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Amateur Radio

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AMATEUR'S JOURNAL

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NOW 70 cm

All Mode Mobility!

TR-751A/851A
Compact all mode transceivers

It's the "New Sound" on the 2 meter band—Kenwood's TR-751A! Automatic mode selection, versatile scanning functions, illuminated multi-function LCD and status lights all contribute to the rig's ease-of-operation. All this and more in a compact package for VHF stations on-the-go!

- Automatic mode selection, plus LSB

144.0 144.1 144.5 145.8 146.0 148.0 MHz

CW	USB	FM	USB	FM

- Optional front panel-selectable 38-tone CTCSS encoder
- Frequency range 142-149 MHz (modifiable to cover 141-151 MHz)
- High performance receiver with GaAs FET front end
- VS-1 voice synthesizer option
- 25 watts high/5 watts adjustable low
- Programmable scanning—memory, band, or mode scan with "COM" channel and priority alert
- 10 memory channels for frequency, mode, CTCSS tone, offset. Two channels for odd splits.
- All mode squelch, noise blanker, and RIT
- Easy-to-read analog S & RF meter
- Dual digital VFOs
- Semi break-in CW with side tone
- MC-48 16-key DTMF hand microphone and microphone hook included
- Frequency lock, offset, reverse switches
- Digital Channel Link (DCL) option

Optional accessories:

- **CD-10** call sign display
- **PS-430** DC power supplies
- **SWT-1** 2 m antenna tuner
- **SWT-2** 70 cm antenna tuner
- **TU-7** 38-tone CTCSS encoder
- **MU-1** modem unit for DCL system
- **VS-1** voice synthesizer
- **MB-10** extra mobile mount
- **SP-41, SP-50B** mobile speakers
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MC-60A, MC-80, MC-85** deluxe base station mics.
- **MC-43S** UP/DOWN mic.
- **MC-55** (8-pin) mobile mic.
- **MA-700** dual band antenna with duplexer

Actual size front panel

TR-851A
70 cm SSB/CW/FM transceiver

The same winning features are yours on 70 cm with the TR-851A!

- Covers 430-439.999 MHz
- 25 W high power/5 W adjustable low
- MC-43S UP/DWN mic. and mic. hook included

Complete service manuals are available for all Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.
Specifications guaranteed for the 144-148 MHz Amateur band only.

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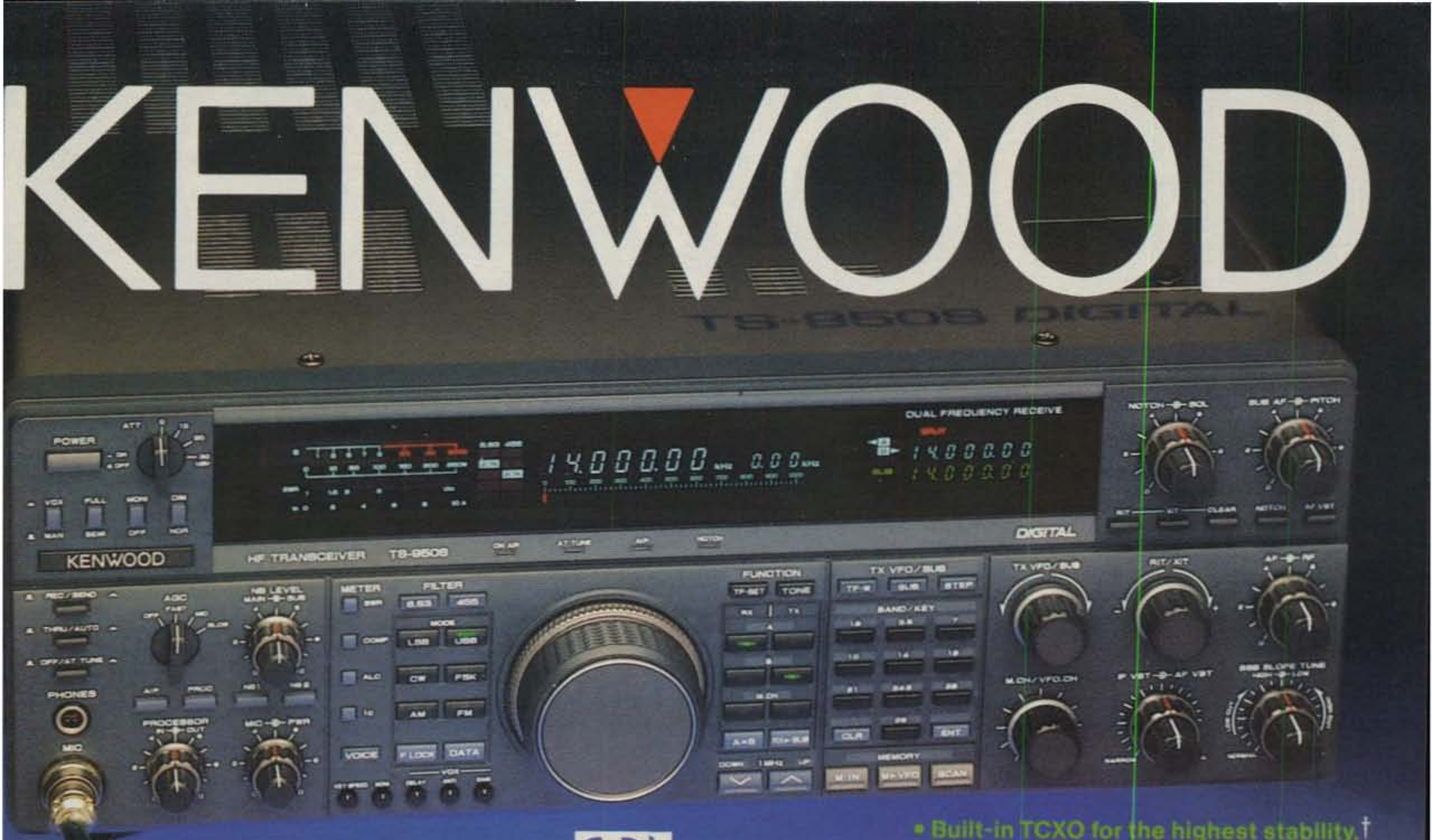

TS-950SD

"DX-clusive" HF Transceiver

The new TS-950SD is the first Amateur Radio transceiver to utilize Digital Signal Processing (DSP), a high voltage final amplifier, dual fluorescent tube digital display and digital meter with a peak-hold function.

The Ultimate Signal.

• Dual Frequency Receive Function. The TS-950SD can receive two frequencies simultaneously.

• New! Digital AF filter. Synchronized with SSB IF slope tuning, the digital AF filter provides sharp characteristics for optimum filter response.

• New high voltage final amplifier. 50 V power transistors in the 150-watt final section, resulting in minimum distortion and higher efficiency. Full-power key-down time exceeds one hour.

• New! Built-in microprocessor controlled automatic antenna tuner.

• Outstanding general coverage receiver performance and sensitivity. Kenwood's Dyna-Mix™ high sensitivity direct mixing system provides incredible performance from 100 kHz to 30 MHz. The Intermodulation dynamic range is 105 dB.

• Famous Kenwood interference reduction circuits. SSB Slope Tuning, CW VBT (Variable Bandwidth Tuning), CW AF tune, IF notch filter, dual-mode noise blanker with level control, 4-step RF attenuator (10, 20, or 30 dB), switchable AGC circuit, and all-mode squelch.

Complete service manuals are available for all Kenwood transceivers and most accessories.
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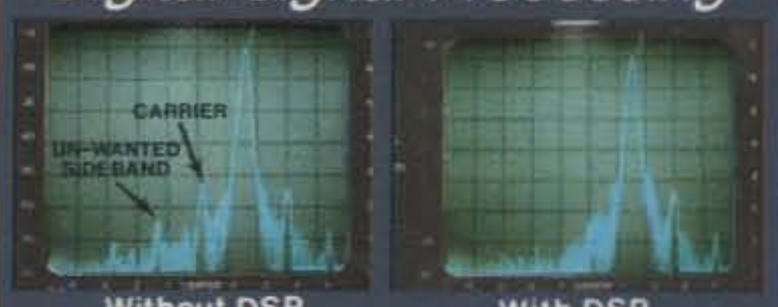
DSP

Digital Signal Processing



Without DSP With DSP

• Digital Signal Processor. DSP is a state-of-the-art technique that maximizes your transmitted RF energy.

• High performance IF filters built-in† Select various filter combinations from the front panel. For CW, 250 and 500 Hz, 2.4 kHz for SSB, and 6 kHz for AM. Filter selections can be stored in memory!

• *Multi-Drive Band Pass Filter (BPF) circuitry.* Fifteen band pass filters are available in the front end to enhance performance.

• Built-in TCXO for the highest stability.†

• Built-in electronic keyer circuit.

• 100 memory channels. Store independent transmit and receive frequencies, mode, filter data, auto-tuner data and CTCSS frequency.

• Digital bar meter.

Additional Features: • Built-in interface for computer control • Programmable tone encoder • Built-in heavy duty AC power supply and speaker • Adjustable VFO tuning torque • Multiple scanning functions • MC-43S hand microphone supplied

Optional Accessories

- DSP-10 Digital Signal Processor *
- SO-2 TCXO * • VS-2 Voice synthesizer
- YK-88C-1 500 Hz CW filter for 8.83 MHz IF *
- YG-455C-1 500 Hz CW filter for 455 kHz IF *
- YK-88CN-1 270 Hz CW filter for 8.83 MHz IF
- YG-455CN-1 250 Hz CW filter for 455 kHz IF *
- YK-88SN-1 1.8 kHz SSB filter for 8.83 MHz IF
- YG-455S-1 2.4 kHz SSB filter for 455 kHz IF *
- SP-950 External speaker w/AF filter
- SM-230 Station monitor w/pan display
- SW-2100 SWR/power meter
- TL-922A Linear amplifier (not for QSK)

* Built-in for the TS-950SD
† Optional for the TS-950S

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TS-440S

Compact high performance HF transceiver with general coverage receiver

Portable reliable performance and ease of use makes the TS-440S your obvious "low bands" choice. It is "Every Ham's" rig to go – ham shack, portable or mobile. But don't let the small size fool you – there's lots of "big rig" performance packed into this package. Built-in antenna tuner option. Continuous duty transmitter. Super DynaMix™ front end. Five filter functions. The TS-440S is at your service wherever you wish to operate.

- **Covers all Amateur bands**
  General coverage receiver tunes from 100 kHz–30 MHz. Easily modified for HF MARS operation.
- **Direct keyboard entry of frequency**
- **All modes built-in**
  USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.
- **VS-1 voice synthesizer (optional)**
- **Built-in automatic antenna tuner (optional).** Covers 80–10 meters.
- **5 IF filter functions**
- **Superior receiver dynamic range**
  Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m.)
- **100% duty cycle transmitter**
  Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB. 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)
- **Computer interface port**
- **Adjustable dial torque**
- **100 memory channels**
  Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
- **TU-8 CTCSS unit (optional)**

- **MC-43S UP/DOWN mic. included**
- **Superb interference reduction**
  IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and opt. filters fight QRM.
- **Dual SSB IF filtering**
  A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, **dual** filtering is provided.
- **VOX, full or semi break-in CW**
- **AMTOR compatible**

Optional accessories:

• **AT-440** internal auto. antenna tuner (80 m – 10 m) • **AT-250** external auto. tuner (160 m – 10 m) • **AT-130** compact mobile antenna tuner (160 m – 10 m) • **IF-232C/IC-10** level translator and modem IC kit • **PS-50** heavy duty power supply • **PS-430** DC power supply • **SP-430** external speaker • **MB-430** mobile mounting bracket • **YK-88C/88CN** 500 HZ/270 Hz CW filters • **YK-88S-88SN** 2.4 kHz/1.8 kHz SSB filters • **MC-60A/80/85** desk microphones • **MC-55** (8P) mobile microphone • **HS-4/5/6/7** headphones • **SP-41/50B** mobile speakers • **MA-5/VP-1 HF** 5 band mobile helical antenna and bumper mount • **TL-922A** 2 kw PEP linear amplifier • **SM-220** station monitor (no pan display) • **VS-1** voice synthesizer • **TU-8** CTCSS tone unit • **PG-2C** extra DC cable.

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CQ The Radio Amateur's Journal

ON THE COVER: If the location isn't familiar, don't feel bad. Terry Murphy, VK8TM of Alice Springs, Northern Territory, Australia (Zone 29) doesn't have too much company on the Alice Springs 2m repeater. (Photo by Larry Mulvehill, WB2ZPI)

MAY 1990 **VOL. 46, NO. 5**

FEATURES

DEPARTMENTS

ZERO BIAS

EDITORIAL

This is it. This is the issue that some of you will be reading just before the BIG ONE takes place in Dayton. Almost everyone who talks about Dayton seems to want to ask, "Why Dayton?" Maybe like the Matterhorn, it's there. Whatever it is, it does perpetuate itself with stories and lore to the point where one year everything there will be frozen in time and shipped off to Disneyland as a new attraction. There might even be speculation by the Smithsonian to do the same thing. Future generations could come and look in awe at the display and ask, "Why Dayton?" And there's always the chance that they would also try to figure out just what was going on and what all those people were doing at the time.

The true experience of Dayton is being there and being able to talk about it later, especially to those who couldn't make it. Of course, you tactfully leave out the part where your whole body hurts from all that walking and your senses overload from the sheer volume of amateur radio input. You also hide some of the strange stuff you bought in the fleamarket because you simply had to have it at the time (and now that it's home, you wonder why you wanted it or what you had in mind).

To go to Dayton is something you really owe yourself as a true amateur radio experience. Most large events or gatherings, such as Woodstock, happen only once and have a profound effect on people for a long time. Dayton as an event can be relived and re-experienced each and every year.

Travels With CQ

I've received a lot of comments already on my "Travels With *CQ*" article in the April issue. The April issue was available at the Charlotte and Orlando Hamfests, and people there read it and came back to the booth making suggestions for improving our mobile installation. A few people, however, did go out to the parking lot to try to find the RV and the mobile KW. I did tell those seekers that the travel crew was using the hamfest time to do some routine maintenance and refueling.

Speaking of hamfests, we've done three so far this year—Miami, Charlotte, and Orlando. Because of a prior commitment, we had to back out of doing the Cincinnati show this year. I was told that a giant snow storm hit the Cincinnati area that weekend, and although traveling was treacherous, a lot of bargain-hunting amateurs managed to trek through to the show.

The food typically is still the same this year. I managed to sample the grease-dogs at the three shows, including a chili-dog variety at Charlotte. I still say that you're better off eating at home or at a local fast-food establishment. Some of the food lines at shows take forever to move up, and by the time you get the food it's cold or tepid at best. Do yourself and your heart a favor by bringing a sandwich from home.

The Orlando show took place the same weekend as the *CQ* WW WPX Contest and so Dick and I missed out on the contest. Arnie backed out of going to Orlando because he claimed he had to go to a family wedding. However, if I see an N2IQO log show up for the WPX event, we'll know what he really had in mind.

Hamfests and fleamarkets are a good chance for you to get out of the shack and find out what's happening in the real world. It's a way for you to see what's out there in the way of new gear, get some first-hand info from the experts at the forums, and check out the prices of used gear. It's the chance to see the stuff of which dreams are made, even if you can't figure out what to do with it once you get it home.

CQ VHF Contest

If you check the table of contents this month, you'll see that we are announcing the 1990 *CQ* VHF Contest. To date we do not have a contest director for this one, but we do have a few hearty souls who will do the appropriate scoring. Steve Bolia, N8BJQ, has graciously volunteered for the 1989 event, so we will persevere. Our efforts with Steve Katz, WB2WIK, have fallen on deaf ears, and he, like Judge Crater, remains an enigma.

New CQ Committee

We are in the midst of organizing a new *CQ* committee. This committee will be charged with the responsibility for handling applications and selection to *CQ*'s Hall of Fame. We currently sponsor a DX Hall of Fame and a Contest Hall of Fame. It is becoming evident that some amateurs cross both fields and some amateurs deserve recognition for other accomplishments such as Humanitarian Service, Technological Innovations, and so forth. What we are working towards is a *CQ* Amateur Radio Hall of Fame, with various categories of notable achievement. I will report on the committee's progress as it occurs.

No-Code Proposal

There has been a lot of talk already about the FCC's No-Code Proposal and the proviso of doing away with the Novice and Technician classes of license (while grandfathering those who presently hold that class of license). I think that most of the objection to the Novice class by the FCC is the fact that at present it doesn't fall under the VEC program and is subject to widespread sale or cheating. In its 35 or so year history, the Novice license did what it was supposed to do. It brought people into the hobby simply and easily while providing an entry-level license enabling one to communicate all over the world. In the early days 2 meters (then a wasteland) was also available to Novices.

While I don't think that there is more cheating going on today than has occurred over the years, the FCC can make the Novice class license available through the VEC program, albeit as a volunteer effort on the part of examiners, or bring it in under the same fee schedule. What it preserves is far more important to amateur radio.

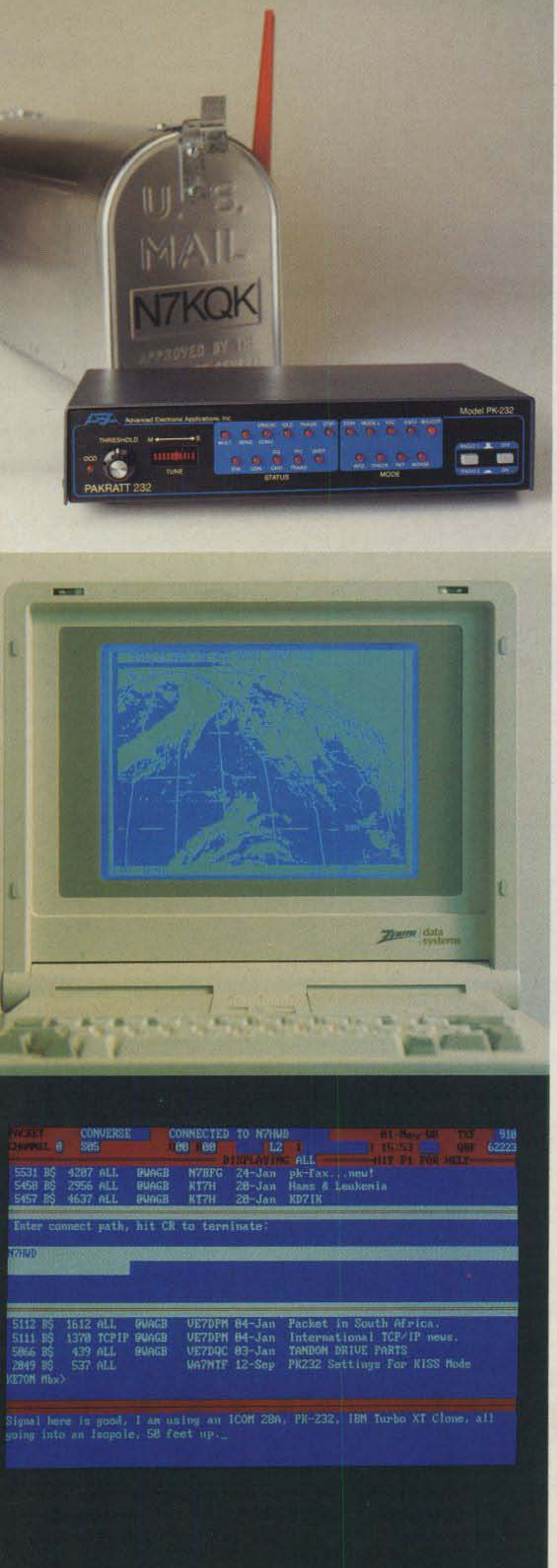
With regard to preserving the Technician class license, think of one small area where we have come to rely on their input. In the matter of building, maintaining, and operating our valued repeater network, we have come to rely on the Technician.

These two proposals impact on what has become the greatest number of licensed amateurs. Obviously, some of what we have read of the proposal will be used as leverage or "bargaining chips," but we should keep our eye on the totality of amateur radio and what each class of license actually does within the hobby and contributes to all of us.

What the hobby, service, or whatever you want to call it doesn't need is for the government to create another "Incentive Licensing" program for amateur radio. We're still feeling the effects of the last one.

If the FCC wants to rest easier with regard to Novice cheating, put it under the VEC Program. I think we would all admit that the program has worked better than a lot of us thought it would, me included. If the few dollars and the VEC Program ease their minds and provide the incentive for enforcement (which is very selective at best), then so be it. We need a code-free license, but not at the expense of what has proven to be a viable asset to amateur radio. It shouldn't be either/or. It most definitely shouldn't be that suddenly what Congress has done to the FCC for years, the FCC turns around and does to us: "We're from the government and we're here to help you."

73, Alan, K2EEK



AEA's NEW PK-232MBX With PakMail™

Now AEA's popular PK-232 multi-mode data controller has new features you've been asking for...PakMail™ Mailbox with selectable third-party traffic, seven-character AMTOR (CCIR R.625) call identity, TDM (Time Division Multiplex) receiving for SWL's, and Prioritized Acknowledgement (ACK) protocol for improved packet performance. Compatible with almost every computer or asynchronous data terminal, you can enjoy the full spectrum of amateur digital communications with AEA's new PK-232MBX.

All Operating Modes. The PK-232MBX includes all authorized amateur digital modes available today...Morse, Baudot, ASCII, AMTOR/SITOR 476 and 625, Packet, WEFAX receive and transmit, as well as commercial standard NAVTEX automated marine information services.

Superior Modem. An eight-pole Chebyshev bandpass filter limiter- discriminator modem improves the signal-to-noise ratio at the detector and virtually eliminates interference from adjacent signals. System performance has been proven superior to that of PLL modems designed for telephone line services.

PakMail.™ PakMail™ mailbox with selective control of third-party traffic is now a standard feature. Your friends can now leave you messages around the clock. Your local full-service BBS can automatically forward your messages directly to your PK-232MBX.

WEFAX Transmission and Reception. AEA brought you the first multi-mode controller to send and receive WEFAX (weather facsimile) charts. The PK-232MBX directly supports the widest range of printers on the market using the optional RS-232/printer cable.

Host Mode. Only AEA provides the type of full-featured Host Mode preferred by many professional programmers for efficient control of the PK-232MBX. AEA's Host Mode programs include PC-Pakratt with FAX for the IBM PC's and compatible MS-DOS computers, COM- Pakratt with FAX for the Commodore C-64 and C-128, and now MacRATT with FAX for the Apple Mac-Intosh.

Two Radio Ports. Independent radio connection ports allow convenient, interchangeable all-mode operation regardless of port selection. You can connect two VHF/UHF radios, an HF and a VHF/UHF radio, or two HF radios, selectable by a front-panel switch.

Signal Analysis. The PK-232MBX's internal software features AEA's exclusive SIAM (Signal Identification and Acquisition Mode). The PK-232MBX automatically identifies Baudot, ASCII, AMTOR/SITOR and TDM signals, then measures signal speed and polarity. A simple "OK" command automatically switches the PK-232MBX to the recognized mode and starts the data display.

PakMail™ Upgrade Kit. The easily-installed PakMail™ upgrade kit includes a plug-in board and new software EPROMs, and is fully compatible with all existing PK-232's. Please contact factory for details.

You Deserve The Original. AEA produced the first multi-mode data controller. The PK-232 continues to be the standard against which all other multi-mode controllers are judged; the choice of critical amateurs, commercial services and government agencies. Don't settle for less than the best.

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CIRCLE 96 ON READER SERVICE CARD

ANNOUNCEMENTS

• **Armed Forces Day Communications Test** - This annual test is set for May 19. The traditional military-to-amateur cross-band operation and broadcast of the Secretary of Defense message are the featured highlights and include operations in CW, SSB, RTTY, and packet radio. The tests give both amateurs and SWLs the opportunity to demonstrate their individual technical skills. Special QSL cards will be awarded to those amateurs achieving a verified two-way radio contact with any of the participating military radio stations. Interception of these contacts by SWLs is not acknowledged by QSL cards. However, anyone who receives and accurately copies the Armed Forces Day CW and/or RTTY message from the Secretary of Defense can qualify to receive a special commemorative certificate from the Secretary. The military-to-amateur cross-band operations will be conducted from 1300 UTC May 19 to 0245 UTC May 20. For participating military stations, frequencies, etc., contact Navy-Marine Corps MARS, Naval Communication Unit, Washington, DC 20397-5161. Transcriptions of the CW and/or RTTY receiving tests should be submitted "as received," with no attempt made to correct errors. The time, frequency, and callsign of the military station copied as well as the name, callsign, and address of the individual submitting the entry must be indicated on the page containing the test message. Entries must be postmarked no later than May 27, 1990 and submitted to the respective military commands.

• **The following special events will take place during May:**

KA1CFA, from Quinnicipiac Council BSA Milford District Cross Sound Spring Camporee, CT; Camp Sequassen Alumni Assn.; May 4-6; General portion of the 10, 15, 20 meter band. For QSL send SASE to Allan Schwartz, 18 Russo Drive, Hamden, CT 06518.

K2KN, from Young/Morse National Historical Site, Poughkeepsie, NY; Poughkeepsie ARC; from 1400-2100Z May 27; CW around 3.710, 7.110, and SSB 14.250, 21.250, 28.400. For special QSL send SASE to Ted Zulkowski, K2JMY, 4 Bishop Drive, Poughkeepsie, NY 12603.

WA3BAT, from *USS Olympia*, Philadelphia, PA; Olympia RAC; 1400Z May 5 to 2000Z May 6; suggested frequencies (plus or minus QRM) CW 7.133, 21.133, 28.133, SSB 3.865, 7.245, 14.255, 21.355, 28.355, 145.270 MHz, and RTTY on 20 and 10 meters. For 8 × 10 certificate send QSL and three units of postage to Olympia RAC, P.O. Box 928, Philadelphia, PA 19105.

WA3PJQ, from submarine *USS Torsk*, Maryland; Maryland Mobileers ARC; 1400-2100Z May 19; SSB 7240, 14240, 21340, 28340 (plus or minus QRM), and FM 146.805. For certificate send SASE to MMARC, P.O. Box 784, Severna Park, MD 21146.

N3HFS, from Towsontown Spring Festival, Towson, MD; 1500-2300Z May 5 and 1800-2300Z May 6 (rain dates May 12, 13); SSB 14.255, 21.355, 28.355, 146.58 MHz, CW 10 and 15 meter Novice bands, RTTY 15 and 20 meters, packet 145.030. For QSL send your QSL and SASE to 305 Colonial Court, Towson, MD 21204.

K4AF, from Armed Forces Day, Pentagon, Washington, DC; Pentagon ARC, May 19; SSB 7.235 and 14.235, CW 7.035 and 14.035. For QSL send QSL and SASE to PARC, P.O. Box 47063, Washington, DC 20050 (include $1.00 if you want an 8 × 10 certificate).

N4QWL, from Mayfest Celebration, Columbia, SC; Columbia ARC; 1500Z May 5 to 2100Z May 6; SSB 28.400, 21.400, 14.250, 7.200 MHz, and CW 28.200, 21.040, 14.040, 7.040 MHz. QSL with SASE to CARC Mayfest, P.O. Box 5802, Columbia, SC 29250.

W5AUU, from 10th anniversary of Toad Suck Daze, Faulkner County, AR; Faulkner County ARC; 0400-1400Z May 5; on 14.270 MHz. For QSL send 9 × 12 SASE to W5AUU, P.O. Box 324, Conway, AR 72032.

K5LIB, from Earth, TX; Lubbock ARC; May 19 to 0200Z May 20; SSB 28.454, 21.370, 14.270, 7.250, CW 28.140, 21.120, 14.040, 7.125. For QSL send SASE to Mike Strong, KT5H, 6405 36th, Lubbock, TX 79407.

WA6YOO, from Avocado Festival, Escondido, CA; Escondido ARS; 0000Z May 11 to 2400Z May 13; SSB 3950, 7250, 21350, 28450 kHz, CW up 50 kHz from band edge. For certificate send QSL and large SASE (2 units postage) to EARS, 2435 Our Country Road, Escondido, CA 92025.

W6KA, Bicentennial of US Coast Guard, San Francisco, CA; 1700-2400Z May 12 and 13; SSB 28.320, 14.320, 21.320 MHz, plus local 2 meter FM. (Guest operators permitted with copy of appropriate license.) For QSL send SASE to WK6A, c/o 1012 Rogers St., West Sacramento, CA 95605.

6-land, from Dixon May Fair; Vaca Valley Radio Club; May 3-6 from 10 AM to 8 PM daily; CW and SSB on 80, 40, 20, 15, and 10 meters. For QSL send SASE to Vaca Valley Radio Club, Suite 127 Drawer 521, Vacaville, CA 95688.

W7ZA, Centennial of Hoquiam, WA; Grays Harbor ARC; 0800 local time May 19 to 1800 May 20; lower 50 kHz of General phone bands on 15 through 80 and on 10 meters at about 28.310 (they also hope to have a station on CW portion of the bands). For QSL send SASE to W7ZA c/o ARS KA7AIR, Joe Ledesma, 516 Sixth St., Hoquiam, WA 98550.

7-land, from Glendive, Montana; Lyars ARC; May 19-20; lower portion of 80, 40, 20, 15, and Novice portion of 10 meters. For QSL send SASE to Lyars Club, Box 1127, Glendive, MT 59330.

WJ7H, from Promontory Summit, Utah; Ogden ARC; 0001-2100Z May 10; freq. on one of the follow-

(Continued on p. 116)

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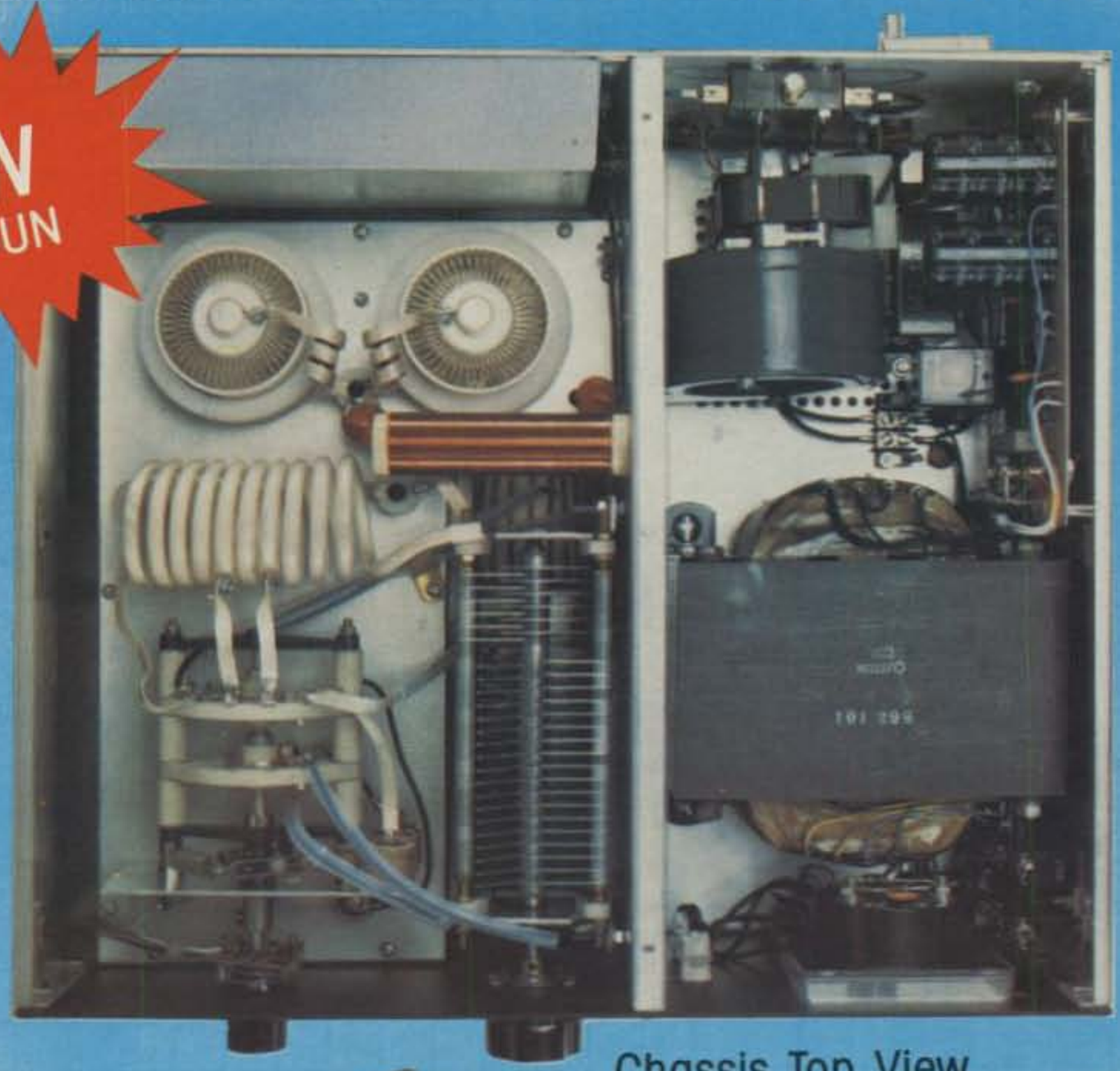
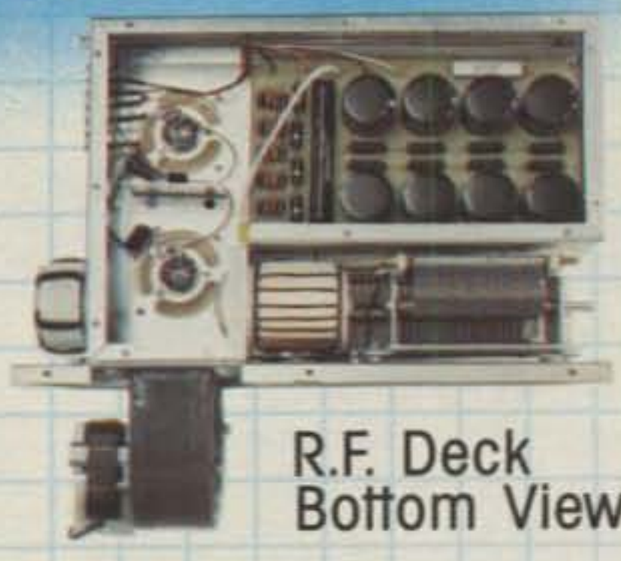


Chassis Top View

R.F. Deck
Top View



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Corrections Department

"World of Ideas" column, February issue: In the diagram on page 77, the "hot" end of C3 should be connected to the other side of the 2.5 mh RFC. Otherwise it will not "regenerate."

"Briefly Speaking—Gel Cell Batteries," February issue: On page 46 near the top of the first column, 1/5C rate for a 5AH battery is 1.0 amp (not 500 ma). On page 52, first column, last paragraph, the reference to fig. 8 should be a reference to fig. 11.

"Build Your Own QRP Dummy Load/Wattmeter," March issue: On page 31, left column, line 3, 31.62 VDC should read 31.32 VDC. In Table I, the first line under WATTS RF, 01.00 should be 0.100, and in the caption for the table, second line, 100 mv should be 100 mw.

Let's Not Fight

Editor, *CQ*:

A comment on the deliberate interference to nets. It seems that those who oppose nets use the argument that the nets dominate frequencies that are "open" to all amateurs, and thereby reduce the available frequencies to the rest of the operators on the band.

I have always considered net operation as helping to open up more frequencies to non-net amateurs because net operation groups many stations on one frequency. If these stations were not listening or participating in the net, then each could be in QSO on several other frequencies, greatly reducing the frequencies available to the rest of the operators. In other words, nets reduce QRM on the band!

Come on, hams. The bands are big enough for all of us. We don't need to act like children fighting over our toys. Let's not let the monitoring community compare us with the childish behavior often associated with other radio services.

John Dellinger, WA8ZFD
Northville, MI

All Sewn Up

Editor, *CQ*:

Ham Radio isn't an easy "mistress" for any XYL! I was particularly proud when my XYL, Amy, made this "needlepoint" of my QSL card. Now if I can only convince her to get her ticket!!

Allen Olender, WA8IWK
Birmingham, MI

Introducing the only compact HT designed for you—Heath's new 2-meter and 450 MHz Micro-Deluxe handheld transceivers.

Built with a receiver sensitivity of 0.158 µV for 12 dB SINAD, the micro-sized HW2P or HW4P measures an unbelievable 4-3/8"H x 2-1/16"W x 1-1/4"D. Battery-packs hinge onto the back of the unit so the HT retains the same basic form, even with the largest capacity batteries. Slip it into your pocket or hook it on your belt - no more hassles with bent clips or tangles with car seatbelts. Heath's new micro-HTs will go anywhere you do.

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HW2P shown actual size.

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THE PARAGON is the choice of many of the most experienced operators on Earth. The fussiest phone folks, cw operators that are out-and-out snobs and many of the digital stations that lead the rtty DXCC list. General coverage receive from 100 kHz to 30 MHz. 100 watts of transmitter power from 1.7 to 29.999 MHz. All of the nifty features expected in a computer based design. Dual VFOs. TX and RX offset with display. 62 programmable memories that include frequency, mode and filter plus a 7 character alpha-numeric displayed tag feature. QSK cw with a changeover time of 30 ms. All digital modes with real FSK. Outstanding ssb with a standard speech processor that is a pleasure to hear. I-F filter selection, independent of mode. In short, a truly outstanding do-everything rig.

THE HERCULES II is a really classy solid state, all mode broadband amplifier that does not require any tuning. Remote band switching can be controlled by our Paragon or Omni V. Temperature controlled cooling system is whisper quiet on ssb, yet has adequate capacity to cool the internal heat sinks under key down conditions. Runs on 12-14 vdc for battery operation, mobile or base. (A heavy duty auto battery with a 10 amp charger makes a good, and inexpensive, base power supply.) Not shown is the Model 9420, 100 amp dc power supply that powers the Hercules II and the transceiver. A remote control system is available for mobile Hercules II installations. The Hercules II is fully metered and includes a 10 element LED peak power bar-graph display. Compact, good looking and a signal within one S-unit of the mighty TITAN!

THE MODEL 253, 2 KW AUTOMATIC ANTENNA COUPLER is the latest in our highly regarded line-up of tuners. Functions as an antenna management system with the front panel, four position, antenna switch. Positions 1 thru 3 are dedicated to coax fed antennas. Position 4 may be used for coax, single wire or balanced feeders through the built-in high power balun. Tuning is accomplished with a motor driven, roller inductor and fixed value capacitors selected with enclosed relays. The system is microprocessor controlled with one memory per antenna select position. Nine memories per antenna position are available when used with the Paragon or Omni V where band information is provided. The finishing touch for any station.

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QSK cw, real FSK and superb ssb performance. Standard features include speech processor, noise blanker, RS-232 interface, nonvolatile RAM for the 25 channel memory system, memory scratchpad and much more. Status register, clock and calendar are backed with a long life, easily replaced, "drug store" lithium battery. Options for FM and a remote frequency tuning encoder that can be positioned anywhere. The reasoned choice for the operator who places the first priority on optimized performance in the ham bands.

THE TITAN "LEGAL LIMIT" LINEAR AMPLIFIER is a workhorse of proven stamina. The heart of the Titan is a pair of Eimac® 3CX800A7 ceramic triodes. This tube is the popular choice among designers of high realiability commercial and military equipment in this power range. We consider the 3CX800 to be the 3-500Z of the 90s. 1500 watts continuous key-down output with ease. Super clean ssb. Unbelievably fast QSK cw using a Jennings® vacuum relay, rather than diodes. Assured reliability, even if you "pull the trigger" into high SWR. You older, really experienced operators never do that, right . . . .

Another Titan difference is the power supply. The power supply capacity required to maximize the performance of a pair of 3CX800 tubes, in our judgement, dictates a transformer size that will not fit into a RF deck of reasonable proportions. We also like the idea of not compromising the cooling of the tubes by adding the heat from the power supply. The Titan power supply is housed in a separate utility enclosure and remote controlled.

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Results of the 1989 CQ World-Wide WPX CW Contest

BY STEVE BOLIA*, N8BJQ

Close to 1500 contesters battled nice weather and terrible propagation on their way to four world records and several continental records in the 1989 *CQ* WPX CW Contest. Conditions were less than ideal during most of the weekend, with very little 10 and 80 meter activity in most areas of the world.

DX

In spite of the conditions, the top two all-band stations broke 5L7T's 1987 record, with V27T (Op. YU1RL) leading the way with 9.4M points. Second place goes to Tine, YT3AA, at P3AA with 8.9M points and a new Asiatic record. Tine won the QSO battle, but could not make up for the 124 multiplier advantage held by V27T. Congratulations to two of the top Yugoslavian contesters for excellent efforts and new prefixes for many of us. Third place goes to CT9M operated by CT1BOH with 5HØT (not HSØT) finishing fourth and FK/JH6SOR claiming fifth and a new Oceania record on his honeymoon. Ten meter conditions favored the North South path with the top scores coming from South America and South Africa. CE3DNP erased ZY5ZBA's 1988 record with a fine 2.8M point effort, with AY4F (LU4FD) and ZS6BCR second and third, respectively.

On 15 meters, AI7B operated FS5T to a new world record followed by 4M7A and 9Y4VU. Bob's 4.5M points was the top single-band score in the contest. LZ5A operated by LZ1AX is the champ on 20 meters with a European record. Close on his heels was XK1CYL (VE1CYL), with ZL3GQ setting a new Oceania standard. Forty meters goes to FS5R operated by W7EJ, with YY1D and YT7A in pursuit. Jose, YX3A (YV5ANT), was top gun on 80 meters with a South American record. UA9SP and KX6DC finished second and third, also with continental records. Top-band honors go to OK1DFP followed by UA2FF and UT5UJO.

In the QRP/p category, YU3BC dethroned 4X1IF for the world top spot. Second place goes to KA2AEV followed by N3RS and 4X1IF. ZLØAAH is the 10 meter QRP champ, with JA6GCE winning 15 meters. W8VSK snagged a world championship on 20, as did YV2BE on 40, HA8KLB on 80, and OK2BXR on 160.

In a new category, Al Slater, G3FXB, is the winner of the European Combined CW/SSB plaque sponsored by the Les Nouvelles DX Group. Al totaled 9,784,463 for both contests. To be eligible for this award, you must enter both contests and compete in the single operator, all-band category.

USA

Repeating as all-band champ is Phil, KT3Y, followed by John, KZ2S, and Bob, KQ2M/3. Rounding out the top five are K1EA (Op. KM3T) and K3ZO. N5RZ and N4ZC battled it out for the top spot on 10 meters with Ralph coming out on top. Bob, K1XA, edged out W2SC/1 for 15 meter honors with Gene, N2AA, taking the top spot on 20 meters. KVØQ is the 40 meter champ with NJ1T and W3BGN right on his heels. WA6VNR takes the top spot on 80 with N6LL operated by WA6CDR top-band champ. KA2AEV is the USA QRP/p champ with N3RS 10K behind and N4KG third. N5US is the USA 28 MHz low-power champ with W8VSK tops in the world on 14 MHz.

4121 Gardenview, Beavercreek, OH 45431

Roger, G3SXW, enjoying paperless contesting using one of the more popular logging programs.

Multis

KM9P and WN4KKN borrowed KP2A's fine station and shattered V31A's 1987 multi-single record. Bill and Trey's 12.8M point effort bettered the '87 record by over four million points. Second-place finisher HG9R also broke the '87 record with a fine 9.9M points and a European record. LQ5A and 5H1HK also set continental standards with their third- and fourth-place finishes. HC2G finished in fifth with the international gang at 4J1FS providing many with a new CW or band country. Y34K is the multi-multi champ, with YT2R in close pursuit. Third in the world and tops in North America is WL7E.

N4WW returns to the top of the USA multi-single category, followed by KU2Q and '88 champ WC4E. WZ6Z came up short in their bid for a CW record, but did get the top spot in the multi-multi class. All the multi-multi activity was in California with AD6E second and N6VR third.

Other "Stuff"

There were several expeditions active for the contest. As mentioned earlier, the group at 4J1FS did an outstanding job from M-V Island, as did the guys at AP2ZA. Others on expeditions included world champ YU1RL at V27T, expedition trophy winner YT3AA at P3AA, ZF2NE/ZF8, FK/JH6SOR, FK/JH9KVF, FS5T (AI7B), FS5R (W7EJ), VP2MU (WCØW), VP2VDX (KT6V), CT9M (CT1BOH), EA8ACH (K2TNO), and 4U4ITU (F2CW).

Many new and unusual prefixes were also activated for the contest. 5H3TW had the most miscopied call of the contest with his special 5HØT call. The gang at LX150L was close behind. Others using special calls for the contest were 4Z9FDB, VO5AC, VO4MP, ATØT, UG/RV3GJ, EF7DMU, IG8A, LJ2A, LG5LG, OL4A, SL4ZXE, SV1RP/SV2, UW2F/UA4WGR, RP7W, 4F1FZ, and ZZ8WHL. Many thanks to these and any whom I may have missed for the multipliers for the contest and new prefixes for the prefix hunters.

While I am on the subject of prefix hunters, I have received several notes and calls about receiving QSLs for contest stations. Several have complained that they have not been able to get QSLs from contesters and were planning to stay out of contests in the future. These are the people who make up the bulk of QSOs for the top stations. If they go away, then scores will go down. QSLing is a courtesy which will lead to more QSOs in future contests.

With regard to the SSB Contest results published in the March issue, several scores were inadvertently left out. They are as follows: JH1BXH/Ø, single op 28 MHz, score 1,556,256, QSOs 1180, prefixes 464. YU3AI, multi-single, score 5,831,436, QSOs 2948, prefixes 754.

The 1990 CW Contest will be the 26th and 27th of May UTC. Check the 1990 rules for the trophy list. If you need forms, send an SASE to N8BJQ or *CQ* requesting WPX forms.

Thanks to N9AG for the assist with the logs. Thanks also to all who sent in log info on disk. Starting with the 1990 contest, you may send your entire log on disk, providing you use the proper format and send along a written summary sheet. At the present, I am able to handle

Here are Jim, WA6AUE, in the front and Johnny, KE7V, in the background at WA6AUE which was a multi-single entry.

logs submitted in *.bin, *.dbf, *.wk1, and pure ASCII format. Some others may be acceptable, but please check with me first. Only MS-DOS compatible disks can be accepted. All log information will be used solely by the WPX contest committee.

Congratulations to all the winners and hope to work you in the 1990 contest.

73, Steve, N8BJQ

Random Comments

My best birthday present was to finish off the 27th with 1200 QSOs . . . *4M7A*. Even we are the only station of the country where we operate, and on a single band, we always find more than 5% duplicates . . . *4U4ITU*. My special prefix sounds almost the same as HS0 on CW! . . . *5H0T*. The WPX CW Contest is always wonderful and full of surprises . . . *7J7AAM*. Biggest thrill—0001 May 29th . . . *9Q5DX*. I wish there were more Novices to work. Maybe a special certificate and or award would help . . . *AA1M*. First time I ever broke 1 million in a contest. Almost gave up Friday nite due to lousy condx. Glad I hung in there! . . . *AD1C*.

First time using computer log. Wish I could type! . . . *AL7CQ*. Saturday morning I was losting best hours. My boss said not free time this middle day! . . . *CE3DNP*. Poor propagation, low QSO rates, lousy score. Should have stayed at home and not gone on DXpedition . . . *CT9M*. My first WPX contest. Enjoyed it very much. Hope to make more points next year . . . *DF4ZL*. Condx were poor, but the K1EA program works very nice . . . *DL5XX (ex-DL4BBO)*. My first WPX Contest. Very poor condx with USA, wrked only 6 W's. Hpe cu all next year . . . *EA7CEZ*. Arrived on EA8 12 hours into the contest. Jet lag really got me Saturday nite . . . *EA8ACH*.

This DXpedition was a honeymoon DXpedition to FK. Many, many thanks to my XYL, Asako! . . . *FK/JH6SOR*. Not enough activity on 7 MHz for this one . . . *FS5R*. First CW contest, first time from UK . . . *G0/AA6MC*. Self-inflicted pain!! . . . *G3GJQ/5N*. I scored more points during the last hour of the contest than at any other time . . . *G4ZME*. I couldn't operate more than 24 hours. I wished to do 6 hours more and have more than 1000 QSOs . . . *HI8JKA*. My last contest from HL land. See you next year from W4 land . . . *HL9CA*. Vy psed to QSO wid 4J1FS. He is very big one for me! . . . *JA3ARM*. I am very happy to get over 1 million points! . . . *JJ1NNJ*.

From bottom of tall buildings, here is Shinjyuku . . . *JK1ZIL*. I could not get up early on 2nd day! . . . *JR1IJV*. Terrible condx on 10 meters . . . *JY9SR*. First day pretty good. Second day a flop . . . *K1BAZ/DV1*. Using Ken Wolff's station and software are two of the finer pleasures of HF contesting . . . *K1EA*. Too bad the contest seems to always be on a weekend of beautiful weather! . . . *K3ND*. Some weird prefixes!! . . . *K3UA*. Twelve feet fell of my 40 meter beam's director late Saturday afternoon. The SWR went down!! . . . *K3ZO*. Working 4J1FS on the first call . . . *K4OD*. Band condx took their revenge for last year. They stunk! . . . *K5ZD/3*.

The only "2 meters" here are plate voltage and plate current . . . *K7NW*. Conditions poor this year. Made contest difficult, but I hung in there . . . *K8AZ*. Missed lots of good mults that seemed only be answering DX CQs . . . *K8MR*. First contest! . . . *KE2GL*. Bad timing. Caught

This is Tom, VP2VDX (KT6V), doing what he calls the "grip and grin." Looks like one of those tough spots from which to operate. Tom always finishes at or near the top and is also a WPX trophy donor.

the flu bug Sunday morning and finally gave up. Had fun anyway. See ya next year . . . *KE9A/DU3*. Good opening to parts of EU on second day saved single band 10 from being a complete bust . . . *KG6DX*. XYL planned a weekend outing, but I still got 15 hours in the contest. What is LX150L? . . . *KM0L*.

Conditions on 10 meters were terrible! Southern hemisphere prop. only. Some Europe via ZS and one JA long path . . . *KM2P*. Inlaws in town. Still managed to get in 20 hours operating in . . . *KR0Y/5*. Can't believe still working new prefixes in WPX test after over 2600 worked now!! . . . *KS7T*. Do AA6's get extra points for working me 7 times/band? Ever hear of a dupe sheet . . . *KV8Q*. Please QSL via LA9DFA . . . *LG5LG*. At least it rained all weekend so I didn't feel guilty about not mowing the yard! A "memorable" contest! . . . *N0AX/7*. The Asian opening over the pole just never fully developed; only worked a handful of UA9 and UA0 . . . *N0BSH/9*.

Computer only made one mistake. Counted /AE as a prefix. Great fun as always . . . *N2AA*. Lots of static on 80 and 40 meters. Also, mni gud ops heard . . . *N4UZ*. Great contest, just need some better conditions . . . *N4ZZ*. My first contest. No help from this ant. We have a big problem with the CBers on 28 MHz . . . *N5MLL*. This is the hardest I've ever worked to make 394 QSOs. At least I came within 2000 QSOs of my 10 meter phone effort! . . . *N5RZ*. Conditions poor, but I still managed to have fun with 100 watts . . . *N6TV*. No band opening stateside cost a lot of multipliers, but Europe was open from dawn til dusk . . . *N7DF/WH2*.

Every year get at least one "goodie" by mistake. Called SP2AZ, which turned out to be AP2AZ . . . *N8BC*. Arguing with neighbor 11:30 PM Sat. nite about TVI. He received a quick education . . . *NC7K*. First CW operation and first CW contest in 21 years. Even more fun than I had remembered . . . *NH6T*. First contest from East Coast! Had fun! . . . *NJ1Q*. Slept thru both JA chances! Thank goodness VE QSOs

TROPHY WINNERS

SINGLE OPERATOR, ALL BAND

WORLD: Terry Baxter, N6CW trophy. Winner: **Radivoje Lazarevic, V27T (YU1RL).**
USA: Steve Bolia, N8BJQ trophy. Winner: **Philip Allardice, KT3Y.**
***JAPAN**: The DX Family Foundation trophy. Winner: **Tatsuya Sasaki, JH7WKQ.**
OCEANIA: Tom Morton, KT6V trophy. Winner: **Yuzoh Fukahori, FK/JH6SOR.**
***CANADA**: Canadian Amateur Radio Federation (CARF) trophy. Winner: **Gus Samuelson, VO4MP.**
WORLD QRP/p: QRP Amateur Radio Club Intl. trophy. Winner: **Franc Bogataj, YU3BC.**
EUROPE COMBINED SSB & CW: Les Nouvelles DX Group trophy. Winner: **Al Slater, G3FXB.**

SINGLE OPERATOR, SINGLE BAND

WORLD: Pedro Piza, Jr., NP4A (Pedro Piza, Sr., KP4ES Memorial) trophy. Winner: **Bob Wruble, FS5T (AI7B - 21 MHz).**
WORLD 3.5 MHz: Lance Johnson Eng. trophy. Winner: **Jose Castejon, YX3A (YV5ANT).**
ASIA: Bruce Frahm, K0BJ trophy. Winner: **Shalom Beitcher, 4Z9FDB.**
USA: Kansas City DX Club trophy. Winner: **Gene Walsh, N2AA.**
USA 21 MHz: Wayne Carroll, W4MPY trophy. Winner: **Robert J. Halprin, K1XA.**
USA 14 MHz: Gene Walsh, N2AA trophy. Winner: **Kurt Andress, NI6W.**
USA 7 MHz: Dennis Younker, NE6I trophy. Winner: **Bill Johnson, KV0Q.**

MULTI-OPERATOR, SINGLE TRANSMITTER

WORLD: Ron Blake, N4KE trophy. Winner: **Station KP2A operated by KM9P & WN4KKN.**
USA: Austin Regal, N4WW trophy. Winner: **Station N4WW operated by N4WW, K0LUZ, NX4N.**

CONTEST EXPEDITION

WORLD: Ed Roller, K4IA trophy. Winner: **Tine Brajnik, P3AA (YT3AA).**

CLUB (SSB & CW)

WORLD: CQ Magazine trophy. Winner: **Northern California Contest Club.**
USA: Northern Ohio Amateur Radio Society (NOARS) trophy. Winner: **North Texas Contest Club.**

**Donor is responsible for this trophy.*

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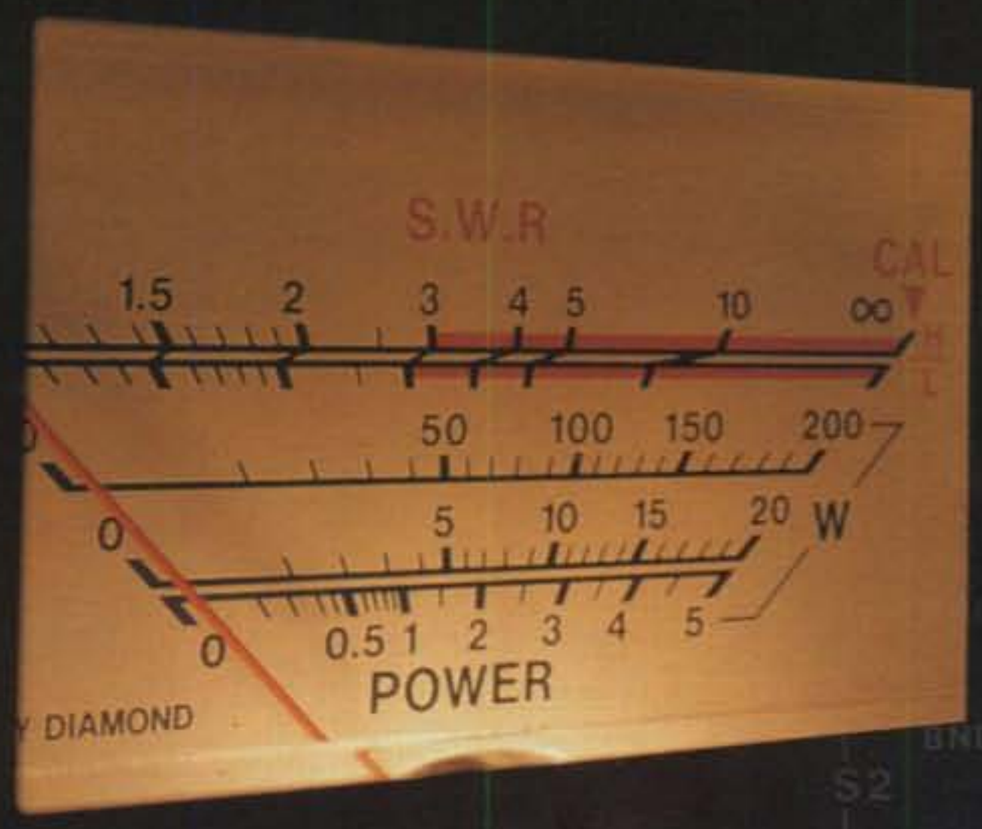

SX-1000

Dual Sensor SWR & Power Meter. 1.8-1300 MHz.
*Function: Forward and Reflected Power (P.E.P. & Average), & SWR *Lighted Meter
*Frequency: Sensor 1: 1.8-160 MHz; Sensor 2: 430-1300 MHz. *Insertion Loss: 0.2dB
*Sensors selected from front panel (sensors may be connected to two separate transmitters
*Power Ranges: 5W/20W/200W (derate for CW/FM) *Accuracy FS; 10%
*P.E.P. / Average Power Switch
*Connectors: Sensor 1: S0-239 (compensated); Sensor 2: Type N
*External 12VDC input jack (meter & LED illumination only).
*Dimensions: 6.1"× 2.7"× 4.5" *Weight : 2 lbs.

SX-400

200 Watt SWR/Power Meter. 140-525 MHz
P.E.P. / Average Power Switch
*Accuracy FS: 10%
*Insertion Loss : 0.2dB
*Lighted Meter
*Minimum power SWR Test : 4W

SX-600

Dual Sensor SWR & Power Meter.
Wideband Performance 1.8-525 MHz
*Sensor 1: 1.8-180 MHz ; Sensor 2: 140-525 MHz.
*Insertion Loss: 0.3dB *Power Ranges: 5W/20W/200W.
*Accuracy FS; 10% *Lighted Meter
*Dimension: 6.1"× 2.7"× 4.5" *Weight : 2 lbs.

SX-200

200 Watt SWR/Power Meter. 1.8-200 MHz
*Accuracy FS: 10%
P.E.P. / Average Power Switch
*Insertion Loss : 0.2dB
*Minimum power SWR Test : 1W
*Lighted Meter

SX-100

3 KW SWR/Power Meter. 1.8-60 MHz
*Power Ranges : 30W/300W/3KW
P.E.P. / Average Power Switch
*Insertion Loss : 0.1dB
*Lighted Meter
*Minimum power SWR Test : 3W

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DR-570T

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The Alinco DR-570T "Twin Bander" has dual LCD readout, volume, squelch and tuning controls. Double barrelled power with 45W on 2M and 35W on 70 cm, plus simultaneous receive on both bands or intermix with four modes of scan. The DR-570T will win the "battle" with its illuminated front function panel and LCD readout, readable in any lighting conditions. Don't let the "Tiny" DR-570T fool you! It's fast, and leaves the competition in the dust with many standard features you expect. Cross band repeat with the flick of a switch. Full duplex, 20 memory channels, call channels, 16-key DTMF Microphone, and subtones are just a few. "Reach" for the DR-570T today!

DR-510T

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20 Memory channels, subtones, built-in DC to DC, 700 mah nicad battery, LCD readout with 6W on 2M and 5W on 70 cm (with optional battery) call channels, DTMF Touchtone, and direct keyboard entry, are just the few winning features of the Alinco DJ-500T Dual Band Handheld. Easy to use, and Value Priced at your Alinco Dealer.

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Tiny 2M Power From Alinco!

DR-110T, this 2M Alinco, enters the nineties a proven winner with the "reputation" of best value. The DR-110T packs a powerful 45W on 2M and sports all the features you expect in todays transceivers. Tuning is a snap with the multi-functioned easy-to-see keyboard, 14 memory channels, subtones, scan, multi- colored LCD readout, reverse, are a few of the many features of the DR110T. The mobile of the future — today! DR-410T available for 70 cm.

DJ-100T&DJ-200T

Best 2M Micro Value Anywhere!

The Alinco DJ-100T is "Magnificent" for its tiny size, but stands up to the competition with power and capability. 10 memory channels store offsets and subtones. Has LCD readout with call channel and reverse at your fingertips. 500 mah battery with direct DC to DC is standard. 3W on standard battery, 6W on optional battery leaves the competition in the dust! DJ-200T for 220 MHz.

DJ-160T&DJ-460T

2M H/T is here! And wow!

"Bells & Whistles" is a tame word to use for the new DJ-160T, newest "Magnificent" one from Alinco. Keyboard entry is just one of four ways to enter a frequency in the extended receiver (137-173.995 Mhz) of the DJ-160T. You can store duplex/simplex pairs in any of 20 Memories, or Call Channel, with offsets, and any of 38 encoding subtones. Choose one of 3 scan modes, "Band" "Program" or "Memory" and one of five step ranges in VFO. Priority mode can be used in VFO, Memory or Call. "Dual Watch" allows the DJ-160T to scan 3 seconds alternately on CALL, VFO or one MEMORY. "Pager" is for group or single person alert. Other features include: Auto "Battery Save", Auto "Power Off", and 2-Memory Autodialer. Get 3-watts on standard 700 mah battery, or increased power from built-in DC to DC, or optional 12V battery. The Alinco DJ-160T, now the "Top Gun" with the competition today! DJ-460T for 70cm.

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CIRCLE 14 ON READER SERVICE CARD

ALINCO GAZETTE

APRIL 1990 APRIL 1990

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So dramatic are the reductions that heads will roll at ALINCO USA when the home office learns what has been done.

Amazingly, the price reductions are not just the normal 5 to 10 percent, but substantially more! So much so, that ALINCO can say without hesitation, "THERE IS NOTHING ON THE MARKET EQUAL TO OUR PRODUCTS IN FEATURES, BENEFITS, AND PRICE."

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Amateur & Advance Comm.—Wilmington, DE
Amateur Comm.ETC.—San Antonio, TX
Amateur Electronic Supply—Milwaukee, WI
Amateur Electronic Supply—Orlando, FL
Amateur Electronic Supply—Clearwater, FL
Amateur Electronic Supply—Las Vegas, NV
Austin Amateur Radio Supply—Austin, TX
Burghardt Amateur Center—Watertown, SD
Colorado Comm. Center—Denver, CO
Delaware Amateur Supply—New Castle, DE
El Original Electronics—Brownsville, TX
Electro-Com—Tacoma, WA
EEB—Vienna, VA
Ericson Communications—Chicago, IL
F & M Electronics—Greensboro, NC
Floyd Electronics—Collinsville, IL
The Ham Station—Evansville, IN
The Ham Hut—Amarillo, TX
Henry Radio—Los Angeles, CA
Hirsch Sales Co.—Williamsville, NY
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KComm—San Antonio, TX
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Madison Electronics—Houston, TX
Maryland Radio Center—Laurel, MD
Memphis Amateur Electronics—Memphis, TN
Michigan Radio—Mt. Clemens, MI
Missouri Radio Center—Kansas City, MO
N & G Electronics—Miami,FL
Omar Electronics—Loganville, GA
Omni Electronics—Laredo, TX
Quement Electronics—San Jose, CA
RF Enterprises—Merrifield, MN
R & L Electronics—Hamilton, OH
Radio World—Boulder City, NV
Reno Radio—Reno, NV
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CIRCLE 155 ON READER SERVICE CARD

CW & SSB CLUB COMPETITION

NORTHERN CALIFORNIA CONTEST CLUB	**61,166,757**	OH1AF CONTEST GANG	1,187,336
OSAKA UNIV. RADIO CLUB	33,751,740	ROCHESTER DX ASSOCIATION	814,910
YU DX CLUB	30,695,907	DOUBERVILLE DX ASSOCIATION	756,650
NORTH TEXAS CONTEST CLUB	**27,675,780**	WESTERN NEW YORK DX ASSOCIATION	752,689
KAUNAS POLYTECHNIC INSTITUTE	23,645,380	SUBIC BAY AMATEUR RADIO CLUB (PHILIPPINES)	728,284
POTOMAC VALLEY RADIO CLUB	19,274,147	GRUPO ARGENTINO DE RADIODELEGRAFIA (GACW)	662,008
MAD RIVER RADIO CLUB	16,089,708	TYLER AMATEUR RADIO CLUB	650,126
SOCIETY OF MIDWEST CONTESTERS	16,006,701	NORTHERN LITHUANIA CONTEST GROUP	537,936
LES NOUVELLES DX GROUP	14,045,204	NORTHERN CALIFORNIA DX CLUB	531,850
TEXAS DX SOCIETY	13,307,874	DELTA DX ASSOCIATION	476,416
NORTHERN LITHUANIA DX GROUP	10,321,170	LEGION OF INDIANA DX'ERS	470,962
WILLAMETTE VALLEY DX CLUB	10,228,288	MAXWELLTOWN AMATEUR RADIO KLUB	467,820
FRANKFORD RADIO CLUB	10,175,212	COLUMBIA AMATEUR RADIO CLUB	443,405
GUADELOUPE DX CLUB	9,936,240	LITHUANIAN CONTEST GROUP	415,240
VIIMSI RADIO CLUB	9,269,244	SOUTHERN CALIFORNIA DX CLUB	353,836
DIXIE DX'ERS	8,738,236	NORTHERN OHIO AMATEUR RADIO SOCIETY	352,224
WESTERN WASHINGTON DX CLUB	7,849,318	SOUTH GERMAN DX GROUP	279,312
YANKEE CLIPPER CONTEST CLUB	7,708,337	DAYTON AMATEUR RADIO ASSN.	263,410
ALASKA DX ASSOCIATION	6,981,532	UTICA AMATEUR RADIO CLUB	257,598
KANSAS CITY DX CLUB	6,700,085	SALT CITY DX ASSOCIATION	248,792
NORTH COAST CONTESTERS	6,298,680	NORTHERN OHIO DX ASSOCIATION	228,468
MAUI AMATEUR RADIO CLUB	6,216,804	LITHUANIA CONTEST GROUP	205,920
HOOSIER CONTESTERS	5,057,994	DAUBERVILLE DX ASSN.	204,568
DX DU MOULIN	4,474,451	FOX RIVER RADIO LEAGUE	204,516
SOUTHERN CALIFORNIA CONTEST CLUB	4,316,786	RIGA RADIO CLUB	152,656
VENEZUELAN RADIO CLUB	4,137,628	SOUTH JERSEY RADIO ASSN.	124,620
READING RADIO CLUB	4,119,549	REDWOOD EMPIRE DX ASSOCIATION	106,654
SAN DIEGO DX CLUB	4,020,401	SPDX CLUB	91,686
ALBANY AMATEUR RADIO ASSOCIATION	3,388,802	SHIZUOKA DX RADIO ASSOCIATION	84,162
SOUTHWEST OHIO DX ASSOCIATION	3,108,383	THE WINNIPEG DX CLUB	81,672
RUBBER CIRCLE CONTEST CLUB	3,085,779	TASHKENT AMATEUR RADIO CLUB "TARC"	76,436
RHEIN-RUHR DX ASSOCIATION	2,696,018	DX - CLUB SAAV-PFALZ	63,855
ARAUCARIA DX GROUP	2,650,219	DADE RADIO CLUB	62,611
VENEZUELA CONTEST CLUB	2,317,477	KENWOOD EMPLOYEES RADIO CLUB	30,875
BAVARIAN CONTEST CLUB	2,196,038	MICHIGAN QRP CLUB	27,400
NEW MEXICO BIG RIVER CONTESTERS	1,995,456	SOUTHEASTERN DX CLUB	25,464
GRAND MESA CONTESTERS	1,975,136	POWAY ARS	24,568
MISSISSIPPI VALLEY DX/CONTEST CLUB	1,937,616	MURPHY'S MARAUDERS	16,610
SP DX CLUB	1,661,508	EASTERN IOWA DX ASSOCIATION	7,367
FRENCH DX FOUNDATION	1,415,238	UTAH CONTEST CLUB	5,865
ONTARIO CONTEST CLUB	1,326,732	COLORADO CONTEST CONSPIRACY	5,472

count points! Wicked QRN—had to abandon many QSOs . . . *NJ1T*. Lots of fun. Heard lots of strange prefixes . . . *NJ3K*. Fun to try out new QTH and antenna! . . . *NJ9C*. Signals fair on Saturday, but Sunday all bands opened up beautifully. 73 to cycle 22! . . . *NJ9Z*.

Too long—how about 24 hours? . . . *NN0M*. Spain and France didn't answer me last year. Gotcha this time and ten new DX. Love the new beam! . . . *NW7S*. Thanks to Pedro, EA4WR, and Fernando, EA4BB, who made my effort possible . . . *OH0XX/EA*. Exciting to see stormy sea just 25M from the window and be afraid of antenna damage . . . *OH1ZAA*. Took part three times and always finished number 2 in EU. Wonder how this year. A lot of competition . . . *OK1RI*. Everything perfect, 5B4TI, his family, sun on the Cyprus, call P3AA, rig, QSO number; only multiplier failed . . . *P3AA*. My first contest. Am ham for abt 3 months. Thanks for all those who QRS for me! . . . *PU1LJA*.

RP7W—Special call for WPX Contest '89. SRI, poor condx. CU next year! . . . *RP7W*. QSLs direct to SM0OGQ only . . . *SL4ZXE*. Thanks for a nice contest. I was just checking out a new PA which I will use on my next DXpedition . . . *SM7PKK*. Have already 2200 prefixes confirmed but still managed to work 13 new in this contest . . . *SM7TV*. Always a pleasure to be among participants in so much attractive

This is the XYL of FK/JH6SOR. Yuzoh took time out from his honeymoon (with the permission of his XYL) to take the top spot in Oceania and world fifth high.

contest . . . *SP5JTR*. Nice to work WPX again! . . . *UA2FF*. This is my first WPX Contest. Thanks for nice contest! . . . *UI9ACQ*. Many thanks for the contest! I am 21, but this is my sixth CQ WW WPX Contest! This is my best score ever! . . . *UT4UXW*.

The biggest thrill: My first QSO in contest was PY2DP on 80 meters (new country) . . . *UT4UZ*. 4000 QSO was easy to maintain, but being North America this time, hunting multipliers was a must . . . *V27T*. Can we swap the WPX weekend for Dayton weekend? We would have better condx. for both! . . . *VE2ZP*. I am 15 years old and this was my first major contest, lots of fun. Something was wrong with my rig so finished early . . . *VE3HQL*. 80 QSOs, 80 prefixes, 1 new country (4J1FS!), and several new prefixes . . . *VE3NBE*. Just back from family wedding in VE2 land, to catch last half hour of contest . . . *VE3PYA*. Hard to predict time-off periods! . . . *VE6OU/3*.

W2HPF software great . . . *VE7SZ*. By the way, this was my 266th contest in which I have exceeded the 200 QSO mark . . . *VK2APK*. Keep off the first 5 kHz for SA, AF, and OC only . . . *VK2BQQ*. 47 bloody duplicates!! Still, really enjoyed it. Preparation paid off! Best single-band score I have ever had!! . . . *VK8XX*. Now I know how some stations had big numbers: they worked everbody twice hi! . . . *VO4MP*. Looks like I picked the wrong band! . . . *VO5AC*. "WOW"—24-hour band openings on 15 . . . *VP2MU*. Condx not a good as last year, but increase in US prefixes more than made up difference . . . *VP2VDX*. Enjoyed getting FR4FD on first call and working 8 new countries on 40 meters . . . *W3FTG*.

Too many US stations calling CQ on top of many DX stations . . . *W8UMR*. First contest

WORLD TOP SCORES

SINGLE OPERATOR ALL BAND

V27T	**9,408,672**
P3AA	**8,951,600**
CT9M	5,731,950
5H0T	4,384,672
FK/JH6SOR	**3,663,177**
KT3Y	**3,297,600**
VO4MP	**3,208,444**
HA0MM	3,159,187
RL7AB	3,078,570
KZ2S	3,033,760
KQ2M/3	3,011,958
9Q5DX	2,922,196
K1EA	2,921,388
RP7W	2,921,373
VE6OU/3	2,882,832
VP2MU	2,837,430
K3ZO	2,762,060
EA8ACH	2,735,657
G3FXB	**2,734,769**
EA8AB	2,505,008
YC3HCM	2,491,746
OK1RI	2,346,690
UW0LT	2,270,635
NJ1Q	2,266,458
VS6UP	2,237,115
K8AZ	2,147,840

28 MHz

CE3DNP	2,857,038
AY4F	2,390,024
ZS6BCR	2,168,411
JH1BXH/0	1,556,256
KG6DX	915,992
HI8JKA	891,242
YT6AA	775,740
JY9SR	755,820
VK4XA	564,896
CE0ZIG	523,218

21 MHz

FS5T	**4,552,470**
4M7A	4,137,628
9Y4VU	3,986,512
VP2VDX	3,804,437
N7DF/WH2	3,243,450
ZY5ZBA	2,650,219
VK8XX	2,633,154
4Z9FDB	2,501,330
FV9NDX	1,990,450
4N4A	1,979,086

14 MHz

LZ5A	3,066,120
XK1CYL	3,016,142
ZL3GQ	2,775,744
4M3A	2,317,477
SV1RP/SV2	1,698,926
N2AA	**1,690,032**
YU7AV	1,633,840
UT4UXW	1,624,080
4N2X	1,476,632
4U4ITU	1,415,238

7 MHz

FS5R	2,847,150
YY1D	2,410,920
YT7A	938,928
G3GJQ/5N	813,610
OH1AF	548,080
KV0Q	498,550
NJ1T	478,134
W3BGN	474,144
UA9YJP	446,340

3.5 MHz

YX3A	**1,004,060**
UA9SP	308,484
KX6DC	258,258

3.5 MHz

UA9CBM	239,910
UP1BYL	205,920
RB5FF	199,606
RB5NC	162,782
HA4FF	161,600
SP5GIQ/7	160,044
RA4AV	105,930

1.8 MHz

OK1DFP	92,564
UA2FF	64,976
UT5UJO	33,456
OL8CVU	29,800
UT4UN	23,400
OL9CUD	14,904
OL9CUH	11,534
UA9MR	10,184
OK1DWJ	8,710
OK1DRU	8,540

QRP/p

YU3BC	**A**	**710,448**
KA2AEV	A	625,504
N3RS	A	615,624
4X1IF	A	603,194
N4KG	A	461,700
JI1CBF	A	437,955
NX7K	A	436,044
YU2TY	A	405,372
YU1LM	A	344,300
N8BJQ	A	303,659
ZL0AAH	28	256,665
PY2ORF	28	71,300
JA6GCE	21	195,360
UR2CR	21	90,528
W8VSK	14	376,648
YT3FM	14	276,816
UB4AR	14	152,702

QRP/p

YV2BE	7	29,648
HA8LKB	3.5	20,240
OK2BXR	1.8	9,648

MULTI-OPERATOR SINGLE TRANSMITTER

KP2A	**12,843,135**
HG9R	9,957,368
LQ5A	8,290,016
5H1HK	7,010,392
HC2G	6,917,481
4J1FS	6,179,859
HG5A	5,740,280
RL8PYL	5,503,272
RQ7W	5,458,023
HG1S	5,437,712
LZ9A	5,396,265
OK7AA	5,191,200
OL4A	5,188,986
EA3VY	4,997,116
N4WW	**4,876,485**
ZF2NE/ZF8	4,571,689
HG5C	4,268,231
F8UFT	4,247,748
HI3UD	4,235,825
UQ0A	4,165,656

MULTI-OPERATOR MULTI-TRANSMITTER

Y34K	9,831,866
YT2R	9,313,824
WL7E	6,981,532
OH7AB	5,852,517
OH1AA	5,299,712
UP1BZO	5,081,987
JA2YKA	4,917,740
VE7ZZZ	2,441,710
JR1ZTT	1,319,096

since upgrade to Extra. Thanks to all sending congratulations . . . *WA0OUI/AE*. Always lots of fun, but condx poor . . . *WA6VNR*. Just having fun. Thanks to all for special prefixes . . . *WA8YTM*. Where were the sunspots?? . . . *WB2DND/1*. Condx so bad, even got my 3 acre lawn mowed during contest period . . . *WD8LLD*. Biggest thrill: having ANY station answer my CQ . . . *WJ7R*. Great contest, but too many dupes! . . . *XK1CYL*. I hope next time will be better propagation. As you can see, I have just a couple USA's in log. Funny! . . . *YT6AA*. Best contest. Big trbls with amp. Next year will be better . . . *YU7FN*.

Thanks, guys, for nice prefixes . . . *YU7FT*. Poor cdx. S9 noise. CU next year . . . *YV1OB*. When one receives half the numbers in abbreviated form, does a "B" mean a mis-sent "6" or an abbreviated "7"? . . . *ZL3GQ*. Despite having only a few hours to operate (upcoming exam), I managed to catch my last 2 zones on 28 MHz. Fun contest! . . . *ZS6BCR*. 50 DX contacts on 40 meters QRP! That 2L quad really works! . . . *N4KG*. Last serious effort—age 73-plus. Moving QTH 1990 . . . *W8VSK*. Terrible conditions . . . *NX7K*. Finally broke 100K QRP. Worked Cyprus and New Zealand for new QRP countries . . . *NU4B*. What a fun contest!! I had a lot of fun running power levels down to ¼ watt (2 watts max.) . . . *NR0R*.

I wish I could have spent more time in the contest . . . *SM0BYD*. QRP a lot of fun! . . . *JA9RPU*. Rotten conditions for QRP . . . *KE7X*. Amazed at what I could work with 5 watts. Even more amazed at what I could not work! . . . *WA3LFY*. ZL3GQ on 20 in these condx with no beam! WAC! . . . *N8CQA*. Continue to be amazed at what 5 watts can do when there are good ears on the other end. One of my favorite contests . . . *NO5W*. 4J1FS on QRP/p: What "ears" he has! . . . *K5MK*. YB3ASQ on 40 with 5 watts and a dipole! . . . *K9AY/0*. Lots of fun, but too few stations to work the second day . . . *N5US*. 10 meters a bomb. 15 meters a blast! . . . *KI4UZ*.

Just getting back after 25 yrs. This old rig (35 yrs old) and poor antenna got out quite well! . . . *W8QZA/6*. Mostly 6's, 7's, and JA's were coming thru. I never heard much else . . . *KL7/W6RCL*. Thanks to all who heard my signals. Was really surprised what can QRP and good antenna done. See you in next *CQ* WW contest . . . *YT3FM*. First contest from Europe—what a ball! . . . *DJ0SI*. Being able to persuade V27T to QRS so we could read his callsign . . . *EI2WW*. This is the first contest with the new call FF1OJX! . . . *FF1OJX*. Very enjoyable contest. Nice to get "HC2Gang" together . . . *HC2G*. IR2ITU was a special event station celebrating the world telecommunications day. We operated from the QTH of I2UIY . . . *IR2ITU*.

We got into this contest in free time, but it was very interesting . . . *JA6YBR*. On 15 meter band, we in the northern part of JA didn't have a good propagation to USA . . . *JA7YAA*. Two hour power failure Sat. morning . . . *K1RU*. To this Texan's perspective, conditions to Europe were very good. This must be what it's like to operate from Massachusetts! . . . *KP2A*. Still wondering how many guys took us for LX15OL or LX1HOL. Next year we'll try to get something simple like LX0A . . . *LX150L*. A few words: we had fun operating the contest, too bad 10 meters was not there . . . *N3DG*. The most excitement came when two scorpions crawled across the floor at about 3:00 AM each nite . . . *N7KA/5*.

