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QST Compares: A Pair of "Six-Shooters"—the Alinco DR-M06 and Azden PCS-7500H 6-Meter FM Mobile Transceivers

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QST Compares: A Pair of "Six-Shooters"—the Alinco DR-M06 and Azden PCS-7500H 6-Meter FM Mobile Transceivers

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Time was that if you wanted to get on 6-meter FM, you had to resort to building your own gear. Or you had to convert a radio originally intended for commercial service. You'll still run into some of these sets. For example, during this review, we had a repeater QSO with a ham whose radio had come from a public works truck that had one day managed to end up at the bottom of a lake! This enterprising ham obtained the soggy radio, dried it out with a hair dryer, cleaned it up, found out it still worked, and converted it for ham use.

These days, you needn't go to such extremes. Getting on 6-meter FM is as easy as contacting your local Amateur Radio dealer and ordering a radio right off the shelf. Here, we consider a couple of possible choices: The Alinco DR-M06 and the Azden PCS-7500H 6-meter FM mobile transceivers.

Alinco DR-M06

Alinco markets the DR-M06 as a radio for those who might be "weary of regular contacts on the 2-m/70-cm bands." Indeed, it didn't take us long to find out that 6-meter FM can be a lot of fun!

Our first impression of the Alinco DR-M06 was that it was quite compact. Unlike the Azden, with its larger heat sink (for its 50-W amplifier), the Alinco can fit into the smallest of spaces (for example, into the cramped quarters offered by new cars, where under-dash space is at a premium).

The 'M06 display is quite good, especially considering that such a tiny radio has to pack lots of things into a small display, by necessity. The Alinco's display offers bold 0.3-inch digits on a light amber background. We noted, however, that the display sometimes was difficult to read from certain angles when the radio was mounted in a vehicle. A single horizontal LED bargraph serves double duty as an S meter and relative-output indicator.

Bottom Line

You'll find lots of FM fun packed into these 6-meter mobiles.

Table 1
Alinco DR-M06, serial number T001224

Manufacturer's Specifications	*Measured in ARRL Lab*
Frequency coverage: Receive and transmit, 50-54 MHz.	As specified.
Power requirements: receive, <800 mA, (squelched); transmit, ≈3 A (high), at 13.8 V (± 10%).	Receive, 510 mA (max volume, no signal); transmit, 2.5 A (high), 1.1 A (low), tested at 13.8 V.
Size (height, width, depth): 1.6×5.6×4.6 inches; weight, ≈1.5 lb.	
Receiver	*Receiver Dynamic Testing*
Sensitivity: For 12 dB SINAD, –16 dBμ (0.158 μV).	For 12 dB SINAD, 0.15 μV.
Two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset from 52 MHz, 68 dB.* 10 MHz offset from 52 MHz, 94 dB.
Adjacent-channel rejection: Not specified	20 kHz offset from 52 MHz, 68 dB.
First IF rejection: Not specified.	>120 dB.
First IF Image rejection: Not specified.	79 dB.
Squelch sensitivity: Not specified	0.07 μV at threshold.
Audio output: >2.5 W at 10% THD into 8 Ω.	3.1 W at 1% THD into 8 Ω.
Transmitter	*Transmitter Dynamic Testing*
Power output (high/low): ≈10 W/≈1 W.	11.4 W/1 W.
Spurious signal and harmonic suppression: at least –60 dBc.	As specified. Meets FCC requirements for spectral purity
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch off, ≈145 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	≈83 ms.

*Measurement was noise limited at value shown.

The concise, 28-page bilingual *Instruction Manual* (14 pages each in English and Japanese) received its share of positive comments—the only fault being that it contains no mention of packet radio (and, yes, there *are* some people who operate 6-meter packet). Aside from that lack, the manual was otherwise complete, and reviewers judged it easy to use.

