

Product Review Column from *QST* Magazine

June 1986

AEA PAKRATT Model PK-64

Alinco ALM-203T 2-M FM Hand-Held Transceiver

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AEA PAKRATT™ Model PK-64

The Commodore 64™ and the PAKRATT 64—a marriage made in techni-heaven. The PK-64 is more than just a packet TNC; it also operates RTTY (Baudot, ASCII and AMTOR) as well as CW. Rick Palm, K1CE, reviewed the operation of the PK-64 in VHF packet-radio communications since his interest and equipment are limited to this mode. Don McGrath, KZ1A, whose interests include RTTY and CW operation on the HF bands, reviewed the PK-64 in use in these modes. With such a versatile piece of equipment, it may be hard to find *anyone* who can use all the capabilities available in this little gray box.

The PK-64 plugs into the cartridge port of the C64—one simple connection to the mic input of a 2-meter rig then allows instant operation on packet. No adapters or excessive cabling are required. The terminal software is in ROM (read-only-memory) in the PK-64 so that no further program needs to be entered into the C64 for operation. The PK-64 does everything an outboard terminal emulation program should do.



VHF operations, for example, can be loaded instantly. When booting the PK-64, the system command will automatically engage the selected set of parameters stored on disk. It literally takes only seconds to be on the air.

As many as 10 connects can be performed and managed at the same time with the PK-64. On one occasion, just to see what can be done, I maintained two packet QSOs with friends and was checked into two mailboxes at the same time! If you are busy with one connection and someone else tries to connect to you, the PK-64 connects with that station on another channel. A real party line!

To reduce on-line time with busy packet bulletin-board systems (BBS), the contents of any buffer, composed off line with the editor, can be sent to the modem with a simple CONTROL N, where N is the number of the buffer. I can compose a file in Speedscript®, convert it to a sequential file using Convert64® and save it to disk for later retrieval and transmission by the PK-64. I can take all the time I want to compose my message for quick on-line forwarding to my local BBS, W1AW-4.

Additional handy commands that can be entered with the C64 function keys include a toggle for QSO buffer recording and a HOLD feature for freezing the receive screen so that incoming data can be read before it is scrolled off screen. With a touch of a button, the QSO and keyboard buffers can be cleared instantly. Another touch and the parameters are displayed for easy change entry. Changes can be made while you are still connected to another station.

Beacon and connect message texts can be keyboarded easily. If your station is unattended and another station connects, a message of your choice will be transmitted, and the QSO buffer automatically toggled on to record the incoming message.

An audio alarm sounds when another station connects to yours. As the manual states, "If the volume is turned high enough, you'll

have the spouse and the kids in the shack, wondering what's up!"

HF Packet, Morse and RTTY Operation

The PK-64 operating manual says that reasonable performance can be expected on HF RTTY (Baudot or ASCII), CW and AMTOR without the optional HFM-64 modem. We found performance is unsatisfactory when signal strength is below S9. Tuning is also more critical.

Using a Yaesu FT-107M HF transceiver, we found that operation was significantly enhanced after installation of the HF modem. The HFM-64 contains 4-pole band-pass filters for mark and space tones, an AM demodulator with an automatic threshold detector and a true Data Carrier Detect (DCD) output to the PK-64. The filters are set for 200-Hz shift at 2110 Hz and 2310 Hz, suitable for HF RTTY, AMTOR and packet. The modem also incorporates a 10-segment LED bar-graph tuning indicator that allows about 25-Hz tuning resolution.

Without inclusion of the HFM-64, the PK-64 uses a phase-locked-loop demodulator that can lock up on extraneous signals. Using the HF modem, the front panel THRESHOLD control is used to set the demodulator threshold so that extraneous characters will not print. The HFM-64 is precalibrated at the factory, but you must reset the PK-64 1600- and 1800-Hz transmit tones to 2110 and 2310 Hz. The calibration chapter in the operating manual makes this procedure foolproof!