If contacts were food, would we die of starvation or boredom first? . . . *NA6A*. If there was a multiplier for beer consumed we surely would've won! . . . *NF8R*. Surprised at low activity. 80 and 160 meters were a bust. Could not get anyone to answer CQ calls . . . *NR4K*. It was our first attempt at multi-single category. Thanks for the contest. We will try again . . . *OK7AA*. Great contest, had a lot of fun . . . *WA6IET*. Strong path to eastern Europe, very poor 40 and 80 meter conditions. Where was Africa? No Pacific . . . *ZF2NE/ZF8*. Didn't know there were so many Y prefixes! . . . *N6VR*. We

CT9M after his 5.7M point effort which netted him the top spot in Africa and world third high.

USA TOP SCORES

SINGLE OPERATOR ALL BAND

KT3Y	**3,297,600**
KZ2S	3,033,760
KQ2M/3	3,011,958
K1EA	2,921,388
K3ZO	2,762,060
NJ1Q	2,266,458
K8AZ	2,147,840
KO7N	2,087,818
KU2C	1,902,840
K4BAI	1,553,832
AJ6V	1,344,600
NE8T	1,284,312
KR0Y/5	1,252,350
AD1C	1,215,672
WD8LLD	1,039,550
KV8Q	924,888
N6TV	910,616
K5NW	881,328
NC7K	739,398

28 MHz

N5RZ	162,134
N4ZC	153,081
N4VZ	118,534
KM2P	43,472
WA6FGV	18,042
WD8IXE	17,572
WD9FTZ/0	15,566
N5MLL	12,416

21 MHz

K1XA	**1,037,374**
W2SC/1	967,280
N4ZZ	783,328
W5WMU	776,736
KA5W	555,228
WB4TDH	513,678
NJ9C	349,979
W2HG	179,983
WJ7R	114,872

14 MHz

N2AA	**1,690,032**
NI6W	**1,267,110**
KD2SX/1	1,129,514
W5FO	1,094,930
N0BSH/9	1,069,430
K3IPK	668,171
KC0D	479,004
W8UMR	141,454

7 MHz

KV0Q	**498,550**
NJ1T	478,134
W3BGN	474,144
W3UM	415,800
AA1M	105,878

3.5 MHz

WA6VNR	1,794

1.8 MHz

N6LL	1,584

QRP/p

KA2AEV	A	625,504
N3RS	A	615,624
N4KG	A	461,700
NX7K	A	436,044
N8BJQ	A	303,659
KE7X	A	254,012
AB4LX	A	160,370
K5MK	A	151,767
K9AY/0	A	123,190
NU4B	A	121,549
W9SE/7	A	95,275
N5US	28	10,890
WA3LFY	28	7,888
W8VSK	14	376,648
K9OSH	14	64,770

MULTI-OPERATOR SINGLE TRANSMITTER

N4WW	**4,876,485**
KU2Q	4,091,568
WC4E	3,911,660
K1RU	3,209,059
WA6AUE	2,023,400
N7KA/5	1,995,456
KS9O	1,899,710
NA6A	1,705,041
N7TT	1,431,621
NF8R	1,422,288
AI6V	1,159,284
WA6IET	1,064,712
KS3F	1,046,220

MULTI-OPERATOR MULTI-TRANSMITTER

WZ6Z	5,183,187
AD6E	2,872,792
N6VR	2,674,960

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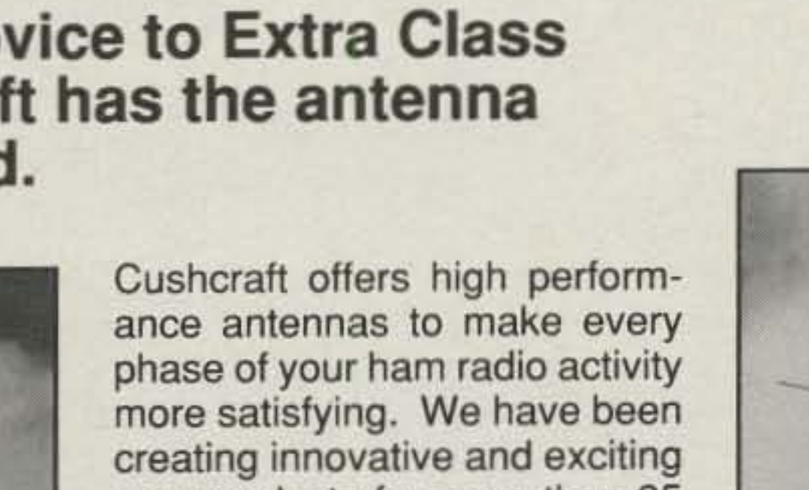

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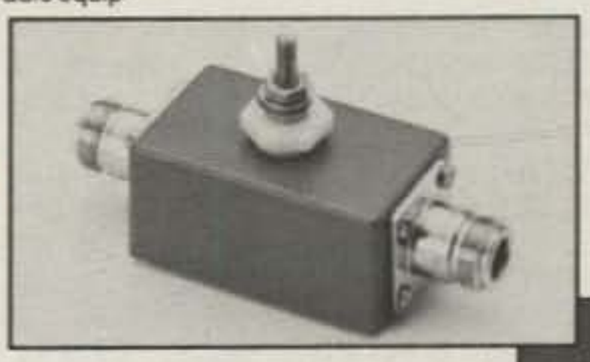

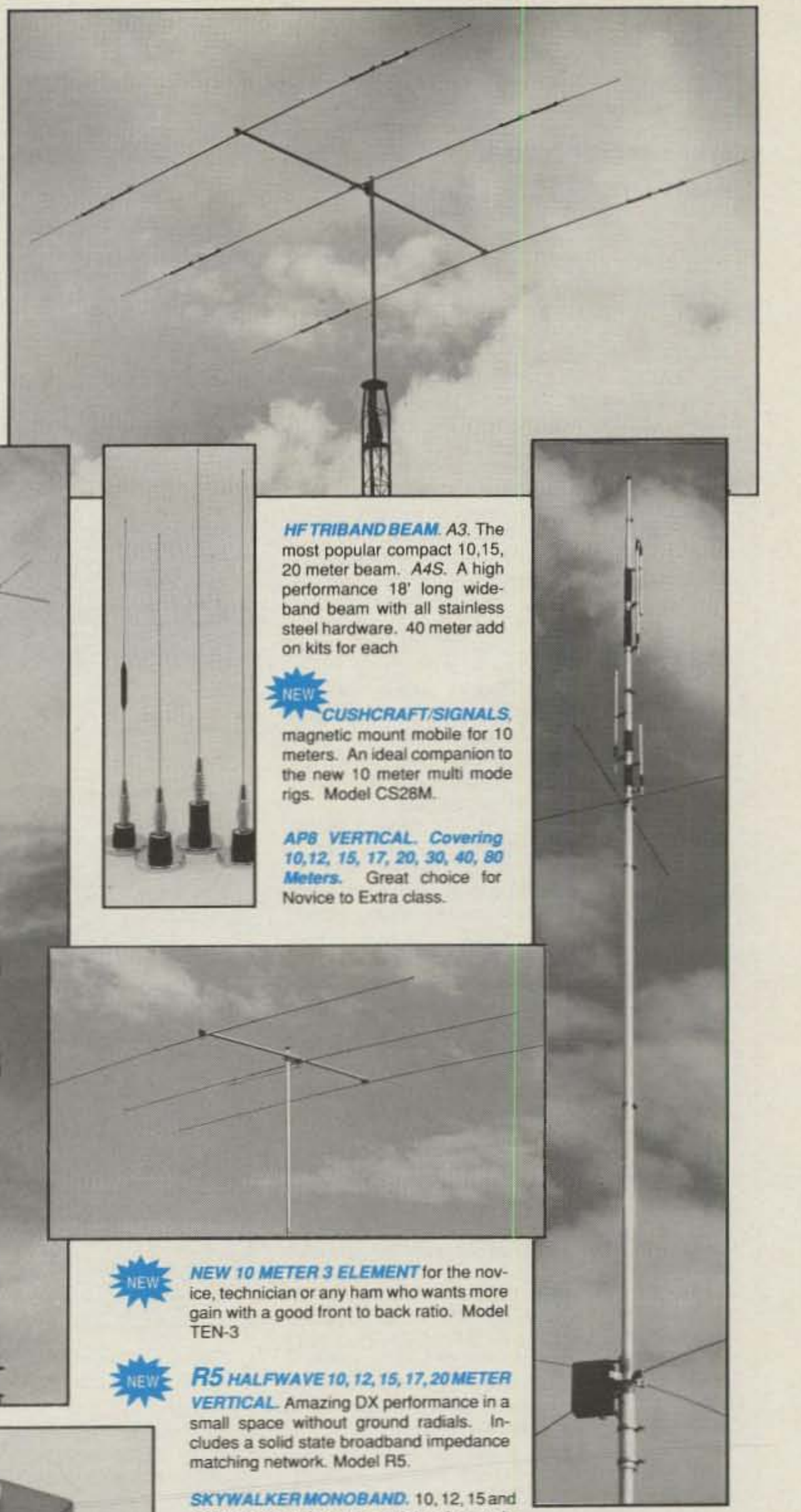

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NEW ***CUSHCRAFT/SIGNALS,*** magnetic mount mobile for 10 meters. An ideal companion to the new 10 meter multi mode rigs. Model CS28M.

AP8 VERTICAL. Covering 10,12, 15, 17, 20, 30, 40, 80 Meters. Great choice for Novice to Extra class.

NEW ***NEW 10 METER 3 ELEMENT*** for the novice, technician or any ham who wants more gain with a good front to back ratio. Model TEN-3

NEW ***R5 HALFWAVE 10, 12, 15, 17, 20 METER VERTICAL.*** Amazing DX performance in a small space without ground radials. Includes a solid state broadband impedance matching network. Model R5.

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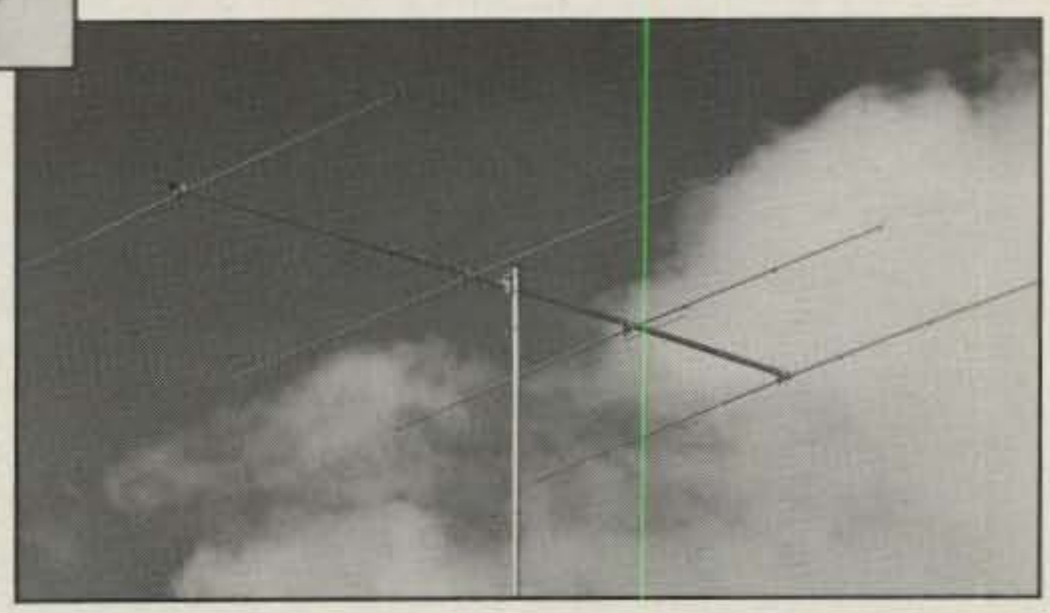

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AVAILABLE THROUGH DEALERS WORLDWIDE

CIRCLE 50 ON READER SERVICE CARD

were prepared for the best of conditions. What happened? . . . *VE7ZZZ*. Conditions were so bad we couldn't even work our own prefix . . . *WL7E*.

Station Operators Multi-Op. Single Transmitter

4G1A/3: 4F3AAL, 4F3BAA, JF2IIZ. **4J1FS**: OH1EH, UA6HZ, OH2BU, OH6DD, UZ3AU, K7JA, UA1ALZ, UW3AX, OH2BH, OH2JA, UR2AR. **5H1HK**: JE3MAS & Club Group. **6D2A**: XE2FU, KZ5M, WB5N, NM5L, K5IY, KG5U. **7S3HK**: SM3CER, SM3IEK, SM3DXC, SM3OJR, SM3EVR, SM3DJV. **AA4M/6** & KC4B, Packet Cluster. **AI6V** & NB6G. **AP2ZA** & AP2SQ, AP2ASA, K2XR. **CJ7SV**: VE7SV & VE7AHA. **DJ8SI** & DK2OY, DL6RAI. **DX9HT**: DU9AU, DU9XU, DU9BI. **EA3VY** & EA3AIR, EA3AVV, EA3DXD, EA3FER, EA3KU, EA3LL. **EI2WW**: EI2CA, EI8CZ, EI2FN, EI4CP, EI6GB, EI9FK. **F8UFT**: F5IN, F6ARC, F6INW, F1LGE. **FF1OJX**: FD1MNC, FD1MLJ, FD1MFL, Benoit. **FF1OKZ**: F6ERZ & F6ANW.

HA2KNP: Robert, Szilitsan, Gyertyak. **HA3KNA**: HA3FO, HA3OV, HA3OU, HA3FTA, HA3NS. **HA5KKF**: HA1RJ & HA2PD. **HA6KNX**: Jozsef, Zsolt, Nandor. **HA6KVB**: Bocsi, Dienes, Gulyas, Virag, Korepta, Crespanyi. **HA8KCK**: HA8FT, HA8FM, HA8DZ, HA8FW, HA8KH, HA8EK. **HA8KVK**: Lukacs & HA8VK. **HA8KWE**: Csaba, Tamas, Lanlo, Peter. **HC2G**: HC2CG, HC2SL, HC2FU, HC2CA, HC2NCY, HC2NAM, HC2NAK, HC1LT, HC1CU, HC5AI, HC5NVR, HC2CPK. **HG8D**: HA0HG, HA0DR, HA0NAR, HA0HV, HA0IL, HA0HA. **HG1S**: HA1TD, HA1AH, HA1DAC, HA1DAE, HA1TJ, HA1SV. **HG5A**: HA5ML, HA5FM, HG5BNL, HA5WE, HA5LN, HA5MK, HG5LYN, HA5OM, HA5GF, HA5AWH. **HG5C**: HA5MO, HA8UB, HA1AG, HA7XQ, HA7SB, HA5BMS, HA1AD, HA5WU.

HG6N: HA6ND, HA6ON, HA6OQ, HA6PX, HA6NY, HA6NQ, HA6NF. **HG7B**: HA5WA, HA5DW, HA8FM, HA7UG, HA0DU, HA7JAO. **HG8Q**: HA8IE, HA8LKE, HA8LLK, HA8-806, HA8JV, HA8PG, HA8JP, HA8-834. **HG9R**: HA9AX, HA9PP, HA9RP, HA9SU, HA4XX, HA9OA, HA9RC, HA9RU, HA9TA. **HI3UD**: HI3HCE, HI3LFE, HI3MBO, HI3RWP. **HL9JZ** & HL9CW, HL9OMT, HL9OB. **IK2EGL** & I2VXJ, I1XPQ, I1ZEU. **IR2ITU**: I2UIY, I2YSB, IK2DVG. **JA0YAK**: JS1PTU, JR0FQM, JI7DED. **JA0ZRY**: JH0ILL, JP1NOM, JP1QGO, JN1JVA, JH5XDD, JR0BQD, JR0SXK, JR0TGT, JQ1OTD, Inukai, Shimomura. **JA1YAD**: JH9AMJ, JN1HYU, JO3OOB, Ajarashi, Iboo, Minky. **JA1YFG**: JL1BLW, JO1RUR, JP1JFG, JP1OGL, JQ1BRW, JE7WBI. **JA3YBF**: JJ2ICA, JJ3IMX, JJ3KGS, JO3VUZ, JF4FUF, JG4CLV.

JA3YKC: JH4RHF, JK3GAD, JG3MRT, JG3WDN, JF3VXV. **JA6YBR**: JR6GKT & JI6BRB. **JA6YJS**: JS1PWV, JF4ETK, JR5BMM, JI6KYX. **JA7YAA**: JJ3CNL, JE7HLZ, JE7JZC, JH0ORW. **JA7YAB**: JA1-36363 & E. Nishiyama. **JA8YBY**: JH8PNE, JH8WBR, JH8XVT, JR8DHA, JE8BRO, JO1DFG. **JA9YBA**: JH9VSF, JH9KIF, JR0ELG, Fujita. **JE2YHS**: JA2OLJ, JR2JVR, JE2WWB, JF2HSU, JF2KQX, JF2POF. **JE2YRD**: JE1JKL, JR7OMD, JF2DQJ, JF2EOC, JI2KVW, JF2XJE. **JG1ZUY**: JO1BMV, JO1RUR, JF2IWL, JH7PKU. **K1RU** & K1YR, K2SS. **K5LZO** & K5GA. **KE6WL** & KD6NT. **KP2A**: KM9P/4 & WN4KKN/5. **KS3F** & NE3F, N3BNA. **KS9O** & K9LJN, NA9J. **KU2Q** & K5NA, WB2Q. **LA1T**: LA4BQ & LA2IG. **LA2AB**: LA4DCA & LA8SDQ.

LO5A: CX8BBH, CX5AO, LU8DPM, LU8EIN, LU7UAF, LU5UL. **LX150L**: LX2PA, PA3BUD, PA3CLS, PA3DMH, JH8UKL, DL2EBX. **LZ9A**: LZ2CC, LZ2PO, LZ2DF, LZ2HE, LZ2EZO, LA1A310/2. **N3DG** & KA3ROF, W3FW. **N4WW** & K0LUZ, NX4N. **N6JV** & Packet. **N7KA/5** & K5TA, AA5B. **N7TT** & Cheryl. **NA6A**: W6REC & N6TIB. **NB3O** & K3TM. **NF8R** & WD8AUB. **NM9H** & N9HXG. **NR4K** & N4BPP. **OH2AQ**: OH2BCI, OH2BUQ, OH2MAM, OH2BQW, OH2BVF, OH2NRV. **OK1KJA**: Club Group. **OK1KNR**: Club Group. **OK1KOK/P**: Club Group. **OK1KQJ**: OK1AYP, OK1DXS, OK1BY, OK1DLE. **OK1OFK**: Club Group. **OK1OFM**: OK1DRQ & OK1-19973. **OK1OPT**: Club Group. **OK2KEZ**: Club Group. **OK2KOD**: OK2BGR, OK2BDI, OK2BNX.

OK3KGQ: Club Group. **OK3KYH**: Club Group. **OK3KZA**: Club Group. **OK3RJB**: Club Group. **OK3RJB**: Club Group. **OK5MVT/P**: Club Group. **OK7AA**: OK3EA, OK3LZ, OK3GI, OK3CDV, OK3RM, OK3GB, OK2PZW, OK3NA, OK3CBU, OK3JW, OK3TMM, OK3LU. **OL4A**: OK1AEZ, OK1AII, OK1JJB, OK1CF, OK1WT. **OZ1OXZ**: OZ1IDL, OZ2DH, OZ4RS, OZ4XX, OZ5DL, OZ5UR, OZ8AE, OZ1JNR. **PA0KHS** & PA3ADJ, PA3EYZ. **RB0QWW**: Club Station of the Industrial Institute. **RB1J/UZ3WWZ**: Victor, Romeo, Oleg. **RB4IYJ**: Alex, Gregory, Witaly. **RL8PYL**: UL7PAE, UL7PCZ, RL8PY, RL7PKN. **RQ7W**: UQ2-037-83, UQ2-037-116, UQ2GJR, UQ2GAG. **SK7GC**: SM7RME & SM7IDF. **SM5GMG** & SM0NSJ, SM6LRR. **SP0BEM**: SP5MXZ, SP5OAU, SP1RKW.

UB4EZQ: Val & Alex. **UB4TWL**: RB5TN, UB5TBS, UB5TCW. **UC1AWK**: UC2AHZ & UC2-188-101. **UC1AWP**: Ilona & Nastaj. **UC1LWN**: Club Group. **UI9AWX**: UI8ACI & RI8AK. **UQ0A**: UQ2GKL, RQ2GN, UQ2GM, UQ2GID. **UR1RWX**: UR2RRR, UR2RDJ, UR2RHF, UR2RJ, UR2RNT, UR2RNA. **UZ0QXU**: UA0QEZ, UA0-098-206, UA0-098-168. **UZ1AWO**: UA1-169-2391 & UA1-169-8991. **UZ1AWQ**: Timofeev, Dolszenkov, Onisshenko. **UZ1NWF**: Vladimir, Alexandr, Nickolay. **UZ1QWD**: UA1QV, RA1QEM, RA1QEE. **UZ1TWB**: RA1TE, UA1TAF, UA1TEI. **UZ4FWA**: UA4FZ, UA4FMQ, UA4-148-481, UA4-148-363. **UZ6HWA**: Ruslan, Sten, Valery. **UZ6LWB**: Alan, Serge, Alex. **UZ9UZL**: RA9UUN, UV9UBW, RV9UER. **UZ9YXI**: Putincev, Selivanov, Firsov.

UZ9YXP: UA9YIM, UA9YCS, UA9YQB. **WA6AUE** & KE7V. **WA6IET** & N6GC, JA7RHJ, W6FKV, W2KVA/6. **WA8LLY/6** & Packet. **WC4E** & K4XS, KD8NS. **Y32CN**: Y32BN, Y32WN, Y32YN. **Y35L**: Y33VL, Y33UL, Y33ZL. **Y89TME**: Y21QI, Y24JI, Y32PI. **YT3T**: YU3BQ, YT3EW, YU3HR. **YT5R**: YU5JA, YU5GX, YU5GB, YU5OC, YU5RS126, YU5RS145, YU5RS146. **YU2CCJ**: Pero, Zlatko, Sale. **YU3AI** & YU3BM, YU3EO, YU3MM, YT3WW. **YU3AI** & YU3BM, YU3EO, YU3MM. **ZF2NE/ZF8**: W5ASP & W5VAH.

Part of the gang at South American multi-single station HC2G. From left to right are HC1LT, HC5NVR, HC1CU, HC5AI, HC2CG, HC2CPK, and HC2SL.

Gene, UC2ADX, content after the contest.

Three of the ops at AP2ZA, a welcome addition to any CW contest. Left to right are AP2SQ, K2XR, and AP2ZA.

Station Operators Multi-Operator Multi-Transmitter

AD6E & N6TU, K6XO, WB6SHD. **JA2YKA**: Club Group. **JR1ZTT**: JN1MSO, JP1MWB, JF3NRI. **N6VR** & AC6T, AD6C, N6DX, WA7ZTN, WT7F, WK6V, AA6NP. **OH1AA**: OH1's CO, SY, DL, MD, JD, HD, WR, LD, LF, KO, NHU, OH3GI, OH7XE. **OH7AB**: OH7MA, OH7XI, OH7JR, OH7XM, OH2BSS, OH7UE, OH7JT, OH8SR, OH7KA. **UP1BZO**: UP2-038-346, UP2BOA, UP2-038-1751, UP2NK, UP2OO, UP2BDV, UP2BDW, UP2BOQ, UP2BKZ, UP3BW, UP3BN, UC2IO. **VE7ZZZ**: VE7AV, VE7ARS, VE7BPH, VE7ENS, VE7SK, VE6EZ. **WL7E** & AL7H, KL7HFA, KL7PJ, KL7U, KL7Y, NL7GP. **WZ6Z** & K3EST, N6IG, WA6VEF, W7BG, W6RGG, W6OSP, K6TMB, W6OAT, VE7NKI. **Y34K**: Y23EK, Y24UK, Y27FN, Y32JK, Y32TK, Y32VK, Y37XJ, Y42FK, Y42LK. **YT2R**: YU2's OG, DQ, IQ, MO, HO, MY, LJ, NJ, AW, RA, WJ, MM, EU, YT2FI, YT2GW, YT2FH, YT2AA, YZ2ADM, YZ2ADW.

CONTINENTAL LEADERS

AFRICA

AB	CT9M	5,731,672
28	ZS6BCR	2,168,411
21	EC8ARX	285,088
14	EA8BLC	393,108
7	G3GJQ/5N	813,610
3.5	No Entrant	
1.8	No Entrant	

ASIA

AB	**P3AA**	**8,951,600**
28	JY9SR	755,820
21	**4Z9FDB**	**2,501,330**
14	UM8DX	643,467
7	UA9YJP	446,340
3.5	UA9SP	308,484
1.8	UA9MR	10,184

EUROPE

AB	HA0MM	3,159,187
28	YT6AA	775,740
21	FV9NDX	1,990,450
14	LZ5A	3,066,120
7	YT7A	938,928
3.5	UP1BYL	205,920
1.8	OK1DFP	92,564

NORTH AMERICA

AB	**V27T**	**9,408,672**
28	HI8JKA	891,242
21	**FS5T**	**4,552,470**
14	XK1CYL	3,016,142
7	FS5R	2,847,150
3.5	WA6VNR	1,794
1.8	N6LL	1,584

OCEANIA

AB	**FK/JH6SOR**	**3,663,177**
28	KG6DX	915,992
21	N7DF/WH2	3,243,450
14	ZL3GQ	2,775,744
7	YB3ASQ	242,592
3.5	KX6DC	258,258
1.8	No Entrant	

SOUTH AMERICA

AB	YV4ABR	1,960,371
28	CE3DNP	2,857,038
21	4M7A	4,137,628
14	4M3A	2,317,477
7	YY1D	2,410,920
3.5	**YX3A**	**1,004,060**
1.8	YV1OB	1,290

MULTI-SINGLE

AF	5H1HK	7,010,392
AS	RL8PYL	5,503,272
EU	HG9R	9,957,368
NA	**KP2A**	**12,843,135**
OC	4G1A/3	1,180,565
SA	LQ5A	8,290,016

MULTI-MULTI

AF	No Entrant	
AS	JA2YKA	4,917,740
EU	Y34K	9,831,866
NA	WL7E	6,981,532
OC	No Entrant	
SA	No Entrant	

Number groups after call letters denote following: Band (A=all), Final Score, Number of QSOs, and Prefixes. Certificate winners are listed in boldface.

QRP/p SECTION WORLDWIDE

YU3BC	**A**	**710,448**	**818**	**361**
KA2AEV	**A**	**625,504**	**697**	**352**
N3RS	**A**	**615,624**	**642**	**339**
4X1IF	**A**	**603,194**	**795**	**314**
N4KG	**A**	**461,700**	**570**	**324**
JI1CBF	**A**	**437,955**	**531**	**301**
NX7K	**A**	**436,044**	**600**	**348**
YU2TY	"	405,372	525	332
YU1LM	"	344,300	623	313
N8BJQ	**A**	**303,659**	**452**	**283**
SP4GFG	**A**	**282,877**	**566**	**251**
OK1DKS	**A**	**264,516**	**467**	**282**
JA9RPU	"	256,872	419	231
KE7X	"	254,012	436	253
Y25NA	**A**	**238,080**	**476**	**256**
UB4IM	**A**	**209,420**	**345**	**283**
N7IR	"	200,860	365	242
AB4LX	"	160,370	297	203
K5MK	**A**	**151,767**	**297**	**219**
K9AY/8	**A**	**123,190**	**271**	**194**
NU4B	"	121,549	275	197
H89ADD	**A**	**114,444**	**304**	**204**
IS0LYN	**A**	**114,192**	**275**	**208**
W9SE/7	"	95,275	266	185
OK1DRE	"	73,472	233	164
NO5W	"	66,667	217	163
JN1CBH	"	60,250	183	125
SM0BYD	**A**	**59,736**	**195**	**152**
KI4UZ	"	56,430	166	135
CX8DT	**A**	**43,460**	**142**	**106**
UA3DPX	**A**	**36,110**	**153**	**115**
JA0GCI	"	35,532	129	94
OK3TNA	"	30,888	152	117
DL4GBR	**A**	**29,403**	**225**	**81**
EA1GT	**A**	**28,899**	**185**	**117**
PA0ADT	**A**	**27,832**	**199**	**142**
N8CQA	"	27,400	122	100
NR0R	"	26,124	116	84
Y21NE	"	25,641	161	111
W0NGB	"	16,638	107	94
Y26JD	"	14,476	106	77
W8EAO	"	10,880	80	80
SM4KL	"	8,517	81	51
Y21XC	"	5,640	49	47
OK1DZD	"	5,406	61	51
OK2KYD	"	5,238	60	54
YO6ADW	**A**	**2,992**	**53**	**44**
SM1CNS	"	2,890	34	34
SM5CCT	"	2,838	33	33
ZL0AAH	**28**	**256,665**	**425**	**213**
PY2ORF	**28**	**71,300**	**209**	**155**
LZ1QN	**28**	**49,350**	**208**	**141**
JH1LBR	**28**	**17,000**	**93**	**85**
N5US	**28**	**10,890**	**79**	**66**
OH3JF	**28**	**10,290**	**92**	**70**
YO2AOB	**28**	**9,828**	**76**	**63**
PY2UJJ	"	8,150	59	50
WA3LFY	**28**	**7,888**	**74**	**58**
EA1KC	**28**	**7,866**	**89**	**69**
UY5UP	**28**	**3,808**	**49**	**34**
JA2ODV	"	1,242	24	23
OK1FSD	**28**	**65**	**5**	**5**
JA6GCE	**21**	**195,360**	**352**	**222**
UR2CR	**21**	**90,528**	**280**	**164**
I4KRF	**21**	**33,625**	**155**	**125**
JA0BMS/1	"	29,536	125	104
JA8RJE	"	23,622	102	93
YU4XA	**21**	**12,060**	**78**	**60**
JH1BUB	"	8,624	87	44
UA0QGO	**21**	**3,024**	**30**	**28**
PU2SCR	**21**	**600**	**16**	**15**
VE7EKS	**21**	**288**	**13**	**12**
SP2UUU	**21**	**84**	**6**	**6**
W8VSK	**14**	**376,648**	**478**	**356**
YT3FM	**14**	**276,816**	**498**	**316**
UB4AR	**14**	**152,702**	**375**	**242**
YO5BQ	**14**	**103,032**	**297**	**216**
SM5MX	**14**	**72,412**	**305**	**172**
K9OSH	**14**	**64,770**	**195**	**170**
4N4AE	"	63,491	215	173
OK1AYQ	**14**	**62,320**	**223**	**164**
OK1NR	"	40,230	205	135
OZ3PE	**14**	**36,309**	**175**	**133**
UB5MLP	"	23,316	123	116
OK1HR	"	23,108	126	109
OK2BMA	"	18,228	103	93
Y26VH	**14**	**15,980**	**108**	**94**
JH8JBX	**14**	**14,214**	**80**	**69**
UB4EX	"	11,005	85	71
KL7/W6RCL	14	2,484	35	27
W8QZA/6	**14**	**2,000**	**28**	**25**
WB2GDD	**14**	**1,512**	**30**	**28**
JK1REJ	"	133	7	7
YV2BE	**7**	**29,648**	**77**	**68**
JR7CDL	**7**	**7,380**	**44**	**41**
JF2LTH	"	6,424	49	44
Y21YH	**7**	**5,208**	**80**	**62**
UA9TX	**7**	**3,750**	**29**	**25**
HA8LKB	**3.5**	**20,240**	**132**	**92**
Y25XA	**3.5**	**2,964**	**45**	**38**
Y24LO	"	1,550	31	31
OK2BXR	**1.8**	**9,648**	**92**	**67**
OL8CWI	"	8,704	93	64
OL8WAT	"	7,076	77	58
OK2PCN	"	5,712	70	56
OL1BUY	"	3,440	48	43
OL1BVR	"	1,400	25	25
I0KHP	**1.8**	**760**	**20**	**19**

SINGLE OPERATOR NORTH AMERICA

UNITED STATES

K1EA	**A**	**2,921,388**	**1749**	**548**
		(Op. KM3T)		
NJ1Q	**A**	**2,266,458**	**1632**	**499**
		(Op. WB9JKI)		
AD1C	**A**	**1,215,672**	**1027**	**444**
W1CNU	"	106,745	233	185
K1TR	"	86,580	207	148
K1CLN	"	28,320	110	96
WB2DND/1	**28**	**987**	**21**	**19**
K1XA	**21**	**1,037,374**	**937**	**442**
W2SC/1	"	967,280	879	428
KD2SX/1	**14**	**1,129,514**	**1000**	**478**
K1ZZJ	"	31,350	113	95
NJ1T	**7**	**478,134**	**478**	**303**
AA1M	"	105,878	210	167
KZ2S	**A**	**3,033,760**	**1810**	**566**
KU2C	**A**	**1,902,840**	**1375**	**471**
NE2W	"	268,983	453	247
WJ2O	"	197,600	422	247
KF2O	"	117,420	254	190
K2PS	"	98,640	236	180
W2FUI	"	31,486	120	91
KE2GL	"	28,825	326	176
KT2D	"	4,900	53	50
KM2P	**28**	**43,472**	**211**	**152**
W2HG	**21**	**179,983**	**323**	**211**
K2KTT	"	6,960	61	58
N2AA	**14**	**1,690,032**	**1299**	**514**
KT3Y	**A**	**3,297,600**	**1869**	**600**
KQ2M/3	**A**	**3,011,958**	**1781**	**579**
K3ZO	**A**	**2,762,060**	**1580**	**545**
K5ZD/3	"	691,200	700	360
WB2EKK/3	"	207,100	360	218
K3WW	"	153,940	267	172
KA3SIO	"	148,356	353	234
KL7HIR/3	"	144,200	294	206
W3FTG	"	46,731	134	111
NQ3S	"	34,100	153	124
N3GAN	"	29,154	141	129
K3ND	"	15,808	76	76
KN3T	"	4,851	62	49
K3IPK	**14**	**668,171**	**722**	**371**
NJ3K	"	52,796	156	134
K3UA	"	14,980	78	70
W3BGN	**7**	**474,144**	**441**	**264**
W3UM	"	415,800	409	280
K4BAI	**A**	**1,553,832**	**1258**	**504**
N8LM/4	**A**	**347,378**	**497**	**289**
AA4XU	"	257,424	426	248
K04J	"	83,961	240	171
W4YN	"	62,611	173	127
W4KMS	"	31,137	123	107
KB4HZ	"	29,539	127	109
N4UZ	"	16,198	98	91
K4OD	"	13,000	70	65
N4MM	"	883	18	17
AA4XM	"	15,834	85	78
N4ZC	**28**	**153,081**	**358**	**233**
N4VZ	**28**	**118,534**	**297**	**194**
N4ZZ	**21**	**783,328**	**827**	**416**
WB4TDH	"	513,678	596	362
K6ETM/4	"	42,840	157	140
N4QVM	"	16,872	83	74
KR0Y/5	**A**	**1,252,350**	**1056**	**495**
K5NW	**A**	**881,328**	**904**	**427**
N5RM	"	483,932	588	337
WB5VZL	"	479,372	642	316
NT5G	"	476,416	577	344
AA5BT	"	431,145	541	335
WF5E	"	135,681	303	213
K5GN	"	116,413	264	209
W5EIJ	"	27,707	123	103
AA5HV	"	6,426	60	51
N5RZ	**28**	**162,134**	**394**	**259**
N5MLL	"	12,416	73	64
W5WMU	**21**	**776,736**	**820**	**432**
KA5W	"	555,228	670	388
W5FO	**14**	**1,094,930**	**1028**	**491**
NJ1V/5	"	62,890	292	190
AJ6V	**A**	**1,344,600**	**1179**	**450**
N6TV	**A**	**910,616**	**887**	**392**
W6UOF	"	369,100	518	298
K6DR	"	255,688	451	248
K6LRN	"	83,260	209	181
W6NKR	"	34,008	120	109
AA6EE	"	24,528	151	112
K6CSL	"	16,932	102	83
K6NA	"	5,985	47	45
WA6UFY	"	5,616	50	48
WA6FGV	**28**	**18,042**	**126**	**97**
N6RVC	**21**	**4,360**	**48**	**40**
NI6W	**14**	**1,267,110**	**1155**	**494**
WA6VNR	**3.5**	**1,794**	**49**	**39**
N6LL	**1.8**	**1,584**	**31**	**24**
		(Op. WA6CDR)		
KO7N	**A**	**2,087,818**	**1352**	**502**
		(Op. N0XX)		
NC7K	**A**	**739,398**	**757**	**374**
K7NW	"	354,578	525	266
WG7A	"	238,560	374	240
KS7T	"	205,250	390	250
N0AX/7	"	142,709	271	203
W7QN	"	57,967	185	169
NW7S	"	41,363	161	133
W7GUR	"	11,200	69	56
K7CU	"	5,865	53	51
W7ZR	**28**	**2,440**	**48**	**40**
WJ7R	**21**	**114,872**	**288**	**173**
W7AYY	**14**	**72,816**	**209**	**164**
KT7G	**7**	**23,000**	**165**	**115**
K8AZ	**A**	**2,147,840**	**1531**	**512**
		(Op. KQ8M)		
NE8T	**A**	**1,284,312**	**1088**	**472**
		(Op. K8JM)		
WD8LLD	**A**	**1,039,550**	**903**	**425**
KV8Q	"	924,888	890	433
WB8PHI	"	352,224	519	288
K8DD	"	261,705	384	239
N8BC	"	228,468	359	241
WA8YTM	"	107,694	249	193
K8CV	"	99,620	216	170
WD8S	"	768	18	16
K8MR	"	0	57	56
WD8IXE	**28**	**17,572**	**118**	**92**
W8UMR	**14**	**141,454**	**270**	**214**
KE9F	**A**	**473,282**	**724**	**454**
K9BG	**A**	**443,871**	**565**	**331**

K9MMS	"	204,516	365	234
NJ9Z	"	100,648	253	184
NJ9C	**21**	**349,979**	**518**	**289**
W9HE	"	61,659	179	153
N8BSH/9	**14**	**1,069,430**	**973**	**467**
KM8L	**A**	**512,316**	**601**	**342**
KJ8G	**A**	**353,210**	**487**	**286**
NS8B	"	216,513	346	243
KF8T	"	157,960	311	220
N8GOS	"	113,750	271	182
W8IZV	"	94,763	228	193
WD8AVV	"	84,294	272	189
NN8M	"	82,271	203	161
WA8OUI/AE	"	28,987	125	101
N8ZA	"	494	14	13
WD9FTZ/8	**28**	**15,566**	**95**	**86**
KC8D	**14**	**479,004**	**647**	**358**
KV8Q	**7**	**498,550**	**521**	**295**
K8CS	"	5,472	40	36

FRENCH SAINT MARTIN

FS5T	**21**	**4,552,470**	**2451**	**702**
			(Op. AI7B)	
FS5R	**7**	**2,847,150**	**1164**	**475**
			(Op. W7EJ)	

DOMINICAN REPUBLIC

HI3AMF	**A**	**639,860**	**661**	**428**
HI8JKA	**28**	**891,242**	**933**	**374**

PANAMA

K8KJ/HP1	**A**	**1,078,227**	**1014**	**423**
HP1AC	"	652,400	712	350

ALASKA

KL7RA	**A**	**1,309,392**	**1182**	**432**
AL7CQ	**21**	**355,284**	**610**	**278**
NL7DU	**14**	**18,944**	**100**	**74**

ANTIGUA

V27T	**A**	**9,408,672**	**3206**	**819**
			(Op. YU1RL)	

CANADA

VO4MP	**A**	**3,208,444**	**1984**	**493**
			(Op. VO1MP)	
VE2ZP	**A**	**1,886,424**	**1305**	**498**
VE6OU/3	**A**	**2,882,832**	**1634**	**551**
VE3KP	"	1,326,732	1024	418
VE7SZ	**A**	**991,224**	**968**	**351**
VE3TEE	"	10,664	65	62
VE3PYA	"	455	13	13
VE3KKU	**28**	**29,992**	**136**	**92**
VE2AEJ/3	"	17,632	100	76
VO5AC	**28**	**6,364**	**60**	**43**
			(Op. VO2AC)	
XK1CYL	**14**	**3,016,142**	**1959**	**586**
			(Op. VE1CYL)	
VE3NBE	"	17,520	80	80
VE3HQL	"	4,700	53	47
VE3NYT	**7**	**20,128**	**68**	**68**

MONTSERRAT

VP2MU	**A**	**2,837,430**	**1881**	**558**
			(Op. WC8W)	

BRITISH VIRGIN IS.

VP2VDX	**21**	**3,804,437**	**2171**	**679**
			(Op. KT6V)	

AFRICA

TANZANIA

5H8T	**A**	**4,384,672**	**2490**	**584**
			(Op. 5H3TW)	

NIGERIA

G3GJQ/5N	**7**	**813,610**	**506**	**295**

ZAMBIA

9J2AL	**A**	**1,170,065**	**998**	**383**

ZAIRE

9Q5DX	**A**	**2,922,196**	**1861**	**524**

MOROCCO

CN8FC	**A**	**145,350**	**239**	**765**
			(Op. WA4UAZ)	

MADEIRA IS.

CT9M	**A**	**5,731,950**	**2517**	**618**
			(Op. CT1BOH)	

CANARY IS.

EA8ACH	**A**	**2,735,657**	**1613**	**492**
			(Op. K2TNO)	
EA8AB	**A**	**2,505,008**	**1666**	**473**
EA8BIE	"	411,600	446	245
EA8ABG	**28**	**187,340**	**330**	**190**
EC8ARX	**21**	**285,088**	**404**	**236**
EA8BLC	**14**	**393,108**	**468**	**282**
EA8BTU	"	22,572	100	76

CUETA

EC9KI	**21**	**1,386**	**22**	**21**

SOUTH AFRICA

ZS6BCR	**28**	**2,168,411**	**1464**	**497**

ASIA

ISRAEL

4Z9FDB	**21**	**2,501,330**	**1829**	**542**

CYPRUS

P3AA	**A**	**8,951,600**	**3455**	**695**
			(Op. YT3AA)	

KOREA

HL9EP	**A**	**544,170**	**678**	**330**
HL9CA	**21**	**36,963**	**145**	**111**

JAPAN

JH7WKQ	**A**	**2,001,834**	**1435**	**486**
JE4VVM	**A**	**1,437,552**	**1252**	**402**
JA7DLE	**A**	**1,295,808**	**1174**	**408**
JH7XGN	"	1,207,610	1039	394
JJ1NNJ	"	1,074,276	1006	378
JR1IJV	"	975,744	970	363
JK1OLT	"	942,198	915	373
JG3KIV	"	919,336	992	337
JH1YDT	"	793,320	836	330
			(Op. JO1ZDL)	
JA8UMV	"	579,462	655	299
JH4NMT	"	445,795	560	271
JF1SEK	"	384,750	520	270
JA3VOV/3	"	361,608	518	247
JS1UMQ	"	354,571	501	259
JA1BNW	"	351,390	484	265
JJ1GQH	"	292,815	463	243
JA1WYQ	"	251,912	401	233
JE4VRF	"	219,342	315	263
JF3GKE	"	206,646	420	186
JA1ALX	"	205,686	302	234
JA7JHT	"	177,859	295	209
JH3JYS	"	155,193	323	179
JA9CWJ	"	115,014	234	174
JA3ARM	"	113,774	266	163
JA1YNE	"	103,950	244	165
		(Op. ex JH1UOQ)		
JA8AJE	"	101,215	245	155
JR1ZIY	"	93,324	251	154
JA6BWH	"	87,318	212	147
JG3NKP	"	86,424	200	156
JA2KPV	"	73,876	192	146
JG2LGM	"	72,144	192	144
JA7ASD	"	65,661	187	129
JH8BLI	"	63,384	184	139
JR4ISK	"	57,486	163	134
JA2XI	"	55,216	161	119
JO1QZI	"	50,694	150	119
JA8HC	"	48,240	154	120
JA1QZC	"	47,268	145	117
JJ3OLZ/1	"	42,510	145	109
JH3TXP	"	30,591	111	99
JR3XEX	"	26,578	110	97
JH1NSD	"	26,311	113	83
JA8HBO	"	25,680	100	80
JA7ERG	"	16,480	84	80
JG3EHD	"	16,048	82	68
JA1KKA	"	9,576	60	57
JA2FNY/1	"	9,440	71	59
7J2AAF	"	6,192	53	48
		(Op. W1END)		
JH4VUI	"	5,075	38	35
JH1PXY	"	4,212	41	36
JA4DUD	"	3,885	40	37
JA4AQR	"	1,775	27	26
JA8BPY	"	1,342	22	22
JA1KFX	**28**	**101,062**	**253**	**169**
JR3RWB	**28**	**82,521**	**219**	**159**
JM1NKT	"	73,920	214	154
JA7YCQ	"	56,140	188	140
		(Op. JI7GBI)		
JA1PBV	"	44,688	139	112
JA6BIF	"	22,876	103	86
JF2VDY/1	"	19,251	101	93
JA1XCZ/4	"	17,334	92	81
JR2NTC	"	4,329	43	39
JA1JCF/1	"	3,720	41	40
JK6QJH	"	1,600	26	25
JA7KM	"	855	19	19
JA1BDI	"	640	16	16
JH1ADR	"	6	2	1
JA4YJA	**21**	**1,142,600**	**1134**	**394**
			(Op. JM3ILK)	
JR5FHC	**21**	**144,720**	**336**	**180**
JA5FDJ	"	125,636	251	196
7J7AAM	"	73,738	213	161
			(Op. KD7H)	
JS1OSP	"	59,616	187	138
JH1AOU	"	59,500	176	140
JR2IGV	"	33,598	123	107
JA3UWB	"	23,360	101	80
JA1JGP	"	21,600	98	96
JE7JZT	"	21,384	100	88
JK1OEO	"	12,988	69	68
JI1LAI	"	1,848	28	28
JA3RKT	"	1,474	23	22
JA8GZ	"	1,426	24	23
JA1GO	"	1,140	20	20
JA6HQT	"	990	19	18
JA6QDU	"	432	12	12
JF2EZA	**14**	**555,228**	**616**	**318**
JA2EU	**14**	**477,712**	**630**	**292**
JH7QXJ	"	297,390	468	230
JA2EJI	"	108,388	247	158
JA2DN	"	104,949	234	169
JA5IP	"	10,270	74	65
JA5JCC	**7**	**144,144**	**205**	**156**
JA7FCJ	**7**	**70,800**	**143**	**118**
JK1ZIL	"	36,490	108	89
JA1QWL	"	11,400	52	50
JA5JGV	"	5,810	37	35
JQ3CHM/2	"	2,900	28	25
JA1NYV	"	2,856	38	17
JN1MKZ/2	"	1,020	17	17
JH3CYZ	**1.8**	**238**	**18**	**17**
JE1SPY	"	28	15	14

JORDAN

JY9SR	**28**	**755,820**	**876**	**323**

HONG KONG

VS6UP	**A**	**2,237,115**	**2219**	**465**
			(Op. KB7G)	

INDIA

AT8T	**21**	**499,431**	**693**	**277**
			(Op. VU2TTC)	

U.S.S.R.

ASIATIC

UW8LT	**A**	**2,270,635**	**1620**	**515**
UA8UDT	**A**	**346,800**	**900**	**272**
UA0SR	"	107,310	252	147
RA0JD	"	31,930	151	103
UA8SU	**28**	**480**	**16**	**16**
RA8FA	**21**	**641,844**	**824**	**324**
UA0BAE	"	74,124	181	135
UA8CS	**14**	**6,784**	**60**	**53**
UA9URF	**A**	**48,328**	**178**	**142**
UA9AOV	"	10,608	50	39
UA9YC	**21**	**781,125**	**920**	**375**
UA9XB	"	201,825	400	207
UA9OA	**14**	**381,429**	**540**	**277**
UA9SCU	"	181,650	393	210
UA9ND	"	74,226	186	139
UA9YJP	**7**	**446,340**	**418**	**215**
RA9UNR	"	393,384	358	222
UA9XC	"	486	9	9
UA9SP	**3.5**	**308,484**	**322**	**171**
UA9CBM	"	239,910	265	165
UZ9CT	"	101,200	168	110
UA9MR	**1.8**	**10,184**	**46**	**38**

AZERBAIJAN

UD6DKW	**A**	**200,823**	**311**	**219**
UD6DFF	**21**	**46,624**	**148**	**124**

ARMENIA

UG/RV3GJ	**A**	**76,516**	**195**	**148**

UZBEKISTAN

UI9ACQ	**14**	**76,436**	**400**	**194**

TADZHIKISTAN

UJ8JCM	**A**	**856,500**	**1035**	**300**
UJ8AQ	**28**	**164,928**	**480**	**192**
UJ8XDH	"	25,756	133	94
UJ8JA	**21**	**793,504**	**830**	**362**

KAZAKHSTAN

RL7AB	**A**	**3,078,570**	**1884**	**491**
UL8CWW	"	917,675	944	355
UL8GBV	**28**	**104,940**	**263**	**159**
UL7BX	**21**	**590,091**	**775**	**343**
UL8GCZ	"	288,558	600	246
UL7AAC	**3.5**	**44,506**	**107**	**77**

KIRGHIZ

UM8MCF	**A**	**115,116**	**281**	**159**
UM8DX	**14**	**543,467**	**723**	**341**

EUROPE

I.T.U. GENEVA

4U4ITU	**14**	**1,415,238**	**1434**	**523**
			(Op. F2CW)	

PORTUGAL

CT4DX	**7**	**20,520**	**90**	**60**
CT1BOH	"	1,024	16	16

FED. REPUBLIC OF GERMANY

DL5XX	**A**	**2,099,194**	**1631**	**493**
DF5BM	**A**	**911,645**	**893**	**427**
DL1TH	"	457,560	496	410
DK3GI	"	413,250	518	290
DF4ZL	"	279,312	422	276
DF9FM	"	229,908	474	238
DL7RAG	"	181,030	346	215
DL9SDO	"	107,514	275	181
DL1ZQ	"	101,067	322	177
DJ1DB	"	77,010	252	270
DL4AAE	"	45,510	154	123
DJ0ZT	"	10,656	82	72
DK5WL	**28**	**63,855**	**276**	**165**
DH3BAP/P	"	551	20	19
			(Op. DL5XX)	
DK8FD	**21**	**307,248**	**610**	**296**
DJ1JF	"	132,108	283	202
DJ6TK	"	38,184	156	129
DL0CW	"	17,292	90	62
			(Op. DL5XX)	
DL6HCC	**7**	**263,544**	**454**	**237**

SPAIN

ED1DX	**A**	**2,034,075**	**1704**	**555**
EA3DBO	**A**	**326,838**	**534**	**282**
EA1EMI	"	230,550	541	265
EA7BUD	"	106,974	209	189
EA2BLH	"	91,020	256	185
EA7CA	"	69,984	213	162
EA4DUL	"	68,093	233	149
EA1JO	"	59,520	221	155
EA2CR	"	37,760	141	128
EA7GQZ	"	19,788	119	97
EA1CVZ	"	11,700	95	90
EA3DWX	"	5,508	60	54
EA7BHO	"	4,860	67	54
OH8XX/EA	**28**	**237,804**	**721**	**266**
EA7CEZ	"	117,626	440	206
EA7DHO	"	56,270	209	170
EA4EP	"	33,024	220	129
EF7DMU	**21**	**222,376**	**417**	**209**
			(Op. EC7DMU)	
EA2IA	"	116,840	307	184
EA7FUR	"	88,242	261	191
EA7GB	"	8,662	80	71
EA2IF	**14**	**94,500**	**285**	**210**

BALEARIC IS.

EA6GP	**A**	**205,953**	**451**	**237**

FRANCE

F1JDG	**A**	**137,223**	**410**	**193**
F6EQV	"	18,492	100	92
FD1LBG	"	5,310	71	45
F6AUS	**28**	**38,080**	**185**	**140**
FV9NDX	**21**	**1,990,450**	**1752**	**550**
			(Op. F6HSV)	
F9DK	"	69,388	232	166
F6DKV	**14**	**556,920**	**851**	**357**

ENGLAND

G3FXB	**A**	**2,734,769**	**1746**	**581**
G3SXW	**A**	**1,866,360**	**1479**	**515**
G3ESF	"	424,116	716	308
G4ZFE	"	386,506	634	298
G0/AA6MC	"	241,230	505	253
G3TXF	"	87,723	219	171
G4OBK	"	65,096	189	158
G4ZME	"	64,548	238	163
G4UZN	**28**	**8,370**	**78**	**62**
G8IDE	**7**	**97,776**	**230**	**168**

ISLE OF MAN

GD4EIP	**14**	**224,093**	**599**	**277**

SCOTLAND

GM3CFS	**A**	**168,700**	**416**	**241**

HUNGARY

HA8MM	**A**	**3,159,187**	**1853**	**679**
HA6NL	**A**	**903,502**	**1045**	**422**
HA0IT	"	698,788	920	388
HA7UI	"	365,418	610	303
HA6VA	"	244,440	425	252
HA1SL	"	243,358	480	271
HA7ML	"	108,108	328	198
HA4KYN	**28**	**57,380**	**224**	**151**
			(Op. HA9CD)	
HA6NW	**21**	**202,279**	**393**	**259**
HA5FG	**14**	**480,595**	**680**	**347**
HA1SN	"	28,035	125	105
HA4FF	**3.5**	**161,600**	**417**	**202**

LIECHTENSTEIN

HB8 /DL1GGT/P	**A**	**1,552,236**	**1496**	**476**

SWITZERLAND

HB9DFY	**A**	**146,146**	**298**	**182**
HB9AGH	"	117,360	250	240
HB9KC	**21**	**9,342**	**59**	**54**
HB9DCQ	**7**	**117,972**	**242**	**174**

ITALY

IK8FWI	**A**	**724,064**	**942**	**374**
IK3FHL	"	13,286	98	73
IG8A	**28**	**447,300**	**926**	**355**
			(Op. I7ALE)	
I1BAY	"	211,926	522	286
I2JIN	"	2,268	32	27
IO3VJW	**21**	**1,021,888**	**1097**	**448**
I5OQV	"	44,144	165	124
IK8ADY	**14**	**47,775**	**196**	**147**
IO5JRR	**7**	**110,547**	**290**	**173**

SARDINIA

IS8OMH	**A**	**112,499**	**402**	**191**

NORWAY

LA9HFA	**A**	**28,992**	**115**	**96**
LA0DY	"	6,746	53	48
LA2OG	"	5,634	106	60
LA8CA	**21**	**58,752**	**197**	**136**
LA7MFA	"	51,221	193	131
LG5LG	**14**	**735,262**	**1086**	**418**
			(Op. LA9VDA)	
LJ2A	"	161,700	506	231
			(Op. LA1QDA)	
LA6PB	"	5,304	62	52

LUXEMBOURG

LX2AA	**14**	**32,940**	**159**	**122**

BULGARIA

LZ1KNP	**A**	**669,382**	**912**	**348**
			(Op. Ilia)	
LZ1BJ	**21**	**498,112**	**806**	**344**
LZ1KAU	"	252,354	480	274
			(Op. Peter)	
LZ1KCO	"	233,051	730	169
			(Op. Yanko)	
LZ1YG	"	63,788	200	148
LZ5A	**14**	**3,066,120**	**2181**	**680**
			(Op. LZ1AX)	

AUSTRIA

OE3RE	**A**	**122,662**	**297**	**198**
OE1TKW	"	32,016	103	92

FINLAND

OH6YF	**A**	**1,224,270**	**1312**	**446**
OH3NM	**A**	**243,380**	**377**	**283**
OH6MM	"	126,420	322	196
OH1MDR	"	119,279	356	181
OH7NW	"	99,994	299	173
OH1NSJ	"	64,532	240	146
OH2VZ	"	45,872	159	122
OH6RC	"	45,474	161	143
OH3MIG	"	4,841	57	47
OH6NIO	**21**	**456,304**	**640**	**304**
OH7EU	"	119,925	267	195
OH8LC	"	43,681	170	121
OH6NPV	"	39,678	187	102
OH5RZ	"	16,974	104	82
OH2YL	"	13,130	80	65
OH1ZAA	**14**	**979,615**	**1153**	**455**
			(Op. OH1NOA)	
OH3GD	"	486,999	653	459
OH1AF	**7**	**548,080**	**619**	**310**
			(Op. OH1HS)	

AALAND IS.

OH8/OZ1JVN	**A**	**208,390**	**528**	**229**

CZECHOSLOVAKIA

OK1RI	**A**	**2,346,690**	**1696**	**537**
OK2BHV	**A**	**1,456,815**	**1298**	**493**
OK2PDT	"	530,392	702	334
OK3CND	"	494,190	693	323
OK1MNV	"	368,220	577	285
OK2RU	"	365,190	526	282
OK3YCA	"	359,094	520	291
OK3FON	"	310,517	439	277
OK2HI	"	284,333	523	269
OK3TBB	"	265,744	509	272
OK1DXW	"	252,960	481	255
OK3CEL	"	228,984	470	232
OK3PQ	"	218,544	420	232
OK3CDZ	"	200,146	482	229
OK2ON	"	193,671	401	243
OK1MKI	"	192,933	368	291
OK1MKU	"	188,734	361	221
OK1ORQ	"	170,940	360	222
OK1KZ	"	170,558	360	214
OK1FCA	"	119,392	304	208
OK2AJ	"	74,328	223	163
OK1DLF	"	69,678	175	147
OK2BHQ	"	65,964	183	138
OK2BCZ	"	63,504	263	162
OK2PGT	"	55,566	209	126
OK2PBG	"	45,508	162	124
OK3KUN	"	40,950	171	130
OK1JDJ	"	30,794	101	89
OK3CWF	"	26,378	158	109
OK1DOW	"	25,248	160	96
OK3CXS	"	21,922	108	97
OK3CVI	"	15,808	105	76

HF Equipment

	Regular	SALE
IC-765 Xcvr/ps/keyer/auto tuner.....	3149.00	**2699**

IC-781 Xcvr/Rcvr/ps/tuner/scope	6149	**5295**

IC-751A 9-band xcvr/.1-30 MHz rcvr	1699.00	**1469**
PS-35 Internal power supply.....	219.00	**199.95**
FL-63A 250 Hz CW filter (1st IF).....	59.00	
FL-52A 500 Hz CW filter (2nd IF)....	115.00	**109.95**
FL-53A 250 Hz CW filter (2nd IF)....	115.00	**109.95**
FL-70 2.8 kHz wide SSB filter.....	59.00	
RC-10 External frequency controller	49.00	

IC-735 HF xcvr/SW rcvr/mic *(Special)*	1149.00	**969.95**
PS-55 External power supply	219.00	**199.95**
AT-150 Automatic antenna tuner	445.00	**389.95**
FL-32A 500 Hz CW filter.....	69.00	
EX-243 Electronic keyer unit.....	64.50	
UT-30 Tone encoder	18.50	
IC-725 HF xcvr/SW rcvr..... *(Special)*	949.00	**799.95**
AH-3 Automatic ant tuner .. *(Special)*	489.00	**379.95**
IC-726 10-band xcvr/6m/.5-30MHz rx	1299.00	**1129**

Accessories

	Regular	SALE
IC-2KL HF solid state amp w/ps.....	1999.00	**1699**
IC-4KL HF 1KW out s/s amp w/ps.....	6995.00	**5995**
EX-627 HF auto. ant. selector *(Special)*	315.00	**269.95**
PS-15 20A external power supply	175.00	**159.95**
PS-30 Systems p/s w/cord, 6-pin plug	349.00	**319.95**
SP-3 External speaker	65.00	
SP-7 Small external speaker	51.99	
CR-64 High stab. ref. xtal; 751A, etc ...	79.00	
PP-1 Speaker/patch	179.00	**169.95**
SM-6 Desk microphone	47.95	
SM-8 Desk mic - two cables, scan	89.00	
AT-100 100W 8-band auto. ant. tuner ...	445.00	**389.95**
AT-500 500W 9-band auto. ant. tuner ...	589.00	**519.95**
AH-2 8-band tuner w/mount & whip	758.00	**689.95**
AH-2A Ant tuner system, only .. *(Special)*	559.00	**469.95**
GC-5 World clock..... *(Special)*	91.95	**69.95**

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VHF/UHF bases

	Regular	SALE
IC-275A 25w 2m FM/SSB/CW w/ps...	1299.00	**1129**
IC-275H 100w 2m FM/SSB/CW.....	1399.00	**1199**
IC-375A 25w 220 FM/SSB... *(Closeout)*	1399.00	**799.95**
IC-475A 25w 440 FM/SSB/CW w/ps	1399.00	**1199**
IC-475H 100w 440 FM/SSB/CW *(Spec)*	1599.00	**1269**
IC-575A 25w 6/10m xcvr/ps *(Special)*	1399.00	**1099**
IC-575H 25w 100w 6/10m xcvr.....	1699.00	**1469**

VHF/UHF/1.2GHz mobiles

	Regular	SALE
IC-28A 25w 2m FM, **TTP** mic *(Closeout)*	469.00	**379.95**
IC-28H 45w 2m FM, **TTP** mic *(Closeout)*	499.00	**389.95**
HM-14 Extra TTP microphone.....	59.00	
UT-28 Digital code squelch.....	39.50	
UT-29 Tone squelch decoder.....	39.50	
HM-16 Speaker/microphone.....	34.00	

IC-228A 25w 2m FM/TTP mic *(Special)*	509.00	**379.95**
IC-228H 45w 2m FM/TTP scan *(Special)*	539.00	**419.95**
IC-448A 25w 440 FM/TTP mic	599.00	**519.95**
UT-40 Pocket beep function.....	45.00	
IC-900A Transceiver controller	639.00	**449.95**

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IC-900A Transceiver controller with **UX-29H** 2m/25W and **UX-39A** 220/25W band units.
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UX-19A 10m, 10w band unit.....	299.00	**269.95**
UX-29A 2m, 25w band unit	299.00	**269.95**
UX-29H 2m, 45w band unit	349.00	**319.95**
UX-39A 220MHZ, 25w unit *(Special)*	349.00	**279.95**
UX-59A 6m, 10w band unit	349.00	**319.95**
UX-129A 1.2GHz 10w band unit.....	549.00	**499.95**
IC-901 2m/440MHz xcvr ..... *(Special)*	1199.00	**929.95**
IC-1200A 10w, 1.2GHz FM... *(Closeout)*	699.00	**589.95**
IC-2500A 35w, 440/1.2GHz FM mobile	999.00	**869.95**
IC-3210A 25w, 2m/440 FM .. *(Closeout)*	739.00	**499.95**
IC-2400A 2m/440 FM/TTP ... *(Special)*	899.00	**699.95**
AH-32 2m/440 Dual Band mobile ant	39.00	
AHB-32 Trunk-lip mount.....	35.00	
Larsen PO-K Roof mount	23.00	
Larsen PO-TLM Trunk-lip mount	24.70	
Larsen PO-MM Magnetic mount	28.75	
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RP-4020 440MHz 25w repeater	2299.00	**1999**

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	Regular	SALE
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IC-04AT 440 *(Closeout)*	449.00	**349.95**
IC-2SA 2m .. *(Special)*	419.00	**299.95**
IC-2SAT 2m HT/TTP	439.00	**389.95**
IC-3SAT 220 HT/TTP	449.00	**399.95**
IC-4SAT 440 HT/TTP	449.00	**399.95**
IC-2GAT 2m HT/TTP	429.00	**379.95**
IC-4GAT 440MHz, TTP	449.00	**389.95**
Special . .		
IC-32AT 2m/440 HT	629.00	**539.95**
IC-24AT 2m/440 HT	629.00	**549.95**
IC-12AT 1.2GHz FM HT/TTP... *(Closeout)*	473.00	**349.95**
IC-12GAT 1w 1.2GHz HT/batt/cgr/TTP	529.00	**469.95**

Aircraft band handhelds

	Regular	SALE
A-2 5W PEP synth. aircraft HT.....	525.00	**479.95**
A-20 Synth. aircraft HT w/VOR.....	625.00	**549.95**

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Receivers

	Regular	SALE
R-71A 100kHz to 30MHz receiver.....	$999.00	**869.95**
RC-11 Infrared remote controller....	70.99	
FL-32A 500 Hz CW filter	69.00	
FL-63A 250 Hz CW filter (1st IF)	59.00	
FL-44A SSB filter (2nd IF).....	178.00	**159.95**
EX-257 FM unit.....	49.00	
EX-310 Voice synthesizer	59.00	
CR-64 High stability oscillator xtal	79.00	
SP-3 External speaker.....	65.00	
CK-70 (EX-299) 12V DC option.....	12.99	
MB-12 Mobile mount	25.99	

R-7000 25MHz-2GHz receiver.....	1199.00	**1029**
RC-12 Infrared remote controller....	70.99	
EX-310 Voice synthesizer	59.00	
TV-R7000 ATV unit.....	139.00	**129.95**
AH-7000 Radiating antenna	99.00	

R-9000 100KHz-2GHz all-mode rcvr ... 5459.00 **4699**

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OK3TEP	"	3,956	55	46
OK1DLX	"	3,906	63	62
OK3CVN	"	2,184	30	28
OK2BDI	"	96	7	6
OK1DWX	**28**	**143,058**	**398**	**226**
OK1ADS	"	63,180	241	162
OK1TW	"	22,360	145	104
OK1VD	**21**	**169,785**	**350**	**231**
OK1WC	"	86,350	213	157
OK2PKJ	"	31,719	128	109
OK1MNW	"	15,862	86	77
OK1MHA	"	13,572	107	78
OK2EC	"	8,855	57	55
OK2KHD	"	6,165	50	45
		(Op. OK2FUN)		
OK1FGS	"	2,697	31	31
OK3CEG	"	1,875	26	25
OK2PLH	**14**	**163,744**	**338**	**238**
OK1FKI	**14**	**114,264**	**313**	**207**
OK3CAB	"	109,956	322	204
OK2PKS	"	78,078	230	182
OK2BND	"	76,895	268	169
OK1MZO	"	71,825	207	169
OK1DOH	"	49,404	172	138
OK1DFT	"	19,575	102	87
OK1DWU	"	16,368	99	93
OK3TUM	"	7,314	106	69
OK3YDP	"	2,880	45	40
OK2BQL	"	799	17	17
OK3CGN	**7**	**215,196**	**386**	**227**
OK2BBQ	"	54,211	200	131
OK1ARI	"	50,652	190	126
OK2ABU	"	20,736	83	72
OK1HCG	"	2,808	38	36
OK1JJF	**3.5**	**89,544**	**292**	**156**
OK2BWJ	"	71,298	238	153
OK3CNS	"	22,528	128	88
OK1DFP	**1.8**	**92,564**	**325**	**146**
OL8CVU	**1.8**	**29,800**	**175**	**100**
OL9CUD	"	14,904	124	81
OL9CUH	"	11,534	100	73
OK1DWJ	"	8,710	85	65
OK1DRU	"	8,540	77	61
OL7BTV/P	"	5,824	77	56
OL4BRC	"	4,386	57	51
OK1FWQ	"	3,240	50	45
OL3BVB	"	600	22	20

BELGIUM

ON4XG	**A**	**303,050**	**536**	**290**
ON5WL	**14**	**19,380**	**108**	**95**

DENMARK

OZ1BUR	**A**	**45,960**	**197**	**120**
OZ7NB	"	42,957	186	129
OZ8E	**28**	**432**	**12**	**12**
OZ1LQH	**21**	**52,197**	**161**	**137**
OZ2E	**7**	**79,920**	**194**	**148**
OZ1JSZ	"	23,184	113	92

THE NETHERLANDS

PA3CWL	**A**	**593,250**	**886**	**339**
PA3BTH	"	33,880	146	121
PA3BBP	"	14,640	86	80
PA3CNI	"	833	17	17
PA2REH	**21**	**227,715**	**450**	**255**
PA3BWD	**14**	**4,455**	**55**	**55**
PA3BNT	**7**	**46,230**	**136**	**115**

SWEDEN

SK6AW	**A**	**124,456**	**297**	**188**
SM7PKK	**A**	**116,406**	**335**	**174**
SM5DAC	"	113,424	266	204
SM5RE	"	99,820	264	217
SM4CJY	"	67,544	180	162
SM7LAZ	"	40,894	180	127
SMØCGO	"	10,833	86	69
SMØBDS	"	8,120	68	56
SMØHTO	**28**	**146,845**	**300**	**215**
SM6BSK	**21**	**108,810**	**251**	**186**
SL4ZXE	**14**	**840,019**	**1122**	**431**
		(Op. SMØOGO/4)		
SMØBVQ	"	190,120	388	245
SM7TV	"	70,930	241	173
SM2CDF	"	23,391	158	113

POLAND

SP2FAP	**A**	**785,268**	**874**	**396**
SP2BKF	**A**	**140,030**	**311**	**209**
SP9EQS	"	63,315	205	135
SP9HNB	"	51,870	235	130
SP9MRM	"	49,170	178	149
SP5FKW	"	21,660	100	95
SP9AKD	"	20,828	106	82
SP9DGO	"	7,130	48	46
SP9IGY	**28**	**8,357**	**76**	**61**
SP5JTR	**21**	**51,480**	**172**	**132**
SP9NLI	"	19,096	111	88
SP3LPR	"	9,106	61	58
SP2ASJ	**14**	**269,568**	**515**	**288**
SP5CJQ	**14**	**261,807**	**475**	**271**
SP1AEN	"	183,230	419	251
SP2JGK	"	93,240	264	180
SP9NSV	"	41,644	141	116
SP6CXH	"	40,192	162	128
SP6FXX	**7**	**63,574**	**192**	**133**
SP9HWN	"	2,520	39	30
SP5GIQ/7	**3.5**	**160,044**	**415**	**191**
SP9GKM	"	8,448	80	66

GREECE

SV1RP/SV2	**14**	**1,698,926**	**1603**	**562**

ICELAND

TF3CW	**14**	**855,897**	**848**	**371**

GERMAN DEMOCRATIC REP.

Y41YM	**A**	**1,137,624**	**1151**	**428**
Y22KK/A	**A**	**514,360**	**735**	**334**
Y28QH/A	"	384,709	669	293
Y55TJ	"	345,933	625	289
Y32TD	"	317,470	655	265
Y54TO	"	303,376	559	268
Y25TG	"	302,280	550	264
Y53ED	"	266,200	562	275
Y36PI	"	235,056	485	249
Y24AM/A	"	164,217	384	201
Y53XN/P	"	160,797	411	217
Y23RJ/P	"	156,156	372	231
Y53YN/P	"	139,320	284	216
Y22BK	"	128,340	295	207
Y23IL	"	116,021	304	181
Y24SK/A	"	100,620	273	180
Y31PG	"	99,416	302	172
Y22UB	"	88,764	201	156
Y31OJ/P	"	85,120	227	152
Y31NJ/P	"	57,988	190	133
Y32ZF	"	57,042	202	141
Y43YK	"	53,600	203	134
Y32WF	"	46,464	162	128
Y53XM	"	45,980	181	121
Y47YM	"	41,154	153	114
Y35WF	"	37,674	189	126
Y36TI	"	32,844	175	119
Y59ZF	"	32,482	171	109
Y26MH/A	"	32,079	147	111
Y39SL	"	24,660	140	90
Y23CM	"	18,792	88	81
Y67UL	"	17,010	97	81
Y24YH	"	13,915	74	55
Y71ZH	"	12,483	91	73
Y38ZM	"	11,252	68	58
Y33RA	"	10,854	70	67
Y58ZA	"	9,185	61	55
Y53VL	"	8,748	65	54
Y31ON	"	7,290	55	54
Y74XG	"	6,156	66	54
Y35VG	"	5,800	48	40
Y58WA	"	4,640	44	40
Y58UA	"	4,446	43	39
Y72XM	"	3,807	60	27
Y77YH	"	3,780	63	36
Y55LA	"	3,315	51	51
Y65LN	"	3,268	51	43
Y21EA	"	2,790	34	30
Y23ZN/A	"	2,214	28	27
Y31KL	"	1,575	37	25
Y36SG	"	1,272	26	24
Y24UB/A	"	1,175	26	25
Y21NM/A	"	850	18	17
Y22IC/A	**21**	**293,150**	**477**	**286**
Y37ZE	"	115,584	267	192
Y25PE	"	42,660	165	135
Y23GB	"	39,330	160	114
Y24XJ	"	18,034	95	71
Y21CL	"	13,455	73	69
Y64NH	"	1,860	31	30
Y64XH	"	1,080	20	20
Y42WB	**14**	**103,315**	**239**	**177**
Y26DM	"	18,183	104	87
Y63OI	"	8,056	76	53
Y23HN	"	2,233	34	29
Y23VB	"	1,887	37	37
Y39RE/P	**7**	**185,400**	**404**	**206**
Y48YN/P	**3.5**	**76,032**	**261**	**144**
Y66YF/P	"	9,512	83	58
Y24OL/P	**1.8**	**6,100**	**63**	**50**

ROMANIA

YO3FBK	**A**	**280,416**	**509**	**276**
YO4BQV	**A**	**103,785**	**300**	**185**
YO8QH	"	65,610	218	162
YO8BPY	"	35,382	146	112
YO8MI	"	23,554	143	114
YO8BOI	"	18,980	120	73
YO7BGA	"	13,206	101	71
YO8RL	"	6,760	62	52
YO9GP	**28**	**3,434**	**55**	**34**
YO4ZF	**21**	**84,669**	**230**	**169**
YO4BEX	**14**	**742,277**	**450**	**277**
YO9HP	"	316,638	555	294
YO8MF	"	41,904	216	144
YO5CUQ	"	2,320	30	29
YO4CAH	"	121,512	286	166
YO8CDQ	**7**	**150,126**	**329**	**191**
YO6KVZ	"	144,000	337	180
		(Op. YO6VZ)		
YO4AAC	"	15,862	95	77
YO4BBH	"	10,856	80	59
YO5CUU	"	7,200	53	50
YO6OBH	"	3,850	40	35
YO6MK	**3.5**	**33,320**	**176**	**98**
YO6BTY	"	880	24	20

YUGOSLAVIA

YU7SF	**A**	**722,753**	**884**	**379**
YU1BM	**A**	**566,720**	**789**	**352**
YT7KW	"	466,032	722	304
YU1BEF	"	421,794	611	321
YU7KM	"	225,120	411	240
YT6AA	**28**	**775,740**	**1036**	**420**
YT7AA	28	505,780	739	380
4N3E	"	271,165	622	281
		(Op. YT3AM)		
YU3BU	"	135,373	369	233
YU3SB	"	119,232	360	216
YU7NH	"	8,911	75	67
4N4A	**21**	**1,979,086**	**1590**	**571**
		(Op. YU4EU)		
YZ3A	**21**	**1,881,282**	**1648**	**542**
		(Op. YU3OH)		
YU1SA	**21**	**1,064,360**	**1117**	**440**
YT3D	"	688,746	895	382
		(Op. YT3AW)		
YU7FN	"	665,792	837	404
YU4YA	"	616,738	625	401
YU2CQ	"	281,100	540	300
YU7FT	"	165,627	340	231
YU7AV	**14**	**1,633,840**	**1341**	**520**
4N2X	**14**	**1,476,632**	**1299**	**524**
		(Op. YU2LH)		
YU3TU	"	1,303,504	1072	514
YT3M	"	917,575	958	425
		(Op. YU3ZO)		
YT7A	**7**	**938,928**	**809**	**372**

U.S.S.R.

EUROPEAN

UW3AA	**A**	**1,974,590**	**1625**	**521**
RW4WA	**A**	**1,024,608**	**1199**	**416**
RV6AGG	**A**	**838,200**	**1217**	**381**
RA6YA	"	551,208	856	357
UA4HKJ	"	236,160	491	240
UA4AHA	"	228,028	516	218
UA4ANZ	"	159,278	340	217
UA1AJ	"	147,258	400	243
UA6YFW	"	136,095	263	211
UA4ALI	"	134,532	411	202
RA4AI	"	127,970	340	191
UA6LIG	"	100,529	355	209
RA1ACW	"	63,441	263	159
UA3DK	"	58,739	201	151
UZ3QZO	"	50,556	165	132
		(Op. Valeri)		
UV3QLR	"	47,498	186	127
UA4PJP	"	38,316	150	124
UA3VLO	"	30,591	131	103
UA6LFQ	"	24,745	107	101
UA3ICJ	"	19,864	119	104
UV6HFK	"	17,686	120	74
RW3DC	"	16,380	114	90
UV6HON	"	10,349	100	79
UA1QM	**28**	**26,316**	**164**	**102**
UA4LDJ	**21**	**169,200**	**404**	**235**
UW3UO	"	121,152	282	192
RA3DN	"	118,611	262	207
UA4CPW	"	111,940	293	193
UA1OLI	"	34,465	150	113
RA3DJA	"	21,696	112	96
RV6AA	"	18,216	110	88
RV3ZA	**14**	**453,720**	**776**	**380**
UA3MBJ	**14**	**233,688**	**529**	**312**
UA3RLZ	"	158,752	350	242
RA1QM	"	120,866	380	223
UA4LAF	"	44,982	240	153
UA4CFC	"	20,480	167	160
UA3RNI	"	13,838	97	74
UV6AAQ	**7**	**266,560**	**484**	**238**
RA4AV	**3.5**	**105,930**	**284**	**165**
UA6BJQ	"	88,608	276	156
UA3YAO	"	40,548	181	109
UV6LIP	**1.8**	**5,368**	**59**	**44**

KARELIA

UA1NDR	**A**	**641,560**	**1185**	**344**
UA1NA	**21**	**98,484**	**178**	**174**

KALININGRADSK

UA2EC	**A**	**113,876**	**268**	**196**
UW2F /UA4WGR	"	93,160	464	191
RA2FB	"	27,976	153	104
UA2FU	"	4,280	45	40
UA2FF	**1.8**	**64,976**	**228**	**131**

UKRAINE

RB5IA	**A**	**846,600**	**1031**	**408**
UB5IAN	**A**	**774,706**	**1015**	**361**
RB5EX	"	538,010	916	335
UB5PAG	"	532,356	805	327
UB5ILW	"	450,232	720	337
UB5IBV	"	299,992	498	308
UB4FWH	"	289,240	551	280
UB3MP	"	242,205	501	241
UB5WCG	"	182,988	435	221
RB5WR	"	138,030	329	645
UB5IF	"	98,592	244	196
UB5CGN	"	98,454	244	183
UB3MW	"	76,838	235	206
UT4UZ	"	75,520	246	140
UB5EF	"	61,948	238	116
UB5LFG	"	36,252	170	114
UB5INT	"	30,840	166	120
RB5AT	"	29,700	130	100
UB4IWI	"	26,620	150	110
UB4LAT	"	21,425	181	75
UB5EIT	"	11,352	91	86
UB5QJN	"	3,298	39	34
UB5IPN	"	2,373	40	37
RT4UB	**28**	**42,250**	**178**	**125**
RB5RF	"	22,140	118	90
RB5FQ	"	13,800	86	75
RB5QW	"	8,710	80	67
UB5VCI	**21**	**188,124**	**470**	**244**
RB5IOV	"	150,331	331	239
UB4JL	"	71,592	258	157
UB5ZCW	"	57,892	230	164
UB5TEX	"	41,540	175	124
UB5EEP	"	40,080	153	120
UB5WBJ	"	15,554	91	77
UB5EPV	"	4,346	43	41
UB5AJP	"	512	16	16
UT4UXW	**14**	**1,624,080**	**1349**	**606**
		(Op. UT5UGR)		
RB5II	**14**	**1,156,725**	**1241**	**485**
UB5III	"	856,800	1156	408
UB5XCU	"	304,320	544	320
RB5XQ	"	239,400	486	280
UY5TE	"	197,316	422	261
UB5JNW	"	195,063	413	257
UB5JS	"	158,115	354	249
UB5MTM	"	135,020	310	215
UB5QBC	"	134,810	332	221
UB5VK	"	51,984	184	144
UT3UA	**7**	**436,674**	**658**	**281**
UB5IOM	"	220,920	407	210
UB5CDX	"	117,264	280	168
UB5XBD	"	100,456	310	156
UY5WA	"	79,426	206	151
RB5FF	**3.5**	**199,606**	**418**	**211**
RB5NC	"	162,782	365	199
UB4FYC	"	22,880	135	88
UB5FDL	"	2,496	33	32
UT5UJO	**1.8**	**33,456**	**168**	**102**
UT4UN	**1.8**	**23,400**	**142**	**90**
UB5ZKE	"	6,996	69	53
UB4JFJ	"	5,829	91	67

BYELORUSSIA

UC2ADX	**A**	**1,117,878**	**1097**	**422**
RC2CR	**A**	**256,032**	**519**	**254**
UC2OT	"	123,772	320	194
UC2AT	"	80,892	226	214
UC2OBB	**21**	**41,080**	**181**	**130**
UC2AGT	**14**	**121**	**11**	**11**
UC2ADH	**7**	**4,736**	**47**	**37**

MOLDAVIA

UO5OO	**14**	**290,115**	**556**	**315**
UO5OLW	"	208,320	451	280

LITHUANIA

RP7W	**A**	**2,921,373**	**2202**	**609**
		(Op. UP3BP)		
UP3BU	**A**	**1,423,962**	**1302**	**478**
UP3BO	"	840,693	1025	399
UP3BQ	"	419,526	599	306
UP2PAQ	"	415,240	651	280
UP3BX	"	376,074	677	306
UP3BS	"	370,491	587	309
UP2BOC	"	258,300	508	225
UP3BA	"	215,936	501	241
UP2BTD	"	162,864	400	208
UP2PCF	"	45,696	158	128
UP1BZR	"	32,854	307	109
UP2BN	**21**	**537,936**	**734**	**336**
UP2BZ	"	223,677	404	261
UP2BIP	"	188,748	367	252
UP2SA	"	64,675	180	135
UP2AV	"	820	21	20
UP2BNC	**14**	**243,250**	**524**	**278**
UP2BLF	"	201,696	477	264
UP2OU	"	131,974	404	217
UP2BB	"	29,960	125	107
UP2BQT	"	25,853	125	103
UP1BYL	**3.5**	**205,920**	**444**	**208**
		(Op. UPØBA)		
UP2BLA	"	76,934	260	143
UP2BEW	**1.8**	**5,016**	**59**	**44**

LATVIA

UQ2GJV	**A**	**291,384**	**510**	**284**
UQ1GWS	"	111,868	323	166
UQ2GN	**21**	**264,934**	**512**	**278**
UQ2GRX	"	18,035	84	65
UQ2GIP	**14**	**8,058**	**90**	**79**
UQ2GGE	**3.5**	**26,656**	**128**	**98**
UQ2GTP	"	24,806	110	79
UQ2GMB	**1.8**	**4,290**	**55**	**39**
UQ2GQN	"	1,026	20	19

ESTONIA

UR3RA	**A**	**515,412**	**751**	**309**
UR2RNG	"	253,215	457	255
UR2RER	"	3,760	43	40
UR2RDO	**14**	**1,012,950**	**1058**	**450**

OCEANIA

THE PHILIPPINES

KE9A/DU3	**A**	**2,132,924**	**1577**	**412**
K1BAZ/DV1	"	1,025,640	1100	315
4F1FZ	**21**	**575,760**	**809**	**240**

NEW CALEDONIA

FK/JH6SOR	**A**	**3,663,177**	**2220**	**527**
FK/JH9KVF	**21**	**1,171,472**	**1135**	**347**

TAHITI

FOØMGZ	**A**	**219,696**	**358**	**184**

GUAM

KG6DX	**28**	**915,992**	**1025**	**308**
N7DF/WH2	**21**	**3,243,450**	**2070**	**525**

HAWAII

AH6JF	**A**	**270,684**	**417**	**206**
NH6T	"	268,128	375	228

MARSHALL IS.