We found programming the little Alinco radio to be a snap. One ham called it "simple enough even for first-time users." Alinco apparently tried to keep it simple—and they succeeded quite well. It's relatively easy to program any of the radio's single bank of

100 memory channels. You begin by pressing the **M/VFO** button to get into VFO mode, then dial in a receive frequency (you can use the VFO knob or the **UP/DOWN** keys and/or the **MHz** button to enter a frequency). Then, set the required repeater shift (**+** or **–**), repeater offset frequency (up to 15.995 MHz), and CTCSS (subaudible) tone, if required. Finally, press the function (**FUNC**) key and use the VFO knob to select an available memory channel. Press the memory write (**MW**) key, and you're done. While we're not sure why you'd need 100 memory channels—unless, perhaps, you travel a lot to different parts of the country—we did find programming the Alinco to be much easier than the Azden.

Alinco provides a way to reset the 'MO-6 to its factory defaults and erase all memory channels. Simply hold in the function (**F**) key and turn the radio on to force a "hard" microprocessor reset. (The Azden radio has no similar provision.)

The DR-M06 has two scanning modes, VFO and memory. Both scan modes stop for up to five seconds if the radio hears a signal. You can set a priority frequency or memory for scanning.

A front-panel high-low switch (**H/L**) on the DR-M06 lets you select either 10 W or 1 W output. The display indicates **LOW** when you choose low power. We generally left the radio set for 10 W, which worked okay for local repeater use. (If the repeaters in your area are right nearby, you might find 1 W will do the trick; we didn't try it here, however.) Nevertheless, while using the DR-M06, we sometimes wished for a bit more power when trying to access distant repeaters here in hilly New England. Enhanced propagation and a good antenna can make all the difference in the world, however.

One Saturday when Peter, KB1HY, was at home using his six-element, monoband Yagi to check out 52.525 FM simplex, he was lucky enough to catch a band opening and worked a station in Florida! So, yes, it *is* possible to work some relatively long-haul "DX" on 6-FM with a 10-W radio. This is one of the reasons that 6 meters is fondly referred to as "the magic band."

Overall, the Alinco DR-M06 received good grades for its compactness, ease of programming and concise *Instruction Manual.* A time-out timer is included; it can be set from 0 to 450 seconds (7.5 minutes). This handy feature can help you avoid the embarrassment of timing out the local repeater. By using the Alinco's timer, you time out *your* radio before you time out the repeater!

While some of us would have liked a lighted keypad on the Alinco, the condenser microphone is rounded and more comfortable than the Azden's, and the keypad buttons are easy to use. For other ops, the only shortcoming of the Alinco DR-M06 might just be its maximum output of 10 W. Again, we found that works fine to access local repeaters while mobile. A small linear amplifier can give you a boost if you feel you need it. Overall, this little radio works very well.

Manufacturer: Alinco Electronics Inc, 438 Amapola Ave, Unit 130, Torrance, CA 90501; tel 310-618-8616; fax 310-618-8758. Manufacturer's suggested retail price, $381.

Azden PCS-7500H

If you've seen the Azden PC-7000H 2-meter mobile radio, you already know what the PCS-7500H looks like. The Azden PCS-7500H looks just like its various siblings for other bands. Azden makes similar mobile transceivers for 10 meters through UHF bands. Considering that the Azden PCS-7500H is a 50-W radio, it's quite compact. While the Azden is roughly the same height and width as the Alinco, it's nearly 3 inches deeper.

The Azden '7500H has a pleasant LCD display with 0.3-inch black numerals on a dark amber background. Rounding out the generally handsome display is a horizontal LCD bar-type meter that serves as an S meter on receive and as a relative-output indicator during transmit.

What's *missing* from the front panel is a VFO (tuning) knob! To move around the band, you must use separate UP/DOWN arrow buttons that allow you to step through the band in either 5-kHz or 1-MHz increments (you can change the default tuning step size). Azden calls this system "feather-touch" tuning. While this system works just fine, our reviewers would have preferred an honest-to-goodness, old fashioned, round VFO knob.

The 21-page *Owners Manual* is straightforward and complete. The text provides easy-to-follow steps for most tasks and, when necessary, helpful pointers to find related information. Like the Alinco DR-M06 manual, the Azden PCS-7500H manual says nothing about using this radio for packet. A separate document included with the manual contains both schematic and block diagrams for the PCS-7500H.

