0.2 W into 8 Ω (THD not specified).	0.21 W into 8 Ω at 12% THD.[5]
IF/audio response: Not specified.	Range at –6 dB points (bandwidth): CW: 102-2127 Hz (2025 Hz); USB: 385-2294 Hz (1909 Hz); LSB: 119-2234 Hz (2115 Hz); AM: 96-1249 Hz (1153 Hz).
Spurious and image rejection: Not specified.	IF rejection: 14 MHz, 96 dB; 144 MHz, 58 dB; 430 MHz, 44 dB; 902 MHz, 35 dB; 1240 MHz, 14 dB; image rejection: 14 MHz, 75 dB; 144 MHz, 87 dB; 430 MHz, 4 dB; 902 MHz, 0 dB; 1240 MHz, 18 dB.

Except as noted, all dynamic range measurements were taken using the ARRL Lab standard spacing of 20 kHz.
*Measurement was noise limited at the value shown.
[1]Sensitivity degrades below 0.5 MHz. Cell blocked 869-895 MHz.
[2]Intercept points were determined by noise floor reference.
[3]Could not be measured due to blocking response.
[4]Meter reads in "dB above the noise floor" according to manufacturer. Using the quasi-standard of 6 dB per S-unit, S9 equals 45 dB. The meter can be calibrated through software (see text).
[5]Output at 10% THD was 20 mW.

Figure 1—The virtual front panel of the WiNRADiO WR-1500i communications receiver. Don't let its simple appearance fool you—this receiver is packed with sophisticated capabilities.

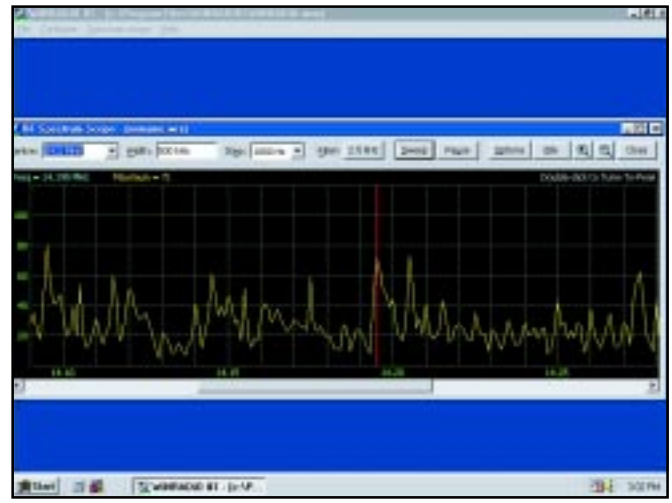


Figure 2—The '1550i's RF Spectrum Scope can sweep through a range of frequencies and generate a graph of relative signal strength. The mouse cursor can be used to instantly tune the receiver to interesting "peaks."

a good sense of its simplicity (see Figure 1).

A Tour of the Controls

The main tuning "knob" is located directly below the digital frequency display—the most prominent feature on the virtual front panel. Placing the cursor on top of the tuning knob and holding down the left mouse button varies the frequency either up or down, depending upon the position of the cursor on the knob. You can also punch in frequencies directly with the number keys on your computer keyboard. (Nearly all of the radio's controls can be alternatively operated using keyboard commands.)

There are four tuning step configurations available: fixed, auto, memory and duplex. "Fixed Stepping" is useful when tuning AM/FM broadcast stations and other "channelized" radio services. "Auto Stepping" is an enhanced form of fixed stepping where the step size and receive mode is directly dependent upon the specific frequency range you're tuning. (You set this up by typing information into a table in a submenu. It's a very simple operation.) "Memory Stepping " is used to move through the stored memory frequencies. "Duplex Stepping" makes the task of jumping between the two sides of a duplex communication a snap.

The receive mode is selected by clicking on one of six buttons located in a group to the left of the main tuning knob. Volume and squelch are controlled by two sets of up/down arrow buttons on the far right side of the front panel. Their relative levels are shown numerically, and there's even a handy MUTE button that can instantly silence the receiver.

Sensitivity is controlled by a pair of buttons located immediately to the left of the digital frequency display. The "DX" setting provides maximum sensitivity; the "local" setting activates an 18-dB attenuator that's helpful in cases of interference, intermod or overload.

Directly under the digital frequency readout is an alphanumeric comment field that displays text that relates to the tuned frequency. When the radio is in the VFO mode, for example, tuning the receiver anywhere between 14 and 14.35 MHz will bring up the message "Amateur Band (20-metre)." Programmed memories are capable of displaying any desired text—up to 34 characters in length—in this same field.