KX6DC	**3.5**	**258,258**	**315**	**143**
			(Op. NZ8B)	

AUSTRALIA

VK2BQQ	**A**	**767,500**	**775**	**307**
VK4XA	**28**	**564,896**	**713**	**278**
VK8XX	**21**	**2,633,154**	**1680**	**534**
VK2APK	**14**	**1,334,295**	**1010**	**447**
VK4TT	"	158,886	303	182
VK5AGX	**7**	**37,730**	**94**	**77**

INDONESIA

YC3HCM	**A**	**2,491,746**	**1177**	**601**
YBØTK/1	**A**	**1,343,454**	**1123**	**406**
YB2FEA	"	279,180	351	270
YB3ASQ	**7**	**242,592**	**248**	**168**

NEW ZEALAND

ZL3GQ	**14**	**2,775,744**	**1620**	**576**

SOUTH AMERICA

TRINIDAD

9Y4VU	**21**	**3,986,512**	**2042**	**656**

CHILE

CE3DNP	**28**	**2,857,038**	**1653**	**582**
CE6NOT	**14**	**1,261,447**	**1188**	**451**

EASTER IS.

CEØZIG	**28**	**523,218**	**610**	**291**

ARGENTINA

LU1EWL	**A**	**662,008**	**641**	**332**
AY4F	**28**	**2,390,024**	**1506**	**536**
			(Op. LU4FD)	
LU1ICX	**21**	**821,740**	**764**	**362**
LU6DW	**14**	**89,590**	**204**	**155**

PERU

OA9DX	**A**	**933,980**	**1048**	**410**
			(Op. OA4ZV)	

BRAZIL

PY2RRG	**A**	**403,700**	**499**	**274**
PY2RRG	**A**	**403,700**	**499**	**275**
ZZ8WHL	"	89,811	205	153
			(Op. PY5FB)	
PU1LJA	"	44,581	138	109
PY7FNE	"	26,880	103	84
PY2PI	"	9,150	57	50
PY2RLQ	**28**	**88,560**	**207**	**144**
PY5BVL	"	70,305	185	129
PY2SZA	"	47,243	169	119
PY2YN	"	31,678	116	94
ZY5ZBA	**21**	**2,650,219**	**1604**	**559**
			(Op. PY5CW)	
PP1CZ	"	703,500	735	350
PY1DGV	**14**	**131,880**	**267**	**168**
PY2TI	**7**	**2,304**	**24**	**24**
PY1BVY	**1.8**	**3,024**	**31**	**24**

VENEZUELA

YV4ABR	**A**	**1,960,371**	**1084**	**609**
4M7A	**21**	**4,137,628**	**1998**	**694**
			(Op. YV7QP)	
4M3A	**14**	**2,317,477**	**1530**	**509**
			(Op. YV3AGT)	
YY1D	**7**	**2,410,920**	**968**	**444**
			(Op. YV1DIG)	
YX3A	**3.5**	**1,004,060**	**564**	**305**
			(Op. YV5ANT)	
YV10B	**1.8**	**1,290**	**17**	**15**

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES

N4WW	**4,876,485**	**2409**	**705**
KU2Q	**4,091,568**	**2233**	**624**
WC4E	3,911,660	2086	655
K1RU	**3,209,059**	**1924**	**553**
WA6AUE	**2,023,400**	**1314**	**536**
N7KA/5	**1,995,456**	**1378**	**547**
KS9O	**1,899,710**	**1359**	**542**
NA6A	1,705,041	1214	531
N7TT	**1,431,621**	**1055**	**459**
NF8R	**1,422,288**	**1208**	**476**
AI6V	1,159,284	1152	444
WA6IET	1,064,712	1112	407
KS3F	**1,046,220**	**1048**	**420**
NM9H	683,268	798	388
N3DG	635,010	596	305
NR4K	476,938	529	326
N6JV	437,578	520	332
K5LZO	257,040	426	270
NB3O	251,472	426	248
AA4M/6	215,964	393	252
KE6WL	52,582	142	122
WA8LLY/6	17,608	85	71

NORTH AMERICA

KP2A	**12,843,135**	**4812**	**835**
ZF2NE/ZF8	**4,571,689**	**2585**	**673**
HI3UD	**4,235,825**	**3137**	**803**
CJ7SV	**3,334,526**	**2191**	**554**
6D2A	**2,507,820**	**1821**	**490**

AFRICA

5H1HK	**7,010,392**	**3260**	**646**

ASIA

JE2YRD	**3,928,782**	**2171**	**627**
JG1ZUY	**3,420,978**	**2105**	**561**
AP2ZA	**3,013,465**	**2273**	**481**
JA8YBY	2,882,352	1799	583
JA7YAA	2,867,922	1823	563
JA1YFG	2,813,048	1894	526
JA3YBF	2,674,364	1769	532
HL9JZ	**1,961,505**	**1613**	**479**
JE2YHS	1,911,286	1444	494
JA3YKC	1,527,680	1243	440
JA6YJS	1,365,287	1043	539
JA7YAB	1,334,659	1224	389
JAØZRY	1,320,718	1116	406
JA1YAD	1,246,138	1135	398
JA9YBA	865,200	953	336
JAØYAK	115,810	247	185
JA6YBR	7,242	60	51

EUROPE

HG9R	**9,957,368**	**5437**	**872**
4J1FS	**6,179,859**	**4232**	**699**
HG5A	5,740,280	3472	760
HG1S	5,437,712	3402	752
LZ9A	**5,396,265**	**3237**	**777**
OK7AA	**5,191,200**	**3106**	**720**
OL4A	5,188,986	3027	718
EA3VY	**4,997,116**	**2900**	**731**
HG5C	4,268,231	3069	671
F8UFT	**4,247,748**	**2618**	**666**
HG8Q	4,007,575	2502	715
IR2ITU	**3,707,394**	**2809**	**646**
HG6N	3,459,950	2340	650
LX150L	**3,272,472**	**2582**	**604**
IK2EGL	3,227,796	2216	594
Y35L	**2,846,364**	**2256**	**579**
YU3AI	**2,812,392**	**2044**	**583**
HG7B	2,681,404	2115	596
HGØD	2,568,780	2059	603
YT3T	2,212,522	1763	559
OH2AQ	**1,943,100**	**1724**	**510**
HA6KVB	1,940,484	1615	546
HA8KVK	1,923,933	1747	519
LA2AB	**1,909,739**	**1695**	**533**
7S3HK	**1,860,166**	**1918**	**517**
OK3RJB	1,600,169	1492	491
SM5GMG	1,548,330	1557	438
SPØBEM	**1,510,026**	**1480**	**471**
OK1KQJ	1,411,425	1324	459
HA8KCK	1,391,082	1427	462
DJØSI	**1,390,592**	**1235**	**512**
SK7GC	1,308,924	1060	618
EI2WW	**1,294,956**	**1507**	**468**
HA3KNA	1,288,320	1361	440
YT5R	1,188,510	1484	458
OZ1OXZ	**1,161,134**	**1181**	**442**
OK2KOD	1,102,790	1089	442
Y32CN	1,016,328	1178	408
YU2CCJ	878,016	946	408
OK1KOK/P	676,476	755	387
HA2KNP	665,260	804	370
OK1KNR	651,490	659	454
LA1T	567,131	859	361
Y89TME	497,960	828	295
OK3KGQ	404,633	710	293
FF1OJX	372,970	750	302
OK1OFK	350,730	698	270
OK1OFM	322,326	521	272
HA8KWE	238,278	459	263
PAØKHS	**218,373**	**468**	**249**
HA6KNX	125,296	284	191
HA5KKF	95,976	259	172
OK3RJB	71,928	187	148
OK5MVT/P	58,499	224	147
FF1OKZ	22,736	119	116
OK2KEZ	19,608	118	86
OK3KZA	7,991	96	61
OK1KJA	6,372	65	59
OK1OPT	2,754	37	34
OK3KYH	1,596	28	28

OCEANIA

4G1A/3	**1,180,565**	**1238**	**289**
DX9HT	108,593	272	113

SOUTH AMERICA

LQ5A	**8,290,016**	**3418**	**784**
HC2G	**6,917,481**	**2946**	**729**

U.S.S.R.
CLUB STATIONS
EUROPE

RQ7W	**5,458,023**	**3357**	**729**
UQØA	4,165,656	2822	682
UR1RWX	**3,049,212**	**2277**	**618**
RBØQWW	**1,769,550**	**1848**	**470**
UZ1AWQ	**1,291,050**	**1452**	**430**
RB1J /UZ3WWZ	1,259,823	1486	463
UZ1TWB	1,246,752	1255	444
UZ4FWA	1,239,690	1216	465
UZ6HWA	1,054,690	1315	427
UC1LWN	**991,935**	**1115**	**423**
RB4IYJ	503,424	910	304
UZ6LWB	244,800	521	240
UZ1NWF	243,236	623	238
UZ1AWO	222,049	376	233
UB4EZQ	185,042	260	286
UC1AWK	155,848	341	184
UZ1QWD	72,981	260	159
UB4TWL	72,369	215	187
UC1AWP	1,410	32	30

ASIA

RL8PYL	**5,503,272**	**2707**	**696**
UZ9YXP	**821,097**	**1060**	**327**
UZ9UZL	592,416	726	264
UZ9YXI	340,782	537	257
UZØQXU	**313,104**	**517**	**264**
UI9AWX	**102,425**	**425**	**241**

MULTI-OPERATOR MULTI-TRANSMITTER

Y34K	**9,831,866**	**5021**	**869**
YT2R	**9,313,824**	**4891**	**878**
WL7E	**6,981,532**	**3134**	**724**
OH7AB	**5,852,517**	**3648**	**737**
OH1AA	5,299,712	3491	704
WZ6Z	**5,183,187**	**2659**	**723**
UP1BZO	**5,081,987**	**3292**	**703**
JA2YKA	**4,917,740**	**2634**	**655**
AD6E	2,872,792	1743	598
N6VR	2,674,960	1716	580
VE7ZZZ	**2,441,710**	**1660**	**530**
JR1ZTT	1,319,096	1203	428

CHECK LOGS: The following logs were used for cross-checking. Check logs and SWL logs are always appreciated. Thank you.
9H3IA, EA1EDU, EA3CWI, EA3JC, EA6EJ, EA7EDW, EA8AB, EC6PG, EC7DEB, HA5FA, HA8ZO, HI8LUZ, JF1SQC, JR1XKU, KA7FEF, KL7HIR/3, KO4D, LA4FBA, LA4IAA, LA5AP, LA5MT, LA8CE, LA8GV, LA9HF, LA9XG, LZ1HX, LZ1IA, LZ1KAZ, LZ1KHB, LZ1WZ, LZ1XO, NY7T, OA4ANR, OE6IMD, OH3TQ, OH3YN, OH5FA, OH5PT, OH6NEV, OH7MFO, OK1AMS, OK1DLJ, OK1DQT, OK1DRO, OK1US, OK2PAY, OK3KJF, OK3TRJ, OL6BTN, OX3CS, OX3RA, OY1CT, OZ1IOC, OZ1JLX, OZ1JNR, OZ1KWG, OZ3Q, OZ4XX, OZ5PA, OZ5UR, OZ8AE, PAØUV, PU2NGL, PY1AJK, PY2CZL, PY2NZP, PY3CJI, RA1QX, RA1WT, RA3ATM, RA3EF, RA3PP, RA3VA, RA3VO, RA4HX, RA4SAE, RA6LBP, RB5CL, RB5ICY, RB5IQU, RB5WA, RB5WW, RL7LCT, RV6AAY, RW3DD, RW3QA, RZ1OA, RZ3DWO, SMØCSX, SM3CVM, SM5FUG, SM6BWQ, SM6CDN, SM7KWE, SP1DWZ, SP2ASJ, SP2DKI, SP2GUV, SP2ZFJ, SP2ZT, SP3CDQ, SP3IOE, SP5CJX, SP5ILO, SP7GAQ, SP8AG, SP8FNA, SP8JMA/A, SP8NCS, SP9BBH, TF3SD, UAØFZ, UAØKCC, UAØKCL, UAØKDH, UAØLGM, UAØUAG, UA1ABP, UA1AUA, UA1NDW, UA1NDX, UA1ODU, UA1OLL, UA1QBQ, UA1WBV, UA3ACH, UA3DGA, UA3DHH, UA3DLU, UA3IAK, UA3JD, UA3LAR, UA3LDZ, UA3PB, UA3PTW, UA3QIB, UA3QPA, UA3RBO, UA3RE, UA3RNM, UA3ST, UA3TAM, UA3TCJ, UA3TDO, UA3VQP, UA3XBB, UA3XCT, UA4AKE, UA4CTE, UA4FEU, UA4HVW, UA4NBD, UA4NBH, UA4PJA, UA4PMO, UA4QK, UA4RC, UA4SS, UA6HPK, UA6HPT, UA6HSN, UA6HXY, UA6LDF, UA6YAV, UA9CBO, UA9CCL, UA9HTT, UA9MJD, UA9OAL, UA9OLW, UA9SAW, UA9XK, UB4GH, UB4JIF, UB4JJB, UB4UAU, UB5DW, UB5GHG, UB5IIH, UB5IJW, UB5JAR/UT5J, UB5QJA, UB5SBF, UB5TBH, UB5ZKG, UC2LB, UF6CX, UI8BAA, UL7BEO, UL7BY, UL7CC, UL7RER, UL8BWW, UP2BPO, UP5PCU, UR2RDZ, UR2RND, UV3DN, UV6AM, UV6HLC, UV6HPI, UV6HSU, UV9CAF, UWØCI, UW3DW, UW3HY/1, UW3QD, UZØDWD, UZ2FWK, UZ3DWZ, UZ3DYF, UZ4WWB, UZ9CL, UZ9MZZ, UZ9OYL, UZ9XXM, VE1ACK, W8HFE, W8LYT, W9YCV, Y21DG/A, Y21DG, Y21DH, Y21GF/P, Y21UD, Y21XH/A, Y22FG, Y22IH, Y22JD, Y22OB, Y22TO, Y23BF, Y23JA, Y24EA, Y24HJ, Y24SL/A, Y24TG, Y24XJ, Y25FI, Y25OF/A, Y25PA, Y26SO, Y26WM, Y27HL, Y36VF/P, Y37EO, Y38ZB, Y41ZF/P, Y42CB, Y43RJ, Y45RJ, Y48ZF, Y51ZE, Y53UL, Y54UA, Y54WM, Y54ZA, Y56SG, Y56YE, Y59NA, Y59QA, Y61XM, Y62OH, Y75YL, YC6INU, YO2AQB, YO3BWK, YO3CD, YO3JU, YO3RK, YO5LU, YO5TA, YO6AW, YO8KOS, YU2WJ.

DISQUALIFIED: RB8M—excessive duplicate contacts; K1ZZI—did not sign portable.

Exotic islands, friendly natives, no hustle or bustle, and everything running smooth as clockwork—that's the picture we have of island-hopping DXpeditioners operating from their enviable positions. Sometimes it's quite different, as YJ8M explains.

YJ1TRS

A DXpedition to The Torres Island Group

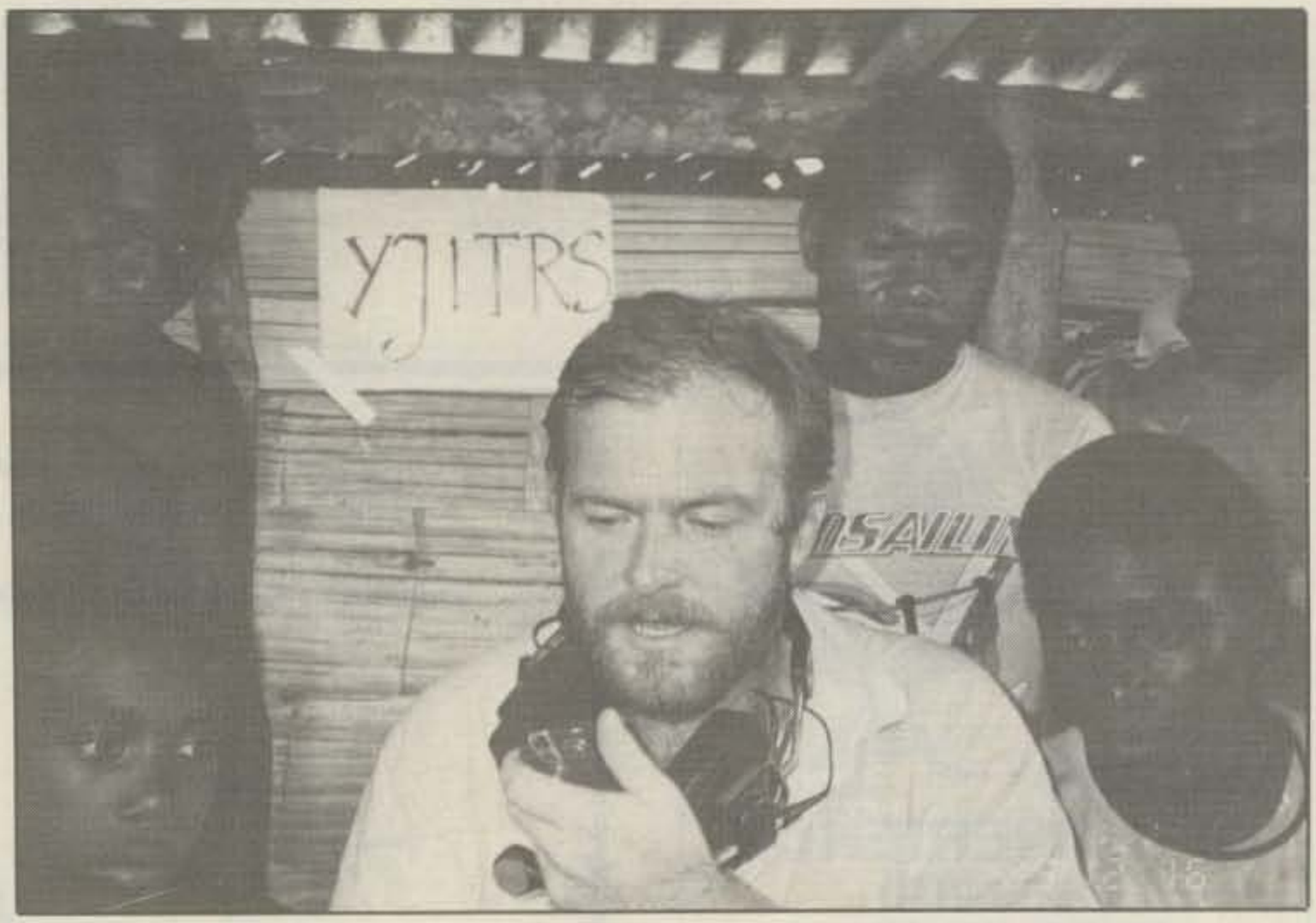
BY DR. MAREK BLADOWSKI, D.D.S.*, YJ8M

There are several adages DXers use which sound simple and yet make perfect sense. The first is "listen," because you never know what you may hear, even on a dead band. The second is "work 'em first and worry about where they are later."

One evening last December I heard this marginal signal signing a prefix that I couldn't place—YJ1. There was barely enough time to work him, and the signal was gone. Nothing showed up in the DX bulletins, and everyone I asked hadn't heard of YJ1TRS. The only thing that was certain was that it was part of Vanuatu.

One other piece of information was the operator's name, Marek (of course my spelling of it at the time was different). I eventually wrote to another Marek, YJ8M, and asked him if he knew anything about either the operator or the call YJ1TRS. Marek is a dentist living in Port Vila, Vanautu.

Recently, I received the card from YJ1TRS and the story below, from Marek. So the old adages are very true—listen, and work 'em first. —K2EEK



Marek, YJ1TRS, operating from the Torres Island group with the assistance of some very interested local residents.

On the 14th of December 1989 I landed on the muddy airstrip of Linua Island in the Torres Island Group, Vanuatu. The pilot took off and left in a rush as though escaping from a leper colony. I tried to get some information from him about the island before we landed, but he only said, "See you sometime next year," and with that he was airborne. I was left standing alone next to my mountain of luggage with only flies and mosquitoes as my companions.

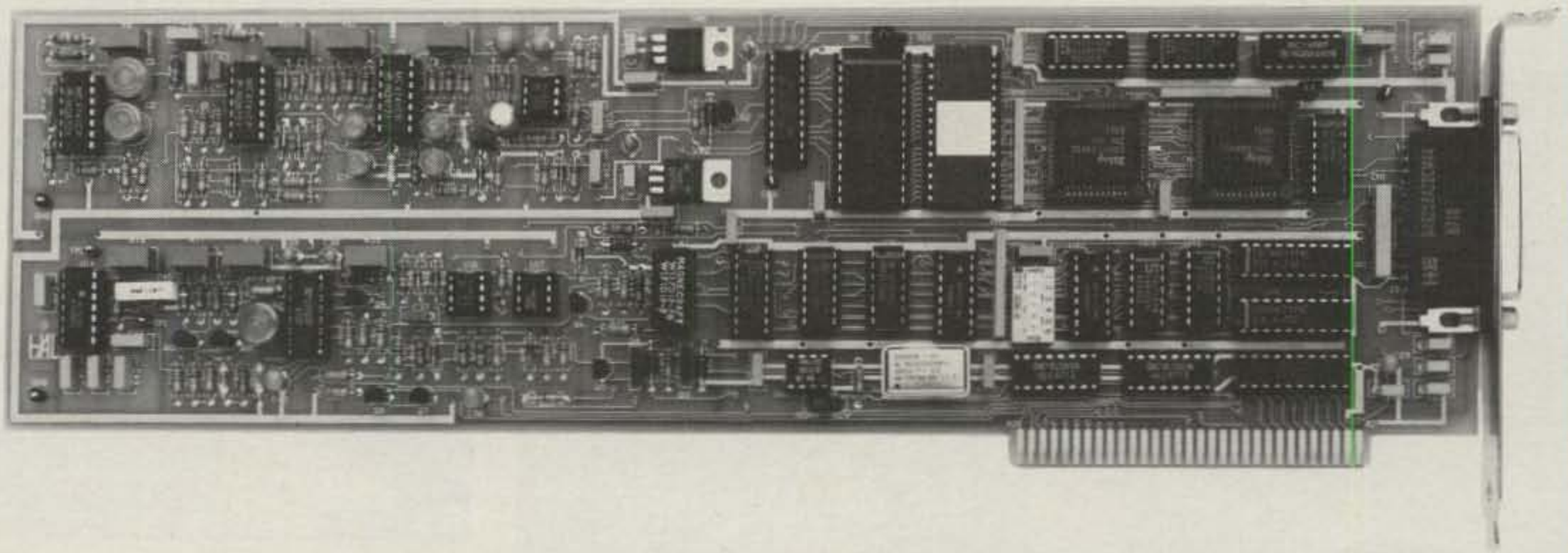
Before departing Port Vila I had made arrangements with the Department of Civil Aviation to use the hut on the landing strip on Linua Island as my base, and I was assured there was a solar power source available. I walked about ¼ mile to the hut to find no power supply at all. Nor was there any living quarters.

Suddenly a handful of Malanesian men appeared from the jungle, took my luggage, and asked me to follow them to their village on Loh Island. The 7 foot long package containing a 3-element Cushcraft beam plus an aluminum 6-element mast especially intrigued them. I also had several bags packed with the rig and anything else I thought might be useful in this rural and isolated place—for a total of over 220 lbs.

To reach Loh Island we had to cross about one mile of sea using their outrigger canoes. I began to worry about my equipment as I remembered the problems Norman Shackley, YJ8JS, had on his DXpedition to Mota Lava Island in the Banks Group earlier in the year. Half of

*P.O. Box 217, Port Vila, Republic of Vanuatu

A Winning Combination . . . The PCI-3000 and SPT-2 from HAL!



The HAL PCI-3000/PC-AMTOR system is designed to put your PC on the HF bands with outstanding performance at an affordable price. Amtor allows you to get through when other methods fail. If you've ever been DX-ing with someone on Amtor when 20 meters dies out in the evening, you know what we mean. Things may slow down, but you can usually keep up the QSO!

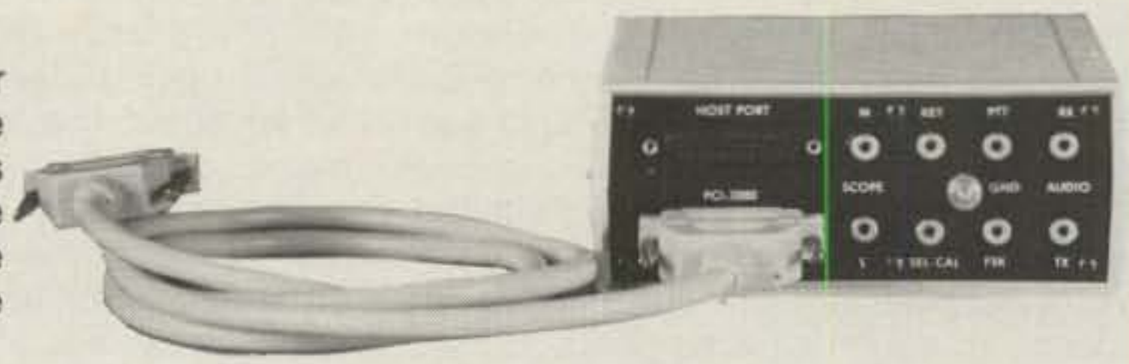
The PCI-3000 doesn't limit you to Amtor. You also get high-performance Baudot and ASCII RTTY, CW, and Search Mode. Search Mode lets you simply tune in the signal—we take it from there. The PCI-3000 automatically finds the correct code, speed, and polarity. No more guessing!

If you want to communicate on HF, do it right with the PCI-3000! Call HAL Communications—your AMTOR source—and put your PC on the air today!

SPT-2 Spectra-Tune:

For ease of tuning your PCI-3000, add the SPT-2 Spectra-Tune. The Spectra-Tune lets you tune in CW and RTTY signals quickly and accurately with a calibrated linear 30-segment bar graph. The bar graph represents a 600 Hz range of the audio spectrum, centered at 2210 Hz for RTTY and AMTOR, and 800 Hz for CW. Calibrated marks indicate the proper frequency for AMTOR, RTTY, and CW tuning.

A cable is included with the SPT-2 for providing power and control from the PCI-3000. The rear panel of the SPT-2 provides convenient "RCA" phono connectors for all radio connections. This avoids having to make radio connections directly to the PCI-3000. Enhance your PCI-3000 system with the SPT-2 Spectra-Tune Today!



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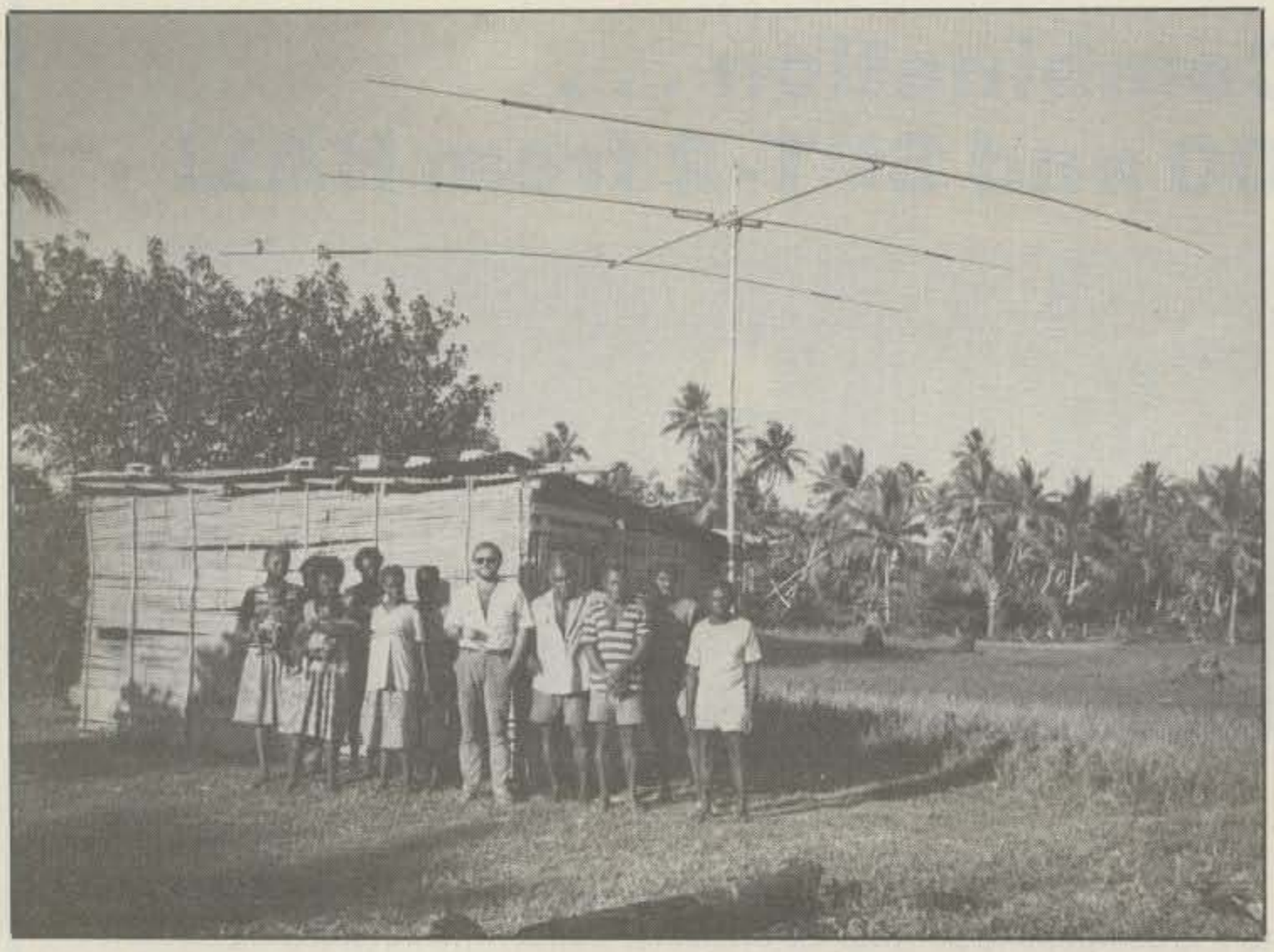
CIRCLE 58 ON READER SERVICE CARD



Here's the shack, both literally and figuratively, of YJ1TRS. Marek was a big hit with the Melanesian people.

Trekking through a path on the island, Marek and friends are shown carrying the DXpedition gear. The banded aluminum comprised the antenna and mast system.

his luggage sank or was lost. Fortunately, we crossed the sea without any mishaps, and after a difficult hike through the jungle, the village appeared. The inhabitants were all excited to see me. Visits from the "white man," which is what they call Europeans, in this area are very rare, so I was not surprised that my appearance was such a big event for the villagers. I received permission from the chief of the village to transmit, but I'm sure he still doesn't know what he gave me permission for.

The only place I could establish myself was a little bamboo hut with a corrugated tin roof which was full of holes and rusty. I was assured before I left Port Vila that a working generator would be available, but once again I was misinformed. There was no usable generator, and even if there had been, there was no petrol on the island, as the last delivery ship had been over six months ago.

I began to establish my station with the help of the whole village. We erected the beam and dipoles which we strung up between two coconut palms about 35 feet above ground. My HF6V Butternut antenna was rendered inoperable during the trip; the coils were squeezed and mangled. My wish was to be on the air as soon as possible, but that proved to be very difficult. As the generator was not there, I had to find an alternate power source. I found a usable car battery and connected my solar panel to it. I re-checked all equipment and switched on my IC-751A. It worked, much to my delight. I began to transmit at 0700 UTC on 15 meters. I made contact with an Australian station but could not catch his callsign, as a small native boy accidntally disconnected my power supply. The hut, which was about 35 feet square, was packed with 30 Malanesians and a far greater number waited outside. I was sweating profusely and was extremely frustrated.

I had set up the mast with the beam close to the hut, which enabled me to turn it manually in the required direction. I started again. Propagation was good, and after a couple of CQs the first real contact came. It was JH7DIS at 0843 UTC, and he gave me a superb report of 59. Later I worked another 30 Japanese stations, and then the first European came through. It was OH2QQ. He was 59 and read me 57. I didn't expect such marvelous copy. I was so happy I no longer cared about the tough conditions surrounding me.

They started to come—German, Italian, U.K., and other European stations. In order to control the pile-up I had to work split. In three hours I made over 400 contacts. Propagation started to die around 1200 UTC, and I decided to finish for the first day. It was December 14, 1989 when I activated YJ1TRS, Torres Group /OC-110/ for IOTA.

The next day at 2300 UTC the first American station appeared. It was NL7RQ from the Aleutian Islands, state of Alaska. He copied me 41. The band did not seem to be open yet. It was my birthday and propagation was unfortunately very poor. It was about noon local time, and the temperature inside the hut reminded me of a good Finnish sauna. I continually burned mosquito repellent to no avail, and the hordes of malaria mosquitoes stabbed at me with no mercy. The black cloud of flies stuck to my skin, and they frolicked in my ears, ears, nose, and upon my lips. The horrible heat did not allow me to work. I found that during the day it was physically impossible to perform any transmission. I decided to have a rest.

When I returned at 1800 local time I found that my coaxial cables, earphones, and other equipment had been chewed by rats. I nearly cried. Fortunately, I had spares, and after a couple of hours I had the station operating again. From 0800 to 1300 UTC I made another few hundred contacts, but the next day was a disaster for me.

I found that after a few transmissions the solar panel was no longer feeding the battery. It was noon and the sun was in its meridian, the sky was clear, the air was still (not even a hint of a breeze), and humidity was around 100%. I felt as though I could cut the air; it was so dense I could hardly breathe. I tried to repair the solar panel, cleaned the connections, and left for a few hours so the battery could charge for the evening transmission. It was Sunday, but it didn't feel like it. Every day seemed the same, as the climate dictates the style of life. Heat, humidity, and the surrounding flora and fauna make any movement difficult, and doing anything requires twice as much energy as you

would need under normal conditions.

I woke up on the beach that evening to see the most beautiful sunset. Vanuatu has the best sunsets on earth. A few villagers were watching me from a distance. I returned to the hut to find some native boys playing with all the buttons on my radio. They saw me come in and disappeared. Propagation was good, and it seemed that the solar battery was working again. I made around 100 contacts mainly with Japan, Korea, and South America, and then Europe came in. I was wearing pilot's headphones and working a VOX so I could have my hands free, but the heat was so intense that the headphones were burning my skin. I had no choice but to keep them on because the chatter and laughter of the crowd in the hut was very distracting.

Suddenly the power started to drop off. I heard John, I1HYW, IOTA Manager for Italy, calling me several times: "Marek, we know you are there. There are a few hundred Europeans waiting for you .... Marek QRZ." I screamed into the microphone, but he didn't hear me, as power was cutting off. I could hardly receive and could not transmit at all. Propagation this evening was so good, but I was powerless. I was so angry that I swore and cried and felt like destroying all the equipment and the hut itself. The natives could not understand my behavior. I could still hear John calling "YJ1TRS, YJ1TRS ...." and a few minutes later the power was gone completely. It was around 1000 UTC Sunday, when all the amateurs in the world have time to work, but I could not transmit. I went to bed angry and upset.

The next day I decided to have a look at the inoperable generator. Thank God I found only a few small problems, corroded connections which I fixed, but still no fuel. I gathered the villagers and said that I knew fuel had to be there somewhere, and I would pay any amount of money they asked. They found five litres which they siphoned from a fishing boat on the other side of the island. I switched on and the generator worked. I connected my radio through the external power supply. I also connected two flat car batteries, to charge them.

It was noon local time. I made a few contacts with the States and Canada. I worked Dewitt, W4BAA, US IOTA Manager, and also another hundred US stations when I ran out of the very expensive fuel. I still had two batteries left. That evening I worked a few more hours until both were drained.

The aircraft which was supposed to pick me up on Tuesday December 19th did not arrive. I didn't know when I would leave Torres. I could not even contact my amateur friends in Vila, because I was totally out of power. To kill time I went with the natives to catch sharks, coconut crabs, and participate in the local life style. I visited a huge cave on Loh Island which during frequent cyclones is used as shelter by the villagers.

Torres Islands, the northernmost part of the Vanuatu archepelago, is one of the most rural and undeveloped areas in the southwest Pacific. No electricity, no regular communications or transport—a land forgotten by God and man. The Torres Group consists of six islands: Hiu, Loh, Toga, Tegua, Metoma, and Linua. On uninhabited Linua Island is a landing strip, a reminder of the American presence during WW II. Total population consists of 326 people living a pure native life. Their only source of income is coconut crabs, which they export to Port Vila if and when the cargo plane arrives. I was very lucky. Christmas was coming and Vila needed coconut crabs. On Thursday December 21 I left the Torres Group with a half ton of coconut crabs bound for Vila.

I made around 1400 contacts, far less than I was expecting to make. However, this was just the beginning of my world DX safari. CQ

Ameritron gives you a full kilowatt *output* of peak envelope power for only $995 -- from a whisper quiet linear that's perfect for your operating desk because it measures just 8¼" H x 14" D x 14¼" W.

You could spend over *twice* the money for a legal power limit amplifier *twice* the size -- and all you'll get is an additional 1/3 S-unit -- a difference you won't ever notice.

You also get 850 watts output on CW and even 500 watts on RTTY.

All Band Coverage

You get all band coverage: rated output on 160, 80, 40, 20 and 15 meters (10 meters with user mod/export) as well as 80% rated output on MARS and WARC bands.

Tuned Input lets solid state rigs deliver full output

The Ameritron AL-80A uses a direct switched, 100% shielded pi-network tuned input circuit that provides an excellent load for any rig. Even the fussiest solid state transmitter works flawlessly with the AL-80A.

Pi-L Output Tank

A carefully designed Pi-L output tank using the optimum Q for each band gives you exceptionally smooth tuning, extremely wide range load impedance matching and full band coverage -- even on 160 and 80 meters -- *plus* you get an extra 10 to 15 dB of harmonic suppression.

You also get peak performance at different power levels from one end of the band to the other.

Ball bearing vernier reductions drives on both the plate and load control makes tuning precise and easy.

3-500Z Tube in shielded RF compartment gives you nearly 70% efficiency

You get the rugged time proven 3-500Z tube with an estimated life of 20,000 hours ICAS. That's nearly 20 years operating 20 hours a week -- you may never have to replace your tube.

The AL-80A is built on a rugged steel chassis. It has a separate RF compartment that's fully shielded to keep unwanted RF from leaking out. This keeps RFI and TVI to an absolute minimum.

A superb RF design and layout, a Hi-Q tank circuit and commercially rated RF power components give you nearly 70% plate efficiency over the entire operating range. This puts maximum power into your antenna instead of heating up your amplifier.

A whisper quiet internal computer style fan draws in cool air over the power supply components and blows it around the 3-500Z tube. This removes excessive heat and gives you reliable performance.

Built-in adjustable ALC circuit keeps your exciter from overdriving your AL-80A. The result? A clean signal without flat-topping.

A standby switch prevents harmful thermal shock to your 3-500Z filaments by keeping them lighted when you're operating barefoot.

Gutsy Heavy Duty Power Supply

The guts of the AL-80A is its heavy ***heavy*** duty power supply.

A husky 22 pound power transformer using a high silicone steel core, computer grade filter capacitors totaling 26 ufd, heavy duty bleeders and ten 3 amp, 1000 V power rectifiers give a stiff 2700 volts fully loaded.

Some competing high priced amplifiers using ***two*** 3-500Zs *can't* give you much more power output than the AL-80A. Why? Because their lightweight power supplies can't deliver enough high voltage for the tubes.

Step-Start Inrush Protection™

When you first turn on your amplifier, a massive inrush current flows.

Your house lights flicker as you hear a loud "thump" from your amplifier. This terrible inrush current stresses *all* your power supply components to their limits. Your cold tube filament suffers abusive thermal shock.

Eventually, this massive inrush current will damage your amplifier.

The AL-80A special ***Step-Start Inrush Protection™*** *stops* damaging inrush current.

By starting your AL-80A through a 10 ohm current limiting resistor, then shorting the resistor with a relay, the AL-80A gives you a start up sequence that is ***easy*** on your tube and power supply components.

Don't consider a linear amplifier without this

Multi-Voltage Primary protects your amplifier and gives you peak performance

Too high a line voltage stresses components and causes them to wear out and fail. Too low line voltage causes a "soft-tube" effect -- low output and signal distortion.

The Multi-Voltage Primary in the AL-80A transformer lets you compensate for too high or too low line voltage.

With the AL-80A you get the longest component life and peak operating efficiency -- regardless of your line voltage.

Before you buy an amplifier make sure it has a multi-voltage primary.

Dual Illuminated Meters

Two large meters give you a complete picture of the operating condition of your AL-80A. They let you know right away if there is a problem.

Grid current of the 3-500Z is monitored continuously by one meter. Grid Current indicates proper amplifier operation better than any other parameter.

You also get a multi-meter that measures plate voltage, plate current, ***peak*** RF watts output and drive power/ALC detector voltage.

Comes completely factory built, tested and guaranteed to work . . . *. . . not a kit you have to build*

You get a full kilowatt right out of the box -- ready to plug in and bust through QRM in minutes.

A kit could actually end up costing you more than your best price on the AL-80A -- and leave you frustrated if you can't get it to work.

A factory built AL-80A has much higher resale and trade-in value than a kit. Why? Because Ameritron's reputation for consistent quality and workmanship is known by hams everywhere.

Two Year Warranty: Twice the protection of our nearest competitor

No other kilowatt amplifier on the market comes with a 2 year warranty. In the unlikely event that there are defects in materials or workmanship, we'll fix it free for 2 years from the date of purchase.

The 3-500Z is covered by the tube manufacturer's warranty.

Ameritron gives you . . . a full Kilowatt from a *quiet desktop* linear . . . for $995

Committment to Service

Even after the 2 year warranty period, Ameritron Customer Service Technicians are available to help you keep your AL-80A performing flawlessly -- no matter how long you have it. Just call 419-531-3024.

Call your dealer today

Bust through QRM with a full kilowatt from the Ameritron AL-80A -- right out of the box. Call your favorite dealer for your *best* price and order today!

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The optional Ameritron PIN-5 QSK switch gives you lightning fast T/R switching for full CW break-in, AMTOR, Packet and other QSK modes for only $189.50.

It lets you switch the legal limit in microseconds into 2:1 VSWR loads with less than 0.5 dB receive attenuation.

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CIRCLE 12 ON READER SERVICE CARD

Sometimes there is an easy and a hard way to do something. As AA4DJ relates, the hard way can be right out of a Clint Eastwood movie.

Coaxial Cable Cover and Concealment

BY LARRY HILL*, AA4DJ

Occasionally, for reasons of personal pride or spousal pressure, amateurs find it appropriate to conceal the coaxial cable which runs from antenna to radio. If this cable can be brought through an exterior wall immediately behind the rig, it usually never gets far enough into the room to show, and hiding it is not a problem. Sometimes, however, it is necessary to place the station against an interior wall. No problem for the innovative amateur.

One approach is to drop the cable through a hole in the ceiling and disguise it with plants and QSL cards. Or, if there is access to the space beneath the floor (and you don't mind crawling around in the stuff which tends to accumulate there), the cable can be brought up through a hold drilled in the floor. While these methods are certainly adequate, they both require holes in unusual places and seem to lack a certain finesse. A more refined method involves dropping the coax down inside the wall directly behind the station. This is obviously a more conventional solution. After all, that's where house wiring is normally hidden, and the people who do that must know something.

The problem arises when the wall in question has a horizontal section of 2 × 4 between the studs. This cross piece is usually about 4 feet above the floor and effectively blocks passage of the coax down from the attic. Feeding cable into the wall from above merely generates a coax pile about half way down–not low enough for an appropriate exit behind the rig. Two solutions to this particular problem are found below. Read them both before you decide which to use. The first approach, while considerably more direct,

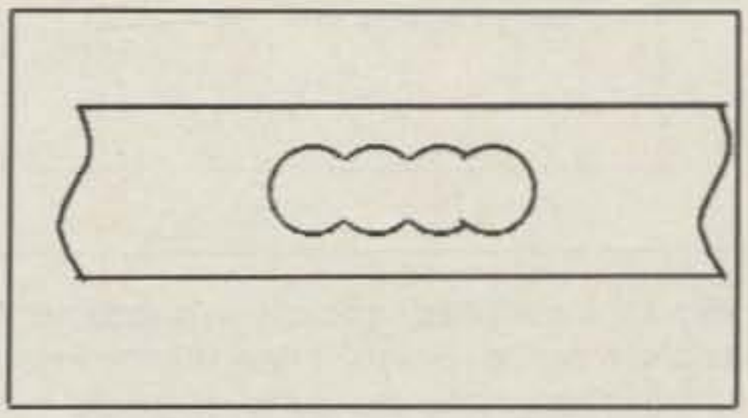

Fig. 1 - Slot from overlapping holes.

would not usually be appreciated by a spouse, landlord, or downstairs neighbor.

A fellow amateur explained the following approach to me some time ago. He swore it was true. For purposes of clarity, the active individual in this story needs a name; for purposes of charity, he should remain anonymous. We'll call him Joe.

Joe was faced with the dilemma outlined above. He already had his antenna in place in the trees outside and had been stringing the coax in through the window and across the room when he wanted to operate—an entirely unsatisfactory situation. He decided to bring the antenna lead down inside the wall to his rig.

At first this seemed like a relatively straightforward effort to Joe, and like many of us he was anxious to complete the project and get back on the air. He routed the coax under the eve of his house and into his attic and then cut a small hole in the wall directly behind his rig. That was the easy part. So far, so good.

Joe carried his handy cordless drill into the attic, drilled a hole in the top plate (the horizontal 2 × 4 across the top of the studs) of the wall behind his rig, and fed the coax down into the wall. This is when he first noticed the problem. The coax didn't emerge anywhere near the exit hole he had cut behind his rig. It didn't emerge at all. It had encountered the cross piece mentioned above.

Joe was initially stymied, but after some thought he realized that he did indeed have a tool which made holes at a distance. He kept it on his closet shelf in the bedroom. It was his old .45 caliber service automatic. The more Joe considered the possibilities, the more it seemed like a quick solution to his problem. After all, he already had a hole in the wall for the lead to come out, and he knew his wife would not be happy about that unless it was being put to use, and maybe not even then). In any case, Joe loaded his pistol, carried it into the attic, and prepared to "drill" the offending 2 × 4. He put the muzzle into the hold he had drilled earlier and positioned it as nearly plumb and parallel to the wall as he could. At this point, if not before, Joe should have been having severe second thoughts, but he was committed (or should have been). In any case, he gritted his teeth, pulled the trigger, and received several unpleasant surprises in quick succession.

Let's pause a moment and reflect on the activity which followed. Joe had never before fired a pistol from this strange position (a semi-squat), and the recoil pushed him off balance. In an effort to remain upright, he straightened his legs, whacked his head against the rafters, and fell backward into the insulation. He put his hand down in an attempt to break his fall, poked a hold in the hall ceiling, and collected an assortment of bruises from the ceiling joists on which he landed.

The gunshot in his quiet house and the hand protruding from the ceiling sent his wife into hysterics. Neighbors asked, "What the hell was that noise?!" and rushed to his house. Joe had just decided that maybe a little more thought would have been appropriate when the neighbors arrived to help extricate his hand from the ceiling. This project, and the planning which went into it, gave Joe an unusual reputation among his friends.

Actually, after everyone calmed down,

*3306 Panorama Drive, Huntsville, AL 35801

the procedure was a (very) qualified success. Joe had no trouble routing his coax down to the rig, since the expanding gases from the pistol had blown the sheetrock and paneling off both sides of the wall behind his rig. And since the slug didn't stop after puncturing the cross piece, he also gained access to the crawl space below the wall (remember the earlier reservation concerning downstairs neighbors?). This whole exercise was basically exciting, but more trouble than Joe had planned for—and certainly more than his wife was willing to endure calmly.

Unless this kind of thrill appeals to you, try the technique which follows. It is considerably less exciting and in the full scheme of things not as time consuming and expensive.

First acquire a brace and bit set, and an extra 1 inch bit. These tools are perfect for this task, since they make relatively large holes and don't require power—ideal for most attics. Take the extra 1 inch bit down to your friendly, local welding shop and have them weld a 4 foot piece of appropriately sized drill rod to the bit's shank. This is not an especially expensive operation (I paid about $12) and enables you to drill through that aggravating piece of 2 × 4 nicely.

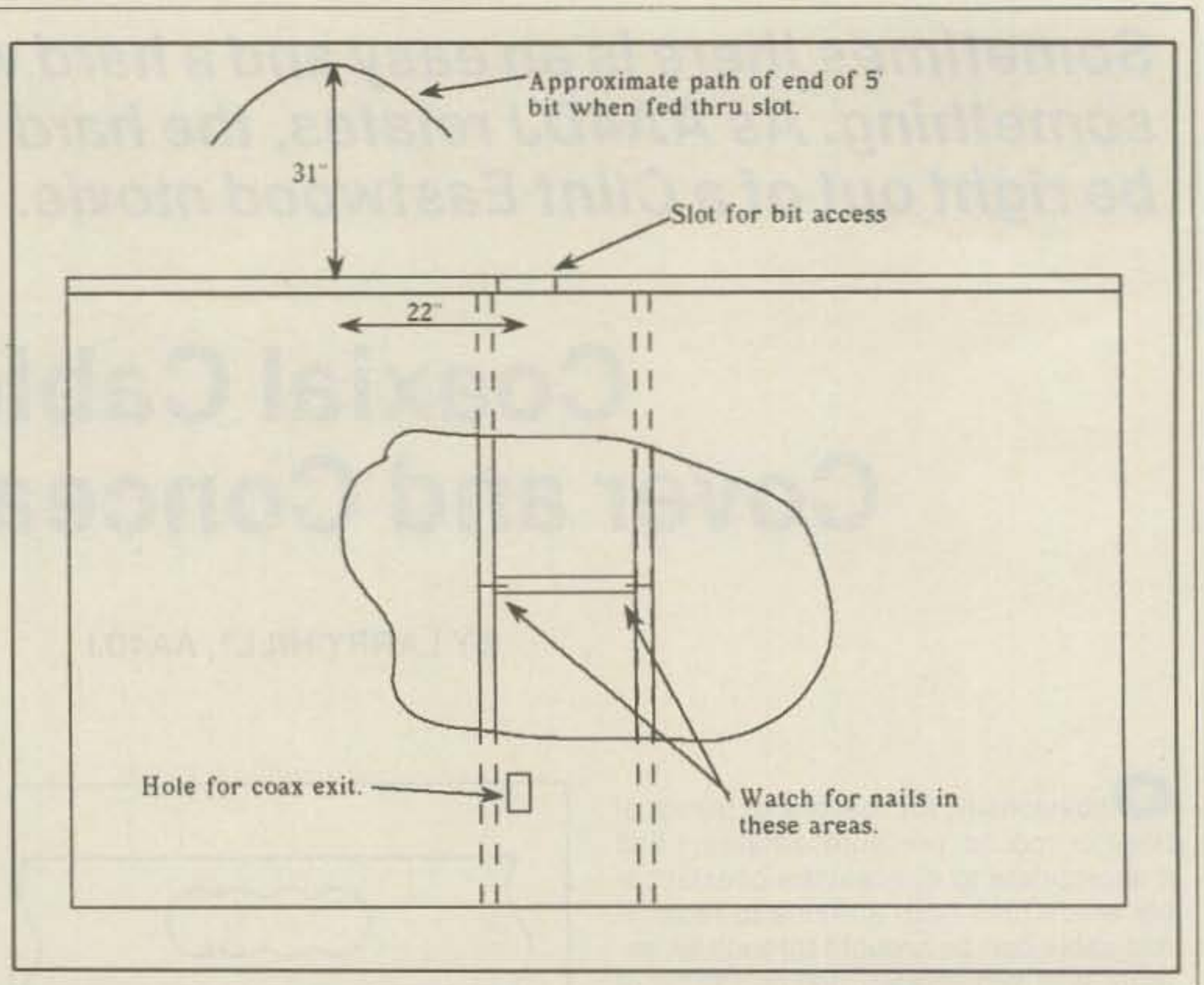

Fig. 2- A 4 foot added section produces a bit about 5 feet long. This can be shortened slightly, but not much. It needs to be at least 4 feet (to reach the cross piece), plus 2 inches (through the cross piece), plus 2 inches (through the top plate), plus 2 inches (for the brace to grab), plus about 4 inches (to clear any obstructions in the attic, although the brace has a ratchet function to help solve this difficulty). A total of 4 feet, 10 inches. As shown above, it requires surprisingly little clearance for a 5 foot bit. The figure is based on a 16 inch spacing between studs. If your studs are on 24 inch centers, the required clearance is considerably smaller.

Run the coax into the attic (you'll have to work this part out for yourself) and take the brace, extended bit, and another slightly larger bit into the attic with you. Brush the insulation aside to uncover the top plate of the wall and locate the correct spot to drill. Since there is rarely enough vertical clearance to permit the extended bit to drill through the top plate, use the other bit to drill a clearance slot. Drill three or four holes in line and slightly overlapping in the header where you expect to lower the coax (see fig. 1). This produces a slot and allows the insertion of the extended bit at an angle (see fig. 2). The clearance required for the insertion of the extended bit is obviously the reason why this process can't be used on an exterior wall—the roof is too close to the top of the wall.

All that remains to be done is to drill the necessary holes in the cross piece and thread the antenna lead through both holes. Don't drill too close to either of the wall joists to avoid the nails used to hold the cross piece in place (see fig. 2 again). I found a flashlight and a small, straight stick (long enough to reach the cross piece) useful for this. Lightly tape the coax to the stick, and using the flashlight to help aim, feed the end through the hole in the cross piece and work the stick loose. While working around the hole you drilled in the top plate, take care not to drop anything into the wall. It will be tough to retrieve without making your room look like Joe's. After the coax is in place, cover the hole with cardboard and replace the insulation brushed away earlier.

The easiest conclusion at this point is to pull the coax out a hole behind the rig. If that seems too crude, try this. Mount the necessary threaded 259-type feedthroughs on a piece of reasonable thick (⅛ inch or so) aluminum and mount this plate over the hole you cut for the coax. Using PL-259s connect the antenna leads to one side and the rig to the other—much neater.

One final, hopeful comment. The cross piece is generally called a "firebreak" and is designed to break up the chimney effect of the space between the framing studs in the event of fire. This construction technique (with the cross piece) is becoming obsolete. If your house is relatively new, it may have been built without this cross piece, and you may not have any trouble routing the coax. If you do decide you need to have an extended bit made, let the other area amateurs know about it. It could be useful to them, too.

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CQ REVIEWS:

The Commander HF-2500 HF Amplifier

BY LEW McCOY*, W1ICP

There is one thing I really appreciate whenever it comes to reviewing a product, and it is best described by a single word—rugged. If ever I reviewed a piece of equipment that fits this word, it is the new Commander HF-2500 linear amplifier manufactured by Command Technologies. You'll see why I say this as we go through the review.

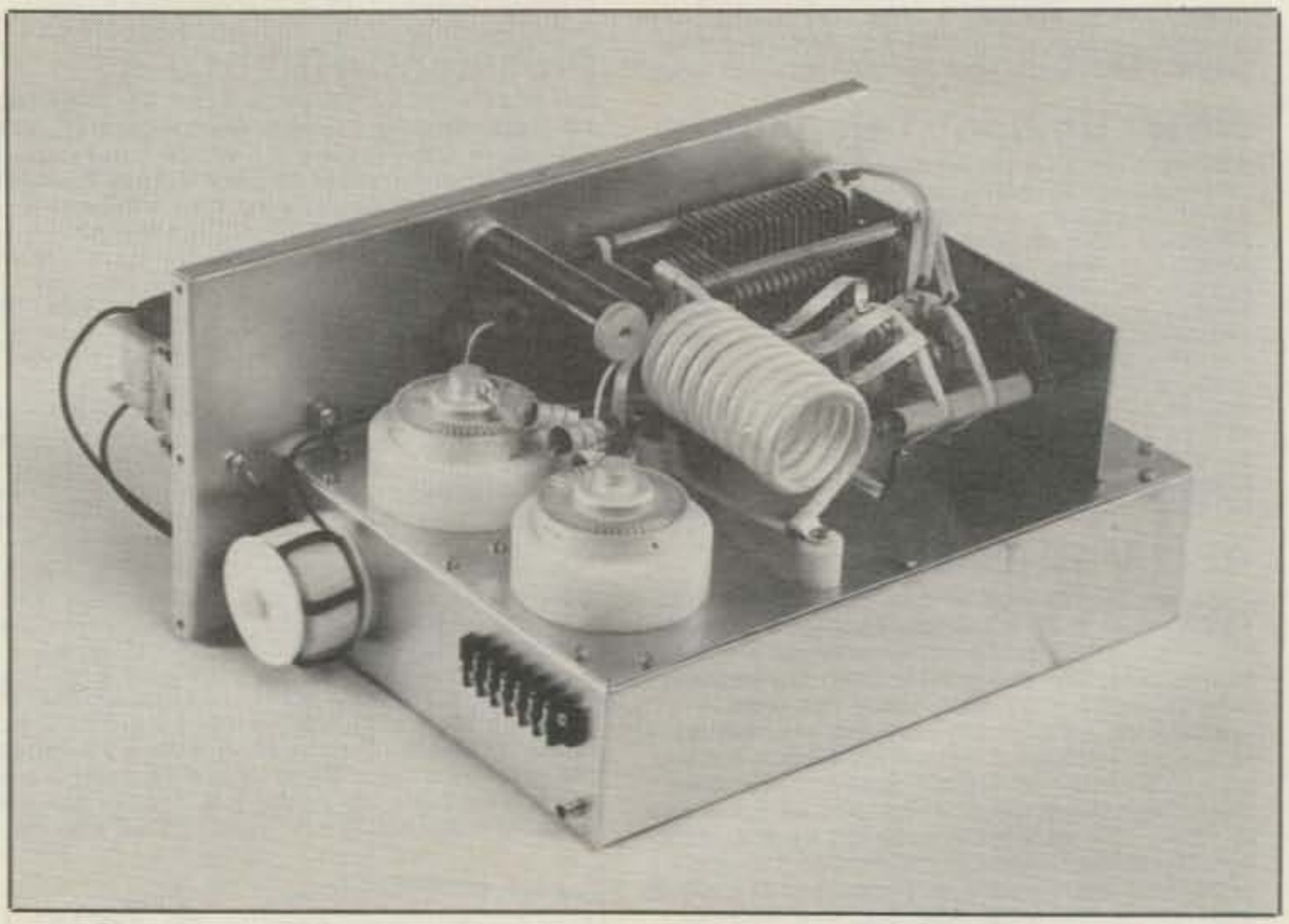
Basically, the HF-2500 is a full-legal-power (1500 watts), grounded-grid linear amplifier covering 160, 80, 40, 20, and 15 meters, and a slight modification will put it on 10 or 12 meters. However, you must send a copy of your license before Command Technologies will provide the information.

Why do I use the term *rugged*? Simple. The amplifier uses a pair (that's right, a pair) of 3CX800A7 tubes. This provides a total plate dissipation of 1600 watts. You can run 1500 watts output, key down, as long as you desire.

The amplifier is completely self-contained, weighing in at 75 pounds (it gets in just under the UPS and Federal Express shipping requirements). It measures 17″ × 16″ × 7¾″. A single switched meter is used to measure plate voltage, plate current, or grid current. The normal drive power required is 50 to 80 watts for a full 1500 watts output, in any mode desired. Fig. 1 is the circuit diagram of the amplifier. However, while not shown, there are RF bypass capacitors on the timer circuit and in other spots where needed.

In fig. 1 note the input circuit with capacitors C28 through C32, which is a tuned network on each band. These tuned input circuits are L-C-L or "T" impedance matching networks with a design "Q" of 5. These circuits reduce intermodulation components plus permit "tailoring" the output of any exciter to the cathode input of two 3CX800s; more about this later. The capacitors are adjustable from the rear panel of the amplifier. The front-panel bandswitch selects the proper tuned circuit. Also, a negative going adjustable ALC circuit is built in which can be used to limit the output of the amplifier.

This is the front-panel view of the HF-2500. At the upper left is the band switch. To the right are the TUNE and LOAD controls. There are two lights, one indicating AC power is on (green) and another showing you are in the transmit mode (red). The OPERATE-STANDBY switch is also an exciter-only switch. In the standby position the exciter is connected straight through to the antenna.



This the final amplifier deck showing the tank circuit. The toroid mounted on the rear is the 4 to 1 balun used to bring the 200 ohm tank output down to 50 ohms.

*Technical Editor, CQ, 200 Idaho St., Silver City, NM 88061

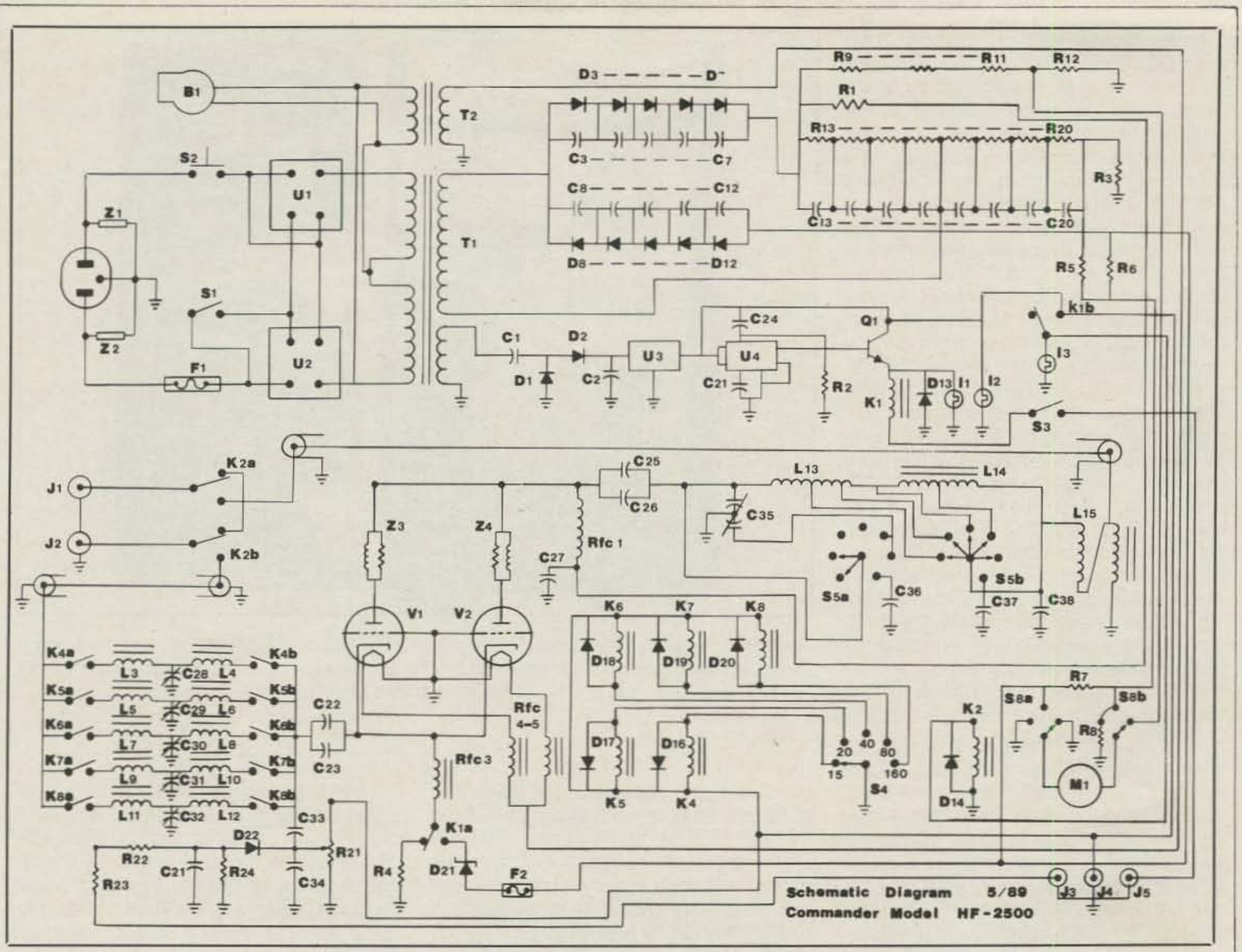


Fig. 1 - Circuit diagram of the HF-2500.

In addition, the ALC is adjustable from the rear panel.

On the plate side of the amplifier, the tank circuit consists of a pi variable network that converts the plate load of 1400 ohms down to 200 ohms. Two air variables and a switched inductor are used to accomplish the transformation. I might add here that the air variables are products of the Oren Elliott Corporation, a firm in Ohio which specializes in building high-quality variables and roller inductors.

The pi network is designed for a "Q" of 14, which provides excellent harmonic attenuation. Fifteen and 20 meters (and 10) are covered by L13, the large-diameter silver-plated inductor shown in the photos. A toroidal wound inductor, L14, covers 160, 80, and 40. In addition, a reactance tuned ferrite core provides a 4 to 1 impedance transformation for the pi from 200 ohms down to 50 ohms. This also provides additional harmonic attenuation. Harmonics are down to a minimum of 50 to 60 dB, well above FCC requirements.

The bandswitch, S5A and B, is an extremely well-constructed unit easily capable of handling high RF voltages (it is rated at 7000 volts). Everything about the final amplifier construction and quality is really first class, as evidenced by the photos.

Of course, one of the important points about any amplifier is its power supply. Don't forget—in fact, *don't ever forget*—that this is no 12 or 24 volt supply. **The voltages and currents in any amplifier using high-voltage triodes or tetrodes can be lethal.** We have acquired countless new amateurs in the last few years who were introduced to amateur radio via the 12 volt, solid-state route, and believe me, it is easy to become careless when all you have dealt with are such low voltages.

The power supply in the HF-2500 is operated from 220 volts AC at 20 amperes, a little story in itself as far as I am concerned. My house has no 200 volt wiring, so I ran a 200 volt line to the shack in order to do the review on this unit. The amplifier I was using was running on 120 volts, but had an arrangement whereby I could change some jumpers and the amplifier would work on 220. I hooked it up, but the darned thing wouldn't come on, resulting in my troubleshooting the wiring for a full day. I finally had the sense to put a voltmeter across each side of the AC outlet to ground and found 120 volts on each side. I was stumped until I put the voltmeter across both of the hot AC leads. Instead of 240 I had 0 volts. I quickly realized I had wired both sides of the line to one side of my 220 input at the fuse box! Talk about feeling stupid!

As I said, the HF-2500 uses 220 volts. The primary of the transformer is switched on by sold-state relays U1 and U2. These relays conduct when the phase angle of the power line voltage equals zero degrees. This minimizes surge currents while the filter banks, C13 through C20, charge. A front-panel switch is used to turn the relays on and off.

The secondary of the high-voltage transformer is 900 volts AC and is fed to a

voltage doubler with a resulting 2650 volts DC. The metering of the plate and grid currents is accomplished by shunt resistors R5, R6, and R7 located in the negative return of the tube cathodes. Plate voltage metering is accomplished by use of the resistor multiplier network (R9, R10, and R11) located in the B+ line. A 50 ohm, 50 watt resistor wired in series with the tube plates limits the current in the event of an arc within the internal structure of the tubes. Relay K1A controls the bias of V1 and V2 during transmit and standby modes. During transmit a zener diode, D21, is in series with the B– supply voltage and tube cathodes, establishing bias for Class AB2 operation.

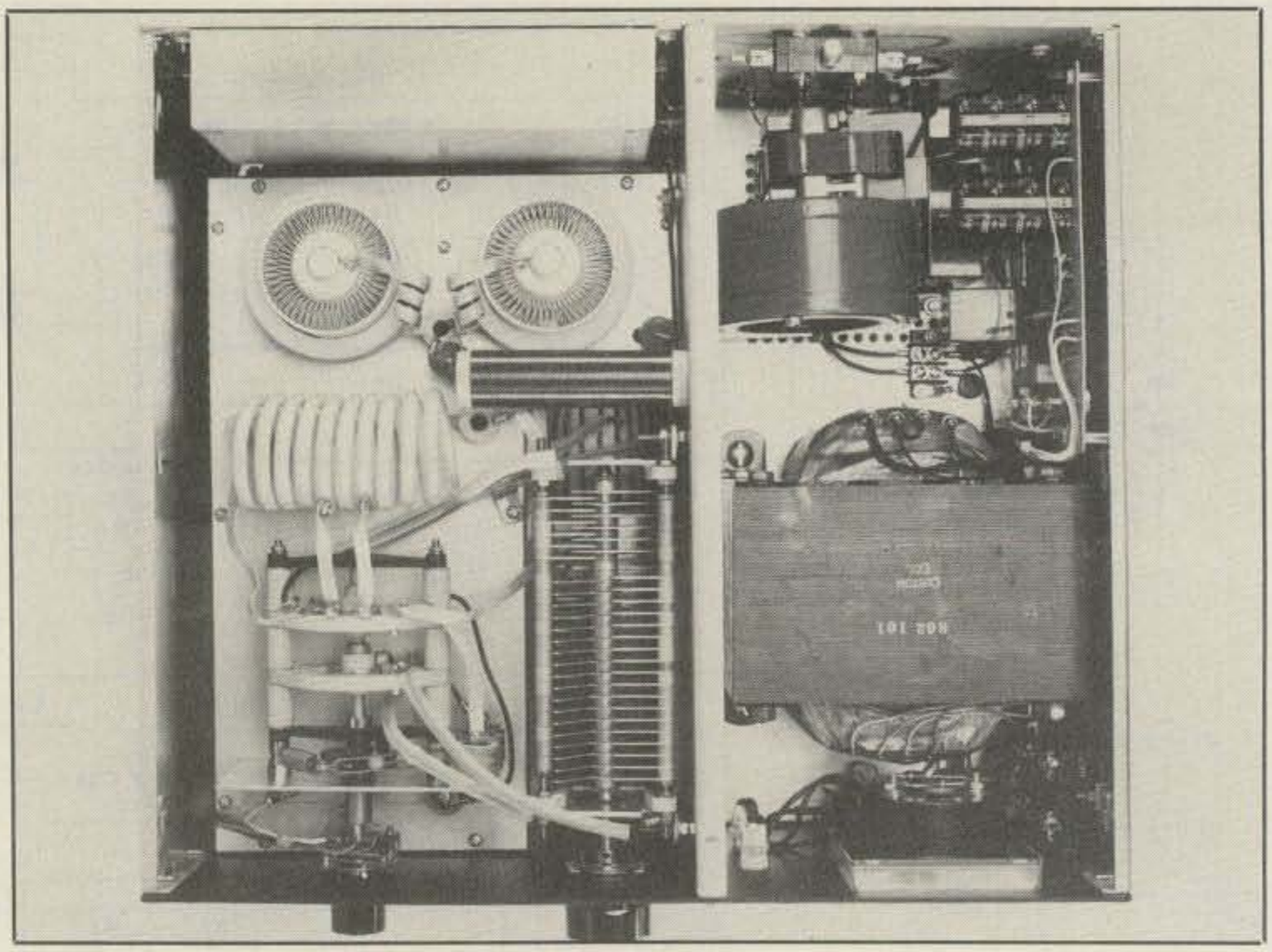
Another winding on the power transformer provides 6.3 volts, which is used in a voltage doubler to produce 17.8 VDC, which is then passed on the input of a 12 volt regulator (U3). A 555 IC timer (U4) provides a 2 minute delay before Q1 turns on. This 2 minute delay provides adequate warm-up time for the cathodes of V1 and V2. Relay K1 is activated by shorting rear-panel jack J3 (key), which places the amplifier in the transmit mode. A Dayton 50 cubic feet per minute blower (which is pressurized) is used to cool the tubes.

While the tank circuit is adjustable, the manufacturer recommends operating into loads of no greater than a 2 to 1 SWR, at least at maximum powers. I also highly recommend this procedure simply because with 1500 watts and the high RF voltages developed, it isn't very smart to run with a high SWR and the corresponding high RF voltages you could develop.

The tubes used in this amplifier, the 3CX800s, are very high gain, and as I have heard, rather "touchy." One acid test for amplifier stability is to remove all drive but leave the plate voltage on and then adjust the loading and tuning controls to see if the amplifier "takes off" (self-oscillation) on its own. I did this on all the bands and found complete stability, which I consider a real credit to the designer.

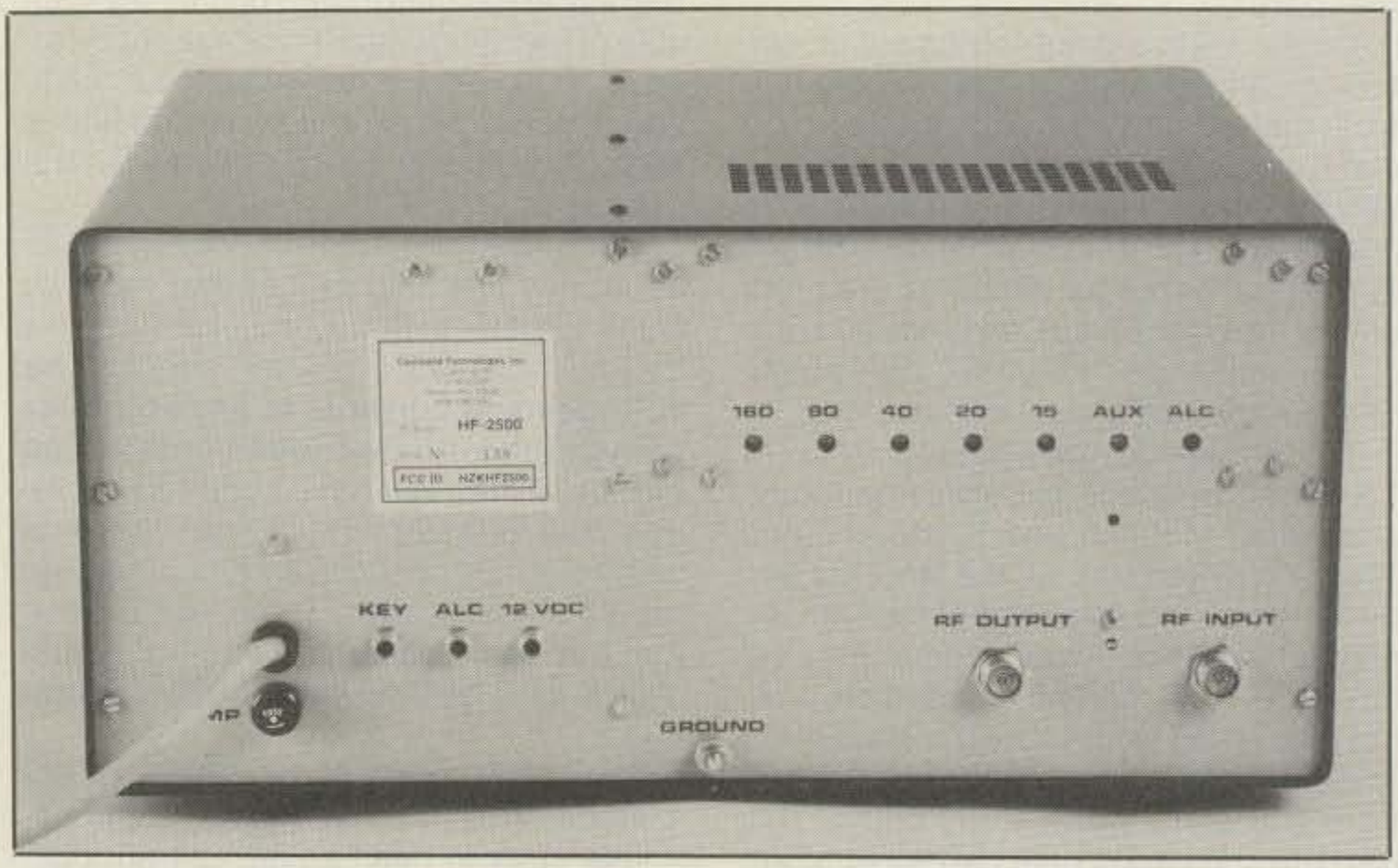
Voltage regulation is also excellent, from key up to key down. Full 1500 watts output, the voltage drops approximately 200 volts. The AC input line is fused with a 15 amp, rear-cabinet-mounted unit. I blew this fuse on my initial tune-up, but never after that. I frankly don't know why. There is also a safety interlock switch on the rear wall that is activated when the top cover is removed. I feel that again I should warn any recently licensed amateur that the voltages in this or any tube-type amplifier are very lethal. As I stated, many newcomers have joined the amateur radio ranks since the advent of solid-state, and some solid-state amplifiers operate on relatively low, non-lethal voltages. Make sure that every precaution is used when using a tube-type amplifier.