Table 2
Azden PC-7500H, serial number C352528

Manufacturer's Specifications	***Measured in ARRL Lab***
Frequency coverage: Receive, 46-54 MHz; transmit, 50-54 MHz.	As specified.
Power requirements: receive, 600 mA; transmit, 10 A (high), at 13.8 V (± 15%).	Receive, 600 mA (max volume, no signal); transmit, 8.3 A (high), 3.8 A (low), tested at 13.8 V.
Size (height, width, depth): 2×5.5×7.3 in; weight, 3 lb.	
Receiver	*Receiver Dynamic Testing*
Sensitivity: For 12 dB SINAD, 0.19 μV or less.	For 12 dB SINAD, 0.14 μV
Two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset from 52 MHz, 75 dB. 10 MHz offset from 52 MHz, 110 dB.
Adjacent-channel rejection: Not specified	20 kHz offset from 52 MHz, 81 dB.
First IF rejection: Not specified.	>120 dB.
First IF Image rejection: Not specified.	97 dB.
Squelch sensitivity: <0.12 μV at threshold.	0.04 μV at threshold.
Audio output: ≥2 W at 10% THD into 8 Ω.	2.8 W at 10% THD into 8 Ω.
Transmitter	*Transmitter Dynamic Testing*
Power output (high/low): 50 W/10 W	55 W/11 W.
Spurious signal and harmonic suppression: at least –60 dBc.	As specified. Meets FCC requirements for spectral purity
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch off, 250 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	≈60 ms.

They call this *wireless*?

For mobile installations, we advise wiring the radio's dc power leads *directly* to your vehicle's battery. Be sure to fuse *both* the positive and the negative leads right at the battery. A direct battery connection helps eliminate a couple of potential problems. Tapping into the wiring harness or (Heaven forbid!) using the cigarette lighter increases the likelihood that your radio will receive noise from, or transmit RF into, your vehicle's electrical systems. You also might discover such makeshift connections suffer from excessive voltage drop. For more mobile installation tips, see "Mobile Installations and Electromagnetic Compatibility" (Lab Notes, *QST*, Mar 1995, p 74).

Alinco provides you with a dc power cord that's more than eight feet long with the DR-MO6, and Azden provides one that's more than five feet long with the PCS-7500H. Even so, you still may find you need to extend the stock power leads to reach your vehicle's battery. If so, be sure to use wire that's sized for the maximum amount of current the radio can draw. Today's microprocessor-controlled rigs can do strange things when the supply voltage drops due to inadequate wiring! The ARRL Lab found that both of these radios still worked okay at 11.5 V, however, although power output was down slightly. (For more information on all aspects of mobiling, check out the ARRL publication *Your Mobile Companion*.)—*Glenn Swanson, KB1GW*

Programming the two banks of 10 memories (20 total) in the PCS-7500H turned out to be a bit of a chore. Our advice: Don't attempt to program this radio on the fly (ie, while mobile). Why not? Because it takes lots of steps to program. For example, to program in a repeater's output frequency, you first press the function (**F**) key, then the program (**PROG[WR]**) key. Then you dial up an empty memory channel using the UP arrow key and press the program (**PROG[WR]**) key again. The frequency display will blink, indicating that you should enter the repeater's output frequency (your receive frequency). Now you press the function (**F**) key and use the **UP/DOWN** arrow keys to input the first two digits of the repeater's output frequency (say, 53 MHz). Wait three seconds until you hear a beep, then use the **UP/DOWN** arrow keys to input the remaining three digits of the repeater's receive frequency (say, 575 kHz). And those are just the steps required to store the repeater's *output* frequency. We've yet to store any CTCSS tones (if needed). That takes three more steps. Nor have we programmed in a repeater's input frequency (your transmit frequency); that adds several more steps you'll need to perform to complete the process of programming just *one* of the radio's 20 memories.

One op attempted programming the '7500H while at home—where there were fewer distractions than in mobile operation. In that more-relaxed atmosphere, he reported that the Azden was fairly easy to program "even after a couple of glasses of wine."