Sampling the Spectrum

The first time you power it on, the WiNRADiO receiver comes up on 10 MHz. The memories are empty and the tuning step rate is 5 kHz. WWV on 10 MHz can occasionally be a bit difficult to hear in my neck of the woods. I moved up to 15 and then 20 MHz by changing the step size from 5 kHz to 1 MHz and clicking the mouse on the up/down arrow buttons to the right of the frequency display. Hey! This is really simple.

All of the IF filters in the radio are preset for their respective modes. These are fixed—the user cannot vary the bandwidth—and this can lead to some frustration when you're trying to separate signals on a crowded band. IF/BFO shift is available in the SSB/CW modes. Some form of external active audio filtering, with notch, would be a great enhancement.

In the SSB/CW modes the BFO can be adjusted in 5-Hz steps up to 3000 Hz above or below the displayed frequency. As with most of the functions on this virtual receiver, the shift value is controlled by using up/down arrow buttons. A RESET button immediately returns the offset to the default value.

It was time for a visit to the HF shortwave broadcast portion of the spectrum—the frequencies around 5.9, 7.2 and 9.5 MHz are known to be popular shortwave watering holes. Grab the mouse—click, click, click—and there it is—BBC World Service on 5.975 MHz. WOW! This is neat! A few more clicks of the mouse and I'm listening to Deutsche Welle—The Voice of Germany—on 9.515 MHz. Oh, I'm beginning to fall for this little rig!

I tried an old shortwave listener's trick. I switched the receiver into the SSB mode and tuned in an AM shortwave broadcaster. This interference-fighting technique is commonly known as ECSS (for *Exalted Carrier Selectable Sideband*). The idea is to isolate either the upper or lower sideband portion of the AM signal within the narrower filter used in the SSB modes. This can reduce interference from nearby stations. I found this effective in several instances.

Our local police department communicates on 154.485 MHz, so I moved from

the HF to the VHF portion of the radio spectrum to give that a listen. Setting the squelch is as simple as clicking on the pair of arrow buttons that increase and decrease the squelch sensitivity. A bar graph relative signal strength meter—calibrated in dB—on the lower right hand portion of the front panel is a welcome tuning aid. By watching the peak signal, it's easy to adjust the squelch threshold to a level where it will mute the receiver and still maintain good sensitivity. This meter functions in all modes. Calibration software—*Calibration Editor*—is available for download free from the WiNRADiO Web site. This will allow you to recalibrate the meter indication independently for each mode.

Since I don't keep my handheld scanner in the shack, I decided to load up a few of the local VHF/UHF "action band" frequencies into the memories. A click of the S (store) button in the MEMORY control group brings up a submenu titled: "Store Frequency Into Memory." It's a simple matter to write the currently selected VFO frequency, mode and squelch settings into one of the WiNRADiO's memory positions, and you can assign the memory to one of 16 memory groups. A memory channel lockout feature, for locking a specific memory out of a memory scan, is available.

Serious scanner listeners will be delighted to hear that optional software is available that will allow this receiver to follow trunked communications. Information on the WiNRADiO Web page indicates that the radio can track Motorola SmartNet and MPT1327 systems.

You can store up to 1000 frequencies in each memory file, and the number of memory files that you can retain is only limited by the available space on your computer's hard drive. You access memories by clicking on the R (recall) button. This evokes the "Recall a Frequency from Memory" submenu. Highlight the desired memory in the list, click the mouse on it and the radio instantly tunes to that frequency. Another optional software package—*Database Manager*—expands the station information retained in the memory files, allows you to sort through the memory data, and lets you import frequency lists from other sources.

You can scan through the memories or a specific range of frequencies by using the buttons in the SCANNER button group. You can even set up frequencies or ranges of frequencies to exclude from a VFO scan.

"Immediate Scanning" is quick and simple. Just select the step size and then click on the left/right arrow buttons in this group and the receiver tuning will take off in whichever direction you selected, stopping on active channels.

"Frequency Range Scanning" is accomplished by using the scanning options menu and entering the start/stop frequencies, the step size, the mode and the squelch settings into a table. You can even select an "AutoStore" mode that will automatically write active frequencies directly into memories.

"Memory Scan" scans the frequencies that are programmed into the memories. The "Scanner Options" dialog box allows you to select a variety of scanning settings including the scan rate, pause/stop on active frequencies, the delay time, etc. All in all, the WiNRADiO's scanning abilities are very impressive.

Another neat feature is the RF Spectrum Scope (see Figure 2). Activate this feature and the receiver will sweep a selected frequency range and generate a graph of signal strength versus frequency. Once you've captured a trace, you hold down the mouse button and drag the cursor up and down the trace to tune around, or double click on a portion of the trace to tune to the closest signal peak. This is very handy when you're searching for interesting signals.