My exciter (transceiver) is a modern solid-state unit capable of 100 watts output into a 50 ohm load. When I first tried the HF-2500, I found I had difficulty reaching the rated output figures on a few bands. I naturally assumed I had plenty of drive, but I was wrong. There was enough of a mismatch between the transceiver and the amplifier that the transceiver was tending to shut down. I realized that I needed to adjust the trimmers, C28 through C32 (fig. 1), that were on the input circuits.



Here is the view looking down into the amplifier. The box mounted on the rear wall contains the tunable circuits for the input. At the right are the power transformer and some of the associated circuits.

First I loaded up on 10 meters and could only get 100 watts output. I noted I didn't have much apparent grid drive, so I adjusted the trimmer capacitor on the input circuit. It was rather amazing to see the drive go up and the output zoom up to 2 kw (into the dummy load, of course). This brought me back to the old cliche "When all else fails, read the instruction manual!" The grid meter is shunted to read 100 ma at full scale, but the two tubes are rated at 120 ma, so you have



This is the rear view of the HF-2500. Along the upper right are the adjustment access holes for the input circuits and ALC adjustment. At the lower left are the KEY, ALC input, and an auxiliary 12 VDC output.

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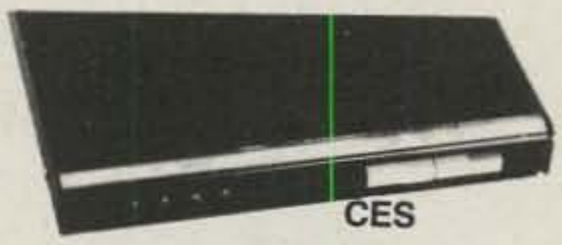

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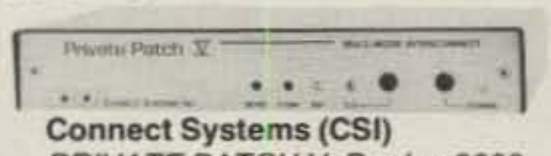

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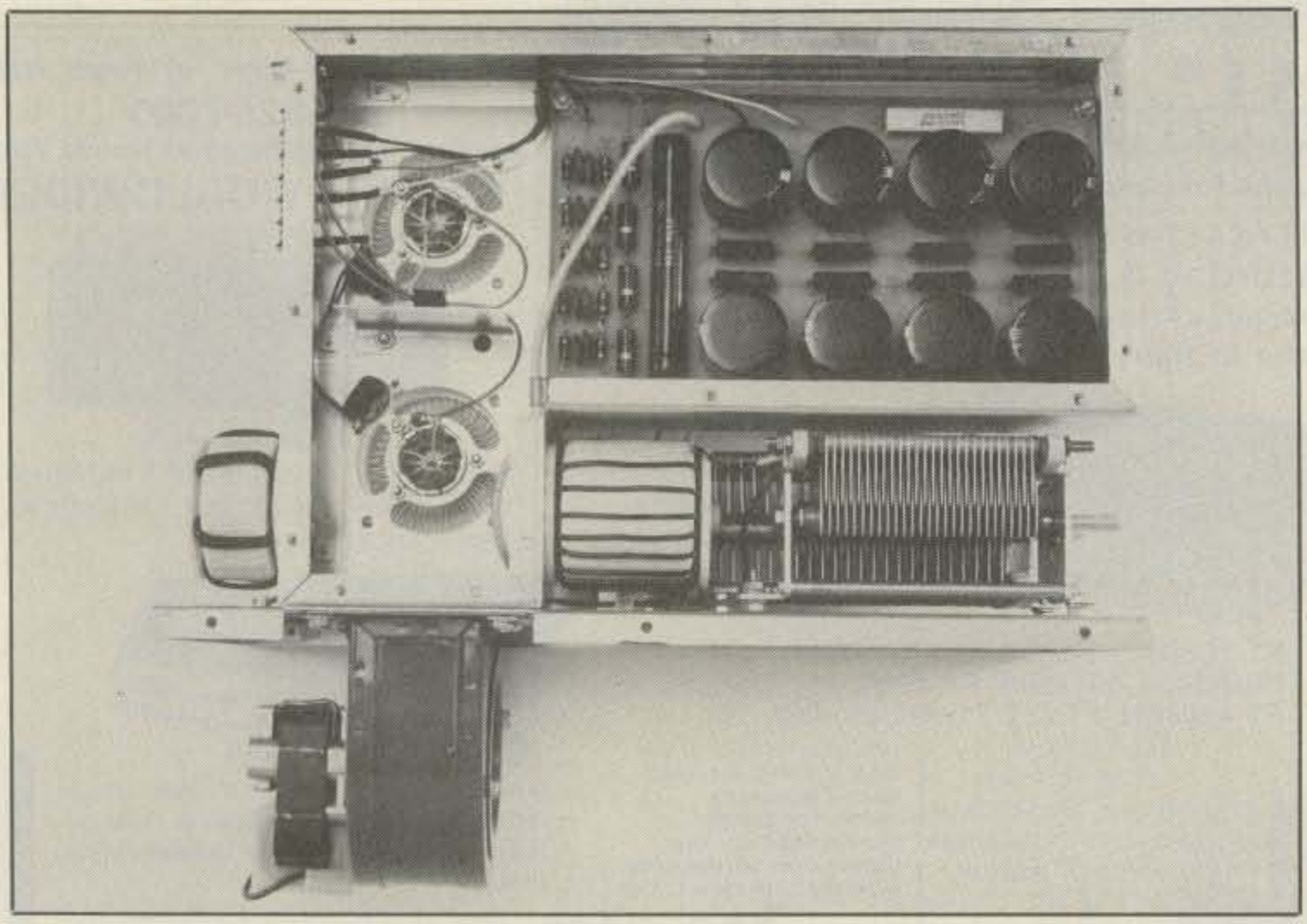

Bottom view of the RF deck. At the upper right is the power supply capacitor deck. To the right of the lower tube is the inductor for the low bands, 40 through 160 meters.

plenty of warning with the meter reading. About 40 to 60 ma of drive will provide 1500 watts output. In fact, I found that in operation I had to reduce the RF drive control on the exciter, actually permitting it to loaf along. Normally, with RTTY and AMTOR the exciter fan would come on to provide cooling. I found this didn't happen when I used the amplifier simply because the exciter was running at about half power to produce 1500 watts amplifier output.

I've mentioned the problems I had, and they were nearly all cockpit problems—failure to do what the manufacturer told me to do. I did have one other problem, and that was an RF arc (only one) and I attribute that to corona because of the high altitude at which I live—nearly 7000 feet above sea level.

The instruction manual is detailed and easy to read. There are plenty of cautionary notes in the manual. As I said earlier, this is no low-voltage amplifier, so all warnings should be heeded.

I tested the HF-2500 on all the bands, 160 through 10 meters. I used a Transmatch on everything below 40 meters and matched antennas on 20 and above. To repeat myself, tune-up is straightforward, and I might add, very easy to reach 1500 watts output. (I tested into a 4 kw dummy and I found I could go well over 2000 watts output!) Operating the amplifier was a real joy, and I would be less than honest if I didn't say the high power made a big difference in many of the contacts I made. Let's face it: amateur radio is a competitive hobby, and the difference in many QSOs is the ability to be heard.

Price of the HF-2500 is $2188. The amplifier is manufactured by Command Technologies, Inc. (no connection with the former Dentron Corp. or Amp Supply), 1117 W. High St., P.O. Box 939, Bryan, Ohio 43506 (1-800-736-0443). CQ

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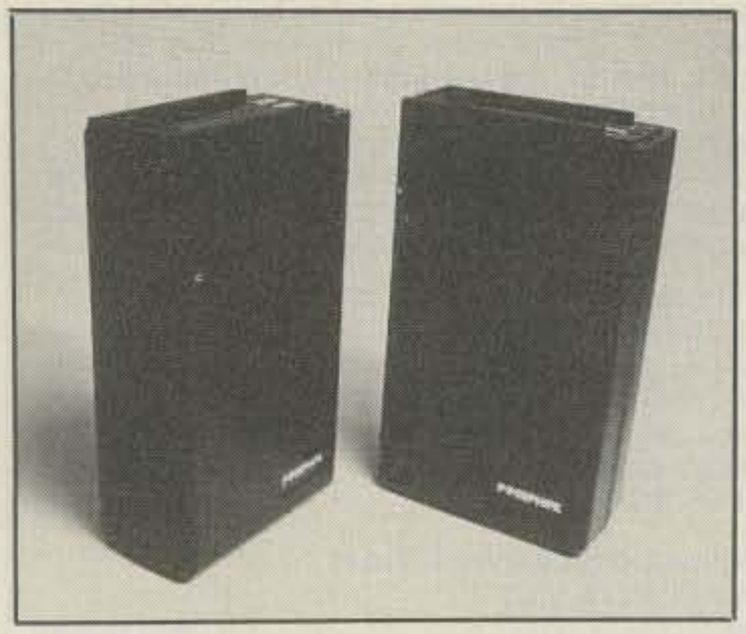
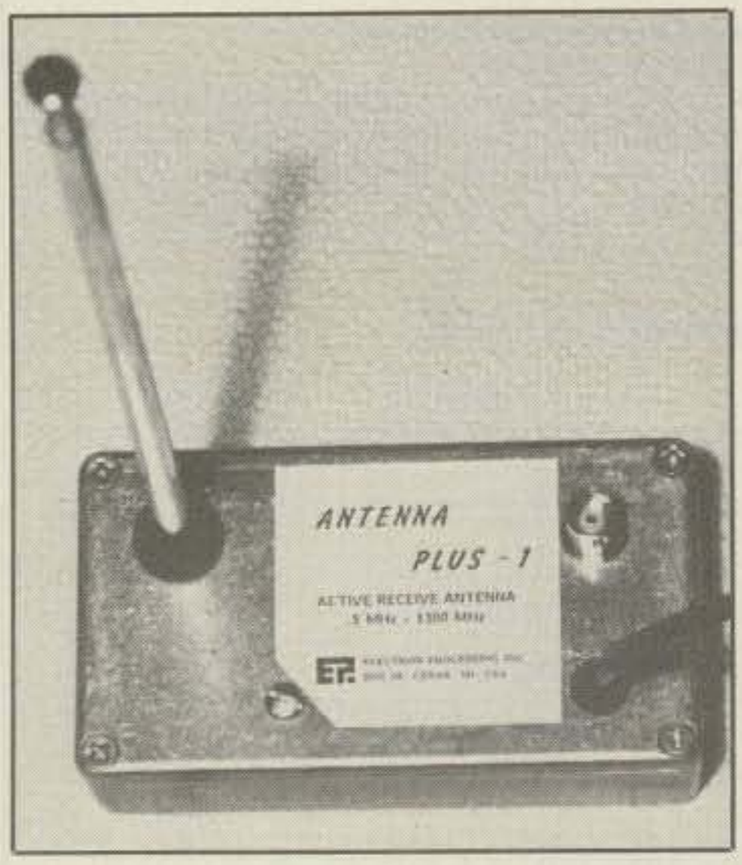


Periphex Battery Packs

Periphex has introduced two new battery packs for the Kenwood TH-25AT, TH-45AT, TH-55AT, and TH-75AT radios with 33% higher capacity than the original Kenwood products. The PB-7S provides 7.2 volts, 1400 mah, 2.5 watt output ($59); PB-8S provides 12 volts, 800 mah, 5 watt output ($59). The PB-7S may be charged with the wall charger or BC-10 or BC-11 desk charger, while the PB-8S may be charged with the BC-10 or BC-11 only. Both packs are 4 inches high and will fit into the carrying case designed for the PB-7. All battery packs are manufactured using computer matched cells and include overcharge, overtemperature, short-circuit protection, and a one-year warranty.

For more information on these or other battery packs, contact Periphex, Inc., 149 Palmer Road, Southbury, CT 06488, or circle number 108 on the reader service card.

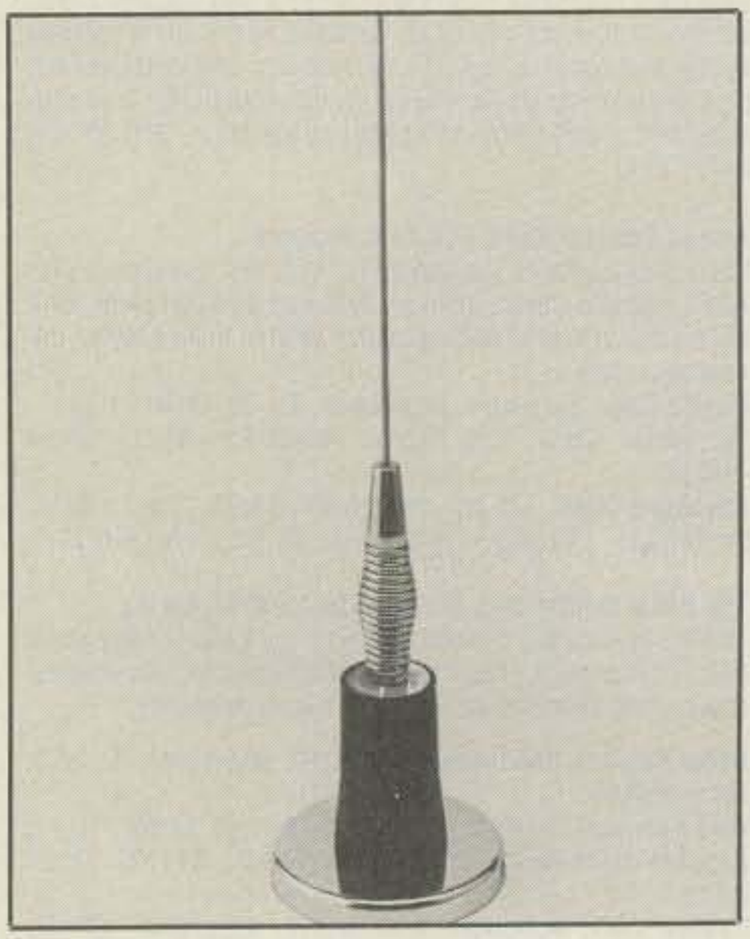


Electron Processing Desktop Receiving Antenna

Electron Processing has announced a new receiving antenna that is designed to sit on any convenient surface near your receiver. The Antenna Plus-1 provides reception from shortwave through scanner frequencies, including FM and TV.

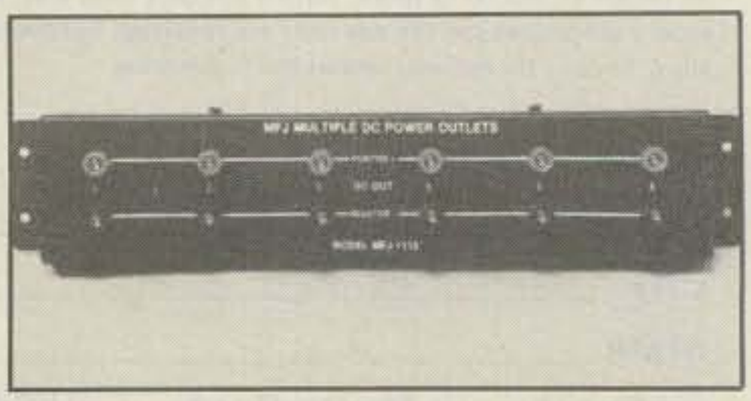
The antenna's compact size (36 inch telescoping whip), rugged construction, and unobtrusive styling allow this antenna to bring in distant stations without creating an eyesore. The internal amplifier guarantees peak performance from 500 kHz to 1300 MHz, maker says. The Antenna Plus-1 is available with choices of BNC, F, SO239 (UHF), and N connectors. The antenna is powered by standard 115 VAC with 12 volt DC and 220 volt Europower also available. A version with a built-in antenna splitter and second output jack is also available.

Pricing starts at $89.95 for the standard model and $109.95 for the dual output model. For additional information, contact Electron Processing, Inc., P.O. Box 68, Cedar, MI 49621, or circle number 103 on the reader service card.



Cushcraft CS28M Magmount Antenna

The CS28M magmount antenna is a new adaptation of the Cushcraft/Signals mobile antennas. The antenna comes with a 49 inch stainless steel whip and spring, a standard ¾ inch (brass base), 90 pound pull, chrome-plated magnet, mylar pad, and 15 feet of quality RG58AU with PL259 connector. For more information, contact Cushcraft Corp., P.O. Box 4680, 48 Perimeter Road, Manchester, NH 03108, or circle number 102 on the reader service card.



MFJ-1112 Multiple DC Outlet

MFJ Enterprises, Inc. has announced the MFJ-1112 Multiple DC Power Outlet. It gives six pairs of heavy-duty binding posts for connecting accessories, and connects directly to a 12 VDC power supply. RF bypassing keeps

RF out of the power supply from the DX line outlet. The black aluminum cabinet measures 13½" × 2¾" × 2½". The MFJ-1112 sells for $24.95 and includes MFJ's one-year guarantee.

For more information contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762, or circle number 104 on the reader service card.

Heil Sound Dual-10 Microphone

The Dual-10 microphone contains both the Heil HC-5 and HC-4 key elements. A tiny bat handled switch located above the push-to-talk slide switch on the Dual-10 allows the operator to select either the full response HC-5 for normal ragchew contacts or the HC-4 for the DX pileups. The Dual-10 is shown here mounted on the MA-1 boom assembly for hands-free operation.

Retail price for the Heil Dual-10 microphone is $119.95. The MA-1 is $49.95. For more information, contact Heil Sound, Ltd., 2 Heil Drive, Marissa, IL 62257, or circle number 109 on the reader service card.

Engineering Consulting Digital Voice Recorder

Engineering Consulting has announced a digital voice record and playback board for the ham shack and the Ultra Com Shack 64. It features 1 megabyte of RAM that can record and store up to 60 seconds of high-quality speech. It can be used as a stand-alone accessory to the ham shack or as an add-on option for any repeater. When used with the Ultra Com Shack 64 the DVM provides ID tail messages, mailbox functions, and an automatic beacon mode. All functions can be controlled from touchtone commands directly from the latest version 8.02 software. Digital recordings can be made directly from your HT or mobile in the field. Commands provide auto CQ, and auto tail message record and playback and digital tail ON/OFF control. The versatile PK8 option board provides all record and playback control and provides end-of-message detection.

When used in the local mode the DVM can select up to 16 individual messages. Record playback and reset buttons provide local control. The DVM includes a microphone input jack and a 1 watt speaker audio amplifier and output jack, and a volume control. The unit measures 4½" × 4½" and operates directly from 9 to 16 volts with a standby current drain of 20 ma. It is supplied wired and tested and interface instructions are supplied for connecting the board directly to the Ultra Com Shack 64 via the PK8. The Model DVM is available for $179.95 plus $4.00 shipping from Engineering Consulting, 583 Candlewood St., Brea, CA 92621, or for more information, circle number 101 on the reader service card.

CQ World-Wide WPX CW Contest All-Time Records

The contest is held each year on the last full weekend of May. The All-Time Records will be updated and published annually. Data following the calls below are: year of operation, total score, and number of prefix multipliers.

BY STEVE BOLIA, N8BJQ

WORLD RECORD HOLDERS

Single Operator

1.8	UP3BP/UF('85)	125,240	101
3.5	YX3A('89)	1,004,060	305
7.0	VP2VCW('86)	4,641,120	586
14	YY5A('88)	4,085,127	639
21	FS5T('89)	4,552,470	702
28	CE3DNP('89)	2,857,038	582
AB	V27T('89)	9,408,672	819

Multi-Operator Single Transmitter

	KP2A('89)	12,843,135	835

Multi-Operator Multi-Transmitter

	UP4A('88)	16,204,961	1013

U.S.A. RECORD HOLDERS

Single Operator

1.8	K5UR('85)	13,668	102
3.5	K5NA/2('86)	197,856	216
7.0	N5RZ('85)	1,754,664	452
14	K2VV('86)	2,525,880	582
21	K6LL/7('88)	2,163,388	557
28	N5RZ('89)	162,134	259
AB	KT3Y('88)	4,079,036	611

Multi-Operator Single Transmitter

	N4WW('88)	5,593,772	698

Multi-Operator Multi-Transmitter

	NSØZ('88)	10,870,380	922

CLUB RECORD

North Texas Contest Club('87) 62,727,586

WPX (Prefix) RECORD

UP4A('88) 1,013

QRPp RECORD

4X4UH('82) 1,028,904

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	ZS6BCR('85)	20	5
3.5	EA8RL('84)	453,456	201
7.0	G3GJQ/5N('89)	813,610	295
14	EL2AV('82)	906,840	330
21	5Z4CS('82)	2,104,245	429
28	ZS6BCR('89)	2,168,411	497
AB	5L7T('87)	8,619,225	679

ASIA

1.8	UP3BP/UF('85)	125,240	101
3.5	UP2NK/UF('85)	701,012	221
7.0	UP2NK/UF('86)	2,084,880	365
14	UZ9FWR('86)	2,570,940	540
21	4Z9FDB('89)	2,501,330	542
28	4X4UH('81)	1,081,262	338
AB	P3AA('89)	8,951,600	695

EUROPE

1.8	UA2FF('87)	117,424	134
3.5	CT5AT('86)	697,248	324
7.0	DF9ZP('85)	1,998,372	482
14	LZ5A('89)	3,066,120	680
21	4N4A('88)	2,585,460	615
28	9H1EL('88)	805,552	398
AB	YZ4GD('85)	3,554,460	651

Multi-Operator Single Transmitter

AF	5H1HK('89)	7,010,392	646
AS	RL1P('88)	8,156,016	792
EU	HG9R('89)	9,957,368	872
NA	KP2A('89)	12,843,135	835
OC	KH6XX('84)	4,646,859	553
SA	AZ8DQ('86)	6,964,584	682

NORTH AMERICA

1.8	VE3BMV('86)	43,428	77
3.5	HK3MAE/HKØ('87)	456,280	187
7.0	VP2VCW('86)	4,641,120	586
14	WC4E/KP4('86)	3,613,248	656
21	FS5T('89)	4,552,470	702
28	HI8JKA('89)	891,242	374
AB	V27T('89)	9,408,672	819

OCEANIA

1.8	KX6DC('88)	12,240	45
3.5	KX6DC('89)	258,258	143
7.0	T32AF('85)	1,249,176	276
14	ZL3GQ('89)	2,775,744	576
21	N7DF/WH2('89)	3,243,450	525
28	KG6DX('81)	1,238,806	334
AB	NH6J/NHØ('88)	4,484,760	532

SOUTH AMERICA

1.8	YV1OB('86)	11,550	35
3.5	YX3A('89)	1,004,060	305
7.0	YX5A('87)	2,999,977	479
14	YY5A('88)	4,085,127	639
21	9Y4VU('89)	3,986,512	656
28	CE3DNP('89)	2,857,038	582
AB	ZZ5EG('87)	7,228,440	690

Multi-Operator Multi-Transmitter

AF	EA9CE('84)	4,383,308	482
AS	JA2YKA('88)	6,776,352	713
EU	UP4A('88)	16,204,961	1013
NA	WL7E('88)	12,826,296	952
OC	KH6XX('85)	8,551,399	647
SA	LQ5A('89)	8,290,016	784

QRPp

AF	CN8FC('88)	194,616	204
AS	4X4UH('82)	1,028,904	344
EU	YU3BC('89)	710,448	361
NA	KA2AEV('89)	625,504	352
OC	FO8JP('86)	572,131	259
SA	OA8V('81)	444,768	246

MFJ 3 KW Roller Inductor Tuner

. . . lets you get your SWR down to *absolute* minimum for *maximum* power out -- something a tapped inductor tuner just can't do . . .

. . . plus you get a **peak reading** SWR/Wattmeter, 6-position antenna switch, balun for balanced lines and 1.8-30 MHz coverage . . . $269.95

- ***Easy-to-use 2-knob design***
- ***Covers 1.8-30 MHz***
- ***Peak and average Cross-needle meter***
- ***Differential capacitor***
- ***Roller inductor with 3-digits turns counter***
- ***Directional coupler***
- ***Current balun***
- ***Handles 3 KW PEP***

MFJ-986

$269.95

- *Made in U.S.A.*
- *1 year unconditional Guarantee*

MFJ's innovative new Differential-T™ Tuner uses a differential capacitor that makes tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only ***one*** setting.

The new MFJ-986 is a rugged no-compromise 3 KW PEP roller inductor antenna tuner that covers 1.8-30 MHz continuously, including 160 Meters, MARS and all the WARC bands. **The roller inductor lets you get your SWR down to the absolute minimum** -- something a tapped inductor tuner just can't do.

A 3-digits turns counter plus a spinner knob gives you precise inductance control -- so you can quickly return to your favorite frequency.

You get a lighted ***peak*** and average reading cross-needle meter that shows you SWR, forward and reflected power at a glance! A new directional coupler gives you even more accurate readings over a wider frequency range.

You get a 6-position antenna switch that lets you select two coax lines and/or random wires (direct or through tuner), balanced line and external dummy load.

A new **current** balun for balanced lines minimizes feedline radiation that causes field pattern distortion, TVI and RF in your shack. Ceramic feedthru insulators for balanced lines withstand high voltages and temperatures.

New Antenna Tuner Technology

MFJ brings you three innovations in antenna tuner technology: a new ***Differential-T***™ circuit simplifies tuning; a new ***directional coupler*** gives you more accurate SWR, forward and reflected power readings; and a new ***current balun*** reduces feedline radiation.

Differential-T Tuner™: A New Twist on a Proven Technology

By replacing the two variable capacitors with a single *differential capacitor*, you get a wide range T-network tuner with only ***two*** controls -- the differential capacitor and a roller inductor.

That's how you get the new MFJ Differential-T Tuner™ that makes tuning easier than ever, gives you minimum SWR at only one setting and has a broadband response that ends constant re-tuning. You'll spend your time QSOing instead of fooling with your tuner.

The compact 10¾ x 4½ x 15 inch cabinet has plenty of room to mount the silver-plated roller inductor away from metal surfaces for highest Q -- you get high efficiency and more power into your antenna.

The wide spaced air gap differential transmitting capacitor lets you run a full 3 KW PEP -- no worries about arcing.

A New Directional Coupler: Accurate SWR and Power Reading

MFJ's Cross-Needle SWR/Wattmeter gives you more accurate SWR and power readings over a wider frequency range with no frequency sensitive adjustments.

That's because MFJ's new directional coupler gives you up to an order of magnitude higher directivity and coupling factor than conventional circuits . . . ***plus*** it gives you a flat frequency response that requires **no** frequency compensation.

The cross-needle meter lets you read forward/reflected power in 2 ranges: 200/50 and 2000/500 watts. The meter lamp is front panel switched and uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

A switch lets you select peak or average power readings.

A New Current Balun: Reduces Feedline Radiation

Nearly all commercially built tuners use a ''voltage'' balun. A ''voltage'' balun forces the voltages to be equal on the two antenna halves. It minimizes unbalanced currents ***only*** if the antenna is perfectly balanced -- not the case with practical antennas.

The MFJ-986 uses a true **current balun** to force equal currents into the two antenna halves -- even if your antenna is not perfectly balanced -- so you get minimum unbalanced currents.

The *current* balun gives superior balance over the ''voltage'' balun.

Minimum unbalanced current reduces field pattern distortion -- which concentrates your power for a stronger signal -- ***plus*** it reduces TVI and RF in your shack caused by feedline radiation.

The MFJ-986 Differential-T Tuner™: Get *absolute minimum* SWR

Get the tuner that incorporates the latest innovations by the world's leader in antenna tuner technology.

See your dealer today for the new MFJ-986 Differential-T™ 3 KW Roller Inductor Tuner. You'll be glad you did!

Why Choose an MFJ Tuner?

Hard-earned Reputation: There's just no shortcut. *MFJ is a name you can trust* -- more hams trust MFJ tuners throughout the world than all other tuners combined.

Proven Reliabliity: *MFJ has made more tuners for more years than anyone else* -- with MFJ tuners you get a highly-developed product with proven reliability.

First Rate Performance: MFJ tuners have earned their reputation for being able to match just about anything -- *anywhere.*

One year *unconditional* guarantee: That means we will repair or replace your MFJ tuner (at our option) *no matter what* happens to it for a year.

Continuing Service: MFJ Customer Service Technicians are available to help you keep your MFJ tuner performing flawlessly -- no matter how long you have it -- just call 601-323-5869.

Your very best value: MFJ tuners give you the most for your money. Not only do you get a *proven* tuner at the lowest cost -- you also get a one year *unconditional* guarantee and *continuing* service. That's how MFJ became the world's leading tuner manufacturer -- by giving *you* your very best *value.*

Choose your MFJ tuner with confidence! You're getting proven performance and reliability from the most trusted name in antenna tuners. Don't settle for less. Get yours today!

MFJ

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Box 494, Miss. State, MS 39762
601-323-5869; **FAX:** (601) 323-6551

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MFJ . . . making quality affordable

Here's the story behind A61AD and A61AC showing up on the bands the end of last summer. WB2DND helped put a rare one on the air and aided in increasing the local amateur radio population.

A61AD—DXing in Arabia

BY DON GREENBAUM*, WB2DND

The United Arab Emirates, known to amateurs as A6, was formed in 1971 when six Arab states gained their independence from Great Britain (a seventh state joined in 1972). In the early 600s A.D. this area was ruled by chiefs of several tribes who adopted Islam as their religion. The region lay on one of the world's major trade routes, and over the next thousand years many European nations established trading posts in the area. Great Britain became the strongest power in the Gulf. During the 1700s Ras Al Khaimah and Sharjah became naval powers, began lucrative pearl fishing and trading activities and ruled the area, often fighting with the other Gulf tribes. In 1820 the British Forces destroyed the city of Ras Al Khaimah and forced all the states to sign truces forbidding war, and they became known as the Trucial States. Abu Dhabi and Dubai developed into major trading ports over the next hundred years. In 1958 oil was discovered in Abu Dhabi, in 1966 in Dubai, and in 1974 in Sharjah. Today oil production and trading are the primary economic engines for these three states, while agriculture and fishing remain the primary economic basis for the other four states: Ajman, Um Al Qaiwan Ras Al Khaimah, and Fujairah.

For over 100 years England controlled all foreign affairs, government, even communications, and issued amateur licenses under the MP4 prefix (all MP4 license holders were members of the British Forces). Before the 1960s, when oil production began, this region in Southwest Asia was one of the most undeveloped in the world. Most of the natives earned a living by fishing, trading, or date farming. Within twenty years the boom in oil transformed the region into a modern independent federation of seven states boasting one of the world's highest per capita incomes.

The hospitality of Saeed and everyone I met was so bountiful that it became a hindrance to my operating. On Saturday night we had dinner with (left to right) Saeed, A61AD, Dr. Hamden, A61AC, and Omar, YK1AO.

The United Arab Emirates has a population of 1.5 million, 80% now living in cities, and covers an area of 33 square miles along the eastern coast of the Arabian Peninsula in the Arabian Gulf. Each of the seven emirates is ruled by an emir who controls the internal political and economic affairs. The federal government controls foreign affairs, defense and economic development. It also issues amateur radio licenses. Since 1972 only four licenses have been issued, making the United Arab Emirates one of the rarest countries to work (number 16 on the *DX Magazine* 1989 most needed list).

In August 1989 I was invited to attend a computer show in the Dubai for three days. Immediately I began to think of the possiblilities of airing A61. Several phone calls to A61AC, the ARRL, and other people who have lived in the area made me quickly realize that I had no chance of getting a license. Several operations from this country in the past have not counted for DXCC. In fact, Dr. Mohammed Hamdan, A61AC, is a minister in a government department and it took over a year for his license to be issued. After several FAXes to Mohammed, we determined we had several things in common through my profession, and I was invited to spend some time visiting with him and even operating one night or so. This seemed the most sensible way to proceed. I was determined that I would do it right or not at all. I have been licensed since 1962, and with my DXCC total in excess of 320, it seemed a DXpedition was

*250 Standish St., Duxbury, MA 02332

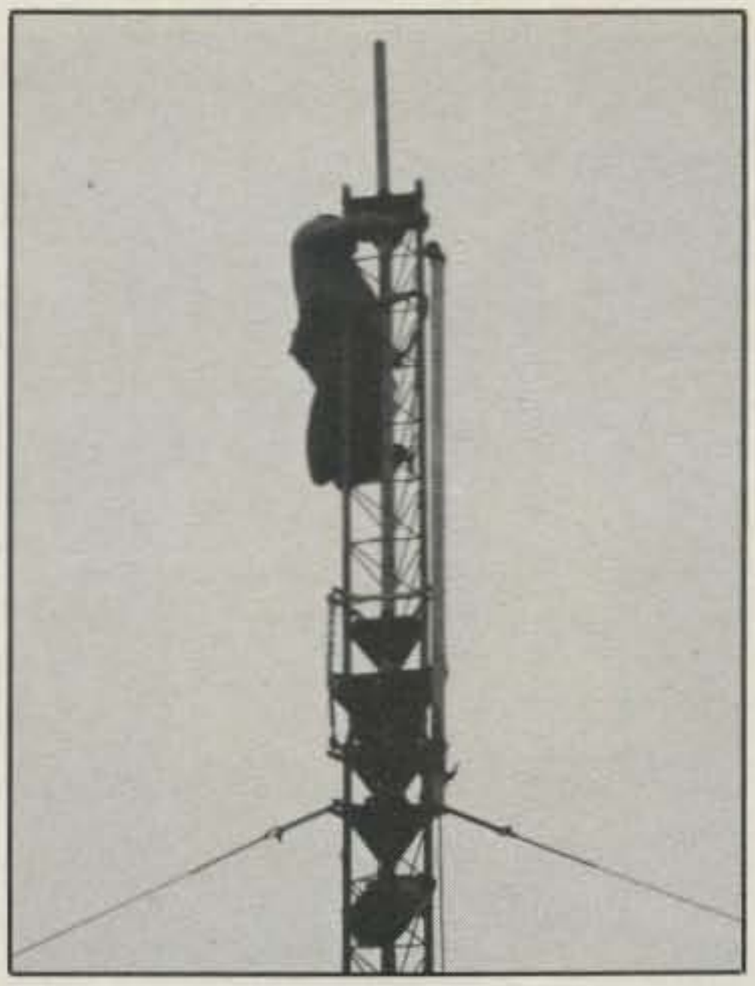


Photo 2– Inverted Rohn 25G top section (with author). Note the supporting chains with turnbuckles running along legs for increased stability while working on the new mast.

swaying "flagpole" effect while working above the first Yagi.

In order to gain a sense of security while climbing, I required a greater perceived lateral dimension and less sway—i.e., more rigidity. After giving this problem some thought, I found that the simplest design was an inverted Rohn 25G top section. A Rohn 25G section is extremely strong, provides inherent horizontal climbing rungs, has a very acceptable lateral dimension that a person can grasp, and has only 2.5 square feet of surface area for wind resistance. An added advantage is that a tower section is relatively cheap—less than $60—when compared to a high-strength steel mast. The ability of the Rohn 25G section to handle forces resulting in high stress and strain is demonstrated by the use of these sections in the top portion of Rohn's FK-25 foldover tower.

The basic concept placed the inverted Rohn 25G top section, equipped with Rohn TB3 thrust bearing, directly on top of and opposing the normal tower top section. A standard 2 inch OD mast passed through both thrust bearings and was secured by the rotor on the tower side and by a pinning/clamping arrangement on the top section (see photo 2). This configuration has several advantages.

First, the two thrust bearings actually rest upon each other and thus create essentially a continuous reinforced, but rotatable, interface between the two opposing tower sections. Therefore, the interface point between the mast and the thrust bearing, considered to be typically the highest point of stress and most likely to bend, was transformed into a much stronger reinforced (by 0.5 inch) and reliable interface.

The second advantage to the design configuration is that only a small length (less than 5 feet) of high-strength 2 inch OD mast needs to be purchased. This high-strength mast goes from the rotor through the thrust bearings and then is coupled to a lower strength and less costly steel mast about 3 feet into the inverted section. For my situation, I had planned on using my existing 17 foot, 2 inch OD, 0.5 inch wall thickness aluminum mast.

In order to physically secure the inner 2 inch mast to the inverted Rohn section,

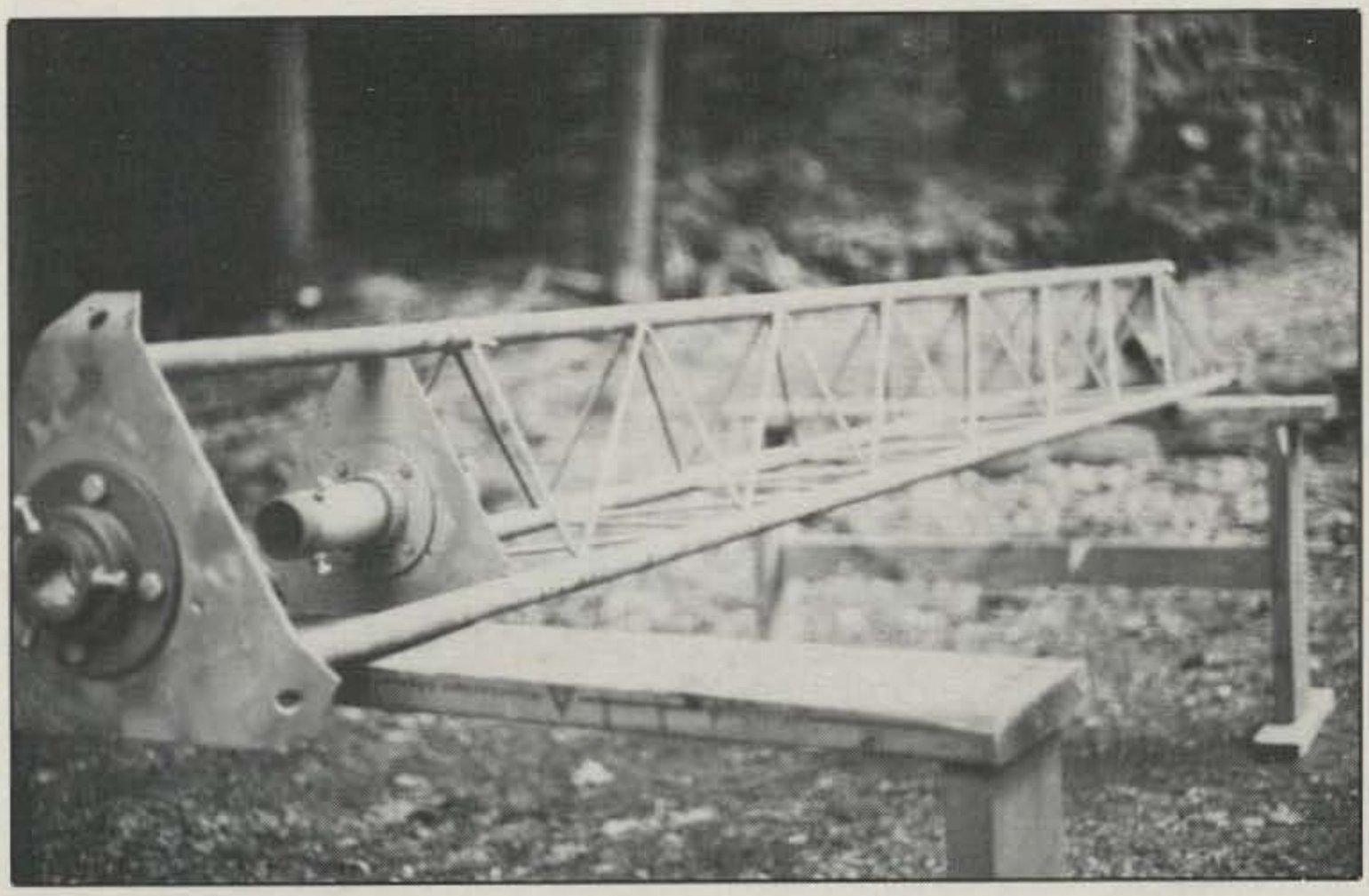


Photo 3– Inverted Rohn 25G top section with Rohn TB3 thrust bearing and pinning/clamping nipple flange arrangements on both ends of the tower section.

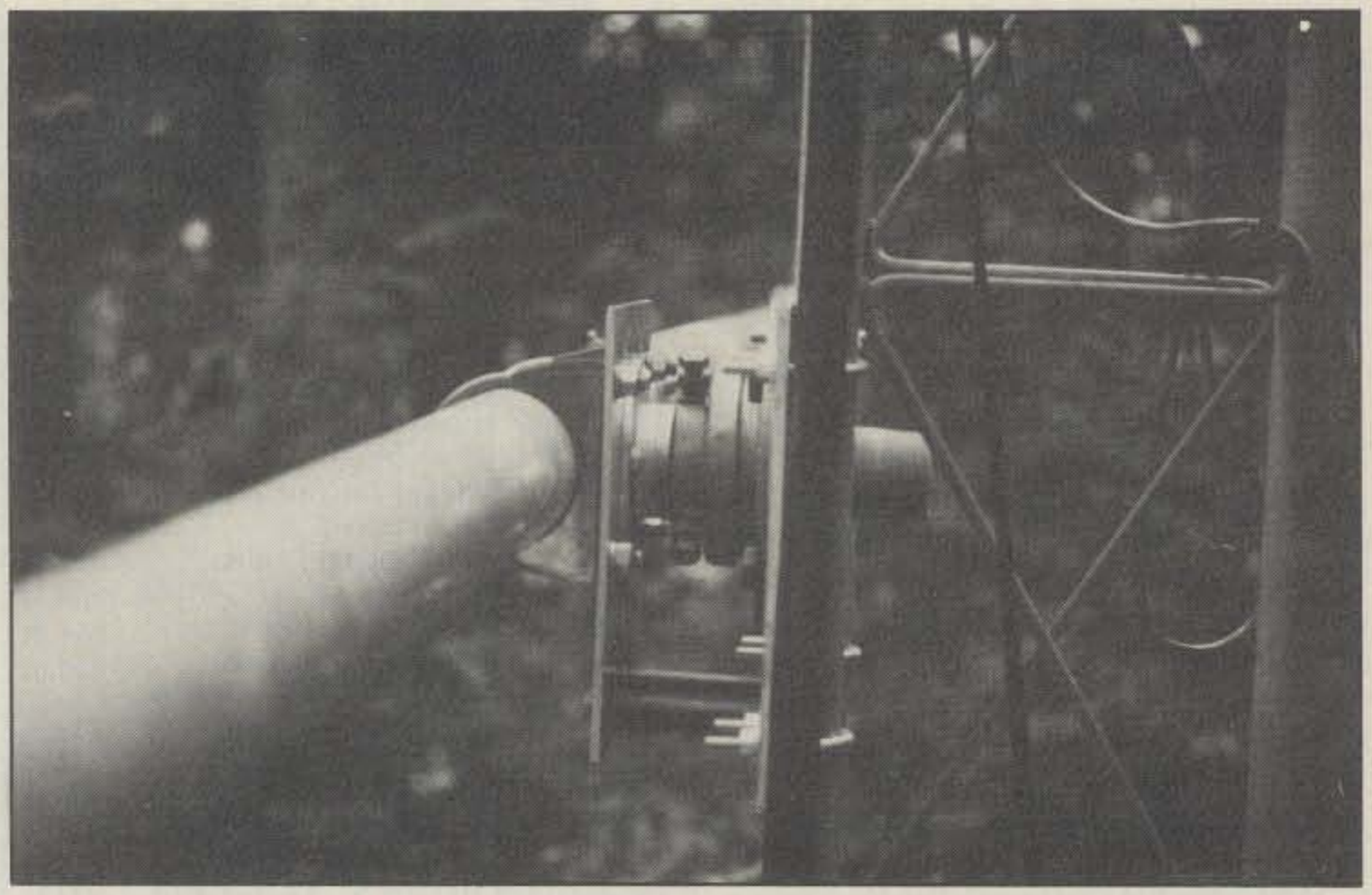


Photo 4– Rotatable boom-to-mast design with mast attached and nipple, without end-cap, fully inserted through thrust bearing. Note in the lower center of the photograph the #5 high-strength bolts used to secure the two aluminum plates after the antenna assembly process was complete.

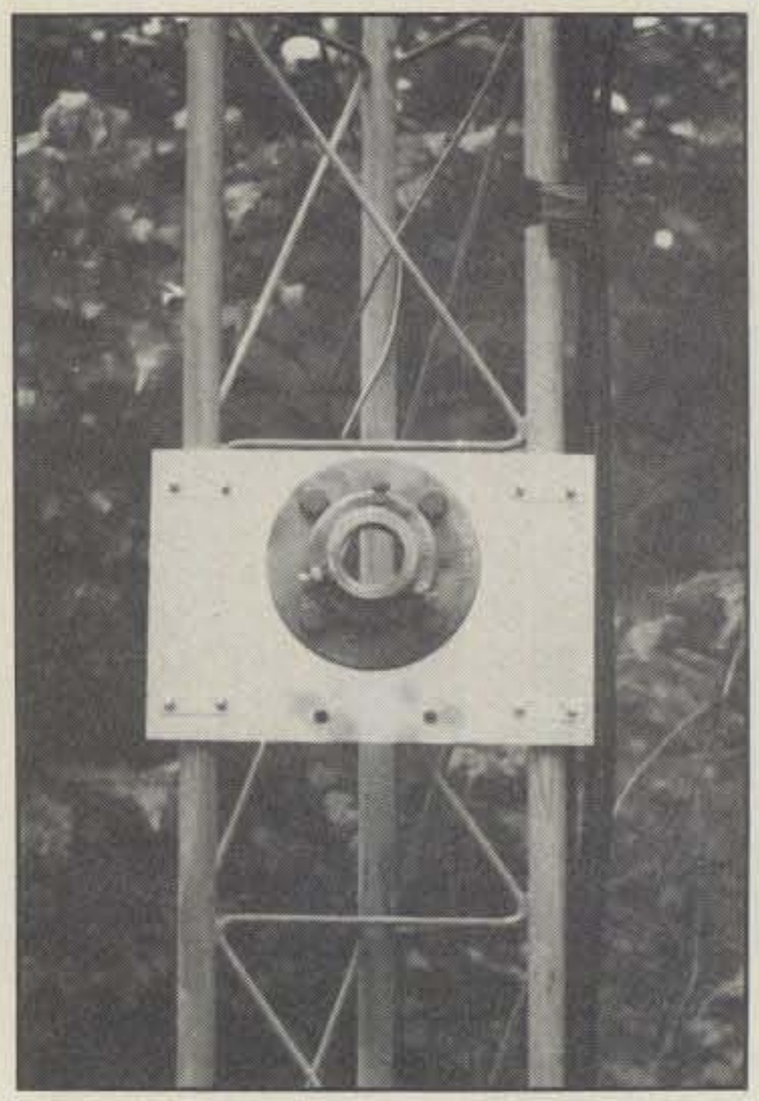


Photo 5– Aluminum plate with mounted thrust bearing.

some type of pinning or clamping arrangement had to be developed. For simplicity, the final design incorporated the use of 6 inch long, 2 inch ID nipples threaded into flanges bolted to a rotor mounting plate attached to the legs of the tower section (see photo 3). Since I had an extra standard 10 foot Rohn 25G section as well as a BAS25G short top section, my total inverted Rohn mast was a combination of the two, or a total length of about 13 feet. The inner 2 inch aluminum mast was pinned at both ends of the tower section.

Standard galvanized plumbing nipples and flanges were purchased for less than $10. The flanges were mounted on opposite sides of the same rotor plate with stainless steel hardware. It was very convenient that the bolt holes of the flanges and the rotor plate precisely lined up, eliminating the need for welding or drilling. The nipples were drilled and threaded at three points separated by 120 degrees to accommodate ¼ inch stainless steel set bolts about 1 inch from the open end of the nipple. Since the nipples are threaded into opposing flanges, once pinned the turning of the mast is always tightening one of the nipples against the stop of the flange, thus preventing slippage. For extra assurance, a muffler clamp retaining device was fabricated wherein two muffler clamps, joined by two pieces of angle iron running laterally, firmly held the nipple to the mast. (This retaining device along with a pinned flange nipple configuration is also very useful when you have to remove your rotor and wish to prevent your antenna from turning. Just remove the rotor, bolt the flange to the rotor plate, and clamp the top muffler clamp to the 2 inch mast.

The inner mast retaining devices and rotor plates were assembled and attached to the inverted tower section on the ground. For those attempting to duplicate this concept, be sure to physically check that the mast will easily slip through the nipples prior to assembly and raising to the top of the tower.

The next consideration was the mounting of the antenna boom to the side of the inverted Rohn 25G mast in such a fashion as to provide total stability while permitting assembly or disassembly of the antenna on the tower by one person—i.e., rotation in two axes. The final version of our rotatable boom-to-mast design for the inverted tower section can be seen in photo 4.

First of all, a ¼ inch thick T-6061 aluminum rectangular plate having dimensions of 12 ″ × 10 ″ was cut and drilled to permit clamping to the inverted tower section. A 2¼ inch hole was cut in the center of the aluminum plate and a TB3 thrust

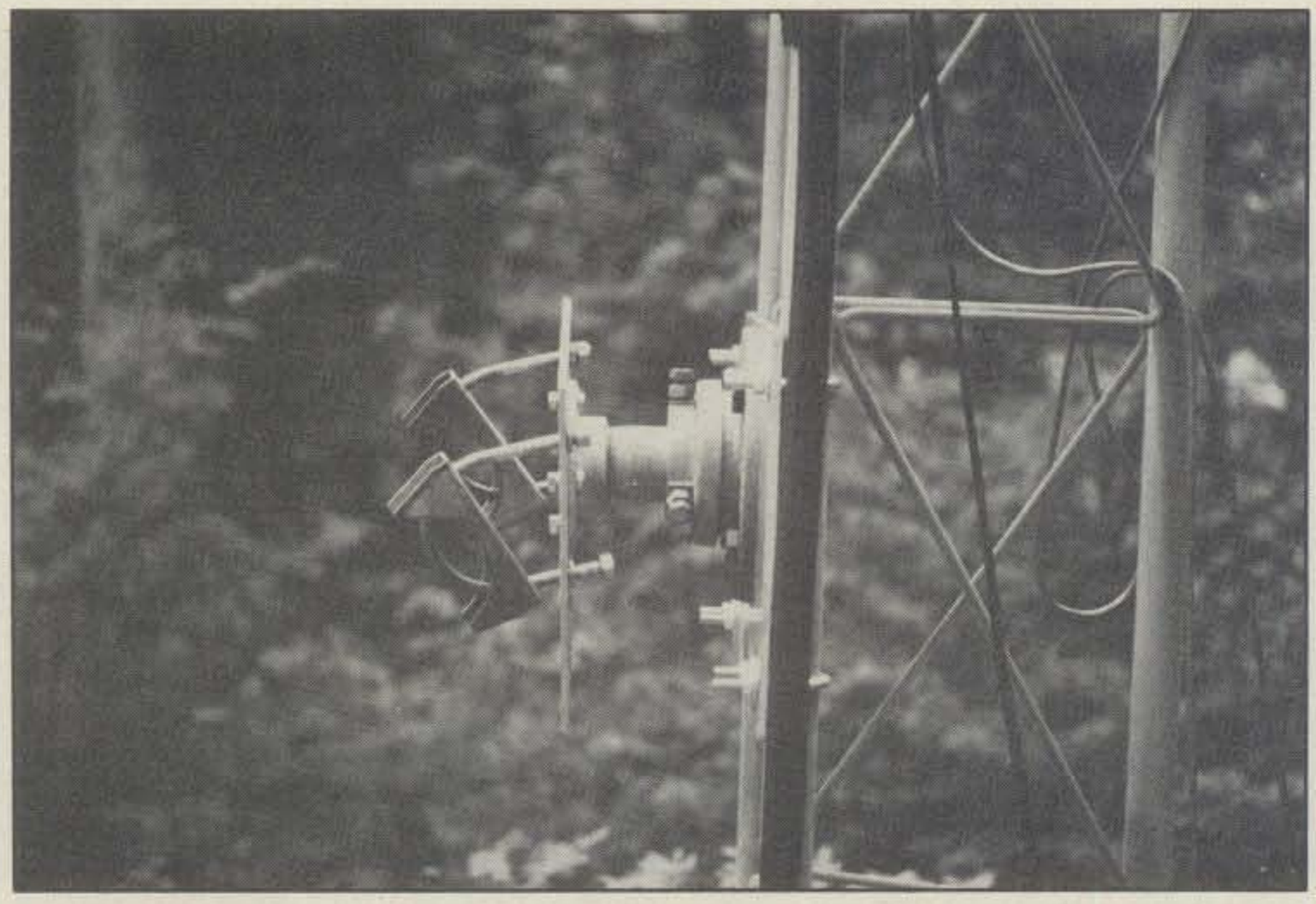
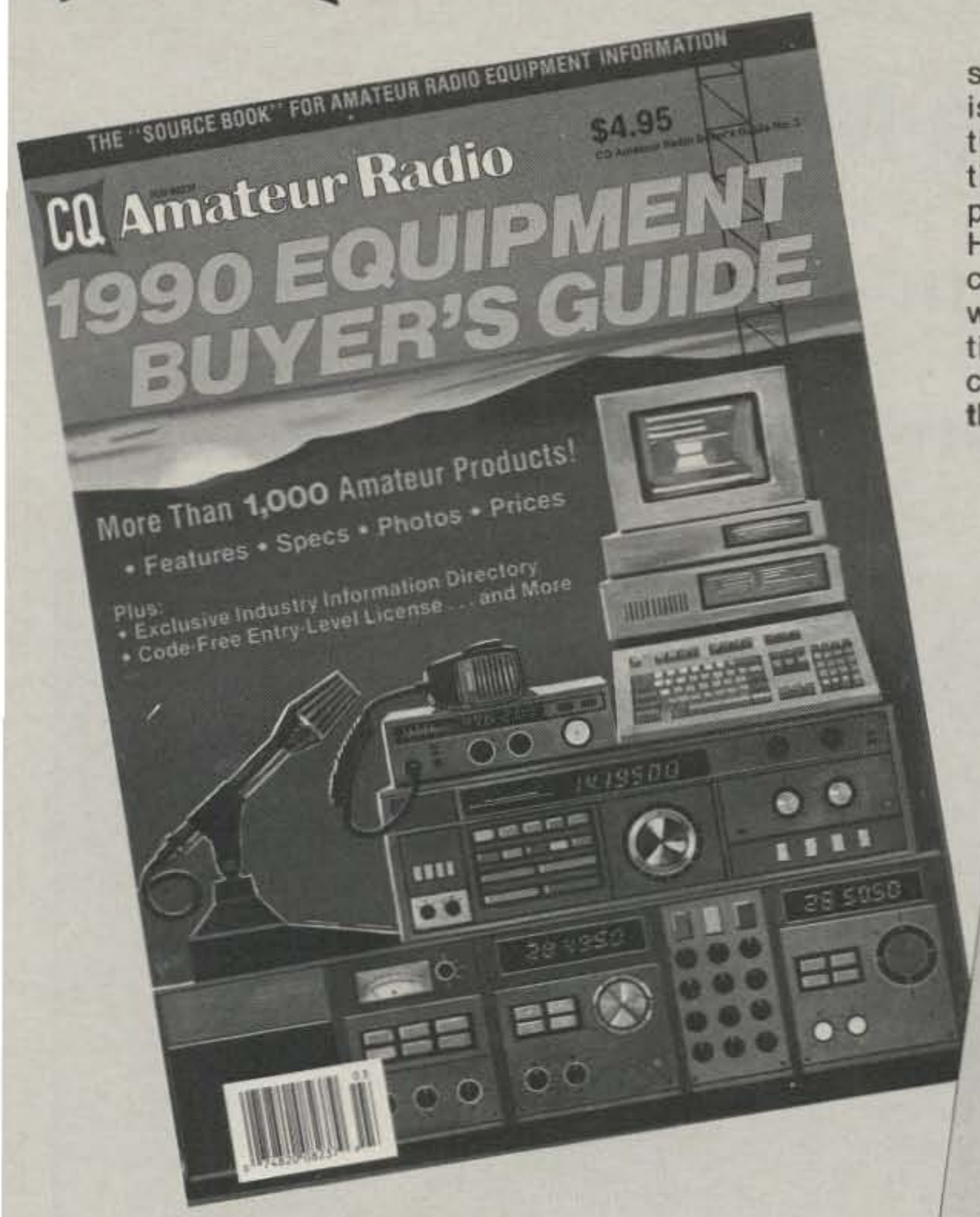
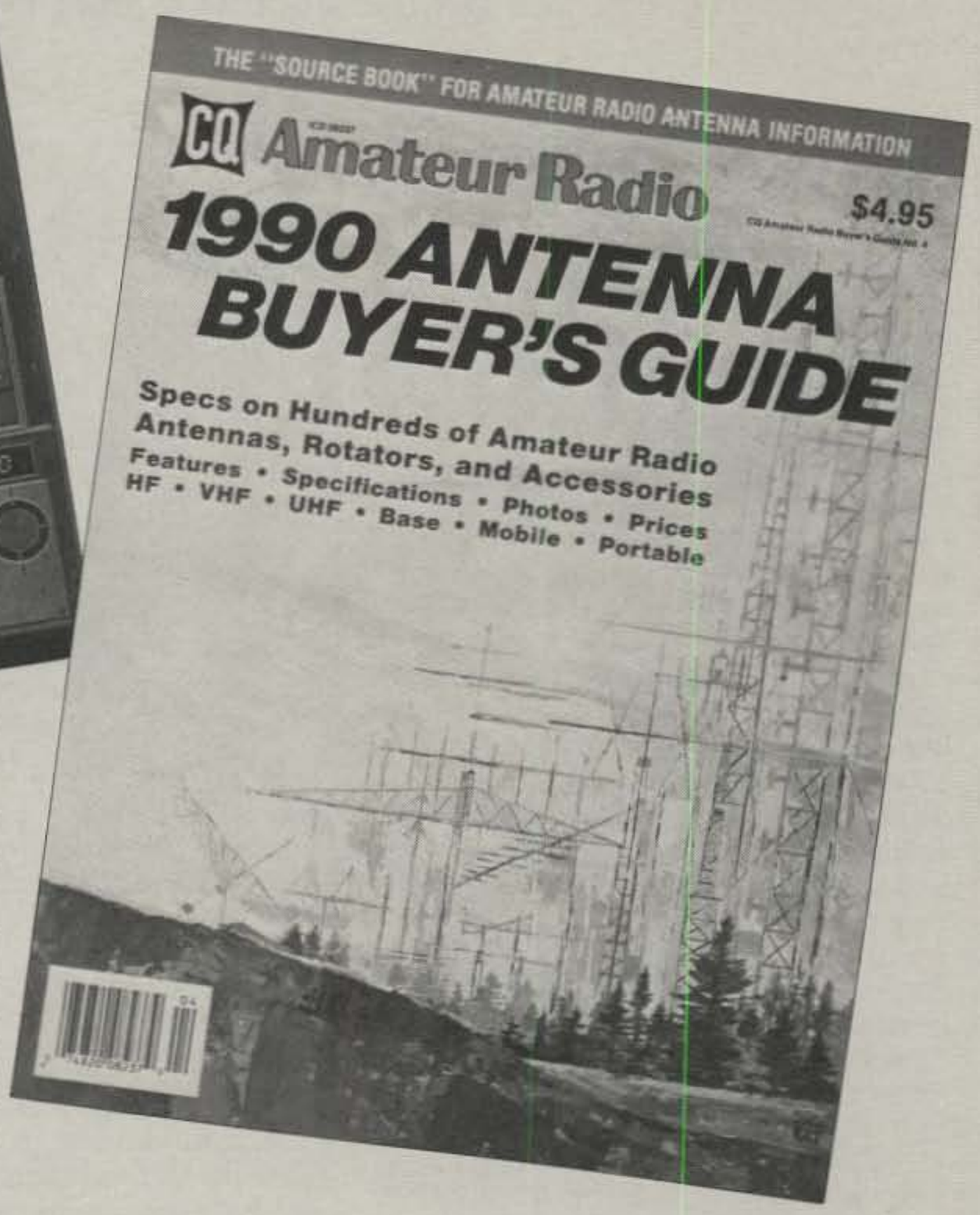


Photo 6– Boom-to-mast design with nipple not fully inserted into thrust bearing. Note the nipple and flange attached to original boom-to-mast plate.

CQ Amateur Radio
1990 Buyer's Guides



The **Equipment Buyer's Guide** gives you the edge in selecting just the right equipment for the shack, whether is be HF or VHF/UHF rigs or accessories. All the information is here in one handy, concise directory with descriptions, technical specifications, model numbers, retail prices and photographs. What do you do to get a license? How do you put a packet station on the air? What transceiver features are important to DXers? What equipment will you need for the new code-free license? These questions and more are answered in feature articles. Buy with confidence when you **make your decisions based on all the facts.**



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A lot of us would like to have this type of antenna problem, but few of us do. W2GVX provides an interesting solution with the aid of his son.

An Alternative Mast Design

Simplifying The Antenna Stacking Process

BY D.E. McCURDY*, W2GVX, AND M.A. McCURDY

Although I have had excellent results with my current 4-element 20 meter and 15 meter monoband stacked Yagis, I was seriously considering exchanging them for longer boom arrays in the 30 foot range. However, I was not thoroughly excited about removing my current stacked arrays and subsequently installing and maintaining even larger arrays on a typical 2 inch OD steel mast. The basic problems, as others have experienced, are (1) the accessibility of the top array and/or truss mount, (2) the additional strength requirement for the mast, and (3) the cost of a high-strength specialty steel mast.

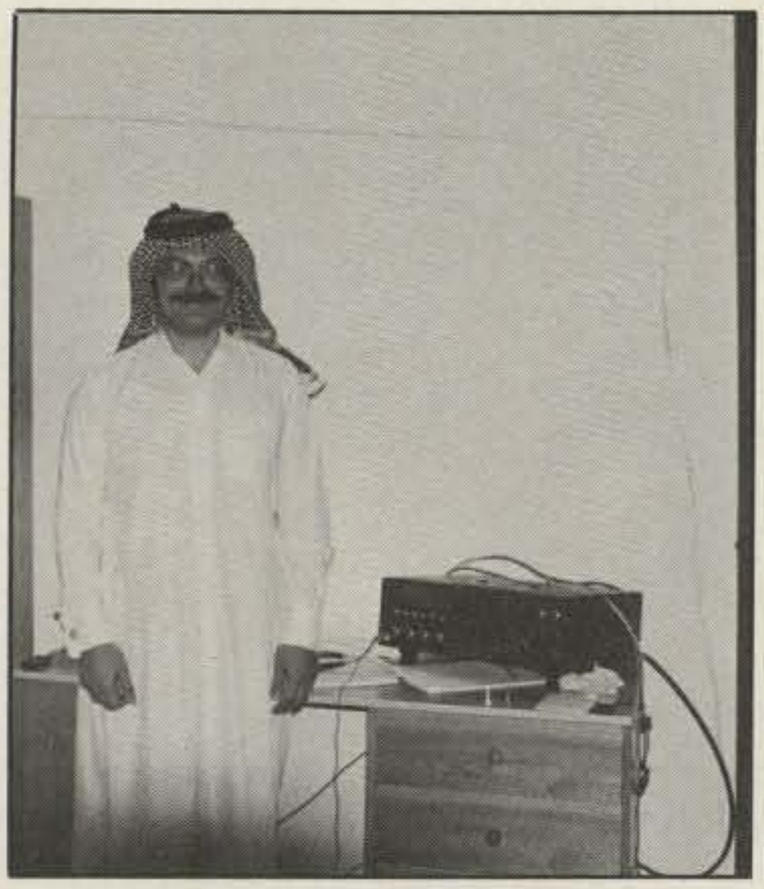
This article will cover a mast design and antenna-mounting concepts which can make tower work a lot easier, and in some cases safer, at no great expense. As the project evolved, I collaborated with my son about design considerations and tower work. My son is a mechanical engineering student at Rice University in Houston, Texas. My plans for long-boom stacked Yagis changed a few months prior to this project, mainly at the suggestion of my friend Robert Ossene, N1AKX. Robert, who moved to Florida last autumn and in the process donated his KLM KT34-XA Yagi to my station, convinced me that the 32 foot boom KT34-XA tribander mounted at 104 feet would perform as well as the long-boom monobanders. Although the stacked-array concept had been changed, my ideas for a new simplified mast with an improved rotatable boom-to-mast clamp were still intriguing.

The project began by first disassembling and then lowering the current stacked arrays (see photo 1) situated on a 17 foot T-6061 aluminum mast (2 inch OD; 0.5 inch wall thickness) at the 4 and 13 foot levels above a 98 foot Rohn 25G guyed tower. With two of us at the top of the tower and my XYL as the ground crew, the sequential disassembly process was completed in an afternoon. First the HAM-IV rotor was removed and the mast dropped via loosening the thrust-bearing set bolts to gain access to the Hy-Gain 204BA. The inner elements were removed, followed by the disassembly of the boom at the boom-to-mast clamp. Once the boom-to-mast clamp was removed, the mast again was dropped through the thrust bearing until the Cushcraft 15-4CD was accessible. The disassembly of this Yagi was much simpler, since it is much lighter in weight and has a boom length 6 feet shorter than the 204BA. The same disassembly sequence was followed except the boom was separated at the pinned boom joint closest to the mast. The entire removal process for the 15 meter array took only 15 minutes. The aluminum mast was then dropped through the thrust bearing to a level where the top of the mast was about 2 inches above the rotor mounting plate. The mast was further supported by a wood block mounted in the tower below.

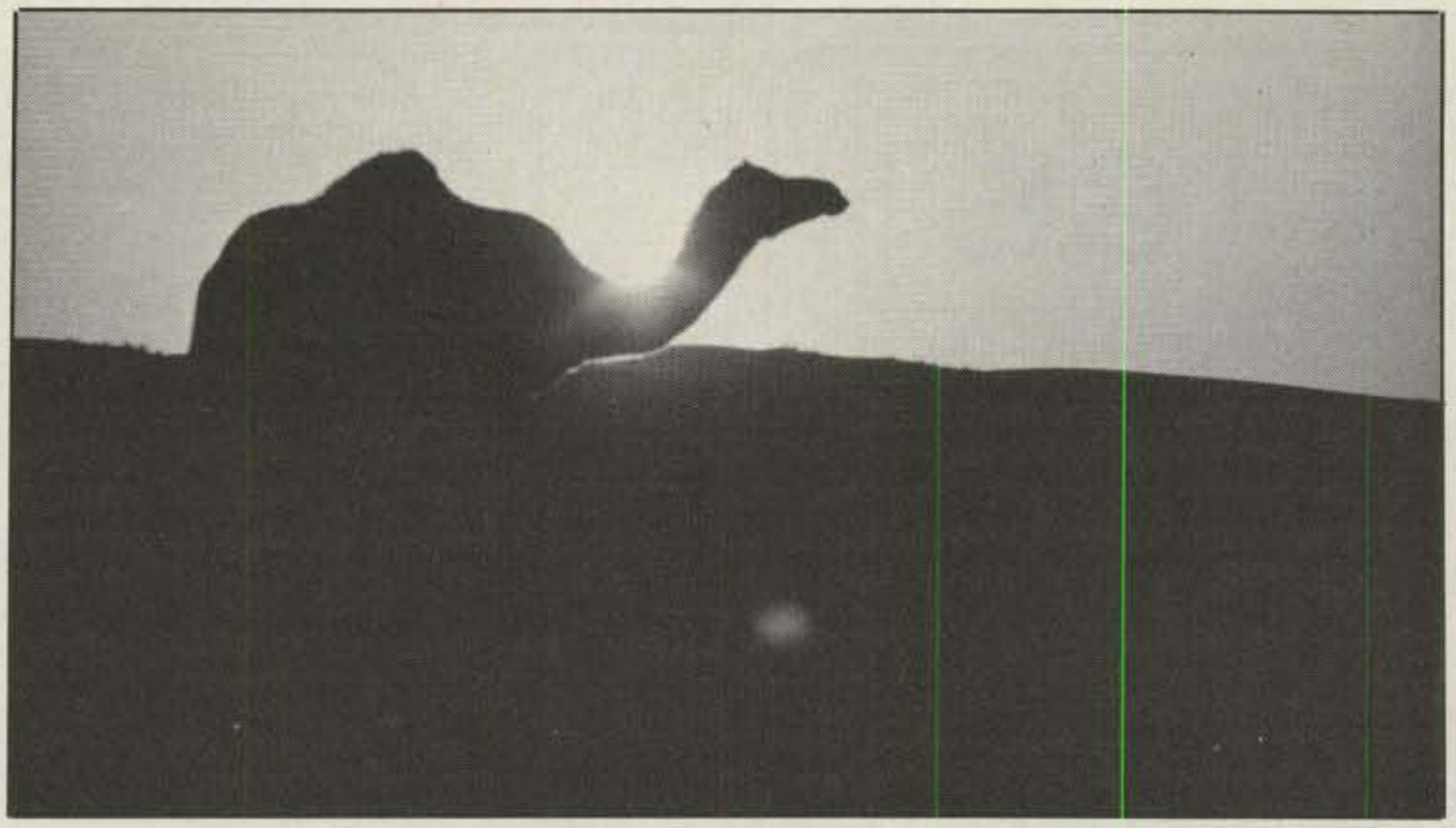
Photo 1– Beginning the disassembly process of the stacked arrays.

The mast concept proposed was to provide high-strength low-cost accessibility to Yagis spaced 10 feet apart, ease of Yagi mounting, no maintenance, and simplicity in design. Although there are commercially available high-strength masts with attached or welded short step rungs, the relative cost may be considered high to some amateurs, and although I am an experienced climber, I still get emotional when dealing with the

*491 Howard St., Northboro, MA 01532



"Sheik Don" at the operating position.



No pileups here in the desert. It is only a 15 minute drive. A wonderful country with many contrasts.

the next logical step in my pursuit of DX.

Three weeks before I was to leave for Dubai, my friend who invited me to visit had dinner with Saeed Al Maktoum, a member of the Dubai Municipal Council. He mentioned my upcoming trip and how he had recently visited me at my home (during which I demonstrated amateur radio and showed him my QSL from a mutual friend, A61AC). Surprisingly, Saeed knew all about amateur radio and had often thought about getting a license. You can also imagine my delight when Saeed called me to request help in obtaining more information about equipment and licensing. I directed him to the Ministry of Communications and Fed X'd several amateur radio magazines and a computer program that taught Morse code.

I also volunteered to visit him to install antennas and show him how to operate a radio. Within two weeks he was licensed as A61AD, an ICOM transceiver was ordered, and I extended my three day visit to six days. The chance of a lifetime was taking shape at a dizzying pace.

To eliminate possible problems at customs, I shipped ahead microphones, an AEA PK232 TNC, and a keyer. When I left on October 12 I carried a Cushcraft AV5 vertical and a headset, both of which arrived too late to ship. I should have carried everything, as the PK232 box had been opened for inspection at customs. Thinking it was a full radio setup, it was turned over to the police. To make matters worse, one of the ruling Sheikh in Abu Dhabi had died the day before my arrival and all government offices were closed for three days for an official period of mourning. I began to be thankful the headset was late in reaching me in Massachusetts. While clearing immigration and customs at the airport, the security police carefully searched all my baggage, paying close attention to all the magazines I was carrying. They never questioned what the headset or large box (clearly marked Cushcraft—Antenna) was all about. I found out later they were looking for pornography; obviously, *CQ* magazine was not sexy enough for them to warrant a closer look.

This was my kind of DXpedition. While the flight took 20 hours (including a 6 hour layover in London), there were no two week boat voyages, plane rides over the jungle, or hostile licensing officials. As I got closer to Dubai, the adrenaline was flowing and I could barely stay in my seat. I was also passing over some choice DX: ZA, TA, YK, YI, HZ, and A7.

I arrived just after midnight Saturday the 14th, checked into my hotel, and slept until 8 AM. Since Saturdays are business days, I went right to the office. Luckily the work habits in the Emirates proved to be very conducive to DXing. They work from 9 to 1 and take a very long lunch break—4 hours! I took advantage of this break on Saturday to set up the antenna and "break in" the station for 1½ hours on 10 meters. The evening hours for work are typically from 5 to 9, after which Saeed invited me back to his house for dinner and hamming.

After an exhausting first day in Dubai, I arrived at Saeed's at about 8:30, and in short order (1 QRZ on 21.295) had a pretty good pileup going when A61AC and YK1AO stopped by to see how we were getting on. Instead of DXing, we had a wonderful time discussing politics, amateur radio, and women. At one point

Dubai, the old and the new. Shown here is an ancient Dhoro in the "creek" that divides the modern city of Dubai.

Day	Hours	Band 10	15	20	40	75	Total
Oct. 14	5	129	464	3	—	—	596
Oct. 15	4	124	109	103	40	22	398
Oct. 16	4	251	—	54	—	—	305
Oct. 17	10	302	239	275	44	39	909
Oct. 18	6	141	337	6	6	55	545
Oct. 19	6	140	48	394	7	2	591
Total	35	1095	1197	835	97	98	3354

QSOs By Continent
North America: USA 1228, Canada 52
Europe: 1143 (301 with Italy)
Asia: 827 (666 with Japan)
Rest of World: 156
Total Countries Worked: 103
5 Band Contacts: IK1HJS, IK6LLF, I1WXY, K1MEM, K1IU, PA0HVF, RO4OE, W1YY

Table I- Recap of the operation.

Saeed noticed my glancing at the radio room and expressed amazement at my desire to operate the radio so much while on a trip to a foreign country. After all, he said, "You can do that at home!" He should hear the pileups I (don't) generate from the rare country of Duxbury, Massachusetts.

The greatest impediment to my operating was not the business commitments, which were formidable, but the hospitality of Saeed, Dr. Hamdan, and all the other people I met while there. It seemed every night there was another dinner until 1 AM, sightseeing tours in the afternoons, and visitors at all hours. The rigors of jet lag and a very busy computer show also took their toll.

Before I arrived in Dubai, I had a goal to show Saeed all the facets of the hobby: SSB/split, CW, RTTY, WARC, and low-band operating. I did not know exactly how many hours of operating I would be afforded, but with the large demand for this country I knew several thousand QSOs would be easily attainable in short order. Leaving behind a trained active amateur would be the priority goal, but the thrill of the pileup was anxiously awaited. My first day of operating was most gratifying. The station was up and running, 600 QSOs were logged in 5 hours, and by that evening Saeed was operating freestyle, split, without chaos on the frequency.

Sunday I had show commitments, and both luncheon and dinner appointments. I could only manage to get to Saeed's QTH very late in the evening. My second day of operating yielded only 400 QSOs. Sixty of those contacts were made on 40 and 75 meters, and I had my first taste of

Dubai is full of mosques, as Islamic law states that one must be within earshot of every home. Most are very beautiful and are patterned after Egyptian mosques.

the unruly European pileups I have heard so much about (mostly from other Europeans). At 2 AM I decided it just wasn't worth it and went to bed. I left the window open for some fresh air and awoke to the local mosque's now familiar "call to prayers." I had no luck on 75 calling the States, but 20 was open long path to the west coast, and I worked about 54 stations before I had to leave for work.

With the show in full force on Monday, my operating time was reduced to 10 meters between 5 PM and a 9 PM dinner party at Dr. Hamdan's. Just 305 contacts for day three. I was now over my jet lag, and decided that after three hard days of work I needed a break. So after the Tuesday morning session I went to lunch with Saeed at the local yacht club and returned to his house at about 3 PM. I then took the break I "needed" and had the most productive hamming for the week. I managed almost ten hours (broken only by a steak barbeque) of contacts on five bands, over 900 QSOs. I had now reached my target with two days to go.

On Wednesday Murphy struck. Saeed and I managed to get to customs and "liberated" the PK232 and microphone (they were to be gifts to Saeed). We would not get the keyer back, since I intended to take it back out of the country. At least we could get on RTTY. After dinner (11 PM) we hooked up the PK232. We continued to receive the message all packet and RTTY enthusiasts love: "Unable to establish communications with your PK232." We then went through a "fire drill" on 21.335 and redid cables, protocols, etc. I hate to think of W6PQS's AT&T bill for the FAXes he sent my office. Since the unit was tested by me before I left, I was confident the 232 was not at fault. Well, after two to three hours of hacking around we gave up. Upon my return home the unit worked fine. (It was re-sent to Dubai, where it again failed; upon final analysis we discovered the power supply in Dubai was the real culprit). I went back to SSB, stayed up most of the night, and made 545 contacts, including another excellent 75 meter opening.

By Thursday Saeed knew I was crazy as I was still on the radio in the same position as when he went to bed. I went back to the show for a meeting with some customers from Qatar, one of whom expressed an interest in getting a license; maybe next year in A7???? After lunch I returned to Saeed's house yet again, but was whisked off for an afternoon touring the desert, nearby Sharjah, and other sights I had wanted to see before departing. Dubai is an amazing country with many great contrasts. In one minute you are in a modern city, while within a five minute drive you pass the green golf courses and enter a barren desert.

After the afternoon trek I returned to Saeed's for a farewell dinner with many of my new friends. After dinner Saeed sent me to the bedroom where the radio was and told me to get out of my shirt and pants. Being new to this part of the world I didn't know what to think. He came into the room with a complete outfit: Kafira, headdress, etc. I have worn it to several radio clubs at which I have spoken, and everyone thinks it is wonderful.

Since I was leaving at 8 AM on Friday, I decided to operate the rest of the evening. I concentrated on 20 meters and worked another 600 stations that evening, bringing my total for the week to 3,354 in 35 hours. In addition, while I was there Saeed logged another 600 QSOs.

My last QSO was with WA2UDV; this was unscheduled but a fitting way to end my trip. Fred was responsible for teaching me the code and assisting me with my Novice test in 1962. He is also my dad.

Those who know me also know that in 1987 I wrote a logging program that was tailored to large QSL management. It is/was used at 9Q5NW, ZS8MI, ZL3AFT, and many other DX stations who log large numbers of QSOs. I installed it at both Saeed's and Mohammed's shacks. It made operating a snap, kept insurance QSOs to a minimum, and was a tremendous help in answering the thousands of cards I received the month following my return. The average turnaround time for a QSL card was two weeks. I can't imagine doing this by hand.

I feel I accomplished much on this trip. I provided many QSOs to the deserving, showed Saeed the ropes, and made several great friends. One of the purposes of amateur radio, after all, is to promote international friendship. By the time you read this I should have returned for a second trip in late March with a goal of providing CW, RTTY, and being an entry in the WPX contest. To improve the signal, a beam is being purchased and Radio Works of Virginia is sending me back with a Delta Loop for 40/80 and the WARC bands.

I am very proud to have been the impetus to establishing another active amateur in the United Arab Emirates, and I hope I provided you with a new one. I also hope I set the stage for other guest amateurs there.