You might want to program your favorite repeater frequencies into memory channel A0. You can access this "call" channel from either the front panel or the microphone. Unlike most FM mobile radios we've used, this radio defaults to the *same* memory channel (A0) every time you power it up, instead of to the last-used memory channel. If your favorite frequency is in any other memory, you'll need to dial up that memory channel *each and every time* you turn the radio on!

In addition to the 20 standard memories, Azden includes a single "temporary" (or scratch-pad) memory. It's good for storing such things as a repeater's output frequency or a simplex frequency that you might happen upon while scanning, for example. The Azden offers both delay and hold scan modes. Delay mode monitors an occupied channel for six seconds, then moves on.

The PCS-7500H offers extended-range receive capabilities, covering 46 to 54 MHz (50 to 54 MHz on transmit), and it's modifiable for MARS and CAP coverage, too. Contact Azden for information on these modifications. We found in ARRL Lab testing that the '7500H can actually tune and hear a little bit outside of its specified range, but the useful sensitivity drops off pretty rapidly once you do.

One minor complaint: The rectangular, clunky-feeling dynamic hand mike was quite a handful and a bit awkward to hold. On the other hand, it does offer a sizable lighted keypad, and that feature won plenty of praise.

During extended transmit sessions, we noticed that the built-in fan on the back of the '7500H came on when the radio got warm. Indeed, the rear right-hand quadrant of the radio does get *quite* warm when you transmit a lot. The cooling fan keeps things under control, however, and we noted no adverse effects from this increase in temperature. (If the radio should sense a high SWR at the antenna port, it will default to memory A0 and emit a "beep" to warn you of a high-SWR condition.)

Azden strongly cautions against tampering with the PCS-7500H to increase its power output, as some owners have done. The manufacturer says such a modification could very likely have unfortunate consequences, degrading your radio's spectral purity and shortening the life of the output transistors.

Overall, this radio worked well and we enjoyed the advantages of 50 W. Once over the programming hump, we found it was fun to use, and the radio received uniformly good reports.

Manufacturer: Azden Communications Division, 147 New Hyde Park Rd, Franklin Square, NY 11010; tel 516-328-7501; fax 516-328-7506. Manufacturer's suggested retail price, $389.

Conclusions

We admit that some of us involved with this review initially had our doubts as to how much activity we'd find on 6-meter FM—even here in New England where 6 meters is fairly heavily used. We certainly found more FM activity than we'd expected to find! We even discovered that 6-meter FM is a very popular mode for links to other bands. For example, on his way to work one morning, Peter, KB1HY, checked into a repeater in north-central Connecticut where he was greeted by George Murphy, K3RQ, who was mobile in New Hampshire. Peter at first thought there might be a band opening, until he learned that K3RQ was using a 440-MHz FM radio to access a repeater with a cross-link to 6 meters! Peter said this added a new twist to repeater operating. "While I've always had a 2-meter FM rig in my truck, I found that operating on 6-meter FM was so much fun that I hardly ever listened to 2 meters anymore!"

Those who work VHF in major metropolitan areas with lots of 6-meter activity will be pleased to note that ARRL Lab tests reveal the Azden's adjacent channel rejection is 81 dB, quite good for a radio in this class. The Alinco radio posted a respectable 68 dB (see Tables 1 and 2).

On-the-air checks with both radios revealed transmit audio to be extremely good—both during repeater use and on 52.525-MHz simplex. Receive audio output was adequate, especially considering the understandably small speakers. A good external speaker might be a useful accessory.

During ARRL Lab tests, both radios exhibited a little quirk in their respective low-power positions. When you transmit, the power initially spikes well above the low-power specification, in excess of 7 W in the Alinco and approaching the full 50 W of power in the Azden. This could present problems if you're driving an amplifier that's expecting the specified "low-power" level.

What do we think after using this pair of *six-shooters* out on the range? For those with a *clean shot* to a 6-meter repeater, the Alinco DR-M06—with its 10 W of output power—will do just fine. It also has lots more memories than the Azden. (CTCSS tone decoding is available as an option for both units, by the way.) For those who need a bit more *firepower*, the Azden PCS-7500H, with its 50 W, should fit the bill. Either way, one of these hot little *pistols* should help you find plenty of fun on 6-meter FM. As always, we recommend trying out each radio, or at least checking out the instruction manual, before making a decision.