Digital mode fanatics may want to investigate the optional *Digital Mode Suite* package. This software product provides WEFAX, HF Fax, Packet and ACARS decode capabilities. Additional features include CTCSS squelch, DTMF decode, a "Signal Classifier" function (that can identify signals as noise, data or carrier for improved scanning), an audio oscilloscope, a spectrum analyzer and a squelch-controlled audio record and playback system.

I can't over-stress the fact that this rig is really simple to operate, which is a definite advantage. The longer it takes to become familiar with the operational characteristics of a receiver, the less time you'll spend having fun doing what you bought the radio to do—listening around the bands. The WiNRADiO folks did their homework on this one. The user interface software that they crafted for this computer-controlled radio makes it extremely user friendly.

Performance Particulars

I've always been leery of "dc-to-daylight" receivers. Trying to cover this much radio real estate in a single receiver often leads to compromises in overall performance. As the accompanying ARRL Lab test results reveal, the WiNRADiO WR-1550i receiver exhibits some less-than-spectacular performance characteristics (see Table 1). There are rather mediocre blocking dynamic range measurements. Sensitivity also suffers in some instances (notice that the AM and FM sensitivity specs are not met on several ham bands). Basically this means that the ability of the WiNRADiO to hear very weak signals, particularly in the presence of strong close-in signals, is sometimes impeded.

Does all this mean that the WiNRADiO is not a "good" receiver? Not at all. On-air usage of the WiNRADiO was, even to my seasoned tastes, quite enjoyable. I found having almost instant access to such a huge hunk of RF spectrum quite intoxicating. Add to this the absolutely fantastic computer/radio interface and this rig can deliver a tremendous amount of listening enjoyment. In fact, I was simultaneously listening to BBC World Service on 12.035 MHz reporting on the first US military strikes against the Taliban in Afghanistan while I was working on this review!

There are a couple of things that I would change on the WiNRADiO. First would be the addition of some sort of AF filtering with a tunable notch filter. Active audio filters are ultra simple to design and much less expensive than IF crystal filters. Since the audio output of this receiver can be jumpered back into your soundcard, you could make use of one of the soundcard-based audio filter programs that are currently available.

Another feature I would like to see incorporated is AGC control. There are times when it can be advantageous to turn off the AGC, especially when there are strong nearby signals that make the AGC "pump."

Would I go out and buy a WiNRADiO? If I wanted to add receive capabilities to the computer in my home office or if I was looking for a wideband HF/VHF/UHF/microwave receiver that wouldn't take up operating desk space in my shack, I would definitely consider a WiNRADiO. Although the overall performance may not be stellar, this is a very user-friendly receiver that delivered a great deal of listening enjoyment.

Manufacturer: WiNRADiO Communications, PO Box 6118, St Kilda Rd, Melbourne 3004, Australia; **www. winradio.com**. Price, WiNRADiO WR-1550i: $549.95. Optional accessories: WR-TO Trunking Option, $99.95; WR-DS Digital Suite, $99.95; WR-DM Database Manager, $49.95. See WiNRADiO's Web site or contact *QST* advertising for US dealers.

Yaesu VL-1000 Quadra Linear Amplifier

Reviewed by Mark Wilson, K1RO,
QST *Publisher*

Convenience is something that many people look for—and seem increasingly willing to pay for—in life. No time to cook dinner after work? That's no problem—there's plenty of takeout available, or your local supermarket has the widest variety of frozen dinners imaginable. Can't wait around the house for that phone call? No problem, grab your cell phone and go.

Over the years our ham stations have gotten more convenient, with solid-state transceivers, automatic antenna tuners, multiband antennas, computer control and the like. Despite the changes in station technology, many of the power amplifiers in use today require the operator to change bands manually. That's not difficult, usually involving turning the band switch and adjusting the tune and load capacitors, but it just seems like a hassle when everything else in your station happens automatically.

The VL-1000 Quadra is Yaesu's latest entry in the amplifier market, and it is designed to add a lot of convenience to your station. The Quadra is a solid-state, no-tune amplifier that uses eight MRF150 power FETs to produce 1 kW output on all amateur bands from 160 through 6 meters. The amplifier sells for about $4000 and competes with high-power auto-tune tube amplifiers from Alpha-Power[1] and ACOM,[2] and with the solid-state ICOM IC-PW1.[3]

Features

The Quadra is actually two pieces—the 46-pound VL-1000 RF deck and the 32-pound VP-1000 switching power supply. The power supply can sit on the floor or some other convenient spot, connected to the RF deck with two 6-foot cables (one carries 48 V dc from the power supply; the other carries control signals). For full power you need a 200-240 V ac supply (14 A max), but you can use it with a 120-V supply in the low power mode (500 W out). Yaesu ships US-model Quadras without an ac power connector because of the wide variety of possible configurations. A local home center had the needed plug for the 240-V ac line in my station. The Quadra detects the line voltage and adjusts itself accordingly—no jumpers or switches. I didn't try the amplifier at 120 V.