I want to thank Saeed and Mohammed for their generous hospitality and friendship; Noel Aranha of Dubai for the use of some of his pictures for this article (my camera did not survive the trip in one piece); my friend and business associate Mustansir for sponsoring my visa; my dad for introducing me to amateur radio; and Dorian, who puts up with all the hours I put into my hobby. CQ

Joint Soviet/CQ Magazine 4J6X DXpedition Planned

In a bold demonstration of *glasnost*, Soviet Union authorities have accepted an invitation from *CQ* magazine to hold a joint DXpedition in the U.S.S.R. The Soviet action appears to support newly won freedom for Soviet amateur radio operators and to strengthen friendship between Soviet and American hams.

Amateur radio authorities in the Soviet Union have authorized a *CQ* DXpedition to the Caucuses Mountains between May 15 and May 30, 1990, where Soviet and American amateurs will operate a portable station with the special callsign 4J6X. For the first time commercial amateur gear, including packet radio, will be brought in from the U.S. and used for the DXpedition in a rare Caucuses oblast, O87, located in the Autonomous Republic of Khabardino-Balkarski, UA6X land. We have received word that as of March 1, packet and SSTV operations in the Soviet Union for category one amateurs are authorized.

The project of cooperation and friendship grew out of a joint idea between Soviet amateurs in the city Rostov-on-Don and H.B. Mutter, N3CBW, of Silver Spring, Maryland. After visiting Rostov in 1988, N3CBW kept up a regular schedule with his Rostov friends and during their ragchewing it was decided to see how far the U.S.S.R. and the U.S. had come in the easing of political problems. A plan for a joint DXpedition was decided on to test the political and bureaucratic waters on both sides. From the U.S. side, the project is an effort to support the U.S.-Soviet Exchange Initiatives program established under former President Reagan.

In September 1989 Richard A. Ross, K2MGA, Publisher of *CQ*, was informed about the idea and became the patron of the DXpedition. He wrote to the Krenkel Central Radio Club of the U.S.S.R. (CRC) on behalf of the proponents of the project and requested official sanction and support for the joint undertaking. Receiving *CQ*'s support, the Rostov amateurs planned a site and time for the DXpedition and enlisted the help of Victor Evtuschenko, UA6XD, and Anatolij Kenzhekulov, UA6XT, amateurs in the city of Nalchick, located in the rarified DX air of the Caucuses.

With plans for the project formulated, authorities at the CRC in Moscow were contacted by the Rostov amateurs with the details supporting the *CQ* DXpedition. Carrying the load for getting Soviet support were Victor Tkachenco, UA6LA; Michael Bondarev, UA6LU; Anatolij Suptela, UV6LF; Alexander Zhadan, UA6LHB; and Boris Larionov, UA6LQ. Through their efforts, official Soviet approval to conduct the DXpedition was received by *CQ*.

Private donors and corporate sponsors have been solicited to help provide the involved Soviet radio clubs with necessary equipment to operate the DXpedition and to retain packet radio stations in the U.S.S.R. after the DXpedition. CQ

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BY BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Military Affiliate Radio System (MARS)— Part I of II

I receive requests for information about the Military Affiliate Radio System (MARS). This article provides a detailed introduction to MARS. Most of this information was extracted from printed material supplied by MARS officials; however, my own comments are sprinkled throughout this article.

Our Department of Defense (DoD) sponsors the overall Military Affiliate Radio System Program. It is established and operated as three similar (but separate) programs involving Air Force MARS, Army MARS, and Navy-Marine Corps MARS.

FCC-licensed amateur radio operator licenses are accepted by all three MARS organizations as proof of qualification to become MARS operators. All affiliate (civilian) MARS operators are FCC-licensed amateurs. There are also full-time MARS operators who are on active duty.

History

A few dedicated pioneers in the U.S. Army Signal Corps formed the Army Amateur Radio System (AARS) during November 1925. AARS remained active until its operations were suspended 7 December 1941, at the start of World War II. More than 8000 amateurs received military communications training in AARS prior to WW II. There were approximately 60,000 American amateurs just prior to the outbreak of WW II, and about 5600 of them were AARS members. If that pre-WW II percentage existed today, Army MARS would have approximately 38,000 members. The combined MARS membership is now about 12,000. There are about 5200, 3500, and 3000 members in Army, Air Force, and Navy-Marine Corps, respectively. About 20% of the pre-WW II AARS members served our country in military or civilian capacities during that conflict.

AARS was reactivated in 1946 and it functioned until 26 November 1948, when the Air Force and Army established the Military Amateur Radio System (MARS). The name of this dual program was changed to the Military Affiliate Radio System 2 September 1956, with the coined name MARS. On 17 August 1962 the Navy-Marine Corps MARS organization became part of the overall DoD MARS Program with a starting date of 1 January 1963. I held Army MARS callsign A1SAD in the early 1950s, and my Navy MARS callsign was N0AEJ during the early 1960s.

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Objectives

The objectives of the three MARS groups are as follows:

1. Attract and train members in military communication procedures, creating a potential reserve of radio operators.
2. Handle morale and quasi-official traffic for armed forces and authorized government civilian personnel stationed throughout the world.
3. Provide military and/or civilian disaster officials with auxiliary communications during emergencies, handling local, national, and international messages. This helps effect normal communications following disasters that overload or disrupt telephone, telegraph, and other communication channels.
4. Provide DoD-sponsored emergency communications as an adjunct to normal local, national, and international communications.
5. Handle standard military communications, if this need arises; however, MARS does not handle such traffic under normal circumstances.
6. Conduct an appropriate amateur radio participation program as part of the Annual Armed Forces Day celebration. This includes direct contact between amateurs and military stations. It also includes a code proficiency award to each amateur who correctly copies the Secretary of Defense's message at 25 wpm. Military and amateur radio operators transmit on their own respective frequencies during Armed Forces Day cross-service contacts, and they listen (only) on each other's transmit frequencies. This activity occurs on the third Saturday in May.

Callsigns

MARS stations are identified by their assigned military callsigns. One does not use her/his amateur radio callsign when operating as a MARS station and using military frequencies.

Emblem of the Military Affiliate Radio System (MARS).

Air Force MARS callsigns, issued to ordinary affiliate members, start with the prefix AFA or AFB, resulting in a callsign such as AFA7UG. Air Force MARS officials (regional and state directors) are issued callsigns starting with the prefix AFF. Air Force MARS military stations use callsigns beginning with the AGA prefix, such as AGA3HQ (Scott Air Force Base in Illinois), the master net control station for USAF MARS. An exception to this AGA prefix use is the Andrews AFB station callsign, which is AIR.

Army MARS callsigns start with AAA through AAZ prefixes, and AAV9CO is an example of an Army MARS callsign.

Navy-Marine Corps MARS issues callsigns starting with the prefix NNN0, and NNN0ERD is an example of a Navy-Marine MARS callsign.

Other military callsigns may be used on MARS nets during actual emergencies and communication exercises, when such usage is authorized by a cognizant authority.

Modes

Most of the MARS nets involve single-sideband (SSB) voice operation in the high-frequency (3 to 30 MHz) range. However, there are also MARS nets using radiotelegraph (code), radioteletype (RTTY), and slow-scan television (SSTV). MARS is authorized to use all modes of emission that amateur radio is permitted

The ARRL awarded a 50-year affiliation certificate to the Green Bay Mike and Key Club of Green Bay, Wisconsin. The club received charter 1922 on 21 October 1939. Four of the original 15 founding members are still active in this club, which now has 110 members. The club is active in ARES, RACES, public service, and licensing activities. The photograph shows (left to right) Gregg Seidl, KA9LOE; Pat Bryhan, KA9VRK; Jerry Van, W9VOW (a founding member); Dick Hugi, KC9CJ (ARRL Wisconsin Section Traffic Manager); Robert Heiser, WA9SWX); and Scott Cole, KB9AMM.

to use. New MARS members are assigned to code and/or voice nets close to amateur bands. Experienced MARS members are allowed to operate packet, RTTY, SSTV, and other exotic modes on MARS frequencies, most of which are farther away from amateur bands.

Frequencies

MARS stations use military frequencies. Day-to-day operations are conducted on frequencies close to amateur bands. Many MARS frequencies are within 200 kHz of amateur radio bands. Transcontinental, international, and other more exotic (non-training) nets are run on frequencies that are farther away from amateur bands.

Typical Air Force MARS frequencies in the 3 to 30 MHz range include 3308, 4517, 4590, 4832, 6995, 7302, 7313.5, and 13996 kHz. USAF MARS uses 143.95 MHz for its 2 meter FM simplex (reception and transmission on a common frequency) operation, whereas 142.150 and 143.450 MHz comprise its standard repeater pair on 2 meter FM.

Typical Army MARS frequencies include 3348.5, 6997.5, and 14403.5 kHz in the 3–30 MHz HF range.

Typical Navy-Marine Corps MARS frequencies include 3190.5, 4042.5, 7382.5, 13975.5, 14385, and 20998.5 kHz in the HF range.

Nets

MARS affiliate operators participate in scheduled networks above and below amateur band limits. Each type of net has specific goals. A variety of administrative nets handle much of the day-to-day traffic that is required to manage the program. Training nets are used to teach required fundamentals of military communications and message handling. Technical nets provide opportunities for members to increase their knowledge of several associated electronics and communications subjects. Traffic nets handle third-party traffic, which is written (message) and voice (phone patch) traffic that involves more than the operators handling it. Emergency nets are exercised to keep MARS members ready to handle communications when real emergencies (floods, earthquakes, hurricanes, etc.) occur.

Single sideband (SSB) voice nets predominate in the 2–30 MHz range, but code, packet, RTTY, RATT, SSTV (slow scan TV), and VHF nets are also active.

Some MARS nets operate on frequencies as much as 200 kHz above or below the edges of nearby amateur radio bands.

MARS only allows its members to operate on 2 to 30 MHz net frequencies while nets are in session; these net frequencies are not used for hobby-type contacts, such as are common on the amateur radio bands.

New MARS members receive on-the-air training while participating in regional high-frequency nets. When one becomes proficient in the use of military radio procedures, long-range net activities become available. These advanced nets include transcontinental radiotelegraph (code), transcontinental radioteletype (RTTY), transcontinental SSB (voice), and

Callsigns	Location	Area Served
AGA4KE	Kelly AFB, Texas	Central and South Americas
AGA5MC	McChord AFB, Washington	Alaska
AGA6TR	Travis AFB, California	Pacific
AGA7RM	Rhein-Main, West Germany	Europe-CONUS
AGA8HI	Hickam AFB, Hawaii	Pacific-radioteletype
AIR	Andrews AFB, Washington, DC	Europe

Table I– Air Force MARS gateway stations.

international phone patch nets. AGA3HQ (Scott AFB, Illinois) is the master control station of the Air Force MARS transcontinental SSB (voice) net.

MARS operates local, state, region/area, national, and international networks circuits (nets). Most major traffic nets operate daily, whereas administrative and technical nets may meet only weekly. Some MARS nets are conducted in the VHF (30 to 300 MHz) range. It is advisable to contact state or region/area MARS officials to obtain specific details regarding local net operations, since net activities can vary from one region to another.

Navy-Marine Corps MARS runs the "Afloat Specialty Network," providing phone-patch (third-party voice) service to personnel aboard U.S. military vessels in international waters. Navy-Marine Corps MARS also operates the radio/telephone network which provides the same service between the continental United States and overseas land bases.

Repeaters/VHF

MARS operates VHF FM repeaters in more than 100 large metropolitan areas, as well as in areas of lesser populations which have many MARS members. These repeaters are available for use by affiliated MARS members whenever they are not being used to conduct a formal MARS exercise, such as a net. The U.S. Air Force MARS nationwide standard repeater pair for 2 meter FM operation is 142.15 MHz (repeater input) and 143.45 MHz (repeater output). The Army MARS nationwide standard repeater pair for 2 meter FM operation is 148.01 MHz (repeater input) and 143.99 MHz (repeater output). The Navy MARS nationwide standard repeater pair for 2 meter FM operation is 148.375 MHz (repeater input) and 148.975 MHz (repeater output). The MARS nationwide 6 meter frequency is 49.98 MHz.

Gateway Stations

Air Force MARS operates 270 stations throughout the world. The Air Force MARS gateway stations are as shown in Table I. Stateside Army MARS gateway stations are located in Hawaii, Maryland (Fort Detrick), Texas (Fort Sam Houston), and Washington (Fort Lewis). Overseas Army gateway MARS stations operate from West Germany and South Korea.

Messages

MARS operators just handle personal messages to and from Armed Forces and other U.S. Government personnel (plus their dependents) serving overseas. MARS message traffic cannot be addressed to personnel aboard ships. Such messages must be addressed to an authorized APO or FPO. The three MARS organizations cooperate with each other in regard to handling traffic. Interservice transfer of narrative traffic is authorized among the three MARS organizations. Interservice message transfer enhances each group's traffic-handling capability by providing additional traffic-delivery outlets.

Here is Joe Ascano, VE3LHY, of Toronto, Canada. He has been licensed to operate in Canada since August 1978. He uses a Kenwood TS-830S transceiver and a Cushcraft AP-8 vertical antenna most of the time. Joe has contacted amateurs in 43 states, and he has 35 DX contacts confirmed. He usually operates on code. In addition to amateur radio, he also enjoys photography, skiing, and stamp collecting. Joe is 38 and single. He works for Northern Telecom Limited as a senior electronic repair technician in their small-systems computer department. Joe was an active staff member of DU1UST (University of Santo Tomas) before he moved from the Philippines to Canada during 1974.

NEW Products From The POWER Of MIRAGE/KLM

New Antenna Power For 6-Meters

Nothing on today's market can match the performance of these TWO newly designed antennas .... The elements are grounded to the boom to prevent static build-up ... Extremely broadbanded in their performance ... With all stainless steel hardware and rugged construction for survivability ....

6M-10

ELECTRICAL		MECHANICAL	
Bandwidth	50-52 MHz	Elements	10
Gain	11.7 dBd	Element Length	116"
VSWR @ 50.1	less than 1.2 to 1	Boom Size	2" o.d. × 34' 3½"
Front-to-Back	26 dBd	Turn Radius	21¾'
Feed Impedance	50 Ohms	Windload	4.4 sq. ft.
Balun	4:1, 5kw PEP	Weight	29 lbs.
Wavelength	1.74	Mast	2"

6M-14

ELECTRICAL		MECHANICAL	
Bandwidth	50-52 MHz	Elements	14
Gain	14.0 dBd	Element Length	116"
VSWR @ 50.1	less than 1.2 to 1	Boom Size	3" o.d. × 61'
Front-to-Back	25 dBd	Turn Radius	35½'
Feed Impedance	50 Ohms	Windload	10 sq. ft.
Balun	4:1, 5kw PEP	Weight	43 lbs.
Wavelength	3.10	Mast	2"

New Pre-Amp Power For All Bands

MIRAGE is in production on new pre-amps for the following bands:

6 Meters
2 Meters
1¼ Meters
70 Centimeters
23 Centimeters
(Coming Soon)

And each is available as a *mast mount* pre-amp or an *in-shack* model. Reasonably priced and rugged ... these reliable pre-amps are ready now.

All of these new pre-amps will carry a *gain in excess of 20 dB* and the *lowest noise figure in the industry of less than 0.6 dB.*

Increase Your POWER With MIRAGE/KLM

Your shack just got more flexible with these 12 amplifers

New Amplifier Power For 50, 144, 220 MHz Marine Band and 1.2 GHz

They all have our new GaAs-FET pre-amps with the lowest noise figure in the industry at less than 0.6 dB ... and each with a gain in excess of 20 dB ... switchable gain on pre-amp to prevent intermodulation ... high VSWR protection, over-power protection, and over-temp shutdown gives you all the flexibility you'll ever need.

2-Meter Power

B-5016-G
50W in
160W out
144-148 MHz

B-5030-G
50W in
300W out
144-148 MHz

B-108-G
10W in
80W out
144-148 MHz

220 MHz Power

C-5012-G
50W in
120W out
220-225 MHz

C-5024-G
50W in
240W out
220-225 MHz

C-3024-G
30W in
240W out
220-225 MHz

C-106-G
10W in
60W out
220-225 MHz

6-Meter Power (Coming Soon)

TWO new amps for
50-52 MHz
Low Input
High Output

1.2 GHz Power (Coming Soon)

TWO amps to use on
1200-1300 MHz
Low Input
High Output

Marine Band Power

M-120-G
2W in
25W out
156.00-158.50 MHz

This handheld size amplifier can be used for just about anything in Marine band communications. Low-noise GaAs-FET pre-amp, gain in excess of 20 dB and of course, high VSWR shut down. In addition, this amp operates comfortably in 2-meters.

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Personal (third-party) message traffic can be refiled between amateur (National Traffic System) and MARS. This is done when it is impractical to handle a particular piece of traffic solely via MARS networks. MARS-originated traffic must be converted to the amateur radio format before it can be refiled into an amateur net. Similarly, amateur-originated traffic must be converted to the MARS format before it can be refiled into a MARS net. The third-party restrictions that apply to amateur radio also apply to MARS. MARS has additional restrictions regarding messages about death or serious illness in one's immediate family; such traffic cannot be handled via MARS networks. MARS official administrative traffic cannot be refiled into our amateur radio service. Third-party traffic cannot be originated by, or delivered to, personnel serving in areas or in countries which do not allow MARS operation.

If a piece of MARS overseas-originated (only) traffic cannot be delivered through MARS or amateur nets, the Department of Defense (DoD) pays the postage that is required to deliver it. Mail delivery of traffic is avoided as much as possible. CONUS-to-CONUS traffic cannot be mailed.

Benefits

The following benefits can be derived from participation in the MARS program:

1. Additional experience operating all modes while using military callsigns on military frequencies in local through international nets.

2. Learning the correct method to handle military communications, plus the subsequent satisfaction of providing this important service.

3. Increased communication opportunities.

4. Opportunities to expand one's knowledge of electronic and communication subjects by completing free correspondence courses offered to Army MARS members. Opportunities to expand one's knowledge of electronic and communication subjects by completing Navy Electricity and Electronics Training Series (NEETS) correspondence courses are offered at no charge. Twenty NEETS modules range from basic electricity through the principles of microwave and radar. MARS members are eligible to take all such courses available to active-duty military personnel. Such courses require a minimum of six months active participation prior to enrollment. This program is not presently available to Air Force MARS members.

5. Association with the military service branch of one's preference, participating in structured nets conducted under military communication rules. This training could benefit anyone who later enters a military service.

6. Participation in the surplus (excess) equipment program after six months of active membership. This opportunity can be important to new amateurs who need equipment and/or accessories to improve their stations. Such property is excess to DoD and civilian federal agencies' needs. It is issued to MARS members for experimental and operational purposes as long as they remain active in MARS. It remains U.S. property that is subject to recall at any time. Issuance is based on equipment availability, plus consideration of possible operating assignments of individual operators. Granting MARS membership to an individual (or group) does not automatically include entitlement to receive (or demand) MARS property. The variety of surplus items is very slim, and most items have to be repaired before they can be used.

Conclusion

This completes the first part of this article. The second (concluding) part covers eligibility, Novice eligibility, joining MARS, Air Force MARS, Army MARS, Navy-Marine Corps MARS, participation, and resigning.

Announcing:

The 1990 CQ World-Wide VHF WPX Contest

Starts: 0000 UTC Saturday, July 14, 1990
Ends: 2400 UTC Sunday, July 15, 1990

1. Contest Period: 48 hours for all stations, single or multi-operator. Operate any portion of the contest period you wish.

II. Objectives: The objectives of this contest are for amateurs around the world to contact as many amateurs as possible in the allotted 48-hour period, to promote VHF/UHF activity, and to allow VHFers the opportunity to experience the enhanced propagation available at this time of year, and for interested amateurs to collect VHF prefixes for award credit.

III. Bands: The 50, 70, 144, 220, 432, 902, and 1296 MHz bands may be used, as authorized by local law and license class.

IV. Type of Competition: 1. Single operator—(a) all band; (b) single band; (c) all band, low power; (d) single band, low power. 2. Multi-operator—(a) all band; (b) single band. 3. Portable (with temporary power source only). 4. FM only. The "portable" category is for single or multi-operator stations. Low power is defined as 30 watts PEP output or less. Stations may select one category of competition only. All transmitters must be located within a 500 meter diameter, or within the property limits of the station licensee's address, whichever is greater. The antennas must be physically connected by wires to the transmitters.

V. Exchange: Callsign and "Maidenhead" locator grid square (4 digits, e.g., FN20). Signal reports are optional and need not be included in the log entry.

VI. Scoring: One point per QSO on 50, 70, and 144 MHz; 2 points per QSO on 220 and 432 MHz; 4 points per QSO on 902 and 1296 MHz. Work stations once per band, regardless of mode. Multiply total QSO points times the **total** number of prefixes (PX) worked. This differs from the scoring for the *CQ* HF WW WPX Contest, where a prefix counts only once regardless of band.

Example: W1XX works stations as follows:
37 QSO's and 12 PX's on 50 MHz
45 QSO's and 18 PX's on 144 MHz
26 QSO's and 10 PX's on 220 MHz
38 QSO's and 11 PX's on 432 MHz
6 QSO's and 3 PX's on 1296 MHz
W1XX's total score is: 234 QSO points × 54 PX's = 12636.

VII. Multipliers: The multiplier is the number of prefixes worked, additive on a band-to-band basis. A prefix is considered to be the three letter/number combination which forms the first part of an amateur radio callsign (N1, W2, WB3, K4, AA6, WD8, 4X4, DL7, G3, IT9, NP2, PY7, VK4, Y32, Y33, KT4, JE3, etc.). **A station in a call area different from that indicated by his callsign is required to sign portable.** This applies even for home stations (e.g., WB2OTK has a licensed station location in SC,but is required to sign /4 for contest purposes only. In all cases, the portable prefix is the multiplier. **Example:** NV6O/2 counts as NV2; KT2B/VE3 counts as VE3; KR2Q/C6A counts as C6A; 4X4FN/W2 counts as W2. **Special-event, commemorative, and other unique prefix stations are encouraged to participate.** A station who changes location during the course of the contest is free to contact as many other stations as he wishes; however, the moving station counts as only one QSO and PX **unless he changes call areas** during the course of operations, in which case his prefix changes by definition, thus becoming a new QSO and PX.

Example: K2SMN operates from the NJ/PA border; he may be counted as K2SMN for one QSO and one PX (K2) by all those he contacts from NJ. He may be counted as K2SMN/3 for one QSO and one PX (K3) by all those he contacts from PA, including stations previously worked from NJ. Changing "grid squares" does not justify a new contact.

VIII. Awards: Engraved trophies will be awarded to the top-scoring stations in each category and major geographic area where competition is indicated. Parchment certificates suitable for framing will be awarded to the top-scoring stations in each category and minor geographic area where competition is indicated. Certificates may also be awarded to other top-scoring stations who show outstanding contest effort. Major geographic areas include North America, Europe, and Japan as of this writing, but may be extended to include other areas as justified by competitive entries. Minor geographic areas include states (U.S.), provinces (Canada), countries (Europe), and call areas (Japan), and may also be extended to include other subdivisions as justified by competitive entries.

Logs must be postmarked no later than August 31, 1990 to be eligible for awards. All logs and log form requests should be mailed to the *CQ* VHF WPX Contest, *CQ* Magazine, 76 N. Broadway, Hicksville, NY 11801.

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- All HF Bands • 150W Output
- Receive 2 Frequencies Simultaneously
- Plus Much More

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- 100% Duty Cycle
- 40 Memory Channels

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- 100% Duty Cycle • 100 Memories
- Direct Keyboard Entry
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- HF Transceiver/General Coverage Receiver
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2m/70cm Dualband FM Transceiver
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COMPACT 2M FM Mobile

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HF "PERFORMANCE" RIG
- 160-10M/General Coverage Receiver
- Built-in Power Supply and Automatic Antenna Tuner
- SSB, CW, FM, AM, RTTY • QSK to 60 wpm

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IC-765 HF XCVR
- Built-In Automatic Antenna Tuner & Power Supply
- 99 Memories • 100W Output
- General Coverage Receiver
- Band Stacking Registers

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Compact and Lightweight HF
- 100 Watts Output • Noise Blanker
- General Coverage Receiver

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IC-725 Ultra Compact HF XCVR
- 26 Memories w/Band Stacking Registers
- USB/LSB/CW, AM Receive Optional Module for AM Transmit and FM TX/RX
- 160-10M Operation • 100W Output
- Receive 30 kHz-33 MHz

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2 meter HT
RX 138-174 MHz
TX 140-150 MHz
7 Watts

IC-32AT Super Dualband FM HT
- 5 Watts on Both Bands
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- Stores Standard & Odd Offsets

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Heavy Duty-High Quality-Rugged-Reliable
- Input Voltage: 105-125 VAC Output:13.8 VDC ± .05\
- Fully Electrically Regulated 5mV Maximum Ripple
- Current Limiting & Crowbar Protection Circuits
- M-Series with Meter A-Series Without Meter

Model	Cont. Amps	ICS Amps	Price
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RS7A	5	7	59
RS12A	9	12	79
RS20A	16	20	99
RS20M	16	20	119
RS35A	25	35	159
RS35M	25	35	179
RS50A	37	50	229
RS50M	37	50	249

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SUPER "PERFORMANCE" HF
- Direct Digital Synthesis (DDS)
- 200 Watts • All Amateur Bands

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PORTABILITY & PERFORMANCE HF
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HDP-1396	Headphones	
HD-1234	Coax Switch	

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rfc 2-317 2M
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2-117	2M	10-170W	$319.00
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Check these features:
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- Complete with base and rotor plate
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Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$CALL
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Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!

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Model	Height	Ant Load*	Weight	Delivered Price*
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HBX56	56 ft	10 sq ft	385	$699
HDBX40	40 ft	18 sq ft	281	$569
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60'	939	1389	1939
70'	999	1719	2159
80'	1199	1869	2369
90'	1289	2039	2579
100'	1369	2199	2989
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120'	1669	2619	3429

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Model	Min.Ht.	Max.Ht.	Ant.load*	Sale price
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TX472	23'	72'	18 sq ft	2279
HDX555	22'	55'	30 sq ft	2079
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- RG-213/U—95% Bare Copper Shield
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- Non-contaminating Vinyl Jacket Foam Dielectric

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- Same specs as Belden 9913
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Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.6
9086	50	.4	.64	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HELIAX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Heliax®	$29	$29	$29	$29
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COAX CONNECTORS

Amphenol Silver PL259	$1.50
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Stranded Copper 14ga	$.10/ft.
Dog bone end insulator	$.79 ea.

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40-2CD 2-el 40 mtr Beam	
A50-5 5-el 6 mtr Beam	
215 WB NEW 15-el 2 mtr Beam	
230 WB NEW 30-el 2 mtr Beam	
4218 XL 18-el 2 mtr Beam	
3219 19-el 2 mtr Beam	
424B 24-el 432 MHz Beam	
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V2S 2-mtr Base Vertical	
V4S 440 MHz Base Vertical	
TH5MK2S Broad Band 5-el Triband Beam	
TH7DXS 7-el Triband Beam	
TH3JRS 3-el Triband Beam	
205BAS 5-el 20-mtr Beam	
155BAS 5-el 15-mtr Beam	
105BAS 5-el 10-mtr Beam	
204BAS 4-el 20-mtr Beam	
64BS 4-el 6-mtr Beam	
12 AVQ 20-10 mtr vertical	
14 AVQ 40-10 mtr vertical	
18 AVT/WB 80-10 mtr Vertical	
18HTS 80-10 mtr Hy-Tower Vertical	
23BS 3-el 2 mtr Beam	
25BS 5-el 2 mtr Beam	
28BS 8-el 2 mtr Beam	
214BS 14-el 2-mtr Beam	
2BDQ 80/40 mtr Trap Dipole	
5BDQ 80-10 mtr Trap Dipole	
BN86 80-10 mtr KW Balun W/Coax Seal	

HUSTLER

6BTV 80-10 mtr Vert	$149	5BTV 80-10 mtr Vert	$129
4BTV 40-10 mtr Vert	$99	G7-144 2-mtr Base	$129
G6-144B 2-mtr Base	$89		

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT ELECTRONICS CO

HF6VX 80-10m Vertical $159.95 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical $149.95 Delivered
- Full Legal Power
- Automatic Band Switching

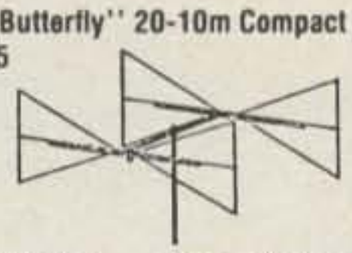
Accessories:

RMK II Roof Mtg. Kit	$59.95
STR II Stub-Tuned Radials	$39.95
TBR160 160m Coil Kit	$59.95
30m Add-on Kit	$39.95
17/12m Add-on Kit	$39.95

HF6V HF2V

FREE UPS on ACCESSORIES when purchased with antenna

HF5B "Butterfly" 20-10m Compact Beam $259.95



- Unique Design Reduces Size
- No Lossy Traps
- Turns w/TV Rotor
- Boom Length 6 Feet
- Element Length 12.5 Feet

FREE UPS Shipping in Continental USA

MIRAGE/KLM

KT34A 4-el Broad Band Triband Beam	$399
KT34XA 6-el Broad Band Triband Beam	$599

ROTORS

Telex CD 4511 (8.5 sq. ft. rating)	$Call
Telex HAM 4 (15 sq. ft. rating)	$Call
Telex Tailtwister (20 sq. ft. rating)	$Call
Telex HDR300 Heavy Duty (25 sq. ft. rating)	$Call
Yaesu G500A Elevation Rotor	$229.95
Yaesu G5400B Az/El Rotor	$429.95

ROTOR CABLE

Standard 8 cord cables $.25/ft. (vinyl jacket 2-#18 & 6-#22 ga)

Heavy Duty 8 Cond cable $.45/ft (vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G	$54.50	45G	$153.50
25G	$65.50	55G	$197.50

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Lead*	Price
FK2548	48 ft.	15.4 sq. ft.	CALL FOR PRICES
FK2558	58 ft.	13.3 sq. ft.	
FK2568	68 ft.	11.7 sq. ft.	
FK4544	44 ft.	34.8 sq. ft.	
FK4554	54 ft.	29.1 sq. ft.	
FK4564	64 ft.	28.4 sq. ft.	

25G Double Guy Kit	$299.
45G Double Guy Kit	$319.

*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	$.15/ft
1/4 EHS Guywire (6650 lb rating)	$.18/ft
5/16 EHS Guywire (11,200 lb rating)	$.29/ft
5/32 7 x 7 Aircraft Cable (2700 lb rating)	$.15/ft
3/16 CCM Cable Clamp (3/16" or 5/32")	$.45
1/4 CCM Cable Clamp (1/4" Cable)	$.55
1/4 TH Thimble (fits all sizes)	$.45
3/8EE (3/8" Eye & Eye Turnbuckle)	$6.95
3/8EJ (3/8" Eye & Jaw Turnbuckle)	$7.95
1/2 x 9EE (1/2" x 9" Eye to Eye Turnbuckle)	$9.95
1/2 x 9EJ (1/2" x 9" Eye & Jaw Turnbuckle)	$10.95
1/2 x 12EE (1/2" x 12" Eye & Eye Turnbuckle)	$12.95
1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle)	$13.95
5/8 x 12EJ (5/8" x 12" Eye & Jaw Turnbuckle)	$16.95
3/16" Preformed Guy Grip	$2.49
1/4" Preformed Guy Grip	$2.99
6" Diam - 4 ft Long Earth Screw Anchor	$19.95
500 D Guy insulator (5/32" or 3/16" Cable)	$1.99
502 Guy Insulator (1/4" Cable)	$3.49
5/8" Diam - 8 ft Copper Clad Ground Rod	$12.95

PHILLYSTRAN GUY CABLE

HPTG 2100I Guy Cable (2100 lb rating)	$.36/ft
HPTG 4000I Guy Cable (4000 lb rating)	$.59/ft
HPTG 6700I Guy Cable (6700 lb rating)	$.79/ft

This Is The New Phillystran Guy Cable, No Longer Requiring Potted Cable Ends.
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GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
12 in Wall	$29	$49	$69	$89
18 in Wall	$49	$89	$129	$149
25 in Wall	$69	$129	$189	$249

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CIRCLE 52 ON READER SERVICE CARD

AWARDS

BY DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for May is:

Jerry Ayers, W9ET
USA-CA All Counties #607,
Mixed, 1-12-89

"Freezing rain and snow were forecast for December 26, and the weatherman's prediction was correct. But it was Christmas vacation and the only time for my daughter, Candy, NU9A, a senior in high school, to give me Monroe County, Iowa.

Jerry Ayers, W9ET, USA-CA All Counties #607, at home in Indiana.

Freezing rain and snow didn't stop Candy Ayers, NU9A, from giving Dad Monroe County, Iowa.

"When I realized there were only a couple of hundred counties yet to work, I started going through my collection of QSL cards. Most of my older cards did not have counties printed on them, so it was necessary to look up the city location on each one.

"Neche, North Dakota (population 451) turned out to be in much needed Pembina county, North Dakota. A May 29, 1955 QSL was from a call familiar to many county hunters, WØOWY, Bill Nash, who is very prominent in MARAC affairs. Not only was this 1955 contact my oldest for a much needed county, but Bill also gave me Worth County, Missouri for the next to last for all counties.

"I discovered 14.336 MHz while working on 5BWAS in the late 1970s. Obviously, it took nearly ten years to accumulate the credits needed for USA-CA All Counties #607. In addition to having the fun of collecting counties, I have spent many enjoyable hours giving out counties while operating mobile.

"Thank you to the net controls and to the mobiles who helped me work them all. Special thanks to my daughters Misty, KA9JUP, and Candy, NU9A, for making long trips to give Dad much needed counties.—73, Jerry, W9ET."

333 South Lincoln Avenue, Mundelein, IL 60060

Awards Issued

George Judy, KD8HA, submitted his filled Record Book and qualified for USA-CA All Counties #650, USA-CA 3000 #678, USA-CA 2500 #753, USA-CA 2000 #821, USA-CA 1500 #907, USA-CA 1000 #1100, and USA-CA 500 #2386, All SSB Mobile, dated 1-2-90.

Clark E. Little, WA4NBC, completed his paperwork and claimed USA-CA All Counties #651, USA-CA 3000 #679, USA-CA 2500 #754, USA-CA 2000 #822, USA-CA 1500 #908, and USA-CA 1000 #1101, Mixed, dated 1-6-90.

John A. Robson, WB9STT, collected all of his confirmations and claimed USA-CA All Counties #652, USA-CA 3000 #680, USA-CA 2500 #755, USA-CA 2000 #824, USA-CA 1500 #909, USA-CA 1000 #1102, and USA-CA 500 #2390, All SSB Mobile, dated 1-18-90.

Andrew Weber, WA0ZBK, took one giant leap and applied for USA-CA All Counties #653, USA-CA 3000 #681, USA-CA 2500 #756, USA-CA 2000 #825, USA-CA 1500 #910, USA-CA 1000 #1103, and USA-CA 500 #2391, All SSB Mobile, dated 1-19-90.

Eddie Puskas, WA8RSQ, filed a full array of confirmations and received USA-CA All Counties #654, USA-CA 3000 #682, USA-CA 2500 #757, USA-CA 2000 #826, USA-CA 1500 #911, USA-CA 1000 #1105, and USA-CA 500 #2394, All SSB, dated 1-25-90.

Robert Tirk, KE9FG, updated his good record and received USA-CA 2000 #823, Mixed, dated 1-6-90.

Ronald P. Smith, VE1GU, received a gold seal for his certificate by claiming USA-CA 2000 #827, Mixed, dated 1-22-90.

Adriano Gugliucci, I1ZEU, submitted another block of confirmed contacts and qualified for USA-CA 1000 #1104, Mixed, dated 1-24-90.

Richard H. Weil, KW0U, updated his good record and received USA-CA 1000 #1106, All 20M SSB, dated 1-25-90.

USA-CA 500 certificates went to:

George Judy, KD8HA, USA-CA 500 #2386, All SSB Mobile, 1-2-90.

Vasteras Radio Club, SK5AA, USA-CA 500 #2387, Mixed, 1-6-90.

Maurice L. Schietecatte, N8CEO, USA-CA 500 #2388, Mixed, 1-10-90.

Anne-Giete Eriksen, OX3AE, USA-CA 500 #2389, All SSB, 1-16-90; #1 to OX-land.

USA-CA Special Honor Roll

George Judy, KD8HA
USA-CA All Counties #650, All SSB Mobile
1-2-90

Clark E. Little, WA4NBC
USA-CA All Counties #651, Mixed
1-6-90

John A. Robson, WB9STT
USA-CA All Counties #652, All SSB Mobile
1-18-90

Andrew Weber, WA0ZBK
USA-CA All Counties #653, All SSB Mobile
1-19-90

Eddie Puskas, WA8RSQ
USA-CA All Counties #654, All SSB
1-25-90

USA-CA Honor Roll

3000		2500		2000		1500	
KD8HA	678	KD8HA	753	KD8HA	821	KD8HA	907
WA4NBC	679	WA4NBC	754	WA4NBC	822	WA4NBC	908
WB9STT	680	WB9STT	755	KE9FG	823	WB9STT	909
WA0ZBK	681	WA0ZBK	756	WB9STT	824	WA0ZBK	910
WA8RSQ	682	WA8RSQ	757	WA0ZBK	825	WA8RSQ	911
				WA8RSQ	826		
		1000		VE1GU	827	1000	
		KD8HA	1100			KD8HA	1100
		WA4NBC	1101			WA4NBC	1101
		WB9STT	1102			WB9STT	1102
		WA0ZBK	1103			WA0ZBK	1103
		I1ZEU	1104			I1ZEU	1104
		WA8RSQ	1105			WA8RSQ	1105
		KW0U	1106			KW0U	1106
		500				500	
		KD8HA	2386			KD8HA	2386
		SK5AA	2387			SK5AA	2387
		N8CEO	2388			N8CEO	2388
		OX3AE	2389			OX3AE	2389
		WB9STT	2390			WB9STT	2390
		WA0ZBK	2391			WA0ZBK	2391
		G4UNH	2392			G4UNH	2392
		I1UW	2393			I1UW	2393
		WA8RSQ	2394			WA8RSQ	2394
		J1SOE	2395			J1SOE	2395

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to *CQ* is $4.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Communications, 76 North Broadway, Hicksville, N.Y. 11801, U.S.A. for $1.25. To qualify for the special subscriber rate please send a recent *CQ* mailing label with your application. To be eligible for the USA-CA, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending an SASE to Dorothy Johnson, WB9RCY, USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060, U.S.A. DX stations must include extra postage for airmail reply.

John A. Robson, WB9STT, USA-CA 500 #2390, All SSB Mobile, 1-18-90.

Andrew Weber, WA0ZBK, USA-CA 500 #2391, All SSB Mobile, 1-19-90.

Alex Pyne, G4UNH, USA-CA 500 #2392, All SSB, 1-23-90.

Renaldo "Ron" Briatta, I1UW, USA-CA 500 #2393, Mixed, 1-24-90.

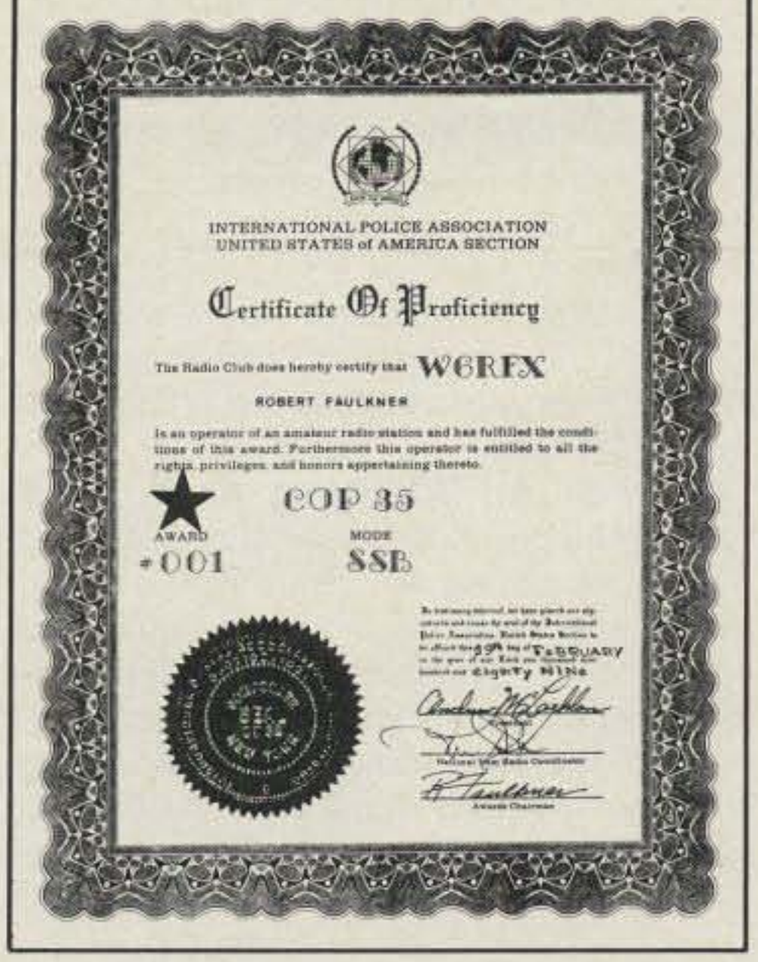
Eddie Puskas, WA8RSQ, USA-CA 500 #2394, All SSB, 1-25-90.

Nobuhiro "Shin" Watanabe, JJ1SOE, USA-CA 500 #2395, Mixed, 1-26-90.

Awards Available

COP (Certificate of Proficiency) Awards, Golden Badge Award. The COP and Golden Badge Awards are sponsored by the United States Section of the International Police Association Radio Club. They are designed to enhance the spirit of friendship among radio amateurs throughout the world according to the motto of the IPA: *Servo per amikeco* (Esperanto, meaning service through friendship).

The COP and Golden Badge Awards are open to all radio amateurs and SWL stations throughout the world. Award hunters must work IPA/RC members. A list of IPA/RC member stations and an application form are available from W6RFX, WA8VDC, or DL3MBE for an SASE/US or 2 IRCs.


INTERNATIONAL POLICE ASSOCIATION
UNITED STATES of AMERICA SECTION

Certificate Of Proficiency

The Radio Club does hereby certify that W6RFX

ROBERT FAULKNER

is an operator of an amateur radio station and has fulfilled the conditions of this award. Furthermore this operator is entitled to all the rights, privileges, and honors appertaining thereto.

AWARD #001

COP 35

MODE SSB

The COP Award sponsored by the International Police Association Radio Club, U.S.A. Section.


INTERNATIONAL POLICE ASSOCIATION
UNITED STATES of AMERICA SECTION

Golden Badge Award

The Radio Club does hereby certify that

is an operator of an amateur radio station and has fulfilled the conditions of this award. Furthermore this operator is entitled to all the rights, privileges, and honors appertaining thereto.

AWARD MODE

The Golden Badge Award sponsored by the U.S.A. Section, International Police Association Radio Club.

The awards have six steps or classes. The object of the awards is to eventually work an IPA/RC member in each of the 50 states of the United States of America. Awards may be earned for CW only, SSB only, or mixed CW/SSB.

1. COP 5 (Certificate Of Proficiency) award—Basic award issued for working one IPA/RC member in 5 different states of the U.S.A.

2. COP 15—Award issued for working one IPA/RC member in 15 different states of the U.S.A.

3. COP 25—Award issued for working one IPA/RC member in 25 different states of the U.S.A.

4. COP 35—Award issued for working one IPA/RC member in 35 different states of the U.S.A.

5. COP 45—Award issued for working one IPA/RC member in 45 different states of the U.S.A.

6. Golden Badge Award—Award issued for working IPA/RC member in all 50 states of the U.S.A. (walnut laser plaque plus brass call plaque and certificate).

A member station may be worked more than once from different states (example—W6RFX may be worked in California then worked again while he is visiting in Nevada). The QTH state at the time of contact is counted toward the award.

Mobile/portable IPA/RC member who QSO's a new state to any station will automatically receive credit for that state.

Awards are issued for contacts made after 1 November 1985. There are no band or mode restrictions.

U.S. stations send completed, verified application/log sheet and $1.00; non-U.S. stations send completed, verified application/log sheet and $2.00 for postage and mailing. The Golden Badge Award is $17.00 plus postage and handling. Mail to: IPA/RC Award Manager, Robert Faulkner, W6RFX, 15733 Rancho Ramon Dr., Tracy, CA 95376, U.S.A.

The J. Edgar Hoover (Ten Most Wanted) Award. The J. Edgar Hoover Award is sponsored by the United States Section of the International Police Association Radio Club. It is designed to enhance the spirit of friendship among radio amateurs throughout the world.

The award is open to all radio amateurs and SWL stations throughout the world. Award hunters must work IPA/RC members. A list of IPA/RC member stations and an application form are available from W6RFX, WA8VDC, or DL3MBE for an SASE/US or 2 IRCs.

The object of the award is to work an IPA/RC member in each of the ten radio call districts of the U.S.A. Awards may be earned for CW only, SSB only, or mixed CW/SSB.

The QTH of the station at the time it is worked will determine the district worked, not just the callsign of the station (example—If W6RFX is worked with a QTH of Nevada then the contact would count for area 7 and not area 6).

A mobile/portable IPA/RC member that QSO's a new state to any station will automatically receive credit for that state.

Contacts with stations in Alaska KL7 count as area 7 and Hawaii KH6 count as area 6.

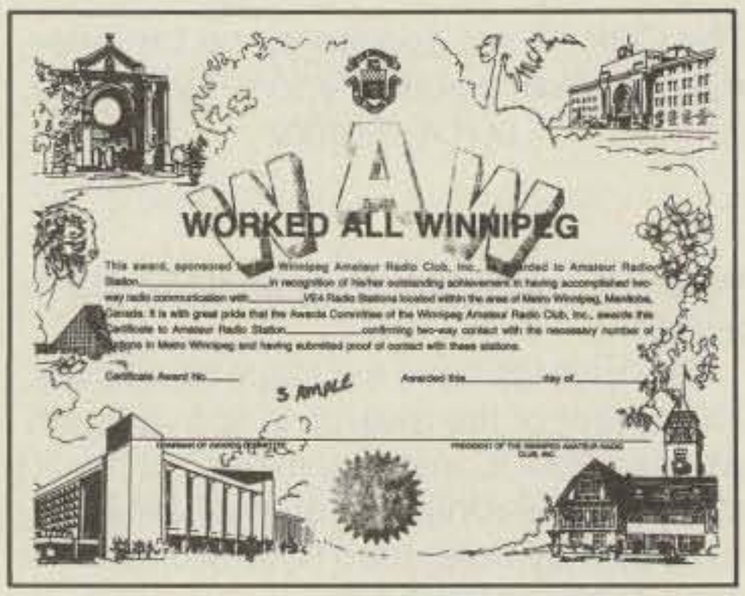
Awards are issued only for contacts after 1 November 1985. There are no band or mode restrictions.

U.S. stations send completed, verified

application/log sheet and $1.00; non-U.S. stations send completed, verified application/log sheet and $2.00 U.S. for postage and handling to: IPA/RC Award Manager, Robert Faulkner, W6RFX, 15733 Rancho Ramon Dr., Tracy, CA 95376 U.S.A.

(Ed. note: Information about the IPA was first published in this column in January and February. Please note changes in Award Manager.)

Worked All Winnipeg Award. The Worked All Winnipeg Award is sponsored by the Winnipeg Amateur Radio Club, Inc., and is awarded to an amateur radio operator in recognition of his/her outstanding achievement in having accomplished two-way radio communications with the required mumber of VE4 radio stations located within the area of the City of Winnipeg, Manitoba, Canada.



The Worked All Winnipeg Award offered by the Winnipeg Amateur Radio Club.

The award is a beautiful certificate on a parchment paper stock with drawings along its border of many of the buildings that represent the attractions of the city of Winnipeg along with the provincial emblems. The rules are as follows:

Stations *outside* Manitoba, but within the North American Continent must work at least 15 different Winnipeg stations.

Stations *within* Manitoba, including the city of Winnipeg, must work at least 25 different Winnipeg stations.

Stations *outside* the North American Continent need only work a minimum of 10 different Winnipeg stations to qualify.

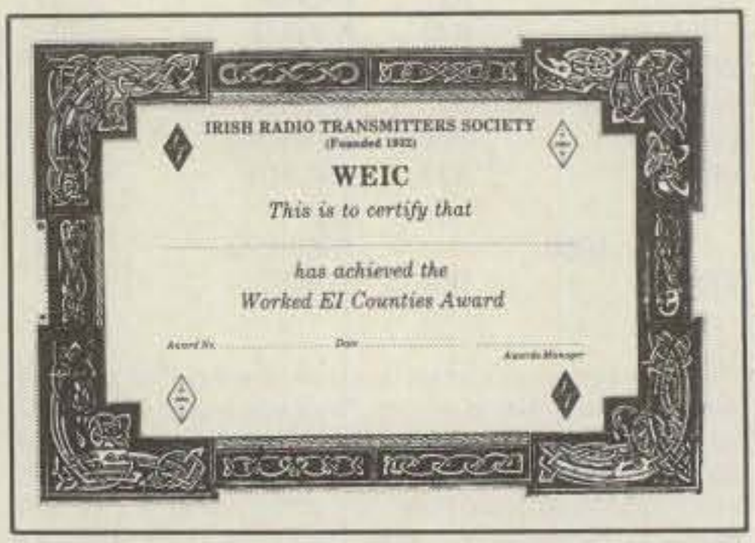
All bands may be used, and any mode, but the contacts must be *direct contacts* between two individual stations (repeater use is not valid). If a *single mode* and/or a *single band* is used for *all* of the qualifying contacts, this will be noted on the award.

All contacts taking place from January 1, 1956 on are accepted.

QSL cards are not required, but a certified *copy* (with signatures of two other amateurs who have checked your log) of your log book data is required. This copy should be sent together with the fee for the certificate and mailing costs ($2.00 or 6 IRCs) to "Worked All Winnipeg Award" Custodian, c/o Dick Maguire, VE4HK, P.O. Box 352, Winnipeg, Manitoba, Canada R3C 2H6.

WEIC Award. The Committee of the IRTS has introduced the WEIC (Worked EI Counties) Award. This is the first award to be sponsored by the IRTS, and the rules governing its issue are as follow.

The WEIC Award, issued by the Irish Radio Transmitters Society, is available to licensed amateurs worldwide who have worked EI or EJ stations located in at least 20 of the 26 counties of Ireland (EI/EJ). It is available also to SWLs on a "heard" basis.



WEIC Award from the Irish Radio Transmitters Society for working Irish counties.

In accordance with IARU Region 1 rules, a claim for the WEIC award must be accompanied by a QSO list, and by a statement from the applicants national DX Awards Manager that correctly filled in QSL cards are in the possession of the applicant. If this is not possible, the applicant must submit all QSLs concerned to IRTS. Applicants in Ireland must submit QSLs with their claims. Contacts only on and after 1 January 1982 are valid.

There will be a charge of IR 3.00 pounds or 10 IRCs for the award. There will be no mode or band endorsements. For applicants in EI only, all contacts must be made from the home station. Contacts made via repeaters or while operating mobile, portable, or from an alternative address will not qualify.

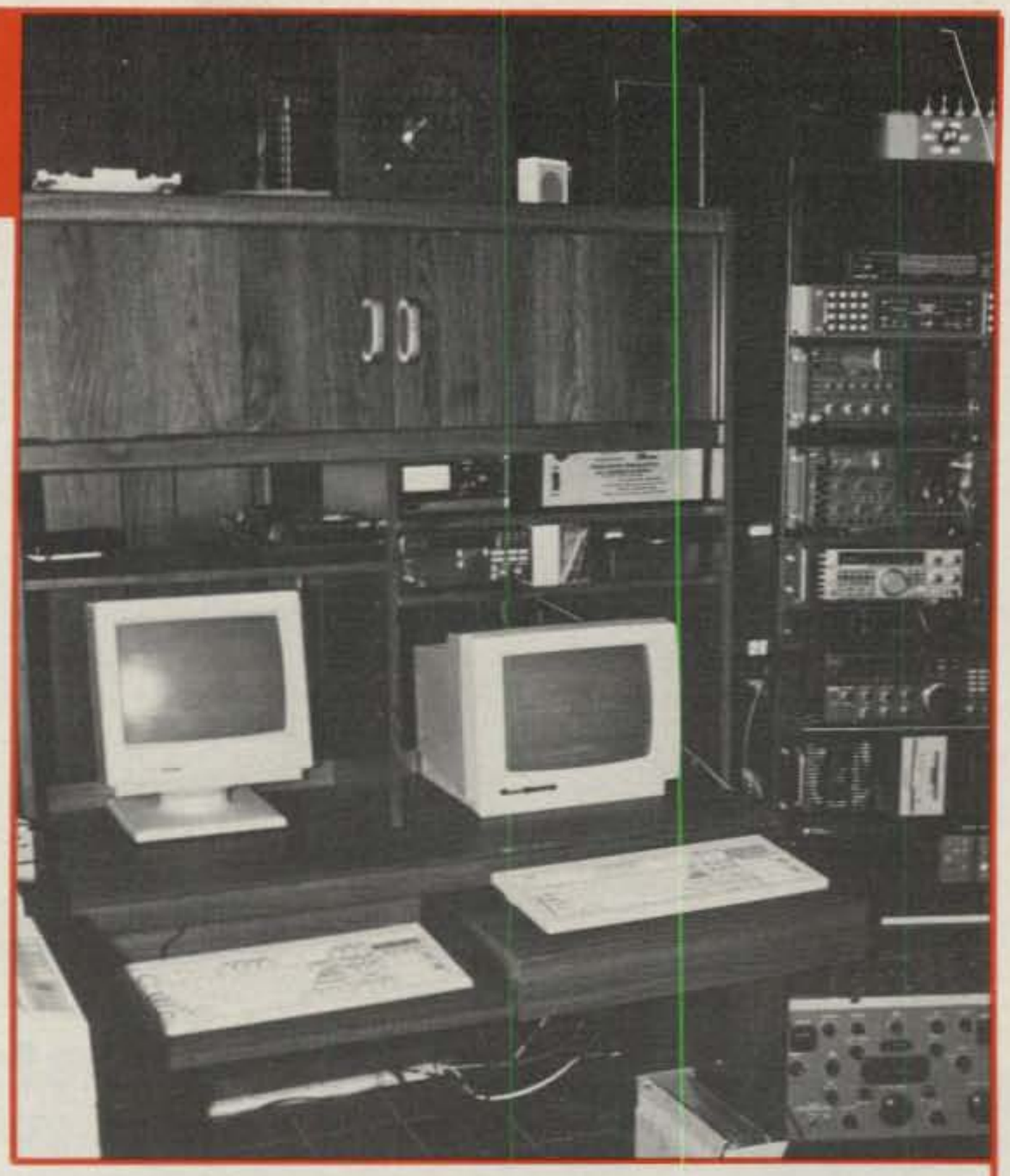
The EI counties are Carlow, Cavan, Clare, Cork, Donegal, Dublin, Galway, Kerry, Kildare, Kilkenny, Laois, Leitrim, Limerick, Longford, Louth, Mayo, Meath, Monaghan, Offaly, Roscommon, Sligo, Tipperary, Waterford, Westmeath, Wexford, and Wicklow.

Send your application to: The WEIC Award Manager, Irish Radio Transmitters Society, P.O. Box 462, Dublin 9, Ireland.

Unofficial information and answers to questions can be obtained (include an SASE) from Joe Duffin, W2ORA/EI8GT, IRTS Member, 4 West Central Ave., Moorestown, NJ 08057, U.S.A.

AROS Millenial Celebration Award. On the occasion of the AROS millenial celebration, ASEA Radio Amateurs (ARA)

COMPUTERIZE YOUR SHACK



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KENWOOD: TS-940, 440, 140, R-5000, 680, 711, 811
YAESU: FT-767, 757 GXII, 757 GX, 747, 9600, 736 212, 712
JRC: NRD 525
COLLINS: 651 S1

Knowledge of MS-DOS is not necessary - the installation program does it all! Datacom allows complete control of your rig from the keyboard. Move your cursor to the desired frequency and the radio will be set automatically.

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- **Adds unlimited memories. Stores frequency, description call sign, sked time, and comments for each frequency, limited only by disk storage.**
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- **Tabular screen display of all of the channels stored in memory, along with a full description of each including: MODE (LSB, USB, FM, etc.), eight character alphanumeric description, call sign, sked time, comments. Data files may be sorted by frequency, description, call sign, time, etc.**
- **Full featured logging utility allows searching for previous entries by call sign. Separate log for each service.**
- **Able to automatically log hits while sweeping or scanning.**
- **Color coded program for easy use (will run on a monochrome system).**
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- **50 page comprehensive user manual.**
- **Optional radio direction finder allows bearing information to be logged automatically.**

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EXT. INTERFACE ALLOWS 4 RADIOS (WITH SQUELCH DETECT)129.95
INTERNAL PC INTERFACE W/1 SERIAL & 1 RADIO PORT.....129.95
may be addressed as com1, com2, com3, com4 includes cables to radio
SPECTRUM ANALYZER MODULE.....(CALL FOR PRICE)
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COMSET ALLOWS OPERATION ON COM3 AND COM4.....25.00
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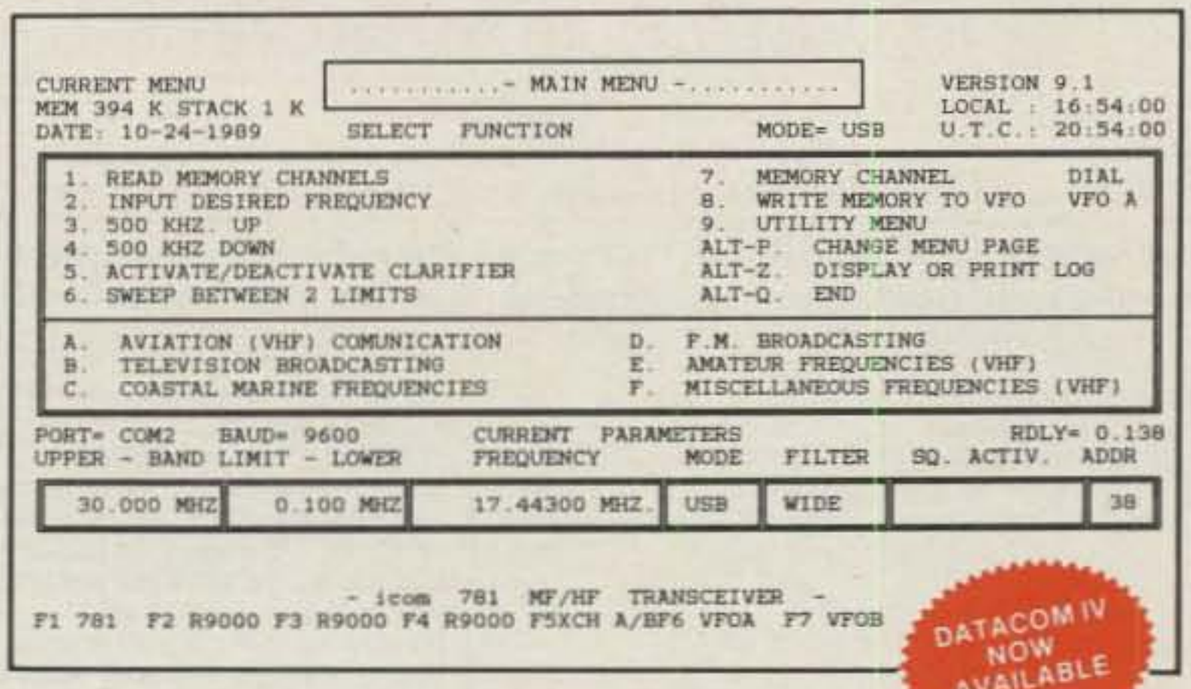
ICOM UX-14 INTERFACES IN STOCK
COMPLETE SYSTEMS (RADIOS, INTERFACE, & COMPUTERS)..(CALL)
30 MINUTE VIDEO TAPE GUIDE TO SETUP AND OPERATION....19.95



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CIRCLE 22 ON READER SERVICE CARD

1000-Ariga Aros-Diplomet issued by ASEA Radio Amateurs and Visteras Radioklubb, Sweden.

and Vasteras Radioklubb (VRK) issue this multi-colored award (1000-Ariga AROS-diplomet) during the period January 1, 1990 to December 31, 1990.

The requirement for winning the award is to have during the year 1990 QSOs with residents or visiting stations within the municipality of Vasteras.

Each QSO yields points depending on one's own QTH according to the rules below. One thousand (1000) points should be collected. All modes and bands may be used.

Calculation of points: QSO with the same station may take place several times; however, only once per band and day. A QSO over a repeater is not valid.

DX: QTH outside Europe—100 points per QSO. In all, 10 QSOs. Europe: Outside Sweden—50 points per QSO. In all, 20 QSOs.

Sweden: Outside Vasteras—20 points per QSO. In all, 50 QSOs.

Vasteras: QTH in municipality of Vasteras (U11)—10 points per QSO. In all, 100 QSOs.

SWLs: Independent of QTH—100 points per each presented QSL card from 10 different radio amateurs in Vasteras. In all, 10 QSL cards.

Double points: The club stations SK5PZ (ARA) and SK5AA (VRK) give double points.

Applications from licensed amateurs must be accompanied by a log extract, verified by two licensed radio amateurs. SWLs have to submit a GCR list. (A list of the cards that the applicant wishes to refer to in the application for the award. The applicant shall have all QSL cards at hand and have two licensed radio amateurs check the cards and verify this. The cards need not be enclosed with the application.)

To receive a special log sheet to make logging and application easier, send an SASE. Applications shall be mailed not later than January 31, 1991. SWLs not later than July 1, 1991. Send to Vasteras Radioklubb/Award Manager, Box 213, S-721 06, Vasteras, Sweden. The award is free of charge, but 4 IRCs for return postage (surface mail) are required. For applicants from SM, LA, OH, OY, OZ, and TF, however, the equivalent of 10 Swedish kronor in local currency is accepted.

Wyoming Centennial Award. The Wyoming Centennial Award is available to all radio amateurs and shortwave listeners for either working or hearing three Wyoming radio amateurs on any band/mode combination during the 1990 calendar year.

No official entry form is required. To apply, send an extract of your station log stating the details of three Wyoming QSOs or SWL reports along with $2.00 (U.S.) or 5 IRCs, and a signed statement that "the log extract information is correct and true in every respect as copied from my station log and I have established two-way communications with (heard) each of the three Wyoming radio amateurs as indicated." Applications must be received by January 31, 1991. Send all applications to Wyoming Centennial Award, University Amateur Radio Club, P.O. Box 3625, Laramie, WY 87021, U.S.A.

The week of July 8-14, the centennial week, will have at least one special-event station operating from the capital city, Cheyenne. Other special-event stations from around the state may also be active during the centennial week. Finally, the third annual Wyoming QSO Party will be sponsored by the University Amateur Radio Club during the first weekend in October (October 6 and 7) 1990.

K1BV DX Awards Directory

Word has been received that the 1990 edition of the K1BV directory is in print and available. It features 1380 different awards from 113 DXCC countries—a considerable expansion over earlier editions. For further information, get in touch with Ted Melinosky, K1BV, 525 Foster Street, South Windsor, CT 06074-2936, U.S.A.

Until next month . . .

73, Dorothy, WB9RCY

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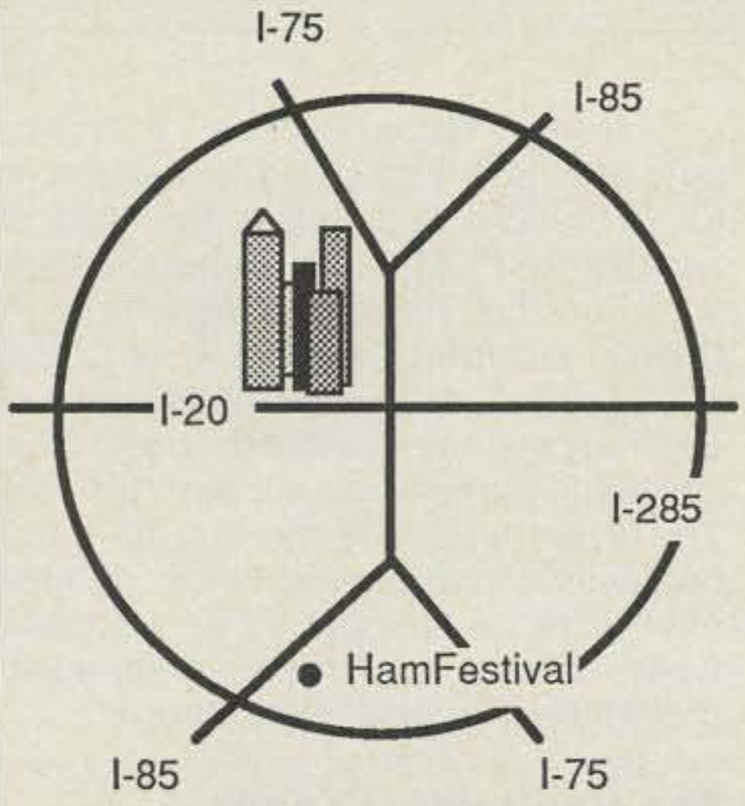

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CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Let the Games Begin!

The games you ask? A momentous event will occur for contesters worldwide as Amateur Radio Contesting has been officially included in the Goodwill Exchange Program of the 1990 Goodwill Games. On July 20, 1990 dozens of the best contesters from around the world will gather in Seattle, Washington to compete as participants in the World Radiosport Team Championship Contest.

Goodwill Games

The 1990 Goodwill Games will be the most significant and prestigious sporting event to occur in the United States this decade. The Games are jointly sponsored by the Seattle Organizing Committee, participating U.S. Sports Federations, Turner Broadcasting Systems, and the USSR State Committees for Sport and Television/Radio. Nearly 1 billion people are expected to view the 80+ hours of continuous television coverage. From July 20 to August 5, 1990 over 2500 athletes representing nearly 50 countries will compete in 21 olympic sporting events including basketball, boxing, gymnastics, figure skating, swimming, track and field, and volleyball to name a few. The 1990 Games are a significant expansion of the first Goodwill Games, which were held in Moscow in 1986 where numerous world and national records were broken. In all, the 1990 Games promise to be a celebration of firsts: The first Goodwill Games to be held on U.S. soil, and the first multi-sport invitational meet of its kind. In addition to athletic competition will be an impressive arts festival, the Goodwill Arts Festival featuring world-renowned talent in drama, music, dance, and visual arts. Additional programs will focus on trade and information interchange among areas of common interest between participating countries.

Amateur Radio Contesting At the Games

In keeping with the spirit of the games, a similar competitive event for amateur radio contesters has been planned. The World Radiosport Team Championship is in cooperation with the Goodwill Exchange Program of the 1990 Goodwill Games and has the participation and support of the Radio Sport Federation in the Soviet Union and the ARRL. On July 20, 1990 the 10-hour competition will begin (Contest Period: 2100Z July 20 to 0700Z July 21). Four two-man teams and alternates have been selected representing the U.S. and U.S.S.R. (see fig. 1). The United States team has the honor of being led by honorary captain Katashi Nose, KH6IJ. Additional competitors have been invited from Japan, Canada, Spain, Yugoslavia, Hungary, Bulgaria, England, Sweden, Finland, Italy, France, Germany, Czechoslovakia, Brazil, and Argentina.

All teams will operate from existing Seattle area locations using fully equipped ICOM stations and similar antennas. In addition to ICOM, other corporate sponsors for the World Radiosport Team Championship include Ham Radio Outlet, U.S. Towers, MFJ, and *CQ* magazine. Each has volunteered financial and other assistance to ensure a successful event. This event is clearly the first time that contesters from around the world have been able to compete on an equalized basis without equipment, geographic, propagation, or other advantages.

The Radiosport Team Championship Contest

Although the rules are being finalized as I write this, the basic concepts for the contest have been determined. The object of the event will be for amateurs to work the World Radiosport Championship Teams (designated by "/WG" after their callsigns) and each other. The competition will run on both modes (SSB and CW) on 80 through 10 meters with the exchange being RS(T) and serial number. Significant bonus points will be awarded to stations contacting team members, and an impressive array of awards and memorabilia will be available to participants. As you may have guessed by now, the official teams will be vying for gold, silver, and bronze metals and the opportunity to claim victory as some of the world's best contest operators.

Closing Thoughts

There needs to be some recognition to the hard work being delivered by a dedi-

Calendar of Events

Apr.	28-29	Swiss Helvetia Contest
Apr.	28-29	Hispanic DX Contest
May	5-6	Massachusetts QSO Party
May	5-6	Nevada QSO Party
May	5-6	MARAC County Hunters CW
May	12-13	Alabama/Georgia QSO Party
May	12-13	CQ-M DX Contest
May	19-21	Michigan QSO Party
May	20	OMARC Spring Midnight
May	**26-27**	**CQ WW WPX CW Contest**
June	2-3	RSGB Field Day
June	9-10	ARRL VHF QSO Party
June	16-17	All Asian Phone Contest
June	23-24	ARRL Field Day
July	**14-15**	**CQ WW VHF WPX Contest**
July	14-15	IARU HF World Champ.
July	20-21	World Radiosport Team Chp.
Aug.	4-5	ARRL UHF Contest
Aug.	25-26	All Asian CW Contest
Oct.	**27-28**	**CQ WW SSB DX Contest**
Nov.	**24-25**	**CQ WW CW DX Contest**

USA Team	USSR Team	
AA4NC	LY2BIG	UA3AO (Support Team)
K1AR	LY2PAJ	UA6HZ (Support Team)
K1DG	UA0SAU	UV3BW (Support Team)
K7JA	UA1DZ	UW3AX (Support Team)
KQ2M	UA9AM	UZ3AU (Support Team)
KR0Y	UA9SA	
W7EJ	UW3AA	
W9RE	UW9AR	
K1CC (Alternate)	RB5IM (Alternate)	
KN0E (Alternate)	UM8MO (Alternate)	
N2AA (Alternate)	UW0CA (Alternate)	
	UW0CN (Alternate)	

Fig. 1– USA/USSR World Radiosport Team Members.

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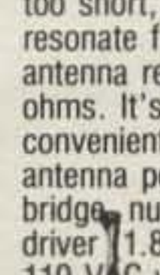
Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz to 30 MHz.



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MFJ-264, $109.95. Versatile UHF/VHF/HF 1.5 KW load. Low SWR to 650 MHz, usable to 750 MHz. Run 100 watts for 10 minutes, 1500 watts for 10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 inches.

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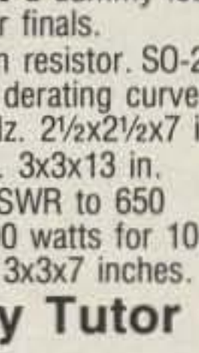

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Mounted in a brushed aluminum frame. Easy to set. The world's most popular ham clocks for accurate logs. MFJ-108B 4½x1x2;MFJ-107B 2¼x1x2 in.

Cross-Needle SWR/Wattmeter

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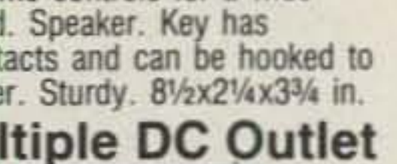

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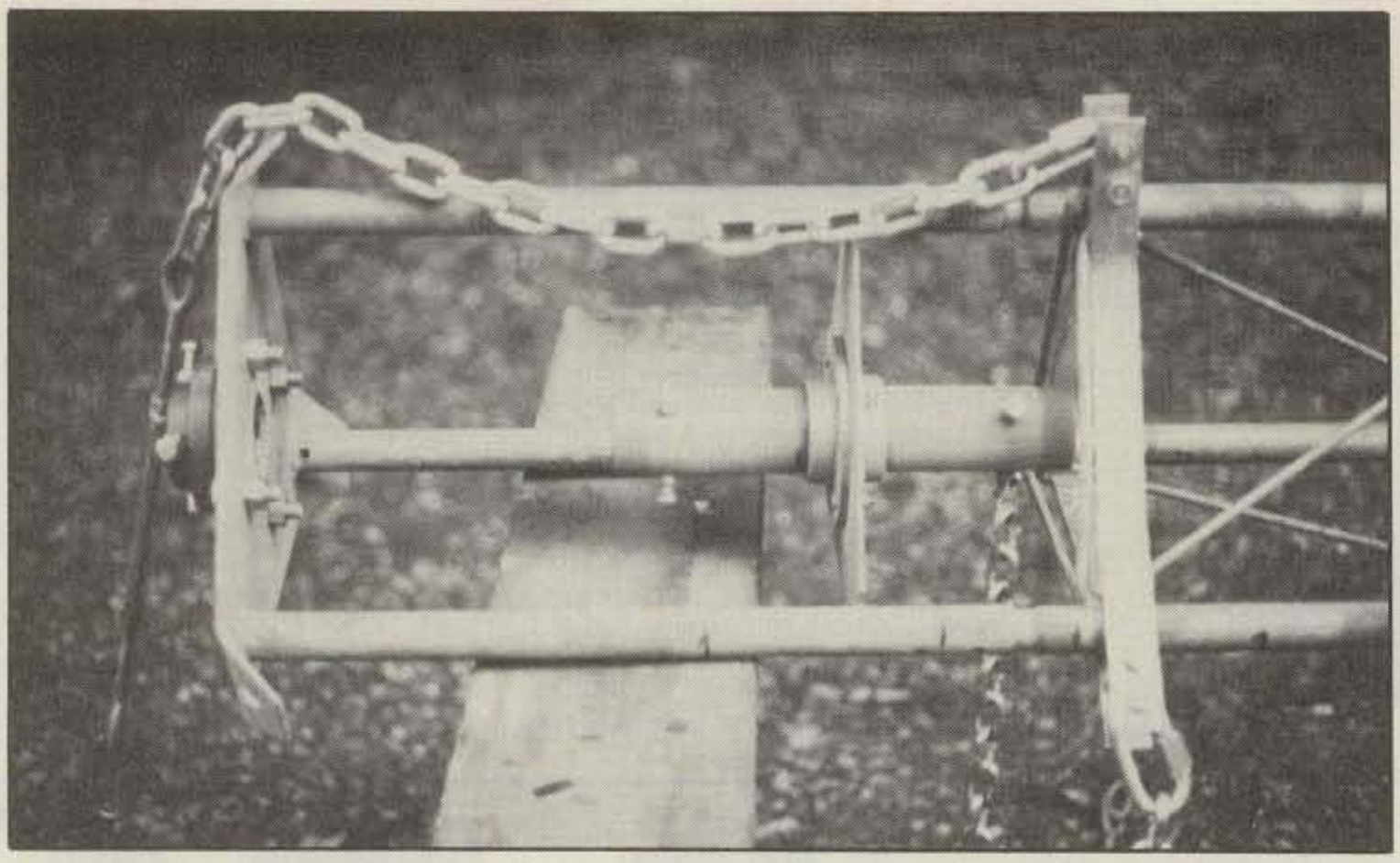

Photo 7– Lower part of the inverted section showing thrust bearing, opposing pinning/clamping nipple flange design, and guy assembly brackets with chain and turnbuckles as seen in photo 1.

bearing was bolted in place (photo 5). The original aluminum KLM boom-to-mast plate which came with the KT34-XA was modified to accept a standard 1⅞ inch pipe flange on the opposite side of the boom retaining saddle clamps. A 6 inch long by 1⅞ inch OD threaded nipple was screwed into the flange as far as possible. The nipple was then slid through the thrust bearing and secured by the set bolts of the TB3. A pipe endcap was screwed on the end of the inserted nipple in order to assure that the assembly cannot pull out of the TB3 (photo 6). For additional lateral strength during windy situations, two long #5 strength bolts were used to secure the two aluminum plates after the antenna assembly was complete. Although the TB3 was slightly greater than $60, it was worth every penny of it in terms of convenience and ease of rotation of the vertical axis.

The aluminum mast resting in the tower was raised through the original tower thrust bearing about 10 inches. The new inverted Rohn 25G mast, equipped with a thrust bearing, flange-nipple retaining device, and the side-mounted aluminum plate with thrust bearing, was raised to the top of the tower and slid over the protruding aluminum mast. The tower legs of the inverted 25G mast were aligned with the tower legs of the tower, and then the two sections were secured by using guy assembly brackets with torsion bars on each section and coupling the torsion bars with high-strength turnbuckles. In order to make up any differences in required lengths, a chain with 1 inch links was used (photo 7).

The securing of the inverted 25G mast to the tower was found to be an added measure of security when climbing or working on an antenna attached to the inverted 25G mast. Once secured, the aluminum mast was slid through the retaining nipples and set. Additionally, two muffler clamp retaining assemblies mentioned earlier clamped the lower nipples to the aluminum mast.

The elements and boom of the KT34-XA were preassembled on the ground, but not secured to each other. The modified aluminum KLM boom-to-mast plate with nipple was attached to the boom and the entire assembly raised and attached to the inverted 25G mast. The elements were then raised and attached in an opposing sequence, with the inner elements attached first. The entire assembly of the antenna on top was performed by me with the ground assistance of KA3DDT. In order to handle the rotation of the boom during element attachment, a nylon rope attached to the boom and laced through a pulley attached to the top of the inverted 25G mast section was used. This was also used to finally rotate the boom to a position perpendicular to the mast. An axial rotation fixed the elements in a horizontal position. The boom rotation via the thrust bearing was smooth and effortless.

The only problem encountered during the entire operation was the frictional force encountered during the axial rotation of the assembled antenna. Apparently, the frictional force created by the weight of the antenna at the interface of the boom and the KLM saddle clamps is extremely great, because I could not rotate the boom on-axis even with two 12 inch long levers securely attached to the boom. One spray of the boom and saddle clamp interface with WD-40 reduced the friction to a point where the on-axis rotation was rendered a one-arm operation.