Our thanks to the following hams for their invaluable input to this review. Rick Lindquist, KX4V; Andrea Sadler, N1PYI; and Mike Gruber, WA1SVF, in the ARRL Lab.

Brian Beezley, K6STI, *RITTY 1.0* Radioteletype Program

Reviewed by Larry Wolfgang, WR1B
Senior Assistant Technical Editor

Radioteletype is a fun mode. Baudot RTTY is simple to operate, with no complicated switching schemes or timing sequences to worry about. You just type on the keyboard and send messages back and forth with other hams. Early RTTY operators obtained surplus teletype machines. Later, simple terminal units with a key-board and display were popular. Eventually, personal computers and microprocessors led to the development of more robust systems, such as AMTOR, packet, and combinations like PACTOR and G-TOR, which use modern multimode communications processors. For all their added error-checking-and-correcting features, though, it is still hard to beat Baudot RTTY for keyboard-to-keyboard chats. After all, who is to say if that "error" on your screen was caused by propagation or the radio system or by the operator simply hitting a wrong key? And what difference does it make, as long as you can still decipher the communication?

Brian Beezley, K6STI, has developed an innovative piece of software to bring back some of the simple joy of radioteletype operation. To use Brian's *RITTY* program, you will need an IBM-compatible computer system with at least a '386 DX/40 processor with a coprocessor (a '486 DX/40 or better is recommended) and a Creative Labs Sound-Blaster 16 or Vibra 16 sound card. But, that's *all* you need, in addition to your radio, of course. The program uses your PC's computational capabilities to create what we might call a "virtual modem." Simply connect the audio output of your radio to the line input of your SoundBlaster, then connect the audio output from the sound card to your radio's microphone input, and you're ready to go! The connections were really simple with my Kenwood TS-820. That radio has phone-patch input and output connectors, and they proved to be the perfect connection points.

The first display you will want to use when you start *RITTY* is the tuning indicator that shows up in the lower left-hand corner of the screen. It's like a small spectrum-analyzer display. The sound card and software perform a fast Fourier transform on the audio input signal, separating the audio signal into various frequency components. As you tune across a RTTY signal, the mark and space tones show up as two peaks on the display. Just tune the radio until the two peaks align with the two purple marks on the baseline. The purple marks indicate the positions of the DSP mark and space filters. The Options menu allows you to select the FSK center frequency and shift from among the common options. You can also fine tune the filter positions with the keyboard to accommodate variation in the equipment in use.

With a signal properly tuned on the radio, you should begin to see understandable text flow across the top half of your screen. At that point you will probably also notice a second graph, in the lower right-hand corner of the screen. This one is fun to watch, although it is more of a curiosity than a useful indicator. Each mark element is shown above the horizontal axis, and each space element is shown below it. This graph depicts the start, stop and data bits of each character.

Menu Options

Hit any key and a menu of options appears. From the Receive Options menu (see Figure 1) you can set the baud rate, select the filter center frequency, tell the program to ignore isolated line-feed characters (which are often received in error and result in prematurely jumping down a line) and turn the "unshift on space" feature on or off, among several other options. A couple of innovative display options are included. The "Display Both Cases" command prints one line of characters as the program has received them and a second line in which the LTRS and FIGS cases have been reversed. This could be useful if, for example, a LTRS or FIGS character was lost in a static crash, causing the normal text to print garbled. In that case the opposite case will be the correct text being sent. The "Show Control Codes" command instructs the program to show a special character for each LTRS, FIGS, carriage return, line feed and other control characters received. It is very interesting to monitor a variety of signals and watch the way various control codes are included.