Operating on HF packet with the PK-64 is a joy! Parameter files, saved to disk, can be retrieved as quickly as your needs dictate. Rotate the threshold control just enough to blank out the DCD light on the front panel, and you are ready to have FUN.

Tuning an HF packet signal can be tricky business. Distorted signals will be difficult to copy. To tune normal packet signals, care must be taken to use as little audio gain as possible. This may be easily accomplished by

What is a TNC?

First things first? TNC stands for Terminal Node Controller, a device that receives data from a computer or terminal, assembles the data into small "packets" of information and sends the packets to a transmitter. In the receiving mode, the TNC accepts packets of data from the receiver, extracts the text information and sends the text to the computer or terminal. The transmission and reception of packets, the detection and correction of errors, and the exact format for each packet is managed by the TNC through a "protocol." The protocol can be thought of as a program that runs on a microprocessor in the TNC. The PK-64 protocol is fully compatible with the latest AX.25 (version 2.0).

VHF Packet Operation

User friendly and largely menu driven, the PK-64 is a pleasure to operate. It supports C64 disk operation from a simple menu: LOAD, to load text stored on disk into one of ten available message buffers and/or a QSO buffer (which is used to capture incoming data); BROWSE, to allow a quick review of the contents of the QSO buffer; SAVE, to permit saving text stored in the buffers to disk or to the printer; and an EDIT menu for editing text stored in the buffers. Several highly useful editing commands facilitate quick and easy word processing of message text off line. Disk commands, including a directory of disk files, are easily made without entering lengthy DOS commands.

A nice feature is the set of 10 packet-parameter files that can be saved to or retrieved from disk to allow quick parameter changes as operating situations change. User-selected parameters are instructions to the TNC covering a wide range of operating conditions. The PK-64 has a large choice of parameters to allow maximum operating flexibility. Parameter differences for HF and

simply turning down the receiver's RF gain. You must tune while a packet is being transmitted and wait for the next packet to see if you are properly tuned. The bar-graph tuning indicator makes this easier. When a packet is present, the DCD light comes on, and the illuminated portion of the bar-graph separates into two areas. If the signal is properly tuned, the illuminated portions are equidistant from the center of the display. If you have properly used the tuning indicator, an on-screen tuning indicator in the packet status window indicates proper reception of mark and space with vertical and horizontal bars. Procedures for tuning RTTY, ASCII and AMTOR are essentially the same as for packet because we are still dealing with AFSK two-tone signals. In CW operation, your radio must be in the proper SSB mode. CW is generated as a 2310-Hz tone and is fed to the radio through the mic connector. You don't use the CW key input! When tuning CW, the 2310-Hz tone is displayed on the left-hand bar of the tuning indicator.

Much of the "nonpacket" operation is identical to packet operation. The message and text editing are accomplished in the same manner. The disk, cassette and printer operations are also essentially the same, with a few exceptions. We encountered some problems using Commodore printers, but AEA has since released updated software, at a modest cost, to accommodate those and several other types of printer. In the PK-64, speed changing is a single-key command function—nice! The '64 provides RTTY operation at 60, 67, 75, 100 and 132 WPM, and ASCII operation at 110, 150 and 300 bauds.

CCIR-compatible AMTOR ARQ and FEC operations are provided. Although AEA concedes that the Mode-A (ARQ) operating system imposes more exacting switching-speed requirements than older operating modes, most radios will operate in either AMTOR mode without modification. We were unable to test either AMTOR mode, and so must take their word for it. Remember that AMTOR Mode-B (FEC) operation is similar to conventional RTTY, so the transmitter operates continuously without any on-off switching.

The Screen

Because the PK-64 is designed for exclusive use with the C64, it can do many things other TNCs can't do. True split-screen operation is possible—a receive window where data scrolls upward across the screen, and a transmit window where text and commands are composed for transmission. A user-selectable parameter permits text and commands to be echoed to the receive window. A third on-screen window provides status indicators for unacknowledged packets, channel of operation, QSO-buffer capacity, incoming data, connect/disconnect and command/converse mode.