The project was completed about five months ago, and no problems have been encountered, even in winds of 40 mph (photo 8). It is suggested that the rotor and 2 inch mast be pinned by a #5 bolt when using large arrays or long-boom arrays having a total surface area greater than 8 square feet. As of yet, I have not stacked additional arrays above the KT34-XA. Since I have a separate tower for a 40 meter Yagi, the only consideration at this time, given the small rotor, is a 2 meter array. As far as I am concerned, the KT34-XA is an exceptional tribander which has performed up to expectation. Given the disadvantage of a W2 area callsign in a pileup, it usually takes only one or two calls for a comeback during an east coast skip. Most amateurs would be very satisfied with these results. CQ

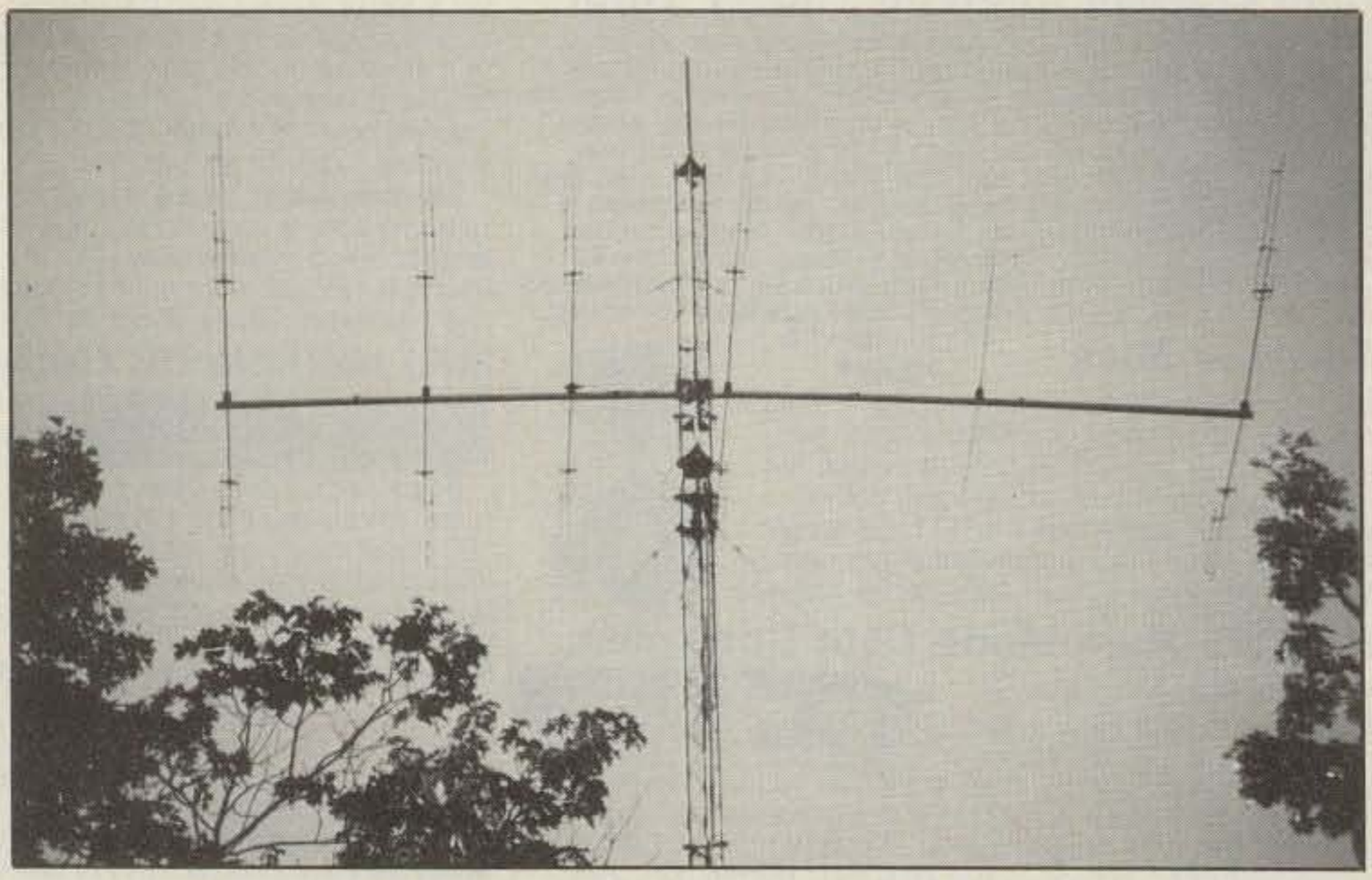

Photo 8– Completed project. It certainly was worth the effort.

California QSO Party Results

K6NA	366,618	KB9S	144,014
W6GO	350,436	K4XS	132,878
N6RO	304,268	KVØI	132,066
AI6V	288,318	NØBSH/9	109,272
W6REC	228,578	K9ZO	107,938
W6BIP	218,370	W5ASP	106,488
N6VR	217,906	NB1B	89,661
WX6M	212,860	KE9I	83,619
KD6FW	201,492	AJ9C	81,054
W6AB	197,838	N1CC	80,245

cated group of contesters who have made this monumental event become reality. They include: K7SS, K7LXC, KE7V, OH2BH, W7NG, KS7L, NV6Z, N7MJZ, W7QGP, and others. Organizing a worldwide event of this magnitude is nothing less than spectacular, and their contribution to contesting will be referenced for years to come!

For more information about the World Radiosport Team Championship contact: World Radiosport Team Championship, Danny Eskenazi, K7SS, Chairman, 4821 51st Street SW, Seattle, WA 98116 USA.

I will be attending the Dayton Hamvention this year and look forward to meeting many of you. I'll have a good supply of paper and pencils on hand, so bring your ideas for us to discuss during the weekend. As always, the deadline for the August column is June 1st.

Reminder: To avoid delays or possible omission from the Contest Calendar be sure to send your organization's contest announcements directly to: John Dorr, K1AR, 2 Baldwin Street, Windham, NH 03087 USA.

73, John, K1AR

Nevada QSO Party

0000Z May 5 to 0600Z May 6

The 1990 Nevada QSO Party is sponsored by the Frontier Amateur Radio Society.

Frequencies: 6 through 160 meters CW, SSB, FM, RTTY, packet, SSTV. Suggested frequencies are CW 15 up from bottom of general bands, phone 25 up from bottom of General phone bands as well as the Novice/Tech bands. No cross-mode or repeater contacts allowed.

Exchange: Nevada stations will send RS(T) and county. Others will send RS(T) and state/province/DXCC country.

Scoring: One point per contact per mode. Multiply points by number of NV counties worked.

Awards: Certificates to top scorers in each state for General and above as well as Novice/Tech. Also to top scorer in each DXCC country.

Submit log copies and summary sheet showing all scoring information to: Jim Frye, NW7O, 4120 Oakhill Ave., Las Vegas, NV 89121 by June 1, 1990.

MARAC County Hunters CW Contest

0000Z Sat., May 5 to 2359Z Sun., May 6

The Mobile Amateur Radio Awards Club is pleased to sponsor the 22nd annual County Hunters CW Contest. Mobile, portable, and fixed stations from every county in the U.S. are invited to participate. Mobiles/portables may be worked each time they change counties and must identify by signing /M or /P after their callsign.

Exchange: QSO #, category (mobile/portable only), RST, county, and state for US (Province/DXCC country for others).

Scoring: Fixed station QSOs are worth 1 point. Mobiles/portables and DX QSOs are worth 3 points. Final score is total QSO points times the total number of US counties worked.

Frequencies: 3575, 7055, 14060, 21060, 28060.

Awards: Certificates will be awarded to the winning fixed and portable stations in each state, province, and DXCC country (1000 points minimum). Other certificates are available to the winning mobile in each state operating from 3 or more counties (10 QSOs/county minimum). Plaques will be awarded to the highest scoring mobile and portable stations, North American fixed station, and DX station scoring at least 50,000 points.

Completed logs, summary sheets, and county lists (required for entries with over 100 counties) must be received by June 4, 1990. Send your logs to: Jerry Burkhead, N6QA, 7525 Baltic Street, San Diego, CA 29111. Include a #10 SASE for contest results.

Michigan QSO Party

1800Z Sat., May 19 to 0300Z Sun., May 20
1100Z Sun., May 20 to 0200Z Mon., May 21

This year's Michigan QSO Party will be sponsored by the Oak Park Amateur Radio Club. As usual, stations are allowed to be worked once on each band/mode. Portables and mobiles may be counted as new contacts each time they operate from a new county.

Exchange: RS(T), QSO number, QTH (county for Michigan stations, state/country for others).

Scoring: Michigan stations—1 point/QSO times (states + countries + Michigan counties). Each CW contact is 2 points/QSO. KL7/KH6 count as states and VE is considered a country. Credit 5 bonus points for each contact with the W8MB club station. Non-Michigan stations use similar scoring except multipli-

ers/QSOs are limited to Michigan counties. Maximum multiplier is 83.

Frequencies: CW—1810, 3540, 3725, 7035, 7125, 14035, 21035, 21125, 28035, 28125. SSB/VHF—1855, 3905, 7280, 14280, 21380, 28580, 50125, 144025, 146520.

Awards: Michigan—plaques are available to the high multi-operator/single-transmitter score, high Michigan (Upper Peninsula), high aggregate club score, and high VHF entry. Certificates will be awarded to the high score in each Michigan county. Non-Michigan—high out-of-state plaques will be awarded and certificates for the high score in each state and country.

Mailing deadline for logs is July 1, 1990. Send your logs to: Mark Shaw, K8ED, 27600 Franklin Road, Apartment 516, Southfield, MI 48034. Members of the Michigan QSO Party committee are not eligible for awards. Include an SASE for a copy of the final results.

OMARC Spring 1990 Midnight Special

0300–0500Z Sun., May 20

This is only a 2 hour quickie sponsored by the Overlook Mountain Amateur Radio Club (OMARC). The intent is to devise a short but fast operating period for entrants to have some exciting contest operating. Be sure to note that the first hour of the contest is limited to 40 SSB and the second to 80 CW.

Exchange: Name (use the name of the "elmer," or most influential amateur who helped get you started), callsign (use the callsign of your "elmer").

Frequencies: 7230–7250 40 meter SSB; 3530–3550 80 meter CW.

Club Competition: Include your club name on your summary sheet (you must be a member in good standing).

The deadline for reporting results is July 1, 1990. Send your logs, dupe sheets, summary forms to: Bob Schwenk, W2XL, 133 Clifton Avenue, Kingston, NY 12401. Final results will be published in the ARRL National Contest Journal.

Massachusetts QSO Party

0000Z Sat., May 5 to 2359Z Sun., May 6

The Wellesley Amateur Radio Society is pleased to announce this year's Massachusetts QSO Party. The object is for participants worldwide to work stations in Massachusetts on SSB and CW.

Exchange: RS(T) and QTH (county for MA stations; state, province, or DXCC country for others).

Scoring: SSB QSOs count 1 point; CW QSOs are worth 2 points/QSO. Credit 5 points for working the club station, W1TKZ. Final score is total QSO points times multiplier (MA counties for non-MA stations; states, provinces, DXCC countries, MA counties for others).

Frequencies: Operate 15 kHz from bottom of CW General bands and 25 kHz from bottom of SSB General segment. Same for Novice/Technician bands.

Certificates will be awarded (no additional information provided). The mailing deadline is June 6, 1990 and logs are to be sent to: Wellesley Amateur Radio Society, MA QSO Party, 211 Washington Street, Wellesley, MA 02181.

Alabama/Georgia QSO Party

1600Z Sat., May 12 to 2300Z Sun., May 13

This new QSO party is jointly sponsored by the Birmingham Amateur Radio Club (Alabama) and the Dixie DX'ers Contest Club (Georgia). Stations can be worked on each band and mode. Mobile and portable QSOs are valid each time they change counties. Alabama and Georgia stations may work each other for QSO and multiplier credit.

Exchange: RS(T) and QTH (county for AL/GA stations plus state; state, province, or DXCC country for others).

Scoring: 2 points for each SSB QSO; 3 points for each CW QSO. Final score is total QSO points times multiplier (AL/GA counties for non-AL/GA stations; states, provinces, DXCC countries, AL/GA counties for others). Mobiles in AL/GA may add 500 bonus points for each county from which they operate (10 QSOs minimum).

Frequencies: CW—1810 and 50 kHz from bottom of band; SSB—1860, 3900, 7260, 14300, 21360, 28400, 50110, 144200, 144500 kHz (use of repeaters is not permitted).

Awards: Certificates will be awarded to all participants. Special endorsements will be provided to the top scorers in each AL/GA county, US state, VE province, and DXCC country.

The mailing deadline is June 30, 1990. CW-only logs are to be sent to: Bill Levey, WA4FAT, 3164 Cahaba Heights Road, Birmingham, AL 35243. SSB and mixed logs go to: Lee Hiers, AA4GA, Box 888, Cornelia, GA 30531. Include the usual summary sheet and a large #10 SASE for your certificate and contest results.

CQ WPX CW Contest

0000Z May 26 to 2400Z May 27

Complete rules were in the January issue of *CQ*. Rules and summary/log sheets can be obtained from *CQ* Magazine, 76 N. Broadway, Hicksville, NY 11801. Check the current rules for the current trophy list. Results of the 1989 contest can be found elsewhere in this issue.

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CIRCLE 156 ON READER SERVICE CARD

WASHINGTON READOUT

BY FREDERICK O. MAIA, W5YI

REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

FCC Proposes Code-Free Amateur License

Complete Wrap-Up on the Proposed Communicator Class!

In response to several petitions from the amateur community, the FCC commissioners have agreed the amateur radio entry requirements should be modernized to better correspond with current communications technology and planned amateur operations. If adopted, it will mean the end of Morse code proficiency as a condition to gain admittance to the fantastic world of VHF and higher frequency amateur radio.

It certainly won't mean the end of the Morse code—a fun and efficient means of communicating for many of us (myself included). Actually "the code" was with us long before Samuel F.B. Morse, and it will be with us long into the future. It will just be electronically sent and received. Digital data transfer is the future of amateur radio, and every other radio service for that matter. Coded signals made up the earliest form of information exchange. Its significance continues to this day.

Primitive people built fire beacons, and used jungle drums and smoke signals, even reflected sunlight. Paul Revere, immortalized by Longfellow, used signal lights in the old North Church. "One if by land, and two if by sea . . . " Such were the first digital codes. The early codes were simply a series of binary (two of something—anything) happenings that when decoded, conveyed intelligence. Yes and no are binary codes as are start/stop and ones and zeros. Digital codes are both the earliest and most modern of concepts.

The Legacy of the Code

In 1820 the Danish scientist Oersted found that electric current could produce a reaction in a magnet placed near it. For the first time electricity had exerted a force. The 1832 discovery of inductance by Charles Henry inspired a struggling artist by the name of Samuel F. B. Morse to wonder about its long-range signalling applications. Could the currents be harnessed to transfer information?

Morse, assisted by Alfred Vail, from Morristown, New Jersey, fashioned various receiving devices, including one which made marks with a pen on a moving strip of paper. The term "telegraph" was born—writing by electricity. A code book at the sending and receiving ends was used to translate the dot/dash electric jiggles. A local printer helped Morse assign the dot/dash sequences. Since there were more "E's" and "T's" in the printer's type box, they reasoned they should be assigned the shortest sequences—dot and dash. Believe it or not, this is how the Morse code was developed. Invented by an artist and a judge with the help of a printer! They weren't scientists or engineers, simply curious amateurs. Truth is indeed stranger than fiction!

In 1844 Morse sent his famous "What hath God wrought" message between Washington and Baltimore—received on a paper tape. Later Morse found that the human ear was a better receiver which allowed him to eliminate the reference code book. Telegraphy caught on, and by 1851 there were more than 50 telegraph companies. It was Guglielmo Marconi, however, who propelled telegraphy into the long-distance information age. Marconi's discovery that electromagnetic signals could be transported through space without wire resulted in wireless telegraphy.

In December 1901 the Morse code leaped the Atlantic Ocean! The world was astonished and the era of the experimenting radio amateur began in earnest! Ships at sea could now communicate directly with land! Using spark transmitters, the ham operator discovered that radio signals often return to earth from the heavens thousands of miles away—a truly miraculous phenomenon! The age of wireless had arrived, and Morse code proficiency became a requirement for all ocean-going vessels. History's first coded SOS is also its most famous! Over a thousand lives were lost aboard the *Titanic* when it hit an iceberg in 1912 in the North Atlantic.

But technology, like time, never stands still. Better ways are continually being found to do most anything. In 1988 the International Maritime Organization, the United Nations agency devoted to the safety of ocean-going vessels, voted to phase out Morse code proficiency and direct ship-to-shore communications. They would replace it with a satellite-based digital process called the Global Maritime Distress and Safety System, GMDSS. This event also signalled to amateurs worldwide that it was probably time to take a hard look at amateur radio requirements.

Such is the tradition and sentiment of the Morse code. It has stood us well over the years, but it is time to move on. The alternative is a decaying amateur radio hobby. Would-be amateurs are moving on to the higher forms of digital data codes which they are transferring among themselves by other than wireless means because no government license is needed. It is a sad situation indeed. There are certainly more exotic codes than the binary Morse. Even the five-bit Baudot code is now considered antique.

The average age of the American amateur radio operator approaches fifty, amateur radio shows no growth, the commercial sector is being awarded our incredibly valuable spectrum, and the public has transferred their communications interest to the expensive landline when they could be investigating the free radio waves. Its time for another revolution! To refuse change is to deny progress. Think about it.

FCC Issues Code-Free Communicator Proposal

The Notice of Proposed Rulemaking (NPRM) adopted by the FCC on February 8th was released to the public on February 16th. PR Docket 90-55 proposes to establish a new class of amateur operator license that would not require the applicant to demonstrate proficiency in manual Morse code telegraphy. The proceeding was initiated by twelve petitions for rulemaking on matters generally related to the amateur operator license class structure, requirements, and privileges.

Background of the Proceeding

The amateur service exists internationally for the noncommercial purpose of self-

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101

training, intercommunication, and technical investigation. Article 32 of the international Radio Regulations requires licensed amateurs to be knowledgeable in the international Morse code. Although this requirement may be waived when the amateur operation is above 30 MHz, each of the five classes of operator licenses issued by the FCC requires Morse code proficiency.

The Commission has received many requests over the years from persons who wish to become amateur radio operators, but who argue that the code requirement is an unnecessary barrier to obtaining a license. Historically, the amateur community has always supported the telegraphy skill requirement for every class of amateur operator license.

The FCC developed a systemized license application processing system during the 1974 Docket 20282 codeless license proceeding. The computer programming provided for several new amateur service characteristics including automatic license renewals, a new amateur callsign assignment system based on four groupings, and a new entry-level Communicator class.

Obviously, the Commission intended to put these features into effect, or they would not have gone to the expense to have the software developed. While the callsign system was adopted, automatic license renewals and the codeless amateur class were not. To this day, 15 years later, the FCC's monthly computer-generated amateur service reports still contain empty spaces next to the lines for automatic renewals and new Communicator licensees added/upgraded. We see them every month.

The FCC tried again in 1983. Docket 83-28 suggested a codeless amateur class by offering two variations. One was to eliminate the code requirement from the Technician class. The alternative was patterned after Canada's digital license, which requires a very difficult essay-type written examination. Both were rejected by the U.S. amateur community.

Canada, by the way, is dropping their unpopular no-code digital class. They will be implementing a much easier to obtain code-free basic certificate which carries 30 MHz and above all-mode privileges in exchange for answering 60 out of 100 multiple-choice questions.

The FCC now feels " . . . the sentiment in the amateur community now appears to favor a codeless license class." It quoted the American Radio Relay League (ARRL) as saying it " . . . now supports a codeless license as being beneficial to the future, short and long term, of the amateur service" and added "The issue of a codeless class of amateur operator license, therefore, should be considered in light of current circumstances in the amateur service."

Discussion of the Petitions

The NPRM quotes from 12 petitioners who seek change in the amateur service structure:

1. " . . . numerous recent surveys have demonstrated that the concept of a no-code license is rapidly attracting a wide base of support within the amateur community." *(David Stall, N5MMK, Webster, TX, RM-6994)*

2. " . . . packet radio and other digital modes have become extremely popular and have led to amateur radio becoming increasingly attractive to computer-literate individuals who possess the ability to contribute significantly to the service, but who fail to perceive the relevance of manual Morse code. . . . the League perceives . . . a signif ant shift in attitudes among amateurs toward a codeless amateur license." *(ARRL, RM-6995)*

3. "Morse code operations were once the only way to make radio communications possible. It is now just a facet of an entire spectrum of possible methods of radio communications. It is no longer in keeping with the basis and purpose of the Amateur Radio service to stress one facet of radio communications over all others. Knowledge of code doesn't eliminate

rules violations or uncourteous operations." *(SCATG, Space Coast Amateur Technical Group, William Newkirk, WB9IVR, Melbourne, FL, RM-6986)*

4. " . . . the public need would best be served if there were a door into amateur radio that had a limited code requirement. Once in the door, these youngsters would be tempted to the rest of the world (and technology) of amateur radio. The public would be served as the base of potential scientists and technicians would be enhanced . . . " *(Burt Fisher, K1OK, Dennis, MA, an electronics school teacher, RM-6989)*

5. " . . . it is essential to have a codeless beginner license so that the amateur service will not stagnate or experience a decrease in the number of licensees, with a consequent increasing re-allocation of amateur service spectrum by the Commission to land mobile services." *(Dr. Michael Trahos, KB4PGC, an Alexandria, VA, physician/surgeon, RM-6990)*

6. "[A codeless class of license] would attract many young minds to the hobby of amateur radio . . . " *(John McCord, N1CVN, Indian Harbour Beach, FL, RM-6993)*

7. " . . . the issue of a codeless class of license [is] contentious and [the code requirement is] defended mostly by the older amateurs and championed by the very population needed for expansion." *(Dennis & Linda Welch, WB7VUM/WA7ZQV, Burke, VA, RM-6987. They also felt the Morse code is more of a barrier to amateur radio entry than a filter which yields disciplined operations.)*

8. " . . . its years as a realistic amateur radio licensing requirement are coming to an end." *(A reluctant observation by CW operator and well known amateur educator, Bill Welsh, W6DDB, Lancaster, CA, RM-6992)*

9. " . . . telegraphy is no longer necessary and the number of amateur operators must be drastically increased in order to continue to justify our existence." *(James E. Taylor, W2OZH, Webster, NY, RM-6985)*

10. " . . . the high speed telegraphy examination should be reduced to 15 words-per-minute or less." *(Clement Bourgeois, Jr., N5AIK, Erath, LA, RM-6988)*

11. " . . . telegraphy examinations [should] only require the examinee to recognize telegraphy characters, rather than to send and receive text at specific rates of speed. I believe that a person should not be excluded from the multitude of other forms of amateur radio on the basis of ability in just one area." *(Larry Ballentine, N5BZB, Bryant, AR, RM-6991)*

12. Alan Horowitz, KZ1Y, Miami, FL suggests " . . . a no code ham license, similar to Canada's license structure" which will be implemented shortly. *(RM-6984)*

Amateur License Restructuring

The ARRL doesn't believe the code is antiquated or irrelevant but this " . . . is a matter that some individuals must learn for themselves." Most petitions favored a structure that avoids any negative effect upon any current licensee.

Three of the petitioners favored adding a sixth no-code class. Others proposed mergers between current classes or making the codeless class non-renewable. James Taylor wanted one all-purpose operator class. Trahos said both the Novice and Technician classes should have codeless versions. Bill Welsh suggested obtaining emission mode endorsements by passing written and on-the-air operating tests. He also suggested that " . . . all frequency segments now offered as incentives be eliminated."

Code-Free License Parameters

The NPRM states, "The petitions generally concur that, as a minimum, a station control operator holding a codeless class of license be authorized all emission privileges on the 1.25 meter (m) and shorter wavelength bands. For the longer wavelength bands, however, there are several views, starting with James Taylor's recommendation that all possible privileges be authorized to the codeless class."

"Michael Trahos and SCATG recommend including the 6 m and 2 m bands. Burt Fisher recommends authorizing the 52-54 MHz segment in the 6 m band. He also recommends including the 2 m band, but excluding emission F3E on that band. The ARRL recommends excluding operation on both the 6 m and 2 m bands. Dennis and Linda Welch, David Stall and John McCord make recommendations similar to those of the ARRL. John McCord, however, suggests including digital type emission privileges on the 6 m and 2 m bands."

The petitions recommend that the eligibility for the codeless class of license, like all amateur operator licenses, require the passing of a written examination. The ARRL said code-free operation should be based on a 60-question examination more comprehensive than that of the present Technician class and be administered under the three-examiner VEC System. The League felt the five additional questions should be on telegraphy applications (2) and three on digital communication techniques. SCATG, on the other hand, stated the written examination should consist of 50 questions.

Various names for the new codeless class were suggested by the petitioners including Apprentice, Novice-V, Novice-Plus/Technician-Plus, and Limited. The League wanted "Communicator," since this class already existed in the FCC's license issuance function.

The FCC Proposal

The Commission felt the petitions had merit, and given the advances in technology, they felt it an appropriate time to consider establishment of a codeless license. "We propose, therefore, to establish a codeless class of amateur operator license, the Communicator Class" which the FCC said was based on three objectives:

I. . . . to offer an entry-level license opportunity to all persons who find the telegraphy requirement a barrier to pursuing the purposes of the amateur service;

II. . . . to propose a type of license that can be implemented quickly if a decision is made to proceed;

III. . . . to avoid any negative effect upon current licensees, upon the work of the volunteer examiners, or upon the Commission's workload or resources.

"To preclude any impact on our resources, it is imperative that our existing computer-aided application processing system be utilized 'as is.'"

Operator License Structure

The FCC recommended establishing four ascending license classes: Communicator, General, Advanced and Amateur Extra Class. Current Technician and Novice class licensees would be grandfathered indefinitely. "There would be no new licenses issued for those license classes, but existing licenses could be modified or renewed," the FCC said.

Several petitioners suggested preserving the five-step ladder by eliminating the code exam requirement from the Novice class. "This approach deserves careful consideration by the amateur community. We did not propose this approach because of its disadvantage of lowering the license qualification standards for the Novice operator class. As such, it may be unacceptable to the hundreds of thousands of amateur operators, including the 85,000 current Novice Class licensees, who qualified for the Novice license by passing a telegraphy examination. The Novice Class has operating privileges below 30 MHz, necessitating the need for a knowledge of telegraphy . . .

"For future licensees, the Communicator Class license would be the first step in the license structure instead of the Novice Class. Our premise is that most newcomers to the service, given the choice, would elect to qualify for the Communicator Class license, rather than the Novice Class license. There would, therefore, no longer be a need for the Novice Class license.

"We particularly invite instructors, volunteer examiners (VEs) and VECs to submit comments on the validity of this prem-

ise, including factual information on the time and effort that would be required for persons to prepare for the proposed 60 question Communicator Class written examination as compared to the time and effort currently required for the Novice Class 30 question written examination and telegraphy examination.

"Because the written examination for the Communicator Class license would be more comprehensive than that of the Technician Class license, the Communicator Class would also serve in the stead of the Technician Class for future licensees. Each step in the proposed four step structure provides recognition that the holder has significantly advanced his or her skills in both the communication and technical phases of the radio art. This structure could be rapidly implemented. The present license application processing system and license application form would continue to be used." The FCC said VEs could write in certain information on the current Form 610.

Operator Privileges

"The proposed control operator privileges of the Communicator Class would generally be those suggested by the ARRL." The privileges would include:

a. all authorized emission types above 222 MHz

b. transmitter power standard would be 200 watts PEP

c. callsigns assigned from the Group D (2-by-3) blocks

d. no privileges on the 2 m and 6 m bands

The FCC added, however, "In view of ARRL's desire to bring the codeless class into the mainstream of the amateur service, however, we particularly invite comments on the effect of excluding Communicator Class licensees from these two popular bands.

"The ARRL stated that one premise for its petition was that an accommodation should be made for codeless class licensees to upgrade their license class. It cited countries that have codeless licenses where the written examination tests the examinee's technical qualifications. The ARRL alleged that amateur service societies in countries such as Australia, the Federal Republic of Germany and Belgium report ongoing telegraphy activities among the codeless class licensees working to upgrade the license class.

"While the proposed Communicator Class privileges include telegraphy on the 1.25 meter and shorter wavelength bands, we recognize that telegraphy operation is more closely associated with the HF bands. The opportunity for newcomers to the amateur service actually to send and receive messages in the Morse code on small segments of the HF 80, 40, 15 and 10 meter bands is provided to the Novice and Technician Classes so that those operators can gain an appreciation of telegraphy and acquire the proficiency needed to pass the telegraphy examination for the General Class operator license. We specifically request comments, therefore, concerning the desirability of including the opportunity for Communicator Class licensees also to experience on-the-air telegraphy operation on the HF bands. In view of our obligation under the provisions of the international Radio Regulations, if it is desired, only domestic communications on the HF bands would be authorized.

"... a Communicator Class licensee who passes, or otherwise receives credit for a telegraphy examination, would be authorized the additional privileges of the Technician Class. To avoid a license processing burden, however, the documentation of the passing of, or credit for, a telegraphy examination would be evidenced by the Certificate of Successful Completion of Examination (CSCE) issued by the administering VE's, rather than by the issuance of a Technician Operator license. The indicator used by the Communicator Class for identification purposes would be AC.

"VE's would be authorized to grant examination credit, evidenced by a CSCE, to a Communicator Class examinee for the slow speed (5 wpm) telegraphy examination when the examinee holds a Novice Operator license. That combination, Communicator Class license and CSCE, would permit the Communicator Class licensee the same rights and privileges of the Technician Class operator. The VEC's would provide (monthly) listings, in paper or magnetic form, of the Communicator Class licensees who have been issued the CSCE."

Examination Standards

Code-free applicants must correctly answer 45 of 60 questions concerning the privileges of a Communicator Class operator license. Element 2 would be discontinued and the entire Novice/Technician question pool would become Element 3(A).

The topics and number of questions required in each Communicator question set are: FCC rules 15, operating procedures 7, radio wave propagation 4, amateur radio practices 11, electrical principles 6, station equipment circuit components 4, practical circuits 3, signals and emissions 4, antennas and feedlines 6.

Volunteer Examiners

The proposal contains significant changes in the amateur operator license examination procedure and the issuance of amateur operator licenses and CSCE's. "All operator license examinations would be administered under the VEC system. The additional task of administering the Communicator Class license would be offset by the elimination of other tasks, including the discontinuance of the two examiner system for the Novice Class license.

"The coordination and oversight by the VEC's provide more credible results than does the two examiner system. In the latter, examination administration errors are more common and cheating is a greater problem than in the VEC system. The task of administering new Technician Operator Class licenses would be discontinued. The Novice and Techni-

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the matter of

PR Docket No. 90-55	)	RM-6984	RM-6985
Amendment of Part 97	)	RM-6986	RM-6987
of the Commission's Rules	)	RM-6988	RM-6989
Concerning the Establish-	)	RM-6990	RM-6991
ment of a Codeless Class of	)	RM-6992	RM-6993
Amateur Operator License	)	RM-6994	RM-6995

Fig. 1 - Format for formal comments. Your comments should be typed on 8½" × 11" paper, preferably double spaced. You should begin by indicating your qualifications to comment on the proposal. Then explain your position and (if possible) document your position with supporting evidence. Remember the FCC is primarily concerned with the public interest, not just the Amateur Service. Address the issues raised in the NPRM. Close with a summary of your conclusions.

cian written examinations would no longer be prepared and administered as separate examinations. The VE's and VEC's, moreover, could be reimbursed for out-of-pocket costs incurred in connection with all examinations."

While Extra, Advanced, or General Class operators may assist in Element 3(A) question pool development; only Advanced or Extra Class licensees who are VEC accredited may administer Element 3(A) to Communicator Class applicants. By the 10th day of the month, VEC's must forward a list to the FCC's Private Radio Bureau of the applicants who have passed telegraphy examinations during the past month.

Are You A Volunteer Examiner?

If so, we would like to hear from you. Under the FCC proposal, only VEC accredited Advanced and Extra Class VEs would examine entry-level applicants. Three examiners would be required. How do you feel about that? Let us know, since your author (Fred, W5YI) is heading up a three-member committee that will be making testing recommendations to the various VECs attending the National VEC Conference being held in Gettysburg, Pennsylvania, on June 15th.

The VECs assembled at that conference will be adopting general guidelines for their comments and your input will be of great assistance in helping us formulate our position. One particular question we would like answered is how do you as a Novice-level examiner obtain the appropriate testing materials. Would it be better for these to be prepared and available to approved examiners from a VEC?

Conclusion

The FCC closed their NPRM with "We believe that this proposal would achieve the objectives set forth above. We seek comments, therefore, on the proposed revisions to Part 97 (Amateur Service Regulations) to establish a Communicator Class Operator license for the amateur service . . . " Comments close August 6, 1990, with replies due on or before September 7. See fig. 1 for the proper format for your comments.

Formal comments require an original and four copies. If you want each Commissioner to receive a personal copy, an original and nine copies must be filed. Comments should be sent to the Secretary, Federal Communications Commission, Washington, D.C. 20554. Indicate that you are commenting on PR Docket No. 90-55.

Notice of Proposed Rulemaking

While the NPRM is summarized here, we have exact, full-length copies of the entire Notice available for those of you who wish the exact wording—plus the FCC's proposed new Part 97 Communicator Class rules. It runs to several pages. Cost is $1.00 postpaid. A label with your name and address will be appreciated. Send to: W5YI Report, P.O. Box 565101, Dallas, Texas 75356. Ask for PR Docket No. 90-55, or just the new Communicator Class FCC proposal. We'll send it out the same day we get your request.

New Question Pools Issued

The VEC's Question Pool Committee has revised all of the question pools to conform to the new Part 97 Amateur Service rules. We have incorporated all of the changes in every pool in our new 300 page *1990 Radio Amateurs Licensing Handbook*. Every one of the nearly 2,000 amateur radio questions, multiple choices, and answers are listed for every license class. Cost is $9.95 plus $2.00 shipping from W5YI Publishing, P.O. Box 565101, Dallas, Texas 75356.

No - 83 - 84

PACKET USER'S NOTEBOOK

BY BUCK ROGERS, K4ABT

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Packet Radio's "New Wave" Comes of Age!

A few months ago there was a flurry of activity just before and during the packet conference in Colorado. That information concerning the new platforms, protocols, and modems was mostly for the high-speed trunks and backbone support and not for the end user. The problem with this kind of thinking is that it covers the handling of heavy data traffic, but it does not enhance the speed and effectiveness of direct connects at the user level.

We can draw an analogy to the old-fashioned telephone which had no dial, and a PBX which used patch cords instead of high-speed, solid-state, cross-point switching. What we are seeing is the high-speed switching being implemented, but the user level is seemingly to remain without any improvements.

The terminal programs have become so sophisticated that they include wonderful features such as the "Node-Walker"™©, which will enable your system to retain a list of routes to distant nodes or stations which can be executed at the touch of a couple of keys. Execute the "Node-Walker" feature, and in a few seconds you are connected to the distant node or station. You no longer need to remember a long list of node and digi calls that are contained in the routes to the distant station(s).

It appears that all our efforts have been centered around the construction of a bridge. Suddenly we realize that we have built both ends of the bridge, but we somehow omitted the center section of our point-to-point transition medium (we left out the middle). In the meantime, the feature-filled MULTICOM terminal programs give us the vehicle to input the data, while the trunks and backbones provide the long-haul, high-speed switching, and heavy traffic transport.

The Bottleneck: A Phone Without A Dial (TNC)

Nestled there between the super-terminal and the high-speed switching network is the TNC belonging to the end user. If you operate 2 meter packet, as about 85% of us do, then you are one of the many TNC owners who could benefit from a "super-charged" TNC.

In the last seven years the telephone modem (end user) has moved from 300 bauds, to 1200 bauds, and most recently to 2400 b/s. Seven years ago we packeteers were ahead of, or at least we were even with, the land-line modem users. What happened? Somehow we never addressed all the instruments of our hobby with the same level of importance.

An Alternative To 1200 Bauds?

Bob, WD4MNT, and I, along with many other packeteers in the southeast, enjoy a relief from, and an alternative to, 1200 bauds. We made an effort to stay abreast of the transition by using 2400 b/s phase shift keying (PSK) to send large ASCII, binary, and picture files via packet. We enjoy data throughput that gives us the maximum efficiency from our TNCs and 2 meter radios. Bob has written a routine into the new MFJMULTI.COM terminal program which gives an on-screen display of the number of bytes and the time used for a file transfer. This program maintains a record of the throughput regardless of the baud rate we use. As a matter of fact, this display is active from the first instant the transfer begins to the moment the last byte of the file is received at the target station. Included in the display is a running account of the current average throughput data displayed in time, bauds, and blocks.

At the transmitting station there is a display of the number of blocks of data that are received and stored to disk at the receiving station. At the end of each file transfer a window in the lower portion of the screen displays the actual "effective" baud rate. Other information is displayed there also, but the effective baud rate is the item that is most important to us at this writing.

Each packet must carry with it the "overhead information." The term "overhead information" refers to the call-sign(s), routing, and destination headers. This information is nonessential to the actual data contained within the file being transferred, but it is essential to the delivery of the data with regard to the destination, routing, and target station. Most of all, it is essential to the "error-free" transmission of the data because the HDLC CRC and frame check sequences (FCS) are contained in the header of each packet. This is how we begin to understand that all packet radio baud rates are not truly the data rate number applied to it—e.g., 9600 b/s is not truly 9600 b/s. Each AX.25, HDLC, packet sent via radio must be "**ACK**ed," and for this to happen, the sending station must pause while the receiving station sends that **ACK**. In AX.25 every level of baud rate from 300 b/s to infinity will not represent the throughput of the data only. One must also consider the total information that is contained in each packet when making the determination of the speed being sent and received.

An Affordable Alternative To 1200 b/s

EXAR developed a chip a few years back for use in other services. Since then the EXAR 2123 has found its way into the TNC by way of the add-on modem to give us 2400 b/s phase shift keying. Kantronics was one of the first to develop an add-on modem that would plug directly onto the headers on the circuit boards of their TNCs. Likewise, they made another wise move by adding the KPC-2400 to their product line.

Something Good is Happening

At the beginning of this year there were four TNC manufacturers either developing or marketing 2400 b/s add-on modems for their TNCs. By the time this article gets to print, there may be more. Something good is happening to advance packet technology for the end user. It is occurring without causing our TNCs to become obsolete. 2400 b/s is an economical as well as technological addition.

Since the TNC manufacturers have developed their own 2400 b/s modems, they also made provisions for the end user to install the modem in their TNCs with as little effort as possible. Some are so simple to install that they just plug in and are ready to use.

On the "all mode" and "multi-mode" data controllers switching between 1200 and 2400 b/s is accomplished by issuing software commands. In the case of the TNC2 and clones, I picked up an idea from WB4RHO that adds a single-pole,

506 Pheasant Ridge Drive, Warner Robins, GA 31088

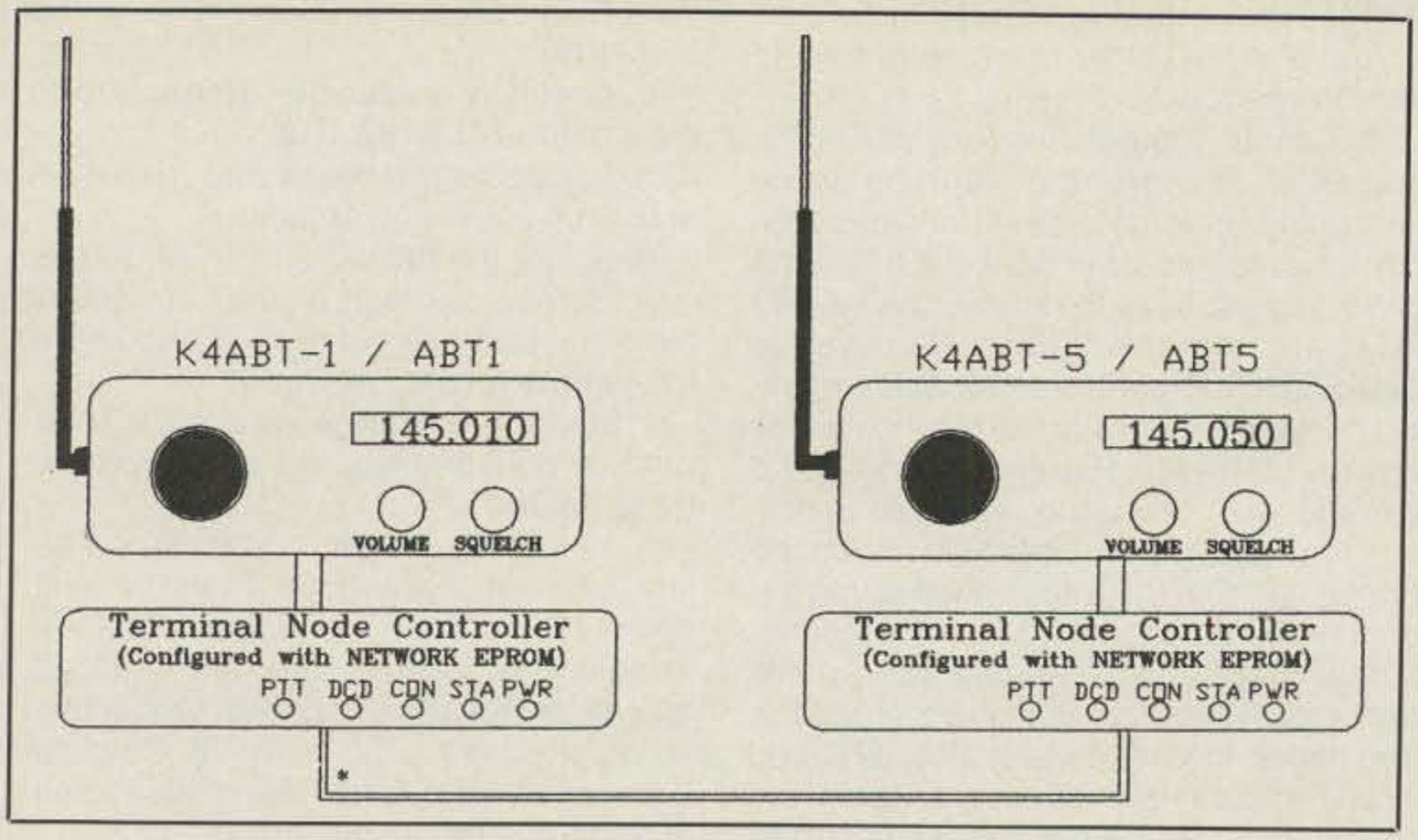

Fig. 1– Typical configuration of a gateway station allowing a user to connect on one frequency at 1200 b/s and digipeat to another at 2400 b/s. (TNCs and cable are specially configured for "gateway" use. See January 1990 CQ, p. 84.)

double-throw switch so I can switch between 1200 and 2400 b/s "on the fly."

No Modifications To The Transceiver

So the end user does have an alternative —2400 b/s. 2400 b/s will pass through both the transmit and receive audio sections of most VHF transceivers. In kind, there is very little phase distortion or noise because the signal is phase shift keying (PSK). The best part is that *no* transceiver modifications are necessary.

A signal which we packeteers can send to the manufacturers is this: "Serious consideration should be given to building TNCs with the 2400b/s feature already on board." One manufacturer already has done it, and it has done well in this area of the country. 2400 b/s is not an option. It is a feature and should be treated as such. The cost to include a 2400 b/s modem in the TNC at the time of manufacture is certainly less than the cost of adding it after the fact. The additional feature will also make the purchase of the TNC more appealing to the "end-user."

For the present we are compelled to make the best use of 2400 b/s with the current production of add-on modems. The benefits of this minor modification far outweigh the cost of the modem. I've listed below just a few of the advantages and benefits of using 2400 b/s.

- No modification to the transceiver.
- Increased speed and through-put.
- The mode is phase shift keying, more responsive.
- The cost of current 2400 b/s modems is less than a hundred dollars.
- The same 2400 b/s technology is adaptable to the "network nodes" and TNCs.
- Shorter packet transmit time, allowing more access time to congested LAN frequencies.
- 2400 b/s makes addition of a VHF/UHF trunk system more economical and easier to implement.
- Installation of 2400 b/s modems is

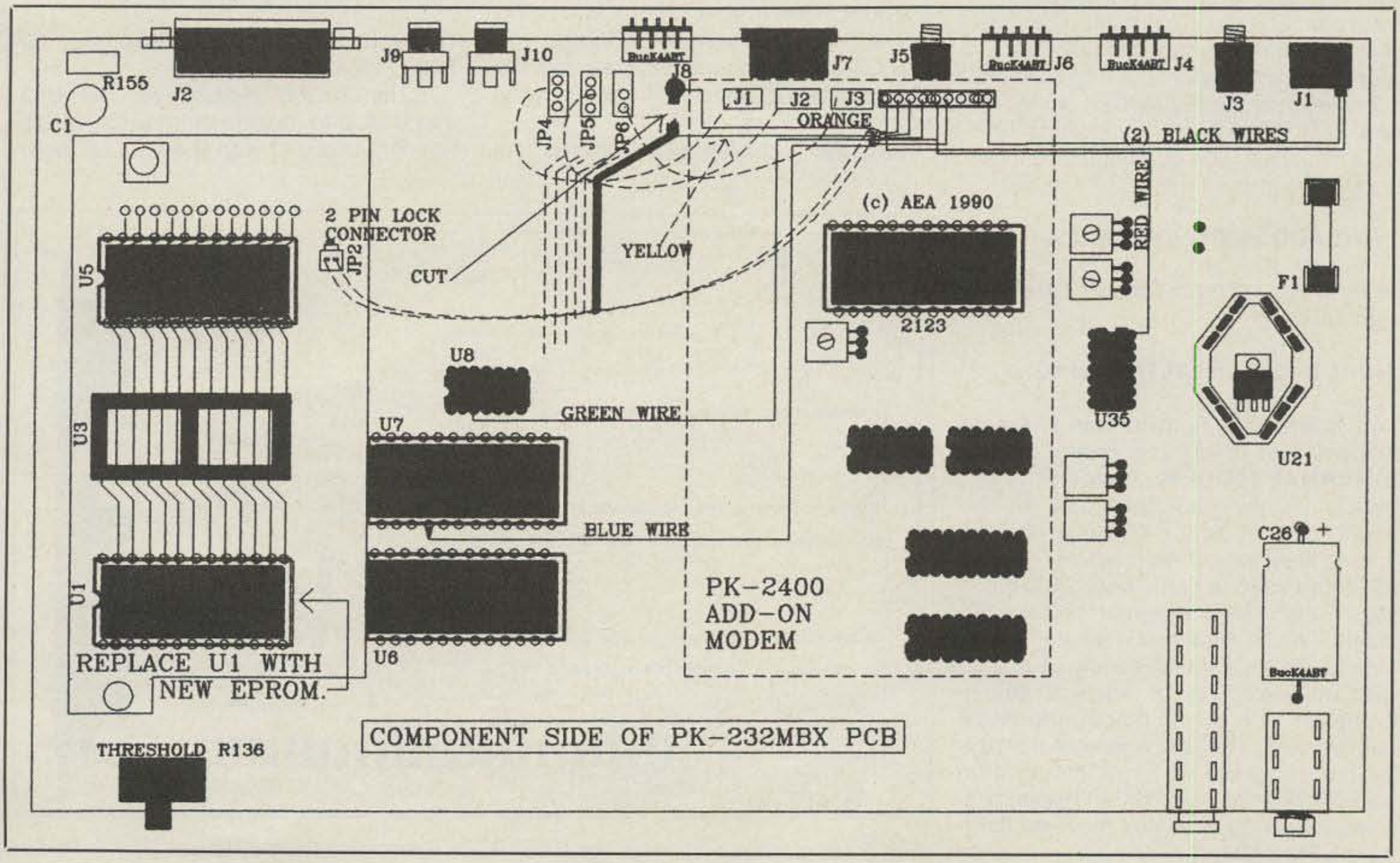

Fig. 2– Component side of the PK-232MBX printed circuit board.

easy and the effort is rewarded.

• The addition of the 2400 b/s modem does *not* defeat the other baud rates in your TNC.

• Most 2400 b/s modems are constructed on a small PC board that fits inside your TNC.

In many parts of the country there are TAPR II clones that are equipped as network nodes and coupled to a companion TNC that has 2400 b/s modems installed inside. This enables the user to connect to the node at 1200 b/s and cross-connect (gateway) to the 2400 b/s companion unit at the same location (see fig. 1). The station may now connect to another 2400 b/s node and cross-connect to 1200 b/s and make a call from that location. Now we have faster throughput, plus gateway and automatic routing capabilities.

To give the packeteer a "leg up" on the ease of installing 2400 b/s in your TNC, I've included the installation procedures for some of today's popular TNCs. Before beginning any of these additions, be sure the TNC is operating correctly, and be sure the modem you plan to install in your TNC is the correct modem for your TNC.

Installing The PK-2400 In The PK-232MBX

We begin with the AEA PK-232 multimode data controller and the manner in which we install the AEA PK-2400 modem. At this writing the PK-2400 requires two commands to enable 2400 b/s. One of the commands may not be a part of your present firmware, but that is no problem because the PK-2400 kit contains a new EPROM with the supporting firmware included. The commands to move to 2400 b/s are:

HBAUD 2400 and **ALTMO**dem **1**

To return to 1200 b/s simply change the commands to:

HBAUD 1200 and **ALTMO**dem **0** (zero)

"ALTMOdem" is derived from *alternate modem*. For 2400 b/s operation the **EXTERNAL MODEM** connector of the PK-232 is now your radio port for the AFSK (mic audio), PTT, receive, and ground lines to your transceiver. The PK-232 that I used to implement 2400 b/s is the PK-232MBX. Installation procedures may vary with earlier models. It is advisable to use the installation notes supplied with the PK-2400 at the time you receive it. Inform AEA of the model and serial number of your PK-232 when ordering the 2400 b/s upgrade kit. From this point on we will follow the AEA PK-2400 modem installation procedures as I received them for the PK-232MBX.

1. Remove the top cover. If your PK-232 has the batteries mounted in the cover, remove the solder from the wires and set the cover aside (see fig. 2).

2. Locate jumper headers JP4, JP5, and JP6. Remove the shorting jacks (strapping options). Some units may not have these headers installed. If this is the case, you will have to remove the PK-232 PC board from the chassis. Remove the **THRESHOLD** control knob and mounting hardware. Remove the mailbox board and the standoffs. Remove the four (six if you do not have the mailbox board) screws and slide the board back from the front panel. Cut the traces connecting the center pin and the pin toward the front of JP4, JP5, and JP6. Use solder wick or solder sucker to clear the holes of solder, and install the headers at JP4, JP5, and JP6. Replace the PC board using the hardware just removed, except install the two ¾ inch standoffs in place of the two screws at the center. Do not reinstall the mailbox board at this time. We will install it later. Install the two pin locking header at JP2 on the mailbox board. The lock faces the back of the MBX PC board.

3. On the component side of the PCB, cut the trace which connects to the feedthrough just behind the **J8** that is printed on the PCB.

4. Remove the 8530 (U7) from its socket (note the orientation of the 8530 in its socket) and carefully bend pin 12 so that it will remain outside the socket when the 8530 is replaced. Carefully install the 8530 back into the socket with the same orientation as it was before it was removed. Replace the mailbox board.

5. Carefully connect the wires from the 9 pin modem connector in the following manner.

a. Solder the **blue** wire from the modem PCB to the extracted pin 12 of the 8530 (**U7**).

b. Carefully solder the **green** wire to pin **3** of the **74LS193**, (**U8**).

c. Solder the two **black** wires to the pin at the top of the power jack.

d. Solder the **red** wire to pin 14 of **U35**.

e. Scrape or clean a small amount of the trace that was cut near J8 and solder the **yellow** wire to the trace.

f. Solder the **orange** wire to the feedthrough hole that was cut away from the trace (at **J8**).

6. Mount the **DPSK** modem board using the ¾ inch standoffs. Plug the 9-pin connector onto the modem. Plug the three connectors from the modem **J1, J2,** and **J3** to **JP4, JP5,** and **JP6**, respectively, on the main PCB near **J8.** Plug the 2-pin connector from the modem onto **JP2** located on the mailbox board.

7. Reconnect the battery wires. The top cover will be replaced after the transmit level is set.

8. Set the small trimpot located near the center of the modem PCB to the proper deviation. Set the commands so that **HBAUD = 2400** and **ALTMODEM = 1**, and be sure you have your radio connected to the "external modem" jack.

9. Replace the cover. This completes the installation of the AEA PK-2400 modem.

Adding The DRSI M-24 to the DRSI PC Packet Adapter

Turn your computer OFF and remove the DRSI PCPA.

1. Remove the RS-232 driver chips **U13** and **U14**, and replace them with the TTL headers supplied with the M24 kit. *Note*

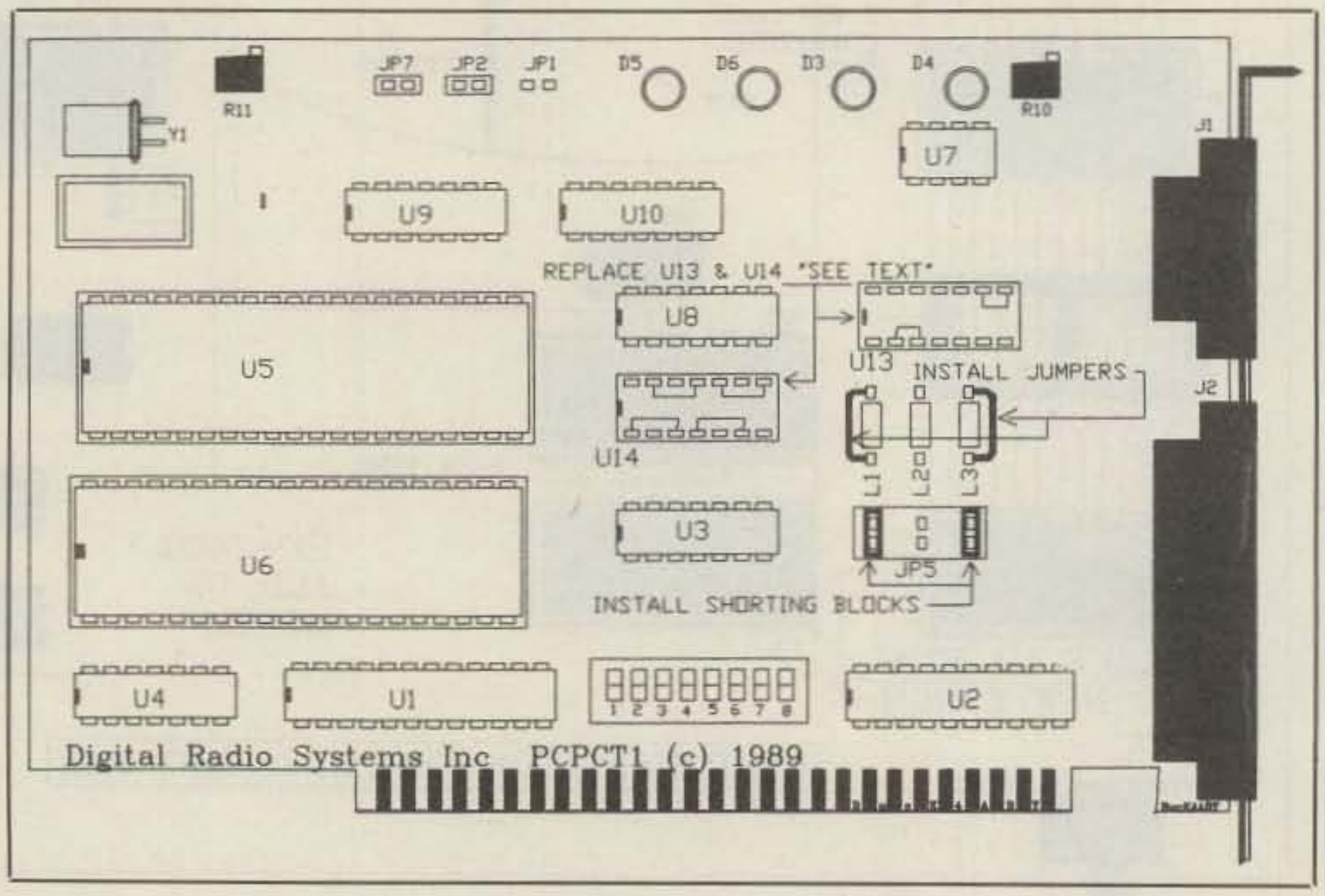

Fig. 3– Component layout of the DRSI PCPA illustrating the location of U13, U14, L1, L3, and JP5. Note two jumper blocks are added at JP5.

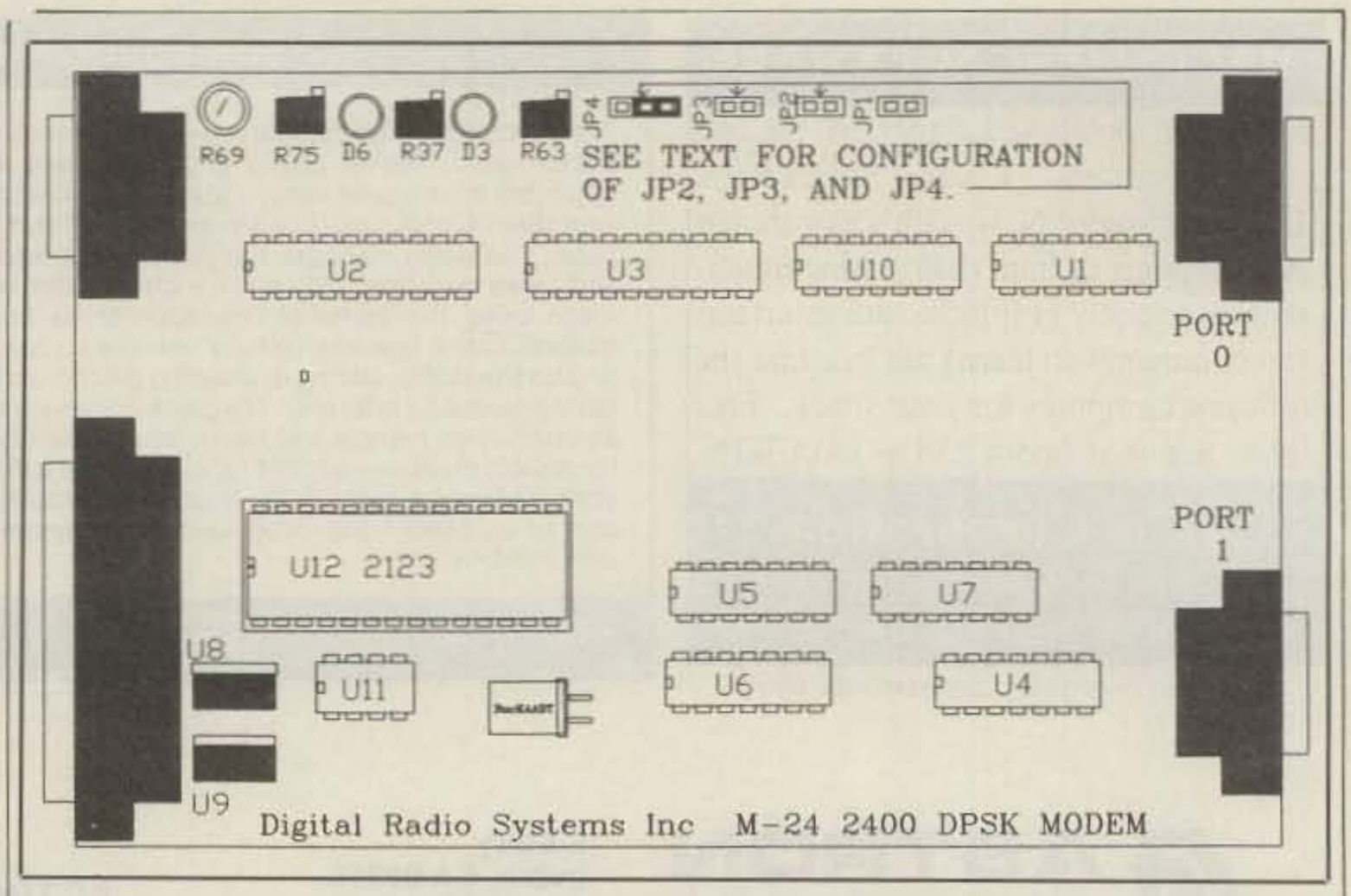

Fig. 4– Representation of DRSI M-24 2400 DPSK modem.

the correct indexing of the headers and sockets. Be sure that pin 1 of each header goes into pin 1 of each socket. The headers have a *beveled corner* nearest **pin 1**. The header with the **two** wires is to be inserted into socket **U13**. The header with the **four** wires is inserted into socket **U14**.

2. Refer to fig. 3 and make the following changes.

a. Install a shorting jumper (supplied) on the leftmost pair of pins on jumper block **JP5**.

b. Install a shorting jumper (supplied) on the rightmost pair of pins on jumper block **JP5**.

c. Solder a shorting wire across **L1**, located directly above **JP5**.

d. Solder a shorting wire across **L3**, located directly above **JP5**.

3. Install the PCPA board into the PC and *insert a jumper* wire between pins **2** and **3** of the **DB25** connector **P4** of the PCPA. Boot the PC and run the PC/TNC program. Make the following test.

a. Using the **ALT C** command, connect to yourself on port one. Type a few sentences and observe that they are displayed in the receive window. Use the **ALT D** command to disconnect.

b. If the test is not successful, check

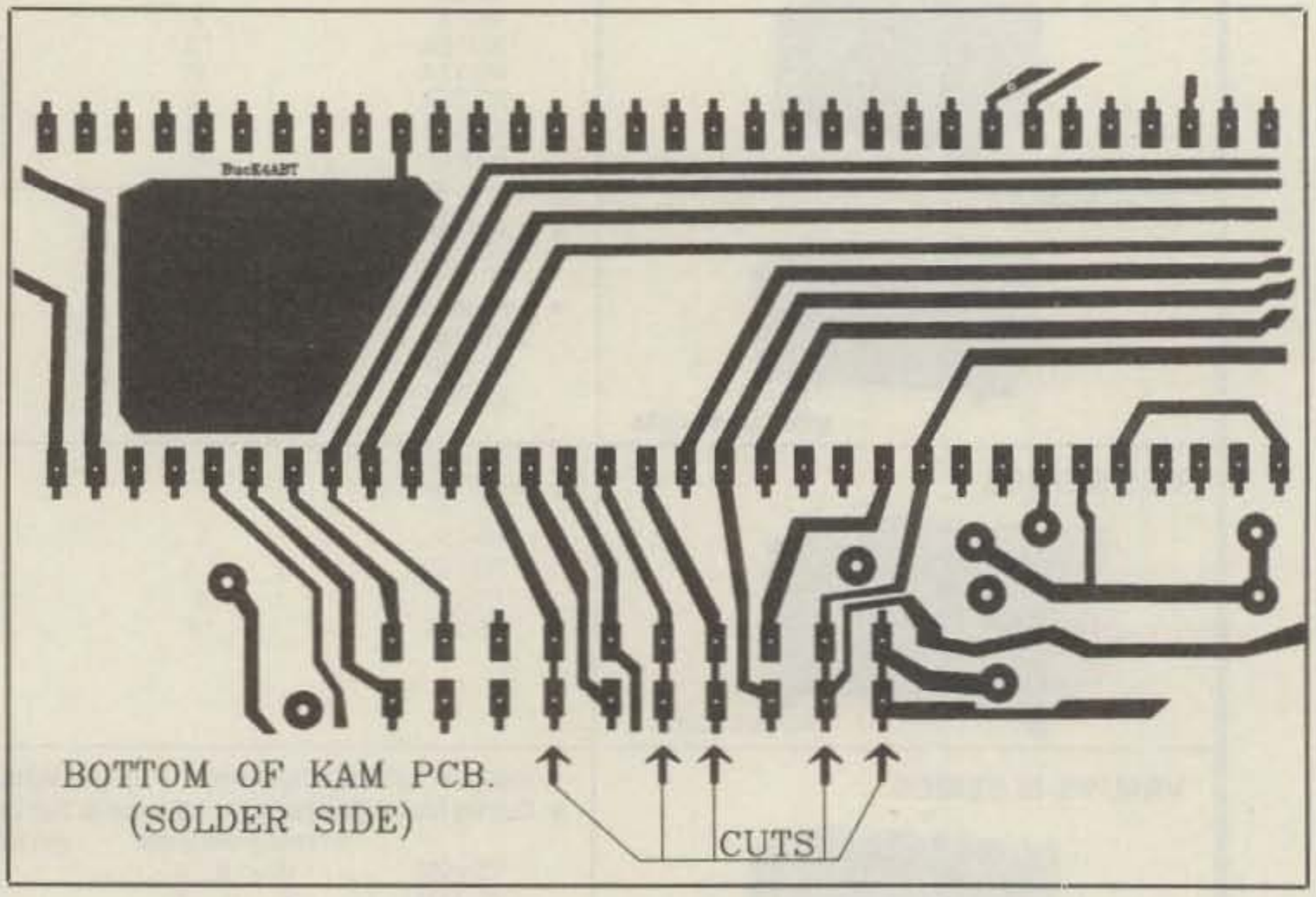

Fig. 5– Bottom of the KAM printed circuit board (solder side). Cut only the trace that connects each of the five pads indicated. Use extreme caution and do not cut the tiny traces which run beside some of the pads. Cut vertical traces only.

the PCPA to be sure you made the correct connections.

c. With all systems go, use the **TAILOR** program to modify the driver programs to set **PORT 1** for EXTERNAL CLOCKING. This is accomplished by setting the **HBAUD** command to **0** (zero). This turns **OFF** the PCPA's internal b/s generator and clock recovery. The PCPA now relies on the **M24's** synchronous modem for the correct clock speed. Once you have modified the driver programs, save them to disk by using the **F10** command.

4. The modem can be configured for either MERGED audio or SPLIT audio. Merged audio permits both 1200 b/s and 2400 b/s to be sent from the upper radio port of the M24. This enables the user to retain 1200 b/s while adding 2400 b/s to the same channel. Split audio causes the 1200 b/s AFSK to be sent out the upper radio port, while 2400 b/s DPSK is sent to the lower radio port of the M24 (see fig. 4).

For **MERGED AUDIO** set the M24 jumpers JP2, JP3, and JP4 as follows:

JP2 = JUMPER **ON**
JP3 = JUMPER **ON**
JP4 = JUMPER **ON**, set to left side

For **SPLIT AUDIO** set the M24 jumpers JP2, JP3, and JP4 as follows:

JP2 = JUMPER **OFF**
JP3 = JUMPER **OFF**
JP4 = JUMPER **ON**, set to left side

CAUTION! Make sure your computer is **OFF** before performing the next step.

5. The M24 is ready to be attached to the PCPA type 1 board. The **DB9** and **DB25** connectors on the M24 plug directly onto the PCPA corresponding connectors.

a. Remove the metal shells from BOTH connectors on the M24. The shells will no longer be needed.

b. Carefully plug the M24 into the connectors of the PCPA board.

c. Secure the M24 modem board to the PCPA using the 4-40 #0 Phillips head screws supplied with the M24 TTL headers kit.

6. Perform the loopback test and set all levels in accordance with the setup procedure that is supplied with the M24. The setup for transmit and receive is spelled out in easy to follow instructions in the setup section of the M24 documentation. Finally, it is always good to run tests with a friend who is also using 2400 b/s.

NOTE: After you complete the setup of the M24 modem, the DCD carrier detect LED (**D6**) should illuminate with the presence of a 2400 b/s signal.

Installing The KM-2400 Modem In The Kantronics KAM

The Kantronics KM-2400 modem can be installed in both the KAM and the KPC-4. We will cover the installation of the KM-2400 in the KAM. The selection of the

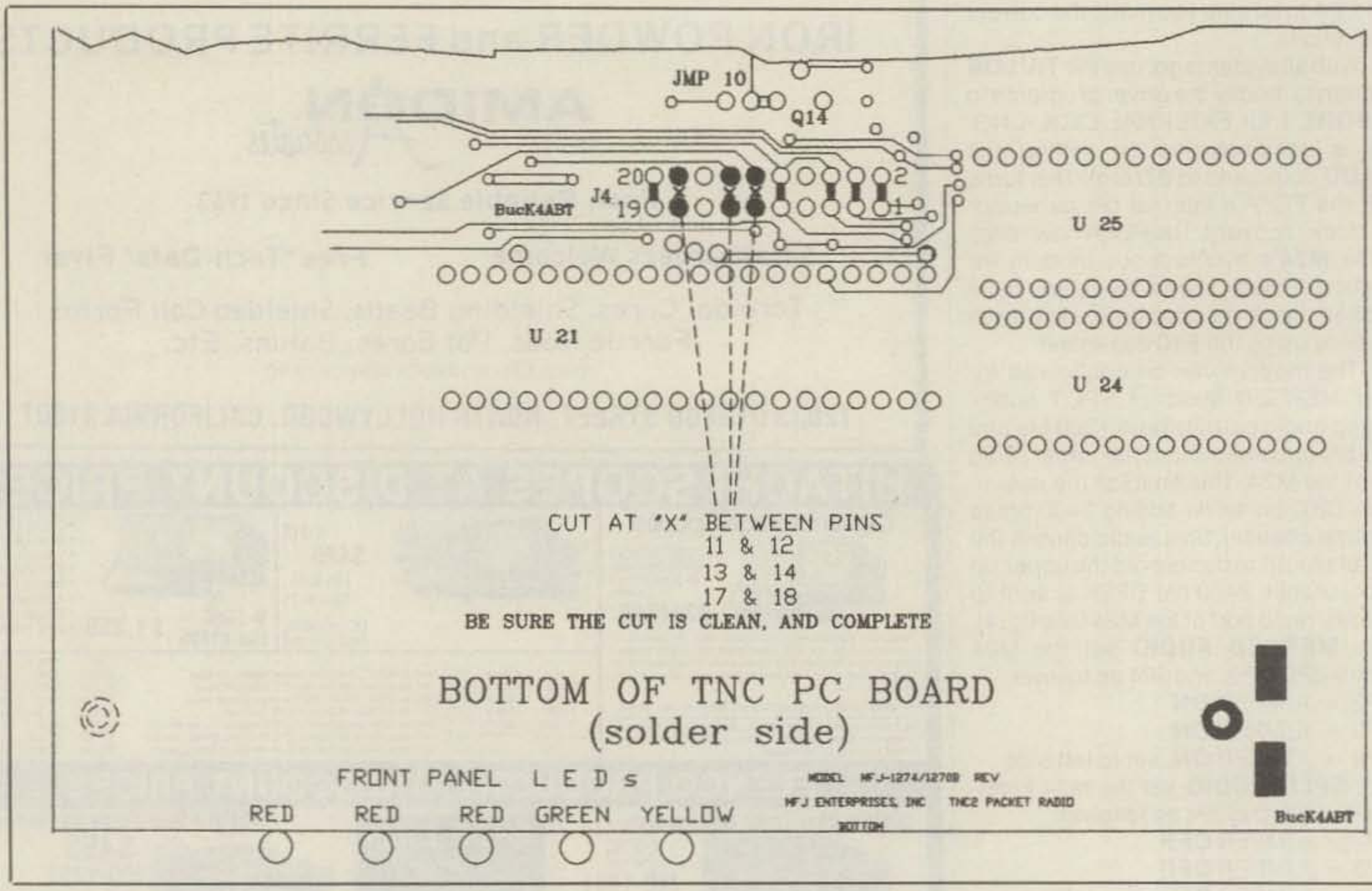

Fig. 6– Bottom of the MFJ-1274/1270B (TNC2 clone) PC board.

2400 b/s mode is accomplished in the KAM by setting two commands. The **MAXUSERS** is set to **0**, while the **EXTernal** modem command is set to **ON**. When the 2400 b/s is activated in the KAM, only the VHF port will operate at 2400 b/s (see fig. 5).

1. Remove the PC board from the case. Be sure to remove the screw from the 5 volt regulator tab before trying to slide the PCB out of the case. Refer to the KAM manual for disassembly information.

2. Locate modem headers **K8** and **K9**.

3. Turn the PC board over and locate the pins of the modem header **K8**.

4. Use care and caution when cutting the following traces on the solder side of the PCB. Cut traces between pins **7/8, 11/12, 13/14, 17/18,** and **19/20**.

Note: *Cut only the trace between the pins*. Be extremely careful to preserve the tiny trace between pins 17/18 and 19/20. After the cuts are complete, only 5 traces are severed.

5. Verify that **R80** and **R82** in the main KAM PCB are **2.2K** (2200 ohm). These resistors are correct in KAMs with serial number 61540 and above. If your KAM is below this serial number, these resistors must be changed so that proper 2400 b/s operation can be achieved.

6. Carefully align the headers of the KM-2400 modem with the main PCB header pins at **K8** and **K9**. Apply firm pressure to the modem, assuring that it seats properly on the main board.

Note: If your KAM has the battery backup socket installed, then it may not be possible to have both the KM-2400 and the battery backup present in the KAM. There is one way to have the best of both worlds. Remove the socket that holds the battery backup socket and solder the battery-backup socket directly to the PCB.

Warning: Unless you are extra good at removing and replacing soldered in ICs and sockets, **I do not** recommend nor do I suggest soldering the battery backup socket to the PCB.

The installation of the KM-2400 to the KPC-4 Dual Port TNC is handled in a similar fashion to that of the KAM. The major difference is in the command structure and the cutting of the traces. Follow the instructions in the guide that accompanies the KM-2400, and you will soon enjoy smooth operating with 2400 b/s in your Kantronics TNC.

Adding The MFJ-2400 To The MFJ-1270B, 1274, and 1278

Installation of the 20-pin header. Installation of the 2400 b/s modem is made to the MFJ-1270, MFJ-1274, and MFJ-1278 by carefully cutting three traces at the modem header, between pins **11-12**, between pins **13-14**, and between pins **17-18**.

Check to be sure that only the required traces are cut and that no nearby traces were cut by accident. Make note of the number progression and location of the pins (see fig. 6).

Install the 20-pin modem header (supplied) in the printed circuit board. Insert the short end of header pins into holes from the component side. Solder the header pins on the bottom (trace side) of the circuit board.

If any of the 20 holes are covered with solder, you can heat the location with a small soldering iron (solder pencil) to open the holes so the 20-pin header can easily be inserted into the holes and soldered on the solder side (trace side) of the PC board. Use caution when soldering to prevent overheating of the traces and PC board bonding.

Istalling the 5-pin I/O connector. Follow the wiring information for the small 5-pin, modem edge connector and solder the wires to the points shown in the accompanying drawing. The wiring is easy as 1, 2, 3, 4, and 5 since the wires follow the standard color code (see fig. 7).

1 = BROWN
2 = RED
3 = ORANGE
4 = YELLOW
5 = GREEN

Looking at the open end (holes) of the connector, pin 1 is on the left and pin 5 will

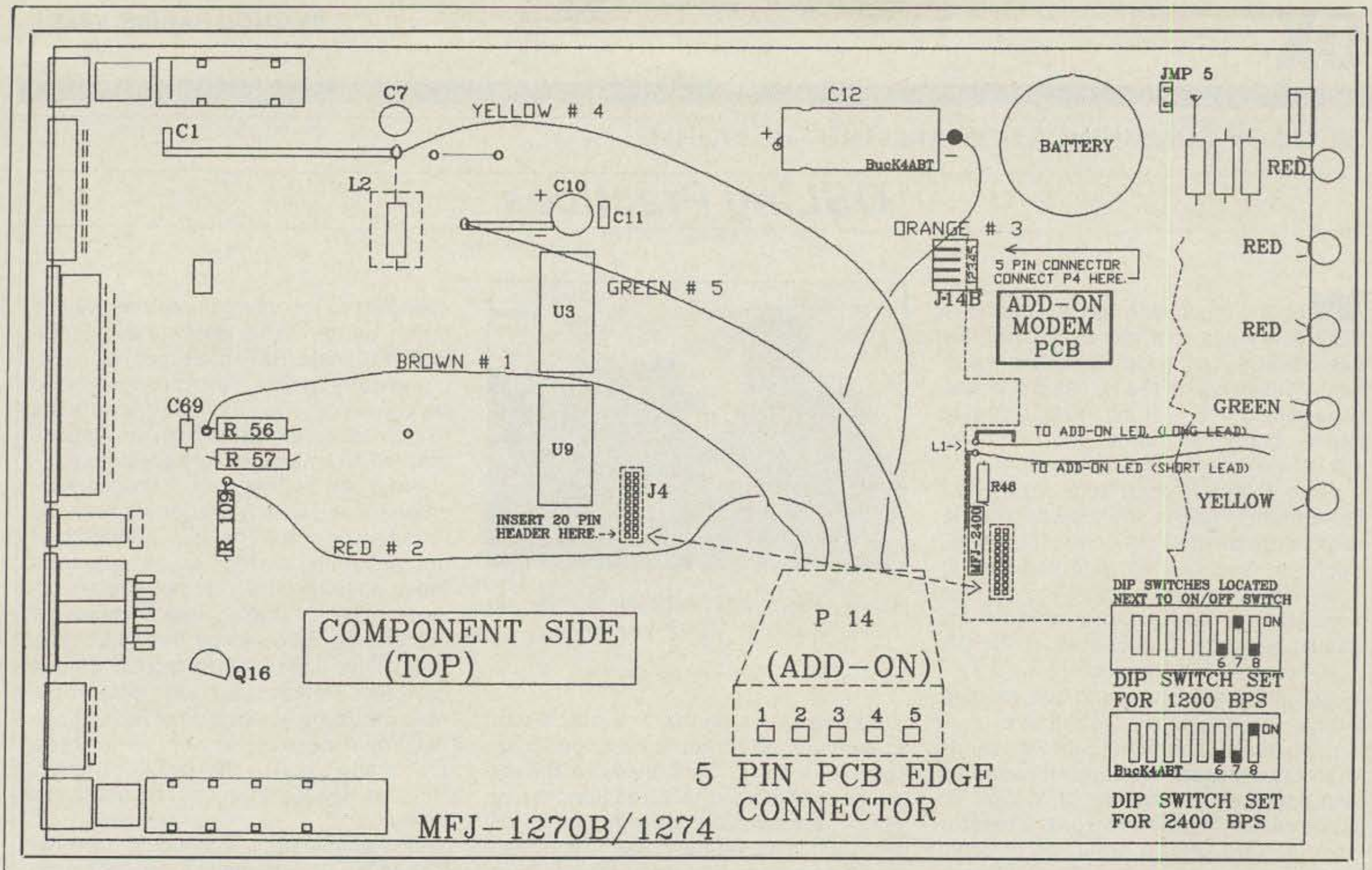

Fig. 7– Component side (top) of the MFJ-1274/1270B PC board.

be the last hole on the right. The connector pins count left to right, 1 to 5, brown to green. Connect the proper color wire to each of the 5 points indicated in fig. 7.

Set dip switches at rear of TNC. To move between 1200 and 2400 b/s requires that you use the last three DIP switches in the cluster of eight at the rear of the MFJ-1270B or MFJ-1274. Use the following switch settings for:

1200 b/s =	**OFF**	**ON**	**OFF**
Switch Number =	**6**	**7**	**8**

2400 b/s =	**OFF**	**OFF**	**ON**
Switch Number =	**6**	**7**	**8**

Adding the MFJ-2400 modem to the MFJ-1278 (REV-9). The late model MFJ-1278/TURBO (with the "TURBO" LED on the face) only requires about 5 minutes to add the MFJ-2400 modem. The REV-9 firmware also supports the switching from 1200 to 2400 b/s. To install the MFJ-2400 in the MFJ-1278/TURBO, simply remove the cover and locate J4. Remove the press-on shorting jumpers that connect pins 11/12, 13/14, and 17/18. Install the MFJ-2400 modem PBC by mating the modem 20-pin header socket to the upright 20 pins at J4. Locate J14 and viewing from the front of the MFJ-1278 *(brown wire on the left)*, plug one end of the 5-wire interface connector onto the J14 upright pins. Plug the free end to the modem 5-pin header. Note that the brown wire is on the left when viewed from the front of the MFJ-1278.

The commands to enable and disable 2400 are:

1200 b/s cmd: **MODE VP 1200** <enter>
2400 b/s cmd: **MODE VP 2400** <enter>

This completes the installation of the MFJ-2400 in the MFJ-1278 (REV-9).

TNC Setup for 2400 b/s

For all practical purposes 2400 b/s needs no unusual setup or parameter changes. There are, however, some changes that can be made later to the TNC parameters which will enable you to improve the speed and throughput performance of the 2400 b/s system. The "honing" of the parameters may not seem like much to think about. We have found that when direct connected at 2400 b/s, the TNC will be more responsive if the **TXDelay** and **FRack** are minimized and the **PACLen** and **MAXFrame** are set longer. 2400 b/s really takes its place in the packet world when you use it to pass large ASCII, binary, and picture files. It is always good to use a clear frequency and use direct connects to achieve the maximum benefit of 2400 b/s.

Implementation of a 2400 b/s node or CONVERSE switch is just as easy as building and using a 1200 b/s node. It may become imperative that many LANs begin considering the addition of 2400 b/s nodes, or 1200/2400 b/s nodes and gateways. You can learn how to use these nodes in a handbook called *The 1990 Packet Radio General Information Handbook*. You may receive this free publication by writing to MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762. Be sure to request the free handbook by title, and include your return address.

I wish to thank the following manufacturers for allowing me to use portions of their 2400 b/s modem installation procedures in the writing of this month's column.

AEA (Advanced Electronic Applications), 2006 196th S.W., Lynnwood, Washington 98036 (206-775-7373).