The RF deck houses the power amplifier circuitry, heat sinks, cooling fans, antenna tuner, control circuitry, and switching for up to four antennas and two transceivers. The Quadra includes extensive protection circuitry. The amplifier will take itself offline and display error messages if the temperature, SWR, drive power, drain voltage or drain current exceed the limits. It will also warn if there is an imbalance among the four power amplifier sections, if the connection between the power supply and RF deck fails, or if your transceiver is set to a different band than the amplifier. An interesting feature exercises the relays periodically when the amplifier is not in use to keep the contacts clean.

You communicate with the Quadra via an LCD panel 8 inches wide by 2 inches high, and a row of pushbuttons under the display. Most of the display is devoted to metering functions, and you switch among them using the DISPLAY SELECT switch. You can store and recall any two options as DISPLAY 1 and DISPLAY 2. Display options include various combinations of peak and average power, SWR, drain current and voltage, and frequency. The graphical SWR meter option shows a graph of SWR with the tuner in and out across the selected band. During antenna tuner adjustment, the display changes to show an SWR bar graph in the center and a graphic representation of two variable capacitors in motion. You can dim the display and adjust its contrast.

The bottom of the display shows the status of the various switches. OPERATE allows you to bypass the amplifier for barefoot operation. LOW switches the amplifier to low power (500 W). INPUT selects between two transceivers that can be connected to the rear panel. ATT switches in a 3-dB attenuator for use with transceivers that exceed 100 W. ANT switches among the four antenna jacks. TUNER switches the antenna tuner in and out, while TUNE starts the automatic antenna tuning process. F SET is used to select the band when the Quadra is not connected to a compatible Yaesu transceiver.

Connections

You can connect two transceivers to the Quadra and choose between them with the front-panel INPUT switch. If you're using a recent Yaesu transceiver (FT-920, FT-1000, FT-1000MP) with the Quadra, an 8-pin "Band Data" cable provides control signals from the radio to automatically switch the Quadra to the appropriate band, handle TR switching, and turn the Quadra's power on and off when the transceiver is switched on and off. There's a supplied ALC cable (phono plugs) to connect to the transceiver's ALC jack to prevent overdriving the Quadra. Transceiver antenna connections are handled by SO-239 jacks labeled INPUT 1 and INPUT 2. BAND-DATA 2 has the same band information as BAND-DATA 1, plus additional pins to close the transceiver's

Bottom Line

The Yaesu VL-1000 Quadra 1 kW amplifier is a great way to boost your signal on all bands from 160 to 6 meters. Although it's designed to work smoothly with Yaesu transceivers, you can use it in any station.

[1]Notes appear on page 76.

Table 2
Yaesu VL-1000, serial number 0K220026

Manufacturer's Claimed Specifications	Measured in the ARRL Lab
Frequency range (US units): 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,[1] 28-29.7,[1] 50-54 MHz.	As specified.
Power output: 1000 W PEP, all modes.[2]	As specified for SSB and CW.
Drive power required: 50-80 W.	Typically 40 W (band dependent).
Input SWR: 1.5:1 or better.	Typically 1.0:1.
Output matching: 16-100 Ω on 160 meters, 16-150 Ω on 80-10 meters and 25-100 Ω on 6 meters.	As specified.
Spurious signal and harmonic suppression: 50 dB for HF, 60 dB for 6 meters.	60 dB on HF and 6 meters.
Intermodulation distortion (IMD): better than –30 dB typical.	See Figure 3.
Primary power requirements: 100-234 V ac (VP-1000 power supply).	
Size (HWD): VL-1000 RF deck, 5.9 × 16.3 × 17.8 inches; weight, 46 lb. VP-1000 power supply, 5.9 × 16.3 × 15 inches; weight, 32 lb.	

[1]See text.
[2]On 200-240 V ac; de-rated to 500 W on 100-120 V ac.

PTT input line when the Quadra's F-SET button is pushed. If you're not using a Yaesu transceiver, you would use a phono cable for TR switching (PTT 1 or PTT 2) and not use the BAND DATA jacks. You also have to use the Quadra's front-panel switch to turn the power on and off.

The Quadra includes connections and switching for up to four antennas, and the control circuitry remembers which antenna is used for each band. In my station, I used these connectors for my multiband beam (20-10 meters), 40-meter dipole, 80-meter inverted V and 6-meter Yagi. When the amplifier is off, antenna "1" is connected to your transceiver.