The Manual

The manual is clear, concise and actually entertaining to read. It contains explanations in plain language that even I, a technical illiterate, can understand. A bibliography is included, and there is even a chapter entitled "Quick Check and Sneak Preview" for those of us that read manuals only as a last resort before operating a new piece of gear. Packet-radio tutorials and appendices

round out the excellent manual.

Conclusion

If you presently own or are planning to purchase a C64, SX-64 or new Commodore 128, add a PK-64 for packet radio—you'll be in on the most exciting thing that's happened in ham radio for a long, long time. What else can you say about a little gray box that does almost everything for you? Great! HPE CU AGN is now Hope to Connect with You Again here at KZ1A and KICE.

The PAKRATT 64 is manufactured by Advanced Electronics Applications, Inc, PO Box C-2160, Lynnwood, WA 98036-0918, tel 206-775-7373. Price class: PK-64 \$220; HFM-64 \$100.—Rick Palm, KICE and Don MacGrath, KZ1A

ALINCO ALM-203T 2-M FM HAND-HELD TRANSCEIVER

After a while, you get tired of looking at all the new goodies—the bells and whistles that some manufacturers feel make an established design appear new to the buying world. There has been a flood of hand-held radios over the past few years, ranging from the multimemory, 100-mW units to the shirt-pocket models that do everything but make the breakfast coffee. Alinco has entered the US market with a hand-held radio that does nothing particularly new, but is really exciting in terms of doing what every other small, hand-held does with a minimum of fuss and bother. It is a joy to operate and provides performance equal to or better than most other comparable units.

Rated at 3-W output with the small, standard 9.6-V NiCd pack and 5 W with an optional dc-to-dc converter producing 13.8 V, this little jewel has plenty of power to handle most FM requirements. A HIGH/LOW power switch permits operation at 0.1 W for the easy contacts. The placement of all of the controls and indicators permits use either as a hand-held unit or as a mobile unit

for the small, cramped foreign-built cars most of us are driving these days.

Controls

Except for the PTT switch, all controls and indicators needed for normal operation are mounted on the top and front of the '203. The PTT switch is inset into the left side of the unit. The top-mounted array includes a BNC antenna connector, an OFFSET channel switch for non-standard repeater offsets, external

speaker and MIC jacks, dual volume/SQL control, HIGH/LOW power select, 20-dB ATTENUATOR and S/R/F meter. Although this may seem to be a lot of controls for the small area involved, there is only one adjustable control, the VOL/SQL. The other top-mounted controls are push buttons. Accordingly there is plenty of room, even if you have fairly thick fingers, to adjust only the control you want.

Front-mounted controls and indicators show the same manufacturer's concern for operating ease as the top-mounted ones. At the very top of the panel are two LED indicators, BUSY and TX. The green BUSY lights only when there is a received signal or the squelch is open; the red TX indicator lights during transmit. Immediately below the receive/transmit indicators, the LCD display shows status of all operations and commands. A 16-key pad is used for all frequency and memory selection and programming of the various operational modes. The 16 keys include numbers 1 through 0, an up-scan function, a down-scan function, Clear/Stop, Function, Memory Recall and Memory Scan. On the main control panel, but to the left and below the key pad, is a small key for Battery SAVE. Opposite the Battery SAVE, on the right side of the panel is the RESET button.

Additional controls mounted horizontally under the key pad include: LAMP ON/off, PTT/STOP, KEY LOCK, SUB A/B, OFFSET ± and DUPLEX/SIMPLEX. There are two controls that are mounted inside the battery compartment and thus are generally inaccessible from the outside of the case: The band selection switch allows selection of either band A, 144.000-147.995 MHz (receive and transmit) or band B, 150.000-160.000 MHz (receive only); also two six-position DIP switches recessed under the front panel allows selection of two subaudible tones (see Table 1). When programmed, the subaudible tone selected on the front panel is activated by the PTT.