DRSI Digital Radio Systems Inc., 2065 Range Road, Clearwater, Florida 34625 (813-461-0204).

Kantronics, Inc., 1202 East 23rd Street, Lawrence, Kansas 66046 (913-842-7745).

MFJ Enterprises Inc., 921 Louisville Road, Mississippi State, Mississippi 39759 (601-323-5869).

Until next month, we're having fun at 2400 b/s. 73, de BucK4ABT

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

QSLing Practices

Working stations in rare countries is difficult enough, but merely getting the new country "in the log" is turning out to be the easier half of the two-step process of earning DXCC. Getting the QSL card is rapidly becoming harder than working the DX station.

Several factors contribute to the problem of confirming a new country. Some factors are beyond the control of DXers, such as deteriorating mail services in some countries and outright theft in others. However, one factor that is (or should be) within the control of the DX community is QSL "ethics."

Some DXpeditioners and QSL managers are balking at the high cost of confirming multiple contacts with thousands of stations and are setting limits on when and how they will confirm a contact. In some cases these limits are very reasonable, but the QSLing practices of some very prominent and active DXpeditioners and managers have sent waves of protest through the DX community. Probably none of these practices generates as much discussion as QSLing "via the bureau."

At some point the DX community will have to draw the line and establish a formal declaration of what are and are not acceptable QSLing procedures. The DX Advisory Committee may consider drafting some additional DXCC rules to expand the current Rule 12, which states that "fair play and good sportsmanship in operating are required for all DXCC members." The rule specifically mentions that confirmation procedures are part of operating.

QSL via the bureau. Most countries have QSL bureaus that provide an inexpensive, if slow, method of exchanging confirmations. The ARRL in-coming QSL bureau is among the best in the world, providing hundreds of thousands of QSL cards to Deserving DXers at a cost to ARRL members of only a few thousands of dollars. And the ARRL bureau is open to non-ARRL members, unlike some other very effective bureaus, such as those of the DARC (West Germany) and the JARL (Japan).

However, while QSLing via the bureau is inexpensive for the DXpeditioner or QSL manager, it is not free. The QSL cards themselves cost money, ranging from less than a penny for a simple card to as much as 30 cents for a four-color, two-sided card. Then there is the expense of shipping the cards from the bureau to the person answering the cards, and then shipping the cards to a bureau for their return. For the average DXer, these costs are minimal, especially when compared to the cost of direct QSLing. These costs add up quickly when the number of cards rises to the thousands, however.

Benny Wyenantea, YB3CN, is often on 14165 kHz at 1200Z, with W2MIG.

The increase in the number of DXers chasing awards other than the straight, mixed-mode DXCC has put a great deal of pressure on DXpeditioners and QSL managers. More DXers want not just a single card, but a card for each band and mode. The costs quickly add up. Rather than find alternatives to reduce the cost of QSLing via the bureau, several well-known DXpeditioners and managers have stopped answering cards via the bureau. Baldur, DJ6SI, has dropped out of the DARC, and thus no longer even receives QSLs via the bureau. Antoine, F6FNU, who handles QSL cards for more than 100 stations, does not answer bureau cards. Jim Smith, VK9NS, and Ron Wright, ZL1AMO, are among the active DXpeditioners who do not respond to bureau cards.

This practice has generated some hard-hitting response. The Northern California DX Foundation, which has provided DXpedition funds for DJ6SI, VK9NS, and ZL1AMO, has announced a QSL Policy Statement that reads, in part, "All [stations] are entitled to receive their QSLs via the bureau." The Radio Society of Great Britain in their Code of Practice for QSL Management states that "Any DX station appointing a QSL manager must ensure that satisfactory arrangements are in place for receiving and responding to incoming *bureau* as well as *direct* cards." The Reseau des Emetteurs Francais (REF, of France) also recommends that QSL managers respond to bureau cards. The REF has gone so far as to stop accepting cards from the stations that F6FNU manages for REF awards!

What can be done to encourage DXpeditioners and QSL managers to respond to bureau cards? The REF approach of not accepting cards for awards from those stations which do not answer bureau cards is a drastic step, and one not likely to be followed by the DXCC program. Even if the DX Advisory Committee says that stations that don't answer bureau cards are in violation of Rule 12, the maximum penalty possible is to throw that station out of the DXCC program. What is needed is encouragement, not penalties.

One simple approach would have the DXpeditioner pass along a copy of his log to an individual or group willing to handle bureau cards. For example, a German club might arrange to get copies of DJ6SI's logs from the various DXpeditions that Baldur has conducted. The only expense involved would be a minor copying charge. Then the club, perhaps with the help of a foundation, could print up inexpensive cards and arrange for transportation to and from the bureau system. The additional effort by the DXpeditioner would be minimal—merely sharing the logs for the few days needed to make copies. The total cost of handling the bureau cards is less than $0.05 each, probably closer to $0.03, or $30 per thousand. Even 10,000 bureau cards would not be a major expense. By splitting up the work, no one amateur would have an unreasonable burden in QSLing. And the radio club handling the bureau cards would get some international recognition for its role, through a notice on the QSL card.

DXpeditioners themselves can reduce the problem of multiple cards for different bands and modes by not working stations on more than one band. The WB2DND logging software can instantly identify those stations previously worked, and the DXpeditioner can refuse to work them, after clearly specifying this practice before the DXpedition, of course. Incidentally, the logging software *greatly* simplifies QSLing, as common problems such as non-UTC time or incorrect date vanish. With battery-operated, lap-top computers available for about $1,000, every DX-

P.O. Box 50, Fulton, CA 95439

The WPX Program

Mixed

1430	F6CDJ	1434	WI9Z
1431	N6IBP	1435	VK3DP
1432	IK0ADY	1436	W6OKX
1433	K3IMC		

SSB

2123	JA8XDM	2126	N6IBP
2124	CT1CQK	2127	JR4NUN
2125	NY1V	2128	K3IMC

CW

2618	N6IBP	2620	VK3DP
2619	JA1CDC		

VPX

262 ONL-5923

Endorsements

Mixed: 450 N6IBP, VE1HA, W6OKX. 500 N6IBP, VE1HA, W6OKX. 550 N61BP, VE1HA, JY9SR, W6OKX. 600 WM0G, N6IBP, JY9SR, W6OKX. 650 N6IBP, W6OKX. 700 SM5DUT, N6IBP, W6OKX. 750 SM5DUT, N6IBP, W6OKX, ONL-2169. 800 KM1D, N6IBP, W6OKX. 850 WB4FOT, KM1D, W6OKX. 900 WB4FOT, KM1D, W6OKX. 950 W9IAL, KM1D, WB2PCF, W6OKX. 1000 WA3GNW, KM1D, W6OKX. 1050 I2EAY, IM1D, W6OKX. 1100 I2EAY, KM1D, W6OKX. 1150 W6OKX. 1200 W6OKX, K9UQN. 1250 W9IL, VE1ACK, W6OKX. 1300 W9IL, VE1ACK, W6OKX. 1350 W9IL, I2EOW, W6OKX. 1400 I2EOW, W6OKX. 1450 KB0G, W6OKX. 1500 W6OKX. 1550 W6OKX. 1650 I1ZEU. 1700 W4UW. 1800 KL7AF. 1950 I1EEW. 2150 IN3ANE. 2350 N2AC.

SSB: 350 JA8XDM, KD3AI, CT1CQK, JR4NUN. 400 K2EEK, KD3AI, OZ1GLN, CT1CQK, IK0JMS, JR4NUN. 450 KB8DAE, OZ1GLN, CT1CQK, IK0JMS, JR4NUN. 500 IK0JMS, JR4NUN. 550 WM0G, WD5KBB, JR4NUN, K8YVI. 600 KM1D, JR4NUN, WD5KBB. 650 KM1D, JR4NUN. 700 KM1D, JR4NUN. 750 NG9L, KM1D, JR4NUN. 800 NE8Q, NG9L, KM1D, JR4NUN. 850 K3ZPG, KM1D, JR4NUN. 900 JR4NUN. 950 YV1CP, JR4NUN. 1000 YV1CP. 1050 YV1CP. 1100 YV1CP. 1150 YV1CP. 1200 YV1CP. 1250 YV1CP. 1300 YV1CP, IK5ACO, I2EOW. 1350 YV1CP, IK5ACO, I2EOW. 1400 YV1CP. KL7AF, I2EOW. 1450 WD8MGQ. 2750 K2POA. 2800 K2POA.

CW: 350 N6IBP. 400 OK3TAY, N5GFX, N6IBP. 500 DL5XAS, LA3GI, KM1D. 550 DL5XAS, W4UW, KM1D, IK6ASR. 600 KM1D, IK6ASR. 650 KM1D, DK8NM. 700 DK8NM. 750 VS6UW, I1EEW. 900 I2EAY. 950 I2EAY. 1050 OK2ON. 1150 KB0G, K4MF, G4SSH. 1200 K4MF. 1250 VE1ACK. 1300 W9PWM, VE1ACK. 1350 KL7AF. 2700 N6JV.

10 Meters: CT1CQK, YU2NA, VS6UW
15 Meters: OK2ON, CT1CQK, KM1D, JR4NUN, YU2NA
20 Meters: DL5XAS, CT1CQK, KM1D
40 Meters: CT1CQK
80 Meters: CT1CQK, YU2NA, I1EEW

Asia: K3ZPG, DL5XAS, CT1CQK, KM1D, AK9Z, JR4NUN, K8MDU, JA7MLG
Africa: KM1D
No. America: CT1CQK, K8MDU, KB8DAE, NY1V
So. America: AK9Z, I1ZEU
Europe: CT1CQK, JR4NUN, K8MDU, JA7MLG
Oceania: KM1D, JR4NUN, I1ZEU, VS6UW, JA7MLG

Award of Excellence Plaque Holders: N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, UR2**, AB9O, FM5WD, I2DMK, W4BQY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K0JN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB0G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, YB0TK, VE7WJ, VE7IG.

Award of Excellence Plaque Holders with 160 Meter Endorsement: NN4Q, G4BUE, LU3YL/W4, I4EAT, VE7WJ, W9NUF, N4NX, VK9NS, DE0DXM, VE7IG, K9BG, AB9O, FM5UD, SM0DJZ, DK5AD, SM6CST, I1JQJ, W3ARK, HI8LC, KA5W, UR2**, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB0G, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, W8ILC, W1BWS.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

Bator Sambu, JT1BG, recently earned 5 Band Worked All Zones #542, the first in Mongolia and first in Zone 23. Bator also holds 5BDXCC, 5BWAC, and many other awards.

peditioner should consider this method of reducing the QSL problem.

At the same time, DXpeditioners should take advantage of other means to reduce the high costs of QSLing. These include using less expensive cards for those DX stations not sending extra postage, and drop-shipping return envelopes in bulk to the US, Japan, etc., to be entered into the domestic mail system. Compared to the cost of an airmail letter from Germany to the US, the $0.25 domestic US postage (soon to the $0.30!) is a bargain. Again, the DXpeditioner should make these arrangements clear ahead of the DXpedition. Then US amateurs can send US SASEs and save everyone money.

Using the ARRL In-Coming QSL Bureau

Some DXers still don't know how to use the in-coming QSL bureau. Sending a business-size, self-addressed, stamped envelope (SASE) to ARRL Headquarters, 225 Main St., Newington, CT 06111 will get you a complete explanation of exactly what the DXer should do to receive his or her bureau cards. In general, this involves sending SASEs of the proper size to your "home" bureau, and being *very* patient. (Your "home" bureau is that of your actual callsign, regardless of where you live. Thus, WB2CHO/6 keeps envelopes on file at the W2 bureau, which is ably run by the North Jersey DX Association.)

A good first step in using the ARRL bureau is to send a business-size SASE to your home bureau and ask for their information sheet. That sheet will include information on the size envelopes they require, on whether they sell envelopes or postage credits, and lots of helpful hints.

Every DXer should keep envelopes at his bureau, or at least send the bureau a letter asking them to dispose of their bureau cards. The only problem worse than unclaimed cards at the all-volunteer bureaus is lack of patience by the DXer. *Any* communication with your bureau should include an SASE. And DXers should expect a minimum of several months delay in getting a response to an inquiry. In many bureaus the cards and mail are sorted at a central point and are distributed at a monthly radio club meeting. If the person who actually sorts your QSL cards misses a monthly meeting, it might be two months before he or she even sees the inquiry.

The other common complaint about the QSL bureau system, especially among new DXers, is the length of time it takes a card to get to the DXer. Even if the DX station doesn't wait for your card but sends a card to his bureau immediately after the contact, that card may take six months or more to get through the system. Double that if the DX station waits for your card before replying, as most active stations do. Cards from some bureaus, such as Box 88, Moscow, can take years. And sometimes a country's bureau can simply break down. The main bureau in India hasn't worked for years, and recently we have heard that the Brazilian bureau is in disarray.

So take a moment to send an SASE to your home bureau for their information sheet, follow their instructions carefully, and wait, and wait, and wait.

DX Activity in May

The ITU Headquarters station in Geneva will be active in the *CQ*WPX CW Contest on May 26-27 under the call of 4U5ITU. DF1SD, DF7TU, DJ0YI, and HB9BUN will operate the station May 25-29, with operation on the WARC bands and RTTY outside the test. QSL to DF1SD.

Per-Einer Dahlen, LA7DFA, is active from Jan Mayen as JX7DFA until late August. Look for Per on 3505, 7005, 14010,

21010, and 28010 kHz, obviously CW only. QSL to his new address: Myrvangsvingen 21, N-7026 Trondheim, Norway. He would appreciation a small donation to help cover the costs of printing the QSL cards. Per is one of those DXpeditioners who has asked for no cards via the bureau (except from Eastern Europe). Perhaps some radio club would try the above suggestion. For those DXers looking for Jan Mayen on SSB, try the French DX Foundation's net on 14256 kHz at 2300Z, where JX9CAA is an occasional check-in.

Some Polish amateurs will be returning to Nepal with a mountain-climbing expedition, and will be active as 9N5CW on CW and 9N5DX on SSB, May 10-31, all bands.

Shortly Noted

The 1990 Goodwill Games in the Seattle, Washington area July 20 to August 5 will include a RadioSport competition between US, Russian, and other operators. July 20-21 twelve teams of two amateurs each will compete for medals. The teams will set up a station field-day style and make as many contacts as they can in a limited period. For more information about this unique event, contact Steve Morris, K7LXC.

The Wyoming University Amateur Radio Club is sponsoring an award for working or hearing three Wyoming stations in 1990, Wyoming's centennial year. Send GCR information with $2.00 to the club at Box 3625, Laramie, WY 82071.

Walvis Bay ZS9 is the newest addition to the DXCC country list. Contacts with stations in Walvis Bay on or after September 1, 1977 will count for DXCC credit. Cards may be submitted on or after June 1, 1990.

The Japan Amateur Radio League recently recognized the Tokyo International Amateur Radio Association (TIARA) for its support of amateur radio in Japan (see photo). TIARA consists of 85 members of many nationalities in the Tokyo area. Club meetings are held on the last Friday of each month in English and visitors are always welcome. For more information on TIARA, contact the JARL or TIARA directly at Box 119, Akasaka, Minato-ku, Tokyo 107.

The radio club at the Sopot Secondary Technical School in Bulgaria has set a goal of 100,000 QSOs (and 100,000 QSLs!) in 1990. Look for LZ1KVZ on 1825, 3555, 7003, 10103, 14055, 21055, or 28055 kHz on CW, and 1845, 3683, 7053, 14180, 21280, and 28490 kHz on SSB. QSL via the bureau, or direct to Box 8, Sopot 4330.

The 3Y5X Club Bouvet operation made almost 47,000 QSOs between 2028Z on December 28th and 1900Z on January 13. Landing on the island was delayed a couple of days due to 20 to 30 foot waves and gale-force winds. The logs are being typed into computers to speed QSLing, and cards are due out soon. Club Bouvet suggests that you send two SASEs if you worked them on more than one band or mode, in case one or more contacts are "not in log." They are also looking for additional donations, as the operators had to take out personal loans to pay all their bills. Meanwhile more than 200 DXers received a confirmation of another kind after the Bouvet DXpedition. The FCC sent out 240 Notices of Violation for out-of-

Shozo Hara, JA1AN (left), President of the JARL, presents an award for support of amateur radio in Japan to TIARA President Frank Striegl, 7J1AAL/KA2TNZ.

The WAZ Program

10 Meter Phone

349 ..... F6BVB

15 Meter Phone

324 ..... KE6KT 325 ..... N0AMI

20 Meter Phone

784 ..... K1NJH 786 ..... W4CVX
785 ..... CT1CQK

10 Meter CW

75 ..... OH3JF

15 Meter CW

171 ..... W3TVB 172 ..... WI8A

20 Meter CW

355 ..... OZ6LH

ALL BAND WAZ SSB

3497	W1/G3IZQ	3502	K7EG
3498	UA4UBC	3503	W0JS
3499	KB8DA	3504	YB1DOA
3500	W1MGP	3505	JA1QNC
3501	K1YDG	3506	JF1TEU

Phone/CW

6718	W5HTG	6727	K7OVM (CW)
6719	NO8R	6728	N6OU
6720	N1QY (CW)	6729	K7EG
6721	N4SRK	6730	K7EG(CW)
6722	W9KDX	6731	W0JS (CW)
6723	KA3LHP	6732	KF5PE
6724	NR3Y	6733	SM5AHX (CW)
6725	NX2Y	6734	PA3DKE
6726	WA1UDU	6735	DL2LY (CW)

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4½ × 9½ to the WAZ Manager, Jim Dionne, K1MEM, 31 De Marco Rd., Sudbury, MA 01776. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all *CQ* awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

5 Band WAZ

As of February 1, 1990, 257 stations have attained the 200 zone level.

New recipients of 5 Band WAZ Award with all 200 zones confirmed:

W0JLC
WA2TMP/7
K1MM

The top 15 contenders for 5 Band WAZ are:

1. N4WW, 199
2. UQ1GXX, 199
3. W7OM, 199
4. K1MEM, 199
5. N2MF, 199
6. SP9PT, 199
7. NY2E, 199
8. K6YRA, 199
9. K5UC, 199
10. K5TSQ, 199
11. SP9CZ, 199
12. K2UU, 199
13. YU2CBM, 199
14. LA4HW, 199
15. HA8XX, 198

631 Stations have attained the 150 zone level as of February 1, 1990.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4½ × 9½ to the WAZ Manager, Jim Dionne, K1MEM, 31 De Marco Rd., Sudbury, MA 01776. Applicants should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

band operation, mostly for DXers accidentally transmitting on the wrong VFO.

AH6FX says he has been receiving QSL cards for his old call, KF4RY, which is no longer a valid call. He asks anyone hearing a station using this call to contact him at 11805 St. Ives Court, Woodbridge, VA 22192.

QSL Notes

Mas, JE3MAS, has completed his **5H1HK** operation with more than 70,000 QSOs. He has taken over answering his QSL cards since his return to Japan. QSL 5H1HK direct or via the JARL bureau to Hiroyuki Kozu, JE3MAS, 5-3 B41-204 Satakedai, Suita 565, Japan.

When sending mail to Namibia ZS3, *don't* add "South Africa," as the countries are separate. Use "Africa" only.

NM7G handles cards for **Z21CA** for contacts after Jan. 1, 1990.

Nelson Ranasinghe, **4S7NE**, reports that mail sent to his Callbook address often does not reach him. Try this address instead: c/o Radio Monitoring Stations, Kadirana, Negombo, Sri Lanka.

QSL Fred Luan, K3ZO's **HS0** operations via WA4BCQ.

Preston Smith, N6SS, operated as **VQ9SS** May 19 to Oct. 17, 1989. QSL home call.

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Total countries are now 323. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is $1.00.

CW

W9DWQ	323	N4MM	316	N2KW	311	K2OWE	302	WA4DAN	294	I2QMU	281
K2FL	323	K1MEM	316	K8PYD	310	YU2TW	301	K4CXY	292	K7ZR	280
K2TQC	323	N4PN	315	AA6AA	309	I3OBO	301	N5DX	291	I5XIM	280
K4CEB	321	DL7AA	315	K9IW	309	WB4RUA	300	KB0G	291	G3KMQ	280
K9MM	322	N6AV	315	W9RY	308	DL6QW	300	W6YQ	291	W2LZX	280
K4CEB	321	W1NG	315	IT9ZGY	308	NN4Q	300	IT9QDS	290	KB9XG	280
SM6CST	321	N4KG	315	W4OEL	307	I8WY	300	N4AH	290	W9NUF	280
N4JF	321	W8KPL	314	W6SN	307	K3FN	298	W1WLW	289	K9TI	280
ON4QX	320	DL8CM	314	KQ9W	307	DJ7CX	297	W4BV	289	WA4IUM	280
K6JG	320	K3UA	314	SM6CTQ	306	K8LJG	297	K1VHS	289	VE7DX	280
DL1PM	320	N6CW	313	W9WAQ	305	N8MC	297	G2GM	289	HB9AFI	279
K6LEB	319	W2FXA	312	W2UE	305	WD9IIX	296	K8NA	288	KA2DIV	279
W4BQY	318	K6EC	312	K9BWQ	305	KD8V	296	G2FFO	287	DL1QT	277
K9AB	318	YU1HA	312	WA4JTI	305	KZ4V	296	W9SC	287	K4JLD	277
DL3RK	318	W0IZ	312	AB4H	304	W1WAI	295	WA8YTM	287	K9DDO	277
W4BOY	318	EA2IA	312	WD9IIC	303	W6DN	295	DJ2PJ	286	KA3R	276
SM3EVR	317	DJ1XP	311	W0HZ	303	NY5L	295	K2JF	283	NS7Z	276
N6AR	317	W6ID	311	WA8DXA	302	N5FW	294	JH1VRQ	282	K4SE	275
OK1MP	317	K9QVB	311	W7CNL	302	IT9TQH	294	W3BBL	282	F3TH	275
W6PT	316	W0SR	311								
K4XO	316										

SSB

K2FL	323	W6DN	317	9H4G	312	KA3HXO	306	KZ4V	299	EA3KW	287
W6EUF	323	VE7WJ	317	W4UNP	312	KZ8Y	305	DJ7CX	298	AB9E	287
W4UG	323	SV1ADG	317	KC8EU	312	K8VFV	305	K9SM	298	W9SC	287
F9RM	323	W9OKL	317	NA5W	312	EA1QF	305	I8LEL	298	PA0XPQ	287
DJ9ZB	323	NY5L	317	W8ILC/QRPp	312	K4RIG	305	JH4PRU	298	I2EOW	287
K6WR	322	I0AMU	316	I2MQP	312	K8ZZU	305	EA9IE	298	N4KEL/M	287
W9DWQ	322	I8ACB	316	NN4Q	312	I4WZK	305	XE1HI	298	N8BJQ	286
W4DPS	322	K8PYD	316	KR9O	312	SM6CST	305	K5DUT	297	N3ARK	286
W0YDB	322	K4XO	316	W4SSU	311	KD8V	304	HP1JC	297	N9CPW	286
ZL3NS	322	OA4OS	316	K6EC	311	KC8YM	304	YU7KV	297	K9MNT	286
4Z4DX	322	W8JXM	316	K8NA	311	I1POR	304	XE1OW	297	IK7DBB	286
K8LJG	322	N4KG	316	NJ0C	311	W6MFC	304	WD9GQV	297	KB5RF	285
W4EEE	322	AI8S	316	I8XTX	311	K4LR	304	KB1JU	297	KF5AR	285
VE1YX	321	W0SR	316	WA4DAN	311	KB0SY	304	WB3GPR	296	IK8BMW	285
EA4DO	321	VE3MRS	316	K9HQM	311	WE2L	304	KB3KV	296	KC7EM	284
VE3MR	321	WB1DQC	316	AG9S	311	XE1KS	303	I0SGF	296	KR9F	284
DL9OH	321	VK4LC	316	KB4HU	311	W2LZX	303	K8NWD	296	WB3HAZ	283
I8AA	321	TI2CC	316	G4ADD	311	KB0U	303	KB0G	296	VE3MV	283
YU1HA	321	G4CHP	316	DK2BL	310	W0ULU	303	W0IYR	295	ZP5JCY	283
I0ZV	321	KZ2P	316	AA6AA	310	W4BQY	303	KK0C	295	I4CSP	283
OZ3SK	321	W2CC	316	WA4JTI	310	K1MEM	302	G3XTT	295	I8DVJ	283
N4JF	321	KB8DB	316	AB9O	310	N5FG	302	VE3XO	295	YB3CEV	283
W2SUA	321	W7FP	316	W4UW	310	W6FET	302	KI3L	295	AE2B	282
K9MM	321	XE1AE	315	KU9I	310	I3OBO	302	I7UNX	295	AI9R	282
TI2HP	320	I8YRK	315	N6AHV	310	K9UAA	302	VE3DLR	295	TG9EP	282
K6YRA	320	I8KDB	315	KB9OC	310	KP4EQF	302	K4JLD	295	VE3NUP	282
I4LCK	320	K9LKA	315	W8IMZ	310	N5FW	302	WD0BNC	294	N1ALR	282
OK1MP	320	ON5KL	315	K1MIZ	310	XE1MDX	302	I5BDE	294	PY2DBU	281
KS2I	320	OZ8BZ	315	I2QMU	310	VE2PJ	302	WB3CQN	294	NP4CC	281
YU1AB	320	K1UO	315	IV3YRN	310	WA2FKF	302	KB8O	294	NX0I	281
VE3GMT	320	W7OM	315	I8KCI	310	IK8GCS	302	K4SE	293	G4FAM	280
PY1APS	320	YV5DFI	315	XE1OX	310	WA3HUP	301	KC8JH	293	KU9Z	280
W3GG	320	W9RY	315	I5EFO	310	VE3FJE	301	AI5I	293	XE1XM	280
I4ZSQ	320	I4EAT	315	W6BCQ	310	WB4NDX	301	W9NUF	293	W9VA	280
YV1KZ	320	NJ2C	315	N4PN	309	YU2TW	301	KD5ZM	293	KB5DN	279
W9SS	320	YS1RRD	314	WD9IIX	309	N4CRU	301	WB6OKK	293	EA6DE	279
ZS6LW	319	K3UA	314	K9QVB	309	KZ0C	301	VE6PW	293	JH8NYK	279
W3AZD	319	I2LLD	314	K4CXY	309	N8BKF	301	TI2LTA	293	KX5V	279
N4MM	319	W1NG	314	W6NLG	309	WT4T	301	WA4LOF	292	WN5K	279
ZL1AGO	319	W1LQQ	314	WB6PSY	309	KB2HK	301	AC0A	292	K4BYK	278
N7RO	319	SM4CTT	314	VK4VC	308	K7LAY	301	VE3FEA	292	VE3IUE	278
W0SFU	319	W6SN	314	YV5AIP	308	KB9KD	301	VP9CP	292	DF6EX	278
K6JG	319	WB4UBD	314	N6AV	308	K2JF	301	W8LKG	292	KG9N	278
OZ5EV	319	K9IW	314	AI8M	308	W5LLU	301	SV1JG	292	I8WYD	278
IT9ZGY	319	N2KW	314	NS7Z	308	KC2FC	301	WA8YTM	292	WB0UFL	277
VE3XN	319	EA4LH	313	YV1AJ	308	IN3ANE	301	TI2JJP	292	W4PTT	277
EA2IA	319	W8PCA	313	K8CMO	308	VE4AT	300	VE3IPR	291	WD0DMN	277
VE2WY	319	N2SS	313	KS0Z	308	SV8CS	300	W4JFE	291	K8YVI	277
CT1FL	319	OE2EGL	313	K4MQG	308	G4GED	300	DU9RG	291	HK6BER	277
W9JT	318	ZL1BIL	313	I0MBX	307	WB5TED	300	XE1CI	291	N0AMI	276
W4NKI	318	K2JLA	313	KV2S	307	I2ZGC	300	KB2MY	291	N7ASL	276
DL6KG	318	WZ4I	313	VK3JF	307	NW5K	300	ZL1BOQ	291	WA4OPW	276
OE3WWB	318	IT9TGO	313	VE4SK	307	WB6GFJ	300	KB7VD	291	KC2RS	276
K5OVC	318	K0GT	313	KB3OQ	307	JH1VRQ	300	K9TI	291	WA9IVU	276
YS1GMV	318	W2FGY	313	KA9ABC	307	IT9TQH	300	KF5DX	291	K0HQW	276
W8ILC	318	G3VOF	313	W4UNP	307	IK8BQE	300	VE3CKP	290	I2WZX	276
N6AR	318	WB3DNA	313	WA2MID	307	K1VHS	300	F6BFI	290	KC4MJ	276
KM2P	318	WA4WTG	313	WA4ECA	307	IK8CNT	300	I4UFH	290	KA5YCM	276
K9AB	318	KQ9W	313	WB4PUD	307	WA9RCQ	300	W9TA	289	KI4FW	276
K9BWQ	318	F2MO	312	N4KE	306	WA4IUM	300	JA5PUL	289	WB1EAZ	275
N6AHU	318	W0SD	312	KB5FU	306	I8IGS	300	AI9U	289	NX4Y	275
VE7DX	318	K9RF	312	KE3A	306	PY4OY	300	WD9IIC	289	VE7BSM	275
DJ1XP	317	K9HDZ	312	K3LUE	306	WA0TKJ	299	OK1AWZ	288	VE5FX	275
KD8VM	317	LA7JO	312	CX4HS	306	I6PLN	299	WA6DTG	288	W0FF	275
N4WF	317	LU3YL	312	WD8PUG	306	KA8T	299	KA9TNZ	288	I8INW	275
K4PQV	317	N6OC	312	KE4HX	306	KB2FC	299	N6CGB	288	WB8TLI	275
WD8MGQ	317										

CQ DX Awards Program

SSB

1746	HB9CMB	1750	K4TWJ
1747	JT1BQ	1751	WD5P
1748	W6UJX	1752	WA0ETL
1749	N4KEL/M	1753	KB4WLD

CW

776	VE7DX	780	W6UJX
777	OK2ON	781	N4KEL/M
778	WB4UBD	782	K4TWJ
779	K7OVM		

RTTY

1	WB4UBD

SSB Endorsements

320	K2FL/323	310	W7FP/316
320	W6EUF/323	310	W6BCQ/310
320	W4UG/323	310	I5EFO/310
320	F9RM/323	300	WB6PSY/309
320	DJ9ZB/323	300	WB4PUD/307
320	K6WR/322	300	KA3HXO/306
320	W4EEE/322	300	K4LR/304
320	K8LJG/322	300	WE2L/304
320	W4DPS/322	300	W5LLU/301
320	4Z4DX/322	275	WD5P/296
320	K9MM/321	275	KF5AR/294
320	N4JF/321	275	N4KEL/M/287
320	W9SS/320	275	K3NEE/283
310	VE3XN/319	200	VE2DRN/202
310	CT1FL/319	150	K4TWJ/195
310	EA2IA/319	Mobile	N4KEL
310	VE7DX/318	Mobile	K4TWJ
310	N6AHU/318	28 MHz	WD5P
310	KB8DB/316	28 MHz	KB4WLD
310	W2CC/316	3.5/7 MHz	WD5P

CW Endorsements

320	W9DWQ/323	275	VE7DX/280
320	K2FL/323	275	K9DDO/277
320	K2TQC/323	200	OK2ON/220
320	K9MM/322	200	W7HZL/205
310	K3UA/314	150	WB4UBD/RTTY 163
310	EA2IA/312	150	N4KEL/158
300	I8WY/300	3.5/7 MHz	OK2ON

Total number of active countries is 323. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

Arne Kass, ex-UR2RGN, is now **ES7RGN.** QSL to P.O. Box 146, Viljandi, 20900 Estonian SSR. Arne will also confirm **ES7WY** and **UR0RWH** (Ruhnu Island).

Gene Schumat, **UA9AB**, reminds DXers *not* to put callsigns on envelopes going to the USSR. Use name and a direct address only. Gene handles cards for **RH8AD, RH8AY, UA9AN/UI, UA0UBG/UA8V, UW8V/UA0UBG, UG/UV3ZZ, UI9ACQ, UI9AXI, UH9AWE, UH8WB, UH9WWA, UH8YP,** and **UI8DAT**. Gene's address is P.O. Box 17, Troitsk 457100 USSR.

Romeo, **3W3RR**, recommends using the following address for QSLs: Bra Ven Kong, Box 308, Moscow 103009 USSR. Direct mail to Ho Chi Minh City isn't reaching him.

KA3DBN now handles cards for **VP2EE, VP2EHF,** and his own **VP2E/KA3DBN** operations.

QSL **V31KX** to Marcus Leatham, KR5N, 5008 Blair Oaks Place, The Colony, TX 75056.

Ian Pitkin, **ZD8IAN**, has returned home to England. QSL direct to Clover Cottage, Kenny, Ashill, Nr Ilminster, Somerset TA19 9NH, England, or via G4KJD through the RSGB bureau.

8P6MY QSLs via Leah Wachter, WB7PHL, 1047 June Terrace, Daytona Beach, FL 32119.

QSL **TA2/UB4JO** to Nick Kudinov, Box 75, Feodosia 4, 334871 USSR.

QSL the following Costa Rica special event calls via the Radio Club of Costa Rica, TI0RC, Box 2412, 1000 San Jose, Costa Rica: **0T6C, 0T8C, TE25UN, TE89R, TE86CR, TE87CR, TE0S.** QSL **TE1-8T**, and **TI100D** via TI4SU.

The United Radio Amateur Club of the Los Angeles Maritime Museaum, **K6AA,** is alive and well, despite being dropped from the Callbook listings. QSL to Berth 84, Foot of Sixth Street, San Pedro, CA 90731.

Joe Mikuckis, K3CHP, now handles cards for **5N0AIP.**

QSL RQ7W and **EK2RR** direct to Box 50, Riga, Latvia 226010 USSR.

The Kaunas DX QSL Service offers to help with cards to Lithuania, Latvia, and Estonia. Contact them at Box 787, Kaunas 233041, Lithuania.

SV0MY/8 is a pirate. Do *not* QSL via K7MO.

QSL Andy Chadwich, **ZD8VJ**, via G4ZVJ, 3 Park Villas, Monkhouse, Cheadle, Stoke-on-Trent ST10 1HZ, England.

QSL to **LQ-DX** stations via the Group Argentine DX, P.O. Box 36, 1834 Temperley, Buenos Aires, Argentina. The GADX will also answer cards for the following Antarctic stations: **LU1ZS, LU1ZM, LU1ZRM, LU1ZD, LU1ZG,** and **LU2ZD.**

QSL **OH0XX** direct to Olli Rissanen, Cerro del Castanar 72, 28034 Madrid, Spain.

The French Union of Radio Clubs, which forwards cards to non-members (unlike the REF), has moved. Their new address is: 11 rue de Bordeaux, F-94700, Maisons-Alfort, France.

Bob, **AP2JZB,** is not getting his mail, especially when IRCs or US $1.00 is enclosed. QSL direct with only a QSL card, or try via G0DOO.

QSL Information

3B9FR to F6FNU
3D2MI to W6MI
3D2PL to N6DMV
3D2QB to SM5BQB
3D2WZ to G3WZ
3D2XR to SM7PKK
3DA0/DF3EC to DF3EC
3DA0BJ to AA4RL
3G6MBQ to CE6OS
3X0A to IK8DYB
3X1SG to ON7GV
3Y5X to LA6VM
4K1DV to UZ1CXA
4K2BCA to RA3YA
4K2OIL to UA9MA
4K2OT to UB5KW
4K2PGO to RA9LA
4K3B8 to RB5CB
4K3ZC to UW1ZC
4K4AFM to UA1AFM
4K4BAN to RB5FO
4K4BCU to RA4YG
4K4QQ to RA1QX
4N4T to YU4JLM
4S7/DK9DR to DF7ZH
4U1ITU to DL8OBC
4U1UN to NA2K
4U1WB to KK4HD
4X1AD to KC4MJ
4X6UO to WB3CQN
4X7A to YU7AJH
5H3JW to VE7HOX
5H3TW to K3ZO
5N0ELT to G4OHX
5N1MRE to K4ZKG
5N9NRK to HB9WU
5R8JS to F5IL
5T5FA to IK3GES
5U7NU to F6FNU
5V7DP to KA2DE
5Z4BH to KE3A
5Z4BI to W4FRU
5Z4FO to KB4EKY
6W1NQ to DL1HH
6W1QB to DK3NP
6W6JX to F6FNU
7J1AEF to K5AQ
7J6CAQ to NK7W
7S4BX to SK4BX
7S8AAA to SK0MT
7S8BBB to SK4NI
7X4AN to DJ2BW
8P9AC to JA2MNB
8P9EM to G3VBL
8Q7AH to HB9TL
8Q7BX to I4ALU
8Q7DB to F6EEM
8Q7DG to W5ODD
8Q7JC to DJ0MBU
8Q7KH to OH6KH
8R8T to F6FNU
9G1PP to G0CAD
9H0B to DF2UU
9H1FBS to N5APW
9H3DX to DF2UU
9H4L to W3HNK
9H8A to 9H1GI
9H8B to DF2UU
9J1NO to DL5FX
9J2BO to W6ORD
9J2FR to I2ZZU
9L1/F6GQN to F6GZA
9M2AX to JA5DQH
9M6HF to WE2K
9N9OILY to JN1XWO
9NIMM to N7EB
9Q5BG to F5JT
9Q5DX to KQ3S
9Q5PL to DE7MCJ
9Q5TE to SM0BEJ
9Q5UN to OH3QZ
9S5G to KD3P
9X5KP to W4IEN
9X5NH to DG6EA
9Y4SRR to W9IKO
9Y4VU to W3EVW
A22BW to DK3KD
A41KB to ON6BY
A92QL to YASME
AH0F to JA2NQG
AH6HX/AH0 to JA1KSO
AP2JZB to G0FUD
BV2A to K2CM
BV2DA to DL7FT
BV2FA to DJ9ZB
BW1Z to DK3NP
BZ4WH to BY4RB
C56/G0CBY to G0CBY
C56/G3RZ to G0GFQ
C6A/KR8V to KR8V
CM6XK to I0WDX
CN8FC to WA4QMQ
CN8YL to VE6AHT
CO6CD to W3HNK
CR2UW to CT4UW
CT3EU to G3PFS
CY0SAB to VE1CBK
D2/LU6ELF to N4THW
DA0SPN to DF6IC
DK7UY/J8 to DK7UY
EA6/G4VPG to G4VPG
EA8/G0KPW to G0KPW
EI4VIJ to G3HZL
EL2CX to N2AU
EL2DK to G3OCA
EL2E to HB9LTZ
EL2WK to G3OCA
EL3MR to WA8LKS
ES1QD to UR2QD
ES2CM to UR2RIM
ES2WX to UR2RRR
ES4XB to UR2RND
ES7GT to UR2RGN
ES7RGN to UR2RGN
ET3CX to PA3CXC
F6GQN/9LL to F6GZA
FH8CL to FD1MXH
FK8FS to JN1XWO
FK8GJ to F6CXJ
FO0BAS to 4Z4TT
FO0PT to DJ0FX
FR4FD to F6FYA
FS/JA2EZD to JA2MNB
FS5R to W7EJ
FS5UQ to W3HNK
FT5XH to F2CW
FW/SM7PKK to SM7PKK
FY5EW to F6BFH
G4WYG/ST2 to G4OHX
GM9OCC to GM3ITN
GU0LYQ to AA6MV
GU4VPM to G4VFG
GW7OG to F2YT
HC8U to W6UE
HG0D to HA0HG
HI9/W4UXI to W4UXI
HL9BR to KB6ZXL
HL9EP to K0VZR
HL9OB to N4GNR
HP1XBH to G3JKB
HR1LW to JA1LW
HS0B to WA4BCQ
HS0E to K9EL
HV3SJ to I0DUD
HZ1AB to K8PYD
IA0PS to I0JBL
IC2A to I1RBJ
IK5DNE/IA5 to IK5DNE
IY0A to I0JBL
IY0M to I0JBL
J3/N2IOE to DK7UY
J37AJ to W2KF
J37XT to W8UVZ
J73EH to WA4WIP
J8/VE3CPU to VE3CPU
J80A to JA2EZD
JD1/JA3EMU to JA3EMU
JD1/JA7FTJ to JA7BIJ
JD1/JE7RJZ to JA7FWR
JD1BFA to JD1AMA
JD1YAA to JA1OGE
JE7RJZ/JDI to JA7FWR
JH1MAO/JD1 to JH1MAO
JS1ANT to FS6GE
JW4MQ to LA4MQ
JW5NM to LA5NM
JW7SP to LA3T
JX8KY to LA7ZO
JX9CAA to LA5NM
JY9MO to WB2OQY
JY9SR to W3FYT
K4SXT/DU3 to WB4KZW
K7SS/PTI to K7SS
KA6DR to N6GWU
KB5GZI/5N1 to W4DVJ
KC4AAC to WD6DRN
KD7P/NH4 to KD7P
KE2AA/KH3 to KE2AA
KE9A/DU3 to WB9YXY
KG6SL to WA6AHF
KH0/JA3SWJ to JA3SWU
KH0AC to K7ZA
KH6/K7BYH to K7BYH
KH8/NH6RT to JH4IFF
KN0E/KH3 to K9UIY
KW5O/TG4 to KF7GH
LQ5A to LU8DPM
LU1ZA to LU2CN
LU2ZA to LU2CW
LX15OL to LX1DA
LY18YC to UP1BYC
LY2BR to UP2BR
LY2ZZ to UP1BZZ
N2IOE/J3 to DK7UY
N3CRH/TJ to AH6HQ
N4XO/C6A to N4XO
NH6D/KH3 to NH6D
NH6RT/KH8 to JH4IFF
NR3J/HR3 to K9APW
NZ6C/5TH to W4FRU
OR0TT to ON7TK
OX3LX to OZ1DJJ
OX3XR to OZ3PZ
P29PL to VK9NS
P29SC to WB1GWB
PA6CC to PA3BAG
PJ2HB to WA2YMX
PJ7/K2KTT to K2KTT
PJ8JP to AB1U
PP5IW/PR8 to PP5IW
PP5IW/PT9 to PP5IW
PY0FF to W9VA
RA0YD/JT to RA9YD
S01A to EA2JG
S01MZ to EA2JG
S79D to WB4YZU
SM0OIG/YN to SM0KCR
SM7PKK/FW to SM7PKK
ST4/WZ6C to W4FRU
SV0MY/8 to K7MO
T30AC to AA6BB/7
T77V to W3HNK
TA4/DL6RAI to DL6RAI
TG9GI to I0WDX
TJ1BP to VE3NPC
TJ1PD to N5DRV
TL8CM to DL8CM
TL8HW to WB4LFM
TL8WD to DL8CM
TP2CE to F6FQK
TU2OP to TU2MA
TU2PA to KE0LS
TU2UI to WA8ZWR
TU2VE to WB4UBS
TY0AS to IT9AZS
TZ6PD to KB6ORK
TZ6VV to N0BLD
U0K/UA0QT to UB5VFT
UA0BCA to UA3YA
UA0KAY to UA0KCL
UA1OT to UB5KW
UA2AO to UA2FM
UA9ZL to UA9YAB
UB5MAL/UA1O to UZ1PWA
UC7S to UC2SR
UC7W to UC2WO
UD6DKW to W3HNK
UF6FJ to UF6FFF
UH0Y/UA4LU to RA4PF
UH1Y/UZ4HWS to RA4PF
UH2Y/UA4PAZ to RA4PF
UH8EA to RA3AR
UI8IF to UI8IAJ
UI91WA to UI81AJ
UL7JC to K8BTH
US1GB to UK3A
UW90Q/RW9H to UA9HTT
UZ2FWA to UA2FM
UZ4FWD/UH0Y to UZ4FWD
V21AJ to WB2TSL
V31DX to KA6V
V44KI to N0DH/4
V63AO to KC6IN
V63CQ to KB5FGL
V73AS to KK4QY
V73AT/KX6HE to K2CL
V73AU/KX6GL to N8BZ
V73AX to KX6BU
V85DA to VK1DA
VE3CPU/J8 to VE3CPU
VK0JR to VK9NS
VK2GDD to YASME
VK9TR to VK5FG
VP2EE to KA3DBN
VP2EHF to KA3DBN
VP2EXX to KC8JH
VP2EZD to JA2MNB
VP2V/KG6WI to KU9A
VP2V/NP2CG to WA2NHA
VP2VE to WA2NHA
VP5/W4UXI to W4UXI
VP5P to WN5A
VQ2DX to K7PQS
VQ9DM to N5DM
VQ9DX to K7PQS
VQ9HB to AA6BB
VQ9LW to WA2ALY
VQ9PN to N4DQY
VR200PI to KB6ISL
VR6IV to KB6ISL
VS6CT to KA6V
VS6WO to K9EK
VU2AYB to WA4FVT
VU2GI to N2HOS
VU2HFR to W8XM
VU2ZAP to W3HNK
W8SEY/J3 to W8SEY
WB1EPO/6Y5 to WB1EPO
WB3KBZ/VP9 to KG8U
WD4FOV/KH8 to N4JR
WZ6C/ST4 to W4FRU
XF1C to WB6JMS
XT2BW to WB2YQH
XT2KG to YASME
XTZBW to WBZYQH
XV2A to JA3UB
XW8KPV to JH1AJT
XX9JN to K99C
Y33VL to Y66QL
YB0ARC to KA6V
YB2BNJ to W8AH
YB3ASQ to W7TSQ
YC3HCM to NA2K
YJ0ABF to DF5WA
YJ0AHM to DL5UF
YJ1SHD to YJ8M
YJ8AB to KC4MJ
YL1WW to UQ1GWW
YN3JG to NT7S
YS1MAE to WN5K
YV4AB to YV4UY
ZC4CZ to UR2RGH
ZD7KM to G3JKB
ZD7VJ to G4ZVJ
ZD8VJ to G4ZVJ
ZD9BV to W4FRU
ZF2AG/ZF8 to N8AG
ZF2GO to KA9DZM
ZF2NJ to K0BJ
ZF2OA to KD6WW
ZF2OR/ZF8 to NR1R
ZF2OS to AA1M
ZF2OT/ZF8 to DF5IW
ZF8/ZF2NB to KA8DSS
ZK1XS to 4Z4TT
ZL0AKH to YASME
ZM7VS to ZL2VS
ZS3UN/OH7NRW to OH7XE
ZS8MI to ZS6PT
ZV7A to PT7PQ
ZV7BI to PT7DX
ZY0TI to PP2BNQ
ZZ5AS to PP5AS
ZZ5FO to PP5FO
ZZ5NL to PY1SL
ZZ5QN to PY1QN
3DA0AV to Box 190, Florida 1710 RSA
3DA0BL to Box 64, Munzini, Swaziland
3W3RR to "BRA-VEN-KO," P.O. Box 308, Moscow 103009
4F3AAL to SM 217 Manila
4S7WP to Box 80, Colombo
4U1VIC to "Phil," P.O. Box 200, A-1400 Vienna Austria
4X6AU to Arad, Box 2417
5N6YBC to Box 66, Jos, Nigeria
5Z4MR to P.O. Box 898, Kisumu
7P8DX to Box 333, Maseru 100100
7X5VVK to Box 341, Batna CP 05000 Algeria
8Q7DC to P.O. Box 88, Bruz F-35270 France
9J2AL to P.O. Box 32481, Lusaka
A41JV to Box 2447, Seeb, Oman
A41KJ to P.O. Box 741, Moscat, Oman
A45ZP to Box 50202, Muscat, SO Oman
BY1QH to P.O. Box 2654, Beijing PRC 100084
BY4RB to Box 413, Zhenjiang
BY5RCS to Box 709, Fuzhou
BY5VZ to P.O. Box 238, Fuznou
BY7KT to Box 1285, Guangzhou PRC
BZ1AJ to KEN, Box 6106, Beijing
BZ1DX to Box 2654, Beijing
BZ4RC to Box 538, Nanjing
BZ4ROX to Box 538, Nanjing
C6AFV to P.O. Box 563, Freeport
CE0MTY to P.O. Box 4000, Santiago, Chile
CP8AL to P.O. Box 240
CT500B to Box 2483, 1112 Lisboa Portugal
CT500C to Box 2483, 1112 Lisboa Portugal
D68CY to P.O. Box 85, Morone Comores
DU3CWM to B7-L3 Guinhawa-Malolosa Bulacan 33000
EL7X to Willi, Box 538, Bong, Liberia
ES1RA to Box 806, Tallind 200017 Estonia
ES3RKI to P.O. Box 125, Tallinn
EW1OWU to P.O. Box 1, Kalinkovichi 247710 Byelorussia
FG5ED to Sam Sahai, Box 444, Pointe-a-Pietre
FH5EJ to Box 161, Dzaouza 97610 Mayotte
FY/N4QKX to "Jay," 35B15 Cesaire, 97300 Cayerre, French Guinea
H44SH to Box 382 Honiara
H44SK to Box 352, Honiaria, Solomon Islands
HI3JH to P.O. Box 122, Santiago, DR
HR2JAE to Box 2020, San Pedro Sulva Honduras
J28EN to Box 1076, Djibouti
J28KY to Box 2417, Djibouti
JT1BJ to Eby, Box 129, 51 Ulan Bator Mongolia
JT1BS to Box 676, Ulan Bator
JT1KAI to P.O. Box 457, Ulan Bator 44 Mongolia
JT2AB to P.O. Box 119, Choibalsan
JT2KAA to Box 119, Choibalsan
JY5FA to P.O. Box 243, Amman
KG4DD to P.O. Box 692, NY, NY 09593-0055
L73GADX to GADX, Box 36, Temperley BA Argentina
LY1BD to P.O. Box 36, Telsau 235610 USSR
LZ1EF/Z2 to P.O. Box 70, Sofia
LZ5DX to Box 36, 1834 Temperley BA Argentina
PJ2AM to Box 3546, Curacao
PZ1DY to P.O. Box 9131, Paramarieo Surinam
R0Z to Box 12, Kamchatka 683000 USSR
RA3ALL to Natalie, P.O. Box 157, Moscow 117463
RA3ZH to P.O. Box 5, Stary-Oskol 309530
RA6AR/UF1V to Box 555, Sochi, Georgia 35435 USSR
RA9YD to Box 2535, Barnoul 656057
RB5EEU/UA0X to UB5EFW, Box 51, Zhelyt Wody 322530 USSR
RB5MT to P.O. Box 22, Schastie 348903
RH0Y/RA4LM to Box 88, Dimitrovgrad-12 Ulyanovsk Oblast 433510 USSR
RH3Y/RA9SB to Box 7, Orsk 462401
RT6J/UB3JWW to Box 13, Simferopol 333038
RW9FW to Box 84, Perm 618404
RX9J/UC2ABA to Box 192, Minsk 94
SV5TS to P.O. Box 7, Paradisse 85106 Rhodes
SV9AKI to Gev, Box 33, Souda 73200 Crete
TA2PC to P.O. Box 2, Bahariye Istanbul
TA3D to Box 963, Izmir, Turkey
TA8KA to P.O. Box 13, Gaziantep
TI2LAK/HP4 to Box 71690, San Jose, Costa Rica
TL8PS to "Philippe," Box 265, Haguenau 67500 France
TR8XX to Box 4069, Libreville
TT8GA to Box 88, F-35170 Bruz France
TU2QQ to Mike, Box 3023, Abidjan, Ivory Coast
TZ6AS to Box 100, Bamako
U1ZA/A to Anatloy, Box 1087, Murmansk 057 USSR
U7FA to P. O. Box 819, Pavlodar 637023
UA1APY to P.O. Box 100, Kronstadt 189610
UA4PK to P.O. Box 4241, Kazan 420061
UB4DWW to P.O. Box 1, Korolevo 295560
UB4MZL/RC4O to "Dick," Box 59, Lisichansk 349900 Ukraine
UB4QWW to P.O. Box 4850, Zaporozhye 330118
UB5RCL to P.O. Box 1242, Chernigov 250034
UC2OAV to P.O. Box 49, Gomel 246049
UD5DC to Box 594, Baku USSR
UD6DJ/UD6N to Box 1, Minchegaus 374311 USSR
UH8AAQ to Box 1, Askhabad 744003 Turkmen
UI8IAW to P.O. Box 83, Samarkand 703000
UJ8JX to Box 327, Dushanbe 734001
UL7ABA to P.O. Box 70, Shevchenko 466100
UL8PA to Box 210, Kanaganda 470061
UM0MO to P.O. Box 1870, Frunze 72000
UM9TWA to P.O. Box 90, Talas 722720
UP8BFH to P.O. Box 60, Port Stanley
UT7J/UB4JIW to Box 13, Simferzpol 333038
UV9FM to P.O. Box 577, Perm 614022
UV9UWW to Box 20, Novokuznetski 654000
UZ0FWM to P.O. Box 57, Sakhalin Island 693000
UZ0KWC to Serge, P.O. Box DX, Madadan Oblast 686830
UZ9WWR to P.O. Box 22, Belebey 452030
V73AQ/KX6OI to Kwajalein Radio Club, P.O. Box 444, APO SF CA 96555
V85SS to P.O. Box 38, Mata
VU2RJE to Box 6538, Bombay 26
XW8KPL to Box 864, Vieniene PDR Laos
XX9TDM to Box 12727, Hong Kong
YI0AD to Box 31008, Baghdad, Iraq
YJ8M to Marek Bladovsky, P.O. Box 217, Port Vila
YL1WC to Box 6, Riga, Latvia
YL1XX to Box 100, Riga, Latvia
YL2LW to P.O. Box 104, Riga 226063
YN3CC to Box 2971, Managua
Z21AV to Box 631, Kwekwe Zamb
ZC4MT to P.O. Box 413, Larnaca
ZD7DP to P.O. Box 86, St Helena
ZD7VC to Box 58, St Helena
ZD8PJ to Box 3, Ascencion Island Via UK
ZF1HJ to Box 1215, Grand Cayman BWI
ZS9A to GEO, Box 1018, Walvis Bay, 9190 Namibia, SW Africa
ZS9S to P.O. Box 2480, Walvis Bay

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

From the Notebook—Part IV

This month we plan to focus on some new antenna products, catch up on and acknowledge reader correspondence, and highlight some new or improved hamshack software. First, a look at the antenna side of the column.

MFJ's new peak- and average-reading cross-needle SWR/wattmeter, the MFJ-815B, is pictured here. The device lets you monitor SWR, forward power, and reverse power at a single glance. (Photo courtesy MFJ Enterprises, Inc.)

Antenna Topix

LTA Championship Monobanders. LTA Vice President E. Lanny Nass sent us some information on his monobanders. These started out with a 10 meter series of Yagis and recently expanded to include antennas for 40 through 6 meters, including the 12 and 17 meter WARC bands.

According to the manufacturer, the Championship series monobanders have been performance-optimized, with forward-gain and front-to-back (F/B) measurements verified through computer modeling. Spec sheets provided focus on free-space environment models to enable realistic comparison to other antenna designs; a good pattern and optimized VSWR bandwidth are slightly favored over forward gain as a design philosophy. LTA has designed their antennas to attenuate the rear lobes over a range of frequencies, not just at a given discrete frequency. The specs provided on the LTA antennas also include 2:1 VSWR bandwidth and rear-window rejection (the worst rear lobe in the rear region).

Certain models are offered with Gamma matches, while others are Beta matched, to maximize clamping methods and antenna performance. The Beta-matched antennas benefit from the use of an RF choke balun which inhibits the feedline outer shield from becoming a part of the radiating system.

The antennas are priced from $92 for a 3-element 10 meter Yagi to $659 for a 5-element 20 meter model. For more information, write to LTA Industries, Inc., P.O. Box 92, 281 Dartmouth Drive, Canfield, OH 44406.

Slack Antenna Systems. Slack Enterprizes has announced several wire antenna systems designed to fit small urban lots. Several different singleband models, all with 450 ohm feed and designed to be used with an antenna tuner, are offered to cover 160 through 10 meters, including the 12 and 17 meter WARC bands. In addition, a 50 foot, 80-10 meter all-band model is available, as is a very compact, 25 foot length all-bander. Prices range from $23.95 to $168, depending on model and band coverage. Accessory baluns are available to enable direct coax feed.

For more information, write to Slack Enterprizes, 6620 Forrest St., Hollywood, FL 33024.

New MFJ SWR/Wattmeter. Having a peak-reading function in one's RF wattmeter seems to be getting popular these days. MFJ informed us that they have incorporated a peak-reading function in their MFJ-815B Cross-Needle SWR/Wattmeter. The device allows you to monitor SWR, forward power, and reflected power all at a single glance. You can select from two power ranges for forward and reflected power—2000 watts forward/500 watts reflected, or 200 watts forward/50 watts reflected; SWR is displayed from 1:1 to 8:1. The meter covers 1.8 to 30 MHz with a claimed 10% accuracy and costs $69.95.

Martin Jue, MFJ's president, reminded us that the meter is protected by MFJ's full one-year "No Matter What"™ warranty, which means that MFJ will repair or replace the unit, at their option, no matter what happens to it for a full year.

For more information, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762.

We Get Letters

In several columns we have dealt with the problem of antenna restrictions in apartments and condominiums, as well as in homes that have restrictive deed covenants. In last September's column we offered some practical suggestions on operating with such restrictions for newly licensed Raymond Hartl, KB9YL. We followed that up in the October column with a photo of Bob Branch, KJ7I's twin-flagpole phased HF verticals that appear to be keeping him out of dutch in his restrictive Arizona development. Those columns brought responses from several readers, several of which we'll share with you here.

Florida Flagpoles. Max W. Goldstein, K4EGZ, wrote to tell us that the governor of Florida signed into law legislation (SB 1183) permitting condominium unit owners to display a portable, removable U.S. flag, regardless of any declaration, rules, or requirements. In Max's case, living on the sixth floor of a condo, he uses a Hustler mobile whip on a quick-disconnect clip, placed out the window in a horizontal position with a small flag attached to the tip. This letter-of-the-law arrangement permits him to work 10-20 meters simply by changing the resonator. So far Max hasn't had any complaints about his "flagpole."

Restricted Space Antennas Ideas de WA4BNO. Richard Bell, WA4BNO, wrote to tell us of his antenna-in-an-apartment experiences. Richard used to live in an apartment where he couldn't erect any outside antennas at all. What he used was the building's rain gutter in a "last ditch" attempt to operate.

In doing so, he checked the resistance to ground, finding it infinite when dry and about 100K ohms to ground when wet. He ran a small insulated wire out the window and hooked it to the gutter downspout. He was able to load it up using an old Johnson Matchbox with good results on 80 and 40 meters, although results on 20-10 meters were mediocre.

Richard adds that last year he installed an attic antenna to use as a backup: "Since 40 meters is my favorite band, I put a 40 meter folded dipole in the attic and bent it to fit. My Matchbox loads it with no problems on 40 and 15 meters. Over the last year I have compared it with the regular outside antenna which is an inverted Vee fed with openwire feeders. Most of the time the attic dipole is about one S-unit down from the outside antenna . . . I tried tying the feedline together, and the Matchbox loaded it perfectly on 80 meters. The attic dipole was made from a roll of inexpensive Radio Shack 300 ohm twinlead."

317 Poplar Drive, Millbrook, AL 36054

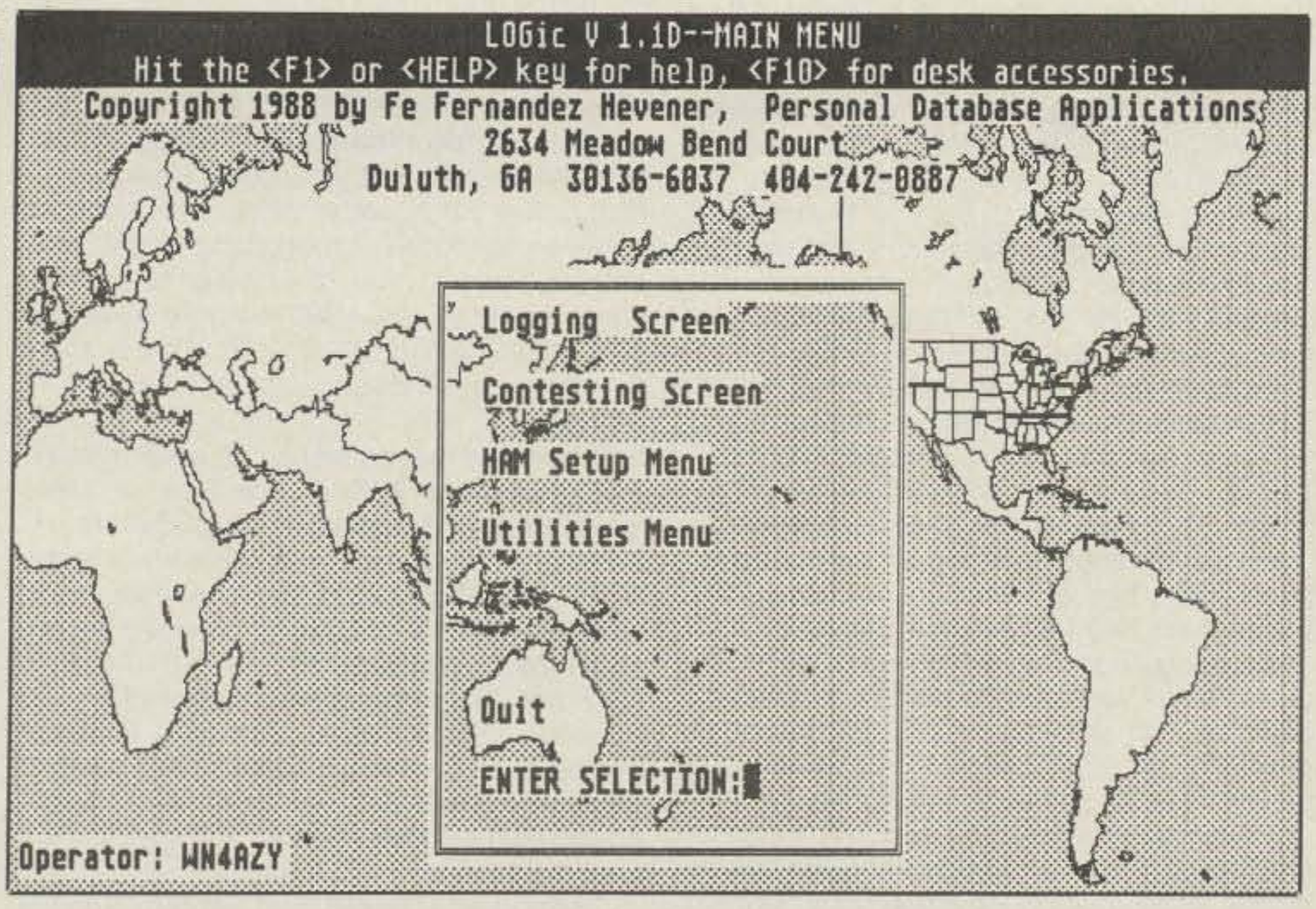

Fig. 1 - Shown here is the LOGic Main Menu, which provides access to the four major areas of the program—logging, contesting, setup, and utilities. The graphic screen shown here is actually from the Atari ST version; the IBM version does not have the world map.

I was certainly impressed with the program when I ran it up. Immediately obvious was the fact that LOGic was a professional product the aim of which was clearly to be among the more sophisticated and flexible computer-based loggers—perhaps to be *the* definitive logger. Especially impressive was the easy and flexible retrieval capability, which lets you page through QSOs or search by any field or combination, including notes and user-defined fields. Another powerful feature is the report writer module, which lets you define custom report formats, mail merge criteria, and other outputs for your logging activities.

In general, LOGic is easy to use, helped along by the hefty, 60-page LOGic user's manual, the even thicker 65-page report writer manual, and the online help. Overall, LOGic is reasonably easy to use and understand, and most of the routine logging and recordkeeping functions it offers are especially simple to use.

However, if you want to successfully take advantage of the program's ultra-sophisticated customization potential, design your own reports, or write your own contest setups, you'll have to dig deeply into the manuals in order to master how the program operates and become familiar with dBMAN programming, a powerful and complex dBASE-type language. If you're willing to do that, you will likely be rewarded by the convenience and amenities of a custom logging program that few if any off-the-shelf programs can hope to offer.

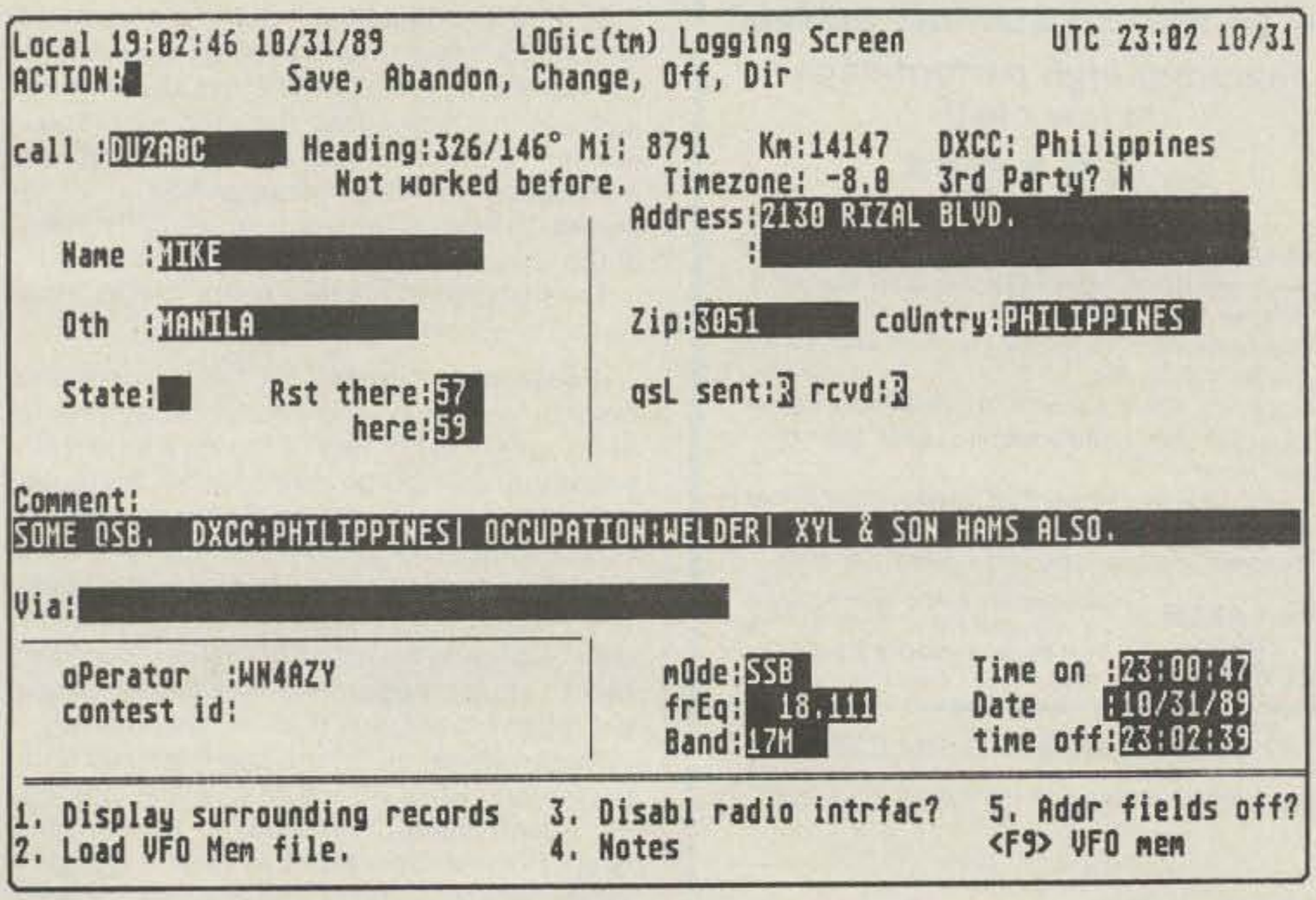

Fig. 2- The heart of LOGic is the Logging Screen, shown here. This screen is used to log non-contest contacts. With this screen you can enter, find, change, and erase data. If you're participating in a contest and want automatic serial number generation and dupechecking, you should use the Contesting Screen.

At this point PDA doesn't plan to offer ready-to-use contest setup files, though in time they probably will provide a few setup files for the more popular contests to serve as examples. A future release of the program will offer real-time contest scoring.

Presently the program is available for the IBM PC and the Atari ST, while Amiga and Macintosh versions are planned. The price is $75 postpaid. Dennis also tells me that his firm offers, in addition to LOGic, Personal Music Librarian and Personal Video Librarian, comprehensive programs for managing large music or video collections. For more information, contact Personal Database Applications, 2634 Meadow Bend Court, Duluth, GA 30136-6037.

Fig. 1 shows the LOGic main menu as shown on an Atari ST computer (the IBM version doesn't make use of the world map). Fig. 2 depicts the LOGic Logging Screen.

MufMap II. Over the course of five or six years we've had the pleasure of reviewing a variety of Commodore and IBM based propagation prediction programs from Base (2) Systems. In the June 1988 column we highlighted MufMap, an unusual and innovative addition to their line which joined MufPlot for the Commodore 64 and BandAid for the IBM PC. The Base (2) gang recently introduced MufMap II, calling it "the next generation."

To review, MufMap lets you see worldwide propagation conditions at a glance—or *globally*, as the buzzword goes. The program simultaneously displays all 10, 15, and 20 meter band openings on a world map. You're able to graphically see to what part of the world the bands are likely to be open for good QSO results.

As we noted in our June 1988 review, the capability to see where the band openings are is a real plus, squarely answering the question "To where are the bands open right now?" This question stands in direct contrast to the firm's other programs, BandAid and MufPlot, which ask a different question. The latter two programs ask what the best time and band are to communicate with a given location.

In addition, MufMap II lets you create and view "MufMovies" on your computer's monitor. You can, for example, set up the program to produce a sort of movie that reveals conditions on a given date in fixed time increments. The presentation looks like a movie when individual "MufMap frames" are displayed one after another since each frame is slightly different from the ones before and after it. By seeing what band conditions will be like during the selected cycle, you can help ensure that you're using your operating time most productively.

The upgraded MufMap II has a few added bells and whistles over and above the original version and is priced at $69. It runs on the IBM PC/XT/PS2 and compatibles with at least 256K RAM. The program supports Hercules, CGA, EGA, or VGA graphics, as well as the 8087 match coprocessor. The program is available from Base (2) Systems, 2534 Nebraska #2, Saginaw, MI 48601.

Fig. 3 shows a typical sample MufMap of world propagation conditions taken from the author's QTH.

QQSL. Bill Mullin, AA4M/6, wrote to tell us he's pleased that we don't overly concentrate on the major commercial and shareware pro-

Turning to the outdoors, Richard also adds one tip—an old one we've seen before, but one which bears repeating: Consider using a spring on antennas attached to trees to prevent undue stretching of the wire when the trees sway in the wind.

Attic Antenna Ideas de K7JNE. Bill Albrant, K7JNE, wrote us a lengthy letter with some ideas that sprang from the September column. Writes Bill:

"About six years ago we bought our new home in Brea, California. At the time I was QRT, so having room for an antenna was of little concern. Also, I didn't even think of all the problems caused by the Homeowners Association rules when I went to put up antennas. Even though it's a single-family home, not a condo, the same regulations are in force.

"My first effort was a G5RV tacked up along the eaves of the roof, with the center insulator right at the peak and the two-story roof. I got away with that for about six months before a tour of the development spotted my pride and joy. I had a rope and pulley arrangement to raise and lower the antenna, but in the heat of a weekend DX contest, I'd forgotten to lower the antenna.

"Next step was to try a [fixed] triband beam in the attic.... It didn't seem to work any better than the G5RV, and of course there was no way to rotate the darn thing either. I came to the conclusion that a shortened tribander, plus the attic location, was causing more signal loss than I was willing to give up."

Bill took out the tribander and settled on several indoor parallel dipoles (40, 20, 15, and 10 meters) suspended from the peak of his roof line and fed with a common coax feedline through a balun. All the dipoles except for the 40 meter dipole run straight; it is bent into a Z-shaped pattern. The antenna is made out of #18 solid hookup wire cut to the standard half-wavelength formula, though each leg was made 6 inches longer to allow trimming for lowest SWR. It took two trips per dipole, or eight trips altogether, to the attic to complete pruning the antenna. Bill admits that there is no way the antenna is going to outperform a 3-element full-size Yagi. On the other hand, results so far have been very satisfying.

From his attic antenna experiences, Bill offers some suggestions. He recommends first using lightweight wire, which is easy to use. Second, he suggests carefully pruning the antenna, cutting leg lengths a few inches longer than formula length to allow for pruning. Third, he cautions that one should stay away from telephone, cable TV, and other wiring for obvious reasons. Fourth, he suggests careful soldering of all wires to the center insulator or balun (a cold solder joint caused him much grief). Finally, Bill recommends using good quality coax rather than "the other stuff."

Taking a negative approach, Bill suggests staying away from trap dipoles and minibeams in attic installations. He'd also recommend not trying to cram a full-size beam in the attic!

T2FD Inquiry. Our mention of the old T2FD antenna in the January 1989 column brought several inquiries from readers. Frank Ivey, KE7U, told us that many years ago he fabricated one while he was living in the San Francisco area, using it with success on MARS frequencies. John wanted to reconstruct his T2FD, but wonders where he might obtain the 200 ohm, 25 watt noninductive terminating resistor. Perhaps readers who have recently erected T2FDs can tell Frank (and us) where they obtained the part from a current source, assuming it didn't come from a well-stocked junkbox. Contact Frank Ivey, KE7U, at 35 Mahonia Cr., Sierra Vista, AZ 85635.

Stacked Monobanders. Fred Bonavita, W5QJM, wrote in suggesting that we put up for discussion the question of proper distances between stacked HF monoband Yagis. Fred decries the fact that most antenna publications, including *The ARRL Antenna Book*, say little about stacking, an important topic, since tuning and performance can be adversely affected.

Fred notes that conventional wisdom has it that the customary "Christmas Tree" arrangement of stacking monobanders (20 meters just above the top of the tower, 15 meters in the middle, and 10 meters at the top) appears to require at least 8 foot spacing between the antennas, but he wonders if this is really the case. He notes that some have suggested that to minimize interaction between adjacent beams, it is necessary also to turn the boom of the middle antenna, the 15 meter Yagi, at right angles to the Yagis above and below it. Fred continues:

"Also to be considered is the physical and mechanical problem of stacking monobanders for best results for operating while following recommended procedures for mounting a rotator inside a tower. Some have said that the best place for a rotator is not at the top of the tower but just above the joint of the top section and the one below it. This also is the place where the top set of guy wires is attached to the tower, giving the whole thing increased strength in dealing with the torque of antennas being turned or blown by winds.

"Given the fact that this joint is 9 to 10 feet below the top of the tower, where a thrust bearing should be placed, and given the fact that the standard section of water pipe used for a mast is 20 feet, stacking monobanders with 8 feet of space between them becomes a problem. There would not be enough mast to do both. In which case, which is more important? Physical and mechanical considerations, or electrical considerations?"

To further boggle the mind and compound the problem even more, Fred cites an article several years ago in one of the major amateur journals that compared the merits of monobanders with those of quads. The author recommended stacking monobanders in an inverted Christmas-tree fashion with 20 meters at the top and 10 meters on the bottom!

Fred would appreciate some reader input on this one, and I would, too.

Fessenden Update. In last December's column we ran a "short burst" about the research of Dr. G.R. "Ray" Fitterer, a former University of Pittsburgh engineering dean, that lends credence to the relatively ignored accomplishments of radio pioneer Reginald Aubrey Fessenden. In the view of some historians Fessenden should receive coequal billing with Guglielmo Marconi for "father of modern radio" status. Apparently, Fessenden should get much more credit than he has received.

We received an interesting follow-up letter from Adam Stein III, N1CVG, whose late father, Adam Stein, Jr., served at Fessenden's Brant Rock station. Mr. Stein indicates that in 1906 there were two radio wireless stations, one at Brant Rock, Massachusetts and the other at Machrihanish, Scotland. The stations were owned by the National Electric Signaling Company and were constructed under the de-

sign and direction of Prof. Reginald A. Fessenden, a Canadian-born scientist and former professor of electrical engineering at the Western University of Pennsylvania, now the University of Pittsburgh.

In November 1906 the Machrihanish station reported that they heard voice transmissions from Brant Rock and claimed to recognize the voice of Adam Stein, Jr., a 1903 Pitt graduate. Their report was found to be in agreement with the Brant Rock station log. The senior Stein's voice was apparently the first voice heard across the Atlantic Ocean. The event proved Fessenden's concepts, and thus he scheduled broadcasts, both voice and music, to ships at sea for Christmas and New Year's Eve. As we noted in last December's column, Fessenden's many patents and developments in radio and other engineering fields rival in importance those of many more noted scientific greats.

The senior Stein left Fessenden's organization around 1910 or 1911 and became a managing engineer for the American Telephone and Telegraph Company's Long Lines Division. He later took charge of engineering at the Marconi plant near Elizabeth, New Jersey. Interestingly, Stein's father was not one to discuss his work, and consequently he and his mother were totally unaware of his father's voice being heard clearly in Scotland. The younger Stein only found out this fact from reading a magazine article by Fessenden while in his freshman year at Pitt, after his father's death in 1936.

Under-recognized or not, both Dr. Fitterer and Mr. Stein believe that Fessenden's contributions to the science of radio are a large part of the foundation for the communications systems—including amateur radio—that we enjoy today.

A Tip of the Hat. We're about to run out of space for letters at this point, so we'd like to acknowledge and thank the many other readers who have taken the time to put pen in hand and write to us about one topic or another. A special thanks to Ken Hahn, W3LC; J.W. Therien, VE1CGN; Abe Magni; Leonard Tedeschi; Murali Soundararajan; Alex Wooten, NV8F; David Bandel, AA6BX; Nestor V. Torres; and R. J. Shivers for their correspondence.

Software Topix

LOGic. Several months ago we ran a brief note about LOGic™, the computer logging, database, and reporting program from Personal Database Applications. At the time we did not have a copy of LOGic that we could check out firsthand. Some time later Dennis Hevener, WN4AZY, sent us a copy of the IBM PC version to check out, and we'd like to briefly share our experience with you.

To recall, LOGic is a very comprehensive and flexible computerized logging program that also interfaces to computerized radios for remote control of frequency and mode. Some of the program's major features include online help; up to 20 pages of notes per QSO; and automatic display of direction, distance, time zone, DXCC country, third-party status, and ARRL outgoing bureau status. The program also includes automatic time, band, and mode logging; user-define "dupe" setups; data import and export; and automatic out-of-band warning, among many other features too numerous to recite here.