Another interesting Receive Option is the "Numerical Flywheel" selection, which you can turn on or off. With this feature turned on, the program attempts to lock its timing to the received signal timing. If a noise pulse or deep signal fade occurs that would cause the modem to have missed a start or stop pulse, the numerical flywheel substitutes an imitation timing pulse to maintain synchronization. This essentially allows you to receive asynchronous RTTY in a synchronous manner. The character display in the lower right-hand corner of the screen adds a mark to show where the program would have begun the character without the flywheel. Under some conditions, you may want to turn off this feature. If the operator at the other end is typing more slowly than the characters are being sent and is not using "diddle," then the flywheel is of no use. Also, some systems appear to operate in a somewhat random fashion. For example, the documentation file points out that some older Kantronics KAM units transmit characters with 2 stop bits, but occasionally use 2.5. Also, old Tono terminal units transmit diddle only on every other character. Such irregular signals can confuse the flywheel and actually cause garbled characters.

The Transmit Options menu allows you to set the baud rate, filter center frequency and frequency shift. You can set the program up to transmit only whole words, so if you are barely staying in front of the transmitted character as you type, it won't start sending a word until you enter a space character. This allows you to backspace to a typo and correct it before it is transmitted. You can have the program transmit "redundant codes," which means it sends each LTRS and FIGS twice—a handy feature under noisy conditions or with weak signals. You can also have the program add a carriage return and line-feed sequence at the beginning and end of each transmission.

On the Air

It is hard to imagine how Brian could have made his program any easier to use on the air. Tune in a signal as I have described and "read the mail." If you want to answer a CQ, call another station or call a CQ of your own, you have two options. Anytime you hit the F12 key, the program goes into transmit mode. Now you can type away, and the characters are sent as you type. If you are a good typist, you can type ahead of the transmitted character. If you want to begin typing your reply while the other station is still transmitting to you, simply hit a function key from F1 to F8 to open one of the "message buffers." This lets you type while receiving. When it is your turn to transmit, just hit F12, and keep typing. As you exit the program, *RITTY* remembers any message you typed into one of these message areas, so this is also a good place to store your CQ message, "brag tape" or other "canned" messages. Just keep one of them free to use as a "type-ahead buffer," so you can begin typing your reply while still receiving. All of the normal editing keys work on the message memories while you are in receive mode, but once you enter the transmit mode, only the backspace key works. That means you cannot go to an earlier line to correct an error while you are transmitting, even if that character hasn't been sent yet.

Overall Impressions

RITTY includes several innovative features. The numerical flywheel helps maintain copy with very weak signals and deep fades. I compared it with my early model Kantronics KAM, and *RITTY* does a significantly better job of copying weak signals.

Bottom Line

RITTY is an innovative and inexpensive way to get on RTTY with just a SoundBlaster 16 sound card and your '386 or better PC.

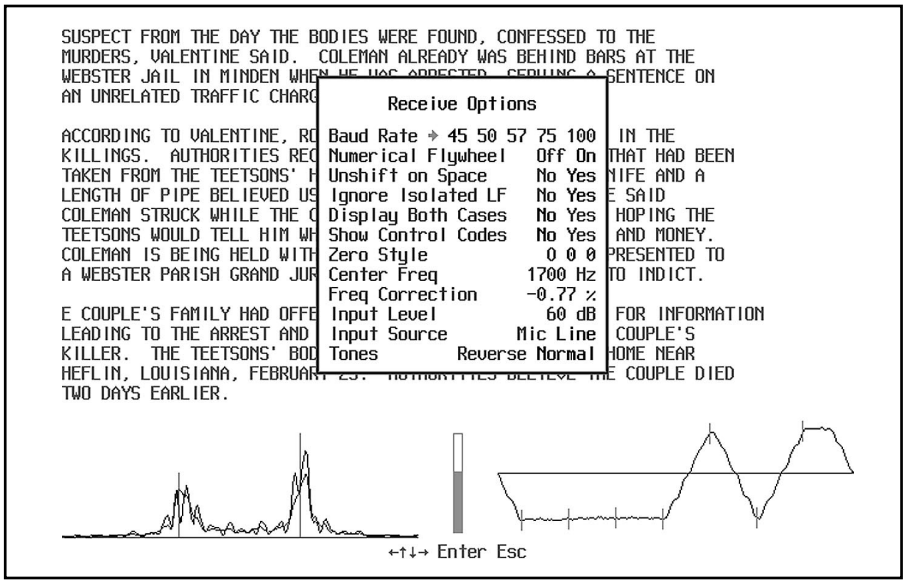

Figure 1—The *RITTY 1.0* screen in receive mode showing the Receive Options window. The tuning indicator is at the lower left, while the graph on the right shows the start, stop and data bits of each character.