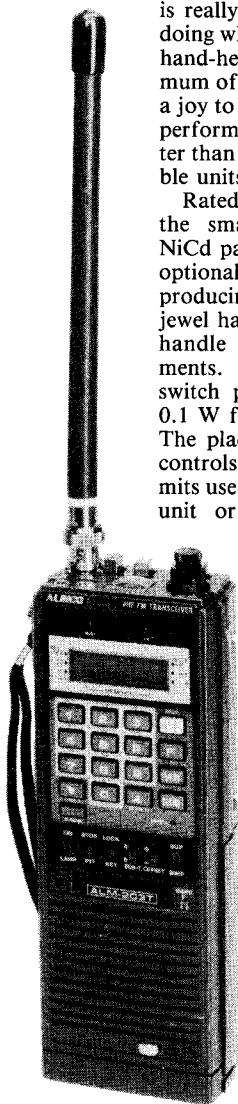
Wow! What a bunch of switches and buttons! Let's look at some of the less obvious ones and see what they accomplish. The first thing to remember is that there are only two controls on the rig to be adjusted—VOL/SQL. Every other function is selected or programmed through switches, push buttons or the key pad.

Frequency Selection

Instead of thumbwheel frequency selection, the '203 allows direct entry of the desired receive frequency from the key pad. By entering the last four digits of the desired frequency, the LCD shows the receive frequency (such as 5.450 for 145.450 MHz.) An audible beep sounds after each digit is entered. The position of the OFFSET ± switch determines the transmit frequency, and when PTT is pressed, the transmit frequency will be displayed, either +600 or -600 kHz from the receive frequency. If the frequency requested is outside the range of the transceiver, an error message, (E), will appear on the display.

Memory/Memory Recall (MR)

Once the receive frequency is displayed, it may be programmed into one of the ten memory channels by pressing the function key, F, MR and a numeral from 1 to 0 for the memory channel number. A lower-pitched audible beep will sound upon completion of the program. The receive frequency will remain in that memory location until replaced



Alinco ALM-203T 2-M Hand-Held Transceiver, Serial No. 05109613

Manufacturer's Claimed Specifications

Frequency coverage:

- Band A—144.000-147.995 MHz in 5-kHz steps.
- Band B—150.000-160.000 MHz (receive only).
- Mode of operation: FM.

Transmitter

Transmitter power (output)
High: 3.0 W at 9.6 V.

5.0 W at 13.8 V.
Low: 0.1 W at 9.6 V.

Harmonic and spurious suppression: 60 dB.

Receiver

Receiver sensitivity

- Less than 0.3 μ V for 20-dB quieting.
- Less than 0.2 μ V for 12-dB signal + noise + distortion/ noise + distortion (SINAD).

Squelch sensitivity: Less than -10 dB (threshold).

Receiver audio output at 10% total harmonic distortion:
More than 350 mW.

Color: Dark gray.

Size (height, width, depth): 7 $\frac{3}{4}$ x 2 $\frac{1}{2}$ x 1 $\frac{1}{2}$ in (not including antenna).

Weight: Approximately 1.1 lb with battery and antenna.

Measured in ARRL Lab

As specified.

As specified.

As specified.

Transmitter Dynamic Testing

- 144.100 MHz, 3.5 W;
- 147.990 MHz, 2.9 W.
- Not tested.
- 144.100 MHz, 0.25 W.
- 147.990 MHz, 0.27 W.
- See Fig 2.

Receiver Dynamic Testing

- 0.17 μ V for 20-dB quieting.
- 0.14 μ V for 12-dB SINAD.
- Min 0.066 μ V, max 0.30 μ V.
- 383 mW at 9% distortion.

or all power is removed and the RESET button pressed. In case of computer malfunction, turning the power switch off and pressing RESET will reactivate the microcomputer. It is not necessary to enter the frequency into

memory to operate—once the frequency is displayed, it will be the receive frequency and the transmit frequency is determined by the OFFSET switch.

To recall any memory-channel frequency, press MR and the channel number. The desired memory frequency will be displayed.

Memory Scan

The memory scan function can be activated by pressing the MS button with the squelch set at the threshold level or above. Scan speed is 0.5 second per channel, and the scan stops at a channel where a signal is present, but will resume scanning two seconds after the signal disappears. Scan function can be stopped by

pressing the C key or by pushing PTT.