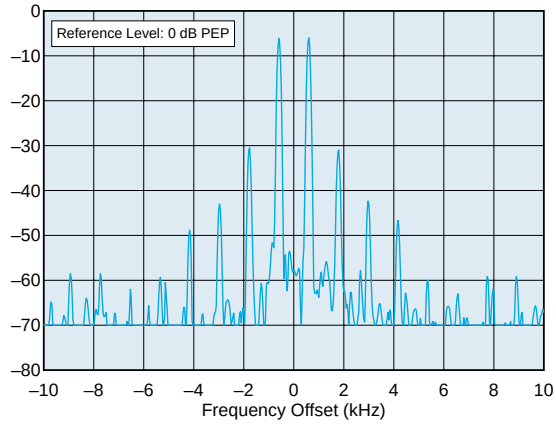


Figure 3—Worst-case spectral display of the Yaesu VL-1000 Quadra amplifier during two-tone intermodulation distortion (IMD) testing. The worst-case third-order product is approximately 32 dB below PEP output, and the worst-case fifth-order product is approximately 44 dB down. The amplifier was being operated at 1 kW at 14.010 MHz. The levels of the third- and fifth-order IMD products are higher than those we have observed on other recently reviewed tube-type amplifiers.

Using the Quadra

The US version of the Quadra is shipped without 10- and 12-meter operation enabled because of FCC regulations. To enable 10- and 12-meter operation, you need to contact Yaesu's service department and provide verification of your amateur license, and they will send details. The operation is not difficult and involves internal jumpers and some programming via the front panel.

I used the Quadra with a Yaesu FT-1000D and an ICOM IC-746. The interconnections were straightforward—INPUT 1, ALC 1, PTT 1, BAND-DATA 1 for the FT-1000, and INPUT 2, ALC 2 and PTT 2 for the IC-746.

Once everything is hooked up, the manual advises you to check the drive power. The Quadra wants to see 50-80 watts for normal operation. If your transceiver is capable of more than 100 W output (like my FT-1000D), use the front-panel ATT control to enable the input power attenuator. Although the ALC level is set to work with Yaesu transceivers, I needed to adjust it slightly to get full 1000 W output with my FT-1000D. That involves entering the "ALC alignment mode" and watching the front-panel display while using the DISPLAY 1 and DISPLAY 2 buttons to increase or decrease the ALC voltage. ALC adjustments for the two inputs are independent of each other. The ALC range is 0 to –10 V dc, which is also compatible with my IC-746 and most other modern transceivers.

The next step is to go through each band, select the appropriate antenna, and adjust the antenna tuner if necessary. The Quadra remembers which antenna you last selected for each band, whether or not the antenna tuner was used, and the last tuner setting that was programmed.

The Quadra will put out full power into an SWR of up to 2:1, so you don't need to use the tuner in many situations. A nice feature is that if the antenna SWR reaches 2:1 and you're not using the tuner, the Quadra folds back into the low-power mode but still puts out 500 W. When the SWR goes below 2:1, the amplifier goes back to high power. The Quadra continues to work in the low power mode until the SWR reaches 3:1; at that point it takes itself offline and issues a high SWR warning via the front panel display.

The built-in antenna tuner can match 16 to 100 Ω on 160 meters, 16 to 150 Ω on HF and 25 to 100 Ω on 6 meters. The tuner came in handy for phone operation with my 40-meter dipole, which is cut for the CW end of the band. I also needed it for some segments of 15 and 20 on my Cushcraft X7 multiband beam. The X7 works on 12 and 17 meters but has an SWR near 3:1 on those bands. The Quadra's tuner had no problem coming up with a good match. The tuner can be used when the amplifier is in standby.