If you use version 2.25 of the RTTY contest and logging program by WF1B, then *RITTY* can serve as the modem. This program seems to be a popular one among RTTY contest operators, so its support of Brian Beezley's *RITTY* program is a definite advantage for both.

The documentation file that comes with the program is lacking in a number of areas, and the text can be somewhat cryptic at times. On the plus side, Beezley apparently considers *RITTY* a work in progress and has been tweaking the code incrementally to improve the program.

Brian says he runs the program under *Windows* 3.1 without doing anything special, but I could not get it to work, even after creating a program information file (PIF) telling *Windows* to run *RITTY* in exclusive mode. It wouldn't even run under the *MS-DOS* prompt from within a *Windows* session. I also could not get it to run under *Windows 95* on another computer, but Brian says he knows of several hams running it under both *Windows* versions.

It annoyed me that *RITTY* was unable to determine when there was no signal present on the input. Even with my radio turned off, the screen quickly filled with garbage. However, Brian says *RITTY* does this on purpose because it's designed to recover weak RTTY signals other modems can't copy. Using a character squelch can make the processor treat a weak signal as noise and suppress print. As he explains, "*RITTY* gives all signals a fighting chance by printing everything it hears, so nothing will be missed." He's considering an optional character squelch for future releases.

This leads me to another issue. There is no receive buffer, and there is no way to recall text that scrolls off the screen. So, if the operator's name, QTH or call sign scrolls off the screen before you make note of it, you could be out of luck.

RITTY is strictly a Baudot radioteletype program. It will not copy AMTOR or any of the newer "–TOR" signals, nor will it copy ASCII or packet radio signals. These shortcomings aside, if you have the necessary computer hardware, I believe you will find *RITTY* to be fun and useful. I hope to print your signals sometime. Incidentally, Beezley's new *DSP Blaster* program uses similar DSP techniques to provide DSP audio filtering using your PC.

Manufacturer: Brian Beezley, K6STI, 3532 Linda Vista, San Marcos, CA 92069, tel 619-599-4962. Price: $100.

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" 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.

Alinco DJ-191 hand-held 2-meter transceiver (see "Product Review," *QST*, May 1996). Minimum bid: $142.

ICOM IC-T22A 2-meter hand-held transceiver (see "Product Review," *QST*, May 1996). Minimum bid: $155.

Kenwood TH-22AT 2-meter hand-held transceiver (see "Product Review," *QST*, May 1996). Minimum bid: $178.

RF Applications P-1500 digital power/VSWR meter (see "Product Review," *QST*, Jun 1996). Minimum bid: $145.

Radio Shack 22-168A multimeter with computer interface, software and book *Using Your Meter* (see "Product Review," *QST*, Jun 1996). Minimum bid: $90.

Standard C-108A 2-meter hand-held transceiver (see "Product Review," *QST*, May 1996). Minimum bid: $145.

Standard C-178A 2-meter hand-held transceiver (see "Product Review," *QST*, May 1996). Minimum bid: $254.

Yaesu FT-10R/A16 2-meter hand-held transceiver (see "Product Review," *QST*, May 1996). Minimum bid: $152.

Yaesu FT-11R 2-meter hand-held transceiver (see "Product Review," *QST*, May 1996). Minimum bid: $175.

Bids are being resolicted for the following items, which have been previously advertised. Minimum bids have been reduced:

AEA PK-12 GPS-compatible TNC (see "Product Review," *QST*, Oct 1995). Minimum bid: $62.

Yaesu FT-5200 dual-band FM transceiver (see "Product Review," *QST*, Nov 1995). Minimum bid: $315.

Sealed bids must be submitted by mail and must be postmarked on or before September 1, 1996. 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 with a confirmation by mail. No other notifications will be made, and no information will be given to anyone other than successful bidders regarding final price or 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