Program Scan

By setting the scan width and scan step beforehand, Program Scan will scan between two desired frequencies. First set the low-edge frequency and press F and up-scan keys, then select the scan step by incrementing the low-edge frequency by the desired spacing and repress F and up-scan. Enter the top-edge frequency and again press F and up-scan keys. Now the low-edge and high-edge frequencies and the scanning steps are defined. Press F and down-scan to initiate scanning. As in Memory Scan, the squelch must be set at threshold or above.

The up-scan and down-scan keys may also be used for manual scanning in 5-kHz increments. Each time the scan key is pressed, the frequency will move either up or down by 5 kHz.

Battery SAVE

Battery consumption can be greatly reduced during standby periods by pressing the B. SAVE key with the squelch set at threshold or above. In this function, the receiver frequency is monitored for about 500 ms every 5 s. If a signal appears, the receiver will function normally and when it disappears, the Save function will resume about 2 seconds later. This function is cleared by pressing C or the PTT, or turning power off.

PTT STOP and KEY LOCK

When the PTT STOP switch is set to STOP, the PTT will not function. This antitransmitting device is used when carrying the transceiver. When the KEY LOCK switch is in LOCK, the 17 keys on the keyboard will not function (great to keep the kiddies out of the memories.)

LCD Panel

A representation of the LCD panel is

Table 1
Subaudible Tones (ON = 1)

Freq (Hz)	P1	P2	P3	P4	P5	P6
67.0	1					
71.9		1				
74.4	1	1				
77.0			1			
79.7	1		1			
82.5		1	1			
85.4	1	1	1			
88.5				1		
91.5	1			1		
94.8		1		1		
97.4	1	1		1		
100.0			1	1		
103.5	1		1	1		
107.2		1	1	1		
110.9	1	1	1	1		
114.8					1	
118.8	1				1	
123.0		1			1	
127.3	1	1			1	
131.8			1		1	
136.5	1		1		1	
141.3		1	1		1	
146.2	1	1	1		1	
151.4				1	1	
156.7	1			1	1	
162.2		1		1	1	
167.9	1	1		1	1	
173.8			1	1	1	
179.9	1		1	1	1	
186.2		1	1	1	1	
192.8	1	1	1	1	1	
203.5						1
210.7	1					1
218.1		1				1
225.7	1	1				1
233.6			1			1
241.8	1		1			1
250.3		1	1			1