During the course of our evaluation

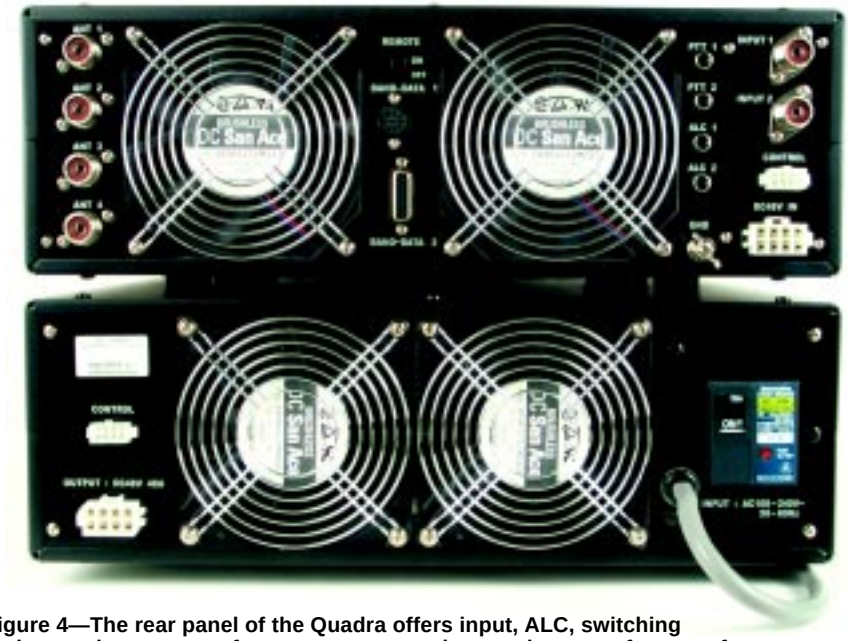


Figure 4—The rear panel of the Quadra offers input, ALC, switching and control connectors for two separate exciters and outputs for up to four antennas.

period, the ARRL Lab received correspondence from a member who reported experiencing some unusual behavior from his VL-1000 when transmitting on 80 or 160 meters. The Quadra includes several cooling fans, and apparently when the amplifier is operated at full output on those bands, stray RF inside the amplifier enclosure causes a noticeable decrease in the motor speed of the fan that cools the antenna tuner subassembly. The member—in the finest of ham tradition—had fashioned an RF shield for the fan motor that eliminated the problem.

Our lab tested two different Quadras (with the amplifiers connected to antennas and to dummy loads) and observed similar fan motor behavior. Yaesu is investigating the problem, but states that during typical transceive operation the short-term decreases in cooling air flow are unlikely to result in failures.

The one aspect of operation where the Quadra could be more convenient is band changes. Although the Quadra tracks the band selections from my FT-1000D, it doesn't track frequency changes within the band. For example, if I am on 14.025 and switch to 14.250, the frequency display on the Quadra doesn't change and the tuner settings don't change to the right ones for phone.

To change frequency, you set your transceiver to RTTY or another carrier mode and press the F-SET switch. If you have the BAND DATA 2 cable hooked up as shown in the manual, the Quadra keys the PTT on your transceiver. If not, you need to press the F-SET switch and then put your transceiver into transmit. The amplifier samples the incoming RF and makes the adjustment. This is also the procedure to change bands if you are using a non-Yaesu transceiver. There are no front-panel band-selection controls.

If you need to use the tuner, press the TUNE switch (again with the transceiver in RTTY or another carrier mode) and the amplifier will tune itself up in a few seconds. The amplifier remembers the last tuner setting that you used for a band. For example, if you have the tuner set for 40-meter SSB, move to 15 meters and then back to 40 SSB, the Quadra remembers the 40 SSB settings. But if you move to the CW end of 40, you have to use the F-SET or TUNE switch to retune. On bands where my antenna is broad enough to do without the tuner, or on the narrow 17- and 12-meter bands where one setting works across the band, this isn't an issue.

The other high-power autotune amplifiers on the market are a little more "automatic." The ACOM and Alpha 87A products sense the drive frequency and preset the tuning/loading capacitors really quickly (sending a dit on CW or speaking a syllable on phone will usually do it). The ICOM IC-PW1 tracks operating frequency via the CI-V system and updates the tuner settings to saved values. It would be great if the Quadra used its internal frequency counter to automatically track frequency changes, or if there was a more direct way to change bands from the front panel other than the F-SET or TUNE procedure.

During the review period, I gave the Quadra a workout on all bands, including a serious effort in the ARRL RTTY Roundup and time in several other CW and phone contests. The manual seems to recommend the low power mode for RTTY "to prevent overheating during continuous operation for several hours." The specifications say the amplifier can transmit continuously for 1 hour at 500 W. RTTY contesting isn't nearly that demanding—more like 5-10 second transmissions with listening periods in between. I ended up using the Quadra at full power for RTTY contests and saw no evidence of overheating. (Had it overheated, one of the error messages would have indicated the need to reduce power or shorten transmissions.) The Quadra's fans are quiet, even when they kick into high gear after you've been transmitting for a while.

The Quadra proved its versatility late in October and November of 2001 when 6 meters opened again. My setup—the IC-746 and a 5-element M^2 Yagi at 45 feet, not on a hill—is not real competitive, but it gets me on the band. Pileups have been frustrating, and it's often difficult to get through when conditions are marginal. After a particularly difficult time getting through the pileup to D44TD, I hooked up the Quadra for 6-meter operation and had a kW out right away. After that it was a lot easier to work through pileups when conditions weren't great, and to get responses to CQs. Now I just need to hear better.

I liked the Quadra a lot. Most of the time it was a convenient extension to my Yaesu transceiver. Although it doesn't run the full legal limit, it's within 1.5 dB. For my interests, the 6-meter capability is worth a lot, as is the internal antenna tuner to deal with my multiband antennas (especially on 12 and 17 meters) and the antenna switching. It would be nice if it was less awkward to changing bands with non-Yaesu radios, and if the amplifier and tuner settings tracked operation within a band.