CIRCLE 11 ON READER SERVICE CARD

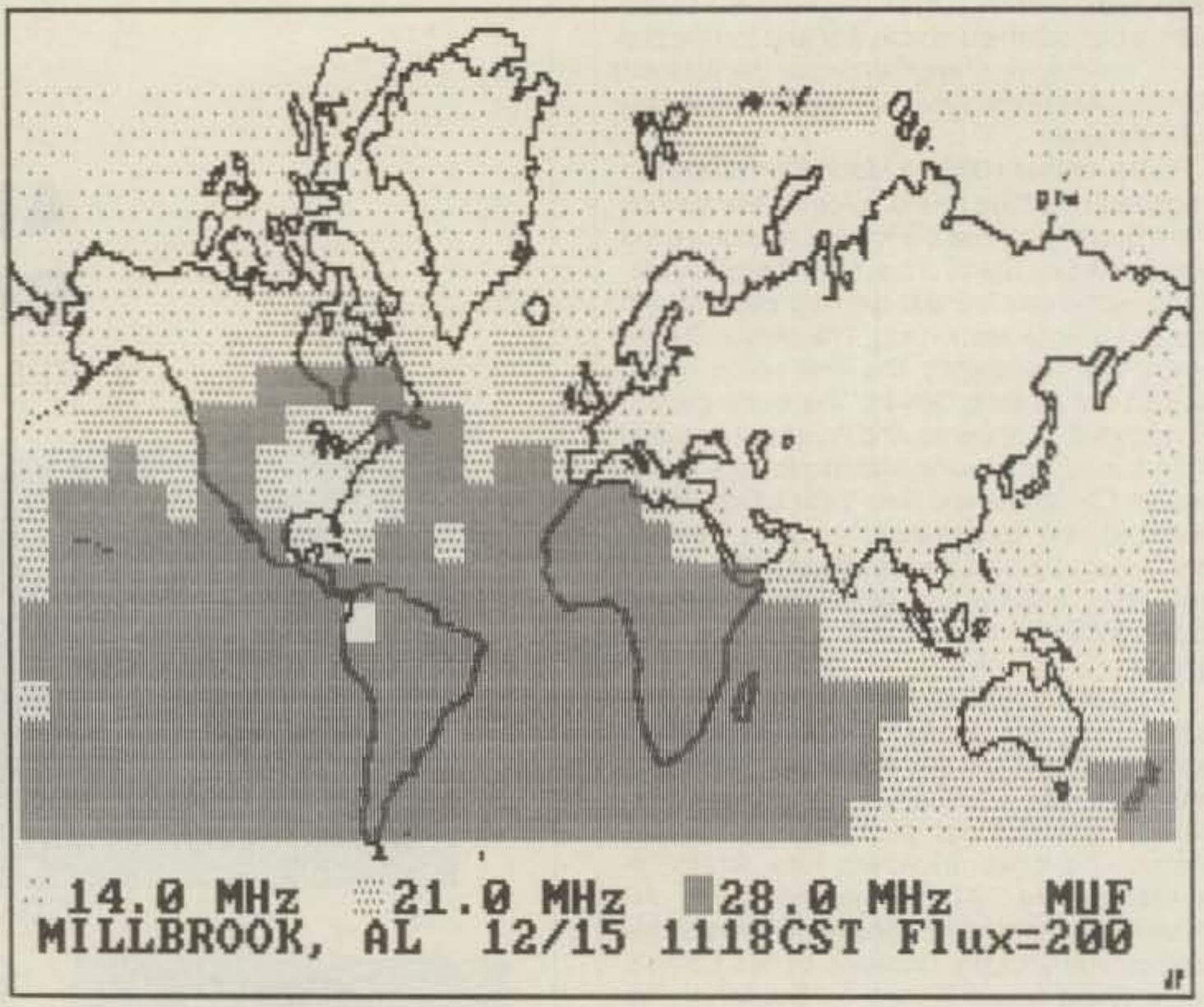

Fig. 3- Shown here is a sample MufMap screen dump, as produced by Base (2) Systems' MufMap II. It shows the areas of the world that are likely to be open on 20 through 10 meters. From the displayed world map, it looks like 10 meters would be a particularly good bet for working the southeastern Pacific, South America, and Africa.

grams. He considers that many software reviewers overlook the many small programs out there which could be quite useful, if potential users only knew about them.

Bill has come up with an IBM PC program for radio amateurs which fits the "small" category. It's a simple but useful freeware program which he calls QQSL, short for "Quick QSL." His program, which he originally wrote for his private use, does only one thing: it prints labels for QSL cards. But it does a nice and fast job.

Bill notes that he found many different label-generating programs, but none of them used a format that he cared for. Too, most other programs required a full computerized log to drive the label-making program. Although he stores most of his log information on a computer, he found it inconvenient to tie together all of the logs, format them into whatever the labeling program in question needed, and then tag the lines that required a QSL label. He found it to be much faster to just compare received QSLs to computer and/or written logs, and then type in the required information for the applicable label.

QQSL is available for download in the CompuServe HAMNET. He will also provide a free copy of the latest version of QQSL to anyone who sends him a 5.25 inch floppy and a stamped, addressed mailer. For this good deal, contact Bill Mullin, AA4M/6, 3042 Larkin Place, San Diego, CA 92123.

Although QQSL can still be obtained free, Bill advised us as this column went to press that he's now marketing it under the shareware concept. The suggested registration fee is $15, which you should remit to him if you continue to use the program. Also, he's recently introduced version 2.0, which is greatly advanced in terms of capabilities, flexibility, and power.

HAM-SOFT Catalog. Ray A. McKnight, WB3ABN, has issued his new catalog of public-domain and shareware software for amateur radio applications, offering dozens of disks not only for the IBM PC, but also for the Commodore and the Macintosh. His first catalog has no graphics, but by the time this reaches print, Ray should have a revised catalog which will provide high-resolution screen shots of many of the programs in actual use. Ray hopes that a graphics-oriented catalog will enable prospective customers to make more informed software purchases, as well as answer many questions about the software before ordering.

The HAM-SOFT catalog is available for $1.00 from HAM-SOFT, P.O. Box 2525, Morgan City, LA 70381.

Short Bursts

C-SAT Satellite Radio. Richard Gamberg of C-SAT Broadcasting operates the C-SAT Public Access Data (PAD) service, which is something of a "BBS in the sky." The service echoes via commercial satellite a wide range of information about the home-satellite-dish industry that is featured on the C-SAT/NWAF ("Not Without a Fight") landline BBS (phone 213-947-5307). This BBS is said to have the largest database concerning satellite communications and related issues of any BBS in the United States.

The C-SAT/NWAF BBS in itself is an interesting one, as it is devoted largely to an exchange of views, proposed legislation, technical data,

public-domain programs, political news, and other information about current issues and trends in the home-satellite industry. The BBS operators' main thesis is that there are a number of major problems in the industry that create an unfair situation for home-satellite system owners and dealers.

What's really interesting to radio amateurs (many of whom, I expect, are also satellite-dish owners) is the alternate method of distribution used by the BBS. Timely and pertinent BBS messages, bulletins, and other information is extracted and broadcast as the C-SAT PAD on the Spacenet 3 (S-3) satellite, using its Transponder 9 and audio subcarrier 6.8. The data uplinked to the satellite is transmitted in standard ASCII format using ordinary modems and commercial terminal programs, allowing reception through practically any computer and modem setup. The C-SAT PAD transmissions are made at 300 and 1200 baud, and, at times, at 2400 baud.

One need only have a satellite receiver to receive the C-SAT PAD signal carried by the Spacenet S-3 satellite, although use of an audio or video recorder enables playback of downloaded data at a later time. To use the system you simply route the audio (either directly from the satellite receiver or through the recorder) to your computer's modem via its telephone-style modular jack. Here the modem processes the audio as though it were ordinary landline BBS data; the only real trick lies in getting the audio level to the modem just right. This process, which sounds Rube Goldbergesque at first glance, actually works; I've seen a garble-free printout of an entire C-SAT PAD session.

An easy-to-understand manual that describes the details of the tuning procedures and electrical hookup required is available from C-SAT Broadcasting for $5; current schedules for the satellite transmissions are available on the C-SAT PAD, or in the PAD section of the C-SAT/NWAF landline BBS. As this is written, the service has three sessions per week.

For more information, contact Richard Gamberg, C-SAT Broadcasting, 225 W. Loockerman St., Dover, DE 19901 (phone 302-678-4400 or 800-688-CSAT).

Datametrics CAS Update. In the December issue we noted that Datametrics, Inc., had available a complete computer-aided scanning (CAS) system for the ICOM R7000 receiver. We'd like to add that the system is also available for the ICOM R71A receiver. Either system is priced at $299 and carries a 30-day return privilege. Also, as we noted, the manual is available separately for $15; a demo disk is now included with the manual.

For further details, contact Datametrics, Inc., 2575 South Bayshore Drive, Suite 8A, Coconut Grove, FL 33133.

Radio Operator's World Atlas. Walt Stinson, W0CP, offers a compact (5" × 7") desktop reference of special interest to the DXer. The *Radio Operator's World Atlas* is a 215-page, full-color book of maps and country statistics that he imports, having recognized the need for a small atlas suitable for desktop and travel use. Printed in Sweden by a leading European cartographic house, the Esselte map service, the atlas is actually *The Concise EARTHBOOK World Atlas*. The book has very recent (1987) and technically superior maps, a thorough name index, and an international callsign allocation table. The book is organized logically by continent, with continental overviews being followed by closeups, and a statistical section with information on each country. Although there is actually little information specifically tailored for the amateur, the large index is outstanding, with even obscure DXCC countries like Navassa, Conway Reef, and Banaba listed with page numbers and grid locators.

The atlas is available for $16.95 postpaid worldwide directly from Walt Stinson, W0CP, 4510 East Quincy Ave., Englewood, CO 80110; add $7 for foreign airmail.

Magnus Opus from K2RR. The heavy-duty reference guide, *From Beverages Through OSCAR—A Bibliography 1909-1988*, is a comprehensive 1200-page listing containing 80 years of references to articles from 297 technical sources, including all articles published in every issue of *CQ*, *QST*, *Ham Radio*, and *73* since January 1945, plus the last 10 years of the British amateur radio journal *Radio Communications (RadCom)*. Even my stuff is there, dating from a short 20 meter antenna construction article in the June 1956 issue of *QST*!

There is little doubt that the bibliography represents the most complete and comprehensive guide to the technical articles published in the major amateur radio magazines —antenna and propagation articles are covered in 28-plus chapters of the *magnus opus*.

The author, Rich Rosen, K2RR, coupled all the knowledge and skills he developed over the past 31 years as a licensed radio amateur with some 9 years of professional editorial experience (*Ham Radio, rf design,* and *Microwaves* magazines) to compile this reference guide. Including 92 chapters spanning 1200 pages and containing 52,880 references, it is presently available in 15/24X microfiche for $75 (amateur net $49.95). Future plans include a paperback edition plus a 3.2-plus megabyte (MB) software database on 3.5 and 5.25 inch disks. Details are available from Didah Publishing, P.O. Box 7368, Nashua, NH 03060.

One possible casualty of the project: I suspect that Rich may now be sporting Coke-bottle trifocals after perusing the roughly 300,000 pages of technical text that went into the research for his reference guide!

Wrapping It Up

That's about all for this month, guys and gals. Next time, more Antennas & Accessories topics of current interest. See you then.

Overheard: Never lend money to people. It has been known to give them amnesia.

73, Karl, W8FX

WORLD OF IDEAS

BY DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Classically Classic Keys

This month's column is a CW special featuring more views of beautiful, classy keys from around the world, plus a brief discussion of amateur radio's favorite old mode itself. I am sure you will find our views most interesting, and they may also inspire your own enthusiasm in collecting and using unique keys on the air today.

In this modern era of high-power SSB QSOs and hour-long RTTY or packet operations, it is terrific fun to switch on a simple low-power rig and make a couple of good DX contacts in spare moments. Recent weekend nights have been especially good for such 20 and 15 meter CW DXing. The crowd gathers on SSB. Thus, you can work the world with a barefoot rig and simple antenna on CW.

Operating mobile CW is another often overlooked activity that is a blast. Our good friend Sy, N4KEL, will attest to that fact. While folks were screaming their lungs out on 20 SSB, he worked the Bouvet expedition right from his van. I personally favor CW mobile because it minimizes those incredulous stares you receive while holding a mike, and it "gets out" like gangbusters. The secret to enjoyable mobile CW, incidentally, is using a good iambic keyer with dot/dash memory. You simply bump the paddles, and the keyer pumps out perfect Morse.

Everyone needs a small collection of keys for such CW fun, and that brings in the second part of our column. This month's goodies are courtesy of noted collectors Rick Van Krugel, VE7FOU; Shige Kawasaki, JN1GAD; Tony Isch, W2GDV; Charles Tryor, N4LMY; and yours truly, K4TWJ. We all encourage you to work more CW and welcome your letters when accompanied by an SASE. Now let's get rolling!

4941 Scenic View Drive, Birmingham, AL 35210

Photo 1

This self-contained electronic keyer is my own pride and joy, thanks to Bencher, MFJ, and VE7FOU. The one-of-a-kind fingerpieces were meticulously crafted by VE7FOU. Rick made them by inlaying hand-cut mother-of-pearl lightning bolts into polished black plexiglas, and they are absolute show stoppers. Countless hours went into perfecting these fingerpieces, and they are obviously more valuable than the whole keyer. Photographs cannot do the little paddles justice. All colors of the rainbow glint off them in sunlight. Rick has built and customized musical instruments for several well-known artists, incidentally, and his work is immaculate. I added a rechargeable battery to this keyer, and use it fixed, mobile, and portable.

Photo 2

This magnificent handkey comes from the collection of Shige, JN1GAD, and it is a work of art that would complement any setup. The key sports a heavy marble base, matching marble knob, and all working parts are high luster chrome that looks like fine jewelry. Notice there are no side adjustments for the arm. Shige calls it simply a "Japanese marble key." He purchased one of the first copies of my *Golden Classics of Yesteryear* book, and we have been corresponding since that time. Shige's work involves international travels, so collecting keys from various areas (and using them on the air) mates perfectly with his lifestyle.

Photo 3

This Japanese key, also from JN1GAD's collection, appears to be a rather popular item in the Orient. Its model number of HK-1

Photo 1- Check out the custom fingerpieces on this keyer. VE7FOU made them by inlaying mother-of-pearl lightning bolts in polished plexiglas. (K4TWJ keyer and photo)

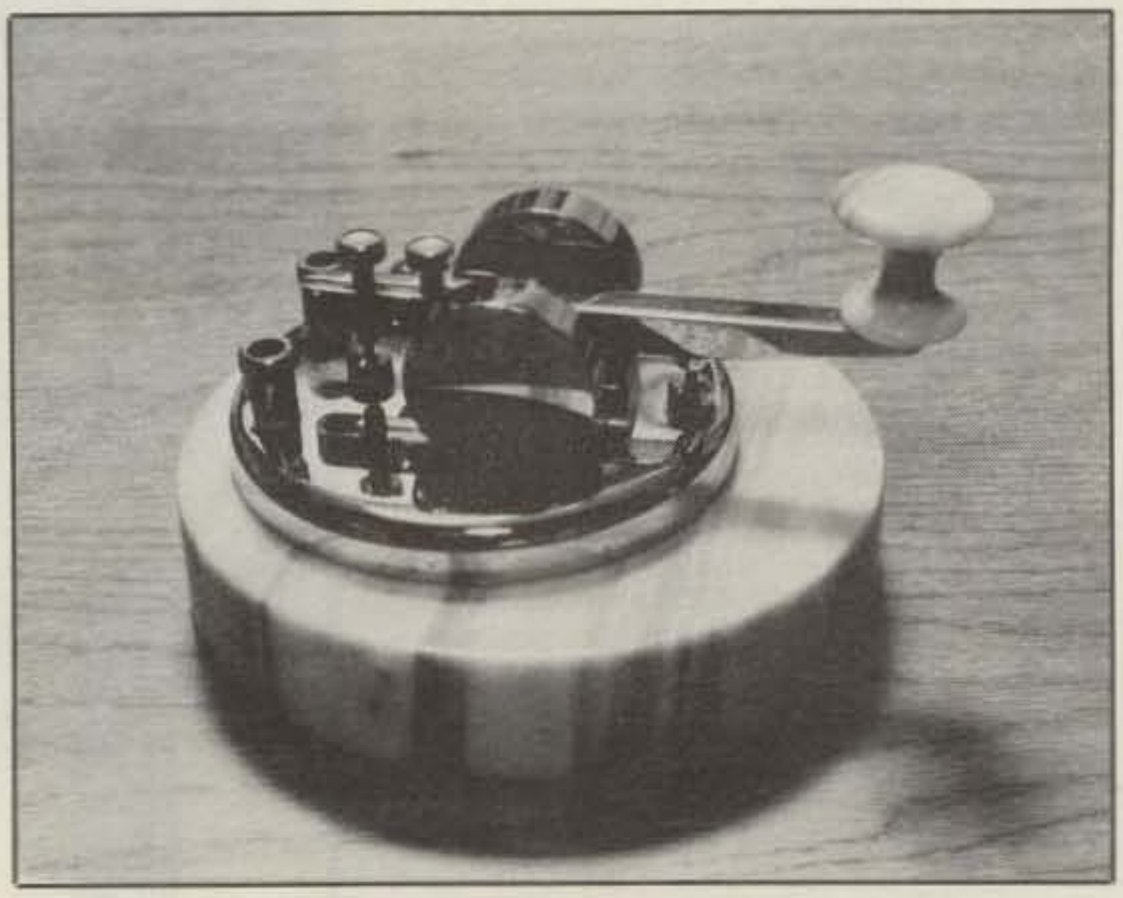

Photo 2- This marble and chrome hand key in JN1GAD's collection works as well as it looks. (Photo via JN1GAD)

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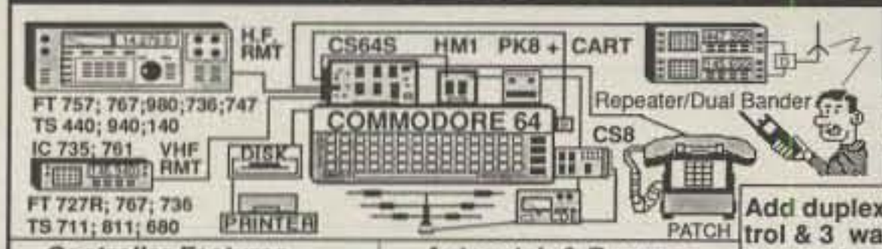

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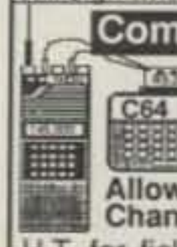

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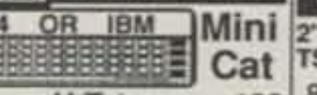

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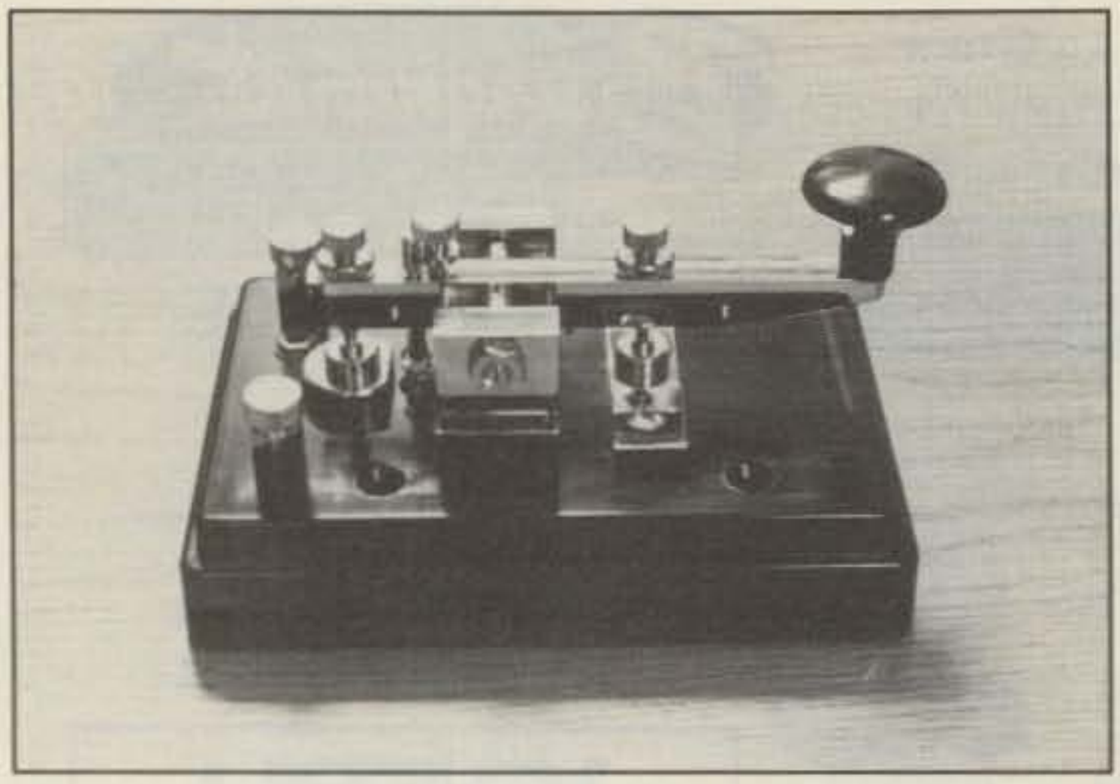

Photo 3- Here is a very neat and precise Japanese hand key any CW devotee would love to operate. Notice its high chrome luster, fine adjustments, and knob with rounded top. This little gem also sports a wieghted plastic base. It is from the collection of JN1GAD.

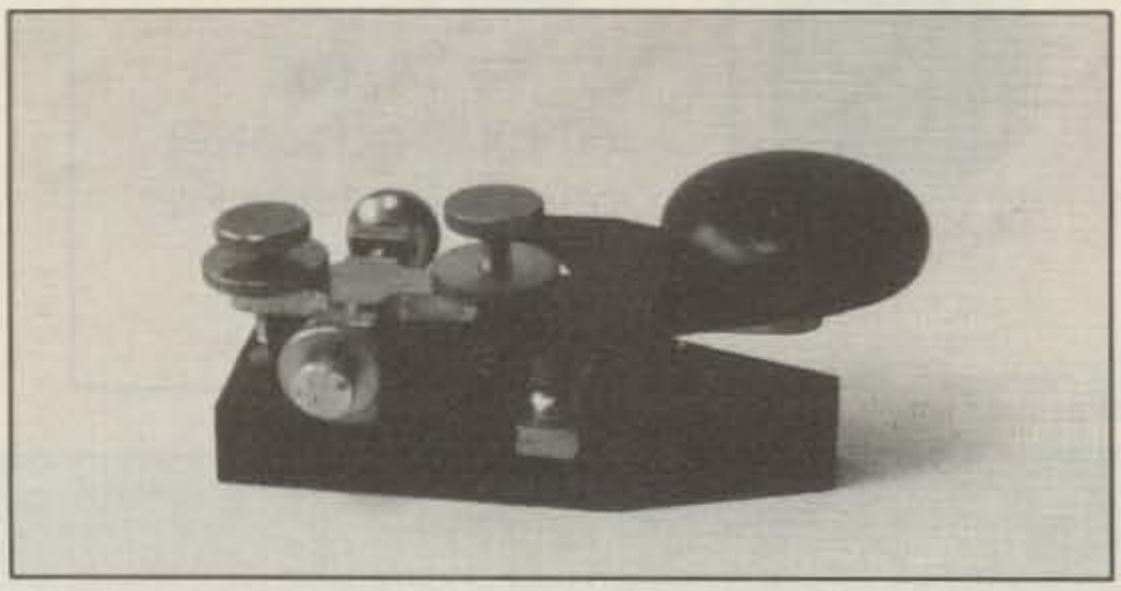

Photo 4- This miniature spy key has a black shroud and small knob covering its brass arm. It fits right in the palm of your hand. (Photo via JN1GAD)

Photo 5- Left key is a Chinese item. Note the similarity to camelback style on lever. The key on the right is a smooth-design Korean item. Note its unusual travel-adjusting screw. (Phcto via JN1GAD)

Photo 6- English key with heavy marble base, ball-bearing fulcrum, and rugged cover. This item even has a built-in T/R switch! (Photo via JN1GAD)

sounds like the Hi Mound Company, which is comparable in notoriety to Vibroplex's name in the U.S. The key shown has a weighted plastic base. A similar model is also available with a thick marble base. Notice the arm's side adjustments with screws and lock nuts, and the little precision pedestals for the front contact and rear arm stop. This is one neat little key with shades of German quality craftsmanship.

Photo 4

Although JN1GAD did not supply any details on this miniature spy key, it looks like a real gem I am sure you will enjoy viewing. First-glance opinions lead one to believe it pivots from the rear, but that illusion is caused by its black shroud over the arm's front. The key actually resembles a shortened version of our famous J-38, and I suspect it has approximately the same "feel." Pocket keys like this are a ball for portable operations. They are just fun to use—if you can find them!

Photo 5

The left item in this photo is a Chinese key with chrome upper parts and a heavy black wrinkle base. It sits a mite high, but the arm is formed down and fitted with a Chinese copy Navy knob (no pun intended) for easy handling. The right item is a Korean handkey with some unusual features. Notice the arm's rear is split and threaded to accept a travel-adjusting screw. A set screw on the side locks that adjustment securely. The arm also pivots on a chrome rod that is not adjustable. Simple, yet effective.

Photo 6

This interesting handkey, also from JN1GAD's collection, was manufactured by Radifon of England. It sits on a hefty marble base and has a rugged top cover that Shige removed for viewing. Notice the fulcrum's ball bearing race similar to modern Kent keys and the etched fingerpiece for non-slip operation. This item was obviously designed for some heavy-duty action! There was no information on the included toggle switch; evidently it is intended for quick T/R switching in a manual/two-handed QSK manner. This key would make a neat addition to an old-time rig restored for use on today's bands.

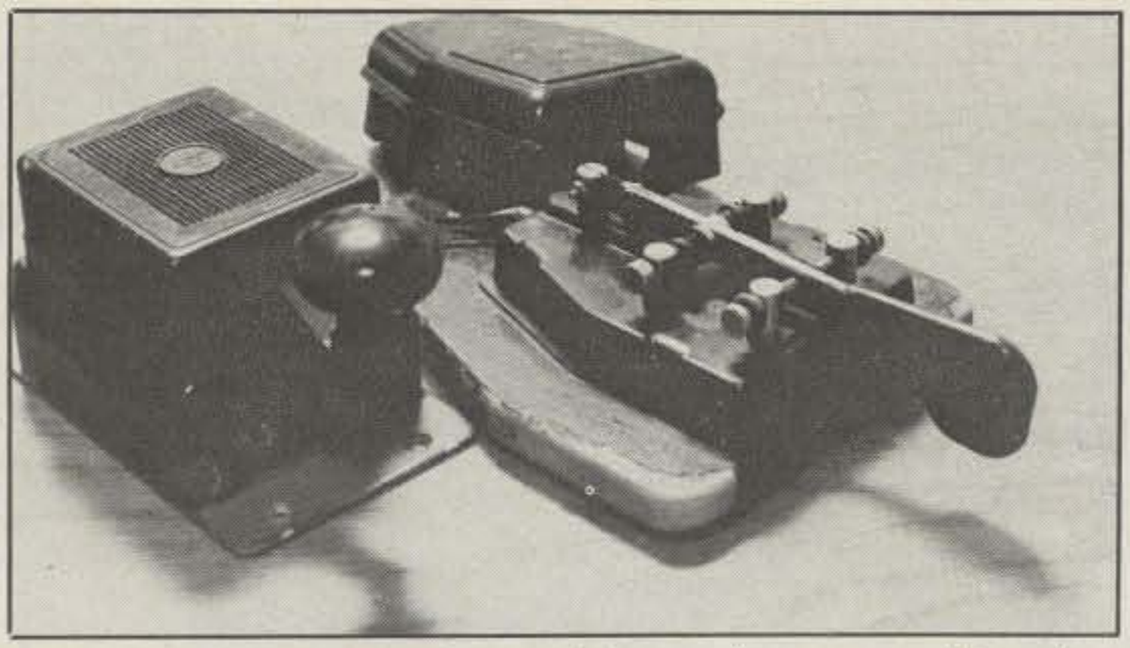

Photo 7- Russian hand key with metal cover and Russian "manipulator" for electronic keyer. Single lever is obviously non-iambic. (Photo via JN1GAD)

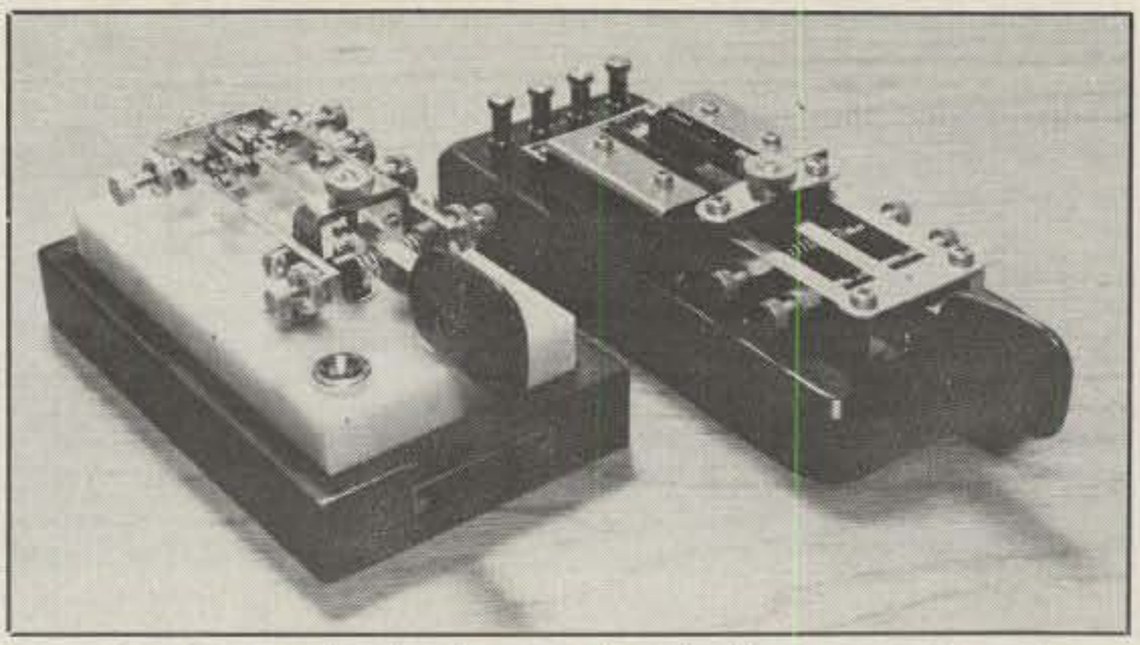

Photo 8- Item on the left is an authentic Japanese sideswiper, not a keyer paddle. Item on the right is a Japanese "manipulator" that can be quick-connected for right- or left-hand use. (Photo via JN1GAD)

Photo 7

Two Russian items in JN1GAD's collection include the pictured handkey (left) and electronic keyer paddle (right). Judging by the handkey's short length, I suspect it pivots from the rear rather than the center. Rear pivoting keys usually have a good "feel," but they lack that second "click" (on contact break) American operators instinctively associate with handkey use. (We grew up under J-38 influence.) The right paddle is called a "manipulator." It also appears to pivot from the rear, as a springy metal strip like a hacksaw blade connects the arm and rear support post. Middle adjustments center the arm and vary tensions, and rear adjustments determine dot/dash travel. This manipulator, with its hearty cover, looks like it would be perfect for mobile use.

Photo 8

The left key in this photo is a Japanese sideswiper. It is manufactured by HiMound and assembled on a polished marble base. The chrome "U"-shaped assembly around the key includes contacts for both sides of the (middle) arm. They are not insulated from each other (like an electronic paddle), but connect to a single common terminal on the right side. An insulated terminal on the left side connects to the key's arm. Two connections, not three—sideswiper. Saavy?

The right item in Photo 8 is a Japanese/HiMound manipulator. It is monted on a heavy plastic base and can be quick-connected for right- or left-hand operation. This trim job is also non-iambic; it has only one lever. Could American amateurs be a minority in their use of dual-lever/iambic paddles?

Photo 9

The left item in this photo is a Korean bag key. The key is quite intriguing. Its vibrating arm (flat piece on right with weight and damper bar at rear) apparently warbles the dit contact (main bar; center area) while dashes are made with the contact closest to the fingerpiece. Use your pocket magnifier to study this key, as it has some fascinating mechanics.

The middle key is a Japanese HiMound BK-100 bag key (that curious designation again!). Close investigation indicates it is very similar to the enclosed Johnson bugs made in the U.S. during the '50s. They were smooth-operating, dustproof keys many amateurs liked.

The key on the right is a HiMound EK-102R. It is a self-contained electronic keyer and non-iambic paddle in an enclosed case that should be great for mobiling. The EK-102R and BK-100, incidentally, may be presently available items in Japan. As far as I know, however, HiMound is not being imported to the U.S. Can anyone tell us different?

Photo 10

Okay, sports fans, here it is: a genuine Japanese back key. this Lionel-train-looking critter was obviously built to take a licking and keep on clicking! Notice the white fingerpiece's special design—wide in the middle for easy handling. The key's vibrating reed is right behind the main arm just like U.S. bugs, the pendulum's weight is set up near that reed (fastest speed position), and the rear damper is protected by a thick cover bar. The "MUSE" nameplate on the metal base has speed calibrations (1 through 9) for weight position, and has "Back key" stamped

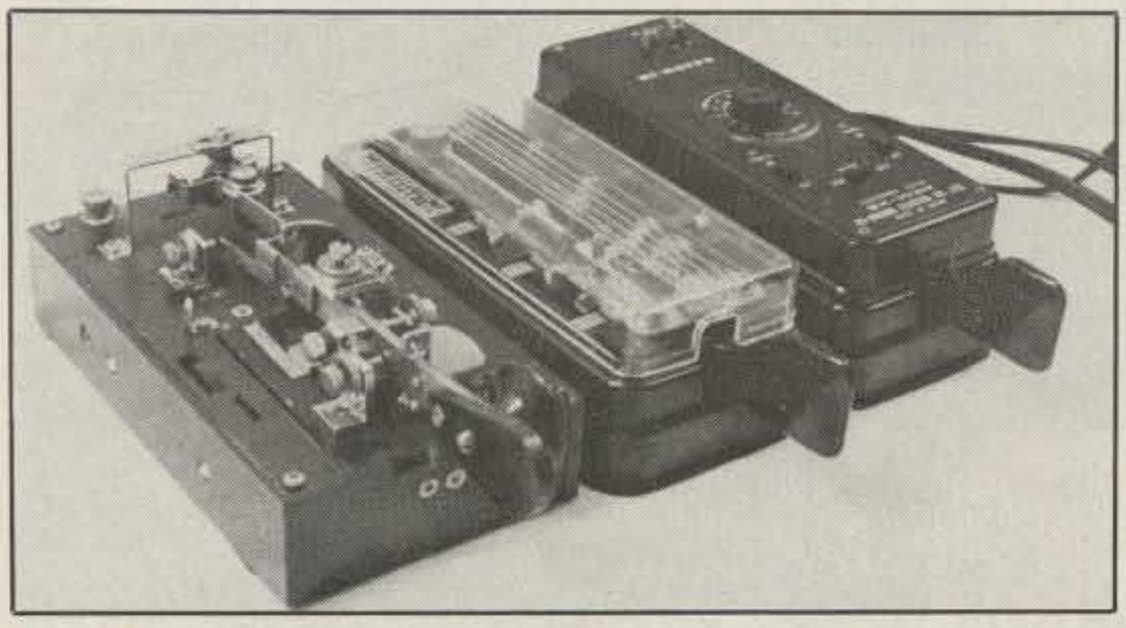

Photo 9- On the left is a genuine Korean bag key with a unique style of vibrating arm. The middle gem is a HiMound bag key. On the right is a HiMound electronic keyer. (Photo via JN1GAD)

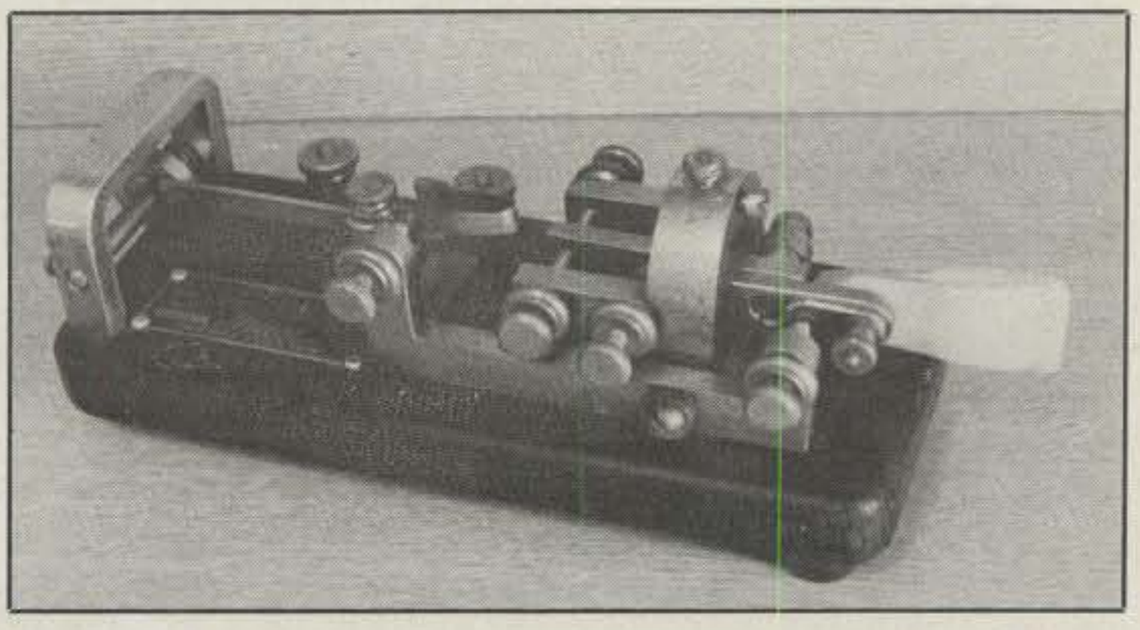

Photo 10- This Japanese bug sports heavy-duty design, rounded yoke, and unique fingerpiece. A real gem! (From the JN1GAD collection)

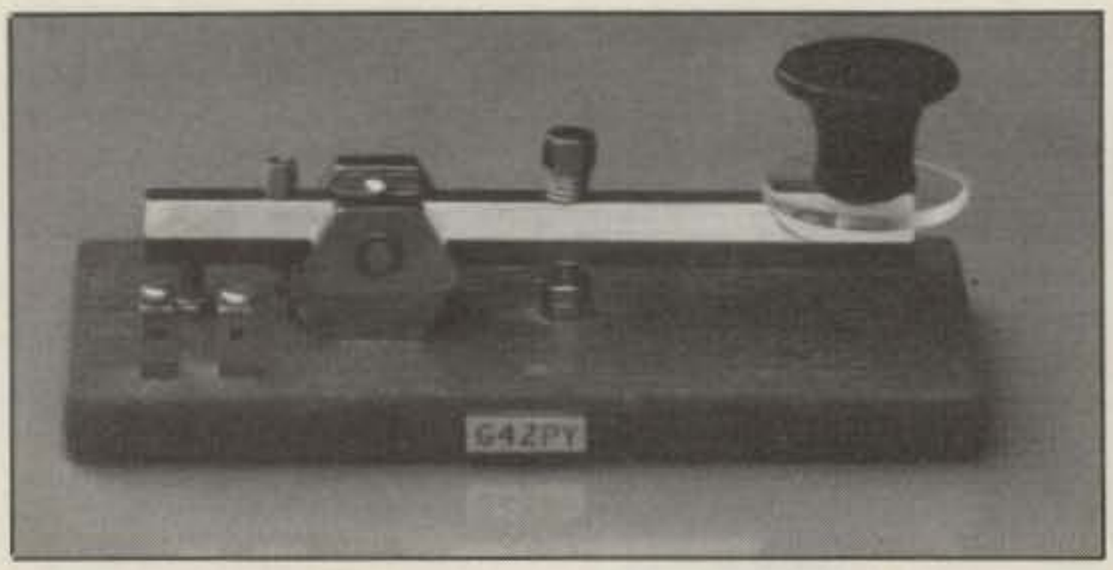

Photo 11- Neat and simple English pump key. The item is solid brass with a green stone base. (Photo via N4LMY)

on its right side). The trim width of this key reminds me of Vibroplex's Blue Racer. As such, the back key should be a delight to use.

Photo 11

Moving from western to eastern areas we have an attactive English "pump key" that Charles, N4LMY, saw advertised in the G-QRP Magazine *SPRAT* and purchased from its manufacturer, G4ZPY. This handcrafted beauty has a highly polished and hex-shaped solid-brass arm. The hex theme continues with adjustment screws and the center support that also includes tiny ball-bearing race assemblies for a very smooth feel. The key is mounted on a green stone base that matches Charles's Heathkit rig beautifully. Charles lives in my area and he mailed this photo plus an informative letter, but he did not include his telephone number (which is unlisted). So, Charles, we like your key and look forward to a telephone call!

Photo 12- A rare Martin Rotoplex. Complete yoke turns on an enclosed ball-bearing assembly to make dits and dahs. (Owned by W2GDV)

Photo 12

Continuing in a more familiar stateside manner, Tony, W2GDV, proudly shares this view of his recently-acquired Martin Rotoplex bug. Notice this gem's molded fingerpiece and large nickle-plated dome rather than a regular top yoke. The bug's arm rotates on a metal post with bearings under that dome to move the pendulum and generate dits—hence the name "Rotoplex." Martin teamed with Bunnell to produce a fair number of Roto-

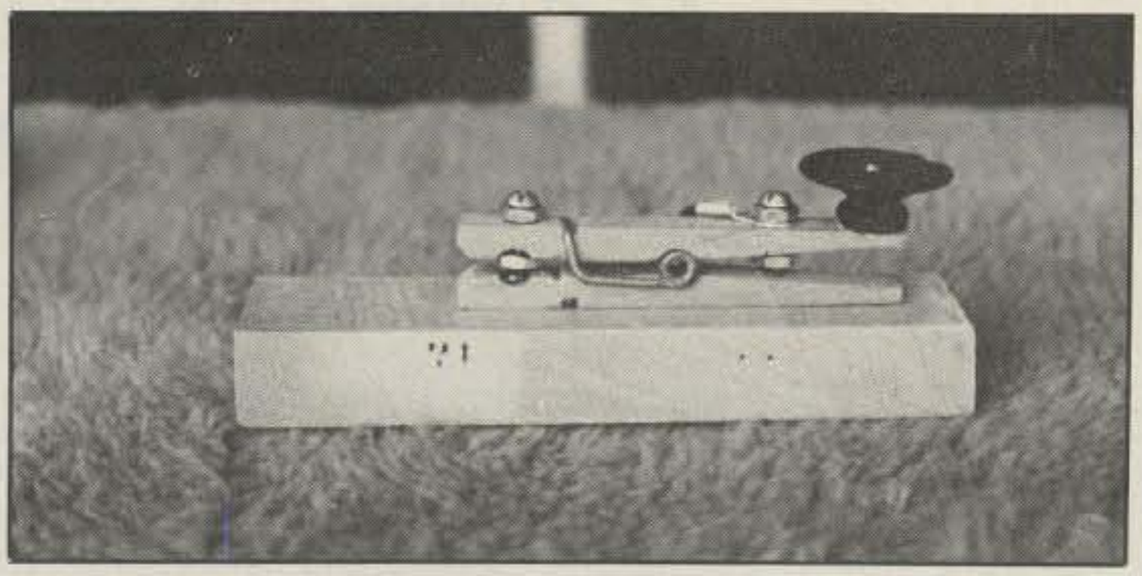

Photo 13- Homebrewed key built from . . . you guessed it—a clothespin! Battle scars show my parrot's appreciation for this easy-to-chew delight. (K4TWJ photo)

plexes for the armed forces during WW II, yet they continue to remain scarce today.

Photo 13

Move over Les Logan and Cedar Rapids Specials. Here is a genuine handmade American key you can assemble before the sun sets tomorrow! Indeed, dear friends, and there are absolutely no worries about keying polarity, switching transistor burnout, or dead-battery syndrome with this weatherproof tyke. Make one for your little toddlers and break 'em in to CW at a young age! My parrot loves this key. It's something he can really sink his beak into (note tell-tale clues in photo)!

Assembly begins by selecting one of mom's clothespins with the weakest spring in the bag (another bag key?). Drill two holes all the way through both pieces, then pull back the spring and remove the top piece. Mount the bottom piece to a simple pine base with two flat-head wood screws. Slip solder lugs under the rear screws for keying leads. Install screws with dual nuts through the top holes, and adjust them for a desired arm travel. Add a rubber foot with mounting screw, an empty thread spool cut in half, a large button, or a handle from an old key for a fingerpiece, and the gem is complete. Snap the clothespin's top in place and enjoy some true two-bit CW! These keys also make good windowsill, carport, or front-doorbell decorations.

Say this month's column kindled your interest in collecting (and using!) classic keys, and you need more "getting started" guidance? Relax. Most of us are in that same situation, learning as we progress. The longer you work with keys, however, the more knowledge you will acquire. Fortunately, too, a new book is now available to help you.

While writing this page, I received a first copy of Tom French, W1IMQ's new *Vibroplex Collector's Guide*, and it is ideal for new and old collectors alike. The book explains how to identify Vibroplex models, estimate time of manufacture, and how to adjust bugs. Also included are reprints of original ads, patent applications, and working sketches of Horace Martin's bugs from the Autoplex through the Zephyr. The 88-page book even includes specific details on the Upright or vertical Vibroplex, the Coffee vertical "look-alike" bug, the Model X, and much more. At $14.95 it is an outstanding investment every collector can use.

The *Vibroplex Collector's Guide* is available from Artifax Books, P.O. Box 88, Maynard, MA 01754. Get one. It is super!

That winds down this month's column, and we wish you good luck in key collecting. Remember, too, the real fun is using them—especially bugs!

I recently moved to a new QTH overlooking Birmingham, and mail delivery has been snakebit. If I have not replied to your letter, please understand and write again (with an SASE).

73, Dave, K4TWJ

PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

A definite slowdown has now been observed in the rise of Sunspot Cycle 22. The Royal Observatory of Belgium reports a mean sunspot number of 179 for January 1990. This results in a 12-month running smoothed sunspot number, upon which solar cycle measurements are based, of 158 centered on July 1989. This is the same level of solar activity reported for June, as the present cycle seems to be leveling off rapidly.

The Algonquin Radio Observatory at Ottawa, Ontario reports a mean 10.7 cm solar flux level of 210 for January 1990. This results in a smoothed number of 213 centered on July 1989. This is approximately the same level as reported for June 1989.

The Space Environmental Services Center (SESC), Boulder, Colorado, continues to report that the growth of Cycle 22 to date exceeds all previous recorded cycles in 10.7 cm radio flux measurements and in smoothed sunspot numbers except for Cycle 19. Their current prediction is that the peak of Cycle 22 occurred during March 1990 with a smoothed sunspot number of 197.4 (±22).

According to various world experts, the predicted smoothed sunspot number for May 1990 may vary between 145 and 174! I am calling for a level of approximately 170. The corresponding solar flux level for May is expected to be in the range of 215.

May Conditions

During the daytime hours, from just after sunrise and continuing through sunset, expect DX conditions to most areas of the world on the *10, 12, 15, 17,* and *20* meter bands. *Twenty* meters should be optimum for a two to three hour period following sunrise. *Fifteen* and *17* meters should take over as best DX bands during the late morning and early afternoon hours. During the late afternoon all five bands should be at their best for DX propagation.

From sundown to midnight *20* meters is expected to be the optimum band for DX, with strong signal openings possible to most areas of the world. Good DX conditions are also expected on *15* and *17* meters for openings towards Latin America, the South Pacific, Asia, and the Far East, and on *30, 40,* and *80* meters towards Europe, Africa, and Latin America. From midnight to sunrise, DX honors are expected to be shared among *20, 30,* and *40* meters, with some good openings also possible on *80* meters. Seasonally higher static levels and the longer hours of daylight are expected to reduce considerably chances for DX openings on the *160* meter band, but some may be possible during the hours of darkness towards the Caribbean and Central American areas.

For specific times of DX openings refer to the DX Propagation Charts which appeared in last month's column. This month's column contains a Short-Skip Chart valid for May and June, as well as charts centered on Alaska and Hawaii. The Short-Skip Chart contains propagation forecasts for openings varying in distance between approximately 50 and 2300 miles. For day-to-day variations expected in propagation conditions during May, see the Last Minute Forecast, which appears at the beginning of this column.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for May 1990

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 1-2, 4-5, 21-22, 27-28, 31	A	A	B	C
High Normal: 3, 7, 13, 19, 23, 25-26, 29-30	A	B	C	C-D
Low Normal: 6, 11-12, 14, 17-18, 24	A-B	B-C	C-D	D-E
Below Normal: 8, 10, 15, 20	B-C	C-D	D-E	E
Disturbed: 9, 16	C-E	D-E	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.

E—No opening expected. 3dB per S-Unit.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be excellent (A) on May 1 and 2, good (B) on the 3rd, excellent (A) on the 4th and 5th, good-to-fair (B-C) on the 6th, etc.

VHF Ionospheric Openings

May should be a good month for short-skip ionospheric openings on the VHF bands.

Look for F-layer openings on the *6* meter band during the daylight hours. Peak conditions should last from shortly before noon through the afternoon hours, with openings likely towards southern Africa, Latin America, and the South Pacific. Transcontinental openings and openings towards Hawaii should also peak during the late afternoon hours. Be sure to check the *6* meter band for F-layer openings when conditions are High Normal or better.

Sproadic-E ionization is expected to increase sharply during May, and frequent 6 meter short-skip openings should be possible. These are most likely to occur over distances of approximately 800 to 1400 miles. Although sporadic-E openings can take place at about any time of the day or night, the best time to check for them is between 10 AM and 2 PM, and again between 6 and 10 PM, local daylight time. With both short- and long-skip openings expected on *6* meters, this should be an interesting band to watch during May.

During periods of intense and widespread sporadic-E ionization, short-skip openings between approximately 1200 and 1400 miles may also be possible on *2* meters.

A seasonal decline in trans-equatorial propagation (TE) conditions is expected during May, but an occasional opening may still be possible on the *6* meter band towards South America from the southern tier states and the Caribbean area. The best time to check for *6* meter TE openings is between 9 and 11 PM local daylight time on north-south paths which will cross the geomagnetic equator at an approximate right angle.

Some fairly good meteor-burst ionospheric openings should be possible on both *6* and *2* meters between May 4th and 6th as a result of the *Eta Aquarids* shower. This is a major meteor shower and is expected to peak on May 5th with a count of approximately 20 meteors an hour. Intermittent openings over distances between approximately 800 and 1200 miles are likely to result from this meteor shower.

A seasonal decline is expected in auro-

ral activity during May, but some may occur during periods of radio storminess. Check the Last Minute Forecast for those days that are expected to be Below Normal or Disturbed. These are the days when there may be a chance for short-skip openings on the *6* and *2* meter bands resulting from ionized regions associated with auroral displays. Auroral-type openings generally range from several hundred miles up to a maximum distance of approximately 1300 miles.

73, George, W3ASK

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distances column of a particular Meter band (10 through 160 Meters) as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 40 Meters) for a particular geographical region of the continental USA as shown in the left hand column of the Charts. An * indicates the best time to listen for 80 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occurr on more than 22 days
(3) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. On the Short-Skip Chart appropriate *daylight time* is used at the *path midpoint*. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are HST. To convert to daylight time in other USA time zones, *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone, and 6 hours in the EDT zone. *Add* 10 hours to covert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA *subtract* 7 hours in the PDT zone; 6 hours in the MDT zone, 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave length above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level for each 10dB loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Department of Commerce, Boulder, Colorado, 80302.

CQ Short-Skip Propagation Chart
May & June 1990
Local Daylight Time at Path Mid-Point
(24-Hour Time System)

Band (Meters)	Distance Between Stations (Miles)			
	50-250	250-750	750-1300	1300-2300
10	Nil	08- 10 (0-1) 10- 14 (0-2) 14- 18 (0-1) 18- 22 (0-2) 22- 00 (0-1)	08- 10 (1-2) 10- 14 (2-3) 14- 18 (1-2) 18- 22 (2) 22- 00 (1) 00- 08 (0-1)	08- 10 (2-0) 10- 14 (3-1) 14- 16 (2-1) 16- 19 (2) 19- 22 (2-0) 22- 08 (1-0)
15	Nil	07 -10 (0-2) 10- 14 (0-3) 14- 18 (0-2) 18- 20 (0-3) 20- 00 (0-2) 00- 07 (0-1)	07- 10 (2) 10- 14 (3) 14- 18 (2-4) 18- 20 (3-4) 20- 22 (2-3) 22- 00 (2) 00- 07 (1)	07- 10 (2-1) 10- 14 (3-2) 14- 16 (4-3) 16- 20 (4) 20- 22 (3-2) 22- 00 (2) 00- 07 (1-0)
20	10- 13 (0-1) 13- 19 (0-2) 19- 01 (0-1)	07- 10 (0-2) 10- 13 (1-3) 13- 19 (2-4) 19- 21 (1-3) 21- 01 (1-2) 01- 07 (0-2)	07- 10 (2-3) 10- 13 (3-4) 13- 19 (4) 19- 21 (3-4) 21- 23 (2-4) 23- 01 (2-3) 01- 07 (2)	07- 10 (3) 10- 16 (4-3) 16- 23 (4) 23- 01 (3-4) 01- 03 (2-3) 03- 07 (2)
40	07- 09 (1-2) 09- 12 (2-4) 12- 20 (3-4) 20- 22 (2-3) 22- 01 (1-2) 01- 07 (0-1)	07- 09 (2-4) 09- 10 (4-3) 10- 16 (4-2) 16- 18 (4-3) 18- 22 (4) 22- 01 (2-3) 01- 07 (1-3)	07- 09 (4-3) 09- 10 (3) 10- 16 (2-1) 16- 18 (3-1) 18- 20 (4-2) 20- 22 (4) 22- 07 (3-4)	08- 10 (3-1) 10- 18 (1-0) 18- 20 (2-1) 20- 22 (4-3) 22- 06 (4) 06- 07 (4-3) 07- 08 (3)
80	08- 11 (4) 11- 19 (4-3) 19- 23 (4) 23- 08 (3-4)	08- 11 (4-1) 11- 17 (3-0) 17- 19 (3-1) 19- 21 (4-2) 21- 06 (4) 06- 08 (4-3)	08- 09 (1) 09- 11 (1-0) 11- 17 (0) 17- 19 (1-0) 19- 21 (2-1) 21- 23 (4-3) 23- 06 (4) 06- 08 (3-2)	08- 09 (1-0) 09- 19 (0) 19- 21 (1-0) 21- 23 (3-2) 23- 04 (4-3) 04- 06 (4-2) 06- 08 (2-1)
160	06- 09 (4-1) 09- 10 (2-0) 10- 19 (1-0) 19- 21 (3-1) 21- 23 (4-2) 23- 06 (4-3)	06- 09 (1) 09- 19 (0) 19- 21 (1-0) 21- 23 (2-1) 23- 01 (3-2) 01- 04 (3) 04- 06 (3-2)	08- 09 (1-0) 09- 21 (0) 21- 23 (1) 23- 01 (2-1) 01- 04 (3-2) 04- 06 (2) 06- 08 (1)	08- 21 (0) 21- 01 (1) 01- 04 (2) 04- 06 (2-1) 06- 07 (1) 07- 08 (1-0)

HAWAII
May & June 1990
Openings Given in Hawaiian Standard Time

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	15-17 (1)	07-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-15 (1) 15-18 (2) 18-20 (3) 20-22 (4) 22-00 (3) 00-02 (2) 02-04 (3) 04-07 (2)	19-20 (1) 20-23 (3) 23-02 (1) 20-21 (1)* 21-23 (2)* 23-01 (1)*
Central USA	12-15 (1) 15-17 (2) 17-18 (1)	05-07 (1) 07-12 (2) 12-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	08-12 (1) 12-16 (2) 16-18 (2) 18-22 (4) 22-00 (3) 00-02 (2) 02-06 (3) 06-08 (2)	19-20 (1) 20-21 (2) 21-01 (4) 01-02 (2) 02-04 (1) 20-21 (1)* 21-00 (2)* 00-03 (1)*
Western USA	09-12 (1) 12-17 (2) 17-19 (1)	06-08 (1) 08-10 (2) 10-12 (3) 12-17 (4) 17-19 (3) 19-22 (2) 22-00 (1)	06-08 (4) 08-16 (3) 16-22 (4) 22-02 (3) 02-06 (2)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-07 (1) 19-20 (1)* 20-21 (2)* 21-03 (3)* 03-04 (2)* 04-05 (1)*

ALASKA
May & June 1990
Openings Given in GMT

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	Nil	18-20 (1) 20-22 (2) 22-01 (1) 01-03 (2) 03-05 (1)	20-22 (1) 22-02 (2) 02-06 (3) 06-08 (2) 08-10 (1) 10-14 (2) 14-16 (1)	05-10 (1)
Central USA	Nil	18-21 (1) 21-23 (2) 23-01 (1) 01-04 (2)	02-08 (3) 08-14 (2) 14-22 (1) 22-02 (2)	05-07 (1) 07-10 (2) 10-12 (1)
Western USA	00-03 (1)	18-20 (1) 20-23 (2) 23-02 (3) 02-05 (2) 05-07 (1)	02-04 (3) 04-08 (4) 08-14 (3) 14-18 (4) 18-20 (3) 20-02 (2)	04-06 (1) 06-08 (2) 08-12 (3) 12-15 (2) 15-16 (1) 08-12 (1)*

For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

Announcing

(from p. 6)

ing—3.970, 7.270, 14.280, 21.375, 28.415 MHz. Send QSL and SASE to Ogden ARC, P.O. Box 3353, Ogden, UT 84409.

AD9E, from anniversary of "What Hath God Wrought" message, MidContinent Railway Museum, North Freedom, WI; Morse Telegraph Club; 1400-2359Z May 26 and 27; 7044, 7144, 10117, 29044. Send QSL and SASE to R.L. King, KA9GNY, 411 Lynn Ave., Baraboo, WI 53913.

W9DUP, from *U-505* submarine, Museum of Science and Industry, Chicago, IL; DuPage ARC; 1600-2300Z May 19-20; SSB 7.250, 14.300, 28.400, 145.25(-600). For certificate send SASE to DuPage ARC, P.O. Box 71, Clarendon Hills, IL 60514.

Scotland, Ireland May 12-13; Scottish Tourist Board (Radio Amateur) Expedition Group Heritage of Whiskey 4 Distillery Event; from GB2SSD Scotland's smallest distillery, Pitochry, Perthshire; GB2OBD Old Bushmills Distillery, Bushmills Co. Antrim; EI7M Midleton Distillery, Midleton Co. Cork; EI7WW John Jamieson's Distillery, Dublin. Certificate available for working two to four stations. Send QSLs to Robbie, GM4UQG, P.O. Box 59, Hamilton, Lanarkshire, ML3 6QB Scotland.

VR200PI/KB, from Pitcairn Island Bicentennial; Kay Brown, VR6KB, op; 00001Z May 1 through 2359Z May 31; 10 meter SSB Novice portion and 15 and 20 meter SSB General portion of the bands. All VR200PI/ QSLs go direct only and should be sent to Dr. G. O'Toole, KB6ISL, 9605 San Gabriel Ave., So. Gate, CA 90280-4725 with No. 10 SASE for confirmation.

•The following hamfests, etc., are slated for May:

May 4-6, **Cochise ARA Hamfest,** Sierra Vista, AZ. Contact N7INK 602-378-3155 after 6 PM, or write to CARA, P.O. Box 1855, Sierra Vista, AZ 85636.

May 5, **Paul Bunyan ARC Hamfest,** VFW Club, Bemidji, MN. Contact Carol Johnson, KA@AJD, 1503 Jefferson Ave. SW, Bemidji, MN 56601 (218-751-7920). (Exams)

May 5, **PEARLFEST '90,** John F. Kennedy Elementary School, Brewster, NY. Contact Terri Cullum, N2GWF, 40 Mile High Road, Highland, NY 12528. (Exams)

May 5, **Arrowhead ARC Swapfest '90,** First United Methodist Church, Duluth, MN. Contact Duane Flynn, KB@LC, 4907 Peabody St., Duluth, MN 55801 (218-525-4580). (Exams at the Government Services Building. For preregistration or info contact John Crow, KA@SYN, 218-879-5356.)

May 5, **Southern Tier Hamfest,** Marvin Park Fairgrounds, Owego, NY. Contact STARC, P.O. Box 7082, Endicott, NY 13760. (Exams)

May 5, **Cedarburg Swapfest,** Circle B Recreation Center, Cedarburg, WI. Contact ORC Swap, N5415 Crystal Springs Ct., Fredonia, WI 53021 (SASE), or call 414-692-2329. (Exams)

May 5, **Jackson County ARC Hamfest,** Ripley Middle School, Ripley, WV. Contact Bob DeHart, KF8AR, RFD #3, Box 229, Ripley, WV 25271.

May 5-6, **Greenville Hamfest and Electronic Fleamarket,** American Legion Fairgrounds, Greenville, SC. Contact Blue Ridge ARS, P.O. Box 6751, Greenville, SC 29606 (SASE).

May 6, **Kishwaukee ARC Swapfest,** Sandwich Fairgrounds, Sandwich, IL. Contact Howard Newquist, WA9TXW, Kishwaukee ARC, P.O. Box 264, Sycamore, IL 60178.

May 6, **NOBARC Mayflea,** Dalton American Legion, Dalton, MA. Call 413-458-8452.

May 11-12, **Hamboree 12/Iowa State Convention,** Marin Inn, So. Sioux City, NE. Contact Al Smith, W@PEX, 3529 Doglas St., Sioux City, IA 51104 (712-258-7475). (Exams)

May 12, **Mancorad RC Hamfest,** Manitowoc County Expo Center, Manitowoc, WI. Contact Mancorad RC, P.O. Box 204, manitowoc, WI 54221-0204, or call "Red" 414-684-9097 (days), Lou 414-682-2557 (evenings). (Exams)

May 12, **Tri-County ARC Hamfest,** Jefferson County Fairgrounds, Jefferson, WI. Contact TCARC, P.O. Box 112, Jefferson, WI 53549 (SASE). (Exams)

May 12, **Clinton ARC Hamfest '90,** Iowa National Guard Armory, Clinton, IA. Contact Darryl Petersen, KD@PY, RR #1, Box 84, Bryant, IA 52727 (319-682-7359).

May 12, **Columbia Hamfest '90,** Columbia, MO. Contact Ben Smith, K@PCK, 3301 Sinclair, Rt. 3 Box 196A, Columbia, MO 65203 (314-443-5168).

May 13, **Athens County ARA Hamfest,** City Recreation Center, Athens, OH. Contact Carl J. Denbow, KA8JXG, 63 Morris Ave., Athens, OH 45701.

May 13, **Carroll County Computer Fest & Hamboree,** Carroll County Agricultural Center, Westminster, MD. Contact Al Parker, KS3L, c/o Summit ARA, P.O. Box 341, Randallstown, MD 21133, or call 301-747-2076.

May 18-20, **1990 Green Country Hamfest,** Expo Square Pavillion, Tulsa, OK. Call 918-272-3081. (Exams, contact KA5VIL, Georgia, 5332 S. Irvington Ave., Tulsa, OK 74135. Preregistration required for Saturday test.)

May 18-20, **16th Annual VHF/UHF/SHF Conference,** Rivier College, Nashua, NH. Contact David Knight, KA1DT, 15 Oakdale Ave., Nashua, NH 03062 for registration forms.

May 19, **Hamfest 90,** Community Building, Rodeo Grounds, Springdale, AR. Contact Mike Lorenz, N8FJJ, Rt. 2, Box 160A, Prairie Grove, AR 72753 (501-846-2516 evenings).

May 19, **Wexaukee ARA Swap & Shop,** Cadillac Middle School, Cadillac, MI. Contact John Craddock, KX8Z, 616-797-5491, or write to Wexaukee ARA, P.O. Box 163, Cadillac, MI 49601.

May 19, **Lancaster County Hamfest,** Ephrata Senior High School, Ephrata, PA. Contact Tom Youngberg, K3RZF, 215-267-2514 after 6 PM, or write to EARS, 906 Clearview Ave., Ephrata, PA 17522. (Exams, and handicap accessible)

May 19, **Pikes Peak RAA Swapfest,** Rustic Hills Mall, Colorado Springs, CO. Contact Rick, WB7THT, 719-599-7665, or write to P.O. Box 16521, Colorado Springs, CO 80935. (Wheelchair accessible)

May 19, **RI Amateur FM Repeater Service Spring Fleamarket & Auction,** VFW Post 6342, Forestdale, RI. Contact Rick Fairweather, K1KYI, Box 591, Harrisville, RI 02830, or call 401-568-0566 from 7-8 PM.

May 19-20, **Yakima ARC Hamfest,** Queen Gym, Yakima, WA. Contact Yakima ARC, W7AQ, P.O. Box 9211, Yakima, WA 98909, or call Mary Wildman, KB7AMF, 509-248-5007. (Exams)

May 20, **KARS Hamfest,** Will County Fairgrounds, Peotone, IL. Contact Kankakee Area Radio Society, Rt. #1 Box 361, Chebanse, IL 60922, or call Frank, KA9PWW, 815-932-6703 after 7 PM.

May 20, **Warminster ARC Hamfest,** Middletown Grange Fairgrounds, Wrightstown, PA. Contact Bill Cusick, W3GJC, Garner House, Apt. 804, Hatboro, PA 19040 (215-441-8048).

May 20, **Bergen ARA Hamfest,** Bergen Community College, Paramus, NJ. Contact Jim Joyce, K2ZO, 286 Ridgewood Blvd., Westwood, NJ 07675 (201-664-6725). (Exams, contact Pete Adely, K2MHP, 201-796-6622)

May 20, **LIMARC Hamfest,** NY Institute of Technology, Old Westbury, Long Island, NY. Contact Neil Hartman, WE2V, 516-462-5549, or Mark Nadel, NK2T, 516-796-2366.

May 20, **TSRAC Wheeling Hamfest/Computer Fair,** Wheeling Park, WV. Contact TSRAC, Box 240, RD 1, Adena, OH 43901 (614-546-3930).

May 26, **DUR-HAM-FEST,** South Square Mall, Durham, NC. Contact Sid Edwards, W4QWM, 1700 High St., Durham, NC 27712. (Exams, contact Pete Goolsby, KY4Y, 120 Radcliff Circle, Durham, NC 27713)

May 27, **Maryland FM Assn. Memorial Day Hamfest,** Howard County Fairgrounds, West Friendship, MD. Contact Melvin Seyle, WA3KZR, 15809 Pointer Ridge Drive, Bowie, MD 20716 (301-249-6147). (Exams, reservations by SASE only to Steve Silberman, K3RMX, P.O. Box 592, Finksburg, MD 21048.)

May 27, **Quebec Provincial Hamfest,** Tracy Curling Club. Contact Sorel-Tracy ARC, P.O. Box 533, Sorel, QC, J3P 5N6 Canada.

May 27, **Chicago ARC Hamfest & Auction,** De Vry Institute of Technology, Chicago, IL. Call 312-45-3622. (Exams)

June 2, **1990 Knoxville Hamfest,** Knoxville Convention Center, World's Fair Park, Knoxville, TN. Contact Frank Ambrister, N4OQJ, P.O. Box 9605, Knoxville, TN 37940 (615-933-2539). (Exams, contact Ray Adams, N4BAQ, 615-687-5410)

June 3, **Hall of Science Hamfest,** NY Hall of Science parking lot, Flushing Meadow Park, Queens, NY. Contact Steve Greenbaum, WB2KDG, 718-898-5599 (evenings), or Phil Kubert, N2HYE, 212-777-8648. (VE exams)

June 3, **Chelsea Swap & Shop,** Chelsea Fairgrounds, Chesea, MI. Contact Robert Schantz, 313-475-1795.

June 3, **Starved Rock Radio Club Hamfest,** Bureau County Fairgrounds, Princeton, IL. Contact Pete Jacobsen, AA9R, 19 Briarcliff Drive, Spring Valley, IL 61362-1001 (815-664-5580).

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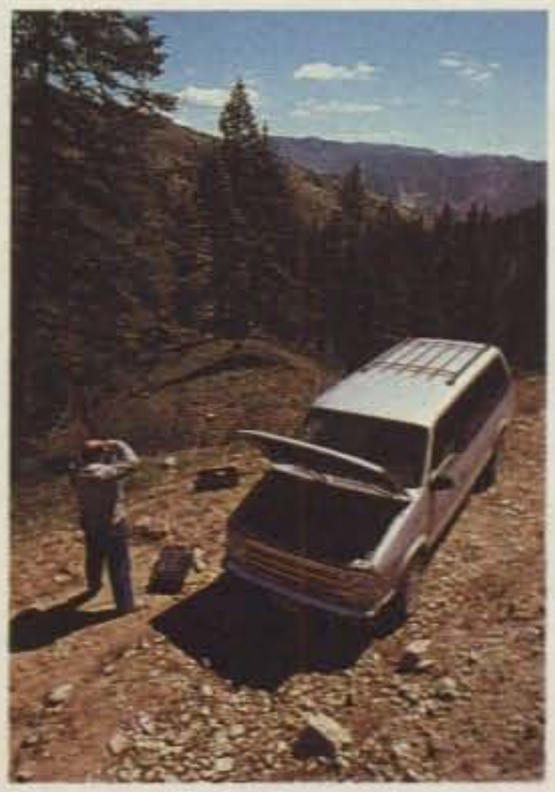

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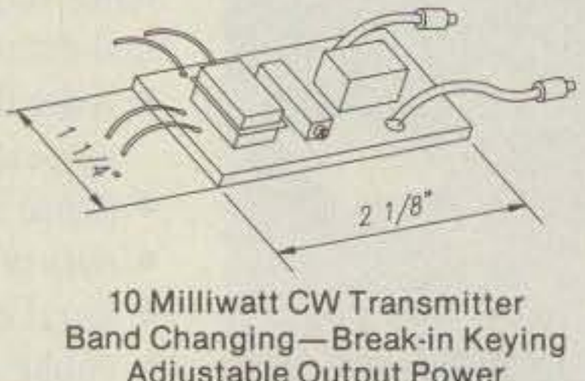

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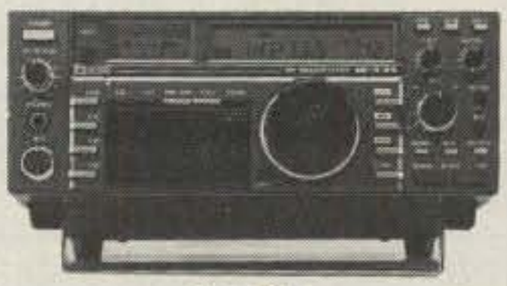

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WANTED: Ham equipment and other property. The Radio Club of Junior High School 22, NYC, Inc. is a nonprofit organization granted 501(C)(3) status by the IRS, incorporated with the goal of using the theme of Ham Radio to further and enhance the education of young people nationwide. Your property donation or financial support would be greatly appreciated and acknowledged with a receipt for your tax deductible contribution. Meet WB2JKJ and the "22 Crew" at the Knoxville, Tennessee Hamfest on June 2. Joe Fairclough will be the featured speaker telling the incredible story of the first 10 years of Education Thru Communications at the core of the Big Apple. Write to us at: P.O. Box 1052, New York, NY 10002. Round-the-clock hotline: (516) 674-4072.

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RADIO SHACK COLOR COMPUTER Ham Software and Hardware. Free Catalog. Dynamic Electronics, Box 896, Hartselle, AL 35640 (205-773-2758).

MACINTOSH SOFTWARE: Send for info on exciting ham radio programs. ZCo Corporation, P.O. Box 3720, Nashua, NH 03061, (603) 888-7200 Fax (603) 888-8452.

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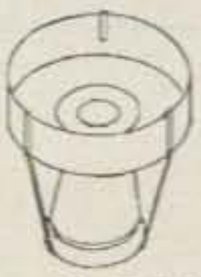

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(Continued on page 131)

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TRANSMIT THE ULTIMATE SIGNAL

- Digital Signal Processing
- Dual Frequency Receive
- Digital AF Filter • 100 Memories

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FT-1000

THE BEST OF THE BEST

- 200 Watts Output
- All Amateur Bands
- Dual Receive
- DDS-Direct Digital Synthesis

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SALE PRICED

IC-735

PROVEN HF WINNER

- Compact and lightweight
- 100 Watts Output
- Noise Blanker
- General Coverage Receiver

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NEW!

DR-570T

VHF/UHF TWIN BANDER

- 45W on 2M/35W on 70cm
- Receive on both Bands at Same Time
- Extended Receiver Range
- More Features for the Money Than Anyone Else

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TS-140S AFFORDABLE DX-ing!

- HF Transceiver With General Coverage Receiver
- All HF Amateur Bands
- 100 W Output
- Compact, Lots of Features

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FT-736R VHF-UHF BASE STATION

- SSB, CW, FM on 2 Meters and 70 cm
- Optional 50 MHz, 220 MHz or 1.2 GHz
- 25 Watts Output on 2 Meters, 220 and 70 cm
- 10 Watts Output on 6 Meters and 1.2 GHz • 100 Memories

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IC-725

NEW ULTRA-COMPACT HF TRANSCEIVER

SALE PRICED

- USB/LSB/CW, AM Receive Optional Module for AM Transmit and FM TX/RX
- 160-10M Operation • 100 W Output
- Receive 30 kHz to 33 MHz
- 26 Memories with Band Stacking Registers

AMERITRON

AL-80A AMPLIFIER

- Full Kilowatt Output
- 160-15 Meters
- 3-500 Z Tube for Maximum Life
- Precise and Easy Tuning
- Step-Start Inrush Protection™

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TH-225A

HIGHER POWER 2 METER H.T

- Now 5 Watts Output
- Odd Off Sets
- Wideband Frequency Coverage
- Same Accessories as TH-215

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NEW!

FT-470

COMPACT DUAL BAND FM HANDHELD (2M/70CM)

21 Memories for Each Band
Dual VFO's for Each Band
Up to 5 Watts Power
Built-in CTCSS
Built-in 10-Memory DTMF Autodialer

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IC-2SA

COMPACT, 2M HANDHELD

- 5 Watts Output
- 48 Memories
- Multiple Scan Functions
- Auto Power Off

NEW!

SPECIAL LOW PRICE $299.95

ASTRON

• RS7A	$49	• RS35M	$159
• RS12A	$70	• VS35M	$174
• RS20A	$89	• RS50A	$199
• RS20M	$109	• RS 50M	$219
• VS20M	$124	• RM50M	$259
• RS35A	$139	• VS50M	$232

KENWOOD

TH-26AT

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- 5 W Capability
- Automatic Repeater Offset

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WORK 10 METER DX WITH A HANDHELD

- SSB and CW
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SUPER SALE PRICE **$199**

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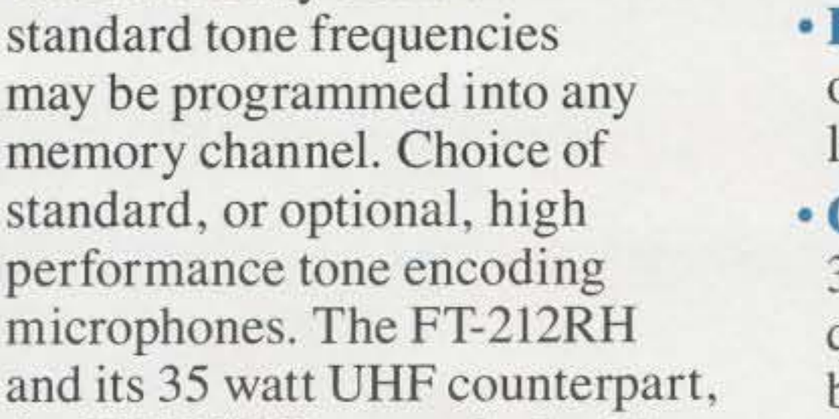
Power . . . and More!

FT-212RH

Frequency Synthesized VHF/UHF FM Transceiver

The compact, versatile FT-212RH is a 45 watt, 2 meter mobile that boasts a lot more than just high power. Inside its sturdy compact frame hides an impressive array of performance features plus high reliability...like 18 general purpose memories; one-touch call channel memory; two scanning range memories; CTCSS on any of the 37 standard tone frequencies may be programmed into any memory channel. Choice of standard, or optional, high performance tone encoding microphones. The FT-212RH and its 35 watt UHF counterpart, the FT-712RH are packed with state-of-the-art refinements... power and more!

- **Frequency Range:** 140-174 MHz on receive (144-148 MHz TX—Modifiable for MARS and CAP). Specifications guaranteed on amateur bands only.
- **Power Output:** 45 watts output with selectable 5 watt low power.
- **CTCSS:** Access any of the 37 standard CTCSS tone frequencies, plus 97.4 Hz can be displayed, selected and programmed into any memory for transmission.
- **19 Memories:** Each memory stores either programmable repeater shift or independent TX and RX frequencies.
- **Automatic Repeater Shift (ARS):** Enables selection of repeater transmitter offset automatically when tuned to a standard repeater subband.
- **Programmable Scanning:** Scans band, band segment or memories. Scan auto-resume with carrier drop or after 5-second pause.
- **Tuning Steps:** Operator selectable steps in 5, 10, 12.5, 20 and 25 KHz increments.
- **CAT System Control:** Provides for external control of VFO frequency, mode and memory functions from operator's personal computer.
- **Amber Backlit LCD Display:** Automatically controls the brightness of the display backlighting and pilot lamps.
- **Tone Encoding Microphone:** Choice of standard, or optional high performance DTMF tone encoding microphones.
- **Digital Voice System (DVS-1):** Optional sytem which allows local and remote digital voice recording and playback.



FT-4700RH

Dual Band VHF/UHF Trunk Mountable FM Transceiver

- **Frequency Range:** 140-174 MHz on 2m (modifiable for MARS and CAP); 430-450 MHz on 70cm. • **Power Output:** 50 watts on 2m; 40 watts on 70cm. Selectable 5 watts low power on both bands. • **Full Duplex Cross Band Operation:** • **Dual Receive:** • **CTCSS Encode/Decode:** • **Remote Control Kit Included:** • **Amber Backlit LCD Display** and controls with dimmer switch. • **20 Memories:** • **Dual Antenna Ports:** • **Programmable Scanning:** • **MH-15C8** Mic standard: **MH-15D8** Mic optional.

For information on these and Yaesu's full line of products, call our literature desk toll-free at **1 (800) 999-2070.**

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Performance without compromise.

ONLY ICOM COULD BUILD THIS MANY FEATURES INTO SUCH A TINY RADIO

ICOM'S AMAZING NEW MINI FM HANDHELDS

ICOM's new **"S Series"** mini handhelds deliver top performance on the 144, 220 and 440MHz bands with super easy operation and a kaleidoscope of features. Built to fit your needs today, tomorrow, anywhere and anytime.

Wide Frequency Coverage. Plenty of overlap for scanning, monitoring, CAP and MARS use. IC-2SA/IC-2SAT: 138-174 MHz Rx. IC-3SAT: 220-225MHz Rx. IC-4SAT: 440-450 MHz Rx. All units transmit all U.S. Amateur bands.

Flexible Size And Power. The IC-2SA packs 2.5 watts with supplied BP-82. The IC-2SAT, 3SAT and 4SAT's internal battery packs 2 watts of output on high power. All models deliver five watts when powered via optional BP-85 battery pack or via top-mounted 13.8 volt socket. A small rig with a big punch!

48 Memories. Store your present frequencies and expand your future interests. Offset frequencies are independently programmed in memory channels 0-9. Memories 10-47 use offset frequency contents of the VFO. Also includes soft-sector memory masking. Use only the number of memories you need!

Band and Memory Scanning with programmable limits, memory skip function, plus selectable pause times while scanning. Additional features include:

Automatic Power Shut-off. Built-in programmable timer automatically switches off transceiver when you forget. **Optional DTMF Paging Function.** Silently monitors any selected frequency for your preprogrammed 3-digit DTMF-keyed calls, then beeps and displays calling station's code.

All ICOM's **"S Series"** handhelds are supported by an extensive line of optional battery packs, chargers, cases, speaker/mics and other accessories. See the exciting new ICOM mini-series handhelds at your authorized ICOM dealer today!

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24 Hour Clock With Timer

48 Memories

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