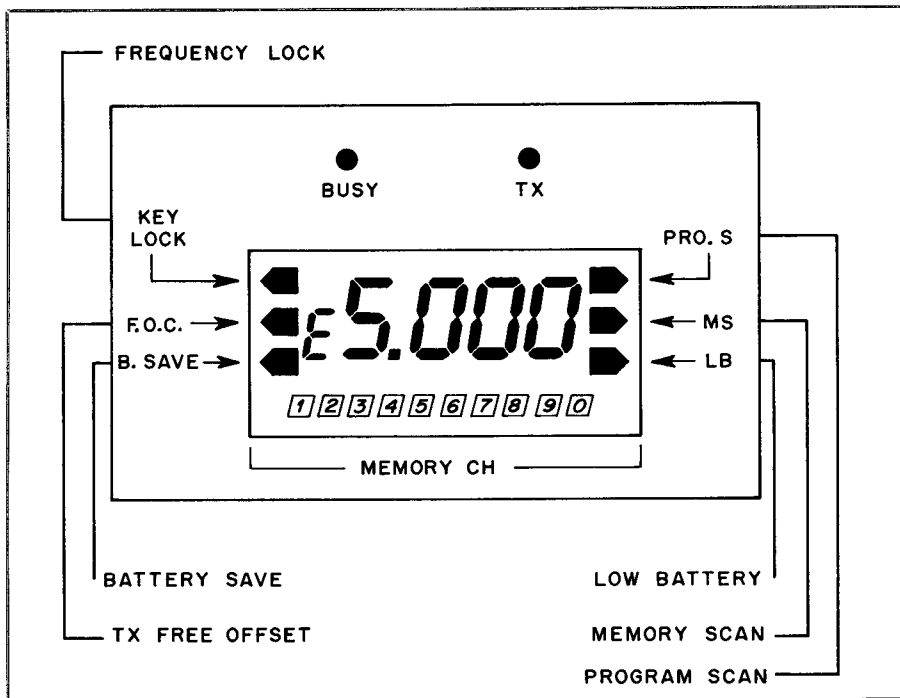


Fig 1—LCD panel layout, showing various indicators.

shown in Fig 1. Operating frequency is displayed in four large numbers in the center. By setting LAMP ON the display is illuminated. Avoid battery problems; use only as required. The various operational functions are indicated by a black arrowhead pointing to "Frequency Lock," "Program and Memory Scan," "TX Free Offset," "Battery Save" and "Low Battery." During operation, the active memory channel is shown. During memory scanning, each programmed memory channel will be shown as it is scanned. If there are unprogrammed memories, they do not appear during scanning.

Testing Problems

When we first received the review unit, we sent it to the ARRL Lab for testing. A significant problem reared its ugly head right away! When the transceiver was placed in transmit mode, the spectral display showed a very short period (fractions of a second) of operation without the synthesizer in lock. This resulted in spurious emissions, at the full rated power level, but ranging from a few kilohertz to several megahertz away from the selected fundamental frequency. These spurious signals could cause in-band interference, but worse yet, could be outside the ham bands in no-no land. They were of sufficient power to access other 2-m repeaters in the area. There was no apparent pattern—these were random-frequency signals. It takes not only a spectrum analyzer to detect these signals, but also a very knowledgeable operator to identify them.

In accordance with ARRL product-review policy, we contacted the manufacturer's representative. Upon hearing of this problem, Everett Gracey, President of Alinco Electronics, immediately shifted into high gear. The entire stock of unsold units in this country was examined! The factory was advised and immediately went into an accelerated program to come up with a viable fix. The results of that program were encouraging. Only a very few (one or two) of the in-stock units, seemed to show the problem, and those had the highest serial numbers. An engineering change to eliminate the problem was incorporated into every unit in stock. This is a relatively simple modification, accomplished at the Reno, Nevada facility of the company.

We have been assured that future production units will not exhibit this fault and that the great majority of the existing units in the field are free from the problem. Alinco Electronics has offered to retrofit any unit that shows this problem, but don't just send your unit to them! Try to discover if there are any problems in operation first. If your unit has a low serial number, the probability of it occurring is less. If you suspect a problem, call the company and ask their advice. As I said before, it takes a specialized piece of test equipment and a very competent operator to determine if the problem exists.

We returned our unit to Reno for repair, and it was returned in a very few days, with no problems. When we went back to the Lab for testing, we really got a pleasant surprise. The performance of the unit met or exceeded all of the manufacturer's claims and showed a spectral purity that is outstanding (see Fig 2).

Operation

Working 2-m FM in the "boonies" of Connecticut is not for the impatient. There aren't

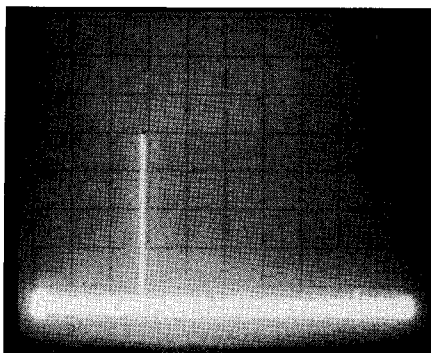


Fig 2—Spectral display of the ALM-203T operating at 146.000 MHz with no modulation. Vertical divisions are each 10 dB; horizontal divisions are each 50 MHz. Power output was 3.4 W. The fundamental (pip at the left center) has been reduced in amplitude approximately 31 dB by means of a notch filter to prevent spectrum analyzer overload. All spurious and harmonic emissions are at least 70 dB below peak fundamental output. The ALM-203T complies with current FCC specifications for spectral purity.