Manufacturer: Yaesu USA, 17210 Edwards Rd, Cerritos, CA 90703; tel 562-404-2700; fax 562-404-4828; **www.yaesu.com**. Manufacturer's suggested retail price: $5990. Typical current street price, $4000.

Notes

[1]"Product Review: AlphaMax and Alpha-Remote for the Alpha 87A," *QST*, Aug 2000, pp 73-74; "Product Review: ETO Alpha 87A MF/HF Linear Amplifier," *QST*, Jun 1992, pp 53-56.

[2]"Product Review: ACOM 2000A HF Linear Amplifier," *QST*, May 2000, pp 64-66.

[3]"Product Review: ICOM PW1 Linear Amplifier," *QST*, Feb 2001, pp 85-87. QST

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

[In order to present the most objective reviews, ARRL purchases equipment off the shelf from dealers. ARRL receives no remuneration from anyone involved with the sale or manufacture of items presented in the Product Review, Short Takes or New Products columns.—*Ed.*]

The ARRL-purchased Product Review equipment listed below is for sale to the highest bidder. Prices quoted are minimum acceptable bids, and are discounted from the purchase prices. All equipment is sold without warranty.

Ameritron ALS-600 solid state HF amplifier, serial number 12727 (see "Product Review," Aug 2001 *QST*). Minimum bid: $750.

AOR TDF-370 DSP multi-media terminal, serial number 01-00060 (see "Product Review," Sep 2001 *QST*). Minimum bid: $215.

ICOM IC-V8 2-meter FM handheld transceiver, serial number 01702 (see "Product Review," Nov 2001 *QST*). Minimum bid: $110.

Ranger Communications RCI-2970DX 10/12-meter transceiver, serial number T1M00426 (see "Product Review," Oct 2001 *QST*). Minimum bid: $285.

Ten-Tec Model 416 Titan II HF amplifier, serial number 02C10070 (see "Product Review," Sep 2001 *QST*). Minimum bid: $1975.

Ten-Tec Model 526 6N2 multimode VHF transceiver, serial number 04C10421 (see "Product Review," Oct 2001 *QST*). Minimum bid: $470.

W2IHY Technologies 8-band audio equalizer and noise gate (see "Short Takes," Dec 2000 *QST*). Minimum bid: $165.

Yaesu FT-7100M dual-band FM mobile transceiver, serial number 1D040208 (see "Product Review," Aug 2001 *QST*). Minimum bid: $295.

Sealed bids must be submitted by mail and must be postmarked on or before Mar 1, 2002. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In the case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

In your bid, clearly identify the item you are bidding on, using the manufacturer's name and model number, or other identification number, if specified. Each item requires a separate bid and envelope. Shipping charges will be paid by ARRL. Please include a daytime telephone number. The successful bidder will be advised by telephone or by mail. Once notified, confirmation from the successful bidder of intent to purchase the item must be made within two weeks. No response within this period will be interpreted as an indication of the winning bidder's refusal to complete the transaction. The next highest bidder will then have the option of purchasing the item. No other notifications will be made, and no information will be given to anyone other than successful bidders regarding the final price or the identity of the successful bidder. If you include a self-addressed, stamped postcard with your bid and you are not the high bidder on that item, we will return the postcard to you when the unit has been shipped to the successful bidder.

Please send bids to Bob Boucher, Product Review Bids, ARRL, 225 Main St, Newington, CT 06111-1494. QST

Two from IZ8BLY: *Stream* and *Vox Recorder*

Stream

Have you been hearing musical signals around 14.080 MHz? If so, you've probably been listening to MFSK16, one of the latest in a series of sound-card-based HF digital modes. Like RTTY and PSK31, MFSK16 is a keyboard-to-keyboard "conversational" mode. MFSK16 does not guarantee 100% error-free copy, but it offers remarkable performance under difficult conditions.

I won't go into the technical details of MFSK16 itself (Murray Greenman, ZL1BPU, covered that ground in his January 2001 *QST* article, "MFSK for the New Millennium"), except to point out that this is a robust, multi-tone digital system that occupies only 350 Hz of spectrum. The multi-tone nature of MFSK16 creates signals that sound like carnival music; they're easy to spot on the bands.

Nino Porcino, IZ8BLY, created the software that brought MSFK16 to the amateur community. His *Stream* freeware package for *Windows* runs on just about any sound-card-equipped Pentium PC, 100 MHz or faster. Transmit/receive switching is handled via the computer's COM port using either a homebrew interface, or one of the RIGblaster, Tigertronics or MFJ commercial interfaces. Audio is routed to and from the sound card directly, or through the interface.