a lot of repeaters within a radius of 20 miles of my QTH. In addition, the gently rolling hills and lush foliage extending up to a hundred feet or more make it difficult to get a 2-m signal where you want it. In any event, I have been successful in accessing several repeaters in the local area, with good signal reports. When I manage to get around to where the concrete "grows," however, performance picks up a lot. I took the unit on a weekend to New York City and had nothing but fun with it. There isn't a lot more to be said about performance with a 2-m FM hand-held rig—if you can hear them and you can work them, it's gotta be right!

If you're considering the purchase of a non-sense, hand-held 2-m rig, this one is certainly worth looking at. The Alinco ALM-203T is available at your local dealer or from Alinco Electronics, Inc, PO Box 20009, Reno, NV 89515, tel 702-359-1414. Price class: \$280.—Bruce O. Williams, WA6IVC

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

[In order to present the most objective reviews, ARRL purchases equipment "off-the-shelf" from Amateur Radio dealers. ARRL receives no remuneration for items presented in the Product Review or New Products columns.—Ed.]

The following ARRL-purchased Product Review equipment is for sale to the highest bidder. Prices quoted are minimum acceptable bids and reflect a discount from the purchase price.

Sealed bids must be submitted by mail and be postmarked on or before June 27. 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.

Please clearly identify the item you wish to bid on, using the manufacturer's name, model number or other identification number if specified. Each item requires a separate bid and envelope. Shipping charges will be paid

by the successful bidder, FOB Newington. The successful bidder will be advised by mail of the successful bid. No other notifications will be made, and no information will be given by telephone to anyone regarding final price or identity of the successful bidder.

Please send your bids to Kathy McGrath, Product Bids, ARRL, 225 Main St, Newington, CT 06111.


Trio-Kenwood TS-940S HF transceiver, s/n 51110330, with AT-940 antenna tuner, YK-88C-1 500-Hz CW filter, YG-455-1 500-Hz CW filter (as a package only—see Feb 1986 QST). Min bid \$1268.

ICOM IC-735 HF transceiver, s/n 1257, IC-FL-32 500-Hz CW filter, IC-EX243 keyer (as a package only—see Jan 1986 QST). Min bid \$568.

Ace Communications MIZUHO MX-15 (15-meter) transceiver, s/n 811855, PL-15 10-W amplifier, MS-1 speaker/mic, NB-7 sidetone kit (sold as a package only). Min bid \$170.

HAL ARQ-1000 code converter, s/n 158. Min bid \$440.

Santec LS-202A 2-m SSB/FM hand-held transceiver, s/n 401197, NP-9 battery pack, CA-110 charger, SH-1 speaker/mic (sold as a package only—see Dec 1985 QST). Min bid \$193.

Mirage C211 220-MHz amplifier, s/n 018384 (see Feb 1986 QST). Min bid \$153. 

New Products

M.S.S. WONDER RODS

□ Medford Specialized Service is marketing an aluminum brazing rod that can be used with a propane torch. Originally developed for repair of motor boat propellers, this rod allows low resistance joints in aluminum masts and antenna parts. It has a low melting point of 732° F, contains its own flux, and can be used by anyone who can solder.

Repair procedures are similar to soldering, with just three simple steps: (1) Clean area to be welded under heat with wire brush; (2) heat area to be welded until rod material flows, brushing with wire brush in area of weld; (3) reheat area again until rod material flows, fill in, and let cool.

Other uses for M.S.S. Wonder Rods include welding copper to aluminum, repair or plug holes in aluminum panels or chassis pans, repair holes in aluminum boats or alternators. Other metals, such as copper, brass, galvanized and white metal, can also be welded.

Available from Medford Specialized Service, N3401 Castle Rd, Medford, WI 54451, tel 715-748-3974. A kit of rods with a stainless steel brush is \$19.95, including instructions, tax and postage.—Bruce O. Williams, WA6IVC