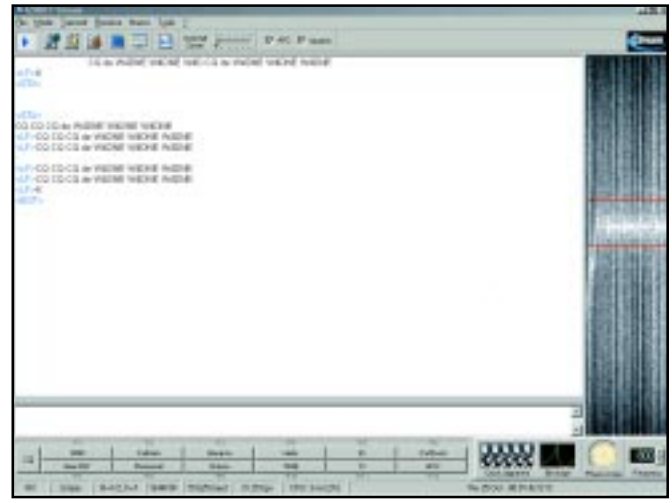
Stream provides macro buttons for all sorts of "canned" messages—CQ, BTU, sign off and so on. Between the buttons and the various status indicators, the *Stream* window may seem quite "busy." Don't let this intimidate you—using *Stream* is much easier than it looks. The display that needs your attention is the horizontally scrolling waterfall along the right-hand side of the window.

You simply tune your SSB transceiver until the jagged lines of an MFSK signal appear somewhere in the waterfall, preferably near the middle. Then, you place your mouse cursor in the waterfall and drag the two horizontal tuning lines up or down until they bracket the signal along the top and bottom. Left click the mouse once and *Stream* will attempt to lock in and begin decoding.

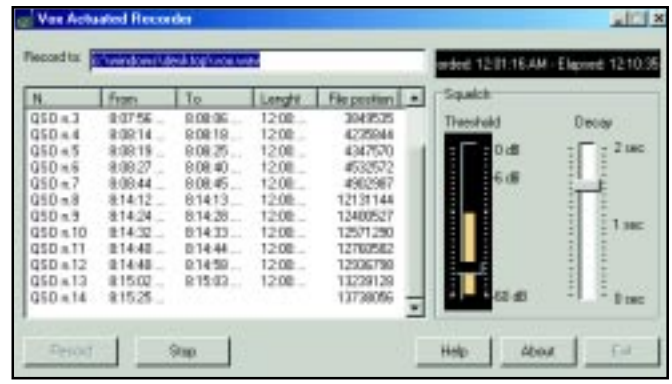
You'll need some patience at this point. Coherent text won't appear in the *Stream* receive window for about 4 seconds. If you still see nothing (or gibberish) after 4 seconds, you need to reposition the tuning lines and try again. I found that with some practice I was able to properly tune MFSK16 signals on the first or second attempts.

Stream has a built-in AFC that will compensate for drift up to about 7 Hz, but you still need to use reasonably stable radios. I've used *Stream* with several late-model rigs without difficulty.

MFSK16 activity is sparse compared to PSK31, but on the weekends I can usually find someone to chat with around 14.080 MHz. It's fascinating to listen as the signals fade almost to silence, only to find that you are still copying readable text!



***Stream* MFSK16 software for *Windows* by IZ8BLY.**



***Vox Recorder* logs activity on 6-meter FM.**

Vox Recorder

Vox Recorder is a neat little *Windows* application from IZ8BLY that allows you to record activity when you are away from the radio. As the name implies, this is sound-activated recording.

All you need to do is feed the audio from your radio to the line or microphone input of your PC sound card. Fire up *Vox Recorder* and set the *threshold*—the audio level that triggers *Vox Recorder* to begin creating files. You can also set the *decay*—the amount of time *Vox Recorder* waits before closing the current file (up to 2 seconds). Simply click on the RECORD button and *Vox Recorder* swings into action.

Each time a signal breaks the threshold, *Vox Recorder* will begin writing an audio WAV file to the designated directory on your hard drive. Additional recordings are appended to the same file. In *Vox Recorder's* status window you'll see a log (including date and time) of each recording.

You can do interesting things with *Vox Recorder*. I set it up to monitor activity on 6-meter FM at 52.525 MHz and 10-meter FM simplex at 29.600 MHz. You'd be amazed at what goes on when you're not at your station!

Download 'Em Today

Both *Stream* and *Vox Recorder* are completely free for downloading from Nino's Web site at **iz8bly.sysonline.it/index.htm/**. If you're looking for a new mode and a useful monitoring tool, both of these applications are worth your attention. QST

Steve Ford, WB8IMY ♦ *QST* Editor